MAIN CATALOG 2022

Motor protection and control

Manual motor starters, contactors and overload relays

Motor protection and control

Manual motor starters, contactors and overload relays

OVERVIEW

MANUAL MOTOR STARTERS AND CIRCUIT BREAKERS FOR TRANSFORMER PROTECTION

AF, EK CONTACTORS AND NF CONTACTOR RELAYS

B, M MINI CONTACTORS, K, M MINI CONTACTOR RELAYS

AS CONTACTORS AND NS CONTACTOR RELAYS

OVERLOAD RELAYS

THERMISTOR PROTECTION RELAYS

TEMPERATURE MONITORING RELAYS

SELF RESETTING CURRENT LIMITING MODULE

DRAS AND DRAF ENCLOSED STARTERS

ELECTRONIC COMPACT STARTERS

UNIVERSAL MOTOR CONTROLLER

CUSTOMER MADE MOTOR STARTING SOLUTION

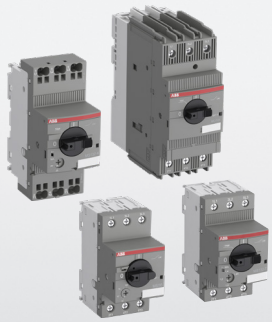
CERTIFICATIONS AND APPROVALS - GENERAL TECHNICAL DATA

INDEX

MARKETING MATERIAL

Protection and control
To keep things running you need control

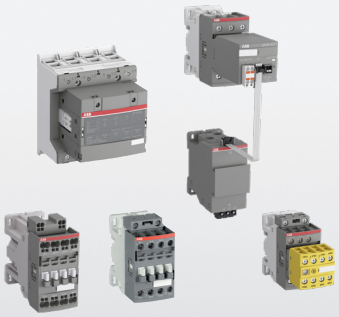
02



Manual motor starters and circuit breakers for transformer protection

- Fuseless motor protection up to 80 A
- Designed to perfectly combine with ABB contactors
- Harmonized accessory range

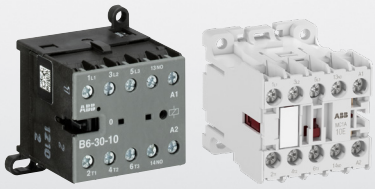
03



Contactors and contactor relays

- 3-pole and 4-pole AC / DC electronic control coil from 9 up to 2850 A AC-1, 500 kW AC-3
- GAF and GF for DC applications
- UA...UA..RA for capacitor switching
- AFS contactors for safety applications
- ABB Novolink devices: towards the digitalization for motor starting solutions

04



Mini contactors and mini contactor relays

- 2 ranges available: B and M mini contactors
- Up to 20 A AC-1 / 5.5 kW AC-3 400 V
- 4 different connecting terminals offered
- Wide accessories assortment

05

Contactors and contactor relays designed for OEM's

- Compact and powerful - up to 7.5 kW AC-3
- Designed for OEM's
- Specially suitable for motor control application

06

Overload relays

- Thermal and electronic type
- Up to 200 A (thermal) and 1250 A (electronic)
- Direct mounting to AF contactors

07

Thermistor protection relays

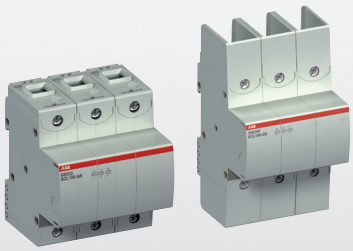
- Monitoring of the winding temperature of motors which have PTC temperature sensors installed
- Evaluation of various motor conditions such as overheating, overload and insufficient cooling
- ATEX approval available for the use in hazardous areas

08

Smart Monitoring Relays

- Smart temperature monitoring relays that can be setup via display or smartphone app
- Measurement of temperatures using different types of sensors, such as PT100, PT1000, PTC or NTC within the same time.
- Monitoring of the winding and bearing temperature of motors.

09



Self resetting current limiting module

- Increases the short-circuit breaking capacity of downstream devices
- Ideal solution for group protection

10

Enclosed starters DRAS and DARF

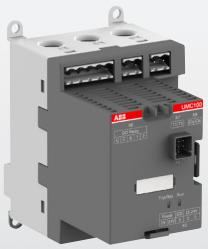
- For machine or wall mounting motor starter
- Up to 7.5 kW
- Robust IP66 and type 4X enclosure

11

Electronic compact starters: HF range

- Forward and reverse running, motor protection, emergency stop
- Space saving up to 90% with only 22.5 mm width
- Up to 75% reduced time in wiring and installation: less error-prone wiring

12



Universal motor controller

- Provision of detailed operational, diagnostic and service data continuously
- Effective data source for modern predictive maintenance systems in any plant
- Seamless integration into ABB Ability™ System 800xA platform

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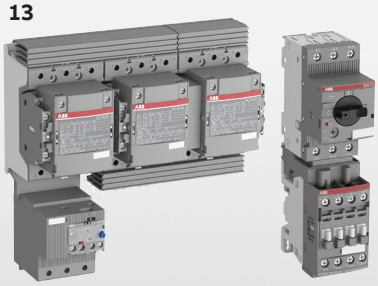

Customer made motor starting solution with AF contactors

- Coordination type 1 and 2 for
  - Direct-on-line starting
  - Reversing starters
  - Start-delta starters
- Full range of connecting kits

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Certifications and approvals general technical data

Protection and control
To keep things running you need control

ABB's protection and control solutions set the standard in sustainable performance, reliability and shape your daily life. ABB certified products and processes make it easier to design and service equipment through easy engineering, optimized logistics, simple installations, energy savings, reduced maintenance and long lasting solutions.

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01

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02

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03

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01 Appliances
—
02 Elevator
—
03 Food & beverage

From small controls to power distribution

For system integrators, OEMs, engineering consultants and distributors to panel builders and industrial end-users, ABB's comprehensive range of motor starting solutions, products and services delivers the certainty of consistent quality and performance.

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04

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05

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06

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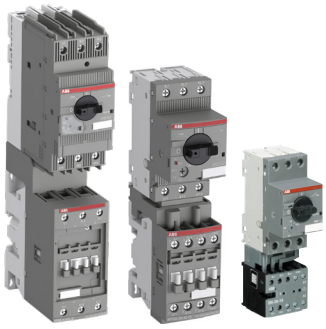
04 EV charging
—
05 Wind power
—
06 Solar power

Control matters, productivity and safety relies on keeping things running. ABB's control and protection solutions ensure performance when it is needed the most.

Manual motor starters
A complete motor protection concept
Up to 80 A

Protect equipment and installations with manual motor starters
Manual motor starters, are mainly used to switch motors ON/OFF manually and to provide fuseless protection against short-circuits, overloads and phase failures. ABB manual motor starters save costs, space and ensure a quick reaction under short-circuit condition by switching the motor off within milliseconds.



Well coordinated and IE3 ready starter combinations
ABB provides coordination tables for the selection of low voltage equipment specifically designed for starting and protecting IE2 and IE3 motors.

ABB's SOC tool (Selected Optimized Coordination) is available at:
https://applications.it.abb.com/SOC/Page/Selection.aspx

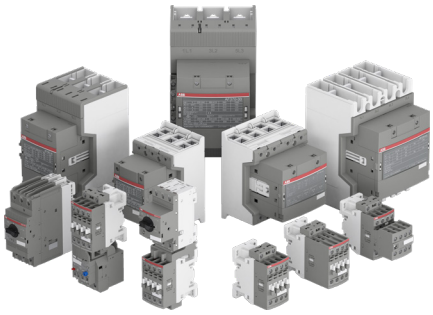
Combines naturally with ABB contactor ranges
ABB manual motor starters match perfectly and are easy to connect with ABB motor control devices, to create type 1 or type 2 motor starting solutions

AF contactors

One range for motor starting and power switching
Up to 2850 A AC-1

Featuring AF technology as standard

ABB range of AF contactors is the industry benchmark. The integrated electronically controlled coil offers multiple benefits over conventional alternatives, and together with ABB's wide product offering an optimal configuration, every time.



Complete global range
AF contactor range features a full assortment of accessories, thermal or electronic overload relays, connecting accessories, is available as standard globally and meets all major international and national standards, and marine applications

3-pole and 4-pole range
AF is available as 3-pole contactors from 9A up to 1060 A AC-3 or up to 2850 A AC-1 and as 4-pole contactors up to 525 A AC-1 all with AC / DC wide operational voltage range coils.

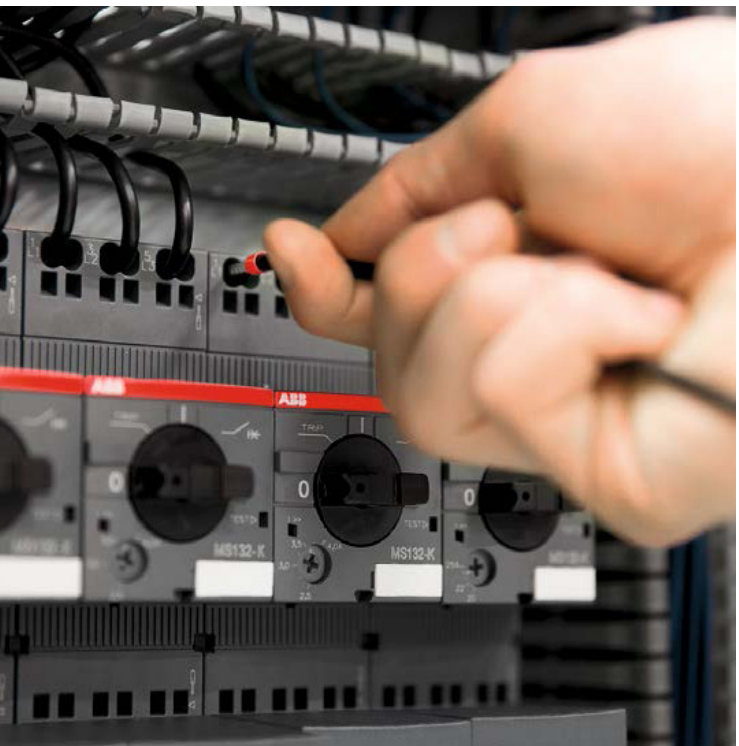
Just push-it

The next generation of spring technology
Up to 38 A

Reliable as ever connections for manual motor starters and for contactors

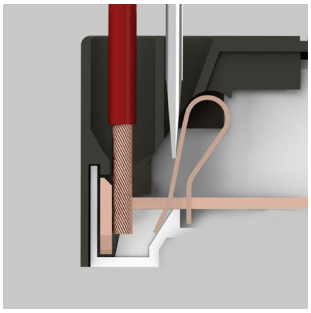
With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions, and the connections are just as reliable. So for speed, ease and reliability, just push it.

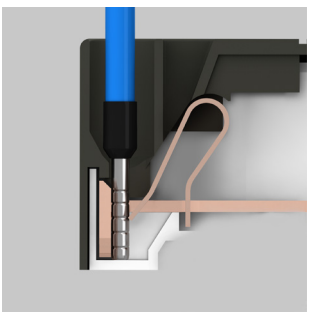
Faster than ever installation, Easier than ever wiring



Push-in mode or spring mode in the same terminal

For the very first time on the market, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.





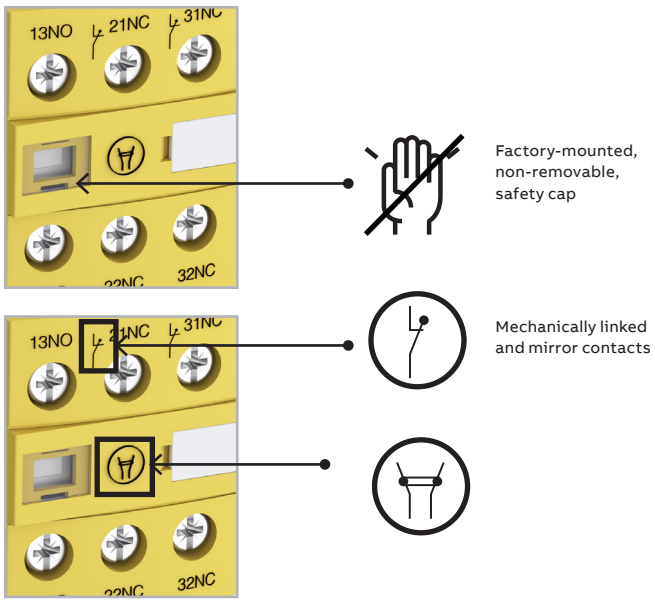
AFS contactors

Because safety matters
Up to 750 A

Contactors dedicated for safety application

Easy to identify with its yellow signature, while enjoying the latest AF technology on board, AFS contactor is the chain link specially dedicated for safety application systems.

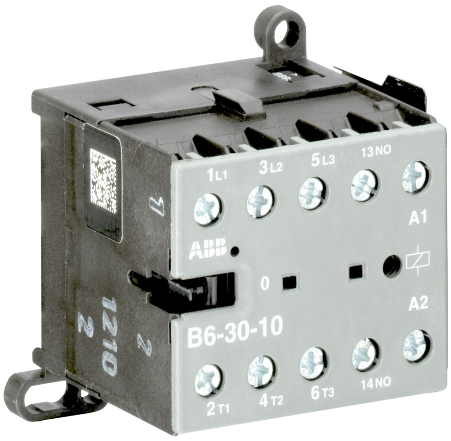
Designed for machine safety applications,
AFS contactors come with fixed front auxiliary contact blocks, making them ideal for monitoring and controlling circuits.

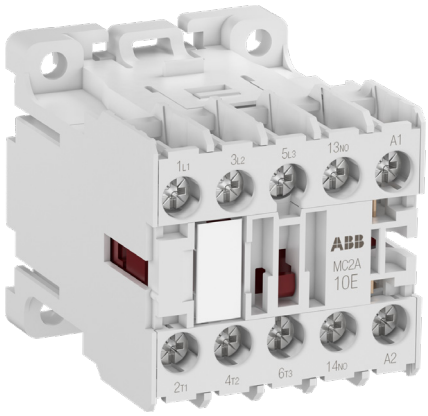


Safety down to the detail
Contactors status is guaranteed with mechanically linked and mirror contacts .
Non removable safety cap prevent unexpected manual operation.

Mini contactors
Efficient and space saving
Up to 5.5 kW AC-3

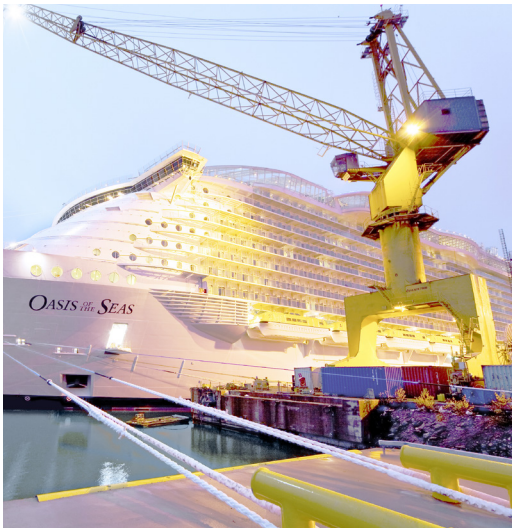
High performances in small dimensions
Mini contactors are the best ally in all the applications where space is a challenge. Thanks to their compact size, wide offer, and accessory assortment, it's always possible to find space-optimized solutions without reducing performances.





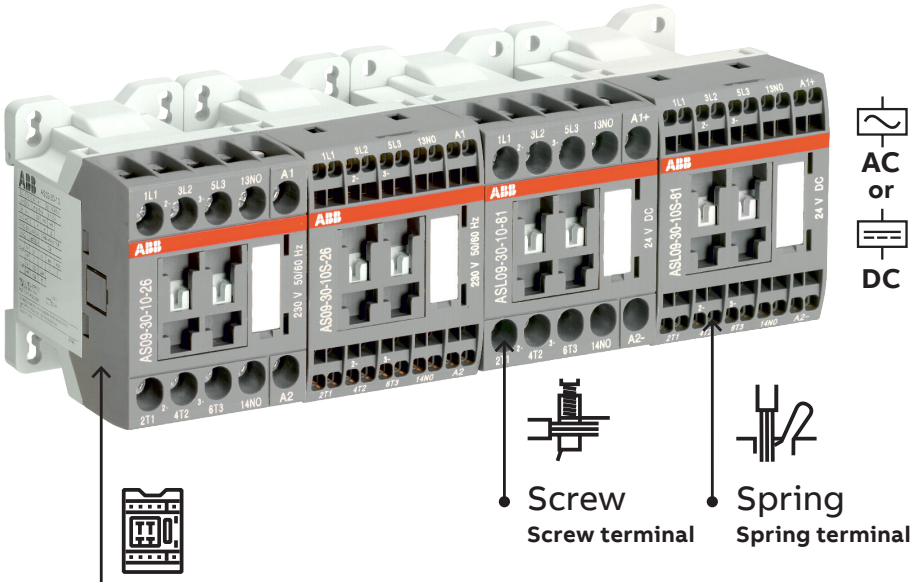
Hides in any place
Mini contactors can be used in any place such as for house or hotel fittings, small house equipment, swimming pools, your workshop or garage door as well as for bakeries or any machine that requires a very small control device.
Both ranges have marine approvals like any other ABB big brother.

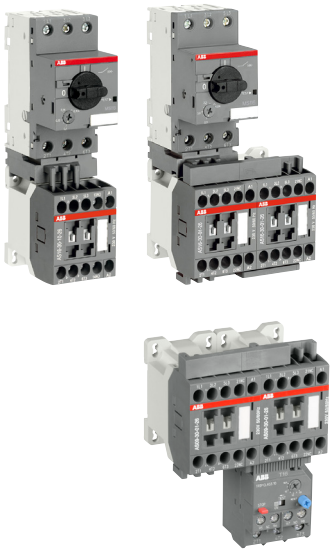
Small in all variants
Mini contactors and mini contactor relays can offer several different connection types and a large number of AC or DC coils, always within small dimensions. Their compact reversing starter has no extra spacing required thanks to the inner mechanical interlock and, in addition, wall or din rail mounting possibilities also contribute making it simple to engineer compact panels.



AS contactors
Compact and powerful
Up to 16 A AC-3

Designed for OEMs
AS solution has been specially designed for OEM applications. It allows to assemble starting solutions in compact size either with AC coil or DC coil and with screw terminals or spring terminals.





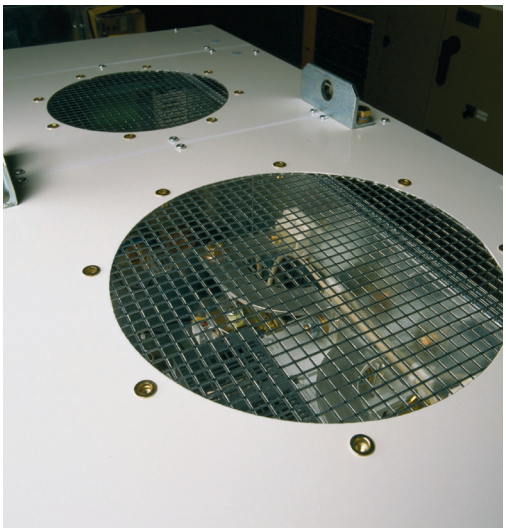
W 45 x H 68 x D 72.5 mm

All in same dimensions

AS contactors feature AC and DC control circuits, screw or spring terminals all in 45 mm width modules with no spacing required even when they are combined with motor protection devices for direct-on-line reversing or star delta starters.

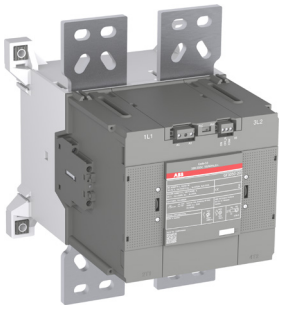
Mainly for motor control

Combined with motor protection devices, AS 3-pole contactors are specially suitable for motor control applications such as ventilation systems, air conditioning, small pumps, escalators, laundries or food and baking equipment

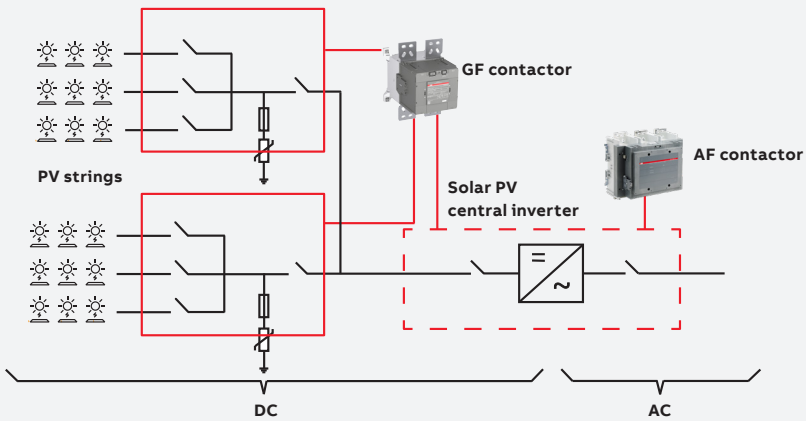


GF and GAF contactors
A compact and efficient way to switch DC loads

Optimal for central inverters
ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution. Thanks to their breaking performance of DC circuits, GF contactors will switch DC-PV3 inverter loads up to 1325 A 1500 V DC and GAF contactors will switch DC loads up to 2050 A 1000 V DC-1.



PV solar plant



UA and UA..RA contactors
For capacitor switching up to 80 kvar

Safely switch your capacitor banks without contacts welding

ABB offers the widest contactor range on the market for the capacitor switching demanding application. UA..RA contactors with damping resistors, are used when inrush peak currents are far exceeding 100 times. UA contactors is a simple solution used when peak currents are less or equal to 100 times nominal rms current.

Power factor correction

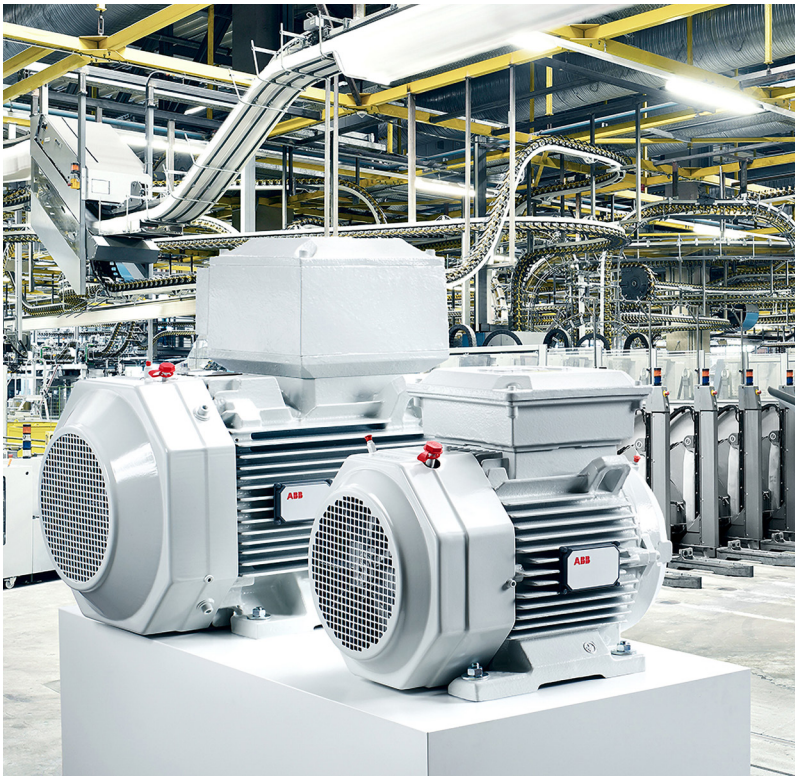
Industrial sites have low power efficiency due to motor winding inductances. Capacitor bank panels are added for power factor correction.
An automatic power factor correction system consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

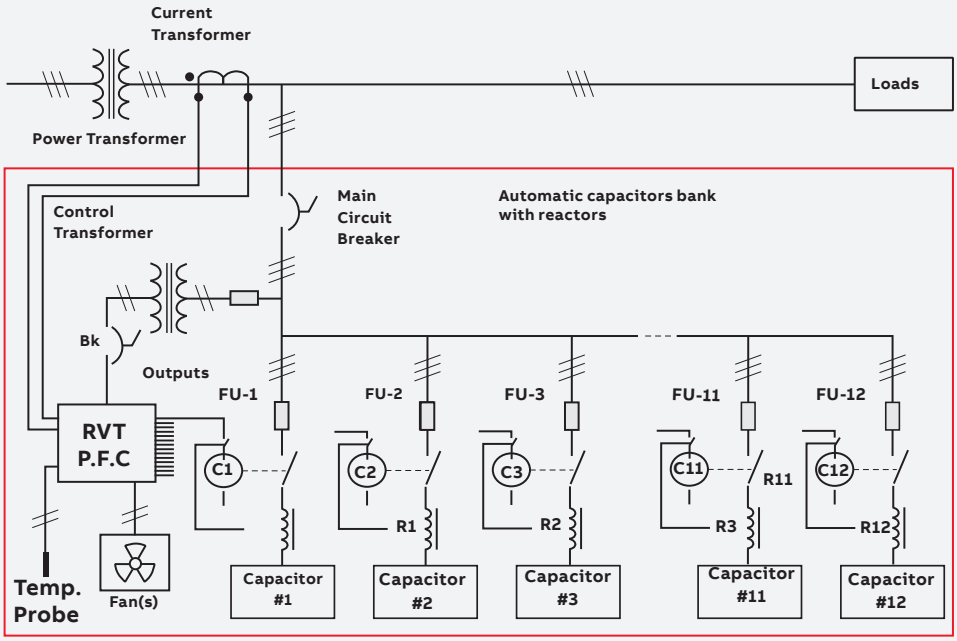
The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.

Switching capacitors banks with standard contactors may cause electrical damages like contact welding, coil burning or even fire on the installation.

ABB provides a choice of contactors dedicated for capacitor switching applications and CAPCAL a selection tool, available on the ABB Website:

https://new.abb.com/low-voltage/products/motor-protection/contactors-for-capacitor-switching

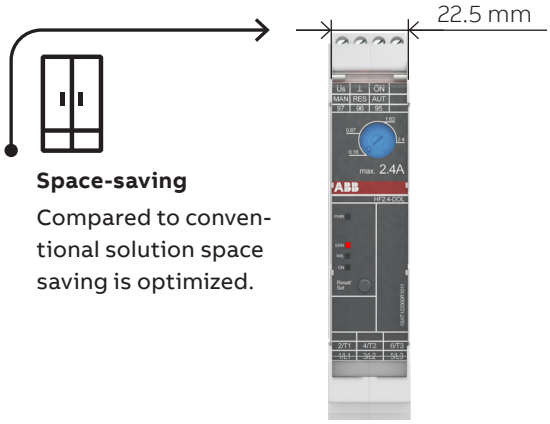




HF range
Great functionality in only 22.5 mm

Electronic compact starters
Direct-on-line, reverse start, overload protection and emergency stop is all integrated in one compact device of only 22.5 mm width. Reliable 30 millions switching cycles for motors up to 3 kW / 400 V AC, reduced wiring time and faults are additional benefits.

Short-circuit protection
Coordinated short circuit protection for single and group mounting with manual motor starters is available.



Space-saving
Compared to conventional solution space saving is optimized.

Safety and ATEX
In combination with Sentry safety relays the HF-Starter reaches SIL3, PL e certification. Feel free to use safety tools like FSDT and Sistema. The libaries are online on ABB.com. Additionally safety variants are ATEX certified.

Control of cooling tanks
The HF range is used to control pumps and compressor for cooling.

Solar tracker
The panels follow the sun and need to be switched frequently in a small cabinet.

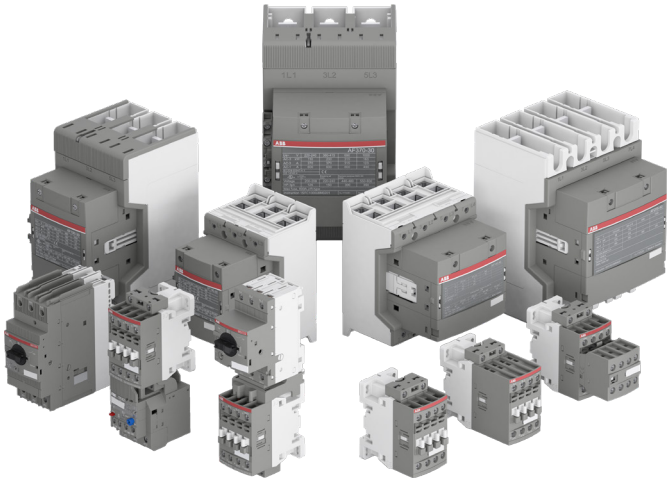
Snow canons
Similiar to the solar tracker the snow canon is switched left and right to ensure equal snow conditions.

Straightening metal
The metal is unrolled directly from the coil. The motor needs to be switched frequently.

Contactors and motor protection for rolling stock
Sustainable mobility for a better world

Specifically designed and manufactured for rolling stock applications (1), our products can be installed in any environment including passenger or driver cabins, for main or urban line trains, underground trains or trams circulating frequently in tunnels or underground passages.

IRIS Certification

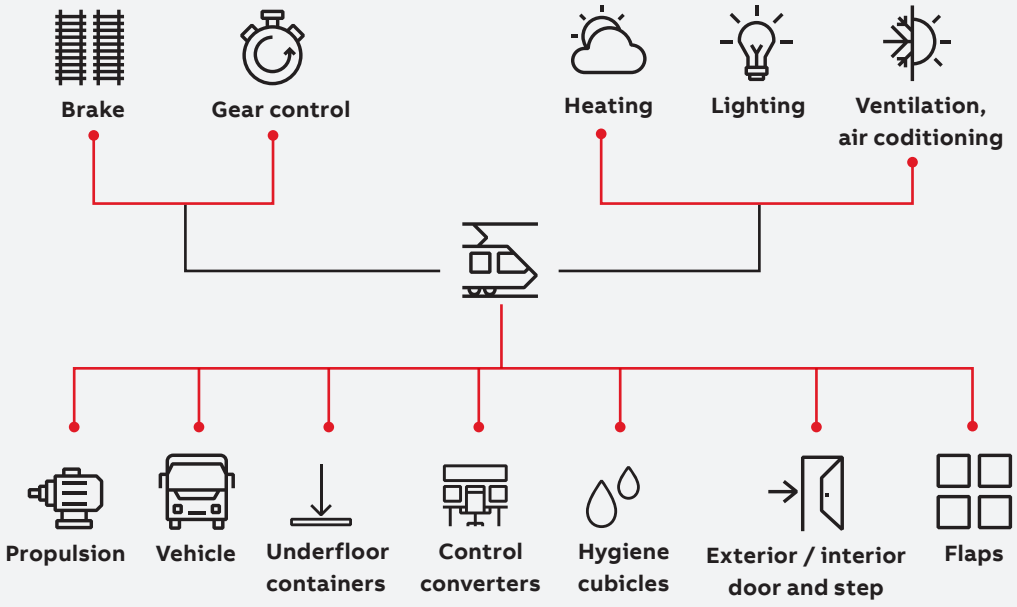


(1) Important notice:
Standard contactors are not suitable for rolling stock applications due to the specific requirements in terms of norms, performance and approvals.
For rolling stock applications, please contact your local ABB sales representative.

With the latest technology in our products for rolling stock you can

- Simplify your installation thanks to compact solution and modular frame size
- Reduce train energy consumption with lighter devices increasing passenger capacity and less coil energy consumption improving power management.
- Optimize your logistics and stocks
- Protect persons and equipment with products specifically designed to meet the latest rolling stock requirements
- Secure uptime thanks to AF technology, handle the large voltage fluctuation to battery use
- Reduce maintenance costs, downtimes and make trouble-shooting easier with real motor protection.

Discover the Contactors and motor protection for rolling stock catalog



How to use this catalog

AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated

AF146-30-00

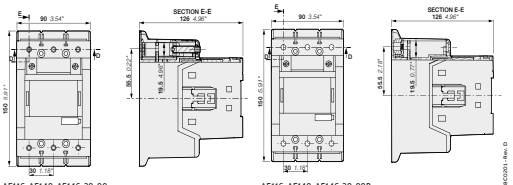
AF146-30-00B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3 kW	current θ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V 50/60 Hz	V DC				Pkg (1 pce) kg
For connection with built-in cable clamps									
55	160	75	160	24...60	20...60	0 0	AF116-30-00-11	1SFL427001R1100	1.750
				48...130	48...130	0 0	AF116-30-00-12	1SFL427001R1200	1.750
				100...250	100...250	0 0	AF116-30-00-13	1SFL427001R1300	1.750
				250...500	250...500	0 0	AF116-30-00-14	1SFL427001R1400	1.750
75	200	100	200	24...60	20...60	0 0	AF140-30-00-11	1SFL447001R1100	1.750
				48...130	48...130	0 0	AF140-30-00-12	1SFL447001R1200	1.750
				100...250	100...250	0 0	AF140-30-00-13	1SFL447001R1300	1.750
				250...500	250...500	0 0	AF140-30-00-14	1SFL447001R1400	1.750
75	225	100	200	24...60	20...60	0 0	AF146-30-00-11	1SFL467001R1100	1.750
				48...130	48...130	0 0	AF146-30-00-12	1SFL467001R1200	1.750
				100...250	100...250	0 0	AF146-30-00-13	1SFL467001R1300	1.750
				250...500	250...500	0 0	AF146-30-00-14	1SFL467001R1400	1.750
With bar connections									
55	160	75	160	24...60	20...60	0 0	AF116-30-00B-11	1SFL427002R1100	1.500
				48...130	48...130	0 0	AF116-30-00B-12	1SFL427002R1200	1.500
				100...250	100...250	0 0	AF116-30-00B-13	1SFL427002R1300	1.500
				250...500	250...500	0 0	AF116-30-00B-14	1SFL427002R1400	1.500
75	200	100	200	24...60	20...60	0 0	AF140-30-00B-11	1SFL447002R1100	1.500
				48...130	48...130	0 0	AF140-30-00B-12	1SFL447002R1200	1.500
				100...250	100...250	0 0	AF140-30-00B-13	1SFL447002R1300	1.500
				250...500	250...500	0 0	AF140-30-00B-14	1SFL447002R1400	1.500
75	225	100	200	24...60	20...60	0 0	AF146-30-00B-11	1SFL467002R1100	1.500
				48...130	48...130	0 0	AF146-30-00B-12	1SFL467002R1200	1.500
				100...250	100...250	0 0	AF146-30-00B-13	1SFL467002R1300	1.500
				250...500	250...500	0 0	AF146-30-00B-14	1SFL467002R1400	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-00 AF116, AF140, AF146-30-00B

Main dimensions mm, inches

Product order code
click on the product order code to obtain the data sheet, the agreement and all technical information regarding that reference.

Product order code
For direct product details information, use product type or order code, ex:
new.abb.com/products/1SBC137001R1310

Web catalog

Print catalog

Find more information on our marketing material page.

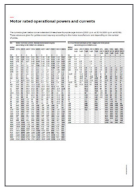


Chart and datas of motor rated operational powers and currents are available in the customer made motor starting solutions chapter.

The products in this catalog can also be found together with product news life cycle status, data sheets, certificates and tools at:
https://new.abb.com/low-voltage/products/motor-protection

Ordering details

Orders can be placed either by using the type code or the order code. The type codes or order codes generally relate to single devices like a contactor, overload relays or an accessory but they can sometimes relate to an indivisible set (ex: connecting kits) or a bag (ex 50 function markers). See the description of the device.

Packaging unit

Products are generally packed as single units but very small products or accessories are often proposed in collective packs. Please refer to the “Package quantity” in the ordering detail charts.

Standards and approvals for the products

Products in this catalogue are designed tested and have third party approvals and markings in compliance with major international or local standards such as EN/IEC 60947-1, EN /IEC947-4-1, EN/IEC 60947-2, EN/IEC 60947-5-1 or UL 60947-4-1. See approvals and certification section.

Standards and approvals for design and manufacturing

ABB has set up a quality assurance organization in compliance with the requirements of ISO 9001 standard and ABB factories are ISO 9001 approved.

Guarantee

The information contained in this catalogue reflects the current state of our knowledge and aims to present our products and their possible applications as defined with the standards. The product data, ratings and utilization conditions are indicated in their respective sections, thus the information does not guarantee special utilizations or combination of characteristics that have not been defined or tested according to normalized values or test conditions defined with the standards.

Liability

The devices in this catalogue do not endanger safety when they are selected, mounted, commissioned used maintained and deposed with the rules and standards that apply to them.

Railway applications for rolling stock are not covered with this catalog

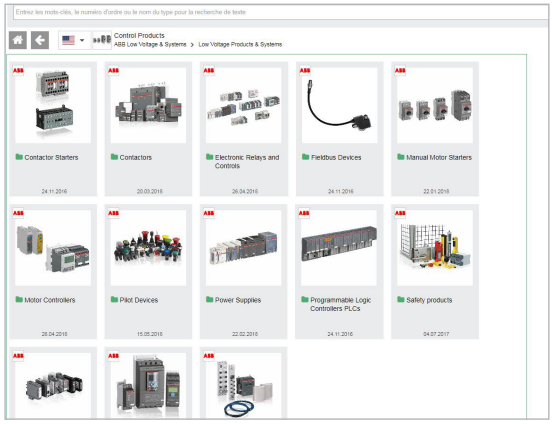
The products in this catalog do generally not meet the special requirements and approvals for rolling stock applications. ABB offers specifically approved products, processes and support for this application.

For rolling stock application see our dedicated portal

https://new.abb.com/low-voltage/products/motor-protection/contactors-and-motor-protection-for-railway-applications

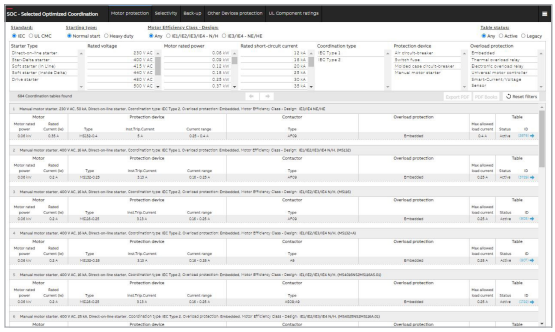
Main online tools

2D and 3D CAD models, ABB CAD Download center



Cadenas portal: Download 2D or 3D files according to your needs (STEP, IGES...)

Selected Optimized Coordination tables - SOC

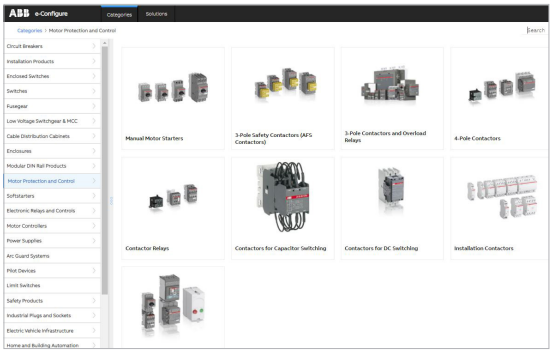


Selected Optimized Coordination tables SOC

Data sheets instructions, manuals and certificates

For direct product details information, use product type or order code, ex:
www.abb.com/productdetails/1SBL137001R1310

Configurators e-Configure



https://econfigure.xe.abb.com/global/#/categories/cfg-solution-Configurators

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Tap and stay connected to all the latest information

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new.abb.com/low-voltage/service/abb-connect

General overview motor protection and control

3-pole contactors

Mini contactors

Contactors

IEC(1)	**AC-3 Rated operational power**	θ ≤ 60 °C (2), 400 V	**kW**	4	5.5	4	5.5	4	5.5	7.5	4	5.5	7.5
UL/CSA	**3-phase motor rating**	480 V	**hp**	3	5	5	7.5	5	7.5	10	5	7.5	10
AC / DC Control supply			Type	—	—	—	—	—	—	—	**AF09**	**AF12**	**AF16**
AC Control supply			Type	**B6**	**B7**	**MC1A**	**MC2A**	**AS09**	**AS12**	**AS16**	**AF09**	**AF12**	**AF16**
DC Control supply			Type	**BC6**	**BC7**	**MC1C, MC1I, MC1K**	**MC2C, MC2I, MC2K**	**ASL09**	**ASL12**	**ASL16**	**AF09**	**AF12**	**AF16**
IEC	AC-3 Rated operational current	θ ≤ 60 °C (2), 400 V	**A**	9	12	9	12	9	12	15.5	9	12	18
	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	**A**	20 (400 V)(3)	20 (400 V)(3)	20	20	22	24	24	25	28	30
UL/CSA	General use rating	600 V	**A**	12 (300 V)(3)	16(3)	20	20	20	20	20	25	28	30
NEMA	NEMA Size			—	—	—	—	00	00	0	00	0	—

(1) 1000 V IEC ratings available for AF80, AF96 and AF146 ... AF2650 contactors.
(2) θ ≤ 55 °C for mini contactors and AF400 ... AF2650 contactors.
(3) Versions equipped with soldering pin terminals: 12 (400 V) IEC AC-1 / 8 (300 V) UL General use for B6 series and 12 (400 V) IEC AC-1 / 12 (600 V) UL General Use for B7 series.

Main accessories

Auxiliary contact blocks	Front mounting	**CAF6**	**CAF6**	**MACN, MARN**	**MACN, MARN**	**CA3-10** (1 x N.O.) **CA3-01** (1 x N.C.)	**CA4-10 (1 x N.O.)** **CA4-01 (1 x N.C.)**
	Side mounting	**CA6**	**CA6**	**MACL, MARL**	**MACL, MARL**		**CAL4-11** **(1 x N.O. + 1 x N.C.)**
Timers	Electronic			**MREBC**	**MREBC**	**TEF3-ON** **TEF3-OFF**	**TEF4-ON** **TEF4-OFF**
Interlocking units(4)	Mechanical			**MMH0**	**MMH0**	**VM3**	**VM4**
	Mechanical / Electrical			—	—		**VEM4**
Connection sets	For reversing contactors	**BSM6-30**	**BSM6-30**	**WKMIU**	**WKMIU**	**BER16C-3**	**BER16-4**
Surge suppressors	Varistor (AC/DC)	**RV-BC6**	**RV-BC6**	**MP0DAE4, MP0DAE5, MP0DAE6**	**MP0DAE4, MP0DAE5, MP0DAE6**	**RV5** (24...440 V)	**Built-in surge protection**
	RC type (AC)			**MP0DAE1, MP0DAE2**	**MP0DAE1, MP0DAE2**	**RC5-1** (24...440 V)	
	Transil diode (DC)	**RD7**	**RD7**	**MP0DAE3**	**MP0DAE3**	**RT5** (12...264 V)	

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

Overload relays

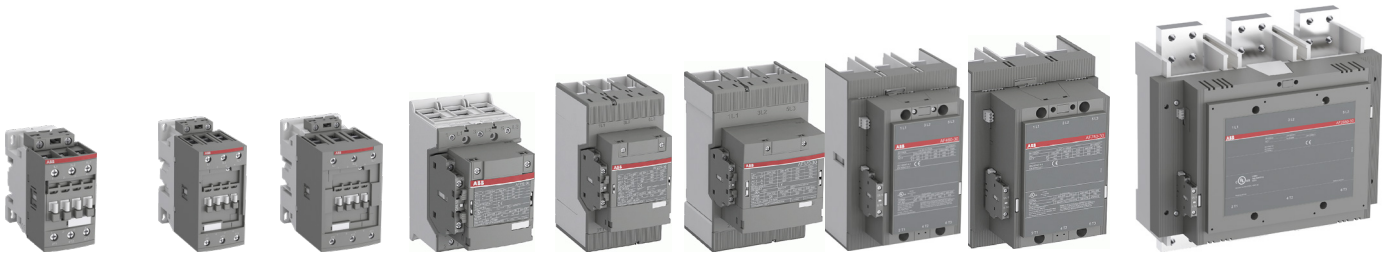
Thermal relays		Class 10 (Class 10A for TF140, TA200DU)	**T16** (0.10...13 A)		**T16** (0.10...13 A)	**T16** (0.10...16 A)	**TF42** (0.10...38 A)
Electronic relays		Class 10E, 20E, 30E	**E16DU** (0.10...18.9 A)		—		**EF19** (0.10...18.9 A)
Accessories (for single mounting)		Thermal relays	**DB16**		**DB16**		**DB42**
		Electronic relays	**DB16E**		—		**DB19EF**

(6) -5 ... +40 °C for TA200-V1000

Manual motor starters

	Thermal / magnetic protection Class 10	**MS116 (0.10...12 A)** Ics up to 50 kA for class 10A	**MS116 (0.10...12 A)** Ics up to 50 kA for class 10A	
		MS132 (0.10...12 A) Ics up to 100 kA	**MS132 (0.10...12 A)** Ics up to 100 kA	
	Magnetic only types	**MO132 (0.16...12A)** Ics up to 100 kA	**MO132 (0.16...12 A)** Ics up to 100 kA	**MO132 (0.16...16 A)**
Accessories	For contactor mounting	**BEA7/132**	**BEMC/132**	**BEMC/132**

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



11	15	18.5	18.5	22	30	37	45/55	55	75	75	90	110	132	160	200	200	250	315	400	—	475	560	—	—	—
15	20	25	30	40	50	60	60/75	75	100	100	125	150	200	250	300	350	400	500	600	—	800	900	—	—	—
AF26		**AF30**	**AF38**		**AF40**	**AF52**	**AF65**	**AF80**	**AF96**	**AF116**	**AF140**	**AF146**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**AF400**	**AF460**	**AF580**	**AF750**	**AF1250**	**AF1350**	**AF1650**	**AF2050**	**AF2650**	**AF2850**
AF26		**AF30**	**AF38**		**AF40**	**AF52**	**AF65**	**AF80**	**AF96**	**AF116**	**AF140**	**AF146**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**AF400**	**AF460**	**AF580**	**AF750**	**AF1250**	**AF1350**	**AF1650**	**AF2050**	**AF2650**	**AF2850**
AF26		**AF30**	**AF38**		**AF40**	**AF52**	**AF65**	**AF80**	**AF96**	**AF116**	**AF140**	**AF146**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**AF400**	**AF460**	**AF580**	**AF750**	**AF1250**	**AF1350**	**AF1650**	**AF2050**	**AF2650**	**AF2850**
26	32	38	40	53	65	80	96/105	116	140	146	190	205	265	305	370	400	460	580	750	—	860	1060	—	—	—
45	50	50	70	100	105	125	130	160	200	225	275	350	400	500	600	600	700	800	1050	1260	1350	1650	2050	2650	2850
45	50	50	60	80	90	105	115	160	200	200	250	300	350	400	520	550	650	750	900	1210	1350	1650	2100	2700	2850
1	—	—	2	—	—	3	—	—	4	—	—	—	5	—	—	—	6	—	7	—	—	8	—	—	—

											CAL19-11 (1 x N.O. + 1 x N.C.)										**CAL18-11** (1 x N.O. + 1 x N.C.)										
			VM96-4								**VM19** (for same size contactors)										**VM750H** **VM750V**								**VM1650H**		
BER38-4			**BER65-4**			**BER96-4**			**BER140-4**			**BER205-4**			**BER370-4**			**BEM460-30**			**BEM750-30**										

			TF65 (22...67 A)			**TF96** (40...96 A)			**TF140DU** (66...142 A) θ ≤ 55 °C			**TA200DU** (66...200 A) (6)θ ≤ 55 °C																				
EF19 (0.10...18.9 A) **EF45** (9...45 A)			**EF65** (20...70 A)			**EF96** (20...100 A)			**EF146** (54...150 A)			**EF205** (63...210 A)			**EF370** (115...380 A)			**EF460** (150...500 A)			**EF750** (250...800 A)			**EF1250DU** (350...1250 A)							
			DB65 (only for TF65)			**DB96**						**DB200**																				
DB45EF						**DB96**																									

MS165 (10...80 A) Ics up to 100 kA
MO165 (16...80 A) Ics up to 100 kA
MO165 (16...80 A) Ics up to 100 kA
BEA65-4(5)

General overview motor protection and control

4-pole contactors

Mini contactors

IEC	**AC-1 Rated operational current**	**≤ 40 °C, 690 V**	**A**	20 (400 V)(1)	20 (400 V)(1)	20	20
UL/CSA	**General use rating**	**600 V**	**A**	12 (300 V)(1)	16(1)	20	20
AC / DC Control supply			**Type**	—	—	—	—
AC Control supply			**Type**	**B6**	**B7**	**MC1A**	**MC2A**
DC Control supply			**Type**	**BC6**	**BC7**	**MC1C, MC1I, MC1K**	**MC2C**

(1) Versions equipped with soldering pin terminals: 12 (400 V) IEC AC-1 / 8 (300 V) UL General use for B6 series and 12 (400 V) IEC AC-1 / 12 (600 V) UL General Use for B7 series

Contactor relays

Mini contactor relays

IEC	**AC-15 Rated operational current**	**400 V**	**A**	**3**			**4**		
UL/CSA	**Pilot duty**			**A600**			**A600, Q600**		
				2 2	3 1	4 0	2 2	3 1	4 0
AC / DC Control supply			**Type**	—	—	—	—	—	—
AC Control supply			**Type**	**K6-22Z**	**K6-31Z**	**K6-40E**	**MCRA022**	**MCRA031**	**MCRA040**
DC Control supply			**Type**	**KC6-22Z**	**KC6-31Z**	**KC6-40E**	**MCRC022, MCRI022, MCRK022**	**MCRC031, MCRI031, MCRK031**	**MCRC040, MCRI040, MCRK040**

Specific contactors

DC Circuit switching

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

875A to 1325A, 1500VDC
DC-PV3/PV4 GF875 to GF1325 types

Contactors

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

Contactor relays

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

Capacitor switching

12.5 to 80 kvar
UA16..RA to UA110..RA types
UA16 to UA110 types

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

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

Manual motor starters & circuit breakers for transformer protection

Manual motor starters

2/3 **Presentation**

2/8 **Overview**

With thermal and electromagnetic protection
Ordering details - 0.10 to 80 A

2/10 MS116 manual motor starters
2/11 MS132 manual motor starters
2/12 MS132-K manual motor starters with Push-in Spring terminals
2/13 MS165 manual motor starters

With electromagnetic protection
Ordering details - 0.16 to 80 A

2/14 MO132 manual motor starters magnetic only
2/15 MO165 manual motor starters magnetic only

2/16 **Technical data**

2/28 **Circuit breakers for transformer protection**

With thermal and electromagnetic protection
Ordering details - 0.10 to 25 A

2/29 MS132-T circuit breakers for transformer protection
2/30 MS132-KT circuit breakers for transformer protection with Push-in Spring terminals

2/31 **Technical data**

2/34 **Accessories**

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 troubleshooting easier.

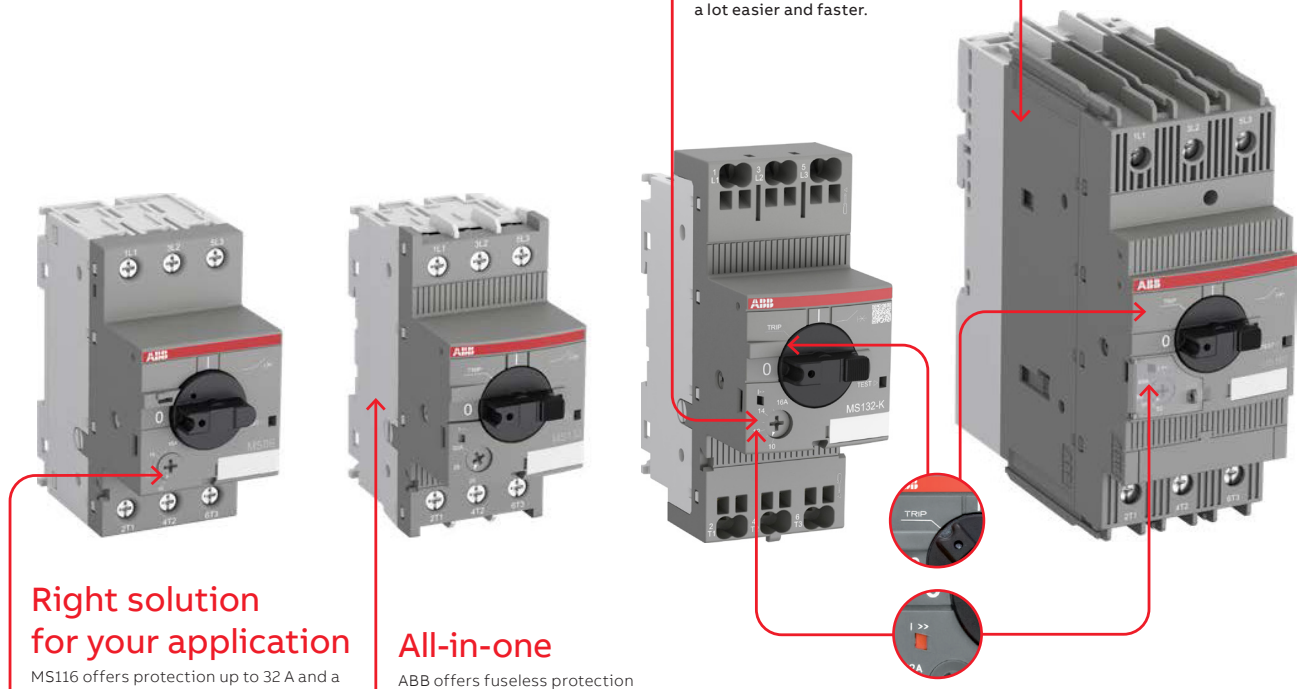
Speed up your projects
Simplified design

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.

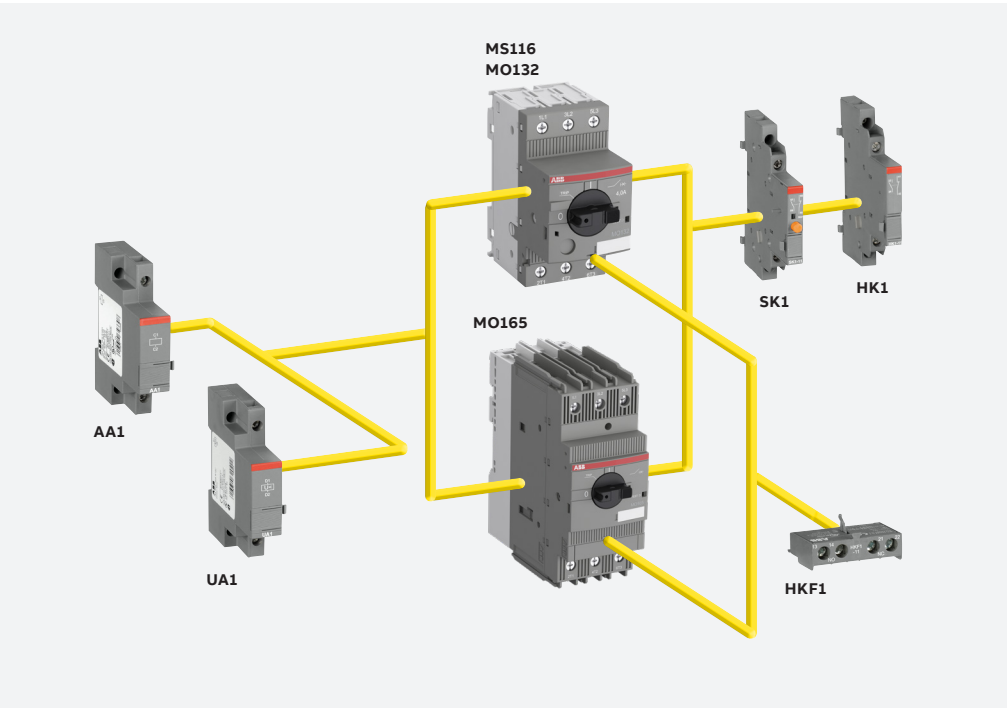
Protection wherever you are
Manual motor starters are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC, EAC and various ship approvals. MS132 and MS165 also apply to ATEX standards for hazardous areas.

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.

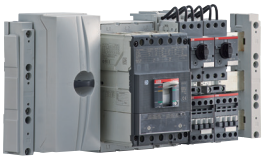
Just push it
With the new Push-in Spring terminals, one push is all you need for a faster than ever installation, an easier than ever wiring and a reliable as ever connection which eliminates routine re-tightening.

Protection and control
The right accessories for your applications

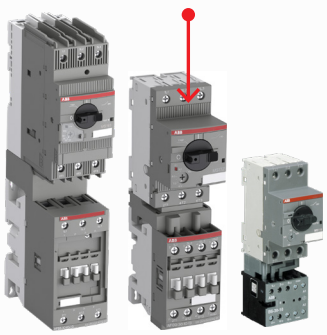


Harmonized range of accessories
All types up to 80 A share the same main accessories like auxiliary contacts, signaling contacts, shunt trips and undervoltage releases. This significantly reduces the part list and makes selection of the right accessories easy.

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.

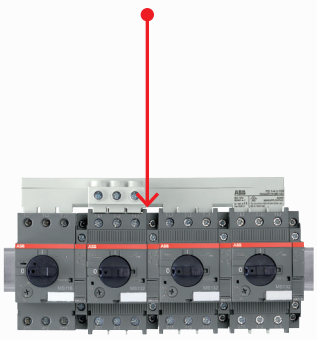


Save wiring time
and avoid mistakes by using a connecting link



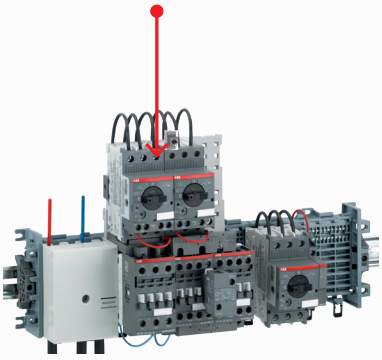
Easy to connect
Save wiring time and avoid mistakes by using a connecting link between ABB manual motor starters and soft starters or contactors. This creates harmonious and compact starter combinations that are easy to mount.

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



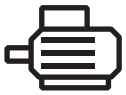
Busbar connectors and enclosures
With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. Enclosures or door handle kits are available as well.

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).

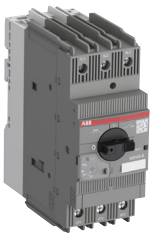
EXTREME CONDITIONS

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
ABB

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

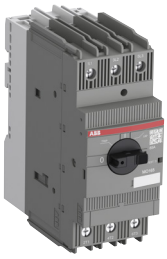
Accessories

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

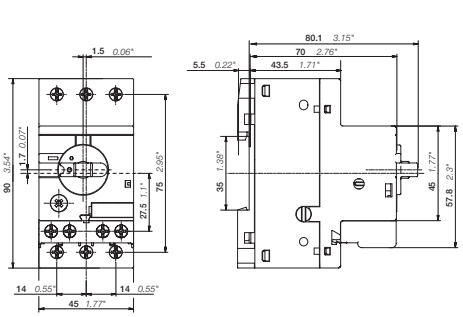
2CDC241020V0017

MS116-32-HKF1-11

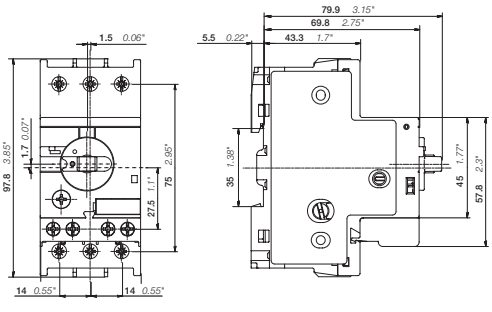
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable 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

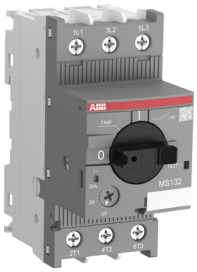
Main dimensions mm, inches

MS132 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection

2CDC241002V0013

MS132-10



2CDC241006V0017

MS132-32

2CDC241021V0017

MS132-0.16-HKF1-11

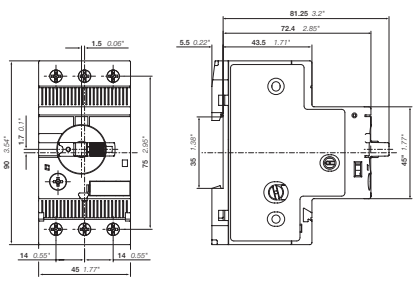
2CDC241022V0017

MS132-32-HKF1-11

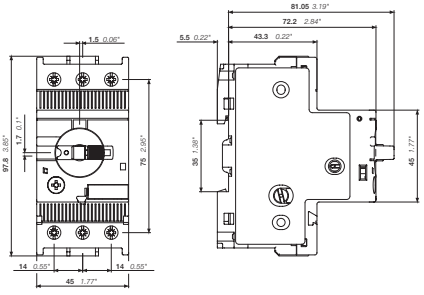
MS132 is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. This type has §a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, 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

MS132-32K

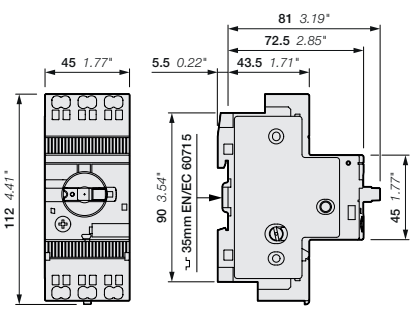
The MS132-K series is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A with a width of only 45 mm. The innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening.

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.

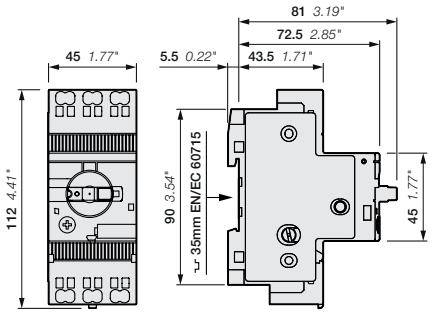
The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the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

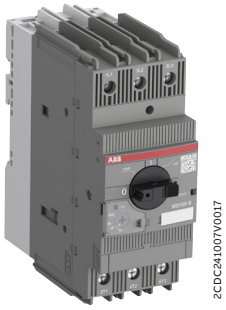


MS132-K ≤ 10 A

Main dimensions mm, inches

MS165 manual motor starters

10 to 80 A – with thermal and electromagnetic protection



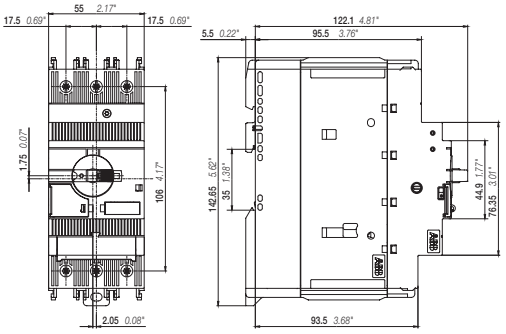
2CDC241007V0017

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

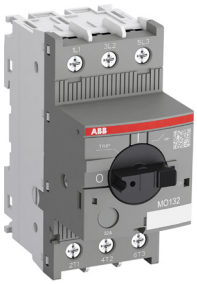
Main dimensions mm, inches

MO132 manual motor starters magnetic only

0.16 to 32 A – with electromagnetic protection

2CDC241018V0017

MO132-6.3



2CDC241015V0017

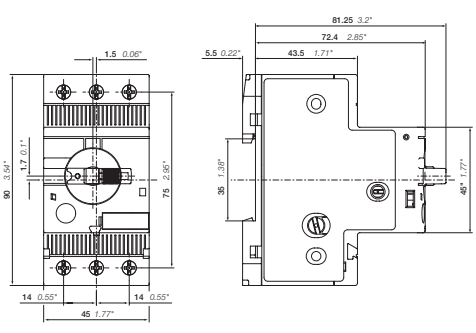
MO132-32

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 li 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

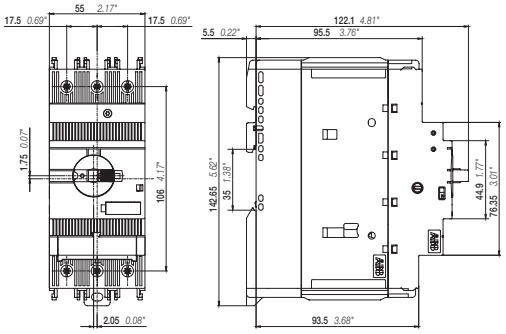
MO165-65

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

02

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 Minimum contactor size	480Y / 277 V kA	600Y / 347 V kA	Coordination type 2 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.

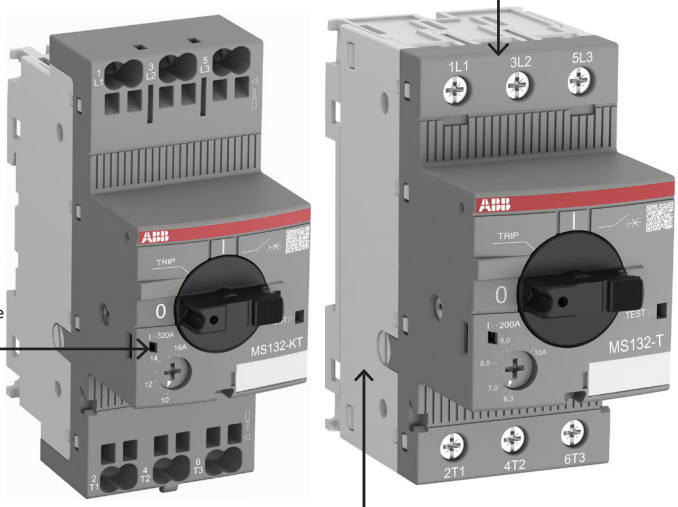
Complete portfolio

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 protec-tion. 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

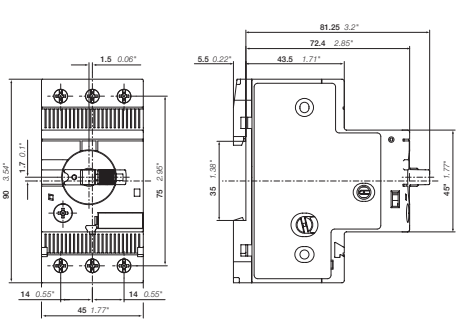
2CDC241002F0014

MS132-25T

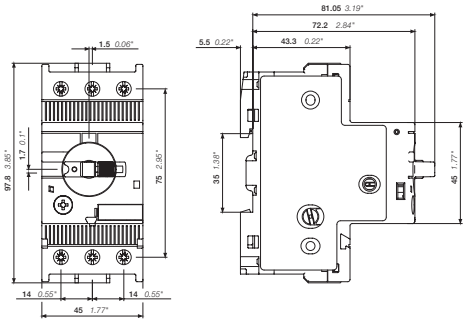
Circuit breakers for transformer protection are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition 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

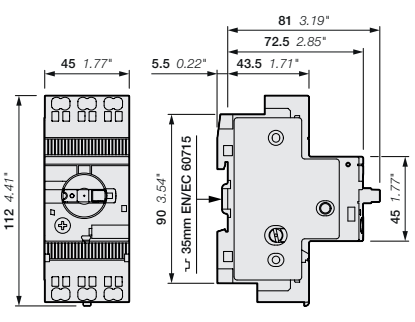
0.10 to 25 A – with thermal and electromagnetic protection

MS132-KT

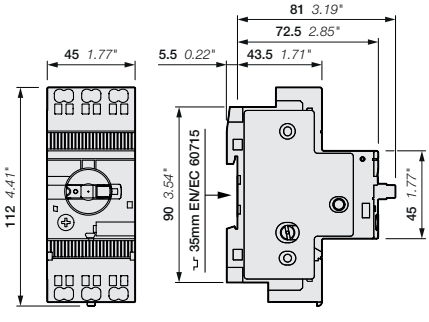
Circuit breakers for transformer protection with Push-in Spring terminals are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction 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

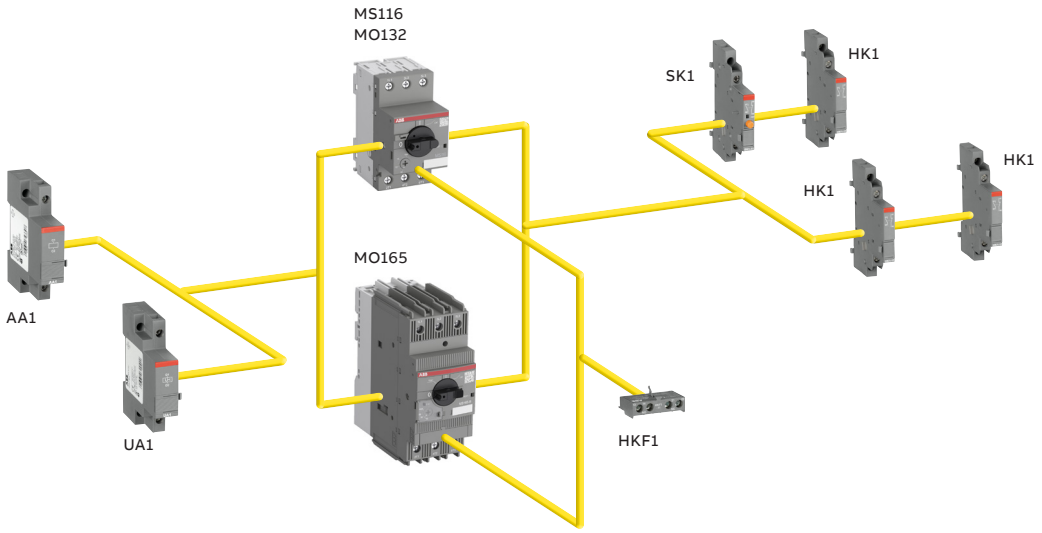
Connecting characteristics - main circuit

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

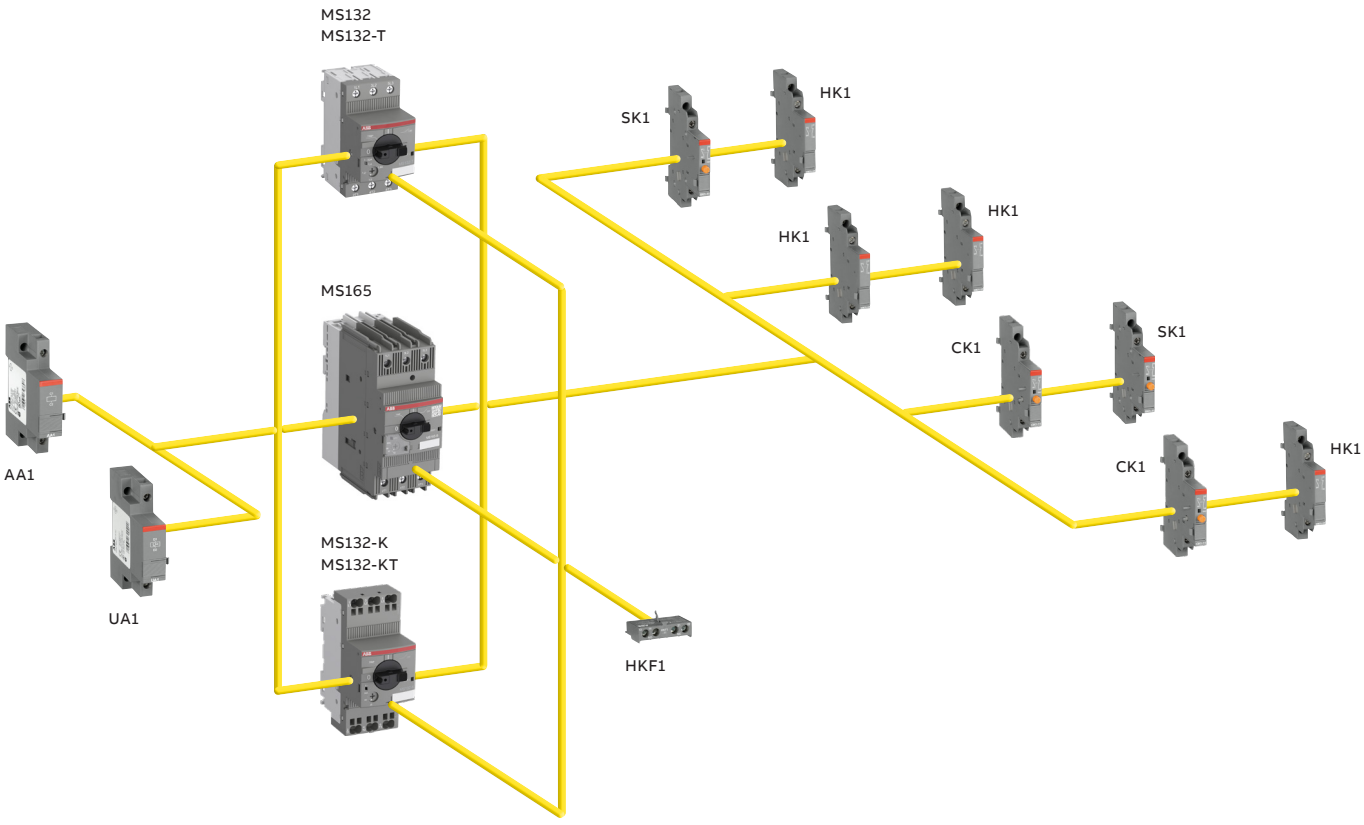
Accessories

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

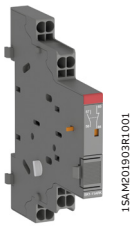
Accessories

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

HKF1-11

HK1-11

SK1-11



SK1-11AR

CK1-11

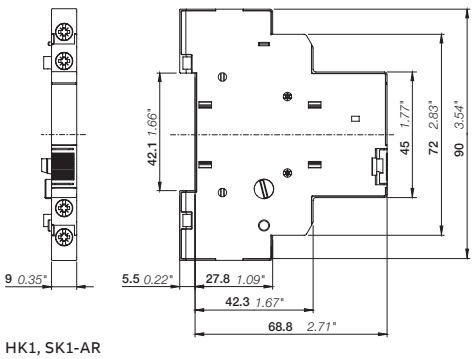
Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting, signaling contacts for lateral mounting, undervoltage releases and shunt trips. Accessories can be fitted wiring free and without tools to the main device. A variety of combinations is possible as required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

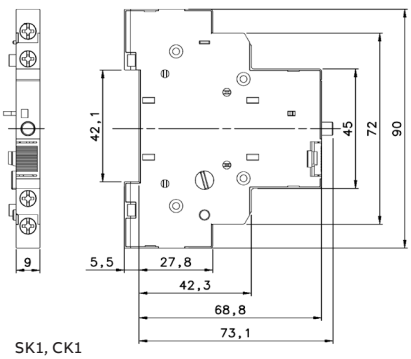
Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Auxiliary contacts – mountable on the front							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1		HKF1-11	1SAM201901R1001	10	0.015
	1	0		HKF1-10	1SAM201901R1003	10	0.013
	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

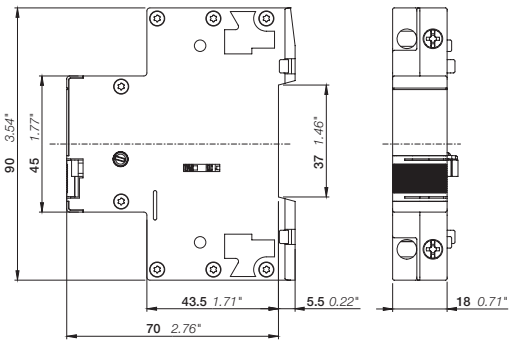
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

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".



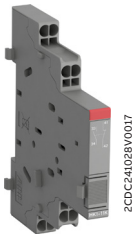
AA1, UA1

Main dimensions mm, inches

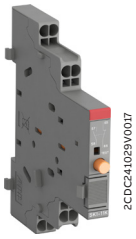
Accessories with Push-in Spring terminals

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

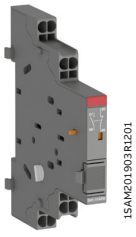
HKF1-11K



HK1-11K



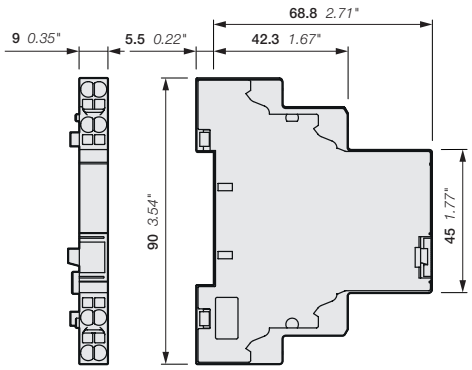
SK1-11K



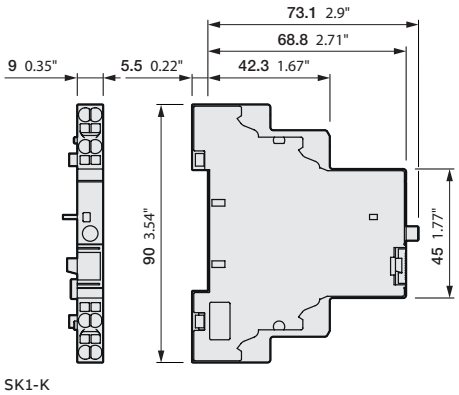
SK1-11ARK

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.

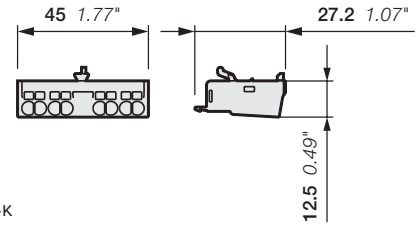
Suitable for	Auxiliary contacts N.O.	Auxiliary contacts N.C.	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Auxiliary contacts - mountable on the front							
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT	1	1		HKF1-11K	1SAM201901R1201	10	0.016
	2	0		HKF1-20K	1SAM201901R1202	10	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.

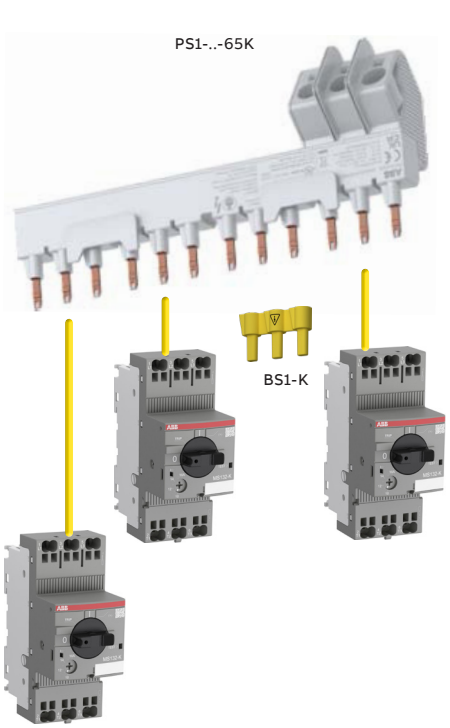
Connecting characteristics - Auxiliary circuit

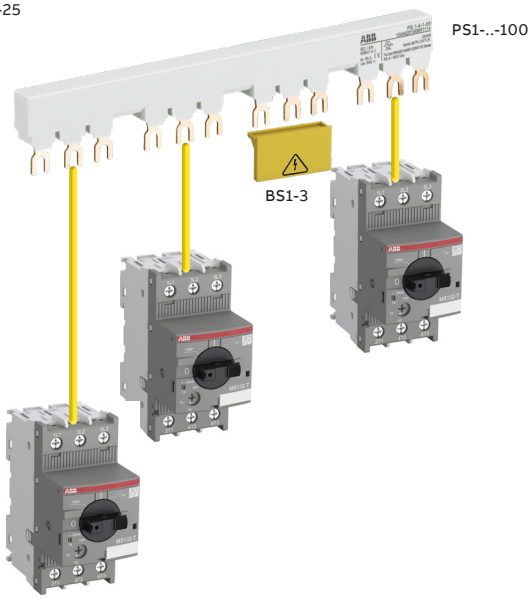
Type			UA1
Connecting capacity			
	Rigid	1 or 2 x	1 ... 4 mm²
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm²
	Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm²
		2 x	0.75 ... 1.5 mm²
	Flexible	1 or 2 x	0.75 ... 2.5 mm²
	Stranded acc. to UL/CSA	1 or 2 x	AWG 16 ... 12
Stripping length			10 mm
Tightening 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)



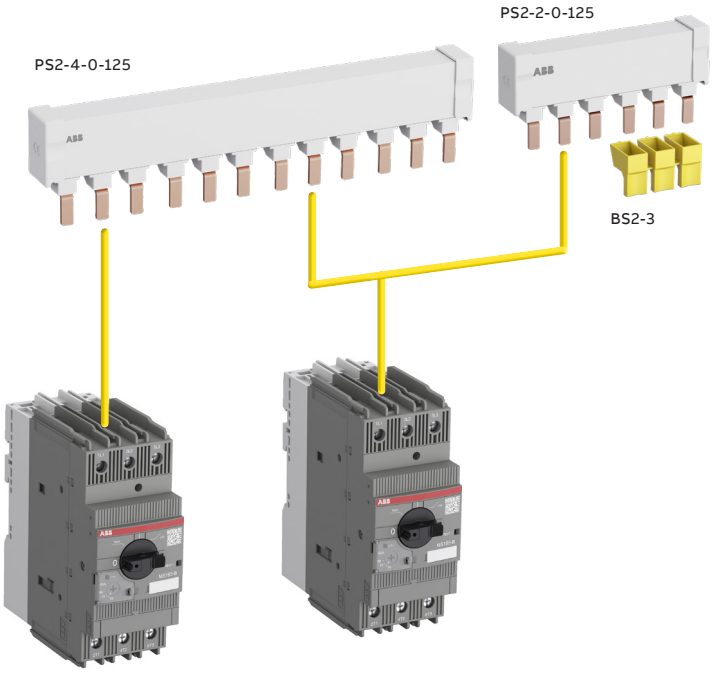


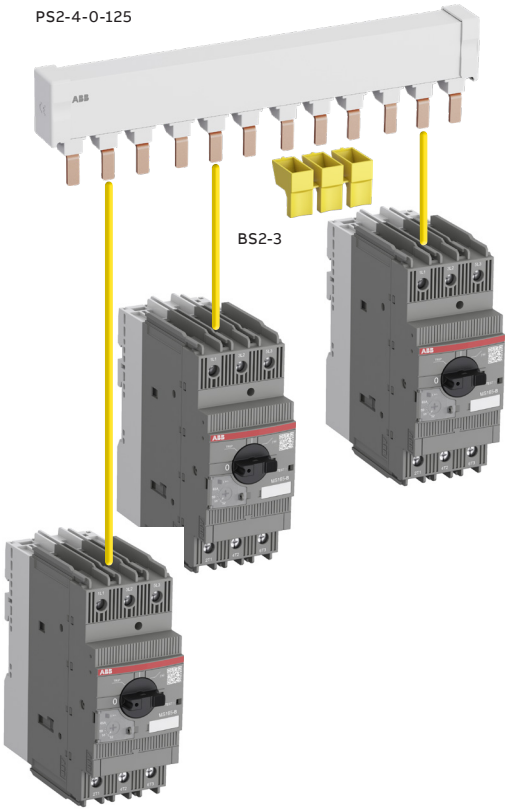
Three phase busbar with Push-in Spring terminals up to 65 A

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)



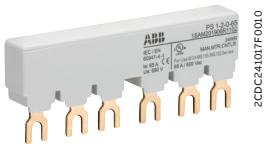


Three-phase busbar up to 125 A

Three-phase busbar up to 125 A

Accessories

MS116, MS132, MO132, MS132-T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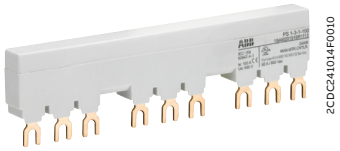
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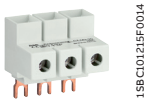
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S1-M2-25

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

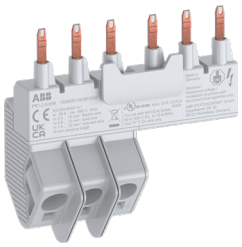
MS116, MS132, MO132, MS132-T	Protection cover for busbars	BS1-3	1SAM201908R1001	50	0.003
	Screw fixing kit	FS116	1SAM201909R1001	1	0.020
	Padlock + two keys	SA2	GJF1101903R0002	10	0.020
MS116	Lock handle	SA1	GJF1101903R0001	10	0.003
	Lock handle box SA1/SA2	SA3	GJF1101903R0003	10	0.050

Accessories for single-phase connection (IEC only)

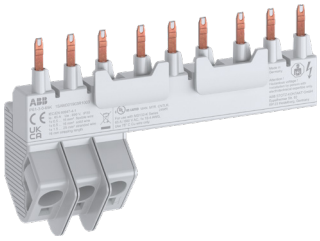
MS116, MS132, MO132, MS132-T	Phase connecting link	PB1-1-32	1SAM201914R1001	1	0.009
	Phase power infeed block	S1-PB1-25	1SAM201914R1002	1	0.013

Accessories with Push-in Spring terminals

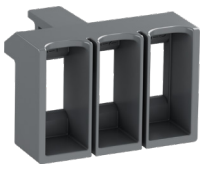
MS132-K, MS132-KT



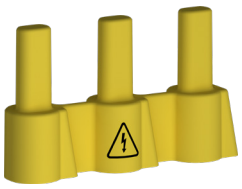
PS1-2-0-65K



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.

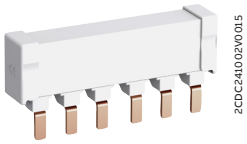
Suitable for	Rated operational current A	Number of Manual motor starters	Number of lateral auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
MS132-K, MS132-KT	65	2	0	PS1-2-0-65K	1SAM301903R1002	1	0.091
	65	3	0	PS1-3-0-65K	1SAM301903R1003	1	0.116
	65	4	0	PS1-4-0-65K	1SAM301903R1004	1	0.140
	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.

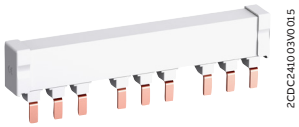
Suitable for	Description	Type	Order code	Pkg qty	Weight (1 pce) kg
Terminal spacers, Type E/F					
MS132-K, MS132-KT	UL/CSA Type E/F and IEC	TS1-M3-K	1SAM301913R1001	2	0.012
Additional accessories					
MS132-K, MS132-KT	Protection cover for PS1-K busbars	BS1-K	1SAM301904R1001	1	0.002
	Padlock + two keys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

Accessories

MS165, MO165

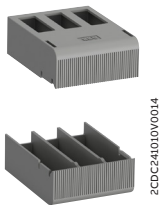


PS2-2-0-125



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

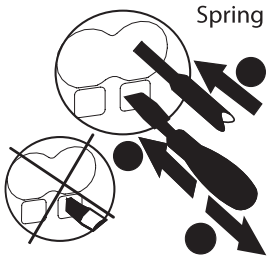
General technical data

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

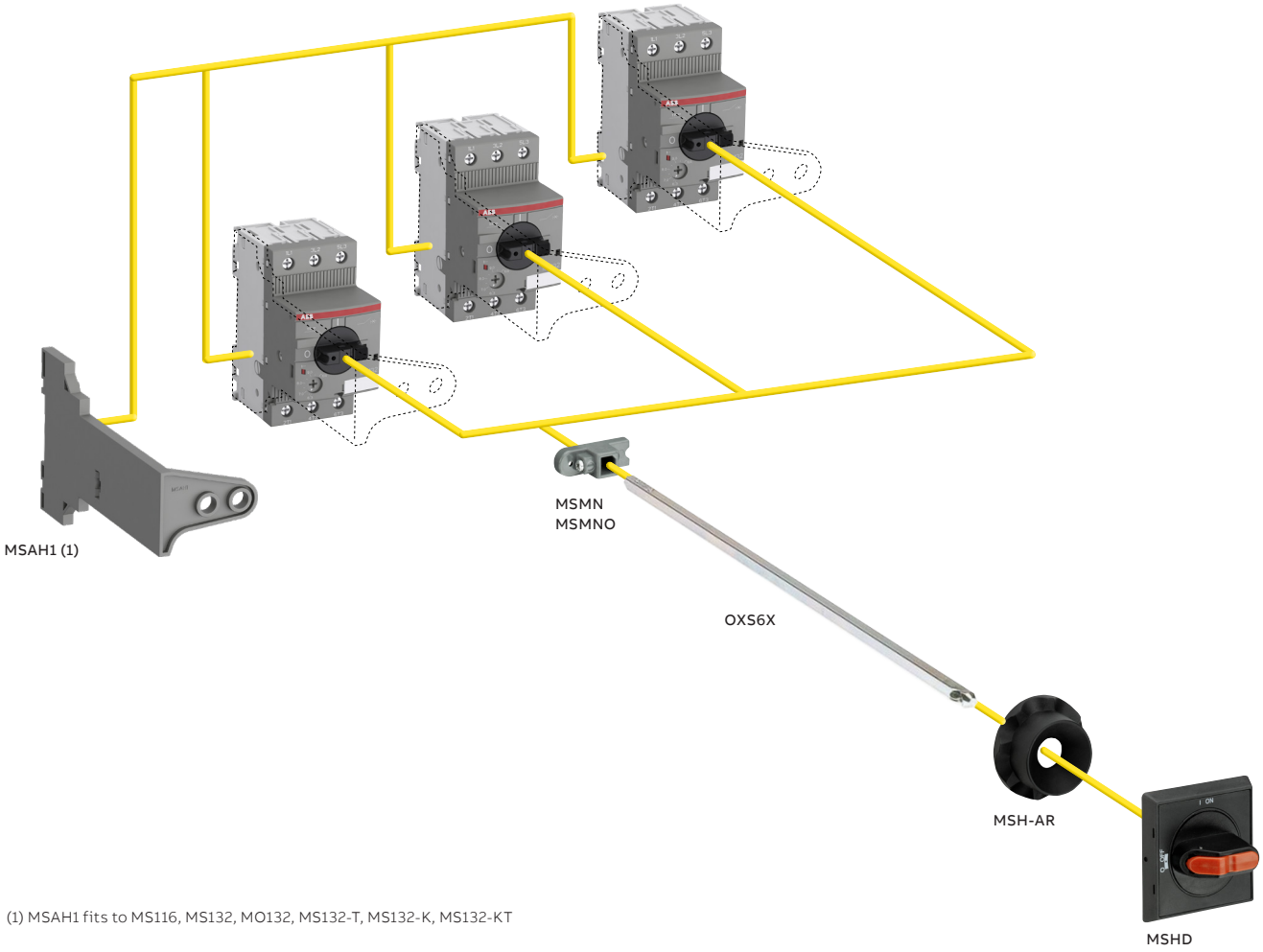
Electrical connection – Main circuit

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

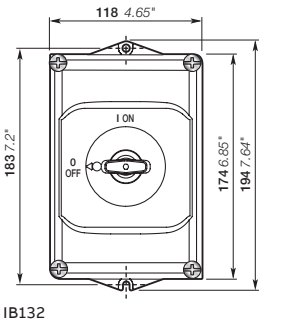
IB132 are IP65 (NEMA Type 12) enclosures for single manual motor starter installation. Additional mounting of auxiliary and signaling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

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.

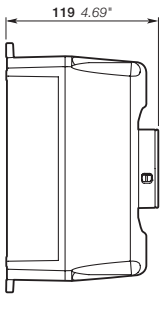
Suitable for	Description	Color	Type	Order code	Pkg qty	Weight (1 pce) kg
IP65 enclosures (NEMA Type 12)						
MS116, MS132, MO132	Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm	Yellow/red	IB132-Y	1SAM201911R1011	1	0.370
		Grey/black	IB132-G	1SAM201911R1010	1	0.370
IP65 door mounting kits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

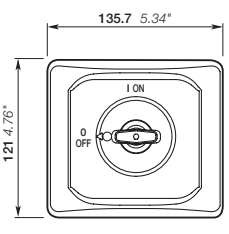
DMS132-Y

DMS132-G

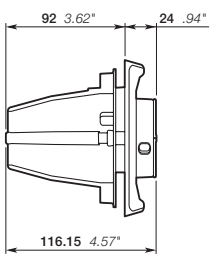


IB132





DMS132



Main dimensions mm, inches

Accessories

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

2CDC241003F0011

MSHD-LB

2CDC241002S0011

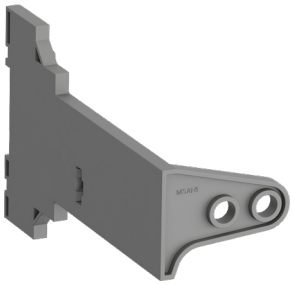
MSHD-LY

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.

Notes

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

www.abb.com/productdetails/**1SBL137001R1310**

AF, EK contactors and NF contactor relays

3/4 **ABB Novolink™ smart modules for AF contactors**

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3/185 **GAF Contactors for DC switching**

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3/257 **Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays**

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3/470 **Questionnaire for product specifications**

—

The all-new ABB Novolink™ devices help digitalize your motor starting solutions and gain insights into the connected loads. They're easy to design into existing wiring plans and connect to standard AF contactors.

Installation is fast and simple, thanks to reduced wiring and fewer components, so your engineering efforts are minimized.

Novolink devices enable predictive maintenance to reduce downtime, as well as increasing efficiencies and boosting cost savings. They're fully integrated into the B&R automation system. And the possibilities open up even more with full remote access to your data, creating new maintenance service and revenue opportunities.

So to simplify engineering, optimize operations, save time and cut costs, think Novolink.

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4	Motors - the key driver of world industry
6	From conventional to digital
7	Digital capabilities to deliver Industry 4.0
9	A closer look at smart devices
10	The link between motors and digitalization
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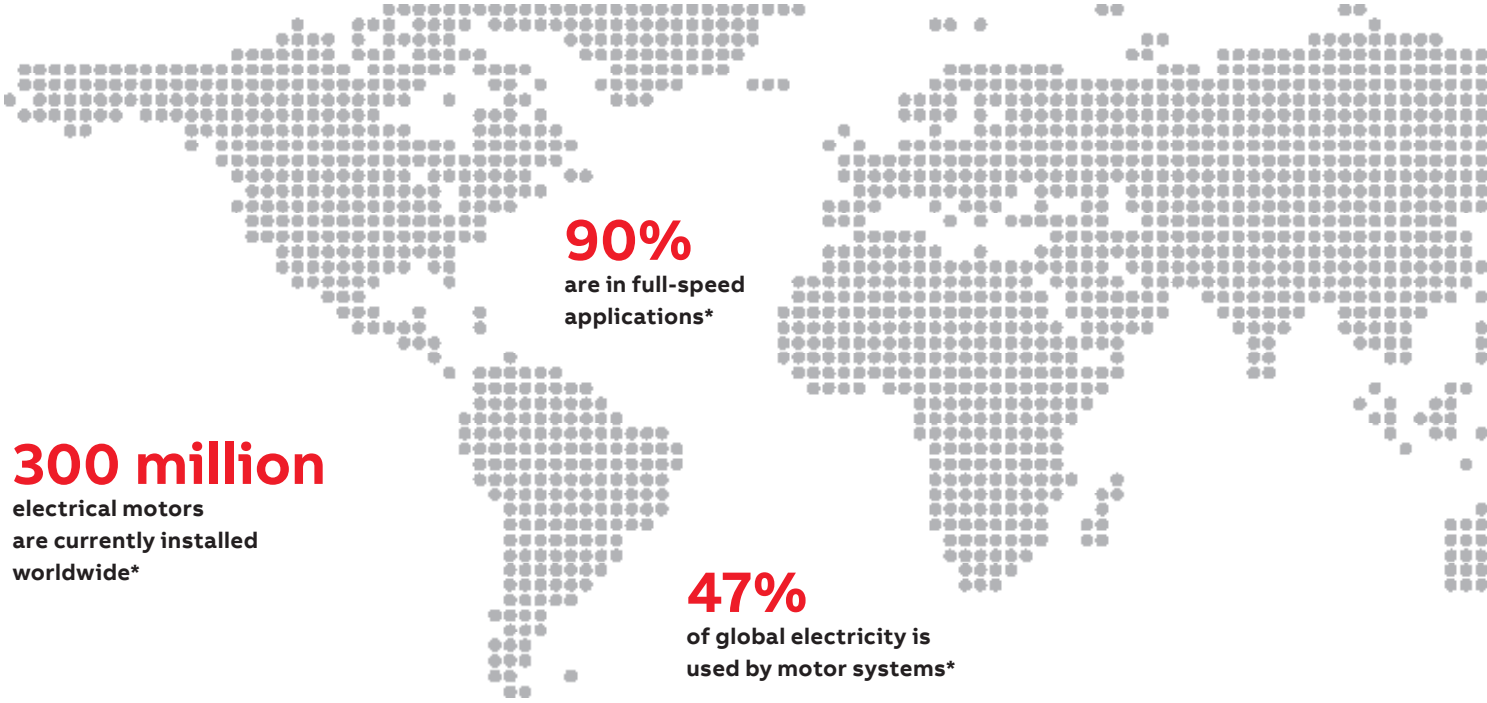
Motors - the key driver of world industry

Motors make the industrial world go round. With the latest digitalization innovations, the control of your motors can achieve even higher levels of efficiency with benefits such as real-time data monitoring and predictive analytics.



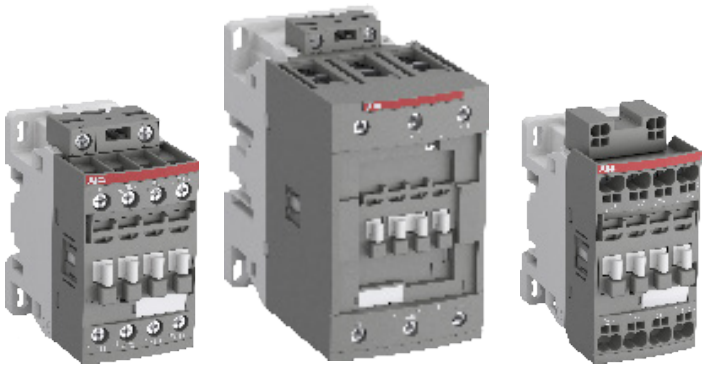
90%
are in full-speed applications*

300 million
electrical motors are currently installed worldwide*

47%
of global electricity is used by motor systems*

Zero
need to replace existing AF contactors

ABB's market-leading contactors have an advanced, electronically-controlled magnet system that covers the complete power range. Our contactors are complemented by a full list of accessories. Novolink devices are compatible with 24 V DC coil contactors – from AF09 up to AF96 in screw & from AF09 up to AF38 in Push-In Spring.

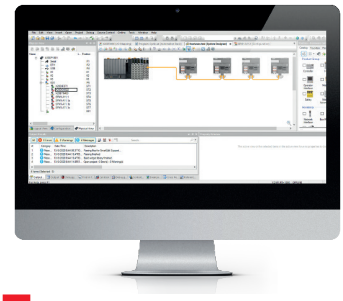


*own estimations

Digitalize one of the best motor starting portfolios on the market

Decide for yourself how you want to digitize your motor starting solutions - with the new Novolink modules even advanced motor protection and equipment monitoring is fast and easy.

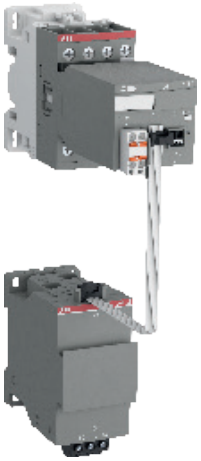
PLC



Easy

drag and drop integration in B&R automation studio.

X2X

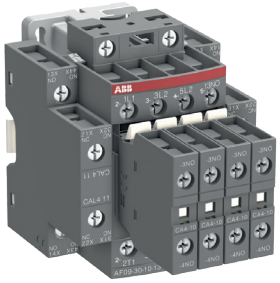


X2X

Binary I/O signals

Level 3

Advanced motor protection and connected equipment monitoring.



Level 2

Basic maintenance counters.
Integrated check-back monitoring.

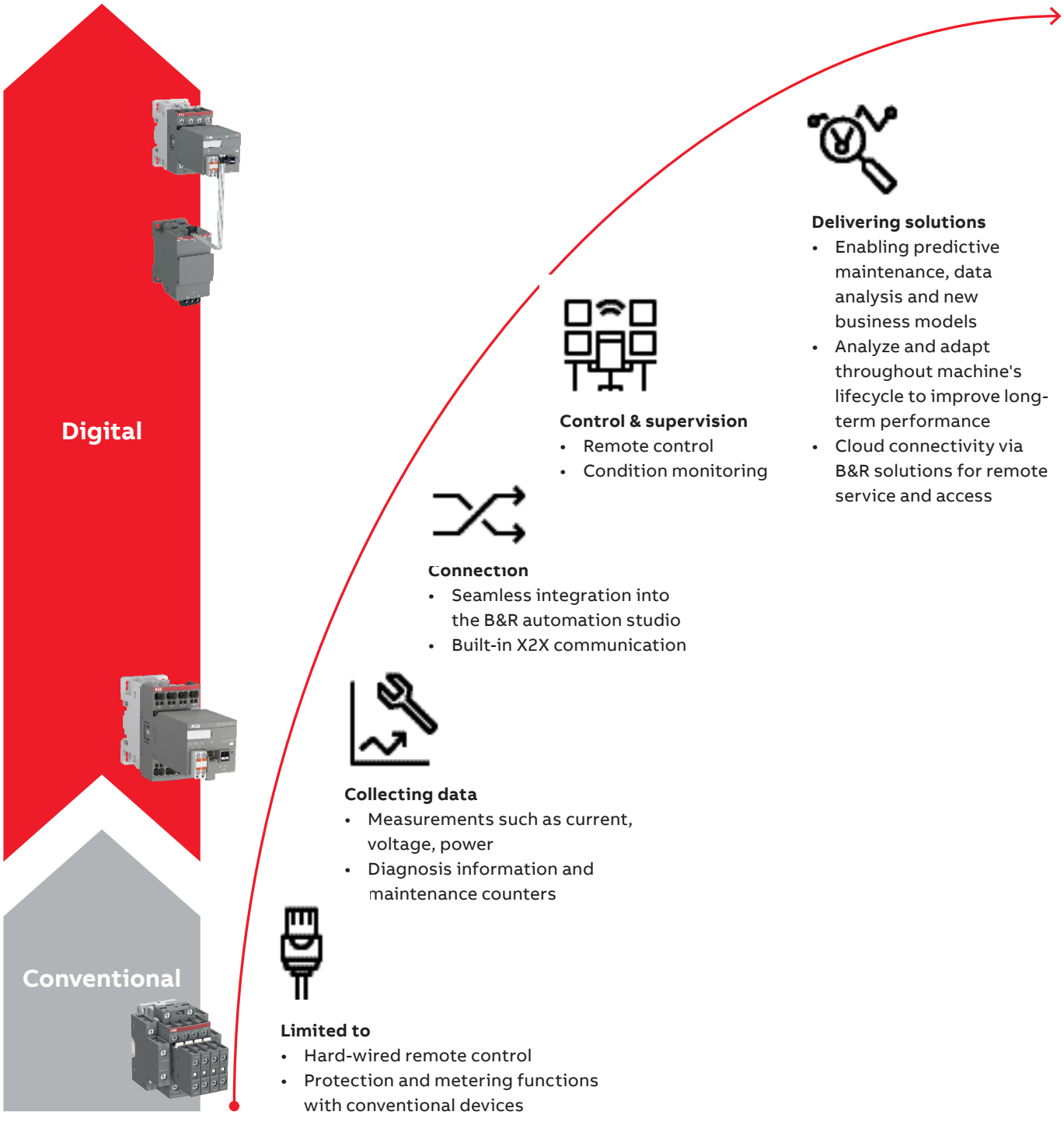
Level 1

Auxiliary contactors to build local control logic and realize connection to a PLC via I/O signals.

The choice is yours: select and mix as needed

From conventional to digital

With Novolinks' enhanced capabilities, you can move from corrective to predictive maintenance, continually optimizing your process.



Digital capabilities to deliver Industry 4.0

Digitalization is no longer optional. Novolink devices offer a smart, competitive edge, improving reliability and reducing maintenance costs.

Smart devices enhance traditional control gear with digital capabilities. They enable the predictive maintenance, remote control, fault diagnostics and data analytics required for Industry 4.0. Monitoring is taken to a new level, using collected information to analyze performance data – including current levels, operating cycles and load levels.

This allows operation and maintenance managers to effectively improve reliability and reduce maintenance costs. With B&R PLCs, monitoring can even be managed from a remote location, eliminating the need for maintenance personnel to conduct regular on-site checks.

Novolink devices in low voltage motor applications

Explore a world of potential, from control to distribution panels.

Novolink's ease of commissioning and functionality creates enormous opportunities for a wide range of industrial applications. Applications include:

Pump

HVAC

Hoisting

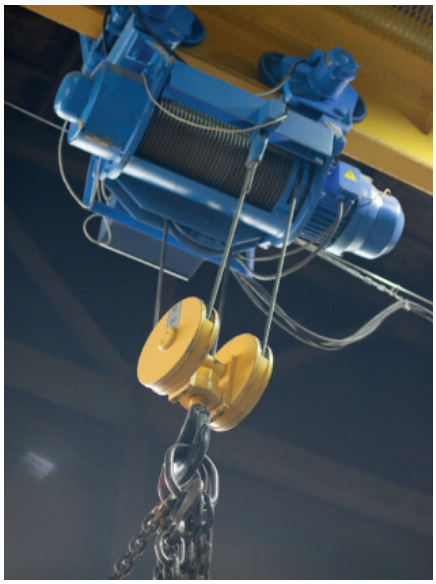
Agitator

Fans

Heating

Lighting

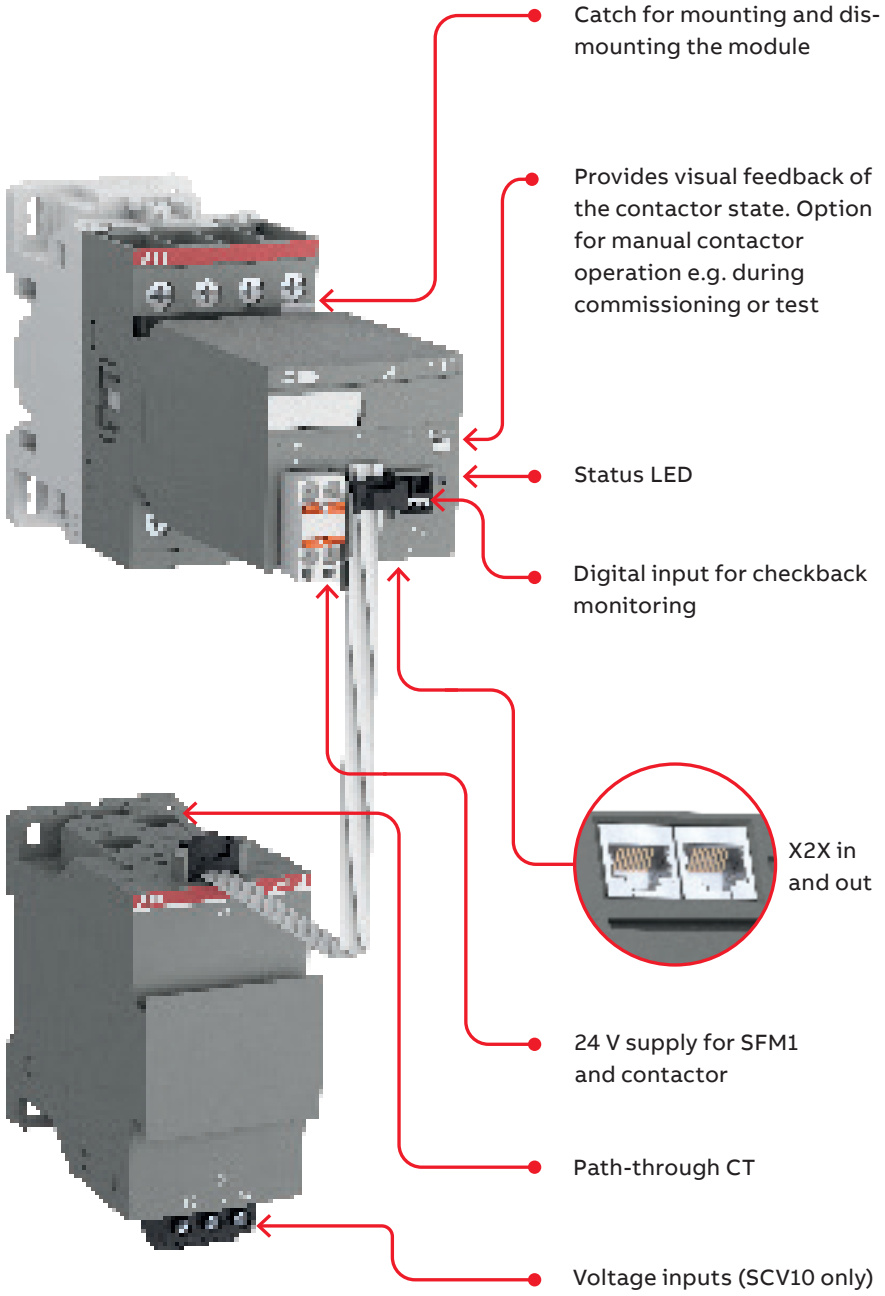
Conveyors



A closer look at smart devices

Smart function device SFM1
This contactor module snaps onto contactors from AF09 to AF96 with 24 V DC operated coil. It is seamlessly integrated into the B&R automation system via the X2X bus.

- Provides relevant maintenance counters like motor operating hours, trip counters and more
- Allows monitoring of short circuit protection devices using a digital input
- Helps to detect problems in load, supply and feeder side in order to solve problems as quickly as possible



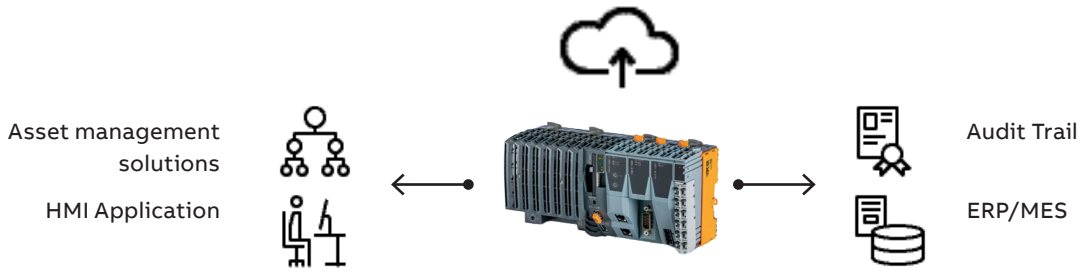
Smart current voltage devices SCV10/ SC10
These high-end motor protection devices provide an optional extension to the contactor module. They enable the status of the connected equipment to be assessed.

Both types:
- Measure phase currents, frequency, earth fault, total harmonic distortions and other relevant parameters
- Feature an advanced thermal model of the motor which is calculated for selectable trip classes from 5E - 30E
- Time to trip, time to cool and the actual thermal load level are available for optimized control
- Integrated current transformers up to 40 A nominal current

SCV10 only:
- Additional integrated voltage measurement up to 690 V AC
- Cos-phi and real power allows to monitor and protect pumps and other connected loads

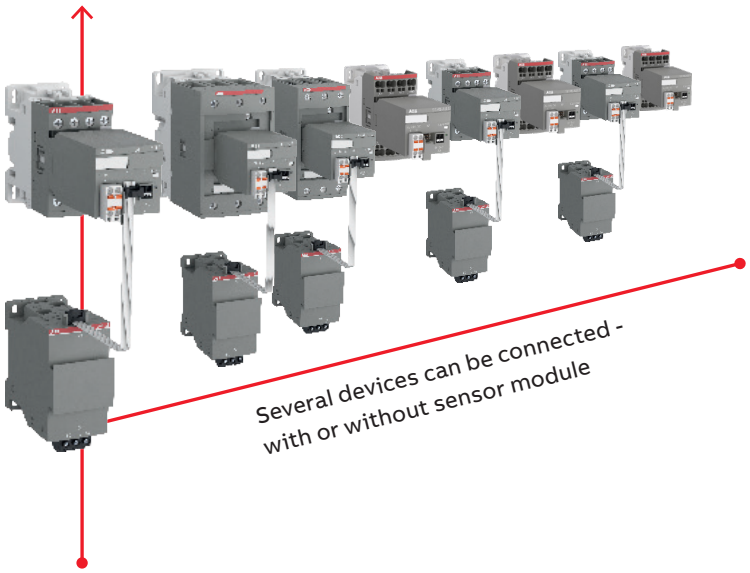
The link between motors and digitalization

By effortlessly connecting the factory floor to the cloud,
Novolink is essential to increase overall equipment effectiveness.



100%

Data availability



1st

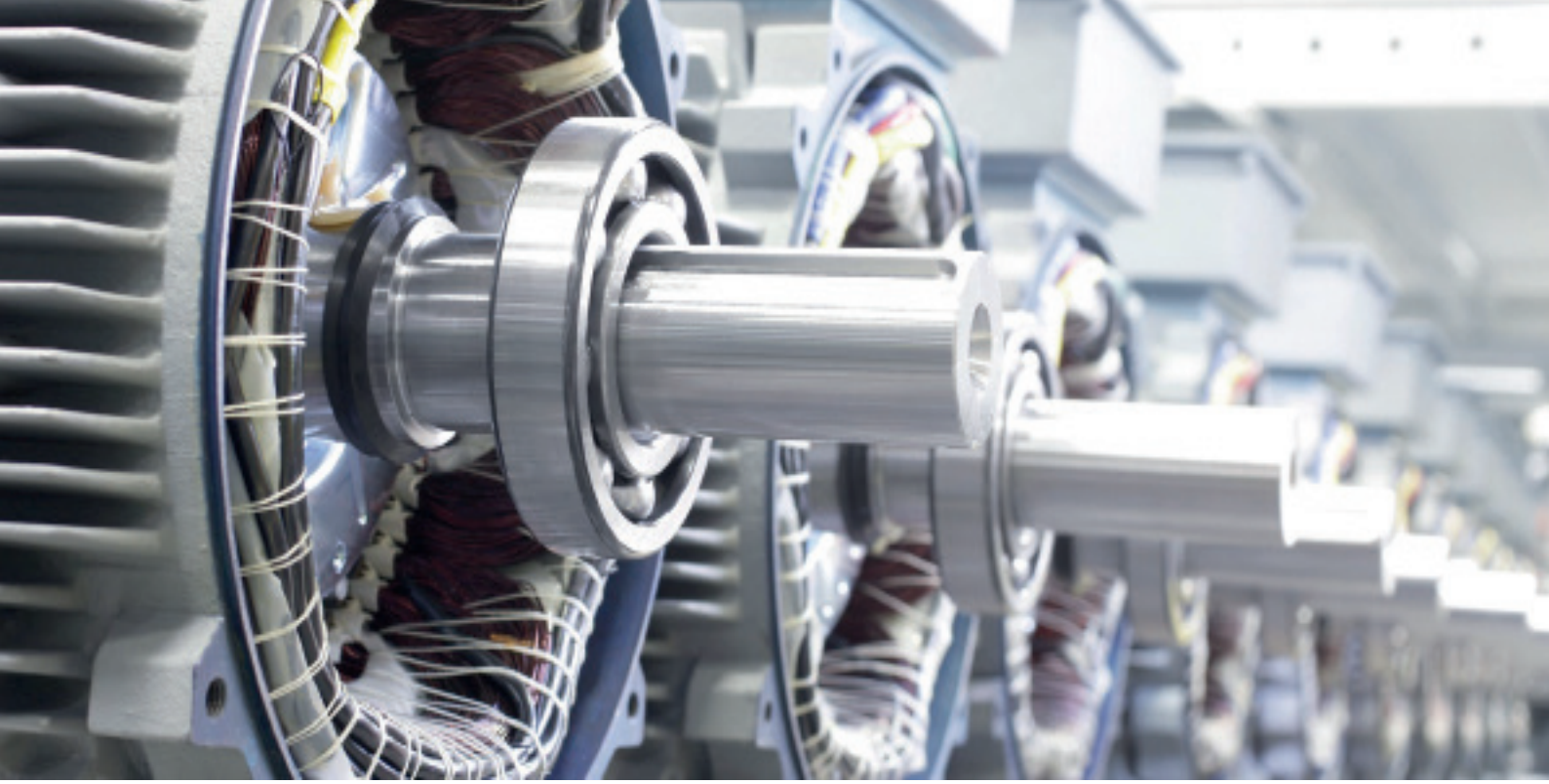
entirely B&R compatible motor starting solution

Engineering efficiency - only two configurable components cover a wide range of applications, reducing devices where otherwise auxiliary devices are needed.

Preventive machine maintenance uses live data from relevant motor parameters

Digitalization allows **remote contactor control and condition monitoring**

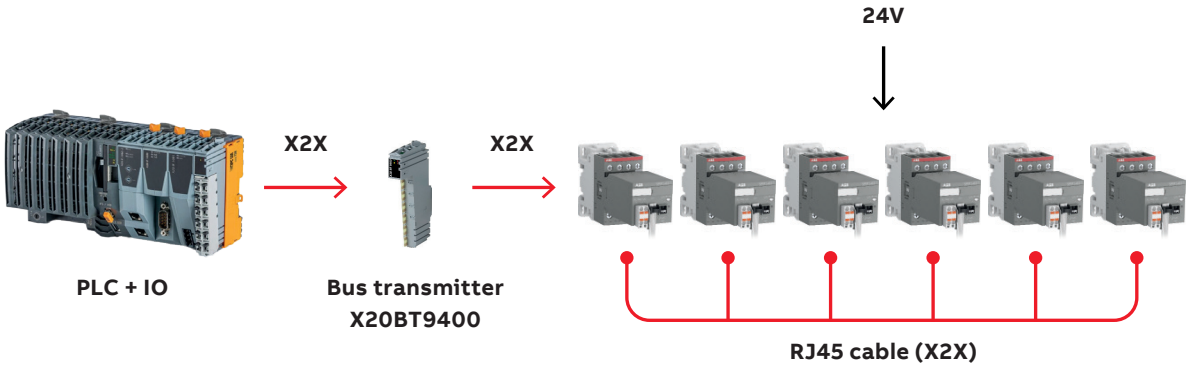
Speed of installation
Reduction of control side wiring. Integration of multiple functions into one device. Reduction of required PLC I/O signals.



B&R advanced application integration
Data from the Novolink devices can be used directly with a wide range of B&R system applications including SCADA, HMI application, audit trail, ERP/MES and cloud infrastructure.

Transform your existing portfolio with the B&R Automation Studio
The B&R Automation Studio offers an integrated software development environment with tools for every project phase. This includes a wide selection of diagnostics for system optimization. You can access extensive target system information via the web with the System Diagnostics Manager. Better still, the controller, drive, communication and visualization are all configurable in one environment, reducing integration time and maintenance costs.

Effortless commissioning with B&R PLCs
Novolink devices can connect easily to X2OBT9400 with ready-made SFM-CAB-RJTB cables. On one side, the SFM-CAB-RJTB cable has a cable shield clamp which connects to the terminal block (containing all the required wires), while the other side has an RJ45 plug which connects to the SFM1 module. Novolink devices can be connected in a daisy chain with multiple devices working in a sequence by simply using standard Ethernet cables.



Ease of design and commissioning

A closer look at the key benefits

Reduced number of components and simplified wiring
In an increasingly fast-paced world, the need for rapid, effective integration with existing systems is essential.

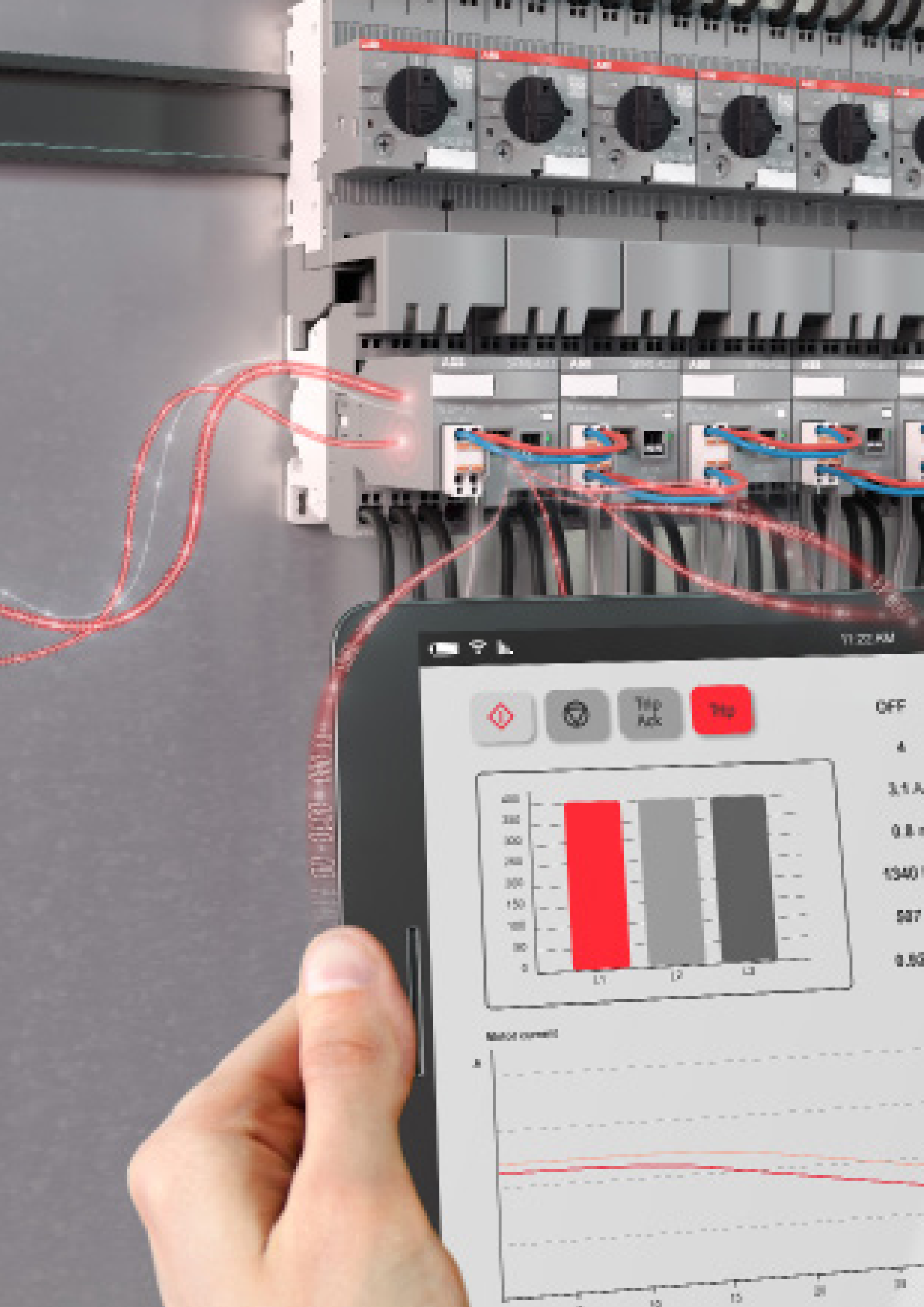
Simply mount the device on an AF contactor to digitalize operations, without increasing the width of your contactor. Novolink devices are cost-effective and even allow for the retrofitting of an existing 24 V DC supplied AF contactor. In such a case often only the control wiring needs to be changed.

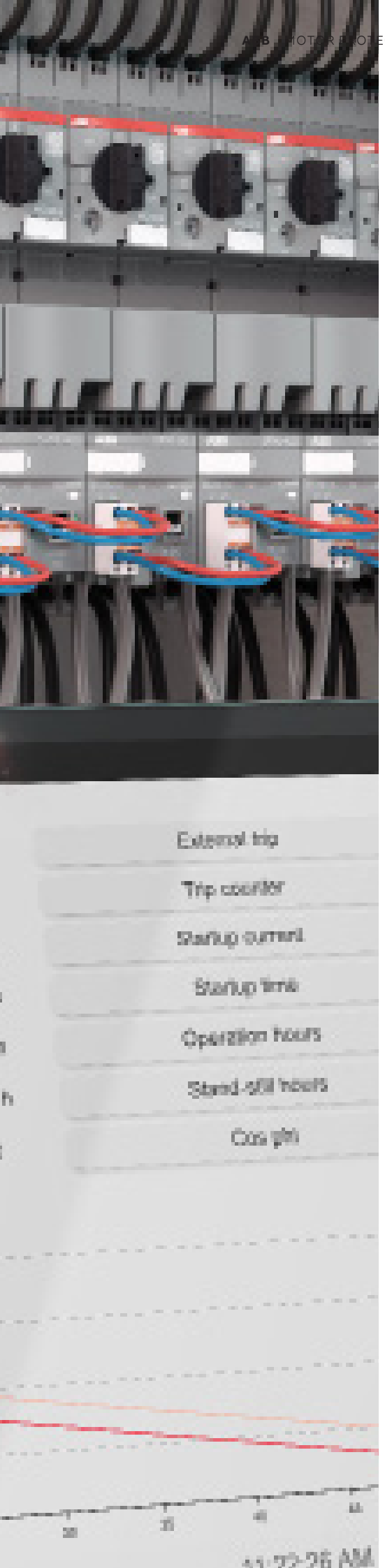
Reduced engineering efforts
An industrial environment is a complex space, which is why Novolink devices were expertly engineered to streamline high-grade motor monitoring and protection. Its out-of-the-box functionality ensures simplicity on the factory floor and beyond.

The standard controls are ready to use without additional engineering and there is no need for expensive specialist cabling or additional training. Programming is drastically simplified because all data is available from a single node representing the feeder. Your motor protection is customizable to the need of your application.

Transform your existing portfolio
Novolink uses standard components like AF contactors, to take your existing solution to another level of innovation. With no need for extensive training, the Novolink opens up new possibilities for your expertise.

11:22 AM
Trip Ack
Trip
OFF
4
3.1 A
0.8 s
1340 h
507 h
0.92
External trip
Trip counter
Startup current
Startup time
Operation hours
Stand-still hours
Cos phi
Motor current
A
L1
L2
L3


11:22 AM
Trip Ack
Trip
OFF



Innovation through digitalization

Guiding you on your journey to a digital future

Enhanced analytics for improved performance
Optimize the performance of your machine in real time with data-driven decision making.

The Novolink's fully digitalized approach means that data trends can be analyzed over the long term so processes can be adapted to maximize performance.

Create new business models
With Novolink, you can offer clients digital services like cloud-based predictive maintenance to pinpoint potential faults with speed and accuracy. An increase in overall equipment effectiveness provides added value for your customers.

Enhanced analytics brings machine builders and OEMs closer to their customers and enables more efficient re-stocking via online data.

100% data availability
Through integrated connectivity and seamless integration into B&R solutions, relevant information can be derived from raw data.

Integration into other systems is easily possible with B&Rs OPC-UA server solutions and other gateways.

Optimized operations and maintenance

Increase your efficiency through innovation

Reduce downtime
Use Novolink's remote monitoring capabilities to reduce costs and increase overall uptime. Operatives can immediately isolate problem areas (such as a malfunctioning load) and suggest solutions before disruption is caused. For ease of use, all control, monitoring and diagnostic signals are fully visible and there is clear fault localization.

Service-on-demand
Avoid unnecessary scheduled servicing by moving from fixed service cycles with Novolink devices. Advanced diagnostic capabilities make it easier to address issues on demand, from switching off idle processes to saving energy through optimizing parameters. You can combine real-time diagnostics with long-term data trend analysis to unlock new service modules.

Enable preventive maintenance
Getting ahead of faults and problems is key to consistent uptimes, maintaining the longevity of equipment and ensuring the ongoing flow of production.

With Novolink, you can set thresholds and receive pre-warnings before equipment failure to reduce energy consumption through optimized operation parameters.

11:22 AM
Trip Ack
Trip
OFF
4
3.1 A
0.8 s
1340 h
507 h
0.92
External trip
Trip counter
Startup current
Startup time
Operation hours
Stand-still hours
Cos phi
Motor current
A
English

Smart and safe manufacturing with ABB safety products and B&R solutions

B&R provides industrial automation solutions and is the global center for machine and factory automation within ABB since 2017. B&R offers PLCs with integrated safety for processing lines or machines automated with B&R

Compatible safety products from ABB Jokab Safety

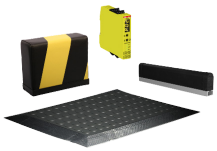
The safety products from ABB Jokab Safety are tested, verified and certified to be connected directly to the B&R safety system. This makes ABB able to offer well-tried and proven safety solutions together with B&R.

Sensors,
switches and locks

Optical safety devices

Control
devices

Emergency stops
and pilot devices



Pressure
sensitive devices

Tina
adapters

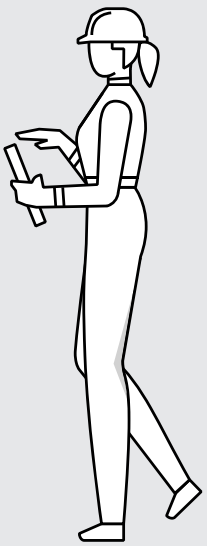
Safe solutions
Reaches the highest level of safety (up to PL e/Cat 4). Certified, verified and reliable safety solutions. Extensive fault detection. Several different types of safety sensors and devices available to suit all safety needs.

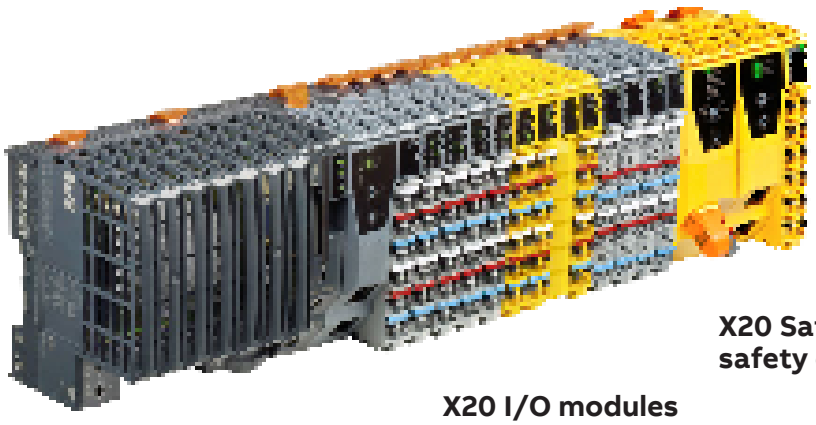
The advantages of DYNlink
The DYNlink signal significantly reduces the required number of cables and safe input channels which leads to more cost-effective solutions.

Developed with installation in mind
Easy connection with M12 connectors. A wide range of adapters and connectors to simplify wairing.
Minimum amount of cabling simplifies installation.

Do you think about safety?

ABB does - find more information on the ABB Jokab Safety offer, details about the products and their applications online.





X20 SafeLOGIC safety controller

X20 I/O modules

X20 CPU

B&R safety controller

In order to supervise ABB safety sensors using B&R controllers the following units are required:

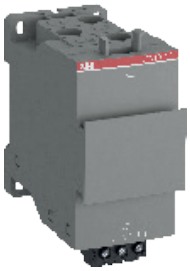
- SafeLOGIC safety controller
- X20 CPU (since the SafeLOGIC is not a standalone PLC)
- Safe X20 I/O modules (to connect the safety devices)

Dry contacts (potential free/zero volt)
B&R supports all ABB Jokab Safety products with dry contacts. For this use case, the B&R safe I/O module provides a unique pulse signal which ensures best cable diagnostic.

OSSD
B&R supports all ABB Jokab Safety products with OSSD interface. For this use case, the B&R safe I/O module provides a filter to avoid influencing the application by the OSSD low phase.

DYNlink
B&R supports all ABB Jokab Safety products with DYNlink interface. (Available and TÜV-certified in B&R mapp Safety from version 5.12)

Ordering details



SCV10-40.1

SC10-40.1

SFM1-A11.1

SFM-CAB-RJTB.1-500

SFM-CAB-S.1-50

SFM-CAB-S.1-25

Description

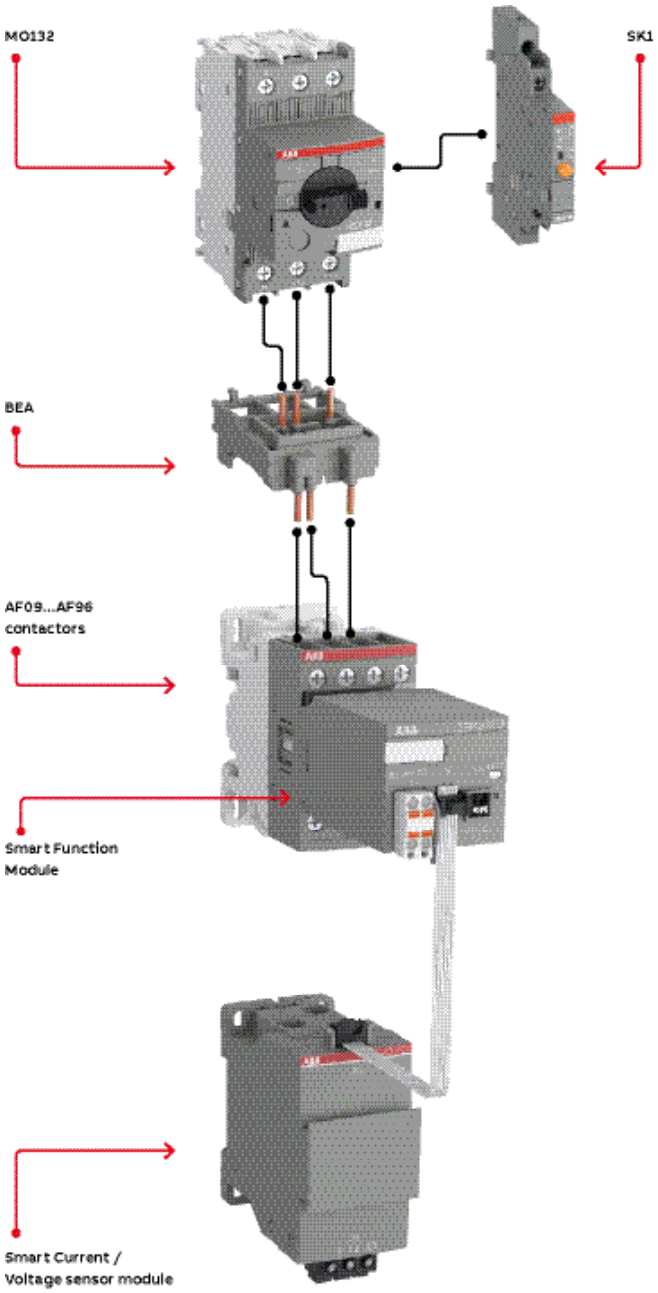
ABB`s Novolink devices consist of the smart function module SFM1 and the sensor module SCV10-40. They allow the remote control and monitoring of AF contactors via X20 bus from within a B&R PLC. The sensor module SCV10-40 is optional and can be connected to the SFM1 module and provides functions for motor and application protection. It provides data for measuring voltage, current, frequency and further derived physical quantities such as cos phi, real power etc.

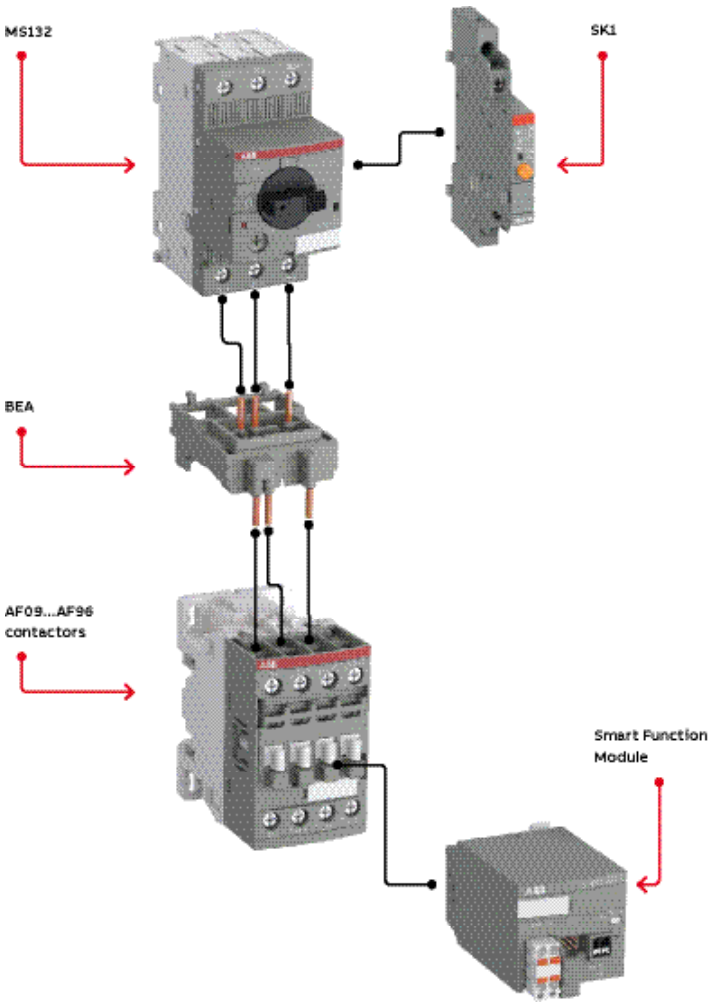
The SFM1 can be snapped onto AF09...AF96 contactors with 24 V DC coil voltage. The module is equipped with two X2X interfaces for incoming and outgoing connections (daisy chain). The module and contactor are supplied via 24 V DC that are also used for the SCV10-40 module.

—

Ordering details

Description	Type	Order code	Weight (1 pc) kg (lb)
Connection cable from PLC to first SFM1 module	SFM-CAB-RJTB.1-500	1SVM823000R0500	0.192 kg (0.423 lb)
Connection cable from SFM1 to SCV10, length 50 cm	SFM-CAB-S.1-50	1SVM811000R0050	0.015 kg (0.0331 lb)
Connection cable from SFM1 to SCV10, length 25 cm	SFM-CAB-S.1-25	1SVM811000R0025	0.008 kg (0.0176 lb)
Smart current and voltage sensor module	SCV10-40.1	1SVM320010R0000	0.23 kg (0. 507 lb)
Smart current sensor module	SC10-40.1	1SVM310010R0000	0.195 kg (0.429 lb)
Smart function module	SFM1-A11.1	1SVM120012R0000	0.11 kg (0.243 lb)


MO132
SK1
BEA
AF09...AF96
contactors
Smart Function
Module
Smart Current /
Voltage sensor module


MS132
SK1
BEA
AF09...AF96
contactors
Smart Function
Module

Technical details

Smart function module

Data at T_a = 25 °C and rated values, unless otherwise indicated

Smart function module

X2X Interface (X4, X5)		
Rated control supply voltage U_s	according to B&R X20 system specification	
Rated control supply voltage U_s tolerance	according to B&R X20 system specification	
Typical current / power consumption (delivered by X2X link power supply output from X20BT9400)	30 mA / 600 mW	
Recommended RJ45 cable	Cat 5e SF/UTP AWG 26 / 1:1 connection Cat 6 S/FTP AWG 27 / 1:1 connection	
Max. distance between nodes Max. distance from X20-BT9400 to first SFM1	20 m	
Max. number of nodes on one X20-BT9400	8	
Max. length of total network from start to last module with 8 modules	160 m	
Grounding	according to B&R X20 system specification, the accessory SFM-CAB-RJTB provides the required grounding of shield	
Minimum cycle time The minimum cycle time defines how far the bus cycle can be reduced without communication errors occurring. Note that very fast cycles decrease the idle time available for handling monitoring, diagnostics and acyclic commands.	300 us	
Contactor supply circuit SFM1 (X1)		
Rated control supply voltage U_s	24 V DC	
Rated control supply voltage U_s tolerance	22 … 31.2 V incl. ripple It must be ensured that the minimum supply voltage is available at the last contactor in a supply chain.	
Typical current / power consumption (AF coil current not considered)	20 mA / 480 mW (SCV40-10 module) 20 mA / 480 mW (SC40-10 module)	
Reverse polarity protection	no	
Short circuit protection of contactor control outputs	yes	
Max. load current for AF contactor	coordinated with supported AF contactor types	
Min. power failure buffering time	10 ms	
Digital Input (X3)		
Number of digital inputs	1	
Supply for digital inputs	internal	
Isolation	no	
Input signal bounce suppression	configurable (see module parameters)	
Typical input current at nominal supply	7.5 mA	
Max. voltage loss at closed external auxiliary contact	max. 2 V	
Max. cable length	10 m	
General data		
MTBF	on request	
Duty time	100 %	
Dimensions	see dimensional drawings	
Weight	0.11 kg	
Mounting	Snapping on AF09 – AF96	
	AF09(Z)...-nn	AF40...-11
	AF12(Z)...-nn	AF52...-11
	AF16(Z)...-nn	AF65...-11
	AF26(Z)...-nn	AF80...-11
	AF30(Z)...-nn	AF96...-11
	AF38(Z)...-nn	
	nn = 11, 21, 30	
Mounting position	on AF contactor. 1-4, 5: max. current = AC-3 current of contactor	
Minimum distance to other units	0 mm for side to side mounting 5 mm to metal parts (e.g. control panel wall)	
Material of housing	UL 94 V0	
Degree of protection	IP20	

Technical details
Smart voltage and current sensor modules

Electrical connection X1, X3			X1	X3
Push-In	1x		0.2...2.5 mm² 24...12 AWG	0.2...1.5 mm² 24...16 AWG
	1x		0.25...2.5 mm²	0.2...1.5 mm²
	1x		0.25...2.5 mm²	0.2...0.75 mm²
	1x		0.2...2.5 mm² 24...12 AWG	0.2...1.5 mm² 24...16 AWG
Spring	1x		0.2...2.5 mm² 24...12 AWG	0.2...1.5 mm² 24...16 AWG
	1x		0.25...2.5 mm²	0.2...1.5 mm²
	1x		0.25...2.5 mm²	0.2...0.75 mm²
Screwdriver type			0.6 x 3.5 mm	0.4 x 2.5 mm
Tightening torque			10 mm	8 mm
Electrical connection X2			use ready-made cables, see accessories.	
Max cable length			0.5 m	
Basic insulation			300 V	
Ensure safe distance from motor wires and other high voltage cables.				

Smart voltage and current sensor modules

Input circuit		SCV10-40	SC10-40
Nominal frequency		50/60 Hz (45 ... 65 Hz)	
Measurement method		true RMS (up to 13th harmonics)	
Number of phases		1/3	
Nominal measuring range current		0.2 to 40 A AC	
Measured current range		0.2 x I_e ... 15 x I_e	
Nominal voltage range	3 phase	150 to 690 V AC ± 10 %	-
	1 phase	90 to 400 V AC ±10 %	-
Measurement accuracy given at Ta=25 °C, 50/60 Hz	I_{rms} (range 0.2 * I_e ≤ 0.75*I_e)	±3 %	
	I_{rms} (range 0.75 * I_e ≤ 2*I_e)	±1,5 %	
	I_{rms} (range >2 * I_e ≤ 15*I_e)	±3 %	
	U_{rms}	±1.5 %	-
	power factor ≥ 0.5 (inductive)	typ. ±1.5% (I_{rms} > 3 A)	-
	apparent power	typ. ±3 %	-
	active power (cos phi > 0.5)	typ. ±5 %	-
	frequency (50/60 Hz)	±1.5 %	-
	current imbalance	typ ±10 % (condition: I_{mot} > 150 mA)	
	voltage imbalance	±10 %	-
	voltage total harmonic distortion (THD)	±5 %	-
	current total harmonic distortion (THD)	±10 % (condition: I_{mot} > 1A)	
Measurement range of earth fault current		> 20% of I_e	
Earth fault current		I_e < 1.0 A : ±25 % (condition: I_{mot} > 100 mA and I_{earth} > 80 mA) I_e >1.0 A : ±10 % (condition: I_{mot} > 200 mA and I_{earth} > 200 mA)	
Supported network types		1/3 phase, grounded networks	
Trip classes, selectable by parameter		5E, 10E, 20E, 30E	
Tripping time for phase loss		determined by parameter CurrPhaseLossDelayPar. adjustable from 0 ... 25.5 s	
Load per phase		approx. 30 mΩ	
Short-circuit protection		provided by external short-circuit protection device, e. g. MO, MCB, MCCB or fuse. Refer also to ABB coordination tables available here: www.lowvoltage-tools.abb.com/soc/	
Max cross-section of wires. Use isolated wires only!		16 mm²	

Technical details

Smart voltage and current sensor modules

Input circuit		**SCV10-40**	**SC10-40**
Conductor holes in the current transformers		13 mm	
Performance under short-circuit conditions Coordination type 2 I_q: Rated conditional short circuit current	Iq	100 kA 80 kA	
		500 V AC 690 V AC	
	fuse	200 A gG 200 A gG	
Additional information relating to cULus approval		suitable for use on circuits capable of delivering not more than 100 kA rms, symmetrical, 600 V AC maximum, when protected by 100 A, class K5/RK5 fuses, use fuses only	
Electrical connection X1			
Connecting capacity	1x	0.2...2.5 mm² 24...12 AWG	
	1x	0.2...2.5 mm² 24...12 AWG	
	1x	0.2...2.5 mm²	
	1x	0.2...2.5 mm²	
Stripping length		8 mm	
Screwdriver type		0.6 x 3.5 mm	
Tightening torque		0.5...0.6 Nm	
General data			
MTBF		on request	
Duty time		100 %	
Dimensions		see dimensional drawings	
Weight		0.23 kg	
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool screw mounting with mounting clips screw mounting with screws (M4)	
Mounting position		any	
Minimum distance to other units		-	
Material of housing		UL 94 V2	
Degree of protection		IP20	

Technical details
Common technical data

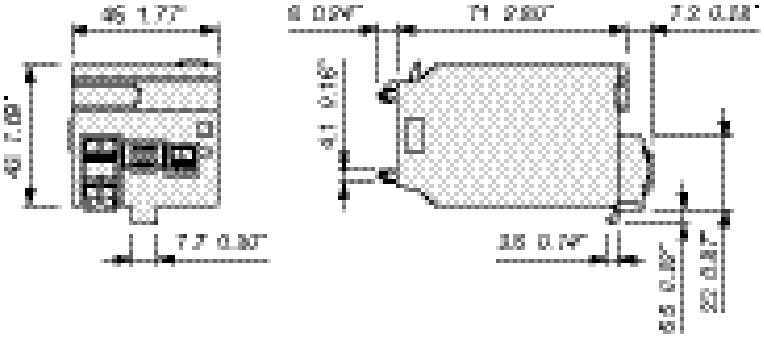
Common technical data

Environmental data (common)				
			SFM1	**SCV10-40/ SC10-40**
Ambient temperature ranges		operation	-25 to +60°C	
		storage	-40 to +70°C	
Damp heat, cyclic (IEC/EN 60068-2-30)			6 x 24 h cycle, 55 °C, 95 % RH	
Climatic class IEC/EN 60721-3-3			3K3 (no condensation, no ice formation) Relative humidity 5 % - 95 %, no condensation	
Vibration, sinusoidal			4 g, 5-300 Hz	
Shock			15 g, 11 ms	
Isolation data of contactor module in combination with contactor (and sensor module)				
Rated insulation voltage U_i		acc. to IEC 60947-4-1	690 V	
		acc. to UL / CSA	600 V	
Rated impulse withstand voltage U_{imp} SFM: Control supply, bus / mains contactor SCN: X2 (voltage input) to control supply, bus			6 kV	
Basic insulation			according to technical data of contactor	
Protective separation pollution degree 3			L/N: 277 V AC L/L: 480 V AC	
Protective separation pollution degree 2			L/N: 400 V AC L/L: 690 V AC	
Pollution degree			3	
Overvoltage category			III	
Installation altitude without derating			max. 2000 m	
Deratings at high altitudes			on request	
Standards / Directives				
Standards			IEC/EN 60947-1:2020 (Ed. 6.0) / EN 60947-1:2007 + A1:2011 + A2:2014 IEC/EN 60947-4-1:2019 UL 60947-4-1:2014 (Ed. 3) UL 60947-1:2013 (Ed. 5)	
Low Voltage Directive			no. 2014/35/EU	
EMC directive			no. 2014/30/EU	
RoHS directive			no. 2011/65/EU incl. 2015/863/EU	
Electromagnetic compatibility				
Emission requirements	radio interference voltage	EN 61000-6-4	X	
		EN 61000-6-3		X
	radio interference field strength	CISPR 11	class A	class B
Immunity requirements	electrostatic discharge	EN 61000-4-2	6 kV contact 8 kV air	
	radiated, radio frequency electromagnetic field amplitude modulated	EN 61000-4-3	10 V/m (80-6000 MHz)	
	electrical fast transients (burst)	EN 61000-4-4	2 kV (power supply lines) 1 kV (signal lines)	
	surge, unsymmetrical / symmetrical	EN 61000-4-5	1 kV / 0.5 kV (DC-supply) 2 kV / 1 kV (measurement lines)	
	conducted disturbance, induced by radio frequency, common mode, amplitude modulated	EN 61000-4-6	10 V	
Performance data				
Cycle time in contactor module: “switch on signal” received via X2X until contactor control voltage set to 24 V DC			typ. 5 ms	
Update rate of measurement values provided from sensor module and available for X2X communication			typ. 25 ms	

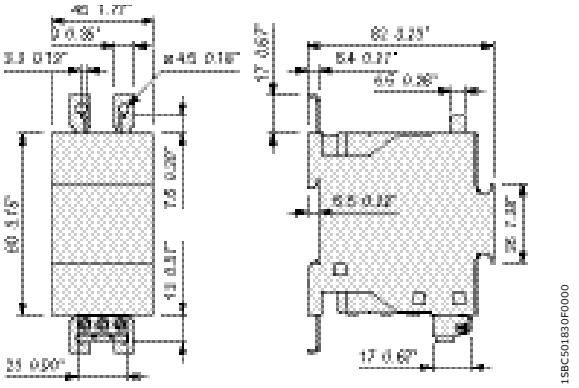
According to the current interpretation of applicable Chinese law the Novolink devices described in this document are imported as industrial automation equipment (they cannot be used without a PLC) and do not need CCC certification.

Technical diagrams

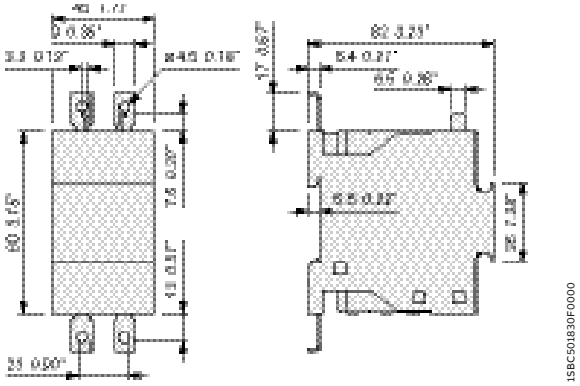
Dimensional drawings
in **mm** and inches



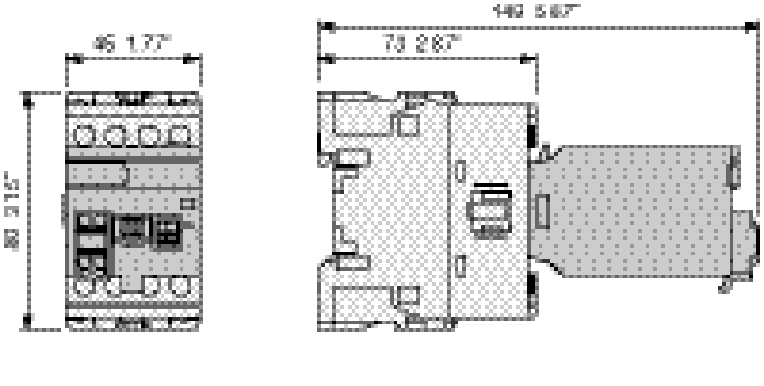
Smart Function Module SFM1



Smart Current and Voltage Sensor Module SCV10-40



Smart Current Sensor Module SC10-40

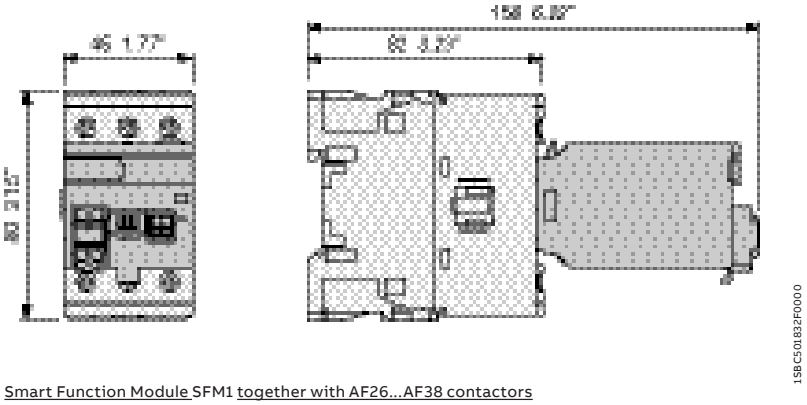


Smart Function Module SFM1 together with AF09...AF16 contactors

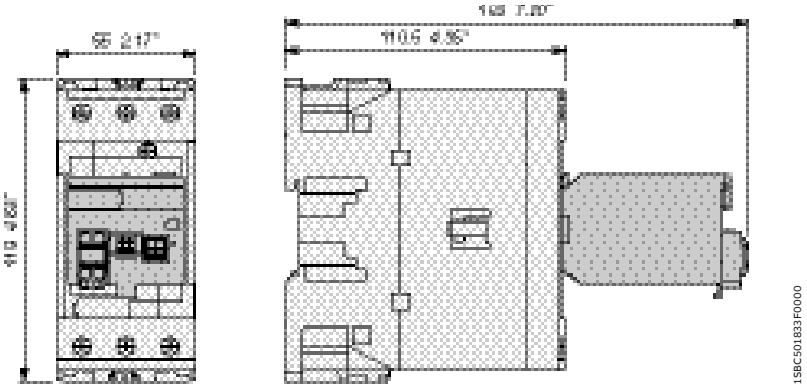
Technical diagrams

—

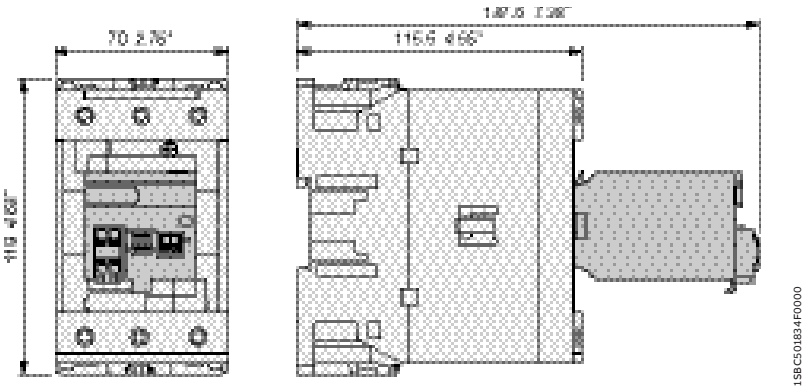
Dimensional drawings
in **mm** and inches



Smart Function Module SFM1 together with AF26...AF38 contactors



Smart Function Module SFM1 together with AF40...AF65 contactors

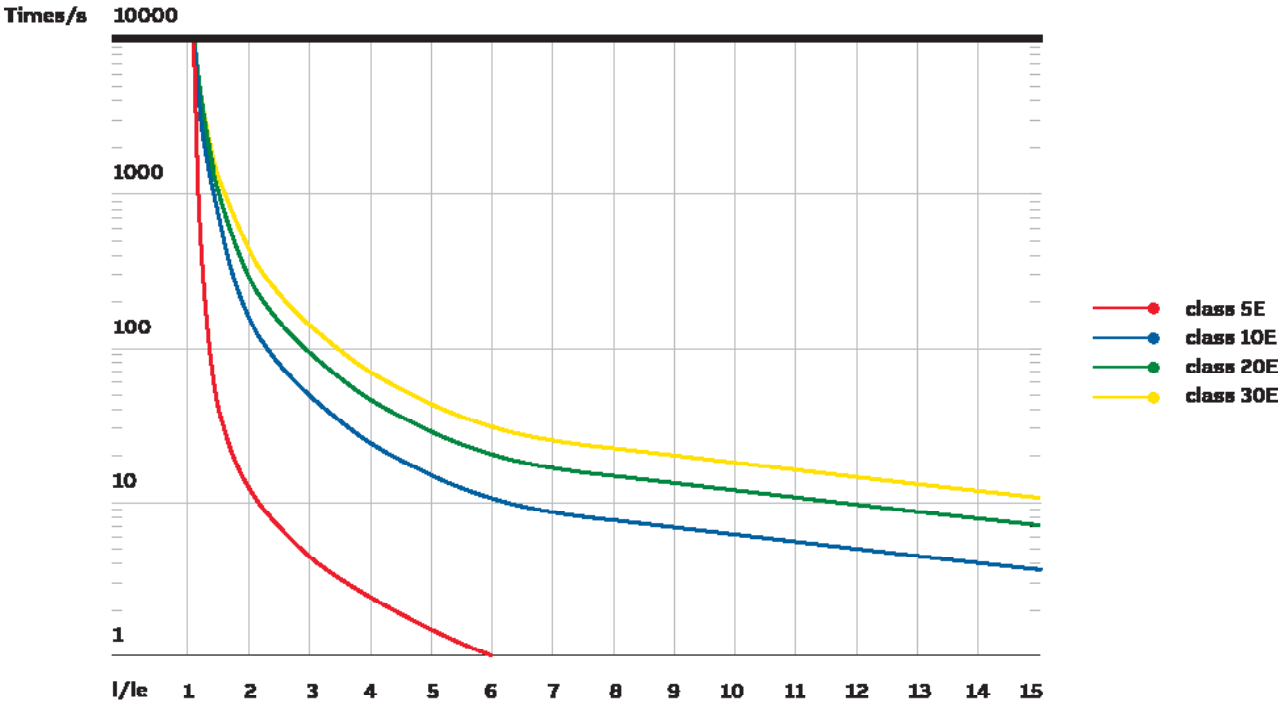


Smart Function Module SFM1 together with AF80, AF96 contactors

Technical diagrams

—

Tripping curves for warm motor for three-phase and single-phase symmetrical loads



2CDC211006V0020

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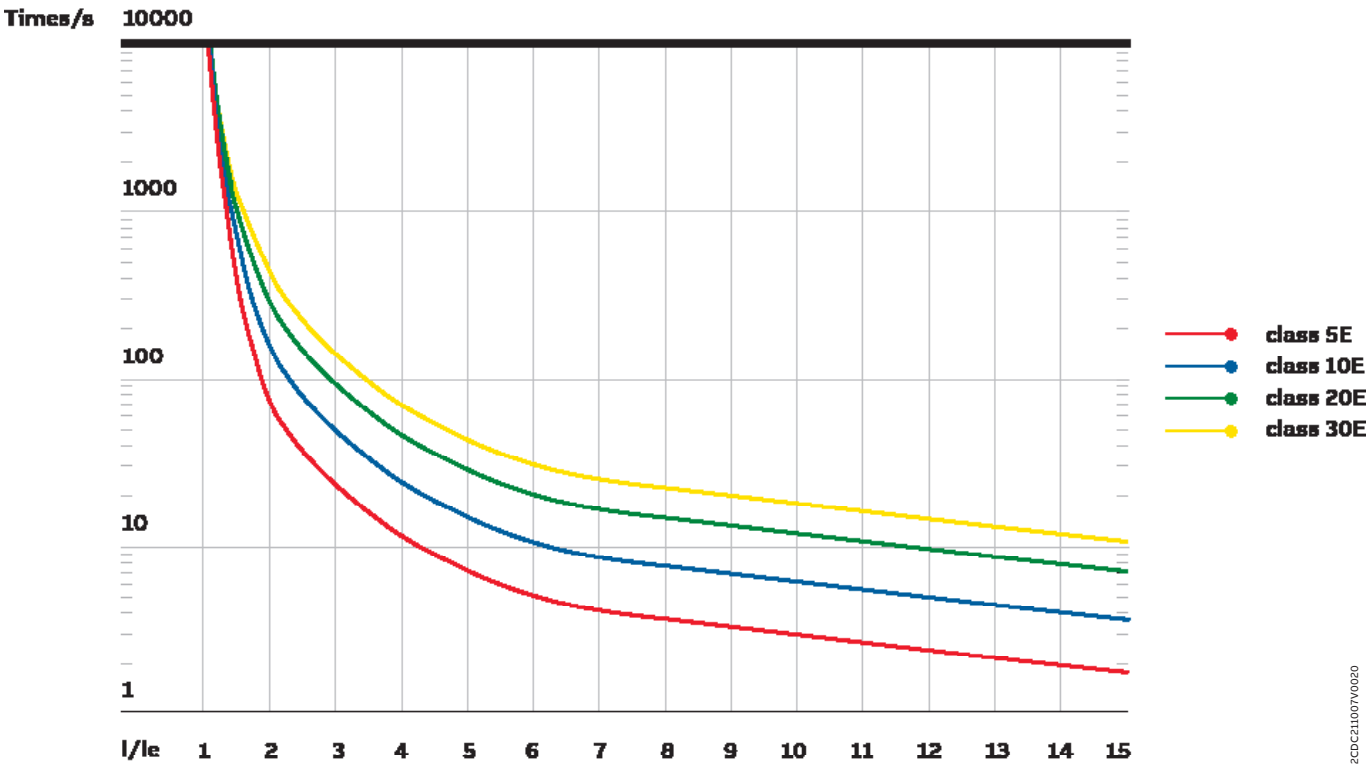
Tripping curves for cold motor for three-phase and single-phase symmetrical loads



2CDC211007V0020

Digitalize motor starting solutions with the all-new ABB Novolink™ motor modules while simplifying engineering and optimizing operations.

AF contactors for motor starting and power switching up to 2850 A

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

Optimized logistics

Cut your costs

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

Continuous operation

Secure uptime

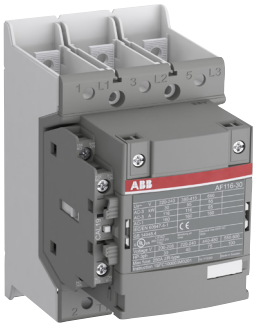
Prevent stoppages caused by voltage fluctuations. The AF contactor ensures distinct operation in unstable networks and signifies a major advance in motor control and power switching.
Voltage sags, dips and surges pose no threat. The AF contactor secures your uptime.

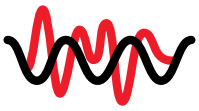
Speed up your projects

Simplify design

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

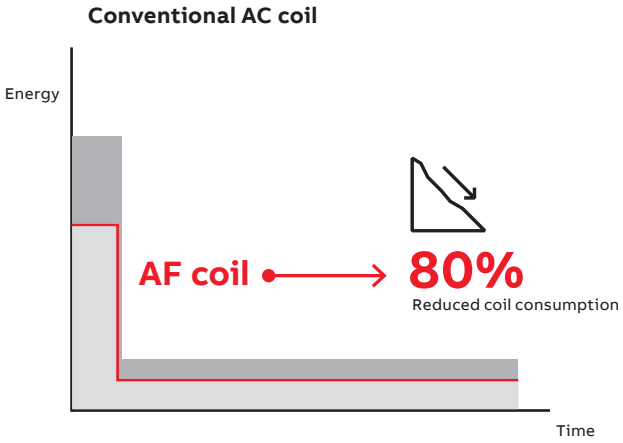
AF technology
Main Benefits





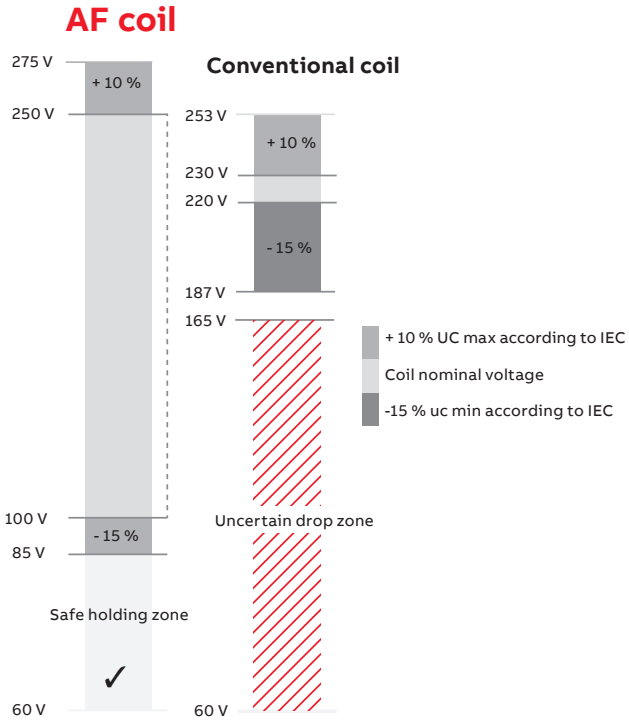
Reliable in all networks

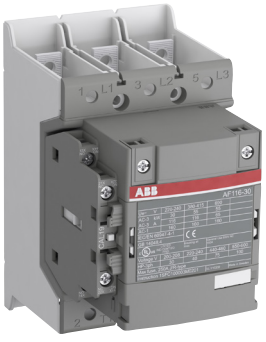
The electronic system within the AF contactor continuously monitors the current and voltage apply to the coil. The contactor is safely operated in an always optimized condition and hum free.

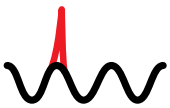


Reduced coil consumption

AF coil and energy consumption is reduced up to 80%. This allows a reduction of the temperature rise, the size of control transformers and size of cabinets.







Wide control voltage range

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

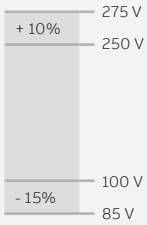
Built-in surge suppression

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

Select AF contactor dedicated to your control circuit application

Direct coil control
Contactor coils are operated directly with an auxiliary contact or PLC-output or indirectly through an interface relay. For direct coil control, the switching capacity of coil operating device (auxiliary contact, solid state PLC-output, ...) must be verified versus the coil consumption at closing and at holding.

AF09...AF2850 - 4 to 400kW - AC / DC operated



AF09...AF370		Coil code
24...60 V	AC / DC	11
48...130 V	AC / DC	12
100...250 V	AC / DC	13
250...500 V	AC / DC	14
AF400...AF1250		
24...60 V	DC	68
48...130 V	AC / DC	69
100...250 V	AC / DC	70
250...500 V	AC / DC	71
AF1350...AF2850		
100...250 V	AC / DC	70

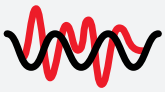
- AC / DC operation
- Wide control voltage range
- With built-in surge protection

AF09Z...AF38Z designed for PLC - 4 to 18.5 kW - 24 V DC operated

Voltage range	Coil code
24 V DC	30

- Allow direct control by 24 V DC ≥ 250 mA PLC-output
- Pull-in consumption 6 W 250 mA
- Holding consumption 1.7 W
- N.O. contact opening time 29 ms and closing time 53 ms
- With built-in surge protection

AF09Z...AF38Z for specific applications - 4 to 18.5 kW - AC / DC operated

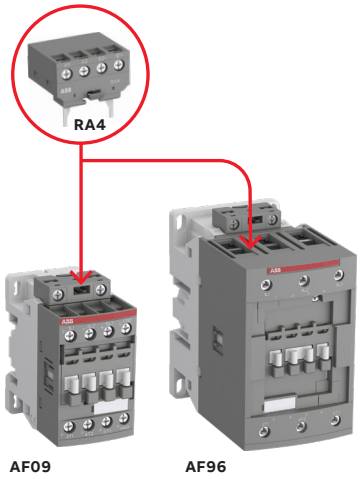


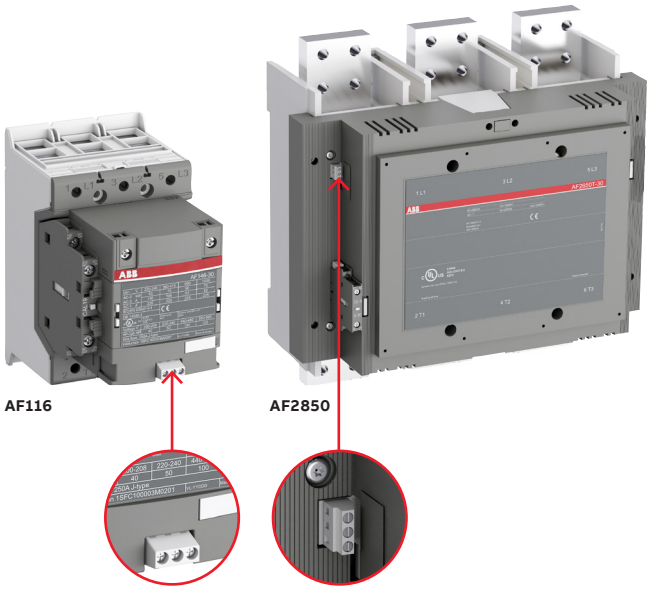
Voltage range		Coil code
12...60 V	DC	20
24...60 V	AC / DC	21
48...130 V	AC / DC	22
100...250 V	AC / DC	23

- Coil 20 covers 12 ... 20 V DC applications
- Coil 21 allows direct control by 24 V DC ≥ 500 mA PLC-output
- Coil 21, 22 and 23 can withstand short voltage sags ans dips with reference to SEMI F47 conditions of use
- With built-in surge protection

Select your AF coil interface for PLC
For contactors up to 2850 A AC-1 / General use

Coil interfaces are offered to operate all contactor size up to AF2850 with very low PLC output signals. They allow a galvanic isolation between the PLC circuit and the contactor coil circuit.

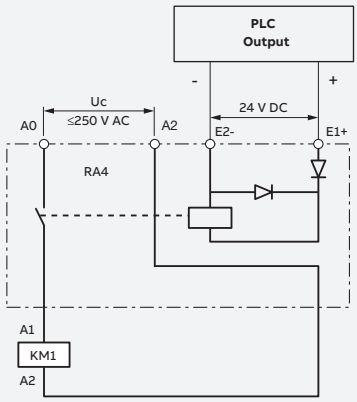




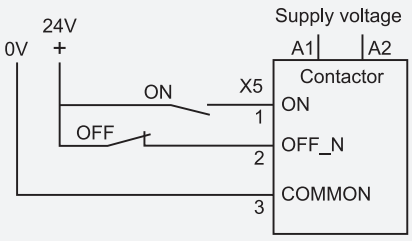
Interface relay
For control with 24 V DC ≥ 20 mA PLC output. RA4 interface relay can be used for rated control circuit voltages Uc 24 ... 250 V 50/60Hz with the standard AF contactors up to 45 kW - 400 V / 60hp - 480 V and with NF contactor relays.

Built-in PLC interface
For control with 24 V DC ≥ 10 mA PLC output. The built-in PLC interface operates the 100 ... 250 V AC / DC or 250 ... 500 V AC / DC AF contactor coil. Available for AF contactors from 55 kW - 400 V / 75 hp up to 560 kW - 400 V /900 hp 480 V and up to 2850 A AC-1 / General use. Dedicated coil code from AF116 up to AF370 and standard feature from AF400 up to AF2850.

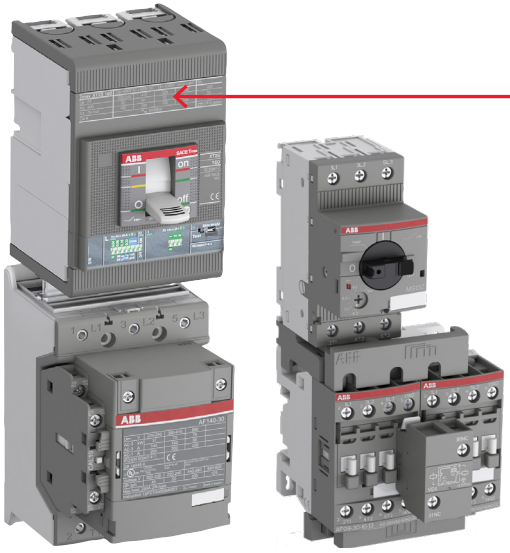
Control circuit with interface relay



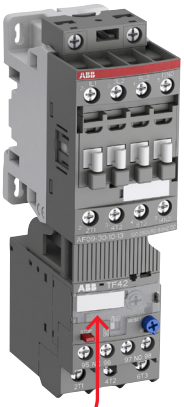
Control inputs with PLC plug



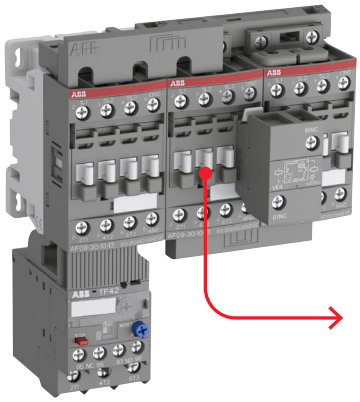
Contactors and motor protection
Advanced but simple



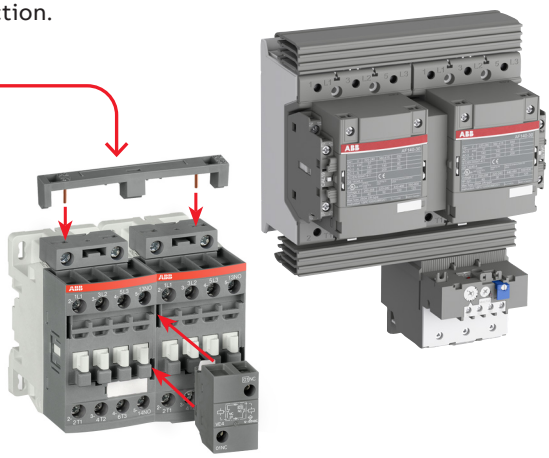
Easy, fast and secure starters assembly
The AF contactor range is perfect for motor starting applications and for solutions where space is limited. You can create any motor starting type and save assembly time with a complete range of accessories and connection sets.



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.



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



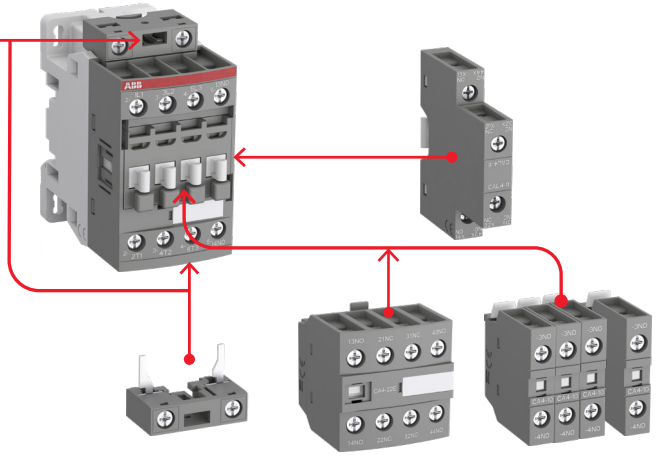
Save space
Interlocking reversing pairs require no spacing between contactors, meaning you can fit more functionality into cabinets or other enclosures.

Contactors and motor protection
Flexible and safe

Easy to use accessories

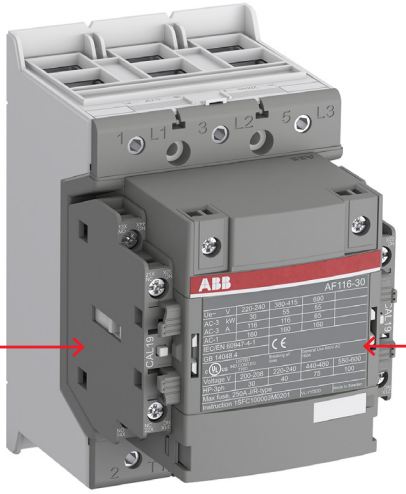
Up to 96 A

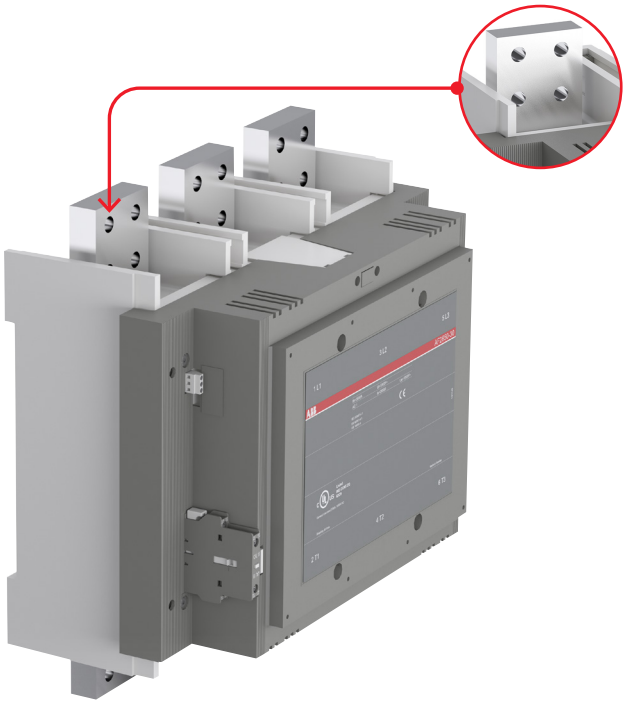
Great flexibility for coil terminal access
Contactors offer free choice of coil terminal access from top, bottom, both top and bottom or front.



Easy to use accessories
1-pole, 2-pole and 4-pole auxiliary contact blocks, front or side mounted, are available for a great flexibility.

Up to 2850 A





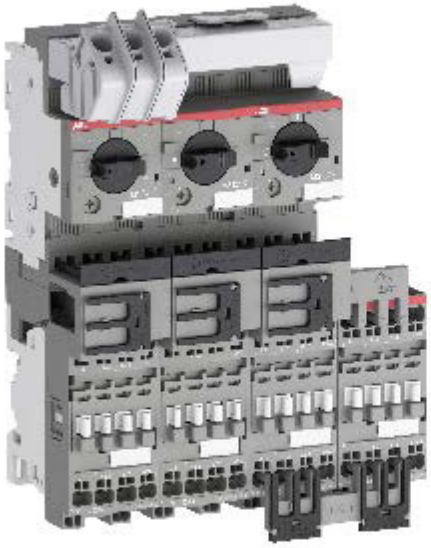
2 side mounted auxiliary contact blocks
AF116 ... AF2850 contactors can take up to 2 side mounted auxiliary contact blocks without adding to its width. Coil connection terminals, mechanical and electrical interlocks and electronic timers are easily connected through the snap-to-connect function.

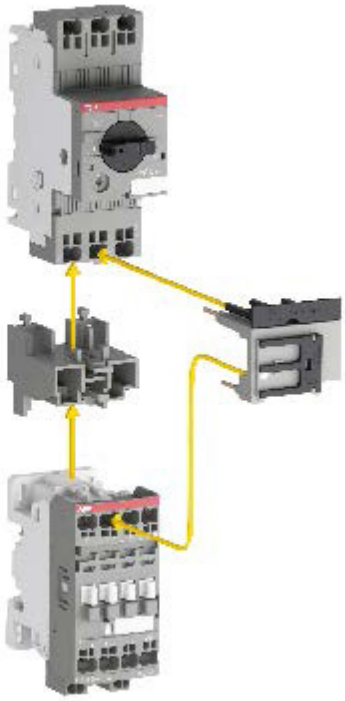
Simple connection and maintenance
The main terminals of AF116 ... AF2850 contactors are at the contactors' back to facilitate your bus bars connections. It also allows easy contact inspection and maintenance from AF400 and above.

Just push it!

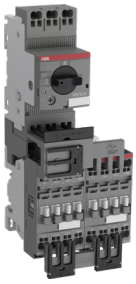
The next evolution in motor starter solutions is here.

So up to 18.5 kW, one push is all you need!





—
Direct on-line Starter



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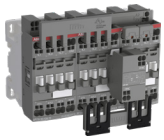
Reversing Starter



—
Star-Delta Starter

—
Save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.

Also available with Push-in technology

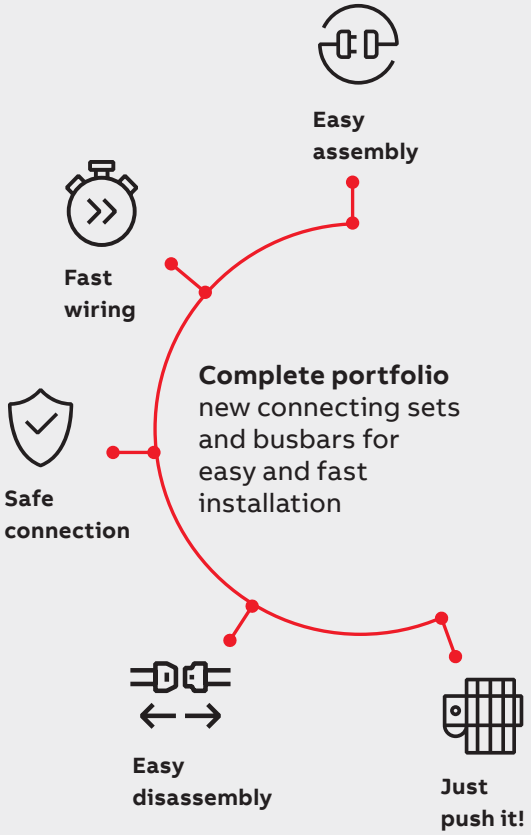
—
Sentry safety relays

—
Monitoring relays

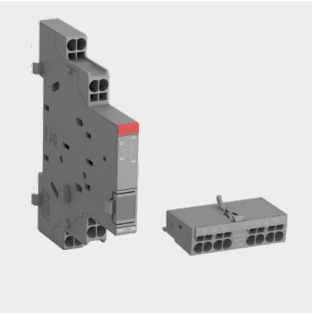
—
Time relays

Benefits / Features

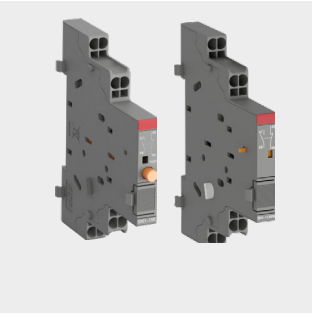
- Fast and intuitive wiring
- Tool-free mounting
- Vibration & shock proof
- Robust design for higher up-time
- Future proof connection technology
- Terminals accessible from the front
- One-hand mounting
- 2-in-1 Push-in / Spring
- Higher connection capacity
- No mounting plate required for starters
- Enabled for automated wiring



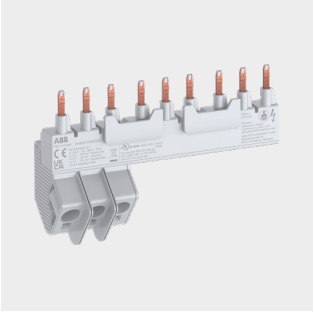
—
CA4..K, CAL4-11K 1, 2 and 4 pole auxiliary contacts



—
HK1-K, HKF1-K auxiliary contacts



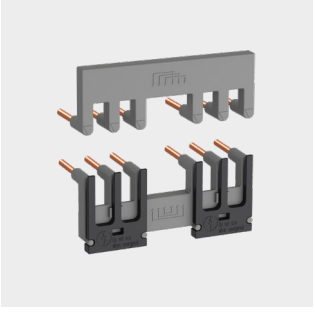
—
SK1-K and SK1-ARK signaling contacts



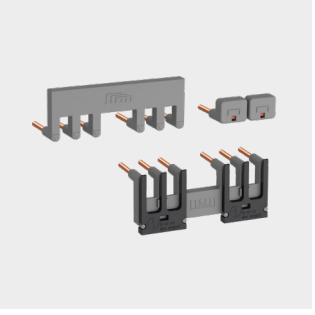
—
PS1-...-65K busbars for 2, 3, 4 or 5 manual motor starters

—
TS1-M3-K terminal spacer for UL Type E/F combination motor controllers

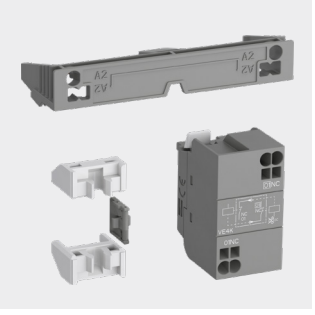
—
BEA16-4KF and BEA38-4KF connecting links with manual motor starters



—
BER16-4KF and BER38-4KF connecting links for reversing starters



—
BEY16-4KF and BEY38-4KF connection sets for Star-Delta starters



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VEM4K electrical and mechanical interlock

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

www.abb.com/productdetails/**1SBL137001R1310**

AF 3-pole contactors

3/42 **Overview**

Ordering details

4 to 200 kW

3/44 AF09 ... AF38 AC / DC operated
3/45 AF09Z ... AF38Z 24 V DC operated designed for PLC
3/46 AF09Z ... AF38Z AC / DC operated for specific applications
3/47 AF40 ... AF96 AC / DC operated
3/48 AF09 … AF96 Contactors and main accessories
3/49 AF116 ... AF146 AC / DC operated
3/50 AF116 ... AF146 AC / DC operated for faster opening utilization
3/51 AF190 ... AF370 AC / DC operated
3/52 AF190 ... AF370 AC / DC operated for faster opening utilization
3/53 AF116 ... AF370 Contactors and main accessories

4 to 560 kW (up to 2850 A AC-1) - with 1 N.O. + 1 N.C.

3/54 AF26 ... AF38 AC / DC operated
3/55 AF26Z ... AF38Z AC / DC operated for specific applications
3/56 AF26 ... AF38 Contactors and main accessories
3/57 AF40 ... AF96 AC / DC operated
3/58 AF40 ... AF96 Contactors and main accessories
3/59 AF116 ... AF146 AC / DC operated
3/60 AF116 ... AF146 AC / DC operated for faster opening utilization
3/61 AF190 ... AF370 AC / DC operated
3/62 AF190 ... AF370 AC / DC operated for faster opening utilization
3/63 AF116 ... AF370 Contactors and main accessories
3/64 AF400 ... AF750 AC / DC operated
3/65 AF1250 ... AF2850 AC / DC operated
3/66 AF1350T ... AF2850T AC / DC operated
3/67 AF400 ... AF2850 Main accessories

4 to 560 kW (up to 2850 A AC-1) - with 2 N.O. + 2 N.C.

3/68 AF09 ... AF38 AC / DC operated
3/69 AF09Z ... AF38Z AC / DC operated for specific applications
3/70 AF40 ... AF96 AC / DC operated
3/71 AF09 … AF96 Contactors and main accessories
3/72 AF116 ... AF146 AC / DC operated
3/73 AF116 ... AF146 AC / DC operated for faster opening utilization
3/74 AF190 ... AF370 AC / DC operated
3/75 AF190 ... AF370 AC / DC operated for faster opening utilization
3/76 AF116 ... AF370 Contactors and main accessories
3/77 AF400 ... AF750 AC / DC operated
3/78 AF1250 ... AF2850 AC / DC operated
3/79 AF400 ... AF2850 Contactors and main accessories

3/80 **Technical data**

3/104 **Electrical durability**

3-pole contactors, for motor control and power switching

AC / DC Control supply				Type	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
IEC	AC-3	Rated operational power	220 - 230 - 240 V	kW	2.2	3	4	6.5	9	11	11	15	18.5	22	30
		θ ≤ 60 °C for AF09 ... AF370	380 - 400 V	kW	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45/55
		θ ≤ 55 °C for AF400 ... AF2650	415 V	kW	4	5.5	9	11	15	18.5	22	30	37	45	55
			440 V	kW	4	5.5	9	15	18.5	22	22	30	37	45	55
			500 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55
			690 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55
			1000 V	kW	—	—	—	—	—	—	—	—	—	35	40
		Rated operational current	380 - 400 V	A	9	12	18	26	32	38	40	53	65	80	105
	AC-1	Rated operational current	θ ≤ 40 °C, 690 V	A	25	28	30	45	50	50	70	100	105	125	130
UL / CSA	1-phase motor rating		120 V	hp	0.75	1	1.5	2	2	2	3	3	5	7.5	7.5
			240 V	hp	1.5	2	3	3	5	5	7.5	10	15	15	20
	3-phase motor rating		200 - 208 V	hp	2	3	5	7.5	10	10	10	15	20	25	30
			220 - 240 V	hp	2	3	5	7.5	10	10	15	20	25	30	40
			440 - 480 V	hp	5	7.5	10	15	20	25	30	40	50	60	60/75
			550 - 600 V	hp	7.5	10	15	20	25	30	40	50	60	75	75
	General use rating		600 V	A	25	28	30	45	50	50	60	80	90	105	115
NEMA	NEMA Size				00	0	—	1	—	—	2	—	—	3	—

Main accessories

Auxiliary contact blocks	Front mounting	CA4-10 (1 x N.O.) CA4-01 (1 x N.C.)				
	Side mounting	CAL4-11 (1 x N.O. + 1 x N.C.)				
Timers	Electronic	TEF4-ON TEF4-OFF				
Interlocking units	Mechanical	VM4		VM96-4		
	Mechanical / Electrical	VEM4				
Connection sets	For reversing contactors	BER16-4	BER38-4	BER65-4	BER96-4	
Surge suppressors		Built-in surge protection				

Overload relays

Thermal relays	Class 10 (Class 10A for TF140, TA200DU)	TF42 (0.10...38 A)		TF65 (22...67 A)	TF96 (40...96 A)	
Electronic relays	Class 10E, 20E, 30E	EF19 (0.10...18.9 A)	EF19 (0.10...18.9 A) EF45 (9...45 A)	EF65 (20...70 A)	EF96 (36...100 A)	

Manual motor starters

	Thermal / magnetic protection Class 10	MS116 (0.10...32 A) Ics up to 50 kA for class 10 A		MS165 (10...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	BEA65-4 (2)

(1) MS165/MO165 are suitable for use with AF09 ... AF30 for North american applications.
(2) BEA65-4 suitable for MS165 and MO165 only.
(3) −5 ... +40 °C for TA200-V1000

	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
	30	37	45	55	55	75	90	110	110	132	160	220	—	257	315	—	—	—
	55	75	75	90	110	132	160	200	200	250	315	400	—	475	560	—	—	—
	55	75	75	90	110	132	160	200	220	250	355	425	—	500	630	—	—	—
	75	90	90	110	132	160	160	200	220	250	355	450	—	560	710	—	—	—
	75	90	90	110	132	160	200	250	250	315	400	520	—	560	710	—	—	—
	55	75	90	132	160	200	250	315	315	355	500	600	—	800	1000	—	—	—
	—	—	75	110	132	160	185	200	220	280	355	400	—	—	—	—	—	—
	116	140	146	190	205	265	305	370	400	460	580	750	—	860	1060	—	—	—
	160	200	225	275	350	400	500	600	600	700	800	1050	1260	1350	1650	2050	2650	2850

	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	30	40	40	50	60	75	100	125	125	150	200	250	—	—	—	—	—	—
	40	50	50	60	75	100	125	150	150	200	250	300	—	400	450	—	—	—
	75	100	100	125	150	200	250	300	350	400	500	600	—	800	900	—	—	—
	100	125	125	150	200	250	300	350	400	500	600	700	—	1000	1150	—	—	—
	160	200	200	250	300	350	400	520	550	650	750	900	1210	1350	1650	2100	2700	2850
	—	4	—	—	—	5	—	—	—	6	—	7	—	—	8	—	—	—

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

	TF140DU (66...142 A) θ ≤ 55 °C			TA200DU (66...200 A) θ ≤ 55 °C(3)														
	EF146 (54...150 A)			EF205 (63...210 A)		EF370 (115...380 A)			EF460 (150...500 A)		EF750 (250...800 A)			EF1250DU (350...1250 A)				

03

AF09 ... AF38 3-pole contactors

4 to 18.5 kW

AC / DC operated

AF09-30-10

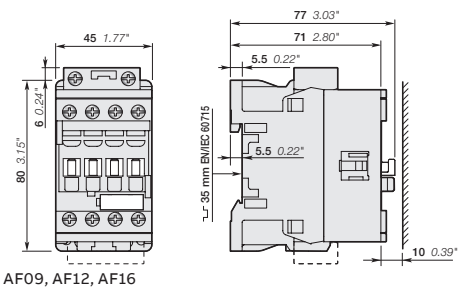
AF26-30-00

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

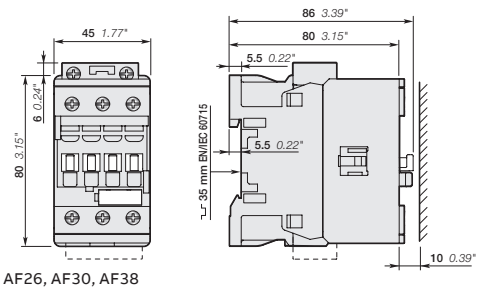
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	24...60	20...60 (1)	1 0	AF09-30-10-11	1SBL137001R1110	0.270
						0 1	AF09-30-01-11	1SBL137001R1101	0.270
				48...130	48...130	1 0	AF09-30-10-12	1SBL137001R1210	0.270
						0 1	AF09-30-01-12	1SBL137001R1201	0.270
				100...250	100...250	1 0	AF09-30-10-13	1SBL137001R1310	0.270
						0 1	AF09-30-01-13	1SBL137001R1301	0.270
				250...500	250...500	1 0	AF09-30-10-14	1SBL137001R1410	0.310
						0 1	AF09-30-01-14	1SBL137001R1401	0.310
5.5	28	7.5	28	24...60	20...60 (1)	1 0	AF12-30-10-11	1SBL157001R1110	0.270
						0 1	AF12-30-01-11	1SBL157001R1101	0.270
				48...130	48...130	1 0	AF12-30-10-12	1SBL157001R1210	0.270
						0 1	AF12-30-01-12	1SBL157001R1201	0.270
				100...250	100...250	1 0	AF12-30-10-13	1SBL157001R1310	0.270
						0 1	AF12-30-01-13	1SBL157001R1301	0.270
				250...500	250...500	1 0	AF12-30-10-14	1SBL157001R1410	0.310
						0 1	AF12-30-01-14	1SBL157001R1401	0.310
7.5	30	10	30	24...60	20...60 (1)	1 0	AF16-30-10-11	1SBL177001R1110	0.270
						0 1	AF16-30-01-11	1SBL177001R1101	0.270
				48...130	48...130	1 0	AF16-30-10-12	1SBL177001R1210	0.270
						0 1	AF16-30-01-12	1SBL177001R1201	0.270
				100...250	100...250	1 0	AF16-30-10-13	1SBL177001R1310	0.270
						0 1	AF16-30-01-13	1SBL177001R1301	0.270
				250...500	250...500	1 0	AF16-30-10-14	1SBL177001R1410	0.310
						0 1	AF16-30-01-14	1SBL177001R1401	0.310
11	45	15	45	24...60	20...60 (1)	0 0	AF26-30-00-11	1SBL237001R1100	0.310
				48...130	48...130	0 0	AF26-30-00-12	1SBL237001R1200	0.310
				100...250	100...250	0 0	AF26-30-00-13	1SBL237001R1300	0.310
				250...500	250...500	0 0	AF26-30-00-14	1SBL237001R1400	0.350
15	50	20	50	24...60	20...60 (1)	0 0	AF30-30-00-11	1SBL277001R1100	0.310
				48...130	48...130	0 0	AF30-30-00-12	1SBL277001R1200	0.310
				100...250	100...250	0 0	AF30-30-00-13	1SBL277001R1300	0.310
				250...500	250...500	0 0	AF30-30-00-14	1SBL277001R1400	0.350
18.5	50	25	50	24...60	20...60 (1)	0 0	AF38-30-00-11	1SBL297001R1100	0.310
				48...130	48...130	0 0	AF38-30-00-12	1SBL297001R1200	0.310
				100...250	100...250	0 0	AF38-30-00-13	1SBL297001R1300	0.310
				250...500	250...500	0 0	AF38-30-00-14	1SBL297001R1400	0.350

(1) AF..-30-..-11 not suitable for direct control by PLC-output.



AF09, AF12, AF16



AF26, AF30, AF38

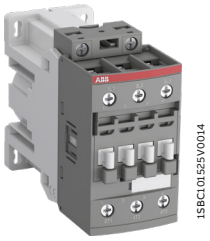
Main dimensions mm, inches

AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

24 V DC operated designed for PLC

AF09Z-30-10



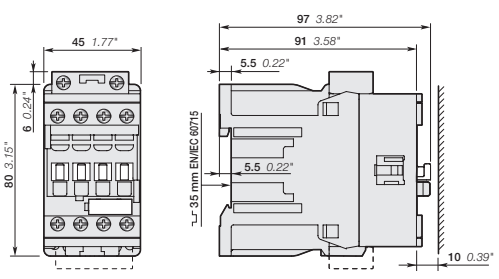
AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

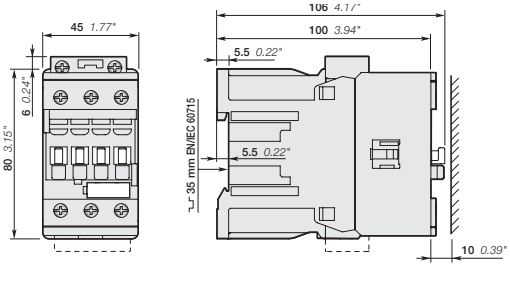
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

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 DC				kg
4	25	5	25	24	1 0	AF09Z-30-10-30	1SBL136001R3010	0.430
					0 1	AF09Z-30-01-30	1SBL136001R3001	0.430
5.5	28	7.5	28	24	1 0	AF12Z-30-10-30	1SBL156001R3010	0.430
					0 1	AF12Z-30-01-30	1SBL156001R3001	0.430
7.5	30	10	30	24	1 0	AF16Z-30-10-30	1SBL176001R3010	0.430
					0 1	AF16Z-30-01-30	1SBL176001R3001	0.430
11	45	15	45	24	0 0	AF26Z-30-00-30	1SBL236001R3000	0.480
15	50	20	50	24	0 0	AF30Z-30-00-30	1SBL276001R3000	0.480
18.5	50	25	50	24	0 0	AF38Z-30-00-30	1SBL296001R3000	0.480

Note: AF..Z contactors with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF12Z, AF16Z



AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

03

AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications

AF09Z-30-10

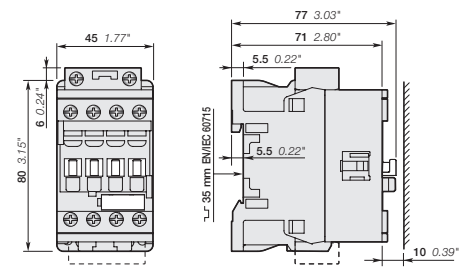
AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

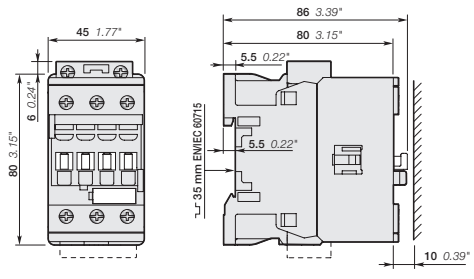
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	-	12...20	1 0	AF09Z-30-10-20	1SBL136001R2010	0.310
						0 1	AF09Z-30-01-20	1SBL136001R2001	0.310
				24...60	20...60	1 0	AF09Z-30-10-21	1SBL136001R2110	0.310
						0 1	AF09Z-30-01-21	1SBL136001R2101	0.310
				48...130	48...130	1 0	AF09Z-30-10-22	1SBL136001R2210	0.310
						0 1	AF09Z-30-01-22	1SBL136001R2201	0.310
				100...250	100...250	1 0	AF09Z-30-10-23	1SBL136001R2310	0.310
						0 1	AF09Z-30-01-23	1SBL136001R2301	0.310
5.5	28	7.5	28	-	12...20	1 0	AF12Z-30-10-20	1SBL156001R2010	0.310
						0 1	AF12Z-30-01-20	1SBL156001R2001	0.310
				24...60	20...60	1 0	AF12Z-30-10-21	1SBL156001R2110	0.310
						0 1	AF12Z-30-01-21	1SBL156001R2101	0.310
				48...130	48...130	1 0	AF12Z-30-10-22	1SBL156001R2210	0.310
						0 1	AF12Z-30-01-22	1SBL156001R2201	0.310
				100...250	100...250	1 0	AF12Z-30-10-23	1SBL156001R2310	0.310
						0 1	AF12Z-30-01-23	1SBL156001R2301	0.310
7.5	30	10	30	-	12...20	1 0	AF16Z-30-10-20	1SBL176001R2010	0.310
						0 1	AF16Z-30-01-20	1SBL176001R2001	0.310
				24...60	20...60	1 0	AF16Z-30-10-21	1SBL176001R2110	0.310
						0 1	AF16Z-30-01-21	1SBL176001R2101	0.310
				48...130	48...130	1 0	AF16Z-30-10-22	1SBL176001R2210	0.310
						0 1	AF16Z-30-01-22	1SBL176001R2201	0.310
				100...250	100...250	1 0	AF16Z-30-10-23	1SBL176001R2310	0.310
						0 1	AF16Z-30-01-23	1SBL176001R2301	0.310
11	45	15	45	-	12...20	0 0	AF26Z-30-00-20	1SBL236001R2000	0.350
				24...60	20...60	0 0	AF26Z-30-00-21	1SBL236001R2100	0.350
				48...130	48...130	0 0	AF26Z-30-00-22	1SBL236001R2200	0.350
				100...250	100...250	0 0	AF26Z-30-00-23	1SBL236001R2300	0.350
15	50	20	50	-	12...20	0 0	AF30Z-30-00-20	1SBL276001R2000	0.350
				24...60	20...60	0 0	AF30Z-30-00-21	1SBL276001R2100	0.350
				48...130	48...130	0 0	AF30Z-30-00-22	1SBL276001R2200	0.350
				100...250	100...250	0 0	AF30Z-30-00-23	1SBL276001R2300	0.350
18.5	50	25	50	-	12...20	0 0	AF38Z-30-00-20	1SBL296001R2000	0.350
				24...60	20...60	0 0	AF38Z-30-00-21	1SBL296001R2100	0.350
				48...130	48...130	0 0	AF38Z-30-00-22	1SBL296001R2200	0.350
				100...250	100...250	0 0	AF38Z-30-00-23	1SBL296001R2300	0.350

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF12Z, AF16Z

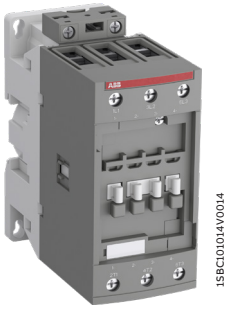


AF26Z, AF30Z, AF38Z

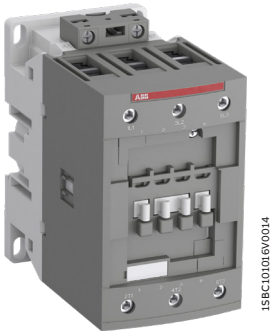
AF40 ... AF96 3-pole contactors

18.5 to 45 kW

AC / DC operated



AF40-30-00



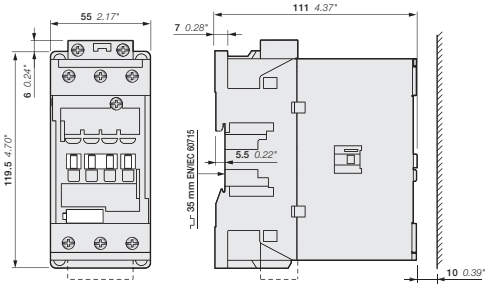
AF80-30-00

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

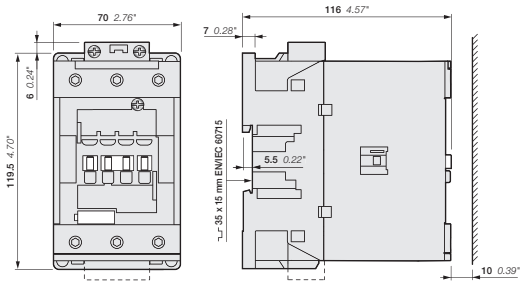
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
18.5	70	30	60	24...60	20...60 (1)	0 0	AF40-30-00-11	1SBL347001R1100	0.970
				48...130	48...130	0 0	AF40-30-00-12	1SBL347001R1200	0.970
				100...250	100...250	0 0	AF40-30-00-13	1SBL347001R1300	0.950
				250...500	250...500	0 0	AF40-30-00-14	1SBL347001R1400	0.950
22	100	40	80	24...60	20...60 (1)	0 0	AF52-30-00-11	1SBL367001R1100	0.970
				48...130	48...130	0 0	AF52-30-00-12	1SBL367001R1200	0.970
				100...250	100...250	0 0	AF52-30-00-13	1SBL367001R1300	0.950
				250...500	250...500	0 0	AF52-30-00-14	1SBL367001R1400	0.950
30	105	50	90	24...60	20...60 (1)	0 0	AF65-30-00-11	1SBL387001R1100	0.970
				48...130	48...130	0 0	AF65-30-00-12	1SBL387001R1200	0.970
				100...250	100...250	0 0	AF65-30-00-13	1SBL387001R1300	0.950
				250...500	250...500	0 0	AF65-30-00-14	1SBL387001R1400	0.950
37	125	60	105	24...60	20...60 (1)	0 0	AF80-30-00-11	1SBL397001R1100	1.220
				48...130	48...130	0 0	AF80-30-00-12	1SBL397001R1200	1.220
				100...250	100...250	0 0	AF80-30-00-13	1SBL397001R1300	1.170
				250...500	250...500	0 0	AF80-30-00-14	1SBL397001R1400	1.170
45/55	130	60/75	115	24...60	20...60 (1)	0 0	AF96-30-00-11	1SBL407001R1100	1.220
				48...130	48...130	0 0	AF96-30-00-12	1SBL407001R1200	1.220
				100...250	100...250	0 0	AF96-30-00-13	1SBL407001R1300	1.170
				250...500	250...500	0 0	AF96-30-00-14	1SBL407001R1400	1.170

(1) For control by PLC-output, use RA4 interface relay.



AF40, AF52, AF65

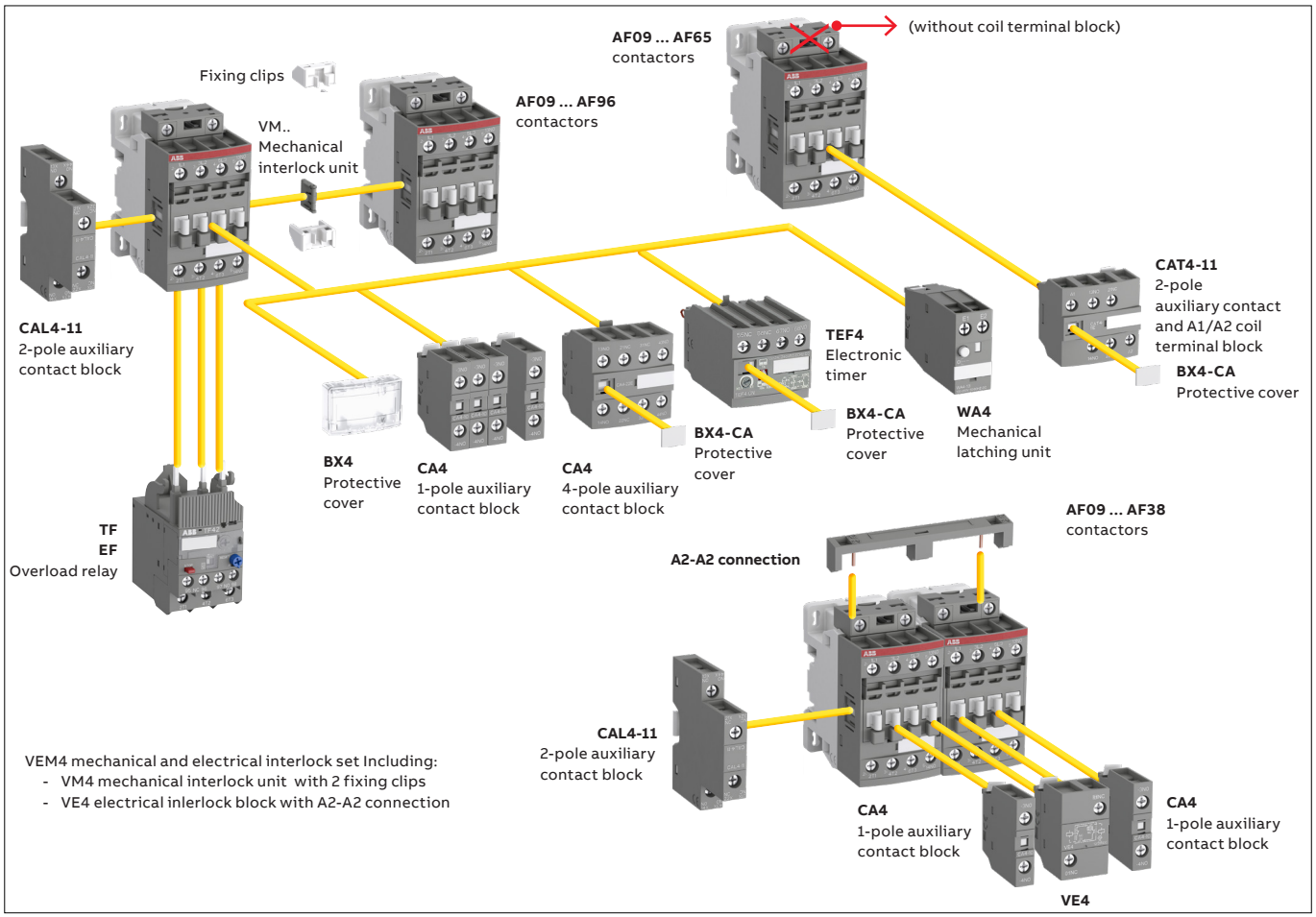


AF80, AF96

Main dimensions mm, inches

AF09 ... AF96 3-pole contactors

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	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 (2)	VEM4		2-pole CAL4-11 Left side	2-pole CAL4-11 Right side
AF09(Z) ... AF38(Z) (1)											
AF09 ... AF16	3 0	0 1	4 max.	or 1	or 1	or 1	or 1	–	+	1	–
AF09 ... AF16	3 0	1 0	2 max.	or 1	–	or 1	or 1	–	+	1	+ 1
AF26 ... AF38	3 0	0 0	3 max.	–	–	–	–	+ 1 (3)	+	1	or 1
AF09Z ... AF38Z 24 V DC designed for PLC - coil 30 (1)											
AF09Z ... AF16Z	3 0	0 1	4 max.	–	or 1	or 1	–	– (3)	or	1	+ 1
AF09Z ... AF16Z	3 0	1 0	2 max.	–	–	or 1	–	– (3)	+	1	or 1
AF26Z ... AF38Z	3 0	0 0	–	–	–	1	–	–	+	1	+ 1
AF40 ... AF96											
AF40 ... AF65	3 0	0 0	4 max.	or 1	or 1	or 1	or 1	–	+	1	+ 1
AF80, AF96	3 0	0 0	4 max.	–	or 1	or 1	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 AF09...AF65 and WA4-96 for AF80, AF96.
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.
For WA4 accessory use with contactor coil 30, please consult your ABB local sales organization.
(3) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

Overload relays fitting details (4)

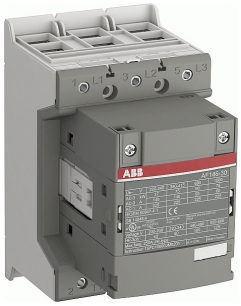
Contactor types	Thermal overload relays	Electronic overload relays
AF09 ... AF38	TF42 (0.10...38 A)	EF19 (0.10...19 A)
AF26 ... AF38	TF42 (0.10...38 A)	EF45 (9...45 A)
AF40 ... AF65	TF65 (22...67 A)	EF65 (20...70 A)
AF80, AF96	TF96 (40...96 A)	EF96 (36...100 A)

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

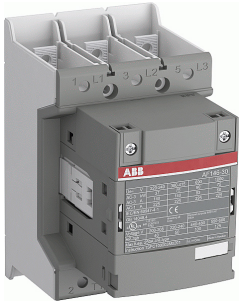
AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated



AF146-30-00



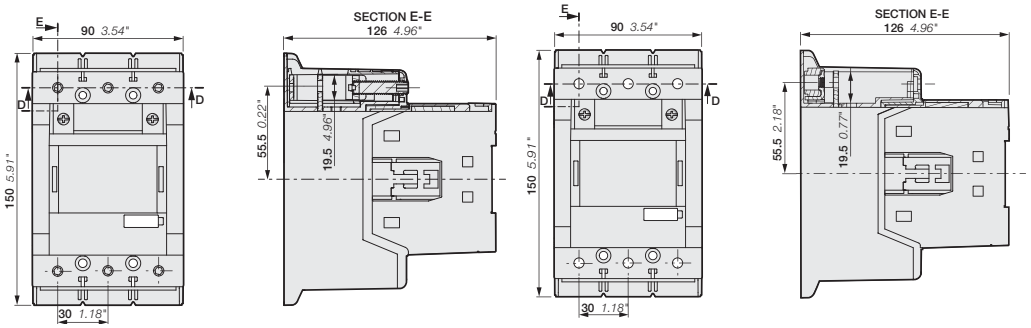
AF146-30-00B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	24...60	20...60	0 0	AF116-30-00-11	1SFL427001R1100	1.750
				48...130	48...130	0 0	AF116-30-00-12	1SFL427001R1200	1.750
				100...250	100...250	0 0	AF116-30-00-13	1SFL427001R1300	1.750
				250...500	250...500	0 0	AF116-30-00-14	1SFL427001R1400	1.750
75	200	100	200	24...60	20...60	0 0	AF140-30-00-11	1SFL447001R1100	1.750
				48...130	48...130	0 0	AF140-30-00-12	1SFL447001R1200	1.750
				100...250	100...250	0 0	AF140-30-00-13	1SFL447001R1300	1.750
				250...500	250...500	0 0	AF140-30-00-14	1SFL447001R1400	1.750
75	225	100	200	24...60	20...60	0 0	AF146-30-00-11	1SFL467001R1100	1.750
				48...130	48...130	0 0	AF146-30-00-12	1SFL467001R1200	1.750
				100...250	100...250	0 0	AF146-30-00-13	1SFL467001R1300	1.750
				250...500	250...500	0 0	AF146-30-00-14	1SFL467001R1400	1.750
With bar connections									
55	160	75	160	24...60	20...60	0 0	AF116-30-00B-11	1SFL427002R1100	1.500
				48...130	48...130	0 0	AF116-30-00B-12	1SFL427002R1200	1.500
				100...250	100...250	0 0	AF116-30-00B-13	1SFL427002R1300	1.500
				250...500	250...500	0 0	AF116-30-00B-14	1SFL427002R1400	1.500
75	200	100	200	24...60	20...60	0 0	AF140-30-00B-11	1SFL447002R1100	1.500
				48...130	48...130	0 0	AF140-30-00B-12	1SFL447002R1200	1.500
				100...250	100...250	0 0	AF140-30-00B-13	1SFL447002R1300	1.500
				250...500	250...500	0 0	AF140-30-00B-14	1SFL447002R1400	1.500
75	225	100	200	24...60	20...60	0 0	AF146-30-00B-11	1SFL467002R1100	1.500
				48...130	48...130	0 0	AF146-30-00B-12	1SFL467002R1200	1.500
				100...250	100...250	0 0	AF146-30-00B-13	1SFL467002R1300	1.500
				250...500	250...500	0 0	AF146-30-00B-14	1SFL467002R1400	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-00

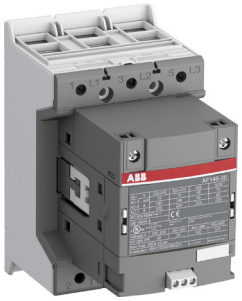
AF116, AF140, AF146-30-00B

Main dimensions mm, inches

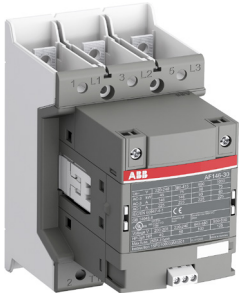
AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated for faster opening utilization



AF146-30-00



AF146-30-00B

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

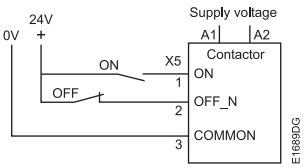
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...500 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

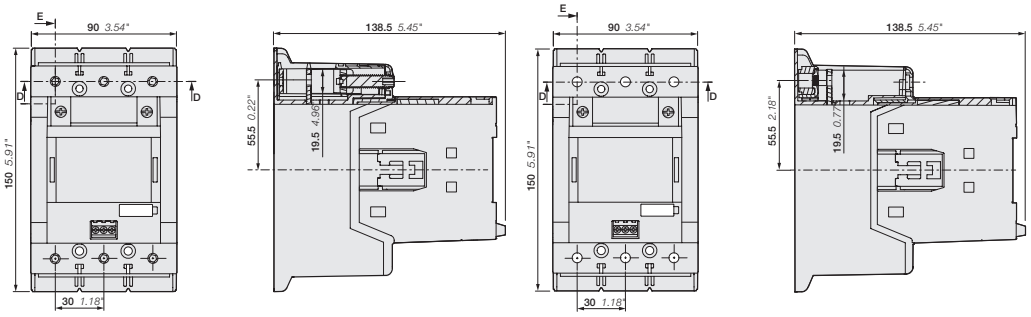
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	100...250	100...250	0 0	AF116-30-00-33	1SFL427001R3300	1.750
				250...500	250...500	0 0	AF116-30-00-34	1SFL427001R3400	1.750
75	200	100	200	100...250	100...250	0 0	AF140-30-00-33	1SFL447001R3300	1.750
				250...500	250...500	0 0	AF140-30-00-34	1SFL447001R3400	1.750
75	225	100	200	100...250	100...250	0 0	AF146-30-00-33	1SFL467001R3300	1.750
				250...500	250...500	0 0	AF146-30-00-34	1SFL467001R3400	1.750
With bar connections									
55	160	75	160	100...250	100...250	0 0	AF116-30-00B-33	1SFL427002R3300	1.500
				250...500	250...500	0 0	AF116-30-00B-34	1SFL427002R3400	1.500
75	200	100	200	100...250	100...250	0 0	AF140-30-00B-33	1SFL447002R3300	1.500
				250...500	250...500	0 0	AF140-30-00B-34	1SFL447002R3400	1.500
75	225	100	200	100...250	100...250	0 0	AF146-30-00B-33	1SFL467002R3300	1.500
				250...500	250...500	0 0	AF146-30-00B-34	1SFL467002R3400	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF116, AF140, AF146-30-00

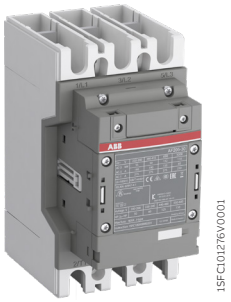
AF116, AF140, AF146-30-00B

Main dimensions mm, inches

AF190 ... AF370 3-pole contactors

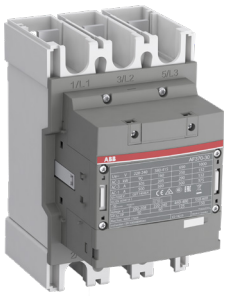
90 to 200 kW

AC / DC operated



1SFC101276V0001

AF205-30-00



1SFC101273V0001

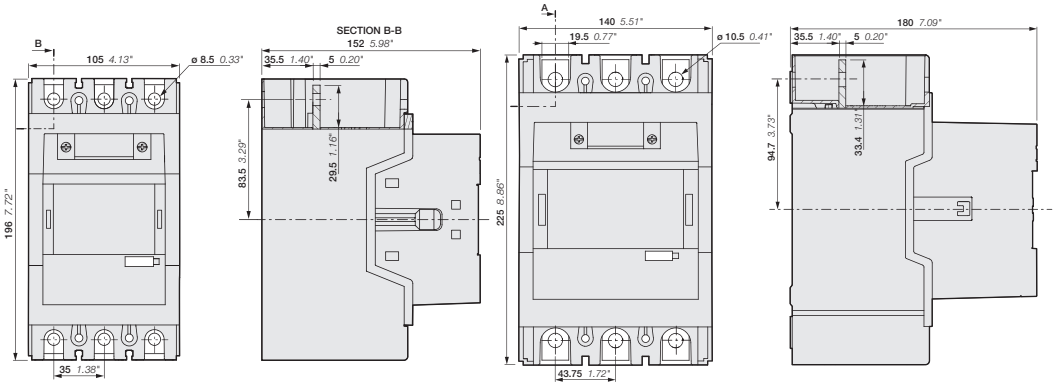
AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	24...60	20...60	0 0	AF190-30-00-11	1SFL487002R1100	3.000
				48...130	48...130	0 0	AF190-30-00-12	1SFL487002R1200	3.000
				100...250	100...250	0 0	AF190-30-00-13	1SFL487002R1300	3.000
				250...500	250...500	0 0	AF190-30-00-14	1SFL487002R1400	3.000
110	350	150	300	24...60	20...60	0 0	AF205-30-00-11	1SFL527002R1100	3.000
				48...130	48...130	0 0	AF205-30-00-12	1SFL527002R1200	3.000
				100...250	100...250	0 0	AF205-30-00-13	1SFL527002R1300	3.000
				250...500	250...500	0 0	AF205-30-00-14	1SFL527002R1400	3.000
132	400	200	350	24...60	20...60	0 0	AF265-30-00-11	1SFL547002R1100	4.605
				48...130	48...130	0 0	AF265-30-00-12	1SFL547002R1200	4.605
				100...250	100...250	0 0	AF265-30-00-13	1SFL547002R1300	4.605
				250...500	250...500	0 0	AF265-30-00-14	1SFL547002R1400	4.605
160	500	250	400	24...60	20...60	0 0	AF305-30-00-11	1SFL587002R1100	4.605
				48...130	48...130	0 0	AF305-30-00-12	1SFL587002R1200	4.605
				100...250	100...250	0 0	AF305-30-00-13	1SFL587002R1300	4.605
				250...500	250...500	0 0	AF305-30-00-14	1SFL587002R1400	4.605
200	600	300	520	24...60	20...60	0 0	AF370-30-00-11	1SFL607002R1100	4.605
				48...130	48...130	0 0	AF370-30-00-12	1SFL607002R1200	4.605
				100...250	100...250	0 0	AF370-30-00-13	1SFL607002R1300	4.605
				250...500	250...500	0 0	AF370-30-00-14	1SFL607002R1400	4.605

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205

AF265, AF305, AF370

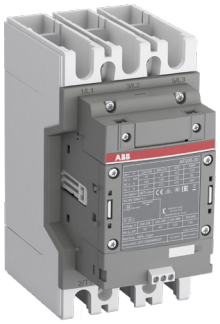
Main dimensions mm, inches

03

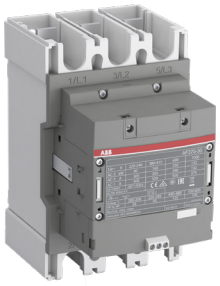
AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated for faster utilization



AF205-30-00



AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

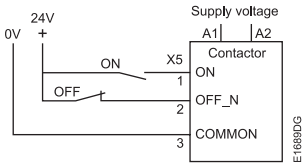
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

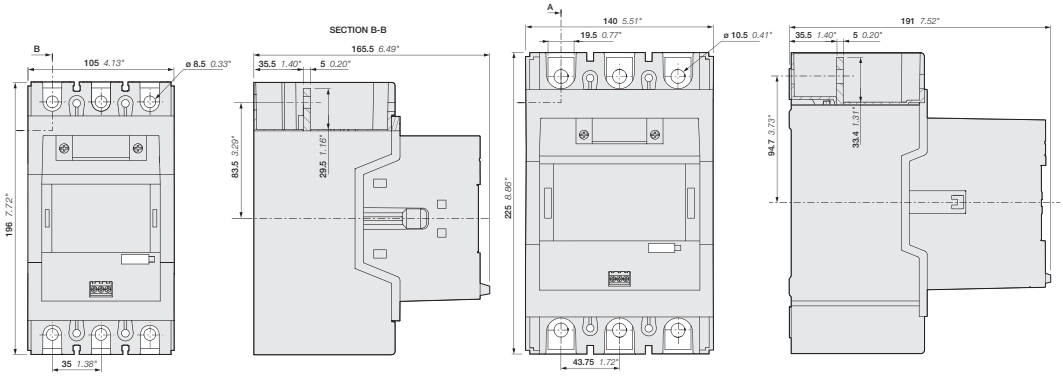
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	100...250	100...250	0 0	AF190-30-00-33	1SFL487002R3300	3.000
				250...500	250...500	0 0	AF190-30-00-34	1SFL487002R3400	3.000
110	350	150	300	100...250	100...250	0 0	AF205-30-00-33	1SFL527002R3300	3.000
				250...500	250...500	0 0	AF205-30-00-34	1SFL527002R3400	3.000
132	400	200	350	100...250	100...250	0 0	AF265-30-00-33	1SFL547002R3300	4.605
				250...500	250...500	0 0	AF265-30-00-34	1SFL547002R3400	4.605
160	500	250	400	100...250	100...250	0 0	AF305-30-00-33	1SFL587002R3300	4.605
				250...500	250...500	0 0	AF305-30-00-34	1SFL587002R3400	4.605
200	600	300	520	100...250	100...250	0 0	AF370-30-00-33	1SFL607002R3300	4.605
				250...500	250...500	0 0	AF370-30-00-34	1SFL607002R3400	4.605

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





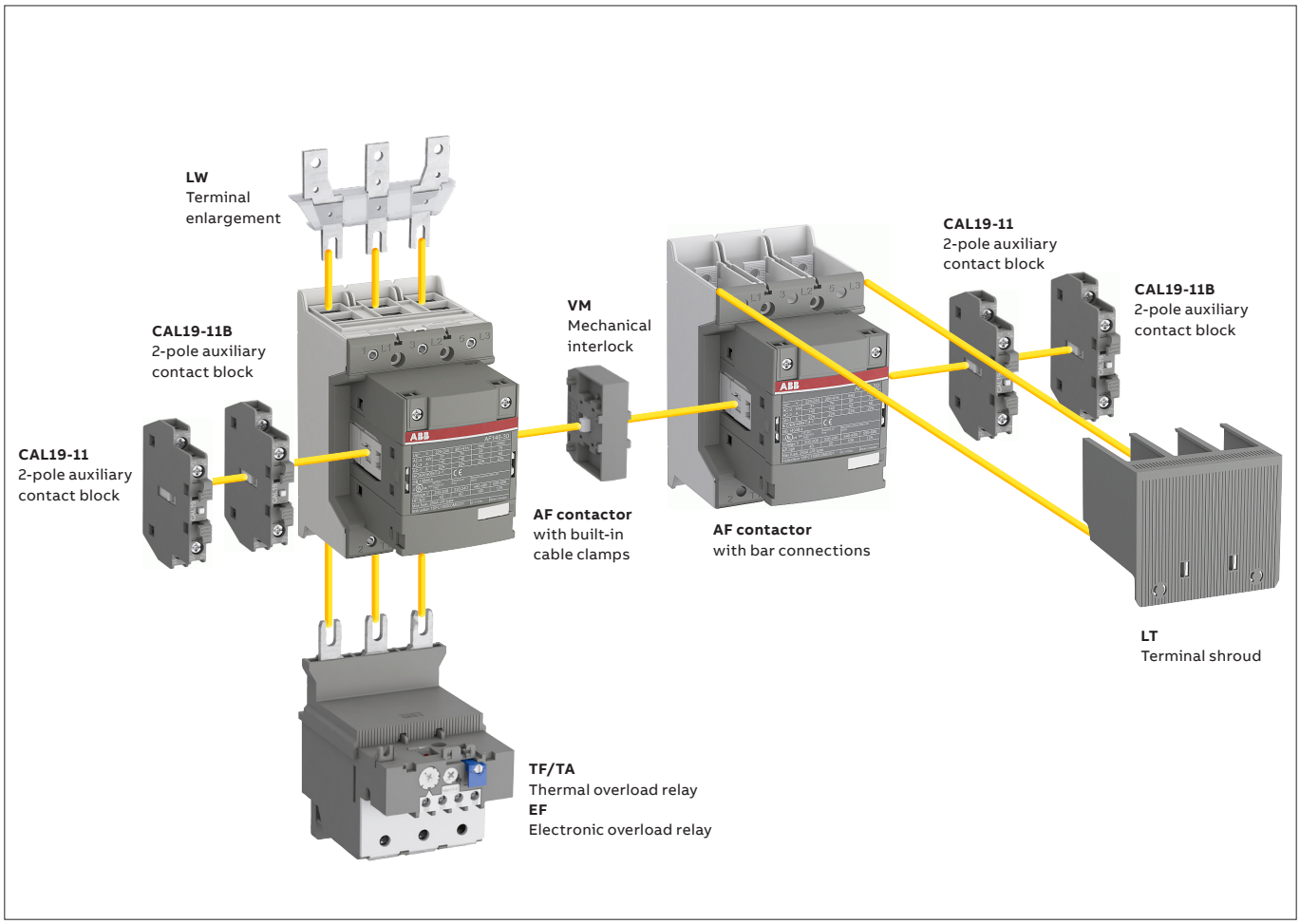
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 3-pole contactors

Contactors and main accessories



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks		Mechanical interlock units (between two contactors)
			CAL19-11 (3)	CAL19-11B	
AF116 ... AF370	3 0	0 0	2 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	3 0	0 0	2 x CAL19-11 (1)	+ 2 x CAL19-11B (1)	+ VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

AF26 ... AF38 3-pole contactors

4 to 18.5 kW

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

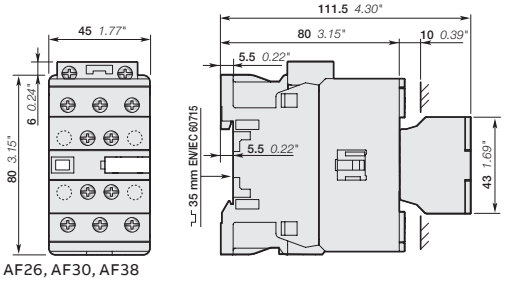
AF26-30-11

AF26 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
11	45	15	45	24...60	20...60 (1)	1 1	AF26-30-11-11	1SBL237001R1111	0.350
				48...130	48...130	1 1	AF26-30-11-12	1SBL237001R1211	0.350
				100...250	100...250	1 1	AF26-30-11-13	1SBL237001R1311	0.350
				250...500	250...500	1 1	AF26-30-11-14	1SBL237001R1411	0.390
15	50	20	50	24...60	20...60 (1)	1 1	AF30-30-11-11	1SBL277001R1111	0.350
				48...130	48...130	1 1	AF30-30-11-12	1SBL277001R1211	0.350
				100...250	100...250	1 1	AF30-30-11-13	1SBL277001R1311	0.350
				250...500	250...500	1 1	AF30-30-11-14	1SBL277001R1411	0.390
18.5	50	25	50	24...60	20...60 (1)	1 1	AF38-30-11-11	1SBL297001R1111	0.350
				48...130	48...130	1 1	AF38-30-11-12	1SBL297001R1211	0.350
				100...250	100...250	1 1	AF38-30-11-13	1SBL297001R1311	0.350
				250...500	250...500	1 1	AF38-30-11-14	1SBL297001R1411	0.390

(1) AF..-30-..-11 not suitable for direct control by PLC-output.



AF26, AF30, AF38

Main dimensions mm, inches

AF26Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications with 1 N.O. + 1 N.C. contacts

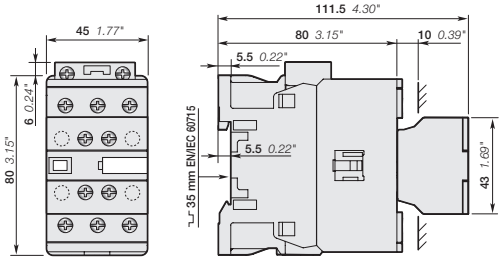
AF26Z-30-11

AF26Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations, allow direct control by PLC-output ≥ 24 V DC 500 mA, reduced panel energy consumption, very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
11	45	15	45	-	12...20	1 1	AF26Z-30-11-20	1SBL236001R2011	0.390
				24...60	20...60	1 1	AF26Z-30-11-21	1SBL236001R2111	0.390
				48...130	48...130	1 1	AF26Z-30-11-22	1SBL236001R2211	0.390
				100...250	100...250	1 1	AF26Z-30-11-23	1SBL236001R2311	0.390
15	50	20	50	-	12...20	1 1	AF30Z-30-11-20	1SBL276001R2011	0.390
				24...60	20...60	1 1	AF30Z-30-11-21	1SBL276001R2111	0.390
				48...130	48...130	1 1	AF30Z-30-11-22	1SBL276001R2211	0.390
				100...250	100...250	1 1	AF30Z-30-11-23	1SBL276001R2311	0.390
18.5	50	25	50	-	12...20	1 1	AF38Z-30-11-20	1SBL296001R2011	0.390
				24...60	20...60	1 1	AF38Z-30-11-21	1SBL296001R2111	0.390
				48...130	48...130	1 1	AF38Z-30-11-22	1SBL296001R2211	0.390
				100...250	100...250	1 1	AF38Z-30-11-23	1SBL296001R2311	0.390

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

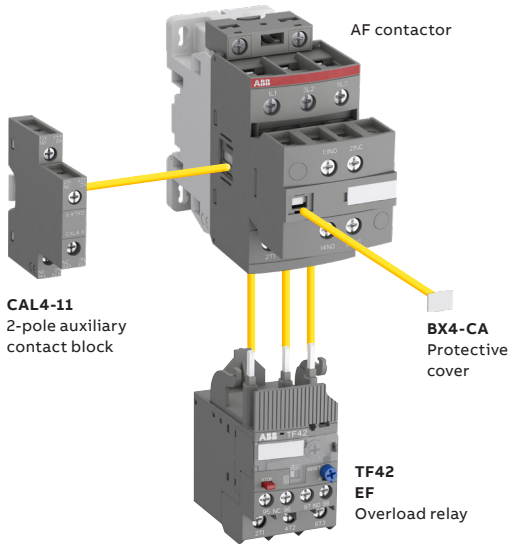


AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

AF26 ... AF38 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

Contactor types	Main poles	Built-in auxiliary contacts	Side-mounted accessories Mechanical interlock unit (between 2 contactors) VM4	Auxiliary contact blocks 2-pole CAL4-11 Left side	Right side
AF26 ... AF38	3 0	1 1	1	+ 1	or 1
			–	+ 1	+ 1

Overload relays fitting details (1)

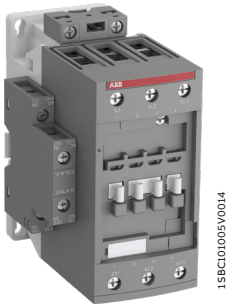
Contactor types	Thermal overload relays	Electronic overload relays
AF26 ... AF38	TF42 (0.10...38 A)	EF19 (0.10...19 A)
		EF45 (9...45 A)

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

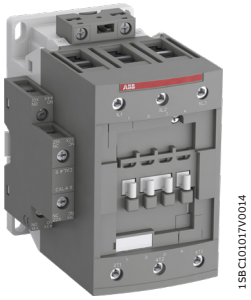
AF40 ... AF96 3-pole contactors

18.5 to 30 kW

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



AF40-30-11



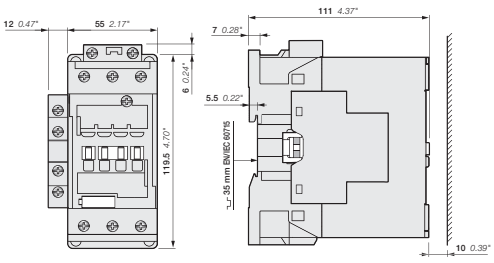
AF80-30-11

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

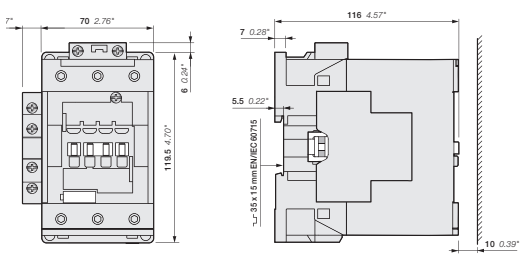
- with 1 N.O. + 1 N.C. side mounted auxiliary contact block
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
185	70	30	60	24...60	20...60 (1)	1 1	AF40-30-11-11	1SBL347001R1111	1.010
				48...130	48...130	1 1	AF40-30-11-12	1SBL347001R1211	1.010
				100...250	100...250	1 1	AF40-30-11-13	1SBL347001R1311	0.990
				250...500	250...500	1 1	AF40-30-11-14	1SBL347001R1411	0.990
22	100	40	80	24...60	20...60 (1)	1 1	AF52-30-11-11	1SBL367001R1111	1.010
				48...130	48...130	1 1	AF52-30-11-12	1SBL367001R1211	1.010
				100...250	100...250	1 1	AF52-30-11-13	1SBL367001R1311	0.990
				250...500	250...500	1 1	AF52-30-11-14	1SBL367001R1411	0.990
30	105	50	90	24...60	20...60 (1)	1 1	AF65-30-11-11	1SBL387001R1111	1.010
				48...130	48...130	1 1	AF65-30-11-12	1SBL387001R1211	1.010
				100...250	100...250	1 1	AF65-30-11-13	1SBL387001R1311	0.990
				250...500	250...500	1 1	AF65-30-11-14	1SBL387001R1411	0.990
37	125	60	105	24...60	20...60 (1)	1 1	AF80-30-11-11	1SBL397001R1111	1.260
				48...130	48...130	1 1	AF80-30-11-12	1SBL397001R1211	1.260
				100...250	100...250	1 1	AF80-30-11-13	1SBL397001R1311	1.210
				250...500	250...500	1 1	AF80-30-11-14	1SBL397001R1411	1.210
45/55	130	60/75	115	24...60	20...60 (1)	1 1	AF96-30-11-11	1SBL407001R1111	1.260
				48...130	48...130	1 1	AF96-30-11-12	1SBL407001R1211	1.260
				100...250	100...250	1 1	AF96-30-11-13	1SBL407001R1311	1.210
				250...500	250...500	1 1	AF96-30-11-14	1SBL407001R1411	1.210

(1) For control by PLC-output, use RA4 interface relay.



AF40, AF52, AF65-30-11-..

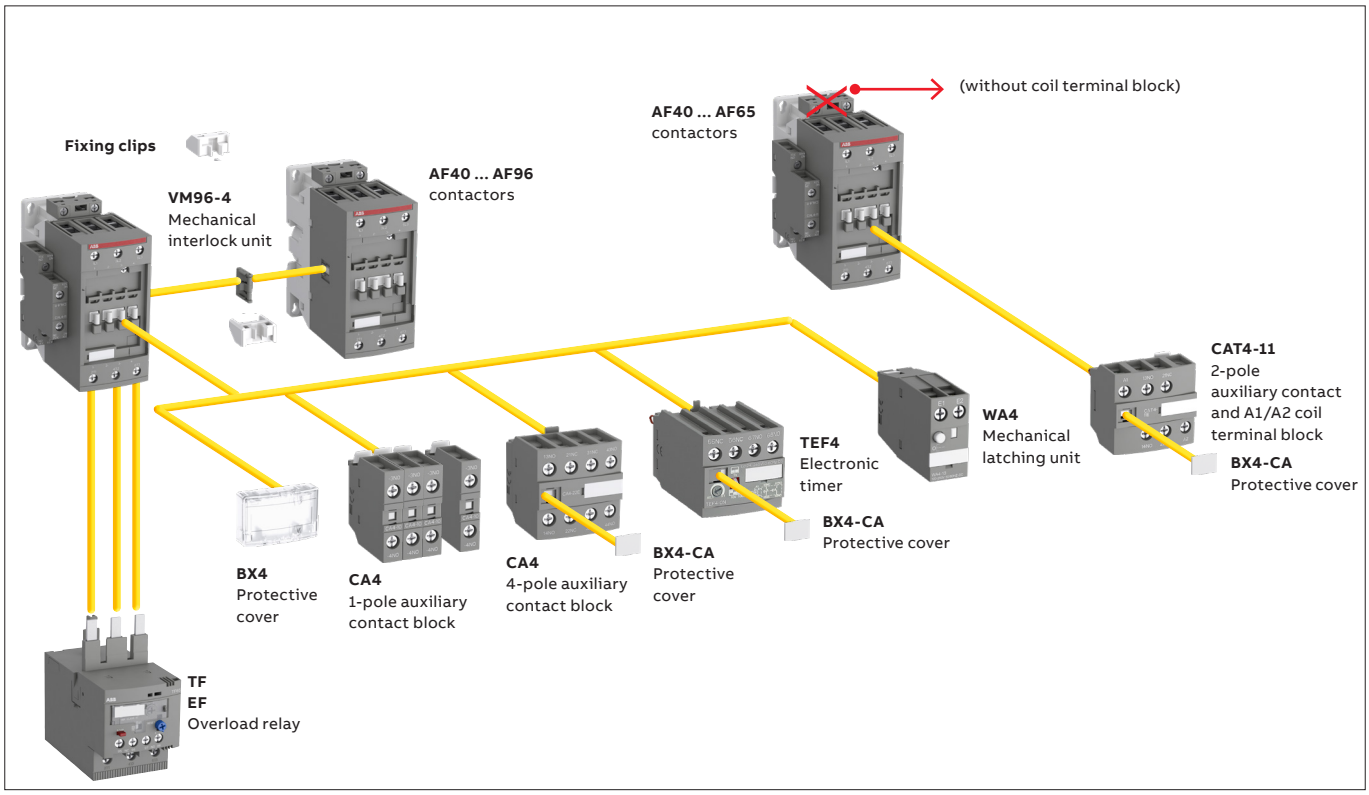


AF80, AF96-30-11-..

Main dimensions mm, inches

AF40 ... AF96 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 (1)	Side-mounted accessories Mechanical interlock set (between 2 contactors)		Auxiliary contact blocks	
			1-pole CA4	2-pole CAT4-11	4-pole CA4	TEF4	WA4	VM96-4		2-pole CAL4-11 Left side	Right side
AF40 ... AF65	3 0	1 1	4 max.	or 1	or 1	or 1	or 1	+ 1		–	–
			4 max.	or 1	or 1	or 1	or 1	–	+	–	1
AF80, AF96	3 0	1 1	4 max.	–	or 1	or 1	or 1	+ 1		–	–
			4 max.	–	or 1	or 1	or 1	–	+	–	1

(1) Use WA4 for AF09...AF65 and WA4-96 for AF80, AF96.
Accept 1-pole CA4 auxiliary contacts on each side of the mechanical latch.

Overload relays fitting details (2)

Contactor types	Thermal overload relays	Electronic overload relays
AF40 ... AF65	TF65 (22...67 A)	EF65 (20...70 A)
AF80, AF96	TF96 (40...96 A)	EF96 (36...100 A)

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

AF116 ... AF146 3-pole contactors

55 to 75 kW

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

AF146-30-11

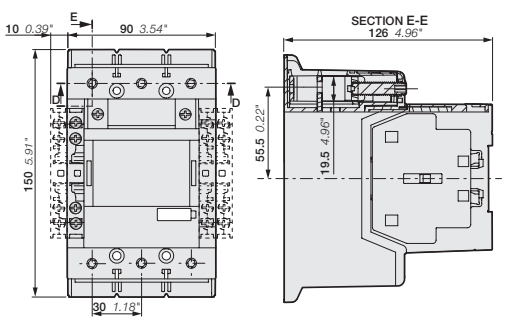
AF146-30-11B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

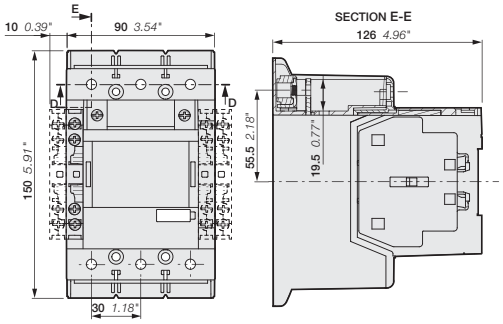
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power	current θ ≤ 40 °C	3-phase motor rating	General use rating						Pkg (1 pce)
400 V AC-3	AC-1	480 V	600 V AC						
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	24...60	20...60	1 1	AF116-30-11-11	1SFL427001R1111	1.750
				48...130	48...130	1 1	AF116-30-11-12	1SFL427001R1211	1.750
				100...250	100...250	1 1	AF116-30-11-13	1SFL427001R1311	1.750
				250...500	250...500	1 1	AF116-30-11-14	1SFL427001R1411	1.750
75	200	100	200	24...60	20...60	1 1	AF140-30-11-11	1SFL447001R1111	1.750
				48...130	48...130	1 1	AF140-30-11-12	1SFL447001R1211	1.750
				100...250	100...250	1 1	AF140-30-11-13	1SFL447001R1311	1.750
				250...500	250...500	1 1	AF140-30-11-14	1SFL447001R1411	1.750
75	225	100	200	24...60	20...60	1 1	AF146-30-11-11	1SFL467001R1111	1.750
				48...130	48...130	1 1	AF146-30-11-12	1SFL467001R1211	1.750
				100...250	100...250	1 1	AF146-30-11-13	1SFL467001R1311	1.750
				250...500	250...500	1 1	AF146-30-11-14	1SFL467001R1411	1.750
With bar connections									
55	160	75	160	24...60	20...60	1 1	AF116-30-11B-11	1SFL427002R1111	1.500
				48...130	48...130	1 1	AF116-30-11B-12	1SFL427002R1211	1.500
				100...250	100...250	1 1	AF116-30-11B-13	1SFL427002R1311	1.500
				250...500	250...500	1 1	AF116-30-11B-14	1SFL427002R1411	1.500
75	200	100	200	24...60	20...60	1 1	AF140-30-11B-11	1SFL447002R1111	1.500
				48...130	48...130	1 1	AF140-30-11B-12	1SFL447002R1211	1.500
				100...250	100...250	1 1	AF140-30-11B-13	1SFL447002R1311	1.500
				250...500	250...500	1 1	AF140-30-11B-14	1SFL447002R1411	1.500
75	225	100	200	24...60	20...60	1 1	AF146-30-11B-11	1SFL467002R1111	1.500
				48...130	48...130	1 1	AF146-30-11B-12	1SFL467002R1211	1.500
				100...250	100...250	1 1	AF146-30-11B-13	1SFL467002R1311	1.500
				250...500	250...500	1 1	AF146-30-11B-14	1SFL467002R1411	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-11



AF116, AF140, AF146-30-11B

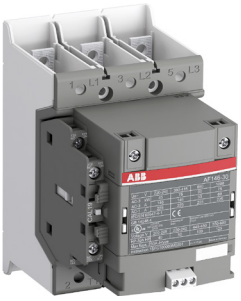
Main dimensions mm, inches

AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts for faster opening utilization

AF146-30-11



AF146-30-11B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

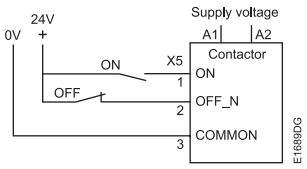
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

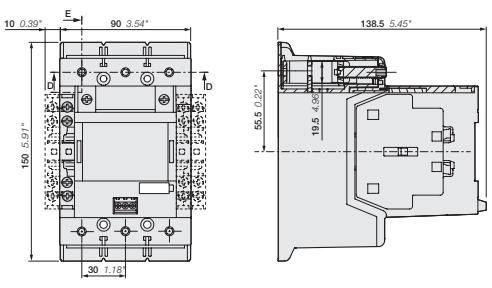
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	100...250	100...250	1 1	AF116-30-11-33	1SFL427001R3311	1.750
				250...500	250...500	1 1	AF116-30-11-34	1SFL427001R3411	1.750
75	200	100	200	100...250	100...250	1 1	AF140-30-11-33	1SFL447001R3311	1.750
				250...500	250...500	1 1	AF140-30-11-34	1SFL447001R3411	1.750
75	225	100	200	100...250	100...250	1 1	AF146-30-11-33	1SFL467001R3311	1.750
				250...500	250...500	1 1	AF146-30-11-34	1SFL467001R3411	1.750
With bar connections									
55	160	75	160	100...250	100...250	1 1	AF116-30-11B-33	1SFL427002R3311	1.500
				250...500	250...500	1 1	AF116-30-11B-34	1SFL427002R3411	1.500
75	200	100	200	100...250	100...250	1 1	AF140-30-11B-33	1SFL447002R3311	1.500
				250...500	250...500	1 1	AF140-30-11B-34	1SFL447002R3411	1.500
75	225	100	200	100...250	100...250	1 1	AF146-30-11B-33	1SFL467002R3311	1.500
				250...500	250...500	1 1	AF146-30-11B-34	1SFL467002R3411	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

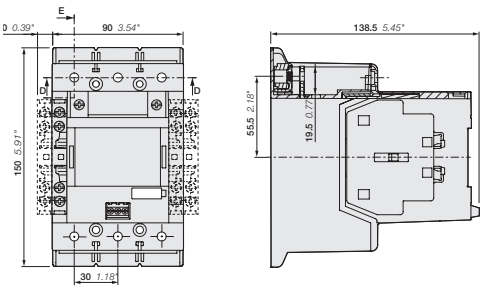
AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF116, AF140, AF146-30-11



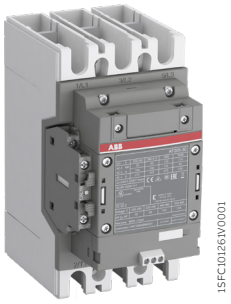
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

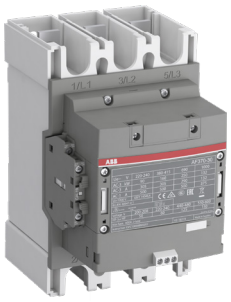
AF190 ... AF370 3-pole contactors

90 to 200 kW

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



AF205-30-11



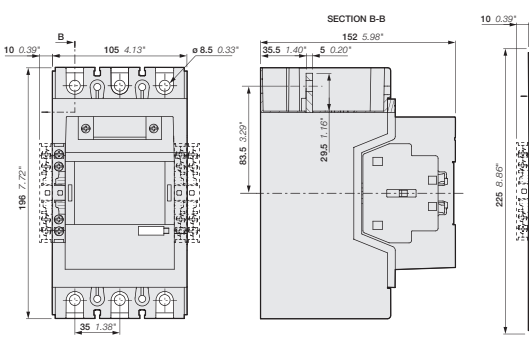
AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

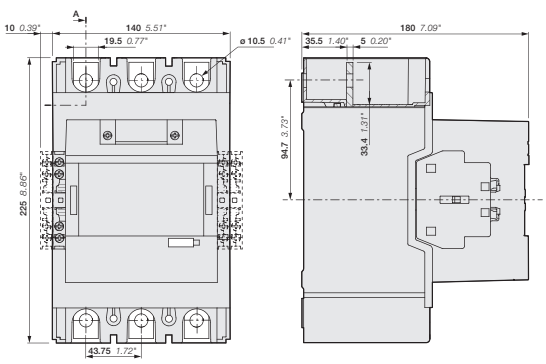
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	24...60	20...60	1 1	AF190-30-11-11	1SFL487002R1111	3.000
				48...130	48...130	1 1	AF190-30-11-12	1SFL487002R1211	3.000
				100...250	100...250	1 1	AF190-30-11-13	1SFL487002R1311	3.000
				250...500	250...500	1 1	AF190-30-11-14	1SFL487002R1411	3.000
110	350	150	300	24...60	20...60	1 1	AF205-30-11-11	1SFL527002R1111	3.000
				48...130	48...130	1 1	AF205-30-11-12	1SFL527002R1211	3.000
				100...250	100...250	1 1	AF205-30-11-13	1SFL527002R1311	3.000
				250...500	250...500	1 1	AF205-30-11-14	1SFL527002R1411	3.000
132	400	200	350	24...60	20...60	1 1	AF265-30-11-11	1SFL547002R1111	4.640
				48...130	48...130	1 1	AF265-30-11-12	1SFL547002R1211	4.640
				100...250	100...250	1 1	AF265-30-11-13	1SFL547002R1311	4.640
				250...500	250...500	1 1	AF265-30-11-14	1SFL547002R1411	4.640
160	500	250	400	24...60	20...60	1 1	AF305-30-11-11	1SFL587002R1111	4.640
				48...130	48...130	1 1	AF305-30-11-12	1SFL587002R1211	4.640
				100...250	100...250	1 1	AF305-30-11-13	1SFL587002R1311	4.640
				250...500	250...500	1 1	AF305-30-11-14	1SFL587002R1411	4.640
200	600	300	520	24...60	20...60	1 1	AF370-30-11-11	1SFL607002R1111	4.640
				48...130	48...130	1 1	AF370-30-11-12	1SFL607002R1211	4.640
				100...250	100...250	1 1	AF370-30-11-13	1SFL607002R1311	4.640
				250...500	250...500	1 1	AF370-30-11-14	1SFL607002R1411	4.640

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205



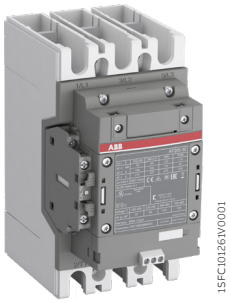
AF265, AF305, AF370

Main dimensions mm, inches

AF190 ... AF370 3-pole contactors with built-in PLC interface

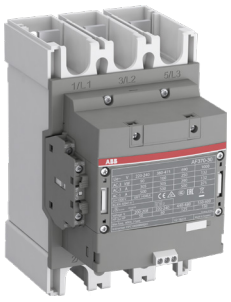
90 to 200 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts for faster opening utilization



1SFC101261V0001

AF205-30-11



1SFC101258V0001

AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

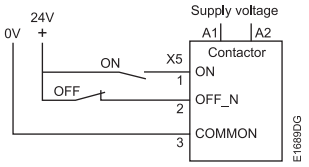
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

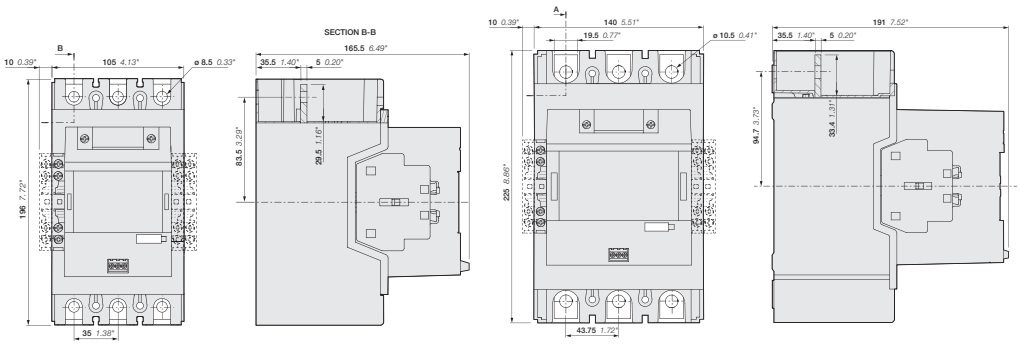
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	100...250	100...250	1 1	AF190-30-11-33	1SFL487002R3311	3.000
				250...500	250...500	1 1	AF190-30-11-34	1SFL487002R3411	3.000
110	350	150	300	100...250	100...250	1 1	AF205-30-11-33	1SFL527002R3311	3.000
				250...500	250...500	1 1	AF205-30-11-34	1SFL527002R3411	3.000
132	400	200	350	100...250	100...250	1 1	AF265-30-11-33	1SFL547002R3311	4.640
				250...500	250...500	1 1	AF265-30-11-34	1SFL547002R3411	4.640
160	500	250	400	100...250	100...250	1 1	AF305-30-11-33	1SFL587002R3311	4.640
				250...500	250...500	1 1	AF305-30-11-34	1SFL587002R3411	4.640
200	600	300	520	100...250	100...250	1 1	AF370-30-11-33	1SFL607002R3311	4.640
				250...500	250...500	1 1	AF370-30-11-34	1SFL607002R3411	4.640

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





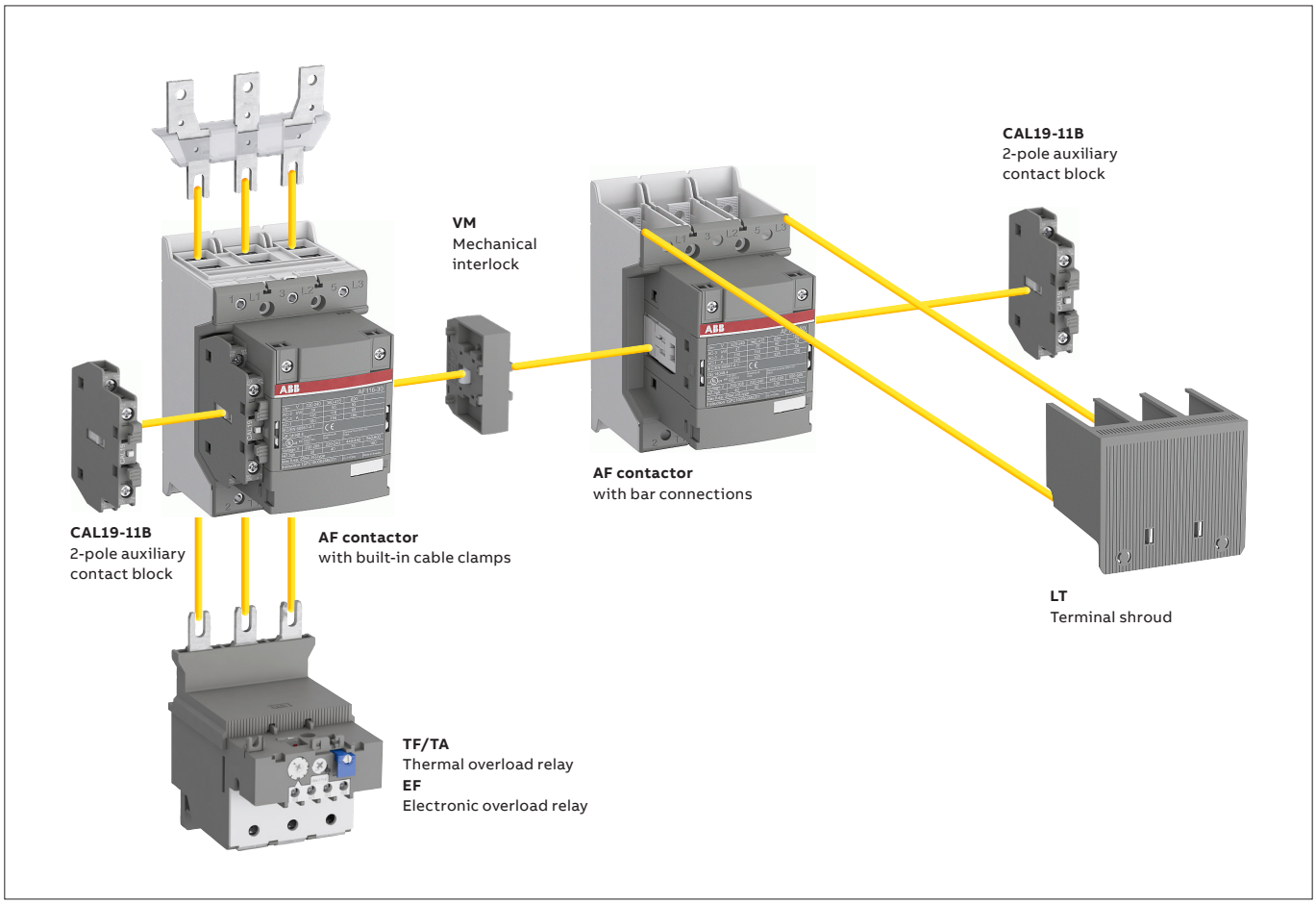
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL19-11 (3)	CAL19-11B (3)	Mechanical interlock units (between two contactors)
AF116 ... AF370	3 0	1 1	1 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	3 0	1 1	–	+ 2 x CAL19-11B (1)	+ VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

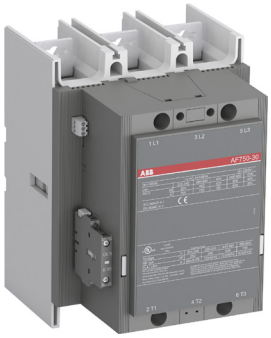
The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

AF400 ... AF750 3-pole contactors

200 to 400 kW

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

AF460-30-11



AF750-30-11

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

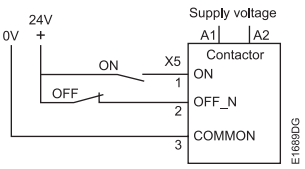
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

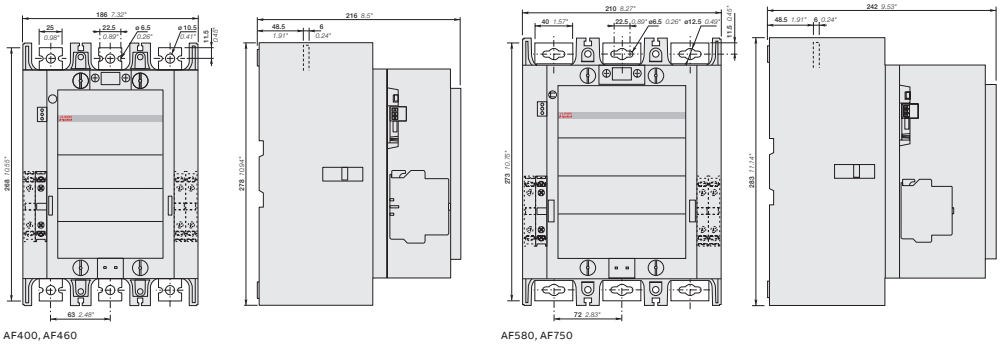
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
200	600	350	550	-	24...60	1 1	AF400-30-11	1SFL577001R6811 (1)	12.000
				48...130	48...130	1 1	AF400-30-11	1SFL577001R6911	12.000
				100...250	100...250	1 1	AF400-30-11	1SFL577001R7011	12.000
				250...500	250...500	1 1	AF400-30-11	1SFL577001R7111	12.000
250	700	400	650	-	24...60	1 1	AF460-30-11	1SFL597001R6811 (1)	12.000
				48...130	48...130	1 1	AF460-30-11	1SFL597001R6911	12.000
				100...250	100...250	1 1	AF460-30-11	1SFL597001R7011	12.000
				250...500	250...500	1 1	AF460-30-11	1SFL597001R7111	12.000
315	800	500	750	-	24...60	1 1	AF580-30-11	1SFL617001R6811 (1)	15.000
				48...130	48...130	1 1	AF580-30-11	1SFL617001R6911	15.000
				100...250	100...250	1 1	AF580-30-11	1SFL617001R7011	15.000
				250...500	250...500	1 1	AF580-30-11	1SFL617001R7111	15.000
400	1050	600	900	-	24...60	1 1	AF750-30-11	1SFL637001R6811 (1)	15.000
				48...130	48...130	1 1	AF750-30-11	1SFL637001R6911	15.000
				100...250	100...250	1 1	AF750-30-11	1SFL637001R7011	15.000
				250...500	250...500	1 1	AF750-30-11	1SFL637001R7111	15.000

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400 ... AF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF400, AF460 AF580, AF750

Main dimensions mm, inches

AF1250 ... AF2850 3-pole contactors

475 to 560 kW and 1260 to 2850 A AC-1

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

1SFC10102V0001

AF1250-30-11

1SFC10103V0001

AF2650-30-11

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.
– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range

(e.g. 100...250 V AC and DC)

- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).

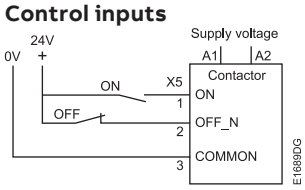
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC (2)						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
-	1260	-	1210	-	24...60	1 1	AF1250-30-11	1SFL647001R6811 (1)	16.000
				48...130	48...130	1 1	AF1250-30-11	1SFL647001R6911	16.000
				100...250	100...250	1 1	AF1250-30-11	1SFL647001R7011	16.000
				250...500	250...500	1 1	AF1250-30-11	1SFL647001R7111	16.000
475	1350	800	1350	100...250	100...250	1 1	AF1350-30-11	1SFL657001R7011	34.000
560	1650	900	1650	100...250	100...250	1 1	AF1650-30-11	1SFL677001R7011	35.000
-	2050	-	2100	100...250	100...250	1 1	AF2050-30-11	1SFL707001R7011	35.000
-	2650	-	2700	100...250	100...250	1 1	AF2650-30-11	1SFL667001R7011	45.000
-	2850	-	2850	100...250	100...250	1 1	AF2850-30-11	1SFL687001R7011	45.000

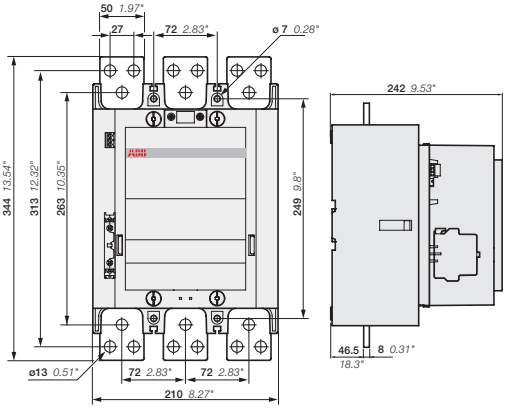
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.(2) AF2650: Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC

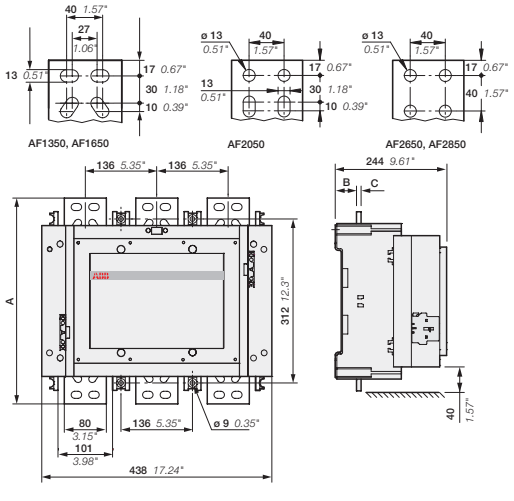
Control inputs



	AF1350, AF1650, AF2050	AF2650, AF2850
A	392 mm / 15.43"	422 mm / 16.61"
B	47 mm / 1.85"	53 mm / 2.09"
C	10 mm / 0.39"	25 mm / 0.98"



AF1250



AF1350, AF1650, AF2050, AF2650, AF2850

Main dimensions mm, inches

AF1350T ... AF2850T 3-pole contactors with built-in LVRT

475 to 560 kW and 1350 to 2850 A AC-1

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

1SFC101216V0001

AF2650-30T-11

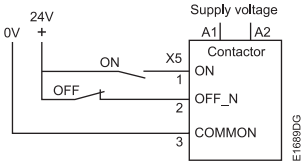
AF1350T .. AF2850T contactors are designed to meet the Low Voltage Ride Through requirements for grid connections withstand voltage drop-outs up to 1 sec without opening. These contactors are often used in grid connected applications where the demand of non interrupted power is required. When controlled through built-in PLC connection the contactor is operated directly without delay function.

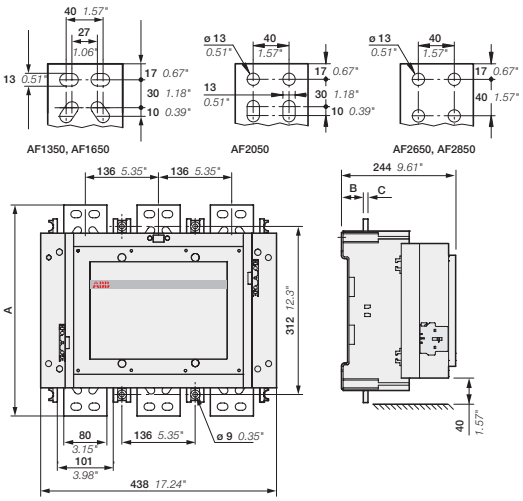
- Control circuit: AC or DC operated with electronic coil interface
  - can withstand voltage drop-outs according to Low Voltage Ride Through requirements
  - equipped with low voltage inputs for direct control by a PLC
  - distinct closing and opening
  - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz				kg
475	1350	800	1350	220 ... 240	1 1	AF1350T-30-11 (1)	1SFL657001R9101	34.000
560	1650	900	1650	220 ... 240	1 1	AF1650T-30-11 (1)	1SFL677001R9101	35.000
-	2050	-	2100	220 ... 240	1 1	AF2050T-30-11 (1)	1SFL707001R9101	35.000
-	2650	-	2700	220 ... 240	1 1	AF2650T-30-11 (1)	1SFL667001R9101	45.000
-	2850	-	2850	220 ... 240	1 1	AF2850T-30-11 (1)	1SFL687001R9101	45.000

(1) Types -00 and -22 on request.

Control inputs





AF1350T-30-11, AF1650T-30-11, AF2050T-30-11, AF2650T-30-11, AF2850T-30-10-11

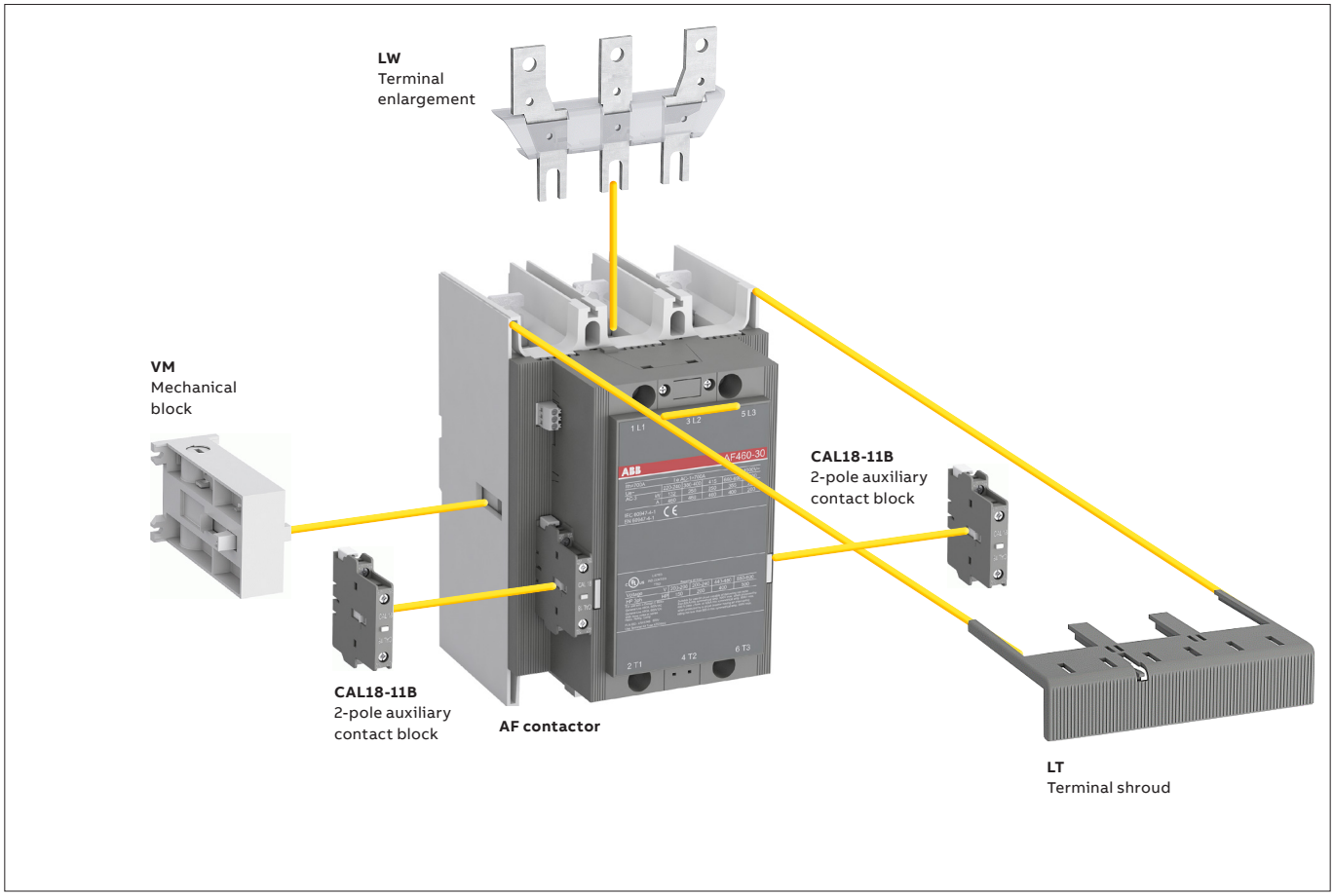
Main dimensions mm, inches

	AF1350, AF1650, AF2050	AF2650, AF2850
A	392 mm / 15.43"	422 mm / 16.61"
B	47 mm / 1.85"	53 mm / 2.09"
C	10 mm / 0.39"	25 mm / 0.98"

AF400 ... AF2850 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories

Main accessories (other accessories available)



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL18-11	 CAL18-11B (3)	Mechanical interlock units (between two contactors)
Contactors + auxiliary contact blocks					
AF400 ... AF2850	3 0	1 1	1 x CAL18-11	+ 2 x CAL18-11B	–
Contactors with mechanical interlocking + auxiliary contact blocks					
AF400 ... AF2850	3 0	1 1	2 x CAL18-11 (1)	+ 4 x CAL18-11B (1)	+ VM...H (2)

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

Overload relays fitting details

Contactor types	Thermal overload relays	Electronic overload relays
AF400, AF460	–	EF460 (150...500 A) (1)
AF580, AF750	–	EF750 (250...800 A) (1)
AF1350, AF1650	–	EF1250DU (375...1250 A) (1)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Mounting kit required (see "Motor protection").

AF09 ... AF38 3-pole contactors

4 to 18.5 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF09-30-22

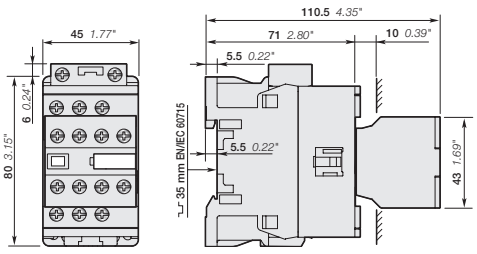
AF26-30-22

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	24...60	20...60 (1)	2 2	AF09-30-22-11	1SBL137001R1122	0.320
				48...130	48...130	2 2	AF09-30-22-12	1SBL137001R1222	0.320
				100...250	100...250	2 2	AF09-30-22-13	1SBL137001R1322	0.320
				250...500	250...500	2 2	AF09-30-22-14	1SBL137001R1422	0.360
5.5	28	7.5	28	24...60	20...60 (1)	2 2	AF12-30-22-11	1SBL157001R1122	0.320
				48...130	48...130	2 2	AF12-30-22-12	1SBL157001R1222	0.320
				100...250	100...250	2 2	AF12-30-22-13	1SBL157001R1322	0.320
				250...500	250...500	2 2	AF12-30-22-14	1SBL157001R1422	0.360
7.5	30	10	30	24...60	20...60 (1)	2 2	AF16-30-22-11	1SBL177001R1122	0.320
				48...130	48...130	2 2	AF16-30-22-12	1SBL177001R1222	0.320
				100...250	100...250	2 2	AF16-30-22-13	1SBL177001R1322	0.320
				250...500	250...500	2 2	AF16-30-22-14	1SBL177001R1422	0.360
11	45	15	45	24...60	20...60 (1)	2 2	AF26-30-22-11	1SBL237001R1122	0.360
				48...130	48...130	2 2	AF26-30-22-12	1SBL237001R1222	0.360
				100...250	100...250	2 2	AF26-30-22-13	1SBL237001R1322	0.360
				250...500	250...500	2 2	AF26-30-22-14	1SBL237001R1422	0.400
15	50	20	50	24...60	20...60 (1)	2 2	AF30-30-22-11	1SBL277001R1122	0.360
				48...130	48...130	2 2	AF30-30-22-12	1SBL277001R1222	0.360
				100...250	100...250	2 2	AF30-30-22-13	1SBL277001R1322	0.360
				250...500	250...500	2 2	AF30-30-22-14	1SBL277001R1422	0.400
18.5	50	25	50	24...60	20...60 (1)	2 2	AF38-30-22-11	1SBL297001R1122	0.360
				48...130	48...130	2 2	AF38-30-22-12	1SBL297001R1222	0.360
				100...250	100...250	2 2	AF38-30-22-13	1SBL297001R1322	0.360
				250...500	250...500	2 2	AF38-30-22-14	1SBL297001R1422	0.400

(1) AF..-30-..-11 not suitable for direct control by PLC-output.



AF09, AF12, AF16

AF26, AF30, AF38

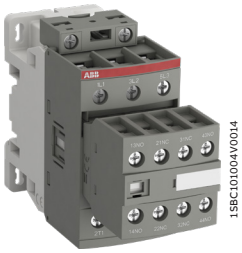
Main dimensions mm, inches

AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications with 2 N.O. + 2 N.C. auxiliary contacts

AF09Z-30-22



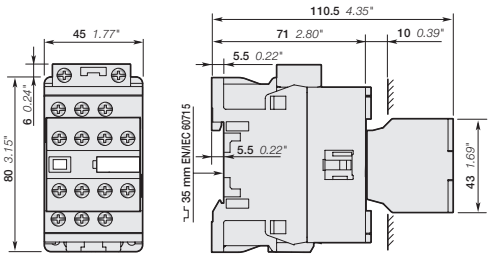
AF26Z-30-22

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

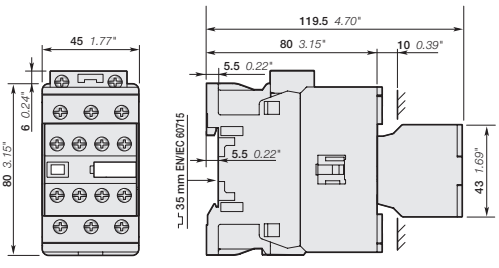
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations,
  - allow direct control by PLC-output ≥ 24 V DC 500 mA,
  - reduced panel energy consumption,
  - very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	-	12...20	2 2	AF09Z-30-22-20	1SBL136001R2022	0.360
				24...60	20...60	2 2	AF09Z-30-22-21	1SBL136001R2122	0.360
				48...130	48...130	2 2	AF09Z-30-22-22	1SBL136001R2222	0.360
				100...250	100...250	2 2	AF09Z-30-22-23	1SBL136001R2322	0.360
5.5	28	7.5	28	-	12...20	2 2	AF12Z-30-22-20	1SBL156001R2022	0.360
				24...60	20...60	2 2	AF12Z-30-22-21	1SBL156001R2122	0.360
				48...130	48...130	2 2	AF12Z-30-22-22	1SBL156001R2222	0.360
				100...250	100...250	2 2	AF12Z-30-22-23	1SBL156001R2322	0.360
7.5	30	10	30	-	12...20	2 2	AF16Z-30-22-20	1SBL176001R2022	0.360
				24...60	20...60	2 2	AF16Z-30-22-21	1SBL176001R2122	0.360
				48...130	48...130	2 2	AF16Z-30-22-22	1SBL176001R2222	0.360
				100...250	100...250	2 2	AF16Z-30-22-23	1SBL176001R2322	0.360
11	45	15	45	-	12...20	2 2	AF26Z-30-22-20	1SBL236001R2022	0.400
				24...60	20...60	2 2	AF26Z-30-22-21	1SBL236001R2122	0.400
				48...130	48...130	2 2	AF26Z-30-22-22	1SBL236001R2222	0.400
				100...250	100...250	2 2	AF26Z-30-22-23	1SBL236001R2322	0.400
15	50	20	50	-	12...20	2 2	AF30Z-30-22-20	1SBL276001R2022	0.400
				24...60	20...60	2 2	AF30Z-30-22-21	1SBL276001R2122	0.400
				48...130	48...130	2 2	AF30Z-30-22-22	1SBL276001R2222	0.400
				100...250	100...250	2 2	AF30Z-30-22-23	1SBL276001R2322	0.400
18.5	50	25	50	-	12...20	2 2	AF38Z-30-22-20	1SBL296001R2022	0.400
				24...60	20...60	2 2	AF38Z-30-22-21	1SBL296001R2122	0.400
				48...130	48...130	2 2	AF38Z-30-22-22	1SBL296001R2222	0.400
				100...250	100...250	2 2	AF38Z-30-22-23	1SBL296001R2322	0.400

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole



AF09Z, AF12Z, AF16Z



AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

AF40 ... AF96 3-pole contactors

18.5 to 30 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF40-30-22

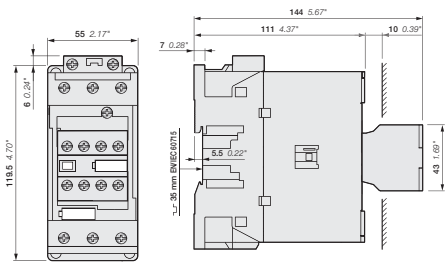
AF80-30-22

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

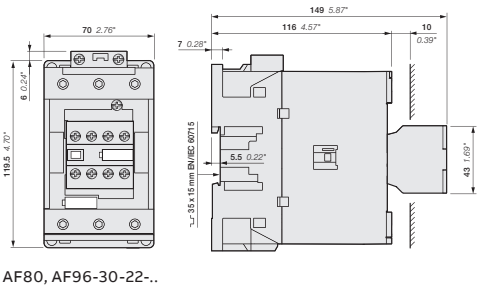
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
18.5	70	30	60	24...60	20...60 (1)	2 2	AF40-30-22-11	1SBL347001R1122	1.020
				48...130	48...130	2 2	AF40-30-22-12	1SBL347001R1222	1.020
				100...250	100...250	2 2	AF40-30-22-13	1SBL347001R1322	1.000
				250...500	250...500	2 2	AF40-30-22-14	1SBL347001R1422	1.000
22	100	40	80	24...60	20...60 (1)	2 2	AF52-30-22-11	1SBL367001R1122	1.020
				48...130	48...130	2 2	AF52-30-22-12	1SBL367001R1222	1.020
				100...250	100...250	2 2	AF52-30-22-13	1SBL367001R1322	1.000
				250...500	250...500	2 2	AF52-30-22-14	1SBL367001R1422	1.000
30	105	50	90	24...60	20...60 (1)	2 2	AF65-30-22-11	1SBL387001R1122	1.020
				48...130	48...130	2 2	AF65-30-22-12	1SBL387001R1222	1.020
				100...250	100...250	2 2	AF65-30-22-13	1SBL387001R1322	1.000
				250...500	250...500	2 2	AF65-30-22-14	1SBL387001R1422	1.000
37	125	60	105	24...60	20...60 (1)	2 2	AF80-30-22-11	1SBL397001R1122	1.270
				48...130	48...130	2 2	AF80-30-22-12	1SBL397001R1222	1.270
				100...250	100...250	2 2	AF80-30-22-13	1SBL397001R1322	1.220
				250...500	250...500	2 2	AF80-30-22-14	1SBL397001R1422	1.220
45/55	130	60/75	115	24...60	20...60 (1)	2 2	AF96-30-22-11	1SBL407001R1122	1.270
				48...130	48...130	2 2	AF96-30-22-12	1SBL407001R1222	1.270
				100...250	100...250	2 2	AF96-30-22-13	1SBL407001R1322	1.220
				250...500	250...500	2 2	AF96-30-22-14	1SBL407001R1422	1.220

(1) For control by PLC-output, use RA4 interface relay.



AF40, AF52, AF65-30-22-..

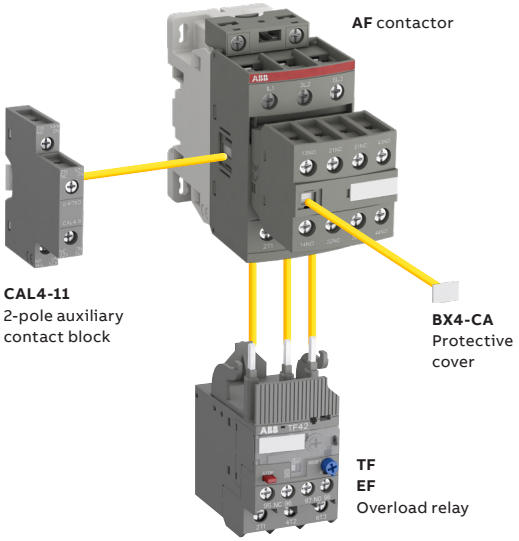


AF80, AF96-30-22-..

Main dimensions mm, inches

AF09 ... AF96 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



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

Contactor types	Main poles	Built-in auxiliary contacts	Side-mounted accessories Mechanical interlock unit (between 2 contactors)	Auxiliary contact blocks	
			VM..	2-pole CAL4-11 Left side	Right side
AF09 ... AF38	3 0	2 2	1	+ 1	or 1
AF40 ... AF96	3 0	2 2	1	+ 1	or 1
			–	+ 1	+ 1

Overload relays fitting details (1)

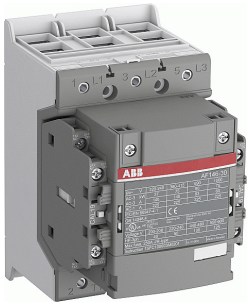
Contactor types	Thermal overload relays	Electronic overload relays
AF09 ... AF38	TF42 (0.10...38 A)	EF19 (0.10...19 A)
AF26 ... AF38	TF42 (0.10...38 A)	EF45 (9...45 A)
AF40 ... AF65	TF65 (22...67 A)	EF65 (20...70 A)
AF80 , AF96	TF96 (40...96 A)	EF96 (36...100 A)

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

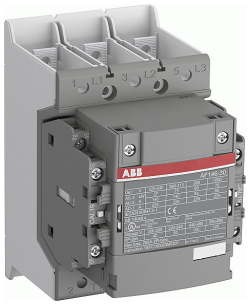
AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF146-30-22



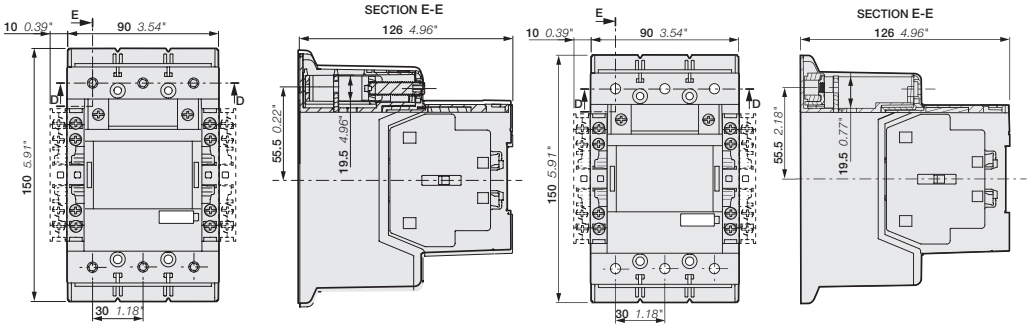
AF146-30-22B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	24...60	20...60	2 2	AF116-30-22-11	1SFL427001R1122	1.750
				48...130	48...130	2 2	AF116-30-22-12	1SFL427001R1222	1.750
				100...250	100...250	2 2	AF116-30-22-13	1SFL427001R1322	1.750
				250...500	250...500	2 2	AF116-30-22-14	1SFL427001R1422	1.750
75	200	100	200	24...60	20...60	2 2	AF140-30-22-11	1SFL447001R1122	1.750
				48...130	48...130	2 2	AF140-30-22-12	1SFL447001R1222	1.750
				100...250	100...250	2 2	AF140-30-22-13	1SFL447001R1322	1.750
				250...500	250...500	2 2	AF140-30-22-13	1SFL447001R1422	1.750
75	225	100	200	24...60	20...60	2 2	AF146-30-22-11	1SFL467001R1122	1.750
				48...130	48...130	2 2	AF146-30-22-12	1SFL467001R1222	1.750
				100...250	100...250	2 2	AF146-30-22-13	1SFL467001R1322	1.750
				250...500	250...500	2 2	AF146-30-22-14	1SFL467001R1422	1.750
With bar connections									
55	160	75	160	24...60	20...60	2 2	AF116-30-22B-11	1SFL427002R1122	1.500
				48...130	48...130	2 2	AF116-30-22B-12	1SFL427002R1222	1.500
				100...250	100...250	2 2	AF116-30-22B-13	1SFL427002R1322	1.500
				250...500	250...500	2 2	AF116-30-22B-14	1SFL427002R1422	1.500
75	200	100	200	24...60	20...60	2 2	AF140-30-22B-11	1SFL447002R1122	1.500
				48...130	48...130	2 2	AF140-30-22B-12	1SFL447002R1222	1.500
				100...250	100...250	2 2	AF140-30-22B-13	1SFL447002R1322	1.500
				250...500	250...500	2 2	AF140-30-22B-14	1SFL447002R1422	1.500
75	225	100	200	24...60	20...60	2 2	AF146-30-22B-11	1SFL467002R1122	1.500
				48...130	48...130	2 2	AF146-30-22B-12	1SFL467002R1222	1.500
				100...250	100...250	2 2	AF146-30-22B-13	1SFL467002R1322	1.500
				250...500	250...500	2 2	AF146-30-22B-14	1SFL467002R1422	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-22

AF116, AF140, AF146-30-22B

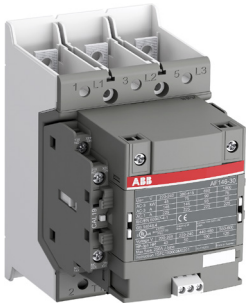
Main dimensions mm, inches

AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts for faster opening utilization

AF146-30-22



AF146-30-22B

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

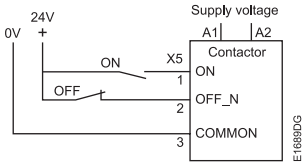
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

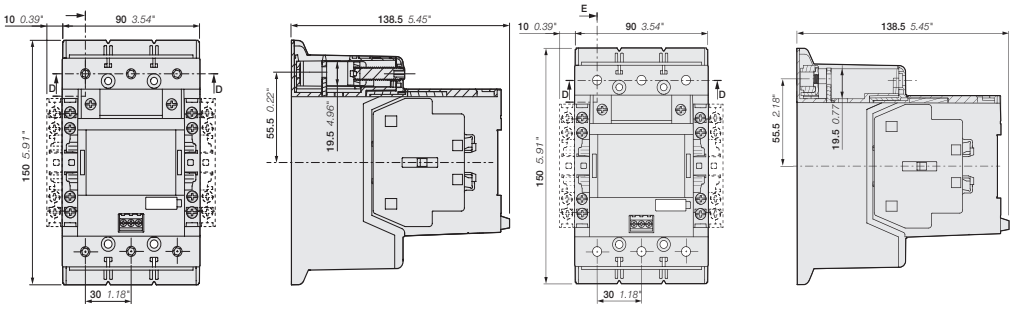
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	100...250	100...250	2 2	AF116-30-22-33	1SFL427001R3322	1.750
				250...500	250...500	2 2	AF116-30-22-34	1SFL427001R3422	1.750
75	200	100	200	100...250	100...250	2 2	AF140-30-22-33	1SFL447001R3322	1.750
				250...500	250...500	2 2	AF140-30-22-34	1SFL447001R3422	1.750
75	225	100	200	100...250	100...250	2 2	AF146-30-22-33	1SFL467001R3322	1.750
				250...500	250...500	2 2	AF146-30-22-34	1SFL467001R3422	1.750
With bar connections									
55	160	75	160	100...250	100...250	2 2	AF116-30-22B-33	1SFL427002R3322	1.500
				250...500	250...500	2 2	AF116-30-22B-34	1SFL427002R3422	1.500
75	200	100	200	100...250	100...250	2 2	AF140-30-22B-33	1SFL447002R3322	1.500
				250...500	250...500	2 2	AF140-30-22B-34	1SFL447002R3422	1.500
75	225	100	200	100...250	100...250	2 2	AF146-30-22B-33	1SFL467002R3322	1.500
				250...500	250...500	2 2	AF146-30-22B-34	1SFL467002R3422	1.500

For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF116, AF140, AF146-30-22

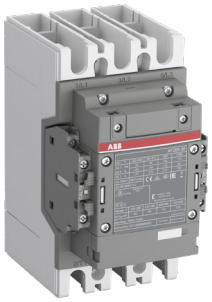
AF116, AF140, AF146-30-22B

Main dimensions mm, inches

AF190 ... AF370 3-pole contactors

90 to 200 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



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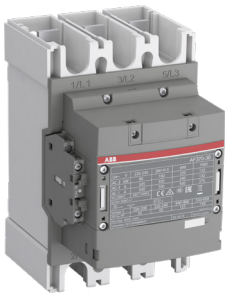
AF205-30-22



1SFC101253V0001

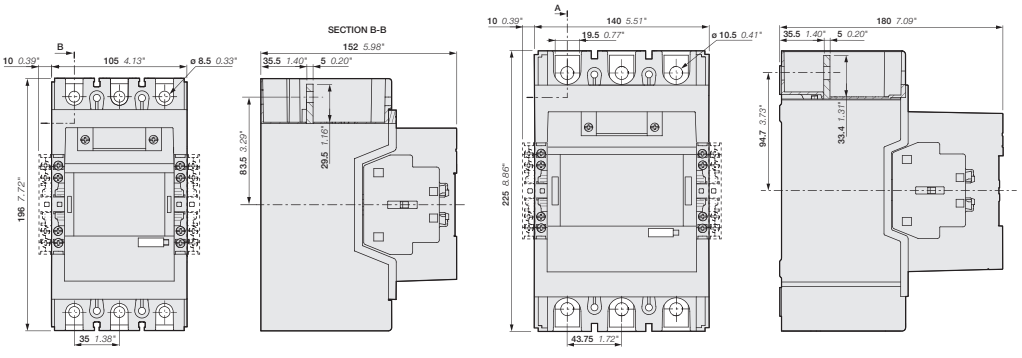
AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	24...60	20...60	2 2	AF190-30-22-11	1SFL487002R1122	3.000
				48...130	48...130	2 2	AF190-30-22-12	1SFL487002R1222	3.000
				100...250	100...250	2 2	AF190-30-22-13	1SFL487002R1322	3.000
				250...500	250...500	2 2	AF190-30-22-14	1SFL487002R1422	3.000
110	350	150	300	24...60	20...60	2 2	AF205-30-22-11	1SFL527002R1122	3.000
				48...130	48...130	2 2	AF205-30-22-12	1SFL527002R1222	3.000
				100...250	100...250	2 2	AF205-30-22-13	1SFL527002R1322	3.000
				250...500	250...500	2 2	AF205-30-22-14	1SFL527002R1422	3.000
132	400	200	350	24...60	20...60	2 2	AF265-30-22-11	1SFL547002R1122	4.675
				48...130	48...130	2 2	AF265-30-22-12	1SFL547002R1222	4.675
				100...250	100...250	2 2	AF265-30-22-13	1SFL547002R1322	4.675
				250...500	250...500	2 2	AF265-30-22-14	1SFL547002R1422	4.675
160	500	250	400	24...60	20...60	2 2	AF305-30-22-11	1SFL587002R1122	4.675
				48...130	48...130	2 2	AF305-30-22-12	1SFL587002R1222	4.675
				100...250	100...250	2 2	AF305-30-22-13	1SFL587002R1322	4.675
				250...500	250...500	2 2	AF305-30-22-14	1SFL587002R1422	4.675
200	600	300	520	24...60	20...60	2 2	AF370-30-22-11	1SFL607002R1122	4.675
				48...130	48...130	2 2	AF370-30-22-12	1SFL607002R1222	4.675
				100...250	100...250	2 2	AF370-30-22-13	1SFL607002R1322	4.675
				250...500	250...500	2 2	AF370-30-22-14	1SFL607002R1422	4.675

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205

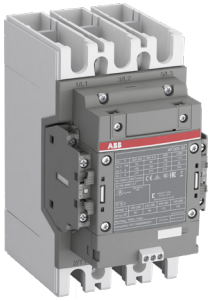
AF265, AF305, AF370

Main dimensions mm, inches

AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts for faster opening utilization



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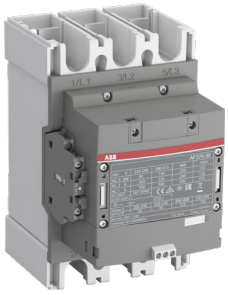
AF205-30-22



1SFC101248V0001

AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

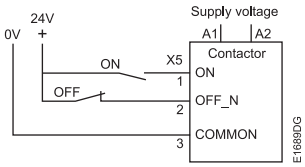
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

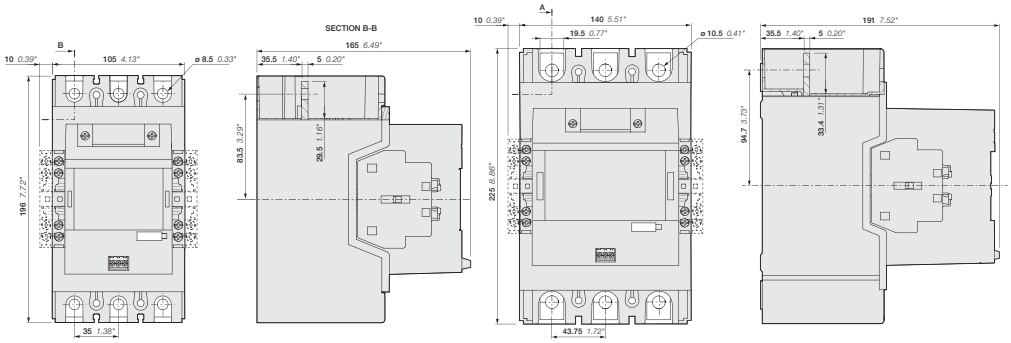
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	100...250	100...250	2 2	AF190-30-22-33	1SFL487002R3322	3.000
				250...500	250...500	2 2	AF190-30-22-34	1SFL487002R3422	3.000
110	350	150	300	100...250	100...250	2 2	AF205-30-22-33	1SFL527002R3322	3.000
				250...500	250...500	2 2	AF205-30-22-34	1SFL527002R3422	3.000
132	400	200	350	100...250	100...250	2 2	AF265-30-22-33	1SFL547002R3322	4.675
				250...500	250...500	2 2	AF265-30-22-34	1SFL547002R3422	4.675
160	500	250	400	100...250	100...250	2 2	AF305-30-22-33	1SFL587002R3322	4.675
				250...500	250...500	2 2	AF305-30-22-34	1SFL587002R3422	4.675
200	600	300	520	100...250	100...250	2 2	AF370-30-22-33	1SFL607002R3322	4.675
				250...500	250...500	2 2	AF370-30-22-34	1SFL607002R3422	4.675

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF190, AF205

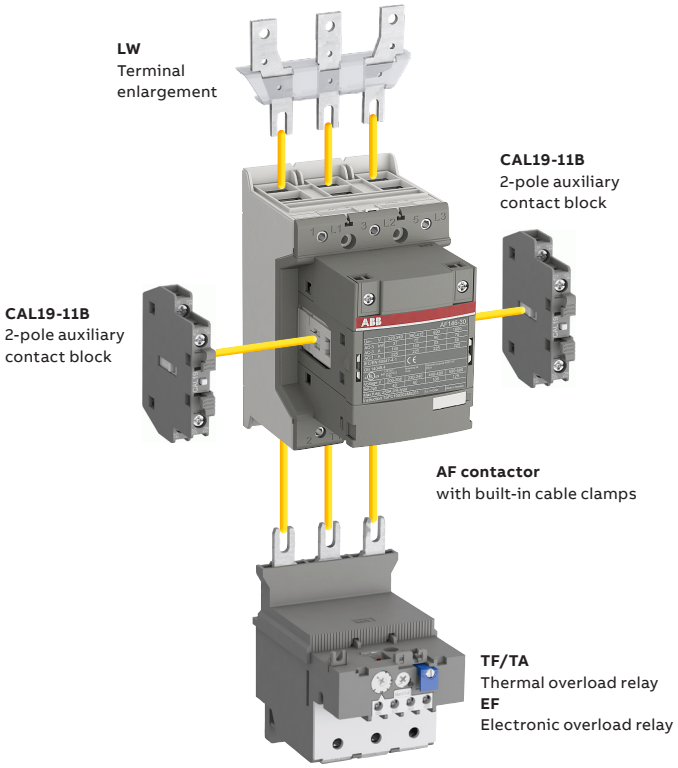
AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories

Main accessories (other accessories available)



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks		Mechanical interlock units (between two contactors)
			CAL19-11 (2)	CAL19-11B (2)	
AF116 ... AF370	3 0	2 2	2 x CAL19-11 included	+ 2 x CAL19-11B	–

(2) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AF116 ... AF140	TF140DU (66...142 A)	EF146 (54...150 A)
AF146	–	EF146 (54...150 A)
AF190, AF205	TA200DU (66...200 A)	EF205 (63...210 A)
AF265 ... AF370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

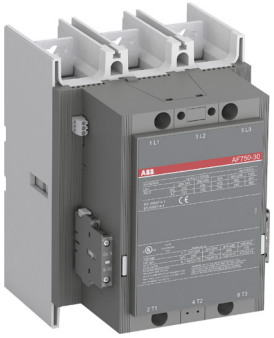
AF400 ... AF750 3-pole contactors

200 to 400 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

1SFC101081V0001

AF460-30-22



1SFC101091V0001

AF750-30-22

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

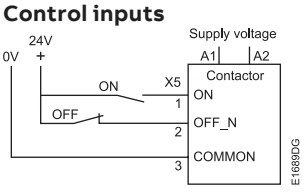
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

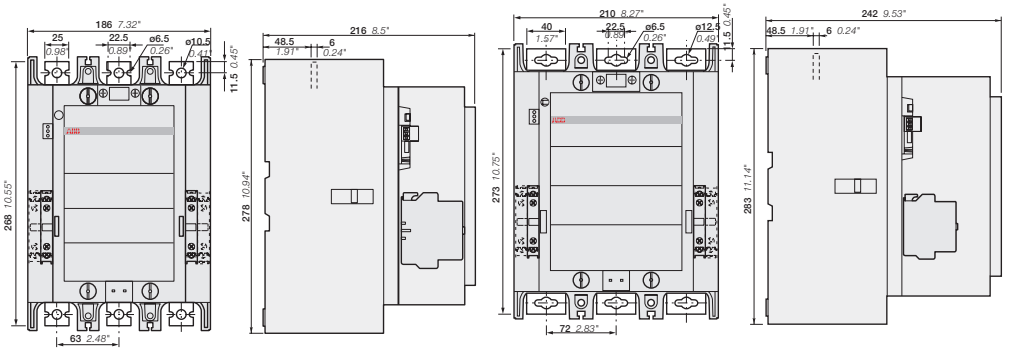
IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
200	600	350	550	-	24...60	2 2	AF400-30-22	1SFL577001R6822 (1)	12.000
				48...130	48...130	2 2	AF400-30-22	1SFL577001R6922	12.000
				100...250	100...250	2 2	AF400-30-22	1SFL577001R7022	12.000
				250...500	250...500	2 2	AF400-30-22	1SFL577001R7122	12.000
250	700	400	650	-	24...60	2 2	AF460-30-22	1SFL597001R6822 (1)	12.000
				48...130	48...130	2 2	AF460-30-22	1SFL597001R6922	12.000
				100...250	100...250	2 2	AF460-30-22	1SFL597001R7022	12.000
				250...500	250...500	2 2	AF460-30-22	1SFL597001R7122	12.000
315	800	500	750	-	24...60	2 2	AF580-30-22	1SFL617001R6822 (1)	15.000
				48...130	48...130	2 2	AF580-30-22	1SFL617001R6922	15.000
				100...250	100...250	2 2	AF580-30-22	1SFL617001R7022	15.000
				250...500	250...500	2 2	AF580-30-22	1SFL617001R7122	15.000
400	1050	600	900	-	24...60	2 2	AF750-30-22	1SFL637001R6822 (1)	15.000
				48...130	48...130	2 2	AF750-30-22	1SFL637001R6922	15.000
				100...250	100...250	2 2	AF750-30-22	1SFL637001R7022	15.000
				250...500	250...500	2 2	AF750-30-22	1SFL637001R7122	15.000

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400...AF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AF400, AF460

AF580, AF750

Main dimensions mm, inches

AF1250 ... AF2850 3-pole contactors

475 to 560 kW and 1260 to 2850 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF1250-30-22

AF2650-30-22

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

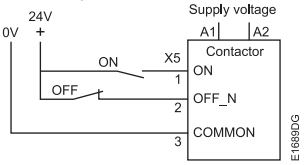
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC (2)						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
-	1260	-	1210	-	24...60	2 2	AF1250-30-22	1SFL647001R6822 (1)	16.000
				48...130	48...130	2 2	AF1250-30-22	1SFL647001R6922	16.000
				100...250	100...250	2 2	AF1250-30-22	1SFL647001R7022	16.000
				250...500	250...500	2 2	AF1250-30-22	1SFL647001R7122	16.000
475	1350	800	1350	100...250	100...250	2 2	AF1350-30-22	1SFL657001R7022	34.000
560	1650	900	1650	100...250	100...250	2 2	AF1650-30-22	1SFL677001R7022	35.000
-	2050	-	2100	100...250	100...250	2 2	AF2050-30-22	1SFL707001R7022	35.000
-	2650	-	2700	100...250	100...250	2 2	AF2650-30-22	1SFL667001R7022	45.000
-	2850	-	2850	100...250	100...250	2 2	AF2850-30-22	1SFL687001R7022	45.000

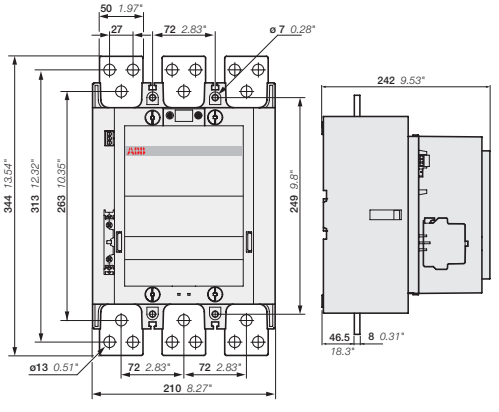
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) AF2650 : Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC.

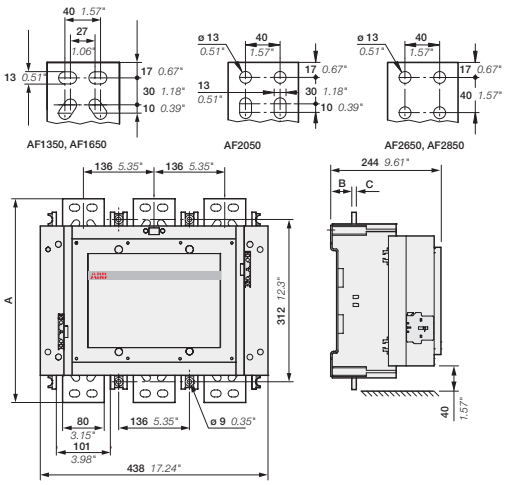
Control inputs



	AF1350, AF1650, AF2050	AF2650, AF2850
A	392 mm / 15.43"	422 mm / 16.61"
B	47 mm / 1.85"	53 mm / 2.11"
C	10 mm / 0.39"	25 mm / 0.98"



AF1250

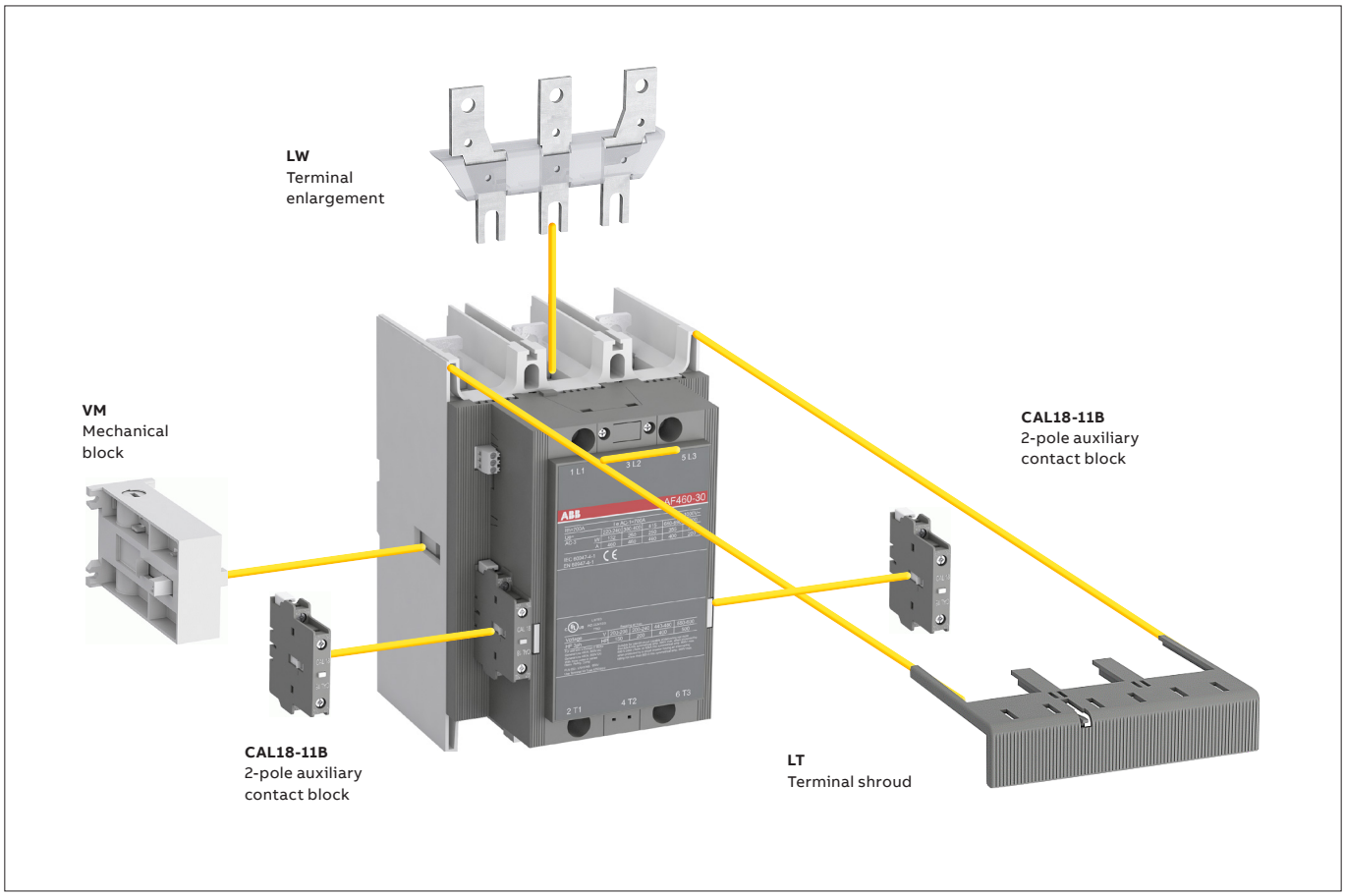


AF1350, AF1650, AF2050, AF2650, AF2850

Main dimensions mm, inches

AF400... AF2850 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL18-11	CAL18-11B (2)	Mechanical interlock units (between two contactors)
Contactors + auxiliary contact blocks					
AF145 ... AF2850	3	0 2 2	2 x CAL18-11 included	2 x CAL18-11B	–
Contactors with mechanical interlocking + auxiliary contact blocks					
AF400 ... AF2850	3	0 2 2	2 x CAL18-11 included	4 x CAL18-11B	+ VM...H (1)

(1) Interlock type, according to the contactor ratings (see "Accessories").
(2) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

Overload relays fitting details

Contactor types	Thermal overload relays	Electronic overload relays
AF400, AF460	–	EF460 (150...500 A) (3)
AF580, AF750	–	EF750 (250...800 A) (3)
AF1350, AF1650	–	E1250DU (375...1250 A) (3)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(3) Mounting kit required (see "Motor protection").

AF09 ... AF38 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage Ue max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free-air thermal current Ith							
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		35 A	35 A	35 A	50 A	50 A	50 A
With conductor cross-sectional area		6 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²
AC-1 Utilization category							
For air temperature close to contactor							
Ie / Rated operational current AC-1	θ ≤ 40 °C	25 A	28 A	30 A	45 A	50 A	50 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	25 A	28 A	30 A	40 A	42 A	42 A
	θ ≤ 70 °C	22 A	24 A	26 A	32 A	37 A	37 A
With conductor cross-sectional area		4 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²
AC-3, AC-3e Utilization category							
For air temperature close to contactor θ ≤ 60 °C							
Ie / Max. rated operational current AC-3, AC-3e (1)							
3-phase motors	220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
	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 (1)							
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 (2)							
Ue ≤ 500 V AC - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A
Rated short-time withstand current Icw	1 s	300 A	300 A	300 A	700 A	700 A	700 A
at 40 °C ambient temperature,	10 s	150 A	150 A	150 A	350 A	350 A	350 A
in free air from a cold state	30 s	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity							
cos ϕ = 0.45	at 440 V	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole	Ie / AC-1	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
	Ie / AC-3, AC-3e	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency	AC-1	600 cycles/h					
	AC-3, AC-3e	1200 cycles/h					
	AC-2, AC-4	300 cycles/h			150 cycles/h		

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

AF40 ... AF96 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage Ue max.		690 V			1000 V	
Rated frequency (without derating)		50 / 60 Hz				
Conventional free-air thermal current Ith						
acc. to IEC 60947-4-1, 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	105 A
	380-400 V	40 A	53 A	65 A	80 A	105 A
3-phase motors	415 V	40 A	53 A	65 A	80 A	96 A
	440 V	40 A	53 A	65 A	80 A	96 A
	500 V	35 A	45 A	55 A	65 A	80 A
	690 V	25 A	35 A	39 A	49 A	57 A
	1000 V	-	-	-	25 A	30A
Rated operational power AC-3, AC-3e (1)						
AC-3e Ue ≤ 690 V	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	30 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	55 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	415 V	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V	-	-	-	35 kW	40 kW
Rated making capacity AC-3, 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".

AF116 ... AF370 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.		690 V	690 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
Rated frequency (without derating)		50 / 60 Hz							
Conventional free-air thermal current Ith									
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
With conductor cross-sectional area		70 mm²	95 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
AC-1 Utilization category									
For air temperature close to contactor									
Ie / Rated operational current AC-1	θ ≤ 40 °C	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	145 A	175 A	200 A	250 A	300 A	350 A	400 A	500 A
	θ ≤ 70 °C	130 A	160 A	175 A	200 A	240 A	290 A	325 A	400 A
Ie / Rated operational current AC-1	θ ≤ 40 °C	–	–	225 A	250 A	275 A	350 A	375 A	400 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 60 °C	–	–	200 A	225 A	250 A	300 A	325 A	350 A
	θ ≤ 70 °C	–	–	175 A	185 A	200 A	240 A	260 A	290 A
With conductor cross-sectional area		70 mm²	95 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
AC-3, AC-3e Utilization category									
For air temperature close to contactor θ ≤ 60 °C									
Ie / Max. rated operational current AC-3, AC-3e (1)									
	220-230-240 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	380-400 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
3-phase motors	415 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	440 V	116 A	140 A	146 A	190 A	205 A	265 A	305 A	370 A
	500 V	110 A	130 A	130 A	156 A	186 A	250 A	290 A	350 A
	690 V	65 A	80 A	93 A	135 A	165 A	250 A	290 A	315 A
	1000 V	–	–	60 A / 54 A	85 A	100 A	113 A	131 A	141 A
Rated operational power AC-3 (1)									
	220-230-240 V	30 kW	37 kW	45 kW	55 kW	55 kW	75 kW	90 kW	110 kW
	380-400 V	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz 3-phase motors	415 V	55 kW	75 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
	440 V	75 kW	90 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW
	500 V	75 kW	90 kW	90 kW	110 kW	132 kW	160 kW	200 kW	250 kW
	690 V	55 kW	75 kW	90 kW	132 kW	160 kW	200 kW	250 kW	315 kW
	1000 V	–	–	75 kW	110 kW	132 kW	160 kW	185 kW	200 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							
Short-circuit protection device for contactors									
without thermal overload relay - Motor protection excluded (2)									
Ue ≤ 500 V AC - gG type fuse		250 A	315 A	315 A	355 A	400 A	500 A	500 A	630 A
Rated short-time withstand current Icw	1 s	1300 A	1460 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A
at 40 °C ambient temperature,	10 s	928 A	1168 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A
in free air from a cold state	30 s	536 A	674 A	674 A	878 A	947 A	1224 A	1409 A	1709 A
	1 min	379 A	477 A	477 A	621 A	670 A	865 A	996 A	1208 A
	15 min	160 A	200 A	225 A	275 A	350 A	400 A	500 A	600 A
Maximum breaking capacity									
cos ϕ = 0.45	at 440 V	2000 A	3000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A
(cos ϕ = 0.35 for Ie > 100 A)	at 690 V	1000 A	1500 A	1500 A	2200 A	2500 A	3300 A	3800 A	4000 A
Power dissipation per pole	Ie / AC-1	12 W	18 W	23 W	15 W	25 W	32 W	50 W	72 W
	Ie / AC-3	6 W	9 W	10 W	7 W	8 W	14 W	19 W	27 W
Maximum electrical switching frequency	AC-1	300 cycles/h							
	AC-3	300 cycles/h							
	AC-2, AC-4	150 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization. AC-3e is valid up to AF190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275A use terminal enlargements or terminal extensions.
(4) For currents above 450A use terminal enlargements or terminal extensions.

AF400 ... AF750 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage Ue max.		1000 V			
Rated frequency (without derating)		50/60 Hz			
Conventional free-air thermal current Ith					
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		600 A	700 A	800 A	1050 A
With conductor cross-sectional area (3)		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)
AC-1 Utilization category					
For air temperature close to contactor					
Ie / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1050 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A
Ie / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1000 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A
With conductor cross-sectional area		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)
AC-3 Utilization category					
For air temperature close to contactor θ ≤ 55 °C					
Ie / Max. rated operational current AC-3 (1)					
	220-230-240 V	400 A	460 A	580 A	750 A
	380-400 V	400 A	460 A	580 A	750 A
M 3~ 3-phase motors	415 V	400 A	460 A	580 A	750 A
	440 V	400 A	460 A	580 A	750 A
	500 V	400 A	460 A	580 A	750 A
	690 V	350 A	400 A	500 A	650 A
	1000 V	155 A	200 A	250 A	300 A
Rated operational power AC-3 (1)					
	220-230-240 V	110 kW	132 kW	160 kW	220 kW
	380-400 V	200 kW	250 kW	315 kW	400 kW
M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz 3-phase motors	415 V	220 kW	250 kW	355 kW	425 kW
	440 V	220 kW	250 kW	355 kW	450 kW
	500 V	250 kW	315 kW	400 kW	520 kW
	690 V	315 kW	355 kW	500 kW	600 kW
	1000 V	220 kW	280 kW	355 kW	400 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1			
Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2)					
Ue ≤ 500 V AC - gG type fuse		630 A	800 A	1000 A	1000 A
Rated short-time withstand current Icw	1 s	4600 A	4600 A	7000 A	7000 A
at 40 °C ambient temperature,	10 s	4400 A	4400 A	6400 A	6400 A
in free air from a cold state	30 s	3100 A	3100 A	4500 A	4500 A
	1 min	2500 A	2500 A	3500 A	3500 A
	15 min	840 A	840 A	1300 A	1300 A
Maximum breaking capacity					
cos ϕ = 0.45	at 440 V	4000 A	5000 A	6000 A	7500 A
(cos ϕ = 0.35 for Ie > 100 A)	at 690 V	3500 A	4500 A	5000 A	7000 A
Power dissipation per pole	Ie / AC-1	30 W	42 W	32 W	50 W
	Ie / AC-3	16 W	21 W	17 W	28 W
Max. electrical switching frequency	AC-1	300 cycles/h		300 cycles/h	
	AC-3	300 cycles/h		300 cycles/h	
	AC-2, AC-4	60 cycles/h		60 cycles/h	

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents". For AC-3e utilization category, please consult your ABB local sales organization.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

AF1250 ... AF2850 3-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage Ue max.		1000 V					
Rated frequency (without derating)		50/60 Hz					
Conventional free-air thermal current Ith							
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		1260 A	1350 A	1650 A	2050 A	2650 A	2850 A
With conductor cross-sectional area (3)		1000 mm² (4)	1000 mm² (5)	1500 mm² (5)	2000 mm² (5)	3000 mm² (5)	3000 mm² (5)
AC-1 Utilization category							
For air temperature close to contactor							
Ie / Rated operational current AC-1	θ ≤ 40 °C	1260 A	1350 A	1650 A	2050 A	2650 A	2850 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 55 °C	1040 A	1150 A	1450 A	1750 A	2350 A	2600 A
	θ ≤ 70 °C	875 A	1000 A	1270 A	1500 A	2120 A	2300 A
Ie / Rated operational current AC-1	θ ≤ 40 °C	1260 A	1350 A	1650 A	2050 A	2650 A	2850 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 55 °C	1040 A	1150 A	1450 A	1750 A	2350 A	2600 A
	θ ≤ 70 °C	875 A	1000 A	1270 A	1500 A	2120 A	2300 A
With conductor cross-sectional area		1000 mm² (4)	1000 mm² (5)	1500 mm² (5)	2000 mm² (5)	3000 mm² (5)	3000 mm² (5)
AC-3, AC-3e Utilization category							
For air temperature close to contactor θ ≤ 55 °C							
Ie / Max. rated operational current AC-3, AC-3e (1)							
3-phase motors	220-230-240 V	–	860 A	1060 A	1060 A	–	–
	380-400 V	–	860 A	1060 A	1060 A	–	–
	415 V	–	860 A	1060 A	1060 A	–	–
	440 V	–	860 A	1060 A	1060 A	–	–
	500 V	–	800 A	970 A	970 A	–	–
	690 V	–	800 A	970 A	970 A	–	–
	1000 V	–	375 A	400 A	425 A	–	–
Rated operational power AC-3, AC-3e (1)							
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	–	257 kW	315 kW	–	–	–
	380-400 V	–	475 kW	560 kW	–	–	–
	415 V	–	500 kW	630 kW	630 kW	–	–
	440 V	–	560 kW	710 kW	710 kW	–	–
	500 V	–	560 kW	710 kW	–	–	–
	690 V	–	800 kW	1000 kW	1000 kW	–	–
	1000 V	–	560 kW	600 kW	630 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					
Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) Ue ≤ 500 V AC - gG type fuse		Please consult us for coordination with circuit-breaker					
Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state	1 s	8000 A	10000 A	12000 A	12000 A	12000 A	12000 A
	10 s	7200 A	8000 A	10000 A	10000 A	10000 A	10000 A
	30 s	5200 A	6000 A	7500 A	7500 A	7500 A	7500 A
	1 min	4000 A	4500 A	5500 A	5500 A	5500 A	5500 A
	15 min	1500 A	1600 A	2200 A	2200 A	2800 A	3000 A
Maximum breaking capacity							
cos ϕ = 0.45	at 440 V	7500 A	10000 A	12000 A	8400 A	8400 A	8400 A
(cos ϕ = 0.35 for Ie > 100 A)	at 690 V	7000 A	–	–	–	–	–
Power dissipation per pole	Ie / AC-1	80 W	80 W	80 W	125 W	200 W	200 W
	Ie / AC-3	–	50 W	50 W	–	–	–
Max. electrical switching frequency	AC-1	300 cycles/h	60 cycles/h		60 cycles/h	15 cycles/h	15 cycles/h
	AC-3	–	60 cycles/h		–	–	–
	AC-2, AC-4	–	60 cycles/h		–	–	–

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents". For AC-3e utilization category, please consult your ABB local sales organization AC-3e is valid up to AF190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

AF09 ... AF38 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		UL 508, CSA C22.2 N°60947-4-1					
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							
	600 V AC	25 A	28 A	30 A	45 A	50 A	50 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
1 pole	80 V DC	25 A	28 A	30 A	45 A	50 A	50 A
2 poles in serie	160 V DC	25 A	28 A	30 A	45 A	50 A	50 A
3 poles in serie	240 V DC	25 A	28 A	30 A	45 A	50 A	50 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	13.8 A	16 A	20 A	24 A	24 A	24 A
	240 V AC	10 A	12 A	17 A	17 A	28 A	28 A
Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	5 hp
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A	32.2 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A	28 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A	34 A (3)
	550-600 V AC	9 A	11 A	17 A	22 A	27 A (2)	32 A (3)
Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp (3)
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp (2)	30 hp (3)
UL / CSA - DC motor starting - 3 poles in series							
Full Load Amps (FLA)	125 V DC	9.5 A	13.2 A	17 A	25 A	25 A	25 A
	250 V DC	8.5 A	12.2 A	12.2 A	20 A	29 A	29 A
Horse power rating	125 V DC	1 hp	1-1/2 hp	2 hp	3 hp	3 hp	3 hp
	250 V DC	2 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded							
High fault current		100 kA					
Fuse rating		30 A	30 A	60 A	60 A	100 A	100 A
Fuse type, 600 V		J					
Max. electrical switching frequency							
For general use		600 cycles/h					
For motor use		1200 cycles/h					

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.
(2) For contactors produced since week 49-2011.
(3) For contactors produced since week 36-2014.

AF40 ... AF96 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		UL 60947-4-1, CSA C22.2 N°60947-4-1				
Maximum operational voltage		600 V				
NEMA size		2	-	-	3	-
NEMA continuous amp rating	Thermal current	45 A	-	-	90 A	-
NEMA maximum horse power ratings						
1-phase, 60 Hz	115 V AC	3 hp	-	-	-	-
	230 V AC	7.5 hp	-	-	-	-
NEMA maximum horse power ratings						
3-phase, 60 Hz	200 V AC	10 hp	-	-	25 hp	-
	230 V AC	15 hp	-	-	30 hp	-
	460 V AC	25 hp	-	-	50 hp	-
	575 V AC	25 hp	-	-	50 hp	-
UL / CSA general use rating						
	600 V AC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
1 pole	80 V DC	60 A	80 A	90 A	105 A	115 A
2 poles in serie	160 V DC	60 A	80 A	90 A	105 A	115 A
3 poles in serie	240 V DC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
UL / CSA maximum 1-phase motor rating						
Full load current	120 V AC	34 A	34 A	56 A	80 A	80 A
	240 V AC	40 A	50 A	68 A	68 A	88 A
Horse power rating	120 V AC	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	240 V AC	7-1/2 hp	10 hp	15 hp	15 hp	20 hp
UL / CSA maximum 3-phase motor rating						
Full load current (1)	200-208 V AC	32.2 A	48.3 A	62.1 A	78.2 A	96 A
	220-240 V AC	42 A	54 A	68 A	80 A	96 A
	440-480 V AC	40 A	52 A	65 A	77 A	96 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	40 hp
	440-480 V AC	30 hp	40 hp	50 hp	60 hp	75 hp
	550-600 V AC	40 hp	50 hp	60 hp	75 hp	75 hp
UL / CSA - DC motor starting - 3 poles in series						
Full Load Amps (FLA)	125 V DC	40 A	58 A	76 A	76 A	110 A
	250 V DC	38 A	55 A	72 A	89 A	106 A
Horse power rating	125 V DC	5 hp	7-1/2 hp	10 hp	10 hp	15 hp
	250 V DC	10 hp	15 hp	20 hp	25 hp	30 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded						
High fault current		100 kA				
Fuse rating		150 A	150 A	150 A	200 A	200 A
Fuse type, 600 V		J				
Maximum electrical switching frequency						
For general use		600 cycles/h				
For motor use		1200 cycles/h				

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

AF116 ... AF370 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Standards		UL 60947-1 / 60947-4-1A and CSA 60947-1 / 60947-4-1A							
Maximum operational voltage		600 V		1000 V					
NEMA size		–	4	–	–	–	5	–	–
NEMA continuous amp rating	Thermal current	–	135 A	–	–	–	270 A	–	–
NEMA maximum horse power ratings									
1-phase, 60 Hz	115 V AC	–	–	–	–	–	–	–	–
	230 V AC	–	–	–	–	–	–	–	–
NEMA maximum horse power ratings									
3-phase, 60 Hz	200 V AC	–	40 hp	–	–	–	75 hp	–	–
	230 V AC	–	50hp	–	–	–	100 hp	–	–
	460 V AC	–	100 hp	–	–	–	200 hp	–	–
	575 V AC	–	100 hp	–	–	–	200 hp	–	–
UL / CSA general use rating									
600 V AC		160 A	200 A		275 A	300 A	350 A	400 A	520 A
1000 V AC		–	–	200 A	250 A	275 A	300 A	350 A	400 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
UL / CSA maximum 1-phase motor rating									
Full load current	120 V AC	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–
Horse power rating	120 V AC	–	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating									
Full load current (1)	200-208 V AC	92 A	120 A	120 A	150 A	177 A	221 A	285 A	359 A
	220-240 V AC	104 A	130 A	130 A	154 A	192 A	248 A	312 A	360 A
	440-480 V AC	96 A	124 A	124 A	156 A	180 A	240 A	302 A	361 A
	550-600 V AC	99 A	125 A	125 A	144 A	192 A	242 A	289 A	336 A
Horse power rating (1)	200-208 V AC	30 hp	40 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded									
High fault current		100 kA							
Fuse rating		225 A	250 A		400 A		500 A	600 A	
Fuse type, 600 V		J							
Maximum electrical switching frequency									
For general use		300 cycles/h							
For motor use		300 cycles/h							

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

AF400 ... AF750 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1			
Maximum operational voltage		1 000 V			
NEMA size		–	6	–	7
NEMA maximum horse power ratings					
1-phase, 60 Hz	115 V AC	–			
	230 V AC	–			
NEMA maximum horse power ratings					
3-phase, 60 Hz	200 V AC	–	150 hp	–	–
	230 V AC	–	200 hp	–	300 hp
	460 V AC	–	400 hp	–	600 hp
	575 V AC	–	400 hp	–	600 hp
UL / CSA general use rating					
1000 V AC		550 A	650 A	750 A	900 A
3 poles in serie	600 V DC	550 A	650 A	750 A	900 A
UL / CSA maximum 1-phase motor rating					
Full load current	120 V AC	–	–	–	–
	240 V AC	–	–	–	–
Horse power rating	120 V AC	–	–	–	–
	240 V AC	–	–	–	–
UL / CSA maximum 3-phase motor rating					
Full load current (1)	200-208 V AC	358.8 A	414 A	552 A	692.3 A
	220-240 V AC	360 A	480 A	604 A	722 A
	440-480 V AC	414 A	477 A	590 A	722 A
	550-600 V AC	382 A	472 A	578 A	672 A
Horse power rating (1)	200-208 V AC	125 hp	150 hp	200 hp	250 hp
	220-240 V AC	150 hp	200 hp	250 hp	300 hp
	440-480 V AC	350 hp	400 hp	500 hp	600 hp
	550-600 V AC	400 hp	500 hp	600 hp	700 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded					
Fuse rating		1000 A		1200 A	
Fuse type, 600 V		L			
Maximum electrical switching frequency					
For general use		300 cycles/h			
For motor use		300 cycles/h			

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

AF1250 ... AF2850 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1					
Maximum operational voltage		1 000 V					
NEMA size		–	–	8	–	–	–
NEMA maximum horse power ratings							
1-phase, 60 Hz	115 V AC	–					
	230 V AC	–					
NEMA maximum horse power ratings							
3-phase, 60 Hz	200 V AC	–	–	–	–	–	–
	230 V AC	300 hp	–	450 hp	–	–	–
	460 V AC	600 hp	–	900 hp	–	–	–
	575 V AC	600 hp	–	900 hp	–	–	–
UL / CSA general use rating							
1000 V AC		1210 A	1350 A	1650 A	2100 A	2700 A	2850 A
3 poles in serie	600 V DC	1210 A	–	–	–	–	–
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–
Horse power rating	120 V AC	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating							
Full load current (1)	200-208 V AC	–	954 A	1030 A	–	–	–
	220-240 V AC	–	954 A	1030 A	–	–	–
	440-480 V AC	–	954 A	1030 A	–	–	–
	550-600 V AC	–	944 A	1050 A	–	–	–
Horse power rating (1)	200-208 V AC	–	–	–	–	–	–
	220-240 V AC	–	400 hp	450 hp	–	–	–
	440-480 V AC	–	800 hp	900 hp	–	–	–
	550-600 V AC	–	1000 hp	1150 hp	–	–	–
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded							
Fuse rating		1200 A	Please consult us for coordination with circuit-breaker				
Fuse type, 600 V		L					
Maximum electrical switching frequency							
For general use		300 cycles/h	60 cycles/h			15 cycles/h	15 cycles/h
For motor use		300 cycles/h	60 cycles/h			–	–

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

AF09 ... AF96 3-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
HVAC application - UL / CSA												
Definite purpose heating rating - 3-phase												
Full Load Amps (FLA)		20 A	25 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	80 A	100 A	120 A	180 A	200 A	200 A	240 A	320 A	360 A	420 A	460 A
Definite purpose air conditioning rating - 3-phase												
Full Load Amps (FLA)		20 A	25 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
Locked Rotor Amps (LRA)	200-208 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	220-240 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	440-480 V AC	120 A	150 A	180 A	270 A	300 A	300 A	360 A	480 A	540 A	630 A	690 A
	550-600 V AC	80 A	100 A	120 A	180 A	200 A	200 A	240 A	320 A	360 A	420 A	460 A
AC Resistance air heating												
Full Load Amps (FLA)	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1												
1-phase												
Horse power rating	110-120 V AC	1/4 hp	1/3 hp	(1)	1-1/2 hp	2 hp	2 hp	3 hp	3 hp	3 hp	5 hp	5 hp
	220-240 V AC	1/2 hp	3/4 hp	(1)	3 hp	3 hp	5 hp	5 hp	7-1/2 hp	10 hp	10 hp	10 hp
3-phase												
Horse power rating	200-208 V AC	1 hp	2 hp	(1)	5 hp	7-1/2 hp	7-1/2 hp	10 hp	10 hp	15 hp	15 hp	15 hp
	220-240 V AC	1 hp	2 hp	(1)	5 hp	7-1/2 hp	10 hp	10 hp	15 hp	20 hp	20 hp	20 hp
	440-480 V AC	3 hp	5 hp	(1)	15 hp	20 hp	20 hp	25 hp	30 hp	40 hp	40 hp	40 hp
	550-600 V AC	3 hp	5 hp	(1)	15 hp	20 hp	20 hp	30 hp	40 hp	40 hp	50 hp	50 hp
Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2												
1-phase												
Horse power rating	110-120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	3 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	220-240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	7.5 hp	7-1/2 hp	7-1/2 hp	10 hp	15 hp	20 hp
3-phase												
Horse power rating	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	75 hp	75 hp
Lighting application - UL / CSA												
Tungsten lamps												
1-phase per pole	347 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
Electrical discharge lamps (ballast)												
1-phase per pole	347 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A
3-phase break all lines	600 V AC	20 A	25 A	30 A	45 A	50 A	50 A	65 A	80 A	90 A	105 A	115 A

(1) 3-pole AF16 cannot be used. Select 4-pole non-reversing contactor AF16..-40-..

AF116 ... AF370 3-pole contactors

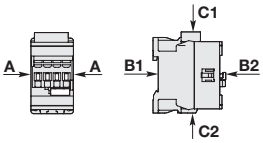
Technical data

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

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
HVAC application - UL / CSA									
Definite purpose heating rating - 3-phase									
Full Load Amps (FLA)		116 A	125 A	160 A	200 A	250 A	300 A	350 A	520 A
Locked Rotor Amps (LRA)	200-208 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	220-240 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	440-480 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	550-600 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
Definite purpose air conditioning rating - 3-phase									
Full Load Amps (FLA)		116 A	125 A	160 A	200 A	250 A	300 A	350 A	520 A
Locked Rotor Amps (LRA)	200-208 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	220-240 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	440-480 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
	550-600 V AC	800 A	875 A	1050 A	1400 A	1500 A	2100 A	2450 A	3120 A
AC Resistance air heating									
Full Load Amps (FLA)	600 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A
Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1									
3-phase									
Horse power rating	200-208 V AC	15 hp	15 hp	15 hp	20 hp	30 hp	40 hp	40 hp	50 hp
	220-240 V AC	20 hp	20 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp
	440-480 V AC	40 hp	40 hp	40 hp	60 hp	75 hp	100 hp	100 hp	125 hp
	550-600 V AC	50 hp	50 hp	50 hp	75 hp	100 hp	125 hp	150 hp	150 hp
Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5. paragraph 19.2.2									
3-phase									
Horse power rating	200-208 V AC	30 hp	40 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Lighting application - UL / CSA									
Tungsten lamps									
1-phase per pole	347 V AC	–	–	–	–	–	–	–	–
3-phase break all lines	600 V AC	–	–	–	–	–	–	–	–
Electrical discharge lamps (ballast)									
1-phase per pole	347 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A
3-phase break all lines	600 V AC	160 A	200 A	200 A	250 A	300 A	400 A	450 A	520 A

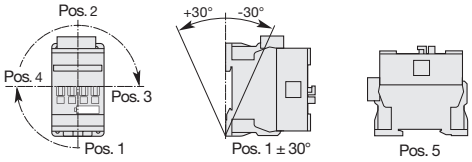
AF09 ... AF38 3-pole contactors
Technical data

General technical data

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated insulation voltage Ui							
acc. to IEC 60947-4-1		690 V					
acc. to UL / CSA		600 V					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)					
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 operating cycles					
Max. switching frequency		3600 cycles/h					
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1							
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	30 g					
	B1	25 g closed position / 5 g open position					
	B2	15 g					
	C1	25 g					
	C2	25 g					
Vibration withstand		5...300 Hz					
acc. to IEC 60068-2-6		4 g closed position / 2 g open position					

(1) Environment B: all AF09...AF38 produced since week 08.2013.
AF09...AF38-..-..-12 (48 ...130 V 50 / 60 Hz - DC) compliant to environment A only: for environment B, select AF09...AF38Z-..-..-22.

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Mounting positions							
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38					
Mounting distances		The contactors can be assembled side by side					
Fixing							
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

AF09 ... AF38 3-pole contactors
Technical data

Magnet system characteristics for AF09 ... AF38 contactors - AC / DC operated

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
	DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
AC control voltage 50/60 Hz							
Rated control circuit voltage Uc		24...500 V AC					
Coil consumption	Average pull-in value	50 VA					
	Average holding value	2.2 VA / 2 W					
DC control voltage							
Rated control circuit voltage Uc		20...500 V DC					
Coil consumption	Average pull-in value	50 W					
	Average holding value	2 W					
PLC-output control		Not suitable for direct control by PLC output					
Drop-out voltage		≤ 60 % of Uc min.					
Voltage sag immunity acc. to SEMI F47-0706		–					
Dips withstand -20 °C ≤ θ ≤ +60 °C		–					
Operating time							
Between coil energization and:	N.O. contact closing	40...95 ms					
	N.C. contact opening	38...90 ms					
Between coil de-energization and:	N.O. contact opening	11...95 ms					
	N.C. contact closing	13...98 ms					

Magnet system characteristics for AF09Z ... AF38Z 24 DC operated - designed for PLC - coil 30

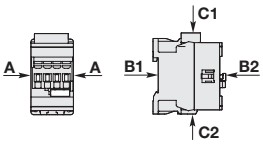
Contactor types	DC operated	AF09Z	AF12Z	AF16Z	AF26Z	AF30Z	AF38Z
Coil operating limits acc. to IEC 60947-4-1	DC supply	At θ ≤ 60 °C 0.85...1.1 x Uc At θ ≤ 70 °C Uc					
DC control voltage							
Rated control circuit voltage Uc		24 V DC					
Coil consumption	Average pull-in value	6 W					
	Average holding value	1.7 W					
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection					
Drop-out voltage		≤ 60 % of Uc min.					
Operating time							
Between coil energization and:	N.O. contact closing	27...53 ms					
	N.C. contact opening	20...35 ms					
Between coil de-energization and:	N.O. contact opening	17...29 ms					
	N.C. contact closing	22...57 ms					

Magnet system characteristics for AF09Z ... AF38Z for specific applications - coils 20, 21, 22, 23

Contactor types	AC / DC operated	AF09Z	AF12Z	AF16Z	AF26Z	AF30Z	AF38Z
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
	DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.					
AC control voltage							
Rated control circuit voltage Uc		24...250 V AC					
Coil consumption	Average pull-in value	16 VA					
	Average holding value	1.7 VA / 1.5 W					
DC control voltage							
Rated control circuit voltage Uc		12...250 V DC					
Coil consumption	Average pull-in value	12...16 W					
	Average holding value	1.7 W					
PLC-output control		(AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - not suitable for safety PLCs					
Drop-out voltage		≤ 60 % of Uc min.					
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z coil 21, 22, 23) conditions of use on request					
Dips withstand -20 °C ≤ θ ≤ +60 °C		(AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC					
Operating time							
Between coil energization and:	N.O. contact closing	40...95 ms					
	N.C. contact opening	38...90 ms					
Between coil de-energization and:	N.O. contact opening	11...95 ms					
	N.C. contact closing	13...98 ms					

AF40 ... AF96 3-pole contactors
Technical data

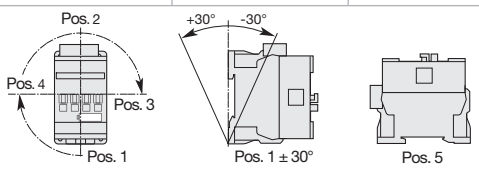
General technical data

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B				
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 operating cycles				
Max. switching frequency		3600 cycles/h				
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1						
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position				
	A	25 g				
	B1	25 g closed position / 5 g open position				
	B2	15 g				
	C1	25 g				
	C2	25 g				
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 3 g closed position / 3 g open position				

Magnet system characteristics

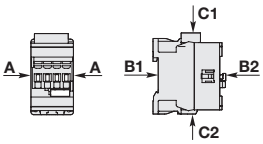
Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.				
acc. to IEC 60947-4-1	DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.				
AC control voltage 50/60 Hz						
Rated control circuit voltage Uc		24...500 V AC				
Coil consumption	Average pull-in value	25 VA			40 VA	
	Average holding value	4 VA / 2 W				
DC control voltage						
Rated control circuit voltage Uc		20...500 V DC				
Coil consumption	Average pull-in value	25 W			40 W	
	Average holding value	2 W				
PLC-output control		–				
Drop-out voltage		≤ 60 % of Uc min.				
Voltage sag immunity acc. to SEMI F47-0706		conditions of use on request				
Dips withstand -20 °C ≤ θ ≤ +60 °C		20 ms average				
Operating time						
Between coil energization and:	N.O. contact closing	42...100 ms				
	N.C. contact opening	38...95 ms				
Between coil de-energization and:	N.O. contact opening	17...100 ms				
	N.C. contact closing	19...105 ms				

Mounting characteristics and conditions

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Mounting positions						
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF40 ... AF96				
Mounting distances		The contactors can be assembled side by side				
Fixing						
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

AF40 ... AF96 3-pole contactors
Technical data

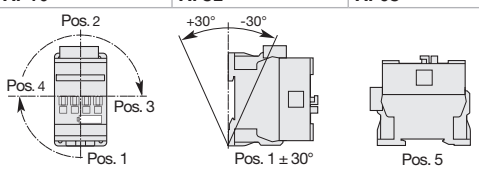
General technical data

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B				
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 operating cycles				
Max. switching frequency		3600 cycles/h				
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1						
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position				
	A	25 g				
	B1	25 g closed position / 5 g open position				
	B2	15 g				
	C1	25 g				
	C2	25 g				
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 3 g closed position / 3 g open position				

Magnet system characteristics

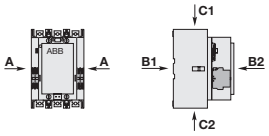
Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.				
acc. to IEC 60947-4-1	DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.				
AC control voltage 50/60 Hz						
Rated control circuit voltage Uc		24...500 V AC				
Coil consumption	Average pull-in value	25 VA			40 VA	
	Average holding value	4 VA / 2 W				
DC control voltage						
Rated control circuit voltage Uc		20...500 V DC				
Coil consumption	Average pull-in value	25 W			40 W	
	Average holding value	2 W				
PLC-output control		–				
Drop-out voltage		≤ 60 % of Uc min.				
Voltage sag immunity acc. to SEMI F47-0706		conditions of use on request				
Dips withstand -20 °C ≤ θ ≤ +60 °C		20 ms average				
Operating time						
Between coil energization and:	N.O. contact closing	42...100 ms				
	N.C. contact opening	38...95 ms				
Between coil de-energization and:	N.O. contact opening	17...100 ms				
	N.C. contact closing	19...105 ms				

Mounting characteristics and conditions

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Mounting positions						
		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF40 ... AF96				
Mounting distances		The contactors can be assembled side by side				
Fixing						
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

AF400 ... AF750 3-pole contactors
Technical data

General technical data

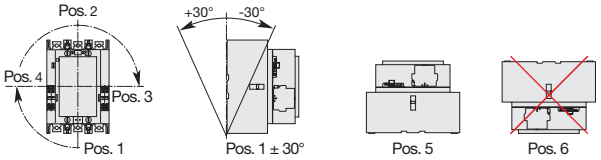
Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Rated insulation voltage Ui					
acc. to IEC 60947-4-1		1000 V			
acc. to UL / CSA		600 V			
Rated impulse withstand voltage Uimp.		8 kV			
Electromagnetic compatibility		AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A			
Pollution degree		3			
Ambient air temperature close to contactor					
Operation	Fitted with electronic overload relay	-25 to +70 °C			
	Without electronic overload relay	-40 to +70 °C			
Storage		-40 to +70 °C			
Climatic withstand		Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)		3000 m			
Mechanical durability					
Number of operating cycles		3 millions operating cycles (contacts needs to be replaced every 0,75 millions operating cycles)			
Max. switching frequency		300 cycles/h			
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1					
	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position			
	A	5 g			
	B1	5 g			
	B2	5 g			
	C1	5 g			
	C2	5 g			
Vibration withstand acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2...100 Hz			

Magnet system characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max			
acc. to IEC 60947-4-1	DC supply	At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max			
Rated control circuit voltage Uc (1)		48...500 V AC, 24...500 V DC			
Coil consumption					
AC control voltage 50/60 Hz					
48...130 V AC	Average pull-in value	1215 VA		1100 VA	
	Average holding value	12 VA		12 VA	
100...250 V AC	Average pull-in value	955 VA		880 VA	
	Average holding value	12 VA		12 VA	
250 ... 500 V AC	Average pull-in value	950 VA		985 VA	
	Average holding value	12 VA		12 VA	
DC control voltage					
24...60 V DC	Average pull-in value	900 W		785 W	
	Average holding value	5 W		5.5 W	
48...130 V DC	Average pull-in value	1150 W		1020 W	
	Average holding value	5 W		5 W	
100...250 V DC	Average pull-in value	895 W		880 W	
	Average holding value	5 W		5 W	
250 ... 500 V DC	Average pull-in value	885 W		910 W	
	Average holding value	7.5 W		7.5 W	
Drop-out voltage		55 % of Uc min.			
Voltage sag immunity acc. to SEMI F47		Conditions of use on request			
Dips withstand		≥ 20 ms			
Operating time					
Coil supply between A1 - A2					
Between coil energization and:	Main contact closing	50...120 ms			
Between coil de-energization and:	Main contact opening	33...70 ms			
Control input for PLC's					
Between coil energization and:	Main contact closing	40...60 ms		40...90 ms	
Between coil de-energization and:	Main contact opening	10...30 ms			

(1) For more detailed data, please consult your ABB local sales organization

Mounting characteristics and conditions for use

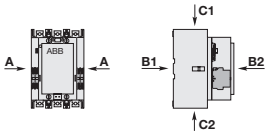
Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Mounting positions					
		Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650			
Mounting distances		The contactors can be assembled side by side			
Fixing					
On rail according to IEC 60715, EN 60715		–			
By screws		4 x M5		4 x M6	

AF1250 ... AF2850 3-pole contactors

Technical data

General technical data

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Rated insulation voltage Ui							
acc. to IEC 60947-4-1							
acc. to UL / CSA			1000 V				
Rated impulse withstand voltage Uimp.							
Electromagnetic compatibility							
Pollution degree		3					
Ambient air temperature close to contactor							
Operation	Fitted with electronic overload relay	-25 to +70 °C					
	Without electronic overload relay	-40 to +70 °C					
Storage		-40 to +70 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		0.5 million operating cycles				0.3 million operating cycles	
Max. switching frequency		300 cycles/h	60 cycles/h				
Shock withstand							
acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1							



Shock direction		
A	5 g	–
B1	5 g	–
B2	5 g	–
C1	5 g	–
C2	5 g	–

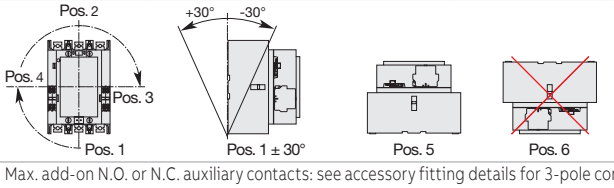
Vibration withstand	
acc to IEC 60068-2-6	0.7 g closed position / 0.7 g open position 13.2...100 Hz

Magnet system characteristics

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Coil operating limits	AC supply						
acc. to IEC 60947-4-1	DC supply						
Rated control circuit voltage Uc			100...250 V AC or DC				
Coil consumption							
AC control voltage 50/60 Hz							
48...130 V AC	Average pull-in value	1100 VA	-				
	Average holding value	12 VA	-				
100...250 V AC	Average pull-in value	880 VA	2450 VA				
	Average holding value	12 VA	48 VA				
250 ... 500 V AC	Average pull-in value	985 VA	-				
	Average holding value	12 VA	-				
DC control voltage							
24...60 V DC	Average pull-in value	785 W	-				
	Average holding value	5.5 W	-				
48...130 V DC	Average pull-in value	1020 W	-				
	Average holding value	5 W	-				
100...250 V DC	Average pull-in value	880 W	2290 W				
	Average holding value	5 W	20.5 W				
250 ... 500 V DC	Average pull-in value	910 W	-				
	Average holding value	7.5 W	-				
Drop-out voltage		55 % of Uc min.					
Voltage sag immunity							
acc. to SEMI F47		Conditions of use on request					
Dips withstand		≥ 20 ms					
Operating time							
Coil supply between A1 - A2							
Between coil energization and:	Main contact closing	50...120 ms	50...80 ms				
Between coil de-energization and:	Main contact opening	33...70 ms	35...55 ms				
Control input for PLC's							
Between coil energization and:	Main contact closing	40...90 ms	40...65 ms				
Between coil de-energization and:	Main contact opening	10...30 ms	10...30 ms				

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Mounting positions							



	Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650
Mounting distances	The contactors can be assembled side by side
Fixing	
On rail according to IEC 60715, EN 60715	–
By screws	4 x M6 / 4 x M8

AF09 ... AF38 3-pole contactors
Technical data

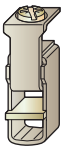
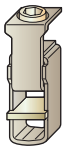
Connecting characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Main terminals		Screw terminals with cable clamp					
Connection capacity (min. ... max.)							
Main conductors (poles)							
Rigid Solid (≤ 4 mm²)	1 x	1...6 mm²			2.5...10 mm²		
Rigid Stranded (≥ 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		
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					

AF40 ... AF96 3-pole contactors

Technical data

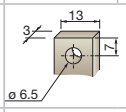
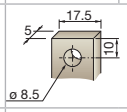
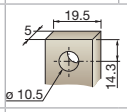
Connecting characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Main terminals		 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
Rigid 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.

AF116 ... AF370 3-pole contactors
Technical data

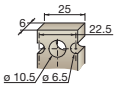
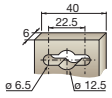
Connecting characteristics

Contactor types	AC / DC operated	AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
Main terminals Flat type									
Connection capacity (min. ... max.)									
Main conductors (poles)									
Cu cable - Stranded	1 x	10...95 mm²			6...150 mm²		16...300 mm²		
Clamp type		LD... included (1)			1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm			14 Nm		25 Nm		
Cu cable - Stranded	2 x	10...95 mm²			50...120 mm²		70...185 mm²		
Clamp type		LD... included (1)			1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm			16 Nm		22 Nm		
Al cable - Stranded	1 x	–			95...185 mm²		185...240 mm²		
Clamp type		–			1SDA054988R1		1SDA055020R1		
Tightening torque		–			31 Nm		43 Nm		
Cu cable - Flexible	1 x	10...70 mm²			6...120 mm²		16...240 mm²		
Clamp type		LD... included (1)			1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm			14 Nm		25 Nm		
Cu cable - Flexible	2 x	10...70 mm²			50...95 mm²		70...185 mm²		
Clamp type		LD... included (1)			1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm			16 Nm		22 Nm		
Lugs	L ≤	22 mm (.866 in)			24 mm (.945 in)		32 mm (1.260 in)		
	Ø >	6 mm (.236 in)			8 mm (.315 in)		10 mm (.394 in)		
Socket type		LL... included			LL... included		LL... included		
Tightening torque		9 Nm / 80 lb.in			18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA	1 x	AWG 6...3/0			6...300 MCM		4...400 MCM		
Clamp type		LD... included (1)			ATK185 (2)		ATK300 (2)		
Tightening torque		8 Nm / 71 lb.in			34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA	2 x	AWG 6...3/0			–		4...500 MCM		
Clamp type		LD... included (1)			–		ATK300/2 (2)		
Tightening torque		8 Nm / 71 lb.in			–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)									
Rigid Solid/Stranded	1 x	1...4 mm²							
	2 x	1...4 mm²							
Flexible	1 x	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Flexible with insulated ferrule	1 x	0.75...2.5 mm²							
	2 x	0.75...2.5 mm²							
Lugs	L <	8 mm							
	I >	3.5 mm							
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14							
Stripping length		9 mm							
Tightening torque		1.00 Nm / 9 lb.in							
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529									
Main terminals		IP00							
Coil terminals		IP20							
Screw terminals									
Main terminals		M6			M8		M10		
Screwdriver type		Screws and bolts							
Coil terminals (delivered in open position)		M3.5							
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2							

(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

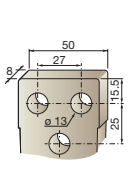
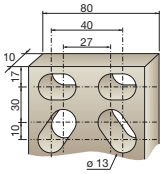
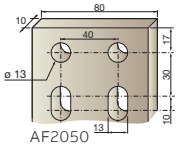
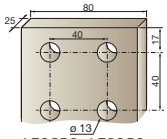
AF400 ... AF750 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF400	AF460	AF580	AF750
Main terminals Flat type				 AF580 AF750	
Connection capacity (min. ... max.)					
Main conductors (poles)					
Cu cable - Stranded	2 x	240 mm²		–	
Clamp type		1SDA013922R1		–	
Tightening torque		35 Nm		–	
Cu cable - Stranded	3 x	–	185 mm²		
Clamp type		–	1SDA013956R1		
Tightening torque		35 Nm	45 Nm		
Al cable - Stranded	2 x	240 mm²		–	
Clamp type		1SDA013922R1		–	
Tightening torque		35 Nm		–	
	3 x	–	185 mm²		
Clamp type		–	1SDA013956R1		
Tightening torque		35 Nm	45 Nm		
Lugs	L ≤	47 mm	50 mm		
	Ø >	10 mm	12 mm		
Tightening torque		35 Nm / 310 lb.in	45 Nm / 398 lb.in		
Connection capacity acc. to UL / CSA	2 x	250-500 MCM alt. 2/0 AWG-500 MCM	–		
Clamp type		K6TH alt. ATK580	–		
Tightening torque		275 lb.in	–		
Connection capacity acc. to UL / CSA	3 x	2/0 AWG-400 MCM	2/0 AWG-500 MCM		
Clamp type		K6TJ	ATK750/3		
Tightening torque		275 lb.in	375 lb.in		
Auxiliary conductors (coil terminals)					
Rigid Solid/Stranded	1 x	1...4 mm²			
	2 x	1...4 mm²			
Flexible	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Flexible with insulated ferrule	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Lugs	L ≤	8 mm			
	l >	3.7 mm			
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14			
Tightening torque Recommended		1.00 Nm / 9 lb.in			
Max.		1.20 Nm			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals		IP00			
Coil terminals		IP20			
Screw terminals					
Main terminals		M10	M12		
		Screws and bolts			
Coil terminals (delivered in open position)		M3.5			
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2			

AF1250 ... AF2850 3-pole contactors
Technical data

Connecting characteristics

Contactor types	AC / DC operated	AF1250	AF1350	AF1650	AF2050	AF2650	AF2850
Main terminals Flat type		 AF1250	 AF1350, AF1650		 AF2050	 AF2650, AF2850	
Connection capacity (min. ... max.)							
Main conductors (poles)							
Cu cable - Stranded	2 x	–					
Clamp type		–					
Tightening torque		–					
Cu cable - Stranded	3 x	–					
Clamp type		–					
Tightening torque		–					
Al cable - Stranded	2 x	–					
Clamp type		–					
Tightening torque		–					
	3 x	–					
Clamp type		–					
Tightening torque		–					
Lugs	L ≤	50 mm	100 mm				
	Ø >	12 mm					
Tightening torque		45 Nm / 398 lb.in					
Connection capacity acc. to UL / CSA	2 x	2// 3 x 0.25 in	4/0 AWG - 500 MCM		4//4 x 0.25 in		
Clamp type		bars, use LW1250	K7TK ATK1350/4	K7TK	bars		
Tightening torque			375 lb.in		–		
Connection capacity acc. to UL / CSA	3 x	2/0 AWG-500 MCM	1/0-750 MCM		–		
Clamp type		–	K8TL, K8TM, ATK1650/4	K8TL, K8TM, ATK1650/4, ATK1650/6	–		
Tightening torque		375 lb.in	500 lb.in		–		
Auxiliary conductors (coil terminals)							
Rigid Solid/Stranded	1 x	1...4 mm²					
	2 x	1...4 mm²					
Flexible	1 x	0.75...2.5 mm²					
	2 x	0.75...2.5 mm²					
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²					
	2 x	0.75...2.5 mm²					
Flexible with insulated ferrule	1 x	0.75...2.5 mm²					
	2 x	0.75...2.5 mm²					
Lugs	L ≤	8 mm					
	I >	3.7 mm					
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14					
Tightening torque Recommended		1.00 Nm / 9 lb.in					
Max.		1.20 Nm					
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals		IP00					
Coil terminals		IP20					
Screw terminals							
Main terminals		M12					
		Screws and bolts					
Coil terminals (delivered in open position)		M3.5					
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2					

AF09 ... AF96 3-pole contactors
Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Rated operational voltage Ue max.		690 V										
Rated frequency (without derating)		50 / 60 Hz										
Conventional free air thermal current Ith - θ ≤ 40 °C		16 A										
Ie / Rated operational current AC-15												
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A										
	220-240 V 50/60 Hz	4 A										
	400-440 V 50/60 Hz	3 A										
	500 V 50/60 Hz	2 A										
	690 V 50/60 Hz	2 A										
Making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1										
Breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1										
Ie / Rated operational current DC-13												
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W										
	48 V DC	2.8 A / 134 W										
	72 V DC	1 A / 72 W										
	110 V DC	0.55 A / 60 W										
	125 V DC	0.55 A / 69 W										
	220 V DC	0.27 A / 60 W										
	250 V DC	0.27 A / 68 W										
	400 V DC	0.15 A / 60 W										
	500 V DC	0.13 A / 65 W										
	600 V DC	0.1 A / 60 W										
Short-circuit protection device gG type fuse		10 A										
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, CAT4 aux. contact blocks) are mechanically linked contacts.										
Mirror contacts acc. to annex F of IEC 60947-4-1		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts.										

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Max. operational voltage		600 V AC, 600 V DC										
Pilot duty		A600, Q600										
AC thermal rated current		10 A										
AC maximum volt-ampere making		7200 VA										
AC maximum volt-ampere breaking		720 VA										
DC thermal rated current		2.5 A										
DC maximum volt-ampere making-breaking		69 VA										

3-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

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

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

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

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

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

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

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

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

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals.

As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

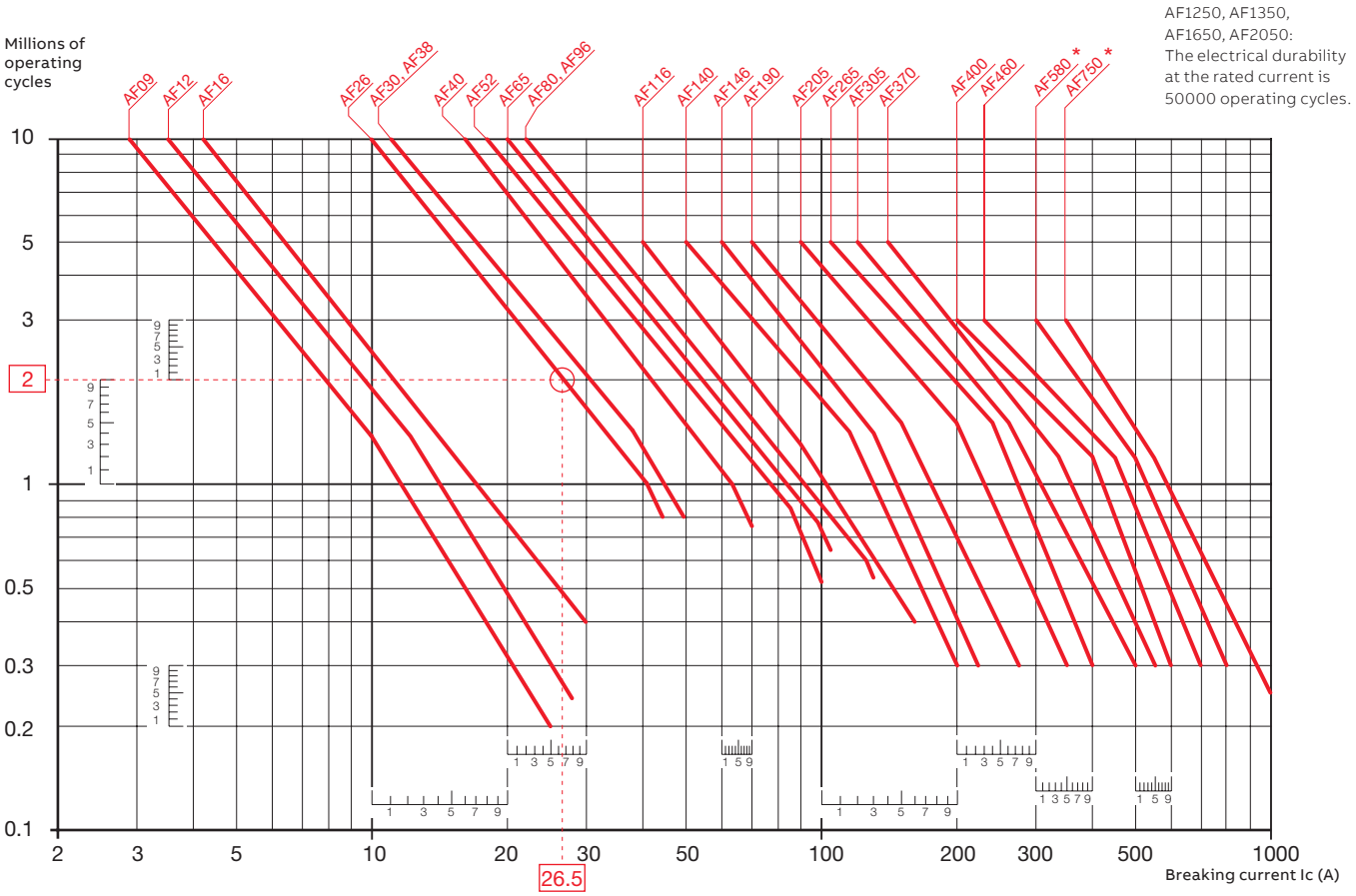
3-pole contactors

Electrical durability

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

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

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



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

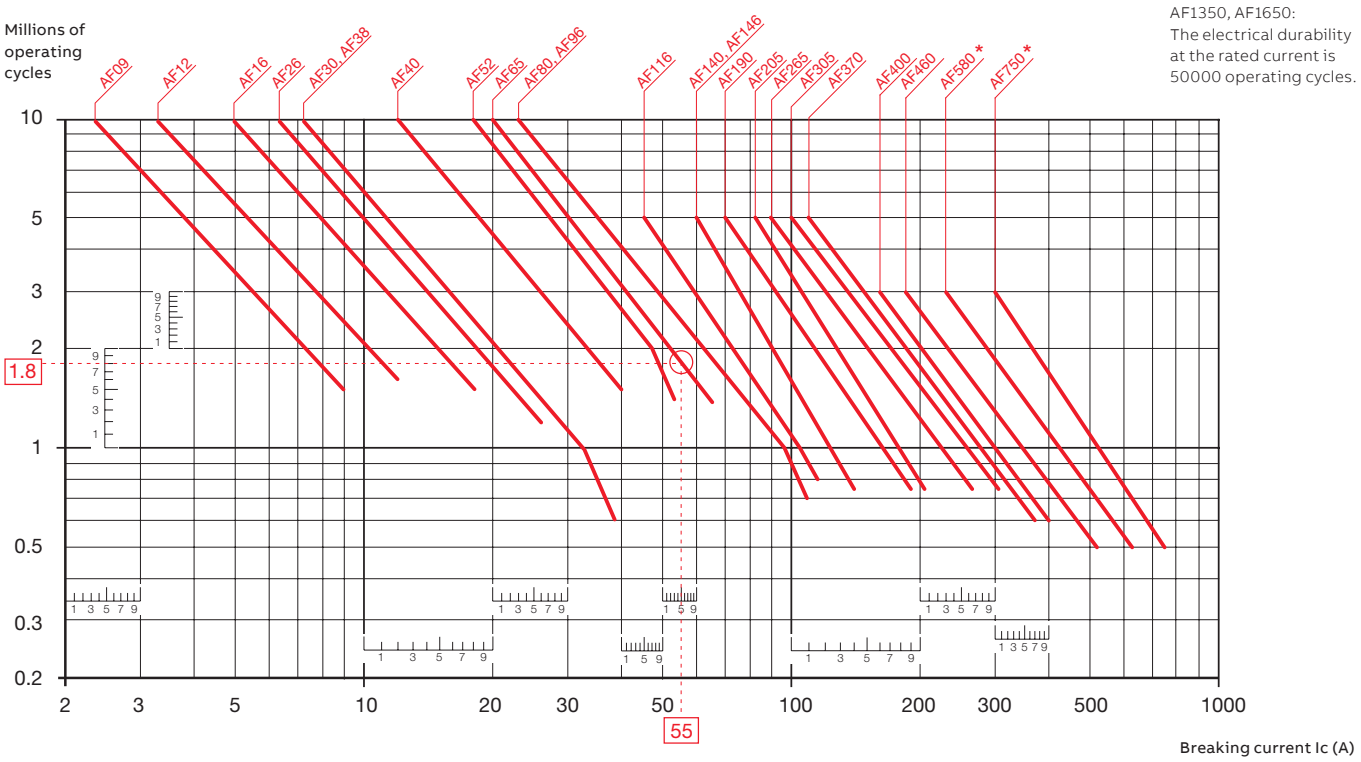
Example:

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

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

3-pole contactors
Electrical durability

Electrical durability for AC-3 utilization category - Ue ≤ 440 V.
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



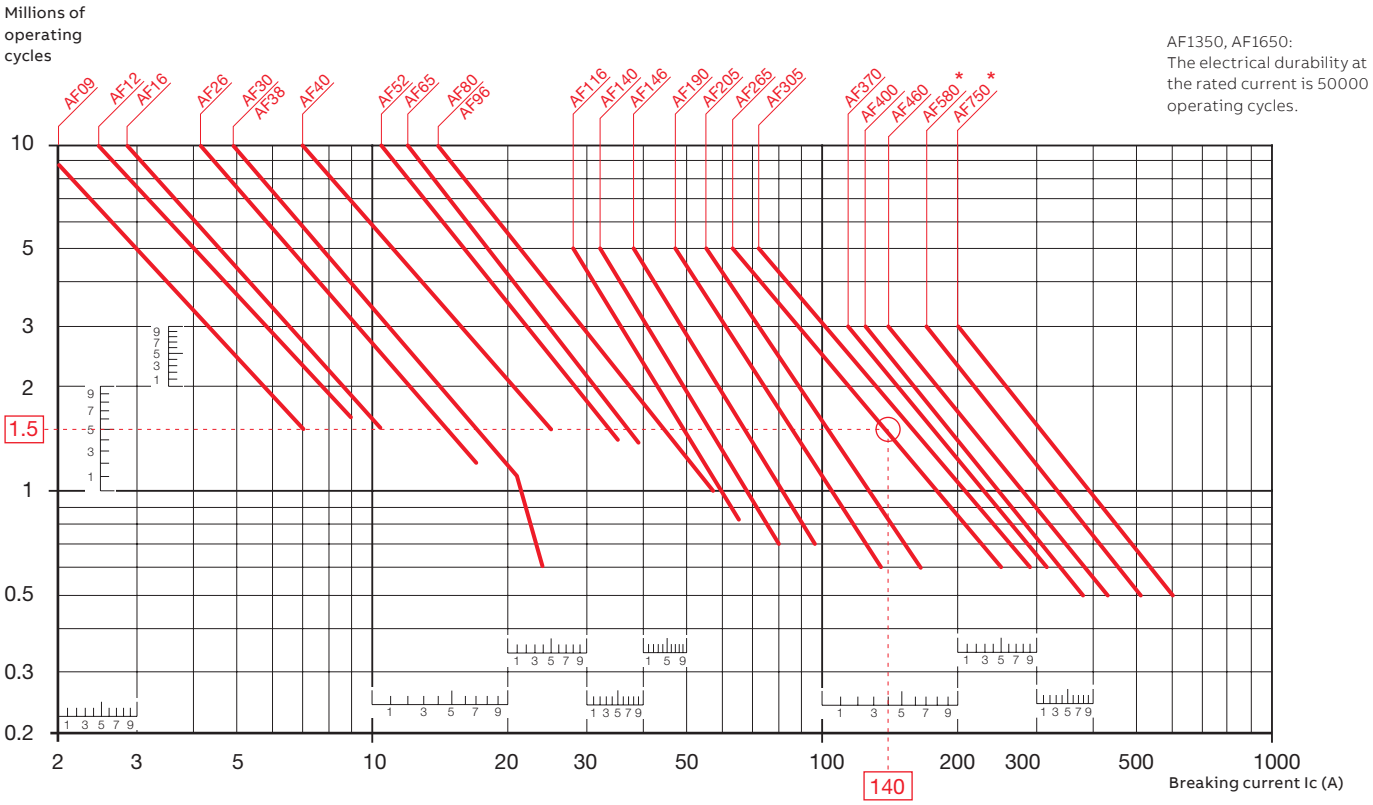
Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

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

3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



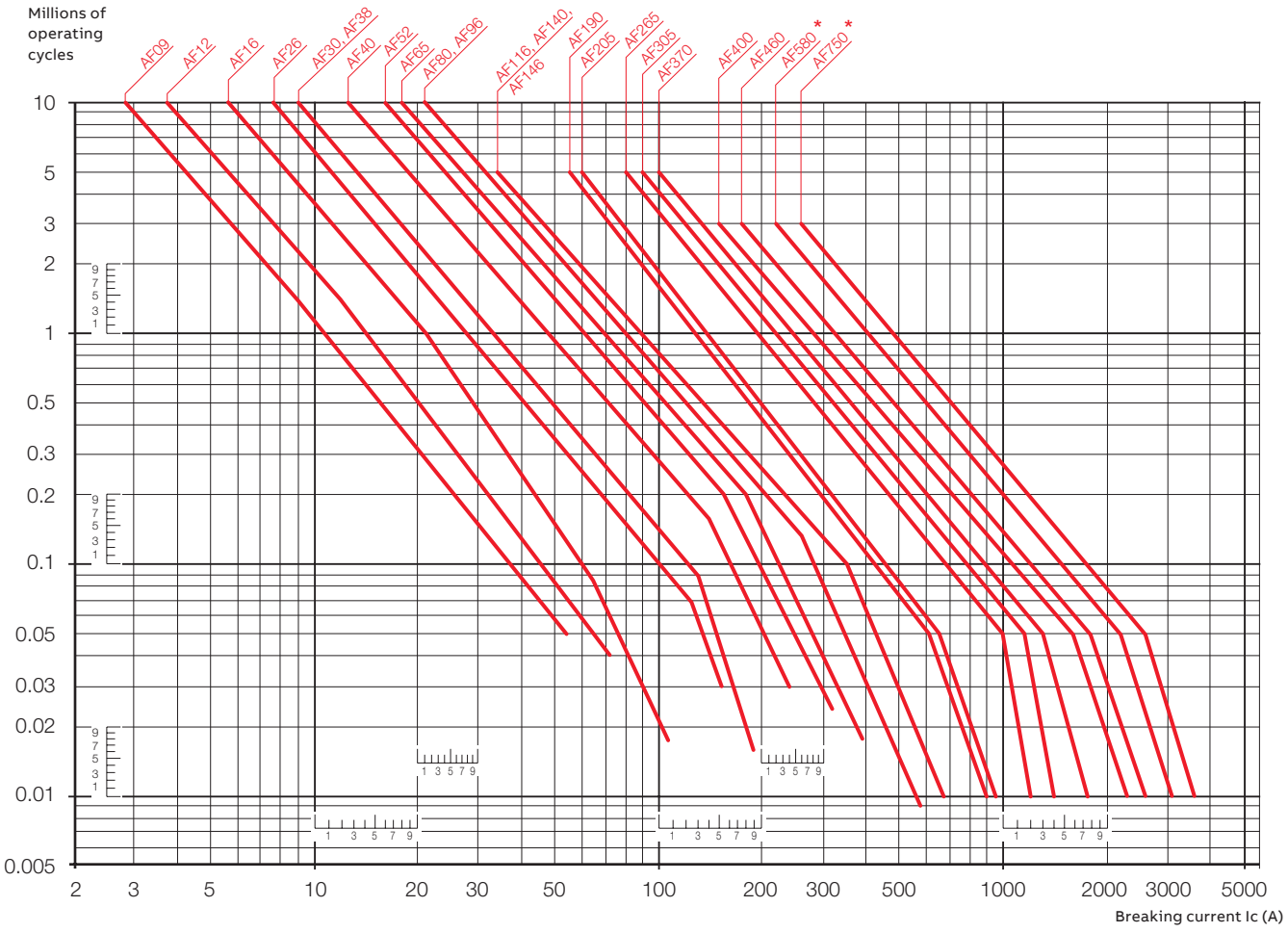
Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

Example:
Motor power 132 kW for AC-3 - Ue = 660 V and Ie = 140 A utilization – Electrical durability required = 1.5 million operating cycles.
For AC-3: Ic = Ie. Select the AF265 contactor at intersection "○" (140 A / 1.5 million operating cycles) on the curves (AC-3 - 440 V < Ue ≤ 690 V).

3-pole contactors
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V
Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF1650
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).

Maximum electrical switching frequency: see "Technical data".

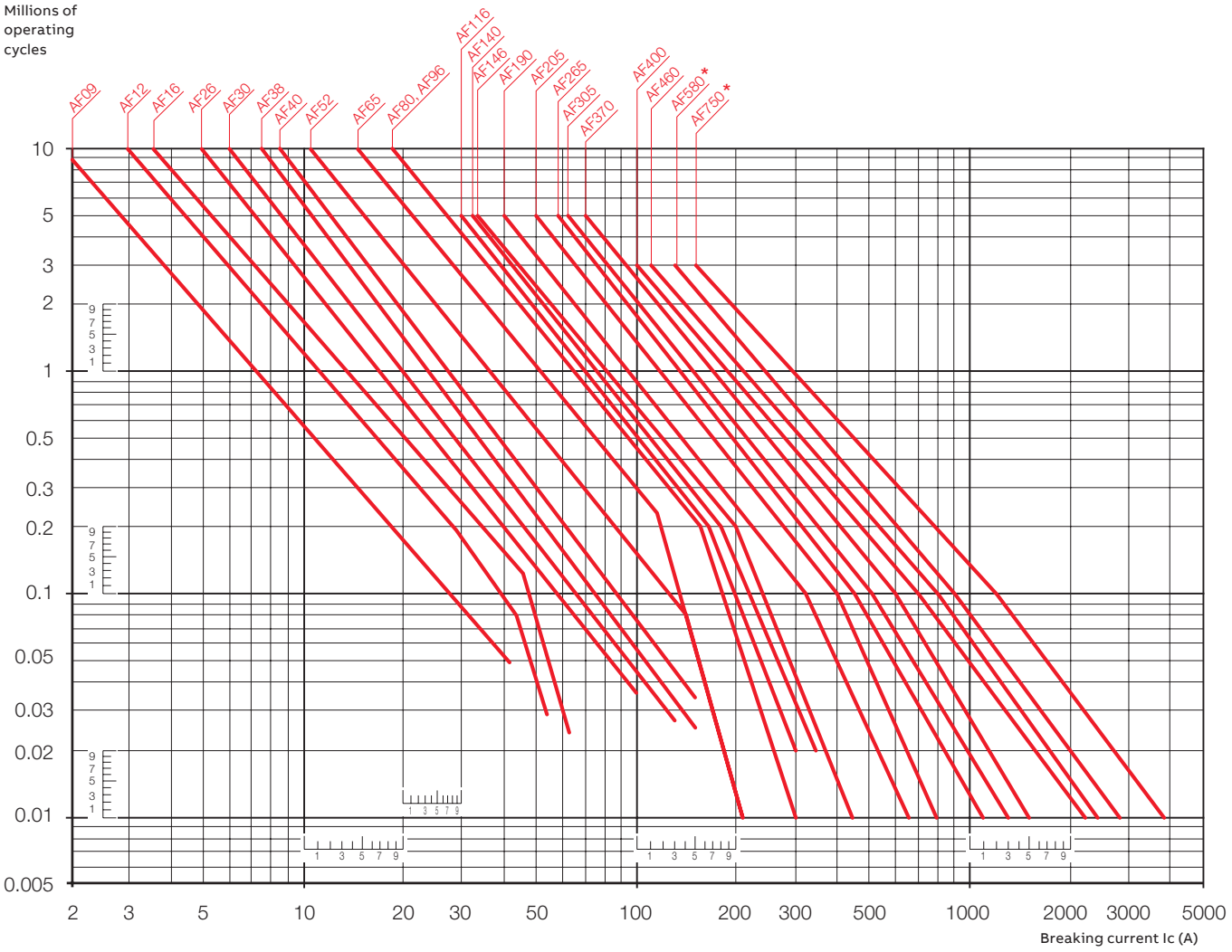


Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

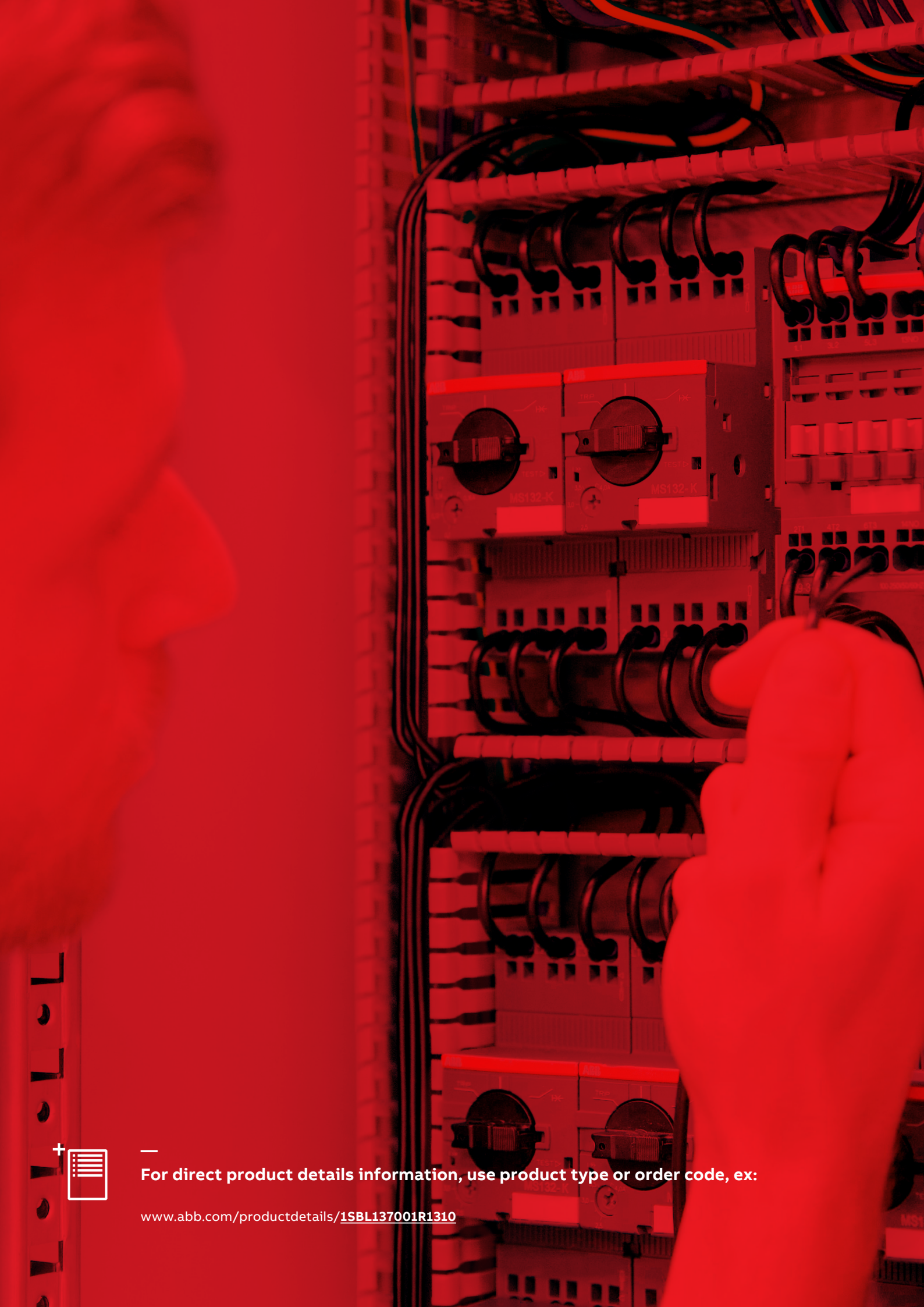
3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF750
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keaping in mind tha Ie is the motor rated operational current (Ie = motor full load current). Maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.



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

www.abb.com/productdetails/**1SBL137001R1310**

Push-in Spring motor starting solution

3/113 **Presentation and Overview**

Ordering details
4 to 18.5 kW

3/115 AF09..K ... AF38..K AC / DC operated
3/121 AF09Z..K ... AF38Z..K 24 V DC designed for PLC
3/122 AF09Z..K ... AF38Z..K AC / DC operated for specific applications

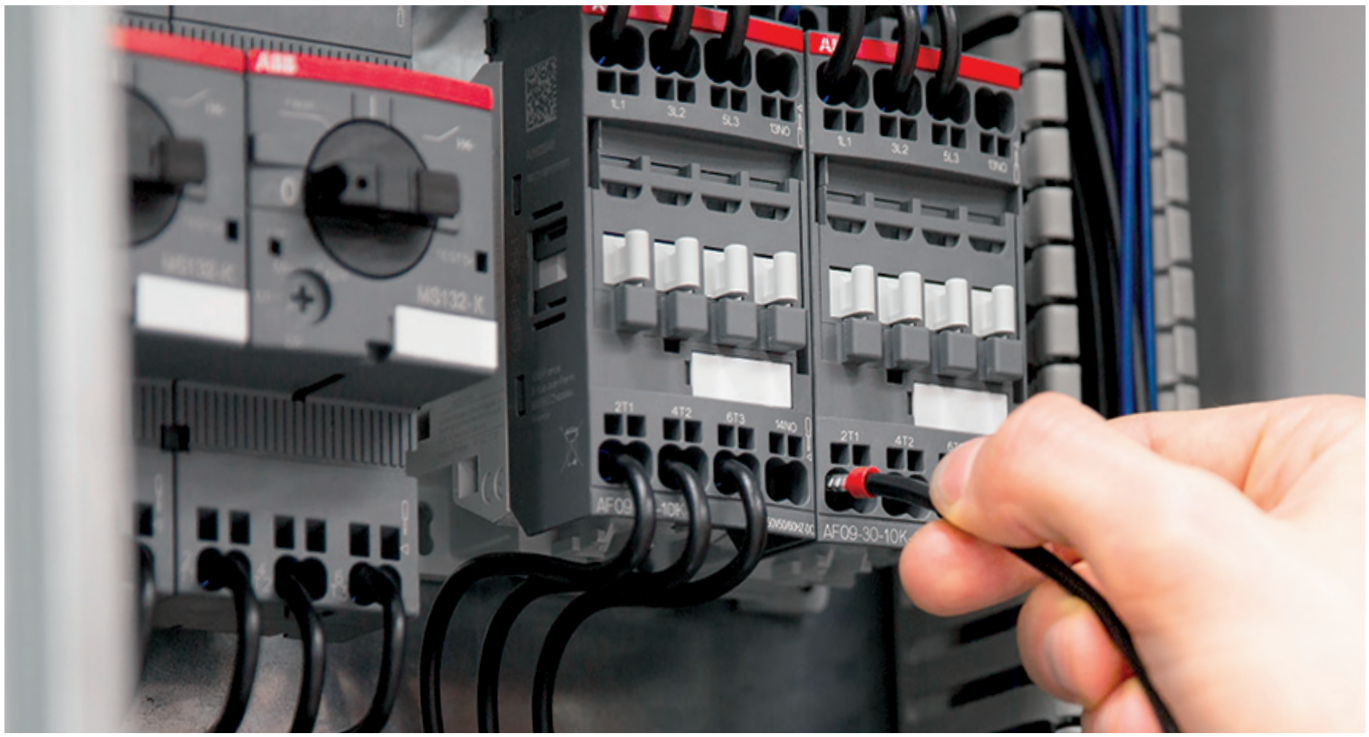
3/124 **Main accessories**

3/125 **Technical data**

3/131 **Electrical durability**

3/466 **Voltage code table**

Just push it
Push-in Spring motor starting solution



With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.

Speed up your projects

Faster than ever installation

Imagine a motor starting solution that's twice as fast to install. With Push-in Spring, you no longer need to imagine – it's a reality. Push-in mode allows you to insert both ferruled and rigid cables without the need to use any tools, boosting your productivity like never before.

Easy to install

Easier than ever wiring

Push-in Spring technology opens up new possibilities. With its unmatched ease of use, wiring becomes far more intuitive. This eliminates the need for special training and reduces the chance of wiring error. What possibilities will it open up for you?

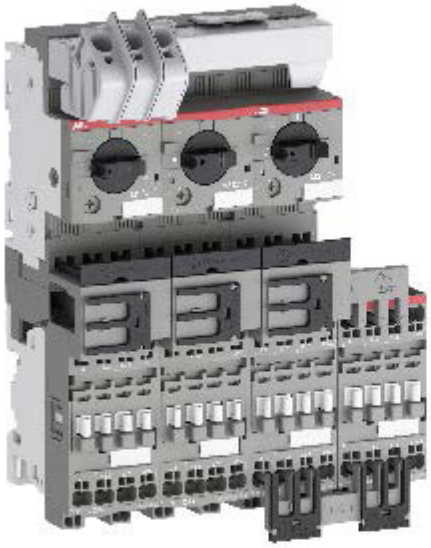
Continuous operation

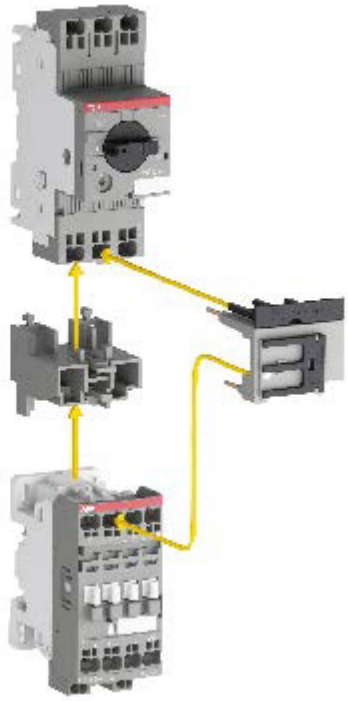
Reliable as ever connections

The speed and ease of Push-in Spring comes with the added reassurance of connections that are as reliable as ever. This gives you complete peace of mind when using the Push-in Spring motor starting solution.

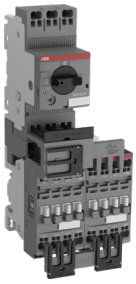
Just push it!
The next evolution in motor starter solutions is here.

So up to 18.5 kW, one push is all you need!





—
Direct on-line Starter



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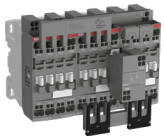
Reversing Starter



—
Star-Delta Starter

—
Save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.

Also available with Push-in technology

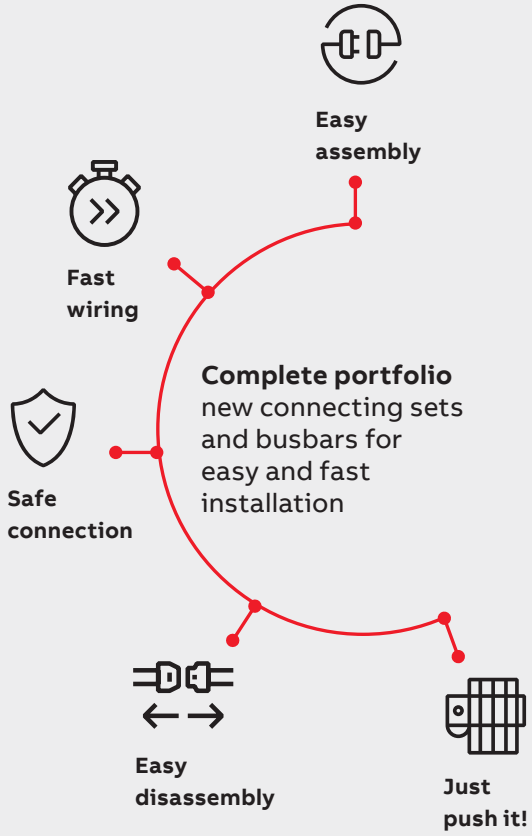
—
Sentry safety relays

—
Monitoring relays

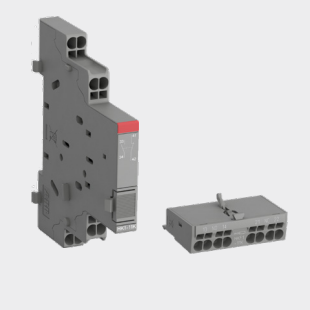
—
Time relays

Benefits / Features

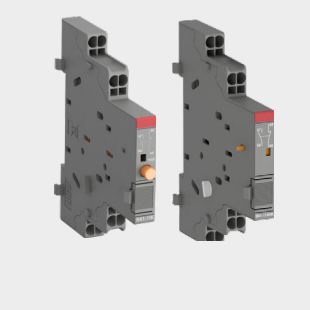
- Fast and intuitive wiring
- Tool-free mounting
- Vibration & shock proof
- Robust design for higher up-time
- Future proof connection technology
- Terminals accessible from the front
- One-hand mounting
- 2-in-1 Push-in / Spring
- Higher connection capacity
- No mounting plate required for starters
- Enabled for automated wiring



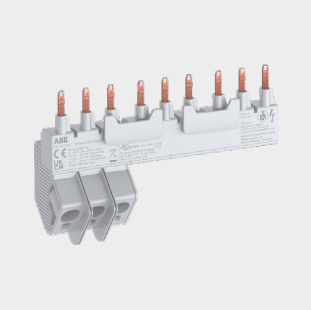
—
CA4..K, CAL4-11K 1, 2 and 4 pole auxiliary contacts



—
HK1-K, HKF1-K auxiliary contacts



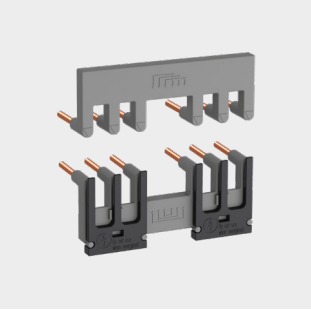
—
SK1-K and SK1-ARK signaling contacts



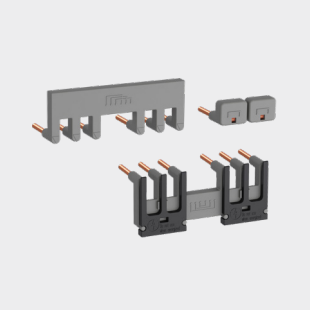
—
PS1-...-65K busbars for 2, 3, 4 or 5 manual motor starters

—
TS1-M3-K terminal spacer for UL Type E/F combination motor controllers

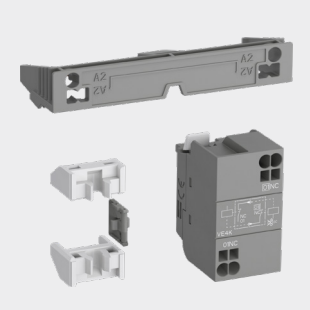
—
BEA16-4KF and BEA38-4KF connecting links with manual motor starters



—
BER16-4KF and BER38-4KF connecting links for reversing starters



—
BEY16-4KF and BEY38-4KF connection sets for Star-Delta starters

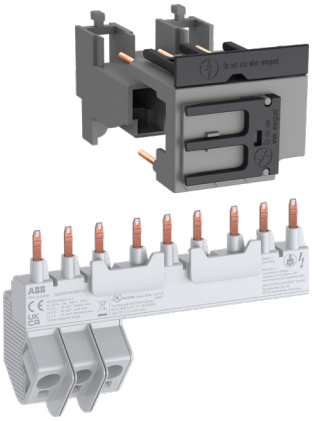


—
VEM4K electrical and mechanical interlock

Faster than ever installation

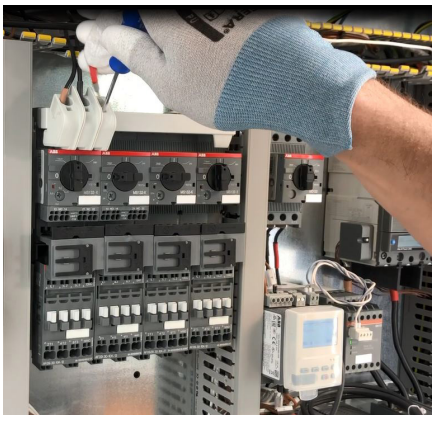
2-in-1 connection

For the very first time, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.



Smart accessories

100% tool-free connecting kits and busbars significantly reduce installation time.



Complete solution

High connection capacities are optimized for motor starting solutions up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A general use). This includes short-circuit fuseless protection up to 100 kA. Push-in Spring accessories can be also mounted on the standard screw range of manual motor starters and contactors.

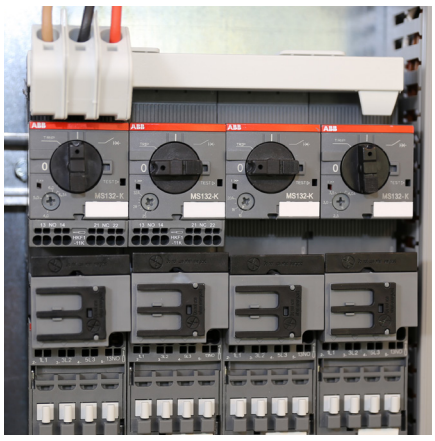
Easier than ever wiring

Intuitive wiring

With Push-in Spring, all cables, busbars and connecting links use the same round shape entry, whilst the square terminals are clearly marked with screwdriver symbols. The result? Wiring and de-wiring that's intuitive and easily repeatable without cabling error, with little to no training required.

Just one screwdriver required

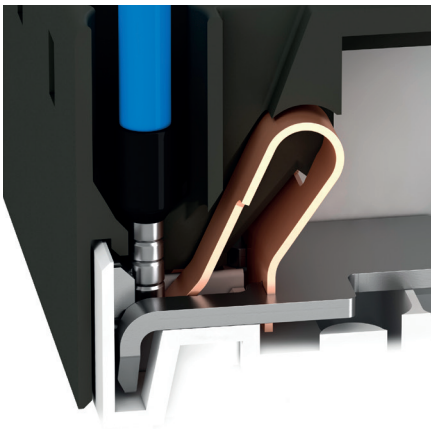
For de-wiring, only one screwdriver size is needed for the entire range. No twisting or turning is required either, so there's less chance of damage to the terminals and to your installation as a whole.



Automated wiring

The Push-in Spring motor starting solution features 90° cable insertion for all terminals. Front access to terminals aids smooth, robust insertion of cables and makes automated robot wiring possible.

Reliable as ever connections



Robust electrical contact

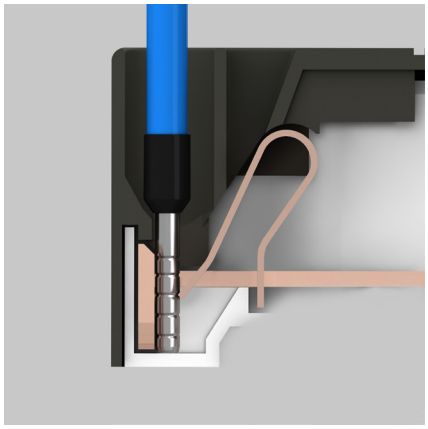
The special spring design guarantees excellent electrical contact. The design provides strict control of contact strength, independent from operator, giving you complete assurance.

Vibration-proof

You can count on Push-in Spring connections, even in harsh environments. Push-in Spring technology has been shock and vibration tested according to IEC 60068-2-27 and IEC 60068-2-6 standards.

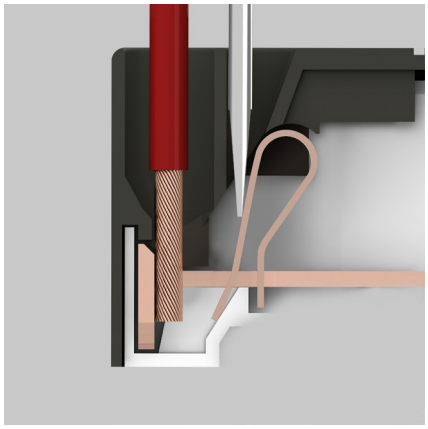
No need to re-tighten

With self-tightening terminals, there's no need to re-tighten after transportation or during the life cycle of the product. High connection strength is guaranteed throughout the whole lifetime of the device.



Push-in mode

Connect rigid cables or ferruled cables simply by pushing them into the cable holes – no need to use any tools. Push-in mode saves up to 50% wiring time compared to conventional spring solutions and makes installation a breeze. Benefit from intuitive wiring, self-tightening terminals and less chance of wiring error.

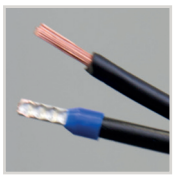


Spring Mode

This mode is used for small cable cross-sections or for cables without ferrules. It is also used for de-wiring the solution. Before inserting the cable, simply push a screwdriver into the clearly marked holes to open the terminal. ABB's Spring mode is easier to use than conventional spring technology, with less chance of damage to terminals as no twisting or turning is required.

Push-in Spring solution
Complete range, complete efficiency

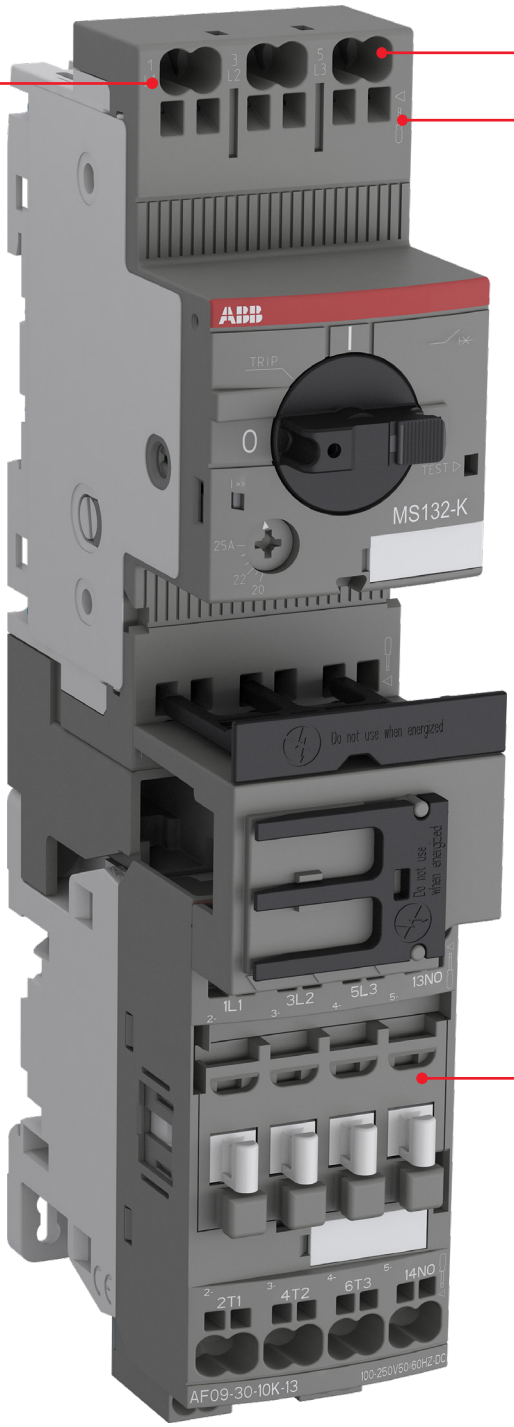
The Push-in Spring motor starting solution products provide you with a range of benefits.

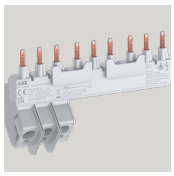


2-in-1
Benefit from both Push-in mode and Spring mode and use ferruled cables or cables without ferrules in the same terminal.

Tool-free connecting links
100% tool-free mounting connecting links.

Compatible with screw range
Mount accessories for control circuits on the screw range up to 45 kW AC-3 400 V on manual motor starters and up to 45 kW AC-3 400 V, 130 A AC-1 on contactors.





Tool-free busbars
Parallel connection of manual motor starters without the need for tools (also certified for UL Type E/ Type F applications)

Just one tool for everything
You only need a 3 mm screwdriver in Spring mode as well as for de-wiring the complete solution.

Higher connecting capacity
The solution ranges up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A 600 V general use).

3-pole contactors and motor protection

AC / DC Control supply				Type	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
IEC	AC-3	Rated operational power	θ ≤ 60 °C, 380 - 400 V	kW	4	5.5	7.5	11	15	18.5
		Rated operational current	380 - 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
UL/CSA	3-phase Motor Rating		440 - 480 V	hp	5	7.5	10	15	20	25
	General Use Rating		600 V	A	25	28	30	42	45	45
NEMA	NEMA size				00	0	–	1	–	–

Main accessories for contactors

Auxiliary contact blocks		Front mounting	CA4-10K (1 N.O.) CA4-01K (1 N.C.)	
		Side mounting	CAL4-11K (1 N.O. + 1 N.C.)	
Interlocking units		Mechanical	VM4	
		Mechanical / Electrical	VEM4K	
Surge protection			Built-in surge protection	

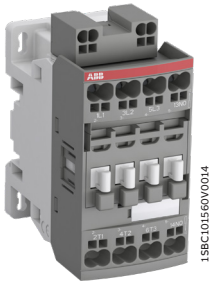
Accessories

Connecting link for contactor mounting		BEA16-4KF	BEA38-4KF
Auxiliary contact blocks	Front mounting	HKF1-..K (1 N.O. + 1N.C.) (2 N.O.)	
	Side mounting	HK1-..K (1 N.O. + 1N.C.) (2 N.O.) (2 N.C.)	
Signaling contact	For trip alarm	SK1-..K (1 N.O. + 1N.C.) (2 N.O.) (2 N.C.)	

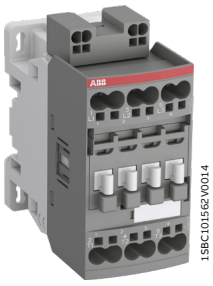
AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

4 to 18.5 kW

AC / DC operated



AF09-30-10K

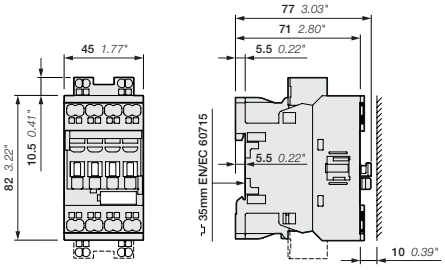


AF26-30-00K

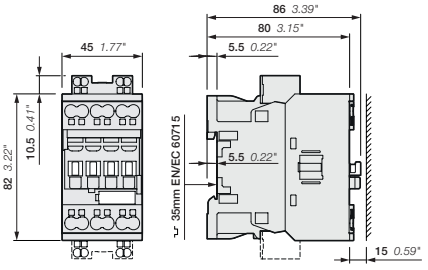
AF09..K ... AF38..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power	current ϑ ≤ 40 °C	3-phase motor rating	General use rating						Pkg (1 pce)
400 V		480 V	600 V AC						
AC-3	AC-1								
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	24 ... 60	20 ... 60	1 0	AF09-30-10K-11	1SBL137005R1110	0.285
						0 1	AF09-30-01K-11	1SBL137005R1101	0.285
				48 ... 130	48 ... 130	1 0	AF09-30-10K-12	1SBL137005R1210	0.285
						0 1	AF09-30-01K-12	1SBL137005R1201	0.285
				100 ... 250	100 ... 250	1 0	AF09-30-10K-13	1SBL137005R1310	0.285
						0 1	AF09-30-01K-13	1SBL137005R1301	0.285
				250 ... 500	250 ... 500	1 0	AF09-30-10K-14	1SBL137005R1410	0.325
						0 1	AF09-30-01K-14	1SBL137005R1401	0.325
5.5	28	7.5	28	24 ... 60	20 ... 60	1 0	AF12-30-10K-11	1SBL157005R1110	0.285
						0 1	AF12-30-01K-11	1SBL157005R1101	0.285
				48 ... 130	48 ... 130	1 0	AF12-30-10K-12	1SBL157005R1210	0.285
						0 1	AF12-30-01K-12	1SBL157005R1201	0.285
				100 ... 250	100 ... 250	1 0	AF12-30-10K-13	1SBL157005R1310	0.285
						0 1	AF12-30-01K-13	1SBL157005R1301	0.285
				250 ... 500	250 ... 500	1 0	AF12-30-10K-14	1SBL157005R1410	0.325
						0 1	AF12-30-01K-14	1SBL157005R1401	0.325
7.5	30	10	30	24 ... 60	20 ... 60	1 0	AF16-30-10K-11	1SBL177005R1110	0.285
						0 1	AF16-30-01K-11	1SBL177005R1101	0.285
				48 ... 130	48 ... 130	1 0	AF16-30-10K-12	1SBL177005R1210	0.285
						0 1	AF16-30-01K-12	1SBL177005R1201	0.285
				100 ... 250	100 ... 250	1 0	AF16-30-10K-13	1SBL177005R1310	0.285
						0 1	AF16-30-01K-13	1SBL177005R1301	0.285
				250 ... 500	250 ... 500	1 0	AF16-30-10K-14	1SBL177005R1410	0.325
						0 1	AF16-30-01K-14	1SBL177005R1401	0.325
11	45	15	42	24 ... 60	20 ... 60	0 0	AF26-30-00K-11	1SBL237005R1100	0.325
				48 ... 130	48 ... 130	0 0	AF26-30-00K-12	1SBL237005R1200	0.325
				100 ... 250	100 ... 250	0 0	AF26-30-00K-13	1SBL237005R1300	0.325
				250 ... 500	250 ... 500	0 0	AF26-30-00K-14	1SBL237005R1400	0.365
15	50	20	45	24 ... 60	20 ... 60	0 0	AF30-30-00K-11	1SBL277005R1100	0.330
				48 ... 130	48 ... 130	0 0	AF30-30-00K-12	1SBL277005R1200	0.330
				100 ... 250	100 ... 250	0 0	AF30-30-00K-13	1SBL277005R1300	0.330
				250 ... 500	250 ... 500	0 0	AF30-30-00K-14	1SBL277005R1400	0.370
18.5	50	25	45	24 ... 60	20 ... 60	0 0	AF38-30-00K-11	1SBL297005R1100	0.330
				48 ... 130	48 ... 130	0 0	AF38-30-00K-12	1SBL297005R1200	0.330
				100 ... 250	100 ... 250	0 0	AF38-30-00K-13	1SBL297005R1300	0.330
				250 ... 500	250 ... 500	0 0	AF38-30-00K-14	1SBL297005R1400	0.370



AF09..K, AF12..K, AF16..K



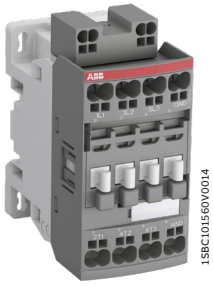
AF26..K, AF30..K, AF38..K

Main dimensions mm, inches

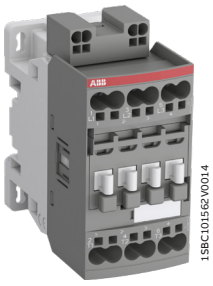
AF09Z..K ... AF38Z..K 3-pole contactors - with Push-in Spring terminals

4 to 18.5 kW

AC / DC operated - for specific applications



AF09Z-30-10K



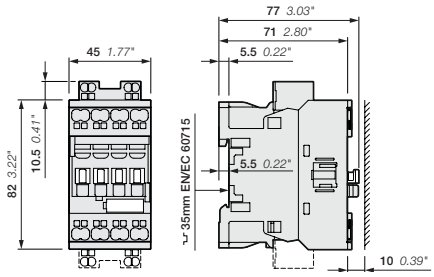
AF26Z-30-00K

AF09Z..K ... AF38Z..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

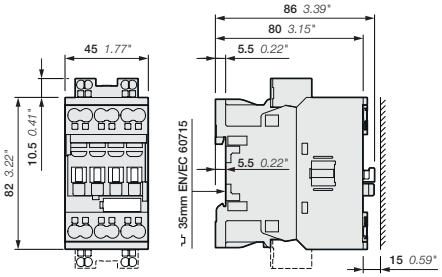
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request)
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power	current ≤ 40 °C	3-phase motor rating	General use rating						Pkg (1 pce)
400 V		480 V	600 V AC						
AC-3	AC-1								
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	–	12 ... 20	1 0	AF09Z-30-10K-20	1SBL136005R2010	0.315
						0 1	AF09Z-30-01K-20	1SBL136005R2001	0.315
				24 ... 60	20 ... 60	1 0	AF09Z-30-10K-21	1SBL136005R2110	0.315
						0 1	AF09Z-30-01K-21	1SBL136005R2101	0.315
				48 ... 130	48 ... 130	1 0	AF09Z-30-10K-22	1SBL136005R2210	0.315
						0 1	AF09Z-30-01K-22	1SBL136005R2201	0.315
				100 ... 250	100 ... 250	1 0	AF09Z-30-10K-23	1SBL136005R2310	0.315
						0 1	AF09Z-30-01K-23	1SBL136005R2301	0.315
5.5	28	7.5	28	–	12 ... 20	1 0	AF12Z-30-10K-20	1SBL156005R2010	0.315
						0 1	AF12Z-30-01K-20	1SBL156005R2001	0.315
				24 ... 60	20 ... 60	1 0	AF12Z-30-10K-21	1SBL156005R2110	0.315
						0 1	AF12Z-30-01K-21	1SBL156005R2101	0.315
				48 ... 130	48 ... 130	1 0	AF12Z-30-10K-22	1SBL156005R2210	0.315
						0 1	AF12Z-30-01K-22	1SBL156005R2201	0.315
				100 ... 250	100 ... 250	1 0	AF12Z-30-10K-23	1SBL156005R2310	0.315
						0 1	AF12Z-30-01K-23	1SBL156005R2301	0.315
7.5	30	10	30	–	12 ... 20	1 0	AF16Z-30-10K-20	1SBL176005R2010	0.315
						0 1	AF16Z-30-01K-20	1SBL176005R2001	0.315
				24 ... 60	20 ... 60	1 0	AF16Z-30-10K-21	1SBL176005R2110	0.315
						0 1	AF16Z-30-01K-21	1SBL176005R2101	0.315
				48 ... 130	48 ... 130	1 0	AF16Z-30-10K-22	1SBL176005R2210	0.315
						0 1	AF16Z-30-01K-22	1SBL176005R2201	0.315
				100 ... 250	100 ... 250	1 0	AF16Z-30-10K-23	1SBL176005R2310	0.315
						0 1	AF16Z-30-01K-23	1SBL176005R2301	0.315
11	45	15	42	–	12 ... 20	0 0	AF26Z-30-00K-20	1SBL236005R2000	0.355
				24 ... 60	20 ... 60	0 0	AF26Z-30-00K-21	1SBL236005R2100	0.355
				48 ... 130	48 ... 130	0 0	AF26Z-30-00K-22	1SBL236005R2200	0.355
				100 ... 250	100 ... 250	0 0	AF26Z-30-00K-23	1SBL236005R2300	0.355
15	50	20	45	–	12 ... 20	0 0	AF30Z-30-00K-20	1SBL276005R2000	0.360
				24 ... 60	20 ... 60	0 0	AF30Z-30-00K-21	1SBL276005R2100	0.360
				48 ... 130	48 ... 130	0 0	AF30Z-30-00K-22	1SBL276005R2200	0.360
				100 ... 250	100 ... 250	0 0	AF30Z-30-00K-23	1SBL276005R2300	0.360
18.5	50	25	45	–	12 ... 20	0 0	AF38Z-30-00K-20	1SBL296005R2000	0.360
				24 ... 60	20 ... 60	0 0	AF38Z-30-00K-21	1SBL296005R2100	0.360
				48 ... 130	48 ... 130	0 0	AF38Z-30-00K-22	1SBL296005R2200	0.360
				100 ... 250	100 ... 250	0 0	AF38Z-30-00K-23	1SBL296005R2300	0.360

Note: Only AF..Z contactors with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z..K, AF12Z..K, AF16Z..K



AF26Z..K, AF30Z..K, AF38Z..K

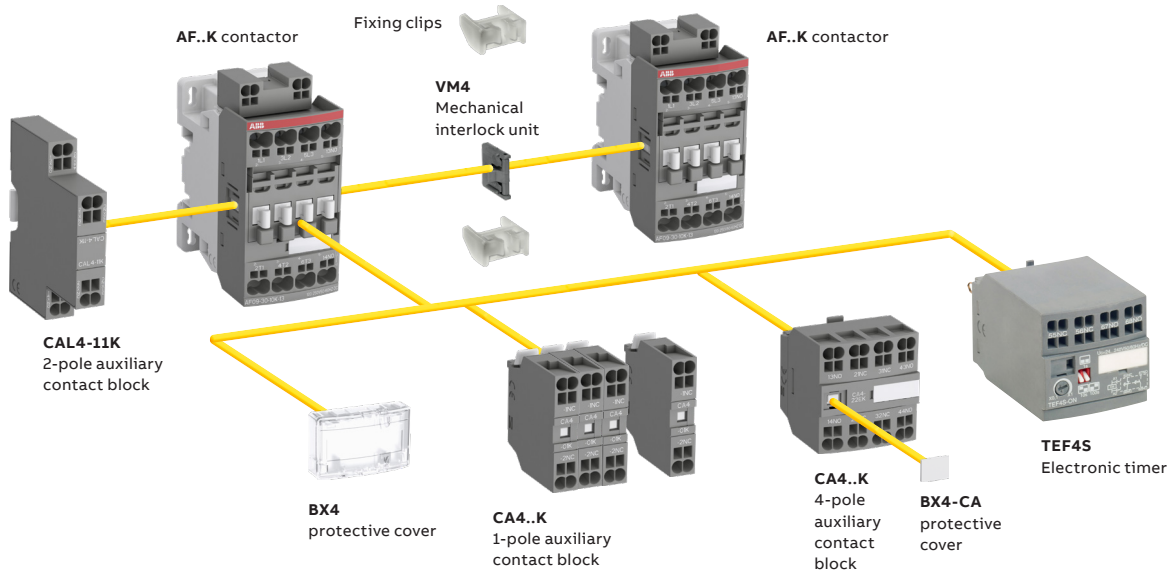
Main dimensions mm, inches

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Main accessories

Contactor and main accessories (other accessories available)

AF09..K ... AF38..K



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	Mechanical interlock unit		Auxiliary contact blocks	
							(between 2 contactors)		Left side	Right side
				1-pole CA4..K	4-pole CA4..K	TEF4S	VM4		2-pole CAL4-11K	
AF09(Z)..K ... AF38(Z)..K (1)										
AF09..K ... AF16..K	3	0	0 1	4 max.	**or** 1	**or** 1	–	+	1	–
AF09..K ... AF16..K	3	0	1 0	2 max.	–	**or** 1	–	+	1	+ 1
AF26..K ... AF38..K	3	0	0 0	4 max.	**or** 1	**or** 1	+ 1	+	1	**or** 1
AF09Z..K ... AF38Z..K 24 V DC designed for PLC - coil 30 (1)										
AF09Z..K ... AF16Z..K	3	0	0 1	4 max.	**or** 1	**or** 1	+ 1	**or**	1	+ 1
AF09Z..K ... AF16Z..K	3	0	1 0	2 max.	–	**or** 1	+ 1	+	1	**or** 1
AF26Z..K ... AF38Z..K	3	0	0 0			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

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..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 (1)							
M 3~ 3-phase motors	220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
	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
	1000 V	–					
Rated operational power AC-3, AC-3e (1)							
M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
	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
	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		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 in free air Motor protection excluded (2) Ue ≤ 500 V AC - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A
Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state	1 s	300 A	300 A	300 A	700 A	700 A	700 A
	10 s	150 A	150 A	150 A	350 A	350 A	350 A
	30 s	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity cos ϕ = 0.45	at 440 V	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole	Ie / AC-1	1.14 W	1.43 W	1.64 W	2 W	2.44 W	2.44 W
	Ie / AC-3, AC-3e	0.15 W	0.26 W	0.6 W	0.66 W	1 W	1.41 W
Max. electrical switching frequency	AC-1	600 cycles/h					
	AC-3, AC-3e	1200 cycles/h					
	AC-2, AC-4	300 cycles/h			150 cycles/h		

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

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

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

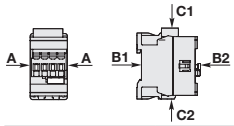
Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
Standards		UL 60947-4-1, CSA-C22.2 No. 60947-4-1					
Maximum operational voltage		600 V					
NEMA size		00	0	-	1	-	-
NEMA continuous amp rating	Thermal current	9 A	18 A		27 A		
NEMA maximum horse power ratings 1-phase, 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							
600 V AC		25 A	28 A	30 A	42 A	45 A	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	42 A	45 A	45 A
2 poles in serie	160 V DC	25 A	28 A	30 A	42 A	45 A	45 A
3 poles in serie	240 V DC	25 A	28 A	30 A	42 A	45 A	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							
Fuse rating		30 A		60 A		100 A	
Fuse type, 600 V		RK5					
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".

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

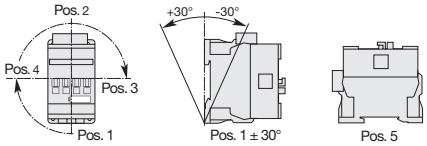
Technical data

General technical data

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..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					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)					
Pollution degree		3					
Ambient air temperature close to contactor							
Operation Without thermal overload relay		-40 ... +70 °C					
Storage		-60 ... +80 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		10 million operating cycles					
Maximum switching frequency		3600 cycles/h					
Shock withstand							
acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	30 g					
	B1	25 g closed position / 5 g open position					
	B2	15 g					
	C1	25 g					
	C2	25 g					
Vibration withstand		5 ... 300 Hz					
acc. to IEC 60068-2-6		4 g Closed position / 2 g Open position					

(1) AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select AF09 ... AF38Z-..-..-22.

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
Mounting positions		 Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38					
Mounting distances		The contactors can be assembled side by side					
Fixing							
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Magnet System Characteristics for AF09..K ... AF38..K contactors - AC / DC operated

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
	DC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
AC control voltage 50/60 Hz							
Rated control circuit voltage Uc		24 ... 500 V AC					
Coil consumption	Average pull-in value	50 VA					
	Average holding value	2.2 VA / 2 W					
DC control voltage							
Rated control circuit voltage Uc		20 ... 500 V DC					
Coil consumption	Average pull-in value	50 W					
	Average holding value	2 W					
PLC-output control		Not suitable for direct control by PLC-output					
Drop-out voltage		≤ 60 % Uc min.					
Operating time							
Between coil energization and:							
	N.O. contact closing	40 ... 95 ms					
	N.C. contact opening	38 ... 90 ms					
Between coil de-energization and:							
	N.O. contact opening	11 ... 95 ms					
	N.C. contact closing	13 ... 98 ms					

Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors 24V DC operated - designed for PLC - coil 30

Contactor types	AC / DC operated	AF09Z..K	AF12Z..K	AF16Z..K	AF26Z..K	AF30Z..K	AF38Z..K
Coil operating limits acc. to IEC 60947-4-1	DC supply	At θ ≤ 60 °C 0.85 ... 1.1 x Uc At θ ≤ 70 °C Uc					
DC control voltage							
Rated control circuit voltage Uc		24 V DC					
Coil consumption	Average pull-in value	6 W					
	Average holding value	1.7 W					
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection					
Drop-out voltage		≤ 60 % of Uc min.					
Operating time							
Between coil energization and:							
	N.O. contact closing	27 ... 53 ms					
	N.C. contact opening	20 ... 35 ms					
Between coil de-energization and:							
	N.O. contact opening	17 ... 29 ms					
	N.C. contact closing	22 ... 57 ms					

Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors - for specific applications - coils 20, 21, 22, 23

Contactor types	AC / DC operated	AF09Z..K	AF12Z..K	AF16Z..K	AF26Z..K	AF30Z..K	AF38Z..K
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max At θ ≤ 70 °C 0.85 x Uc min ... Uc max					
	DC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max					
AC control voltage 50/60 Hz							
Rated control circuit voltage Uc		24 ... 250 V AC					
Coil consumption	Average pull-in value	16 VA					
	Average holding value	1.7 VA / 1.5 W					
DC control voltage							
Rated control circuit voltage Uc		12 ... 250 V DC					
Coil consumption	Average pull-in value	12 ... 16 W					
	Average holding value	1.7 W					
PLC-output control		(AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs					
Drop-out voltage		≤ 60 % of Uc min.					
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z coil 21, 22, 23) conditions of use on request					
Dips withstand -20 °C ≤ θ ≤ +60°C		(AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC					
Operating time							
Between coil energization and:							
	N.O. contact closing	40 ... 95 ms					
	N.C. contact opening	38 ... 90 ms					
Between coil de-energization and:							
	N.O. contact opening	11 ... 95 ms					
	N.C. contact closing	13 ... 98 ms					

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Connecting characteristics

Contactor types	AC / DC operated		AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..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					

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
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					
Maximum 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.					
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 aux. contact blocks) are mirror contacts.					

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC / DC operated	AF09..K	AF12..K	AF16..K	AF26..K	AF30..K	AF38..K
Maximum 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					

AF09..K ... AF38..K 3-pole contactors with Push-in Spring terminals

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

Characteristics	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"

Characteristics	Load 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")
Utilization category	AC-1, AC-2, AC-3 or AC-4
Breaking current for AC-3	Ic = Ie
Breaking current for AC-4 while "motor accelerating"	Ic = 6 x Ie
Percentage of AC-4 operating cycles	K (on the basis of the total number of operating cycles)

- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
  - The number of operating cycles A for Ic = Ie (AC-3)
  - The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

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

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

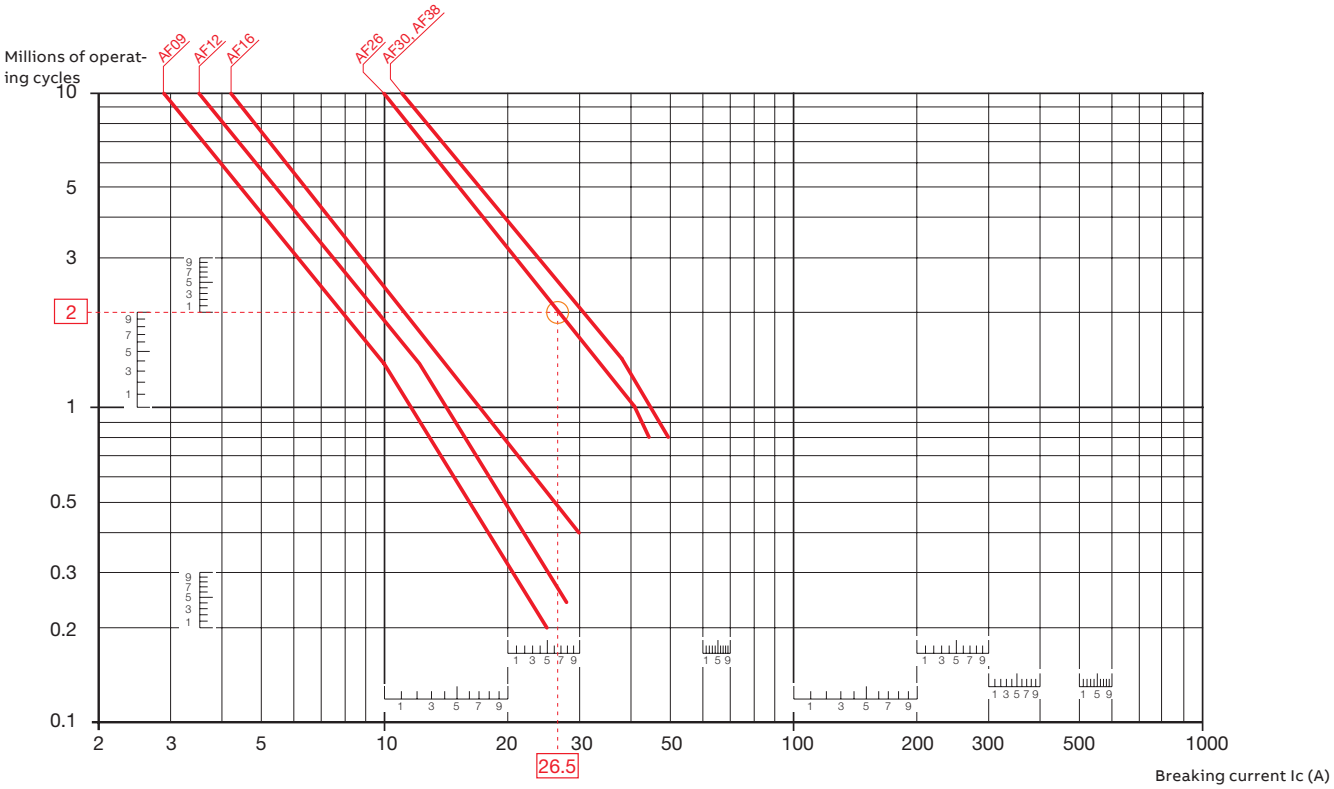
Case of uninterrupted duty

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

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

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 AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

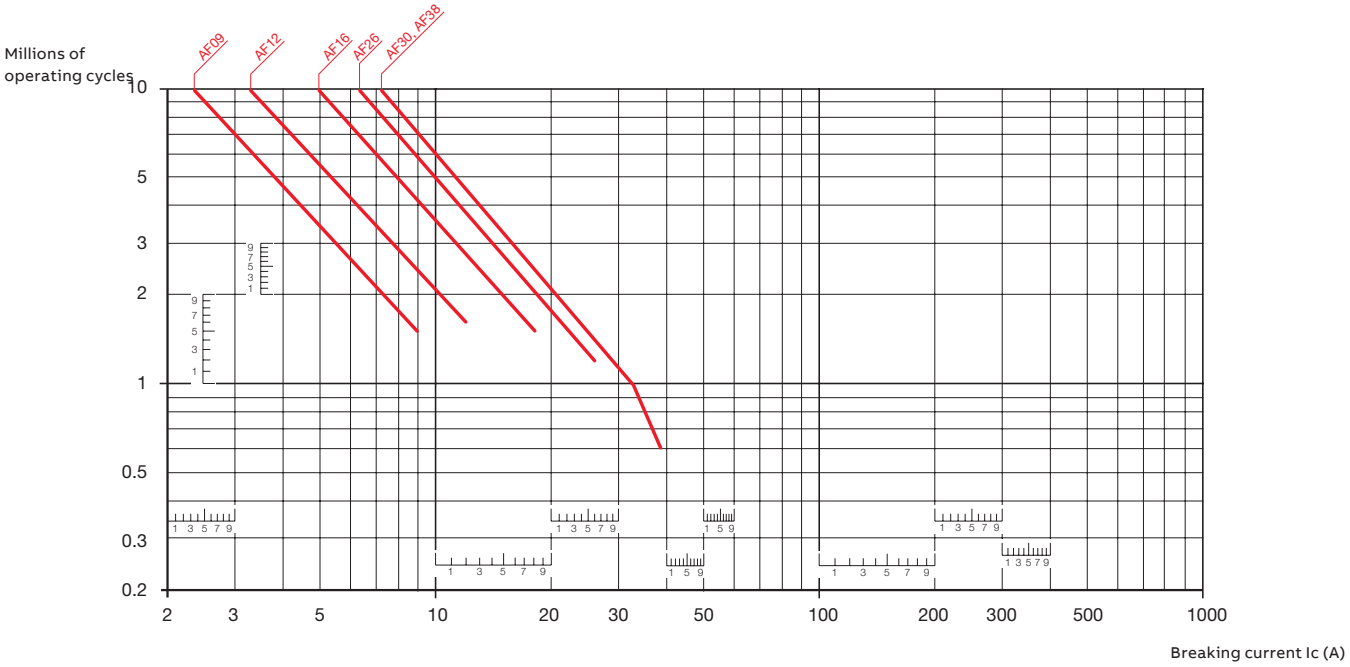
AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Electrical durability

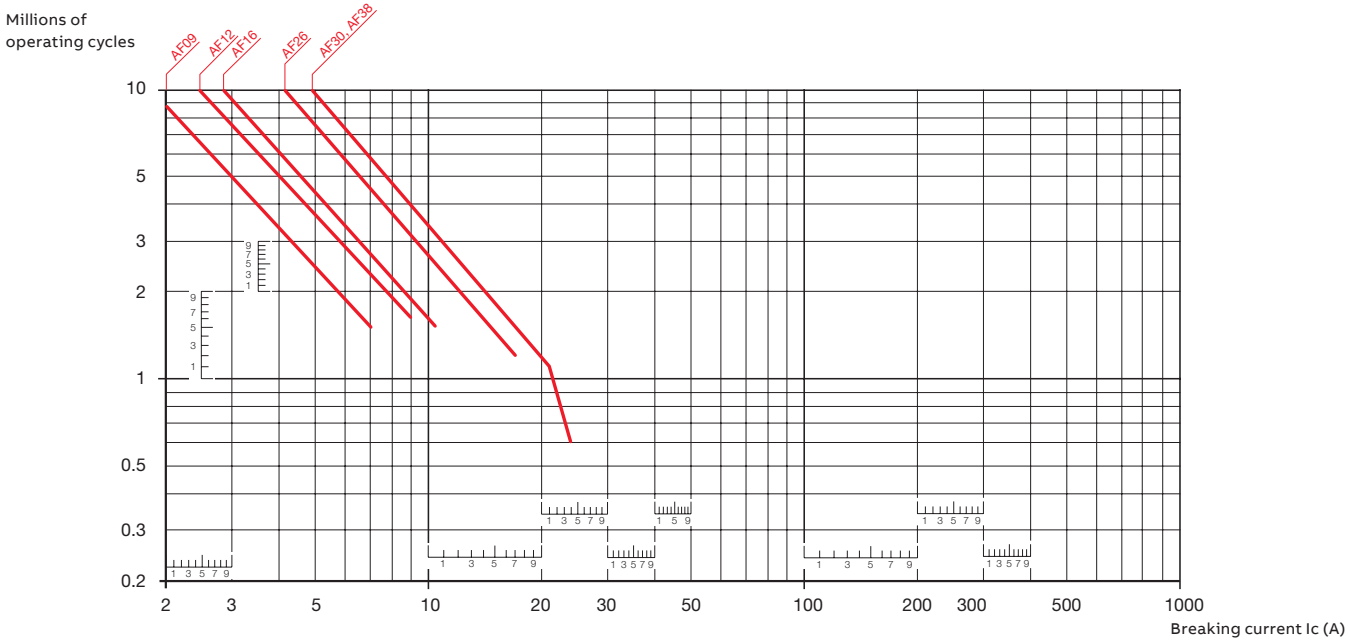
Electrical Durability for AC-3 Utilization Category

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

AC-3 - Ue ≤ 440 V



AC-3 - 440 V < Ue ≤ 690 V



AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

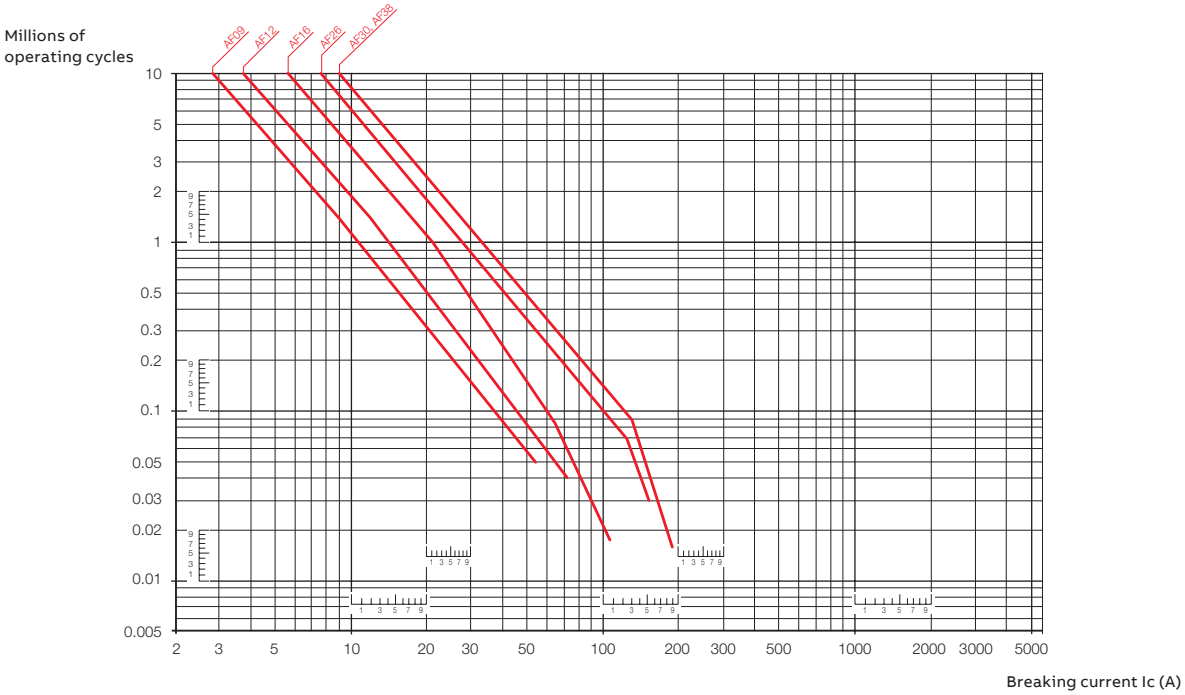
Electrical durability

Electrical Durability for AC-2 or AC-4 Utilization Category

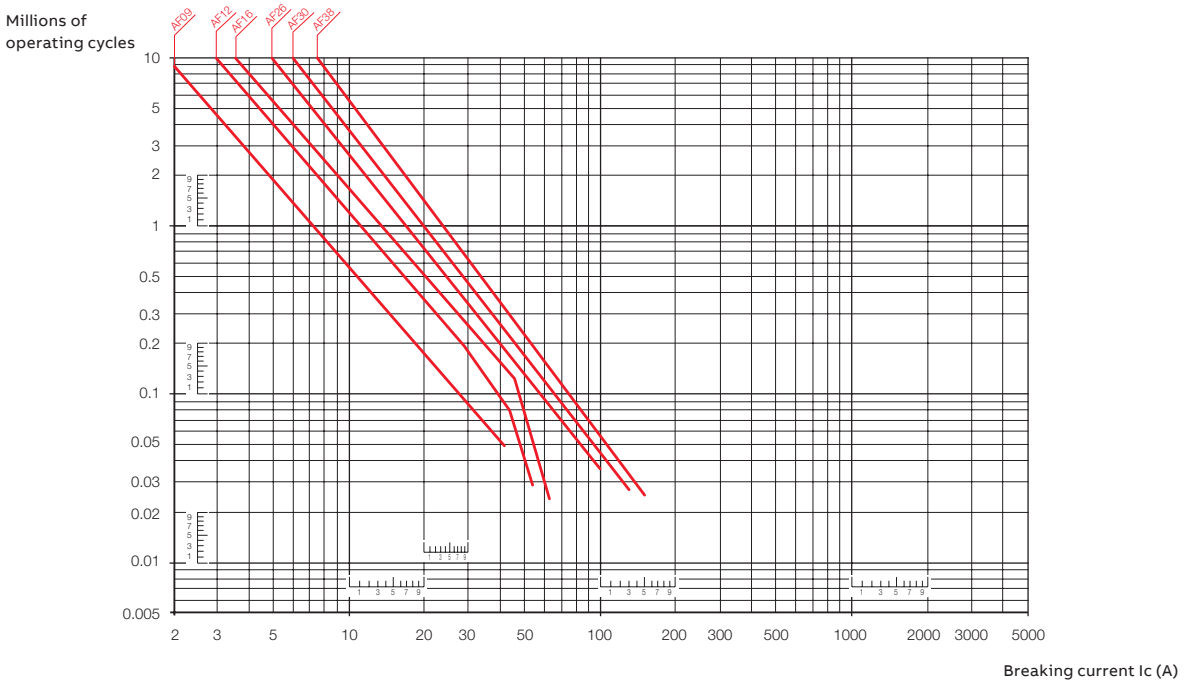
Switching cage motors: starting reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x I_e for AC-2 and 6 x I_e for AC-4, keeping in mind that I_e is the motor rated operational current Ie (Ie = motor full load current).

Ambient temperature ≤ 60 °C. Maximum electrical switching frequency: see "Technical Data".

AC-2 or AC-4 - Ue ≤ 440 V



AC-2 or AC-4 - 440 V < Ue ≤ 690 V



Notes

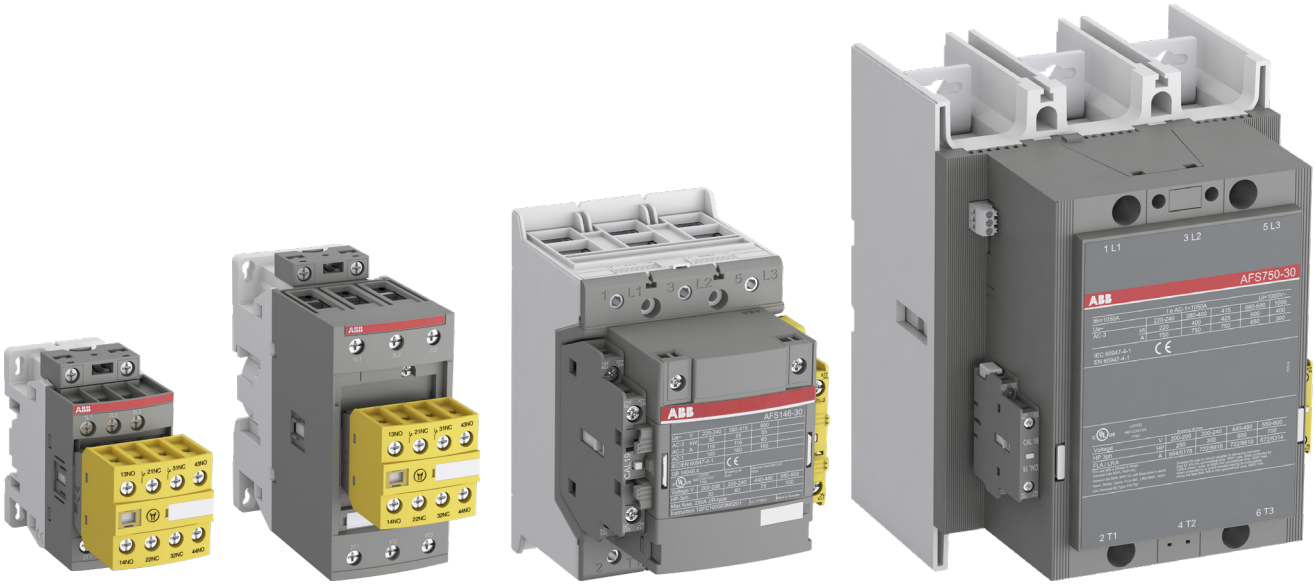
For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**1SBL137001R1310**

AFS 3-pole contactors dedicated for safety applications

3/139	**Overview**	
	Ordering details	
	4 to 45 kW	
3/144	AFS09 ... AFS38	AC / DC operated with 2 N.O. + 2 N.C.
3/145	AFS40 ... AFS96	AC / DC operated with 2 N.O. + 2 N.C.
3/146	AFS09 ... AFS96	Main accessories
	55 to 200 kW	
3/147	AFS116 ... AFS146	AC / DC operated with 1 N.O. + 2 N.C.
3/148	AFS116 ... AFS146	AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface
3/149	AFS190 ... AFS370	AC / DC operated with 1 N.O. + 2 N.C.
3/150	AFS190 ... AFS370	AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface
3/151	AFS09 ... AFS370	Main accessories
	200 to 400 kW	
3/152	AFS400 ... AFS750	AC / DC operated with 1 N.O. + 2 N.C.
3/153	AFS400 ... AFS750	Main accessories
3/154	**Technical data**	
3/168	**Terminal marking and positioning**	
3/169	**Electrical durability**	

AFS 3-pole contactors
Dedicated for safety applications



Designed for machine safety applications, AFS contactors now complete ABB's safety component portfolio.
With a range stretching from 9 A up to 750 A for motor starting applications and with a design complying with the latest safety standard, the AFS range of contactors is the given choice for any application that puts the users safety first.

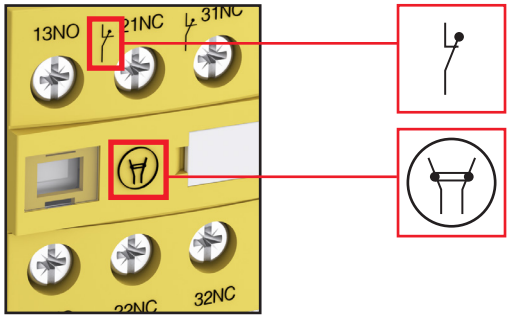
Safety and protection
ABB's AFS contactors can be easily integrated in machine manufacturer's systems complying with main standards EN ISO 13849 and EN 62061 - guaranteeing the safe use of your machinery and equipment. An easily identifiable yellow low energy auxiliary contact block ensures the status feedback circuits required in machine safety applications.

Continuous operation
The AFS contactor secures system uptime. Featuring ABB's tested and proven AF technology, AFS contactors are reliable in any network. Direct control by safety PLCs or safety relays ensures the required safety performance.

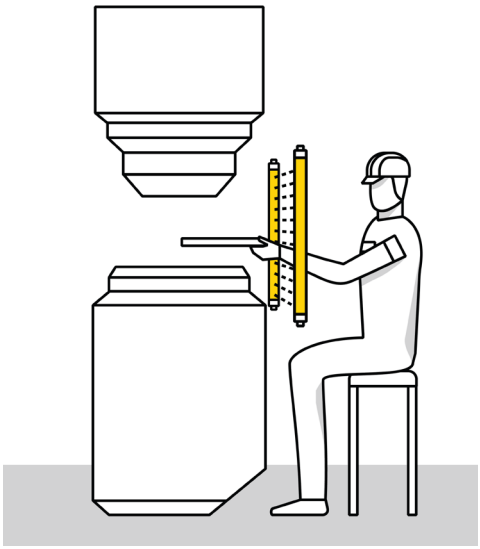
Speed up your projects
AFS design makes integration easier. With energy efficient coils smaller transformers can be used and panel space more efficiently used. Wide voltage range coils and easily available safety data simplifies product selection. In addition, all the safety data for the AFS contactors is available using common safety design tools.

AFS 3-pole contactors
Dedicated for safety applications

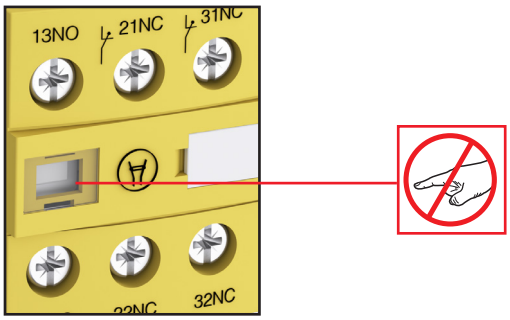
Guaranteed contactor status
ABB's permanently fixed auxiliary contact blocks guarantee the correct contactor status at all times. Mechanically linked and mirror contacts provide the performance required in feedback circuits. This prevents any unexpected state changes of auxiliary contact if main contacts become welded or stuck and ensures an accurate depiction of the safety system status displayed at all times. Mechanically linked and mirror contact symbols are marked on the yellow auxiliary block.



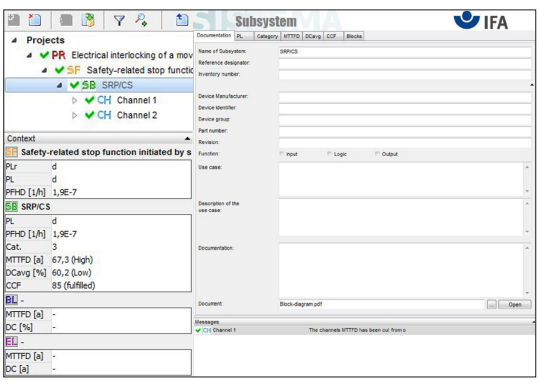
Fast response for increased safety
In safety applications speed is essential to protect operators. AFS contactors feature fast opening times, down to 20 ms for certain PLC controlled contactors, ensuring that when a dangerous failure is detected the operator is kept out of harms way.



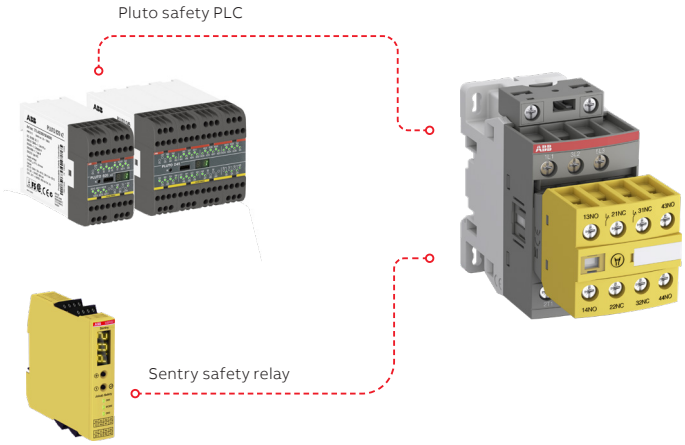
Prevent unexpected operations
Factory fitted auxiliary contact blocks that are permanently fixed protects devices against accidental operation and misuse. A factory-fitted transparent cover on contactors up to 96 A shields the contactor status indicator, providing additional protection from misuse.



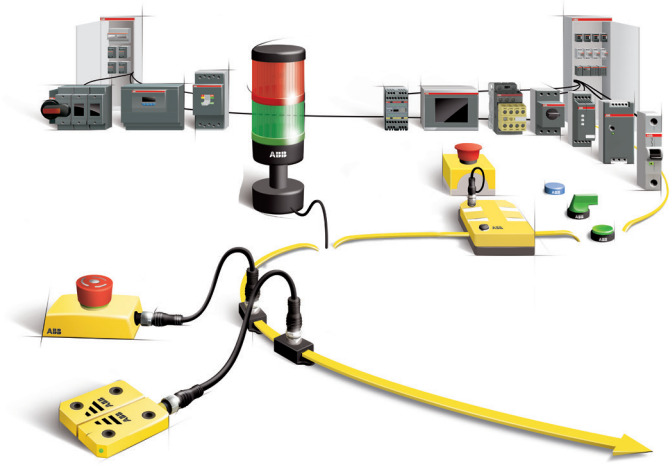
Simplify calculation of your installation safety level
AFS contactor safety data is available in safety design tools Sistema and FSDT, dedicated software for determining the Performance Level (PL) and Safety Integrity Level (SIL) of safety functions and generating technical documentations.



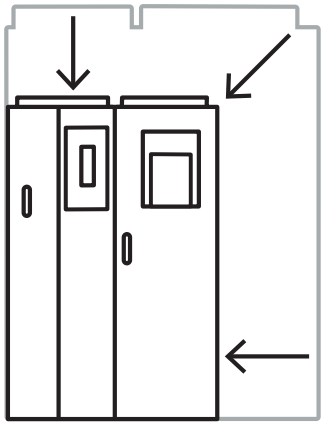
Control by safety PLCs or safety relays
ABB’s AFS contactors can be controlled directly by safety PLCs or safety relays, or by a power relay depending on size. AFS contactors is part of the ABB safety family, and selected sizes are tested together with ABB's Pluto safety PLC and the Sentry safety relay. For full coordination please advise ABB. The auxiliary contacts only require a minimum switching capacity of 3 V / 1 mA. They guarantee system status feedback, making the system safe and reliable.



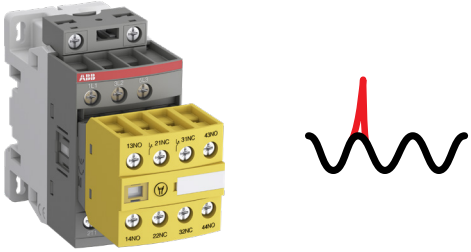
Easy safety chain identification
The yellow housing of ABB’s AFS contactors makes identifying the safety product in your panel quicker. During routine maintenance work, ABB’s intuitive design saves valuable time.



Panel size reduction
Utilizing AF technology, AFS coils needs up to 60% less energy than conventional contactor coils. This allows for smaller transformers to be used for contactor control, which in turn allows for more efficient use of panel space. Using AFS contactors saves money and precious space.

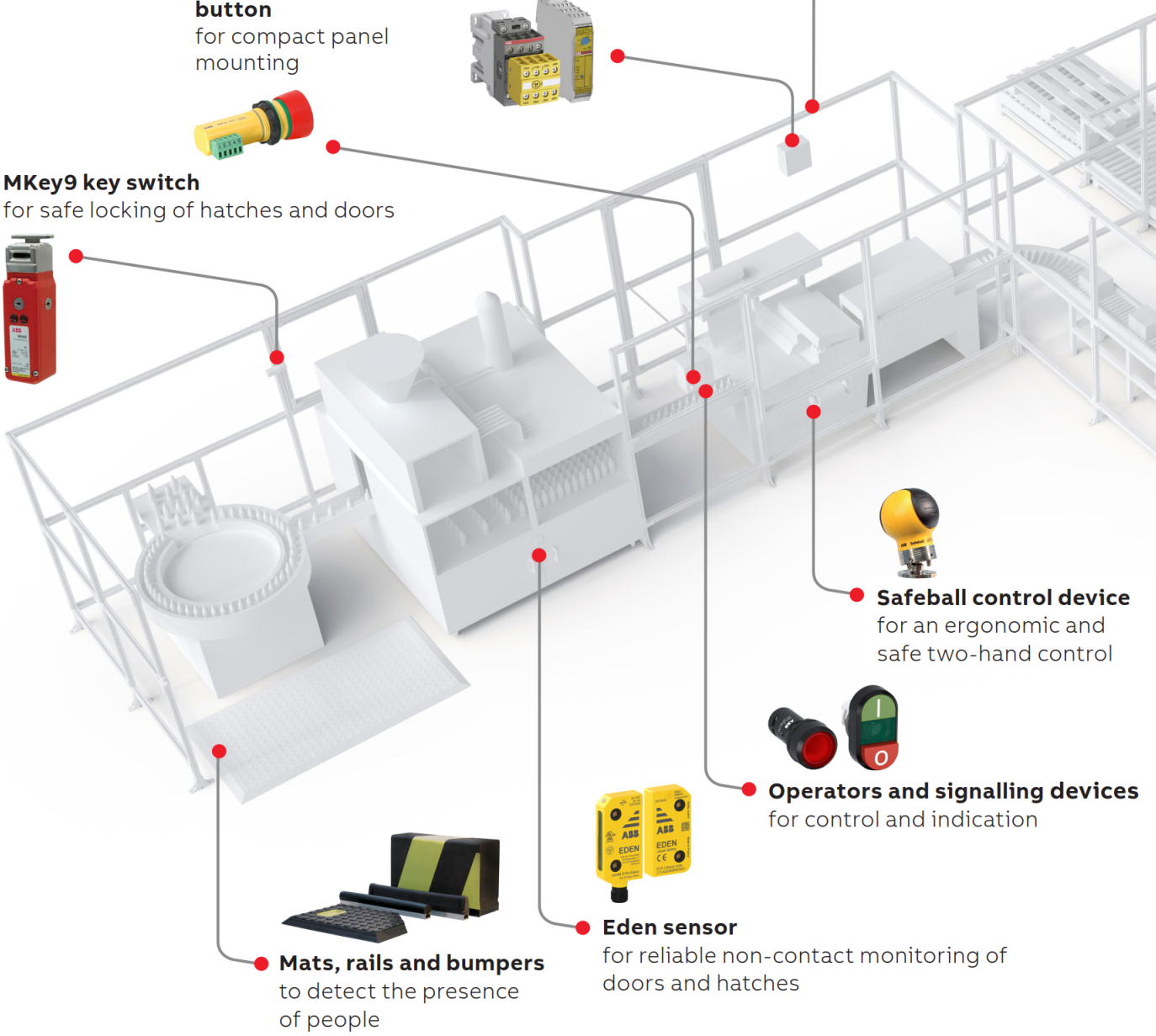


Built-in surge suppression
Unlike conventional contactors, ABB's AFS contactors have built-in surge suppression, preventing surges from ever reaching the control circuit. With no need for the usual external surge suppressor add-ons, ABB’s solution means one less device to install and one less complication to manage.



AFS 3-pole contactors

A part of ABB's complete safety solutions



Magne magnetic lock
to keep doors and hatches locked during a process

Pluto programmable safety controller, Vital safety controller and Sentry safety relays
for flexible monitoring of safety devices

Smile emergency stop button
to safely stop machinery in hazardous situations

Orion light guards
for a production friendly safety detection

Knox safety lock
for safe locking of doors

JSDH4 three-position device
for safe and ergonomic inspection and troubleshooting

LineStrong pull wire emergency stop switch
for easy access of emergency stop function

AFS09 ... AFS38 3-pole contactors for safety applications

4 to 18.5 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AFS16-30-22

AFS38-30-22

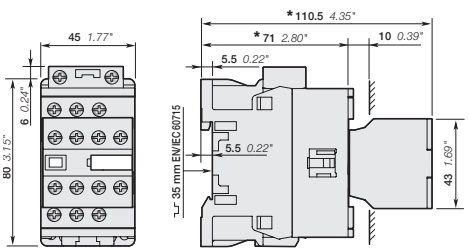
AFS09 ... AFS38 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked and mirror contacts make your system safer.

- control circuit with electronic coil interface:
  - dedicated 24 V DC for direct control by PLC-output ≥ 250 mA, low holding consumption up to 1.7 W
  - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
  - permanently fixed
  - protective cover to prevent manual operation
  - yellow housing for easy identification
  - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

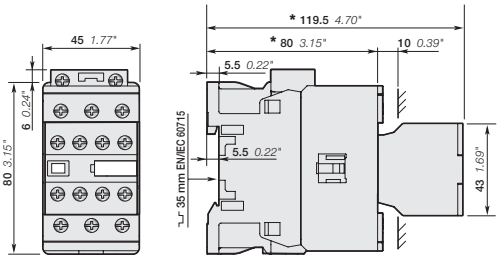
IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3, AC3-e	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
4	25	5	25	-	24	2 2	AFS09Z-30-22-30	1SBL136082R3022	0.490
				24 ... 60	20 ... 60 (1)	2 2	AFS09-30-22-11	1SBL137082R1122	0.320
				100 ... 250	100 ... 250	2 2	AFS09-30-22-13	1SBL137082R1322	0.320
5.5	28	7-1/2	28	-	24	2 2	AFS12Z-30-22-30	1SBL156082R3022	0.490
				24 ... 60	20 ... 60 (1)	2 2	AFS12-30-22-11	1SBL157082R1122	0.320
				100 ... 250	100 ... 250	2 2	AFS12-30-22-13	1SBL157082R1322	0.320
7.5	30	10	30	-	24	2 2	AFS16Z-30-22-30	1SBL176082R3022	0.490
				24 ... 60	20 ... 60 (1)	2 2	AFS16-30-22-11	1SBL177082R1122	0.320
				100 ... 250	100 ... 250	2 2	AFS16-30-22-13	1SBL177082R1322	0.320
11	45	15	45	-	24	2 2	AFS26Z-30-22-30	1SBL236082R3022	0.540
				24 ... 60	20 ... 60 (1)	2 2	AFS26-30-22-11	1SBL237082R1122	0.360
				100 ... 250	100 ... 250	2 2	AFS26-30-22-13	1SBL237082R1322	0.360
15	50	20	50	-	24	2 2	AFS30Z-30-22-30	1SBL276082R3022	0.540
				24 ... 60	20 ... 60	2 2	AFS30-30-22-11	1SBL277082R1122	0.360
				100 ... 250	100 ... 250 (1)	2 2	AFS30-30-22-13	1SBL277082R1322	0.360
18.5	50	25	50	-	24	2 2	AFS38Z-30-22-30	1SBL296082R3022	0.540
				24 ... 60	20 ... 60 (1)	2 2	AFS38-30-22-11	1SBL297082R1122	0.360
				100 ... 250	100 ... 250	2 2	AFS38-30-22-13	1SBL297082R1322	0.360

(1) AFS..-30-..-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.



AFS09, AFS12, AFS16

* For AFS09Z, AFS12Z, AFS16Z-30-22-30: depth + 20 mm (+ 0.79")



AFS26, AFS30, AFS38

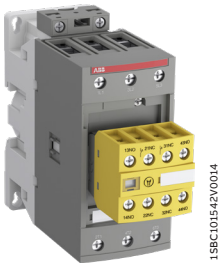
* For AFS26Z, AFS30Z, AFS38Z-30-22-30: depth + 20 mm (+ 0.79")

Main dimensions mm, inches

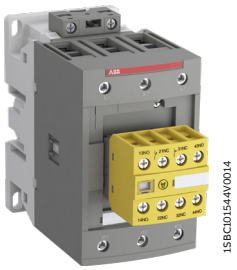
AFS40 ... AFS96 3-pole contactors for safety applications

18.5 to 45 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AFS65-30-22



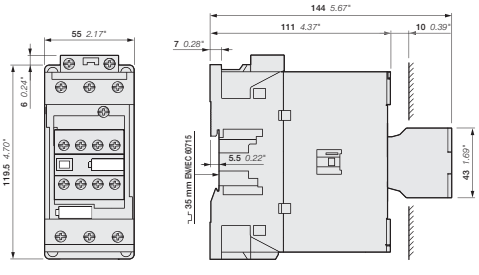
AFS96-30-22

AFS40 ... AFS96 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked and mirror contacts make your system safer.

- control circuit with electronic coil interface:
  - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
  - permanently fixed
  - protective cover to prevent manual operation
  - yellow housing for easy identification
  - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

IEC		UL/CSA		Rated control circuit voltage Uc min. ... Uc max.			Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3, AC3-e	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC							Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC					kg
18.5	70	30	60	24 ... 60	20 ... 60	(1)	2 2	AFS40-30-22-11	1SBL347082R1122	1.020
				100 ... 250	100 ... 250		2 2	AFS40-30-22-13	1SBL347082R1322	1.000
22	100	40	80	24 ... 60	20 ... 60	(1)	2 2	AFS52-30-22-11	1SBL367082R1122	1.020
				100 ... 250	100 ... 250		2 2	AFS52-30-22-13	1SBL367082R1322	1.000
30	105	50	90	24 ... 60	20 ... 60	(1)	2 2	AFS65-30-22-11	1SBL387082R1122	1.020
				100 ... 250	100 ... 250		2 2	AFS65-30-22-13	1SBL387082R1322	1.000
37	125	60	105	24 ... 60	20 ... 60	(1)	2 2	AFS80-30-22-11	1SBL397082R1122	1.270
				100 ... 250	100 ... 250		2 2	AFS80-30-22-13	1SBL397082R1322	1.220
45/55	130	60/75	115	24 ... 60	20 ... 60	(1)	2 2	AFS96-30-22-11	1SBL407082R1122	1.270
				100 ... 250	100 ... 250		2 2	AFS96-30-22-13	1SBL407082R1322	1.220

(1) AFS..-30-..-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.



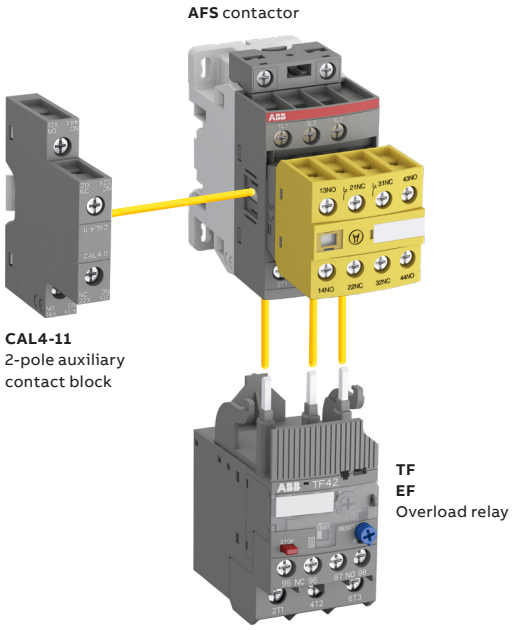
AFS40, AFS52, AFS65

AFS80, AFS96

Main dimensions mm, inches

AFS09 ... AFS96 3-pole contactors for safety applications

Contactors and main accessories



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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories Auxiliary contact blocks 1-pole CA4	2-pole CAT4-11	4-pole CA4	Electronic timer TEF4	Mechanical interlock unit (between 2 contactors) VM..		Side-mounted accessories Auxiliary contact blocks 2-pole CAL4-11 Left side	Right side
AFS09 ... AFS38	3 0	2 2	–	–	–	–	1	+	1	**or** 1
AFS09Z ... AFS38Z	3 0	2 2	–	–	–	–	1		–	–
AFS40 ... AFS96	3 0	2 2	–	–	–	–	–	+	1	+ 1
			–	–	–	–	1	+	1	**or** 1

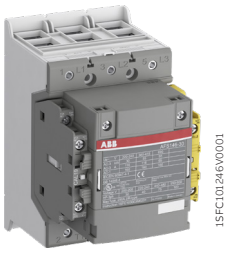
Overload relays fitting details (1)

Contactor types	Thermal overload relays	Electronic overload relays
AFS09 ... AFS38	TF42 (0.10...38 A)	EF19 (0.10...19 A)
AFS26 ... AFS38	TF42 (0.10...38 A)	EF45 (9...45 A)
AFS40 ... AFS65	TF65 (22...67 A)	EF65 (20...70 A)
AFS80, AFS96	TF96 (40...96 A)	EF96 (36...100 A)

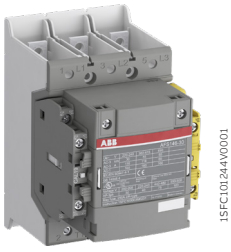
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

AFS116 ... AFS146 3-pole contactors for safety applications
55 to 75 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS146-30-12



AFS146-30-12B

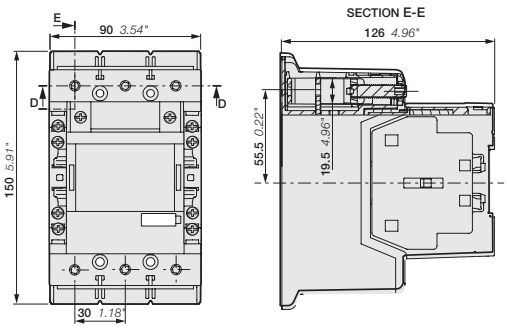
AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

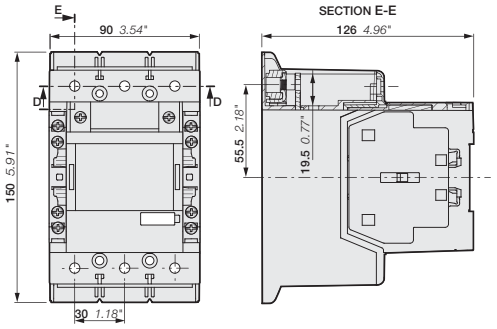
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	24...60	20...60	1 2	AFS116-30-12-11	1SFL427081R1112	1.750
				48...130	48...130	1 2	AFS116-30-12-12	1SFL427081R1212	1.750
				100...250	100...250	1 2	AFS116-30-12-13	1SFL427081R1312	1.750
				250...500	250...500	1 2	AFS116-30-12-14	1SFL427081R1412	1.750
75	225	100	200	24...60	20...60	1 2	AFS146-30-12-11	1SFL467081R1112	1.750
				48...130	48...130	1 2	AFS146-30-12-12	1SFL467081R1212	1.750
				100...250	100...250	1 2	AFS146-30-12-13	1SFL467081R1312	1.750
				250...500	250...500	1 2	AFS146-30-12-14	1SFL467081R1412	1.750
With bar connections									
55	160	75	160	24...60	20...60	1 2	AFS116-30-12B-11	1SFL427082R1112	1.500
				48...130	48...130	1 2	AFS116-30-12B-12	1SFL427082R1212	1.500
				100...250	100...250	1 2	AFS116-30-12B-13	1SFL427082R1312	1.500
				250...500	250...500	1 2	AFS116-30-12B-14	1SFL427082R1412	1.500
75	225	100	200	24...60	20...60	1 2	AFS146-30-12B-11	1SFL467082R1112	1.500
				48...130	48...130	1 2	AFS146-30-12B-12	1SFL467082R1212	1.500
				100...250	100...250	1 2	AFS146-30-12B-13	1SFL467082R1312	1.500
				250...500	250...500	1 2	AFS146-30-12B-14	1SFL467082R1412	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AFS116, AFS146-30-12

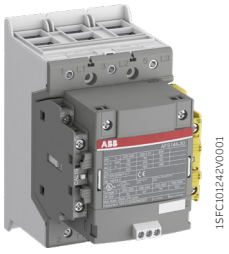


AFS116, AFS146-30-12B

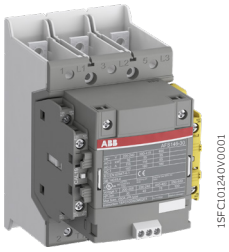
Main dimensions mm, inches

AFS116 ... AFS146 3-pole contactors for safety applications with built-in PLC interface - 55 to 75 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS146-30-12



AFS146-30-12B

AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

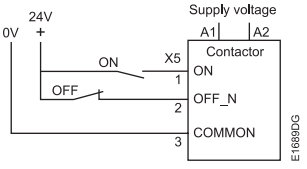
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

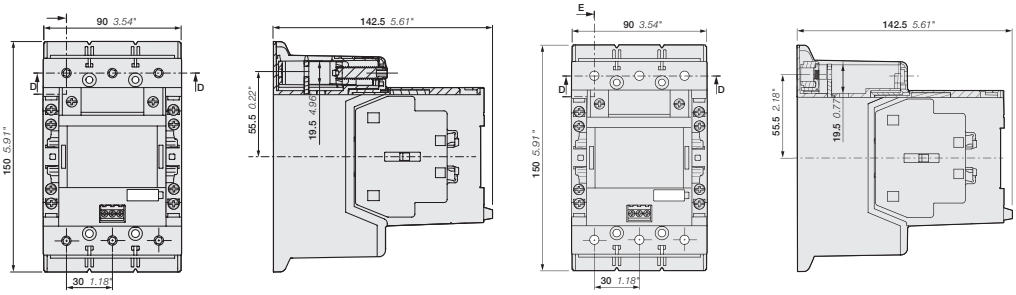
IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
For connection with built-in cable clamps									
55	160	75	160	100...250	100...250	1 2	AFS116-30-12-33	1SFL427081R3312	1.750
				250...500	250...500	1 2	AFS116-30-12-34	1SFL427081R3412	1.750
75	225	100	200	100...250	100...250	1 2	AFS146-30-12-33	1SFL467081R3312	1.750
				250...500	250...500	1 2	AFS146-30-12-34	1SFL467081R3412	1.750
With bar connections									
55	160	75	160	100...250	100...250	1 2	AFS116-30-12B-33	1SFL427082R3312	1.500
				250...500	250...500	1 2	AFS116-30-12B-34	1SFL427082R3412	1.500
75	225	100	200	100...250	100...250	1 2	AFS146-30-12B-33	1SFL467082R3312	1.500
				250...500	250...500	1 2	AFS146-30-12B-34	1SFL467082R3412	1.500

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AFS116 ... AFS146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





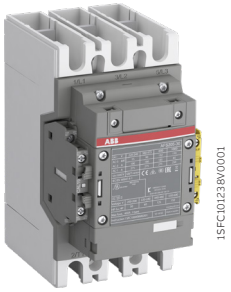
AFS116, AFS146-30-12

AFS116, AFS146-30-12B

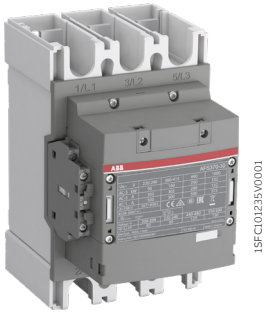
Main dimensions mm, inches

AFS190 ... AFS370 3-pole contactors for safety applications 90 to 200 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS205-30-12



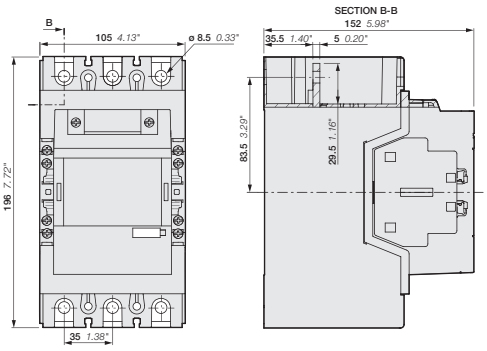
AFS370-30-12

AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

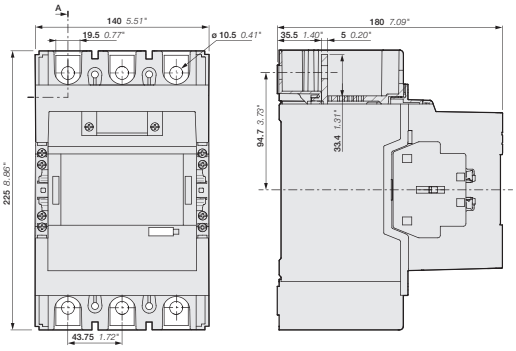
Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	24...60	20...60	1 2	AFS190-30-12-11	1SFL487082R1112	3.000
				48...130	48...130	1 2	AFS190-30-12-12	1SFL487082R1212	3.000
				100...250	100...250	1 2	AFS190-30-12-13	1SFL487082R1312	3.000
				250...500	250...500	1 2	AFS190-30-12-14	1SFL487082R1412	3.000
110	350	150	300	24...60	20...60	1 2	AFS205-30-12-11	1SFL527082R1112	3.000
				48...130	48...130	1 2	AFS205-30-12-12	1SFL527082R1212	3.000
				100...250	100...250	1 2	AFS205-30-12-13	1SFL527082R1312	3.000
				250...500	250...500	1 2	AFS205-30-12-14	1SFL527082R1412	3.000
132	400	200	350	24...60	20...60	1 2	AFS265-30-12-11	1SFL547082R1112	4.675
				48...130	48...130	1 2	AFS265-30-12-12	1SFL547082R1212	4.675
				100...250	100...250	1 2	AFS265-30-12-13	1SFL547082R1312	4.675
				250...500	250...500	1 2	AFS265-30-12-14	1SFL547082R1412	4.675
160	500	250	400	24...60	20...60	1 2	AFS305-30-12-11	1SFL587082R1112	4.675
				48...130	48...130	1 2	AFS305-30-12-12	1SFL587082R1212	4.675
				100...250	100...250	1 2	AFS305-30-12-13	1SFL587082R1312	4.675
				250...500	250...500	1 2	AFS305-30-12-14	1SFL587082R1412	4.675
200	600	300	520	24...60	20...60	1 2	AFS370-30-12-11	1SFL607082R1112	4.675
				48...130	48...130	1 2	AFS370-30-12-12	1SFL607082R1212	4.675
				100...250	100...250	1 2	AFS370-30-12-13	1SFL607082R1312	4.675
				250...500	250...500	1 2	AFS370-30-12-14	1SFL607082R1412	4.675



AFS190, AFS205

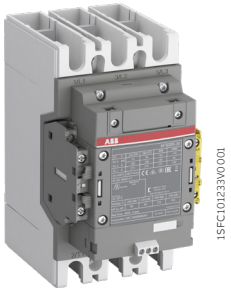


AFS265, AFS305, AFS370

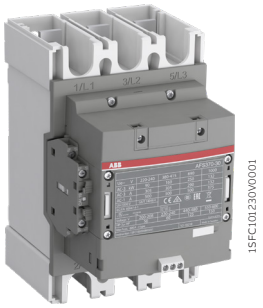
Main dimensions mm, inches

AFS190 ... AFS370 3-pole contactors for safety applications with built-in PLC interface - 90 to 200 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS205-30-12



AFS370-30-12

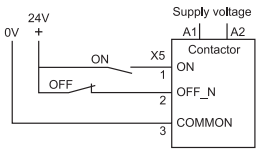
AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked contacts make your system safer.

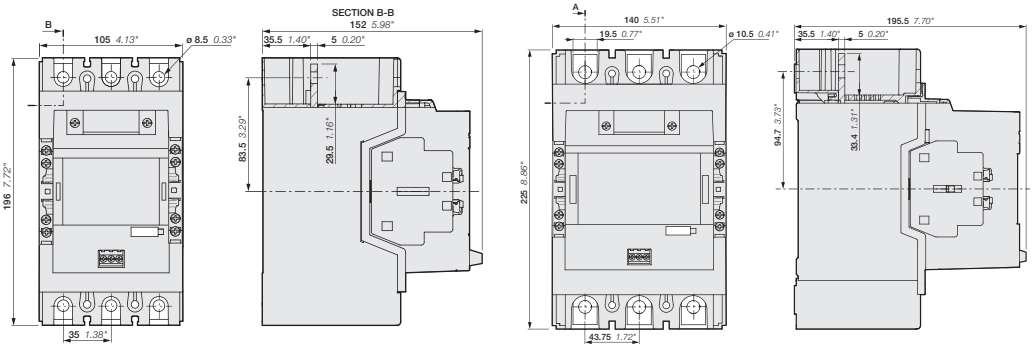
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

IEC		UL / CSA		Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50/60 Hz	V DC				kg
90	275	125	275	100...250	100...250	1 2	AFS190-30-12-33	1SFL487082R3312	3.000
				250...500	250...500	1 2	AFS190-30-12-34	1SFL487082R3412	3.000
110	350	150	300	100...250	100...250	1 2	AFS205-30-12-33	1SFL527082R3312	3.000
				250...500	250...500	1 2	AFS205-30-12-34	1SFL527082R3412	3.000
132	400	200	350	100...250	100...250	1 2	AFS265-30-12-33	1SFL547082R3312	4.675
				250...500	250...500	1 2	AFS265-30-12-34	1SFL547082R3412	4.675
160	500	250	400	100...250	100...250	1 2	AFS305-30-12-33	1SFL587082R3312	4.675
				250...500	250...500	1 2	AFS305-30-12-34	1SFL587082R3412	4.675
200	600	300	520	100...250	100...250	1 2	AFS370-30-12-33	1SFL607082R3312	4.675
				250...500	250...500	1 2	AFS370-30-12-34	1SFL607082R3412	4.675

AFS190 ... AFS370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





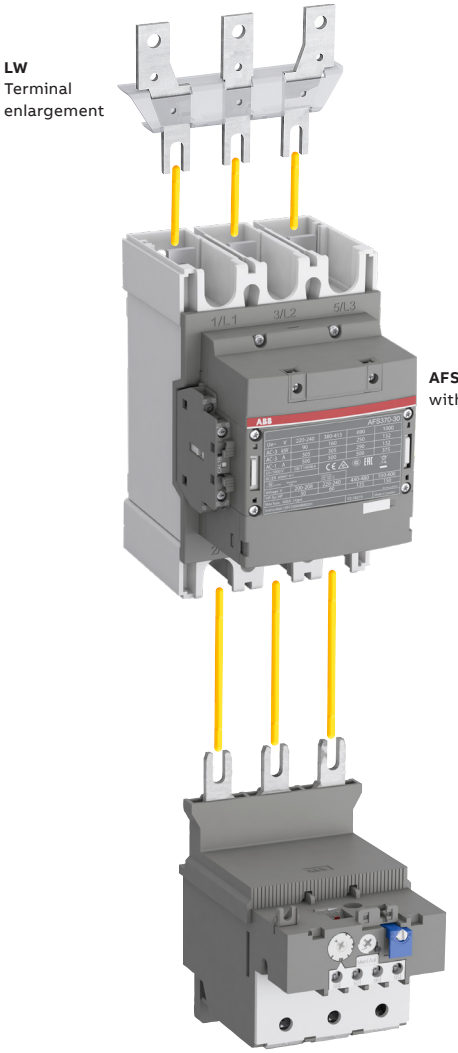
AFS190, AFS205

AFS265, AFS305, AFS370

Main dimensions mm, inches

AFS116 ... AFS370 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



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

Overload relays fitting details (1)

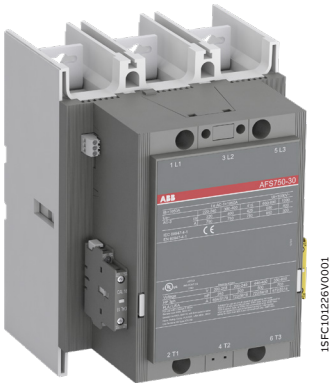
Contactor types	Thermal overload relays	Electronic overload relays
AFS116	TF140DU (66...142 A)	EF146 (54...150 A)
AFS146	–	EF146 (54...150 A)
AFS190, AFS205	TA200DU (66...200 A)	EF205 (63...210 A)
AFS265 ... AFS370	–	EF370 (115...380 A)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

AFS400 ... AFS750 3-pole contactors for safety applications 200 to 400 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts

AFS460-30-12



AFS750-30-12

AFS400 ... AFS750 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

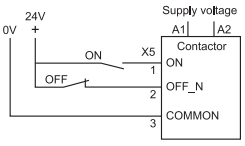
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

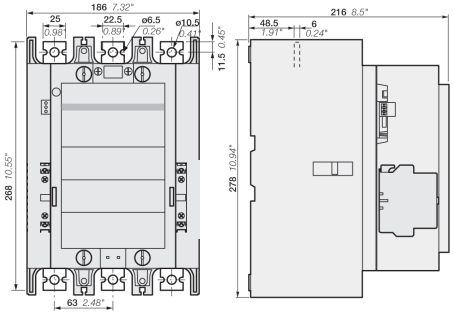
IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C 690 V AC-1	3-phase motor rating 480 V	General use rating 600 V AC	V 50/60 Hz	V DC				Pkg (1 pce)
kW	A	hp	A						kg
200	600	350	550	-	24...60	1 2	AFS400-30-12-68	1SFL577081R6812 (1)	12.000
				48...130	48...130	1 2	AFS400-30-12-69	1SFL577081R6912	12.000
				100...250	100...250	1 2	AFS400-30-12-70	1SFL577081R7012	12.000
				250...500	250...500	1 2	AFS400-30-12-71	1SFL577081R7112	12.000
250	700	400	650	-	24...60	1 2	AFS460-30-12-68	1SFL597081R6812 (1)	12.000
				48...130	48...130	1 2	AFS460-30-12-69	1SFL597081R6912	12.000
				100...250	100...250	1 2	AFS460-30-12-70	1SFL597081R7012	12.000
				250...500	250...500	1 2	AFS460-30-12-71	1SFL597081R7112	12.000
315	800	500	750	-	24...60	1 2	AFS580-30-12-68	1SFL617081R6812 (1)	15.000
				48...130	48...130	1 2	AFS580-30-12-69	1SFL617081R6912	15.000
				100...250	100...250	1 2	AFS580-30-12-70	1SFL617081R7012	15.000
				250...500	250...500	1 2	AFS580-30-12-71	1SFL617081R7112	15.000
400	1050	600	900	-	24...60	1 2	AFS750-30-12-68	1SFL637081R6812 (1)	15.000
				48...130	48...130	1 2	AFS750-30-12-69	1SFL637081R6912	15.000
				100...250	100...250	1 2	AFS750-30-12-70	1SFL637081R7012	15.000
				250...500	250...500	1 2	AFS750-30-12-71	1SFL637081R7112	15.000

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AFS580, AFS750.

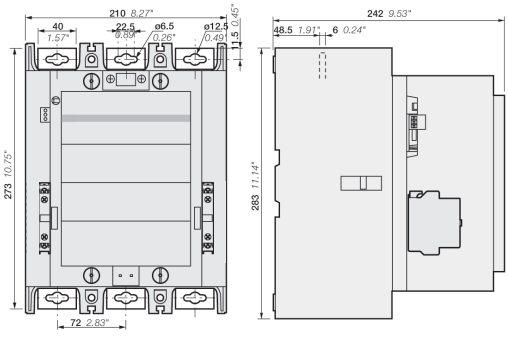
AFS400...AFS750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





AFS400, AFS460

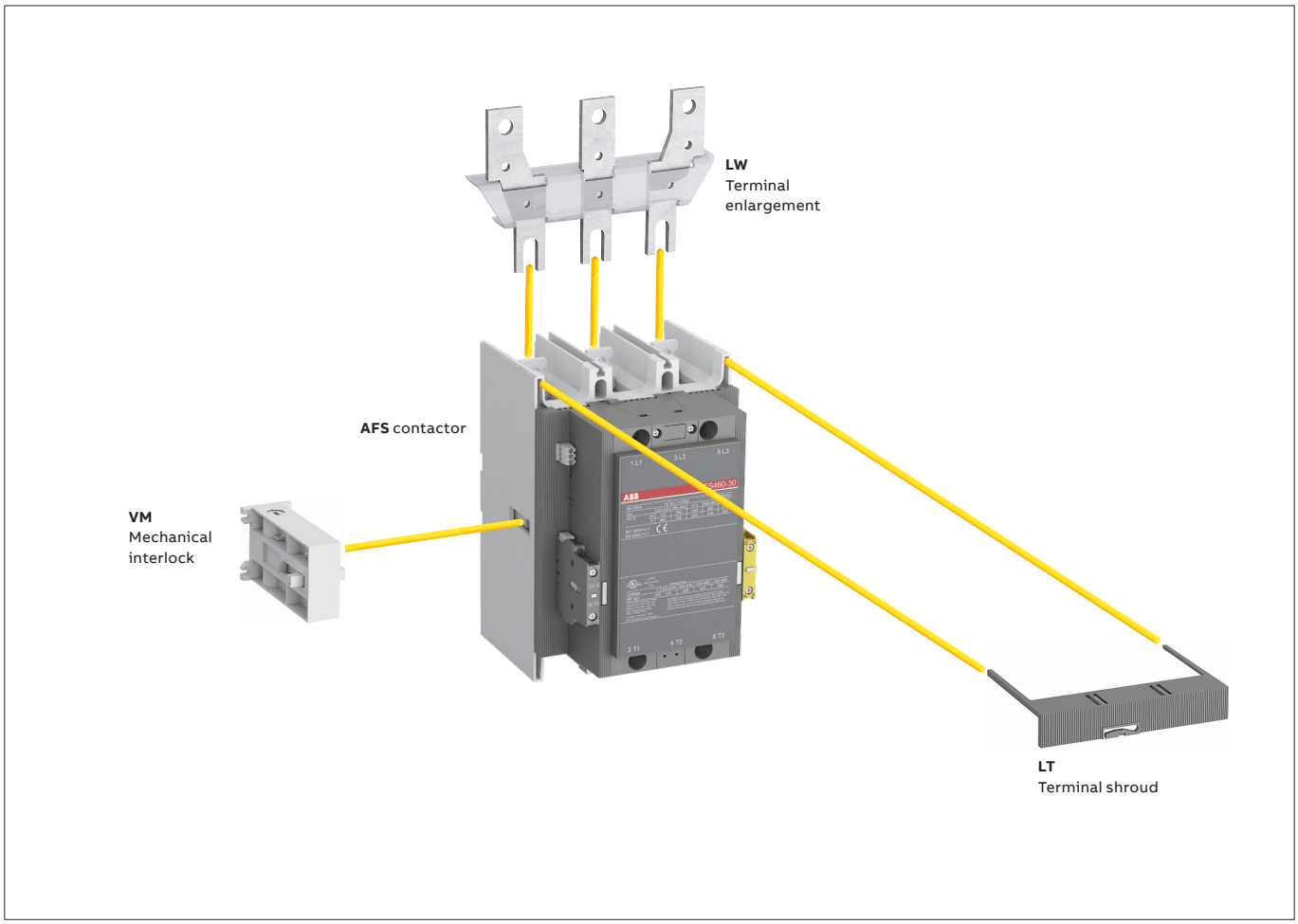


AFS580, AFS750

Main dimensions mm, inches

AFS400 ... AFS750 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



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

Overload relays fitting details

Contactor types	Thermal overload relays	Electronic overload relays
AFS400, AFS460	–	EF460 (150...500 A) (3)
AFS580, AFS750	–	EF750 (250...800 A) (3)

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(3) Mounting kit required (see "Motor protection").

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38	AFS40	AFS52	AFS65	AFS80	AFS96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1										
Rated operational voltage Ue max.		690 V									1000 V	
Rated frequency (without derating)		50 / 60 Hz										
Conventional free-air thermal current Ith												
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		35 A	35 A	35 A	50 A	50 A	50 A	105 A	105 A	105 A	130 A	130 A
With conductor cross-sectional area		6 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²	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	25 A	28 A	30 A	45 A	50 A	50 A	70 A	100 A	105 A	125 A	130 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	25 A	28 A	30 A	40 A	42 A	42 A	60 A	80 A	90 A	100 A	105 A
	θ ≤ 70 °C	22 A	24 A	26 A	32 A	37 A	37 A	50 A	70 A	80 A	85 A	90 A
With conductor cross-sectional area		4 mm²	6 mm²	6 mm²	10 mm²	10 mm²	10 mm²	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	9 A	12 A	18 A	26 A	33 A	40 A	40 A	53 A	65 A	80 A	105 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A	40 A	53 A	65 A	80 A	105 A
3-phase motors	415 V	9 A	12 A	18 A	26 A	32 A	38 A	40 A	53 A	65 A	80 A	96 A
	440 V	9 A	12 A	18 A	26 A	32 A	38 A	40 A	53 A	65 A	80 A	96 A
	500 V	9.5 A	12.5 A	15 A	23 A	28 A	33 A	35 A	45 A	55 A	65 A	80 A
	690 V	7 A	9 A	10.5 A	17 A	21 A	24 A	25 A	35 A	39 A	49 A	57 A
	1000 V										25 A	30 A
Rated operational power AC-3, AC-3e (1)												
AC-3e Ue ≤ 690 V	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW	11 kW	15 kW	18.5 kW	22 kW	30 kW
	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW	18.5 kW	22 kW	30 kW	37 kW	55 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	415 V	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	4 kW	5.5 kW	9 kW	15 kW	18.5 kW	22 kW	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V										35 kW	40 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	53 A	70 A	85 A	105 A	120 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW	15 kW	20 kW	25 kW	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		25 A	32 A	32 A	50 A	63 A	63 A	100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current Icw	1 s	300 A	300 A	300 A	700 A	700 A	700 A	1000 A	1000 A	1000 A	1200 A	1200 A
at 40 °C ambient temperature,	10 s	150 A	150 A	150 A	350 A	350 A	350 A	600 A	600 A	600 A	780 A	780 A
in free air from a cold state	30 s	80 A	80 A	80 A	225 A	225 A	225 A	350 A	350 A	350 A	450 A	450 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A	250 A	250 A	250 A	300 A	300 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A	110 A	110 A	110 A	140 A	140 A
Maximum breaking capacity												
cos ϕ = 0.45	at 440 V	250 A	250 A	250 A	500 A	500 A	500 A	950 A	950 A	950 A	1150 A	1150 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A	600 A	600 A	600 A	750 A	750 A
Power dissipation per pole	Ie / AC-1	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W	3 W	6.3 W	7 W	7.6 W	8.2 W
	Ie / AC-3, AC-3e	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W	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	300 cycles/h			150 cycles/h							
B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V		1.3 million operating cycles										

(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".

AFS116 ... AFS370 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AFS116	AFS146	AFS190	AFS205	AFS265	AFS305	AFS370
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage Ue max.		690 V	1000 V					
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current Ith								
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		160 A	225 A	275 A	350 A	400 A	500 A	600 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
AC-1 Utilization category								
For air temperature close to contactor								
Ie / Rated operational current AC-1	θ ≤ 40 °C	160 A	225 A	275 A	350 A	400 A	500 A	600 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	145 A	200 A	250 A	300 A	350 A	400 A	500 A
	θ ≤ 70 °C	130 A	175 A	200 A	240 A	290 A	325 A	400 A
Ie / Rated operational current AC-1	θ ≤ 40 °C	–	225 A	250 A	275 A	350 A	375 A	400 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 60 °C	–	200 A	225 A	250 A	300 A	325 A	350 A
	θ ≤ 70 °C	–	175 A	185 A	200 A	240 A	260 A	290 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2 x 185 mm² (4)
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)								
	220-230-240 V	116 A	146 A	190 A	205 A	265 A	305 A	370 A
	380-400 V	116 A	146 A	190 A	205 A	265 A	305 A	370 A
3-phase motors	415 V	116 A	146 A	190 A	205 A	265 A	305 A	370 A
	440 V	116 A	146 A	190 A	205 A	265 A	305 A	370 A
	500 V	110 A	130 A	135 A	165 A	250 A	290 A	315 A
	690 V	65 A	93 A	135 A	165 A	250 A	290 A	315 A
	1000 V	–	60 A / 54 A	85 A	100 A	113 A	131 A	141 A
Rated operational power AC-3, AC-3e (1)								
	220-230-240 V	30 kW	45 kW	55 kW	55 kW	75 kW	90 kW	110 kW
	380-400 V	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	415 V	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW
	440 V	75 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW
	500 V	75 kW	90 kW	90 kW	110 kW	200 kW	200 kW	250 kW
	690 V	55 kW	90 kW	132 kW	160 kW	200 kW	250 kW	315 kW
	1000 V	–	75 kW	110 kW	132 kW	160 kW	185 kW	200 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						
Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2)								
Ue ≤ 500 V AC - gG type fuse		250 A	315 A	355 A	400 A	500 A	500 A	630 A
Rated short-time withstand current Icw	1 s	1300 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A
at 40 °C ambient temperature,	10 s	928 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A
in free air from a cold state	30 s	536 A	674 A	878 A	947 A	1224 A	1409 A	1709 A
	1 min	379 A	477 A	621 A	670 A	865 A	996 A	1208 A
	15 min	160 A	225 A	275 A	350 A	400 A	500 A	600 A
Maximum breaking capacity								
cos ϕ = 0.45	at 440 V	2000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A
(cos ϕ = 0.35 for Ie > 100 A)	at 690 V	1000 A	1500 A	2200 A	2500 A	3300 A	3800 A	4000 A
Power dissipation per pole	Ie / AC-1	12 W	23 W	15 W	25 W	32 W	50 W	72 W
	Ie / AC-3	6 W	10 W	7 W	8 W	14 W	19 W	27 W
Maximum electrical switching frequency	AC-1	300 cycles/h						
	AC-3	300 cycles/h						
	AC-2, AC-4	150 cycles/h						
B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V		1.3 million operating cycles						

(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".
For AC-3e utilization category, please consult your ABB local sales organization AC-3e is valid up to AFS190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Rated operational voltage Ue max.		1000 V			
Rated frequency (without derating)		50/60 Hz			
Conventional free-air thermal current Ith					
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		600 A	700 A	800 A	1050 A
With conductor cross-sectional area (3)		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)
AC-1 Utilization category					
For air temperature close to contactor					
Ie / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1050 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A
Ie / Rated operational current AC-1	θ ≤ 40 °C	600 A	700 A	800 A	1000 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 55 °C	500 A	600 A	700 A	875 A
	θ ≤ 70 °C	400 A	480 A	580 A	720 A
With conductor cross-sectional area		2x185 mm²	2x240 mm²	2x240 mm²	800 mm² (4)
AC-3 Utilization category					
For air temperature close to contactor θ ≤ 55 °C					
Ie / Max. rated operational current AC-3 (1)					
3-phase motors	220-230-240 V	400 A	460 A	580 A	750 A
	380-400 V	400 A	460 A	580 A	750 A
	415 V	400 A	460 A	580 A	750 A
	440 V	400 A	460 A	580 A	750 A
	500 V	400 A	460 A	580 A	750 A
	690 V	350 A	400 A	500 A	650 A
	1000 V	155 A	200 A	250 A	300 A
Rated operational power AC-3 (1)					
	220-230-240 V	110 kW	132 kW	160 kW	220 kW
	380-400 V	200 kW	250 kW	315 kW	400 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	415 V	220 kW	250 kW	355 kW	425 kW
	440 V	220 kW	250 kW	355 kW	450 kW
	500 V	250 kW	315 kW	400 kW	520 kW
	690 V	315 kW	355 kW	500 kW	600 kW
	1000 V	220 kW	280 kW	355 kW	400 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1			
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1			
Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) Ue ≤ 500 V AC - gG type fuse		630 A	800 A	1000 A	1000 A
Rated short-time withstand current Icw	1 s	4600 A	4600 A	7000 A	7000 A
at 40 °C ambient temperature,	10 s	4400 A	4400 A	6400 A	6400 A
in free air from a cold state	30 s	3100 A	3100 A	4500 A	4500 A
	1 min	2500 A	2500 A	3500 A	3500 A
	15 min	840 A	840 A	1300 A	1300 A
Maximum breaking capacity					
cos ϕ = 0.45	at 440 V	4000 A	5000 A	6000 A	7500 A
(cos ϕ = 0.35 for Ie > 100 A)	at 690 V	3500 A	4500 A	5000 A	7000 A
Power dissipation per pole	Ie / AC-1	30 W	42 W	32 W	50 W
	Ie / AC-3	16 W	21 W	17 W	28 W
Max. electrical switching frequency	AC-1	300 cycles/h		300 cycles/h	
	AC-3	300 cycles/h		300 cycles/h	
	AC-2, AC-4	60 cycles/h		60 cycles/h	
B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V		0.68 million operating cycles			

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

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

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

Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38	AFS40	AFS52	AFS65	AFS80	AFS96
Standards		UL 60947-4-1, CSA-C22.2 No. 60947-4-1										
Maximum operational voltage		600 V										
NEMA size		00	0	-	1	-	-	2	-	-	3	-
NEMA continuous amp rating	Thermal current	9 A	18 A	-	27 A	-	-	45 A	-	-	90 A	-
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1 hp	-	2 hp	-	-	3 hp	-	-	-	-
	230 V AC	1 hp	2 hp	-	3 hp	-	-	7.5 hp	-	-	-	-
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1-1/2 hp	3 hp	-	7-1/2 hp	-	-	10 hp	-	-	25 hp	-
	230 V AC	1-1/2 hp	3 hp	-	7-1/2 hp	-	-	15 hp	-	-	30 hp	-
	460 V AC	2 hp	5 hp	-	10 hp	-	-	25 hp	-	-	50 hp	-
	575 V AC	2 hp	5 hp	-	10 hp	-	-	25 hp	-	-	50 hp	-
UL / CSA general use rating												
600 V AC		25 A	28 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8	AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
1 pole	80 V DC	25 A	28 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
2 poles in serie	160 V DC	25 A	28 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
3 poles in serie	240 V DC	25 A	28 A	30 A	45 A	50 A	50 A	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8	AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
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	34 A	34 A	56 A	80 A	80 A
	240 V AC	10 A	12 A	17 A	17 A	28 A	28 A	40 A	50 A	68 A	68 A	88 A
Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp	2 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp	5 hp	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	7.8 A	11 A	17.5 A	25.3 A	32.2 A	32.2 A	32.2 A	48.3 A	62.1 A	78.2 A	96 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A	28 A	42 A	54 A	68 A	80 A	96 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A	34 A	40 A	52 A	65 A	77 A	96 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A	32 A	41 A	52 A	62 A	77 A	77 A
Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp
	440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	75 hp
	550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp	30 hp	40 hp	50 hp	60 hp	75 hp	75 hp
UL / CSA - DC motor starting - 3 poles in series												
Full Load Amps	125 V DC	9.5 A	13.2 A	17 A	25 A	25 A	25 A	40 A	58 A	76 A	76 A	110 A
	250 V DC	8.5 A	12.2 A	12.2 A	20 A	29 A	29 A	38 A	55 A	72 A	89 A	106 A
Horse power rating	125 V DC	1 hp	1-1/2 hp	2 hp	3 hp	3 hp	3 hp	5 hp	7-1/2 hp	10 hp	10 hp	15 hp
	250 V DC	2 hp	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp	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		30 A		60 A		100 A		150 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".

AFS116 ... AFS370 3-pole contactors for safety applications
Technical data

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

Contactor types	AC / DC operated	AFS116	AFS146	AFS190	AFS205	AFS265	AFS305	AFS370
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1						
Maximum operational voltage		600 V	1000 V					
NEMA size		–	–	–	–	5	–	–
NEMA continuous amp rating	Thermal current	–	–	–	–	270 A	–	–
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	–	–	–	–	–	–	–
	230 V AC	–	–	–	–	–	–	–
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	–	–	–	–	75 hp	–	–
	230 V AC	–	–	–	–	100 hp	–	–
	460 V AC	–	–	–	–	200 hp	–	–
	575 V AC	–	–	–	–	200 hp	–	–
UL / CSA general use rating								
600 V AC		160 A	200 A	275 A	300 A	350 A	400 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
1 000 V AC		–	200 A	250 A	275 A	300 A	350 A	400 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
1 pole	90 V DC	160 A	200 A	–	–	–	–	–
	100 V DC	–	–	250 A	350 A	–	–	–
	110 V DC	–	–	–	–	400 A	500 A	520 A
2 poles in serie	175 V DC	160 A	200 A	–	–	–	–	–
	200 V DC	–	–	250 A	350 A	–	–	–
	225 V DC	–	–	–	–	400 A	500 A	520 A
3 poles in serie	260 V DC	160 A	200 A	–	–	–	–	–
	300 V DC	–	–	250 A	350 A	–	–	–
	340 V DC	–	–	–	–	400 A	500 A	520 A
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 350 (2)	MCM 500	2//AWG 3/0	2//MCM 300
UL / CSA maximum 1-phase motor rating								
Full load current	120 V AC	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–
Horse power rating	120 V AC	–	–	–	–	–	–	–
	240 V AC	–	–	–	–	–	–	–
UL / CSA maximum 3-phase motor rating								
Full load current (1)	200-208 V AC	92 A	120 A	150 A	177 A	221 A	285 A	359 A
	220-240 V AC	104 A	130 A	154 A	192 A	248 A	312 A	360 A
	440-480 V AC	96 A	124 A	156 A	180 A	240 A	302 A	361 A
	550-600 V AC	99 A	125 A	144 A	192 A	242 A	289 A	336 A
Horse power rating (1)	200-208 V AC	30 hp	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp
	220-240 V AC	40 hp	50 hp	60 hp	75 hp	100 hp	125 hp	150 hp
	440-480 V AC	75 hp	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp
	550-600 V AC	100 hp	125 hp	150 hp	200 hp	250 hp	300 hp	350 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded								
High fault current		100 kA						
Fuse rating		225 A	250 A	350 A	400 A	500 A	600 A	600 A
Fuse type, 600 V		J						
Maximum electrical switching frequency								
For general use		300 cycles/h						
For motor use		300 cycles/h						

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

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

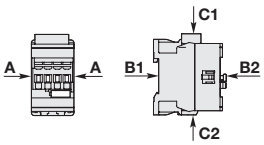
Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Standards		UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1			
Maximum operational voltage		1000 V			
NEMA size		–	6	–	7
NEMA maximum horse power ratings					
1-phase, 60 Hz	115 V AC	–			
	230 V AC	–			
NEMA maximum horse power ratings					
3-phase, 60 Hz	200 V AC	–	150 hp	–	–
	230 V AC	–	200 hp	–	300 hp
	460 V AC	–	400 hp	–	600 hp
	575 V AC	–	400 hp	–	600 hp
UL / CSA general use rating					
1000 V AC		550 A	650 A	750 A	900 A
3 poles in serie	600 V DC	550 A	650 A	750 A	900 A
UL / CSA maximum 1-phase motor rating					
Full load current	120 V AC	–	–	–	–
	240 V AC	–	–	–	–
Horse power rating	120 V AC	–	–	–	–
	240 V AC	–	–	–	–
UL / CSA maximum 3-phase motor rating					
Full load current (1)	200-208 V AC	358.8 A	414 A	552 A	692.3 A
	220-240 V AC	360 A	480 A	604 A	722 A
	440-480 V AC	414 A	477 A	590 A	722 A
	550-600 V AC	382 A	472 A	578 A	672 A
Horse power rating (1)	200-208 V AC	125 hp	150 hp	200 hp	250 hp
	220-240 V AC	150 hp	200 hp	250 hp	300 hp
	440-480 V AC	350 hp	400 hp	500 hp	600 hp
	550-600 V AC	400 hp	500 hp	600 hp	700 hp
Short-circuit protection device for contactors					
without thermal overload relay - Motor protection excluded					
Fuse rating		1000 A		1200 A	
Fuse type, 600 V		L			
Maximum electrical switching frequency					
For general use		300 cycles/h			
For motor use		300 cycles/h			

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

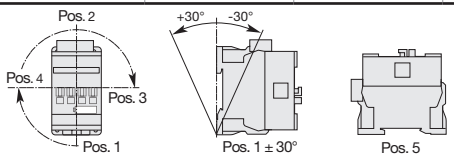
AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

General technical data

Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38
Rated insulation voltage Ui							
acc. to IEC 60947-4-1		690 V					
acc. to UL / CSA		600 V					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environments A and B					
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 million operating cycles					
Maximum switching frequency		3600 cycles/h					
Shock withstand							
acc. to IEC 60068-2-27 and EN 60068-2-27							
Mounting position 1	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
	A	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 / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38
Mounting positions							
Mounting distances		The contactors can be assembled side by side					
Fixing							
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

AFS09 ... AFS38 3-pole contactors for safety applications

Technical data

Magnet system characteristics for AFS09 ... AFS38 contactors - AC / DC operated

Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.					
	DC supply	at θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max at θ ≤ 70 °C 0.85 x Uc min ... Uc max					
AC control voltage 50/60 Hz							
Rated control circuit voltage Uc		24 ... 250 V AC					
Coil consumption	Average pull-in value	50 VA					
	Average holding value	2.2 VA / 2 W					
DC control voltage							
Rated control circuit voltage Uc		20 ... 250 V DC					
Coil consumption	Average pull-in value	50 W					
	Average holding value	2 W					
PLC-output control		AFS..-30-22-11 not suitable for direct control by PLC-output.					
Drop-out voltage		≤ 60 % Uc min.					
Operating time							
Between coil energization and:	N.O. contact closing	40 ... 95 ms					
	N.C. contact opening	38 ... 90 ms					
Between coil de-energization and:	N.O. contact opening	11 ... 95 ms (1)					
	N.C. contact closing	13 ... 98 ms					

(1) AFS09 ... AFS38 ≤ 35 ms for 20 °C ≤ θ ≤ 70 °C

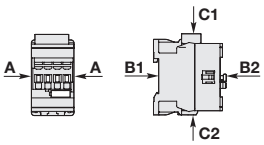
Magnet System Characteristics for AFS09Z ... AFS38Z contactors 24V DC operated - designed for PLC - coil 30

Contactor types	DC operated	AFS09Z	AFS12Z	AFS16Z	AFS26Z	AFS30Z	AFS38Z
Coil operating limits acc. to IEC 60947-4-1	DC supply	at θ ≤ 60 °C 0.85 ... 1.1 x Uc at θ ≤ 70 °C Uc					
DC control voltage							
Rated control circuit voltage Uc		24 V DC					
Coil consumption	Average pull-in value	6 W					
	Average holding value	1.7 W					
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection					
Drop-out voltage		≤ 60 % Uc min.					
Operating time							
Between coil energization and:	N.O. contact closing	27 ... 53 ms					
	N.C. contact opening	20 ... 35 ms					
Between coil de-energization and:	N.O. contact opening	17 ... 29 ms					
	N.C. contact closing	22 ... 57 ms					

AFS40 ... AFS96 3-pole contactors for safety applications

Technical data

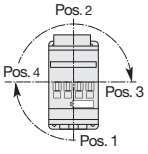
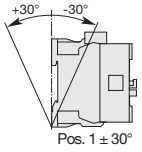
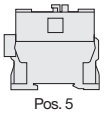
General technical data

Contactor types	AC / DC operated	AFS40	AFS52	AFS65	AFS80	AFS96
Rated insulation voltage Ui						
acc. to IEC 60947-4-1		690 V			1000 V	
acc. to UL / CSA		600 V				
Rated impulse withstand voltage Uimp.		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environments A and B				
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 million operating cycles				
Maximum switching frequency		3600 cycles/h				
Shock withstand						
acc. to IEC 60068-2-27 and EN 60068-2-27						
Mounting position 1	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position				
	A	25 g				
	B1	25 g closed position / 5 g open position				
	B2	15 g				
	C1	25 g				
	C2	25 g				
Vibration withstand		5 ... 300 Hz				
acc. to IEC 60068-2-6		3 g Closed position / 3 g Open position				

Magnet system characteristics for AFS40 ... AFS96 contactors - AC / DC operated

Contactor types	AC / DC operated	AFS40	AFS52	AFS65	AFS80	AFS96
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max.				
acc. to IEC 60947-4-1	DC supply	at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max				
AC control voltage 50/60 Hz						
Rated control circuit voltage Uc		24 ... 250 V AC				
Coil consumption	Average pull-in value	25 VA			40 VA	
	Average holding value	4 VA / 2 W				
DC control voltage						
Rated control circuit voltage Uc		20 ... 250 V DC				
Coil consumption	Average pull-in value	25 W			40 W	
	Average holding value	2 W				
PLC-output control		AFS..-30-22-11 not suitable for direct control by PLC-output.				
Drop-out voltage		≤ 60 % Uc min.				
Operating time						
Between coil energization and:	N.O. contact closing	42 ... 100 ms				
	N.C. contact opening	38 ... 95 ms				
Between coil de-energization and:	N.O. contact opening	17 ... 100 ms				
	N.C. contact closing	19 ... 105 ms				

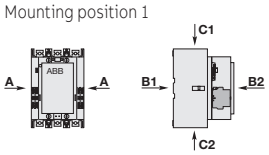
Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AFS40	AFS52	AFS65	AFS80	AFS96
Mounting positions						
Mounting distances		The contactors can be assembled side by side				
Fixing						
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

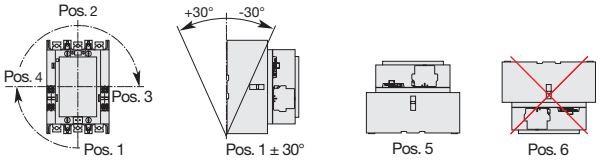
General technical data

Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Rated insulation voltage Ui					
acc. to IEC 60947-4-1		1000 V			
acc. to UL / CSA		600 V			
Rated impulse withstand voltage Uimp.		8 kV			
Electromagnetic compatibility		AFS contactors complying with IEC 60947-1 / EN 60947-1 - Environment A			
Pollution degree		3			
Ambient air temperature close to contactor					
Operation Fitted with electronic overload relay		-25 ... +70 °C			
Without electronic overload relay		-40 ... +70 °C			
Storage		-40 ... +70 °C			
Climatic withstand		Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)		3000 m			
Mechanical durability					
Number of operating cycles		3 millions operating cycles			
Max. switching frequency		300 cycles/h			
Shock withstand					
acc. to IEC 60068-2-27 and EN 60068-2-27					
Mounting position 1	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position			
	A	5 g			
	B1	5 g			
	B2	5 g			
	C1	5 g			
	C2	5 g			
Vibration withstand					
acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2...100 Hz			

Magnet system characteristics

Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max			
acc. to IEC 60947-4-1	DC supply	At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max			
Rated control circuit voltage Uc					
Coil consumption		48...500 V AC, 24...500 V DC			
AC control voltage 50/60 Hz					
48...130 V AC	Average pull-in value	1215 VA		1100 VA	
	Average holding value	12 VA		12 VA	
100...250 V AC	Average pull-in value	955 VA		880 VA	
	Average holding value	12 VA		12 VA	
250 ... 500 V AC	Average pull-in value	950 VA		985 VA	
	Average holding value	12 VA		12 VA	
DC control voltage					
24...60 V DC	Average pull-in value	900 W		785 W	
	Average holding value	5 W		5.5 W	
48...130 V DC	Average pull-in value	1150 W		1020 W	
	Average holding value	5 W		5 W	
100...250 V DC	Average pull-in value	895 W		880 W	
	Average holding value	5 W		5 W	
250 ... 500 V DC	Average pull-in value	885 W		910 W	
	Average holding value	7.5 W		7.5 W	
Drop-out voltage		55 % of Uc min.			
Voltage sag immunity		Conditions of use on request			
acc. to SEMI F47					
Dips withstand		≥ 20 ms			
Operating time					
Coil supply between A1 - A2					
Between coil energization and:	Main contact closing	50...120 ms			
Between coil de-energization and:	Main contact opening	33...70 ms			
Control input for PLC's					
Between coil energization and:	Main contact closing	40...60 ms		40...90 ms	
Between coil de-energization and:	Main contact opening	10...30 ms			

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Mounting positions					
Mounting distances		The contactors can be assembled side by side			
Fixing					
On rail according to IEC 60715, EN 60715		–			
By screws		4 x M5		4 x M6	

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Connecting characteristics

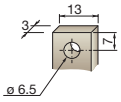
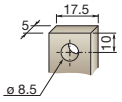
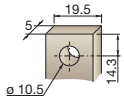
Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38	AFS40	AFS52	AFS65	AFS80	AFS96
Main terminals		Screw terminals with cable clamp						Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)												
Main conductors (poles)												
Rigid Solid (≤ 4 mm²)	1 x	1 ... 6 mm²			2.5 ... 10 mm²			6 ... 35 mm²			6 ... 70 mm²	
Rigid Stranded (≥ 1 mm²)	2 x	1 ... 6 mm²			2.5 ... 10 mm²			6 ... 35 mm²			6 ... 50 mm²	
Flexible with non insulated ferrule	1 x	0.75 ... 6 mm²			1.5 ... 10 mm²			4 ... 35 mm²			6 ... 50 mm²	
	2 x	0.75 ... 6 mm²			1.5 ... 10 mm²			4 ... 35 mm²			6 ... 50 mm²	
Flexible with insulated ferrule	1 x	0.75 ... 4 mm²			1.5 ... 10 mm²			4 ... 35 mm²			6 ... 50 mm²	
	2 x	0.75 ... 2.5 mm²			1.5 ... 4 mm²			4 ... 35 mm²			6 ... 50 mm²	
Bars or lugs	L <	9.6 mm			12.5 mm			9.2 mm			12.2 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 16 ... 10			AWG 14 ... 8			AWG 10 ... 2			AWG 6 ... 1	
Stripping length		10 mm			14 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 (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										
Bars or 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						IP10*				
Coil terminals		IP20										
Built-in auxiliary terminals		IP20										
Screw terminals		Delivered in open position, screws of unused terminals must be tightened										
Main terminals		M3.5			M4			M6			M8	
Screwdriver type		Flat Ø 5.5 / Pozidriv 2			Flat Ø 6.5 / Pozidriv 2						hexagon socket (s = 4 mm)	
Coil terminals		M3.5										
Screwdriver type		Flat Ø 5.5 / Pozidriv 2										
Built-in auxiliary terminals		M3.5										
Screwdriver type		Flat Ø 5.5 / Pozidriv 2										

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

AFS116 ... AFS370 3-pole contactors for safety applications

Technical data

Connecting characteristics

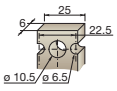
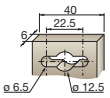
Contactor types	AC / DC operated	AFS116	AFS146	AFS190	AFS205	AFS265	AFS305	AFS370
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
Cu cable - Stranded	1 x	10...95 mm²		6...150 mm²		16...300 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Stranded	2 x	10...95 mm²		50...120 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Al cable - Stranded	1 x	–		95...185 mm²		185...240 mm²		
Clamp type		–		1SDA054988R1		1SDA055020R1		
Tightening torque		–		31 Nm		43 Nm		
Cu cable - Flexible	1 x	10...70 mm²		6...120 mm²		16...240 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Flexible	2 x	10...70 mm²		50...95 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Lugs	L ≤	22 mm (.866 in)		24 mm (.945 in)		32 mm (1.260 in)		
	Ø >	6 mm (.236 in)		8 mm (.315 in)		10 mm (.394 in)		
Socket type		LL... included		LL... included		LL... included		
Tightening torque		9 Nm / 80 lb.in		18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA	1 x	AWG 6...3/0		6...300 MCM		4...400 MCM		
Clamp type		LD... included (1)		ATK185 (2)		ATK300 (2)		
Tightening torque		8 Nm / 71 lb.in		34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA	2 x	AWG 6...3/0		–		4...500 MCM		
Clamp type		LD... included (1)		–		ATK300/2 (2)		
Tightening torque		8 Nm / 71 lb.in		–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)								
Rigid Solid/Stranded	1 x	1...4 mm²						
	2 x	1...4 mm²						
Flexible	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with insulated ferrule	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Lugs	L <	8 mm						
	l >	3.5 mm						
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14						
Stripping length		9 mm						
Tightening torque		1.00 Nm / 9 lb.in						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals		IP00						
Coil terminals		IP20						
Screw terminals								
Main terminals		M6		M8		M10		
Screwdriver type		Screws and bolts						
Coil terminals (delivered in open position)		M3.5						
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2						

(1) LD... not included for AFS116 ... AFS146-30-..B.
(2) Available in North America only.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

Connecting characteristics

Contactor types	AC / DC operated	AFS400	AFS460	AFS580	AFS750
Main terminals Flat type					
Connection capacity (min. ... max.)					
Main conductors (poles)					
Cu cable - Stranded	2 x	240 mm²			–
Clamp type		1SDA013922R1			–
Tightening torque		35 Nm			–
Cu cable - Stranded	3 x	–		185 mm²	
Clamp type		–		1SDA013956R1	
Tightening torque		35 Nm		45 Nm	
Al cable - Stranded	2 x	240 mm²			–
Clamp type		1SDA013922R1			–
Tightening torque		35 Nm			–
	3 x	–		185 mm²	
Clamp type		–		1SDA013956R1	
Tightening torque		35 Nm		45 Nm	
Lugs	L ≤	47 mm		50 mm	
	Ø >	10 mm		12 mm	
Tightening torque		35 Nm / 310 lb.in		45 Nm / 398 lb.in	
Connection capacity acc. to UL / CSA	2 x	250-500 MCM alt. 2/0 AWG-500 MCM		–	
Clamp type		K6TH alt. ATK580		–	
Tightening torque		275 lb.in		–	
Connection capacity acc. to UL / CSA	3 x	2/0 AWG-400 MCM		2/0 AWG-500 MCM	
Clamp type		K6TJ		ATK750/3	
Tightening torque		275 lb.in		375 lb.in	
Auxiliary conductors (coil terminals)					
Rigid Solid/Stranded	1 x	1...4 mm²			
	2 x	1...4 mm²			
Flexible	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Flexible with insulated ferrule	1 x	0.75...2.5 mm²			
	2 x	0.75...2.5 mm²			
Lugs	L ≤	8 mm			
	l >	3.7 mm			
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14			
Tightening torque Recommended		1.00 Nm / 9 lb.in			
Max.		1.20 Nm			
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals		IP00			
Coil terminals		IP20			
Screw terminals					
Main terminals		M10		M12	
		Screws and bolts			
Coil terminals (delivered in open position)		M3.5			
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2			

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38	AFS40	AFS52	AFS65	AFS80	AFS96
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										
Maximum 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 (CAL4 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 (CAL4 aux. contact blocks) are mirror contacts.										

Built-in auxiliary contacts according to UL / CSA

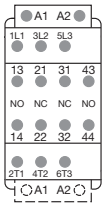
Contactor types	AC / DC operated	AFS09	AFS12	AFS16	AFS26	AFS30	AFS38	AFS40	AFS52	AFS65	AFS80	AFS96
Maximum operational voltage		600 V AC, 600 V DC										
Pilot duty		A600, Q600										
AC thermal rated current		10 A										
AC maximum volt-ampere making		7200 VA										
AC maximum volt-ampere breaking		720 VA										
DC thermal rated current		2.5 A										
DC maximum volt-ampere making-breaking		69 VA										

AFS09 ... AFS750 3-pole contactors for safety applications

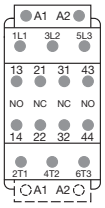
Terminal marking and positioning

AFS09 ... AFS96 contactors - AC / DC operated

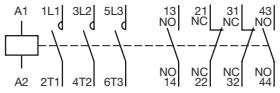
Standard devices



AFS09 ... AFS16..-30-22



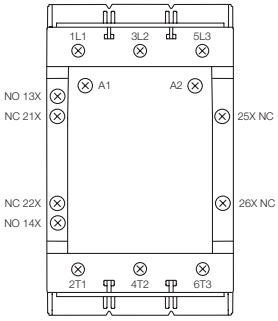
AFS26 ... AFS96..-30-22



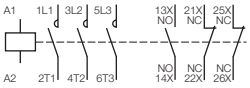
AFS09 ... AFS96..-30-22

AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



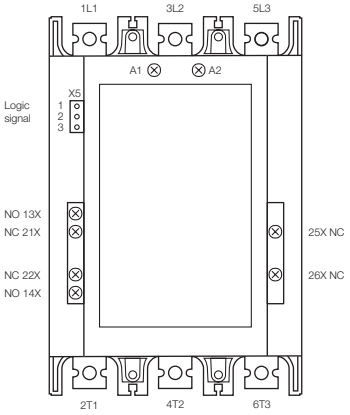
AFS116 ... AFS370-30-12



AFS116 ... AFS370-30-12

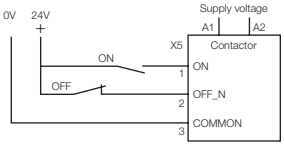
AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

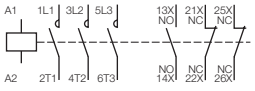


AFS400 ... AFS750-30-12

Control with logic signal



AFS400 ... AFS750-30-12



AFS400 ... AFS750-30-12

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.

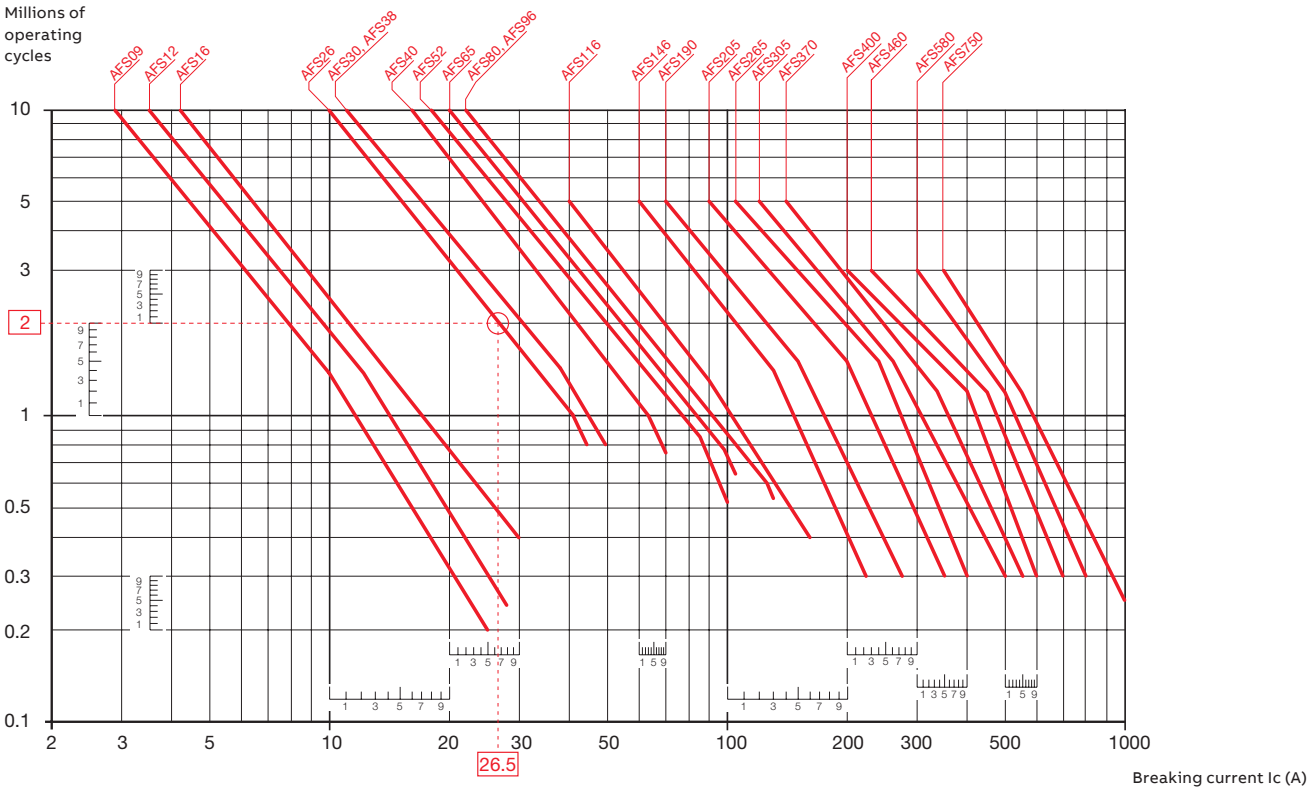
3-pole contactors for safety applications

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:

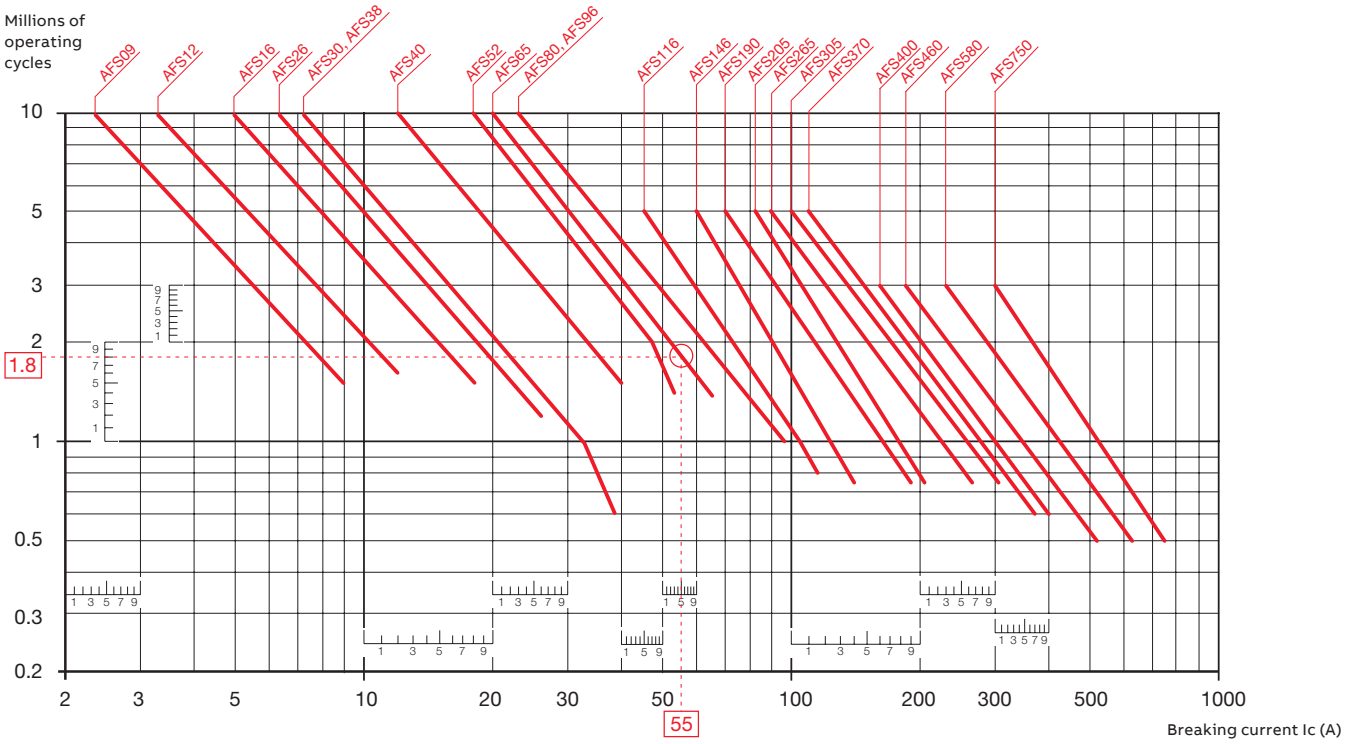
Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AFS26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

3-pole contactors for safety applications

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".

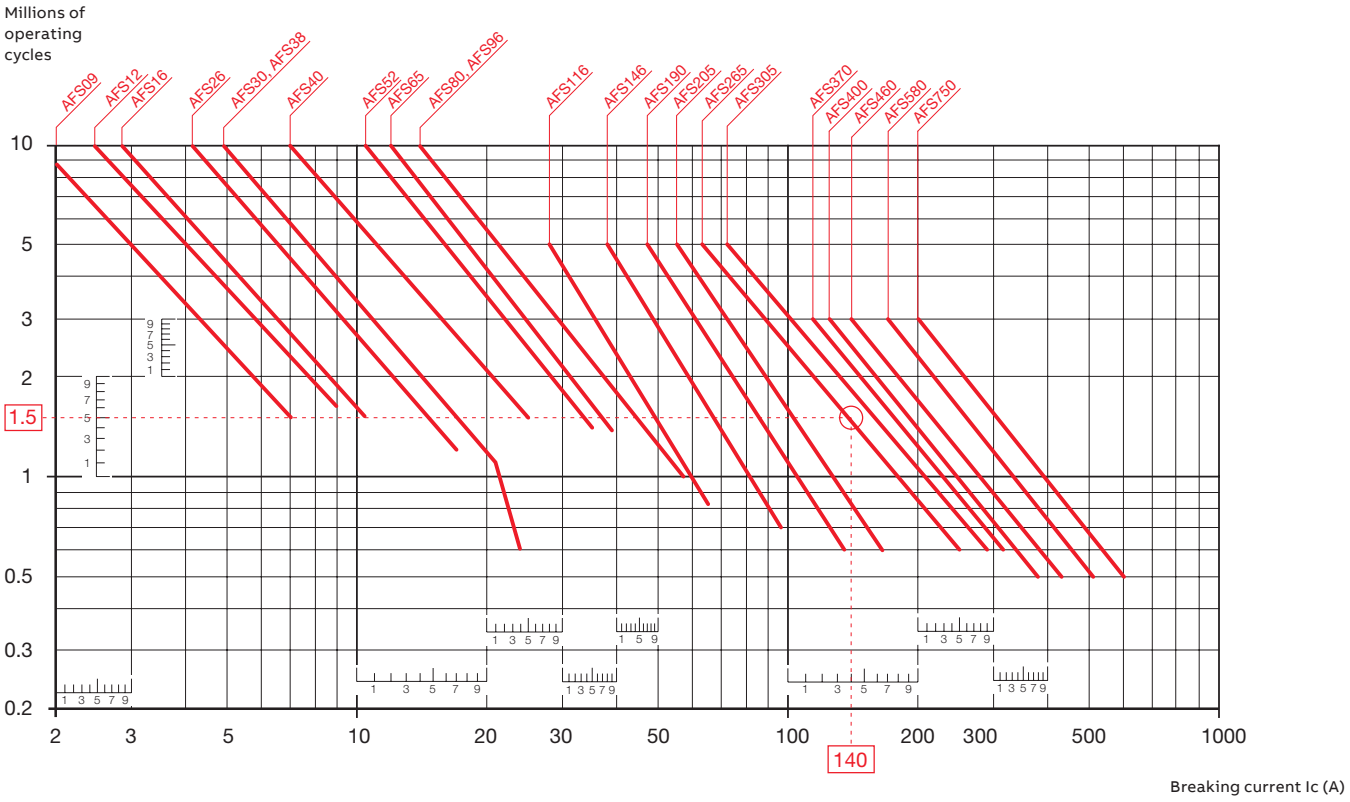


Example:
Motor power 30 kW for AC-3 - Ue = 400 V and Ie = 55 A utilization – Electrical durability required = 1.8 million operating cycles.
For AC-3: Ic = Ie. Select the AFS65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

3-pole contactors for safety applications

Electrical durability

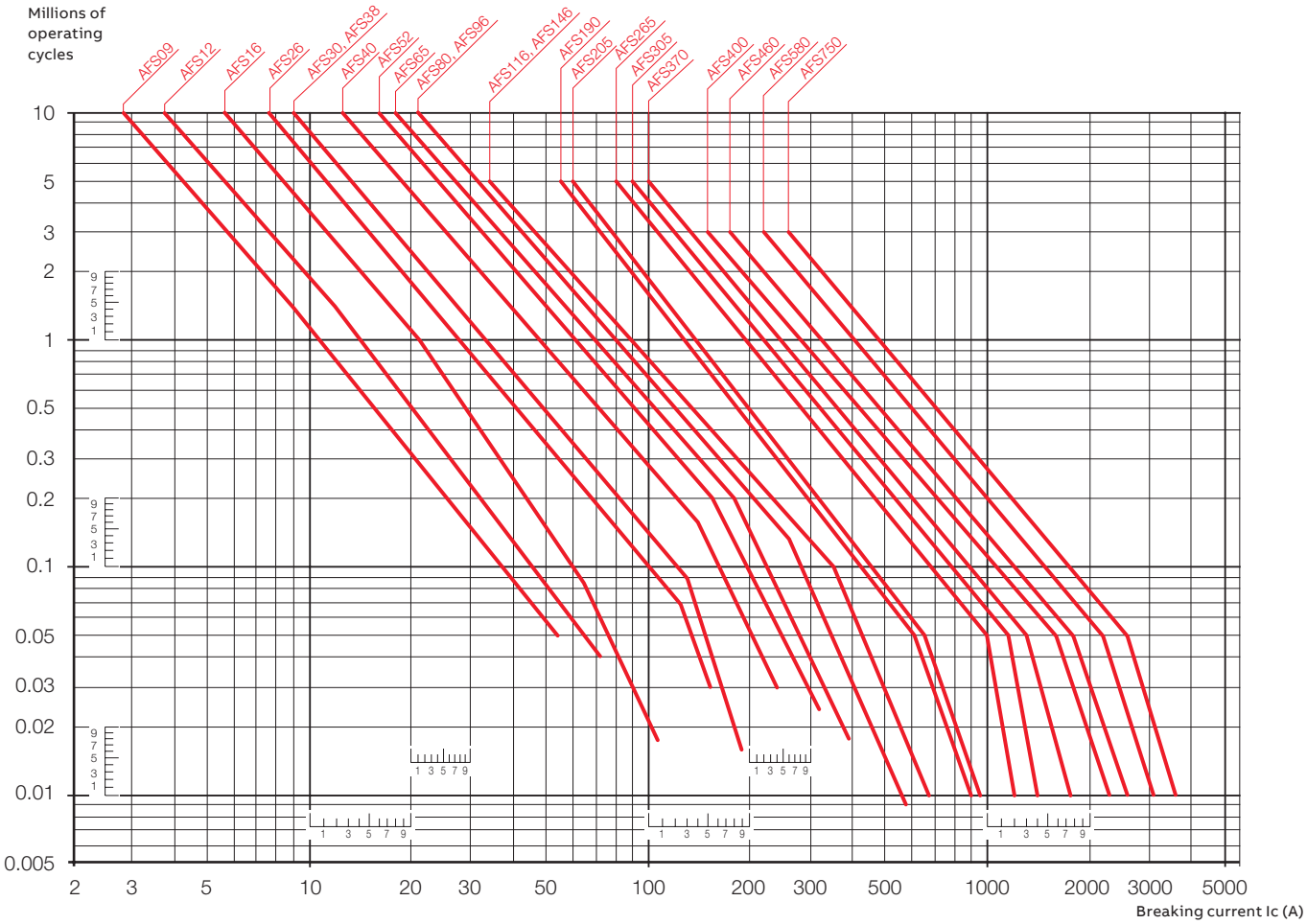
Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



3-pole contactors for safety applications

Electrical durability

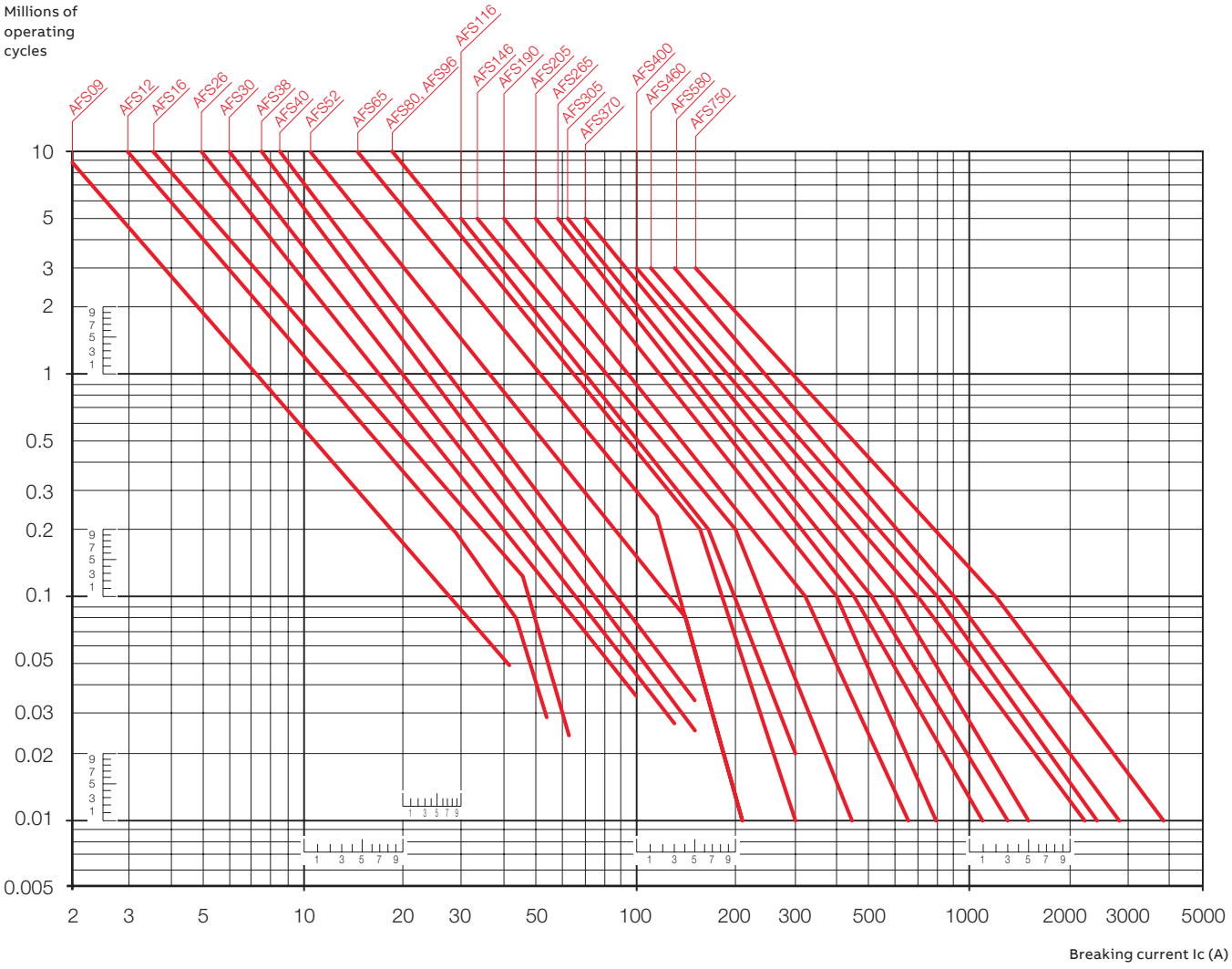
Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V
Ambient temperature ≤ 60 °C for AFS09 ... AFS96
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).
Maximum electrical switching frequency: see "Technical data".



3-pole contactors for safety applications

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V
Ambient temperature ≤ 60 °C for AFS09 ... AFS96
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/**1SBL137001R1310**

AF and EK 4-pole contactors

3/178 **Overview**

Ordering details

25 to 125 A AC-1

3/180 AF09 … AF38 AC / DC operated
3/181 AF09Z … AF16Z 24 V DC operated designed for PLC
3/182 AF09Z ... AF38Z AC / DC operated for specific applications
3/183 AF40 … AF80 AC / DC operated
3/184 Contactors and main accessories

160 to 525 A AC-1

3/185 AF116 … AF140 AC / DC operated
3/186 AF190 … AF370 AC / DC operated
3/187 Contactors and main accessories
3/188 AF116 … AF140 AC / DC operated - with 1 N.O. + 1 N.C.
3/189 AF190 … AF370 AC / DC operated - with 1 N.O. + 1 N.C.
3/190 Contactors and main accessories
3/191 AF116 … AF140 AC / DC operated - with 2 N.O. + 2 N.C.
3/192 AF190 … AF370 AC / DC operated - with 2 N.O. + 2 N.C.
3/193 Contactors and main accessories

800 to 1000 A AC-1

3/194 EK550, EK1000 AC operated - with 1 N.O. + 1 N.C.
3/195 EK550, EK1000 DC operated - with 2 N.O. + 1 N.C.
3/196 EK550, EK1000 AC operated - with 2 N.O. + 2 N.C.
3/197 Main accessories

3/199 **Technical data**

3/211 **Electrical durability**

3/466 **Voltage code table**

4-pole contactors

Overview

IEC	AC-1 Rated operational current	θ ≤ 40 °C, 690 V	A	25	30	45	55	70	100	125
UL/CSA	General use rating	600 V	A	25	30	45	55	60	80	105
AC / DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
AC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
DC Control supply			Type	**AF09**	**AF16**	**AF26**	**AF38**	**AF40**	**AF52**	**AF80**
IEC	AC-1 Rated operational current 690 V	θ ≤ 40 °C	A	25	30	45	55	70	100	125
		θ ≤ 60 °C (1)	A	25	30	40	45	60	80	105
		θ ≤ 70 °C	A	22	26	32	37	50	70	90
	With conductor cross sectional area		mm^2	4	6	10	16	35	35	50
	Rated operational voltage Ue max.		V	690	690	690	690	690	690	690

(1) θ ≤ 55 °C for EK550, EK1000 contactors

Main accessories

Auxiliary contact blocks	Front mounting	**CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.)	
	Side mounting	**CAL4-11** (1 x N.O. + 1 x N.C.)	
Timers	Electronic	**TEF4-ON** **TEF4-OFF**	
Interlocking units	Mechanical	**VM4**	**VM96-4**
	Mechanical / Electrical	**VEM4**	
Surge suppressors	Varistor + RC (AC / DC)	Built-in surge protection	

	160	200	275	350	400	500	525	800	1000
	160	175	230	250	300	350	420	540	—
	AF116	**AF140**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**—**	**—**
	AF116	**AF140**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**EK550**	**EK1000**
	AF116	**AF140**	**AF190**	**AF205**	**AF265**	**AF305**	**AF370**	**EK550**	**EK1000**
	160	200	275	350	400	500	525	800	1000
	145	175	250	300	350	400	425	650	800
	130	160	200	240	290	325	350	575	720
	70	95	150	240	240	300	2 x 185	2 x 240	2 x 300
	690	690	1000	1000	1000	1000	1000	1000	1000

	CAL19-11 (1 x N.O. + 1 x N.C.)	**CAL16-11** (1 x N.O. + 1 x N.C.)
	VM19 (for same size contactors)	**VH800**
		RC-EH800

AF09 ... AF38 4-pole contactors

25 to 55 A AC-1

AC / DC operated

AF09-40-00

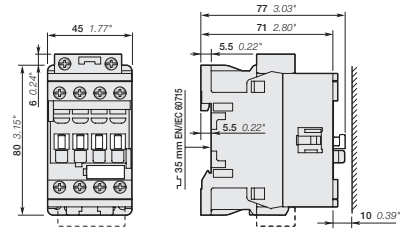
AF26-40-00

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

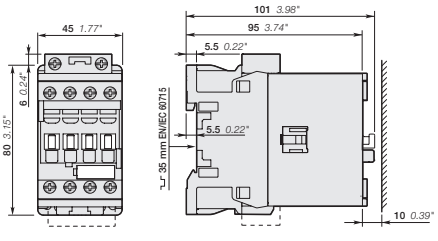
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC	UL/CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
25	25	24...60	20...60 (1)	0 0	AF09-40-00-11	1SBL137201R1100	0.270
		48...130	48...130	0 0	AF09-40-00-12	1SBL137201R1200	0.270
		100...250	100...250	0 0	AF09-40-00-13	1SBL137201R1300	0.270
		250...500	250...500	0 0	AF09-40-00-14	1SBL137201R1400	0.310
30	30	24...60	20...60 (1)	0 0	AF16-40-00-11	1SBL177201R1100	0.270
		48...130	48...130	0 0	AF16-40-00-12	1SBL177201R1200	0.270
		100...250	100...250	0 0	AF16-40-00-13	1SBL177201R1300	0.270
		250...500	250...500	0 0	AF16-40-00-14	1SBL177201R1400	0.310
45	45	24...60	20...60 (1)	0 0	AF26-40-00-11	1SBL237201R1100	0.360
		48...130	48...130	0 0	AF26-40-00-12	1SBL237201R1200	0.360
		100...250	100...250	0 0	AF26-40-00-13	1SBL237201R1300	0.360
		250...500	250...500	0 0	AF26-40-00-14	1SBL237201R1400	0.400
55	55	24...60	20...60 (1)	0 0	AF38-40-00-11	1SBL297201R1100	0.360
		48...130	48...130	0 0	AF38-40-00-12	1SBL297201R1200	0.360
		100...250	100...250	0 0	AF38-40-00-13	1SBL297201R1300	0.360
		250...500	250...500	0 0	AF38-40-00-14	1SBL297201R1400	0.400
2 N.O. + 2 N.C. main poles							
25	25	24...60	20...60 (1)	0 0	AF09-22-00-11	1SBL137501R1100	0.270
		48...130	48...130	0 0	AF09-22-00-12	1SBL137501R1200	0.270
		100...250	100...250	0 0	AF09-22-00-13	1SBL137501R1300	0.270
		250...500	250...500	0 0	AF09-22-00-14	1SBL137501R1400	0.310
30	30	24...60	20...60 (1)	0 0	AF16-22-00-11	1SBL177501R1100	0.270
		48...130	48...130	0 0	AF16-22-00-12	1SBL177501R1200	0.270
		100...250	100...250	0 0	AF16-22-00-13	1SBL177501R1300	0.270
		250...500	250...500	0 0	AF16-22-00-14	1SBL177501R1400	0.310
45	45	24...60	20...60 (1)	0 0	AF26-22-00-11	1SBL237501R1100	0.360
		48...130	48...130	0 0	AF26-22-00-12	1SBL237501R1200	0.360
		100...250	100...250	0 0	AF26-22-00-13	1SBL237501R1300	0.360
		250...500	250...500	0 0	AF26-22-00-14	1SBL237501R1400	0.400
55	55	24...60	20...60 (1)	0 0	AF38-22-00-11	1SBL297501R1100	0.360
		48...130	48...130	0 0	AF38-22-00-12	1SBL297501R1200	0.360
		100...250	100...250	0 0	AF38-22-00-13	1SBL297501R1300	0.360
		250...500	250...500	0 0	AF38-22-00-14	1SBL297501R1400	0.400

(1) AF..-40-..-11 and AF..-22-..-11 not suitable for direct control by PLC-output.



AF09, AF16



AF26, AF38

Main dimensions mm, inches

AF09Z ... AF38Z 4-pole contactors

25 to 55 A AC-1

24 V DC operated designed for PLC

AF09Z-40-00

AF26Z-40-00

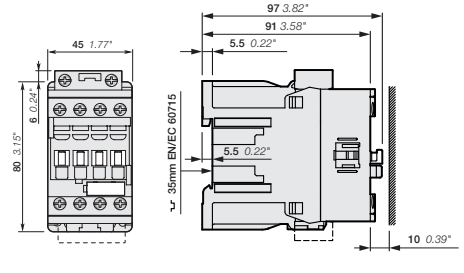
AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

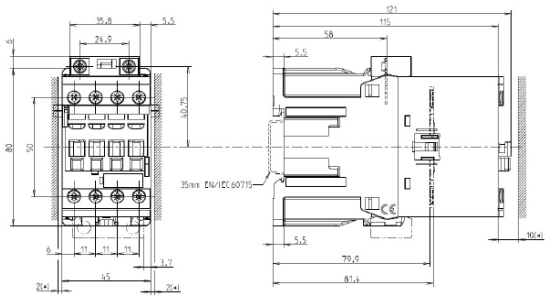
IEC Rated operational current ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
4 N.O. main poles						
25	25	24	0 0	AF09Z-40-00-30	1SBL136201R3000	0.430
30	30	24	0 0	AF16Z-40-00-30	1SBL176201R3000	0.430
45	45	24	0 0	AF26Z-40-00-30	1SBL236201R3000	0.530
55	55	24	0 0	AF38Z-40-00-30	1SBL296201R3000	0.530
2 N.O. + 2 N.C. main poles						
25	25	24	0 0	AF09Z-22-00-30	1SBL136501R3000	0.430
30	30	24	0 0	AF16Z-22-00-30	1SBL176501R3000	0.430
45	45	24	0 0	AF26Z-22-00-30	1SBL236501R3000	0.530
55	55	24	0 0	AF38Z-22-00-30	1SBL296501R3000	0.530

Note: AF..Z contactors with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches



AF09Z, AF16Z



AF26Z, AF38Z

AF09Z ... AF38Z 4-pole contactors

25 to 55 A AC-1

AC / DC operated for specific applications

AF09Z-40-00

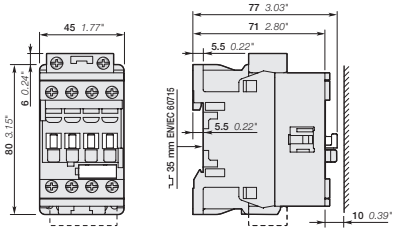
AF26Z-40-00

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

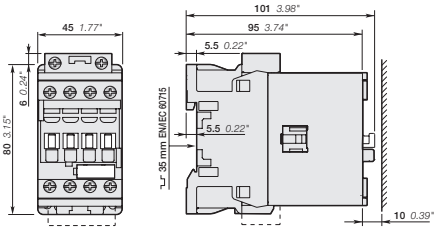
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC Rated operational current ≤ 40 °C AC-1 A	UL/CSA General use rating 600 V AC A	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	 V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
4 N.O. main poles							
25	25	-	12...20	0 0	AF09Z-40-00-20	1SBL136201R2000	0.310
		24...60	20...60	0 0	AF09Z-40-00-21	1SBL136201R2100	0.310
		48...130	48...130	0 0	AF09Z-40-00-22	1SBL136201R2200	0.310
		100...250	100...250	0 0	AF09Z-40-00-23	1SBL136201R2300	0.310
30	30	-	12...20	0 0	AF16Z-40-00-20	1SBL176201R2000	0.310
		24...60	20...60	0 0	AF16Z-40-00-21	1SBL176201R2100	0.310
		48...130	48...130	0 0	AF16Z-40-00-22	1SBL176201R2200	0.310
		100...250	100...250	0 0	AF16Z-40-00-23	1SBL176201R2300	0.310
45	45	-	12...20	0 0	AF26Z-40-00-20	1SBL236201R2000	0.400
		24...60	20...60	0 0	AF26Z-40-00-21	1SBL236201R2100	0.400
		48...130	48...130	0 0	AF26Z-40-00-22	1SBL236201R2200	0.400
		100...250	100...250	0 0	AF26Z-40-00-23	1SBL236201R2300	0.400
55	55	-	12...20	0 0	AF38Z-40-00-20	1SBL296201R2000	0.400
		24...60	20...60	0 0	AF38Z-40-00-21	1SBL296201R2100	0.400
		48...130	48...130	0 0	AF38Z-40-00-22	1SBL296201R2200	0.400
		100...250	100...250	0 0	AF38Z-40-00-23	1SBL296201R2300	0.400
2 N.O. + 2 N.C. main poles							
25	25	-	12...20	0 0	AF09Z-22-00-20	1SBL136501R2000	0.310
		24...60	20...60	0 0	AF09Z-22-00-21	1SBL136501R2100	0.310
		48...130	48...130	0 0	AF09Z-22-00-22	1SBL136501R2200	0.310
		100...250	100...250	0 0	AF09Z-22-00-23	1SBL136501R2300	0.310
30	30	-	12...20	0 0	AF16Z-22-00-20	1SBL176501R2000	0.310
		24...60	20...60	0 0	AF16Z-22-00-21	1SBL176501R2100	0.310
		48...130	48...130	0 0	AF16Z-22-00-22	1SBL176501R2200	0.310
		100...250	100...250	0 0	AF16Z-22-00-23	1SBL176501R2300	0.310
45	45	-	12...20	0 0	AF26Z-22-00-20	1SBL236501R2000	0.400
		24...60	20...60	0 0	AF26Z-22-00-21	1SBL236501R2100	0.400
		48...130	48...130	0 0	AF26Z-22-00-22	1SBL236501R2200	0.400
		100...250	100...250	0 0	AF26Z-22-00-23	1SBL236501R2300	0.400
55	55	-	12...20	0 0	AF38Z-22-00-20	1SBL296501R2000	0.400
		24...60	20...60	0 0	AF38Z-22-00-21	1SBL296501R2100	0.400
		48...130	48...130	0 0	AF38Z-22-00-22	1SBL296501R2200	0.400
		100...250	100...250	0 0	AF38Z-22-00-23	1SBL296501R2300	0.400

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF16Z



AF26Z, AF38Z

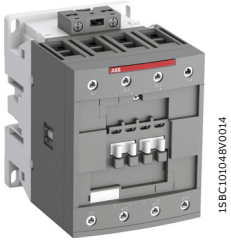
Main dimensions mm, inches

AF40 ... AF80 4-pole contactors

70 to 125 A AC-1

AC / DC operated

AF40-40-00



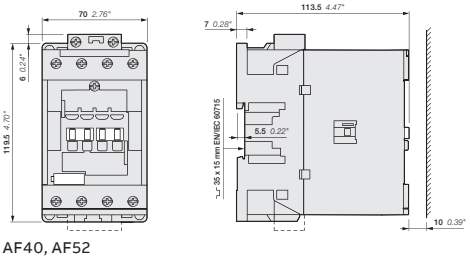
AF80-40-00

AF40 ... AF80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

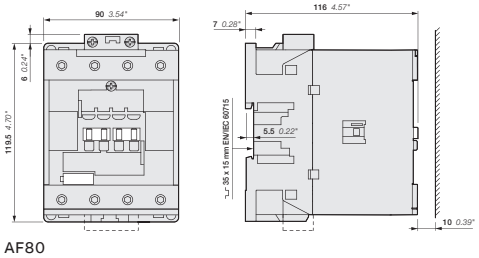
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltages ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

IEC	UL/CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
70	60	24...60	20...60	0 0	AF40-40-00-11	1SBL347201R1100	1.210
		48...130	48...130	0 0	AF40-40-00-12	1SBL347201R1200	1.210
		100...250	100...250	0 0	AF40-40-00-13	1SBL347201R1300	1.160
		250...500	250...500	0 0	AF40-40-00-14	1SBL347201R1400	1.160
100	80	24...60	20...60	0 0	AF52-40-00-11	1SBL367201R1100	1.210
		48...130	48...130	0 0	AF52-40-00-12	1SBL367201R1200	1.210
		100...250	100...250	0 0	AF52-40-00-13	1SBL367201R1300	1.160
		250...500	250...500	0 0	AF52-40-00-14	1SBL367201R1400	1.160
125	105	24...60	20...60	0 0	AF80-40-00-11	1SBL397201R1100	1.490
		48...130	48...130	0 0	AF80-40-00-12	1SBL397201R1200	1.490
		100...250	100...250	0 0	AF80-40-00-13	1SBL397201R1300	1.440
		250...500	250...500	0 0	AF80-40-00-14	1SBL397201R1400	1.440
2 N.O. + 2 N.C. main poles							
70	60	24...60	20...60	0 0	AF40-22-00-11	1SBL347501R1100	1.210
		48...130	48...130	0 0	AF40-22-00-12	1SBL347501R1200	1.210
		100...250	100...250	0 0	AF40-22-00-13	1SBL347501R1300	1.160
		250...500	250...500	0 0	AF40-22-00-14	1SBL347501R1400	1.160
125	105	24...60	20...60	0 0	AF80-22-00-11	1SBL397501R1100	1.490
		48...130	48...130	0 0	AF80-22-00-12	1SBL397501R1200	1.490
		100...250	100...250	0 0	AF80-22-00-13	1SBL397501R1300	1.440
		250...500	250...500	0 0	AF80-22-00-14	1SBL397501R1400	1.440

For control by PLC-output, use RA4 interface relay.



AF40, AF52

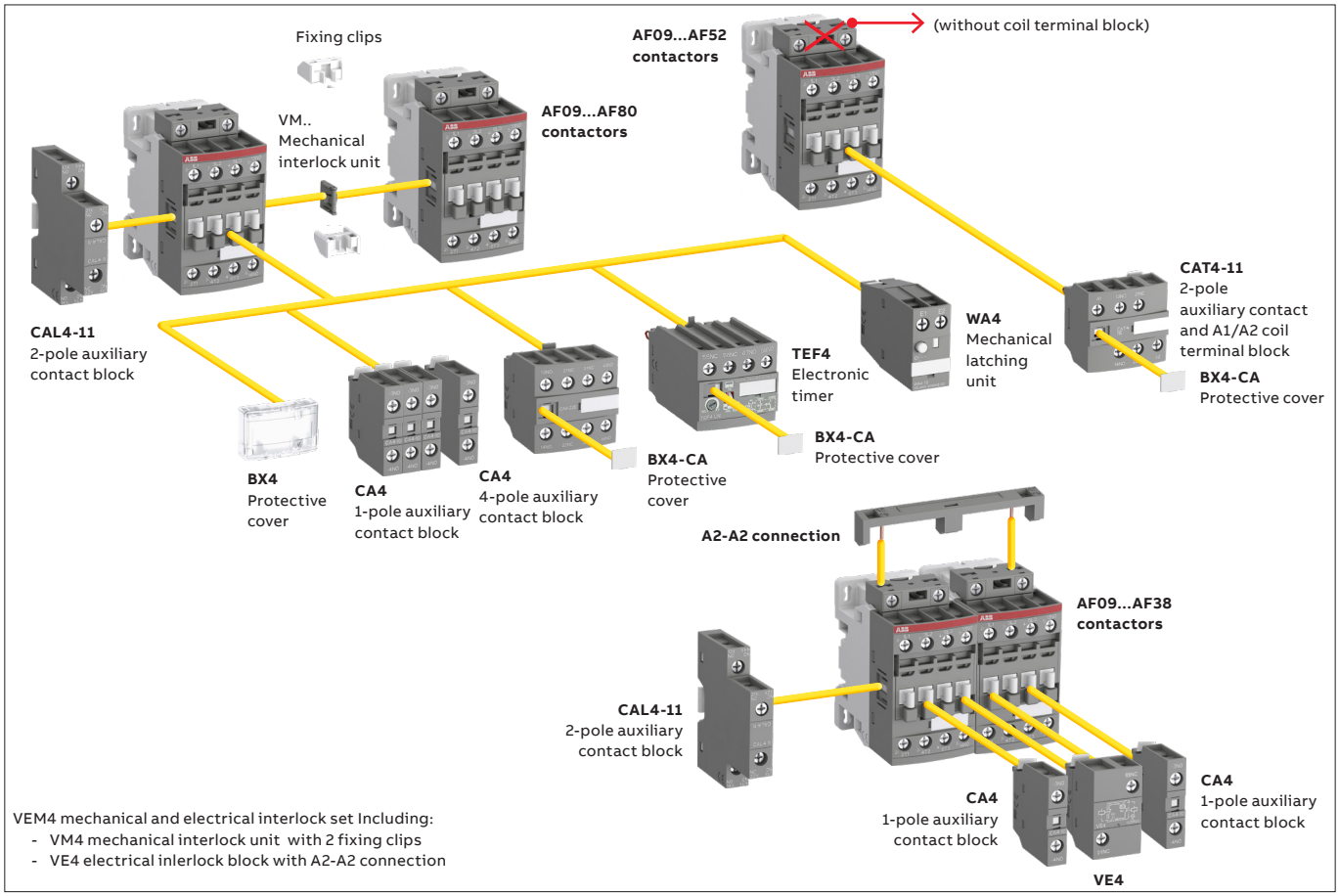


AF80

Main dimensions mm, inches

AF09 ... AF80 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

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 (4)	VEM4	2-pole CAL4-11 Left side	2-pole CAL4-11 Right side
AF09(Z) ... AF38(Z)										
AF09 ... AF16	4 0	0 0 (1)	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	–	+ 1	–
AF26 ... AF38	4 0	0 0 (2)	2 max.	**or** 1	–	**or** 1	**or** 1	–	+ 1	+ 1
			3 max.	–	–	–	–	+ 1 (5)	+ 1	or 1
AF09 ... AF38	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
AF09Z ... AF38Z 24 V DC designed for PLC - coil 30										
AF09Z ... AF16Z	4 0	0 0 (1)	4 max.	–	**or** 1	**or** 1	–	– (5)	**or** 1	+ 1
AF26Z ... AF38Z	4 0	0 0 (2)	2 max.	–	–	**or** 1	–	– (5)	+ 1	or 1
			–	–	–	1	–	–	+ 1	+ 1
AF09Z ... AF38Z	2 2	0 0 (2)	4 max.	–	**or** 1	**or** 1	–	–	**or** 1	+ 1
			2 max.	–	–	**or** 1	–	–	+ 1	or 1
			–	–	–	1	–	–	+ 1	+ 1
AF40 ... AF80										
AF40 ... AF52	4 0	0 0	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	–	+ 1	+ 1
AF80	4 0	0 0	4 max.	–	**or** 1	**or** 1	**or** 1	–	+ 1	+ 1
AF40	2 2	0 0 (3)	4 max.	**or** 1	**or** 1	**or** 1	**or** 1	–	+ 1	–
			4 max.	–	**or** 1	**or** 1	**or** 1	–	+ 1	+ 1
AF80	2 2	0 0 (3)	4 max.	–	**or** 1	**or** 1	**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: 2 N.C. auxiliary contacts max. on positions 1, 1 ±30°, 2, 3, 4, 5.
(4) Use WA4 for AF09...AF52 and WA4-96 for AF80.
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.
For WA4 accessory use with contactors coil 30, please consult your ABB local sales organization.
(5) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated

AF140-40-00

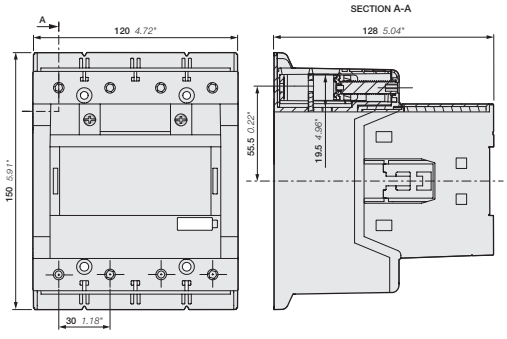
AF140-40-00B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

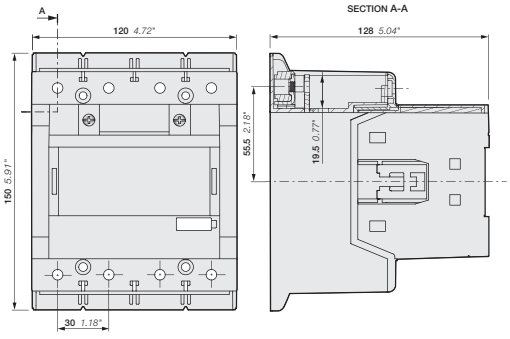
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
For connection with built-in cable clamps							
160	160	24...60	20...60	0 0	AF116-40-00-11	1SFL427101R1100	2.250
		48...130	48...130	0 0	AF116-40-00-12	1SFL427101R1200	2.250
		100...250	100...250	0 0	AF116-40-00-13	1SFL427101R1300	2.250
		250...500	250...500	0 0	AF116-40-00-14	1SFL427101R1400	2.250
200	175	24...60	20...60	0 0	AF140-40-00-11	1SFL447101R1100	2.250
		48...130	48...130	0 0	AF140-40-00-12	1SFL447101R1200	2.250
		100...250	100...250	0 0	AF140-40-00-13	1SFL447101R1300	2.250
		250...500	250...500	0 0	AF140-40-00-14	1SFL447101R1400	2.250
With bar connections							
160	160	24...60	20...60	0 0	AF116-40-00B-11	1SFL427102R1100	2.150
		48...130	48...130	0 0	AF116-40-00B-12	1SFL427102R1200	2.150
		100...250	100...250	0 0	AF116-40-00B-13	1SFL427102R1300	2.150
		250...500	250...500	0 0	AF116-40-00B-14	1SFL427102R1400	2.150
200	175	24...60	20...60	0 0	AF140-40-00B-11	1SFL447102R1100	2.150
		48...130	48...130	0 0	AF140-40-00B-12	1SFL447102R1200	2.150
		100...250	100...250	0 0	AF140-40-00B-13	1SFL447102R1300	2.150
		250...500	250...500	0 0	AF140-40-00B-14	1SFL447102R1400	2.150

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF116, AF140-40-00



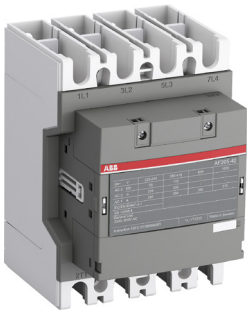
AF116, AF140-40-00B

Main dimensions mm, inches

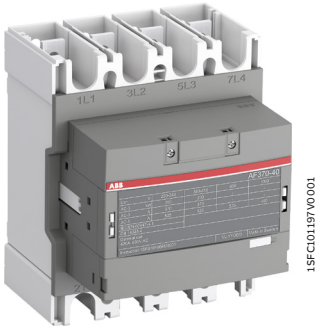
AF190 ... AF370 4-pole contactors

275 to 525 A AC-1

AC / DC operated



AF205-40-00



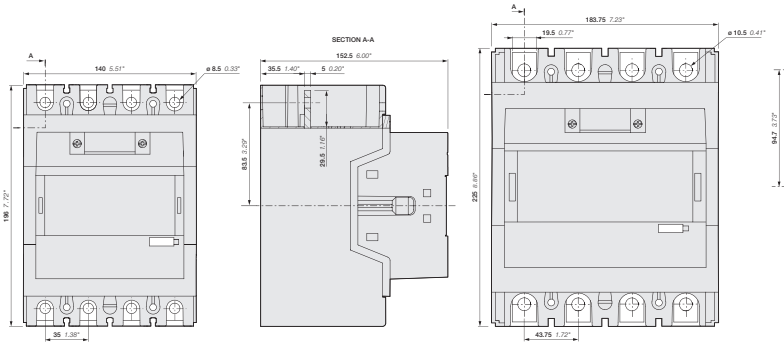
AF370-40-00

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
275	230	24...60	20...60	0 0	AF190-40-00-11	1SFL487102R1100	3.900
		48...130	48...130	0 0	AF190-40-00-12	1SFL487102R1200	3.900
		100...250	100...250	0 0	AF190-40-00-13	1SFL487102R1300	3.900
		250...500	250...500	0 0	AF190-40-00-14	1SFL487102R1400	3.900
350	250	24...60	20...60	0 0	AF205-40-00-11	1SFL527102R1100	3.900
		48...130	48...130	0 0	AF205-40-00-12	1SFL527102R1200	3.900
		100...250	100...250	0 0	AF205-40-00-13	1SFL527102R1300	3.900
		250...500	250...500	0 0	AF205-40-00-14	1SFL527102R1400	3.900
400	300	24...60	20...60	0 0	AF265-40-00-11	1SFL547102R1100	6.360
		48...130	48...130	0 0	AF265-40-00-12	1SFL547102R1200	6.360
		100...250	100...250	0 0	AF265-40-00-13	1SFL547102R1300	6.360
		250...500	250...500	0 0	AF265-40-00-14	1SFL547102R1400	6.360
500	350	24...60	20...60	0 0	AF305-40-00-11	1SFL587102R1100	6.360
		48...130	48...130	0 0	AF305-40-00-12	1SFL587102R1200	6.360
		100...250	100...250	0 0	AF305-40-00-13	1SFL587102R1300	6.360
		250...500	250...500	0 0	AF305-40-00-14	1SFL587102R1400	6.360
525	420	24...60	20...60	0 0	AF370-40-00-11	1SFL607102R1100	6.360
		48...130	48...130	0 0	AF370-40-00-12	1SFL607102R1200	6.360
		100...250	100...250	0 0	AF370-40-00-13	1SFL607102R1300	6.360
		250...500	250...500	0 0	AF370-40-00-14	1SFL607102R1400	6.360

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



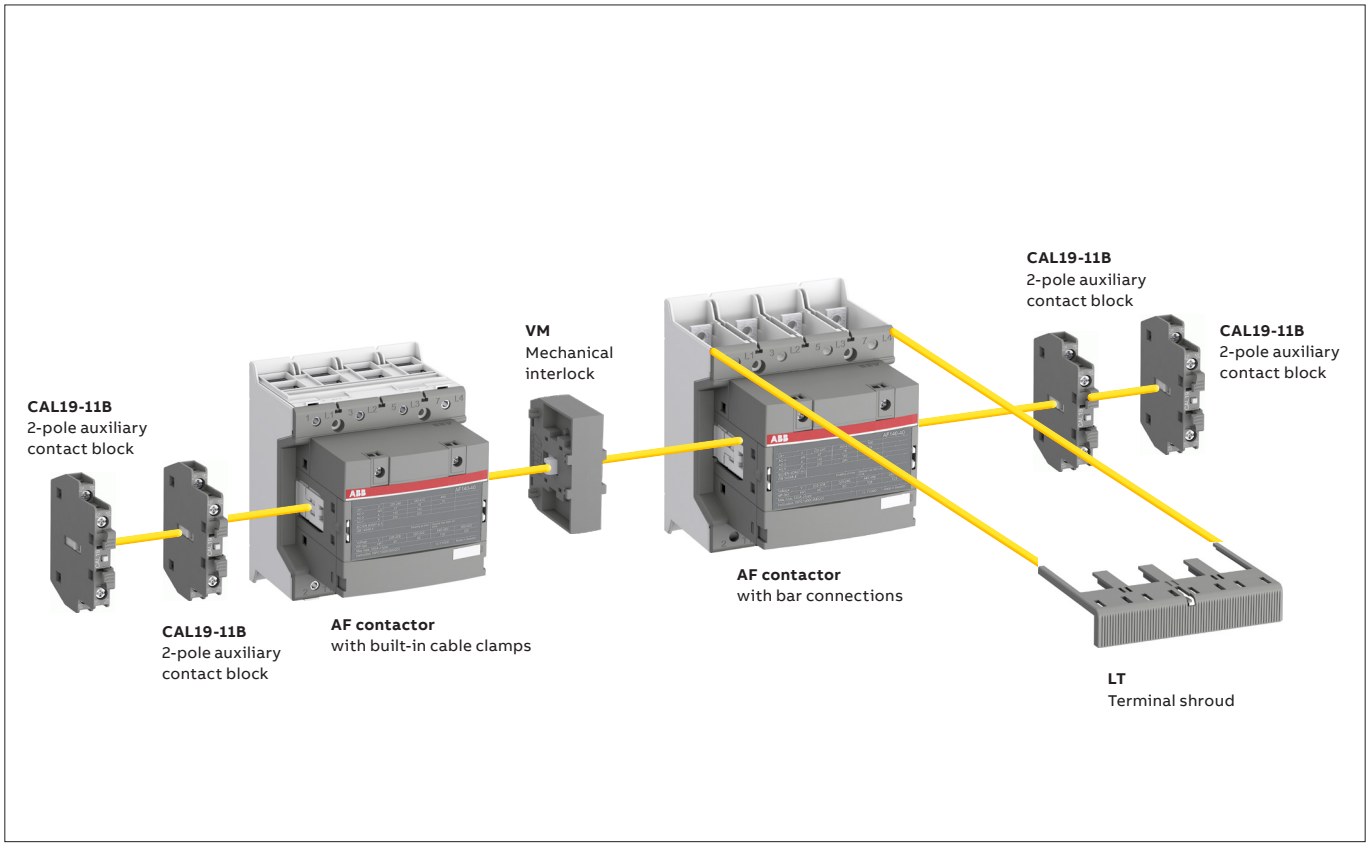
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-pole contactors

Contactors and main accessories



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks CAL19-11 (3)	CAL19-11B (3)	Mechanical interlock units (between two contactors)
AF116 ... AF370	4 0	0 0	2 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	4 0	0 0	2 x CAL19-11 (1)	+ 2 x CAL19-11B (1)	+ VM... (2)

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

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

AF140-40-11

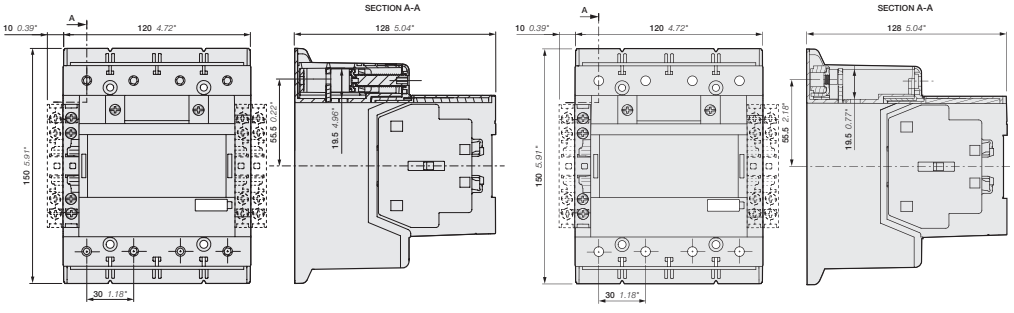
AF140-40-11B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
For connection with built-in cable clamps							
160	160	24...60	20...60	1 1	AF116-40-11-11	1SFL427101R1111	2.270
		48...130	48...130	1 1	AF116-40-11-12	1SFL427101R1211	2.270
		100...250	100...250	1 1	AF116-40-11-13	1SFL427101R1311	2.270
		250...500	250...500	1 1	AF116-40-11-14	1SFL427101R1411	2.270
200	175	24...60	20...60	1 1	AF140-40-11-11	1SFL447101R1111	2.270
		48...130	48...130	1 1	AF140-40-11-12	1SFL447101R1211	2.270
		100...250	100...250	1 1	AF140-40-11-13	1SFL447101R1311	2.270
		250...500	250...500	1 1	AF140-40-11-14	1SFL447101R1411	2.270
With bar connections							
160	160	24...60	20...60	1 1	AF116-40-11B-11	1SFL427102R1111	2.170
		48...130	48...130	1 1	AF116-40-11B-12	1SFL427102R1211	2.170
		100...250	100...250	1 1	AF116-40-11B-13	1SFL427102R1311	2.170
		250...500	250...500	1 1	AF116-40-11B-14	1SFL427102R1411	2.170
200	175	24...60	20...60	1 1	AF140-40-11B-11	1SFL447102R1111	2.170
		48...130	48...130	1 1	AF140-40-11B-12	1SFL447102R1211	2.170
		100...250	100...250	1 1	AF140-40-11B-13	1SFL447102R1311	2.170
		250...500	250...500	1 1	AF140-40-11B-14	1SFL447102R1411	2.170

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF116, AF140-40-11

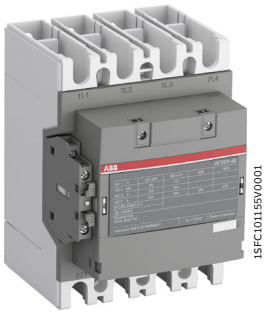
AF116, AF140-40-11B

Main dimensions mm, inches

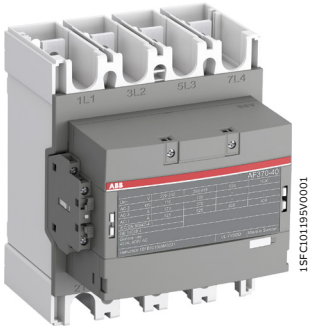
AF190 ... AF370 4-pole contactors

275 to 525 A AC-1

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



AF205-40-11



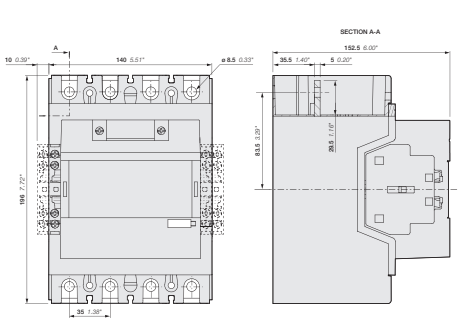
AF370-40-11

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

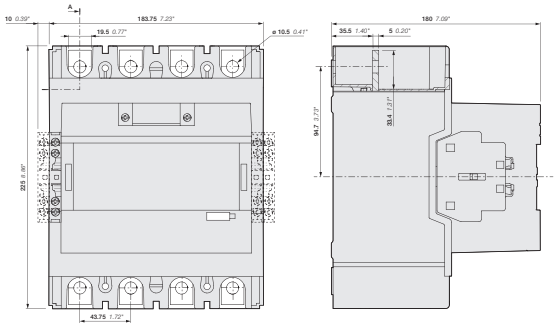
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC Rated operational current ≤ 40 °C AC-1	UL / CSA General use rating 600 V AC	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
275	230	24...60	20...60	1 1	AF190-40-11-11	1SFL487102R1111	3.920
		48...130	48...130	1 1	AF190-40-11-12	1SFL487102R1211	3.920
		100...250	100...250	1 1	AF190-40-11-13	1SFL487102R1311	3.920
		250...500	250...500	1 1	AF190-40-11-14	1SFL487102R1411	3.920
350	250	24...60	20...60	1 1	AF205-40-11-11	1SFL527102R1111	3.920
		48...130	48...130	1 1	AF205-40-11-12	1SFL527102R1211	3.920
		100...250	100...250	1 1	AF205-40-11-13	1SFL527102R1311	3.920
		250...500	250...500	1 1	AF205-40-11-14	1SFL527102R1411	3.920
400	300	24...60	20...60	1 1	AF265-40-11-11	1SFL547102R1111	6.380
		48...130	48...130	1 1	AF265-40-11-12	1SFL547102R1211	6.380
		100...250	100...250	1 1	AF265-40-11-13	1SFL547102R1311	6.380
		250...500	250...500	1 1	AF265-40-11-14	1SFL547102R1411	6.380
500	350	24...60	20...60	1 1	AF305-40-11-11	1SFL587102R1111	6.380
		48...130	48...130	1 1	AF305-40-11-12	1SFL587102R1211	6.380
		100...250	100...250	1 1	AF305-40-11-13	1SFL587102R1311	6.380
		250...500	250...500	1 1	AF305-40-11-14	1SFL587102R1411	6.380
525	420	24...60	20...60	1 1	AF370-40-11-11	1SFL607102R1111	6.380
		48...130	48...130	1 1	AF370-40-11-12	1SFL607102R1211	6.380
		100...250	100...250	1 1	AF370-40-11-13	1SFL607102R1311	6.380
		250...500	250...500	1 1	AF370-40-11-14	1SFL607102R1411	6.380

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF190, AF205

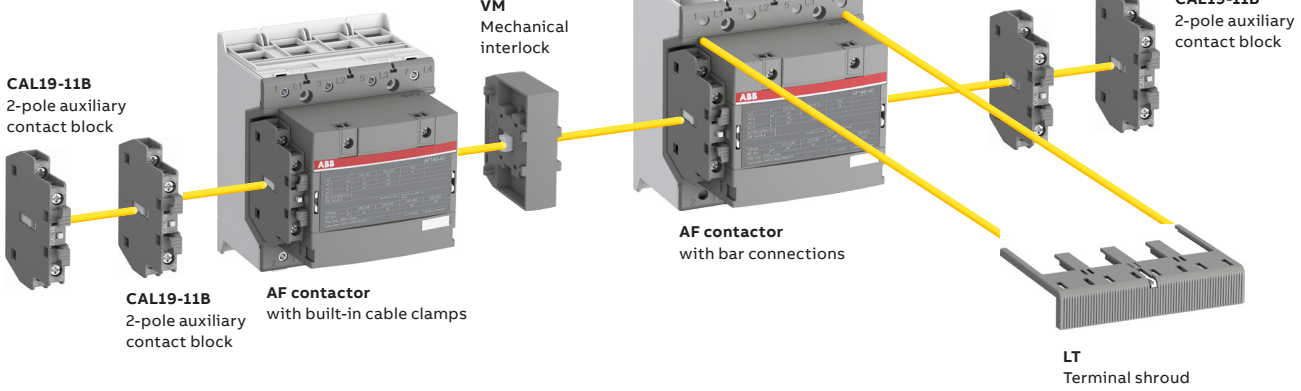


AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks		
			CAL19-11	**CAL19-11B**	Mechanical interlock units (between two contactors)
AF116 ... AF370	4 0	1 1	1 x CAL19-11	+ 2 x CAL19-11B	–
AF116 ... AF370	4 0	1 1	–	+ 2 x CAL19-11B (1)	+ VM... (2)

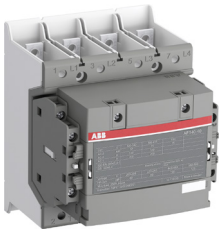
(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

AF140-40-22



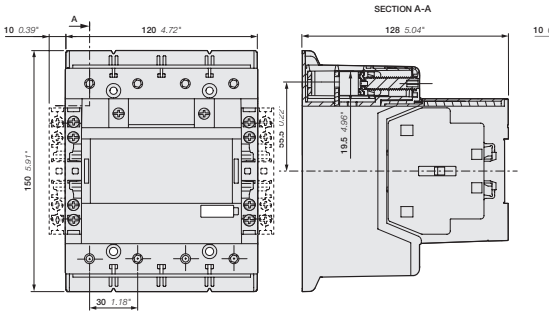
AF140-40-22B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

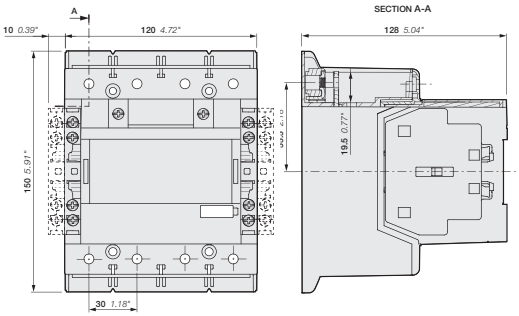
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
For connection with built-in cable clamps							
160	160	24...60	20...60	2 2	AF116-40-22-11	1SFL427101R1122	2.290
		48...130	48...130	2 2	AF116-40-22-12	1SFL427101R1222	2.290
		100...250	100...250	2 2	AF116-40-22-13	1SFL427101R1322	2.290
		250...500	250...500	2 2	AF116-40-22-14	1SFL427101R1422	2.290
200	175	24...60	20...60	2 2	AF140-40-22-11	1SFL447101R1122	2.290
		48...130	48...130	2 2	AF140-40-22-12	1SFL447101R1222	2.290
		100...250	100...250	2 2	AF140-40-22-13	1SFL447101R1322	2.290
		250...500	250...500	2 2	AF140-40-22-14	1SFL447101R1422	2.290
With bar connections							
160	160	24...60	20...60	2 2	AF116-40-22B-11	1SFL427102R1122	2.190
		48...130	48...130	2 2	AF116-40-22B-12	1SFL427102R1222	2.190
		100...250	100...250	2 2	AF116-40-22B-13	1SFL427102R1322	2.190
		250...500	250...500	2 2	AF116-40-22B-14	1SFL427102R1422	2.190
200	175	24...60	20...60	2 2	AF140-40-22B-11	1SFL447102R1122	2.190
		48...130	48...130	2 2	AF140-40-22B-12	1SFL447102R1222	2.190
		100...250	100...250	2 2	AF140-40-22B-13	1SFL447102R1322	2.190
		250...500	250...500	2 2	AF140-40-22B-14	1SFL447102R1422	2.190

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF116, AF140-40-11



AF116, AF140-40-11B

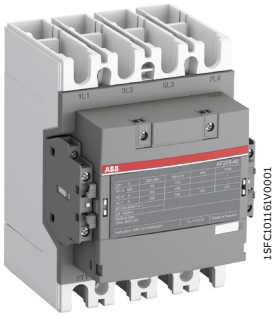
Main dimensions mm, inches

03

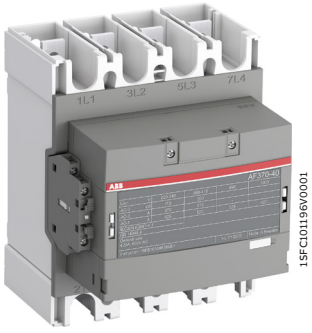
AF190 ... AF370 4-pole contactors

275 to 525 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF205-40-22



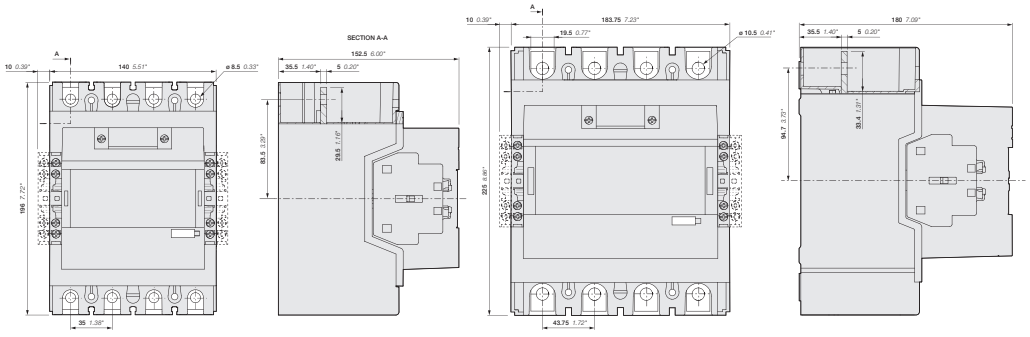
AF370-40-22

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc min. ... Uc max.		Auxiliary contacts fitted	Type (1)	Order code	Weight
Rated operational current ≤ 40 °C AC-1	General use rating 600 V AC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
4 N.O. main poles							
275	230	24...60	20...60	2 2	AF190-40-22-11	1SFL487102R1122	3.940
		48...130	48...130	2 2	AF190-40-22-12	1SFL487102R1222	3.940
		100...250	100...250	2 2	AF190-40-22-13	1SFL487102R1322	3.940
		250...500	250...500	2 2	AF190-40-22-14	1SFL487102R1422	3.940
350	250	24...60	20...60	2 2	AF205-40-22-11	1SFL527102R1122	3.940
		48...130	48...130	2 2	AF205-40-22-12	1SFL527102R1222	3.940
		100...250	100...250	2 2	AF205-40-22-13	1SFL527102R1322	3.940
		250...500	250...500	2 2	AF205-40-22-14	1SFL527102R1422	3.940
400	300	24...60	20...60	2 2	AF265-40-22-11	1SFL547102R1122	6.400
		48...130	48...130	2 2	AF265-40-22-12	1SFL547102R1222	6.400
		100...250	100...250	2 2	AF265-40-22-13	1SFL547102R1322	6.400
		250...500	250...500	2 2	AF265-40-22-14	1SFL547102R1422	6.400
500	350	24...60	20...60	2 2	AF305-40-22-11	1SFL587102R1122	6.400
		48...130	48...130	2 2	AF305-40-22-12	1SFL587102R1222	6.400
		100...250	100...250	2 2	AF305-40-22-13	1SFL587102R1322	6.400
		250...500	250...500	2 2	AF305-40-22-14	1SFL587102R1422	6.400
525	420	24...60	20...60	2 2	AF370-40-22-11	1SFL607102R1122	6.400
		48...130	48...130	2 2	AF370-40-22-12	1SFL607102R1222	6.400
		100...250	100...250	2 2	AF370-40-22-13	1SFL607102R1322	6.400
		250...500	250...500	2 2	AF370-40-22-14	1SFL607102R1422	6.400

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



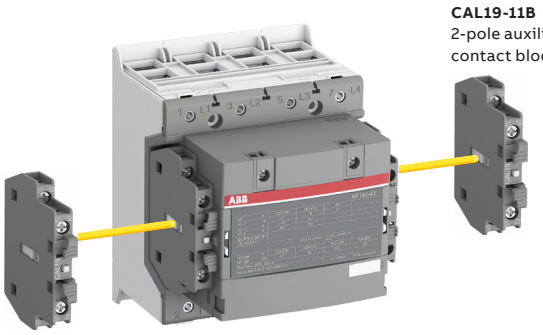
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



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

Contactor types	Main poles	Available auxiliary contacts	Side-mounted accessories Auxiliary contact blocks		
			CAL19-11 (1)	**CAL19-11B (1)**	Mechanical interlock units (between two contactors)
AF116 ... AF370	4 0	2 2	2 x CAL19-11 included	+ 2 x CAL19-11B	–

(1) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

EK550, EK1000 4-pole contactors

800 to 1000 A AC-1

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

EK1000-40-11

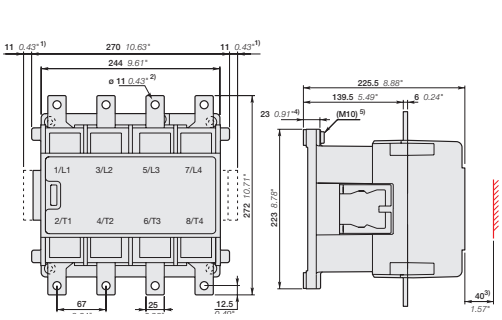
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

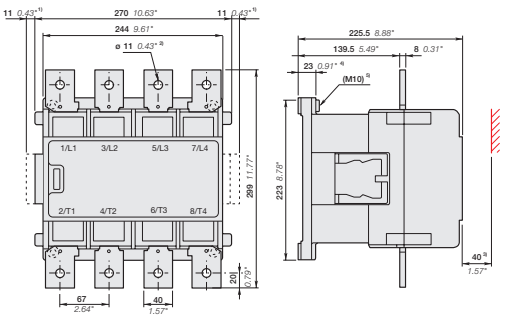
- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC **Rated operational current** **≤ 40 °C** **AC-1** A	UL/CSA **General use rating** **600 V AC** A	**Rated control circuit voltage Uc** (1) V 50 Hz	 V 60 Hz	**Auxiliary contacts fitted** 	**Type**	**Order code**	**Weight** **Pkg (1 pce)** kg
800	540	220	220...240	1 1	EK550-40-11	SK827041-EL	17.200
		220...230	230...255	1 1	EK550-40-11	SK827041-EM	17.200
		400...415	-	1 1	EK550-40-11	SK827041-AR	17.200
1000	-	220	220...240	1 1	EK1000-40-11	SK827044-EL	17.500
		220...230	230...255	1 1	EK1000-40-11	SK827044-EM	17.500
		400...415	-	1 1	EK1000-40-11	SK827044-AR	17.500

(1) Other control voltages see voltage code table.



EK550



EK1000

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

Main dimensions mm, inches

EK550, EK1000 4-pole contactors

800 to 1000 A AC-1

DC operated with 2 N.O. + 1 N.C. auxiliary contacts

1SFC98099-069

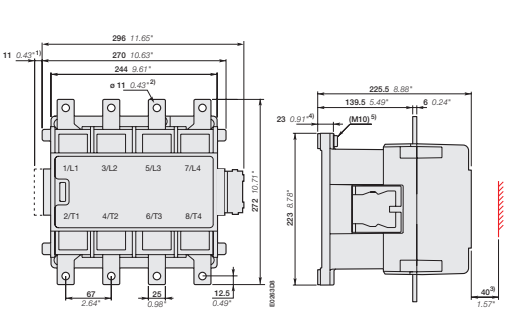
EK1000-40-21

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

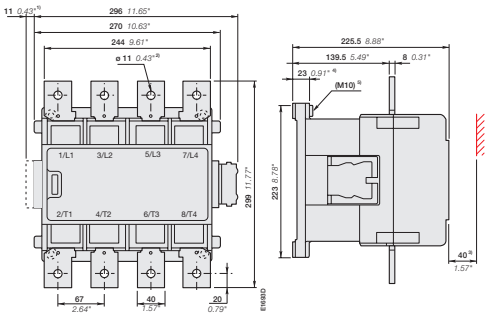
These contactors are of the block type design with:

- 4 main poles
- control circuit: DC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC Rated operational current ≤ 40 °C AC-1 A	UL / CSA General use rating 600 V AC A	Rated control circuit voltage Uc V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
800	540	48	2 1	EK550-40-21	SK827041-DD	17.200
		110	2 1	EK550-40-21	SK827041-DE	17.200
		125	2 1	EK550-40-21	SK827041-DU	17.200
		220	2 1	EK550-40-21	SK827041-DF	17.200
1000	-	36	2 1	EK1000-40-21	SK827044-DC	17.500
		48	2 1	EK1000-40-21	SK827044-DD	17.500
		60	2 1	EK1000-40-21	SK827044-DT	17.500
		110	2 1	EK1000-40-21	SK827044-DE	17.500
		125	2 1	EK1000-40-21	SK827044-DU	17.500
		220	2 1	EK1000-40-21	SK827044-DF	17.500



EK550



EK1000

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

EK550, EK1000 4-pole Contactors

800 to 1000 A AC-1

AC operated with 2 N.O. + 2 N.C. auxiliary contacts

EK1000-40-22

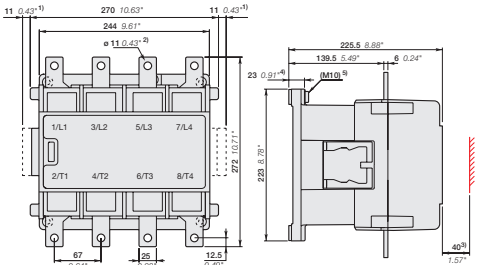
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

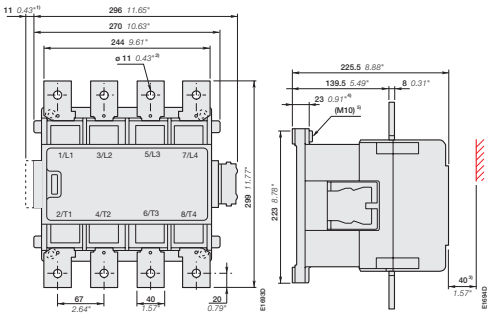
IEC **Rated operational current** **≤ 40 °C** **AC-1** A	UL/CSA **General use rating** **600 V AC** A	**Rated control circuit voltage Uc (1)** V 50 Hz	 V 60 Hz	**Auxiliary contacts fitted** 	**Type**	**Order code**	**Weight** **Pkg (1 pce)** kg
800	540	220	220...240	2 2	EK550-40-22	SK827043-EL	17.200
		220...230	230...255	2 2	EK550-40-22	SK827043-EM	17.200
		400...415	-	2 2	EK550-40-22	SK827043-AR	17.200
1000	-	220	220...240	2 2	EK1000-40-22	SK827045-EL	17.500
		220...230	230...255	2 2	EK1000-40-22	SK827045-EM	17.500
		380	380...415	2 2	EK1000-40-22	SK827045-EP	17.500
		380...400	400...440	2 2	EK1000-40-22	SK827045-ER	17.500
		400...415	-	2 2	EK1000-40-22	SK827045-AR	17.500

(1) Other control voltages see voltage code table.



EK550

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



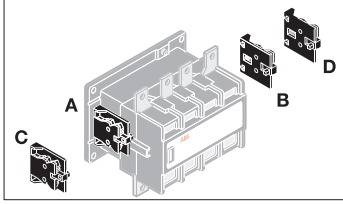
EK1000

Main dimensions mm, inches

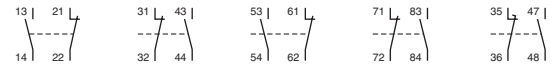
EK550, EK1000 4-pole contactors with 1 N.O. + 1 N.C. and 2 N.O. + 1 N.C. auxiliary contacts

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

Mounting positions of the auxiliary contact



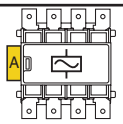
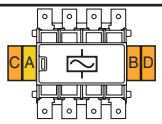
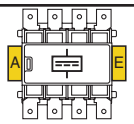
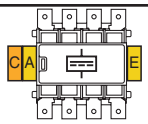
Auxiliary contact types and connecting diagrams



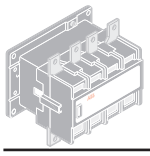
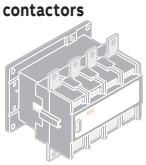
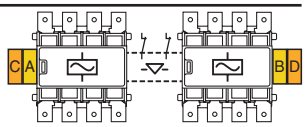
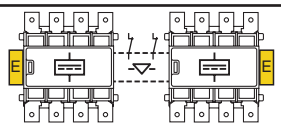
CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E (1)

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

EK 4-pole contactors

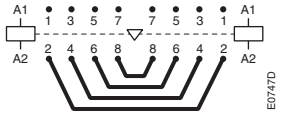
Contactor types	Main poles	Available auxiliary contacts			Add-on auxiliary contact blocks **2-pole CAL16-11 ...**	**Mounting and positioning** Factory mounted auxiliary contacts Add-on CAL16-11 auxiliary contacts
AC operated, 50 Hz, 60 Hz or 50/60 Hz						
EK550, EK1000	4 0	1 1		+	1 x CAL16-11B + 1 x CAL16-11C + 1 x CAL16-11D	
DC operated						
EK550, EK1000	4 0	2 1		+	1 x CAL16-11C	

EK 4-pole reversing contactors with VH800 mechanical and electrical interlock units

"Left hand" contactors	**Interlocking**	**"Right hand" contactors**		**Add-on auxiliary contact blocks** **2-pole CAL16-11 ...**	**Mounting and positioning** Factory mounted auxiliary contacts Add-on CAL16-11 auxiliary contacts
					
AC operated, 50 Hz, 60 Hz or 50/60 Hz					
EK550, EK1000	VH800	EK550, EK1000	+	1 x CAL16-11C 1 x CAL16-11D	
DC operated					
EK550, EK1000	VH800	EK550, EK1000		–	

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

and 2 N.O. + 1 N.C. auxiliary contacts



BSS550 ... BSS1000

RC-EH

For contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce)
						kg
Side-mounted auxiliary contact blocks						
EK	1	1	CAL16-11B	SK829002-B	1	0.050
	1	1	CAL16-11C	SK829002-C	1	0.050
	1	1	CAL16-11D	SK829002-D	1	0.050
	1	1	CCL16-11E (2)	SK829002-E	1	0.050
Mechanical interlock unit for two horizontal mounted contactors						
EK550, EK1000			VH800	SK829070-F	1	6.000
Connecting sets						
EK550			BSS550	SK829090-E	1	3.300
EK1000			BSS1000	SK829090-H	1	5.500

Surge suppressors

For contactors	Rated control circuit voltage Uc			Type	Order code	Pkg qty	Weight (1 pce)
	V	AC	DC				kg
EK550, EK1000	48...110	●	–	RC-EH800/110	SK829007-C	1	0.015
EK550, EK1000	24...125	–	●	RC-EH800/110	SK829007-C	1	0.015
EK550, EK1000	220...600	●	–	RC-EH800/600	SK829007-D	1	0.015

See "Main accessory fitting details" table.
(2) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

AF09 ... AF80 4-pole contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1						
Rated operational voltage Ue max.		1000 V						
Rated frequency (without derating)		50 / 60 Hz						
Conventional free-air thermal current Ith								
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		35 A	35 A	55 A	55 A	105 A	105 A	125 A
With conductor cross-sectional area		6 mm²	6 mm²	16 mm²	16 mm²	35 mm²	35 mm²	50 mm²
AC-1 Utilization category								
For air temperature close to contactor								
Ie / Rated operational current AC-1	θ ≤ 40 °C	25 A	30 A	45 A	55 A	70 A	100 A	125 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	25 A	30 A	40 A	45 A	60 A	80 A	105 A
	θ ≤ 70 °C	22 A	26 A	32 A	37 A	50 A	70 A	90 A
With conductor cross-sectional area		4 mm²	6 mm²	10 mm²	16 mm²	25 mm²	35 mm²	50 mm²
AC-3 Utilization category								
For air temperature close to contactor θ ≤ 60 °C								
Ie / Max. rated operational current AC-3 (1)								
3-phase motors	220-230-240 V	9 A	18 A	23.2 A	23.2 A	40 A	53 A	80 A
	380-400 V	9 A	18 A	22 A	22 A	40 A	53 A	80 A
	415 V	9 A	18 A	21.2 A	21.2 A	40 A	53 A	80 A
	440 V	9 A	18 A	20 A	20 A	40 A	53 A	80 A
	500 V	9.5 A	15 A	17.6 A	17.6 A	35 A	45 A	65 A
	690 V	7 A	10.5 A	10.5 A	10.5 A	25 A	35 A	49 A
	1000 V							25 A
Rated operational power AC-3 (1)								
1500 r.p.m. 50 Hz	220-230-240 V	2.2 kW	4 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	11 kW (3)	11 kW (3)	18.5 kW	22 kW	37 kW
3-phase motors	415 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	440 V	4 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	500 V	5.5 kW	9 kW	11 kW	11 kW	22 kW	30 kW	45 kW
	690 V	5.5 kW	9 kW	9 kW	9 kW	22 kW	30 kW	45 kW
	1000 V							35 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1						
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1						
Short-circuit protection device for contactors								
Without thermal overload relay - Motor protection excluded								
Ue ≤ 500 V AC - gG type fuse		25 A	32 A	50 A	63 A	80 A	110 A	160 A
Rated short-time withstand current Icw	1 s	300 A	300 A	450 A	450 A	1000 A	1000 A	1200 A
At 40 °C ambient temperature,	10 s	150 A	150 A	300 A	300 A	600 A	600 A	780 A
in free air from a cold state	30 s	80 A	80 A	225 A	225 A	350 A	350 A	450 A
	1 min	60 A	60 A	150 A	150 A	250 A	250 A	300 A
	15 min	35 A	35 A	55 A	55 A	110 A	110 A	140 A
Maximum breaking capacity N.O. main pole	at 440 V	250 A	250 A	-	-	950 A	950 A	1100 A
cos ϕ = 0.45	at 690 V	106 A	106 A	-	-	600 A	600 A	750 A
N.C. Main pole	at 440 V	-	-	-	-	600 A	-	900 A
	at 690 V	-	-	-	-	300 A	-	750 A
Power dissipation per pole	Ie / AC-1	0.8 W	1.2 W	1.6 W	2.3 W	3 W	6.3 W	8 W
	Ie / AC-3	0.1 W	0.35 W	0.42 W	0.42 W	1 W	1.7 W	3.2 W
Max. electrical switching frequency	AC-1	600 cycles/h						

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

AF116 ... EK1000 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1								
Rated operational voltage Ue max.		690 V		1000 V						
Rated frequency (without derating)		50 / 60 Hz								
Conventional free-air thermal current Ith										
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		160 A	200 A	275 A	350 A	400 A	500 A	525 A	800 A	1000 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2x 185 mm² (4)	2x 240 mm²	2x 300 mm²
AC-1 Utilization category										
For air temperature close to contactor										
Ie / Rated operational current AC-1	θ ≤ 40 °C	160 A	200 A	275 A	350 A	400 A	500 A	525 A	800 A	1000 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	145 A	175 A	250 A	300 A	350 A	400 A	425 A	650 A	800 A
	θ ≤ 70 °C	130 A	160 A	200 A	240 A	290 A	325 A	350 A	575 A	720 A
Ue max. ≤ 1000 V, 50/60 Hz	θ ≤ 40 °C	-	-	250 A	275 A	350 A	375 A	400 A	800 A	1000 A
	θ ≤ 60 °C (2)	-	-	225 A	250 A	300 A	325 A	350 A	650 A	800 A
	θ ≤ 70 °C	-	-	185 A	200 A	240 A	260 A	290 A	575 A	720 A
With conductor cross-sectional area		70 mm²	95 mm²	150 mm²	240 mm² (3)	240 mm²	300 mm² (4)	2x 185 mm² (4)	2x 240 mm²	2x 300 mm²
AC-3 Utilization category										
For air temperature close to contactor θ ≤ 60 °C (2)										
Ie / Max. rated operational current AC-3 (1)										
3-phase motors	220-230-240 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	380-400 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	415 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	440 V	116 A	140 A	190 A	205 A	265 A	305 A	370 A	550 A	-
	500 V	-	-	-	-	-	-	-	550 A	-
	690 V	-	-	-	-	-	-	-	550 A	-
	1000 V	-	-	-	-	-	-	-	175 A	-
Rated operational power AC-3 (1)										
1500 r.p.m. 50 Hz	220-230-240 V	30 kW	37 kW	55 kW	55 kW	75 kW	90 kW	110 kW	160 kW	-
1800 r.p.m. 60 Hz	380-400 V	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW	280 kW	-
3-phase motors	415 V	55 kW	75 kW	90 kW	110 kW	132 kW	160 kW	200 kW	315 kW	-
	440 V	75 kW	90 kW	110 kW	132 kW	160 kW	160 kW	200 kW	315 kW	-
	500 V	-	-	-	-	-	-	-	400 kW	-
	690 V	-	-	-	-	-	-	-	500 kW	-
	1000 V	-	-	-	-	-	-	-	250 kW	-
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1								
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1								
Short-circuit protection device for contactors										
Without thermal overload relay - Motor protection excluded										
Ue ≤ 500 V AC - gG type fuse		200 A	250 A	355 A	400 A	630 A	630 A	630 A	800 A	1000 A
Rated short-time withstand current Icw	1 s	1300 A	1460 A	1900 A	2050 A	2650 A	3050 A	3700 A	5500 A	6800 A
At 40 °C ambient temperature,	10 s	928 A	1168 A	1520 A	1640 A	2120 A	2440 A	2960 A	5300 A	6400 A
in free air from a cold state	30 s	536 A	674 A	878 A	947 A	1224 A	1409 A	1709 A	3700 A	4400 A
	1 min	379 A	477 A	621 A	670 A	865 A	996 A	1208 A	3000 A	3400 A
	15 min	160 A	200 A	275 A	350 A	400 A	500 A	525 A	1000 A	1200 A
Maximum breaking capacity	at 440 V	2000 A	3000 A	3300 A	3500 A	3800 A	4600 A	5000 A	5400 A	-
cos ϕ = 0.45	at 690 V	-	-	-	-	-	-	-	5400 A	-
Power dissipation per pole	Ie / AC-1	12 W	18 W	15 W	25 W	32 W	50 W	72 W	60 W	80 W
	Ie / AC-3	-	-	-	-	-	-	-	25 W	-
Max. electrical switching frequency	AC-1	300 cycles/h								
	AC-3	300 cycles/h								-
	AC-2, AC4	-							120 cycles/h	-

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) θ ≤ 55 °C for EK550, EK1000
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

AF09 ... AF80 4-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Standards		UL 508, CSA C22.2 N°14				UL 60947-4-1, CSA-C22.2 No. 60947-4-1		
Max. operational voltage		600 V						
UL / CSA general use rating								
	600 V AC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 8	AWG 6	AWG 6	AWG 4	AWG 2
1 pole	80 V DC	25 A (1)	30 A (1)	45 A	55 A	60 A	80 A	105 A
2 poles in serie	160 V DC	25 A (1)	30 A (1)	45 A	55 A	60 A	80 A	105 A
3 poles in serie	240 V DC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
4 poles in serie	320 V DC	25 A	30 A	45 A	55 A	60 A	80 A	105 A
With conductor cross-sectional area		AWG 10	AWG 10	AWG 8	AWG 8	AWG 6	AWG 4	AWG 2
Max. electrical switching frequency								
For general use		600 cycles/h						

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".
(1) 20 A for AF09..-22-00 and AF16..-22-00.

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

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Lighting application - UL / CSA - breaking all lines								
Electrical discharge lamps (ballast)								
1-phase per pole	347 V AC	20 A	30 A	45 A	50 A	-	-	-
3-phase break all lines	600 V AC	20 A	30 A	45 A	50 A	-	-	-
Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1								
1-phase								
Horse power rating	110-120 V AC	-	1/2 hp	-	-	-	-	-
	220-240 V AC	-	1-1/2 hp	-	-	-	-	-
3-phase								
Horse power rating	200-208 V AC	-	3 hp	-	-	-	-	-
	220-240 V AC	-	3 hp	-	-	-	-	-
	440-480 V AC	-	7-1/2 hp	-	-	-	-	-
	550-600 V AC	-	10 hp	-	-	-	-	-

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

AF116 ... EK1000 4-pole contactors
Technical data

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

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Standards		UL 60947-4-1							UL 508, CSA C22.2 N°14	
Max. operational voltage		600 V								
UL / CSA general use rating										
600 V AC		160 A	175 A	230 A	250 A	300 A	350 A	420 A	540 A	-
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300	-	-
1 pole	90 V DC	200 A	200 A	-	-	-	-	-	-	-
	100 V DC	-	-	250 A	350 A	-	-	-	-	-
	110 V DC	-	-	-	-	400 A	500 A	520 A	-	-
2 poles in serie	175 V DC	200 A	200 A	-	-	-	-	-	-	-
	200 V DC	-	-	250 A	350 A	-	-	-	-	-
	225 V DC	-	-	-	-	400 A	500 A	520 A	-	-
3 poles in serie	260 V DC	200 A	200 A	-	-	-	-	-	-	-
	300 V DC	-	-	250 A	350 A	-	-	-	-	-
	340 V DC	-	-	-	-	400 A	500 A	520 A	-	-
4 poles in series	350 V DC	200 A	200 A	-	-	-	-	-	-	-
	400 V DC	-	-	250 A	350 A	-	-	-	-	-
	450 V DC	-	-	-	-	400 A	500 A	520 A	-	-
With conductor cross-sectional area		AWG 2/0	AWG 3/0	MCM 250	MCM 250	MCM 400	MCM 500	2//MCM 300	-	-
Max. electrical switching frequency										
For general use		300 cycles/h								

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

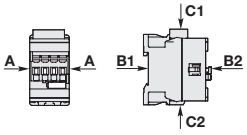
Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370	EK550	EK1000
Lighting application - UL/CSA - breaking all lines										
Electrical discharge lamps (ballast)										
1-phase per pole	347 V AC	160 A	200 A	250 A	300 A	400 A	450 A	520 A	-	-
3-phase break all lines	600 V AC	160 A	200 A	250 A	300 A	400 A	450 A	520 A	-	-

AF09 ... AF80 4-pole contactors

Technical data

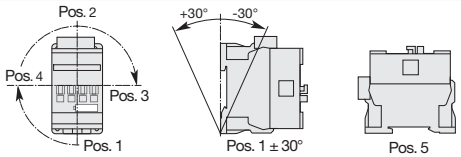
General technical data

Contactor types	AC / DC operated		AF09	AF16	AF26	AF38	AF40	AF52	AF80
Rated insulation voltage Ui									
acc. to IEC 60947-4-1			690 V						1000 V
acc. to UL / CSA			600 V						
Rated impulse withstand voltage Uimp.			6 kV						8 kV
Electromagnetic compatibility			Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)						
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 operating cycles						
Max. switching frequency			3600 cycles/h						
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1									
		Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position						
	4 N.O. Main poles	A	30 g				20 g		
		B1	25 g Closed position / 5 g Open position				20 g Closed position / 5 g Open position		
		B2	15 g				10 g		
		C1	25 g				20 g		
		C2	25 g				20 g		
	2 N.O. + 2 N.C. Main poles	A	30 g		30 g Closed position / 25 g Open position		20 g		
		B1	25 g Closed position / 5 g Open position		25 g Closed position / 5 g Open position		20 g Closed position / 5 g Open position		20 g Closed position / 4 g Open position
		B2	15 g		15 g Closed position / 10 g Open position		10 g		
		C1	25 g		25 g Closed position / 20 g Open position		20 g		
		C2	25 g		25 g Closed position / 20 g Open position		20 g		
Vibration withstand 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		

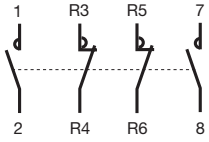


(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013.
AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B select AF09Z ... AF38Z-..-..-22.

Mounting characteristics and conditions for use

Contactor types	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Mounting positions	 Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF80						
Mounting distances	The contactors can be assembled side by side						
Fixing							
On rail according to IEC 60715, EN 60715	35 x 7.5 mm or 35 x 15 mm				35 x 15 mm		
By screws (not supplied)	2 x M4 screws placed diagonally				2 x M4 or 2 x M6 screws placed diagonally		

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

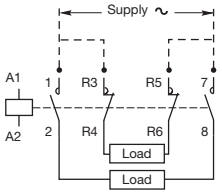


These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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

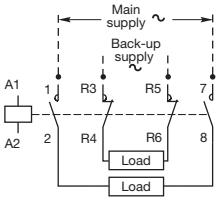
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

- Single supply and 2 separate loads

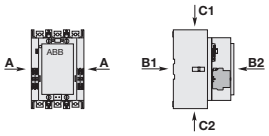


- 2 separate supplies and 2 separate loads

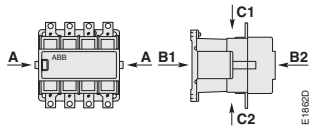


AF116 ... EK1000 4-pole contactors
Technical data

General technical data

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL / CSA		600 V						
Rated impulse withstand voltage Uimp.		8 kV						
Electromagnetic compatibility		AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A						
Pollution degree		3						
Ambient air temperature close to contactor								
Operation		-40 to +70 °C						
Storage		-40 to +70 °C						
Climatic withstand		Category B according to IEC 60947-1 Annex Q						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 million operating cycles						
Maximum switching frequency		300 cycles/h						
Shock withstand								
acc. to IEC 60068-2-27 and EN 60068-2-27								
Mounting position 1		No change in contact position, closed or open position						
	Shock direction	1/2 sinusoidal shock for 11 ms			1/2 sinusoidal shock for 30 ms			
	A	20 g			20 g			
	B1	15 g closed position / 3 g open position			15 g closed position / 3 g open position			
	B2	15 g closed position / 3 g open position			15 g closed position / 3 g open position			
	C1	20 g			20 g			
	C2	20 g			20 g			
Vibration withstand								
acc to IEC 60068-2-6		0.7 g closed position / 0.7 g open position 13.2...100 Hz						

General technical data

Contactor types		AC or DC operated	EK550	EK1000
Rated insulation voltage Ui				
acc. to IEC 60947-4-1			1000 V	
acc. to UL			600 V	
Rated impulse withstand voltage Uimp.			8 kV	
Electromagnetic compatibility			EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A	
Ambient air temperature close to contactor				
Operation	Fitted with thermal overload relay		-25 to +55 °C	-
	Without thermal overload relay		-40 to +70 °C	-
Storage			-50 to +70 °C	-
Climatic withstand			Category B acc. to IEC 60068-2-30	
Maximum operating altitude (without derating)			≤ 3000 m	
Mechanical durability				
Number of operating cycles			5 millions operating cycles	3 millions operating cycles
Max. switching frequency			60 cycles/h	
Shock withstand				
acc. to IEC 60068-2-27 and EN 60068-2-27				
Mounting position 1				
Closed or open position				
		Shock direction	1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position	
		A	10 g	
		B1	10 g	
		B2	10 g	
		C1	10 g	
		C2	10 g	

AF09 ... AF80 4-pole contactors
Technical data

Magnet system characteristics AF09 ... AF80 AC / DC operated

Contactor types	AC / DC operated	AF09	AF16	AF26	AF38	AF40	AF52	AF80
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.				at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max		
	DC supply	at θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max at θ ≤ 70 °C 0.85 x Uc min ... Uc max				at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max		
AC control voltage 50/60 Hz								
Rated control circuit voltage Uc		24...500 V AC						
Coil consumption	Average pull-in value	50 VA				40 VA		
	Average holding value	2.2 VA / 2 W				4 VA / 2 W		
DC control voltage								
Rated control circuit voltage Uc		20...500 V DC				20...500 V DC		
Coil consumption	Average pull-in value	50 W				40 W		
	Average holding value	2 W				2 W		
PLC-output control		AF...-11 not suitable for direct control by PLC-output.				-		
Drop-out voltage		≤ 60 % of Uc min.				≤ 60 % of Uc min.		
Voltage sag immunity acc. to SEMI F47-0706		–				conditions of use on request		
Dips withstand -20 °C ≤ θ ≤ +60 °C		–				20 ms average		
Operating time								
Between coil energization and:	N.O. contact closing	40...95 ms				48...120 ms		
	N.C. contact opening	38...90 ms				44...115 ms		
Between coil de-energization and:	N.O. contact opening	11...95 ms				16...110 ms		
	N.C. contact closing	13...98 ms				18...113 ms		

Magnet System Characteristics AF09Z...AF38Z 24V DC operated designed for PLC - coil 30

Contactor types	DC operated	AF09Z	AF16Z
Coil operating limits acc. to IEC 60947-4-1	DC supply	at θ ≤ 60 °C 0.85 ... 1.1x Uc at θ ≤ 70 °C Uc	
DC control voltage			
Rated control circuit voltage Uc		24 V DC	
Coil consumption	Average pull-in value	6 W	
	Average holding value	1.7 W	
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection	
Drop-out voltage		≤ 60 % of Uc min.	
Voltage sag immunity acc. to SEMI F47-0706		-	
Dips withstand -20 °C ≤ θ ≤ +60 °C		-	
Operating time			
Between coil energization and:	N.O. contact closing	27 ... 53 ms	
	N.C. contact opening	20 ... 35 ms	
Between coil de-energization and:	N.O. contact opening	17 ... 29 ms	
	N.C. contact closing	22 ... 57 ms	

Magnet System Characteristics AF09Z...AF38Z AC / DC operated for specific applications - coils 20, 21, 22, 23

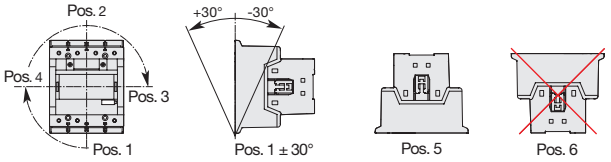
Contactor types	AC / DC operated	AF09Z	AF16Z	AF26Z	AF38Z
Coil operating limits acc. to IEC 60947-4-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.			
	DC supply	at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max			
AC control voltage 50/60 Hz					
Rated control circuit voltage Uc		24...250 V AC			
Coil consumption	Average pull-in value	16 VA			
	Average holding value	1.7 VA / 1.5 W			
DC control voltage					
Rated control circuit voltage Uc		12...250 V DC			
Coil consumption	Average pull-in value	12 ... 16 W			
	Average holding value	1.7 W			
PLC-output control		(AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs			
Drop-out voltage		≤ 60 % of Uc min.			
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z coil 21, 22, 23) conditions of use on request			
Dips withstand -20 °C ≤ θ ≤ +60 °C		(AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC			
Operating time					
Between coil energization and:	N.O. contact closing	40...95 ms			
	N.C. contact opening	38...90 ms			
Between coil de-energization and:	N.O. contact opening	11...95 ms			
	N.C. contact closing	13...98 ms			

AF116 ... AF370 4-pole contactors
Technical data

Magnet system characteristics

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Coil operating limits	AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max						
acc. to IEC 60947-4-1	DC supply	At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max						
Rated control circuit voltage Uc		24...500 V AC, 20...500 V DC						
Coil consumption								
AC control voltage 50/60 Hz								
24...60 V AC	Average pull-in value	225 VA		165 VA		475 VA		
	Average holding value	5.5 VA / 2.5 W		5 VA / 3 W		9 VA / 3 W		
48...130 V AC	Average pull-in value	180 VA		180 VA		340 VA		
	Average holding value	6 VA / 2 W		6 VA / 2 W		17 VA / 3 W		
100...250 V AC	Average pull-in value	130 VA		220 VA		385 VA		
	Average holding value	8 VA / 2.5 W		8 VA / 2.5 W		20 VA / 4.5 W		
250...500 V AC	Average pull-in value	260 VA		260 VA		550 VA		
	Average holding value	18 VA / 4 W		18 VA / 4 W		27 VA / 4.5 W		
DC control voltage								
20...60 V DC	Average pull-in value	210 W		205 W		400 W		
	Average holding value	2.5 W		2.5 W		3.5 W		
48...130 V DC	Average pull-in value	150 W		150 W		360 W		
	Average holding value	2.5 W		2.5 W		2.5 W		
100...250 V DC	Average pull-in value	135 W		190 W		410 W		
	Average holding value	3 W		2.5 W		4.5 W		
250...500 V DC	Average pull-in value	230 W		230 W		650 W		
	Average holding value	4 W		4 W		4.7 W		
Drop-out voltage		55 % of Uc min						
Voltage sag immunity acc. to SEMI F47		Conditions of use on request						
Dips withstand		20 ms						
Operating time Coil supply between A1 - A2								
Between coil energization and:	N.O. contact closing	20...55 ms		25...60 ms		30...60 ms		
Between coil de-energization and:	N.O. contact opening	40..70 ms		45...80 ms		45...80 ms		

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Mounting positions		 Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF116 ... AF370						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail acc. to IEC 60715, EN 60715		-						
By screws		4 x M4		4 x M5				

EK550 ... EK1000 4-pole contactors

Technical data

Magnet system characteristics

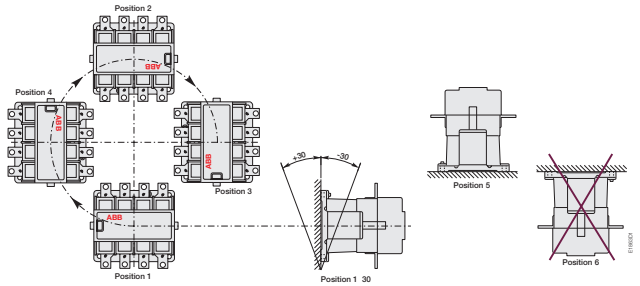
Contactor types		AC operated	EK550	EK1000
Coil operating limits		AC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.	
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"	
AC control voltage				
Rated control circuit voltage		50 Hz	48...500 V	
		60 Hz	110...600 V	
Coil consumption	Average pull-in value	50 Hz	3500 VA	
		60 Hz	4000 VA	
	50/60 Hz (1)		3800 / 3400 VA	
	Average holding value	50 Hz	125 VA / 50 W	
		60 Hz	140 VA / 60 W	
	50/60 Hz (1)		140 VA /60 W	
Drop-out voltage in % of Uc min.			approx. 45...65 %	
Operating time				
Between coil energization and:		N.O. contact closing	30...60 ms	
		N.C. contact opening	25...55 ms	
Between coil de-energization and:		N.O. contact opening	10...20 ms	
		N.C. contact closing	13...23 ms	

(1) "A" coil voltage: see "Coil voltage code table".

Magnet system characteristics

Contactor types		DC operated	EK550	EK1000
Coil operating limits		DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.	
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"	
DC control voltage				
Rated control circuit voltage			24...220 V	
Coil consumption		Average pull-in value	1100 W	
		Average holding value	20 W	
Drop-out voltage			approx. 15...50 % of Uc min.	
Coil time constant				
Open		L/R	12 ms	
Closed		L/R	60 ms	
Operating time				
Between coil energization and:		N.O. contact closing	60...80 ms	
		N.C. contact opening	55...75 ms	
Between coil de-energization and:		N.O. contact opening	10...35 ms	
		N.C. contact closing	13...38 ms	

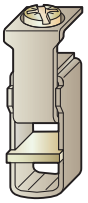
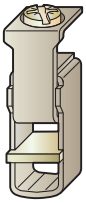
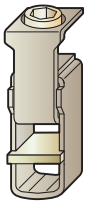
Mounting characteristics and conditions for use

Contactor types		AC / DC operated	EK550	EK1000
Mounting positions			 Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK550, EK1000	
Control voltage / Ambient temperature				
Mounting positions	1, 1±30°, 2, 3, 4, 5	at θ ≤ 70 °C	0.85...1.1 x Uc	
	6	at θ ≤ 70 °C	Unauthorized	
Mounting distances			The contactors can be assembled side by side	
Fixing				
On rail according to IEC 60715, EN 60715			–	
By screws			4 x M6 (2)	

(2) Damping elements are supplied.

AF09 ... AF80 4-pole contactors
Technical data

Connecting characteristics

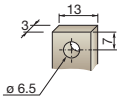
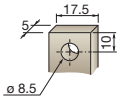
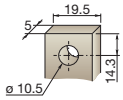
Contactor types			AF09	AF16	AF26	AF38	AF40	AF52	AF80
Main terminals			Screw terminals with cable clamp		 Screw terminals with double connector 2 x (5.5 width x 6.8 depth)		 Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)		 Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)
Connection capacity (min. ... max.)									
Main conductors (poles)									
Rigid	Solid (≤ 4 mm²)	1 x	1...6 mm²		1.5...16 mm²		6...35 mm²		6...70 mm²
	Stranded (≥ 1 mm²)	2 x	1...6 mm²		1.5...16 mm²		6...35 mm²		6...50 mm²
Flexible with non insulated ferrule		1 x	0.75...6 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
		2 x	0.75...6 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
Flexible with insulated ferrule		1 x	0.75...4 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
		2 x	0.75...2.5 mm²		1.5...16 mm²		4...35 mm²		6...50 mm²
L 6 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/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						
L 6 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						

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

AF116 ... AF370 4-pole contactors

Technical data

Connecting characteristics

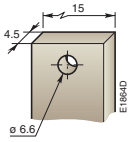
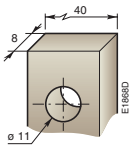
Contactor types	AC / DC operated	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Main terminals Flat type								
Connection capacity (min. ... max.)								
Main conductors (poles)								
Cu cable - Stranded	1 x	10...95 mm²		6...150 mm²		16...300 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Stranded	2 x	10...95 mm²		50...120 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Al cable - Stranded	1 x	–		95...185 mm²		185...240 mm²		
Clamp type		–		1SDA054988R1		1SDA055020R1		
Tightening torque		–		31 Nm		43 Nm		
Cu cable - Flexible	1 x	10...70 mm²		6...120 mm²		16...240 mm²		
Clamp type		LD... included (1)		1SDA066917R1		1SDA055016R1		
Tightening torque		8 Nm		14 Nm		25 Nm		
Cu cable - Flexible	2 x	10...70 mm²		50...95 mm²		70...185 mm²		
Clamp type		LD... included (1)		1SFN074709R1000, LZ185-2C/120		1SCA022194R0890, OZXB4		
Tightening torque		8 Nm		16 Nm		22 Nm		
Lugs	L ≤	22 mm (.866 in)		24 mm (.945 in)		32 mm (1.260 in)		
	Ø >	6 mm (.236 in)		8 mm (.315 in)		10 mm (.394 in)		
Socket type		LL... included		LL... included		LL... included		
Tightening torque		9 Nm / 80 lb.in		18 Nm / 160 lb.in		28 Nm / 248 lb.in		
Connection capacity acc. to UL / CSA	1 x	AWG 6...3/0		6...300 MCM		4...400 MCM		
Clamp type		LD... included (1)		ATK185 (2)		ATK300 (2)		
Tightening torque		8 Nm / 71 lb.in		34 Nm / 301 lb.in		42 Nm / 372 lb.in		
Connection capacity acc. to UL / CSA	2 x	AWG 6...3/0		–		4...500 MCM		
Clamp type		LD... included (1)		–		ATK300/2 (2)		
Tightening torque		8 Nm / 71 lb.in		–		42 Nm / 372 lb.in		
Auxiliary conductors (coil terminals)								
Rigid Solid/Stranded	1 x	1...4 mm²						
	2 x	1...4 mm²						
Flexible	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Flexible with insulated ferrule	1 x	0.75...2.5 mm²						
	2 x	0.75...2.5 mm²						
Lugs	L <	8 mm						
	I >	3.5 mm						
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14						
Stripping length		9 mm						
Tightening torque		1.00 Nm / 9 lb.in						
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals		IP00						
Coil terminals		IP20						
Screw terminals								
Main terminals		M6		M8		M10		
Screwdriver type		Screws and bolts						
Coil terminals (delivered in open position)		M3.5						
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2						

(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

EK550 ... EK1000 4-pole contactors

Technical data

Connecting characteristics

Contactor types				**EK550**	**EK1000**
		AC or DC operated			
Main terminals Flat type					
Connection capacity (min. ... max.)					
Main conductors (poles)					
Rigid with connector		Cu cable	1 x	70...300 mm²	-
		Al/Cu cable	1 x	70...300 mm²	95...300 mm²
		Al/Cu cable	2 x	35...185 mm²	95...300 mm²
Bars or lugs			L ≤	55 mm	
			Ø >	10 mm	
Connection capacity acc. to UL/CSA			1 or 2 x	3 x 4 - 500 MCM	-
Tightening torque		Recommended		18 Nm / 160 lb.in	
		Max.		22 Nm	
Auxiliary conductors (coil terminals)					
Rigid Solid/Stranded			1 x	0.5...2.5 mm²	
			2 x	0.5...2.5 mm²	
Flexible with ferrule			1 x	0.5...2.5 mm²	
			2 x	0.5...2.5 mm²	
Bars or lugs			L ≤	8 mm	
			I >	3.7 mm	
Connection capacity acc. to UL/CSA			1 or 2 x	18...14 AWG	
Tightening torque		Recommended		1.00 Nm / 9 lb.in	
		Max.		1.20 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals				IP00	
Coil terminals				IP20	
Screw terminals					
Main terminals				M10	
				Screws and bolts	
Coil terminals (delivered in open positions)				M3.5	
		Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2	

4-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1: Ic = Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability curves:

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

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1

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

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

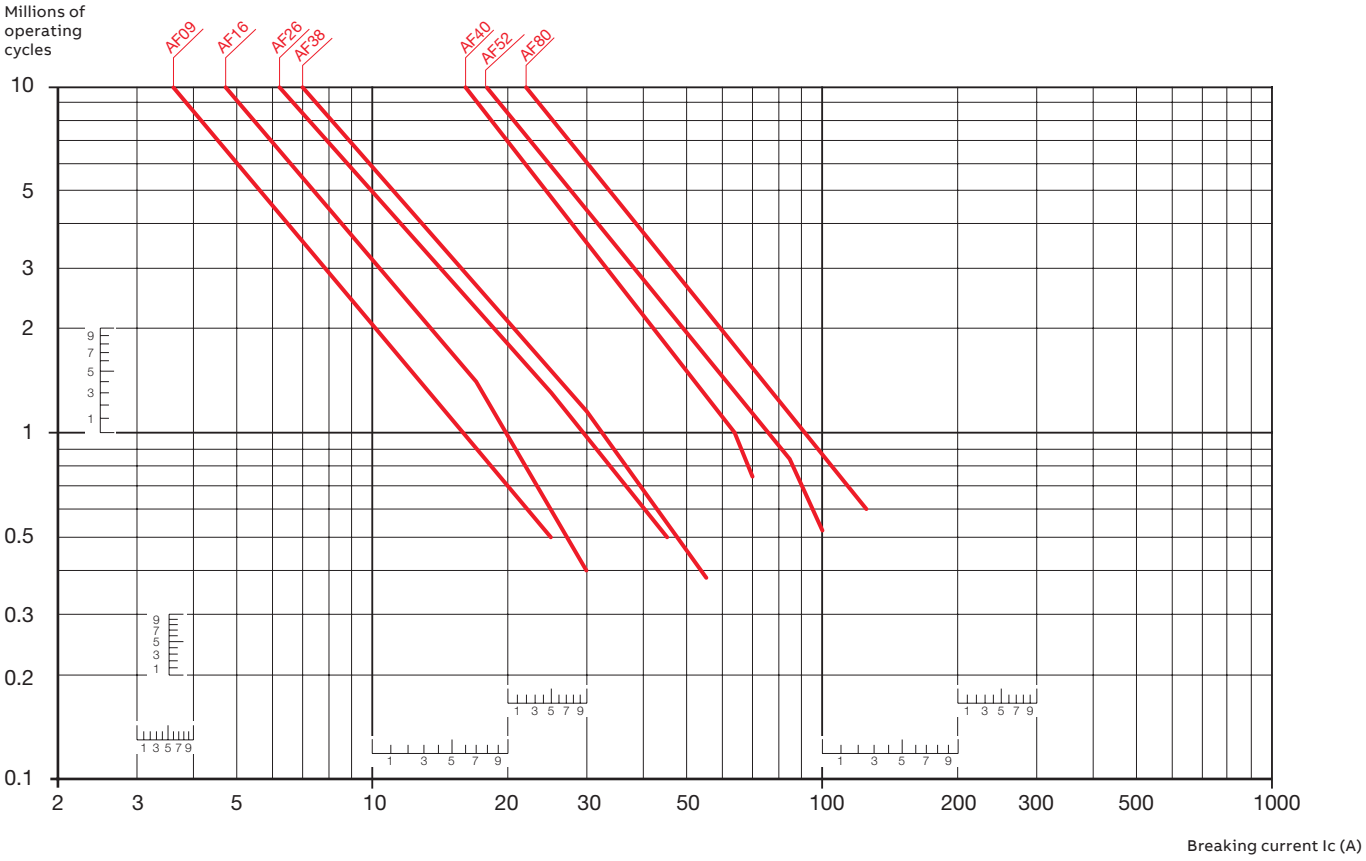
The combined effect of environmental conditions and the proper temperature of the product may require some disposals.

As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

4-pole contactors
Electrical durability

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

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



Notes

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

www.abb.com/productdetails/**1SBL137001R1310**

Contactors for DC switching

GF contactors

3/217 **Overview**

ordering details

3/220 GF875 ... GF1325 AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

3/221 **Technical data**

GA, GAF contactors

3/226 **overview**

3/228 Contactors for DC switching applications

3/229 Connection diagrams

Ordering details

100 A DC-1

3/234 GA75 AC operated

3/235 GAE75 DC operated

250 to 400 A DC-1

3/236 GAF185 ... GAF300 AC / DC operated with 1 N.O. + 1 N.C.

600 to 875 A DC-1

3/237 GAF460 ... GAF750 AC / DC operated with 1 N.O. + 1 N.C.

1040 to 1750 A DC-1

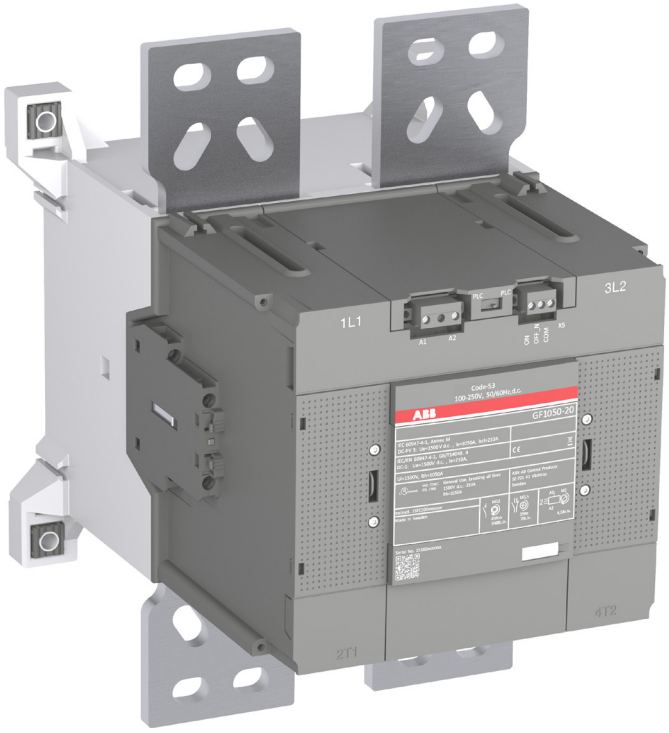
3/238 GAF1250 ... GAF2050 AC / DC operated with 1 N.O. + 1 N.C.

3/239 **Technical data**

3/466 **Voltage code table**

GF contactors for DC switching

The compact and efficient way of DC switching



The renewable energy industry is continuously striving towards increasing its efficiency in order to compete with traditional power sources. Photovoltaic (PV) solar power is one of the sources leading the way. In moving from 1000 V DC to 1500 V DC, costs of utility-scale power plants are greatly reduced.

The GF range of contactors expands ABB's current AF and GAF PV solar product offering by adding contactor switching capabilities for 1500 V DC.

Energy Efficiency

GF contactors offer tailored solutions to enable remote, automatic and energy efficient switching of 1500 V DC circuits in central PV inverter optimization.
The GF contactors are built with ABB's standard low energy electronic coils for safe and controlled operation.

Continuous operation

The GF contactor features AF technology with continuous voltage and current control during the contactors operation. This ensures distinct, safe and energy efficient operations even in unstable networks. Voltage sags, dips or surges pose no threat. The GF contactor secures application uptime.

Speed up your projects

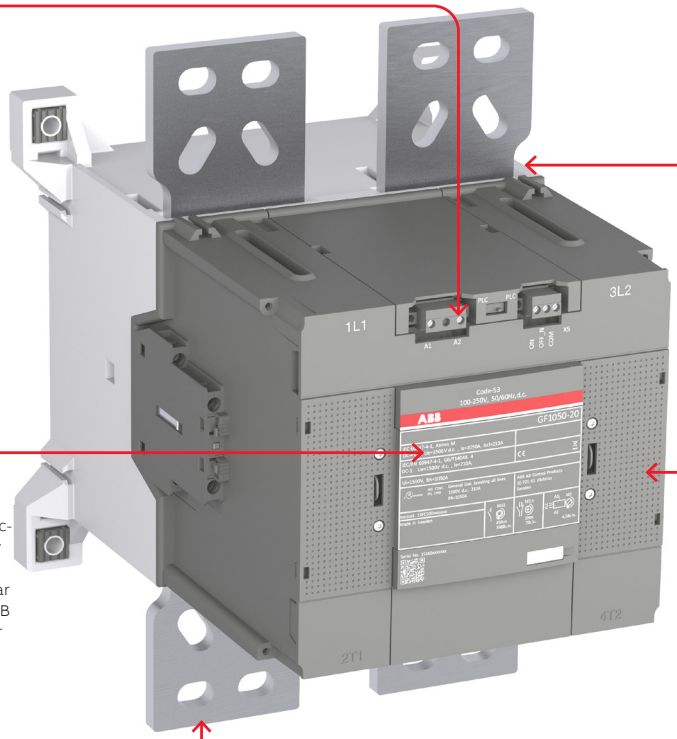
ABB's GF contactor complies with all major international standards.
It features AC/DC controlled wide voltage range coils together with easily accessible coil terminals to make easier and quicker product selection and installation.

GF contactor range

The compact and efficient way of DC switching

Easy installation

GF contactors are designed for easy installation. Coil terminals and PLC control terminals are easily identified and accessed from the front of the contactor.



AF technology

GF contactors feature AF technology that ensures controlled, distinct and energy efficient operation of the contactor.
Only two coils to cover
24 ... 60 V AC / DC
and 100 ... 250 V AC / DC.

New IEC rating

DC-PV3 and DC-PV4 are two new contactor utilization categories introduced by IEC in 2018.
Both are specifically tailored for PV solar applications. As a technical pioneer, ABB offers the GF contactor as the first ever DC-PV3 rated contactor.

Bidirectional design

The GF's two pole bidirectional design allows it to break both plus and minus, through the entire current range.
Each pole is rated for 750 V DC.

Up to 1325 A 1500 V DC-PV3

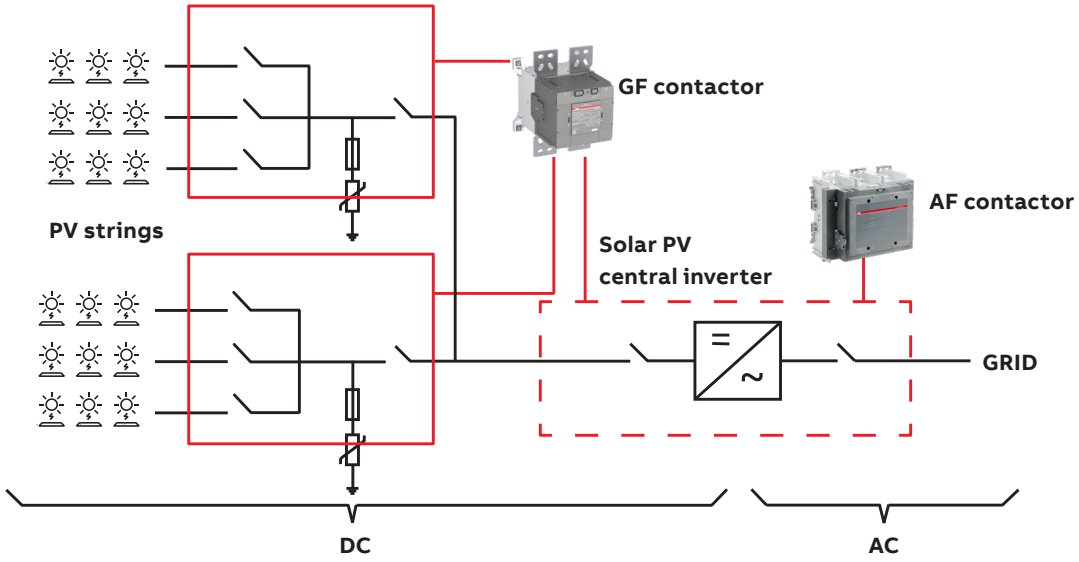
The new GF range of DC contactors extends up to 1325 A for DC-PV3.

Switching DC in PV Plants

Contactors are typically selected for applications that need automatic remote control and switching. In a central PV inverter it can be necessary to switch the DC side in order to disconnect PV strings for output optimization. Grid codes sometime require a central PV inverter to be used for grid stabilization at night, this requires all PV panels to be disconnected on the DC side.

GF contactors allow remote and energy efficient switching in DC applications.
By bringing contactor switching capabilities to 1500 V DC there are now additional options for PV inverter manufacturers to solve DC switching.
Together with breakers and switch disconnects, ABB now have the most complete DC switching portfolio available for PV solar power.

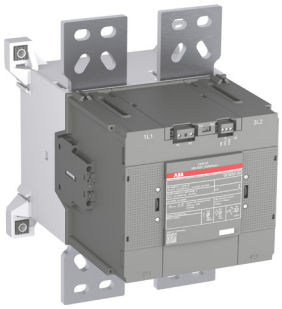
PV solar plant



GF875 ... GF1325 AC / DC operated

875 to 1325 A DC-PV3

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

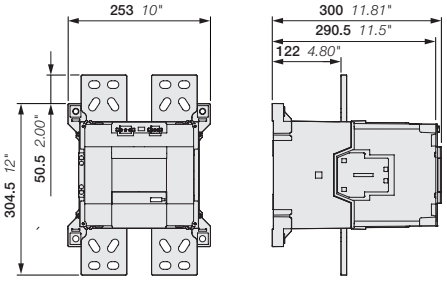


GF1050-30-22

GF875 ... GF1325 contactors are specifically designed for 1500 V DC PV solar central inverters. These contactors are of the block type design with 2 main poles. The main poles are fitted with special arcing contacts enabling bi-directional breaking of currents up to 750 V DC per pole.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V DC), only 2 coils to cover control voltages between 24 ... 60 V AC / DC and 100 ... 250 V AC / DC.
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags.
- built-in surge suppression

IEC	UL/CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current □ ≤ 40 °C 1500 V DC-PV3	General use rating □ ≤ 40 °C 1500 V DC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
875	210	24...60	24...60	2 2	GF875-20-22-51	1SFL617731R5122	14.3
		100...250	100...250	2 2	GF875-20-22-53	1SFL617731R5322	14.3
1050	210	24...60	24...60	2 2	GF1050-20-22-51	1SFL637731R5122	14.3
		100...250	100...250	2 2	GF1050-20-22-53	1SFL637731R5322	14.3
1325	210	24...60	24...60	2 2	GF1325-20-22-51	1SFL647731R5122	14.3
		100...250	100...250	2 2	GF1325-20-22-53	1SFL647731R5322	14.3



GF875, GF1050

Main dimensions mm, inches

GF875 ... GF1325 contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC / DC operated	GF875	GF1050	GF1325
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		1500 V DC		
Conventional free-air thermal current Ith acc. to IEC 60947-4-1				
For air temperature close to contactor	θ ≤ 60 °C	875 A	1050 A	1325 A
	θ ≤ 70 °C	650 A	850 A	1050 A
With conductor cross-sectional area		600 mm²	800 mm²	1000 mm²
DC-PV3 Utilization category for air temperature close to contactor Ue max. ≤ 1500, Iscl = 210 A				
	θ ≤ 60 °C	875 A	1050 A	1325 A
	θ ≤ 70 °C	650 A	850 A	1050 A
DC-PV4 Utilization category for air temperature close to contactor Ue max. ≤ 1500, Iscl = 256 A		325 A	390 A	490 A
Maximum electrical switching frequency		15 cycles/h		

Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC / DC operated	GF875	GF1050	GF1325
Standards		UL 60947-4-1		
Thermal current Ith		875 A	1050 A	1325 A
DC general use acc. to UL60947-4-1, Ue max. ≤ 1500		210 A	210 A	210 A

General technical data

Contactor types	AC / DC operated	GF875	GF1050	GF1325
Rated insulation voltage Ui				
acc. to IEC 60947-4-1		1500 V		
acc. to UL		1500 V		
Rated impulse withstand voltage Uimp.				
Main contacts		8 kV		
Coil terminal		4 kV		
Pollution degree		3		
Ambient air temperature close to contactor				
Operation		-40 to +70 °C		
Storage		-40 to +70 °C		
Climatic withstand		acc. to IEC 60068-2-30		
Maximum operating altitude (without derating)		2000 m		
Rated short-time withstand current Icw at 40 °C ambient temp. in free air from a cold state				
	1 s	6218 A	7600 A	9500 A
	10 s	5184 A	6336 A	7920 A
	30 s	1450 A	5072 A	6340 A
	1 min	3109 A	3800 A	4750 A
	15 min	1139 A	1392 A	1740 A
Mechanical durability				
Number of operating cycles, 1500 V DC		50 000		
Max. switching frequency		15 cycles/h		

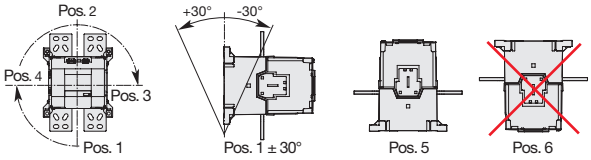
GF875 ... GF1325 contactors
Technical data

Magnet system characteristics

Contactor types	AC / DC operated	GF875	GF1050	GF1325
Coil operating limits acc. to IEC 60947-4-1	AC or DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max.		
Rated control circuit voltage Uc Coil Consumption (1)				
AC control voltage				
24...60 V AC 50/60Hz	Max. pull-in value	600 VA		
	Max. holding value	17 VA		
100...250 V AC 50/60Hz	Max. pull-in value	600 VA		
	Max. holding value	23 VA		
DC control voltage				
24...60 V DC	Max. pull-in value	700 W		
	Max. holding value	12 W		
100...250 V DC	Max. pull-in value	505 W		
	Max. holding value	12 W		
Drop-out voltage		55 % of Uc min.		
Dips withstand -20 °C ≤ θ ≤ +60 °C		≥ 20 ms		
Operating time Coil supply between A1 - A2				
Between coil energization and:	Main contact opening	50...120 ms		
Between coil de-energization and:	Main contact closing	33...70 ms		
Control input for PLC's				
Between coil energization and:	Main contact closing	40...90 ms		
Between coil de-energization and:	Main contact opening	10...30 ms		

(1) Internal measurement for indication.
Official values pending.

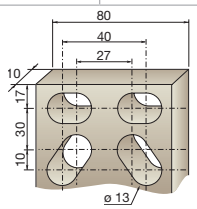
Mounting characteristics and conditions for use

Contactor types	AC / DC operated	GF875	GF1050	GF1325
Mounting positions				
Control voltage / Ambient temperature				
Mounting positions	1, 1±30°, 2, 3, 4, 5 at θ ≤ 70 °C	0.85 x Uc min...1.1 x Uc max.		
	6	Unauthorized		
Fixing by screws		4 x M5		

GF875 ... GF1050 contactors

Technical data

Connecting characteristics

Contactor types	AC / DC operated	GF875	GF1050
Main terminals Flat type			
Connection capacity (min. ... max.)			
Main conductors (poles)			
Bars or lugs	L ≤	100 mm	
	Ø >	12 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	busbars only	
Tightening torque Recommended		45 Nm / 398 lb.in	
Max.		49 Nm	
Auxiliary conductors			
Rigid Solid/Stranded	1 x	1...4 mm² (coil terminals : 2.5 mm²)	
	2 x	1...4 mm² (coil terminals : 1.5 mm²)	
Flexible with ferrule	1 x	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Lugs	L ≤	8 mm	
	l >	3.7 mm	
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 18...14	
Tightening torque Recommended		1.00 Nm / 9 lb.in	
Max.		1.20 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Main terminals		IP00	
Coil terminals		IP00	
Screw terminals			
Main terminals		M12	
		Screws and bolts	
Coil terminals (delivered in open position)		M3.5	
	Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2	

Accessories

CAL20-11

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

Types of auxiliary contact blocks for side mounting:

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

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

The CAL20-11B is a second block for mounting in addition to a first CAL20-11 block, right- and/or left-hand of the GF875 ... GF1050 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
Side-mounted instantaneous auxiliary contact blocks					
GF875, GF1050	1 1	CAL20-11	1SFN010920R1011	1	0.040
	1 1	CAL20-11B	1SFN010920R3011	1	0.040

Auxiliary contact blocks for GF875 ... GF1050 contactors

Technical data

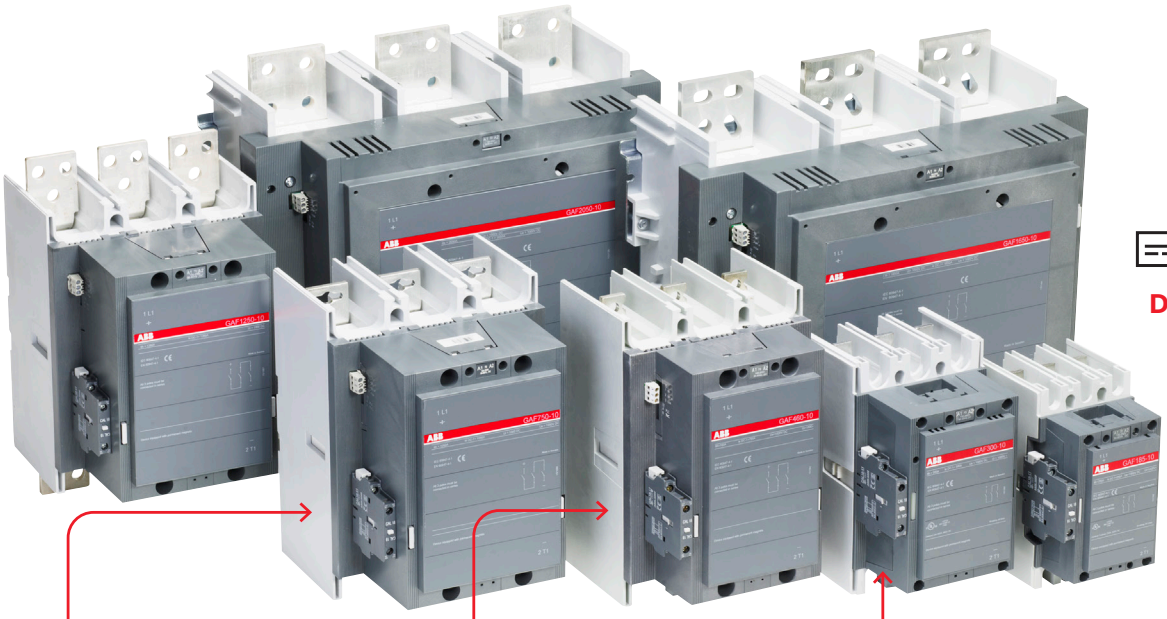
Type			CAL20
Contact utilization characteristics according to IEC			
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V
Rated impulse withstand voltage Uimp.			6 kV
Rated operational voltage Ue max.			24...690 V AC
Conventional thermal current Ith - θ ≤ 40 °C			16 A
Rated frequency (without derating)			50/60 Hz
Ie / Rated operational current AC-15			
acc. to IEC 60947-5-1		24-127 V 50/60 Hz	6 A
		220-240 V 50/60 Hz	4 A
		380-440 V 50/60 Hz	3 A
		500-690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15
Ie / Rated operational current DC-13			
acc. to IEC 60947-5-1		24 V DC	3 A / 72 W
		48 V DC	1.5 A / 72 W
		72 V DC	1 A / 72 W
		110 V DC	0.55 A / 60 W
		125 V DC	0.55 A / 69 W
		220 V DC	0.3 A / 69 W
		250 V DC	0.3 A / 75 W
Short-circuit protection device gG type fuse			10 A
Rated short-time withstand current Icw		for 1.0 s	100 A
θ = 40 °C		for 0.1 s	140 A
Minimum switching capacity			24 V / 50 mA
with failure rate acc. to IEC 60947-5-4			≤ 10-6
Power dissipation per pole at 6 A			0.15 W
Mechanical durability	Number of operating cycles		3 millions
	Max. switching frequency		300 cycles/h
Max. electrical switching frequency		AC-15	300 cycles/h
		DC-13	300 cycles/h

Contact utilization characteristics according to UL / CSA			
Standards			UL 508, CSA C22.2 N°14
Max. operational voltage			600 V AC, 250 V DC
Pilot duty			A600, Q300
AC thermal rated current			10 A
AC maximum volt-ampere making			7200 V A
AC maximum volt-ampere breaking			720 V A
DC thermal rated current			2.5 A
DC maximum volt-ampere making-breaking			69 V A

Connecting characteristics			
Connection capacity (min. ... max.)			
	Rigid Solid/Stranded	1 x	1...4 mm²
		2 x	1...4 mm²
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Lugs	L ≤	8 mm
		l >	3.7 mm
Connection capacity acc. to UL/CSA		1 or 2 x	AWG18...14
Stripping length			9 mm
Tightening torque			1 Nm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

GAF contactors

The compact efficient way to switch DC loads



DC

Up to 2050 A 1000 V DC-1

The GAF range of DC contactors extends from 250 A up to 2050 A for DC-1 and UL DC general use at 1000 V.

Proven technology

The GAF range of contactor is based on the tested and well proven AFcontactor range. The GAF share all accessories with the AF range, reducing the number of parts needed.

Easy selection

The GAF contactors feature ABBs AF technology and all of its features. With only four coils the entire voltage range of 20 V DC and 24 V AC to 500 V AC / DC is covered. The built in surge suppression takes away the need of a separate surge suppressor. All to enable easier selection of contactors.

PV plant applications for DC switching

Contactors are typically selected for applications that need remote control and switching of the central inverter's DC side at least once per day. Application examples include: disconnection of the inverter from PV strings; or changing the string configuration to increase plant capacity.

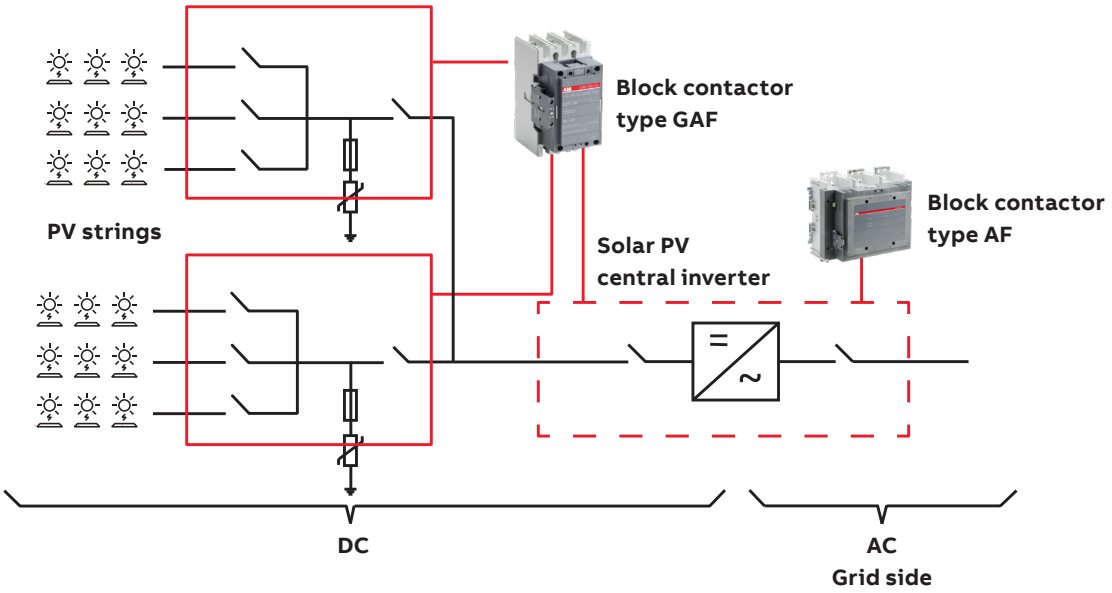
GAF contactors

The compact efficient way to switch DC loads

Optimised for central inverters

ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution applications. Due to their breaking performance for DC circuits, GAF contactors can switch DC loads of up to 2050 A 1000 V DC-1.

PV solar plant



Contactors for DC switching applications

DC-1, DC-3, DC-5 applications according to IEC 60947-4-1

The circuit switching on DC is more difficult than on AC, as alternating current go to zero according to the frequency of the supply source while DC current has a continuous value.
The main parameters to be considered for selecting a contactor are the current, the voltage and the L/R time constant of the controlled load.

Time constant and utilization categories
In DC applications, the nature of load to switch (resistor, inductance or a combination) is characterized by the ratio of the inductance to the resistance (L (inductance of operated circuit) / R (resistance of operated circuit) = mH/Ω = ms)
This ratio L/R is called the time constant of the circuit.

DC current utilization categories are defined according to IEC 60947-4-1:
- DC-1 non inductive or slightly inductive loads, resistance furnaces (L/R ≤ 1 ms)
- DC-3 shunt motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 2 ms)
- DC-5 series motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 7.5 ms).

The higher the time constant value is, the more difficult it is to break the arc.
The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs, by reducing the time constant.

Operational voltage
- The higher the operational voltage value is, the more difficult it is to break the arc.
- The use of main poles connected in series will allow to increase the value of switched voltage.

However, the maximum switched voltage must be within the max operational voltage of the contactor.
All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis) (see recommended connection diagrams).

ABB offer a large choice of possibilities for DC switching applications (see selection tables):
- Standard 3-pole or 4-pole contactors with either 1- pole breaking or breaking with poles connected in series.
- Special contactors designed for DC breaking with permanent magnets fitted on the main poles for use with the 3 poles connected in series and considered as 1-pole devices:
  - GA75 and GAE75 contactors: the 3 poles are connected in series via two supplied and fitted insulated connections (25 mm^2)
  - GAF145 … GAF2050 contactors: the 3 poles must be connected in series by the user according to conductor cross-sectional area (refer to main pole technical data) or by using LP connection bars to be ordered separately.

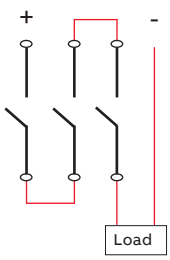
Selection tables
The enclosed selection tables will guide your choice through all contactor variants according to utilization category, for operational voltage up to 1000 V DC-1 and operational current up to 2050 A in ambient temperatures from -25 °C up to 40 °C.
For higher values of current or voltage or heavy DC switching applications see bar mounted R contactors.

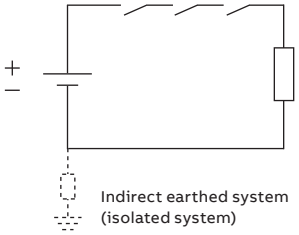
Connection diagrams

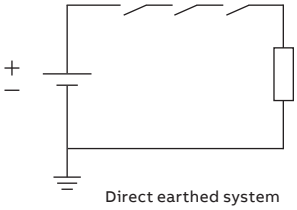
Connection diagrams

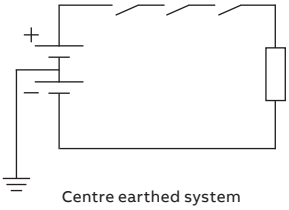
Recommended connection

In the example below, the 3 poles are connected in series without the load in between.
This connection is recommended in systems according to the following configurations.



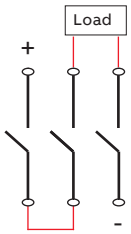


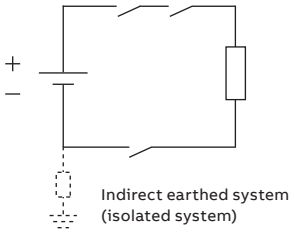




Alternative connection (not possible for GA75, GAE75)

The load could be placed in between the contacts in a indirect earthed system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.





Points to consider

The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.

Polarity:

For all GA, GAE, GAF types, connection polarities must be respected.
(See instruction leaflet and see markings on the main terminals or the contactor front)

AF09 ... AF96 contactors

DC circuit switching

General

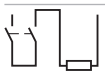
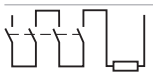
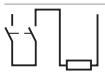
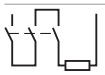
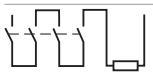
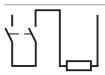
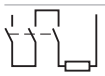
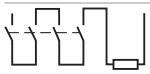
The arc switching on DC is more difficult than on AC.

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

Technical data

- The tables indicate for the standard contactors the Ie max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage Ue and the pole coupling details. Ampere values quoted in these tables are valid for a -25...+70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature
- Max. switching frequency: 300 cycles/h.

Selection table

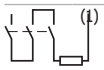
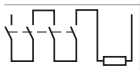
Contactor types		AF09	AF12	AF16	AF26		AF30	AF38		AF40	AF52	AF65	AF80	AF96
		3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole	3-pole	3-pole	3-pole	3-pole	3-pole
Utilization category DC-1, L/R ≤ 1 ms														
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	10 A	15 A	20 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	220 V	10 A	15 A	20 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	110 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	220 V	25 A	-	30 A	-	45 A	-	-	55 A	-	-	-	-	-
	440 V	10 A	-	20 A	-	-	-	-	-	-	-	-	-	-
Utilization category DC-3, L/R ≤ 2 ms														
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	6 A	7 A	8 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	6 A	7 A	8 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	220 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	440 V	6 A	-	8 A	-	-	-	-	-	-	-	-	-	-
Utilization category DC-5, L/R ≤ 7.5 ms														
	≤ 72 V	9 A	12 A	16 A	20 A	-	25 A	25 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	4 A	4 A	4 A	-	-	-	-	-	-	-	-	-	-
	220 V	-	-	-	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	10 A	15 A	20 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	4 A	4 A	4 A	-	-	-	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	110 V	25 A	27 A	30 A	45 A	-	50 A	50 A	-	70 A	100 A	105 A	125 A	130 A
	220 V	9 A	12 A	16 A	20 A	-	25 A	25 A	-	70 A	100 A	105 A	125 A	130 A
	≤ 72 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-	-	-	-	-	-	-
	220 V	10 A	-	20 A	-	-	-	-	-	-	-	-	-	-
	440 V	4 A	-	4 A	-	-	-	-	-	-	-	-	-	-

For additional ratings ≥ 440 V, please consult us.
Note: For AFS09 ... AFS96 safety contactors, DC switching rating are the same as AF09 ... AF96 3-pole contactors.

AF116 ... AF2650 contactors

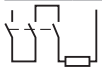
DC circuit switching

Selection table

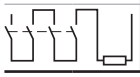
Contactor types		AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
		3 or 4-pole		3-pole	3 or 4-pole					3-pole								
Utilization category DC-1, L/R ≤ 1 ms																		
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	90 V	160	200	200	250	350	400	500	520	-	-	-	-	-	-	-	-	-
	100 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-	-
	110 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	175 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-	-
	200 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-	-
	220 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	-	-	-	-	-
 (1)	≤ 72 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	110 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	220 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	260 V	160	200	200	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	300 V	-	-	-	250	350	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	340 V	-	-	-	-	-	400	500	520	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	440 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	600 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	780 V	-	-	-	-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	850 V	-	-	-	-	-	-	-	-	-	-	800 A	1050 A	1250 A	1350 A	1650 A	2050 A	2650 A
	< 350 V	200	200	-	250	350	400	500	520	-	-	-	-	-	-	-	-	-
	400 V	-	-	-	250	350	400	500	520	-	-	-	-	-	-	-	-	-
	440 V	-	-	-	-	-	400	500	520	-	-	-	-	-	-	-	-	-

(1) AF2650 at 780 V DC = 2650 A

Utilization category DC-3, L/R ≤ 2 ms

	≤ 72 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	≤ 72 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	220 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-	-
	≤ 72 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	220 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	440 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	600 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	320 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	-	-	-	-	-	-	-	-	-

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

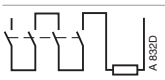
	≤ 72 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	≤ 72 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	220 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	-	-	-	-	-
	≤ 72 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	110 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	220 V	145 A	160 A		250 A	275 A	350 A	400 A	450 A	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	440 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	600 V	-	-		-	-	-	-	-	600 A	700 A	800 A	1050 A	1250 A	1350 A	-	-	-
	320 V	145 A	160 A	-	250 A	275 A	350 A	400 A	450 A	-	-	-	-	-	-	-	-	-

For additional ratings ≥ 440 V, please consult us.

EK550, EK1000 contactors

DC circuit switching

Selection table

Contactor types			EK550	EK1000
Utilization category DC-1, L/R ≤ 1 ms				
	≤ 72 V	A	550	–
	110 V	A	550	–
	≤ 72 V	A	800	–
	110 V	A	800	–
	220 V	A	800	–
	≤ 72 V	A	800	–
	110 V	A	800	–
	220 V	A	800	–
	440 V	A	650	–
	600 V	A	650	–
	≤ 72 V	A	800	–
	110 V	A	800	–
	220 V	A	800	–
	440 V	A	650	–
	600 V	A	650	–
Utilization category DC-3, L/R ≤ 2 ms				
	≤ 72 V	A	550	–
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	440 V	A	650	–
	600 V	A	650	–
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	440 V	A	650	–
	600 V	A	650	–
Utilization category DC-5, L/R ≤ 7.5 ms				
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	440 V	A	650	–
	600 V	A	650	–
	≤ 72 V	A	650	–
	110 V	A	650	–
	220 V	A	650	–
	440 V	A	650	–
	600 V	A	650	–

Notes

GA75 1-pole contactors
100 A DC-1
AC operated

GA75-10-11

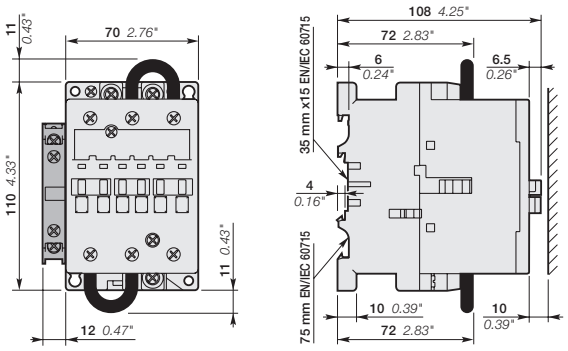
GA75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles delivered connected in serie.

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

IEC Rated operational current ≤ 55 °C 440 V DC-1 A	UL / CSA General use rating 440 V DC A	Rated control circuit voltage Uc (1) V 50 Hz	 V 60 Hz	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
100	100	24	24	0 0	GA75-10-00	1SBL411025R8100	1.220
				1 1	GA75-10-11	1SBL411025R8111	1.260
		48	48	0 0	GA75-10-00	1SBL411025R8300	1.220
				1 1	GA75-10-11	1SBL411025R8311	1.260
		110	110...120	0 0	GA75-10-00	1SBL411025R8400	1.220
				1 1	GA75-10-11	1SBL411025R8411	1.260
		220...230	230...240	0 0	GA75-10-00	1SBL411025R8000	1.220
				1 1	GA75-10-11	1SBL411025R8011	1.260
		230...240	240...260	0 0	GA75-10-00	1SBL411025R8800	1.220
				1 1	GA75-10-11	1SBL411025R8811	1.260
		380...400	400...415	0 0	GA75-10-00	1SBL411025R8500	1.220
				1 1	GA75-10-11	1SBL411025R8511	1.260
		400...415	415...440	0 0	GA75-10-00	1SBL411025R8600	1.220
				1 1	GA75-10-11	1SBL411025R8611	1.260

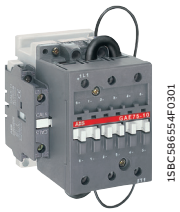
(1) Other control voltages see voltage codes table.



GA75-10-11

Main dimensions mm, inches

GAE75 1-pole contactors
100 A DC-1
DC operated



GAE75-10-11

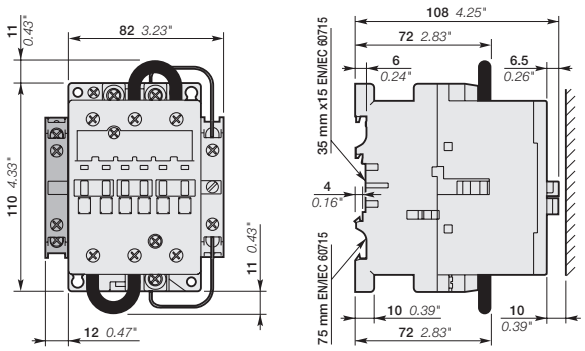
GAE75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles delivered connected in serie.

- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: DC operated with double winding coil (and factory mounted lagging contact for "holding" winding insertion)
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

IEC	UL/CSA	Rated control circuit voltage Uc (1)	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C 440 V DC-1	General use rating 440 V DC					Pkg (1 pce)
A	A	V DC				kg
100	100	12	0 0	GAE75-10-00	1SBL419025R8000	1.260
			1 1	GAE75-10-11	1SBL419025R8011	1.300
		24	0 0	GAE75-10-00	1SBL419025R8100	1.260
			1 1	GAE75-10-11	1SBL419025R8111	1.300
		48	0 0	GAE75-10-00	1SBL419025R8300	1.260
			1 1	GAE75-10-11	1SBL419025R8311	1.300
		110	0 0	GAE75-10-00	1SBL419025R8600	1.260
			1 1	GAE75-10-11	1SBL419025R8611	1.300
		125	0 0	GAE75-10-00	1SBL419025R8700	1.260
			1 1	GAE75-10-11	1SBL419025R8711	1.300
		220	0 0	GAE75-10-00	1SBL419025R8800	1.260
			1 1	GAE75-10-11	1SBL419025R8811	1.300
		240	0 0	GAE75-10-00	1SBL419025R8900	1.260
			1 1	GAE75-10-11	1SBL419025R8911	1.300

(1) Other control voltages see voltage codes table.



GAE75-10-11

Main dimensions mm, inches

GAF185 ... GAF300 1-pole (3-pole in serie) contactors
250 to 400 A DC-1

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

GAF185-10-11

GAF300-10-11

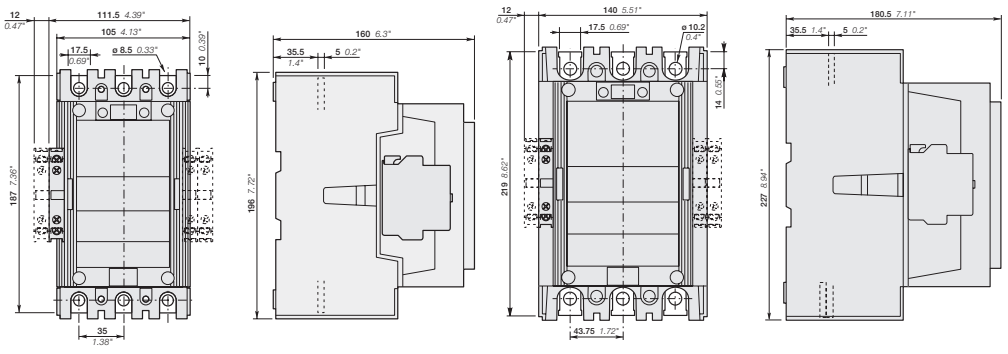
GAF185 ... GAF300 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL / CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C 1000 V DC-1	General use rating ≤ 40 °C 1000 V DC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
250	250	-	20...60	1 1	GAF185-10-11 (1)	1SFL497025R7211	3.600
		48...130	48...130	1 1	GAF185-10-11	1SFL497025R6911	3.600
		100...250	100...250	1 1	GAF185-10-11	1SFL497025R7011	3.600
400	400	-	20...60	1 1	GAF300-10-11 (1)	1SFL557025R7211	6.200
		48...130	48...130	1 1	GAF300-10-11	1SFL557025R6911	6.200
		100...250	100...250	1 1	GAF300-10-11	1SFL557025R7011	6.200

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



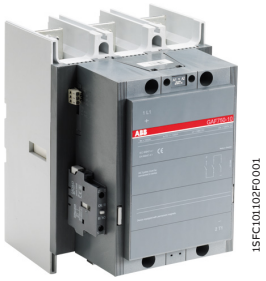
GAF185 GAF300

Main dimensions mm, inches

GAF460 ... GAF750 1-pole (3-pole in serie) contactors
600 to 875 A DC-1

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

GAF460-10-11



GAF750-10-11

GAF460 ... GAF750 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

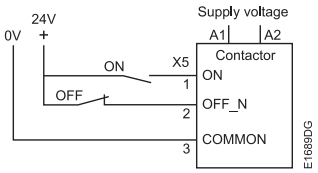
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

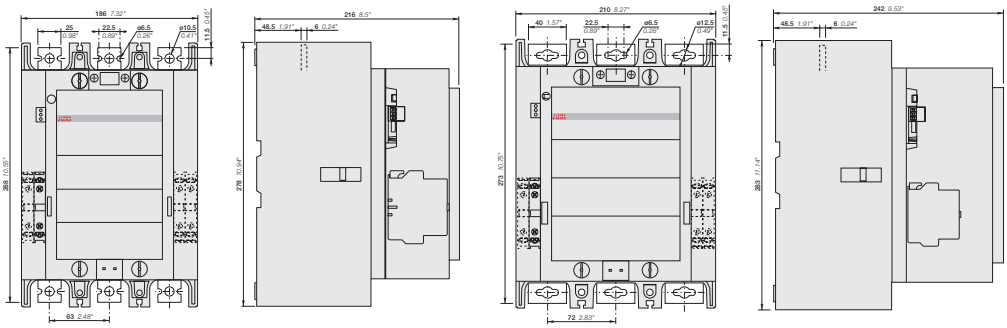
IEC	UL / CSA	Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C 1000 V DC-1	General use rating ≤ 40 °C 1000 V DC						Pkg (1 pce)
A	A	V 50/60 Hz	V DC				kg
600	650	-	24...60	1 1	GAF460-10-11 (1)	1SFL597025R6811	12.000
		48...130	48...130	1 1	GAF460-10-11	1SFL597025R6911	12.000
		100...250	100...250	1 1	GAF460-10-11	1SFL597025R7011	12.000
		250...500	250...500	1 1	GAF460-10-11	1SFL597025R7111	12.000
875	900	-	24...60	1 1	GAF750-10-11 (1)	1SFL637025R6811	15.000
		48...130	48...130	1 1	GAF750-10-11	1SFL637025R6911	15.000
		100...250	100...250	1 1	GAF750-10-11	1SFL637025R7011	15.000
		250...500	250...500	1 1	GAF750-10-11	1SFL637025R7111	15.000

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

GAF460 ... GAF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs





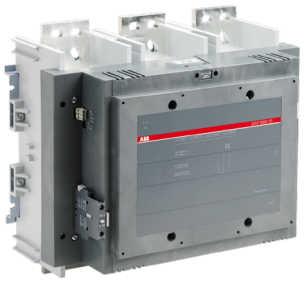
GAF460 GAF750

Main dimensions mm, inches

GAF1250 ... GAF2050 1-pole (3-pole in serie) contactors
1040 to 1750 A DC-1

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

GAF1250-10-11



GAF1650-10-11

GAF1250 ... GAF2050 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

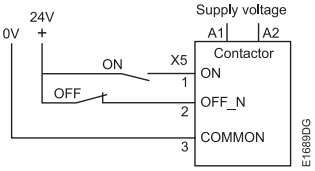
These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

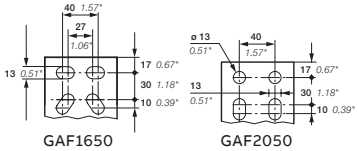
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC Rated operational current ≤ 55 °C 1000 V DC-1 A	UL / CSA General use rating ≤ 40 °C 1000 V A	Rated control circuit voltage Uc V 50/60 Hz	 V DC	Auxiliary contacts fitted 	Type	Order code	Weight Pkg (1 pce) kg
1040	1210	-	24...60	1 1	GAF1250-10-11	1SFL647025R6811	16.000
		48...130	48...130	1 1	GAF1250-10-11	1SFL647025R6911	16.000
		100...250	100...250	1 1	GAF1250-10-11	1SFL647025R7011	16.000
		250...500	250...500	1 1	GAF1250-10-11	1SFL647025R7111	16.000
1450	1650	100...250	100...250	1 1	GAF1650-10-11	1SFL677025R7011	35.000
1750	2050	100...250	100...250	1 1	GAF2050-10-11	1SFL707025R7011	35.000

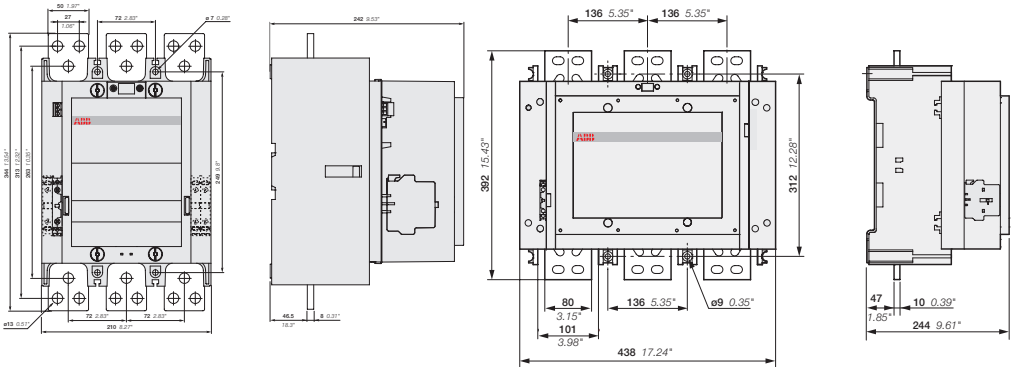
GAF1250 ... GAF2050 are equipped with low voltage inputs for control, for example by a PLC

Control inputs





GAF1650 GAF2050



GAF1250 GAF1650, GAF2050

Main dimensions mm, inches

GA75 ... GAF2050 contactors
Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	GA75							
	DC operated	GAE75							
	AC / DC operated		GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.		1000 V DC							
DC-1 Utilization category, L/R ≤ 1 ms									
For air temperature close to contactor									
Ie / Rated operational current DC-1									
θ ≤ 40 °C	220 V	120 A	275 A	500 A	700 A	1050 A	1250 A	1650 A	2050 A
	440 V	100 A	275 A	500 A	700 A	1050 A	1250 A	1650 A	2050 A
	600 V	75 A	275 A	500 A	700 A	1050 A	1250 A	1650 A	2050 A
	1000 V	35 A	275 A	500 A	700 A	1050 A	1250 A	1650 A	2050 A
θ ≤ 55 °C	220 V	100 A	250 A	400 A	600 A	875 A	1040 A	1450 A	1750 A
	440 V	100 A	250 A	400 A	600 A	875 A	1040 A	1450 A	1750 A
	600 V	75 A	250 A	400 A	600 A	875 A	1040 A	1450 A	1750 A
	1000 V	35 A	250 A	400 A	600 A	875 A	1040 A	1450 A	1750 A
θ ≤ 70 °C	220 V	85 A	180 A	325 A	480 A	720 A	875 A	1270 A	1500 A
	440 V	85 A	180 A	325 A	480 A	720 A	875 A	1270 A	1500 A
	600 V	75 A	180 A	325 A	480 A	720 A	875 A	1270 A	1500 A
	1000 V	35 A	180 A	325 A	480 A	720 A	875 A	1270 A	1500 A
With conductor cross-sectional area (3)		(1)	150 mm²	300 mm² (2)	2x 240 mm²	2x 50x8 mm²	2x 100x5 mm²	3x 100x5 mm²	4x 100x5 mm²
DC-3 Utilization category, L/R ≤ 2 ms									
Ie / Rated operational current DC-3									
θ ≤ 55 °C	220 V	100 A	-						
	440 V	85 A	-						
DC-5 Utilization category, L/R ≤ 7.5 ms									
Ie / Rated operational current DC-5									
θ ≤ 55 °C	220 V	85 A	-						
	440 V	35 A	-						
Maximum electrical switching frequency		300 cycles/h							

(1) Refer to IEC 60947-1, table 9.
(2) For currents up to 370 A, use 2 x LP300 kits.For higher currents, use 300 mm² conductors of minimum length 500 mm together with terminal extension/enlargement (LX300/LW300).
(3) To minimize terminal temperature for GAF185 ... GAF2050, length of connection should be at least 0.5 m per pole.

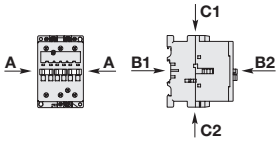
Main pole - Utilization characteristics according to UL / CSA

Contactor types	AC operated	GA75							
	DC operated	GAE75							
	AC / DC operated		GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Standards		UL 508, CSA C22.2 N°14		UL 60947-4-1, CSA C22.2 N°60947.4-1					
Maximum operational voltage		1000 V DC							
UL / CSA DC general use rating									
θ ≤ 40 °C	440 V	100 A	250 A	400 A	650 A	900 A	1210 A	1650 A	2050 A
	600 V	75 A	250 A	400 A	650 A	900 A	1210 A	1650 A	2050 A
	1000 V	35 A	250 A	400 A	650 A	900 A	1210 A	1650 A	2050 A
Maximum electrical switching frequency		300 cycles/h							

GA75 and GAE75 contactors

Technical data

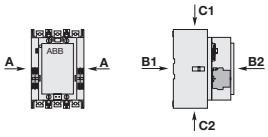
General technical data

Contactor types	AC operated	**GA75**
	DC operated	**GAE75**
Rated insulation voltage Ui		
acc. to IEC 60947-4-1		1000 V
acc. to UL		600 V
Rated impulse withstand voltage Uimp.		8 kV
Pollution degree		3
Ambient air temperature close to contactor		
Operation		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		10 millions operating cycles (5 millions for GAE75)
Max. switching frequency		3600 cycles/h
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1		
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	20 g
	B1	10 g closed position / 5 g open position
	B2	15 g
	C1	20 g
	C2	20 g

GAF185 ... GAF2050 contactors

Technical data

General technical data

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Rated insulation voltage Ui								
acc. to IEC 60947-4-1		1000 V						
acc. to UL		1000 V						
Rated impulse withstand voltage Uimp.		8 kV						
Pollution degree		3						
Ambient air temperature close to contactor								
Operation		-40 to +70 °C						
Storage		-40 to +70 °C						
Climatic withstand		acc. to IEC 60068-2-30						
Maximum operating altitude (without derating)		3000 m						
Mechanical durability								
Number of operating cycles		5 millions operating cycles				0.5 millions	0.5 millions operating cycles	
Max. switching frequency		300 cycles/h					60 cycles/h	
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1								
	Shock direction	1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position						
	A	5 g					-	
	B1	5 g					-	
	B2	5 g					-	
	C1	5 g					-	
	C2	5 g					-	

GA75 and GAE75 contactors

Technical data

Magnet system characteristics

Contactor types		AC operated	**GA75**
Coil operating limits		AC supply	At θ ≤ 55 °C 0.85...1.1 x Uc
acc. to IEC 60947-4-1			Please also refer to "Mounting characteristics and conditions for use"
AC control voltage			
Rated control circuit voltage Uc		at 50 Hz	24...690 V
		at 60 Hz	24...690 V
Coil consumption	Average pull-in value	50 Hz	180 VA
		60 Hz	210 VA
		50/60 Hz (1)	190 VA / 180 VA
	Average holding value	50 Hz	18 VA / 5.5 W
		60 Hz	18 VA / 5.5 W
		50/60 Hz (1)	18 VA / 5.5 W
Drop-out voltage			Approx. 40...65 % of Uc
Operating time			
Between coil energization and:		N.O. contact closing	8...27 ms
		N.C. contact opening	7...22 ms
Between coil de-energization and:		N.O. contact opening	4...11 ms
		N.C. contact closing	7...14 ms

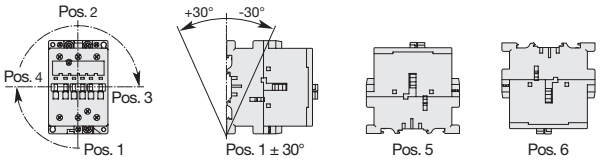
(1) 50/60 Hz coils: see "Voltage code table".

Magnet system characteristics

Contactor types	DC operated	**GAE75**
Coil operating limits	AC supply	At θ ≤ 55 °C 0.85...1.1 x Uc
acc. to IEC 60947-4-1		Please also refer to "Mounting characteristics and conditions for use"
DC control voltage		
Rated control circuit voltage Uc		12...250 V DC
Coil consumption	Average pull-in value	200 W
	Average holding value	4 W
Drop-out voltage		Approx. 15...40 % of Uc
Coil time constant		
Open	L/R	3 ms
Closed	L/R	15 ms
Operating time		
Between coil energization and:	N.O. contact closing	13...30 ms
	N.C. contact opening	10...27 ms
Between coil de-energization and:	N.O. contact opening (1)	5...15 ms
	N.C. contact closing (1)	8...18 ms

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

Mounting characteristics and conditions for use

Contactor types		AC operated	**GA75**
		DC operated	**GAE75**
Mounting positions			
Control voltage / Ambient temperature			
Mounting positions	1, 1±30°, 2, 3, 4, 5	at θ ≤ 55 °C	0.85...1.1 x Uc
		at θ ≤ 70 °C	Uc
	6	at θ ≤ 55 °C	0.95...1.1 x Uc
		at θ ≤ 70 °C	Unauthorized
Mounting distances			The contactors can be assembled side by side
Fixing			
On rail according to IEC 60715, EN 60715			35 x 15 mm or 75 x 25 mm
By screws (not supplied)			2 x M6 screws placed diagonally

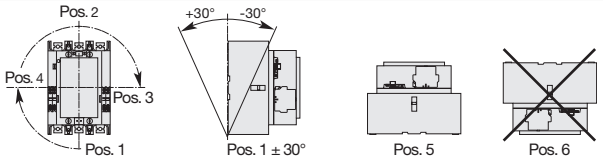
GAF185 ... GAF2050 contactors

Technical data

Magnet system characteristics

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Coil operating limits acc. to IEC 60947-4-1	AC or DC supply	At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use"						
AC control voltage 50/60 Hz								
Rated control circuit voltage Uc		48...250 V AC		48...500 V AC			100...250 V AC	
Coil consumption	Average pull-in value	430 VA	470 VA	890 VA	850 VA		1900 VA	
	Average holding value	12 VA / 3.5 W	10 VA / 2.5 W	12 VA / 4 W	12 VA / 4.5 W		48 VA / 17 W	
DC control voltage								
Rated control circuit voltage Uc		20...250 V DC		24...500 V DC			100...250 V DC	
Coil consumption	Average pull-in value	500 W	520 W	990 W	950 W		1700 W	
	Average holding value	2 W		4 W	4.5 W		16 W	
Drop-out voltage		55 % of Uc min.						
Dips withstand -20 °C ≤ θ ≤ +60 °C		≥ 20 ms						
Operating time								
Coil supply between A1 - A2								
Between coil energization and:	N.O. contact closing	30...115 ms		50...120 ms			50...80 ms	
	N.C. contact opening	30...115 ms		50...120 ms			50...80 ms	
Between coil de-energization and:	N.O. contact opening	25...80 ms		33...70 ms			35...55 ms	
	N.C. contact closing	25...80 ms		33...70 ms			35...55 ms	
Control input for PLC's								
Between coil energization and:	N.O. contact closing	-		40...60 ms	40...90 ms		40...65 ms	
	N.C. contact opening	-		40...60 ms	40...90 ms		40...65 ms	
Between coil de-energization and:	N.O. contact opening	-		10...30 ms			10...30 ms	
	N.C. contact closing	-		10...30 ms			10...30 ms	

Mounting characteristics and conditions for use

Contactor types	AC / DC operated	GAF185	GAF300	GAF460	GAF750	GAF1250	GAF1650	GAF2050
Mounting positions								
Control voltage / Ambient temperature								
Mounting positions	1, 1±30°, 2, 3, 4, 5 at θ ≤ 70 °C	0.85 x Uc min...1.1 x Uc max.						
	6	Unauthorized						
Mounting distances		The contactors can be assembled side by side						
Fixing								
On rail according to IEC 60715, EN 60715		–						
By screws (not supplied)		4 x M5			4 x M6		4 x M8	

GA75 and GAE75 contactors
Technical data

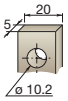
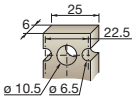
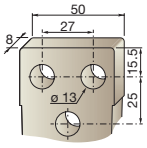
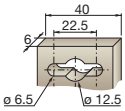
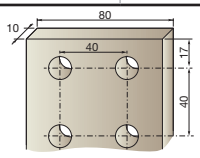
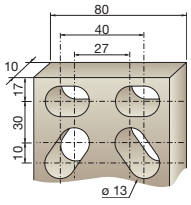
Connecting characteristics

Contactor types			AC operated	**GA75**
			DC operated	**GAE75**
Main terminals				Screw terminals with single connector (13 x 10 mm)
Connection capacity (min. ... max.)				
Main conductors (poles)				
	Rigid	Solid (≤ 4 mm²)	1 x	6...50 mm²
		Stranded (≥ 6 mm²)	2 x	6...25 mm²
	Flexible with ferrule		1 x	6...35 mm²
			2 x	6...16 mm²
	Bars or lugs		L ≤	–
			I >	–
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 8...1
Tightening torque		Recommended		4.00 Nm / 35 lb.in
		Max.		4.50 Nm
Auxiliary conductors (coil terminals)				
	Rigid solid		1 x	1...4 mm²
			2 x	1...4 mm²
	Flexible with ferrule		1 x	1...2.5 mm²
			2 x	0.75...2.5 mm²
	Lugs		L ≤	8 mm
			I >	3.7 mm
Connection capacity acc. to UL / CSA			1 or 2 x	AWG 18...14
Tightening torque				
Coil terminals		Recommended		1.00 Nm / 9 lb.in
		Max.		1.20 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals				IP10
Coil terminals				IP20
Screw terminals				Delivered in open position, screws of unused terminals must be tightened
Main terminals				M6
Screwdriver type				Flat Ø 6.5 / Pozidriv 2
Coil terminals				M3.5
Screwdriver type				Flat Ø 5.5 / Pozidriv 2

GAF185 ... GAF2050 contactors

Technical data

Connecting characteristics

Contactor types			AC / DC operated	GAF185	GAF300	GAF460	GAF750 GAF1250	GAF1650 GAF2050
Main terminals Flat type							 GAF1250  GAF750	 GAF2050  GAF1650
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid with connector	Single for Cu cable			6...185 mm²	16...240 mm²	240 mm²	300 mm²	–
	Single for Al/Cu cable			25...150 mm²	120...240 mm²	240 mm²	300 mm²	–
	Double for Al/Cu cable			–	2 x 95...120 mm²	2 x 240 mm²	3 x 185 mm²	–
Bars or lugs		L ≤		24 mm	32 mm	47 mm	52 mm	100 mm
		Ø >		8 mm	10 mm	10 mm	12 mm	12 mm
Connection capacity acc. to UL/CSA		1 or 2 x		6 - 250 MCM	4 - 500 MCM	2//250 - 500 MCM	3// 2/0 - 500 MCM	1/0 - 750 MCM
Tightening torque	Recommended			18 Nm / 160 lb.in	28 Nm / 247 lb.in	35 Nm / 310 lb.in	45 Nm / 398 lb.in	45 Nm / 398 lb.in
	Max.			20 Nm	30 Nm	40 Nm	49 Nm	49 Nm
Auxiliary conductors (coil terminals)								
Rigid Solid/Stranded		1 x		1...4 mm²				
		2 x		1...4 mm²				
Flexible with ferrule		1 x		0.75...2.5 mm²				
		2 x		0.75...2.5 mm²				
Lugs		L ≤		8 mm				
		l >		3.7 mm				
Connection capacity acc. to UL/CSA		1 or 2 x		AWG 18...14				
Tightening torque	Recommended			1.00 Nm / 9 lb.in				
	Max.			1.20 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP00				
Coil terminals				IP20				
Screw terminals								
Main terminals				M8	M10	M10	M12	
Coil terminals (delivered in open position)				Screws and bolts				
				M3.5				
			Screwdriver type	Flat Ø 5.5 mm / Pozidriv 2				

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

www.abb.com/productdetails/**1SBL137001R1310**

Contactors for capacitor switching

3/248 **Overview**

UA16..RA up to UA110..RA - Unlimited peak current Î

3/250 Ordering details
3/253 Main accessories
3/254 Technical data

UA16 up to UA110
Peak current Î ≤ 100 times the rms current

3/256 Ordering details
3/259 Main accessories
3/260 Technical data

3/466 **Voltage code table**

Contactors for capacitor switching

AC-6b utilization category according to IEC 60947-4-1

Capacitor transient conditions

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

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

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

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

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

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

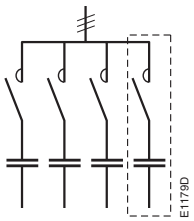
The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

Single-step capacitor bank scheme
Use the AF... or UA... contactor ranges

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

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

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



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

Steady state condition data

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

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

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

$$IT = 1.3 \times 1.15 \times In = 1.5 \times In$$

Consequences for the contactors

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

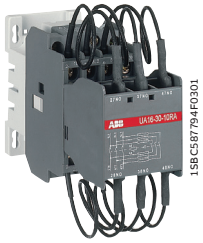
- **A permanent current that can reach 1.5 times the nominal current of the capacitor bank.**
- **The short but high peak current on pole closing** (maximum permissible peak current $\hat{I}$).

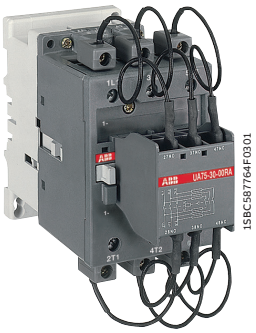
Contactors for capacitor switching
The ABB solutions

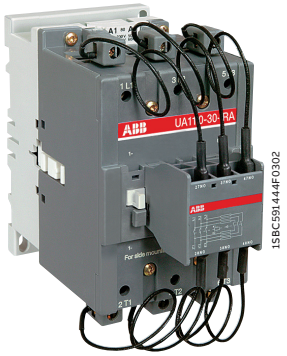
ABB offers 2 contactor versions according to the value of the inrush current peak and the power of the capacitor bank.

UA..RA contactors for capacitor switching (UA16..RA to UA110..RA) with insertion of damping resistors

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

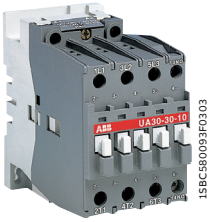


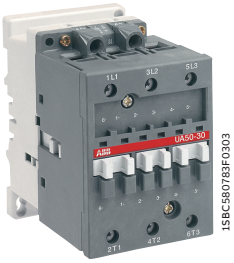




UA contactors for capacitor switching (UA16 to UA110)

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

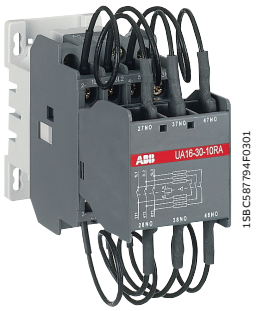




UA16..RA ... UA30..RA 3-pole contactors for capacitor switching

12.5 to 30 kvar - Unlimited peak current Î

AC operated



UA16-30-10RA

UA30-30-10RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

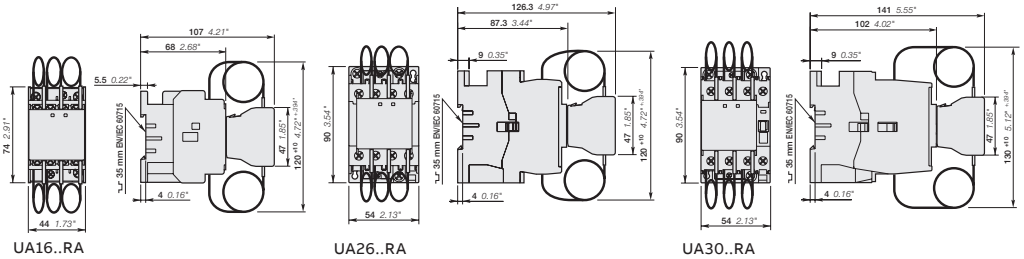
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power ≤ 40 °C 400 V AC-6b	Rated operational power ≤ 40 °C 480 V						Pkg (1 pce)
kvar	kvar	V 50 Hz	V 60 Hz				kg
12.5	16	24	24	1 0	UA16-30-10RA	1SBL181024R8110	0.460
		110	110...120	1 0	UA16-30-10RA	1SBL181024R8410	0.460
		220...230	230...240	1 0	UA16-30-10RA	1SBL181024R8010	0.460
		230...240	240...260	1 0	UA16-30-10RA	1SBL181024R8810	0.460
		380...400	400...415	1 0	UA16-30-10RA	1SBL181024R8510	0.460
		400...415	415...440	1 0	UA16-30-10RA	1SBL181024R8610	0.460
22	22	24	24	1 0	UA26-30-10RA	1SBL241024R8110	0.710
		110	110...120	1 0	UA26-30-10RA	1SBL241024R8410	0.710
		220...230	230...240	1 0	UA26-30-10RA	1SBL241024R8010	0.710
		230...240	240...260	1 0	UA26-30-10RA	1SBL241024R8810	0.710
		380...400	400...415	1 0	UA26-30-10RA	1SBL241024R8510	0.710
		400...415	415...440	1 0	UA26-30-10RA	1SBL241024R8610	0.710
30	28	24	24	1 0	UA30-30-10RA	1SBL281024R8110	0.810
		110	110...120	1 0	UA30-30-10RA	1SBL281024R8410	0.810
		220...230	230...240	1 0	UA30-30-10RA	1SBL281024R8010	0.810
		230...240	240...260	1 0	UA30-30-10RA	1SBL281024R8810	0.810
		380...400	400...415	1 0	UA30-30-10RA	1SBL281024R8510	0.810
		400...415	415...440	1 0	UA30-30-10RA	1SBL281024R8610	0.810

(1) Other control voltages see voltage code table.

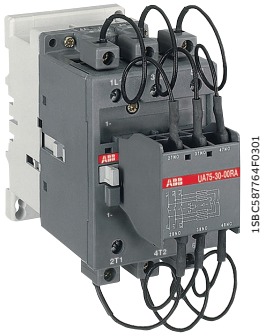


Main dimensions mm, inches

UA50..RA ... UA75..RA 3-pole contactors for capacitor switching

40 to 60 kvar - Unlimited peak current Î

AC operated



UA75-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

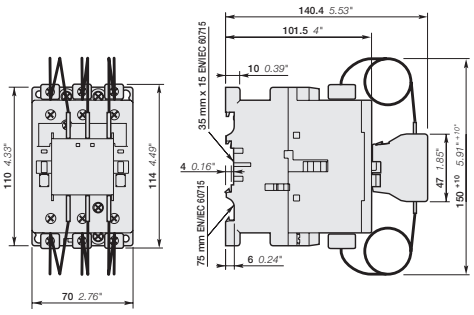
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power □ ≤ 40 °C 400 V AC-6b	Rated operational power □ ≤ 40 °C 480 V						Pkg (1 pce)
kvar	kvar	V 50 Hz	V 60 Hz				kg
40	50	24	24	0 0	UA50-30-00RA	1SBL351024R8100	1.350
		110	110...120	0 0	UA50-30-00RA	1SBL351024R8400	1.350
		220...230	230...240	0 0	UA50-30-00RA	1SBL351024R8000	1.350
		230...240	240...260	0 0	UA50-30-00RA	1SBL351024R8800	1.350
		380...400	400...415	0 0	UA50-30-00RA	1SBL351024R8500	1.350
		400...415	415...440	0 0	UA50-30-00RA	1SBL351024R8600	1.350
50	55	24	24	0 0	UA63-30-00RA	1SBL371024R8100	1.350
		110	110...120	0 0	UA63-30-00RA	1SBL371024R8400	1.350
		220...230	230...240	0 0	UA63-30-00RA	1SBL371024R8000	1.350
		230...240	240...260	0 0	UA63-30-00RA	1SBL371024R8800	1.350
		380...400	400...415	0 0	UA63-30-00RA	1SBL371024R8500	1.350
		400...415	415...440	0 0	UA63-30-00RA	1SBL371024R8600	1.350
60	64	24	24	0 0	UA75-30-00RA	1SBL411024R8100	1.350
		110	110...120	0 0	UA75-30-00RA	1SBL411024R8400	1.350
		220...230	230...240	0 0	UA75-30-00RA	1SBL411024R8000	1.350
		230...240	240...260	0 0	UA75-30-00RA	1SBL411024R8800	1.350
		380...400	400...415	0 0	UA75-30-00RA	1SBL411024R8500	1.350
		400...415	415...440	0 0	UA75-30-00RA	1SBL411024R8600	1.350

(1) Other control voltages see voltage code table.



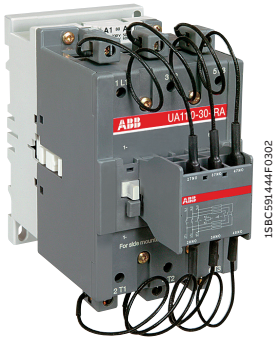
UA50..RA, UA63..RA, UA75..RA

Main dimensions mm, inches

UA95..RA ... UA110..RA 3-pole contactors for capacitor switching

70 to 80 kvar - Unlimited peak current Î

AC operated



UA110-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

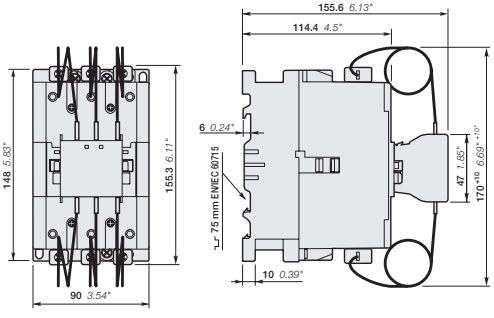
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC	UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power ≤ 40 °C 400 V AC-6b	Rated operational power ≤ 40 °C 480 V	V 50 Hz	V 60 Hz				Pkg (1 pce)
							kg
70	80	24	24	0 0	UA95-30-00RA	1SFL431024R8100	2.000
		110	110...120	0 0	UA95-30-00RA	1SFL431024R8400	2.000
		220...230	230...240	0 0	UA95-30-00RA	1SFL431024R8000	2.000
		230...240	240...260	0 0	UA95-30-00RA	1SFL431024R8800	2.000
		380...400	400...415	0 0	UA95-30-00RA	1SFL431024R8500	2.000
		400...415	415...440	0 0	UA95-30-00RA	1SFL431024R8600	2.000
80	95	24	24	0 0	UA110-30-00RA	1SFL451024R8100	2.000
		110	110...120	0 0	UA110-30-00RA	1SFL451024R8400	2.000
		220...230	230...240	0 0	UA110-30-00RA	1SFL451024R8000	2.000
		230...240	240...260	0 0	UA110-30-00RA	1SFL451024R8800	2.000
		380...400	400...415	0 0	UA110-30-00RA	1SFL451024R8500	2.000
		400...415	415...440	0 0	UA110-30-00RA	1SFL451024R8600	2.000

(1) Other control voltages see voltage code table.



UA95..RA, UA100..RA

Main dimensions mm, inches

UA..RA 3-pole contactors for capacitor switching

Unlimited peak current Î

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	Available auxiliary contacts	Front-mounted accessories Auxiliary contact blocks 1-pole CA5-..	Side-mounted accessories Auxiliary contact blocks 2-pole CAL...
UA16-30-10RA	3 0	1 0	–	1 x CAL5-11
UA26-30-10RA	3 0	1 0	–	1 to 2 x CAL5-11
UA30-30-10RA	3 0	1 0	1 x CA5-...	+ 1 to 2 x CAL5-11
UA50-30-00RA	3 0	0 0	1 to 2 x CA5-...	+ 1 to 2 x CAL5-11
UA63-30-00RA	3 0	0 0		
UA75-30-00RA	3 0	0 0		
UA95-30-00RA	3 0	0 0	1 to 2 x CA5-...	+ 1 to 2 x CAL18-11
UA110-30-00RA	3 0	0 0		

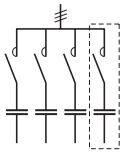
UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

Unlimited peak current Î

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
Pollution degree			3							
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	θ ≤ 40 °C	230-240 V	8 kvar	12.5 kvar	16 kvar	25 kvar	30 kvar	35 kvar	40 kvar	45 kvar
		400-415 V	12.5 kvar	22 kvar	30 kvar	40 kvar	50 kvar	60 kvar	70 kvar	80 kvar
		440 V	15 kvar	24 kvar	32 kvar	50 kvar	55 kvar	65 kvar	75 kvar	85 kvar
		500-550 V	18 kvar	30 kvar	34 kvar	55 kvar	65 kvar	75 kvar	85 kvar	95 kvar
		690 V	22 kvar	35 kvar	45 kvar	72 kvar	80 kvar	100 kvar	120 kvar	130 kvar
	θ ≤ 55 °C	230-240 V	7.5 kvar	11.5 kvar	16 kvar	24 kvar	27 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	40 kvar	45 kvar	50 kvar	60 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	43 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	16 kvar	25 kvar	34 kvar	50 kvar	60 kvar	65 kvar	75 kvar	82 kvar
		690 V	21 kvar	31 kvar	45 kvar	65 kvar	75 kvar	80 kvar	105 kvar	110 kvar
	θ ≤ 70 °C	230-240 V	6 kvar	9 kvar	11 kvar	20 kvar	23 kvar	25 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	15.5 kvar	19.5 kvar	35 kvar	39 kvar	41 kvar	53 kvar	60 kvar
		440 V	11 kvar	17 kvar	20.5 kvar	37 kvar	42.5 kvar	45 kvar	58 kvar	70 kvar
		500-550 V	12.5 kvar	20 kvar	25 kvar	46 kvar	50 kvar	55 kvar	70 kvar	78 kvar
		690 V	17 kvar	26 kvar	32 kvar	60 kvar	65 kvar	70 kvar	85 kvar	100 kvar
Max. permissible peak current Î			Unlimited							
Short-circuit protection device for contactors gG type fuse (2)			80 A	125 A	200 A				250 A	
Max. electrical switching frequency			240 cycles/h							
Electrical durability AC-6b		Ue ≤ 440 V	250 000 operating cycles							
		500 V ≤ Ue ≤ 690 V	100 000 operating cycles							



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.

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

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA	UA63..RA	UA75..RA	UA95..RA	UA110..RA
Power - 60 Hz										
For air temperature close to contactor	θ ≤ 40 °C	240 V	8 kvar	11 kvar	14 kvar	25 kvar	27.5 kvar	32 kvar	40 kvar	45 kvar
		480 V	16 kvar	22 kvar	28 kvar	50 kvar	55 kvar	64 kvar	80 kvar	95 kvar
		600 V	20 kvar	27 kvar	35 kvar	62 kvar	70 kvar	80 kvar	100 kvar	120 kvar
Max. permissible peak Current Î			Unlimited							

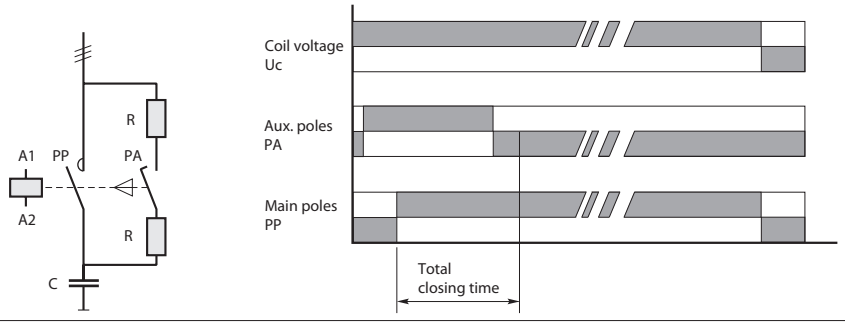
Operating principle

The front-mounted block mechanism of the UA..RA contactors ensures:
- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

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

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

The contactor can then begin a new cycle.



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

UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

Unlimited peak current Î

Technical data

Connecting characteristics

Contactor types			AC operated	UA16..RA	UA26..RA	UA30..RA	UA50..RA UA63..RA UA75..RA	UA95..RA UA110..RA
Connection capacity (min. ... max.)								
Main conductors (poles)								
Rigid	Solid (≤ 4 mm²)		1 x	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
	Stranded (≥ 6 mm²)		2 x	-	-	2.5...16 + 2.5...6 mm²	6...25 + 6...16 mm²	6...35 mm²
Flexible with ferrule			1 x	0.75...2.5 mm²	1.5...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
			2 x	-	-	2.5...10 + 2.5...4 mm²	6...16 + 6...10 mm²	6...35 mm²
Bars or lugs			L ≤	7.7 mm	10 mm	-	-	-
			I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque	Recommended			1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 53 lb.in
	Max.			1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)								
Rigid Solid/Stranded			1 x	1...4 mm²				0.75...2.5 mm²
			2 x	1...4 mm²				0.75...2.5 mm²
Flexible with ferrule			1 x	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
			2 x	0.75...2.5 mm²				
Lugs	Coil terminals		L ≤	8 mm				
			I >	3.7 mm				
	Built-in auxiliary terminals		L ≤	7.7 mm	10 mm	8 mm	-	-
			I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 18...14				
Tightening torque								
Coil terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Built-in auxiliary terminals	Recommended			1 Nm / 9 lb.in				
	Max.			1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20		IP10		
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals				Delivered in open position, screws of unused terminals must be tightened				
Main terminals				M 3.5	M 4	M 5	M6	M8
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M 3.5				
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals				M 3.5	M 4	M 3.5	-	-
		Screwdriver type		Flat Ø 5.5 / Pozidriv 2			-	-

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

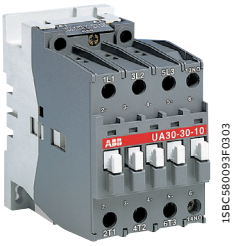
03

UA16 ... UA30 3-pole contactors for capacitor switching

12.5 to 27.5 kvar - Peak current Î ≤ 100 times the rms current

AC operated

UA16-30-10



UA30-30-10

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

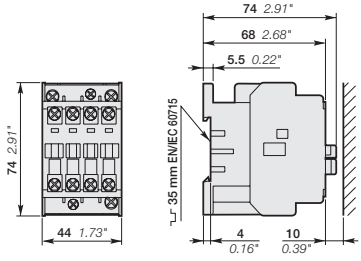
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

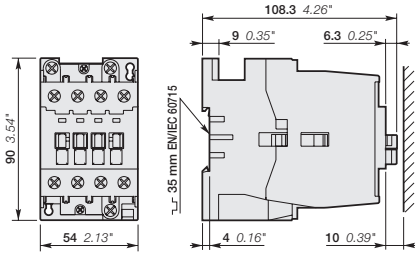
- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

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

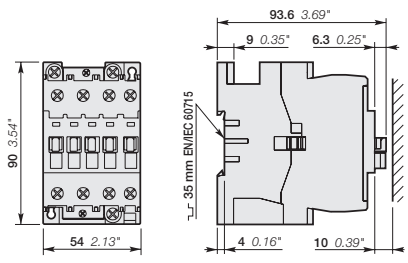
(1) Other control voltages see voltage code table.



UA16



UA30



UA26

Main dimensions mm, inches

UA50 ... UA75 3-pole contactors for capacitor switching

33 to 50 kvar - Peak current Î ≤ 100 times the rms current
AC operated

UA50-30-00

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

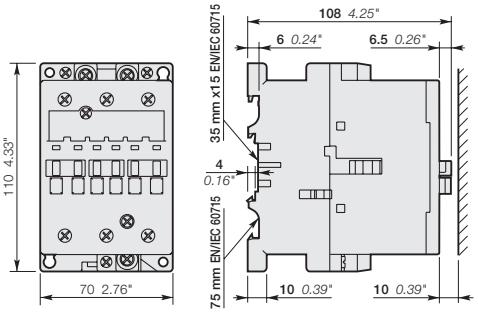
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

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

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power □ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power □ ≤ 40 °C 480 V						Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz				kg
33	5	40	24	24	0 0	UA50-30-00	1SBL351022R8100	1.160
			48	48	0 0	UA50-30-00	1SBL351022R8300	1.160
			110	110...120	0 0	UA50-30-00	1SBL351022R8400	1.160
			220...230	230...240	0 0	UA50-30-00	1SBL351022R8000	1.160
			230...240	240...260	0 0	UA50-30-00	1SBL351022R8800	1.160
			380...400	400...415	0 0	UA50-30-00	1SBL351022R8500	1.160
			400...415	415...440	0 0	UA50-30-00	1SBL351022R8600	1.160
45	6.5	-	24	24	0 0	UA63-30-00	1SBL371022R8100	1.160
			48	48	0 0	UA63-30-00	1SBL371022R8300	1.160
			110	110...120	0 0	UA63-30-00	1SBL371022R8400	1.160
			220...230	230...240	0 0	UA63-30-00	1SBL371022R8000	1.160
			230...240	240...260	0 0	UA63-30-00	1SBL371022R8800	1.160
			380...400	400...415	0 0	UA63-30-00	1SBL371022R8500	1.160
			400...415	415...440	0 0	UA63-30-00	1SBL371022R8600	1.160
50	7.5	55	24	24	0 0	UA75-30-00	1SBL411022R8100	1.160
			48	48	0 0	UA75-30-00	1SBL411022R8300	1.160
			110	110...120	0 0	UA75-30-00	1SBL411022R8400	1.160
			220...230	230...240	0 0	UA75-30-00	1SBL411022R8000	1.160
			230...240	240...260	0 0	UA75-30-00	1SBL411022R8800	1.160
			380...400	400...415	0 0	UA75-30-00	1SBL411022R8500	1.160
			400...415	415...440	0 0	UA75-30-00	1SBL411022R8600	1.160

(1) Other control voltages see voltage code table.



UA50, UA63, UA75

Main dimensions mm, inches

UA95 ... UA110 3-pole contactors for capacitor switching

65 to 75 kvar - Peak current Î ≤ 100 times the rms current

AC operated

UA110-30-00

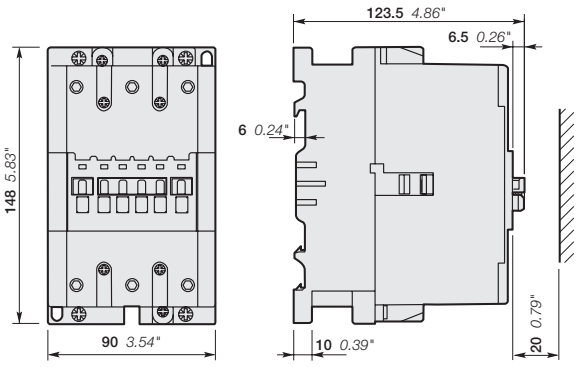
UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

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

IEC		UL/CSA	Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power □ ≤ 40 °C 400 V AC-6b	Max peak current Î	Rated operational power □ ≤ 40 °C 480 V						Pkg (1 pce)
kvar	kA	kvar	V 50 Hz	V 60 Hz				kg
65	9.3	70	24	24	0 0	UA95-30-00	1SFL431022R8100	2.000
			48	48	0 0	UA95-30-00	1SFL431022R8300	2.000
			110	110...120	0 0	UA95-30-00	1SFL431022R8400	2.000
			220...230	230...240	0 0	UA95-30-00	1SFL431022R8000	2.000
			230...240	240...260	0 0	UA95-30-00	1SFL431022R8800	2.000
			380...400	400...415	0 0	UA95-30-00	1SFL431022R8500	2.000
			400...415	415...440	0 0	UA95-30-00	1SFL431022R8600	2.000
75	10.5	80	24	24	0 0	UA110-30-00	1SFL451022R8100	2.000
			48	48	0 0	UA110-30-00	1SFL451022R8300	2.000
			110	110...120	0 0	UA110-30-00	1SFL451022R8400	2.000
			220...230	230...240	0 0	UA110-30-00	1SFL451022R8000	2.000
			230...240	240...260	0 0	UA110-30-00	1SFL451022R8800	2.000
			380...400	400...415	0 0	UA110-30-00	1SFL451022R8500	2.000
			400...415	415...440	0 0	UA110-30-00	1SFL451022R8600	2.000

(1) Other control voltages see voltage code table.



UA95, UA110

Main dimensions mm, inches

UA... 3-pole contactors for capacitor switching

Peak current Î ≤ 100 times the rms current

Main accessory fitting details

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

Contactor types	Main poles	Available auxiliary contacts	Front-mounted accessories Auxiliary contact blocks			Side-mounted accessories Auxiliary contact blocks
			1-pole CA5-..	4-pole CA5-..		2-pole CAL...
UA16-30-10	3 0	1 0	1 to 4 x CA5-..	**or** 1 x CA5-.. (4-pole)	+	1 to 2 x CAL5-11
UA26-30-10	3 0	1 0	1 to 4 x CA5-..	**or** 1 x CA5-.. (4-pole)	+	1 to 2 x CAL5-11
UA30-30-10	3 0	1 0	1 to 5 x CA5-..	**or** 1 x CA5-.. (4-pole) + 1 x 1-pole CA5-..	+	1 to 2 x CAL5-11
UA50-30-00	3 0	0 0	1 to 6 x CA5-..	**or** 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	1 to 2 x CAL5-11
UA63-30-00	3 0	0 0				
UA75-30-00	3 0	0 0				
UA95-30-00	3 0	0 0	1 to 6 x CA5-..	**or** 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-..	+	1 to 2 x CAL18-11
UA110-30-00	3 0	0 0				

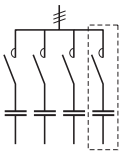
UA16 ... UA110 3-pole contactors for capacitor switching

Peak current Î ≤ 100 times the rms current

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Standards			IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1							
Rated operational voltage Ue max.			690 V							
Rated frequency (without derating)			50 / 60 Hz							
Pollution degree			3							
AC-6b Utilization category										
Rated operational power AC-6b (1)										
For air temperature close to contactor	θ ≤ 40 °C	230-240 V	7.5 kvar	12 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	12.5 kvar	20 kvar	27.5 kvar	33 kvar	45 kvar	50 kvar	65 kvar	75 kvar
		440 V	13.7 kvar	22 kvar	30 kvar	36 kvar	50 kvar	55 kvar	65 kvar	75 kvar
		500-550 V	15.5 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	21.5 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 55 °C	230-240 V	6.7 kvar	11 kvar	16 kvar	20 kvar	25 kvar	30 kvar	35 kvar	40 kvar
		400-415 V	11.7 kvar	18.5 kvar	27.5 kvar	33 kvar	43 kvar	50 kvar	65 kvar	70 kvar
		440 V	13 kvar	20 kvar	30 kvar	36 kvar	48 kvar	53 kvar	65 kvar	75 kvar
		500-550 V	14.7 kvar	22 kvar	34 kvar	40 kvar	50 kvar	62 kvar	70 kvar	80 kvar
		690 V	20 kvar	30 kvar	45 kvar	55 kvar	70 kvar	75 kvar	80 kvar	90 kvar
	θ ≤ 70 °C	230-240 V	6 kvar	8.5 kvar	11 kvar	19 kvar	21 kvar	22 kvar	30 kvar	35 kvar
		400-415 V	10 kvar	14.5 kvar	19 kvar	32 kvar	37 kvar	39 kvar	55 kvar	65 kvar
		440 V	11 kvar	16 kvar	20 kvar	35 kvar	41 kvar	43 kvar	55 kvar	70 kvar
		500-550 V	12.5 kvar	19.5 kvar	23.5 kvar	40 kvar	45 kvar	47.5 kvar	60 kvar	75 kvar
		690 V	17 kvar	25 kvar	32 kvar	52 kvar	60 kvar	65 kvar	70 kvar	85 kvar
Max. permissible peak current Î		Ue ≤ 500 V	1.8 kA	3 kA	3.5 kA	5 kA	6.5 kA	7.5 kA	9.3 kA	10.5 kA
		Ue > 500 V	1.6 kA	2.7 kA	3.1 kA	4.5 kA	5.8 kA	6.75 kA	8 kA	9 kA
Short-circuit protection device for contactors										
gG type fuse			sized 1.5...1.8 In of the capacitor							
Max. electrical switching frequency			240 cycles/h							
Electrical durability AC-6b		Ue ≤ 690 V	100 000 operating cycles							



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.
If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

Main pole - Utilization characteristics according to UL / CSA

Contactor types		AC operated	UA16	UA26	UA30	UA50	UA63	UA75	UA95	UA110
Power - 60 Hz										
For air temperature close to contactor	θ ≤ 40 °C	240 V	-	12.5 kvar	16 kvar	20 kvar	-	27.5 kvar	35 kvar	40 kvar
		480 V	-	25 kvar	32 kvar	40 kvar	-	55 kvar	70 kvar	80 kvar
		600 V	-	30 kvar	40 kvar	50 kvar	-	70 kvar	75 kvar	85 kvar

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

UA16 ... UA110 3-pole contactors for capacitor switching

Peak current Î ≤ 100 times the rms current

Technical data

Connecting characteristics

Contactor types			AC operated	UA16	UA26	UA30	UA50 UA63 UA75	UA95 UA110
Connection capacity (min. ... max.)								
Main conductors (poles)								
	Rigid	Solid (≤ 4 mm²)	1 x	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...50 mm²	10...95 mm²
		Stranded (≥ 6 mm²)	2 x	1...4 mm²	1.5...6 mm²	2.5...16 mm²	6...25 mm²	6...35 mm²
	Flexible with ferrule		1 x	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...35 mm²	10...70 mm²
			2 x	0.75...2.5 mm²	0.75...4 mm²	2.5...10 mm²	6...16 mm²	6...35 mm²
	Bars or lugs		L ≤	7.7 mm	10 mm	-	-	-
			I >	3.7 mm	4.2 mm	-	-	-
Connection capacity acc. to UL/CSA			1 or 2 x	AWG 18...10	AWG 12...8	AWG 8...4	AWG 8...1	AWG 6...2/0
Tightening torque		Recommended		1 Nm / 9 lb.in	1.7 Nm / 15 lb.in	2.3 Nm / 20 lb.in	4 Nm / 35 lb.in	8 Nm / 71 lb.in
		Max.		1.2 Nm	2.2 Nm	2.6 Nm	4.5 Nm	9 Nm
Auxiliary conductors (built-in auxiliary terminals + coil terminals)								
	Rigid Solid/Stranded		1 x	1...4 mm²				0.75...2.5 mm²
			2 x	1...4 mm²				0.75...2.5 mm²
	Flexible with ferrule		1 x	0.75...2.5 mm²			1...2.5 mm²	0.75...2.5 mm²
			2 x	0.75...2.5 mm²				
	Lugs	Coil terminals	L ≤	8 mm				
			I >	3.7 mm				
		Built-in auxiliary	L ≤	7.7 mm	10 mm	8 mm	-	-
		terminals	I >	3.7 mm	4.2 mm	3.7 mm	-	-
Connection capacity acc. to UL/CSA				AWG 18...14				
Tightening torque								
Coil terminals		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Built-in auxiliary terminals		Recommended		1 Nm / 9 lb.in				
		Max.		1.2 Nm				
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals				IP20			IP10	
Coil terminals				IP20				
Built-in auxiliary terminals				IP20			-	-
Screw terminals				Delivered in open position, screws of unused terminals must be tightened				
Main terminals				M3.5	M4	M5	M6	M8
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2		Flat Ø 6.5 / Pozidriv 2		Hexagon socket (s = 4 mm)
Coil terminals				M3.5				
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals				M3.5	M4	M3.5	-	-
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2			-	-

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

AF 3-pole contactors for capacitor switching

Single step - Peak current Î ≤ 30 times the rms curent

The AF116 ... AF1650 3-pole contactors are suited for capacitor bank switching for the peak current and power values in the table below.

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

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

AF116 ... AF370 3-pole contactors

Contactor types			AF116	AF140	AF146	AF190	AF205	AF265	AF305	AF370
AC-6b Utilization category										
For air temperature close to contactor										
Rated operational power AC-6b										
	θ ≤ 40 °C	230-240 V	40 kvar	45 kvar	50 kvar	60 kvar	75 kvar	85 kvar	100 kvar	110 kvar
		400-415 V	75 kvar	85 kvar	90 kvar	110 kvar	130 kvar	145 kvar	165 kvar	200 kvar
		440 V	75 kvar	90 kvar	93 kvar	115 kvar	135 kvar	155 kvar	180 kvar	200 kvar
		500-550 V	83 kvar	95 kvar	110 kvar	140 kvar	160 kvar	180 kvar	210 kvar	240 kvar
		690 V	80 kvar	95 kvar	110 kvar	135 kvar	170 kvar	200 kvar	240 kvar	280 kvar
		1000 V	-	-	100 kvar	140 kvar	150 kvar	155 kvar	160 kvar	170 kvar
	θ ≤ 55 °C	230-240 V	40 kvar	45 kvar	50 kvar	60 kvar	75 kvar	85 kvar	100 kvar	110 kvar
		400-415 V	70 kvar	85 kvar	90 kvar	110 kvar	130 kvar	145 kvar	165 kvar	200 kvar
		440 V	75 kvar	90 kvar	93 kvar	115 kvar	135 kvar	155 kvar	180 kvar	200 kvar
		500-550 V	83 kvar	95 kvar	110 kvar	135 kvar	160 kvar	180 kvar	210 kvar	240 kvar
		690 V	80 kvar	95 kvar	110 kvar	135 kvar	170 kvar	200 kvar	240 kvar	280 kvar
		1000 V	-	-	100 kvar	140 kvar	150 kvar	155 kvar	160 kvar	170 kvar
	θ ≤ 70 °C	230-240 V	35 kvar	40 kvar	42 kvar	45 kvar	57 kvar	70 kvar	85 kvar	100 kvar
		400-415 V	65 kvar	70 kvar	74 kvar	83 kvar	105 kvar	135 kvar	155 kvar	180 kvar
		440 V	65 kvar	75 kvar	80 kvar	85 kvar	110 kvar	140 kvar	163 kvar	180 kvar
		500-550 V	78 kvar	90 kvar	96 kvar	102 kvar	130 kvar	165 kvar	196 kvar	220 kvar
		690 V	75 kvar	90 kvar	110 kvar	135 kvar	160 kvar	200 kvar	240 kvar	260 kvar
		1000 V	-	-	95 kvar	120 kvar	130 kvar	140 kvar	150 kvar	160 kvar
Max. permissible peak current I		Ue ≤ 500 V	4 kA	4 kA	4 kA	5 kA	6.5 kA	8 kA	8 kA	8 kA

Single-step capacitor bank scheme

AF400 ... AF1650 3-pole contactors

Contactor types			AF400	AF460	AF580	AF750	AF1350	AF1650
AC-6b Utilization category								
For air temperature close to contactor								
Rated operational power AC-6b								
	θ ≤ 40 °C	230-240 V	120 kvar	140 kvar	170 kvar	220 kvar	250 kvar	300 kvar
		400-415 V	210 kvar	240 kvar	285 kvar	400 kvar	450 kvar	500 kvar
		440 V	220 kvar	260 kvar	300 kvar	410 kvar	500 kvar	550 kvar
		500-550 V	260 kvar	325 kvar	350 kvar	490 kvar	550 kvar	600 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	650 kvar	800 kvar
		1000 V	250 kvar	300 kvar	350 kvar	450 kvar	-	-
	θ ≤ 55 °C	230-240 V	120 kvar	140 kvar	170 kvar	220 kvar	250 kvar	300 kvar
		400-415 V	210 kvar	240 kvar	285 kvar	400 kvar	450 kvar	500 kvar
		440 V	220 kvar	260 kvar	300 kvar	410 kvar	500 kvar	550 kvar
		500-550 V	260 kvar	325 kvar	350 kvar	480 kvar	550 kvar	600 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	650 kvar	800 kvar
		1000 V	250 kvar	300 kvar	350 kvar	450 kvar	-	-
	θ ≤ 70 °C	230-240 V	105 kvar	120 kvar	160 kvar	190 kvar	230 kvar	280 kvar
		400-415 V	195 kvar	225 kvar	275 kvar	370 kvar	430 kvar	480 kvar
		440 V	200 kvar	230 kvar	290 kvar	380 kvar	470 kvar	520 kvar
		500-550 V	241 kvar	300 kvar	340 kvar	435 kvar	530 kvar	570 kvar
		690 V	300 kvar	325 kvar	440 kvar	600 kvar	630 kvar	750 kvar
		1000 V	220 kvar	270 kvar	300 kvar	400 kvar	-	-
Max. permissible peak current I		Ue ≤ 500 V	10 kA	10 kA	12 kA	12 kA	18 kA	20 kA

Single-step capacitor bank scheme

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**

NF 4-pole and 8-pole contactor relays

Ordering details 4-pole contactor relays

3/266 NF AC / DC operated
3/267 NFZ 24 V DC operated designed for PLC
3/268 NFZ AC / DC operated for specific applications
3/269 Contactor relays and main accessories

Ordering details 8-pole contactor relays

3/270 NF AC / DC operated
3/271 NFZ 24 V DC operated designed for PLC
3/272 NFZ AC / DC operated for specific applications
3/273 Contactor relays and main accessories

3/274 **Technical data**

Ordering details contactor relays with Push-in Spring terminals

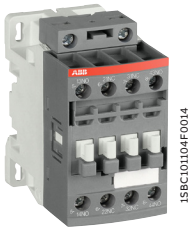
3/277 NF..K AC / DC operated
3/278 NFZ..K 24 V DC operated designed for PLC
3/279 NFZ..K AC / DC operated for specific applications
3/280 Contactor relays and main accessories

3/281 **Technical data**

3/466 **Voltage code table**

NF 4-pole contactor relays

AC / DC operated

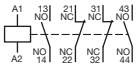
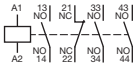


NF22E

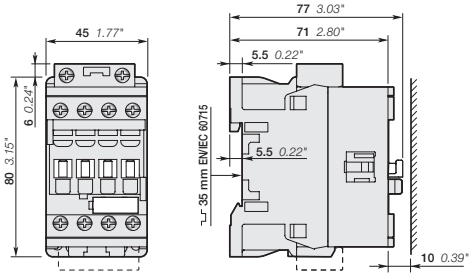
NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.			Type	Order code	Weight Pkg (1 pce)
	V 50/60 Hz	V DC				kg
	24...60	20...60	(1)	NF22E-11	1SBH137001R1122	0.270
	48...130	48...130		NF22E-12	1SBH137001R1222	0.270
	100...250	100...250		NF22E-13	1SBH137001R1322	0.270
	250...500	250...500		NF22E-14	1SBH137001R1422	0.310
	24...60	20...60	(1)	NF31E-11	1SBH137001R1131	0.270
	48...130	48...130		NF31E-12	1SBH137001R1231	0.270
	100...250	100...250		NF31E-13	1SBH137001R1331	0.270
	250...500	250...500		NF31E-14	1SBH137001R1431	0.310
	24...60	20...60	(1)	NF40E-11	1SBH137001R1140	0.270
	48...130	48...130		NF40E-12	1SBH137001R1240	0.270
	100...250	100...250		NF40E-13	1SBH137001R1340	0.270
	250...500	250...500		NF40E-14	1SBH137001R1440	0.310

(1) NF..-11 not suitable for direct control by PLC-output.

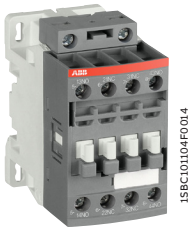


NF22E, NF31E, NF40E

Main dimensions mm, inches

NFZ 4-pole contactor relays

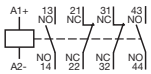
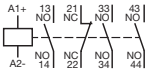
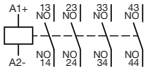
24 V DC operated designed for PLC



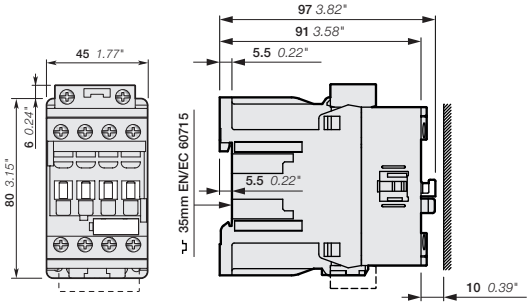
NFZ22E-30

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc V DC	Type	Order code	Weight Pkg (1 pce) kg
4-pole contactor relays				
	24	NFZ22E-30	1SBH136001R3022	0.430
	24	NFZ31E-30	1SBH136001R3031	0.430
	24	NFZ40E-30	1SBH136001R3040	0.430

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

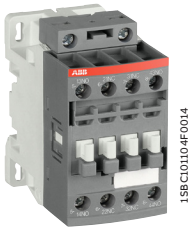


NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

NFZ 4-pole contactor relays

AC / DC operated for specific applications

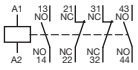
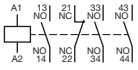
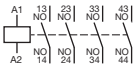


NFZ22E

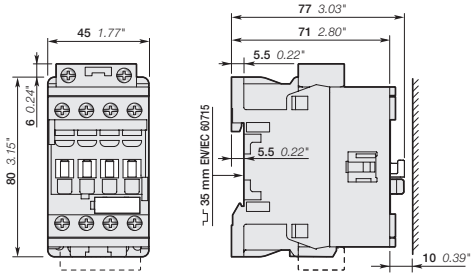
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code	Weight Pkg (1 pce)
	V 50/60 Hz	V DC			kg
	–	12...20	NFZ22E-20	1SBH136001R2022	0.310
	24...60	20...60	NFZ22E-21	1SBH136001R2122	0.310
	48...130	48...130	NFZ22E-22	1SBH136001R2222	0.310
	100...250	100...250	NFZ22E-23	1SBH136001R2322	0.310
	–	12...20	NFZ31E-20	1SBH136001R2031	0.310
	24...60	20...60	NFZ31E-21	1SBH136001R2131	0.310
	48...130	48...130	NFZ31E-22	1SBH136001R2231	0.310
	100...250	100...250	NFZ31E-23	1SBH136001R2331	0.310
	–	12...20	NFZ40E-20	1SBH136001R2040	0.310
	24...60	20...60	NFZ40E-21	1SBH136001R2140	0.310
	48...130	48...130	NFZ40E-22	1SBH136001R2240	0.310
	100...250	100...250	NFZ40E-23	1SBH136001R2340	0.310

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

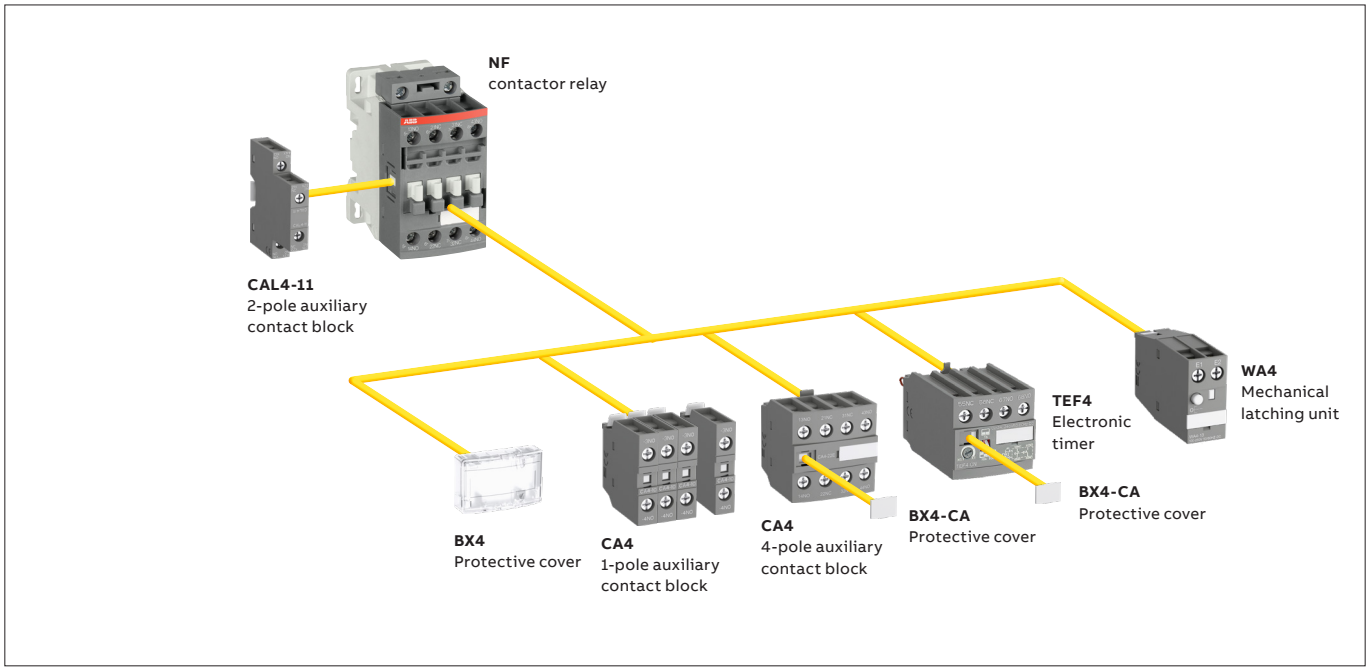


NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

NF 4-pole 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.

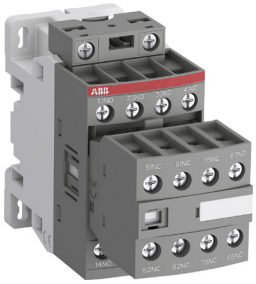
Contactor relay types	Main poles		Front-mounted accessories					Side-mounted accessories	
			Auxiliary contact blocks		Electronic timer	Mechanical latching unit		Auxiliary contact blocks	
								2-pole CAL4-11	
			1-pole CA4	4-pole CA4	TEF4	WA4 (3)		Left side	Right side
NF(Z)									
NF	2 2	E (1)	4 max.	**or** 1	**or** 1	**or** 1	+	1	–
	3 1	E (1)	2 max.	–	**or** 1	**or** 1	+	1	+ 1
	4 0	E (2)							
NFZ 24 V DC designed for PLC - coil 30									
NFZ	2 2	E (1)	4 max.	**or** 1	**or** 1	–	**or**	1	+ 1
	3 1	E (1)	2 max.	–	**or** 1	–	+	1	–
	4 0	E (2)	–	–	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.
For WA4, accessory use with contactor relays coil 30, please consult your ABB local sales organization.

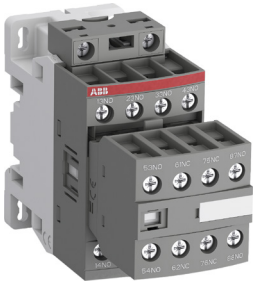
NF 8-pole contactor relays

AC / DC operated

NF44E



NF33/11

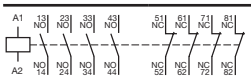
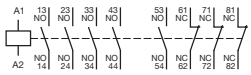
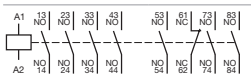
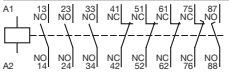


NF51/11

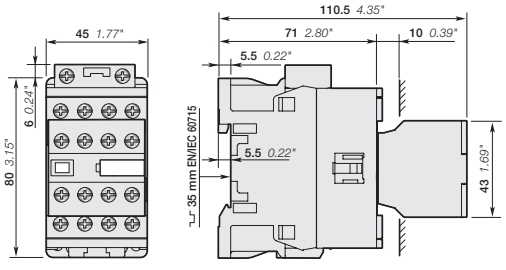
NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NF33/11 and NF51/11 variants
- overlapping of lagging / leading contacts for NF33/11 and NF51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code	Weight Pkg (1 pce) kg
8-pole contactor relays						
		24...60	20...60 (1)	NF44E-11	1SBH137001R1144	0.320
		48...130	48...130	NF44E-12	1SBH137001R1244	0.320
		100...250	100...250	NF44E-13	1SBH137001R1344	0.320
		250...500	250...500	NF44E-14	1SBH137001R1444	0.360
		24...60	20...60 (1)	NF53E-11	1SBH137001R1153	0.320
		48...130	48...130	NF53E-12	1SBH137001R1253	0.320
		100...250	100...250	NF53E-13	1SBH137001R1353	0.320
		250...500	250...500	NF53E-14	1SBH137001R1453	0.360
		24...60	20...60 (1)	NF62E-11	1SBH137001R1162	0.320
		48...130	48...130	NF62E-12	1SBH137001R1262	0.320
		100...250	100...250	NF62E-13	1SBH137001R1362	0.320
		250...500	250...500	NF62E-14	1SBH137001R1462	0.360
		24...60	20...60 (1)	NF71E-11	1SBH137001R1171	0.320
		48...130	48...130	NF71E-12	1SBH137001R1271	0.320
		100...250	100...250	NF71E-13	1SBH137001R1371	0.320
		250...500	250...500	NF71E-14	1SBH137001R1471	0.360
		24...60	20...60 (1)	NF80E-11	1SBH137001R1180	0.320
		48...130	48...130	NF80E-12	1SBH137001R1280	0.320
		100...250	100...250	NF80E-13	1SBH137001R1380	0.320
		250...500	250...500	NF80E-14	1SBH137001R1480	0.360
8-pole contactor relays with overlapping of lagging / leading contacts						
		24...60	20...60 (1)	NF33/11-11	1SBH137001R1139	0.320
		48...130	48...130	NF33/11-12	1SBH137001R1239	0.320
		100...250	100...250	NF33/11-13	1SBH137001R1339	0.320
		250...500	250...500	NF33/11-14	1SBH137001R1439	0.320
		24...60	20...60 (1)	NF51/11-11	1SBH137001R1159	0.320
		48...130	48...130	NF51/11-12	1SBH137001R1259	0.320
		100...250	100...250	NF51/11-13	1SBH137001R1359	0.320
		250...500	250...500	NF51/11-14	1SBH137001R1459	0.320

(1) NF..-11 not suitable for direct control by PLC.



NF44E, NF53E, NF62E, NF71E, NF80E, NF33/11, NF51/11

Main dimensions mm, inches

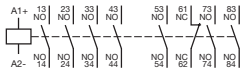
NFZ 8-pole contactor relays

24 V DC operated designed for PLC

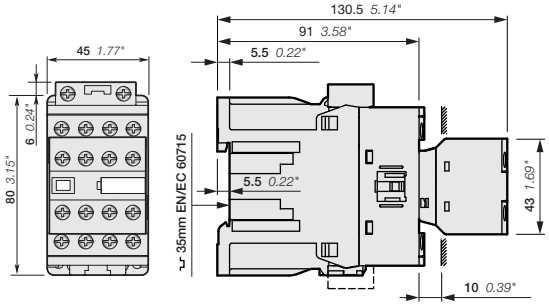
NFZ44E

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression.

Number of contacts	Rated control circuit voltage Uc V DC	Type	Order code	Weight Pkg (1 pce) kg
8-pole contactor relays				
	24	NFZ44E-30	1SBH136001R3044	0.490
	24	NFZ53E-30	1SBH136001R3053	0.490
	24	NFZ62E-30	1SBH136001R3062	0.490
	24	NFZ71E-30	1SBH136001R3071	0.490
	24	NFZ80E-30	1SBH136001R3080	0.490

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



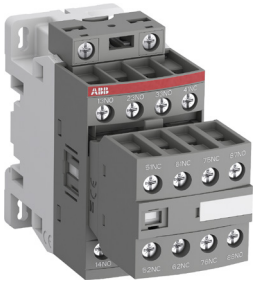
NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E

Main dimensions mm, inches

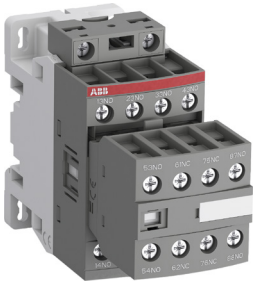
NFZ 8-pole contactor relays

AC / DC operated for specific applications

NFZ44E



NFZ33/11

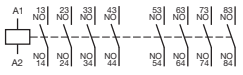
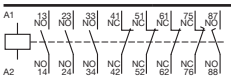
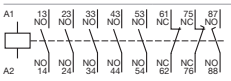


NFZ51/11

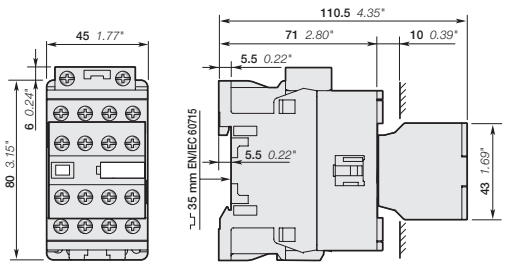
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NFZ33/11 and NFZ51/11 variants
- overlapping of lagging / leading contacts for NFZ33/11 and NFZ51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24 ... 250 V 50/60 Hz and 12 ... 250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

Number of contacts 1st stack	2nd stack	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code	Weight Pkg (1 pce) kg
8-pole contactor relays						
		-	12...20	NFZ44E-20	1SBH136001R2044	0.360
		24...60	20...60	NFZ44E-21	1SBH136001R2144	0.360
		48...130	48...130	NFZ44E-22	1SBH136001R2244	0.360
		100...250	100...250	NFZ44E-23	1SBH136001R2344	0.360
		-	12...20	NFZ53E-20	1SBH136001R2053	0.360
		24...60	20...60	NFZ53E-21	1SBH136001R2153	0.360
		48...130	48...130	NFZ53E-22	1SBH136001R2253	0.360
		100...250	100...250	NFZ53E-23	1SBH136001R2353	0.360
		-	12...20	NFZ62E-20	1SBH136001R2062	0.360
		24...60	20...60	NFZ62E-21	1SBH136001R2162	0.360
		48...130	48...130	NFZ62E-22	1SBH136001R2262	0.360
		100...250	100...250	NFZ62E-23	1SBH136001R2362	0.360
		-	12...20	NFZ71E-20	1SBH136001R2071	0.360
		24...60	20...60	NFZ71E-21	1SBH136001R2171	0.360
		48...130	48...130	NFZ71E-22	1SBH136001R2271	0.360
		100...250	100...250	NFZ71E-23	1SBH136001R2371	0.360
		-	12...20	NFZ80E-20	1SBH136001R2080	0.360
		24...60	20...60	NFZ80E-21	1SBH136001R2180	0.360
		48...130	48...130	NFZ80E-22	1SBH136001R2280	0.360
		100...250	100...250	NFZ80E-23	1SBH136001R2380	0.360
8-pole contactor relays with overlapping of lagging / leading contacts						
		-	12...20	NFZ33/11-20	1SBH136001R2039	0.360
		24...60	20...60	NFZ33/11-21	1SBH136001R2139	0.360
		48...130	48...130	NFZ33/11-22	1SBH136001R2239	0.360
		100...250	100...250	NFZ33/11-23	1SBH136001R2339	0.360
		-	12...20	NFZ51/11-20	1SBH136001R2059	0.360
		24...60	20...60	NFZ51/11-21	1SBH136001R2159	0.360
		48...130	48...130	NFZ51/11-22	1SBH136001R2259	0.360
		100...250	100...250	NFZ51/11-23	1SBH136001R2359	0.360

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

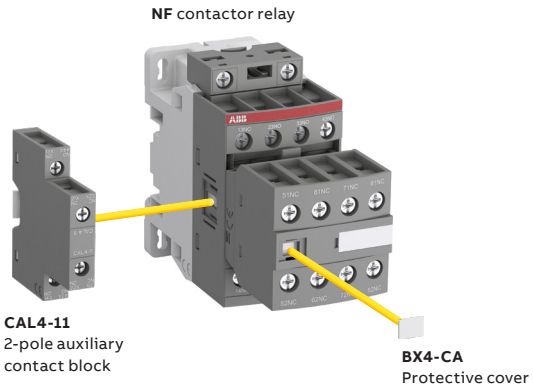


NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E, NFZ33/11, NFZ51/11

Main dimensions mm, inches

NF 8-pole contactor relays

Contactor relays and main accessories



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

Contactor relay types	Main poles			Side-mounted accessories Auxiliary contact blocks 2-pole CAL4-11 (1)	
				Left side	Right side
NF	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) not allowed for 24 V DC operated contactor relay (coil 30).

NF contactor relays
Technical data

Contact utilization characteristics according to IEC

Contactor relay types	AC / DC operated	**NF**
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 40 °C		16 A
Ie / Rated operational current AC-15 acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Rated making capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Rated breaking capacity AC-15		10 x Ie AC-15 acc. to IEC 60947-5-1
Ie / Rated operational current DC-13 acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
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 / DC operated	**NF**
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V AC, 600 V DC
Pilot duty		A600, Q600
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA

NF contactor relays
Technical data

Magnet System Characteristics - NF contactor relays AC / DC operated

Contactor relay types	AC / DC operated	**NF**
Coil operating limits acc. to IEC 60947-5-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max. At θ ≤ 70 °C 0.85 x Uc min...Uc max.
	DC supply	at θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max at θ ≤ 70 °C 0.85 x Uc min ... Uc max
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24...500 V AC
Coil consumption	Average pull-in value	50 VA
	Average holding value	2.2 VA / 2 W
DC control voltage		
Rated control circuit voltage Uc		20...500 V DC
Coil consumption	Average pull-in value	50 W
	Average holding value	2 W
PLC-output control		Not suitable for direct control by PLC-output
Drop-out voltage		≤ 60 % of Uc min.
Voltage sag immunity acc. to SEMI F47-0706		–
Dips withstand -20 °C ≤ θ ≤ +60 °C		–
Operating time		
Between coil energization and:	N.O. contact closing	40...95 ms
	N.C. contact opening	38...90 ms
Between coil de-energization and:	N.O. contact opening	11...95 ms
	N.C. contact closing	13...98 ms

Magnet System Characteristics - NFZ contactor relays 24V DC operated - designed for PLC - coil 30

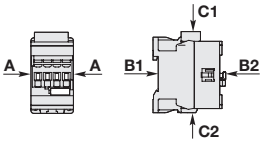
Contactor relay types	DC operated	**NFZ**
Coil operating limits acc. to IEC 60947-5-1	DC supply	at θ ≤ 60 °C 0.85 ... 1.1x Uc at θ ≤ 70 °C Uc
DC control voltage		
Rated control circuit voltage Uc		24 V DC
Coil consumption	Average pull-in value	6 W
	Average holding value	1.7 W
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection
Drop-out voltage		≤ 60 % of Uc min.
Operating time		
Between coil energization and:	N.O. contact closing	27 ... 53 ms
	N.C. contact opening	20 ... 35 ms
Between coil de-energization and:	N.O. contact opening	17 ... 29 ms
	N.C. contact closing	22 ... 57 ms

Magnet System Characteristics - NFZ... contactor relays - for specific applications - coils 20, 21, 22, 23

Contactor relay types	AC / DC operated	**NFZ**
Coil operating limits acc. to IEC 60947-5-1	AC supply	at θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max at θ ≤ 70 °C 0.85 x Uc min ... Uc max
	DC supply	at θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24...250 V AC
Coil consumption	Average pull-in value	16 VA
	Average holding value	1.7 VA / 1.5 W
DC control voltage		
Rated control circuit voltage Uc		12...250 V DC
Coil consumption	Average pull-in value	12 ... 16 W
	Average holding value	1.7 W
PLC-output control		(NFZ coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs
Drop-out voltage		≤ 60 % of Uc min.
Voltage sag immunity acc. to SEMI F47-0706		Conditions of use on request
Dips withstand -20 °C ≤ θ ≤ +60 °C		(NFZ coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC
Operating time		
Between coil energization and:	N.O. contact closing	40...95 ms
	N.C. contact opening	38...90 ms
Between coil de-energization and:	N.O. contact opening	11...95 ms
	N.C. contact closing	13...98 ms

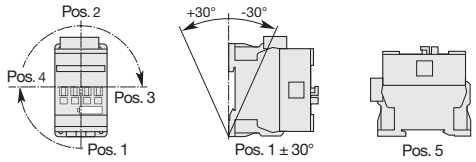
NF contactor relays
Technical data

General technical data

Contactor relay types	AC / DC operated	**NF**
Rated insulation voltage Ui		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		600 V
Rated impulse withstand voltage Uimp.		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)
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 operating cycles
Max. switching frequency		6000 cycles/h
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1		
	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	30 g
	B1	25 g closed position / 5 g open position
	B2	15 g
	C1	25 g
	C2	25 g
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 4 g closed position / 2 g open position

(1) Environment B: all NF contactor relays produced since week 08-2013.
NF..E-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B, select NFZ..E-22.

Mounting characteristics

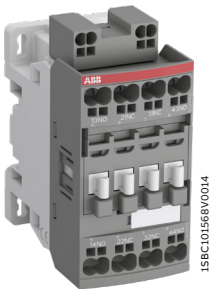
Contactor relay types	AC / DC operated	**NF**
Mounting positions		
		Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay
Mounting distances		The contactor relays can be assembled side by side.
Fixing		
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
By screws (not supplied)		2 x M4 screws placed diagonally

Connecting characteristics

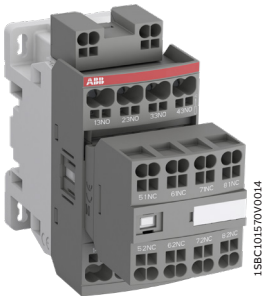
Contactor relay types	AC / DC operated	**NF**
Main terminals		 Screw terminals with cable clamp
Connection capacity (min. ... max.)		
Pole and coil terminals		
Rigid Solid/Stranded	1 x	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with 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

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

AC / DC operated



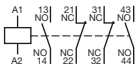
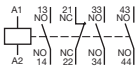
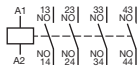
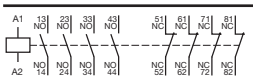
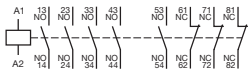
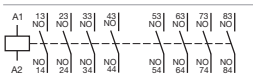
NF22EK



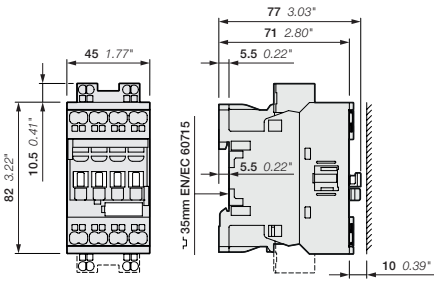
NF44EK

NF..K contactor relays are used for switching auxiliary and control circuits.
These contactor relays are of the block type design with:

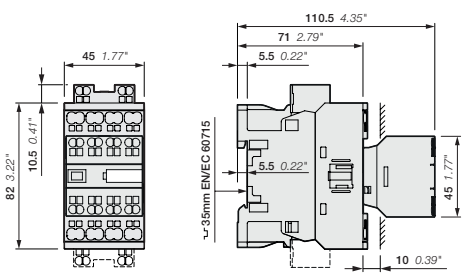
- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
  Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code	Weight Pkg (1 pce) kg
4-pole contactor relays					
	24 ... 60	20 ... 60 (1)	NF22EK-11	1SBH137005R1122	0.285
	48 ... 130	48 ... 130	NF22EK-12	1SBH137005R1222	0.285
	100 ... 250	100 ... 250	NF22EK-13	1SBH137005R1322	0.285
	250 ... 500	250 ... 500	NF22EK-14	1SBH137005R1422	0.325
	24 ... 60	20 ... 60 (1)	NF31EK-11	1SBH137005R1131	0.285
	48 ... 130	48 ... 130	NF31EK-12	1SBH137005R1231	0.285
	100 ... 250	100 ... 250	NF31EK-13	1SBH137005R1331	0.285
	250 ... 500	250 ... 500	NF31EK-14	1SBH137005R1431	0.325
	24 ... 60	20 ... 60 (1)	NF40EK-11	1SBH137005R1140	0.285
	48 ... 130	48 ... 130	NF40EK-12	1SBH137005R1240	0.285
	100 ... 250	100 ... 250	NF40EK-13	1SBH137005R1340	0.285
	250 ... 500	250 ... 500	NF40EK-14	1SBH137005R1440	0.325
8-pole contactor relays					
	24 ... 60	20 ... 60 (1)	NF44EK-11	1SBH137005R1144	0.330
	48 ... 130	48 ... 130	NF44EK-12	1SBH137005R1244	0.330
	100 ... 250	100 ... 250	NF44EK-13	1SBH137005R1344	0.330
	250 ... 500	250 ... 500	NF44EK-14	1SBH137005R1444	0.370
	24 ... 60	20 ... 60 (1)	NF53EK-11	1SBH137005R1153	0.330
	48 ... 130	48 ... 130	NF53EK-12	1SBH137005R1253	0.330
	100 ... 250	100 ... 250	NF53EK-13	1SBH137005R1353	0.330
	250 ... 500	250 ... 500	NF53EK-14	1SBH137005R1453	0.370
	24 ... 60	20 ... 60 (1)	NF62EK-11	1SBH137005R1162	0.330
	48 ... 130	48 ... 130	NF62EK-12	1SBH137005R1262	0.330
	100 ... 250	100 ... 250	NF62EK-13	1SBH137005R1362	0.330
	250 ... 500	250 ... 500	NF62EK-14	1SBH137005R1462	0.370
	24 ... 60	20 ... 60 (1)	NF71EK-11	1SBH137005R1171	0.330
	48 ... 130	48 ... 130	NF71EK-12	1SBH137005R1271	0.330
	100 ... 250	100 ... 250	NF71EK-13	1SBH137005R1371	0.330
	250 ... 500	250 ... 500	NF71EK-14	1SBH137005R1471	0.370
	24 ... 60	20 ... 60 (1)	NF80EK-11	1SBH137005R1180	0.330
	48 ... 130	48 ... 130	NF80EK-12	1SBH137005R1280	0.330
	100 ... 250	100 ... 250	NF80EK-13	1SBH137005R1380	0.330
	250 ... 500	250 ... 500	NF80EK-14	1SBH137005R1480	0.370

(1) NF..K-11 not suitable for direct control by PLC-output.



NF22EK, NF31EK, NF40EK



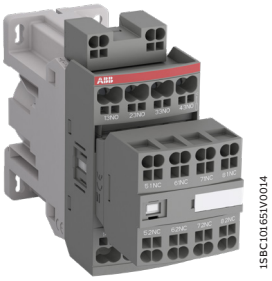
NF44EK, NF53EK, NF62EK, NF71EK, NF80EK

Main dimensions mm, inches

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

24 V DC operated designed for PLC

NFZ22EK-30

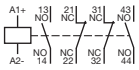
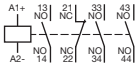
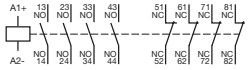
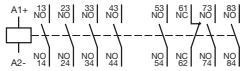


NFZ44EK-30

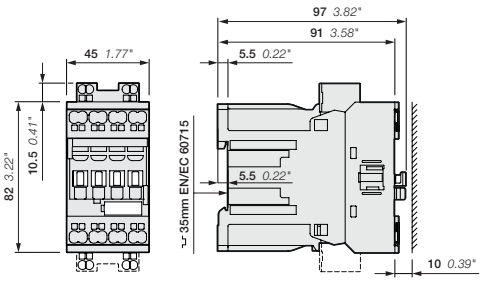
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with 4 poles or 8 poles (with a permanently fixed 4-pole auxiliary contact block).

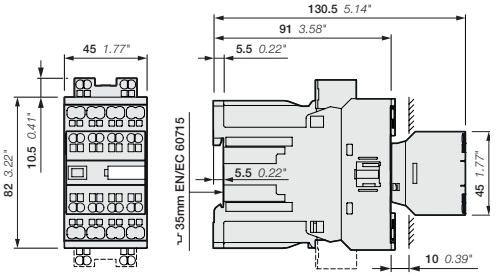
- contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc min. ... Uc max. V DC	Type	Order code	Weight Pkg (1 pce) kg
4-pole contactor relays				
	24	NFZ22EK-30	1SBH136005R3022	0.435
	24	NFZ31EK-30	1SBH136005R3031	0.435
	24	NFZ40EK-30	1SBH136005R3040	0.435
8-pole contactor relays				
	24	NFZ44EK-30	1SBH136005R3044	0.490
	24	NFZ53EK-30	1SBH136005R3053	0.490
	24	NFZ62EK-30	1SBH136005R3062	0.490
	24	NFZ71EK-30	1SBH136005R3071	0.490
	24	NFZ80EK-30	1SBH136005R3080	0.490

Note: NFZ contactor relays with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
For product availability, please consult your ABB local sales organization.



NFZ22EK, NFZ31EK, NFZ40EK

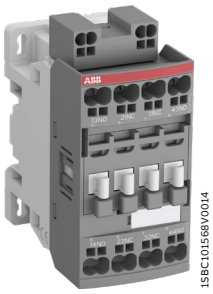


NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK

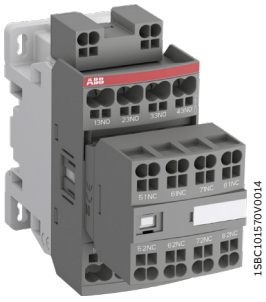
Main dimensions mm, inches

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

AC / DC operated for specific applications



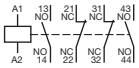
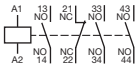
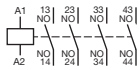
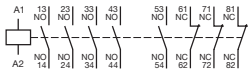
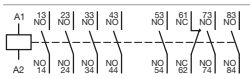
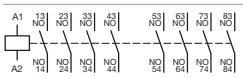
NFZ22EK



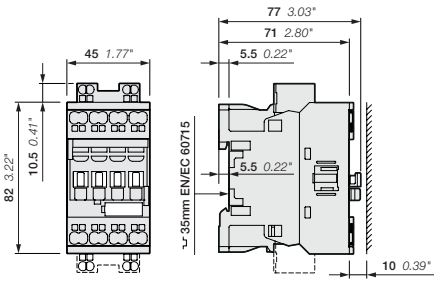
NFZ44EK

NFZ..K contactor relays are used for switching auxiliary and control circuits.
These contactor relays are of the block type design with:

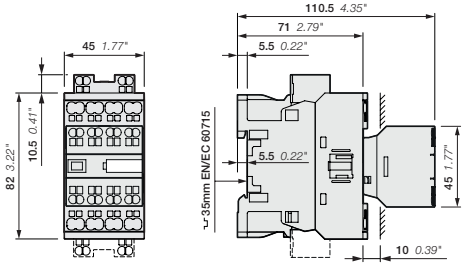
- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
  Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Number of contacts	Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code	Weight Pkg (1 pce) kg
4-pole contactor relays					
	–	12 ... 20	NFZ22EK-20	1SBH136005R2022	0.315
	24 ... 60	20 ... 60	NFZ22EK-21	1SBH136005R2122	0.315
	48 ... 130	48 ... 130	NFZ22EK-22	1SBH136005R2222	0.315
	100 ... 250	100 ... 250	NFZ22EK-23	1SBH136005R2322	0.315
	–	12 ... 20	NFZ31EK-20	1SBH136005R2031	0.315
	24 ... 60	20 ... 60	NFZ31EK-21	1SBH136005R2131	0.315
	48 ... 130	48 ... 130	NFZ31EK-22	1SBH136005R2231	0.315
	100 ... 250	100 ... 250	NFZ31EK-23	1SBH136005R2331	0.315
	–	12 ... 20	NFZ40EK-20	1SBH136005R2040	0.315
	24 ... 60	20 ... 60	NFZ40EK-21	1SBH136005R2140	0.315
	48 ... 130	48 ... 130	NFZ40EK-22	1SBH136005R2240	0.315
	100 ... 250	100 ... 250	NFZ40EK-23	1SBH136005R2340	0.315
8-pole contactor relays					
	–	12 ... 20	NFZ44EK-20	1SBH136005R2044	0.360
	24 ... 60	20 ... 60	NFZ44EK-21	1SBH136005R2144	0.360
	48 ... 130	48 ... 130	NFZ44EK-22	1SBH136005R2244	0.360
	100 ... 250	100 ... 250	NFZ44EK-23	1SBH136005R2344	0.360
	–	12 ... 20	NFZ53EK-20	1SBH136005R2053	0.360
	24 ... 60	20 ... 60	NFZ53EK-21	1SBH136005R2153	0.360
	48 ... 130	48 ... 130	NFZ53EK-22	1SBH136005R2253	0.360
	100 ... 250	100 ... 250	NFZ53EK-23	1SBH136005R2353	0.360
	–	12 ... 20	NFZ62EK-20	1SBH136005R2062	0.360
	24 ... 60	20 ... 60	NFZ62EK-21	1SBH136005R2162	0.360
	48 ... 130	48 ... 130	NFZ62EK-22	1SBH136005R2262	0.360
	100 ... 250	100 ... 250	NFZ62EK-23	1SBH136005R2362	0.360
	–	12 ... 20	NFZ71EK-20	1SBH136005R2071	0.360
	24 ... 60	20 ... 60	NFZ71EK-21	1SBH136005R2171	0.360
	48 ... 130	48 ... 130	NFZ71EK-22	1SBH136005R2271	0.360
	100 ... 250	100 ... 250	NFZ71EK-23	1SBH136005R2371	0.360
	–	12 ... 20	NFZ80EK-20	1SBH136005R2080	0.360
	24 ... 60	20 ... 60	NFZ80EK-21	1SBH136005R2180	0.360
	48 ... 130	48 ... 130	NFZ80EK-22	1SBH136005R2280	0.360
	100 ... 250	100 ... 250	NFZ80EK-23	1SBH136005R2380	0.360

Note: NFZ contactor relays with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



NFZ22EK, NFZ31EK, NFZ40EK



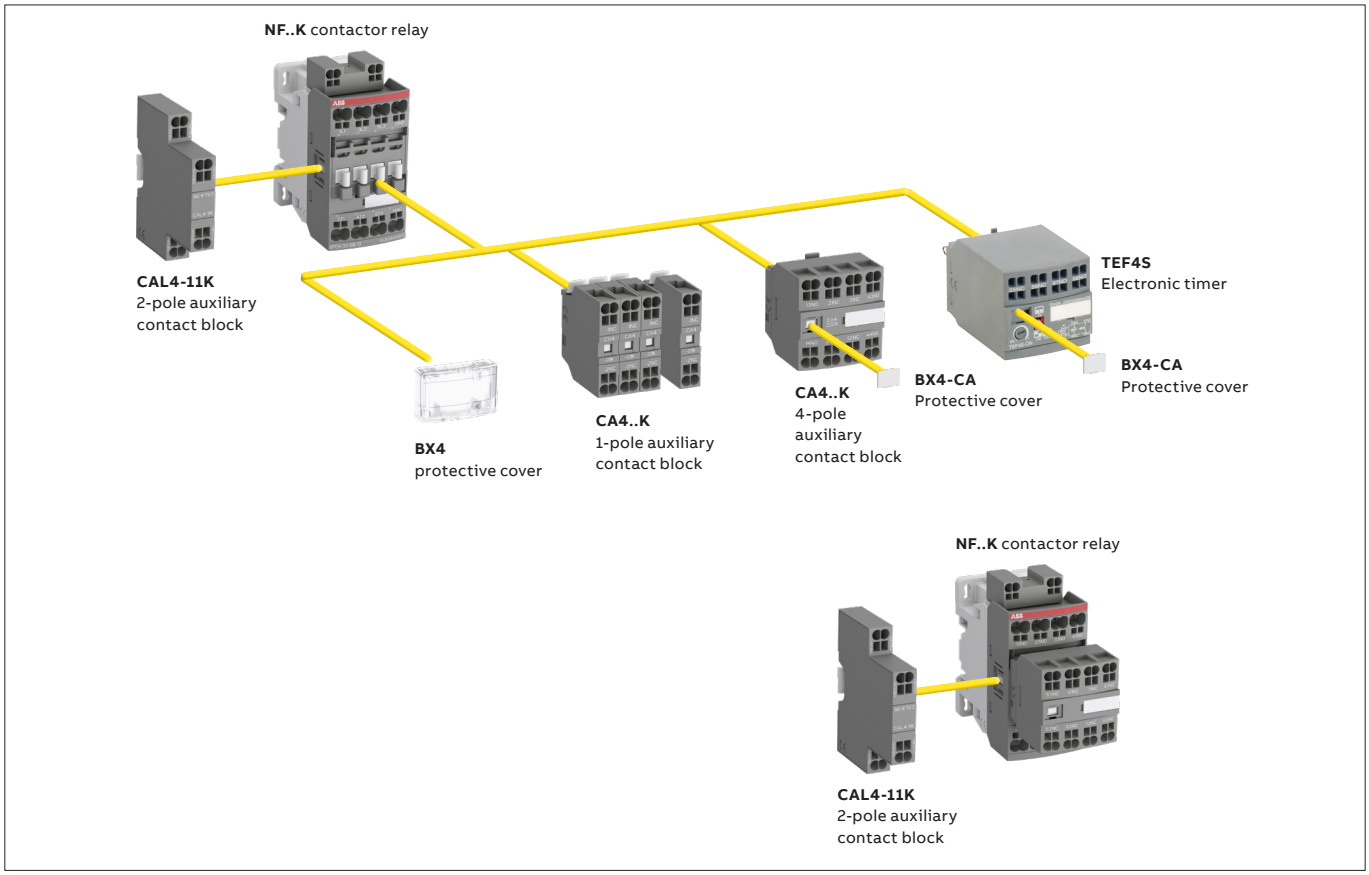
NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK

Main dimensions mm, inches

03

NF..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
NF(Z)										
NF	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)								
NF	4 4	EK		-	-	-	-	+	1	-
	5 3	EK								
	6 2	EK								
	7 1	EK								
	8 0	EK								
NFZ 24 V DC designed for PLC - coil 30										
NFZ	2 2	EK (1)		4 max.	**or** 1	**or** 1		or	1	+ 1
	3 1	EK (1)		2 max.	-	**or** 1		+	1	
	4 0	EK (2)				1		+	1	+ 1
NFZ	4 4	EK		-	-	-			-	-
	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

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

Technical data

Contact utilization characteristics according to IEC

Contactor relay types	AC / DC operated	**NF..K**
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage Ue max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free air thermal current Ith - θ ≤ 40 °C		16 A
Ie / Rated operational current AC-15 acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
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
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
Maximum 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

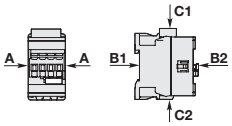
Contact utilization characteristics according to UL / CSA

Contactor relay types	**NF..K**
Standards	UL 508, CSA C22.2 N°14
Maximum 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

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

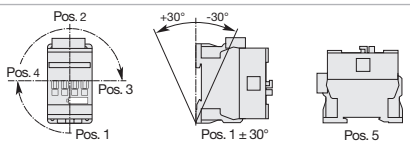
Technical data

General technical data

Contactor relay types	AC / DC operated	**NF..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
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)
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 million operating cycles
Maximum switching frequency		6000 cycles/h
Shock withstand		
acc. to IEC 60068-2-27 and EN 60068-2-27		
Mounting position 1	Shock direction	1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position
	A	30 g
	B1	25 g closed position / 5 g open position
	B2	15 g
	C1	25 g
	C2	25 g
Vibration withstand		5 ... 300 Hz
acc. to IEC 60068-2-6		4 g closed position / 2 g open position

(1) NF..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select NFZ..-22.

Mounting characteristics

Contactor relay types	AC / DC operated	**NF..K**
Mounting positions		 Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay
Mounting distances		The contactor relays can be assembled side by side
Fixing		
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm
By screws (not supplied)		2 x M4 screws placed diagonally

Connecting characteristics

Contactor relay types	AC / DC operated		**NF..K**
Main terminals			Push-in Spring terminals
Connection capacity (min. ... max.)			
Pole and coil terminals			
Rigid Solid		1 x	1 ... 2.5 mm²
		2 x	1 ... 2.5 mm²
Flexible with non insulated		1 x	1 (push-in) / 0.5 (spring) ... 2.5 mm²
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			IP20
Screwdriver type	All terminals		Flat Ø 3 mm x 0.5 mm

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

Technical data

Magnet System Characteristics for NF..K contactor relays - AC / DC operated

Contactor relay types	AC / DC operated	NF..K
Coil operating limits acc. to IEC 60947-5-1	AC supply	at θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max at θ ≤ 70 °C 0.85 x Uc min ... Uc max
	DC supply	At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max At θ ≤ 70 °C 0.85 x Uc min ... Uc max
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24 ... 500 V AC
Coil consumption	Average pull-in value	50 VA
	Average holding value	2.2 VA / 2 W
DC control voltage		
Rated control circuit voltage Uc		20 ... 500 V DC
Coil consumption	Average pull-in value	50 W
	Average holding value	2 W
PLC-output control		Not suitable for direct control by PLC-output
Drop-out voltage		≤ 60 % of Uc min.
Voltage sag immunity according to SEMI F47-0706		–
Dips withstand -20 °C ≤ θ ≤ +60°C		–
Operating time		
Between coil energization and:		
	N.O. contact closing	40 ... 95 ms
	N.C. contact opening	38 ... 90 ms
Between coil de-energization and:		
	N.O. contact opening	11 ... 95 ms
	N.C. contact closing	13 ... 98 ms

Magnet System Characteristics for NFZ..K contactor relays 24V DC operated - designed for PLC - coil 30

Contactor relay types	AC / DC operated	NFZ..K
Coil operating limits acc. to IEC 60947-5-1	DC supply	At θ ≤ 60 °C 0.85 ... 1.1 x Uc At θ ≤ 70 °C Uc
DC control voltage		
Rated control circuit voltage Uc		24 V DC
Coil consumption	Average pull-in value	6 W
	Average holding value	1.7 W
PLC-output control		≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection
Drop-out voltage		≤ 60 % of Uc min.
Operating time		
Between coil energization and:		
	N.O. contact closing	27 ... 53 ms
	N.C. contact opening	20 ... 35 ms
Between coil de-energization and:		
	N.O. contact opening	17 ... 29 ms
	N.C. contact closing	22 ... 57 ms

Magnet System Characteristics for NFZ..K contactor relays - for specific applications - coils 20, 21, 22, 23

Contactor relay types	AC / DC operated	NFZ..K
Coil operating limits acc. to IEC 60947-5-1	AC supply	At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max At θ ≤ 70 °C 0.85 x Uc min ... Uc max
	DC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max
AC control voltage 50/60 Hz		
Rated control circuit voltage Uc		24 ... 250 V AC
Coil consumption	Average pull-in value	16 VA
	Average holding value	1.7 VA / 1.5 W
DC control voltage		
Rated control circuit voltage Uc		12 ... 250 V DC
Coil consumption	Average pull-in value	12 ... 16 W
	Average holding value	1.7 W
PLC-output control		(AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs
Drop-out voltage		≤ 60 % of Uc min.
Voltage sag immunity according to SEMI F47-0706		(NFZ coil 21, 22, 23) conditions of use on request
Dips withstand -20 °C ≤ θ ≤ +60°C		(NFZ coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC
Operating time		
Between coil energization and:		
	N.O. contact closing	40 ... 95 ms
	N.C. contact opening	38 ... 90 ms
Between coil de-energization and:		
	N.O. contact opening	11 ... 95 ms
	N.C. contact closing	13 ... 98 ms

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

www.abb.com/productdetails/**1SBL137001R1310**

Accessories

Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays

3/288 Auxiliary contact blocks
3/302 Electronic timers
3/305 Interlocks
3/308 Impulse contact blocks
3/309 Interface relays
3/311 Mechanical latching unit
3/313 Other accessories
3/315 Terminal shrouds
3/316 Additional terminal blocks
3/317 Terminals for control lead connections
3/318 Connections
3/319 Terminal connecting strips and shorting bars
3/321 Connection accessories for starting solutions
3/323 Connection accessories for starting solutions with Push-in Spring terminals
3/324 Connection sets for star-delta starter
3/325 Connection bars
3/326 Adapter plates
3/327 Low Voltage Ride Through (LVRT) modules
3/328 Spare parts contactors

Accessories for UA, UA..RA, GA75, GAE75, GAF contactors

3/334 Auxiliary contact blocks
3/340 Electronic timers
3/345 Mechanical and electrical interlock units
3/346 CA5, CE5, CAL, CEL18 and TEF5 fitting details
3/347 Function markers - Mounting piece
3/348 Surge suppressors for contactor coils
3/350 Interface relays
3/352 Mechanical latching units
3/354 Additional terminal blocks and others accessories
3/355 Terminals for control lead connections
3/356 Connection bar for contactors
3/357 Contactor coils and main contact sets

Accessories for EK550, EK1000 4-pole contactors

3/360 Auxiliary contact blocks
3/364 Mechanical interlock units, terminal shrouds and connection sets
3/365 Surge suppressors for contactor coils
3/367 Main contact sets - Arc chutes
3/368 Contactor coils

3/466 **Voltage code table**

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

www.abb.com/productdetails/**1SBL137001R1310**

Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays

3/288 **Auxiliary contact blocks**

3/302 **Electronic timers**

3/305 **Interlocks**

3/308 **Impulse contact blocks**

3/309 **Interface relays**

3/311 **Mechanical latching unit**

3/313 **Other accessories**

3/315 **Terminal shrouds**

3/316 **Additional terminal blocks**

3/317 **Terminals for control lead connections**

3/318 **Connections**

3/319 **Terminal connecting strips and shorting bars**

3/321 **Connection accessories for starting solutions**

3/323 **Connection accessories for starting solutions with Push-in Spring terminals**

3/324 **Connection sets for star-delta starter**

3/325 **Connection bars**

3/326 **Adapter plates**

3/327 **Low Voltage Ride Through (LVRT) modules**

3/328 **Spare parts contactors**

Auxiliary contact blocks for AF09 ... AF96 contactors and NF 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						
AF09 ... AF96	1 0	– –	CA4-10	1SBN010110R1010	1	0.014
4-pole NF	1 0	– –	CA4-10-T	1SBN010110T1010	10	0.014
	0 1	– –	CA4-01	1SBN010110R1001	1	0.014
	0 1	– –	CA4-01-T	1SBN010110T1001	10	0.014
AF09 ... AF16..-30-10	2 2	– –	CA4-22M	1SBN010140R1122	1	0.055
	3 1	– –	CA4-31M	1SBN010140R1131	1	0.055
	1 3	– –	CA4-13M	1SBN010140R1113	1	0.055
	0 4	– –	CA4-04M	1SBN010140R1104	1	0.055
AF26 ... AF96..-30-00	2 2	– –	CA4-22E	1SBN010140R1022	1	0.055
AF09 ... AF80..-40-00	3 1	– –	CA4-31E	1SBN010140R1031	1	0.055
AF09 ... AF80..-22-00	4 0	– –	CA4-40E	1SBN010140R1040	1	0.055
AF26 ... AF96..-30-00 AF09 ... AF16..-40-00 AF40 ... AF80..-40-00	0 4	– –	CA4-04E	1SBN010140R1004	1	0.055
AF09 ... AF16..-30-01	2 2	– –	CA4-22U	1SBN010140R1322	1	0.055
	3 1	– –	CA4-31U	1SBN010140R1331	1	0.055
	4 0	– –	CA4-40U	1SBN010140R1340	1	0.055
4-pole NF	2 2	– –	CA4-22N	1SBN010140R1222	1	0.055
	3 1	– –	CA4-31N	1SBN010140R1231	1	0.055
	4 0	– –	CA4-40N	1SBN010140R1240	1	0.055
	1 3	– –	CA4-13N	1SBN010140R1213	1	0.055
NF..40E	0 4	– –	CA4-04N	1SBN010140R1204	1	0.055
Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact						
AF09 ... AF96	– –	1 0	CC4-10	1SBN010111R1010	1	0.014
4-pole NF	– –	0 1	CC4-01	1SBN010111R1001	1	0.014
Side-mounted instantaneous auxiliary contact blocks						
AF09 ... AF96	1 1	– –	CAL4-11	1SBN010120R1011	1	0.040
NF	1 1	– –	CAL4-11-T	1SBN010120T1011	10	0.040
Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks						
AF09 ... AF16..-30-10	1 1	– –	CAT4-11M	1SBN010151R1111	1	0.040
AF26 ... AF65..-30-00 AF09 ... AF52..-40-00 AF09 ... AF40..-22-00	1 1	– –	CAT4-11E	1SBN010151R1011	1	0.040
AF09 ... AF16..-30-01	1 1	– –	CAT4-11U	1SBN010151R1311	1	0.040

Note: 1 max CC4-10 and 1 max CC4-01.
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.

For each contactor or contactor relay type, refer to "Accessory fitting details" table.
Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

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

Technical data

Contact utilization characteristics according to IEC

Types			1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V
Rated impulse withstand voltage Uimp.			6 kV
Pollution degree			3
Rated operational voltage Ue max.			24...690 V
Conventional thermal current Ith - θ ≤ 40 °C			16 A
Rated frequency (without derating)			50/60 Hz
Ie / Rated operational current AC-15		24-127 V 50/60 Hz	6 A
acc. to IEC 60947-5-1		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

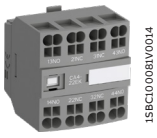
Types	1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V AC, 600 V DC
Pilot duty	A600, Q600
AC thermal rated current	10 A
AC maximum volt-ampere making	7200 VA
AC maximum volt-ampere breaking	720 VA
DC thermal rated current	2.5 A
DC maximum volt-ampere making-breaking	69 VA

Connecting characteristics

Types			1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4
Connection capacity (min. ... max.)			
	Rigid Solid/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 with Push-in Spring terminals

CA4-10K



CA4-22EK

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					
AF09 ... AF96 NF	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
AF09 ... AF16..-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
AF26 ... AF96..-30-00 AF09 ... AF80..-40-00 AF09 ... AF80..-22-00	2 2	CA4-22EK	1SBN010146R1022	1	0.050
	3 1	CA4-31EK	1SBN010146R1031	1	0.050
	4 0	CA4-40EK	1SBN010146R1040	1	0.050
4-pole NF	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
NF40E	0 4	CA4-04NK	1SBN010146R1204	1	0.050
Side-mounted instantaneous auxiliary contact blocks					
3-pole					
AF09 ... AF96 NF	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 AF09 ... AF96 contactors and NF 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 with failure rate acc. to IEC 60947-5-4			12 V / 3 mA
			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 508, 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 AF09 ... AF96 contactors and NF contactor relays

CE5-10W

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

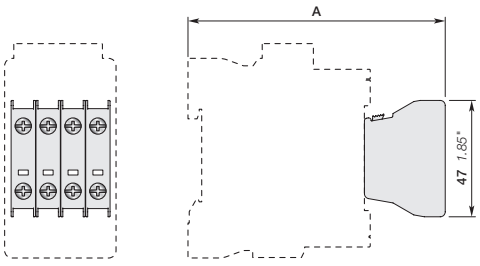
Types of auxiliary contact blocks for front mounting:

- 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 contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF96	1 0	– –	CE5-10D0.1	1SBN010015R1010	1	0.020
NF	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 contactor type, refer to "Accessory fitting details" table.
Note: For use with 24 V DC operated AF..Z contactor and NFZ contactor relay (coil 30), please consult your ABB local sales organization.



Main dimensions mm, inches

1-pole CE5 on	A
AF09 ... AF16..-30-xx 1 stack AF09, AF16..-40/22-00 NF..E 1-stack	103.5 mm / 4.07"
AF26 ... AF38..-30-00	112.5 mm / 4.43"
AF26, AF38..-40/22-00	127.5 mm / 5.02"
AF40 ... AF65-30-00	137 mm / 5.39"
AF40 ... AF65-40/22-00	140 mm / 5.51"
AF80 ... AF96-30-00	142 mm / 5.59"
AF80-40/22-00	142 mm / 5.59"

Auxiliary contact blocks for severe industrial environments

Technical data

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			
AF09 ... AF38 contactors		3 V / 1 mA	17 V / 1 mA
with failure rate acc. to IEC 60947-5-4		–	≤ 10^{-7}
Mechanical durability			
Number of operating cycles		5 millions for CE5-..D0.1	5 millions for CE5-..D2
		2.5 millions for CE5-..W0.1	2.5 millions for CE5-..W2
Max. switching frequency		3600 cycles/h	
Electrical durability			
Number of operating cycles		2.5 millions for CE5-..D0.1	1 million for CE5-..D2
		0.7 millions for CE5-..W0.1	0.3 millions for CE5-..W2
Max. electrical switching frequency			
	AC-14	1200 cycles/h	
	AC-15	1200 cycles/h	
	DC-12	900 cycles/h	
Contact utilization characteristics according to UL / CSA			
Standards		UL 508, CSA C22.2 N°14	
Max. operational voltage		125 V AC / 110 V DC	250 V AC / 220 V DC
Pilot duty			
AC thermal rated current		0.1 A	2 A
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid Solid/Stranded	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	

(1) HRC fuses for very fast action (6.3 x 32 mm size).

Auxiliary contact blocks for severe industrial environments

For AF09 ... AF96 3-pole contactors and AF09 ... AF80 4-pole contactors

For AF 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 1-pole CE5		Front-mounted accessories: Auxiliary contact blocks 1-pole CA4		Front-mounted accessories: Electrical and mechanical interlock set (Between 2 contactors) VEM4		Side-mounted accessories: Auxiliary contact blocks Left side 2-pole CAL4-11		Side-mounted accessories: Auxiliary contact blocks Right side
3-pole contactors AF09 ... AF96											
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											
AF09 ... AF16	3	0 1	1		+ 3 max.		–	+	1		–
AF09 ... AF16	3	1 0	2		+ 2 max.		–		–		–
AF26 ... AF38	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											
AF09 ... AF16	3	0 1	1		+ 3 max.		–		–		–
AF09 ... AF16	3	1 0	1		+ 3 max.		–	+	1		–
AF26 ... AF38	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											
AF40 ... AF96	3	0 0	2		+ 2 max.		–	+	1		+ 1
			1		+ 3 max.		–	+	1		+ 1
4-pole contactors AF09 ... AF80											
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											
AF09, AF16	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											
AF26, AF38	4	0 0	1		+ 3 max.		–	+	1		–
			1		+ 2 max.		+ 1		–		–
AF09 ... AF38	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											
AF09, AF16	4	0 0	1		+ 3 max.		–	+	1		–
			1		+ 2 max.		+ 1		–		–
On positions 1 ±30°, 5 ; No add-on N.C. auxiliary contacts											
AF26, AF38	4	0 0	1		+ 3 max.		–		–		–
AF09 ... AF38	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											
AF40 ... AF80	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											
AF40, AF80	2	2 0 0	1		+ 3 max.		–		–		–

Auxiliary contact blocks for severe industrial environments

For NF 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								
NF	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								
NF	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								
NF	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								
NF	4 0	E	1	+ 3 max.	–	+	1	–

Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments

1SFC101214V0001

CEL19

1SFC101083V0001

CEL18

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

Types of auxiliary contact blocks for side mounting:

- CEL 1-pole block, with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

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

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

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce)
					kg
Side-mounting instantaneous auxiliary contact blocks					
AF116 ... AF370	1 0	CEL19-10	1SFN010832R1010	1	0.040
	0 1	CEL19-01	1SFN010832R1001	1	0.040
AF400 ... AF2850	1 0	CEL18-10	1SFN010716R1010	1	0.050
	0 1	CEL18-01	1SFN010716R1001	1	0.050

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

Auxiliary contact blocks for AF116 ... AF2850 contactors

Technical data

Types			CAL18	CAL19
Contact utilization characteristics according to IEC				
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V	
Rated impulse withstand voltage Uimp.			6 kV	
Pollution degree			3	
Rated operational voltage Ue max.			24...690 V AC	
Conventional thermal current Ith - θ ≤ 40 °C			16 A	
Rated frequency (without derating)			50/60 Hz	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		24-127 V 50/60 Hz	6 A	
		220-240 V 50/60 Hz	4 A	
		380-440 V 50/60 Hz	3 A	
		500-690 V 50/60 Hz	2 A	
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15	
Ie / Rated operational current DC-13				
acc. to IEC 60947-5-1		24 V DC	6 A / 144 W	3 A / 72 W
		48 V DC	2.8 A / 134 W	1.5 A / 72 W
		72 V DC	1 A / 72 W	1 A / 72 W
		110 V DC	0.55 A / 60 W	0.55 A / 60 W
		125 V DC	0.55 A / 69 W	0.55 A / 69 W
		220 V DC	0.3 A / 66 W	0.3 A / 69 W
		250 V DC	0.3 A / 75 W	0.3 A / 75 W
Short-circuit protection device gG type fuse			10 A	
Rated short-time withstand current Icw		for 1.0 s	100 A	
θ = 40 °C		for 0.1 s	140 A	
Minimum switching capacity			24 V / 50 mA (0.5 million of operating cycles)	24 V / 50 mA
with failure rate acc. to IEC 60947-5-4			≤ 10-6	
Power dissipation per pole at 6 A			0.15 W	
Mechanical durability	Number of operating cycles		3 millions (A/AF400 ... AF750)	
			0.5 million (AF1250 ... AF2050)	5 millions operating cycles
	Max. switching frequency		3600 cycles/h	300 cycles/h
Max. electrical switching frequency		AC-15	1200 cycles/h	300 cycles/h
		DC-13	900 cycles/h	300 cycles/h
Mirror contacts acc. to annex F of IEC 60947-4-1			N.C. auxiliary contacts are mirror contacts (1)	

(1) CAL19: for 3-pole contactors only.

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid Solid/Stranded	1 x	1...4 mm²
		2 x	1...4 mm²
	Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Flexible with insulated ferrule	1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
	Lugs	L ≤	8 mm
		l >	3.7 mm
Connection capacity acc. to UL/CSA		1 or 2 x	AWG18...14
Stripping length			9 mm
Tightening torque			1 Nm
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments

1SFC101214V0001

CEL19

1SFC101083V0001

CEL18

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

Types of auxiliary contact blocks for side mounting:

- CEL 1-pole block, with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

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

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

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce)
					kg
Side-mounting instantaneous auxiliary contact blocks					
AF116 ... AF370	1 0	CEL19-10	1SFN010832R1010	1	0.040
	0 1	CEL19-01	1SFN010832R1001	1	0.040
AF400 ... AF2850	1 0	CEL18-10	1SFN010716R1010	1	0.050
	0 1	CEL18-01	1SFN010716R1001	1	0.050

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

Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments

Technical data

Types			CEL18, CEL19
Contact utilization characteristics according to IEC			
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			250 V
Pollution degree			3
Rated operational voltage Ue max.			125 V
Conventional thermal current Ith - θ ≤ 40 °C			0.1 A
Ie / Rated operational current AC-14			
acc. to IEC 60947-5-1		24-127 V 50/60 Hz	0.1 A
Making capacity acc. to IEC 60947-5-1			6 x Ie AC-14
Breaking capacity acc. to IEC 60947-5-1			6 x Ie AC-14
Ie / Rated operational current DC-12			
acc. to IEC 60947-5-1		24 V DC	0.1 A
		48 V DC	0.1 A
		72 V DC	0.1 A
		110 V DC	0.1 A
		220 V DC	–
Short-circuit protection device			0.1 A (FF type fuses) (1)
Minimum switching capacity			
with failure rate acc. to IEC 60947-5-4			3 V / 1 mA
Mechanical durability	Number of operating cycles		1 million (2)
	Max. switching frequency		1200 cycles/h (2)
Electrical durability	Number of operating cycles		0.7 millions (2)
	Max. switching frequency	AC-14, AC15	1200 cycles/h (2)
		DC-12	900 cycles/h (2)
Mirror contacts acc. to annex F of IEC 60947-4-1			N.C. auxiliary contacts are mirror contacts
Contact utilization characteristics according to UL / CSA			
Standards			UL 508, CSA C22.2 N°14
Max. operational voltage			125 V
Pilot duty			
AC thermal rated current			0.1 A
Connecting characteristics			
Connection capacity (min. ... max.)			
	Rigid Solid/Stranded	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
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18...14
Tightening torque			1 Nm
Degree of protection		Terminals	IP20
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Microswitches	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

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

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

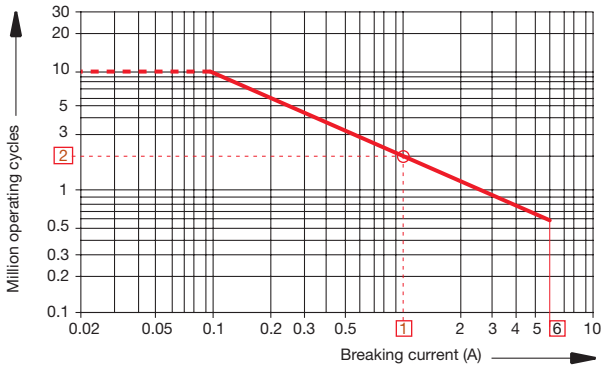
Electrical durability

Electrical durability for AC-15 utilization category

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

These curves represent the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

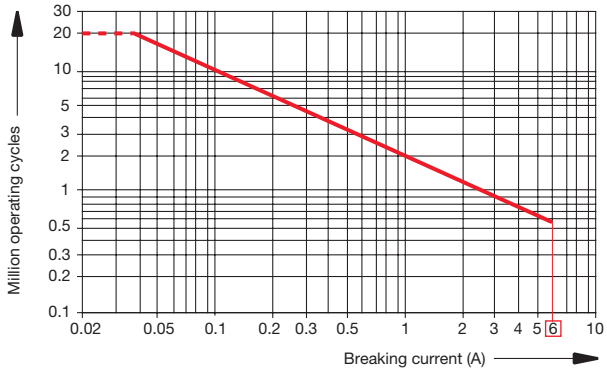


- AF09 ... AF96 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4, 2-pole CAT4,
  1-pole CC4,
  2-pole CAL4 add-on auxiliary contacts.

Example:

Breaking current = 1 A

On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

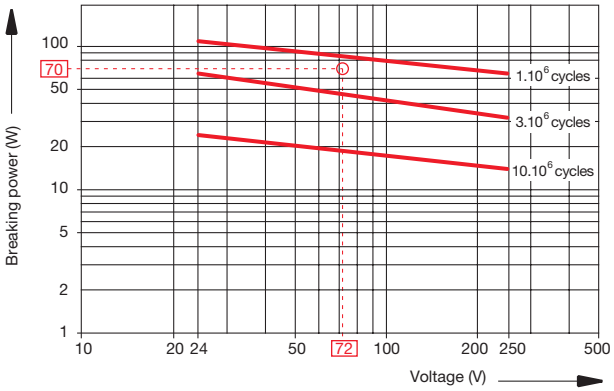


NF contactor relays.

(For add on auxiliary contacts see curve above).

Electrical durability for DC-13 utilization category

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



- AF09 ... AF96 contactor built-in auxiliary contacts 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4,
- 2-pole CAL4 add-on auxiliary contacts,
- NF contactor relays.

Example:

Control of DC electro-magnet:
Ue voltage = 72 V DC and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Auxiliary contact blocks for AF116 ... AF2850 contactors

Electrical durability

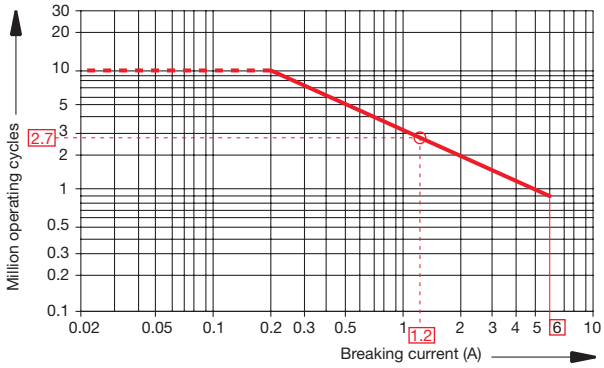
Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

This curves represent the electrical durability of the add-on auxiliary contacts, in relation to the breaking current.

The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



- AF116 ... AF2850 contactors auxiliary contacts
- 2-pole CAL18 and CAL19 add-on auxiliary contacts

Example:

Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

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 AF contactors or NF contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

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

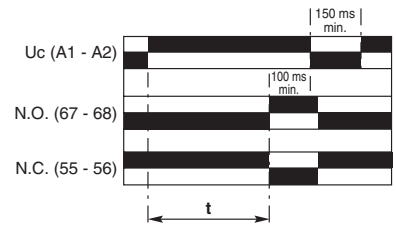
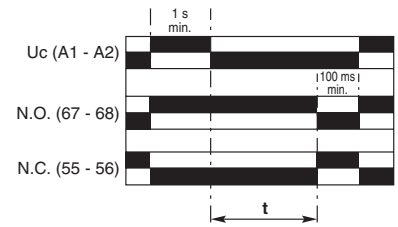
Available for a wide control voltage range 24...240 V AC/DC

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

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								
AF09 ... AF96 NF	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								
AF09 ... AF96 NF	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	
Pollution degree		3	
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 50/60 Hz	Rated control circuit voltage Uc	24...240 V AC	
	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 acc. to IEC 60068-2-27 and EN 60068-2-27 (Mounting position 1)		1/2 sinusoidal shock for 11 ms: no change in contact position Same as contactor or contactor relay	
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz 3 g closed position / 2 g open position	
Mechanical durability	Number of operating cycles	5 millions operating cycles	
	Max. switching frequency	3600 cycles/h	1800 cycles/h
Max. electrical switching frequency	AC-15	1200 cycles/h	
	DC-13	900 cycles/h	

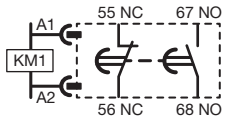
Electronic timers
Technical data

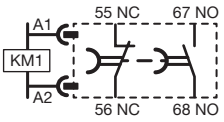
Contact utilization characteristics according to UL / CSA

Types	TEF4-ON	TEF4-OFF
Standards	UL 508, CSA C22.2 N°14	
Rated insulation voltage Ui acc. to UL / CSA	300 V	
Max. operational voltage	240 V	
Pilot duty	B300, R300	
AC thermal rated current	5 A	
AC maximum volt-ampere making	3600 VA	
AC maximum volt-ampere breaking	360 VA	
DC thermal rated current	1 A	
DC maximum volt-ampere making-breaking	28 VA	

Connecting characteristics

Connection capacity (min. ... max.)		
Rigid Solid/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 (0.75 ... 1.5 mm² with spring terminals)
	2 x	0.75...1.5 mm² (0.75 ... 1.5 mm² with spring terminals)
Lugs	L ≤	8 mm (1)
	l >	3.7 mm (1)
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 (1)
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		Delivered in open position, screws of unused terminals should be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2
Spring terminals		
Screwdriver type		Ø 3.5
Terminal Marking		

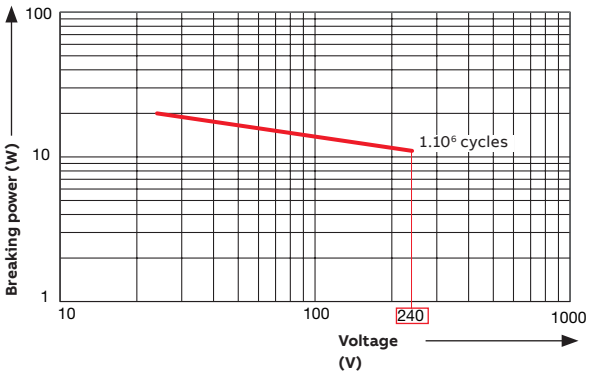




(1) Not applicable for TEF4S-ON and TEF4S-OFF with spring terminals.

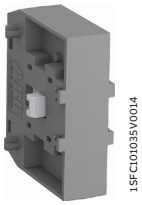
Electrical durability for DC-13 utilization category

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



Interlocks

VM4

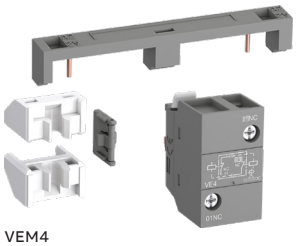


VM19

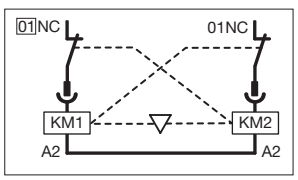
Mechanical interlock units

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

For contactors	Mounting	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical interlock units for two contactors mounted side by side					
AF09 ... AF38..-30-.. AF09 ... AF38..-40-00		VM4	1SBN030105T1000	10	0.005
AF40 ... AF96-30-.. AF40 ... AF80-40-00		VM96-4	1SBN033405T1000	10	0.006
For same size contactors: AF116 ... AF146 AF190, AF205 AF265 ... AF370		VM19	1SFN030300R1000	1	0.054
AF116 ... AF146 and AF190, AF205		VM140/190	1SFN034403R1000	1	0.088
AF190, AF205 and AF265 ... AF370		VM205/265	1SFN035203R1000	1	0.090
AF265 ... AF370 and AF400 ... AF460		VM370/400H	1SFN035403R1000	1	0.100
AF400 ... AF1250		VM750H	1SFN035700R1000	1	0.200
AF1350 ... AF2650	Plate included	VM1650H	1SFN036503R1001	1	6.000
Mechanical interlock units for two contactors mounted one above the other					
AF400 ... AF1250	Additional plate (not supplied)	VM750V	1SFN035701R1000	1	0.200



VEM4



Mechanical and electrical interlock sets

VEM4 mechanical and electrical interlock set for the interlocking of two AF contactors.
VEM4 set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4 electrical interlock block with A2-A2 connection.
Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock set					
For same size contactors: AF09 ... AF16..-30-.. AF26 ... AF38..-30-00 AF09, AF16..-40-00 AF26, AF38..-40-00	0 2	VEM4	1SBN030111R1000	1	0.035
Fixing clips					
AF09 ... AF96		BB4	1SBN110120W1000	50	0.002

Note: VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

BB4

Interlocks

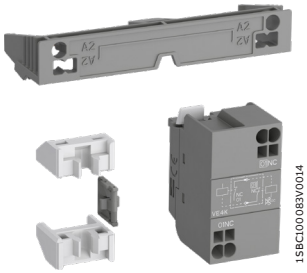
VM4

Mechanical interlock unit

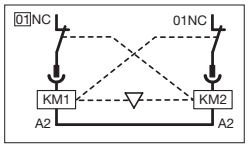
VM4 mechanical interlock unit is designed for the interlocking of two AF contactors.

When mounted between two contactors, the VM4 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed. The mechanical interlock unit VM4 includes 2 fixing clips (BB4).

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF38	VM4	1SBN030105T1000	10	0.005



VEM4K



BB4

Mechanical and electrical interlock set

VEM4K mechanical and electrical interlock set for the interlocking of two AF..K contactors.

VEM4K set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4K 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.

VE4K block must be used with A2-A2 connection to respect the electrical connection.

For contactors	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09..K .. AF16..K	1 1	VEM4K	1SBN030113R1000		0.030
AF26..K .. AF38..K					

Fixing clips

AF09 ... AF96		BB4	1SBN110120W1000	50	0.002

Note: VEM4K not suitable for AF..Z..K contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

Interlocks
Technical data

Mechanical interlock unit

Types		VM4, VM96	VM19 ... VM750	VM1650H
Mechanical durability	Number of operating cycles	5 millions operating cycles	1 million operating cycles	500 000 operating cycles
	Max. mechanical switching frequency	1800 cycles/h	300 cycles/h	

Mechanical and electrical interlock set

Contact utilization characteristics according to IEC

Types		VEM4
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Rated impulse withstand voltage Uimp.		6 kV
Pollution degree		3
Rated control circuit voltage Uc		
	AC 50/60 Hz control voltage	24...500 V AC
	DC control voltage	20...500 V DC
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Mechanical durability	Number of operating cycles	5 millions operating cycles
	Max. mechanical switching frequency	1800 cycles/h
Electrical durability	Max. electrical switching frequency	1200 cycles/h

Contact utilization characteristics according to UL / CSA

Types	VEM4, VEM4K
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	500 V AC, 500 V DC

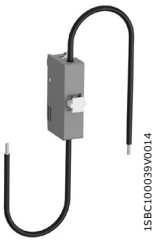
Connecting characteristics

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

Connecting characteristics

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

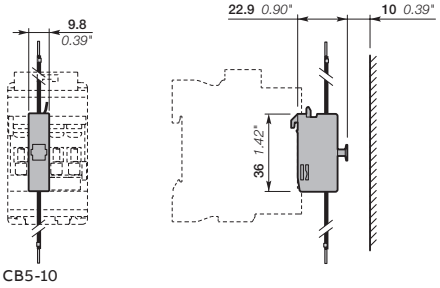
Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

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

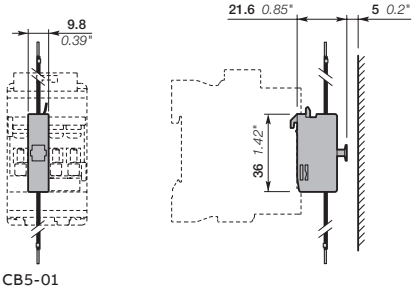
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

For contactors	Contacts		Type	Order code	Pkg qty	Weight (1 pce)
						kg
AF09 ... AF96	1	–	CB5-10	1SBN010013R1010	1	0.012
	–	1	CB5-01	1SBN010013R1001	1	0.012



CB5-10



CB5-01

Main dimensions mm, inches

RA4 interface relays

RA4

RA4 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant AF09 ... AF96 contactors or the NF contactor relays. RA4 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA4 is protected from surge thanks to the built-in surge protection of AF09 ... AF96. Furthermore, the RA4 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

The "E1+" and "E2–" input terminals must be connected, according to their polarity, to the PLC-output.

The RA4 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil.

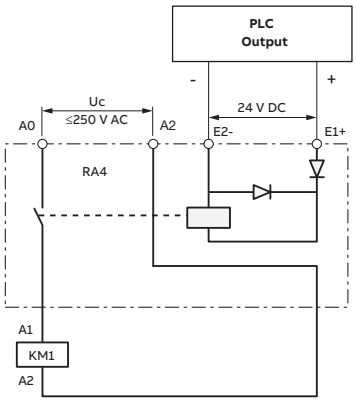
This coil is supplied between the A0 and A2 terminals of the RA4.

Mounting

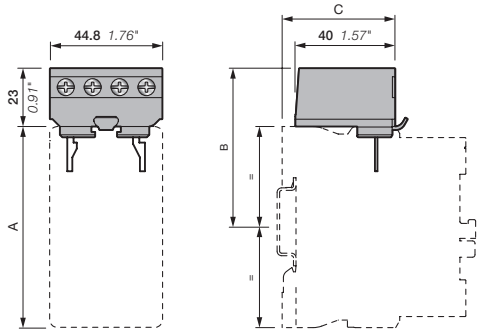
Remove the coil terminal block from the contactor and clip the interface relay without any screwing operation.

For contactors (1)	Coil voltages (2) V AC 50/60 Hz (4)	Rated control circuit voltage Uc V DC	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF96 NF	24 ... 250	24	RA4	1SBN060100R1000	1	0.040

(1) LDC4 additional terminal blocks and CAT4 auxiliary contact blocks not suitable with RA4.
(2) Main use with contactor coils 41, 11, 12, 13.



Wiring diagram



RA4 mounted on	AF09 ... AF38	AF40 ... AF96
A	80 mm / 3.15"	119.5 mm / 4.70"
B	63 mm / 2.48"	83 mm / 3.27"
C	45 mm / 1.77"	40 mm / 1.57"

Main dimensions mm, inches

RA4 interface relays
Technical data

Utilization characteristics according to IEC

Type			**RA4**
Standards			IEC 60947 5-1
Rated insulation voltage Ui acc. to IEC 60947 5-1			250 V AC 50/60 Hz
Pollution degree			3
Ambient air temperature			
In free air operation	at Uc = 24 V DC (between E1 and E2)		-25 ... +70 °C
	from 0.85 to 1.1 x Uc		-25 ... +60 °C
Storage			-40 ... +70 °C
Climatic withstand			Category B according to IEC 60947-1 Annex Q
Maximum operating altitude			≤3000 m
Mounting positions			Mounting positions 1, 1 ±30°, 2, 3, 4, 5

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid Solid/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 protection against direct contact in acc. with EN 50274 RA4 wired and mounted on the associated contactor
Screw terminals			Delivered in open position
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

Working data

Surge suppression		
For interface relay coil		Included inside AF built-in surge protection
Protection against polarity reversal between terminals E1 and E2		Diode
Interface relay operating time		Closing and drop-out ≤10 ms
Total operating time interface relay + contactor (1)		
Between energization and:	N.O. contact closing	42 ... 95 ms (AF09 ... AF38, NF) 44 ... 105 ms (AF40 ... AF96)
	N.C. contact opening	40 ... 90 ms (AF09 ... AF38, NF) 40 ... 100 ms (AF40 ... AF96)
Between de-energization and:	N.O. contact opening	15 ... 57 ms (AF09 ... AF38, NF) 21 ... 107 ms (AF40 ... AF96)
	N.C. contact closing	17 ... 60 ms (AF09 ... AF38, NF) 23 ... 112 ms (AF40 ... AF96)

(1) For contactor coils 41, 11, 12, 13.

Electrical input data

Control voltage (E1 and E2 terminals) Uc		
Rated value		24 V DC
Max. range at ambient temperature 20 °C		19 ... 30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C		0.3 W
"0" status (relay open)	for Uc	≤2.4 V DC
	for Ic	<1 mA
"1" status (relay closed)	for Uc	≥19 V DC
Max. short supply interruption immunity time		2 ms
Short-circuit protection device gG fuse rating		10 A

Electrical output data

Switching voltage (A0 and A2 terminals)		≤250 V AC
Electrical durability		
Switching frequency		600 cycles/h
Number of operating cycles		2 million operating cycles

Mechanical latching unit

WA4

The WA4 mechanical latching unit for AF09 ... AF96 contactors and NF contactor relays ensures that the contactor or contactor relay remains switched on even if there is a lack or a failure of voltage. Standard contactors can be easily converted into compact latched contactors.

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

Operation

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

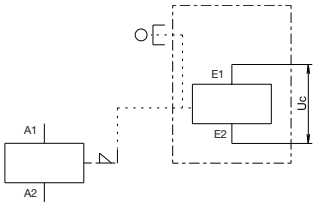
Contactor opening can be controlled:

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

Mounting

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

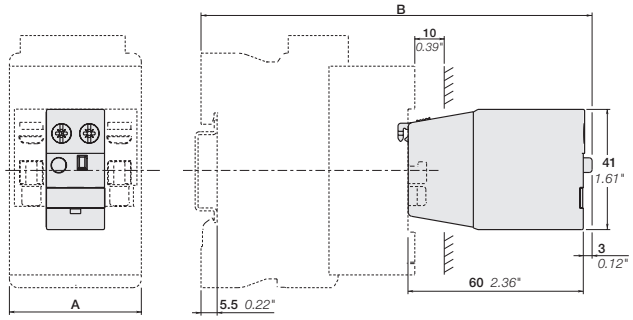
Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.



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
AF09 ... AF65, 4-pole NF	24...60	24...60	WA4-11	1SBN040100R1011	1	0.080
	48...130	48...130	WA4-12	1SBN040100R1012	1	0.080
	100...250	100...250	WA4-13	1SBN040100R1013	1	0.080
	250...500	250...500	WA4-14	1SBN040100R1014	1	0.080
AF80, AF96	24...60	24...60	WA4-96-11	1SBN040200R1011	1	0.080
	48...130	48...130	WA4-96-12	1SBN040200R1012	1	0.080
	100...250	100...250	WA4-96-13	1SBN040200R1013	1	0.080
	250...500	250...500	WA4-96-14	1SBN040200R1014	1	0.080
Mechanical latching unit for 24 V DC - 500 mA PLC control						
AF09 ... AF38, 4-pole NF	–	24	WA4-10	1SBN040100R1010	1	0.080

Note: For WA4 accessory use with contactor or contactor relay coil 30, please consult your ABB local sales organization.



WA4 + AF09 ... AF96, NF 1-stack

Main dimensions mm, inches

For contactors and contactor relays	A mm in.	B mm in.
AF09 ... 16(Z)-30-.. AF09 ... 16(Z)-40/22-00 NF(Z)	45 1.77"	133.5 5.25"
AF26 ... 38(Z)-30-00	45 1.77"	142.5 5.61"
AF26 ... 38(Z)-40/22-00	45 1.77"	157.5 1.77"
AF40 ... 65-30-00	55 2.16"	167 6.57"
AF40-40/22-00	70 2.75"	170 6.70"
AF52-40-00	70 2.75"	170 6.70"
AF80, 96-30-00	70 2.75"	172 6.77"
AF80-40/22-00	90 3.54"	172 6.77"

Mechanical latching unit
Technical data

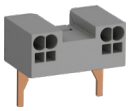
Types			**WA4, WA4-96**	**WA4**
Coil voltage code			11, 12, 13, 14	10
Standards			IEC 60947-4-1	
Rated insulation voltage Ui				
acc. to IEC 60947-1			690 V AC	
Pollution degree 3			3	
Coil operating limits		AC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	–
acc. to IEC 60947-4-1		DC supply	At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max	At θ ≤ 70 °C 0.85 x Uc ... 1.1 x Uc
Control circuit voltage				
AC control voltage 50/60 Hz				
Rated control circuit voltage Uc			24 ... 500 V AC 50/60 Hz	–
Coil consumption		Average pull-in value	15 ... 100 VA	–
DC control voltage 50/60 Hz				
Rated control circuit voltage Uc			24 ... 500 V DC	24 V DC
Coil consumption		Average pull-in value	15 ... 100 W	12 W
Max. electrical impulse time				
On AC control supply (with load factor 1.6%)			4 s	–
On DC control supply (with load factor 1.6%)			4 s	
Min. electrical impulse time				
For latching, energizing of the contactor coil			120 ms	
For unlatching, energizing of the mechanical latching unit coil			50 ms	
Operating time				
On contactor closing (latching) between coil energization and:				
N.O. contact closing			No difference with the operation of a contactor without mechanical latching unit	
N.C. contact opening			No difference with the operation of a contactor without mechanical latching unit	
On contactor opening (unlatching) between mechanical latching unit coil energization and:				
N.O. contact opening			8 ... 15 ms	
N.C. contact closing			10 ... 17 ms	
Ambient air temperature				
Operation			-25 ... +70 °C	
Storage			-60 ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Max. operating altitude			≤ 3000 m	
Mounting positions			Mounting positions 1, 1+/- 30°, 2, 3, 4, 5	
Mechanical durability			AF09 ... AF38, NF: 1 million operating cycles	
			AF40 ... AF65: 0.5 million operating cycles	
			AF80, AF96: 0.2 million operating cycles	
Max. switching frequency				
with on-load factor of 1.6%		cycles/h	600	

Connecting characteristics

Connection capacity (min. ... max.)			
	Rigid Solid/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
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

Other accessories

LDC4



LDC4K

BX4

BX4-CA

BA4

BA5-50

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

AF09 ... AF96, NF	LDC4	1SBN070156T1000	10	0.010

With Push-in Spring terminal

AF09 ... AF96, NF	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.

AF09 ... AF96 1-stack contactors and NF contactor relays	BX4	1SBN110108T1000	10	0.006
4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer	BX4-CA	1SBN110109W1000	50	0.001

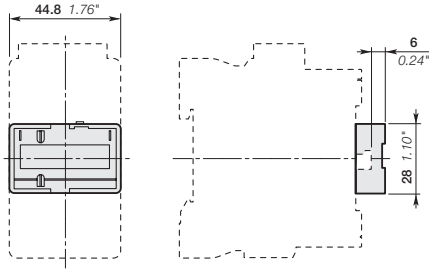
Note: BX4 produced since 13045 (day 045 - year 2013) are suitable for AF40 ... AF96.

Function markers AF09 ... AF2850

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").
- BA5 : set of 50 pieces. Marker dimensions: 7 x 19 mm (.276" x .748").

AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters	BA4	1SNA235156R2700	16	0.011
AF400 ... AF2850 and accessories	BA5-50	1SBN110000R1000	1	0.017

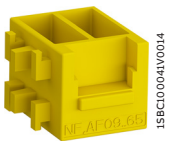


BX4

Main dimensions mm, inches

Other accessories

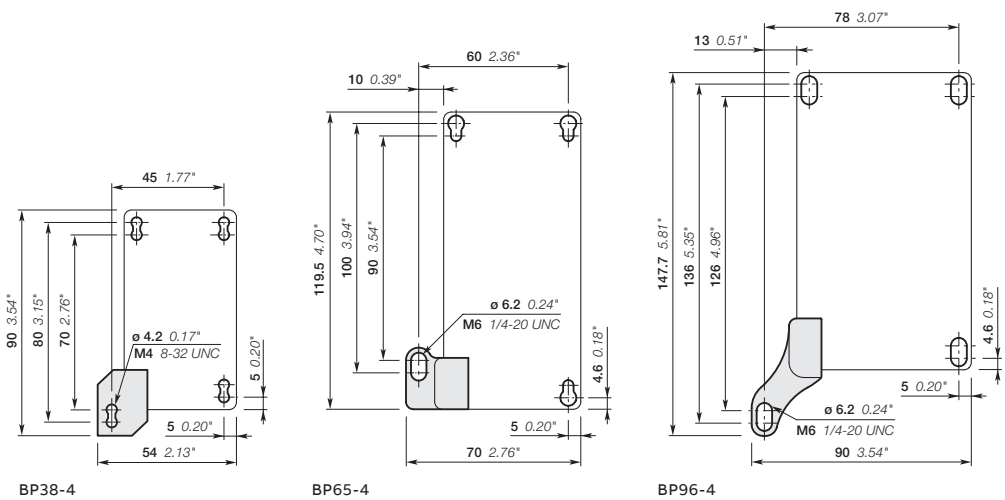
BP38-4



BDT4
For AF09 ... AF65, NF

BDT4
For AF80 ... AF96

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, AL26 ... AL40	AF09 ... AF38	BP38-4	1SBN112303T1000	10	0.003
A50 ... A75, AE50 ... AE75, AF50 ... AF75	AF40 ... AF65	BP65-4	1SBN113403T1000	10	0.004
A95, A110, AE95, AE110, AF95, AF110	AF80 ... AF96	BP96-4	1SBN113903T1000	10	0.005
Test block					
BDT4 test block is suitable for switching on contactor off-load. Marking on the block indicates the contactor type to fit with.					
AF09...AF96, NF		BDT4	1SBN110122T1000	10	0.007

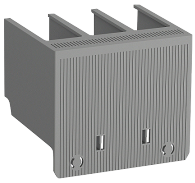


Main dimensions mm, inches

Terminal shrouds

1SBC100073V0014

LT65-30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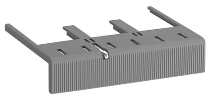
LT140-30L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LT460-AC

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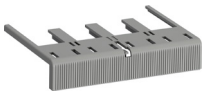
LT80-40


1SFC101199V0001

LT205-40

Main terminal protection for AF40 ... AF1250 contactors.

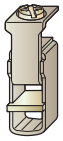
The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.

The main terminals, equipped with compression lugs or cable clamps, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

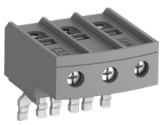
For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
3-pole contactors				
AF40 ... AF65	LT65-30	1SBN123401R1000	1	0.015
AF80, AF96	LT96-30	1SBN123901R1000	1	0.020
AF116 ... AF146, with compression lugs	LT140-30L	1SFN124203R1000	2	0.070
AF190, AF205, with cable clamps	LT205-30C	1SFN124801R1000	2	0.050
AF190, AF205, with compression lugs	LT205-30L	1SFN124803R1000	2	0.220
AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL starters	LT205-30Y	1SFN124804R1000	1	0.050
AF265 ... AF370, with cable clamps	LT370-30C	1SFN125401R1000	2	0.035
AF265 ... AF370, with compression lugs	LT370-30L	1SFN125403R1000	2	0.280
AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL starters	LT370-30Y	1SFN125404R1000	1	0.075
AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4	LT370-30D	1SFN125406R1000	1	0.15
AF400, AF460 with cable clamps	LT460-AC	1SFN125701R1000	2	0.100
AF400, AF460 with compression lugs	LT460-AL	1SFN125703R1000	2	0.800
AF580, AF750 with cable clamps	LT750-AC	1SFN126101R1000	2	0.120
AF580, AF1250 with compression lugs	LT750-AL	1SFN126103R1000	2	0.825
4-pole contactors				
AF40, AF52	LT52-40	1SBN123402R1000	1	0.020
AF80	LT80-40	1SBN123902R1000	1	0.025
AF116 ... AF140, with compression lugs	LT140-40L	1SFN124203R2000	2	0.090
AF190 ... AF205, with cable clamps	LT205-40C	1SFN124801R2000	2	0.035
AF190 ... AF205, with compression lugs	LT205-40L	1SFN124803R2000	2	0.140
AF265 ... AF370, with cable clamps	LT370-40C	1SFN125401R2000	2	0.040
AF265 ... AF370, with compression lugs	LT370-40L	1SFN125403R2000	2	0.165

Note: With LT65-30, LT96-30, LT52-40, LT80-40, use rigid cables or flexible cables with insulated ferrules including a stripping length ≥ 18 mm.

Connecting characteristics with LT ... terminal shrouds

Contactor types	AC / DC operated	AF40 ... 65 + LT65 ...	AF80 ... 96 + LT ...
			
		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 contactor (poles)			
Rigid Solid/Stranded	1 x	6...16 mm² or 25 ...35 mm²	6...16 mm² or 25 ...70 mm²
	2 x	6...16 mm² or 25 ...35 mm²	6...16 mm² or 35 ... 50 mm²
Flexible with insulated ferrule	1 x	4...16 mm² or 25 ...35 mm²	6...16 mm² or 25 ...50 mm²
	2 x	4...16 mm² or 25 ...35 mm²	6...16 mm² or 35 ...50 mm²
Bars or Lugs	L <	9.2 mm	12.2 mm
Connection capacity acc. to UL / CSA	1 x	AWG 10...6 or AWG 4..2	AWG 6 or AWG 4..1
	2 x	AWG 10...6 or AWG 4..2	AWG 6 or AWG 2..1
Stripping length		18 mm	18 mm
Tightening torque Recommended		4 Nm / 35 lb.in	6 Nm / 53 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 Main terminals equipped with LT		IP20	
Screw terminals Main terminals		M6	M8
	Screwdriver type	Flat Ø 6.5 / Pozidriv 2	hexagon socket (s = 4 mm)

Additional terminal blocks

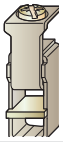


LD38-4

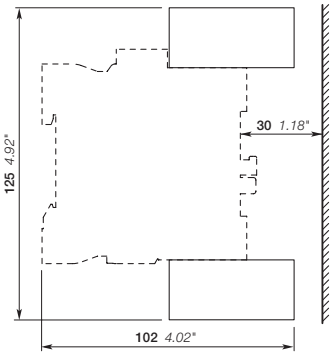
The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF26 ... AF38	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 AF40 ... AF96 contactors and derivative versions.

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

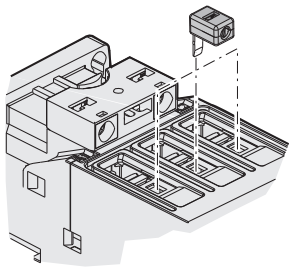
The LK96-4F is fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF40 ... AF96	LK96-4F	1SBN073452R2000	2	0.005

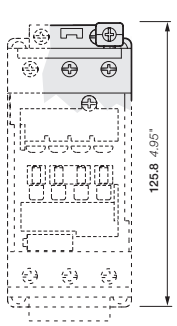
Note : LK96 not compatible with LT Terminal shrouds

Technical data

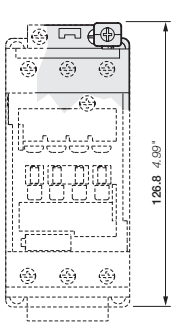
Types		LK96-4..
Connection capacity (min. ... max.)		
Rigid	1 x	1...2.5 mm²
	2 x	1...2.5 mm²
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...1.5 mm²
Lugs	L ≤	8 mm
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 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



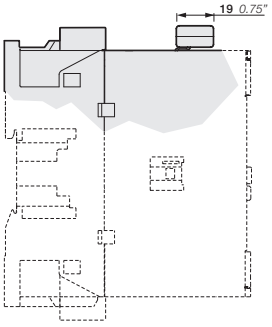
LK positioning



AF40, AF52, AF65 + LK96-4F

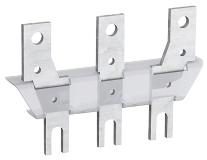


AF80, AF96 + LK96-4F



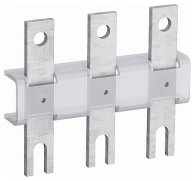
Main dimensions mm, inches

Connections



LW140

LW205-40



LX140

LL146-30

LD146-30

Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

For contactors	Dimensions		Type	Order code	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm				kg
3-pole contactors						
AF116 ... AF146	6.5	13 x 3	LW140	1SFN074207R1000	1	0.115
AF190, AF205	10.5	17.5 x 5	LW205	1SFN074807R1000	1	0.260
AF265 ... AF370	10.5	25 x 5	LW370	1SFN075407R1000	1	0.340
AF400, AF460	10.5	25 x 5	LW460	1SFN075707R1000	1	0.730
AF580, AF750	13	40 x 6	LW750	1SFN076107R1000	1	1.230
AF1250	13	50 x 10	LW1250	1SFN076407R1000	1	2.000
4-pole contactors						
AF190 ... AF205	10.5	20 x 5	LW205-40	1SFN074807R2000	1	0.306
AF265 ... AF370	10.5	25 x 5	LW370-40	1SFN075407R2000	1	0.540

Terminal extension

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

For 3-pole contactors	Dimensions		Type	Order code	Pkg qty	Weight (1 pce)
	hole Ø mm	bar mm				kg
AF116 ... AF146	6.5	13 x3	LX140	1SFN074210R1000	1	0.072
AF190, AF205	8.5	17.5 x 5	LX205	1SFN074810R1000	1	0.180
AF265 ... AF370	10.5	20 x 5	LX370	1SFN075410R1000	1	0.234
AF400, AF460	10.5	25 x 5	LX460	1SFN075710R1000	1	0.500
AF580, AF750	13	40 x 6	LX750	1SFN076110R1000	1	0.850

Connection sockets

Connection socket can be used to replace built-in cable clamps in AF116 ... AF146.

For contactor	Type	Order code	Pkg qty	Weight (1 pce)
				kg
3-pole contactors				
AF116 ... AF146	LL146-30	1SFN074211R1000	6	0.102
AF190 ... AF205	LL205-30	1SFN074811R1000	1	0.166
AF265 ... AF370	LL370-30	1SFN075411R1000	1	0.173
AF400 ... AF460	LE460	1SFN075716R1000	6	0.600
AF580 ... AF750	LE750	1SFN076116R1000	6	0.750
4-pole contactors				
AF116 ... AF140	LL146-40	1SFN074211R2000	8	0.132
AF190 ... AF205	LL205-40	1SFN074811R2000	2	0.216
AF265 ... AF370	LL370-40	1SFN075411R2000	2	0.224

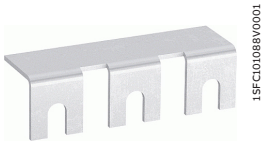
Connection module

Connection module can be fixed on AF116 ... AF146 delivered with bar terminals.

For contactor	Type	Order code	Pkg qty	Weight (1 pce)
				kg
3-pole contactors				
AF116 ... AF146	LD146-30	1SFN074208R1000	2	0.165
4-pole contactors				
AF116 ... AF140	LD146-40	1SFN074208R2000	2	0.225

Terminal connecting strips and shorting bars

LY16-4



LY185

LH38-4

LF16-4

LG16-4

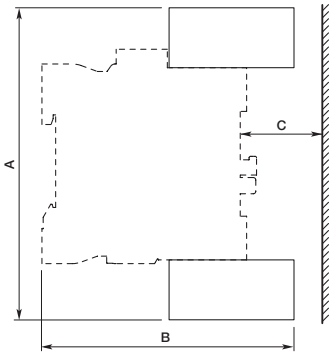
Parallel and series connection of 3-pole contactors:

- 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).

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.

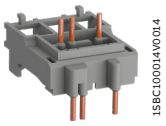
For contactors	max. nominal continuous current with "n" poles				Cable cross-sectional area	Type	Order code	Pkg qty	Weight (1 pce)
	in parallel			in series					
	2 poles	3 poles	4 poles	2 poles					
	A				mm^2				kg
AF09	30	33	–	25	6	LY16-4	1SBN071303T1000	10	0.006
AF12	32	36	–	27					
AF16	34	40	–	30					
AF26	50	60	–	45	10	LY38-4	1SBN072303T1000	10	0.012
AF116 ... AF146	–	240	–		–	LY140	1SFN074203R1000	1	0.055
AF190, AF205	–	400	–		–	LY185	1SFN074703R1000	1	0.200
AF265 ... AF370	–	670	–		–	LY300	1SFN075103R1000	1	0.300
AF400, AF460	–	1000	–		–	LY460	1SFN075703R1000	1	0.450
AF580, AF750	–	1650	–		–	LY750	1SFN076103R1000	1	0.800
AF190, AF205	300	–	–		–	LP185	1SFN074712R1000	2	0.300
AF265 ... AF370	475	–	–		–	LP300	1SFN075112R1000	2	0.400
AF400, AF460	725	–	–		–	LP460	1SFN075712R1000	2	0.550
AF580, AF750	1200	–	–		–	LP750	1SFN076112R1000	2	0.950
AF09	45		–	–	10	LH38-4	1SBN072304R1000	2	0.012
AF12	50		–	–	10				
AF16	54		–	–	16				
AF26	81		–	–	25				
AF30, AF38	90		–	–	25				
AF09		62	–		16	LF16-4	1SBN071305R1000	2	0.020
AF12		70	–		25				
AF16		75	–		25				
AF26		112	–		35	LF38-4	1SBN072305R1000	2	0.040
AF30, AF38		125	–		50				
AF09	–	–	70	–	25	LG16-4	1SBN071306R1000	2	0.025
AF12	–	–	78	–	25				
AF16	–	–	84	–	25				



Main dimensions

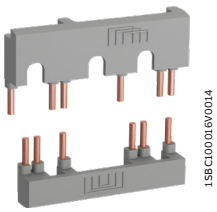
Type	For contactors	Dimensions					
		A		B		C	
		mm	inch	mm	inch	mm	inch
LH38-4	AF09 ... AF16	111.20	4.38"	83	3.27"	22	0.87"
	AF26 ... AF38	114	4.49"	86	3.39"	16	0.63"
LF16-4	AF09 ... AF16	121	4.76"	87	3.43"	23	0.91"
LF38-4	AF26 ... AF38	135.20	5.32"	103	4.06"	31	1.22"
LG16-4	AF09 ... AF16	124.20	4.89"	87	3.43"	23	0.91"

Connection accessories for starting solutions



BEA16-4

BPR65-4



BER16-4

Connecting links with manual motor starters

The BEA insulated 3-pole connecting links are used to connect AF09 ... AF65 contactors with the MS116 or MS132 or MS165 manual motor starters. The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. BPR65-4 35 mm rail hooks used with BEA65-4 connecting link, allow direct mounting on 2 rails 35 mm of MS165 manual motor starters with AF40 ... AF65 contactors.

For 3-pole contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	MS116-0.16 ... MS116-25, MS132-0.16... MS132-25	BEA16-4	1SBN081306T1000	10	0.025
AF26 ... AF38	MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10	BEA26-4	1SBN082306T1000	10	0.025
	MS116-20 ... MS116-32, MS132-12 ... MS132-32	BEA38-4	1SBN082306T2000	10	0.030
AF40 ... AF65	MS165-16 ... MS165-65	BEA65-4	1SBN083406R1000	1	0.090
	MS165-16 ... MS165-65 (1)	BPR65-4 (2)	1SBN113405R1000	1	0.007

Note: BEA16-4, BEA26-4 and BEA38-4 used with the PMS38-4 adapting plate, are suitable for AF..Z contactors with DC control voltage 24 V DC (coil 30).
(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).
(2) Use one BPR65-4 for each contactor AF40 ... AF65.

PMS38-4

Adapting plate for MS.. and BEA..series

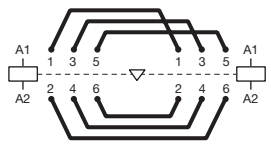
The PMS38-4 is an adapting plate allowing the assembly of Direct-on-line (DOL) motor starters using MS116 or MS132(K) manual motor starters, AF..Z..(K) contactors with DC control voltage 24 V DC (coil 30) and BEA..-4(KF) connecting links.

PMS38-4 is made of two parts: one part to fix on the manual motor starter, the second one to fix on the connecting link.

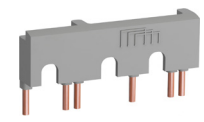
DOL starting and reversing starters can be mounted on single TH35 rail or fixed by screws on plate using MS serie's FS116 fixing kits.

PMS38-4 is the adequate solution in case of use of three-phase busbar systems feeding DOL and reversing starter using contactors of different depths.

For combinations	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09Z..(K)..-30 ... AF38Z..(K)..-30 with BEA...-4(KF) with MS..(K)	PMS38-4	1SBN090106R000	1	0.175



BER, BEM
Reversing connections



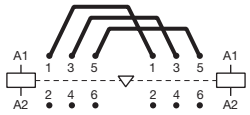
BEP16-30

BEP140-30

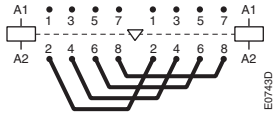
Connection sets for reversing contactors

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

For 3-pole contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	BER16-4	1SBN081311R1000	1	0.045
AF26 ... AF38	BER38-4	1SBN082311R1000	1	0.100
AF40 ... AF65	BER65-4	1SBN083411R1000	1	0.175
AF80, AF96	BER96-4	1SBN083911R1000	1	0.250
AF116 ... AF146	BER140-4	1SFN084211R1000	1	0.615
AF190, AF205	BER205-4	1SFN084811R1000	1	1.237
AF265 ... AF370	BER370-4	1SFN085411R1000	1	2.140
AF400, AF460	BEM460-30	1SFN085701R1000	1	4.400
AF580, AF750	BEM750-30	1SFN086101R1000	1	7.300



BEP, BES
3-pole phase to phase connections



BEP
4-pole changeover connections

Phase to phase connections

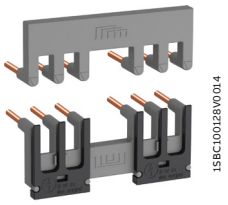
The BEP and BES connection sets are used to connect phase to phase between the main poles of two contactors mounted side by side. 4-pole contactors will then operate as source reversing contactors. The BEP connection sets contain 1 busbar used for upstream or downstream connection. The BES connection sets are made up of 3 busbars used for upstream or downstream connection. BEP and BES connection sets are insulated and made of solid copper bars.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
3-pole contactors				
AF09 ... AF16	BEP16-30	1SBN081314R1000	1	0.025
AF26 ... AF38	BEP38-30	1SBN082314R1000	1	0.050
AF116 ... AF146	BEP140-30	1SFN084214R1000	1	0.320
AF190, AF205	BEP205-30	1SFN084814R1000	1	0.534
AF265 ... AF370	BEP370-30	1SFN085414R1000	1	0.926
AF400, AF460	BES460	1SFN085704R1000	1	2.200
AF580, AF750	BES750	1SFN086104R1000	1	3.700
4-pole contactors				
AF116 ... AF140	BEP140-40	1SFN084214R2000	1	0.420
AF190 ... AF205	BEP205-40	1SFN084814R2000	1	0.710
AF265 ... AF370	BEP370-40	1SFN085414R2000	1	1.230

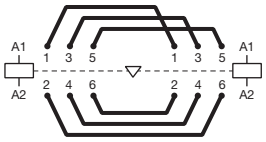
Connection accessories for starting solutions with Push-in Spring terminals

BEA16-4KF

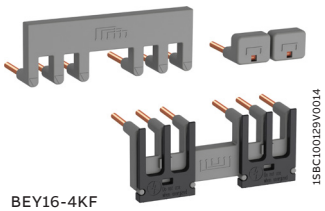
PMS38-4



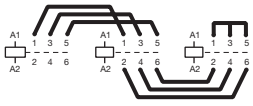
BER16-4KF



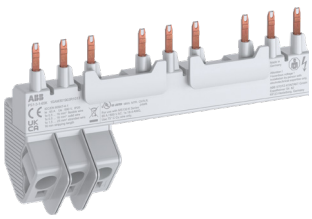
BER
Reversing connections



BEY16-4KF



BEY
Line-delta-star connection



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

Connecting links with manual motor starters

The BEA..-4KF insulated 3-pole connecting links are used to connect AF09..K ... AF38..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.

For 3-pole contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09..K ... AF16..K	MS132-0.16 ... MS132-25	BEA16-4KF	1SBN081325T1000	10	0.052
AF26..K ... AF38..K	MS132-0.16 ... MS132-32	BEA38-4KF	1SBN082325T2000	10	0.057

Connection sets for reversing contactors

AF09..K ... AF16..K	BER16-4KF	1SBN081322R1000	1	0.050
AF26..K ... AF38..K	BER38-4KF	1SBN082322R1000	1	0.080

Connection sets for star-delta starter

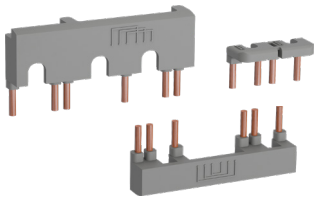
AF09..K ... AF16..K	BEY16-4KF	1SBN081323R2000	1	0.055
AF26..K ... AF38..K	BEY38-4KF	1SBN082323R2000	1	0.090

Busbars with Push-in Spring terminals

Suitable for	Rated operational current A	No. of manual motor starter	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
	65	4	1	PS1-4-1-65K	1SAM301903R1014	1	0.151
	65	5	1	PS1-5-1-65K	1SAM301903R1015	1	0.178

Connection accessories for starting solutions

Connection sets for start-delta starter



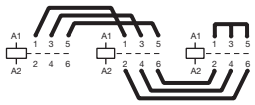
1SBC100018V0014

BEY16-4

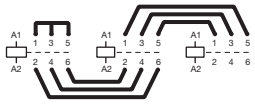
The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

The connection sets are made up of:

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



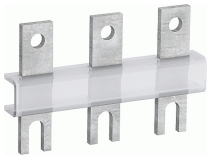
AF09 ... AF370
Line-delta-star connection



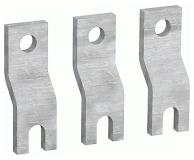
AF400 ... AF750
Star-delta-line connection

For 3-pole line, delta & star contactors	Interlock unit between delta & star contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09 ... AF16	With or without VM4 or VEM4	BEY16-4	1SBN081313R2000	1	0.050
AF26 ... AF38	With or without VM4 or VEM4	BEY38-4	1SBN082713R2000	1	0.110
AF40 ... AF65	With or without VM96-4	BEY65-4	1SBN083413R2000	1	0.200
AF80, AF96	With or without VM96-4	BEY96-4	1SBN083913R2000	1	0.250
AF116 ... AF146	With or without VM19	BEY140-4	1SFN084413R1000	1	1.040
AF190 ... AF205 (line and delta) AF116 ... AF146 (star)	With or without VM140/190	BEY190-4	1SFN084813R1000	1	1.154
AF190, AF205	With or without VM19	BEY205-4	1SFN085213R1000	1	1.205
AF265 ... AF370 (line and delta) AF190 ... AF205 (star)	With or without VM205/265	BEY265-4	1SFN085413R1000	1	2.020
AF265 ... AF370	With or without VM19	BEY370-4	1SFN085813R1000	1	2.110
AF400 ... AF460	With or without VM750H	BED460	1SFN085703R1000	1	4.700
AF580 ... AF750 (line and delta) AF400 ... AF460 (star)	With or without VM750H	BED580	1SFN085903R1000	1	6.300
AF580 ... AF750	With or without VM750H	BED750	1SFN086103R1000	1	7.700

Connection bars



BEA140/XT2



BEA205/T4

BEA370/T5

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

For 3-pole contactors	MCCB	Type	Order code	Pkg qty	Weight (1 pce) kg
Vertical assembly					
AF116 ... AF146	XT2	BEA140/XT2	1SFN084206R1000	1	0.058
AF116 ... AF146	XT3	BEA140/XT3	1SFN084206R1002	1	0.070
AF116 ... AF146	XT4	BEA140/XT4	1SFN084206R1001	1	0.068
AF190, AF205	XT4	BEA205/XT4	1SFN084806R1000	1	0.200
AF190, AF205	T4	BEA205/T4	1SFN084806R1001	1	0.190
AF265 ... AF370	T5	BEA370/T5	1SFN085406R1000	1	0.350
AF400 ... AF750	T6/XT6	BEA750/T6	1SFN086106R1000	1	0.410
AF400 ... AF750	T5	BEA750/T5	1SFN086106R1001	1	0.410
AF265...AF370	XT5	BEA370/XT5	1SFN085406R1001	1	0.262
AF400...AF460	XT5	BEA460/XT5	1SFN085706R1001	1	0.430
AF580...AF750	XT5	BEA750/XT5	1SFN086106R1005	1	0.580

Note: For XT5, Use back shield code 1SDA112971R1, to be ordered separately.
Alternatively, use an insulate back panel if the enclosure is bare metal

Vertical assembly with control wire terminals
(also suitable when using busbar kits for starter combinations)

AF400 ... AF750	T5	BEA750D/T5	1SFN086106R1003	1	0.720
AF400 ... AF750	T6	BEA750D/T6	1SFN086106R1002	1	0.720

Horizontal assembly
(also suitable when using busbar kits for starter combinations)

AF400, AF460	T6/XT6	BEA460H/S6	1SFN085907R1000	1	2.450

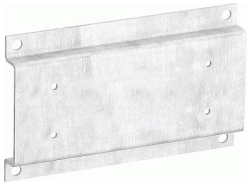
Connection bars between contactors and switch fuse

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

For 3-pole contactors	Switch fuse	Type	Order code	Pkg qty	Weight (1 pce) kg
Vertical assembly					
AF400, AF460	OESA400	BEF460/OESA400	1SFN085708R1000	1	0.340
AF460 ... AF750	OESA630 to OESA800	BEF750/OESA800	1SFN086108R1000	1	0.740
Horizontal assembly					
AF400, AF460	OESA400...LR	OESA460H/OESA400	1SFN085709R1000	1	1.250

Note: The BEF connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

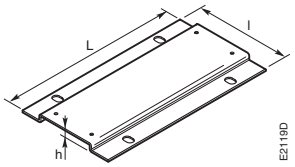
Adapter plates



PR146-1

Adapter plates with fixing holes for replacing installed contactors.

From contactors	To contactor	Type	Order code	Pkg qty	Weight (1 pce) kg
A95, AF95, A110, AF110	AF116, AF140, AF146	PR146-1	1SFN094200R1000	1	0.300
EH150, EH160, EH175, EH210, EG160	AF190, AF205	PR210-1	1SFN094900R1000	1	0.440
EH250, EH260, EH300	AF265, AF305, AF370	PR300-1	1SFN095300R1000	1	0.560
EH370, EH550, EG315	AF400, AF460, AF580	PR460-1	1SFN095700R1000	1	0.900
EH700, EH800	AF750	PR750-1	1SFN096100R1000	1	0.500
OKYM150, OKYM175	AF190	PR185-2	1SFN095100R1001	1	0.500
OKYM200, OKYM250	AF265, AF305, AF370	PR300-2	1SFN095300R1001	1	0.500
OKYM315	AF400, AF460	PR400-2	1SFN095700R1002	1	0.820
OKYM400	AF400, AF460	PR460-2	1SFN095700R1001	1	0.800
OKYM500	AF580	PR580-2	1SFN096100R1002	1	0.700
EH550, EG630, OKYM630	AF580, AF750	PR750-2	1SFN096100R1001	1	1.100



Dimensions (mm)

Type of the plate	Dimensions			Fixing holes
	L	l	h	mm
PR146-1	150	90	15	4 x ø 6.5
PR210-1	200	132	11.5	4 x ø 7
PR300-1	200	172	11.5	4 x ø 7
PR460-1	278	198	11.5	4 x ø 7
PR750-1	283	244	11.5	4 x ø 7
PR185-2	202	152	11.2	4 x ø 11
PR300-2	202	152	11.2	4 x ø 11
PR400-2	278	151	11.5	4 x ø 11
PR460-2	278	176	11.5	4 x ø 11
PR580-2	283	176	11.5	4 x ø 11
PR750-2	283	255	11.5	4 x ø 14

Fixing holes according to the plate types

Low Voltage Ride Through (LVRT) modules

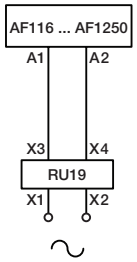
RU19/120

RU19 is designed to meet the Low Voltage Ride Through (LVRT) requirements for grid connections by staying operational during voltage dips preventing disturbances on the grid it self.

The RU19 is a separate module connected to the contactors coil connection A1-A2 creating a delay function of the opening of the contactor. When controlled by PLC, the contactor is operated directly whitout delay functionality. The RU19 can be screw or DIN rail mounted.

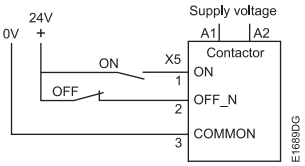
For contactor	Rated control circuit voltage Uc V 50/60 Hz	Type	Order code	Weight Pkg (1 pce) kg
AF116 ... AF370 use coil 33	110...120	RU19/120	1SFN170801R1001	0.400
AF400 ... AF1250 use coil 69				
AF116 ... AF370 use coil 33	230...240	RU19/240	1SFN170801R1002	0.400
AF400 ... AF1250 use coil 70				

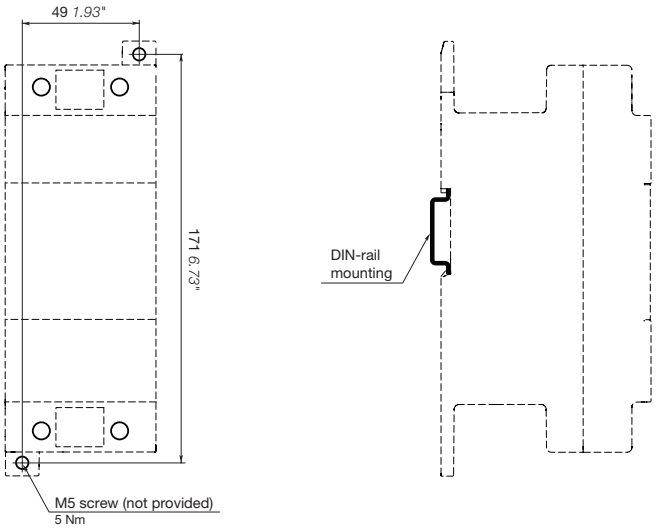
AF116 ... AF1250



For direct opening of AF400 ... AF1250 contactors, connect through built in PLC interface.

Control inputs





RU19/240

Main dimensions mm, inches

Spare parts contactors

Contactor coils, main contact sets and arc chutes

ZAF1650

Contactor coils

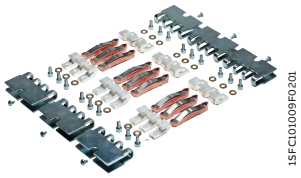
For contactors	Rated control circuit voltage Uc min. ... Uc max.		Type	Order code	Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC				kg
AF400, AF460	-	24...60	ZAF460	1SFN155770R6806	1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906	1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006	1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106	1	0.525
AF580 ... AF1250	-	24...60	ZAF750	1SFN156170R6806	1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906	1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006	1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106	1	1.335
AF1350 ... AF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026	1 set	0.900
			ZP1650 (2)	1SFN166521R1070	1	0.300
AF2650	100...250	100...250	ZAF2650 (1)	1SFN156670R7026	1 set	0.900
			ZP2650 (2)	1SFN166621R1070	1	0.300

ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

Main contact sets

Replacement parts for the main contacts. Set for AF116 ... AF370 includes complete base, complete moving contact bridge and return springs.

Set for AF400 ... AF2650 consists of six fixed contacts, three moving contacts, springs and the required screws.



ZL1650

For contactors		Type	Order code	Pkg qty	Weight (1 pce)
					kg
3-pole contactors					
AF116		ZL116	1SFN164203R1000	1	0.410
AF140		ZL140	1SFN164403R1000	1	0.410
AF146		ZL146	1SFN164603R1000	1	0.410
AF190		ZL190	1SFN164803R1000	1	1.093
AF205		ZL205	1SFN165203R1000	1	1.093
AF265		ZL265	1SFN165403R1000	1	2.010
AF305		ZL305	1SFN165803R1000	1	2.010
AF370		ZL370	1SFN166003R1000	1	2.010
AF400		ZL400	1SFN165703R1000	1	1.320
AF460		ZL460	1SFN165903R1000	1	1.320
AF580		ZL580	1SFN166103R1000	1	1.840
AF750		ZL750	1SFN166303R1000	1	1.840
AF1250		ZL1250	1SFN166403R1000	1	1.840
AF1350	For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx	ZL1350	1SFN166503R1000	1	2 500
	For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx	ZL1350-1	1SFN166503R1001	1	4 500
AF1650	For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx	ZL1650	1SFN166703R1000	1	3 500
	For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx	ZL1650-1	1SFN166703R1001	1	4 500
AF2050	For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx	ZL2050	1SFN167003R1000	1	3 500
	For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx	ZL2050-1	1SFN167003R1001	1	4 500
AF2650 (3)		ZL2650	1SFN166603R1000	1	1.200
4-pole contactors					
AF116		ZLT116	1SFN164204R1000	1	0.435
AF140		ZLT140	1SFN164404R1000	1	0.435
AF190		ZLT190	1SFN164804R1000	1	2.038
AF205		ZLT205	1SFN165204R1000	1	2.038
AF265		ZLT265	1SFN165404R1000	1	2.222
AF305		ZLT305	1SFN165804R1000	1	2.222
AF370		ZLT370	1SFN166004R1000	1	2.222

(3) Does not include fixed contacts and screws.
Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactor coils, main contact sets and arc chutes

Contactor coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

	Rated contol circuit Voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
	V 50/60Hz	V DC				kg
3-pole contactors						
AF116	24...60	20...60	ZAF116-11	1SFN154270R1106	1	0.324
	48...130	48...130	ZAF116-12	1SFN154270R1206	1	0.313
	100...250	100...250	ZAF116-13	1SFN154270R1306	1	0.288
	250...500	250...500	ZAF116-14	1SFN154270R1406	1	0.040
AF140	24...60	20...60	ZAF140-11	1SFN154470R1106	1	0.324
	48...130	48...130	ZAF140-12	1SFN154470R1206	1	0.313
	100...250	100...250	ZAF140-13	1SFN154470R1306	1	0.288
	250...500	250...500	ZAF140-14	1SFN154470R1406	1	0.298
AF146	24...60	20...60	ZAF146-11	1SFN154670R1106	1	0.324
	48...130	48...130	ZAF146-12	1SFN154670R1206	1	0.313
	100...250	100...250	ZAF146-13	1SFN154670R1306	1	0.288
	250...500	250...500	ZAF146-14	1SFN154670R1406	1	0.298
AF190, AF205	24...60	20...60	ZAF205-11	1SFN154870R1106	1	0.856
	48...130	48...130	ZAF205-12	1SFN154870R1206	1	0.831
	100...250	100...250	ZAF205-13	1SFN154870R1306	1	0.823
	250...500	250...500	ZAF205-14	1SFN154870R1406	1	0.818
AF265, AF305, AF370	24...60	20...60	ZAF370-11	1SFN155470R1106	1	1.262
	48...130	48...130	ZAF370-12	1SFN155470R1206	1	1.316
	100...250	100...250	ZAF370-13	1SFN155470R1306	1	1.036
	250...500	250...500	ZAF370-14	1SFN155470R1406	1	1.006
AF400, AF460	-	24...60	ZAF460	1SFN155770R6806	1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906	1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006	1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106	1	0.525
AF580 ... AF1250	-	24...60	ZAF750	1SFN156170R6806	1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906	1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006	1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106	1	1.335
AF1350 ... AF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026	1 set	0.900
			ZP1650 (2)	1SFN166521R1070	1	0.300
AF2650	100...250	100...250	ZAF2650 (1)	1SFN156670R7026	1 set	0.900
			ZP2650 (2)	1SFN166621R1070	1	0.300
3-pole contactors with built-in PLC interface						
AF116	100...250	100...250	ZAF116-33	1SFN154270R3306	1	0.310
	250...500	250...500	ZAF116-34	1SFN154270R3406	1	0.324
AF140	100...250	100...250	ZAF140-33	1SFN154470R3306	1	0.310
	250...500	250...500	ZAF140-34	1SFN154470R3406	1	0.324
AF146	100...250	100...250	ZAF146-33	1SFN154670R3306	1	0.310
	250...500	250...500	ZAF146-34	1SFN154670R3406	1	0.324
AF190	100...250	100...250	ZAF190-33	1SFN154870R3306	1	0.893
	250...500	250...500	ZAF190-34	1SFN154870R3406	1	0.878
AF205	100...250	100...250	ZAF205-33	1SFN155270R3306	1	0.893
	250...500	250...500	ZAF205-34	1SFN155270R3406	1	0.878
AF265	100...250	100...250	ZAF265-33	1SFN155470R3306	1	1.124
	250...500	250...500	ZAF265-34	1SFN155470R3406	1	1.094
AF305	100...250	100...250	ZAF305-33	1SFN155870R3306	1	1.124
	250...500	250...500	ZAF305-34	1SFN155870R3406	1	1.094
AF370	100...250	100...250	ZAF370-33	1SFN156070R3306	1	1.124
	250...500	250...500	ZAF370-34	1SFN156070R3406	1	1.094

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactor coils, main contact sets and arc chutes

Contactor coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

	Rated contol circuit Voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
	V 50/60Hz	V DC				kg
4-pole contactors						
AF116	24...60	20...60	ZAF116-40-11	1SFN154270R1146	1	0.340
	48...130	48...130	ZAF116-40-12	1SFN154270R1246	1	0.331
	100...250	100...250	ZAF116-40-13	1SFN154270R1346	1	0.308
	250...500	250...500	ZAF116-40-14	1SFN154270R1446	1	0.320
AF140	24...60	20...60	ZAF140-40-11	1SFN154470R1146	1	0.340
	48...130	48...130	ZAF140-40-12	1SFN154470R1246	1	0.331
	100...250	100...250	ZAF140-40-13	1SFN154470R1346	1	0.308
	250...500	250...500	ZAF140-40-14	1SFN154470R1446	1	0.320
AF190, AF205	24...60	20...60	ZAF205-40-11	1SFN154870R1146	1	0.864
	48...130	48...130	ZAF205-40-12	1SFN154870R1246	1	0.841
	100...250	100...250	ZAF205-40-13	1SFN154870R1346	1	0.839
	250...500	250...500	ZAF205-40-14	1SFN154870R1446	1	0.834
AF265, AF305, AF370	24...60	20...60	ZAF370-40-11	1SFN155470R1146	1	1.272
	48...130	48...130	ZAF370-40-12	1SFN155470R1246	1	1.328
	100...250	100...250	ZAF370-40-13	1SFN155470R1346	1	1.052
	250...500	250...500	ZAF370-40-14	1SFN155470R1446	1	1.032

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Electronic Modules

Control circuit electronic module spare part.

	Rated contol circuit Voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
	V 50/60Hz	V DC				kg
3-pole contactors						
AF116	24...60	20...60	ZP116-11	1SFN164223R1011	1	0.133
	48...130	48...130	ZP116-12	1SFN164223R1012	1	0.131
	100...250	100...250	ZP116-13	1SFN164223R1013	1	0.133
	250...500	250...500	ZP116-14	1SFN164223R1014	1	0.143
AF140	24...60	20...60	ZP140-11	1SFN164423R1011	1	0.133
	48...130	48...130	ZP140-12	1SFN164423R1012	1	0.131
	100...250	100...250	ZP140-13	1SFN164423R1013	1	0.133
	250...500	250...500	ZP140-14	1SFN164423R1014	1	0.143
AF146	24...60	20...60	ZP146-11	1SFN164623R1011	1	0.133
	48...130	48...130	ZP146-12	1SFN164623R1012	1	0.131
	100...250	100...250	ZP146-13	1SFN164623R1013	1	0.133
	250...500	250...500	ZP146-14	1SFN164623R1014	1	0.143
AF190, AF205	24...60	20...60	ZP205-11	1SFN164823R1011	1	0.610
	48...130	48...130	ZP205-12	1SFN164823R1012	1	0.610
	100...250	100...250	ZP205-13	1SFN164823R1013	1	0.610
	250...500	250...500	ZP205-14	1SFN164823R1014	1	0.620
AF265, AF305, AF370	24...60	20...60	ZP370-11	1SFN165423R1011	1	0.696
	48...130	48...130	ZP370-12	1SFN165423R1012	1	0.704
	100...250	100...250	ZP370-13	1SFN165423R1013	1	0.694
	250...500	250...500	ZP370-14	1SFN165423R1014	1	0.694
3-pole contactors with built-in PLC interface						
AF116	100...250	100...250	ZP116-33	1SFN164223R1033	1	0.155
	250...500	250...500	ZP116-34	1SFN164223R1034	1	0.169
AF140	100...250	100...250	ZP140-33	1SFN164423R1033	1	0.155
	250...500	250...500	ZP140-34	1SFN164423R1034	1	0.169
AF146	100...250	100...250	ZP146-33	1SFN164623R1033	1	0.155
	250...500	250...500	ZP146-34	1SFN164623R1034	1	0.169
AF190	100...250	100...250	ZP190-33	1SFN164823R1033	1	0.680
	250...500	250...500	ZP190-34	1SFN164823R1034	1	0.680
AF205	100...250	100...250	ZP205-33	1SFN165223R1033	1	0.680
	250...500	250...500	ZP205-34	1SFN165223R1034	1	0.680
AF265	100...250	100...250	ZP265-33	1SFN165423R1033	1	0.782
	250...500	250...500	ZP265-34	1SFN165423R1034	1	0.782
AF305	100...250	100...250	ZP305-33	1SFN165823R1033	1	0.782
	250...500	250...500	ZP305-34	1SFN165823R1034	1	0.782
AF370	100...250	100...250	ZP370-33	1SFN166023R1033	1	0.782
	250...500	250...500	ZP370-34	1SFN166023R1034	1	0.782

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactor coils, main contact sets and arc chutes

Electronic Modules

Control circuit electronic module spare part.

	Rated contol circuit Voltage Uc		Type		Pkg qty	Weight (1 pce)
	V 50/60Hz	V DC				kg
4-pole contactors						
AF116	24...60	20...60	ZPT116-11	1SFN164224R1011	1	0.149
	48...130	48...130	ZPT116-12	1SFN164224R1012	1	0.149
	100...250	100...250	ZPT116-13	1SFN164224R1013	1	0.153
	250...500	250...500	ZPT116-14	1SFN164224R1014	1	0.165
AF140	24...60	20...60	ZPT140-11	1SFN164424R1011	1	0.149
	48...130	48...130	ZPT140-12	1SFN164424R1012	1	0.149
	100...250	100...250	ZPT140-13	1SFN164424R1013	1	0.153
	250...500	250...500	ZPT140-14	1SFN164424R1014	1	0.165
AF190, AF205	24...60	20...60	ZPT205-11	1SFN165224R1011	1	0.618
	48...130	48...130	ZPT205-12	1SFN165224R1012	1	0.620
	100...250	100...250	ZPT205-13	1SFN165224R1013	1	0.626
	250...500	250...500	ZPT205-14	1SFN165224R1014	1	0.636
AF265, AF305, AF370	24...60	20...60	ZPT370-11	1SFN166024R1011	1	0.706
	48...130	48...130	ZPT370-12	1SFN166024R1012	1	0.716
	100...250	100...250	ZPT370-13	1SFN166024R1013	1	0.710
	250...500	250...500	ZPT370-14	1SFN166024R1014	1	0.720

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Arc chutes

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF400, AF460	ZW460	1SFN165710R1000	1	1.380
AF580, AF750, AF1250	ZW750	1SFN166110R1000	1	1.500
AF1350, AF1650, AF2050	ZW1650	1SFN166510R1001	1	4.560
AF2650	ZW2650	1SFN166610R1000	1	4.000

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

www.abb.com/productdetails/**1SBL137001R1310**

Accessories for UA, UA..RA contactors and GA75, GAE75, GAF contactors

3/334 Auxiliary contact blocks
3/340 Electronic timers
3/345 Mechanical and electrical interlock units
3/346 CA5, CE5, CAL, CEL18 and TEF5 fitting details
3/347 Function markers - Mounting piece
3/348 Surge suppressors for contactor coils
3/350 Interface relays
3/352 Mechanical latching units
3/354 Additional terminal blocks and others accessories
3/355 Terminals for control lead connections
3/356 Connection bar for contactors
3/357 Contactor coils and main contact sets

Auxiliary contact blocks

CA5-10

CA5-40E

CAL5-11

CAL18-11

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

Types of auxiliary contact blocks for front mounting:

- CA5 1 or 4-pole block, instantaneous with N.O., N.C. contacts
- CC5 1-pole block, with N.O. leading contact or N.C. lagging contact.

Select the 4-pole auxiliary contact blocks CA5 type, according to the contactor type for compliance with the standard requirements (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block instantaneous N.O. + N.C. contacts.

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

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

For contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce)
						kg
Front-mounted instantaneous auxiliary contact blocks, 1-pole						
UA16 ... UA110	1 0	– –	CA5-10	1SBN010010R1010	10	0.014
	0 1	– –	CA5-01	1SBN010010R1001	10	0.014
	– –	1 0	CC5-10	1SBN010011R1010	10	0.014
	– –	0 1	CC5-01	1SBN010011R1001	10	0.014
Front-mounted instantaneous auxiliary contact blocks, 4-pole						
UA16 ... UA30	2 2	– –	CA5-22M	1SBN010040R1122	2	0.060
	3 1	– –	CA5-31M	1SBN010040R1131	2	0.060
	1 3	– –	CA5-13M	1SBN010040R1113	2	0.060
	0 4	– –	CA5-04M	1SBN010040R1104	2	0.060
	1 1	1 1	CA5-11/11M	1SBN010040R1118	2	0.060
UA50 ... UA110	2 2	– –	CA5-22E	1SBN010040R1022	2	0.060
	3 1	– –	CA5-31E	1SBN010040R1031	2	0.060
	4 0	– –	CA5-40E	1SBN010040R1040	2	0.060
	0 4	– –	CA5-04E	1SBN010040R1004	2	0.060
	1 1	1 1	CA5-11/11E	1SBN010040R1018	2	0.060
Side-mounted instantaneous auxiliary contact blocks, 2-pole						
UA16 ... UA75	1 1	– –	CAL5-11	1SBN010020R1011	2	0.050
UA95, UA110, GAF185...GAF2050	1 1	– –	CAL18-11	1SFN010720R1011	2	0.050

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

Note:

- The front-mounted auxiliary contact blocks provided for the UA75 contactors can be used with the GA and GAE types
- The CAL auxiliary contact blocks can be used with GA contactors:
  - GA75-10-00: 2 x CAL5-11 blocks
  - GA75-10-11: 1 x CAL5-11 block
  - GAE75-10-00: 1 x CAL5-11 block
  - GAE75-10-11: no add-on block.
- The CAL auxiliary contact blocks can be used with UA..RA contactors. See "Accessory fitting details" for this contactor type.

Auxiliary contact blocks

Technical data

			Front mounted	Side mounted	
Types			1-pole CA5, 1-pole CC5, 4-pole CA5	CAL5-11	CAL18-11, CAL18-11B
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V		
Pollution degree			3		
Rated operational voltage Ue max.			24...690 V AC		
Conventional thermal current Ith - θ ≤ 40 °C			16 A		
Ie / Rated operational current AC-15					
acc. to IEC 60947-5-1		24-127 V 50/60 Hz	6 A		
		220-240 V 50/60 Hz	4 A		
		380-440 V 50/60 Hz	3 A		
		500-690 V 50/60 Hz	2 A		
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15		
Ie / Rated operational current DC-13					
acc. to IEC 60947-5-1		24 V DC	6 A / 144 W		
		48 V DC	2.8 A / 134 W		
		72 V DC	1 A / 72 W		
		110 V DC	0.55 A / 60 W		
		125 V DC	0.55 A / 69 W		
		220 V DC	0.3 A / 66 W		
		250 V DC	0.3 A / 75 W		
Short-circuit protection device gG type fuse			10 A		
Rated short-time withstand current Icw		for 1.0 s	100 A		
θ = 40 °C		for 0.1 s	140 A		
Minimum switching capacity					
A40 ... A75 contactors			17 V / 1 mA		–
with failure rate acc. to IEC 60947-5-4			≤ 10^{-7}		–
A95 ... A110 contactors			24 V / 50 mA	–	24 V / 50 mA (0.5 million of operating cycles)
with failure rate acc. to IEC 60947-5-4			–	–	≤ 10-6
Power dissipation per pole at 6 A			0.1 W		0.15 W
Mechanical durability	Number of operating cycles		10 millions (UA16 ... UA75)	10 millions	5 millions (UA95 ... UA110)
			3 millions (UA95 ... UA110)		3 millions (GAF185 ... GAF750)
					0.5 million (GAF1250 ... GAF2050)
	Max. switching frequency		3600 cycles/h		
Electrical durability	Number of operating cycles		see "Electrical durability" curves		
	Max. switching frequency	AC-15	1200 cycles/h		
		DC-13	900 cycles/h		

Contact utilization characteristics according to UL / CSA

Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	600 V AC, 250 V DC
Pilot duty	A600, Q300
AC thermal rated current	10 A

Connecting characteristics

Connection capacity (min. ... max.)				
	Rigid Solid/Stranded	1 x	1...4 mm²	
		2 x	1...4 mm²	
	Flexible with ferrule	1 x	0.75...2.5 mm²	
		2 x	0.75...2.5 mm²	
	Lugs	L ≤	7.7 mm	8 mm
		l >	3.7 mm	3.7 mm
Stripping length			10 mm	-
Tightening torque			1 Nm	
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		Terminals	IP20	
Screw terminals			Delivered in open position, screws of unused terminals must be tightened	
All terminals			M3.5	
Screwdriver type			Flat Ø 5.5 / Pozidriv 2	

Auxiliary contact blocks for severe industrial environments

CE5-01W

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

Types of auxiliary contact blocks for front mounting:

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

Types of auxiliary contact blocks for side mounting:

- CEL18 1-pole block with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

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

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

For contactors	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
Front-mounting instantaneous auxiliary contact blocks, 1-pole						
UA16 ... UA75	1 –	– –	CE5-10D0.1	1SBN010015R1010	1	0.020
	– 1	– –	CE5-01D0.1	1SBN010015R1001	1	0.020
	1 –	– –	CE5-10D2	1SBN010017R1010	1	0.020
	– 1	– –	CE5-01D2	1SBN010017R1001	1	0.020
	1 –	– –	CE5-10W0.1	1SBN010016R1010	1	0.020
	– 1	– –	CE5-01W0.1	1SBN010016R1001	1	0.020
	1 –	– –	CE5-10W2	1SBN010018R1010	1	0.020
	– 1	– –	CE5-01W2	1SBN010018R1001	1	0.020
Side-mounting instantaneous auxiliary contact blocks, 1-pole microswitch auxiliary contact N.O. or N.C.						
UA95, UA110 GAF185 ... GAF2050	1 0	– –	CEL18-10	1SFN010716R1010	1	0.050
UA95, UA110 GAF185 ... GAF2050	0 1	– –	CEL18-01	1SFN010716R1001	1	0.050

For each contactor type, refer to "Accessory fitting details" table.
Note: The front-mounted auxiliary contact blocks provided for the UA contactors can be used with the GA and GAE types.
The side-mounted auxiliary contact blocks provided for the UA95, UA110 contactors can be used with the GAF types.

Auxiliary contact blocks

Technical data

			Front-mounted		Side-mounted
Types			1-pole CE5-..0.1	1-pole CE5-..2	CEL18-10, CEL18-01
Contact utilization characteristics according to IEC					
Standards			IEC 60947-5-1 and EN 60947-5-1		
Rated insulation voltage Ui acc. to IEC 60947-5-1			250 V		
Pollution degree			3		
Rated operational voltage Ue max.			125 V	250 V	125 V
Conventional thermal current Ith - θ ≤ 40 °C			0.1 A	2 A	0.1 A
Ie / Rated operational current			**AC-14**	**AC-15**	**AC-14**
acc. to IEC 60947-5-1	24-127 V 50/60 Hz		0.1 A	2 A	0.1 A
	220-240 V 50/60 Hz		–	2 A	–
Making capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Breaking capacity acc. to IEC 60947-5-1			6 x Ie AC-14	10 x Ie AC-15	6 x Ie AC-14
Ie / Rated operational current			**DC-12**		
acc. to IEC 60947-5-1		24 V DC	0.1 A	2 A	0.1 A
		48 V DC	0.1 A	1 A	0.1 A
		72 V DC	0.1 A	0.3 A	0.1 A
		110 V DC	0.1 A	0.2 A	0.1 A
		125 V DC	–	0.2 A	–
		220 V DC	–	0.1 A	–
Short-circuit protection device			0.1 A (FF type fuses) (1)	10 A (FF type fuses) (1)	0.1 A (FF type fuses) (1)
Minimum switching capacity					
A40 ... A75 contactors			3 V / 1 mA	17 V / 1 mA	3 V / 1 mA
With failure rate acc. to IEC 60947-5-4			–	≤ 10-7	–
A95 ... A110 contactors			3 V / 1 mA	17 V / 1 mA	–
With failure rate acc. to IEC 60947-5-4			–	≤ 10-7	–
Mechanical durability	Number of operating cycles		5 millions for CE5-..D0.1	5 millions for CE5-..D2	1 million
			2.5 millions for CE5-..W0.1	2.5 millions for CE5-..W2	–
	Max. switching frequency		3600 cycles/h		1200 cycles/h
Electrical durability	Number of operating cycles		2.5 millions for CE5-..D0.1	1 million for CE5-..D2	0.7 millions
			0.7 millions for CE5-..W0.1	0.3 millions for CE5-..W2	
	Max. switching frequency	AC-14, AC-15	1200 cycles/h		
		DC-12	900 cycles/h		
Contact utilization characteristics according to UL / CSA					
Standards			UL 508, CSA C22.2 N°14		
Max. operational voltage			125 V AC / 110 V DC	250 V AC / 220 V DC	125 V
Pilot duty					
AC thermal rated current			0.1 A	2 A	0.1 A

Connecting characteristics

Connection capacity (min. ... max.)					
	Rigid Solid/Stranded	1 x	1...4 mm²		
		2 x	1...4 mm²		
	Flexible with ferrule	1 x	0.75...2.5 mm²		
		2 x	0.75...2.5 mm²		
	Bars or lugs	L ≤	7.7 mm		
		l >	3.7 mm		
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18...14		
Tightening torque			1 Nm		
Degree of protection		Terminals	IP20		
acc. to IEC 60947-1 / EN 60947-1		Microswitches	IP40 for CE5-..D0.1	IP40 for CE5-..D2	IP67
and 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		

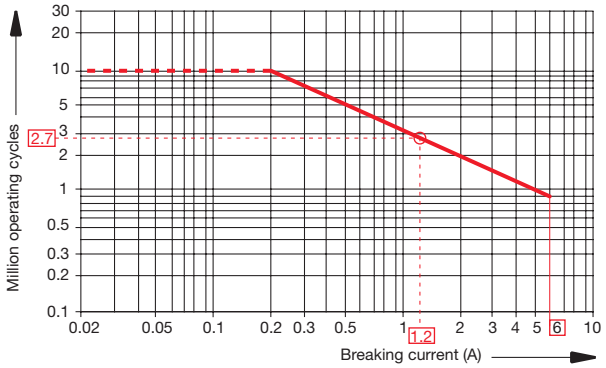
(1) or HRC fuses for very fast action (6.3 x 32 mm size).

Auxiliary contacts
Electrical durability

Electrical durability for AC-15 utilization category

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

These curves represent the electrical durability of the built-in or add-on auxiliary contacts, in relation to the breaking current.
The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

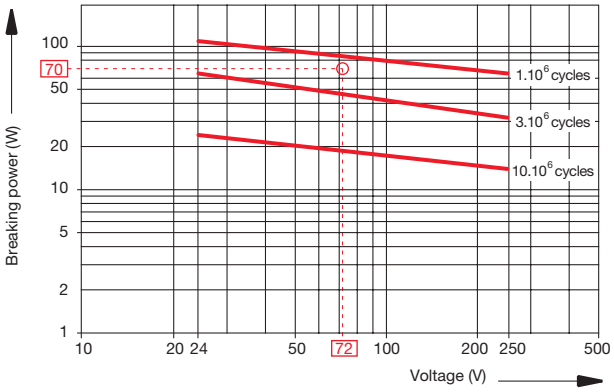


- 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:
Breaking current = 1.2 A
On the opposite curve at intersection "O" 1.2 A
the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

Electrical durability for DC-13 utilization category

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



- 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:
Control of DC electro-magnet: Ue voltage = 72 V DC and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W
the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Add-on auxiliary contacts

Terminal marking and positioning

1-pole auxiliary contacts

CA5-01

CA5-10

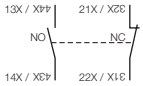
CE5-01, CEL18-01

CE5-10, CEL18-10

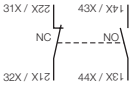
CC5-01

CC5-10

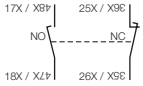
2-pole auxiliary contacts



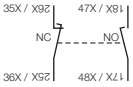
CAL5-11, CAL18-11
(Left-side mounted)



CAL5-11, CAL18-11
(Right-side mounted)

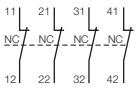


CCL5-11
(Left-side mounted)

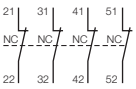


CCL5-11
(Right-side mounted)

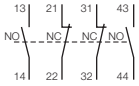
4-pole auxiliary contacts



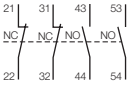
CA5-04E



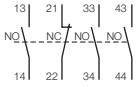
CA5-04M



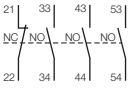
CA5-22E



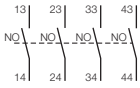
CA5-22M



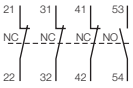
CA5-31E



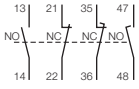
CA5-31M



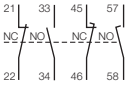
CA5-40E



CA5-13M



CA5-11/11E



CA5-11/11M

Electronic timers

1SBC101396F0014

TEF5-OFF

TEF5 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF5 electronic timers are front-mounted and locked on contactors.
A mechanical indicator allows to show the state of the contactor.

TEF5 electronic timers are supplied by direct wiring to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

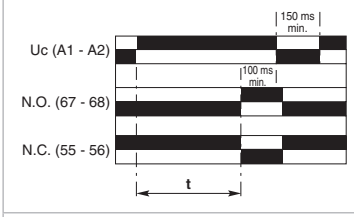
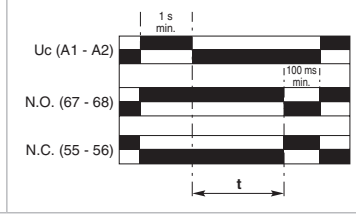
Available for a wide control voltage range 24...240 V AC/DC

TEF5-ON or TEF5-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

For contactors, contactor relays	Time delay range selected by switch	Delay type	Rated control circuit voltage Uc V 50/60 Hz or DC	Auxiliary contacts	Type	Order code	Weight Pkg (1 pce) kg
UA16 ... UA75 GA75, GAE75	0.1...1 s 1...10 s 10...100 s	ON-delay	24...240	1 1	TEF5-ON	1SBN020312R1000	0.065
		OFF-delay	24...240	1 1	TEF5-OFF	1SBN020314R1000	0.065

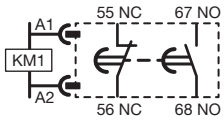
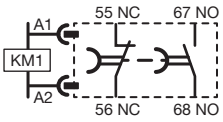
Electronic timers
Technical data

Contact utilization characteristics according to IEC

Types			TEF5-ON	TEF5-OFF
Standards			IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage Ui acc. to IEC 60947-5-1			400 V	
Rated impulse withstand voltage Uimp			4 kV	
Pollution degree			3	
Rated operational voltage Ue max.			240 V	
Rated frequency (without derating)			50 / 60 Hz	
Conventional thermal current Ith - θ ≤ 40 °C			5 A	
Ie / Rated operational current AC-15				
acc. to IEC 60947-5-1		24-127 V 50/60 Hz	3 A	
		220-240 V 50/60 Hz	1.5 A	
Making capacity			10 x Ie AC-15 acc. to IEC 60947-5-1	
Breaking capacity			10 x Ie AC-15 acc. to IEC 60947-5-1	
Ie / Rated operational current DC-13 acc. to IEC 60947-5-1		24 V DC	1 A / 24 W	
Short-circuit protection device gG type fuse			6 A	
Rated short-time withstand current Icw		for 1.0 s	8 A	
θ = 40 °C		for 0.1 s	8 A	
Minimum switching capacity			12 V / 3 mA	
with failure rate acc. to IEC 60947-5-4		24 V DC	10^{-7}	
Power dissipation per pole at 3 A			0.1 W	
Function diagram			ON-delay	OFF-delay
				
			Bistable relay inside. Before use, once apply Uc then switch it off in order to initialize position of the contacts.	
Control circuit voltage				
AC control voltage	Rated control circuit voltage Uc		24...240 V AC	
50/60 Hz	Average consumption		1.5 mA RMS	1 mA RMS
DC control voltage	Rated control circuit voltage Uc		24...240 V DC	
	Average consumption		1.5 mA	1 mA
Rated frequency limits			50 / 60 Hz	
Supply voltage range			0.85...1.1 x Uc (at θ ≤ 70 °C)	
Overvoltage protection			Varistor included	
Time delay range (t) selected by switch		0.1...1 s		
		1...10 s		
		10...100 s		
On-load reiteration accuracy under constant conditions			≤ 1 %	
Minimum ON period			0.1 s	1 s
Recovery time			0.15 s	0.1 s
Ambient air temperature	Operation		-25 °C ... +70 °C	
	Storage		-40 °C ... +80 °C	
Climatic withstand			Category B according to IEC 60947-1 Annex Q	
Maximum operating altitude			2000 m	
Mounting positions			Acc. to mounting positions permitted on contactors or contactor relays	
Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 (Mounting position 1)			1/2 sinusoidal shock for 11 ms: no change in contact position Same as contactor or contactor relay	
Mechanical durability				
	Number of operating cycles		5 millions operating cycles	
	Max. switching frequency		3600 cycles/h	1800 cycles/h
Max. electrical switching frequency				
		AC-15	1200 cycles/h	
		DC-13	900 cycles/h	

Electronic timers
Technical data

Connecting characteristics

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
		l >	3.7 mm
Stripping length			10 mm
Tightening torque			1 N.m / 9 lb.in
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			IP20
Screw terminals			Delivered in open position, screws of unused terminals should be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2
Terminal Marking			 

Notes

Mechanical and electrical interlock units

VE5-2

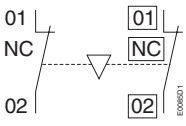
When mounted between two contactors, the mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VE interlock units are used for mechanical and electrical interlocking of two AC or DC operated contactors mounted side by side.

For contactors	Mounting	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors					
GA75, GAE75	Rail mounting	VE5-2	1SBN030210R1000	1	0.146

Mechanical and electrical interlock units

Technical data

Types		VE5-2
Contact utilization characteristics according to IEC		
Standards		IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1		690 V
Pollution degree		3
Rated operational voltage Ue max.		24...690 V
Conventional thermal current Ith - θ ≤ 40 °C		16 A
Ie / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	380-440 V 50/60 Hz	3 A
	500-690 V 50/60 Hz	2 A
Making capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1		10 x Ie AC-15
Ie / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A
	48 V DC	2.8 A
	72 V DC	1 A
	125 V DC	0.55 A
	250 V DC	0.3 A
Short-circuit protection device - gG type fuse		10 A
Rated short-time withstand current Icw	for 1.0 s	100 A
θ = 40 °C	for 0.1 s	140 A
Power dissipation per pole at 6 A		0.15 W
Mechanical durability		
Number of operating cycles		5 millions operating cycles
Max. switching frequency		600 cycles/h
Utilization characteristics according to UL/CSA		
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		600 V
Connecting characteristics		
Connection capacity (min. ... max.)		
Rigid Solid/Stranded	1 x	1...4 mm²
	2 x	1...4 mm²
Flexible with ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Lugs	L <	8 mm
	l >	3.5 mm
Stripping length		10 mm
Tightening torque		
Recommended		1 Nm
Max.		1.2 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		delivered in open position, screws of unused terminals must be tightened
All terminals		M3.5
Screwdriver type		Flat Ø 5.5 / Pozidriv 2
Terminal marking		

Technical note: when, during switching, the arc time is estimated to more than 40 ms, the closing signal of one of the two contactors must be delayed with respect to the opening signal of the other contactor in order to prevent a short-circuit.
Use a TEF5 electronic timer according to application use with time lapse for GA75, GAE75 contators.

CA5, CE5, CAL, CEL18 and TEF5 fitting details

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories Auxiliary contact blocks 1-pole CA5 1-pole CE5	 4-pole CA5	Electronic timer TEF5	Side-mounted accessories Auxiliary contact blocks 2-pole CAL 1-pole CEL18	 Interlock unit VE5
UA contactors							
UA16 ... UA26	3 0	1 0	1 to 4 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 to 2 x CAL5-11	–
			1 to 2 x CE5 max. (1)	**+** 1 x 1-pole CA5 or CE5 (1)	**+** 1 x 1-pole CA5	–	–
UA30	3 0	1 0	1 to 5 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 to 2 x CAL5-11	–
			1 to 3 x CE5 max. (1)	**+** 1 x 1-pole CA5 or CE5 (1)	**+** 1 x 1-pole CA5	–	–
UA50 ... UA75	3 0	0 0	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 to 2 x CAL5-11	–
			1 to 5 x CE5 max. (2)	+ 2 x 1-pole CA5 or CE5 (1)	**+** 2 x 1-pole CA5	–	–
	3 0	1 1	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 x CAL5-11	–
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (1)	**+** 2 x 1-pole CA5	–	–
UA95, UA110	3 0	0 0	1 to 6 x CA5	**or** 1 x 4-pole CA5	–	**+** 1 to 2 x CAL18-11	–
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (1)	–	**or** 1 to 2 x CEL18	–
	3 0	1 1	1 to 6 x CA5	**or** 1 x 4-pole CA5	–	**+** 1 x CAL18-11	–
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (1)	–	**or** 1 x CEL18	–
UA..RA contactors							
UA16-30-10RA	3 0	1 0	–	–	–	**+** 1 x CAL5-11	–
UA26-30-10RA	3 0	1 0					
UA30-30-10RA	3 0	1 0	1 x CA5 1 x CE5	–	–	**+** 1 to 2 x CAL5-11	–
UA50-30-00RA	3 0	0 0	1 to 2 x CA5 1 to 2 x CE5	–	–	**+** 1 to 2 x CAL5-11	–
UA63-30-00RA	3 0	0 0					
UA75-30-00RA	3 0	0 0					
UA95-30-00RA	3 0	0 0	1 to 2 x CA5	–	–	**+** 1 to 2 x CAL18-11	–
UA110-30-00RA	3 0	0 0	1 to 2 x CE5	–	–	**or** 1 to 2 x CEL18	–
GA75, GAE75 contactors							
GA75	1 0	0 0	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 to 2 x CAL5-11	**or** 1 x VE5-2
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (2)	**+** 2 x 1-pole CA5	–	**+** 1 x CAL5-11
	1 0	1 1	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 x CAL5-11	**or** 1 x VE5-2
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (2)	**+** 2 x 1-pole CA5	–	–
GAE75	1 0	0 0	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	**+** 1 x CAL5-11	**or** 1 x VE5-2
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (2)	**+** 2 x 1-pole CA5	–	–
	1 0	1 1	1 to 6 x CA5	**or** 1 x 4-pole CA5	**or** 1 x TEF5	–	–
			1 to 5 x CE5 max. (2)	**+** 2 x 1-pole CA5 or CE5 (2)	**+** 2 x 1-pole CA5	–	–

Notes regarding combination of CE5 with other accessories:
(1) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 3. CES auxiliary contacts not allowed in mounting position 5.
(2) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 5.

Function markers

Mounting piece

BA5-50

BA5-50 Function markers

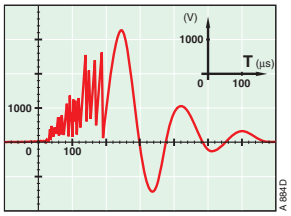
Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.

Self-adhesive labels (not supplied) can also be added to them.

Marker dimensions: 7 x 19 mm (0.276" x 0.748").

For contactors	Type	Order code		Pkg qty	Weight (1 pce) kg
UA, UA..RA and accessories GA75, GAE75	BA5-50	1SBN110000R1000		1	0.017

Surge suppressors for contactor coils



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

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

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

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

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

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

RV5/50

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

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

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

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

RC5-1/50

For contactors	Rated control circuit voltage Uc			Type	Order code	Pkg qty	Weight (1 pce)
	V	AC	DC				kg
UA, UA..RA GA75, GAE75	24...50	●	●	RV5/50	1SBN050010R1000	2	0.015
	50...133	●	●	RV5/133	1SBN050010R1001	2	0.015
	110...250	●	●	RV5/250	1SBN050010R1002	2	0.015
	250...440	●	●	RV5/440	1SBN050010R1003	2	0.015
UA16...UA30, UA16RA...UA30RA	24...50	●	–	RC5-1/50	1SBN050100R1000	2	0.012
	50...133	●	–	RC5-1/133	1SBN050100R1001	2	0.012
	110...250	●	–	RC5-1/250	1SBN050100R1002	2	0.012
	250...440	●	–	RC5-1/440	1SBN050100R1003	2	0.012
UA50...UA110, UA50RA...UA110RA GA75	24...50	●	–	RC5-2/50	1SBN050200R1000	2	0.015
	50...133	●	–	RC5-2/133	1SBN050200R1001	2	0.015
	110...250	●	–	RC5-2/250	1SBN050200R1002	2	0.015
	250...440	●	–	RC5-2/440	1SBN050200R1003	2	0.015
GAE75	12...32	–	●	RT5/32	1SBN050020R1000	2	0.015
	25...65	–	●	RT5/65	1SBN050020R1001	2	0.015
	50...90	–	●	RT5/90	1SBN050020R1002	2	0.015
	77...150	–	●	RT5/150	1SBN050020R1003	2	0.015
	150...264	–	●	RT5/264	1SBN050020R1004	2	0.015

Surge suppressors for contactor coils

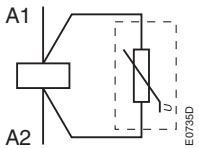
Technical data

Varistor	RV5/50	RV5/133	RV5/250	RV5/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
	24...50 V DC	50...133 V DC	110...250 V DC	250...440 V DC
Residual overvoltage (clipping voltage)	132 V AC	270 V AC	480 V AC	825 V AC
	132 V DC	270 V DC	480 V DC	825 V DC
Opening time growth factor	1.1...1.5			
Operating temperature	-20...+70 °C			
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.			
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages	High energy absorption: good damping - Unpolarized system.			
Drawback	Clipping as from Uvdr*, thus voltage front up to this point.			
	*Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %.			

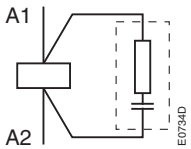
RC type	RC5-1/50 RC5-2/50	RC5-1/133 RC5-2/133	RC5-1/250 RC5-2/250	RC5-1/440 RC5-2/440
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	1.2...1.3			
Operating temperature	-20...+70 °C			
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.			
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.			
Advantages	Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays.			

Transil diode	RT5/32	RT5/65	RT5/90	RT5/150	RT5/264
Rated control circuit voltage Uc	12...32 V DC	25...65 V DC	50...90 V DC	77...150 V DC	150...264 V DC
Residual overvoltage (clipping voltage)	50 V DC	100 V DC	150 V DC	210 V DC	390 V DC
Opening time growth factor	1.5...3				
Operating temperature	-20...+70 °C				
Connection to the coil terminals (parallel mounting)	Clip-on for both fixing and connection.				
Fixing	Clipped onto the top part of the contactor base without change in contactor overall dimensions.				
Advantages	Good energy absorption - Unpolarized system - Simple, reliable system.				
Drawback	A certain delay on drop out which does not however reduce contactor breaking capacity.				

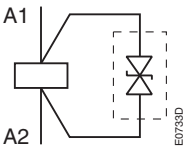
Wiring diagrams



Varistor

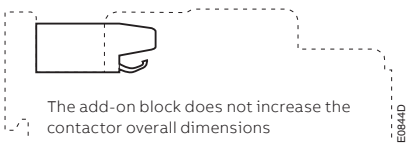


RC type



Transil diode

Dimensions



RV5, RC5, RT5

Interface relays

RA5-1

RA5-1 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant contactors.

RA5-1 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA5-1 is equipped with surge suppressors:

- on the 24 V DC relay coil via a diode,
- on the power contactor coil via a varistor.

Furthermore, the RA5-1 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

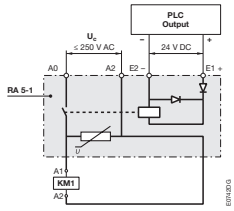
For contactors	Coil voltages	Rated control circuit voltage Uc	Type	Order code	Pkg qty	Weight (1 pce)
	V 50/60 Hz	V DC				kg
UA, UA..RA	24...250	24	RA5-1	1SBN060300R1000	1	0.050
GA75			RA5-1	1SBN060300T1000	10	0.050

Interface relays

Technical data

Type			RA5-1
Utilization characteristics according to IEC			
Standards			IEC 60255-5
Rated insulation voltage Ui acc. to IEC 60947-4-1			250 V AC
Pollution degree			3
Ambient air temperature			
In free air operation	at Uc = 24 V DC (between E1 and E2)		-25...+70 °C
	from 0.85 to 1.1 x Uc		-25...+55 °C
Storage			-40...+70 °C
Climatic withstand			Complies with that of associated contactors
Maximum operating altitude			3000 m
Mounting positions			No limitation
Fixing			Using the contactor A1 and A2 teminal connecting parts
Connecting characteristics			
Connection capacity (min. ... max.)			
Rigid Solid/Stranded		1 x	1...4 mm²
		2 x	1...4 mm²
Flexible with ferrule		1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Lugs		L <	8 mm
		l >	3.5 mm
Stripping length (all terminals)			10 mm
Tightening torque			
Recommended			1 Nm
Max.			1.2 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			Protection against direct contact in acc. with EN 50274 RA5-1 wired and mounted on the associated contactor
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2
Working data			
Surge suppression			
For contactor coil			Varistor
For interface relay coil			Diode
Protection against polarity reversal between terminals E1 and E2			Diode
Interface relay operating time			Closing and drop-out ≤ 10 ms
Total operating time, interface relay + contactor			
Between energization and:	N.O. contact closing		20...37 ms
	N.C. contact opening		17...32 ms
Between de-energization and:	N.O. contact opening		17...25 ms
	N.C. contact closing		20...28 ms
Electrical input data			
Control voltage (E1 and E2 terminals) Uc			
Rated value			24 V DC
Max. range at ambient temperature 20 °C			19...30 V DC
Max. consumption for Uc = 24 V DC, θ = 20 °C			0.3 W
"0" status (relay open)		for Uc	≤ 2.4 V DC
		for Ic	< 1 mA
"1" status (relay closed)		for Uc	≥ 19 V DC
Max. short supply interruption immunity time			2 ms
Electrical output data			
Switching voltage (A0 and A2 terminals)			≤ 250 V AC
Electrical durability			
Number of operating cycles			2 millions (600 cycles/h) on UA16(RA) ... UA75(RA), GA75 contactors
			0.5 million (600 cycles/h) on UA95(RA) and UA110(RA) contactors

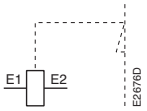
Connection



The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output.
The RA5-1 is equipped with two terminal pads for connection to the A1 and the A2 terminals of the contactor coil.
This coil is supplied between the A0 and the A2 terminals of the RA 5-1.
Mounting: terminals pads clamped inside the contactor coil terminals.

Mechanical latching units

WB75-A



Terminal marking

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screwdriver guidance; delivered untightened and protected against accidental direct contact.

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

Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WB75-A block coil.
  (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting
The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).

For contactors	Rated control circuit voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
	V 50 Hz or DC	V 60 Hz				kg
UA16 ... UA75, GA75, GAE75	24	24...28	WB75-A	FPTN372726R1001	1	0.120
	42	42...48	WB75-A	FPTN372726R1002	1	0.120
	48	48...55	WB75-A	FPTN372726R1003	1	0.120
	110	110...127	WB75-A	FPTN372726R1004	1	0.120
	220...230	220...255	WB75-A	FPTN372726R1006	1	0.120
	230...240	230...277	WB75-A	FPTN372726R1005	1	0.120
	380...415	380...440	WB75-A	FPTN372726R1007	1	0.120
	415...440	440...480	WB75-A	FPTN372726R1008	1	0.120

Mechanical latching units

Technical data

Type			WB75-A
Utilization characteristics according to IEC			
Rated insulation voltage Ui acc. to IEC 60947-1			690 V
Pollution degree			3
Max. electrical impulse time			
On AC coil (with load factor 5 %)			20 s
On DC coil (with load factor 3 %)			8 s
Min. electrical impulse time			
For latching (energizing of the contactor coil)		AC	50 ms (UA, GA contactors)
		DC	50 ms (GAE contactors)
For pull-out (energizing of the WB block coil)		AC	30 ms (UA, GA contactors)
		DC	50 ms (GAE contactors)
Coil operating limits		AC or DC supply	0.85...1.1 x Uc
AC control voltage 50/60 Hz			
Rated control circuit voltage Uc			24...480 V AC
Coil consumption		Average pull-in value	90 VA
		Average holding value	60 VA
DC control voltage			
Rated control circuit voltage Uc			24...440 V DC
Coil consumption		Average pull-in value	110 W
		Average holding value	110 W
On contactor closing (latching) Between coil energization and:		N.O. contact closing	No difference with the operation of a contactor without mechanical latching unit
		N.C. contact opening	No difference with the operation of a contactor without mechanical latching unit
On contactor opening (unlatching) Between WB coil energization and:		N.O. contact opening	5...25 ms
		N.C. contact closing	7...28 ms
Mechanical durability			
		Number of operating cycles	1 million operating cycles
Max. switching frequency			3600 cycles/h with on-load factor of 8 %

Connecting characteristics

Connection capacity (min. ... max.)			
Rigid Solid/Stranded		1 x	1...4 mm²
		2 x	1...4 mm²
Flexible with ferrule		1 x	0.75...2.5 mm²
		2 x	0.75...2.5 mm²
Lugs		L <	8 mm
		I >	3.5 mm
Stripping length			10 mm
Tightening torque	Recommended		1 Nm
	Max.		1.2 Nm
Screw terminals			Delivered in open position, screws of unused terminals must be tightened
All terminals			M3.5
Screwdriver type			Flat Ø 5.5 / Pozidriv 2

Additional terminal blocks and other accessories

LD75

Terminal blocks

The LD terminal blocks are designed to increase the connecting capacity of the contactor on which they are fitted and for preparation of the wiring before final connection on the contactor.

The LD blocks are 3-pole terminal blocks with tunnel terminals.

The LD75 terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
UA50(RA) ... UA75(RA)	LD75	1SBN073508R1000	1	0.115

Technical data

Types				LD75
Rated insulation voltage Ui				
acc. to IEC 60947-4-1				690 V
acc. to UL / CSA				600 V
Pollution degree				3
Main terminals				
				Screw terminals with single connector
				10x11 mm
Connection capacity (min. ... max.)				
	Rigid	Solid (≤ 4 mm²)	1 x	6...50 mm²
		Stranded (≥ 6 mm²)	2 x	6...25 mm²
	Flexible with ferrule		1 x	6...35 mm²
			2 x	6...16 mm²
	Bars			10 mm
Tightening torque				4 Nm
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				IP10
Screw terminals				Delivered in closed position
				M6
		Screwdriver type		pozidriv 2

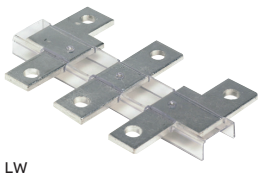
Note: The utilization of LD additional terminal blocks leaves the possibility to connect the following cables directly into the contactor main terminals.

	LD75
Possible cross section of rigid cable in the contactor terminals	50 mm²

Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Sets containing 3 tin plated copper bars fixed by an isolating spacer.



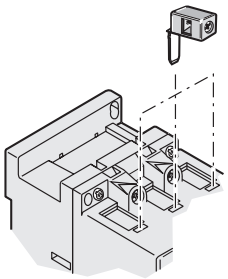
LW

For contactors	Dimensions		Type	Order code	Pkg qty	Weight (1 pce) kg
	hole Ø mm	bar mm				
UA95, UA110	6.5	15 x 3	LW110	1SFN074307R1000	1	0.100

Terminals for control lead connections

LK75-L

LK75-F



LK positioning

Terminals designed to connect the control conductors to the main poles of the UA and GA contactors and derivative versions.

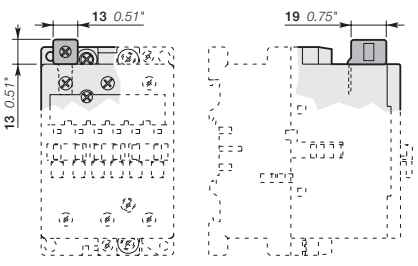
Accessories clipped into the slots placed above each power terminal connector.

The LK75 are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

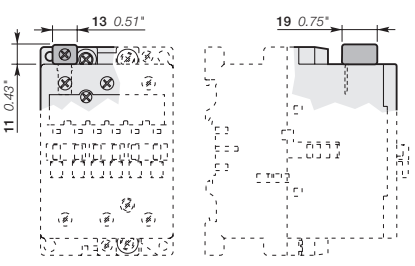
- Degree of protection IP20
- Connecting terminal delivered in open position: cable clamp and M3.5 (+,-) pozidriv 2 screw.
- Cable cross-sectional area:
  - 1 or 2 rigid conductors.....1...4 mm²
  - 1 or 2 flexible conductors with cable end .....0.75...2.5 mm²
- Tightening torque for the LK screw:
  - recommended .....1.00 Nm
  - maxi. .....1.20 Nm

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
Right and left on: UA50(RA) ... UA75(RA) GA75, GAE75	LK75-L	1SBN073552R1003	2	0.006
Opposite on: UA50(RA) ... UA75(RA) GA75, GAE75	LK75-F	1SBN073552R1002	2	0.006

Note: The LK terminals provided for the UA contactors can be used with the AM types.



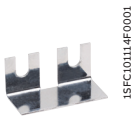
LK75-L



LK75-F

Main dimensions mm, inches

Connection bar for contactor



LP185

LP2050

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
Connection bar for contactor				
GAF185	LP185	1SFN074712R1000	2	0.300
GAF300	LP300	1SFN075112R1000	2	0.400
GAF460	LP460	1SFN075712R1000	4	0.550
GAF750	LP750	1SFN076112R1000	4	0.950
GAF1250	LP1250	1SFN076412R1000	4	1.900
GAF1650, GAF2050	LP2050	1SFN076512R1000	4	2.900

Maximum continuous current with two parrallel connection strips per pole

Connexion kit (includes 4 pcs of connection strips)	Ie max
2 x LP185	220 A
2 x LP300	370 A
1 x LP460	600 A
1 x LP750	800 A
1 x LP1250	900 A
1 x LP2050	1650 A

Contactor coils and main contact sets

ZA16

ZAF1650

Contactor coils

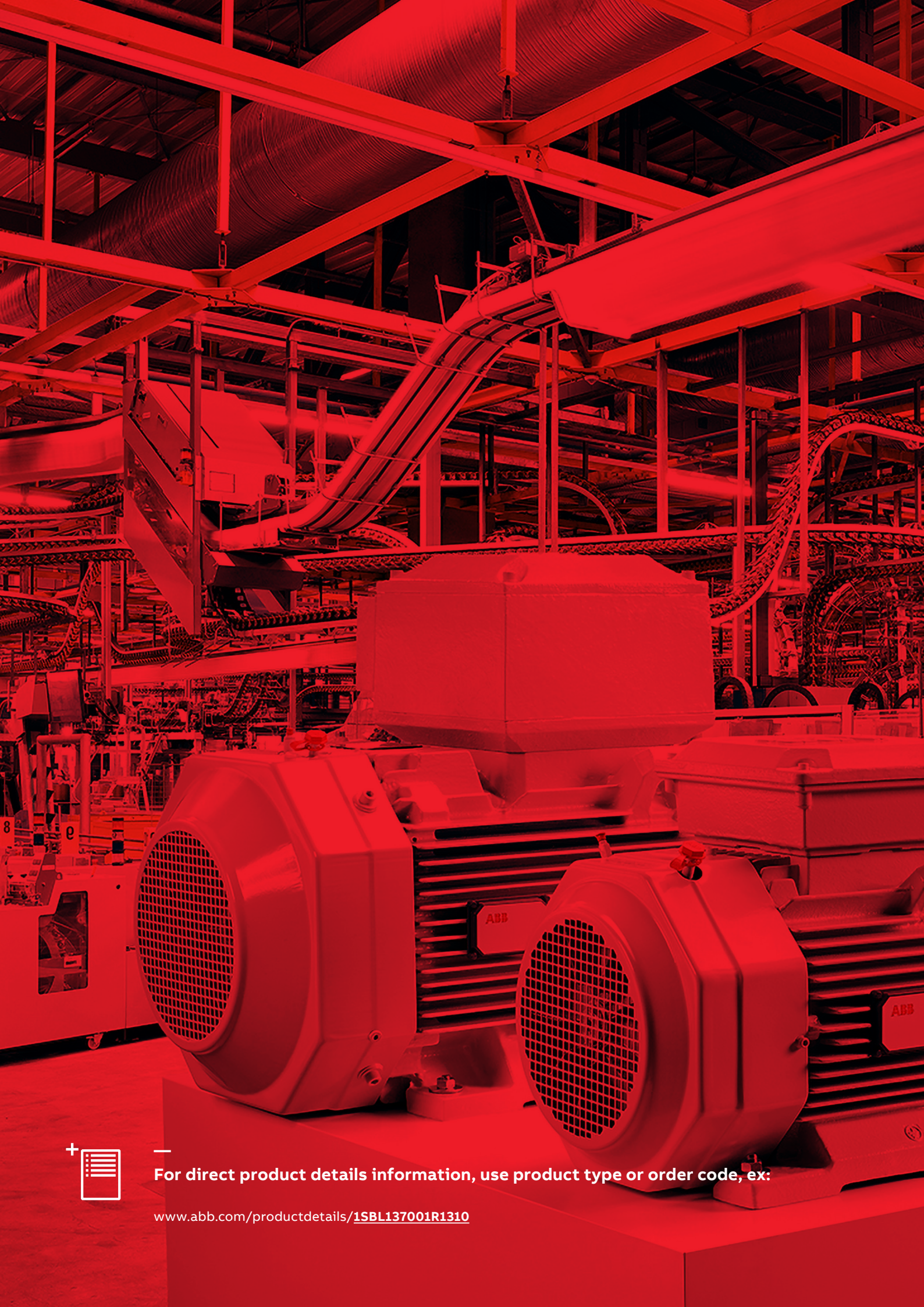
For contactors	Rated control circuit voltage Uc V 50 Hz	V 60 Hz	Type	Order code	Pkg qty	Weight (1 pce) kg
UA16,	24	24	ZA16	1SBN151410R8106	1	0.093
	110	110...120	ZA16	1SBN151410R8406	1	0.093
	220...230	230...240	ZA16	1SBN151410R8006	1	0.093
	230...240	240...260	ZA16	1SBN151410R8806	1	0.093
	380...400	400...415	ZA16	1SBN151410R8506	1	0.093
	400...415	415...440	ZA16	1SBN151410R8606	1	0.093
UA26, UA30,	24	24	ZA40	1SBN152410R8106	1	0.148
	110	110...120	ZA40	1SBN152410R8406	1	0.148
	220...230	230...240	ZA40	1SBN152410R8006	1	0.148
	230...240	240...260	ZA40	1SBN152410R8806	1	0.148
	380...400	400...415	ZA40	1SBN152410R8506	1	0.148
	400...415	415...440	ZA40	1SBN152410R8606	1	0.148
UA50 ... UA75	24	24	ZA75	1SBN153510R8106	1	0.166
GA75	110	110...120	ZA75	1SBN153510R8406	1	0.166
	220...230	230...240	ZA75	1SBN153510R8006	1	0.166
	230...240	240...260	ZA75	1SBN153510R8806	1	0.166
	380...400	400...415	ZA75	1SBN153510R8506	1	0.166
	400...415	415...440	ZA75	1SBN153510R8606	1	0.166
UA95, UA110	24	24	ZA110	1SFN154310R8106	1	0.170
	110	110...120	ZA110	1SFN154310R8406	1	0.170
	220...230	230...240	ZA110	1SFN154310R8006	1	0.170
	230...240	240...260	ZA110	1SFN154310R8806	1	0.170
	380...400	400...415	ZA110	1SFN154310R8506	1	0.170
	400...415	415...440	ZA110	1SFN154310R8606	1	0.170
GAF460	-	24...60	ZAF460	1SFN155770R6806	1	0.525
	48...130	48...130	ZAF460	1SFN155770R6906	1	0.525
	100...250	100...250	ZAF460	1SFN155770R7006	1	0.525
	250...500	250...500	ZAF460	1SFN155770R7106	1	0.525
GAF750 ... AF1250	-	24...60	ZAF750	1SFN156170R6806	1	1.335
	48...130	48...130	ZAF750	1SFN156170R6906	1	1.335
	100...250	100...250	ZAF750	1SFN156170R7006	1	1.335
	250...500	250...500	ZAF750	1SFN156170R7106	1	1.335
GAF1650 ... GAF2050	100...250	100...250	ZAF1650 (1)	1SFN156570R7026	1 set	0.900
			ZP1650 (2)	1SFN166521R1070	1	0.300

ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

Main contact sets

The contact sets for 3-pole contactors consists of six fixed contacts, three moving contacts, springs and the required screws.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
UA50	ZLU50	1SBN163502R1000	1	0.115
UA63	ZLU63	1SBN163702R1000	1	0.145
UA75	ZLU75	1SBN164102R1000	1	0.145
UA95	ZLU95	1SFN164302R1000	1	0.190
UA110	ZLU110	1SFN164502R1000	1	0.190



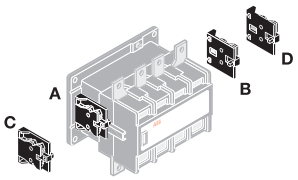
For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**1SBL137001R1310**

Accessories for EK550, EK1000 4-pole contactors

3/360 Auxiliary contact blocks
3/364 Mechanical interlock units, terminal shrouds and connection sets
3/365 Surge suppressors for contactor coils
3/367 Main contact sets - Arc chutes
3/368 Contactor coils

Auxiliary contact blocks



Mounting positions of the CAL16-11

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

Types of auxiliary contact blocks for standard industrial environments:

- CAL instantaneous with N.O. + N.C. contacts
- CCL N.O. leading contact + N.C. lagging contact.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact, and bear the corresponding function marking.
Mounting: Screwed onto the right and / or lefthand side of the EK550, EK1000 contactors.

For contactors	Number of blocks	Auxiliary contacts		Type	Order code	Pkg qty	Weight (1 pce) kg
2-pole auxiliary contacts N.O. + N.C.							
EK	1	1 1	– –	CAL16-11A	SK829002-A	1	0.050
	1	1 1	– –	CAL16-11B	SK829002-B	1	0.050
	1	1 1	– –	CAL16-11C	SK829002-C	1	0.050
	1	1 1	– –	CAL16-11D	SK829002-D	1	0.050
	1	1 –	– 1	CCL16-11E (1)	SK829002-E	1	0.050

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

Auxiliary contact blocks

Technical data

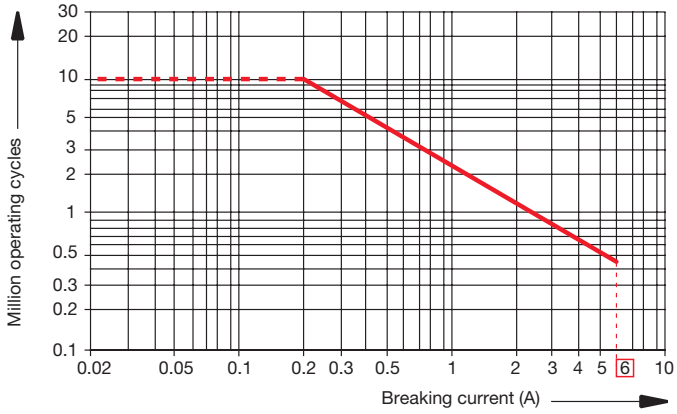
Types			2-pole CAL 16-11, 2-pole CCL 16-11
Contact utilization characteristics according to IEC			
Standards			IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage Ui acc. to IEC 60947-5-1			690 V
Rated operational voltage Ue max.			24...690 V
Conventional thermal current Ith - θ ≤ 40 °C			10 A
Rated frequency (without derating)			50/60 Hz
Ie / Rated operational current AC-15			
acc. to IEC 60947-5-1	24-127 V		6 A
	220-240 V		6 A
	380-440 V		4 A
	500-690 V		1 A
Making capacity acc. to IEC 60947-5-1			10 x Ie AC-15
Breaking capacity acc. to IEC 60947-5-1			10 x Ie AC-15
Ie / Rated operational current DC-13			
acc. to IEC 60947-5-1		24 V DC	6 A
		48 V DC	6 A
		72 V DC	4 A
		125 V DC	1.8 A
		250 V DC	0.6 A
Short-circuit protection device gG type fuse			10 A
Rated short-time withstand current Icw		for 1.0 s	50 A
θ = 40 °C		for 0.1 s	100 A
Minimum switching capacity with failure rate acc. to IEC 60947-5-4			0.25 VA / 12 V or 0.25 VA / 5 mA
Power dissipation per pole at 6 A			0.2 W
Mechanical durability	Number of operating cycles		10 millions operating cycles
	Max. switching frequency		3600 cycles/h
Electrical durability	Number of operating cycles		see "Electrical durability" curves
	Max. switching frequency		1200 cycles/h
Contact utilization characteristics according to UL / CSA			
Max. operational voltage			600 V
Pilot duty			A600
Connecting characteristics			
Connection capacity (min. ... max.)			
	Rigid Solid/Stranded	1 x	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with ferrule	1 x	0.5...2.5 mm²
		2 x	0.5...2.5 mm²
	Flexible with insulated ferrule	1 x	0.5...1.5 mm²
		2 x	0.5...1.5 mm²
	Lugs	L ≤	8 mm
		I >	3.7 mm
Tightening torque	Recommended		1.00 Nm
	Max.		1.20 Nm
Degree of protection 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			Pozidriv 2

Auxiliary contacts
Electrical durability

Electrical Durability for AC-15 Utilization Category

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

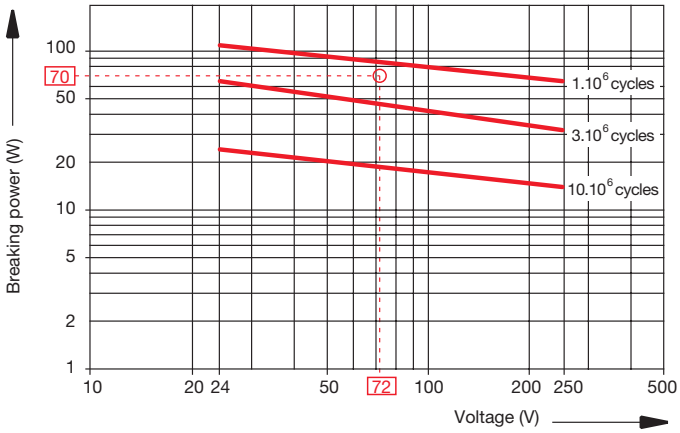
This curve represents the electrical durability of the auxiliary contacts in relation to the breaking current.
The curve has been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



2-pole CAL16... and CCL16... auxiliary contact blocks

Electrical Durability for DC-13 Utilization Category

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



2-pole CAL16... and CCL16... auxiliary contact blocks

Example:
Control of d.c. electro-magnet: Ue voltage = 72 V d.c. and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W the correspon-ding value for the electrical durability is approx-imately 2 millions cycles.

Add-on auxiliary contacts

Terminal marking and positioning

2-pole auxiliary contacts

CAL16-11A

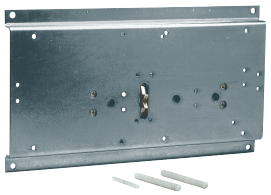
CAL16-11B

CAL16-11C

CAL16-11 D

CAL16-11E

Mechanical interlock units, terminal shrouds and connection sets



Mechanical interlock units

The mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VH800 interlock unit is used for the mechanical interlocking of two horizontal mounted EK550, EK1000 contactors. Mounting plate is included.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical interlock unit for two horizontal mounted contactors				
EK550, EK1000	VH800	SK829070-F	1	6.000

Terminal shrouds

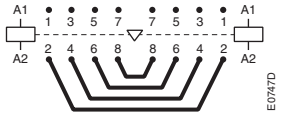
The use of terminal shrouds on the main terminals of EK contactors is required in electrical panels or cubicles to be built in compliance with the rules for protection against direct contact with live parts in acc. with EN 50274.

On EK550, EK1000 contactors:

- The auxiliary contact blocks and coils are designed to provide an IP20 degree of protection
- The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Each terminal shroud protects all the terminals on one side of the contactor. Two terminal shrouds should be provided for each separate contactor.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
EK550	LT550-EK	SK178001-LB	1	0.190
EK1000	LT1000-EK	SK178001-MB	1	0.200



BSS550, BSS1000

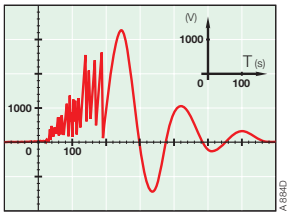
Connection sets

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

These sets are made up of four downstream connections.
BSS550, BSS1000 – Bare, solid copper bars.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock units for two horizontal mounted contactors				
EK550	BSS550	SK829090-E	1	3.300
EK1000	BSS1000	SK829090-H	1	5.500

Surge suppressors for contactor coils



RC-EH

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

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

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

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

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

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

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

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

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

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

For contactors	Rated control circuit voltage Uc			Type	Order code	Pkg qty	Weight (1 pce)
	V	AC	DC				kg
EK550, EK1000	48...110	●	–	RC-EH800/110	SK829007-C	1	0.015
EK550, EK1000	24...125	–	●	RC-EH800/110	SK829007-C	1	0.015
EK550, EK1000	220...600	●	–	RC-EH800/600	SK829007-D	1	0.015

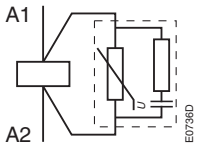
Surge suppressors for contactor coils

Technical data

Varistor + RC	RC-EH800/110	RC-EH800/600
Rated control circuit voltage Uc	48...110 V AC	220...600 V AC
	24...125 V DC	–
Residual overvoltage (clipping voltage)	205 V AC	1100 V AC
	205 V DC	–
Opening time growth factor	1.1 ... 1.15	
Operating temperature	-20 ... +70 °C	
Connection to the coil terminals (parallel mounting)	Flexible, accessible leads, equipped with forked lugs	
Fixing	Glued to the top part of the contactor base	
Advantages	- High energy absorption: good damping - Unpolarized system - The RC system damps the voltage front under the Uvdr (1) threshold.	

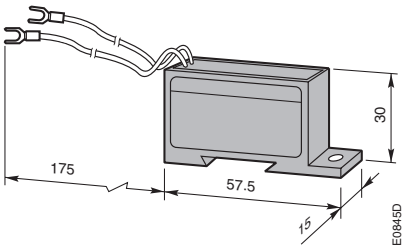
(1) Uvdr = Varistor operating (voltage dependant resistor), tolerance ±10 %.

Wiring diagrams



Varistor + RC

Main dimensions mm



RC-EH

Main contact sets
Arc chutes

KZK

Main contact sets

The contact sets for 4-pole contactors consist of eight fixed contacts, four moving contacts, springs and the necessary screws. In addition, the sets include four moving arcing contacts for EK550, EK1000 contactors.

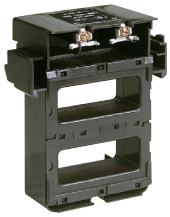
For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
EK550	KZK550	SK827204-B	1	2.400
EK1000	KZK1000	SK827204-F	1	3.000

Arc chutes

The arc chutes sets for EK 4-pole contactors contain 8 pieces.

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
EK550	KWK550	5223351-Z	1	3.170
EK1000	KWK1000	5223351-AN	1	3.170

Contactor coils



KH800

For AC operated coil

Coils for EK550, EK1000 - AC operated.

For contactors	Rated control circuit voltage Uc (1)		Type	Order code	Pkg qty	Weight (1 pce)
	V 50 Hz	V 60 Hz				kg
EK550, EK1000	220	220...240	KH800	SK828100-EL	1	0.950
	220...230	230...255	KH800	SK828100-EM	1	0.950
	380...400	400...440	KH800	SK828100-ER	1	0.950
	400...415	-	KH800	SK828100-AR	1	0.950

(1) Other control voltages, see voltage code table.

For DC operated coil

Coils for EK550, EK1000 - DC operated with sets including a DC coil, an economy resistor and a insertion contact.

For contactors	Rated control circuit voltage Uc (1)	Type	Order code	Pkg qty	Weight (1 pce)
	V DC				kg
EK550, EK1000	110	KP800	SK828150-DE	1 set	1.060
	125	KP800	SK828150-DU	1 set	1.060
	220	KP800	SK828150-DF	1 set	1.060

(1) Other control voltages, see voltage code table.

Notes

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

www.abb.com/productdetails/**1SBL137001R1310**

Contactors and contactor relays Terminal marking and positioning, Dimensions

Terminal marking and positioning

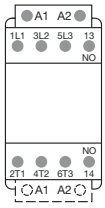
3/372 AF, AF..K, AFS 3-pole contactors
3/376 AF, EK 4-pole contactors
3/380 UA, UA ... RA contactors
3/382 NF contactor relays

Dimensions

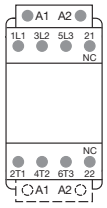
3/384 AF, AFS, AF ... K 3-pole contactors
3/420 AF, EK 4-pole contactors
3/433 GA, GAF contactors
3/440 UA, UA ... RA contactors
3/443 NF contactor relays

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

AF09 ... AF96 contactors - AC / DC operated
Standard devices without addition of auxiliary contacts

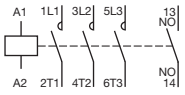


AF09 ... AF16..-30-10 (1)

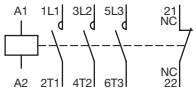


AF09 ... AF16..-30-01 (1)

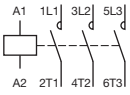
AF26 ... AF96..-30-00 (1)



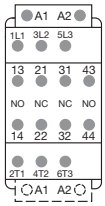
AF09 ... AF16..-30-10 (1)



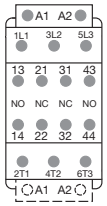
AF09 ... AF16..-30-01 (1)



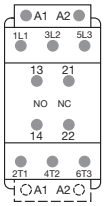
AF26 ... AF96..-30-00 (1)



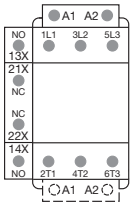
AF09 ... AF16..-30-22



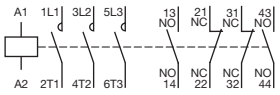
AF26 ... AF96..-30-22



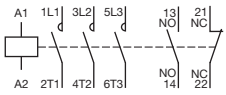
AF26 ... AF38..-30-11



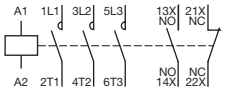
AF40 ... AF96..-30-11



AF09 ... AF96..-30-22

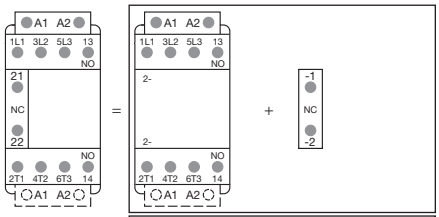


AF26 ... AF38..-30-11

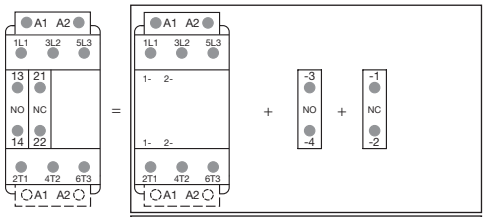


AF40 ... AF96..-30-11

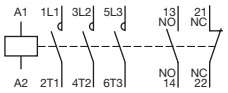
Other possible contact combinations with auxiliary contacts added by the user



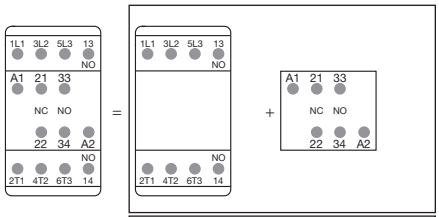
Combination 11 = AF09 ... AF16..-30-10 + CA4-01 (1)



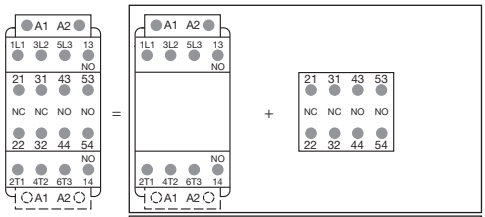
Combination 11 = AF26 ... AF96..-30-00 + CA4-10 + CA4-01 (1)



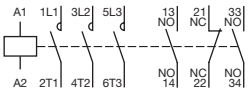
Combination 11



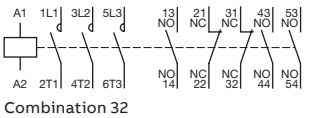
Combination 21 = AF09 ... AF16..-30-10 + CAT4-11M



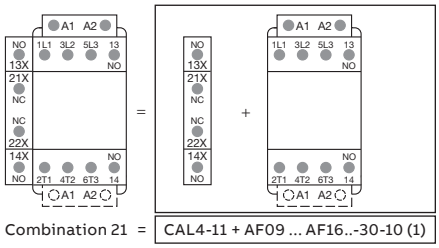
Combination 32 = AF09 ... AF16..-30-10 + CA4-22M (1)



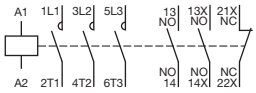
Combination 21



Combination 32



Combination 21 = CAL4-11 + AF09 ... AF16..-30-10 (1)

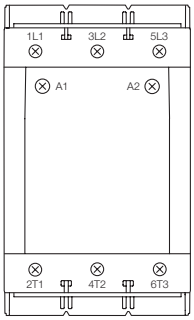


Combination 21

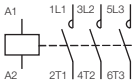
Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
(1) For AF09..K ... AF38..K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

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

AF116 ... AF370 contactors - AC / DC operated
Standard devices without addition of auxiliary contacts

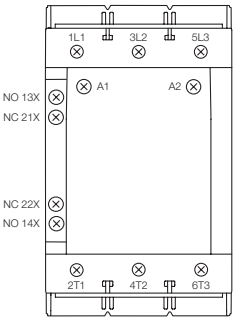


AF116 ... AF370-30-00

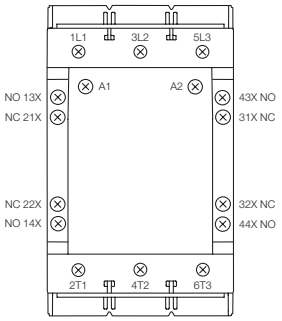


AF116 ... AF370-30-00

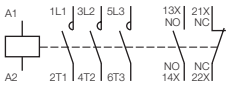
Standard devices with factory mounted auxiliary contacts



AF116 ... AF370-30-11



AF116 ... AF370-30-22



AF116 ... AF370-30-11

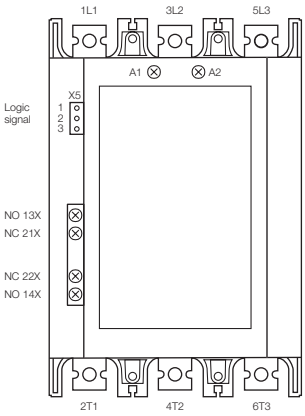
AF116 ... AF370-30-22

AF400 ... AF2850 3-pole contactors

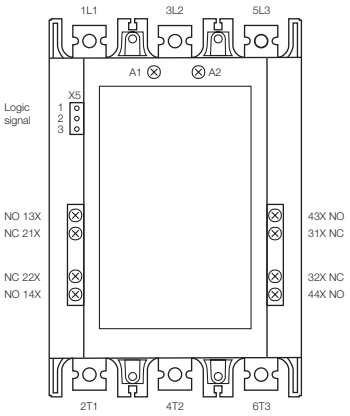
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

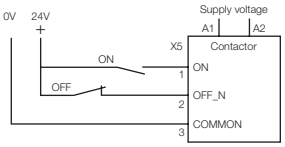


AF400 ... AF1250-30-11

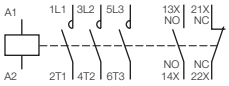


AF400 ... AF1250-30-22

Control with logic signal



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

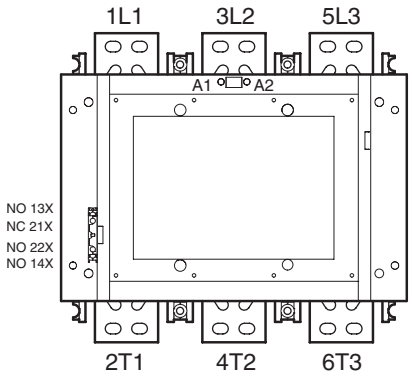


AF400 ... AF1250-30-11

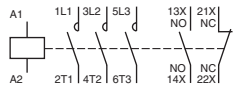
AF400 ... AF1250-30-22

AF1350 ... AF2850 contactors - AC / DC operated

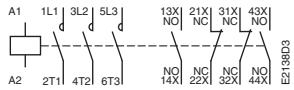
Standard devices with factory mounted auxiliary contacts



AF1350 ... AF2850-30-11

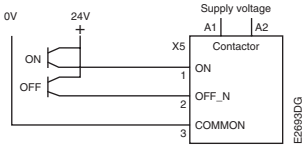


AF1350 ... AF2850-30-11



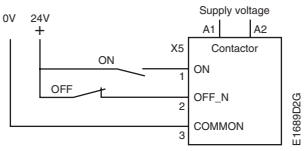
AF1350 ... AF2850-30-22

Wiring diagrams
when used with transistor output



AF1350, AF1650

when used with transistor output

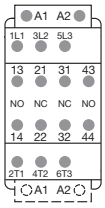


AFS09 ... AFS750 3-pole contactors for safety applications

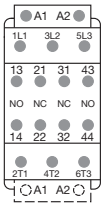
Terminal marking and positioning

AFS09 ... AFS96 contactors - AC / DC operated

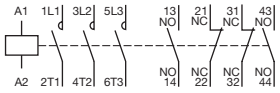
Standard devices



AFS09 ... AFS16..-30-22



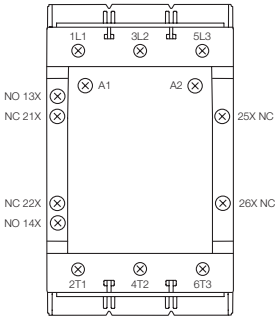
AFS26 ... AFS96..-30-22



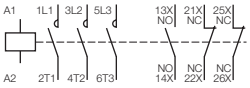
AFS09 ... AFS96..-30-22

AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



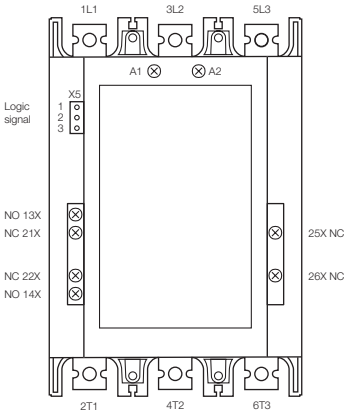
AFS116 ... AFS370-30-12



AFS116 ... AFS370-30-12

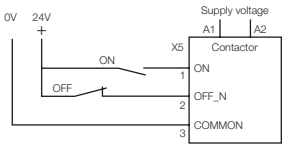
AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

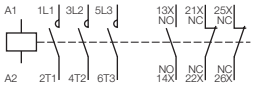


AFS400 ... AFS750-30-12

Control with logic signal



AFS400 ... AFS750-30-12



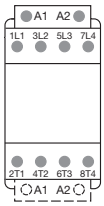
AFS400 ... AFS750-30-12

AF09 ... AF80 4-pole contactors

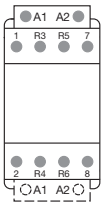
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

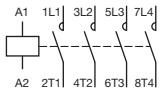
Standard devices without addition of auxiliary contacts



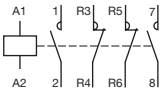
AF09 ... AF80..-40-00



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

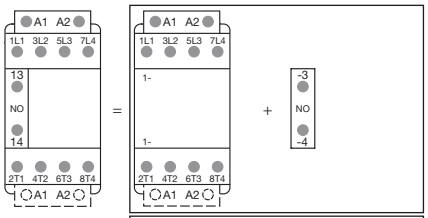


AF09 ... AF80..-40-00

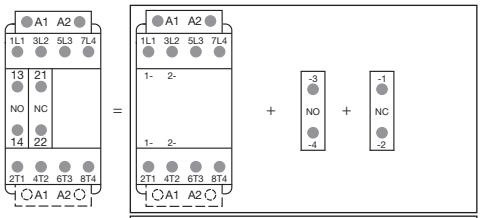


AF09 ... AF40..-22-00
AF80-22-00

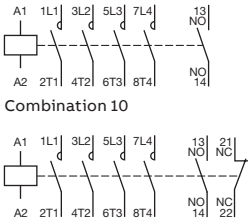
Other possible contact combinations with auxiliary contacts added by the user



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

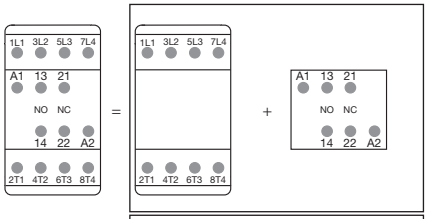


Combination 11 = AF09 ... AF80..-40-00 + CA4-10 + CA4-01

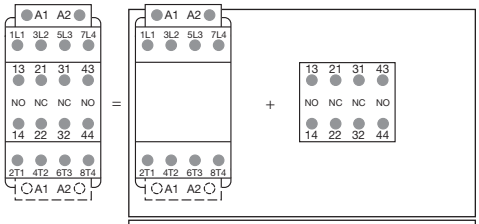


Combination 10

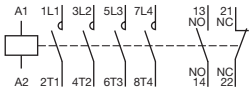
Combination 11



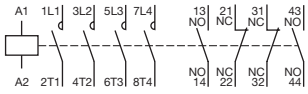
Combination 11 = AF09 ... AF80..-40-00 + CAT4-11E



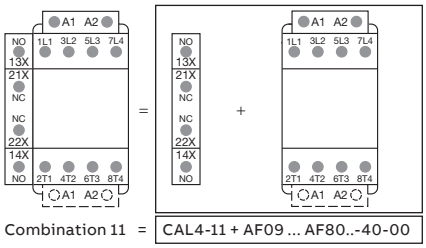
Combination 22 = AF09 ... AF80..-40-00 + CA4-22E



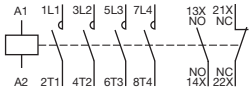
Combination 11



Combination 22



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

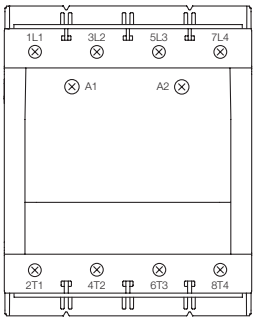


Combination 11

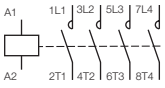
Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

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

AF116 ... AF370 contactors - AC / DC operated
Standard devices without addition of auxiliary contacts

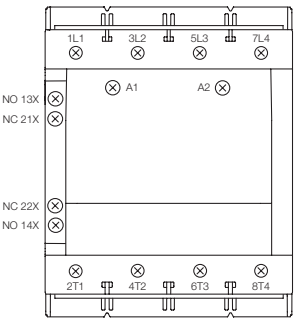


AF116 ... AF370-40-00

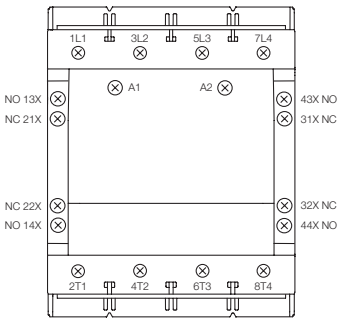


AF116 ... AF370-40-00

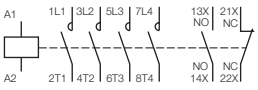
Standard devices with factory mounted auxiliary contacts



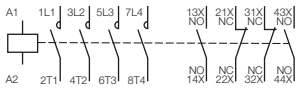
AF116 ... AF370-40-11



AF116 ... AF370-40-22



AF116 ... AF370-40-11



AF116 ... AF370-40-22

Add-on auxiliary contacts for AF09 ... AF370 contactors

Terminal marking and positioning

1-pole auxiliary contacts

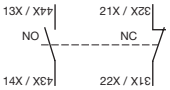
CA4-01 (1)

CA4-10 (1)

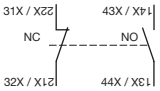
CC4-01

CC4-10

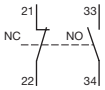
2-pole auxiliary contacts



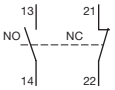
CAL4-11 (1)
(Left-side mounted)



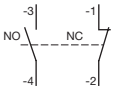
CAL4-11 (1)
(Right-side mounted)



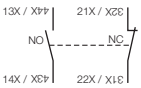
CAT4-11M



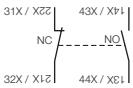
CAT4-11E



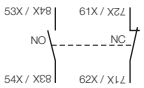
CAT4-11U



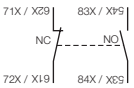
CAL18-11, CAL19-11
(Left-side mounted)



CAL18-11, CAL19-11
(Right-side mounted)

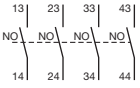


CAL18-11B, CAL19-11B
(Left-side mounted)

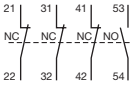


CAL18-11B, CAL19-11B
(Right-side mounted)

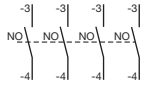
4-pole auxiliary contacts



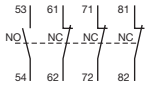
CA4-40E (1)



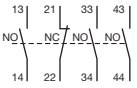
CA4-13M (1)



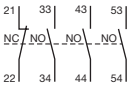
CA4-40U



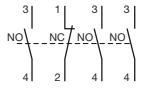
CA4-13N (1)



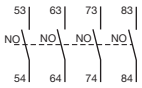
CA4-31E (1)



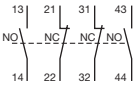
CA4-31M (1)



CA4-31U



CA4-40N (1)



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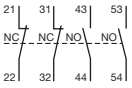

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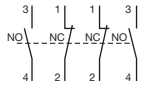
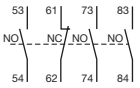


CA4-22U



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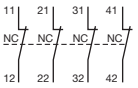
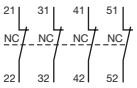


CA4-04E



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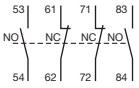

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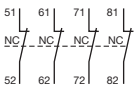


CA4-04N (1)

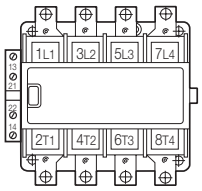
(1) available with Push-in Spring terminals

EK 4-pole contactors

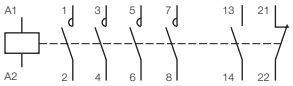
Terminal marking and positioning

EK550, EK1000 contactors - AC operated

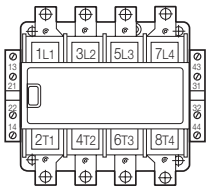
Standard devices



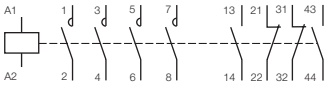
EK550, EK1000-40-11



EK550, EK1000-40-11

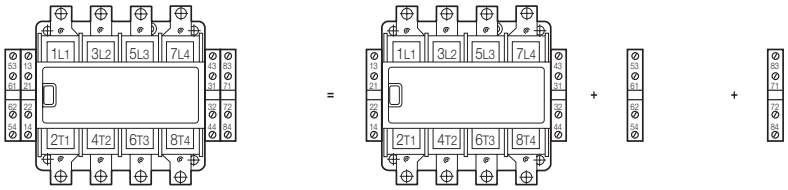


EK550, EK1000-40-22

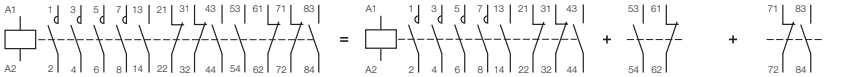


EK550, EK1000-40-22

Other possible contact combinations with auxiliary contacts added by the user



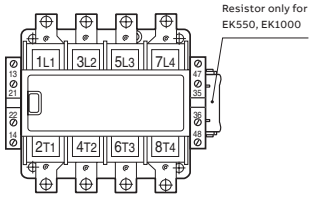
Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D



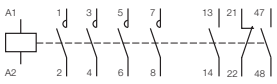
Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D

EK550, EK1000 contactors - with multifrequency coil or DC operated

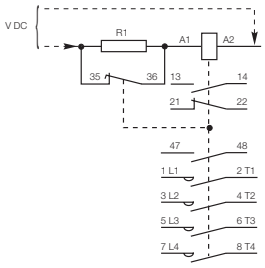
Standard devices



EK550, EK1000-40-21

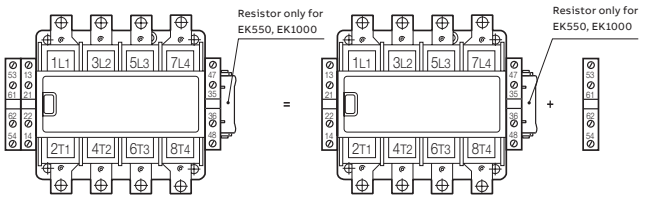


EK550, EK1000-40-21

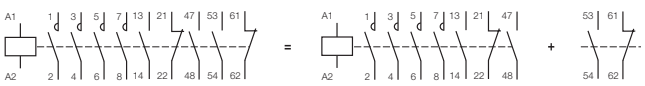


EK550, EK1000 DC operated

Other possible contact combinations with auxiliary contacts added by the user



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



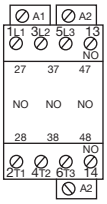
Combination 32 = EK550, EK1000-40-21 + CAL16-11C

UA..RA contactors

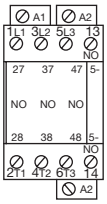
Terminal marking and positioning

UA..RA contactors - AC operated

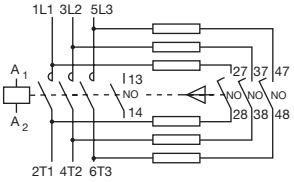
Standard devices without addition of auxiliary contacts



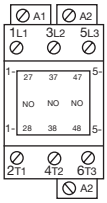
UA16-30-10 RA
UA26-30-10 RA



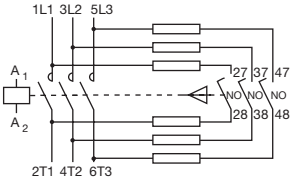
UA30-30-10 RA



UA16 ... 30-30-10 RA



UA50 ... 110-30-00 RA



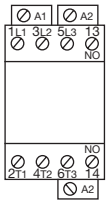
UA50 ... 110-30-00 RA

UA... contactors

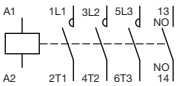
Terminal marking and positioning

UA... contactors - AC operated

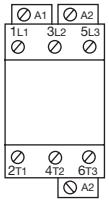
Standard devices without addition of auxiliary contacts



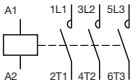
UA16 ... UA30-30-10



UA16 ... UA30-30-10

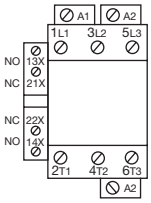


UA50 ... UA110-30-00

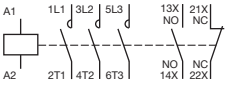


UA50 ... UA110-30-00

Standard devices with factory mounted auxiliary contacts



UA50 ... UA110-30-11

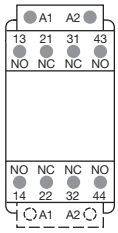


UA50 ... UA110-30-11

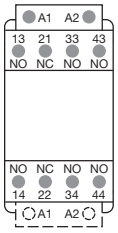
NF contactor relays

Terminal marking and positioning

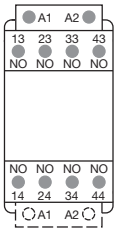
Standard devices without addition of auxiliary contacts



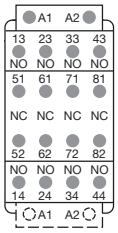
NF..22E



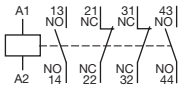
NF..31E



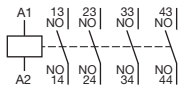
NF..40E



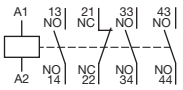
NF..44E



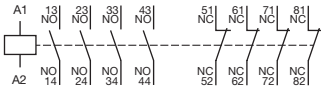
NF..22E



NF..40E



NF..31E



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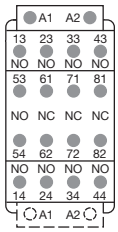

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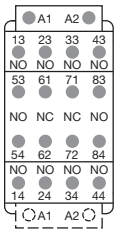

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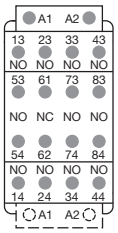

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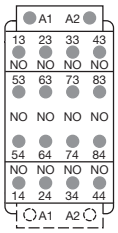

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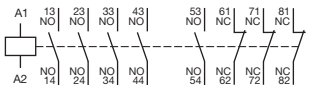

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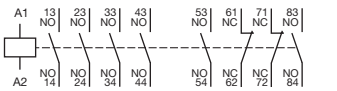

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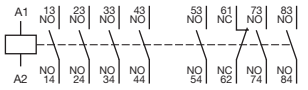

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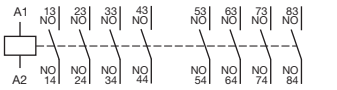
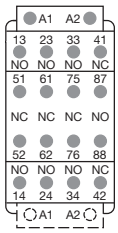
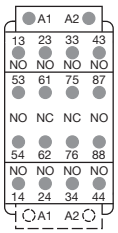


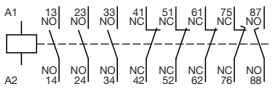
NF..80E



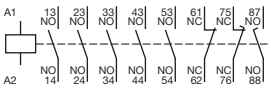
NF..33/11 (1)



NF..51/11 (1)

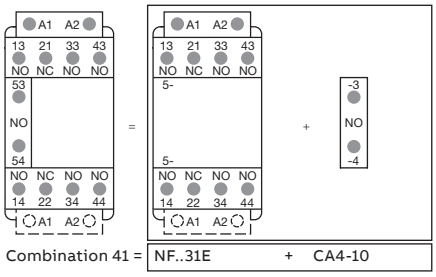


NF..33/11 (1)

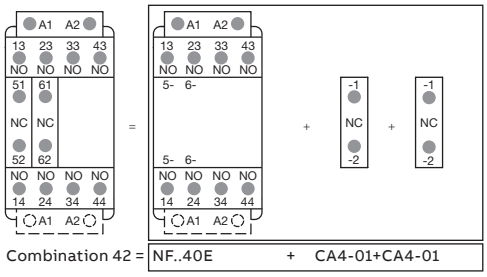


NF..51/11 (1)

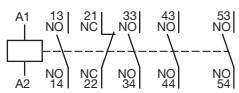
Other possible contact combinations with auxiliary contacts added by the user



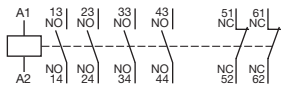
Combination 41 = NF..31E + CA4-10



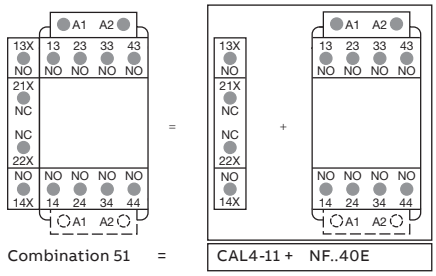
Combination 42 = NF..40E + CA4-01+CA4-01



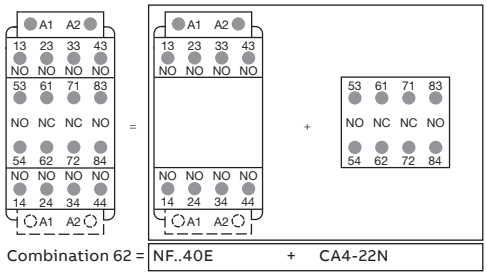
Combination 41 E



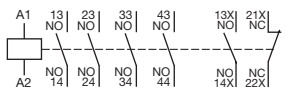
Combination 42 E



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



Combination 62 = NF..40E + CA4-22N



Combination 51 E

Combination 62 E

Note: only NFZ contactor relays with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
(1) Not available with Contactor relays with Push-in Spring terminals.

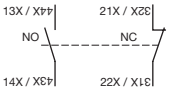
NF add-on auxiliary contacts

Terminal marking and positioning

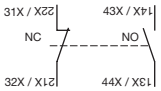
1-pole auxiliary contacts

CA4-01 CA4-10 CC4-01 CC4-10

2-pole auxiliary contacts

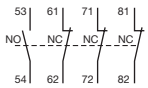


CAL4-11
(Left side-mounted)

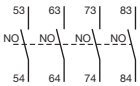


CAL4-11
(Right side-mounted)

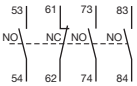
4-pole auxiliary contacts



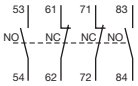
CA4-13N



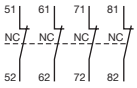
CA4-40N



CA4-31N

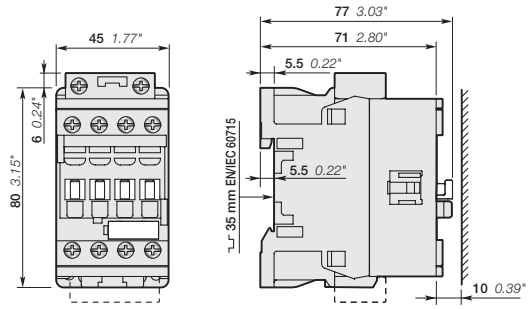


CA4-22N

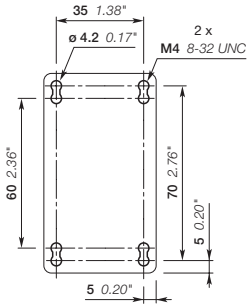


CA4-04N

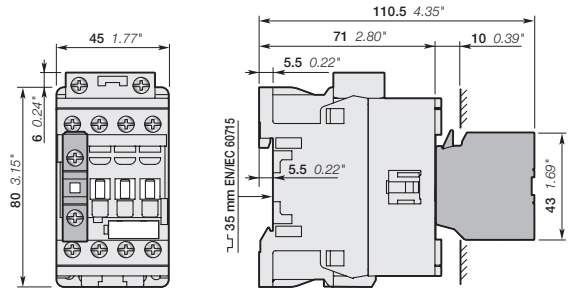
AF09, AF12, AF16 3-pole contactors
Dimensions



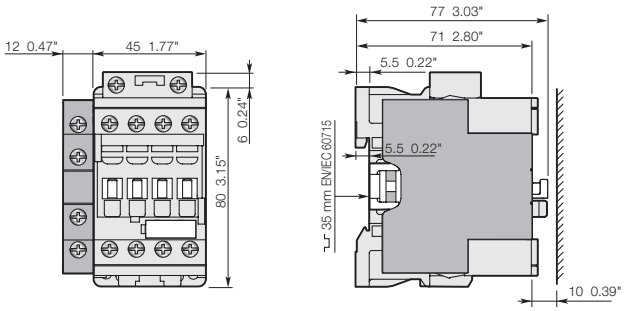
AF09, AF12, AF16



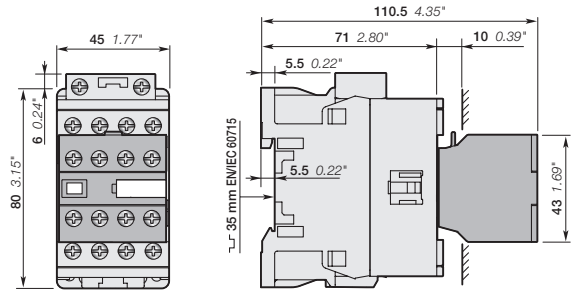
AF09, AF12, AF16



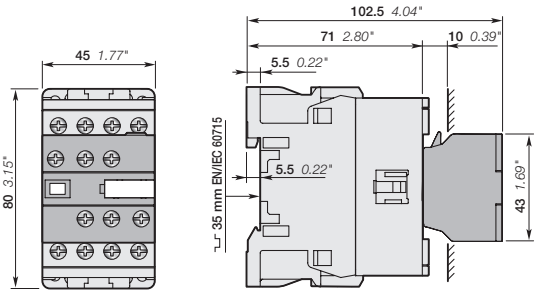
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



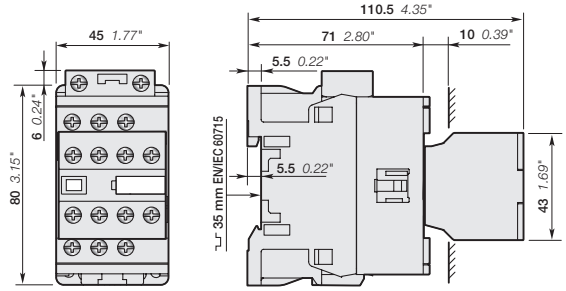
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



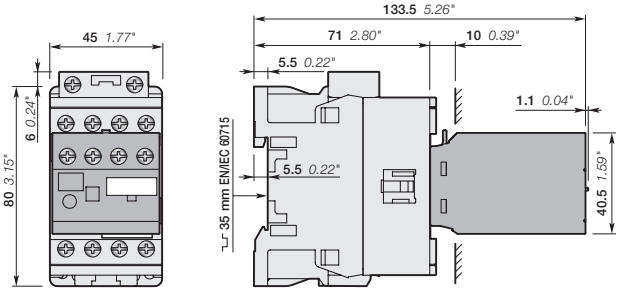
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



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



AF09, AF12, AF16..-30-22

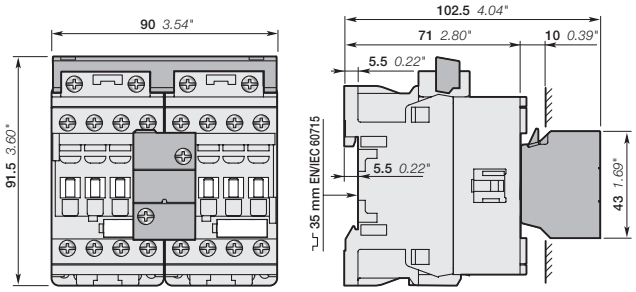


AF09, AF12, AF16
+ TEF4 electronic timer

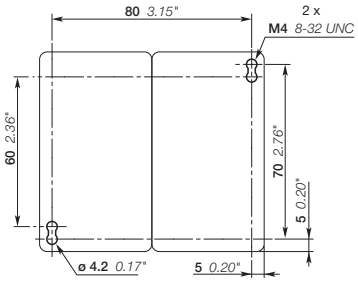
(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

Main dimensions mm, inches (1)

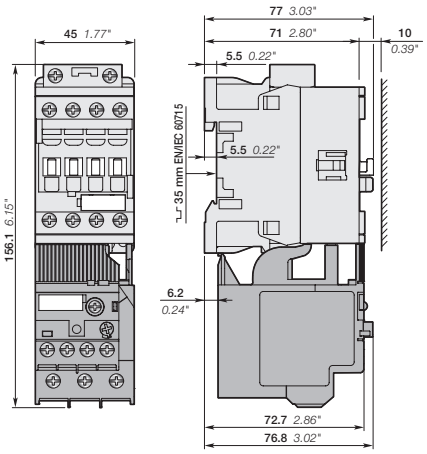
AF09, AF12, AF16 3-pole contactors
Dimensions



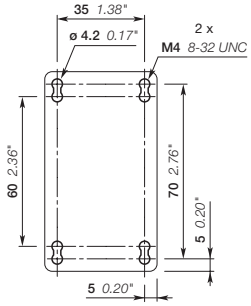
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



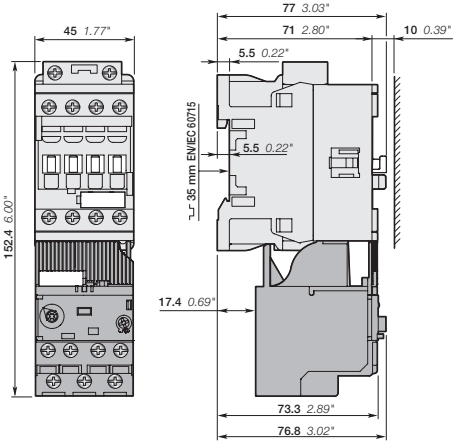
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



AF09, AF12, AF16
+ TF42 thermal overloard relay



AF09, AF12, AF16
+ TF42, EF19

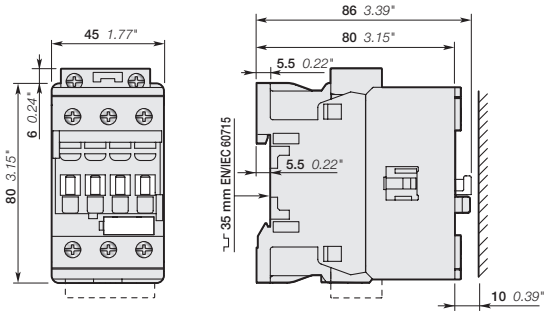


AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

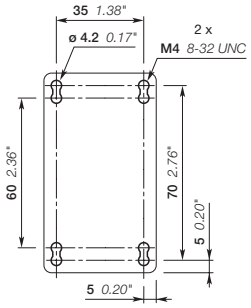
(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

Main dimensions mm, inches (1)

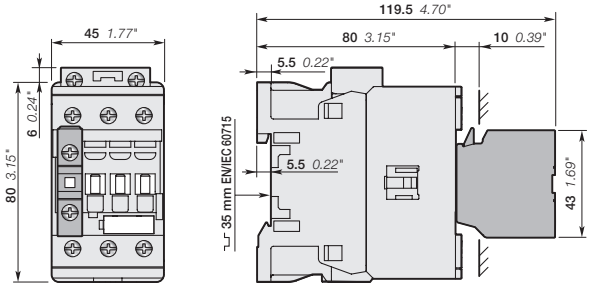
AF26, AF30, AF38 3-pole contactors
Dimensions



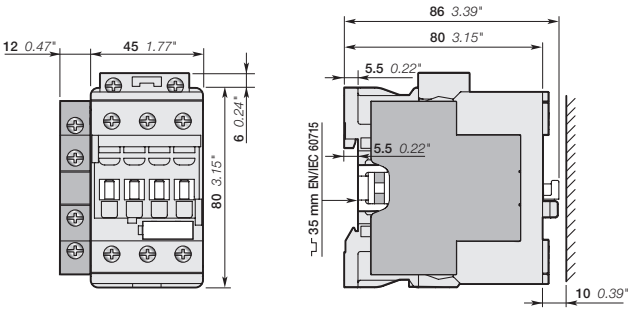
AF26, AF30, AF38



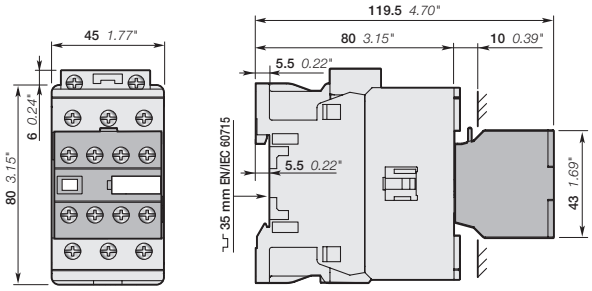
AF26, AF30, AF38



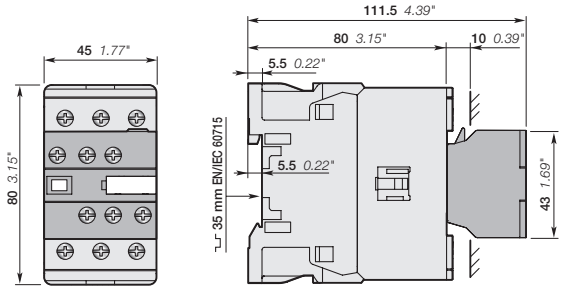
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



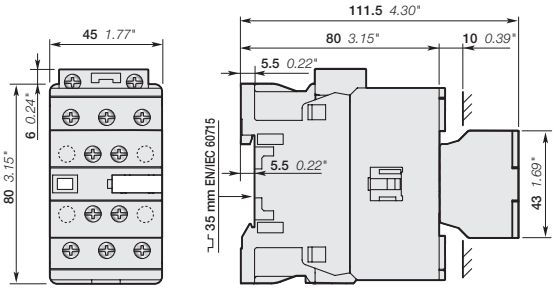
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



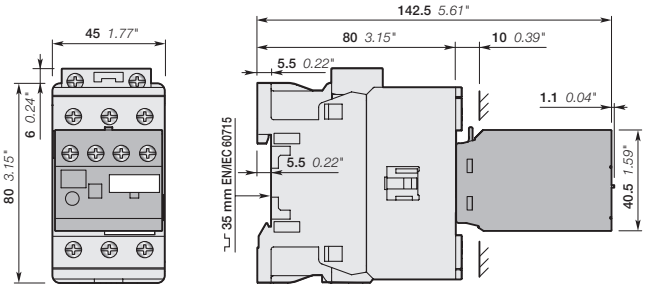
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



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



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

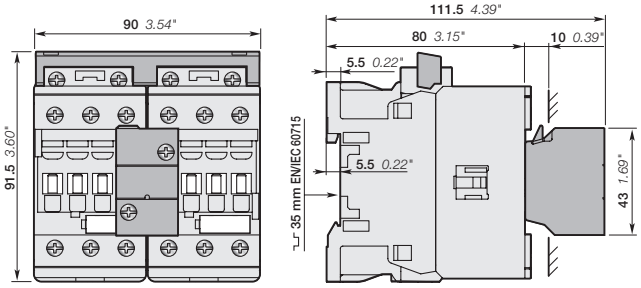


AF26, AF30, AF38
+ TEF4 electronic timer

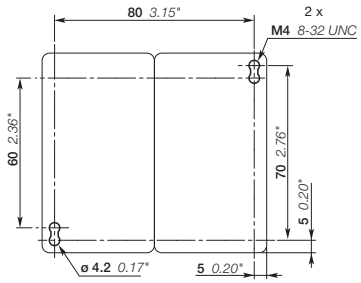
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min.
24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

Main dimensions mm, inches (1)

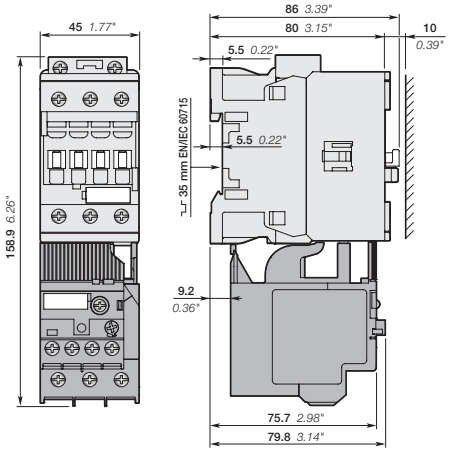
AF26, AF30, AF38 3-pole contactors
Dimensions



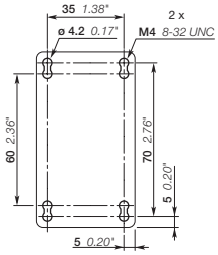
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



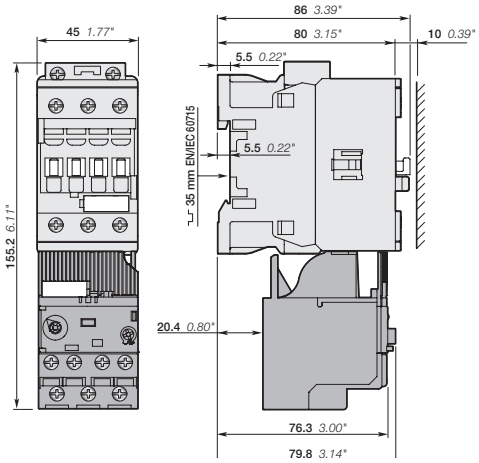
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



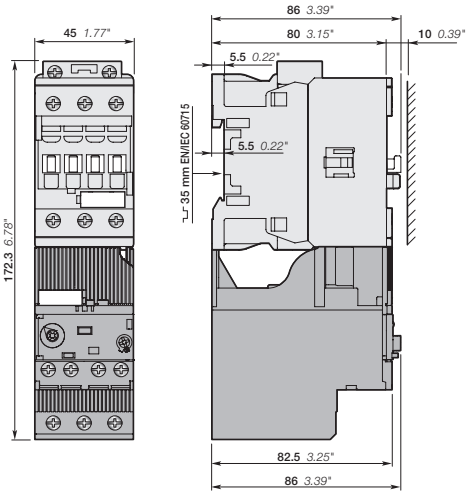
AF26, AF30, AF38
+ TF42 thermal overload relay



AF26, AF30, AF38
+ TF42, EF19, EF45



AF26 3-pole contactors
+ EF19 electronic overload relay

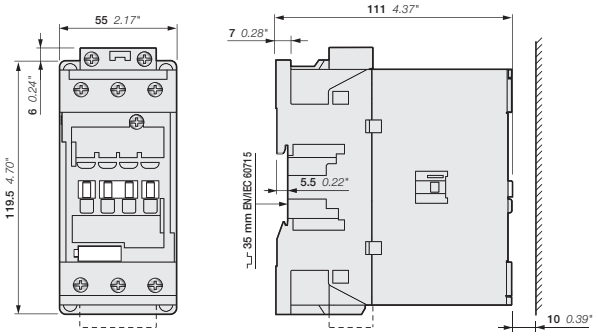


AF26, AF30, AF38 3-pole contactors
+ EF45 electronic overload relay

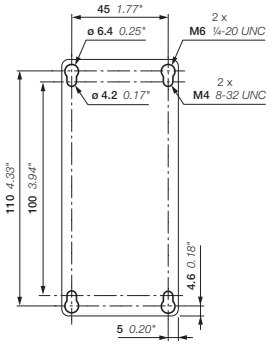
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min.
24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

Main dimensions mm, inches (1)

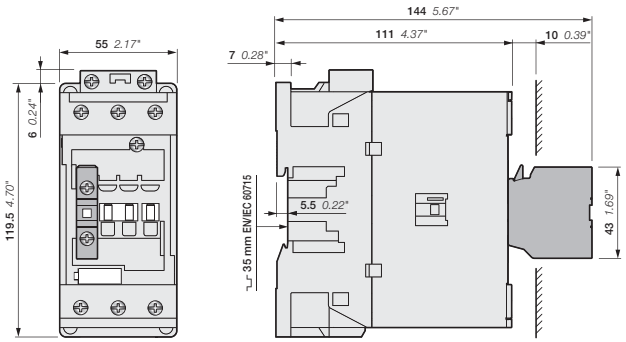
AF40 ... AF65 3-pole contactors
Dimensions



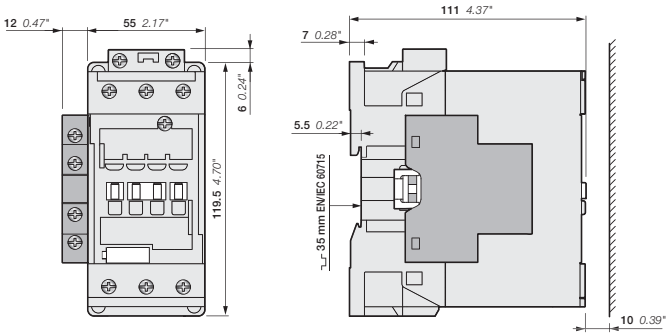
AF40, AF52, AF65



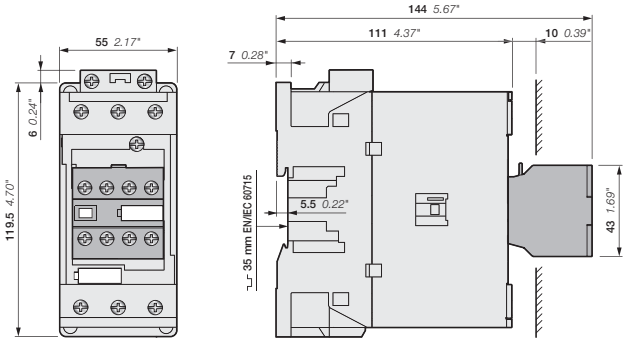
AF40, AF52, AF65



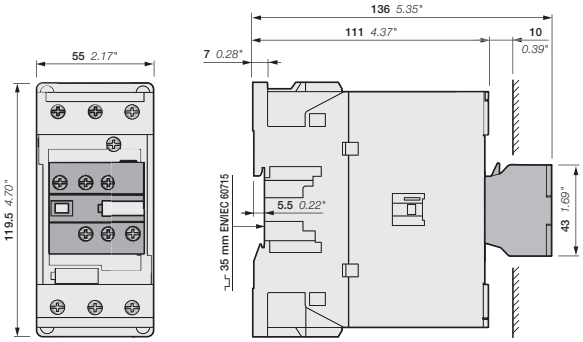
AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



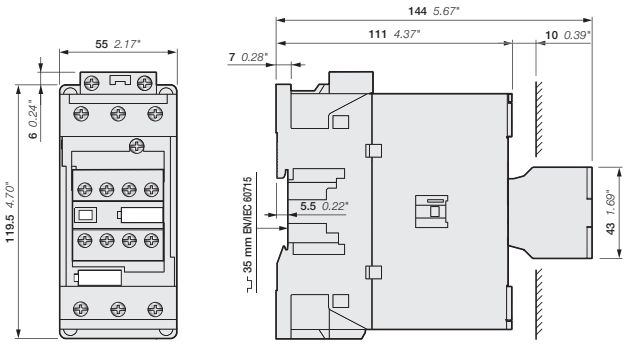
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



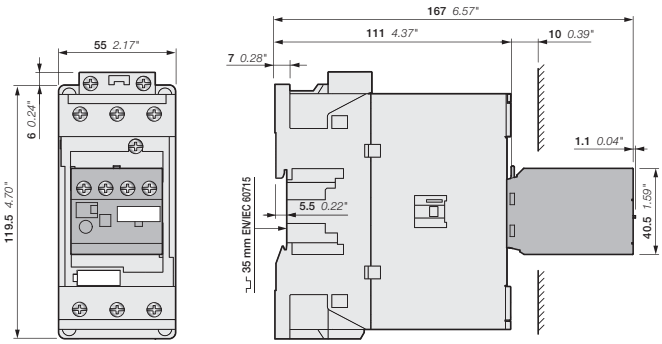
AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block



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



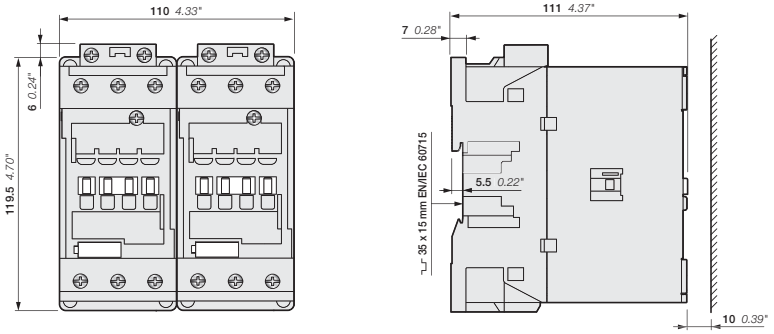
AF40, AF52, AF65..-30-22



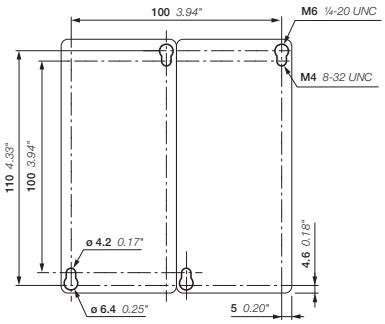
AF40, AF52, AF65
+ TEF4 electronic timer

Main dimensions mm, inches

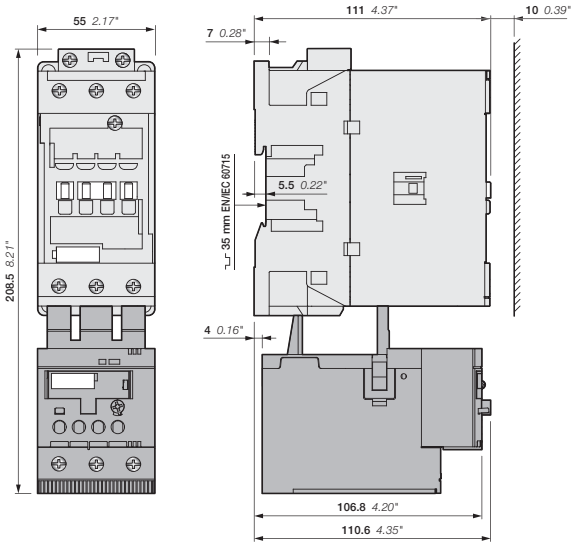
AF40 ... AF65 3-pole contactors
Dimensions



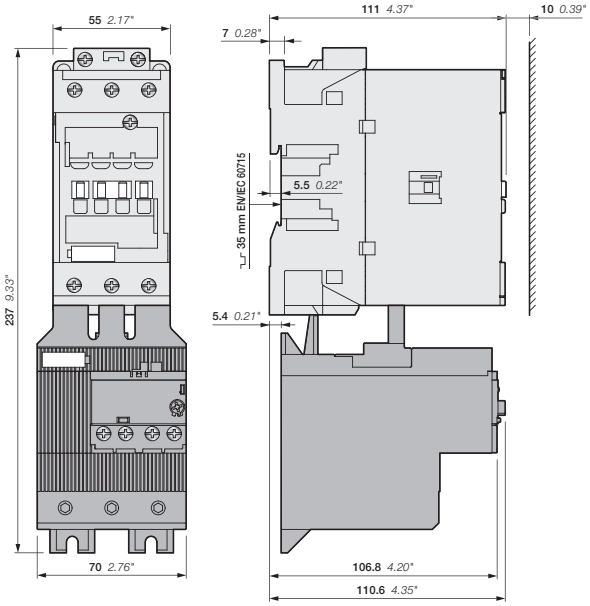
AF40, AF52, AF65
+ VM96-4 mechanical interlock unit



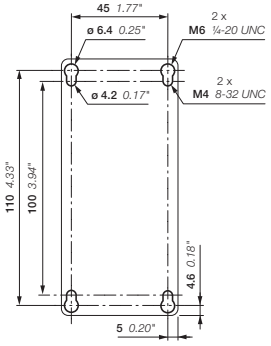
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



AF40, AF52, AF65
+ TF65 thermal overload relay



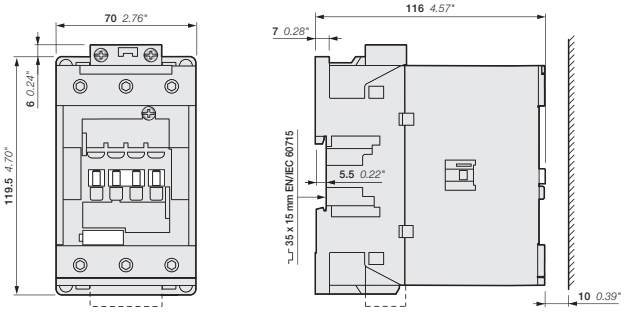
AF40, AF52, AF65
+ EF65 electronic overload relay



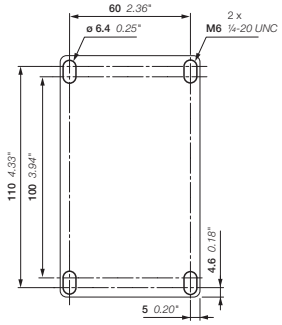
AF40, AF52, AF65
+ TF65, EF65

Main dimensions mm, inches

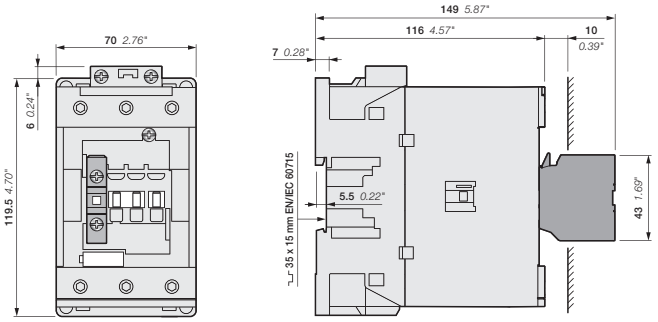
AF80 ... AF96 3-pole contactors
Dimensions



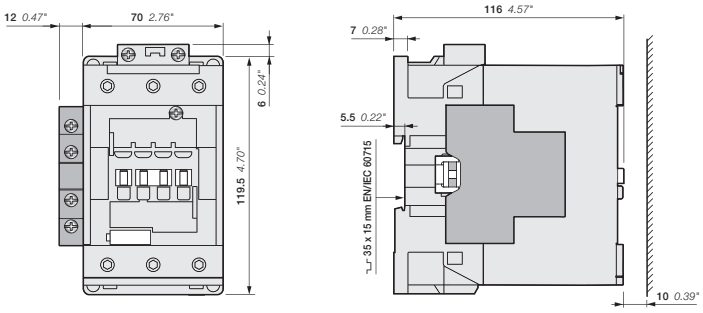
AF80, AF96



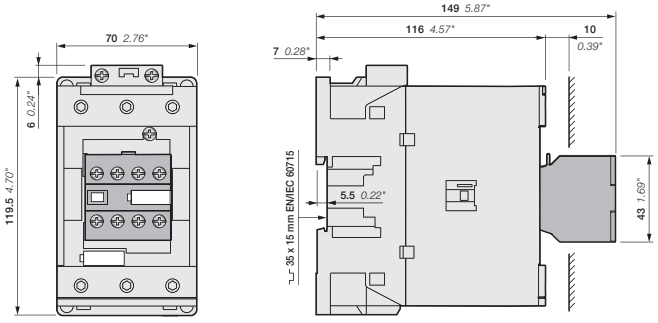
AF80, AF96



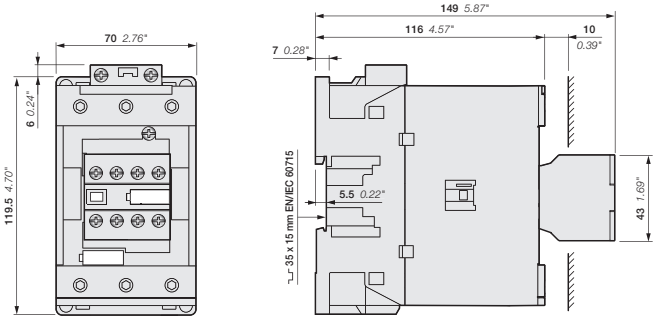
AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



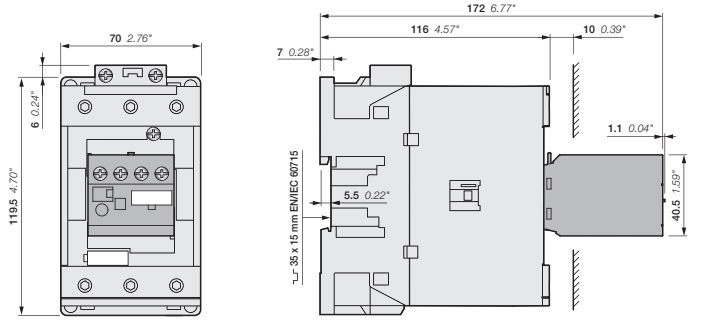
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11



AF80, AF96
+ CA4 4-pole auxiliary contact block



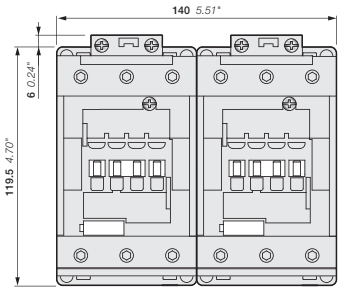
AF80, AF96..-30-22

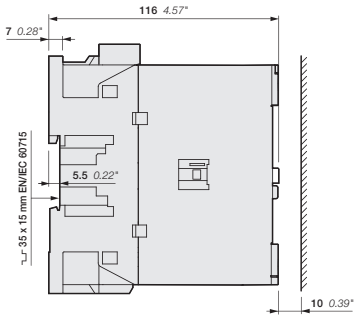


AF80, AF96
+ TEF4 electronic timer

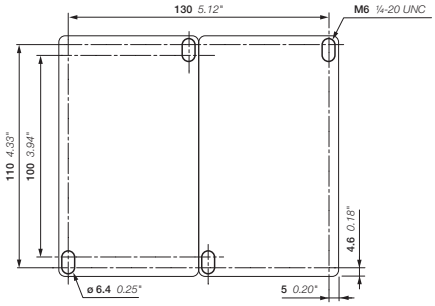
Main dimensions mm, inches

AF80 ... AF96 3-pole contactors
Dimensions

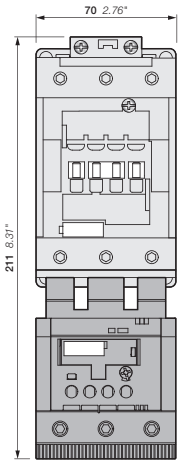


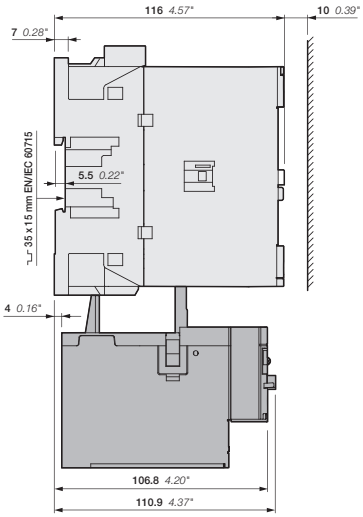


AF80, AF96
+ VM96-4 mechanical interlock unit

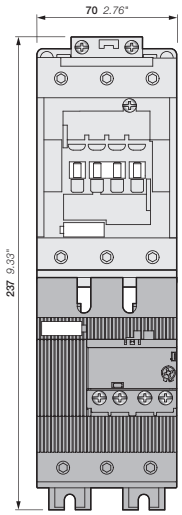


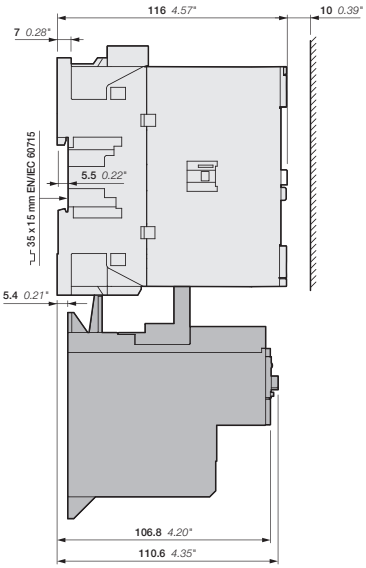
AF80, AF96
+ VM96-4 mechanical interlock set



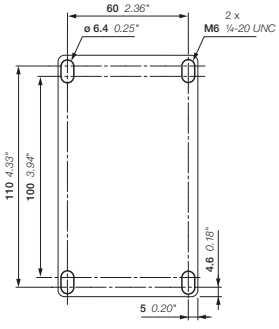


AF80, AF96
+ TF96 thermal overload relay





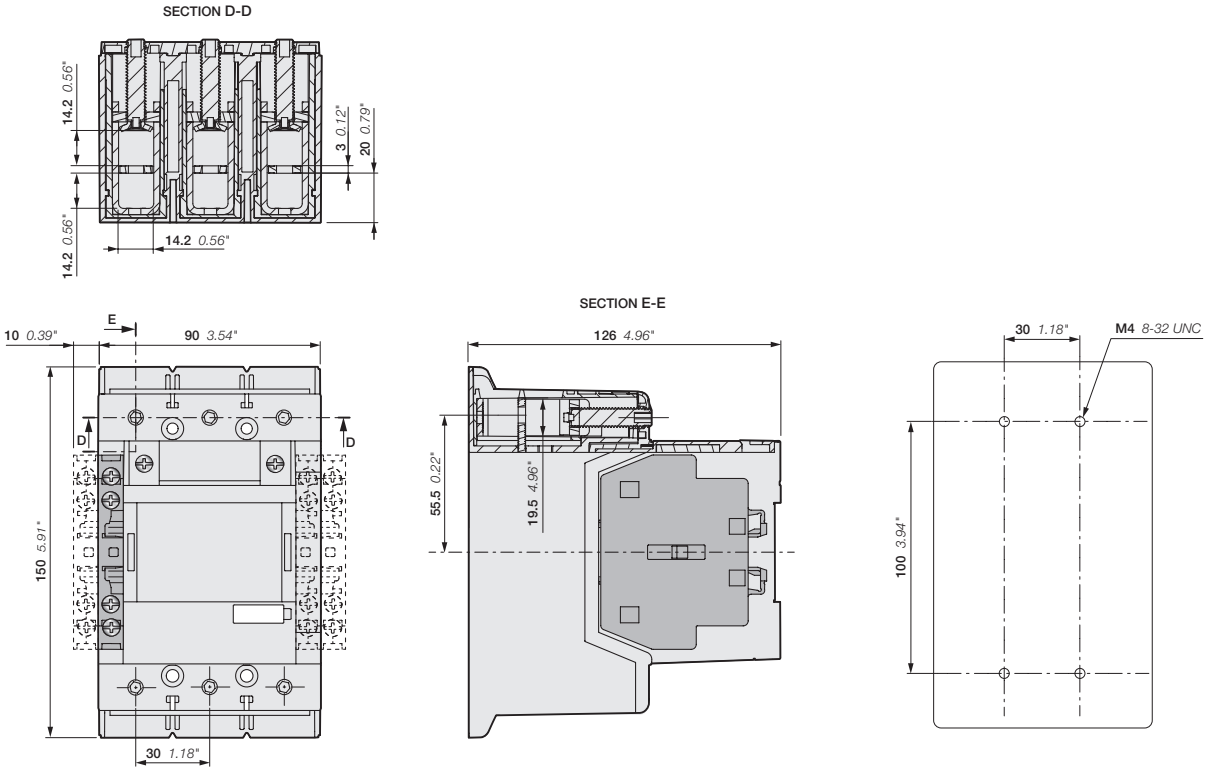
AF80, AF96
+ EF96 electronic overload relay



AF80, AF96
+ TF96, EF96

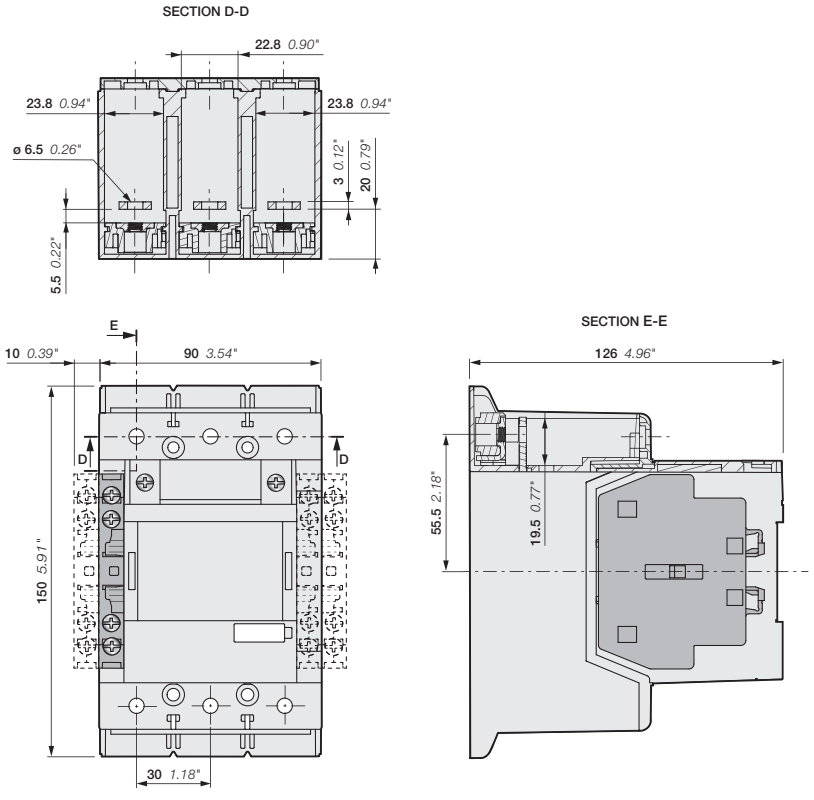
Main dimensions mm, inches

AF116, AF140, AF146 3-pole contactors
Dimensions



AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-..(B)

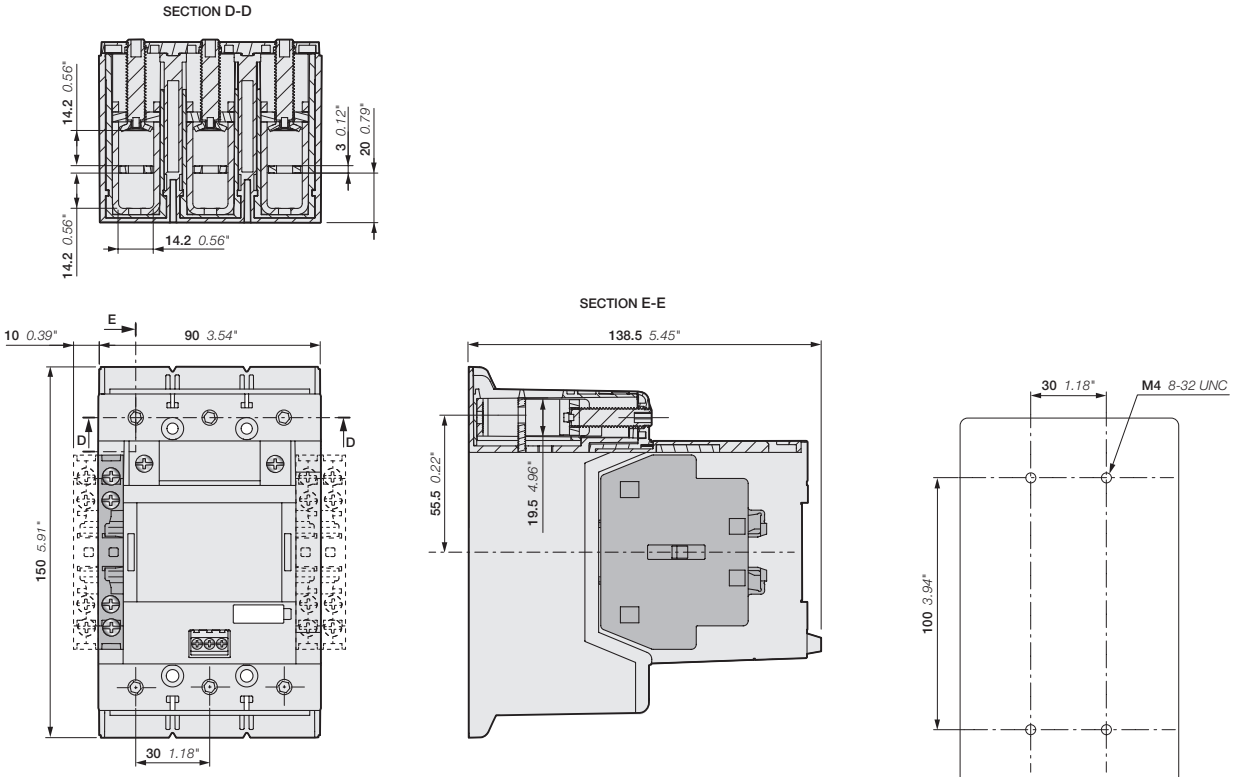


AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

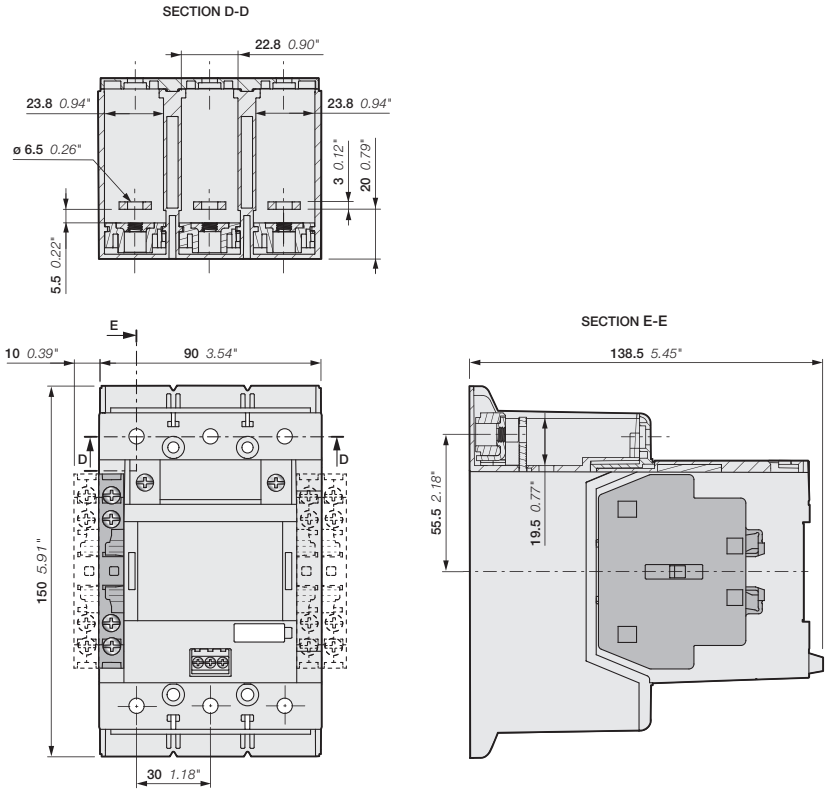
AF116, AF140, AF146 3-pole contactors With built-in PLC interface (coil code 33, 34)

Dimensions



AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

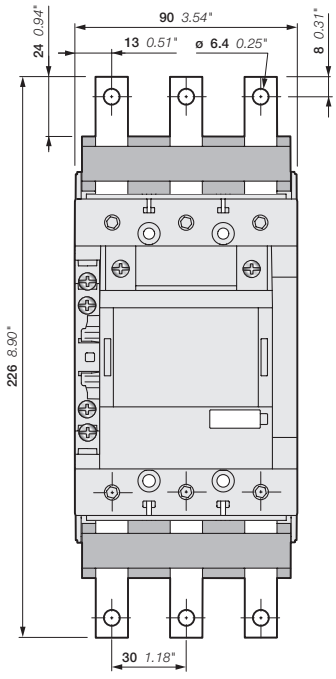
AF116, AF140, AF146-30-..(B)



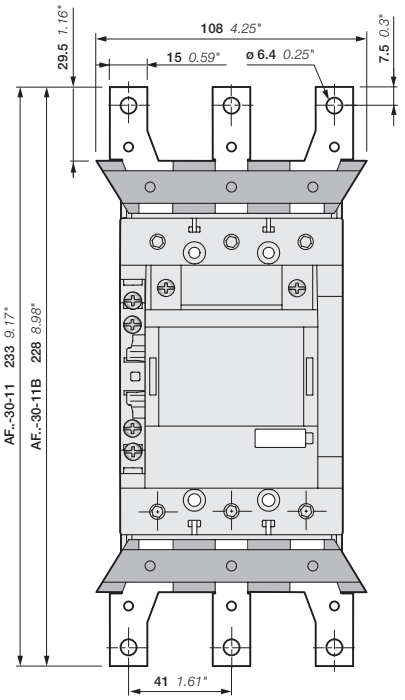
AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

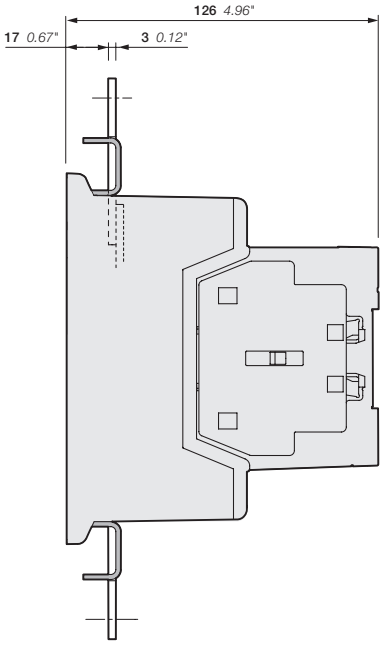
AF116, AF140, AF146 3-pole contactors
Dimensions

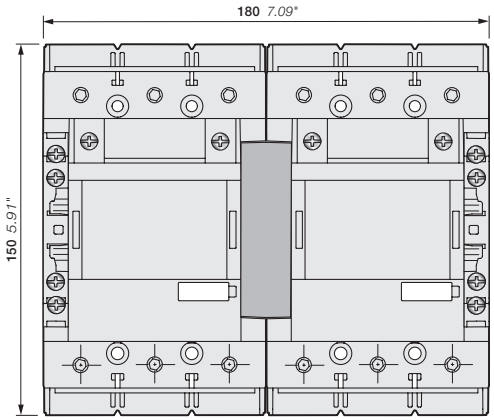


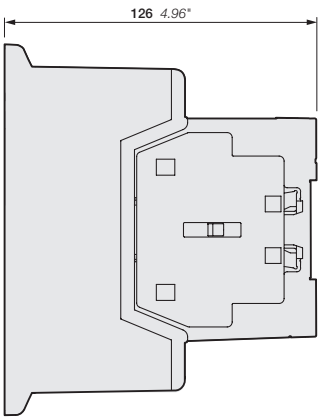
AF116, AF140, AF146-30-11
+ LX140 terminal extension



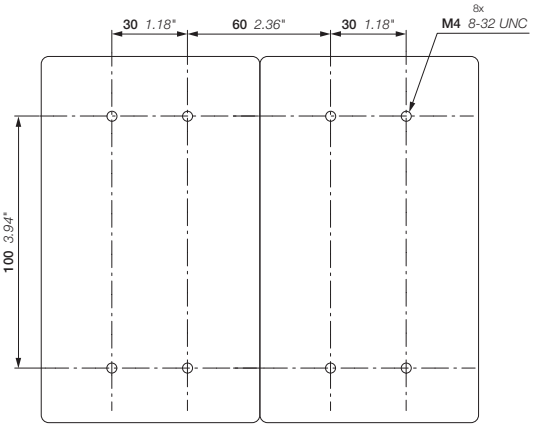
AF116, AF140, AF146-30-11(B)
+ LW140(B) terminal enlargement







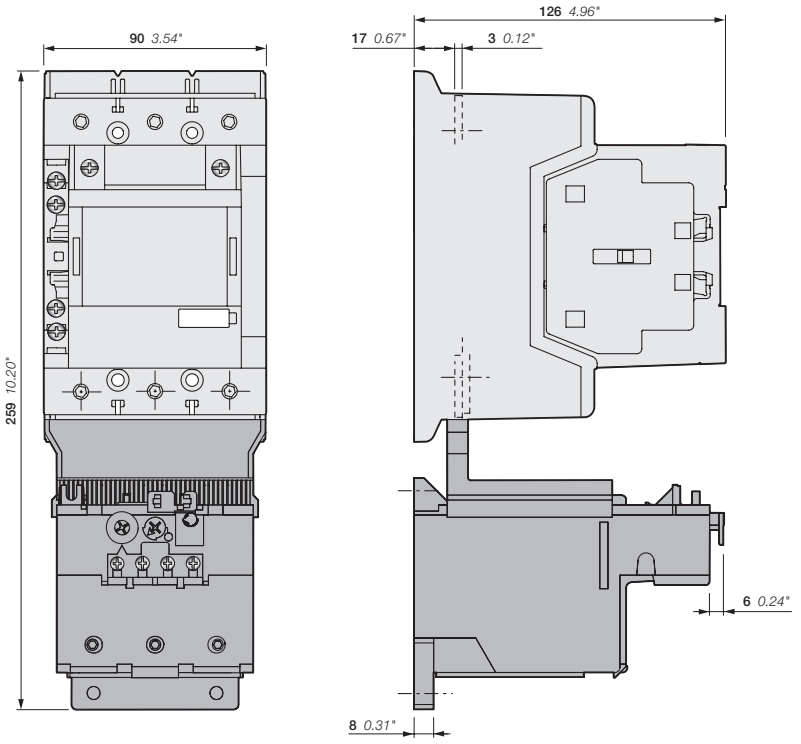
AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit



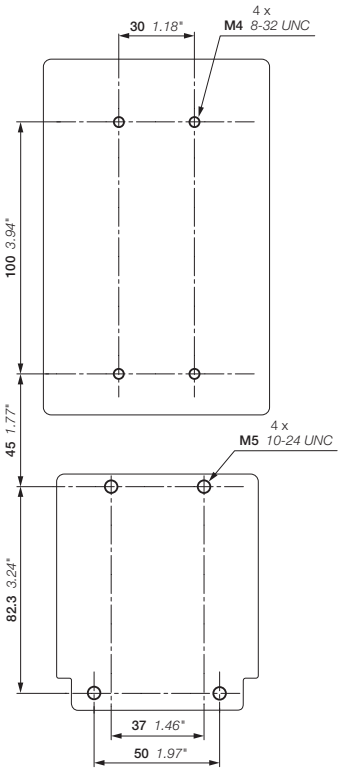
AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit

Main dimensions mm, inches

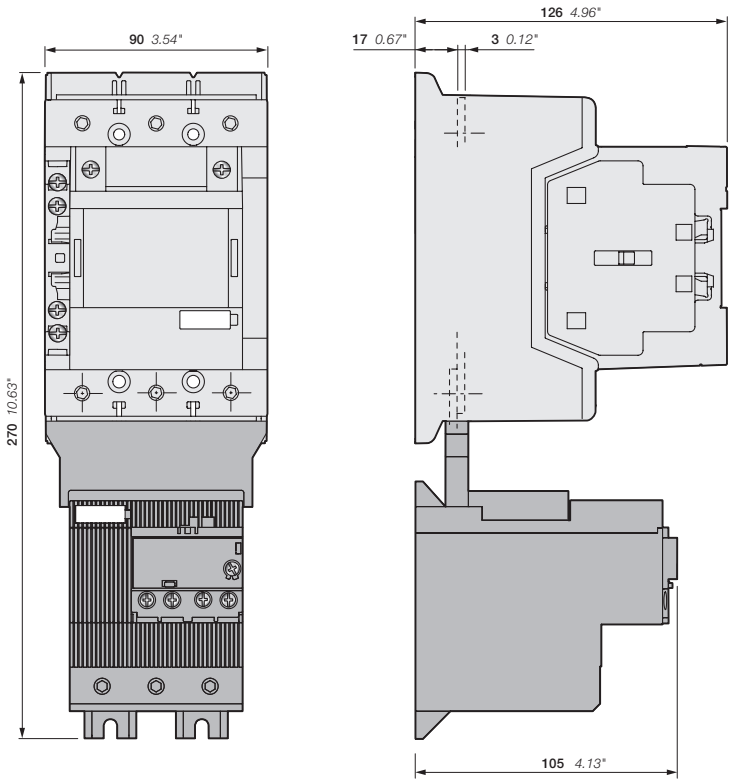
AF116, AF140, AF146 3-pole contactors
Dimensions



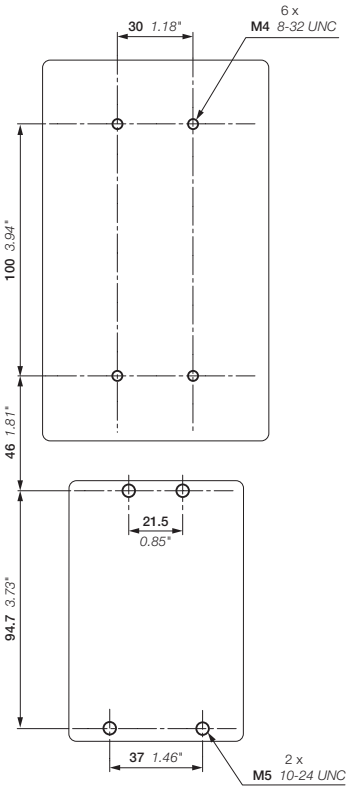
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



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



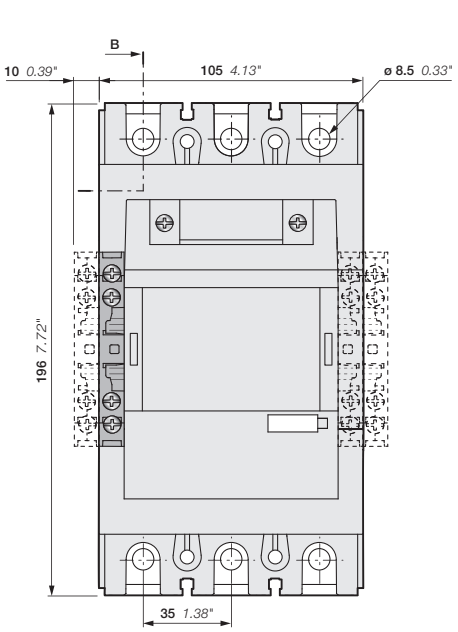
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

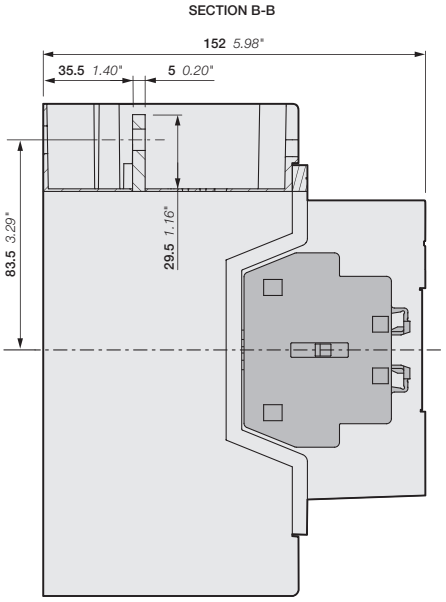


AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

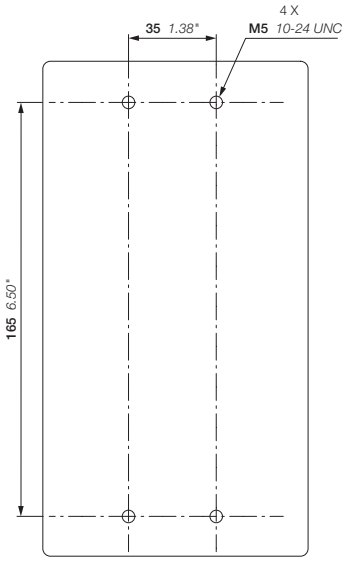
Main dimensions mm, inches

AF190, AF205 3-pole contactors
Dimensions

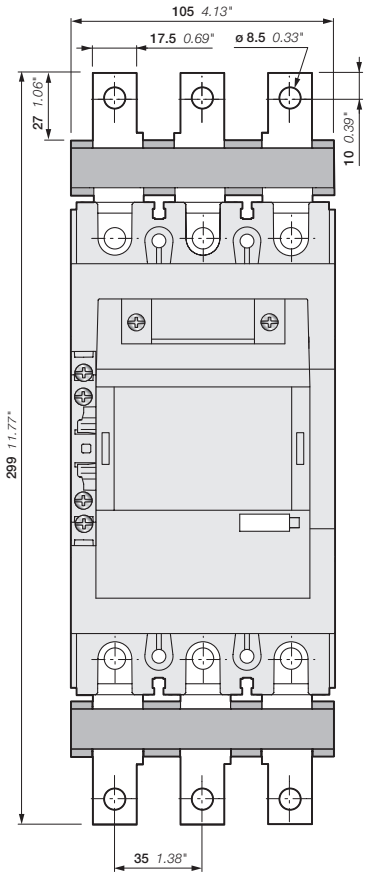




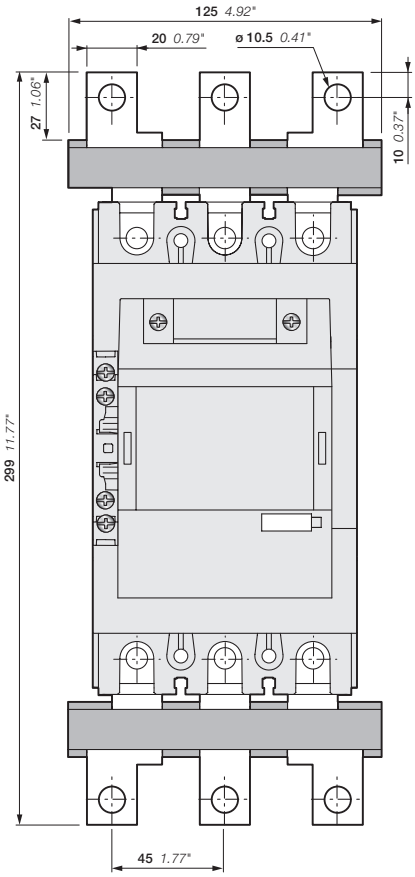
AF190, AF205-30-00 + CAL19 2-pole auxiliay contact block
AF190, AF205-30-11



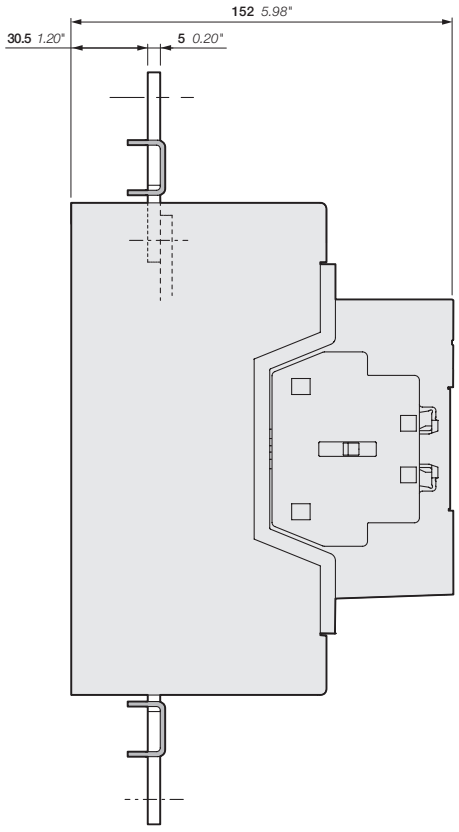
AF190, AF205



AF190, AF205-30-11
+ LX205 terminal extension



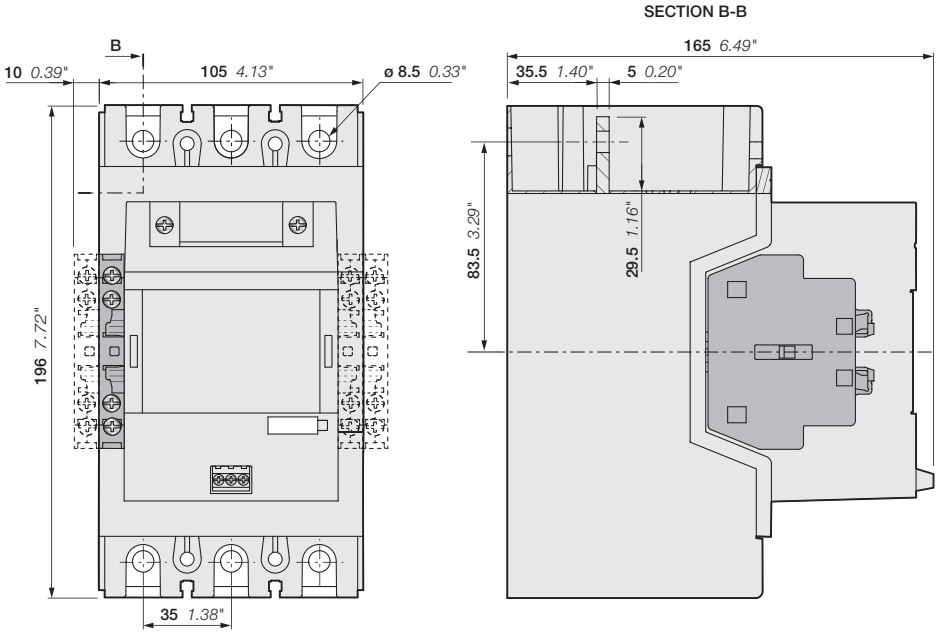
AF190, AF205-30-11
+ LW205 terminal enlargement



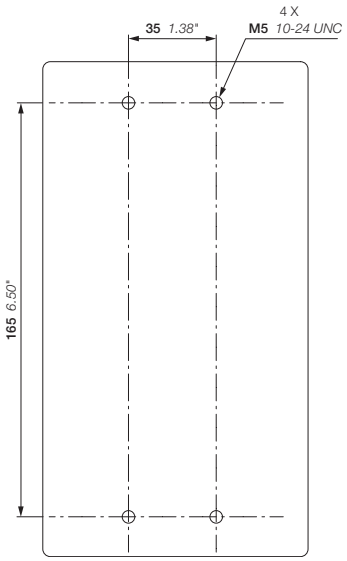
Main dimensions mm, inches

AF190, AF205 3-pole contactors With built-in PLC interface (coil code 33, 34)

Dimensions



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

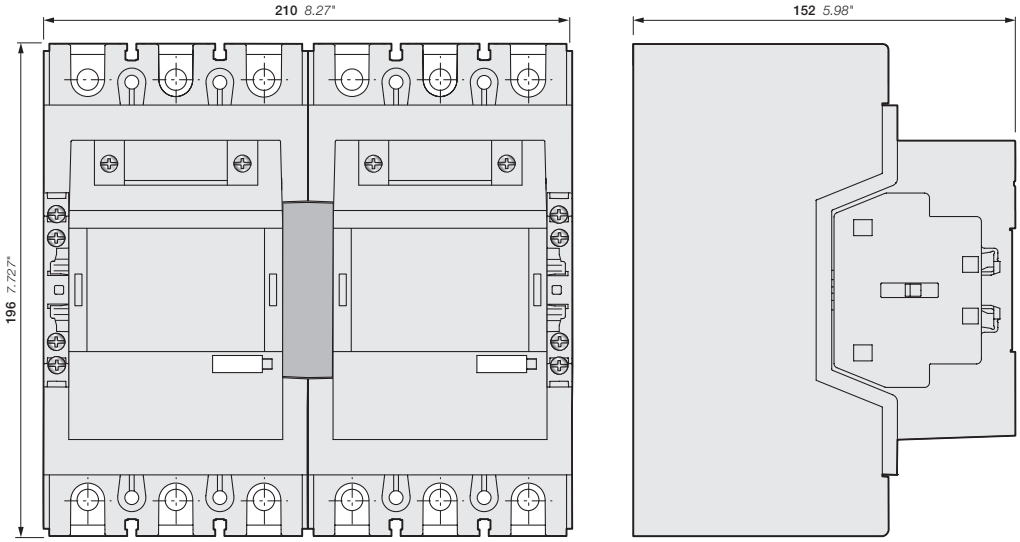


AF190, AF205

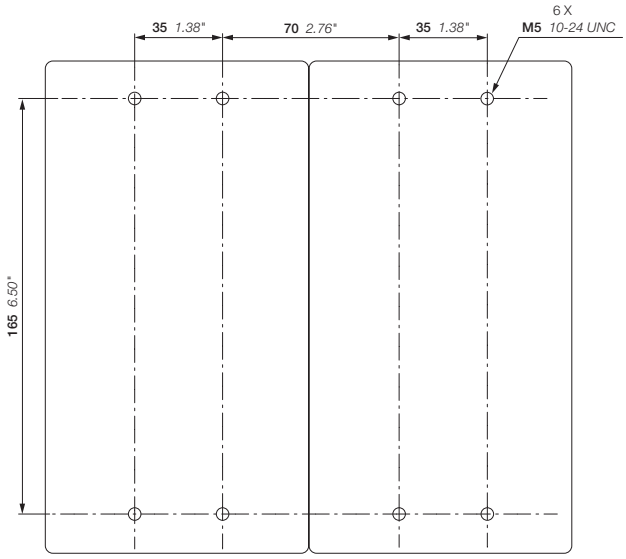
Main dimensions mm, inches

03

AF190, AF205 3-pole contactors
Dimensions



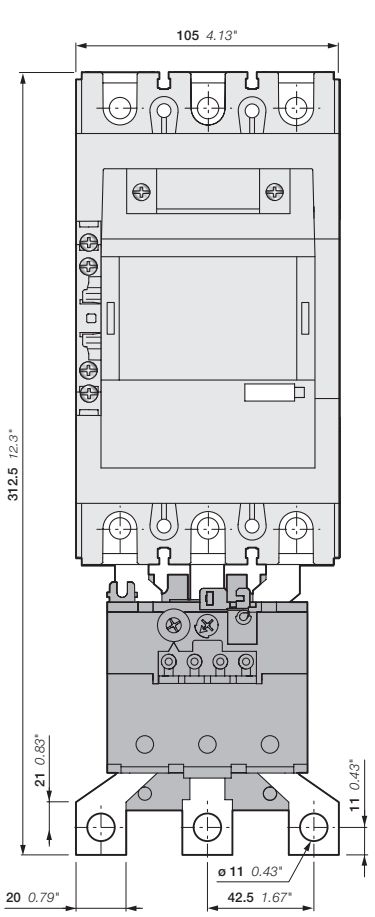
AF190, AF205-30-11
+ VM19 mechanical interlocking unit

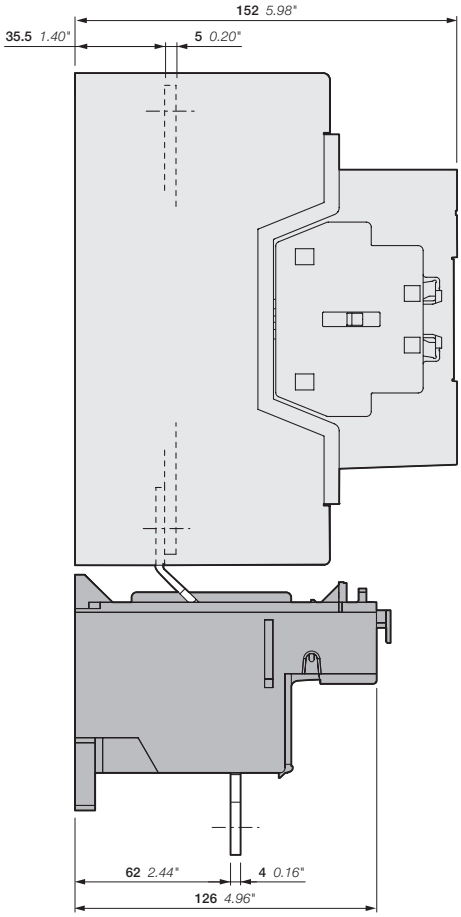


AF190, AF205
+ VM19 mechanical interlocking unit

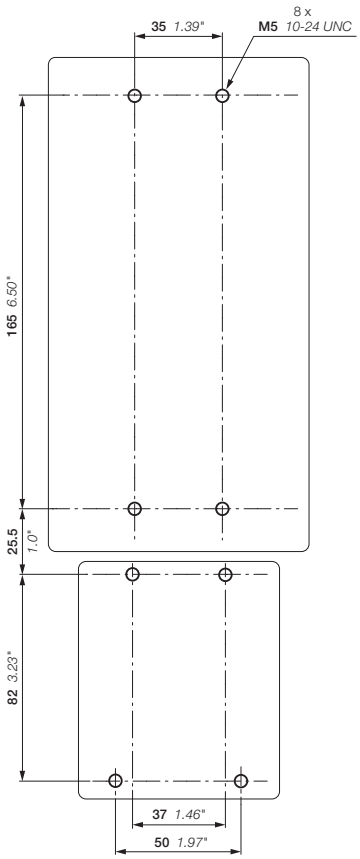
Main dimensions mm, inches

AF190, AF205 3-pole contactors
Dimensions





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

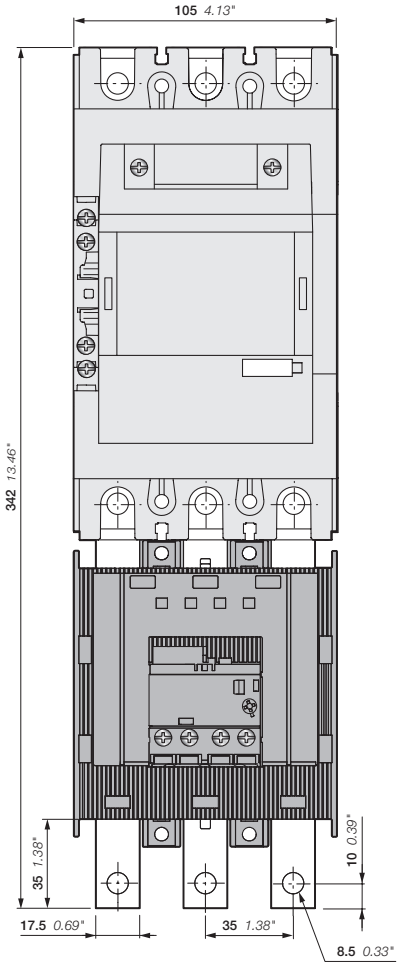


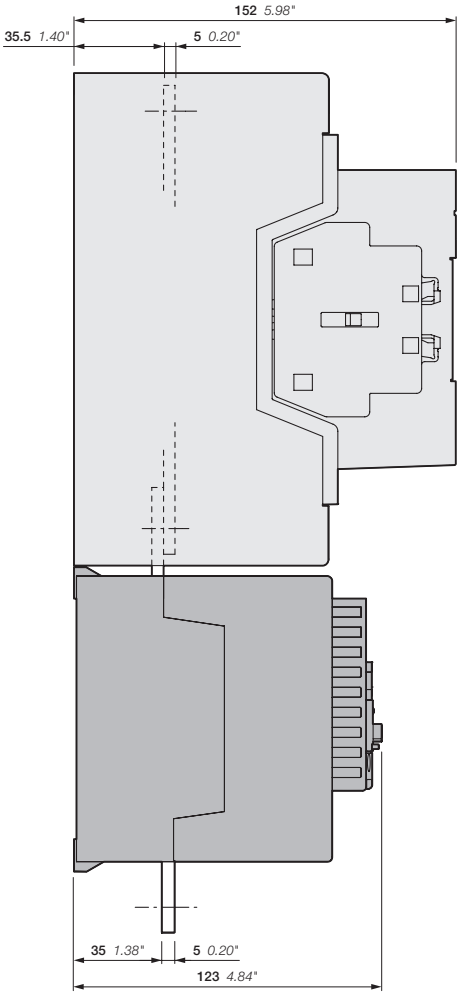
AF190, AF205
+ TA200DU thermal overload relay

Main dimensions mm, inches

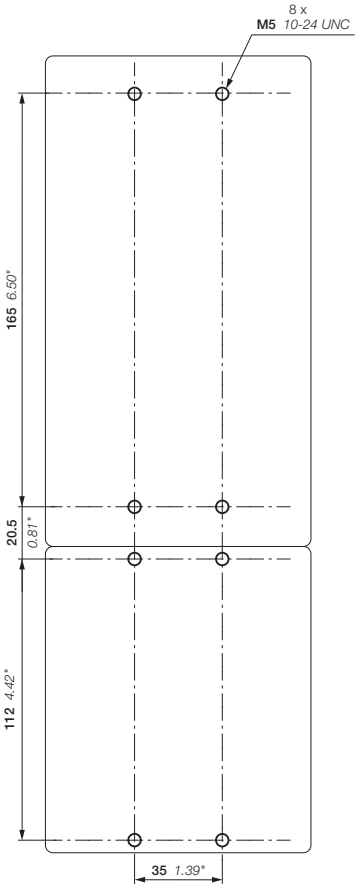
03

AF190, AF205 3-pole contactors
Dimensions





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

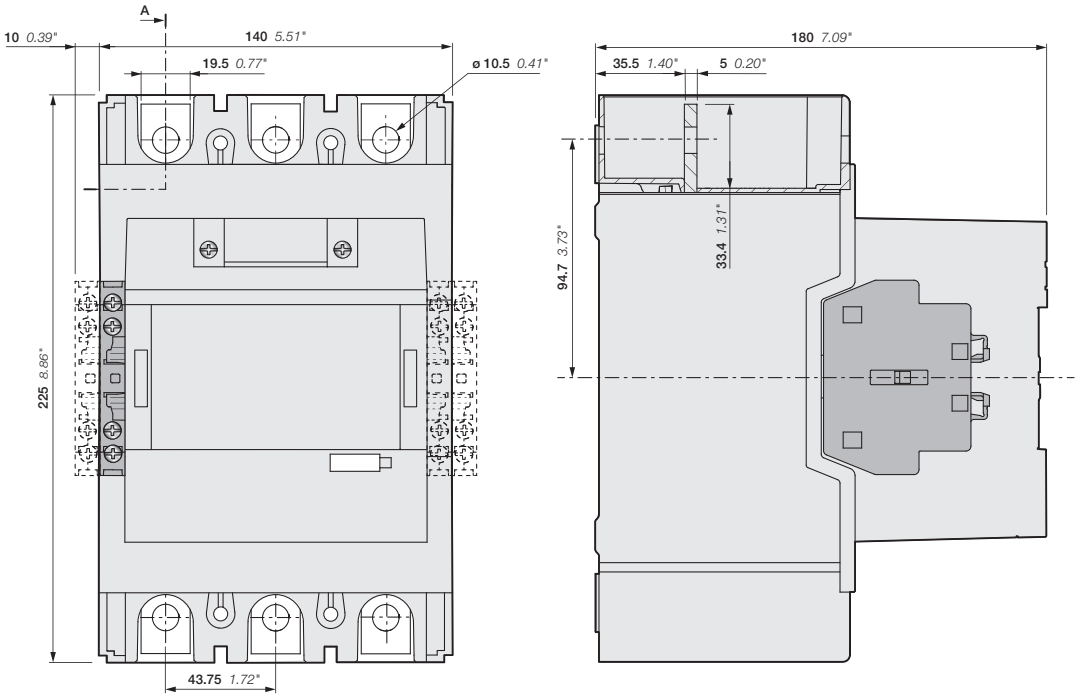


AF190, AF205
+ EF205 electronic overload relay

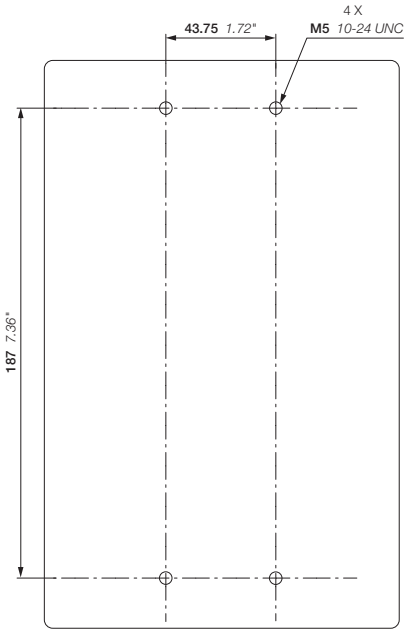
Main dimensions mm, inches

AF265, AF305, AF370 3-pole contactors

Dimensions



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

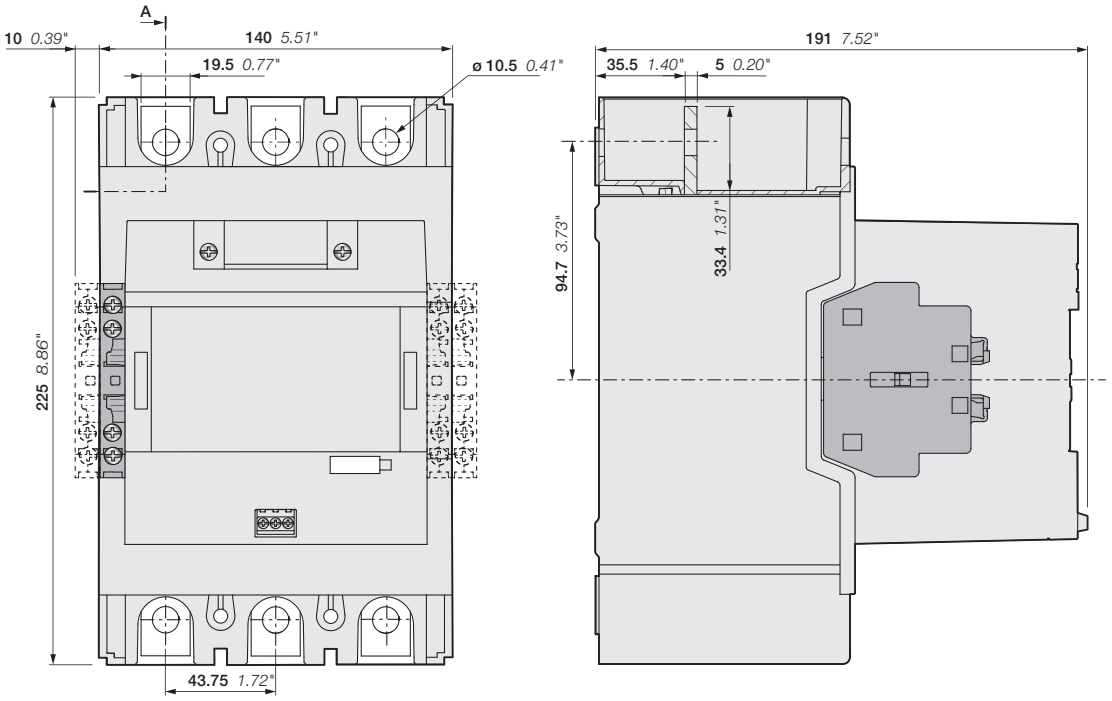


AF265, AF305, AF370

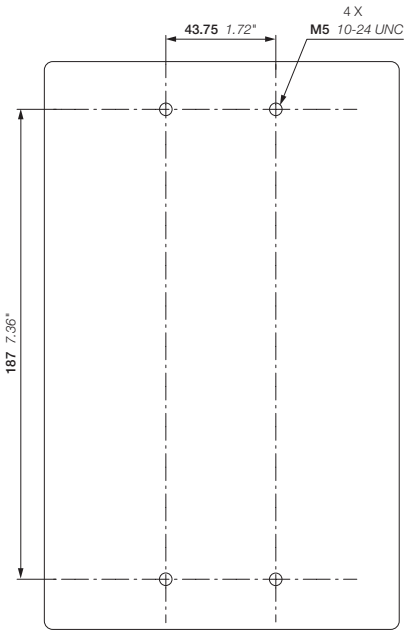
Main dimensions mm, inches

AF265, AF305, AF370 3-pole contactors with built-in PLC interface (coil code 33, 34)

Dimensions



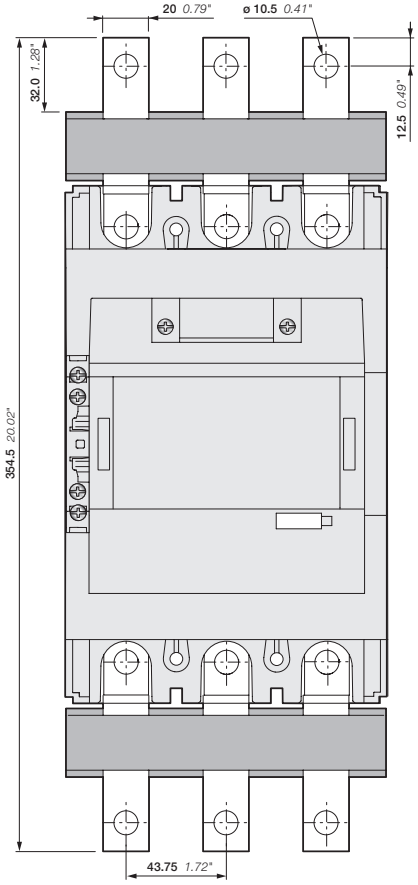
AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
AF265, AF305, AF370-30-11



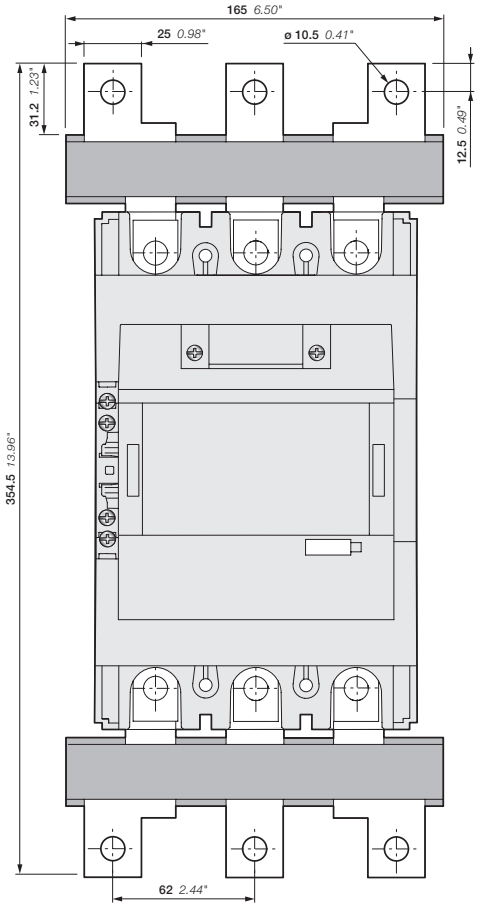
AF265, AF305, AF370

Main dimensions mm, inches

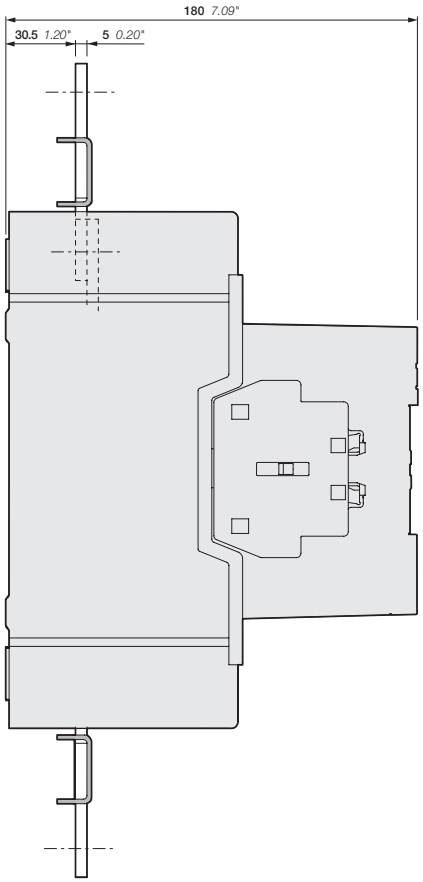
AF265, AF305, AF370 3-pole contactors
Dimensions



AF265, AF305, AF370-30-11
+ LX370 terminal extension

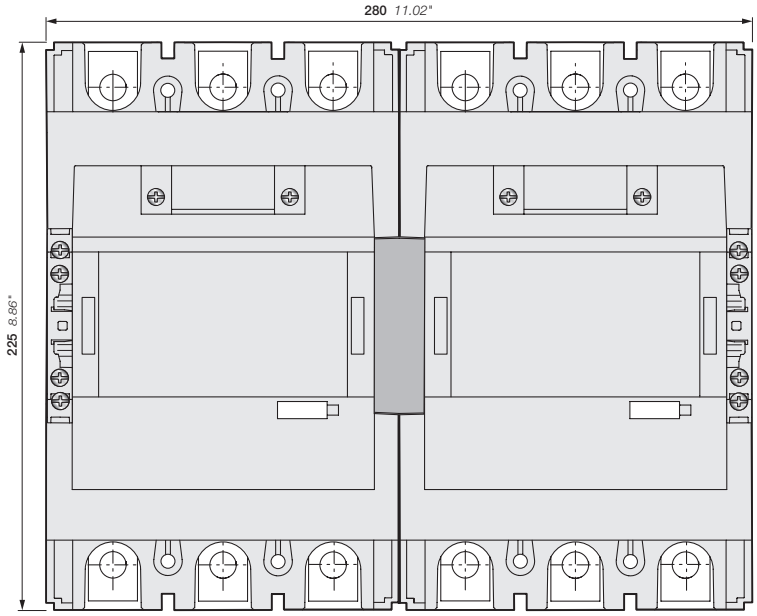


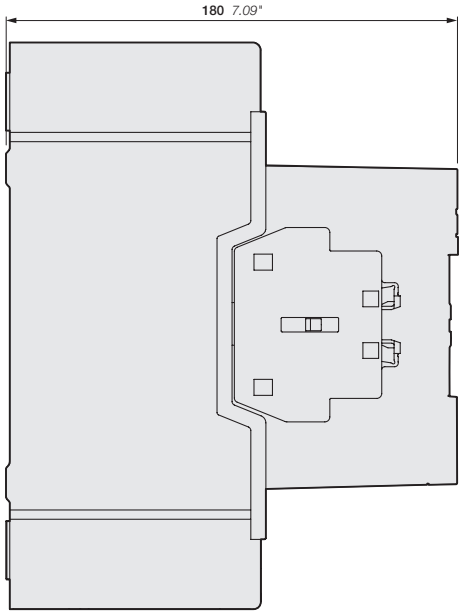
AF265, AF305, AF370-30-11
+ LW370 terminal enlargement



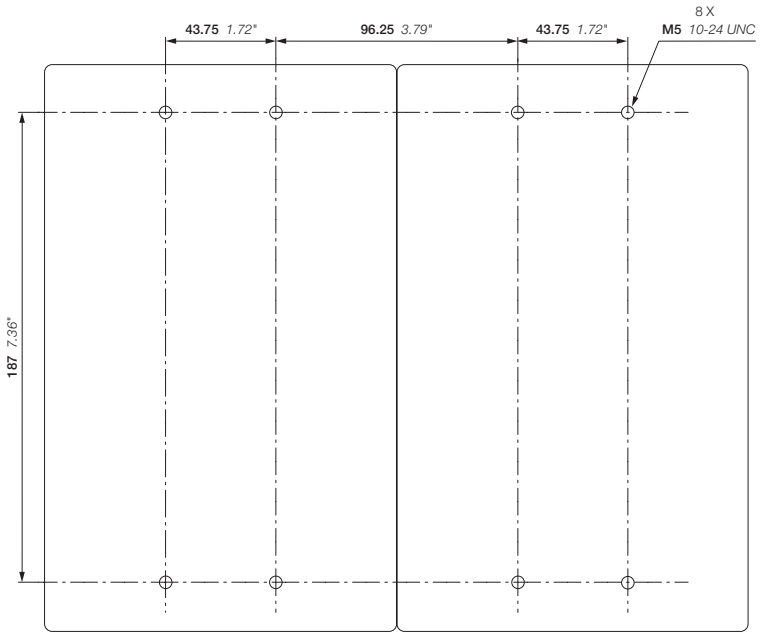
Main dimensions mm, inches

AF265, AF305, AF370 3-pole contactors
Dimensions





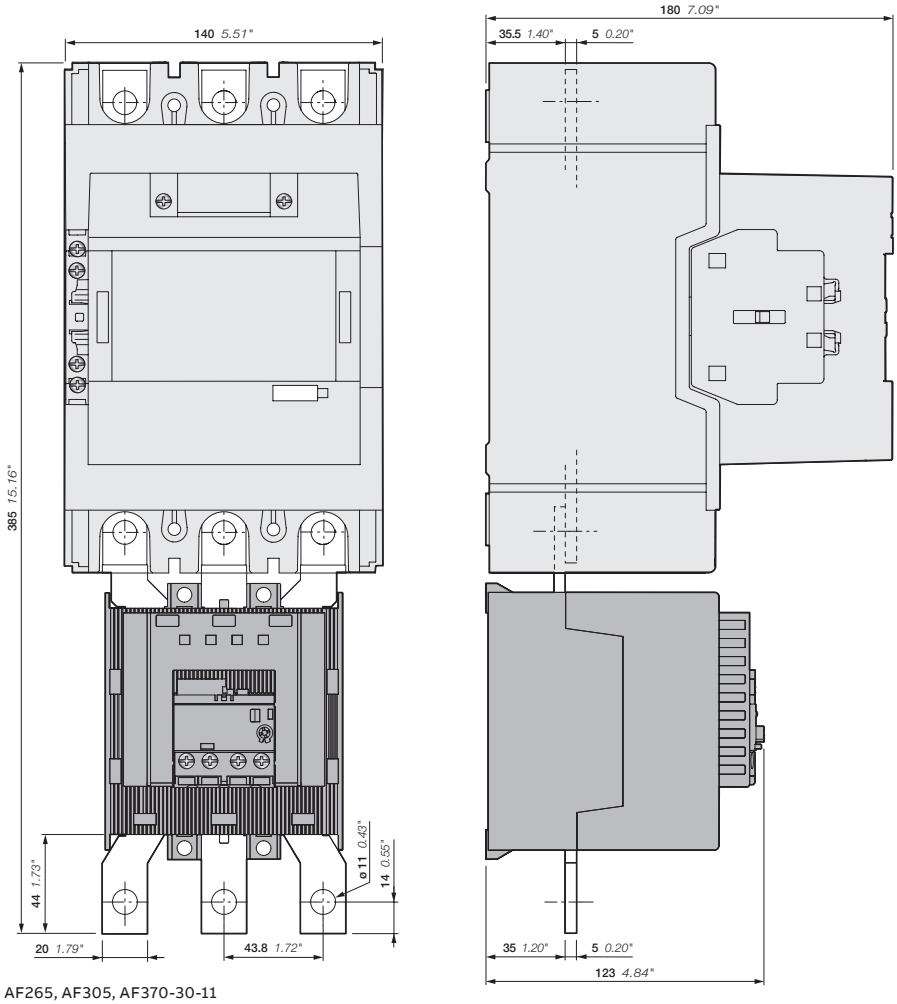
AF265, AF305, AF370-30-11
+ VM19 mechanical interlocking unit



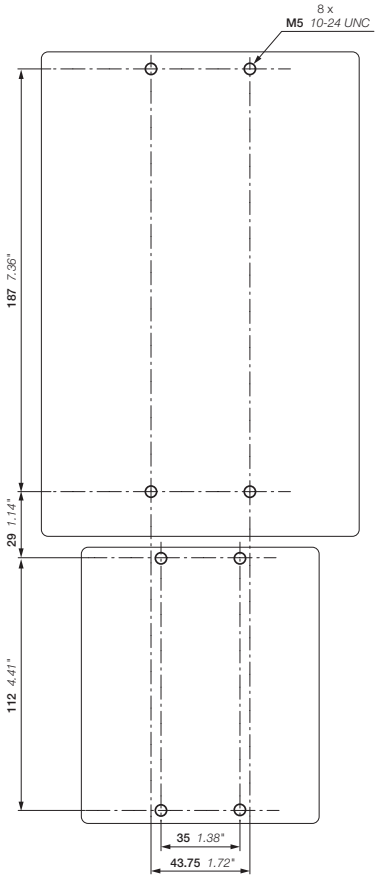
AF265, AF305, AF370
+ VM19 mechanical interlocking unit

Main dimensions mm, inches

AF265, AF305, AF370 3-pole contactors
Dimensions



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

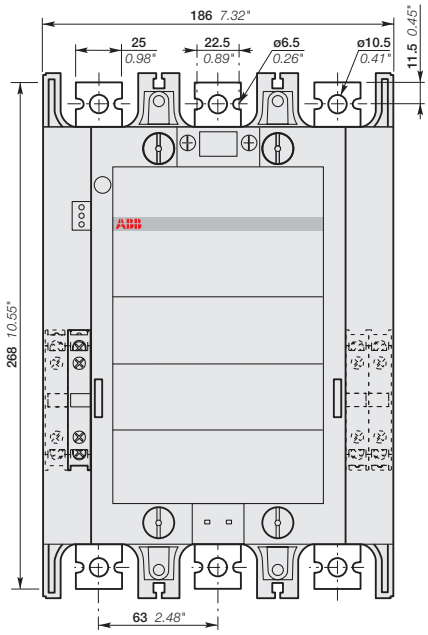


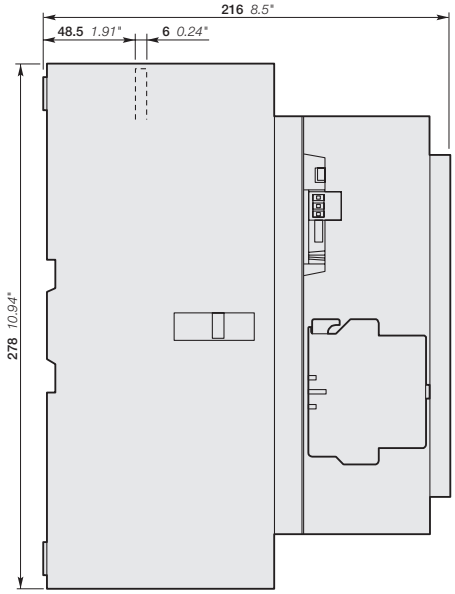
AF265, AF305, AF370
+ EF370 electronic overload relay

Main dimensions mm, inches

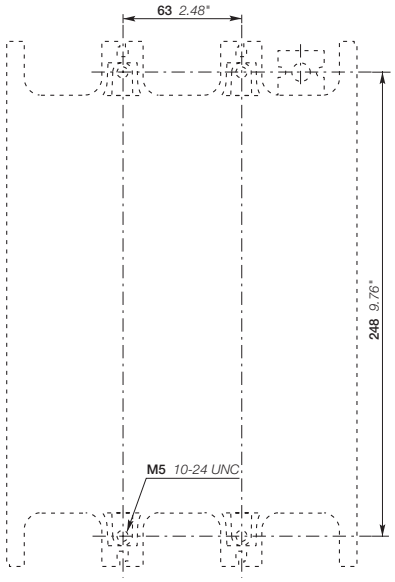
AF400 and AF460 3-pole contactors

Dimensions

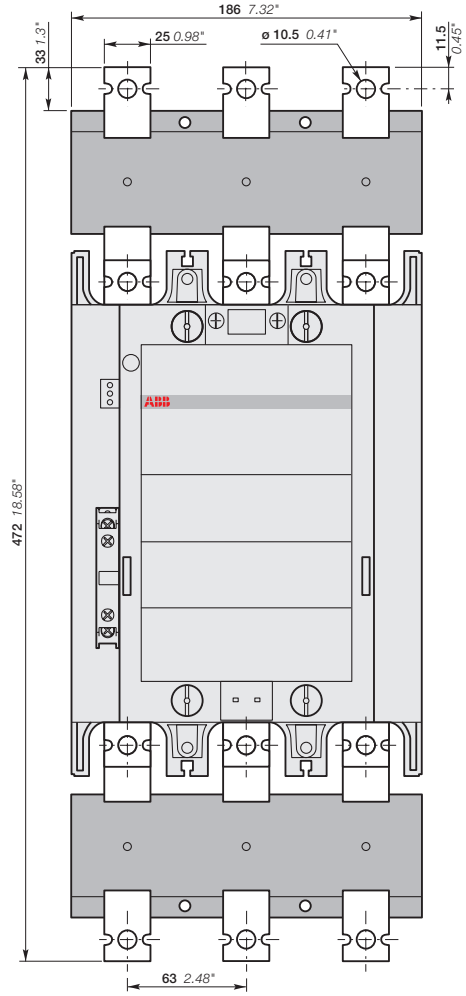




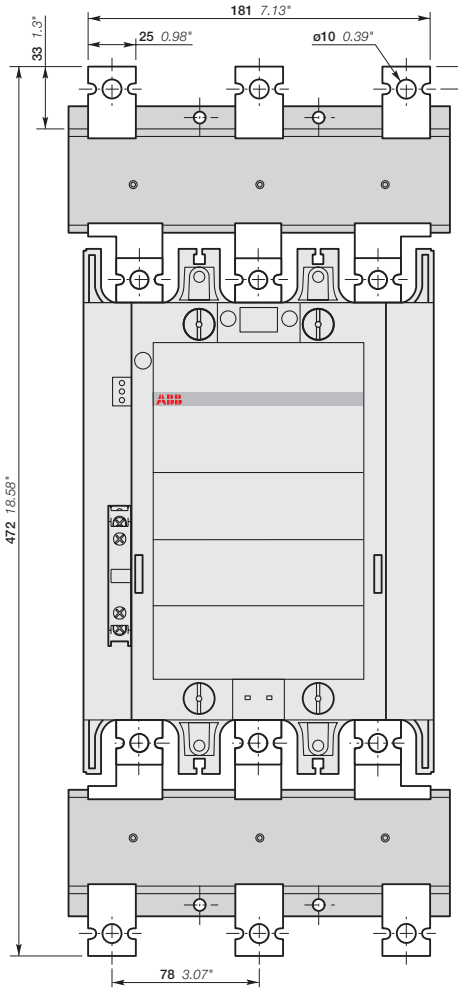
AF400, AF460-30-11



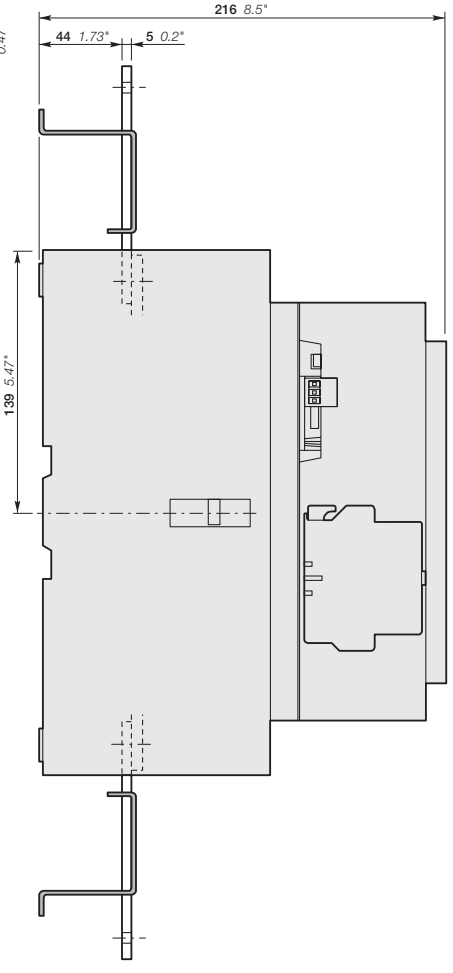
AF400, AF460



AF400, AF460-30-11
+ LX460 terminal extension



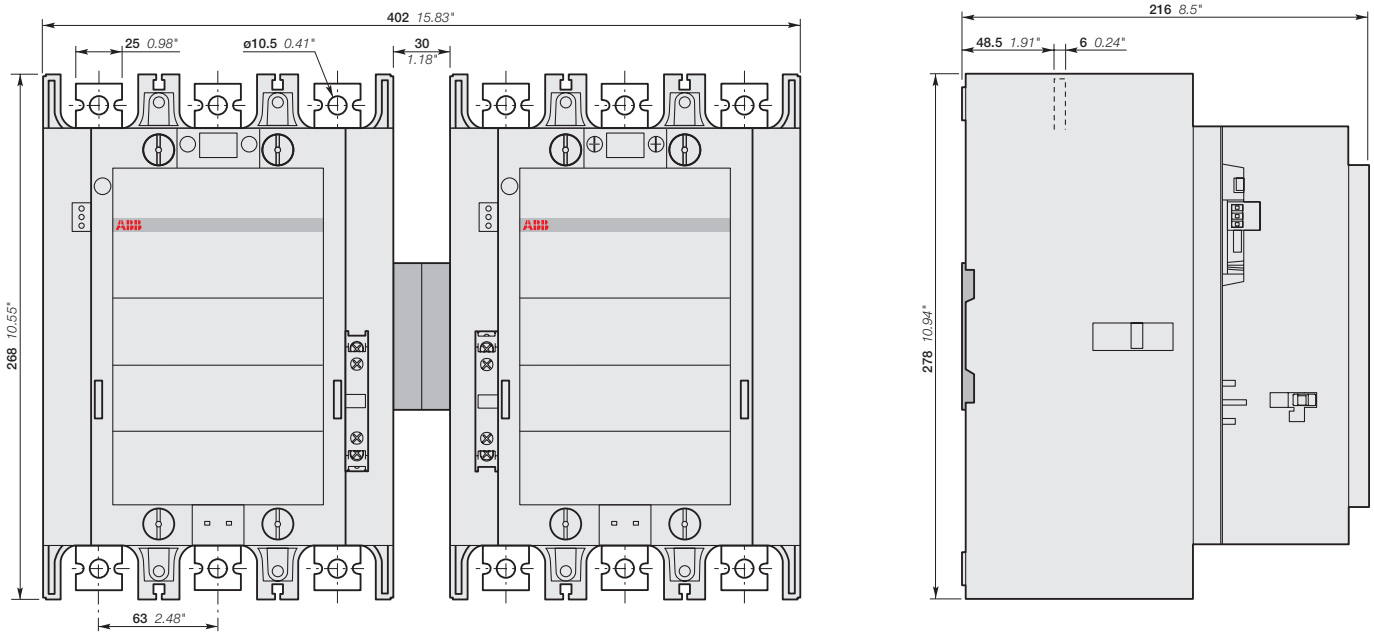
AF400, AF460-30-11
+ LW460 terminal enlargement



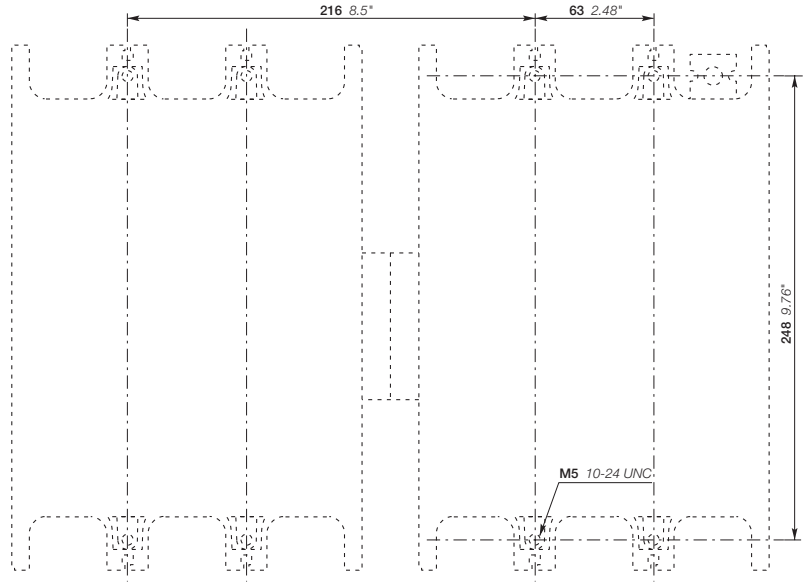
Main dimensions mm, inches

AF400 and AF460 3-pole contactors

Dimensions



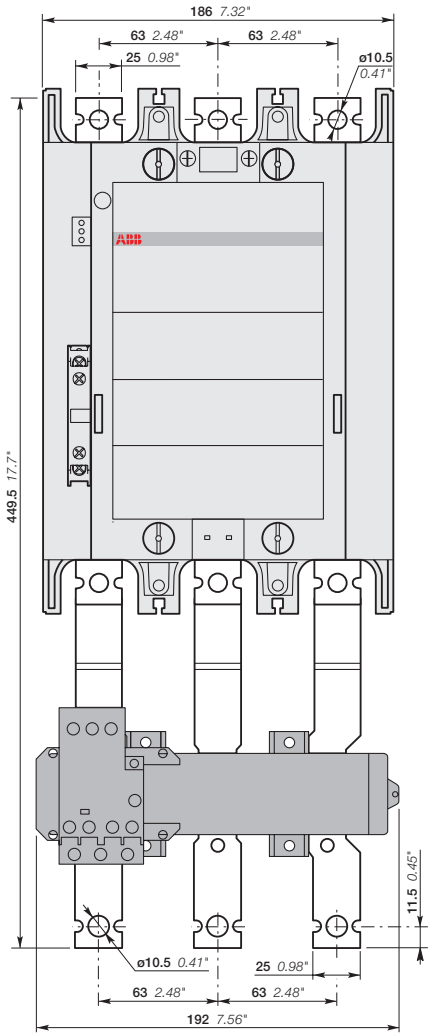
AF400, AF460-30-11
+ VM750H mechanical interlock unit

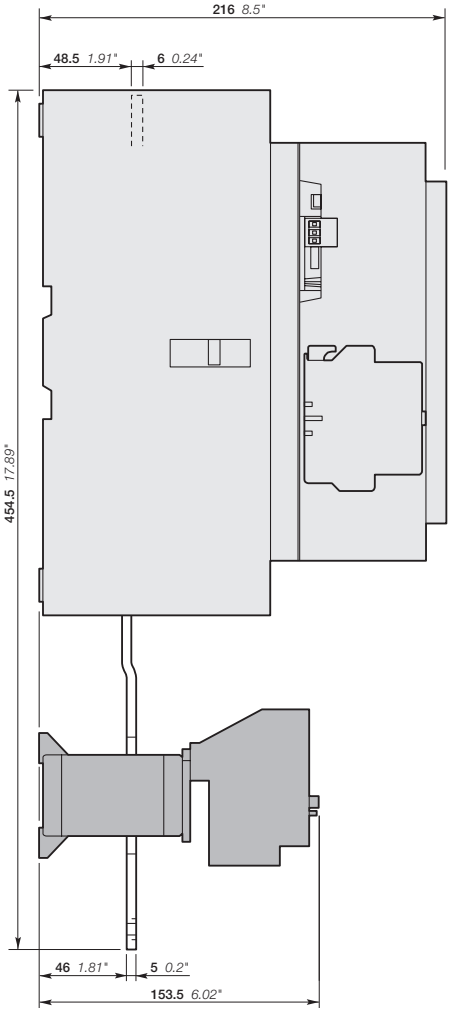


AF400, AF460
+ VM750H mechanical interlock unit

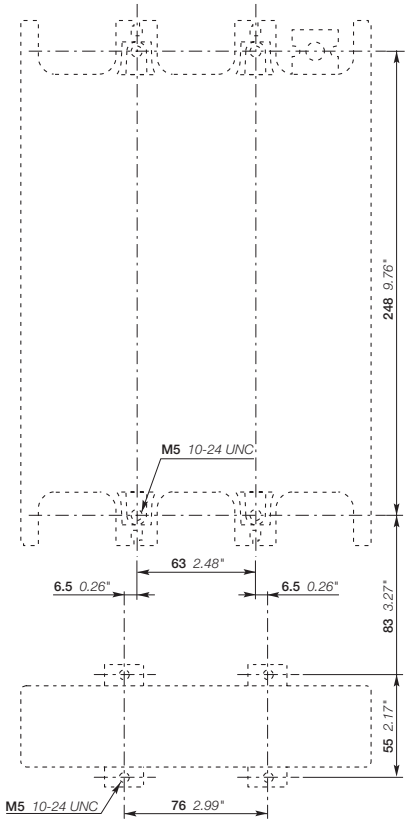
Main dimensions mm, inches

AF400 and AF460 3-pole contactors
Dimensions





AF400, AF460-30-11
+ EF460 electronic O/L relay

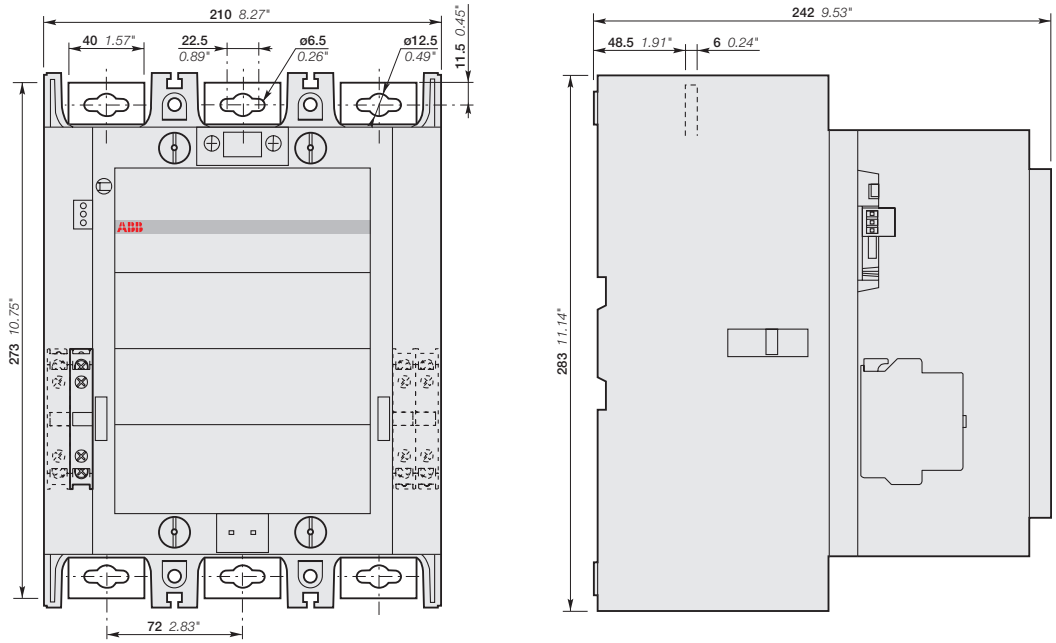


AF400, AF460
+ EF460 electronic O/L relay

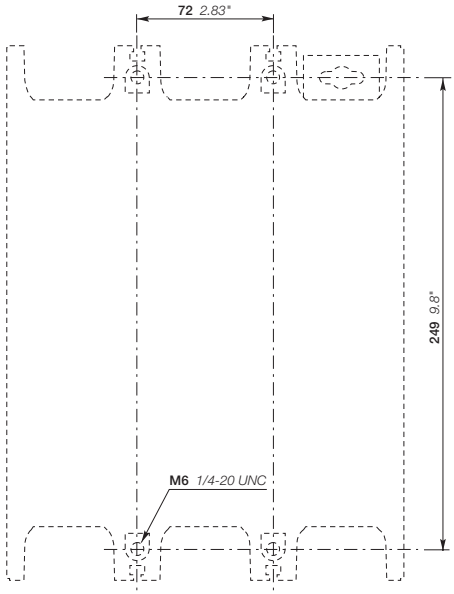
Main dimensions mm, inches

AF580 and AF750 3-pole contactors

Dimensions



AF580 and AF750-30-11

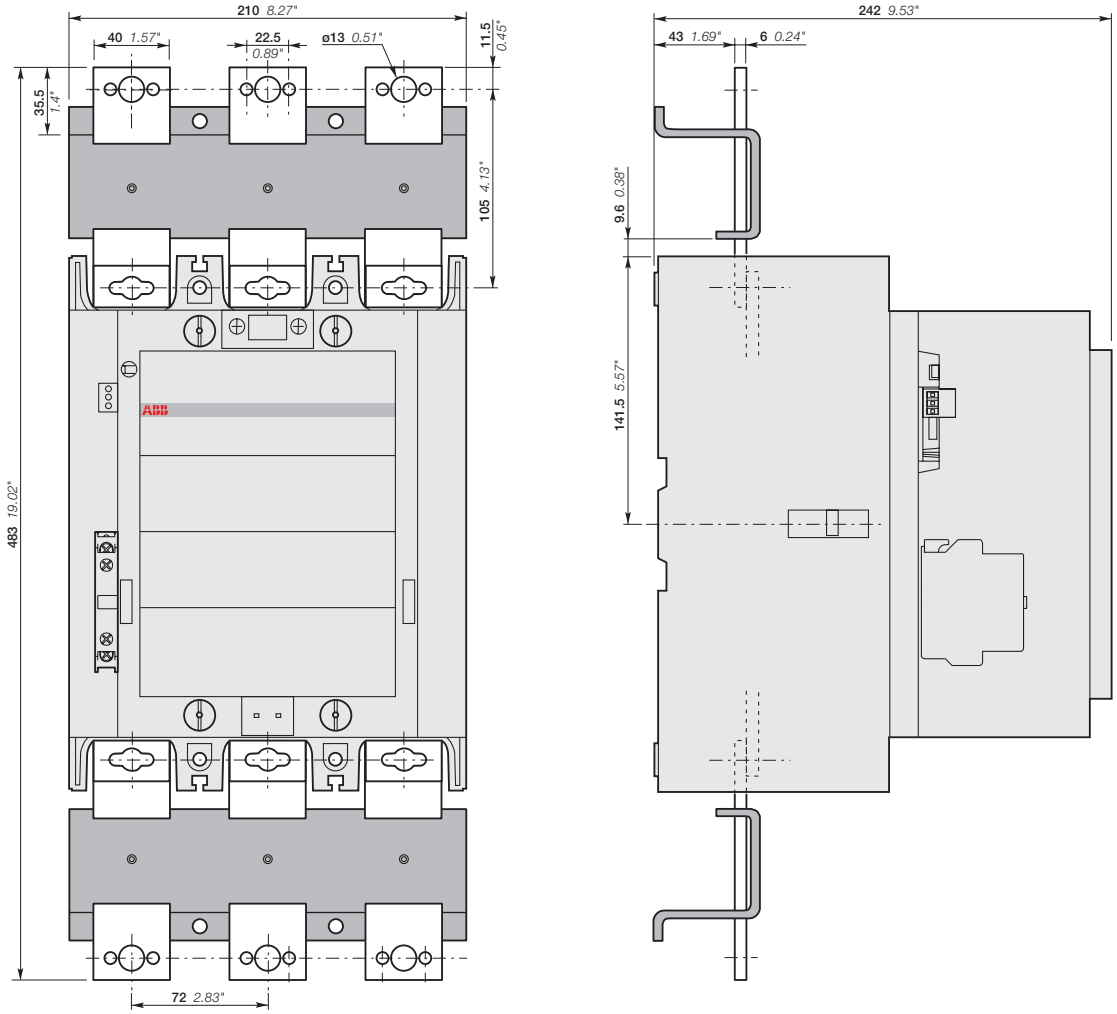


AF580 and AF750

Main dimensions mm, inches

03

AF580 and AF750 3-pole contactors
Dimensions

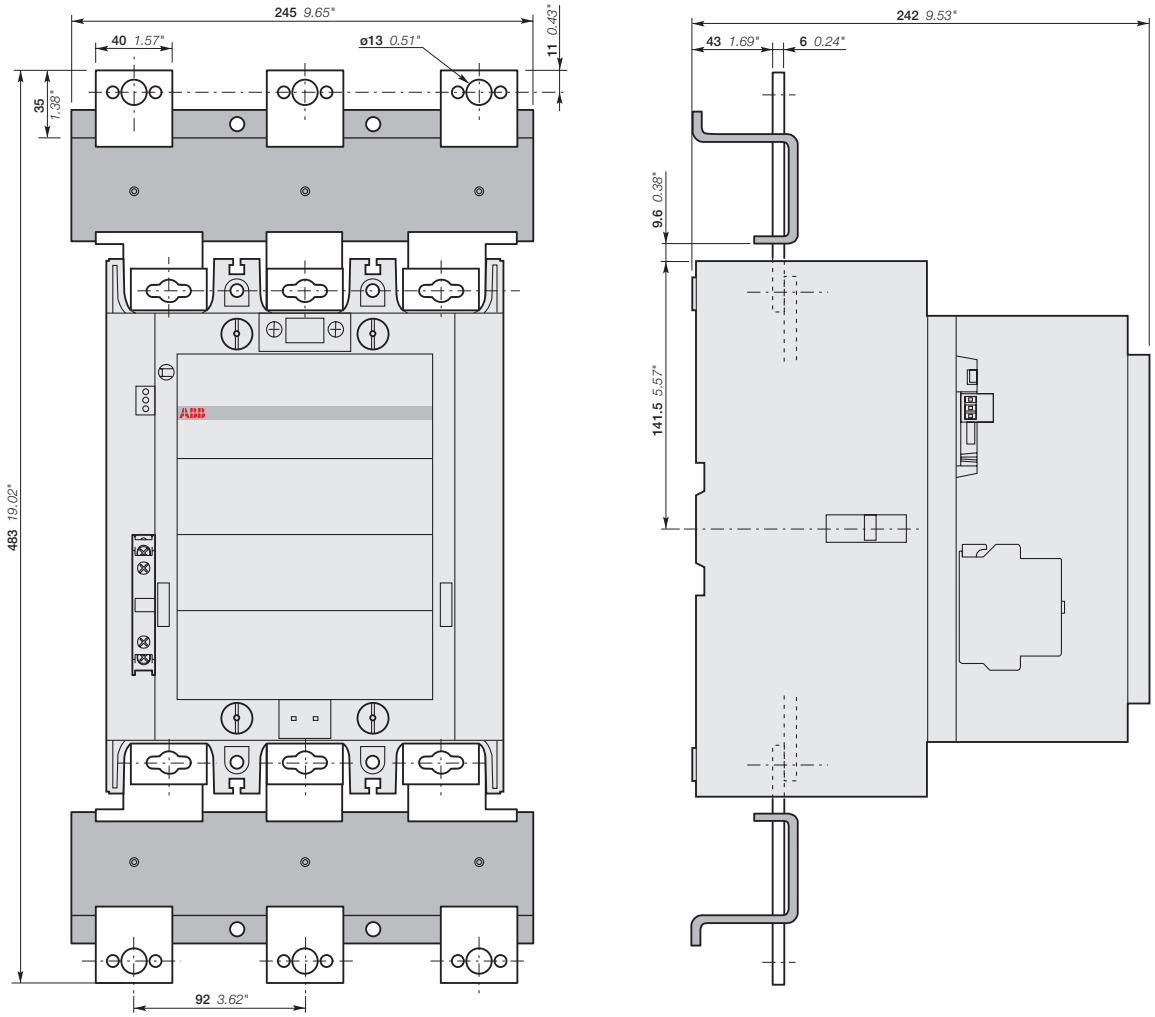


AF580 and AF750-30-11
+ LX750 terminal extension

Main dimensions mm, inches

AF580 and AF750 3-pole contactors

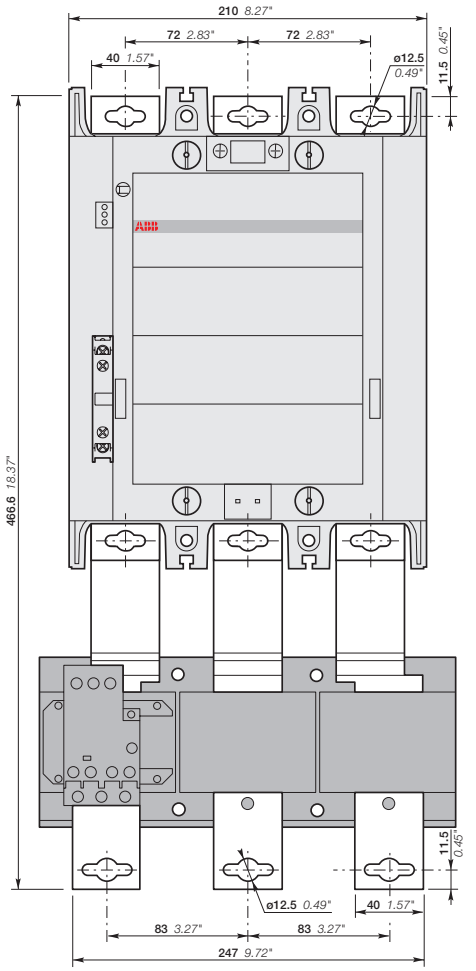
Dimensions

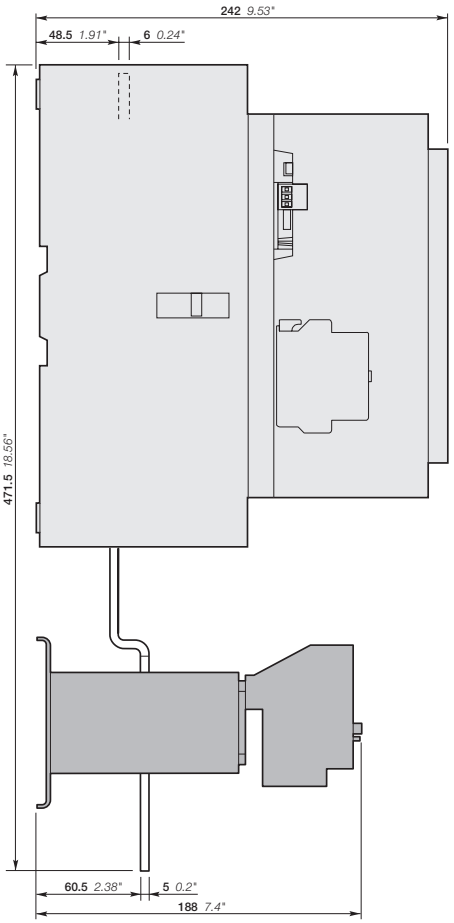


AF580 and AF750-30-11
+ LW750 terminal enlargement

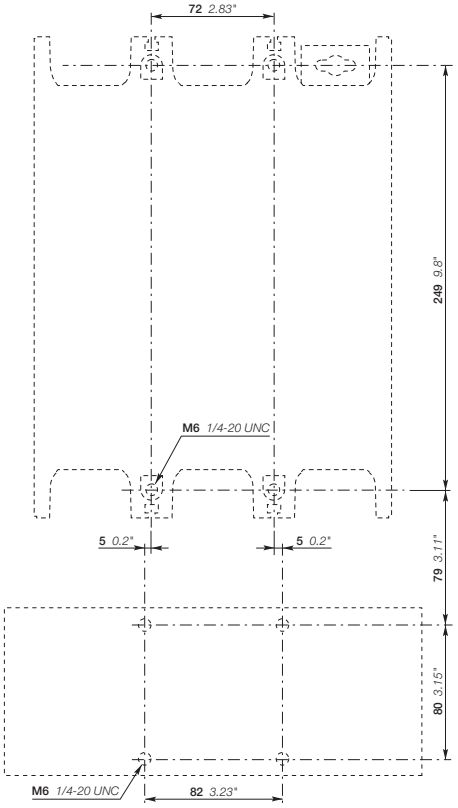
Main dimensions mm, inches

AF580 and AF750 3-pole contactors
Dimensions





AF580 and AF750-30-11
+ EF750 electronic O/L relay

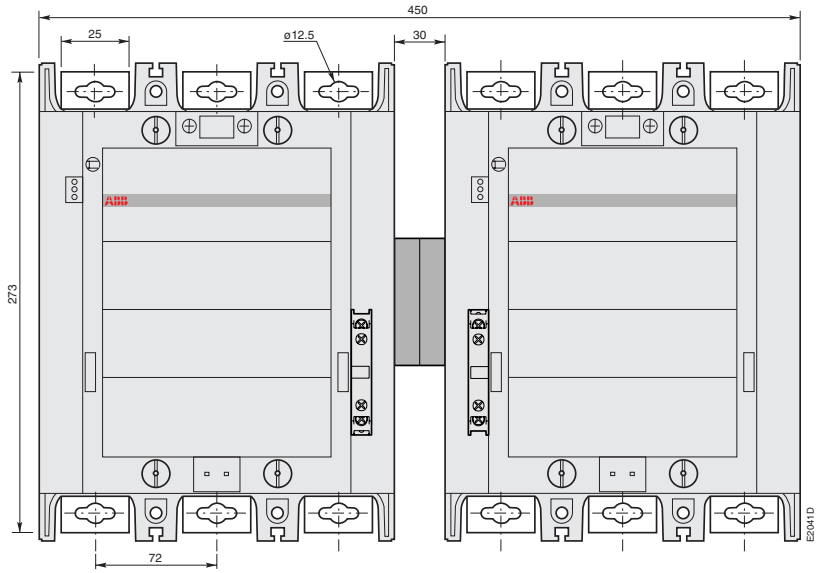


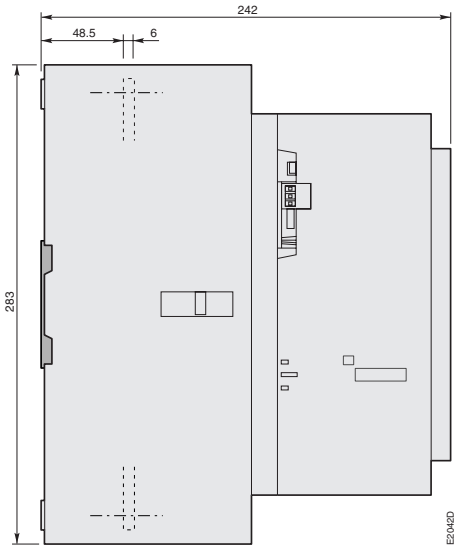
AF580 and AF750
+ EF750 electronic O/L relay

Main dimensions mm, inches

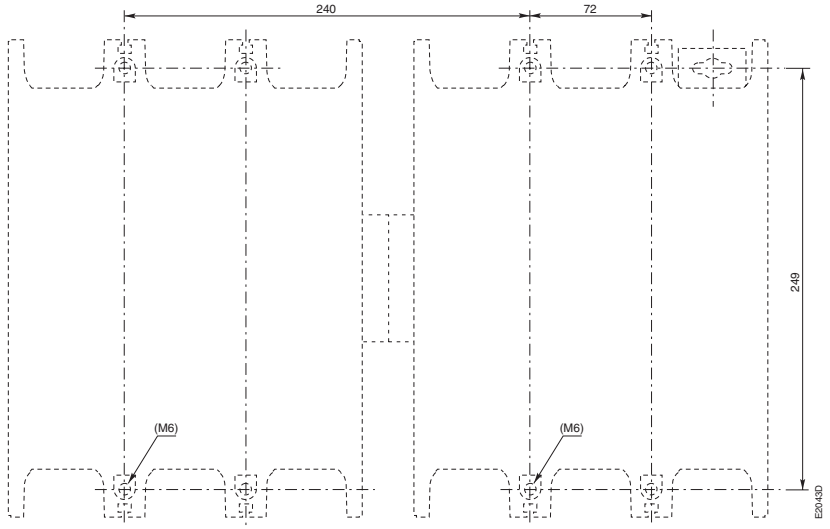
AF580 and AF750 3-pole contactors

Dimensions





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

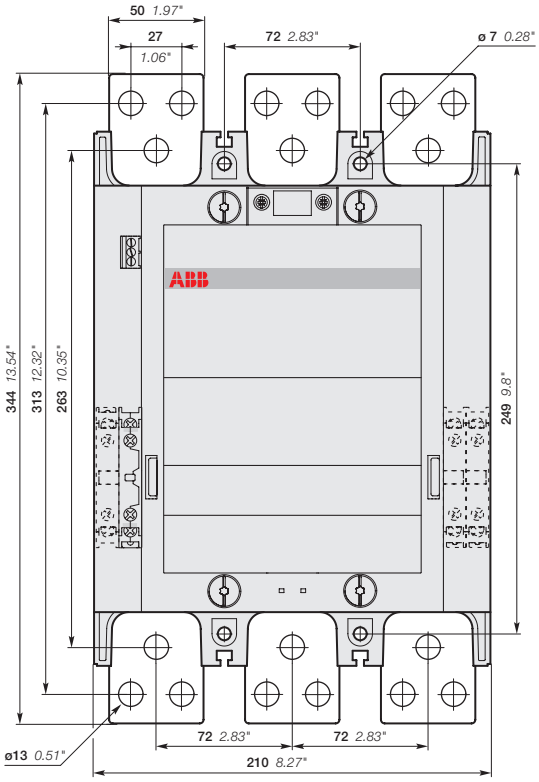


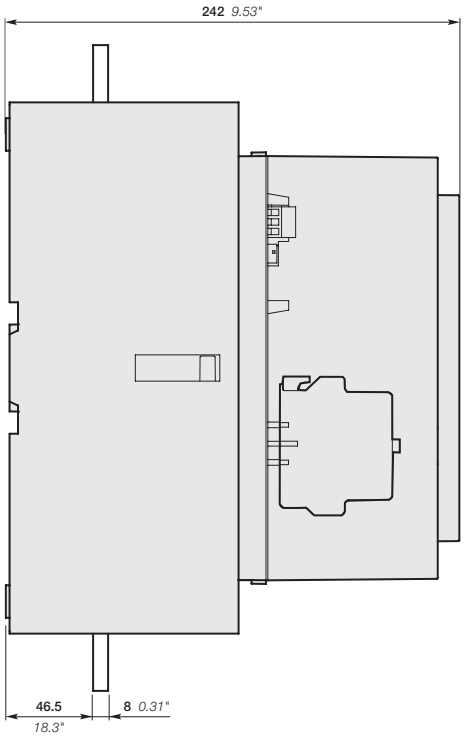
AF580 and AF750
+ VM 750H mechanical interlock unit

Main dimensions mm, inches

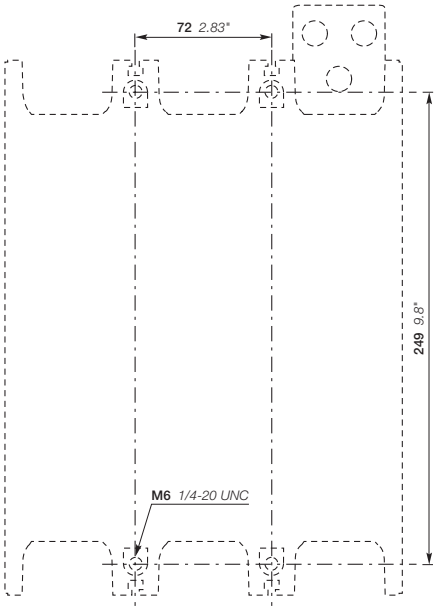
AF1250 3-pole contactors

Dimensions





AF1250-30-11

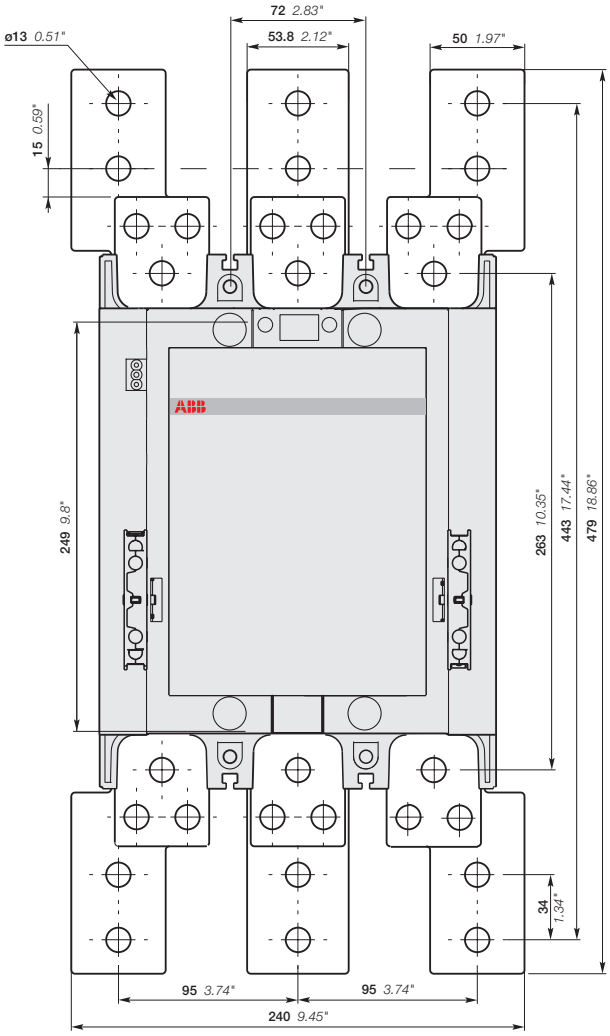


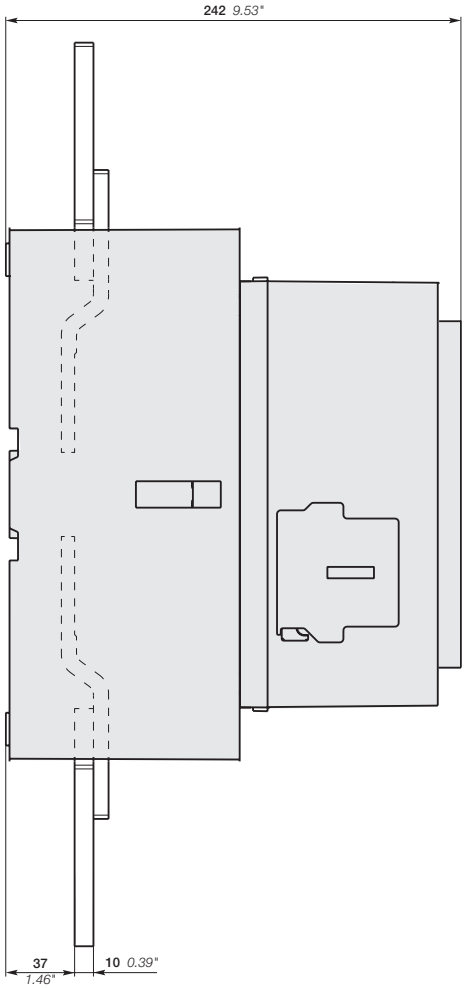
AF1250

Main dimensions mm, inches

AF1250 3-pole contactors

Dimensions



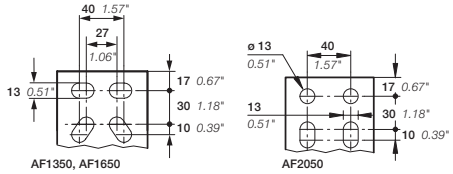


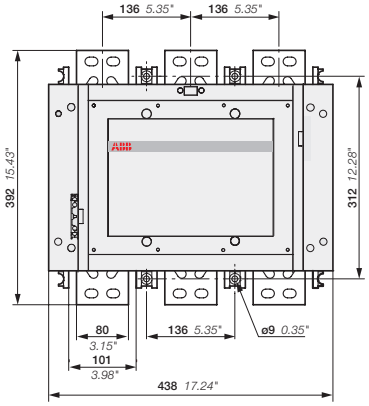
AF1250-30-11
+ LW1250 terminal enlargement

Main dimensions mm, inches

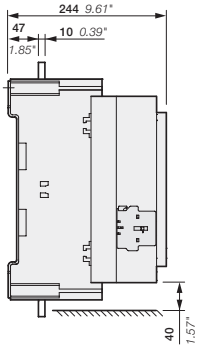
AF1350, AF1650, AF2050 and AF2850 3-pole contactors

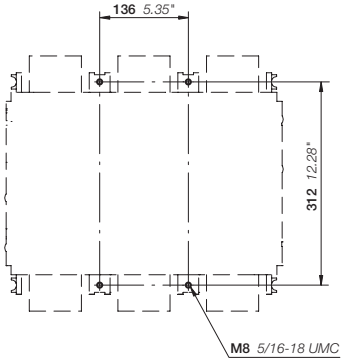
Dimensions



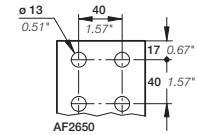


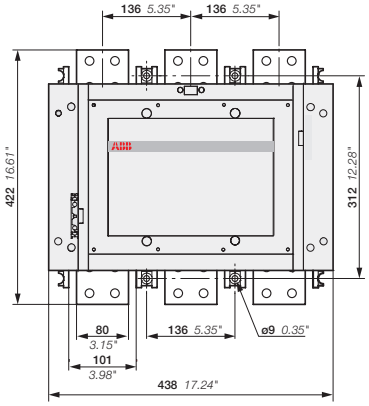
AF1350, AF1650, AF2050-30-11



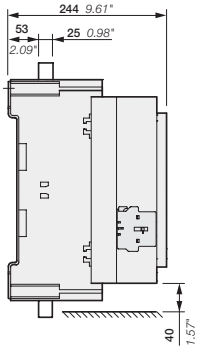


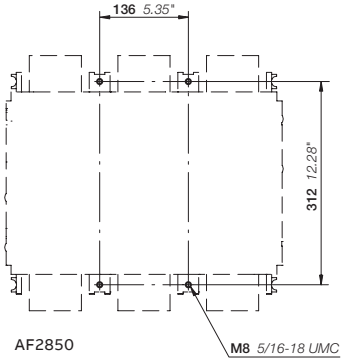
AF1350, AF1650, AF2050





AF2850-30-11



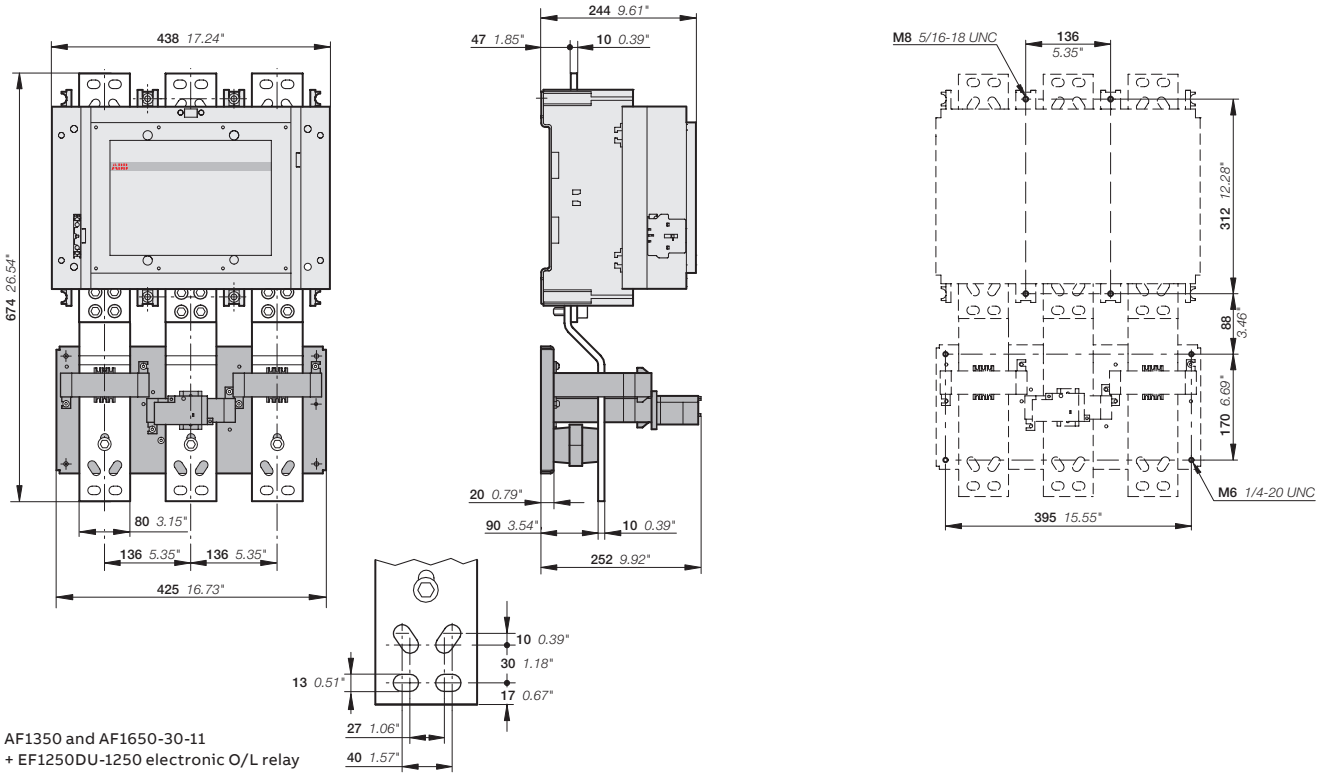


AF2850

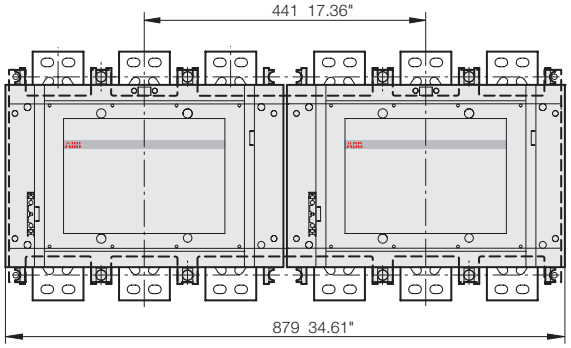
Main dimensions mm, inches

AF1350, AF1650, AF2050 and AF2850 3-pole contactors

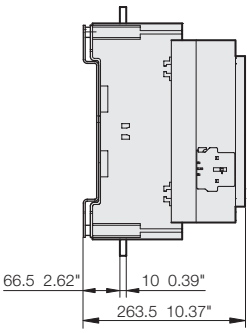
Dimensions



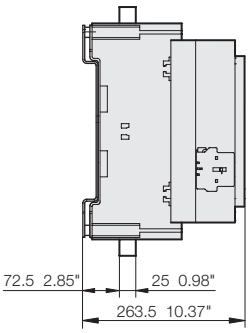
AF1350 and AF1650-30-11
+ EF1250DU-1250 electronic O/L relay



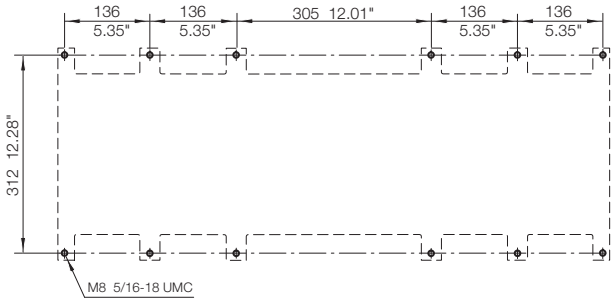
AF1350, AF1650, AF2050, AF2850-30-11
+ VM 1650H mechanical interlock unit



AF1350, AF1650, AF2050



AF2850

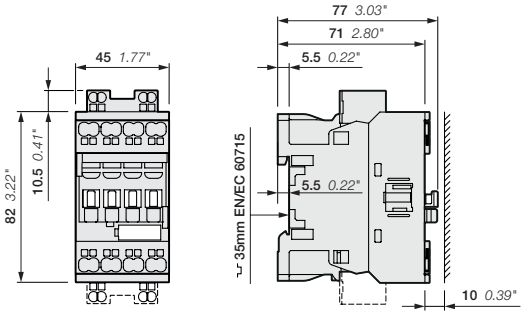


AF1350, AF1650, AF2050, AF2850
+ VM 1650H mechanical interlock unit

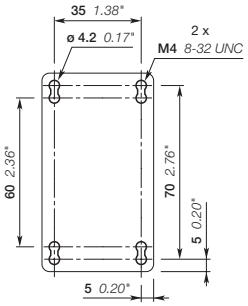
Main dimensions mm, inches

AF09..K, AF12..K, AF16..K 3-pole contactors - with Push-in Spring terminals

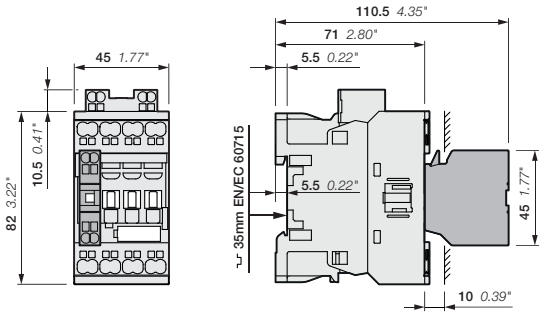
Dimensions



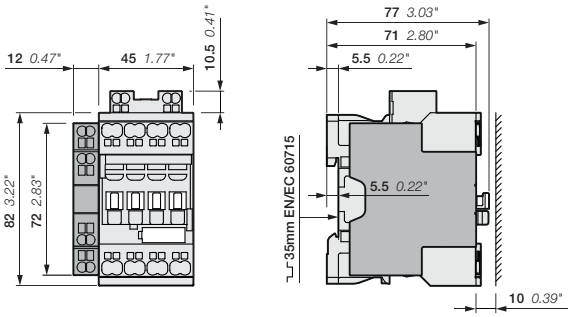
AF09..K, AF12..K, AF16..K



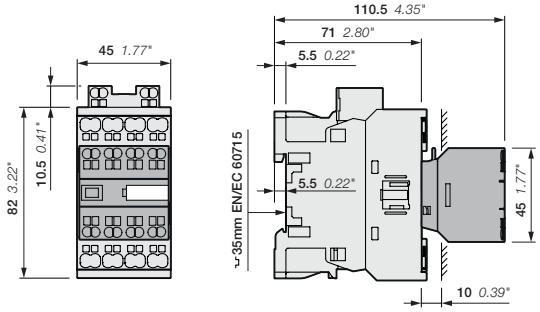
AF09..K, AF12..K, AF16..K



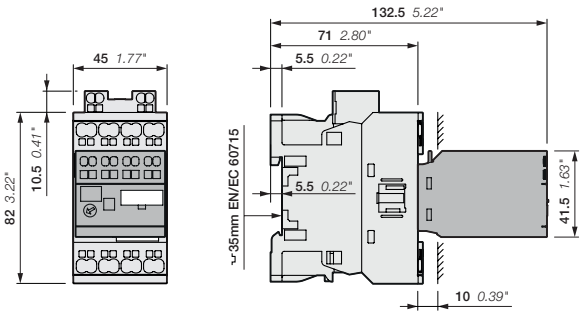
AF09..K, AF12..K, AF16..K
+ CA4..K 1-pole auxiliary contact block



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



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



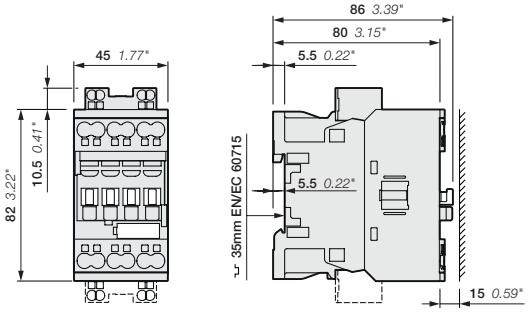
AF09..K, AF12..K, AF16..K
+ TEF4S electronic timer

Note: For AF09..K ... AF16..K contactors, lateral distance to grounded component 2 mm 0.08" min
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

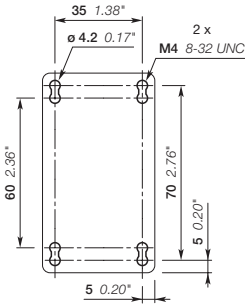
Main dimensions mm, inches

AF26..K, AF30..K, AF38..K 3-pole contactors - with Push-in Spring terminals

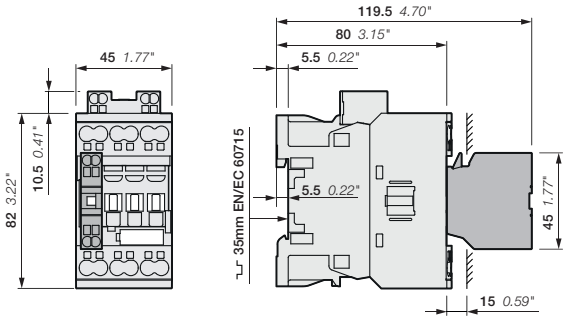
Dimensions



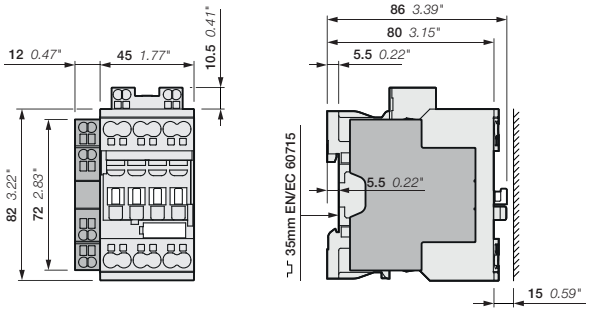
AF26..K, AF30..K, AF38..K



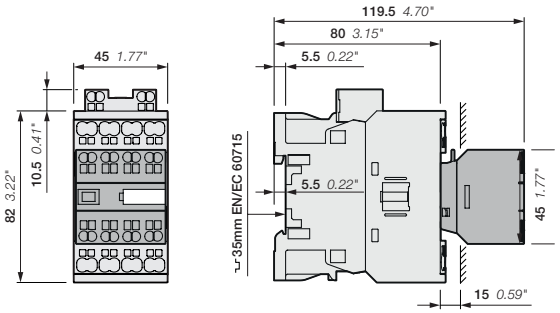
AF26..K, AF30..K, AF38..K



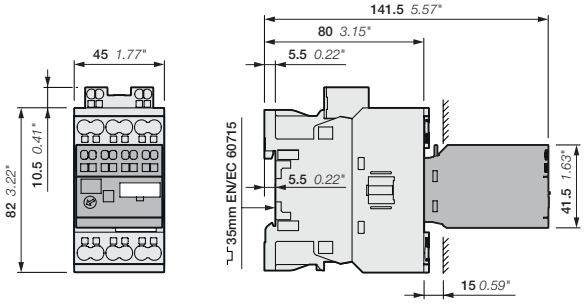
AF26..K, AF30..K, AF38..K
+ CA4..K 1-pole auxiliary contact block



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



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

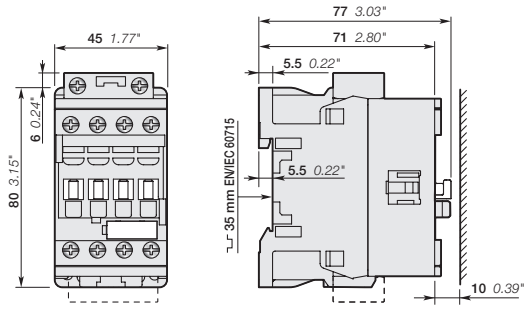


AF26..K, AF30..K, AF38..K
+ TEF4S electronic timer

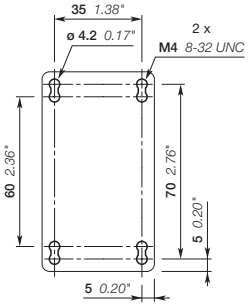
Note: For AF26..K ... AF38..K contactors, lateral distance to grounded component 2 mm 0.08" min
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

Main dimensions mm, inches

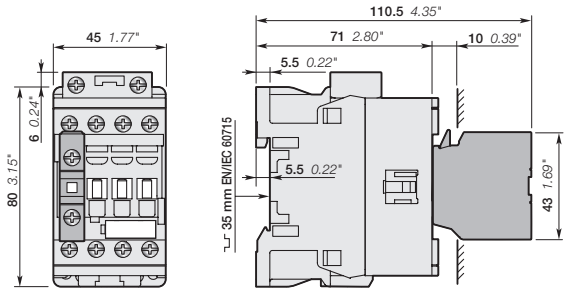
AF09, AF16 4-pole contactors



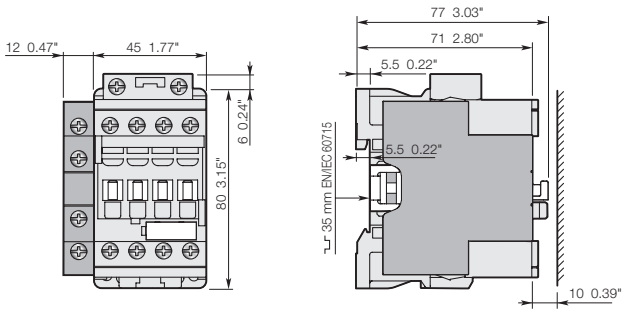
AF09, AF16



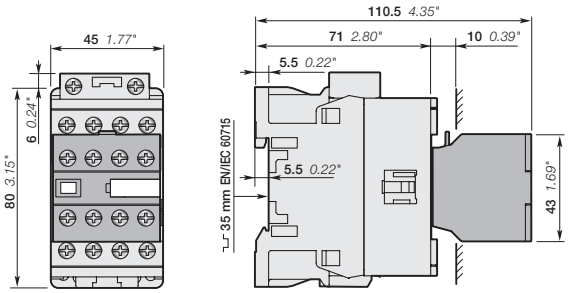
AF09, AF16



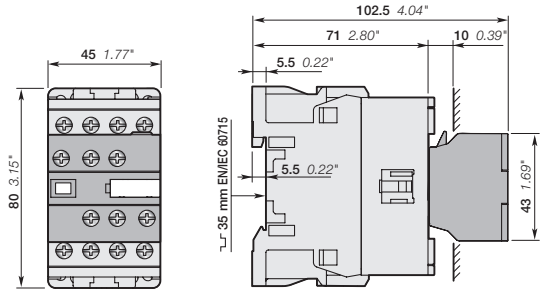
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



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



AF09, AF16
+ CA4 4-pole auxiliary contact block

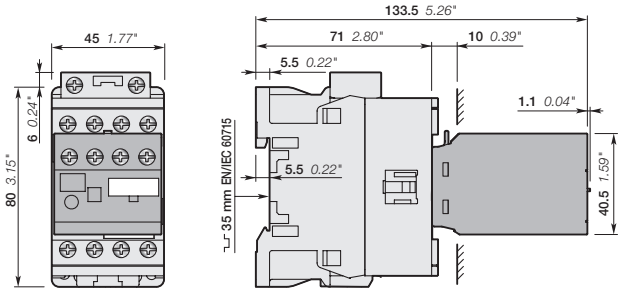


AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

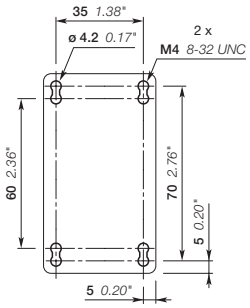
(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches (1)

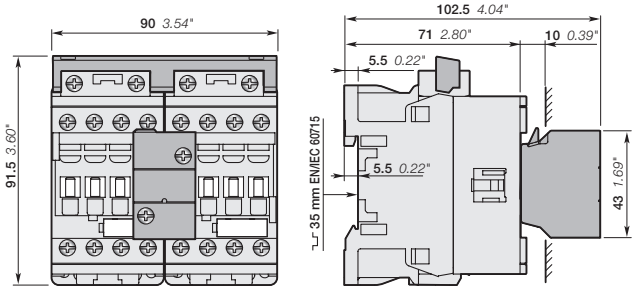
AF09, AF16 4-pole contactors



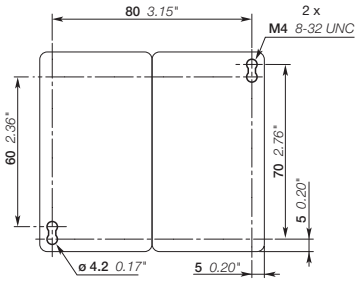
AF09, AF16
+ TEF4 electronic timer



AF09, AF16



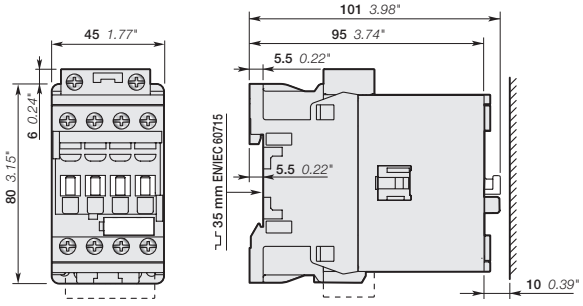
AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set



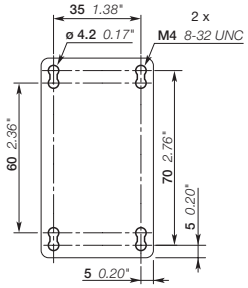
AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

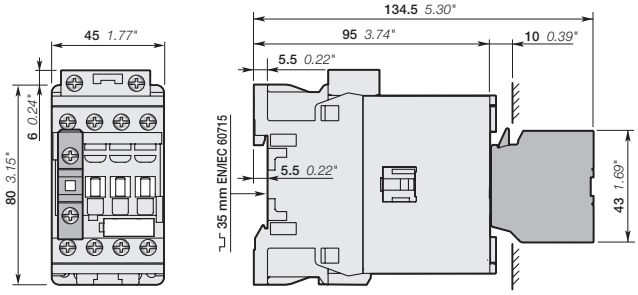
AF26, AF38 4-pole contactors
Dimensions



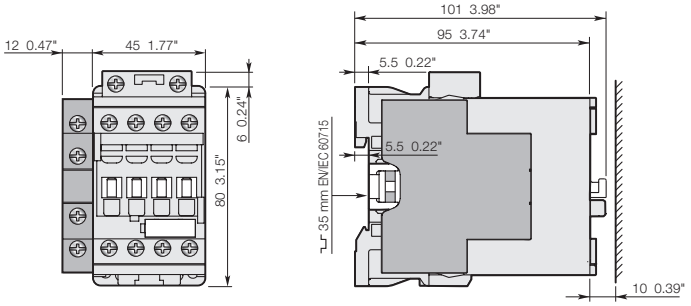
AF26, AF38



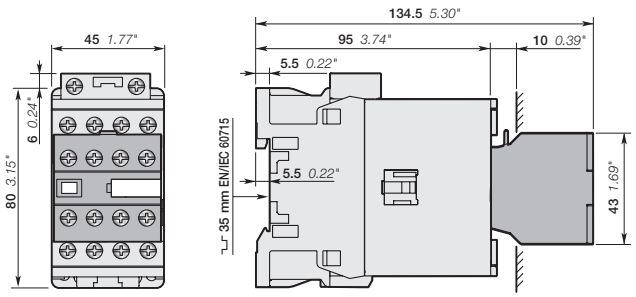
AF26, AF38



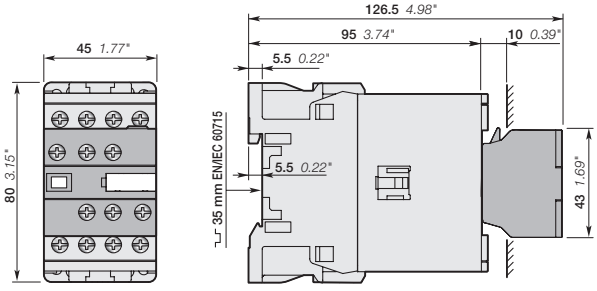
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



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



AF26, AF38
+ CA4 4-pole auxiliary contact block

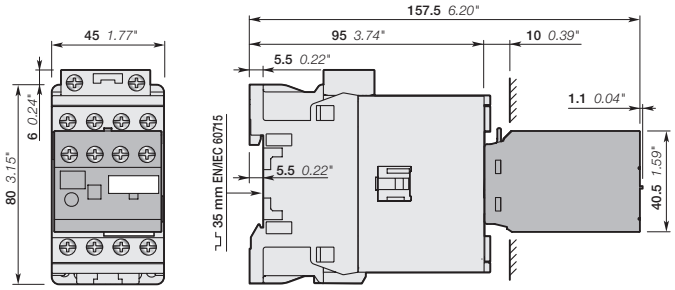


AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

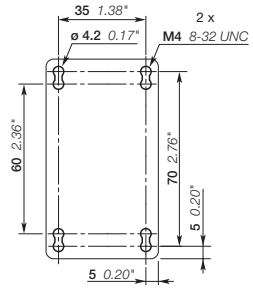
Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches

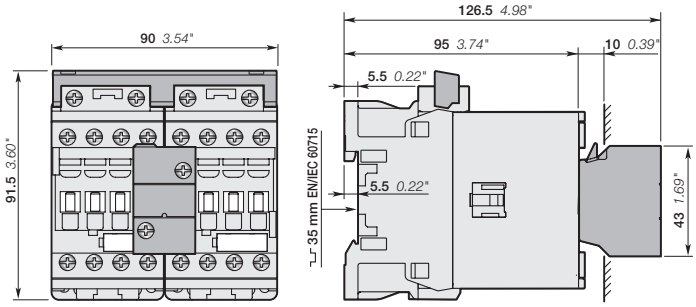
AF26, AF38 4-pole contactors
Dimensions



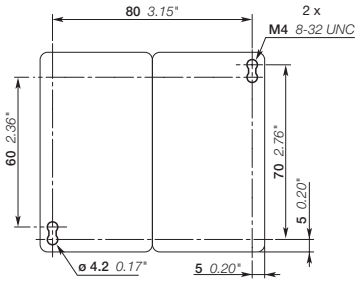
AF26, AF38
+ TEF4 electronic timer



AF26, AF38



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

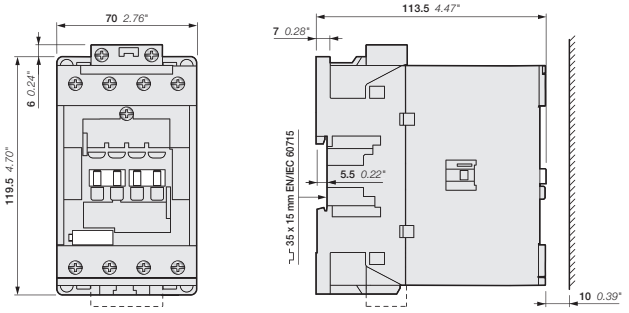


AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

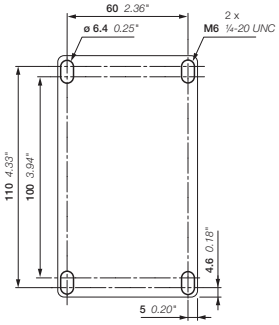
(1) Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.

Main dimensions mm, inches (1)

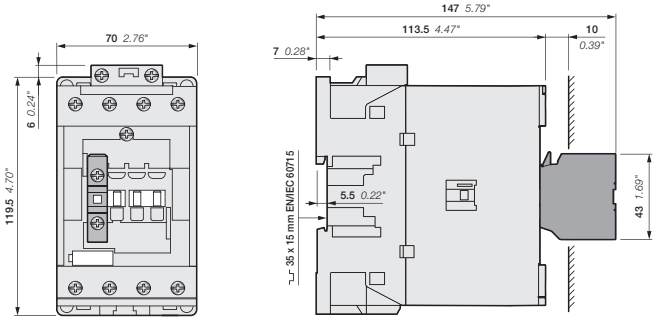
AF40, AF52 4-pole contactors
Dimensions



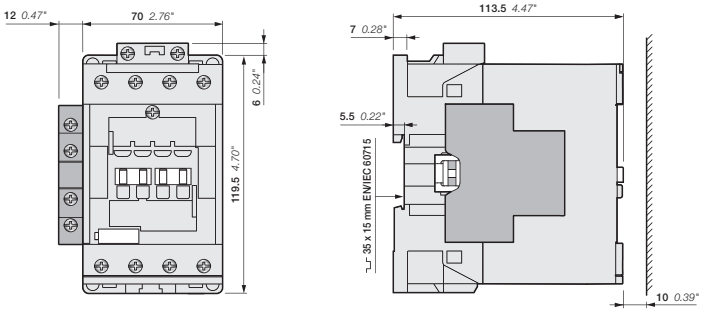
AF40, AF52



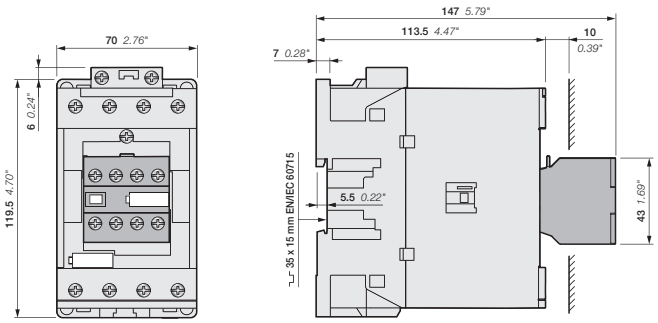
AF40, AF52



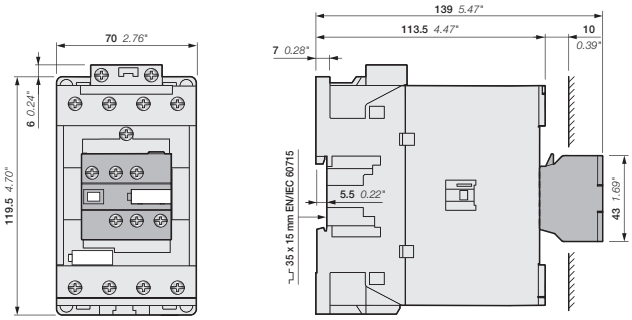
AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block



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



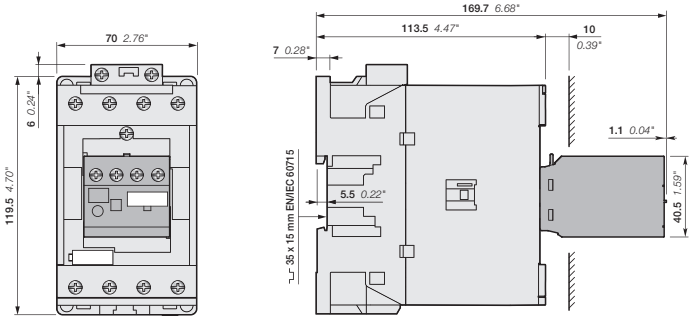
AF40, AF52
+ CA4 4-pole auxiliary contact block



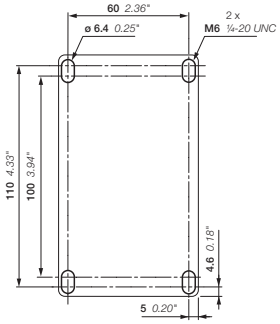
AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

Main dimensions mm, inches

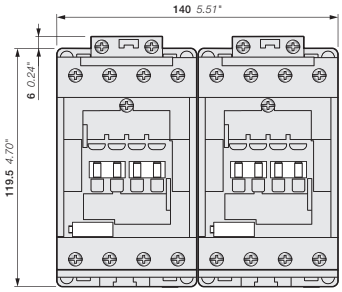
AF40, AF52 4-pole contactors
Dimensions



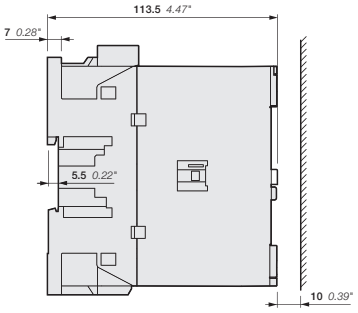
AF40, AF52
+ TEF4 electronic timer

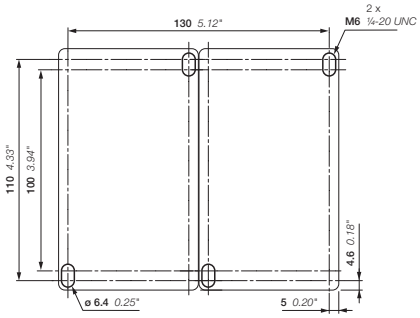


AF40, AF52



AF40, AF52
+ VM96-4 mechanical interlock unit

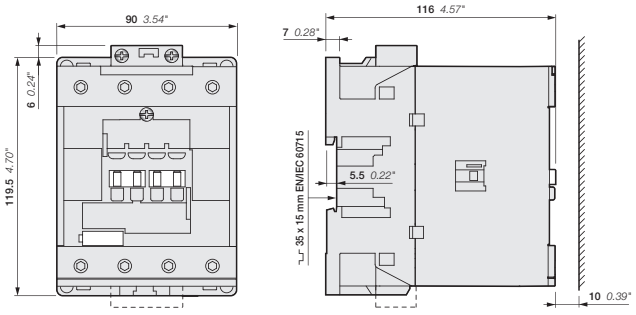




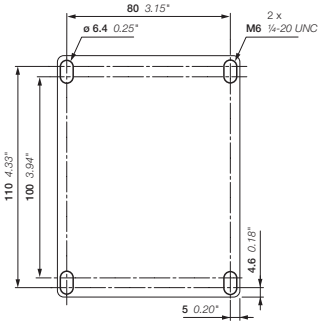
AF40, AF52
+ VM96-4 mechanical interlock unit

Main dimensions mm, inches

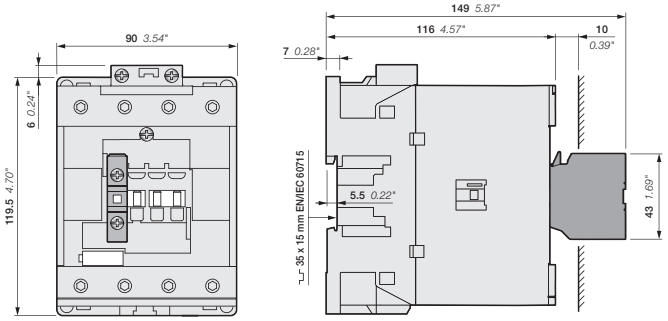
AF80 4-pole contactors
Dimensions



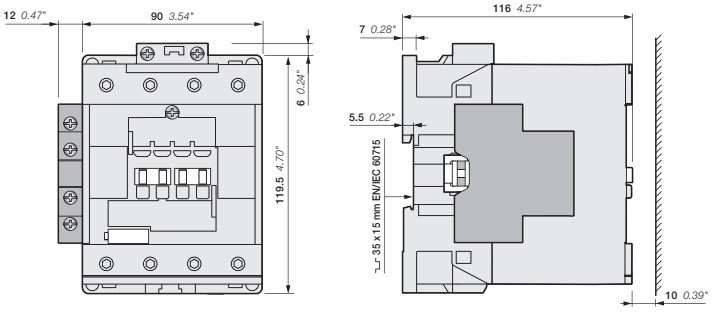
AF80



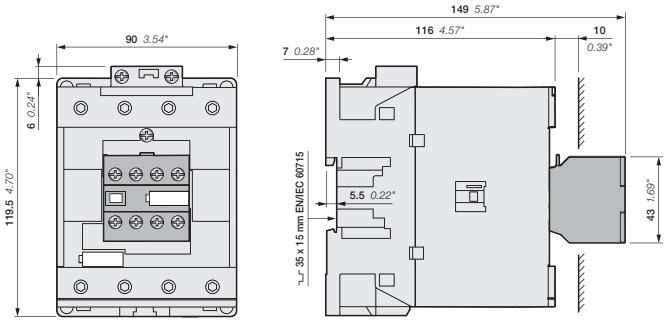
AF80



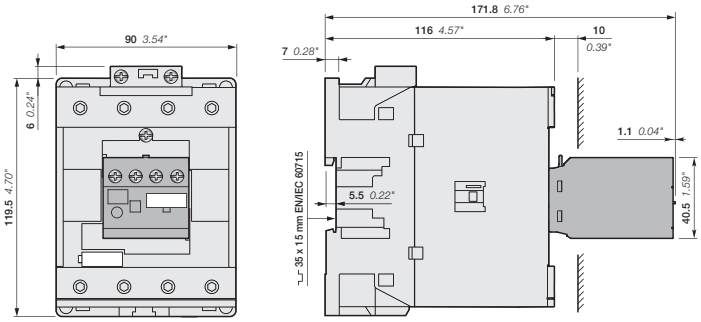
AF80
+ CA4, CC4 1-pole auxiliary contact block



AF80
+ CAL4-11 2-pole auxiliary contact block



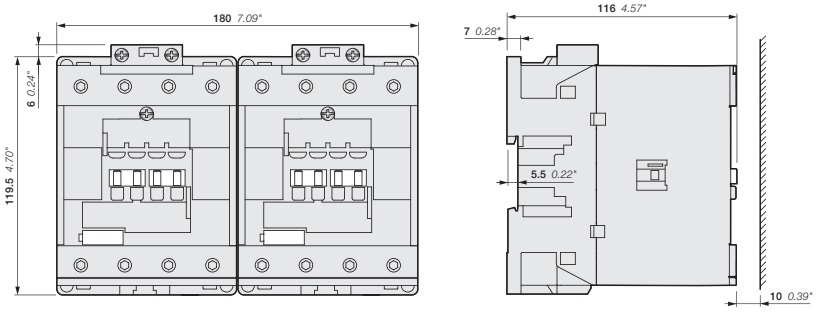
AF80
+ CA4 4-pole auxiliary contact block



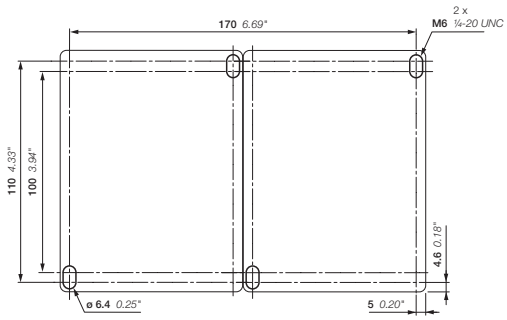
AF80
+ TEF4 Electronic timer

Main dimensions mm, inches

AF80 4-pole contactors
Dimensions



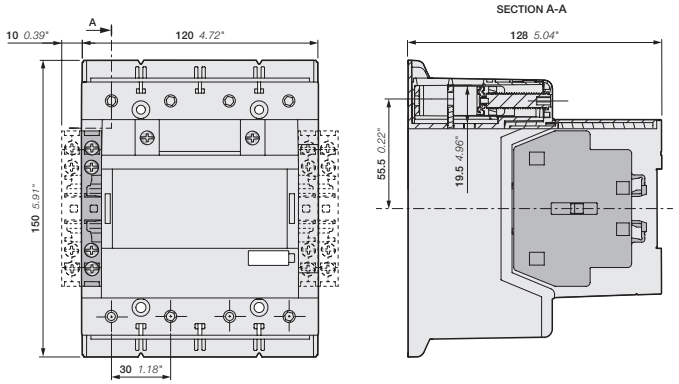
AF80
+ CA4, CC4 1-pole auxiliary contact block



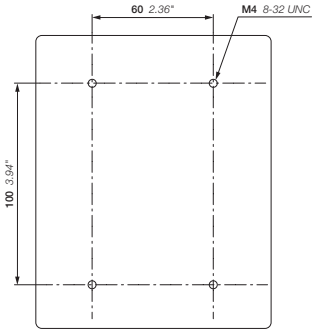
AF80
+ VM96-4 mechanical interlock unit

Main dimensions mm, inches

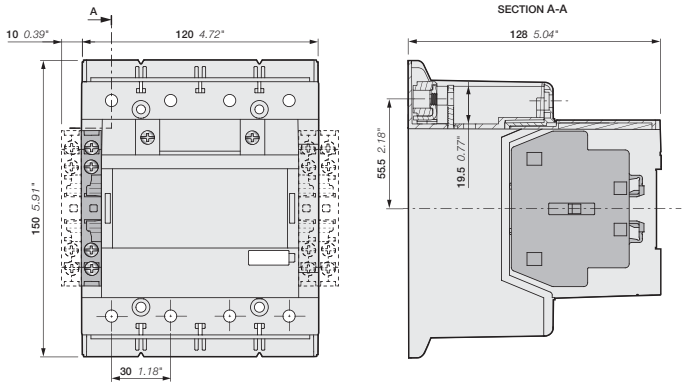
AF116, AF140 4-pole contactors
Dimensions



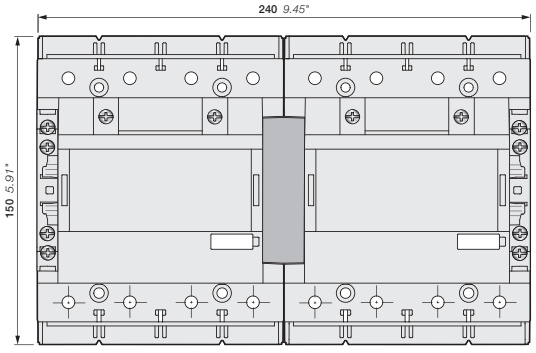
AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11

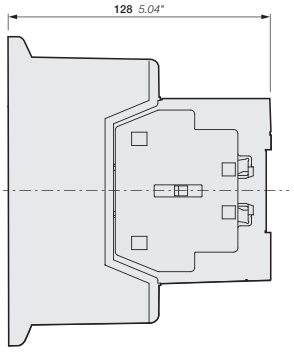


AF116, AF140-40-..(B)

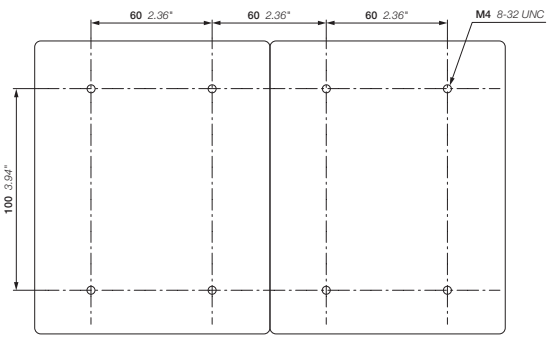


AF116, AF140-40-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11B





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

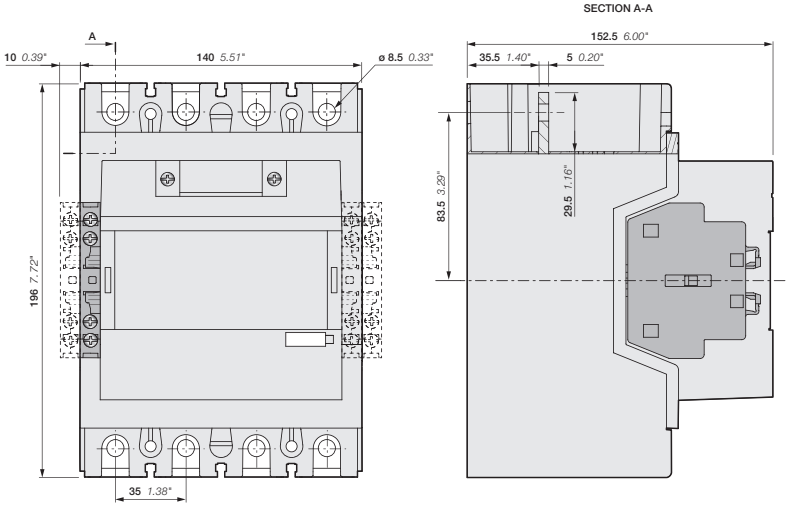


AF116, AF140
+ VM19 mechanical interlocking unit

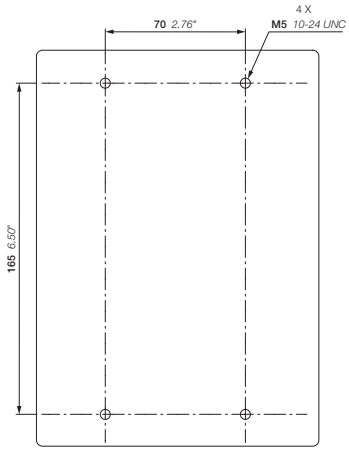
Main dimensions mm, inches

AF190, AF205 4-pole contactors

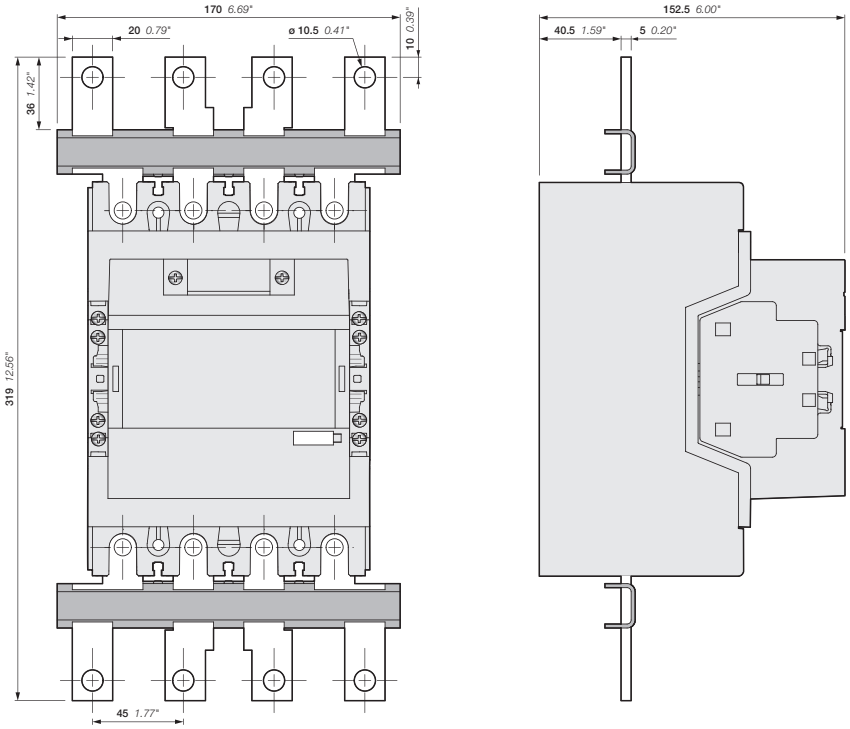
Dimensions



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



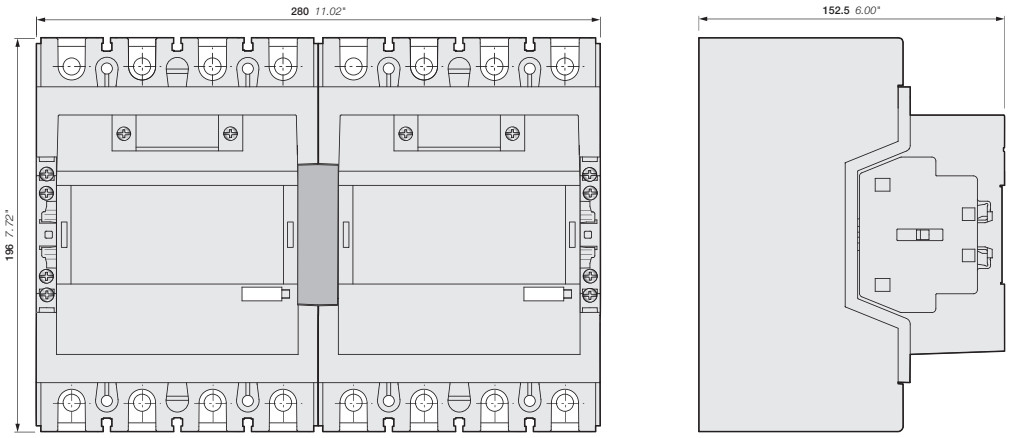
AF190, AF205-40



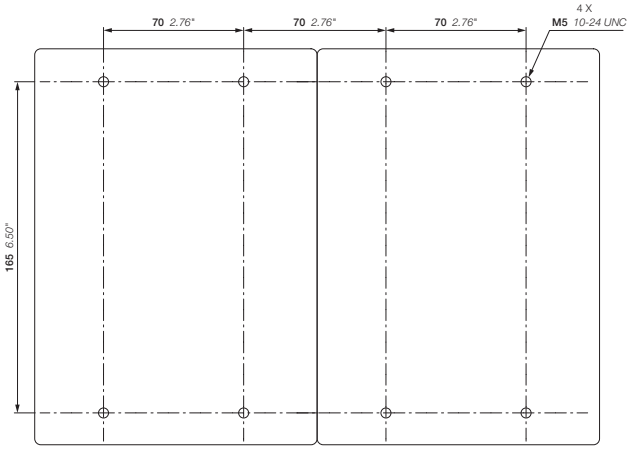
AF190, AF205-40-11
+ LW205-40 terminal enlargement

Main dimensions mm, inches

AF190, AF205 4-pole contactors
Dimensions



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

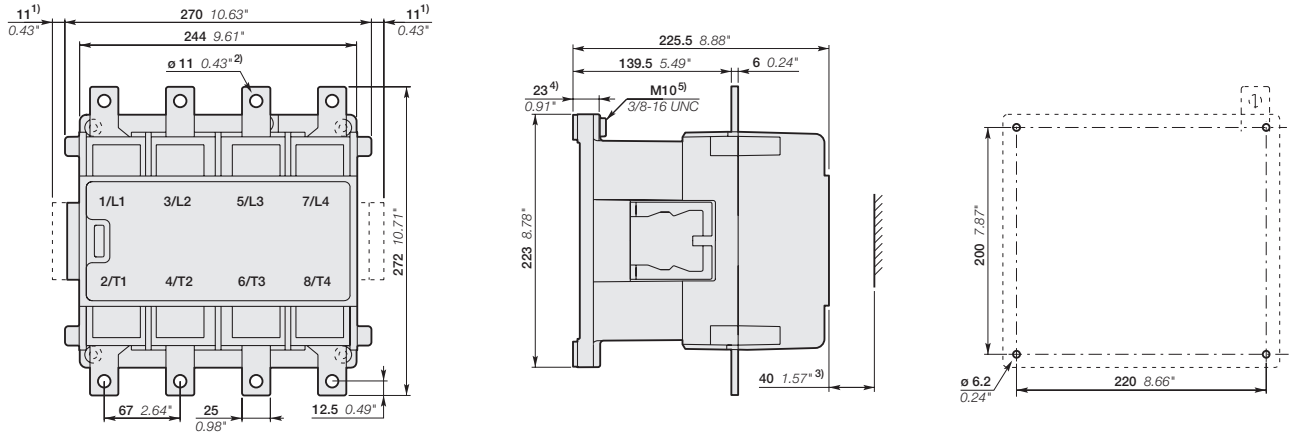


AF190, AF205
+ VM19 mechanical interlocking unit

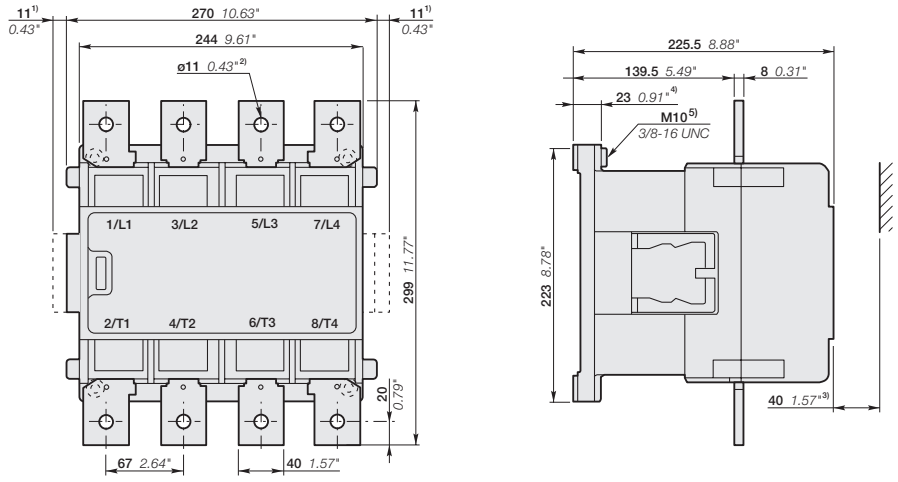
Main dimensions mm, inches

EK550, EK1000 4-pole contactors AC operated

Dimensions

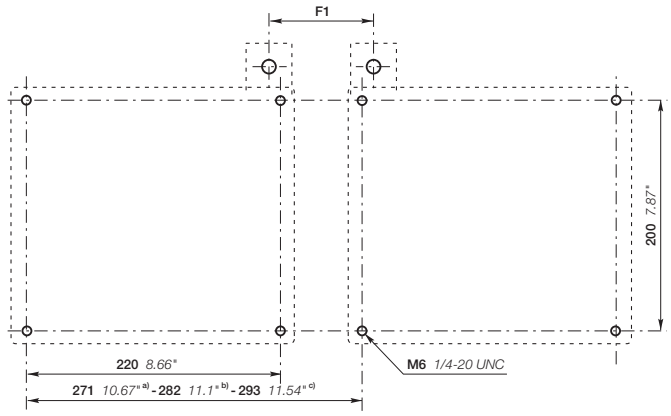


EK550



EK1000

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



EK1000

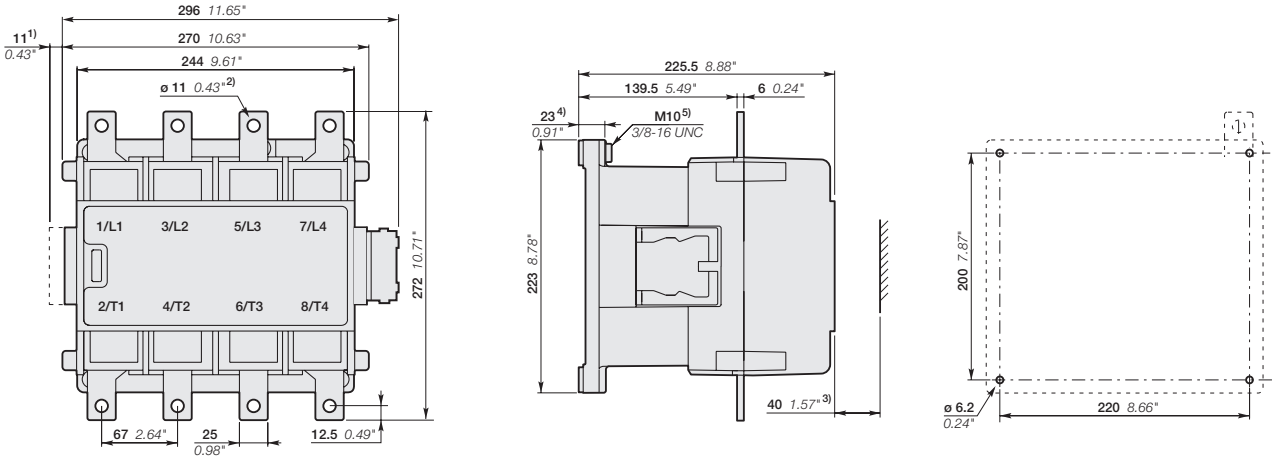
a) Min. dim Makes distance F1 = 70
b) Includes space for three auxiliary contact blocks between the contactors
c) Includes space for four auxiliary contact blocks between the contactors

Main dimensions mm, inches

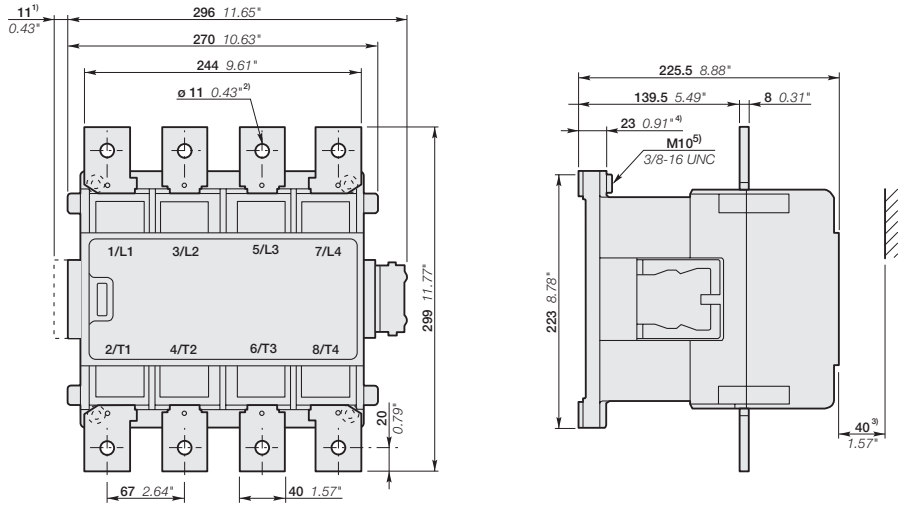
03

EK550, EK1000 4-pole contactors DC operated

Dimensions

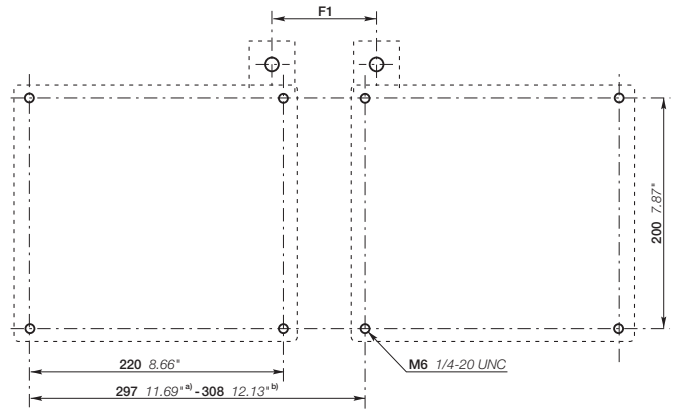


EK550



EK1000

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



EK1000

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

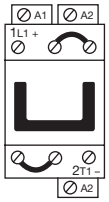
Main dimensions mm, inches

GA75 ... GAF2050 contactors

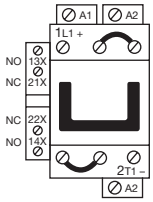
Terminal marking and positioning

GA75 contactors - AC operated

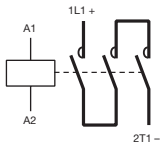
Standard devices without addition of auxiliary contacts



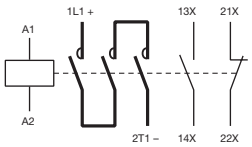
GA75-10-00



GA75-10-11



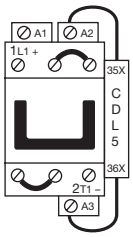
GA75-10-00



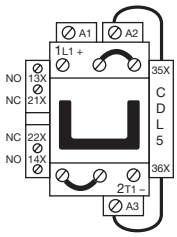
GA75-10-11

GAE75 contactors - DC operated

Standard devices without addition of auxiliary contacts



GAE75-10-00



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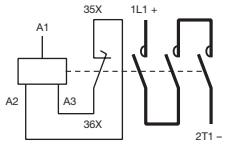
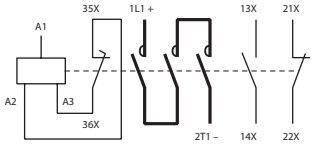
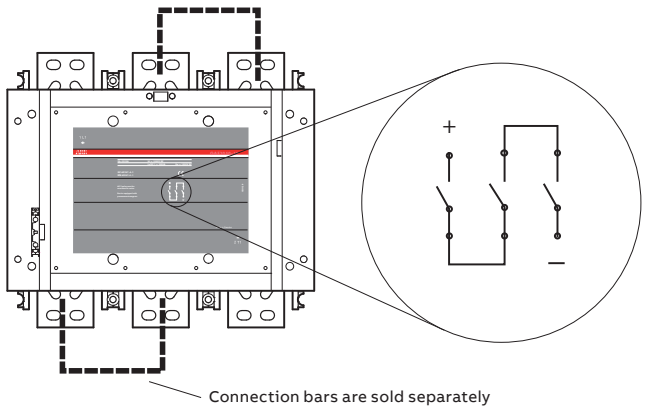


GAE75-10-00

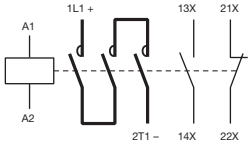


GAE75-10-11

GAF185 ... GAF2050 contactors - AC / DC operated



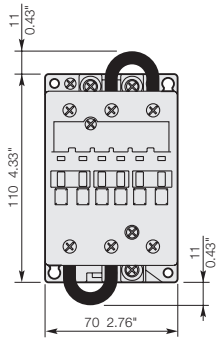
GAF185 ... GAF2050-10-11



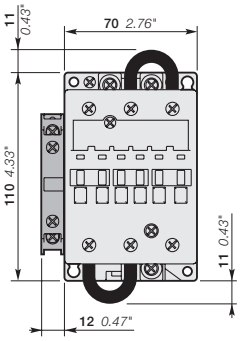
GAF185 ... GAF2050-10-11

GA75, GAE75 1-pole contactor

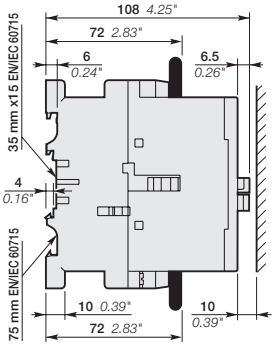
Dimensions

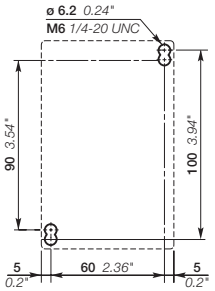


GA75-10-00

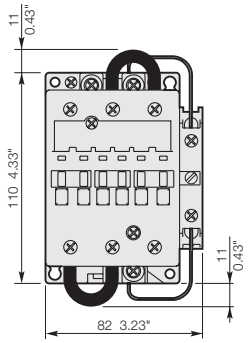


GA75-10-11





GA75



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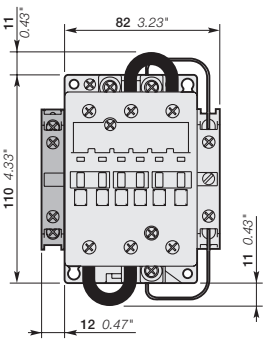
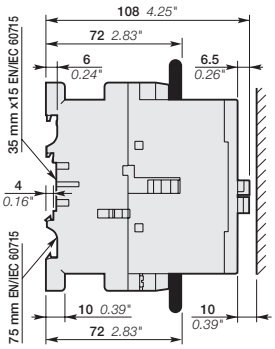
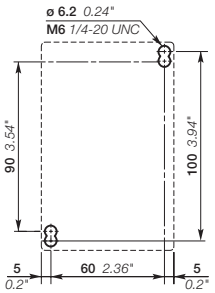


GAE75-10-11



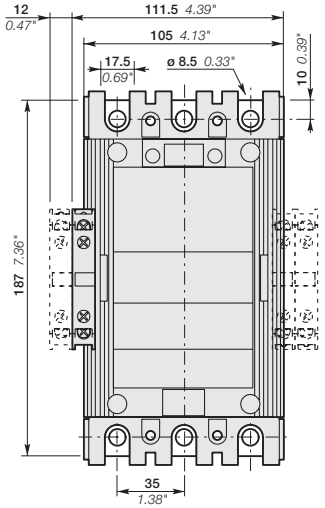


GAE75

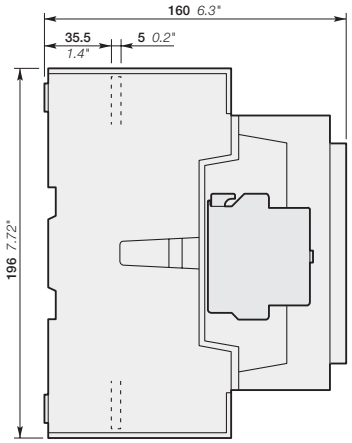
Main dimensions mm, inches

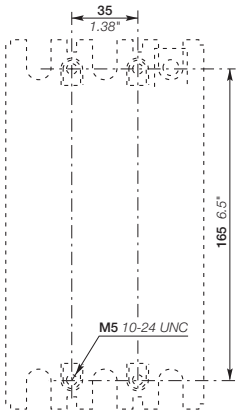
GAF185, GAF300 3-pole contactor

Dimensions

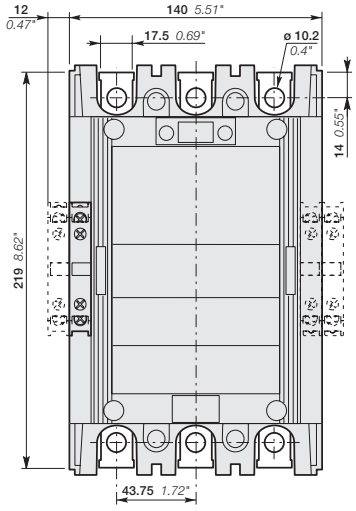


GAF185-30-11

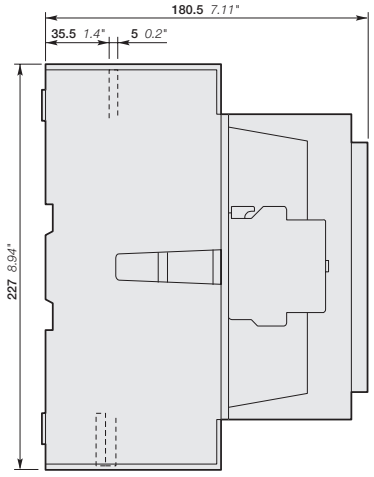


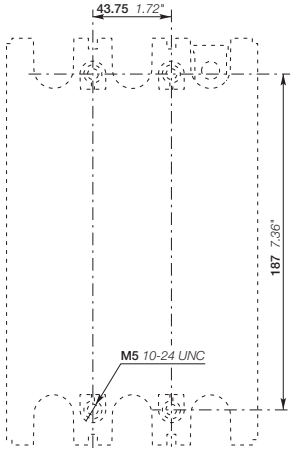


GAF185-30-11



GAF300-30-11



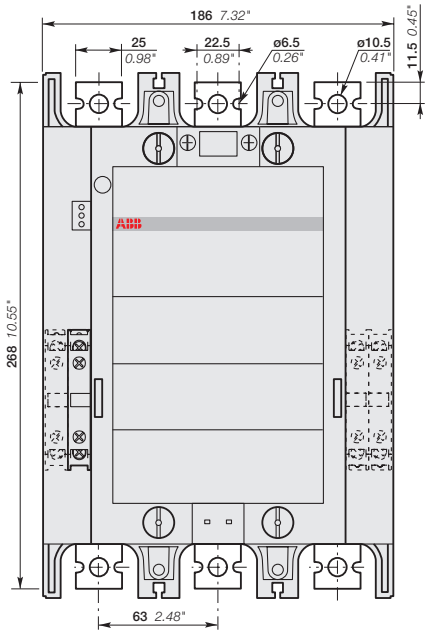


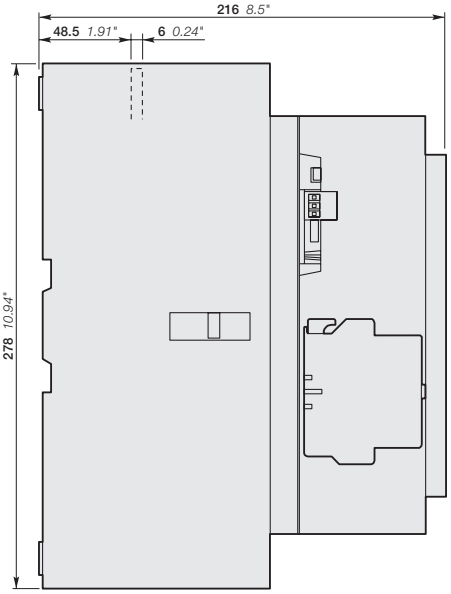
GAF300-30-11

Main dimensions mm, inches

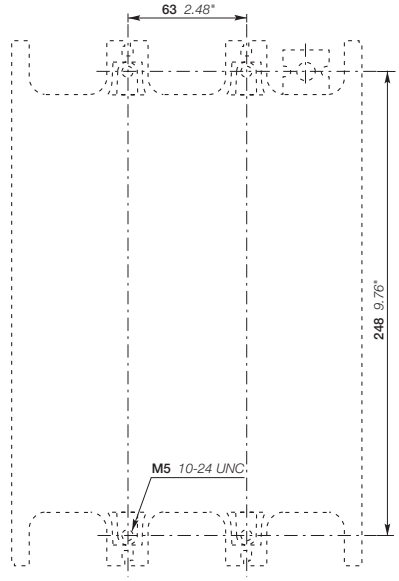
GAF460 3-pole contactor

Dimensions





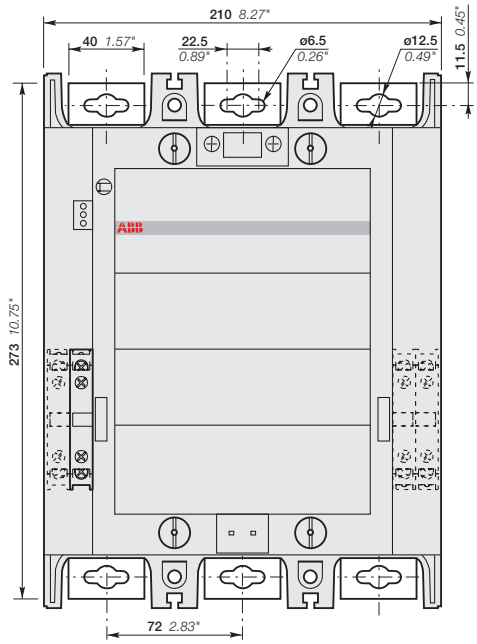
GAF460-30-11



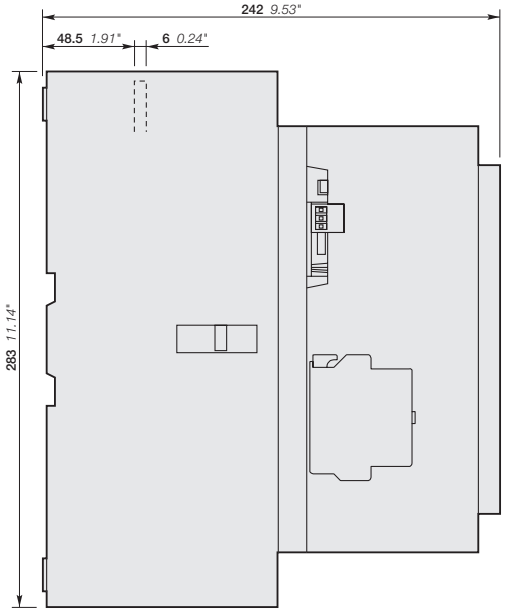
Main dimensions mm, inches

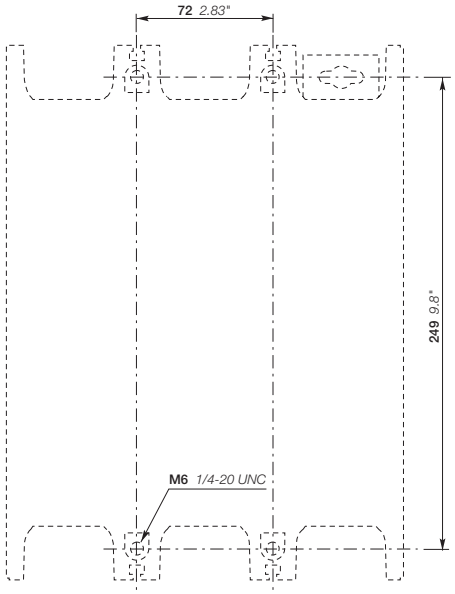
GAF750 3-pole contactor

Dimensions



GAF750-30-11

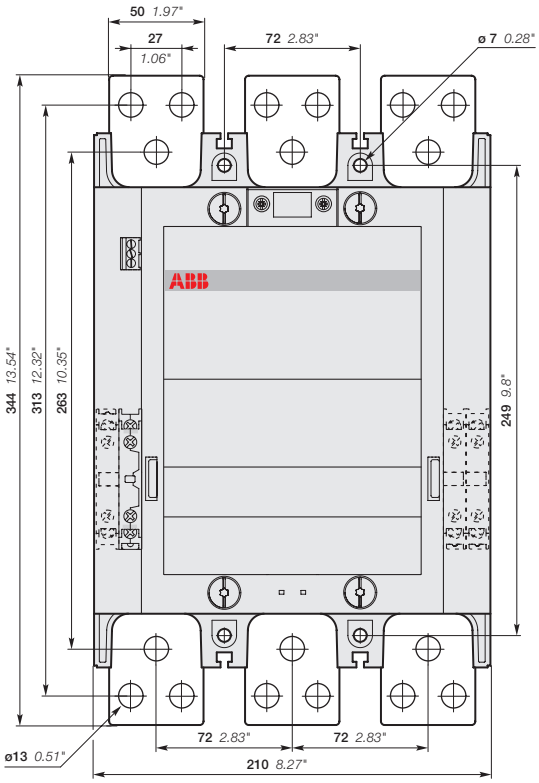


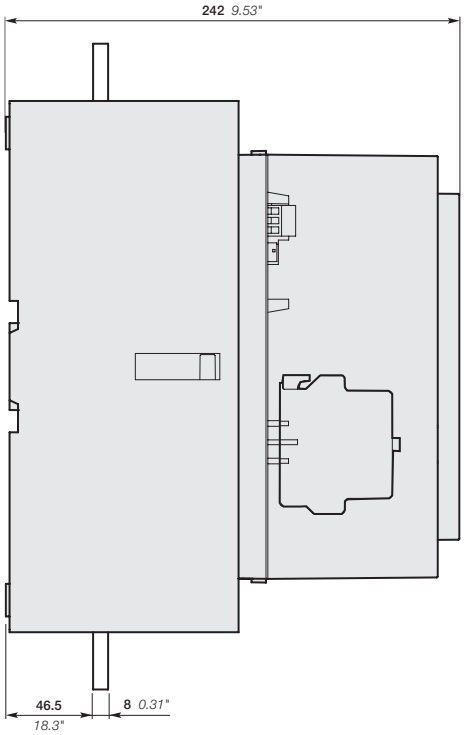


Main dimensions mm, inches

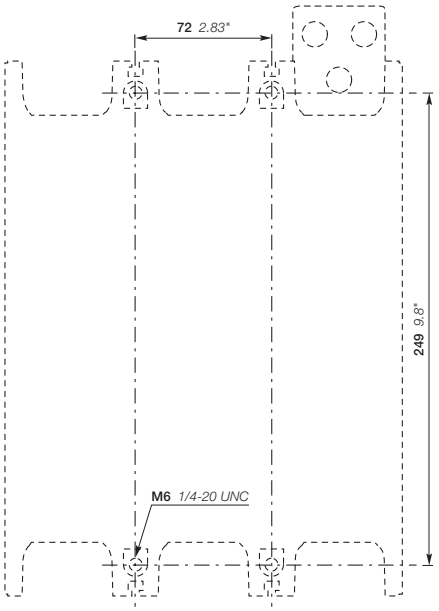
GAF1250 3-pole contactor

Dimensions





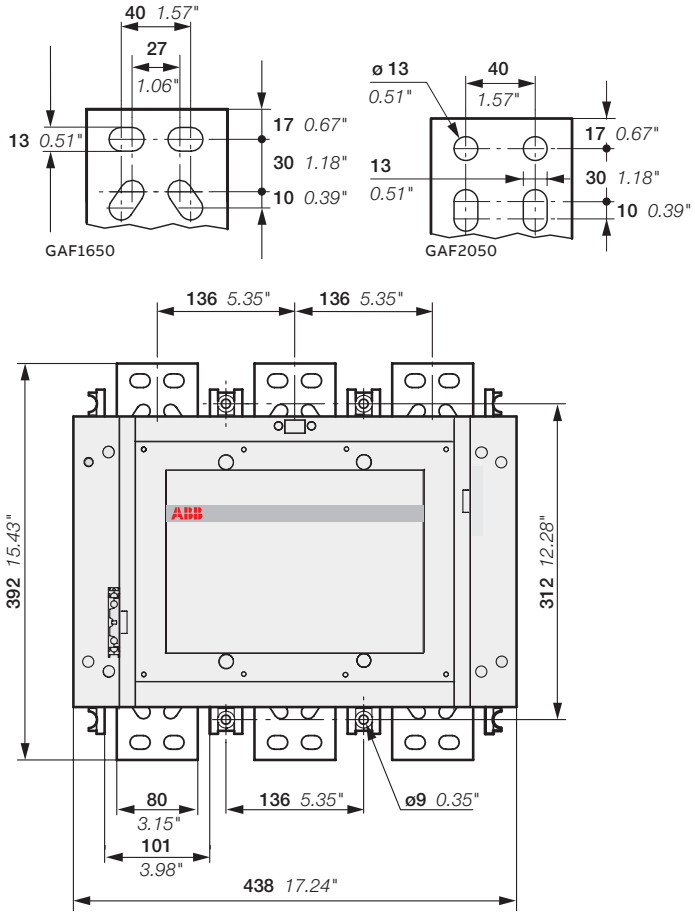
GAF1250-30-11



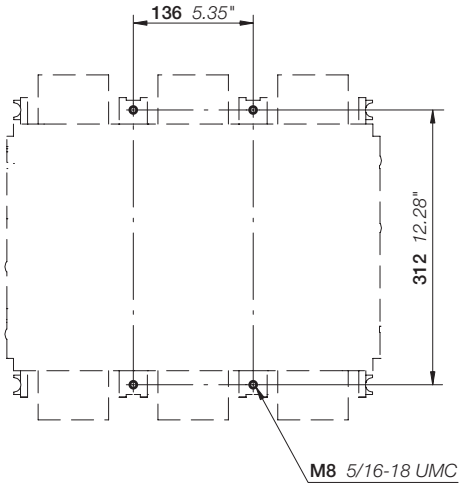
Main dimensions mm, inches

GAF1650, GAF2050 3-pole contactor

Dimensions



GAF1650, GAF2050-30-11

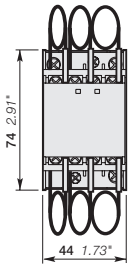


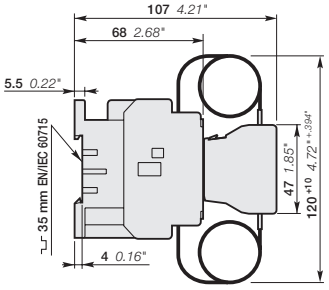
Main dimensions mm, inches

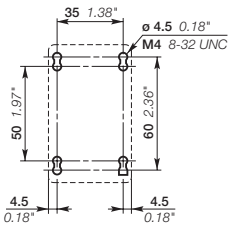
03

UA..RA 3-pole contactors for capacitor switching

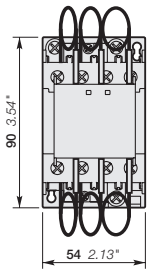
Unlimited peak current Î

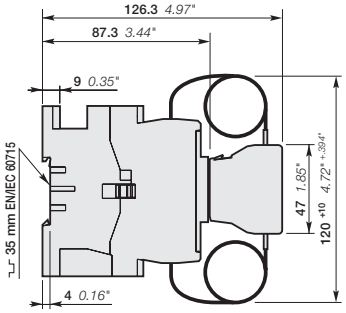


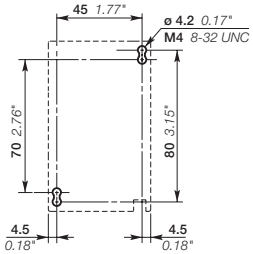




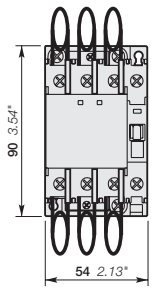
UA16..RA

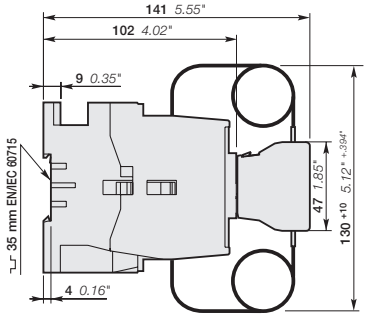


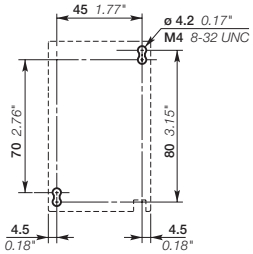




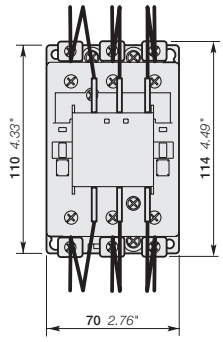
UA26..RA

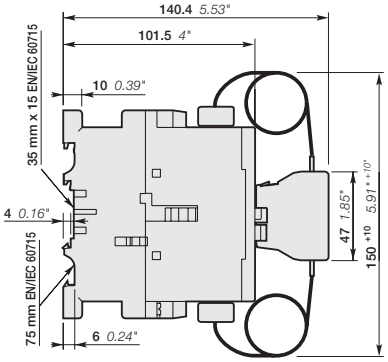


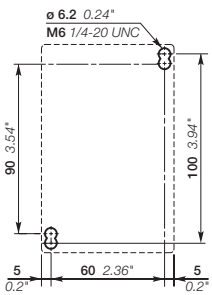




UA30..RA





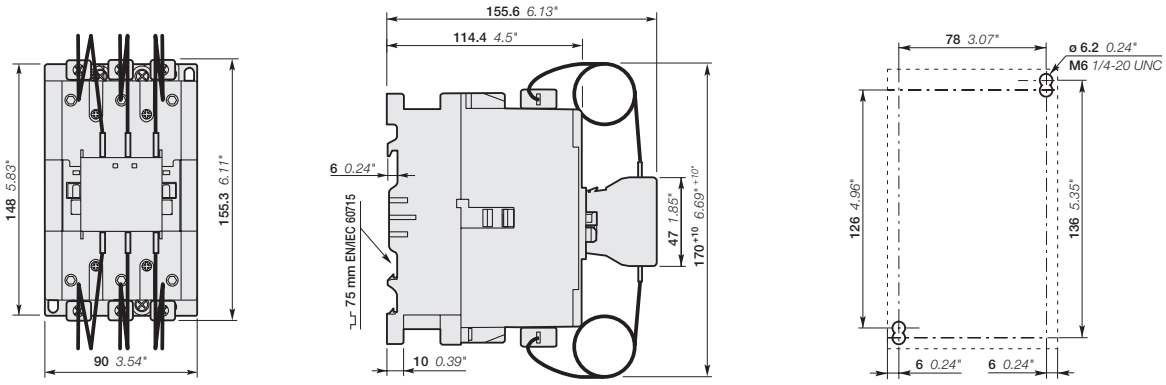


UA50..RA, UA63..RA, UA75..RA

Main dimensions mm, inches

UA..RA 3-pole contactors for capacitor switching

Unlimited peak current Î

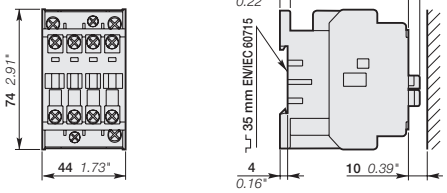


UA95..RA, UA110..RA

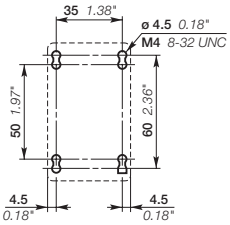
Main dimensions mm, inches

UA.. 3-pole contactors for capacitor switching

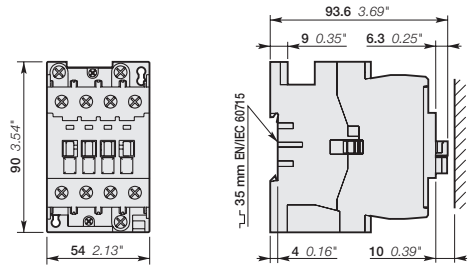
Dimensions



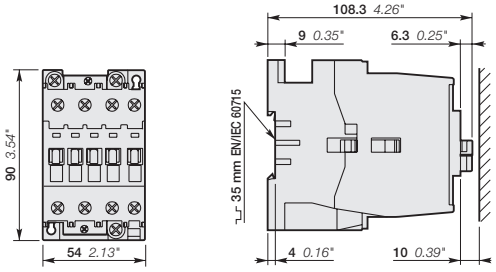
UA16



UA16 drilling plan



UA26



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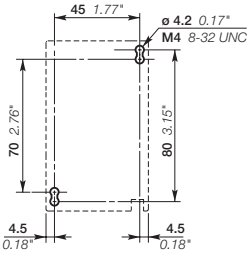
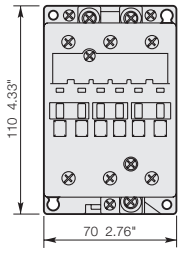
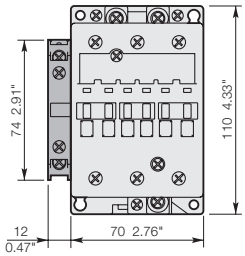


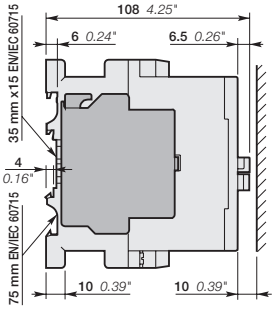
UA26, UA30 drilling plan

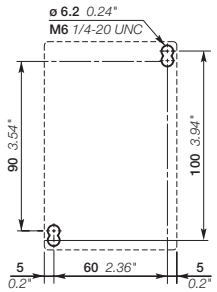


UA50, UA63, UA75-30-00

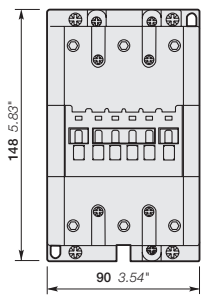


UA50, UA63, UA75-30-11

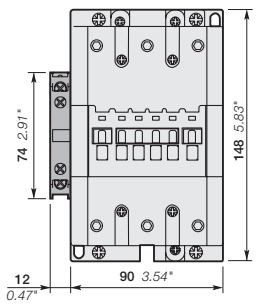




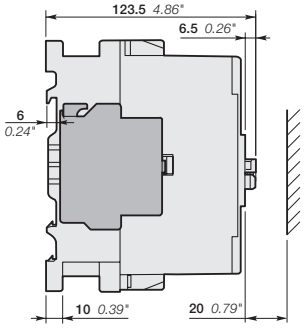
Drilling plan

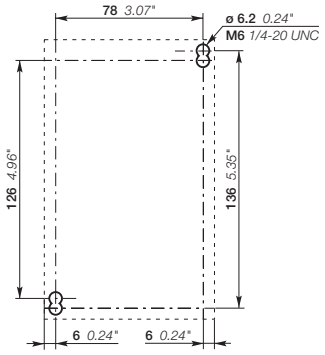


UA95, UA110-30-00



UA95, UA110-30-11

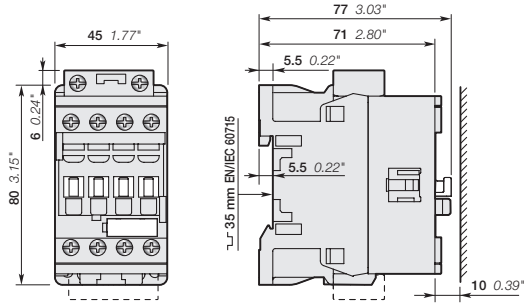




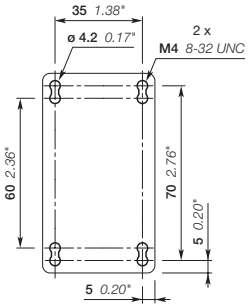
Drilling plan

Main dimensions mm, inches

NF contactor relays
Dimensions



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



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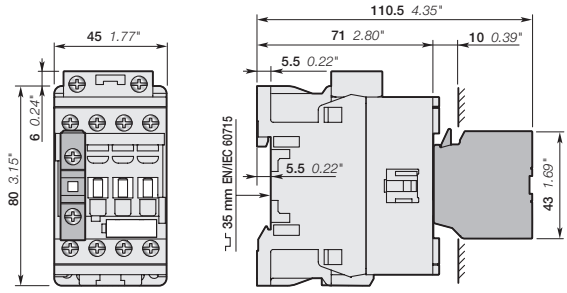
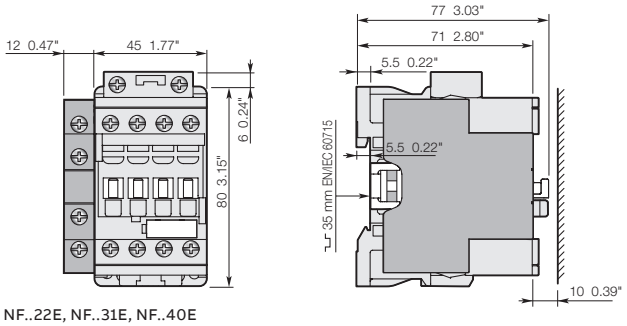
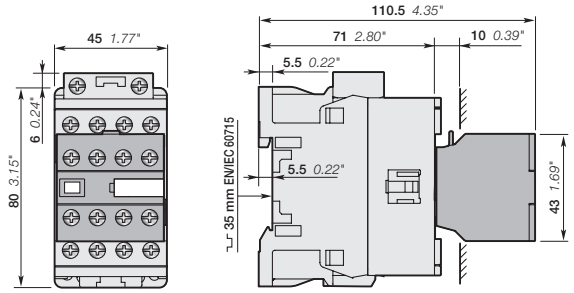


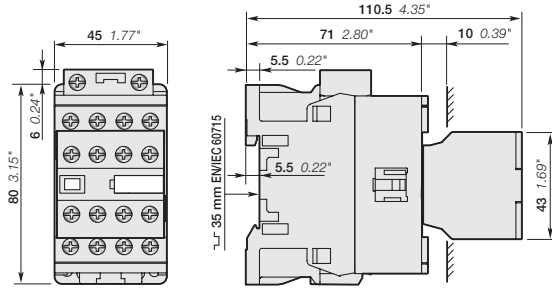
NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



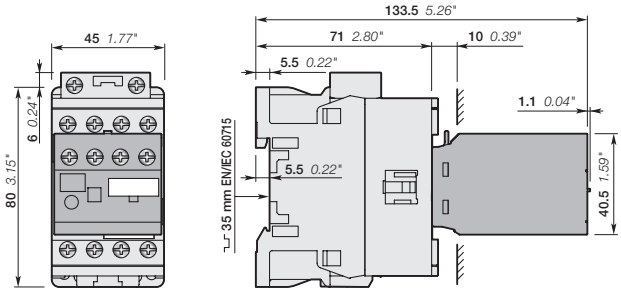
NF..22E, NF..31E, NF..40E
+ CAL4-11 2-pole auxiliary contact block



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



NF..44E, NF..53E, NF..62E, NF..71E, NF..80E, NF..33/11, NF..51/11



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

(1) Note: contactor relay lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor relay (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches (1)

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

www.abb.com/productdetails/**1SBL137001R1310**

Other contactor application data

Contactor selection

3/446 Control of three-phase slip-ring motors
3/448 Autotransformer starters
3/449 Three-phase transformer switching
3/451 Lighting circuit switching
3/460 Parallel connection of main poles
3/461 Temporary or intermittent duty
3/462 Influence of the length of conductors used in contactor control circuit

3/466 **Voltage code table**

3/470 **Questionnaire for product specifications**

Control of three-phase slip-ring motors
Contactor selection

General

Three kinds of contactors are used to control three-phase slip-ring motors: the stator contactor, the acceleration contactor(s) and the rotor short-circuit contactor. Refer to the diagram opposite.
The selection tables below concern complete smooth starting, excluding specific cases, such as: intermittent operation, regenerative current, controlled slipping, etc. for which you need to consult our specialised departments.
The starting and breaking technical data for slip-ring motors are defined in standard IEC 60947-4-1 in the AC-2 utilization category.
The load factor is defined by the equation:

$$\text{L.F. (\%)} = \frac{\text{Operating cycle}}{\text{Cycle time (Operating cycle + Rest cycle)}} \times 100$$

Stator contactor

Closing of the starting current, conditioned by the value of the rotor resistances: it may reach 1.5 to 4 times rated motor operational current.
Breaking of the rated operational current, or of the starting current, with possible regenerative current.
The following table gives the permissible values of the Ie / AC-2 rated operational stator current, as a function of load factor.
Temperature of 60 °C for AF09 ... AF370 and 55 °C for AF400 ... AF1650 maximum near the contactor.
Maximum switching frequency and electrical durability in AC-2 category: see "Technical data".

Contactor types				AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Load factor	15 %	Ie / AC-2	A	18	24	33	52	64	76	79	106	124	154	184
	25 %	Ie / AC-2	A	15	20	31	44	54	65	68	90	111	136	163
	40 %	Ie / AC-2	A	13	17	26	38	46	55	58	77	94	116	139
	60 %	Ie / AC-2	A	11	14	22	31	38	46	48	64	78	96	115
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			A	9	12	18	26	32	38	40	53	65	80	96

Acceleration contactors

The sizing of these contactors is based on the AC-1 rated operational current (see "Technical data") that we recall below for the maximum ambient temperature of 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650.
The table below lists the factors to be applied to the AC-1 current of the contactors in order to obtain the maximal permissible value of the rotor current after contactor closing for star connection. If delta connection is used, increase by 50 % this current. This table takes into account the number of cycles an hour (without inching) and the current flow time per cycle, in the contactor.

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

Contactors		**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**	**AF40**	**AF52**	**AF65**	**AF80**	**AF96**
Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C	A	25	28	30	40	42	42	60	80	90	100	105

Rotor short-circuit contactor

The duty of this contactor is characterized by small closing stresses. The decisive factor is the thermal stress. Delta connection of the contactor is considered (reduce currents by 35 % if star connection is used).
The following table gives the permissible values of the rated operational rotor current, as a function of load factor.
Temperature: 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650 maximum near the contactor.

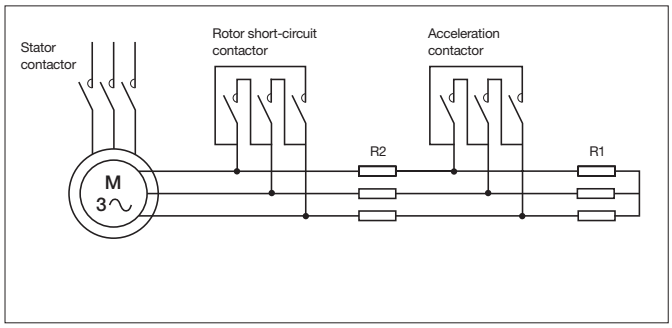
Contactor types				**AF09**	**AF12**	**AF16**	**AF26**	**AF30**	**AF38**	**AF40**	**AF52**	**AF65**	**AF80**	**AF96**
Load factor	15 %	Ie	A	63	71	76	102	107	107	152	203	228	254	266
	25 %	Ie	A	57	64	69	92	96	96	137	183	206	229	241
	40 %	Ie	A	49	55	59	78	82	82	117	157	176	196	206
	60 %	Ie	A	43	48	51	68	72	72	103	137	154	171	180
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			A	36	41	44	58	61	61	87	116	131	145	152
Rated operational rotor voltage:														
- Maximum values for starting and breaking			V	1380 (1600 in star connection)									2000 (2300 in star connection)	
- Maximum values for starting and electrical braking			V	690 (730 in star connection)									690 (730 in star connection)	

Control of three-phase slip-ring motors

Contactor selection

Example of a three-stroke starter

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



Contactor types				AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Load factor	15 %	Ie / AC-2	A	220	335	360	425	530	625	750	850	950	1150	1500	1720	2100
	25 %	Ie / AC-2	A	185	270	300	350	440	515	620	680	780	975	1250	1430	1750
	40 %	Ie / AC-2	A	150	215	250	300	370	430	515	580	650	800	1050	1200	1470
	60 %	Ie / AC-2	A	135	180	220	255	315	370	430	480	550	700	900	1030	1250
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			A	116	140	190	210	265	305	370	400	460	580	750	860	1050

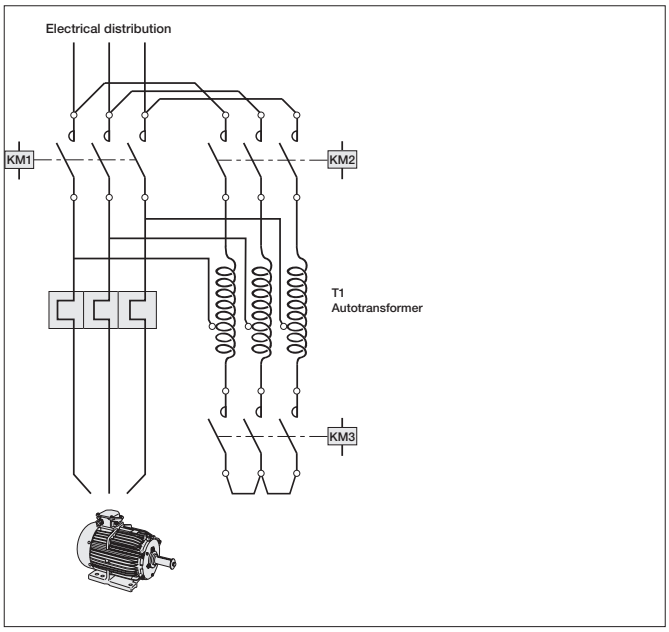
Contactors		AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C (AF116-AF370) ≤ 55 °C (AF400-AF1650)	A	145	175	250	300	350	400	500	500	600	700	800	1150	1450

Contactor types				AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Load factor	15 %	Ie	A	330	540	580	750	830	950	1050	1200	1400	1650	1900	2400	2800
	25 %	Ie	A	300	490	530	650	725	830	915	1050	1250	1450	1650	2100	2500
	40 %	Ie	A	260	425	460	575	630	720	800	950	1100	1300	1450	1850	2200
	60 %	Ie	A	230	375	400	500	575	650	700	810	975	1150	1300	1650	1950
S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking			A	200	300	350	380	480	550	640	700	840	980	1150	1500	1800
Rated operational rotor voltage:																
- Maximum values for starting and breaking			V	2200 (2600 in star connection)				3000 (3600 in star connection)								
- Maximum values for starting and electrical braking			V	690 (730 in star connection)												

Autotransformer starters
Contactor selection

General

An autotransformer starter allows to start a squirel cage motor with a reduced starting current due to the reduced voltage within the accelerating duration.
Unlike the star-delta wiring, this autotransformer starting method needs three wires and three terminals on the motor.
At the starting period, the motor is wired to the autotransformer taps: the star contactor "KM3" and the autotransformer contactor "KM2" are closed, the motor is under reduced voltage. Consequently, the torque is reduced as the square of the applied voltage. The autotransformers are generally equipped of three taps at each phase in order to adapt the starting parameters to the field requirements.
When the motor reaches 80...95 % of its nominal speed, the star contactor opens. Then, the line contactor "KM1" is making and the autotransformer contactor is opening. This starting process is done without any network interruption.



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

kW motor ratings 50/60 Hz					Contactors					
					KM1	KM2				KM3
					line	autotransformer taps:				star
220/240 V	380/400 V	415 V	440 V	690 V		90 %	80 %	70 %	60 %	
4	7.5	7.5	7.5	9	AF16	AF16	AF12	AF09	AF09	AF09
6.5	11	11	11	15	AF26	AF26	AF16	AF16	AF09	AF16
11	18.5	18.5	18.5	22	AF38	AF30	AF26	AF26	AF16	AF26
15	22	30	30	30	AF52	AF52	AF38	AF30	AF26	AF30
18.5	30	37	37	37	AF65	AF52	AF40	AF30	AF26	AF38
22	37	45	45	45	AF80	AF65	AF52	AF40	AF30	AF40
25	45	55	55	55	AF96	AF80	AF65	AF52	AF38	AF52
30	55	55	75	55	AF116	AF116	AF80	AF65	AF52	AF65
37	75	75	90	75	AF140	AF140	AF96	AF80	AF65	AF65
45	75	75	90	90	AF146	AF140	AF96	AF80	AF65	AF65
55	90	90	110	132	AF190	AF146	AF116	AF96	AF65	AF80
55	110	110	132	160	AF205	AF190	AF140	AF116	AF80	AF96
75	132	132	160	200	AF265	AF265	AF190	AF140	AF96	AF116
90	160	160	160	250	AF305	AF265	AF205	AF190	AF116	AF140
110	200	200	200	315	AF370	AF370	AF265	AF190	AF140	AF190
132	250	250	250	355	AF460	AF400	AF305	AF265	AF190	AF205
160	315	355	355	500	AF580	AF580	AF400	AF305	AF205	AF305
220	400	425	450	600	AF750	AF750	AF580	AF400	AF305	AF400
257	475	500	560	900	AF1350	AF750	AF580	AF460	AF400	AF460
315	560	600	670	1000	AF1650	AF1350	AF750	AF580	AF460	AF580

Three-phase transformer switching

Contactor selection

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

General

Switching the primary of 3-phase transformers, on energization of the transformer, is characterized by high current peaks due to the magnetization phenomena.

Selection Table

The tables below show the operational ratings for:

- current peaks up to 20 to 30 times the transformer nominal current
- maximum switching frequency of 60 operating cycles per hour
- air ambient temperature ≤ 40 °C.

AC / DC operated contactors		AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
Operational power at Ue: 50/60 Hz - according to AC-6a												
220 / 240 V	kVA	4	5	6	10	13	14	15	19	21	23	25
380 / 400 V	kVA	7	8	10	17	22	25	26	33	36	39	44
415 / 440 V	kVA	8	9	11	18	24	27	28.5	36	40	43	48
500 V	kVA	9	11	13	22	28	32	34.5	43	48	52	57
660 / 690 V	kVA	12.5	14	18	29	37	43	45.5	57	64	68	75
Max. permissible Îpeak	A	350	400	500	800	1000	1200	1250	1550	1750	1900	2100

AC / DC operated contactors		AF116	AF140	AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1350	AF1650
Operational power at Ue: 50/60 Hz - according to AC-6a														
220 / 240 V	kVA	26	30	42	45	55	63	76	95	100	110	130	160	190
380 / 400 V	kVA	46	52	73	75	94	108	132	165	170	190	240	275	350
415 / 440 V	kVA	50	57	80	80	103	118	144	180	190	210	270	325	390
500 V	kVA	60	68	96	100	124	143	173	220	230	250	320	–	–
660 / 690 V	kVA	80	90	127	130	164	188	228	290	300	310	410	–	–
Max. permissible Îpeak	A	2100	2400	3300	3500	4300	4900	6000	7700	8400	9300	12000	–	–

Notes

Lighting circuit switching
Contactor selection

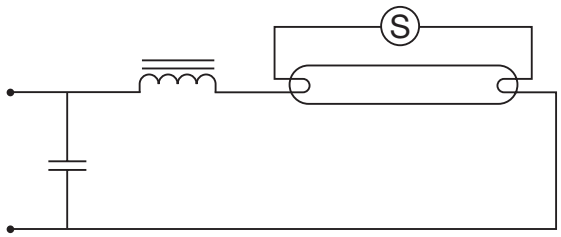
General

Contactor selection criteria for control of lighting circuits are as follows:
- type, power rating and number of lamps
- connection mode
- current values on closing and in steady state
- power factor
- presence or not of correction capacitors.

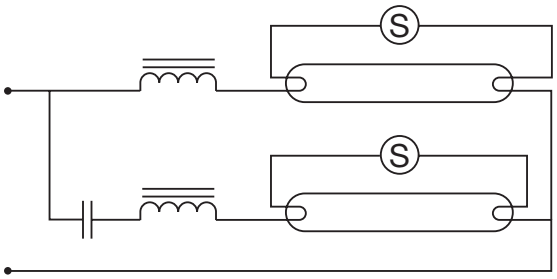
Lighting circuits

In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. gG fuses or modular circuit-breakers will be chosen for this purpose.
The lamps have very specific technical data, according to their construction type.
- Incandescent lamps have a very high current on closing: more than 15 times nominal current.
  They do not introduce a large phase displacement between current and voltage
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Individual compensation
(parallel compensation)



Serial compensation in dual mounting



Selection of contactors

The following tables indicate, for each contactor type, the maximum permissible number of lamps per phase. Air temperature, near the contactor, must be limited to 60 °C. Numbers are given for a 230 V voltage distributed between phase and neutral: single-phase (phase + neutral) or three-phase (3 phases + neutral) distribution, lamps are wired in star connection. In the case of a three-phase supply without neutral, 230 V phase-to-phase, the permissible number of lamps per phase will be that given in the tables multiplied by 0.58.

Example:
120 x 100 W / 230 V incandescent lamps - 400 V three-phase network with distributed neutral.
Calculate the number of lamps per phase: 120 : 3 = 40. On the 100 W line of the incandescent lamp table, contactor AF09 is limited to 38 lamps per phase, you must thus select contactor AF12 which accepts up to 43 lamps per phase.

Lighting circuit switching

Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	64	72	77	103	129	148	177	207	233	259	277	430	519	541
100	0.45	-	38	43	46	62	77	89	106	124	140	155	166	258	311	324
200	0.91	-	19	21	23	30	38	44	52	61	69	77	82	127	154	160
300	1.37	-	12	14	15	20	25	29	35	41	46	51	54	85	102	107
500	2.28	-	7	8	9	12	15	17	21	24	27	30	33	51	61	64
1000	4.55	-	3	4	4	6	7	8	10	12	13	15	16	25	31	32
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	46	51	55	73	84	92	126	147	157	184	210	305	368	384
40	0.45	-	38	43	46	62	71	77	106	124	133	155	177	258	311	324
65	0.70	-	25	27	30	40	45	50	68	80	85	100	114	166	200	209
80	0.80	-	21	24	26	35	40	43	60	70	75	87	100	145	175	183
100	1.15	-	15	16	18	24	27	30	41	48	52	60	69	101	122	127
110	1.20	-	14	16	17	23	26	29	40	46	50	58	66	97	117	122
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	53	53	53	155	168	176	266	309	325	388	444	644	778	811
40	0.26	5	53	53	53	107	123	134	184	215	230	269	307	446	538	562
65	0.42	7	37	37	37	66	76	83	114	133	142	166	190	276	333	348
80	0.52	7	33	37	37	53	61	67	92	107	115	134	153	223	269	281
100	0.65	16	16	16	16	43	49	53	73	86	92	107	123	178	215	225
110	0.70	18	14	14	14	40	45	49	68	80	85	100	114	166	200	209
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	62	69	75	100	114	125	171	200	214	250	285	414	500	521
2 x 40	2 x 0.25	-	35	39	42	56	64	70	96	112	120	140	160	232	280	292
2 x 65	2 x 0.40	-	21	24	26	35	40	43	60	70	75	87	100	145	175	183
2 x 80	2 x 0.48	-	18	20	21	29	33	36	50	58	62	72	83	121	146	152
2 x 100	2 x 0.60	-	14	16	17	23	26	29	40	46	50	58	66	97	117	122
2 x 110	2 x 0.65	-	13	15	16	21	24	26	36	43	46	53	61	89	108	112
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	388	433	466	622	711	777	1066	1244	1333	1555	1777	2578	3111	3244
7	0.075	-	233	260	280	373	426	466	640	746	800	933	1066	1547	1867	1947
11	0.105	-	166	185	200	266	304	333	457	533	571	666	761	1105	1333	1390
15	0.135	-	129	144	155	207	237	259	355	414	444	518	592	859	1037	1081
20	0.160	-	109	121	131	175	200	218	300	350	375	437	500	725	875	913
23	0.180	-	97	108	116	155	177	194	266	311	333	388	444	644	778	811

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	704	759	981	1130	1370	1481	1704	2148	2778	3009	3250	3972	4935	6380
100	0.45	-	422	456	589	678	822	889	1022	1289	1667	1806	1950	2383	2961	3828
200	0.91	-	209	225	291	335	407	440	505	637	824	893	964	1179	1464	1893
300	1.37	-	139	150	193	223	270	292	336	423	547	593	641	783	973	1257
500	2.28	-	83	90	116	134	162	175	202	254	329	356	385	470	584	755
1000	4.55	-	42	45	58	67	81	88	101	127	165	179	193	236	293	379
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	500	539	697	803	974	1053	1211	1526	1974	2138	2309	2822	3507	4533
40	0.45	-	422	456	589	678	822	889	1022	1289	1667	1806	1950	2383	2961	3828
65	0.70	-	271	293	379	436	529	571	657	829	1071	1161	1254	1532	1904	2461
80	0.80	-	238	256	331	381	463	500	575	725	938	1016	1097	1341	1666	2153
100	1.15	-	165	178	230	265	322	348	400	504	652	707	763	933	1159	1498
110	1.20	-	158	171	221	254	308	333	383	483	625	677	731	894	1110	1435
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	1056	1139	1472	1694	2056	2222	2556	3222	4167	4514	4875	5958	7403	9569
40	0.26	5	731	788	1019	1173	1423	1538	1769	2231	2885	3125	3375	4125	5125	6625
65	0.42	7	452	488	631	726	881	952	1095	1381	1786	1935	2089	2554	3173	4101
80	0.52	7	365	394	510	587	712	769	885	1115	1442	1563	1688	2063	2563	3313
100	0.65	16	292	315	408	469	569	615	708	892	1154	1250	1350	1650	2050	2650
110	0.70	18	271	293	379	436	529	571	657	829	1071	1161	1254	1532	1904	2461
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	679	732	946	1089	1321	1429	1643	2071	2679	2902	3134	3830	4759	6152
2 x 40	2 x 0.25	-	380	410	530	610	740	800	920	1160	1500	1625	1755	2145	2665	3445
2 x 65	2 x 0.40	-	238	256	331	381	463	500	575	725	938	1016	1097	1341	1666	2153
2 x 80	2 x 0.48	-	198	214	276	318	385	417	479	604	781	846	914	1117	1388	1794
2 x 100	2 x 0.60	-	158	171	221	254	308	333	383	483	625	677	731	894	1110	1435
2 x 110	2 x 0.65	-	146	158	204	235	285	308	354	446	577	625	675	825	1025	1325
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	4222	4556	5889	6778	8222	8889	10222	12889	16667	18056	19500	23833	29611	38278
7	0.075	-	2533	2733	3533	4067	4933	5333	6133	7733	10000	10833	11700	14300	17767	22967
11	0.105	-	1810	1952	2524	2905	3524	3810	4381	5524	7143	7738	8357	10214	12690	16405
15	0.135	-	1407	1519	1963	2259	2741	2963	3407	4296	5556	6019	6500	7944	9870	12759
20	0.160	-	1188	1281	1656	1906	2313	2500	2875	3625	4688	5078	5484	6703	8328	10766
23	0.180	-	1056	1139	1472	1694	2056	2222	2556	3222	4167	4514	4875	5958	7403	9569

Lighting circuit switching

Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	9	10	12	15	15	16	23	31	35	39	42	70	85	89
55	1.4	-	9	10	12	15	15	16	23	31	35	39	42	70	85	89
90	2.1	-	6	7	8	10	10	10	15	20	23	26	28	47	57	59
135	3.1	-	4	4	5	6	7	7	10	14	15	17	19	32	38	40
180	3.1	-	4	4	5	6	7	7	10	14	15	17	19	32	38	40
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	12	12	12	35	36	38	55	73	81	91	100	164	198	207
55	0.6	20	12	12	12	35	36	38	55	73	81	91	100	164	198	207
90	0.9	25	10	10	10	23	24	25	36	48	55	61	66	110	132	138
135	0.9	45	5	5	5	18	18	19	34	34	36	57	59	110	132	138
180	0.9	45	5	5	5	18	18	19	34	34	36	57	59	110	132	138
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	7	8	9	11	12	12	18	24	27	30	33	45	54	57
250	3.0	-	4	5	5	7	7	7	11	14	16	18	20	27	33	34
400	4.4	-	3	3	3	4	5	5	7	10	11	12	13	18	22	23
600	6.2	-	2	2	2	3	3	3	5	7	7	8	9	13	16	16
1000	10.3	-	1	1	1	2	2	2	3	4	4	5	5	8	10	10
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1.0	20	12	12	12	21	22	23	33	43	49	55	60	93	112	117
250	1.5	36	7	7	7	14	14	15	22	29	33	36	40	62	75	78
400	2.5	48	5	5	5	8	8	9	13	17	19	22	24	37	45	47
600	3.3	65	3	3	3	6	6	6	10	13	15	16	18	28	34	35
1000	6.2	100	2	2	2	3	3	3	5	7	7	8	9	15	18	19
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	22	25	28	35	36	38	55	73	82	91	100	152	190	214
80	0.80	-	16	18	21	26	27	28	41	55	61	68	75	114	143	160
125	1.15	-	11	13	14	18	19	20	28	38	43	47	52	79	99	112
250	2.15	-	6	6	7	9	10	10	15	20	23	25	27	42	53	60
400	3.25	-	4	4	5	6	6	7	10	13	15	16	18	28	35	39
700	5.40	-	2	2	3	3	4	4	6	8	9	10	11	17	21	24
1000	7.50	-	1	2	2	2	2	3	4	5	6	7	8	12	15	17
Voltage: 380/415 V AC																
2000	8.00	-	1	1	2	2	2	2	4	5	6	6	7	11	14	16
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	36	36	36	75	78	82	117	157	176	196	214	326	407	458
80	0.43	8	31	31	31	48	51	53	76	102	115	127	139	212	265	298
125	0.66	10	20	22	25	31	33	34	50	66	75	83	90	138	173	194
250	1.28	18	10	11	13	16	17	17	25	34	38	42	46	71	89	100
400	2.05	25	6	7	8	10	10	11	16	21	24	26	29	44	56	63
700	3.55	40	3	4	4	5	6	6	9	12	13	15	16	26	32	36
1000	4.83	60	2	3	3	4	4	4	6	9	10	11	12	19	24	27
Voltage: 380/415 V AC																
2000	5.45	35	2	2	3	3	4	4	6	8	9	10	11	17	21	24

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	115	124	161	185	225	243	279	352	455	493	533	651	809	1046
55	1.4	-	115	124	161	185	225	243	279	352	455	493	533	651	809	1046
90	2.1	-	77	83	107	123	150	162	186	235	304	329	355	434	539	697
135	3.1	-	52	56	73	84	101	110	126	159	206	223	241	294	365	472
180	3.1	-	52	56	73	84	101	110	126	159	206	223	241	294	365	472
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	269	290	375	432	524	567	652	822	1063	1151	1243	1519	1888	2440
55	0.6	20	269	290	375	432	524	567	652	822	1063	1151	1243	1519	1888	2440
90	0.9	25	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
135	0.9	45	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
180	0.9	45	179	194	250	288	349	378	434	548	708	767	829	1013	1258	1627
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	74	80	103	119	144	156	179	226	292	313	338	413	513	663
250	3.0	-	44	48	62	71	86	93	107	135	175	188	203	248	308	398
400	4.4	-	30	33	42	49	59	64	73	92	119	128	138	169	210	271
600	6.2	-	21	23	30	34	42	45	52	65	85	91	98	120	149	192
1000	10.3	-	13	14	18	21	25	27	31	39	51	55	59	72	90	116
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1.0	20	152	164	212	244	296	320	368	464	600	625	675	825	1025	1325
250	1.5	36	101	109	141	163	197	213	245	309	400	417	450	550	683	883
400	2.5	48	61	66	85	98	118	128	147	186	240	250	270	330	410	530
600	3.3	65	46	50	64	74	90	97	112	141	182	189	205	250	311	402
1000	6.2	100	25	26	34	39	48	52	59	75	97	101	109	133	165	214
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	261	333	380	475	570	570	665	760	998	1188	1283	1568	1948	2518
80	0.80	-	196	249	285	356	428	428	499	570	748	891	962	1176	1461	1888
125	1.15	-	136	173	198	248	297	297	347	397	520	620	669	818	1016	1313
250	2.15	-	73	93	106	133	159	159	186	212	278	331	358	437	543	703
400	3.25	-	48	61	70	88	105	105	123	140	184	219	237	289	360	465
700	5.40	-	29	37	42	53	63	63	74	84	111	132	143	174	216	280
1000	7.50	-	21	27	30	38	46	46	53	61	80	95	103	125	156	201
Voltage: 380/415 V AC																
2000	8.00	-	20	25	29	36	43	43	50	57	75	89	96	118	146	189
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	560	713	814	1018	1221	1221	1425	1629	2138	2545	2748	3359	4173	5395
80	0.43	8	365	464	530	663	795	795	928	1060	1392	1657	1790	2187	2717	3513
125	0.66	10	238	302	345	432	518	518	605	691	907	1080	1166	1425	1770	2289
250	1.28	18	122	156	178	223	267	267	312	356	468	557	601	735	913	1180
400	2.05	25	76	97	111	139	167	167	195	222	292	348	375	459	570	737
700	3.55	40	44	56	64	80	96	96	112	128	169	201	217	265	329	425
1000	4.83	60	32	41	47	59	71	71	83	94	124	148	159	195	242	313
Voltage: 380/415 V AC																
2000	5.45	35	29	37	42	52	63	63	73	84	110	131	141	173	214	277

Lighting circuit switching

Contactor selection AF09 ... AF146 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96	AF116	AF140	AF146
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	4	5	5	7	7	7	11	14	16	18	20	27	33	38
400	4	-	3	3	4	5	5	5	8	11	12	13	15	20	25	28
1000	9.5	-	1	1	1	2	2	2	3	4	5	5	6	8	11	12
2000	16.5	-	0	0	1	1	1	1	2	2	3	3	3	5	6	7
Voltage: 380/415 V AC																
2000	10.5	-	1	1	1	2	2	2	3	4	4	5	5	8	10	11
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	7	7	7	15	16	17	25	33	37	41	45	69	86	97
400	2.22	45	5	5	5	9	9	10	14	19	22	24	27	41	51	58
1000	5.14	85	2	2	3	4	4	4	6	8	9	10	11	18	22	25
2000	11.5	148	1	1	1	1	1	2	2	3	4	4	5	8	10	11
Voltage: 380/415 V AC																
2000	6.10	60	2	2	2	3	3	3	5	7	8	9	9	15	19	21

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

3-pole AC / DC operated contactors			AF190	AF205	AF265	AF305	AF370	AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	46	58	67	83	100	100	117	133	175	208	225	275	342	442
400	4	-	34	44	50	63	75	75	88	100	131	156	169	206	256	331
1000	9.5	-	14	18	21	26	32	32	37	42	55	66	71	87	108	139
2000	16.5	-	8	11	12	15	18	18	21	24	32	38	41	50	62	80
Voltage: 380/415 V AC																
2000	10.5	-	13	17	19	24	29	29	33	38	50	60	64	79	98	126
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	119	151	173	216	259	259	302	345	453	540	583	713	885	1144
400	2.22	45	71	90	103	128	154	154	180	205	270	321	347	424	526	680
1000	5.14	85	30	39	44	55	67	67	78	89	116	139	150	183	227	294
2000	11.5	148	14	17	20	25	30	30	35	40	52	62	67	82	102	131
Voltage: 380/415 V AC																
2000	6.10	60	26	33	37	47	56	56	65	75	98	117	126	154	192	248

Lighting circuit switching

Contactor selection AF09 ... AF370 4-pole contactors

Selection table

4-pole AC / DC operated contactors			AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
Incandescent and halogen lamps																**according to AC-5b**
Voltage: 220/240 V AC																
60	0.27	-	64	77	103	114	177	207	259	430	519	704	759	981	1130	1370
100	0.45	-	38	46	62	68	106	124	155	258	311	422	456	589	678	822
200	0.91	-	19	23	30	34	52	61	77	127	154	209	225	291	335	407
300	1.37	-	12	15	20	22	35	41	51	85	102	139	150	193	223	270
500	2.28	-	7	9	12	13	21	24	30	51	61	83	90	116	134	162
1000	4.55	-	3	4	6	6	10	12	15	25	31	42	45	58	67	81
Fluorescent lamps without compensation - Fluorescent lamps with electronic starter																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.38	-	46	55	73	81	126	147	184	305	368	500	539	697	803	974
40	0.45	-	38	46	62	68	106	124	155	258	311	422	456	589	678	822
65	0.70	-	25	30	40	44	68	80	100	166	200	271	293	379	436	529
80	0.80	-	21	26	35	38	60	70	87	145	175	238	256	331	381	463
100	1.15	-	15	18	24	26	41	48	60	101	122	165	178	230	265	322
110	1.20	-	14	17	23	25	40	46	58	97	117	158	171	221	254	308
Fluorescent lamps with parallel compensation																**according to AC-5a**
Voltage: 220/240 V AC																
20	0.18	5	53	53	110	110	266	309	309	644	778	1056	1139	1472	1694	2056
40	0.26	5	53	53	107	110	184	215	269	446	538	731	788	1019	1173	1423
65	0.42	7	37	37	66	73	114	133	166	276	333	452	488	631	726	881
80	0.52	7	33	37	53	59	92	107	134	223	269	365	394	510	587	712
100	0.65	16	16	16	34	34	73	86	96	178	215	292	315	408	469	569
110	0.70	18	14	14	30	30	68	80	86	166	200	271	293	379	436	529
Fluorescent lamps in dual mounting																**according to AC-5a**
Voltage: 220/240 V AC																
2 x 20	2 x 0.14	-	62	75	100	110	171	200	250	414	500	679	732	946	1089	1321
2 x 40	2 x 0.25	-	35	42	56	62	96	112	140	232	280	380	410	530	610	740
2 x 65	2 x 0.40	-	21	26	35	38	60	70	87	145	175	238	256	331	381	463
2 x 80	2 x 0.48	-	18	21	29	32	50	58	72	121	146	198	214	276	318	385
2 x 100	2 x 0.60	-	14	17	23	25	40	46	58	97	117	158	171	221	254	308
2 x 110	2 x 0.65	-	13	16	21	23	36	43	53	89	108	146	158	204	235	285
Compact fluorescent lamps																**according to AC-5a**
Voltage: 220/240 V AC																
5	0.045	-	388	466	622	688	1066	1244	1555	2578	3111	4222	4556	5889	6778	8222
7	0.075	-	233	280	373	413	640	746	933	1547	1867	2533	2733	3533	4067	4933
11	0.105	-	166	200	266	295	457	533	666	1105	1333	1810	1952	2524	2905	3524
15	0.135	-	129	155	207	229	355	414	518	859	1037	1407	1519	1963	2259	2741
20	0.160	-	109	131	175	193	300	350	437	725	875	1188	1281	1656	1906	2313
23	0.180	-	97	116	155	172	266	311	388	644	778	1056	1139	1472	1694	2056
Low pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
35	1.4	-	9	12	15	16	23	31	39	70	85	115	124	161	185	225
55	1.4	-	9	12	15	16	23	31	39	70	85	115	124	161	185	225
90	2.1	-	6	8	10	10	15	20	26	47	57	77	83	107	123	150
135	3.1	-	4	5	6	7	10	14	17	32	38	52	56	73	84	101
180	3.1	-	4	5	6	7	10	14	17	32	38	52	56	73	84	101
Low pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
35	0.6	20	12	12	27	27	55	73	77	164	198	269	290	375	432	524
55	0.6	20	12	12	27	27	55	73	77	164	198	269	290	375	432	524
90	0.9	25	10	10	22	22	36	48	61	110	132	179	194	250	288	349
135	0.9	45	5	5	12	12	34	34	34	110	132	179	194	250	288	349
180	0.9	45	5	5	12	12	34	34	34	110	132	179	194	250	288	349

Lighting circuit switching

Contactor selection AF09 ... AF370 4-pole contactors

Selection table

4-pole AC / DC operated contactors			AF09	AF16	AF26	AF38	AF40	AF52	AF80	AF116	AF140	AF190	AF205	AF265	AF305	AF370
Lamp characteristics			Maximum permissible number of lamps per phase													
W	A	µF														
High pressure sodium vapour lamps without compensation																
Voltage: 220/240 V AC																
150	1.8	-	7	9	11	12	18	24	30	45	54	74	80	103	119	144
250	3,0	-	4	5	7	7	11	14	18	27	33	44	48	62	71	86
400	4.4	-	3	3	4	5	7	10	12	18	22	30	33	42	49	59
600	6.2	-	2	2	3	3	5	7	8	13	16	21	23	30	34	42
1000	10.3	-	1	1	2	2	3	4	5	8	10	13	14	18	21	25
High pressure sodium vapour lamps with parallel compensation																
Voltage: 220/240 V AC																
150	1,0	20	12	12	21	23	33	43	55	93	112	152	164	212	244	296
250	1.5	36	7	7	14	15	22	29	36	62	75	101	109	141	163	197
400	2.5	48	5	5	8	9	13	17	22	37	45	61	66	85	98	118
600	3.3	65	3	3	6	6	10	13	16	28	34	46	50	64	74	90
1000	6.2	100	2	2	3	3	5	7	8	15	18	25	26	34	39	48
High pressure mercury vapour lamps without compensation																
Voltage: 220/240 V AC																
50	0.60	-	22	28	35	38	55	73	91	152	190	261	333	380	475	570
80	0.80	-	16	21	26	28	41	55	68	114	143	196	249	285	356	428
125	1.15	-	11	14	18	20	28	38	47	79	99	136	173	198	248	297
250	2.15	-	6	7	9	10	15	20	25	42	53	73	93	106	133	159
400	3.25	-	4	5	6	7	10	13	16	28	35	48	61	70	88	105
700	5.40	-	2	3	3	4	6	8	10	17	21	29	37	42	53	63
1000	7.50	-	1	2	2	3	4	5	7	12	15	21	27	30	38	46
Voltage: 380/415 V AC																
2000	8	-	1	2	2	2	4	5	6	11	14	20	25	29	36	43
High pressure mercury vapour lamps with compensation																
Voltage: 220/240 V AC																
50	0.28	7	36	36	75	79	117	157	196	326	407	560	713	814	1018	1221
80	0.43	8	31	31	48	53	76	102	127	212	265	365	464	530	663	795
125	0.66	10	20	25	31	34	50	66	83	138	173	238	302	345	432	518
250	1.28	18	10	13	16	17	25	34	42	71	89	122	156	178	223	267
400	2.05	25	6	8	10	11	16	21	26	44	56	76	97	111	139	167
700	3.55	40	3	4	5	6	9	12	15	26	32	44	56	64	80	96
1000	4.83	60	2	3	4	4	6	9	11	19	24	32	41	47	59	71
Voltage: 380/415 V AC																
2000	5,45	35	2	3	3	4	6	8	10	17	21	29	37	42	52	63
Metal halide vapour lamps without compensation																
Voltage: 220/240 V AC																
250	3	-	4	5	7	7	11	14	18	27	33	46	58	67	83	100
400	4	-	3	4	5	5	8	11	13	20	25	34	44	50	63	75
1000	9.5	-	1	1	2	2	3	4	5	8	11	14	18	21	26	32
2000	16.5	-	0	1	1	1	2	2	3	5	6	8	11	12	15	18
Voltage: 380/415 V AC																
2000	10.5	-	1	1	2	2	3	4	5	8	10	13	17	19	24	29
Metal halide vapour lamps with compensation																
Voltage: 220/240 V AC																
250	1.32	33	7	7	15	16	25	33	41	69	86	119	151	173	216	259
400	2.22	45	5	5	9	10	14	19	24	41	51	71	90	103	128	154
1000	5.14	85	2	3	4	4	6	8	10	18	22	30	39	44	55	67
2000	11.5	148	1	1	1	2	2	3	4	8	10	14	17	20	25	30
Voltage: 380/415 V AC																
2000	6.10	60	2	2	3	3	5	7	9	15	19	26	33	37	47	56

Parallel connection of main poles

General

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

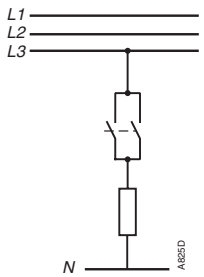
Remarks:

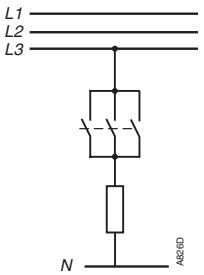
- Parallel connection of main poles to increase the DC resistive load is not acceptable
- Parallel connection of main poles does not increase the breaking capacity.

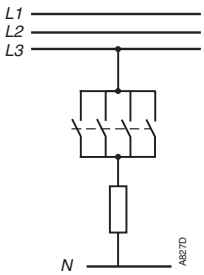
The table below shows the uprating factor for Ie / AC-1 max. in relation to the number of poles wired connected in parallel and for a maximum switching frequency.

Note: The poles can be connected in parallel via following connecting strips. See details and permissible current in "Accessory" part.

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







			2 poles in parallel	3 poles in parallel	4 poles in parallel
Contactors			**Factor to be applied to the rated operational current Ie / AC-1 to obtain the permissible current Ie / AC-1 with "n" poles in parallel**		
AC operated	DC operated	Cycles / h			
3-pole contactors					
AF09 ... AF96	AF09 ... AF96	600	1.6	2.2	–
AF116 ... AF1250	AF116 ... AF1250	300	1.6	2.2	–
AF1350 ... AF2650	AF1350 ... AF2650	30	1.6	2.2	–
4-pole contactors					
AF09 ... AF38 A45 ... A75	AF09 ... AF38	600	1.6	2.2	2.6
AF45 ... AF75	AE45 ... AE75 TAE45 ... TAE75 AF45 ... AF75	300	1.6	2.2	2.6
EK	EK	300	1.6	2.2	2.8

Temporary or intermittent duty

Utilization of contactors for temporary / intermittent duty

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

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

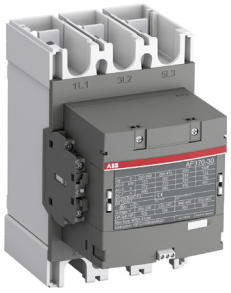
Example:

AF09 contactor (intermittent duty, resistive load)

Rated operational current Ie / AC-1 at 60 °C	
(see "Technical data: main pole utilization characteristics")	25 A
Switching frequency	2 operating cycles/h
Current flow time per cycle	20 s
Factor to be applied to the current Ie / AC-1	2.7
Permissible current: 2.7 x 25 =	67 A

Influence of the length of conductors used in contactor control circuit

AF40-30-00



AF370-30-11

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

- **no closing:** due to excessive voltage drop (in AC or DC)
- **no opening:** due to excessive capacitance (in AC).

Contactor Closing (contactor with AC or DC operated coil).

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

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

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

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

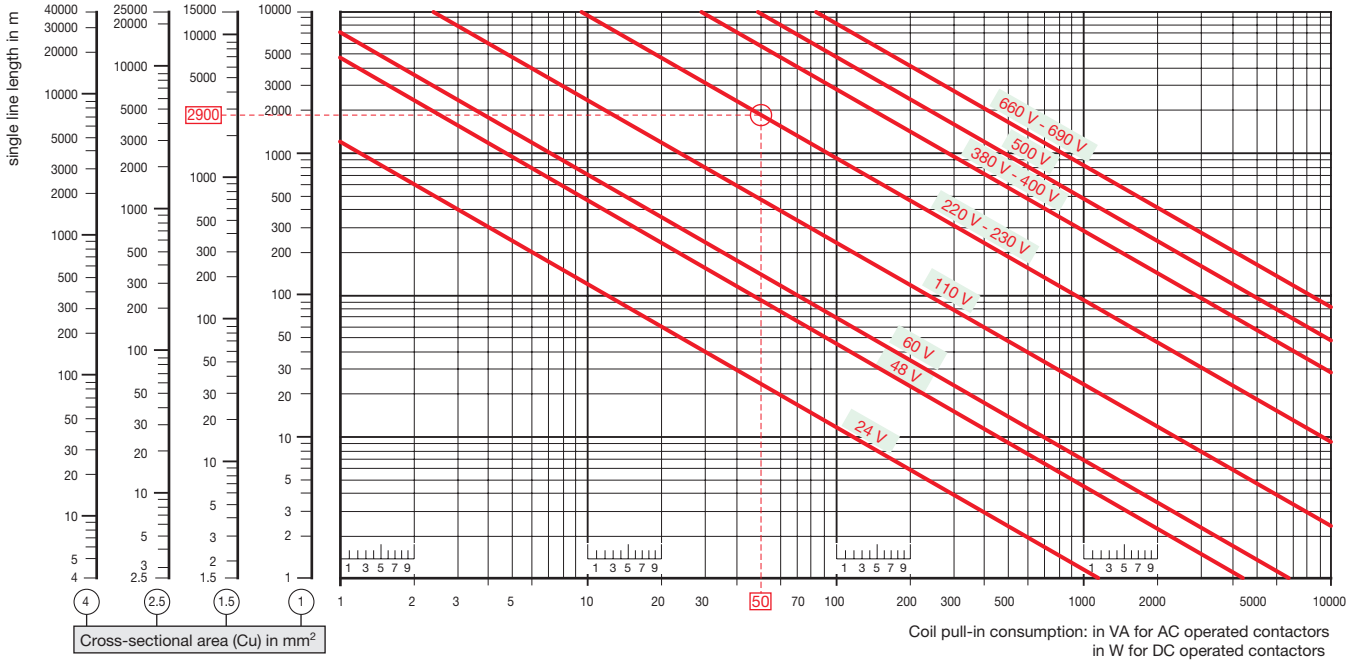
Coil pull-in consumption (average value)

3-pole contactors	AC control supply 50/60 Hz	DC control supply
AF09, AF12, AF16, AF26, AF30, AF38	50 VA	50 W
AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z	20 VA	20 W
AF40, AF52, AF65	25 VA	25 W
AF80, AF96	40 VA	40 W
AF116, AF140, AF146	180 VA	170 W
AF190, AF205	195 VA	185 W
AF265, AF305, AF370	405 VA	465 W
AF400, AF460	1005 VA	960 W
AF580, AF750, AF1250	940 VA	900 W
AF1350, AF1650, AF2050, AF2650	2450 VA	2290 W

4-pole contactors	AC control supply 50/60 Hz	DC control supply
AF09, AF16, AF26, AF38	50 VA	50 W
AF09Z, AF16Z, AF26Z, AF38Z	20 W	20 W
AF40, AF52, AF80	40 VA	40 W
AF116, AF140	185 VA	170 W
AF190, AF205	190 VA	180 W
AF265, AF305, AF370	405 VA	445 W

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

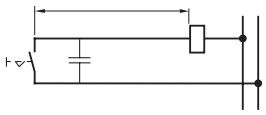
Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



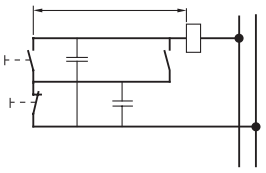
Example AF09 contactor: Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 50 VA, control circuit conductor cross-sectional area: Cu 1.5 mm². Max. permissible length: 2900 m.

Influence of the length of conductors used in contactor control circuit

Single control line length



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



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

Contactor Opening (contactor with AC operated coil)

Under certain conditions, an AC operated contactor does not open when the control circuit is de-energized.

This is due to a critical capacity of the excessively long control circuit line and the type of contactor coil control layout (see diagrams A and B opposite). This may be caused by the following factors:

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

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

- select a contactor with a higher rating
- select a lower control voltage
- connect “Rp” resistance in parallel with the contactor coil:

$$RP = \frac{10^3}{C}\ \Omega \text{(with C in µF)}$$

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

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

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

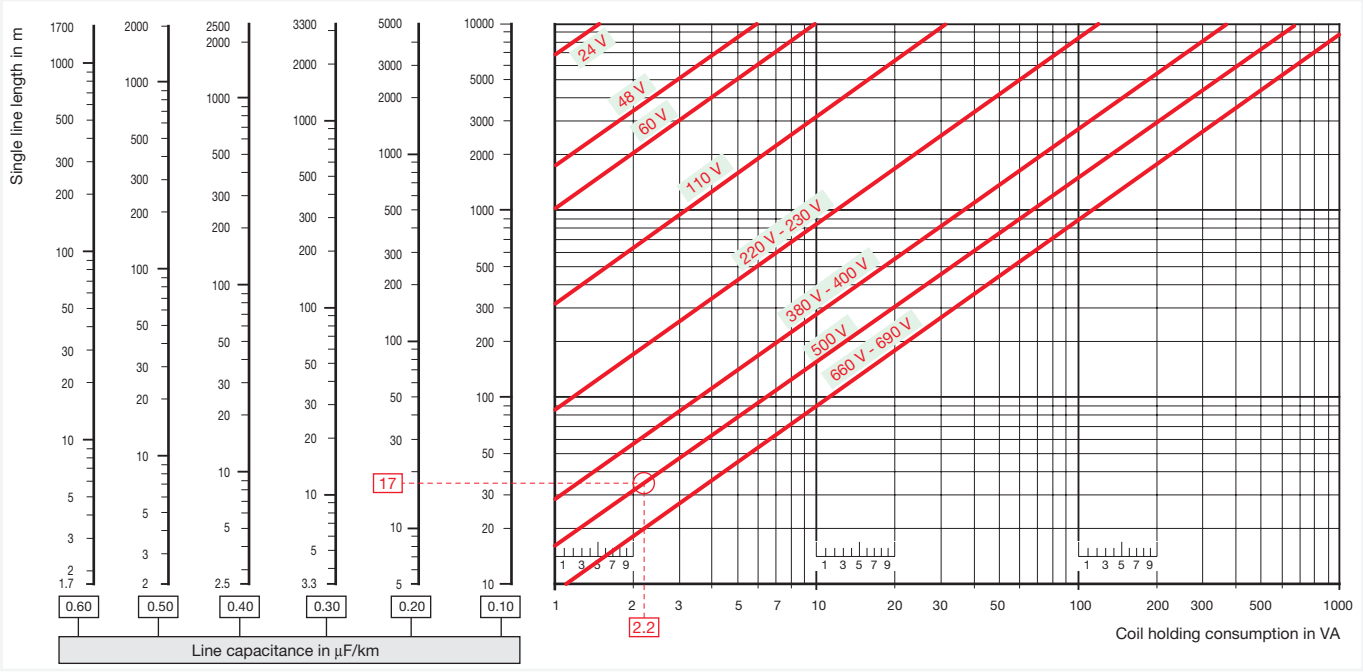
Coil holding consumption (average value)

3-pole contactors	AC control supply 50/60 Hz
AF09, AF12, AF16, AF26, AF30, AF38	2.2 VA
AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z	1.7 VA
AF40, AF52, AF65, AF80, AF96	4 VA
AF116, AF140, AF146	8.9 VA
AF190, AF205	9.3 VA
AF265, AF305, AF370	16.6 VA
AF400, AF460, AF580, AF750, AF1250	12 VA
AF1350, AF1650, AF2050, AF2650	48 VA

4-pole contactors	AC control supply 50/60 Hz
AF09, AF16, AF26, AF38	2.2 VA
AF09Z, AF16Z, AF26Z, AF38Z	1.7 VA
AF40, AF52, AF80	4 VA
AF116, AF140, AF190, AF205	8 VA
AF265, AF305, AF370	16 VA

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

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



Example AF16 contactor: Coil voltage Uc = 500 V, 50 Hz, 2.2 VA contactor coil holding consumption, control type: diagram A, via maintained pushbutton, and 2-core cable with a capacity of 0.2 µF/km. Max. permissible length: 17 m.

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give the order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the order code according to the table below. Example: for contactor AF400-30-11 and coil 100...250 V 50/60 Hz, the order code is: 1SFL577001R7011.

AF09 ... AF370 3-pole contactors
AF09 ... AF370 4-pole contactors

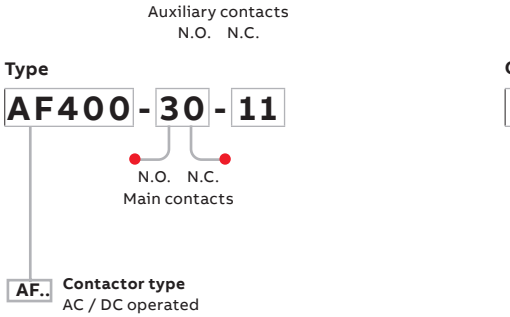
	AC coil code 50/60 Hz	DC coil code
41	24...60 V	-
11	24...60 V	20...60 V
12	48...130 V	48...130 V
13	**100...250 V**	**100...250 V**
14	250...500 V	250...500 V

Coil 41: not available for AF116 ... AF370

AF116 ... AF370 3-pole contactors with built-in PLC interface

	AC coil code 50/60 Hz	DC coil code
33	100...250 V	100...250 V
34	250...500 V	250...500 V

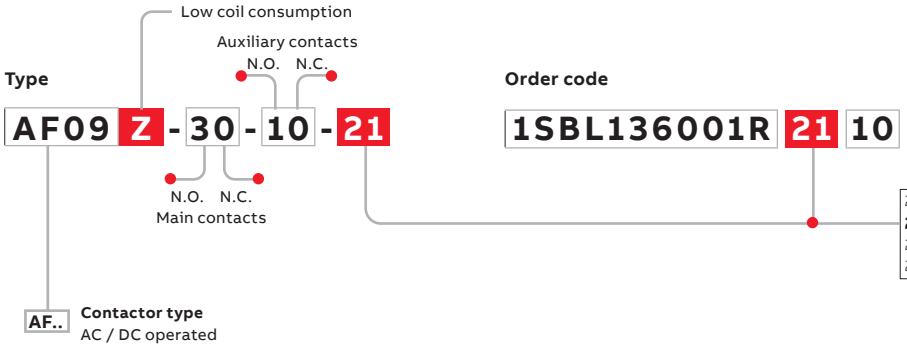
AF400 ... AF2650 3-pole contactors



	AC coil code 50/60 Hz	DC coil code
68	-	24...60 V
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V
71	250...500 V	250...500 V

Coil 68, 69, 71: not available for AF1350 ... AF2650

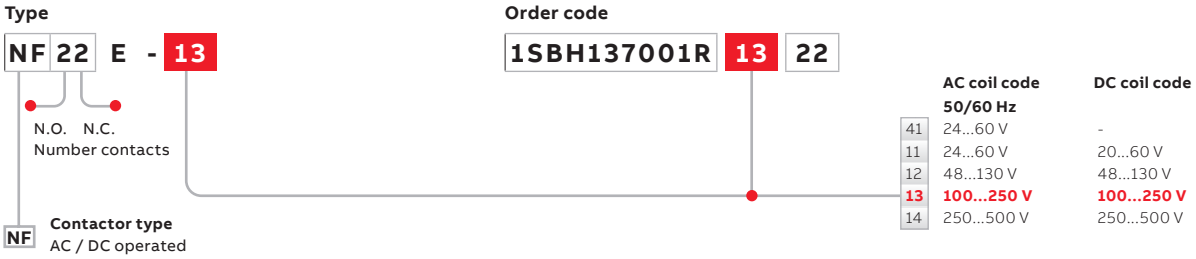
AF09 ... AF38 3- and 4-pole contactors - low consumption



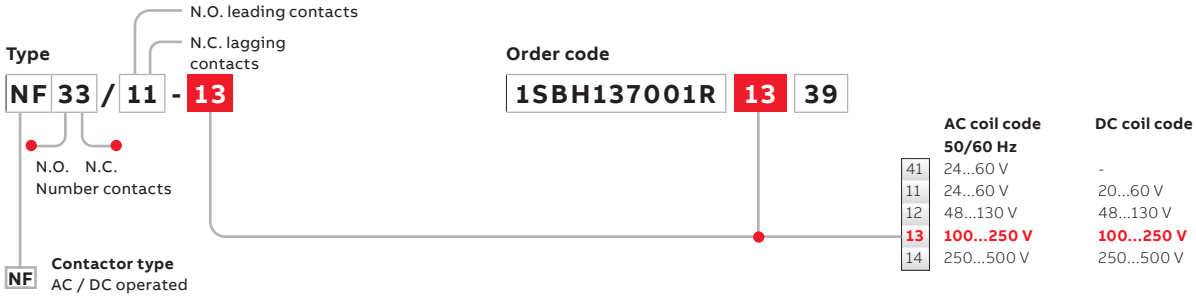
	AC coil code 50/60 Hz	DC coil code
20	-	12...20 V
21	**24...60 V**	**20...60 V**
22	48...130 V	48...130 V
23	100...250 V	100...250 V

Voltage code table

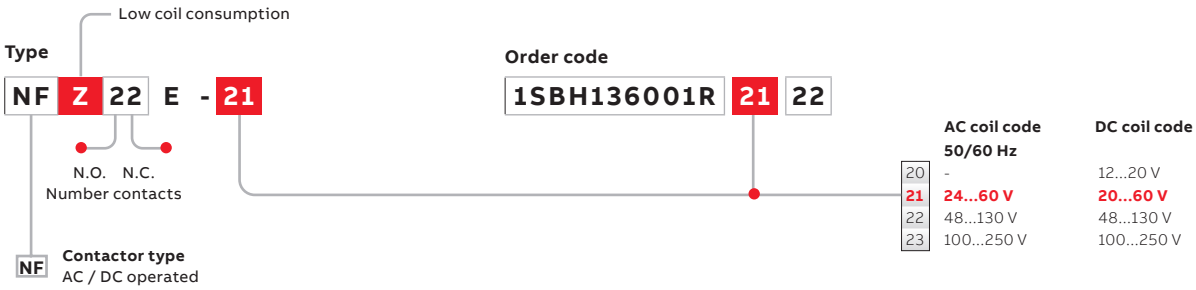
NF contactor relays



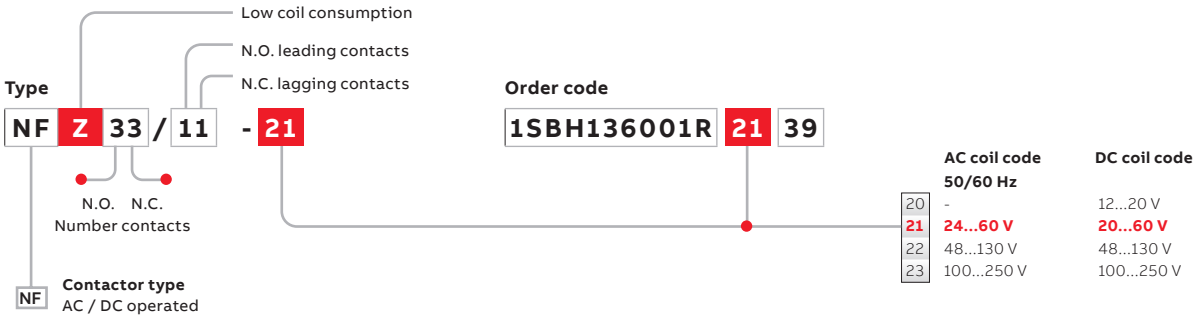
NF contactor relays with overlapping of lagging / leading contacts



NF contactor relays - low consumption

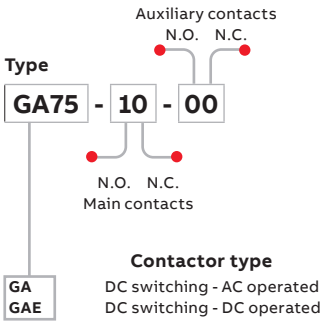


NF contactor relays with overlapping of lagging / leading contacts - low consumption



Voltage code table

GA contactors



Order code

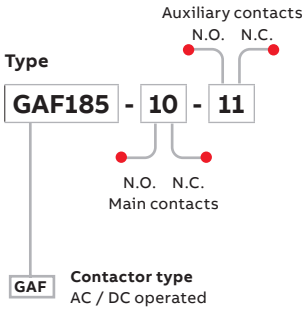
1SBL411025R 80 00

	Contactors: GA AC coil code 50 Hz	60 Hz
81	**24 V**	**24 V**
82	**42 V**	**42 V**
83	**48 V**	**48 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
42	230...240 V	277 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V

Codes in bold for dual frequency coils.

Contactors: GAE DC coil code	
80	12 V
81	24 V
83	48 V
86	110 V
87	125 V
88	220 V
89	240 V
38	250 V

GAF185 ... GAF300 contactors

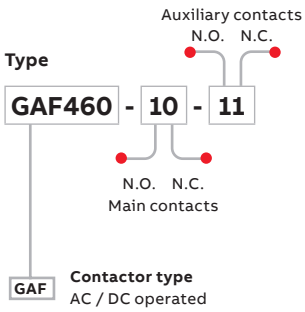


Order code

1SFL497025R 69 11

	AC coil code 50/60 Hz	DC coil code
72	- 20...60 V	
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V

GAF460 ... GAF1250 contactors



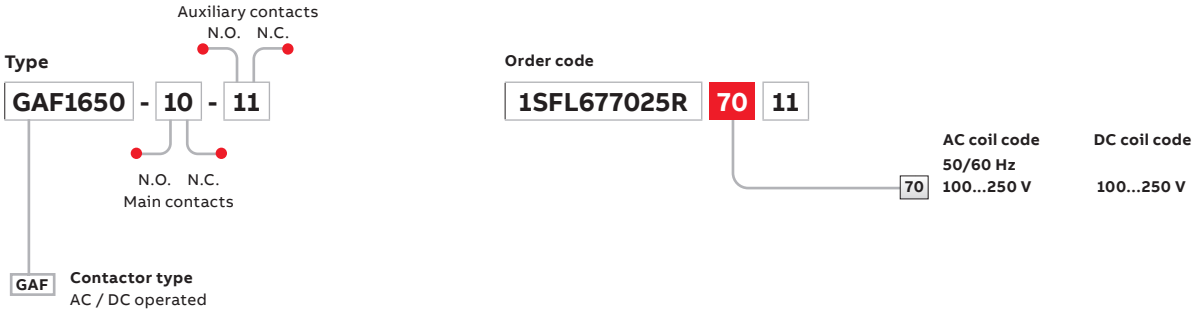
Order code

1SFL597025R 69 11

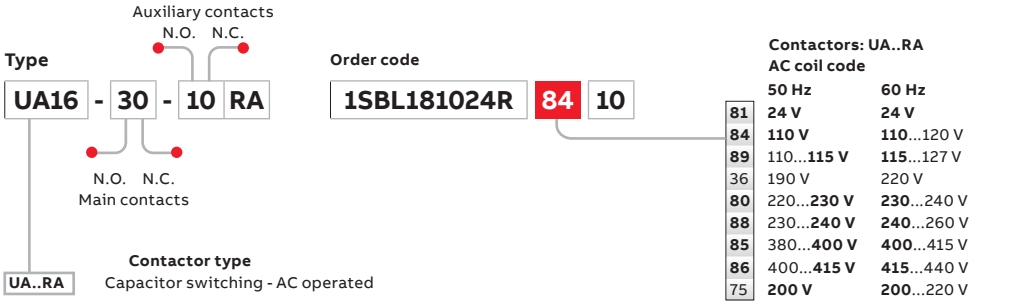
	AC coil code 50/60 Hz	DC coil code
68	- 24...60 V	
69	**48...130 V**	**48...130 V**
70	100...250 V	100...250 V
71	250...500 V	250...500 V

Voltage code table

GAF1650, GAF2050 contactors



UA..RA contactors

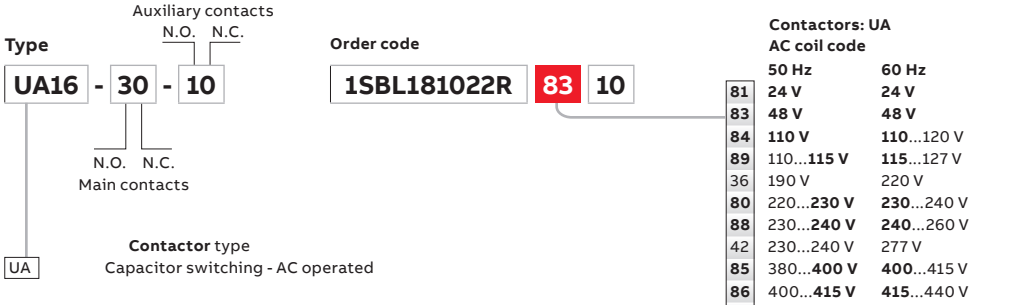


Contactors: UA..RA

AC coil code	50 Hz	60 Hz
81	**24 V**	**24 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
36	190 V	220 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V
75	**200 V**	**200**...220 V

Codes in bold for dual frequency coils.

UA contactors



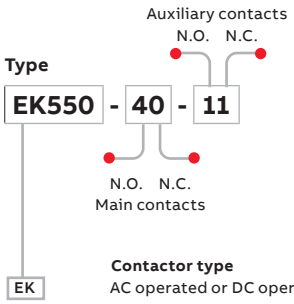
Contactors: UA

AC coil code	50 Hz	60 Hz
81	**24 V**	**24 V**
83	**48 V**	**48 V**
84	**110 V**	**110**...120 V
89	110...**115 V**	**115**...127 V
36	190 V	220 V
80	220...**230 V**	**230**...240 V
88	230...**240 V**	**240**...260 V
42	230...240 V	277 V
85	380...**400 V**	**400**...415 V
86	400...**415 V**	**415**...440 V
75	**200 V**	**200**...220 V

Codes in bold for dual frequency coils.

Voltage code table

EK550, EK1000 contactors



Contactor type
AC operated or DC operated

Order code
SK827041 - AF

AC coil code

	50 Hz	60 Hz
AF	110 V	120 V
AG	127 V	-
AL	220...230 V	240 V
AM	230...240 V	-
AP	380...400 V	440 V
AR	400...415 V	-

Dual frequency coil code

	50 Hz	60 Hz
EL	220 V	220...240 V
EM	220...230 V	230...255 V

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

DC coil code

DD	48 V
DE	110 V
DU	125 V
DF	220 V

Questionnaire for product specifications: Block contactors

Tel.: e-mail:
Segments:

Tel.: e-mail:
Date:

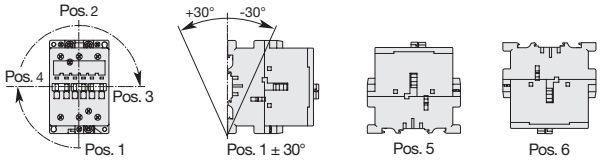
Application

Type: No of phases:
Utilisation category (AC/DC): % AC4 if any:
Rated operational voltage Ue: V Cos j:

Frequency: Hz L/R: ms
Nominal current In: A
Making current: A Breaking current: A
Duty: ☐ continuous ☐ temporary ☐ intermittent
Load factor (% of ON time): %
Number of cycles per hour: or per year:
Expected durability: operating cycles
Number of main poles N.O.: N.C.:
Other information:

Installation

Ambient temperature:
Ambient environment:
Humidity: %
Chemical pollution:
Other:
Mounting position, see drawing below (Position 6: please consult factory):



Wiring: ☐ Clamping screws or cage connectors
☐ Cable lugs (ring tongue)
Other: Cross section:
Additional comments:

Control circuit

Rated control Uc voltage: V ☐ DC ☐ AC f: Hz
Minimum / maximum: V to V
Surge suppressor: type:
Interface with PLC: mA V DC
Accessories:
Number of auxiliary contacts: N.O.: N.C.:
Low level contacts: mA V ☐ DC ☐ AC

Protection

Short circuit protection:
Type: ☐ Fuse ☐ Circuit breaker ☐ Manual motor starter
Max short circuit current: A
Motor protection: ☐ Overload relay ☐ Manual Motor Starter ☐ Electronic overload relay

Logistic and packaging

Quantity by batch:
Delivery order:
Expected quantity: per year
Expected first delivery date: and Qty:
Quantity on first 6 month: on first year:

Approvals and other requirements

Reference standards:
Required approvals:
Customer specifications:
Shock and vibrations:
Specific quality assurance clauses:
Other comments:

Questionnaire for product specifications: Block contactors

Other comments:

User Guide for the questionnaire

This document is used to define the contactor specifications according to the complete information on the application. Do not hesitate to join some complementary documents if necessary (schemes, tables, customer specification...).

Please see below some definitions to help you :

Operating cycle

Includes one making operation and one breaking operation.

Electrical Durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

Mechanical Durability

Number of no-current operating cycles that the contactor is able to carry out

Load Factor

Ratio of the on-load operating time to the total cycle time x 100 (%).

Intermittent Duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Temporary Duty

Duty in which the main contacts of the contactor remain closed for periods insufficient to allow the equipment to reach stabilized temperature, the unload periods being separated by off-load periods of sufficient duration to restore the ambient temperature

Continuous Duty

Duty in which the main contacts of the contactor remain closed, with a continuous current during enough time to reach thermal stabilization, but no more than eight hours without interruption.

Ambient Temperature

Air temperature close to the contactor.

Mounting Position

Comply with the manufacturer's instructions. Restrictions could be taken into account for certain mounting positions.

A contactor's duty is characterized by the utilization category together with the rated operational voltage and current indicated:

Utilization categories for contactors according to IEC 60947-4-1
Utilization categories for contactor relays according to IEC 60947-5-1

See our catalog p7/8

Making and breaking current

Current at contactor closing or at contactor opening

Time constant L/R (for DC circuit)

Ratio of the inductance to the resistance (L/R = mH/Ω = ms)

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

www.abb.com/productdetails/**GJL1213001R0107**

B, M mini contactors
K, M mini contactor relays

4/3 **B mini contactors**
K mini contactor relays

4/59 **M mini contactors**
M mini contactor relays

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

www.abb.com/productdetails/**GJL1213001R0107**

B mini contactors
K mini contactor relays

4/5 **Presentation**

4/8 **Overview**

With screw terminals

4/10 3-pole contactors AC and DC operated
4/12 3-pole reversing contactors AC and DC operated
4/16 3-pole low consumption contactors DC operated
4/17 4-pole contactors AC and DC operated
4/19 Contactor relays AC and DC operated
4/21 Low consumption contactor relays DC operated

With soldering pins

4/22 3-pole contactors AC and DC operated
4/24 3-pole reversing contactors AC and DC operated
4/28 3-pole low consumption contactors DC operated
4/29 Contactor relays AC and DC operated
4/31 Low consumption contactor relays DC operated

With flat pin connection

4/32 3-pole contactors AC and DC operated
4/34 3-pole reversing contactors AC and DC operated
4/38 3-pole low consumption contactors DC operated
4/39 Contactor relays AC and DC operated
4/41 Low consumption contactor relays DC operated

4/42 **Technical data**

4/49 **Accessories**

4/52 **Terminal marking and positioning**

4/53 **Dimension drawings**

B mini contactors
Flexibility in small spaces

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

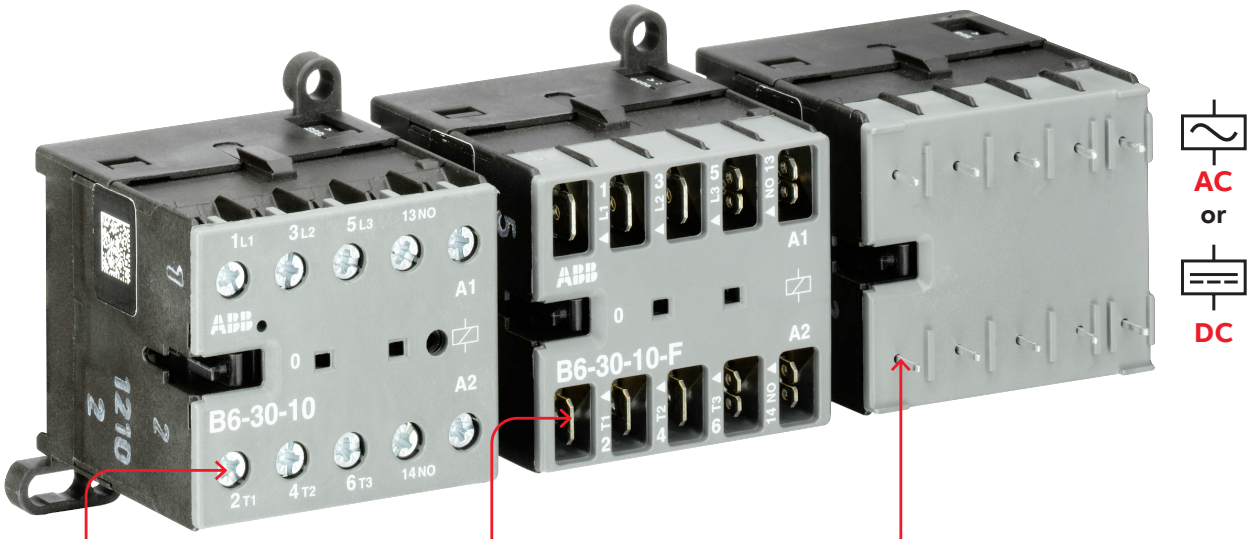
Space-saving
Designed to be mini
This type of contactor is a specialist for applications in small spaces. It comes with three different terminal types. Side or front auxiliary contact blocks can be mounted to match the requirements of width or depth limitations.

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

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

B mini contactors

Smart - flexibility and diversity in a small size



Screw

Screw terminals

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

Flat pins

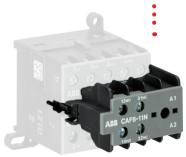
Flat pin terminals

Thanks to really quick plug-in assembling, good reliability of the connection and low costs, the flat pin terminals are already the favorite choice in many industry sectors. The best option when high connection speed is required.

Soldering pins

Soldering pin terminals

This connection type allows an easy installation on PCB boards, where all components have to be soldered in place.
The soldering pins sustain currents up to AC-1/AC-3 12 A.

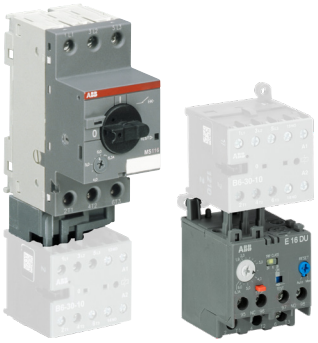


Mountable in just about any place

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

Save assembly time

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



Perfect fit

B mini contactors match manual motor starters or overload relays. This creates a space-saving and easy to install motor starting solution for a complete protection and control of your devices.

B mini contactors
Compact - a tiny specialist for specific needs

Choose your specialist.
No matter what kind of application - The B mini contactors range includes contactors with low power consumption coils and integrated surge suppression for direct control by PLC. Dedicated relay versions for control functions or for small loads are also available.

Motors control
With a maximum rated operational power AC-3 of 5.5 kW at 400 V the B mini contactors are the best solution for controlling the small motor inside your products. If the both direction control is needed, the preassembled reversing contactors are always ready to help.

Resisitive loads
Not only motors! The B mini contactors can be used for the activation of your AC-1 loads up to 20 A as well. Heaters, coffee machines and ovens are just examples of products in which it is possible to utilize these reliable and silent devices as components.

Marine applications
B mini contactors are covered by the most important marine approvals in order to ensure their suitability also for applications close to the see.

B mini contactors

				Screw terminals			
AC Control supply							
3-pole contactors		Coil consumption 3.5 VA	Type	**B6**	**B7**	**-**	**-**
3-pole reversing contactors		Coil consumption 3.5 VA	Type	**-**	**-**	**VB6** **VB6A (2)**	**VB7** **VB7A (2)**
4-pole contactors		Coil consumption 3.5 VA	Type	**B6**	**B7**	**(3)**	**(3)**
DC Control supply							
3-pole contactors		Coil consumption 3.5 W	Type	**BC6**	**BC7** **B7D (1)**	**-**	**-**
3-pole reversing contactors		Coil consumption 3.5 W	Type	**-**	**-**	**VBC6** **VBC6A (2)**	**VBC7** **VBC7A (2)**
3-pole low consumption contactors		Coil consumption 1.4 ... 2.8 W	Type	**BC6** **B6S (1)**	**BC7** **B7S (1)**	**(3)**	**(3)**
4-pole contactors		Coil consumption 3.5 W	Type	**BC6**	**B7D**	**(3)**	**(3)**
IEC	Rated operational power AC-3	220-230-240 V	kW	2.2	3	2.2	3
		380-400 V	kW	4	5.5	4	5.5
	Rated operational current AC-1	400 V, θ ≤ 40 °C	A	20	20	20	20
UL/CSA	3-phase motor rating	220-240 V AC	hp	2	3	2	3
		440-480 V AC	hp	3	5	3	5
	General use rating		A	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)
Main accessories							
Auxiliary contact blocks		Front mounting		CAF6			
		Side mounting		CA6		**-**	
Connection sets		For reversing contactors		BSM6-30			
Surge suppressors		Varistor (AC/DC)		RV-BC6			
Overload relays							
Thermal overload relays Thermal and phase failure protection, with single setup possible			Class 10	T16			
Electronic overload relays With single setup possible			Class 10E, 20E, 30E	E16DU			
Manual motor starters							
Thermal / magnetic protection			Class 10	MS116, MS132			
Magnetic only types				MO132			
Connecting link to manual motor starters				BEA7/132			

K mini contactor relays

				Screw terminals
AC Control supply				
4-pole contactor relays		Coil consumption 3.5 VA	Type	**K6**
DC Control supply				
4-pole contactor relays		Coil consumption 3.5 W	Type	**KC6**
4-pole low consumption contactor relays		Coil consumption 1.4 ... 2.8 W	Type	**KC6, K6S (1)**
IEC	Rated operational current AC-15	220-230-240 V	A	4
		380-400 V	A	3
	Rated operational current DC-13	24 V	A	2.5
Main accessories				
Auxiliary contact blocks		Front mounting		CAF6
		Side mounting		CA6-11K

(1) With integrated surge suppressor
(2) With safety blocking function
(3) Please visit: https://new.abb.com/low-voltage/products/motor-protection/3-pole-contactors-and-overload-relays-for-motor-starting/mini-contactors

	Soldering pins				Flat pins			
	B6...P	**B7...P**	**-**	**-**	**B6...F**	**B7...F**	**-**	**-**
	-	**-**	**VB6...P** **VB6A...P (2)**	**VB7...P** **VB7A...P (2)**	**-**	**-**	**VB6...F** **VB6A...F (2)**	**VB7...F** **VB7A...F (2)**
	(3)	**(3)**	**(3)**	**(3)**	**(3)**	**(3)**		
	BC6...P	**BC7...P** **B7D...P (1)**	**-**	**-**	**BC6...F**	**BC7...F** **B7D...F (1)**	**-**	**-**
	-	**-**	**VBC6...P** **VBC6A...P (2)**	**VBC7...P** **VBC7A...P (2)**	**-**	**-**	**VBC6...F** **VBC6A...F (2)**	**VBC7...F** **VBC7A...F (2)**
	BC6...P	**BC7...P**	**(3)**	**(3)**	**BC6...F**	**BC7...F**	**-**	**-**
	(3)	**(3)**	**(3)**	**(3)**	**(3)**	**(3)**		
	2.2	3	2.2	3	2.2	3	2.2	3
	4	5.5	4	5.5	4	5.5	4	5.5
	12	12	12	12	20	20	20	20
	2	3	2	3	2	3	2	3
	3	5	3	5	3	5	3	5
	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)	12 (300 V)	16 (600 V)
	-				-			
	CA6-11K-P		-		CA6-11K-F		-	
	-				-			
	-				-			
	-				-			
	-				-			
	MS116, MS132				MS116, MS132			
	MO132				MO132			
	-				-			

	Soldering pins	Flat pins
	K6...P	**K6...F**
	KC6...P	**KC6...F**
	KC6...P	**KC6...F**
	4	4
	3	3
	2.5	2.5
	-	-
	CA6-11K-P	CA6-11K-F

B6, B7 3-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated

2CDC211001F0010

B6-30-10

2CDC211014F0011

B7-30-10

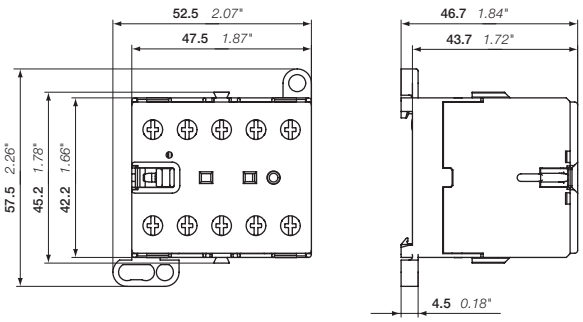
B6, B7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

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

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7, B7D 3-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated

2CDC211040F0011

BC6-30-10

2CDC211013F0011

BC7-30-10

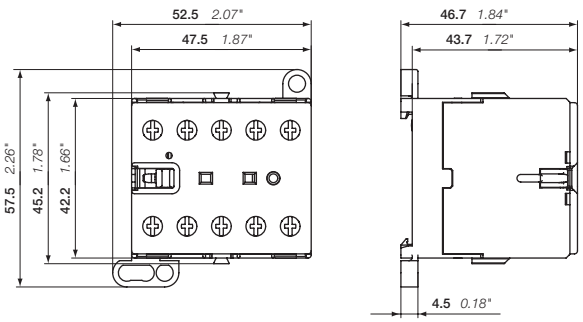
BC6, BC7, B7D 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

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

Other types on request



BC6, BC7, B7D

Main dimensions mm, inches

VB6, VB7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

AC operated

2CDC211006F0011

VB7-30-10

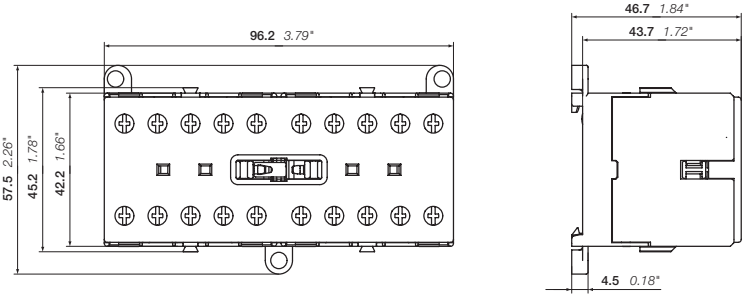
VB6, VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

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

Other types on request



VB6, VB7

Main dimensions mm, inches

VBC6, VBC7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated

2CDC211042F0011

VBC6-30-10

2CDC211001F0011

VBC7-30-10

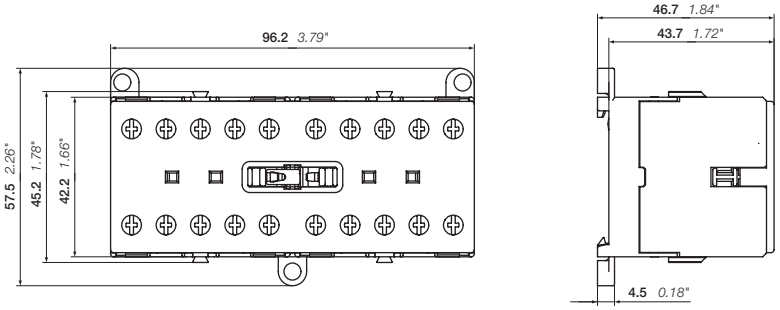
VBC6, VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

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

Other types on request



VBC6, VBC7

Main dimensions mm, inches

VB6A, VB7A 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

AC operated – with safety blocking function

VB6A-30-10

VB7A-30-10

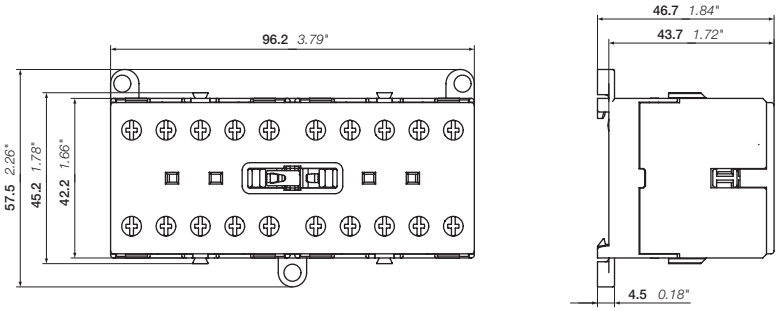
VB6A, VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

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

Other types on request



VB6A, VB7A

Main dimensions mm, inches

VBC6A, VBC7A 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated – with safety blocking function

2CDC211044F0011

VBC6A-30-10

2CDC211007F0011

VBC7A-30-10

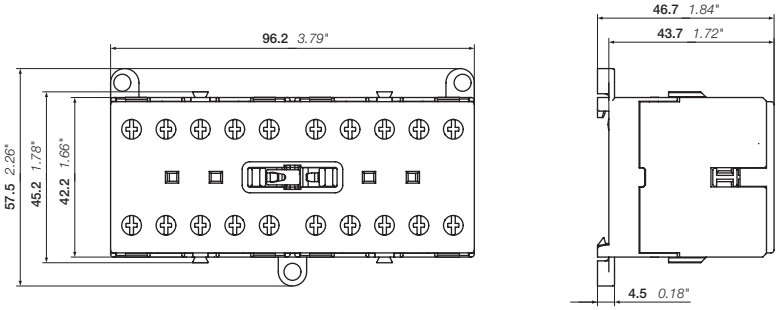
VBC6A, VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

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

Other types on request



VBC6A, VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated - low consumption

BC6-30-10

BC7-30-10

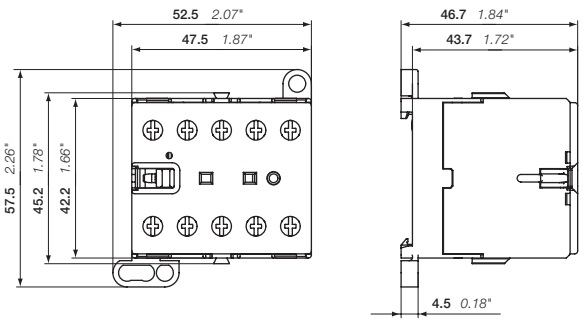
BC6, BC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
DC operation 24 V / 1.4 W									
4	20	3	300 V / 12 A	24	1 0	BC6-30-10-1.4-81	GJL1213001R8101	10	0.175
					0 1	BC6-30-01-1.4-81	GJL1213001R8011	10	0.175
5.5	20	5	600 V / 16 A	24	1 0	BC7-30-10-1.4-81	GJL1313001R8101	10	0.175
					0 1	BC7-30-01-1.4-81	GJL1313001R8011	10	0.175
DC operation 17 ... 32 V / 2.4 W									
4	20	3	300 V / 12 A	17 ... 32	1 0	BC6-30-10-2.4-51	GJL1213001R5101	10	0.175
					0 1	BC6-30-01-2.4-51	GJL1213001R5011	10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	BC7-30-10-2.4-51	GJL1313001R5101	10	0.175
					0 1	BC7-30-01-2.4-51	GJL1313001R5011	10	0.175
Connection to PLCs with integrated protective circuit									
DC operation 24 V / 1.7 W									
4	20	3	300 V / 12 A	24	1 0	B6S-30-10-1.7-71	GJL1213001R7101	10	0.175
					0 1	B6S-30-01-1.7-71	GJL1213001R7011	10	0.175
5.5	20	5	600 V / 16 A	24	1 0	B7S-30-10-1.7-71	GJL1313001R7101	10	0.175
					0 1	B7S-30-01-1.7-71	GJL1313001R7011	10	0.175
DC operation 17 ... 32 V / 2.8 W									
4	20	3	300 V / 12 A	17 ... 32	1 0	B6S-30-10-2.8-72	GJL1213001R7102	10	0.175
					0 1	B6S-30-01-2.8-72	GJL1213001R7012	10	0.175
5.5	20	5	600 V / 16 A	17 ... 32	1 0	B7S-30-10-2.8-72	GJL1313001R7102	10	0.175
					0 1	B7S-30-01-2.8-72	GJL1313001R7012	10	0.175

Other types on request



BC6, BC7

Main dimensions mm, inches

B6, B7 4-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated

2CDC211028F0011

B6-22-00

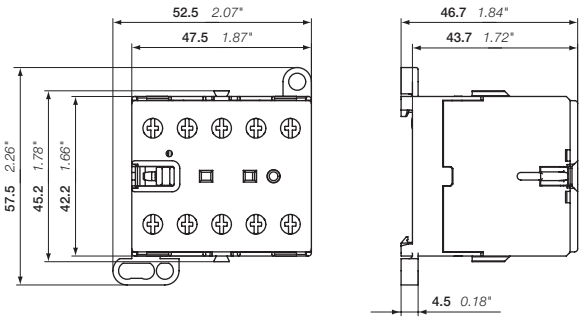
B6, B7 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

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

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

Other types on request



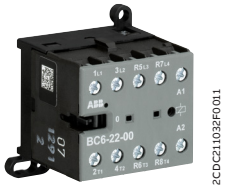
B6, B7

Main dimensions mm, inches

BC6, BC7, B7D 4-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated



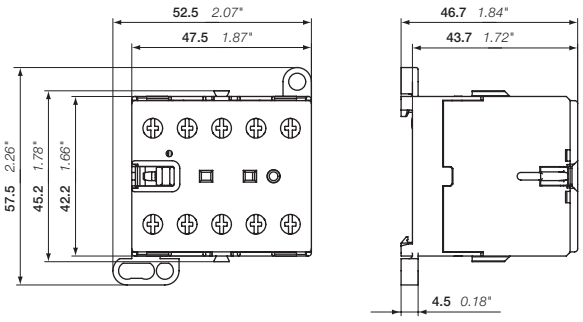
BC6-22-00

B6, B7, B7D 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

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

IEC	UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational current ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	V DC					kg
4 N.O. main poles								
20	3	300 V / 12 A	12	0 0	BC6-40-00-07	GJL1213201R0007	10	0.175
			24	0 0	BC6-40-00-01	GJL1213201R0001	10	0.175
			48	0 0	BC6-40-00-16	GJL1213201R1006	10	0.175
			110 ... 125	0 0	BC6-40-00-04	GJL1213201R0004	10	0.175
			220 ... 240	0 0	BC6-40-00-05	GJL1213201R0005	10	0.175
20	5	600 V / 16 A	12	0 0	BC7-40-00-07	GJL1313201R0007	10	0.175
			24	0 0	BC7-40-00-01	GJL1313201R0001	10	0.175
			48	0 0	BC7-40-00-16	GJL1313201R1006	10	0.175
			110 ... 125	0 0	BC7-40-00-04	GJL1313201R0004	10	0.175
			220 ... 240	0 0	BC7-40-00-05	GJL1313201R0005	10	0.175
2 N.O. + 2 N.C. main poles								
20	3	300 V / 12 A	12	0 0	BC6-22-00-07	GJL1213501R0007	10	0.175
			24	0 0	BC6-22-00-01	GJL1213501R0001	10	0.175
			48	0 0	BC6-22-00-16	GJL1213501R1006	10	0.175
			110 ... 125	0 0	BC6-22-00-04	GJL1213501R0004	10	0.175
			220 ... 240	0 0	BC6-22-00-05	GJL1213501R0005	10	0.175
4 N.O. main poles with integrated suppressor diode								
20	5	600 V	24	0 0	B7D-40-00-05	GJL1317201R0005	10	0.175
			220 ... 240	0 0	B7D-40-00-01	GJL1317201R0001	10	0.175



BC6, B7D

Main dimensions mm, inches

K6 4-pole mini contactor relays – with screw terminals

AC operated

2CDC211012F0011

K6-22Z

2CDC211004F0010

K6-31Z

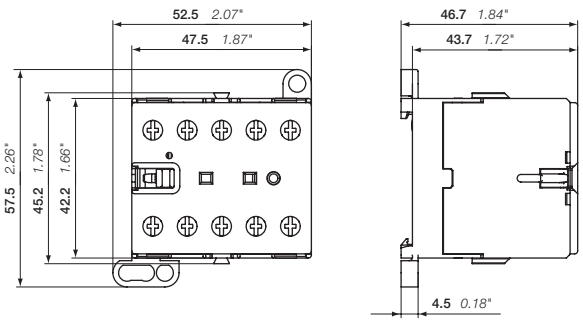
K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

Rated control circuit voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
50 Hz V AC	60 Hz V AC				kg
2 N.O. + 2 N.C. contacts					
24	24	K6-22Z-01	GJH1211001R0221	10	0.175
48	48	K6-22Z-03	GJH1211001R0223	10	0.175
110 ...127	110 ...127	K6-22Z-84	GJH1211001R8224	10	0.175
220 ... 240	220 ... 240	K6-22Z-80	GJH1211001R8220	10	0.175
380 ... 415	380 ... 415	K6-22Z-85	GJH1211001R8225	10	0.175
3 N.O. + 1 N.C. contacts					
24	24	K6-31Z-01	GJH1211001R0311	10	0.175
48	48	K6-31Z-03	GJH1211001R0313	10	0.175
110 ...127	110 ...127	K6-31Z-84	GJH1211001R8314	10	0.175
220 ... 240	220 ... 240	K6-31Z-80	GJH1211001R8310	10	0.175
380 ... 415	380 ... 415	K6-31Z-85	GJH1211001R8315	10	0.175
4 N.O. contacts					
24	24	K6-40E-01	GJH1211001R0401	10	0.175
48	48	K6-40E-03	GJH1211001R0403	10	0.175
110 ...127	110 ...127	K6-40E-84	GJH1211001R8404	10	0.175
220 ... 240	220 ... 240	K6-40E-80	GJH1211001R8400	10	0.175
380 ... 415	380 ... 415	K6-40E-85	GJH1211001R8405	10	0.175

Other types on request.



K6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with screw terminals

DC operated

2CDC211016F0011

KC6-22Z

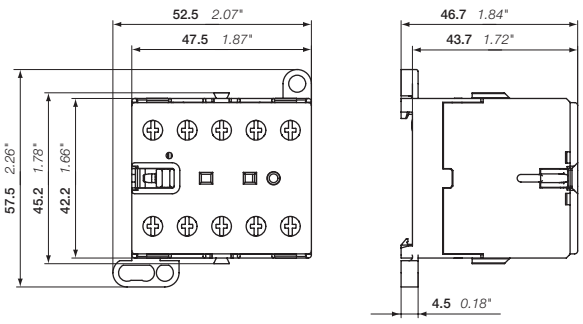
KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

Rated control circuit voltage Uc V DC	Type	Order code	Pkg qty	Weight (1 pce) kg
2 N.O. + 2 N.C. contacts				
12	KC6-22Z-07	GJH1213001R0227	10	0.175
24	KC6-22Z-01	GJH1213001R0221	10	0.175
48	KC6-22Z-16	GJH1213001R1226	10	0.175
110 ... 125	KC6-22Z-04	GJH1213001R0224	10	0.175
220 ... 240	KC6-22Z-05	GJH1213001R0225	10	0.175
3 N.O. + 1 N.C. contacts				
12	KC6-31Z-07	GJH1213001R0317	10	0.175
24	KC6-31Z-01	GJH1213001R0311	10	0.175
48	KC6-31Z-16	GJH1213001R1316	10	0.175
110 ... 125	KC6-31Z-04	GJH1213001R0314	10	0.175
220 ... 240	KC6-31Z-05	GJH1213001R0315	10	0.175
4 N.O. contacts				
12	KC6-40E-07	GJH1213001R0407	10	0.175
24	KC6-40E-01	GJH1213001R0401	10	0.175
48	KC6-40E-16	GJH1213001R1406	10	0.175
110 ... 125	KC6-40E-04	GJH1213001R0404	10	0.175
220 ... 240	KC6-40E-05	GJH1213001R0405	10	0.175

Other types on request



KC6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with screw terminals

DC operated - low consumption

KC6-31Z

KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

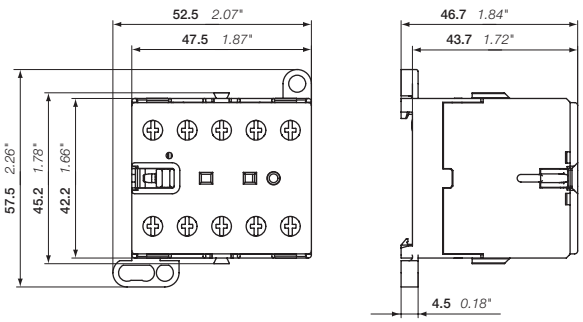
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

Rated control circuit voltage Uc V DC	Type	Order code	Pkg qty	Weight (1 pce) kg
DC operation 24 V / 1.4 W				
24	KC6-31Z-1.4-81	GJH1213001R8311	10	0.175
24	KC6-40E-1.4-81	GJH1213001R8401	10	0.175
DC operation 17 ... 32 V / 2.4 W				
17 ... 32	KC6-31Z-2.4-51	GJH1213001R5311	10	0.175
17 ... 32	KC6-40E-2.4-51	GJH1213001R5401	10	0.175

Connection to PLCs with integrated protective circuit

DC operation 24 V / 1.7 W				
24	K6S-22Z-1.7-71	GJH1213001R7221	10	0.175
24	K6S-31Z-1.7-71	GJH1213001R7311	10	0.175
24	K6S-40E-1.7-71	GJH1213001R7401	10	0.175
DC operation 17 ... 32 V / 2.8 W				
17 ... 32	K6S-22Z-2.8-72	GJH1213001R7222	10	0.175
17 ... 32	K6S-31Z-2.8-72	GJH1213001R7312	10	0.175
17 ... 32	K6S-40E-2.8-72	GJH1213001R7402	10	0.175

Other types on request



KC6

Main dimensions mm, inches

B6, B7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

AC operated

2CDC211003F0010

B6-30-10-P

2CDC211011F0011

B7-30-10-P

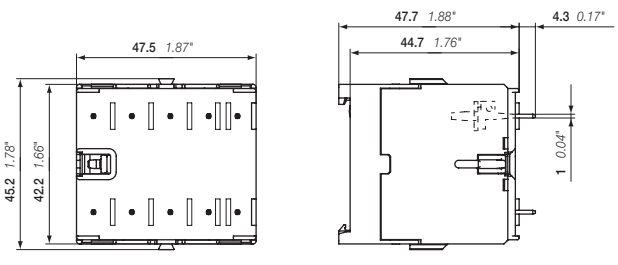
B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz					
kW	A	hp		V AC	V AC					kg
B6 mini contactors										
4	12	3	300 V / 8 A	24	24	1 0	B6-30-10-P-01	GJL1211009R0101	10	0.170
						0 1	B6-30-01-P-01	GJL1211009R0011	10	0.170
				48	48	1 0	B6-30-10-P-03	GJL1211009R0103	10	0.170
						0 1	B6-30-01-P-03	GJL1211009R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B6-30-10-P-84	GJL1211009R8104	10	0.170
						0 1	B6-30-01-P-84	GJL1211009R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B6-30-10-P-80	GJL1211009R8100	10	0.170
						0 1	B6-30-01-P-80	GJL1211009R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B6-30-10-P-85	GJL1211009R8105	10	0.170
						0 1	B6-30-01-P-85	GJL1211009R8015	10	0.170
B7 mini contactors										
5.5	12	5	600 V / 12 A	24	24	1 0	B7-30-10-P-01	GJL1311009R0101	10	0.170
						0 1	B7-30-01-P-01	GJL1311009R0011	10	0.170
				48	48	1 0	B7-30-10-P-03	GJL1311009R0103	10	0.170
						0 1	B7-30-01-P-03	GJL1311009R0013	10	0.170
				110 ... 127	110 ... 127	1 0	B7-30-10-P-84	GJL1311009R8104	10	0.170
						0 1	B7-30-01-P-84	GJL1311009R8014	10	0.170
				220 ... 240	220 ... 240	1 0	B7-30-10-P-80	GJL1311009R8100	10	0.170
						0 1	B7-30-01-P-80	GJL1311009R8010	10	0.170
				380 ... 415	380 ... 415	1 0	B7-30-10-P-85	GJL1311009R8105	10	0.170
						0 1	B7-30-01-P-85	GJL1311009R8015	10	0.170

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

DC operated

BC7-30-10-P

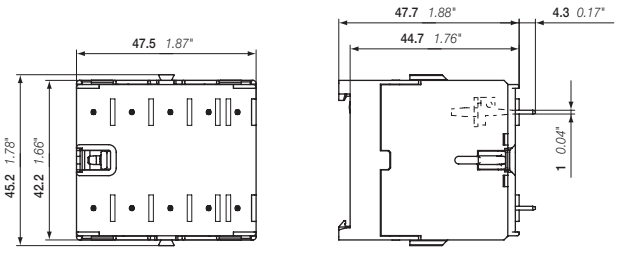
B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
BC6 mini contactors with 3 N.O. main poles									
4	12	3	300 V / 8 A	12	1 0	BC6-30-10-P-07	GJL1213009R0107	10	0.170
					0 1	BC6-30-01-P-07	GJL1213009R0017	10	0.170
				24	1 0	BC6-30-10-P-01	GJL1213009R0101	10	0.170
					0 1	BC6-30-01-P-01	GJL1213009R0011	10	0.170
				48	1 0	BC6-30-10-P-16	GJL1213009R1106	10	0.170
					0 1	BC6-30-01-P-16	GJL1213009R1016	10	0.170
				110 ... 125	1 0	BC6-30-10-P-04	GJL1213009R0104	10	0.170
					0 1	BC6-30-01-P-04	GJL1213009R0014	10	0.170
				220 ... 240	1 0	BC6-30-10-P-05	GJL1213009R0105	10	0.170
					0 1	BC6-30-01-P-05	GJL1213009R0015	10	0.170
BC7 mini contactors with 3 N.O. main poles									
5.5	12	5	600 V / 12 A	12	1 0	BC7-30-10-P-07	GJL1313009R0107	10	0.170
					0 1	BC7-30-01-P-07	GJL1313009R0017	10	0.170
				24	1 0	BC7-30-10-P-01	GJL1313009R0101	10	0.170
					0 1	BC7-30-01-P-01	GJL1313009R0011	10	0.170
				48	1 0	BC7-30-10-P-16	GJL1313009R1106	10	0.170
					0 1	BC7-30-01-P-16	GJL1313009R1016	10	0.170
				110 ... 125	1 0	BC7-30-10-P-04	GJL1313009R0104	10	0.170
					0 1	BC7-30-01-P-04	GJL1313009R0014	10	0.170
				220 ... 240	1 0	BC7-30-10-P-05	GJL1313009R0105	10	0.170
					0 1	BC7-30-01-P-05	GJL1313009R0015	10	0.170
BC6 mini contactors 2 N.O. + 1 N.C. main poles									
4	12	3	300 V / 8 A	24	1 0	BC6-21-10-P-01	GJL1213109R0101	10	0.170
				48	1 0	BC6-21-10-P-16	GJL1213109R1106	10	0.170
				110 ... 125	1 0	BC6-21-10-P-04	GJL1213109R0104	10	0.170
				220 ... 240	1 0	BC6-21-10-P-05	GJL1213109R0105	10	0.170

Other types on request



B6, B7

Main dimensions mm, inches

VB6, VB7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

AC operated

2CDC211010S0011

VB7-30-10-P

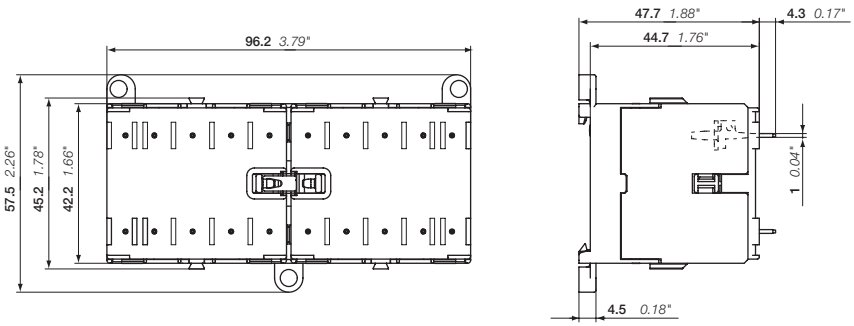
VB6..P, VB7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating	50 Hz	60 Hz					
kW	A	hp		V AC	V AC					kg
VB6 mini reversing contactors										
4	12	3	300 V / 8 A	24	24	1 0	VB6-30-10-P-01	GJL1211909R0101	5	0.345
						0 1	VB6-30-01-P-01	GJL1211909R0011	5	0.345
				48	48	1 0	VB6-30-10-P-03	GJL1211909R0103	5	0.345
						0 1	VB6-30-01-P-03	GJL1211909R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB6-30-10-P-84	GJL1211909R8104	5	0.345
						0 1	VB6-30-01-P-84	GJL1211909R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB6-30-10-P-80	GJL1211909R8100	5	0.345
						0 1	VB6-30-01-P-80	GJL1211909R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB6-30-10-P-85	GJL1211909R8105	5	0.345
						0 1	VB6-30-01-P-85	GJL1211909R8015	5	0.345
VB7 mini reversing contactors										
5.5	12	5	600 V / 12 A	24	24	1 0	VB7-30-10-P-01	GJL1311909R0101	5	0.345
						0 1	VB7-30-01-P-01	GJL1311909R0011	5	0.345
				48	48	1 0	VB7-30-10-P-03	GJL1311909R0103	5	0.345
						0 1	VB7-30-01-P-03	GJL1311909R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7-30-10-P-84	GJL1311909R8104	5	0.345
						0 1	VB7-30-01-P-84	GJL1311909R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7-30-10-P-80	GJL1311909R8100	5	0.345
						0 1	VB7-30-01-P-80	GJL1311909R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7-30-10-P-85	GJL1311909R8105	5	0.345
						0 1	VB7-30-01-P-85	GJL1311909R8015	5	0.345

Other types on request



VB6, VB7

Main dimensions mm, inches

VBC6, VBC7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

DC operated

2CDC211009F0011

VBC7-30-10-P

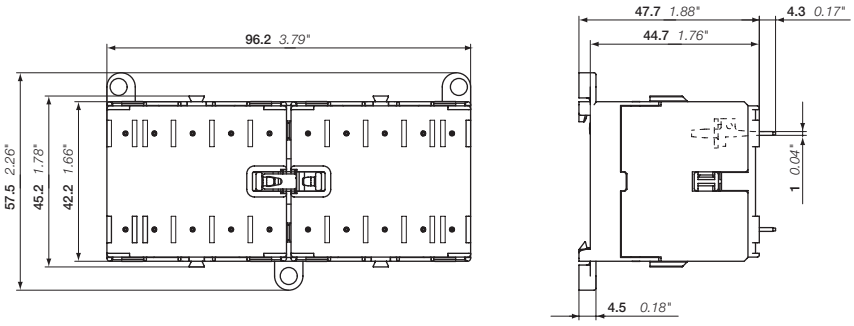
VBC6..P, VBC7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
VBC6 mini reversing contactors									
4	12	3	300 V / 8 A	12	1 0	VBC6-30-10-P-07	GJL1213909R0107	5	0.345
					0 1	VBC6-30-01-P-07	GJL1213909R0017	5	0.345
				24	1 0	VBC6-30-10-P-01	GJL1213909R0101	5	0.345
					0 1	VBC6-30-01-P-01	GJL1213909R0011	5	0.345
				48	1 0	VBC6-30-10-P-06	GJL1213909R0106	5	0.345
					0 1	VBC6-30-06-P-06	GJL1213909R0016	5	0.345
				110 ... 125	1 0	VBC6-30-10-P-04	GJL1213909R0104	5	0.345
					0 1	VBC6-30-01-P-04	GJL1213909R0014	5	0.345
				220 ... 240	1 0	VBC6-30-10-P-05	GJL1213909R0105	5	0.345
					0 1	VBC6-30-01-P-05	GJL1213909R0015	5	0.345
VBC7 mini reversing contactors									
5.5	12	5	600 V / 12 A	12	1 0	VBC7-30-10-P-07	GJL1313909R0107	5	0.345
					0 1	VBC7-30-01-P-07	GJL1313909R0017	5	0.345
				24	1 0	VBC7-30-10-P-01	GJL1313909R0101	5	0.345
					0 1	VBC7-30-01-P-01	GJL1313909R0011	5	0.345
				48	1 0	VBC7-30-10-P-16	GJL1313909R1106	5	0.345
					0 1	VBC7-30-01-P-16	GJL1313909R1016	5	0.345
				110 ... 125	1 0	VBC7-30-10-P-04	GJL1313909R0104	5	0.345
					0 1	VBC7-30-01-P-04	GJL1313909R0014	5	0.345
				220 ... 240	1 0	VBC7-30-10-P-05	GJL1313909R0105	5	0.345
					0 1	VBC7-30-01-P-05	GJL1313909R0015	5	0.345

Other types on request



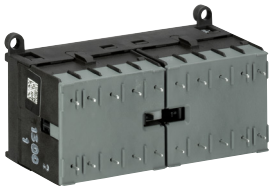
VBC6, VBC7

Main dimensions mm, inches

VB6A, VB7A 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

AC operated – with safety blocking function



2CDC211013F0010

VB7-30-01-P

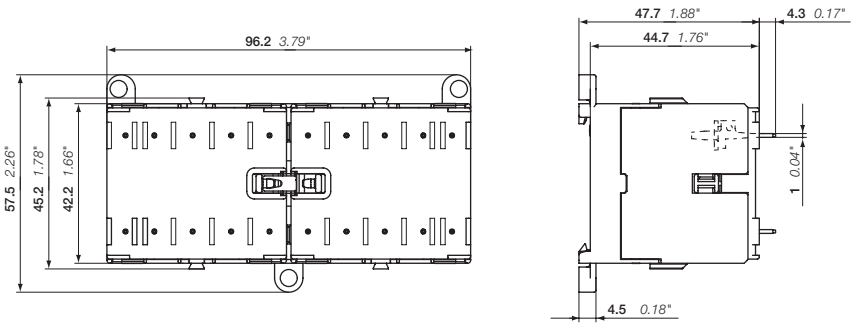
VB6A..P, VB7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3 kW	current ϑ ≤ 40 °C AC-1 A	3-phase motor rating 480 V hp	General use rating	50 Hz V AC	60 Hz V AC					kg
VB6A mini reversing contactors with safety blocking function										
4	12	3	300 V / 8 A	24	24	1 0	VB6A-30-10-P-01	GJL1211919R0101	5	0.345
						0 1	VB6A-30-01-P-01	GJL1211919R0011	5	0.345
				48	48	1 0	VB6A-30-10-P-03	GJL1211919R0103	5	0.345
						0 1	VB6A-30-01-P-03	GJL1211919R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB6A-30-10-P-84	GJL1211919R8104	5	0.345
						0 1	VB6A-30-01-P-84	GJL1211919R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB6A-30-10-P-80	GJL1211919R8100	5	0.345
						0 1	VB6A-30-01-P-80	GJL1211919R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB6A-30-10-P-85	GJL1211919R8105	5	0.345
						0 1	VB6A-30-01-P-85	GJL1211919R8015	5	0.345
VB7A mini reversing contactors with safety blocking function										
5.5	12	5	600 V / 12 A	24	24	1 0	VB7A-30-10-P-01	GJL1311919R0101	5	0.345
						0 1	VB7A-30-01-P-01	GJL1311919R0011	5	0.345
				48	48	1 0	VB7A-30-10-P-03	GJL1311919R0103	5	0.345
						0 1	VB7A-30-01-P-03	GJL1311919R0013	5	0.345
				110 ... 127	110 ... 127	1 0	VB7A-30-10-P-84	GJL1311919R8104	5	0.345
						0 1	VB7A-30-01-P-84	GJL1311919R8014	5	0.345
				220 ... 240	220 ... 240	1 0	VB7A-30-10-P-80	GJL1311919R8100	5	0.345
						0 1	VB7A-30-01-P-80	GJL1311919R8010	5	0.345
				380 ... 415	380 ... 415	1 0	VB7A-30-10-P-85	GJL1311919R8105	5	0.345
						0 1	VB7A-30-01-P-85	GJL1311919R8015	5	0.345

Other types on request



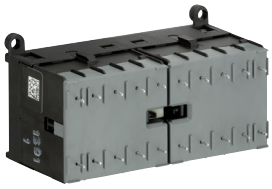
VB6A, VB7A

Main dimensions mm, inches

VBC7A 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

DC operated – with safety blocking function



VBC7A-30-10-P

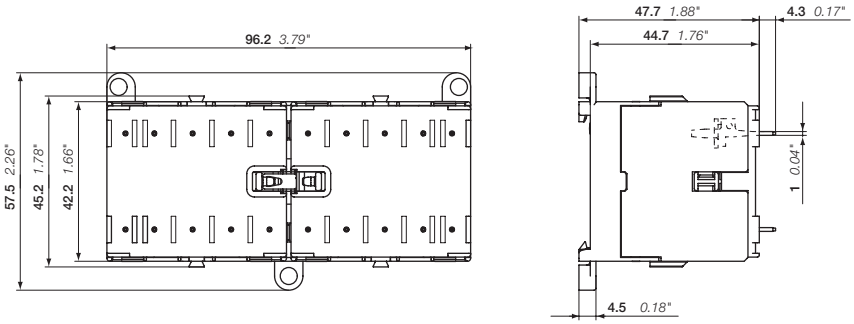
VBC7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
VBC7A mini reversing contactors with safety blocking function									
5.5	12	5	600 V / 12 A	24	1 0	VBC7A-30-10-P-01	GJL1313919R0101	5	0.345
					0 1	VBC7A-30-01-P-01	GJL1313919R0011	5	0.345

Other types on request



VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

DC operated - low consumption

2CDC211030F0011

BC7-30-10-P

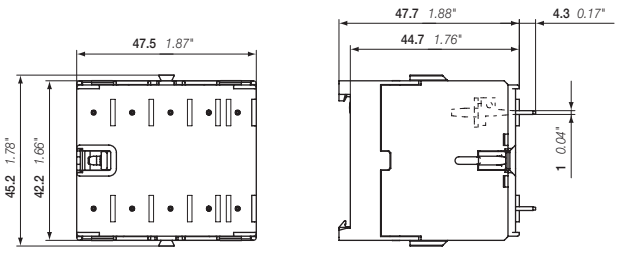
BC6..P, BC7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

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

Other types on request



BC6, BC7

Main dimensions mm, inches

K6 4-pole mini contactor relays – with soldering pins

AC operated

K6-22Z-P

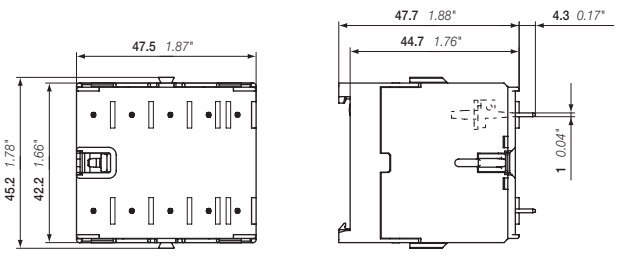
K6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

Rated control circuit voltage Uc		Type	Order code	Pkg qty	Weight (1 pce)
50 Hz	60 Hz				
V AC	V AC				kg
2 N.O. + 2 N.C. contacts					
24	24	K6-22Z-P-01	GJH1211009R0221	10	0.170
48	48	K6-22Z-P-03	GJH1211009R0223	10	0.170
110 ...127	110 ...127	K6-22Z-P-84	GJH1211009R8224	10	0.170
220 ... 240	220 ... 240	K6-22Z-P-80	GJH1211009R8220	10	0.170
380 ... 415	380 ... 415	K6-22Z-P-85	GJH1211009R8225	10	0.170
3 N.O. + 1 N.C. contacts					
24	24	K6-31Z-P-01	GJH1211009R0311	10	0.170
48	48	K6-31Z-P-03	GJH1211009R0313	10	0.170
110 ...127	110 ...127	K6-31Z-P-84	GJH1211009R8314	10	0.170
220 ... 240	220 ... 240	K6-31Z-P-80	GJH1211009R8310	10	0.170
380 ... 415	380 ... 415	K6-31Z-P-85	GJH1211009R8315	10	0.170
4 N.O. contacts					
24	24	K6-40E-P-01	GJH1211009R0401	10	0.170
48	48	K6-40E-P-03	GJH1211009R0403	10	0.170
110 ...127	110 ...127	K6-40E-P-84	GJH1211009R8404	10	0.170
220 ... 240	220 ... 240	K6-40E-P-80	GJH1211009R8400	10	0.170
380 ... 415	380 ... 415	K6-40E-P-85	GJH1211009R8405	10	0.170

Other types on request.



K6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with soldering pins

DC operated

2CDC211025F0011

KC6-22Z-P

2CDC211023F0011

KC6-31Z-P

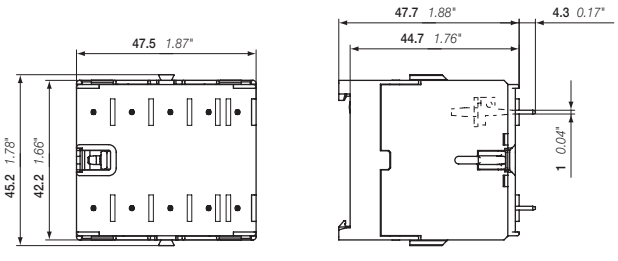
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

Rated control circuit voltage Uc V DC	Type	Order code	Pkg qty	Weight (1 pce) kg
2 N.O. + 2 N.C. contacts				
24	KC6-22Z-P-01	GJH1213009R0221	10	0.170
3 N.O. + 1 N.C. contacts				
24	KC6-31Z-P-01	GJH1213009R0311	10	0.170
4 N.O. contacts				
24	KC6-40E-P-01	GJH1213009R0401	10	0.170

Other types on request.



KC6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with solderings pins

DC operated - low consumption

KC6-31Z-P-1.4

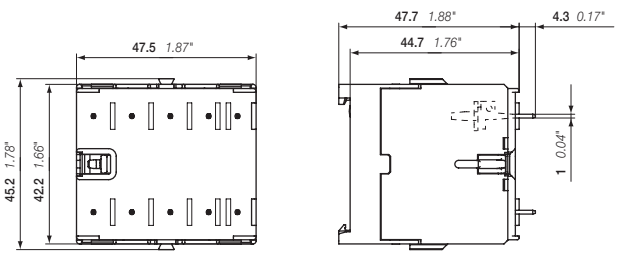
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

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

Other types on request



KC6

Main dimensions mm, inches

04

B6, B7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

AC operated

B6-30-10-F

B7-30-10-F

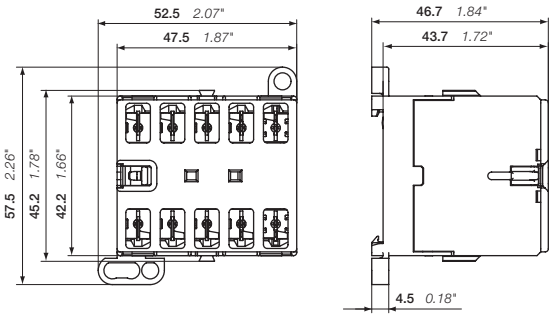
B6..F, B7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

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

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated

BC6-30-10-F

BC7-30-10-F

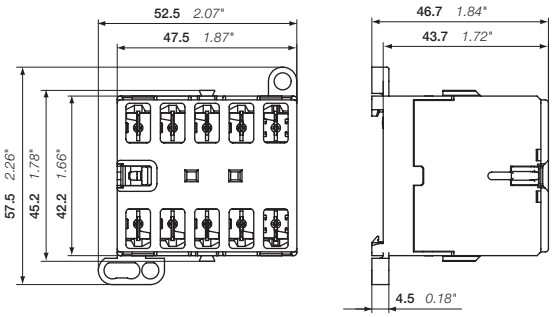
BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

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

Other types on request



BC6, BC7

Main dimensions mm, inches

VB7 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

AC operated

VB7-30-10-F

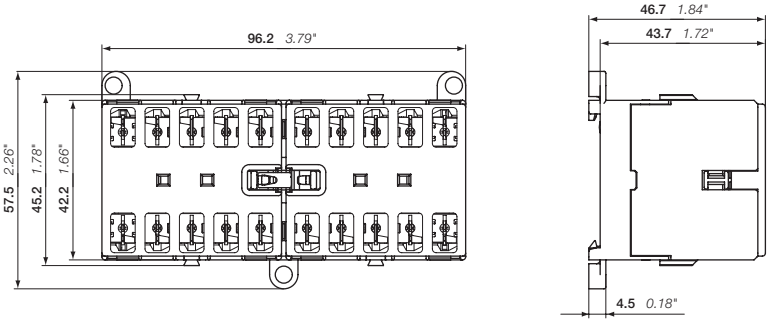
VB7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

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

Other types on request



VB7

Main dimensions mm, inches

VBC7 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

DC operated

VBC7-30-10-F

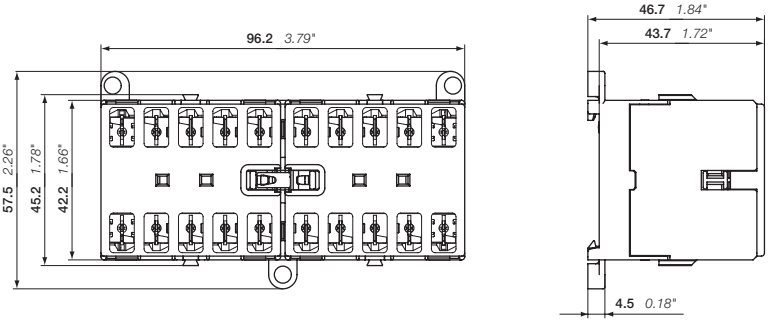
VBC7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
VBC7 mini reversing contactors									
5.5	20	5	600 V / 16 A	24	1 0	VBC7-30-10-F-01	GJL1313903R0101	5	0.345
					0 1	VBC7-30-01-F-01	GJL1313903R0011	5	0.345

Other types on request



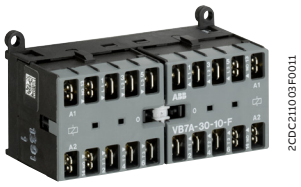
VBC7

Main dimensions mm, inches

VB7A 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

AC operated – with safety blocking function



VB7A-30-10-F

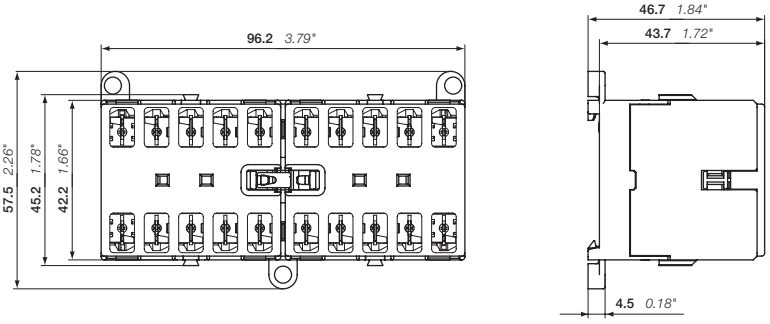
VB7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

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

Other types on request



VB7A

Main dimensions mm, inches

VBC7A 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

DC operated – with safety blocking function

VBC7A-30-10-F

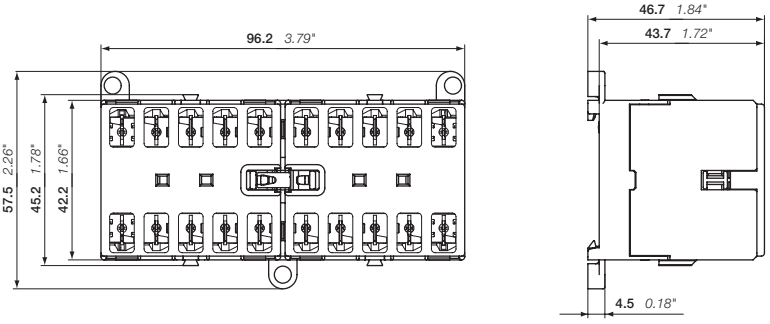
VBC7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Pkg qty	Weight (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating						
kW	A	hp		V DC					kg
VBC7A mini reversing contactors with safety blocking function									
5.5	20	5	600 V / 16 A	24	1 0	VBC7A-30-10-F-01	GJL1313913R0101	5	0.345
					0 1	VBC7A-30-01-F-01	GJL1313913R0011	5	0.345

Other types on request



VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated - low consumption

BC6-30-10-F

BC7-30-10-F

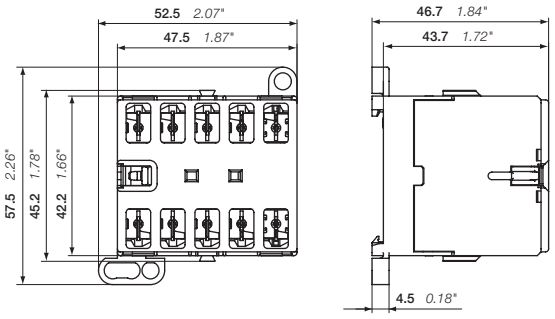
BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

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

Other types on request



BC6, BC7

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated - low consumption

BC6-30-10-F

BC7-30-10-F

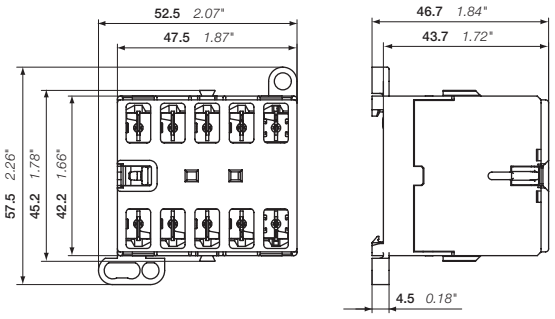
BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

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

Other types on request



BC6, BC7

Main dimensions mm, inches

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

DC operated

KC6-22Z-F-01

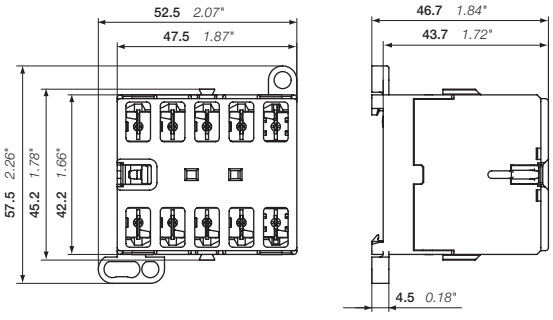
K6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

Rated control circuit voltage Uc V DC	Type	Order code	Pkg qty	Weight (1 pce) kg
2 N.O. + 2 N.C. contacts				
24	KC6-22Z-F-01	GJH1213003R0221	10	0.170
3 N.O. + 1 N.C. contacts				
24	KC6-31Z-F-01	GJH1213003R0311	10	0.170
4 N.O. contacts				
24	KC6-40E-F-01	GJH1213003R0401	10	0.170

Other types on request.



KC6

Main dimensions mm, inches

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

DC operated - low consumption

KC6-31Z-F-05

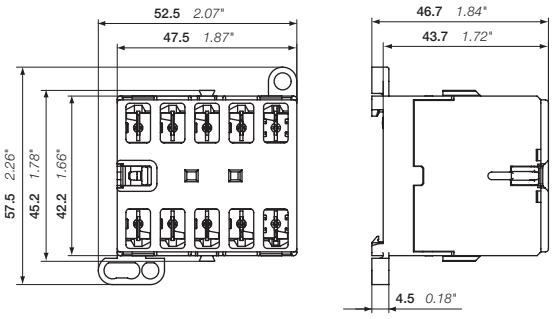
KC6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

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

Other types on request



KC6

Main dimensions mm, inches

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

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	**B6, VB6, VB6A**	**B7, VB7, VB7A**
	DC operated	**BC6, VBC6, VBC6A**	**BC7, VBC7, VBC7A**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1	
Rated operational voltage Ue max		690 V AC, 220 V DC	
Rated frequency (without derating)		DC or 50 / 60 Hz	
Conventional free-air thermal current Ith acc. to IEC/EN 60947-4-1, open contactors, θ ≤ 40 °C, with conductor cross-sectional area		Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 40 °C			
Ie / Rated operational current AC-1 Ue max ≤ 690 V, 50/60 Hz	240 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	400 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	440 V	Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A	
	500 V	12 A	
	690 V	6 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
Ie / Rated operational current AC-1 Ue max ≤ 690 V, 50/60 Hz	240 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	400 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	440 V	Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A	
	500 V	12 A	
	690 V	6 A	
AC-3 / AC-3e Utilization category for air temperature close to contactor θ ≤ 55 °C			
Ie / Rated operational current AC-3 / AC-3e 3-phase motors	240 V	9 A	12 A
	400 V	9 A	12 A
	440 V	8 A	11 A
	500 V	6.5 A	9 A
	690 V	3.5 A	3.5 A
Rated operational power AC-3 / AC-3e 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	240 V	2.2 kW	3 kW
	400 V	4 kW	5.5 kW
	440 V	4 kW	5.5 kW
	500 V	4 kW	5.5 kW
	690 V	3 kW	3 kW
Rated making capacity		10 x Ie AC-3 acc. to IEC/EN 60947-4-1; 13 x Ie AC-3e acc. to IEC/EN 60947-4-1	
Rated breaking capacity		8 x Ie AC-3 acc. to IEC/EN 60947-4-1; 8.5 x Ie AC-3e acc. to IEC/EN 60947-4-1	
Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG		Type 1: 25 A / Type 2: 20 A	Type 1: 25 A / Type 2: 25 A
Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state	10 s	64 A	96 A
Maximum breaking capacity cos ϕ = 0.45	at 400 V	64 A	96 A
Maximum electrical switching frequency	AC-1	300 cycles/h	
	AC-3	600 cycles/h	
	DC-1, DC-3, DC-5	600 cycles/h	

DC-1 / DC-3 / DC-5 Utilization category for air temperature close to the contactor θ ≤ 55 °C - valid for B7 only

Ie / Rated operational current	Per pole					Two poles in series					Three poles in series				
	24 V	48 V	60 V	110 V	220 V	24 V	48 V	60 V	110 V	220 V	24 V	48 V	60 V	110 V	220 V
DC-1 (L/R ≤ 1 ms)	16 A	16 A	16 A	5 A	0.6 A	16 A	16 A	16 A	16 A	5 A	16 A	16 A	16 A	16 A	14 A
DC-3 (L/R ≤ 2 ms)	16 A	8 A	8 A	1.5 A	0.25 A	16 A	16 A	16 A	7 A	1.5 A	16 A	16 A	16 A	15 A	4 A
DC-5 (L/R ≤ 7.5 ms)	16 A	2 A	2 A	0.4 A	0.2 A	16 A	16 A	16 A	2 A	1 A	16 A	16 A	16 A	8 A	2 A

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

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

Contactor types	AC operated	B6, VB6, VB6A	B7, VB7, VB7A
	DC operated	BC6, VBC6, VBC6A	BC7, VBC7, VBC7A
Standards		UL/CSA 60947-1, UL/CSA 60947-4-1	
Maximum operational voltage		600 V	
UL/CSA general use rating		12 A / 300 V (2)	16 A / 600 V (2)
UL/CSA maximum 1-phase motor rating			
Full load current	120 V AC	5.8 A	13.8 A
	240 V AC	4.9 A	10.0 A
Horse power rating	120 V AC	0.25 hp	0.75 hp
	240 V AC	0.5 hp	1.5 hp
UL/CSA maximum 3-phase motor rating			
Full load current (1)	200 / 208 V AC	4.8 / 4.6 A	7.8 / 10.6 A
	220-240 V AC	6.8 A	9.6 A
	440-480 V AC	4.8 A	7.6 A
	550-600 V AC	1.7 A	6.1 A
Horse power rating (1)	200 / 208 V AC	1 hp	2 / 3 hp
	220-240 V AC	2 hp	3 hp
	440-480 V AC	3 hp	5 hp
	550-600 V AC	1 hp	5 hp
Resistive Heating	300 V per pole	8 A	8 A
Incandescent Lamps	300 V per pole	6 A	6 A
Fluorescent Lamps	300 V per pole	8.4 A	8.4 A
Short-circuit protection device for contactors without thermal overload relay - motor protection excluded			
High fault current	600 V	100 kA (3)	
Fuse rating	600 V	40 A	
Fuse type	600 V	Class J	

(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) Versions equipped with soldering pin terminals: 8 A / 300 V for B6 series and 12 A / 600 V for B7 series
(3) Versions equipped with flat and soldering pin terminals: 5 kA

General technical data

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

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

Magnet system characteristics for B6, B7 contactors

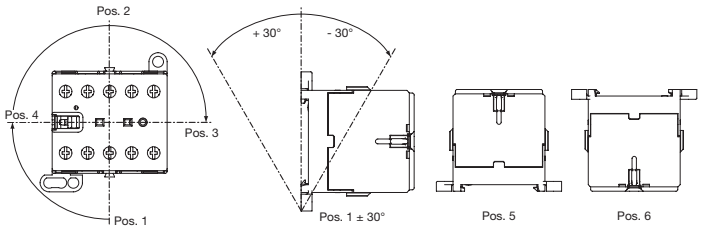
Contactor types	AC operated	**B6, VB6**	**B7, VB7**
Coil operating limits acc. to IEC/EN 60947-4-1	AC supply	0.85 ... 1.1 x Uc	
AC control voltage			
Rated control circuit voltage Uc		See ordering tables	
Coil consumption	Average pull-in value	3.5 VA	
	Average holding value	3.5 VA	
Drop-out voltage in % of Uc min		20 ... 75 %	

Magnet system characteristics for BC6, BC7 contactors

Contactor types	DC operated	**BC6, VBC6**	**BC7, VBC7**
Coil operating limits acc. to IEC/EN 60947-4-1	DC supply	0.85 ... 1.1 x Uc	
AC control voltage			
Rated control circuit voltage Uc		See ordering tables	
Coil consumption (1)	Average pull-in value	3.5 W	
	Average holding value	3.5 W	
Drop-out voltage in % of Uc min		10 ... 75 %	

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

Mounting characteristics and conditions for use

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

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

Built-in auxiliary contact according to IEC

Types		Built-in auxiliary contacts
Standards		IEC/EN 60947-1, IEC/EN 60947-5-1
Rated operational voltage Ue max		690 V AC, 250 V DC
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 40 °C		6 A
Ie / Rated operational current AC-15	24 V	4 A
	110-120 V	4 A
	220-230-240 V	4 A
	380-400 V	3 A
	440 V	3 A
Ie / Rated operational current DC-13	24 V	2.5 A
	110 V	0.7 A
	220 - 240 V	0.4 A
Short-circuit protection device - fuse type gG		6 A
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

Built-in auxiliary contact according to UL/CSA

Types	Built-in auxiliary contacts
Standard	UL/CSA 60947-1, UL/CSA 60947-5-1
Max. operational voltage	600 V AC
Pilot duty	A600

Connection characteristics

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

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

K6, KC6 4-pole mini contactor relays
Technical data

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	**K6**
	DC operated	**KC6**
Standards		IEC/EN 60947-1, IEC/EN 60947-5-1
Rated operational voltage Uemax		690 V AC, 250 V DC
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 40 °C		6 A
Ie / Rated operational current AC-15	24 V	4 A
	110-120 V	4 A
	220-230-240 V	4 A
	380-400 V	3 A
	440 V	3 A
	480-500 V	2 A
Ie / Rated operational current DC-13	24 V	2.5 A
	110 V	0.7 A
	220-240 V	0.4 A
Short-circuit protection device for contactors - fuse type gG		6 A
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

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

Contactor types	AC operated	**K6**
	DC operated	**KC6**
Standards		UL/CSA 60947-1, UL/CSA 60947-5-1
Maximum operational voltage		600 V AC
Pilot duty		A600

K6, KC6 4-pole mini contactor relays
Technical data

General technical data

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

Magnet system characteristics for K6 contactor relays

Contactor types	AC operated	**K6**
Coil operating limits acc. to IEC/EN 60947-5-1	AC supply	0.85 ... 1.1 x Uc
AC control voltage		
Rated control circuit voltage Uc		See ordering tables
Coil consumption	Average pull-in value	3.5 VA
	Average holding value	3.5 VA
Drop-out voltage in % of Uc min.		20 ... 75 %

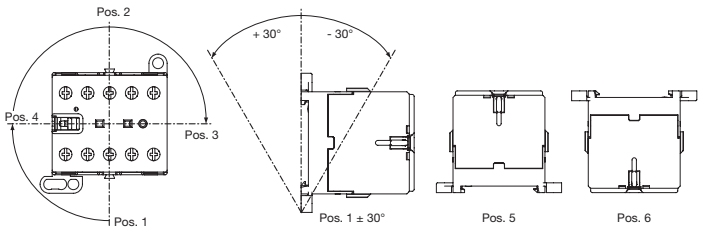
Magnet system characteristics for KC6 contactor relays

Contactor types	DC operated	**KC6**
Coil operating limits acc. to IEC/EN 60947-5-1	DC supply	0.85 ... 1.1 x Uc
DC control voltage		
Rated control circuit voltage Uc		See ordering tables
Coil consumption (1)	Average pull-in value	3.5 W
	Average holding value	3.5 W
Drop-out voltage in % of Uc min.		10 ... 75 %

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

K6, KC6 4-pole mini contactor relays
Technical data

Mounting characteristics and conditions for use

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

Connecting characteristics

Contactor types	AC operated	**K6**
	DC operated	**KC6**
Terminals (1)		 Screw terminals with cable clamp
Connection capacity		
Main conductors (poles)		
Rigid: solid and stranded	1 or 2 x	1 ... 4 mm²
Flexible without ferrule	1 or 2 x	1 ... 2.5 mm²
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 22 ... 10
Stripping length		9 mm
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in
Degree of protection acc. to IEC/EN60947-1 and IEC/EN 60529		
All		IP20
Screw terminals		(Delivered in open position, screws of unused terminals must be tightened)
All terminals		M3
Screwdriver type		Flat Ø 5.5 / Pozidriv 1

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

Accessories for B mini contactors

2CDC211012S0010

CAF6-11N

2CDC211008S0010

CA6-11E

2CDC211018S0011

CA6-11E-P

2CDC211020S0011

CA6-11E-F

2CDC211007S0010

RV-BC6/250

SST27792R

BSM6-30

2CDC231012S0011

LT6-B

Suitable for	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
Front mounted instantaneous auxiliary contact blocks (1) (2) (3)					
B6-, B7-40-00, BC6-, BC7-40-00 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11E	GJL1201330R0002	10	0.020
	2 0	CAF6-20E	GJL1201330R0006	10	0.020
	0 2	CAF6-02E	GJL1201330R0010	10	0.020
B6-, B7-30-10, BC6-, BC7-30-10 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11M	GJL1201330R0003	10	0.020
	2 0	CAF6-20M	GJL1201330R0007	10	0.020
	0 2	CAF6-02M	GJL1201330R0011	10	0.020
B6-, B7-30-01, BC6-, BC7-30-01 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A	1 1	CAF6-11N	GJL1201330R0004	10	0.020
	2 0	CAF6-20N	GJL1201330R0008	10	0.020
	0 2	CAF6-02N	GJL1201330R0012	10	0.020
Side mounted instantaneous auxiliary contact block (1) (2) (3)					
B6-, B7-40-00, BC6-, BC7-40-00	1 1	CA6-11E	GJL1201317R0002	10	0.030
B6-, B7-30-10, BC6-, BC7-30-10	1 1	CA6-11M	GJL1201317R0003	10	0.030
B6-, B7-30-01, BC6-, BC7-30-01	1 1	CA6-11N	GJL1201317R0004	10	0.030
Side mounted instantaneous auxiliary contact block with soldering pins (1) (2) (3)					
B6-, B7-40-00-P, BC6-,BC7-40-00-P	1 1	CA6-11E-P	GJL1201319R0002	10	0.025
B6-, B7-30-10-P, BC6-, BC7-30-10-P	1 1	CA6-11M-P	GJL1201319R0003	10	0.025
B6-, B7-30-01-P, BC6-, BC7-30-01-P	1 1	CA6-11N-P	GJL1201319R0004	10	0.025
Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2) (3)					
B6-, B7-40-00-F, BC6-,BC7-40-00-F	1 1	CA6-11E-F	GJL1201318R0002	10	0.025
B6-, B7-30-10-F, BC6-, BC7-30-10-F	1 1	CA6-11M-F	GJL1201318R0003	10	0.025
B6-, B7-30-01-F, BC6-, BC7-30-01-F	1 1	CA6-11N-F	GJL1201318R0004	10	0.025
Soldering socket (Ith = 10 A, AC-3: 500 V / 8 A, 690 V / 3.5 A, UL: 300 V / 8 A)					
B6, B7, BC6, BC7		LB6	GJL1201902R0001	10	0.020
2-pole aux.contact blocks CA		LB6-CA	GJL1201903R0001	10	0.010

(1) Not allowed for mounting on B6S, B7S and low consumption contactors.
(2) CA6 and CAF6 must not be fitted simultaneously.
(3) The auxiliary contacts in the front or side blocks are not Mirror contacts.

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

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

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

Accessories for K mini contactor relays

2CDC211019S0011

CAF6-11K

2CDC211009S0010

CA6-11K

2CDC211015S0010

CA6-11K-P

2CDC211010S0010

CA6-11K-F

2CDC211006S0010

LT6-B

2CDC211007S0010

RV-BC6/250

Suitable for	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
Front mounted instantaneous auxiliary contact blocks (1) (2) (3)					
K6, KC6	1 1	CAF6-11K	GJL1201330R0001	10	0.020
	2 0	CAF6-20K	GJL1201330R0005	10	0.020
	0 2	CAF6-02K	GJL1201330R0009	10	0.020
Side mounted instantaneous auxiliary contact block (1) (2) (3)					
K6, KC6	1 1	CA6-11K	GJL1201317R0001	10	0.030
Side mounted instantaneous auxiliary contact block with soldering pins (1) (2) (3)					
K6..P, KC6..P	1 1	CA6-11K-P	GJL1201319R0001	10	0.025
Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2) (3)					
K6..F, KC6..F	1 1	CA6-11K-F	GJL1201318R0001	10	0.025
Soldering socket (Ie < 8 A)					
K6, KC6		LB6	GJL1201902R0001	10	0.020
2-pole auxiliary contact blocks CA		LB6-CA	GJL1201903R0001	10	0.010

(1) Not allowed for mounting on K6S and low consumption contactor relays.
(2) CA6 and CAF6 must not be fitted simultaneously.
(3) The auxiliary contacts in the front or side blocks are not Mechanically linked contacts.

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

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

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

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

Auxiliary contacts for front mounting and side mounting according to IEC

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

Auxiliary contacts for front mounting and side mounting according to UL/CSA

Types	CA6, CAF6
Standards	UL/CSA 60947-1, UL/CSA 60947-5-1
Max. operational voltage	600 V AC
Pilot duty	A600
AC thermal rated current	5 A

Connection characteristics

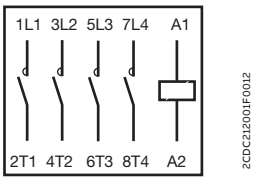
Types		CA6, CAF6
Terminals (1)		Screw terminals with cable clamp
Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals)		
Rigid: solid and stranded	1 or 2 x	1 ... 4 mm²
Flexible without ferrule	1 or 2 x	1 ... 2.5 mm²
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 22 ... 10
Stripping length		9 mm
Tightening torques		0.8 ... 1.1 Nm / 7 lb.in
Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529		
Auxiliary terminals		IP20
Screw terminals		(Delivered in open position, screws of unused terminals must be tightened)
All terminals		M3
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 1

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

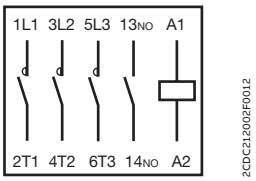
B mini contactors and K mini contactor relays

Terminal marking and positioning

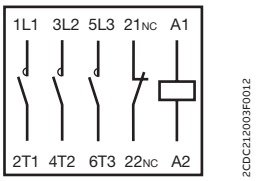
Mini contactors



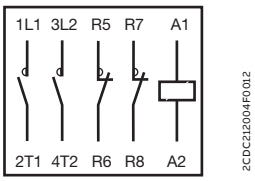
B6(7)-40-00 ...
BC6(7)-40-00 ...



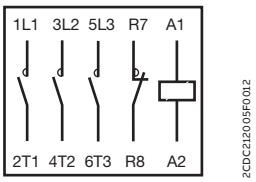
B6(7)-30-10 ...
BC6(7)-30-10 ...



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

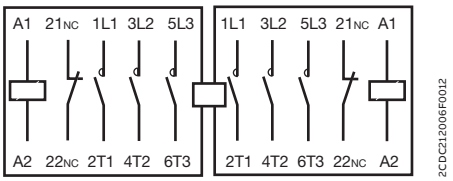


B6(7)-22-00 ...
BC6(7)-22-00 ...

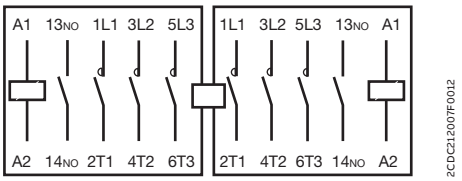


B6(7)-31-00 ...
BC6(7)-31-00 ...

Compact reversing contactors

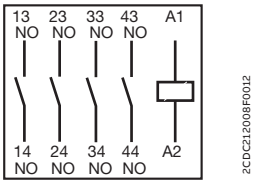


VB6(7)-30-01 ...
VBC6(7)-30-01 ...

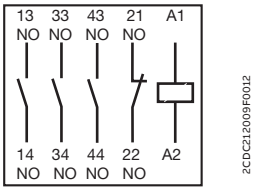


VB6(7)-30-10 ...
VBC6(7)-30-10 ...

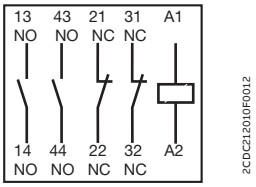
Mini contactor relays



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



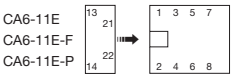
K6-31Z ...
KC6-31Z ...



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

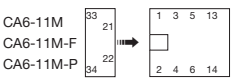
Auxiliary switches

CA6...



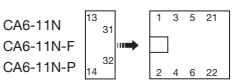
CA6-11E
CA6-11E-F
CA6-11E-P

B(C)6(7)-40-00
B(C)6(7)-40-00-F
B(C)6(7)-40-00-P



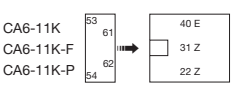
CA6-11M
CA6-11M-F
CA6-11M-P

B(C)6(7)-30-10
B(C)6(7)-30-10-F
B(C)6(7)-30-10-P



CA6-11N
CA6-11N-F
CA6-11N-P

B(C)6(7)-30-01
B(C)6(7)-30-01-F
B(C)6(7)-30-01-P

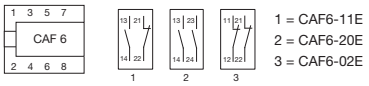


CA6-11K
CA6-11K-F
CA6-11K-P

K(C)6 .....
K(C)6 ....-F
K(C)6 ....-P

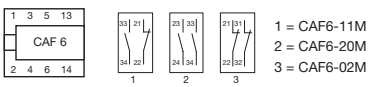
CAF...

B(C)6(7)-40-00



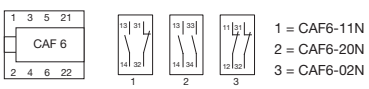
1 = CAF6-11E
2 = CAF6-20E
3 = CAF6-02E

B(C)6(7)-30-10



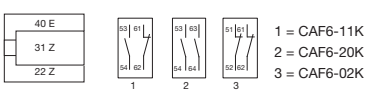
1 = CAF6-11M
2 = CAF6-20M
3 = CAF6-02M

B(C)6(7)-30-01



1 = CAF6-11N
2 = CAF6-20N
3 = CAF6-02N

K(C)6 .....

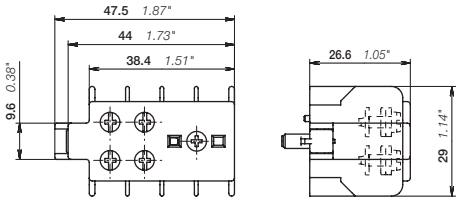


1 = CAF6-11K
2 = CAF6-20K
3 = CAF6-02K

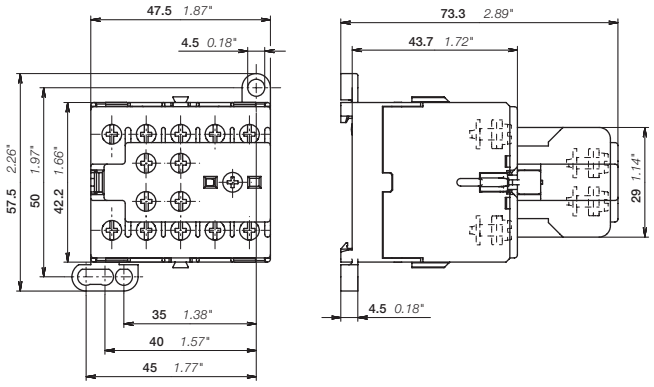
B mini contactors and K mini contactor relays

Dimension drawings with accessories

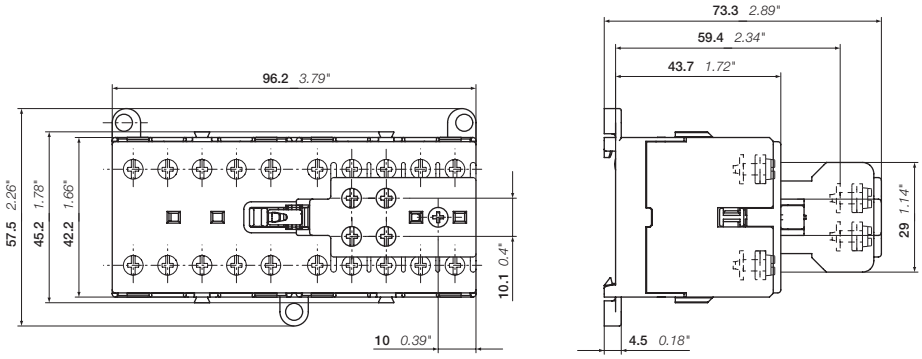
Front mounted auxiliary contact blocks, with screw terminals



CAF6

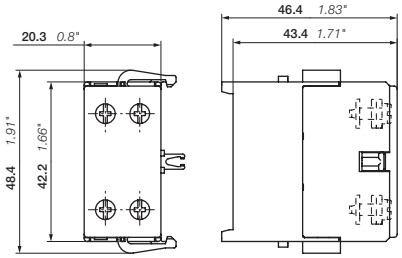


Mini contactors or contactor relays + CAF6

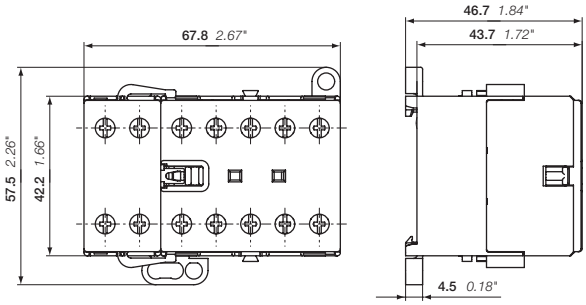


Mini reversing contactors + CAF6 (max. 2 contact blocks)

Side mounted auxiliary contact blocks, with screw terminals



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

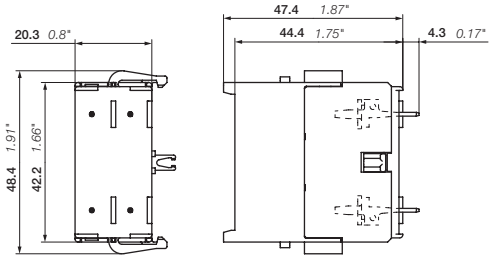


Mini contactors or contactor relays + CA6-11E, CA6-11M, CA6-11N

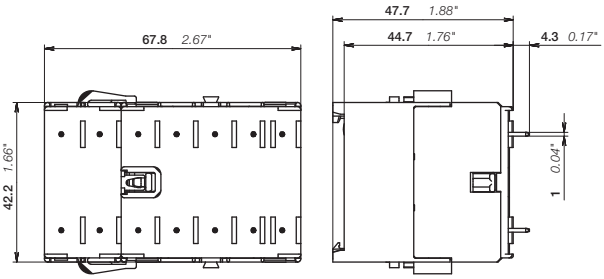
B mini contactors and K mini contactor relays

Dimension drawings with accessories

Side mounted auxiliary contact blocks, with soldering pins

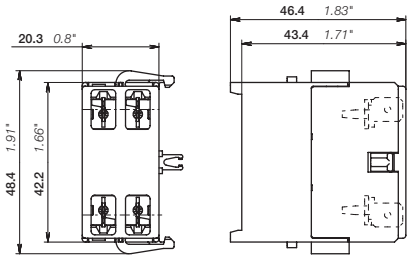


CA6-11E-P, CA6-11M-P, CA6-11N-P

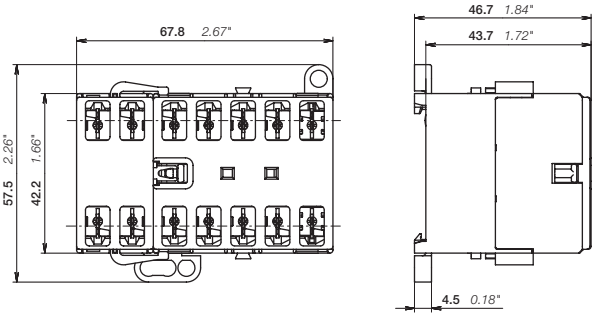


Mini contactors or contactor relays + CA6-11E-P, CA6-11M-P, CA6-11N-P

Side mounted auxiliary contact blocks, with flat pin connection

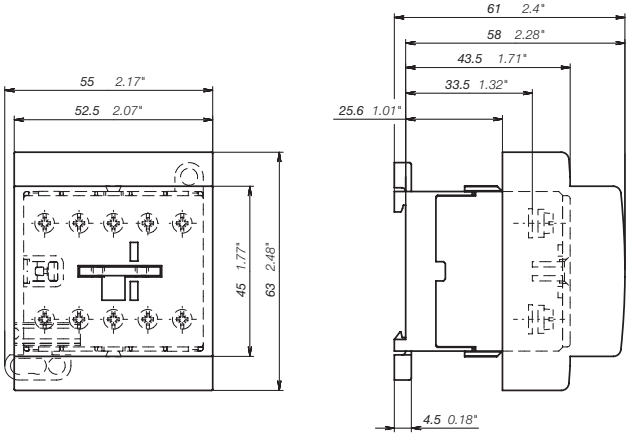


CA6-11E-F, CA6-11M-F, CA6-11N-F



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

Front mounted cover cap for DIN rail panel installation

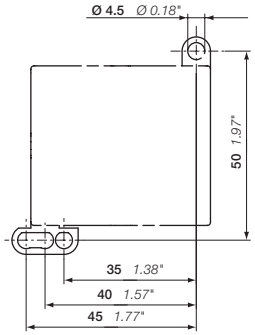


Mini contactors or contactor relays + LT6-B cover cap

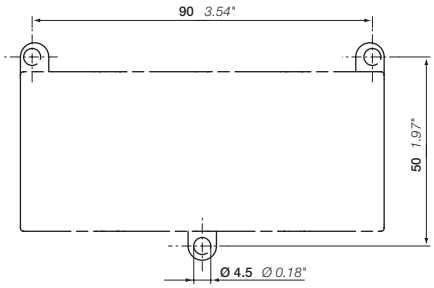
B mini contactors and K mini contactor relays

Dimension drawings with accessories

Drilling plans for wall mounting

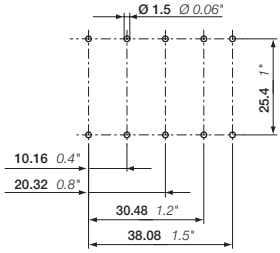


Mini contactors or contactor relays with screw terminals and flat pin connection

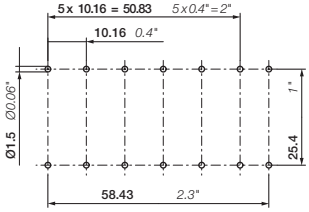


Mini reversing contactors with screw terminals and flat pin connection

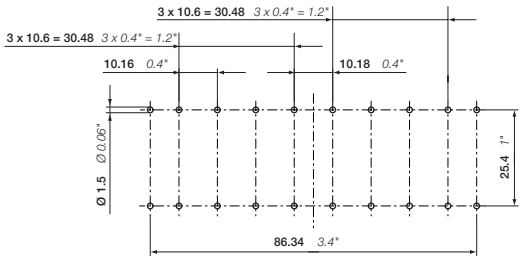
Drilling plans for PCBA



Mini contactors or contactor relays with soldering pins



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



Mini reversing contactors with soldering pins

Main dimensions mm, inches

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

www.abb.com/productdetails/**1SAL102617R9901**

M mini contactors and contactor relays

4/59 **Presentation**

4/60 **Overview**

3-pole mini contactors - 4 to 5.5 kW

With screw terminals

4/62	MC1A	AC operated
4/63	MC2A	AC operated
4/64	MC1C	DC operated
4/65	MC2C	DC operated
4/66	MC1I, MC1K, MC2I, MC2K	DC operated - low consumption

For ring tongue ferrules

4/67	MC1A..R, MC2A..R	AC operated
4/68	MC1C..R	DC operated
4/69	MC1K..R	DC operated - low consumption

4-pole mini contactors - 4 to 5.5 kW

With screw terminals

4/70	MC1A	AC operated
4/71	MC2A	AC operated
4/72	MC1C, MC2C	DC operated
4/73	MC1I, MC1K	DC operated - low consumption

For ring tongue ferrules

4/74	MC1A..R	AC operated
4/75	MC1C..R	DC operated
4/76	MC1K..R	DC operated - low consumption

4-pole mini contactor relays

With screw terminals

4/77	MCRA	AC operated
4/78	MCRC	DC operated
4/79	MCRI, MCRK	DC operated - low consumption

For ring tongue ferrules

4/80	MCRA..R	AC operated
4/81	MCRC..R	DC operated
4/82	MCRK..R	DC operated - low consumption

4/85 **Accessories**

4/87 **Technical data**

4/96 **Terminal marking and positioning**

4/98 **Dimensions**

M mini contactors and contactor relays
Reliability, always

The M contactors range is a performance-dimension optimized solution for all the purposes.
Its high reliability, even in extreme conditions, combined to the small sizes and the safe connections lead to easy design and compact panels.

Space-saving
Small dimensions for big projects
The M range devices are a great solution when high performances are needed but the space is limited. The small dimensions of the products and the possibility to mount them side by side will maximize the cost efficiency of the cabinets without making compromises.

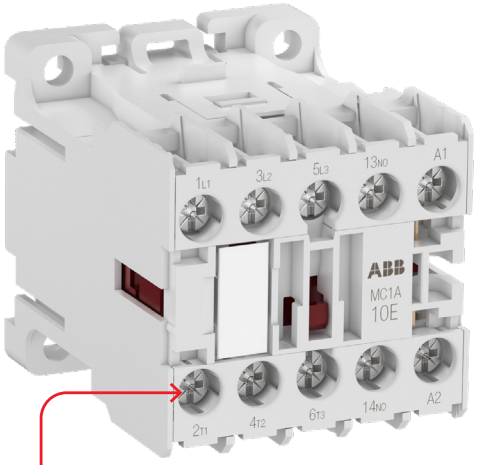
Reliability in extreme conditions
Made for all the applications
The technology used in the design of the contactors and the wide set of variants available guarantee reliability of operation with heavy working conditions as well. Instability of the network, high altitude and extreme temperatures will not be a limit anymore.

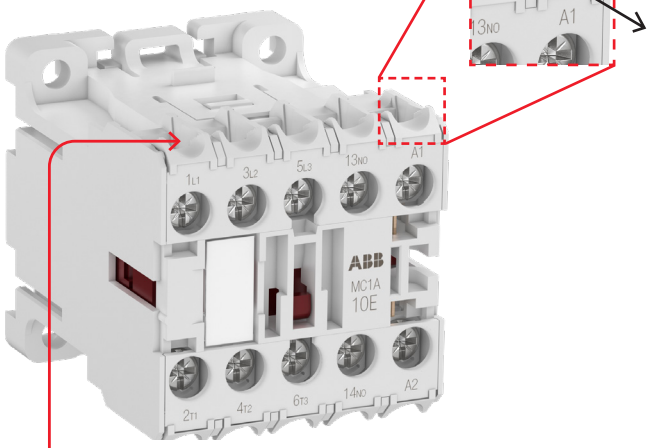
Optimum interface
Never without a solution
A wide set of coils is provided for matching all the requirements: pure AC or DC for very fast switching, with low energy consumption for direct control by PLC and with extended operating limits to face voltage fluctuations.
A complete offer for realizing your projects.

M mini contactors and contactor relays
Efficient - High performances in small dimensions

AC
or
DC

Lugs easy connection





Screw

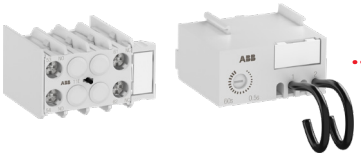
Screw terminals

The same screw is used for all the terminals and circuits of the device for an efficient and fast screwing. The connection is always stable, the range of usable wire dimensions wide and the maintenance easy.

Ring tongue ferrules

With specific screw terminal

A large set of contactors and contactor relays is equipped with specific screw terminals; these allow quick and simple installations using ring tongue ferrules. A must for applications with shocks and vibrations and when the solidity of the connection is a crucial factor.



Wide range of accessories

Up to 6 auxiliary contacts can be mounted on the devices, on the side or the front and with both the connection types. Electronic timers, surge suppressors and parallel connection links are also available in the assortment.

Assemble your reversing starter

Thanks to the mechanical interlock and the connection sets a compact reversing starter can be easily assembled for motor controlling in both directions. Auxiliary contact blocks can be installed on the front or on both sides of the reversing contactor.

Compact protection

The M mini contactors are fully compatible with manual motor starters and thermal overload relays for creating a very compact but still effective solution to defend your loads against current overloads and phase failures.

M mini contactors
Powerful - as a contactor, but mini

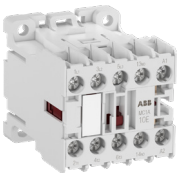
No more compromises.
Feel free to plan your panels without limitations - Having the large assortment of M mini contactors by your side, with their high level of design, the superior quality of materials, and wide set of accessories, there will be no more constraints to your control possibilities, in all applications

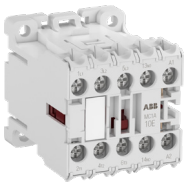
Plugging and inching motor control
M mini contactors are suitable for use in the control of AC-4 motors up to 4 kW at 400 V.

Household appliances
Thanks to plastic material compliant to the IEC 60335-1 standard clause 30, M mini contactors can be safely used in unattended household appliances

Harsh conditions
The standard main features of the M mini contactors are also compatible with all applications having harsh operating conditions: High temperature and altitude resistance, extended operating limit coils against network instability/voltage fluctuation, pure AC or DC coils for fast switching, high-performance materials.

M mini contactors





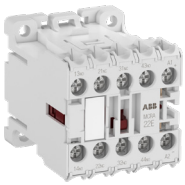
				Screw terminals		Screw terminals for ring tongue ferrules	
AC Control supply							
3-pole contactors	Coil consumption (50 Hz) 5.3 VA		Type	**MC1A..T**	**MC2A..T**	**MC1A..R**	**MC2A..R**
4-pole contactors	Coil consumption (50 Hz) 5.3 VA		Type	**MC1A..T**	**MC2A..T**	**MC1A..R**	**–**
DC Control supply							
3-pole contactors	Coil consumption 3 W		Type	**MC1C..T**	**MC2C..T**	**MC1C..R**	**–**
3-pole low consumption contactors	Coil consumption 1.2 / 2 W		Type	**MC1I..T / MC1K..T**	**MC2I..T / MC2K..T**	**MC1K..R**	**–**
3-pole extended limits coil contactors	Coil consumption 4 W		Type	**MC1C..TW**	**MC2C..TW**	**–**	**–**
4-pole contactors	Coil consumption 3 W		Type	**MC1C..T**	**–**	**MC1C..R**	**–**
4-pole low consumption contactors	Coil consumption 1.2 / 2 W		Type	**MC1I..T / MC1K..T**	**–**	**MC1K..R**	**–**
4-pole extended limits coil contactors	Coil consumption 4 W		Type	**MC1C..TW**	**MC2C..TW**	**–**	**–**
IEC Rated operational power AC-3	230 V		kW	2.2	3	2.2	3
	400 V		kW	4	5.5	4	5.5
	500 V		kW	4	5.5	4	5.5
	690 V		kW	4 (1)	4 (1)	4 (1)	4 (1)
Rated operational current AC-1	400 V, θ ≤ 55 °C		A	20	20	20	20
UL/CSA 3-phase motor rating	200 V AC		hp	3	3	3	3
	240 V AC		hp	3	3	3	3
	380-425 V AC		hp	3	5	3	5
	440-480 V AC		hp	5	7.5	5	7.5
	500-600 V AC		hp	5	10	5	10
General use rating			A	20 (600 V)	20 (600 V)	20 (600 V)	20 (600 V)

Main accessories		
Auxiliary contact blocks	Front mounting	MACN / MARN
	Side mounting	MACL / MARL
Electronic timers		MREBC
Connection sets	For reversing contactors	WKMIU
Surge suppressors		MP0

Overload relays		
Thermal overload relays	Class 10	T16
Thermal and phase failure protection, with single setup possible		

(1) Valid for N.O. contacts only.

M mini contactor relays



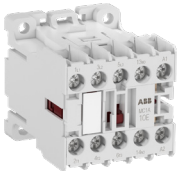
				Screw terminals	Screw terminals for ring tongue ferrules
AC Control supply					
4-pole contactor relays	Coil consumption (50 Hz) 5.3 VA		Type	**MCRA..T**	**MCRA..R**
DC Control supply					
4-pole contactor relays	Coil consumption 3 W		Type	**MCRC..T**	**MCRC..R**
4-pole low consumption contactor relays	Coil consumption 1.2 / 2 W		Type	**MCRI..T / MCRK..T**	**MCRK..R**
4-pole extended limits coil contactor relays	Coil consumption 4 W		Type	**MCRC..TW**	**–**
IEC Rated operational current AC-15	240 V		A	6	6
	400 V		A	4	4
Rated operational current DC-13	24 V		A	5	5
UL/CSA Pilot duty				A600, Q600	

Main accessories		
Auxiliary contact blocks	Front mounting	MARN
	Side mounting	MARL
Electronic timers		MREBC
Surge suppressor		MP0

MC1A 3-pole mini contactors with screw terminals

4 kW

AC operated



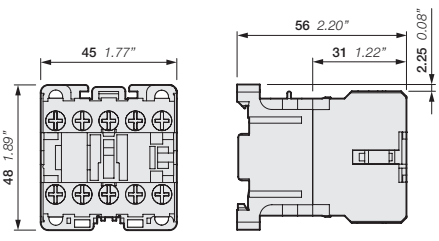
MC1A310AT

MC1A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current θ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
4	20	5	20	24	24	1 0	MC1A310AT1	1SAL102617R9901	0.170
						0 1	MC1A301AT1	1SAL102638R9901	0.170
				48	48	1 0	MC1A310AT9	1SAL100298R9901	0.170
						0 1	MC1A301AT9	1SAL100320R9901	0.170
				110...115	110...120	1 0	MC1A310ATJ	1SAL100213R9901	0.170
						0 1	MC1A301ATJ	1SAL100223R9901	0.170
				120	120	1 0	MC1A310AT4	1SAL102620R9901	0.170
						0 1	MC1A301AT4	1SAL102641R9901	0.170
				–	208...220	1 0	MC1A310ATM	1SAL102611R9901	0.170
						0 1	MC1A301ATM	1SAL220348R9901	0.170
				220...230	220...230	1 0	MC1A310AT6	1SAL102622R9901	0.170
						0 1	MC1A301AT6	1SAL102643R9901	0.170
				220...240	240...277	1 0	MC1A310ATN	1SAL100214R9901	0.170
						0 1	MC1A301ATN	1SAL100224R9901	0.170
				240	240	1 0	MC1A310AT7	1SAL102623R9901	0.170
						0 1	MC1A301AT7	1SAL102995R9901	0.170
				380...400	440	1 0	MC1A310ATU	1SAL100215R9901	0.170
						0 1	MC1A301ATU	1SAL100225R9901	0.170
				415...440	480	1 0	MC1A310ATW	1SAL102615R9901	0.170
						0 1	MC1A301ATW	1SAL102636R9901	0.170
				500	600	1 0	MC1A310ATY	1SAL102616R9901	0.170
						0 1	MC1A301ATY	1SAL102637R9901	0.170



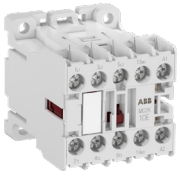
MC1A

Main dimensions mm, inches

MC2A 3-pole mini contactors with screw terminals

5.5 kW

AC operated



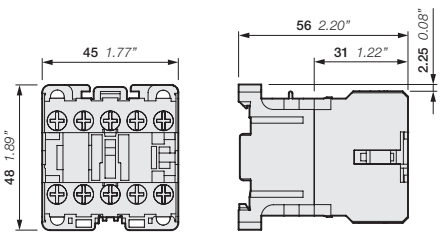
MC2A310AT

MC2A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
5.5	20	7.5	20	24	24	1 0	MC2A310AT1	1SAL103577R9902	0.170
						0 1	MC2A301AT1	1SAL103569R9902	0.170
				48	48	1 0	MC2A310AT9	1SAL103268R9902	0.170
						0 1	MC2A301AT9	1SAL103269R9902	0.170
				110...115	110...120	1 0	MC2A310ATJ	1SAL103573R9902	0.170
						0 1	MC2A301ATJ	1SAL103565R9902	0.170
				120	120	1 0	MC2A310AT4	1SAL101644R9902	0.170
						0 1	MC2A301AT4	1SAL101641R9902	0.170
				–	208...220	1 0	MC2A310ATM	1SAL103835R9902	0.170
						0 1	MC2A301ATM	1SAL100046R9902	0.170
				220...230	220...230	1 0	MC2A310AT6	1SAL103579R9902	0.170
						0 1	MC2A301AT6	1SAL103571R9902	0.170
				220...240	240...277	1 0	MC2A310ATN	1SAL103574R9902	0.170
						0 1	MC2A301ATN	1SAL103566R9902	0.170
				240	240	1 0	MC2A310AT7	1SAL101875R9902	0.170
						0 1	MC2A301AT7	1SAL101877R9902	0.170
				380...400	440	1 0	MC2A310ATU	1SAL103575R9902	0.170
						0 1	MC2A301ATU	1SAL103567R9902	0.170
				415...440	480	1 0	MC2A310ATW	1SAL135704R9902	0.170
						0 1	MC2A301ATW	1SAL135705R9902	0.170
				500	600	1 0	MC2A310ATY	1SAL101876R9902	0.170
						0 1	MC2A301ATY	1SAL101907R9902	0.170



MC2A

Main dimensions mm, inches

MC1C 3-pole mini contactors with screw terminals

4 kW

DC operated

MC1C310AT

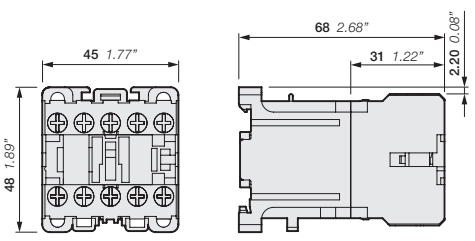
MC1C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1pce)
kW	A	hp	A	V DC				kg
MC1C mini contactors								
4	20	5	20	12	1 0	MC1C310ATB	1SAL100210R9901	0.250
					0 1	MC1C301ATB	1SAL100220R9901	0.250
				24	1 0	MC1C310ATD	1SAL100216R9901	0.250
					0 1	MC1C301ATD	1SAL100226R9901	0.250
				24 with Diode	1 0	MC1C310ATDD	1SAL113312R9901	0.250
					0 1	MC1C301ATDD	1SAL113328R9901	0.250
MC1C mini contactors with extended operating limits coil								
4	20	5	20	24*	1 0	MC1C310ATWD	1SAL220373R9901	0.250
					0 1	MC1C301ATWD	1SAL220372R9901	0.250
				48*	1 0	MC1C310ATWG	1SAL100380R9901	0.250
					0 1	MC1C301ATWG	1SAL200795R9901	0.250
				110*	1 0	MC1C310ATWJ	1SAL220371R9901	0.250
					0 1	MC1C301ATWJ	1SAL220370R9901	0.250
				125*	1 0	MC1C310ATWL	1SAL220460R9901	0.250
					0 1	MC1C301ATWL	1SAL220459R9901	0.250
				220*	1 0	MC1C310ATWN	1SAL220369R9901	0.250
					0 1	MC1C301ATWN	1SAL220368R9901	0.250

* With the extended operating limits coils:
- at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC1C

Main dimensions mm, inches

MC2C 3-pole mini contactors with screw terminals

5.5 kW

DC operated

MC2C310AT

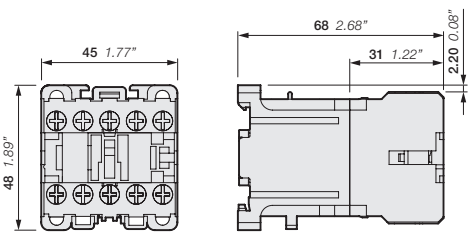
MC2C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
kW	A	hp	A	V DC				kg
MC2C mini contactors								
5.5	20	7.5	20	12	1 0	MC2C310ATB	1SAL103588R9902	0.250
					0 1	MC2C301ATB	1SAL103589R9902	0.250
				24	1 0	MC2C310ATD	1SAL103584R9902	0.250
					0 1	MC2C301ATD	1SAL103580R9902	0.250
				24 with Diode	1 0	MC2C310ATDD	1SAL101926R9902	0.250
					0 1	MC2C301ATDD	1SAL101955R9902	0.250
MC2C mini contactors with extended operating limits coil								
5.5	20	7.5	20	24*	1 0	MC2C310ATWD	1SAL102378R9902	0.250
					0 1	MC2C301ATWD	1SAL102379R9902	0.250
				48*	1 0	MC2C310ATWG	1SAL101951R9902	0.250
					0 1	MC2C301ATWG	1SAL101958R9902	0.250
				110*	1 0	MC2C310ATWJ	1SAL102381R9902	0.250
					0 1	MC2C301ATWJ	1SAL102382R9902	0.250
				125*	1 0	MC2C310ATWL	1SAL204887R9902	0.250
					0 1	MC2C301ATWL	1SAL204886R9902	0.250
				220*	1 0	MC2C310ATWN	1SAL100442R9902	0.250
					0 1	MC2C301ATWN	1SAL100435R9902	0.250

* With the extended operating limits coils:
- at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC2C

Main dimensions mm, inches

MC1I, MC1K, MC2I, MC2K 3- pole mini contactors with screw terminals

4 to 5.5 kW

DC operated - low consumption

MC1I310AT

MC2I310AT

MC1K310AT

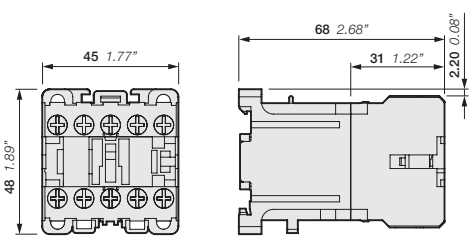
MC2K310AT

MC..I and MC..K 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce)
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					
kW	A	hp	A	V DC				kg
DC operation 24 V / 1.2 W								
4	20	7.5	20	24	1 0	MC1I310ATD	1SAL100572R9901	0.250
					0 1	MC1I301ATD	1SAL100573R9901	0.250
5.5	20	7.5	20	24	1 0	MC2I310ATD	1SAL100559R9902	0.250
					0 1	MC2I301ATD	1SAL100538R9902	0.250
DC operation 24 V / 2 W								
4	20	7.5	20	24	1 0	MC1K310ATD	1SAL100576R9901	0.250
					0 1	MC1K301ATD	1SAL100577R9901	0.250
5.5	20	7.5	20	24	1 0	MC2K310ATD	1SAL103590R9902	0.250
					0 1	MC2K301ATD	1SAL103591R9902	0.250



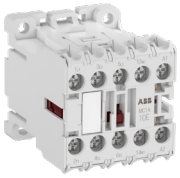
MC1I, MC1K, MC2I, MC2K

Main dimensions mm, inches

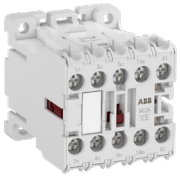
MC1A..R, MC2A..R 3-pole mini contactors for ring tongue ferrules

4 to 5.5 kW

AC operated



MC1A310AR



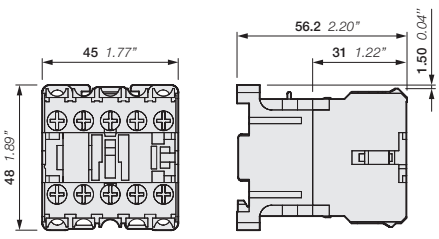
MC2A310AR

MC1A..R and MC2A..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
MC1A mini contactors									
4	20	5	20	24	24	1 0	MC1A310AR1	1SAL103386R9901	0.170
						0 1	MC1A301AR1	1SAL103399R9901	0.170
				110 ... 115	110 ... 120	1 0	MC1A310ARJ	1SAL100182R9901	0.170
						0 1	MC1A301ARJ	1SAL100175R9901	0.170
				220 ... 230	220 ... 230	1 0	MC1A310AR6	1SAL102157R9901	0.170
						0 1	MC1A301AR6	1SAL102158R9901	0.170
MC2A mini contactors									
5.5	20	7.5	20	24	24	1 0	MC2A310AR1	1SAL103412R9902	0.170
						0 1	MC2A301AR1	1SAL103425R9902	0.170
				110 ... 115	110 ... 120	1 0	MC2A310ARJ	1SAL103414R9902	0.170
						0 1	MC2A301ARJ	1SAL103427R9902	0.170
				220 ... 230	220 ... 230	1 0	MC2A310AR6	1SAL102175R9902	0.170
						0 1	MC2A301AR6	1SAL102176R9902	0.170



MC1A..R, MC2A..R

Main dimensions mm, inches

MC1C..R 3-pole mini contactors for ring tongue ferrules

4 kW

DC operated

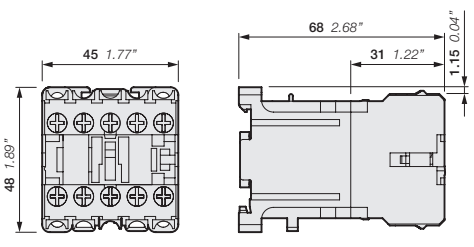
MC1C310AR

MC1C..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
kW	A	hp	A	V DC				kg
4	20	5	20	12	1 0	MC1C310ARB	1SAL101847R9901	0.250
					0 1	MC1C301ARB	1SAL101848R9901	0.250



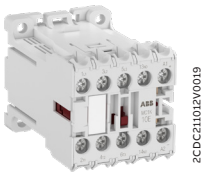
MC1C..R

Main dimensions mm, inches

MC1K..R 3-pole mini contactors for ring tongue ferrules

4 kW

DC operated - low consumption



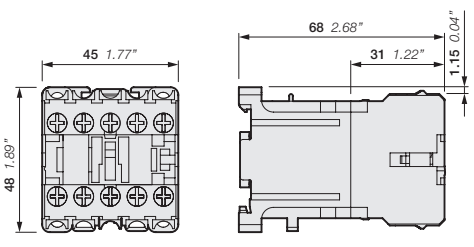
MC1K310AR

MC1K..R 3-pole interface mini contactors are high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC		UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
kW	A	hp	A	V DC				kg
DC operation 24 V / 2 W								
4	20	5	20	24	1 0	MC1K310ARD	1SAL103446R9901	0.250
					0 1	MC1K301ARD	1SAL101858R9901	0.250



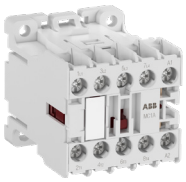
MC1K..R

Main dimensions mm, inches

MC1A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated



MC1A400AT

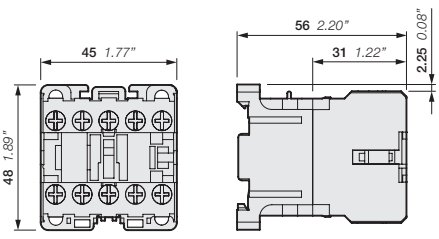
MC1A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
A	hp	A	V 50 Hz	V 60 Hz				kg
4 N.O. main poles								
20	5	20	24	24	0 0	MC1A400AT1	1SAL102986R9901	0.170
			48	48	0 0	MC1A400AT9	1SAL100296R9901	0.170
			110 ... 115	110 ... 120	0 0	MC1A400ATJ	1SAL100363R9901	0.170
			120	120	0 0	MC1A400AT4	1SAL102989R9901	0.170
			–	208 ... 220	0 0	MC1A400ATM	1SAL102980R9901	0.170
			220 ... 230	220 ... 230	0 0	MC1A400AT6	1SAL102991R9901	0.170
			220 ... 240	240 ... 277	0 0	MC1A400ATN	1SAL100364R9901	0.170
			240	240	0 0	MC1A400AT7	1SAL103101R9901	0.170
			380 ... 400	440	0 0	MC1A400ATU	1SAL100365R9901	0.170
			415 ... 440	480	0 0	MC1A400ATW	1SAL102984R9901	0.170
			500	600	0 0	MC1A400ATY	1SAL102985R9901	0.170
2 N.O. + 2 N.C. main poles								
20	5	20	24	24	0 0	MC1AB00AT1	1SAL103007R9901	0.170
			48	48	0 0	MC1AB00AT9	1SAL100400R9901	0.170
			110 ... 115	110 ... 120	0 0	MC1AB00ATJ	1SAL100373R9901	0.170
			120	120	0 0	MC1AB00AT4	1SAL103010R9901	0.170
			–	208 ... 220	0 0	MC1AB00ATM	1SAL103001R9901	0.170
			220 ... 230	220 ... 230	0 0	MC1AB00AT6	1SAL103012R9901	0.170
			240	240	0 0	MC1AB00AT7	1SAL103099R9901	0.170
			220 ... 240	240 ... 277	0 0	MC1AB00ATN	1SAL100374R9901	0.170
			380 ... 400	440	0 0	MC1AB00ATU	1SAL100375R9901	0.170
			415 ... 440	480	0 0	MC1AB00ATW	1SAL101834R9901	0.170
			500	600	0 0	MC1AB00ATY	1SAL103006R9901	0.170

Note: Other contact configuration available. Please consult your ABB local sales organization.



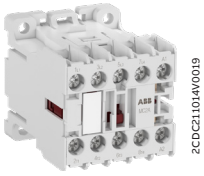
MC1A

Main dimensions mm, inches

MC2A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated



MC2A400AT

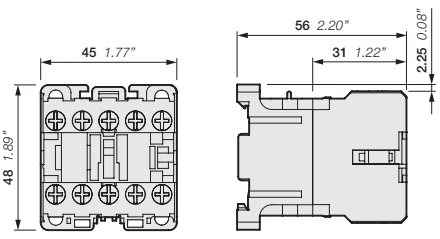
MC2A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current □ ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
A	hp	A	V 50 Hz	V 60 Hz				kg
4 N.O. main poles								
20	7.5	20	24	24	0 0	MC2A400AT1	1SAL101645R9902	0.170
			48	48	0 0	MC2A400AT9	1SAL116195R9902	0.170
			110 ... 115	110 ... 120	0 0	MC2A400ATJ	1SAL116184R9902	0.170
			120	120	0 0	MC2A400AT4	1SAL101647R9902	0.170
			–	208 ... 220	0 0	MC2A400ATM	1SAL101912R9902	0.170
			220 ... 230	220 ... 230	0 0	MC2A400AT6	1SAL103595R9902	0.170
			220 ... 240	240 ... 277	0 0	MC2A400ATN	1SAL116177R9902	0.170
			240	240	0 0	MC2A400AT7	1SAL101910R9902	0.170
			380 ... 400	440	0 0	MC2A400ATU	1SAL103292R9902	0.170
			415 ... 440	480	0 0	MC2A400ATW	1SAL116193R9902	0.170
			500	600	0 0	MC2A400ATY	1SAL101915R9902	0.170
2 N.O. + 2 N.C. main poles								
20	7.5	20	24	24	0 0	MC2AB00AT1	1SAL101648R9902	0.170
			48	48	0 0	MC2AB00AT9	1SAL248068R9902	0.170
			110 ... 115	110 ... 120	0 0	MC2AB00ATJ	1SAL110548R9902	0.170
			120	120	0 0	MC2AB00AT4	1SAL101650R9902	0.170
			–	208 ... 220	0 0	MC2AB00ATM	1SAL101918R9902	0.170
			220 ... 230	220 ... 230	0 0	MC2AB00AT6	1SAL103027R9902	0.170
			220 ... 240	240 ... 277	0 0	MC2AB00ATN	1SAL135699R9902	0.170
			240	240	0 0	MC2AB00AT7	1SAL101917R9902	0.170
			380 ... 400	440	0 0	MC2AB00ATU	1SAL101919R9902	0.170
			415 ... 440	480	0 0	MC2AB00ATW	1SAL247441R9902	0.170
			500	600	0 0	MC2AB00ATY	1SAL101923R9902	0.170

Note: Other contact configuration available. Please consult your ABB local sales organization.



MC2A

Main dimensions mm, inches

MC1C, MC2C 4-pole mini contactors with screw terminals

4 to 5.5 kW

DC operated

MC1C400AT

MC2C400AT

MC1C, MC2C 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

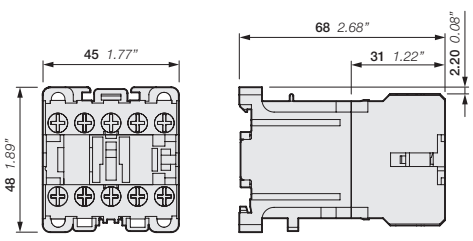
These contactors are designed with 4 main poles:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current □ ≤ 55 °C AC-1 A	3-phase motor rating 480 V hp	General use rating 600 V AC A	V DC				Pkg (1 pce) kg
4 N.O. main poles							
20	5	20	12	0 0	MC1C400ATB	1SAL100360R9901	0.250
			24	0 0	MC1C400ATD	1SAL100366R9901	0.250
			24 with Diode	0 0	MC1C400ATDD	1SAL101841R9901	0.250
4 N.O. main poles mini contactors with extended operating limits coil							
20	5	20	24*	0 0	MC1C400ATWD	1SAL220344R9901	0.250
			48*	0 0	MC1C400ATWG	1SAL220364R9901	0.250
			110*	0 0	MC1C400ATWJ	1SAL220342R9901	0.250
			125*	0 0	MC1C400ATWL	1SAL220462R9901	0.250
			220*	0 0	MC1C400ATWN	1SAL220340R9901	0.250
20	7.5	20	24*	0 0	MC2C400ATWD	1SAL101961R9902	0.250
			48*	0 0	MC2C400ATWG	1SAL101962R9902	0.250
			110*	0 0	MC2C400ATWJ	1SAL101963R9902	0.250
			125*	0 0	MC2C400ATWL	1SAL101964R9902	0.250
			220*	0 0	MC2C400ATWN	1SAL100445R9902	0.250
2 N.O. + 2 N.C. main poles mini contactors with extended operating limits coil							
20	5	20	24*	0 0	MC1CB00ATWD	1SAL220345R9901	0.250
			48*	0 0	MC1CB00ATWG	1SAL220366R9901	0.250
			110*	0 0	MC1CB00ATWJ	1SAL220343R9901	0.250
			125*	0 0	MC1CB00ATWL	1SAL220461R9901	0.250
			220*	0 0	MC1CB00ATWN	1SAL220341R9901	0.250
20	7.5	20	24*	0 0	MC2CB00ATWD	1SAL101965R9902	0.250
			48*	0 0	MC2CB00ATWG	1SAL101966R9902	0.250
			110*	0 0	MC2CB00ATWJ	1SAL101967R9902	0.250
			125*	0 0	MC2CB00ATWL	1SAL204888R9902	0.250
			220*	0 0	MC2CB00ATWN	1SAL101968R9902	0.250

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:
  - at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
  - a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC1C, MC2C

Main dimensions mm, inches

MC1I, MC1K 4-pole mini contactors with screw terminals

4 kW

DC operated - low consumption

MC1I400AT

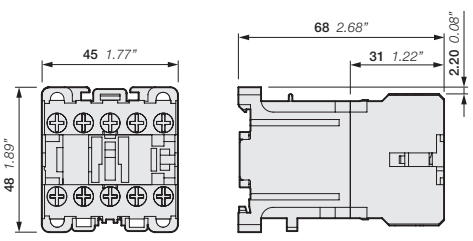
MC1K400AT

MC1I, MC1K 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc	Type	Order code	Weight
Rated operational current ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC				Pkg (1 pce)
A	hp	A	V DC			kg
DC operation 24 V / 1.2 W						
20	5	20	24	MC1I400ATD	1SAL101840R9901	0.250
DC operation 24 V / 2 W						
20	5	20	24	MC1K400ATD	1SAL100569R9901	0.250



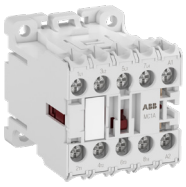
MC1I, MC1K

Main dimensions mm, inches

MC1A..R 4-pole mini contactors for ring tongue ferrules

4 kW

AC operated



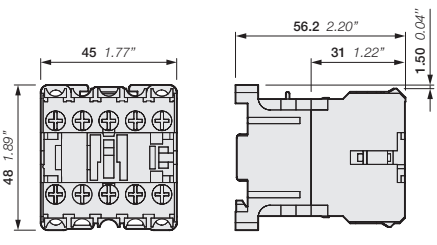
MC1A400AR

MC1A..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
A	hp	A	V 50 Hz	V 60 Hz				kg
4 N.O. main poles								
20	5	20	24	24	0 0	MC1A400AR1	1SAL102160R9901	0.170
			110 ... 115	110 ... 120	0 0	MC1A400ARJ	1SAL102166R9901	0.170
			220 ... 230	220 ... 230	0 0	MC1A400AR6	1SAL102164R9901	0.170
2 N.O. + 2 N.C. main poles								
20	5	20	24	24	0 0	MC1AB00AR1	1SAL102172R9901	0.170
			110 ... 115	110 ... 120	0 0	MC1AB00ARJ	1SAL102174R9901	0.170
			220 ... 230	220 ... 230	0 0	MC1AB00AR6	1SAL102173R9901	0.170



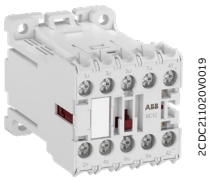
MC1A..R

Main dimensions mm, inches

MC1C..R 4-pole mini contactors for ring tongue ferrules

4 kW

DC operated



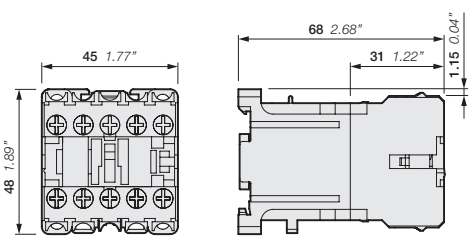
MC1C400AR

MC1C..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational current ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
A	hp	A	V DC				kg
4 N.O. main poles							
20	5	20	12	0 0	MC1C400ARB	1SAL101859R9901	0.250



MC1C..R

Main dimensions mm, inches

MC1K..R 4-pole mini contactors for ring tongue ferrules

4 kW

DC operated - low consumption

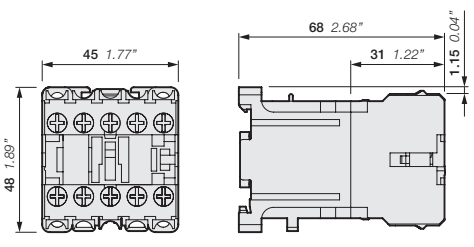
MC1K400AR

MC1K..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

IEC	UL/CSA		Rated control circuit voltage Uc	Type	Order code	Weight
Rated operational current ≤ 55 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC				Pkg (1 pce)
A	hp	A	V DC			kg
20	5	20	24	MC1K400ARD	1SAL101860R9901	0.250



MC1K..R

Main dimensions mm, inches

MCRA 4-pole mini contactor relays with screw terminals

AC operated

MCRA040AT

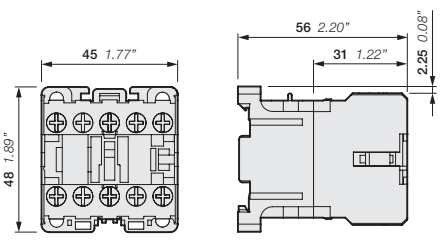
MCRA 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc		Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce)
V 50 Hz	V 60 Hz				kg
4 N.O. poles					
24	24	4 0	MCRA040AT1	1SAH102013R9900	0.170
48	48	4 0	MCRA040AT9	1SAH108237R9900	0.170
110 ... 115	110 ... 120	4 0	MCRA040ATJ	1SAH100003R9900	0.170
120	120	4 0	MCRA040AT4	1SAH102016R9900	0.170
–	208 ... 220	4 0	MCRA040ATM	1SAH102007R9900	0.170
220 ... 230	220 ... 230	4 0	MCRA040AT6	1SAH102018R9900	0.170
220 ... 240	240 ... 277	4 0	MCRA040ATN	1SAH100004R9900	0.170
240	240	4 0	MCRA040AT7	1SAH103106R9900	0.170
380 ... 400	440	4 0	MCRA040ATU	1SAH100005R9900	0.170
415 ... 440	480	4 0	MCRA040ATW	1SAH102011R9900	0.170
500	600	4 0	MCRA040ATY	1SAH102012R9900	0.170
3 N.O. + 1 N.C. poles					
24	24	3 1	MCRA031AT1	1SAH102034R9900	0.170
48	48	3 1	MCRA031AT9	1SAH108238R9900	0.170
110 ... 115	110 ... 120	3 1	MCRA031ATJ	1SAH100013R9900	0.170
120	120	3 1	MCRA031AT4	1SAH102037R9900	0.170
–	208 ... 220	3 1	MCRA031ATM	1SAH102028R9900	0.170
220 ... 230	220 ... 230	3 1	MCRA031AT6	1SAH102039R9900	0.170
220 ... 240	240 ... 277	3 1	MCRA031ATN	1SAH100014R9900	0.170
240	240	3 1	MCRA031AT7	1SAH103105R9900	0.170
380 ... 400	440	3 1	MCRA031ATU	1SAH100015R9900	0.170
415 ... 440	480	3 1	MCRA031ATW	1SAH102032R9900	0.170
500	600	3 1	MCRA031ATY	1SAH102033R9900	0.170
2 N.O. + 2 N.C. poles					
24	24	2 2	MCRA022AT1	1SAH220438R9900	0.170
48	48	2 2	MCRA022AT9	1SAH108236R9900	0.170
110 ... 115	110 ... 120	2 2	MCRA022ATJ	1SAH100023R9900	0.170
120	120	2 2	MCRA022AT4	1SAH102058R9900	0.170
–	208 ... 220	2 2	MCRA022ATM	1SAH102049R9900	0.170
220 ... 230	220 ... 230	2 2	MCRA022AT6	1SAH102060R9900	0.170
220 ... 240	240 ... 277	2 2	MCRA022ATN	1SAH100024R9900	0.170
240	240	2 2	MCRA022AT7	1SAH102061R9900	0.170
380 ... 400	440	2 2	MCRA022ATU	1SAH100025R9900	0.170
415 ... 440	480	2 2	MCRA022ATW	1SAH102053R9900	0.170
500	600	2 2	MCRA022ATY	1SAH102054R9900	0.170

Note : Other contact configuration available. Please consult your ABB local sales organization.



MCRA

Main dimensions mm, inches

MCRC 4-pole mini contactor relays with screw terminals

DC operated

MCRC040AT

MCRC 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

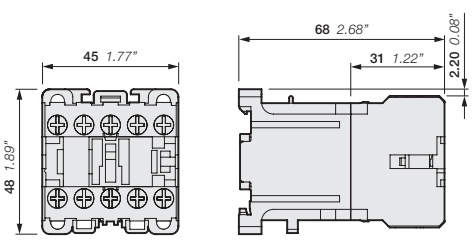
These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
4 N.O. poles				
12	4 0	MCRC040ATB	1SAH100000R9900	0.235
24	4 0	MCRC040ATD	1SAH100006R9900	0.235
24 with Diode	4 0	MCRC040ATDD	1SAH113311R9900	0.235
3 N.O. + 1 N.C. poles				
12	3 1	MCRC031ATB	1SAH100010R9900	0.235
24	3 1	MCRC031ATD	1SAH100016R9900	0.235
24 with Diode	3 1	MCRC031ATDD	1SAH113325R9900	0.235
2 N.O. + 2 N.C. poles				
12	2 2	MCRC022ATB	1SAH100020R9900	0.235
24	2 2	MCRC022ATD	1SAH100026R9900	0.235
24 with Diode	2 2	MCRC022ATDD	1SAH113324R9900	0.235
4 N.O. poles MCRC mini contactors relays with extended operating limits coil				
24*	4 0	MCRC040ATWD	1SAH220410R9900	0.235
48*	4 0	MCRC040ATWG	1SAH220463R9900	0.235
110*	4 0	MCRC040ATWJ	1SAH220407R9900	0.235
125*	4 0	MCRC040ATWL	1SAH220458R9900	0.235
220*	4 0	MCRC040ATWN	1SAH220404R9900	0.235
3 N.O. + 1 N.C. poles mini contactors relays with extended operating limits coil				
24*	3 1	MCRC031ATWD	1SAH220409R9900	0.235
48*	3 1	MCRC031ATWG	1SAH100070R9900	0.235
110*	3 1	MCRC031ATWJ	1SAH220406R9900	0.235
125*	3 1	MCRC031ATWL	1SAH220457R9900	0.235
220*	3 1	MCRC031ATWN	1SAH220403R9900	0.235
2 N.O. + 2 N.C. poles mini contactors relays with extended operating limits coil				
17 ... 32	2 2	MCRC022ATWD	1SAH220408R9900	0.235
34 ... 62	2 2	MCRC022ATWG	1SAH100082R9900	0.235
77 ... 143	2 2	MCRC022ATWJ	1SAH107171R9900	0.235
87 ... 162	2 2	MCRC022ATWL	1SAH220456R9900	0.235
154 ... 286	2 2	MCRC022ATWN	1SAH220402R9900	0.235

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:
  - at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
  - a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MCRC

Main dimensions mm, inches

MCRI, MCRK 4-pole mini contactor relays with screw terminals

DC operated - low consumption

MCRI040AT

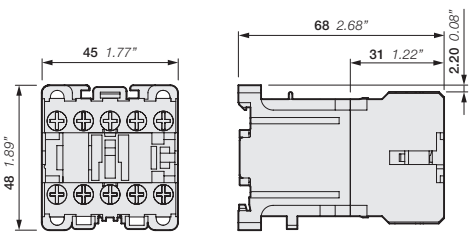
MCRK040AT

MCRI, MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce)
V DC				kg
DC operation 24 V / 1.2 W				
24	4 0	MCRI040ATD	1SAH100530R9900	0.235
	3 1	MCRI031ATD	1SAH100531R9900	0.235
	2 2	MCRI022ATD	1SAH100532R9900	0.235
DC operation 24 V / 2 W				
24	4 0	MCRK040ATD	1SAH100533R9900	0.235
	3 1	MCRK031ATD	1SAH100534R9900	0.235
	2 2	MCRK022ATD	1SAH100535R9900	0.235



MCRI, MCRK

Main dimensions mm, inches

MCRA..R 4-pole mini contactor relays for ring tongue ferrules

AC operated

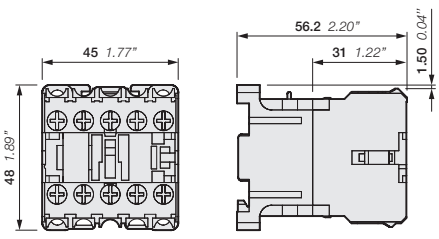
MCRA040AR

MCRA..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc V 50 Hz	V 60 Hz	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
4 N.O. poles					
24	24	4 0	MCRA040AR1	1SAH102177R9900	0.170
110 ... 115	110 ... 120	4 0	MCRA040ARJ	1SAH102179R9900	0.170
220 ... 230	220 ... 230	4 0	MCRA040AR6	1SAH102178R9900	0.170
3 N.O. + 1 N.C. poles					
24	24	3 1	MCRA031AR1	1SAH102180R9900	0.170
110 ... 115	110 ... 120	3 1	MCRA031ARJ	1SAH102182R9900	0.170
220 ... 230	220 ... 230	3 1	MCRA031AR6	1SAH102181R9900	0.170
2 N.O. + 2 N.C. poles					
24	24	2 2	MCRA022AR1	1SAH102183R9900	0.170
110 ... 115	110 ... 120	2 2	MCRA022ARJ	1SAH100485R9900	0.170
220 ... 230	220 ... 230	2 2	MCRA022AR6	1SAH102184R9900	0.170



MCRA..R

Main dimensions mm, inches

MCRC..R 4-pole mini contactor relays for ring tongue ferrules

DC operated

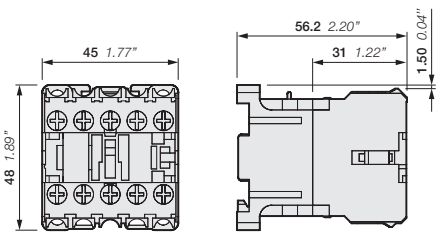
MCRC040AR

MCRC..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
12	4 0	MCRC040ARB	1SAH101994R9900	0.245
	3 1	MCRC031ARB	1SAH101996R9900	0.245
	2 2	MCRC022ARB	1SAH101998R9900	0.245



MCRC..R

Main dimensions mm, inches

MCRK..R 4-pole mini contactor relays for ring tongue ferrules

DC operated - low consumption

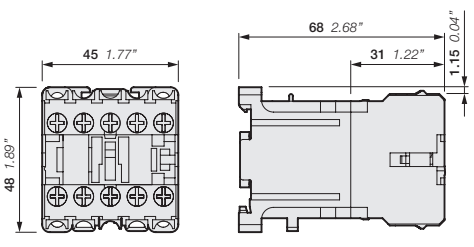
MCRK040AR

MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 main poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

Rated control circuit voltage Uc V DC	Auxiliary contacts fitted	Type	Order code	Weight Pkg (1 pce) kg
DC operation 24 V / 2 W				
24	4 0	MCRK040ARD	1SAH101995R9900	0.245
	3 1	MCRK031ARD	1SAH101997R9900	0.245
	2 2	MCRK022ARD	1SAH100540R9900	0.245

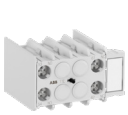


MCRK..R

Main dimensions mm, inches

Auxiliary contact blocks for MC1 and MC2 mini contactors

With screw terminals and specific screw terminals for ring tongue ferrules



MACN211AT

MACN422AT

MACL110AT

Screw terminals

Suitable for	Auxiliary contacts	Type	Order code	Weight Pkg (1 pce) kg
Front mounted instantaneous auxiliary contact blocks				
All MC1 and MC2 variants Contacts in accordance with EN 50012	1 1	MACN211AT	1SAL100999R9906	0.030
	0 2	MACN202AT	1SAL100998R9906	0.030
	3 1	MACN431AT	1SAL100995R9906	0.040
	2 2	MACN422AT	1SAL100996R9906	0.040
	1 3	MACN413AT	1SAL100997R9906	0.040
All MC1 and MC2 variants Contacts in accordance with EN 50005	2 0	MARN220AT	1SAL100994R9906	0.030
	1 1	MARN211AT	1SAL100993R9906	0.030
	0 2	MARN202AT	1SAL100992R9906	0.030
	4 0	MARN440AT	1SAL100991R9906	0.040
	3 1	MARN431AT	1SAL100990R9906	0.040
	2 2	MARN422AT	1SAL100989R9906	0.040
	1 3	MARN413AT	1SAL100988R9906	0.040
	0 4	MARN404AT	1SAL100987R9906	0.040
Side mounted instantaneous auxiliary contact block				
All MC1 and MC2 variants Contacts in accordance with EN 50012	1 0	MACL110AT	1SAL100560R9906	0.017
	0 1	MACL101AT	1SAL100561R9906	0.017
All MC1 and MC2 variants Contacts in accordance with EN 50005	1 0	MARL110ATS	1SAL100519R9906	0.017
	0 1	MARL101ATS	1SAL100520R9906	0.017

MARN211AR

MARN422AR

MACL110AR

Specific screw terminals for ring tongue ferrules

Suitable for	Auxiliary contacts	Type	Order code	Weight Pkg (1 pce) kg
Front mounted instantaneous auxiliary contact blocks				
All MC1 and MC2 variants Contacts in accordance with EN 50012	1 1	MACN211AR	1SAL103557R9906	0.030
	0 2	MACN202AR	1SAL103558R9906	0.030
	3 1	MACN431AR	1SAL103559R9906	0.040
	2 2	MACN422AR	1SAL103560R9906	0.040
	1 3	MACN413AR	1SAL103561R9906	0.040
All MC1 and MC2 variants Contacts in accordance with EN 50005	2 0	MARN220AR	1SAL103349R9906	0.030
	1 1	MARN211AR	1SAL103350R9906	0.030
	0 2	MARN202AR	1SAL103351R9906	0.030
	4 0	MARN440AR	1SAL103352R9906	0.040
	3 1	MARN431AR	1SAL103353R9906	0.040
	2 2	MARN422AR	1SAL103354R9906	0.040
	1 3	MARN413AR	1SAL103355R9906	0.040
	0 4	MARN404AR	1SAL103300R9906	0.040
Side mounted instantaneous auxiliary contact block				
All MC1 and MC2 variants Contacts in accordance with EN 50012	1 0	MACL110AR	1SAL103555R9906	0.017
	0 1	MACL101AR	1SAL103556R9906	0.017
All MC1 and MC2 variants Contacts in accordance with EN 50005	1 0	MARL110ARS	1SAL103299R9906	0.017
	0 1	MARL101ARS	1SAL103298R9906	0.017

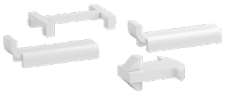
Other accessories for MC1 and MC2 mini contactors

2CDC211036V0019

MP0AAE1

2CDC211037V0019

MREBC10AC2


2CDC211038V0019

MMH0

2CDC211039V0019

WKMIU

2CDC211040V0019

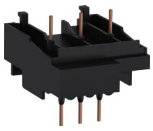
MVB0R

2CDC211041V0019

MVP0C

2CDC211042V0019

MVB0L


2CDC211041V0019

BEMC/132

Suitable for	Rated control circuit voltage Uc V DC	V 50 Hz	V 60 Hz	Protection type	Type	Order code	Pkg qty	Weight (1 pce) kg
Surge suppressors for contactor coils								
All MC1 and MC2 DC operated variants	240	–	–	Diode	MP0CAE3	1SAL100546R9906	1	0.006
All MC1 and MC2 AC operated variants	–	12 ... 60	12 ... 60	R/C	MP0AAE1	1SAL100544R9906	1	0.006
	–	72 ... 240	72 ... 240	R/C	MP0AAE2	1SAL100545R9906	1	0.006
All MC1 and MC2 variants	24 ... 48	24 ... 48	24 ... 48	Varistor	MP0DAE4	1SAL100536R9906	1	0.006
	50 ... 127	50 ... 127	50 ... 127	Varistor	MP0DAE5	1SAL204848R9906	1	0.006
	130 ... 250	130 ... 250	130 ... 250	Varistor	MP0DAE6	1SAL204849R9906	1	0.006
Connecting links with manual motor starter (2)								
all MC1 and MC2 variants					BEMC/132	1SAM301920R1001	1	0.021
Electronic timers (1)								
All MC1 and MC2 variants	24 ... 250	24 ... 250	24 ... 250	0.5 ... 60 sec.	MREBC10AC2	1SAL100541R9906	1	0.040
				0.2 ... 24 sec	MREBC20AC2	1SAL100542R9906	1	0.040
DIN rail adapter for electronic timers								
All MREBC variants					MVB0R	1SAL100543R9906	1	0.003
Mechanical interlock								
All MC1 and MC2 variants					MMH0	1SAL100547R9906	1	0.003
Parallel connecting link								
All MC1 and MC2 variants					MVP0C	1SAL100600R9906	1	0.010
Connection sets for reversing contactors (2)								
All MC1 and MC2 variants					WKMIU	1SAL101421R9906	1	0.030
Lütze® rail adapter for contactors and contactor relays								
All MC1 and MC2 variants					MVB0L	1SAL101830R9906	30	0.002

(1) Usage not allowed in combination with low consumption contactors
(2) Usage allowed with current up to 12 A

Auxiliary contact blocks for MCR mini contactor relays

With screw terminals and specific screw terminals for ring tongue ferrules

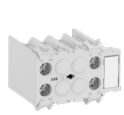
MARN211AT

MARN422AT

MARL110AT

Screw terminals

Suitable for	Auxiliary contacts	Type	Order code	Weight Pkg (1 pce) kg
Front mounted instantaneous auxiliary contact blocks				
All MCR variants Contacts in accordance with EN 50005	2 0	MARN220AT	1SAL100994R9906	0.030
	1 1	MARN211AT	1SAL100993R9906	0.030
	0 2	MARN202AT	1SAL100992R9906	0.030
	4 0	MARN440AT	1SAL100991R9906	0.040
	3 1	MARN431AT	1SAL100990R9906	0.040
	2 2	MARN422AT	1SAL100989R9906	0.040
	1 3	MARN413AT	1SAL100988R9906	0.040
	0 4	MARN404AT	1SAL100987R9906	0.040
Side mounted instantaneous auxiliary contact block				
All MCR variants	1 0	MARL110AT	1SAL100513R9906	0.017
	0 1	MARL101AT	1SAL100514R9906	0.017
	1 0	MARL110ATS	1SAL100519R9906	0.017
	0 1	MARL101ATS	1SAL100520R9906	0.017



MARN211AR

MARN422AR

MARL110AR

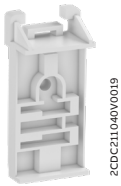
Specific screw terminals for ring tongue ferrules

Suitable for	Auxiliary contacts	Type	Order code	Weight Pkg (1 pce) kg
Front mounted instantaneous auxiliary contact blocks				
All MCR variants Contacts in accordance with EN 50005	2 0	MARN220AR	1SAL103349R9906	0.030
	1 1	MARN211AR	1SAL103350R9906	0.030
	0 2	MARN202AR	1SAL103351R9906	0.030
	4 0	MARN440AR	1SAL103352R9906	0.040
	3 1	MARN431AR	1SAL103353R9906	0.040
	2 2	MARN422AR	1SAL103354R9906	0.040
	1 3	MARN413AR	1SAL103355R9906	0.040
	0 4	MARN404AR	1SAL103300R9906	0.040
Side mounted instantaneous auxiliary contact block				
All MCR variants	1 0	MARL110AR	1SAL103356R9906	0.017
	0 1	MARL101AR	1SAL103357R9906	0.017
	1 0	MARL110ARS	1SAL103299R9906	0.017
	0 1	MARL101ARS	1SAL103298R9906	0.017

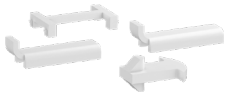
Other accessories for MCR mini contactor relays

MP0AAE1

MREBC10AC2



MVB0R



MMH0

MVB0L

Suitable for	Rated control circuit voltage Uc			Protection type	Type	Order code	Pkg qty	Weight (1 pce)
	V DC	V 50 Hz	V 60 Hz					kg
Surge suppressors for contactor coils								
All MCR DC operated variants	240	–	–	Diode	MP0CAE3	1SAL100546R9906	1	0.006
All MC1 and MC2	–	12 ... 60	12 ... 60	R/C	MP0AAE1	1SAL100544R9906	1	0.006
AC operated variants	–	72 ... 240	72 ... 240	R/C	MP0AAE2	1SAL100545R9906	1	0.006
All MCR variants	24 ... 48	24 ... 48	24 ... 48	Varistor	MP0DAE4	1SAL100536R9906	1	0.006
	50 ... 127	50 ... 127	50 ... 127	Varistor	MP0DAE5	1SAL204848R9906	1	0.006
	130 ... 250	130 ... 250	130 ... 250	Varistor	MP0DAE6	1SAL204849R9906	1	0.006
Electronic timers (1)								
All MCR variants	24 ... 250	24 ... 250	24 ... 250	0.5 ... 60 sec.	MREBC10AC2	1SAL100541R9906	1	0.040
				0.2 ... 24 sec	MREBC20AC2	1SAL100542R9906	1	0.040
DIN rail adapter for electronic timers								
All MREBC variants					MVB0R	1SAL100543R9906	1	0.003
Mechanical interlock								
All MCR variants					MMH0	1SAL100547R9906	1	0.003
Lütze® rail adapter for contactors and contactor relays								
All MCR variants					MVB0L	1SAL101830R9906	30	0.002

(1) Usage not allowed in combination with low consumption contactor relays

MC1, MC2 3-pole and 4-pole mini contactors
Technical data

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	**MC1A**	**MC2A**
	DC operated	**MC1C**	**MC2C**
Standards		IEC/EN 60947-1, IEC/EN 60947-4-1	
Rated operational voltage Ue max		690 V AC, 440 V DC	
Rated frequency (without derating)		DC or 50 / 60 Hz	
Conventional free-air thermal current Ith acc. to IEC/EN 60947-4-1, open contactors, θ ≤ 55 °C, with conductor cross-sectional area		20 A	
AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C			
Ie / Rated operational current AC-1	230 V	20 A	
Ue max ≤ 690 V, 50/60 Hz	400 V	20 A	
	500 V	20 A	
	690 V	20 A	
AC-1 Utilization category for air temperature close to contactor 55 < θ ≤ 70°C			
Ie / Rated operational current AC-1	230 V	16 A	
Ue max ≤ 690 V, 50/60 Hz	400 V	16 A	
	500 V	16 A	
	690 V	16 A	
AC-3 / AC-3e Utilization category for air temperature close to contactor θ ≤ 55 °C			
Ie / Rated operational current AC-3 / AC-3e (1)	230 V	9 A	12 A
M 3~ 3-phase motors	400 V	9 A	12 A
	500 V	8 A	10 A
	690 V	5 A (2)	5 A
Rated operational power AC-3 / AC-3e (1)	230 V	2.2 kW	3 kW
M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	400 V	4 kW	5.5 kW
	500 V	4 kW	5.5 kW
	690 V	4 kW (2)	4 kW
AC-4 Utilization category for air temperature close to contactor θ ≤ 55 °C			
Ie / Rated operational current AC-4	230 V	9 A	9 A
M 3~ 3-phase motors	400 V	9 A	9 A
	500 V	8 A	8 A
	690 V	5 A (2)	5 A
Rated operational power AC-4	230 V	2.2 kW	2.2 kW
M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	400 V	4 kW	4 kW
	500 V	4 kW	4 kW
	690 V	4 kW (2)	4 kW
Rated making capacity		10 x Ie AC-3 acc. to IEC/EN 60947-4-1, 13 x Ie AC-3e acc. to IEC/EN 60947-4-1, 12 x Ie AC-4 acc. to IEC/EN 60947-4-1	
Rated breaking capacity		8 x Ie AC-3 acc. to IEC/EN 60947-4-1, 8.5 x Ie AC-3e acc. to IEC/EN 60947-4-1, 10 x Ie AC-4 acc. to IEC/EN 60947-4-1	
Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG		Type 1: 32 A / Type 2: 20 A	
Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state	10 s	72 A	96 A
Maximum breaking capacity cos ϕ = 0.45	at 400 V	90 A	120 A
Maximum electrical switching frequency	AC	300 cycles/h (AC-1), 1200 cycles/h (AC-3), 150 cycles/h (AC-4)	
	DC	600 cycles/h	

(1) For MC2, AC-3 only
(2) Valid for N.O. contacts only. Other ratings on request.

DC-1 / DC-3 / DC-5 Utilization category for air temperature close to the contactor θ ≤ 55 °C - valid for MC2 only

Ie / Rated operational current	Per pole						Two poles in series						Three poles in series					
	24 V	48 V	60 V	110 V	220 V	440 V	24 V	48 V	60 V	110 V	220 V	440 V	24 V	48 V	60 V	110 V	220 V	440 V
DC-1 (L/R ≤ 1 ms)	20	20	20	6	0.8	0.2	20	20	20	20	6	0.5	20	20	20	20	20	2
DC-3 (L/R ≤ 2 ms)	20	20	10	2	0.3	0.1	20	20	20	10	2	0.25	20	20	20	16	6	0.75
DC-5 (L/R ≤ 7.5 ms)	20	10	2.5	0.5	0.25	-	20	20	20	4	1.25	0.15	20	20	20	10	2.5	0.3

MC1, MC2 3-pole and 4-pole mini contactors
Technical data

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

Contactor types	AC operated	**MC1A**	**MC2A**
	DC operated	**MC1C**	**MC2C**
Standards		UL/CSA 60947-1, UL/CSA 60947-4-1	
Maximum operational voltage		600 V AC	
UL/CSA general use rating		20 A / 600 V	
UL/CSA maximum 1-phase motor rating for air temperature close to contactor θ ≤ 40 °C			
Full load current	115 V AC	9.8 A	9.8 A
	230 V AC	10 A	12 A
Horse power rating	115 V AC	0.5 hp	0.5 hp
	230 V AC	1.5 hp	2 hp
UL/CSA maximum 3-phase motor rating for air temperature close to contactor θ ≤ 40 °C			
Full load current (1)	200 V AC	11 A	11 A
	240 V AC	9.6 A	9.6 A
	380-415 V AC	6.1 A	9.7 A
	440-480 V AC	7.6 A	11 A
	550-600 V AC	6.1 A	11 A
Horse power rating (1)	200 V AC	3 hp	3 hp
	240 V AC	3 hp	3 hp
	380-415 V AC	3 hp	5 hp
	440-480 V AC	5 hp	7.5 hp
	550-600 V AC	5 hp	10 hp
Short-circuit protection device for contactors without thermal overload relay - motor protection excluded			
High fault current		50 kA	
Fuse rating and type	600 V	50 A Class J or 30 A class CC	

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

General technical data

Contactor types	AC operated	**MC1A**	**MC2A**
	DC operated	**MC1C**	**MC2C**
Rated insulation voltage Ui			
acc. to IEC/EN 60947-4-1		750 V	
acc. to UL/CSA 60947-4-1		600 V	
Rated impulse withstand voltage Uimp		6 kV (1)	
Ambient air temperature, close to contactor			
Operation Fitted with thermal overload relay		-25 ... +55 °C	
Without thermal overload relay		-40 ... +55 °C	
Storage		-55 ... +80 °C	
Climatic withstand		Acc. to IEC 60947-1 Annex Q	
Maximum operating altitude (without derating)		3000 m	
Mechanical durability		10^7 operating cycles	
Electrical durability			
	AC-1 20 A	210 000 operating cycles	260 000 operating cycles
	AC-3 400 V	900 000 operating cycles (9 A) (2)	800 000 operating cycles (12 A) (2)
	AC-4 400 V	30 000 operating cycles (9 A) (2)	35 000 operating cycles (9 A) (2)
Resistance to shock		Half-sine	
acc. to IEC/EN 60068-2-27		25 g / 11 ms	
acc. to IEC/EN 60947-1 Annex. Q		Category E	
Resistance to vibrations		Sinusoidal	
acc. to IEC/EN 60068-2-6		5 g / 3 ... 150 Hz	
acc. to IEC/EN 60947-1 Annex. Q		Category E	

(1) 2 mm clearance distance between contactor side wall and grounded metal parts of cabinet required
(2) Valid for 3-pole mini contactors only. Other ratings on request.

MC1, MC2 3-pole and 4-pole mini contactors

Technical data

Magnet system characteristics for MC1A, MC2A contactors

Contactor types	AC operated	**MC1A**	**MC2A**
Coil operating limits acc. to IEC/EN 60947-4-1	AC supply	0.85 ... 1.1 x Uc	
AC control voltage			
Rated control circuit voltage Uc		See ordering tables	
Coil consumption	Average pull-in value (50 Hz)	26 VA	
	Average pull-in value (60 Hz)	32 VA	
	Average holding value (50 Hz)	5.3 VA	
	Average holding value (60 Hz)	4.5 VA	
Drop-out voltage in % of Uc min		20 ... 75%	

Magnet system characteristics for MC1C, MC2C contactors

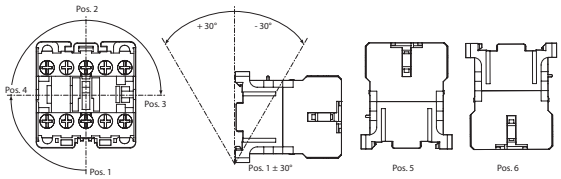
Contactor types	DC operated	**MC1C**	**MC2C**
Coil operating limits acc. to IEC/EN 60947-4-1	DC supply	0.85 ... 1.1 x Uc	
DC control voltage			
Rated control circuit voltage Uc		See ordering tables	
Coil consumption (1)	Average pull-in value	3 W	
	Average holding value	3 W	
Drop-out voltage in % of Uc min		10 ... 75%	

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

Magnet system characteristics for MC1C, MC2C contactors with extended operating limits coils

Contactor types	DC operated	**MC1C**	**MC2C**
Coil operating limits acc. to IEC/EN 60947-4-1	DC supply	0.85 ... 1.1 x Uc	
DC control voltage			
Rated control circuit voltage Uc		See ordering tables	
Coil consumption	Average pull-in value	4 W	
	Average holding value	4 W	
Drop-out voltage in % of Uc min		10 ... 65%	

Mounting characteristics and conditions for use

Contactor types	AC operated	**MC1A**	**MC2A**
	DC operated	**MC1C**	**MC2C**
Mounting positions			
Mounting distances		The contactors can be assembled side by side	
Fixing			
On rail acc. to IEC/EN 60715		35 x 7.5 mm or 35 x 15 mm	
By screws (not supplied)		4 screws at the 4 angles - M4	

MC1, MC2 3-pole and 4-pole mini contactors

Technical data

Built-in auxiliary contact according to IEC

Types		Built-in auxiliary contacts
Standards		IEC/EN 60947-1, IEC/EN 60947-5-1
Rated operational voltage Ue max		690 V AC, 440 V DC
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 55 °C		10 A
Ie / Rated operational current AC-15	240 V	6 A
	400 V	4 A
	500 V	2.5 A
	690 V	1.5 A
Ie / Rated operational current DC-13	24 V	5 A
	48 V	2.5 A
	125 V	0.55 A
	250 V	0.3 A
	440 V	0.15 A
Short-circuit protection device - fuse type gG		10 A
Minimum switching capacity with failure rate acc. to IEC/EN 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	360 cycles/h
	DC-13	360 cycles/h

Built-in auxiliary contact according to UL/CSA

Types	Built-in auxiliary contacts
Standards	UL/CSA 60947-1, UL/CSA 60947-5-1
Maximum operational voltage	600 V AC
Pilot duty	A600, Q600

Connection

Contactor types	AC operated	MC1A, MC2A	MC1A..R, MC2A..R
	DC operated	MC1C, MC2C	MC1C..R, MC2C..R
Terminals		Screw terminals with cable clamp	Conductors with insulated ring tongue ferrule
Connection capacity			
Main conductors (poles + built-in auxiliary terminals)			
Rigid: solid	1 x	0.75 ... 4 mm²	–
	2 x	0.75 ... 2.5 mm²	–
Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible with ferrule	1 x	0.75 ... 2.5 mm²	–
(insulated or not)	2 x	0.75 ... 1.5 mm²	–
Lugs	Ø mm >	–	3.6 mm
	L mm <	–	6.6 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 12 ... 18	–
Stripping length		9 mm	–
Tightening torques		0.8 ... 1.0 Nm / 7 lb.in	0.8 ... 1.0 Nm / 7 lb.in
Coil terminals			
Rigid: solid	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible with ferrule	1 x	0.75 ... 2.5 mm²	–
(insulated or not)	2 x	0.75 ... 1.5 mm²	–
Lugs	Ø mm >	–	3.6 mm
	L mm <	–	6.6 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 12 ... 18	–
Stripping length		9 mm	–
Tightening torques		0.8 ... 1.0 Nm / 7 lb.in	
Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529			
All terminals		IP20	
Screw terminals		(screws of unused terminals must be tightened)	
All terminals		M3	M3.5
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2	

MCR 4-pole mini contactor relays
Technical data

Main pole – Utilization characteristics according to IEC

Contactor types	AC operated	**MCRA**
	DC operated	**MCRC**
Standards		IEC/EN 60947-1, EN 60947-5-1
Rated operational voltage Ue max		690 V AC, 440 V DC
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 55 °C		10 A
Ie / Rated operational current AC-15	240 V	6 A
	400 V	4 A
	500 V	2.5 A
	690 V	1.5 A
Ie / Rated operational current DC-13	24 V	5 A
	48 V	2.5 A
	125 V	0.55 A
	250 V	0.3 A
	440 V	0.15 A
Short-circuit protection device for contactors - fuse type gG		10 A
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	600 cycles/h
	DC-13	600 cycles/h

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

Contactor types	AC operated	**MCRA**
	DC operated	**MCRC**
Standards		UL/CSA 60947-1, UL/CSA 60947-5-1
Maximum operational voltage		600 V AC
Pilot duty		A600, Q600

MCR 4-pole mini contactor relays
Technical data

General technical data

Contactor relay types	AC operated	**MCRA**
	DC operated	**MCRC**
Rated insulation voltage Ui		
acc. to IEC/EN 60947-5-1		750 V
acc. to UL/CSA 60947-5-1		600 V
Rated impulse withstand voltage Uimp		6 kV
Electromagnetic compatibility		
Ambient air temperature close to contactor relay	Operation in free air	-40 ... +55 °C
	Storage	-55 ... +80 °C
Climatic withstand		Acc. to IEC / EN 60947-1 Annex. Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		10^7 operating cycles
Resistance to shock		Half-sine
acc. to IEC/EN 60068-2-27		25 g / 11ms
acc. to IEC/EN 60947-1 Annex. Q		Category E
Resistance to vibrations		Sinusoidal
acc. to IEC/EN 60068-2-6		5 g / 3 ... 150 Hz
acc. to IEC/EN 60947-1 Annex. Q		Category E

Magnet system characteristics for MCRA contactor relays

Contactor relay types	AC operated	**MCRA**
Coil operating limits acc. to IEC/EN 60947-5-1	AC supply	0.85 ... 1.1 x Uc
AC control voltage		
Rated control circuit voltage Uc		See ordering tables
Coil consumption	Average pull-in value (50 Hz)	26 VA
	Average pull-in value (60 Hz)	32 VA
	Average holding value (50 Hz)	5.3 VA
	Average holding value (60 Hz)	4.5 VA
Drop-out voltage in % of Uc min		20 ... 75 %

Magnet system characteristics for MCRC contactor relays

Contactor relay types	DC operated	**MCRC**
Coil operating limits acc. to IEC/EN 60947-5-1	DC supply	0.85 ... 1.1 x Uc
DC control voltage		
Rated control circuit voltage Uc		See ordering tables
Coil consumption (1)	Average pull-in value	3 W
	Average holding value	3 W
Drop-out voltage in % of Uc min		10 ... 75 %

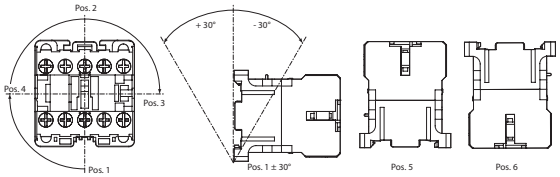
(1) Low consumption mini contactor relays: see coil consumption on ordering details pages.

Magnet system characteristics for MCRC contactor relays with extended operating limits coils

Contactor types	DC operated	**MCRC**
Coil operating limits acc. to IEC/EN 60947-5-1	DC supply	0.85 ... 1.1 x Uc
DC control voltage		
Rated control circuit voltage Uc		See ordering tables
Coil consumption	Average pull-in value	4 W
	Average holding value	4 W
Drop-out voltage in % of Uc min		10 ... 65 %

MCR 4-pole mini contactor relays
Technical data

Mounting characteristics and conditions for use

Contactor types	AC operated	**MCRA**
	DC operated	**MCRC**
Mounting positions		
Mounting distances		The contactors can be assembled side by side.
Fixing		
On rail acc. to IEC/EN 60715		35 x 7.5 mm or 35 x 15 mm
By screws (not supplied)		4 screws at the 4 angles - M4

Connection characteristics

Contactor types	AC operated	**MCRA**	**MCRA..R**
	DC operated	**MCRC**	**MCRC..R**
Terminals		Screw terminals with cable clamp	Conductors with insulated ring tongue ferrule
Connection capacity			
Auxiliary terminals			
Rigid: solid	1 x	0.75 ... 4 mm²	–
	2 x	0.75 ... 2.5 mm²	–
Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible with ferrule	1 x	0.75 ... 2.5 mm²	–
(insulated or not)	2 x	0.75 ... 1.5 mm²	–
Lugs	Ø mm >	–	3.6 mm
	L mm <	–	6.6 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 12 ... 18	–
Stripping length		9 mm	–
Tightening torques		0.8 ... 1.0 Nm / 7 lb.in	0.8 ... 1.0 Nm / 7 lb.in
Coil terminals			
Rigid: solid	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible with ferrule	1 x	0.75 ... 2.5 mm²	–
(insulated or not)	2 x	0.75 ... 1.5 mm²	–
Lugs	Ø mm >	–	3.6 mm
	L mm <	–	6.6 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 12 ... 18	–
Stripping length		9 mm	–
Tightening torques		0.8 ... 1.0 Nm / 7 lb.in	
Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529			
All terminals		IP20	
Screw terminals		(screws of unused terminals must be tightened)	
All terminals		M3	M3.5
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2	

Accessories
Technical data

Auxiliary contacts for front mounting and side mounting according to IEC

Types		MACN, MARN, MACL, MARL
Standards		IEC/EN 60947-1, IEC/EN 60947-5-1
Rated operational voltage Ue max		690 V AC
Rated frequency (without derating)		DC or 50 / 60 Hz
Conventional free-air thermal current Ith θ ≤ 55 °C		10 A
Ie / Rated operational current AC-15	240 V	6 A
	400 V	4 A
	500 V	2.5 A
	690 V	1.5 A
Short-circuit protection device - fuse type gG		10 A
Minimum switching capacity with failure rate acc. to IEC/EN 60947-5-4		17 V / 5 mA
Maximum electrical switching frequency	AC-15	360 cycles/h
	DC-13	360 cycles/h

Auxiliary contacts for front mounting and side mounting according to UL/CSA

Types	MACN, MARN, MACL, MARL
Standards	UL/CSA 60947-1, UL/CSA 60947-5-1
Max. operational voltage	600 V AC
Pilot duty	A600, Q600

Connection characteristics

Terminals		Screw terminals with cable clamp	Conductors with insulated ring tongue ferrule
Connection capacity			
Auxiliary terminals			
Rigid: solid	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm²	–
Flexible with ferrule	1 x	0.75 ... 2.5 mm²	–
(insulated or not)	2 x	0.75 ... 1.5 mm²	–
Lugs	Ø mm >	–	3.6 mm
	L mm <	–	6.6 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 12 ... 18	–
Stripping length		9 mm	–
Tightening torques		0.8 Nm / 7 lb.in	
Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529			
Auxiliary terminals		IP20	
Screw terminals		(screws of unused terminals must be tightened)	
All terminals		M3.5	
Screwdriver type		Flat Ø 5.5 mm / Pozidriv 2	

Accessories
Technical data

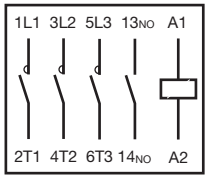
Electronic timers

Insulation Voltage		750 V
Impulse withstand voltage Uimp		4 kV
Control voltage, Uc	50 Hz, 60 Hz, DC	24-250 V
Tolerance of control voltage		0.85 ... 1.1 x Uc
Timing range	MREBC10AC2	0.5 s - 60 s (+/- 6 s)
	MREBC20AC2	0.2 s - 24 s (+/- 6 s)
Ambient air temperature close to the timer	Operation in free air	-25 °C ... +55 °C
	Storage	-55 °C ... +80 °C
Recovery time		100 ms
Repeatability		+/-1 %
Temperature variation of delay	% / ° C	0.075
Degree of protection		IP20
Mounting position		Any

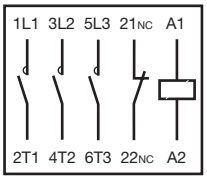
MC.. 3-pole and 4-pole mini contactors, MCR.. 4-pole mini contactor relays

Terminal marking and positioning

MC.. 3-pole mini contactors

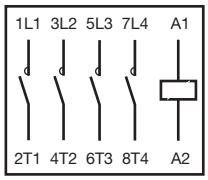


MC..310A

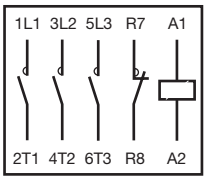


MC..301A

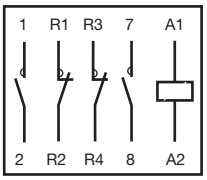
MC.. 4-pole mini contactors



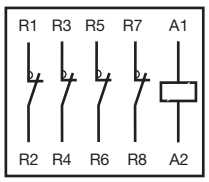
MC..400A



MC..C00A

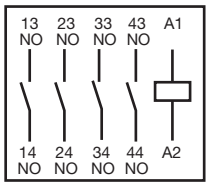


MC..B00A

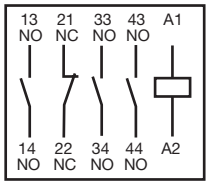


MC..A00A

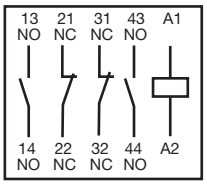
MC.. 4-pole mini contactor relays



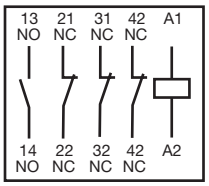
MCR..040A



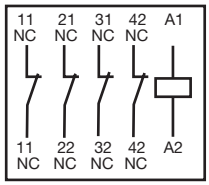
MCR..031A



MCR..022A



MCR..013A

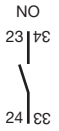


MCR..004A

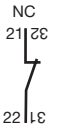
Auxiliary contact blocks for MC1 and MC2 mini contactors

Terminal marking and positioning

MACL.., MARL.. side mounted (left or right) 1-pole auxiliary contact block

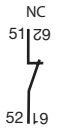


MACL110A



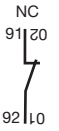
MACL101A

MARL110A



MARL101A

MARL110A..S



MARL101A..S

MACN.., MARN.. front mounted 2-pole auxiliary contact block

MACN211A

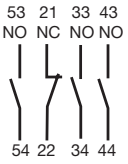
MACN202A

MARN220A

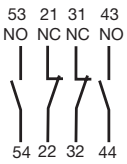
MARN211A

MARN202A

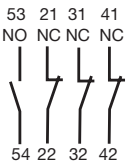
MACN.., MARN.. front mounted 4-pole auxiliary contact block



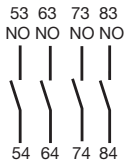
MACN431A



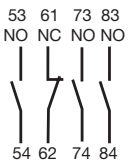
MACN422A



MACN413A

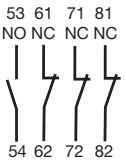


MARN440A

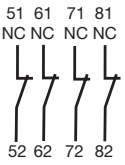


MARN431A

MARN422A

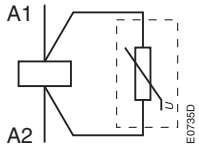


MARN413A

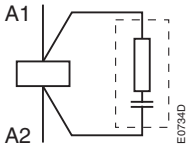


MARN404A

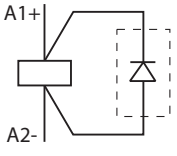
Surge suppressors



Varistor



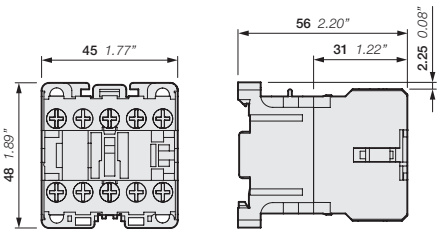
RC



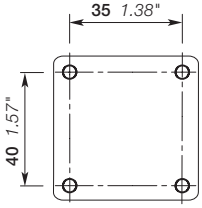
Diode

MC.. mini contactors and MCR.. mini contactor relays - AC operated with screw terminals and specific screw terminals for ring tongue ferrules

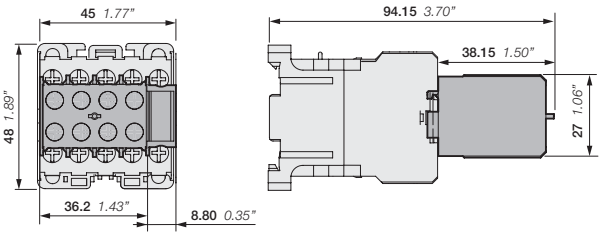
Dimensions



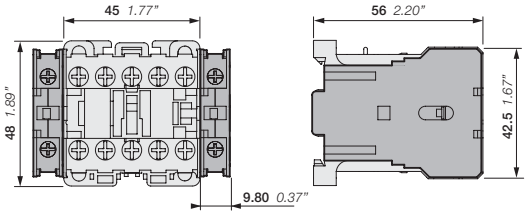
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R



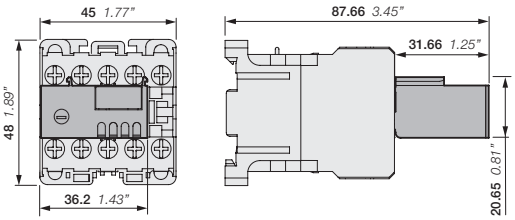
Drilling plan



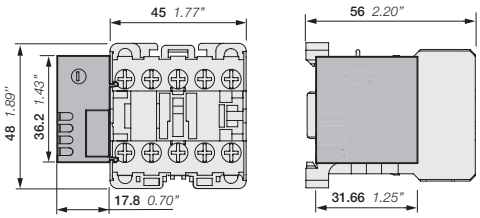
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACN2.., MARN2.. 2-pole auxiliary contact block
MACN4.., MARN4.. 4-pole auxiliary contact block



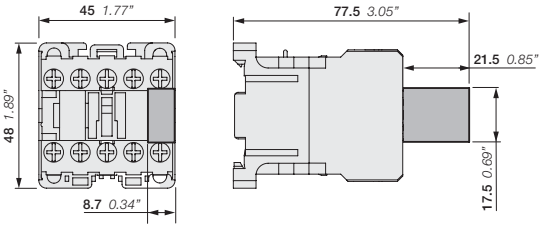
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACL.., MARL.. 1-pole auxiliary contact block



MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC front mounted electronic timer



MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC side mounted electronic timer

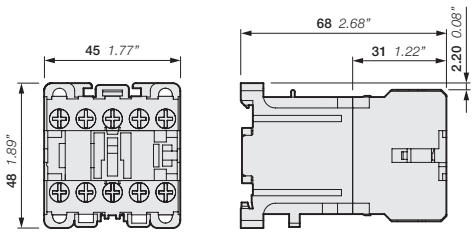


MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MP0A surge suppressor

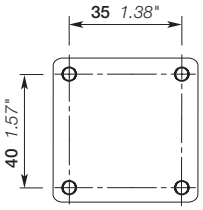
Main dimensions mm, inches

MC.. mini contactors and MCR.. mini contactor relays - DC operated with screw terminals and specific screw terminals for ring tongue ferrules

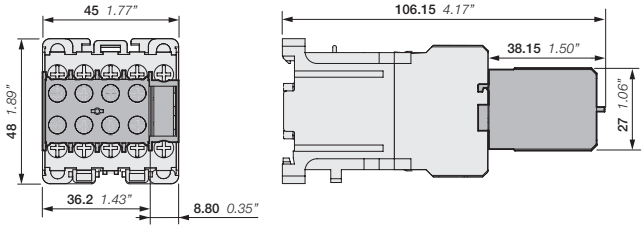
Dimensions



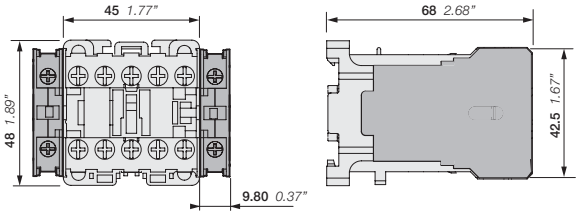
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R



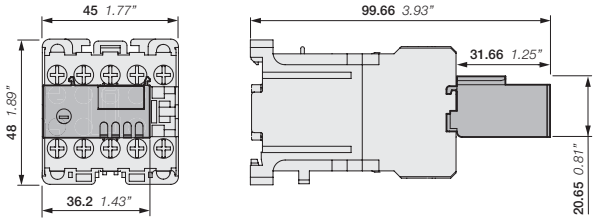
Drilling plan



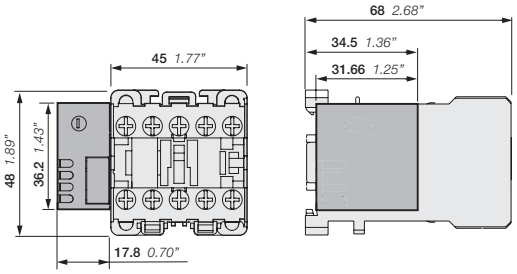
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACN2.., MARN2.. 2-pole auxiliary contact block
MACN4.., MARN4.. 4-pole auxiliary contact block



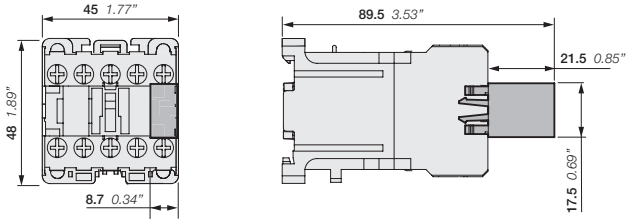
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACL.., MARL.. 1-pole auxiliary contact block



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC front mounted electronic timer



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC side mounted electronic timer



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MP0A surge suppressor

Main dimensions mm, inches

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

www.abb.com/productdetails/**1SBL101001R2010**

AS 3-pole contactors and NS 3-pole contactor relays
with screw terminals

3-pole contactors

5/3 Overview
5/8 AS09 ... AS16 AC operated
5/9 ASL09 ... ASL16 DC operated
5/10 AS09 ... AS16 AC operated - 2-stack
5/11 ASL09 ... ASL16 DC operated - 2-stack
5/12 Main accessories
5/14 Technical data
5/20 Electrical durability
5/22 Terminal marking and positioning
5/24 Dimensions

Contactor relays

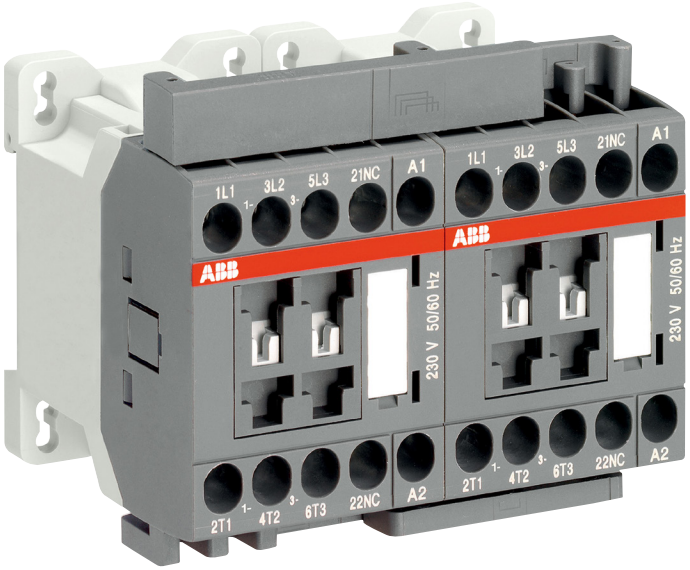
5/28 Overview
5/30 NS AC operated
5/31 NSL DC operated
5/32 Main accessories
5/34 Technical data
5/38 Terminal marking and positioning
5/40 Dimensions

Accessories

5/42 Auxiliary contact blocks
5/45 Surge suppressors
5/47 Mechanical interlock unit and other accessories
5/48 Connection accessories for starting solutions

5/49 **Voltage code table**

AS contactors
Efficient and space saving



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

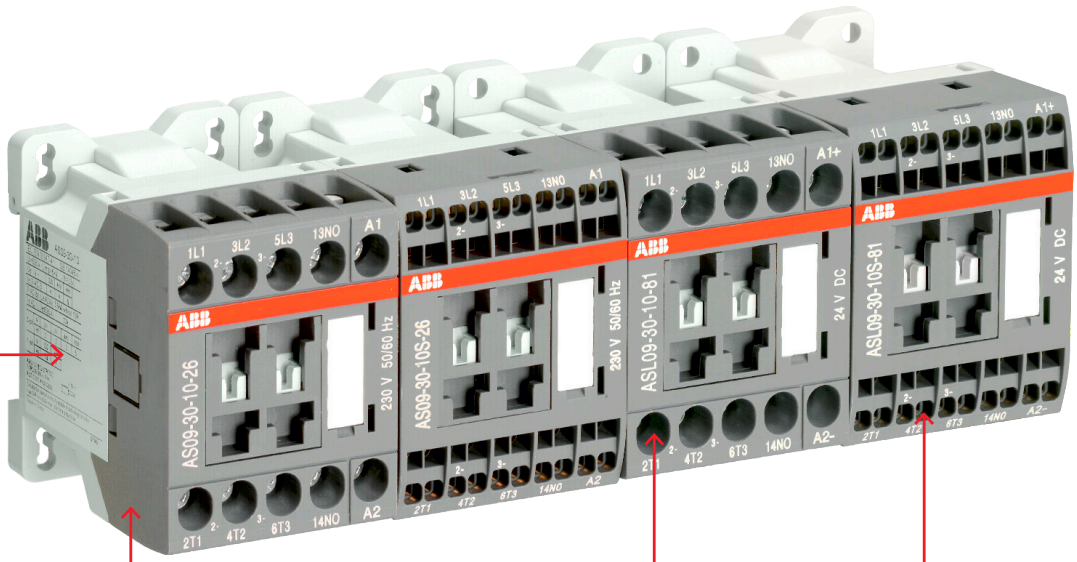
Speed up your projects
Simpler by design
AS contactors come in one single size and are designed to make life easy for engineering, handling and wiring purposes. These products follow a simple marking pattern, which enables a quick identification of their individual features.

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

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

Compact and efficient

Optimize your equipment dimensions!



W 45 x H 68 x D 72.5 mm

Easy to engineer with just one size

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

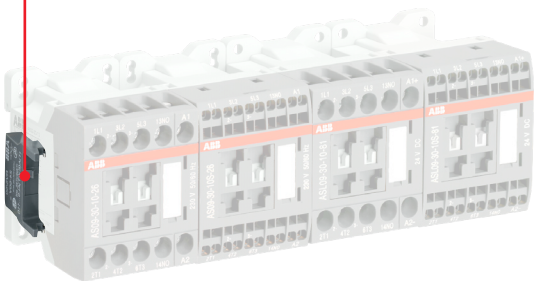
Screw

Screw terminal

On top of that, they are available with screw or spring terminals.

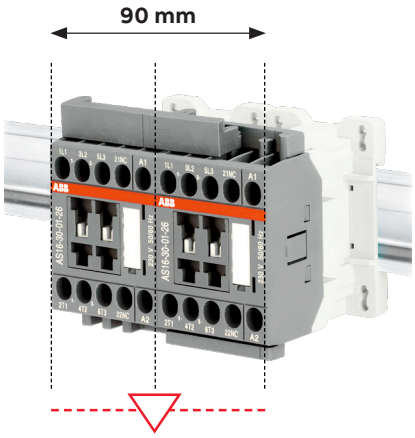
Spring

Spring terminal



Side clip-on surge suppressors

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



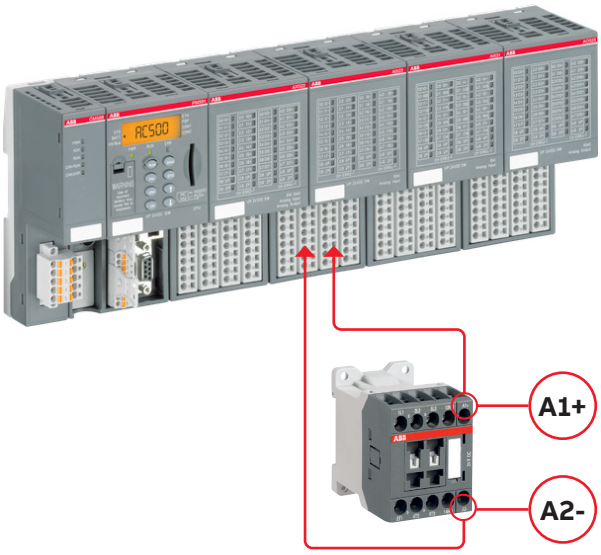
Compact reversing contactors

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

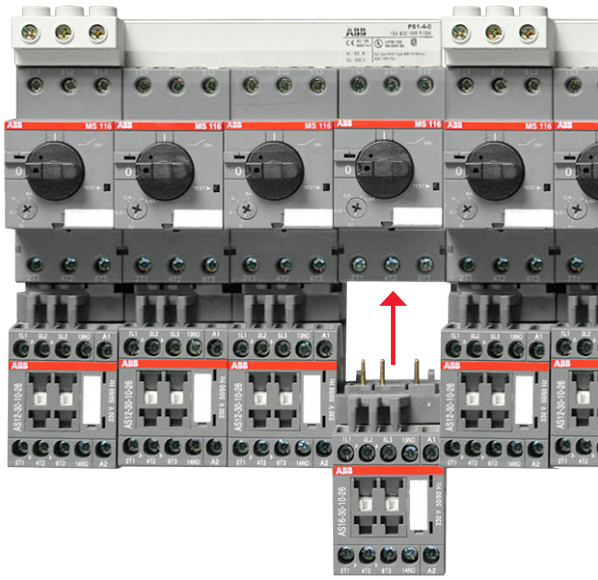
Easy to use
Space-saving and intuitive

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

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



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

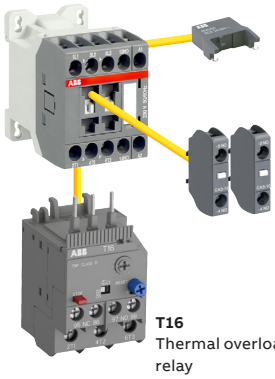


Choose reliable and time-saving solutions
AS contactors can easily be connected to manual motor starters or overload relays. The connecting accessories prevent mistakes and save time when assembling starter combinations.

3-pole contactors
Main accessories

AS09 ... AS16
3-pole contactors

Main accessories for contactors



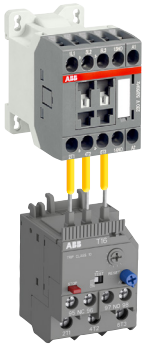
RV5, RT5 or RC5-1
Surge suppressor

CA-3
1-pole auxiliary contact block

T16
Thermal overload relay

Main accessories for starting solutions

Direct-on-line starter

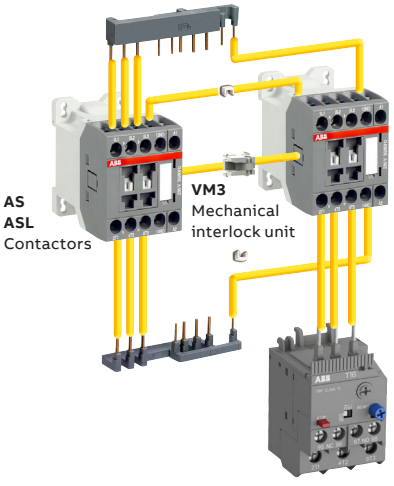


AS
ASL
Contactors

T16
Thermal overload relay

Reversing starter

BER16C-3
Connection set



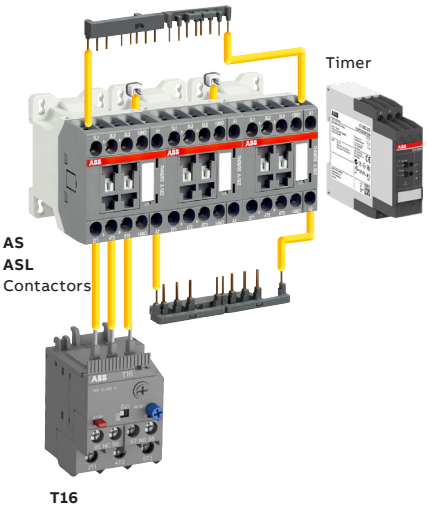
AS
ASL
Contactors

VM3
Mechanical interlock unit

T16
Thermal overload relay

Star-delta starter

BEY16C-3
Connection set



Timer

AS
ASL
Contactors

T16
Thermal overload relay

3-pole contactors

Screw terminals

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

Switching of 3-phase cage motors

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

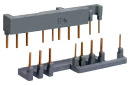
Protection of 3-phase motors

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

Switching of resistive circuits

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

Main accessories

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

AS09 ... AS16 3-pole contactors

4 to 7.5 kW

AC operated

AS09-30-10

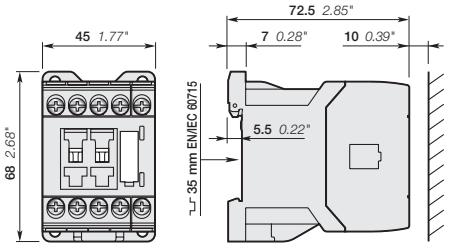
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
4	22	5	20	24	24	1 0	AS09-30-10-20	1SBL101001R2010	0.220
						0 1	AS09-30-01-20	1SBL101001R2001	0.220
				220	220	1 0	AS09-30-10-25	1SBL101001R2510	0.220
						0 1	AS09-30-01-25	1SBL101001R2501	0.220
				230	230	1 0	AS09-30-10-26	1SBL101001R2610	0.220
						0 1	AS09-30-01-26	1SBL101001R2601	0.220
5.5	24	7.5	20	24	24	1 0	AS12-30-10-20	1SBL111001R2010	0.220
						0 1	AS12-30-01-20	1SBL111001R2001	0.220
				220	220	1 0	AS12-30-10-25	1SBL111001R2510	0.220
						0 1	AS12-3001-25	1SBL111001R2501	0.220
				230	230	1 0	AS12-30-10-26	1SBL111001R2610	0.220
						0 1	AS12-30-01-26	1SBL111001R2601	0.220
7.5	24	10	20	24	24	1 0	AS16-30-10-20	1SBL121001R2010	0.220
						0 1	AS16-30-01-20	1SBL121001R2001	0.220
				220	220	1 0	AS16-30-10-25	1SBL121001R2510	0.220
						0 1	AS16-30-01-25	1SBL121001R2501	0.220
				230	230	1 0	AS16-30-10-26	1SBL121001R2610	0.220
						0 1	AS16-30-01-26	1SBL121001R2601	0.220

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



AS09, AS12, AS16

Main dimensions mm, inches

ASL09 ... ASL16 3-pole contactors

4 to 7.5 kW
DC operated

ASL09-30-10

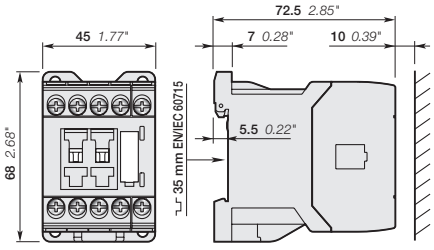
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

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

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



ASL09, ASL12, ASL16

Main dimensions mm, inches

AS09 ... AS16 2-stack 3-pole contactors

4 to 7.5 kW

AC operated

AS09-30-32

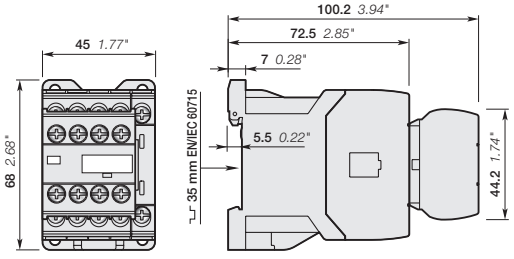
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
4	22	5	20	24	24	3 2	AS09-30-32-20	1SBL101001R2032	0.260
				220	220	3 2	AS09-30-32-25	1SBL101001R2532	
				230	230	3 2	AS09-30-32-26	1SBL101001R2632	0.260
5.5	24	7.5	20	24	24	3 2	AS12-30-32-20	1SBL111001R2032	0.260
				220	220	3 2	AS12-30-32-25	1SBL111001R2532	
				230	230	3 2	AS12-30-32-26	1SBL111001R2632	0.260
7.5	24	10	20	24	24	3 2	AS16-30-32-20	1SBL121001R2032	0.260
				220	220	3 2	AS16-30-32-25	1SBL121001R2532	
				230	230	3 2	AS16-30-32-26	1SBL121001R2632	0.260

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



AS09, AS12, AS16

Main dimensions mm, inches

ASL09 ... ASL16 2-stack 3-pole contactors

4 to 7.5 kW
DC operated

ASL09-30-32

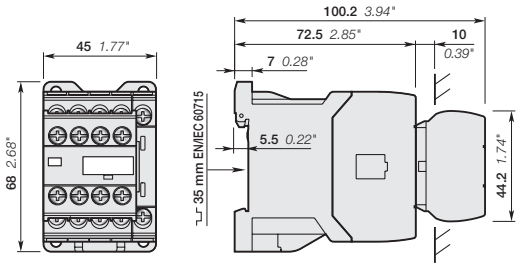
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

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

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



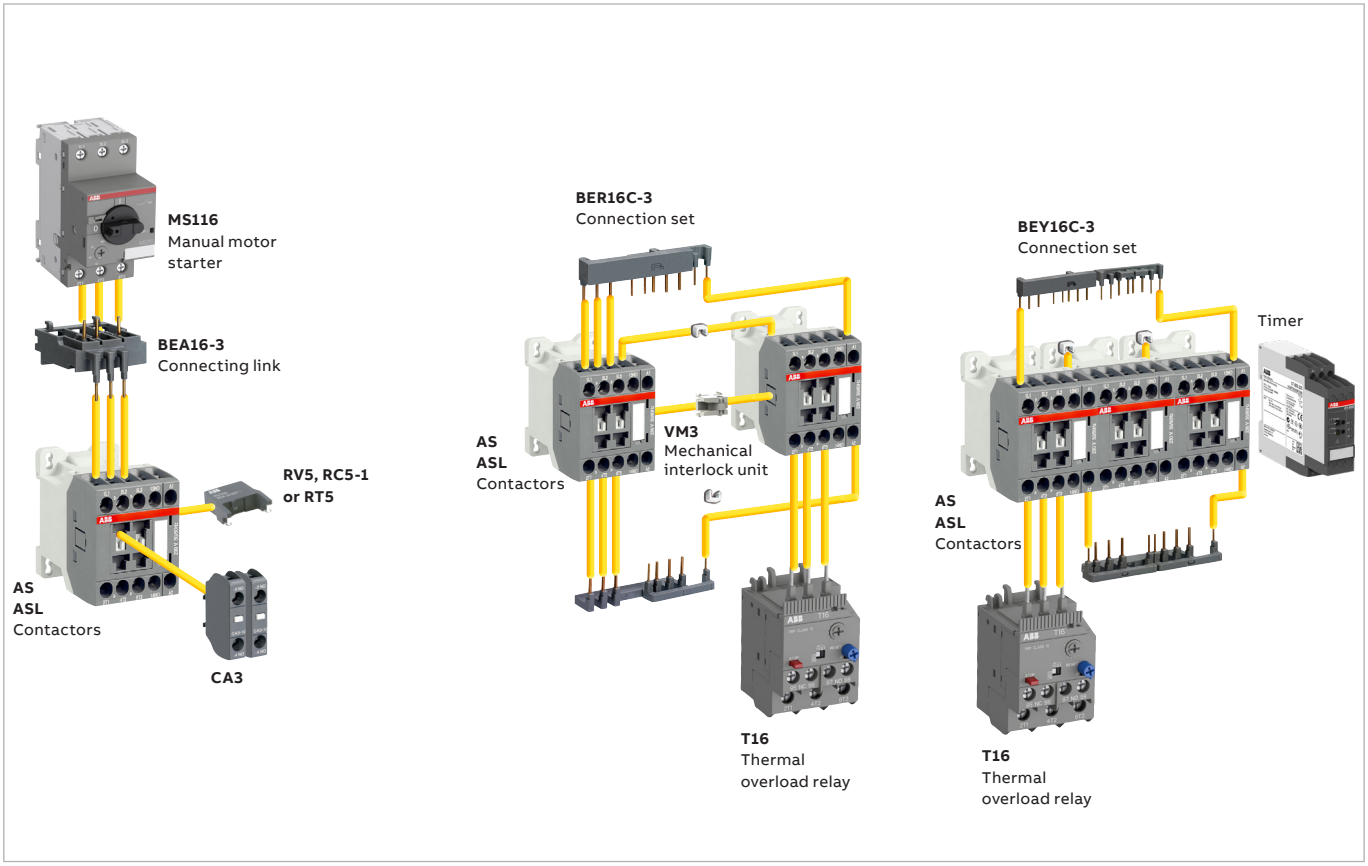
ASL09, ASL12, ASL16

Main dimensions mm, inches

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

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

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

Overload relays fitting details (1)

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

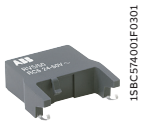
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

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

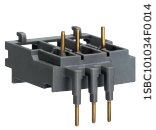
Main accessories

CA3-10

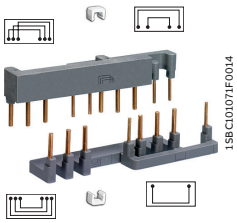
VM3



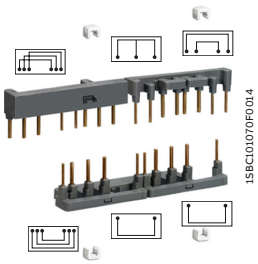
RV5



BEA16-3



BER16C-3



BEY16C-3

Front-mounted instantaneous auxiliary contact blocks

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

Mechanical interlock unit

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

Surge suppressors

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

Connecting links with manual motor starters

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

Connection sets for reversing contactors

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

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

Connection sets for star-delta starting

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

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

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

Technical data

Main pole - Utilization characteristics according to IEC

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

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

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

Technical data

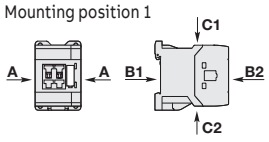
Main pole - Utilization characteristics according to UL / NEMA / CSA

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

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

General technical data

Contactor types		AC operated	AS09	AS12	AS16
		DC operated	ASL09	ASL12	ASL16
Rated insulation voltage Ui					
acc. to IEC 60947-4-1			690 V		
acc. to UL / CSA			600 V		
Rated impulse withstand voltage Uimp.			6 kV		
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 operating cycles		
Max. switching frequency			3600 cycles/h		
Shock withstand			1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		
acc. to IEC 60068-2-27 and EN 60068-2-27		Shock direction	AS contactors - AC operated	ASL contactors - DC operated	
Mounting position 1		A	20 g	20 g closed position / 10 g open position	
		B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position	
		B2	15 g	10 g	
		C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position	
		C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position	
Vibration withstand acc. to IEC 60068-2-6			5...300 Hz / 3 g closed position / 2 g open position		



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

Technical data

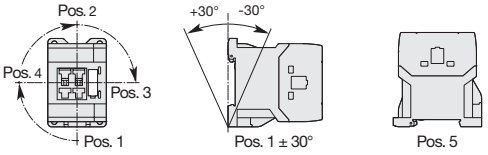
Magnet system characteristics for AS09 ... AS16 contactors

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

Magnet system characteristics for ASL09 ... ASL16 contactors

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

Mounting characteristics and conditions for use

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

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

Connecting characteristics

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

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

Technical data

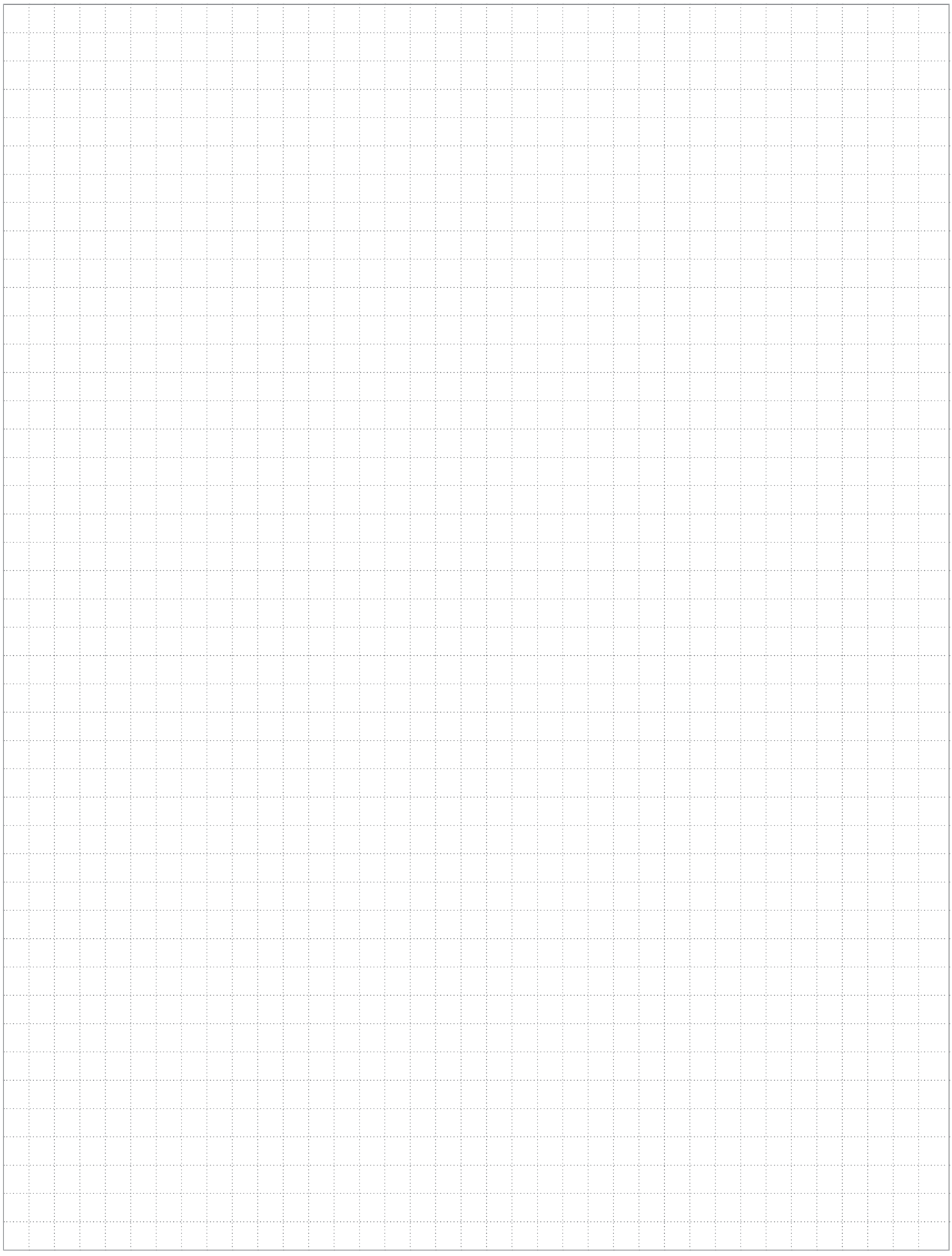
Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

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

Notes

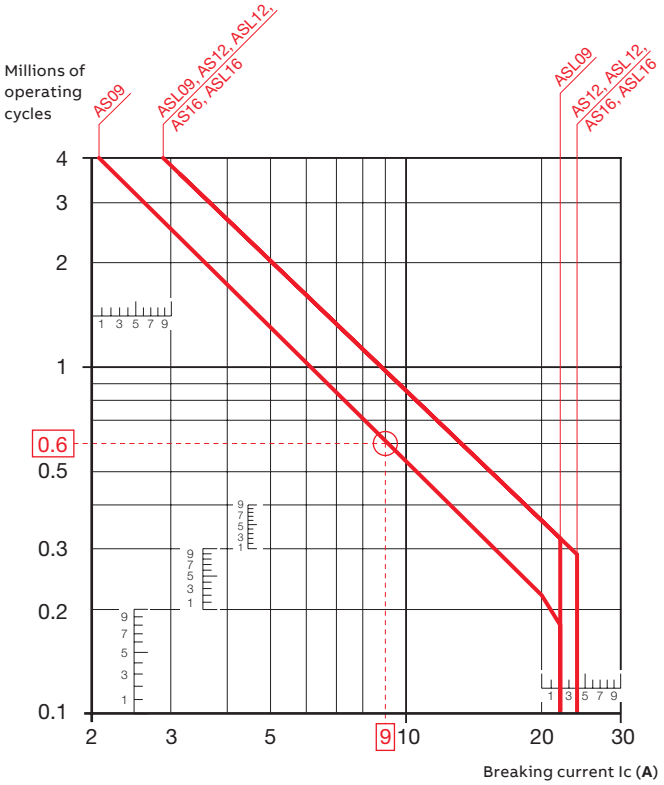


AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V
Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

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



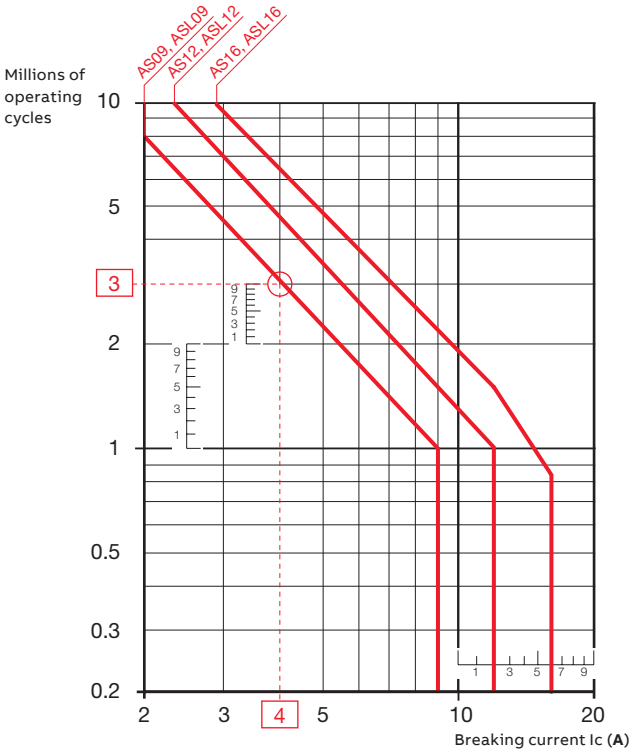
Example:
Breaking current = 9 A.
On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

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

Electrical durability

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

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

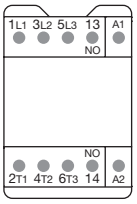


Example:
Breaking current = 4 A.
On the opposite curve at intersection "○" 4 A the corresponding value for the electrical durability is approximately 3 millions operating cycles.

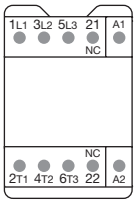
AS09 ... AS16 3-pole contactors
Terminal marking and positioning

AS contactors - AC operated

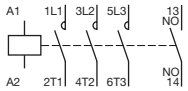
Standard devices without addition of auxiliary contacts



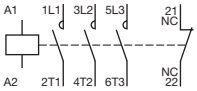
AS09 ... AS16-30-10



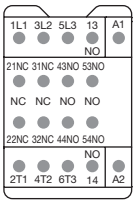
AS09 ... AS16-30-01



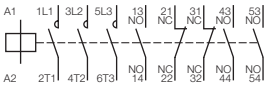
AS09 ... AS16-30-10



AS09 ... AS16-30-01

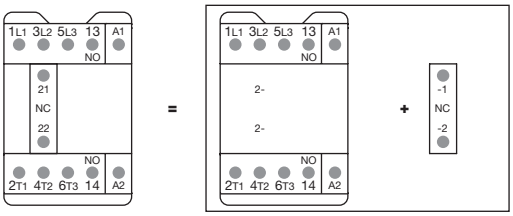


AS09 ... AS16-30-32

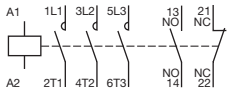


AS09 ... AS16-30-32

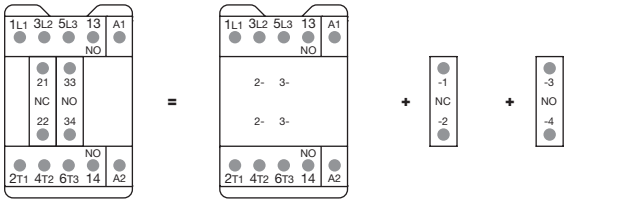
Other possible contact combinations with auxiliary contact blocks added by the user



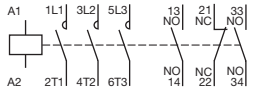
Combination 11 = AS09 ... AS16-30-10 + CA3-01



Combination 11

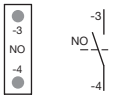


Combination 21 = AS09 ... AS16-30-10 + CA3-01 + CA3-10

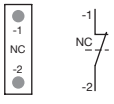


Combination 21

CA3 1-pole auxiliary contact blocks



CA3-10



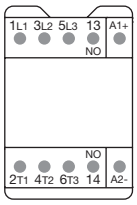
CA3-01

ASL09 ... ASL16 3-pole contactors

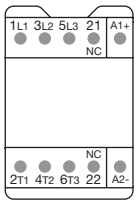
Terminal marking and positioning

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

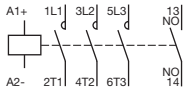
Standard devices without addition of auxiliary contacts



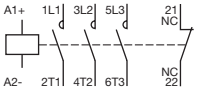
ASL09 ... ASL16-30-10



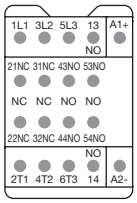
ASL09 ... ASL16-30-01



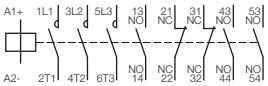
ASL09 ... ASL16-30-10



ASL09 ... ASL16-30-01

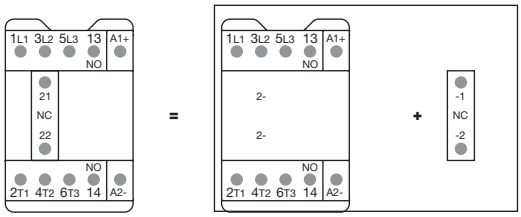


ASL09 ... ASL16-30-32

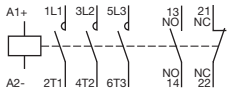


ASL09 ... ASL16-30-32

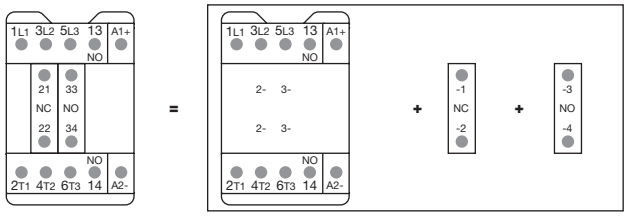
Other possible contact combinations with auxiliary contact blocks added by the user



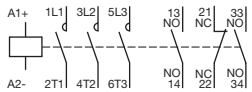
Combination 11 = ASL09 ... ASL16-30-10 + CA3-01



Combination 11

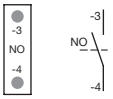


Combination 21 = ASL09 ... ASL16-30-10 + CA3-01 + CA3-10

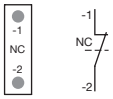


Combination 21

CA3 1-pole auxiliary contact blocks

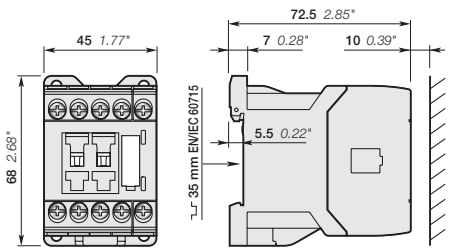


CA3-10

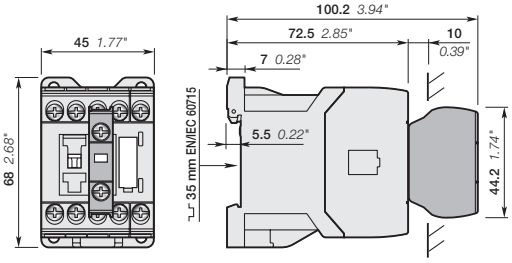


CA3-01

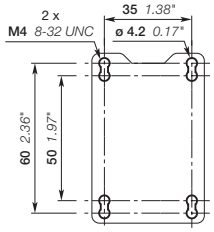
AS09 ... AS16 3-pole contactors
Dimensions

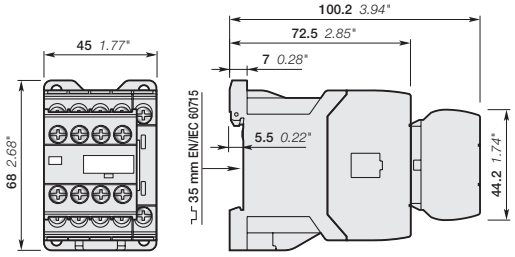


AS09, AS12, AS16



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

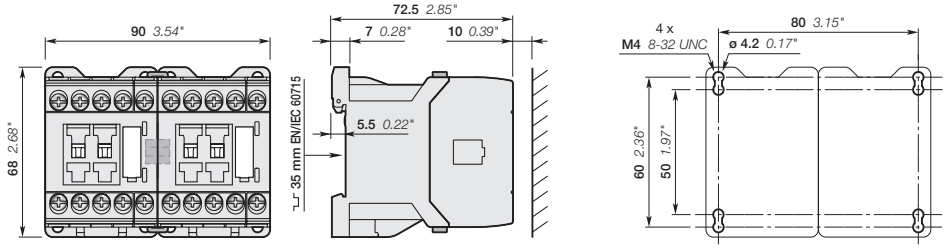




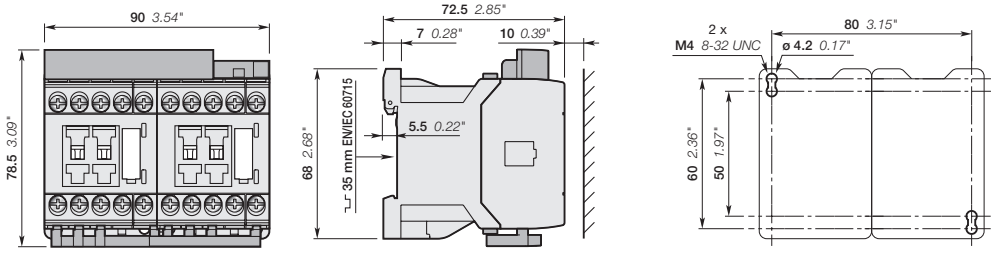
AS09 ... 16-30-32

Main dimensions mm, inches

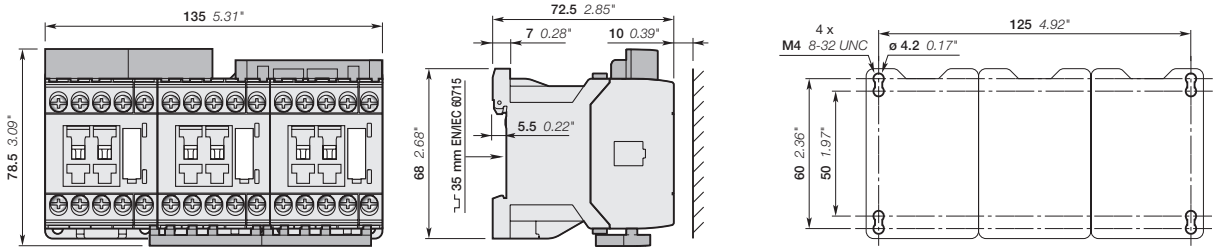
AS09 ... AS16 3-pole contactors
Dimensions



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



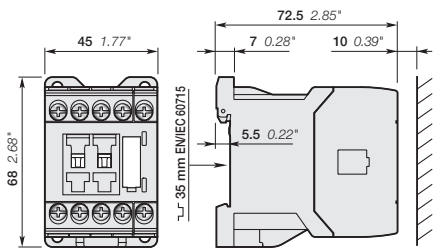
AS09, AS12, AS16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



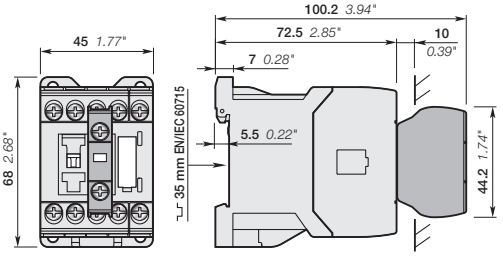
AS09, AS12, AS16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

Main dimensions mm, inches

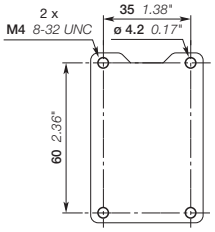
ASL09 ... ASL16 3-pole contactors
Dimensions

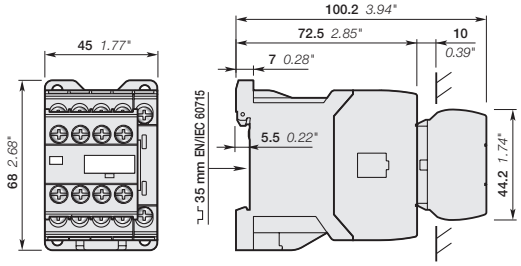


ASL09, ASL12, ASL16



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

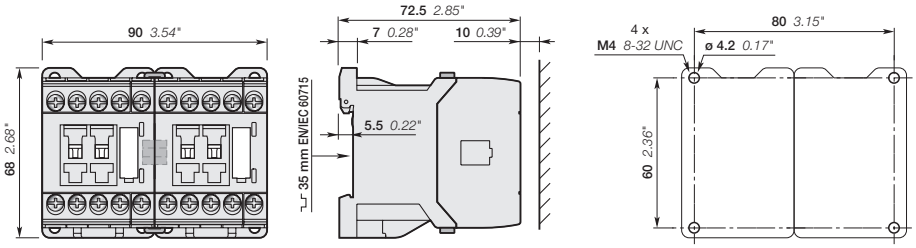




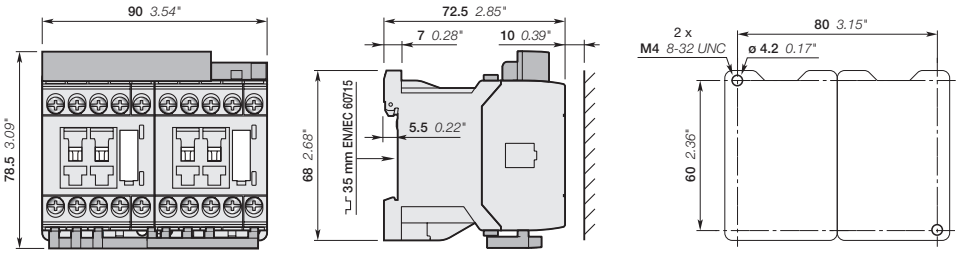
ASL09 ... 16-30-32

Main dimensions mm, inches

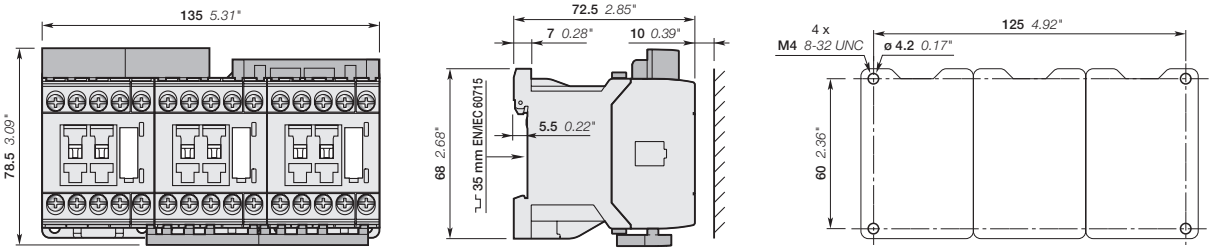
ASL09 ... ASL16 3-pole contactors
Dimensions



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



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

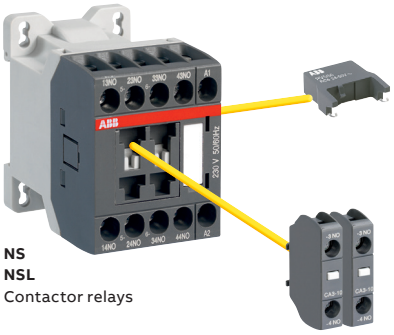


ASL09, ASL12, ASL16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

Contactor relays
Main accessories

NS, NSL
Contactor relays

4-pole contactor relays



RV5, RT5 or RC5-1
Surge suppressor

CA-3
1-pole auxiliary contact block

NS
NSL
Contactor relays

8-pole contactor relays

RV5, RT5 or RC5-1
Surge suppressor

NS
NSL
Contactor relays

Contactor relays

NS

NSL

Screw terminals

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

NS

NSL

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

Control circuit switching

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

Main accessories

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

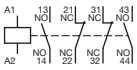
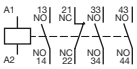
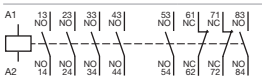
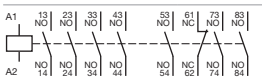
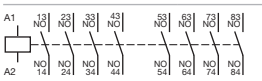
NS contactor relays
AC operated

NS22E

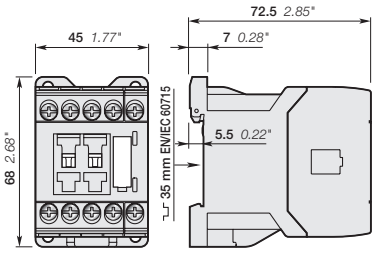
NS contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

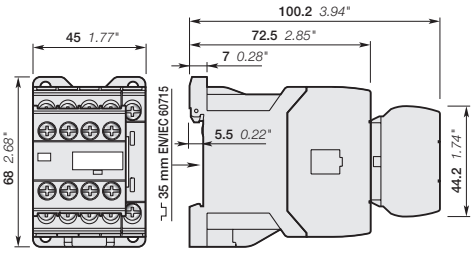
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Number of contacts		Rated control circuit voltage Uc (1)		Type	Order code	Weight Pkg (1 pce)
1st stack	2nd stack	V 50 Hz	V 60 Hz			kg
		24	24	NS22E-20	1SBH101001R2022	0.220
		220	220	NS22E-25 Relay	1SBH101001R2522	0.220
		230	230	NS22E-26	1SBH101001R2622	0.220
		24	24	NS31E-20	1SBH101001R2031	0.220
		220	220	NS31E-25 Relay	1SBH101001R2531	0.220
		230	230	NS31E-26	1SBH101001R2631	0.220
		24	24	NS40E-20	1SBH101001R2040	0.220
		220	220	NS40E-25 Relay	1SBH101001R2540	0.220
		230	230	NS40E-26	1SBH101001R2640	0.220
		24	24	NS44E-20	1SBH101001R2044	0.260
		220	220	NS44E-25 Relay	1SBH101001R2544	0.260
		230	230	NS44E-26	1SBH101001R2644	0.260
		24	24	NS53E-20	1SBH101001R2053	0.260
		220	220	NS53E-25 Relay	1SBH101001R2553	0.260
		230	230	NS53E-26	1SBH101001R2653	0.260
		24	24	NS62E-20	1SBH101001R2062	0.260
		220	220	NS62E-25 Relay	1SBH101001R2562	0.260
		230	230	NS62E-26	1SBH101001R2662	0.260
		24	24	NS71E-20	1SBH101001R2071	0.260
		220	220	NS71E-25 Relay	1SBH101001R2571	0.260
		230	230	NS71E-26	1SBH101001R2671	0.260
		24	24	NS80E-20	1SBH101001R2080	0.260
		220	220	NS80E-25 Relay	1SBH101001R2580	0.260
		230	230	NS80E-26	1SBH101001R2680	0.260

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



NS22E, NS31E, NS40E



NS44E, NS53E, NS62E, NS71E, NS80E

Main dimensions mm, inches

NSL contactor relays

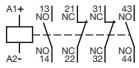
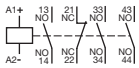
DC operated

NSL22E

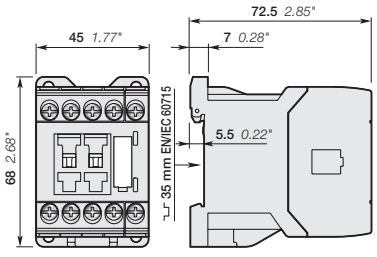
NSL contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

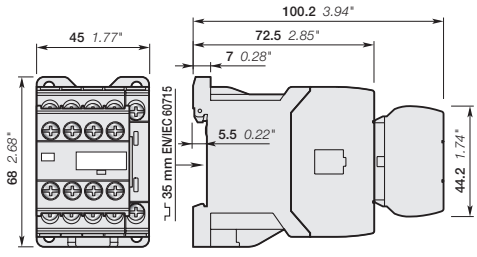
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and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

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

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



NSL22E, NSL31E, NSL40E



NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Main dimensions mm, inches

NS and NSL contactor relays
Main accessories

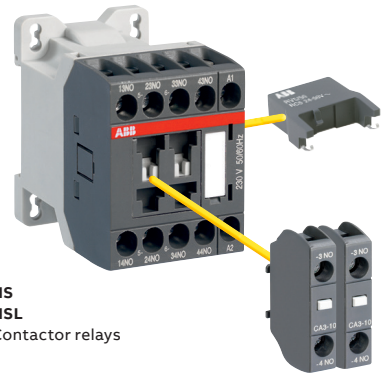
Contactor relays and main accessories (other accessories available)

8-pole contactor relay

RV5, RT5 or RC5-1
Surge suppressor

NS
NSL
Contactor relays

4-pole contactor relay



RV5, RT5 or RC5-1
Surge suppressor

NS
NSL
Contactor relays

CA-3
1-pole auxiliary contact block

CA3

Main accessory fitting details

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

NS and NSL contactor relays
Main accessories

CA3-10

Front-mounted instantaneous auxiliary contact blocks

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

RV5

Surge suppressors

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

NS and NSL contactor relays
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

NS and NSL contactor relays
Technical data

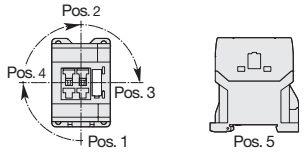
Magnet system characteristics for NS contactor relays

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

Magnet system characteristics for NSL contactor relays

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

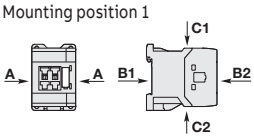
Mounting characteristics and conditions for use

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

NS and NSL contactor relays

Technical data

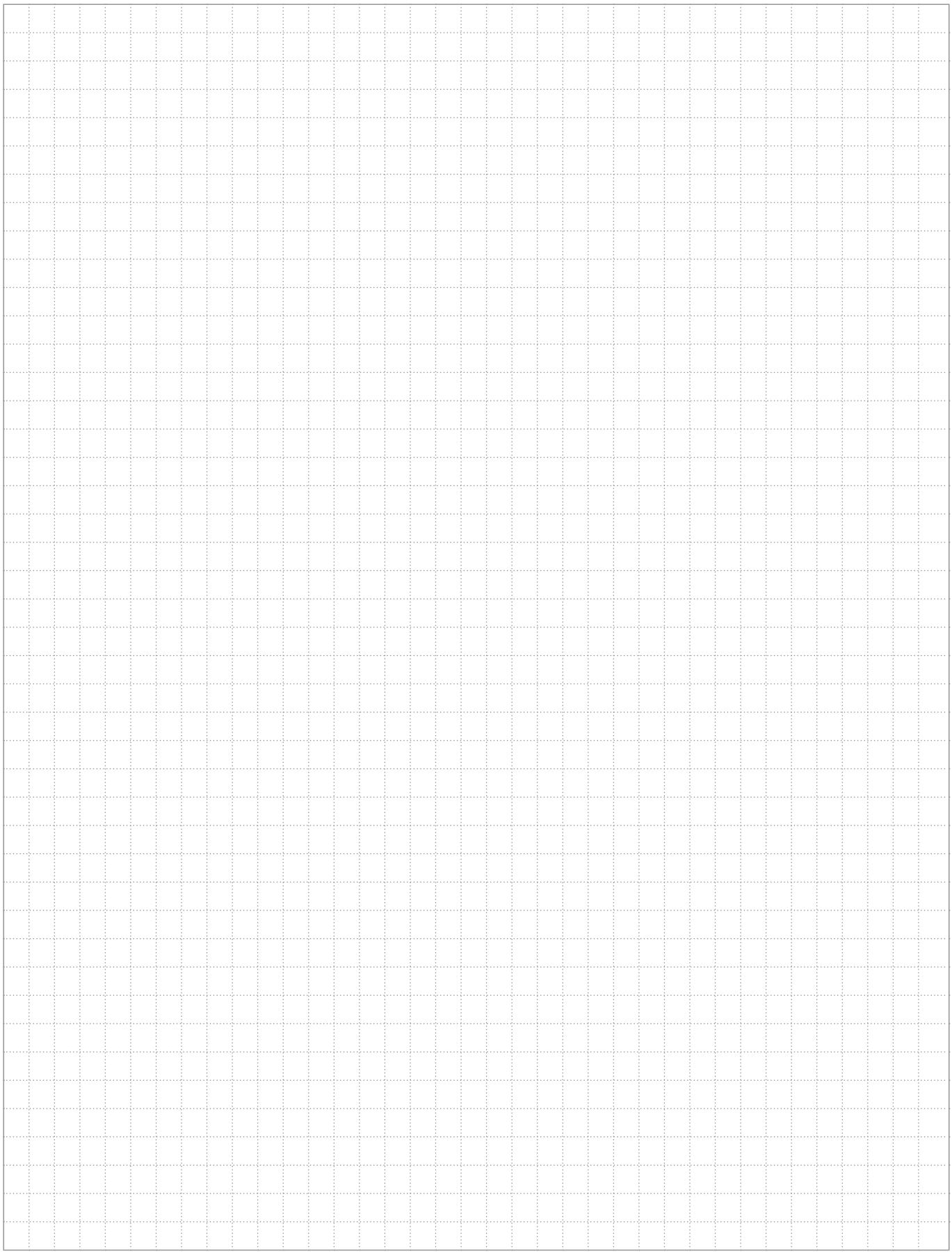
General technical data

Contactor relay types	AC operated	**NS**	
	DC operated	**NSL**	
Rated insulation voltage Ui			
acc. to IEC 60947-5-1		690 V	
acc. to UL / CSA		600 V	
Rated impulse withstand voltage Uimp.		6 kV	
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 operating cycles	
Max. switching frequency		3600 cycles/h	
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position	
acc. to IEC 60068-2-27 and EN 60068-2-27	Shock direction	NS contactor relays - AC operated	NSL contactor relays - DC operated
Mounting position 1	A	20 g	20 g closed position / 10 g open position
	B1	5 g	15 g closed position / 5 g open position
	B2	15 g	10 g
	C1	19 g closed position / 8 g open position	19 g closed position / 8 g open position
	C2	16 g closed position / 13 g open position	14 g closed position / 8 g open position
Vibration withstand acc. to IEC 60068-2-6		5...300 Hz / 3 g closed position / 2 g open position	

Connecting characteristics

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

Notes

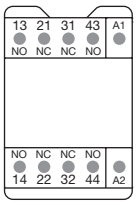


NS contactor relays

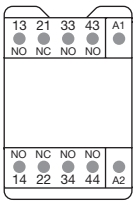
Terminal marking and positioning

NS contactor relays - AC operated

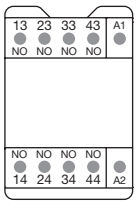
Standard devices without addition of auxiliary contact blocks



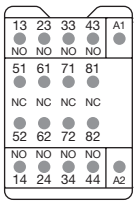
NS22E



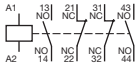
NS31E



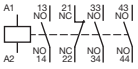
NS40E



NS44E



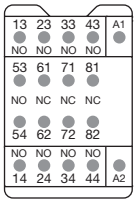
NS22E



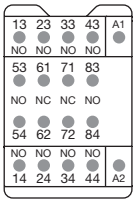
NS31E

NS40E

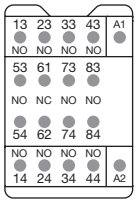
NS44E



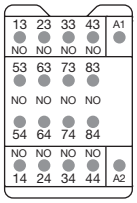
NS53E



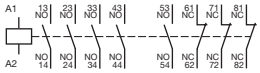
NS62E



NS71E



NS80E



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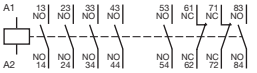
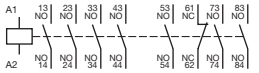


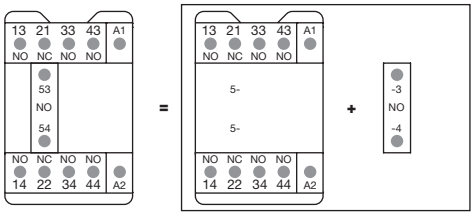
NS62E



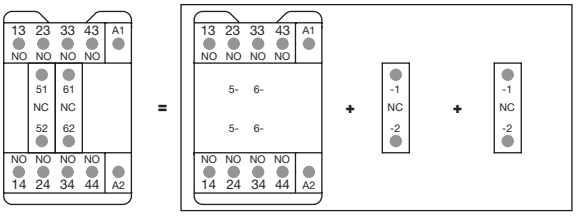
NS71E

NS80E

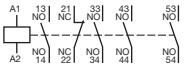
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NS31E + CA3-10

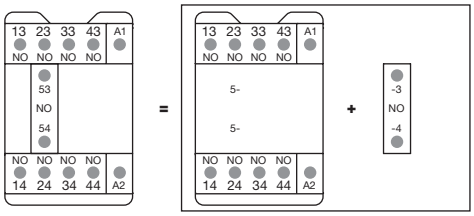


Combination 42E = NS40E + CA3-01 + CA3-01

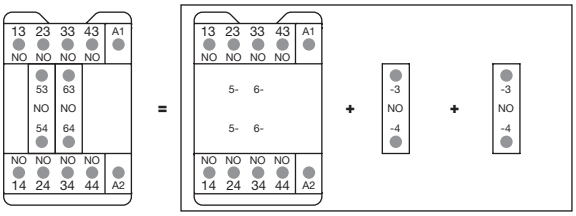


Combination 41E

Combination 42E

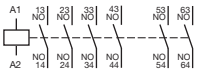


Combination 50E = NS40E + CA3-10



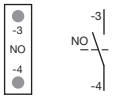
Combination 60E = NS40E + CA3-10 + CA3-10

Combination 50E

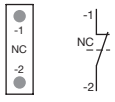


Combination 60E

CA3 1-pole auxiliary contact blocks



CA3-10



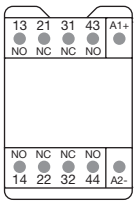
CA3-01

NSL contactor relays

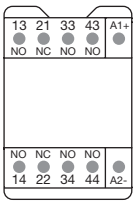
Terminal marking and positioning

NSL contactor relays - DC operated (the polarity A1+, A2- must be respected)

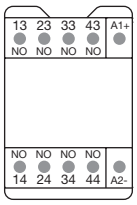
Standard devices without addition of auxiliary contact blocks



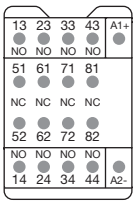
NSL22E



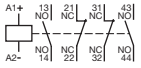
NSL31E



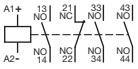
NSL40E



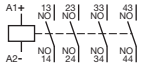
NSL44E



NSL22E

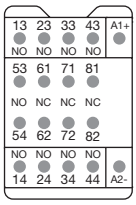


NSL31E

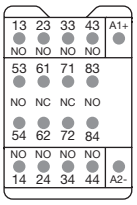


NSL40E

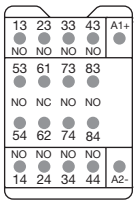
NSL44E



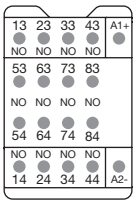
NSL53E



NSL62E



NSL71E



NSL80E

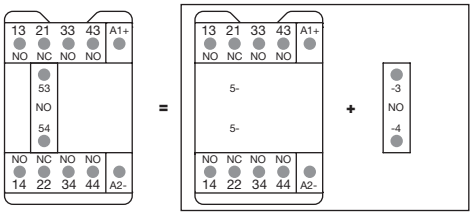
NSL53E

NSL62E

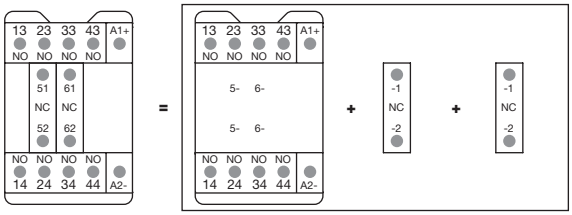
NSL71E

NSL80E

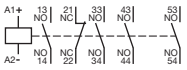
Other possible contact combinations with auxiliary contact blocks added by the user



Combination 41E = NSL31E + CA3-10

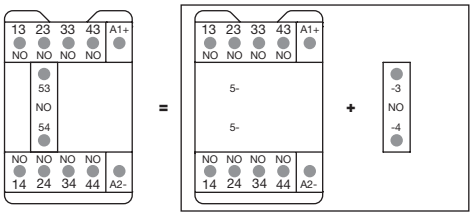


Combination 42E = NSL40E + CA3-01 + CA3-01

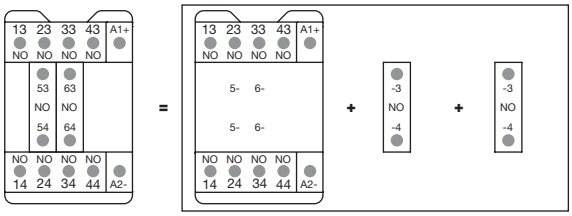


Combination 41E

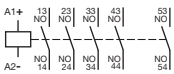
Combination 42E



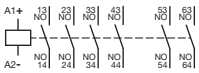
Combination 50E = NSL40E + CA3-10



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

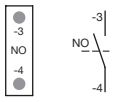


Combination 50E

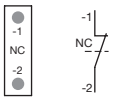


Combination 60E

CA3 1-pole auxiliary contact blocks



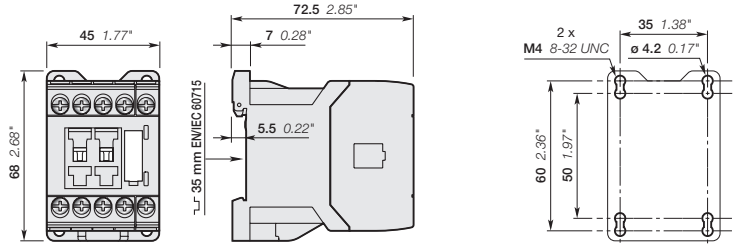
CA3-10



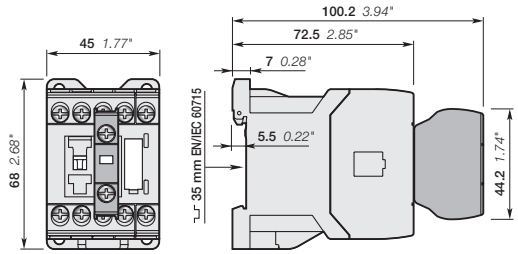
CA3-01

NS contactor relays
Dimensions

4-pole contactor relays

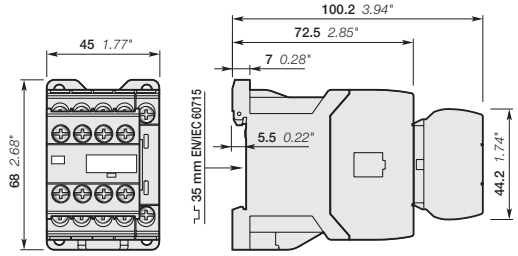


NS22E, NS31E, NS40E



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

8-pole contactor relays

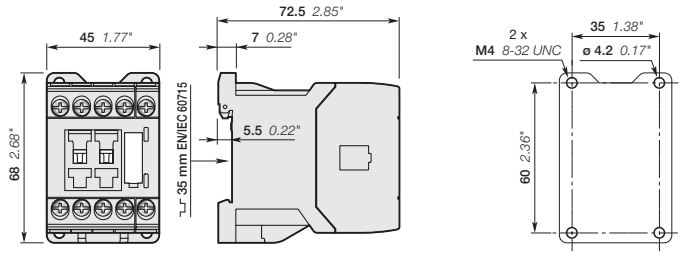


NS44E, NS53E, NS62E, NS71E, NS80E

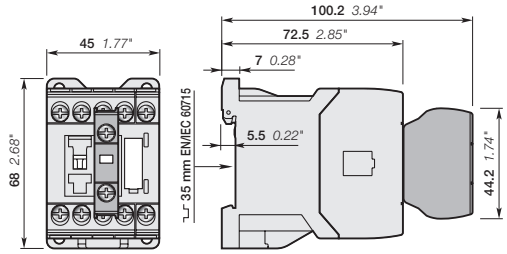
Main dimensions mm, inches

NSL contactor relays
Dimensions

4-pole contactor relays

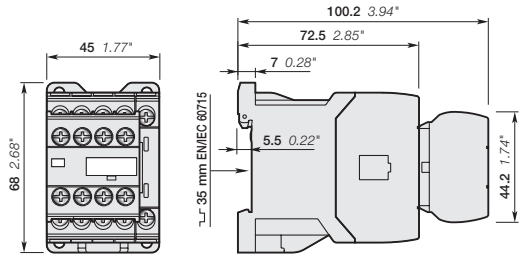


NSL22E, NSL31E, NSL40E



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

8-pole contactor relays



NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Main dimensions mm, inches

Auxiliary contact blocks

Accessories

CA3-10

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

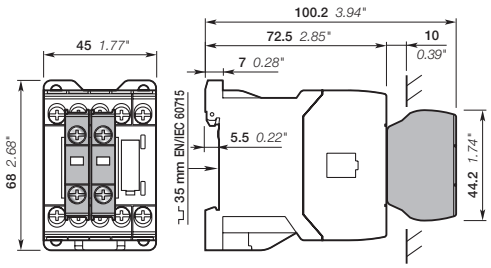
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- Screw-type connecting terminals with cage clamp delivered open.

All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

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



Main dimensions mm, inches

Auxiliary contact blocks
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

Connecting characteristics

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

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

Electrical durability

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

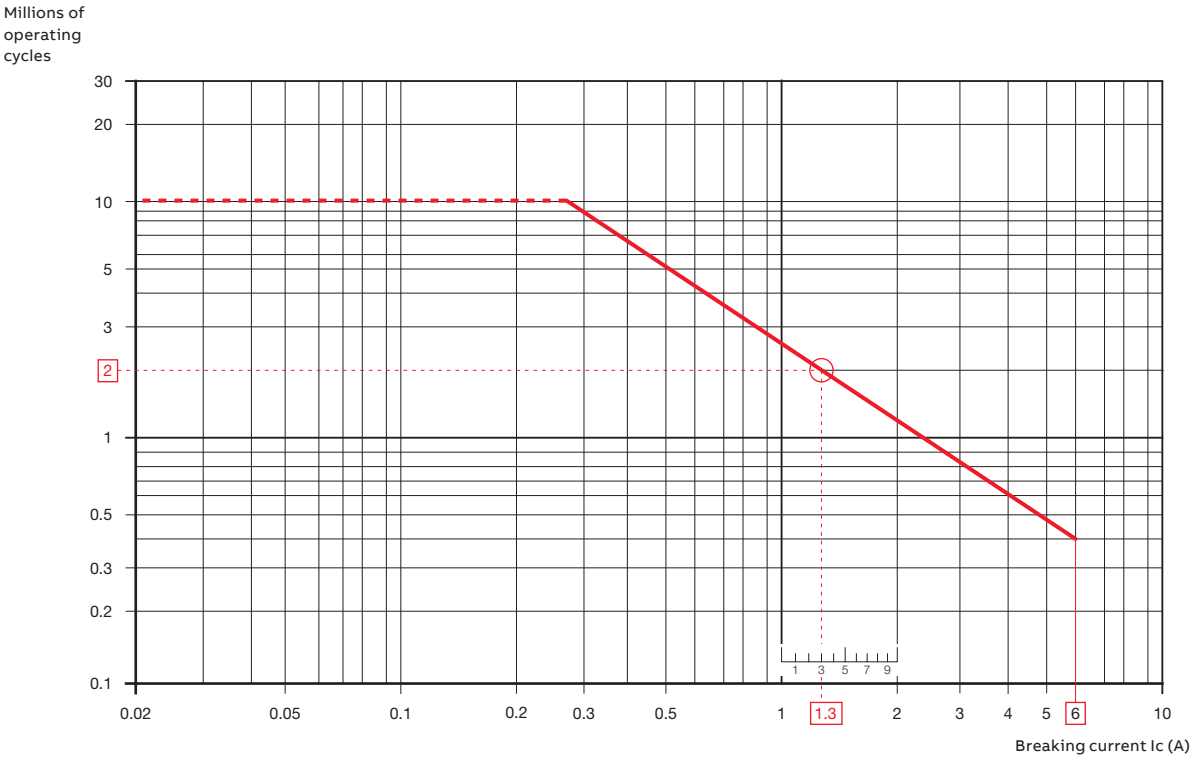
AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

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

The curve has been drawn for resistive and inductive loads up to 400 V:

- AS09 ... AS16 and ASL09 ... ASL16 contactor built-in auxiliary contacts
- 1-pole CA3
- NS and NSL contactor relays.

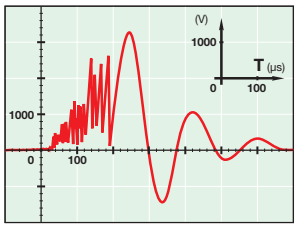


Example:

Breaking current = 1.3 A

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

Surge suppressors for contactor coils



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

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

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

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

Overvoltage Factor

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

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

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

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

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

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

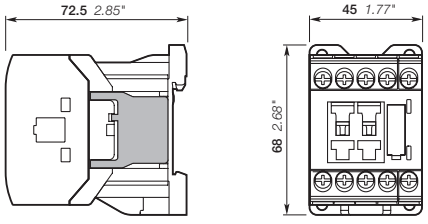
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

RV5

RC5-1

RT5

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



Main dimensions mm, inches

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

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

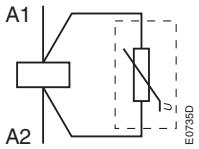
Surge suppressors for contactor coils
Technical data

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

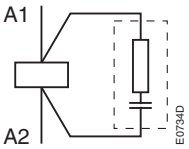
RC type	**RC5-1/50**	**RC5-1/133**	**RC5-1/250**	**RC5-1/440**
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very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

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

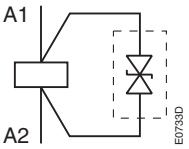
Wiring diagrams



Varistor



RC type



Transil diode

Mechanical interlock unit and other accessories

VM3

Mechanical interlock unit

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

The mechanical interlock unit includes 2 fixing clips.

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

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

BB3

Fixing clips

BB3 is a set of 50 fixing clips.

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

Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

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

1SBC100043V0014

BDT4

Function markers

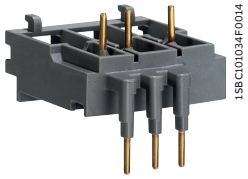
Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (.276" x .787").

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

1SNC160101F0014

BA4

Connection accessories for starting solutions



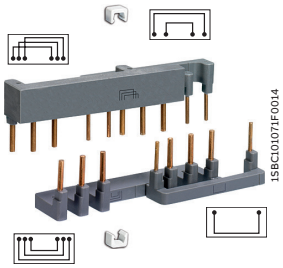
BEA16-3

Connecting links

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

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

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



BER16C-3

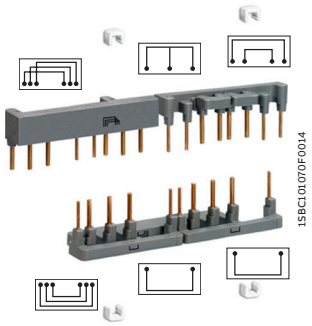
Connection sets for reversing contactors

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

The connection sets are made up of:

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

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



BEY16C-3

Connection sets for star-delta starting

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

The connection sets are made up of:

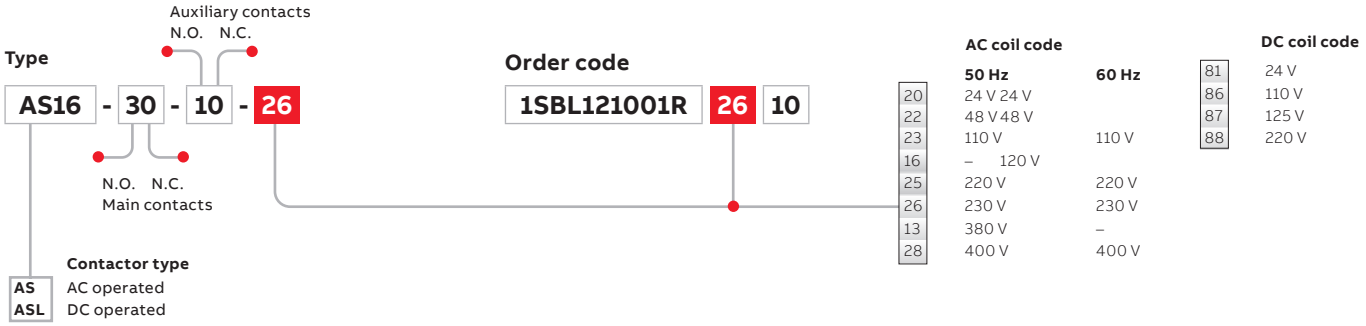
- Line contactor / delta contactor: upstream phase-to-phase connection,
- Delta contactor / star contactor: downstream connection in parallel,
- Star contactor: star point upstream,
- An electrical interlocking between delta and star contactors equipped with built-in N.C. auxiliary contacts,
- 4 fixing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

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

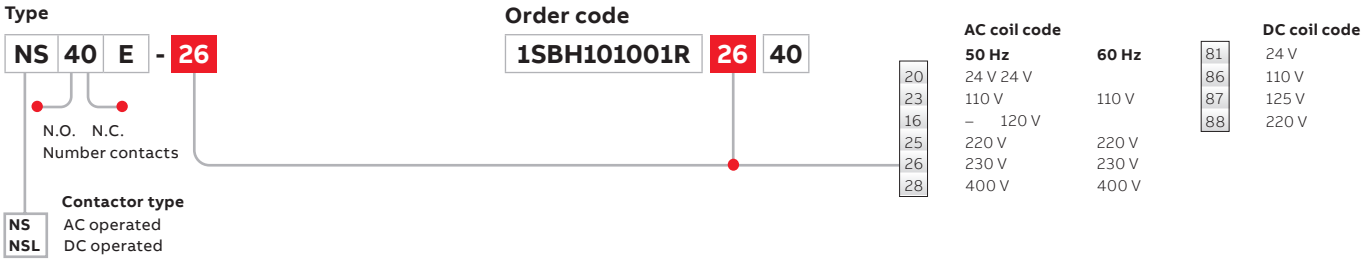
Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. For detail code information, please contact your ABB local sales organization.

3-pole contactors



Contactor relays



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

www.abb.com/productdetails/**1SBL137001R1310**

AS..S 3-pole contactors and NS..S contactor relays with spring terminals

AS..S 3-pole contactors - with spring terminals

5/56 AS09..S ... AS16..S AC operated
5/57 ASL09..S ... ASL16..S DC operated
5/58 AS09..S ... AS16..S AC operated - 2-stack
5/59 ASL09..S ... ASL16..S DC operated - 2-stack
5/60 Main accessories
5/62 Technical data
5/68 Electrical durability
5/69 Terminal marking and positioning
5/71 Dimensions

NS..S contactors relays - with spring terminals

5/73 NS..S AC operated
5/74 NSL..S DC operated
5/75 Main accessories
5/77 Technical data
5/80 Terminal marking and positioning
5/82 Dimensions

Accessories

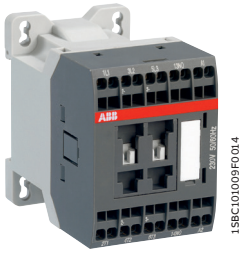
5/84 Auxiliary contact blocks - with spring terminals
5/88 Surge suppressors for contactor coils
5/90 Connecting links for starting solution and other accessories

5/91 **Voltage code table**

AS09..S ... AS16..S 3-pole contactors

4 to 7.5 kW

AC operated - with spring terminals



AS09-30-10S

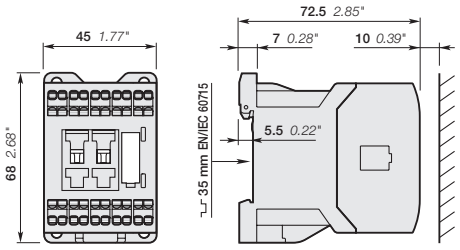
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
4	20	5	12	24	24	1 0	AS09-30-10S-20	1SBL101004R2010	0.220
						0 1	AS09-30-01S-20	1SBL101004R2001	0.220
				220	220	1 0	AS09-30-10S-25	1SBL101004R2510	0.220
						0 1	AS09-30-01S-25	1SBL101004R2501	0.220
				230	230	1 0	AS09-30-10S-26	1SBL101004R2610	0.220
						0 1	AS09-30-01S-26	1SBL101004R2601	0.220
5.5	22	7.5	12	24	24	1 0	AS12-30-10S-20	1SBL111004R2010	0.220
						0 1	AS12-30-01S-20	1SBL111004R2001	0.220
				220	220	1 0	AS12-30-10S-25	1SBL111004R2510	0.220
						0 1	AS12-30-01S-25	1SBL111004R2501	0.220
				230	230	1 0	AS12-30-10S-26	1SBL111004R2610	0.220
						0 1	AS12-30-01S-26	1SBL111004R2601	0.220
7.5	22	10	15.2	24	24	1 0	AS16-30-10S-20	1SBL121004R2010	0.220
						0 1	AS16-30-01S-20	1SBL121004R2001	0.220
				220	220	1 0	AS16-30-10S-25	1SBL121004R2510	0.220
						0 1	AS16-30-01S-25	1SBL121004R2501	0.220
				230	230	1 0	AS16-30-10S-26	1SBL121004R2610	0.220
						0 1	AS16-30-01S-26	1SBL121004R2601	0.220

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



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

Main dimensions mm, inches

ASL09..S ... ASL16..S 3-pole contactors

4 to 7.5 kW

DC operated - with spring terminals

ASL09-30-10S

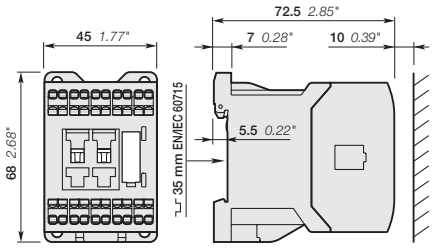
ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

IEC		UL/CSA		Rated control circuit voltage Uc (1)	Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ϑ ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC					Pkg (1 pce)
kW	A	hp	A	V DC				kg
4	20	5	12	24	1 0	ASL09-30-10S-81	1SBL103004R8110	0.280
					0 1	ASL09-30-01S-81	1SBL103004R8101	0.280
5.5	22	7.5	12	24	1 0	ASL12-30-10S-81	1SBL113004R8110	0.280
					0 1	ASL12-30-01S-81	1SBL113004R8101	0.280
7.5	22	10	15.2	24	1 0	ASL16-30-10S-81	1SBL123004R8110	0.280
					0 1	ASL16-30-01S-81	1SBL123004R8101	0.280

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



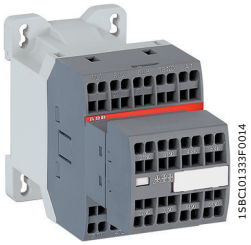
ASL09..S, ASL12..S, ASL16..S

Main dimensions mm, inches

AS09..S ... AS16..S 2-stack 3-pole contactors

4 to 7.5 kW

AC operated - with spring terminals



AS09-30-32S

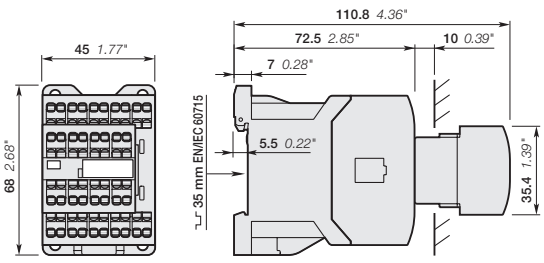
AS09..S ... AS16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

IEC		UL/CSA		Rated control circuit voltage Uc (1)		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power 400 V AC-3	current ≤ 40 °C AC-1	3-phase motor rating 480 V	General use rating 600 V AC						Pkg (1 pce)
kW	A	hp	A	V 50 Hz	V 60 Hz				kg
4	20	5	12	24	24	3 2	AS09-30-32S-20	1SBL101004R2032	0.260
				220	220	3 2	AS09-30-32S-25	1SBL101004R2532	0.260
				230	230	3 2	AS09-30-32S-26	1SBL101004R2632	0.260
5.5	22	7.5	12	24	24	3 2	AS12-30-32S-20	1SBL111004R2032	0.260
				220	220	3 2	AS12-30-32S-25	1SBL111004R2532	0.260
				230	230	3 2	AS12-30-32S-26	1SBL111004R2632	0.260
7.5	22	10	15.2	24	24	3 2	AS16-30-32S-20	1SBL121004R2032	0.260
				220	220	3 2	AS16-30-32S-25	1SBL121004R2532	0.260
				230	230	3 2	AS16-30-32S-26	1SBL121004R2632	0.260

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



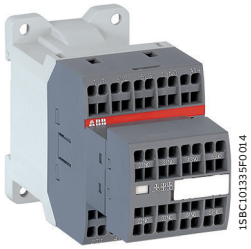
AS09..S, AS12..S, AS16..S

Main dimensions mm, inches

ASL09..S ... ASL16..S 2-stack 3-pole contactors

4 to 7.5 kW

DC operated - with spring terminals



ASL09-30-32S

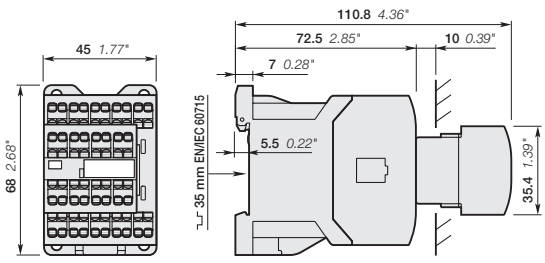
ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

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

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

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



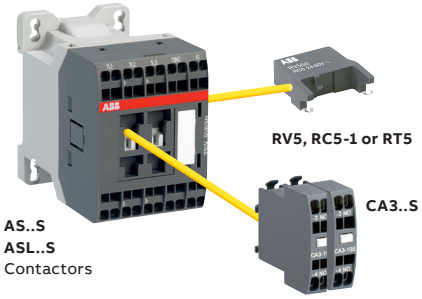
ASL09..S, ASL12..S, ASL16..S

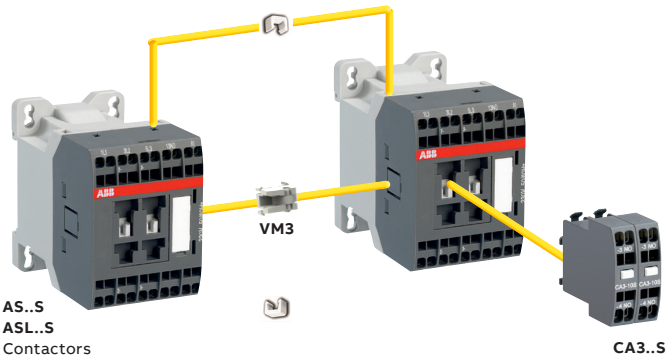
Main dimensions mm, inches

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

Main accessories

Contactor and main accessories (other accessories available)





Main accessory fitting details

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

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

Main accessories

CA3-10S

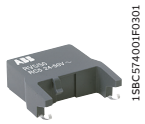
Front-mounted instantaneous auxiliary contact blocks

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

VM3

Mechanical interlock unit

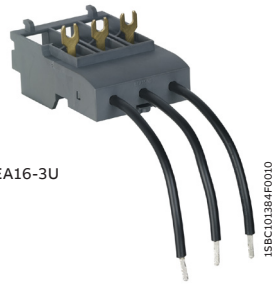
For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S, ASL09..S ... ASL16..S	VM3	1SBN031005T1000	10	0.002



RV5

Surge suppressors

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



BEA16-3U

Connecting links with manual motor starters

For contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S ASL09..S ... ASL16..S	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3U	1SBN081020R1000	1	0.045

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

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	AC operated	**AS09..S**	**AS12..S**	**AS16..S**
	DC operated	**ASL09..S**	**ASL12..S**	**ASL16..S**
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1		
Rated operational voltage Ue max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free-air thermal current Ith				
acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C		20 A	22 A	22 A
With conductor cross-sectional area		2.5 mm²	2.5 mm²	2.5 mm²
AC-1 Utilization category				
For air temperature close to contactor				
Ie / Rated operational current AC-1	θ ≤ 40 °C	20 A	22 A	22 A
Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 60 °C	15 A	17 A	17 A
	θ ≤ 70 °C	12 A	14 A	14 A
With conductor cross-sectional area		2.5 mm²		
AC-3 Utilization category				
For air temperature close to contactor θ ≤ 60 °C				
Ie / Max. rated operational current AC-3 (1)				
	220-230-240 V	9 A	12 A	15.7 A
3-phase motors	400 V	9 A	12 A	15.5 A
	415 V	9 A	12 A	15.5 A
	440 V	8 A	11 A	13.6 A
	500 V	8 A	11 A	12.5 A
	690 V	5 A	7 A	9 A
Rated operational power AC-3 (1)				
	220-230-240 V	2.2 kW	3 kW	4 kW
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	400 V	4 kW	5.5 kW	7.5 kW
	415 V	4 kW	5.5 kW	7.5 kW
	440 V	4 kW	5.5 kW	7.5 kW
	500 V	4 kW	5.5 kW	7.5 kW
	690 V	4 kW	5.5 kW	7.5 kW
Rated making capacity AC-3		10 x Ie AC-3 acc. to IEC 60947-4-1		
Rated breaking capacity AC-3		8 x Ie AC-3 acc. to IEC 60947-4-1		
AC-8a Utilization category				
(without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C)				
Ie / Rated operational current AC-8a		12 A	16 A	22 A
Rated operational power AC-8a		5.5 kW	7.5 kW	11 kW
Short-circuit protection device for contactors				
without thermal overload relay - Motor protection excluded (2)				
Ue ≤ 500 V AC - gG type fuse		25 A		
Rated short-time withstand current Icw	1 s	230 A	250 A	250 A
at 40 °C ambient temperature,	10 s	100 A	124 A	124 A
in free air from a cold state	30 s	65 A	75 A	75 A
	1 min	50 A	55 A	55 A
	15 min	20 A	22 A	22 A
Maximum breaking capacity				
cos ϕ = 0.45	at 440 V	155 A		
	at 690 V	90 A		
Power dissipation per pole	Ie / AC-1	0.9 W	1.1 W	1.1 W
	Ie / AC-3	0.18 W	0.33 W	0.55 W
Max. electrical switching frequency	AC-1	600 cycles/h		
	AC-3	1200 cycles/h		
	AC-4	300 cycles/h		

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

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

Technical data

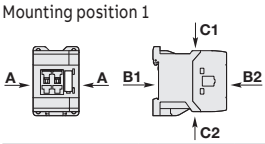
Main pole - Utilization characteristics according to UL / NEMA / CSA

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

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

General technical data

Contactor types	AC operated	**AS09..S**	**AS12..S**	**AS16..S**
	DC operated	**ASL09..S**	**ASL12..S**	**ASL16..S**
Rated insulation voltage Ui				
acc. to IEC 60947-4-1		690 V		
acc. to UL / CSA		600 V		
Rated impulse withstand voltage Uimp.		6 kV		
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 operating cycles		
Max. switching frequency		3600 cycles/h		
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position		
acc. to IEC 60068-2-27 and EN 60068-2-27 Mounting position 1	Shock direction	AS contactors - AC operated	ASL contactors - DC operated	
	A	20 g	20 g closed position / 10 g open position	
	B1	10 g closed position / 5 g open position	15 g closed position / 5 g open position	
	B2	15 g	10 g	
	C1	20 g closed position / 9 g open position	15 g closed position / 8 g open position	
	C2	20 g closed position / 14 g open position	14 g closed position / 8 g open position	
Vibration withstand	acc. to IEC 60068-2-6	5...300 Hz / 3 g closed position / 2 g open position		



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

Technical data

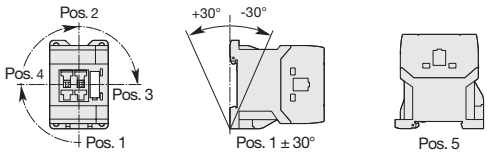
Magnet system characteristics for AS09..S ... AS16..S contactors

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

Magnet system characteristics for ASL09..S ... ASL16..S contactors

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

Mounting characteristics and conditions for use

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

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

Connecting characteristics

Contactor types	AC operated	**AS09..S**	**AS12..S**	**AS16..S**
	DC operated	**ASL09..S**	**ASL12..S**	**ASL16..S**
Main terminals		Spring terminals		
Connection capacity (min. ... max.)				
Main conductors (poles)				
Rigid Solid/Stranded	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	1 x	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...12		
Stripping length		10 mm		
Auxiliary conductors (built-in auxiliary terminals + coil terminals)				
Rigid Solid/Stranded	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²		
	2 x	0.75...2.5 mm²		
Flexible with insulated ferrule	1 x	0.75...1.5 mm²		
	2 x	0.75...1.5 mm²		
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14		
Stripping length		10 mm		
Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
All terminals		IP20		
Screwdriver type		Flat Ø 3.5		

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

Technical data

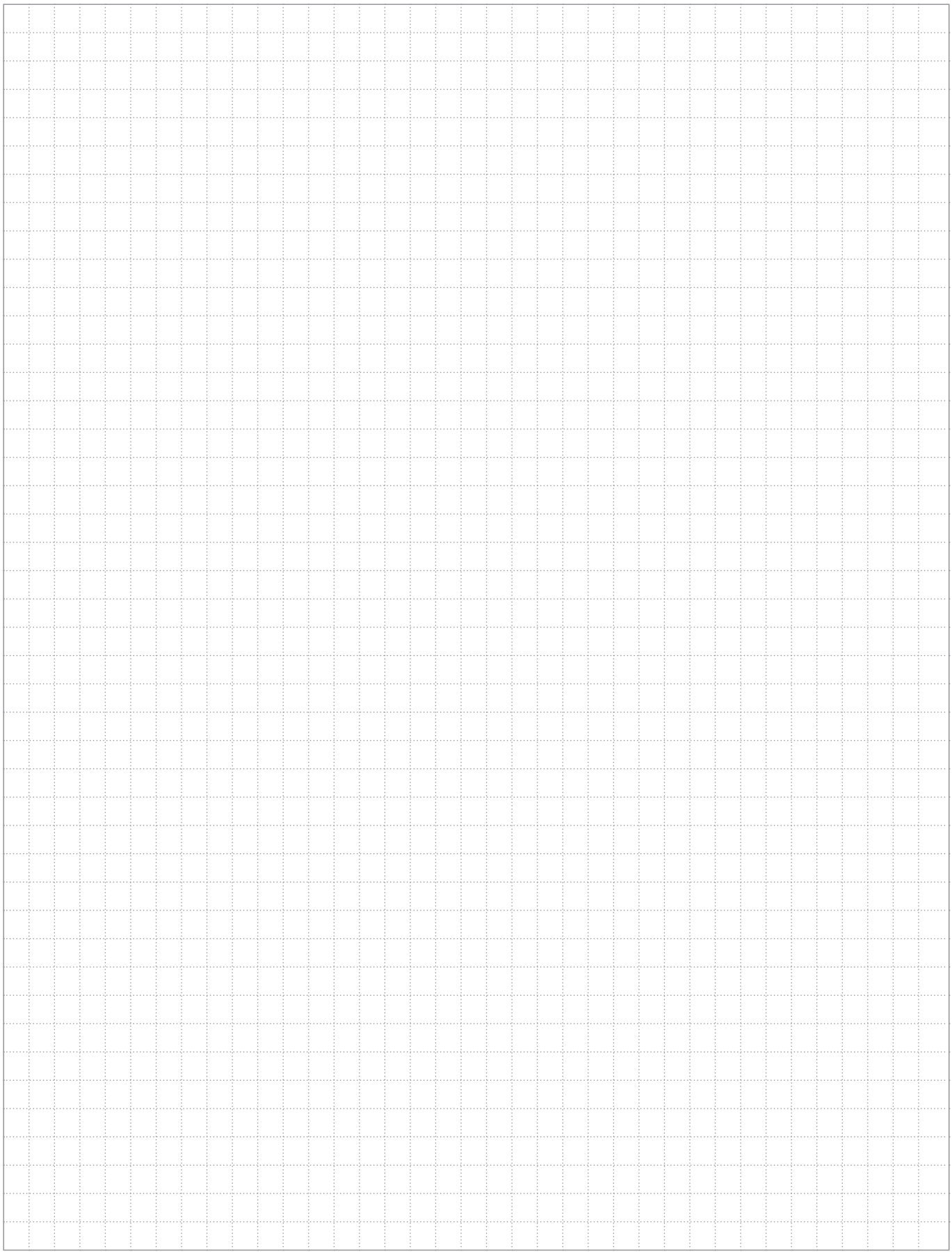
Built-in auxiliary contacts according to IEC

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

Built-in auxiliary contacts according to UL / CSA

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

Notes

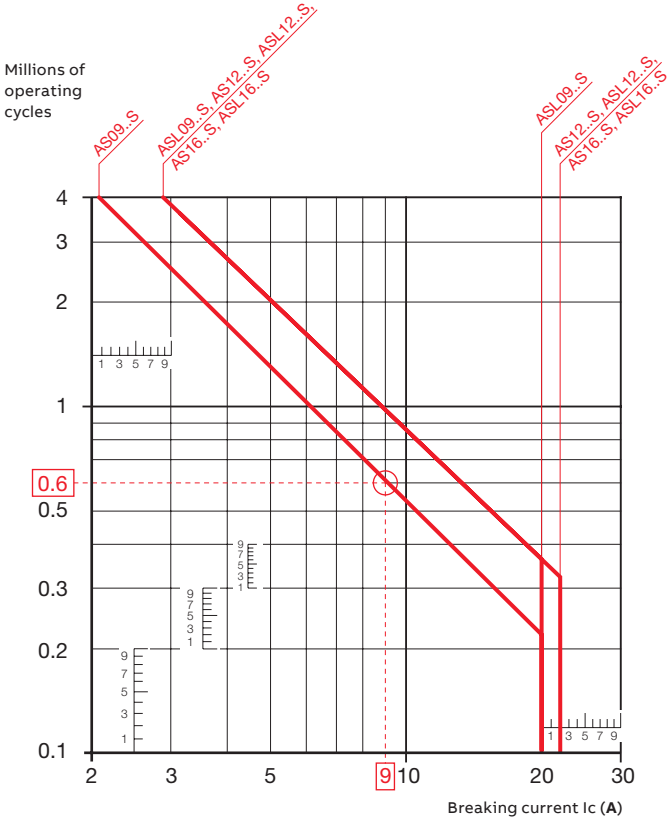


AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Electrical durability

Electrical durability for AC-1 utilization category - Ue ≤ 690 V
Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

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



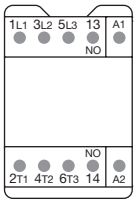
Example:
Breaking current = 9 A.
On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

AS09..S ... AS16..S 3-pole contactors - with spring terminals

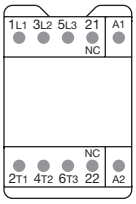
Terminal marking and positioning

AS..S contactors - AC operated

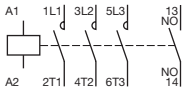
Standard devices without addition of auxiliary contacts



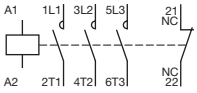
AS09 ... AS16-30-10S



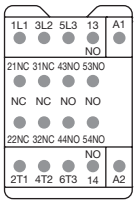
AS09 ... AS16-30-01S



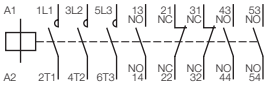
AS09 ... AS16-30-10S



AS09 ... AS16-30-01S

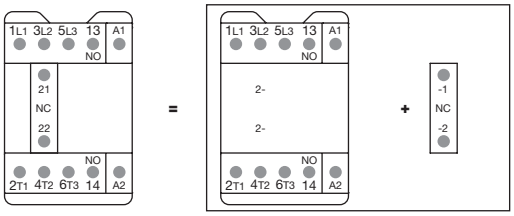


AS09 ... AS16-30-32S

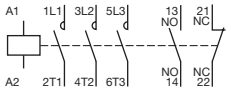


AS09 ... AS16-30-32S

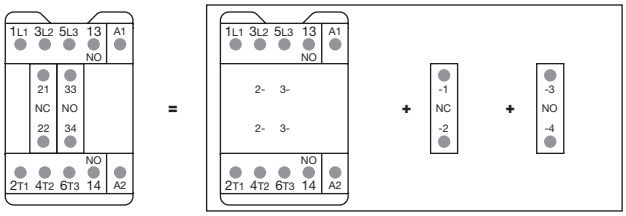
Other possible contact combinations with auxiliary contact blocks added by the user



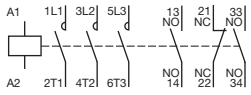
Combination 11 = AS09 ... AS16-30-10S + CA3-01S



Combination 11

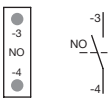


Combination 21 = AS09 ... AS16-30-10S + CA3-01S + CA3-10S

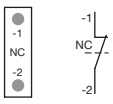


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



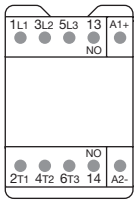
CA3-01S

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

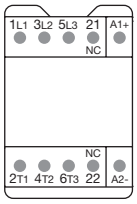
Terminal marking and positioning

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

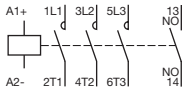
Standard devices without addition of auxiliary contacts



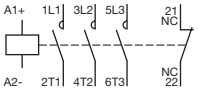
ASL09 ... ASL16-30-10S



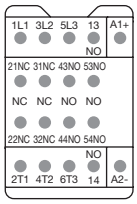
ASL09 ... ASL16-30-01S



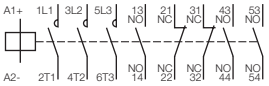
ASL09 ... ASL16-30-10S



ASL09 ... ASL16-30-01S

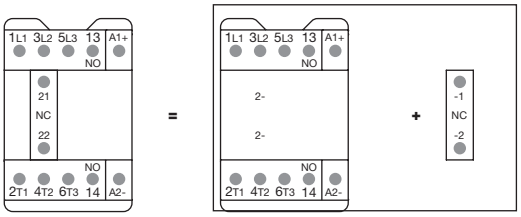


ASL09 ... ASL16-30-32

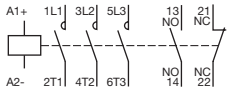


ASL09 ... ASL16-30-32S

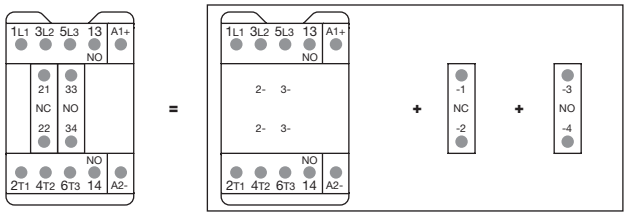
Other possible contact combinations with auxiliary contact blocks added by the user



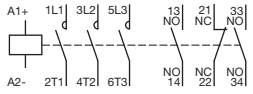
Combination 11 = ASL09 ... ASL16-30-10S + CA3-01S



Combination 11

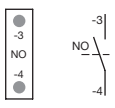


Combination 21 = ASL09 ... ASL16-30-10S + CA3-01S + CA3-10S

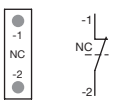


Combination 21

CA3..S 1-pole auxiliary contact blocks



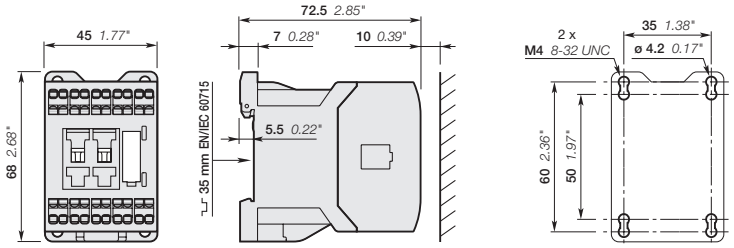
CA3-10S



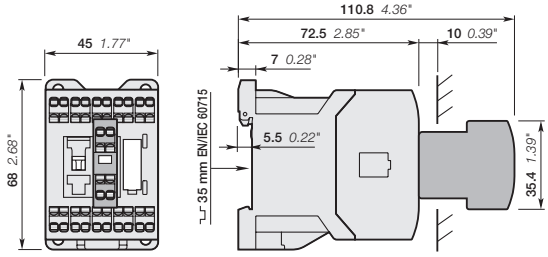
CA3-01S

AS09..S ... AS16..S 3-pole contactors - with spring terminals

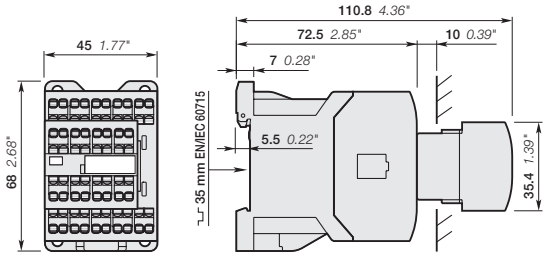
Dimensions



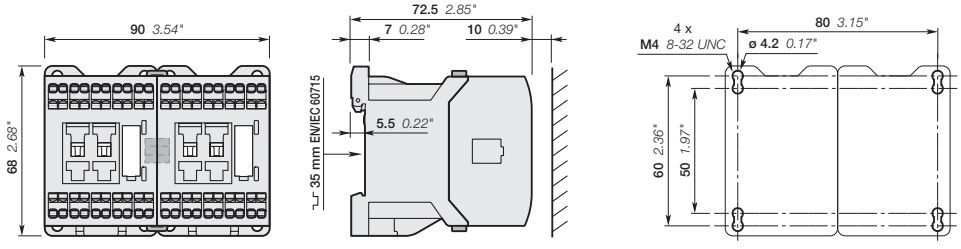
AS09..S, AS12..S, AS16..S



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



AS09...16-30-32S

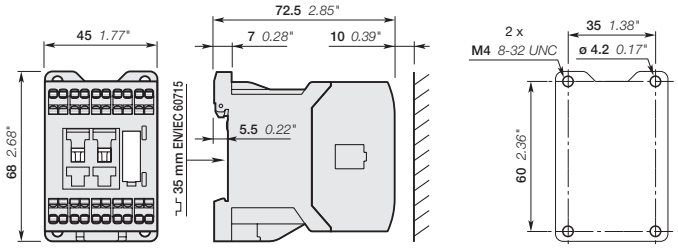


AS09..S, AS12..S, AS16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

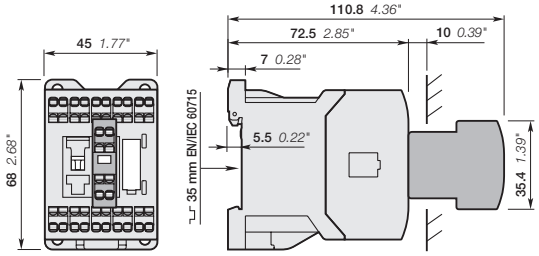
Main dimensions mm, inches

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

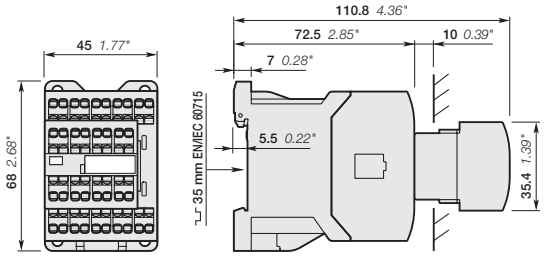
Dimensions



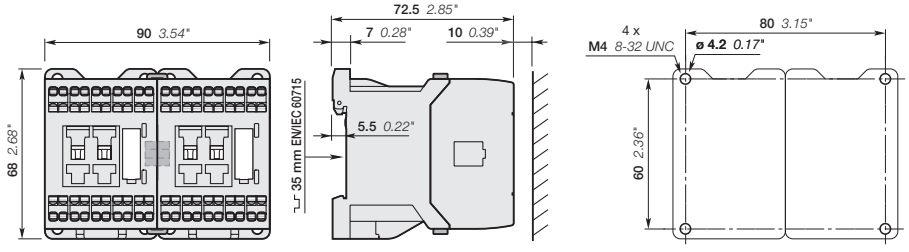
ASL09..S, ASL12..S, ASL16..S



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



ASL09...16-30-32S



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

Main dimensions mm, inches

NS..S contactor relays - with spring terminals

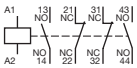
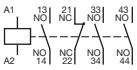
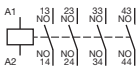
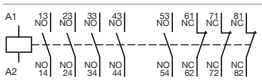
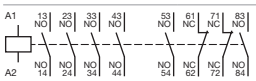
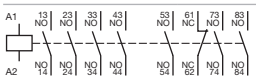
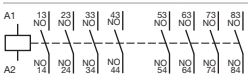
AC operated

NS22ES

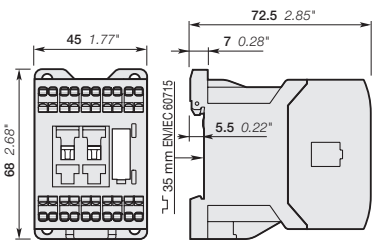
NS..S contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

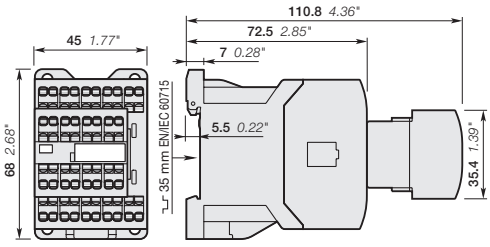
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

Number of contacts 1st stack / 2nd stack	Rated control circuit voltage Uc (1) V 50 Hz	 V 60 Hz	Type	Order code	Weight Pkg (1 pce) kg
	24	24	NS22ES-20	1SBH101004R2022	0.220
	220	220	NS22ES-25 Relay	1SBH101004R2522	
	230	230	NS22ES-26	1SBH101004R2622	0.220
	24	24	NS31ES-20	1SBH101004R2031	0.220
	220	220	NS31ES-25 Relay	1SBH101004R2531	
	230	230	NS31ES-26	1SBH101004R2631	0.220
	24	24	NS40ES-20	1SBH101004R2040	0.220
	220	220	NS40ES-25 Relay	1SBH101004R2540	
	230	230	NS40ES-26	1SBH101004R2640	0.220
	24	24	NS44ES-20	1SBH101004R2044	0.260
	220	220	NS44ES-25 Relay	1SBH101004R2544	
	230	230	NS44ES-26	1SBH101004R2644	0.260
	24	24	NS53ES-20	1SBH101004R2053	0.260
	220	220	NS53ES-25 Relay	1SBH101004R2553	
	230	230	NS53ES-26	1SBH101004R2653	0.260
	24	24	NS62ES-20	1SBH101004R2062	0.260
	220	220	NS62ES-25 Relay	1SBH101004R2562	
	230	230	NS62ES-26	1SBH101004R2662	0.260
	24	24	NS71ES-20	1SBH101004R2071	0.260
	220	220	NS71ES-25 Relay	1SBH101004R2571	
	230	230	NS71ES-26	1SBH101004R2671	0.260
	24	24	NS80ES-20	1SBH101004R2080	0.260
	220	220	NS80ES-25 Relay	1SBH101004R2580	
	230	230	NS80ES-26	1SBH101004R2680	0.260

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



NS22ES, NS31ES, NS40ES



NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

Main dimensions mm, inches

NSL..S contactor relays - with spring terminals

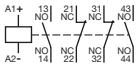
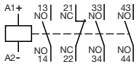
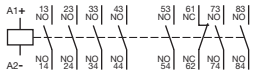
DC operated

NSL22ES

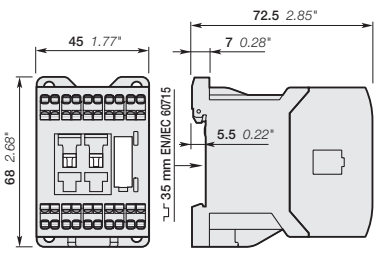
NSL..S contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

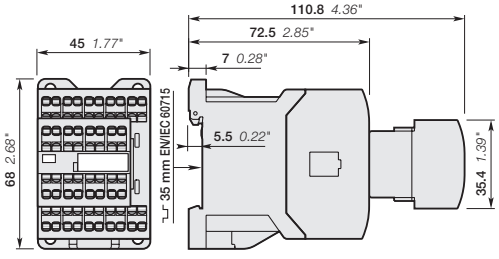
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil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

Number of contacts		Rated control circuit voltage Uc (1)	Type	Order code	Weight
1st stack	2nd stack	V DC			Pkg (1 pce) kg
		24	NSL22ES-81	1SBH103004R8122	0.280
		24	NSL31ES-81	1SBH103004R8131	0.280
		24	NSL40ES-81	1SBH103004R8140	0.280
		24	NSL44ES-81	1SBH103004R8144	0.320
		24	NSL53ES-81	1SBH103004R8153	0.320
		24	NSL62ES-81	1SBH103004R8162	0.320
		24	NSL71ES-81	1SBH103004R8171	0.320
		24	NSL80ES-81	1SBH103004R8180	0.320

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



NSL22ES, NSL31ES, NSL40ES

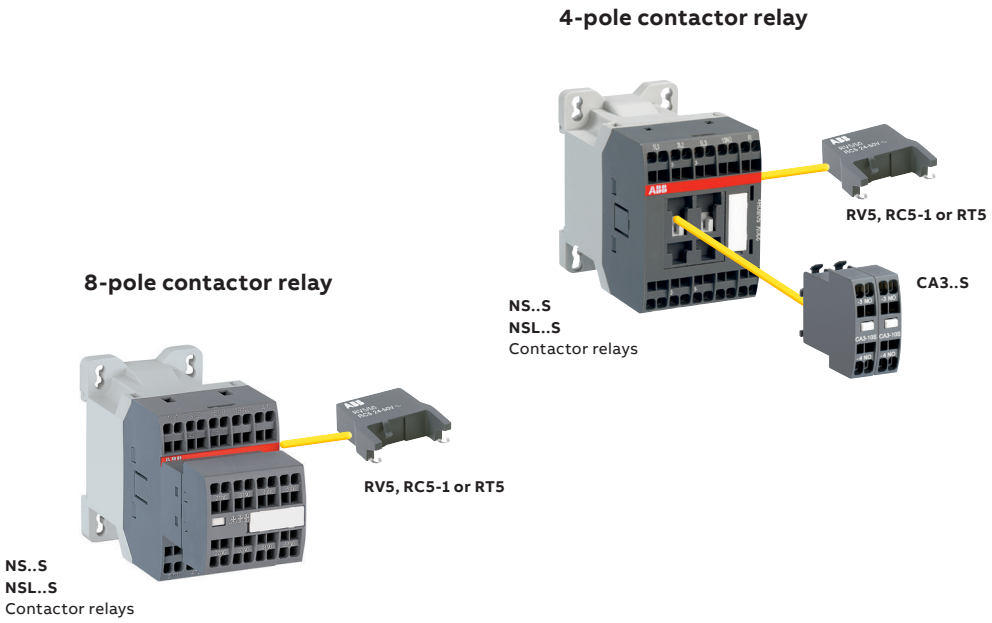


NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Main dimensions mm, inches

NS..S and NSL..S contactor relays - with spring terminals
Main accessories

Contactor relays and main accessories



Main accessory fitting details

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

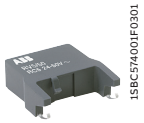
NS..S and NSL..S contactor relays - with spring terminals

Main accessories

CA3-10S

Front mounted instantaneous auxiliary contact blocks

For contactor relays	Auxiliary contacts	Type	Order code	Pkg qty	Weight (1 pce) kg
NS..S, NSL..S	1 0	CA3-10S	1SBN011019T1010	10	0.011
	0 1	CA3-01S	1SBN011019T1001	10	0.011



RV5

Surge suppressors

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

NS..S and NSL..S contactor relays - with spring terminals
Technical data

Contact utilization characteristics according to IEC

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

Contact utilization characteristics according to UL / CSA

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

NS..S and NSL..S contactor relays - with spring terminals

Technical data

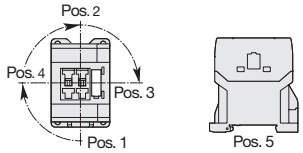
Magnet system characteristics for NS..S contactor relays

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

Magnet system characteristics for NSL..S contactor relays

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

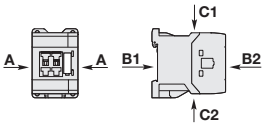
Mounting characteristics and conditions for use

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

NS..S and NSL..S contactor relays - with spring terminals

Technical data

General technical data

Contactor relay types	AC operated	**NS..S**	
	DC operated	**NSL..S**	
Rated insulation voltage Ui			
acc. to IEC 60947-5-1		690 V	
acc. to UL / CSA		600 V	
Rated impulse withstand voltage Uimp.		6 kV	
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 operating cycles	
Max. switching frequency		3600 cycles/h	
Shock withstand		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position	
acc. to IEC 60068-2-27 and EN 60068-2-27	Shock direction		
Mounting position 1		NS contactor relays - AC operated	NSL contactor relays - DC operated
	A	20 g	20 g closed position / 10 g open position
	B1	5 g	15 g closed position / 5 g open position
	B2	15 g	10 g
	C1	19 g closed position / 8 g open position	19 g closed position / 8 g open position
	C2	16 g closed position / 13 g open position	14 g closed position / 8 g open position
Vibration withstand		5...300 Hz	
acc. to IEC 60068-2-6		3 g closed position / 2 g open position	

Connecting characteristics

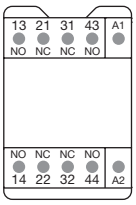
Contactor relay types	AC operated	**NS..S**	
	DC operated	**NSL..S**	
Main terminals		Spring terminals	
Connection capacity (min. ... max.)			
Pole and coil terminals			
Rigid Solid/Stranded	1 x	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²	
	2 x	0.75...2.5 mm²	
Flexible with insulated ferrule	1 x	0.75...1.5 mm²	
	2 x	0.75...1.5 mm²	
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14	
Stripping length		10 mm	
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
All terminals		IP20	
Screwdriver type		Flat Ø 3.5	

NS..S contactor relays - with spring terminals

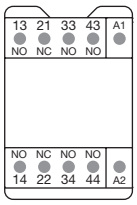
Terminal marking and positioning

NS..S contactor relays - AC operated

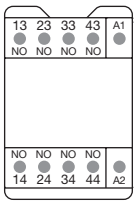
Standard devices without addition of auxiliary contact blocks



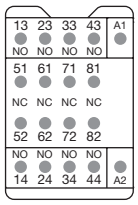
NS22ES



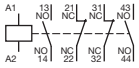
NS31ES



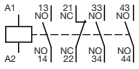
NS40ES



NS44ES



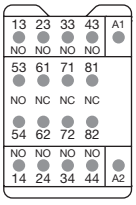
NS22ES



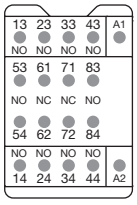
NS31ES

NS40ES

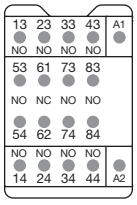
NS44ES



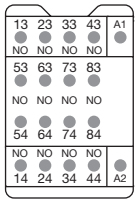
NS53ES



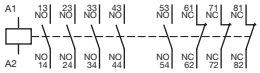
NS62ES



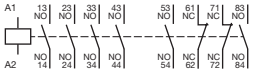
NS71ES



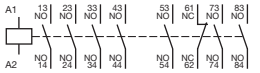
NS80ES



NS53ES



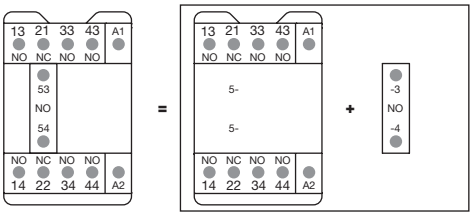
NS62ES



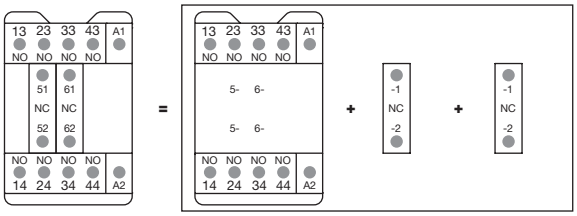
NS71ES

NS80ES

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



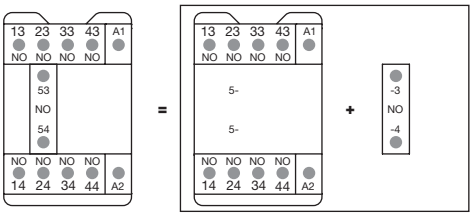
Combination 41E = NS31ES + CA3-10S



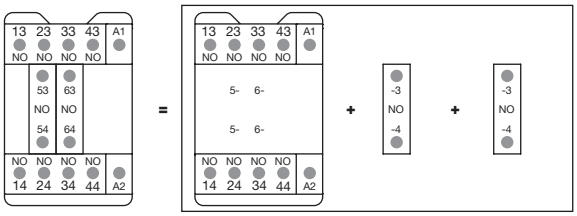
Combination 42E = NS40ES + CA3-01S + CA3-01S

Combination 41E

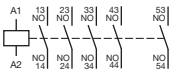
Combination 42E



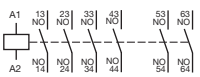
Combination 50E = NS40ES + CA3-10S



Combination 60E = NS40ES + CA3-10S + CA3-10S

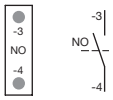


Combination 50E

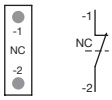


Combination 60E

CA3..S 1-pole auxiliary contact blocks



CA3-10S



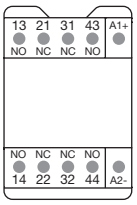
CA3-01S

NSL..S contactor relays - with spring terminals

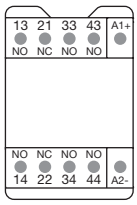
Terminal marking and positioning

NSL..S contactor relays - DC operated (the polarity A1+, A2- must be respected)

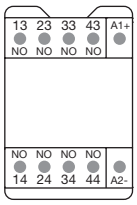
Standard devices without addition of auxiliary contact blocks



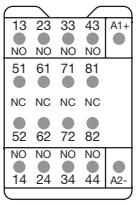
NSL22ES



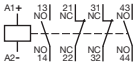
NSL31ES



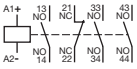
NSL40ES



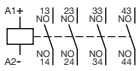
NSL44ES



NSL22ES

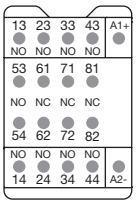


NSL31ES

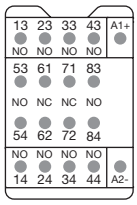


NSL40ES

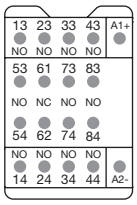
NSL44ES



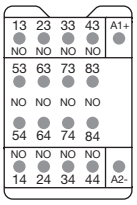
NSL53ES



NSL62ES



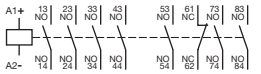
NSL71ES



NSL80ES

NSL53ES

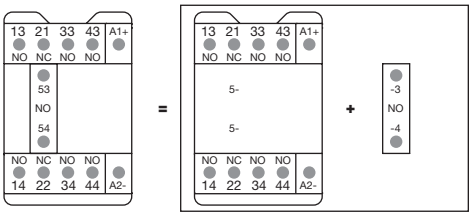
NSL62ES



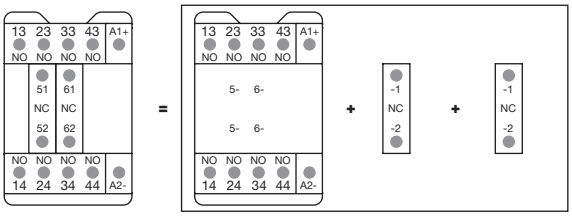
NSL71ES

NSL80ES

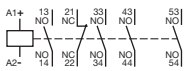
Other possible contact combinations with auxiliary contact blocks added by the user



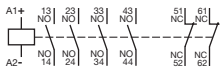
Combination 41E = NSL31ES + CA3-10S



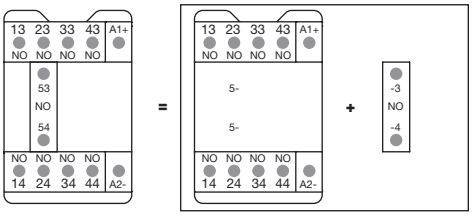
Combination 42E = NS4L0ES + CA3-01S + CA3-01S



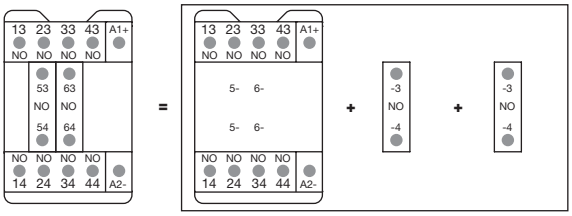
Combination 41E



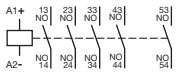
Combination 42E



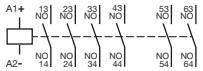
Combination 50E = NSL40ES + CA3-10S



Combination 60E = NSL40ES + CA3-10S + CA3-10S

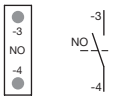


Combination 50E

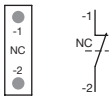


Combination 60E

CA3..S 1-pole auxiliary contact blocks



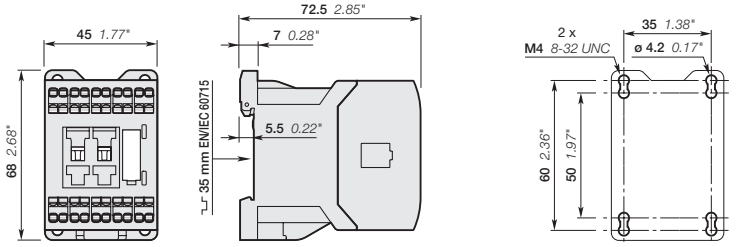
CA3-10S



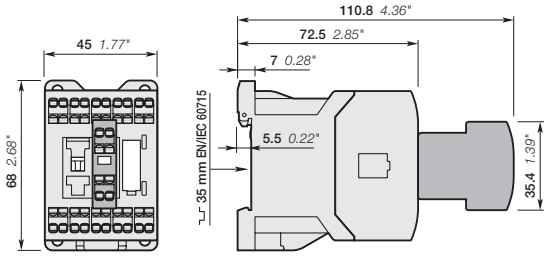
CA3-01S

NS..S contactor relays - with spring terminals
Dimensions

4-pole contactor relays

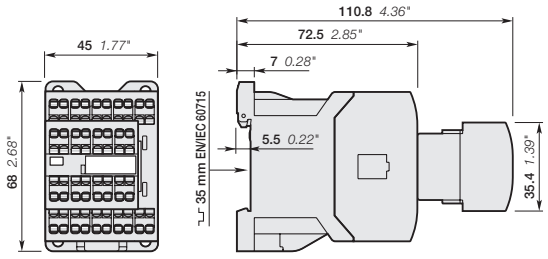


NS22ES, NS31ES, NS40ES



NS22ES, NS31ES, NS40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



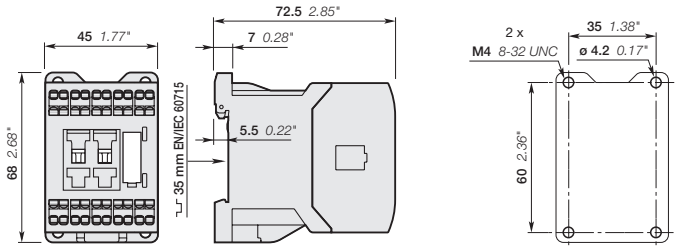
NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

Main dimensions mm, inches

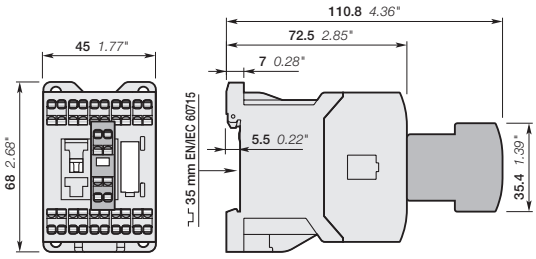
NSL..S contactor relays - with spring terminals

Dimensions

4-pole contactor relays

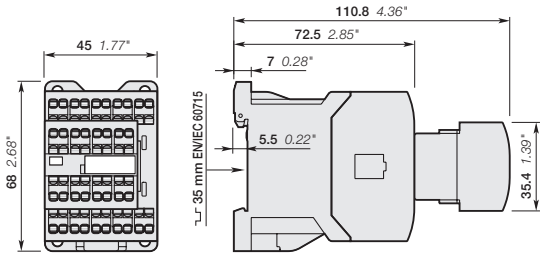


NSL22ES, NSL31ES, NSL40ES



NSL22ES, NSL31ES, NSL40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Main dimensions mm, inches

Auxiliary contact blocks - with spring terminals

Accessories

CA3-10S

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

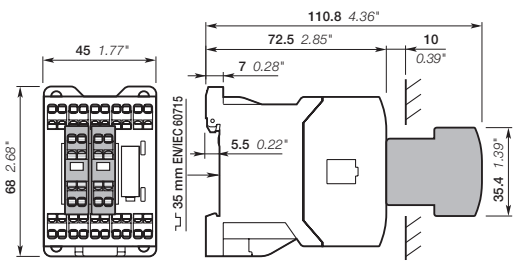
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- spring-type connecting terminals.

All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

For contactors	For contactor relays	Contact blocks	Type	Order code	Pkg qty	Weight (1 pce)
						kg
1-pole auxiliary contact blocks with spring terminals						
AS09..S ... AS16..S	NS..S, NSL..S	1 –	CA3-10S	1SBN011019T1010	10	0.011
ASL09..S ... ASL16..S		– 1	CA3-01S	1SBN011019T1001	10	0.011



Main dimensions mm, inches

Auxiliary contact blocks - with spring terminals

Front mounting

Technical data

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

Contact utilization characteristics according to UL / CSA		
Standards		UL 508, CSA C22.2 N°14
Max. operational voltage		690 V AC, 250 V DC
Pilot duty		A600, Q300
AC thermal rated current		10 A
AC maximum volt-ampere making		7200 VA
AC maximum volt-ampere breaking		720 VA
DC thermal rated current		2.5 A
DC maximum volt-ampere making-breaking		69 VA
Connecting characteristics		
Connection capacity (min. ... max.)		
Rigid Solid/Stranded	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with non insulated ferrule	1 x	0.75...2.5 mm²
	2 x	0.75...2.5 mm²
Flexible with insulated ferrule	1 x	0.75...1.5 mm²
	2 x	0.75...1.5 mm²
Connection capacity acc. to UL / CSA	1 or 2 x	AWG 18...14
Stripping length		10 mm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		IP20
Screw terminals		
All terminals		Spring terminals
Screwdriver type		Flat Ø 3.5

Auxiliary contact blocks for AS09..S ... AS16..S, ASL09..S ... ASL16..S contactors and NS, NSL contactor relays - with spring terminals

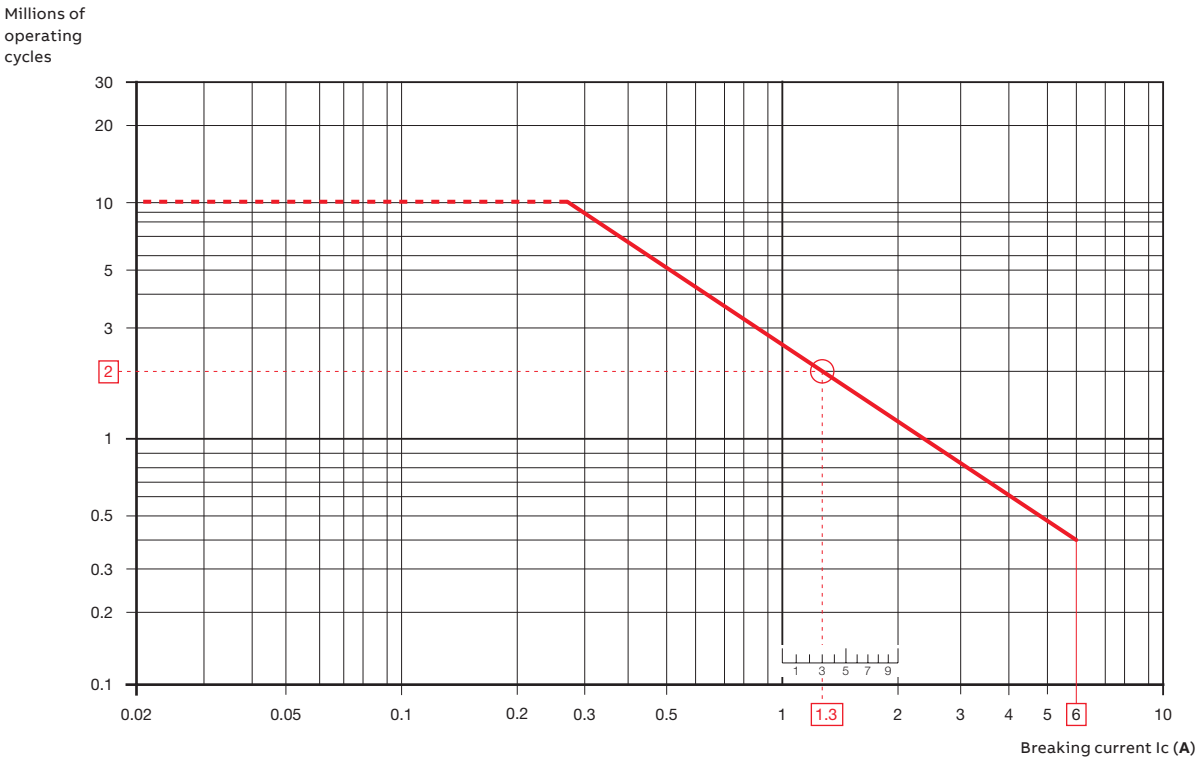
Electrical durability

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

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

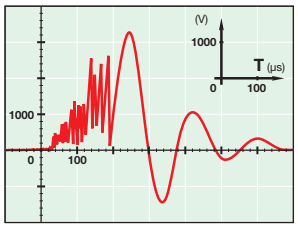
This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

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



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

Surge suppressors for contactor coils
Accessories



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

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

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

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

Overvoltage Factor

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

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

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

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

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

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

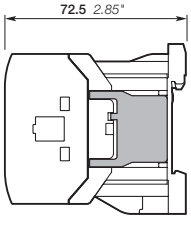
Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

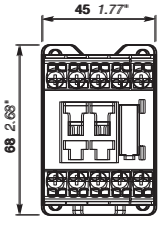
RV5

RC5-1

RT5

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





Main dimensions mm, inches

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

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

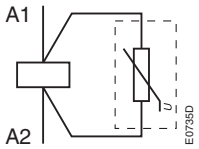
Surge suppressors for contactor coils
Technical data

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

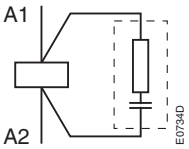
RC type	**RC5-1/50**	**RC5-1/133**	**RC5-1/250**	**RC5-1/440**
Rated control circuit voltage Uc	24...50 V AC	50...133 V AC	110...250 V AC	250...440 V AC
Residual overvoltage (clipping voltage)	2 to 3 x Uc max.			
Opening time growth factor	2...3			
Operating temperature	-20...+70 °C			
Advantages	Very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

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

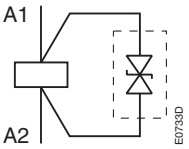
Wiring diagrams



Varistor

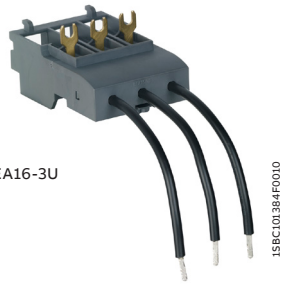


RC type



Transil diode

Connecting links for starting solutions and other accessories



BEA16-3U

Connecting links

The BEA16-3U insulated connecting links are used to connect an AS..S AC operated contactor or an ASL..S DC operated contactor with a manual motor starter.

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

For contactors	Manual motor starter	Type	Order code	Pkg qty	Weight (1 pce) kg
AS09..S ... AS16..S ASL09..S ... ASL16..S	MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16	BEA16-3U	1SBN081020R1000	1	0.045

BDT4

Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

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

BA4

Function markers

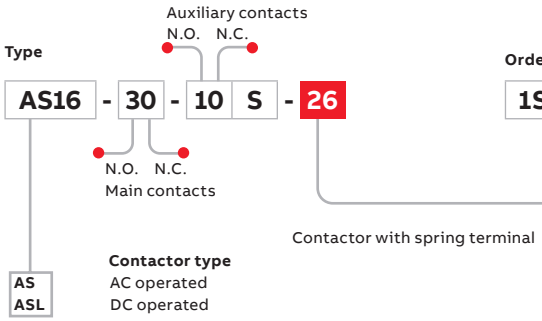
Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (.276" x .787").

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

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. Example: for contactor AS09-30-10S and coil 42 V 50/60 Hz, type is AS09-30-10S-21 and order code is 1SBL101004R2110.

3-pole contactors - with spring terminals

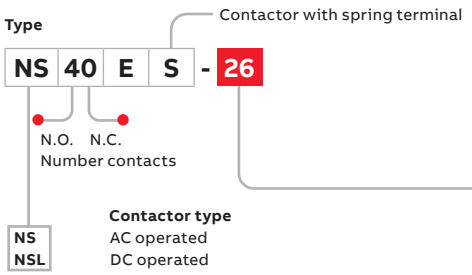


Order code: 1SBL121004R 26 10

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

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

Contactor relays - with spring terminals



Order code: 1SBH101004R 26 40

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

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

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

www.abb.com/productdetails/**1SAZ711201R1025**

Overload relays

6/2 **Overview**

Thermal overload relays

6/9 T16 thermal overload relays – 0.10 to 16.0 A
6/12 TF42 thermal overload relays – 0.10 to 38.0 A
6/17 TF65 thermal overload relays – 22.0 to 67.0 A
6/21 TF96 thermal overload relays – 40.0 to 96.0 A
6/25 TF140DU thermal overload relays – 66 to 142 A
6/29 TA200DU thermal overload relays – 66 to 200 A

Electronic overload relays

6/33 E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
6/37 EF65, EF96, EF146 electronic overload relays – 20 to 150 A
6/43 EF205, EF370 electronic overload relays – 63 to 380 A
6/47 EF460, EF750, EF1250DU electronic overload relays 150 to 1250 A

6/51 **General accessories**

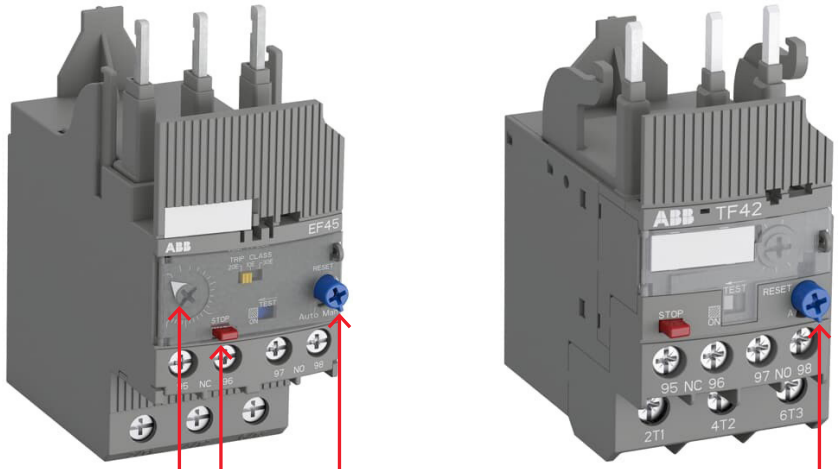
Overload relays
Protection concepts for your individual needs

Thermal and electronic overload relays provide, in combination with contactors, reliable protection against overloads and phase failures for motors. They allow to set up customized motor starting solutions according to individual needs

Easy application and storage
Cut your costs
Overload relays are a perfect fit to ABB's contactors (e.g. AF, mini contactors) and can be directly mounted and connected without further wiring. By combining wide current setting ranges with three trip classes, electronic overload relays allow to reduce the number of variants in stock.

Continuous operation
Secure uptime
The selectable automatic reset mode allows to reduce downtimes and travelling costs for installation in dispersed locations. The manual reset mode can be complemented by the DRS-F reset coil that allows a remote control over large distances.

Optimized design
Efficient operation
Electronic overload relays combine a high accuracy with an energy efficient design that does not need extra external supply. Thanks to its overlapping current setting ranges, the usage at the limits of the setting range can be avoided which reduces power heat loss.



Wide current setting range
Electronic overload relays come with an optimized current setting range, that allows to reduce stock keeping.

Trip Class Selection
Electronic overload relays allow to choose between Trip Class 10, 20 or 30.

Manual or automatic reset modes
Selection between both reset modes. Accessories also allow the remote control of the manual mode.

Compatible with ABB Contactors
Easy and faultless combination without further wiring.

Protection wherever you are
Overload relays are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC, EAC and various ship approvals. Furthermore they also apply to ATEX standards for hazardous areas.

Wide portfolio
Thermal overload relays cover a current range from 0.1 A to 200 A while electronic overload relays cover an even larger current range from 0.1 A to 1250 A.

Individual motor starting solutions

Direct-On-Line Starter

A direct-on-line starter is a simple and economic solution for controlling three-phase asynchronous motors.

You can easily assemble a direct-on-line starter by connecting an AF contactor with a TF thermal overload relay or EF electronic overload relay. In an extended combination with a MO manual motor starter, also a protection against short circuits can be implemented.

Reversing starters

This starting mode is a popular way to protect the motor during start-up and can be used with most squirrel cage motors. Star-delta starters are ideal for machines having high starting torque such as pumps, centrifugal compressors or wood-working machines.

You can assemble star-delta starters with any contactor thanks to our complete range of connection sets.

Star-Delta starters

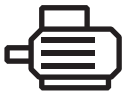
Reversing starters use two contactors to interchange the connection of two terminals. This allows to change the direction of the motor.

Thanks to our complete range of accessories, you can easily assemble reversing starter combinations.

All starting solutions can also be realized with ABB mini contactors in combination with suitable overload relays. This allows to create individual starting solutions in applications where space is at a premium. (ADD T16 + M Contactor)

Technical details regarding the creation of motor starting solutions with AF contactors are shown in chapter 12.

Application examples



MOTOR PROTECTION

ABB overload relays in combination with contactors offer reliable protection for motors in the event of overload or phase failure. In combination with 3 pole contactors, ABB overload relays allow to set up customized starter solutions, like direct-on-line starter, reversing starters or star-delta starters. Further combinations with fuses or manual motor starters allow additional protection against short-circuits.

LONG DISTANCE INSTALLATIONS

The reset modes of ABB overload relays can be selected between manual or automatic reset. In installations with dispersed locations (e.g. wind turbines), the automatic reset mode allows to reduce costs by avoiding travel time.

EXTREME CONDITIONS

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

DC LOADS

Despite AC applications, thermal overload relays are also rated for direct current loads (e.g. for motors used in solar panel tracking systems). They can be used for three- and single-phase applications.

SMALL SPACE INSTALLATION

Overload Relays are compatible to contactors and can be connected without further wiring. In combination with ABB mini contactors (compatible to T16 and E16DU overload relays), the installation in narrow spaces is possible.

EFFICIENT APPLICATIONS

Electronic overload relays can reduce energy costs due to their comparably low power consumption. Furthermore, the current measurement is more exact compared to thermal protection devices so that deviations in the tripping time are minimized.

Thermal and electronic overload relays

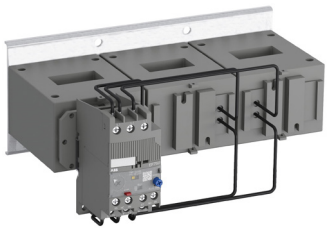
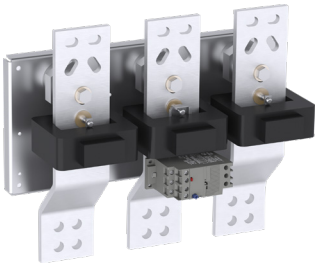
Thermal overload relays

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

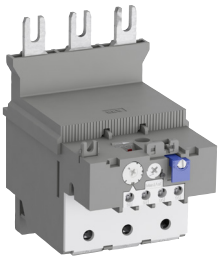
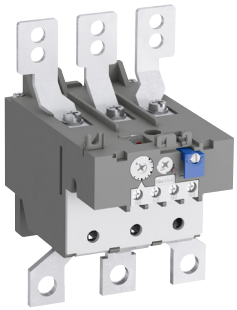
Electronic overload relays with integrated CT

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	-

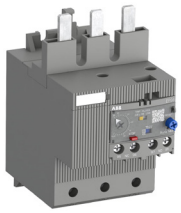
Electronic overload relays with external separate CT

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		

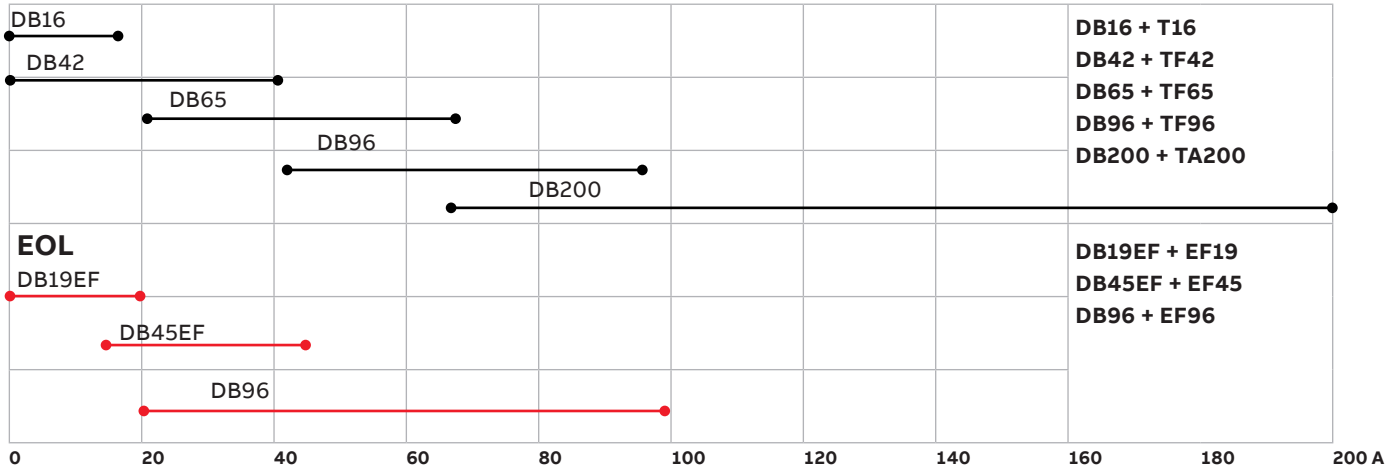
18.5 ... 45 kW	37 ... 75 kW	37 ... 110 kW	
30 ... 75 hp	50 ... 100 hp	50 ... 150 hp	
AF80, AF96	AF116, AF140, AF146	AF190, AF205	
TF96	**TF140DU**	**TA200DU**	
40 ... 96 A	66 ... 142 A	66 ... 200 A	
10	10A	10A	
yes	yes	yes	
DB96	-	DB200	



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	-	-	-

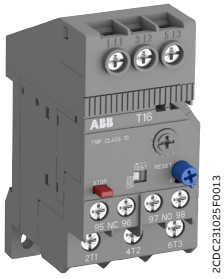
Single mounting kit overview

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.

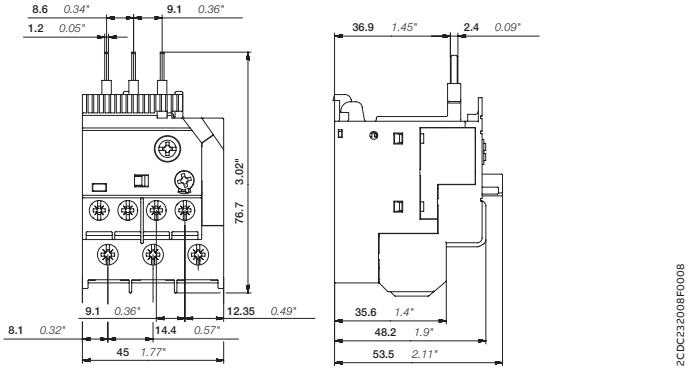
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release 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

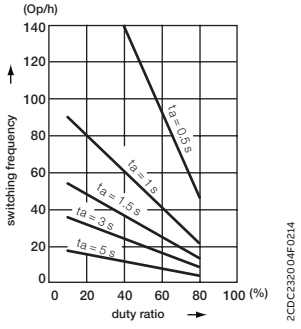
Main circuit – Utilization characteristics according to IEC/EN

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)

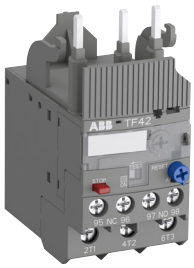
Auxiliary circuit

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

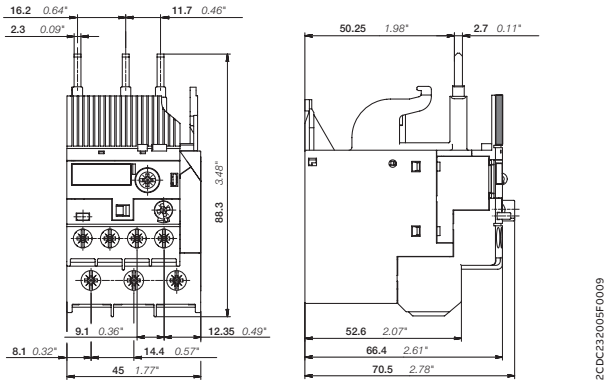
TF42 + DB42

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

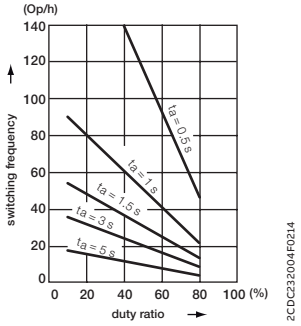
Main circuit – Utilization characteristics according to IEC/EN

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

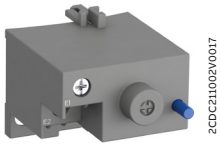
Ordering details

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).

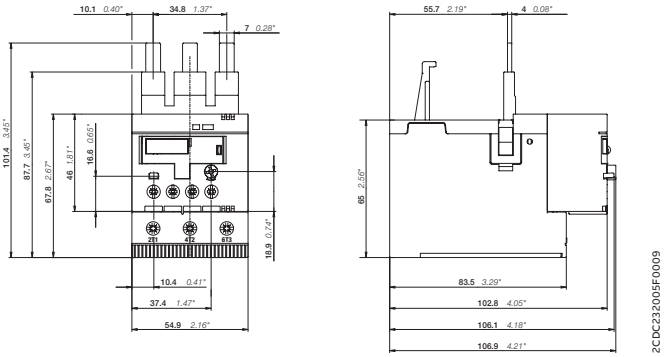
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

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

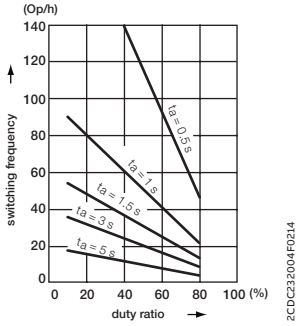
Main circuit – Utilization characteristics according to IEC/EN

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)

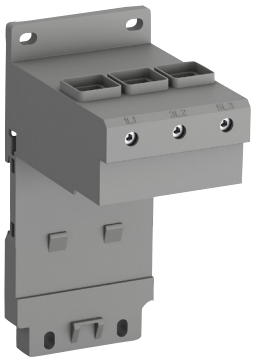
Auxiliary circuit

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

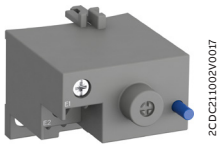
TF96



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).

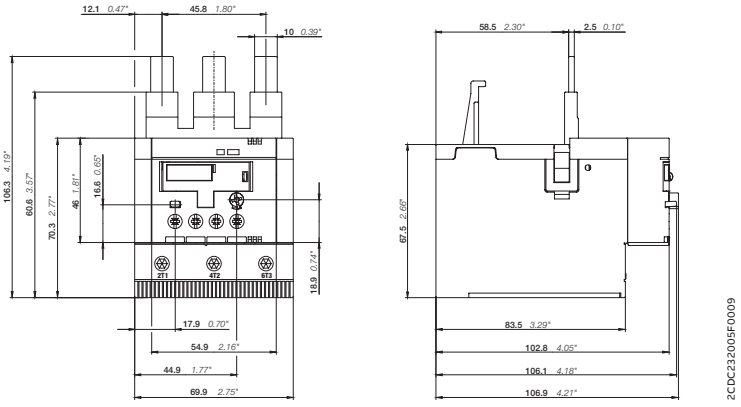
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

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

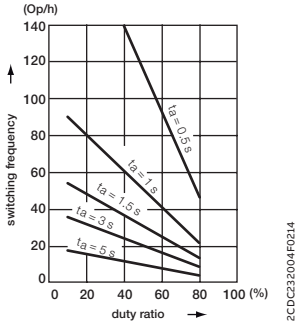
Main circuit – Utilization characteristics according to IEC/EN

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)

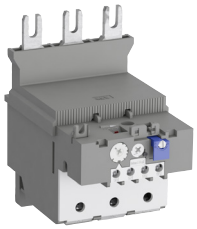
(2) Valid for products, produced from week 27, 2015

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



TF140DU

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).

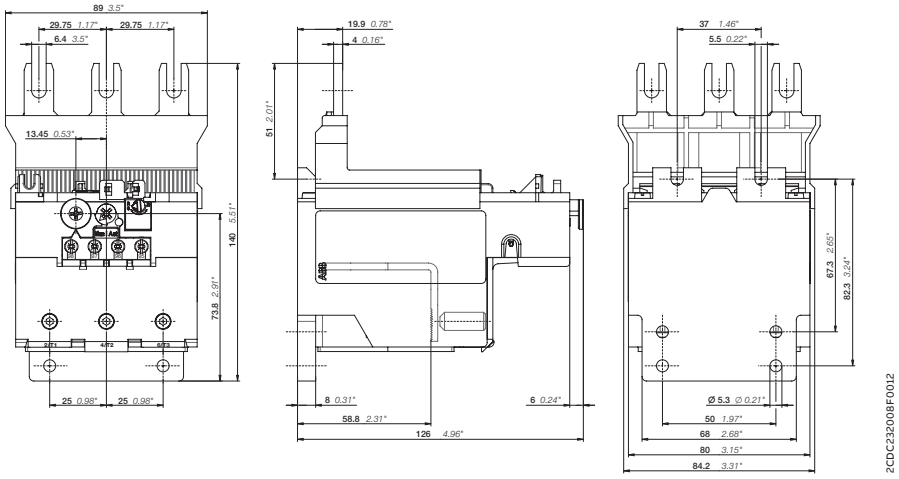
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

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

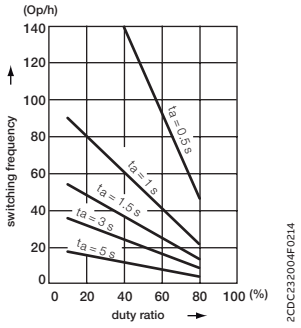
Main circuit – Utilization characteristics according to IEC/EN

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

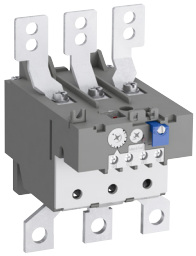
Type			**TF140DU / TF140DU-V1000**
Connecting capacity			
	Rigid	1 x	16 ... 70 mm²
		2 x	-
	Flexible	1 x	16 ... 70 mm²
		2 x	-
	Stranded acc. to UL/CSA	1 or 2 x	AWG 6-2/0
	Flexible acc. to UL/CSA	1 or 2 x	AWG 6-2/0
Stripping length			25 mm
Tightening torque			8 ... 10 Nm / 77 ... 88 lb.in
Recommended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

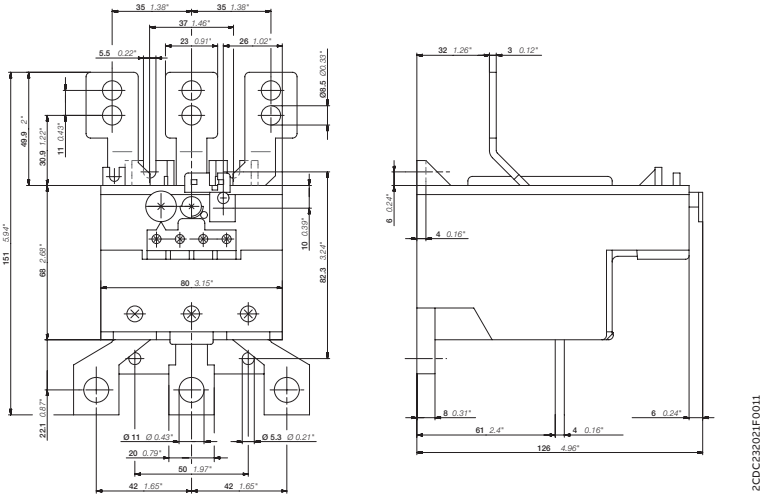
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

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



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TA200DU

Main dimensions mm, inches

TA200DU thermal overload relays – 66 to 200 A
Technical data

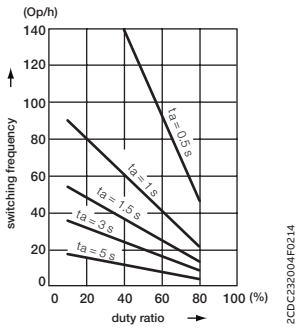
Main circuit – Utilization characteristics according to IEC/EN

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

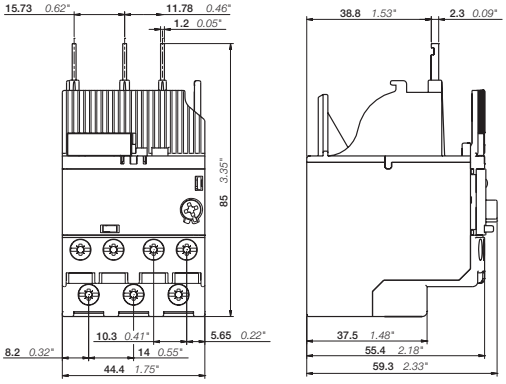
EF19-18.9

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

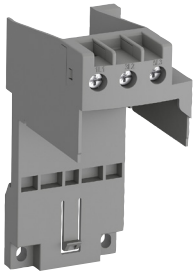
(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.



EF19, EF45

Main dimensions mm, inches

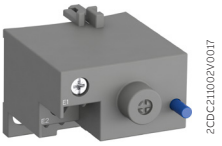
E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Ordering details



DB19EF

DB45EF

KPR-101L

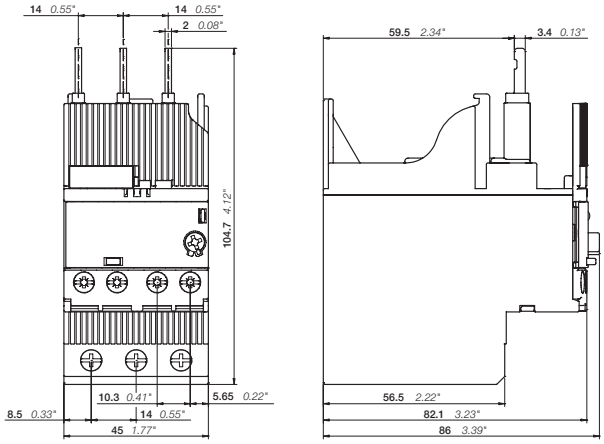


DRS-F

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

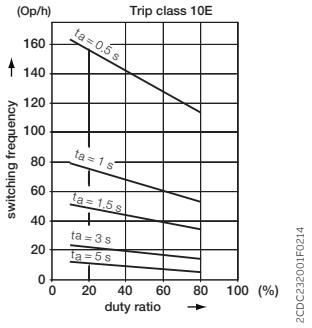
Type	E16DU	EF19	EF45
Standards	IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1		
Rated operational voltage Ue	690 V AC		
Rated frequency	50/60 Hz – not suitable for DC applications		
Trip class	10E, 20E, 30E, selectable		
Number of poles	3		
Duty time	100%		
Operating frequency without early tripping	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

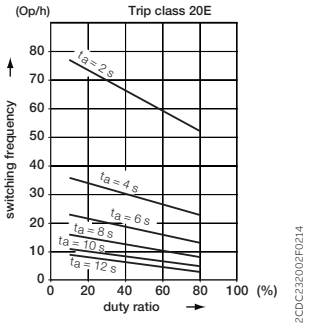
Type		E16DU	EF19	EF45
Rated operational voltage Ue		600 V AC / DC		
Conventional free air thermal current Ith		6 A		
Rated frequency		DC, 50/60 Hz		
Number of poles		1 N.C. + 1 N.O.		
Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category				
110-120 V	50/60 Hz	3.00 A		
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

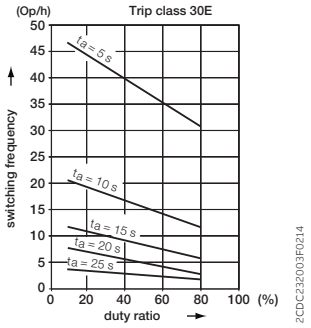
Technical diagram – Intermittent periodic duty



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

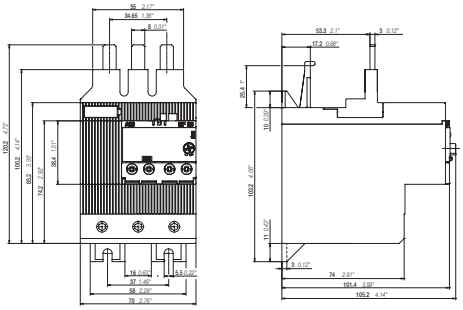
EF96-100

EF146-150

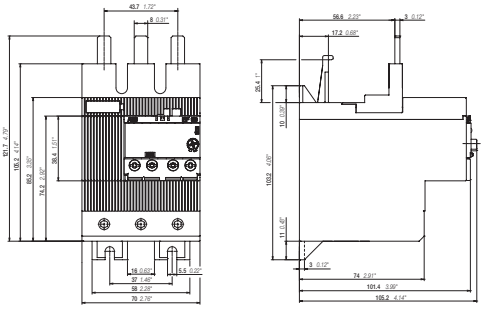
The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic 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

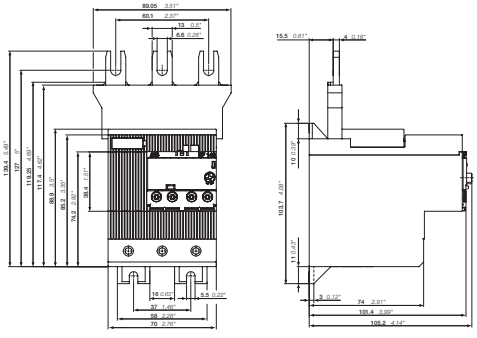
(1) ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.



EF65-56 / EF65-70



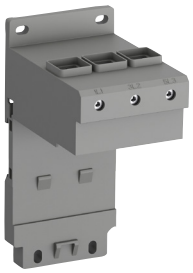
EF96-56 / EF96-100



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

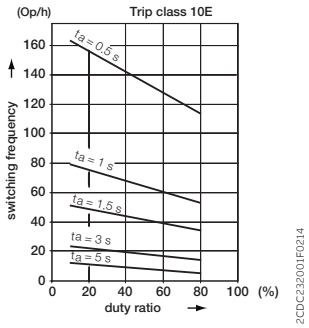
Main circuit – Utilization characteristics according to IEC/EN

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

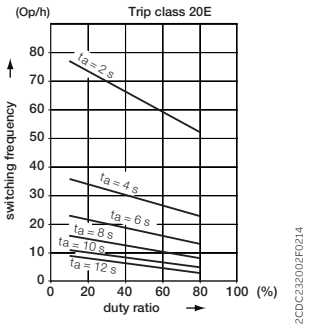
Auxiliary circuit according to IEC/EN

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

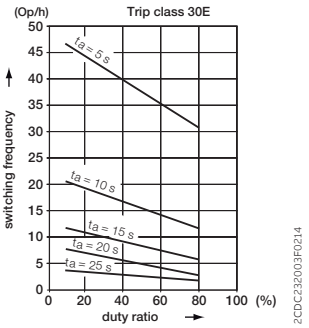
Technical diagram – Intermittent periodic duty



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

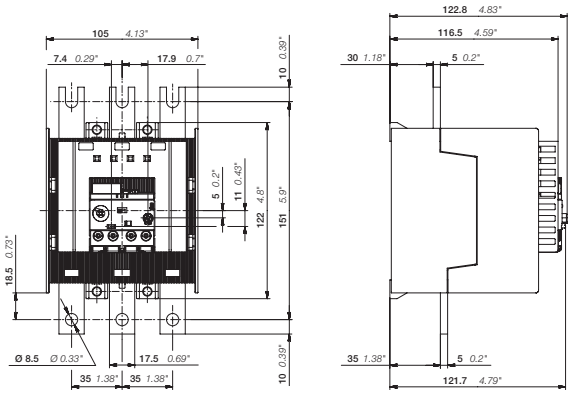
The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic 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

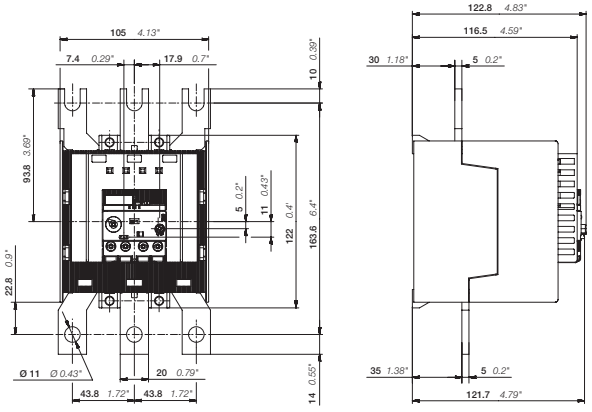
(1) ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

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

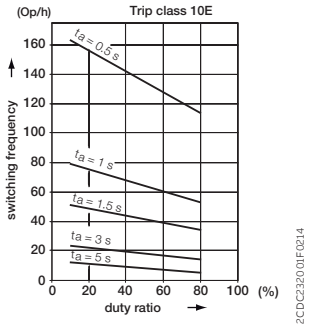
Main circuit – Utilization characteristics according to IEC/EN

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

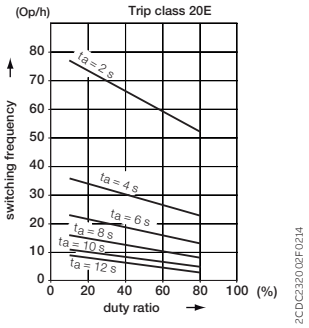
Auxiliary circuit according to IEC/EN

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

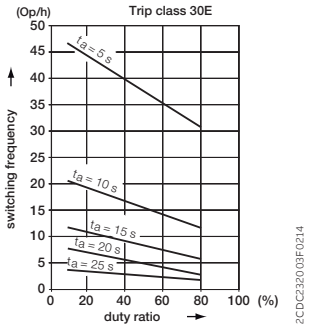
Technical diagram – Intermittent periodic duty



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

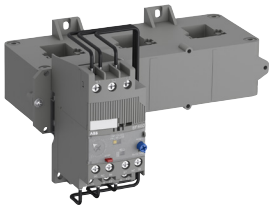
Type			EF205	EF370
Connecting capacity				
	Rigid	1 x	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Flexible	1 x	16 ... 185 mm²	50 ... 240 mm²
		2 x	16 ... 120 mm²	50 ... 150 mm²
	Lugs	L ≤	24 mm	32 mm
	Bars	Ø >	8 mm	10 mm
	Stranded acc. to UL/CSA	1 x	AWG 6-0000	AWG 1-500 kcmil
		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)

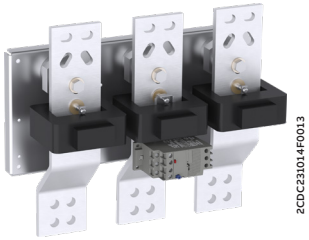
EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details



EF460-500

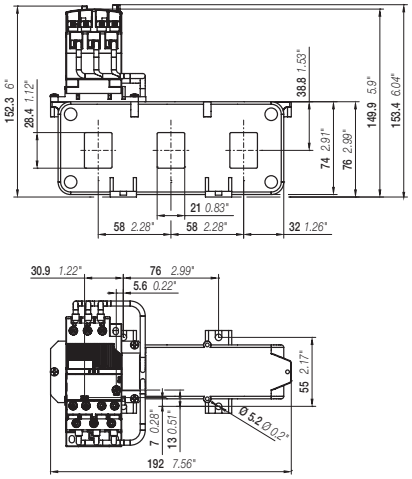
EF750-800



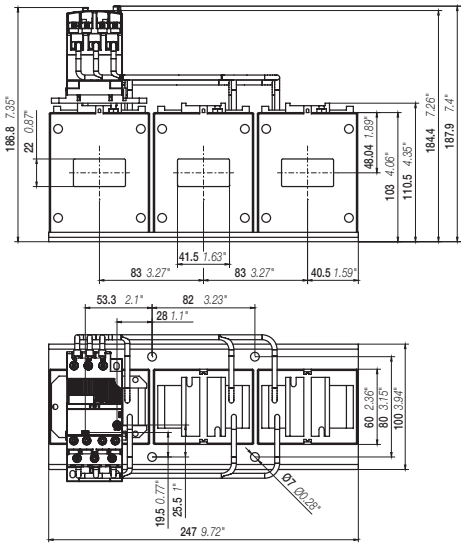
EF1250DU-1250

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	



EF460-500



EF750-800

Main dimensions mm, inches

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details

1SFC151224F0002

KPR-101L

2CDC211002V0017

DRS-F

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

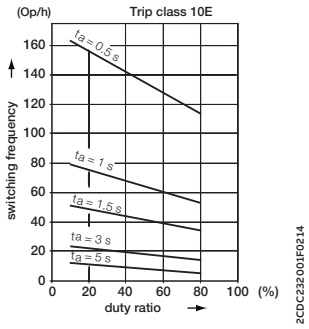
Main circuit – Utilization characteristics according to IEC/EN

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		

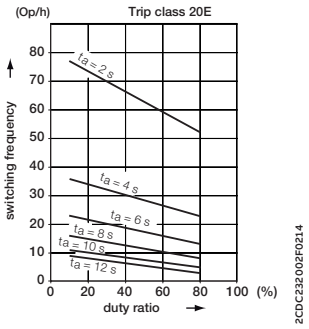
Auxiliary circuit according to IEC/EN

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		

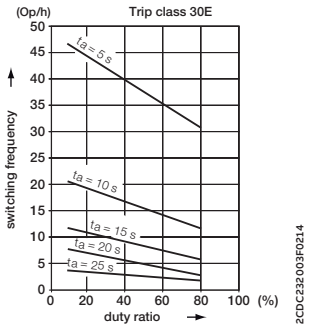
Technical diagram – Intermittent periodic duty



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

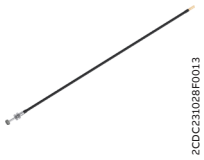
Type		EF460	EF750	EF1250DU
Pollution degree		3		
Phase loss sensitive		Yes		
Ambient air temperature				
Operation	Open - compensated	-25 ... +70 °C		
Storage		-50 ... +85 °C		
Ambient air temperature compensation		Acc. to IEC/EN60947-4-1		
Maximum operating altitude permissible		2000 m		
Resistance 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

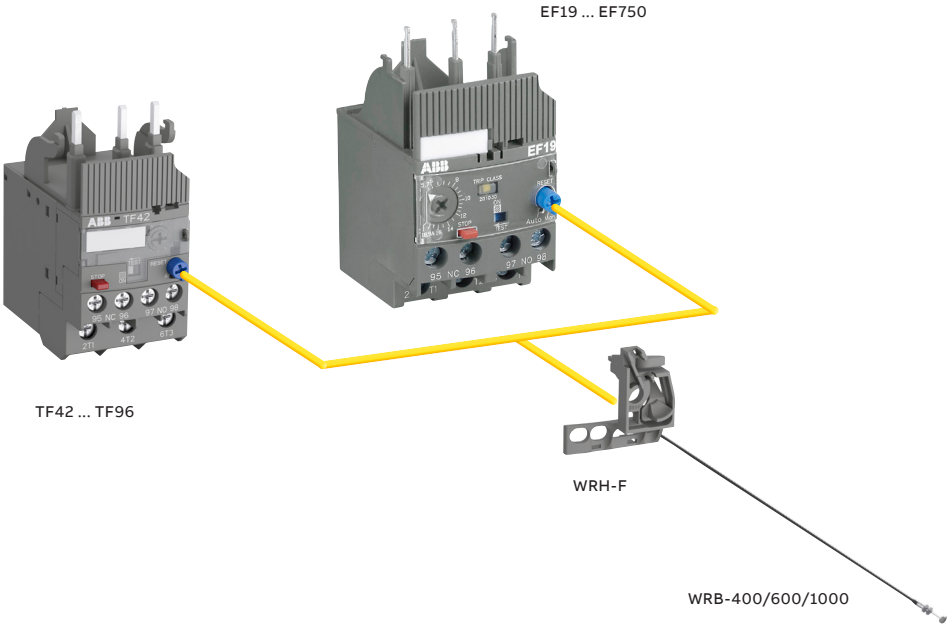
WRH-F

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/1SVR740720R1400

Thermistor motor protection relays

7/2 **Benefits and advantages,**

7/3 **Applications**

7/4 **Operating controls**

7/5 **Selection table CM-MSx range**

7/6 **Ordering details**

7/7 **Ordering details - PTC temperature sensors C011**

7/8 **Technical data - CM-MSS**

7/11 **Technical data - CM-MSE**

7/13 **Connection diagrams**

7/14 **Circuit diagram**

Thermistor motor protection relays

Benefits and advantages

The thermistor motor protection relays of the CM-MSx range protect motors with PTC sensors against high temperature. These sensors are incorporated in the motor windings thus measuring the motor heat directly.

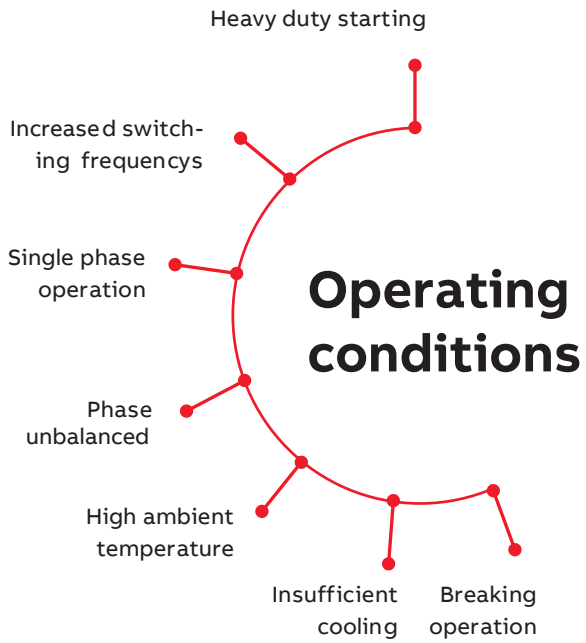
Continuous operation
By using thermistor motor protection relays from ABB, the down and commissioning time can be reduced. The relay is continuously monitoring the sensor circuit to detect short-circuit or interrupted i.e. wire faults, thus contributing to maintenance and time saving in case of faults. In addition, the clear error messages of the front LEDs makes it possible to distinguish between the various fault causes.

Reliable in harsh conditions
Direct motor protection through temperature monitoring of the motor winding offers 100 % motor protection, even under the most difficult ambient conditions. The ABB thermistor motor protection relays give you access to worldwide markets and are approved by local and international standards for many applications such as industry, renewable energies, the marine sector and dangerous and explosive environments. To prove that, the CM-MSS thermistor motor protection relays are certified according to ATEX Ex II (2) G and D for environments with explosive gas or dust loads.

Easy installation
Due to the compliance with the latest standards, there is no need to make any adjustments on the device. All relays come with two different connection possibilities - screw or push-in - to make any adjustments on the installation a breeze. Thanks to direct measurement of the motor temperature, dimensioning of the thermistor motor protection relay, considering the size of the motor, is not necessary.

Thermistor motor protection relays
Applications

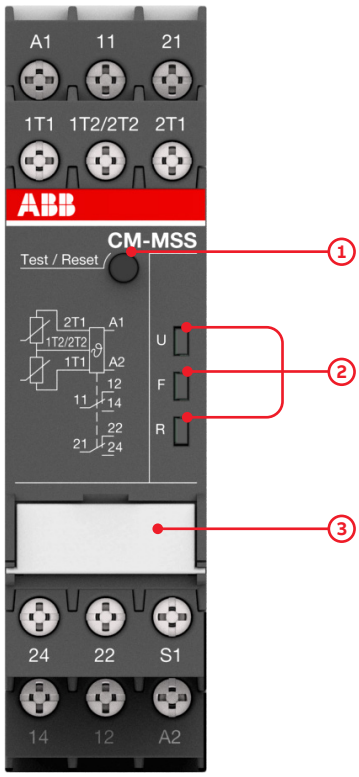
Direct temperature monitoring
Generally, motor damage caused by overload or overheating situations can be prevented in different ways. Compared to the indirect temperature measuring which monitors the motor current, the temperature inside the motor can be measured by direct temperature measuring. This enables direct control and evaluation of different operating conditions. Therefore, the consequences from overheating, such as abrasion as well as electrical failures, can be prevented. The direct measuring principle is carried out by a combination of the thermistor motor protection relay and three PTC sensors which are installed directly in the motor by the manufacturer. Those 3 PTC sensors are placed directly at the thermal hotspots, the motor windings.



Motor protection using current- and temperature-dependent protective devices
IEC 60204 stipulates that motors must be protected from overheating at a rating of 0.5 kW and higher. The protection can be provided or executed by overload protection, overtemperature protection or current limiting. For motors with frequent starting and braking, and in environments where cooling may be impaired (e.g. by dust), it is recommended to use the overtemperature protection option in the form of a protective device coordinated with this mode of operation. On rotor-critical motors, overtemperature detection in the stator windings can lead to delayed and hence inadequate protection. In this case, the standards stipulate additional protection, e.g. by means of an overload relay. This combination of thermistor motor protection and an overload relay is recommended for full motor protection in case of frequent starting and braking of motors, irregular intermittent duty or excessive switching frequency.

Operating mode
The thermistor motor protection relays are used to monitor the temperature of motors or generators equipped with PTC sensors type A according to the latest product standard IEC/EN 60947-8. The sensors are built-in into the motor windings, measuring the motor heating. In case of an increase of the temperature in the motor, the resistance of the PTC sensors increases as well. If the motor heats-up excessively (>2.83 kΩ), the output relay(s) de-energize(s) and the corresponding LED displays the overtemperature. A short circuit and an interrupted wire within the sensor circuit can also be detected. A reset is only possible after cooling down of the motor (<1.1 kΩ) or after a wire interruption, or a short circuit within the sensor circuit has been removed. A reset after tripping can be done manually with the Test / Reset button, externally with a push button between S1 and 1T2/2T2, or automatically by jumpering S1-1T2/2T2.

Thermistor motor protection relays
Operating controls



1 Test / Reset button
Test – only possible if/when the relay doesn't show any fault.
Reset – only possible if measured value < switch-on resistance

2 Indication of operational states with LEDs
U: green LED - Status indication of control supply voltage
Control supply voltage applied V
F: red LED - Fault message
R: yellow LED - Status indication of the output relay

3 Marker label / DIP switches (depending on device) e.g.
i Single evaluation 2 x 1 c/o (SPDT) contact
j Accumulative evaluation 1 x 2 c/o (SPDT) contacts
y Short-circuit detection de-activated
x Short-circuit detection activated
f Non-volatile fault storage activated
e Non-volatile fault storage de-activated
Remote Reset
Remote Test/Reset

LEDs, status information and fault messages CM-MSS

Operational state	U: green LED	F: red LED	R: yellow LED
Absence of control supply voltage	OFF	OFF	OFF
Internal fault (2)	OFF	W	W
Internal fault (2)	X	X	X
Control supply voltage not within the tolerance range	X	V	OFF
Short circuit	V	Y	OFF
Interrupted wire	V	Z	OFF
Measuring circuit 2: Overtemperature	V	W	OFF
Measuring circuit 1: Overtemperature	V	V	OFF
Fault rectified but not confirmed	V	-- (1)	X
Test function	X	OFF	OFF
Change of configuration not confirmed	V	OFF	X
No fault	V	OFF	V

(1) Depending on the fault with the highest priority
(2) Restart the device. If after restart the same fault is indicated, replace the device.

2CDC 253 001 F0015

Thermistor motor protection relays

Selection table CM-MSx range

	Order code	1SVR550805R9300	1SVR550800R9300	1SVR550801R9300	1SVR740720R1400	1SVR730720R1400	1SVR740700R0100	1SVR730700R0100	1SVR740700R2100	1SVR730700R2100	1SVR740722R1400	1SVR730722R1400	1SVR740700R0200	1SVR730700R0200	1SVR740700R2200	1SVR730700R2200	1SVR740712R1400	1SVR730712R1400	1SVR740712R0200	1SVR730712R0200	1SVR740712R2200	1SVR730712R2200	1SVR740712R1200	1SVR730712R1200	1SVR740712R1300	1SVR730712R1300
	Type	CM-MSE	CM-MSE	CM-MSE	CM-MSS.11P	CM-MSS.11S	CM-MSS.12P	CM-MSS.12S	CM-MSS.13P	CM-MSS.13S	CM-MSS.21P	CM-MSS.21S	CM-MSS.22P	CM-MSS.22S	CM-MSS.23P	CM-MSS.23S	CM-MSS.31P	CM-MSS.31S	CM-MSS.32P	CM-MSS.32S	CM-MSS.33P	CM-MSS.33S	CM-MSS.41P	CM-MSS.41S	CM-MSS.51P	CM-MSS.51S
Characteristics																										
ATEX approval					■	■					■	■					■	■	■	■	■	■	■	■	■	■
Number of sensor circuits		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
Single or accumulative evaluation																									■	■
Number of LEDs					3	3	2	2	2	2	3	3	2	2	2	2	3	3	3	3	3	3	3	3	3	3
Contacts																										
1 c/o (SPDT) contact							■	■	■	■																
2 c/o (SPDT) contacts													■	■	■	■			■	■	■	■	■	■		
1 n/o		■	■	■																						
1 n/c and 1 n/o					■	■					■	■					■	■								
2 x 1 c/o or 1 x 2 c/o contacts, configurable																									■	■
Reset																										
Manual													■	■	■	■	■	■	■	■	■	■	■	■	■	■
Remote													■	■	■	■	■	■	■	■	■	■	■	■	■	■
Auto		■	■	■	■	■	■	■	■	■	■	■	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (1)	■ (2)	■ (2)
Test button																	■	■	■	■	■	■	■	■	■	■
Functions																										
Short-circuit detection											■	■					■	■	■	■	■	■				
Short-circuit detection, configurable																							■	■	■	■
Dynamic interrupted wire detection					■	■					■	■					■	■	■	■	■	■	■	■	■	■
Non-volatile fault storage					■	■					■	■					■	■								
Non-volatile fault storage, configurable																							■	■	■	■
Rated control supply voltage U_s																										
24 V AC		■																								
110-130 V AC			■																							
220-240 V AC				■																						
24-240 V AC/DC					■	■					■	■					■	■					■	■	■	■
24 V AC/DC							■	■					■	■					■	■						
110-130 V AC, 220-240 V AC									■	■					■	■					■	■				
Connection type																										
Push-in terminals					■		■		■		■		■		■		■		■		■		■		■	
Double-chamber cage connection terminals						■		■		■		■		■		■		■		■		■		■		■
Screw		■	■	■																						

(1) For automatic reset, connect terminals S1 to T2.
(2) For automatic reset, connect Terminals S1 to 1T2/2T2.

Thermistor motor protection relays
Ordering details

CM-MSS.12S

CM-MSS.41S

CM-MSS.51S

The thermistor motor protection relay CM-MSS monitors the winding temperature and thus protects the motor from overheating, overload and insufficient cooling in accordance to the product standard IEC/EN 60947-8.

CM-MSx

Characteristics	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
See "Selection table CM-MSx range" on page 4.	CM-MSE	1SVR550805R9300		0.11 (0.24)
	CM-MSE	1SVR550800R9300		0.11 (0.24)
	CM-MSE	1SVR550801R9300		0.11 (0.24)
	CM-MSS.11P	1SVR740720R1400		0.119 (0.263)
	CM-MSS.11S	1SVR730720R1400		0.127 (0.280)
	CM-MSS.12P	1SVR740700R0100		0.105 (0.231)
	CM-MSS.12S	1SVR730700R0100		0.113 (0.249)
	CM-MSS.13P	1SVR740700R2100		0.147 (0.324)
	CM-MSS.13S	1SVR730700R2100		0.155 (0.342)
	CM-MSS.21P	1SVR740722R1400		0.118 (0.260)
	CM-MSS.21S	1SVR730722R1400		0.126 (0.278)
	CM-MSS.22P	1SVR740700R0200		0.121 (0.267)
	CM-MSS.22S	1SVR730700R0200		0.132 (0.291)
	CM-MSS.23P	1SVR740700R2200		0.163 (0.359)
	CM-MSS.23S	1SVR730700R2200		0.174 (0.384)
	CM-MSS.31P	1SVR740712R1400		0.120 (0.265)
	CM-MSS.31S	1SVR730712R1400		0.128 (0.282)
	CM-MSS.32P	1SVR740712R0200		0.120 (0.265)
	CM-MSS.32S	1SVR730712R0200		0.130 (0.287)
	CM-MSS.33P	1SVR740712R2200		0.162 (0.357)
	CM-MSS.33S	1SVR730712R2200		0.172 (0.379)
	CM-MSS.41P	1SVR740712R1200		0.130 (0.287)
	CM-MSS.41S	1SVR730712R1200		0.141 (0.311)
	CM-MSS.51P	1SVR740712R1300		0.135 (0.298)
	CM-MSS.51S	1SVR730712R1300		0.145 (0.320)

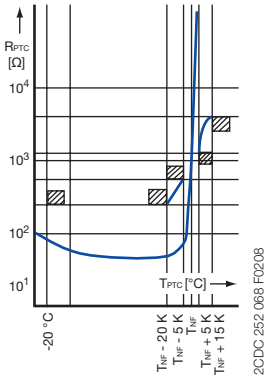
S: screw connection
P: push-in connection

Further documentation thermistor motor protection monitoring relays on www.abb.com

Thermistor motor protection relays

Ordering details - PTC temperature sensors C011

Temperature sensor characteristics



The PTC temperature sensors (temperature-dependent with positive temperature coefficient) are selected by the manufacturer of the motor depending on:

- the motor insulation class according to IEC/EN 60034-11,
- the special characteristics of the motor, such as the conductor cross-section of the windings, the permissible overload factor etc.
- special conditions prescribed by the user, such as the permissible ambient temperature, risks resulting from locked rotor, extent of permitted overload etc.

One temperature sensor must be embedded in each phase winding. For instance, in case of three-phase squirrel cage motors, three sensors are embedded in the stator windings. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. Pole-changing motors with two windings, however, require 6 sensors. If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit.

The sensors are suitable for embedding in motor windings with rated operating voltages of up to 600 V AC. Conductor length: 500 mm per sensor. A 14 V varistor can be connected in parallel to protect the sensors from overvoltage. Due to their characteristics, the thermistor motor protection relays can also be used with PTC temperature sensors of other manufacturers which comply with IEC/EN 60947-8.

CM-MSS accessories

Rated response temperature TNF	Color coding	Type	Order code	Price 1 pce	Weight (1 pce) kg (lb)
70 °C	white-brown	C011-70 (1)	GHC0110003R0001		0.02 (0.044)
80 °C	white-white	C011-80 (1)	GHC0110003R0002		0.02 (0.044)
90 °C	green-green	C011-90 (1)	GHC0110003R0003		0.02 (0.044)
100 °C	red-red	C011-100 (1)	GHC0110003R0004		0.02 (0.044)
110 °C	brown-brown	C011-110 (1)	GHC0110003R0005		0.02 (0.044)
120 °C	gray-gray	C011-120 (1)	GHC0110003R0006		0.02 (0.044)
130 °C	blue-blue	C011-130 (1)	GHC0110003R0007		0.02 (0.044)
140 °C	white-blue	C011-140 (1)	GHC0110003R0011		0.02 (0.044)
150 °C	black-black	C011-150 (1)	GHC0110003R0008		0.02 (0.044)
160 °C	blue-red	C011-160 (1)	GHC0110003R0009		0.02 (0.044)
170 °C	white-green	C011-170 (1)	GHC0110003R0010		0.02 (0.044)
150 °C	black-black	C011-3-150 (2)	GHC0110033R0008		0.05 (0.11)

(1) Temperature sensor C011, standard version acc. to IEC/EN 60947-8
(2) Triple temperature sensor C011-3

Technical data

Characteristic data	Sensor type C011
Cold-state resistance	50 -100 at 25 °C
Warm-state resistance ± 5 up to 6 K of rated response temperature T_{NF}	10 000
Thermal time constant, sensor open (1)	< 5 s
Permitted ambient temperature	+180 °C

Rated response temperature tolerance T_{NF} T_{NF}	PTC resistance R from -20 °C to T_{NF} - 20 K	PTC resistance R2) at PTC temperatures of:		
		T_{NF} - T_{NF} (UPTC 2.5 V)	T_{NF} + T_{NF} (UPTC 2.5 V)	T_{NF} + 15 K (UPTC 7.5 V)
70 5 °C	100	570	570	-
80 5 °C				
90 5 °C		550	1330	4000
100 5 °C				
110 5 °C				
120 5 °C				
130 5 °C				
140 5 °C				
150 5 °C				
160 5 °C				
170 7 °C		570	570	-

(1) Not embedded in windings.
(2) For triple temperature sensor take values x 3.

Thermistor motor protection relays

Technical data - CM-MSS

Data at T_a = 25 °C and rated values, unless otherwise indicated

Supply circuit - Input circuit		**CM-MSS.x1**	**CM-MSS.x2**	**CM-MSS.x3**
Rated control supply voltage U_s	A1-A2	24-240 V AC/DC	24 V AC/DC	220-240 V AC
	A2-A3	-	-	110-130 V AC
Rated control supply voltage U_s tolerance		-15...+10 %		
Rated frequency		15-400 Hz	50-60 Hz	
Electrical insulation between supply circuit and measuring circuit		yes	no	yes
Power failure buffering time		20 ms		

Supply circuit - Measuring circuit / Sensor circuit		
Number of circuits		1 (CM-MSS.51: 2)
Sensor type		PTC type A IEC/EN 60947-8
Max. total resistance of sensors connected in series, cold state		< 750 Ω
Overtemperature monitoring	switch-off resistance (relay de-energizes)	2.83 kΩ 1% (CM-MSS.12 /.13 /.22 /.23: 2.7 kΩ 5%)
	switch-on resistance (relay energizes)	1.1 kΩ 1% (CM-MSS.12 /.13 /.22 /.23: 1.2 kΩ 5%)
Maximum voltage in sensor circuit	1.33 kΩ	2.5 V
	4 kΩ	3.7 V
	kΩ	5.5 V
Maximum current in sensor circuit		3.7 mA
Maximum sensor cable length		2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm²
Accuracy within the rated control supply voltage tolerance		0.50 % (CM-MSS.12 /.13 /.22 /.23: 5 %)
Accuracy within the temperature range		0.01 %/K (CM-MSS.12 /.13 /.22 /.23: 0.5 %/K)
Repeat accuracy (constant parameters)		on request
Reaction time of the safety function		< 100 ms
Hardware fault tolerance (HFT)		0

Control circuit	
Control function	see "Selection table CM-MSx range" on page 5
Maximum no-load voltage	5.5 V
Max. current	0.6 mA (CM-MSS.12 /.13 /.22 /.23: 1.2 mA)
Maximum cable length	2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm²

Indication of operational states		
Control supply voltage	U	LED green
Relay status	R	LED yellow
Fault message	F	LED red

Output circuit		
Kind of output		see "Selection table CM-MSx range" on page 5
Operating principle		closed-circuit principle
Contact material		AgNi alloy, Cd free
Rated operational voltage U_e (IEC/EN 60947-1)		250 V AC
Minimum switching voltage / Minimum switching current		24 V / 10 mA
Maximum switching voltage / Maximum switching current		see data sheet
Rated operating current I_e (IEC/EN 60947-5-1)	AC-12 (resistive) at 230 V	4 A
	AC-15 (inductive) at 230 V	3 A
	DC-12 (resistive) at 24 V	4 A
	DC-13 (inductive) at 24 V	2 A
AC Rating (UL 508)	utilization category (Control Circuit Rating Code)	B 300
	maximum rated operational voltage	300 V AC
	maximum continuous thermal current at B 300	5 A
	maximum making/breaking apparent power at B 300	3600/360 VA
	general purpose rating	250 V AC - 4 A
Mechanical lifetime		30 x 10^6 switching cycles
Electrical lifetime	at AC12, 230 V AC, 4 A	0.1 x 10^6 switching cycles
Maximum fuse rating to achieve short-circuit protection	n/c contact	10 A fast-acting (CM-MSS.12, CM-MSS.13, CM-MSS.51: 6 A)
	n/o contact	10 A fast-acting

Thermistor motor protection relays
Technical data - CM-MSS

Type		CM-MSS.x1	CM-MSS.x2	CM-MSS.x3
General data				
MTBF		on request		
Duty time		100 %		
Dimensions (W x H x D)	product dimensions	22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in)		
	packaging dimensions	97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in)		
Weight		see "Ordering details" on page 6		
Mounting		DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position		any		
Minimum distance to other units	vertical	10 mm (0.394 in) if switching current > 2 A		
	horizontal	10 mm (0.394 in) if switching current > 2 A		
Material of housing		UL 94 V-0		
Degree of protection	housing	IP50		
	terminals	IP20		
Electrical connection		**Screw connection technology**		**Easy Connect Technology (push-in)**
Connection capacity	fine-strand with(out) wire end ferrule	1 x 0.5-2.5 mm² (1 x 18-14 AWG) 2 x 0.5-1.5 mm² (2 x 18-16 AWG)		2 x 0.5-1.5 mm² (2 x 18-16 AWG)
	rigid	1 x 0.5-4 mm² (1 x 20-12 AWG) 2 x 0.5-2.5 mm² (2 x 20-14 AWG)		2 x 0.5-1.5 mm² (2 x 20-16 AWG)
Stripping length		8 mm (0.32 in)		
Tightening torque		0.6-0.8 Nm (7.08 lb.in)		-
Environmental data				
Ambient temperature ranges	operation	-25...+60 °C (-13...+140 °F)		
	storage	-40...+85 °C (-40...+185 °F)		
Damp heat, cyclic (IEC/EN 60068-2-30)		6 x 24 h cycle, 55 °C, 95 % RH		
Climatic class (IEC/EN 60721-3-3)		3K5 (no condensation, no ice formation)		
Vibration, sinusoidal		5...13.2 Hz: ±1 mm; 13.2...100 Hz: 0.7 g		
Shock		Class 2		
Isolation data				
Rated insulation voltage U_i (IEC/EN 60947-1, IEC/EN 60664-1)	Supply circuit / Measuring circuit (1)	300 V AC (CM-MSS.x2: n/a)		
	Supply circuit / Output circuits	300 V AC		
	Measuring circuit (1) / Output circuits	300 V AC		
	Output circuit 1 / Output circuit 2	300 V AC		
Rated impulse withstand voltage U_{imp} (IEC/EN 60947-1, IEC/EN 60664-1)	Supply circuit / Measuring circuit (1)	4 kV (CM-MSS.x2: n/a)		
	Supply circuit / Output circuits	4 kV		
	Measuring circuit (1) / Output circuits	4 kV		
	Output circuit 1 / Output circuit 2	4 kV		
Basic insulation (IEC/EN 60664-1)	Supply circuit / Measuring circuit (1)	600 V AC (CM-MSS.x2: n/a)		
	Supply circuit / Output circuits	600 V AC		
	Measuring circuit (1) / Output circuits	600 V AC		
	Output circuit 1 / Output circuit 2	300 V AC		
Protective separation (IEC/EN 61140)	Supply circuit / Measuring circuit (1)	yes, up to 300 V		
	Supply circuit / Output circuits	yes (CM-MSS.x2: n/a)		
	Measuring circuit (1) / Output circuits	yes		
	Output circuit 1 / Output circuit 2	no		
Pollution degree (IEC/EN 60664-1)		3		
Overvoltage category (IEC/EN 60664-1)		III		

Thermistor motor protection relays

Technical data - CM-MSS

Type		CM-MSS.x1	CM-MSS.x2	CM-MSS.x3
Standards				
Product standard		EN 60947-5-1, EN 60947-8		
Low Voltage Directive		2014/35/EC		
EMC directive		2014/30/EC		
ATEX directive		2014/34/EC (only ATEX variants "Selection table CM-MSx range" on page 5)		
RoHS directive		2011/65/EC		
Electromagnetic compatibility				
Interference immunity to		IEC/EN 61000-6-1, IEC/EN 61000-6-2		
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV contact discharge, 8 kV air discharge		
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz)		
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz		
surge	IEC/EN 61000-4-5	Level 3, Installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz)		
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	Class 3		
harmonics and interharmonics	IEC/EN 61000-4-13	Class 3		
Additional interference immunity according to product standard EN 60255-1 (reference on EN 60255-26_2011)				
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	10 V/m (80 MHz - 3 GHz)		
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	10 V at stated frequencies		
damped oscillatory waves	IEC/EN 61000-4-18	Signal lines, symmetric coupling: 1 kV peak voltage Power supply, asymmetric coupling: 2.5 kV peak voltage		
Interference emissions		IEC/EN 61000-6-3, IEC/EN 61000-6-4		
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B		
high-frequency radiated	Germanischer Lloyd	increased requirements in the emergency call frequency band		

Thermistor motor protection relays

Technical data - CM-MSE

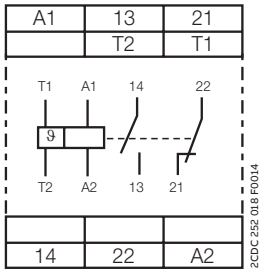
Data at T_a = 25 °C and rated values, unless otherwise indicated

Supply circuit - Input circuit		CM-MSE
Rated control supply voltage U_s power consumption	1SVR550805R9300	24 V AC approx. 1.5 A
	1SVR550800R9300	110-130 V AC approx. 1.5 A
	1SVR550801R9300	220-240 V AC approx. 1.5 A
Rated control supply voltage U_s tolerance		-15...+10 %
Rated frequency		50-60 Hz
Measuring circuit		
Monitoring function	T1-T2	temperature monitoring by means of PTC sensors
Number of sensor circuits		1
Sensor circuit		
Sensor type		PTC type A (IEC/EN 60947-8)
Max. total resistance of sensors connected in series, cold state		≤1.0 kΩ
Overtemperature monitoring	switch-off resistance (relay de-energizes)	2.0-3.0 kΩ
	switch-on resistance (relay energizes)	1.2-1.65 kΩ
Maximum voltage in sensor circuit	4 kΩ	5 V
	∞ kΩ	15 V
Maximum current in sensor circuit		2 mA
Maximum sensor cable length		2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm²
Reaction time		<100 ms
Output circuit		
Kind of output	13-14	1 n/o contact
Operational principle		closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold)
Maximum switching voltage		250 V
Rated operating voltage U_e and rated operating current I_e	AC-12 (resistive) at 230 V	4 A
	AC-15 (inductive) at 230 V	3 A
	DC-12 (resistive) at 24 V	4 A
	DC-13 (inductive) at 24 V	2 A
AC Rating (UL 508)	utilization category (Control Circuit Rating Code)	B 300
	maximum rated operational voltage	300 V AC
	maximum continuous thermal current at B 300	5 A
	maximum making/breaking apparent power at B 300	3600/360 VA
	general purpose rating	250 V AC - 4 A
Mechanical lifetime		30 x 10^6 switching cycles
Electrical lifetime	at AC12, 230 V AC, 4 A	0.1 x 10^6 switching cycles
Maximum fuse rating to achieve short-circuit protection	n/c contact	10 A fast-acting
	n/o contact	10 A fast-acting
General data		
Dimensions		22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in)
Duty cycle		100 %
Mounting		DIN rail (IEC/EN 60715)
Mounting position		any
Degree of protection	housing / terminals	IP50 / IP20
Electrical connection		
Connecting capacity	fine strand with wire end ferrule	2 x 1.5 mm² (2 x 16 AWG)
	fine strand without wire end ferrule	2 x 0.75-1.5 mm² (2 x 18-16 AWG)
	rigid	2 x 1-1.5 mm² (2 x 18-16 AWG)
Stripping length		2 x 0.75-1.5 mm² (2 x 18-16 AWG)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)
Environmental data		
Ambient temperature ranges	Operation	-20...+60 °C
	Storage	-40...+85 °C
Damp heat	IEC/EN 60068-2-30	+40 °C, 93 % RH, 4 days
Vibration withstand	IEC/EN 60062-2-6	10-57 Hz: 0.075 mm; 57-150 Hz: 1 g
Isolation data		
Rated insulation voltage U_i		250 V
Rated impulse withstand voltage U_{imp}		4 kV / 1.2 - 50 µs
Pollution degree		3
Overvoltage category		III

Type		CM-MSE
Standards/Directives		
Standards		IEC/EN 60947-5-1, IEC/EN 60947-8
Low Voltage Directive		2014/35/EU
EMC Directive		2014/30/E
RoHS Directive		2011/65/EU
Electromagnetic compatibility		
Interference immunity to		IEC/EN 61000-6-2, IEC/EN 60947-8
electrostatic discharge	IEC/EN 61000-4-2	Level 3, 6 kV contact discharge, 8 kV air discharge
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz)
electrical fast transient /burst	IEC/EN 61000-4-4	Level 3, 2 kV / 5 kHz
surge	IEC/EN 61000-4-5	Level 3, installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz)
Interference emission		6 g
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B

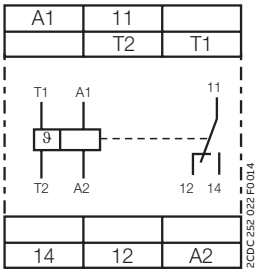
Thermistor motor protection relays
Connection diagrams

CM-MSS.11, CM-MSS.21



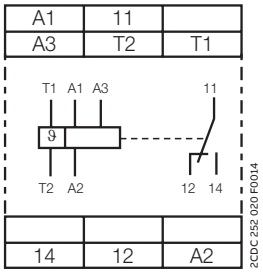
A1 – A2	Control supply voltage
13 – 14	n/o contact
21 – 22	n/c contact
T1 – T2	Measuring circuit

CM-MSS.12



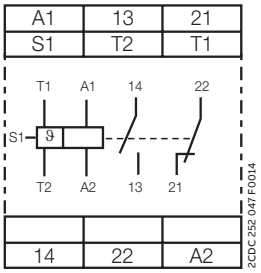
A1 – A2	Control supply voltage
11 – 12/14	c/o contact
T1 – T2	Measuring circuit

CM-MSS.13



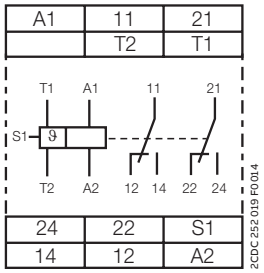
A1 – A2	Control supply voltage 220-240 V AC
A2 – A3	Control supply voltage 110-130 V AC
11 – 12/14	c/o contact
T1 – T2	Measuring circuit

CM-MSS.31



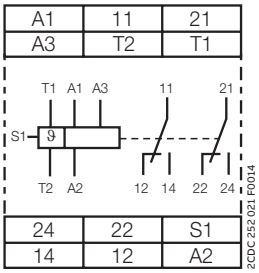
A1 – A2	Control supply voltage
13 – 14	n/o contact
21 – 22	n/c contact
S1 – T2	Automatic reset (jumpered)
T1 – T2	Measuring circuit

CM-MSS.22, CM-MSS.32, CM-MSS.41



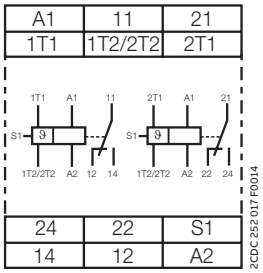
A1 – A2	Control supply voltage 24 V AC/DC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2	Automatic reset (jumpered)
T1 – T2	Measuring circuit

CM-MSS.23, CM-MSS.33



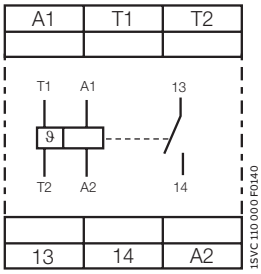
A1 – A2	Control supply voltage 220-240 V AC
A2 – A3	Control supply voltage 110-130 V AC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – T2	Automatic reset (jumpered)
T1 – T2	Measuring circuit

CM-MSS.51



A1 – A2	Control supply voltage 220-240 V AC
11 – 12/14	1st c/o (SPDT) contact
21 – 22/24	2nd c/o (SPDT) contact
S1 – 1T2/2T2	Automatic reset (jumpered)
1T1 – 1T2/2T2	Measuring circuit 1
2T1 – 1T2/2T2	Measuring circuit 2

CM-MSE

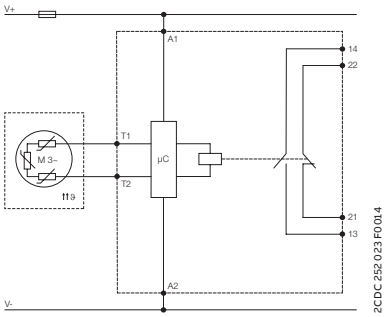


A1 – A2	Control supply voltage 24 V AC
T1-T2	Sensor circuit
13-14	Output contact - Closed circuit principle

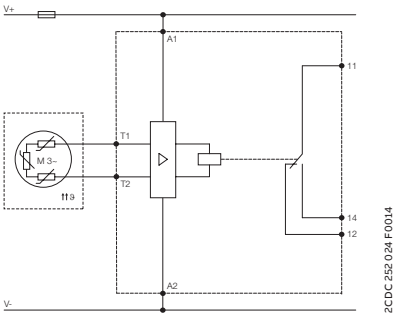
Thermistor motor protection relays

Circuit diagram

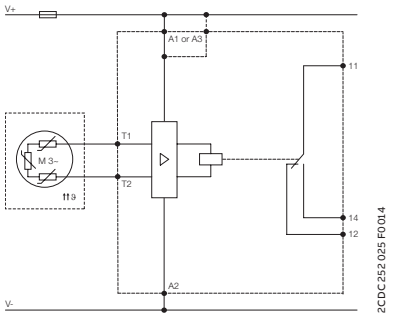
CM-MSS.11, CM-MSS.21



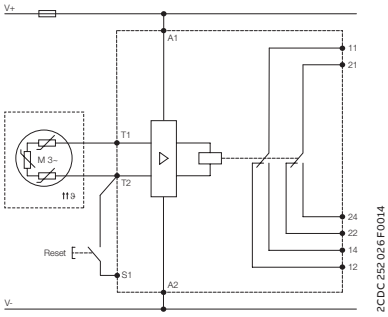
CM-MSS.12



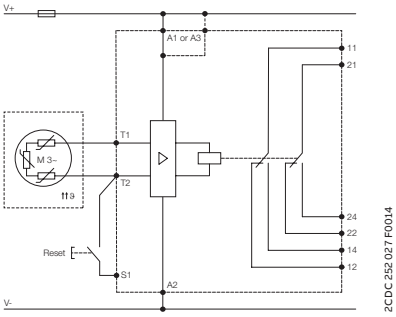
CM-MSS.13



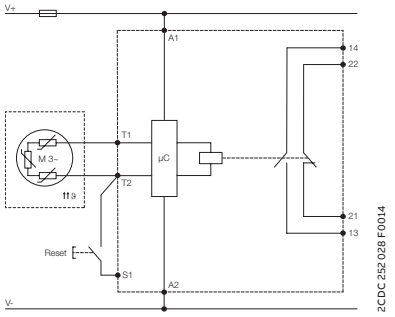
CM-MSS.22



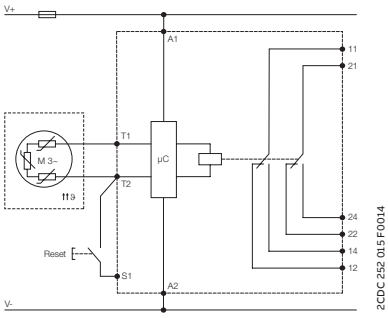
CM-MSS.23



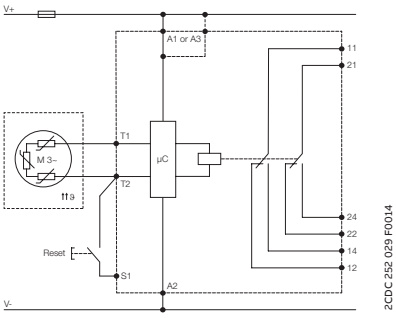
CM-MSS.31



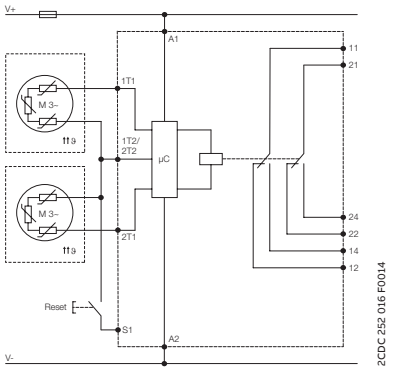
CM-MSS.32, CM-MSS.41



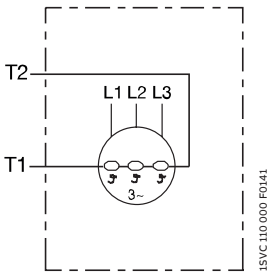
CM-MSS.33



CM-MSS.51



CM-MSE



07

Set up these innovative temperature monitoring relays exactly as you need, either via a back-lit LCD or smartphone app. Parametrization and configuration are just one touch away with the ABB EPiC app – even in a non-powered state – reducing installation time by 80%.

Just one relay covers a wide range of applications, enables you to monitor their condition and provides thermal protection. Increased uptime and safety makes ABB's Smart monitoring relays a true game changer.

Smart monitoring relays

8/2 **Features and benefits**

8/4 **Built-in connectivity**

8/5 **Applications**

8/8 **Ordering details**

8/9 **Technical data**

8/13 **Technical diagrams**

One look, one touch – one device
Features and benefits

Set up these innovative temperature monitoring relays exactly as you need, either via a back-lit LCD or smartphone app. Parametrization and configuration are just one touch away with the ABB EPiC app – even in a non-powered state – reducing installation time by 80%. And with just one relay covering a wide range of application, stocks can be reduced significantly, making ABB's Smart monitoring relays a true game changer.

Easy to install

One look - back-lit LCD for easy reading and parametrization
Everything you need at a glance: the LCD at the front of the relay shows the currently measured values and maintenance data. And with just one push, the symbol-based menu structure can be accessed via the push-rotate button. Simply set the thresholds and parameters with the help of an intuitive and future-ready interface.

Optimum interface

One touch - NFC parametrization via smartphone app
One touch is all that is needed for fast, easy and intuitive configuration with the ABB EPiC smartphone app. Simply touch the relay with your mobile phone: Parameter settings can be edited and stored in the app and then copied to different devices, even if they are not in the powered state. Available in a range of different languages, installation and configuration have never been so easy.

Continuous operation

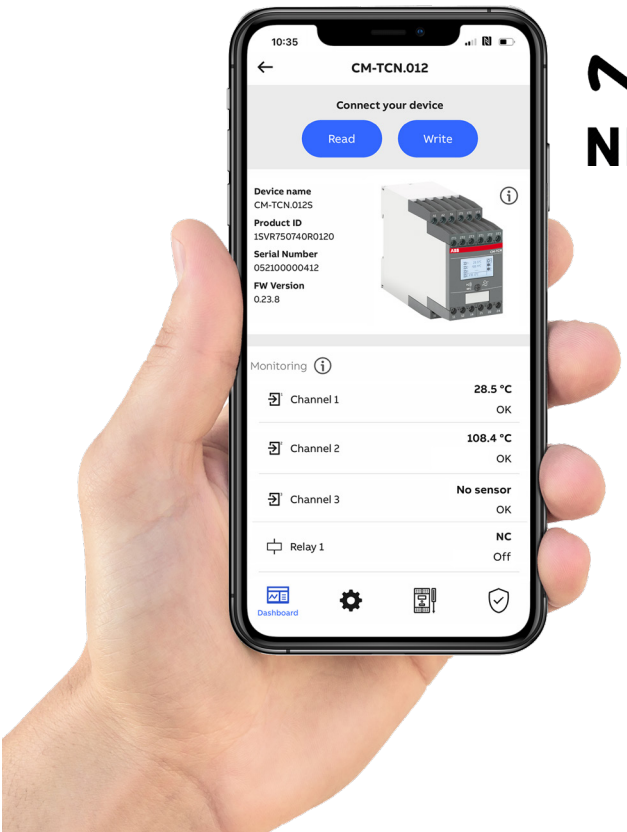
One device - for thermal protection and condition monitoring
Smart temperature monitoring relays ensure that your application remains operational by detecting potential failures in advance. They protect the life of your assets by providing early detection of unacceptable temperature rises and the need for maintenance. The relay is configurable over a wide range of settings and can be adjusted flexibly. Set a pre-alarm and alarm thresholds according to application needs. Increase personal safety by monitoring temperature remotely with Modbus RTU or ABB Ability™ Energy and Asset Manager.

Smart temperature monitoring relays
Setup via display or smartphone app

CM-TCN temperature monitoring relays can measure temperatures of solids, liquids and gaseous media in up to three sensor circuits using various types of sensors.

One...

look **to have the information needed**
the display shows the measured values and relay status at a glance. The symbol-based menu structure and presettings make parametrization simple.



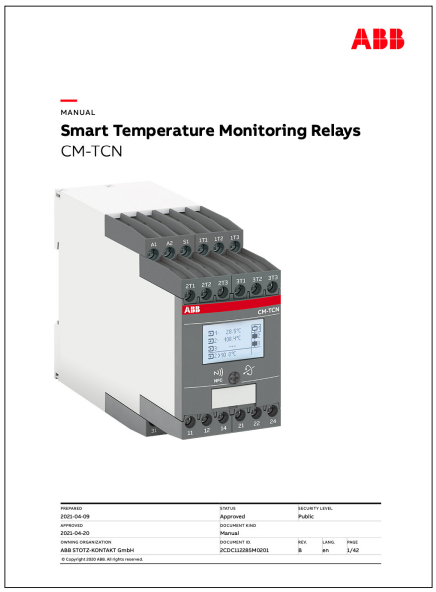
NFC

touch **for up to 80% faster setup**
for easy parametrization and copying of settings between multiple devices via NFC with the ABB EPiC smartphone app – even if the relay is not powered.

device **for thermal protection and condition monitoring**
Just one relay to cover many different applications, monitor their condition, increase safety and ensure uptime.

Built-in connectivity
Communication via embedded Modbus RTU

The smart temperature monitoring relay CM-TCN.012 supports the data transfer using the Modbus RTU communication protocol. The communication interface RS-485 is embedded in the relay and does not require installation of any accessories.



CM-TCN manual
Modbus communication map and information about the device configuration can be found in the CM-TCN user manual

The communication interface makes it possible to:

Read the temperature measurements, relays state and temperature sensors status.

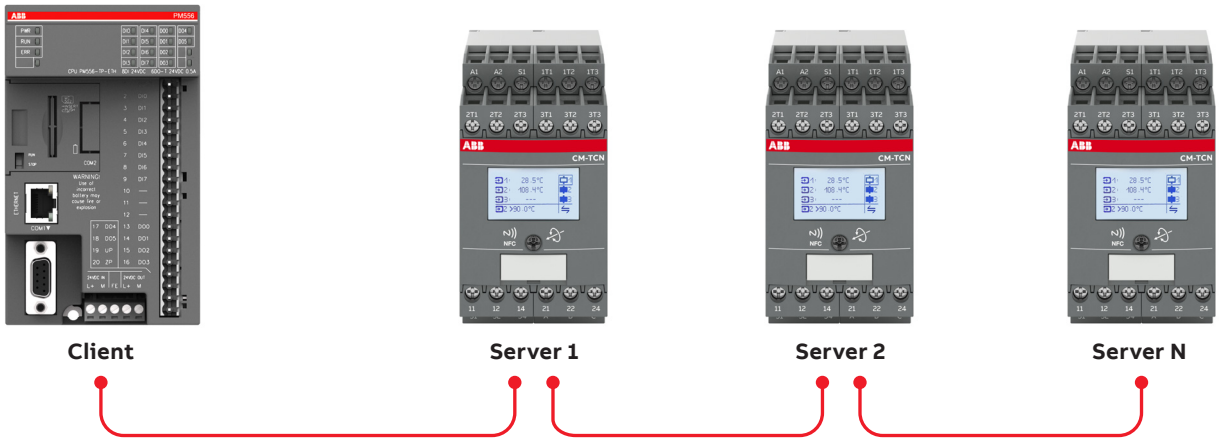
Reset the history and settings (trip counter, event history, etc)

Access the condition monitoring data such as event history, operating hours counter, maintenance counter, statistics.

Read system information (serial number, firmware version)

Configure the smart monitoring relay remotely.

Control output relays and trigger them in case of the communication bus error



Cloud integration with ABB Ability™

Real-time data monitoring and temperature trends

Providing full remote visibility of asset and electrical-system behavior, ABB Ability™ Energy and Asset Manager (EAM) provides insights that help you minimize costs, risks and maximize performance as well as safety across your operations.

The CM-TCN.012 smart monitoring relay is enabled in ABB Ability™ Energy and Asset Manager. Thus, allowing access to the real-time data monitoring and temperature trends from the cloud solution.

The data received from CM-TCN.012 is organized in plain widgets for the remote condition monitoring of assets such as a machine, motor, transformer or switchboard. The temperature trends can be compared between different measuring sensors giving you valuable insights about temperature behavior of your assets at the place of the sensors´ installation.

Additionally, the customer can set up SMS or E-mail alerts to notify key personnel in case of the temperature relay tripping or sensors error. The periodic report with temperature values can also be scheduled.

CM-TCN.012 can be connected to the cloud-computing platform via Modbus RS-485 communication interface. The interface is embedded in the device and does not require any accessories.

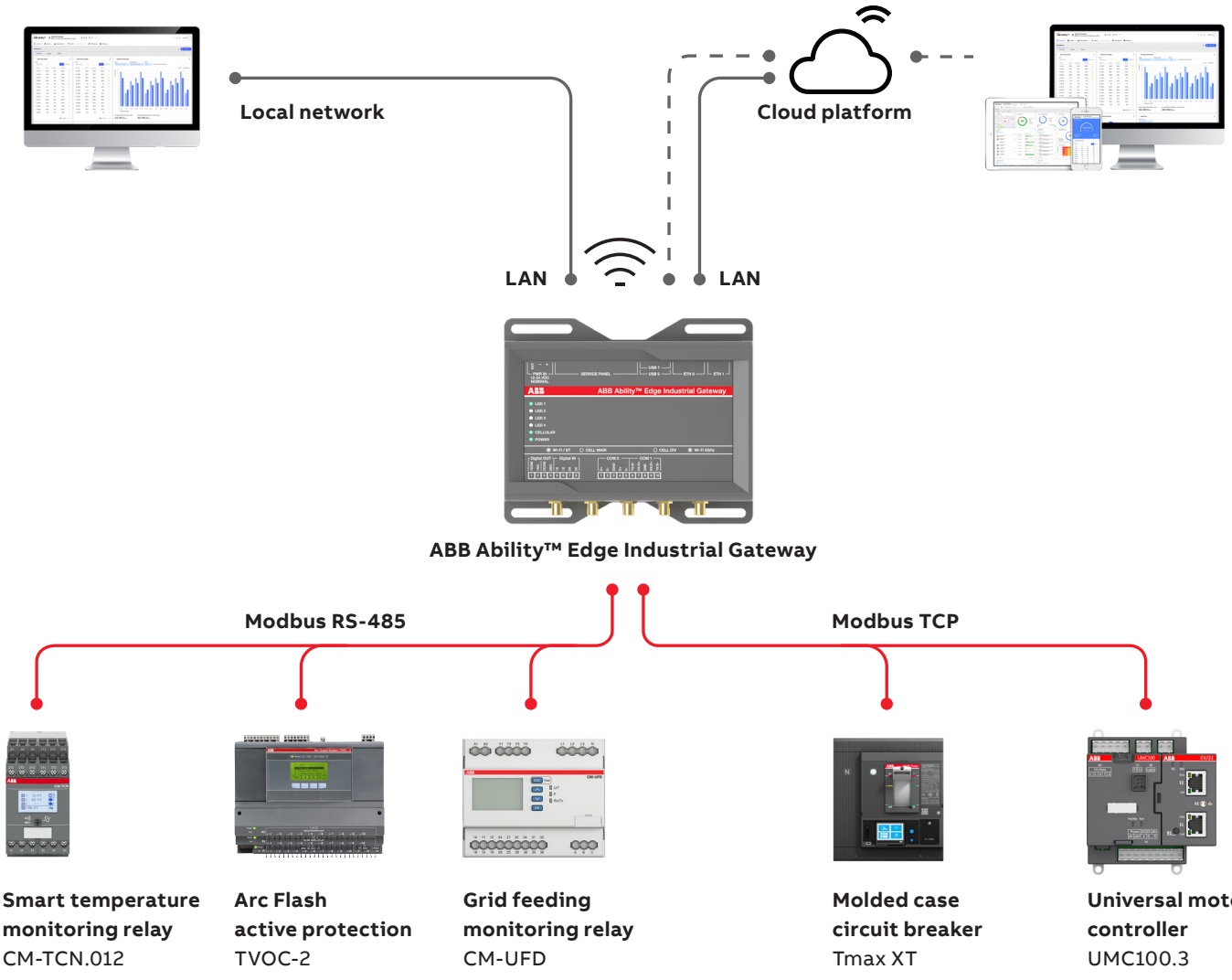
The smart relay can share the data with the platform using an external solution with the ABB Ability™ Edge Industrial Gateway.

ABB Ability™ Energy and Asset Manager

Example communication architecture
CM-TCN.012 ABB Ability™ enabled relay

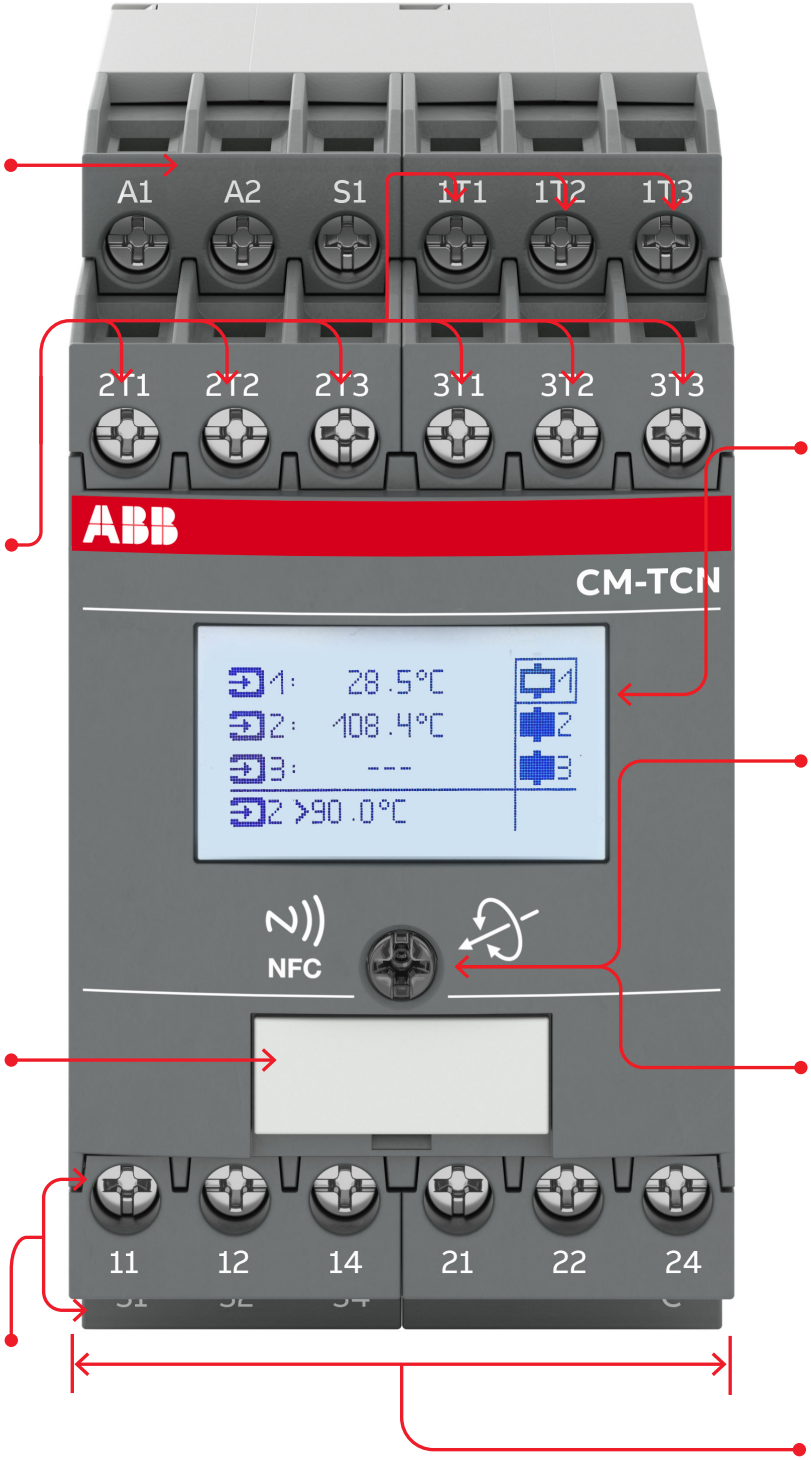
ABB Ability™ Energy and Asset Manager is a state-of-the-art cloud solution that integrates energy and asset management in a single intuitive dashboard.

Architecture with ABB Ability™ Edge Industrial Gateway



Integrate a range of devices like circuit breakers, motor controllers and the new CM-TCN.012 monitoring relay into the ABB Ability™ Energy and Asset Manager. It is a state-of-the-art cloud solution that integrates energy and asset management in a single intuitive dashboard. Providing full remote visibility of asset and electrical-system behavior, ABB Ability™ Energy and Asset Manager (EAM) provides insights that help you minimize cost and risk and maximize performance and safety across your operations.

Operating controls



Push-in and screw terminals

3 measuring inputs
PT100, PT1000, PTC, NTC

Marker label

Connection terminals
Wide terminal spacing allows connection of wires:
2 x 1.5 mm² (2 x 16 AWG) with wire end ferrules or
2 x 2.5 mm² (2 x 14 AWG) without ferrules.

Back-lit LCD
Symbol-based menu structure

Push-rotate button
Intuitive operation with just one button

LED status indication
Red: Failure
Yellow: NFC ready for pairing
Green: Control supply voltage applied; no failure

Width 45 mm

Smart monitoring relays
Ordering details

CM-TCN

Description
The temperature monitoring relays CM-TCN are able to measure temperatures of solids, liquids and gaseous media within up to three sensor circuits using different types of sensors, such as PT100, PT1000, PTC or NTC within the same time. Different types of sensors, e.g. PT100 and PTC sensors, can be monitored simultaneously.
The temperature is obtained by the sensors in the medium, evaluated by the device and monitored to determine whether it is within an operating range (range monitoring function) or has exceeded or fallen below a threshold. Depending on the parametrization, up to three output relays signalize the changes in the measuring circuits.

CM-TCN catalog
Further details about features and benefits of the smart monitoring relays can be found in the dedicated catalog

Smart temperature monitoring relays CM-TCN

Rated control supply voltage	Terminal type	Display & NFC	Modbus RTU	Temperature sensor	Width mm	Type	Order code	Weight (1 pc) kg (lb)
24-240 V AC/DC	Screw	yes	no	PT100, PTC, PT1000, NTC	45	CM-TCN.011S	1SVR750740R0110	0.293 (0.646)
	Push-in	yes	no			CM-TCN.011P	1SVR760740R0110	0.293 (0.646)
	Screw	yes	yes			CM-TCN.012S	1SVR750740R0120	0.299 (0.659)
	Push-in	yes	yes			CM-TCN.012P	1SVR760740R0120	0.299 (0.659)

* CM-TCN.011: supply voltage 24-240 V AC/DC for revision G or later and supply voltage 24 V AC/DC for revision F or earlier.

Accessories

Description	for type	Width mm	Type	Order code	Pkg qty	Weight (1 pc) kg (lb)
Adapter for screw mounting	CM-N.S/P	45	ADP.02	1SVR440029R0100	1	36.7 (1.30)
Marker label	CM-S.S/P CM-N.S/P		MAR.01	1SVR366017R0100	10	0.19 (0.007)
Sealable transparent cover	CM-N.S/P	45	COV.12	1SVR750005R0100	1	7 (0.247)

Smart monitoring relays
Technical data

Data at Ta = 25 °C and rated values, unless otherwise indicated

Type		**CM-TCN.011**	**CM-TCN.012**
Input circuit		**A1-A2**	
Rated control supply voltage U_s		24-240 V AC/DC*	
Rated control supply voltage U_s tolerance		-15 ... +10 %	
Rated frequency	AC	50 - 60 Hz	
Frequency range	AC	45 - 66 Hz	
Typical current consumption	24 V AC/DC	typ. 30 mA / max. 40 mA	
	115 V AC	typ. 16 mA / max. 20 mA	
	230 V AC	typ. 13 mA / max. 15 mA	
Power failure buffering time		min. 20 ms	
Measuring circuits		**xT1, xT2, xT3**	
Sensor type		PT100, PT1000**, PTC, NTC, bi-metal switch	
Connection of the sensor	2-wire	yes, jumper xT2 - xT3	
	3-wire	yes, use terminal xT1, xT2, xT3	
Interrupted wire detection		yes	
Short-circuit detection		yes	
Measuring ranges	PT100	-200 °C ... +850 °C / -328 °F ... +1562 °F	
	PT1000	-200 °C ... +850 °C / -328 °F ... +1562 °F**	
	NTC	+80 °C ... +155 °C / +176 °F ... +311 °F	
	PTC	max. total resistance of connected resistors in cold state <750 Ohm	
Monitoring functions		undertemperature, overtemperature, window monitoring	
Measuring input range		-200 ... +850 °C / -328 ... +1562 °F	
Hysteresis related to the threshold values		1 ... 99.9 °C / 1.8 ... 179.8 °F	
Measuring principle		continuous current	
Typical current in the sensor circuit	PT100	0.5 mA	
	PT1000	0.5 mA	
Maximum current in sensor circuit		0.5 mA	
Measuring accuracy		± 0.5 K (-50 ... +200 °C / -58 ... +392 °F) ± 1 K (< -50 °C / -58 °F and > 200 °C / 392 °F)	
Accuracy within the rated control supply voltage tolerance		< 0.05 % full scale/1 V	
Accuracy within the temperature range		< 0.05 % full scale/1 K	
Repeat accuracy (constant parameters)		± 0.07 % full scale	
Maximum measuring cycle		< 2 s	
Maximum cable length		500 m / 1 mm^2 (shielded cable)	
Control circuits			
Type of triggering		volt-free triggering	
Control function	S1	remote reset	
Maximum input current		< 1.5 mA	
Maximum no-load voltage at the control inputs		< 15 V	
Minimum control pulse length		150 ms	
Maximum cable length at the control inputs		100 m - 100 pF/m	

* CM-TCN.011: supply voltage 24-240 V AC/DC for revision G or later and supply voltage 24 V AC/DC for revision F or earlier.
** When CM-TCN is used with PT1000 sensors, a bridge must be installed between terminals xT2 and xT3 of unused measuring circuits. The bridge must also be installed between open terminals xT2 and xT3 when CM-TCN is used with one or two PT1000 in combination with PTC or NTC or bimetal switch.

Smart monitoring relays
Technical data

Type		CM-TCN.011	CM-TCN.012
Timing functions			
Power-on delay		2-999.9 s	
ON-delay R1, R2, R3 *		0-6553.5 s	
OFF-delay R1, R2, R3 *		0-6553.5 s	
Cyclic switching function	On time	1 min - 1 day	
	cycle time	10 min - 1 year	
Indication of operational states			
Control supply voltage applied		LED green	
Cyclic switching function running		LED orange	
Internal fault		LED red on	
Short circuit		LED red: Y	
Wire break		LED red: Z	
Overtemperature / Measurement value exceeds high limit		LED red: W	
Undertemperature / Measurement value exceeds low limit		LED red: X	
Parameter error		Orange and red LEDs alternate	
NFC pairing		LED orange: W	
For details see the message on the display			
Display			
Technology		LCD	
Backlight	on	press button	
	off	switch-off delay adjustable, 10 s -1 h (default 10 s)	
Resolution		128 x 64 pixel	
Display size		25.58 x 12.78 mm	
Operating controls			
Push-rotate button		Operable with screw driver: PZ1 DIN ISO 8764-1	
Near field communication (NFC)			
Standards		ISO/IEC 14443 Part 2+3 NFC Forum Type 2 tag compliant	
Communication interface			
Communication protocol		-	Modbus RTU
Physical interface		-	two-wire RS-485
Integrated termination resistors		-	no
Possible bus addresses		-	1 ... 247
Baud rates		-	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 B/s
Typical response time		-	< 30 ms
Bus master supervision time / Timeout		-	adjustable 1 … 255 s in steps of 1 s
Frame		-	8 data, Even, 1 stop 8 data, Odd, 1 stop 8 data, None, 2 stop 8 data, None, 1 stop

* If the selected ON-delay or OFF-delay is less than 2 s, the maximum measuring cycle should be taken into account.

Smart monitoring relays
Technical data

Type			CM-TCN.011	CM-TCN.012
Output circuits				
Kind of outputs		11-12/14	relay R1, c/o (SPDT) contact	
		21-22/24	relay R2, c/o (SPDT) contact	
		31-32/34	relay R3, c/o (SPDT) contact	
Operating principle		open- or closed circuit principle	configurable; default: closed-circuit principle*	
Contact material			AgNi alloy, Cd-free	
Maximum switching voltage / maximum switching current			see "Load limit curves"	
Rated operational voltage U_e and rated operational current I_e		AC-12 (resistive) at 230 V	4 A	
		AC-15 (inductive) at 230 V	3 A	
		DC-12 (resistive) at 24 V	4 A	
		DC-13 (inductive) at 24 V	2 A	
Mechanical lifetime			30 x 10^6 switching cycles	
Electrical lifetime		at AC-12, 230 V AC, 4 A	0.1 x 10^6 switching cycles	
Maximum fuse rating to achieve short-circuit protection		n/c contact	6 A fast-acting	
		n/o contact	10 A fast-acting	
Conventional thermal current I_{th}			4 A	
General data				
MTBF			on request	
Duty cycle			100 %	
Dimensions			see "Dimensional drawing"	
Mounting			DIN rail (IEC/EN 60715) TH 35-7.5 and TH 35-15, snap-on mounting without any tool	
Mounting position			any	
Minimum distance to other units		horizontal	not necessary	
Material of housing			UL 94 V-0	
Degree of protection		terminals	IP20	
Electrical connection			**CM-TCN.011S, CM-TCN.012S**	**CM-TCN.011P, CM-TCN.012P**
Connecting capacity	fine-strand with/ without wire end ferrule	A1, A2, R1, R2, R3, S1, C	1x 0.5-2.5 mm² (1x18-14 AWG) 2 x 0.5-1.5 mm² (2x18-16 AWG)	2x0.5-1.5 mm² (2x18-16 AWG)
		xT1, xT2, xT3, A, B, C	1x 0.2-2.5 mm² (1x24-14 AWG) 2 x 0.2-1.5 mm² (2x24-16 AWG)	2x0.2-1.5 mm² (2x24-16 AWG)
	rigid	A1, A2, R1, R2, R3, S1, C	1x 0.5-4 mm² (1x20-12 AWG) 2 x 0.5-2.5 mm² (2x20-14 AWG)	2x0.5-1.5 mm² (2x20-16 AWG)
		xT1, xT2, xT3, A, B, C	1x 0.2-4 mm² (1x24-12 AWG) 2 x 0.2-2.5 mm² (2x24-14 AWG)	2x0.2-1.5 mm² (2x24-16 AWG)
Stripping length			8 mm (0.32 in)	
Tightening torque		< 0.5 mm²	0.5 Nm (4.43 lb.in)	-
		≥ 0.5 mm²	0.6 - 0.8 Nm (7.08 lb.in)	-

* Closed-circuit principle: Output relay de-energizes if a fault is occurring
Open-circuit principle: Output relay energizes if a fault is occurring

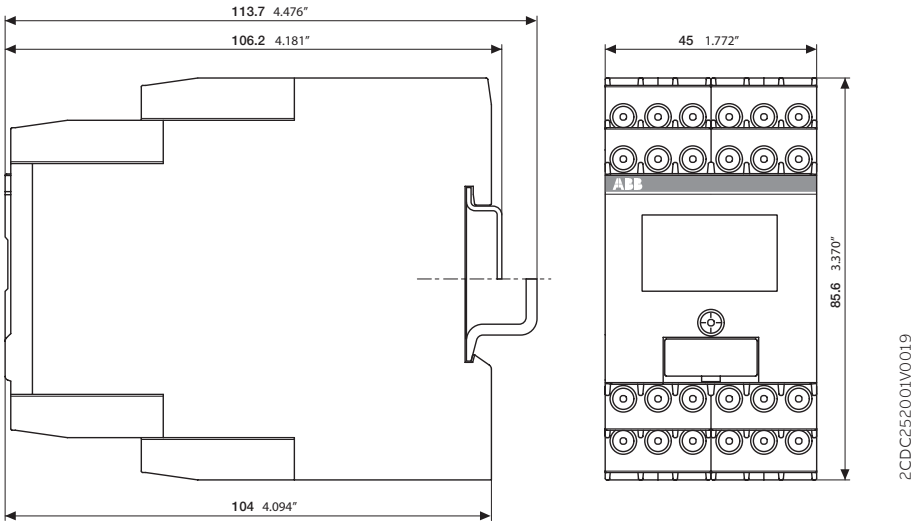
Smart monitoring relays

Technical data

Type		CM-TCN.011	CM-TCN.012
Environmental data			
Ambient temperature ranges	operation	-25 °C...+60 °C (-13...+140 °F)	
	storage	-40 °C...+85 °C (-40...+185 °F)	
Damp heat, cyclic	IEC/EN 60068-2-30	6 x 24 h cycle, 55 °C, 95 % RH	
Climatic class	IEC/EN 60721-3-3	3K5 (no condensation, no ice formation)	
Vibration, sinusoidal		class 1	
Shock		class 1	
Isolation data			
Rated impulse withstand voltage (U_{imp}) EN/IEC60664-1	supply circuit / measuring circuit and modbus / output circuits (relay)	6 kV	
	output circuit 1 / output circuit 2 / output circuit 3	4 kV	
Rated insulation voltage U_i Basic insulation	supply circuit / measuring circuit and modbus / output circuits (relay)	600 V	
	output circuit 1 / output circuit 2 / output circuit 3	300 V	
Protective separation IEC/EN 61140	supply circuit / measuring circuit and modbus / output circuits (relay)	300 V	
	output circuit 1 / output circuit 2 / output circuit 3	150 V	
Pollution degree		3	
Overvoltage category		III	
Standards/Directives			
Standards		IEC/EN 60947-5-1	
Low Voltage Directive		2014/35/EU	
EMC Directive		2014/30/EU	
RoHS Directive		2011/65/EU incl. 2015/863/EU	
WEEE Directive		2012/19/EU	
RED Directive		2014/53/EU	
Electromagnetic compatibility			
Interference immunity to		IEC/EN 60947-5-1	
electrostatic discharge	IEC/EN 61000-4-2	level 2, 4 kV contact discharge, 8 kV air discharge	
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	level 3, 10 V/m	
electrical fast transient / burst	IEC/EN 61000-4-4	level 3 / 2 kV, 5 kHz	
surge	IEC/EN 61000-4-5	supply circuit: level 3; L-L 1 kV, L-PE 2 kV relay circuit: level 3; L-PE 2 kV measuring circuit, remote S1: level 2; L-PE 1 kV	
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	level 3, 10 V	
voltage dips, short interruptions and voltage variations	IEC/EN 61000-4-11	class 3	
Interference emission		IEC/EN 60947-5-1	
high-frequency radiated		fulfilled (environment B)	
high-frequency conducted		fulfilled (environment A and B)	

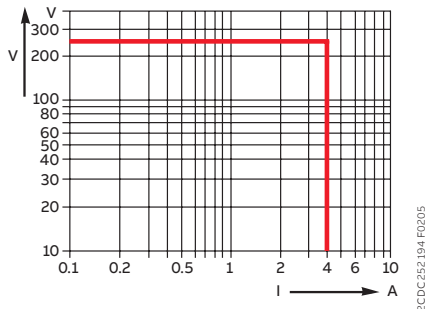
Smart monitoring relays
Technical diagrams

Dimensional drawings
in **mm** and inches

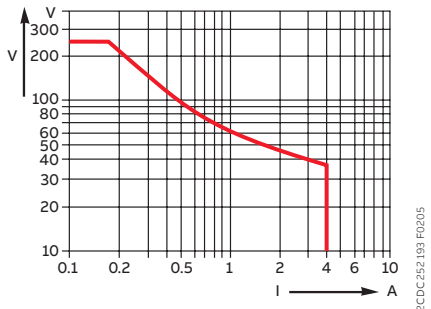


CM-TCN.01x

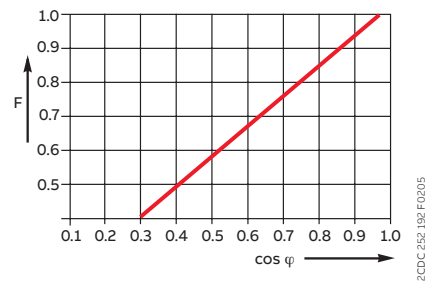
Load limit curves



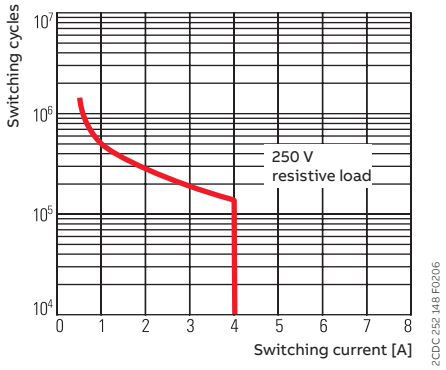
AC load (resistive)



DC load (resistive)



Derating factor F for inductive AC load



Contact lifetime

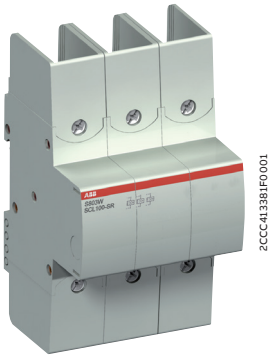
Self resetting current limiting module

S800-SCL-SR
9/2 Ordering details
9/3 Technical data

S800-SCL-SR

Self-resetting current limiting module

S800S-SCL-SR



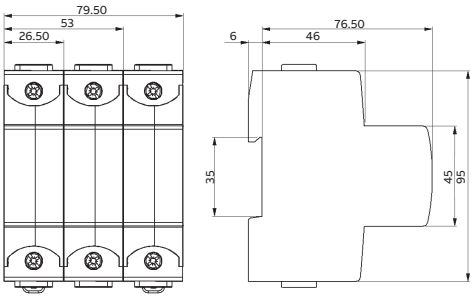
S803W-SCL-SR

S800-SCL-SR is ABB's innovative self-resetting current limiting module which considerably increases the short-circuit breaking capacity of downstream manual motor starters and high performance MCBs. S800-SCL-SR is a self resetting current limiting module based on the S800 technology.

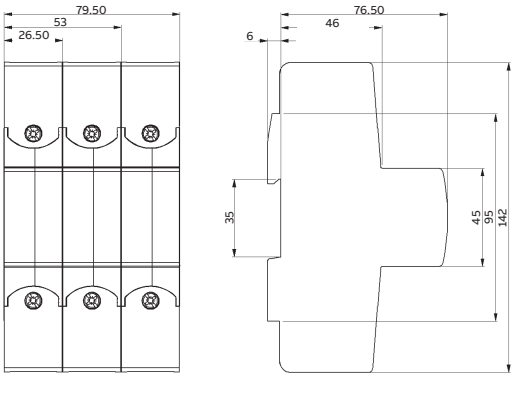
It limits the short-circuit current until the downstream means of protection trips. Its current continuity makes it as the ideal solution for group protection: All parallel branches remain operative. This leads to an Expanded application range of the low voltage switchgear whose short-circuit capabilities are usually limited. S800-SCL-SR can be combined with S800S high performance MCB or with manual motor starters. S800-SCL-SR can also back up a single circuit breaker or a group of circuit breakers or motor starters (group protection). Terminals and outside dimensions are identical to the S800 range.

Self-resetting short-circuit limiter IEC version A	Type designation	Product number	EAN number 7612271	Weight kg	Pack. unit
1-pole					
32	S801S-SCL32-SR	2CCS801901R0539	412012	0.25	1
63	S801S-SCL63-SR	2CCS801901R0599	412036	0.25	1
100	S801S-SCL100-SR	2CCS801901R0639	411992	0.25	1
2-pole					
32	S802S-SCL32-SR	2CCS802901R0539	412074	0.5	1
63	S802S-SCL63-SR	2CCS802901R0599	412098	0.5	1
100	S802S-SCL100-SR	2CCS802901R0639	412050	0.5	1
3-pole					
32	S803S-SCL32-SR	2CCS803901R0539	411930	0.75	1
63	S803S-SCL63-SR	2CCS803901R0599	411947	0.75	1
100	S803S-SCL100-SR	2CCS803901R0639	411954	0.75	1

Self-resetting short-circuit limiter IEC/UL version A	Type designation	Product number	EAN number 7612271	Weight kg	Pack. unit
3-pole					
32	S803W-SCL32-SR	2CCS803917R0539	412319	0.75	1
63	S803W-SCL63-SR	2CCS803917R0599	412326	0.75	1
100	S803W-SCL100-SR	2CCS803917R0639	412302	0.75	1



S800S-SCL-SR



S803W-SCL-SR

Main dimensions mm, inches

S800S-SCL-SR/S803W-SCL-SR

Technical data

			S800S-SCL-SR	S803W-SCL-SR
Rated operational current Ie		[A]	32, 63, 100	32, 63, 100
Pole			1, 2, 3	3
Rated operational voltage Ue (AC) according to IEC 60947-2	50/60 Hz	[V]	400/690	690
(AC) according to UL 508	50/60 Hz	[V]		600
Rated insulation voltage Ui		[V]	690	690
Rated impulse withstand voltage Uimp		[kV]	8	8
Rated ultimate short-circuit breaking capacity				
Icu = Ics according to IEC 60947-2*				
(AC) 50/60 Hz 240/415 V		[kA]	100	100
(AC) 50/60 Hz 254/440 V		[kA]	100	100
(AC) 50/60 Hz 277/480 V		[kA]	65	65
(AC) 50/60 Hz 289/500 V		[kA]	65	65
(AC) 50/60 Hz 346/600 V		[kA]	65	65
(AC) 50/60 Hz 400/690 V		[kA]	50	50
Short-circuit rating according to UL 508, CSA 22.2*				
(AC) 50/60 Hz 480 V		[kA]	65	65
(AC) 50/60 Hz 600 V		[kA]	65	65

* Valid only for approved combinations

Rated frequency		[Hz]	50/60	50/60
Mounting position			any	any
Connections Cu				
		[mm²]	1 ... 50 rigid (solid/stranded)	1 ... 50 rigid (solid/stranded)
		[mm²]	1 ... 70 flexible	1 ... 70 flexible
				14–1 AWG
Tightening torque				
		[Nm]	min. 3 / max. 4	min. 3 / max. 4
		[in. lbs.]		min. 26.5 / max. 25
Feeding			optional	optional
Mouting on DIN top hat rail			EN 60715	EN 60715
Ambient air temperature		[°C]	–40 ... +70	–40 ... +70
Storage temperature		[°C]	–40 ... +85	–40 ... +85
Degree of protection			IP20	IP20
Classification acc. to NF F 16-101, NF F 16-102			I3, F2	I3, F2
Damp Heat			IEC 60068-2-30, 55 °C / 95% r.h.	IEC 60068-2-30, 55 °C / 95% r.h.
Vibration			IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x I_e	IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x I_e
Random Vibration			IEC 60068-2-64, 5–500 Hz / 2 g at 0.5 x I_e	IEC 60068-2-64, 5–500 Hz / 2 g at 0.5 x I_e
Resistance to climatic conditions			IEC 60068-2-1 /-2-2 /-2-30	IEC 60068-2-1 /-2-2 /-2-30
Standard			IEC 60947-2 IEC 60947-4-1	IEC 60947-2 IEC 60947-4-1 UL 508, CSA 22.2 No. 14

Internal resistance at 25°C ambient temperature and nominal power losses

Rated current In A	**Internal resistance Ri** mΩ/pole	**Power losses Pvn** W/pole
32	2.8	3.6
63	1.3	5.7
100	0.7	7.8

Influence of ambient temperature – single mounted devices

Rated current In A	**10°C**	**15°C**	**20°C**	**25°C**	**30°C**	**35°C**	**40°C**	**45°C**	**50°C**	**55°C**	**60°C**	**65°C**	**70°C**
32	38.2	37.2	35.8	35.2	34.2	33.3	32	30.7	29.8	28.8	27.8	26.5	25.1
63	75.3	73.2	70.6	69.3	67.4	65.5	63	60.5	58.6	56.7	54.8	52.3	49.8
100	119.5	116.2	112	110	107	104	100	96	93	90	87	84	80

S800-SCL-SR
Technical data

Short circuit breaking capacity

		S800S-SCL-SR	S803W-SCL-SR
Rated ultimate short-circuit breaking capacity			
Icu = Ics according to IEC 60947-2			
(AC) 50/60 Hz 240/415 V	[kA]	100	100
(AC) 50/60 Hz 254/440 V	[kA]	100	100
(AC) 50/60 Hz 277/480 V	[kA]	65	65
(AC) 50/60 Hz 289/500 V	[kA]	65	65
(AC) 50/60 Hz 346/600 V	[kA]	65	65
(AC) 50/60 Hz 400/690 V	[kA]	50	50
Short-circuit rating according to UL 508, CSA 22.2			
(AC) 50/60 Hz 480 V	[kA]		65
(AC) 50/60 Hz 600 V	[kA]		65

Coordination

Type	230 V AC						400 V AC						440 V AC					
			Fuse		Current Limiter				Fuse		Current Limiter				Fuse		Current Limiter	
	I_{cs} kA	I_{cu} kA	gG, kA	aM A	S803x-SCL-SR kA	A	I_{cs} kA	I_{cu} kA	gG, kA	aM A	S803x-SCL-SR kA	A	I_{cs} kA	I_{cu} kA	gG, kA	aM A	S803x-SCL-SR kA	A
MS132-0.16																		
MS132-0.25																		
MS132-0.4																		
MS132-0.63																		
MS132-1.0	No back-up required						No back-up required						No back-up required					
MS132-1.6																		
MS132-2.5																		
MS132-4.0													20	20	100	63	100	32,63,100
MS132-6.3													20	20	100	100	100	32,63,100
MS132-10													20	20	100	100	100	32,63,100
MS132-12													20	20	100	125	100	32,63,100
MS132-16													20	20	100	125	100	32,63,100
MS132-20													20	20	100	125	100	32,63,100
MS132-25	50	50	100	125	100	63,100	50	50	100	125	100	63,100	20	20	100	125	100	63,100
MS132-32	25	50	100	125	100	63,100	25	50	100	125	100	63,100	20	20	100	125	100	63,100

Type	500 V AC						690 V AC					
			Fuse		Current Limiter				Fuse		Current Limiter	
	I_{cs} kA	I_{cu} kA	gG, kA	aM A	S803x-SCL-SR kA	A	I_{cs} kA	I_{cu} kA	gG, kA	aM A	S803x-SCL-SR kA	A
MS132-0.16												
MS132-0.25												
MS132-0.4												
MS132-0.63												
MS132-1.0	No back-up required						No back-up required					
MS132-1.6												
MS132-2.5	20	20	100	35	65*	32, 63,100	3	3	80	35	50**	32, 63,100
MS132-4.0	20	20	100	63	65*	32, 63,100	3	3	80	63	50**	32, 63,100
MS132-6.3	20	20	100	100	65*	32, 63,100	3	3	80	100	50**	32, 63,100
MS132-10	20	20	100	100	65*	32, 63,100	3	3	80	100	50**	32, 63,100
MS132-12	20	20	100	125	65*	32, 63,100	3	3	80	125	50**	32, 63,100
MS132-16	20	20	100	125	65*	32, 63,100	3	3	80	125	50**	32, 63,100
MS132-20	20	20	100	125	65*	32, 63,100	3	3	80	125	50**	32, 63,100
MS132-25	10	10	100	125	65*	63,100	3	3	80	125	50**	63,100
MS132-32	10	10	100	125	65*	63,100	3	3	80	125	50**	63,100

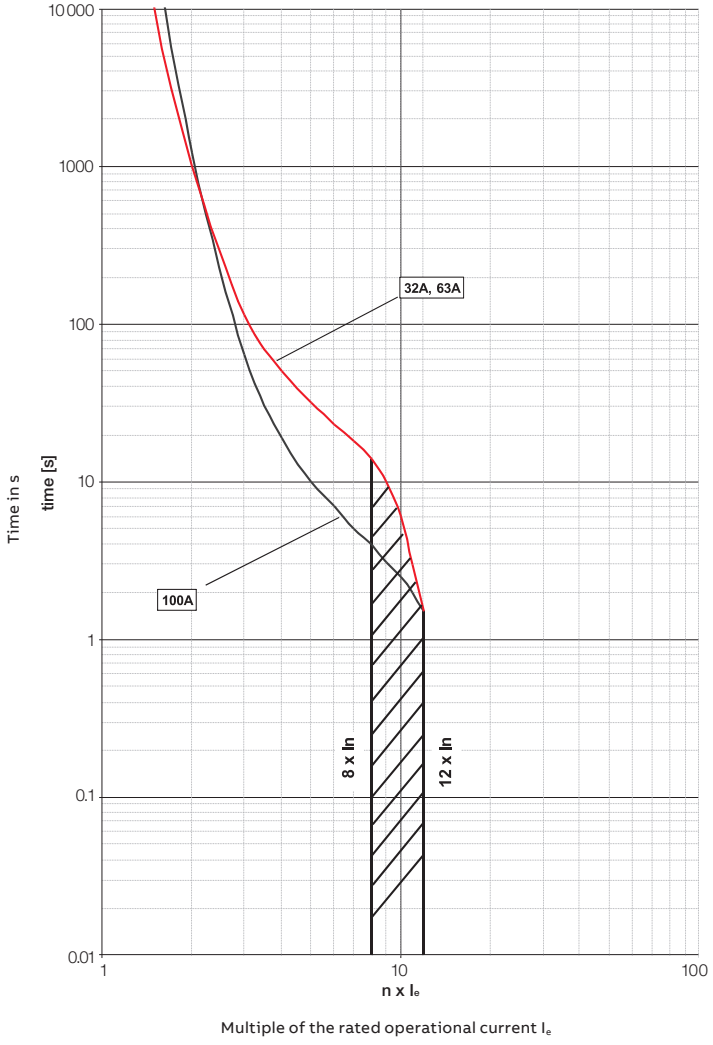
* 100 kA when two current limiters are used in series.
** 80 kA when two current limiters are used in series.

S800-SCL-SR
Technical data

Installation requirements

The total sum of the rated currents of all downstream motor starters or circuit breakers shall not exceed the rated current of the S800-SCL-SR (valid also for HV version). Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S800-SCL-SR (valid also for HV version).

Maximum load



Multiple of the rated operational current I_e

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

www.abb.com/productdetails/**1SBK104235R2000**

DRAS and DRAF enclosed starters

DRAS enclosed starter

10/2 Ordering details
10/3 Control supply wiring versions
10/3 Wiring diagram
10/3 Main dimensions
10/4 Voltage code table

DRAF enclosed starter

10/6 Experience reliable and easy to install motor starting
10/8 Ordering details
10/10 Control supply wiring versions
10/10 Wiring diagram
10/10 Main dimensions

DRAS09 ... DRAS16 enclosed direct-on-line starters

4 to 7.5 kW, protected by thermal overload relays

AC or DC operated

DRAS
+ T16 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP65 compact plastic enclosure with double insulation, equipped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 2 quarter-turn, quick fastening screws and a base with 6 cable inlets and outlets via knockouts.
- 1 AS or ASL 3-pole contactor with holding contact
- 1 PE and 1 neutral terminal.

3 versions of control supply wiring are available: phase-to-phase, separate supply or phase-to-neutral.

T16 thermal overload relay has to be ordered separately and choses according to motor's nominal current (see table below).

DRAS, DRASL enclosed DOL starters

IEC - AC-3				Rated control circuit voltage Uc Other control voltages see AS voltage code table		Control supply wiring	Type	Order code	Weight Pkg (1 pce)
Rated operational power 220 V 230 V 240 V	400 V	500 V	max. current ϑ ≤ 40 °C Ue=400 V						
kW	kW	kW	A	V 50/60 Hz	V DC				kg
AC operated with AS 3-pole contactors									
2.2	4	4	9	24	-	Separate supply	DRAS09-20S	1SBK104235R2000	0.650
				220	-	Phase-to-neutral	DRAS09-25N	1SBK104135R2500	0.650
				230	-	Phase-to-neutral	DRAS09-26N	1SBK104135R2600	0.650
3	5.5	5.5	12	24	-	Separate supply	DRAS12-20S	1SBK114235R2000	0.650
				220	-	Phase-to-neutral	DRAS12-25N	1SBK114135R2500	0.650
				230	-	Phase-to-neutral	DRAS12-26N	1SBK114135R2600	0.650
4	7.5	7.5	15.5	24	-	Separate supply	DRAS16-20S	1SBK124235R2000	0.650
				220	-	Phase-to-phase	DRAS16-25N	1SBK124135R2500	0.650
				230	-	Phase-to-neutral	DRAS16-26N	1SBK124135R2600	0.650
DC operated with ASL 3-pole contactors									
2.2	4	4	9	-	24	Separate supply	DRASL09-81S	1SBK104335R8100	0.700
3	5.5	5.5	12	-	24	Separate supply	DRASL12-81S	1SBK114335R8100	0.700
4	7.5	7.5	15.5	-	24	Separate supply	DRASL16-81S	1SBK124335R8100	0.700

T16

T16 thermal overload relays to be ordered separately

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
0.10...0.13	0.5 A, Fuse type T	10	T16-0.13	1SAZ711201R1005	0.100
0.13...0.17	1.0 A, Fuse type T		T16-0.17	1SAZ711201R1008	0.100
0.17...0.23			T16-0.23	1SAZ711201R1009	0.100
0.23...0.31			T16-0.31	1SAZ711201R1013	0.100
0.31...0.41	2.0 A, Fuse type gG		T16-0.41	1SAZ711201R1014	0.100
0.41...0.55			T16-0.55	1SAZ711201R1017	0.100
0.55...0.74	4.0 A, Fuse type gG		T16-0.74	1SAZ711201R1021	0.100
0.74...1.00	6.0 A, Fuse type gG		T16-1.0	1SAZ711201R1023	0.100
1.00...1.30			T16-1.3	1SAZ711201R1025	0.100
1.30...1.70	10.0 A, Fuse type gG		T16-1.7	1SAZ711201R1028	0.100
1.70...2.30			T16-2.3	1SAZ711201R1031	0.100
2.30...3.10			T16-3.1	1SAZ711201R1033	0.100
3.10...4.20	20.0 A, Fuse type gG		T16-4.2	1SAZ711201R1035	0.100
4.20...5.70			T16-5.7	1SAZ711201R1038	0.100
5.70...7.60	35.0 A, Fuse type gG		T16-7.6	1SAZ711201R1040	0.100
7.60...10.0			T16-10	1SAZ711201R1043	0.104
10.0...13.0	40.0 A, Fuse type gG		T16-13	1SAZ711201R1045	0.104
13.0...16.0			T16-16	1SAZ711201R1047	0.104

Empty enclosure with push-button

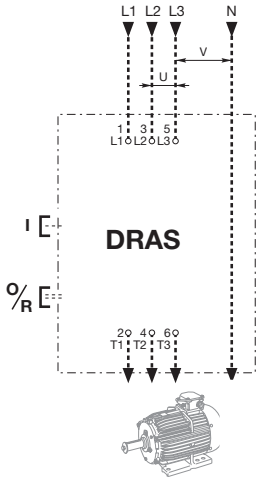
-	-	-	FR16AS-12VARS	1SBN101035R1000	0.394

To be completed with AS or ASL contactor, T16 thermal overload relay and MCB-10B (1SFA611610R2001) contact block.

Empty enclosure
with push-button

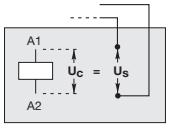
DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed direct-on-line starters

Control supply wiring versions



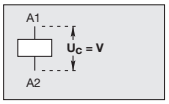
DRAS..S, DRASL..S

Separate supply



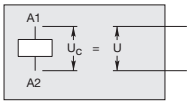
DRAS..N

Phase-to-neutral

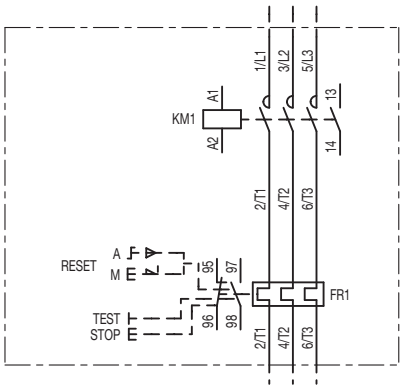


DRAS..P

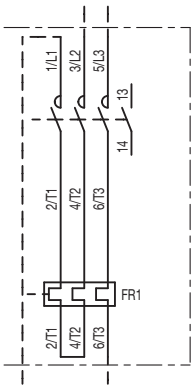
Phase-to-phase



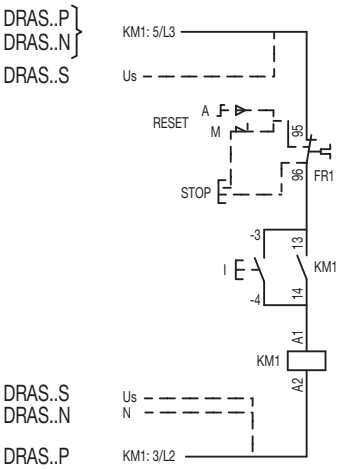
Wiring diagram



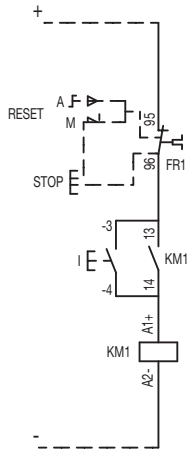
Power circuit



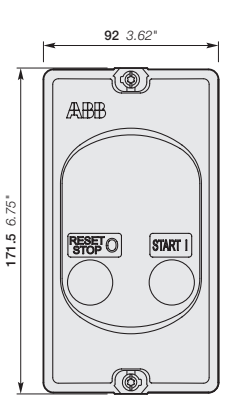
1-phase

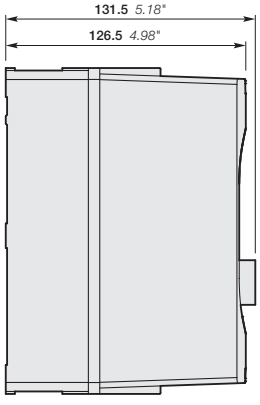


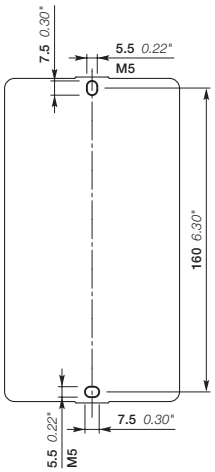
AC local control
DRAS09 ... DRAS16 + T16



DC local control
DRASL09 ... DRASL16..S + T16







DRAS09, DRAS12, DRAS16
DRASL09, DRASL12, DRASL16

Main dimensions mm, inches

Cable inlets		Cable outlet
Enclosure top	**Enclosure back**	**Enclosure bottom**
2 x ø 20.5/25.5 mm	2 x ø 20.5 mm	2 x ø 20.5/25.5 mm
2 x ø 0.81/1.00"	2 x ø 0.81"	2 x ø 0.81/1.00"

ø 20.5mm - ø 0.81" for ISO M20
ø 25.5mm - ø 1.00" for ISO M25

Voltage code table

DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed DOL starters

Type

DR **AS16** - **26N**

Contactor type

AS	AC operated
ASL	DC operated

AS contactors
AC coil code

		50 Hz	60 Hz
20	S	24 V	24 V
21	S	42 V	42 V
22	S	48 V	48 V
16	N	-	120 V
23	N	110 V	110 V
24	N	115 V	115 V
25	N	220 V	220 V
26	**N**	**230 V**	**230 V**
27	N	240 V	240 V
13	P	380 V	380 V
17	P	-	277 V
28	P	400 V	400 V
29	P	415 V	415 V

ASL contactors
DC coil code

81	S	24 V
83	S	48 V

Control supply wiring

S	Separate supply
N	Phase-to-neutral
P	Phase-to-phase

DRAF09 ... DRAF16 enclosed direct-on-line starters

Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated

TF42

Empty enclosure
with push-button

TF42 thermal overload relays to be ordered separately

Setting range A	Short-circuit protective device	Trip class	Type	Order code	Weight (1 pce) kg
0.10 ... 0.13	0.5 A, Fuse type T	10	TF42-0.13	1SAZ721201R1005	0.130
0.13 ... 0.17	1.0 A, Fuse type T	10	TF42-0.17	1SAZ721201R1008	0.130
0.17 ... 0.23	1.0 A, Fuse type T	10	TF42-0.23	1SAZ721201R1009	0.130
0.23 ... 0.31	1.0 A, Fuse type T	10	TF42-0.31	1SAZ721201R1013	0.130
0.31 ... 0.41	2.0 A, Fuse type gG	10	TF42-0.41	1SAZ721201R1014	0.130
0.41 ... 0.55	2.0 A, Fuse type gG	10	TF42-0.55	1SAZ721201R1017	0.130
0.55 ... 0.74	4.0 A, Fuse type gG	10	TF42-0.74	1SAZ721201R1021	0.130
0.74 ... 1.00	6.0 A, Fuse type gG	10	TF42-1.0	1SAZ721201R1023	0.130
1.00 ... 1.30	6.0 A, Fuse type gG	10	TF42-1.3	1SAZ721201R1025	0.130
1.30 ... 1.70	10.0 A, Fuse type gG	10	TF42-1.7	1SAZ721201R1028	0.130
1.70 ... 2.30	10.0 A, Fuse type gG	10	TF42-2.3	1SAZ721201R1031	0.130
2.30 ... 3.10	10.0 A, Fuse type gG	10	TF42-3.1	1SAZ721201R1033	0.130
3.10 ... 4.20	20.0 A, Fuse type gG	10	TF42-4.2	1SAZ721201R1035	0.130
4.20 ... 5.70	20.0 A, Fuse type gG	10	TF42-5.7	1SAZ721201R1038	0.130
5.70 ... 7.60	35.0 A, Fuse type gG	10	TF42-7.6	1SAZ721201R1040	0.130
7.60 ... 10.0	35.0 A, Fuse type gG	10	TF42-10	1SAZ721201R1043	0.130
10.0 ... 13.0	40.0 A, Fuse type gG	10	TF42-13	1SAZ721201R1045	0.130
13.0 ... 16.0	40.0 A, Fuse type gG	10	TF42-16	1SAZ721201R1047	0.130
16.0 ... 20.0	63.0 A, Fuse type gG	10	TF42-20	1SAZ721201R1049	0.145

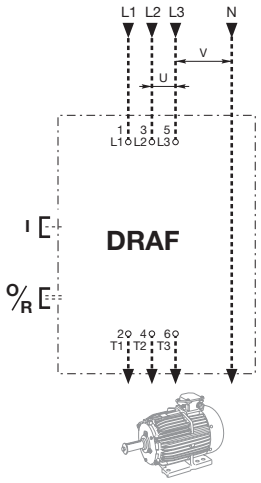
Empty enclosure with push-button

mm cable inlet/outlet suitable for IEC starter types	–	FR16AF-12	1SBN101337R1000	0.53
Inch cable inlet/outlet suitable for UL starter types	–	FR16AF-12U	1SBN101338R1000	0.53

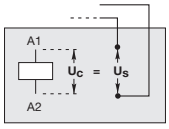
To be completed with AF contactor, TF42 thermal overload relay and CB5-10 (1SBN010013R1010) start contact block.

DRAF09 ... DRAF16 enclosed direct-on-line starters

Control supply wiring versions

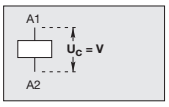


DRAF..S
DRAF..U
Separate supply



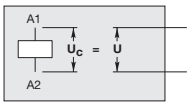
DRAF..N

Phase-to-neutral



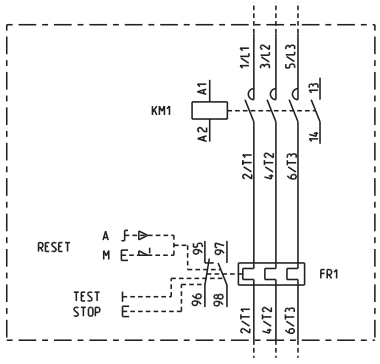
DRAF..P

Phase-to-phase

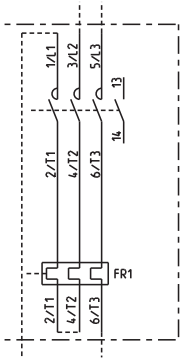


Wiring diagram

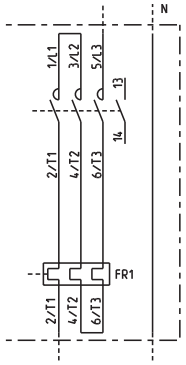
Power circuit



3-phase motor

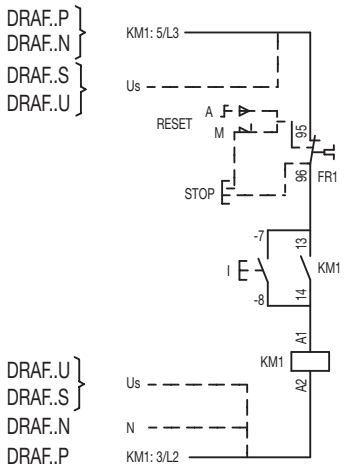


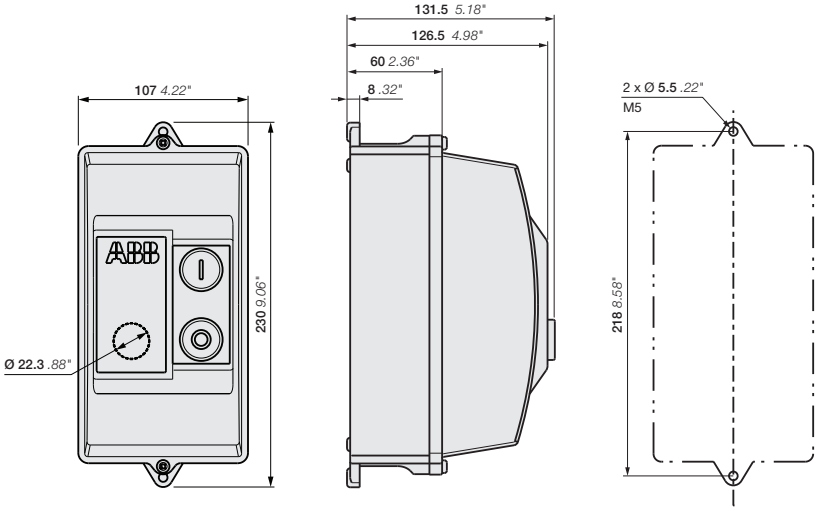
Phase-to-phase
Single phase motor



Phase-to-neutral
Single phase motor

AC local control





DRAF09, DRAF12, DRAF16

Main dimensions mm, inches

IEC starter types - ISO M20

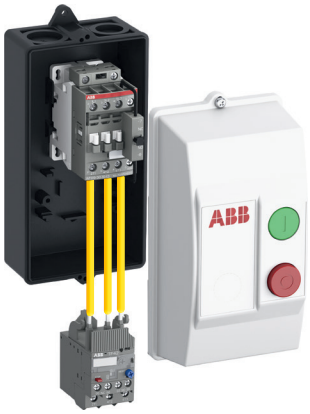
Cable inlet	Cable outlet
Enclosure top	Enclosure bottom
2 x ø 20 mm	2 x ø 20 mm
2 x ø 0.79"	2 x ø 0.79"

UL starter types - NPT

Cable inlet	Cable outlet
Enclosure top	Enclosure bottom
1 x 3/4"	1 x 3/4"
1 x 1/2"	1 x 1/2"

DRAF09 ... DRAF16 enclosed direct-on-line starters

Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated



1SBC133005V0014

DRAF
+ TF42 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP66 and type 4X plastic enclosure with double insulation, equiped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 4 cable inlets and outlets via knockouts.
- 1 AF 3-pole contactor with holding contact
- 1 CB5-10 start contact block
- 1 PE and 1 neutral terminal.

Control supply wiring:
IEC starters type: phase-to-phase, separate supply or phase-to-neutral.
UL starters type: separate supply.

TF42 thermal overload relay to be ordered separately and choses according to motor's nominal current (see table in the next page).

DRAF enclosed DOL starters

IEC - AC-3					Control supply wiring	Rated control circuit voltage Uc min ... Uc max (1)	Type	Order code	Weight Pkg (1 pce)
Rated operational power				max. current ≤ 40 °C Ue=400 V					
220 V 230 V 240 V	380 V 400 V	500 V	690 V						
kW	kW	kW	kW	A		V 50/60 Hz			kg
IEC starters type									
2.2	4	5.5	5.5	9	Separate supply	24...60	DRAF09-11S	1SBK134237R1100	0.820
					Phase-to-neutral	100...250	DRAF09-13N	1SBK134137R1300	0.820
					Phase-to-phase	250...500	DRAF09-14P	1SBK134037R1400	0.820
3	5.5	7.5	7.5	12	Separate supply	24...60	DRAF12-11S	1SBK154237R1100	0.820
					Phase-to-neutral	100...250	DRAF12-13N	1SBK154137R1300	0.820
					Phase-to-phase	250...500	DRAF12-14P	1SBK154037R1400	0.820
4	7.5	9	9	18	Separate supply	24...60	DRAF16-11S	1SBK174237R1100	0.820
					Phase-to-neutral	100...250	DRAF16-13N	1SBK174137R1300	0.820
					Phase-to-phase	250...500	DRAF16-14P	1SBK174037R1400	0.820

(1) Select DRAF..S with separate supply for 24...60 V DC control circuit voltage (change A2 - Us wire to blue color acc. to IEC 60947-4-1).

UL starter type with separate control supply wiring

UL / CSA						Rated control circuit voltage Uc min ... Uc max	Type	Order code	Weight Pkg (1 pce)
Horse power ratings									
Single phase motor		Three phase motor							
120 V	240 V	200 V 208 V	220 V 240 V	440 V 480 V	550 V 600 V				
hp	hp	hp	hp	hp	hp	V 50/60 Hz			kg
UL starters type									
0.75	1.5	2	2	5	7.5	24...60	DRAF09-11U	1SBK134238R1100	0.820
						100...250	DRAF09-13U	1SBK134238R1300	0.820
						250...500	DRAF09-14U	1SBK134238R1400	0.820
1	2	3	3	7.5	10	24...60	DRAF12-11U	1SBK154238R1100	0.820
						100...250	DRAF12-13U	1SBK154238R1300	0.820
						250...500	DRAF12-14U	1SBK154238R1400	0.820
1.5	3	5	5	10	15	24...60	DRAF16-11U	1SBK174238R1100	0.820
						100...250	DRAF16-13U	1SBK174238R1300	0.820
						250...500	DRAF16-14U	1SBK174238R1400	0.820

DRAF enclosed direct-on-line starters

Experience reliable and easy to install motor starting

Improve installation efficiency

- Easy to connect and to operate
- Pre-wired control circuit and easy to follow wiring instructions
- Coil energy consumption down by 80%.

Reliable in harsh condition

- High number of electrical and mechanical operations
- Robust IP66 and type 4X enclosure
- Double electrical insulation.

Continuous operation

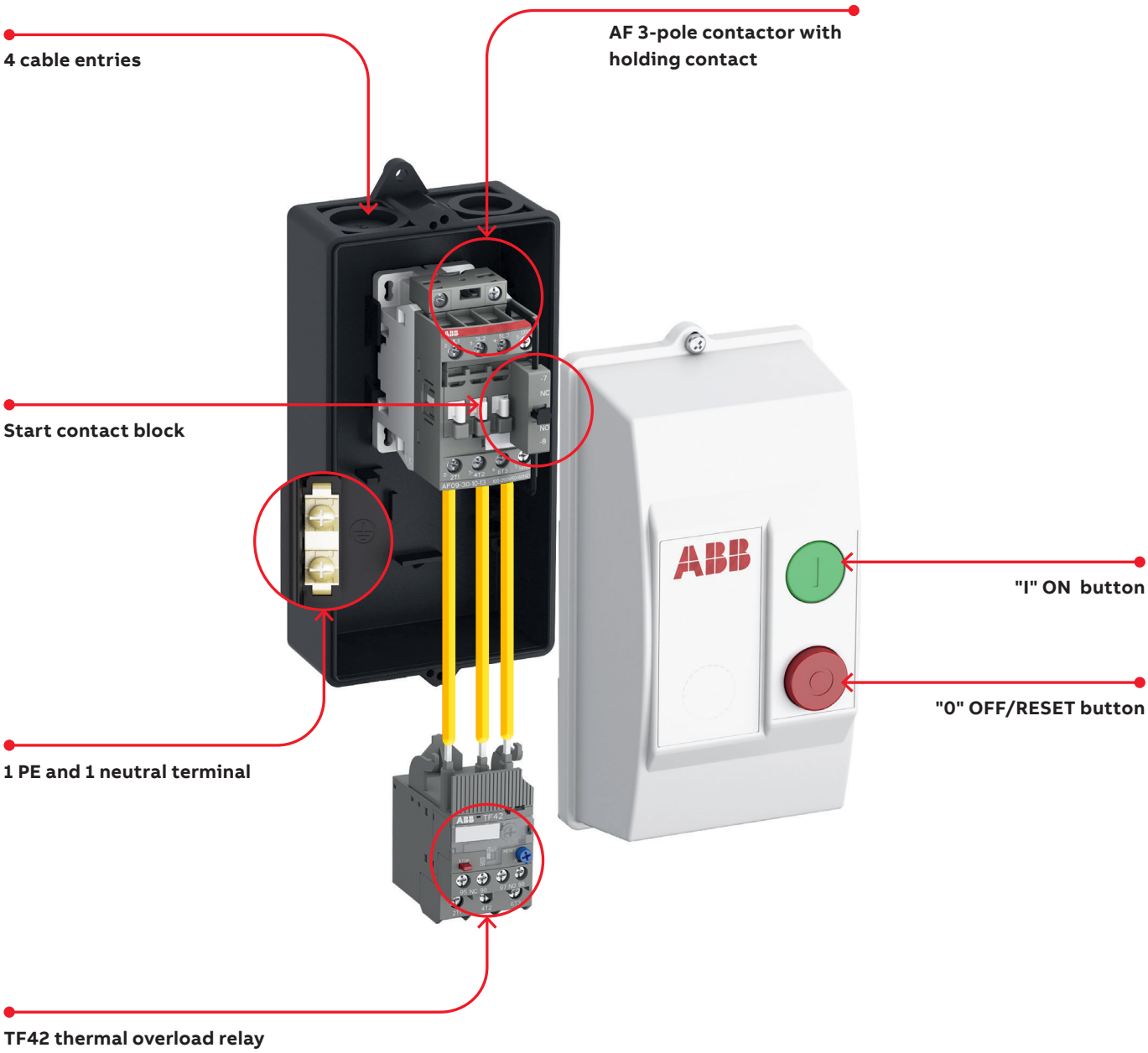
- AF contactors manage voltage fluctuation, chattering free
- Protected motor with thermal overload relay
- Safety through coordinated product.

For machine or wall mounting

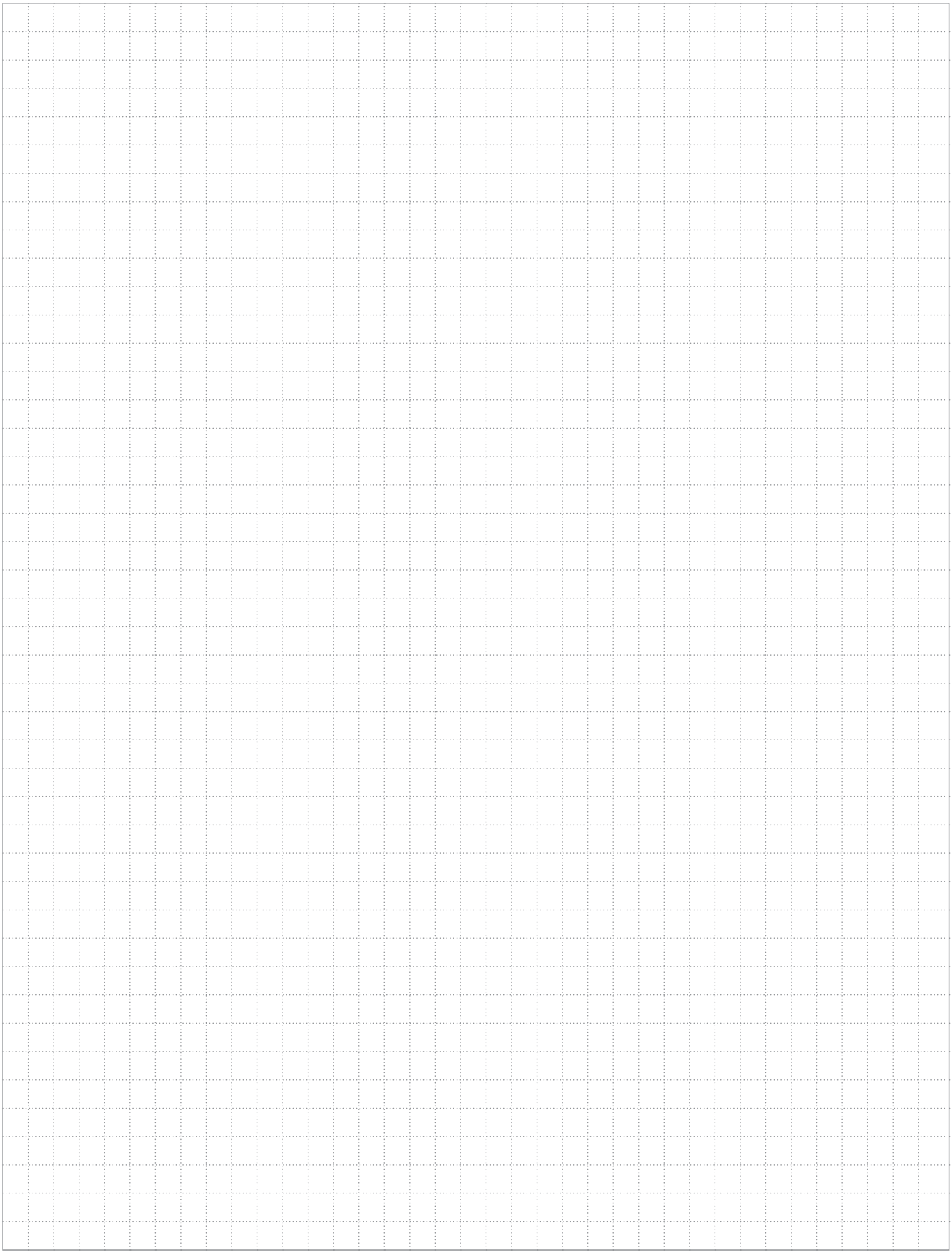
Main applications

Control of stand alone motors like for heat pumps, air conditioning units, small machine tools, compressors, pumping, irrigation...

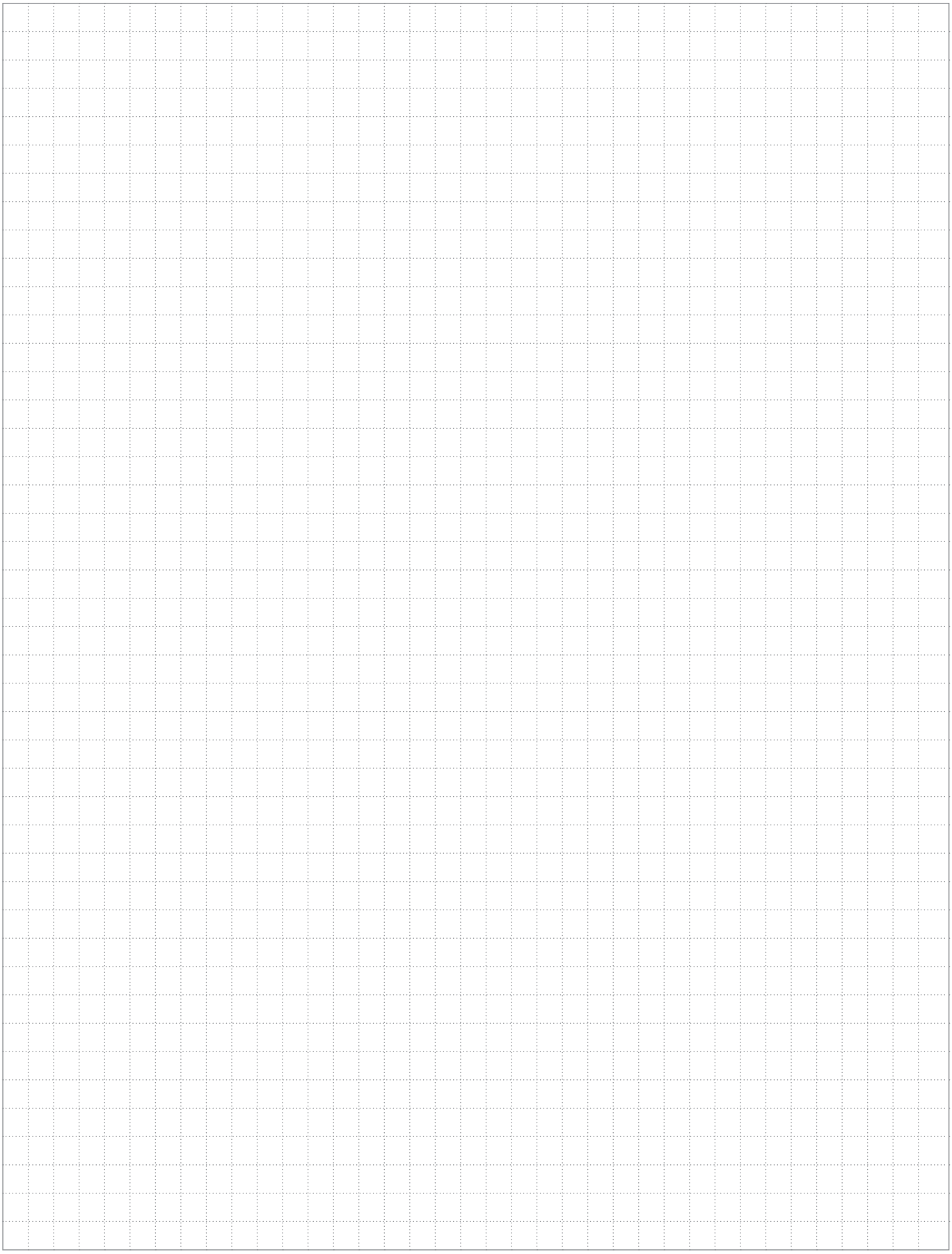
Motor starting solutions up to 7.5 kW and 10 hp



Notes



Notes



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

www.abb.com/productdetails/**1SAT25000R1011**

Electronic compact starters: HF range

11/3 **Overview**

HF0.6, HF2.4, HF9 electronic compact starters

11/8 Direct-on-line starter

11/8 Direct-on-line starter with emergency stop

11/9 Reversing starter

11/9 Reversing starter with emergency stop

11/10 **Technical data**

11/15 **Technical diagrams**

Electronic compact starters: HF range
A compact solution with great functionality

ABB’s electronic compact starter packs more functions into less space. The compact unit is just 22.5 mm wide and is suitable for three-phase motor loads up to 3 kW - 400 V AC. Direct-on-line and reversed starter with overload protection and emergency stop versions are available, making the range a perfect fit for high frequent and reliable long life switching of e.g. paper machines, conveyors, pumps, compressors and machine tools.

Saving space
Up to 90% less space required
ABB's electronic compact starter saves cabinet space, and is especially effective for group mounting. The starter is just 22.5 mm wide and yet still provides motor starting functionalities with motor protection and safety embedded.

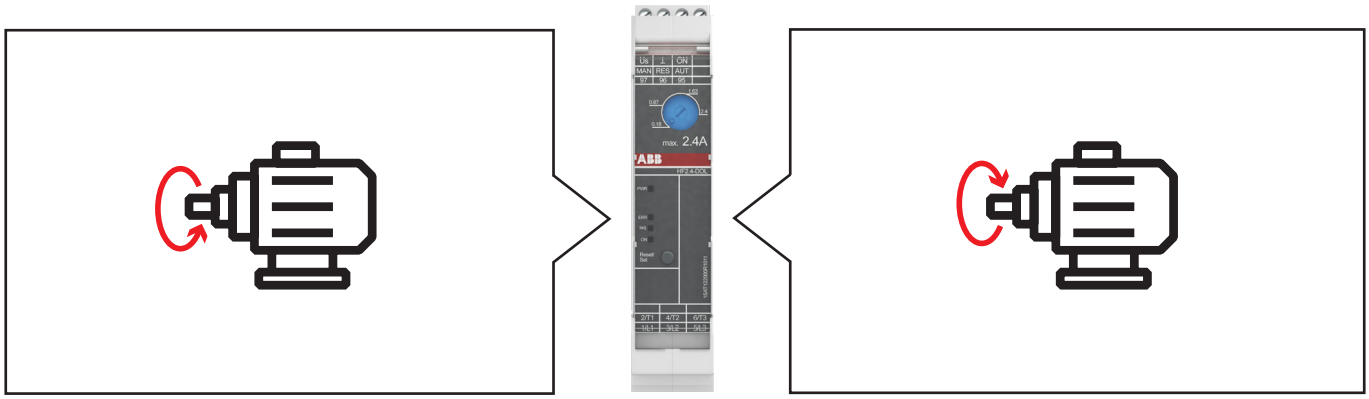
Safety and protection
Integrated safety function
Protect your people with an emergency stop version that complies with SIL 3, PL e safety standards.
Extend the life of your equipment and reduce maintenance costs with service lives that are ten times higher than electromechanical solutions.

Easy to install
Up to 75% reduced time in wiring
Wiring time during installation is cut to a minimum with motor protection, reversing function and emergency stop already integrated in the product. With just one component to install, the risk of wiring errors is lower. Separate overload protection is no longer needed.

Electronic compact starters
All-in-one: four functions in one starter

Direct-on-line
Start the motor in a forward direction covering most of the strand applications in only 22,5 mm width.

Reversing capability
This function allows to start the motor in both directions. This results in avoiding wiring faults and additionally saving time and space.

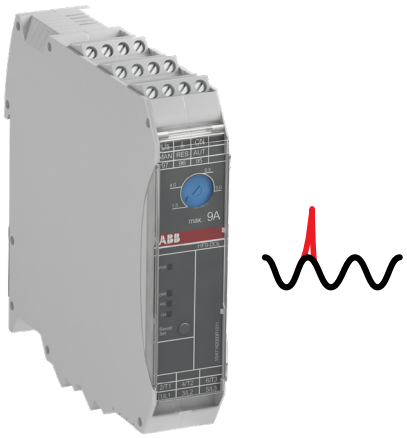


Direct-on-line and reversing function in only one product

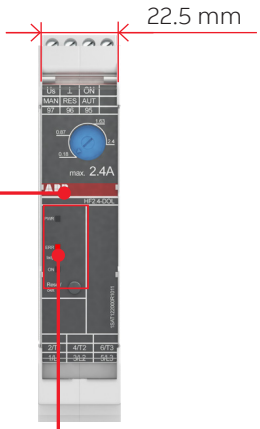
Emergency stop

ABB's HF safety range supports safety applications complying to SIL3 and PL e safety level in combination with modular safety relays such as ABB's Sentry SSR10.

Overload protection
ABB offers three variants with wide setting ranges, using an electronic relay to protect the motor from overload. Protection against phase asymmetry and phase failure is also integrated.

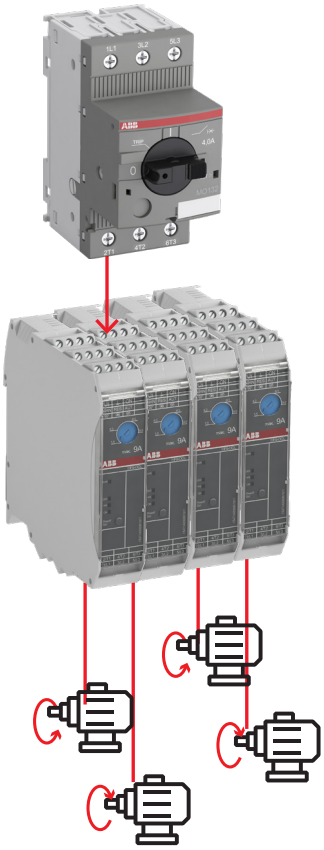


Electronic compact starters
Features and benefits



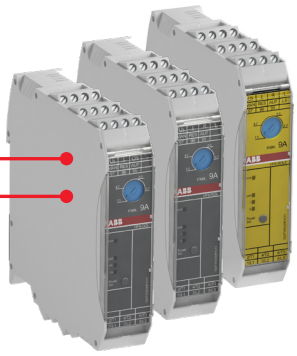
Space-saving
Using an HF electronic compact starter saves space, especially when group-mounting units. With a width of just 22.5 mm and high function density, the unit fits any control cabinet. Smaller footprints for more compact systems are also possible.

Reset function
After the overload function has tripped, the electronic compact starter can be reset automatically, manually or remotely. The LEDs on the device are visualizing that an error has occurred. Additionally, a feedback relay will be activated.



Group mounting and protection ability
Combine the HF-Starter with a MO132. Protection against overload is realized with the HF-Starter and the MO132 protects against short-circuit. Maximum space saving for group mounting is guaranteed.

Less wiring
The control circuit is placed on the upper side of the device with the main circuit on the underside. The all-in-one functionality reduces wiring, saving time and money – and reducing faults.

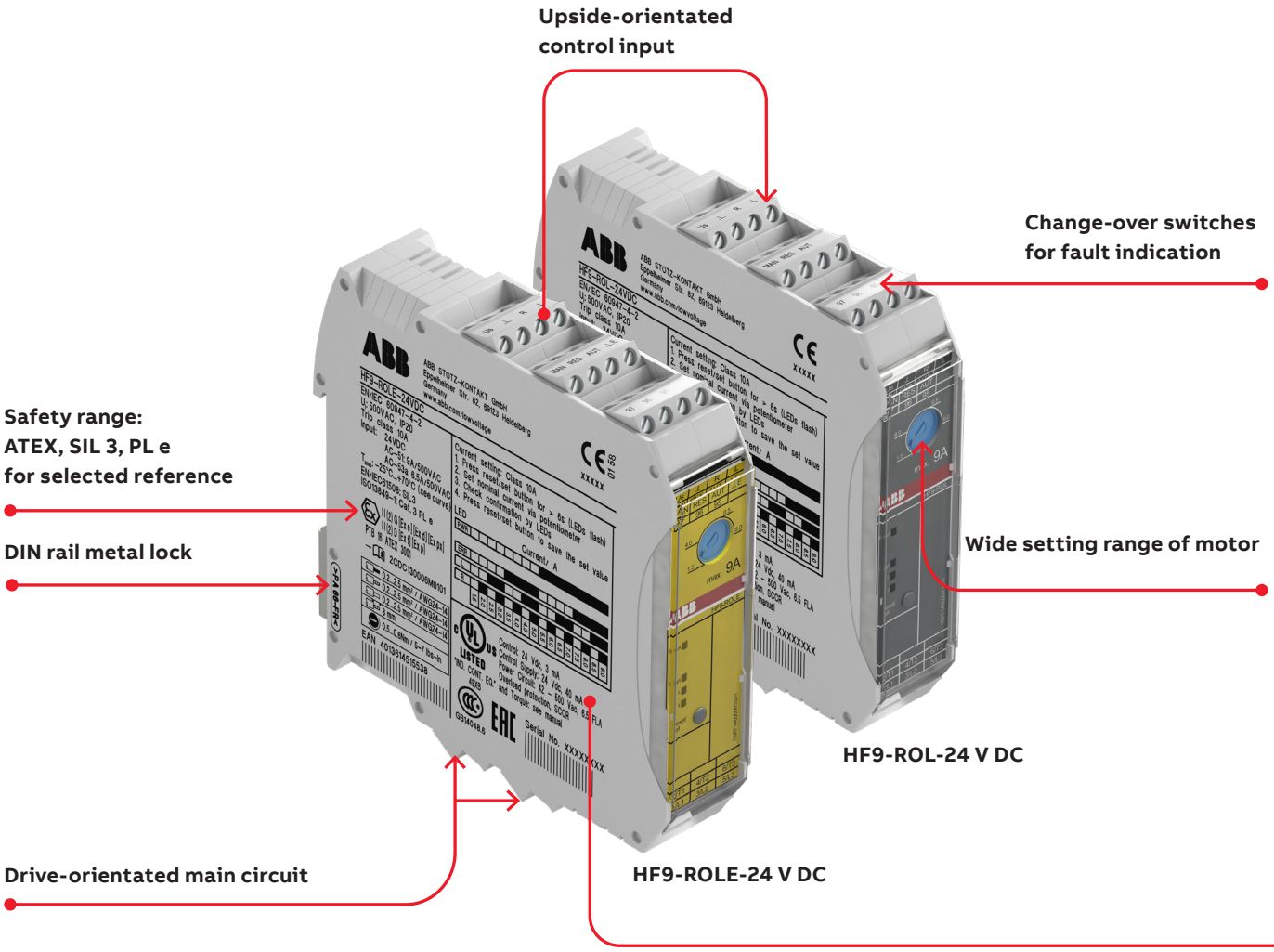


Longer working life
ABB's hybrid technology improves durability and reduces power losses. Semiconductors switch on and off the unit and the bypass relays remain active while the motor is running. With a lifespan of 30 million cycles now achievable, maintenance costs are reduced.

Electronic compact starters

Hybrid technology

Hybrid technology – efficient, durable and compact – is the key feature of this range. Smart use of semiconductors with a bypass relay eliminates the wearing of contact materials. A microcontroller ensures the precise interaction of the components, providing the smoother switching that helps extend its long lifespan.



Electronic compact starters - HF range

Hybrid technology

Thanks to laser labeling and fewer connection points compared to conventional solutions, hybrid technology makes wiring easy. The screw connections for both the control and the main circuit have an optimized angle to provide access.

Only one component for up to four functions leads to shorter wiring time

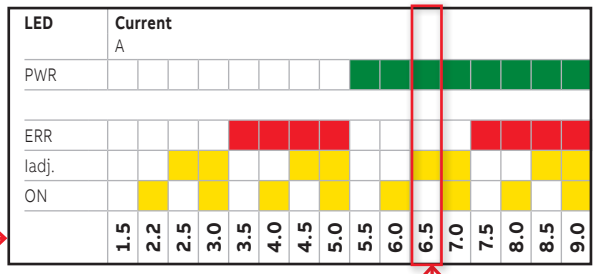
22.5 mm

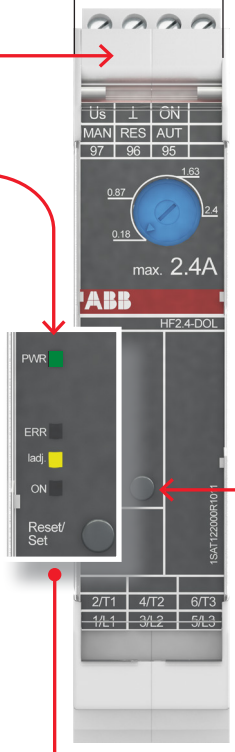
Group mounting in confined spaces is no problem

Easy-to-read starter status with LED indicators: Precise current setting with LED confirmation Users can easily adjust the current and get visual feedback via the LEDs.

Reset: direct manual reset of device with button, convenient remote or automatic reset after thermal trip

For example, if 6.5 A is set, the LED's on the front side confirm the selection:





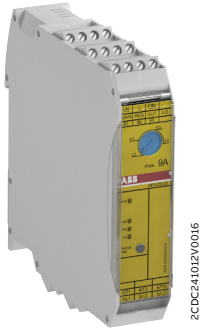
HF2.4-DOL-24 V DC

Note: PWR: Control supply voltage, ERR : Error/Message, Iadj.: Current setting, ON: Motor is running

HF0.6, HF2.4, HF9 electronic compact starters

Direct-on-line starter

HF9-DOL-24VDC



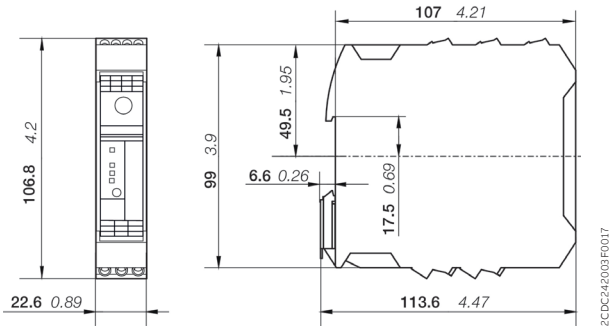
HF9-DOLE-24VDC

The HF-DOL-range is used for the direct-on-line start of motors and the switching of non-resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-DOLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

Rated operational current AC-53a A	Rated operational power AC-53a kW	Rated operational current AC-51 A	Setting range A	Full load amps motor use A	Type	Order code	Weight (1 pce) kg
Direct-on-line starter with overload protection							
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOL-24VDC	1SAT112000R1011	0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOL-24VDC	1SAT122000R1011	0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOL-24VDC	1SAT142000R1011	0.206
Direct-on-line starter with overload protection and emergency stop							
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOLE-24VDC	1SAT113000R1011	0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOLE-24VDC	1SAT123000R1011	0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOLE-24VDC	1SAT143000R1011	0.206

Main dimensions mm, inches



HF0.6, HF2.4, HF9

HF0.6, HF2.4, HF9 electronic compact starters

Reversing starter

HF9-ROL-24VDC

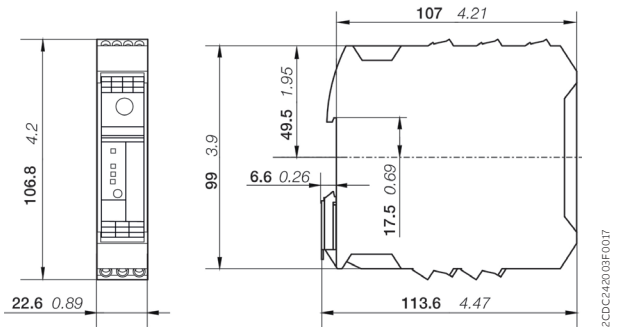
HF9-ROLE-24VDC

The HF-ROL-range is used for forward and reverse running motors, as well as for switching non resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-ROLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

Rated operational current AC-53a	Rated operational power AC-53a	Rated operational current AC-51	Setting range	Full load amps motor use	Type	Order code	Weight (1 pce)
A	kW	A	A	A			kg
Reversing starter with overload protection							
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROL-24VDC	1SAT115000R1011	0.217
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROL-24VDC	1SAT125000R1011	0.219
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROL-24VDC	1SAT145000R1011	0.218
Reversing starter with overload protection and emergency stop							
0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROLE-24VDC	1SAT116000R1011	0.218
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROLE-24VDC	1SAT126000R1011	0.270
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROLE-24VDC	1SAT146000R1011	0.289

Main dimensions mm, inches



HF0.6, HF2.4, HF9

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type		HF-DOL/ROL	HF-DOLE/ROLE
Standards		IEC/EN 60947-1, IEC/EN 60947-4-2	IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849
Rated operational voltage Ue		500 V AC	
Operational voltage	Minimum	42 V AC,	
	Maximum	550 V AC	
Setting range		see ordering details	
Rated frequency		50/60 Hz	
Trip class		10A	
Number of poles		3	
Number of protected poles		3	
Mechanical durability		10000 cycles	
Electrical durability		30 Mio. cycles	
Rated impulse withstand voltage Uimp		6 kV	
Rated insulation voltage Ui		500 V	
Rated operational current Ie AC-51		see ordering details	
Rated operational current Ie AC-53a		see ordering details	
Rated uninterrupted current Iu		see ordering details, Rated operational current Ie	
Overvoltage category		III	
Delay time	Off, minimum, switched off with pushbutton	1 s	1 s
	Off, maximum, switched off with pushbutton	3 s	3 s
	Off, typical, switched off via control input voltage	30 ms	30 ms
	Off, maximum, switched off via control input voltage	-	HF0.6, HF2.4: 60 ms HF9: 80 ms
	Off, typical, switched off via supply voltage	25 ms	25 ms
	Off, maximum, switched off via supply voltage	-	500 ms
Switch off time	By phase failure	1.8 s	1.8 s
	By phase asymmetry at 33%	120 s	120 s
	By phase asymmetry at 67%	1.8 s	1.8 s
Overspeed tripping	Operating threshold	HF9-DOL/ROL/DOLE/ROLE: >45 A	
	Response time	HF9-DOL/ROL/DOLE/ROLE: 2 s	
Power loss	Minimum	1.1 W	
	Maximum	HF0.6: 1.5 W HF2.4: 3.3 W HF9: 14.6 W	
Switching frequency		≤ 2 Hz; 120 starts/min; 7200 starts/h	
Overvoltage category		III	

Short circuit protection with MO132 for single mounting, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Rated motor power	Rated motor current	Starter Type	Protection type	HF-Starter	Current setting range of HF-Starter	Max. allowed setting current for AC-53a
kW	A				A	A
0.18	0.48	DOL, ROL, DOLE, ROLE (1)	MO132-0.63	HF0.6	0.075 - 0.6	0.6
1.1	2.2	DOL, ROL, DOLE, ROLE (1)	MO132-2.5	HF2.4	0.18 - 2.4	2.4
3.0	5.2	DOL, ROL, DOLE, ROLE (1)	MO132-6.3	HF9	1.5 - 9 (1)	6.5

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a.

Short circuit protection with MO132 for single mounting, IEC Type 1, 415 V AC, 70 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Rated motor power	Rated motor current	Starter Type	Protection type	HF-Starter	Current setting range of HF-Starter	Max. allowed setting current for AC-53a
kW	A				A	A
0.18	0.58	DOL, ROL, DOLE, ROLE (1)	MO132-0.63	HF0.6	0.075 - 0.6	0.6
0.75	1.8	DOL, ROL, DOLE, ROLE (1)	MO132-2.5	HF2.4	0.18 - 2.4	2.4
3.0	6.3	DOL, ROL, DOLE, ROLE (1)	MO132-6.3	HF9	1.5 - 9 (1)	6.5

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Short circuit protection with MO132 for group mounting, IEC Type 1, 500 V AC, EN/IEC 60947-4-2

Max. sum of current of HF-Starter in group	Iq kA	HF-Starter Type	SCPD A
6.5	35	DOL, ROL, DOLE, ROLE (1)	MO132-6.3
10	3		MO132-10
12	3		MO132-12
16	3		MO132-16
20	3		MO132-20
25	3		MO132-25
32	3		MO132-32

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

Short circuit protection with MO132 for group mounting, IEC Type 1, 415 V AC, EN/IEC 60947-4-2

Max. sum of current of HF-Starter in group	Iq kA	HF-Starter Type	SCPD A
6.5	70	DOL, ROL, DOLE, ROLE (1)	MO132-6.3
10	35		MO132-10
12	3		MO132-12
16	3		MO132-16
20	3		MO132-20
25	3		MO132-25
32	3		MO132-32

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

Single mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Rated motor power kW	Rated motor current A	Starter Type	Protection type	HF-Starter	Current setting range of HF-Starter A	Max. allowed setting current for AC-53a A
0.18	0.48	DOL, ROL, DOLE, ROLE (1)	Fuse 25A gG	HF0.6	0.075 - 0.6	0.6
1.1	2.2	DOL, ROL, DOLE, ROLE (1)	Fuse 25A gG	HF2.4	0.18 - 2.4	2.4
3.0	5.2	DOL, ROL, DOLE, ROLE, R (1)	Fuse 25A gG	HF9	1.5 - 91)	6.5

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

Single mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Rated motor power kW	Rated motor current A	Starter Type	Protection type	HF-Starter	Current setting range of HF-Starter A	Max. allowed setting current for AC-53a A
0.18	0.58	DOL, ROL, DOLE, ROLE (1)	Fuse 25A gG	HF0.6	0.075 - 0.6	0.6
0.75	1.8	DOL, ROL, DOLE, ROLE (1)	Fuse 25A gG	HF2.4	0.18 - 2.4	2.4
3.0	6.3	DOL, ROL, DOLE, ROLE (1)	Fuse 25A gG	HF9	1.5 - 91)	6.5

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

Group mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Iq kA	SCPD	Max. sum of current of used devices A	HF-Starter
35	Fuse 25A gG	25	HF0.6
35	Fuse 25A gG	25	HF2.4
35	Fuse 25A gG	25	HF9

Group mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

Iq kA	SCPD	Max. sum of current of used devices A	HF-Starter
50	Fuse 25A gG	25	HF0.6
50	Fuse 25A gG	25	HF2.4
50	Fuse 25A gG	25	HF9

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type		HF
Standards		UL 60947-1; UL 60947-4-2
Rated operational voltage		500 V AC
Operational voltage	Minimum	42 V AC
	Maximum	550 V AC
Ampere Rating UL/CSA		see ordering details, Full load amps motor use
Horse power rating	Nominal switching performance full load (power factor = 0.4)	HF0.6: 0.4 hp HF2.4: 1.2 hp HF9: 3.0 hp
	Nominal switching performance full load (power factor = 0.8)	HF0.6: 0.6 hp HF2.4: 2.2 hp HF9: 6.1 hp
Full loads Amps (FLA)		see ordering details
Short-circuit current rating (SCCR) (500 V AC, 30 A Class J or CC)		100 kA

General technical data

Type		HF
Utilization category		AC51, AC53a
Pollution degree		2
Phase loss sensitive		Yes
Ambient air temperature	Operation	-25 ... + 70 °C
	Operation compensated	-40 ... + 80 °C
Mounting position		Position 1, load side bottom
Mounting in DIN Rail		TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715, TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715
Degree of protection	Housing	IP20
	Main circuit terminals	IP20

Control circuit

Type		HF
Rated control circuit voltage Uc		24 V DC
Input voltage Uin	Switching Threshold at Signal <0>	-3 ... 9.6 V
	Switching Threshold at Signal <1>	19.2 ... 30 V
Input current Ic		3 mA

Supply circuit

Type	HF
Rated control supply voltage Us	24 V DC
Control supply voltage	19.2 ... 30 V DC
Rated control supply current Is	0.04 A

Single and group mounting HF-Starter, Type 1 coordination with fuse class J or CC according to UL60947-1/-4-1

HF-Starter	FLA A / V AC	Iq kA	SCPD	Max. current A	Max. Voltage V AC
HF0.6	0.6 / 500	100	Fuse class J or CC	30	480
HF2.4	2.4 / 500	100	Fuse class J or CC	30	480
HF9	6.5 / 500	100	Fuse class J or CC	30	480

Single and group mounting HF-Starter, Type 1 coordination with fuse RK 5 according to UL60947-1/-4-1

HF-Starter	FLA A / V AC	Iq kA	SCPD	Max. current A	Max. Voltage V AC
HF0.6	0.6 / 500	5	Fuse RK 5	20	480
HF2.4	2.4 / 500	5	Fuse RK 5	20	480
HF9	6.5 / 500	5	Fuse RK 5	20	480

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Safety related data

Type		HF-DOLE/ROLE
Standards		IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849
Safe shut down for ambient temperature 40°C ... 60°C		
Safety integrity level acc. to IEC 61508-1		SIL 3
Performance level		Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07		DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, motor protection		447 years
Mean time to dangerous failure, safe shutdown		DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectabled λsd	DOLE: 543 FIT ROLE: 664 FIT
	Safe, undetectable λsu	DOLE: 852 FIT ROLE: 968 FIT
	Dangerous, detectable λdd	218 FIT
	Dangerous, undetectable λdu	DOLE: 2.4 FIT ROLE: 2.67 FIT
Safe failure fraction (SFF)		DOLE: 99.85% ROLE: 99.86%
Diagnostic coverage (DC)		DOLE: 98.91% ROLE: 98.79%
Probability of dangerous failure per hour (PFH)		DOLE: 2.4 ROLE: 2.67
Motor overload protection for ambient temperature 40°C ... 60°C		
Safety integrity level acc. to IEC 61508-1		SIL 3
Performance level		Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07		DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, safe shutdown		DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectabled	DOLE: 517 FIT ROLE: 637 FIT
	Safe, undetectable	DOLE: 809 FIT ROLE: 870 FIT
	Dangerous, detectable	239 FIT
	Dangerous, undetectable	17 FIT
Safe failure fraction (SFF)		DOLE: 98.92% ROLE: 99.03%
Diagnostic coverage		DOLE: 98.91% ROLE: 98.79%

HF0.6, HF2.4, HF9 electronic compact starters
Technical data

Connecting characteristics

Main circuit

Type			HF
Connecting capacity			
	Rigid	1 x	2 ... 2.5 mm²
	Flexible	1 x	2 ... 2.5 mm²
	Flexible with ferrule	1 x	2 ... 2.5 mm²
Connecting capacity acc. to UL/CSA			
	Rigid	1 x	24 ... 14 AWG
	Flexible	1 x	24 ... 14 AWG
	Flexible with ferrule	1 x	24 ... 14 AWG
Stripping length			8 mm
Tightening torque			0.5 ... 0.6 N·m
Tightening torque UL/CSA			5 ... 7 in·lb
Terminal type			Screw terminals
Recommended screw driver			M3

Control circuit

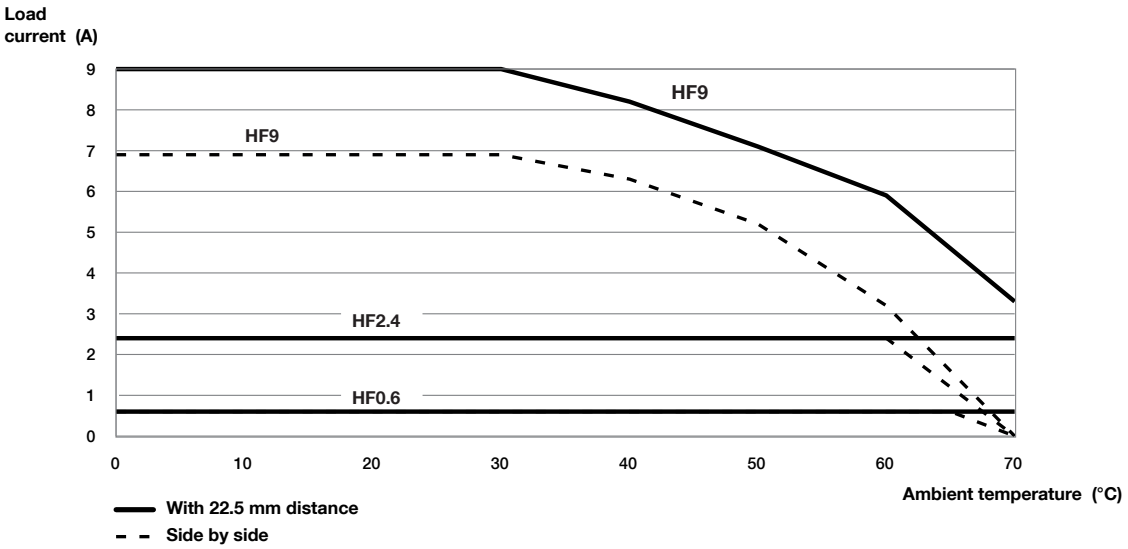
Type			HF
Connecting capacity			
	Rigid	1 x	2 ... 2.5 mm²
	Flexible	1 x	2 ... 2.5 mm²
	Flexible with ferrule	1 x	2 ... 2.5 mm²
Connecting capacity acc. to UL/CSA			
	Rigid	1 x	24 ... 14 AWG
	Flexible	1 x	24 ... 14 AWG
	Flexible with ferrule	1 x	24 ... 14 AWG
Stripping length			8 mm
Tightening torque			0.5 ... 0.6 Nm
Tightening torque UL/CSA			5 ... 7 in.lb
Terminal type			Screw terminals
Recommended screw driver			M3

HF0.6, HF2.4, HF9 electronic compact starters

Technical diagrams

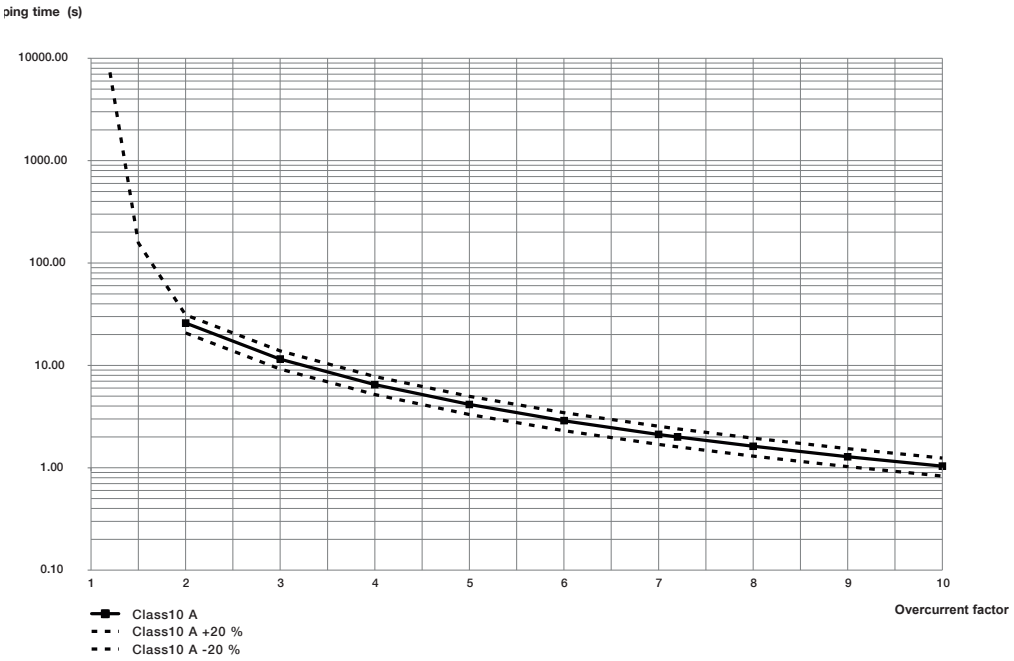
Derating curve

Please consider the derating curves for group mounting with and without ≥22.5 mm distance and the overload protection for tripping class 10A.



Derating curve HF range - electronic compact starters

Tripping characteristics



Tripping characteristics class 10A HF range - electronic compact starters

The Universal Motor Controller UMC100.3 delivers all the reliability and protection you expect while driving an intelligent data hub for predictive applications, maintenance and asset management. Outstanding user experience for smooth running of your operations, paired with unrivalled communication options, simple configuration and market leading software.

The UMC100.3 Motor Controller – future ready, and ready to take motor control to the next level.

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

www.abb.com/productdetails/1SAJ530000R0100

Universal Motor Controller

12/2 **Main benefits**

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Safe and reliable

Optimizes safe and reliable plant operations

Say hello to effortless motor control. Keep your plant running, with comprehensive protection and a modular design for simple expansion to suit your requirements.

Safe & Reliable

Protection at all times
With the UMC100.3, your motors are protected at all times, even if your control or communication system (Ethernet or Fieldbus) breaks down. Ideal for critical applications where any failure can incur substantial costs.

Detect problems early
Intelligent Motor Management Systems provide information about the motor and connected loads and its status. This information is transferred to the superior control system (DCS) and is directly available on the operator panel in the MCC. This allows you to detect upcoming problems and prevent plant standstills, as well as increase plant availability.

Easy expansion for higher functionality
Its modular design means that the UMC meets all motor management requirements, greatly simplifying planning, construction, and inventory. Easy-to-attach modules – such as digital expansion modules, analog and temperature modules, and voltage modules – give you complete flexibility and cover a wide range of applications.

Integrated and future ready

An intelligent data hub for predictive applications

UMC100.3 takes motor control to the next level. Delivering unrivalled communication, integration, and fault detection, you're prepared for any eventuality.

Future ready

Wide range of communication protocols available
The UMC100.3 is compatible with more communication protocols than any other motor controller. Serial communication reduces wiring and installation, and provides much more data. This allows you to have software that enables predictive maintenance and acts as an intelligent data hub. And the more data you have, the quicker you can identify errors.

Integrated into distributed control systems (DCS)
The UMC100.3 fits into ABB System 800xA, acting as a gateway for ABB Ability™. Due to the support of many communication systems it fits also quite well to other control systems and programmable logic controllers (PLC).

Field Information Manager
With its Field Information Manager software, the UMC100.3 is the only universal motor controller that follows the Field Device Integration (FDI) standard. This easy-to-use, market leading software enables you to configure and integrate a field device, test settings and monitor status and diagnostics.

Unique local control
The control panel offers many features. Easy modifications of settings, monitoring all status, diagnosis and fault info, operating the motor. And this all with full text in many languages instead of cryptic codes.

Software configuration
The UMC100.3 can be configured from the control system by an integrated fieldbus or network configurator using the software provided by the control system supplier. This means that communication modules for the UMC aren't a one-way street: they provide information to the control system but are also used to parametrize the UMC.

Simple configuration

Quality FDI software and operating panel

Configuration can be tricky. But not with the UMC100.3, which gives you simple synchronization and software configuration so that you're always in control.

Software tool FIM UMC edition
The FIM UMC Edition is the standard software that provides all the functionalities you need for effective use of the UMC100.3. Device parametrization, operating and monitoring modes allow a fast and easy configuration of UMC100.3, testing and online diagnosis. Project management is included for the handling of larger projects. And the localized software allows for multilingual use.

Easy to install

Functions in detail
UMC100.3

Motor protection
- The UMC provides comprehensive motor protection
- Overload protection for single- and three-phase AC motors according to EN/IEC 60947-4-1
- Rated motor currents from 0.24 to 63 A with integrated measuring system in a single version
- Rated motor currents up to 850 A with external current transformer CT4L / CT5L
- Selectable tripping classes 5E, 10E, 20E, 30E or 40E
- Locked rotor protection
- Phase failure, asymmetry and sequence protection
- Under-/overcurrent protection
- Thermistor motor protection
- Ground leakage detection – internally or using CEM11 sensor
- Limitation of motor starts per time
- Motor protection independent from bus communication

In combination with voltage module VI150/ VI155-FBP.0
- Undervoltage/overvoltage protection
- Power supervision
- Power factor supervision (cos j)
- Voltage-based detection of phase failure, asymmetry and sequence

Motor control
- Integration of the most important motor control functions as ready, easily parameterizable blocks
- Direct, reversing, star-delta starters
- Pole changing Dahlander / Actuator mode
- Inching / jog mode
- Adjustable restart strategy (load shedding)

Extended motor control
- Freely programmable for special, application-specific control functions
- Simple adaptation to specified control functions
- Comprehensive library
- Blocks for logic, counters, timing
- Access to all I/Os and internal signals

Service data
- Counter for motor operating and standstill hours
- Number of starts
- Number of overload trips
- Energy

Diagnostic data
- Comprehensive and detailed error messages and warnings
- Log for previous 16 errors
- Plain text display on the control panel

Open communication
The UMC is a basic device that can use various communication methods; the communication protocol is selected by plugging on the right fieldbus communication interface or connecting an Ethernet communication interface.

Control stations and operation modes
- Individual and flexible configuration
- Remote operation via DCS or PLC
- Local control via pushbuttons
- Local control via operatings panel UMC100-PAN
- Force local via input signal

Motor status/communication
Quick and comprehensive access to all data via control station, fieldbus, Ethernet and/or laptop

Operating data
- Motor status
- Motor current
- Thermal load
- Maximum starting current
- Run-up time
- Time to trip
- Remaining cool down time

Operating data with voltage module VI150/ VI155-FBP.0
- Phase voltages
- Active power
- Apparent power
- Power factor
- Energy

Main areas of application

Smooth running is guaranteed with the UMC100.3, whatever application you use it for

—
01 Cement factories

—
02 The oil and gas industry, chemical industry

—
03 Pulp and paper plants

—
04 Mining

—
05 Water supply and treatment

—
06 others

—
01

—
02

—
03

Cement factories
- Robust and compact design
- Several inputs, e.g. for querying the position of the damper limit switches

The oil and gas industry, chemical industry
- Programmability
- Ground fault monitoring
- Undervoltage detection and configurable restart following voltage drops
- Protection of motors in hazardous environments (ATEX)
- Use in IT networks

Pulp and paper plants
- Modular design
- Flexible communication
- Versions with conformal coating available

Mining
- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m
- Ground fault monitoring

Water supply and treatment
- Pump controls as required
- Underload detection with 2 x detection
- Own control logic e.g. for pump cleaning

Others
- Steel plants
- Ships

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04

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05

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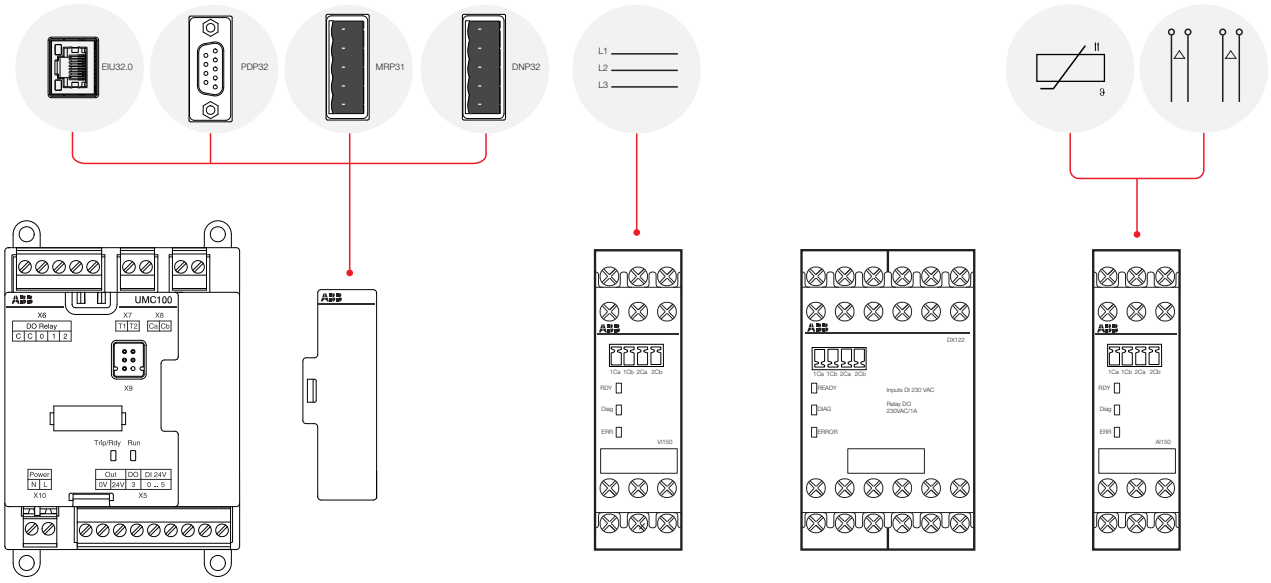
06

Components

The basic device can be expanded with several modules. Digital expansion modules, analog and temperature modules, voltage modules and a range of communication interfaces guarantee full flexibility and cover a wide range of applications.

MAIN COMPONENTS



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❶

UNIVERSAL MOTOR CONTROLLER UMC100.3
Basic device, expandable with different modules
- Voltage: max. 1000 V AC
- Tripping classes: 5E, 10E, 20E, 30E, 40E in accordance with IEC/EN 60947-4-1
- Built-in wide range measuring system, up to 63 A with one single version
- Supply voltages: 24 V DC, 110-240 V AC/DC
- Inputs: six digital inputs 24 V DC, one PTC input
- Outputs: four digital outputs

❷

COMMUNICATION INTERFACES
Directly connect a variety of communication interfaces to the UMC
- Fieldbus interfaces:
  PDP32.0: Profibus DP, DNP31.0: DeviceNet, MRP31.0: Modbus RTU
- Ethernet Interfaces:
  MTQ22-FBP.0: Modbus TCP, PNQ22-FBP.0: Profinet IO, EIU32.0: EtherNet/IP™, PNU32.0 Profinet Interface

❸

VOLTAGE MODULES VI150/VI155-FBP.0
Voltage modules for determining phase voltages, power factor (cos j), active power, apparent power, energy, harmonic content (THD)
- Supply voltage: 24 V DC
- 3-phase voltage measurement, up to 690 V in grounded and ungrounded networks
- Voltage dependent protection functions

A control panel with a backlit LDC display and choice of nine different languages ensures easy operation of the UMC, wherever you are. Sensors detect earth leakages and current transformers increase the current measuring range.

4

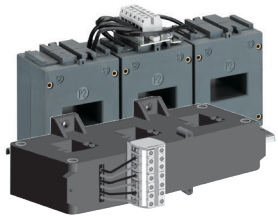
DIGITAL MODULES DX111/DX122-FBP.0
Compact modules that increase the number of digital inputs and outputs
- Supply voltage 24 V DC
- Inputs: DX111 eight digital inputs 24 V DC, DX122 eight digital inputs 110/230 V AC
- Outputs: four digital relay outputs, one configurable analog output

5

ANALOG/TEMPERATURE MODULE AI111.0
Expand the UMC with analog and temperature inputs
- Supply voltage: 24 V DC
- Three analog inputs
- Configurable for temperature sensors and standard signals
- Two modules AI111 can be connected to one UMC

ACCESSORIES

OPERATING PANEL UMC100-PAN
Installation on the UMC or on the control cabinet door
- Graphics-enabled, backlit display with three LEDs for status indication
- Monitors all values, shows the status and diagnostic data
- Speaks your language - choice of nine menu languages
- USB-port for connection to a PC
- Up/download of parameters and custom application logic



CURRENT TRANSFORMERS CT4L/CT5L
Extend the integrated measuring system for larger motors
- For nominal motor currents > 63 A up to 850 A
- Linear transformer, 3-phase with terminal block, designed for connecting leads Cu 2.5 mm^2

EARTH LEAKAGE SENSORS CEM11-FBP.XXX
Summation current transformer for connecting to a digital input. Mounting with bracket on DIN busbar or wall
- Four versions available with diameters from 20 mm to 120 mm
- Simple residual current adjustment with rotary switch, including test position
- Direct connected to a digital input of the motor controller
- Flexible mounting

Universal Motor Controller UMC100.3

Ordering details

UMC100.3

Description

Intelligent motor management system for single and three-phase motors with I_e = 0.24 - 63 A in a single device. Compact housing with integrated current transformer for cable cross sections up to 25 mm² (max. Ø with insulation 11 mm). Higher currents with additional external current transformer. Thermal overload protection according to EN/IEC 60947-4-1, selectable trip classes 5E, 10E, 20E, 30E, 40E. Some functions require an additional expansion module.

- Motor protection functions:
  Over-/underload, over-/undercurrent, over-/undervoltage, rotor blocking, phase failure/ imbalance/sequence
  Earth fault detection integrated or with external sensor CEM11-FBP.0
  Hot motor protection with thermistor
  or temperature measurement
- Motor control functions:
  Easily configurable motor control functions: direct, reverse, star-delta starter, pole-changing, overload relay, actuator mode, softstarter mode. Additionally free programmable application specific logic with function blocks
- Service and diagnostic data:
  Operating hours, number of motor starts and overload trips, energy, standstill and operation hours supervision, motor status, faults and warnings, fault history (16 events)
  Motor current, phase voltages, thermal load, power factor (cos φ), active power, apparent power, energy, total harmonic distortion (THD).
- Integrated I/Os: six digital inputs, one PTC input, four digital outputs. Maximum number of I/Os with expansion modules: 14 digital inputs, one PTC input, nine digital outputs, six analog inputs, one analog output
- Communication interfaces for fieldbuses and Ethernet networks, Interface for operator panel UMC100-PAN, bus interface for connection of expansion modules
- Versions for supply voltage 24 V DC and
  110 – 240 V AC/DC, with ATEX approval and with ATEX plus conformal coating for applications in aggressive atmosphere

Description	Supply voltage	Type	Order code		Pkg qty	Weight (1 pc.) kg
Universal Motor Controller	24 V DC	UMC100.3 DC	1SAJ530000R0100		1	0.275
Universal Motor Controller	110-240 V AC/DC	UMC100.3 UC	1SAJ530000R1100		1	0.315
Universal Motor Controller, ATEX	24 V DC	UMC100.3 DC EX	1SAJ530000R0200		1	0.275
Universal Motor Controller, ATEX	110-240 V AC/DC	UMC100.3 UC EX	1SAJ530000R1200		1	0.315
Universal Motor Controller, ATEX conformal coating	24 V DC	UMC100.3 DC EX Coated	1SAJ530000R0210		1	0.275
Universal Motor Controller, ATEX conformal coating	110-240 V AC/DC	UMC100.3 UC EX Coated	1SAJ530000R1210		1	0.315

Operating panel and cables

Ordering details

UMC100-PAN

Description

Operating panel for Universal Motor Controller UMC100.3. Backlit graphical and multilingual full-text display, LEDs for status display. Assembly directly on UMC100.3 or on the control cabinet door via door mounting set (includes connection cable).

Functions

- Monitor: Shows motor status, diagnostics and maintenance data
- Operate: Start, stop, fault reset
- Parametrize: Setting and changing of all motor and fieldbus parameters (password protection possible); all settings are performed in the selected language
- Memory: Copy settings from one UMC100.3 to another
- USB port for up/download of parameters and logic from PC with PBDTM software

Supports nine languages: English, Finnish, French, German, Italian, Polish, Portuguese, Russian, Spanish

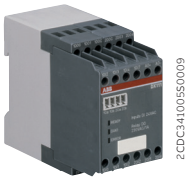
UMC100-PAN CAP

The protection cap UMC100-PAN increases the degree of protection for the operator panel from IP52 to IP54. It is made of transparent and flexible silicone material, making it easy to read text messages, check the LED status and use the buttons. It is removable to access the micro-USB port for parameter up/download.

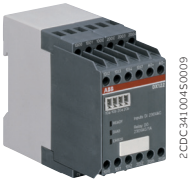
Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
Operating panel	UMC100-PAN	1SAJ590000R0103		1	0.047
0.7 m ext. cable with door mounting set	UMCPAN-CAB.070	1SAJ510003R0002		1	0.070
1.5 m ext. cable with door mounting set	UMCPAN-CAB.150	1SAJ510004R0002		1	0.088
3 m ext. cable with door mounting set	UMCPAN-CAB.300	1SAJ510002R0002		1	0.176
Protection cap for operating panel	UMC100-PAN CAP	1SAJ510005R0001		10	0.013

Expansion modules

Ordering details



DX111-FBP.0



DX122-FBP.0

VI150-FBP.0

AI111.0

Description
Up to four expansion modules can be connected to one UMC100.3:

- One digital expansion module DX111-FBP.0 or DX122-FBP.0
- One voltage expansion module VI150-FBP.0 or VI155-FBP.0
- Two analog/temperature expansion modules AI111.0

The supply voltage is 24 V DC; the 110-240 V AC/DC version of the UMC100.3 provides the 24 V DC supply for expansion modules

DX111-FBP.0
I/O-expansion module with eight digital inputs 24 V DC, four relay outputs, one analog output 0/4-20 mA or 0…10 V

DX122-FBP.0
I/O-expansion module with eight digital inputs 110/230 V AC, four relay outputs, one analog output 0/4-0 mA or 0-10 V

VI15x-FBP.0
Voltage modules for the determination of phase voltages, power factor (cos φ), apparent power, energy, total harmonic distortion (THD). For use in grounded networks (VI150-FBP.0) or in all networks (VI155-FBP.0), 150-690 V AC

AI111.0
Analog/temperature expansion module, three inputs PT100, PT1000, KTY83, KTY84, NTC, 0–10 V, 0/4-20 mA one or two modules AI111.0 can be connected to an UMC100.3

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
I/O module for UMC100, 24 V DC digital input	DX111-FBP.0	1SAJ611000R0101		1	0.220
I/O module for UMC100, 110 - 230 V AC digital input	DX122-FBP.0	1SAJ622000R0101		1	0.220
3-phase voltage module for grounded networks	VI150-FBP.0	1SAJ650000R0100		1	0.110
3-phase voltage module for all networks	VI155-FBP.0	1SAJ655000R0100		1	0.110
Analog/temperature module 3 analog inputs	AI111.0	1SAJ613000R0101		1	0.116
Connection cable UMC100 - I/O module, length 0.3 m	UMCIO-CAB.030	1SAJ691000R0001		1	0.011
Connection cable IO-module - IO-module, length 0.3 m	IOIO-CAB.030	1SAJ692000R0001		1	0.011
Terminal set for UMC100.3 DC (spare parts)	UMCTB-FBP.0	1SAJ929160R0001		1	0.043
Terminal set for UMC100.3 UC (spare parts)	UMCTB.1	1SAJ929160R0002		1	0.045

Fieldbus interfaces
Ordering details

PDP32.0

MRP31.0

DNP31.0

PDR31.0

Description
Fieldbus communication interfaces enable the UMC100.3 to communicate via fieldbus.
The interfaces can be used in two ways:
- Mounted directly on the UMC100.3 – the interface is supplied from the UMC100.3 and no additional accessory is required
- Mounted separately on an SMK3.0 adapter in the cable chamber of an MCC, the interface plugged on SMK3.0 requires a 24 V DC supply. Ready-made cables for applications in withdrawable systems are available, as well as terminal blocks for other cables:
  CDP18.150: Cable for use inside the CDP24.150 drawer: Cable from SMK3.0 to drawer outside

PDP32.0
- Communication interface for PROFIBUS DP; supports the protocols PROFIBUS DP/V0 and V1
- PNO-certified PROFIBUS slave
- Data transfer rate up to 12 Mbit/s
- Diagnostic LEDs
- Fieldbus connection via nine-pole Sub-D connector or terminal blocks
- GSD download from UMC100.3 webpage

MRP31.0
- Communication interface for Modbus RTU
- Data transfer rate up to 57.6 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks

DNP31.0
- Communication interface for DeviceNet
- ODVA-certified DeviceNet slave
- Data transfer rate up to 500 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks
- EDS download from UMC100.3 webpage

PDR31.0
- External active fieldbus termination for Profibus DP; the PDR31.0 needs to be mounted on a SMK3.0 adapter and supplied by 24 V DC

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
Profibus DP communication interface	PDP32.0	1SAJ242000R0001		1	0.050
Modbus RTU communication interface; terminal block for fieldbus connection included	MRP31.0	1SAJ251000R0001		1	0.039
DeviceNet communication interface; terminal block for fieldbus connection included	DNP31.0	1SAJ231000R0001		1	0.039
Profibus DP active bus termination	PDR31.0	1SAJ243000R0001		1	0.030

Adapter and accessories

Ordering details

SMK3.0

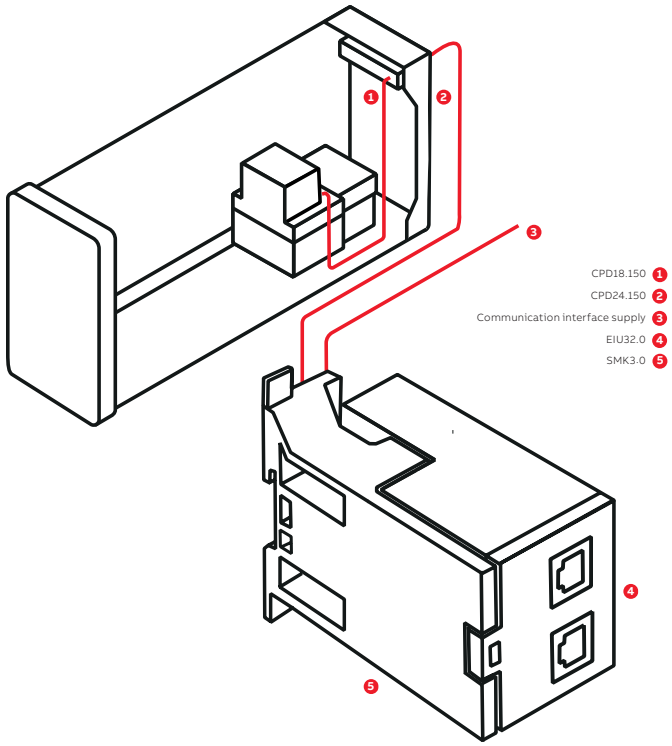
CDP18.150

PDP32.0 on SMK3.0

EIU32.0 on SMK3.0

Adapter and ready-made cables

Adapter SMK3.0 for external mounting of a fieldbus or EtherNet/IP™ interface EIU32.0 outside a drawer. SMK3.0 can be mounted on a DIN-rail or fixed by screws. 24 V DC supply is required. Ready-made cables for inside and outside the drawer, including a terminal block on one side and open end on the other. Terminal blocks are also separately available for making own cables.



Separate wiring of the EtherNet/IP™ communication interface EIU32.0

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
Adapter for separate mounting of a communication interface; terminal block for 24 V DC supply included	SMK3.0	1SAJ929600R0001		1	0.038
Cable for use inside drawer, length 1.5 m	CDP18.150	1SAJ929180R0015		1	0.060
Cable from SMK3.0 to drawer's outside, length 1.5 m	CDP24.150	1SAJ929240R0015		1	0.060
Terminal block 2-pole for SMK3.0 supply (spare parts)	SMK3-X2.10	1SAJ929610R0001		10	0.017
Terminal block 5-pole for SMK3.0 comm. (spare parts)	SMK3-X1.10	1SAJ929620R0001		10	0.041

Ethernet interfaces

Ordering details

MTQ22-FBP.0

PNQ22-FBP.0

EIU32.0

PNU32.0

Description

Ethernet communication interfaces enable the UMC100.3 to communicate via an Ethernet network. There are two types of interfaces:

Interfaces for the connection of one to four Universal Motor Controllers UMC100.3:
- MTQ22-FBP.0 for Modbus TCP
- PNQ22-FBP.0 for Profinet IO

Interface for a single universal motor controller UMC100.3:
- EIU32.0 for EtherNet/IP™

MTQ22-FBP.0
- Protocol Modbus TCP
- For one to four UMC100.3
- Master supervision with timeout control for up to four masters
- Micro USB-port for configuration via PC (configuration software downloaded from UMC100.3 webpage)
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- 24 V DC supply voltage
- DIN-rail mounting

PNQ22-FBP.0
- Protocol Profinet IO
- PNO-certified
- For one to four UMC100.3 devices
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- Fully integrated into ABB 800xA
- Time-stamped events with ABB 800xA
- 24 V DC supply voltage
- DIN-rail mounting
- GSDML downloaded from UMC100.3 webpage

EIU32.0
- Protocol EtherNet/IP™
- ODVA-certified
- For one motor controller UMC100.3
- Mounting directly on an UMC100.3 (supplied by UMC100.3) or remotely on an SMK3.0 adapter (24 V DC supply required)
- Integrated Ethernet switch
- Supports all network topologies
- DLR (Device Level Ring) function for redundancy
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- EDS download from UMC100.3 webpage

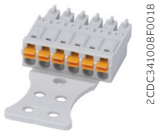
PNU32.0
- Protocol Profinet
- PNO-certified
- For one motor controller UMC100.3
- Mounting directly on an UMC100.3 (supplied by UMC100.3) or remotely on an SMK3.0 adapter (24 V DC supply required)
- Integrated Ethernet switch
- Supports all network topologies
- MRP redundancy
- S2 master redundancy supported
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- GSDML download from UMC100.3 webpage

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
Ethernet Modbus TCP interface	MTQ22-FBP.0	1SAJ260000R0100		1	0.172
Ethernet Profinet IO interface	PNQ22-FBP.0	1SAJ261000R0100		1	0.172
EtherNet/IP™ interface	EIU32.0	1SAJ262000R0100		1	0.110
Ethernet Profinet S2 interface	PNU32.0	1SAJ263000R0100		1	0.110

Ready-made cables, terminal blocks

Ordering details

CDP18.150



Terminal blocks ETHTB-FBP.xx

Ready-made cables

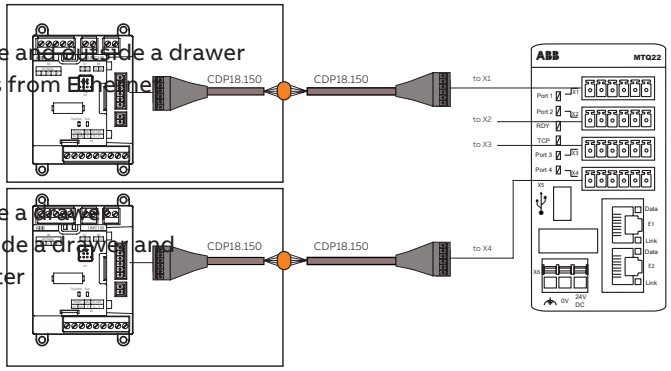
Ready-made cables are available for application in withdrawable systems as well as for fixed installations. Cables include ready-mounted terminal blocks. All connectors are also available as spare parts for creating individual cable connections.
Terminal blocks for making own cables are also available:

MTQ22-FBP.0, PNQ22-FBP.0

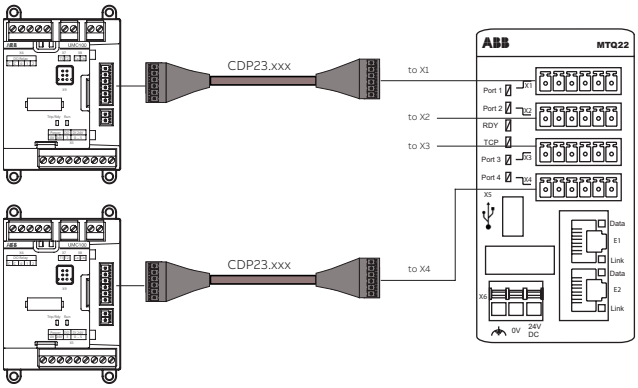
- CDP18.150 cable for use inside and outside a drawer
- CDP23.150, CDP23.300 cables from Ethernet interface to UMC100.3

EIU32.0

- CDP18.150 cable for use inside a drawer
- CDP24.150 cable for use outside a drawer and connection to a SMK3.0 adapter



UMC100.3, withdrawable application with MTQ22 -FBP.0/PNQ22-FBP.0

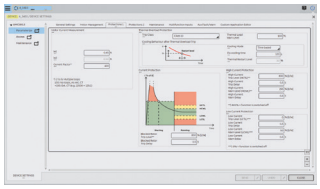


UMC100.3, fix mounted application with solution MTQ22-FBP.0/PNQ22-FBP.0

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
Cable for inside and outside drawer, length 1.5 m	CDP18.150	1SAJ929180R0015		1	0.060
Cable Ethernet interface - UMC100.3, length 1.5 m	CDP23.150	1SAJ929230R0015		1	0.100
Cable Ethernet interface - UMC100.3, length 3 m	CDP23.300	1SAJ929230R0030		1	0.160
Cable from SMK3.0 to drawer's outside, length 1.5 m	CDP24.150	1SAJ929240R0015		1	0.060
Terminal blocks for MTQ22/PNQ22 X1...X4	ETHTB-FBP.4	1SAJ929200R0001		4	0.015
Terminal blocks for MTQ22/PNQ22 X1...X4	ETHTB-FBP.50	1SAJ929200R0002		50	0.015

Configuration software

Ordering details



Configuration software example

FIM UMC EDITION configuration software for the UMC100.3 motor management system
The FIM UMC Edition is based on the Field Device Integration (FDI) standard. This latest standard combines the benefits of both major former technologies, EDD and FDT/DTM. It is the perfect tool for configuration of the UMC100.3 universal motor controller in large applications in the process industry and also in smaller projects such as the water industry. The FIM UMC Edition is equipped with a high-performance graphical user interface which is quick to install. It scans, identifies and enables access to devices within three minutes. It provides effective basic functionality for configuration, diagnosis and maintenance, during commissioning, in the workshop or as second master in a Profibus network of a process control system.

Overview of features
- Online/offline configuration and parameterization of UMC100.3
- Maximum number of tags is 2500
- Reading parameterization and configuration information from the device
- Online display of measuring, status and diagnostics data
- Online operation and error acknowledgment
- Creation of custom application logics
- Archiving

UTP22-FBP.0

Supported languages

FIM basic package	Chinese, English, German
UMC100.3 Device Package	Chinese, English, Spanish, German, Italian, Polish, Portuguese, Russian
UMC100.3 Custom Application Editor	English

System requirements
- Windows 7 (64 bit)/Windows 8.1, Windows 10, admin rights
- 10 GB storage space
- Minimum of 1 GB RAM

Connection to UMC100.3 can be done either via PROFIBUS DP or as a point-to-point connection
Connection to Profibus DP network: UTP22-FBP.0
Connection to UMC100.3: With micro-USB cable via control panel UMC100-PAN
Connection to Profinet ethernet network: With RJ-45 cable via ethernet socket

A trial version with limited functionality can be downloaded from
https://new.abb.com/control-systems/fieldbus-solutions/fim

The single user license in the FIM UMC Edition package upgrades the trial version to a full version

Description	Type	Order code		Pkg qty	Weight (1 pc.) kg
USB interface for Profibus networks	UTP22-FBP.0	1SAJ924013R0001		1	0.261
FIM UMC Edition, Single user license	FIM UMC Editon	1SAJ925000R0001		1	n.a.

Earth fault monitors, current transformers

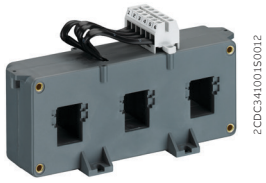
Ordering details

CEM11-FBP.xxx

Earth fault monitors CEM11-FBP.xxx for use with the UMC100.3 Universal Motor Controller
The CEM11-FBP.xxx device monitors if the sum of the currents flowing through it is zero (factorial addition). If the sum is zero, no residual current is present. If the residual current is above an adjusted threshold value, the output signal of the CEM11-FBP.xxx changes. It can be used in motor feeders to detect leakage currents, as well as ground faults caused by insulation breakdowns for example.

- CEM11-FBP.xxx is connected to a digital input of the UMC100.3
- Earth fault current threshold can be set in eight steps with a screwdriver
- Test position for easy control of wiring

CEM11-FBP.xxx is delivered with adapters for DIN-rail or wall mounting.
CEM-11.FBP.120 is for wall-mounting only.



CT4L185R/4, CT4L310R/4

Earth fault currents [mA]	Through-hole diameter	Type	Order code		Pkg qty	Weight (1 pc.) kg
80[1)], 300, 550, 750, 1000, 1200, 1500, 1700	20 mm	CEM11-FBP.20	1SAJ929200R0020		1	0.130
100[1)], 500, 1000, 1400, 2000, 2400, 3000, 3400	35 mm	CEM11-FBP.35	1SAJ929200R0035		1	0.200
120[1)], 1000, 2000, 2800, 4000, 4800, 6000, 6800	60 mm	CEM11-FBP.60	1SAJ929200R0060		1	0.330
300[1)], 2000, 4000, 5600, 8000, 9600, 12000, 13600	120 mm	CEM11-FBP.120	1SAJ929200R0120		1	0.940

[1)] Lower values have higher inaccuracy

CT5L500R/4, CT5L850R/4

Current transformers for use with the Universal Motor Controller UMC100.3
Linear type three-phase transformers, for use with the UMC100.3 and nominal motor currents >63 A. Terminal blocks for conductors Cu 2.5 mm² for wiring on the UMC100.3 side.

Description	Recommended current range	Type	Order code		Pkg qty	Weight (1 pc.) kg
Current transformer	60...185 A AC	CT4L185R/4	1SAJ929500R0185		1	1.600
Current transformer	180...310 A AC	CT4L310R/4	1SAJ929500R0310		1	1.500
Current transformer	300...500 A AC	CT5L500R/4	1SAJ929501R0500		1	1.700
Current transformer	500...850 A AC	CT5L850R/4	1SAJ929501R0850		1	1.900

UMC100-FBP.0 and FBP system accessories are being phased out. Please contact your local ABB contact for spare parts or retrofit solutions.

Universal Motor Controller UMC100.3

Technical data

Control voltage circuit

Type	UMC100.3 DC	UMC100.3 UC
Supply voltage	24 V DC (+30 % ... -20 %) (19,2 ... 31,2 V DC) including ripple	110V - 240V AC/DC -15% / +10%
Total power dissipation Conditions: all digital inputs high, all relay outputs activated*	min. 3 W	min P: 3.5 W / S: 8 W
Reverse polarity protection	yes	not relevant

Controller unit

LEDs	Red: Motor has been tripped due to a thermal overload condition or another fault Yellow: Motor is running Green: Ready for operation

Digital inputs

Number of digital inputs	6 (DI0 ... D15) Type 1 accord. to EN 61131-2
Supply for digital inputs	24 V DC
Isolation	No
Input signal bounce suppression	Typ. 2 ms
Signal 0 range including ripple	-31.2 ... +5 V
Signal 1 range including ripple	+15 ... +31.2 V
Input current per channel (24 V DC)	Typ. 6.0 mA
Input resistor to 0 V	3.9 k Ω
Cable length	Unshielded max. 600 m Shielded max. 1000 m

Relay outputs

Number of relay outputs	3 x monostable with one common root
Voltage range of contacts	12-250 V AC/DC
Lowest switched power for correct signals	1 W or 1 VA
Switching capacity per relay contact according to EN 60947-5-1 (electromagnetic load)	AC-15 240 V AC max. 1.5 A AC-15 120 V AC max. 3 A DC-13 250 V DC max. 0.11 A DC-13 25 V DC max. 0.22 A DC-13 24 V DC max. 1 A
Short circuit protection	6 A gG
Rated impulse withstand voltage U_{imp}	4 kV
Switching of inductive power	Inductive loads need additional measures for spark suppression Diodes for DC voltage and varistors / RC elements for AC voltage are suitable Some DC coil contactors contain rectifiers which suppress sparks perfectly
Relay contact service life	Mechanical 500 000 switching cycles Electrical (250 V AC): 0.5 A; 100 000 cycles 1.5 A 50 000 switching
Internal clearance and creepage distances relay contacts to 24 V circuits	> 5.5 mm (safety insulation up to 250 V AC) (EN 60947-1, Pollution degree 2)
Pollution degree terminals	3
Supply power down/up, behaviour: Valid for all motor control functions, except transparent and overload relay	Whenever the supply voltage of the UMC is switched off and on, the starting of the motor needs a new RUN signal

*Please refer to the product manual for more detailed information.

Universal Motor Controller UMC100.3

Technical data

Transistor output

Type	UMC100.3 DC	UMC100.3 UC
Max. output current	200 mA	50 mA
Short circuit protected	Yes	Yes
Output voltage if high	UMC100.3 supply voltage, nominal 24 V DC	nominal 24 V DC
Isolation	No	Yes, to AC mains

Thermistor motor protection (PTC - binary) type A

Broken wire resistance	> 4.8 kΩ
Voltage at broken wires between terminals T1/T2	12 V DC (typ.)
Response resistance	3.4-3.8 kΩ
Reset resistance	1.5-1.65 kΩ
Short circuit resistance	< 21 Ω
Current at short circuit conditions	1.5 mA (typ.)
Response time	800 ms
Max. cold resistance of PTC sensor chain	< 1.5 kΩ
Line length	2.5 mm^2: 2 x 250 m 1.5 mm^2: 2 x 150 m 0.5 mm^2: 2 x 50 m
Isolation	No

Environmental and mechanical data

Type	UMC100.3 DC	UMC100.3 UC
Mounting	On DIN-rail (EN 50022-35) or with four screws M4	
Mounting position	Any	
Dimensions (W x H x D)	70 x 105 x 106 mm	
Net weight	0.3 kg	0.35 kg
Tightening torque	ø 3.5 mm / 0.138 in ; 0.5 Nm, 4.5 in.lb	
Wire size with wire end ferrule	1 x 0.2-2.5mm^2 (1 x 28 ... 12 AWG)	
Wire size with rigid	1 x 0.2-2.5mm^2 (1 x 28 ... 12 AWG)	
Tightening torque for screw mounting	0.8 Nm	
Degree of protection	IP20	
Temperature range storage	-25 ... +70 °C	
Temperature range operation	0 ... +60 °C with two output relays activated	0 ... +60°C with two relay outputs activated and 24 V DC supply output loaded with 200 mA 0 ... +50°C with two relay outputs activated and 24 V DC supply output loaded with 400 mA

Performance data

Reaction time UMC100 DI to UMC100 Relay Output (incl. hardware delays)	typ. 10 ms (Transparent Control Function)
Reaction time UMCI00 DI to DX111 Relay Output (incl. hardware delays)	typ. 10 ms (Transparent Control Function)
Reaction time from DX111 DI to UMC100 Relay Ouput (incl. hardware delays)	typ. 14 ms (Transparent Control Function)
Number of supported function blocks	See 2CDC135014D02xx

Digital expansion modules DX111-FBP.0, DX122-FBP.0

Technical data

Digital inputs

Type		DX111-FBP.0	DX122-FBP.0
Number of inputs		Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs) Insulation: Type 1 acc. to EN 61131-1	Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs) Insulation: Type 2 acc. to EN 61131-1
Input voltage		24 V DC	110 V AC ... 240 V AC
Input delay		6 ms typ.	20 ms typ.
Signal levels	0 state	- 31.2 ... + 5 V	0 ... 40 V AC
	1 state	+ 15 ... + 31.2 V	74 ... 265 V AC
ON current per channel		6.0 mA typ. (24 V DC)	10.0 mA typ. (230 V AC)
Input resistance against 0 V		3.9 kΩ	
Frequency range			45 ... 65 Hz

Digital output

Number of digital outputs		4 relay outputs with 2 common supplies (1DO0 & 1DO1 by 1DOC; 2DO2 & 2DO3 by 2DOC)
Voltage switching capacity		12 ... 250 V AC/DC
Load current via common		I_{max} = 6 A gL / gG per common supply (1DOC, 2DOC)
Minimum load for proper switching		1 W or 1 VA
Contact wiring for inductive load		Free-wheeling diode for direct current, varistors/VDRs for alternating current
Current switching capacity per relay		EN 60947-5-1
	240 V AC (AC-15)	max. 1.5 A
	120 V AC (AC-15)	max. 3 A
	250 V DC (DC-13)	max. 0.11 A
	125 V DC (DC-13)	max. 0.22 A
	24 V DC (DC-13)	max. 1 A
Relay contact lifetime		> 500.000 switching cycles – mechanical, > 100.000 switching cycles – at 250 V AC, 0.5 A > 50.000 switching cycles – at 250 V AC, 1.5 A

Analog output

Number of analog outputs	1
Connection type	2-wire, for motor current indication on an external analog instrument
Output ranges	Configurable: 0/4 ...20 mA or 0 ... 10 V
Cable specification	< 30 m outside the control cabinet; >30 m if shielded
Max. output voltage	10 V
Accuracy	< 5%
Output load	500 Ω max. if configured for 0/4 ... 20 mA output; 1 k Ω min. if configured for 0 ... 10 V output
Resolution	8 bits
Short-circuit detection	Yes, if configured for 0 ... 10 V output
Wire break detection	Yes, if configured for 4 ... 20 mA output
Insulation	none

Interfaces

Interface for I/O expansion	1 for connection to UMC100 and/or other expansion modules
Integrated diagnostic functions	Green LED: Device ready for operation, Yellow LED: Wire break or short circuit indication Red LED: Error (loss of communication, failure, ...)

Digital expansion modules DX111-FBP.0, DX122-FBP.0

Technical data

General data

Type	DX111-FBP.0	DX122-FBP.0
Supply voltage	24 V DC (+ 30%, – 20%) (19.2 … 31.2 V DC incl. residual ripple)	
Conductor cross section	max. 2 x 0.75 - 2.5 mm^2	
Mounting	Snap-on mounting on DIN rail, any mounting position	
Dimensions	45 x 77 x 100 mm (without communication plug)	
Weight	0.220 kg	
Degree of protection	IP20	
Temperature range	Storage: -25 ... +70 °C	Storage: -25 ... +70 °C
	Operation: 0 ... +60 °C	Operation: 0 ... +55 °C
Approvals	ATEX, CCC, CE, cUL, EAC (other approvals on request) Shipping ABS, DNV, GL	

Voltage expansion modules VI150-FBP.0, VI155-FBP.0

Technical data

Type	VI150-FBP.0	VI155-FBP.0
Application	only in grounded networks	in grounded and ungrounded networks

Electrical data

Type	VI150-FBP.0	VI155-FBP.0
Supply voltaqe	24 V DC (+ 30 %, - 20 %) (19.2 ... 31.2 V DC including ripple)	
Current consumption relay enerqized	max. 40 mA	max. 55 mA
Voltaqe input	L1, L2, L3	L1, L2, L3
Overvoltaqe category	III in grounded networks	
		II in ungrounded networks
Nominal voltaqe input range (phase to phase)	90 - 690 V AC	
U_{imp}	8 kV	
Accuracy voltage	+/- 2% in nominal input range	
Accuracy power factor	+/- 3.5 % in range 0.4 ... 0.95, I > 0.75 A	
Accuracy real power kW	+/- 5 % typ.	
Accuracy energy kWh	+/- 5 % typ.	
Total Harmonic Distortion THD	in %	
Rated operational voltage U_e	690 V AC	
Voltage supply cables	connection cables for voltage measurement may require additional cable protection	

Digital output

Number		1 relay output
Voltage switching capacity		12 ... 250 V AC/DC
Current switching capacity		EN 60947-5-1
	240 V AC (AC-15)	max. 1.5 A
	120 V AC (AC-15)	max. 3 A
	250 V DC (DC-13)	max. 0.11 A
	125 V DC (DC-13)	max. 0.22 A
	24 V DC (DC-13)	max. 1 A
Minimum load for proper switching		1 W or 1 VA
Contact wiring for inductive load		Free-wheeling diode for DC, Varistors/VDRs for AC
Relay contact lifetime		> 500.000 switching cycles – mechanical > 100.000 switching cycles – at 250 V AC, 0.5 A > 50.000 switching cycles – at 250 V AC, 1.5 A

Interfaces

Interface for I/O expansion	1 for connection to UMC100.3 and/or other expansion modules
Integrated diagnostic functions	Green LED: Device ready Yellow LED: Diagnostics Red LED: Fault

General data

Type	VI150-FBP.0	VI155-FBP.0
Conductor cross section	2 x 0.75 - 2.5 mm^2 max.	
Mounting	Snap-on mounting on DIN-rail, any mounting position Min. 10 mm distance left and right to the L1 and L3 terminals required for voltages > 230 / 400 V	
Dimensions (W x H x D)	22.5 x 77 x 100 mm (excl. communication connector)	
Weight	0.110 kg	
Degree of protection	IP20	
Temperature range	Storage: - 25 ... + 70 °C, operation:: 0 ... + 60 °C	
Operation altitude above sea level	Max. 2000 m	Max. 4000 m without derating
Approvals	ATEX, CCC, CE, cUL,EAC (other approvals on request) Shipping: ABS, DNV, GL	

Analog/temperature expansion module AI111.0

Technical data

General

Type	AI111.0
Mounting	On DIN rail (EN 50022-35)
Mounting position	Any
Dimensions (W x H x D)	See dimensions of expansion modules
LEDs: Red/yellow/green	Red: Hardware error of module Yellow: Diagnosis available Green: Ready for operation
Supply voltage	24 V DC (+30 % ... -20 %) (19.2 ... 31.2 V DC) including ripple
Supply current	Max. 40 mA (at 19.2 ... 31.2 V DC)
Tightening torque for the communication terminals	See section DX1xx
Tightening torque for the input, output and supply terminals	See section DX1xx
Net weight	0.118 kg (0.260 lb)
Degree of protection	IP20
Temperature range	Storage -25 ... +70 °C Operation 0 ... +60 °C
Marks, Approvals	CE, cUL Further in preparation. Ask your local sales representative for other marks/approvals.
Functional isolation between anlog inputs and 24 V DC supply / communication interface	Yes
Indiviual configuration of each analog input	Yes
U_{imp} sensor analog inputs	0.5 kV
Pollution degree terminals	3
Operation altitude above sea level	Up to 5000 m

Temperature inputs

Type	AI111.0
Type of connection	2 or 3 wire
Number of input channels	3 (one AI111.0) / 6 (two AI111.0)
Type of temperature inputs (adjustable per channel)	PT100 -50 °C...+400 °C PT100 -50 °C...+70 °C PT1000 -50 °C...+400 °C KTY83-110 -50 °C...+175 °C KTY84-130 -40 °C...+300 °C NTC +80...+160 °C [B75227-K333-A1]
Accuracy at 20 °C (T20)	≤ ± 2 K
Temperature coefficient	0.1 K per K deviation from T20
Out of range detection	Yes
Max. cable length	Max. cable resistance: 50R (single wire) [e.g. with copper wire 1.5 mm²: 1900 m cable length]
Cable shielding	Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m
Update rate	Typ. 600 ms
Sensor current (typ.)	PT100 1 mA PT1000/KTY83/KTY84/NTC 0.2 mA

Analog/temperature expansion module AI111.0

Technical data

Analog inputs

Type	AI111.0
Number of inputs	3 (one AI111.0) / 6 (two AI111.0)
Type of analog inputs (adjustable)	0/4 mA - 20 mA / 0-10 V
Resolution	15 Bit

Measuring ranges

Type	AI111.0
0…20 mA and 0…10 V	0 …. 27648 dec (6C00 hex)
4…20 mA	0 …. 27648 dec (6C00 hex)
Max. input current for 0/4-20 mA	60 mA (destruction limit)
Accuracy at 20 °C (T20)	±1 % from full scale value
Temperature coefficient	0.05 / K deviation from T20
Input resistance	≤ 300 Ohm at 0/4 -20 mA ≥ 10 k Ohm at 0-10 V
Wire break detection	In operation mode: 4 mA - 20 mA
Cable shielding	Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m

Fieldbus communication interfaces PDP32.0, MRP31.0, DNP31.0, PDR31.0

Technical data

General data

Type	PDP32.0	MRP31.0	DNP31.0	PDR31.0
Supply voltage	24 V DC -20 … +30% (19.2 … 31.2 V DC) incl. ripple	24 V DC -20% / - 20% (19.2 … 31.2 V DC) incl. ripple	24 V DC (11 … 24,7 V DC) according to DeviceNet specification	24 V DC -20 … +30% (19.2 … 31.2 V DC) incl. ripple
Current consumption	55 mA (excl. load on 5 V supply for termination resistors)	Typ. 30 mA	Typ. 18.5 mA (from DeviceNet)	28 mA
Communication protocol	Profibus DP-V0/DP-V1	Modbus RTU	DeviceNet	Active Profibus DP termination
Certificate	Yes, PNO	-	Yes, ODVA	-
Fieldbus connection	9-pole Sub-D connector or terminal blocks	Removable 5-pole terminal blocks	Removable 5-pole terminal blocks	9-pole Sub-D connector or terminal blocks
Integrated termination resistors	No	No	No	Yes
Possible bus addresses (set via UMC100.3)	1 ... 125	1 ... 125	0 ... 63	-
Max. baud rate	12 MBit/s	57.6 kbaud	500 kbaud	-
Isolated +5 V supply available for bus termination circuitry (X3 pins 5 and 6)	30 mA max. -	-	-	-

Standards / directives

Type	PDP32.0	MRP31.0	DNP31.0	PDR31.0
EMC Directive	2014/30/EC	2014/30/EC	2014/30/EC	2014/30/EC
RoHS Directive	2011/65/EU	2011/65/EU	2011/65/EU	2011/65/EU

Environmental and mechanical data

Type		PDP32.0	MRP31.0	DNP31.0	PDR31.0
Mounting		On UMC100.3 or SMK3.0 adapter	On UMC100.3 or SMK3.0 adapter	On UMC100.3 or SMK3.0 adapter	On SMK3.0 adapter
Mounting position		Any	Any	Any	Any
Ambient air temperature	Operation	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C
	Storage	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		0.7 g / 10 .... 150 Hz	0.7 g / 10 .... 150 Hz	0.7 g / 10 .... 150 Hz	0.7 g / 10 .... 150 Hz
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		15 g / 11 ms	15 g / 11 ms	15 g / 11 ms	15 g / 11 ms
Degree of protection		IP20	IP20	IP20	IP20
Pollution degree		3	3	3	3
Operation altitude above sea level		4000 m	4000 m	4000 m	4000 m
Duty cycle		100 %	100 %	100 %	100 %
Weight		0.051 kg	0.039 kg	0.042 kg	0.047 kg

Ethernet communication interfaces MTQ22-FBP.0, PNQ22-FBP.0, EIU32.0, PNU32.0

Technical data

General data

Type	MTQ22-FBP.0	PNQ22-FBP.0	EIU32.0	PNU32.0
Supply voltage	24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple	24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple	24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple	24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple
Current consumption	Max. 180 mA	Max. 180 mA	Typ 90 mA, max. 130 mA	Typ 90 mA, max. 130 mA
Total power dissipation	Max. 3.5 W	Max. 3.5 W	Typ. 2.2 W, max. 2.5 W	Typ. 2.2 W, max. 2.5 W
Short circuit protection at port 1 ... 4	PTC resistor	Yes, PTC resistor	-	-
Connection between Ethernet interface and UMC100.3	Max. 3 m	Max. 3 m	Max. 3 m	Max. 3 m
Communication protocol	Modbus TCP	Profinet IO	EtherNet/IP™	Profinet IO
Certificate	-	Yes, PNO	Yes, ODVA	Yes, PNO
Integrated Ethernet switch	Yes	Yes	Yes	Yes
Supported bit rates	10 / 100 Mbit/s	100 Mbit/s	10 / 100 Mbit/s	10 / 100 Mbit/s
Network redundancy protocol	MRP client acc. to EN/IEC 62439-2	MRP client acc. to EN/IEC 62439-2	DLR (Device Level Ring)	MRP client acc. to EN/IEC 62439-2
Master redundancy protocol				S2 master redundancy
USB port	For configuration via PC and software tool	Reserved	Reserved	Reserved

Standards / directives

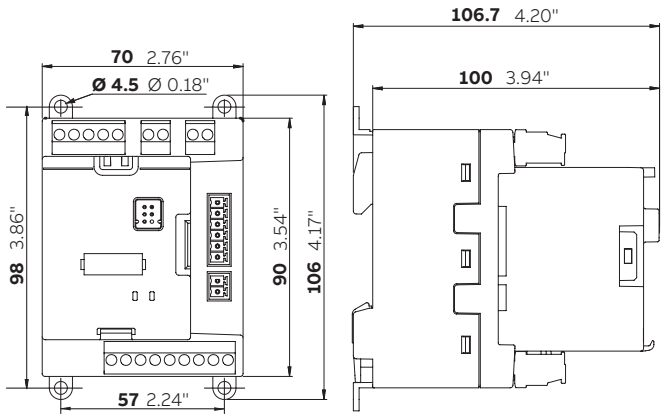
Type	MTQ22-FBP.0	PNQ22-FBP.0	EIU32.0	PNU32.0
EMC Directive	2014/30/EC	2014/30/EC	2014/30/EU	2014/30/EU
RoHS Directive	2011/65/EU	2011/65/EU	2011/65/EU	2011/65/EU incl. 2015/863/EU

Environmental and mechanical data

Type		MTQ22-FBP.0	PNQ22-FBP.0	EIU32.0	PNU32.0
Mounting		DIN-rail	DIN-rail	Directly on the UMC100.3 or remotely on SMK3.0 adapter	Directly on the UMC100.3 or remotely on SMK3.0 adapter
Mounting position		Any	Any	Any	Any
Ambient air temperature	Operation	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C	0 ... +60 °C
	Storage	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Dimensions (W x H x D)		45 mm x 90 mm x 96 mm	45 mm x 90 mm x 96 mm	42.5 mm x 64 mm x 96 mm	42.5 mm x 64 mm x 96 mm
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		0.7 g / 10 ... 150 Hz	0.7 g / 10 ... 150 Hz	0.7 g / 10 ... 150 Hz (mounted on UMC100.3/ SMK3.0)	0.7 g / 10 ... 150 Hz (mounted on UMC100.3/ SMK3.0)
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		15 g / 11 ms	15 g / 11 ms	15 g / 11 ms	15 g / 11 ms
Degree of protection		IP20	IP20	IP20	IP20
Pollution degree		3	3	3	3
Operation altitude above sea level		2000 m	2000 m	2000 m	2000 m
Duty cycle		100 %	100 %	100 %	100 %
Weight		0.172 kg	0.172 kg	0.110 kg	0.110 kg

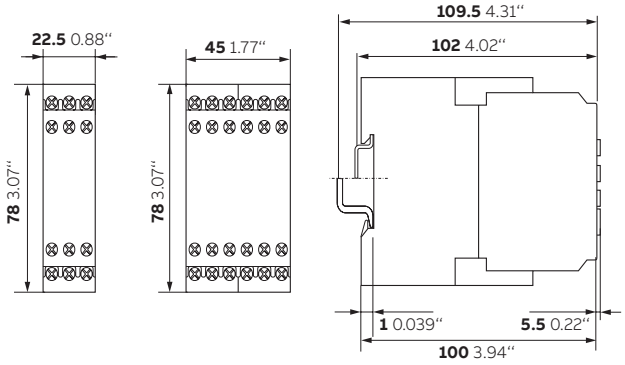
Dimensional drawings

Universal Motor Controller UMC100.3



UMC100.3

Expansion modules

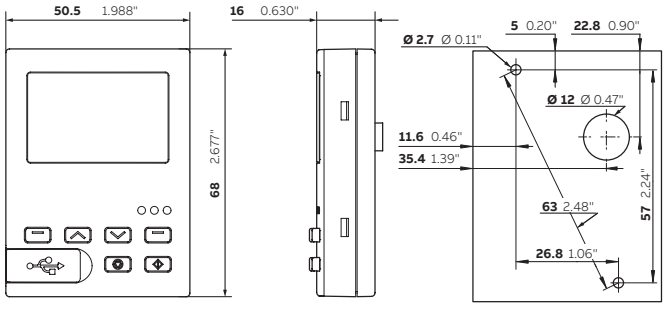


VI150-FBP.0
VI155-FBP.0
AI111.0

DX111-FBP.0,
DX122-FBP.0

DX111-FBP.0, DX122-FBP.0
VI150-FBP.0, VI155-FBP.0
AI111.0

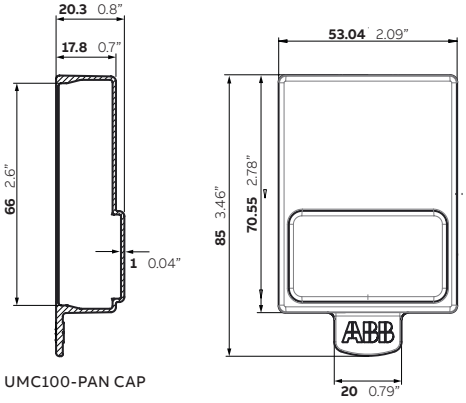
Operating panel



UMC100.3-PAN

UMC100.3-PAN
drilling instruction

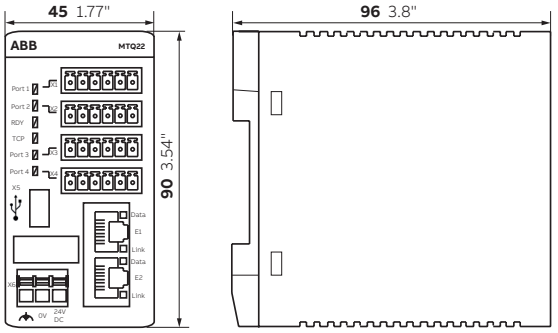
Operating panel protection cap



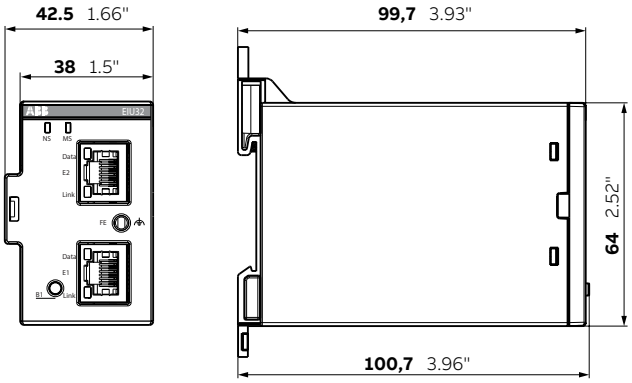
UMC100-PAN CAP

Dimensional drawings

Ethernet communication interfaces

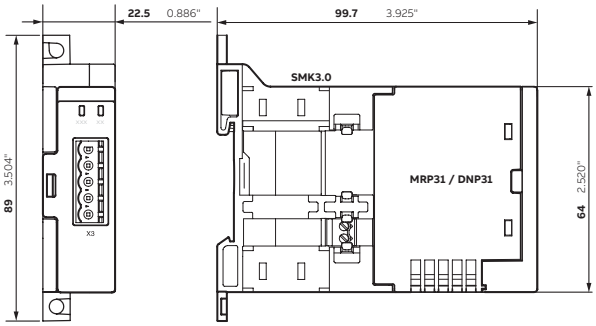


MTQ22-FBP.0
PNQ22-FBP.0

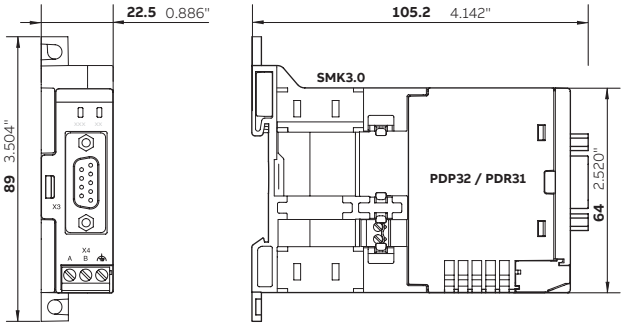


EIU32.0

Fieldbus communication interfaces



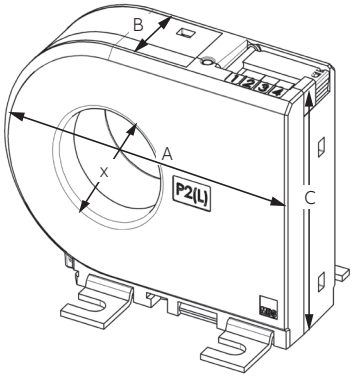
DNP31.0, MRP31.0, SMK3.0



PDP32.0, PDR31.0

Dimensional drawings

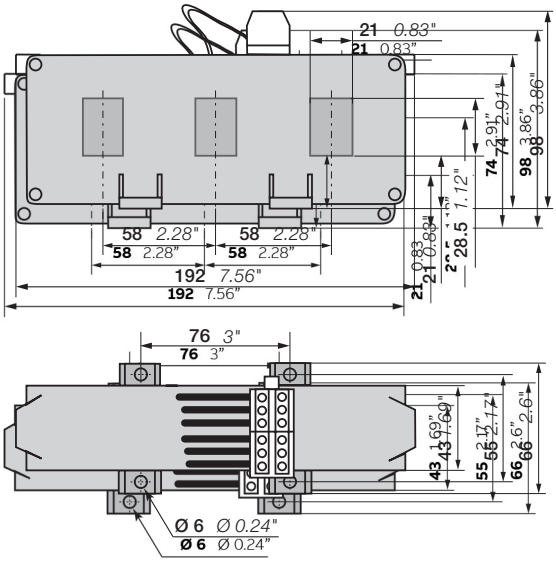
Earth fault monitor



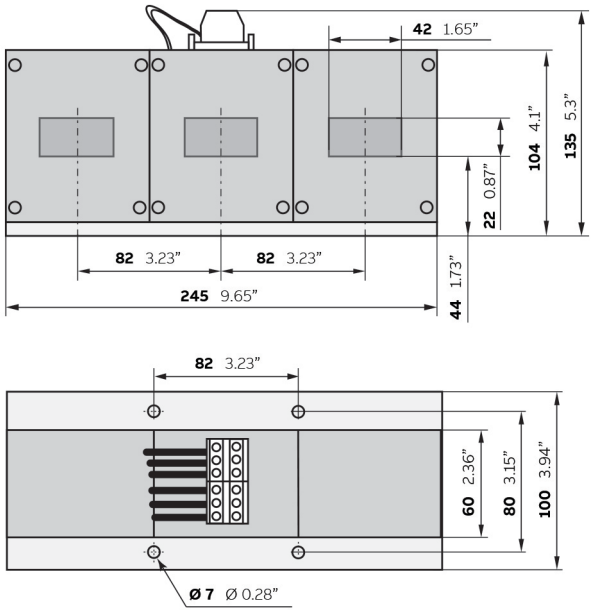
CEM11-FBP.xx

Type	Width (A)	Depth (B)	Height (C)	Ø
CEM11-FBP.20	76.4 (3.01)	30 (1.18)	56 (2.20)	20 (0.79)
CEM11-FBP.35	99.5 (1.38)	30 (1.18)	79 (3.11)	35 (1.38)
CEM11-FBP.60	135 (5.31)	38 (1.46)	116 (4.57)	60 (2.36)
CEM11-FBP.120	210 (8.27)	38 (1.46)	190 (7.48)	120 (4.72)

Current transformer



CT4L185R/4, CT4L310R/4



CT5L500R/4, CT5L850R/4

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AI111.0	1SAJ613000R0101	17
CDP18.150	1SAJ929180R0015	19
CDP18.150	1SAJ929180R0015	21
CDP23.150	1SAJ929230R0015	21
CDP23.300	1SAJ929230R0030	21
CDP24.150	1SAJ929240R0015	19
CDP24.150	1SAJ929240R0015	21
DNP31.0	1SAJ231000R0001	18
DX111-FBP.0	1SAJ611000R0101	17
DX122-FBP.0	1SAJ622000R0101	17
EIU32.0	1SAJ262000R0100	20
ETHTB-FBP.4	1SAJ929200R0001	21
ETHTB-FBP.50	1SAJ929200R0002	21
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MTQ22-FBP.0	1SAJ260000R0100	20
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UMC100.3 DC EX	1SAJ530000R0200	15
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UMC100.3 UC	1SAJ530000R1100	15
UMC100.3 UC EX	1SAJ530000R1200	15
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Type classification

Type	Order code	Page
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PDR31.0	1SAJ243000R0001	18
MRP31.0	1SAJ251000R0001	18
MTQ22-FBP.0	1SAJ260000R0100	20
PNQ22-FBP.0	1SAJ261000R0100	20
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UMC100.3 DC	1SAJ530000R0100	15
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UMCTB-FBP.0	1SAJ929160R0001	17
UMCTB.1	1SAJ929160R0002	17
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SMK3-X2.10	1SAJ929610R0001	19
SMK3-X1.10	1SAJ929620R0001	19

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

www.abb.com/productdetails/**1SBL137001R1310**

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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

Customer assembled motor starting solutions

ABB Expertise

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer covers 400 V AC, 500 V AC, 690 V AC networks.

A complete database of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), and UL 60947-4-1 between the branch circuit protective device and the motor starter is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:

- Case circuit-breakers (MCCBs)
- Miniature circuit-breakers (MCBs)
- Switch-disconnector-fuses (aM, gG and BS)
- Manual motor starters (MMS).

Select Optimized Coordination tool (SOC)

Selected Optimized Coordination is 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.

In order to guarantee the best performance and the longest lifetime, devices involved into the applications mentioned above (short-circuit protection devices, contactors, overload relays, softstarters, ...) need to be coordinated.

- The coordination among devices cannot be determined directly: tests in power laboratories shall be carried out to qualify the coordination type at low fault and high fault currents, according to IEC or UL standards.
- ABB coordination tables are the results of such tests and represent the ABB offerings in terms of motor starting and protection, selectivity, back-up and switch-disconnector protection.
- In Selected Optimized Coordination all available ABB coordination tables are stored and easily accessible.

Website access:

http://applications.it.abb.com/SOC/Page/Selection.aspx

How to combine assemble and wire starter components

The section "customer assembled motor stating solutions" in this catalog gives the components lists and wiring diagrams to assemble the most typical motor starting solutions.

It covers direct-on-line Starters, reversing starters or star-delta starters protected with manual motor starters or with thermal overload relays for Type I or type II coordination for normal starting time.

Note:

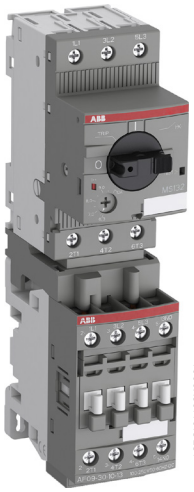
In order to confirm your starter combination ratings according to ABB's lattest coordination test results, or to see other coordination of components please refer to the above mentioned SOC tool. SOC tool get constant updates and additions

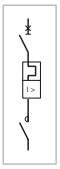
General remarks applicable to all tables

- Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
- Fuses: factor of 0.8 applied to In for an ambient temperature of 70 °C
- MCCBs and MCBs: factor of 0.8 applied to In for an ambient temperature of 60 °C
- The starter derating factor depends on the operating conditions of thermal overload relays:
- Factor of 0.9 applied to In for an ambient temperature of 70 °C.
- Each table is defined for motor currents: 3-phase motors, 4-pole
- Normal starting means a starting time < 2 s. - Difficult starting means an accelerating time 10 s < ts < 30 s
- Tripping classes of thermal overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10A and 10
- Tripping classes of electronic overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10E, 20E, 30E selectable
- In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 Ie AC-3 so that the transient current peak occurring during starting does not lead to tripping.

DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form

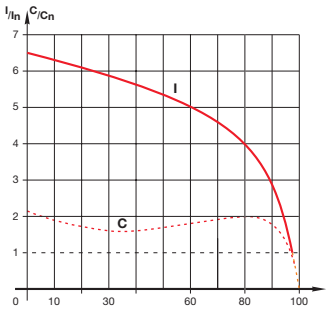




DOL starter
MS132-10 + BEA16-4 + AF09-30-10

Application

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



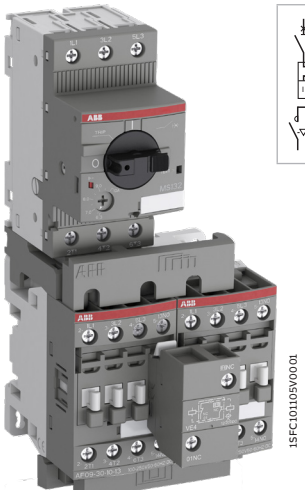
I = current
C = torque
In = nominal current
Cn = nominal torque

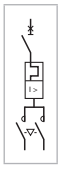
Coordination types

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

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

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



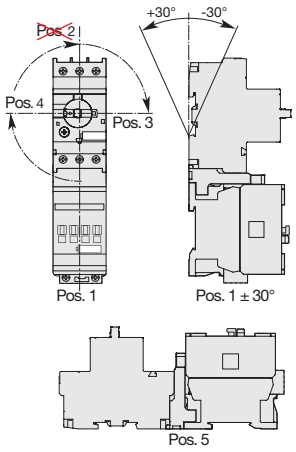


Reversing starter
MS132-10 + BEA16-4 + BER16-4
+ VEM4 + AF09-30-10

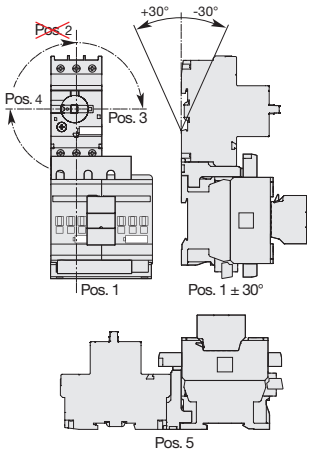
Main Technical Data

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

Mounting positions



DOL starters

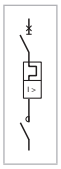


Reversing starters

DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form

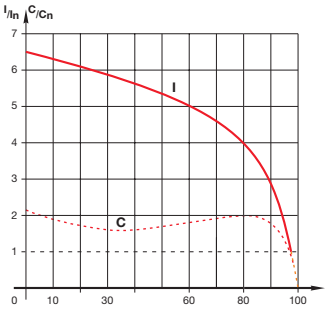
1SFC101102V0001



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

Application

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



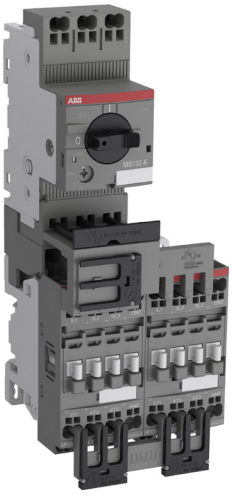
I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

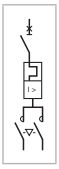
The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

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

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



1SFC101105V0001

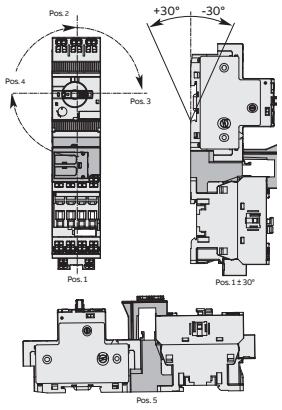


Reversing starter
MS132-10K + BEA16-4KF
+ BER16-4KF + AF09-30-10K

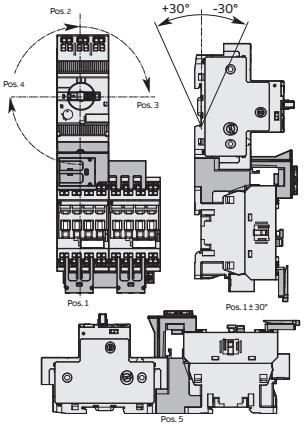
Main Technical Data

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

Mounting positions



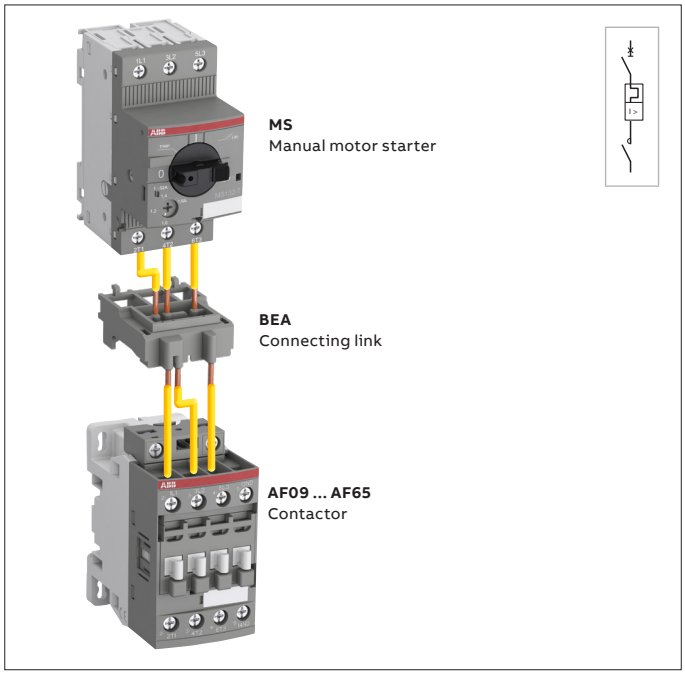
DOL starters



Reversing starters

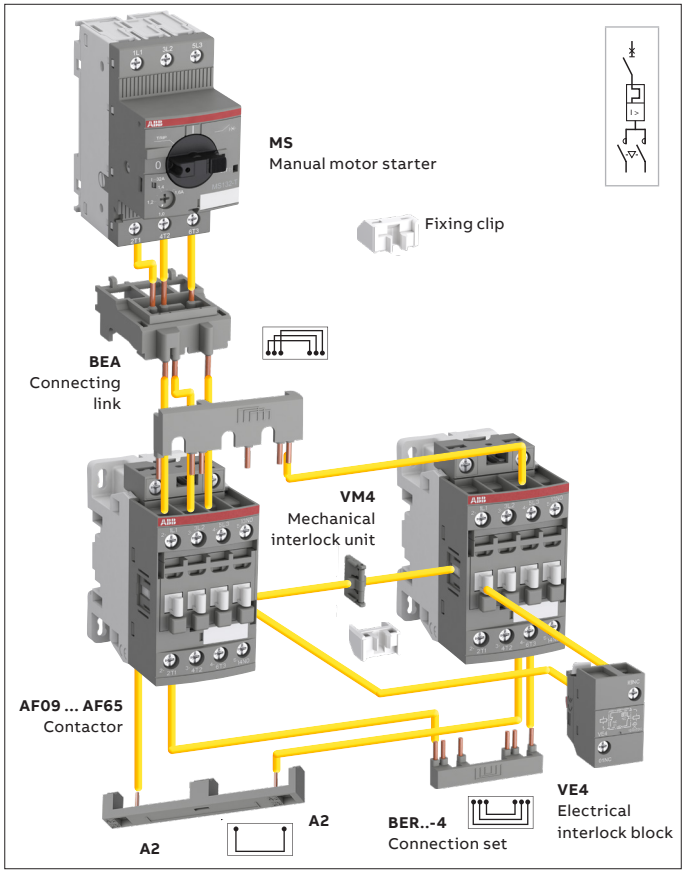
DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form



Direct-on-line starters

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



Reversing starters

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

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

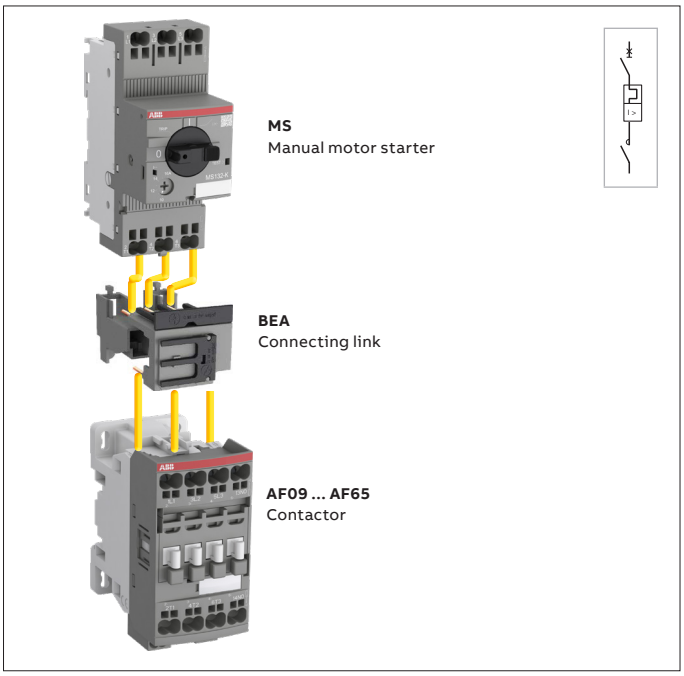
Note: for direct mounting on 2 rails 35 mm of MS165 manual motor starter with AF40 ... AF65 contactors, BEA65-4 connecting link must be associated with BPR65-4 35 mm rail hook fixed on each contactor base. Starter combination using BPR65-4 are applicable for MS165 manufactured after week 31, 2016 (date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

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

For the full coordination tables, please visit our SOC tool :
https://applications.it.abb.com/SOC/Selectivity

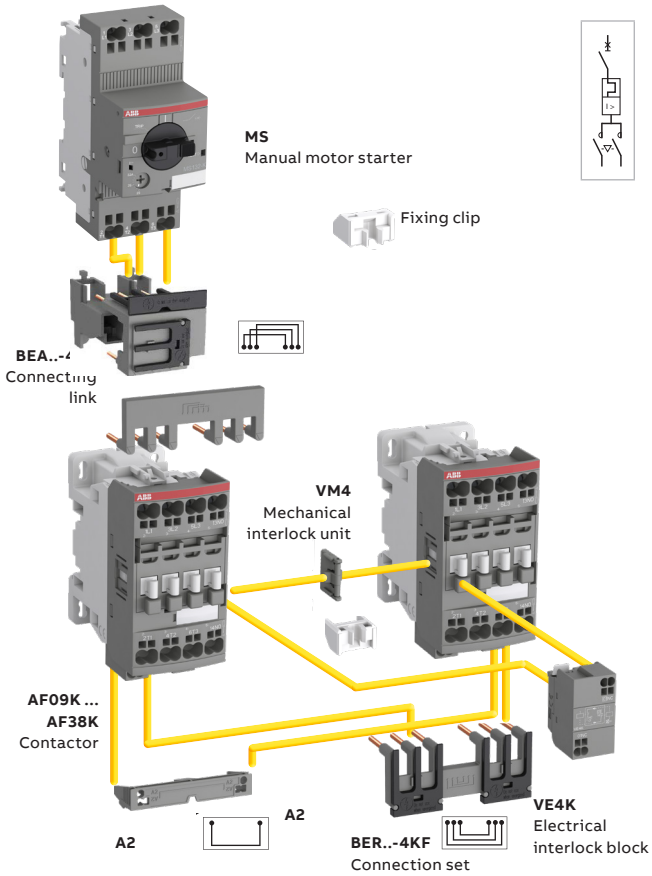
DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form



Direct-on-line starters

You can easily assemble a direct-on-line starter by using the BEA..-4KF connecting link 3-pole insulated. It is used to electrically and mechanically connect MS132-K manual motor starter and AF09 ... AF38..K contactor, AC or DC operated.



Reversing starters

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

- BEA..-4KF connecting link 3-pole insulated: it is used to electrically and mechanically connect MS132 manual motor starter and AF09..K ... AF38..K contactor, AC or DC operated.
- For AF09..K ... AF38..K, use VEM4K mechanical and electrical interlock set for reversing starter in 90 mm width. It includes:
  - VM4 mechanical interlock unit including 2 fixing clips.
  - VE4K electrical interlock block with A2-A2 connection.
- For AF40 ... AF96, use VM96-4 mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking
- BER..-4KF connection set: it assures a safe and simple reversing connection between both contactor main terminals.

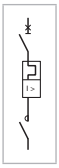
Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 16 kA up to 18.5 kW and Iq = 50 kA up to 45 kW.

For the full coordination tables, please visit our SOC tool :
https://www.lowvoltage-tools.abb.com/soc/Motor

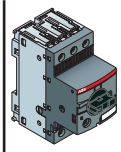
DOL starters protected by MS manual motor starters

Coordination type 1

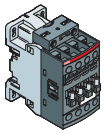
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



Manual motor starters



Contactors



Accessories

BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power	current	Type (1)	Order code	Setting range	Rated instantaneous short-circuit current setting Ii	Rated control circuit voltage Uc min. ... Uc max. (2)		Type (3)	Order code	Allowed setting current	Type	Order code
kW	A			A		V 50/60 Hz	V DC			A		
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	3.13	24...60	20...60 (5)	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	5	24...60	20...60 (5)	AF09Z-30-10-21	1SBL136001R2110	0.4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	12.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	31.25	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	6.3		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	12		
						100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	16		
						100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	25		1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			1SBN010110R1010
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32	BEA38-4	
						100...250	100...250	AF30-30-00-13	1SBL277001R1300		+ CA4-10	
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		BPR65-4 (4)	1SBN113405R1000
											CA4-10	
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53		1SBN010110R1010
						100...250	100...250	AF52-30-00-13	1SBL367001R1300			
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65		
						100...250	100...250	AF65-30-00-13	1SBL387001R1300			
37	66	MS497-75	1SAM580000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75		
						100...250	100...250	AF80-30-00-13	1SBL397001R1300			
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90		
						100...250	100...250	AF96-30-00-13	1SBL407001R1300			

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

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

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

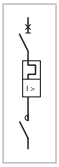
(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

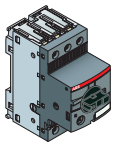
DOL starters protected by MS manual motor starters

Coordination type 2

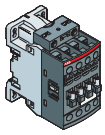
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



Manual motor starters



Contactors



Accessories

BEA..-4

CA4-10

IEC AC-3, 400 V Rated operational power	current	Type (1)	Order code	Setting range	Rated instantaneous short-circuit current setting Ii	Rated control circuit voltage Uc min. ... Uc max. (2)		Type (3)	Order code	Allowed setting current	Type	Order code
kW	A			A	A	V 50/60 Hz	V DC (6)			A		
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	3.13	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	12.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	31.25	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	BEA26-4	1SBN082306T1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ CA4-10	1SBN010110R1010
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	6.3		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	12	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ CA4-10	1SBN010110R1010
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	16		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	25		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		BPR65-4 (5)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	CA4-10	1SBN010110R1010
						100...250	100...250	AF52-30-00-13	1SBL367001R1300			
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65		
						100...250	100...250	AF65-30-00-13	1SBL387001R1300			
37	66	MS497-75	1SAM580000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75		
						100...250	100...250	AF80-30-00-13	1SBL397001R1300			
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90		
						100...250	100...250	AF96-30-00-13	1SBL407001R1300			

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

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

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

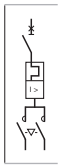
(4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(6) AF ... -11 not suitable for direct control by PLC-output.

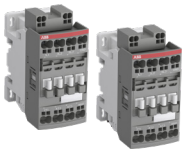
Reversing starters protected by MS manual motor starters

Coordination type 1

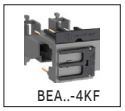


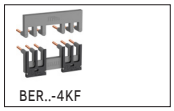
Manual motor starters

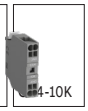
Contactors



Accessories







IEC AC-3, 400 V Rated operational power kW	current A	Type (1)	Order code	Setting range A	Rated instantaneous short-circuit current setting Ii A	Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A		Type	Order code
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz													
0.06	0.2	MS132-0.25K	1SAM350010R1002	0.16...0.25	3.13	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.25		BEA16-4KF	1SBN081325T1000
0.09	0.3	MS132-0.4K	1SAM350010R1003	0.25...0.40	5	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.4	+	BER16-4KF	1SBN081322R1000
0.12	0.44	MS132-0.63K	1SAM350010R1004	0.40...0.63	7.88	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.63	+	VEM4K	1SBN030113R1000
0.18	0.6	MS132-0.63K	1SAM350010R1004	0.40...0.63	7.88	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.63			
0.25	0.85	MS132-1.0K	1SAM350010R1005	0.63...1.00	12.5	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1			
0.37	1.1	MS132-1.6K	1SAM350010R1006	1.00...1.60	20	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1.6			
0.55	1.5	MS132-1.6K	1SAM350010R1006	1.00...1.60	20	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1.6			
0.75	1.9	MS132-2.5K	1SAM350010R1007	1.60...2.50	31.25	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	2.5			
1.1	2.7	MS132-4.0K	1SAM350010R1008	2.50...4.00	50	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	4			
1.5	3.6	MS132-4.0K	1SAM350010R1008	2.50...4.00	50	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	4			
2.2	4.9	MS132-6.3K	1SAM350010R1009	4.00...6.30	78.75	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	6.3			
3	6.5	MS132-10K	1SAM350010R1010	6.30...10.0	150	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	9			
4	8.5	MS132-10K	1SAM350000R1010	6.30...10.0	150	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	9			
5.5	11.5	MS132-12K	1SAM350010R1012	8.00...12.0	180	100...250	100...250	AF12-30-10K-13	1SBL157005R1310	12			
7.5	15.5	MS132-16K	1SAM350010R1011	10.0...16.0	240	100...250	100...250	AF16-30-10K-13	1SBL177005R1310	16			
11	22	MS132-25K	1SAM350010R1014	20.0...25.0	375	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	25		BEA38-KF	1SBN082325T2000
15	29	MS132-32K	1SAM350010R1015	25.0...32.0	480	100...250	100...250	AF30-30-00K-13	1SBL277005R1300	32	+	BER38-4KF	1SBN082332R1000
											+	VEM4K	1SBN030113R1000
											-2x	CA4-10K	1SBN010160R1010
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz													
0.06	0.2	MS132-0.25K	1SAM350010R1002	0.16...0.25	3.13	100...250	100...250	AF09-30-10-13	1SBL137001R1310	0.25		BEA16-4KF	**1SBN081325T1000**
0.09	0.3	MS132-0.4K	1SAM350000R1003	0.25...0.40	5	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.4	+	BER16-4KF	**1SBN081322R1000**
0.12	0.44	MS132-0.63K	1SAM350010R1004	0.40...0.63	7.88	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.63	+	VEM4K	**1SBN030113R1000**
0.18	0.6	MS132-0.63K	1SAM350010R1004	0.40...0.63	7.88	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	0.63			
0.25	0.85	MS132-1.0K	1SAM350010R1005	0.63...1.00	12.5	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1			
0.37	1.1	MS132-1.6K	1SAM350010R1006	1.00...1.60	20	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1.6			
0.55	1.5	MS132-1.6K	1SAM350010R1006	1.00...1.60	20	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	1.6			
0.75	1.9	MS132-2.5K	1SAM350010R1007	1.60...2.50	31.25	100...250	100...250	AF09-30-10K-13	1SBL137005R1310	2.5			
1.1	2.7	MS132-4.0K	1SAM350010R1008	2.50...4.00	50	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	4			
1.5	3.6	MS132-4.0K	1SAM350010R1008	2.50...4.00	50	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	4			
2.2	4.9	MS132-6.3K	1SAM350010R1009	4.00...6.30	78.75	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	6.3			
3	6.5	MS132-10K	1SAM350010R1010	6.30...10.0	150	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	10		BEA38-KF	**1SBN082306T2000**
4	8.5	MS132-10K	1SAM350010R1010	6.30...10.0	150	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	10	+	BER38-4KF	**1SBN082322R1000**
5.5	11.5	MS132-12K	1SAM350010R1012	8.00...12.0	180	100...250	100...250	AF26-30-00K-13	1SBL237005R1300	12	+	VEM4K	**1SBN030113R1000**
7.5	15.5	MS132-16K	1SAM350010R1011	10.0...16.0	240	100...250	100...250	AF30-30-00K-13	1SBL277005R1300	16	+2x	CA4-10K	**1SBN01060R1010**
11	22	MS132-25K	1SAM350010R1014	20.0...25.0	375	100...250	100...250	AF30-30-00K-13	1SBL277005R1300	25			
15	29	MS132-32K	1SAM350010R1015	25.0...32.0	480	100...250	100...250	AF30-30-00K-13	1SBL277005R1300	32			

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

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

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

(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

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

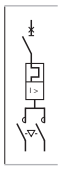
(4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

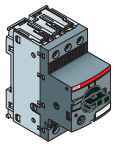
Reversing starters protected by MS manual motor starters

Coordination type 1

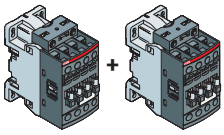
Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



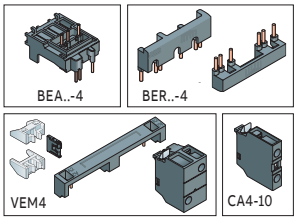
Manual motor starters



Contactors



Accessories



IEC AC-3, 400 V Rated operational power kW	current A	Type (1)	Order code	Setting range A	Rated instantaneous short-circuit current setting Ii A	Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A	Type	Order code
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	3.13	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310		+ BER16-4	1SBN081311R1000
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	12.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	31.25	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	4		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	6.3		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	9		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	12		
						100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	16		
						100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	25	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32	+ VEM4	1SBN030111R1000
						100...250	100...250	AF30-30-00-13	1SBL277001R1300		+ 2x CA4-10	1SBN010110R1010
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		+ 2x BPR65-4 (4)	1SBN113405R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ BER65-4	1SBN083411R1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ VM96-4	1SBN033405T1000
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF65-30-00-13	1SBL387001R1300		+ 2x CA4-01	1SBN010110R1001
37	66	MS497-75	1SAM580000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75	BER96-4	1SBN083911R1000
						100...250	100...250	AF80-30-00-13	1SBL397001R1300		+ VM96-4	1SBN033405T1000
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF96-30-00-13	1SBL407001R1300		+ 2x CA4-01	1SBN010110R1001

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

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

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

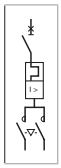
(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

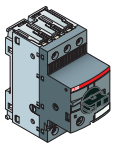
Reversing starters protected by MS manual motor starters

Coordination type 2

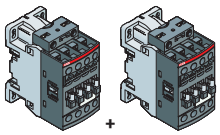
Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



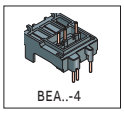
Manual motor starters

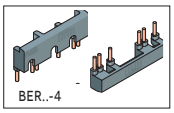


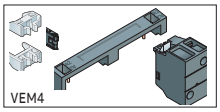
Contactors



Accessories







IEC AC-3, 400 V Rated operational power kW	current A	Type (1)	Order code	Setting range A	Rated instantaneous short-circuit currentsetting Ii	Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz	V DC	Type (3)	Order code	Allowed setting current A	Type (4)	Order code
0.06	0.2	MS132-0.25	1SAM350000R1002	0.16...0.25	3.13	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.25	BEA16-4	1SBN081306T1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310		+ BER16-4	1SBN081311R1000
0.09	0.3	MS132-0.4	1SAM350000R1003	0.25...0.40	5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.12	0.44	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.18	0.6	MS132-0.63	1SAM350000R1004	0.40...0.63	7.88	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	0.63		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.25	0.85	MS132-1.0	1SAM350000R1005	0.63...1.00	12.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.37	1.1	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.55	1.5	MS132-1.6	1SAM350000R1006	1.00...1.60	20	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	1.6		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
0.75	1.9	MS132-2.5	1SAM350000R1007	1.60...2.50	31.25	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	2.5		
						100...250	100...250	AF09-30-10-13	1SBL137001R1310			
1.1	2.7	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	BEA26-4	1SBN082306T1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
1.5	3.6	MS132-4.0	1SAM350000R1008	2.50...4.00	50	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	4	+ VEM4	1SBN030111R1000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ 2x CA4-10	1SBN010110R1010
2.2	4.9	MS132-6.3	1SAM350000R1009	4.00...6.30	78.75	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	6.3		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
3	6.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
4	8.5	MS132-10	1SAM350000R1010	6.30...10.0	150	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	10		
						100...250	100...250	AF26-30-00-13	1SBL237001R1300			
5.5	11.5	MS132-12	1SAM350000R1012	8.00...12.0	180	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	12	BEA38-4	1SBN082306T2000
						100...250	100...250	AF26-30-00-13	1SBL237001R1300		+ BER38-4	1SBN082311R1000
7.5	15.5	MS132-16	1SAM350000R1011	10.0...16.0	240	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	16	+ VEM4	1SBN030111R1000
						100...250	100...250	AF30-30-00-13	1SBL277001R1300		+ 2x CA4-10	1SBN010110R1010
11	22	MS132-25	1SAM350000R1014	20.0...25.0	375	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	25		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
15	29	MS132-32	1SAM350000R1015	25.0...32.0	480	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	32		
						100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	MS165-42	1SAM451000R1015	30.0...42.0	630	24...60	20...60	AF40-30-00-11	1SBL347001R1100	40	BEA65-4	1SBN083406R1000
						100...250	100...250	AF40-30-00-13	1SBL347001R1300		+ 2x BPR65-4 (5)	1SBN113405R1000 1SBN083411R1000
22	41	MS165-54	1SAM451000R1016	40.0...54.0	810	24...60	20...60	AF52-30-00-11	1SBL367001R1100	53	+ BER65-4	1SBN033405T1000
						100...250	100...250	AF52-30-00-13	1SBL367001R1300		+ VM96-4	1SBN010110R1010
30	55	MS165-65	1SAM451000R1017	52.0...65.0	975	24...60	20...60	AF65-30-00-11	1SBL387001R1100	65	+ 2x CA4-10	1SBN010110R1001
						100...250	100...250	AF65-30-00-13	1SBL387001R1300		+ 2x CA4-01	
37	66	MS497-75	1SAM580000R1008	57.0...75.0	975	24...60	20...60	AF80-30-00-11	1SBL397001R1100	75	BER96-4	1SBN083911R1000
						100...250	100...250	AF80-30-00-13	1SBL397001R1300		+ VM96-4	1SBN033405T1000
45	80	MS495-90	1SAM550000R1009	70.0...90.0	1170	24...60	20...60	AF96-30-00-11	1SBL407001R1100	90	+ 2x CA4-10	1SBN010110R1010
						100...250	100...250	AF96-30-00-13	1SBL407001R1300		+ 2x CA4-01	1SBN010110R1001

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to
- 15 kW 400V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(6) AF ... -11 not suitable for direct control by PLC-output.

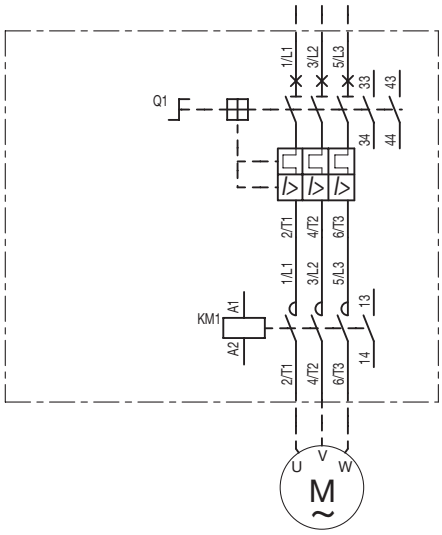
DOL and reversing starters protected by manual motor starters

With AF..K contactors - open type version in kit form

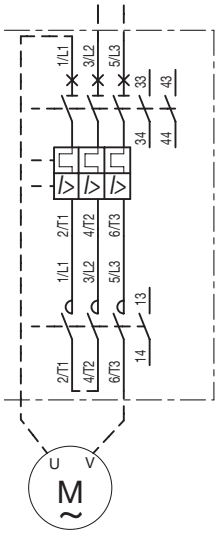
Wiring diagrams

Direct-on-line starters

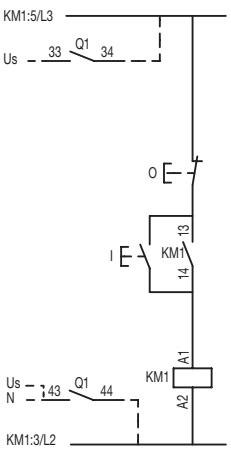
Power circuit



1-phase

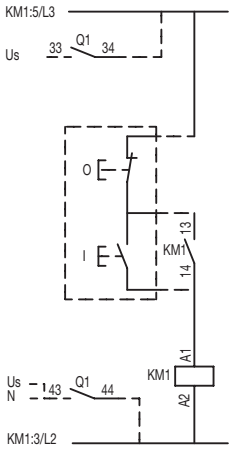


AC or DC local control



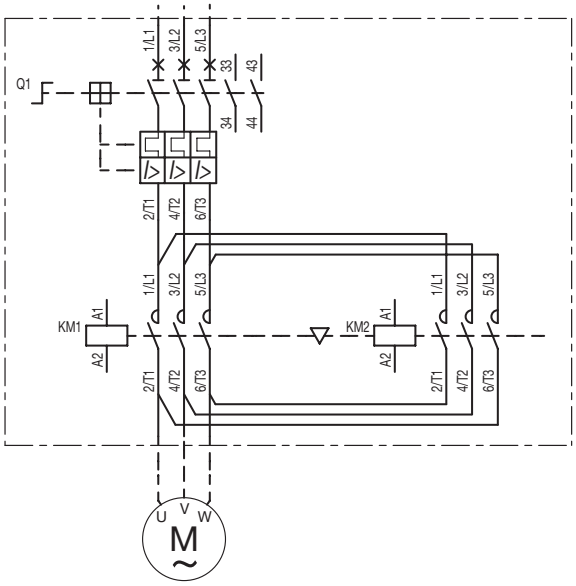
Note: coil Uc 12-20 V DC : A1+, A2-

AC or DC remote control

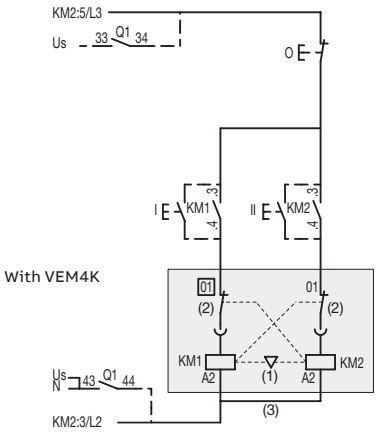


Reversing starters

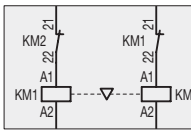
Power circuit



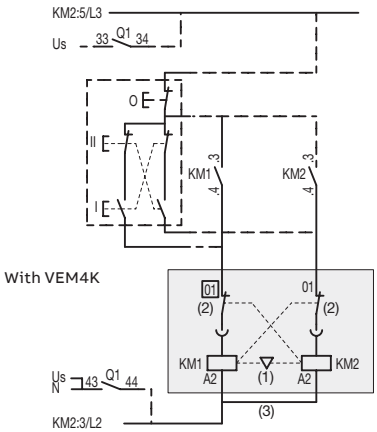
AC or DC local control



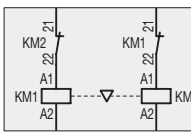
With VM



AC or DC remote control



With VM



Note: - VEM4K = VM4K (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4K).
- coil Uc 12-20 V DC : A1+, A2-

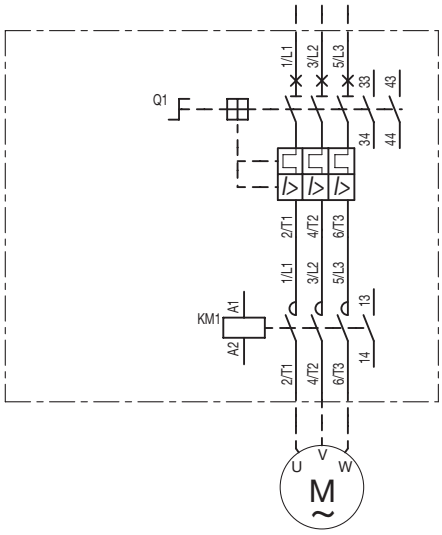
DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form

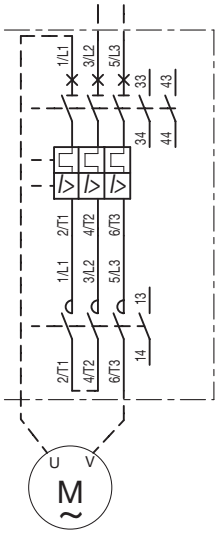
Wiring diagrams

Direct-on-line starters

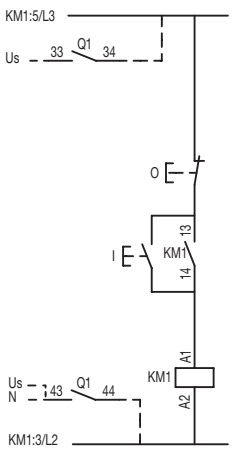
Power circuit



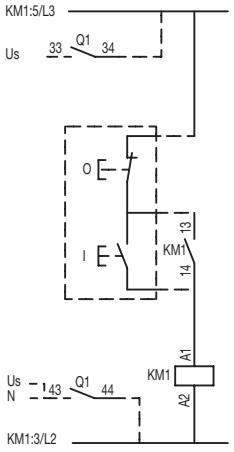
1-phase



AC or DC local control



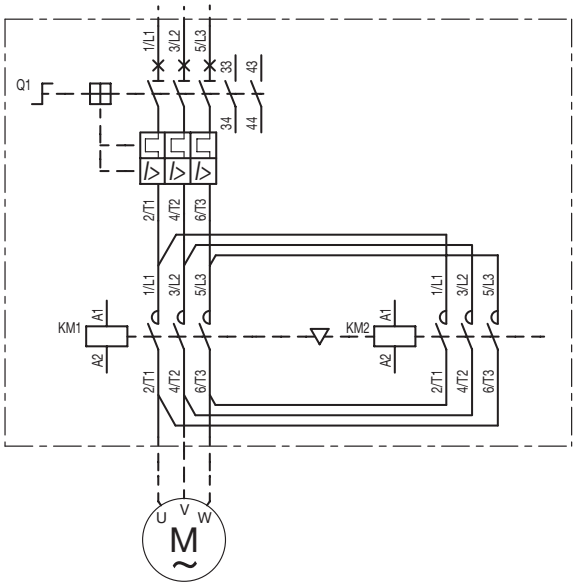
AC or DC remote control



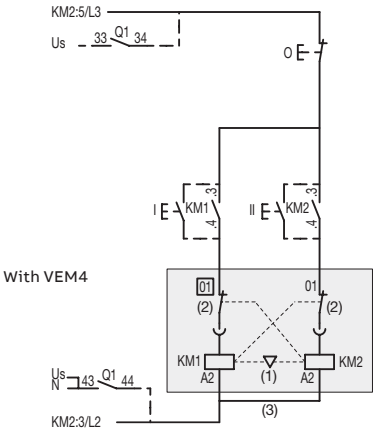
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

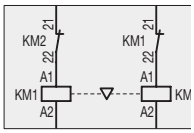
Power circuit



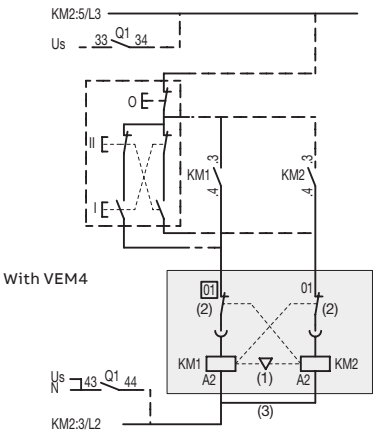
AC or DC local control



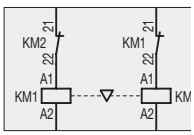
With VM



AC or DC remote control



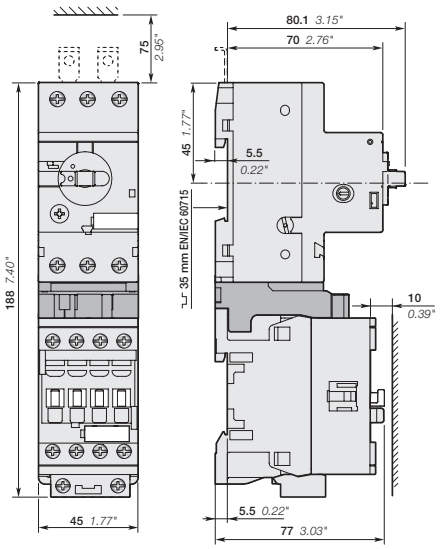
With VM



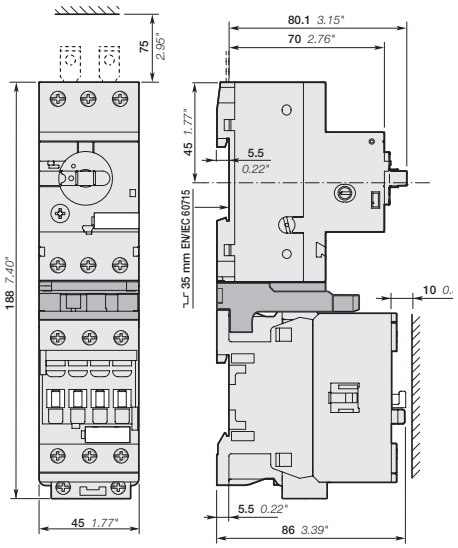
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

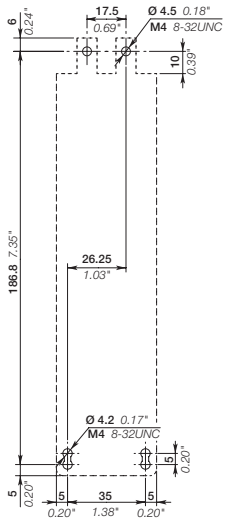
DOL starters protected by MS116 manual motor starters

With AF contactors - open type version in kit form



MS116-0.16 ... MS116-16
+ BEA16-4
+ AF09, AF12, AF16





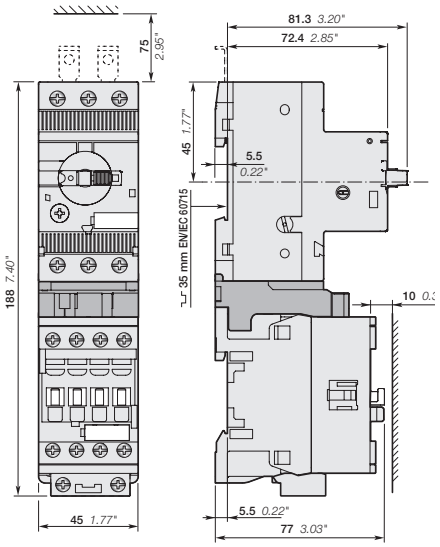
MS116-0.16 ... MS116-16
+ BEA26-4
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Coordination tables for MS166 available is our SOC tool :
https://applications.it.abb.com/SOC/Selectivity

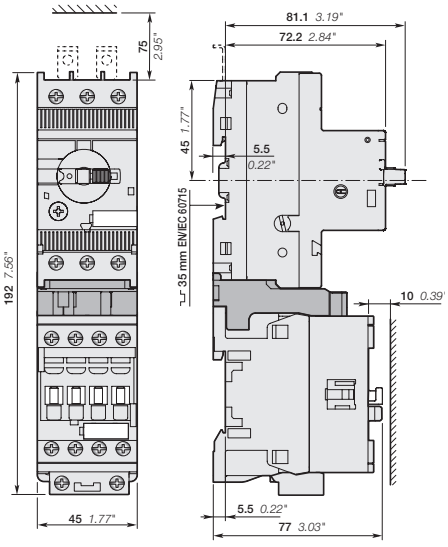
Main dimensions mm, inches

DOL starters protected by MS132 manual motor starters

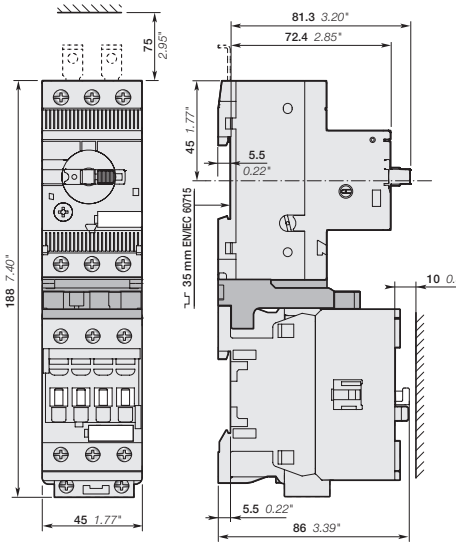
With AF contactors - open type version in kit form



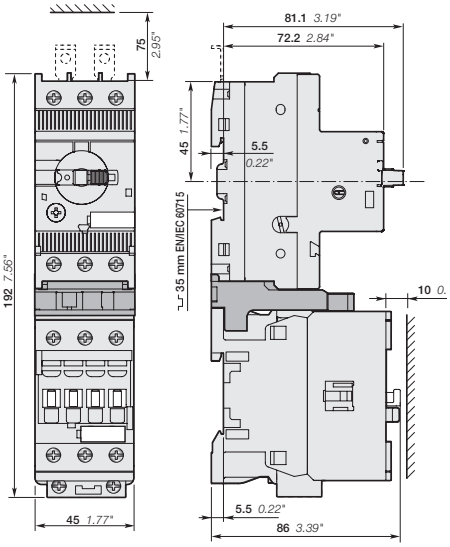
MS132-0.16 ... MS132-10
+ BEA16-4
+ AF09, AF12, AF16



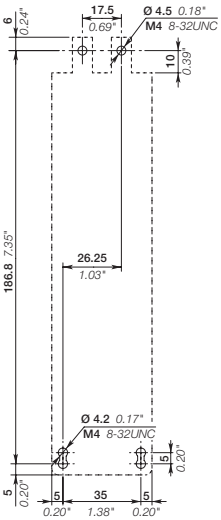
MS132-12 ... MS132-25
+ BEA16-4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4
+ AF26, AF30, AF38



MS132-12 ... MS132-32
+ BEA38-4
+ AF26, AF30, AF38

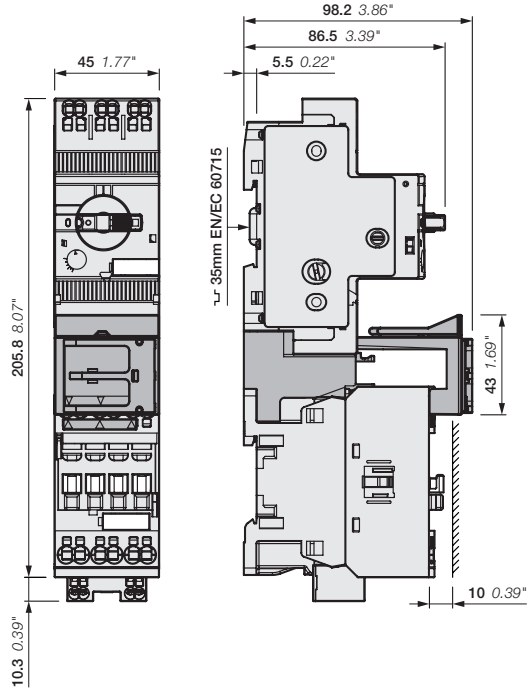


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

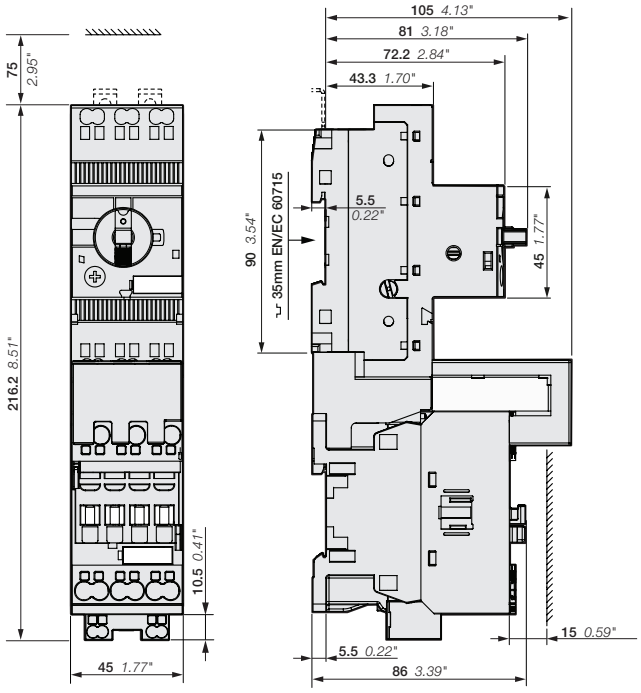
Main dimensions mm, inches

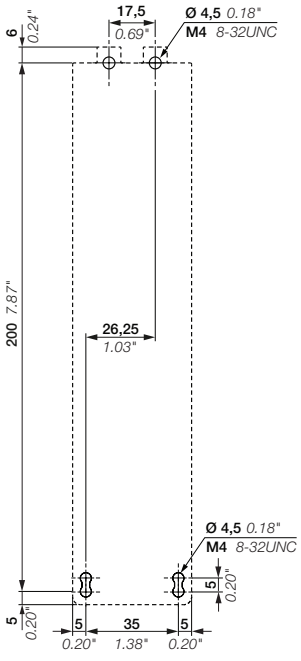
DOL starters protected by MS132-K manual motor starters

With AF..K contactors - open type version in kit form



MS132-K
+ BEA16-4KF
+ AF09..K, AF12..K, AF16..K





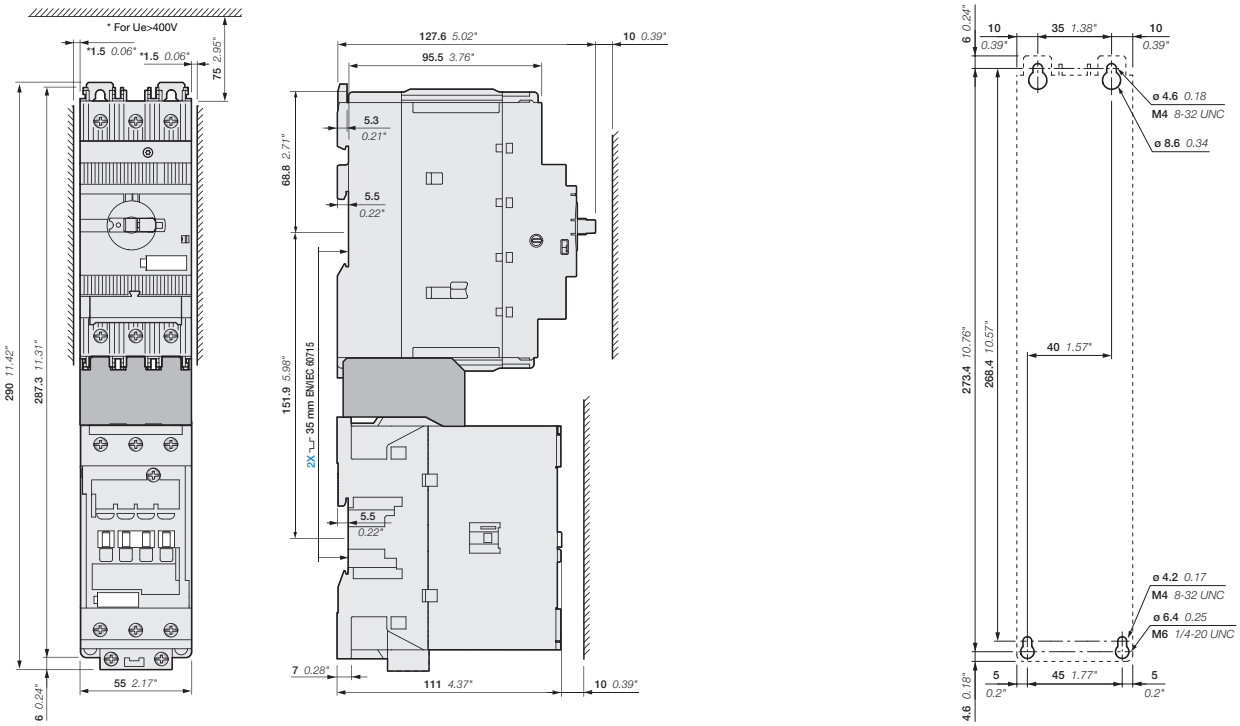
MS132-K
+ BEA38-4KF
+ AF26..K, AF30..K, AF38..K

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

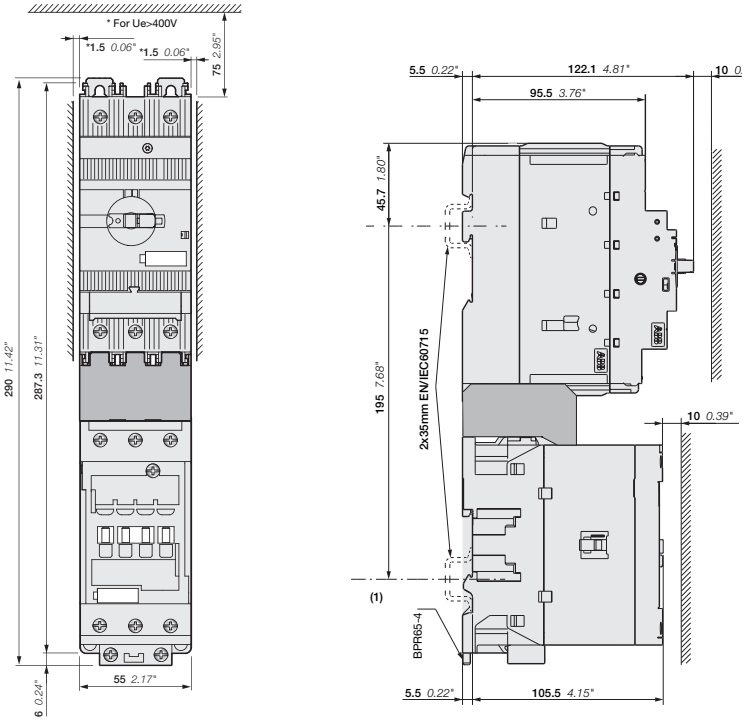
Main dimensions mm, inches

DOL starters protected by MS165 manual motor starters

With AF contactors - open type version in kit form



MS165
+ BEA65-4
+ AF40, AF52, AF65



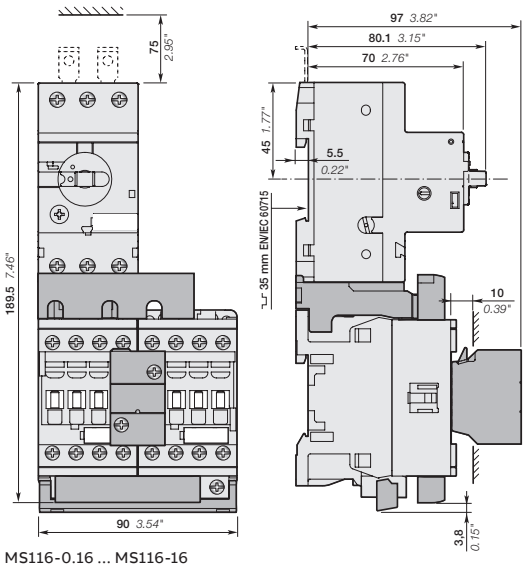
MS165
+ BEA65-4
+ AF40, AF52, AF65 + BPR65-4

Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm 0.06" min.
(1) Assembly on fixed DIN Rails for DOL starter with BPR65-4 rail hook

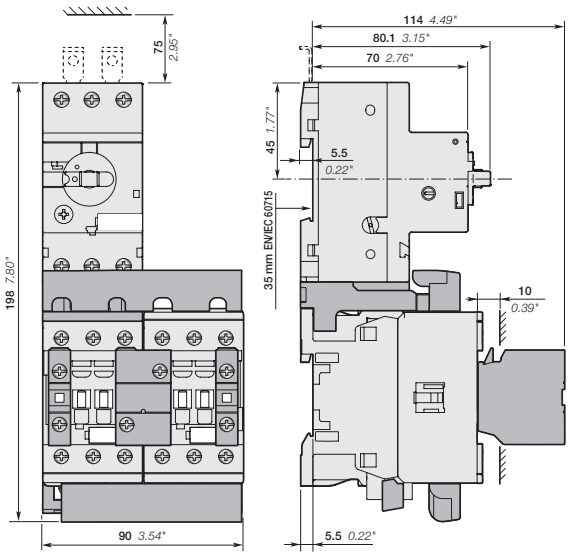
Main dimensions mm, inches

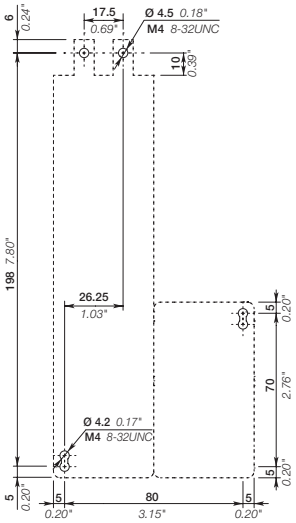
Reversing starters protected by MS116 manual motor starters

With AF contactors - open type version in kit form



MS116-0.16 ... MS116-16
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16





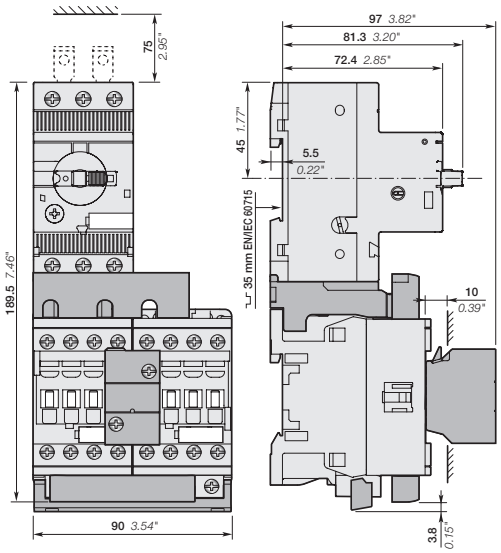
MS116-0.16 ... MS116-16
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Coordination tables for MS166 available is our SOC tool :
https://applications.it.abb.com/SOC/Selectivity

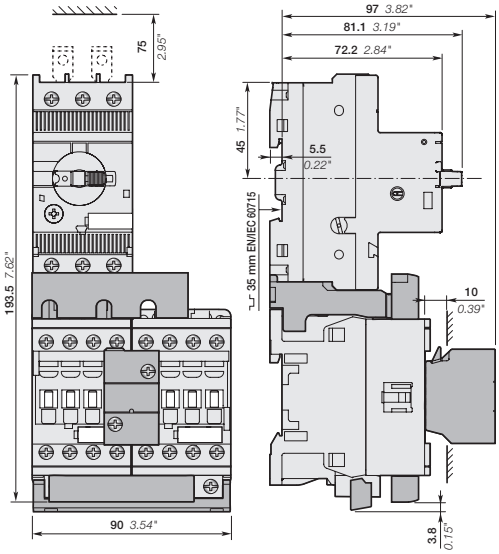
Main dimensions mm, inches

Reversing starters protected by MS132 manual motor starters

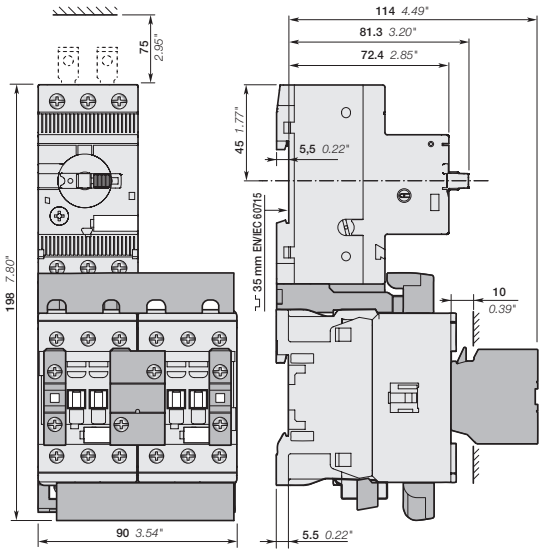
With AF contactors - open type version in kit form



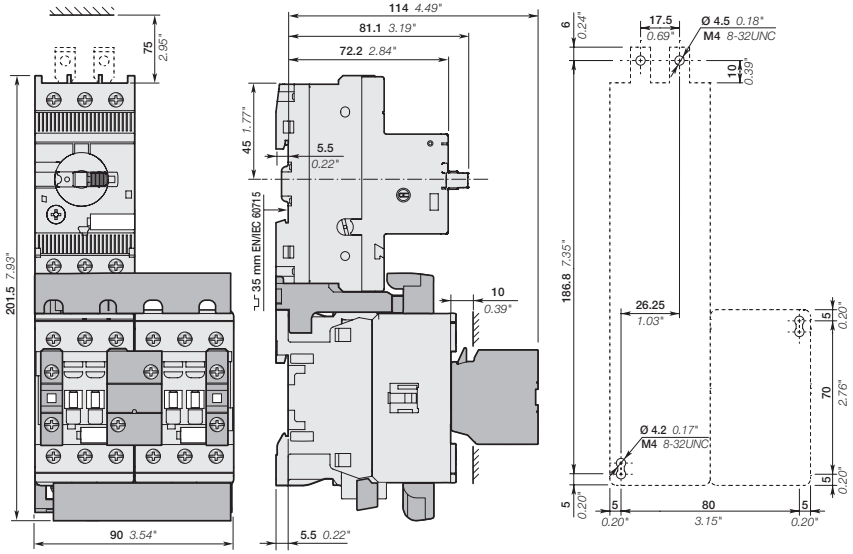
MS132-0.16 ... MS132-10
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS132-12 ... MS132-25
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38



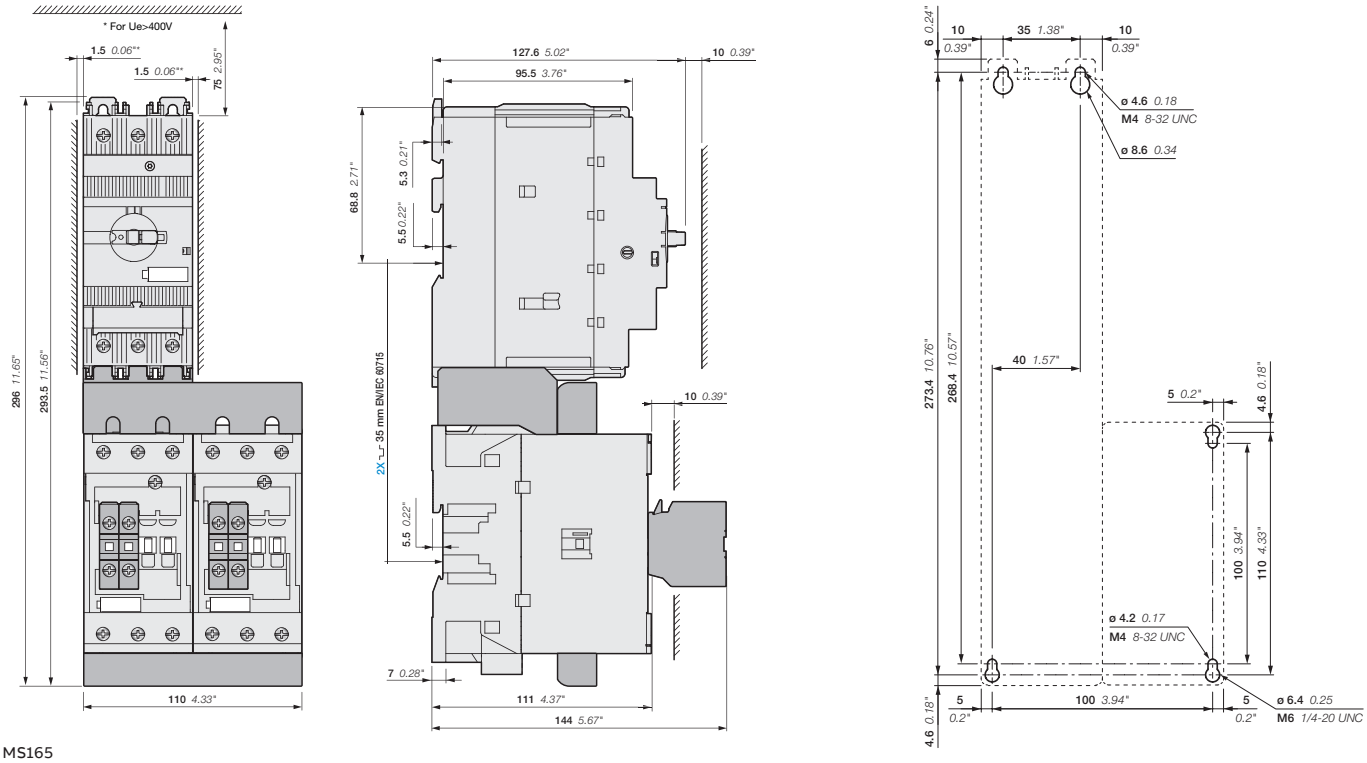
MS132-12 ... MS132-32
+ BEA38-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

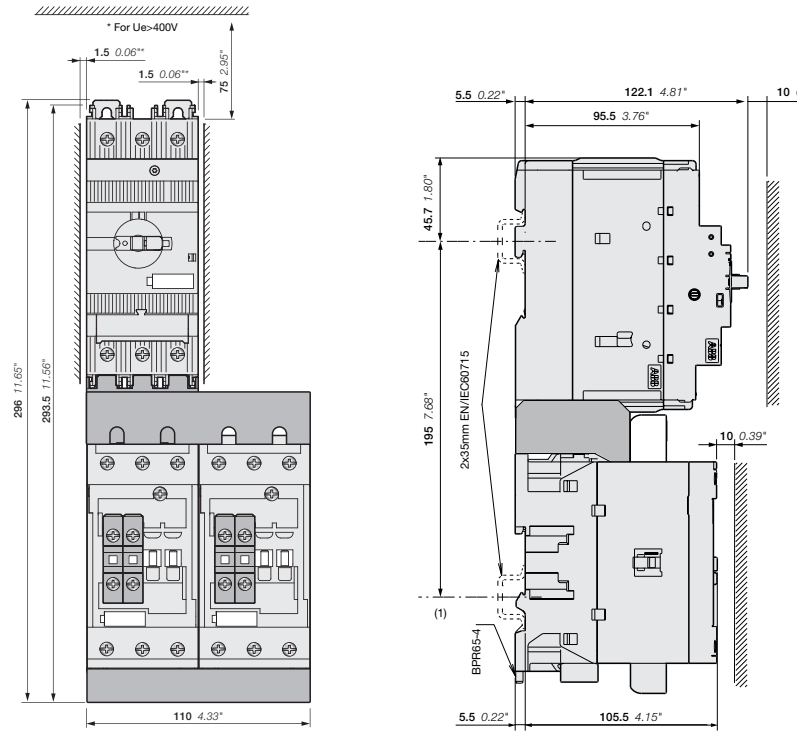
Main dimensions mm, inches

Reversing starters protected by MS165 manual motor starters

With AF contactors - open type version in kit form



MS165
+ BEA65-4, BER65-4, VM96-4
+ AF40, AF52, AF65



MS165
+ BEA65-4,
+ AF40, AF52, AF65 + 2x BPR65-4

Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm 0.06" min.
(1): Assembly on fixed DIN Rails for reverser starter with BPR65-4 rail hook

Main dimensions mm, inches

DOL starters protected by moulded-case circuit-breakers and overload relays

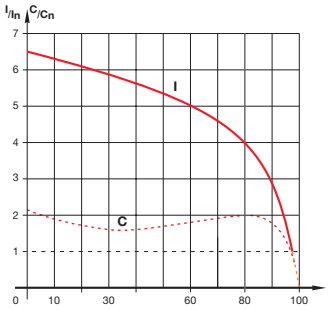
With AF contactors - open type version in kit form

XT2S 160 + BEA140/XT2 + AF140-30-11

XT2S 160 + BEA140/XT2 + AF140-30-11 + EF146

Application

Full voltage direct-on-line (DOL) starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the moulded-case circuit-breaker control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1/ EN 60947-4-1) defining the anticipated level of service continuity as follow:

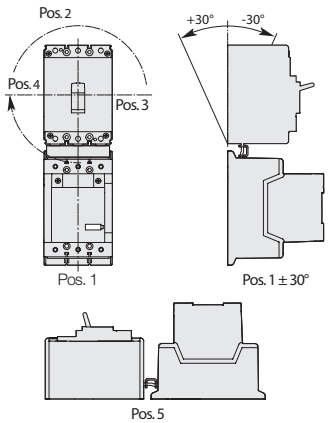
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main Technical Data

Standards	**IEC 60947-4-1 / EN 60947-4-1**
Rated operational voltage Ue max.	400 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature	
Close to the device	< 55 °C
Degree of protection	IP20

Mounting positions



Direct-on-line
MCCB + AF

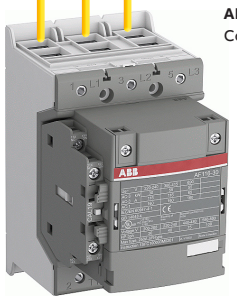
Direct-on-line
MCCB + AF + OL

DOL starters protected by moulded-case circuit-breakers and overload relays

With AF contactors - open type version in kit form

MCCB
Moulded-case circuit-breaker including motor protection

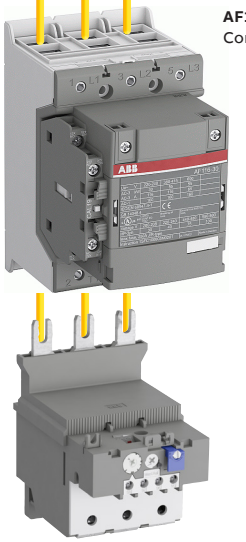
BEA
Connection bar



AF116 ... AF370
Contactor

MCCB
Moulded-case circuit-breaker (magnetic only)

BEA
Connection bar



AF116 ... AF370
Contactor

TF
Thermal overload relay
EF
Electronic overload relay

You can easily assemble a direct-on-line starter by using the BEA connection bars. It is used to electrically connect MCCB moulded-case circuit-breaker and AF116 ... AF370 contactor, AC or DC operated.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 50 kA up to 200 kW.

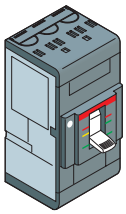
For the full coordination tables,
please visit our SOC tool :
https://applications.it.abb.com/SOC/Selectivity

DOL starters protected by MCCB including motor protection

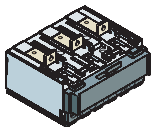
Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

MCCB

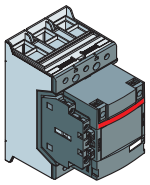


+



IEC		Magnetic triping current setting	Max. allowed thermal setting	Base			Trip unit	
AC-3, 400 V				Type	Order code		Type	Order code
Rated power kW	Rated current A	A						
55	97	1440	116	XT2S 160	1SDA068164R1	+	Ekip M-LIU In160	1SDA067355R1
75	132	1920	140	XT2S 160	1SDA068164R1	+	Ekip M-LIU In160	1SDA067355R1
90	160	2400	190	T4S 250 PR222MP In200	1SDA054527R1		Included	-
110	195	2880	205	T5S 400 PR222MP In320	1SDA054553R1		Included	-
132	230	3600	265	T5S 400 PR222MP In400	1SDA054554R1		Included	-
160	280	4400	305	T5S 400 PR222MP In400	1SDA054554R1		Included	-

Contactors



Connection bars

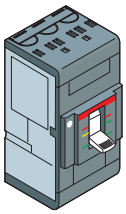
Control voltage Uc min. ... Uc max.		Type	Order code	Type	Order code
V 50/60 Hz	V DC				
24...60	20...60	AF116-30-11-11	1SFL427001R1111	BEA140/XT2	1SFN084206R1000
100...250	100...250	AF116-30-11-13	1SFL427001R1311		
24...60	20...60	AF140-30-11-11	1SFL447001R1111		
100...250	100...250	AF140-30-11-13	1SFL447001R1311		
24...60	20...60	AF190-30-11-11	1SFL487002R1111	BEA205/T4	1SFN084806R1001
100...250	100...250	AF190-30-11-13	1SFL487002R1311		
24...60	20...60	AF205-30-11-11	1SFL527002R1111		
100...250	100...250	AF205-30-11-13	1SFL527002R1311		
24...60	20...60	AF265-30-11-11	1SFL547002R1111	BEA370/T5	1SFN085406R1000
100...250	100...250	AF265-30-11-13	1SFL547002R1311		
24...60	20...60	AF305-30-11-11	1SFL587002R1111		
100...250	100...250	AF305-30-11-13	1SFL587002R1311		

DOL starters protected by MCCB (magnetic only) and overload relays

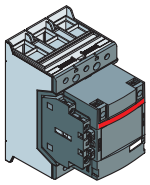
Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

MCCB



Contactors



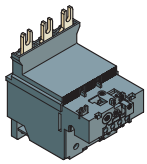
Thermal overload relays

IEC AC-3, 400 V Rated power kW	Rated current A	Magnetic tripping current A	Type	Order code	Control voltage Uc min. ... Uc max. V 50/60 Hz	V DC	Type	Order code
55	97	1600	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF116-30-11-11	1SFL427001R1111
					100...250	100...250	AF116-30-11-13	1SFL427001R1311
75	132	1920	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF140-30-11-11	1SFL447001R1111
					100...250	100...250	AF140-30-11-13	1SFL447001R1311
90	160	2250	XT4S 250 Ekip I In250	1SDA068480R1	24...60	20...60	AF190-30-11-11	1SFL487002R1111
					100...250	100...250	AF190-30-11-13	1SFL487002R1311
110	195	2720	T4S 320 PR221-I In320	1SDA054126R1	24...60	20...60	AF205-30-11-11	1SFL527002R1111
					100...250	100...250	AF205-30-11-13	1SFL527002R1311

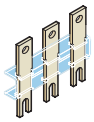
Electronic overload relays

55	97	1600	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF116-30-11-11	1SFL427001R1111
					100...250	100...250	AF116-30-11-13	1SFL427001R1311
75	132	1920	XT2S 160 MA 160	1SDA076530R1	24...60	20...60	AF140-30-11-11	1SFL447001R1111
					100...250	100...250	AF140-30-11-13	1SFL447001R1311
90	160	2250	XT4S 250 Ekip I In250	1SDA068480R1	24...60	20...60	AF190-30-11-11	1SFL487002R1111
					100...250	100...250	AF190-30-11-13	1SFL487002R1311
110	195	2720	T4S 320 PR221-I In320	1SDA054126R1	24...60	20...60	AF205-30-11-11	1SFL527002R1111
					100...250	100...250	AF205-30-11-13	1SFL527002R1311
132	230	3200	T5S 400 PR221-I In400	1SDA054335R1	24...60	20...60	AF265-30-11-11	1SFL547002R1111
					100...250	100...250	AF265-30-11-13	1SFL547002R1311
160	280	4000	T5S 400 PR221-I In400	1SDA054335R1	24...60	20...60	AF305-30-11-11	1SFL587002R1111
					100...250	100...250	AF305-30-11-13	1SFL587002R1311
200	350	5040	T5S 630 PR221-I In630	1SDA054405R1	24...60	20...60	AF370-30-11-11	1SFL607002R1111
					100...250	100...250	AF370-30-11-13	1SFL607002R1311

Overload relays



Connection bars



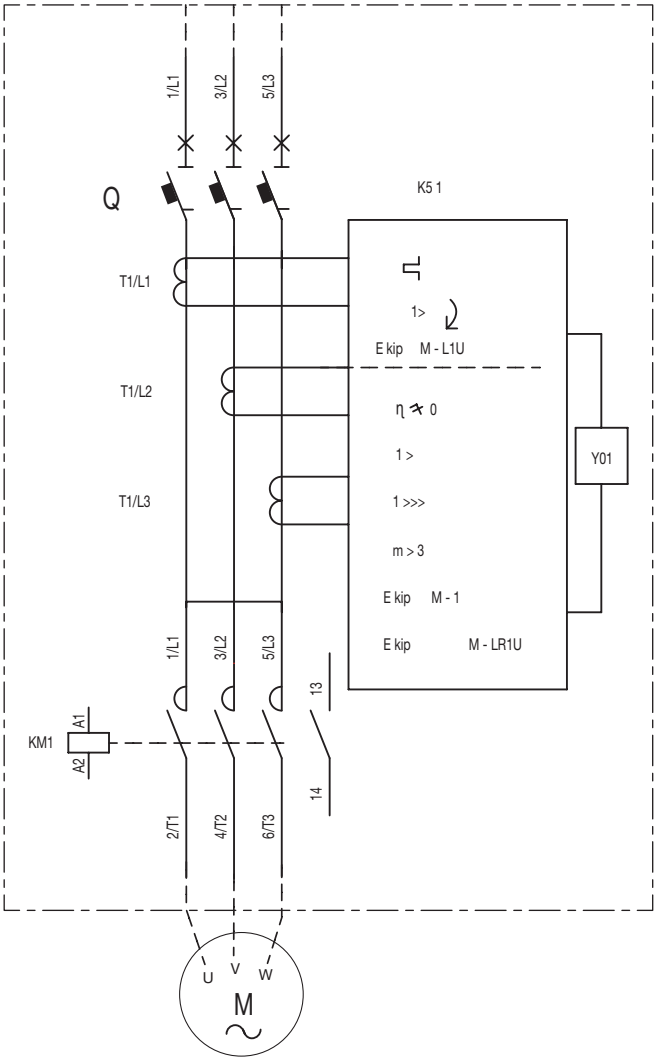
	Setting ranges A	Max. allowed setting current A	Type	Order code	Type	Order code
	80...110	110	TF140DU-110	1SAZ431201R1002	BEA140/XT2	1SFN084206R1000
	110...142	140	TF140DU-142	1SAZ431201R1004		
	130...175	175	TA200DU-175	1SAZ421201R1005	BEA205/XT4	1SFN084806R1000
	155...200	200	TA200DU-200	1SAZ421201R1006	BEA205/T4	1SFN084806R1001
	54...150	116	EF146-150	1SAX351001R1101	BEA140/XT2	1SFN084206R1000
	54...150	140	EF146-150	1SAX351001R1101		
	63...210	190	EF205-210	1SAX531001R1101	BEA205/XT4	1SFN084806R1000
	63...210	205	EF205-210	1SAX531001R1101	BEA205/T4	1SFN084806R1001
	115...380	265	EF370-380	1SAX611001R1101	BEA370/T5	1SFN085406R1000
	115...380	305	EF370-380	1SAX611001R1101		
	115...380	350	EF370-380	1SAX611001R1101		

DOL starters protected by moulded-case circuit-breakers and overload relays

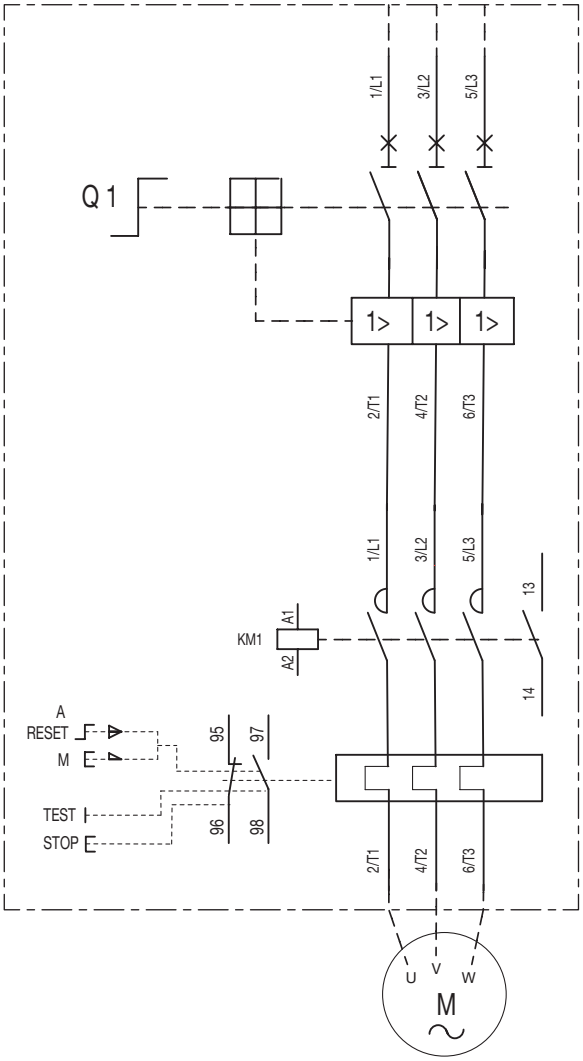
With AF contactors - Open type version in kit form

Direct-on-line starters

Protected by MCCB including motor protection

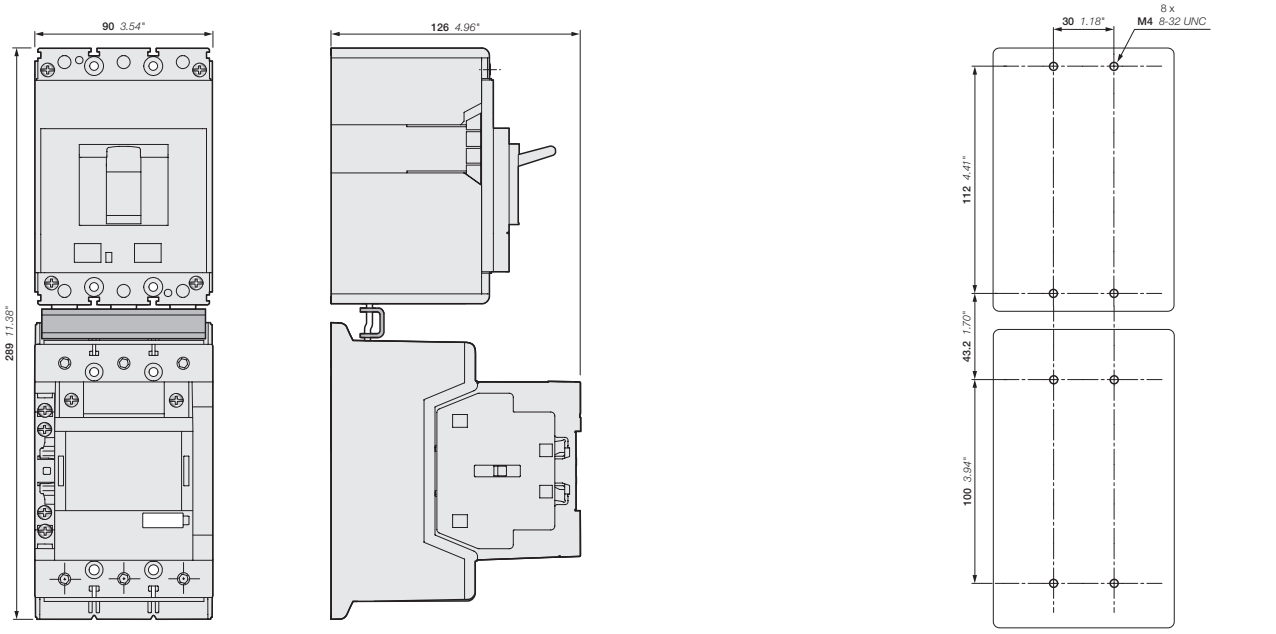


Protected by MCCB (magnetic only) and overload relays

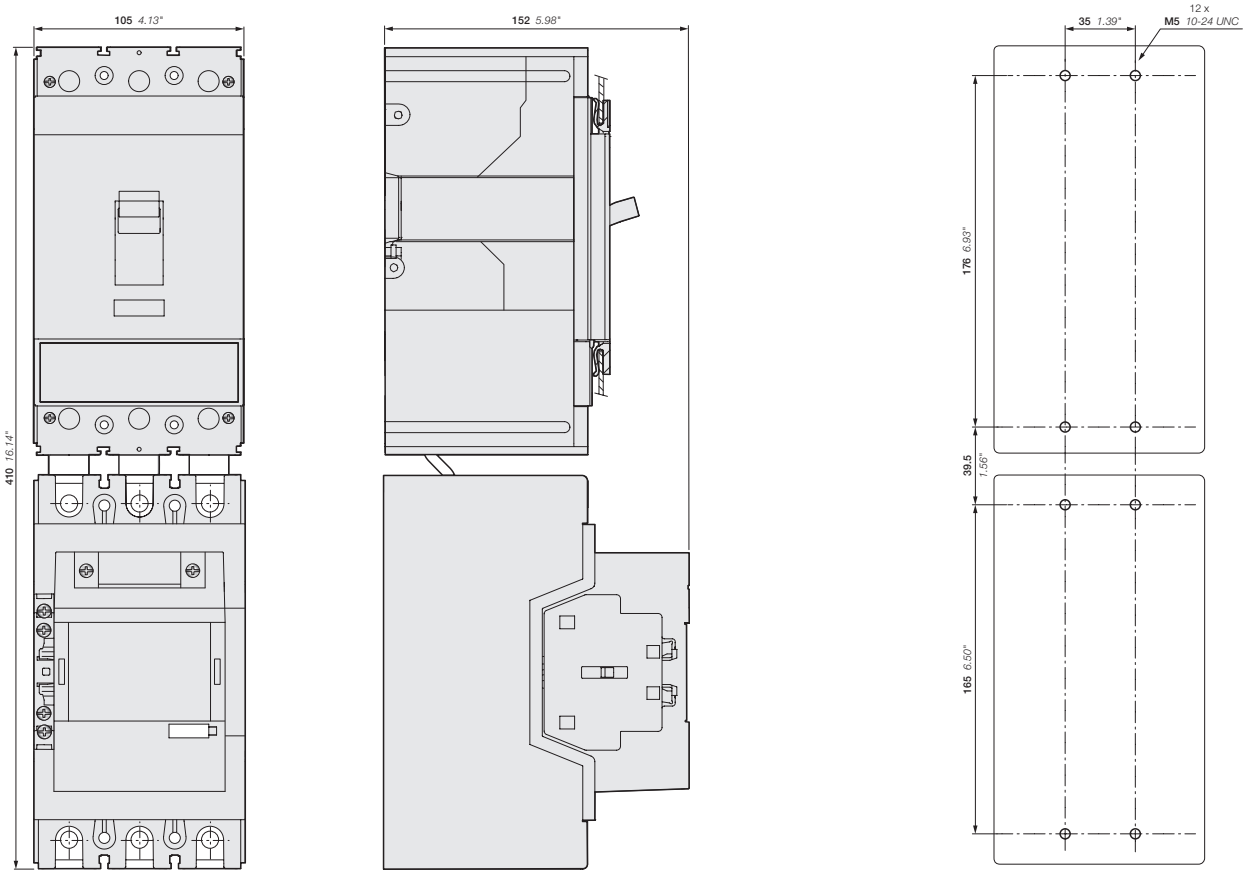


DOL starters protected by MCCB, including motor protection

With AF contactors - Open type version in kit form



XT2S 160 + Ekip M-LIU In160
+ BEA140/XT2
+ AF116, AF140, AF146

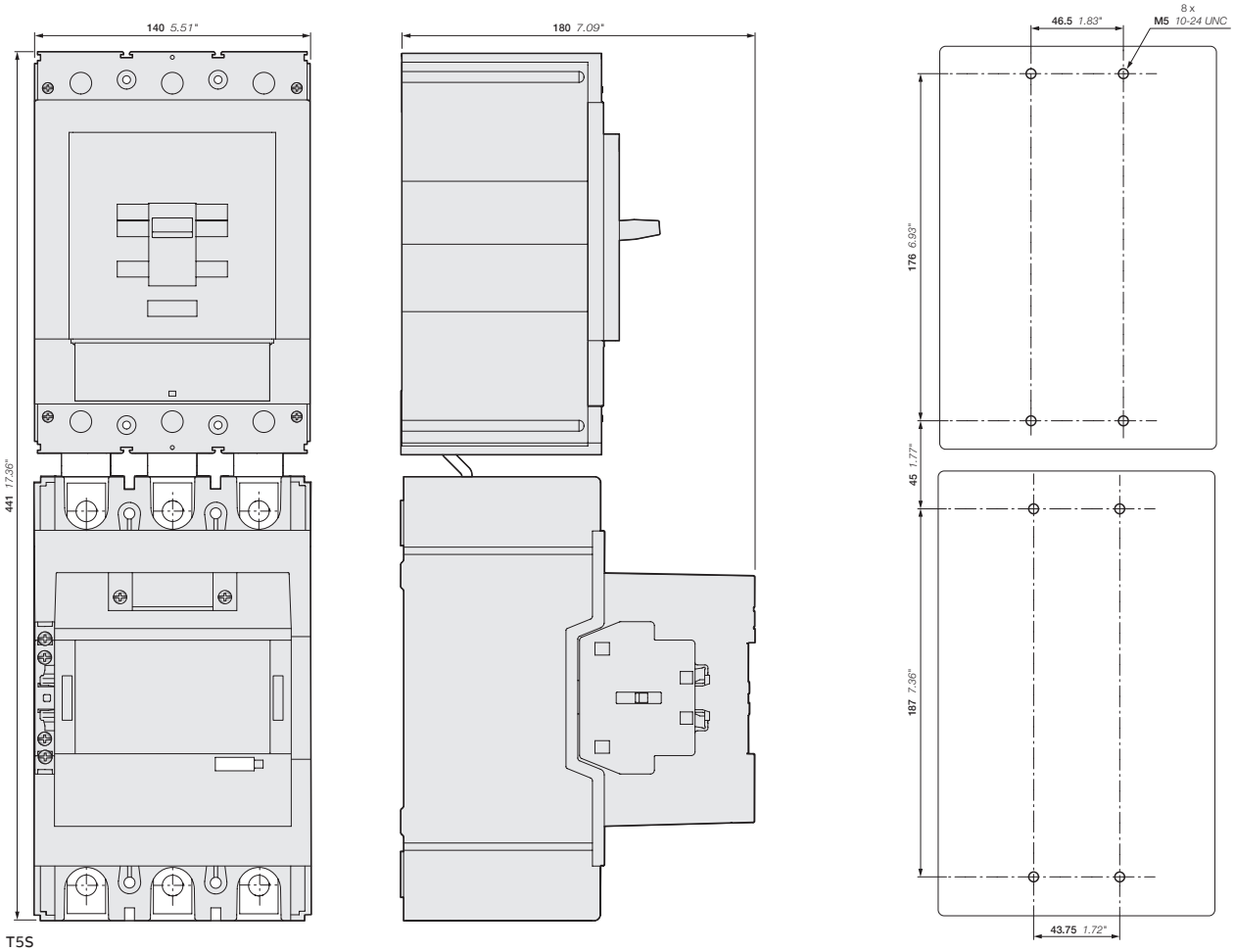


T4S
+ BEA205/T4
+ AF190, AF205

Main dimensions mm, inches

DOL starters protected by MCCB, including motor protection

With AF contactors - Open type version in kit form

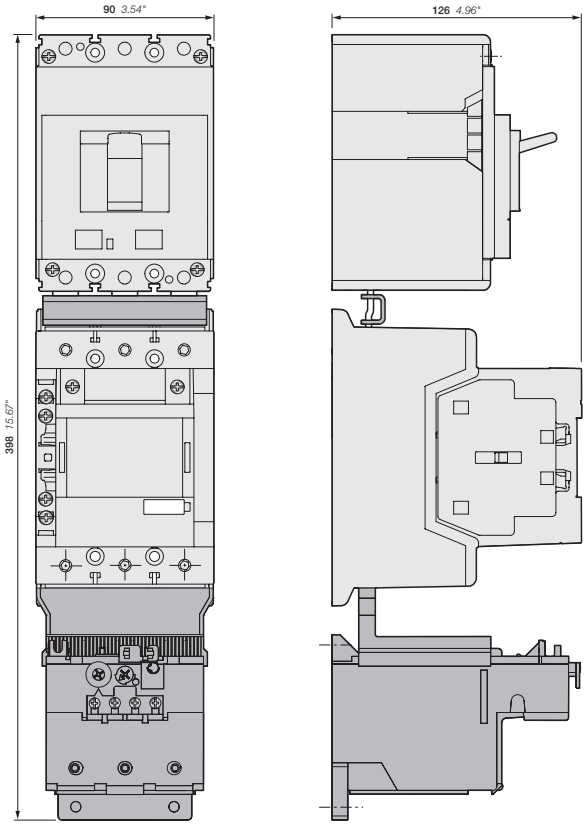


T5S
+ BEA370/T5
+ AF265, AF305, AF370

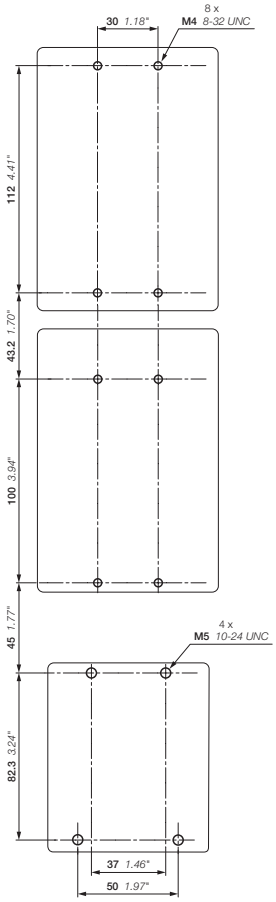
Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and thermal overload relays

With AF contactors - Open type version in kit form



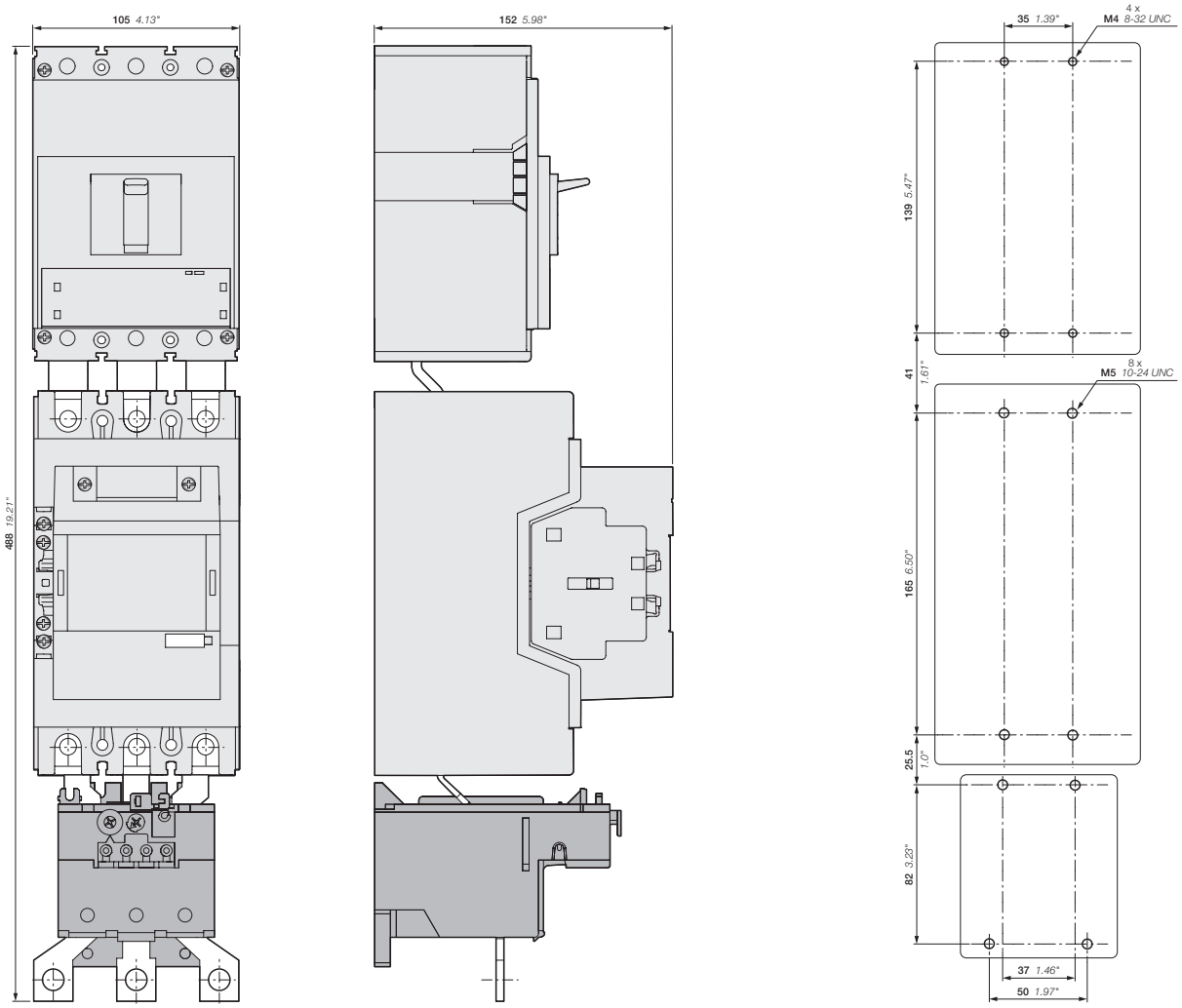
XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ TF140 thermal overload relay



Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and thermal overload relays

With AF contactors - Open type version in kit form

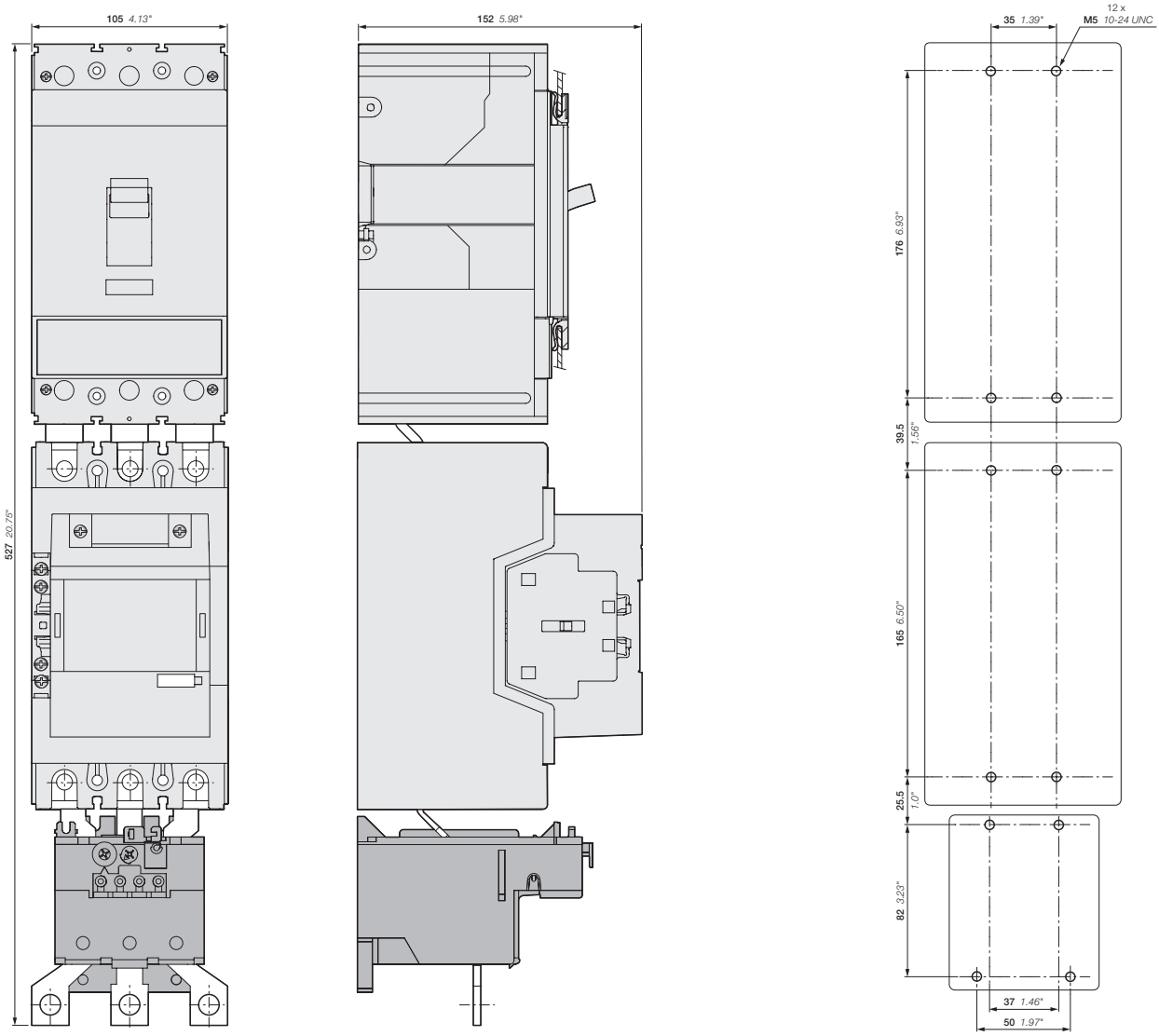


XT4S
+ BEA205/XT4
+ AF190, AF205
+ TA200DU thermal overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and thermal overload relays

With AF contactors - Open type version in kit form

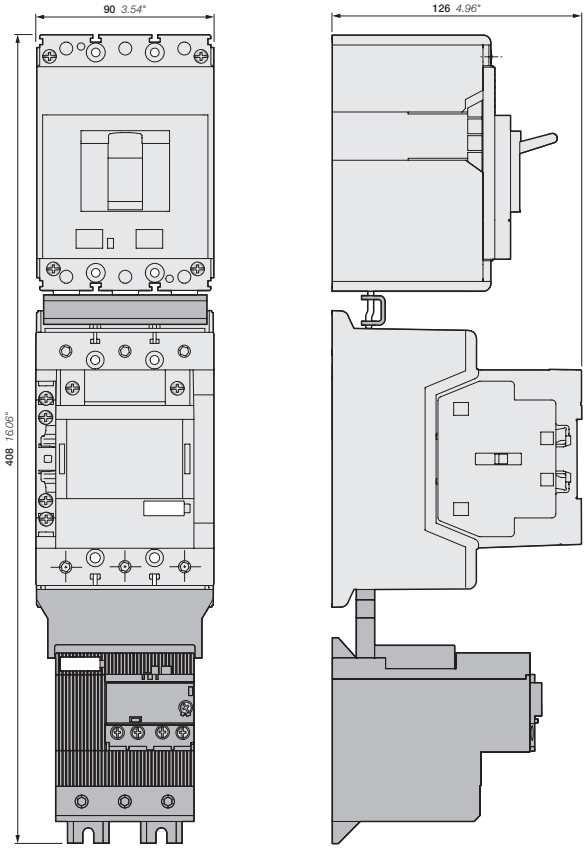


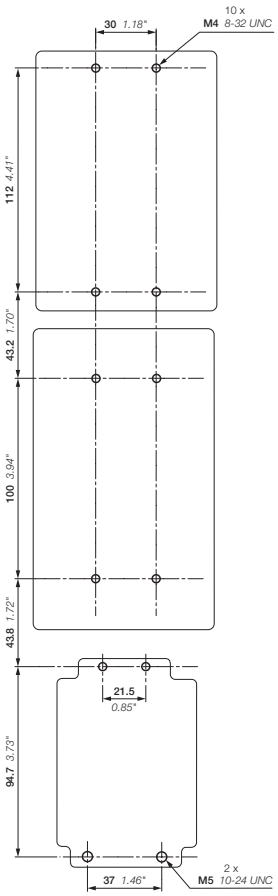
T4S
+ BEA205/T4
+ AF190, AF205
+ TA200DU thermal overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form



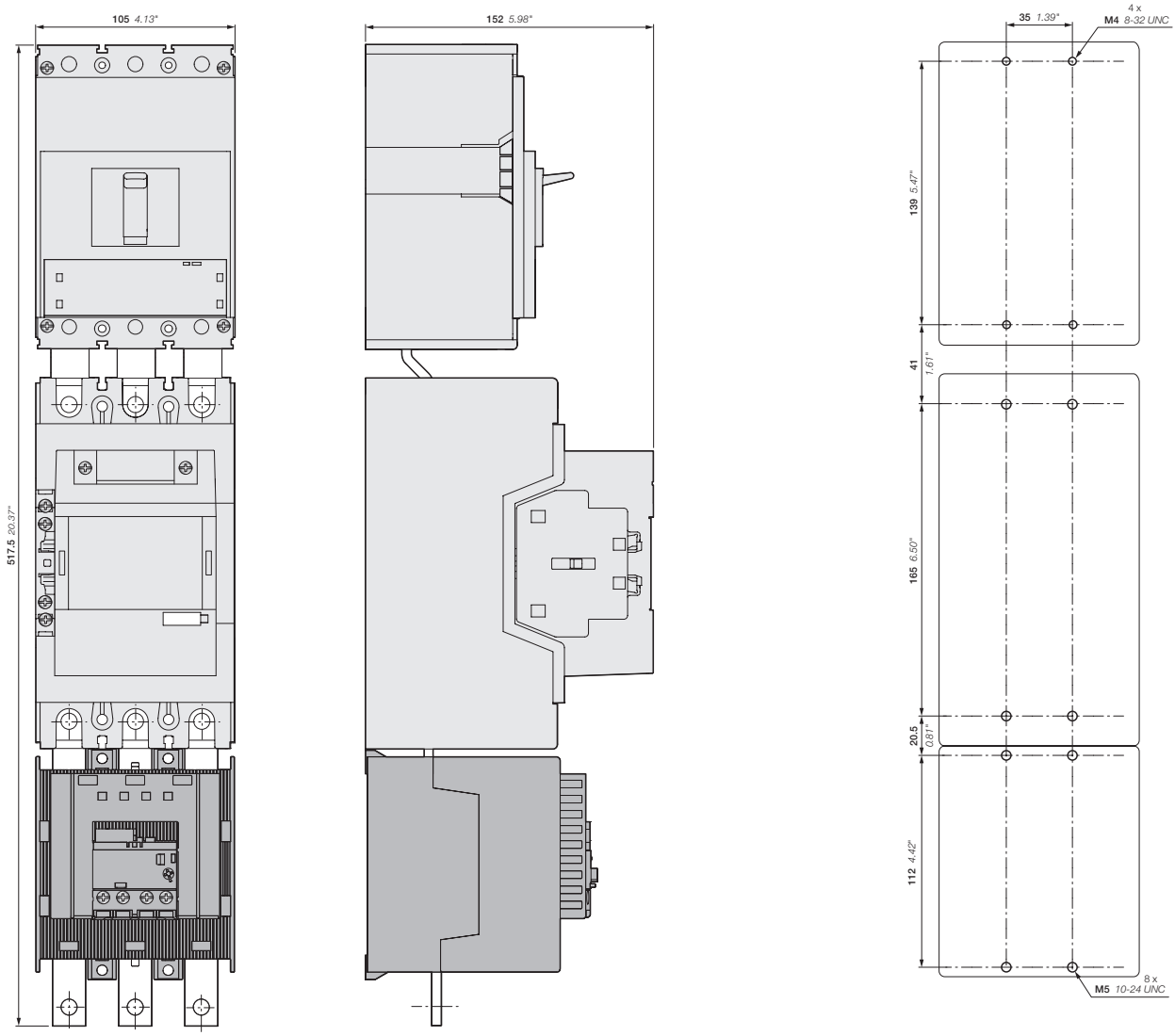


XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ EF146 electronic overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

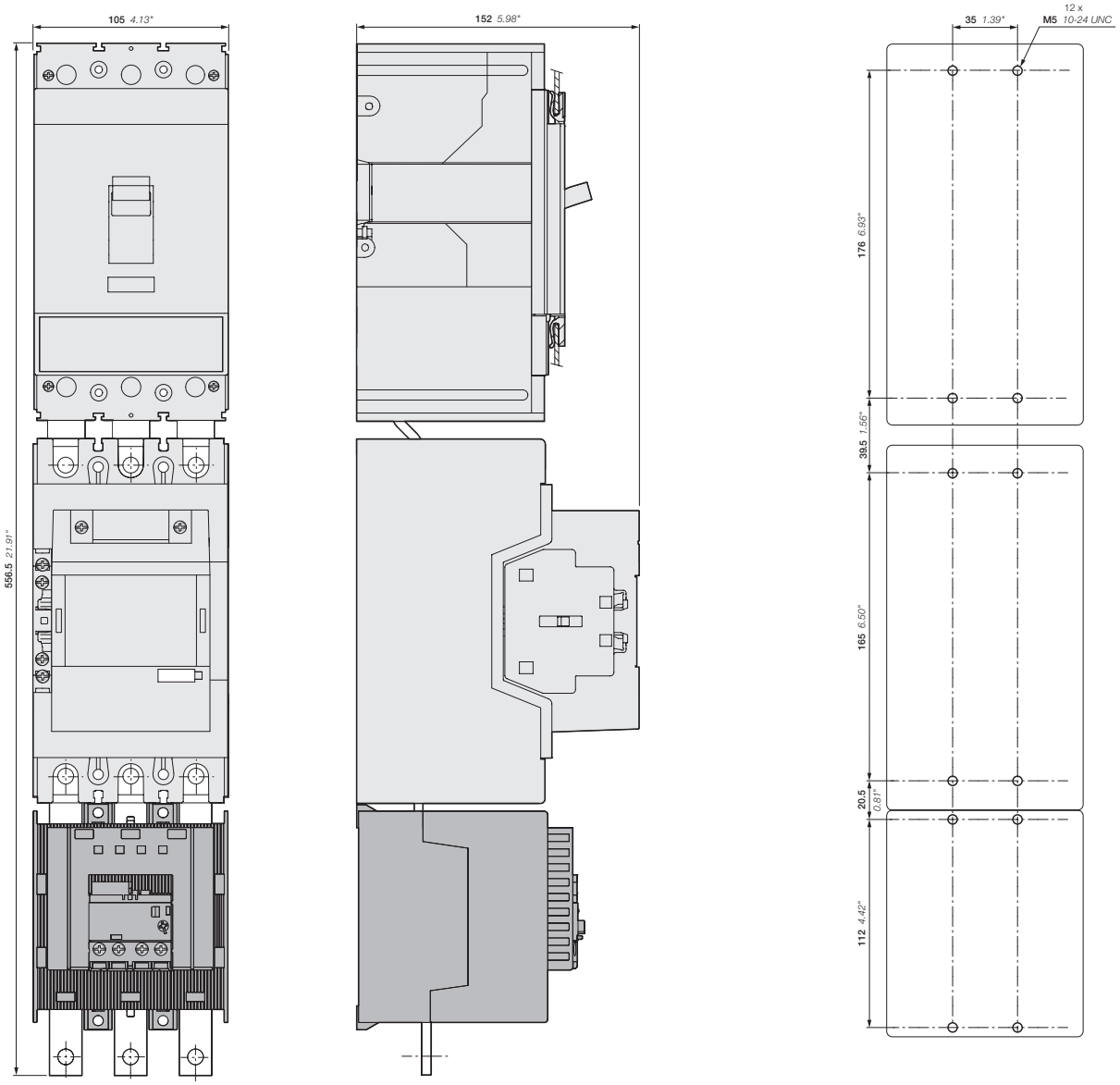


XT4S
+ BEA205/XT4
+ AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

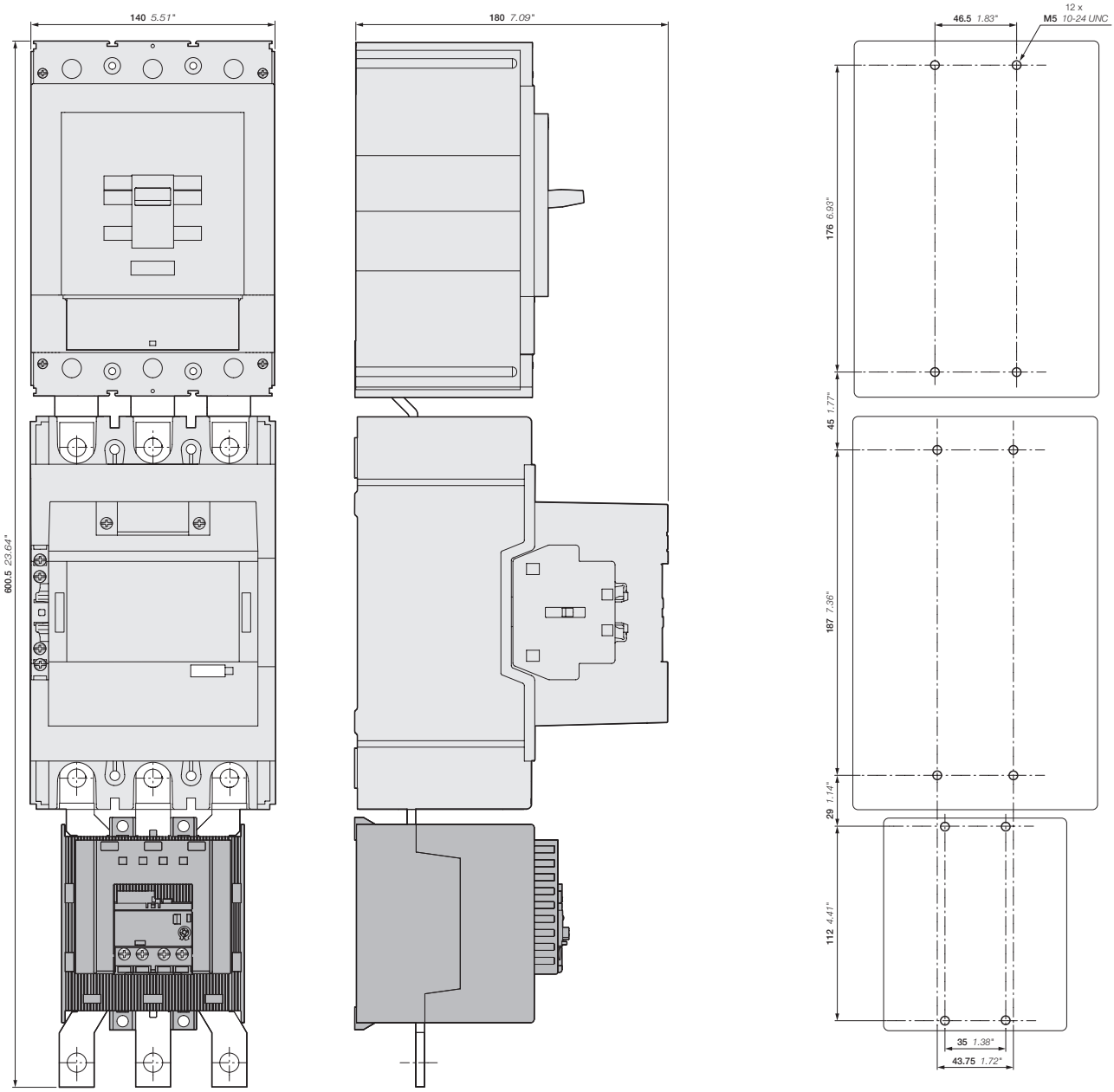


T4S
+ BEA205/T4
+ AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

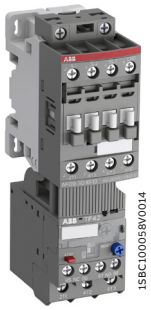


T5S
+ BEA370/T5
+ AF265, AF305, AF370
+ EF370 electronic overload relay

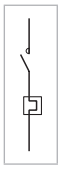
Main dimensions mm, inches

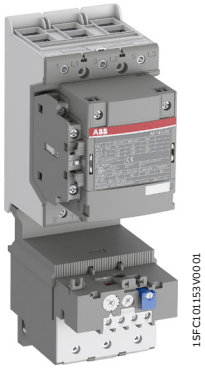
DOL and reversing starters protected by overload relays

With AF contactors - Open type version in kit form



AF09-30-10 + TF42

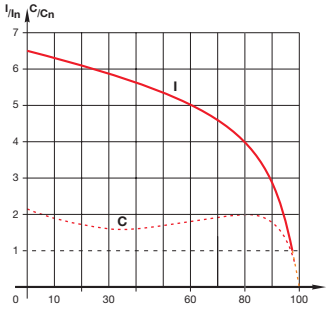




AF140-30-11 + TF140DU

Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination Types

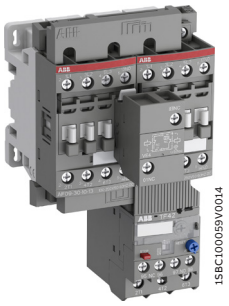
The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

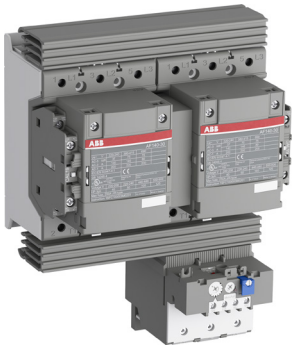
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Ambient air temperature	
Close to the device	≤ 60 °C (TF42: 38 A above ≤ 50 °C)
Degree of protection	IP20
Switching frequency	Refer to "Switching frequency diagrams" page

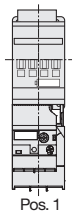


AF09-30-10 + BER16-4 + VEM4 + TF42

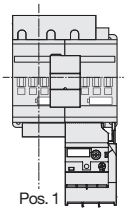


AF140-30-11 + BER140-4 + VM19 + TF140DU

Mounting positions



Direct-on-line



Reversing

DOL and reversing starters protected by overload relays

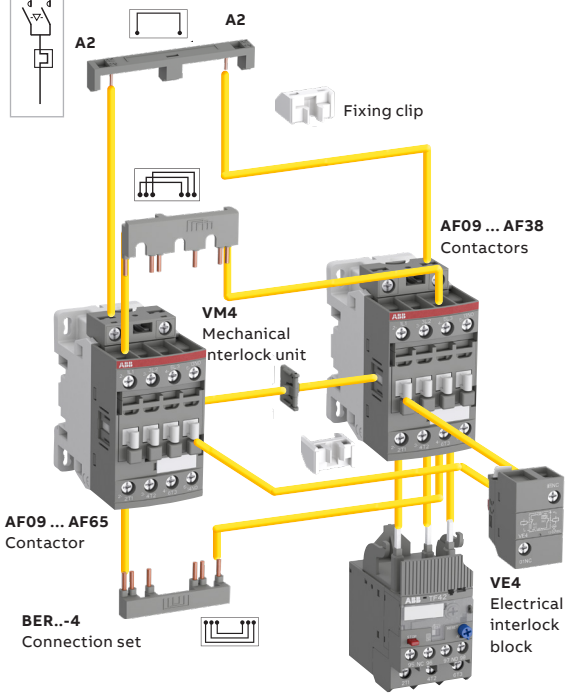
With AF contactors - Open type version in kit form

Direct-On-Line starters

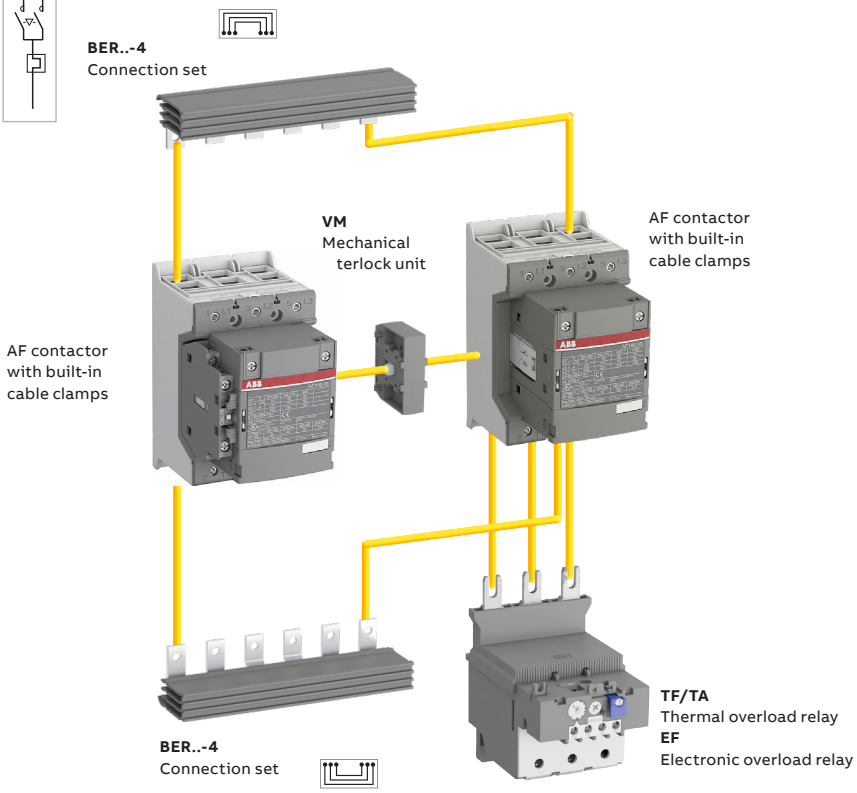
AF09 ... AF96
Contactor

TF
Thermal overload relay
EF
Electronic overload relay

Reversing starters for AF09 ... AF38



Reversing starters for AF116 ... AF370



You can easily assemble a direct-on-line starter by connecting AF contactor and TF thermal overload relay or EF electronic overload relay.
You can also easily assemble reversing starter thanks to our complete range of accessories:

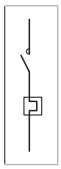
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width.
- It includes:
  - VM4 mechanical interlock unit including 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BER..-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

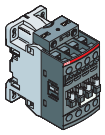
For the full coordination tables, please visit our SOC tool :
https://applications.it.abb.com/SOC/Selectivity

Direct-on-line starters protected by thermal overload relays

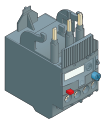
With AF contactors - Open type version in kit form



Contactors



Thermal overload relays



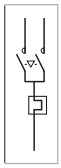
Accessories

IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC (2)	Type	Order code	Setting ranges A	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	TF42-10	1SAZ711201R1043
		100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	10.0...13.0	TF42-13	1SAZ711201R1045
		100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	13.0...16.0	TF42-16	1SAZ711201R1047
		100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	20.0...24.0	TF42-24	1SAZ711201R1051
		100...250	100...250	AF26-30-00-13	1SBL237001R1300			
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	29.0...35.0	TF42-35	1SAZ711201R1053
		100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	35.0...38.0/40.0	TF42-38	1SAZ711201R1055
		100...250	100...250	AF38-30-00-13	1SBL297001R1300			
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	30.0...40.0	TF65-40	1SAZ811201R1003
		100...250	100...250	AF40-30-00-13	1SBL347001R1300			
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	36.00...47.0	TF65-47	1SAZ811201R1004
		100-250	100-250	AF52-30-00-13	1SBL367001R1300			
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	50.0...60.0	TF65-60	1SAZ811201R1006
		100-250	100-250	AF65-30-00-13	1SBL387001R1300			
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	57.0...68.0	TF96-68	1SAZ911201R1003
		100-250	100-250	AF80-30-00-13	1SBL397001R1300			
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	75.0..87.0	TF96-87	1SAZ911201R1005
		100-250	100-250	AF96-30-00-13	1SBL407001R1300			
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	80...110	TF140DU-110	1SAZ431201R1002
		100-250	100-250	AF116-30-11-13	1SFL427001R1311			
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	100...135	TF140DU-135	1SAZ431201R1003
		100-250	100-250	AF140-30-11-13	1SFL447001R1311			
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	130...175	TA200DU-175	1SAZ411201R1005
		100-250	100-250	AF190-30-11-13	1SFL487002R1311			
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	150...200	TA200DU-200	1SAZ411201R1006
		100-250	100-250	AF205-30-11-13	1SFL527002R1311			

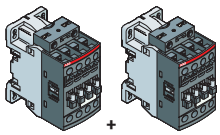
(1) For other control voltages, see "Voltage code table".
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".
(2) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by thermal overload relays

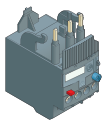
With AF contactors - Open type version in kit form



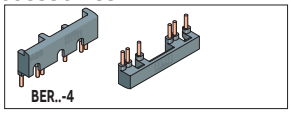
Contactors

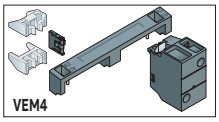


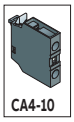
Thermal overload relays



Accessories





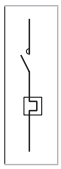


IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Setting ranges A	Type	Order code	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	7.60...10.0	TF42-10	1SAZ711201R1043	BER16-4	1SBN081311R1000
		100...250	100...250	AF09-30-10-13	1SBL137001R1310				+ VEM4	1SBN030111R1000
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	10.0...13.0	TF42-13	1SAZ711201R1045		
		100...250	100...250	AF12-30-10-13	1SBL157001R1310					
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	13.0...16.0	TF42-16	1SAZ711201R1047		
		100...250	100...250	AF16-30-10-13	1SBL177001R1310					
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	20.0...24.0	TF42-24	1SAZ711201R1051	BER38-4	1SBN082311R1000
		100...250	100...250	AF26-30-00-13	1SBL237001R1300				+ VEM4	1SBN030111R1000
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	29.0...35.0	TF42-35	1SAZ711201R1053	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF30-30-00-13	1SBL277001R1300					
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	35.0...38.0/40.0	TF42-38	1SAZ711201R1055		
		100...250	100...250	AF38-30-00-13	1SBL297001R1300					
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	30.0...40.0	TF65-40	1SAZ811201R1003	BER65-4	1SBN083411R1000
		100...250	100...250	AF40-30-00-13	1SBL347001R1300				+ VM96-4	1SBN033405T1000
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	36.00...47.0	TF65-47	1SAZ811201R1004	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF52-30-00-13	1SBL367001R1300				+ 2x CA4-01	1SBN010110R1001
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	50.0...60.0	TF65-60	1SAZ811201R1006		
		100...250	100...250	AF65-30-00-13	1SBL387001R1300					
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	57.0...68.0	TF96-68	1SAZ911201R1003	BER96-4	1SBN083911R1000
		100...250	100...250	AF80-30-00-13	1SBL397001R1300				+ VM96-4	1SBN033405T1000
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	75.0..87.0	TF96-87	1SAZ911201R1005	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF96-30-00-13	1SBL407001R1300				+ 2x CA4-01	1SBN010110R1001
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	80...110	TF140DU-110	1SAZ431201R1002	BER140-4	1SFN084111R1000
		100...250	100...250	AF116-30-11-13	1SFL427001R1311				+ VM19	1SFN030300R1000
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	100...135	TF140DU-135	1SAZ431201R1003		
		100...250	100...250	AF140-30-11-13	1SFL447001R1311					
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	130...175	TA200DU-175	1SAZ411201R1005	BER205-4	1SFN084811R1000
		100...250	100...250	AF190-30-11-13	1SFL487002R1311				+ VM19	1SFN030300R1000
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	150...200	TA200DU-200	1SAZ411201R1006		
		100...250	100...250	AF205-30-11-13	1SFL527002R1311					

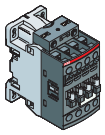
(1) For other control voltages, see "Voltage code table".
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".
(2) AF ... -11 not suitable for direct control by PLC-output.

Direct-on-line starters protected by electronic overload relays

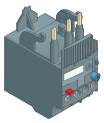
With AF contactors - Open type version in kit form



Contactors



Electronic overload relays



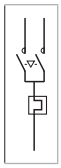
Accessories

IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Setting ranges A	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105
		100...250	100...250	AF09-30-10-13	1SBL137001R1310			
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105
		100...250	100...250	AF12-30-10-13	1SBL157001R1310			
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105
		100...250	100...250	AF16-30-10-13	1SBL177001R1310			
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	9.00...30.0	EF45-30	1SAX221001R1101
		100...250	100...250	AF26-30-00-13	1SBL237001R1300			
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	9.00...30.0	EF45-30	1SAX221001R1101
		100...250	100...250	AF30-30-00-13	1SBL277001R1300			
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	15.0...45.0	EF45-45	1SAX221001R1102
		100...250	100...250	AF38-30-00-13	1SBL297001R1300			
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100...250	100...250	AF40-30-00-13	1SBL347001R1300			
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100-250	100-250	AF52-30-00-13	1SBL367001R1300			
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	25.0...70.0	EF65-70	1SAX331001R1101
		100-250	100-250	AF65-30-00-13	1SBL387001R1300			
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	36...100	EF96-100	1SAX341001R1101
		100-250	100-250	AF80-30-00-13	1SBL397001R1300			
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	36...100	EF96-100	1SAX341001R1101
		100-250	100-250	AF96-30-00-13	1SBL407001R1300			
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	54...150	EF146-150	1SAX351001R1101
		100-250	100-250	AF116-30-11-13	1SFL427001R1311			
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	54...150	EF146-150	1SAX351001R1101
		100-250	100-250	AF140-30-11-13	1SFL447001R1311			
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	63...110	EF205-110	1SAX531001R1101
		100-250	100-250	AF190-30-11-13	1SFL487002R1311			
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	63...110	EF205-110	1SAX531001R1101
		100-250	100-250	AF205-30-11-13	1SFL527002R1311			
132	230	24...60	20...60	AF265-30-11-11	1SFL547002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF265-30-11-13	1SFL547002R1311			
160	280	24...60	20...60	AF305-30-11-11	1SFL587002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF305-30-11-13	1SFL587002R1311			
200	350	24...60	20...60	AF370-30-11-11	1SFL607002R1111	115...380	EF370-380	1SAX611001R1101
		100-250	100-250	AF370-30-11-13	1SFL607002R1311			

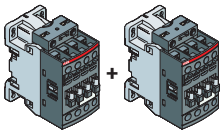
(1) For other control voltages, see "Voltage code table".
(2) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by electronic overload relays

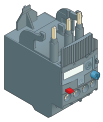
With AF contactors - Open type version in kit form



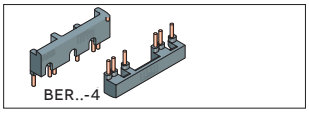
Contactors

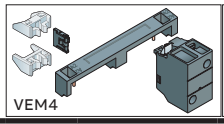


Electronic overload relays



Accessories





IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Setting ranges A	Type	Order code	Type	Order code
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105	BER16-4	1SBN081311R1000
		100...250	100...250	AF09-30-10-13	1SBL137001R1310				+ VEM4	1SBN030111R1000
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105		
		100...250	100...250	AF12-30-10-13	1SBL157001R1310					
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	5.70...18.9	EF19-18.9	1SAX111001R1105		
		100...250	100...250	AF16-30-10-13	1SBL177001R1310					
11	22	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	9.00...30.0	EF45-30	1SAX211001R1101	BER38-4	1SBN082311R1000
		100...250	100...250	AF26-30-00-13	1SBL237001R1300				+ VEM4	1SBN030111R1000
15	29	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	9.00...30.0	EF45-30	1SAX221001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF30-30-00-13	1SBL277001R1300					
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL296001R2100	15.0...45.0	EF45-45	1SAX221001R1102		
		100...250	100...250	AF38-30-00-13	1SBL297001R1300					
18.5	35	24...60	20...60	AF40-30-00-11	1SBL347001R1100	25.0...70.0	EF65-70	1SAX331001R1101	BER65-4	1SBN083411R1000
		100...250	100...250	AF40-30-00-13	1SBL347001R1300				+ VM96-4	1SBN033405T1000
22	41	24...60	20...60	AF52-30-00-11	1SBL367001R1100	25.0...70.0	EF65-70	1SAX331001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF52-30-00-13	1SBL367001R1300				+ 2x CA4-01	1SBN010110R1001
30	55	24...60	20...60	AF65-30-00-11	1SBL387001R1100	25.0...70.0	EF65-70	1SAX331001R1101		
		100...250	100...250	AF65-30-00-13	1SBL387001R1300					
37	66	24...60	20...60	AF80-30-00-11	1SBL397001R1100	36...100	EF96-100	1SAX341001R1101	BER96-4	1SBN083911R1000
		100...250	100...250	AF80-30-00-13	1SBL397001R1300				+ VM96-4	1SBN033405T1000
45	80	24...60	20...60	AF96-30-00-11	1SBL407001R1100	36...100	EF96-100	1SAX341001R1101	+ 2x CA4-10	1SBN010110R1010
		100...250	100...250	AF96-30-00-13	1SBL407001R1300				+ 2x CA4-01	1SBN010110R1001
55	97	24...60	20...60	AF116-30-11-11	1SFL427001R1111	54...150	EF146-150	1SAX351001R1101	BER140-4	1SFN084111R1000
		100...250	100...250	AF116-30-11-13	1SFL427001R1311				+ VM19	1SFN030300R1000
75	132	24...60	20...60	AF140-30-11-11	1SFL447001R1111	54...150	EF146-150	1SAX351001R1101		
		100...250	100...250	AF140-30-11-13	1SFL447001R1311					
90	160	24...60	20...60	AF190-30-11-11	1SFL487002R1111	63...110	EF205-110	1SAX531001R1101	BER205-4	1SFN084811R1000
		100...250	100...250	AF190-30-11-13	1SFL487002R1311				+ VM19	1SFN030300R1000
110	195	24...60	20...60	AF205-30-11-11	1SFL527002R1111	63...110	EF205-110	1SAX531001R1101		
		100...250	100...250	AF205-30-11-13	1SFL527002R1311					
132	230	24...60	20...60	AF265-30-11-11	1SFL547002R1111	115...380	EF370-380	1SAX611001R1101	BER370-4	1SFN085411R1000
		100...250	100...250	AF265-30-11-13	1SFL547002R1311				+ VM19	1SFN030300R1000
160	280	24...60	20...60	AF305-30-11-11	1SFL587002R1111	115...380	EF370-380	1SAX611001R1101		
		100...250	100...250	AF305-30-11-13	1SFL587002R1311					
200	350	24...60	20...60	AF370-30-11-11	1SFL607002R1111	115...380	EF370-380	1SAX611001R1101		
		100...250	100...250	AF370-30-11-13	1SFL607002R1311					

(1) For other control voltages, see "Voltage code table".
(2) AF ... -11 not suitable for direct control by PLC-output.

DOL and reversing starters protected by overload relays

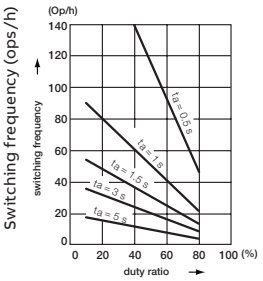
With AF contactors - Open type version in kit form
Switching frequency diagrams

General

Overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency.

Thermal overload relay

Intermittent periodic duty



Duty ratio (%)

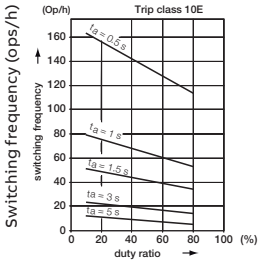
ta: motor starting time

Example:
Starting time of the motor: 1 second - Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour.

Electronic overload relay

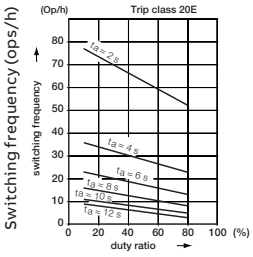
Intermittent periodic duty

Trip class 10E



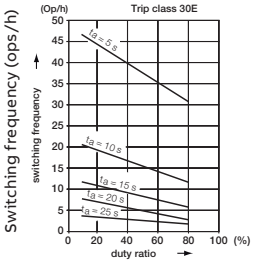
Duty ratio (%)

Trip class 20E



Duty ratio (%)

Trip class 30E



Duty ratio (%)

ta: motor starting time

Exemple for trip class 10E:
Starting time of the motor: 1 second. Duty ratio: 60 % means a permitted switching frequency of max. 60 operating cycles per hour, for a motor breaking current not exceeding 6 x In.

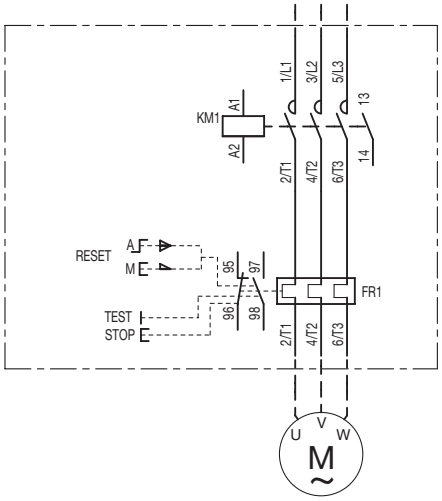
DOL and reversing starters protected by overload relays

With AF contactors - Open type version in kit form

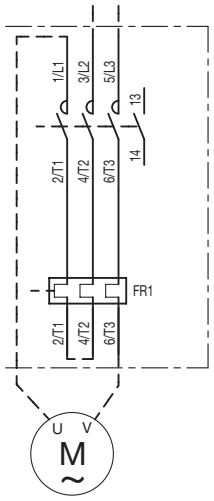
Wiring diagrams

Direct-on-line starters

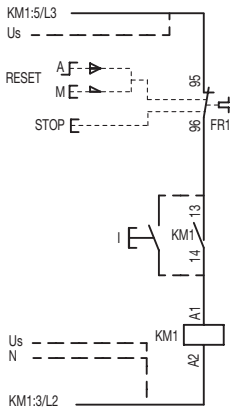
Power circuit



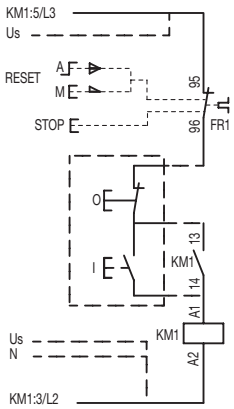
1-phase



AC or DC local control



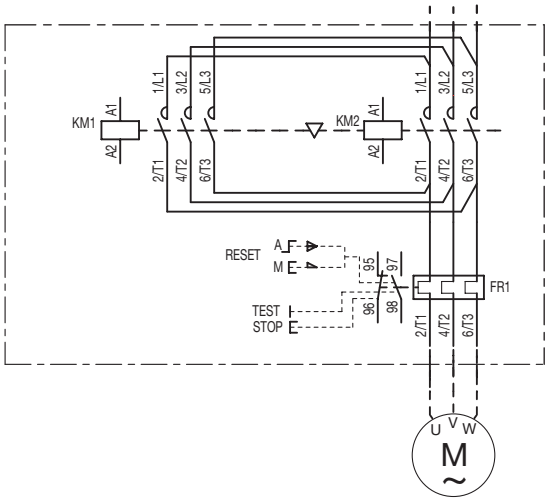
AC or DC remote control



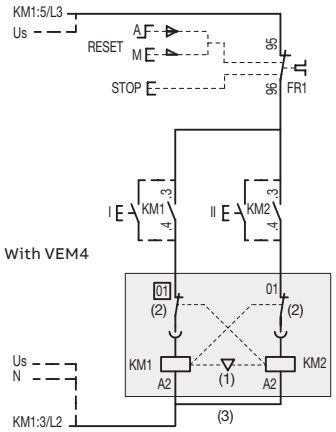
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

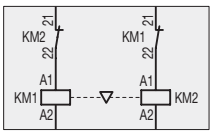
Power circuit



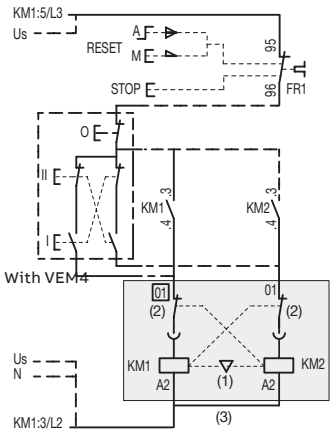
AC or DC local control



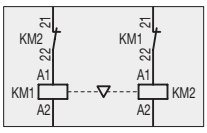
With VM



AC or DC remote control



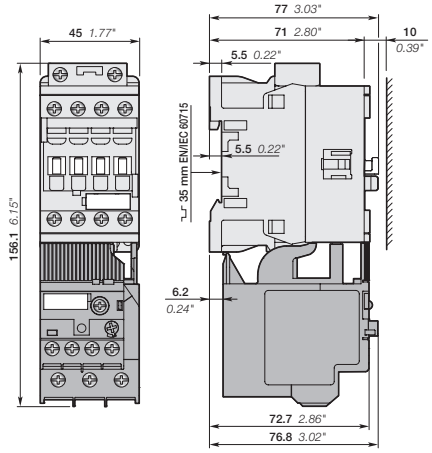
With VM



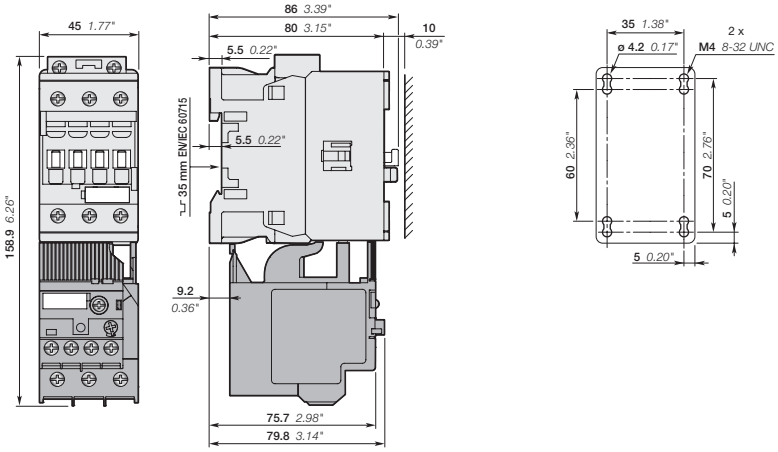
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

DOL starters protected by thermal overload relays

With AF contactors - open type version in kit form

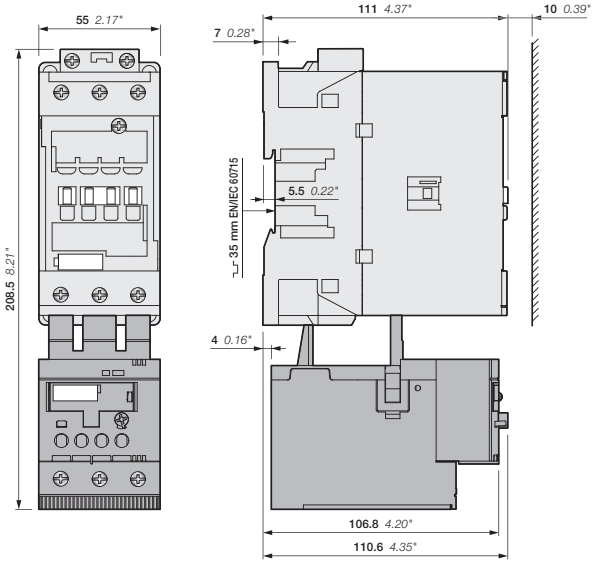


AF09, AF12, AF16
+ TF42 thermal overload relay

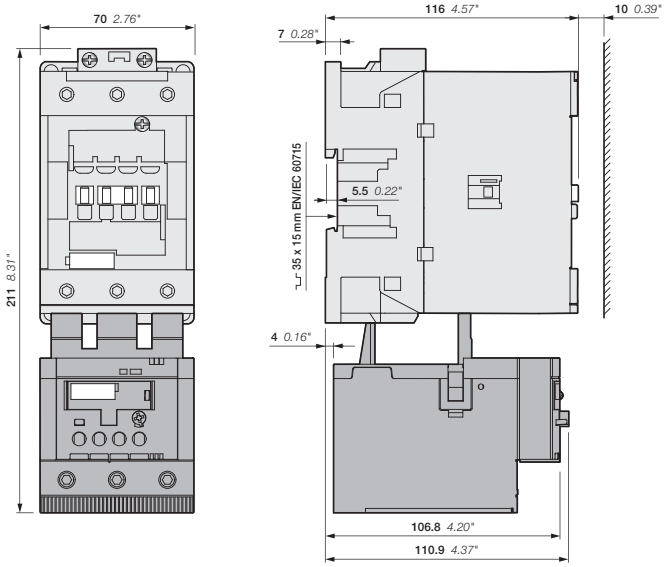


AF26, AF30, AF38
+ TF42 thermal overload relay

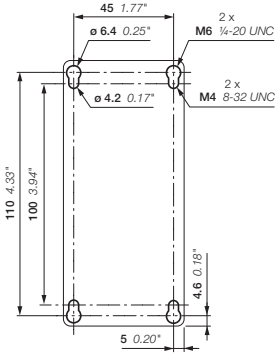
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



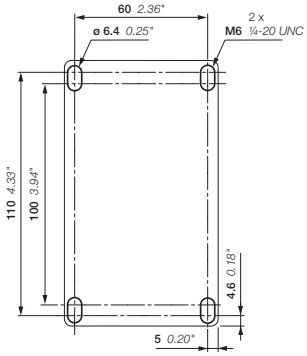
AF40, AF52, AF65
+ TF65 thermal overload relay



AF80, AF96
+ TF96 thermal overload relay



AF40, AF52, AF65
+ TF65 thermal overload relay

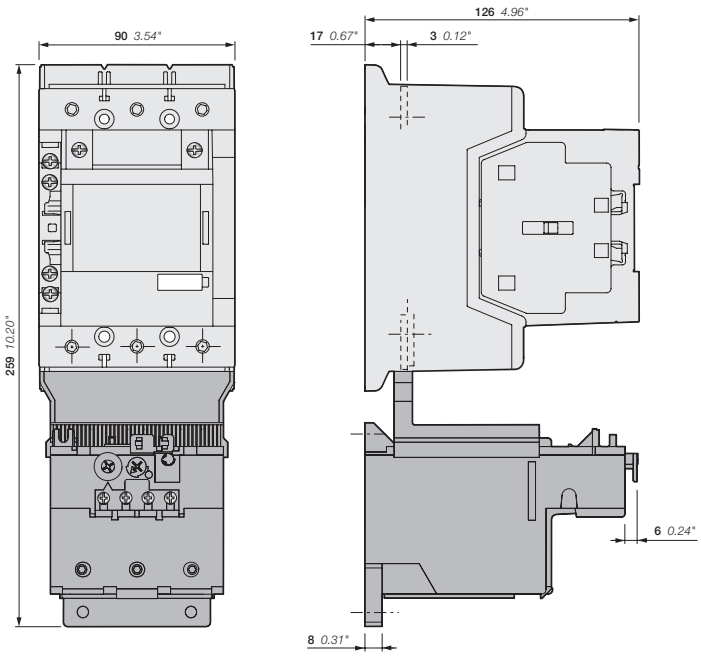


AF80, AF96
+ TF96 thermal overload relay

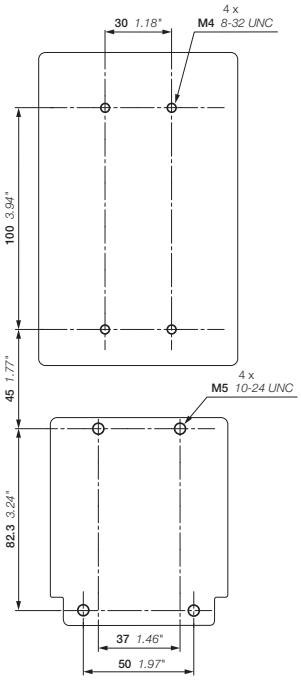
Main dimensions mm, inches

DOL starters protected by thermal overload relays

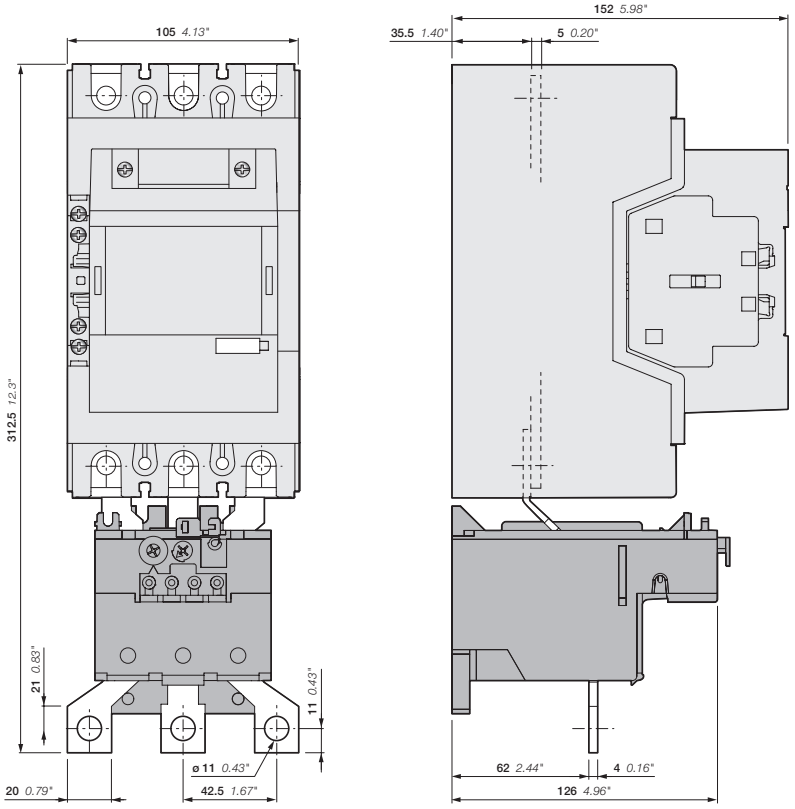
With AF contactors - open type version in kit form



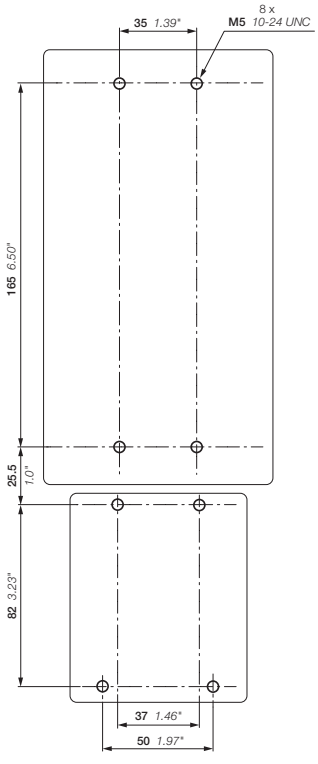
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF190, AF205-30-11
+ TA200DU thermal overload relay

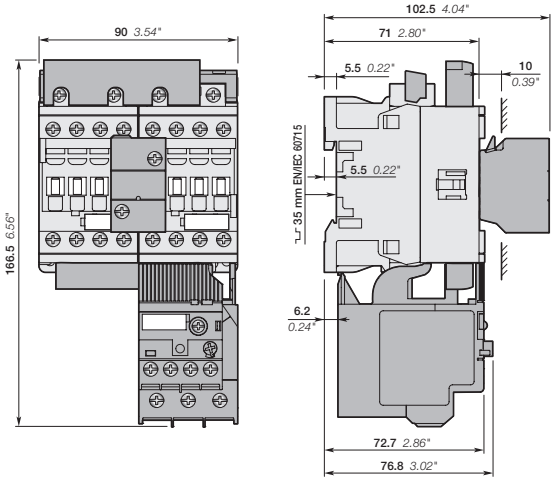


AF190, AF205
+ TA200DU thermal overload relay

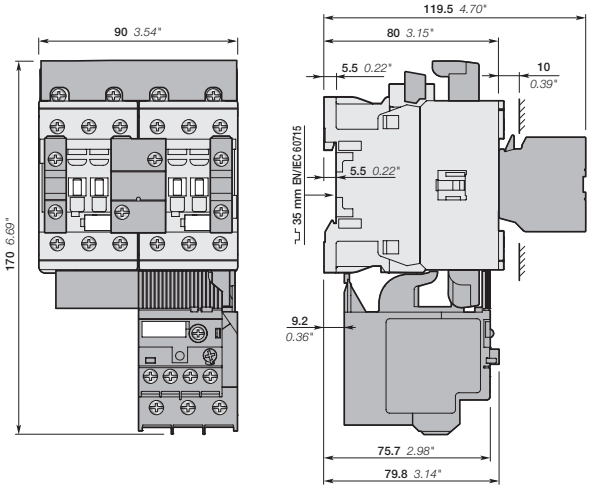
Main dimensions mm, inches

Reversing starters protected by thermal overload relays

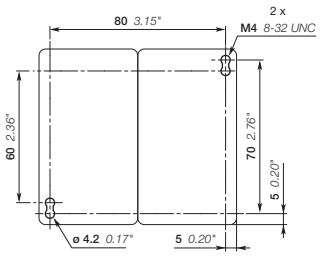
With AF contactors - open type version in kit form



AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42 thermal overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42 thermal overload relay



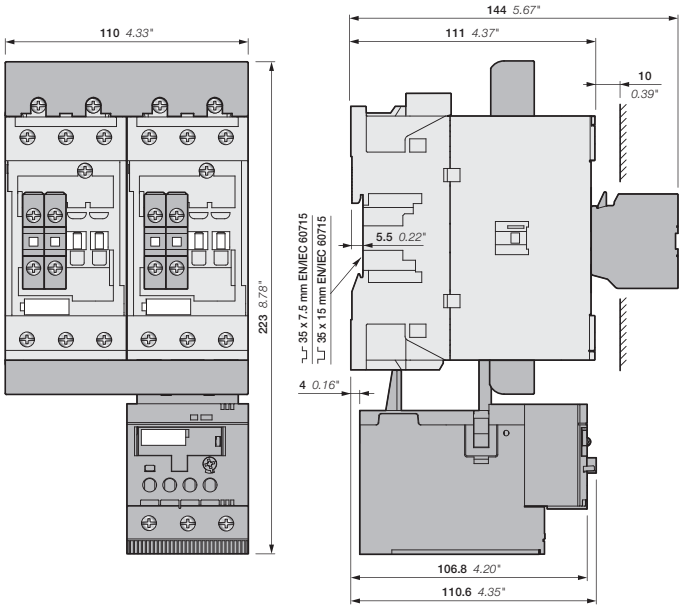
AF09, AF12, AF16, AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

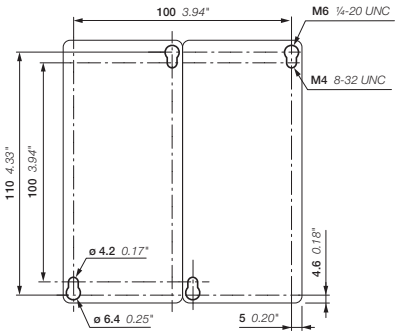
Main dimensions mm, inches

Reversing starters protected by thermal overload relays

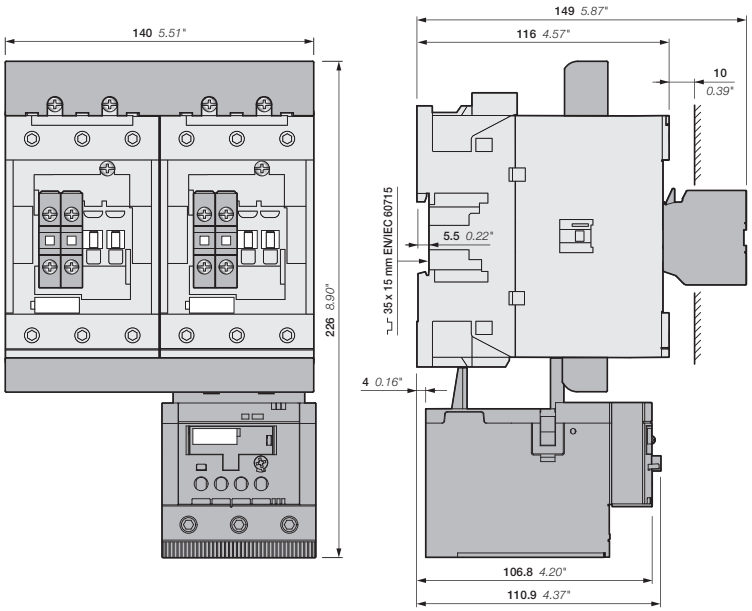
With AF contactors - open type version in kit form



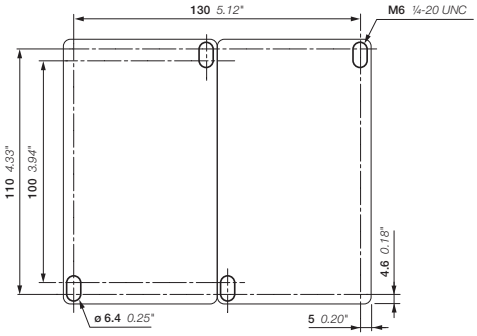
AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

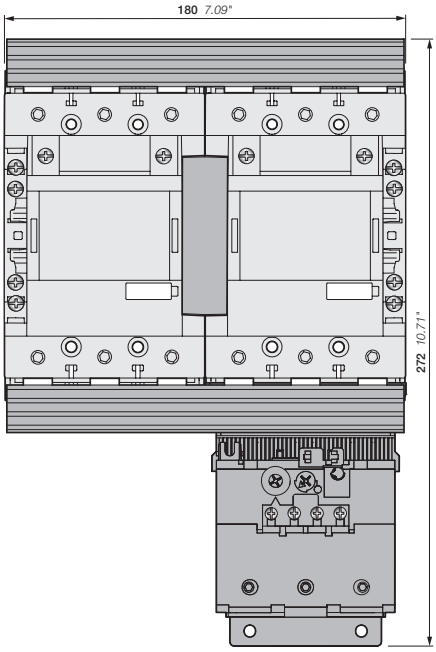


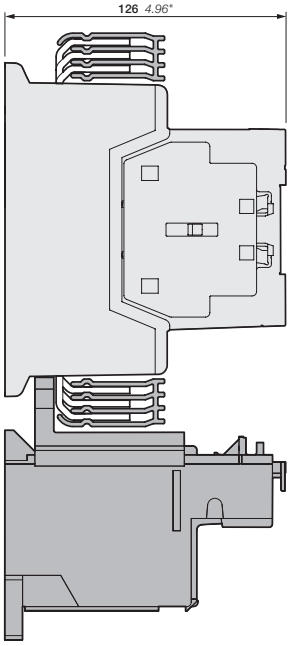
AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

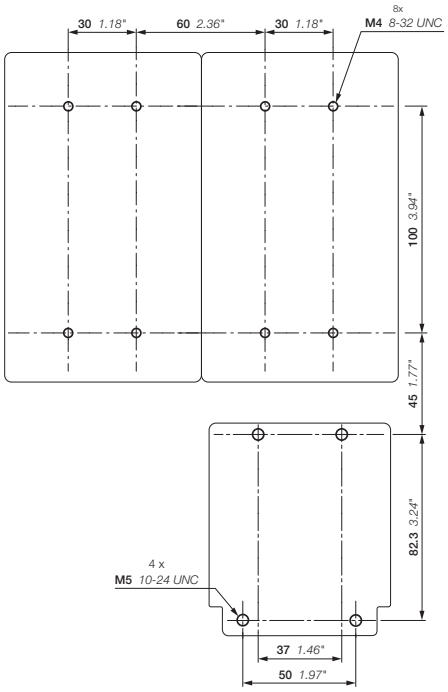
Main dimensions mm, inches

Reversing starters protected by thermal overload relays

With AF contactors - open type version in kit form





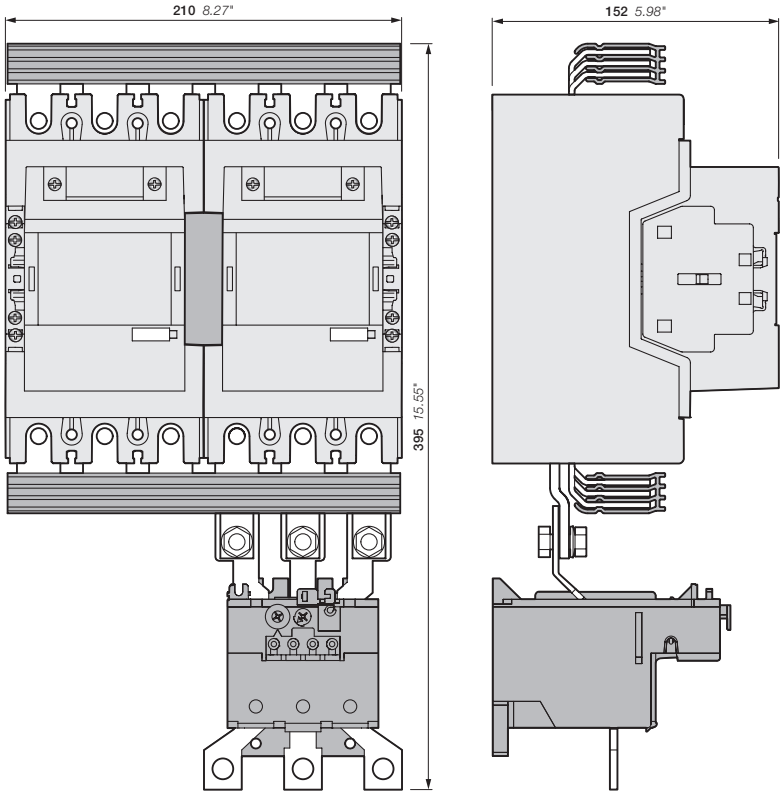


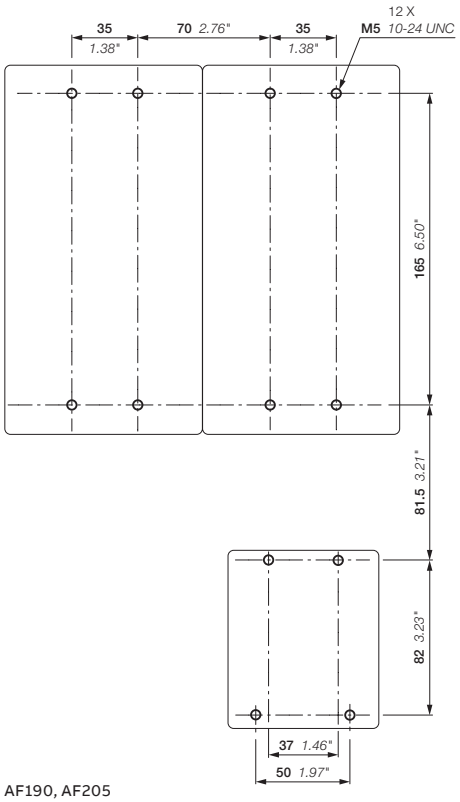
AF116, AF140, AF146
+ BER140-4, VM19
+ TF140 thermal overload relay

Main dimensions mm, inches

Reversing starters protected by thermal overload relays

With AF contactors - open type version in kit form



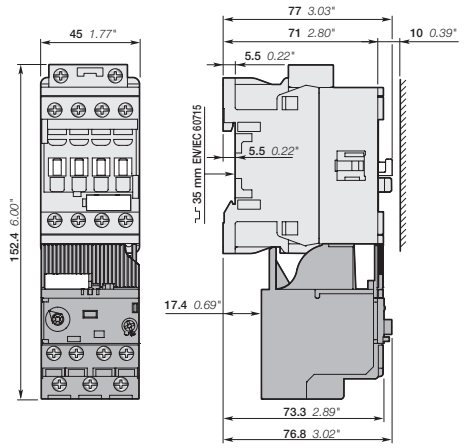


AF190, AF205
+ BER205-4, VM19
+ TA200DU thermal overload relay

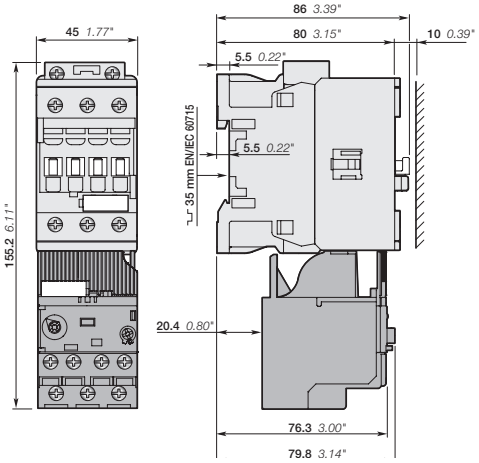
Main dimensions mm, inches

DOL starters protected by electronic overload relays

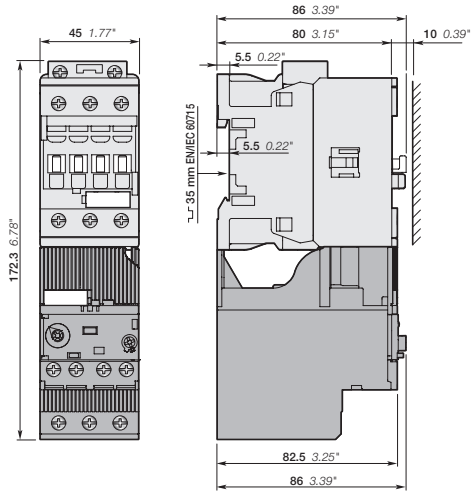
With AF contactors - open type version in kit form



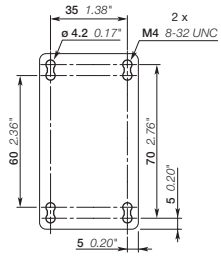
AF09, AF12, AF16
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF45 electronic overload relay



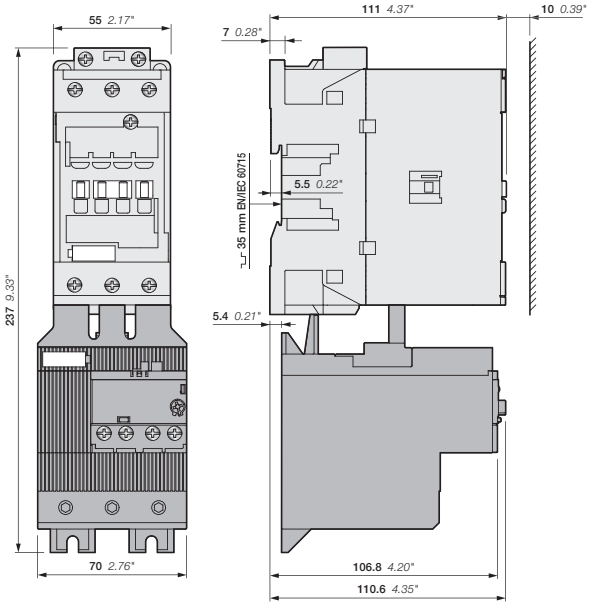
AF09, AF12, AF16, AF26, AF30, AF38
+ EF electronic overload relay

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

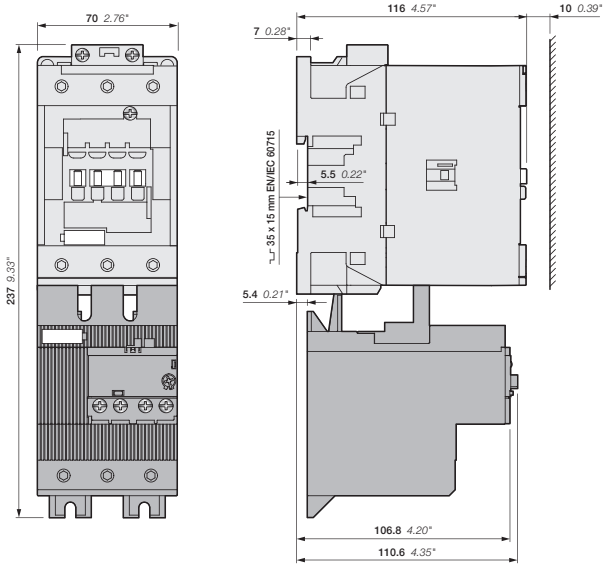
Main dimensions mm, inches

DOL starters protected by electronic overload relays

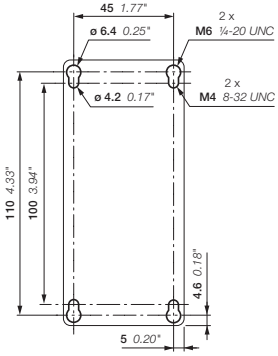
With AF contactors - open type version in kit form



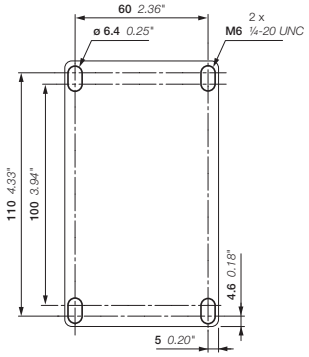
AF40, AF52, AF65
+ EF65 electronic overload relay



AF80, AF96
+ EF96 electronic overload relay



AF40, AF52, AF65
+ EF65 electronic overload relay

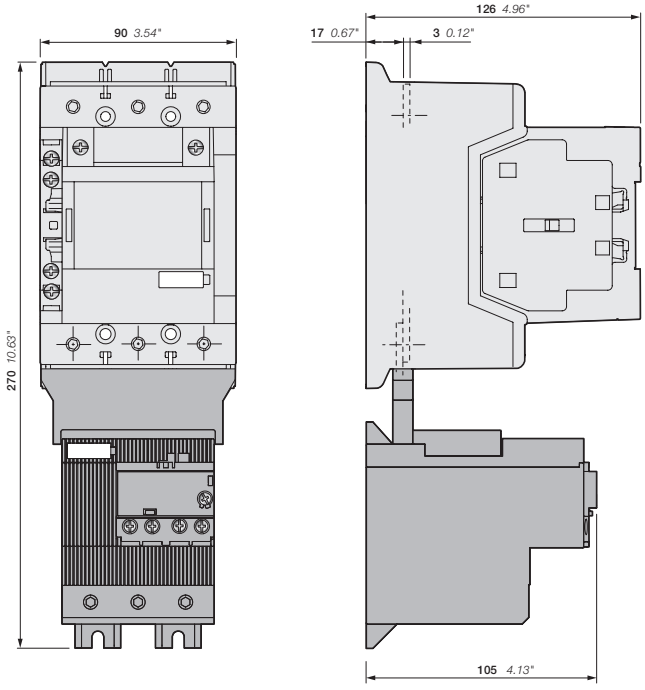


AF80, AF96
+ EF96 electronic overload relay

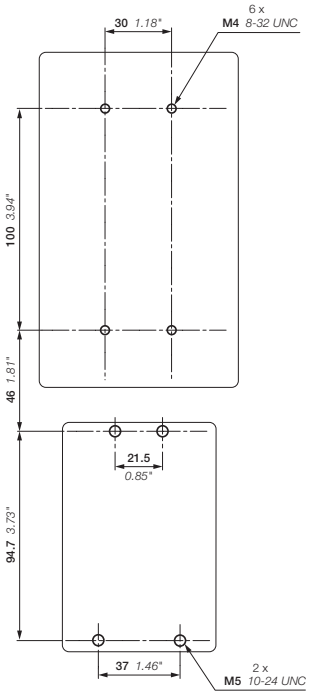
Main dimensions mm, inches

DOL starters protected by electronic overload relays

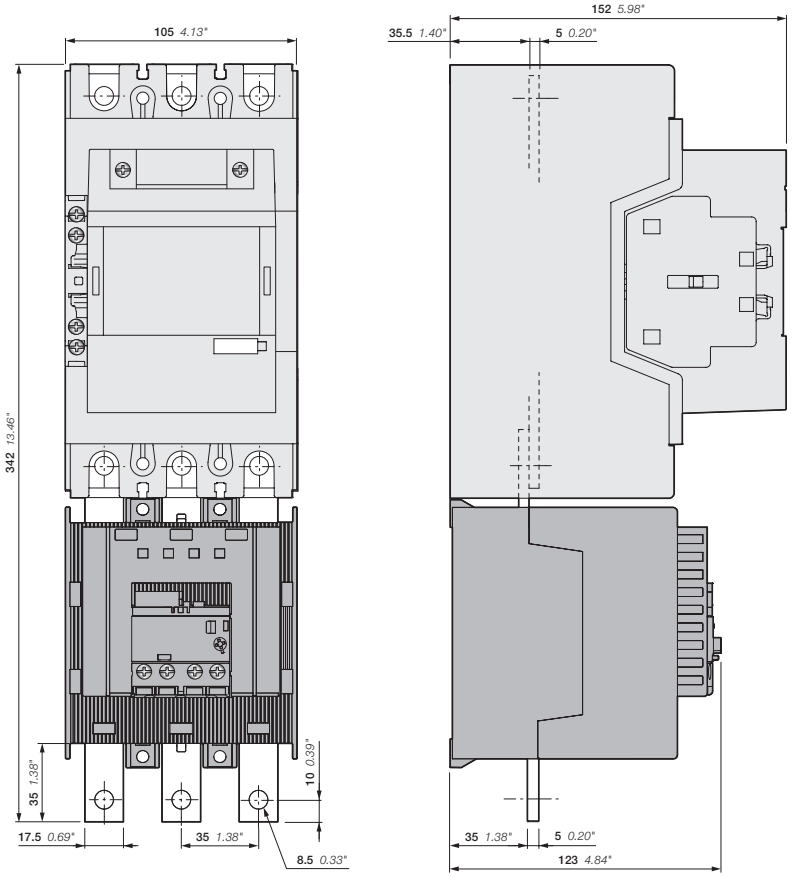
With AF contactors - open type version in kit form



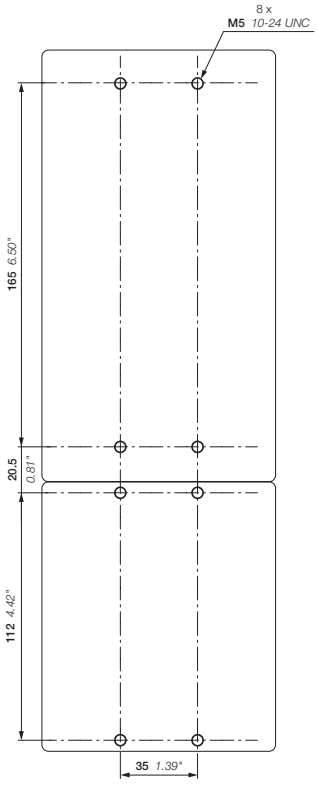
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



AF190, AF205-30-11
+ EF205 electronic overload relay

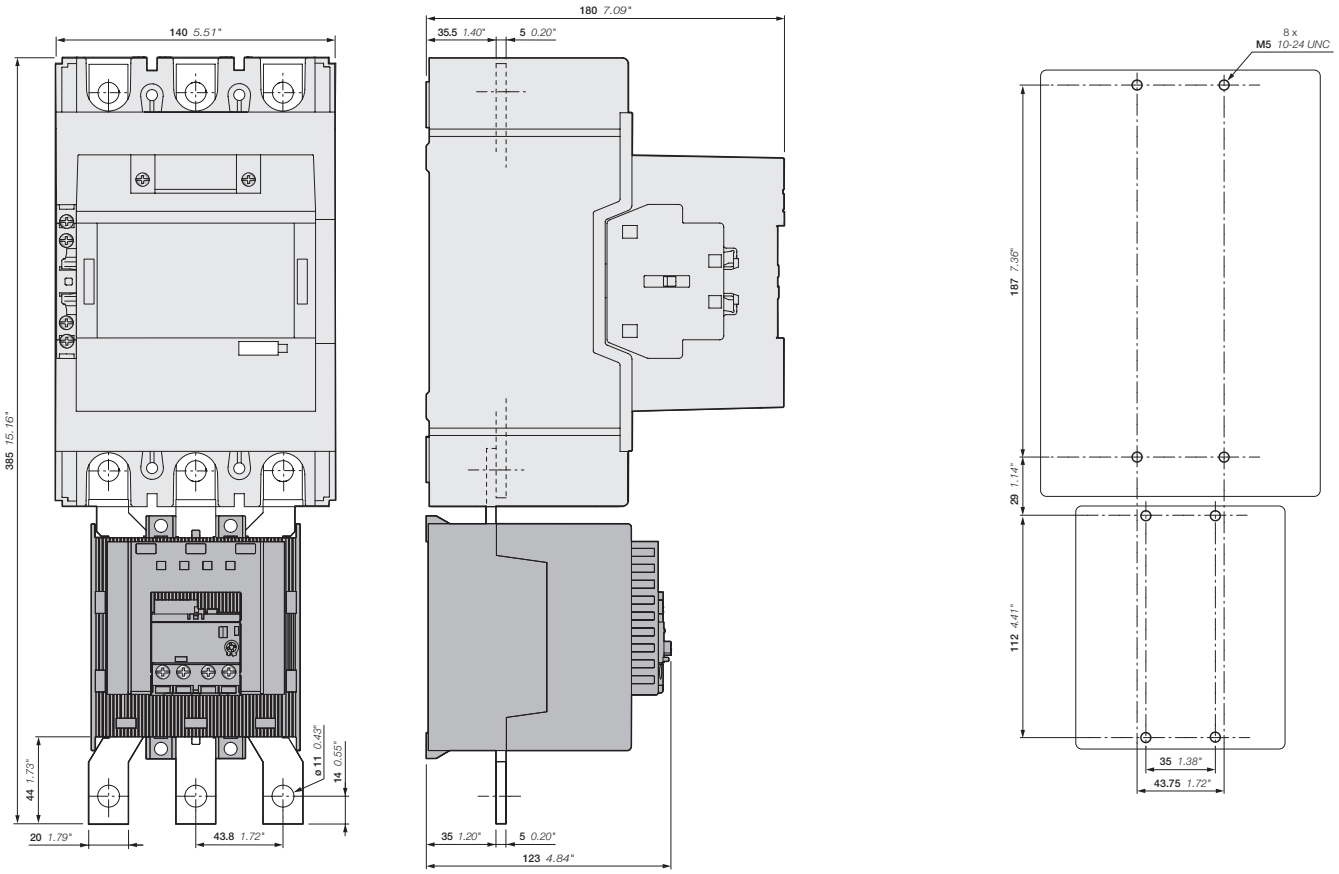


AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

DOL starters protected by electronic overload relays

With AF contactors - open type version in kit form

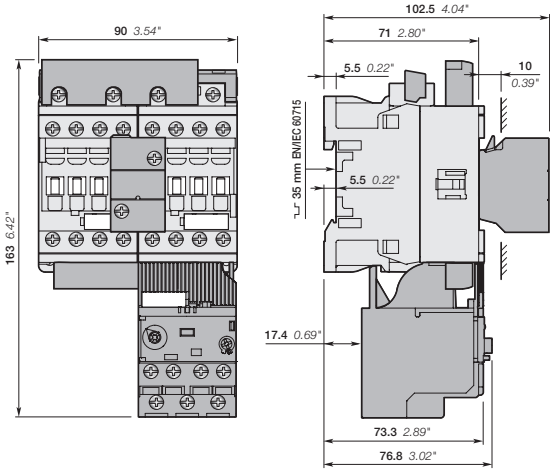


AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

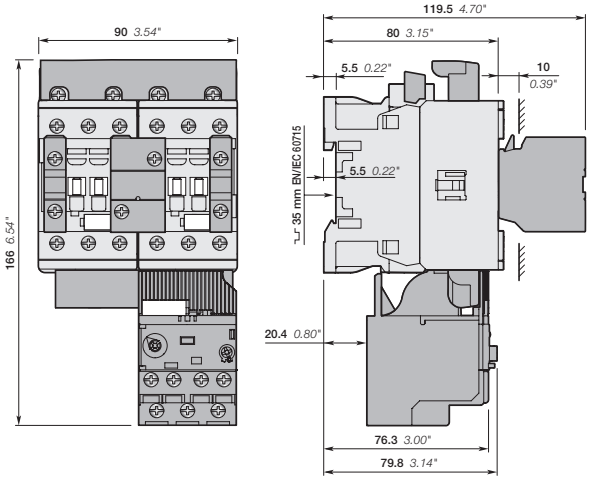
Main dimensions mm, inches

Reversing starters protected by electronic overload relays

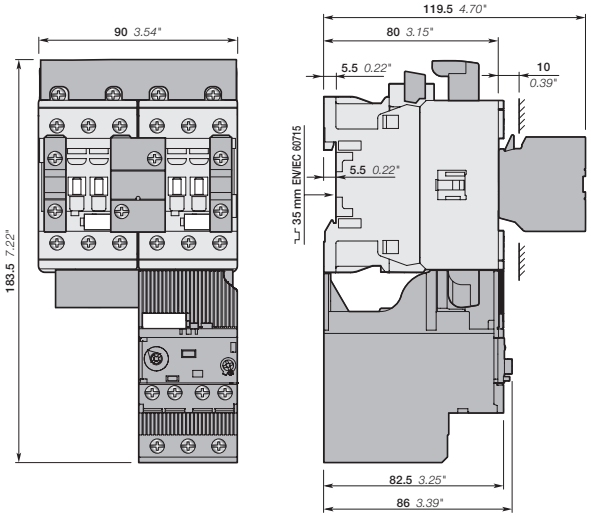
With AF contactors - open type version in kit form



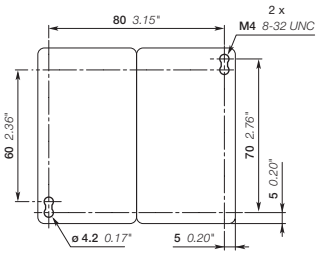
AF09, AF12, AF16
+ BER16-4, VEM4
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF45 electronic overload relay



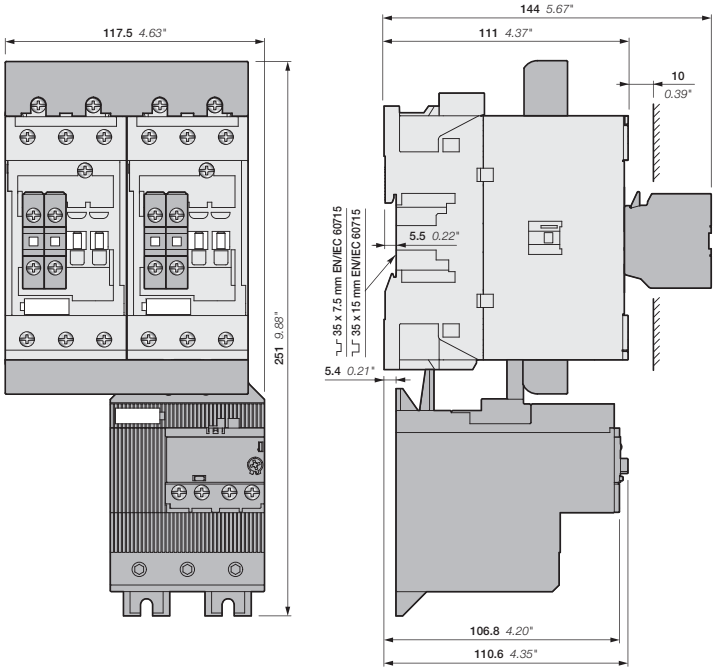
AF09, AF12, AF16, AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

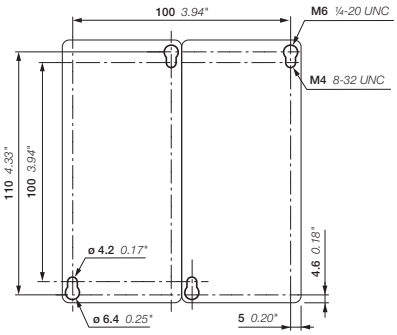
Main dimensions mm, inches

Reversing starters protected by electronic overload relays

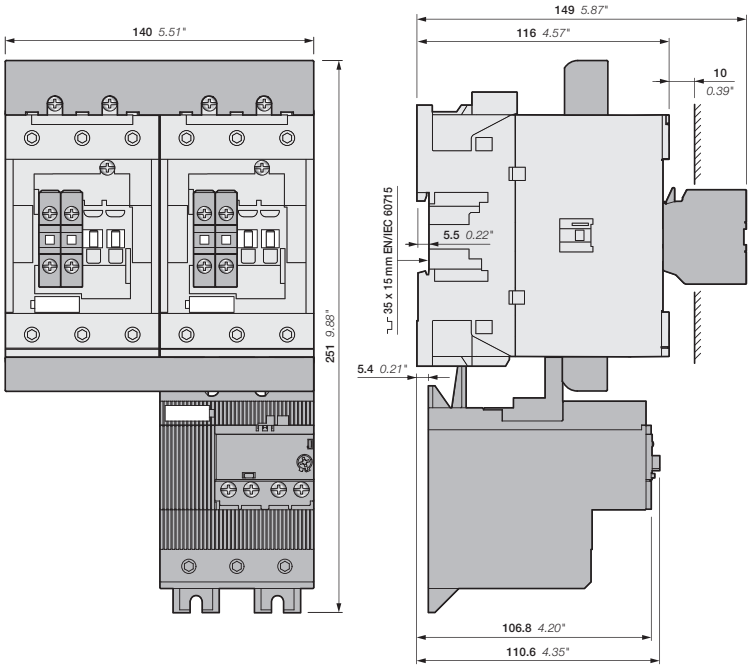
With AF contactors - open type version in kit form



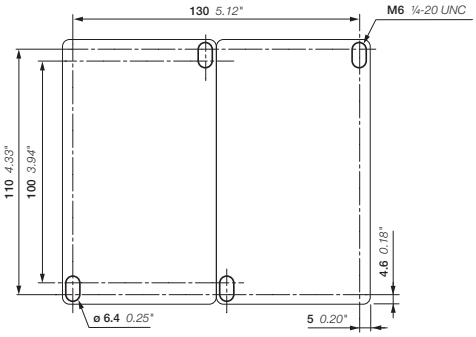
AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

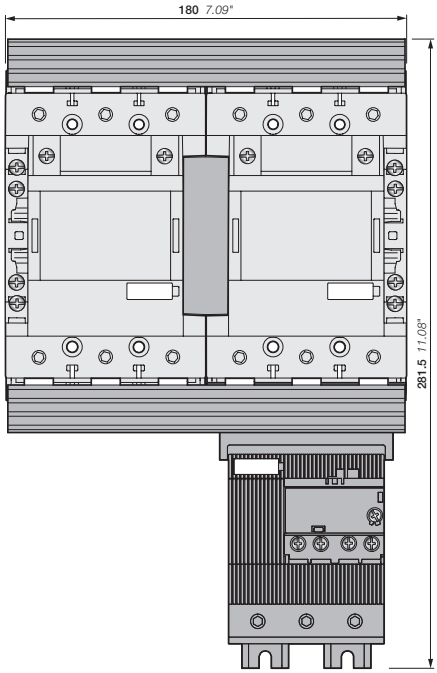


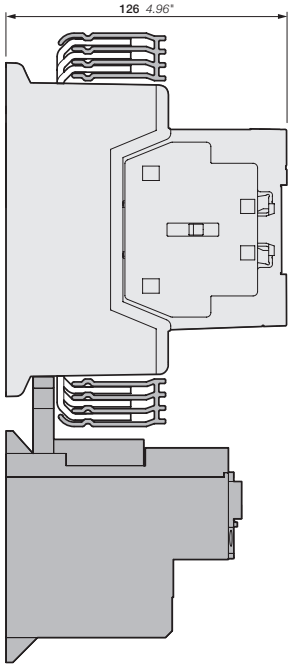
AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

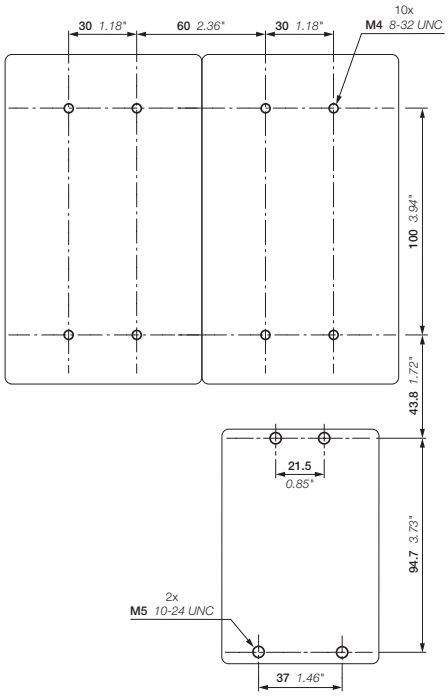
Main dimensions mm, inches

Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form





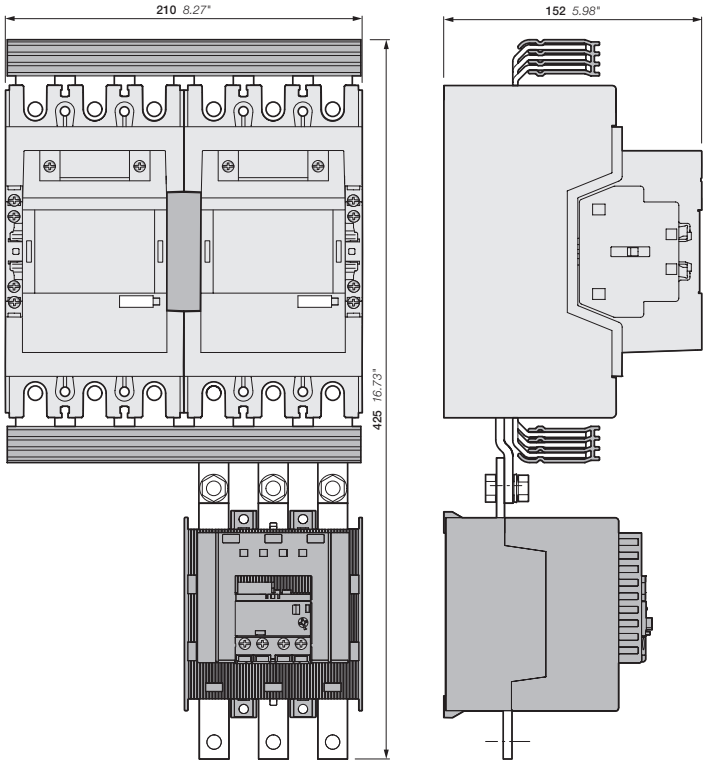


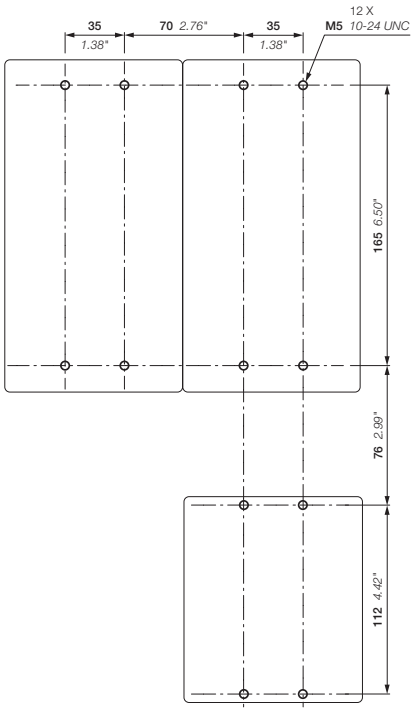
AF116, AF140, AF146
+ BER140-4, VM19
+ EF146 electronic overload relay

Main dimensions mm, inches

Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form



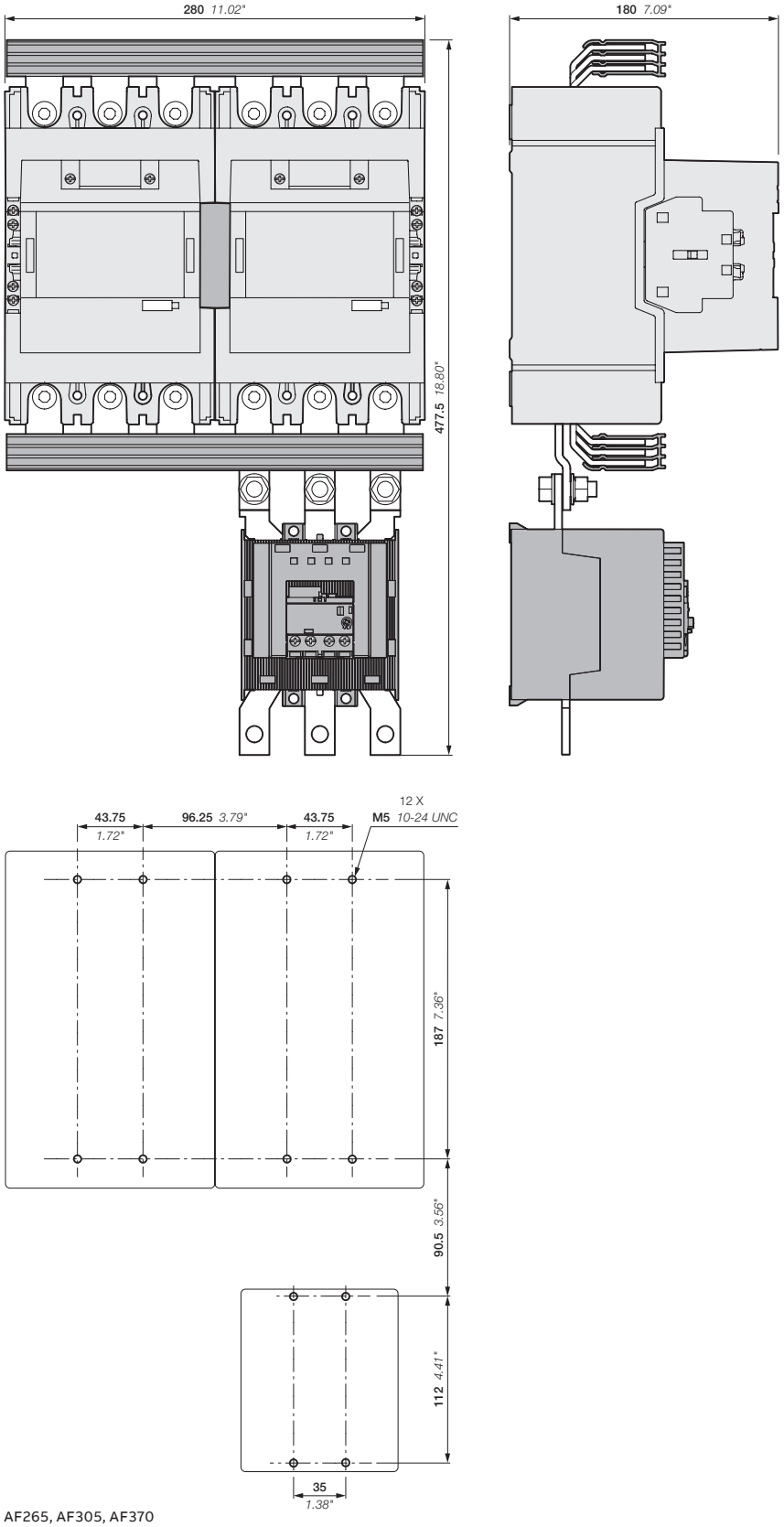


AF190, AF205
+ BER205-4, VM19
+ EF205 electronic overload relay

Main dimensions mm, inches

Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form

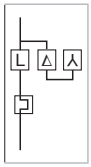


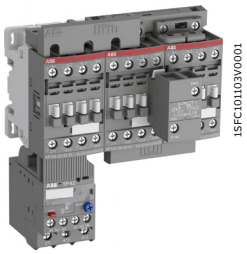
AF265, AF305, AF370
+ BER370-4, VM19
+ EF370 electronic overload relay

Main dimensions mm, inches

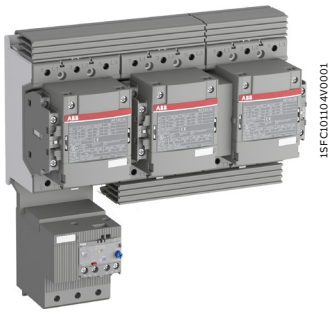
Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form





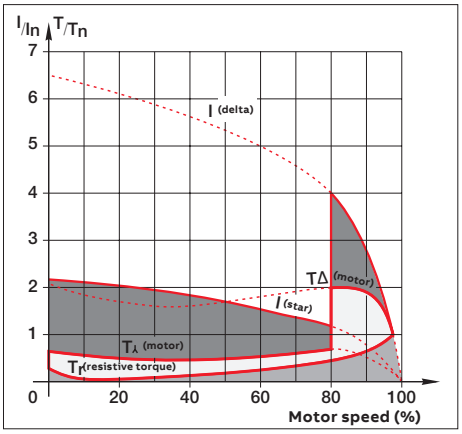
AF16-30-10 + AF16-30-10 +
AF09-30-10 + BEY16-4 + VEM4 + TF42



AF140-30-11 + AF140-30-11 +
AF140-30-11 + BEY140-4 + VM19 + EF146

Application

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.



I = current
T = torque

In = nominal current
Tn = nominal torque

When starting:

- Inrush current is reduced to a third of direct starting current
- Motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection.
During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs.
This starting mode is therefore ideal for machines having high starting torque such as pumps, centrifugal compressors, wood-working machines...

Precaution

- Motor nominal voltage in delta connection must be equal to that of the mains. Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
- In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

Sequence

Starting is a three-stage process:

1st stage: "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.

2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.

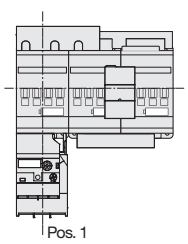
3rd stage: "Delta" connection - Thanks to AF contactors, a transition time (or dwelling time) of 50 ms is already integrated between the opening of the "star" contactor and closing of the "delta" contactor.

Conclusion: An on-delay timer without dwelling time (e.g.: CT-ERS.21S or TEF4-ON) is enough to countdown the programmed starting time (6 to 10 s) during "Star connection". The use of a star-delta timer including a dwelling time is not permitted.

Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui	
acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Ambient air temperature	
Close to the device	≤ 60 °C (TF42: 38 A above ≤ 50 °C)
Degree of protection	IP20
Switching frequency	Refer to "Switching frequency diagrams" page

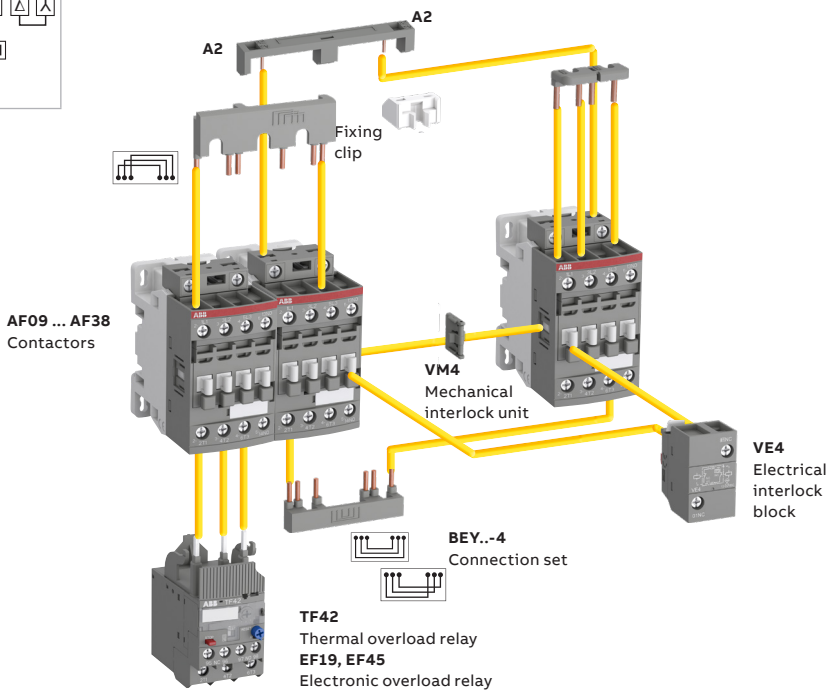
Mounting positions



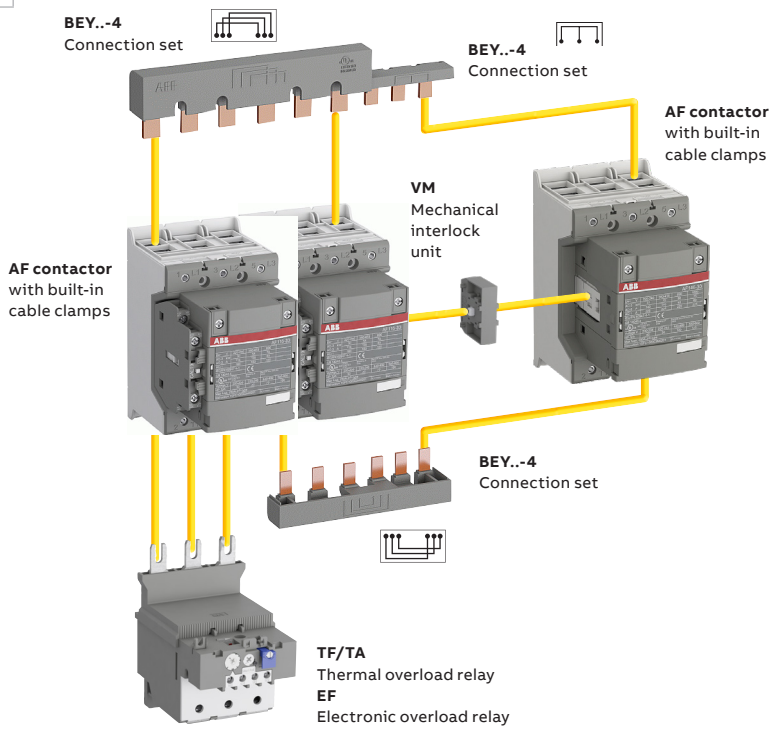
Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

Star-delta starters for AF09 ... AF38



Star-delta starters for AF116 ... AF370



You can easily assemble star-delta starter thanks to our complete range of accessories:

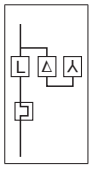
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set without increasing starter width. It includes:
  - VM4 mechanical interlock unit and 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BEY..-4 connection set: it assures a safe and simple connection between both contactor main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

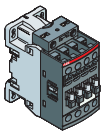
For the full coordination tables: **www.abb.com/lowvoltage** then go to the right menu: "**Support**", select: "**Online Product Selection Tools**" then select "**Coordination Tables for motor protection**"

Star-delta starters protected by thermal overload relays

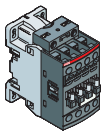
With AF contactors - Open type version in kit form



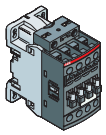
Line contactor KM1



Delta contactor KM3

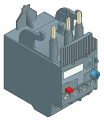


Star contactor KM2

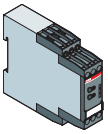


IEC		Control voltage Uc min. ... Uc max. (1)		Type	Order code	Type	Order code	Type	Order code
AC-3 Rated power 400 V	Rated current 400 V								
kW	A	V 50/60 Hz	V DC						
7.5	15.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310
11	22	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	AF12Z-30-10-21	1SBL156001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF12-30-10-13	1SBL157001R1310	AF12-30-10-13	1SBL157001R1310	AF09-30-10-13	1SBL137001R1310
15	29	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	AF16Z-30-10-21	1SBL176001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF16-30-10-13	1SBL177001R1310	AF16-30-10-13	1SBL177001R1310	AF09-30-10-13	1SBL137001R1310
18.5	35	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
22	41	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
25	47	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	AF30Z-30-00-21	1SBL276001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF30-30-00-13	1SBL277001R1300	AF30-30-00-13	1SBL277001R1300	AF26-30-00-13	1SBL237001R1300
37	66	24...60	20...60	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300
45	80	24...60	20...60	AF52-30-00-11	1SBL367001R1100	AF52-30-00-11	1SBL367001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF52-30-00-13	1SBL367001R1300	AF52-30-00-13	1SBL367001R1300	AF40-30-00-13	1SBL347001R1300
55	97	24...60	20...60	AF65-30-00-11	1SBL387001R1100	AF65-30-00-11	1SBL387001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF65-30-00-13	1SBL387001R1300	AF65-30-00-13	1SBL387001R1300	AF40-30-00-13	1SBL347001R1300
75	132	24...60	20...60	AF80-30-00-11	1SBL397001R1100	AF80-30-00-11	1SBL397001R1100	AF52-30-00-11	1SBL367001R1100
		100...250	100...250	AF80-30-00-13	1SBL397001R1300	AF80-30-00-13	1SBL397001R1300	AF52-30-00-13	1SBL367001R1300
90	160	24...60	20...60	AF96-30-00-11	1SBL407001R1100	AF96-30-00-11	1SBL407001R1100	AF65-30-00-11	1SBL387001R1100
		100...250	100...250	AF96-30-00-13	1SBL407001R1300	AF96-30-00-13	1SBL407001R1300	AF65-30-00-13	1SBL387001R1300
110	195	24...60	20...60	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11 (4)	1SFL427001R1111
		100...250	100...250	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311
132	230	24...60	20...60	AF140-30-11-11	1SFL447001R1111	AF140-30-11-11	1SFL447001R1111	AF116-30-11-11	1SFL427001R1111
		100...250	100...250	AF140-30-11-13	1SFL447001R1311	AF140-30-11-13	1SFL447001R1311	AF116-30-11-13	1SFL427001R1311
160	280	24...60	20...60	AF190-30-11-11	1SFL487002R1111	AF190-30-11-11	1SFL487002R1111	AF140-30-11-11	1SFL447001R1111
		100...250	100...250	AF190-30-11-13	1SFL487002R1311	AF190-30-11-13	1SFL487002R1311	AF140-30-11-13	1SFL447001R1311

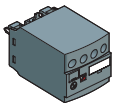
Thermal overload relays (2)



Electronic timers (3)



CT-ERS

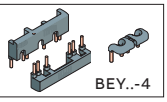


TEF4-ON

Uc = 24...240 V
50/60 Hz or DC

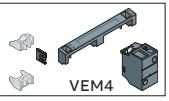
Accessories

Connection sets



BEY..-4

Mechanical and electrical interlock sets



VEM4

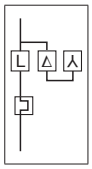
Auxiliary contact blocks

CA4

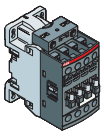
Setting ranges A	Type	Order code	Type	Order code	Type	Order code	Type	Order code
7.60...10.0	TF42-10	1SAZ721201R1043	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
10.0...13.0	TF42-13	1SAZ721201R1045	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
16.0...20.0	TF42-20	1SAZ721201R1049	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
20.0...24.0	TF42-24	1SAZ721201R1051	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
20.0...24.0	TF42-24	1SAZ721201R1051	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
24.0...29.0	TF42-29	1SAZ721201R1052	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
30.0...40.0	TF65-40	1SAZ811201R1003	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36.0...47.0	TF65-47	1SAZ811201R1004	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
50.0...60.0	TF65-60	1SAZ811201R1006	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
65.0...78.0	TF96-78	1SAZ911201R1004	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
84.0...96.0	TF96-96	1SAZ911201R1006	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
100...135	TF140DU-135	1SAZ431201R1003	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
100...135	TF140DU-135	1SAZ431201R1003	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
130...175	TA200DU-175	1SAZ421201R1005	CT-ERS.21S	1SVR730100R0300	BEY190-4 + VM140/190	1SFN084813R1000 1SFN034403R1000	-	-

Star-delta starters protected by electronic overload relays

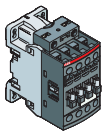
With AF contactors - Open type version in kit form



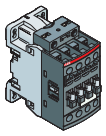
Line contactor KM1



Delta contactor KM3



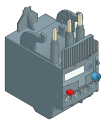
Star contactor KM2



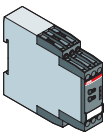
IEC AC-3 Rated power 400 V kW	Rated current 400 V A	Control voltage Uc min. ... Uc max. (1) V 50/60 Hz	V DC	Type	Order code	Type	Order code	Type	Order code
7.5	15.5	24...60	20...60	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310	AF09-30-10-13	1SBL137001R1310
11	22	24...60	20...60	AF12Z-30-10-21	1SBL156001R2110	AF12Z-30-10-21	1SBL156001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF12-30-10-13	1SBL157001R1310	AF12-30-10-13	1SBL157001R1310	AF09-30-10-13	1SBL137001R1310
15	29	24...60	20...60	AF16Z-30-10-21	1SBL176001R2110	AF16Z-30-10-21	1SBL176001R2110	AF09Z-30-10-21	1SBL136001R2110
		100...250	100...250	AF16-30-10-13	1SBL177001R1310	AF16-30-10-13	1SBL177001R1310	AF09-30-10-13	1SBL137001R1310
18.5	35	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
22	41	24...60	20...60	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300	AF26-30-00-13	1SBL237001R1300
25	47	24...60	20...60	AF30Z-30-00-21	1SBL276001R2100	AF30Z-30-00-21	1SBL276001R2100	AF26Z-30-00-21	1SBL236001R2100
		100...250	100...250	AF30-30-00-13	1SBL277001R1300	AF30-30-00-13	1SBL277001R1300	AF26-30-00-13	1SBL237001R1300
37	66	24...60	20...60	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300	AF40-30-00-13	1SBL347001R1300
45	80	24...60	20...60	AF52-30-00-11	1SBL367001R1100	AF52-30-00-11	1SBL367001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF52-30-00-13	1SBL367001R1300	AF52-30-00-13	1SBL367001R1300	AF40-30-00-13	1SBL347001R1300
55	97	24...60	20...60	AF65-30-00-11	1SBL387001R1100	AF65-30-00-11	1SBL387001R1100	AF40-30-00-11	1SBL347001R1100
		100...250	100...250	AF65-30-00-13	1SBL387001R1300	AF65-30-00-13	1SBL387001R1300	AF40-30-00-13	1SBL347001R1300
75	132	24...60	20...60	AF80-30-00-11	1SBL397001R1100	AF80-30-00-11	1SBL397001R1100	AF52-30-00-11	1SBL367001R1100
		100...250	100...250	AF80-30-00-13	1SBL397001R1300	AF80-30-00-13	1SBL397001R1300	AF52-30-00-13	1SBL367001R1300
90	160	24...60	20...60	AF96-30-00-11	1SBL407001R1100	AF96-30-00-11	1SBL407001R1100	AF65-30-00-11	1SBL387001R1100
		100...250	100...250	AF96-30-00-13	1SBL407001R1300	AF96-30-00-13	1SBL407001R1300	AF65-30-00-13	1SBL387001R1300
110	195	24...60	20...60	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11	1SFL427001R1111	AF116-30-11-11 (4)	1SFL427001R1111
		100...250	100...250	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311	AF116-30-11-13	1SFL427001R1311
132	230	24...60	20...60	AF140-30-11-11	1SFL447001R1111	AF140-30-11-11	1SFL447001R1111	AF116-30-11-11	1SFL427001R1111
		100...250	100...250	AF140-30-11-13	1SFL447001R1311	AF140-30-11-13	1SFL447001R1311	AF116-30-11-13	1SFL427001R1311
160	280	24...60	20...60	AF190-30-11-11	1SFL487002R1111	AF190-30-11-11	1SFL487002R1111	AF140-30-11-11	1SFL447001R1111
		100...250	100...250	AF190-30-11-13	1SFL487002R1311	AF190-30-11-13	1SFL487002R1311	AF140-30-11-13	1SFL447001R1311
200	350	24...60	20...60	AF205-30-11-11	1SFL527002R1111	AF205-30-11-11	1SFL527002R1111	AF190-30-11-11	1SFL487002R1111
		100...250	100...250	AF205-30-11-13	1SFL527002R1311	AF205-30-11-13	1SFL527002R1311	AF190-30-11-13	1SFL487002R1311
250	430	24...60	20...60	AF265-30-11-11	1SFL547002R1111	AF265-30-11-11	1SFL547002R1111	AF205-30-11-11	1SFL527002R1111
		100...250	100...250	AF265-30-11-13	1SFL547002R1311	AF265-30-11-13	1SFL547002R1311	AF205-30-11-13	1SFL527002R1311
315	540	24...60	20...60	AF370-30-11-11	1SFL607002R1111	AF370-30-11-11	1SFL607002R1111	AF265-30-11-11	1SFL547002R1111
		100...250	100...250	AF370-30-11-13	1SFL607002R1311	AF370-30-11-13	1SFL607002R1311	AF265-30-11-13	1SFL547002R1311
355	610	24...60	20...60	AF370-30-11-11	1SFL607002R1111	AF370-30-11-11	1SFL607002R1111	AF305-30-11-11	1SFL587002R1111
		100...250	100...250	AF370-30-11-13	1SFL607002R1311	AF370-30-11-13	1SFL607002R1311	AF305-30-11-13	1SFL587002R1311

(1) AF09 ... AF370: ambient temperature ≤ 60 °C.
(2) The setting current value is: nominal motor current x 0.58. Overload relay type given for 400 V - AC-3.
For other voltage, select overload relay type according to required nominal motor current x 0.58.
(3) On-delay timer without dwelling-time (e.g.: side-mounted CT-ERS.21S or front-mounted TEF4-ON) is enough to countdown the programmed starting time during "Star connection". In case of use of front-mounted TEF4-ON on-delay timer, mount on KM1 contactor AF26 ... AF96 a side-mounted CAL4-11 auxiliary contact block instead of CA4-10 auxiliary contact block.
(4) AF80 can also be used, but no connection set and mechanical interlock is available for this combination.

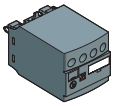
Electronic overload relays (2)



Electronic timers (3)



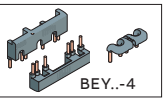
CT-ERS



TEF4-ON
Uc = 24...240 V
50/60 Hz or DC

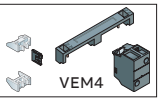
Accessories

Connection sets



BEY..-4

Mechanical and electrical interlock sets



VEM4

Auxiliary contact blocks

CA4

Setting ranges A	Type	Order code	Type	Order code	Type	Order code	Type	Order code
5.70...18.9	EF19-18.9	1SAX121001R1105	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
5.70...18.9	EF19-18.9	1SAX121001R1105	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
5.70...18.9	EF19-18.9	1SAX121001R1105	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY16-4 + VEM4	1SBN081313R2000 1SBN030111R1000	-	-
9.00...30.0	EF45-30	1SAX221001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
9.00...30.0	EF45-30	1SAX221001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
9.00...30.0	EF45-30	1SAX221001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY38-4 + VEM4	1SBN082713R2000 1SBN030111R1000	KM1 : 1 x CA4-10 KM2 : 1 x CA4-10	1SBN010110R1010 1SBN010110R1010
25...70	EF65-70	1SAX331001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
25...70	EF65-70	1SAX331001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
25...70	EF65-70	1SAX331001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY65-4 + VM96-4	1SBN083413R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36...100	EF96-100	1SAX341001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
36...100	EF96-100	1SAX341001R1101	CT-ERS.21S or TEF4-ON	1SVR730100R0300 1SBN020112R1000	BEY96-4 + VM96-4	1SBN083913R2000 1SBN033405T1000	KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01	1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001
54...150	EF146-150	1SAX351001R1101	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
54...150	EF146-150	1SAX351001R1101	CT-ERS.21S	1SVR730100R0300	BEY140-4 + VM19	1SFN084413R1000 1SFN030300R1000	-	-
63...210	EF205-210	1SAX531001R1101	CT-ERS.21S	1SVR730100R0300	BEY190-4 + VM140/190	1SFN084813R1000 1SFN034403R1000	-	-
63...210	EF205-210	1SAX531001R1101	CT-ERS.21S	1SVR730100R0300	BEY205-4 + VM19	1SFN085213R1000 1SFN030300R1000	-	-
115...380	EF370-380	1SAX611001R1101	CT-ERS.21S	1SVR730100R0300	BEY265-4 + VM205/265	1SFN085413R1000 1SFN035203R1000	-	-
115...380	EF370-380	1SAX611001R1101	CT-ERS.21S	1SVR730100R0300	BEY370-4 + VM19	1SFN085813R1000 1SFN030300R1000	-	-
115...380	EF370-380	1SAX611001R1101	CT-ERS.21S	1SVR730100R0300	BEY370-4 + VM19	1SFN085813R1000 1SFN030300R1000	-	-

Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

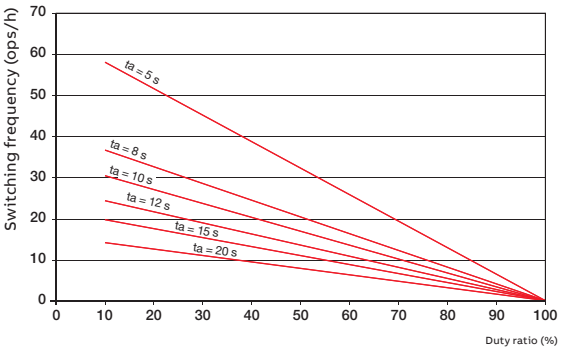
Switching frequency diagrams

General

Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay.

Thermal overload relay

Intermittent periodic duty



ta: motor starting time

Example:
Starting time of the motor: 7 second (use 8s curve) - Duty ratio: 63 % means a permitted switching frequency of max. 15 operating cycles per hour.

This corresponds to a 4 minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.

Electronic overload relay : please consult us

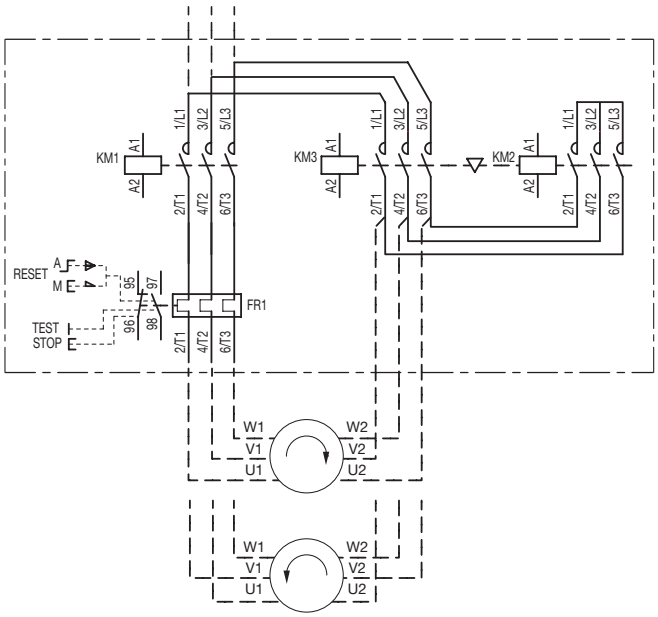
Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

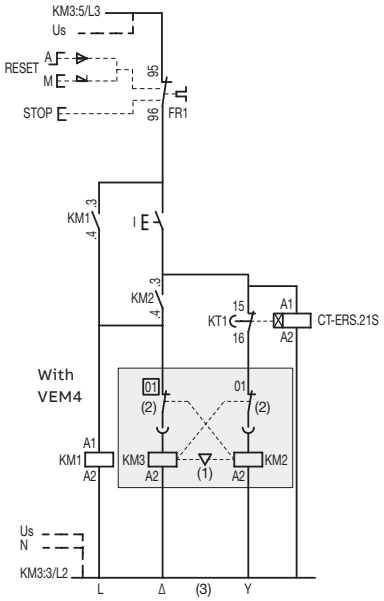
Wiring diagrams with CT-ERS.21S timer

Star-delta starters

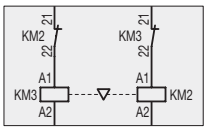
Power circuit



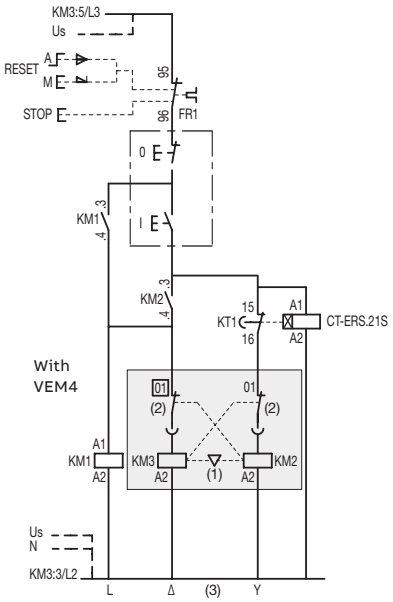
AC or DC local control with CT-ERS.21S timer



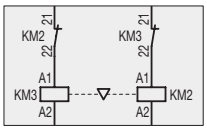
With VM



AC or DC remote control with CT-ERS.21S timer



With VM



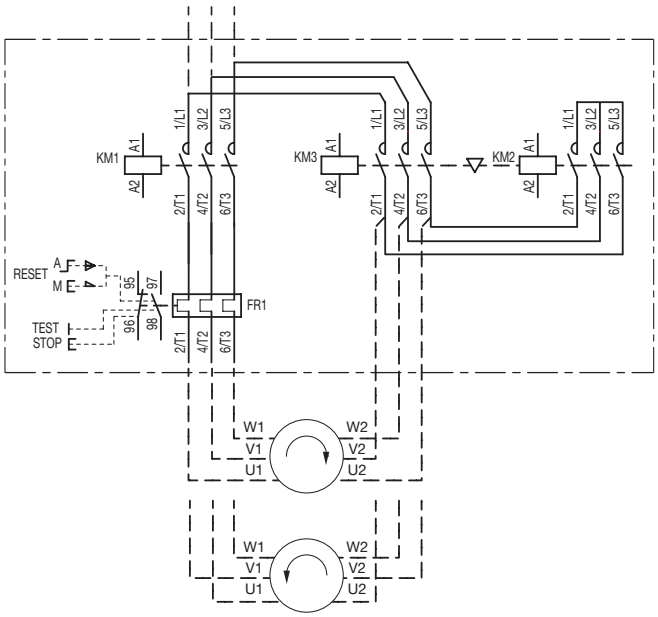
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

Star-delta starters protected by overload relays

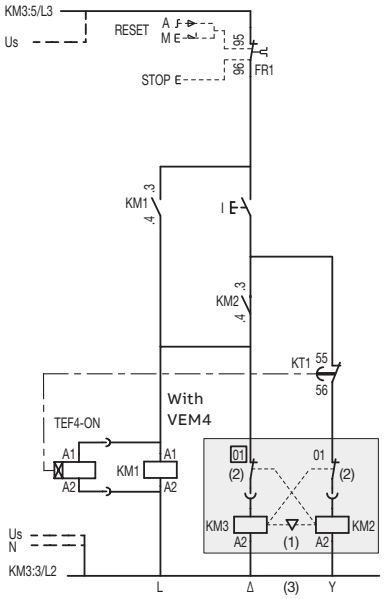
With AF contactors - Open type version in kit form
Wiring diagrams with TEF4-ON timer

Star-delta starters

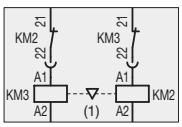
Power circuit



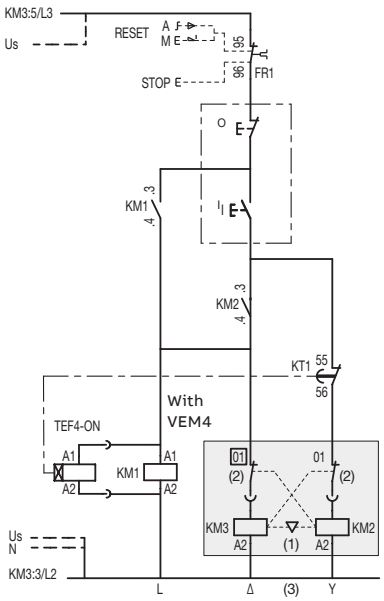
AC or DC local control with TEF4-ON timer
Uc = 24...240 V 50/60 Hz or DC



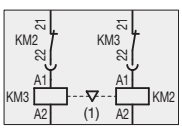
With VM



AC or DC remote control with TEF4-ON timer
Uc = 24...240 V 50/60 Hz or DC



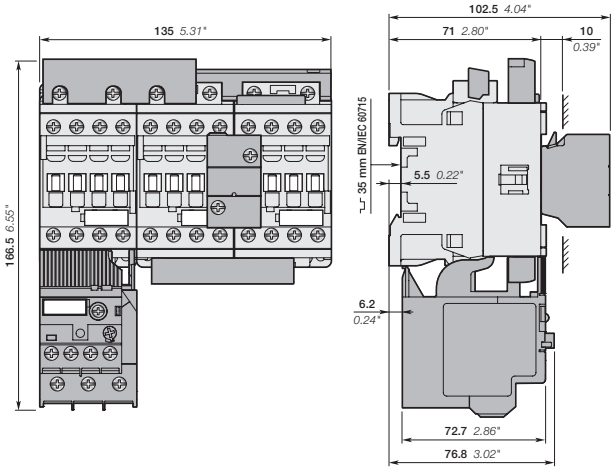
With VM



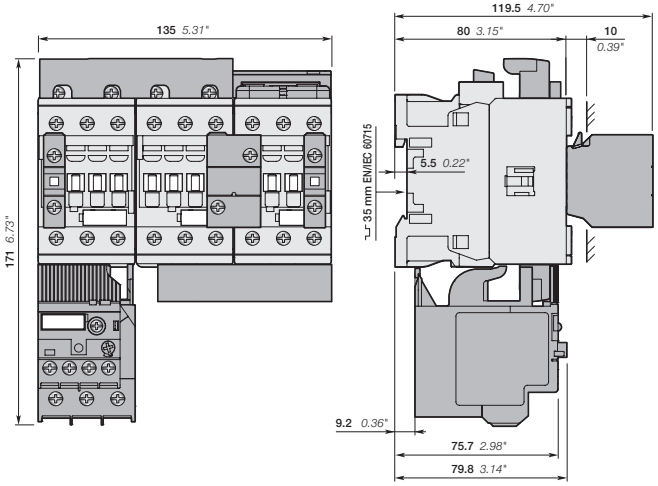
Note: VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection

Star-delta starters protected by thermal overload relays

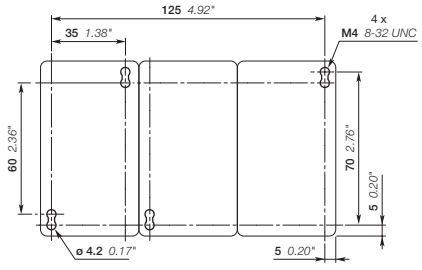
With AF contactors - Open type version in kit form



AF09, AF12, AF16
+ BEY16-4, VEM4
+ TF42 thermal overload relay



AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ TF42 thermal overload relay

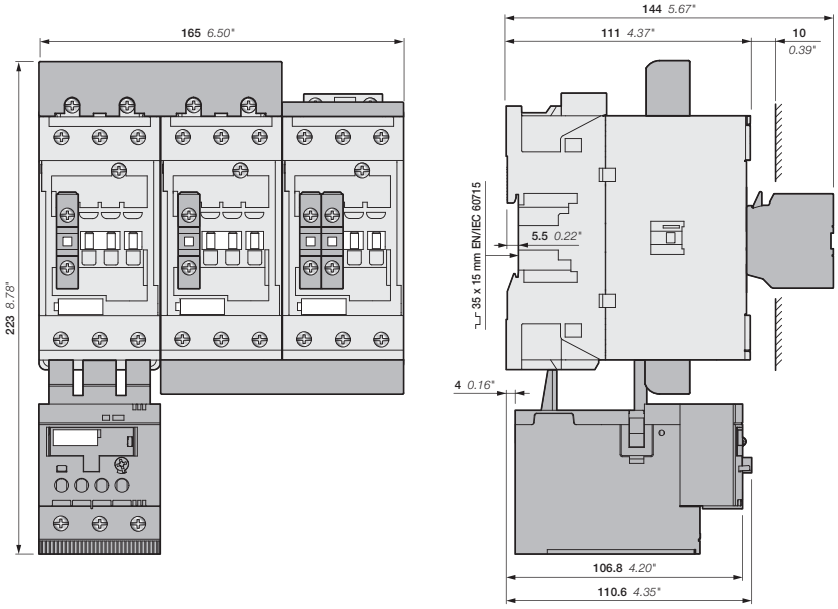


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

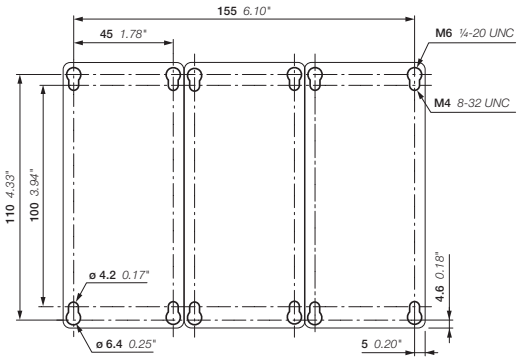
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



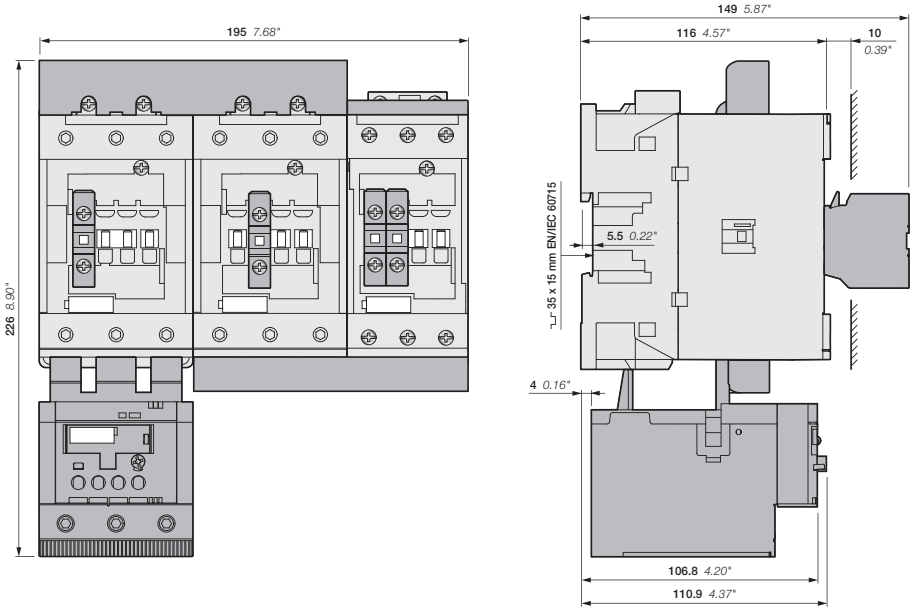
AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ TF65 thermal overload relay



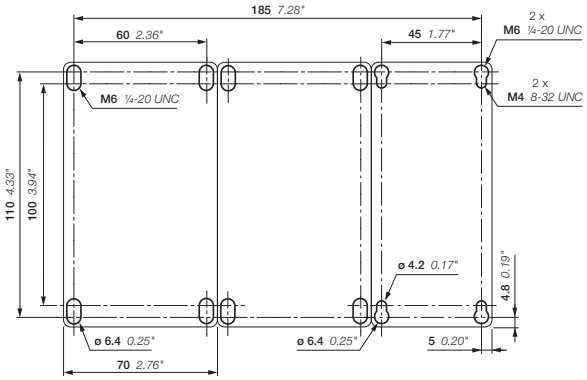
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



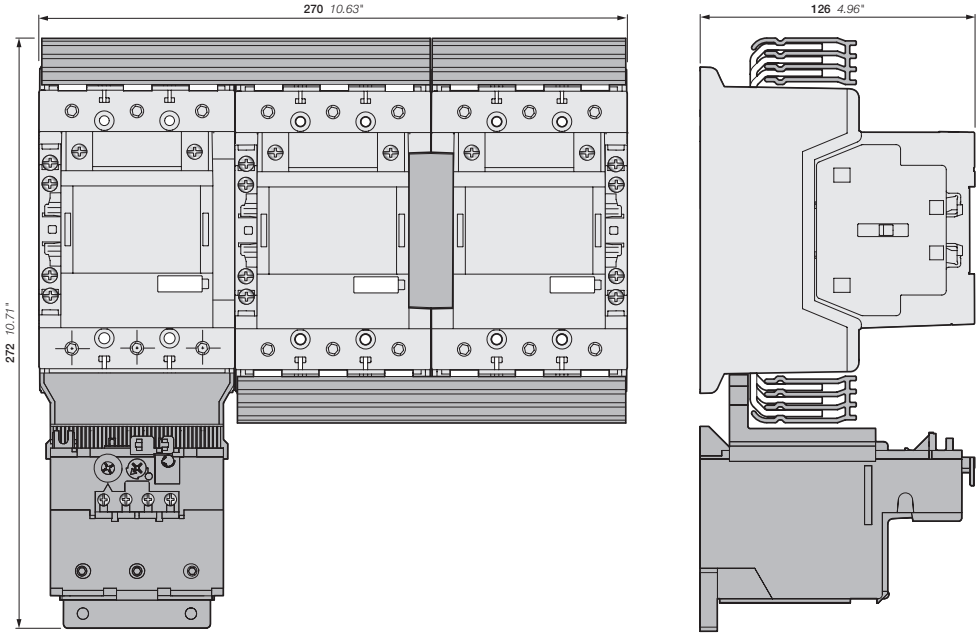
Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ TF96 thermal overload relay



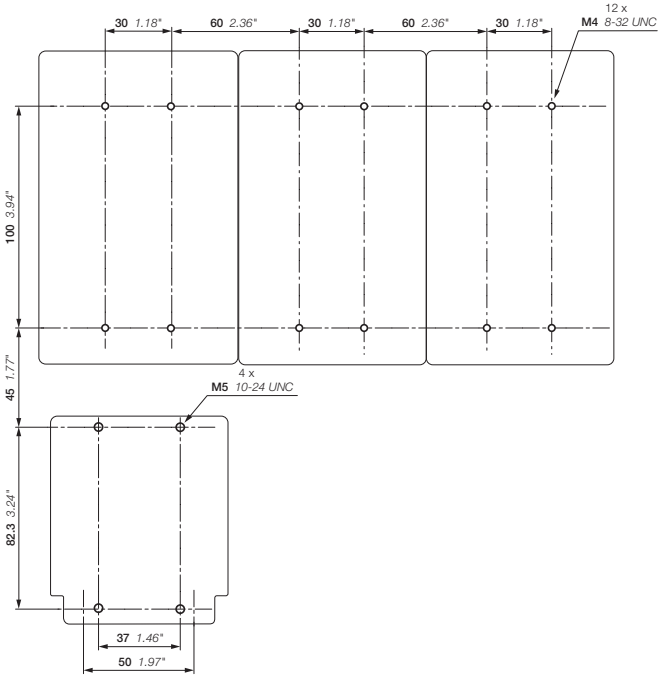
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



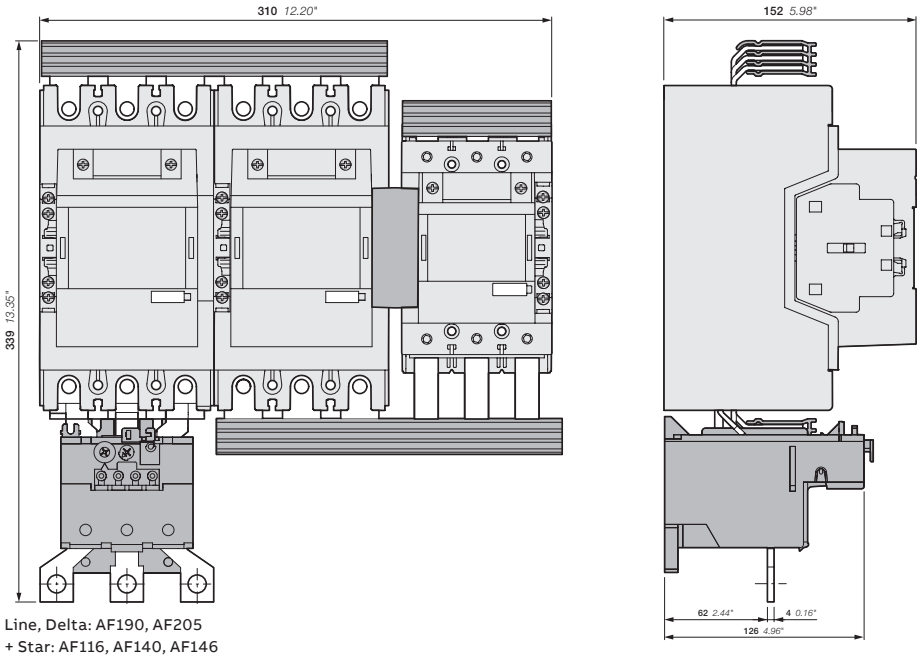
AF116, AF140, AF146
+ BEY140-4, VM19
+ TF140 thermal overload relay



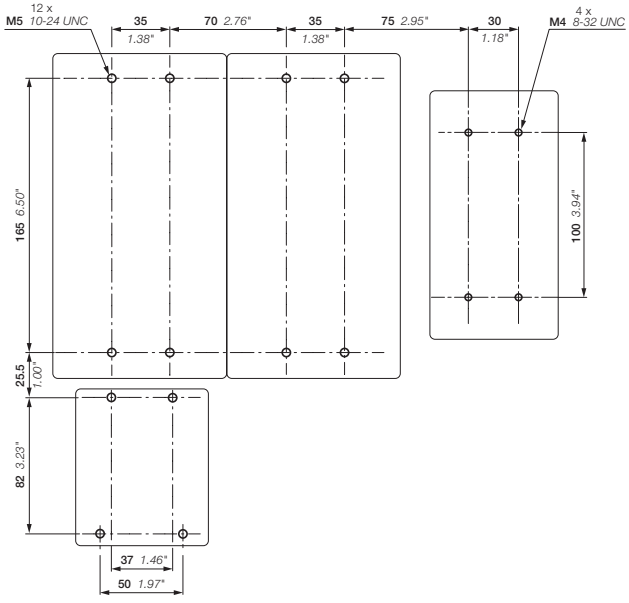
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



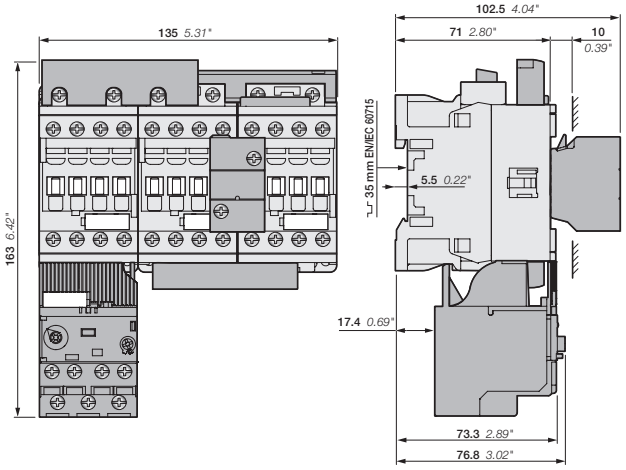
Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ TA200 thermal overload relay



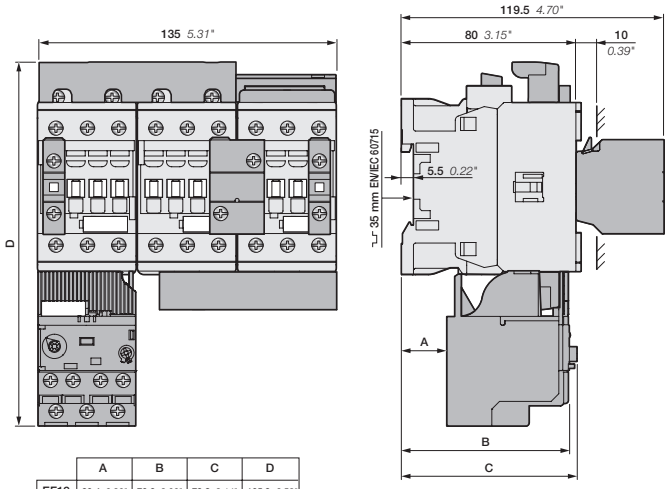
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form

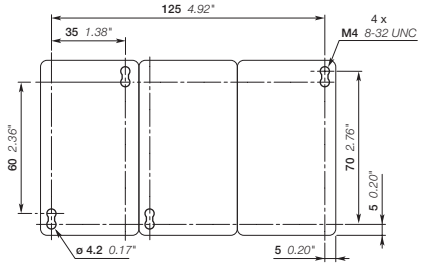


AF09, AF12, AF16
+ BEY16-4, VEM4
+ EF19 electronic overload relay



	A	B	C	D
EF19	20.4 0.80"	76.3 3.00"	79.8 3.14"	165.9 6.53"
EF45	0 0.00"	82.5 3.25"	86 3.39"	183.5 7.22"

AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ EF19/EF45 electronic overload relay

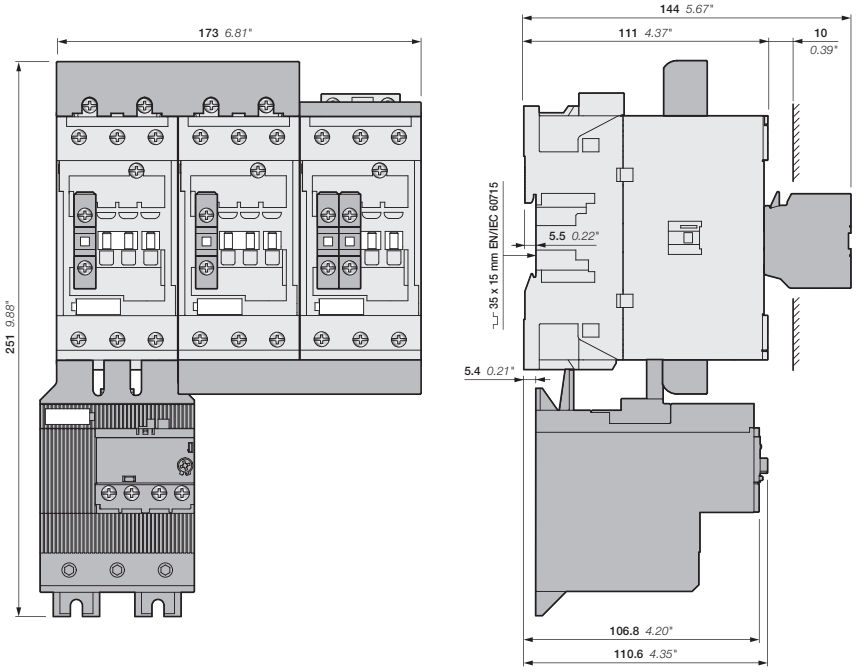


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

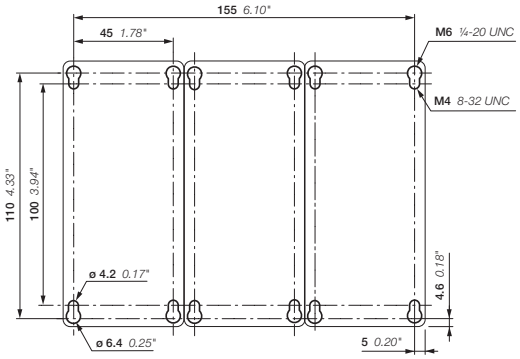
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



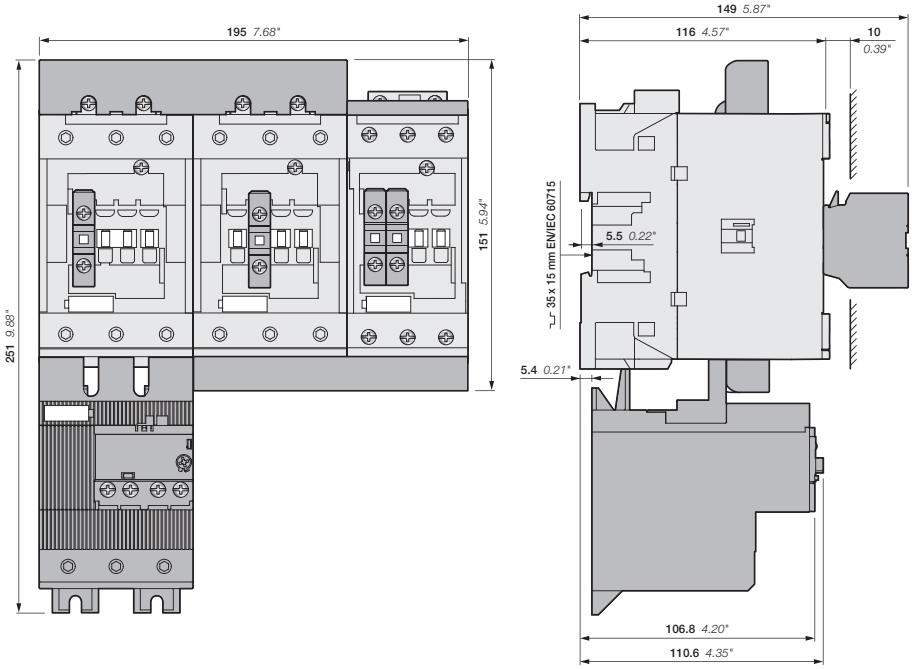
AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ EF65 electronic overload relay



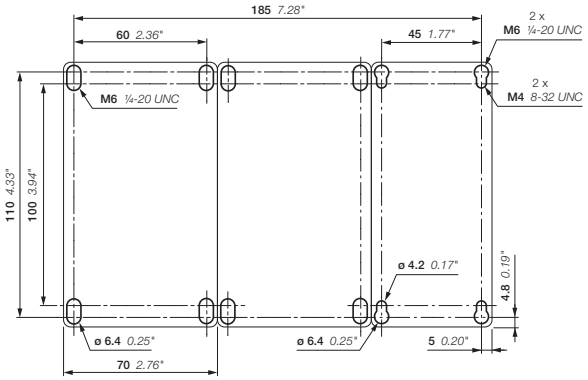
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



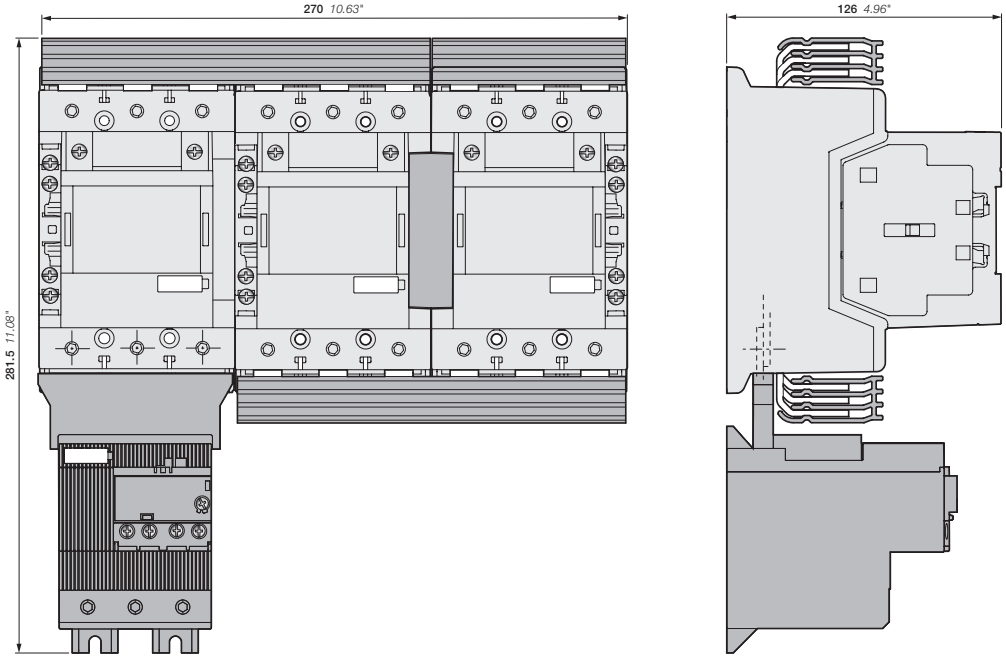
Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ EF96 electronic overload relay



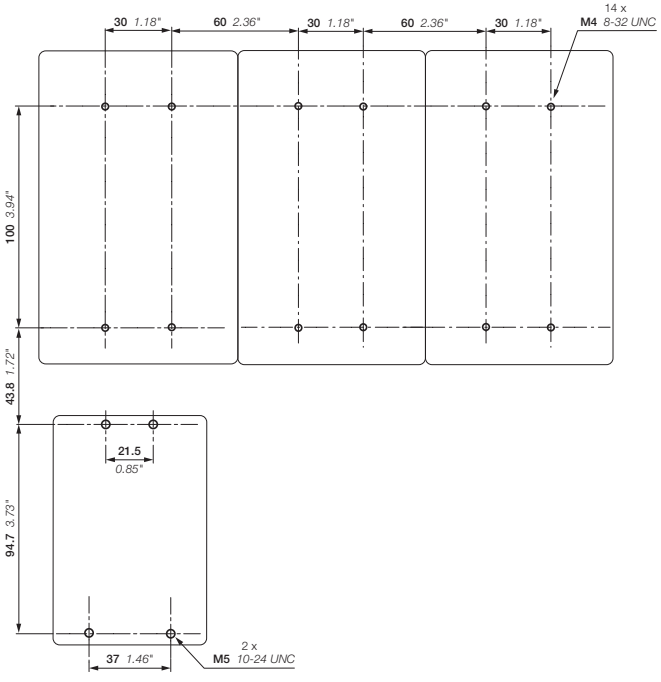
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



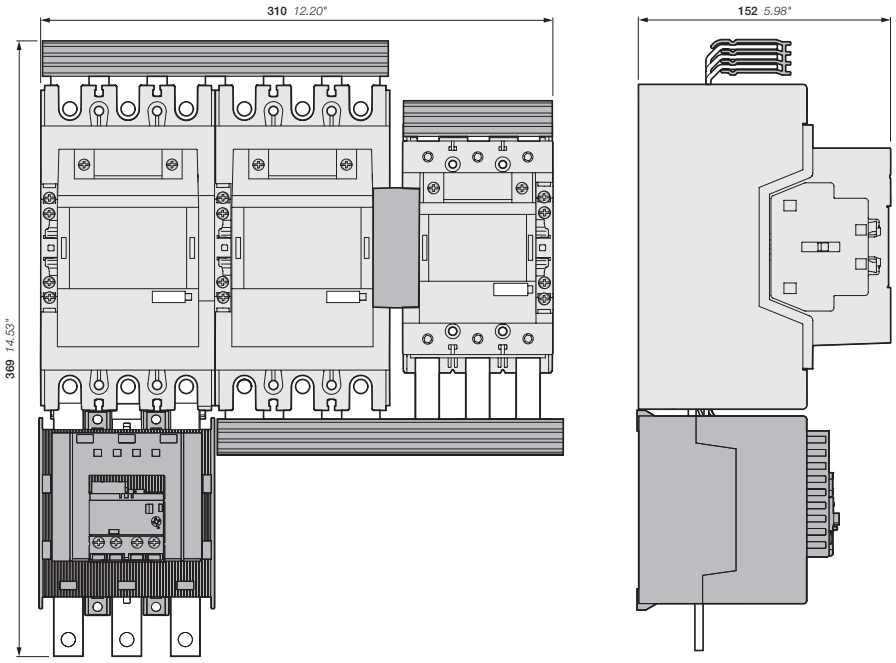
AF116, AF140, AF146
+ BEY140-4, VM19
+ EF146 electronic overload relay



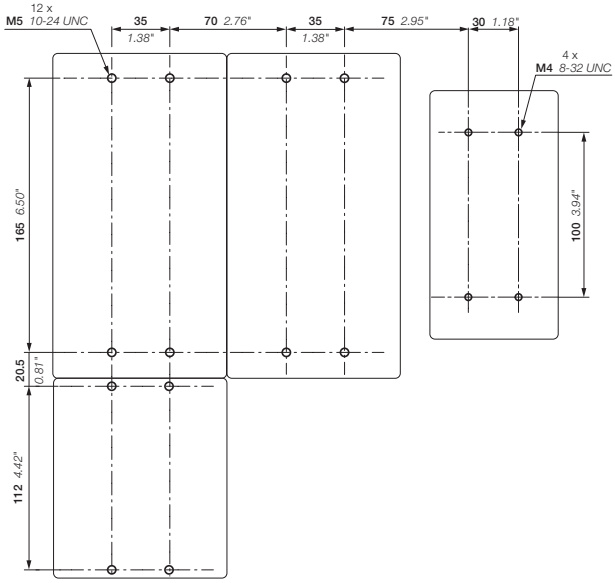
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



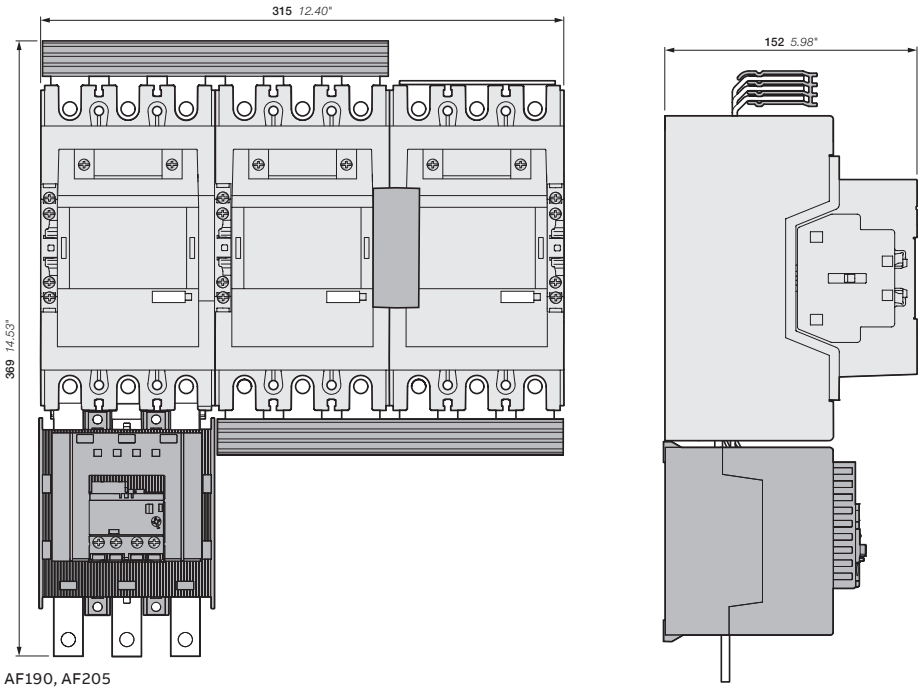
Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ EF205 electronic overload relay



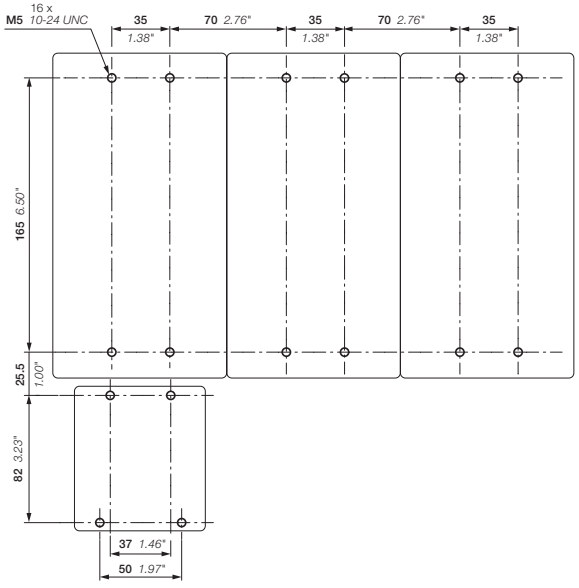
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



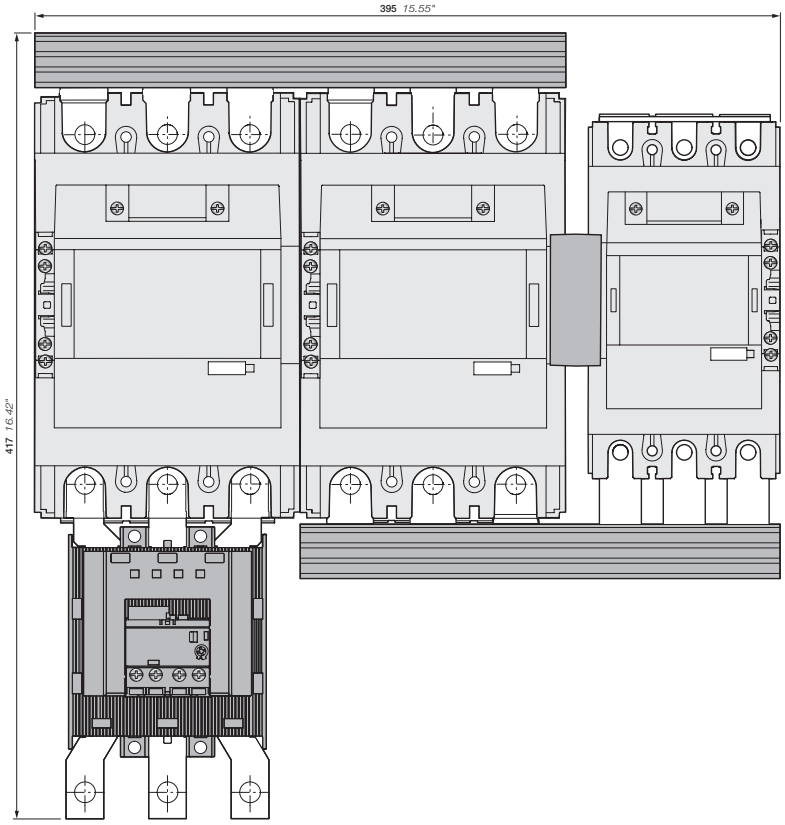
AF190, AF205
+ BEY205-4, VM19
+ EF205 electronic overload relay

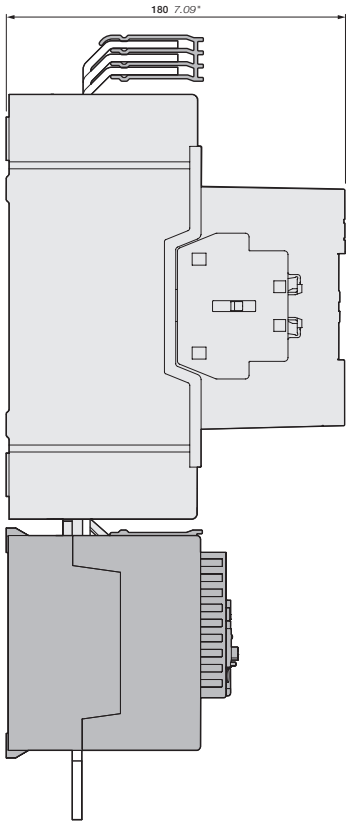


Main dimensions mm, inches

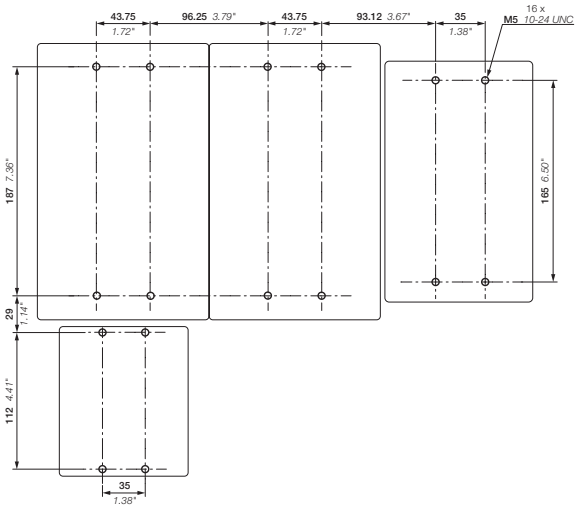
Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form





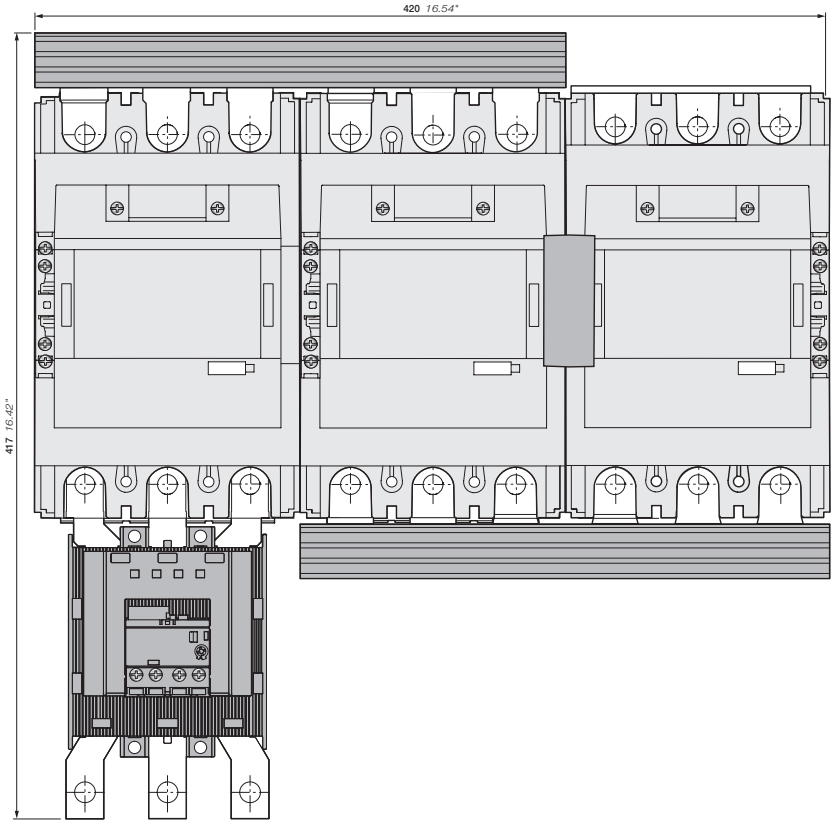
Line, Delta: AF265, AF305, AF370
+ Star: AF190, AF205
+ BEY265-4, VM205/265
+ EF370 electronic overload relay

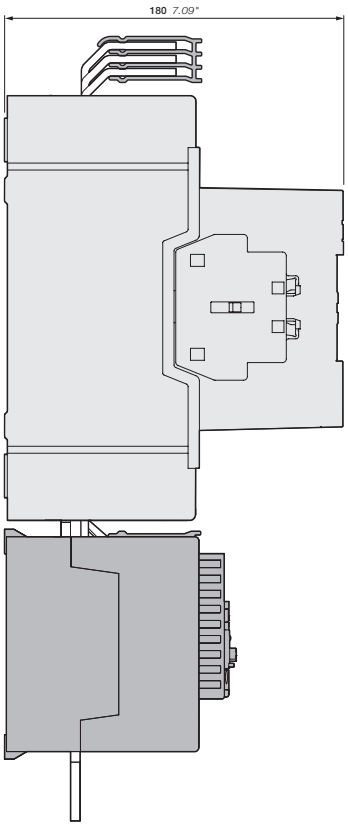


Main dimensions mm, inches

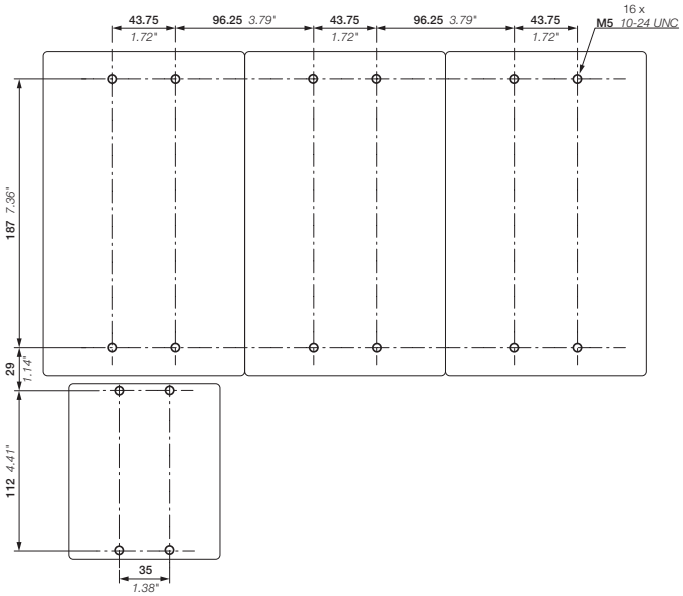
Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form





AF265, AF305, AF370
+ BEY370-4, VM19
+ EF370 electronic overload relay



Main dimensions mm, inches

For direct product details information, use product type or order code, ex:

www.abb.com/productdetails/**1SBL137001R1310**

Certifications and approvals
General technical data

14/2 **Certifications and approvals**

General technical data

14/10 Coordination with short-circuit protection devices
14/13 Standards, specifications and certifying organizations
14/15 Terms and technical definitions
14/18 Standards and utilization categories
14/20 North American standards and utilization categories
14/21 Degrees of protection
14/22 Climatic withstand of devices

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**	cULus North America	CCC China	EAC Russia	KC Korea	BV France	DNV	LR Gr.Britain	RINa Italy	ABS USA	RMRS Russia	CCS China shipping	ClassNK Japan	PRS Poland
3-pole contactors with screw terminals													
4 to 7.5 KW													
AC operated AS09, AS12, AS16	■ E312527	■											
DC operated ASL09, ASL12, ASL16	■ E312527	■											
4 to 45 kW													
AC / DC operated AF09, AF12, AF16, AF26, AF30, AF38	■ E312527	■	■	■	■	■	■	■	■	■		■	
AC / DC operated AF40, AF52, AF65, AF80, AF96	■ E312527	■	■	■	■	■	■	■	■	■		■	
55 to 200 kW													
AC / DC operated (1, 2) AF116, AF140, AF146	■ E36588	■	■	■	■	■	■	■	■	■	■	■	■
AC / DC operated (1, 2) AF190, AF205, AF265, AF305, AF370	■ E36588	■	■	■	■	■	■	■	■	■	■	■	■
200 to 560 kW													
AC / DC operated AF400, AF460, AF580, AF750	■ E36588	■	■		■ coming next	■	■	■	■	■	■	■	■
AC / DC operated AF1250	■ E73397	■	■				■	■	■	■	■	■	■
AC / DC operated AF1350, AF1650	■ E36588	■	■		■ coming next	■	■	■	■	■	■	■	■
AC / DC operated AF2050	■ E73397	■	■				■	■	■	■	■	■	■
AC / DC operated AF2650, AF2850	■ E73397	■	■				■	■		■	■	■	■
4-pole contactors with screw terminals													
25 to 125 A, AC-1													
AC / DC operated AF09, AF16, AF26, AF38	■ E319322	■	■	■	■	■	■	■	■	■		■	
AC / DC operated AF40, AF52, AF80	■ E312527	■	■	■		■		■	■			■	
160 to 525 A, AC-1													
AC / DC operated AF116, AF140, AF190, AF205, AF265, AF305, AF370	■ E73397	■	■	■ (1)	■	■	■	■	■	■	■	■	■
800 to 1000 A AC-1													
AC operated EK550	■ E36588	■	■										
AC operated EK1000		■	■										
DC operated EK550	■ E36588	■	■										
DC operated EK1000		■	■										

(1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface.
All AF contactors are (RCM) marked.

Certifications and approvals

	Certifications				Approvals: ship classification societies								
Mark													
Abbreviation	cULus	CCC	EAC	KC	BV	DNV	LR	RINa	ABS	RMRS	CCS	ClassNK	PRS
Approved in	North America	China	Russia	Korea	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan	Poland
DC switching contactors													
AC operated GA75	■ E319322 UL & CSA certified	■											
DC operated GAE75	■ E319322 UL & CSA certified	■											
DC operated GF875...GF1325	■	■	■ Under approval		■	■	■		■				
AC / DC operated GAF185 ... GAF300	■ E73397	■	■										
AC / DC operated GAF460, GAF750, GAF1250, GAF1650, GAF2050	■ E73397	■	■										
Capacitor switching contactors													
AC operated UA16	■ E312527 UL certified only	■	■										
AC operated UA26 ... UA75	■ E312527 UL certified only	■	■										
AC operated UA95, UA110	■ E36588	■	■										
AC operated UA16..RA	■ E312527 UL certified only	■	■										
AC operated UA26..RA ... UA75..RA	■ E312527 UL & CSA certified	■	■										
AC operated UA95..RA, UA110..RA	■ E36588	■	■										
Contactor relays with screw terminals													
AC operated 4-pole, 8-pole - NS..	■ E252354	■											
DC operated 4-pole, 8- pole - NSL..	■ E252354	■											

All GAF and NF contactors are (RCM) marked.

3-pole contactors with spring terminals													
4 to 7.5 KW													
AC operated AS09..S, AS12..S, AS16..S	■ E312527	■											
DC operated ASL09..S, ASL12..S, ASL16..S	■ E312527	■											
4 to 11 KW													
AC / DC operated AF09..S AF12..S, AF16..S	■ E312527	■	■			■	■		■	■	■		■
AF26..S		■	■			■	■		■	■	■		■
Contactor relays with spring terminals													
AC operated 4-pole, 8-pole - NS..	■ E252354	■											
DC operated 4-pole, 8- pole - NSL..	■ E252354	■											

Certifications and approvals

	Certifications			Approvals: ship classification societies								
Mark												
Abbreviation	cULus	CCC	EAC	BV	DNV	LR	RINa	ABS	RMRS	CCS	ClassNK	PRS
Approved in	North America	China	Russia	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan	Poland
Accessories for AS09 ... AS16 contactors												
Auxiliary contacts												
CA3	■ E252354	■	■									
CA3..S	■ E252354	■										
Mechanical interlock unit												
VM3	■ E312527		■	□	□	□	□	□	□	□		
Connecting links												
BEA16-3	■ E312527		■	□	□	□	□	□	□	□		
BEA16-3U	■ E312527			□	□	□	□	□	□	□		
BER16C-3	■ E312527		■	□	□	□	□	□	□	□		
BEY16C-3	■ E312527		■	□	□	□	□	□	□	□		
Electronic timer												
TEF3	■ E252354		■									
Surge suppressors												
RT5, RC5-1, RV5	■ E312527		■									
Accessories for AF09 ... AF2650 and EK contactors and NF contactor relays												
Auxiliary contacts												
CA4, CC4	■ E252354	■	■	■ (CA4)	■ (CA4)	■	■	■	■		□	
CAT4	■ E252354	■	■	■	■	■	■	■	■		□	
CAL4	■ E252354	■	■	■	■	■	■	■	■		□	
CAL19	■ E76003	■	■	■	■	■	■	■	■	■	■	
CAL18	■ E76003	■	■		■	■	■	■	■	■	■	
CAL20	■	■										
CAL16	■ E76003	■	■									
CE5...D0.1	■ E319322	■	■									
CE5...D2	■ E319322	■	■									
CE5...W0.1	■ E319322	■	■									
CE5...W2	■ E319322		■									
CEL18	■ E76003	■	■									
CEL19	■	■	■									
CA4..S, CAL4..S, CAT4..S	■ E252354	■	■	■	■		■	■	■			
Electronic timer												
TEF4, TEF45	■ E252354		■									
Mechanical / electrical interlock unit												
VEM4	■ E312527	■	■									
Mechanical interlock units												
VM4, VM96-4	■ E312527		■	□	□	□	□	□	□	□	□	
VM19	■ E36588			□	□	□	□	□	□	□		
VM140/190	■ E36588			□	□	□	□	□	□	□		
VM205/265	■ E36588			□	□	□	□	□	□	□		
VM 750	■ E36588			□	□	□	□	□	□	□		
VM1650H	■ E36588			□	□	□	□	□	□	□		
Interface relay												
RA4	■ E252354		■									

□ Marine not needed for this accessory.

Certifications and approvals

	Certifications			Approvals: ship classification societies							
Mark											
Abbreviation	cULus	CCC	EAC	BV	DNV	LR	RINa	ABS	RMRS	CCS	ClassNK	PRS
Approved in	North America	China	Russia	France		Gr.Britain	Italy	USA	Russia	China shipping	Japan	Poland
Latching unit												
WB75-A	■ E252354 UL certified only		■									
WA4	■ E312527											
Connecting links with manual motor starters												
BEA16-4, BEA26-4, BEA38-4, BEA65-4	■ E312527		■	□	□	□	□	□	□	□	□	
Connection sets for reversing contactors												
BER16-4, BER38-4	■ E312527		■	□	□	□	□	□	□	□	□	
BER65-4, BER96-4	■ E312527		■	□	□	□	□	□	□	□	□	
BER140-4, BER205-4, BER370-4	■ E36588			□	□	□	□	□	□	□	□	
BEM460-30, BEM750-30	■ E36588			□	□	□	□	□	□	□	□	
Connection sets for star-delta starters												
BEY16-4, BEY38-4	■ E312527		■	□	□	□	□	□	□	□	□	
BEY65-4, BEY96-4	■ E312527		■	□	□	□	□	□	□	□	□	
BEY190-4, BEY205-4, BEY265-4, BEY370-4	■ E36588			□	□	□	□	□	□	□	□	
BED460, BED580, BED750	■ E36588			□	□	□	□	□	□	□	□	
Phase to phase connections												
BEP140-30, BEP205-30, BEP370-30	■ E36588			□	□	□	□	□	□	□	□	
BEP140-40, BEP205-40, BEP370-40				□	□	□	□	□	□	□	□	
BES460, BES750	■ E36588			□	□	□	□	□	□	□	□	
Connection bars between contactors and MCCB												
BEA140/XT2, BEA140/XT3	■ E36588			□	□	□	□	□	□	□	□	
BEA205/XT4	■ E36588			□	□	□	□	□	□	□	□	
BEA370/T5	■ E36588			□	□	□	□	□	□	□	□	
Terminal connecting strips and shorting bars												
LY16-4, LY38-4	■ E312527		■	□	□	□	□	□	□	□	□	
LY110, LY185, LY300, LY460, LY750	■ E36588		■	□	□	□	□	□	□	□	□	
LP185, LP300, LP460, LP750	■ E36588		■	□	□	□	□	□	□	□	□	
LH38-4	■ E312527		■	□	□	□	□	□	□	□	□	
LF16-4, LF38-4	■ E312527		■	□	□	□	□	□	□	□	□	
LG16-4	■ E312527		■	□	□	□	□	□	□	□	□	
LK96-4F	■ 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	–			□	□	□	□	□	□	□	□	
LT140 ... LT750	■ E36588			□	□	□	□	□	□	□	□	
LT140-40 ... LT370-40	■ E73397			□	□	□	□	□	□	□	□	
Terminal enlargement												
LW	■ E36588			□	□	□	□	□	□	□	□	

(1) In progress. □ Marine approvals not needed for this accessory.

Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	EAC	ATEX	IEC Ex	KC	BV	DNV	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
Teminal extension															
LX			■ E36588		■	□			□	□	□	□	□	□	□
Connection socket															
LL			■ E36588		■	□			□	□	□	□	□	□	□
Connection modules															
LD146-30, LD146-40			■ E36588		■	□			□	□	□	□	□	□	□
Function marker															
BA4			■ E252354			□			□	□	□	□	□	□	□
Fixing clip															
BB4			■ E312527			□			□	□	□	□	□	□	□
Manual motor starters															
MS116			■ E137861	■	■			■	■	■	■		■	■	
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	■											
B mini contactors															
3-pole contactors															
AC operated B6, B7			■ E191658(5)	■	■			■	■	■	■			■	
DC operated BC6, BC7, B7D			■ E191658(5)	■	■			■	■	■	■			■	
3-pole reversing contactors															
AC operated VB6, VB7			■ E191658(5)	■	■			■		■				■	
DC operated VBC6, VBC7			■ E191658(5)	■	■			■		■				■	
AC operated VB6A, VB7A			■ E191658(5)	■	■			■		■				■	
DC operated VBC6A, VBC7A			■ E191658(5)	■	■			■		■				■	
3-pole low consumption contactors															
DC operated BC6, BC7			■ E191658(5)	■	■			■	■	■	■			■	
DC operated B6S, B7S			■ E191658(5)	■	■			■	■	■	■			■	
4-pole contactors															
AC operated BC6, BC7			■ E191658(5)	■	■			■	■	■	■			■	
DC operated B6S, B7S			■ E191658(5)	■	■			■	■	■	■			■	

Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	EAC	ATEX	IEC Ex	KC	BV	DNV	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
Contactor relays															
AC operated K6			■ E48139(5)	■	■									■	
DC operated KC6			■ E48139(5)	■	■									■	
Low consumption contactor relays															
DC operated KC6			■ E48139(5)	■	■									■	
DC operated K6S				■	■									■	
Accessories for B mini contactors															
Auxiliary contacts															
CA6			■ E48139(5)	■	■									■	
CAF6			■ E48139	■	■									■	
Connecting links															
BEA7/132			■ E312527(5)						□	□	□	□	□	□	□
Connection sets for reversing contactors															
BSM6-30			■ E191658						□	□	□	□	□	□	□
Surge suppressors															
RV-BC6			■ E191658												

(5) cURus for devices equipped with flat and soldering pin terminals, and BEA7/132

Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	EAC	ATEX	IEC Ex	KC	BV	DNV	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
M mini contactors															
3-pole contactors															
AC operated MC1A, MC2A			■ E191658	■					■			■			
DC operated MC1C, MC2C			■ E191658	■					■			■			
3-pole low consumption contactors															
DC operated MC1I, MC1K, MC2I, MC2K			■ E191658	■								■			
4-pole contactors															
AC operated MC1A, MC2A			■ E191658	■					■			■			
DC operated MC1C, MC2C			■ E191658	■					■			■			
4-pole low consumption contactors															
DC operated MC1I, MC1K			■ E191658	■								■			
Contactor relays															
AC operated MCRA			■ E48139	■					■						
DC operated MCRC			■ E48139	■					■						
Low consumption contactor relays															
DC operated MCRI, MCRK			■ E48139	■											
Accessories for M mini contactors															
Auxiliary contacts															
MACL, MARL			■ E48139	■					■			■			
MACN, MARN			■ E48139	■					■			■			
Mechanical interlock unit															
MMH0			■ E191658						□	□	□	□	□	□	□
Connecting links															
BEMC/132			■ E137861						□	□	□	□	□	□	□
Connection sets for reversing contactors															
WKMIU			■ E191658						□	□	□	□	□	□	□
Electronic timer															
MREBC			■ E48139												
Surge suppressors															
MP0			■ E48139						■			■			
Thermal overload relays															
T16			■ E48139	■	■				■	■	■	■	■	■	
TF42			■ E48139	■	■	■			■	■	■	■	■	■	
TF65			■ E48139	■	■	■ (3)			■	■	■	■	■	■	
TF96			■ E48139	■	■	■ (3)			■	■	■	■	■	■	
TF140DU			■ E48139	■	■				■	■	■	■	■	■	
TF140DU-V1000			■ E48139	■	■	■			■	■	■	■	■	■	
TA200DU			■ E48139	■	■				■	■ (4)	■		■	■	
TA200DU-V1000			■ E48139	■	■	■			■	■ (4)	■		■	■	

Certifications and approvals

	Certifications								Approvals: ship classification societies						
Mark															
Abbreviation	CSA	UL	cULus	CCC	EAC	ATEX	IEC Ex	KC	BV	DNV	LR	RINa	ABS	RMRS	ClassNK
Approved in	Canada	USA	North America	China	Russia			Korea	France		Gr.Britain	Italy	USA	Russia	Japan
Electronic overload relays															
0.10...45 A															
E16DU			■ E48139	■	■									■	
EF19			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF45			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
20...150 A															
EF65			■ E48139	■	■	■ (2)	■ (1)		■	■	■	■ (2)	■	■	
EF96			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF146			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
63...380 A															
EF205			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF370			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
150...1250 A															
EF460			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF750			■ E48139	■	■	■	■ (1)		■	■	■	■	■	■	
EF1250			■ E76003		■										
Electronic compact starter															
HF range			■ E191658	■		■									

(1) IECEx is valid for product produced from week15, 2017. (2) EF65-56 has no RINa approval and ATEX certification is valid for EF65-56 produced from week 47, 2015. (3) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

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.

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

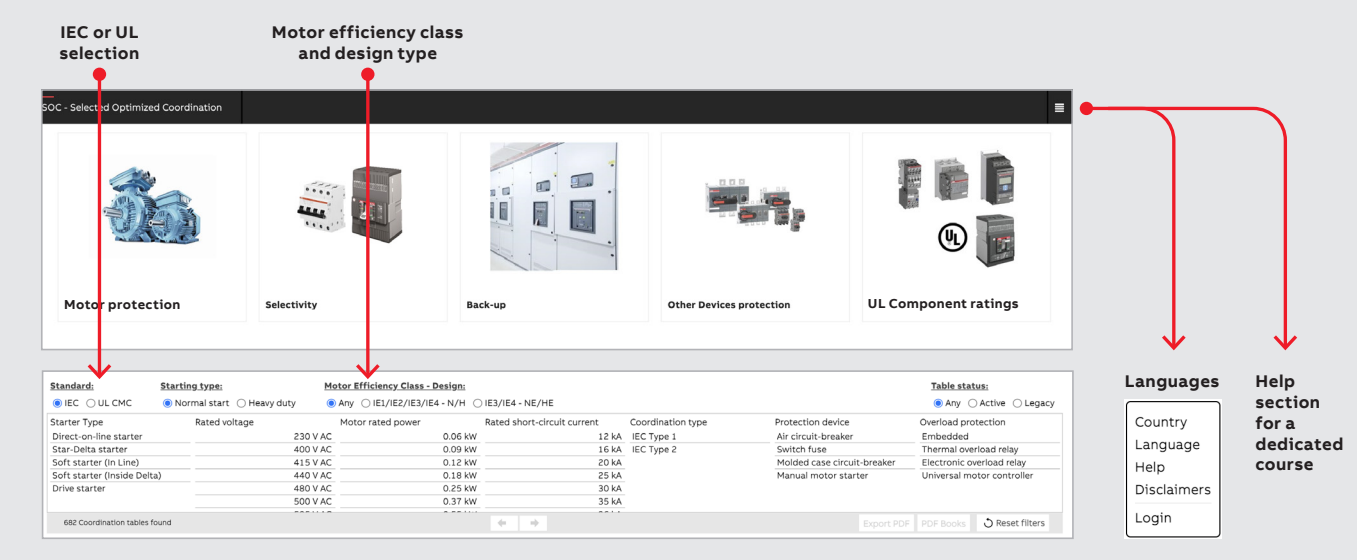
A complete data base of coordination tables, is available on below ABB Website:

- 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/



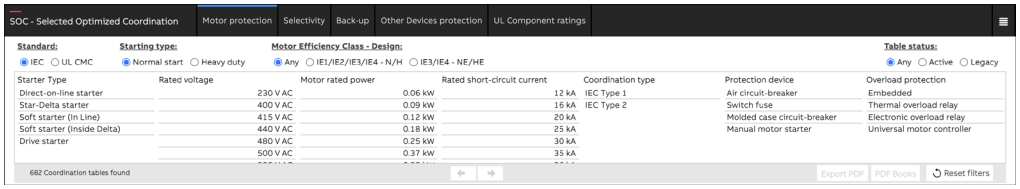
Features

- 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

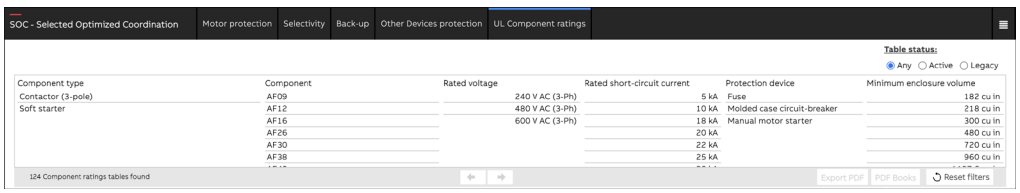
Results

- 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



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.

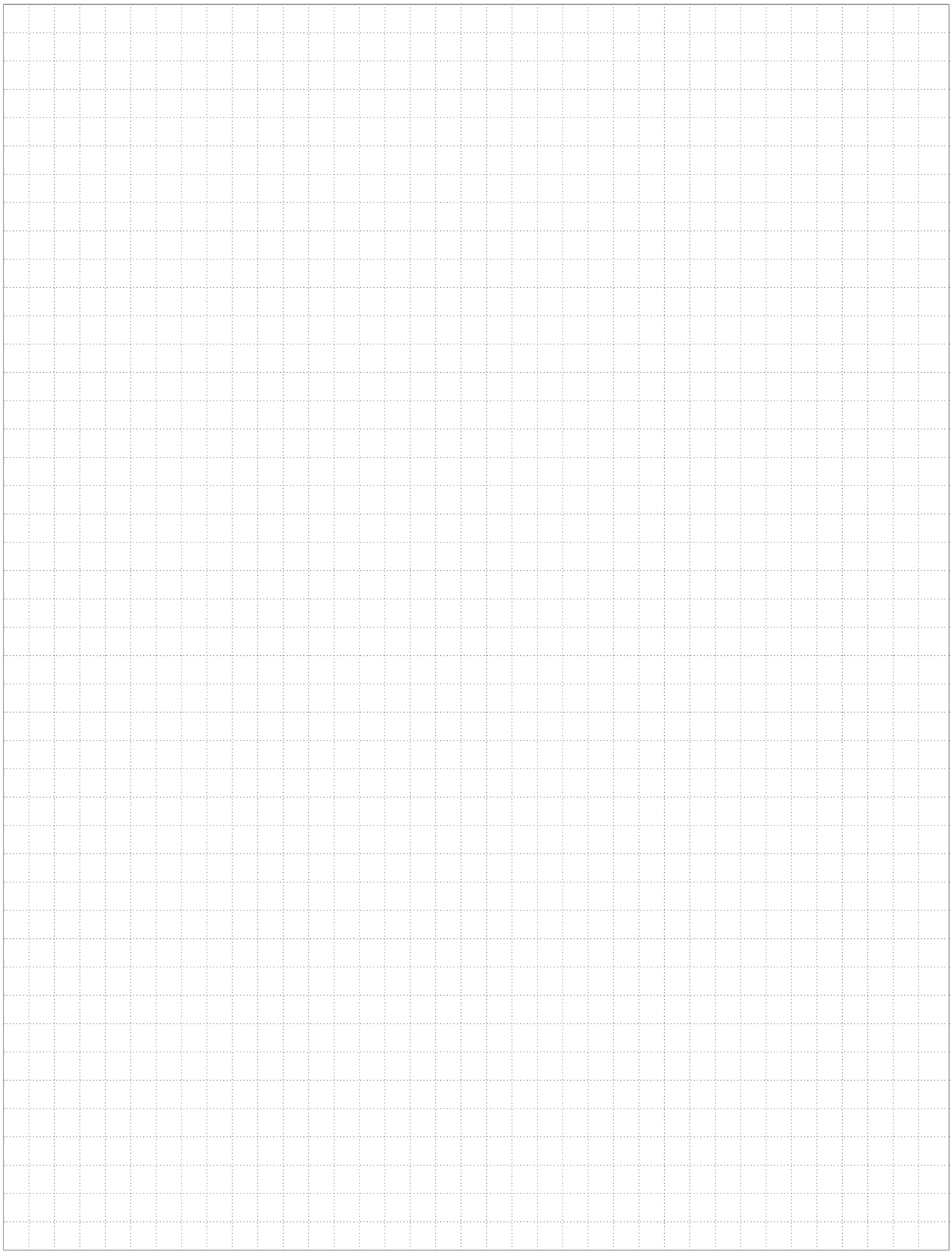
In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m^3 of enclosure).

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).

Notes



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Order code classification

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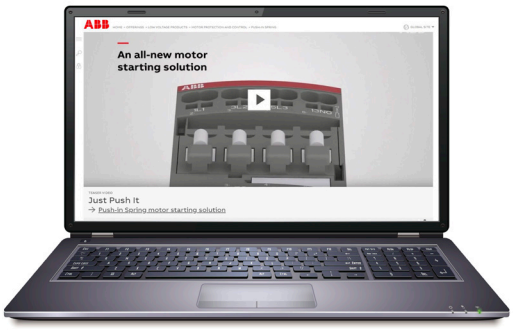

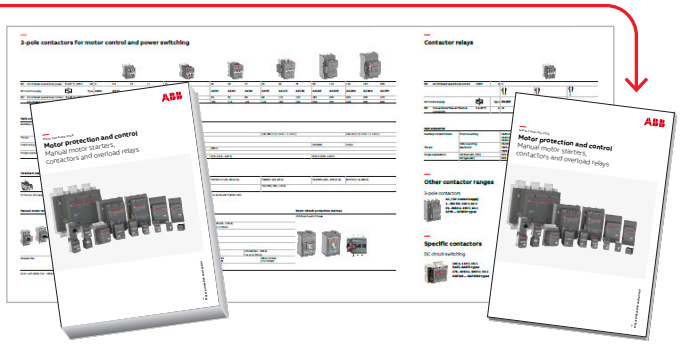

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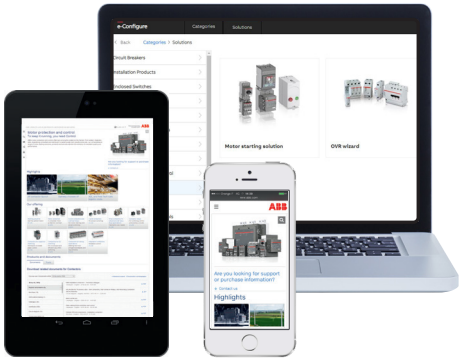

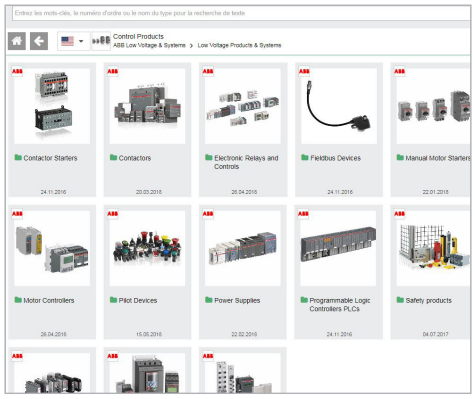

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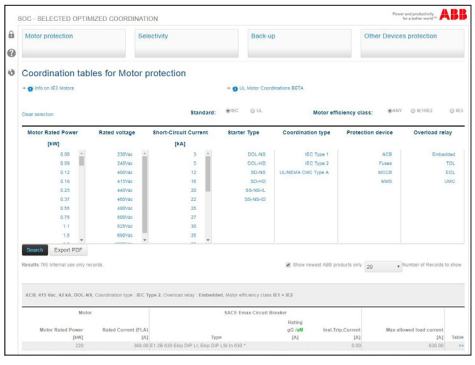

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Low Voltage Products and Systems
Protection & Connection
SE-721 61 Västerås / Sweden

You can find the address of your local sales organization on the ABB home page

http://new.abb.com/low-voltage/products/motor-protection

http://www.abb.com/lowvoltage

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