

AF09-30-10-.. / AF09Z-30-10-.. 3-pole Contactors AC / DC Operated - with Screw Terminals

AF09(Z) contactors are used for controlling power circuits up to 690 V AC and 220 V DC.

They are mainly used for controlling 3-phase motors, non-inductive or slightly inductive loads.

- AF..(Z) contactors include an electronic coil interface providing reduced pull-in and holding consumption, particularly for AC control circuits
- Only four coils are needed to cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC.

AF..(Z) offer extended operating limits and are suitable worldwide for different control voltages. e.g.: the coil 100...250 V 50/60 Hz - DC is suitable for Europe (230 V 50 Hz) and for North America (120 V 60 Hz and 208 V 60 Hz).

AF..(Z) contactors can manage large control voltage variations

- AF.Z contactors equipped with a 24...60 V 50/60 Hz - 20...60 V DC coil allow direct control by 24 V DC 500 mA PLC-output
- AF.Z contactors withstand short voltage dips and voltage sags (SEMI F47-0706 compliance)
- AF..(Z) contactors have built-in surge protection and do not require additional surge suppressors.



| | | | |
|--|--|------|--|
| | | 4 kW | |
| | | 5 hp | |

3D CAD outline drawings available on «Control Product 3D» portal

Ordering Details

| IEC | UL/CSA | Control voltage | | Main contacts | Auxiliary contacts fitted | Type | Order code | EAN | Weight |
|-------------|----------------------|---------------------|------|---------------|---------------------------|------|------------|-----|-----------------------|
| Rated power | 3-phase motor rating | Uc min. ... Uc max. | | | | | | | Pack ^(ing) |
| 400 V | | | | | | | | | |
| AC-3 | 480 V | | | | | | | | 1 piece |
| kW | hp | V 50/60 Hz | V DC | | | | | | kg |

3-pole Contactors

| 4 | 5 | 24...60 | 20...60 | 3 0 | 1 0 | AF09-30-10-11 | 1SBL137001R1110 | 3471523110014 | 0.270 |
|---|---|-----------|-----------|-----|-----|---------------|-----------------|---------------|-------|
| | | 48...130 | 48...130 | 3 0 | 1 0 | AF09-30-10-12 | 1SBL137001R1210 | 3471523110021 | 0.270 |
| | | 100...250 | 100...250 | 3 0 | 1 0 | AF09-30-10-13 | 1SBL137001R1310 | 3471523110038 | 0.270 |
| | | 250...500 | 250...500 | 3 0 | 1 0 | AF09-30-10-14 | 1SBL137001R1410 | 3471523110045 | 0.310 |

Note: AF09-30-10-11 not suitable for a direct control by PLC-output. AF09-30-10-11 available in some countries: please consult your ABB representative.

3-pole Contactors - Low Consumption



| 4 | 5 | - | 12...20 | 3 0 | 1 0 | AF09Z-30-10-20 | 1SBL136001R2010 | 3471523113206 | 0.310 |
|---|---|-----------|-----------|-----|-----|----------------|-----------------|---------------|-------|
| | | 24...60 | 20...60 | 3 0 | 1 0 | AF09Z-30-10-21 | 1SBL136001R2110 | 3471523113213 | 0.310 |
| | | 48...130 | 48...130 | 3 0 | 1 0 | AF09Z-30-10-22 | 1SBL136001R2210 | 3471523113220 | 0.310 |
| | | 100...250 | 100...250 | 3 0 | 1 0 | AF09Z-30-10-23 | 1SBL136001R2310 | 3471523113237 | 0.310 |

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

Certifications and Approvals

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

Main Pole - Utilization Characteristics according to IEC

| | | |
|---|--|--|
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated operational voltage U_e max. | 690 V | |
| Rated frequency limits | 25 ... 400 Hz | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ °C}$ | 35 A | |
| with conductor cross-sectional area | 6 mm ² | |
| AC-1 Utilization category for air temperature close to contactor | | |
| I_e / AC-1 rated operational current | $\theta \leq 40\text{ °C}$ | 25 A |
| U _e max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 60\text{ °C}$ | 25 A |
| | $\theta \leq 70\text{ °C}$ | 22 A |
| with conductor cross-sectional area | 4 mm ² | |
| AC-3 Utilization category for air temperature close to contactor $\theta \leq 60\text{ °C}$ (for 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors) | | |
| I_e / AC-3 max. rated operational current | 220-230-240 V | 9 A |
|  3-phase motors | 380-400 V | 9 A |
| | 415 V | 9 A |
| | 440 V | 9 A |
| | 500 V | 9.5 A |
| | 690 V | 7 A |
| | AC-3 rated operational power | 220-230-240 V |
|  1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 380-400 V | 4 kW |
| | 415 V | 4 kW |
| | 440 V | 4 kW |
| | 500 V | 5.5 kW |
| | 690 V | 5.5 kW |
| | Rated making capacity AC-3 | 10 x I _e AC-3 acc. to IEC 60947-4-1 |
| Rated breaking capacity AC-3 | 8 x I _e AC-3 acc. to IEC 60947-4-1 | |
| AC-8a Utilization category (without thermal overload relay - U _e 400 V - $\theta \leq 40\text{ °C}$) | | |
| I_e / AC-8a rated operational current | 12 A | |
| AC-8a rated operational power | 5.5 kW | |
| Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded U _e $\leq 500\text{ V AC}$ - gG type fuse | 25 A | |
| Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 300 A |
| | 10 s | 150 A |
| | 30 s | 80 A |
| | 1 min | 60 A |
| | 15 min | 35 A |
| Maximum breaking capacity | at 440 V | 250 A |
| cos $\phi = 0.45$ | at 690 V | 106 A |
| Heat dissipation per pole | I_e / AC-1 | 0.8 W |
| | I_e / AC-3 | 0.1 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h |
| | AC-3 | 1200 cycles/h |
| | AC-2, AC-4 | 300 cycles/h |

Built-in Auxiliary Contacts according to IEC

| | | |
|---|--------------------|---|
| Rated operational voltage U _e max. | | 690 V |
| Conventional free air thermal current I _{th} - θ ≤ 40 °C | | 16 A |
| Rated frequency limits | | 25 ... 400 Hz |
| Rated operational current I _e / 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 I _e AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| Rated operational current I _e / DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 16 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 gG type fuse | | 10 A |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10 ⁻⁷ |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Heat dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |

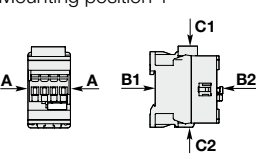
Main Pole - Utilization Characteristics according to UL / NEMA / CSA

| | | |
|--|-----------------|------------------------|
| Standards | | UL 508, CSA C22.2 N°14 |
| Rated operational voltage U _e max. | | 600 V |
| NEMA size | | 00 |
| NEMA continuous amp rating | thermal current | 9 A |
| NEMA maximum H.P. ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp |
| | 230 V AC | 1 hp |
| NEMA maximum H.P. ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp |
| | 230 V AC | 1-1/2 hp |
| | 460 V AC | 2 hp |
| | 575 V AC | 2 hp |
| UL General use rating | | |
| 600 V AC | | 25 A |
| With conductor cross-sectional area | | AWG 10 |
| 80 V DC - 1-pole | | 25 A |
| With conductor cross-sectional area | | AWG 10 |
| UL maximum 1-phase motor rating | | |
| Amp-rating | 120 V AC | 13.8 A |
| | 240 V AC | 10 A |
| Motor power | 120 V AC | 3/4 hp |
| | 240 V AC | 1-1/2 hp |
| UL maximum 3-phase motor rating | | |
| Amp-rating | 200-208 V AC | 7.8 A |
| | 220-240 V AC | 6.8 A |
| | 440-480 V AC | 7.6 A |
| | 550-600 V AC | 9 A |
| Motor power | 200-208 V AC | 2 hp |
| (for 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz 3-phase motors) | 220-240 V AC | 2 hp |
| | 440-480 V AC | 5 hp |
| | 550-600 V AC | 7.5 hp |
| Short-circuit protection | | |
| for contactors without thermal O/L relay - Motor protection excluded | | |
| Fuse rating | | 60 A |
| Fuse type, 600 V | | NTD |
| Max. electrical switching frequency | | |
| for general use | | 600 cycles/h |
| for motor use | | 1200 cycles/h |

Built-in Auxiliary Contacts according to UL / CSA

| | |
|---|--------------------|
| Max. rated operational voltage U_e max. | 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 |

General Technical Data

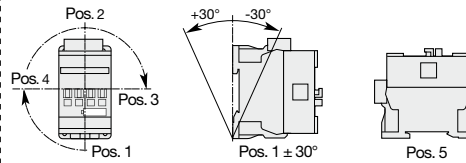
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|---|---|
| Rated insulation voltage U_i acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Rated impulse withstand voltage U_{imp} | 6 kV |
| Electromagnetic compatibility | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A |
| Ambient air temperature close to contactor | |
| Operation fitted with thermal overload relay | -25 ... +60 °C |
| without thermal overload relay | -40 ... +70 °C |
| Storage | -60 ... +80 °C |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q |
| Operating altitude | ≤ 3000 m |
| Mechanical durability | |
| Number of operating cycles | 10 millions operating cycles |
| Max. switching frequency | 3600 cycles/h |
| Shock withstand acc. 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 |
| 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 |

Magnet System Characteristics

| | | |
|---|-------------------------------------|--|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | at $\theta \leq 60$ °C 0.85 x U_c min ... 1.1 x U_c max at $\theta \leq 70$ °C 0.85 x U_c min ... U_c max |
| | DC supply | at $\theta \leq 60$ °C 0.85 x U_c min ... 1.1 x U_c max at $\theta \leq 70$ °C (AF) 0.85 x U_c min ... U_c max - (AF..Z) 0.85 x U_c min ... 1.1 x U_c max |
| AC control voltage 50/60 Hz | Rated control circuit voltage U_c | 24 ... 500 V AC |
| | Coil consumption | Average pull-in value (AF) 50 VA - (AF..Z) 16 VA Average holding value (AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W |
| DC control voltage | Rated control circuit voltage U_c | 12 ... 500 V DC |
| | Coil consumption | Average pull-in value (AF) 50 W - (AF..Z) 12 ... 16 W Average holding value (AF) 2 W - (AF..Z) 1.7 W |
| PLC-Output control | | (AF..Z) ≥ 500 mA 24 V DC |
| Drop-out voltage in % of U_c min. | | ≤ 60 % U_c min |
| Voltage sag immunity according to SEMI F47-0706 | | (AF..Z) conditions of use on request |
| Dips withstand (level 0% according to IEC 61000-4-11) -20 °C ≤ θ ≤ +60 °C | | (AF..Z) 22 ms average for $U_c = 24$... 250 V 50/60Hz |
| Operating time | | |
| between coil energization and: | N.O. contact closing | 40 ... 95 ms |
| | N.C. contact opening | 38 ... 90 ms |
| between coil de-energization and: | N.O. contact opening | 11 ... 95 ms |
| | N.C. contact closing | 13 ... 98 ms |

Mounting Characteristics

Mounting positions



Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38

Mounting distances

The contactors can be assembled side by side.

Fixing

on rail according to IEC 60715, EN 60715
by screws (not supplied)

35 x 7.5 mm or 35 x 15 mm
2 x M4 screws placed diagonally

Connecting Characteristics

Main terminals



Screw terminals with cable clamp

Connecting capacity (min. ... max.)

Main conductors (poles)

| | | | | |
|--|-------------------------------------|------------------------------------|-----|------------------------------|
| | Rigid | solid ($\leq 4 \text{ mm}^2$) | 1 x | 1 ... 6 mm ² |
| | | stranded ($\geq 6 \text{ mm}^2$) | 2 x | 1 ... 6 mm ² |
| | Flexible with non insulated ferrule | | 1 x | 0.75 ... 6 mm ² |
| | | | 2 x | 0.75 ... 6 mm ² |
| | Flexible with insulated ferrule | | 1 x | 0.75 ... 4 mm ² |
| | | | 2 x | 0.75 ... 2.5 mm ² |
| | Bars or lugs | | L < | 9.6 mm |

Capacity according to UL/CSA 1 or 2 x AWG 16 ... 10

Stripping length 10 mm

Auxiliary conductors

(built-in auxiliary terminals + 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 |
| | Bars or lugs | | L < | 8 mm |

Capacity according 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

Screw terminals

(delivered in open position, screws of unused terminals must be tightened)

Main terminals M3.5

Coil terminals M3.5

Built-in auxiliary terminals M3.5

Screwdriver type

Flat $\varnothing 5.5$ / Pozidriv 2

Tightening torque

Main pole terminals 1.5 Nm / 13 lb.in

Coil terminals 1.2 Nm / 11 lb.in

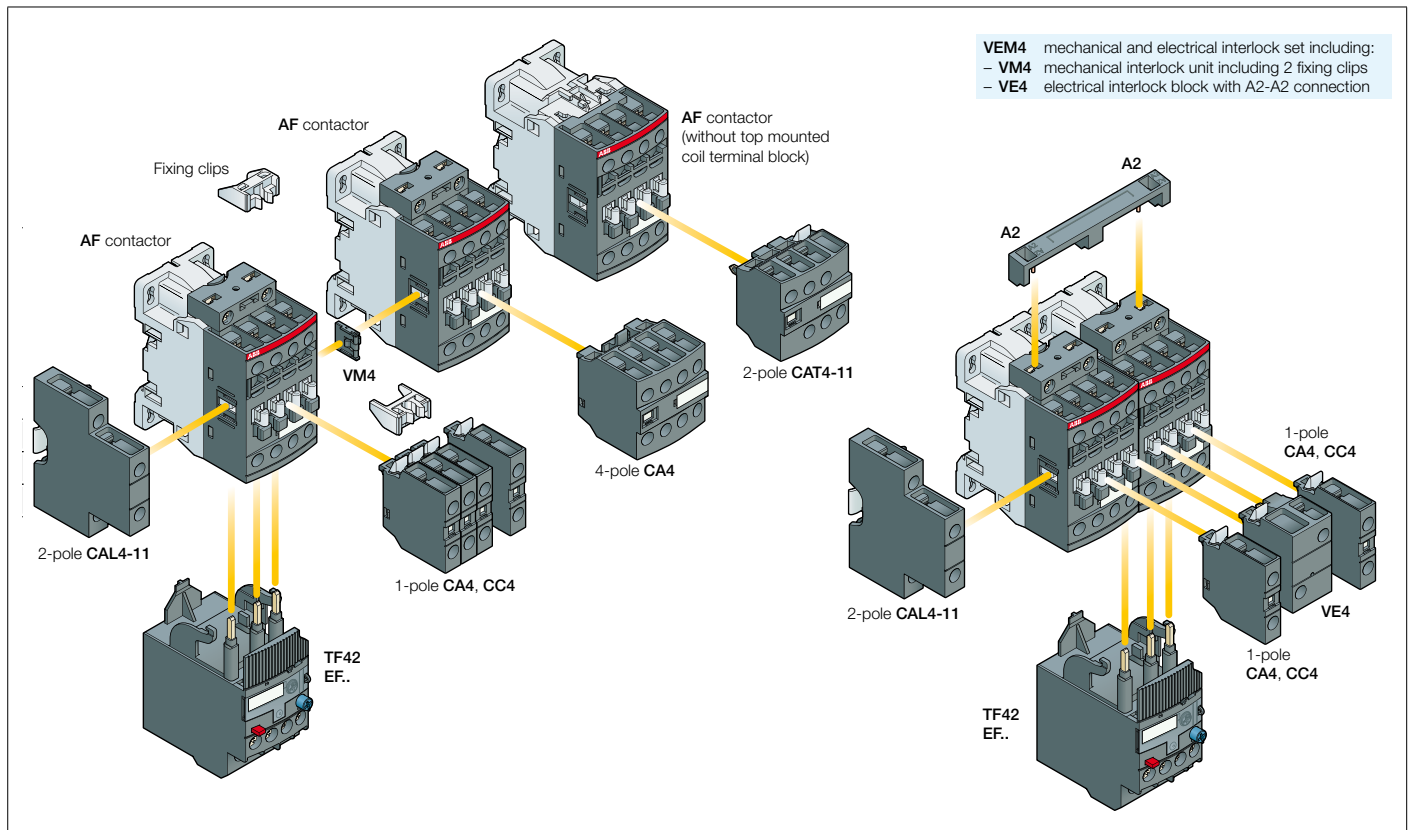
Built-in auxiliary terminals 1.2 Nm / 11 lb.in

Accessory Fitting Details for a 3-pole Contactor

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


| Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories | |
|---|-----------------------------|---------------------------|------|----------------|------------|---|--------------------------|------------|
| | | Auxiliary contact blocks | | | | | Auxiliary contact blocks | |
| | | 1-pole CA4 | | 2-pole CAT4-11 | 4-pole CA4 | VEM4 | Left side | Right side |
| | | 1-pole CC4 | | | | | 2-pole CAL4-11 | |
| Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5 | | | | | | | | |
| 3 0 1 0 | ▶ | 4 max. | or 1 | | or 1 | – | + 1 | – |
| | | 2 max. | or 1 | | – | – | + 1 | + 1 |
| | | 3 max. | – | | – | + 1 | + 1 | or 1 |

Overview of main accessories (other accessories available)



Main Accessories

Ordering Details

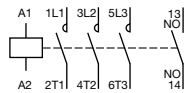
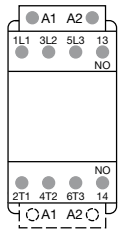
| Description | Auxiliary contacts  | Type | Order code | EAN | Pack ^(ing) piece | Weight | |
|--|---|---------|-----------------|-----------------|-----------------------------|------------|-------|
| | | | | | | kg (1 pce) | |
| Additional auxiliary contact blocks | Front-mounted instantaneous auxiliary contact blocks | 0 1 - - | CA4-01 | 1SBN010110R1001 | 3471523130029 | 1 | 0.014 |
| | | 1 0 - - | CA4-10 | 1SBN010110R1010 | 3471523130005 | 1 | 0.014 |
| | | 0 1 - - | CA4-01-T | 1SBN010110T1001 | 3471523130395 | 10 | 0.014 |
| | | 1 0 - - | CA4-10-T | 1SBN010110T1010 | 3471523130371 | 10 | 0.014 |
| | Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact | - - 0 1 | CC4-01 | 1SBN010111R1001 | 3471523130432 | 1 | 0.014 |
| | | - - 1 0 | CC4-10 | 1SBN010111R1010 | 3471523130425 | 1 | 0.014 |
| | Side-mounted instantaneous auxiliary contact blocks | 1 1 - - | CAL4-11 | 1SBN010120R1011 | 3471523130043 | 1 | 0.040 |
| | | 1 1 - - | CAL4-11-T | 1SBN010120T1011 | 3471523130418 | 10 | 0.040 |
| | Front-mounted instantaneous auxiliary contact blocks | 0 4 - - | CA4-04M | 1SBN010140R1104 | 3471523130197 | 1 | 0.055 |
| | | 1 3 - - | CA4-13M | 1SBN010140R1113 | 3471523130180 | 1 | 0.055 |
| | 2 2 - - | CA4-22M | 1SBN010140R1122 | 3471523130166 | 1 | 0.055 | |
| | 3 1 - - | CA4-31M | 1SBN010140R1131 | 3471523130173 | 1 | 0.055 | |
| | Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks | 1 1 - - | CAT4-11M | 1SBN010151R1111 | 3471523130074 | 1 | 0.040 |
| Interlocks | Mechanical interlock unit | | VM4 | 1SBN030105T1000 | 3471523130609 | 10 | 0.005 |
| | Mechanical and electrical interlock set | 1 1 - - | VEM4 | 1SBN030111R1000 | 3471523130616 | 1 | 0.035 |
| | Fixing clips | | BB4 | 1SBN110120W1000 | 3471523130722 | 50 | 0.002 |
| Connection accessories for starting | Connecting links with manual motor starters | | BEA16-4 | 1SBN081306T1000 | 3471523130739 | 10 | 0.025 |
| | Connection sets for reversing contactors | | BER16-4 | 1SBN081311R1000 | 3471523130777 | 1 | 0.045 |
| Additional coil terminal block | Additional coil terminal block | | LDC4 | 1SBN070156T1000 | 3471523130678 | 10 | 0.010 |
| Protective covers | Protective covers | | BX4 | 1SBN110108T1000 | 3471523130708 | 10 | 0.006 |
| | | | BX4-CA | 1SBN110109W1000 | 3471523130715 | 50 | 0.001 |
| Function markers | Function markers | | BA4 | 1SNA235156R2700 | 3472592351568 | 16 | 0.011 |
| | | | HTP500-BA4 | 1SNA235712R2400 | 3472592357126 | 1 | 0.220 |
| | | | SPRC 1 | 1SNA360010R1500 | 3472593600108 | 1 | 0.290 |

Note:

- CAT4: not fittable on AF..Z contactors with DC control voltage 12...20VDC.
- VM4: includes 2 fixing clips (BB4) to maintain together both contactors.
- VEM4: includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block and A2-A2 connection. VE4 block must be used with its A2-A2 connection to respect the electrical connection diagram.
- VE4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

Terminal Marking and Positioning

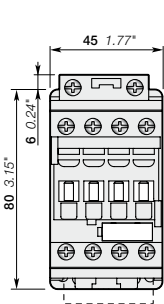
Standard devices without addition of auxiliary contacts



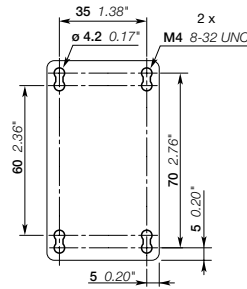
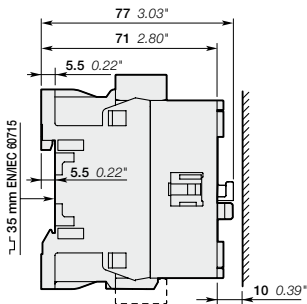
AF09-30-10.. / AF09Z-30-10..

AF09-30-10.. / AF09Z-30-10..

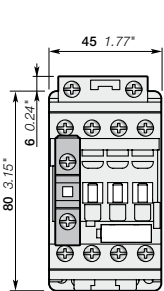
Dimensions mm, inches



AF09

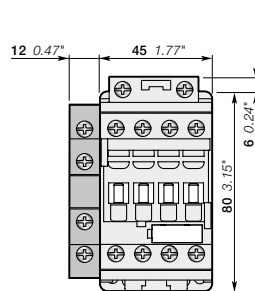
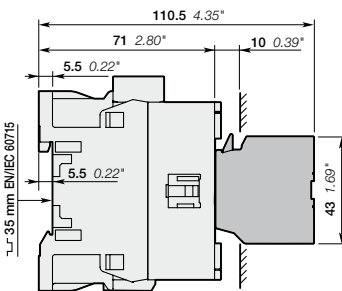


AF09



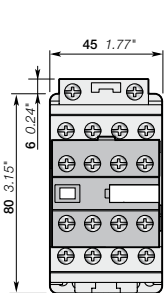
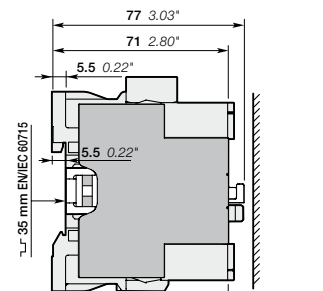
AF09

+ CA4, CC4 1-pole auxiliary contact block



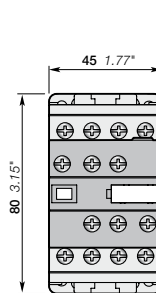
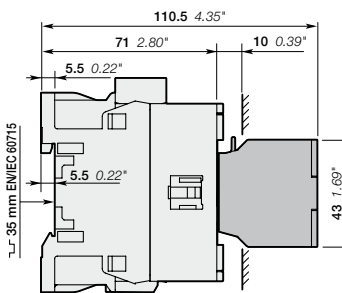
AF09

+ CAL4-11 2-pole auxiliary contact block



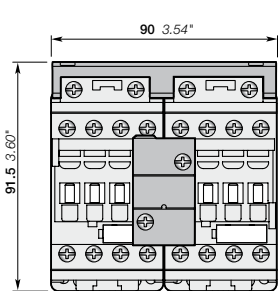
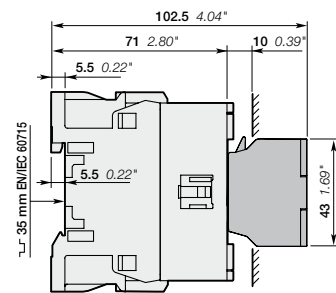
AF09

+ CA4 4-pole auxiliary contact block



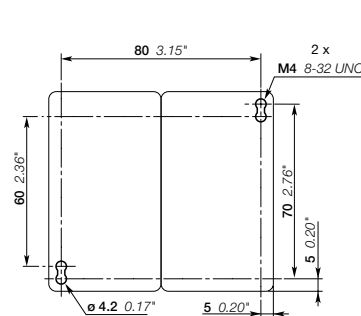
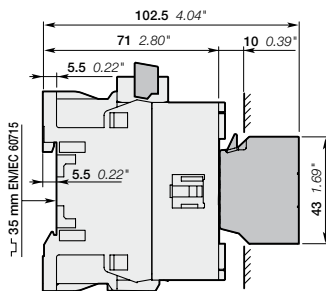
AF09

+ CAT4 2-pole auxiliary contact and coil terminal block



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+ VEM4 mechanical and electrical interlock set



AF09

+ VEM4 mechanical and electrical interlock set

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

Contact us

ABB France

Low Voltage Products Division

10, rue Ampère Z.I. - B.P. 114
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You can find the address of your local sales organisation
on the ABB home page
<http://www.abb.com/contacts> -> Low Voltage products

Note

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