

# AF09-30-01-.. / AF09Z-30-01-.. 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
- The built-in N.C. auxiliary contact is a mirror contact in compliance with annex F of IEC 60947-4-1.



		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 <sup>(ing)</sup>
400 V	480 V	V 50/60 Hz	V DC						1 piece
AC-3	hp								kg

### 3-pole Contactors

4	5	24...60	20...60	3 0	0 1	AF09-30-01-11	1SBL 137 001 R1101	3471523110113	0.270
		48...130	48...130	3 0	0 1	AF09-30-01-12	1SBL 137 001 R1201	3471523110120	0.270
		100...250	100...250	3 0	0 1	AF09-30-01-13	1SBL 137 001 R1301	3471523110137	0.270
		250...500	250...500	3 0	0 1	AF09-30-01-14	1SBL 137 001 R1401	3471523110144	0.310

Note: AF09-30-01-11 not suitable for a direct control by PLC-output. AF09-30-01-11 available in some countries: please consult your ABB representative.

### 3-pole Contactors - Low Consumption



4	5	-	12...20	3 0	0 1	AF09Z-30-01-20	1SBL 136 001 R2001	3471523113305	0.310
		24...60	20...60	3 0	0 1	AF09Z-30-01-21	1SBL 136 001 R2101	3471523113312	0.310
		48...130	48...130	3 0	0 1	AF09Z-30-01-22	1SBL 136 001 R2201	3471523113329	0.310
		100...250	100...250	3 0	0 1	AF09Z-30-01-23	1SBL 136 001 R2301	3471523113336	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

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## Main Pole - Utilization Characteristics according to IEC

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

## Built-in Auxiliary Contacts according to IEC

Rated operational voltage U <sub>e</sub> max.		690 V
Conventional free air thermal current I <sub>th</sub> - θ ≤ 40 °C		16 A
Rated frequency limits		25 ... 400 Hz
Rated operational current I <sub>e</sub> / 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 <sub>e</sub> AC-15 acc. to IEC 60947-5-1
Breaking capacity AC-15		10 x I <sub>e</sub> AC-15 acc. to IEC 60947-5-1
Rated operational current I <sub>e</sub> / 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 <sub>cw</sub>	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 <sup>-7</sup>
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

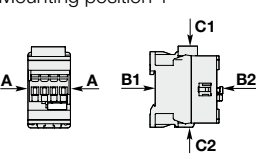
## Main Pole - Utilization Characteristics according to UL / NEMA / CSA

Standards		UL 508, CSA C22.2 N°14
Rated operational voltage U <sub>e</sub> 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

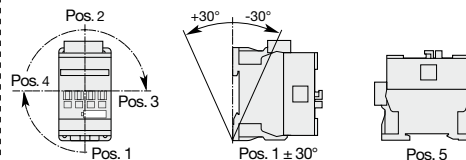
Rated insulation voltage $U_i$ acc. to IEC 60947-4-1	690 V
acc. to UL / CSA	600 V
Rated impulse withstand voltage $U_{imp}$	6 kV
Electromagnetic compatibility	Devices complying with IEC 60947-1 / EN 60947-1 - Environment A
Ambient air temperature close to contactor	
Operation fitted with thermal overload 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 ≤ $\theta$ ≤ +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 <sup>2</sup>
		stranded ( $\geq 6 \text{ mm}^2$ )	2 x	1 ... 6 mm <sup>2</sup>
	Flexible with non insulated ferrule		1 x	0.75 ... 6 mm <sup>2</sup>
			2 x	0.75 ... 6 mm <sup>2</sup>
	Flexible with insulated ferrule		1 x	0.75 ... 4 mm <sup>2</sup>
			2 x	0.75 ... 2.5 mm <sup>2</sup>
	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 <sup>2</sup>
			2 x	1 ... 2.5 mm <sup>2</sup>
	Flexible with non insulated ferrule		1 x	0.75 ... 2.5 mm <sup>2</sup>
			2 x	0.75 ... 2.5 mm <sup>2</sup>
	Flexible with insulated ferrule		1 x	0.75 ... 2.5 mm <sup>2</sup>
			2 x	0.75 ... 1.5 mm <sup>2</sup>
	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

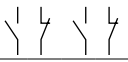

Main pole terminals 1.5 Nm / 13 lb.in

Coil terminals 1.2 Nm / 11 lb.in

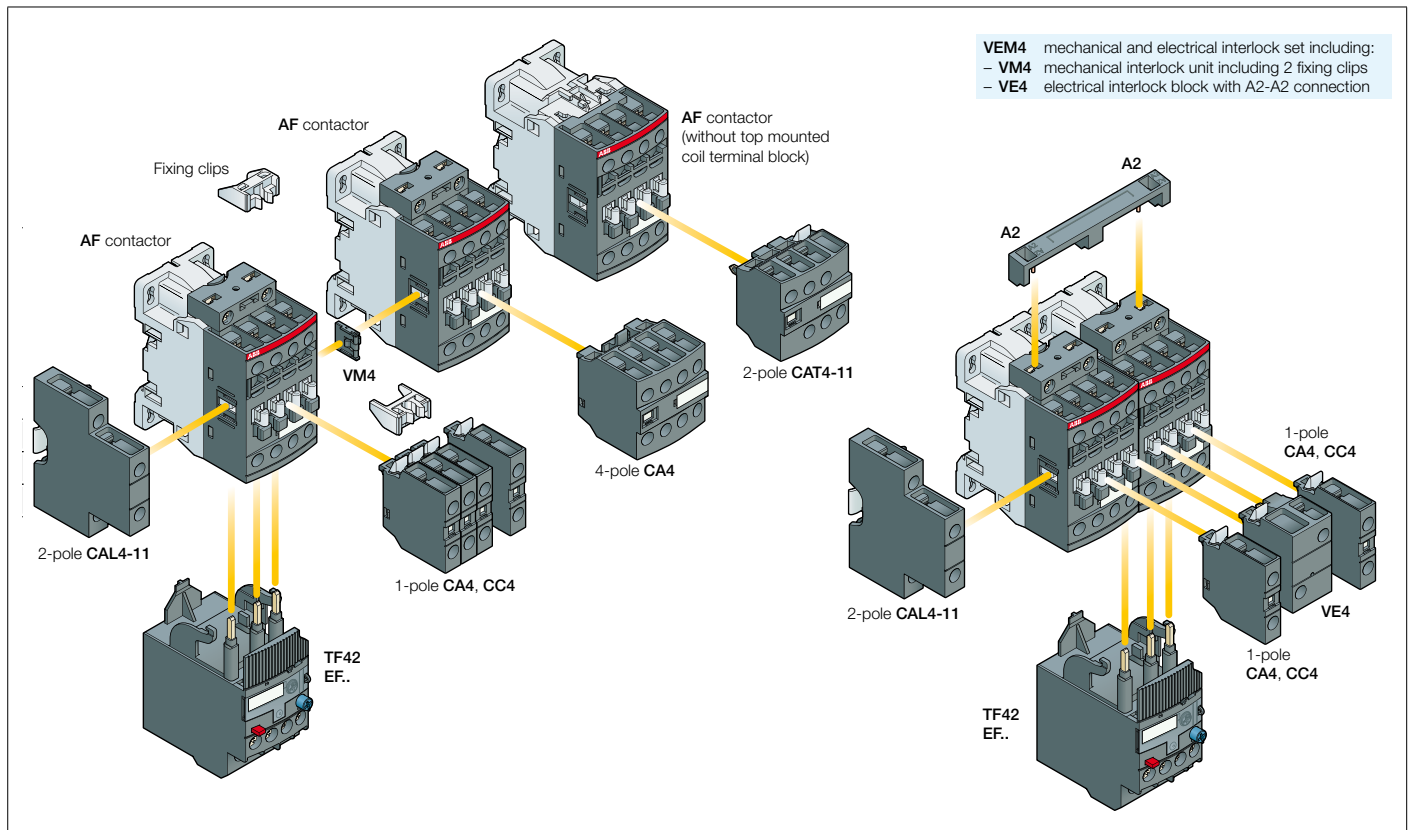
Built-in auxiliary terminals 1.2 Nm / 11 lb.in

## 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				VEM4	Left side	Right side
		1-pole CC4	2-pole CAT4-11	4-pole CA4			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 0 1		4 max.	or 1		or 1	–	+ 1	–
		2 max.	–		–	–	+ 1	+ 1
		3 max.	–		–	+ 1	+ 1	or 1

## Overview of main accessories (other accessories available)



## Main Accessories

### Ordering Details

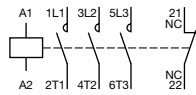
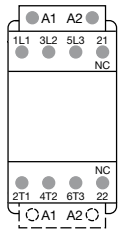
Description	Auxiliary contacts 	Type	Order code	EAN	Pack <sup>(ing)</sup> piece	Weight	
						kg (1 pce)	
<b>Additional auxiliary contact blocks</b>	Front-mounted instantaneous auxiliary contact blocks	0 1 - -	CA4-01	1SBN 010 110 R1001	3471523130029	1	0.014
		1 0 - -	CA4-10	1SBN 010 110 R1010	3471523130005	1	0.014
		0 1 - -	CA4-01-T	1SBN 010 110 T1001	3471523130395	10	0.014
		1 0 - -	CA4-10-T	1SBN 010 110 T1010	3471523130371	10	0.014
	Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact	- - 0 1	CC4-01	1SBN 010 111 R1001	3471523130432	1	0.014
		- - 1 0	CC4-10	1SBN 010 111 R1010	3471523130425	1	0.014
	Side-mounted instantaneous auxiliary contact blocks	1 1 - -	CAL4-11	1SBN 010 120 R1011	3471523130043	1	0.040
		1 1 - -	CAL4-11-T	1SBN 010 120 T1011	3471523130418	10	0.040
	Front-mounted instantaneous auxiliary contact blocks	2 2 - -	CA4-22U	1SBN 010 140 R1322	3471523130203	1	0.055
		3 1 - -	CA4-31U	1SBN 010 140 R1331	3471523130210	1	0.055
		4 0 - -	CA4-40U	1SBN 010 140 R1340	3471523130227	1	0.055
	Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks	1 1 - -	CAT4-11U	1SBN 010 151 R1311	3471523130081	1	0.040
<b>Interlocks</b>	Mechanical interlock unit		VM4	1SBN 030 105 T1000	3471523130609	10	0.005
	Mechanical and electrical interlock set	1 1 - -	VEM4	1SBN 030 111 R1000	3471523130616	1	0.035
	Fixing clips		BB4	1SBN 110 120 W1000	3471523130722	50	0.002
<b>Connection accessories for starting</b>	Connecting links with manual motor starters		BEA16-4	1SBN 081 306 T1000	3471523130739	10	0.025
	Connection sets for reversing contactors		BER16-4	1SBN 081 311 R1000	3471523130777	1	0.045
<b>Additional coil terminal block</b>	Additional coil terminal block		LDC4	1SBN 070 156 T1000	3471523130678	10	0.010
<b>Protective covers</b>	Protective covers		BX4	1SBN 110 108 T1000	3471523130708	10	0.006
			BX4-CA	1SBN 110 109 W1000	3471523130715	50	0.001
<b>Function markers</b>	Function markers		BA4	1SNA 235 156 R2700	3472592351568	16	0.011
			HTP500-BA4	1SNA 235 712 R2400	3472592357126	1	0.220
			SPRC 1	1SNA 360 010 R1500	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 block must be used with its A2-A2 connection to respect the electrical connection diagram.
- VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

## Terminal Marking and Positioning

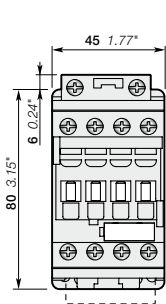
Standard devices without addition of auxiliary contacts



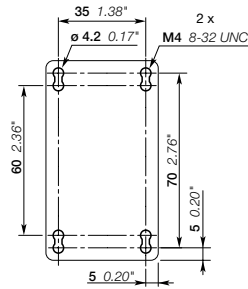
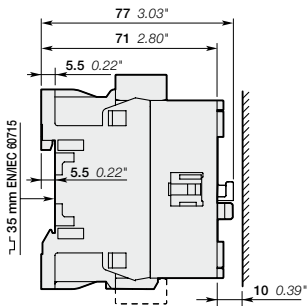
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AF09-30-01-.. / AF09Z-30-01-..

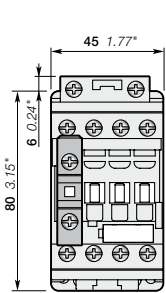
## Dimensions mm, inches



AF09

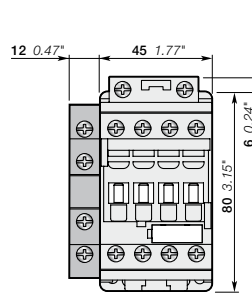
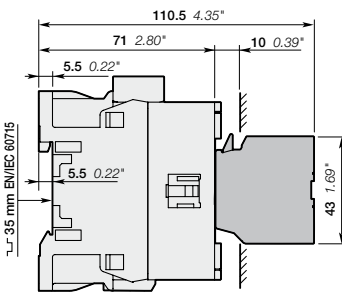


AF09



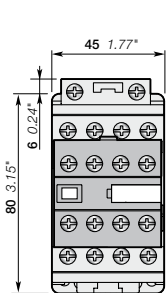
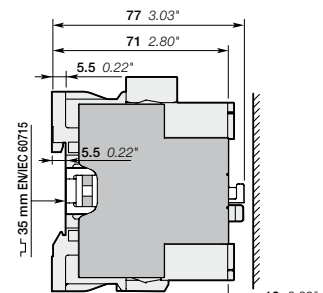
AF09

+ CA4, CC4 1-pole auxiliary contact block



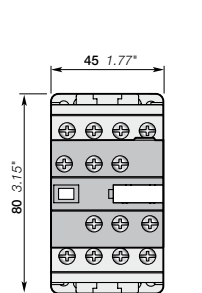
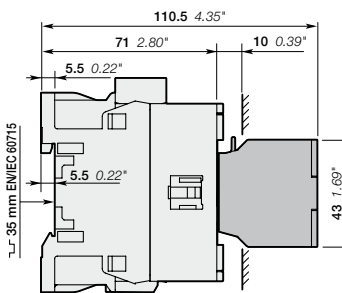
AF09

+ CAL4-11 2-pole auxiliary contact block



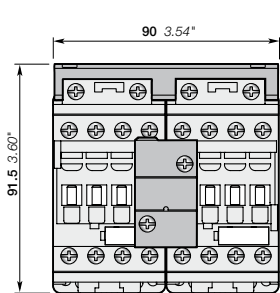
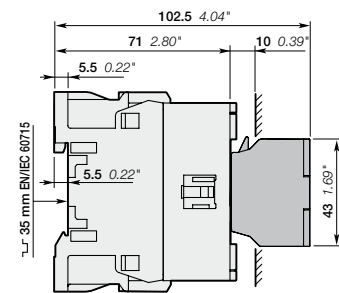
AF09

+ CA4 4-pole auxiliary contact block



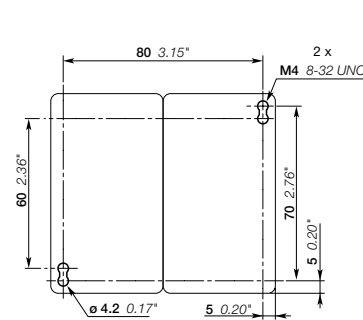
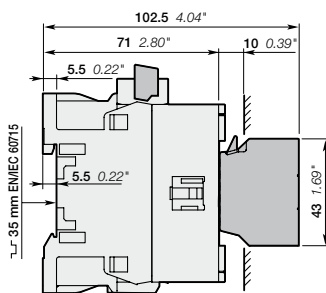
AF09

+ CAT4 2-pole auxiliary contact and coil terminal block



AF09

+ 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

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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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