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



Motor protection and control with AFC contactors and NFC contactor relays

OVERVIEW

AFC CONTACTORS AND
NFC CONTACTOR RELAYS

MANUAL MOTOR STARTERS
AND TRANSFORMER
PROTECTION

OVERLOAD RELAYS

CERTIFICATIONS AND
APPROVALS

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AFC contactors for AC control applications

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



Speed up your projects

One modular design

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



Optimum interface

One contactor platform

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



Global availability

Expand your market

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

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



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

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

Part of the AF platform

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



Select Optimized Coordination tool (SOC)

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

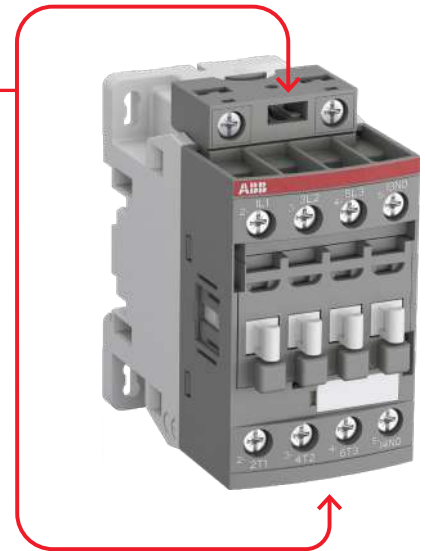
- motor starting and protection
- selectivity between protection devices
- back-up protection
- other devices protection
- UL component ratings.



Flexible and safe

Great flexibility for coil terminal access and surge suppressor

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



Compatible and easy to use accessories

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



Easy, fast and secure starters assembly

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



Protect from overload in all conditions

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



Select contactor dedicated to your application

The complement to the AF contactors




| | | | AFC contactors AFC09 ... AFC96 | AF contactors AF09 ... AF96 |
|-------------------------|--|-----------|---|---|
| Main Pole IEC | AC-3/AC-3e rated operational power 380-400 V | kW | 4 ... 45 | 4 ... 45 |
| | AC-3/AC-3e rated operational current 380-400 V | A | 9 ... 96 | 9 ... 96 |
| | AC-1 rated operational current 690 V | A | 25 ... 130 | 25 ... 130 |
| | Rated operational voltage Ue max | V | 690 V Ue max = 690V | |
| Main Pole UL/CSA | 3-phase motor rating 440-480 V | hp | 5 ... 60 | 5 ... 60 |
| | General use rating 600 V | A | 25 ... 115 | 25 ... 115 |
| Terminal types | | | Screw Push-in Spring | Screw Push-in Spring |
| Control circuit | Control circuit | | AC | |
| | Number of coils | | 9 | |
| | Rated control circuit voltage 50 Hz | V | Coil 81 : 24 Coil 84 : 110 Coil 80 : 220 ... 230 Coil 88 : 230 ... 240 Coil 85 : 380 ... 400 Coil 86 : 400 ... 415 | Coil 34 : 175 Coil 42 : 230 ... 240 Coil 51 : 400 ... 415 |
| | Rated control circuit voltage 60 Hz | V | Coil 81 : 24 Coil 84 : 110 ... 120 Coil 80 : 230 ... 240 Coil 88 : 240 ... 260 Coil 85 : 400 ... 415 Coil 86 : 415 ... 440 | Coil 11 : 24...60 V 50/60 Hz / 20...60 V DC Coil 12 : 48...130 V 50/60 Hz / DC Coil 13 : 100...250 V 50/60 Hz / DC Coil 14 : 250...500 V 50/60 Hz / DC |
| | Surge suppressor | | External | |
| | Operating time - NO contact opening | ms | max. 18 | |
| | Operating time - NO contact closing | ms | max. 26 | |
| | Coil operating limits and drop zone | | | |
| | <ul style="list-style-type: none"> + 10 % UC max. acc. to IEC Uc coil nominal voltage - 15% Uc min. according to IEC Uncertain drop zone Safe holding zone | | | |

AFC 3-pole contactors and motor protection




AFC 3-pole contactors

| IEC | AC-3 Rated operational power | $\theta \leq 60^\circ\text{C}, 400\text{ V}$ | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
|-------------------|---|--|----------|----------|----------|----------|----------|----------|------|
| AC Control supply |  | Type | AFC09 | AFC12 | AFC16 | AFC26 | AFC30 | AFC38 | |
| | | | AFC09..K | AFC12..K | AFC16..K | AFC26..K | AFC30..K | AFC38..K | |
| IEC | AC-3 Rated operational current | $\theta \leq 60^\circ\text{C}, 400\text{ V}$ | A | 9 | 12 | 18 | 26 | 32 | 38 |
| | AC-1 Rated operational current | $\theta \leq 40^\circ\text{C}, 690\text{ V}$ | A | 25 | 28 | 30 | 45 | 50 | 50 |


Main accessories

| | | | |
|--------------------------|--------------------------|--|---------|
| Auxiliary contact blocks | Front mounting | CA4-10 (1 x N.O.) CA4-01 (1 x N.C.) CA4-11 (1xN.O.+1xN.C.) CA4-20 (2xN.O.) CA4-02 (2xN.C.) | |
| | Side mounting | CAL4-11 (1 x N.O. + 1 x N.C.) | |
| Timers | Electronic | TEF4-ON TEF4-OFF | |
| | Mechanical | VM4 | |
| Interlocking units | Mechanical / Electrical | VEM4 | |
| | For reversing contactors | BER16-4 | BER38-4 |
| Connection sets | Surge suppressors | Varistor (AC) | RV4-1 |
| | RC type (AC) | RC4-1 | |

Overload relays

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

Manual motor starters

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

(1) MS165/MO165 are suitable for use with AFC09 ... AFC30 for North american applications.

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



| | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | 18,5 | 22 | 30 | 37 | 45 |
| | AFC40 | AFC52 | AFC65 | AFC80 | AFC96 |
| | 40 | 53 | 65 | 80 | 96 |
| | 70 | 100 | 105 | 125 | 130 |

| | | |
|--|---|----------------|
| | CA4-10 (1 x N.O.) CA4-01 (1 x N.C.) CA4-11 (1xN.O.+1xN.C.) CA4-20 (2xN.O.) CA4-02 (2xN.C.) | |
| | CAL4-11 (1 x N.O. + 1 x N.C.) | |
| | TEF4-ON TEF4-OFF | |
| | VM96-4 | |
| | - | |
| | BER65-4 | BER96-4 |
| | - | |
| | RC4-2 | |


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

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

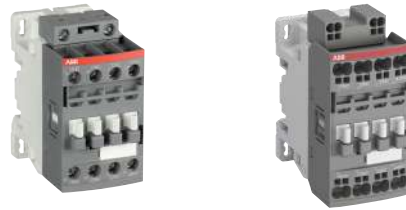
AFC 4-pole contactors and NFC contactor relays





AFC 4-pole contactors



| | | | | | | | | | | |
|-------------------|---|--|---|-------|-------|-------|-------|-------|-------|-------|
| IEC | AC-1 Rated operational current | $\theta \leq 40^\circ\text{C}$, 690 V | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| AC Control supply |  | Type | | AFC09 | AFC16 | AFC26 | AFC38 | AFC40 | AFC52 | AFC80 |
| IEC | AC-3 Rated operational current | $\theta \leq 60^\circ\text{C}$, 400 V | A | 9 | 18 | 22 | 22 | 40 | 53 | 80 |
| | AC-1 Rated operational current | $\theta \leq 40^\circ\text{C}$, 690 V | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |







NFC 4-pole contactor relays



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

NFC 8-pole contactor relays



| | | | | | | | |
|-------------------|---|---|---|--|---|---|-------------------|
| IEC | AC-15 Rated operational current | 400 V | 3 | | | | |
| UL/CSA | Pilot duty | A600, Q600 | | | | | |
| | |  |  |  |  |  | |
| AC Control supply |  | Type | NFC44E NFC44EK | NFC53E NFC53EK | NFC62E NFC62EK | NFC71E NFC71EK | NFC80E NFC80EK |

AFC contactors and NFC contactor relays

- 2/1 AFC 3-pole contactors**
- 2/35 AFC 4-pole contactors**
- 2/53 NFC contactor relays**
- 2/71 Accessories**
- 2/99 Terminal marking and positioning**
- 2/105 Dimensions**



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

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

AFC 3-pole contactors

With screw terminals

| | |
|------------|--------------------------------------|
| 2/2 | AFC09 ... AFC16 |
| 2/4 | AFC26 ... AFC38 |
| 2/6 | AFC40 ... AFC96 |
| 2/7 | AFC40 ... AFC96 with 1 N.O. + 1.N.C. |

With Push-in Spring terminals

| | |
|-------------|-----------------------|
| 2/12 | AFC09..K ... AFC16..K |
| 2/14 | AFC26..K ... AFC38..K |
| 2/17 | Technical data |
| 2/29 | Electrical durability |

AFC09 ... AFC16 3-pole contactors

4 to 7.5 kW
AC operated

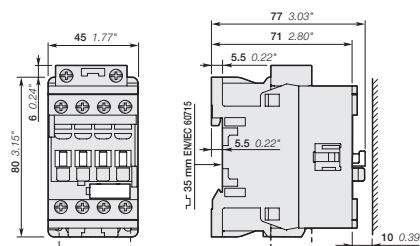


AFC09-30-10

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

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

| IEC | UL / CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|------------|-------------------------|----------------------|--|-------------|---------------------------|--------------------|-----------------|--------|
| | Rated operational power | 3-phase motor rating | General use rating | V 50 Hz | | | | |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | | | | | kg |
| kW | A | hp | A | | | | | |
| 4 | 25 | 5 | 25 | 24 | 24 | 1 0 AFC09-30-10-81 | 1SBL131001R8110 | 0.331 |
| | | | | | | 0 1 AFC09-30-01-81 | 1SBL131001R8101 | 0.331 |
| | | | | 110 | 110 ... 120 | 1 0 AFC09-30-10-84 | 1SBL131001R8410 | 0.328 |
| | | | | | | 0 1 AFC09-30-01-84 | 1SBL131001R8401 | 0.328 |
| | | | | 220 ... 230 | 230 ... 240 | 1 0 AFC09-30-10-80 | 1SBL131001R8010 | 0.322 |
| | | | | | | 0 1 AFC09-30-01-80 | 1SBL131001R8001 | 0.322 |
| | | | | 230 ... 240 | 240 ... 260 | 1 0 AFC09-30-10-88 | 1SBL131001R8810 | 0.324 |
| | | | | | | 0 1 AFC09-30-01-88 | 1SBL131001R8801 | 0.324 |
| | | | | 380 ... 400 | 400 ... 415 | 1 0 AFC09-30-10-85 | 1SBL131001R8510 | 0.318 |
| | | | | | | 0 1 AFC09-30-01-85 | 1SBL131001R8501 | 0.318 |
| | | | | 400 ... 415 | 415 ... 440 | 1 0 AFC09-30-10-86 | 1SBL131001R8610 | 0.321 |
| | | | | | | 0 1 AFC09-30-01-86 | 1SBL131001R8601 | 0.321 |
| 5.5 | 28 | 7.5 | 28 | 24 | 24 | 1 0 AFC12-30-10-81 | 1SBL151001R8110 | 0.331 |
| | | | | | | 0 1 AFC12-30-01-81 | 1SBL151001R8101 | 0.331 |
| | | | | 110 | 110 ... 120 | 1 0 AFC12-30-10-84 | 1SBL151001R8410 | 0.328 |
| | | | | | | 0 1 AFC12-30-01-84 | 1SBL151001R8401 | 0.328 |
| | | | | 220 ... 230 | 230 ... 240 | 1 0 AFC12-30-10-80 | 1SBL151001R8010 | 0.322 |
| | | | | | | 0 1 AFC12-30-01-80 | 1SBL151001R8001 | 0.322 |
| | | | | 230 ... 240 | 240 ... 260 | 1 0 AFC12-30-10-88 | 1SBL151001R8810 | 0.324 |
| | | | | | | 0 1 AFC12-30-01-88 | 1SBL151001R8801 | 0.324 |
| | | | | 380 ... 400 | 400 ... 415 | 1 0 AFC12-30-10-85 | 1SBL151001R8510 | 0.318 |
| | | | | | | 0 1 AFC12-30-01-85 | 1SBL151001R8501 | 0.318 |
| | | | | 400 ... 415 | 415 ... 440 | 1 0 AFC12-30-10-86 | 1SBL151001R8610 | 0.321 |
| | | | | | | 0 1 AFC12-30-01-86 | 1SBL151001R8601 | 0.321 |
| 7.5 | 30 | 10 | 30 | 24 | 24 | 1 0 AFC16-30-10-81 | 1SBL171001R8110 | 0.331 |
| | | | | | | 0 1 AFC16-30-01-81 | 1SBL171001R8101 | 0.331 |
| | | | | 110 | 110 ... 120 | 1 0 AFC16-30-10-84 | 1SBL171001R8410 | 0.328 |
| | | | | | | 0 1 AFC16-30-01-84 | 1SBL171001R8401 | 0.328 |
| | | | | 220 ... 230 | 230 ... 240 | 1 0 AFC16-30-10-80 | 1SBL171001R8010 | 0.322 |
| | | | | | | 0 1 AFC16-30-01-80 | 1SBL171001R8001 | 0.322 |
| | | | | 230 ... 240 | 240 ... 260 | 1 0 AFC16-30-10-88 | 1SBL171001R8810 | 0.324 |
| | | | | | | 0 1 AFC16-30-01-88 | 1SBL171001R8801 | 0.324 |
| | | | | 380 ... 400 | 400 ... 415 | 1 0 AFC16-30-10-85 | 1SBL171001R8510 | 0.318 |
| | | | | | | 0 1 AFC16-30-01-85 | 1SBL171001R8501 | 0.318 |
| | | | | 400 ... 415 | 415 ... 440 | 1 0 AFC16-30-10-86 | 1SBL171001R8610 | 0.321 |
| | | | | | | 0 1 AFC16-30-01-86 | 1SBL171001R8601 | 0.321 |



AFC09, AFC12, AFC16
Main dimensions mm, inches

AFC09 ... AFC16 3-pole contactors

4 to 7.5 kW

AC operated - With specific 60 Hz voltage

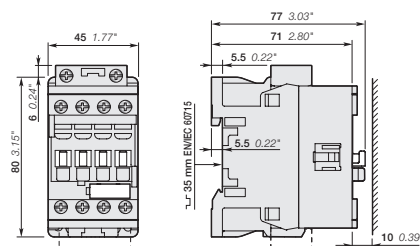


AFC09-30-10

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

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

| IEC | UL / CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | | | | | | |
|-------------|---|-------------------------------------|--|-------------|---------------------------|----------------|-----------------|-----------------------------|-----------------|-----------------|-------|----------------|-----------------|-------|
| | Rated operational power 400 V AC-3 kW | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V 50 Hz | | | | | V 60 Hz | | | | | |
| 4 | 25 | 5 | 25 | 175 | 208 | | AFC09-30-10-34 | 1SBL131001R3410 | 0.328 | | | | | |
| | | | | 0 | 1 | | AFC09-30-01-34 | 1SBL131001R3401 | 0.328 | | | | | |
| | | | | 230 ... 240 | 277 | | 1 | 0 | AFC09-30-10-42 | 1SBL131001R4210 | 0.323 | | | |
| | | | | 0 | 1 | | AFC09-30-01-42 | 1SBL131001R4201 | 0.323 | | | | | |
| | | | | 400 ... 415 | 480 | | 1 | 0 | AFC09-30-10-51 | 1SBL131001R5110 | 0.321 | | | |
| | | | | 0 | 1 | | AFC09-30-01-51 | 1SBL131001R5101 | 0.321 | | | | | |
| | | | | 5.5 | 28 | | 7.5 | 28 | 175 | 208 | | AFC12-30-10-34 | 1SBL151001R3410 | 0.328 |
| | | | | | | | | | 0 | 1 | | AFC12-30-01-34 | 1SBL151001R3401 | 0.328 |
| 230 ... 240 | 277 | 1 | 0 | | | AFC12-30-10-42 | | | 1SBL151001R4210 | 0.323 | | | | |
| 0 | 1 | AFC12-30-01-42 | 1SBL151001R4201 | | | 0.323 | | | | | | | | |
| 400 ... 415 | 480 | 1 | 0 | | | AFC12-30-10-51 | | | 1SBL151001R5110 | 0.321 | | | | |
| 0 | 1 | AFC12-30-01-51 | 1SBL151001R5101 | | | 0.321 | | | | | | | | |
| 7.5 | 30 | 10 | 30 | | | 175 | | | 208 | | | AFC16-30-10-34 | 1SBL171001R3410 | 0.328 |
| | | | | | | 0 | | | 1 | | | AFC16-30-01-34 | 1SBL171001R3401 | 0.328 |
| | | | | 230 ... 240 | 277 | 1 | 0 | AFC16-30-10-42 | 1SBL171001R4210 | | 0.323 | | | |
| | | | | 0 | 1 | AFC16-30-01-42 | 1SBL171001R4201 | 0.323 | | | | | | |
| | | | | 400 ... 415 | 480 | 1 | 0 | AFC16-30-10-51 | 1SBL171001R5110 | | 0.321 | | | |
| | | | | 0 | 1 | AFC16-30-01-51 | 1SBL171001R5101 | 0.321 | | | | | | |



AFC09, AFC12, AFC16

Main dimensions mm, inches

AFC26 ... AFC38 3-pole contactors

11 to 18.5 kW
AC operated



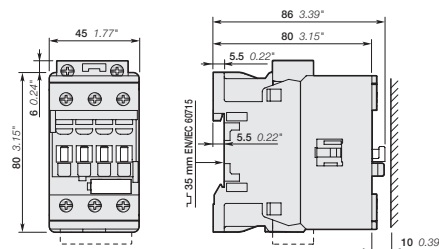
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AFC26-30-00

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

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

| IEC | UL / CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight | |
|---------------|-------------------------|----------------------|----------------------------------|-------------|---------------------------|------|----------------|-----------------|---------|
| | Rated operational power | 3-phase motor rating | General use rating | V 50 Hz | | | | | V 60 Hz |
| 400 V AC-3 kW | AC-1 A | hp | A | | | | | kg | |
| 11 | 45 | 15 | 45 | 24 | 24 | 0 0 | AFC26-30-00-81 | 1SBL231001R8100 | 0.383 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC26-30-00-84 | 1SBL231001R8400 | 0.380 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC26-30-00-80 | 1SBL231001R8000 | 0.374 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC26-30-00-88 | 1SBL231001R8800 | 0.376 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC26-30-00-85 | 1SBL231001R8500 | 0.370 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC26-30-00-86 | 1SBL231001R8600 | 0.373 |
| 15 | 50 | 20 | 50 | 24 | 24 | 0 0 | AFC30-30-00-81 | 1SBL271001R8100 | 0.383 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC30-30-00-84 | 1SBL271001R8400 | 0.380 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC30-30-00-80 | 1SBL271001R8000 | 0.374 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC30-30-00-88 | 1SBL271001R8800 | 0.376 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC30-30-00-85 | 1SBL271001R8500 | 0.370 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC30-30-00-86 | 1SBL271001R8600 | 0.373 |
| 18.5 | 50 | 25 | 50 | 24 | 24 | 0 0 | AFC38-30-00-81 | 1SBL291001R8100 | 0.383 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC38-30-00-84 | 1SBL291001R8400 | 0.380 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC38-30-00-80 | 1SBL291001R8000 | 0.374 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC38-30-00-88 | 1SBL291001R8800 | 0.376 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC38-30-00-85 | 1SBL291001R8500 | 0.370 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC38-30-00-86 | 1SBL291001R8600 | 0.373 |



AFC26, AFC30, AFC38

Main dimensions mm, inches

AFC26 ... AFC38 3-pole contactors

11 to 18.5 kW

AC operated - With specific 60 Hz voltage



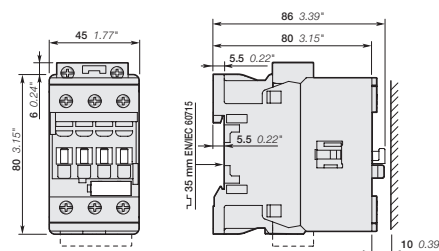
1SBL101001R01.4

AFC26-30-00

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

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

| IEC | UL / CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight | | |
|------------|-------------------------|---------|--|---------------------------|---------|------------|----------------|----------------------|--------------------|
| | Rated operational power | current | | | | | | 3-phase motor rating | General use rating |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | | | | kg | | |
| kW | A | hp | A | | V 50 Hz | V 60 Hz | | | |
| 11 | 45 | 15 | 45 | 175 | 208 | 0 0 | AFC26-30-00-34 | 1SBL231001R3400 | 0.379 |
| | | | | 230 ... 240 | 277 | 0 0 | AFC26-30-00-42 | 1SBL231001R4200 | 0.374 |
| | | | | 400 ... 415 | 480 | 0 0 | AFC26-30-00-51 | 1SBL231001R5100 | 0.372 |
| 15 | 50 | 20 | 50 | 175 | 208 | 0 0 | AFC30-30-00-34 | 1SBL271001R3400 | 0.379 |
| | | | | 230 ... 240 | 277 | 0 0 | AFC30-30-00-84 | 1SBL271001R8400 | 0.374 |
| | | | | 400 ... 415 | 480 | 0 0 | AFC30-30-00-51 | 1SBL271001R5100 | 0.372 |
| 18.5 | 50 | 25 | 50 | 175 | 208 | 0 0 | AFC38-30-00-34 | 1SBL291001R3400 | 0.379 |
| | | | | 230 ... 240 | 277 | 0 0 | AFC38-30-00-42 | 1SBL291001R4200 | 0.374 |
| | | | | 400 ... 415 | 280 | 0 0 | AFC38-30-00-51 | 1SBL291001R5100 | 0.372 |



AFC26, AFC30, AFC38

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW
AC operated

20



AFC40-30-00

15BCL01014V0014



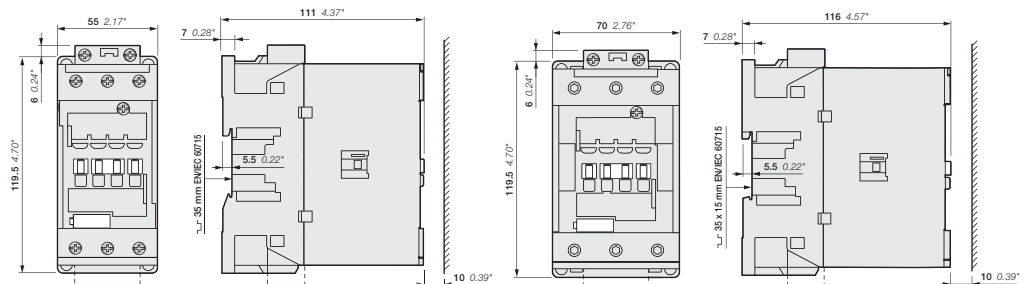
AFC80-30-00

15BCL01016V0014

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

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

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | | |
|------|---|-------------------------------------|--|---------------------------|-------------|------------|----------------|-------------------------------------|-------------|
| | Rated operational power 400 V AC-3 kW | 3-phase motor rating 480 V hp | | | | | | General use rating 600 V AC A | Pkg (1 pce) |
| | | | | | | | kg | | |
| | | | V 50 Hz | 60 Hz | | | | | |
| 18.5 | 70 | 30 | 60 | 24 | 24 | 0 0 | AFC40-30-00-81 | 1SBL341001R8100 | 0.972 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC40-30-00-84 | 1SBL341001R8400 | 0.969 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC40-30-00-80 | 1SBL341001R8000 | 0.963 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC40-30-00-88 | 1SBL341001R8800 | 0.965 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC40-30-00-85 | 1SBL341001R8500 | 0.959 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC40-30-00-86 | 1SBL341001R8600 | 0.962 |
| 22 | 100 | 40 | 80 | 24 | 24 | 0 0 | AFC52-30-00-81 | 1SBL361001R8100 | 0.972 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC52-30-00-84 | 1SBL361001R8400 | 0.969 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC52-30-00-80 | 1SBL361001R8000 | 0.963 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC52-30-00-88 | 1SBL361001R8800 | 0.965 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC52-30-00-85 | 1SBL361001R8500 | 0.959 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC52-30-00-86 | 1SBL361001R8600 | 0.962 |
| 30 | 105 | 50 | 90 | 24 | 24 | 0 0 | AFC65-30-00-81 | 1SBL381001R8100 | 0.972 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC65-30-00-84 | 1SBL381001R8400 | 0.969 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC65-30-00-80 | 1SBL381001R8000 | 0.963 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC65-30-00-88 | 1SBL381001R8800 | 0.965 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC65-30-00-85 | 1SBL381001R8500 | 0.959 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC65-30-00-86 | 1SBL381001R8600 | 0.962 |
| 37 | 125 | 60 | 105 | 24 | 24 | 0 0 | AFC80-30-00-81 | 1SBL391001R8100 | 1.193 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC80-30-00-84 | 1SBL391001R8400 | 1.199 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC80-30-00-80 | 1SBL391001R8000 | 1.204 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC80-30-00-88 | 1SBL391001R8800 | 1.196 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC80-30-00-85 | 1SBL391001R8500 | 1.194 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC80-30-00-86 | 1SBL391001R8600 | 1.198 |
| 45 | 130 | 60 | 115 | 24 | 24 | 0 0 | AFC96-30-00-81 | 1SBL401001R8100 | 1.193 |
| | | | | 110 | 110 ... 120 | 0 0 | AFC96-30-00-84 | 1SBL401001R8400 | 1.199 |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC96-30-00-80 | 1SBL401001R8000 | 1.204 |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC96-30-00-88 | 1SBL401001R8800 | 1.196 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC96-30-00-85 | 1SBL401001R8500 | 1.194 |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC96-30-00-86 | 1SBL401001R8600 | 1.198 |



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

AFC80, AFC96-30-00-..

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

AC operated - With specific 60 Hz voltage



1SBCL01014V0034

AFC40-30-00








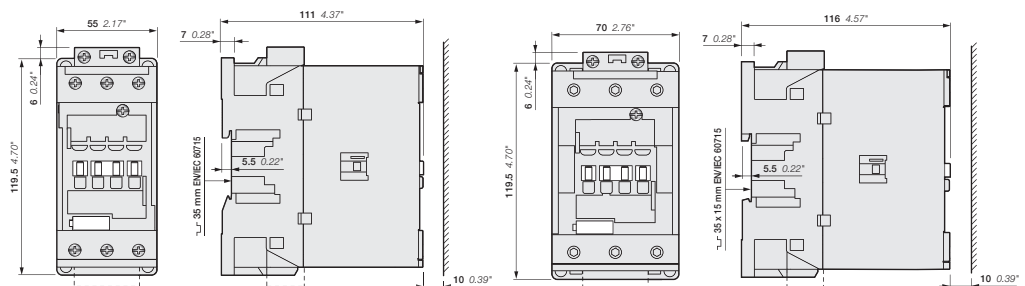
1SBCL01016V0014

AFC80-30-00

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

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

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | | | |
|------|---|--|--|--|-------------|------------|-----------------------------|-------------------------------------|-----------------|-------|
| | Rated operational power 400 V AC-3 kW | 3-phase motor rating 480 V AC-1 hp | | | | | | General use rating 600 V AC A | | |
| 18.5 | 70 | 30 | 60 |  | 175 | 208 | AFC40-30-00-34 | 1SBL341001R3400 | 0.969 | |
| | | | | | 230 ... 240 | 277 | 0 0 | AFC40-30-00-42 | 1SBL341001R4200 | 0.964 |
| | | | | | 400 ... 415 | 480 | 0 0 | AFC40-30-00-51 | 1SBL341001R5100 | 0.962 |
| 22 | 100 | 40 | 80 |  | 175 | 208 | AFC52-30-00-34 | 1SBL361001R3400 | 0.969 | |
| | | | | | 230 ... 240 | 277 | 0 0 | AFC52-30-00-42 | 1SBL361001R4200 | 0.964 |
| | | | | | 400 ... 415 | 480 | 0 0 | AFC52-30-00-51 | 1SBL361001R5100 | 0.962 |
| 30 | 105 | 50 | 90 |  | 175 | 208 | AFC65-30-00-34 | 1SBL381001R3400 | 0.969 | |
| | | | | | 230 ... 240 | 277 | 0 0 | AFC65-30-00-42 | 1SBL381001R4200 | 0.964 |
| | | | | | 400 ... 415 | 480 | 0 0 | AFC65-30-00-51 | 1SBL381001R5100 | 0.962 |
| 37 | 125 | 60 | 105 |  | 175 | 208 | AFC80-30-00-34 | 1SBL391001R3400 | 1.197 | |
| | | | | | 230 ... 240 | 277 | 0 0 | AFC80-30-00-42 | 1SBL391001R4200 | 1.196 |
| | | | | | 400 ... 415 | 480 | 0 0 | AFC80-30-00-51 | 1SBL391001R5100 | 1.198 |
| 45 | 130 | 60 | 115 |  | 175 | 208 | AFC96-30-00-34 | 1SBL401001R3400 | 1.197 | |
| | | | | | 230 ... 240 | 277 | 0 0 | AFC96-30-00-42 | 1SBL401001R4200 | 1.196 |
| | | | | | 400 ... 415 | 480 | 0 0 | AFC96-30-00-51 | 1SBL401001R5100 | 1.198 |



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

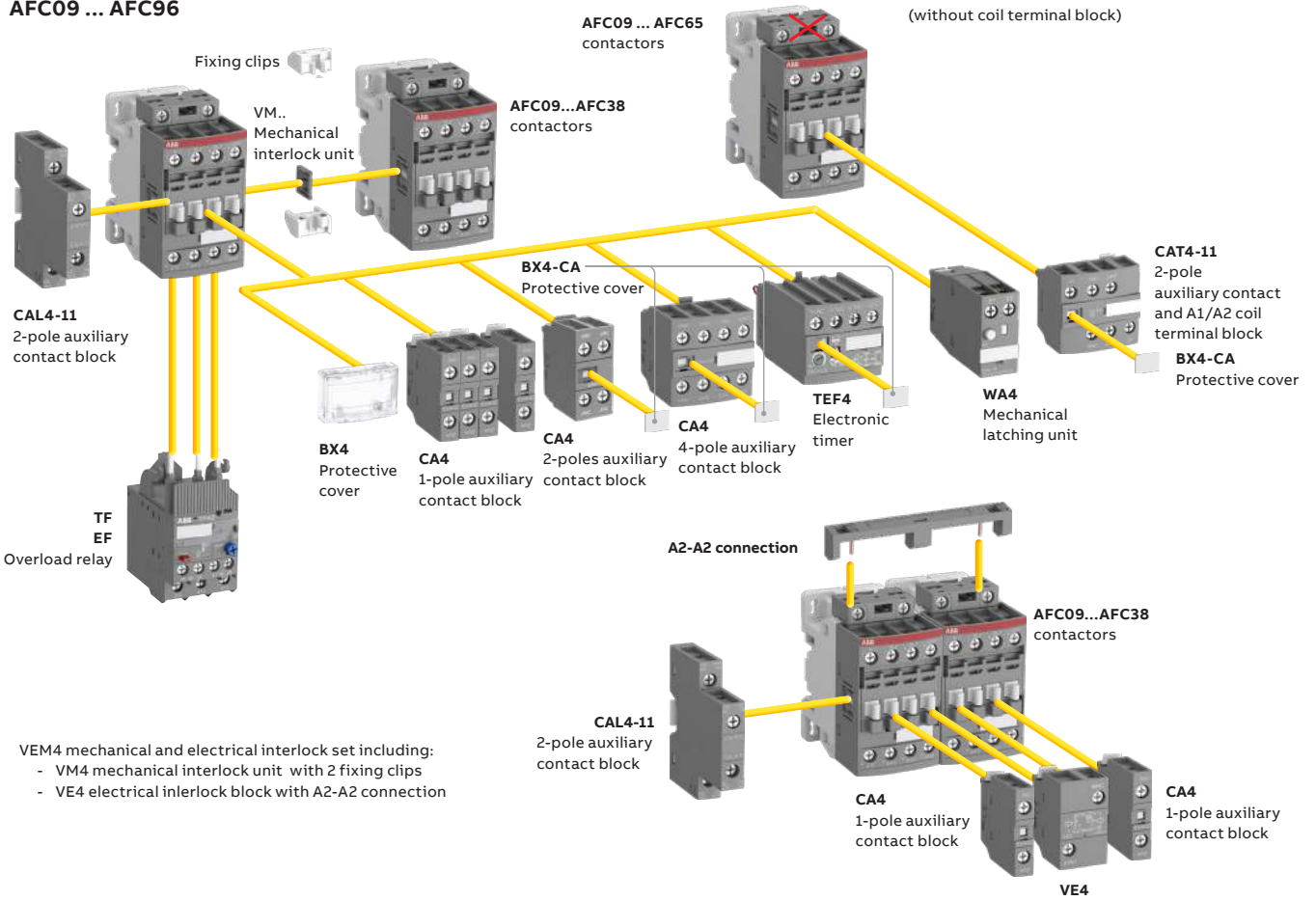
AFC80, AFC96-30-00-..

Main dimensions mm, inches

AFC09 ... AFC96 3-pole contactors

Contactors and main accessories

AFC09 ... AFC96



VEM4 mechanical and electrical interlock set including:
 - VM4 mechanical interlock unit with 2 fixing clips
 - VE4 electrical interlock 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 | | | | Electronic timer | Mechanical latching unit | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories | |
|----------------------------|------------|-----------------------------|---------------------------|------------|----------------|------------|------------------|--------------------------|---|--------------------------|------------|
| | | | Auxiliary contact blocks | | | | | | | Auxiliary contact blocks | |
| | | | 1-pole CA4 | 2-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 (3) | WA4 (2) | VEM4 | 2-pole CAL4-11 | |
| | | | | | | | | | | Left side | Right side |
| AFC09 ... AFC38 (1) | | | | | | | | | | | |
| AFC09 ... AFC16 | 3 | 0 | 0 | 1 | 4 max. | or 2 max. | or 1 | or 1 | - | + 1 | - |
| AFC09 ... AFC16 | 3 | 0 | 1 | 0 | 2 max. | or 1 max. | or 1 | or 1 | - | + 1 | + 1 |
| AFC26 ... AFC38 | 3 | 0 | 0 | 0 | 3 max. | or 1 max. | - | - | + 1 | + 1 | or 1 |
| AFC40 ... AFC96 | | | | | | | | | | | |
| AFC40 ... AFC65 | 3 | 0 | 0 | 0 | 4 max. | or 2 max. | or 1 | - | - | + 1 | + 1 |
| AFC80, AFC96 | 3 | 0 | 0 | 0 | 4 max. | or 2 max. | - | - | - | + 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 AFC09...AFC38.
 Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
 (3) Not to be used for Star-Delta starter. For a compatible Star-Delta timer, please use CT-SDS.22S, CT-SDS.23S or CT-SDC.22

Overload relays fitting details (4)

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

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

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

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



AFC40-30-11

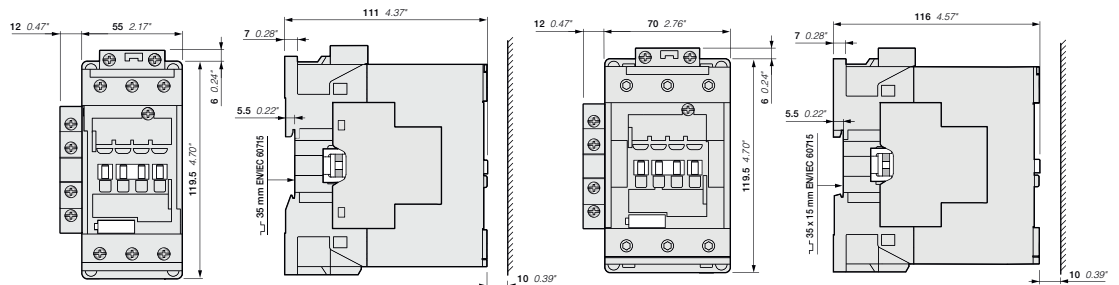


AFC80-30-11

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

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

| IEC Rated operational power | UL / CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | | | | | | | | | | |
|-----------------------------------|---|--------------------------------------|---|-------------|---------------------------------|------|----------------|--|-------|----|----|----|-------------|-------------|-----|----------------|-----------------|-------|
| | | | V 50 Hz | 60 Hz | | | | | | | | | | | | | | |
| 400 V AC-3 kW | AC-1 hp | A | A | V 50 Hz | 60 Hz | | | kg | | | | | | | | | | |
| | | | | | | | | | 18.5 | 70 | 30 | 60 | 24 | 24 | 0 0 | AFC40-30-11-81 | 1SBL341001R8111 | 1.012 |
| | | | | | | | | | | | | | 110 | 110 ... 120 | 0 0 | AFC40-30-11-84 | 1SBL341001R8411 | 1.009 |
| | | | | | | | | | | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC40-30-11-80 | 1SBL341001R8011 | 1.003 |
| | | | | | | | | | | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC40-30-11-88 | 1SBL341001R8811 | 1.005 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC40-30-11-85 | 1SBL341001R8511 | 0.999 | | | | | | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC40-30-11-86 | 1SBL341001R8611 | 1.002 | | | | | | | | | |
| 22 | 100 | 40 | 80 | V 50 Hz | 60 Hz | | | kg | | | | | | | | | | |
| | | | | | | | | | | | | | 24 | 24 | 0 0 | AFC52-30-11-81 | 1SBL361001R8111 | 1.012 |
| | | | | | | | | | | | | | 110 | 110 ... 120 | 0 0 | AFC52-30-11-84 | 1SBL361001R8411 | 1.009 |
| | | | | | | | | | | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC52-30-11-80 | 1SBL361001R8011 | 1.003 |
| | | | | | | | | | | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC52-30-11-88 | 1SBL361001R8811 | 1.005 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC52-30-11-85 | 1SBL361001R8511 | 0.999 | | | | | | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC52-30-11-86 | 1SBL361001R8611 | 1.002 | | | | | | | | | |
| 30 | 105 | 50 | 90 | V 50 Hz | 60 Hz | | | kg | | | | | | | | | | |
| | | | | | | | | | | | | | 24 | 24 | 0 0 | AFC65-30-11-81 | 1SBL381001R8111 | 1.012 |
| | | | | | | | | | | | | | 110 | 110 ... 120 | 0 0 | AFC65-30-11-84 | 1SBL381001R8411 | 1.009 |
| | | | | | | | | | | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC65-30-11-80 | 1SBL381001R8011 | 1.003 |
| | | | | | | | | | | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC65-30-11-88 | 1SBL381001R8811 | 1.005 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC65-30-11-85 | 1SBL381001R8511 | 0.999 | | | | | | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC65-30-11-86 | 1SBL381001R8611 | 1.002 | | | | | | | | | |
| 37 | 125 | 60 | 105 | V 50 Hz | 60 Hz | | | kg | | | | | | | | | | |
| | | | | | | | | | | | | | 24 | 24 | 0 0 | AFC80-30-11-81 | 1SBL391001R8111 | 1.233 |
| | | | | | | | | | | | | | 110 | 110 ... 120 | 0 0 | AFC80-30-11-84 | 1SBL391001R8411 | 1.239 |
| | | | | | | | | | | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC80-30-11-80 | 1SBL391001R8011 | 1.244 |
| | | | | | | | | | | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC80-30-11-88 | 1SBL391001R8811 | 1.236 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC80-30-11-85 | 1SBL391001R8511 | 1.234 | | | | | | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC80-30-11-86 | 1SBL391001R8611 | 1.238 | | | | | | | | | |
| 45 | 130 | 60 | 115 | V 50 Hz | 60 Hz | | | kg | | | | | | | | | | |
| | | | | | | | | | | | | | 24 | 24 | 0 0 | AFC96-30-11-81 | 1SBL401001R8111 | 1.233 |
| | | | | | | | | | | | | | 110 | 110 ... 120 | 0 0 | AFC96-30-11-84 | 1SBL401001R8411 | 1.239 |
| | | | | | | | | | | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC96-30-11-80 | 1SBL401001R8011 | 1.244 |
| | | | | | | | | | | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC96-30-11-88 | 1SBL401001R8811 | 1.236 |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC96-30-11-85 | 1SBL401001R8511 | 1.234 | | | | | | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC96-30-11-86 | 1SBL401001R8611 | 1.238 | | | | | | | | | |



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

AFC80, AFC96-30-11...

Main dimensions mm, inches

AFC40 ... AFC96 3-pole contactors

18.5 to 45 kW

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



AFC40-30-11

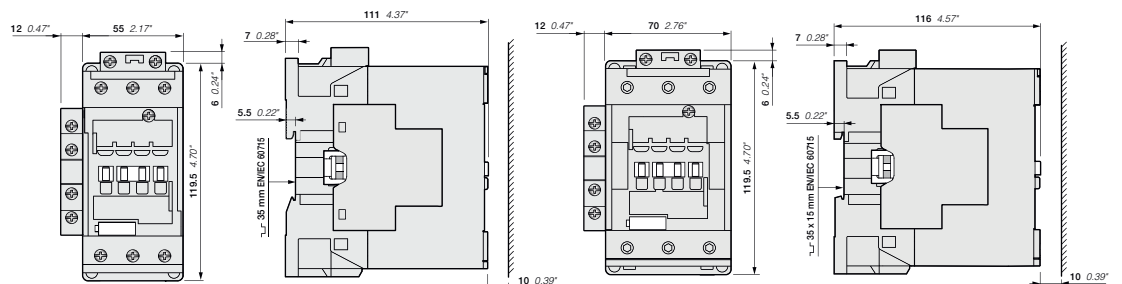


AFC80-30-11

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

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

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight |
|------|---|--|--|---------------------------|----------------|-----------------|--------|
| | Rated operational power 400 V AC-3 kW | 3-phase motor rating 480 V AC-1 hp | | | | | |
| | | | | | | | kg |
| 18.5 | 70 | 30 | 60 | 0 0 | AFC40-30-11-34 | 1SBL341001R3411 | 1.009 |
| | | | | | | 1SBL341001R4211 | 1.004 |
| | | | | | | 1SBL341001R5111 | 1.002 |
| 22 | 100 | 40 | 80 | 0 0 | AFC52-30-11-34 | 1SBL361001R3411 | 1.009 |
| | | | | | | 1SBL361001R4211 | 1.004 |
| | | | | | | 1SBL361001R5111 | 1.002 |
| 30 | 105 | 50 | 90 | 0 0 | AFC65-30-11-34 | 1SBL381001R3411 | 1.009 |
| | | | | | | 1SBL381001R4211 | 1.004 |
| | | | | | | 1SBL381001R5111 | 1.002 |
| 37 | 125 | 60 | 105 | 0 0 | AFC80-30-11-34 | 1SBL391001R3411 | 1.237 |
| | | | | | | 1SBL391001R4211 | 1.236 |
| | | | | | | 1SBL391001R5111 | 1.238 |
| 45 | 130 | 60 | 115 | 0 0 | AFC96-30-11-34 | 1SBL401001R3411 | 1.237 |
| | | | | | | 1SBL401001R4211 | 1.236 |
| | | | | | | 1SBL401001R5111 | 1.238 |



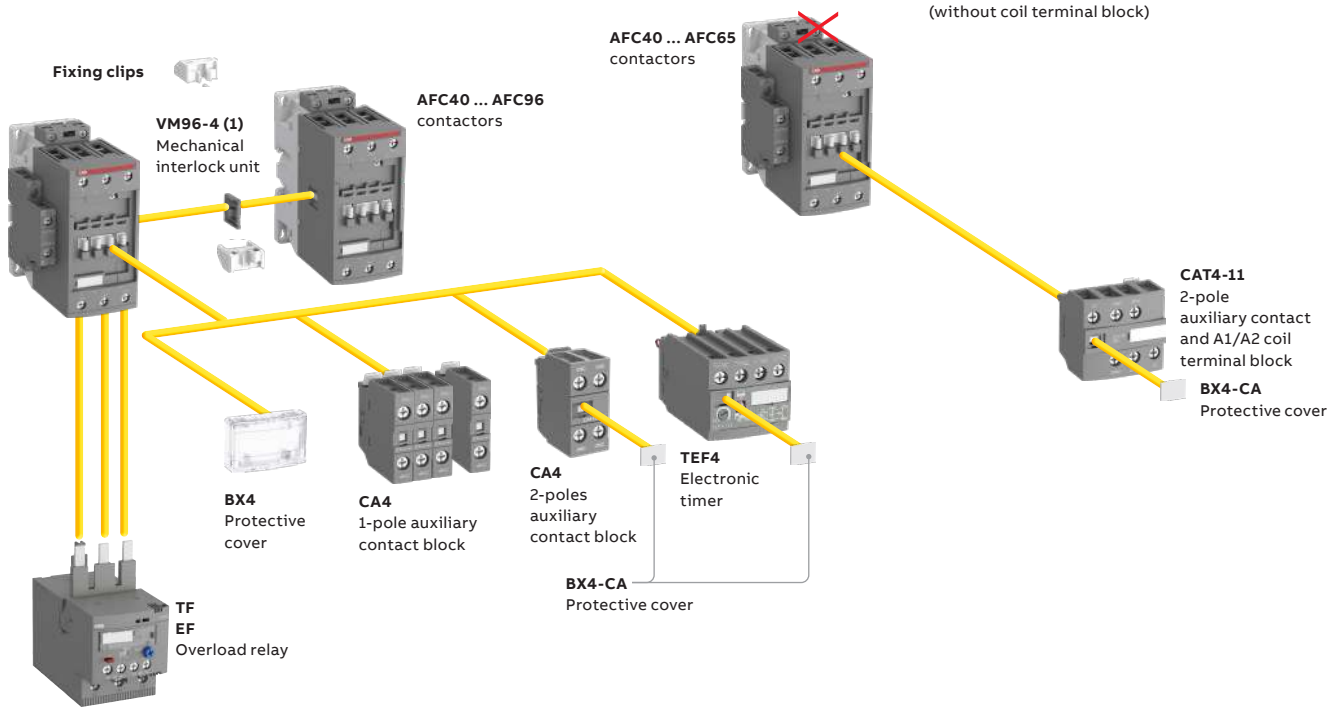
AFC40, AFC52, AFC65-30-11-..

AFC80, AFC96-30-11-..

Main dimensions mm, inches

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

Contactors and main accessories



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

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

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Electronic timer | Mechanical latching unit | Side-mounted accessories | Auxiliary contact blocks | |
|-----------------|------------|-----------------------------|---------------------------|------------|----------------|------------|------------------|--------------------------|--------------------------|---|-----------|
| | | | Auxiliary contact blocks | | | | | | | Mechanical interlock set (between 2 contactors) | Left side |
| AFC40 ... AFC65 | 3 0 | 1 1 | 1-pole CA4 | 2-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 (2) | WA4 | VM96-4 (1) | 2-pole CAL4-11 | |
| | | | 4 max. | or 2 max. | or 1 | - | or 1 | - | +1 | - | - |
| | | | 4 max. | or 2 max. | or 1 | - | or 1 | - | - | + | - 1 |
| AFC80, AFC96 | 3 0 | 1 1 | 4 max. | or 2 max. | - | - | or 1 | - | +1 | - | - |
| | | | 4 max. | or 2 max. | - | - | or 1 | - | - | + | - 1 |

(1) Use VM96-4 revision B of later.

For contactors AFC80, AFC96 mounted side by side, ambient temperature should remain <60°C

(2) Not to be used for Star-Delta starter. For a compatible Star-Delta timer, please use CT-SDS.22S, CT-SDS.23S or CT-SDC.22.

Overload relays fitting details (3)

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

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(3) Direct mounting - No kit required.

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

4 to 7.5 kW
AC operated



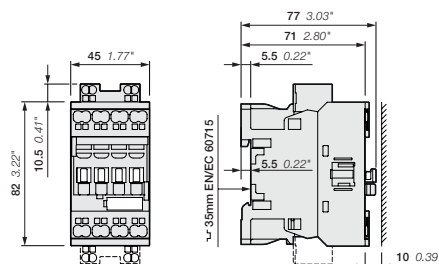
AFC09-30-10K

1SBL13101560V00014

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

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

| IEC | UL / CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight | | | | | |
|---------------|-------------------------|----------------------------|--|-------------|---------------------------|------|-----------------|-----------------|---------|-------------|-----------------|-----------------|-------|
| | Rated operational power | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | | | | | V 60 Hz | Pkg (1 pce) | | | |
| 400 V AC-3 kW | AC-1 A | 5 hp | 25 A | 24 | 24 | 1 0 | AFC09-30-10K-81 | 1SBL131005R8110 | 0.337 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-81 | 1SBL131005R8101 | 0.337 | | | | |
| | | | | 110 | 110 ... 120 | 1 0 | AFC09-30-10K-84 | 1SBL131005R8410 | 0.334 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-84 | 1SBL131005R8401 | 0.334 | | | | |
| | | | | 220 ... 230 | 230 ... 240 | 1 0 | AFC09-30-10K-80 | 1SBL131005R8010 | 0.328 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-80 | 1SBL131005R8001 | 0.328 | | | | |
| | | | | 230 ... 240 | 240 ... 260 | 1 0 | AFC09-30-10K-88 | 1SBL131005R8810 | 0.330 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-88 | 1SBL131005R8801 | 0.330 | | | | |
| | | | | 380 ... 400 | 400 ... 415 | 1 0 | AFC09-30-10K-85 | 1SBL131005R8510 | 0.324 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-85 | 1SBL131005R8501 | 0.324 | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 1 0 | AFC09-30-10K-86 | 1SBL131005R8610 | 0.327 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-86 | 1SBL131005R8601 | 0.327 | | | | |
| | | | | 5.5 | 28 | 7.5 | 28 | 24 | 24 | 1 0 | AFC12-30-10K-81 | 1SBL151005R8100 | 0.337 |
| | | | | | | | | | | 0 1 | AFC12-30-01K-81 | 1SBL151005R8101 | 0.337 |
| 110 | 110 ... 120 | 1 0 | AFC12-30-10K-84 | | | | | 1SBL151005R8410 | 0.334 | | | | |
| | | 0 1 | AFC12-30-01K-84 | | | | | 1SBL151005R8401 | 0.334 | | | | |
| 220 ... 230 | 230 ... 240 | 1 0 | AFC12-30-10K-80 | | | | | 1SBL151005R8010 | 0.328 | | | | |
| | | 0 1 | AFC12-30-01K-80 | | | | | 1SBL151005R8001 | 0.328 | | | | |
| 230 ... 240 | 240 ... 260 | 1 0 | AFC12-30-10K-88 | | | | | 1SBL151005R8810 | 0.330 | | | | |
| | | 0 1 | AFC12-30-01K-88 | | | | | 1SBL151005R8801 | 0.330 | | | | |
| 380 ... 400 | 400 ... 415 | 1 0 | AFC12-30-10K-85 | | | | | 1SBL151005R8510 | 0.324 | | | | |
| | | 0 1 | AFC12-30-01K-85 | | | | | 1SBL151005R8501 | 0.324 | | | | |
| 400 ... 415 | 415 ... 440 | 1 0 | AFC12-30-10K-86 | | | | | 1SBL151005R8610 | 0.327 | | | | |
| | | 0 1 | AFC12-30-01K-86 | | | | | 1SBL151005R8601 | 0.327 | | | | |
| 7.5 | 30 | 10 | 30 | | | | | 24 | 24 | 1 0 | AFC16-30-10K-81 | 1SBL171005R8110 | 0.337 |
| | | | | | | | | | | 0 1 | AFC16-30-01K-81 | 1SBL171005R8101 | 0.337 |
| | | | | 110 | 110 ... 120 | 1 0 | AFC16-30-10K-84 | 1SBL171005R8410 | 0.334 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-84 | 1SBL171005R8401 | 0.334 | | | | |
| | | | | 220 ... 230 | 230 ... 240 | 1 0 | AFC16-30-10K-80 | 1SBL171005R8010 | 0.328 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-80 | 1SBL171005R8001 | 0.328 | | | | |
| | | | | 230 ... 240 | 240 ... 260 | 1 0 | AFC16-30-10K-88 | 1SBL171005R8810 | 0.330 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-88 | 1SBL171005R8801 | 0.330 | | | | |
| | | | | 380 ... 400 | 400 ... 415 | 1 0 | AFC16-30-10K-85 | 1SBL171005R8510 | 0.324 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-85 | 1SBL171005R8501 | 0.324 | | | | |
| | | | | 400 ... 415 | 415 ... 440 | 1 0 | AFC16-30-10K-86 | 1SBL171005R8610 | 0.327 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-86 | 1SBL171005R8601 | 0.327 | | | | |



AFC09, AFC12, AFC16..K

Main dimensions mm, inches

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

4 to 7.5 kW

AC operated - With specific 60 Hz voltage

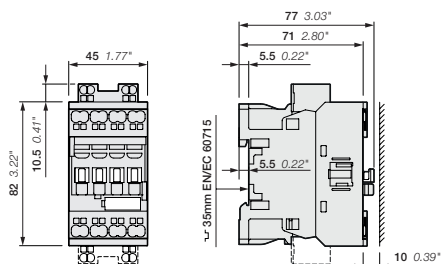


AFC09-30-10K

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

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

| IEC | UL / CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) | | | | | |
|---------------|-------------------------|----------------------|--|---------|---------------------------|------|-----------------|--------------------|---------|-----|-----------------|-----------------|-------|
| | Rated operational power | 3-phase motor rating | General use rating | V 50 Hz | | | | | V 60 Hz | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | | | | | kg | | | | | |
| 4 | 25 | 5 | 25 | 175 | 208 | 1 0 | AFC09-30-10K-34 | 1SBL131005R3410 | 0.334 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-34 | 1SBL131005R3401 | 0.334 | | | | |
| | | | | | | 1 0 | AFC09-30-10K-42 | 1SBL131005R4210 | 0.329 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-42 | 1SBL131005R4201 | 0.329 | | | | |
| | | | | | | 1 0 | AFC09-30-10K-51 | 1SBL131005R5110 | 0.327 | | | | |
| | | | | | | 0 1 | AFC09-30-01K-51 | 1SBL131005R5101 | 0.327 | | | | |
| | | | | 5.5 | 28 | 7.5 | 28 | 175 | 208 | 1 0 | AFC12-30-10K-34 | 1SBL151005R3410 | 0.334 |
| | | | | | | | | | | 0 1 | AFC12-30-01K-34 | 1SBL151005R3401 | 0.334 |
| | | | | | | | | | | 1 0 | AFC12-30-10K-42 | 1SBL151005R4210 | 0.329 |
| | | | | | | | | | | 0 1 | AFC12-30-01K-42 | 1SBL151005R4201 | 0.329 |
| | | | | | | | | | | 1 0 | AFC12-30-10K-51 | 1SBL151005R5110 | 0.327 |
| | | | | | | | | | | 0 1 | AFC12-30-01K-51 | 1SBL151005R5101 | 0.327 |
| 7.5 | 30 | 10 | 30 | 175 | 208 | 1 0 | AFC16-30-10K-34 | 1SBL171005R3410 | 0.334 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-34 | 1SBL171005R3401 | 0.334 | | | | |
| | | | | | | 1 0 | AFC16-30-10K-42 | 1SBL171005R4210 | 0.329 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-42 | 1SBL171005R4201 | 0.329 | | | | |
| | | | | | | 1 0 | AFC16-30-10K-51 | 1SBL171005R5110 | 0.327 | | | | |
| | | | | | | 0 1 | AFC16-30-01K-51 | 1SBL171005R5101 | 0.327 | | | | |



AFC09, AFC12, AFC16..K

Main dimensions mm, inches

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

11 to 18.5 kW
AC operated



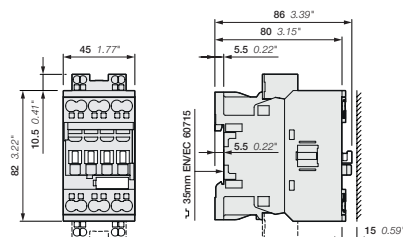
AFC26-30-00K

1SBL101562V0014

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

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

| IEC | UL / CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight | | | | |
|---------------|-------------------------|----------------------------|----------------------------------|-------------|---------------------------|------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|
| | Rated operational power | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | | | | | V 60 Hz | Pkg (1 pce) | | |
| 400 V AC-3 kW | AC-1 A | hp | A | 24 | 24 | 0 0 | AFC26-30-00K-81 | 1SBL231005R8100 | 0.386 | | | |
| | | | | 110 | 110 ... 120 | 0 0 | AFC26-30-00K-84 | 1SBL231005R8400 | 0.383 | | | |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC26-30-00K-80 | 1SBL231005R8000 | 0.377 | | | |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC26-30-00K-88 | 1SBL231005R8800 | 0.379 | | | |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC26-30-00K-85 | 1SBL231005R8500 | 0.373 | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC26-30-00K-86 | 1SBL231005R8600 | 0.376 | | | |
| | | | | 15 | 20 | 45 | 24 | 24 | 0 0 | AFC30-30-00K-81 | 1SBL271005R8100 | 0.386 |
| 15 | 50 | 20 | 45 | 110 | 110 ... 120 | 0 0 | AFC30-30-00K-84 | 1SBL271005R8400 | 0.383 | | | |
| | | | | 220 ... 230 | 230 ... 240 | 0 0 | AFC30-30-00K-80 | 1SBL271005R8000 | 0.377 | | | |
| | | | | 230 ... 240 | 240 ... 260 | 0 0 | AFC30-30-00K-88 | 1SBL271005R8800 | 0.379 | | | |
| | | | | 380 ... 400 | 400 ... 415 | 0 0 | AFC30-30-00K-85 | 1SBL271005R8500 | 0.373 | | | |
| | | | | 400 ... 415 | 415 ... 440 | 0 0 | AFC30-30-00K-86 | 1SBL271005R8600 | 0.376 | | | |
| | | | | 18.5 | 25 | 45 | 24 | 24 | 0 0 | AFC38-30-00K-81 | 1SBL291005R8100 | 0.386 |
| | | | | 18.5 | 50 | 25 | 45 | 110 | 110 ... 120 | 0 0 | AFC38-30-00K-84 | 1SBL291005R8400 |
| 220 ... 230 | 230 ... 240 | 0 0 | AFC38-30-00K-80 | | | | | 1SBL291005R8000 | 0.377 | | | |
| 230 ... 240 | 240 ... 260 | 0 0 | AFC38-30-00K-88 | | | | | 1SBL291005R8800 | 0.379 | | | |
| 380 ... 400 | 400 ... 415 | 0 0 | AFC38-30-00K-85 | | | | | 1SBL291005R8500 | 0.373 | | | |
| 400 ... 415 | 415 ... 440 | 0 0 | AFC38-30-00K-86 | | | | | 1SBL291005R8600 | 0.376 | | | |



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

Main dimensions mm, inches

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

11 to 18.5 kW

AC operated - With specific 60 Hz voltage



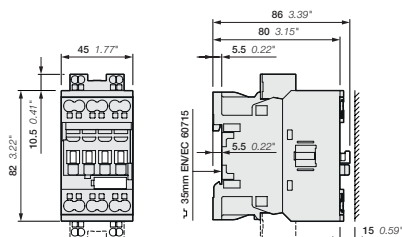
AFC26-30-00K

1SBL101562V0014

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

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

| IEC Rated operational power | UL / CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | | |
|-----------------------------------|---|--------------------------------------|--|-------------|---------------------------------|------|-----------------|--------------------------------|-----------------|-------|
| | | | V 50 Hz | V 60 Hz | | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | 175 | 208 | | AFC26-30-00K-34 | 1SBL231005R3400 | 0.383 | |
| | | | | 230 ... 240 | 277 | | | AFC26-30-00K-42 | 1SBL231005R4200 | 0.378 |
| | | | | 400 ... 415 | 480 | | | AFC26-30-00K-51 | 1SBL231005R5100 | 0.376 |
| 11 | 45 | 15 | 42 | 175 | 208 | 0 0 | AFC26-30-00K-34 | 1SBL271005R3400 | 0.383 | |
| | | | | 230 ... 240 | 277 | 0 0 | AFC30-30-00K-42 | 1SBL271005R4200 | 0.378 | |
| | | | | 400 ... 415 | 480 | 0 0 | AFC30-30-00K-51 | 1SBL271005R5100 | 0.376 | |
| 15 | 50 | 20 | 45 | 175 | 208 | 0 0 | AFC30-30-00K-34 | 1SBL291005R3400 | 0.383 | |
| | | | | 230 ... 240 | 277 | 0 0 | AFC38-30-00K-42 | 1SBL291005R4200 | 0.378 | |
| | | | | 400 ... 415 | 480 | 0 0 | AFC38-30-00K-51 | 1SBL291005R5100 | 0.376 | |
| 18.5 | 50 | 25 | 45 | 175 | 208 | 0 0 | AFC38-30-00K-34 | 1SBL291005R3400 | 0.383 | |
| | | | | 230 ... 240 | 277 | 0 0 | AFC38-30-00K-42 | 1SBL291005R4200 | 0.378 | |
| | | | | 400 ... 415 | 480 | 0 0 | AFC38-30-00K-51 | 1SBL291005R5100 | 0.376 | |



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

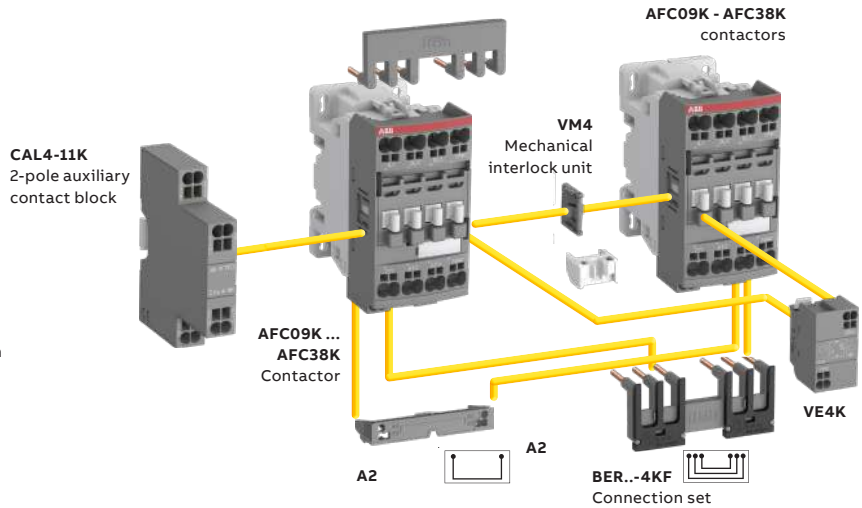
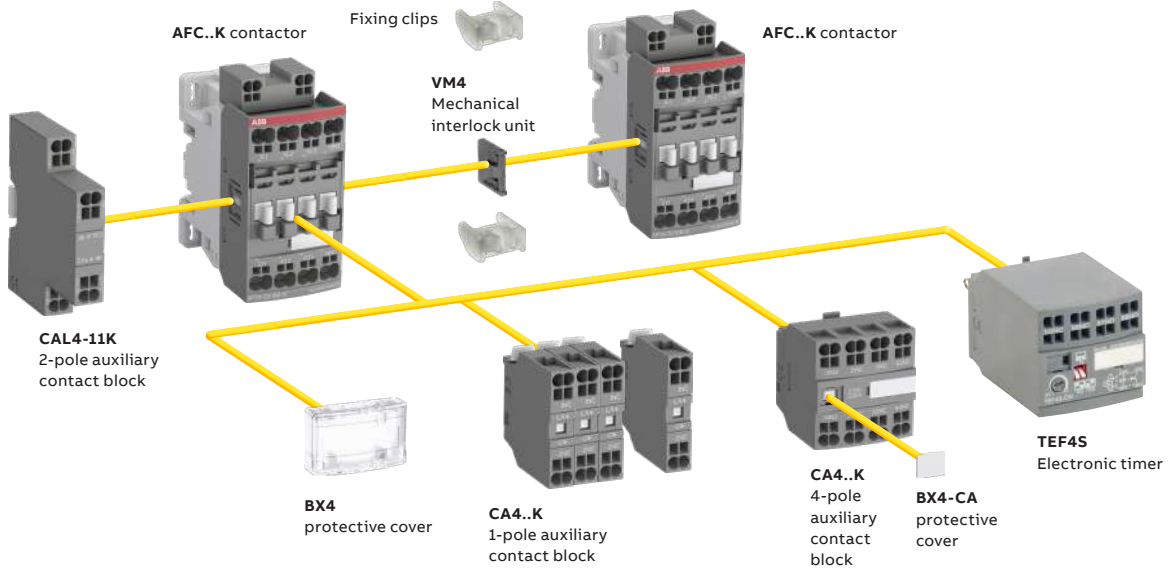
Main dimensions mm, inches

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

Main accessories

Contactor and main accessories (other accessories available)

AFC09..K ... AFC38..K



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

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

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



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

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

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

Technical data



Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AFC09(..K) | AFC12(..K) | AFC16(..K) | AFC26(..K) | AFC30(..K) | AFC38(..K) |
|---|-------------------------------------|---|---|-------------------|--------------------|--------------------|--------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| Rated operational voltage U _e max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free-air thermal current I _{th} | | | | | | | |
| 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 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| le / Rated operational current AC-1 | θ ≤ 40 °C | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| U _e 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 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-3, AC-3e Utilization category | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | |
| le / Max. rated operational current AC-3, AC-3e | | | | | | | |
|  3-phase motors | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 32 A | 40 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| | Rated operational power AC-3, AC-3e | | | | | | |
|  1500 r.p.m. 50 Hz 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 |
| | Rated making capacity AC-3, AC-3e | | 10 x I _e AC-3, 12 x I _e AC-3e acc. to IEC 60947-4-1 | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x I _e AC-3, 8.5 x I _e AC-3e acc. to IEC 60947-4-1 | | | | | |
| AC-8a Utilization category | | | | | | | |
| (without thermal overload relay - U _e 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | | |
| le / 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 | | | | | | | |
| U _e ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| Rated short-time withstand current I _{cw} | 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 | le / AC-1 | 0.8 / 1.14 W | 1 / 1.43 W | 1.2 / 1.64 W | 1.8 / 2 W | 2.4 / 2.44 W | 2.4 / 2.44 W |
| Screw terminal / Push-in Spring terminal | le / AC-3 | 0.1 / 0.26 W | 0.2 / 0.26 W | 0.35 / 0.6 W | 0.6 / 0.66 W | 0.9 / 1 W | 1.3 / 1.41 W |
| Max. electrical switching frequency | | | | | | | |
| | AC-1 | 600 cycles/h | | | | | |
| | AC-3 | 1200 cycles/h | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | | 150 cycles/h | |

AFC40 ... AFC96 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AFC40 | AFC52 | AFC65 | AFC80 | AFC96 |
|---|--|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | |
| Rated operational voltage U_e max. | | 690 V | | | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ With conductor cross-sectional area | | 105 A 35 mm ² | 105 A 35 mm ² | 105 A 35 mm ² | 130 A 50 mm ² | 130 A 50 mm ² |
| AC-1 Utilization category For air temperature close to contactor I_e / Rated operational current AC-1 U_e max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | | | | | | |
| | $\theta \leq 40^\circ\text{C}$ | 70 A | 100 A | 105 A | 125 A | 130 A |
| | $\theta \leq 60^\circ\text{C}$ | 60 A | 80 A | 90 A | 100 A | 105 A |
| | $\theta \leq 70^\circ\text{C}$ | 50 A | 70 A | 80 A | 85 A | 90 A |
| | With conductor cross-sectional area | 25 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | 50 mm ² |
| AC-3, AC-3e Utilization category For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ I_e / Max. rated operational current AC-3, AC-3e (1) AC-3e $U_e \leq 690\text{ V}$ | | | | | | |
| | 220-230-240 V | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 380-400 V | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 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 | - | - | - | - | - |
| |  3-phase motors | | | | | |
| Rated operational power AC-3, AC-3e (1) AC-3e $U_e \leq 690\text{ V}$ | | | | | | |
| | 220-230-240 V | 11 kW | 15 kW | 18.5 kW | 22 kW | 25 kW |
| | 380-400 V | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW |
| | 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 | - | - | - | - | - |
| |  1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | | | | | |
| Rated making capacity AC-3, AC-3e | | 10 x I_e AC-3, 12 x I_e AC-3e acc. to IEC 60947-4-1 | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x I_e AC-3, 8.5 x I_e AC-3e acc. to IEC 60947-4-1 | | | | |
| AC-8a Utilization category (without thermal overload relay $U_e 400\text{ V } 50/60\text{ Hz} - \theta \leq 40^\circ\text{C}$) I_e / Rated operational current AC-8a Rated operational power AC-8a | | | | | | |
| | | 53 A | 70 A | 85 A | 105 A | 120 A |
| | | 25 kW | 37 kW | 45 kW | 55 kW | 65 kW |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) $U_e \leq 500\text{ V AC} - \text{gG type fuse}$ | | | | | | |
| | | 100 A | 125 A | 160 A | 160 A | 200 A |
| Rated short-time withstand current I_{cw} at 40°C ambient temperature, in free air from a cold state | | | | | | |
| | 1 s | 1000 A | 1000 A | 1000 A | 1200 A | 1200 A |
| | 10 s | 600 A | 600 A | 600 A | 780 A | 780 A |
| | 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 $\cos \phi = 0.45$ | | | | | | |
| | 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 | | | | | | |
| | I_e / AC-1 | 3 W | 6.3 W | 7 W | 7.6 W | 8.2 W |
| | I_e / AC-3, AC-3e | 1 W | 1.7 W | 2.7 W | 3 W | 4.5 W |
| Max. electrical switching frequency | | | | | | |
| | AC-1 | 600 cycles/h | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | |

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

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

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

Technical data

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

| Contactor types | AC operated | AFC09(..K) | AFC12(..K) | AFC16(..K) | AFC26(..K) | AFC30(..K) | AFC38(..K) |
|--|-----------------|-------------------------------------|------------|------------|------------|------------|------------|
| Standards | | UL 60947-4-1, CSA C22.2 N°60947-4-1 | | | | | |
| Maximum operational voltage | | 600 V | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | | 27 A | | |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | | 2 hp | | |
| | 230 V AC | 1 hp | 2 hp | | 3 hp | | |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 230 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 460 V AC | 2 hp | 5 hp | | 10 hp | | |
| | 575 V AC | 2 hp | 5 hp | | 10 hp | | |
| UL / CSA general use rating Screw / Push-in Spring | | | | | | | |
| | 600 V AC | 25 A | 28 A | 30 A | 45 / 42 A | 50 / 45 A | 50 / 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 45 / 42 A | 50 / 45 A | 50 / 45 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 45 / 42 A | 50 / 45 A | 50 / 45 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 45 / 42 A | 50 / 45 A | 50 / 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A | 32 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | |
| High fault current | | 100 kA | | | | | |
| Fuse rating | | 30 A | 30 A | 60 A | 60 A | 100 A | 100 A |
| Fuse type, 600 V : Screw / Push-in | | J / RK5 | | | | | |
| Max. electrical switching frequency | | | | | | | |
| For general use | | 600 cycles/h | | | | | |
| For motor use | | 1200 cycles/h | | | | | |

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

AFC40 ... AFC96 3-pole contactors

Technical data

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

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

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

AFC40 ... AFC96 3-pole contactors

Technical data

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

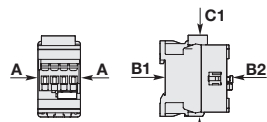
| Contactors types | AC operated | AFC40 | AFC52 | AFC65 | AFC80 | AFC96 |
|--|--------------|----------|----------|-------|----------|----------|
| HVAC application - UL / CSA | | | | | | |
| Definite purpose heating rating - 3-phase | | | | | | |
| Full Load Amps (FLA) | | 60 A | 80 A | 90 A | 105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

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

Technical data

General technical data

| Contactor types | AC operated | AFC09(..K) | AFC12(..K) | AFC16(..K) | AFC26(..K) | AFC30(..K) | AFC38(..K) |
|---|------------------------------------|--|------------|------------|------------|------------|------------|
| Rated insulation voltage U_i | | 690 V | | | | | |
| acc. to IEC 60947-4-1 | | 600 V | | | | | |
| acc. to UL / CSA | | 6 kV | | | | | |
| Rated impulse withstand voltage U_{imp} | | 3 | | | | | |
| Pollution degree | | -25...+60 °C | | | | | |
| Ambient air temperature close to contactor | | -40...+70 °C | | | | | |
| Operation | Fitted with thermal overload relay | -60...+80 °C | | | | | |
| | Without thermal overload relay | | | | | | |
| Storage | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Climatic withstand | | 3000 m | | | | | |
| Maximum operating altitude (without derating) | | 10 millions | | | | | |
| Mechanical durability | | 3600 cycles/h | | | | | |
| Number of operating cycles | | | | | | | |
| Max. switching frequency | | | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
| | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | 5...300 Hz | | | | | |
| acc. to IEC 60068-2-6 | | 4 g closed position / 2 g open position | | | | | |



Mounting characteristics and conditions for use

| Contactor types | AC operated | AFC09(..K) | AFC12(..K) | AFC16(..K) | AFC26(..K) | AFC30(..K) | AFC38(..K) |
|--|-------------|---|------------|------------|------------|------------|------------|
| Mounting positions | | | | | | | |
| Mounting distances | | Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AFC09 ... AFC38 | | | | | |
| Fixing | | The contactors can be assembled side by side | | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

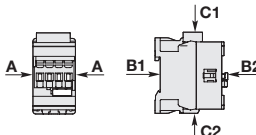
Magnet system characteristics for AFC09(..K) ... AFC38(..K) contactors - AC operated

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

AFC40 ... AFC96 3-pole contactors

Technical data

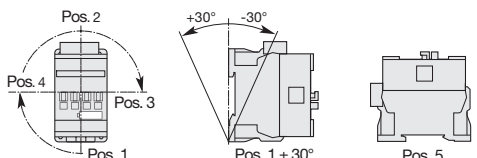
General technical data

| Contactor types | AC operated | AFC40 | AFC52 | AFC65 | AFC80 | AFC96 |
|---|--|--|-------|-------|------------|-------|
| Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA | | 690 V 600 V | | | 1000 V | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | 8 kV | |
| Pollution degree | | 3 | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation | Fitted with thermal overload relay Without thermal overload relay | -40...+70 °C -40...+70 °C | | | | |
| Storage | | -60...+80 °C | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 10 millions | | | 4 millions | |
| Max. switching frequency | | 3600 cycles/h | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | |
| Mounting position 1 | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | |
| | A | 25 g | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | |
| | B2 | 15 g | | | | |
| | C1 | 25 g | | | | |
| C2 | 25 g | | | | | |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 3 g closed position / 3 g open position | | | | |

Magnet system characteristics

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



Mounting characteristics and conditions

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

AFC09 ... AFC38 3-pole contactors

Technical data


















Connecting characteristics

| Contactor types | AC operated | AFC09 | AFC12 | AFC16 | AFC26 | AFC30 | AFC38 |
|---|------------------|---|-------|-------|-------|--------------------------|-------|
| Main terminals | |  Screw terminals with cable clamp | | | | | |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Rigid Solid ($\leq 4 \text{ mm}^2$) | } 1 x | 1...6 mm ² | | | | 2.5...10 mm ² | |
|  Stranded ($\geq 1 \text{ mm}^2$) | | 2 x 1...6 mm ² | | | | 2.5...10 mm ² | |
|  Flexible with non insulated ferrule | } 1 x | 0.75...6 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | | 2 x 0.75...6 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | } 1 x | 0.75...4 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | | 2 x 0.75...2.5 mm ² | | | | 1.5...4 mm ² | |
|  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 mm ² | | | | | |
|  Rigid solid / Stranded | | 2 x 1...2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | } 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | | 2 x 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | } 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | | 2 x 0.75...1.5 mm ² | | | | | |
|  Lugs | L < | 8 mm | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | | |
| Stripping length | | 10 mm | | | | | |
| Tightening torque | | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | | |
| Degree of protection | | | | | | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | IP20 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | | |
| Main terminals | | M3.5 | | | | M4 | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | Flat Ø 6.5 / Pozidriv 2 | |
| Coil terminals | | M3.5 | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | |

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

Technical data

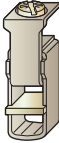
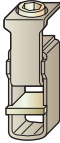














Connecting characteristics

| Contactor types | AC operated | AFC09..K | AFC12..K | AFC16..K | AFC26..K | AFC30..K | AFC38..K |
|---|-----------------------------------|---|--|-------------------------|--------------|----------------------------------|--------------------------|
| Main terminals | |  Push-in Spring terminals | | | | | |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Rigid | Solid ($\leq 2.5 \text{ mm}^2$) | } 1 x | 1 ... 6 mm ² | | | 1 ... 10 mm ² | |
|  Stranded ($\geq 4 \text{ mm}^2$) | | | 2 x | 1 ... 6 mm ² | | | 1 ... 10 mm ² |
|  Flexible with non insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | 1 ... 6 mm ² | |
|  Flexible with insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | 1 ... 6 mm ² | |
|  Flexible without ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | 1 ... 6 mm ² | |
|  Flexible without ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | 1 ... 6 mm ² | |
|  Flexible without ferrule | | 1 x | (spring) 0.5 ... 4 mm ² | | | (spring) 1 ... 6 mm ² | |
|  Flexible without ferrule | | 2 x | (spring) 0.5 ... 4 mm ² | | | (spring) 1 ... 6 mm ² | |
| Connection capacity acc. to UL/CSA (Solid \leq 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 mm ² | | | | |
|  Rigid solid | | 2 x | 1 ... 2.5 mm ² | | | | |
|  Flexible with non insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | | |
|  Flexible with non insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | | |
|  Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² | | | | |
|  Flexible with insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² | | | | |
|  Flexible without ferrule | | 1 x | (spring) 0.5 ... 2.5 mm ² | | | | |
|  Flexible without ferrule | | 2 x | (spring) 0.5 ... 2.5 mm ² | | | | |
| 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 \varnothing 3 mm x 0.5 mm | | | | | |

AFC40 ... AFC96 3-pole contactors

Technical data

Connecting characteristics

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

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

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

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | AFC09 | AFC12 | AFC16 | AFC26 | AFC30 | AFC38 | AFC40 | AFC52 | AFC65 | AFC80 | AFC96 |
|---|--------------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Rated operational voltage Ue max. | | 690 V | | | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 16 A | | | | | | | | | | |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | | | | | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | | | | | | |
| | for 0.1 s | 140 A | | | | | | | | | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA 10 ⁻⁷ | | | | | | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | | | | | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | | | | | | | | | |
| | DC-13 | 900 cycles/h | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts. | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts. | | | | | | | | | | |

Built-in auxiliary contacts according to UL / CSA

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

3-pole contactors

Electrical durability and utilization categories

General

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

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

- Categories AC-1 and AC-3: $I_c = I_e$
- Category AC-2: $I_c = 2.5 \times I_e$
- Category AC-4: $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ 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 I_c .

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 U_e
 - Current normally drawn I_e ($U_e / I_e / kW$ relation for motors, see "Motor rated operational powers and currents").
 - Utilization category AC-1, AC-2, AC-3 or AC-4
 - Breaking current $I_c = I_e$ for AC-1 and for AC-3; $I_c = 2.5 \times I_e$ for AC-2; $I_c = 6 \times I_e$ 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 ($I_c ; N$).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
 - Operational voltage U_e
 - Current normally drawn while "motor running" I_e ($U_e / I_e / kW$ relation for motors, see "Motor rated operational powers and currents")
 - Breaking current for AC-3 $I_c = I_e$
 - Breaking current for AC-4 while "motor accelerating" $I_c = 6 \times I_e$
 - 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 (U_e / I_e) 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 $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (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.

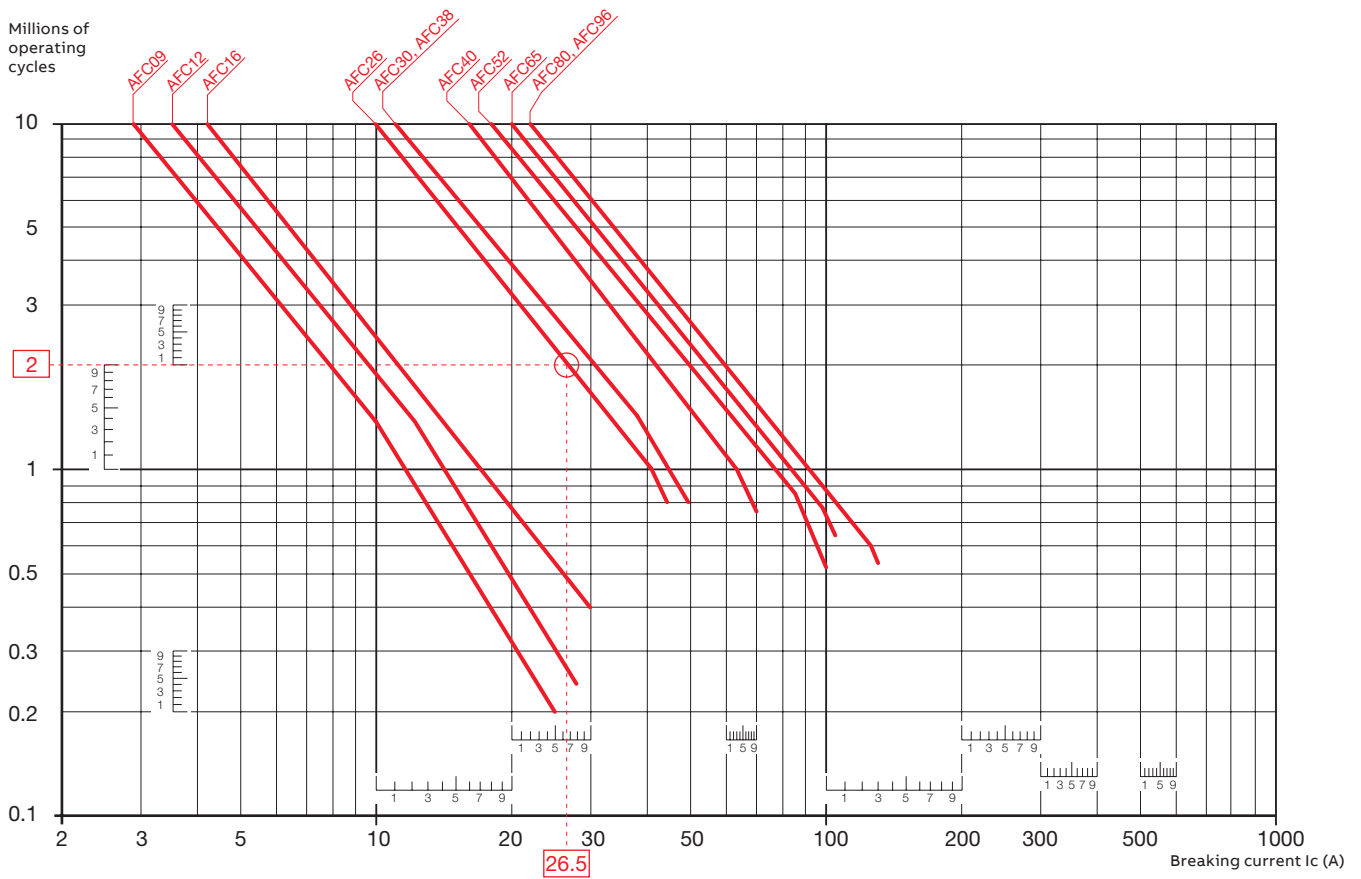
3-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

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

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



Example:

$I_c / AC-1 = 26.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

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

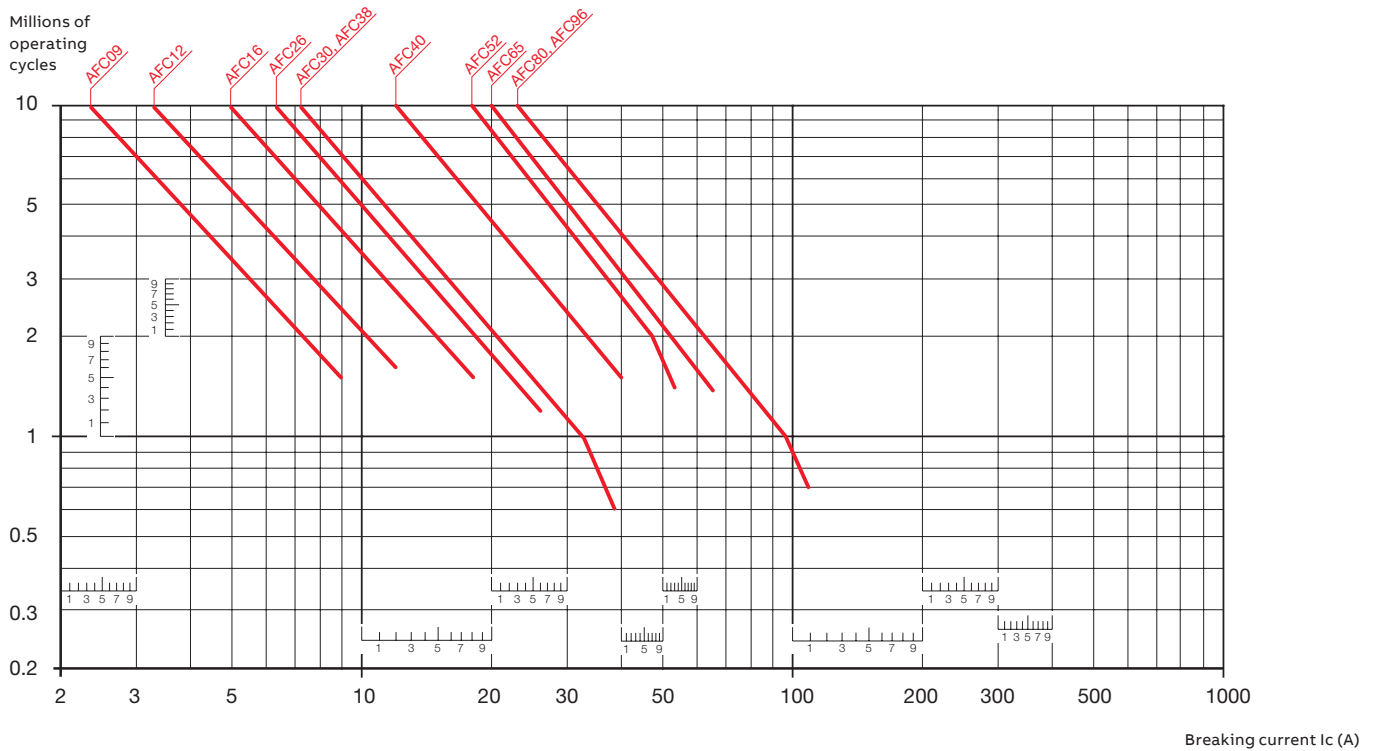
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440$ V.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

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



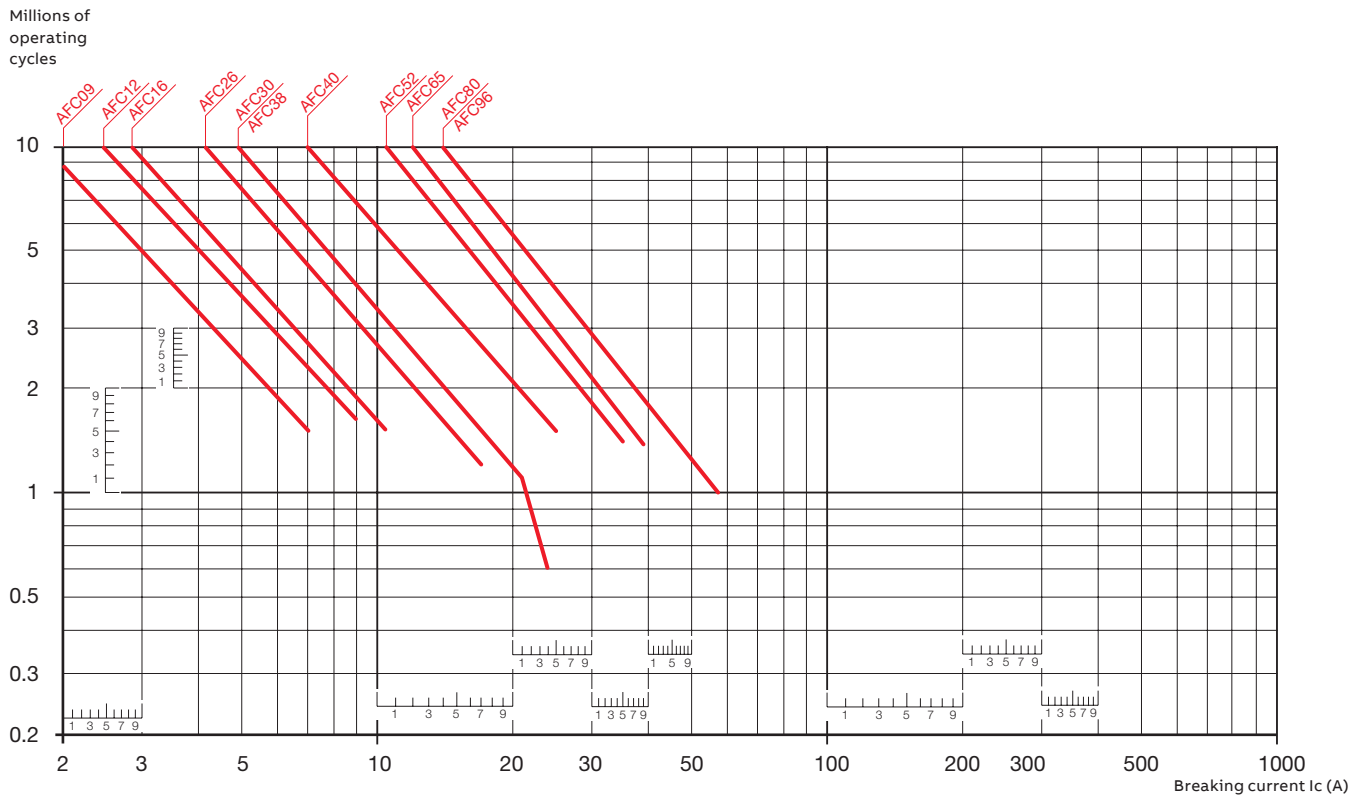
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

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



3-pole contactors

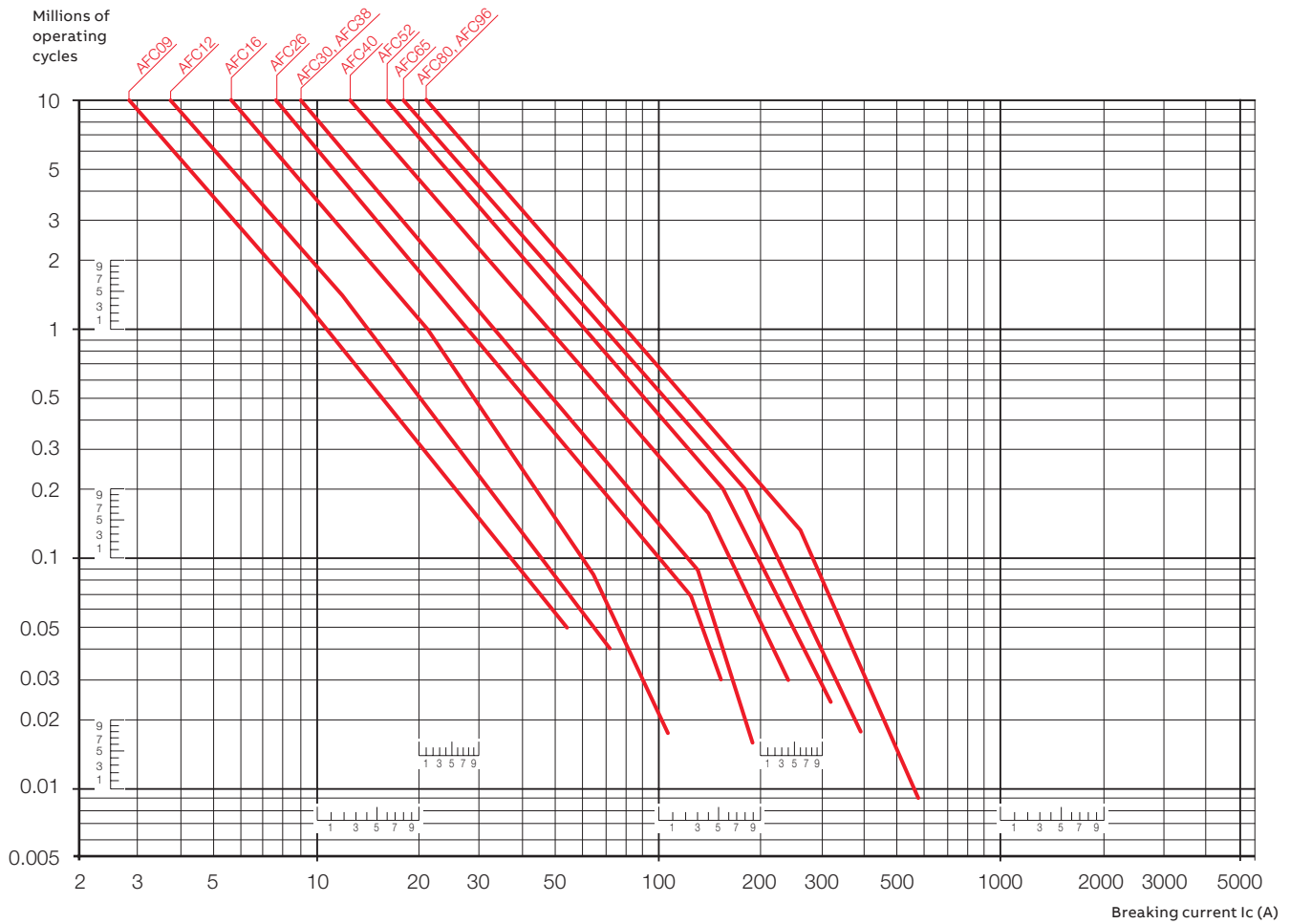
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $U_e \leq 440\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AFC09 ... AFC96.

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

Maximum electrical switching frequency: see "Technical data".

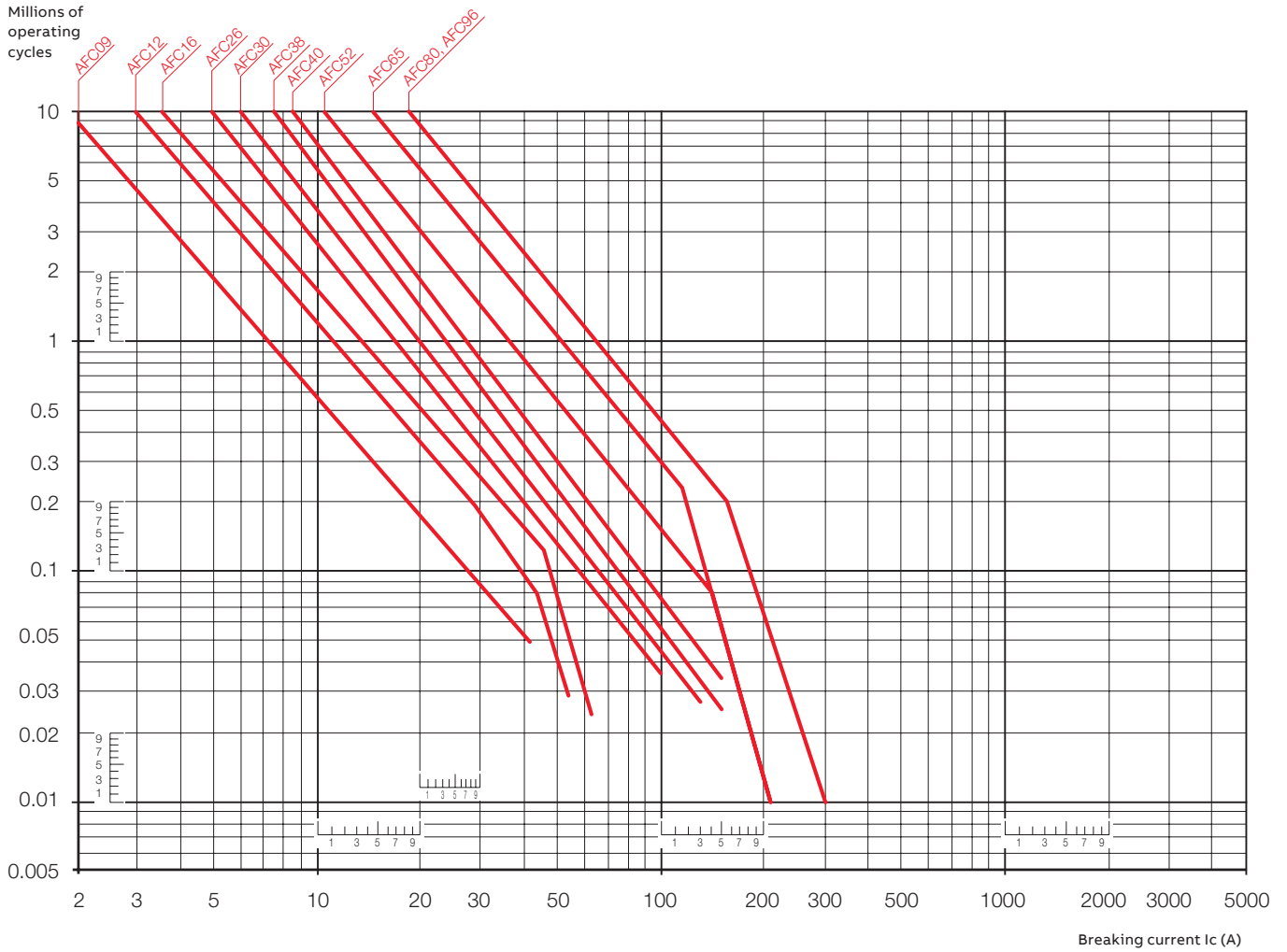


3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$
Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AFC09 ... AFC96

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full load current). Maximum electrical switching frequency: see "Technical data".





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

or www.abb.com/productdetails/AFC09-40-00-80
www.abb.com/productdetails/1SBL131201R8000

AFC 4-pole contactors

25 to 55 A AC-1

- 2/36** AFC09 ... AFC16 – 25 to 30 A
- 2/38** AFC26 ... AFC38 – 45 to 55 A
- 2/40** AFC40 ... AFC80 – 70 to 125 A

- 2/43** Technical data

AFC09, AFC16 4-pole contactors

25 to 30 A AC-1

AC operated



AFC09-40-00

1SBL101095F0014

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

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

| IEC | UL/CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|--------------------------------|--|---------|---------------------------|------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | Pkg (1 pce) kg |
| A | A | V 50 Hz | V 60 Hz | | | | |

4 N.O. main poles

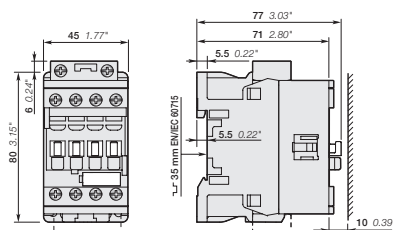
| Rated operational current | General use rating | Rated control circuit voltage U _c (V 50 Hz) | Rated control circuit voltage U _c (V 60 Hz) | Auxiliary contacts fitted | Type | Order code | Weight |
|---------------------------|--------------------|--|--|---------------------------|----------------|-----------------|--------|
| 25 | 25 | 24 | 24 | 0 0 | AFC09-40-00-81 | 1SBL131201R8100 | 0.331 |
| | | 110 | 110 ... 120 | 0 0 | AFC09-40-00-84 | 1SBL131201R8400 | 0.328 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC09-40-00-80 | 1SBL131201R8000 | 0.322 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC09-40-00-88 | 1SBL131201R8800 | 0.324 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC09-40-00-85 | 1SBL131201R8500 | 0.318 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC09-40-00-86 | 1SBL131201R8600 | 0.321 |
| 30 | 30 | 24 | 24 | 0 0 | AFC16-40-00-81 | 1SBL171201R8100 | 0.331 |
| | | 110 | 110 ... 120 | 0 0 | AFC16-40-00-84 | 1SBL171201R8400 | 0.328 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC16-40-00-80 | 1SBL171201R8000 | 0.322 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC16-40-00-88 | 1SBL171201R8800 | 0.324 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC16-40-00-85 | 1SBL171201R8500 | 0.318 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC16-40-00-86 | 1SBL171201R8600 | 0.321 |

4 N.C. main poles

| Rated operational current | General use rating | Rated control circuit voltage U _c (V 50 Hz) | Rated control circuit voltage U _c (V 60 Hz) | Auxiliary contacts fitted | Type | Order code | Weight |
|---------------------------|--------------------|--|--|---------------------------|----------------|-----------------|--------|
| 30 | 30 | 24 | 24 | 0 0 | AFC16-04-00-81 | 1SBL171101R8100 | 0.331 |
| | | 110 | 110 ... 120 | 0 0 | AFC16-04-00-84 | 1SBL171101R8400 | 0.328 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC16-04-00-80 | 1SBL171101R8000 | 0.322 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC16-04-00-88 | 1SBL171101R8800 | 0.324 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC16-04-00-85 | 1SBL171101R8500 | 0.318 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC16-04-00-86 | 1SBL171101R8600 | 0.321 |

2 N.O. + 2 N.C. main poles

| Rated operational current | General use rating | Rated control circuit voltage U _c (V 50 Hz) | Rated control circuit voltage U _c (V 60 Hz) | Auxiliary contacts fitted | Type | Order code | Weight |
|---------------------------|--------------------|--|--|---------------------------|----------------|-----------------|--------|
| 25 | 25 | 24 | 24 | 0 0 | AFC09-22-00-81 | 1SBL131501R8100 | 0.331 |
| | | 110 | 110 ... 120 | 0 0 | AFC09-22-00-84 | 1SBL131501R8400 | 0.328 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC09-22-00-80 | 1SBL131501R8000 | 0.322 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC09-22-00-88 | 1SBL131501R8800 | 0.324 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC09-22-00-85 | 1SBL131501R8500 | 0.318 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC09-22-00-86 | 1SBL131501R8600 | 0.321 |
| 30 | 30 | 24 | 24 | 0 0 | AFC16-22-00-81 | 1SBL171501R8100 | 0.331 |
| | | 110 | 110 ... 120 | 0 0 | AFC16-22-00-84 | 1SBL171501R8400 | 0.328 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC16-22-00-80 | 1SBL171501R8000 | 0.322 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC16-22-00-88 | 1SBL171501R8800 | 0.324 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC16-22-00-85 | 1SBL171501R8500 | 0.318 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC16-22-00-86 | 1SBL171501R8600 | 0.321 |



AFC09, AFC16

Main dimensions mm, inches

AFC09, AFC16 4-pole contactors

25 to 30 A AC-1

AC operated - With specific 60 Hz voltage



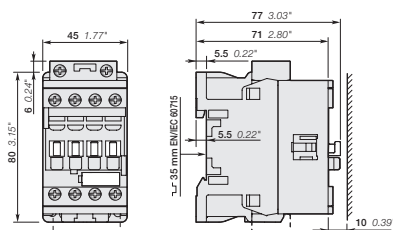
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AFC09-40-00

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

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

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



AFC09, AFC16

Main dimensions mm, inches

AFC26, AFC38 4-pole contactors

45 to 55 A AC-1
AC operated



AFC26-40-00

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

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

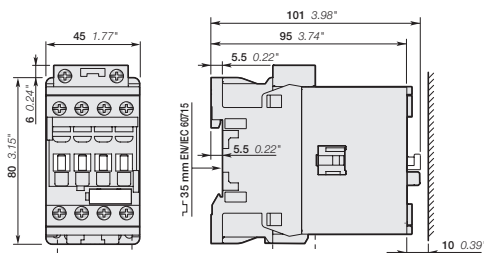
| IEC | UL/CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|--|--------------------------------|--|---------|---------------------------|------|------------|-------------------|
| | | V 50 Hz | V 60 Hz | | | | |
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) kg |
| A | A | V 50 Hz | V 60 Hz | | | | |

4 N.O. main poles

| Rated current | UL/CSA | V 50 Hz | V 60 Hz | Control circuit | Type | Order code | Weight |
|---------------|--------|-------------|-------------|-----------------|----------------|-----------------|--------|
| 45 | 45 | 24 | 24 | 0 0 | AFC26-40-00-81 | 1SBL231201R8100 | 0.423 |
| | | 110 | 110 ... 120 | 0 0 | AFC26-40-00-84 | 1SBL231201R8400 | 0.420 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC26-40-00-80 | 1SBL231201R8000 | 0.414 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC26-40-00-88 | 1SBL231201R8800 | 0.416 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC26-40-00-85 | 1SBL231201R8500 | 0.410 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC26-40-00-86 | 1SBL231201R8600 | 0.411 |
| 55 | 55 | 24 | 24 | 0 0 | AFC38-40-00-81 | 1SBL291201R8100 | 0.423 |
| | | 110 | 110 ... 120 | 0 0 | AFC38-40-00-84 | 1SBL291201R8400 | 0.420 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC38-40-00-80 | 1SBL291201R8000 | 0.414 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC38-40-00-88 | 1SBL291201R8800 | 0.416 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC38-40-00-85 | 1SBL291201R8500 | 0.410 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC38-40-00-86 | 1SBL291201R8600 | 0.411 |

2 N.O. + 2 N.C. main poles

| Rated current | UL/CSA | V 50 Hz | V 60 Hz | Control circuit | Type | Order code | Weight |
|---------------|--------|-------------|-------------|-----------------|----------------|-----------------|--------|
| 45 | 45 | 24 | 24 | 0 0 | AFC26-22-00-81 | 1SBL231501R8100 | 0.423 |
| | | 110 | 110 ... 120 | 0 0 | AFC26-22-00-84 | 1SBL231501R8400 | 0.420 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC26-22-00-80 | 1SBL231501R8000 | 0.414 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC26-22-00-88 | 1SBL231501R8800 | 0.416 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC26-22-00-85 | 1SBL231501R8500 | 0.410 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC26-22-00-86 | 1SBL231501R8600 | 0.411 |
| 55 | 55 | 24 | 24 | 0 0 | AFC38-22-00-81 | 1SBL291501R8100 | 0.423 |
| | | 110 | 110 ... 120 | 0 0 | AFC38-22-00-84 | 1SBL291501R8400 | 0.420 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC38-22-00-80 | 1SBL291501R8000 | 0.414 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC38-22-00-88 | 1SBL291501R8800 | 0.416 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC38-22-00-85 | 1SBL291501R8500 | 0.410 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC38-22-00-86 | 1SBL291501R8600 | 0.411 |



AFC26, AFC38

Main dimensions mm, inches

AFC26, AFC38 4-pole contactors

45 to 55 A AC-1

AC operated - With specific 60 Hz voltage

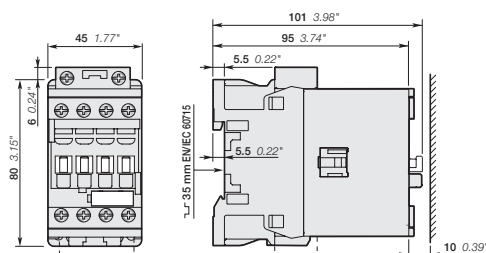


AFC26-40-00

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

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

| IEC | UL/CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|--|--------------------------------|--|---------|---------------------------|----------------|-----------------|-------------------|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | Pkg (1 pce) kg |
| | | | | | | | |
| 4 N.O. main poles | | | | | | | |
| 45 | 45 | 175 | 208 | 0 0 | AFC26-40-00-34 | 1SBL231201R3400 | 0.418 |
| | | 230 ... 240 | 277 | 0 0 | AFC26-40-00-42 | 1SBL231201R4200 | 0.413 |
| | | 400 ... 415 | 480 | 0 0 | AFC26-40-00-51 | 1SBL231201R5100 | 0.411 |
| 55 | 55 | 175 | 208 | 0 0 | AFC38-40-00-34 | 1SBL291201R3400 | 0.418 |
| | | 230 ... 240 | 277 | 0 0 | AFC38-40-00-42 | 1SBL291201R4200 | 0.413 |
| | | 400 ... 415 | 480 | 0 0 | AFC38-40-00-51 | 1SBL291201R5100 | 0.411 |
| 2 N.O. + 2 N.C. main poles | | | | | | | |
| 45 | 45 | 175 | 208 | 0 0 | AFC26-22-00-34 | 1SBL231501R3400 | 0.418 |
| | | 230 ... 240 | 277 | 0 0 | AFC26-22-00-42 | 1SBL231501R4200 | 0.413 |
| | | 400 ... 415 | 480 | 0 0 | AFC26-22-00-51 | 1SBL231501R5100 | 0.411 |
| 55 | 55 | 175 | 208 | 0 0 | AFC38-22-00-34 | 1SBL291501R3400 | 0.418 |
| | | 230 ... 240 | 277 | 0 0 | AFC38-22-00-42 | 1SBL291501R4200 | 0.413 |
| | | 400 ... 415 | 480 | 0 0 | AFC38-22-00-51 | 1SBL291501R5100 | 0.411 |



AFC26, AFC38

Main dimensions mm, inches

AFC40 ... AFC80 4-pole contactors

70 to 125 A AC-1

AC operated



AFC40-40-00



AFC80-40-00

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

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

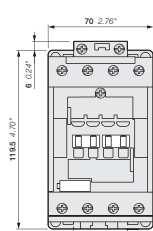
| IEC | UL/CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------------------|-----------------------------|--|-------|---------------------------|------|------------|-------------|
| Rated operational current θ ≤ 40 °C | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| AC-1 | A | V 50 Hz | 60 Hz | | | | kg |

4 N.O. main poles

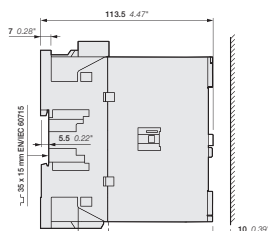
| Rated current | Rated voltage | Rated current | Rated voltage | Control voltage | Order code | Order code | Weight |
|---------------|---------------|---------------|---------------|-----------------|----------------|-----------------|--------|
| 70 | 60 | 24 | 24 | 0 0 | AFC40-40-00-81 | 1SBL341201R8100 | 1.154 |
| | | 110 | 110 ... 120 | 0 0 | AFC40-40-00-84 | 1SBL341201R8400 | 1.160 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC40-40-00-80 | 1SBL341201R8000 | 1.165 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC40-40-00-88 | 1SBL341201R8800 | 1.157 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC40-40-00-85 | 1SBL341201R8500 | 1.155 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC40-40-00-86 | 1SBL341201R8600 | 1.159 |
| 100 | 80 | 24 | 24 | 0 0 | AFC52-40-00-81 | 1SBL361201R8100 | 1.154 |
| | | 110 | 110 ... 120 | 0 0 | AFC52-40-00-84 | 1SBL361201R8400 | 1.160 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC52-40-00-80 | 1SBL361201R8000 | 1.165 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC52-40-00-88 | 1SBL361201R8800 | 1.157 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC52-40-00-85 | 1SBL361201R8500 | 1.155 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC52-40-00-86 | 1SBL361201R8600 | 1.159 |
| 125 | 105 | 24 | 24 | 0 0 | AFC80-40-00-81 | 1SBL391201R8100 | 1.449 |
| | | 110 | 110 ... 120 | 0 0 | AFC80-40-00-84 | 1SBL391201R8400 | 1.455 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC80-40-00-80 | 1SBL391201R8000 | 1.460 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC80-40-00-88 | 1SBL391201R8800 | 1.452 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC80-40-00-85 | 1SBL391201R8500 | 1.450 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC80-40-00-86 | 1SBL391201R8600 | 1.454 |

2 N.O. + 2 N.C. main poles

| Rated current | Rated voltage | Rated current | Rated voltage | Control voltage | Order code | Order code | Weight |
|---------------|---------------|---------------|---------------|-----------------|----------------|-----------------|--------|
| 70 | 60 | 24 | 24 | 0 0 | AFC40-22-00-81 | 1SBL341501R8100 | 1.159 |
| | | 110 | 110 ... 120 | 0 0 | AFC40-22-00-84 | 1SBL341501R8400 | 1.165 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC40-22-00-80 | 1SBL341501R8000 | 1.170 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC40-22-00-88 | 1SBL341501R8800 | 1.162 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC40-22-00-85 | 1SBL341501R8500 | 1.160 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC40-22-00-86 | 1SBL341501R8600 | 1.164 |
| 125 | 105 | 24 | 24 | 0 0 | AFC80-22-00-81 | 1SBL391501R8100 | 1.458 |
| | | 110 | 110 ... 120 | 0 0 | AFC80-22-00-84 | 1SBL391501R8400 | 1.464 |
| | | 220 ... 230 | 230 ... 240 | 0 0 | AFC80-22-00-80 | 1SBL391501R8000 | 1.469 |
| | | 230 ... 240 | 240 ... 260 | 0 0 | AFC80-22-00-88 | 1SBL391501R8800 | 1.461 |
| | | 380 ... 400 | 400 ... 415 | 0 0 | AFC80-22-00-85 | 1SBL391501R8500 | 1.459 |
| | | 400 ... 415 | 415 ... 440 | 0 0 | AFC80-22-00-86 | 1SBL391501R8600 | 1.463 |



AFC40, AFC52



AFC80

Main dimensions mm, inches

AFC40 ... AFC80 4-pole contactors

70 to 125 A AC-1

AC operated - With specific 60 Hz voltage



AFC40-40-00



AFC80-40-00

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

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

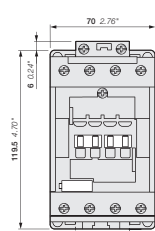
| IEC | UL/CSA | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|--|-----------------------------|----------------------------------|-------|---------------------------|------|------------|-------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| AC-1 | A | V 50 Hz | 60 Hz | | | | kg |

4 N.O. main poles

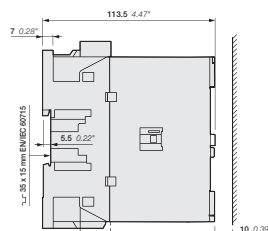
| Rated current | General use rating | Uc 50 Hz | Uc 60 Hz | Contacts | Type | Order code | Weight |
|---------------|--------------------|-------------|----------|----------|----------------|-----------------|--------|
| 70 | 60 | 175 | 208 | 0 0 | AFC40-40-00-34 | 1SBL341201R3400 | 1.158 |
| | | 230 ... 240 | 277 | 0 0 | AFC40-40-00-42 | 1SBL341201R4200 | 1.157 |
| | | 400 ... 415 | 480 | 0 0 | AFC40-40-00-51 | 1SBL341201R5100 | 1.159 |
| 100 | 80 | 175 | 208 | 0 0 | AFC52-40-00-34 | 1SBL361201R3400 | 1.158 |
| | | 230 ... 240 | 277 | 0 0 | AFC52-40-00-42 | 1SBL361201R4200 | 1.157 |
| | | 400 ... 415 | 480 | 0 0 | AFC52-40-00-51 | 1SBL361201R5100 | 1.159 |
| 125 | 105 | 175 | 208 | 0 0 | AFC80-40-00-34 | 1SBL391201R3400 | 1.453 |
| | | 230 ... 240 | 277 | 0 0 | AFC80-40-00-42 | 1SBL391201R4200 | 1.452 |
| | | 400 ... 415 | 480 | 0 0 | AFC80-40-00-51 | 1SBL391201R5100 | 1.454 |

2 N.O. + 2 N.C. main poles

| Rated current | General use rating | Uc 50 Hz | Uc 60 Hz | Contacts | Type | Order code | Weight |
|---------------|--------------------|-------------|----------|----------|----------------|-----------------|--------|
| 70 | 60 | 175 | 208 | 0 0 | AFC40-22-00-34 | 1SBL341501R3400 | 1.163 |
| | | 230 ... 240 | 277 | 0 0 | AFC40-22-00-42 | 1SBL341501R4200 | 1.162 |
| | | 400 ... 415 | 480 | 0 0 | AFC40-22-00-51 | 1SBL341501R5100 | 1.164 |
| 125 | 105 | 175 | 208 | 0 0 | AFC80-22-00-34 | 1SBL391501R3400 | 1.462 |
| | | 230 ... 240 | 277 | 0 0 | AFC80-22-00-42 | 1SBL391501R4200 | 1.461 |
| | | 400 ... 415 | 480 | 0 0 | AFC80-22-00-51 | 1SBL391501R5100 | 1.463 |



AFC40, AFC52

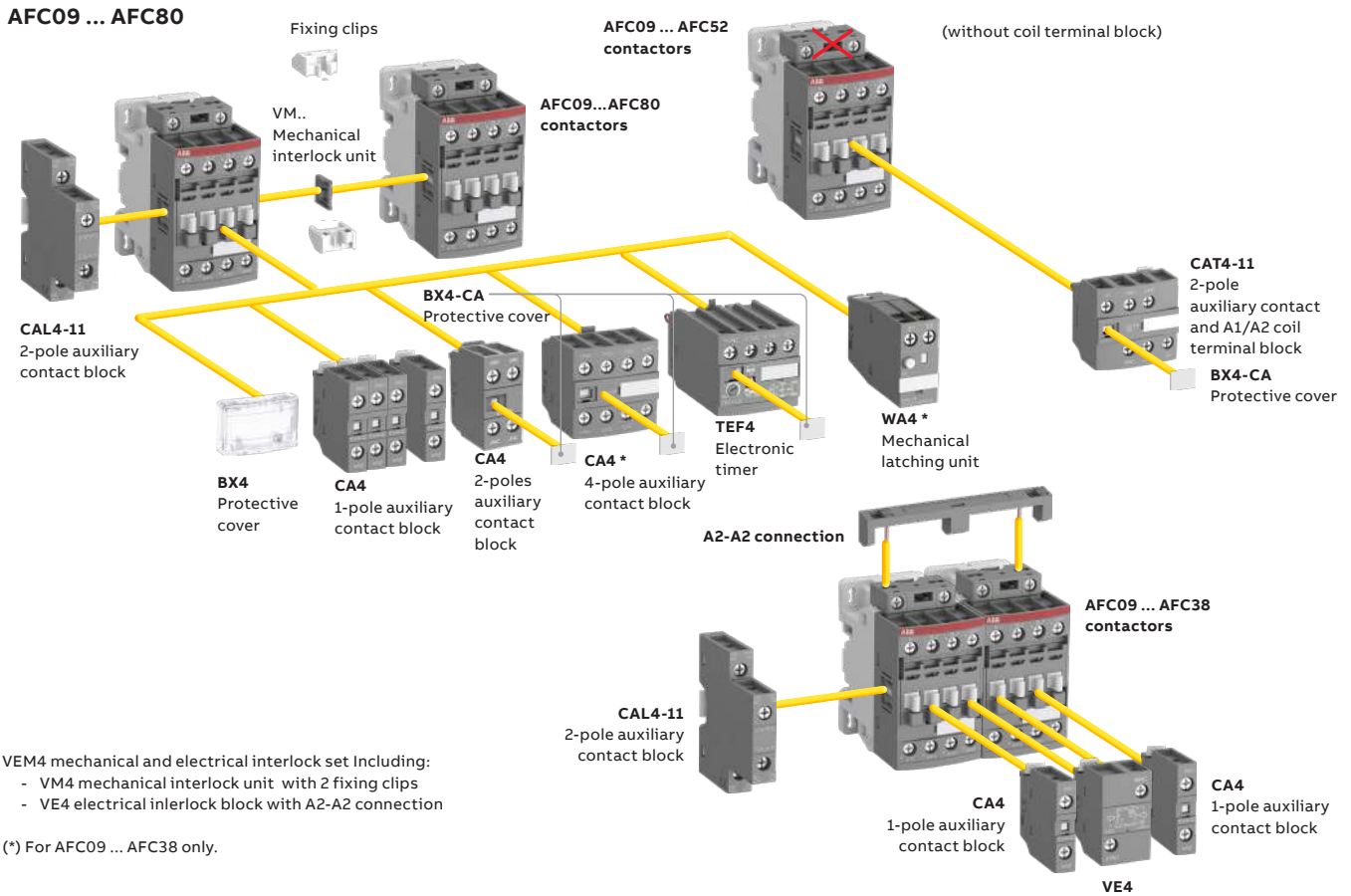


AFC80

Main dimensions mm, inches

AFC09 ... AFC80 4-pole contactors

Contactors and main accessories



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

(*) For AFC09 ... AFC38 only.

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



| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories Auxiliary contact blocks | | | | Electronic timer TEF4 | Mechanical latching unit WA4 (5) | Electrical and mechanical interlock set (between 2 contactors) VEM4 | Side-mounted accessories Auxiliary contact blocks | |
|------------------------|------------|-----------------------------|---|------------|----------------|------------|--------------------------|-------------------------------------|---|--|------------|
| | | | 1-pole CA4 | 2-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | | | | Left side | Right side |
| AFC09 ... AFC38 | | | | | | | | | | | |
| AFC09 ... AFC16 | 4 0 | 0 0 (1) | 4 max. | or 2 max. | or 1 | or 1 | or 1 | - | + 1 | - | |
| AFC26 ... AFC38 | 4 0 | 0 0 (2) | 2 max. 3 max. | or 1 max. | or 1 | - | or 1 - | - + 1 | + 1 | + 1 or 1 | |
| AFC09 ... AFC38 | 2 2 | 0 0 (2) | 4 max. 2 max. | or 2 max. | or 1 | or 1 | or 1 or 1 | - - | + 1 | - + 1 | |
| AFC16-04 | 0 4 | 0 0 (3) | 4 max. 4 max. | or 2 max. | or 1 | or 1 | or 1 or 1 | -(6) -(6) | + - | - or 1 | |
| AFC40 ... AFC80 | | | | | | | | | | | |
| AFC40 ... AFC52 | 4 0 | 0 0 | 4 max. | or 2 max. | or 1 | - | or 1 | - | + 1 | + 1 | |
| AFC80 | 4 0 | 0 0 | 4 max. | or 2 max. | - | - | or 1 | - | + 1 | + 1 | |
| AFC40 | 2 2 | 0 0 (4) | 4 max. 4 max. | or 2 max. | or 1 | - | or 1 or 1 | - - | + 1 | - + 1 | |
| AFC80 | 2 2 | 0 0 (4) | 4 max. | or 2 max. | - | - | or 1 | - | + 1 | + 1 | |

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

AFC09 ... AFC80 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFC09 | AFC16 | AFC16-04 | AFC26 | AFC38 | AFC40 | AFC52 | AFC80 | |
|--|--------------------------------|--|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | |
| Rated operational voltage Ue max. | | 690 V | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | |
| Conventional free-air thermal current Ith acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 35 A | 35 A | 30 A | 55 A | 55 A | 105 A | 105 A | 125 A | |
| With conductor cross-sectional area | | 6 mm ² | 6 mm ² | 6 mm ² | 16 mm ² | 16 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | |
| AC-1 Utilization category | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | |
| le / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 25 A | 30 A | 30 A | 45 A | 55 A | 70 A | 100 A | 125 A | |
| Ue max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 60^\circ\text{C}$ | 25 A | 30 A | 30 A | 40 A | 45 A | 60 A | 80 A | 105 A | |
| | $\theta \leq 70^\circ\text{C}$ | 22 A | 26 A | 26 A | 32 A | 37 A | 50 A | 70 A | 90 A | |
| With conductor cross-sectional area | | 4 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 16 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | |
| AC-3 Utilization category | | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | | | | |
| le / Max. rated operational current AC-3 (1) | | | | | | | | | | |
|  3-phase motors | 220-230-240 V | 9 A | 18 A | 4.9 A | 23.2 A | 23.2 A | 40 A | 53 A | 80 A | |
| | 380-400 V | 9 A | 18 A | 5.2 A | 22 A | 22 A | 40 A | 53 A | 80 A | |
| | 415 V | 9 A | 18 A | 5.2 A | 21.2 A | 21.2 A | 40 A | 53 A | 80 A | |
| | 440 V | 9 A | 18 A | 5.7 A | 20 A | 20 A | 40 A | 53 A | 80 A | |
| | 500 V | 9.5 A | 15 A | 5.1 A | 17.6 A | 17.6 A | 35 A | 45 A | 65 A | |
| | 690 V | 7 A | 10.5 A | - | 10.5 A | 10.5 A | 25 A | 35 A | 49 A | |
| | 1000 V | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | |
|  Rated operational power AC-3 (1) 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 220-230-240 V | 2.2 kW | 4 kW | 1.1 kW | 5.5 kW | 5.5 kW | 11 kW | 15 kW | 22 kW | |
| | 380-400 V | 4 kW | 7.5 kW | 2.2 kW | 11 kW (3) | 11 kW (3) | 18.5 kW | 22 kW | 37 kW | |
| | 415 V | 4 kW | 9 kW | 2.2 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 440 V | 4 kW | 9 kW | 3 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 500 V | 5.5 kW | 9 kW | 4 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 690 V | 5.5 kW | 9 kW | - | 9 kW | 9 kW | 22 kW | 30 kW | 45 kW | |
| | 1000 V | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | | | | | | |
| Ue $\leq 500\text{ V AC - gG type fuse}$ | | 25 A | 32 A | 32 A | 50 A | 63 A | 80 A | 110 A | 160 A | |
| Rated short-time withstand current Icw | 1 s | 300 A | 300 A | 300 A | 450 A | 450 A | 1000 A | 1000 A | 1200 A | |
| At 40 °C ambient temperature, in free air from a cold state | 10 s | 150 A | 150 A | 150 A | 300 A | 300 A | 600 A | 600 A | 780 A | |
| | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 350 A | 350 A | 450 A | |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 250 A | 250 A | 300 A | |
| | 15 min | 35 A | 35 A | 35 A | 55 A | 55 A | 110 A | 110 A | 140 A | |
| Maximum breaking capacity N.O. main pole $\cos \phi = 0.45$ | at 440 V | 250 A | 250 A | 250 A | - | - | 950 A | 950 A | 1100 A | |
| | at 690 V | 106 A | 106 A | 106 A | - | - | 600 A | 600 A | 750 A | |
| | N.C. Main pole | at 440 V | - | - | - | - | - | 600 A | - | 900 A |
| | | at 690 V | - | - | - | - | - | 300 A | - | 750 A |
| Power dissipation per pole | Ie / AC-1 | 0.8 W | 1.2 W | 1.2 W | 1.6 W | 2.3 W | 3 W | 6.3 W | 8 W | |
| | Ie / AC-3 | 0.1 W | 0.35 W | 0.35 W | 0.42 W | 0.42 W | 1 W | 1.7 W | 3.2 W | |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | | | | |

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"

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

(3) 400 V 3-phase motors only.

AFC09 ... AFC80 4-pole contactors

Technical data

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

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

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

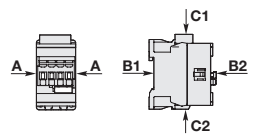
(1) 20 A for AFC09...-22-00 and AFC16...-22-00.

AFC09 ... AFC38 4-pole contactors

Technical data

General technical data

| Contactor types | AC operated | AFC09 | AFC16 | AFC26 | AFC38 | AFC40 | AFC52 | AFC80 |
|---|-------------|--|-------|---|-------|--|-------|--|
| Rated insulation voltage U_i acc. to IEC 60947-4-1 | | 690 V | | | | | | 1000 V |
| acc. to UL / CSA | | 600 V | | | | | | |
| Rated impulse withstand voltage U_{imp} | | 6 kV | | | | | | 8 kV |
| Pollution degree | | 3 | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | | -40...+70 °C | | | | | | |
| Storage | | -60...+80 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 10 millions | | | | 6 millions | | 4 millions |
| Max. switching frequency | | 3600 cycles/h | | | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 (1) | | | | | | | | |
| Shock direction | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | | |
| 4 N.O. Main poles | A | 30 g | | | | 20 g | | |
| B1 | | 25 g Closed position / 5 g Open position | | | | 20 g Closed position / 5 g Open position | | |
| B2 | | 15 g | | | | 10 g | | |
| C1 | | 25 g | | | | 20 g | | |
| C2 | | 25 g | | | | 20 g | | |
| 2 N.O. + 2 N.C. Main poles | A | 30 g | | 30 g Closed position / 25 g Open position | | 20 g | | |
| 4 N.C. Main poles | B1 | 25 g (1) Closed position / 5 g Open position | | 25 g Closed position / 5 g Open position | | 20 g Closed position / 5 g Open position | | 20 g Closed position / 4 g Open position |
| B2 | | 15 g | | 15 g Closed position / 10 g Open position | | 10 g | | |
| C1 | | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | | |
| C2 | | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | | |
| Vibration withstand acc. to IEC 60068-2-6 | | 5 ... 300 Hz | | | | 5 ... 300 Hz | | |
| Shock direction | | 4 g Closed position / 2 g Open position | | | | 3 g Closed position / 2 g Open position | | |



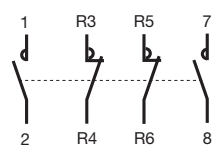
(1) AFC16-04 Shock withstand in B1 direction: 20g.

Mounting characteristics and conditions for use

| Contactor types | AFC09 | AFC16 | AFC26 | AFC38 | AFC40 | AFC52 | AFC80 |
|--|--|-------|-------|-------|---|-------|---|
| Mounting positions | | | | | | | Position 5 not allowed for AF16-04 contactors |
| Mounting distances | The contactors can be assembled side by side | | | | | | (2) |
| Fixing | | | | | | | |
| On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | | 35 x 15 mm | | |
| By screws (not supplied) | 2 x M4 screws placed diagonally | | | | 2 x M4 or 2 x M6 screws placed diagonally | | |

(2) At $\theta < 60^\circ\text{C}$, the contactors can be assembled side by side; At $\theta \leq 70^\circ\text{C}$, contactors must be spaced by 5 mm

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



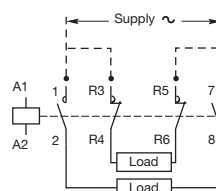
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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



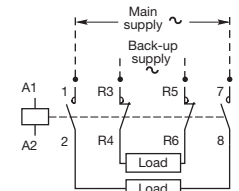
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

- Single supply and 2 separate loads



- 2 separate supplies and 2 separate loads



AFC09 ... AFC80 4-pole contactors

Technical data


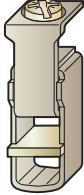
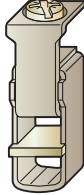
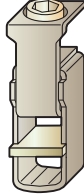









Magnet system characteristics AFC09 ... AFC80 contactors - AC operated

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

AFC09 ... AFC80 4-pole contactors

Technical data

Connecting characteristics

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

4-pole contactors

Electrical durability and utilization categories

General

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

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

- Categories AC-1: $I_c = I_e$

Generally speaking $I_c = m \times I_e$ 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 I_c .

Electrical durability curves:

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

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..... U_e
 - Current normally drawn..... I_e (U_e / I_e / kW relation for motors, see "Motor rated operational powers and currents").
 - Utilization category..... AC-1
 - Breaking current..... $I_c = I_e$ 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 (I_c ; 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.

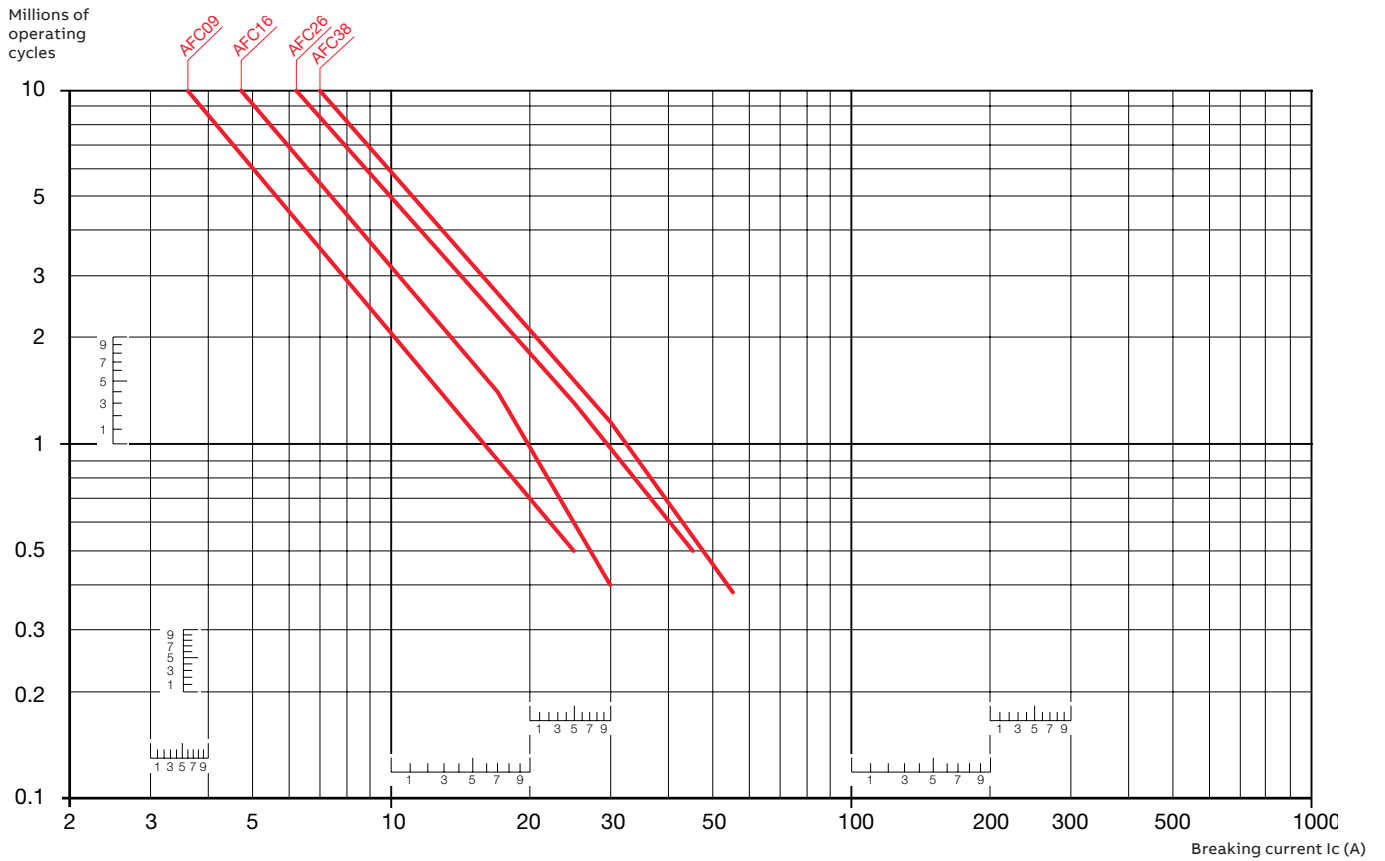
4-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

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

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



Motor rated operational powers and currents

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

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

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



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

www.abb.com/productdetails/NFC22E-80

or

www.abb.com/productdetails/1SBH131001R8022

NFC contactor relays

With screw terminals

2/54 NFC 4-pole

2/56 NFC 8-pole

With Push-in Spring terminals

2/61 NFC..K 4-pole

2/63 NFC..K 8-pole

2/66 Technical data

NFC 4-pole contactor relays

AC operated



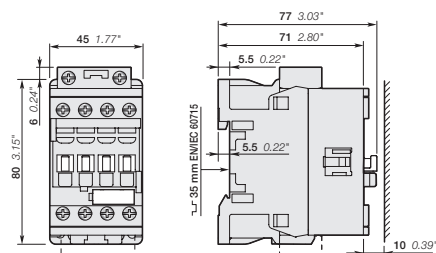
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NFC22E

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

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

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



NFC22E, NFC31E, NFC40E
Main dimensions mm, inches

NFC 4-pole contactor relays

AC operated - With specific 60 Hz voltage



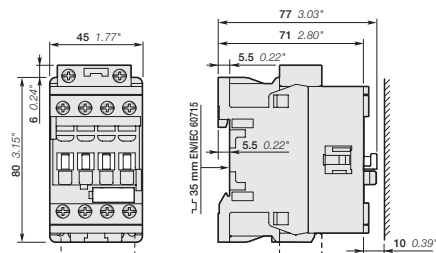
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NFC22E

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

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

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



NFC22E, NFC31E, NFC40E

Main dimensions mm, inches

NFC 8-pole contactor relays

AC operated



1SBH01029V0014

NFC44E

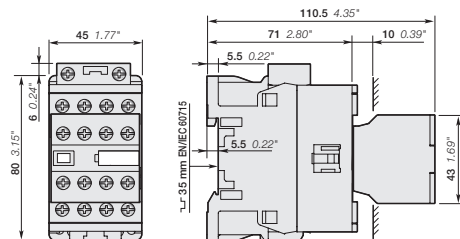
The NFC 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and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

- 690 V IEC or 600 V UL/CSA
- 8 poles: 4 N.O. + 4 N.C., 5 N.O. + 3 N.C., 6 N.O. + 2 N.C., 7 N.O. + 1 N.C., 8 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24...415 V AC 50Hz / 24...440 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

| Number of contacts | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|--------|------|------------|--------------------------|
| | V 50 Hz | V 60Hz | | | |

8-pole contactor relays

| | | | | | |
|--|-------------|-------------|-----------|-----------------|-------|
| | 24 | 24 | NFC44E-81 | 1SBH131001R8144 | 0.381 |
| | 110 | 110 ... 120 | NFC44E-84 | 1SBH131001R8444 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC44E-80 | 1SBH131001R8044 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC44E-88 | 1SBH131001R8844 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC44E-85 | 1SBH131001R8544 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC44E-86 | 1SBH131001R8644 | 0.371 |
| | 24 | 24 | NFC53E-81 | 1SBH131001R8153 | 0.381 |
| | 110 | 110 ... 120 | NFC53E-84 | 1SBH131001R8453 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC53E-80 | 1SBH131001R8053 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC53E-88 | 1SBH131001R8853 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC53E-85 | 1SBH131001R8553 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC53E-86 | 1SBH131001R8653 | 0.371 |
| | 24 | 24 | NFC62E-81 | 1SBH131001R8162 | 0.381 |
| | 110 | 110 ... 120 | NFC62E-84 | 1SBH131001R8462 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC62E-80 | 1SBH131001R8062 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC62E-88 | 1SBH131001R8862 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC62E-85 | 1SBH131001R8562 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC62E-86 | 1SBH131001R8662 | 0.371 |
| | 24 | 24 | NFC71E-81 | 1SBH131001R8171 | 0.381 |
| | 110 | 110 ... 120 | NFC71E-84 | 1SBH131001R8471 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC71E-80 | 1SBH131001R8071 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC71E-88 | 1SBH131001R8871 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC71E-85 | 1SBH131001R8571 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC71E-86 | 1SBH131001R8671 | 0.371 |
| | 24 | 24 | NFC80E-81 | 1SBH131001R8180 | 0.381 |
| | 110 | 110 ... 120 | NFC80E-84 | 1SBH131001R8480 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC80E-80 | 1SBH131001R8080 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC80E-88 | 1SBH131001R8880 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC80E-85 | 1SBH131001R8580 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC80E-86 | 1SBH131001R8680 | 0.371 |



NFC44E, NFC53E, NFC62, NFC71E, NFC80E

Main dimensions mm, inches

NFC 8-pole contactor relays

AC operated



1SBH131025W0014

NFC33/11

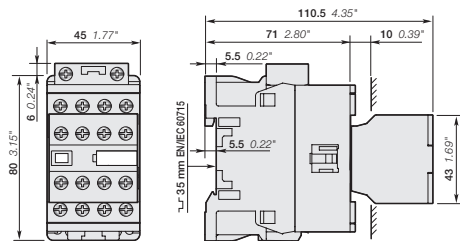
The NFC.../11 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks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

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

| Number of contacts | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|---------|------|------------|--------------------------|
| | V 50 Hz | V 60 Hz | | | |

8-pole contactor relays with overlapping of lagging / leading contacts

| Terminal Diagram | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|------------------|--|-------------|-------------|-----------------|--------------------------|
| | V 50 Hz | V 60 Hz | | | |
| | 24 | 24 | NFC33/11-81 | 1SBH131001R8139 | 0.381 |
| | 110 | 110 ... 120 | NFC33/11-84 | 1SBH131001R8439 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC33/11-80 | 1SBH131001R8039 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC33/11-88 | 1SBH131001R8839 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC33/11-85 | 1SBH131001R8539 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC33/11-86 | 1SBH131001R8639 | 0.371 |
| | 24 | 24 | NFC51/11-81 | 1SBH131001R8159 | 0.381 |
| | 110 | 110 ... 120 | NFC51/11-84 | 1SBH131001R8459 | 0.378 |
| | 220 ... 230 | 230 ... 240 | NFC51/11-80 | 1SBH131001R8059 | 0.372 |
| | 230 ... 240 | 240 ... 260 | NFC51/11-88 | 1SBH131001R8859 | 0.374 |
| | 380 ... 400 | 400 ... 415 | NFC51/11-85 | 1SBH131001R8559 | 0.368 |
| | 400 ... 415 | 415 ... 440 | NFC51/11-86 | 1SBH131001R8659 | 0.371 |



NFC33/11, NFC51/11

Main dimensions mm, inches

NFC 8-pole contactor relays

AC operated - With specific 60 Hz voltage



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NFC44E

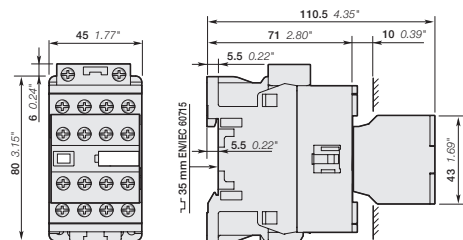
The NFC 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks and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

- 690 V IEC or 600 V UL/CSA
- 8 poles: 4 N.O. + 4 N.C., 5 N.O. + 3 N.C., 6 N.O. + 2 N.C., 7 N.O. + 1 N.C., 8 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Screw terminals
- Common accessory range for the complete AF platform.

| Number of contacts | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|--------|------|------------|--------------------------|
| | V 50 Hz | V 60Hz | | | |

8-pole contactor relays

| | | | | | |
|--|-------------|-----|-----------|-----------------|-------|
| | 175 | 208 | NFC44E-34 | 1SBH131001R3444 | 0.378 |
| | 230 ... 240 | 277 | NFC44E-42 | 1SBH131001R4244 | 0.372 |
| | 400 ... 415 | 480 | NFC44E-51 | 1SBH131001R5144 | 0.370 |
| | 175 | 208 | NFC53E-34 | 1SBH131001R3453 | 0.378 |
| | 230 ... 240 | 277 | NFC53E-42 | 1SBH131001R4253 | 0.372 |
| | 400 ... 415 | 480 | NFC53E-51 | 1SBH131001R5153 | 0.370 |
| | 175 | 208 | NFC62E-34 | 1SBH131001R3462 | 0.378 |
| | 230 ... 240 | 277 | NFC62E-42 | 1SBH131001R4262 | 0.372 |
| | 400 ... 415 | 480 | NFC62E-51 | 1SBH131001R5162 | 0.370 |
| | 175 | 208 | NFC71E-34 | 1SBH131001R3471 | 0.378 |
| | 230 ... 240 | 277 | NFC71E-42 | 1SBH131001R4271 | 0.372 |
| | 400 ... 415 | 480 | NFC71E-51 | 1SBH131001R5171 | 0.370 |
| | 175 | 208 | NFC80E-34 | 1SBH131001R3480 | 0.378 |
| | 230 ... 240 | 277 | NFC80E-42 | 1SBH131001R4280 | 0.372 |
| | 400 ... 415 | 480 | NFC80E-51 | 1SBH131001R5180 | 0.370 |



NFC44E, NFC53E, NFC62, NFC71E, NFC80E

Main dimensions mm, inches

NFC 8-pole contactor relays

AC operated - With specific 60 Hz voltage



NFC33/11

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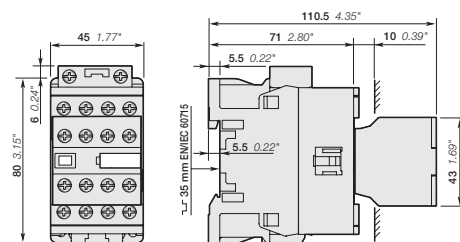
The NFC.../11 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks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

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

| Number of contacts | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|---------|------|------------|--------------------------|
| | V 50 Hz | V 60 Hz | | | |

8-pole contactor relays with overlapping of lagging / leading contacts

| | | | | | |
|--|-------------|-----|-------------|-----------------|-------|
| | 175 | 208 | NFC33/11-34 | 1SBH131001R3439 | 0.378 |
| | 230 ... 240 | 277 | NFC33/11-42 | 1SBH131001R4239 | 0.372 |
| | 400 ... 415 | 480 | NFC33/11-51 | 1SBH131001R5139 | 0.370 |
| | 175 | 208 | NFC51/11-34 | 1SBH131001R3459 | 0.378 |
| | 230 ... 240 | 277 | NFC51/11-42 | 1SBH131001R4259 | 0.372 |
| | 400 ... 415 | 480 | NFC51/11-51 | 1SBH131001R5159 | 0.370 |

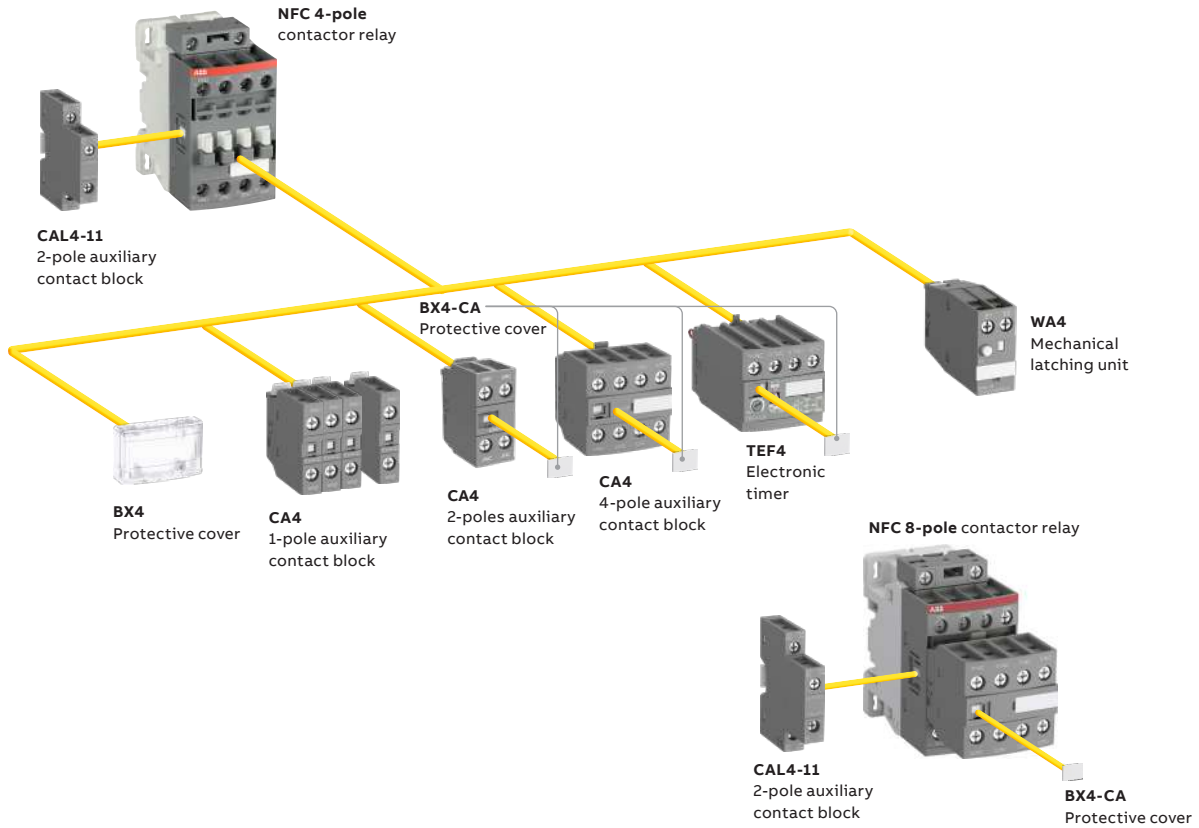


NFC33/11, NFC51/11

Main dimensions mm, inches



NFC Contactor relays

Contactor relays and main accessories



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

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

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

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

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

(3) Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of additional N.C. auxiliary contacts.

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

AC operated



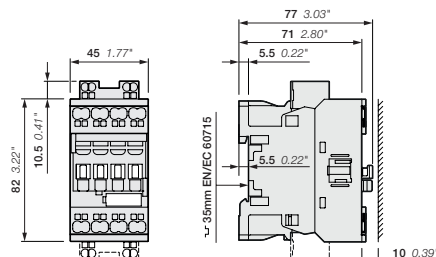
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NFC22EK

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

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

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



NFC22EK, NFC31EK, NFC40EK

Main dimensions mm, inches

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

AC operated - With specific 60 Hz voltage



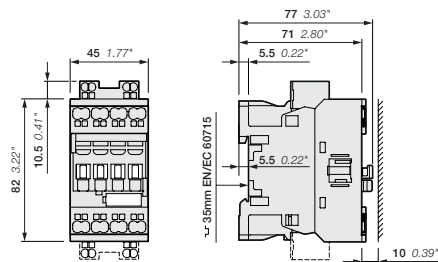
1SBH13105R5140

NFC22EK

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

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

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



NFC22EK, NFC31EK, NFC40EK

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

AC operated



NFC44EK

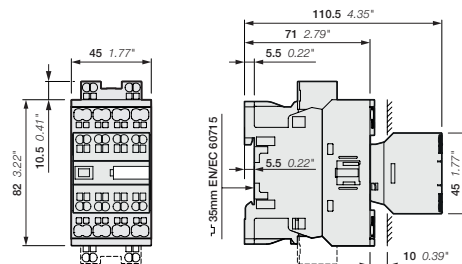
The NFC..K 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks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

- 690 V IEC or 600 V UL/CSA
- 8 poles : 4 N.O. + 4 N.C., 5 N.O. + 3 N.C., 6 N.O. + 2 N.C., 7 N.O. + 1 N.C., 8 N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 24...240 V AC 50Hz / 24...260 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

| Number of contacts | Rated control circuit voltage U _c | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|---------|------|------------|--------------------------|
| | V 50 Hz | V 60 Hz | | | |

8-pole contactor relays

| | | | | | |
|-------------|-------------|-------------|-----------------|-----------------|-------|
| | 24 | 24 | NFC44EK-81 | 1SBH131005R8144 | 0.391 |
| | 110 | 110 ... 120 | NFC44EK-84 | 1SBH131005R8444 | 0.388 |
| | 220 ... 230 | 230 ... 240 | NFC44EK-80 | 1SBH131005R8044 | 0.382 |
| | 230 ... 240 | 240 ... 260 | NFC44EK-88 | 1SBH131005R8844 | 0.384 |
| | 380 ... 400 | 400 ... 415 | NFC44EK-85 | 1SBH131005R8544 | 0.378 |
| | 24 | 24 | NFC53EK-81 | 1SBH131005R8153 | 0.391 |
| | 110 | 110 ... 120 | NFC53EK-84 | 1SBH131005R8453 | 0.388 |
| | 220 ... 230 | 230 ... 240 | NFC53EK-80 | 1SBH131005R8053 | 0.382 |
| | 230 ... 240 | 240 ... 260 | NFC53EK-88 | 1SBH131005R8853 | 0.384 |
| | 380 ... 400 | 400 ... 415 | NFC53EK-85 | 1SBH131005R8553 | 0.378 |
| | 24 | 24 | NFC62EK-81 | 1SBH131005R8162 | 0.391 |
| | 110 | 110 ... 120 | NFC62EK-84 | 1SBH131005R8462 | 0.388 |
| | 220 ... 230 | 230 ... 240 | NFC62EK-80 | 1SBH131005R8062 | 0.382 |
| | 230 ... 240 | 240 ... 260 | NFC62EK-88 | 1SBH131005R8862 | 0.384 |
| | 380 ... 400 | 400 ... 415 | NFC62EK-85 | 1SBH131005R8562 | 0.378 |
| | 24 | 24 | NFC71EK-81 | 1SBH131005R8171 | 0.391 |
| | 110 | 110 ... 120 | NFC71EK-84 | 1SBH131005R8471 | 0.388 |
| | 220 ... 230 | 230 ... 240 | NFC71EK-80 | 1SBH131005R8071 | 0.382 |
| | 230 ... 240 | 240 ... 260 | NFC71EK-88 | 1SBH131005R8871 | 0.384 |
| | 380 ... 400 | 400 ... 415 | NFC71EK-85 | 1SBH131005R8571 | 0.378 |
| | 24 | 24 | NFC80EK-81 | 1SBH131005R8180 | 0.391 |
| | 110 | 110 ... 120 | NFC80EK-84 | 1SBH131005R8480 | 0.388 |
| | 220 ... 230 | 230 ... 240 | NFC80EK-80 | 1SBH131005R8080 | 0.382 |
| | 230 ... 240 | 240 ... 260 | NFC80EK-88 | 1SBH131005R8880 | 0.384 |
| | 380 ... 400 | 400 ... 415 | NFC80EK-85 | 1SBH131005R8580 | 0.378 |
| 400 ... 415 | 415 ... 440 | NFC80EK-86 | 1SBH131005R8680 | 0.381 | |



NFC44EK, NFC53EK, NFC62K, NFC71EK, NFC80EK

Main dimensions mm, inches

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

AC operated - With specific 60 Hz voltage



NFC44EK

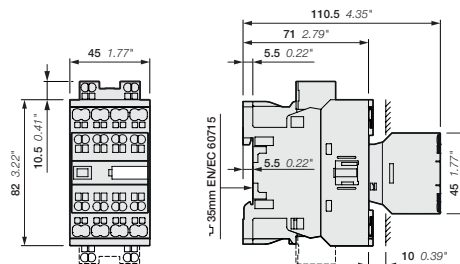
The NFC..K 8-pole contactor relays are mainly used for switching auxiliary and control circuits, offering an optimized operating time for AC control applications with electromagnetic control. NFC..K contactor relays have a block type design and can be easily extended with add-on auxiliary contact blocks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

- 690 V IEC or 600 V UL/CSA
- 8 poles : 4 N.O. + 4 N.C., 5 N.O. + 3 N.C., 6 N.O. + 2 N.C., 7 N.O. + 1 N.C., 8. N.O.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- Control circuit: 175...415 V AC 50Hz / 208...480 V AC 60Hz
- Push-in Spring terminals
- Common accessory range for the complete AF platform.

| Number of contacts | Rated control circuit voltage Uc | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|----------------------------------|---------|------|------------|--------------------------|
| | V 50 Hz | V 60 Hz | | | |

8-pole contactor relays

| | | | | | |
|--|-------------|-----|------------|-----------------|-------|
| | 175 | 208 | NFC44EK-34 | 1SBH131005R3444 | 0.388 |
| | 230 ... 240 | 277 | NFC44EK-42 | 1SBH131005R4244 | 0.383 |
| | 400 ... 415 | 480 | NFC44EK-51 | 1SBH131005R5144 | 0.381 |
| | 175 | 208 | NFC53EK-34 | 1SBH131005R3453 | 0.388 |
| | 230 ... 240 | 277 | NFC53EK-42 | 1SBH131005R4253 | 0.383 |
| | 400 ... 415 | 480 | NFC53EK-51 | 1SBH131005R5153 | 0.381 |
| | 175 | 208 | NFC62EK-34 | 1SBH131005R3462 | 0.388 |
| | 230 ... 240 | 277 | NFC62EK-42 | 1SBH131005R4262 | 0.383 |
| | 400 ... 415 | 480 | NFC62EK-51 | 1SBH131005R5162 | 0.381 |
| | 175 | 208 | NFC71EK-34 | 1SBH131005R3471 | 0.388 |
| | 230 ... 240 | 277 | NFC71EK-42 | 1SBH131005R4271 | 0.383 |
| | 400 ... 415 | 480 | NFC71EK-51 | 1SBH131005R5171 | 0.381 |
| | 175 | 208 | NFC80EK-34 | 1SBH131005R3480 | 0.388 |
| | 230 ... 240 | 277 | NFC80EK-42 | 1SBH131005R4280 | 0.383 |
| | 400 ... 415 | 480 | NFC80EK-51 | 1SBH131005R5180 | 0.381 |

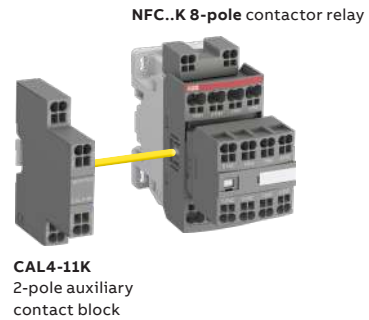
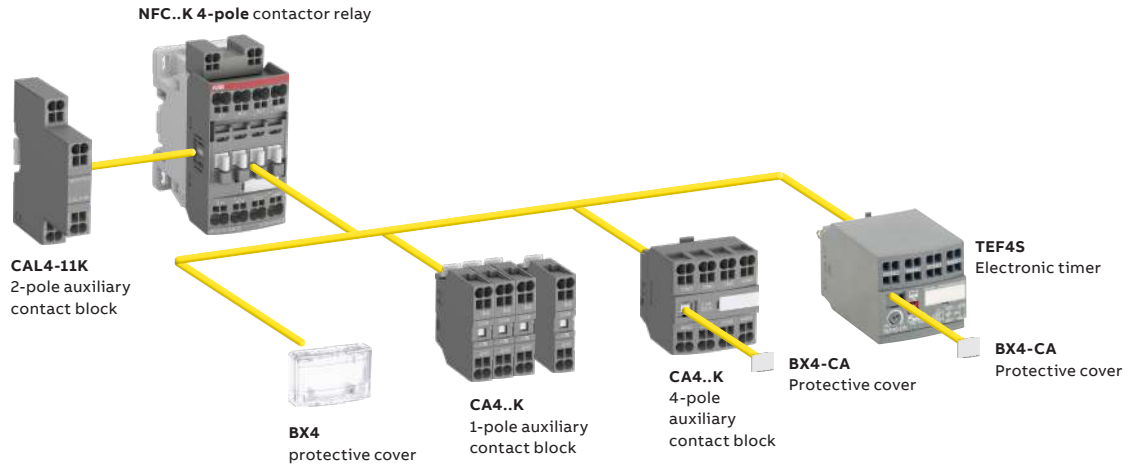


NFC44EK, NFC53EK, NFC62K, NFC71EK, NFC80EK

Main dimensions mm, inches

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

Contactor relays and main accessories



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

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

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

NFC(..K) contactor relays

Technical data

Contact utilization characteristics according to IEC

| Contact relay types | AC operated | NFC(..K) |
|---|--------------------|---|
| Standards | | IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1 |
| Rated operational voltage U _e max. | | 690 V AC |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | | 16 A |
| I _e / 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 I _e AC-15 acc. to IEC 60947-5-1 |
| Rated breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| I _e / 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 I _{cs} | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA |
| Non-overlapping time between N.O. and N.C. contacts | | 10 ⁻⁷ |
| Power dissipation per pole at 6 A | | ≥ 2 ms |
| Max. electrical switching frequency | AC-15 | 0.1 W |
| | DC-13 | 1200 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | 900 cycles/h |
| | | 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

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

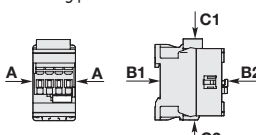
NFC(..K) contactor relays

Technical data

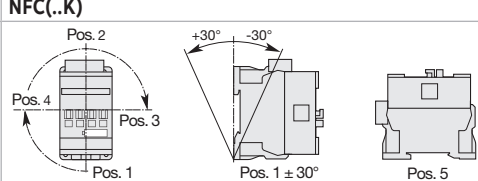
Magnet System Characteristics - NFC(..K) contactor relays AC operated

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

General technical data

| Contactor relay types | AC operated | NFC(..K) |
|---|-----------------|--|
| Rated insulation voltage U _i acc. to IEC 60947-5-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Rated impulse withstand voltage U _{imp} . | | 6 kV |
| Pollution degree | | 3 |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40...+70 °C |
| Storage | | -60...+80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 millions |
| Max. switching frequency | | 6000 cycles/h |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
|  | A | 30 g |
| | B1 | 25 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 25 g |
| | C2 | 25 g |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 4 g closed position / 2 g open position |









Mounting characteristics










| Contactor relay types | AC operated | NFC(..K) |
|--|-------------|---|
| Mounting positions | |  |
| Mounting distances | | Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NFC contactor relay |
| Fixing | | The contactor relays can be assembled side by side. |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |

NFC(..K) contactor relays

Technical data

Connecting characteristics

| Contactor relay types | AC operated | NFC |
|---|-------------|---|
| Main terminals | |  Screw terminals with cable clamp |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
|  Rigid Solid/Stranded | 1 x | 1...2.5 mm ² |
|  Rigid Solid/Stranded | 2 x | 1...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² |
|  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 | | |
| All terminals | | Delivered in open position, screws of unused terminals must be tightened |
| Screwdriver type | | M3.5 |
| | | Flat Ø 5.5 / Pozidriv 2 |

| Contactor relay types | AC operated | NFC..K |
|---|---------------|---|
| Main terminals | |  Push-in Spring terminals |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
|  Rigid | 1 x | 1 ... 2.5 mm ² |
|  Rigid | 2 x | 1 ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm ² |
|  Flexible without ferrule | 2 x | (spring) 0.5 ... 2.5 mm ² |
| 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 | All terminals | Flat Ø 3 mm x 0.5 mm |



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

| | |
|-------------|--|
| 2/72 | Auxiliary contact blocks |
| 2/80 | Electronic timers |
| 2/83 | Interlocks |
| 2/85 | Impulse contact blocks |
| 2/86 | Surge suppressors for contactor coils |
| 2/88 | Mechanical latching units |
| 2/90 | Other accessories |
| 2/92 | Additional terminal blocks |
| 2/93 | Terminals for control lead connections |
| 2/94 | Terminal connecting strips and shorting bars |
| 2/95 | Connection accessories for starting solutions |



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

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

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



CA4-10



CA4-11



CAL4-11



CA4-22E



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



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

Types of auxiliary contact blocks for side mounting:

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

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

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

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|---|------|------------|---------|----------------|
| |   | | | | kg |

Front-mounted instantaneous auxiliary contact blocks

| | | | | | | |
|------------------------|-----------------------|-----|----------|-----------------|-----------------|-------|
| AFC09 ... AFC96 | 1 0 | -- | CA4-10 | 1SBN010110R1010 | 1 | 0,014 |
| 4-pole NFC | 1 0 | -- | CA4-10-T | 1SBN010110T1010 | 10 | 0,014 |
| | 0 1 | -- | CA4-01 | 1SBN010110R1001 | 1 | 0,014 |
| | 0 1 | -- | CA4-01-T | 1SBN010110T1001 | 10 | 0,014 |
| | 1 1 | -- | CA4-11 | 1SBN010110R1011 | 5 | 0,024 |
| | 2 0 | -- | CA4-20 | 1SBN010110R1020 | 5 | 0,024 |
| | 0 2 | -- | CA4-02 | 1SBN010110R1002 | 5 | 0,024 |
| | AFC09 ... AFC16-30-10 | 2 2 | -- | CA4-22M | 1SBN010140R1122 | 1 |
| 3 1 | | -- | CA4-31M | 1SBN010140R1131 | 1 | 0,055 |
| 1 3 | | -- | CA4-13M | 1SBN010140R1113 | 1 | 0,055 |
| 0 4 | | -- | CA4-04M | 1SBN010140R1104 | 1 | 0,055 |
| AFC26 ... AFC38-30 (1) | 2 2 | -- | CA4-22E | 1SBN010140R1022 | 1 | 0,055 |
| AFC09 ... AFC38-40 (1) | 3 1 | -- | CA4-31E | 1SBN010140R1031 | 1 | 0,055 |
| AFC09 ... AFC38-22 (1) | 4 0 | -- | CA4-40E | 1SBN010140R1040 | 1 | 0,055 |
| | 0 4 | -- | CA4-04E | 1SBN010140R1004 | 1 | 0,055 |
| AFC16-04 | 3 1 | -- | CA4-31E | 1SBN010140R1031 | 1 | 0,055 |
| AFC09 ... AFC16-30-01 | 2 2 | -- | CA4-22U | 1SBN010140R1322 | 1 | 0,055 |
| | 3 1 | -- | CA4-31U | 1SBN010140R1331 | 1 | 0,055 |
| | 4 0 | -- | CA4-40U | 1SBN010140R1340 | 1 | 0,055 |
| 4-pole NFC | 2 2 | -- | CA4-22N | 1SBN010140R1222 | 1 | 0,055 |
| | 3 1 | -- | CA4-31N | 1SBN010140R1231 | 1 | 0,055 |
| | 4 0 | -- | CA4-40N | 1SBN010140R1240 | 1 | 0,055 |
| | 1 3 | -- | CA4-13N | 1SBN010140R1213 | 1 | 0,055 |
| NFC..40E | 0 4 | -- | CA4-04N | 1SBN010140R1204 | 1 | 0,055 |

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

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

| | | | | | | |
|-----------------|----|-----|--------|-----------------|---|-------|
| AFC09 ... AFC96 | -- | 1 0 | CC4-10 | 1SBN010111R1010 | 1 | 0,014 |
| 4-pole NFC | -- | 0 1 | CC4-01 | 1SBN010111R1001 | 1 | 0,014 |

Note: - 1 max CC4-10 and 1 max CC4-01. AFC16-04: 2 max CC4-10. No CC4-01 use.

CC4-01 use: on each "Accessory fitting details" table, the allowed number of N.C. add-on and built-in contacts including CC4-01, is decreased by one.

Side-mounted instantaneous auxiliary contact blocks

| | | | | | | |
|-----------------|-----|----|-----------|-----------------|----|-------|
| AFC09 ... AFC96 | 1 1 | -- | CAL4-11 | 1SBN010120R1011 | 1 | 0,040 |
| NFC | 1 1 | -- | CAL4-11-T | 1SBN010120T1011 | 10 | 0,040 |

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

| | | | | | | |
|-----------------------|-----|----|----------|-----------------|---|-------|
| AFC09 ... AFC16-30-10 | 1 1 | -- | CAT4-11M | 1SBN010151R1111 | 1 | 0,040 |
| AFC26 ... AFC65-30-00 | 1 1 | -- | CAT4-11E | 1SBN010151R1011 | 1 | 0,040 |
| AFC09 ... AFC38-40-00 | | | | | | |
| AFC09 ... AFC40-22-00 | | | | | | |
| AFC16-04-00 | | | | | | |
| AFC09 ... AFC16-30-01 | 1 1 | -- | CAT4-11U | 1SBN010151R1311 | 1 | 0,040 |

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

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

Technical data





Contact utilization characteristics according to IEC

| | | |
|--|---|------------------------------|
| Types | 1-pole CA4, 1-pole CC4, 2-pole CA4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 | |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | |
| Pollution degree | 3 | |
| Rated operational voltage U_e max. | 24...690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ C$ | 16 A | |
| Rated frequency (without derating) | 50/60 Hz | |
| I_e / 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 I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / 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 I_{cw} | for 1.0 s | 100 A |
| $\theta = 40^\circ C$ | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 12 V / 3 mA | |
| Power dissipation per pole at 6 A | 10 ⁻⁷ | |
| 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, 2-pole CA4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 | |
| Standards | UL 60947-5-1, CSA C22.2 N° 60947-5-1-14 | |
| Max. operational voltage | 600 V AC, 600 V DC | |
| Pilot duty | A600, Q600 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 VA | |
| AC maximum volt-ampere breaking | 720 VA | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 VA | |

Connecting characteristics

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

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



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

| | | | | | |
|-------------------------------|-----|-----------|-----------------|----|-------|
| AFC09 ... AFC96 4-pole NFC | 1 0 | CA4-10K | 1SBN010160R1010 | 1 | 0.012 |
| | 1 0 | CA4-10K-T | 1SBN010160T1010 | 10 | 0.012 |
| | 0 1 | CA4-01K | 1SBN010160R1001 | 1 | 0.012 |
| | 0 1 | CA4-01K-T | 1SBN010160T1001 | 10 | 0.012 |
| AFC09 ... AFC16-30-10 | 2 2 | CA4-22MK | 1SBN010146R1122 | 1 | 0.050 |
| | 3 1 | CA4-31MK | 1SBN010146R1131 | 1 | 0.050 |
| | 1 3 | CA4-13MK | 1SBN010146R1113 | 1 | 0.050 |
| | 0 4 | CA4-04MK | 1SBN010146R1104 | 1 | 0.050 |
| AFC26 ... AFC38-30 (1) | 2 2 | CA4-22EK | 1SBN010146R1022 | 1 | 0.050 |
| AFC09 ... AFC38-40 (1) | 3 1 | CA4-31EK | 1SBN010146R1031 | 1 | 0.050 |
| AFC09 ... AFC38-22 (1) | 4 0 | CA4-40EK | 1SBN010146R1040 | 1 | 0.050 |
| AFC16-04 | 3 1 | CA4-31EK | 1SBN010146R1031 | 1 | 0.050 |
| 4-pole NFC | 1 3 | CA4-13NK | 1SBN010146R1213 | 1 | 0.050 |
| | 2 2 | CA4-22NK | 1SBN010146R1222 | 1 | 0.050 |
| | 3 1 | CA4-31NK | 1SBN010146R1231 | 1 | 0.050 |
| | 4 0 | CA4-40NK | 1SBN010146R1240 | 1 | 0.050 |
| NFC40E | 0 4 | CA4-04NK | 1SBN010146R1204 | 1 | 0.050 |

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

Side-mounted instantaneous auxiliary contact blocks

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

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

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

Technical data









Contact utilization characteristics according to IEC

| Contactor relay types | 1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K | |
|---|--|-----------------------------|
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | |
| Pollution degree | 3 | |
| Rated operational voltage U_e max. | 690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| I_e / 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 I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / 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 I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | 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 60947-5-1, CSA C22 N°14 |
| Max. operational voltage | 600 V AC, 600 V DC |
| Pilot duty | A600, Q600 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

Connecting characteristics

| | | |
|---|----------------------------------|--|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1 ... 2.5 mm ² |
|  Rigid solid | 2 x | 1 ... 2.5 mm ² |
|  Flexible with ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm ² |
|  Flexible without ferrule | 2 x | (spring) 0.5 ... 2.5 mm ² |
| 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 \varnothing 3 mm x 0.5 mm | |

Auxiliary contact blocks for severe industrial environments

For AFC09 ... AFC96 contactors and NFC contactor relays





CE5-10W

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

Types of auxiliary contact blocks for front mounting:

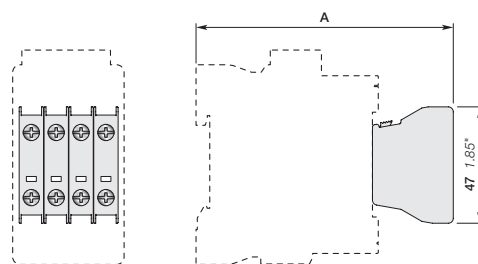
- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, available in 2 IP degrees
 - CE5 D with built-in microswitch IP40, degree of protection (IP20 on terminals)
 - CE5 W with built-in microswitch IP67, degree of protection (IP20 on terminals).

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

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

(1) For each device type, refer to "Accessory fitting details" table.

(2) AFC16-04: CE5 use not allowed.



Main dimensions mm, inches

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

Auxiliary contact blocks for severe industrial environments

Technical data

| | | |
|--------------|-------------------------|-----------------------|
| | Front mounted | |
| Types | 1-pole CE5-..0.1 | 1-pole CE5-..2 |




Contact utilization characteristics according to IEC

| | | |
|---|--|--|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | 250 V | |
| Pollution degree | 3 | |
| Rated operational voltage Ue max. | 125 V | 250 V |
| Conventional thermal current Ith - θ ≤ 40 °C | 0.1 A | 2 A |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Ie / Rated operational current | AC-14 | AC-15 |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz 0.1 A | 2 A |
| | 220-240 V 50/60 Hz - | 2 A |
| Making capacity | 6 x Ie AC-14 acc. to IEC 60947-5-1 | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity | 6 x Ie AC-14 acc. to IEC 60947-5-1 | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-12 acc. to IEC 60947-5-1 | 24 V DC 0.1 A | 2 A |
| | 48 V DC 0.1 A | 1 A |
| | 72 V DC 0.1 A | 0.3 A |
| | 110 V DC 0.1 A | 0.2 A |
| | 125 V DC - | 0.2 A |
| | 220 V DC - | 0.1 A |
| Short-circuit protection device FF type fuse (1) | 0.1 A | 10 A |
| Conditional short-circuit current | 1 kA | 1 kA |
| Minimum switching capacity | | |
| AFC09 ... AFC38 contactors with failure rate acc. to IEC 60947-5-4 | 3 V / 1 mA - | 17 V / 1 mA ≤ 10 ⁻⁷ |
| Mechanical durability | | |
| Number of operating cycles | 5 millions for CE5-..D0.1 2.5 millions for CE5-..W0.1 | 5 millions for CE5-..D2 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 0.7 millions for CE5-..W0.1 | 1 million for CE5-..D2 0.3 millions for CE5-..W2 |
| Max. electrical switching frequency | AC-14 1200 cycles/h AC-15 1200 cycles/h DC-12 900 cycles/h | |

Contact utilization characteristics according to UL / CSA

| | | |
|--------------------------|------------------------|---------------------|
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 125 V AC / 110 V DC | 250 V AC / 220 V DC |
| Pilot duty | | |
| AC thermal rated current | 0.1 A | 2 A |

Connecting characteristics

| | | |
|---|---------------|--|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...4 mm ² |
| | 2 x | 1...4 mm ² |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Lugs | L ≤ | 7.7 mm |
| | I > | 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 IEC 60529 / EN 60529 | Microswitches | IP40 for CE5-..D0.1 IP67 for CE5-..W0.1 |
| | | IP40 for CE5-..D2 IP67 for CE5-..W2 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

Auxiliary contact blocks for severe industrial environments

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

For AFC contactors

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

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

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Side-mounted accessories | |
|-----------------|------------|---|---------------------------|------------|------------|---|-----------------------------|------------|
| | | | Auxiliary contact blocks | | | Electrical and mechanical interlock set (Between 2 contactors) VEM4 | Auxiliary contact blocks | |
| | |  | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | | Left side 2-pole CAL4-11 | Right side |

3-pole contactors AFC09 ... AFC96

On positions 1, 2, 3, 4; Max. N.C. built-in and add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC09 ... AFC16 | 3 | 0 0 1 | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| AFC09 ... AFC16 | 3 | 0 1 0 | 2 | + 2 max. | or +1 max. | - | - | - |
| AFC26 ... AFC38 | 3 | 0 0 0 | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| | | | 1 | + 1 max. | - | - | + 1 | + 1 |
| | | | 1 | + 2 max. | or +1 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

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC09 ... AFC16 | 3 | 0 0 1 | 1 | + 3 max. | or +1 max. | - | - | - |
| AFC09 ... AFC16 | 3 | 0 1 0 | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| AFC26 ... AFC38 | 3 | 0 0 0 | 1 | + 2 max. | or +1 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

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC40 ... AFC96 | 3 | 0 0 0 | 2 | + 2 max. | or +1 max. | - | + 1 | + 1 |
| | | | 1 | + 3 max. | or +1 max. | - | + 1 | + 1 |

4-pole contactors AFC09 ... AFC80

On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC09, AFC16 | 4 | 0 0 0 | 2 | + 2 max. | or +1 max. | - | - | - |
| | | | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| | | | 1 | + 1 max. | - | - | + 1 | + 1 |
| | | | 1 | + 2 max. | or +1 max. | + 1 | + 1 | - |

On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC26, AFC38 | 4 | 0 0 0 | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| | | | 1 | + 2 max. | or +1 max. | + 1 | - | - |
| AFC09 ... AFC38 | 2 | 2 0 0 | 1 | + 3 max. | or +1 max. | - | + 1 | - |

On positions 1 ±30°, 5; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC09, AFC16 | 4 | 0 0 0 | 1 | + 3 max. | or +1 max. | - | + 1 | - |
| | | | 1 | + 2 max. | or +1 max. | + 1 | - | - |

On positions 1 ±30°, 5; No add-on N.C. auxiliary contacts

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC26, AFC38 | 4 | 0 0 0 | 1 | + 3 max. | or +1 max. | - | - | - |
| AFC09 ... AFC38 | 2 | 2 0 0 | 1 | + 3 max. | or +1 max. | - | - | - |

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

| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC40 ... AFC80 | 4 | 0 0 0 | 2 | + 2 max. | or +1 max. | - | + 1 | + 1 |
| | | | 1 | + 3 max. | or +1 max. | - | + 1 | + 1 |

On positions 1, 1 ±30°, 2, 3, 4, 5; No add-on N.C. auxiliary contacts


| Contactor types | Main poles | Built-in auxiliary contacts | 1-pole CE5 | 1-pole CA4 | 2-pole CA4 | Electrical and mechanical interlock set (VEM4) | Left side | Right side |
|-----------------|------------|-----------------------------|------------|------------|------------|--|-----------|------------|
| AFC40, AFC80 | 2 | 2 0 0 | 1 | + 3 max. | or +1 max. | - | - | - |

Auxiliary contact blocks for severe industrial environments

For NFC contactor relays

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

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

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

Electronic timers



1SBCL0000AV0014

TEF4-ON



1SBCL00012V0014

TEF4-OFF



1SBCL01394F0014

TEF4S-ON



1SBCL01394F0014

TEF4S-OFF

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

Compact solution in cabinet compared to separate timers

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

Safe and cost-reduced wiring

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

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

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

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage U _c | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) |
|----------------------------------|-------------------------------------|------------|--|--------------------|------|------------|--------------------|
| | | | V 50/60 Hz or DC | | | | kg |

With screw terminals

| | | | | | | | |
|-----------------|------------------------|-----------|----------|-----|----------|-----------------|-------|
| AFC09 ... AFC96 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF4-ON | 1SBN020112R1000 | 0.065 |
| NFC 4-pole | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF4-OFF | 1SBN020114R1000 | 0.065 |

With spring terminals

| | | | | | | | |
|-----------------|------------------------|-----------|----------|-----|-----------|-----------------|-------|
| AFC09 ... AFC96 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF4S-ON | 1SBN020113R1000 | 0.065 |
| NFC..K 4-pole | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF4S-OFF | 1SBN020115R1000 | 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 U_i acc. to IEC 60947-5-1 | 400 V | |
| Rated impulse withstand voltage U_{imp} | 4 kV | |
| Rated operational voltage U_e max. | 240 V AC / 24 V DC | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ C$ | 5 A | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz 220-240 V 50/60 Hz | 3 A 1.5 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / 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 I_{cw} $\theta = 40^\circ C$ | for 1.0 s for 0.1 s | 8 A 8 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 24 V DC | 12 V / 3 mA 10^{-7} |
| Power dissipation per pole at 3 A | 0.1 W | |
| Function diagram | <p>ON-delay</p> | <p>OFF-delay</p> |
| <p>Bistable relay inside. Before use, once apply U_c then switch it off in order to initialize position of the contacts.</p> | | |
| Control circuit voltage | | |
| AC control voltage | Rated control circuit voltage U_c 50/60 Hz | 24...240 V AC 1.5 mA RMS |
| DC control voltage | Rated control circuit voltage U_c Average consumption | 24...240 V DC 1.5 mA 1 mA |
| Rated frequency limits | 50 / 60 Hz | |
| Supply voltage range | 0.85...1.1 x U_c (at $\theta \leq 70^\circ C$) | |
| 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 | $\leq 1\%$ | |
| Minimum ON period | 0.15 s | |
| Recovery time | 0.15 s | |
| Ambient air temperature | Operation Storage | -25 °C ... +70 °C -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) | <p>1/2 sinusoidal shock for 11 ms: no change in contact position For use with AFC09 ... AFC38 1-stack contactors or NFC 4-pole contactor relays - shock direction A: 25g - other shock directions B1, B2, C1, C2: same as contactors or contactor relays.</p> <p>For use with AFC40 ... AFC96: same as contactors</p> | |
| | | |
| 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 DC-13 | 1200 cycles/h 900 cycles/h |





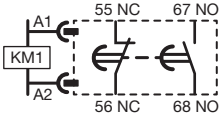
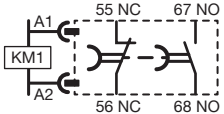
Electronic timers

Technical data

Contact utilization characteristics according to UL / CSA

| Types | TEF4-ON | TEF4-OFF |
|---|-----------------------------|----------|
| Standards | UL 508, CSA C22.2 No. 14-18 | |
| Rated insulation voltage U_i 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 | |

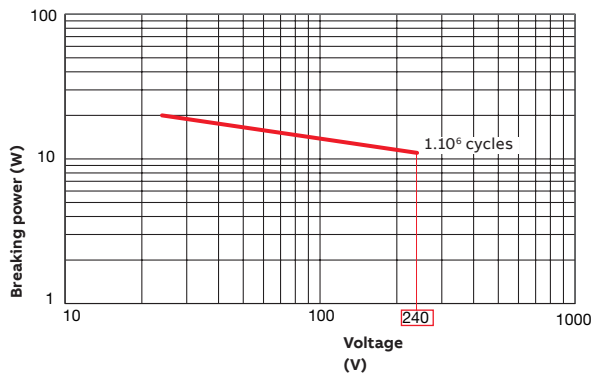
Connecting characteristics

| | |
|---|--|
| Connection capacity (min. ... max.) | |
|  Rigid Solid/Stranded | 1 x 1...2.5 mm ² 2 x 1...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² 2 x 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² (0.75 ... 1.5 mm ² with spring terminals) 2 x 0.75...1.5 mm ² (0.75 ... 1.5 mm ² 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/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 |
| 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/EN 60947-5-1: making and breaking current I_e and U_e .



Interlocks



Mechanical interlock units

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

| For contactors | Mounting | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|----------|------|------------|---------|-------------------|
|----------------|----------|------|------------|---------|-------------------|

Mechanical interlock units for two contactors mounted side by side

| | | | | | |
|-------------------------|--|--------|-----------------|----|-------|
| AFC09 ... AFC38...30-.. | | VM4 | 1SBN030105T1000 | 10 | 0.005 |
| AFC09 ... AFC38...40-00 | | | | | |
| AFC40 ... AFC96-30-.. | | VM96-4 | 1SBN033405T1000 | 10 | 0.006 |

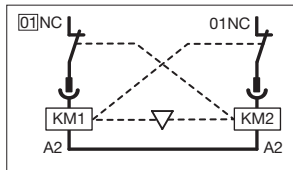
Note: Accessories limitation with VM96. Only use VM96-4 revision B and later.
 (1) For contactors AFC80, AFC96 mounted side by side, ambient temperature must remain <60°C
 (2) For VM4 use with AFC16-04-00, please see your ABB sales representative.

Mechanical and electrical interlock sets

VEM4 and VEM4K mechanical and electrical interlock sets for the respective interlocking of two AFC and AFC..K contactors.

VEM4(K) set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4(K) electrical interlock block with A2-A2 connection.

Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4(K) block must be used with A2-A2 connection to respect the electrical connection diagram.



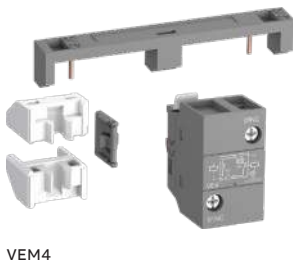
| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--------------------|------|------------|---------|-------------------|
| | | | | | |

Mechanical and electrical interlock set for AFC with screw terminals

| For same size contactors: | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|---------------------------|--------------------|------|-----------------|---------|----------------|
| AFC09 ... AFC16...30-.. | 0 2 | VEM4 | 1SBN030111R1000 | 1 | 0.035 |
| AFC26 ... AFC38...30-00 | | | | | |
| AFC09, AFC16...40-00 | | | | | |
| AFC26, AFC38...40-00 | | | | | |

Mechanical and electrical interlock set for AFC...K with Push-in Spring terminals

| | | | | | |
|-----------------------|----|-------|-----------------|---|-------|
| AFC09..K ... AFC16..K | 02 | VEM4K | 1SBN030113R1000 | 1 | 0.030 |
| AFC26..K ... AFC38..K | | | | | |



VEM4



VEM4K



BB4

Fixing clips

| | | | | |
|-----------------|-----|-----------------|----|-------|
| AFC09 ... AFC65 | BB4 | 1SBN110120W1000 | 50 | 0.002 |
|-----------------|-----|-----------------|----|-------|

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

Interlocks

Technical data

Mechanical interlock units

| Types | | VEM4, VM96 |
|-----------------------|-------------------------------------|-----------------------------|
| Mechanical durability | Number of operating cycles | 5 millions operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h |

Mechanical and electrical interlock sets








Contact utilization characteristics according to IEC









| Types | | VEM4, VEM4K |
|--|-------------------------------------|--------------------------------|
| Standards | | IEC 60947-5-1 and EN 60947-5-1 |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 690 V |
| Rated impulse withstand voltage U_{imp} . | | 6 kV |
| Pollution degree 3 | | |
| Rated control circuit voltage U_c | | |
| | AC 50 Hz control voltage | 24...240 V AC |
| | AC 60 Hz control voltage | 24...260 V AC |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 16 A |
| Mechanical durability | Number of operating cycles | 5 millions operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h |
| Electrical durability | Max. electrical switching frequency | 1200 cycles/h |

Contact utilization characteristics according to UL / CSA

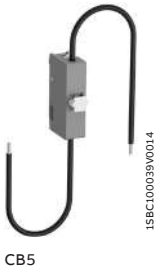
| Types | | VEM4 |
|--------------------------|--|--|
| Standards | | UL 60947-1, UL 60947-4-1, CSA C22.2 N° 60947-1, CSA C22.2 N° 60947-4-1 |
| Max. operational voltage | | 240 V 50 Hz, 260 V 60 Hz |

Connecting characteristics

| Types | | VEM4 |
|---|---------------------------------|--|
| Connection capacity (min. ... max.) | | |
|  | Rigid Solid/Stranded | 1 x 1...2.5 mm ² |
|  | | 2 x 1...2.5 mm ² |
|  | Flexible with ferrule | 1 x 0.75...2.5 mm ² |
|  | | 2 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² |
|  | | 2 x 0.75...1.5 mm ² |
|  | Lugs | L < 8 mm |
| Connection capacity acc. to UL / CSA | | 1 or 2 x AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

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

Impulse contact blocks



CB5

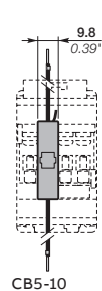
Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

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

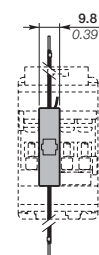
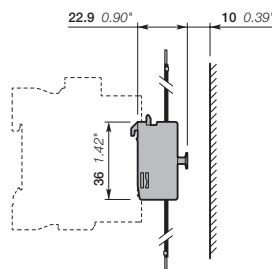
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

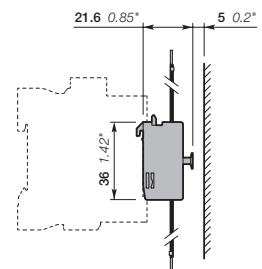
| For contactors | Contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|-----------------|----------|--------|-----------------|---------|----------------|
| | | | | | kg |
| AFC09 ... AFC96 | 1 - | CB5-10 | 15BN010013R1010 | 1 | 0.012 |
| | - 1 | CB5-01 | 15BN010013R1001 | 1 | 0.012 |



CB5-10

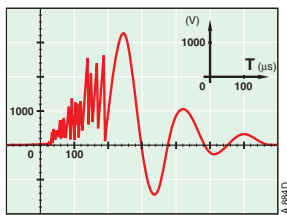


CB5-01



Main dimensions mm, inches

Surge suppressors for contactor coils



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

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

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



RV4-1/50

2TFH200007A1001



RC4-1/50

2TFH200007A1001

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

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

Surge suppressors for contactor coils

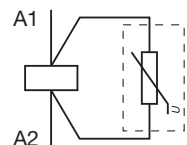
Technical data

| Varistor | RV4-1/50 | RV4-1/130 | RV4-1/260 | RV4-1/440 |
|--|---|---------------|----------------|------------------|
| Rated control circuit voltage U_c | 24...50 V AC | 50...130 V AC | 110...260 V AC | 260 ... 440 V AC |
| Residual overvoltage (clipping voltage) | 132 V AC | 270 V AC | 480 V AC | 900 V AC |
| Opening time growth factor | 1.1...1.5 | | | |
| Operating temperature | -20...+70 °C | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from U_{vdr} (1), thus voltage front up to this point. | | | |

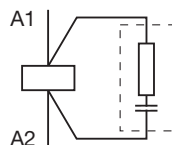
(1) U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$.

| RC type | RC4-1/50 | RC4-1/130 | RC4-1/260 | RV4-1/440 |
|--|---|---------------|----------------|------------------|
| Rated control circuit voltage U_c | 24...50 V AC | 50...130 V AC | 110...260 V AC | 260 ... 440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x U_c max. | | | |
| Opening time growth factor | 1.2...1.3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

Wiring diagrams



Varistor



RC type

Mechanical latching unit



WA4

1SBFC101058V0014

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

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

Operation

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

Contactor opening can be controlled:

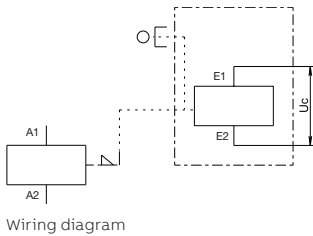
- electrically by an impulse (AC or DC) on the WA4 block coil (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WA4 block.

Mounting

The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).

The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

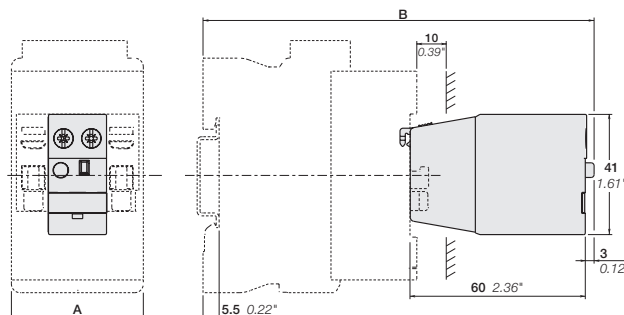
Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.



| For contactors and contactor relays | Rated control circuit voltage U _c | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------------------------|--|-----------|--------|-----------------|---------|----------------------|
| | V AC 50/60 Hz | V DC | | | | |
| AFC09 ... AFC38, 4-pole NFC | 24...60 | 24...60 | WA4-11 | 1SBN040100R1011 | 1 | 0.080 |
| | 48...130 | 48...130 | WA4-12 | 1SBN040100R1012 | 1 | 0.080 |
| | 100...250 | 100...250 | WA4-13 | 1SBN040100R1013 | 1 | 0.080 |
| | 250...500 | 250...500 | WA4-14 | 1SBN040100R1014 | 1 | 0.080 |

Mechanical latching unit for 24 V DC - 500 mA PLC control

| | | | | | | |
|-----------------------------|---|----|--------|-----------------|---|-------|
| AFC09 ... AFC38, 4-pole NFC | - | 24 | WA4-10 | 1SBN040100R1010 | 1 | 0.080 |
|-----------------------------|---|----|--------|-----------------|---|-------|



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

Main dimensions mm, inches








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

Mechanical latching unit

Technical data

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

Connecting characteristics

| | | |
|---|----------|------------------------------|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1 ... 2.5 mm ² |
|  Rigid solid | 2 x | 1 ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75 ... 1.5 mm ² |
|  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

1SBC100023V0014



LDC4K

1SBC100090V0014



BX4

1SBC100021V0014



BX4-CA

1SBC100023V0014

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|-------------------|
|----------------|------|------------|---------|-------------------|

Additional coil terminal blocks

Additional coil terminal blocks for a top and/or bottom access to the coil terminals of contactors or contactor relays.

With screw terminal

| | | | | |
|----------------------|------|-----------------|----|-------|
| AFC09 ... AFC96, NFC | LDC4 | 1SBN070156T1000 | 10 | 0.010 |
|----------------------|------|-----------------|----|-------|

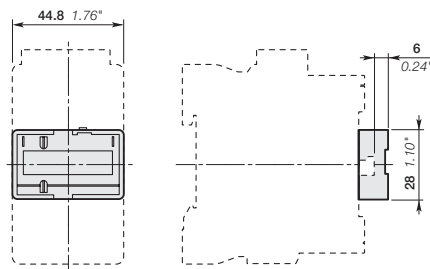
With Push-in Spring terminal

| | | | | |
|----------------------|-------|-----------------|----|-------|
| AFC09 ... AFC96, NFC | LDC4K | 1SBN070159T1000 | 10 | 0.010 |
|----------------------|-------|-----------------|----|-------|

Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

| | | | | |
|---|--------|-----------------|----|-------|
| AFC09 ... AFC96 1-stack contactors and NFC contactor relays | BX4 | 1SBN110108T1000 | 10 | 0.006 |
| 4-pole CA4, 2-pole CA4 , 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer | BX4-CA | 1SBN110109W1000 | 50 | 0.001 |



BX4

Main dimensions mm, inches

Other accessories



BP38-4



BDT4
For AFC09 ... AFC96, NFC



BA4

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|-------------------|
|----------------|------|------------|---------|-------------------|

Mounting piece for replacing installed contactors fixed by screws by AF contactors.

| From contactor | To contactor | | | | |
|-------------------------|-----------------|--------|-----------------|----|-------|
| A26 ... A40 | AFC09 ... AFC38 | BP38-4 | 1SBN112303T1000 | 10 | 0.003 |
| A50 ... A75 | AFC40 ... AFC65 | BP65-4 | 1SBN113403T1000 | 10 | 0.004 |
| A95, A7110, AF95, AF110 | AFC80 ... AFC96 | BP96-4 | 1SBN113903T1000 | 10 | 0.005 |

Test block

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

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

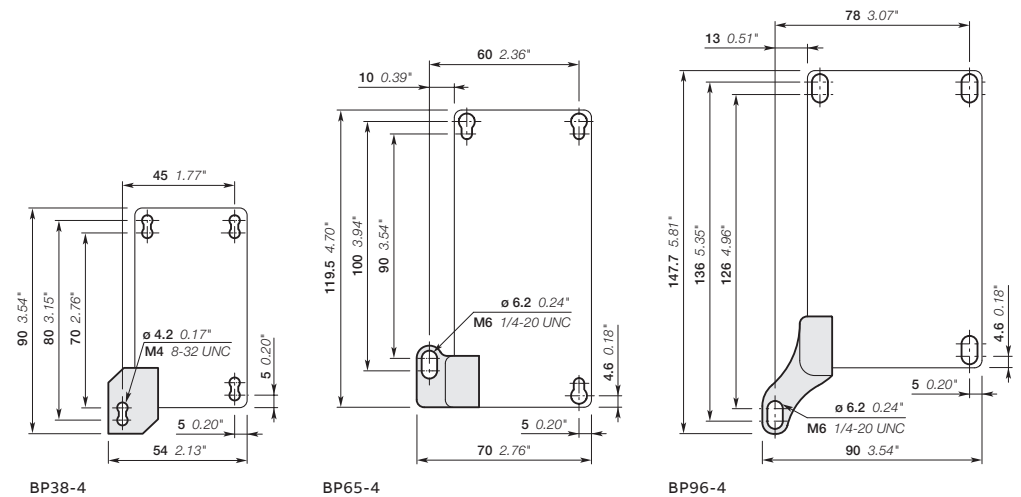
Function markers AFC09 ... AFC96

Function markers designed to be clipped onto the front face of the contactor, manual motor starter or overload relays to identify them. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.

Self-adhesive labels (not supplied) can also be added to them.

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

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



Main dimensions mm, inches

Additional terminal blocks



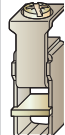




LD38-4

1SBN10038V0014

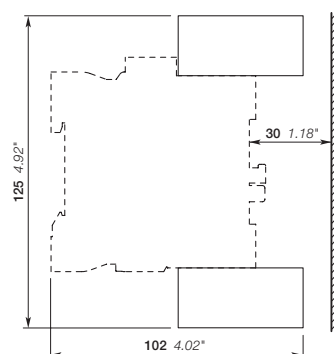
The LD terminal block is designed to increase the connecting capacity of 3-pole AFC26 ... AFC38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

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

Technical data

| Types | LD38-4 |
|---|---|
| Rated insulation voltage U_i 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 ($\leq 4 \text{ mm}^2$)  Stranded ($\geq 6 \text{ mm}^2$) | 1x 2.5...25 mm ² 1x 2.5...25 mm ² + 1x 2.5...16mm ² |
|  Flexible with non insulated ferrule  Flexible with insulated ferrule | 1x 2.5...16 mm ² 1x 2.5...16mm ² + 1x 2.5...10mm ² 1x 2.5...16mm ² 1x 2.5...16mm ² + 1x 2.5...10mm ² |
| 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 M5 |
| Main terminals | Screwdriver type Flat $\varnothing 6.5$ / Pozidriv 2 |

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



Main dimensions mm, inches

Terminals for control lead connections



LK96-4F

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

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

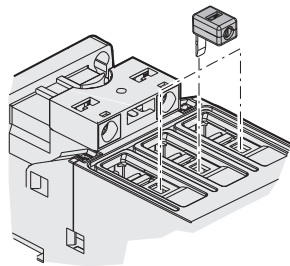
The LK96-4F is fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

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

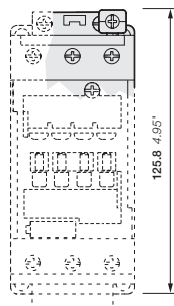
Note : LK96 not compatible with LT Terminal shrouds

Technical data

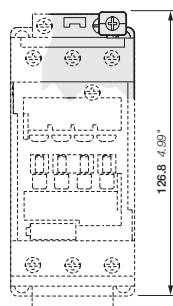
| Types | LK96-4F | |
|--|---|----------------------------|
| Connection capacity (min. ... max.) | | |
| Rigid | 1 x | 1...2.5 mm ² |
| | 2 x | 1...2.5 mm ² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...1.5 mm ² |
| 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 M3.5 | |
| All terminals | | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | |



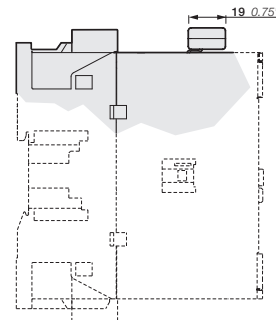
LK positioning



AFC40, AFC52, AFC65 + LK96-4F



AFC80, AFC96 + LK96-4F



Main dimensions mm, inches

Terminal connecting strips and shorting bars

02



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).

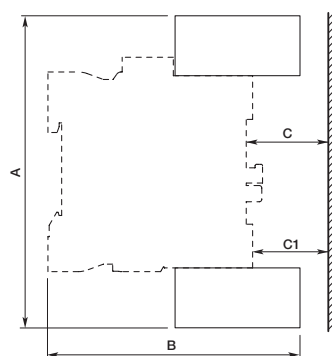


| Types | for connection of "n" poles | with terminal | insulated |
|-------|--|---------------|-----------|
| LP | n = 2 | no | no (1) |
| LY | n = 2 (secable LY16-4, LY38-4 connecting strips) | no | yes |
| | n = 3 | no | yes (1) |
| LH | n = 2 | yes | no |
| LF | n = 3 | yes | yes |
| LG | n = 4 | 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 mm ² | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--|---------|-----------|---------|---|--------|-----------------|---------|----------------------|
| | in parallel | | in series | | | | | | |
| | 2 poles | 3 poles | 4 poles | 2 poles | | | | | |
| AFC09 | 30 | 33 | - | 25 | 6 | LY16-4 | 1SBN071303T1000 | 10 | 0.006 |
| AFC12 | 32 | 36 | - | 27 | | | | | |
| AFC16 | 34 | 40 | - | 30 | | | | | |
| AFC26 | 50 | 60 | - | 45 | 10 | LY38-4 | 1SBN072303T1000 | 10 | 0.012 |
| AFC09 | 45 | - | - | - | 10 | LH38-4 | 1SBN072304R1000 | 2 | 0.012 |
| AFC12 | 50 | - | - | - | 10 | | | | |
| AFC16 | 54 | - | - | - | 16 | | | | |
| AFC26 | 81 | - | - | - | 25 | | | | |
| AFC30, AFC38 | 90 | - | - | - | 25 | | | | |
| AFC09 | - | 62 | - | - | 16 | | | | |
| AFC12 | - | 70 | - | - | 25 | | | | |
| AFC16 | - | 75 | - | - | 25 | | | | |
| AFC26 | - | 112 | - | - | 35 | | | | |
| AFC30, AFC38 | - | 125 | - | - | 50 | LF38-4 | 1SBN072305R1000 | 2 | 0.040 |
| AFC09 | - | - | 70 | - | 25 | LG16-4 | 1SBN071306R1000 | 2 | 0.025 |
| AFC12 | - | - | 78 | - | 25 | | | | |
| AFC16 | - | - | 84 | - | 25 | | | | |



Main dimensions

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

Connection accessories for starting solutions



BEA16-4

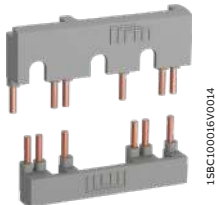
Connecting links with manual motor starters

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

| For 3-pole contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|---|-------------|-----------------|---------|-------------------|
| AFC09 ... AFC16 | MS116-0.16 ... MS116-25, MS132-0.16... MS132-25 | BEA16-4 | 1SBN081306T1000 | 10 | 0.025 |
| AFC26 ... AFC38 | MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10 | BEA26-4 | 1SBN082306T1000 | 10 | 0.025 |
| | | BEA38-4 | 1SBN082306T2000 | 10 | 0.030 |
| AFC40 ... AFC65 | MS165-16 ... MS165-65 | BEA65-4 | 1SBN083406R1000 | 1 | 0.090 |
| | MS165-16 ... MS165-65 (1) | BPR65-4 (2) | 1SBN113405R1000 | 1 | 0.014 |

(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

(2) Use one BPR65-4 for each contactor AFC40 ... AFC65.

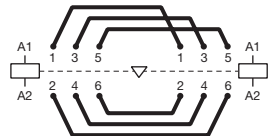


BER16-4

Connection sets for reversing contactors

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

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



BER
Reversing connections



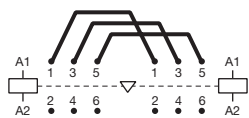
BEP16-30

Phase to phase connections

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

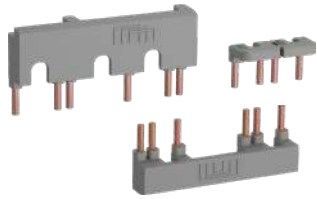
| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|------|------------|---------|-------------------|
| 3-pole contactors | | | | |

| | | | | |
|-----------------|----------|-----------------|---|-------|
| AFC09 ... AFC16 | BEP16-30 | 1SBN081314R1000 | 1 | 0.025 |
| AFC26 ... AFC38 | BEP38-30 | 1SBN082314R1000 | 1 | 0.050 |



BEP
3-pole phase to phase connections

Connection accessories for starting solutions



BEY16-4

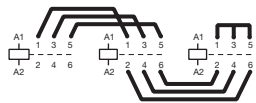
1SBCE00018V/0014

Connection sets for star-delta starter

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

The connection sets are made up of:

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



AFC09 ... AFC96
Line-delta-star connection

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

Connection accessories for starting solutions with Push-in Spring terminals



BEA16-4KF

Connecting links with manual motor starters

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

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

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



BER16-4KF

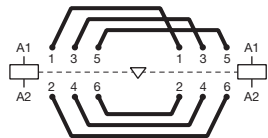
Connection sets for reversing contactors

The BER...-4KF connection sets are used to connect the main poles of two 3-pole AFC09..K ... AFC38..K contactors mounted side by side.

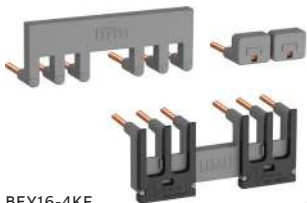
The connection sets are made up of:

- 1 upstream and 1 downstream connections
- Insulated, solid copper bars
- Black fork pieces for a quick dismounting of reversing contactors.

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



BER
Reversing connections



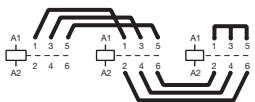
BEY16-4KF

Connection sets for star-delta starter

The BEY...-4KF connection sets are used to connect the main poles of the Line, Delta and Star AFC09..K ... AFC38..K contactors of a star-delta starter.

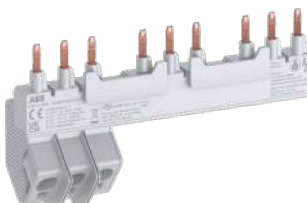
The connection sets are made up of:

- Line contactor / delta contactor: upstream phase-to-phase connection
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar
- Black fork pieces for a quick dismounting of reversing contactors.



BEY
Line-delta-star connection

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



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

Busbars with Push-in Spring terminals

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



Contactors and contactor relays

Terminal marking and positioning, Dimensions

Terminal marking and positioning

- 2/100** AFC 3-pole contactors
- 2/102** AFC 4-pole contactors
- 2/103** Add-on auxiliary contacts for AFC09 ... AFC96 contactors
- 2/104** NFC contactor relays

Dimensions

- 2/107** AFC, AFC..K 3-pole contactors
- 2/117** AFC 4-pole contactors
- 2/125** NFC contactor relays
- 2/126** NFC..K contactor relays - with Push-in Spring terminals



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

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

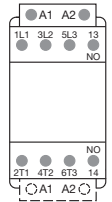
AFC09 ... AFC96 3-pole contactors

Terminal marking and positioning

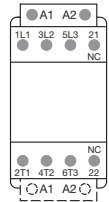
02

AFC09 ... AFC96 contactors

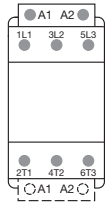
Standard devices without addition of auxiliary contacts



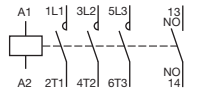
AFC09 ... AFC16-30-10 (1)



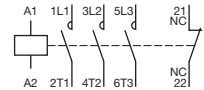
AFC09 ... AFC16-30-01 (1)



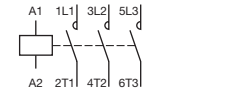
AFC26 ... AFC96-30-00 (1)



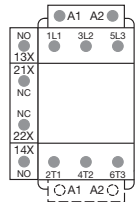
AFC09 ... AFC16-30-10 (1)



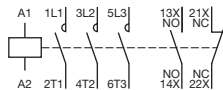
AFC09 ... AFC16-30-01 (1)



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



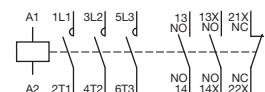
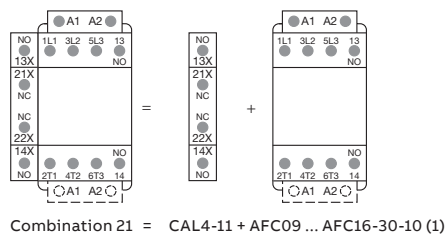
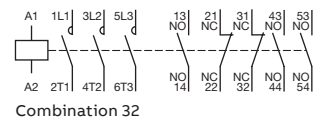
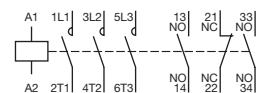
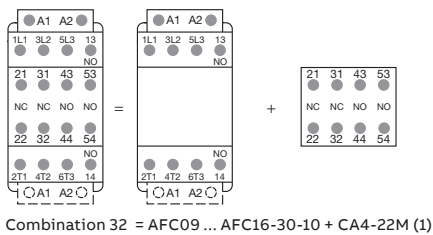
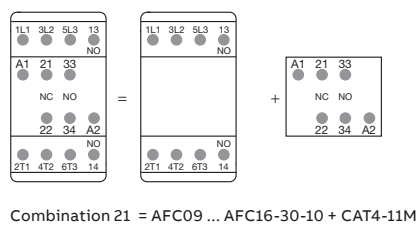
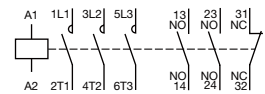
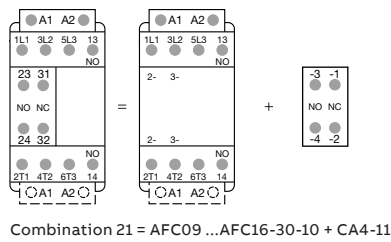
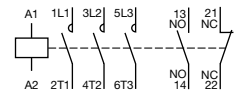
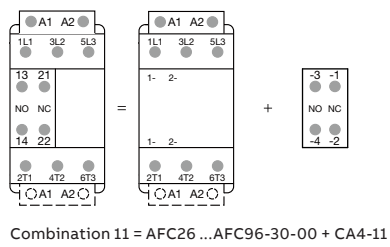
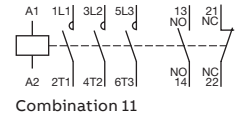
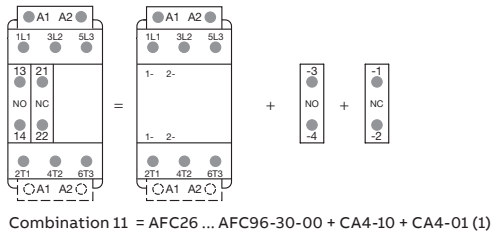
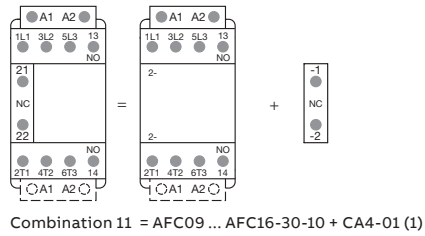
AFC40 ... AFC96-30-11



AFC40 ... AFC96-30-11

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

Other possible contact combinations with auxiliary contacts added by the user



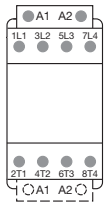
(1) For AFC09..K ... AFC38..K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

AFC09 ... AFC80 4-pole contactors

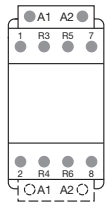
Terminal marking and positioning

AFC09 ... AFC80 contactors - AC operated

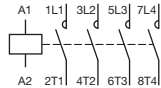
Standard devices without addition of auxiliary contacts



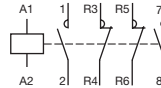
AFC09 ... AFC80-40-00



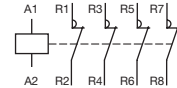
AFC09 ... AFC80-22-00



AFC09 ... AFC80-40-00

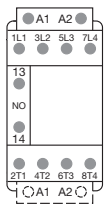


AFC09 ... AFC80-22-00

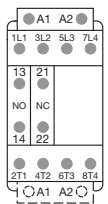
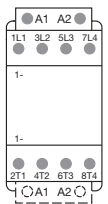


AFC16-04-00

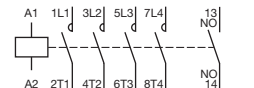
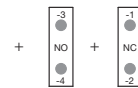
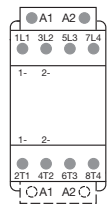
Other possible contact combinations with auxiliary contacts added by the user



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



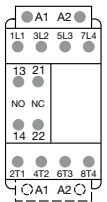
Combination 11 = AFC09 ... AFC80-40-00 + CA4-10 + CA4-01



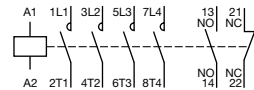
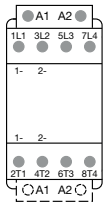
Combination 10



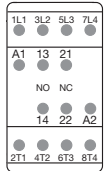
Combination 11



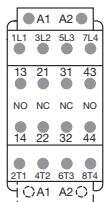
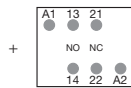
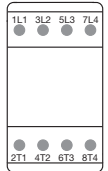
Combination 11 = AFC09...AFC80-40-00 + CA4-11



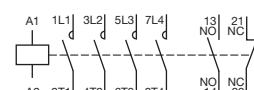
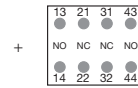
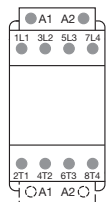
Combination 11



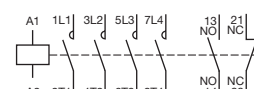
Combination 11 = AFC09 ... AFC80-40-00 + CAT4-11E



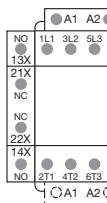
Combination 22 = AFC09 ... AFC80-40-00 + CA4-22E



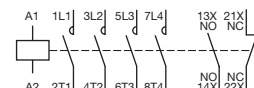
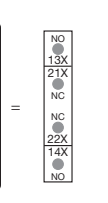
Combination 11



Combination 22



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

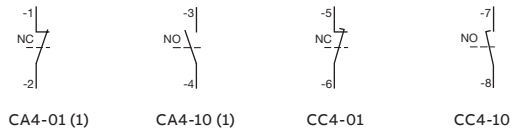


Combination 11

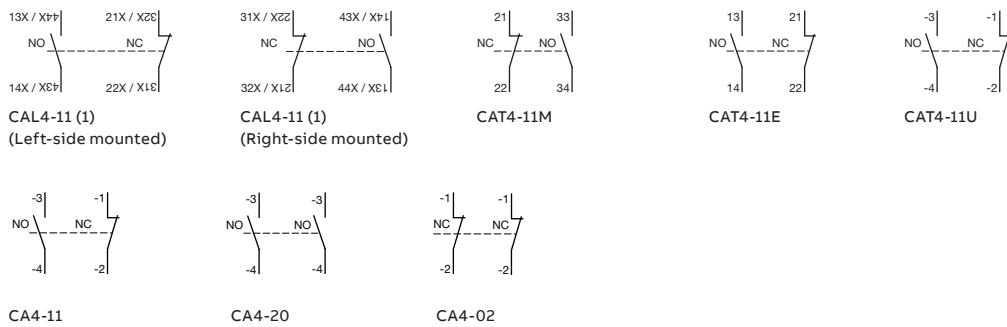
Add-on auxiliary contacts for AFC09 ... AFC96 contactors

Terminal marking and positioning

1-pole auxiliary contacts



2-pole auxiliary contacts



4-pole auxiliary contacts

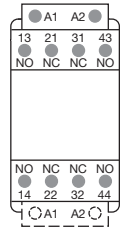


(1) available with Push-in Spring terminals

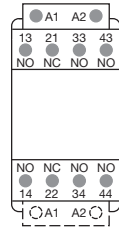
NFC contactor relays

Terminal marking and positioning

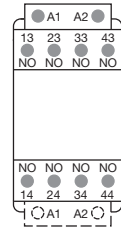
Standard devices without addition of auxiliary contacts



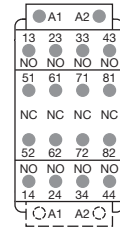
NFC22E



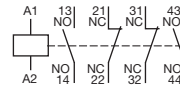
NFC31E



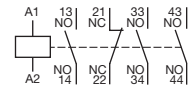
NFC40E



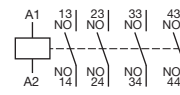
NFC44E



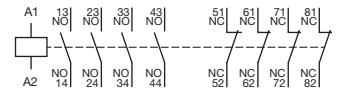
NFC22E



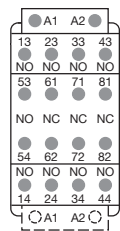
NFC31E



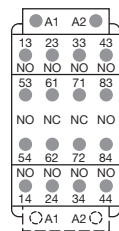
NFC40E



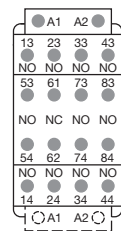
NFC44E



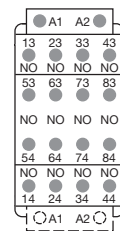
NFC53E



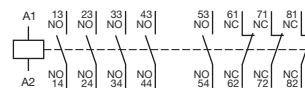
NFC62E



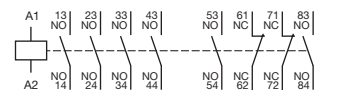
NFC71E



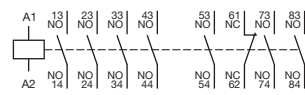
NFC80E



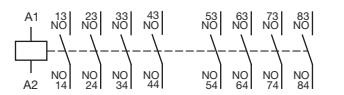
NFC53E



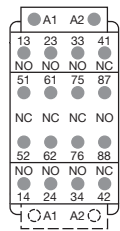
NFC62E



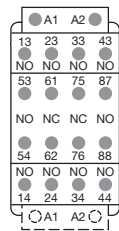
NFC71E



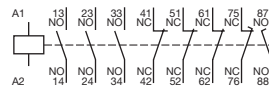
NFC80E



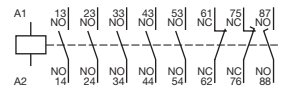
NFC..33/11



NFC..51/11



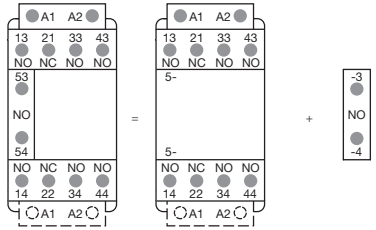
NF..33/11



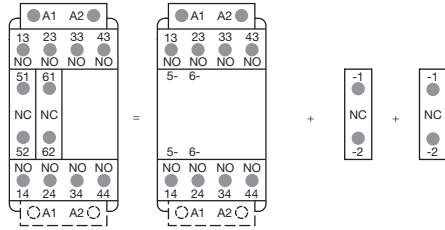
NF..51/11

02

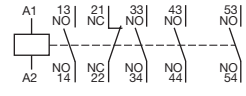
Other possible contact combinations with auxiliary contacts added by the user



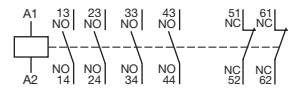
Combination 41 = NFC31E + CA4-10



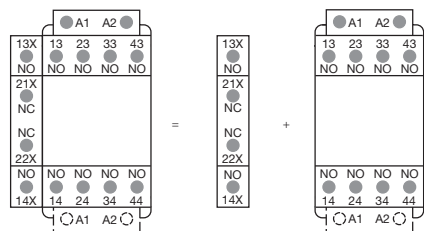
Combination 42 = NFC40E + CA4-01+CA4-01



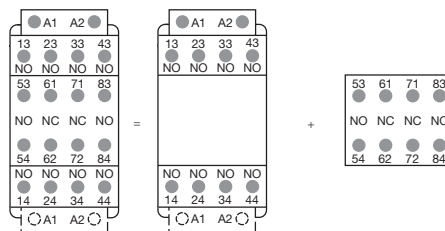
Combination 41 E



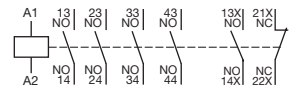
Combination 42 E



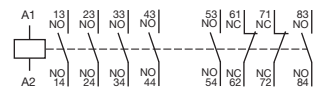
Combination 51 = CAL4-11 + NFC40E



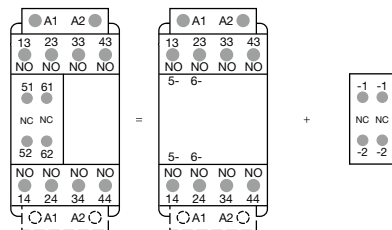
Combination 62 = NFC40E + CA4-22N



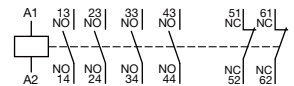
Combination 51 E



Combination 62 E



Combination 42 = NFC40E + CA4-02



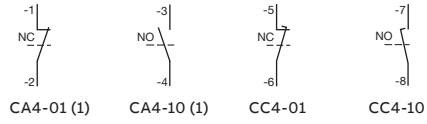
Combination 42 E

NFC add-on auxiliary contacts

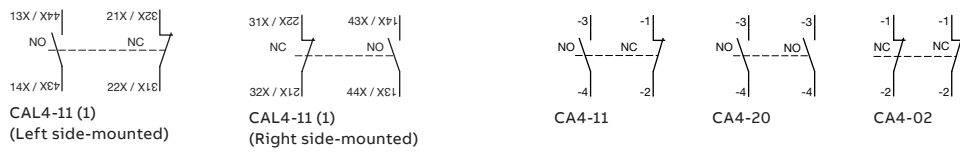
Terminal marking and positioning

02

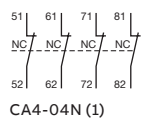
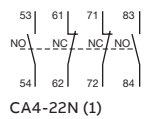
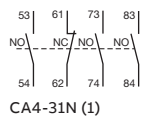
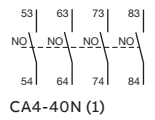
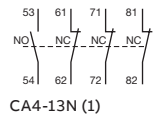
1-pole auxiliary contacts



2-pole auxiliary contacts



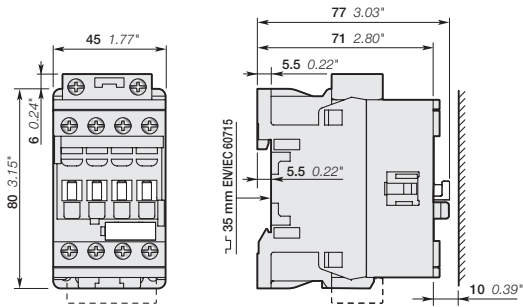
4-pole auxiliary contacts



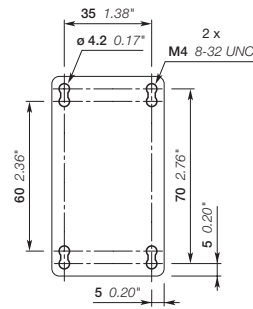
(1) Available with Push-in Spring terminals.

AFC09, AFC12, AFC16 3-pole contactors

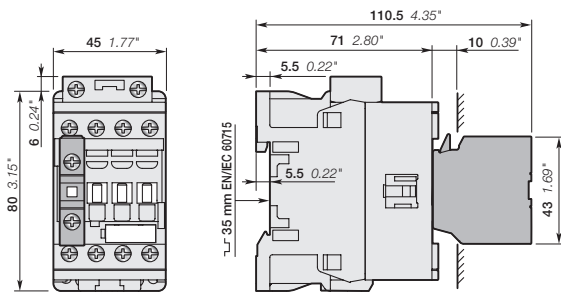
Dimensions



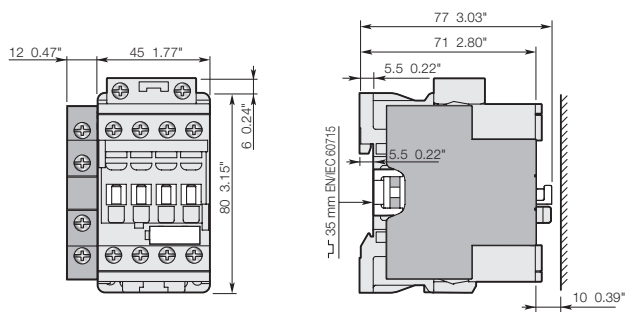
AFC09, AFC12, AFC16



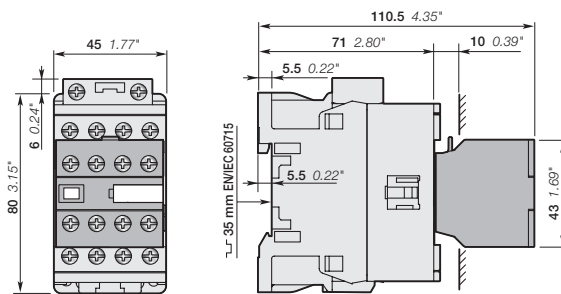
AFC09, AFC12, AFC16



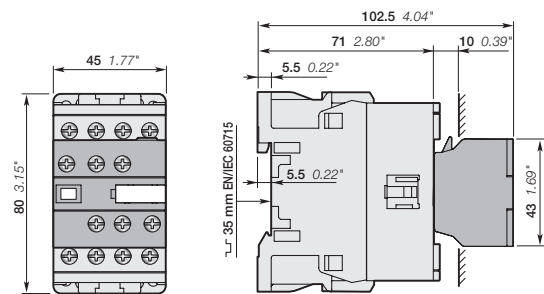
AFC09, AFC12, AFC16
+ CA4, CC4 1-pole auxiliary contact block



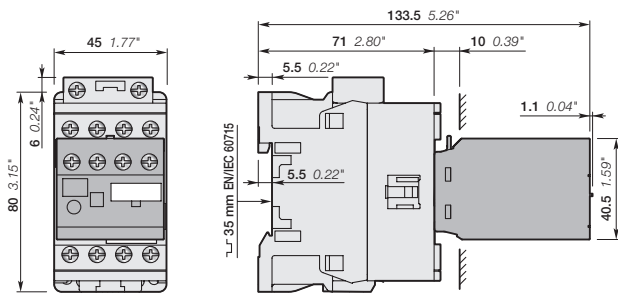
AFC09, AFC12, AFC16
+ CAL4-11 2-pole auxiliary contact block



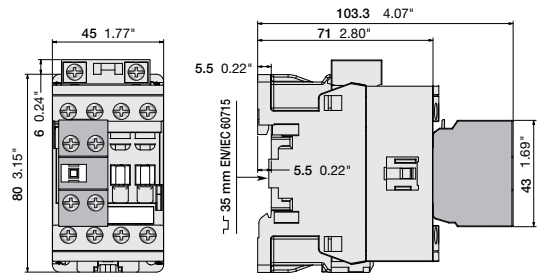
AFC09, AFC12, AFC16
+ CA4 4-pole auxiliary contact block



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



AFC09, AFC12, AFC16
+ TEF4 electronic timer



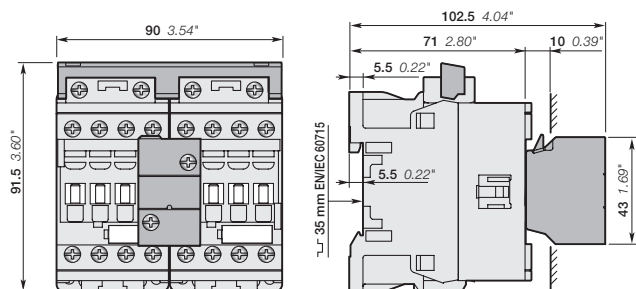
AFC09, AFC12, AFC16
+ CA4 2-pole auxiliary contact

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

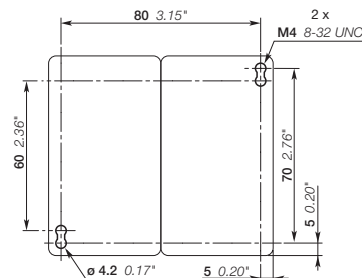
AFC09, AFC12, AFC16 3-pole contactors

Dimensions

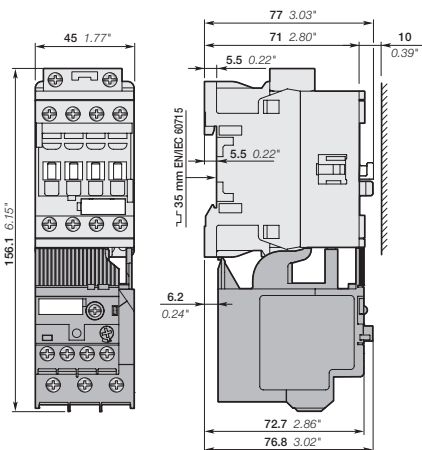
02



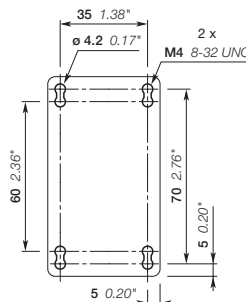
AFC09, AFC12, AFC16
+ VEM4 mechanical and electrical interlock set



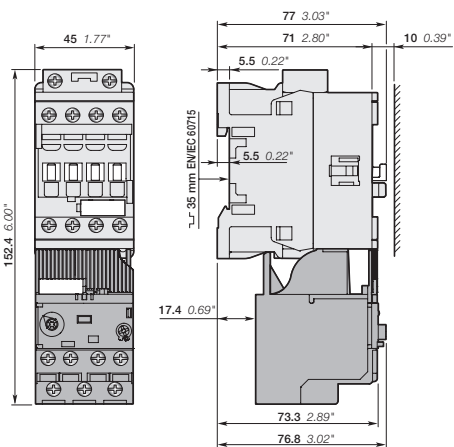
AFC09, AFC12, AFC16
+ VEM4 mechanical and electrical interlock set



AFC09, AFC12, AFC16
+ TF42 thermal overload relay



AFC09, AFC12, AFC16
+ TF42, EF19

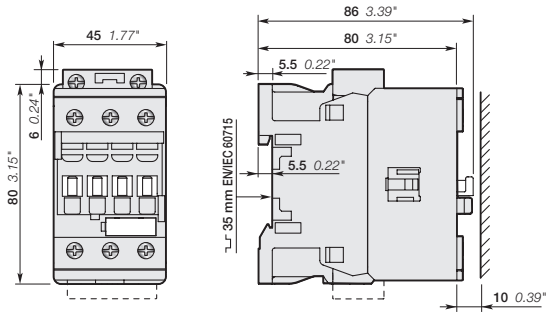


AFC09, AFC12, AFC16 3-pole contactors
+ EF19 electronic overload relay

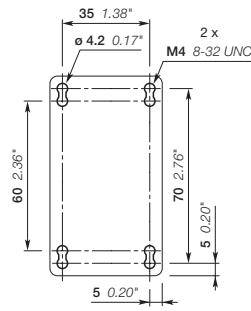
(1) Note: For AFC09 ... AFC16 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

AFC26, AFC30, AFC38 3-pole contactors

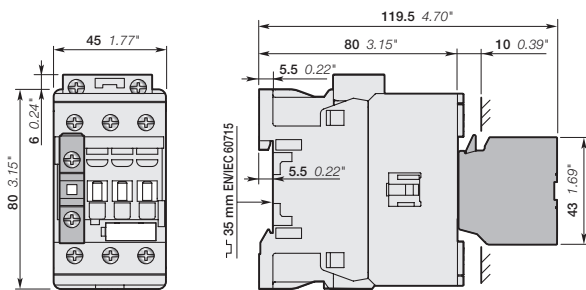
Dimensions



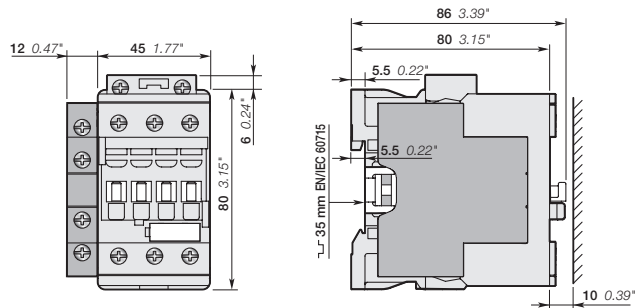
AFC26, AFC30, AFC38



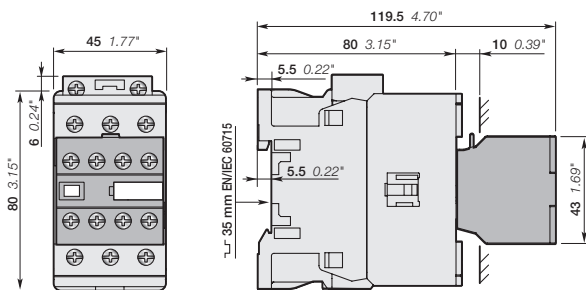
AFC26, AFC30, AFC38



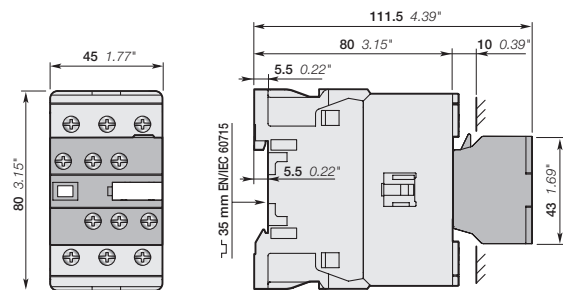
AFC26, AFC30, AFC38
+ CA4, CC4 1-pole auxiliary contact block



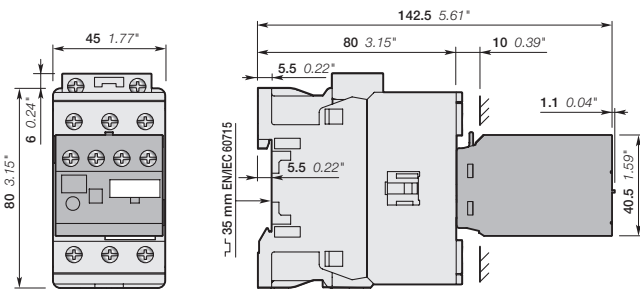
AFC26, AFC30, AFC38
+ CAL4-11 2-pole auxiliary contact block



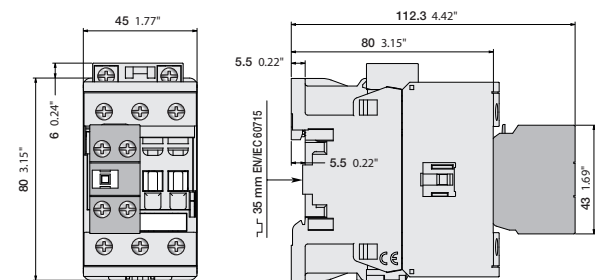
AFC26, AFC30, AFC38
+ CA4 4-pole auxiliary contact block



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



AFC26, AFC30, AFC38
+ TEF4 electronic timer



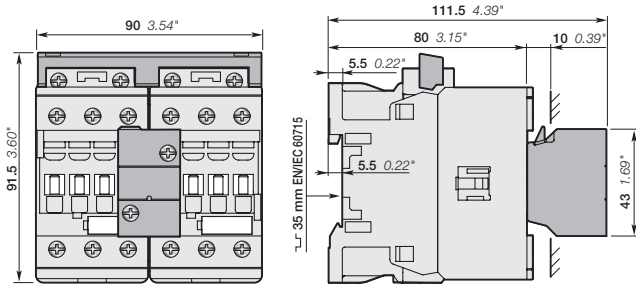
AFC26, AFC30, AFC38
+ CA4 2-pole auxiliary contact

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

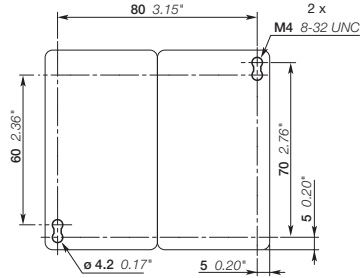
AFC26, AFC30, AFC38 3-pole contactors

Dimensions

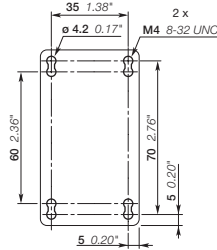
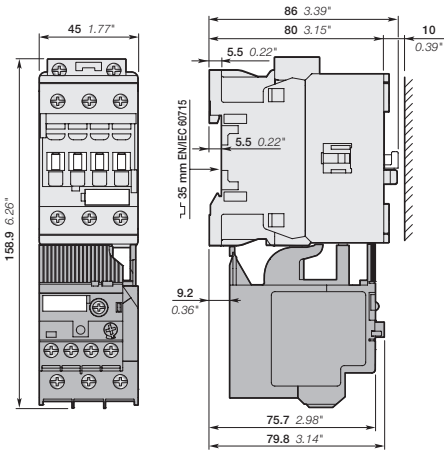
02



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

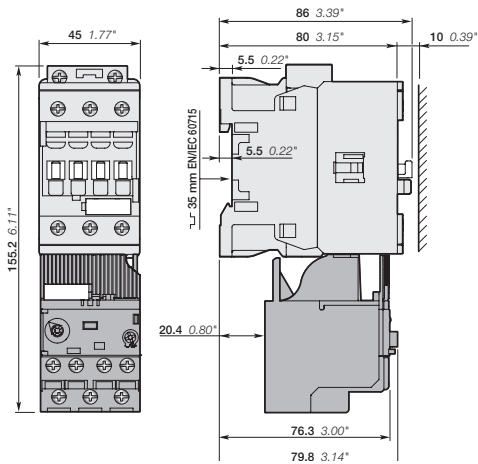


AFC26, AFC30, AFC38
+ VEM4 mechanical and electrical interlock set

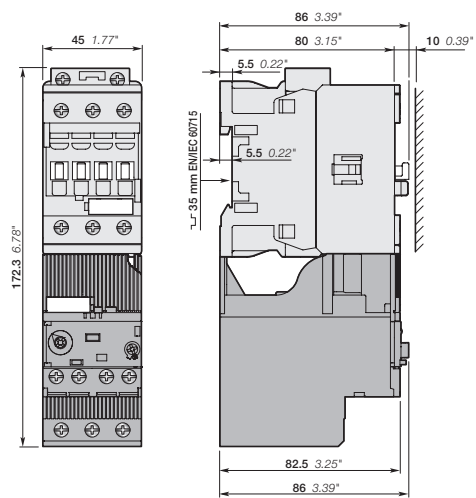


AFC26, AFC30, AFC38
+ TF42, EF19, EF45

AFC26, AFC30, AFC38
+ TF42 thermal overload relay



AFC26 3-pole contactors
+ EF19 electronic overload relay

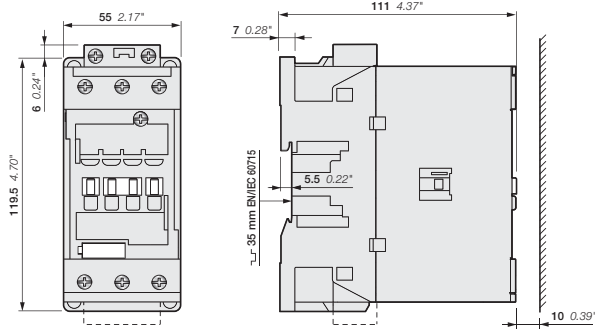


AFC26, AFC30, AFC38 3-pole contactors
+ EF45 electronic overload relay

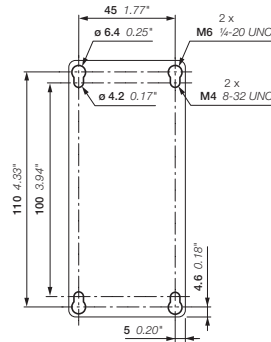
(1) Note: For AFC26 ... AFC38 contactors, lateral distance to grounded component 2 mm (0.08 inches) min.
Note: Use of surge suppressor increase the total height by 8mm

AFC40 ... AFC65 3-pole contactors

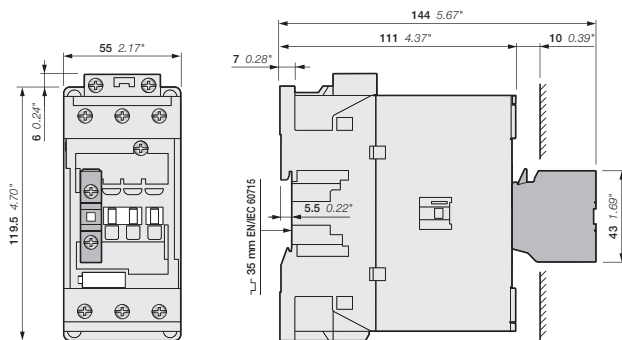
Dimensions



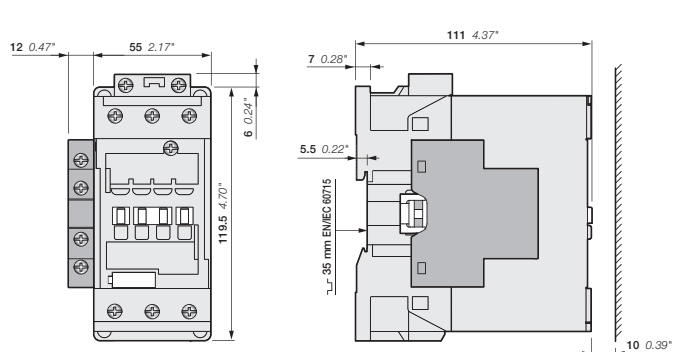
AFC40, AFC52, AFC65



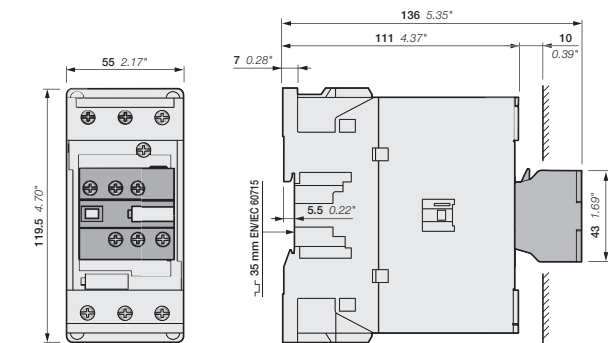
AFC40, AFC52, AFC65



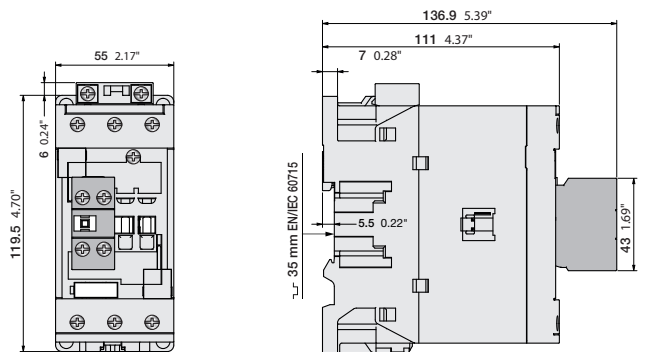
AFC40, AFC52, AFC65
+ CA4, CC4 1-pole auxiliary contact block



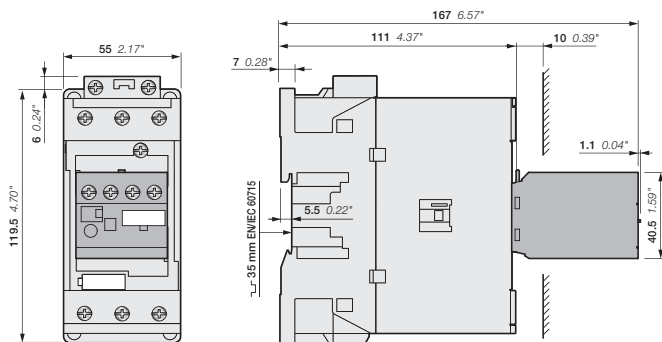
AFC40, AFC52, AFC65-30-00 + CAL4-11 2-pole auxiliary contact block
AFC40, AFC52, AFC65-30-11



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



AFC40, AFC52, AFC65
+ CA4 2-pole auxiliary contact



AFC40, AFC52, AFC65
+ TEF4 electronic timer

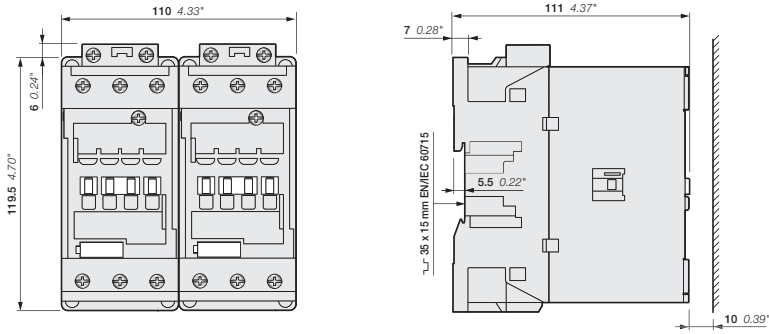
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

Main dimensions mm, inches

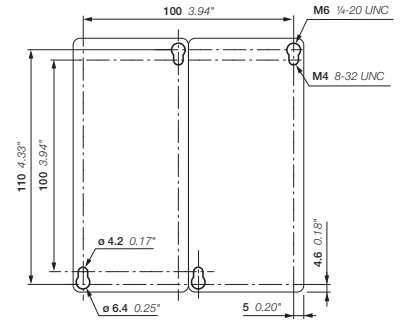
AFC40 ... AFC65 3-pole contactors

Dimensions

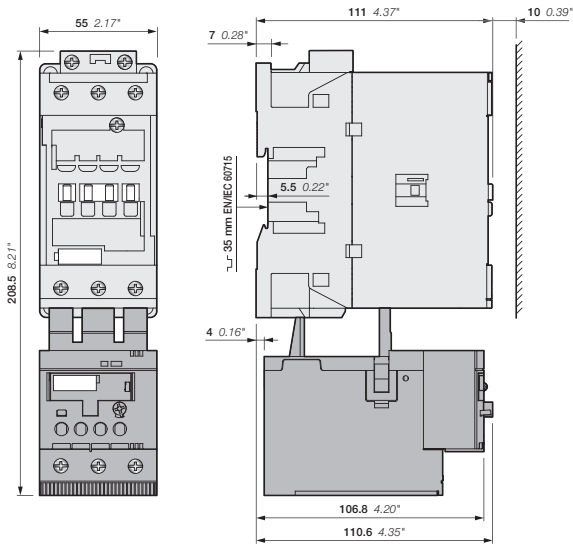
02



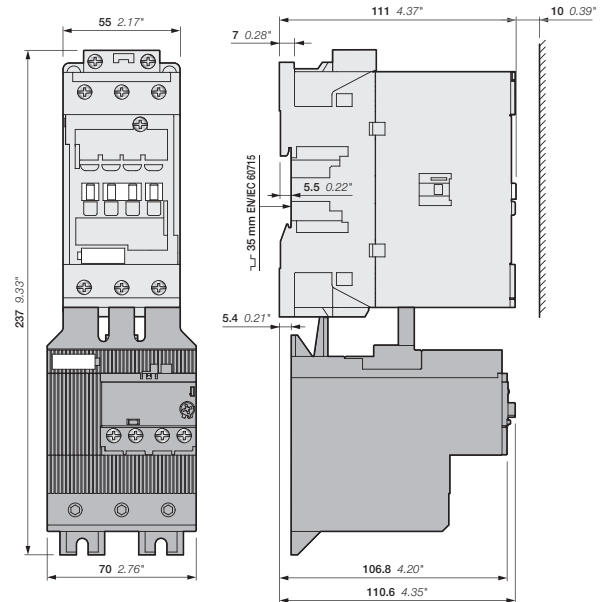
AFC40, AFC52, AFC65
+ VM96-4 mechanical interlock unit



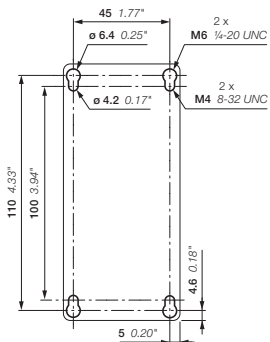
AFC40, AFC52, AFC65
+ VM96-4 mechanical interlock set



AFC40, AFC52, AFC65
+ TF65 thermal overload relay



AFC40, AFC52, AFC65
+ EF65 electronic overload relay

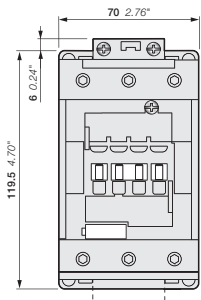


AFC40, AFC52, AFC65
+ TF65, EF65

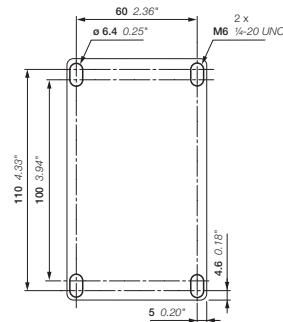
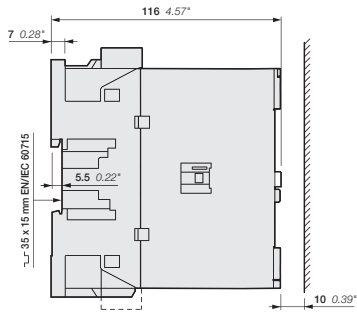
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

AFC80 ... AFC96 3-pole contactors

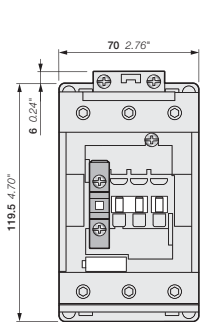
Dimensions



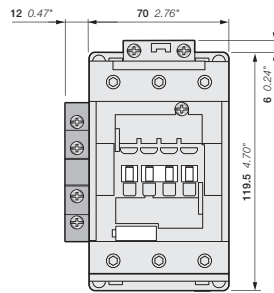
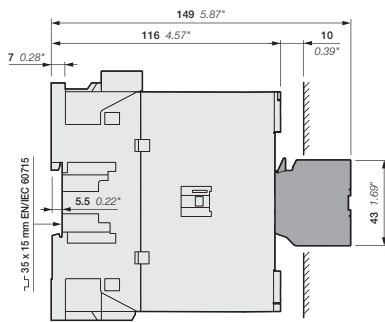
AFC80, AFC96



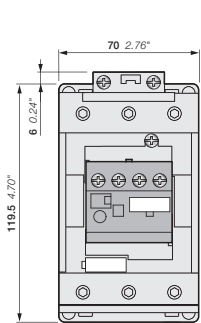
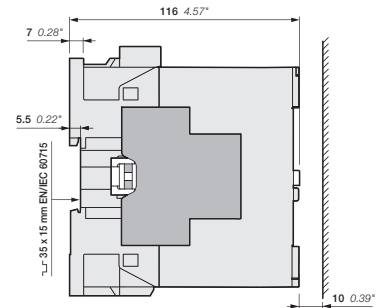
AFC80, AFC96



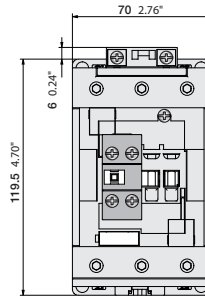
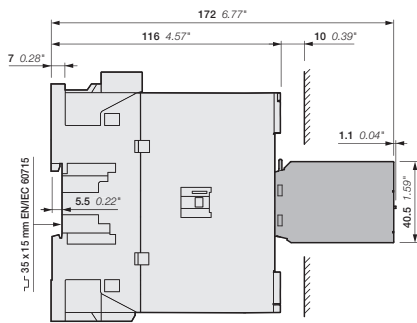
AFC80, AFC96
+ CA4, CC4 1-pole auxiliary contact block



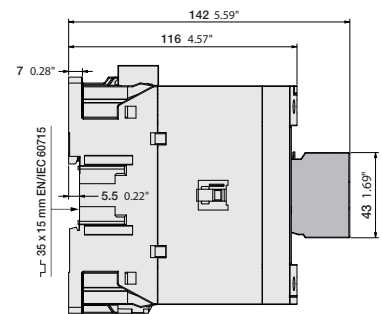
AFC80, AFC96-30-00 + CAL4-11 2-pole auxiliary contact block
AFC80, AFC96-30-11



AFC80, AFC96
+ TEF4 electronic timer



AFC80, AFC96
+ CA4 2-pole auxiliary contact

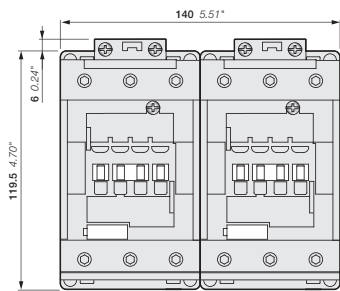


Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

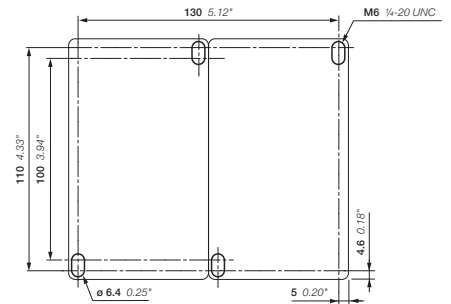
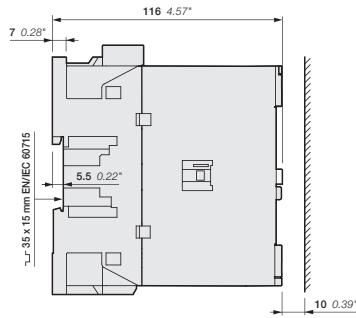
AFC80 ... AFC96 3-pole contactors

Dimensions

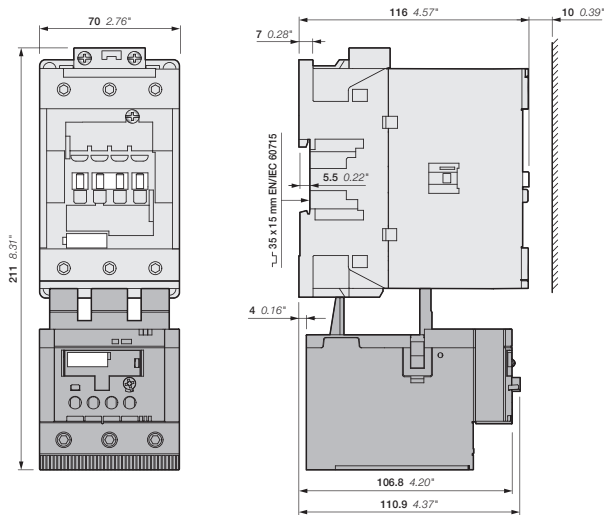
02



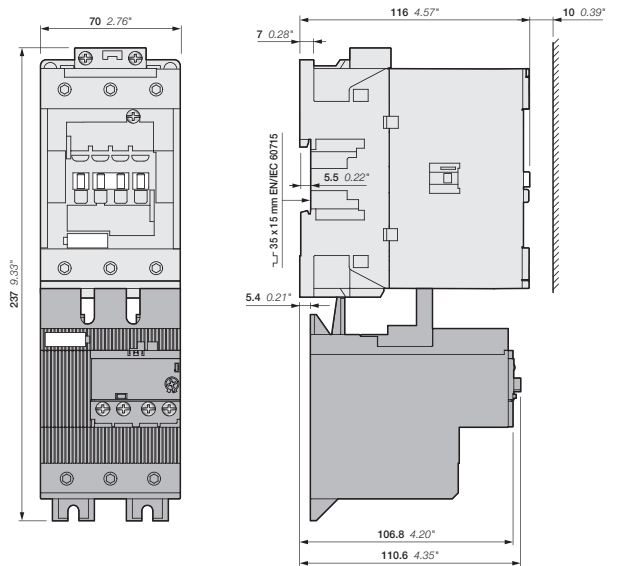
AFC80, AFC96
+ VM96-4 mechanical interlock unit



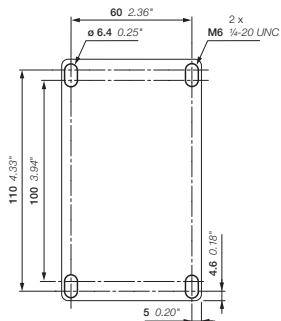
AFC80, AFC96
+ VM96-4 mechanical interlock set



AFC80, AFC96
+ TF96 thermal overload relay



AFC80, AFC96
+ EF96 electronic overload relay

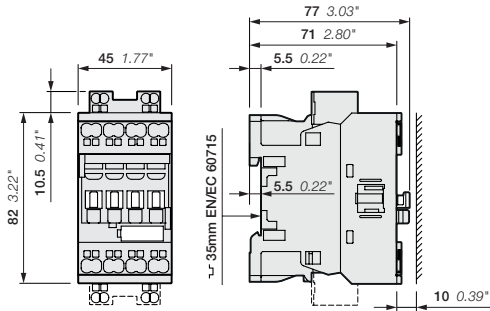


AFC80, AFC96
+ TF96, EF96

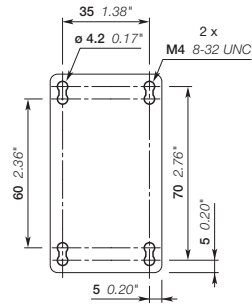
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

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

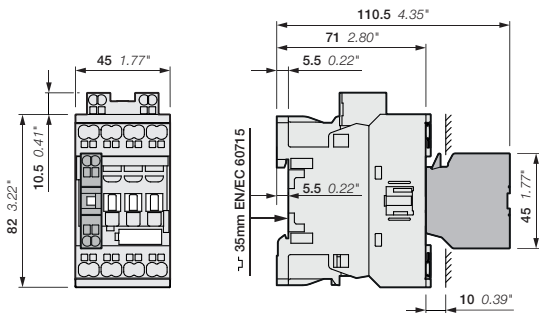
Dimensions



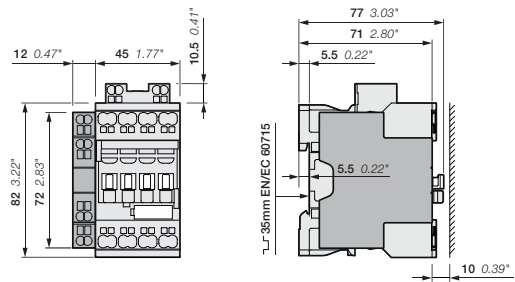
AFC09..K, AFC12..K, AFC16..K



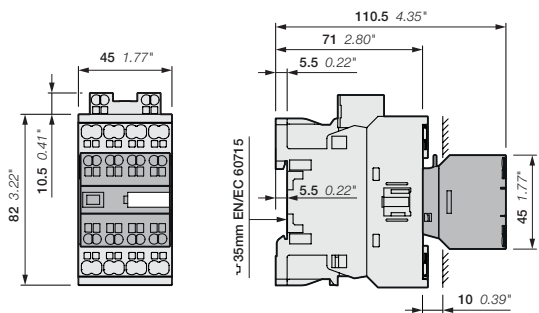
AFC09..K, AFC12..K, AFC16..K



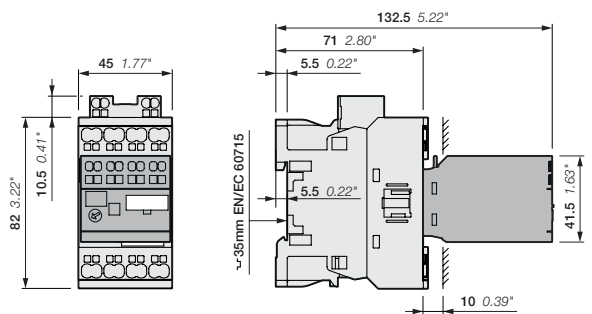
AFC09..K, AFC12..K, AFC16..K
+ CA4..K 1-pole auxiliary contact block



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



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



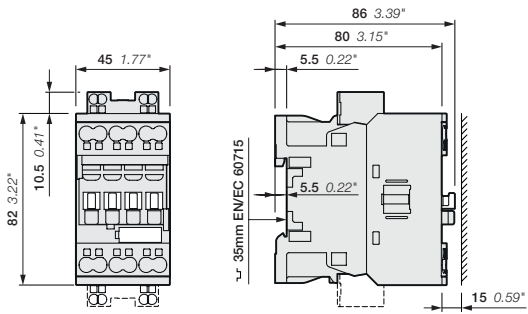
AFC09..K, AFC12..K, AFC16..K
+ TEF4S electronic timer

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

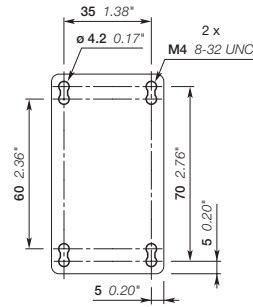
AFC26..K, AFC30..K, AFC38..K 3-pole contactors - with Push-in Spring terminals

Dimensions

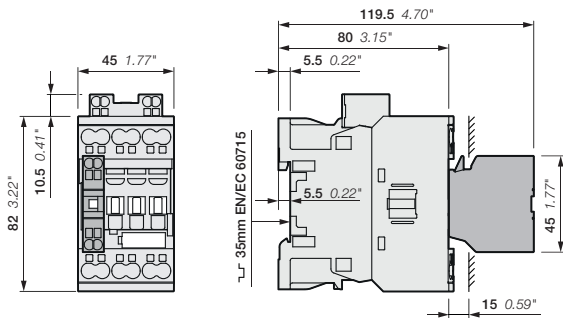
20



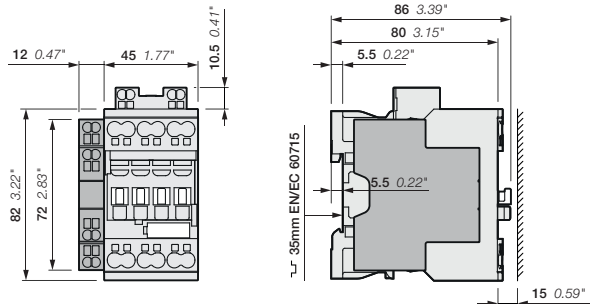
AFC26..K, AFC30..K, AFC38..K



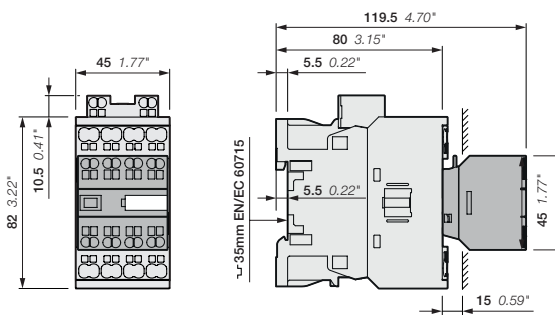
AFC26..K, AFC30..K, AFC38..K



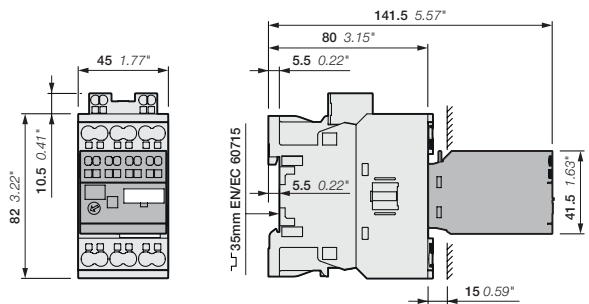
AFC26..K, AFC30..K, AFC38..K
+ CA4..K 1-pole auxiliary contact block



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



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

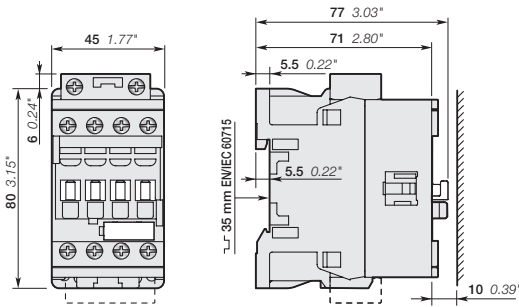


AFC26..K, AFC30..K, AFC38..K
+ TEF45 electronic timer

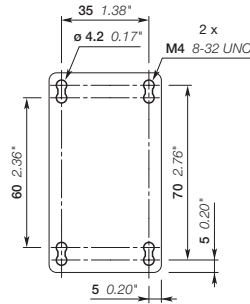
Note: For AFC26..K ... AFC38..K contactors, lateral distance to grounded component 2 mm 0.08" min
Note : Use of surge suppressor increase the total height by 8mm

AFC09, AFC16 4-pole contactors

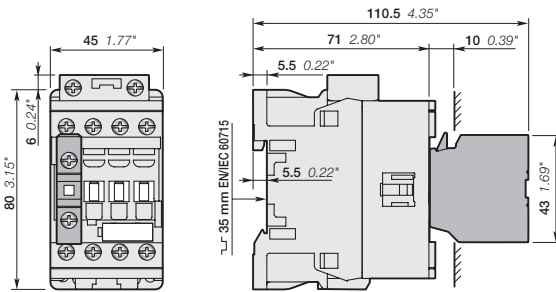
Dimensions



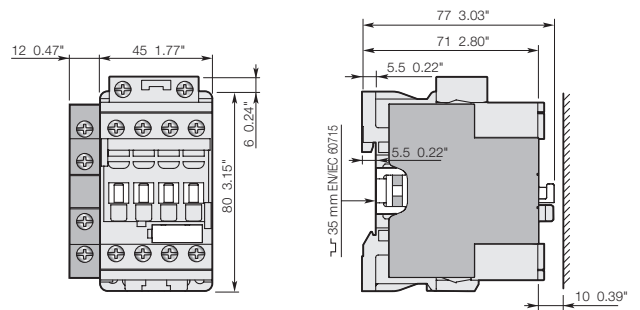
AFC09, AFC16



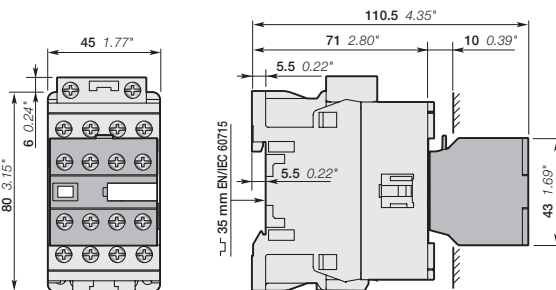
AFC09, AFC16



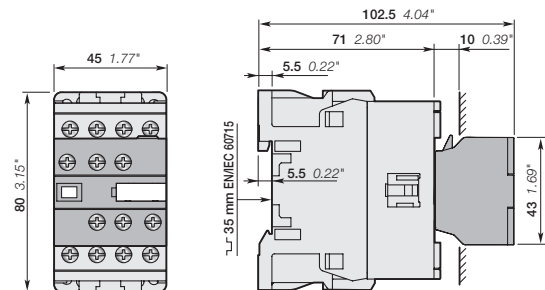
AFC09, AFC16
+ CA4, CC4 1-pole auxiliary contact block



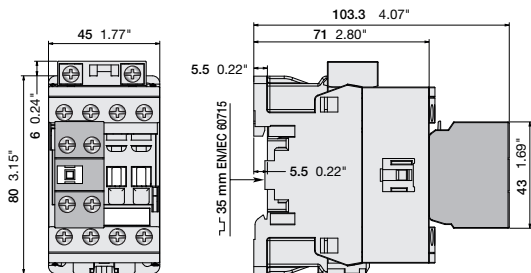
AFC09, AFC16
+ CAL4-11 2-pole auxiliary contact block



AFC09, AFC16
+ CA4 4-pole auxiliary contact block



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

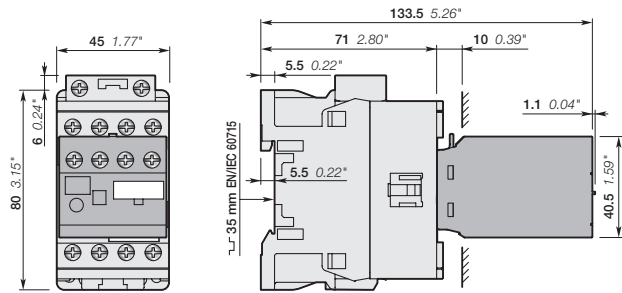


AFC09, AFC16
+ CA4 2-pole auxiliary contact

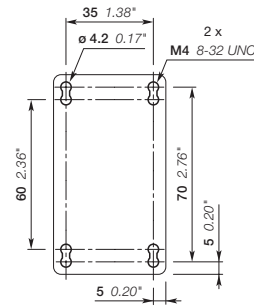
(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

AFC09, AFC16 4-pole contactors

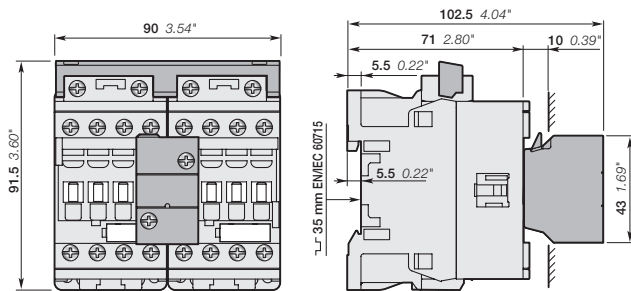
Dimensions



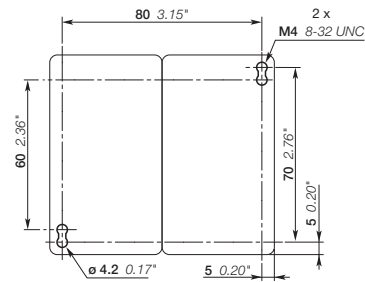
AFC09, AFC16
+ TE4 electronic timer



AFC09, AFC16



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

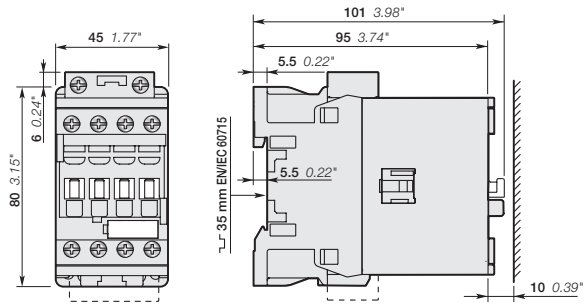


AFC09-40-00, AFC16-40-00
+ VEM4 mechanical and electrical interlock set

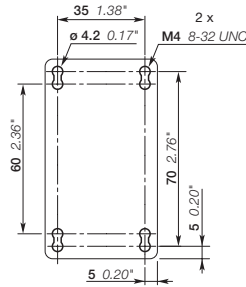
(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
Note: Use of surge suppressor increase the total height by 8mm

AFC26, AFC38 4-pole contactors

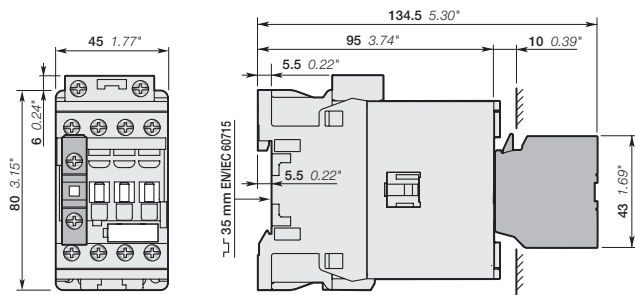
Dimensions



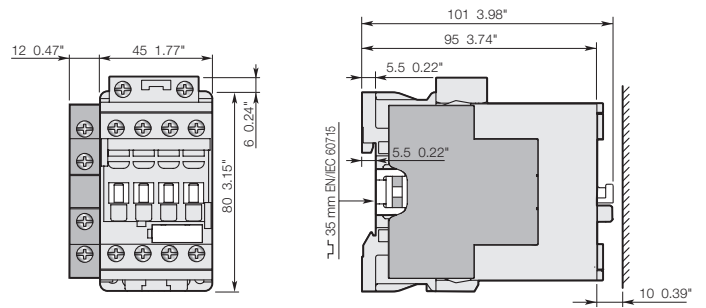
AFC26, AFC38



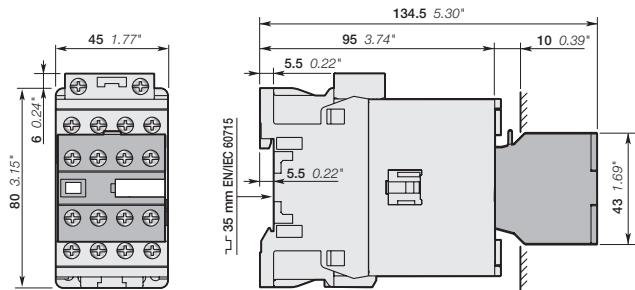
AFC26, AFC38



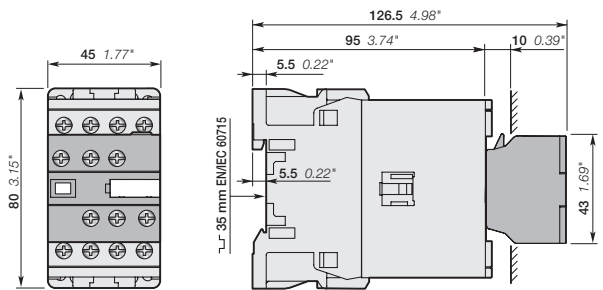
AFC26, AFC38
+ CA4, CC4 1-pole auxiliary contact block



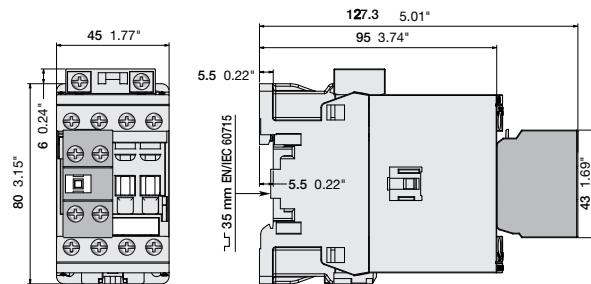
AFC26, AFC38
+ CAL4-11 2-pole auxiliary contact block



AFC26, AFC38
+ CA4 4-pole auxiliary contact block



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



AFC26, AFC38
+ CA4 2-pole auxiliary contact

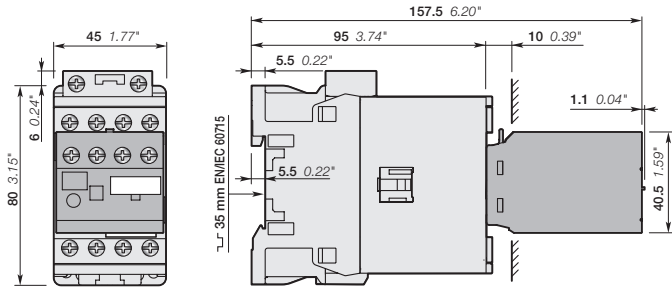
Note: For AFC26 and AFC38 contactors, lateral distance to grounded component 2 mm 0.08" min.
Note : Use of surge suppressor increase the total height by 8mm

Main dimensions mm, inches

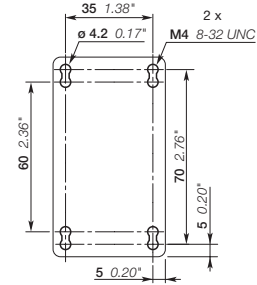
AFC26, AFC38 4-pole contactors

Dimensions

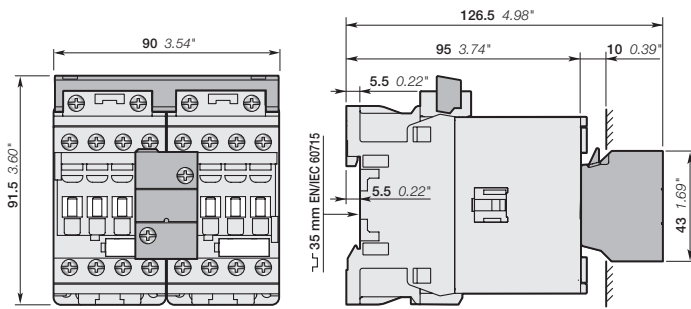
02



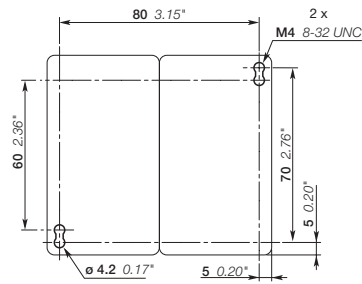
AFC26, AFC38
+ TE4 electronic timer



AFC26, AFC38



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

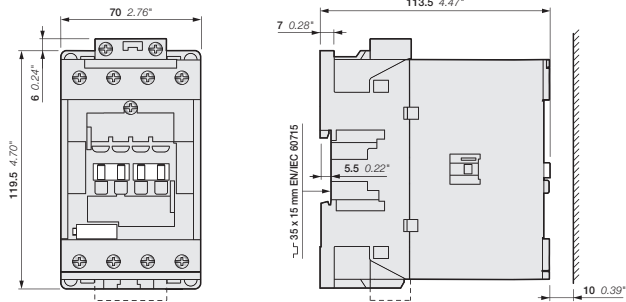


AFC26-40-00, AFC38-40-00
+ VEM4 mechanical and electrical interlock set

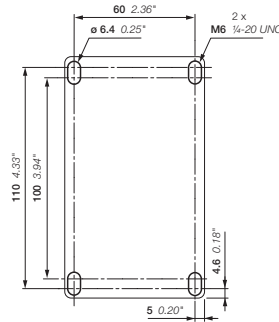
(1) Note: For AFC26 and AFC38 contactors, lateral distance to grounded component 2 mm 0.08 inches min.
Note : Use of surge suppressor increase the total height by 8mm

AFC40, AFC52 4-pole contactors

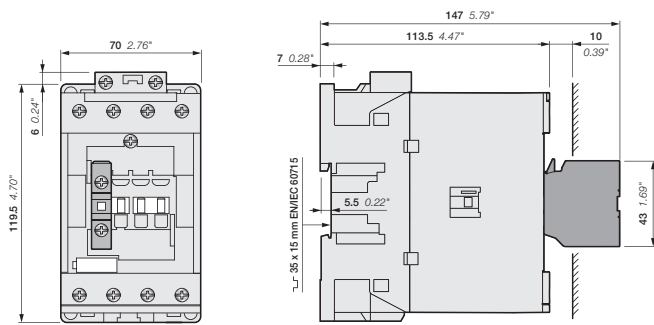
Dimensions



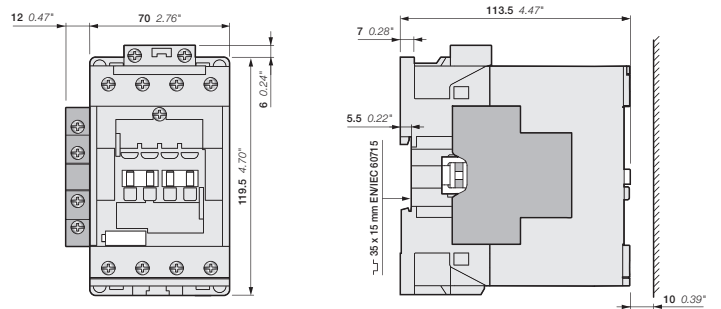
AFC40, AFC52



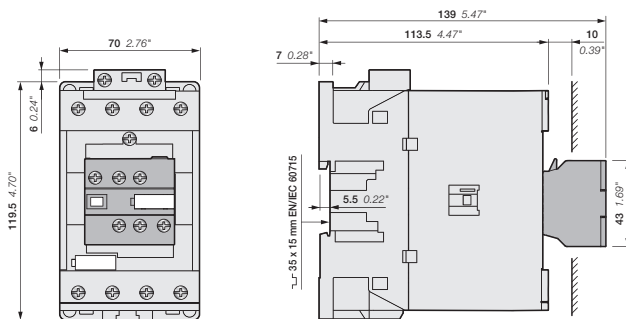
AFC40, AFC52



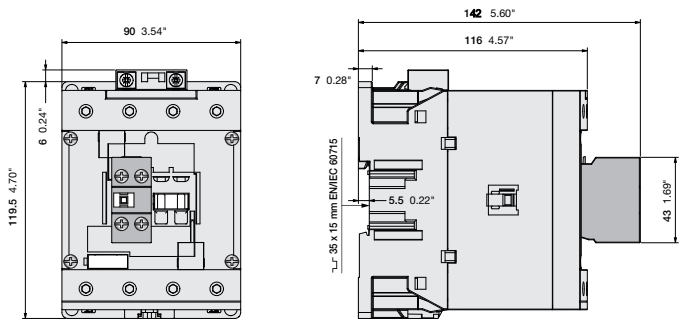
AFC40, AFC52
+ CA4, CC4 1-pole auxiliary contact block



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



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

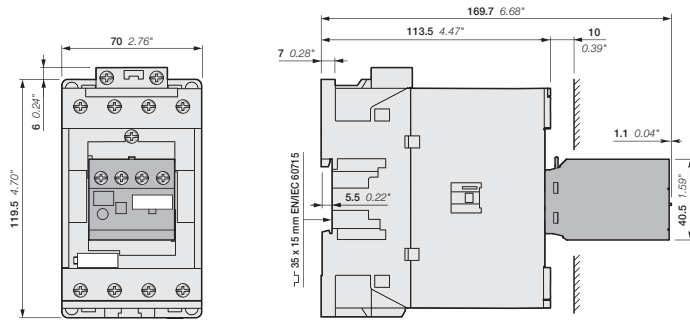


AFC40, AFC52
+ CA4 2-pole auxiliary contact

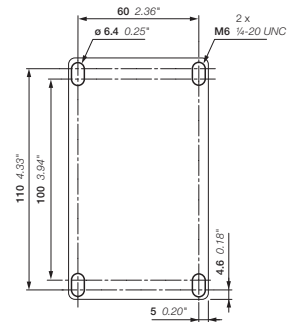
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

AFC40, AFC52 4-pole contactors

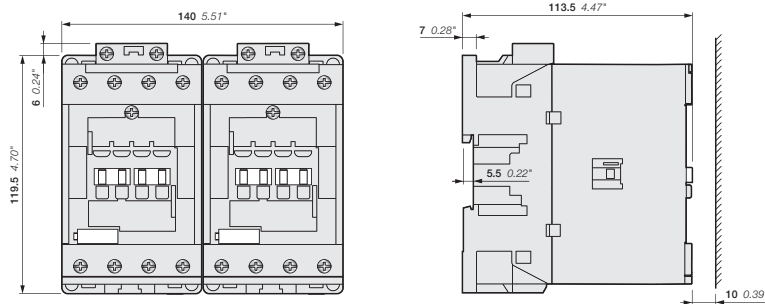
Dimensions



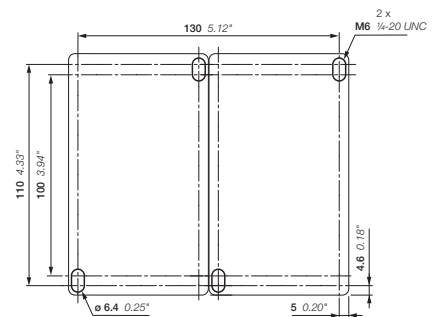
AFC40, AFC52
+ TEF4 electronic timer



AFC40, AFC52



AFC40, AFC52
+ VM96-4 mechanical interlock unit



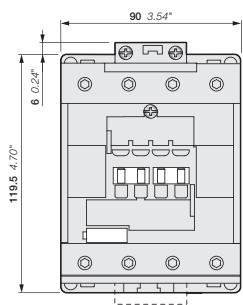
AFC40, AFC52
+ VM96-4 mechanical interlock unit

Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.

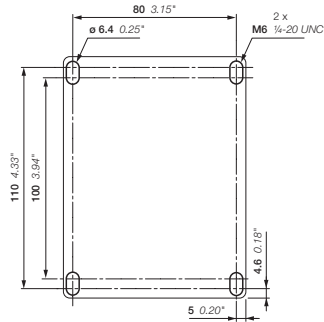
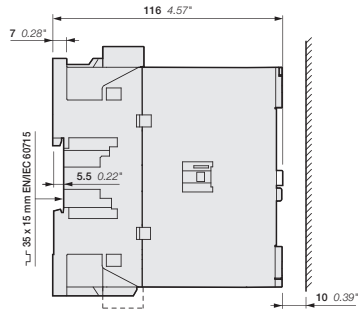
Note: Use of surge suppressor increase the total height by 8mm

AFC80 4-pole contactors

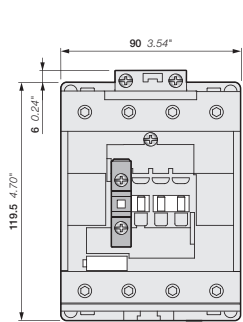
Dimensions



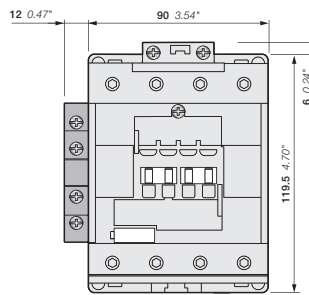
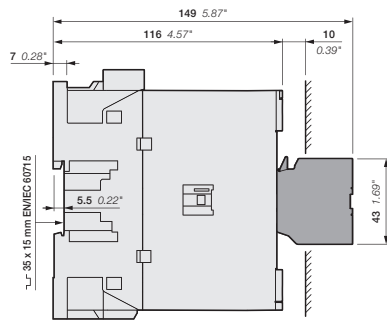
AFC80



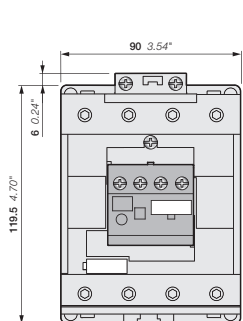
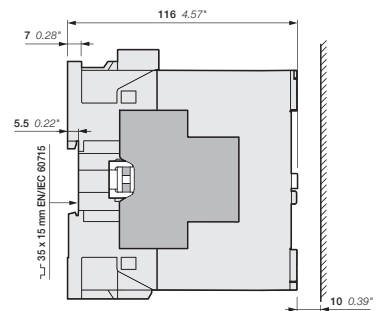
AFC80



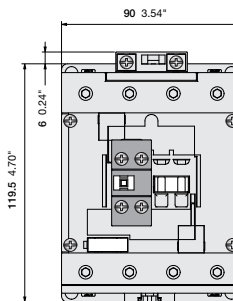
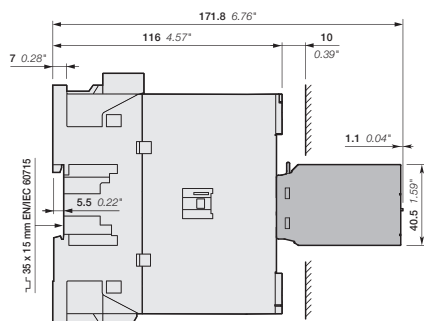
AFC80
+ CA4, CC4 1-pole auxiliary contact block



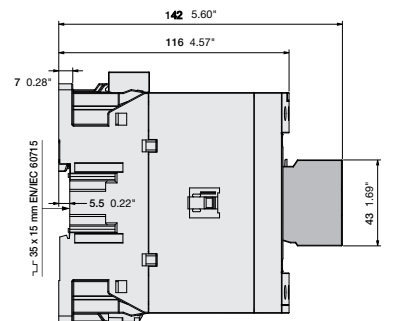
AFC80
+ CAL4-11 2-pole auxiliary contact block



AFC80
+ TEF4 Electronic timer



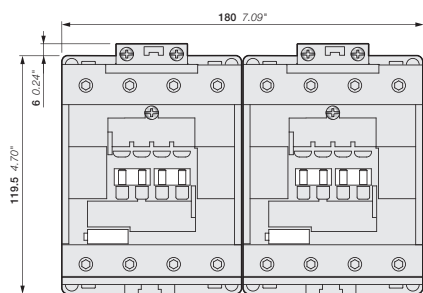
AFC80
+ CA4 2-pole auxiliary contact



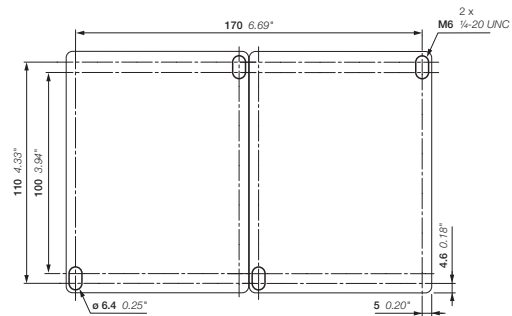
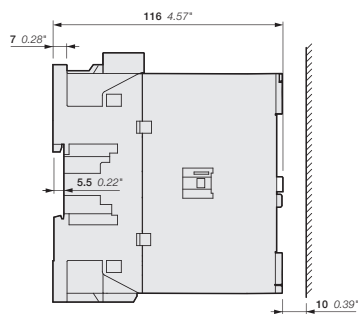
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

AFC80 4-pole contactors

Dimensions



AFC80
+ CA4, CC4 1-pole auxiliary contact block

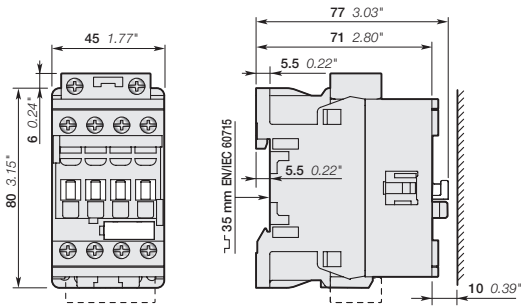


AFC80
+ VM96-4 mechanical interlock unit

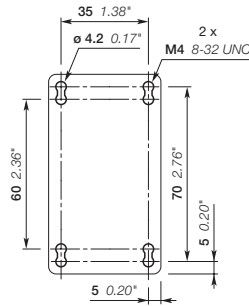
Note: for contactors mounted side-by-side, max ambient temperature must remain < 60°C.
For higher temperature contactors must have at least 5 mm space on each side.
Note : Use of surge suppressor increase the total height by 8mm

NFC contactor relays

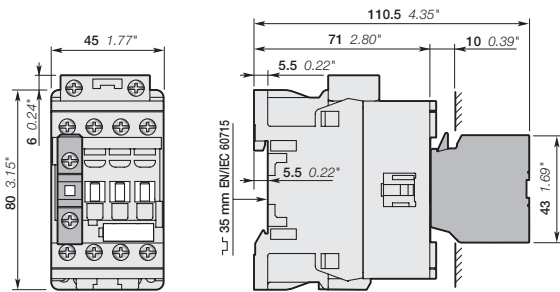
Dimensions



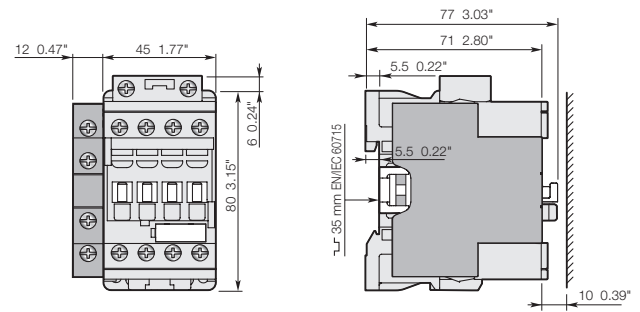
NFC22E, NFC31E, NFC40E



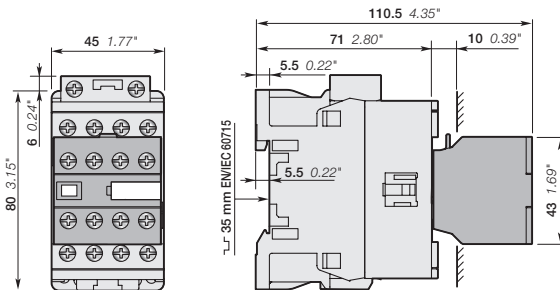
NFC



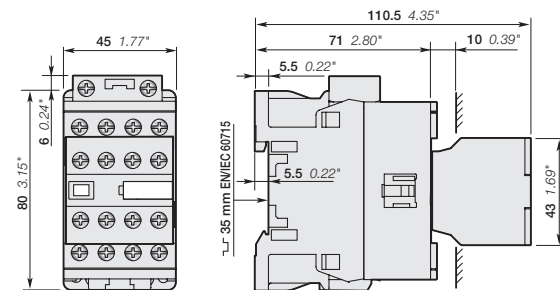
NFC22E, NFC31E, NFC40E
+ CA4, CC4 1-pole auxiliary contact block



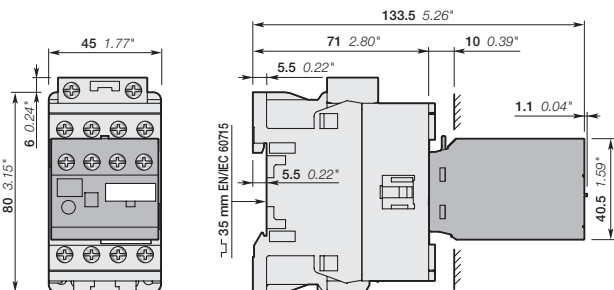
NFC22E, NFC31E, NFC40E
+ CAL4-11 2-pole auxiliary contact block



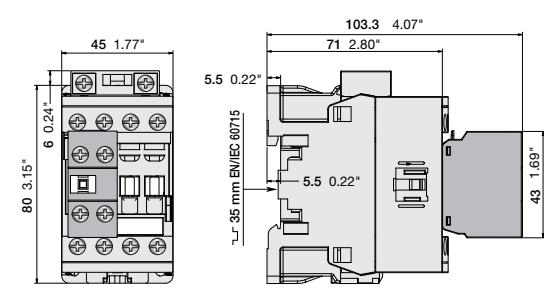
NFC22E, NFC31E, NFC40E
+ CA4 4-pole auxiliary contact block



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



NFC22E, NFC31E, NFC40E
+ TEF4 electronic timer



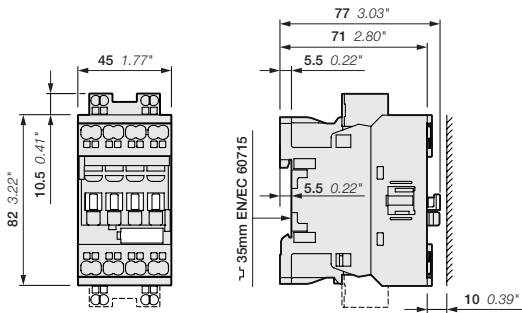
NFC22E, NFC31E, NFC40E+ CA4
2-pole auxiliary contact

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

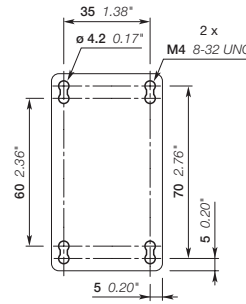
NFC..K contactor relays - with Push-in Spring terminals

Dimensions

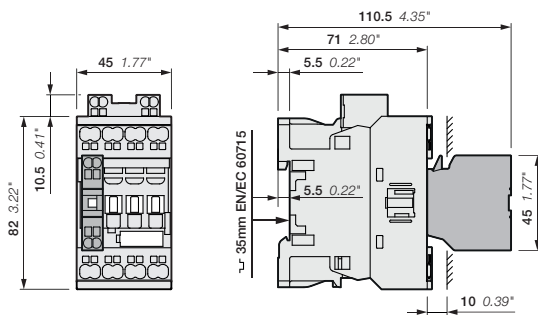
20



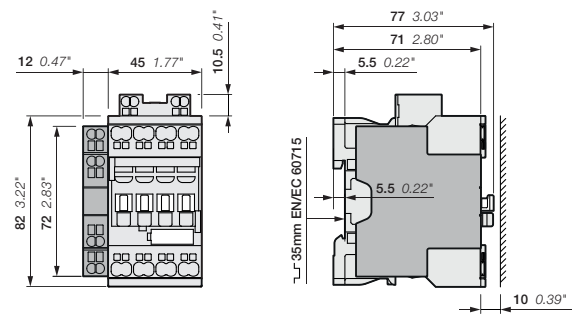
NFC22EK, NFC31EK, NFC40EK



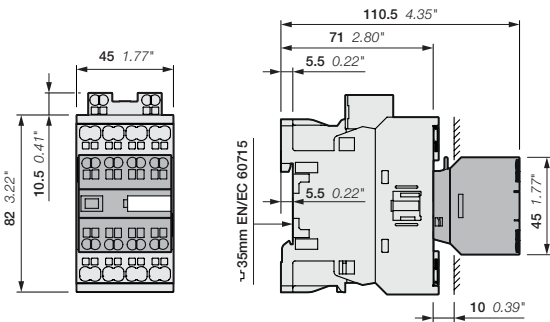
NFC22EK, NFC31EK, NFC40EK



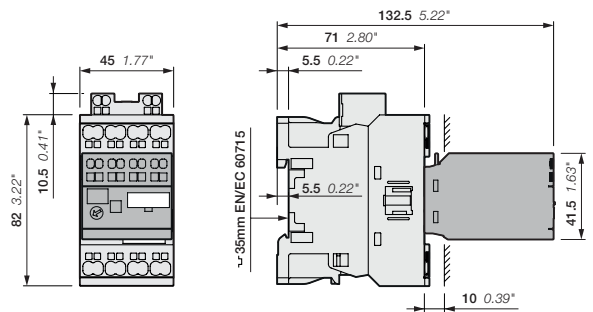
NFC22EK, NFC31EK, NFC40EK
+ CA4..K 1-pole auxiliary contact block



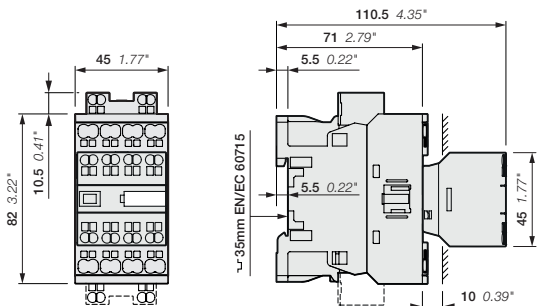
NFC22EK, NFC31EK, NFC40EK
+ CAL4-11K 2-pole auxiliary contact block



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



NFC22EK, NFC31EK, NFC40EK
+ TEF4S electronic timer



NFC44EK, NFC53EK, NFC62EK,
NFC71EK, NFC80EK

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

Main dimensions mm, inches



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

or www.abb.com/productdetails/MS116-0.16
www.abb.com/productdetails/1SAM250000R1001

Manual motor starters & circuit breakers for transformer protection

Manual motor starters

3/3 Presentation

3/8 Overview

With thermal and electromagnetic protection

Ordering details - 0.10 to 80 A

3/10 MS116 manual motor starters

3/11 MS132 manual motor starters

3/12 MS132-K manual motor starters with Push-in Spring terminals

3/13 MS165 manual motor starters

With electromagnetic protection

Ordering details - 0.16 to 80 A

3/14 MO132 manual motor starters magnetic only

3/15 MO165 manual motor starters magnetic only

3/16 Technical data

3/28 Circuit breakers for transformer protection

With thermal and electromagnetic protection

Ordering details - 0.10 to 25 A

3/29 MS132-T circuit breakers for transformer protection

3/30 MS132-KT circuit breakers for transformer protection
with Push-in Spring terminals

3/31 Technical data

3/34 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

03

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.

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.

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.



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.



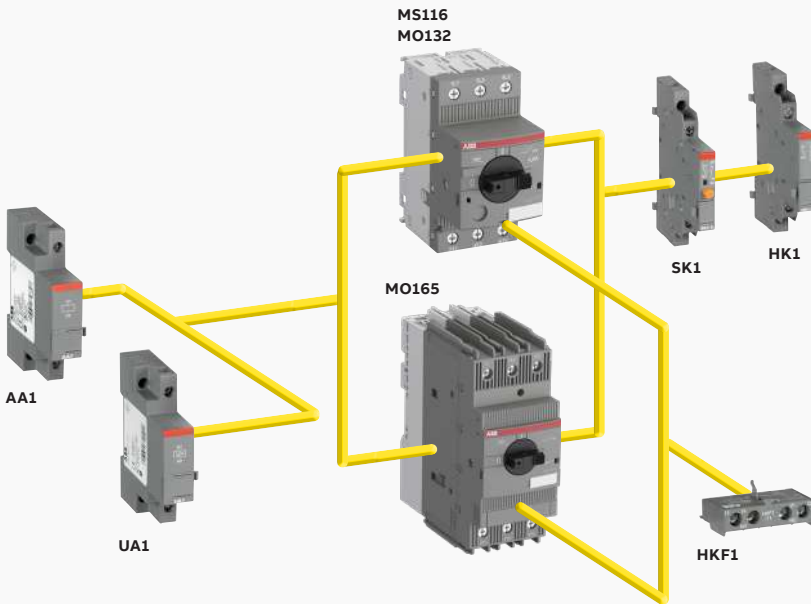
Ready for IE3 and IE4 motors
MS116/MS132/MO132/MS165/MO165 comply with the latest IE3 and IE4 N/H and NE/HE motors. NE/HE requires utilization category AC-3e.



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



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

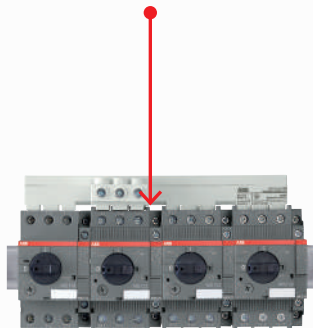


With a lockable handle
maintenance will be safe for every technician



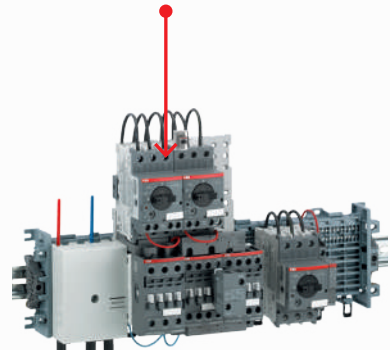
Easy to connect

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.



Busbar connectors and enclosures

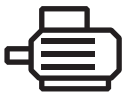
With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. Enclosures or door handle kits are available as well.



Compatible with SMISLINE TP plug-in distribution system

SMISLINE 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.



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 I _e | 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) | | |
| Signaling contact 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 | |
|-------------------------|-----------------------------------|------------|---------------------------------|-----------------|-------------------------|---------------------------------|-----------------|
| | | | I _{cu} | I _{cs} | | I _{cu} | I _{cs} |
| 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 I _e | 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) |
| Signaling contact for short-circuit alarm | - | CK1 |
| Shunt trip | AA1 | AA1 |
| Undervoltage release | UA1 | UA1 |

Table for short-circuit ratings for 400 V AC

| Performance range MO132, MO165 | | | | Transformer protection MS132-T | |
|-----------------------------------|---------------------|---------------------------------|-----------------|-----------------------------------|---------------------------------|
| Rated operational power | Type | Short-circuit breaking capacity | | Type | Short-circuit breaking capacity |
| | | I _{cu} | I _{cs} | | |
| 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 | | |
| 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



MS116-16

2CDC24100V00017



MS116-25

2CDC24101TV00017



MS116-0.16-HKF1-11

2CDC241019V00017



MS116-32-HKF1-11

2CDC241020V00017

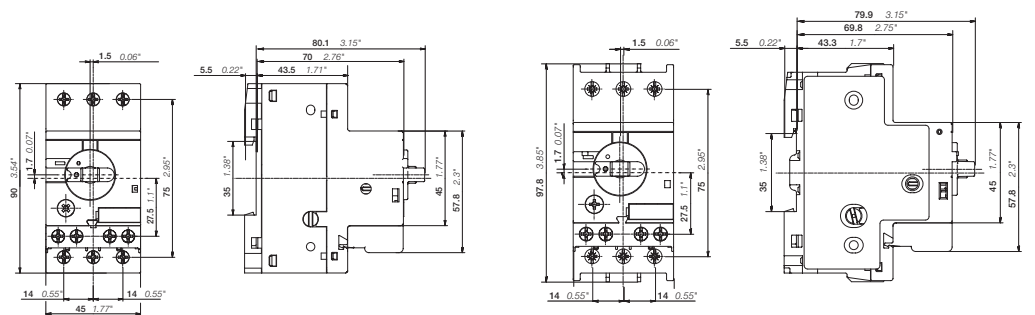
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable 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 | 1SAM25000R1001 | 0.225 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25 | 1SAM25000R1002 | 0.225 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4 | 1SAM25000R1003 | 0.225 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63 | 1SAM25000R1004 | 0.225 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0 | 1SAM25000R1005 | 0.225 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6 | 1SAM25000R1006 | 0.265 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5 | 1SAM25000R1007 | 0.265 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0 | 1SAM25000R1008 | 0.265 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3 | 1SAM25000R1009 | 0.265 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10 | 1SAM25000R1010 | 0.265 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12 | 1SAM25000R1012 | 0.265 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16 | 1SAM25000R1011 | 0.265 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20 | 1SAM25000R1013 | 0.310 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25 | 1SAM25000R1014 | 0.310 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32 | 1SAM25000R1015 | 0.310 |

Mounted Auxiliary Contacts 1 N.O. + 1 N.C.

| 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-HKF1-11 | 1SAM250005R1001 | 0.240 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25-HKF1-11 | 1SAM250005R1002 | 0.240 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4-HKF1-11 | 1SAM250005R1003 | 0.240 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63-HKF1-11 | 1SAM250005R1004 | 0.240 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0-HKF1-11 | 1SAM250005R1005 | 0.240 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6-HKF1-11 | 1SAM250005R1006 | 0.280 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5-HKF1-11 | 1SAM250005R1007 | 0.280 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0-HKF1-11 | 1SAM250005R1008 | 0.280 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3-HKF1-11 | 1SAM250005R1009 | 0.280 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10.0-HKF1-11 | 1SAM250005R1010 | 0.280 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12.0-HKF1-11 | 1SAM250005R1012 | 0.280 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16.0-HKF1-11 | 1SAM250005R1011 | 0.280 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20-HKF1-11 | 1SAM250005R1013 | 0.326 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25-HKF1-11 | 1SAM250005R1014 | 0.326 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32-HKF1-11 | 1SAM250005R1015 | 0.326 |

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



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A

MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

Main dimensions mm, inches

MS132 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection



MS132-10

ZDCDC241002V0013



MS132-32

ZDCDC241006V0017



MS132-0.16-HKF1-11

ZDCDC241021V0017



MS132-32-HKF1-11

ZDCDC241022V0017

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 |

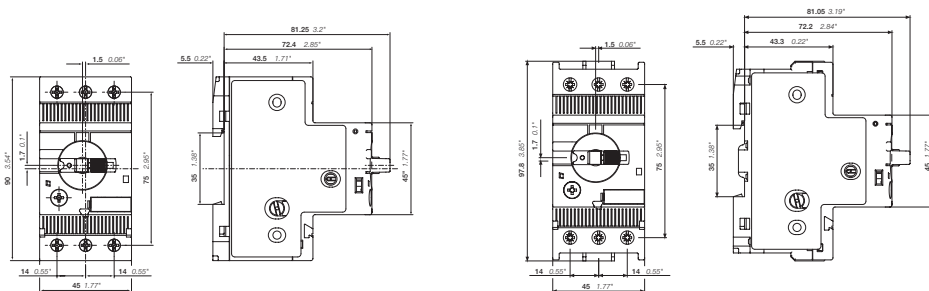
Mounted Auxiliary Contacts 1 N.O. + 1 N.C.

| | | | | | | |
|----------|---------------|-----|------|--------------------|-----------------|-------|
| 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

2CDC241025V0007

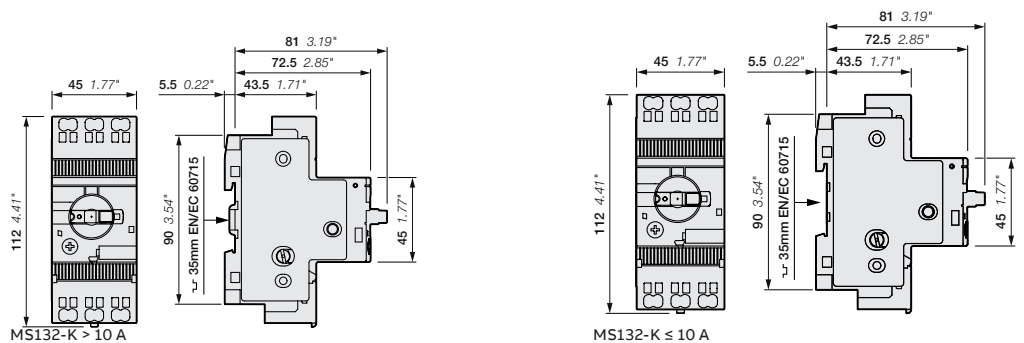
The MS132-K series is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A with a width of only 45 mm. The innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening.

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 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 | MS132-0.16K | 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



Main dimensions mm, inches

MS165 manual motor starters

10 to 80 A – with thermal and electromagnetic protection



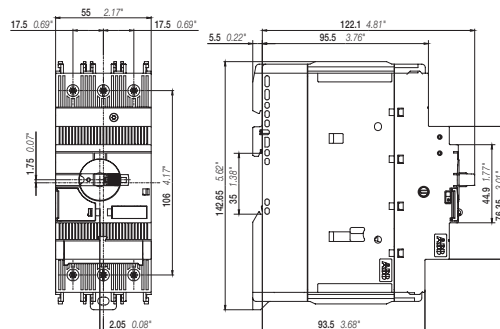
MS165-65

ZCDC241007V0017

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



2CDC24101BV0017

MO132-6.3



2CDC241015V0017

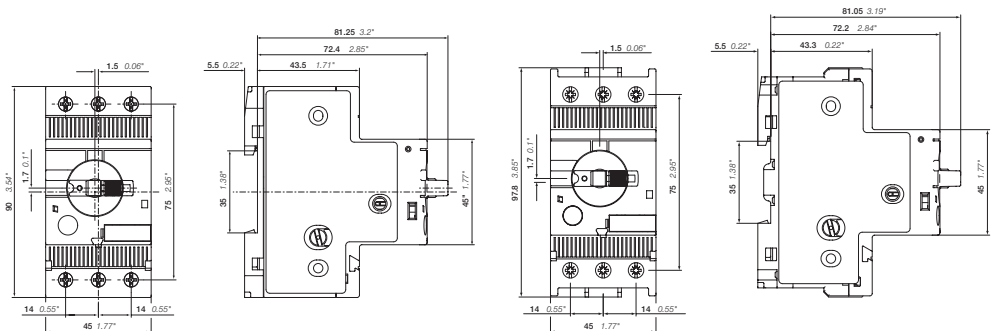
MO132-32

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

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

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

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



MO132 ≤ 10 A

MO132 ≥ 12 A

Main dimensions mm, inches

MO165 manual motor starters magnetic only

16 to 80 A – with electromagnetic protection



MO165-65

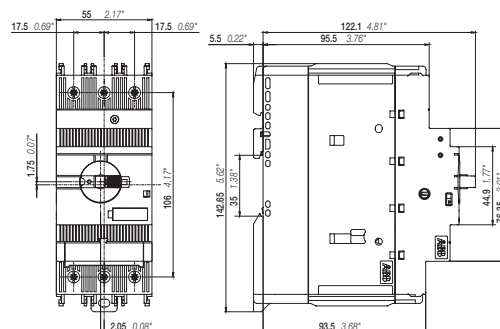
2CDC241008V0017

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

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 16 A | 100000 cycles | 50000 cycles | 25000 cycles | 50000 cycles |
| | 20 ... 65 A | 50000 cycles | 50000 cycles | 25000 cycles | 50000 cycles |
| | 65 ... 80 A | - | - | 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 (1) | 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 (1) | 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 (1) | 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 | | Maximum short-circuit current | | | |
|------------|--|---|-------------------------------|-------|-------------------------|-------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect (2) | | for group installations | |
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V |
| | A | A | kA | kA | kA | kA |
| MS116-0.16 | 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 | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | Manual self-protected Combination Motor Controllers (Type E) (2) | |
|------------|------------------------------------|---|----------------------|-------|-------------------------|-------|---|--------------|--|--------------|
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V | 480Y / 277 V | 600Y / 347 V | 480Y / 277 V | 600Y / 347 V |
| | A | A | kA | kA | kA | kA | kA | kA | kA | kA |
| MS132-0.16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.25 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.40 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.63 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.6 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-2.5 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-4.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-6.3 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-10 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-12 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-16 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-20 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-25 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-32 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |

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

MS116, MS132, MS165, MO132, MO165

Technical data

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

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

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

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

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

MS116, MS132, MS165, MO132, MO165

Technical data

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

| Type | EOL | Combination Motor Controllers (Type F) (1) | | | |
|------------|---------|--|-----|------------------------|----|
| | | Coordination type 1 | | Minimum contactor size | |
| | | 480Y / 277 V | | 600Y / 347 V | |
| | | kA | | 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 | | | | | | | | Manual self-protected Combination Motor Controllers (Type E) | |
|----------|--|---|----------------------|----------|-------------------------|----------|---|-----------------|--|-----------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | | |
| | Fuses 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 | 10 |
| MS165-80 | 50 | 10 | 50 | 10 | 50 | 10 | 50 | 10 | | |

(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) | | | | Manual self-protected Combination Motor Controllers (Type F) | | | | |
|----------|--|------------------------|---------------------|------------------------|--|------------------------|---------------------|------------------------|-----------------|
| | Coordination type 1 | | Coordination type 2 | | Coordination type 1 | | 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 | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
|------------|--|--|----------------------|-------|-------------------------|-------|---|---------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | 480 V | 600 V | 480 V | 600 V | 480 Y / 277 V | 600 Y / 347 V |
| | Fuses A | Circuit breaker 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 | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
|----------|--|--|----------------------|-------|-------------------------|-------|---|--------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | 480 V | 600 V | 480 V | 600 V | 480Y / 277 V | 600Y / 347 V |
| | Fuses A | Circuit breaker 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 mm ² | 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
| 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 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| 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 mm ² |
|  Rigid stranded | 1 or 2 x 1 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 1 (push-in) / 0.5 (spring) ... 4 mm ² |
|  Flexible with insulated ferrule | 1 x 1 (push-in) / 0.5 (spring) ... 4 mm ² |
|  Flexible | 1/2 x 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x 0.5 (spring) ... 4 mm ² |
| Stranded acc. to UL/CSA | 1/2 x AWG 18 ... 10 (push-in) / AWG 18 ... 8 (spring) |
| Stranded acc. to UL/CSA | 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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible | 1 or 2 x | 1 ... 35 mm ² |
| 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 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| 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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible | 1 or 2 x | 1 ... 35 mm ² |
| 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.

Troubleshooting made easy

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



Complete portfolio

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



Transformer protection

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



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

Selection table MS132-T with ABB control transformers:

Please refer to document no. 2CDC131111D0201



Application example

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

MS132-T circuit breakers for transformer protection

0.10 to 25 A – with thermal and electromagnetic protection



MS132-10T

2CDC24009V0017



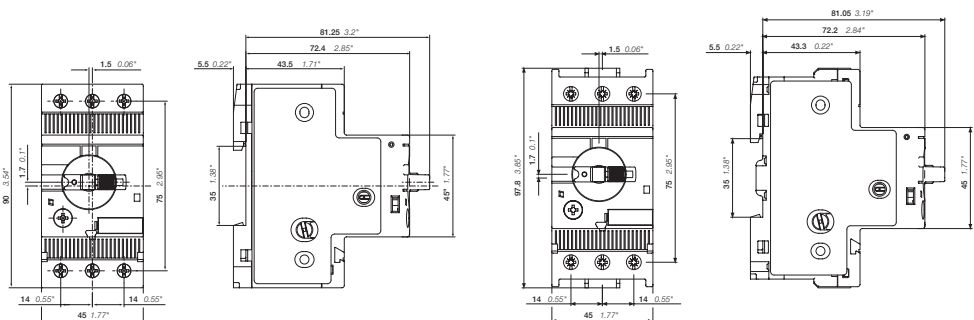
MS132-25T

2CDC241008P0014

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 | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) |
|---------------|--|--|-------------|-----------------|----------------|
| A | | | | | 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

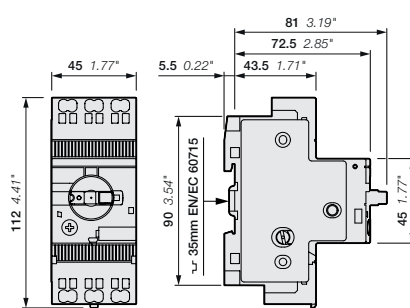


MS132-KT

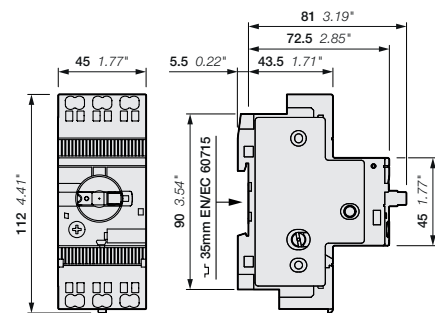
Circuit breakers for transformer protection with Push-in Spring terminals are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction 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 | 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 U _e 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 | 220 ... 240 V AC |
|----------------|------------------|------------------|
| | FLA | 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 | 600Y / 347 V |
| | kA | 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 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| 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 |

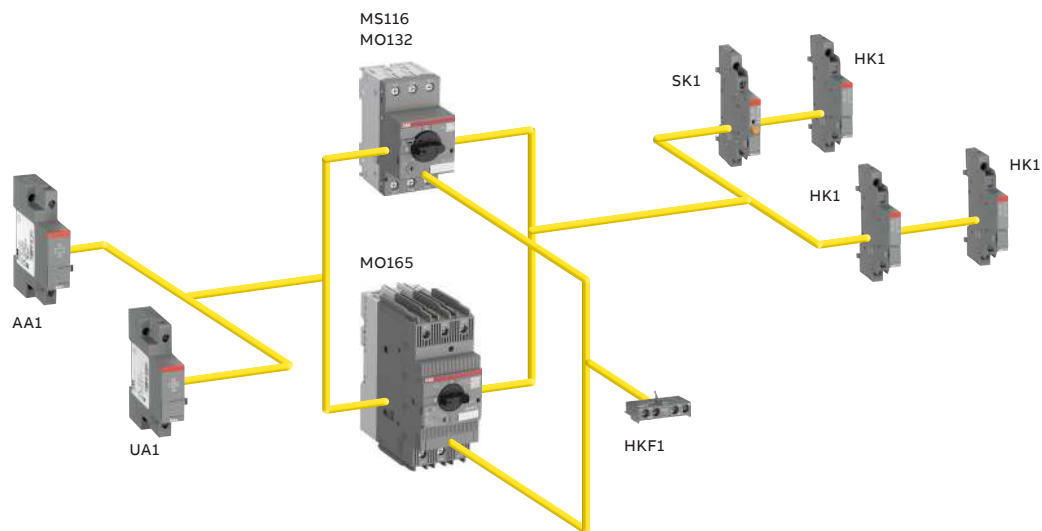
Connecting characteristics - main circuit

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

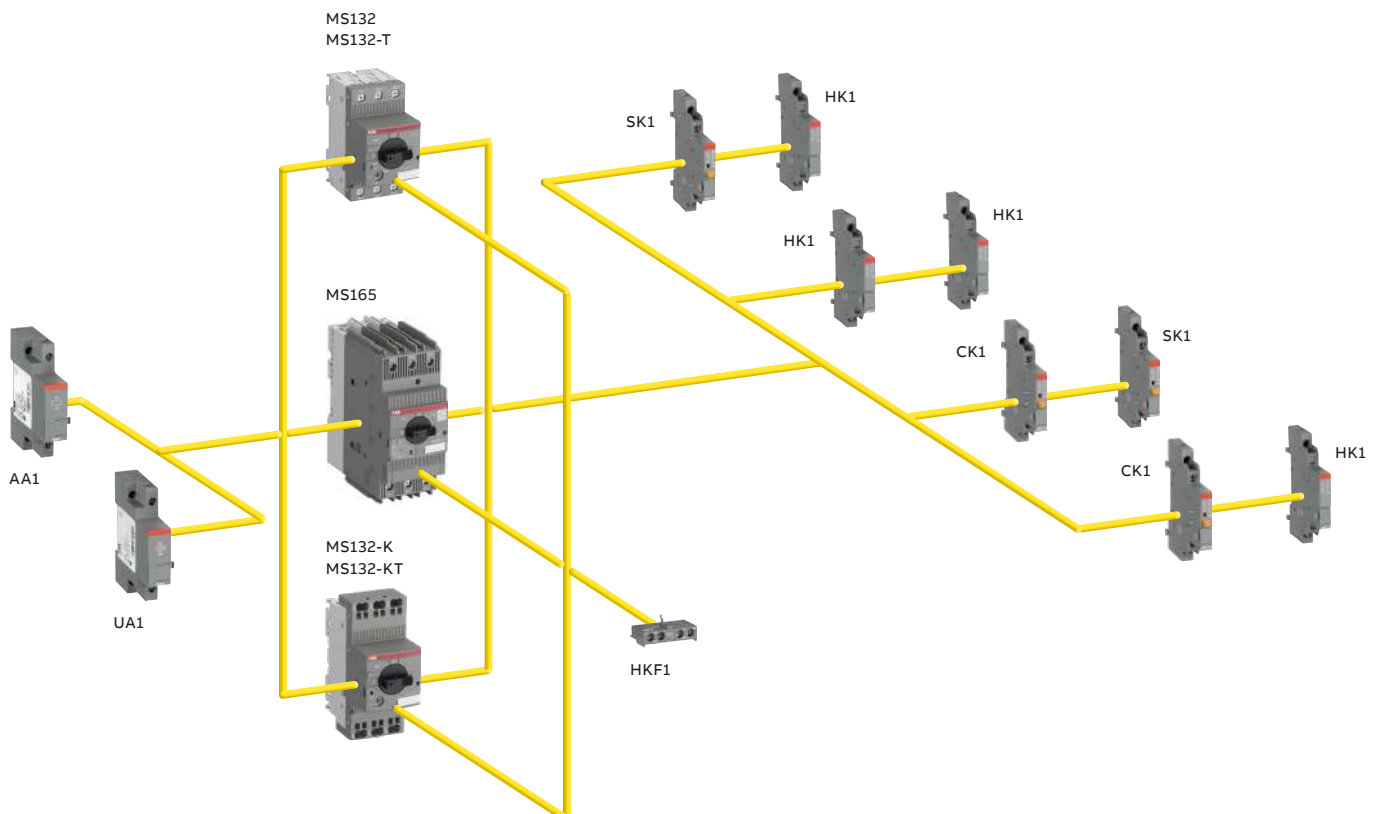
Accessories

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, | 1 | 1 | | HKF1-11 | 1SAM201901R1001 | 10 | 0.015 |
| MS165, MO132, | 1 | 0 | | HKF1-10 | 1SAM201901R1003 | 10 | 0.013 |
| MO165, MS132-T, | 0 | 1 | | HKF1-01 | 1SAM201901R1004 | 10 | 0.013 |
| MS132-K, MS132-KT | 2 | 0 | | HKF1-20 | 1SAM201901R1002 | 10 | 0.015 |

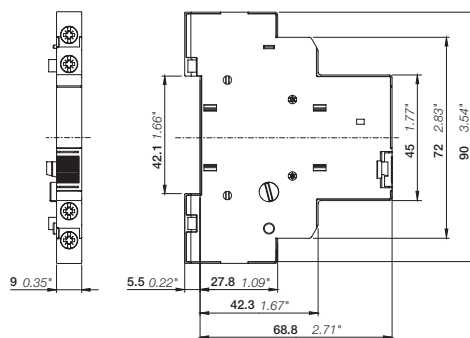
Auxiliary contacts – mountable on the right

| | | | | | | | |
|-------------------|---|---|--|---------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | max. 2 pieces | HK1-11 | 1SAM201902R1001 | 2 | 0.035 |
| MS165, MO132, | 2 | 0 | max. 2 pieces | HK1-20 | 1SAM201902R1002 | 2 | 0.035 |
| MO165, MS132-T, | 0 | 2 | max. 2 pieces | HK1-02 | 1SAM201902R1003 | 2 | 0.035 |
| MS132-K, MS132-KT | | | | | | | |
| MS116, MS132, | 2 | 0 | max. 2 pieces with leading contacts | HK1-20L | 1SAM201902R1004 | 2 | 0.035 |
| MO132, MS132-T, | | | | | | | |
| MS132-K, MS132-KT | | | | | | | |
| MS116, MS132, | 1 | 1 | max. 2 pieces, terminal marking (13/14, 21/22) | HK1-11A | 1SAM201902R1011 | 2 | 0.035 |
| MS165, MO132, | | | | | | | |
| MO165, MS132-T, | 1 | 1 | max. 2 pieces, terminal marking (43/44, 31/32) | HK1-11B | 1SAM201902R1021 | 2 | 0.035 |
| MS132-K, MS132-KT | | | | | | | |
| | 0 | 2 | max. 2 pieces, terminal marking (13/14, 23/24) | HK1-20A | 1SAM201902R1012 | 2 | 0.035 |

Signaling contacts – mountable on the right

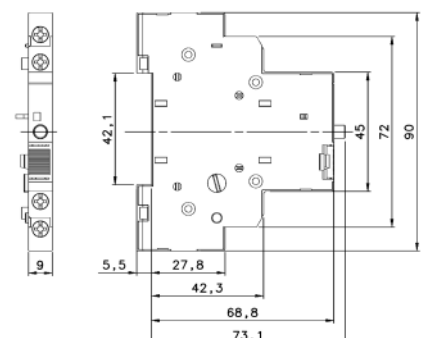
| | | | | | | | |
|-------------------|---|---|--------------------------------------|----------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | for tripped alarm, with manual reset | SK1-11 | 1SAM201903R1001 | 2 | 0.035 |
| MS165, MO132, | 2 | 0 | for tripped alarm, with manual reset | SK1-20 | 1SAM201903R1002 | 2 | 0.035 |
| MO165, MS132-T, | 0 | 2 | for tripped alarm, with manual reset | SK1-02 | 1SAM201903R1003 | 2 | 0.035 |
| MS132-K, MS132-KT | | | | | | | |
| MS116, MS132, | 1 | 1 | for tripped alarm | SK1-11AR | 1SAM201903R1004 | 2 | 0.036 |
| MS165, MO132, | 2 | 0 | for tripped alarm | SK1-20AR | 1SAM201903R1005 | 2 | 0.036 |
| MO165, MS132-T, | 0 | 2 | for tripped alarm | SK1-02AR | 1SAM201903R1006 | 2 | 0.036 |
| MS132-K, MS132-KT | | | | | | | |
| MS132, MS165, | 1 | 1 | for short-circuit alarm | CK1-11 | 1SAM301901R1001 | 2 | 0.035 |
| MS132-T, MS132-K, | 2 | 0 | for short-circuit alarm | CK1-20 | 1SAM301901R1002 | 2 | 0.035 |
| MS132-KT | 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 | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|------------------------------|---------------|------|------------|---------|----------------------|
| | 50 Hz V AC | 60 Hz V AC | | | | |

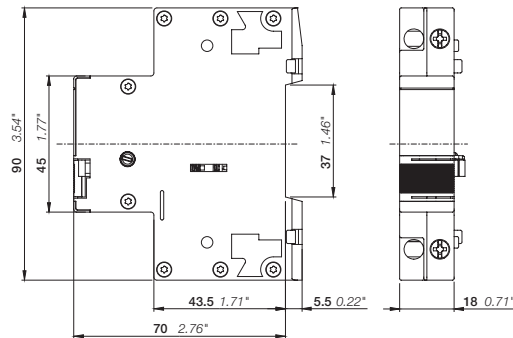
Shunt trips – mountable on the left

| | | | | | | |
|-------------------|-------------|-------------|---------|-----------------|---|-------|
| MS116, MS132, | 20 ... 24 | 20 ... 24 | AA1-24 | 1SAM201910R1001 | 1 | 0.100 |
| MS165, MO132, | 110 | 110 | AA1-110 | 1SAM201910R1002 | 1 | 0.100 |
| MO165, MS132-T, | 200 ... 240 | 200 ... 240 | AA1-230 | 1SAM201910R1003 | 1 | 0.100 |
| MS132-K, MS132-KT | 350 ... 415 | 350 ... 415 | AA1-400 | 1SAM201910R1004 | 1 | 0.100 |

Undervoltage releases – mountable on the left

| | | | | | | |
|-------------------|-----|-----|---------|-----------------|---|-------|
| MS116, MS132, | 20 | 24 | UA1-20 | 1SAM201904R1010 | 1 | 0.100 |
| MS165, MO132, | 24 | - | UA1-24 | 1SAM201904R1001 | 1 | 0.100 |
| MO165, MS132-T, | 48 | - | UA1-48 | 1SAM201904R1002 | 1 | 0.100 |
| MS132-K, MS132-KT | 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

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.



HKF1-11K

2CDC241027V007



HK1-11K

2CDC24028V0007



SK1-11K

2CDC241029V0007



SK1-11ARK

1SAM201903R1201

| 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

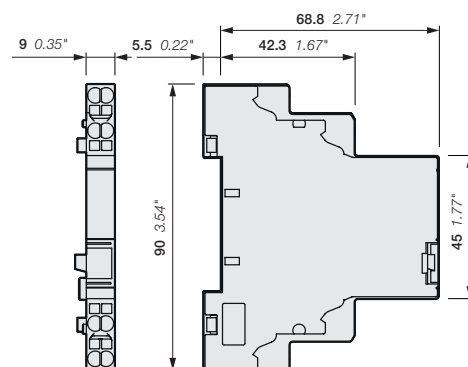
| | | | | | | | |
|---|---|---|--|----------|-----------------|----|-------|
| MS116, MS132, | 1 | 1 | | HKF1-11K | 1SAM201901R1201 | 10 | 0.016 |
| MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 2 | 0 | | HKF1-20K | 1SAM201901R1202 | 10 | 0.016 |

Auxiliary contacts - mountable on the right

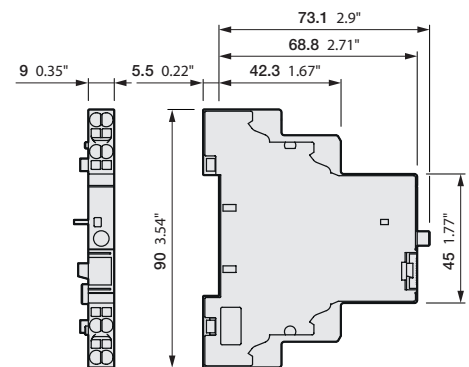
| | | | | | | | |
|----------------------------|---|---|-----------------------|----------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | max. 2 pieces | HK1-11K | 1SAM201902R1201 | 2 | 0.035 |
| MS165, MO132, | 2 | 0 | max. 2 pieces | HK1-20K | 1SAM201902R1202 | 2 | 0.035 |
| MO165, | 0 | 2 | max. 2 pieces | HK1-02K | 1SAM201902R1203 | 2 | 0.035 |
| MS132-T, MS132-K, MS132-KT | 2 | 0 | with leading contacts | HK1-20LK | 1SAM201902R1204 | 2 | 0.035 |

Signaling contacts - mountable on the right

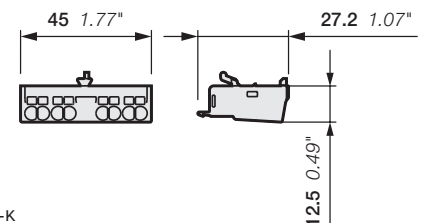
| | | | | | | | |
|---------------|---|---|--------------------------------------|-----------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | for tripped alarm, with manual reset | SK1-11K | 1SAM201903R1201 | 2 | 0.035 |
| MS165, MO132, | 2 | 0 | for tripped alarm, with manual reset | SK1-20K | 1SAM201903R1202 | 2 | 0.035 |
| MO165, | 0 | 2 | for tripped alarm, with manual reset | SK1-02K | 1SAM201903R1203 | 2 | 0.035 |
| MS132-T, | 1 | 1 | for tripped alarm | SK1-11ARK | 1SAM201903R1204 | 2 | 0.035 |
| MS132-K, | 2 | 0 | for tripped alarm | SK1-20ARK | 1SAM201903R1205 | 2 | 0.035 |
| MS132-KT | 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 U _e | 690 V AC / 600 V DC | | 250 V AC / 250 V DC |
| Conventional free-air thermal current I _{th} | 6 A | | 5 A |
| Rated frequency | 50/60 Hz | | |
| Rated impulse withstand voltage U _{imp} | 6 kV | | |
| Rated insulation voltage U _i | 690 V AC | | 250 V AC |
| Pollution degree | 3 | | |
| Ambient air temperature | Operation | -25 ... +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 | | |
| I _e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | 24 V, 120 V | 6 A | 3 A |
| | 240 V | 4 A | 1.5 A |
| | 400 V | 3 A | - |
| | 440 V, 690 V | 1 A | - |
| I _e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | 24 V | 2 A | 1 A |
| | 125 V | 0.55 A | 0.27 A |
| | 250 V | 0.27 A | 0.11 A |
| | 440 V, 600 V | 0.15 A | - |
| Minimum switching capacity | 17 V / 5 mA | | |
| Short-circuit protective device | N.C., 95-96 | 10 A Type gG | |
| | N.O., 97-98 | 10 A Type gG | |
| Duty time | 100 % | | |
| Mounting | Right side of 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 U _e acc. to UL/CSA | 600 V AC / 600 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 mm ² 0.5 (spring) / 1 (push-in) ... 2.5 mm ² | 1 ... 2.5 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 1.5 mm ² 0.5 (spring) / 1 (push-in) ... 2.5 mm ² | |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 1.5 mm ² 0.5 (spring) / 1 (push-in) ... 1.5 mm ² | |
|  Flexible | 1 or 2 x 0.75 ... 1.5 mm ² 0.5 ... 2.5 mm ² (with Push-in Spring terminals) | 0.75 ... 2.5 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x AWG 16 ... 14 | |
| | 1 or 2 x 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 |
| | 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 |
| | Storage | -50 ... +80 °C |
| Resistance to shock acc. to IEC 60068-2-27 | 15g / 11 ms | 15g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting | left side of manual motor starters / MS132-T | left side of manual motor starters / MS132-T |
| Mounting positions | - | - |

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

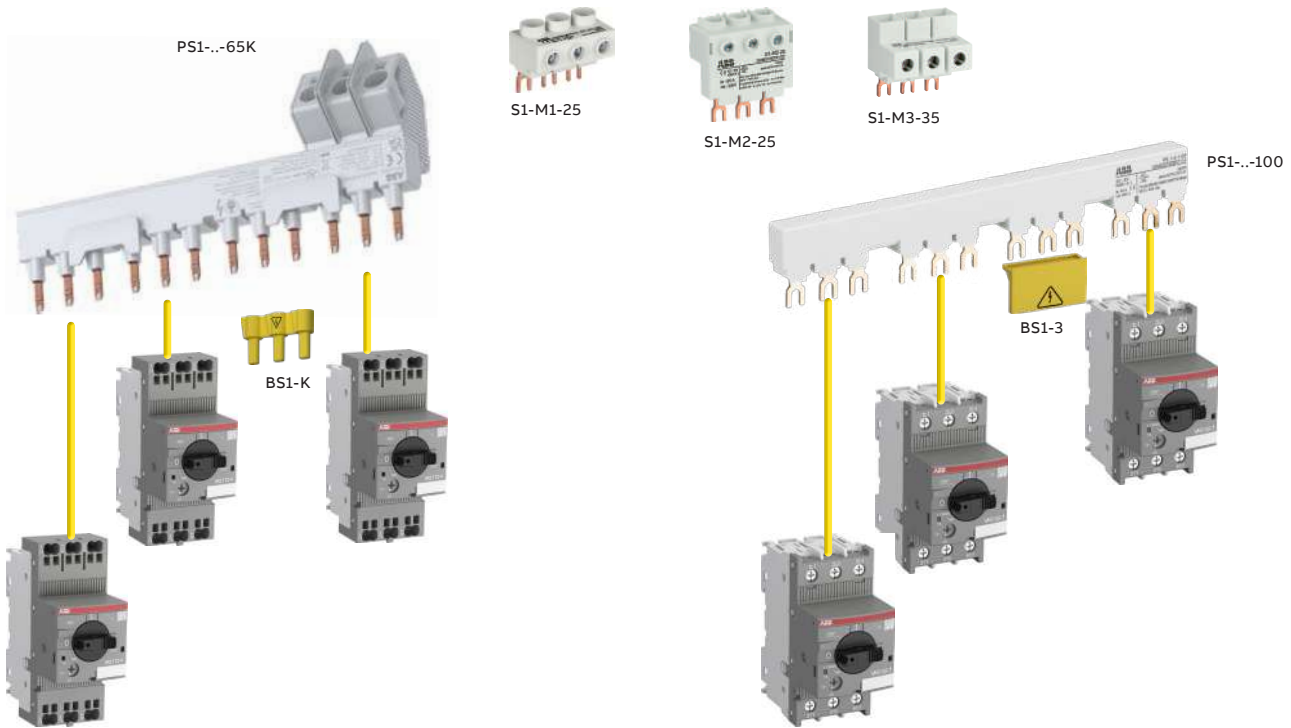
Connecting characteristics - Auxiliary circuit

| Type | UA1 | AA1 |
|---|--------------------------|------------------------------|
| Connecting capacity | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² |
| | Stranded acc. to UL/CSA | 1 or 2 x |
| 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)

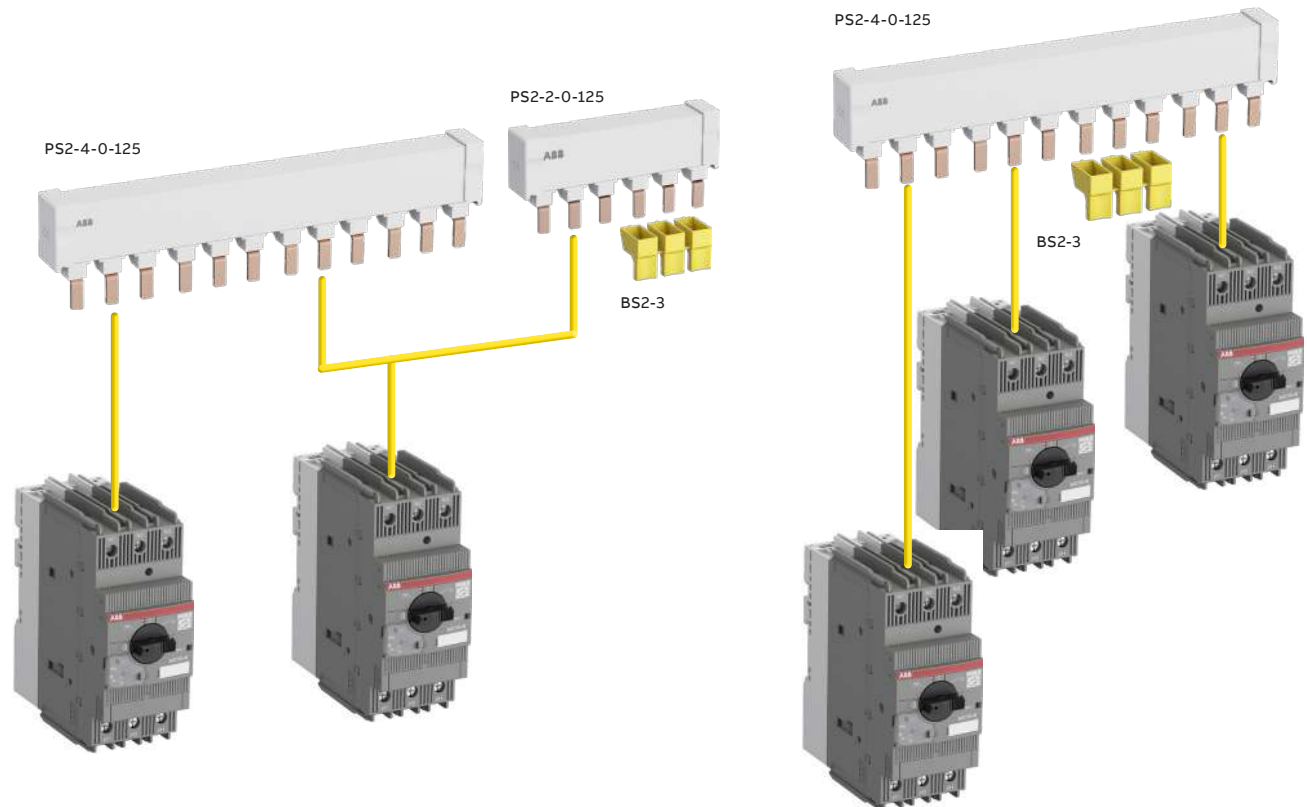


Three phase busbar with Push-in Spring terminals up to 65 A

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



PS1-2-0-65

2CDC24101F0000



PS1-3-1-100

2CDC241014F0010



S1-M3-35

159C101215F0014



S1-M2-25

159C101266F0014



TS1-M30-S1

2CDC241013V0019



SA2

2CDC241023F0013



SA1

5K108B91



PB1-1-32

2CDC241004F0014



S1-PB1-25

2CDC241005G0014

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 mm ² | 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)

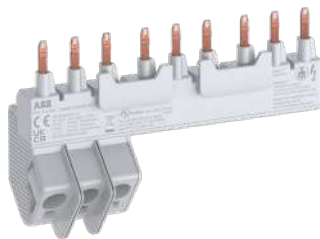
| | | | | | |
|------------------------------|--------------------------|-----------|-----------------|---|-------|
| MS116, MS132, MO132, MS132-T | Phase connecting link | PB1-1-32 | 1SAM201914R1001 | 1 | 0.009 |
| | Phase power infeed block | S1-PB1-25 | 1SAM201914R1002 | 1 | 0.013 |

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 | Number of Manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---------------------------|---------------------------------|--------------------------------------|-------------|-----------------|---------|----------------|
| | A | | | | | | kg |
| MS132-K, | 65 | 2 | 0 | PS1-2-0-65K | 1SAM301903R1002 | 1 | 0.091 |
| MS132-KT | 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

2CDC24002V0015



PS2-3-0-125

2CDC24003V0015



S2-M3-50

2CDC24012V0019



KA165

2CDC24010V0014



BS2-3

2CDC24001V0015



SA2

2CDC24003F0013

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 | Number of Manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---------------------------|---------------------------------|--------------------------------------|-------------|-----------------|---------|----------------|
| | A | | | | | | 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 | Rated cross section | Mounting form | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---------------------------|---------------------|----------------|----------|-----------------|---------|----------------|
| | A | mm ² | | | | | 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) |
|--------------|------------------------------|-------|-----------------|---------|----------------|
| 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












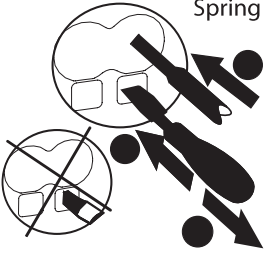













General technical data

| 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

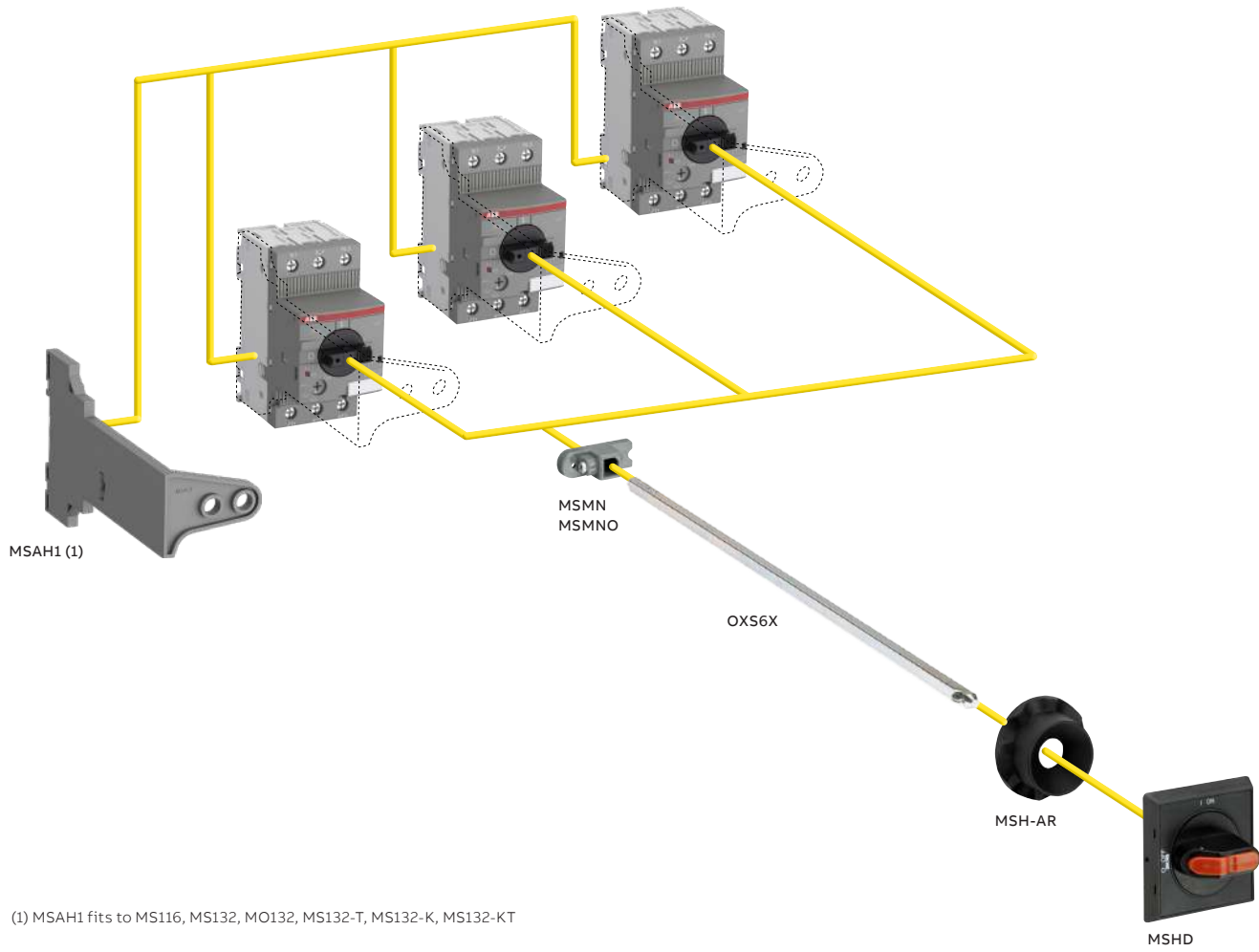
| Type | S1-M1-25 | S1-M2-25 | S1-M3-25 | S1-M3-35 | S2-M3-50 |
|---|--------------------------------|--------------------------|----------------------------|---------------------------|---------------------------|
| Connecting capacity | | | | | |
|  Rigid | 1 x 2.5 ... 25 mm ² | 4 ... 25 mm ² | 2.5 ... 25 mm ² | 10 ... 35 mm ² | 10 mm ² |
|  Flexible with ferrule | 1 x - | - | - | - | 10 ... 50 mm ² |
|  Flexible with insulated ferrule | 1 x - | - | - | - | 10 ... 50 mm ² |
|  Flexible | 1 x 2.5 ... 16 mm ² | 4 ... 16 mm ² | 2.5 ... 16 mm ² | 10 ... 35 mm ² | 10 ... 50 mm ² |
| 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 | | |
|---|---|---|---|----------|
|  |  | 1 x | 6 ... 25 mm ² / AWG 8 ... 4 | |
| |  | 2 x | - | |
| |  | 1 x | 4 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 4 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 4 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 4 ... 6 mm ² | |
| |  | 2 x | - | |
|  |  | 1 x | 1.5 ... 25 mm ² / AWG 18 ... 4 | |
| |  | 2 x | - | |
| |  | 1 x | 0.5 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 0.5 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 0.5 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | 1 x | 0.5 ... 16 mm ² | |
| |  | 2 x | - | |
| |  | | | fi 4 mm |
| |  | | | x 0.5 mm |
| |  | | | 16 mm |



Accessories

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



Accessories

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



2CDC241004F0010

IB132-Y



2CDC241003F0010

IB132-G



2CDC241002F0010

DMS132-Y



2CDC241001F0010

DMS132-G

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

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

| Suitable for | Description | Color | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|-------------|-------|------|------------|---------|-------------------|
|--------------|-------------|-------|------|------------|---------|-------------------|

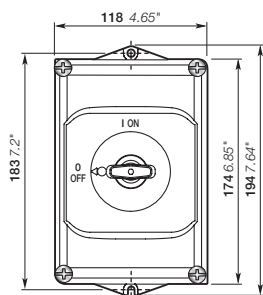
IP65 enclosures (NEMA Type 12)

| | | | | | | |
|---------------------|---|------------|---------|-----------------|---|-------|
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | IB132-Y | 1SAM201911R1011 | 1 | 0.370 |
| | | Grey/black | IB132-G | 1SAM201911R1010 | 1 | 0.370 |

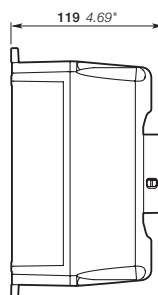
IP65 door mounting kits (NEMA Type 12)

| | | | | | | |
|---------------------|---|------------|----------|-----------------|---|-------|
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | DMS132-Y | 1SAM201912R1011 | 1 | 0.170 |
| | | Grey/black | DMS132-G | 1SAM201912R1010 | 1 | 0.170 |

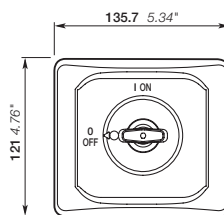
Indication I-O-T and ON-OFF-T.



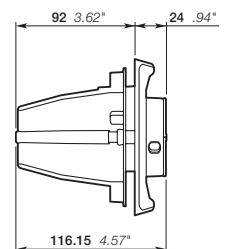
IB132



Main dimensions mm, inches



DMS132



Accessories

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



MSHD-LB

2CDC241003R0011



MSHD-LY

2CDC241004F0011



MSMN



MSH-AR

2CDC241001F0012



MSAH1

2CDC241017V0013

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. | 85 105 130 180 | | OXS6X85 OXS6X105 OXS6X130 OXS6X180 | 1SCA101647R1001 1SCA108043R1001 1SCA101655R1001 1SCA101659R1001 | 1 1 1 1 | 0.020 0.020 0.030 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 Yellow Black Yellow | MSHD-LB (1) MSHD-LY (1) MSHD-LTB (2) MSHD-LTY (2) | 1SAM201920R1001 1SAM201920R1002 1SAM201920R1011 1SAM201920R1012 | 1 1 1 1 | 0.065 0.065 0.065 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) MSMNO (4) | 1SAM101923R0002 1SAM101923R0012 | 1 1 | 0.002 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 MSAH1 it is possible to support the shaft in the extension of handle (MSHD). It is mandatory for the usage of shafts >130 mm. | | | MSAH1 | 1SAM201909R1021 | 1 | 0.035 |
|---|--|--|--|-------|-----------------|---|-------|

(1) Indication I-O and ON-OFF (recommended for MS116)

(2) Indication I-O and ON-OFF + Trip indication

(3) Coded - Positioning of ON indication dependent on mounting orientation of the MMS

(4) Uncoded - Positioning of ON indication independent of mounting orientation of the MMS.



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

www.abb.com/productdetails/TF42-0.13

or

www.abb.com/productdetails/1SAZ721201R1005

Overload relays

4/2 Overview

Thermal overload relays

- 4/4 T16 thermal overload relays – 0.10 to 16.0 A
- 4/8 TF42 thermal overload relays – 0.10 to 38.0 A
- 4/13 TF65 thermal overload relays – 22.0 to 67.0 A
- 4/17 TF96 thermal overload relays – 40.0 to 96.0 A
- 4/21 TF140DU thermal overload relays – 66 to 142 A
- 4/25 TA200DU thermal overload relays – 66 to 200 A

Electronic overload relays

- 4/29 E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
- 4/33 EF65, EF96, EF146 electronic overload relays – 20 to 150 A
- 4/39 EF205, EF370 electronic overload relays – 63 to 380 A
- 4/43 EF460, EF750, EF1250DU electronic overload relays
150 to 1250 A

4/47 General accessories

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 |

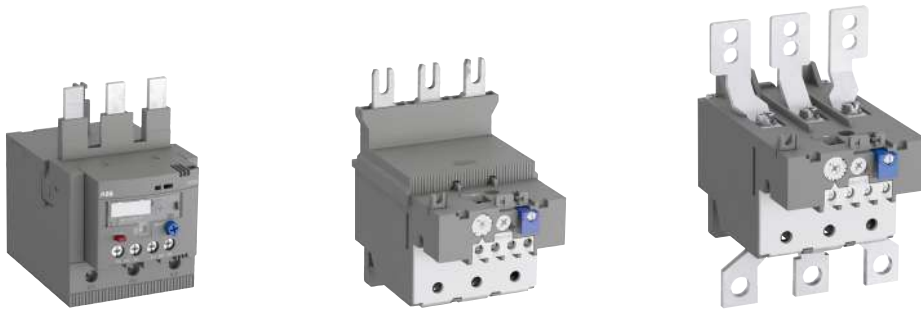
| Type | E16DU | EF19 | EF45 | EF65 | |
|----------------------|--------------------------|-----------------|------------|-------------|--|
| Current range | 0.10 ... 18.9 A | 0.10 ... 18.9 A | 9 ... 45 A | 20 ... 70 A | |
| Trip class | 10E, 20E, 30E selectable | | | | |
| Suitable for 1-phase | no | no | no | no | |
| Single mounting kit | DB16E | DB19EF | DB45EF | - | |

Electronic overload relays with external separate CT

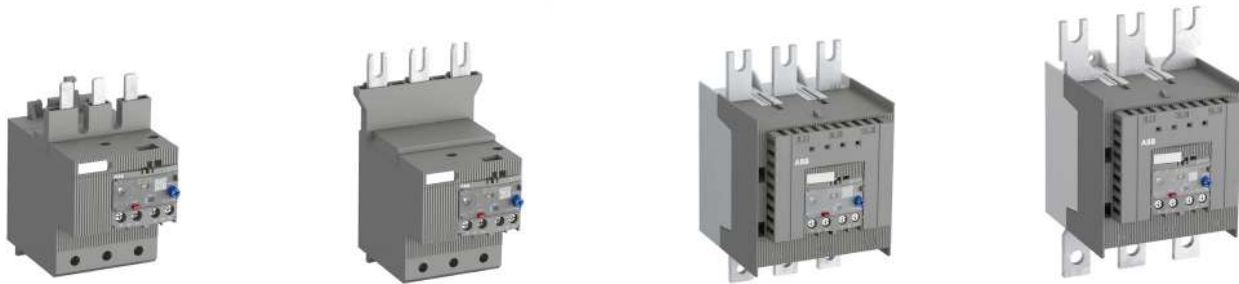


| | | | | |
|-----------------------------------|-------|----------------|----------------------|------------------------|
| IEC: rated operational power AC-3 | 400 V | 75 ... 250 kW | 132 ... 400 kW | 250 ... 710 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 100 ... 400 hp | 200 ... 500 hp | 600 ... 900 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

| | | | | | | | | | | | |
|------------|--------|------|----|-------|-----|-----|-----|-----|-----|-------|----------------------|
| DB16 | | | | | | | | | | | DB16 + T16 |
| DB42 | | | | | | | | | | | DB42 + TF42 |
| | DB65 | | | | | | | | | | DB65 + TF65 |
| | | DB96 | | | | | | | | | DB96 + TF96 |
| | | | | DB200 | | | | | | | DB200 + TA200 |
| EOL | | | | | | | | | | | DB19EF + EF19 |
| DB19EF | | | | | | | | | | | DB45EF + EF45 |
| | DB45EF | | | | | | | | | | DB96 + EF96 |
| | | DB96 | | | | | | | | | |
| 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 A | |

T16 thermal overload relays – 0.10 to 16.0 A

Ordering details



T16

2CDC23109F0013



T16 + DB16

1E10C231025F0010



KPR-101L

1SFC15124F0002



DB16

2CDC231002F001

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

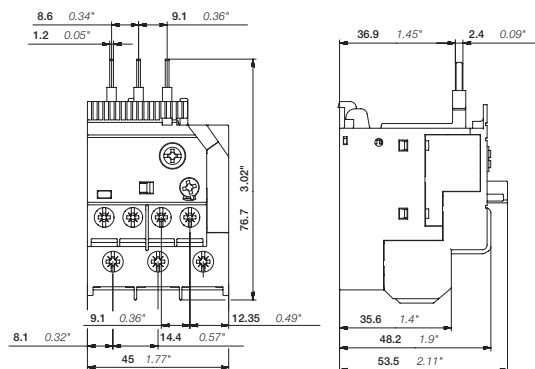
| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

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

2CDC232008F0008

T16 thermal overload relays – 0.10 to 16.0 A

Technical data

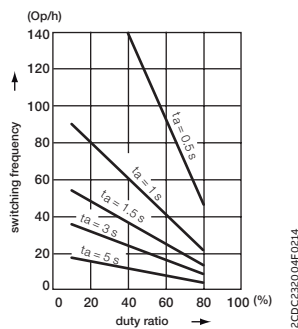
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 | |
|----------|----------------------|---|-----------|---|---------------|
| | | 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 |
| Storage | 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 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² or 1.5 ... 4 mm ² (1) |
|  Flexible | 1 or 2 x | 0.75 ... 4 mm ² |
| 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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² (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

2CDC231006F0013



TF42 + DB42

2CDC231026F0013

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.

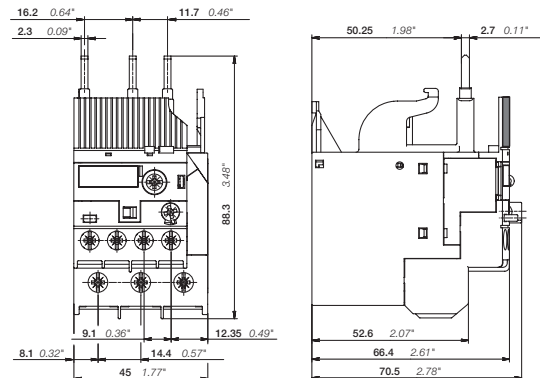
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release 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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|----------------------|
| A | | | | | |

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

2CDC232005F0009

TF42 thermal overload relays – 0.10 to 38.0 A

Ordering details



DB42

2CDC231000F0011



KPR-101L

15FCL51224F0002



DRS-F

2CDC211002V0017

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

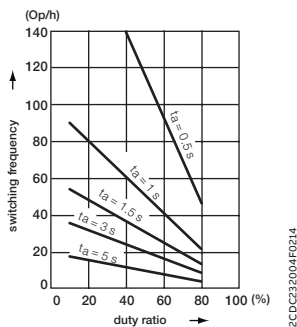
Main circuit – Utilization characteristics according to IEC/EN

| 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 mm ² | 1.5 ... 2.5 mm ² or 2.5 ... 10 mm ² (1) |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 4 mm ² | 2.5 ... 4 mm ² or 4 ... 6 mm ² (1) |
| | Stranded acc. to UL/CSA | AWG 18-10 | AWG 14-6 |
| | Flexible acc. to UL/CSA | 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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² (1) |
| | Stranded acc. to UL/CSA | AWG 18-12 |
| | Flexible acc. to UL/CSA | 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

2CDC231004F013



DB65

2CDC231003V0015



DB65 + TF65

2CDC231004V0015



KPR-101L

15FC151224F0002



DRS-F

2CDC211002V0017

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

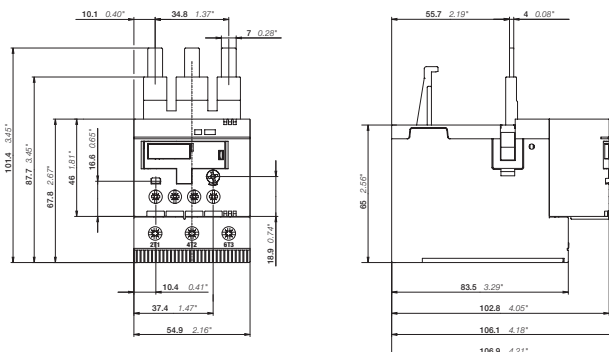
Suitable for AF40...AF65 contactors

| | | | | | |
|---------------|----------------------|----|---------|-----------------|-------|
| 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

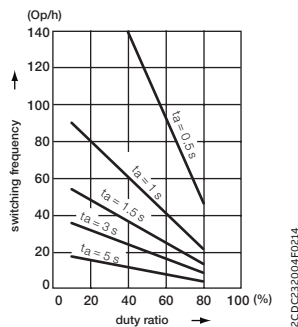
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 | | 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 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible with ferrule | 1 or 2 x | 2.5 ... 10 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 2.5 ... 10 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible | 1 or 2 x | 2.5 ... 16 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
| | 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 (Pozi driv 2) | |

Auxiliary circuit

| | | |
|---|-------------------------------|---|
| Type | TF65 | |
| Connecting capacity | | |
|  Rigid | 1 or 2 x | 0.75 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 4 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² |
| | 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 (Pozi driv 2) | |

TF96 thermal overload relays – 40.0 to 96.0 A

Ordering details



TF96

2CDC231005F0013

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)



DB96

2CDC231001V0015

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

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.



DB96 + TF96

2CDC231005V0015



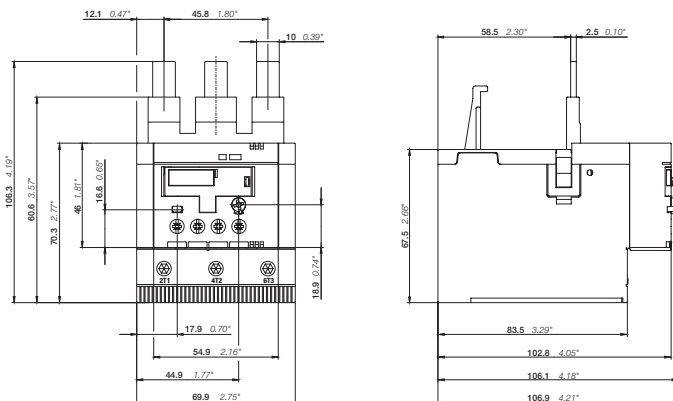
KPR-101L

1SFC151224F0002



DRS-F

2CDC211002V0017



TF96

Main dimensions mm, inches

TF96 thermal overload relays – 40.0 to 96.0 A

Technical data

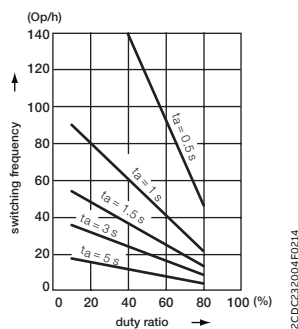
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 | | 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 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible with ferrule | 1 or 2 x 6 ... 35 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible with insulated ferrule | 1 or 2 x 6 ... 16 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible | 1 or 2 x 6 ... 35 mm ² 1 x 6 ... 50 mm ² |
| | 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 mm ² |
|  | Flexible with ferrule | 1 or 2 x 0.75 ... 4 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75 ... 2.5 mm ² 2 x 0.75 ... 1.5 mm ² |
|  | Flexible | 1 or 2 x 0.75 ... 1 mm ² or 1 ... 2.5 mm ² |
| | 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

2CDC31012F0002



KPR-101L

1SFC15124F0002

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

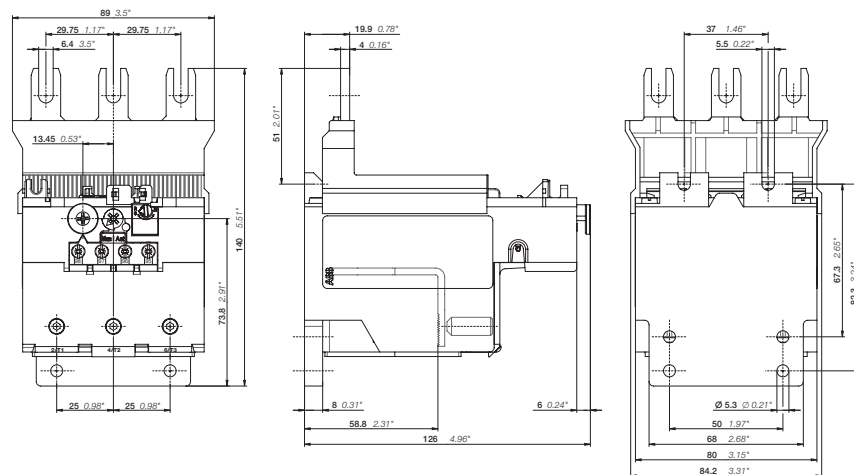
Suitable for AF116...AF140 contactors

| | | | | | |
|-------------|---------------------|-----|--------------------|-----------------|-------|
| 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

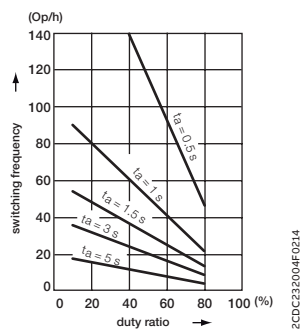
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 mm ² 2 x - |
|  | Flexible | 1 x 16 ... 70 mm ² 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 mm ² |
|  | Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² |
|  | Flexible | 1 or 2 x 0.75 ... 2.5 mm ² |
| | 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 (Pozi driv 2) |

TA200DU thermal overload relays – 66 to 200 A

Ordering details



TA200DU

2CDC231016F0013



KPR-101L

1SFC151224F0002

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

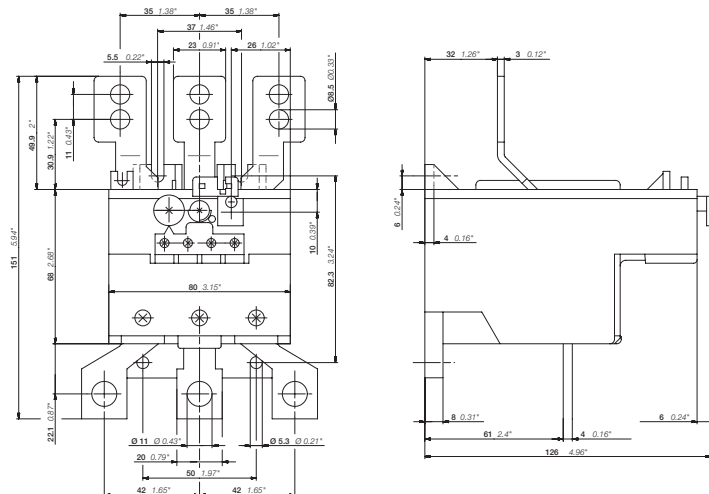
Suitable for AF145...AF2050 contactors

| | | | | | |
|-------------|--------------------------------|-----|-----------------------|-----------------|-------|
| 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 |



TA200DU

Main dimensions mm, inches

2CDC23202F0011

TA200DU thermal overload relays – 66 to 200 A

Technical data

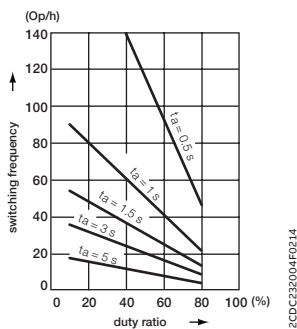
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 mm ² |
|  Flexible | 1 x 25 ... 120 mm ² |
| 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 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x 0.75 ... 2.5 mm ² |
| | 2 x 0.75 ... 1 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² |
| 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 (Poizdriv 2) |

EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Ordering details



EF19-18.9

1SBC101447F0010



EF45-30

1SBC101448F0010

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

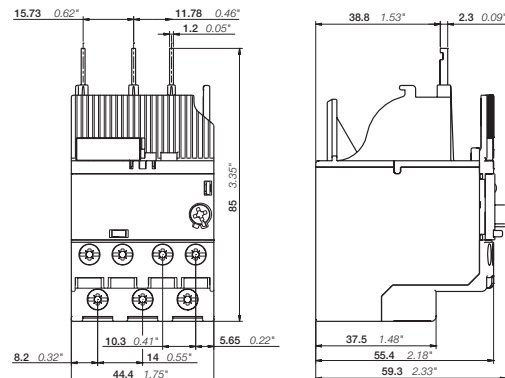
EF19 electronic overload relays, suitable for AF09 ... AF38 / AFC09 ... AFC38 (1)

| | | | | | |
|---------------|--------------------|---------------|-----------|-----------------|-------|
| 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

2CDC231024V0013



DB45EF

2CDC231002V0104



KPR-101L

1SFC151524F0002



DRS-F

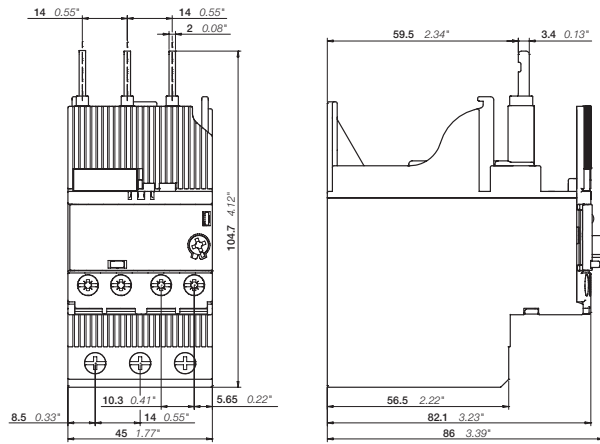
2CDC21002V0017

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, | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | EF460, EF750 | 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 | | |

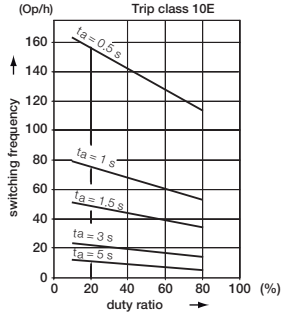
Auxiliary circuit according to IEC/EN

| 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 | | |

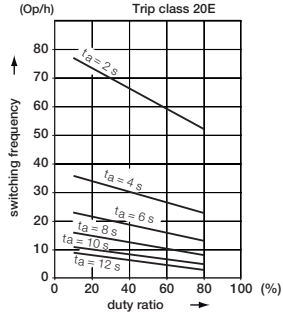
E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Technical data

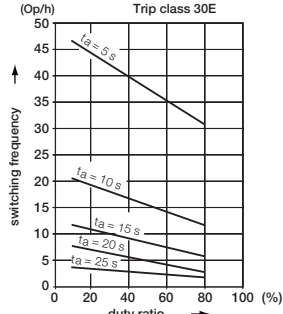
Technical diagram – Intermittent periodic duty



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 N.O., 97-98 | B600, Q300 B600, Q300 | B600, Q600 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 | | |
| Storage | -25 ... +70 °C | | |
| Ambient air temperature compensation | -50 ... +85 °C | | |
| Maximum operating altitude permissible | Acc. to IEC/EN60947-4-1 | | |
| Resistance to shock acc. to IEC 60068-2-27 | 2000 m | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 15g / 11 ms pulse | 25g / 11 ms pulse | |
| Mounting position | 5g / 3 ... 150 Hz | 3g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting | Position 1-6 | | |
| Degree of protection | Mount on the contactor and tighten the screws of the main circuit terminals | | |
| Housing | IP20 | | |
| Main circuit terminals | IP20 | | |

Electrical connection

Main circuit

| Type | E16DU | EF19 | EF45 |
|---|---------------------------------------|------------------------------|----------------------------|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 4 mm ² | 2.5 ... 16 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 2.5 ... 10 mm ² |
| 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 | | |
| Tightening torque | 0.8 ... 1.5 Nm / 7 ... 13 lb.in | | |
| Recommended screw driver | M3.5 (Pozi driv 2) | | |

Auxiliary circuit

| Type | E16DU | EF19 | EF45 |
|---|---------------------------------------|------------------------------|------------------------------|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 4 mm ² | 1 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
| 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 | | |
| Tightening torque | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | | |
| Recommended screw driver | M3.5 (Pozi driv 2) | | |

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

Ordering details



EF65-70



EF96-100

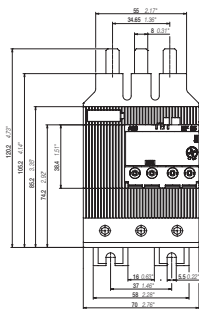


EF146-150

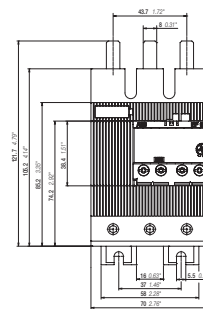
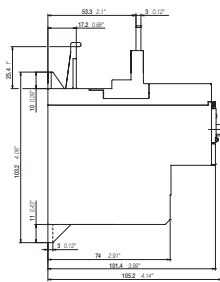
The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic 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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---|---------------------------------|---------------|-----------|-----------------|-------------------|
| A | | | | | |
| 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 |

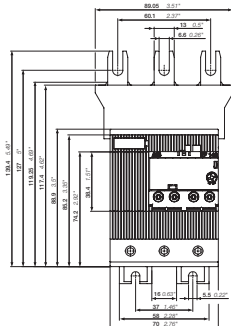
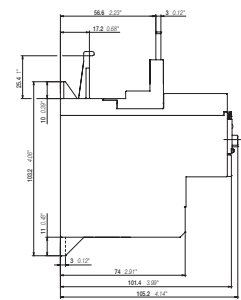
(1) ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.



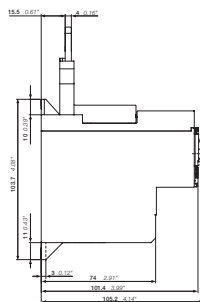
EF65-56 / EF65-70



EF96-56 / EF96-100



EF146-150



Main dimensions mm, inches

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

Ordering details



2CDC231001V0015

DB96



2CDC231002V0015

DB96 + EF96



15FC151224F0002

KPR-101L



2CDC21002V0017

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, | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | EF460, EF750 | 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

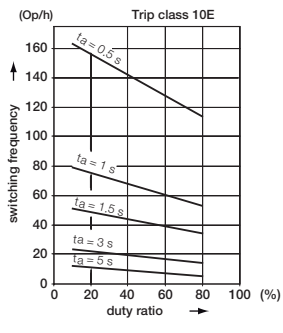
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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 |

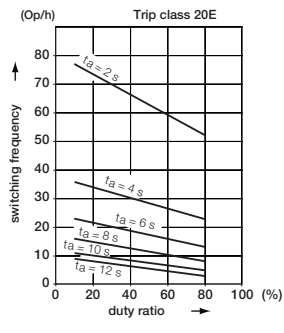
Auxiliary circuit according to IEC/EN

| | |
|---|--------------------------|
| 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 |

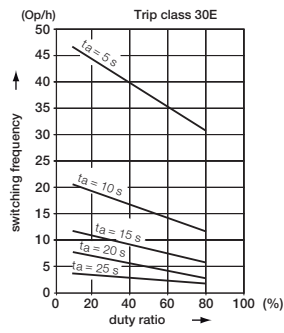
Technical diagram – Intermittent periodic duty



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 mm ² | 4 ... 70 mm ² | 10 ... 95 mm ² |
| | 2 x | 4 ... 35 mm ² | 4 ... 35 mm ² | 10 ... 35 mm ² |
|  Flexible (1) | 1 x | 4 ... 35 mm ² | 4 ... 50 mm ² | 10 ... 70 mm ² |
| | 2 x | 2.5 ... 35 mm ² | 4 ... 35 mm ² | 10 ... 35 mm ² |
| 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 (Pozi driv 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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² |
| 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 (Pozi driv 2) |

EF205, EF370 electronic overload relays – 63 to 380 A

Ordering details



EF205-210

2CDC21010V0012



EF370-380

2CDC21013V0012



KPR-101L

19FC151224F0002



DRS-F

2CDC21002V0017

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AF145, AF185, AF190, AF205

| | | | | | |
|------------|----------------------|---------------|-----------|-----------------|-------|
| 63 ... 210 | 1250 A, fuse type gG | 10E, 20E, 30E | EF205-210 | 1SAX531001R1101 | 1.210 |
|------------|----------------------|---------------|-----------|-----------------|-------|

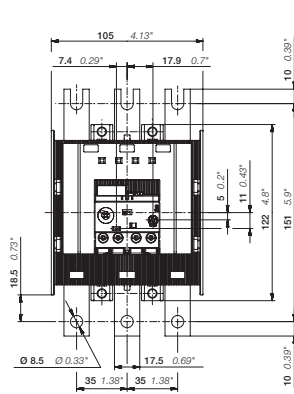
Suitable for AF210, AF260, AF265, AF300, AF305, AF370

| | | | | | |
|-------------|----------------------|---------------|-----------|-----------------|-------|
| 115 ... 380 | 1600 A, fuse type gG | 10E, 20E, 30E | EF370-380 | 1SAX611001R1101 | 1.430 |
|-------------|----------------------|---------------|-----------|-----------------|-------|

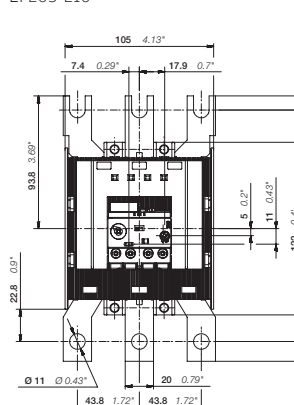
(1) ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

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, | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | EF460, EF750 | 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

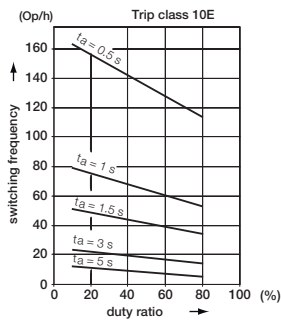
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| 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

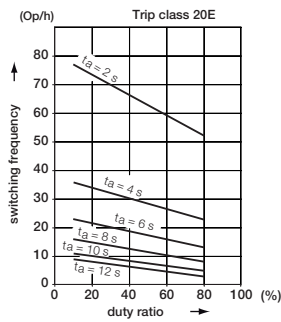
| | |
|---|---------------------|
| Type | EF205, EF370 |
| Rated operational voltage Ue | 600 V AC / DC |
| Conventional free air thermal current Ith | 6 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.C. + 1 N.O. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization 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



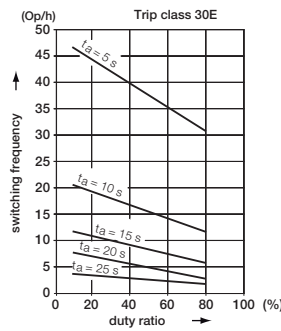
Trip class 10E

2CDD23200BF0214



Trip class 20E

2CDD23200BF0214



Trip class 30E

2CDD23200BF0214

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 mm ² | 50 ... 240 mm ² |
| | 2 x | 16 ... 120 mm ² | 50 ... 150 mm ² |
|  Flexible | 1 x | 16 ... 185 mm ² | 50 ... 240 mm ² |
| | 2 x | 16 ... 120 mm ² | 50 ... 150 mm ² |
|  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 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² |
| Stranded acc. to UL/CSA | | AWG 18-10 |
| Flexible acc. to UL/CSA | | AWG 18-10 |
| Stripping length | | 9 mm |
| Tightening torque | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | M3.5 (Poqidriv 2) |

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details



EF460-500

2CDC231013F0013



EF750-800

2CDC231014F0013



EF1250DU-1250

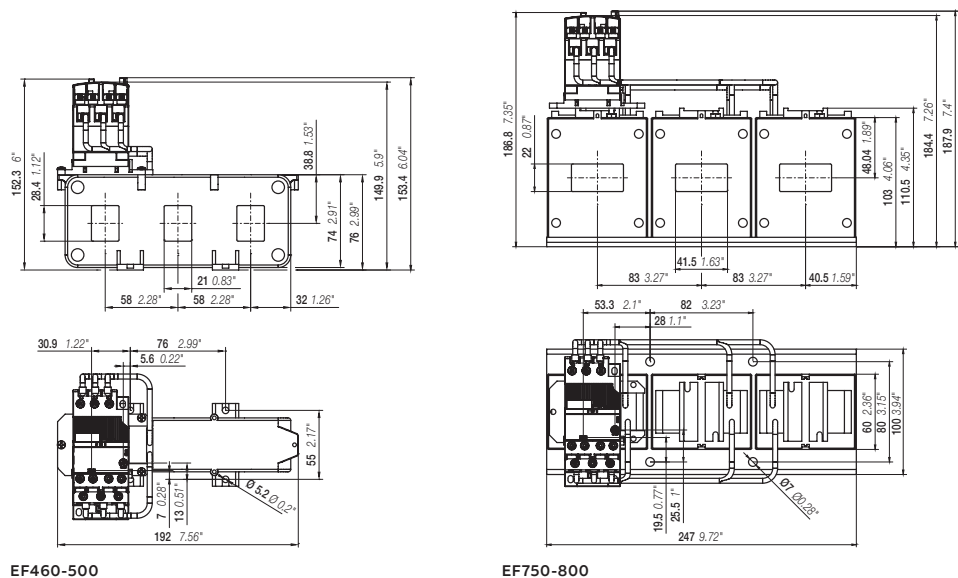
2CDC231014F0013

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 | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|--|--|---------------|---------------|-----------------|-------------------|
| EF460 electronic overload relay, suitable for AF400, AF460 (1) | | | | | |
| 150 ... 500 | 690 V: 630 A, Type gG 1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF460-500 | 1SAX721001R1101 | 1.170 |
| EF750 electronic overload relay, suitable for AF580, AF750 (1) | | | | | |
| 250 ... 800 | 690 V: 800 A, Type gG 1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF750-800 | 1SAX821001R1101 | 3.905 |
| EF1250DU electronic overload relay, suitable for AF1350, AF1650, AF2050 | | | | | |
| 375 ... 1250 | 500 V: 1600 A, Type gG | 10E, 20E, 30E | EF1250DU-1250 | 1SFA739001R1001 | |

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

Main dimensions mm, inches



EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details



KPR-101L

1SFA616162R1014



DRS-F

2CDC110020V00017

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, | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | EF460, EF750 | 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

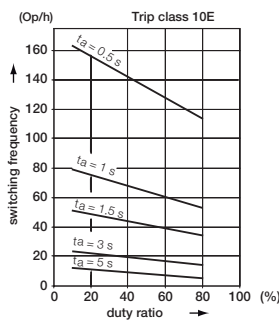
Main circuit – Utilization characteristics according to IEC/EN

| 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

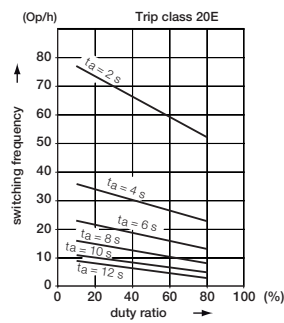
| Type | EF460 | EF750 | EF1250DU |
|---|-------------------|--------|----------|
| Rated operational voltage Ue | 600 V AC / DC | | |
| Conventional free air thermal current Ith | 6 A | | |
| Rated frequency | DC, 50/60 Hz | | |
| Number of poles | 1 N.C. + 1 N.O. | | |
| Ie / Rated operational current 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



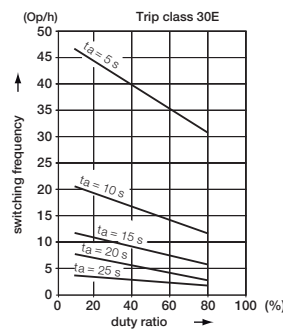
Trip class 10E

2CDC233002F0214



Trip class 20E

2CDC233002F0214



Trip class 30E

2CDC233002F0214

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 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 | | |
| Storage | -25 ... +70 °C | | |
| Ambient air temperature compensation | -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 mm ² | |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | |
| 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

2CDC31028F0013



WRH-F

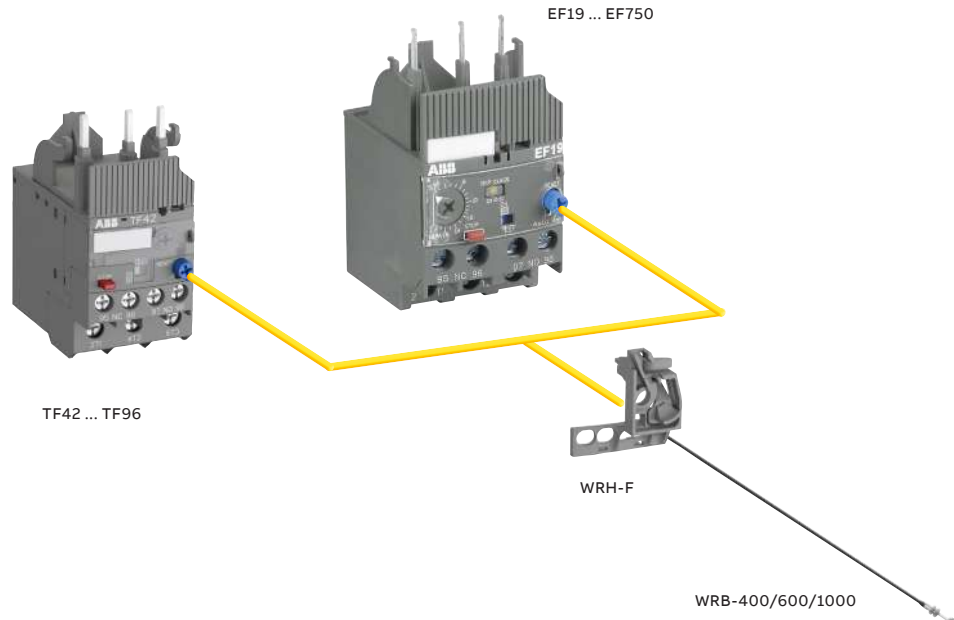
2CDC31027F0013

The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

| Suitable for | Description | Length mm | Type | Order code | Weight (1 pce) kg |
|---|--|--------------|----------|-----------------|-------------------------|
| Holder | | | | | |
| TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | Holder for tool less direct mounting | | WRH-F | 1SAZ701903R1001 | 0.006 |
| Bowden wire with actuator | | | | | |
| WRH-F | Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm | 400 | WRB-400 | 1SAZ701903R1011 | 0.030 |
| | | 600 | WRB-600 | 1SAZ701903R1012 | 0.040 |
| | | 1000 | WRB-1000 | 1SAZ701903R1013 | 0.060 |
| IP54 gasket | | | | | |
| WRB-400 WRB-600 WRB-1000 | IP54 Panel seal gasket | | WRBG | 1SAZ701903R1030 | 0.037 |

Overload relays with accessory wire reset (WRH, WRB)





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

www.abb.com/productdetails/AF09-30-10-13

or

www.abb.com/productdetails/1SBL137001R1310

Certifications and approvals

General technical data

5/2 **Certifications and approvals**

General technical data

- 5/5 Coordination with short-circuit protection devices
- 5/8 Standards, specifications and certifying organizations
- 5/10 Terms and technical definitions
- 5/13 Standards and utilization categories
- 5/15 North American standards and utilization categories
- 5/16 Degrees of protection
- 5/17 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.

| Mark | Certifications | | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|--|--|---|---|--|--|---|---|--|--|---|--|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  KC Korea |  BV France |  DNV-GL |  LR Gr. Britain |  RINA Italy |  ABS USA |  RMRS Russia |  CCS China shipping |  ClassNK Japan |
| 3-pole contactors with screw terminals | | | | | | | | | | | | | | |
| 4 to 45 kW | | | | | | | | | | | | | | |
| AC operated AFC09, AFC12, AFC16, AFC26, AFC30, AFC38 | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E312527 | | | | | | | | | | | | | | |
| AC operated AFC40, AFC52, AFC65, AFC80, AFC96 | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E312527 | | | | | | | | | | | | | | |
| (1) For 2650 only. | | | | | | | | | | | | | | |
| 4-pole contactors with screw terminals | | | | | | | | | | | | | | |
| 25 to 125 A, AC-1 | | | | | | | | | | | | | | |
| AC operated AFC09, AFC16, AFC26, AFC38 | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E319322 | | | | | | | | | | | | | | |
| AC operated AFC40, AFC52, AFC80 | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E312527 | | | | | | | | | | | | | | |
| (1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface: only DNV is available. All AF contactors are  (RCM) marked. | | | | | | | | | | | | | | |
| 3-pole contactors with Push-in Spring terminals | | | | | | | | | | | | | | |
| 4 to 11 kW | | | | | | | | | | | | | | |
| AC operated AFC09..K AFC12..K, AFC16..K | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E312527 | | | | | | | | | | | | | | |
| AFC26..K | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | | | | | | | | | | | | |
| Contactors relays with Push-in Spring terminals | | | | | | | | | | | | | | |
| AC operated 4-pole, 8-pole - NFC..K | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| E252354 | | | | | | | | | | | | | | |
















05


Certifications and approvals

| Mark | Certifications | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|---|--|---|--|---|---|---|--|--|--|--|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  BV France |  DNV-GL |  Lloyd's Register Gr. Britain |  RINA Italy |  ABS USA |  RMRS Russia |  CCS China shipping |  ClassNK Japan |
| Accessories for AFC09 ... AFC96 and NFC contactor relays | | | | | | | | | | | | | |
| Auxiliary contacts | | | | | | | | | | | | | |
| CA4, CC4 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| CAT4 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| CAL4 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| CE5...D0.1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| CE5...D2 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| CE5...W0.1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| CE5...W2 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| CA4..K, CAL4..K | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Electronic timer | | | | | | | | | | | | | |
| TEF4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | | | | | | | | |
| Mechanical / electrical interlock unit | | | | | | | | | | | | | |
| VEM4 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | |
| Mechanical interlock units | | | | | | | | | | | | | |
| VM4, VM96-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Interface relay | | | | | | | | | | | | | |
| RA4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | | | | | | | | |
| Latching unit | | | | | | | | | | | | | |
| WA4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | | | | | | | | |
| Connecting links with manual motor starters | | | | | | | | | | | | | |
| BEA16-4(KF), BEA26-4, BEA38-4(KF), BEA65-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Connection sets for reversing contactors | | | | | | | | | | | | | |
| BER16-4(KF), BER38-4(KF) | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| BER65-4, BER96-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Connection sets for star-delta starters | | | | | | | | | | | | | |
| BEY16-4(KF), BEY38-4(KF) | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| BEY65-4, BEY96-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Terminal connecting strips and shorting bars | | | | | | | | | | | | | |
| LY16-4, LY38-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| LH38-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| LF16-4, LF38-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| LG16-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| LK96-4F | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Additional coil terminal blocks | | | | | | | | | | | | | |
| LD38-4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Additional terminal blocks | | | | | | | | | | | | | |
| LDC4 | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Protective covers | | | | | | | | | | | | | |
| BX4, BX4-CA | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Terminal shrouds | | | | | | | | | | | | | |
| LT65-30 ... LT96-30 | | | - | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| LT52-40 ... LT80-40 | | | - | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Marine approvals not needed for this accessory.

Certifications and approvals

| Mark | Certifications | | | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|--|--|---|--|--|---|---|--|--|---|--|--|--|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  ATEX |  IEC Ex |  KC Korea |  BV France |  DNV-GL |  LR Gr.Britain |  RINA Italy |  ABS USA |  RMRS Russia |  ClassNK Japan |
| Function marker | | | | | | | | | | | | | | | |
| BA4 | | | ■ E252354 | | | | □ | | □ | □ | □ | □ | □ | □ | □ |
| Fixing clip | | | | | | | | | | | | | | | |
| BB4 | | | ■ E312527 | | | | □ | | □ | □ | □ | □ | □ | □ | □ |
| Manual motor starters | | | | | | | | | | | | | | | |
| MS116 | | | ■ E137861 | ■ | ■ | | | | ■ | ■ | | | ■ | ■ | |
| MS132 | | | ■ E137861 E345003 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| MS165 | | | ■ E137861 E345003 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| MS132-K | | | ■ | ■ | ■ | | | | ■ | ■ | | | ■ | ■ | |
| Manual motor starters magnetic only | | | | | | | | | | | | | | | |
| MO132 | | | ■ E137861 E345003 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| MO165 | | | ■ E137861 E345003 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| Circuit breaker for transformer protection | | | | | | | | | | | | | | | |
| MS132-T | | | ■ E137861 | ■ | ■ | | | | ■ | ■ | | | | | |
| MS132-KT | | | ■ E137864 | ■ | ■ | | | | | | | | | | |
| Thermal overload relays | | | | | | | | | | | | | | | |
| TF42 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| TF65 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| TF96 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| Electronic overload relays | | | | | | | | | | | | | | | |
| 0.10...45 A | | | | | | | | | | | | | | | |
| E16DU | | | ■ E48139 | ■ | ■ | | | | | | | | | ■ | |
| EF19 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| EF45 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| 20...150 A | | | | | | | | | | | | | | | |
| EF65 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |
| EF96 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | |

(1) Valid for production date week 47, 2018. ■ Marine approvals not needed for this accessory.
 (2) IECEx is valid for product produced from week15, 2017. (3) EF65-56 has no RINA approval and ATEX certification is valid for EF65-56 produced from week 47, 2015.
 (4) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are  (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

05

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:
 - $r = 1 \text{ kA}$ for $I_e \text{ AC-3/AC-3e} \leq 16 \text{ A}$
 - $r = 3 \text{ kA}$ for $16 \text{ A} < I_e \text{ AC-3/AC-3e} \leq 63 \text{ A}$
 - $r = 5 \text{ kA}$ for $63 \text{ A} < I_e \text{ AC-3/AC-3e} \leq 125 \text{ A}$ etc.
- Short-circuit condition tests at the rated conditional short-circuit current “Iq”.
This is the maximum prospective current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) UL 60947-4-1 defines two types of coordination between the branch circuit protective device and the motor starter according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

- Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.
- Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Combination Motor Controllers (CMC)

Article 409 of the National Electrical Code (NFPA 70) requires industrial control panels to be marked with a SCCR (Short-Circuit Current Rating). According to the National Electrical Code (NEC), UL 508A Supplement SB - Standard for Industrial Control Panels - provides an accepted method for determining the SCCR of the control panel. Industrial control panel manufacturers can use Selected Optimized Coordination tool (SOC) for guidance. SOC tool is intended for those manufacturers that purchase the discrete components and assemble combination motor controllers within their panels to achieve a combination SCCR that is higher than the lowest-rated individual component.

Failure of components under fault conditions can lead to safety concerns for personnel working in close proximity to electrical equipment. The harmonized UL 60947-4-1 and CSA C22.2 No.60947-4-1 standards define acceptance criteria for these components.

Several criteria exist for all devices:

- The short-circuit protective device successfully interrupts the fault
- The enclosure door has not blown open, and it remains possible to open it manually
- No damage to, or separation between, the conductors and the terminals
- No damage to the insulating bases of live parts, and no access to current carrying parts.

For Combination Motor Controllers, the included circuit-breaker / manual motor starter or switch should be capable of being manually operated, and should not be damaged, exposing conductive parts.

Coordination with short-circuit protection devices

Identification number A, C, D, E or F is assigned as a reference by the submitter for each combination motor controller (CMC) construction or rating:

- Type A fusible combination: disconnecter, 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.

- 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



For additional information, please consult our application note for NEMA Premium® Efficiency motor starting

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

| Starter Type | Rated voltage | Motor rated power | Rated short-circuit current | Coordination type | Protection device | Overload protection |
|-----------------------------|---------------|-------------------|-----------------------------|-------------------|-----------------------------|----------------------------|
| Direct-on-line starter | 230 V AC | 0.06 kW | 12 kA | IEC Type 1 | Air circuit-breaker | Embedded |
| Star-Delta starter | 400 V AC | 0.09 kW | 16 kA | IEC Type 2 | Switch fuse | Thermal overload relay |
| Soft starter (in Line) | 415 V AC | 0.12 kW | 20 kA | | Molded case circuit-breaker | Electronic overload relay |
| Soft starter (inside Delta) | 440 V AC | 0.18 kW | 25 kA | | Manual motor starter | Universal motor controller |
| Drive starter | 480 V AC | 0.25 kW | 30 kA | | | |
| | 500 V AC | 0.37 kW | 35 kA | | | |

To consult the last information about SOC tool, please see:

<https://new.abb.com/low-voltage/support/software/selected-optimized-coordination-soc>



UL Component ratings

| Component type | Component | Rated voltage | Rated short-circuit current | Protection device | Minimum enclosure volume |
|----------------|-----------|-----------------|-----------------------------|-----------------------------|--------------------------|
| Soft starter | AF09 | 240 V AC (3-Ph) | 5 kA | Fuse | 182 cu in |
| | AF12 | 480 V AC (3-Ph) | 10 kA | Molded case circuit-breaker | 218 cu in |
| | AF16 | 600 V AC (3-Ph) | 18 kA | Manual motor starter | 300 cu in |
| | AF26 | | 20 kA | | 480 cu in |
| | AF30 | | 22 kA | | 720 cu in |
| | AF38 | | 25 kA | | 960 cu in |

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 I_e .

Current rated by the manufacturer. It is mainly based on the rated operational voltage U_e , the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional free air thermal current I_{th}

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 U_c 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 ($L/R = \text{mH}/\Omega = \text{ms}$).
- 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 U_c

Control voltage value for which the control circuit is sized.

Terms and technical definitions

Rated operational voltage U_e

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated insulation voltage U_i

Reference voltage for dielectric tests and creepage distances.

Rated impulse withstand voltage U_{imp}

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 starter 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 conditions | | | Breaking conditions | | | Making and breaking capacities - 50 operating cycles | | | | | |
| | I/Ie | U/Ue | Cos. φ or L/R (ms) | I/Ie | U/Ue | Cos. φ or L/R (ms) | Making conditions | | | Breaking conditions | | |
| | | | | | | 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 conditions | | | Breaking conditions | | | Making and breaking capacities - 50 operating cycles | | | | | |
| | I/Ie | U/Ue | T0.95 | I/Ie | U/Ue | T0.95 | Making conditions | | | Breaking conditions | | |
| | | | | | | 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 m³ of enclosure).

The table below gives the cases where heating is necessary.

| Environment | | Operating conditions | Climate | Internal heating of enclosure |
|---------------------------|-------------------------------------|--------------------------------------|-----------------------|-------------------------------|
| Inside premises | No running water no condensation | Continuous or not | All climates | Without |
| | With running water | Continuous | All climates | Without |
| | | Frequent or long stops | Temperate Tropical | Without With |
| Outside, sheltered | No running water no condensation | Continuous or not | Temperate | Without |
| | | | Tropical | With |
| Outside or by the seaside | With running water | Continuous Frequent or long stops | All climates | Without |
| | | | Temperate | Without |
| | | | Tropical | With |

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).



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

www.abb.com/productdetails/AF09-30-10-13

www.abb.com/productdetails/1SBL137001R1310

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Order code classification

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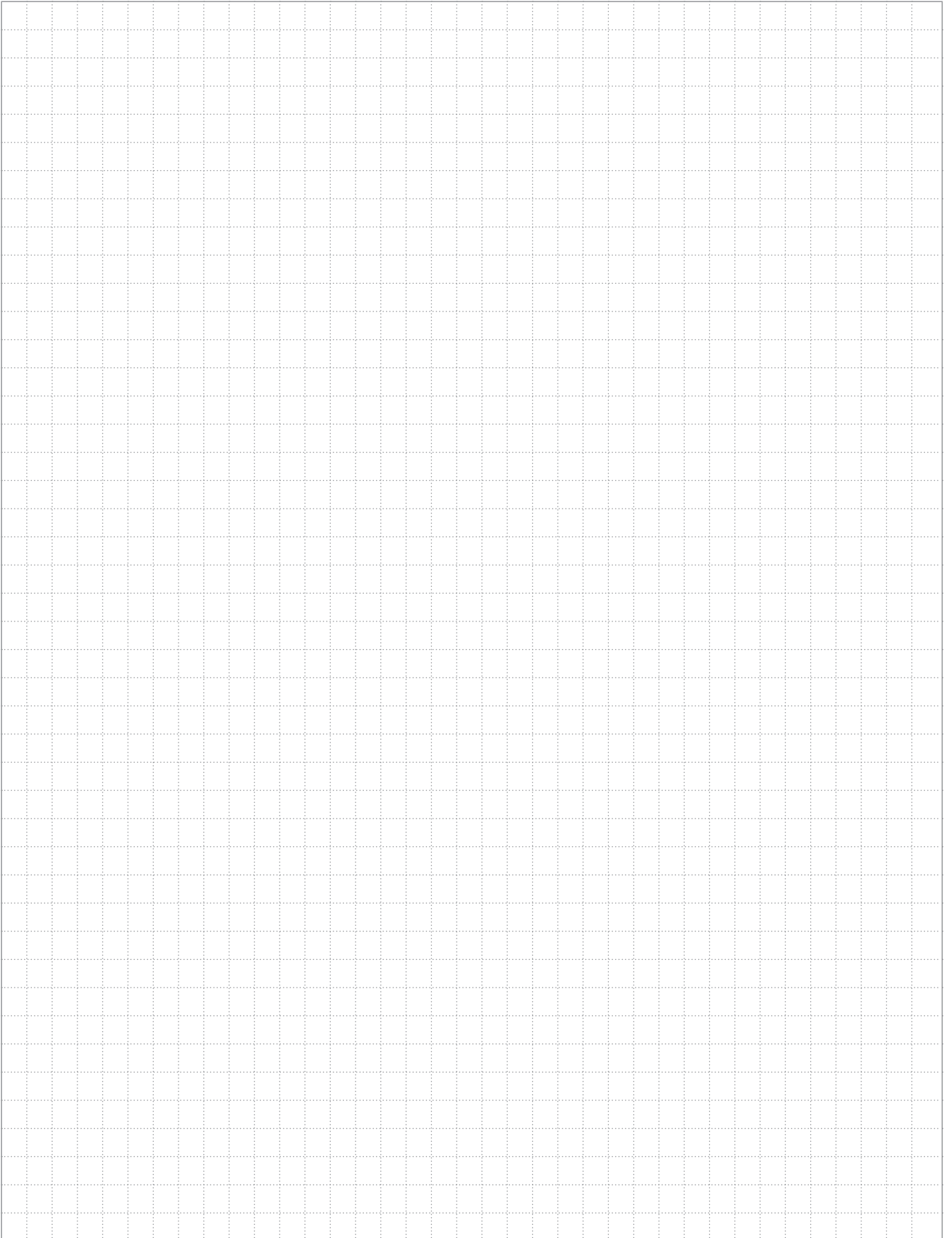
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Notes





—
ABB France
Electrification Business
Low Voltage Products and Systems
2 rue d'Arsonval
F-69687 Chassieu cedex / France

—
ABB STOTZ-KONTAKT GmbH
Electrification Business
Low Voltage Products and Systems
Eppelheimer Straße 82
D-69123 Heidelberg / Germany

—
ABB AB
Electrification Business
Low Voltage Products and Systems
Protection & Connection
SE-721 61 Västerås / Sweden

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