

**ABB Inc.**

Low Voltage Control Products  
16250 W. Glendale Drive  
New Berlin, WI 53151  
Phone: 888-385-1221  
Fax: 800-726-1441

USA Technical support & Customer Service:

888-385-1221, Option 4  
7:30AM to 5:30PM, CST,  
Monday - Friday  
lvps.support@us.abb.com

Web: [www.abb.us/lowvoltage](http://www.abb.us/lowvoltage)

**ABB Canada**

Low Voltage Products  
2117, 32<sup>nd</sup> Avenue  
Lachine, Quebec H8T 3J1

Tel.: 514 420 3100  
Toll free: 800 567 0283

Canadian technical support:

lvps.support@ca.abb.com  
Web: [www.abb.ca/lowvoltage](http://www.abb.ca/lowvoltage)

1SXU100105C0201 June 2011

Star Series Motor protection and control



Short form catalog

# STAR Series Motor protection & control

ABB

# Motor Protection and Control up to 20 HP/480 VAC

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# ABB's new control and protection devices

## One product family

ABB presents a new generation of first-class specialized components: manual motor starters, contactors, overload relays and softstarters for motor starting solutions up to 20 HP / 480 VAC

- Harmonized design and color
- Compact and modular
- Low energy consumption
- Small number of parts
- Minimum need for accessories
- Optimized wiring and configuration
- High ratings and service capability
- Increased application possibilities
- Reliability proven over many years of experience



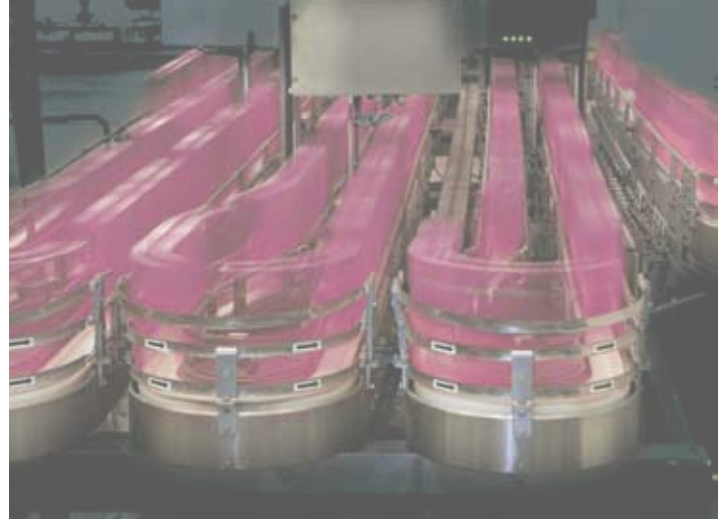
## Simplicity for your design

Our engineers have taken modularity and uniformity to the next level in terms of flexibility and practicality for your applications. We offer you increased application possibilities, exchangeability and reduced panel size.



## Safety and reliability

ABB's new line of industrial motor control and protection devices has been developed to meet the main safety standards of the toughest industrial scenarios where high reliability and safety level are required.



## Increased availability for your equipment

Designing with simplicity in mind, our engineers have made it possible to integrate the entire family into just a few components. We offer you reduced inventory and greater exchangeability, resulting in fewer shortages and less down time.



## Energy efficiency and sustainability

Reducing energy consumption and protecting the environment has long been at the top of ABB's list of priorities, and we are proud to introduce a first-class product line.



# Large choice of starting solutions in kit form



## Short-circuit and overload protection

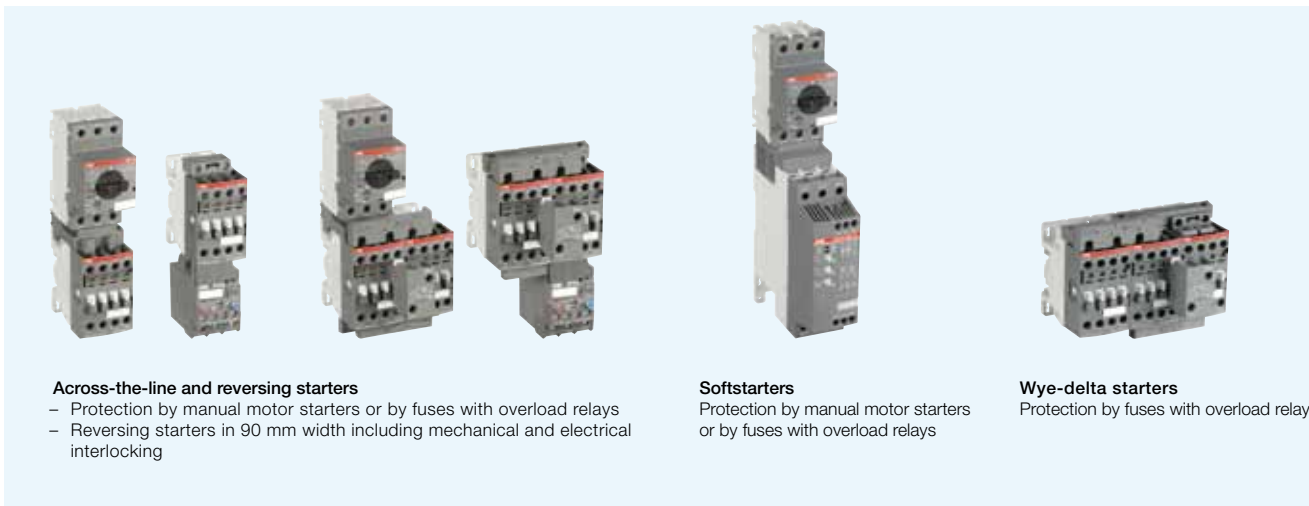
- Type 1 or Type 2 coordination available with manual motor starters
- Choice of thermal or electronic overload relays

## Simple construction

- All starters in 45 mm width frame

## Time/cost saving

- Same frame size for AC or DC control supply
- Easy, fast and secure assembly, fitting and wiring of components



### Across-the-line and reversing starters

- Protection by manual motor starters or by fuses with overload relays
- Reversing starters in 90 mm width including mechanical and electrical interlocking

### Softstarters

- Protection by manual motor starters or by fuses with overload relays

### Wye-delta starters

- Protection by fuses with overload relays

## Standardized busbars and optimized interconnection accessories

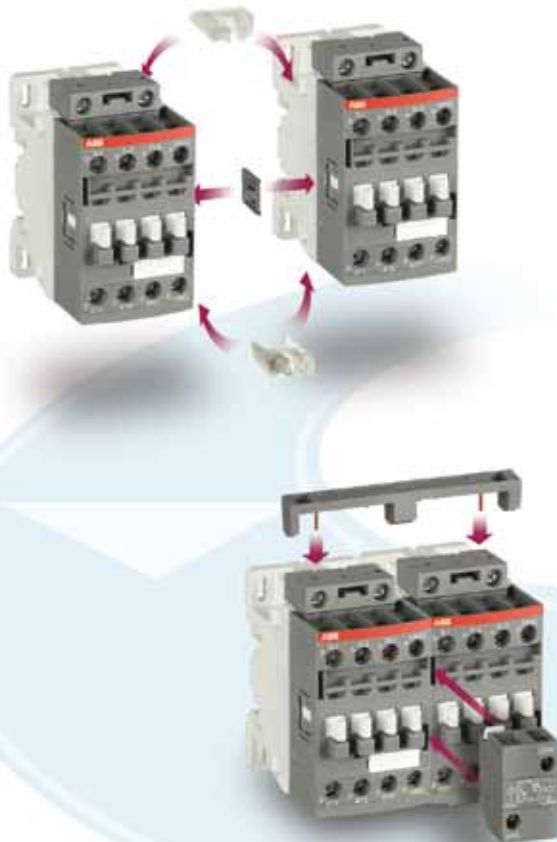
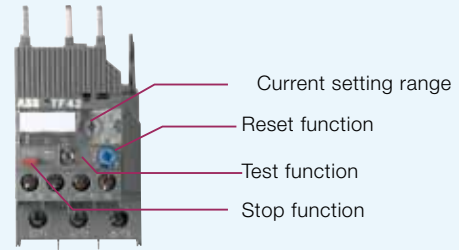
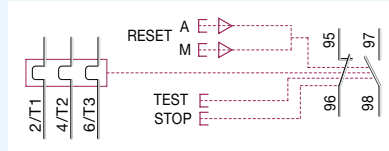
- Same 3-phase busbar and feeder range up to 92 A for manual motor starters
- Direct 35 mm rail mounting: no additional mounting plate required
- Complete range of connection links with manual motor starters and connection sets to build reversing and star-delta starters
- Easy installation and dismantling of contactors: no unwiring of manual motor starters





**Protect your motors with thermal or electronic overload relays**

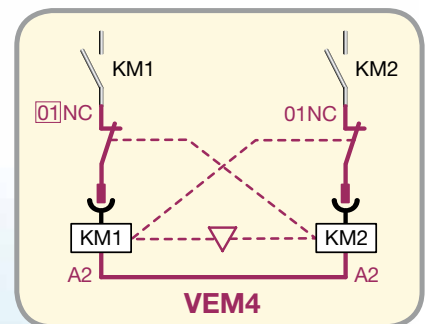
- One range of TF42 thermal overload relays, trip class 10
- One range of EF19 and EF45 electronic overload relays up to 45 A, 7 setting ranges, trip class 10, 20, 30
- Adjustable current setting ranges
- Overload protection with phase loss sensitivity
- Temperature compensation:
  - up to +60 °C for thermal overload relays
  - up to +70 °C for electronic overload relays
- Automatic or manual reset, sealable
- Stop and test function



**Interlock your reversing contactors quickly in 90 mm width:**

- Easy with VM4 mechanical interlock unit
- Simple with VEM4 set including mechanical interlock unit and electrical interlock block with A2-A2 connection
- 50% wiring cost savings in one click!

Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coil supplies



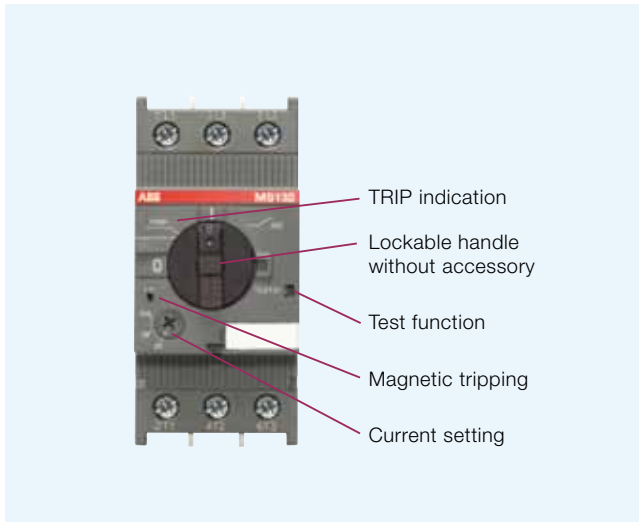
# MS116 and MS132 manual motor starters

Harmonized design in 45 mm width

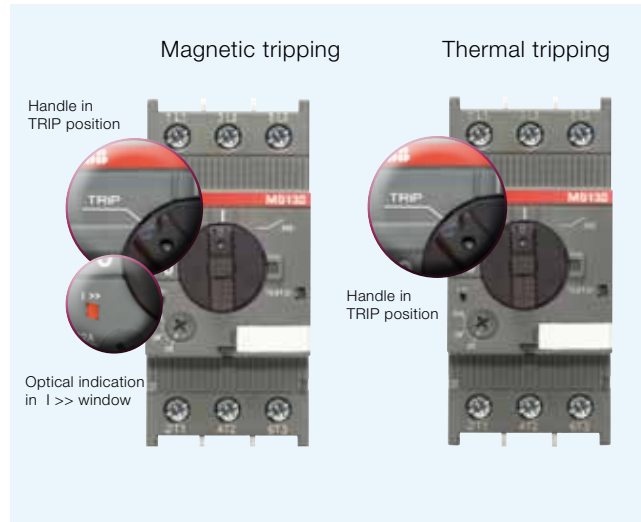


Types	MS116	MS132
Setting range	0.1 ... 16 A	0.1 ... 32 A
Switch position	ON / OFF	ON / OFF / TRIP
Magnetic trip indication	–	yes
Lockable handle without accessories	–	yes
Short circuit ratings	18 kA at 480 V 5 kA at 600 V	50 kA at 480 V 18 kA at 600 V
Trip class	10A	10

## ON/OFF/TRIP switch functionality, MS132 only



## Clear tripping identification, MS132 only



## One range of accessories for MS116 and MS132

- Common auxiliary contacts, signaling contacts and auxiliary trip units
- Common busbar systems



# AF09 ... AF30 3-pole contactors

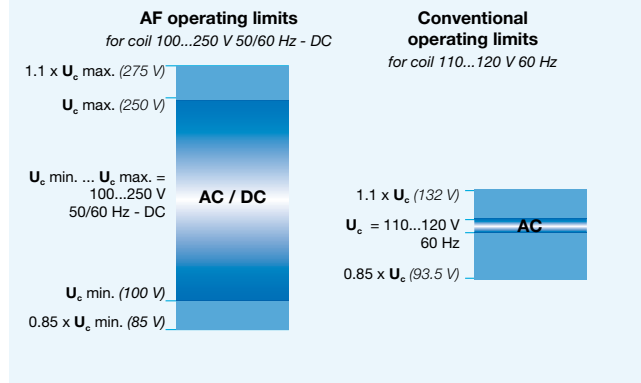
Simple design with 2 frame sizes in 45 mm width



Types	AF09	AF12	AF16	AF26	AF30
UL/CSA 1-phase HP	120 V	0.75	1	1.5	2
	240 V	1.5	2	3	5
UL/CSA 3-phase HP	240 V	2	3	5	10
	480 V	5	7.5	10	15
	600 V	7.5	10	15	20
General purpose current A	25	28	30	45	50

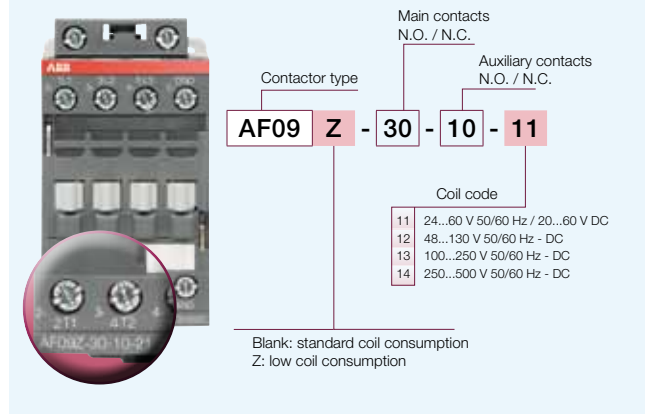
## A unique contactor for AC or DC control supply

- Manages large control voltage variations
- Includes an electronic coil interface with extended operating limits  $0.85 \times U_c \text{ min.} \dots 1.1 \times U_c \text{ max.}$



## Only four coils for easier selection

Control voltages covering 24...500 V 50/60 Hz and 20...500 V DC



## Reduced panel energy consumption

- With low holding AC and DC coil consumption
- From 30% (AF coil) to 80% (AF.Z coil) reduction of AC pull-in consumption

## Built-in surge protection

- No extra surge suppressor required

## Improve your equipment reliability with AF.Z contactors

- Withstands voltage short dips
- Withstands control voltage interruptions according to SEMI F47-0706 standards
- Additional AF.Z coils available for control voltages between 12...20 V DC and 24...250 V 50/60 Hz - DC

## Direct control by PLC-output $\geq 500 \text{ mA}$ , 24 V DC

No use of interface relay







# Switching of auxiliary and control circuits



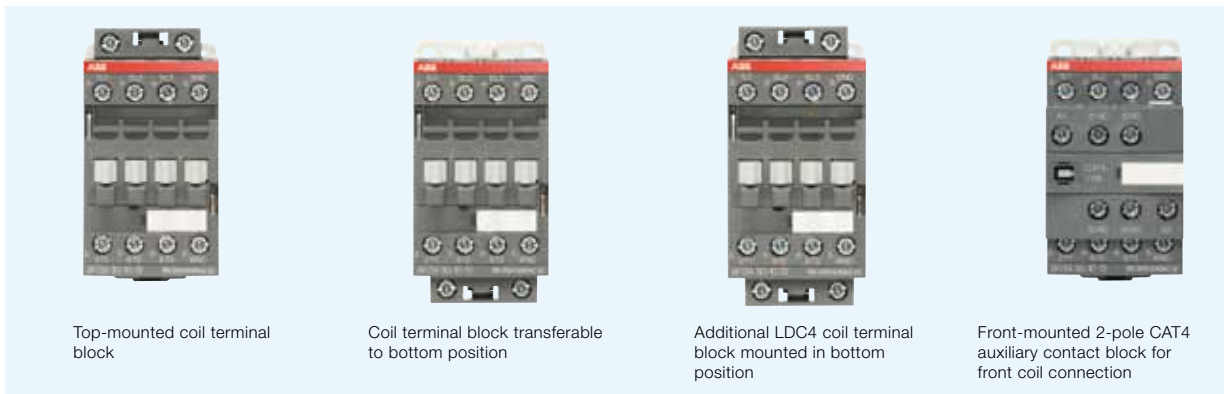
## Optimize your auxiliary contact block configuration

- AF09...AF16 3-pole contactors equipped with a built-in auxiliary contact N.O. or N.C.
- Up to 6 additional auxiliary contacts:
  - front-mounted 1 or 4-pole CA4 blocks
  - side-mounted 2-pole CAL4 blocks
- Reduced panel dimension using up to 2 side-mounted 2-pole CAL4 blocks

## Make your control circuit safe

- **Mirror contact** .....  according to IEC 60947-4-1 Annex F 2.1
- **Mechanically linked contacts** .....  according to IEC 60947-5-1 Annex L 3.0

## Coil termination options



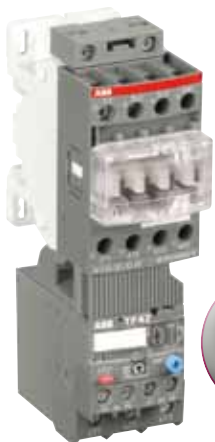
Top-mounted coil terminal block

Coil terminal block transferable to bottom position

Additional LDC4 coil terminal block mounted in bottom position

Front-mounted 2-pole CAT4 auxiliary contact block for front coil connection

## Protect your equipment against accidental contact



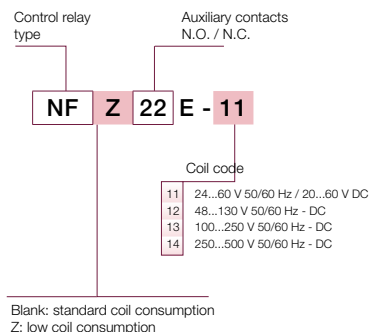
Sealable and transparent protective covers on contactors (BX4) and overload relays



Non-removable protective covers (BX4-CA) for auxiliary contact blocks

## Complete choice of control relays

- Same advantages and accessories as AF contactors
- Only four coils for easier selection



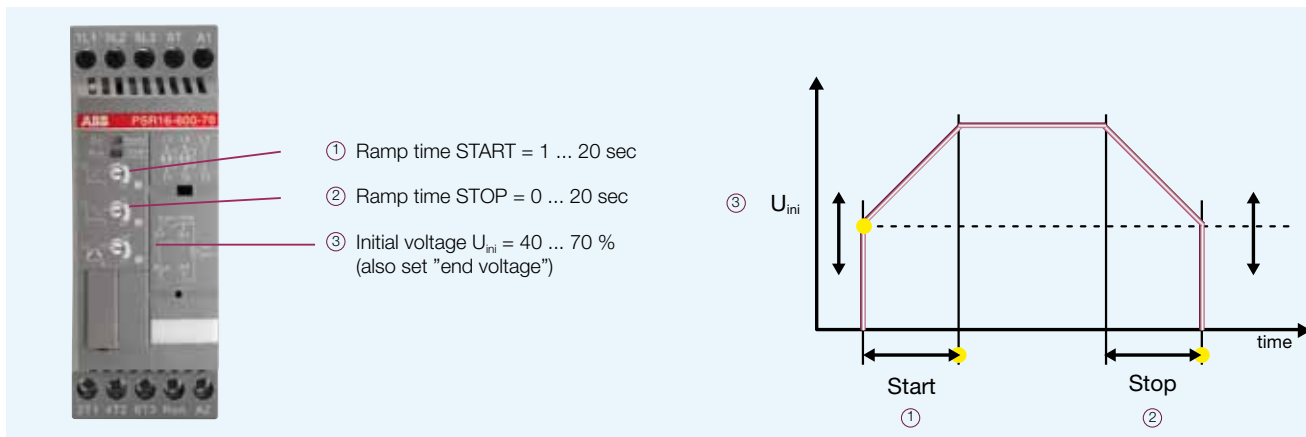
# PSR softstarters

## Compact design with 2 frame sizes



Types	PSR3 ... PSR16	PSR25, PSR30
UL/CSA 3-phase motor power - 230 V	0.75 ... 5	7.5 ... 10
480 V	2 ... 10	15 ... 20
600 V	2 ... 10	20 ... 25

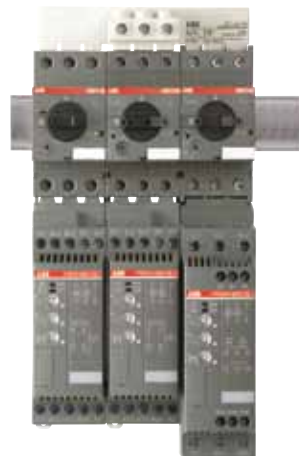
- Built-in by-pass contacts in main circuit
- Wide main voltage range: from 208 to 600 V
  - fewer variants
  - very robust and insensitive to voltage variations
- Wide supply voltage range: 100 ... 240 V AC or 24 V DC

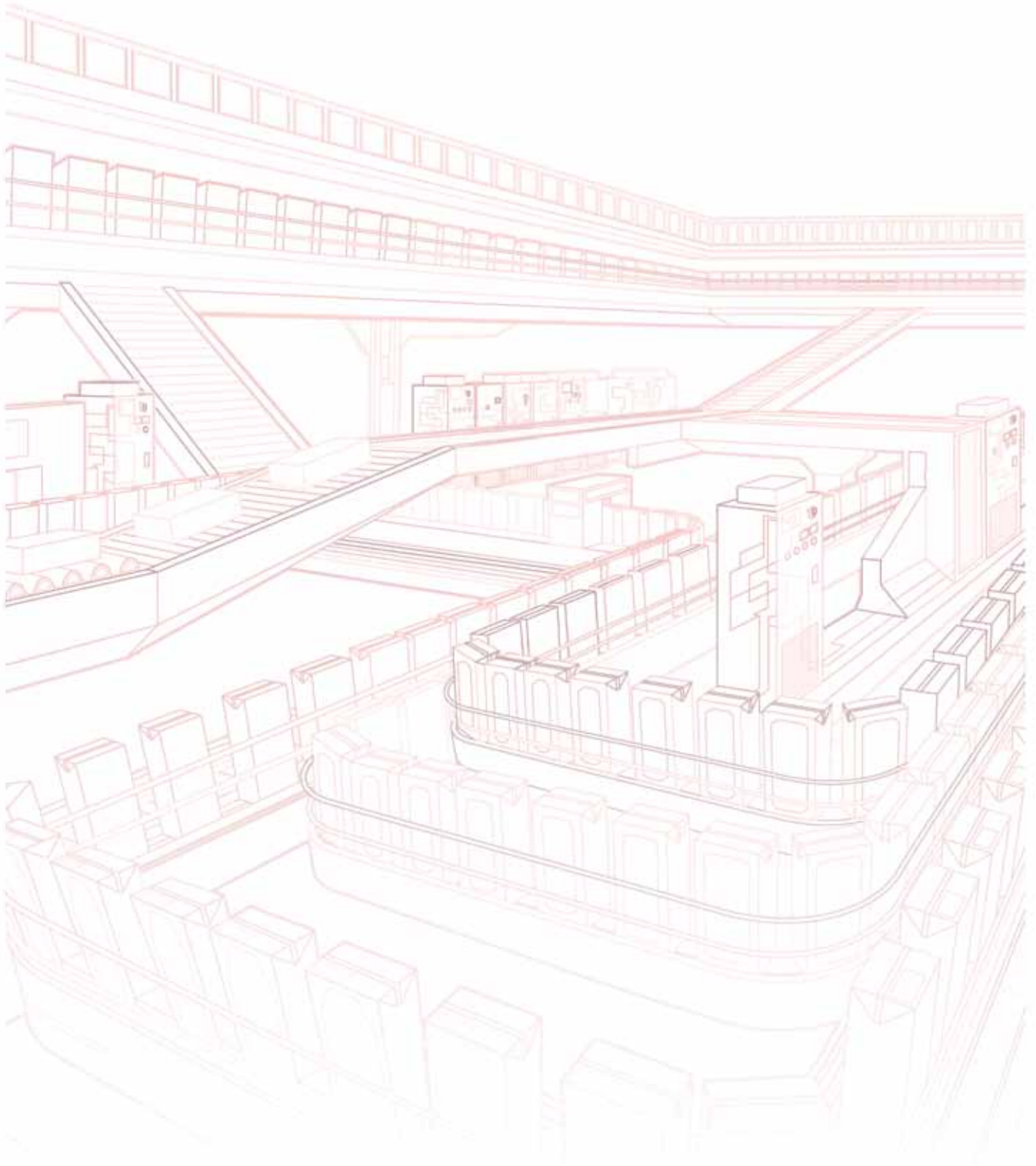


### Easy to install and set up

- 35 mm rail or screw mounting
- All settings visible and adjustable on front face
- Run signal relay for all sizes
- Output signal for TOR (Top Of Ramp) for PSR25...PSR30
- 10 starts per hour standard, increased to 20 starts or more with addition of auxiliary cooling fan
- Remote control connection using Field Bus Plug as accessory

**Compact starter solution in 45 mm width with manual motor starter up to 20 HP - 480V, 25 HP - 480V, 25 HP - 600 V**





# AF09 ... AF30 3-pole Contactors up to 20 HP / 480 VAC

## Contactors and Overload Relays

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### AF09 ... AF30 3-pole Contactors

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### TF42 Thermal Overload Relays

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### EF19 and EF45 Electronic Overload Relays

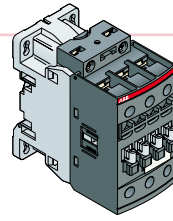
Ordering Details ..... 39

Main Technical Data ..... 40



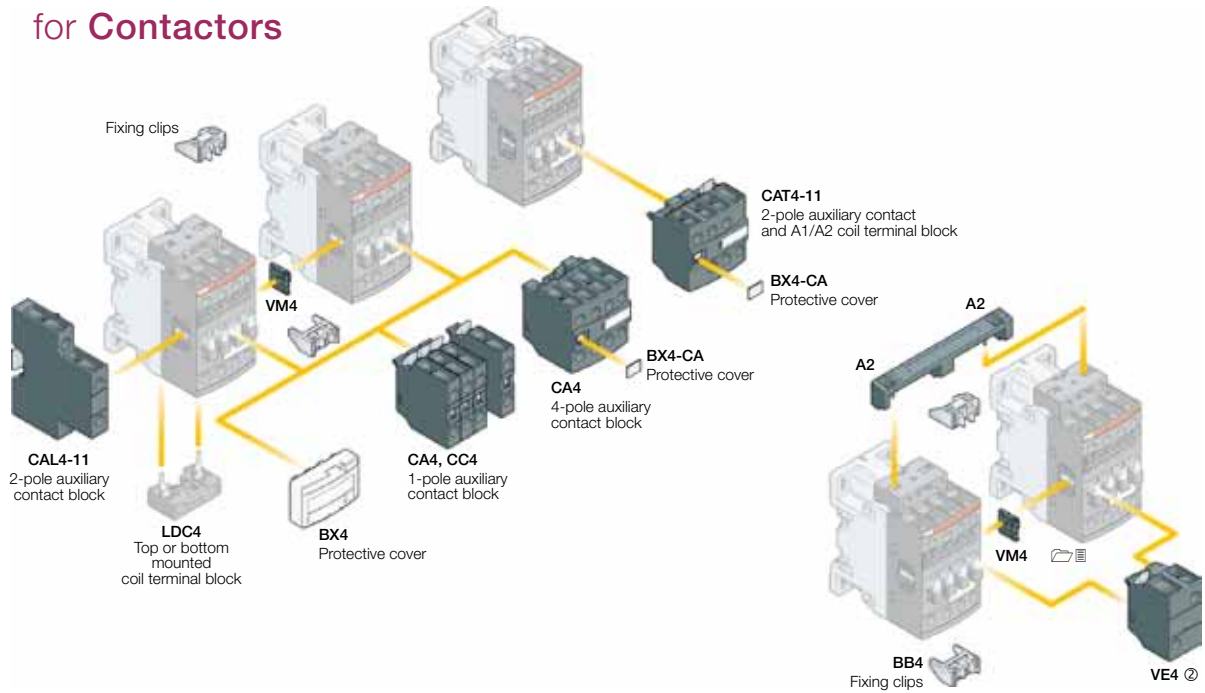


**AF09 ... AF16**  
3-pole contactors



**AF26 ... AF30**  
3-pole contactors

## for Contactors



**VEM4 mechanical and electrical interlock set including:**  
 Ⓛ VM4 mechanical interlock unit including 2 fixing clips (BB4)  
 Ⓞ VE4 electrical interlock block with A2-A2 connection

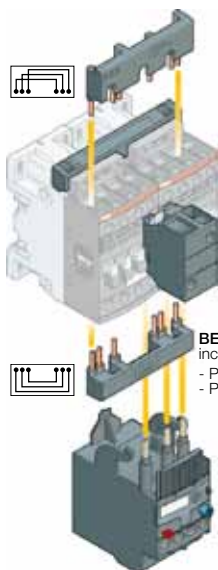
## for Starting Solutions

Across-the-line Starter



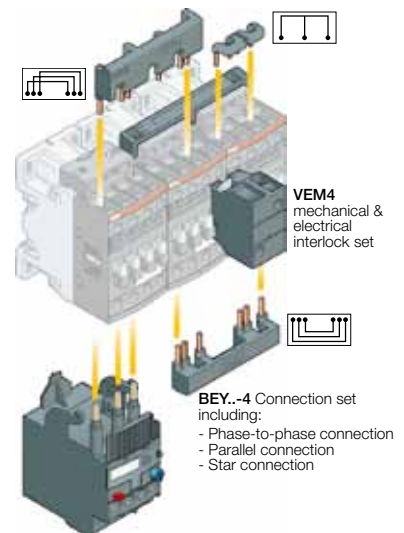
**TF42** Thermal overload relay  
**EF..** Electronic overload relay

Reversing Starter



**TF42** Thermal overload relay  
**EF..** Electronic overload relay

Wye-Delta Starter



**TF42** Thermal overload relay  
**EF..** Electronic overload relay

# 3-pole Contactors



AC / DC control voltage

AF09	AF12	AF16
AF09-30-10	AF12-30-10	AF16-30-10
AF09-30-01	AF12-30-01	AF16-30-01

AF26	AF30
AF26-30-00	AF30-30-00

## Switching of 3-phase Cage Motors

UL/CSA	Motor rating, HP 1-phase	120 V
M	Motor rating, HP 3-phase	240 V
		480 V
		600 V
NEMA size		

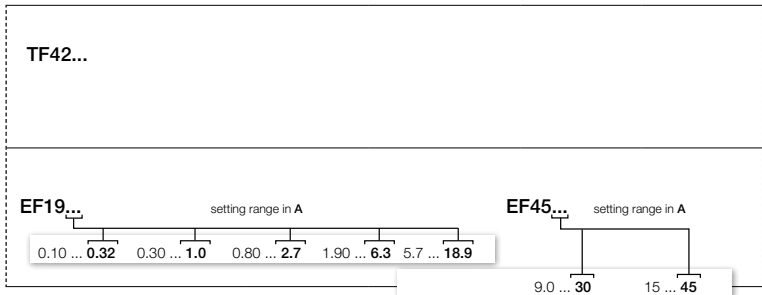
0.75	1	1.5
1.5	2	3
2	3	5
5	7.5	10
7.5	10	15
00	0	-

2	2
3	5
7.5	10
15	20
20	-
1	-

Protection of 3-phase motors

Thermal overload relays

Electronic overload relays



## Switching of Resistive Circuits

UL/CSA	General use rating		600 V AC
		With conductor cross-sectional area	
IEC	AC-1	Rated operational current	$\theta \leq 40^\circ\text{C}$ 690 V
			$\theta \leq 60^\circ\text{C}$ 690 V
			$\theta \leq 70^\circ\text{C}$ 690 V
With conductor cross-sectional area			

25 A	28 A	30 A
AWG 10	AWG 10	AWG 10
25 A	28 A	30 A
22 A	24 A	26 A
4 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>

45 A	50 A
AWG 8	AWG 8
45 A	50 A
40 A	42 A
32 A	37 A
10 mm <sup>2</sup>	10 mm <sup>2</sup>

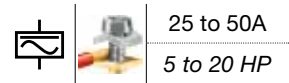
## Main Accessories

Auxiliary contact blocks	Front mounting	
	Side mounting	
Interlocks	Mechanical / electrical	
	Mechanical	
Connection sets	Reversing Starters	
	Star-Delta Starters	

1-pole CA4-10 or CA4-01, CC4-10 or CC4-01	
4-pole CA4	
2-pole CAT4-11 (with coil front connection)	
2-pole CAL4-11	
VEM4 including VM4 mechanical interlock unit and VE4 electrical interlock block with A2-A2 connection	
VM4 including 2 fixing clips	
BER16-4	BER38-4
BEY16-4	BEY38-4

# AF09 ... AF30 3-pole Contactors

## AC / DC Operated - with Screw Terminals



25 to 50A  
5 to 20 HP



### Application

**AF09 ... AF30** contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors, non-inductive or slightly inductive loads.

### Description

- **AF09 ... AF30** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **AF** contactors can manage large control voltage variations. One coil (e.g. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **AF** 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.

### Ordering Details

UL/CSA General purpose rating	UL/CSA Motor ratings, HP					Control voltage Range $U_c$ min. ... $U_c$ max.		Auxiliary contacts fitted		Catalog number	List price	Weight
	1-phase 120 V	240 V	200 -240 V	440 -480 V	550 -600 V	V 50/60 Hz	V DC					
25	0.75	1.5	2	5	7.5	24...60	20...60	1	0	AF09-30-10-11		0.31/0.68
						24...60	20...60	0	1	AF09-30-01-11		0.31/0.68
						48...130	48...130	1	0	AF09-30-10-12		0.27/0.60
						48...130	48...130	0	1	AF09-30-01-12		0.27/0.60
						100...250	100...250	1	0	AF09-30-10-13		0.27/0.60
						100...250	100...250	0	1	AF09-30-01-13		0.27/0.60
						250...500	250...500	1	0	AF09-30-10-14		0.31/0.68
250...500	250...500	0	1	AF09-30-01-14		0.31/0.68						
28	1	2	3	7.5	10	24...60	20...60	1	0	AF12-30-10-11		0.31/0.68
						24...60	20...60	0	1	AF12-30-01-11		0.31/0.68
						48...130	48...130	1	0	AF12-30-10-12		0.27/0.60
						48...130	48...130	0	1	AF12-30-01-12		0.27/0.60
						100...250	100...250	1	0	AF12-30-10-13		0.27/0.60
						100...250	100...250	0	1	AF12-30-01-13		0.27/0.60
						250...500	250...500	1	0	AF12-30-10-14		0.31/0.68
250...500	250...500	0	1	AF12-30-01-14		0.31/0.68						
30	1.5	3	5	10	15	24...60	20...60	1	0	AF16-30-10-11		0.31/0.68
						24...60	20...60	0	1	AF16-30-01-11		0.31/0.68
						48...130	48...130	1	0	AF16-30-10-12		0.27/0.60
						48...130	48...130	0	1	AF16-30-01-12		0.27/0.60
						100...250	100...250	1	0	AF16-30-10-13		0.27/0.60
						100...250	100...250	0	1	AF16-30-01-13		0.27/0.60
						250...500	250...500	1	0	AF16-30-10-14		0.31/0.68
250...500	250...500	0	1	AF16-30-01-14		0.31/0.68						
45	2	3	7.5	15	20	24...60	20...60	0	0	AF26-30-00-11		0.35/0.77
						48...130	48...130	0	0	AF26-30-00-12		0.31/0.68
						100...250	100...250	0	0	AF26-30-00-13		0.31/0.68
						250...500	250...500	0	0	AF26-30-00-14		0.35/0.77
50	2	5	10	20	-	24...60	20...60	0	0	AF30-30-00-11		0.35/0.77
						48...130	48...130	0	0	AF30-30-00-12		0.31/0.68
						100...250	100...250	0	0	AF30-30-00-13		0.31/0.68
						250...500	250...500	0	0	AF30-30-00-14		0.35/0.77

### Auxiliary contact block

For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight
						Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front	1	0	CA4-10		0.014/0.03
	Front	0	1	CA4-01		0.014/0.03
	Side	1	1	CAL4-11		0.040/0.09

# AF09 ... AF30 3-pole Contactors - AF..Z Additional Coils

## AC / DC Operated - with Screw Terminals



25 to 50A  
5 to 20 HP



AF09Z-30-10



AF26Z-30-00



CA4-10



CAL4-11

### Application

**AF09Z ... AF30Z** contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors, non-inductive or slightly inductive loads.

### Description

- **AF09Z ... AF30Z** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max and managing large control voltage variations.
- **AF..Z** contactors cover control voltages comprised between 24...250 V 50/60 Hz or 12...250 V DC
- **AF..Z** contactors allow direct control by PLC-output  $\geq 24$  V DC 500 mA and obtain a reduced holding coil consumption.
- **AF..Z** contactors withstand short dips and voltage interruptions (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.

### Ordering Details

UL/CSA General purpose rating	UL/CSA Motor ratings, HP					Control voltage Range $U_c$ min. ... $U_c$ max.		Auxiliary contacts fitted		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
	1-phase 120 V	240 V	200 -240 V	440 -480 V	550 -600 V	V 50/60 Hz	V DC					
A	0.75	1.5	2	5	7.5	-	12..20	1	0	AF09Z-30-10-20		0.31/0.68
						-	12..20	0	1	AF09Z-30-01-20		0.31/0.68
						24..60	20..60	1	0	AF09Z-30-10-21		0.31/0.68
						24..60	20..60	0	1	AF09Z-30-01-21		0.31/0.68
						48..130	48..130	1	0	AF09Z-30-10-22		0.31/0.68
						48..130	48..130	0	1	AF09Z-30-01-22		0.31/0.68
						100..250	100..250	1	0	AF09Z-30-10-23		0.31/0.68
					100..250	100..250	0	1	AF09Z-30-01-23		0.31/0.68	
28	1	2	3	7.5	10	-	12..20	1	0	AF12Z-30-10-20		0.31/0.68
						-	12..20	0	1	AF12Z-30-01-20		0.31/0.68
						24..60	20..60	1	0	AF12Z-30-10-21		0.31/0.68
						24..60	20..60	0	1	AF12Z-30-01-21		0.31/0.68
						48..130	48..130	1	0	AF12Z-30-10-22		0.31/0.68
						48..130	48..130	0	1	AF12Z-30-01-22		0.31/0.68
						100..250	100..250	1	0	AF12Z-30-10-23		0.31/0.68
					100..250	100..250	0	1	AF12Z-30-01-23		0.31/0.68	
30	1.5	3	5	10	15	-	12..20	1	0	AF16Z-30-10-20		0.31/0.68
						-	12..20	0	1	AF16Z-30-01-20		0.31/0.68
						24..60	20..60	1	0	AF16Z-30-10-21		0.31/0.68
						24..60	20..60	0	1	AF16Z-30-01-21		0.31/0.68
						48..130	48..130	1	0	AF16Z-30-10-22		0.31/0.68
						48..130	48..130	0	1	AF16Z-30-01-22		0.31/0.68
						100..250	100..250	1	0	AF16Z-30-10-23		0.31/0.68
					100..250	100..250	0	1	AF16Z-30-01-23		0.31/0.68	
45	2	3	7.5	15	20	-	12..20	0	0	AF26Z-30-00-20		0.35/0.77
						24..60	20..60	0	0	AF26Z-30-00-21		0.35/0.77
						48..130	48..130	0	0	AF26Z-30-00-22		0.35/0.77
						100..250	100..250	0	0	AF26Z-30-00-23		0.35/0.77
50	2	5	10	20	-	-	12..20	0	0	AF30Z-30-00-20		0.35/0.77
						24..60	20..60	0	0	AF30Z-30-00-21		0.35/0.77
						48..130	48..130	0	0	AF30Z-30-00-22		0.35/0.77
						100..250	100..250	0	0	AF30Z-30-00-23		0.35/0.77

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

### Auxiliary contact block

For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front	1	0	CA4-10		0.014/0.03
	Front	0	1	CA4-01		0.014/0.03
	Side	1	1	CAL4-11		0.040/0.09



# AF09R ... AF30R 3-pole Reversing Contactors

## AC / DC Operated - with Screw Terminals



25 to 50A  
5 to 20 HP



cULus



CE



AF09R-30-10



CA4-10



CAL4-11

### Application

**AF09R ... AF30R** reversing contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors.

### Description

- **AF09R ... AF30R** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **AF** contactors can manage large control voltage variations. One coil (e.g. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **AF** 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.

### Ordering Details

UL/CSA General purpose rating	UL/CSA Motor ratings, HP					Control voltage Range Uc min. ... Uc max.		Auxiliary contacts fitted per contactors		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
	1-phase 120 V	240 V	3-phase 200 -240 V	440 -480 V	550 -600 V	V 50/60 Hz	V DC					
A 25	0.75	1.5	2	5	7.5	24...60	20...60	1	1	AF09R-30-22-11		0.77/1.69
						48...130	48...130	1	1	AF09R-30-22-12		0.69/1.51
						100...250	100...250	1	1	AF09R-30-22-13		0.69/1.51
						250...500	250...500	1	1	AF09R-30-22-14		0.77/1.69
28	1	2	3	7.5	10	24...60	20...60	1	1	AF12R-30-22-11		0.77/1.69
						48...130	48...130	1	1	AF12R-30-22-12		0.69/1.51
						100...250	100...250	1	1	AF12R-30-22-13		0.69/1.51
						250...500	250...500	1	1	AF12R-30-22-14		0.77/1.69
30	1.5	3	5	10	15	24...60	20...60	1	1	AF16R-30-22-11		0.77/1.69
						48...130	48...130	1	1	AF16R-30-22-12		0.69/1.51
						100...250	100...250	1	1	AF16R-30-22-13		0.69/1.51
						250...500	250...500	1	1	AF16R-30-22-14		0.77/1.69
45	2	3	7.5	15	20	24...60	20...60	0	1	AF26R-30-02-11		0.85/1.86
						48...130	48...130	0	1	AF26R-30-02-12		0.77/1.69
						100...250	100...250	0	1	AF26R-30-02-13		0.77/1.69
						250...500	250...500	0	1	AF26R-30-02-14		0.85/1.86
50	2	5	10	20	-	24...60	20...60	0	1	AF30R-30-02-11		0.85/1.86
						48...130	48...130	0	1	AF30R-30-02-12		0.77/1.69
						100...250	100...250	0	1	AF30R-30-02-13		0.77/1.69
						250...500	250...500	0	1	AF30R-30-02-14		0.85/1.86

### Auxiliary contact block

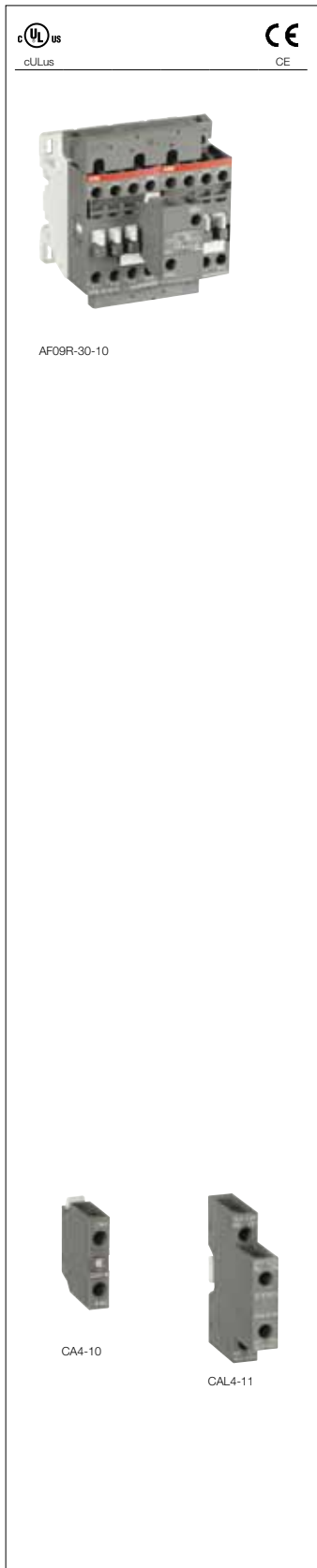
For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front	1	0	CA4-10		0.014/0.03
	Front	0	1	CA4-01		0.014/0.03
	Side	1	1	CAL4-11		0.040/0.09

# AF09R ... AF30R 3-pole Reversing Contactors - AF..Z Additional Coils

## AC / DC Operated - with Screw Terminals



25 to 50A  
5 to 20 HP



### Application

**AF09ZR ... AF30ZR** reversing contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors.

### Description

- **AF09ZR ... AF30ZR** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max and managing large control voltage variations.
- **AF..Z** contactors cover control voltages comprised between 24...250 V 50/60 Hz or 12...250 V DC
- **AF..Z** contactors allow direct control by PLC-output  $\geq 24$  V DC 500 mA and obtain a reduced holding coil consumption.
- **AF..Z** contactors withstand short dips and voltage interruptions (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 in compliance with annex F of IEC 60947-4-1.

### Ordering Details

UL/CSA General purpose rating	UL/CSA Motor ratings, HP					Control voltage Range $U_c$ min. ... $U_c$ max.		Auxiliary contacts fitted per contactors		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs						
	1-phase 120 V	240 V	3-phase			V 50/60 Hz	V DC											
A	0.75	1.5	200	440	550	24...60	20...60	1	1	AF09ZR-30-22-21		0.77/1.69						
			-240 V	-480 V	-600 V								48...130	48...130	1	1	AF09ZR-30-22-22	0.77/1.69
													100...250	100...250	1	1	AF09ZR-30-22-23	0.77/1.69
28	1	2	3	7.5	10	24...60	20...60	1	1	AF12ZR-30-22-21		0.77/1.69						
													48...130	48...130	1	1	AF12ZR-30-22-22	0.77/1.69
													100...250	100...250	1	1	AF12ZR-30-22-23	0.77/1.69
30	1.5	3	5	10	15	24...60	20...60	1	1	AF16ZR-30-22-21		0.77/1.69						
													48...130	48...130	1	1	AF16ZR-30-22-22	0.77/1.69
													100...250	100...250	1	1	AF16ZR-30-22-23	0.77/1.69
45	2	3	7.5	15	20	24...60	20...60	0	1	AF26ZR-30-02-21		0.85/1.86						
													48...130	48...130	0	1	AF26ZR-30-02-22	0.85/1.86
													100...250	100...250	0	1	AF26ZR-30-02-23	0.85/1.86
50	2	5	10	20	-	24...60	20...60	0	1	AF30ZR-30-02-21		0.85/1.86						
													48...130	48...130	0	1	AF30ZR-30-02-22	0.85/1.86
													100...250	100...250	0	1	AF30ZR-30-02-23	0.85/1.86

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

### Auxiliary contact block

For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front		0	CA4-10		0.014/0.03
	Front	0		CA4-01		0.014/0.03
	Side			CAL4-11		0.040/0.09

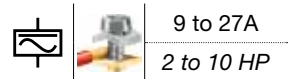


CA4-10



CAL4-11

# AF09N00 ... AF26N1 3-pole Contactors, NEMA Rated AC / DC Operated - with Screw Terminals



## Application

**AF09N00 ... AF26N1**, NEMA contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors.

## Description

- **AF09N00 ... AF26N1** NEMA contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **AF** contactors can manage large control voltage variations. One coil (e.g. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **AF** 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.

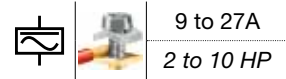
## Ordering Details

NEMA size	Continuous current A	UL/CSA Motor rating, HP 3-phase			Control voltage Range $U_c$ min. ... $U_c$ max.		Auxiliary contacts fitted		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs
		200 -240 V	440 -480 V	550 -600 V	V 50/60 Hz	V DC					
00	9	1.5	2	2	24...60	20...60	1	0	AF09N00-30-10-11		0.31/0.68
					24...60	20...60	0	1	AF09N00-30-01-11		0.31/0.68
					48...130	48...130	1	0	AF09N00-30-10-12		0.27/0.68
					48...130	48...130	0	1	AF09N00-30-01-12		0.27/0.68
					100...250	100...250	1	0	AF09N00-30-10-13		0.27/0.68
					100...250	100...250	0	1	AF09N00-30-01-13		0.27/0.68
					250...500	250...500	1	0	AF09N00-30-10-14		0.31/0.68
					250...500	250...500	0	1	AF09N00-30-01-14		0.31/0.68
0	18	3	5	5	24...60	20...60	1	0	AF12N0-30-10-11		0.31/0.68
					24...60	20...60	0	1	AF12N0-30-01-11		0.31/0.68
					48...130	48...130	1	0	AF12N0-30-10-12		0.27/0.68
					48...130	48...130	0	1	AF12N0-30-01-12		0.27/0.68
					100...250	100...250	1	0	AF12N0-30-10-13		0.27/0.68
					100...250	100...250	0	1	AF12N0-30-01-13		0.27/0.68
					250...500	250...500	1	0	AF12N0-30-10-14		0.31/0.68
					250...500	250...500	0	1	AF12N0-30-01-14		0.31/0.68
1	27	7.5	10	10	24...60	20...60	0	0	AF26N1-30-00-11		0.35/0.77
					48...130	48...130	0	0	AF26N1-30-00-12		0.31/0.68
					100...250	100...250	0	0	AF26N1-30-00-13		0.31/0.68
					250...500	250...500	0	0	AF26N1-30-00-14		0.35/0.77

## Auxiliary contact block

For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front	1	0	CA4-10		0.014/0.03
	Front	0	1	CA4-01		0.014/0.03
	Side	1	1	CAL4-11		0.040/0.09

# AF09ZN00 ... AF26ZN1 3-pole Contactors - NEMA Rated AC / DC Operated - with Screw Terminals AF.Z Additional Coils



9 to 27A  
2 to 10 HP



## Application

**AF09ZN00 ... AF26ZN1**, NEMA contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling 3-phase motors.

## Description

- **AF09ZN00 ... AF26ZN1** NEMA contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max and managing large control voltage variations.
- **AF.Z** contactors cover control voltages comprised between 24...250 V 50/60 Hz or 12...250 V DC
- **AF.Z** contactors allow direct control by PLC-output  $\geq 24$  V DC 500 mA and obtain a reduced holding coil consumption.
- **AF.Z** contactors withstand short dips and voltage interruptions (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.

## Ordering Details

NEMA size	Continuous current A	UL/CSA Motor rating, HP 3-phase			Control voltage Range $U_c$ min. ... $U_c$ max.		Auxiliary contacts fitted		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs
		200 -240 V	440 -480 V	550 -600 V	V 50/60 Hz	V DC					
00	9	1.5	2	2	-	12...20	1	0	<b>AF09ZN00-30-10-20</b>		0.31/0.68
					-	12...20	0	1	<b>AF09ZN00-30-01-20</b>		0.31/0.68
					24...60	20...60	1	0	<b>AF09ZN00-30-10-21</b>		0.31/0.68
					24...60	20...60	0	1	<b>AF09ZN00-30-01-21</b>		0.31/0.68
					48...130	48...130	1	0	<b>AF09ZN00-30-10-22</b>		0.31/0.68
					48...130	48...130	0	1	<b>AF09ZN00-30-01-22</b>		0.31/0.68
					100...250	100...250	1	0	<b>AF09ZN00-30-10-23</b>		0.31/0.68
					100...250	100...250	0	1	<b>AF09ZN00-30-01-23</b>		0.31/0.68
0	18	3	5	5	-	12...20	1	0	<b>AF12ZN0-30-10-20</b>		0.31/0.68
					-	12...20	0	1	<b>AF12ZN0-30-01-20</b>		0.31/0.68
					24...60	20...60	1	0	<b>AF12ZN0-30-10-21</b>		0.31/0.68
					24...60	20...60	0	1	<b>AF12ZN0-30-01-21</b>		0.31/0.68
					48...130	48...130	1	0	<b>AF12ZN0-30-10-22</b>		0.31/0.68
					48...130	48...130	0	1	<b>AF12ZN0-30-01-22</b>		0.31/0.68
					100...250	100...250	1	0	<b>AF12ZN0-30-10-23</b>		0.31/0.68
					100...250	100...250	0	1	<b>AF12ZN0-30-01-23</b>		0.31/0.68
1	27	7.5	10	10	-	12...20	0	0	<b>AF26ZN1-30-00-20</b>		0.35/0.77
					24...60	20...60	0	0	<b>AF26ZN1-30-00-21</b>		0.35/0.77
					48...130	48...130	0	0	<b>AF26ZN1-30-00-22</b>		0.35/0.77
					100...250	100...250	0	0	<b>AF26ZN1-30-00-23</b>		0.35/0.77

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

## Auxiliary contact block

For contactors	Positioning	Auxiliary contacts		Catalog number	List price	Weight Pack <sup>(ing)</sup> 1 piece kg/lbs
AF09 ... AF30	Front	1	0	<b>CA4-10</b>		0.014/0.03
	Front	0	1	<b>CA4-01</b>		0.014/0.03
	Side	1	1	<b>CAL4-11</b>		0.040/0.09

# AF09 ... AF30 3-pole Contactors

## Technical Data



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

Contactor types	AF09	AF12	AF16	AF26	AF30	
Standards	UL 508, CSA C22.2 N°14					
Rated operational voltage $U_e$ max.	600 V					
NEMA size	00	0	-	1	-	
NEMA continuous amp rating	thermal current	9 A	18 A		27 A	
NEMA maximum H.P. 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 H.P. 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	
CSA/UL General use rating						
600 V AC	25 A	28 A	30 A	45 A	50 A	
With conductor cross-sectional area	AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	
80 V DC - 1-pole, 160 V DC - 2-pole, 240 V DC - 3-pole	25 A	28 A	30 A	45 A	50 A	
With conductor cross-sectional area	AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	
CSA/UL maximum 1-phase motor rating						
Amp-rating	120 V AC	13.8 A	16 A	20 A	24 A	24 A
	240 V AC	10 A	12 A	17 A	17 A	28 A
Motor power	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp
	240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp
CSA/UL maximum 3-phase motor rating						
Amp-rating	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A
	220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A
	440-480 V AC	7.6 A	11 A	14 A	21 A	27 A
	550-600 V AC	9 A	11 A	17 A	22 A	27 A
	Motor power	200-208 V AC	2 hp	3 hp	5 hp	7.5 hp
(for 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz 3-phase motors)	220-240 V AC	2 hp	3 hp	5 hp	7.5 hp	10 hp
440-480 V AC	5 hp	7.5 hp	10 hp	15 hp	20 hp	
550-600 V AC	7.5 hp	10 hp	15 hp	20 hp	-	
Short-circuit protection						
for contactors without thermal O/L relay - Motor protection excluded						
Fuse rating	Max.	60 A	60 A	60 A	150 A	150 A
Fuse type, 600 V		J				
Short-circuit current rating		100 kA				
Max. electrical switching frequency						
for general use		600 cycles/h				
for motor use		1200 cycles/h				
Mechanical durability						
Number of operating cycles		10 millions operating cycles				
Max. switching frequency		3600 cycles/h				

(1) On request

### Built-in Auxiliary Contacts according to UL / CSA

Contactor types	AF09	AF12	AF16	AF26	AF30
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				

# AF09 ... AF30 3-pole Contactors

## Technical Data



### Main Pole - Utilization Characteristics according to IEC

Contactor types	AF09	AF12	AF16	AF26	AF30
<b>Standards</b>	IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
<b>Rated operational voltage <math>U_n</math> max.</b>	690 V				
<b>Rated frequency limits</b>	25 ... 400 Hz				
<b>Conventional free-air thermal current <math>I_{th}</math></b> acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$	35 A	35 A	35 A	50 A	50 A
with conductor cross-sectional area	6 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	10 mm <sup>2</sup>
<b>AC-1 Utilization category</b> for air temperature close to contactor					
<b><math>I_n</math> / AC-1 rated operational current</b> $U_n$ max. $\leq 690$ V, 50/60 Hz	$\theta \leq 40^\circ\text{C}$ : 25 A	: 28 A	: 30 A	: 45 A	: 50 A
	$\theta \leq 60^\circ\text{C}$ : 25 A	: 28 A	: 30 A	: 40 A	: 42 A
	$\theta \leq 70^\circ\text{C}$ : 22 A	: 24 A	: 26 A	: 32 A	: 37 A
with conductor cross-sectional area	4 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	10 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><math>I_n</math> / AC-3 max. rated operational current</b> 3-phase motors	<b>220-230-240 V</b> : 9 A	: 12 A	: 18 A	: 26 A	: 33 A
	<b>380-400 V</b> : 9 A	: 12 A	: 18 A	: 26 A	: 32 A
	<b>415 V</b> : 9 A	: 12 A	: 18 A	: 26 A	: 32 A
	<b>440 V</b> : 9 A	: 12 A	: 18 A	: 26 A	: 32 A
	<b>500 V</b> : 9.5 A	: 12.5 A	: 15 A	: 23 A	: 28 A
	<b>690 V</b> : 7 A	: 9 A	: 10.5 A	: 17 A	: 21 A
<b>AC-3 rated operational power</b> 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	<b>220-230-240 V</b> : 2.2 kW	: 3 kW	: 4 kW	: 6.5 kW	: 9 kW
	<b>380-400 V</b> : 4 kW	: 5.5 kW	: 7.5 kW	: 11 kW	: 15 kW
	<b>415 V</b> : 4 kW	: 5.5 kW	: 9 kW	: 11 kW	: 15 kW
	<b>440 V</b> : 4 kW	: 5.5 kW	: 9 kW	: 15 kW	: 18.5 kW
	<b>500 V</b> : 5.5 kW	: 7.5 kW	: 9 kW	: 15 kW	: 18.5 kW
	<b>690 V</b> : 5.5 kW	: 7.5 kW	: 9 kW	: 15 kW	: 18.5 kW
<b>Rated making capacity AC-3</b>	10 x $I_n$ AC-3 acc. to IEC 60947-4-1				
<b>Rated breaking capacity AC-3</b>	8 x $I_n$ AC-3 acc. to IEC 60947-4-1				
<b>AC-8a Utilization category</b> (without thermal overload relay - $U_n$ 400 V - $\theta \leq 40^\circ\text{C}$ )					
<b><math>I_n</math> / AC-8a rated operational current</b>	12 A	16 A	22 A	30 A	40 A
<b>AC-8a rated operational power</b>	5.5 kW	7.5 kW	11 kW	15 kW	20 kW
<b>Short-circuit protection for contactors</b> without thermal O/L relay - Motor protection excluded $U_n \leq 500$ V AC - gG type fuse	25 A	32 A	32 A	50 A	63 A
<b>Rated short-time withstand current <math>I_{cw}</math></b> at 40 °C ambient temperature, in free air from a cold state	<b>1 s</b> : 300 A	: 300 A	: 300 A	: 700 A	: 700 A
	<b>10 s</b> : 150 A	: 150 A	: 150 A	: 350 A	: 350 A
	<b>30 s</b> : 80 A	: 80 A	: 80 A	: 225 A	: 225 A
	<b>1 min</b> : 60 A	: 60 A	: 60 A	: 150 A	: 150 A
	<b>15 min</b> : 35 A	: 35 A	: 35 A	: 50 A	: 50 A
<b>Maximum breaking capacity</b> $\cos \varphi = 0.45$	<b>at 440 V</b> : 250 A	: 250 A	: 250 A	: 500 A	: 500 A
	<b>at 690 V</b> : 106 A	: 106 A	: 106 A	: 200 A	: 200 A
<b>Heat dissipation per pole</b>	$I_n$ / AC-1 : 0.8 W	: 1 W	: 1.2 W	: 1.8 W	: 2.4 W
	$I_n$ / AC-3 : 0.1 W	: 0.2 W	: 0.35 W	: 0.6 W	: 0.9 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			: 150 cycles/h	

# AF09 ... AF30 3-pole Contactors

## Technical Data



### Built-in Auxiliary Contacts according to IEC

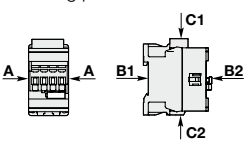
Contactor types	AF09	AF12	AF16	AF26	AF30
Rated operational voltage $U_e$ max.	690 V				
Conventional free air thermal current $I_{th}$ - $\theta \leq 40$ °C	16 A				
Rated frequency limits	25 ... 400 Hz				
Rated operational current $I_e$ / AC-15					
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A			
	220-240 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	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 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 <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			

# AF09 ... AF30 3-pole Contactors

## Technical Data



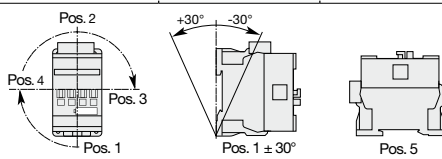
### General Technical Data

Contactor types	AF09	AF12	AF16	AF26	AF30
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-4-1	690 V				
acc. to UL / CSA	600 V				
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV				
<b>Electromagnetic compatibility</b>	Devices complying with IEC 60947-1 / EN 60947-1 - Environment A				
<b>Ambient air temperature</b> close to contactor					
Operation fitted with thermal overload relay	-				
without thermal overload relay	-40 ... +70 °C				
Storage	-60 ... +80 °C				
<b>Climatic withstand</b>	Category B according to IEC 60947-1 Annex Q				
<b>Operating altitude</b>	≤ 3000 m				
<b>Mechanical durability</b>					
Number of operating cycles	10 millions operating cycles				
Max. switching frequency	3600 cycles/h				
<b>Shock withstand</b> acc. IEC 60068-2-27 and EN 60068-2-27					
Mounting position 1					
					
<b>Shock direction</b>	1/2 sinusoidal shock for 11 ms: no change in contact position				
<b>A</b>	30 g				
<b>B1</b>	25 g Closed position / 5 g Open position				
<b>B2</b>	15 g				
<b>C1</b>	25 g				
<b>C2</b>	25 g				
<b>Vibration withstand</b> acc. to IEC 60068-2-6	5 ... 300 Hz				
	4 g Closed position / 2 g Open position				

### Magnet System Characteristics

Contactor types	AF09	AF12	AF16	AF26	AF30
<b>Coil operating limits</b> acc. to IEC 60947-4-1					
<b>AC supply</b>	at $\theta \leq 60$ °C $0.85 \times U_c$ min ... $1.1 \times U_c$ max				
	at $\theta \leq 70$ °C $0.85 \times U_c$ min ... $U_c$ max				
<b>DC supply</b>	at $\theta \leq 60$ °C $0.85 \times U_c$ min ... $1.1 \times U_c$ max				
	at $\theta \leq 70$ °C (AF) $0.85 \times U_c$ min ... $U_c$ max - (AF.Z) $0.85 \times U_c$ min ... $1.1 \times U_c$ max				
<b>AC control voltage</b> 50/60 Hz	Rated control circuit voltage $U_c$	24 ... 500 V AC			
Coil consumption	<b>Average pull-in value</b>	(AF) 50 VA - (AF.Z) 16 VA			
	<b>Average holding value</b>	(AF) 2.2 VA / 2 W - (AF.Z) 1.7 VA / 1.5 W			
<b>DC control voltage</b>	Rated control circuit voltage $U_c$	12 ... 500 V DC			
Coil consumption	<b>Average pull-in value</b>	(AF) 50 W - (AF.Z) 12 ... 16 W			
	<b>Average holding value</b>	(AF) 2 W - (AF.Z) 1.7 W			
<b>PLC-Output control</b>		(AF.Z) ≥ 500 mA 24 V DC			
<b>Drop-out voltage in % of <math>U_c</math> min.</b>		≤ 60 % $U_c$ min			
<b>Voltage sag immunity</b> according to SEMI F47-0706		(AF.Z) conditions of use on request			
<b>Dips withstand</b> (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			
<b>Operating time</b>					
between coil energization and:	<b>N.O. contact closing</b>	40 ... 95 ms			
	<b>N.C. contact opening</b>	38 ... 90 ms			
between coil de-energization and:	<b>N.O. contact opening</b>	11 ... 95 ms			
	<b>N.C. contact closing</b>	13 ... 98 ms			

### Mounting Characteristics

Contactor types	AF09	AF12	AF16	AF26	AF30
<b>Mounting positions</b>					
<b>Mounting distances</b>	Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF30				
<b>Fixing</b>	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				


















# AF09 ... AF30 3-pole Contactors

## Technical Data



### Connecting Characteristics

Contactor types	AF09	AF12	AF16	AF26	AF30
<b>Main terminals</b>					
	Screw terminals with cable clamp				
<b>Connecting capacity (min. ... max.)</b>					
<b>Main conductors (poles)</b>					
 Rigid	solid ( $\leq 4 \text{ mm}^2$ )	1 x	1 ... 6 mm <sup>2</sup>		2.5 ... 10 mm <sup>2</sup>
 Flexible with non insulated ferrule	stranded ( $\geq 6 \text{ mm}^2$ )	2 x	1 ... 6 mm <sup>2</sup>		2.5 ... 10 mm <sup>2</sup>
 Flexible with non insulated ferrule		1 x	0.75 ... 6 mm <sup>2</sup>		1.5 ... 10 mm <sup>2</sup>
 Flexible with insulated ferrule		2 x	0.75 ... 6 mm <sup>2</sup>		1.5 ... 10 mm <sup>2</sup>
 Flexible with insulated ferrule		1 x	0.75 ... 4 mm <sup>2</sup>		1.5 ... 10 mm <sup>2</sup>
 Flexible with insulated ferrule		2 x	0.75 ... 2.5 mm <sup>2</sup>		1.5 ... 4 mm <sup>2</sup>
 Bars or lugs		L <	9.6 mm		12.5 mm
Capacity according to UL/CSA		1 or 2 x	AWG 16 ... 10		AWG 14 ... 8
Stripping length			10 mm		14 mm
<b>Auxiliary conductors</b> (built-in auxiliary terminals + coil terminals)					
 Rigid solid		1 x	1 ... 2.5 mm <sup>2</sup>		
 Rigid solid		2 x	1 ... 2.5 mm <sup>2</sup>		
 Flexible with non insulated ferrule		1 x	0.75 ... 2.5 mm <sup>2</sup>		
 Flexible with non insulated ferrule		2 x	0.75 ... 2.5 mm <sup>2</sup>		
 Flexible with insulated ferrule		1 x	0.75 ... 2.5 mm <sup>2</sup>		
 Flexible with insulated ferrule		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		
<b>Degree of protection</b>					
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529					
Main terminals	IP20				
Coil terminals	IP20				
Built-in auxiliary terminals	IP20				
<b>Screw terminals</b>	(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				
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2				
<b>Tightening torque</b>					
Main pole terminals	1.5 Nm / 13 lb.in			2.5 Nm / 22 lb.in	
Coil terminals	1.2 Nm / 11 lb.in				
Built-in auxiliary terminals	1.2 Nm / 11 lb.in				

# AF09 ... AF38 Contactors

## DC Circuit Switching

### General


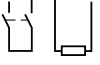
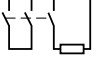
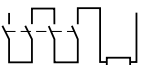

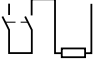
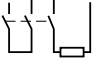


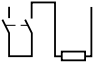

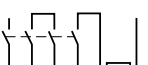
The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces ( $L/R \approx 1$  ms), inductive loads such as shunt motors ( $L/R \approx 2$  ms) or series motors ( $L/R \approx 7.5$  ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

### Technical Data

- The tables indicate for the standard contactors the  $I_e$  max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage  $U_e$  and the pole coupling details.
- Ampere values quoted in these tables are valid for a  $-25 \dots +70$  °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature.
- Max. switching frequency: 300 cycles/h.

### Selection Table

Contactor types	AF09	AF12	AF16	AF26	AF30		AF38		
	3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole	
<b>Utilization category DC-1, L/R <math>\leq 1</math> ms</b>									
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	10 A	15 A	20 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	10 A	15 A	20 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	$\leq 72$ V	25 A	—	30 A	—	45 A	—	—	55 A
	110 V	25 A	—	30 A	—	45 A	—	—	55 A
	220 V	25 A	—	30 A	—	45 A	—	—	55 A
	440 V	10 A	—	20 A	—	—	—	—	—
<b>Utilization category DC-3, L/R <math>\leq 2</math> ms</b>									
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	6 A	7 A	8 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	6 A	7 A	8 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	$\leq 72$ V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	25 A	—	30 A	—	—	—	—	—
	440 V	6 A	—	8 A	—	—	—	—	—
<b>Utilization category DC-5, L/R <math>\leq 7.5</math> ms</b>									
	$\leq 72$ V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	110 V	4 A	4 A	4 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	10 A	15 A	20 A	45 A	—	50 A	50 A	—
	220 V	4 A	4 A	4 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	$\leq 72$ V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	10 A	—	20 A	—	—	—	—	—
	440 V	4 A	—	4 A	—	—	—	—	—

# 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 power kW	Motor nominal current: standardized values in orange-violet colour (according to IEC 60947-4-1 Annex G)									
	220 V	230 V	240 V	380V	400 V	415 V	440 V	500 V	660 V	690 V
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	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	6.0	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	4.0	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	7.0	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	28.0	25.4	23	17.8	17
18.5	63.8	61	58.5	36.8	35	33.7	30.7	28	22.0	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 power hp	Motor nominal current: standardized values (according to IEC 60947-4-1 Annex G and UL 508)				
	208 V	220-240 V	380-415 V	440-480 V	550-600 V
1/2	2.4	2.2	1.3	1.1	0.9
3/4	3.5	3.2	1.8	1.6	1.3
1	4.6	4.2	2.3	2.1	1.7
1-1/2	6.6	6	3.3	3	2.4
2	7.5	6.8	4.3	3.4	2.7
3	10.6	9.6	6.1	4.8	3.9
5	16.7	15.2	9.7	7.6	6.1
7-1/2	24.2	22	14	11	9
10	30.8	28	18	14	11
15	46.2	42	27	21	17
20	59.4	54	34	27	22
25	74.8	68	44	34	27
30	88	80	51	40	32
40	114	104	66	52	41
50	143	130	83	65	52
60	169	154	103	77	62
75	211	192	128	96	77
100	273	248	165	124	99
125	343	312	208	156	125
150	396	360	240	180	144
200	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

# AF09 ... AF38 3-pole Contactors

## 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.

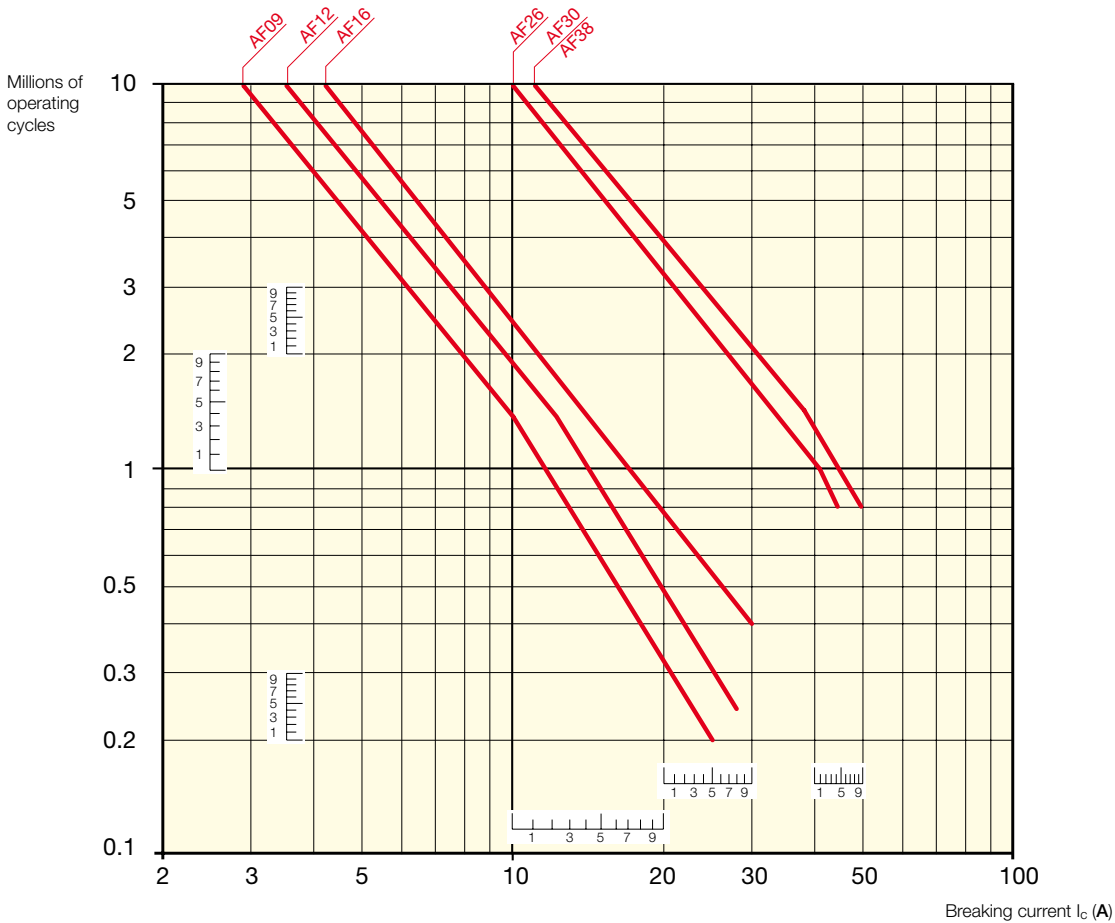
# AF09 ... AF38 3-pole Contactors

## Electrical Durability

**Electrical Durability for AC-1 Utilization Category -  $U_e \leq 690$  V. Ambient Temperature  $\leq 60$  °C**

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.

Maximum electrical switching frequency: see "Technical Data".



AF09 ... AF38 3-pole contactors AC-1 electrical durability

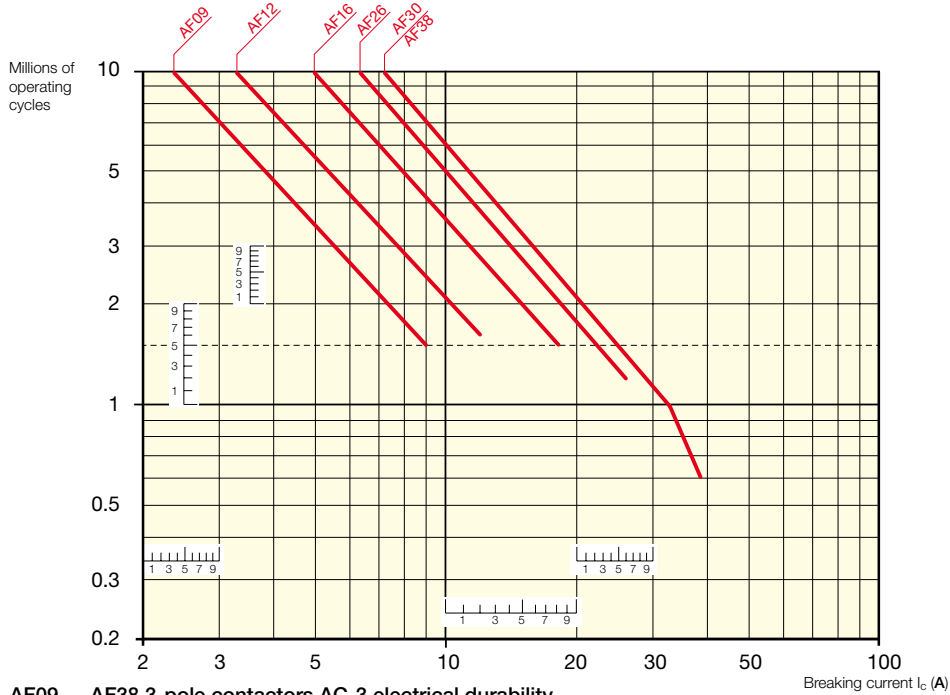
# AF09 ... AF38 3-pole Contactors

## Electrical Durability

### Electrical Durability for AC-3 Utilization Category - $U_e \leq 440$ V. Ambient Temperature $\leq 60$ °C

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).

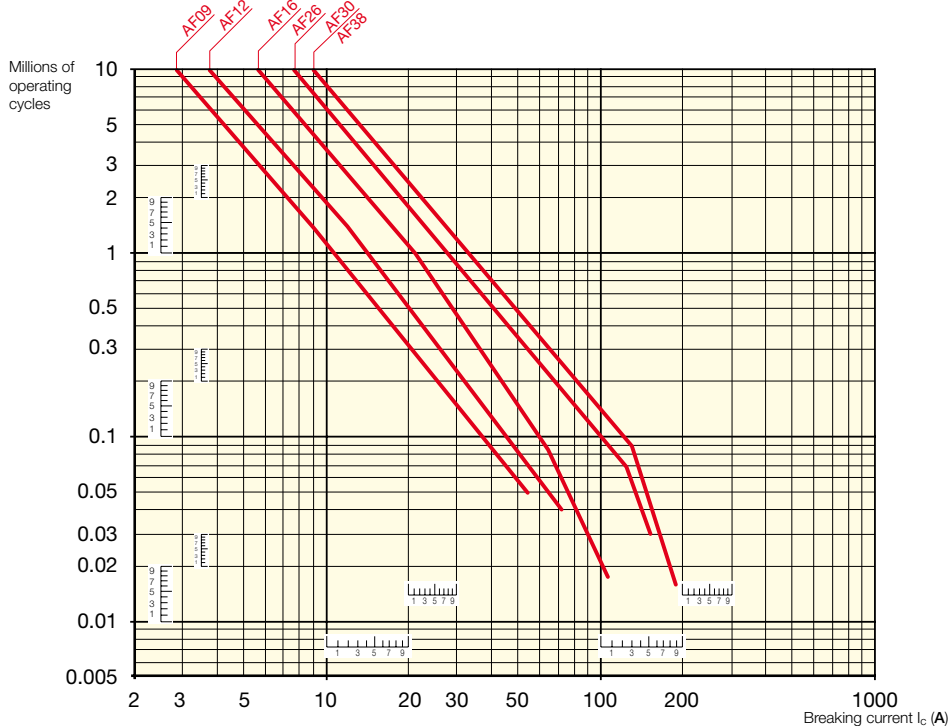
Maximum electrical switching frequency: see "Technical Data".



### Electrical Durability for AC-2 or AC-4 Utilization Category - $U_e \leq 440$ V. Ambient Temperature $\leq 60$ °C

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".



# AF09 ... AF30 3-pole Contactors

## Main Accessories

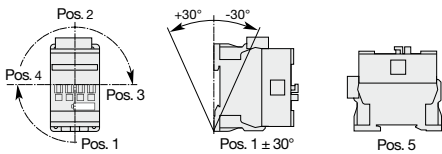


### Accessory fitting details for a 3-pole contactor AF09 ... AF30

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				Electrical and mechanical interlock set (between 2 contactors)	Side-mounted accessories	
			Auxiliary contact blocks			VEM4		Auxiliary contact blocks	
			1-pole CA4 1-pole CC4	2-pole CAT4-11	4-pole CA4			Left side	Right side
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									
AF09 ... AF16	3	0 0 1	4 max.	or 1	or 1	-	+ 1	-	
			2 max.	-	-	-	+ 1	+ 1	
			3 max.	-	-	+ 1	+ 1	or 1	
AF09 ... AF16	3	0 1 0	4 max.	or 1	or 1	-	+ 1	-	
AF26 ... AF30	3	0 0 0	2 max.	or 1	-	-	+ 1	+ 1	
			3 max.	-	-	+ 1	+ 1	or 1	

### Mounting positions

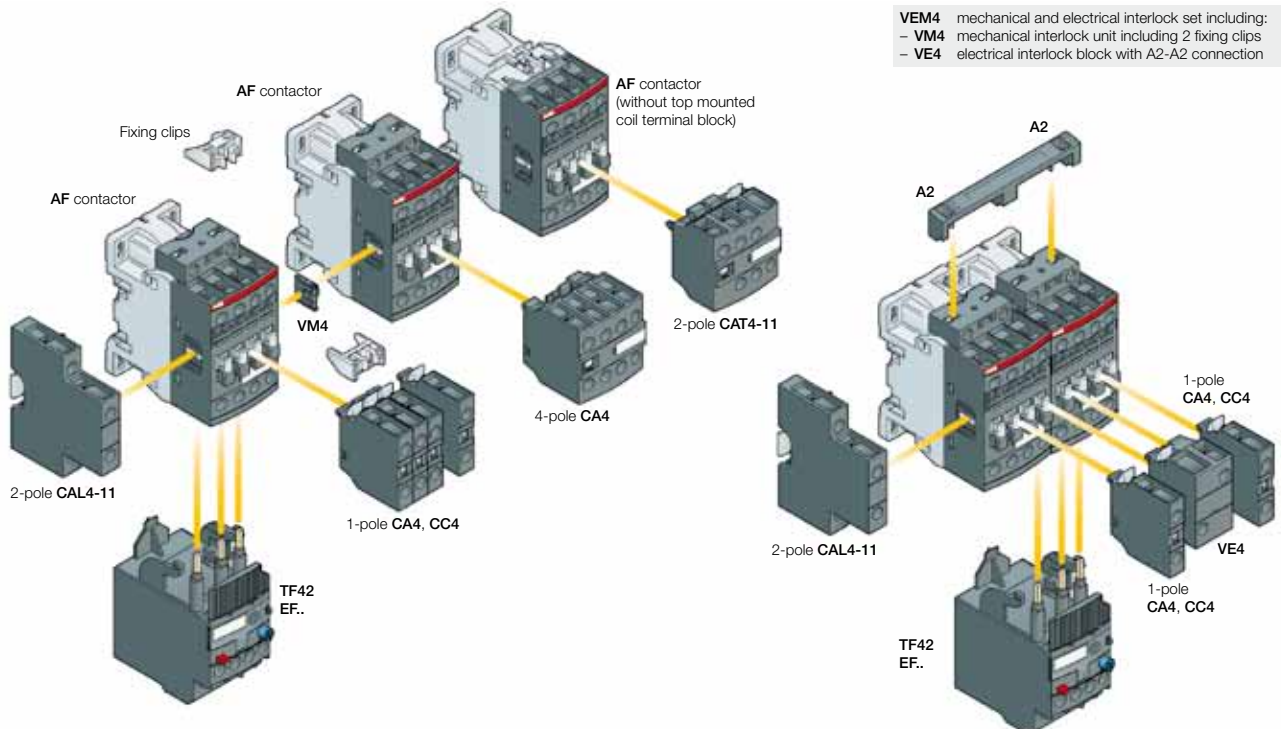


### Protection against overloads with thermal or electronic overload relays

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

Contactor types	Overload relays - direct mounting - no kit required
AF09 ... AF30	TF42 thermal overload relay
AF09 ... AF30	EF19 electronic overload relay
AF26 ... AF30	EF45 electronic overload relay

### Contactors and main accessories (other accessories available)



# Auxiliary Contact Blocks

## Accessories for AF09 ... AF30 3-pole Contactors



CA4-10



CA4-22M



CAL4-11



CAT4-11E

### Application

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

### Description

Types of auxiliary contact blocks for standard industrial environments:

- **CA4** 1 or 4-pole block, front-mounted, instantaneous with N.O., N.C. contacts
- **CC4** 1-pole block, front-mounted, with N.O. leading contact or N.C. lagging contact
- **CAT4** 2-pole block, front-mounted, instantaneous N.O. + N.C. contacts with A1 / A2 coil terminal connection on front face
- **CAL4** 2-pole block instantaneous N.O. + N.C. contacts clipped onto the right and/or left side of the contactors.

Select the type of 2 or 4-pole auxiliary contact blocks CAT4 or CA4-..E, CA 4-..M or CA 4-..U, according to the contactor type for compliance with the standard requirements (see terminal and marking positioning).

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

Fitting Details - For each contactor refer to "Accessory Fitting Details" table.

### Ordering Details

For contactors	Auxiliary contacts	Catalog number	List price	Pack <sup>(log)</sup> pieces	Weight kg/lbs (1 pce)

#### Front-mounted instantaneous auxiliary contact blocks

AF09 ... AF30	1	0	-	-	CA4-10	1	0.014/0.03
	0	1	-	-	CA4-01	1	0.014/0.03
AF09 ... AF16..-30-10	2	2	-	-	CA4-22M	1	0.055/0.12
	3	1	-	-	CA4-31M	1	0.055/0.12
	1	3	-	-	CA4-13M	1	0.055/0.12
	0	4	-	-	CA4-04M	1	0.055/0.12
AF26 ... AF30..-30-00	2	2	-	-	CA4-22E	1	0.055/0.12
	3	1	-	-	CA4-31E	1	0.055/0.12
	4	0	-	-	CA4-40E	1	0.055/0.12
	0	4	-	-	CA4-04E	1	0.055/0.12
AF09 ... AF16..-30-01	2	2	-	-	CA4-22U	1	0.055/0.12
	3	1	-	-	CA4-31U	1	0.055/0.12
	4	0	-	-	CA4-40U	1	0.055/0.12

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

AF09 ... AF30	-	-	1	0	CC4-10	1	0.014/0.03
	-	-	0	1	CC4-01	1	0.014/0.03

#### Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF30	1	1	-	-	CAL4-11	1	0.040/0.09
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#### Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF16..-30-10	1	1	-	-	CAT4-11M	1	0.040/0.09
AF26 ... AF30..-30-00	1	1	-	-	CAT4-11E	1	0.040/0.09
AF09 ... AF16..-30-01	1	1	-	-	CAT4-11U	1	0.040/0.09

Note: CAT4 not fittable on AF.Z contactors with DC control voltage 12...20 V DC.



# Auxiliary Contact Blocks

## Accessories for AF09 ... AF30 3-pole Contactors



### Technical Data

**Types** : 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4








#### Contact Utilization Characteristics according to IEC

<b>Standards</b>	IEC 60947-5-1 and EN 60947-5-1	
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-5-1	690 V	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV	
<b>Rated operational voltage <math>U_o</math> max.</b>	24 ... 690 V	
<b>Conventional thermal current <math>I_{th}</math></b> - $\theta \leq 40$ °C	16 A	
<b>Rated frequency limits</b>	25 ... 400 Hz	
<b>Rated operational current <math>I_o</math> / AC-15</b> 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
<b>Making capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1	
<b>Breaking capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1	
<b>Rated operational current <math>I_o</math> / DC-13</b> 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
	<b>Short-circuit protection gG type fuse</b>	10 A
<b>Rated short-time withstand current <math>I_{sc}</math></b> $\theta = 40$ °C	for 1.0 s	100 A
	for 0.1 s	140 A
<b>Minimum switching capacity</b> with failure rate acc. to IEC 60947-5-4	12 V / 3 mA	
<b>Heat dissipation per pole at 6 A</b>	10 <sup>7</sup>	
<b>Mechanical durability</b>	Number of operating cycles	10 millions operating cycles
	Max. switching frequency	3600 cycles/h
<b>Max. electrical switching frequency</b>	for AC-15	1200 cycles/h
	for DC-13	900 cycles/h

#### Contact Utilization Characteristics according to UL / CSA

<b>Standards</b>	UL 508, CSA C22.2 N°14
<b>Rated insulation voltage <math>U_i</math></b>	600 V
<b>Max. rated voltage</b>	600 V AC, 600 V DC
<b>Pilot duty</b>	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

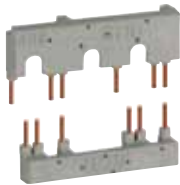
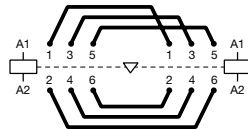
<b>Screw terminals</b>	(delivered in open position, screws of unused terminals must be tightened)	
All terminals	M3.5	
<b>Connecting capacity (min. ... max.)</b>		
 Rigid solid	1 x	1 ... 2.5 mm <sup>2</sup>
 Flexible with non insulated ferrule	2 x	1 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	2 x	0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	1 x	0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	2 x	0.75 ... 1.5 mm <sup>2</sup>
 Bars or lugs	L <	8 mm
Capacity acc. to UL/CSA	1 or 2 x	AWG 18 ... 14
Stripping length	10 mm	
<b>Degree of protection</b> acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20	
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2	
<b>Tightening torque</b>	1.2 Nm / 11 lb.in	

# Connection Accessories for Starting Solutions

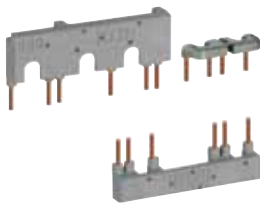
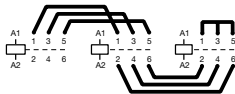
## Accessories for AF09 ... AF30 3-pole Contactors



BEA16-4



BER16-4



BEY16-4

### Connecting links with manual motor starters

#### Description

The **BEA...-4** connecting links are used to connect AF09 ... AF30 contactors with the MS116 or MS132 manual motor starters.

The **BEA...-4** insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter.

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF16 with MS116 and MS132	<b>BEA16-4</b>		10	0.025/0.05
AF26 ... AF30 with MS132-12 ... MS132-32	<b>BEA38-4</b>		10	0.030/0.07

### Connection sets for reversing contactors

#### Description

**BER16-4** and **BER38-4** connection sets between the main poles of two 3-pole contactors mounted side by side.

The connection sets are made up of 1 upstream and 1 downstream connections: insulated, solid copper bars.

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF16	<b>BER16-4</b>		1	0.045/0.10
AF26 ... AF30	<b>BER38-4</b>		1	0.100/0.22

### Connection sets for WYE-Delta starting

#### Description

**BEY16-4** and **BEY38-4** connection sets between the main poles of the Line, Delta and WYE contactors of a WYE-Delta starter.

The connection sets are made up of:

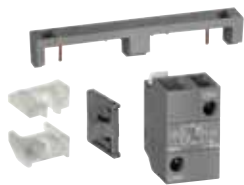
- - Line contactor / Delta contactor: upstream phase-to-phase connection
- - Delta contactor / WYE contactor: downstream connection in parallel
- - WYE contactor: WYE point upstream.

#### Ordering Details

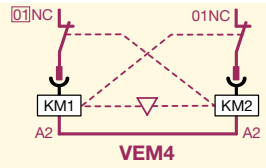
For Line, Delta and WYE contactors	Interlock unit between Delta & WYE contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF16	With or without	<b>BEY16-4</b>		1	0.05/0.11
AF26 ... AF30	VM4 or VEM4	<b>BEY38-4</b>		1	0.11/0.24



VM4



VEM4



BB4

### Mechanical interlock unit

#### Description

**VM4** mechanical interlock unit for the interlocking of two AF contactors.

When mounted between two contactors without additional width, the VM4 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

The mechanical interlock unit includes 2 fixing clips (BB4).

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF30	<b>VM4</b>		10	0.005/0.01

### Mechanical and electrical interlock set

#### Description

**VEM4** mechanical and electrical interlock set for the interlocking of two AF contactors.

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

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

#### Ordering Details

For contactors	Auxiliary contacts	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF16 AF26 ... AF30	1 1 	<b>VEM4</b>		1	0.035

Note: VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

### Fixing clips

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF30	<b>BB4</b>		50	0.002/0.004

# Interlocks

## Accessories for AF09 ... AF30 3-pole Contactors



### Technical Data

<b>Interlock types</b>	<b>VM4</b>
<b>Mechanical durability</b>	
Number of operating cycles	5 million operating cycles
Max. switching frequency	1800 cycles/h

<b>Interlock types</b>	<b>VEM4</b>
------------------------	-------------








### Contact Utilization Characteristics according to IEC

<b>Standards</b>	IEC 60947-5-1 and EN 60947-5-1
<b>Rated insulation voltage <math>U_i</math> acc. to IEC 60947-5-1</b>	690 V
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV
<b>Rated control circuit voltage <math>U_c</math></b>	<b>AC 50/60 Hz control voltage</b> 24 ... 500 V AC
	<b>DC control voltage</b> 20 ... 500 V DC
<b>Conventional thermal current <math>I_{th} - \theta \leq 40 \text{ °C}</math></b>	16 A
<b>Mechanical and electrical durability</b>	
Number of operating cycles	5 million operating cycles
Max. mechanical switching frequency	1800 cycles/h
Max. electrical switching frequency	1200 cycles/h

### Contact Utilization Characteristics according to UL / CSA

<b>Standards</b>	UL 508, CSA C22.2 N°14
<b>Max. rated voltage</b>	500 V AC, 500 V DC

### Connecting Characteristics

<b>Screw terminals</b>	
All terminals	M3.5
<b>Connecting capacity (min. ... max.)</b>	
 Rigid Solid	1 x ; 1 ... 2.5 mm <sup>2</sup>
 Flexible with non insulated ferrule	2 x ; 1 ... 2.5 mm <sup>2</sup>
 Flexible with non insulated ferrule	1 x ; 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with non insulated ferrule	2 x ; 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	1 x ; 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	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
<b>Degree of protection</b>	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2
<b>Tightening torque</b>	1.2 Nm / 11 lb.in



LDC4

### Additional coil terminal block

#### Description

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF30	LDC4		10	0.010/0.022



BX4



BX4-CA

### Protective covers

#### Description

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

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
All 1-stack contactors	BX4		10	0.006/0.013
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA		50	0.001/0.002



BA4

### Function markers

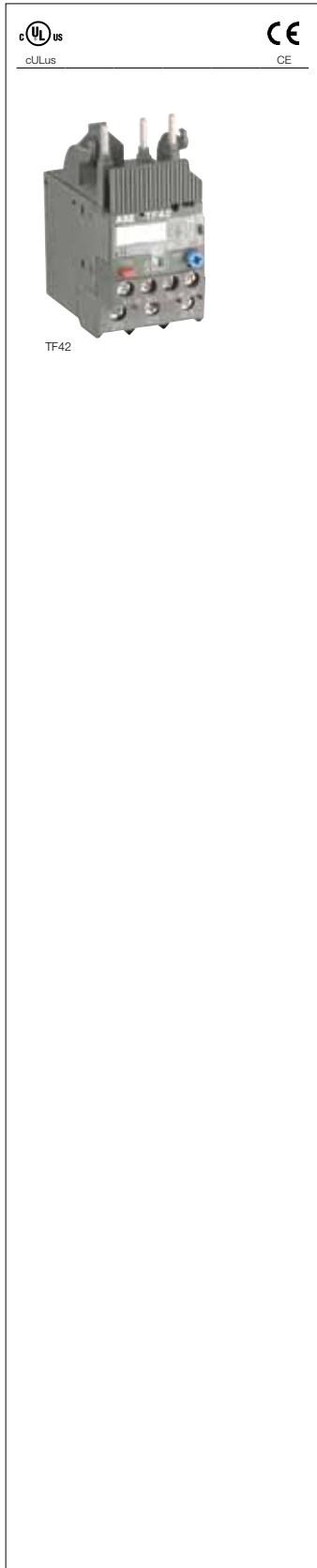
#### Description

Box of 16 blank cards (16 markers per card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787")

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
Marker card	BA4		16	0.011/0.024
AMS 500 support plate for 8 BA4	XUSP02633		1	0.220/0.48
HTP500 support plate	1SNA235712R2400		1	0.290/0.64



### Application

- Overload protection
- Trip class 10
- Phase loss sensitivity
- Manual/automatic reset selectable

### Description

- 45 mm width
- Suitable for contactor **AF09 ... AF30**
- Sealable operating elements

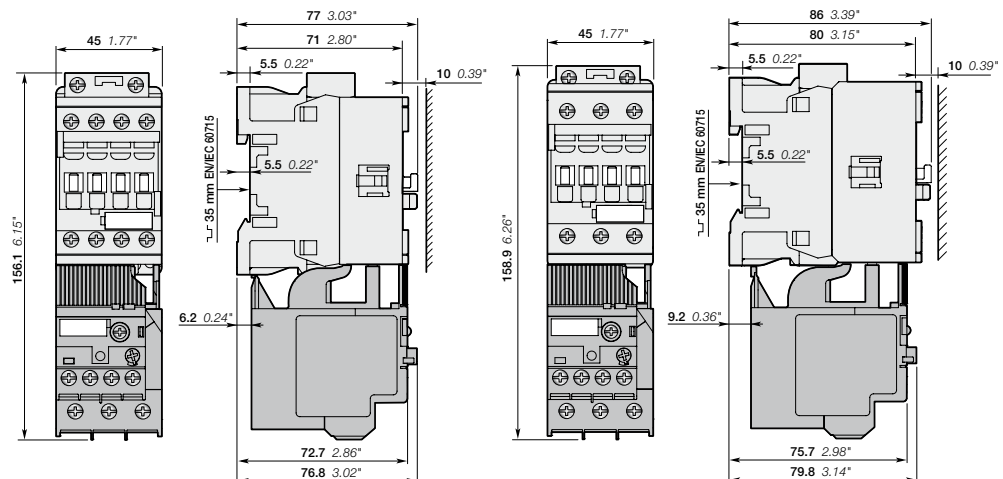
### Ordering Details

Setting ranges	Max. fuse J A	Suitable for contactors	Catalog number	List price	Pack <sup>(10)</sup> pieces	Weight kg/lbs (1 pce)
0.10 ... 0.13		AF09 ... AF30	<b>TF42-0.13</b>		1	0.13/0.29
0.13 ... 0.17		AF09 ... AF30	<b>TF42-0.17</b>		1	0.13/0.29
0.17 ... 0.23		AF09 ... AF30	<b>TF42-0.23</b>		1	0.13/0.29
0.23 ... 0.31		AF09 ... AF30	<b>TF42-0.31</b>		1	0.13/0.29
0.31 ... 0.41		AF09 ... AF30	<b>TF42-0.41</b>		1	0.13/0.29
0.41 ... 0.55		AF09 ... AF30	<b>TF42-0.55</b>		1	0.13/0.29
0.55 ... 0.74		AF09 ... AF30	<b>TF42-0.74</b>		1	0.13/0.29
0.74 ... 1.0		AF09 ... AF30	<b>TF42-1.0</b>		1	0.13/0.29
1.0 ... 1.3		AF09 ... AF30	<b>TF42-1.3</b>		1	0.13/0.29
1.3 ... 1.7		AF09 ... AF30	<b>TF42-1.7</b>		1	0.13/0.29
1.7 ... 2.3		AF09 ... AF30	<b>TF42-2.3</b>		1	0.13/0.29
2.3 ... 3.1		AF09 ... AF30	<b>TF42-3.1</b>		1	0.13/0.29
3.1 ... 4.2		AF09 ... AF30	<b>TF42-4.2</b>		1	0.13/0.29
4.2 ... 5.7		AF09 ... AF30	<b>TF42-5.7</b>		1	0.13/0.29
5.7 ... 7.6		AF09 ... AF30	<b>TF42-7.6</b>		1	0.13/0.29
7.6 ... 10		AF09 ... AF30	<b>TF42-10</b>		1	0.13/0.29
10 ... 13		AF09 ... AF30	<b>TF42-13</b>		1	0.13/0.29
13 ... 16		AF09 ... AF30	<b>TF42-16</b>		1	0.13/0.29
16 ... 20		AF09 ... AF30	<b>TF42-20</b>		1	0.13/0.29
20 ... 24		AF09 ... AF30	<b>TF42-24</b>		1	0.145/0.32
24 ... 29		AF09 ... AF30	<b>TF42-29</b>		1	0.145/0.32
29 ... 35		AF09 ... AF30	<b>TF42-35</b>		1	0.145/0.32
35 ... 38		AF09 ... AF38	<b>TF42-38</b>		1	0.145/0.32

### Main Dimensions (mm, inches)

AF09, AF12, AF16 3-pole contactors  
+ TF42 thermal overload relay

AF26, AF30 3-pole contactors  
+ TF42 thermal overload relay





## Main Technical Data

### Overload Relay Types

### TF42

<b>Standards</b>	Conformity to standards			IEC/EN60947-1, IEC/EN60947-4-1, IEC/EN60947-5-1, UL 508, CSA C22.2 No. 14	
	Phase loss sensitivity	(acc. to IEC/EN 60947-4-1)		Yes	
<b>General data</b>	Mounting position			any	
	Degree of protection	(acc. to IEC 60947-1)		IP 20	
<b>UL/CSA</b>					
<b>Main circuit</b>	Max. operational voltage			600 V AC	
<b>Connecting capacity</b>	Main circuit	Stranded	<b>1 or 2 x</b>	AWG 16 ... 6	
		Flexible without ferrule	<b>1 or 2 x</b>	AWG 16 ... 6	
	Stripping length				
	Tightening torque				
	Auxiliary circuit	Stranded	<b>1 or 2 x</b>	AWG 18 ... 10	
		Flexible without ferrule	<b>1 or 2 x</b>	AWG 18 ... 10	
Stripping length		9 mm			
Tightening torque		7 ... 11 lb. in			
<b>Main circuit</b>	Rated operational voltage <b>U<sub>e</sub></b>			690 V AC	
	Rated operational current AC-3 <b>I<sub>e</sub></b>			up to 35 A	
	Conventional free air thermal current <b>I<sub>th</sub></b>			up to 35 A	
	Rated frequency			0 to 400 Hz	
	Trip class			10	
<b>Isolation data</b>	Rated impulse withstand voltage <b>U<sub>imp</sub></b>			6 kV	
(acc. to IEC/EN 60947-1)	Rated insulation voltage <b>U<sub>i</sub></b>			690 V	
<b>Environmental data</b>	Ambient air temperature range				
	Operation	Open - compensated		-25 ... +70 °C	
		Open		-25 ... +70 °C	
	Storage			-50 ... +85 °C	
	Vibration	(acc. to IEC/EN 60068-2-6)		1 g / 3-150 Hz	
	Shock	(acc. to IEC/EN 60068-2-27)		15 g / 11 ms	
<b>Auxiliary circuit</b>	Rated operational voltage <b>U<sub>e</sub></b>	(acc. to IEC/EN 60947-5-1)		600 V	
	Rated operational current <b>I<sub>e</sub></b>	(acc. to IEC/EN 60947-5-1 utilization category)			
	AC-15 (resistive)	110-120 V	<b>N.C.</b>	3 A	
			<b>N.O.</b>	3 A	
		220-230-240 V	<b>N.C.</b>	3 A	
			<b>N.O.</b>	3 A	
		400 V	<b>N.C.</b>	1.1 A	
			<b>N.O.</b>	1.1 A	
		480-500 V	<b>N.C.</b>	0.75 A	
			<b>N.O.</b>	0.75 A	
		600 V	<b>N.C.</b>	0.5 A	
			<b>N.O.</b>	0.5 A	
	DC-13 (resistive)	24 V	<b>N.C.</b>	1.5 A	
			<b>N.O.</b>	1.5 A	
		110-120-125 V	<b>N.C.</b>	0.55 A	
			<b>N.O.</b>	0.55 A	
		250 V	<b>N.C.</b>	0.27 A	
			<b>N.O.</b>	0.27 A	
<b>Connecting capacity</b>	Main circuit	Rigid	<b>1 or 2 x</b>	1.0 ... 4 mm <sup>2</sup>	
		Flexible with ferrule	<b>1 or 2 x</b>	0.75 ... 2.5 mm <sup>2</sup>	
		Flexible without ferrule	<b>1 or 2 x</b>	0.75 ... 2.5 mm <sup>2</sup>	
		Stripping length		9 mm	
		Tightening torque		0.8 ... 1.5 Nm	
		Auxiliary circuit	Rigid	<b>1 or 2 x</b>	0.75 ... 2.5 mm <sup>2</sup>
	Flexible with ferrule		<b>1 or 2 x</b>	0.75 ... 2.5 mm <sup>2</sup>	
	Flexible without ferrule		<b>1 or 2 x</b>	0.75 ... 2.5 mm <sup>2</sup>	
	Stripping length		9 mm		
	Tightening torque		7 ... 11 lb. in		

# EF19 and EF45 Electronic Overload Relays



0.10 ... 45.0 A  
Class 10, 20, 30



cULus  
cULus

CE  
CE

EF19

EF45

## Application

- Overload protection
- Trip class 10, 20, 30
- Phase loss sensitivity
- Manual/automatic reset selectable

## Description

- 45 mm width
- Suitable for contactor AF09 ... AF30

## Ordering Details

Setting ranges	Max. fuse J A	Suitable for contactors	Catalog number	Price list	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
A ... A	A					

## EF19 Electronic Overload Relay

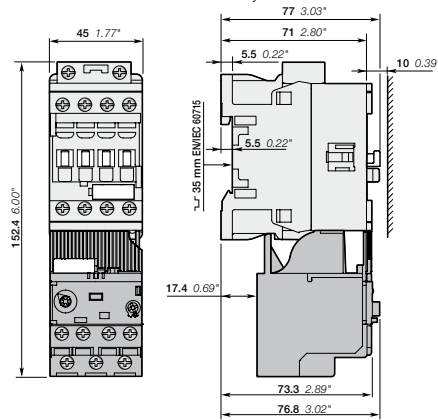
0.10 ... 0.32	1	AF09 ... AF30	<b>EF19-0.32</b>		1	0.158/0.35
0.30 ... 1.00	3	AF09 ... AF30	<b>EF19-1.0</b>		1	0.158/0.35
0.80 ... 2.70	10	AF09 ... AF30	<b>EF19-2.7</b>		1	0.158/0.35
1.90 ... 6.30	20	AF09 ... AF30	<b>EF19-6.3</b>		1	0.158/0.35
5.70 ... 18.9	50	AF09 ... AF30	<b>EF19-18.9</b>		1	0.158/0.35

## EF45 Electronic Overload Relay

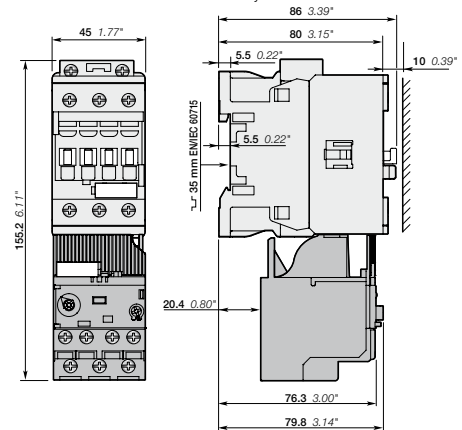
9.00 ... 30.0	100	AF26 ... AF30	<b>EF45-30</b>		1	0.362/0.80
15.0 ... 45.0	100	AF26 ... AF30	<b>EF45-45</b>		1	0.362/0.80

## Main Dimensions mm, inches

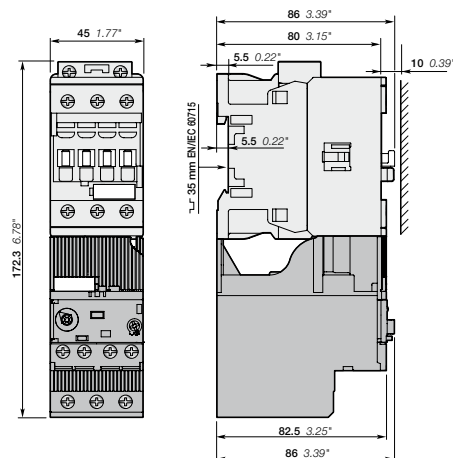
AF09, AF12, AF16 3-pole contactors  
+ EF19 electronic overload relay



AF26, AF30 3-pole contactors  
+ EF19 electronic overload relay



AF26, AF30 3-pole contactors  
+ EF45 electronic overload relay







## Main Technical Data

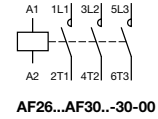
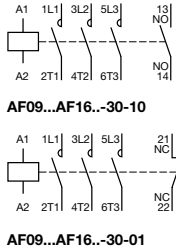
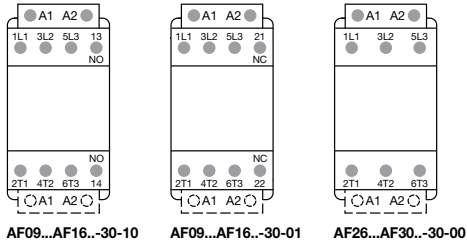
Overload Relay Types		EF19	EF45			
		up to 18.9 A	up to 45.0 A			
<b>Standards</b>	Conformity to standards	IEC/EN60947-1, IEC/EN60947-4-1, IEC/EN60947-5-1, UL 508, CSA G22.2 No. 14				
	Phase loss sensitivity (acc. to IEC/EN 60947-4-1)	Yes				
<b>General data</b>	Mounting position	any				
	Degree of protection (acc. to IEC 60947-1)	IP 20				
<b>UL/CSA</b>						
<b>Main circuit</b>	Max. operational voltage	600 V AC				
<b>Connecting capacity</b>	Main circuit	Stranded	1 or 2 x	AWG 16 ... 10	AWG 16 ... 6	
		Flexible without ferrule	1 or 2 x	AWG 16 ... 10	AWG 16 ... 6	
	Stripping length		9 mm		13 mm	
	Tightening torque		7 ... 13 lb.in		20 ... 22 lb.in	
	Auxiliary circuit	Stranded	1 or 2 x	AWG 18 ... 10		
		Flexible without ferrule	1 or 2 x	AWG 18 ... 10		
Stripping length		9 mm				
Tightening torque		7 ... 11 lb.in				
<b>IEC</b>						
<b>Main circuit</b>	Rated operational voltage <b>U<sub>e</sub></b>	690 V AC				
	Rated operational current AC-3 <b>I<sub>e</sub></b>	up to 18.9 A	up to 45.0 A			
	Conventional free air thermal current <b>I<sub>th</sub></b>	up to 18.9 A	up to 45.0 A			
	Rated frequency	50 / 60 Hz				
	Trip class	10E, 20E, 30E				
<b>Isolation data</b>	Rated impulse withstand voltage <b>U<sub>imp</sub></b>	6 kV				
	(acc. to IEC/EN 60947-1) Rated insulation voltage <b>U<sub>i</sub></b>	690 V				
<b>Environmental data</b>	Ambient air temperature range					
	Operation	Open - compensated	-25 ... +70 °C			
		Open	-25 ... +70 °C			
	Storage		-50 ... +85 °C			
	Vibration (acc. to IEC/EN 60068-2-6)	1 g / 3-150 Hz				
Shock (acc. to IEC/EN 60068-2-27)	15 g / 11 ms					
<b>Auxiliary circuit</b>	Rated operational voltage <b>U<sub>e</sub></b> (acc. to IEC/EN 60947-5-1)		600 V			
	Rated operational current <b>I<sub>e</sub></b> (acc. to IEC/EN 60947-5-1 utilization category):					
	AC-15 (resistive)	110-120 V	N.C.	3 A		
			N.O.	3 A		
		220-230-240 V	N.C.	3 A		
			N.O.	3 A		
		400 V	N.C.	1.1 A		
			N.O.	1.1 A		
	480-500 V	N.C.	0.75 A			
		N.O.	0.75 A			
		N.C.	0.75 A			
	DC-13 (resistive)	24 V	N.C.	1.5 A		
			N.O.	1.5 A		
		110-120-125 V	N.C.	0.55 A		
			N.O.	0.55 A		
250 V		N.C.	0.27 A			
N.O.	0.27 A					
<b>Connecting capacity</b>	Main circuit	Rigid	1 or 2 x	1.0 ... 4 mm <sup>2</sup>	2.5 ... 16 mm <sup>2</sup>	
		Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>	2.5 ... 10 mm <sup>2</sup>	
		Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>	2.5 ... 10 mm <sup>2</sup>	
		Stripping length		9 mm		13 mm
		Tightening torque		0.8 ... 1.5 Nm		2.3 ... 2.5 Nm
		Auxiliary circuit	Rigid	1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>	
	Flexible with ferrule		1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>		
	Flexible without ferrule		1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>		
	Stripping length		9 mm			
	Tightening torque		0.8 ... 1.2 Nm			

# AF09 ... AF30 3-pole Contactors

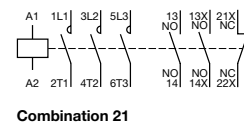
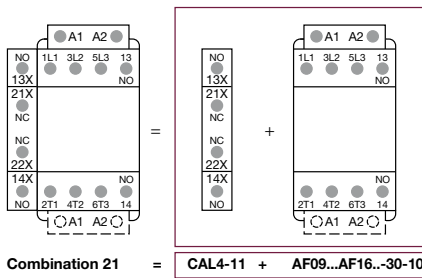
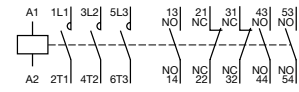
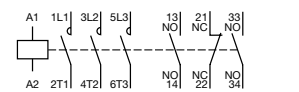
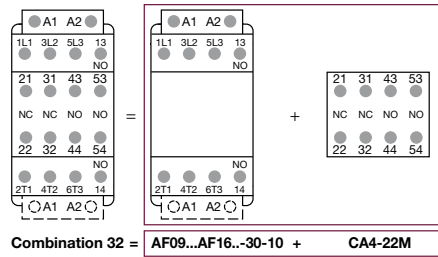
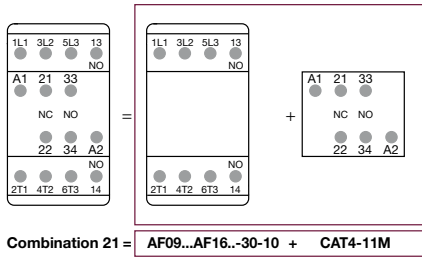
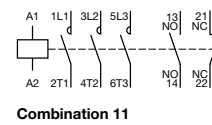
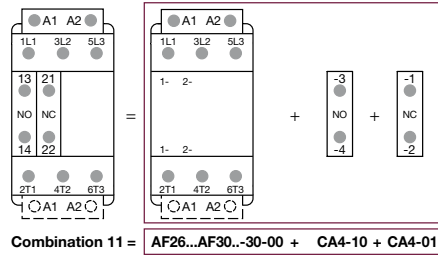
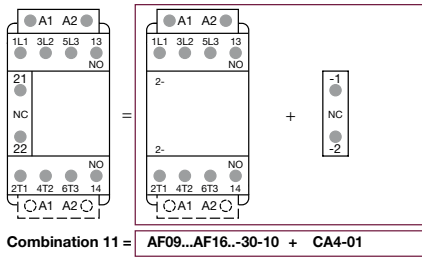
## Terminal Marking and Positioning



### Standard devices without addition of auxiliary contacts



### Other possible contact combinations with auxiliary contacts



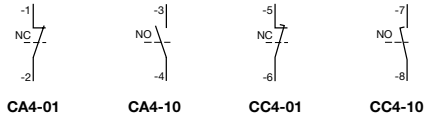
Note: Only AF.Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

# Add-on Auxiliary Contacts

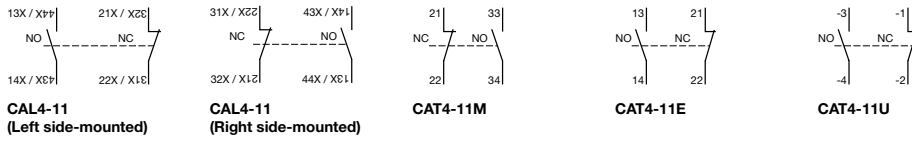
## Terminal Marking and Positioning



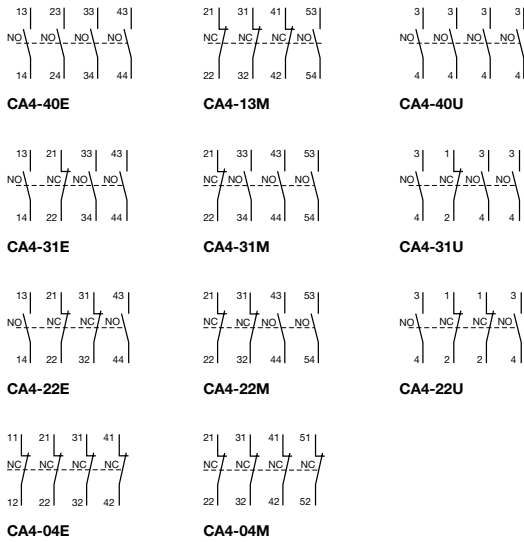
### 1-pole auxiliary contacts



### 2-pole auxiliary contacts



### 4-pole auxiliary contacts

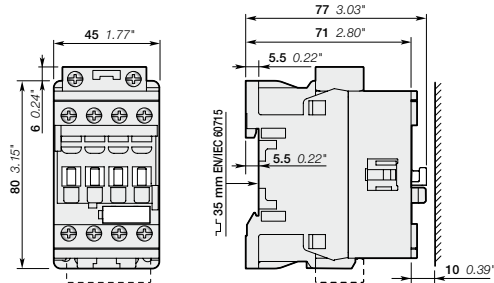


# AF09 ... AF16 3-pole Contactors

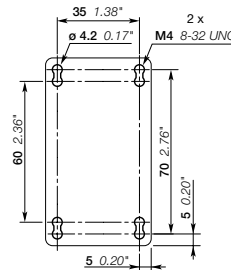
## AC / DC Operated - with Screw Terminals



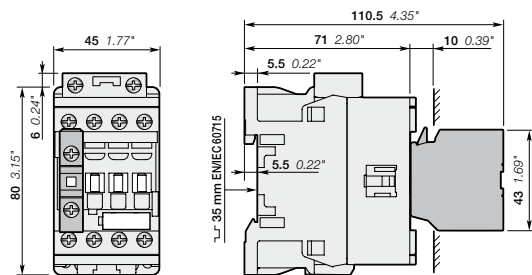
Dimensions mm, inches



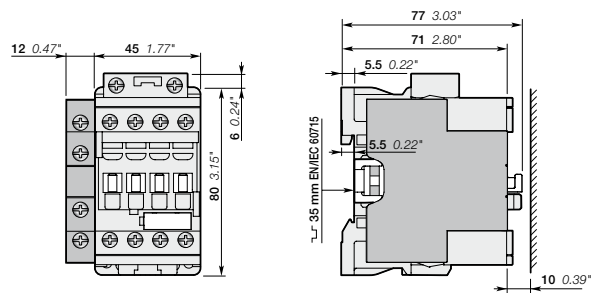
AF09, AF12, AF16



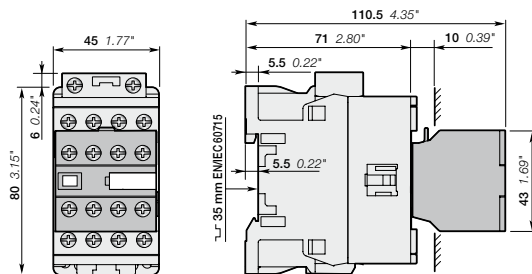
AF09, AF12, AF16



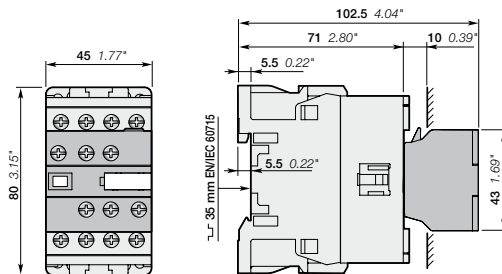
AF09, AF12, AF16  
 + CA4, CC4 1-pole auxiliary contact block



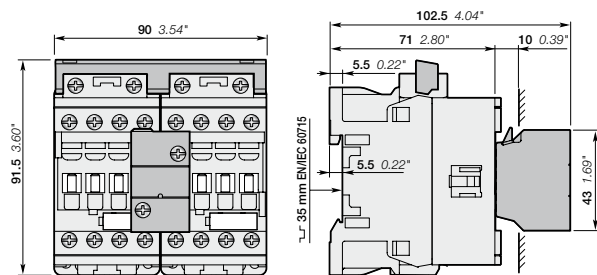
AF09, AF12, AF16  
 + CAL4-11 2-pole auxiliary contact block



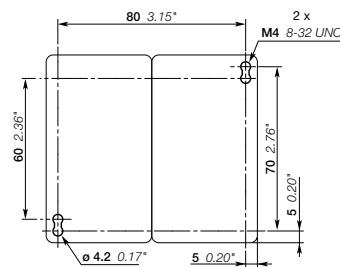
AF09, AF12, AF16  
 + CA4 4-pole auxiliary contact block



AF09, AF12, AF16  
 + CAT4 2-pole auxiliary contact and coil terminal block



AF09, AF12, AF16  
 + VEM4 mechanical and electrical interlock set



AF09, AF12, AF16  
 + VEM4 mechanical and electrical interlock set

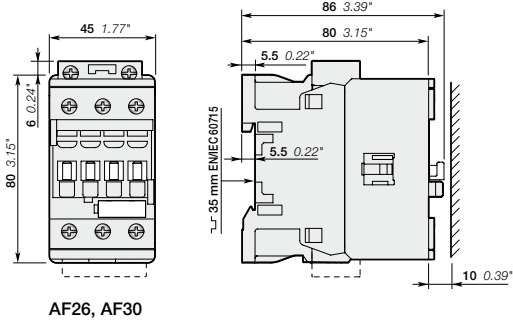
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

# AF26 ... AF30 3-pole Contactors

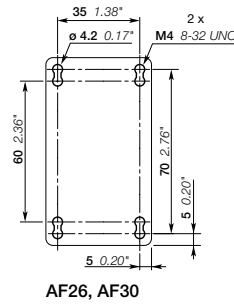
## AC / DC Operated - with Screw Terminals



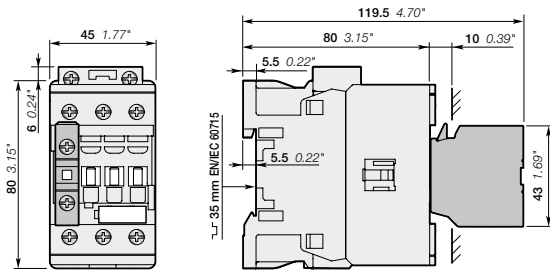
### Dimensions mm, inches



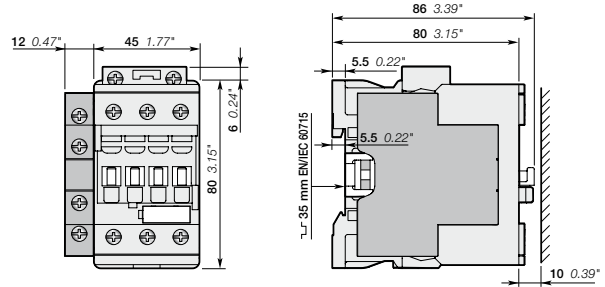
AF26, AF30



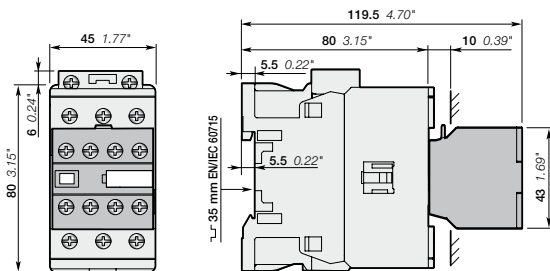
AF26, AF30



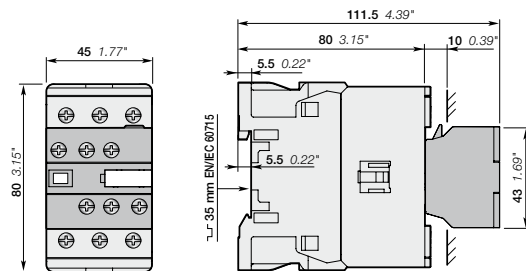
AF26, AF30  
+ CA4, CC4 1-pole auxiliary contact block



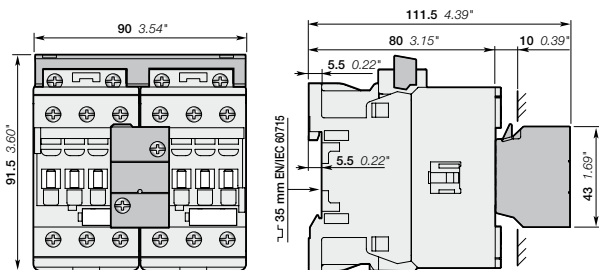
AF26, AF30  
+ CAL4-11 2-pole auxiliary contact block



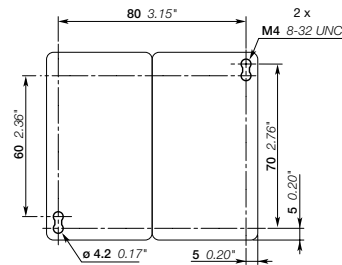
AF26, AF30  
+ CA4 4-pole auxiliary contact block



AF26, AF30  
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26, AF30  
+ VEM4 mechanical and electrical interlock set



AF26, AF30  
+ VEM4 mechanical and electrical interlock set

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

# AF09 ... AF38 4-pole Contactors up to 55 A



<b>Overview</b> .....	47
<b>Ordering Details</b>	
– AF09 ... AF38 4-pole Contactors .....	48
– AF09Z ... AF38Z Additional Coils .....	49
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# 4-pole Contactors



AC / DC control voltage

AF09	AF16	AF26	AF38
AF09-40-00	AF16-40-00	AF26-40-00	AF38-40-00
AF09-22-00	AF16-22-00	AF26-22-00	AF38-22-00

## Switching of Resistive Circuits

	IEC	AC-1	Rated operational current	$\theta \leq 40^\circ\text{C}$	690 V
				$\theta \leq 60^\circ\text{C}$	690 V
				$\theta \leq 70^\circ\text{C}$	690 V
With conductor cross-sectional area					
	UL/CSA	General use rating		600 V AC	
		With conductor cross-sectional area			

25 A	30 A	45 A	55 A
25 A	30 A	40 A	42 A
22 A	26 A	32 A	37 A
4 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>
25 A	30 A	45 A	55 A
AWG 10	AWG 10	AWG 8	AWG 6

## Main Accessories

**Auxiliary contact blocks**

Front mounting

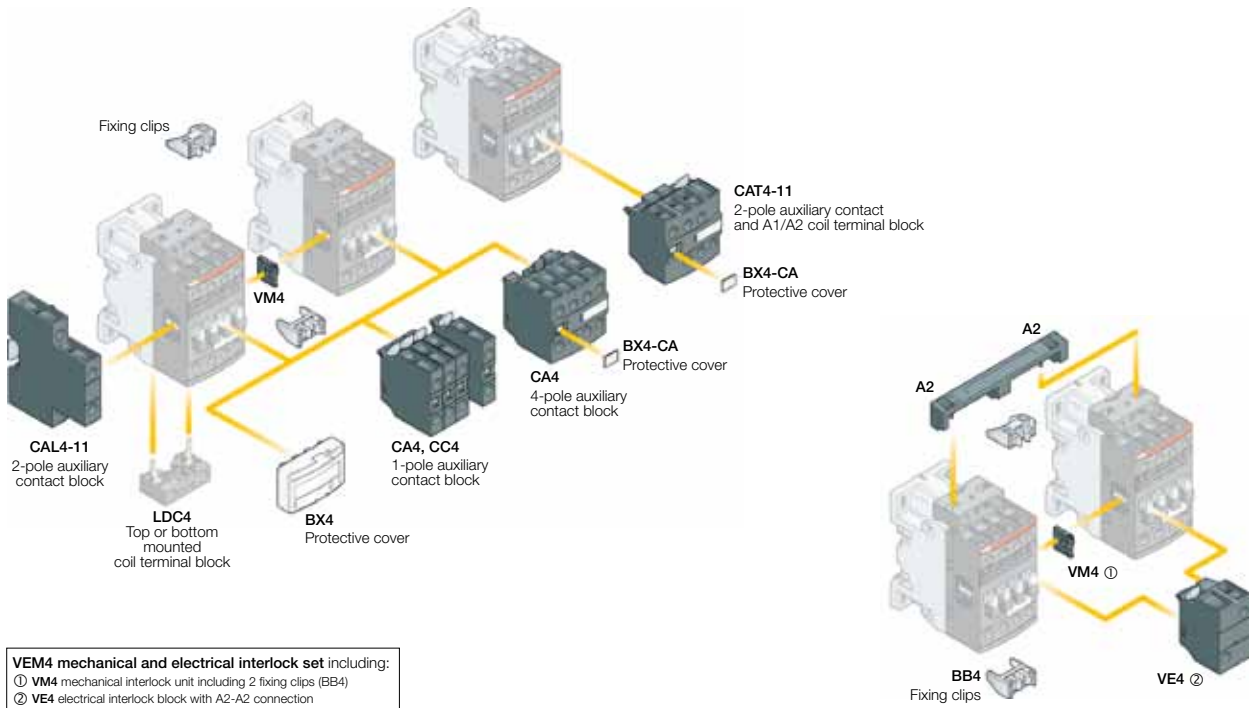
Side mounting

**Interlocks**

Mechanical / electrical

Mechanical

- 1-pole CA4-10 or CA4-01, CC4-10 or CC4-01
- 4-pole CA4
- 2-pole CAT4-11 (with coil front connection)
- 2-pole CAL4-11
- VEM4**  
including VM4 mechanical interlock unit and VE4 electrical interlock block with A2-A2 connection
- VM4**  
including 2 fixing clips



**VEM4 mechanical and electrical interlock set including:**  
 ① VM4 mechanical interlock unit including 2 fixing clips (BB4)  
 ② VE4 electrical interlock block with A2-A2 connection



# AF09 ... AF38 4-pole Contactors

## AC / DC Operated - with Screw Terminals



25 to 55 A



AF09-40-00



AF09-22-00



### Application

**AF09 ... AF38** 4-pole contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...).

### Description

- **AF09 ... AF38** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **AF** contactors can manage large control voltage variations. One coil (i.e. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **AF** contactors have built-in surge protection and do not require additional surge suppressors.

### Ordering Details

IEC	UL/CSA	Control voltage		Auxiliary contacts fitted	Catalog number	List price	Weight
AC-1 Rated current	General use rating	$U_c$ min. ... $U_c$ max.					Pack <sup>(ing)</sup>
$\theta \leq 40^\circ\text{C}$	600 V AC	V 50/60 Hz	V DC	 			1 piece
A	A						kg/lbs

### 4 N.O. Main Poles

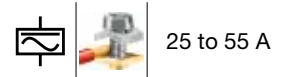
25	25	24...60	20...60	0	0	AF09-40-00-11	0.31/0.68
		48...130	48...130	0	0	AF09-40-00-12	0.27/0.60
		100...250	100...250	0	0	AF09-40-00-13	0.27/0.60
		250...500	250...500	0	0	AF09-40-00-14	0.31/0.68
30	30	24...60	20...60	0	0	AF16-40-00-11	0.31/0.68
		48...130	48...130	0	0	AF16-40-00-12	0.27/0.60
		100...250	100...250	0	0	AF16-40-00-13	0.27/0.60
		250...500	250...500	0	0	AF16-40-00-14	0.31/0.68
45	45	24...60	20...60	0	0	AF26-40-00-11	0.36/0.79
		48...130	48...130	0	0	AF26-40-00-12	0.36/0.79
		100...250	100...250	0	0	AF26-40-00-13	0.36/0.79
		250...500	250...500	0	0	AF26-40-00-14	0.40/0.88
55	55	24...60	20...60	0	0	AF38-40-00-11	0.36/0.79
		48...130	48...130	0	0	AF38-40-00-12	0.36/0.79
		100...250	100...250	0	0	AF38-40-00-13	0.36/0.79
		250...500	250...500	0	0	AF38-40-00-14	0.40/0.88

### 2 N.O. + 2 N.C. Main Poles

25	25	24...60	20...60	0	0	AF09-22-00-11	0.31/0.68
		48...130	48...130	0	0	AF09-22-00-12	0.27/0.60
		100...250	100...250	0	0	AF09-22-00-13	0.27/0.60
		250...500	250...500	0	0	AF09-22-00-14	0.31/0.68
30	30	24...60	20...60	0	0	AF16-22-00-11	0.31/0.68
		48...130	48...130	0	0	AF16-22-00-12	0.27/0.60
		100...250	100...250	0	0	AF16-22-00-13	0.27/0.60
		250...500	250...500	0	0	AF16-22-00-14	0.31/0.68
45	45	24...60	20...60	0	0	AF26-22-00-11	0.36/0.79
		48...130	48...130	0	0	AF26-22-00-12	0.36/0.79
		100...250	100...250	0	0	AF26-22-00-13	0.36/0.79
		250...500	250...500	0	0	AF26-22-00-14	0.40/0.88
55	55	24...60	20...60	0	0	AF38-22-00-11	0.36/0.79
		48...130	48...130	0	0	AF38-22-00-12	0.36/0.79
		100...250	100...250	0	0	AF38-22-00-13	0.36/0.79
		250...500	250...500	0	0	AF38-22-00-14	0.40/0.88

# AF09 ... AF38 4-pole Contactors - AF.Z Additional Coils

## AC / DC Operated - with Screw Terminals



25 to 55 A



### Application

**AF09Z ... AF38Z** 4-pole contactors are used for controlling power circuits up to 600 V AC and 240 V DC. They are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...).

### Description

- **AF09Z ... AF38Z** contactors include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max and managing large control voltage variations.
- **AF.Z** contactors cover control voltages between 24...250 V 50/60 Hz or 12...250 V DC
- **AF.Z** contactors allow direct control by PLC-output  $\geq 24$  V DC 500 mA and obtain a reduced holding coil consumption.
- **AF.Z** contactors withstand short dips and voltage interruptions (SEMI F47-0706 compliance)
- **AF.Z** contactors have built-in surge protection and do not require additional surge suppressors.

### Ordering Details

IEC	UL/CSA	Control voltage		Auxiliary contacts fitted	Catalog number	List price	Weight
AC-1 Rated current	General use rating	$U_c$ min. ... $U_c$ max.					Pack <sup>(ing)</sup>
$\theta \leq 40^\circ\text{C}$ A	600 V AC A	V 50/60 Hz	V DC				1 piece kg/lbs

### 4 N.O. Main Poles

Rated current (A)	UL/CSA rating (A)	Control voltage (V AC)	Control voltage (V DC)	NO	NC	Catalog number	Weight (kg/lbs)
25	25	-	12...20	0	0	AF09Z-40-00-20	0.31/0.68
		24...60	20...60	0	0	AF09Z-40-00-21	0.31/0.68
		48...130	48...130	0	0	AF09Z-40-00-22	0.31/0.68
		100...250	100...250	0	0	AF09Z-40-00-23	0.31/0.68
30	30	-	12...20	0	0	AF16Z-40-00-20	0.31/0.68
		24...60	20...60	0	0	AF16Z-40-00-21	0.31/0.68
		48...130	48...130	0	0	AF16Z-40-00-22	0.31/0.68
		100...250	100...250	0	0	AF16Z-40-00-23	0.31/0.68
45	45	-	12...20	0	0	AF26Z-40-00-20	0.36/0.79
		24...60	20...60	0	0	AF26Z-40-00-21	0.36/0.79
		48...130	48...130	0	0	AF26Z-40-00-22	0.36/0.79
		100...250	100...250	0	0	AF26Z-40-00-23	0.40/0.88
55	55	-	12...20	0	0	AF38Z-40-00-20	0.36/0.79
		24...60	20...60	0	0	AF38Z-40-00-21	0.36/0.79
		48...130	48...130	0	0	AF38Z-40-00-22	0.36/0.79
		100...250	100...250	0	0	AF38Z-40-00-23	0.40/0.88

### 2 N.O. + 2 N.C. Main Poles

Rated current (A)	UL/CSA rating (A)	Control voltage (V AC)	Control voltage (V DC)	NO	NC	Catalog number	Weight (kg/lbs)
25	25	-	12...20	0	0	AF09Z-22-00-20	0.31/0.68
		24...60	20...60	0	0	AF09Z-22-00-21	0.31/0.68
		48...130	48...130	0	0	AF09Z-22-00-22	0.31/0.68
		100...250	100...250	0	0	AF09Z-22-00-23	0.31/0.68
30	30	-	12...20	0	0	AF16Z-22-00-20	0.31/0.68
		24...60	20...60	0	0	AF16Z-22-00-21	0.31/0.68
		48...130	48...130	0	0	AF16Z-22-00-22	0.31/0.68
		100...250	100...250	0	0	AF16Z-22-00-23	0.31/0.68
45	45	-	12...20	0	0	AF26Z-22-00-20	0.36/0.79
		24...60	20...60	0	0	AF26Z-22-00-21	0.36/0.79
		48...130	48...130	0	0	AF26Z-22-00-22	0.36/0.79
		100...250	100...250	0	0	AF26Z-22-00-23	0.40/0.88
55	55	-	12...20	0	0	AF38Z-22-00-20	0.36/0.79
		24...60	20...60	0	0	AF38Z-22-00-21	0.36/0.79
		48...130	48...130	0	0	AF38Z-22-00-22	0.36/0.79
		100...250	100...250	0	0	AF38Z-22-00-23	0.40/0.88

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

# AF09 ... AF38 4-pole Contactors

## Technical Data



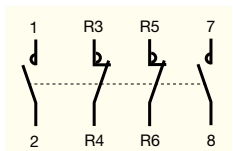
### Main Pole - Utilization Characteristics according to UL / CSA

Contactor types	AF09	AF16	AF26	AF38
Standards	UL 508, CSA C22.2 N°14			
Rated operational voltage $U_{e,max}$	600 V			
UL General use rating				
600 V AC	25 A	30 A	45 A	55 A
240 V DC - 3-pole for 4 N.O. main poles	25 A	30 A	45 A	55 A
160 V DC - 2-pole for 2 N.O. / 2 N.C. main poles	20 A	20 A	45 A	55 A
Max. conductor cross-sectional area	AWG 10	AWG 10	AWG 8	AWG 6
Max. electrical switching frequency for general use	600 cycles/h			

### Main Pole - Utilization Characteristics according to IEC

Contactor types	AF09	AF16	AF26	AF38
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, $\leq 40^\circ\text{C}$	35 A	35 A	55 A	55 A
with conductor cross-sectional area	6 mm <sup>2</sup>	6 mm <sup>2</sup>	16 mm <sup>2</sup>	16 mm <sup>2</sup>
AC-1 Utilization category for air temperature close to contactor				
$I_e$ / AC-1 rated operational current	$\theta \leq 40^\circ\text{C}$ 25 A	30 A	45 A	55 A
$U_e$ max. $\leq 690$ V, 50/60 Hz	$\theta \leq 60^\circ\text{C}$ 25 A	30 A	40 A	45 A
	$\theta \leq 70^\circ\text{C}$ 22 A	26 A	32 A	37 A
with conductor cross-sectional area	4 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded				
$U_s \leq 500$ V AC - gG type fuse	25 A	32 A	50 A	63 A
Rated short-time withstand current $I_{cw}$ at $40^\circ\text{C}$ ambient temperature, in free air from a cold state	1 s 300 A	300 A	450 A	450 A
	10 s 150 A	150 A	350 A	350 A
	30 s 80 A	80 A	225 A	225 A
	1 min 60 A	60 A	150 A	150 A
	15 min 35 A	35 A	55 A	55 A
Heat dissipation per pole	$I_e$ / AC-1 0.8 W	1.2 W	1.6 W	2.3 W
Max. electrical switching frequency	AC-1 600 cycles/h			

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



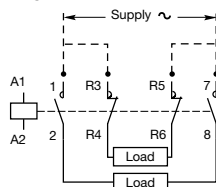
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlap between the N.O. poles and the N.C. poles: BREAK before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



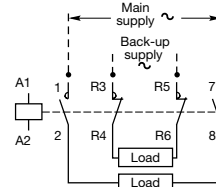
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

#### Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads

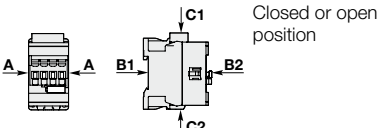


# AF09 ... AF38 4-pole Contactors

## Technical Data



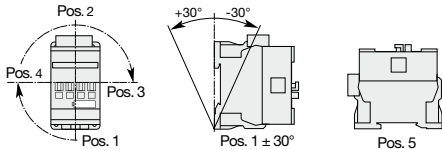
### General Technical Data

Contactor types	AF09	AF16	AF26	AF38
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-4-1 acc. to UL	690 V 600 V			
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV			
<b>Electromagnetic compatibility</b>	Devices complying with IEC 60947-1 / EN 60947-1 - Environment A			
<b>Ambient air temperature</b> close to contactor Operation in free air Storage	-40 ... +70 °C -60 ... +80 °C			
<b>Climatic withstand</b>	Category B according to IEC 60947-1 Annex Q			
<b>Operating altitude</b>	≤ 3000 m			
<b>Mechanical durability</b> Number of operating cycles Max. switching frequency	10 millions operating cycles 3600 cycles/h			
<b>Shock withstand</b> acc. IEC 60068-2-27 and EN 60068-2-27				
Mounting position 1				
	<b>Shock direction</b> 1/2 sinusoidal shock for 11 ms: no change in contact position			
	<b>A</b> 30 g			30 g Closed position / 25 g Open position
	<b>B1</b> 25 g	25 g Closed position / 5 g Open position	25 g Closed position / 5 g Open position	
	<b>B2</b> 15 g			15 g Closed position / 10 g Open position
	<b>C1</b> 25 g			25 g Closed position / 20 g Open position
	<b>C2</b> 25 g			25 g Closed position / 20 g Open position
<b>Vibration withstand</b> acc. to IEC 60068-2-6	5 ... 300 Hz 4 g Closed position / 2 g Open position			

### Magnet System Characteristics

Contactor types	AF09	AF16	AF26	AF38
<b>Coil operating limits</b> acc. to IEC 60947-4-1	<b>AC supply</b> at $\theta \leq 60$ °C $0.85 \times U_c$ min ... $1.1 \times U_c$ max at $\theta \leq 70$ °C $0.85 \times U_c$ min ... $U_c$ max			
	<b>DC supply</b> at $\theta \leq 60$ °C $0.85 \times U_c$ min ... $1.1 \times U_c$ max at $\theta \leq 70$ °C (AF) $0.85 \times U_c$ min ... $U_c$ max - (AF..Z) $0.85 \times U_c$ min ... $1.1 \times U_c$ max			
<b>AC control voltage</b> 50/60 Hz	Rated control circuit voltage $U_c$ Coil consumption Average pull-in value Average holding value			
	24 ... 500 V AC (AF) 50 VA - (AF..Z) 16 VA (AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W			
<b>DC control voltage</b>	Rated control circuit voltage $U_c$ Coil consumption Average pull-in value Average holding value			
	12 ... 500 V DC (AF) 50 W - (AF..Z) 12 ... 16 W (AF..Z) ≥ 500 mA 24 V DC			
<b>PLC-Output control</b>	(AF..Z) conditions of use on request			
<b>Drop-out voltage in % of <math>U_c</math> min.</b>	≤ 60 % $U_c$ min			
<b>Voltage sag immunity</b> according to SEMI F47-0706	(AF..Z) conditions of use on request			
<b>Dips withstand</b> (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			
<b>Operating time</b> between coil energization and: between coil de-energization and:	<b>N.O. contact closing</b> 40 ... 95 ms <b>N.C. contact opening</b> 38 ... 90 ms <b>N.O. contact opening</b> 11 ... 95 ms <b>N.C. contact closing</b> 13 ... 98 ms			

### Mounting Characteristics


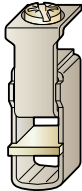








Contactor types	AF09	AF16	AF26	AF38
<b>Mounting positions</b>				
<b>Mounting distances</b>	Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF38			
<b>Fixing</b> on rail according to IEC 60715, EN 60715 by screws (not supplied)	The contactors can be assembled side by side. 35 x 7.5 mm or 35 x 15 mm 2 x M4 screws placed diagonally			

# AF09 ... AF38 4-pole Contactors

## Technical Data



### Connecting Characteristics

Contactor types	AF09	AF16	AF26	AF38
<b>Main terminals</b>				
	Screw terminals with cable clamp		Screw terminals with double connector 2x (5.5 width x 6.8 depth)	
<b>Connecting capacity (min. ... max.)</b>				
<b>Main conductors (poles)</b>				
 Rigid	solid ( $\leq 4 \text{ mm}$ )	<b>1 x</b> 1 ... 6 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
	stranded ( $\geq 6 \text{ mm}^2$ )	<b>2 x</b> 1 ... 6 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
 Flexible with non insulated ferrule		<b>1 x</b> 0.75 ... 6 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
		<b>2 x</b> 0.75 ... 6 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
 Flexible with insulated ferrule		<b>1 x</b> 0.75 ... 4 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
		<b>2 x</b> 0.75 ... 2.5 mm <sup>2</sup>	1.5 ... 16m <sup>2</sup>	
 Bars or lugs		<b>L &lt;</b> 9.6 mm		
Capacity according to UL/CSA		<b>1 or 2 x</b> AWG 16 ... 10	AWG 16 ... 6	
Stripping length		10 mm	12 mm	
<b>Auxiliary conductors</b>				
 Rigid solid		<b>1 x</b> 1 ... 2.5 mm <sup>2</sup>		
		<b>2 x</b> 1 ... 2.5 mm <sup>2</sup>		
 Flexible with non insulated ferrule		<b>1 x</b> 0.75 ... 2.5 mm <sup>2</sup>		
		<b>2 x</b> 0.75 ... 2.5 mm <sup>2</sup>		
 Flexible with insulated ferrule		<b>1 x</b> 0.75 ... 2.5 mm <sup>2</sup>		
		<b>2 x</b> 0.75 ... 1.5 mm <sup>2</sup>		
 Bars or lugs		<b>L &lt;</b> 8 mm		
Capacity according to UL/CSA		<b>1 or 2 x</b> AWG 18 ... 14		
Stripping length		10 mm		
<b>Degree of protection</b>				
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529				
Main terminals		IP20		
Coil terminals		IP20		
<b>Screw terminals</b>				
(delivered in open position, screws of unused terminals must be tightened)				
Main terminals		M3.5	M4.5	
Coil terminals		M3.5		
<b>Screwdriver type</b>				
Flat $\varnothing 5.5$ / Pozidriv 2				
<b>Tightening torque</b>				
Main pole terminals		1.5 Nm / 13 lb.in	2.5 Nm / 22 lb.in	
Coil terminals		1.2 Nm / 11 lb.in		

# AF09 ... AF38 Contactors

## DC Circuit Switching

### General


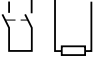
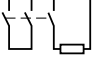
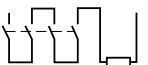

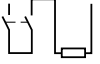
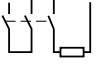

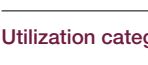

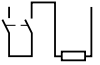

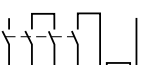
The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces ( $L/R \approx 1$  ms), inductive loads such as shunt motors ( $L/R \approx 2$  ms) or series motors ( $L/R \approx 7.5$  ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

### Technical Data

- The tables indicate for the standard contactors the  $I_e$  max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage  $U_e$  and the pole coupling details.  
Ampere values quoted in these tables are valid for a  $-25 \dots +70$  °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature.
- Max. switching frequency: 300 cycles/h.

### Selection Table

Contactor types	AF09	AF12	AF16	AF26		AF30	AF38		
	3 or 4-pole			3-pole	4-pole	3-pole	3-pole	4-pole	
<b>Utilization category DC-1, L/R <math>\leq 1</math> ms</b>									
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	10 A	15 A	20 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	10 A	15 A	20 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	50 A	55 A
	$\leq 72$ V	25 A	—	30 A	—	45 A	—	—	55 A
	110 V	25 A	—	30 A	—	45 A	—	—	55 A
	220 V	25 A	—	30 A	—	45 A	—	—	55 A
	440 V	10 A	—	20 A	—	—	—	—	—
<b>Utilization category DC-3, L/R <math>\leq 2</math> ms</b>									
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	6 A	7 A	8 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	6 A	7 A	8 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	$\leq 72$ V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	25 A	—	30 A	—	—	—	—	—
	440 V	6 A	—	8 A	—	—	—	—	—
<b>Utilization category DC-5, L/R <math>\leq 7.5</math> ms</b>									
	$\leq 72$ V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	110 V	4 A	4 A	4 A	—	—	—	—	—
	220 V	—	—	—	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	10 A	15 A	20 A	45 A	—	50 A	50 A	—
	220 V	4 A	4 A	4 A	—	—	—	—	—
	$\leq 72$ V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	110 V	25 A	27 A	30 A	45 A	—	50 A	50 A	—
	220 V	9 A	12 A	16 A	20 A	—	25 A	25 A	—
	$\leq 72$ V	25 A	—	30 A	—	—	—	—	—
	110 V	25 A	—	30 A	—	—	—	—	—
	220 V	10 A	—	20 A	—	—	—	—	—
	440 V	4 A	—	4 A	—	—	—	—	—

# 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 power kW	Motor nominal current: standardized values in orange-violet colour (according to IEC 60947-4-1 Annex G)									
	220 V	230 V	240 V	380V	400 V	415 V	440 V	500 V	660 V	690 V
	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	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	6.0	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	4.0	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	7.0	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	28.0	25.4	23	17.8	17
18.5	63.8	61	58.5	36.8	35	33.7	30.7	28	22.0	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 power hp	Motor nominal current: standardized values (according to IEC 60947-4-1 Annex G and UL 508)				
	208 V	220-240 V	380-415 V	440-480 V	550-600 V
	A	A	A	A	A
1/2	2.4	2.2	1.3	1.1	0.9
3/4	3.5	3.2	1.8	1.6	1.3
1	4.6	4.2	2.3	2.1	1.7
1-1/2	6.6	6	3.3	3	2.4
2	7.5	6.8	4.3	3.4	2.7
3	10.6	9.6	6.1	4.8	3.9
5	16.7	15.2	9.7	7.6	6.1
7-1/2	24.2	22	14	11	9
10	30.8	28	18	14	11
15	46.2	42	27	21	17
20	59.4	54	34	27	22
25	74.8	68	44	34	27
30	88	80	51	40	32
40	114	104	66	52	41
50	143	130	83	65	52
60	169	154	103	77	62
75	211	192	128	96	77
100	273	248	165	124	99
125	343	312	208	156	125
150	396	360	240	180	144
200	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

# AF09 ... AF38 4-pole Contactors

## Contactor 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  $I_c = I_e$  for category AC-1. The curve corresponding to category AC-1 represents 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 category AC-1

- Note the characteristics of the load to be controlled:
  - Operational voltage .....  $U_e$
  - Current normally drawn .....  $I_e$
  - 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 ( $I_c ; N$ ).

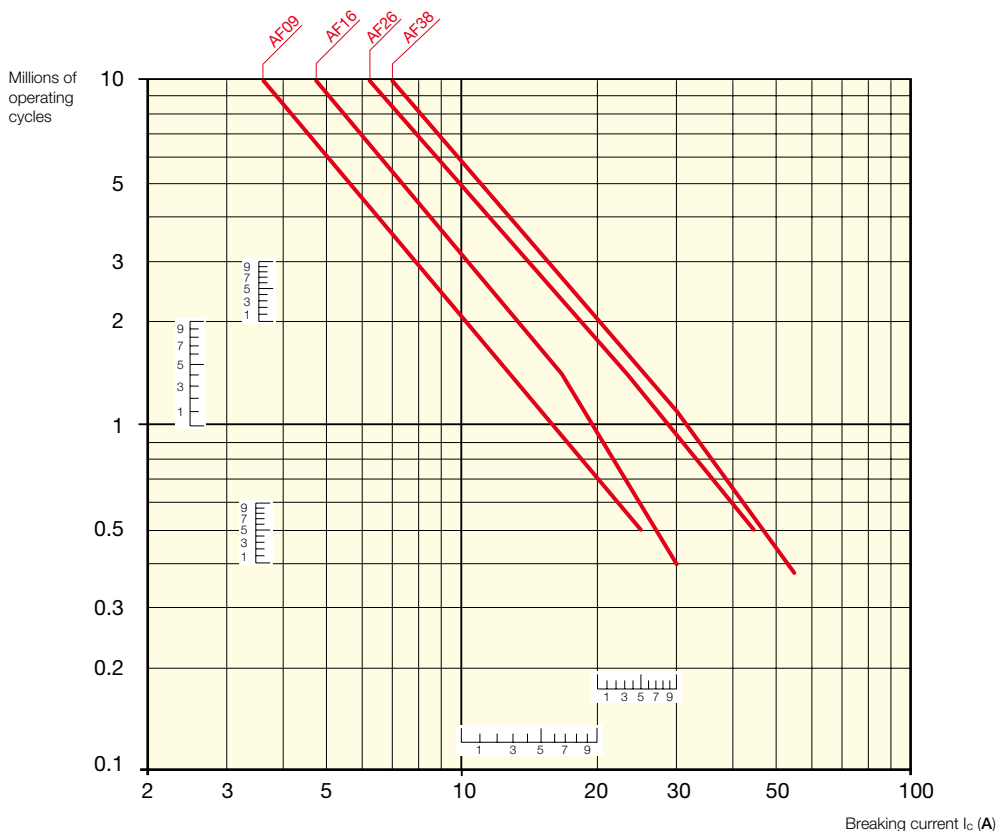
#### Case of uninterrupted duty

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.

#### Electrical Durability for AC-1 Utilization Category - $U_e \leq 690$ V. Ambient Temperature $\leq 60$ °C

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.

Maximum electrical switching frequency: see "Technical Data".



AF09 ... AF38 4-pole contactors AC-1 electrical durability



# AF09 ... AF38 4-pole Contactors

## Main Accessories

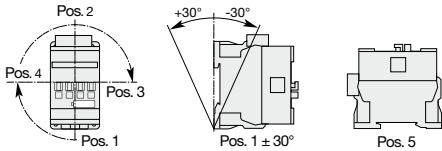


### Accessory fitting details for a 4-pole contactor AF09 ... AF38

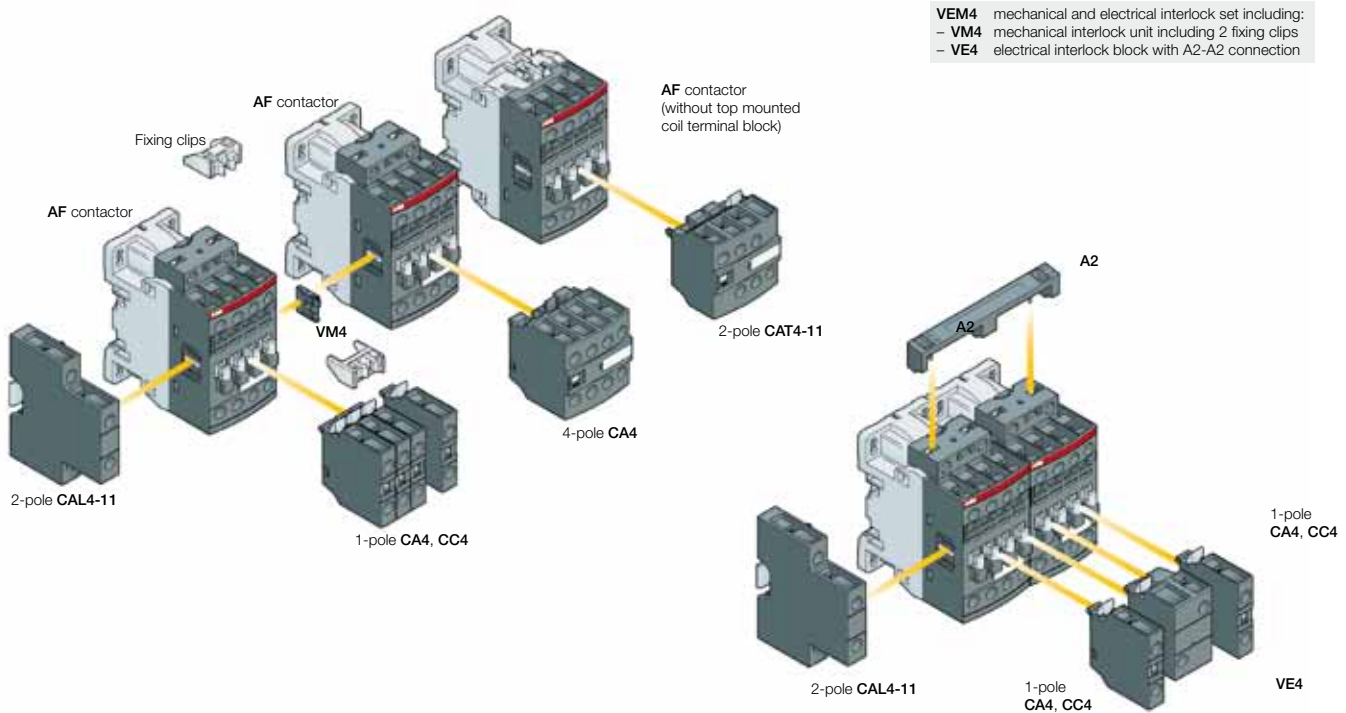
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

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)	Auxiliary contact blocks			
			1-pole CA4 1-pole CC4	2-pole CAT4-11	4-pole CA4	VEM4	Left side 2-pole CAL4-11	Right side		
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5										
AF09 ... AF38	4	0	0	0	4 max.	or 1	or 1	-	+ 1	-
AF09 ... AF38	4	0	0	0	2 max.	or 1	-	-	+ 1	+ 1
					3 max.	-	-	+ 1	+ 1	-
Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5										
AF09 ... AF16	2	2	0	0	4 max.	or 1	or 1	-	+ 1	-
AF26 ... AF38	2	2	0	0	2 max.	or 1	-	-	+ 1	+ 1

### Mounting positions



### Contactors and main accessories (other accessories available)



# Auxiliary Contact Blocks

## Accessories for AF09 ... AF38 4-pole Contactors



CA4-10



CA4-22E



CAL4-11



CAT4-11E

### Application

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

### Description



Types of auxiliary contact blocks for standard industrial environments:

- **CA4** 1 or 4-pole block, front-mounted, instantaneous with N.O., N.C. contacts
- **CC4** 1-pole block, front-mounted, with N.O. leading contact or N.C. lagging contact
- **CAT4** 2-pole block, front-mounted, instantaneous N.O. + N.C. contacts with A1 / A2 coil terminal connection on front face
- **CAL4** 2-pole block instantaneous N.O. + N.C. contacts clipped onto the right and/or left 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.

Fitting Details - For each contactor, refer to "Accessory Fitting Details" table.

### Ordering Details

For contactors	Auxiliary contacts	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
	 				

#### Front-mounted instantaneous auxiliary contact blocks

AF09 ... AF38...-40-00	1	0	-	-	<b>CA4-10</b>	1	0.014/0.03
AF09 ... AF38...-22-00	0	1	-	-	<b>CA4-01</b>	1	0.014/0.03
	2	2	-	-	<b>CA4-22E</b>	1	0.055/0.12
	3	1	-	-	<b>CA4-31E</b>	1	0.055/0.12
	4	0	-	-	<b>CA4-40E</b>	1	0.055/0.12
AF09 ... AF38...-40-00	0	4	-	-	<b>CA4-04E</b>	1	0.055/0.12

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

AF09 ... AF38...-40-00	-	-	1	0	<b>CC4-10</b>	1	0.014/0.03
AF09 ... AF38...-22-00	-	-	0	1	<b>CC4-01</b>	1	0.014/0.03

#### Side-mounted instantaneous auxiliary contact blocks

AF09 ... AF38...-40-00	1	1	-	-	<b>CAL4-11</b>	1	0.040/0.09
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#### Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09 ... AF38...-40-00	1	1	-	-	<b>CAT4-11E</b>	1	0.040/0.09
AF09 ... AF38...-22-00							

Note: CAT4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

# Auxiliary Contact Blocks

## Accessories for AF09 ... AF38 4-pole Contactors



### Technical Data

**Types** : 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4

### Contact Utilization Characteristics according to IEC

<b>Standards</b>	IEC 60947-5-1 and EN 60947-5-1	
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-5-1	690 V	
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV	
<b>Rated operational voltage <math>U_o</math> max.</b>	24 ... 690 V	
<b>Conventional thermal current <math>I_{th}</math></b> - $\theta \leq 40$ °C	16 A	
<b>Rated frequency limits</b>	25 ... 400 Hz	
<b>Rated operational current <math>I_o</math> / AC-15</b> 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
<b>Making capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1	
<b>Breaking capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1	
<b>Rated operational current <math>I_o</math> / DC-13</b> acc. to IEC 60947-5-1	<b>24 V DC</b>	6 A / 144 W
	<b>48 V DC</b>	2.8 A / 134 W
	<b>72 V DC</b>	1 A / 72 W
	<b>110 V DC</b>	0.55 A / 60 W
	<b>125 V DC</b>	0.55 A / 69 W
	<b>220 V DC</b>	0.27 A / 60 W
	<b>250 V DC</b>	0.27 A / 68 W
	<b>400 V DC</b>	0.15 A / 60 W
	<b>500 V DC</b>	0.13 A / 65 W
	<b>600 V DC</b>	0.1 A / 60 W
<b>Short-circuit protection gG type fuse</b>	10 A	
<b>Rated short-time withstand current <math>I_{sw}</math></b> $\theta = 40$ °C	for 1.0 s	100 A
	for 0.1 s	140 A
<b>Minimum switching capacity</b> with failure rate acc. to IEC 60947-5-4	12 V / 3 mA	
<b>Heat dissipation per pole at 6 A</b>	10 <sup>-7</sup>	
<b>Mechanical durability</b>	Number of operating cycles	10 million operating cycles
	Max. switching frequency	3600 cycles/h
<b>Max. electrical switching frequency</b>	for AC-15	1200 cycles/h
	for DC-13	900 cycles/h

### Contact Utilization Characteristics according to UL/CSA

<b>Standards</b>	UL 508, CSA C22.2 N°14
<b>Rated insulation voltage <math>U_i</math></b>	600 V
<b>Max. rated voltage</b>	600 V AC, 600 V DC
<b>Pilot duty</b>	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

<b>Screw terminals</b>	(delivered in open position, screws of unused terminals must be tightened)	
All terminals	M3.5	
<b>Connecting capacity (min. ... max.)</b>		
Rigid solid	1 x	1 ... 2.5 mm <sup>2</sup>
Rigid solid	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 acc. to UL/CSA	1 or 2 x	AWG 18 ... 14
Stripping length	10 mm	
<b>Degree of protection</b> acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20	
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2	
<b>Tightening torque</b>	1.2 Nm / 11 lb.in	



VM4

### Mechanical interlock unit

#### Description

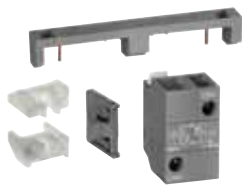
**VM4** mechanical interlock unit for the interlocking of two AF contactors.

When mounted between two contactors without additional width, the VM4 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

The mechanical interlock unit includes 2 fixing clips (BB4).

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF38..-40-00	<b>VM4</b>		10	0.005/0.011



VEM4

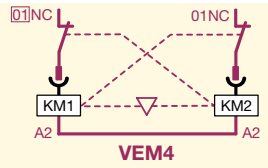
### Mechanical and electrical interlock set

#### Description

**VEM4** mechanical and electrical interlock set for the interlocking of two AF contactors.

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

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



#### Ordering Details

For contactors	Auxiliary contacts	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF38..-40-00	1 1 	<b>VEM4</b>		1	0.035/0.077

Note: VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.

### Fixing clips

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF38..-40-00	<b>BB4</b>		50	0.002/0.004



BB4

# Interlocks

## Accessories for AF09 ... AF38 4-pole Contactors



### Technical Data





<b>Interlock types</b>	<b>VM4</b>
<b>Mechanical durability</b>	
Number of operating cycles	5 million operating cycles
Max. switching frequency	1800 cycles/h

<b>Interlock types</b>	<b>VEM4</b>
<b>Contact Utilization Characteristics according to IEC</b>	
<b>Standards</b>	IEC 60947-5-1 and EN 60947-5-1
<b>Rated insulation voltage <math>U_i</math> acc. to IEC 60947-5-1</b>	690 V
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV
<b>Rated control circuit voltage <math>U_c</math></b>	<b>AC 50/60 Hz control voltage</b> 24 ... 500 V AC
	<b>DC control voltage</b> 20 ... 500 V DC
<b>Conventional thermal current <math>I_{th} - \theta \leq 40^\circ\text{C}</math></b>	16 A
<b>Mechanical and electrical durability</b>	
Number of operating cycles	5 million operating cycles
Max. mechanical switching	1800 cycles/h
Max. electrical switching frequency	1200 cycles/h

### Contact Utilization Characteristics according to UL / CSA

<b>Standards</b>	UL 508, CSA C22.2 N°14
<b>Max. rated voltage</b>	500 V AC, 500 V DC

### Connecting Characteristics

<b>Screw terminals</b>	
All terminals	M3.5
<b>Connecting capacity (min. ... max.)</b>	
 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
<b>Degree of protection</b>	
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2
<b>Tightening torque</b>	1.2 Nm / 11 lb.in



LDC4

### Additional coil terminal block

#### Description

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(mg)</sup> pieces	Weight kg/lbs (1 pce)
AF09 ... AF38	LDC4		10	0.010/0.02



BX4



BX4-CA

### Protective covers

#### Description

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

#### Ordering Details

For contactors	Catalog number	List price	Pack <sup>(mg)</sup> pieces	Weight kg/lbs (1 pce)
All 1-stack contactors	BX4		10	0.006/0.013
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA		50	0.001/0.002



BA4

### Function markers

#### Description

Box of 16 blank cards (16 markers per card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787")

#### Ordering Details

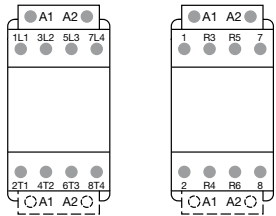
For contactors	Catalog number	List price	Pack <sup>(mg)</sup> pieces	Weight kg/lbs (1 pce)
Marker card	BA4		16	0.011/0.024
AMS 500 support plate for 8 BA4	XUSP02633		1	0.220/0.48
HTP500 support plate	1SNA235712R2400		1	0.290/0.64

# AF09 ... AF38 4-pole Contactors

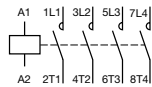
## Terminal Marking and Positioning



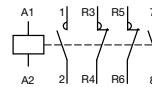
### Standard devices without addition of auxiliary contacts



AF09 ... AF38..-40-00 AF09 ... AF38..-22-00

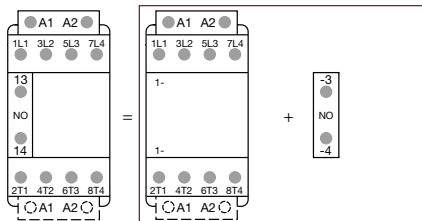


AF09 ... AF38..-40-00

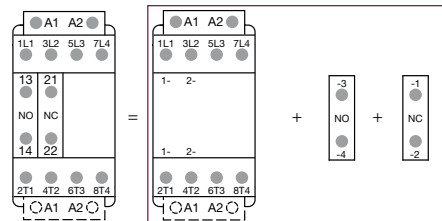


AF09 ... AF38..-22-00

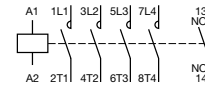
### Other possible contact combinations with auxiliary contacts



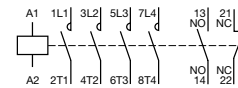
Combination 10 = AF09 ... AF38..-40-00 + CA4-10



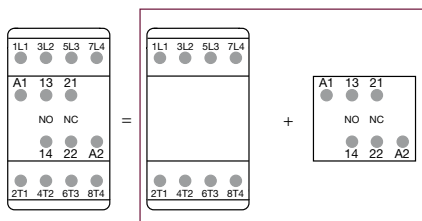
Combination 11 = AF09 ... AF38..-40-00 + CA4-10 + CA4-01



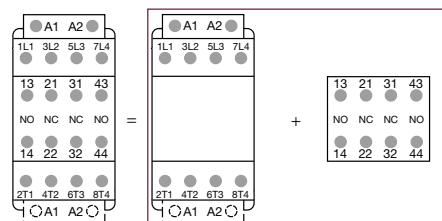
Combination 10



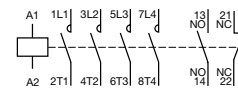
Combination 11



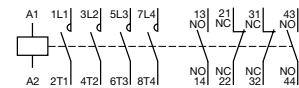
Combination 11 = AF09 ... AF38..-40-00 + CAT4-11E



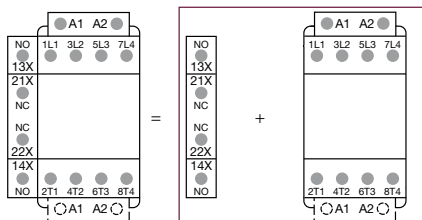
Combination 22 = AF09 ... AF38..-40-00 + CA4-22E



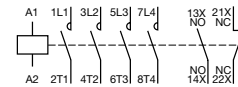
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF38-40-00



Combination 11

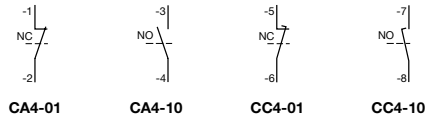
Note: Only AF.Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

# Add-on Auxiliary Contacts

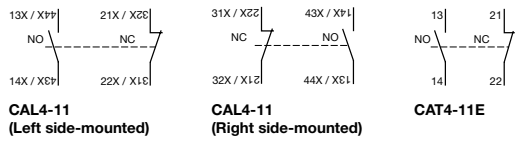
## Terminal Marking and Positioning



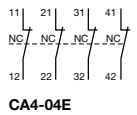
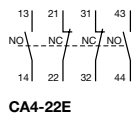
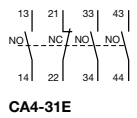
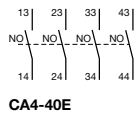
### 1-pole auxiliary contacts



### 2-pole auxiliary contacts



### 4-pole auxiliary contacts



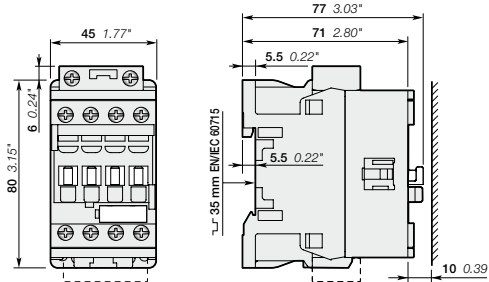


# AF09 ... AF38 4-pole Contactors

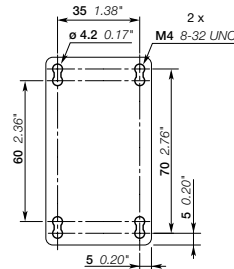
## AC / DC Operated - with Screw Terminals



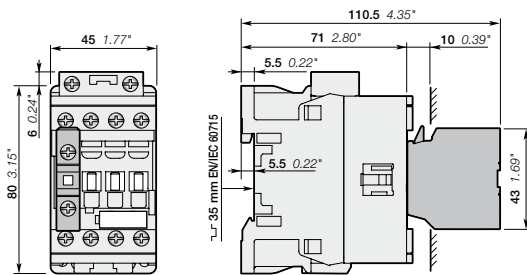
Dimensions mm, inches



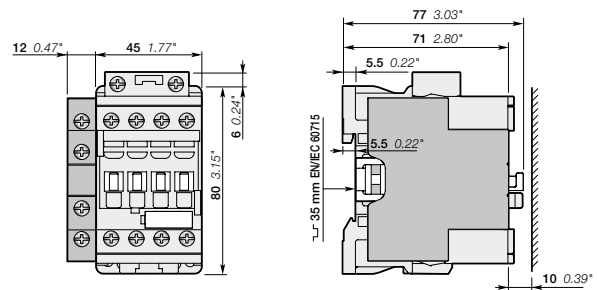
AF09, AF16



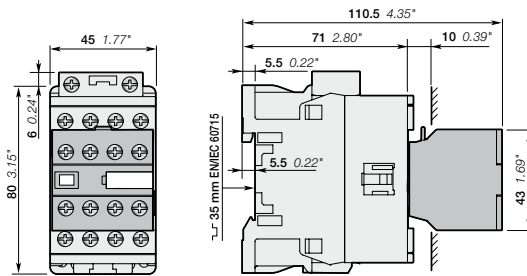
AF09, AF16



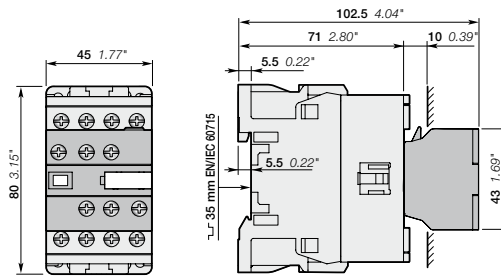
AF09, AF16  
+ CA4, CC4 1-pole auxiliary contact block



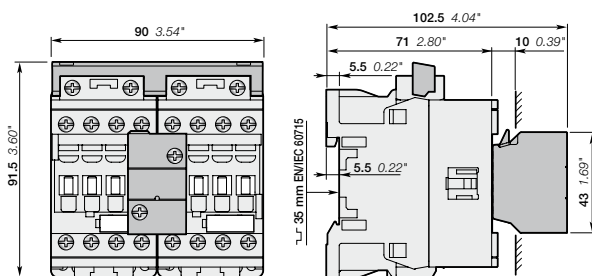
AF09, AF16  
+ CAL4-11 2-pole auxiliary contact block



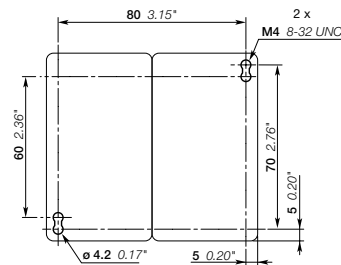
AF09, AF16  
+ CA4 4-pole auxiliary contact block



AF09, AF16  
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09..-40-00, AF16..-40-00  
+ VEM4 mechanical and electrical interlock set



AF09..-40-00, AF16..-40-00  
+ VEM4 mechanical and electrical interlock set

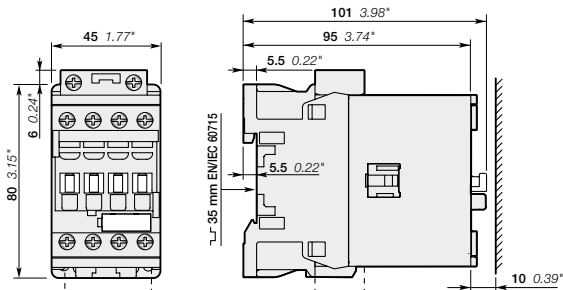
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

# AF26, AF38 4-pole Contactors

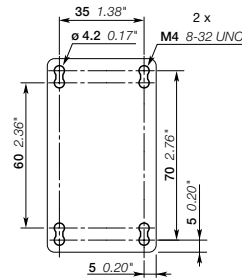
## AC / DC Operated - with Screw Terminals



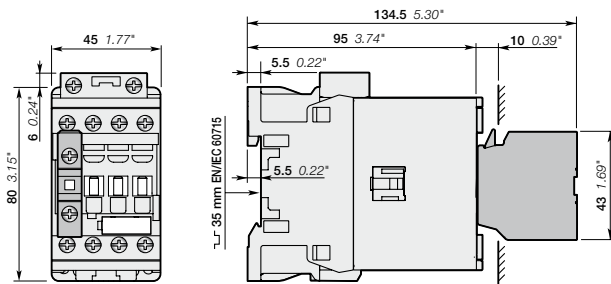
Dimensions mm, inches



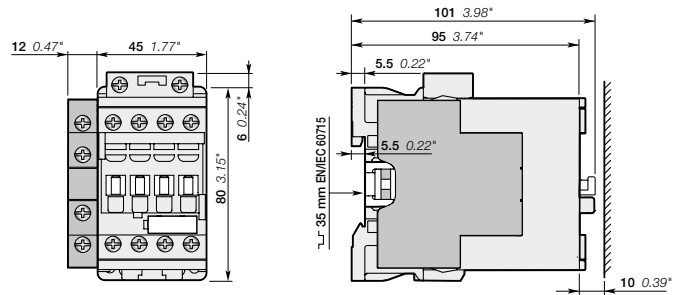
AF26, AF38



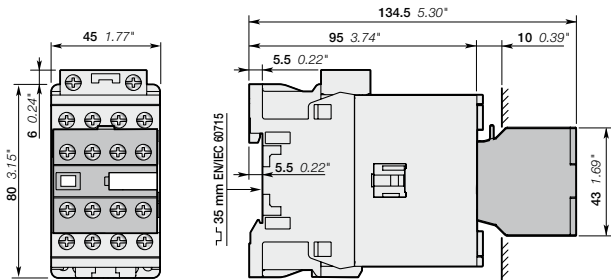
AF26, AF38



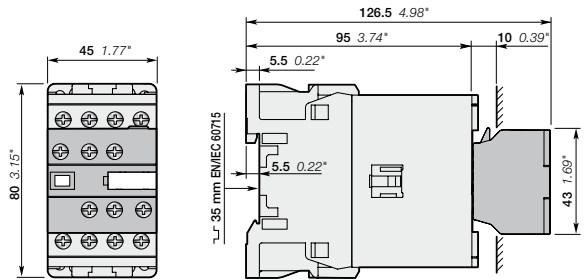
AF26, AF38  
+ CA4, CC4 1-pole auxiliary contact block



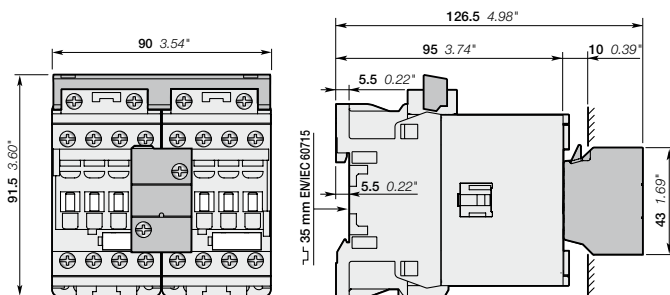
AF26, AF38  
+ CAL4-11 2-pole auxiliary contact block



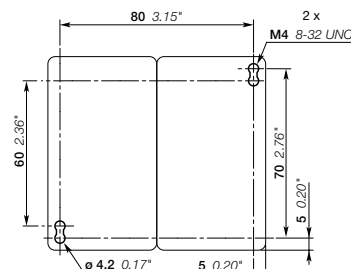
AF26, AF38  
+ CA4 4-pole auxiliary contact block



AF26, AF38  
+ CAT4 2-pole auxiliary contact and coil terminal block

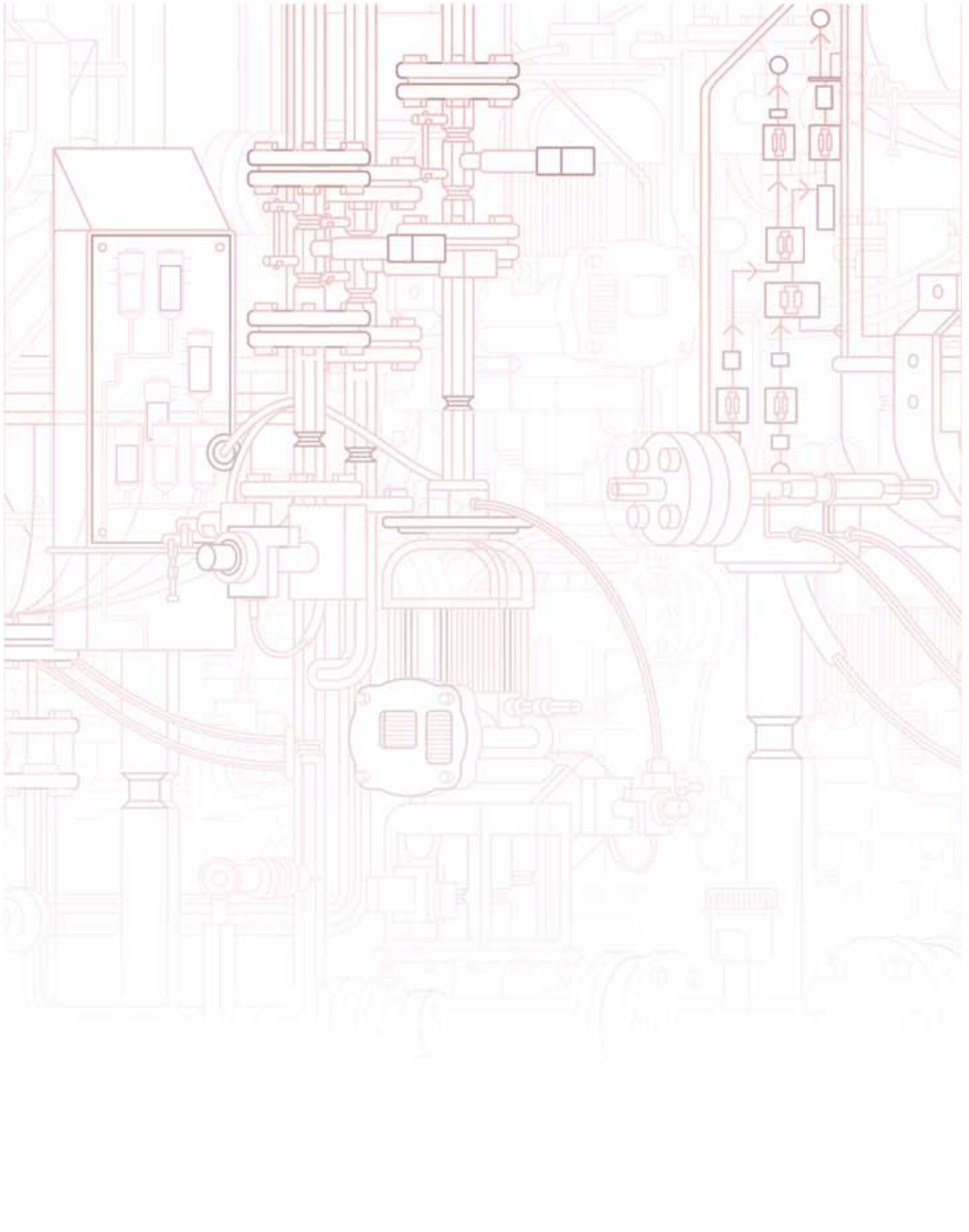


AF26..-40-00, AF38..-40-00  
+ VEM4 mechanical and electrical interlock set



AF26..-40-00, AF38..-40-00  
+ VEM4 mechanical and electrical interlock set

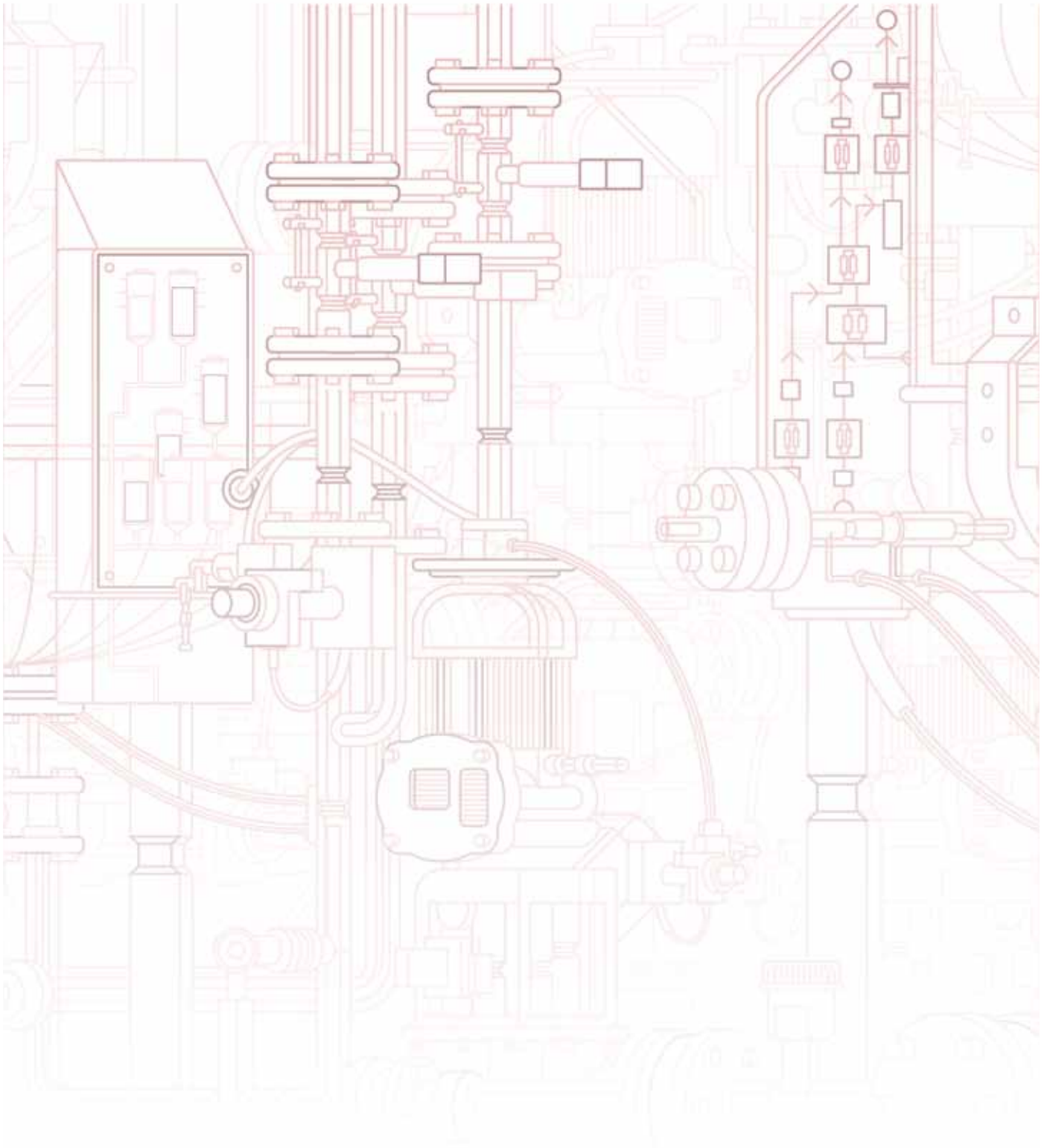
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



# NF Control Relays



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# Control Relays



⚡ AC / DC control voltage

NF22E	NF31E	NF40E
2 N.O. + 2 N.C.	3 N.O. + 1 N.C.	4 N.O.

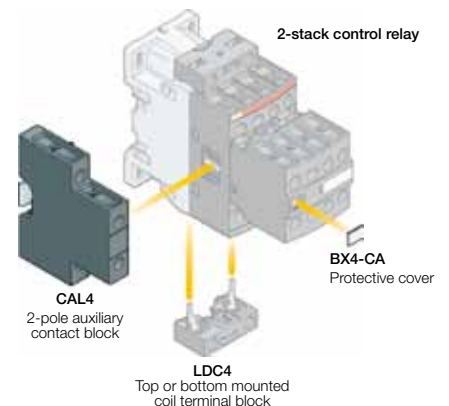
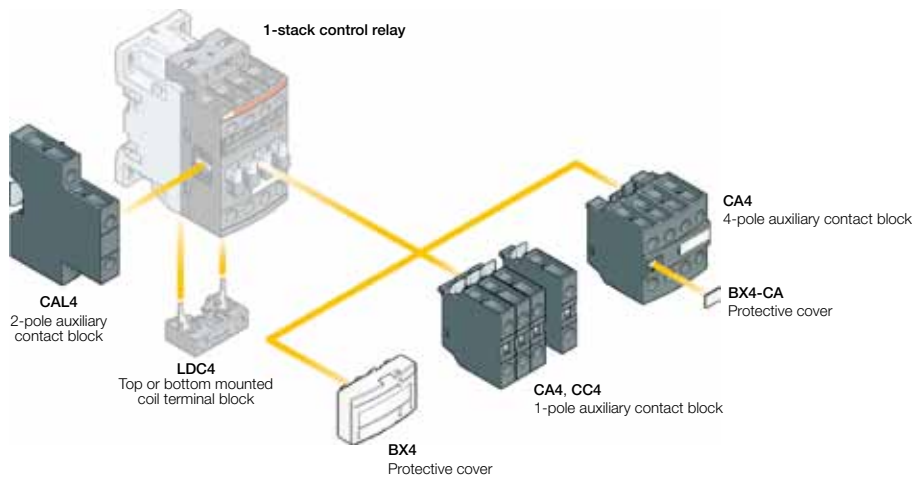
NF44E	NF53E	NF62E	NF71E	NF80E
4 N.O. + 4 N.C.	5 N.O. + 3 N.C.	6 N.O. + 2 N.C.	7 N.O. + 1 N.C.	8 N.O.

## Control Circuit Switching

Rated operational current			
IEC	AC-15	240 V	4 A
		400 V	3 A
		690 V	2 A
DC-13	24 V	6 A / 144 W	
	400 V	0.15 A / 60 W	
UL/CSA	Pilot Duty		A600, Q600

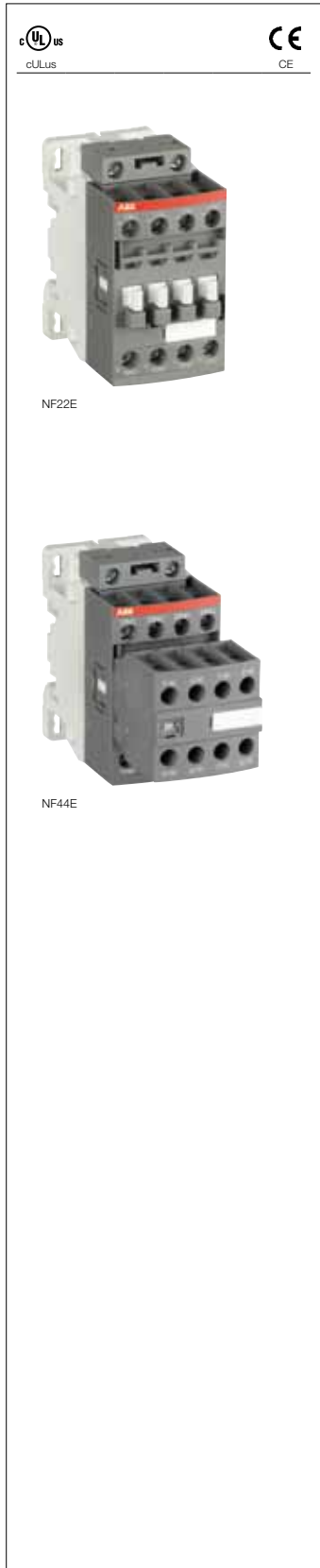
## Main Accessories

Auxiliary contact blocks			
Front mounting		1-pole CA4-10 or CA4-01, CC4-10 or CC4-01	—
Side mounting		4-pole CA4	—
			2-pole CAL4



# NF Control Relays

## AC / DC Operated - with Screw Terminals



cULus CE  
cULus CE

### Application

NF control relays are used for switching auxiliary and control circuits.

### Description

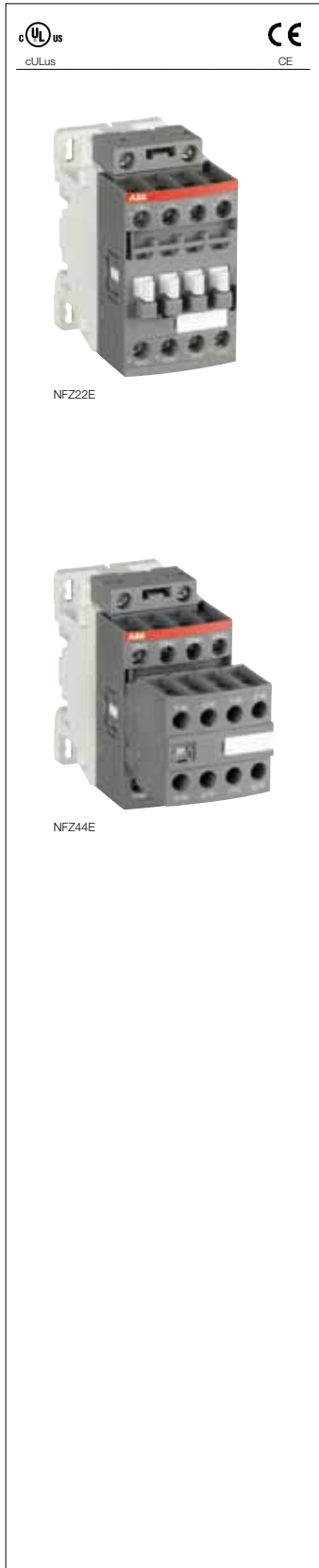
- NF control relays include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- NF control relays can manage large control voltage variations. One coil (i.e. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- NF control relays have built-in surge protection and do not require additional surge suppressors
- The control relays have mechanically-linked auxiliary contacts compliant with Annex L of IEC 60947-5-1 and include the "Mechanically Linked" symbol on their side
- 8-pole control relays are mounted with a non-removable auxiliary contact block (2<sup>nd</sup> stack).

### Ordering Details

Number of contacts 1 <sup>st</sup> stack      2 <sup>nd</sup> stack	Control voltage Range $U_c$ min. ... $U_c$ max.		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
	V 50/60 Hz	V DC			
	24...60	20...60	NF22E-11		0.31/0.68
	48...130	48...130	NF22E-12		0.27/0.60
	100...250	100...250	NF22E-13		0.27/0.60
	250...500	250...500	NF22E-14		0.31/0.68
	24...60	20...60	NF31E-11		0.31/0.68
	48...130	48...130	NF31E-12		0.27/0.60
	100...250	100...250	NF31E-13		0.27/0.60
	250...500	250...500	NF31E-14		0.31/0.68
	24...60	20...60	NF40E-11		0.31/0.68
	48...130	48...130	NF40E-12		0.27/0.60
	100...250	100...250	NF40E-13		0.27/0.60
	250...500	250...500	NF40E-14		0.31/0.68
	24...60	20...60	NF44E-11		0.36/0.79
	48...130	48...130	NF44E-12		0.32/0.70
	100...250	100...250	NF44E-13		0.32/0.70
	250...500	250...500	NF44E-14		0.36/0.79
	24...60	20...60	NF53E-11		0.36/0.79
	48...130	48...130	NF53E-12		0.32/0.70
	100...250	100...250	NF53E-13		0.32/0.70
	250...500	250...500	NF53E-14		0.36/0.79
	24...60	20...60	NF62E-11		0.36/0.79
	48...130	48...130	NF62E-12		0.32/0.70
	100...250	100...250	NF62E-13		0.32/0.70
	250...500	250...500	NF62E-14		0.36/0.79
	24...60	20...60	NF71E-11		0.36/0.79
	48...130	48...130	NF71E-12		0.32/0.70
	100...250	100...250	NF71E-13		0.32/0.70
	250...500	250...500	NF71E-14		0.36/0.79
	24...60	20...60	NF80E-11		0.36/0.79
	48...130	48...130	NF80E-12		0.32/0.70
	100...250	100...250	NF80E-13		0.32/0.70
	250...500	250...500	NF80E-14		0.36/0.79

# NF Control Relays - NFZ Additional Coils

## AC / DC Operated - with Screw Terminals



### Application

NFZ control relays are used for switching auxiliary and control circuits.

### Description

- NFZ control relays include an electronic coil interface accepting a wide control voltage  $U_c$  min. ...  $U_c$  max. and managing large control voltage variations.
- NFZ control relays cover control voltages between 24...250 V 50/60 Hz or 12...250 V DC
- NFZ control relays allow direct control by PLC-output  $\geq 24$  V DC 500 mA and obtain a reduced holding coil consumption.
- NFZ control relays withstand short dips and voltage interruptions (SEMI F47-0706 compliance)
- NFZ control relays have built-in surge protection and do not require additional surge suppressors
- The control relays have mechanically-linked auxiliary contacts compliant with Annex L of IEC 60947-5-1 and include the "Mechanically Linked" symbol on their side
- 8-pole control relays are mounted with a non-removable auxiliary contact block (2<sup>nd</sup> stack).

### Ordering Details

Number of contacts 1 <sup>st</sup> stack	2 <sup>nd</sup> stack	Control voltage Range $U_c$ min. ... $U_c$ max.		Catalog number	List price	Weight  Pack <sup>(ing)</sup> 1 piece kg/lbs
		V 50/60 Hz	V DC			
		-	12...20	NFZ22E-20		0.31/0.68
		24...60	20...60	NFZ22E-21		0.31/0.68
		48...130	48...130	NFZ22E-22		0.31/0.68
		100...250	100...250	NFZ22E-23		0.31/0.68
		-	12...20	NFZ31E-20		0.31/0.68
		24...60	20...60	NFZ31E-21		0.31/0.68
		48...130	48...130	NFZ31E-22		0.31/0.68
		100...250	100...250	NFZ31E-23		0.31/0.68
		-	12...20	NFZ40E-20		0.31/0.68
		24...60	20...60	NFZ40E-21		0.31/0.68
		48...130	48...130	NFZ40E-22		0.31/0.68
		100...250	100...250	NFZ40E-23		0.31/0.68
		-	12...20	NFZ44E-20		0.36/0.79
		24...60	20...60	NFZ44E-21		0.36/0.79
		48...130	48...130	NFZ44E-22		0.36/0.79
		100...250	100...250	NFZ44E-23		0.36/0.79
		-	12...20	NFZ53E-20		0.36/0.79
		24...60	20...60	NFZ53E-21		0.36/0.79
		48...130	48...130	NFZ53E-22		0.36/0.79
		100...250	100...250	NFZ53E-23		0.36/0.79
		-	12...20	NFZ62E-20		0.36/0.79
		24...60	20...60	NFZ62E-21		0.36/0.79
		48...130	48...130	NFZ62E-22		0.36/0.79
		100...250	100...250	NFZ62E-23		0.36/0.79
		-	12...20	NFZ71E-20		0.36/0.79
		24...60	20...60	NFZ71E-21		0.36/0.79
		48...130	48...130	NFZ71E-22		0.36/0.79
		100...250	100...250	NFZ71E-23		0.36/0.79
		-	12...20	NFZ80E-20		0.36/0.79
		24...60	20...60	NFZ80E-21		0.36/0.79
		48...130	48...130	NFZ80E-22		0.36/0.79
		100...250	100...250	NFZ80E-23		0.36/0.79

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





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

Contactor relay types	<b>NF</b>
Standards	UL 508, CSA C22.2 N°14
Rated insulation voltage $U_i$	600 V
Max. rated 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

### Contact Utilization Characteristics according to IEC

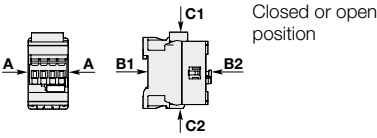
Contactor relay types	<b>NF</b>
Standards	IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1
Rated operational voltage $U_o$ max.	690 V
Conventional free-air thermal current $I_{th}$ $\theta \leq 40$ °C	16 A
Rated frequency limits	25 ... 400 Hz
Rated operational current $I_o$ / AC-15	
acc. to IEC 60947-5-1	
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 $I_o$ AC-15 acc. to IEC 60947-5-1
Breaking capacity AC-15	10 x $I_o$ AC-15 acc. to IEC 60947-5-1
Rated operational current $I_o$ / 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 gG type fuse	10 A
Rated short-time withstand current $I_{sw}$	
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	$\geq 2$ 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

# NF Control Relays

## Technical Data



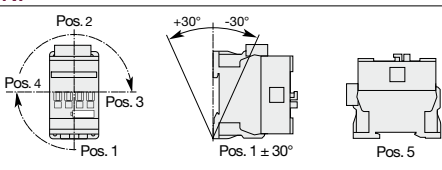
### General Technical Data

<b>Control relay types</b>	<b>NF</b>
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-5-1	690 V
acc. to UL / OSA	600 V
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV
<b>Electromagnetic compatibility</b>	Devices complying with IEC 60947-1 / EN 60947-1 - Environment A
<b>Ambient air temperature</b> close to contactor	
Operation in free air	-40 ... +70 °C
Storage	-60 ... +80 °C
<b>Climatic withstand</b>	Category B according to IEC 60947-1 Annex Q
<b>Operating altitude</b>	≤ 3000 m
<b>Mechanical durability</b>	
Number of operating cycles	20 million operating cycles
Max. switching frequency	7200 cycles/h
<b>Shock withstand</b> acc. IEC 60068-2-27 and EN 60068-2-27	
Mounting position 1	
	<b>Shock direction</b> 1/2 sinusoidal shock for 11 ms: no change in contact position
	<b>A</b> 30 g
	<b>B1</b> 25 g Closed position / 5 g Open position
	<b>B2</b> 15 g
	<b>C1</b> 25 g
	<b>C2</b> 25 g
<b>Vibration withstand</b> acc. to IEC 60068-2-6	5 ... 300 Hz 4 g Closed position / 2 g Open position

### Magnet System Characteristics

<b>Control relay types</b>	<b>NF</b>
<b>Coil operating limits</b> acc. to IEC 60947-5-1	<b>AC supply</b> at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$
	<b>DC supply</b> at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ (NF) $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ - (NFZ) $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$
<b>AC control voltage</b> Rated control circuit voltage $U_c$ 50/60 Hz Coil consumption	24 ... 500 V AC <b>Average pull-in value</b> (NF) 50 VA - (NFZ) 16 VA <b>Average holding value</b> (NF) 2.2 VA / 2 W - (NFZ) 1.7 VA / 1.5 W
<b>DC control voltage</b> Rated control circuit voltage $U_c$ Coil consumption	12 ... 500 V DC <b>Average pull-in value</b> (NF) 50 W - (NFZ) 12 ... 16 W <b>Average holding value</b> (NF) 2 W - (NFZ) 1.7 W
<b>PLC-Output control</b>	(NFZ) $\geq 500 \text{ mA}$ 24 V DC
<b>Drop-out voltage in % of <math>U_c \text{ min}</math></b>	$\leq 60 \% U_c \text{ min}$
<b>Voltage sag immunity</b> according to SEMI F47-0706	(NFZ) conditions of use on request
<b>Dips withstand</b> (level 0% according to IEC 61000-4-11) -20 °C $\leq \theta \leq +60$ °C	(NFZ) 22 ms average for $U_c = 24 \dots 250 \text{ V}$ 50/60Hz
<b>Operating time</b>	
between coil energization and:	<b>N.O. contact closing</b> 40 ... 95 ms <b>N.C. contact opening</b> 38 ... 90 ms
between coil de-energization and:	<b>N.O. contact opening</b> 11 ... 95 ms <b>N.C. contact closing</b> 13 ... 98 ms

### Mounting Characteristics

<b>Control relay types</b>	<b>NF</b>
<b>Mounting positions</b>	
<b>Mounting distances</b>	Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF control relay The control relays can be assembled side by side.
<b>Fixing</b>	35 x 7.5 mm or 35 x 15 mm 2 x M4 screws placed diagonally



### Connecting Characteristics

#### Contactor relay types

NF

#### Main terminals




Screw terminals with cable clamp

#### Connecting capacity (min. ... max.)


##### Pole and coil terminals

 Rigid 1 x 1 ... 2.5 mm<sup>2</sup>


 Flexible with non insulated ferrule 2 x 1 ... 2.5 mm<sup>2</sup>

 Flexible with non insulated ferrule 1 x 0.75 ... 2.5 mm<sup>2</sup>

 Flexible with insulated ferrule 2 x 0.75 ... 2.5 mm<sup>2</sup>

 Flexible with insulated ferrule 1 x 0.75 ... 2.5 mm<sup>2</sup>

 Flexible with insulated ferrule 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

All terminals IP20

#### Screw terminals

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

All terminals M3.5

#### Screwdriver type

Flat Ø5.5 / Pozidriv 2

#### Tightening torque

Pole terminals 1.2 Nm / 11 lb.in

Coil terminals 1.2 Nm / 11 lb.in

# NF Control Relays

## Main Accessories

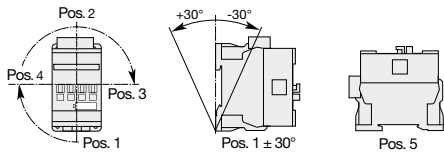


### Accessory fitting details for a NF control relay

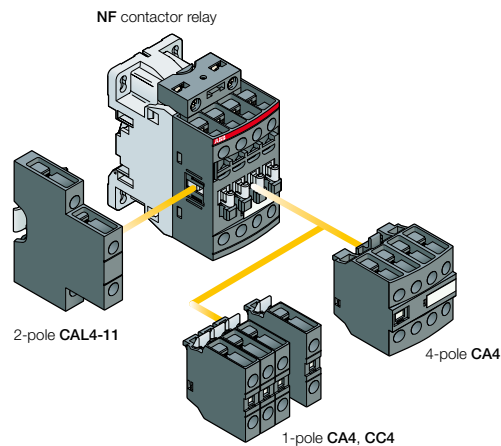
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Control relay types	Main poles	Front-mounted accessories		Side-mounted accessories	
		Auxiliary contact blocks		Auxiliary contact blocks	
		1-pole CA4 1-pole CC4	4-pole CA4	Left side 2-pole CAL4-11	Right side
		Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5			
NF..	2 2 E	4 max.	or 1	+ 1	-
NF..	3 1 E	2 max.	-	+ 1	+ 1
		Max. 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			
NF..	4 0 E	4 max.	or 1	+ 1	-
		2 max.	-	+ 1	+ 1
NF..	4 4 E				
NF..	5 3 E				
NF..	6 2 E			1	
NF..	7 1 E				
NF..	8 0 E				

### Mounting positions



### Control relays and main accessories (other accessories available)



# Auxiliary Contact Blocks

## Accessories for NF Control Relays



CA4-10



CA4-22N



CAL4-11

### Application

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

### Description



Types of auxiliary contact blocks for standard industrial environments:

- **CA4** 1 or 4-pole block, front-mounted, instantaneous with N.O., N.C. contacts.
- **CC4** 1-pole block, front-mounted, with N.O. leading contact or N.C. lagging contact.
- **CAL4** 2-pole block instantaneous N.O. + N.C. contacts clipped onto the right and/or left side of the relays.

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

Fitting Details - For each control relay type, refer to "Accessory Fitting Details" table.

### Ordering Details

For contactor relays	Auxiliary contacts	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lbs (1 pce)
	 				

#### Front-mounted instantaneous auxiliary contact blocks

4-pole NF	1	0	-	-	CA4-10	1	0.014/0.03
	0	1	-	-	CA4-01	1	0.014/0.03
	4	0	-	-	CA4-40N	1	0.055/0.12
	3	1	-	-	CA4-31N	1	0.055/0.12
	2	2	-	-	CA4-22N	1	0.055/0.12
	1	3	-	-	CA4-13N	1	0.055/0.12
NF..40E	0	4	-	-	CA4-04N	1	0.055/0.12

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

4-pole NF	-	-	1	0	CC4-10	1	0.014/0.03
	-	-	0	1	CC4-01	1	0.014/0.03

#### Side-mounted instantaneous auxiliary contact blocks

NF	1	1	-	-	CAL4-11	1	0.04/0.09
----	---	---	---	---	---------	---	-----------

# Auxiliary Contact Blocks

## Accessories for NF Control Relays



### Contact Utilization Characteristics according to UL/CSA

<b>Standards</b>	UL 508, CSA C22.2 N°14
<b>Rated insulation voltage <math>U_i</math></b>	600 V
<b>Max. rated voltage</b>	600 V AC, 600 V DC
<b>Pilot duty</b>	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








### Technical Data

<b>Types</b>	1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAL4
--------------	---

### Contact Utilization Characteristics according to IEC

<b>Standards</b>	IEC 60947-5-1 and EN 60947-5-1																				
<b>Rated insulation voltage <math>U_i</math></b> acc. to IEC 60947-5-1	690 V																				
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>	6 kV																				
<b>Rated operational voltage <math>U_o</math> max.</b>	24 ... 690 V																				
<b>Conventional thermal current <math>I_{th}</math> - <math>\theta \leq 40</math> °C</b>	16 A																				
<b>Rated frequency limits</b>	25 ... 400 Hz																				
<b>Rated operational current <math>I_o</math> / AC-15</b> acc. to IEC 60947-5-1	<table border="0"> <tr> <td>24-127 V 50/60 Hz</td> <td>6 A</td> </tr> <tr> <td>220-240 V 50/60 Hz</td> <td>4 A</td> </tr> <tr> <td>400-440 V 50/60 Hz</td> <td>3 A</td> </tr> <tr> <td>500 V 50/60 Hz</td> <td>2 A</td> </tr> <tr> <td>690 V 50/60 Hz</td> <td>2 A</td> </tr> </table>	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										
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																				
<b>Making capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1																				
<b>Breaking capacity</b> acc. to IEC 60947-5-1	10 x $I_o$ AC-15 acc. to IEC 60947-5-1																				
<b>Rated operational current <math>I_o</math> / DC-13</b> acc. to IEC 60947-5-1	<table border="0"> <tr> <td>24 V DC</td> <td>6 A / 144 W</td> </tr> <tr> <td>48 V DC</td> <td>2.8 A / 134 W</td> </tr> <tr> <td>72 V DC</td> <td>1 A / 72 W</td> </tr> <tr> <td>110 V DC</td> <td>0.55 A / 60 W</td> </tr> <tr> <td>125 V DC</td> <td>0.55 A / 69 W</td> </tr> <tr> <td>220 V DC</td> <td>0.27 A / 60 W</td> </tr> <tr> <td>250 V DC</td> <td>0.27 A / 68 W</td> </tr> <tr> <td>400 V DC</td> <td>0.15 A / 60 W</td> </tr> <tr> <td>500 V DC</td> <td>0.13 A / 65 W</td> </tr> <tr> <td>600 V DC</td> <td>0.1 A / 60 W</td> </tr> </table>	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
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500 V DC	0.13 A / 65 W																				
600 V DC	0.1 A / 60 W																				
<b>Short-circuit protection gG type fuse</b>	10 A																				
<b>Rated short-time withstand current <math>I_{cw}</math></b> $\theta = 40$ °C	<table border="0"> <tr> <td>for 1.0 s</td> <td>100 A</td> </tr> <tr> <td>for 0.1 s</td> <td>140 A</td> </tr> </table>	for 1.0 s	100 A	for 0.1 s	140 A																
for 1.0 s	100 A																				
for 0.1 s	140 A																				
<b>Minimum switching capacity</b> with failure rate acc. to IEC 60947-5-4	12 V / 3 mA																				
<b>Heat dissipation per pole at 6 A</b>	10 <sup>-7</sup>																				
<b>Mechanical durability</b>	0.1 W																				
Number of operating cycles	10 million operating cycles																				
Max. switching frequency	3600 cycles/h																				
<b>Max. electrical switching frequency</b>	<table border="0"> <tr> <td>for AC-15</td> <td>1200 cycles/h</td> </tr> <tr> <td>for DC-13</td> <td>900 cycles/h</td> </tr> </table>	for AC-15	1200 cycles/h	for DC-13	900 cycles/h																
for AC-15	1200 cycles/h																				
for DC-13	900 cycles/h																				

### Connecting Characteristics

<b>Screw terminals</b>	(delivered in open position, screws of unused terminals must be tightened)
All terminals	M3.5
<b>Connecting capacity (min. ... max.)</b>	
 Rigid solid	1 x 1 ... 2.5 mm <sup>2</sup>
 Flexible with non insulated ferrule	2 x 1 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	1 x 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	2 x 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	1 x 0.75 ... 2.5 mm <sup>2</sup>
 Flexible with insulated ferrule	2 x 0.75 ... 1.5 mm <sup>2</sup>
 Bars or lugs	L < 8 mm
Capacity acc. to UL/CSA	1 or 2 x AWG 18 ... 14
<b>Stripping length</b>	10 mm
<b>Degree of protection</b> acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529	IP20
<b>Screwdriver type</b>	Flat Ø5.5 / Pozidriv 2
<b>Tightening torque</b>	1.2 Nm / 11 lb.in

# Other Accessories

## Accessories for **NF** Control Relays



### Additional coil terminal block

#### Description

Additional coil terminal block for a bottom access to the coil terminals of contactors or control relays.

#### Ordering Details

For control relays	Catalog number	List price	Pack <sup>(incl)</sup> pieces	Weight kg/lb (1 pce)
NF	LDC4		10	0.011/0.02

### Protective covers

#### Description

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

#### Ordering Details

For control relays	Catalog number	List price	Pack <sup>(incl)</sup> pieces	Weight kg/lb (1 pce)
All 1-stack contactor relays	BX4		10	0.006/0.013
For 4-pole CA4 auxiliary contact blocks	BX4-CA		50	0.001/0.002

### Function markers

#### Description

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787")

#### Ordering Details

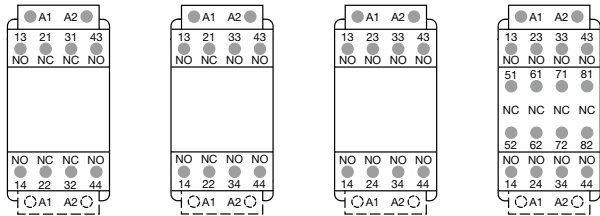
For control relays	Catalog number	List price	Pack <sup>(incl)</sup> pieces	Weight kg/lb (1 pce)
Marker card	BA4		16	0.011/0.02
AMS 500 support plate for 8 BA4	XUSP02633		1	0.290/0.64
HTP500 support plate	1SNA235712R2400		1	0.220/0.48

# NF Control Relays

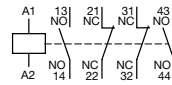
## Terminal Marking and Positioning



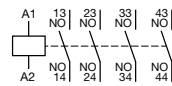
### Standard devices without addition of auxiliary contacts



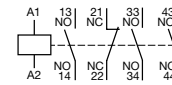
NF.22E      NF.31E      NF.40E      NF.44E



NF.22E



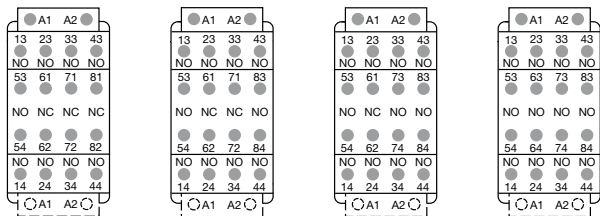
NF.31E



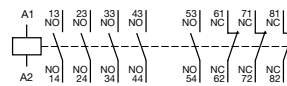
NF.40E



NF.44E



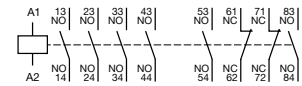
NF.53E      NF.62E      NF.71E      NF.80E



NF.53E



NF.62E

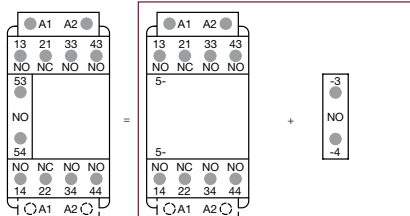


NF.71E

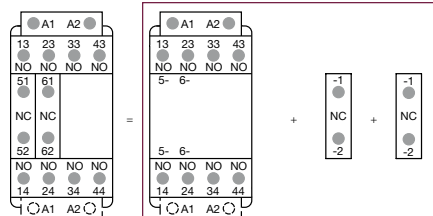


NF.80E

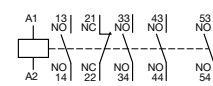
### Other possible contact combinations with auxiliary contacts



Combination 41 = NF.31E + CA4-10



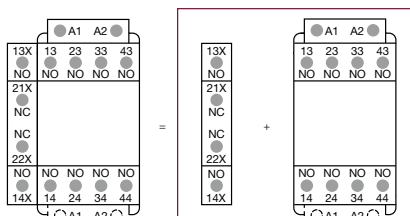
Combination 42 = NF.40E + CA4-01+CA4-01



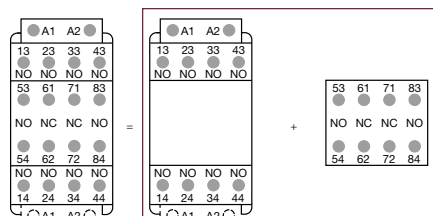
Combination 41 E



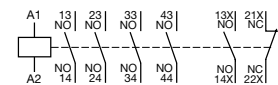
Combination 42 E



Combination 51 = CAL4-11 + NF.40E



Combination 62 = NF.40E + CA4-22N



Combination 51 E



Combination 62 E

Note: Only NFZ contactor relays with DC control 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.

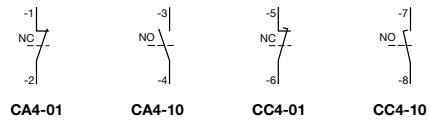


# NF Add-on Auxiliary Contacts

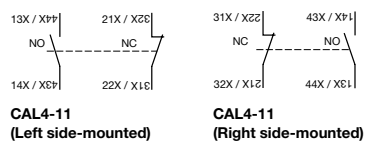
## Terminal Marking and Positioning



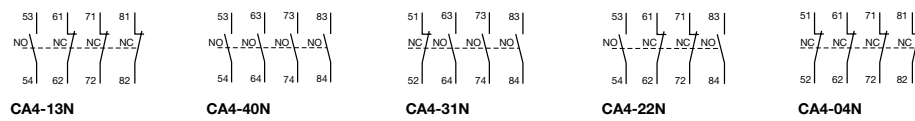
### 1-pole auxiliary contacts



### 2-pole auxiliary contacts



### 4-pole auxiliary contacts

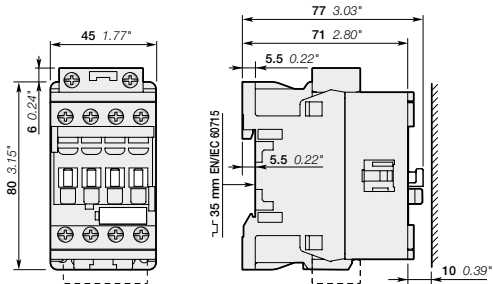


# NF Control Relays

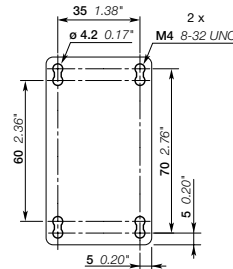
## AC / DC Operated - with Screw Terminals



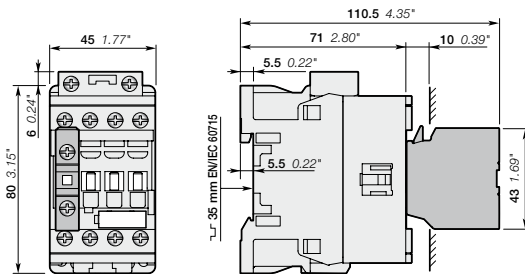
### Dimensions mm, inches



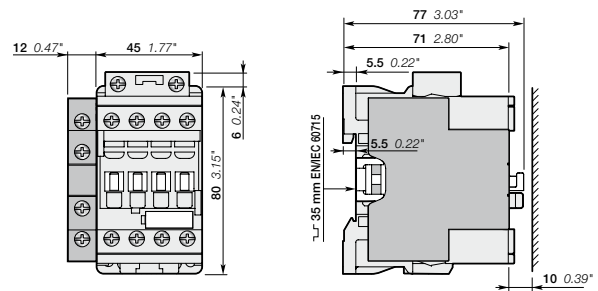
NF.22E, NF.31E, NF.40E



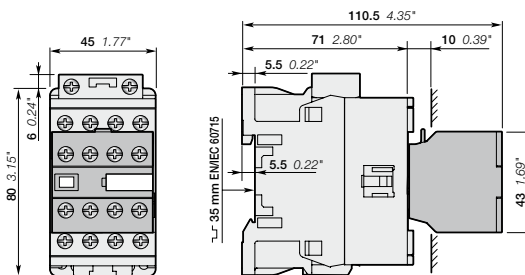
NF



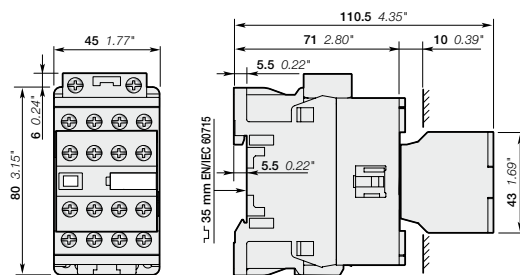
NF.22E, NF.31E, NF.40E  
+ CA4, CC4 1-pole auxiliary contact block



NF.22E, NF.31E, NF.40E  
+ CAL4-11 2-pole auxiliary contact block

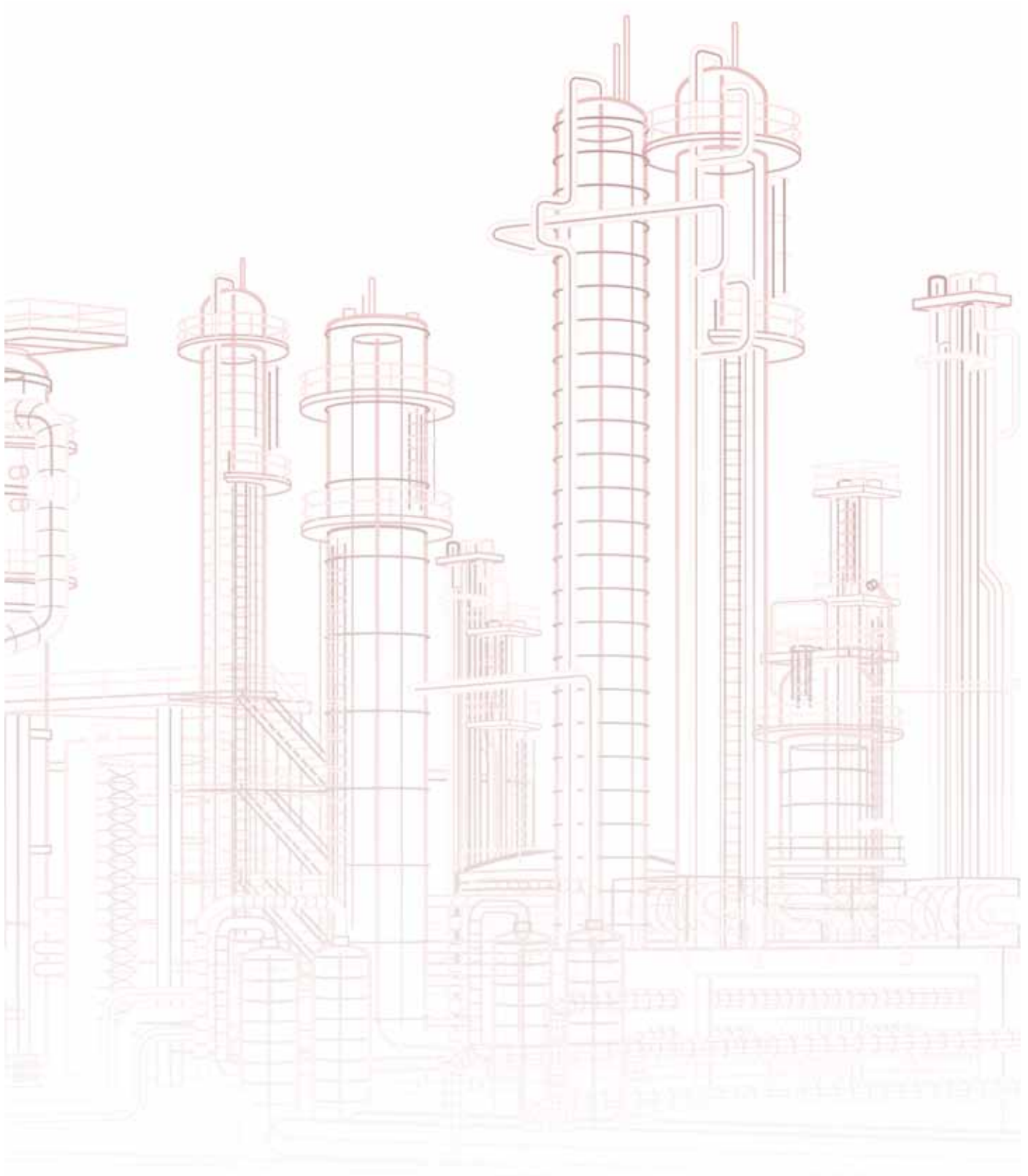


NF.22E, NF.31E, NF.40E  
+ CA4 4-pole auxiliary contact block



NF.44E, NF.53E, NF.62E, NF.71E, NF.80E

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

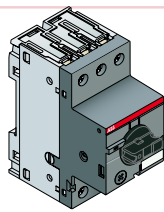


# MS116 - MS132 Manual Motor Starters up to 32 A

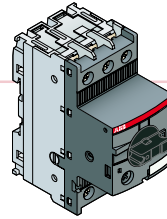


## Manual Motor Starters

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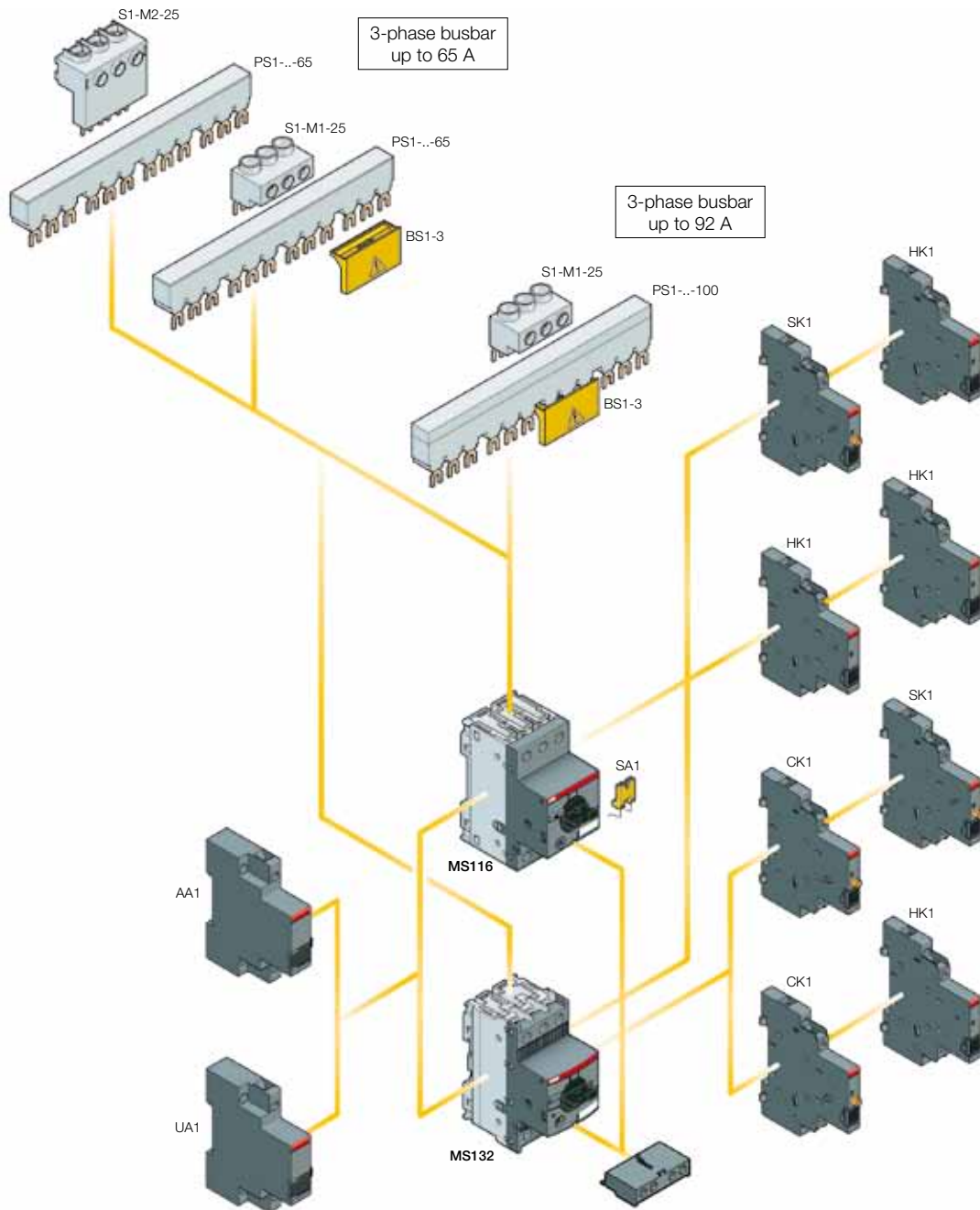
**MS116**  
(0.10 ... 16 A)



**MS132**  
(0.10 ... 32 A)

## for Manual Motor Starters

# Main Accessories



# Manual Motor Starters



	MS116	MS132
Certifications and approvals		
Electromagnetic trip a multiple of the rated current	9.75 ... 15 x I <sub>n</sub>	9.75 ... 15 x I <sub>n</sub>
Phase loss sensitivity	yes	yes
Switch position	ON/OFF	ON/OFF/TRIP
Magnetic trip indication	-	yes
Lockable handle without accessories	-	yes
Disconnecting feature	yes	yes
Width	45 mm	45 mm
Setting range	0.1 ... 16 A	0.1 ... 32 A
Rated operational voltage U <sub>e</sub>	600 V AC	600 V AC
Rated frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Trip class	10A	10
UL/CSA Short circuit rating	up to 30 kA <sup>1)</sup>	up to 30 kA <sup>2)</sup>
Ambient air temperature open compensated	-25 ... +55 °C	-25 ... +60 °C

1) For complete SCCR ratings on MS116 Manual Motor Starters, refer to literature number 1SXU131003L0201  
 2) For complete SCCR ratings on MS132 Manual Motor Starters, refer to literature number 1SXU131004L0201

## Main Accessories

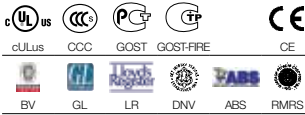
Item	Catalog Number Prefix
<b>Auxiliary contacts</b> Front mounting	HKF1-
	Side mounting
<b>Signaling contacts</b> Tripped alarm	SK1-
	Short-circuit alarm
<b>Auxiliary trip units</b> Shunt trip	AA1-
	Undervoltage release
<b>Busbar systems</b> 3-phase busbar	PS1
	Feeder terminals

# MS116 Manual Motor Starter

## With Thermal and Electromagnetic Protection



0.10 ... 16.0 A  
Class 10A



MS116

### Application

- Short-circuit protection
- Overload protection
- Trip class 10A
- Phase loss sensitivity
- ON/OFF switching functionality
- Disconnecting feature
- Suitable for three- and single phase applications

### Description

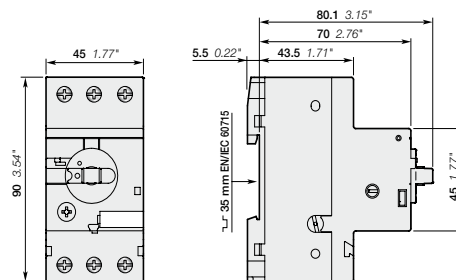
- 45 mm width
- One range of common accessories for MS116 & MS132

### Ordering Details

Setting ranges A ... A	Short-circuit <sup>1)</sup>		Rated instantaneous short-circuit current setting A	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
	at 600 V AC kA	at 480 V AC kA					
0.10 ... 0.16	5	30	1.25 ... 1.87	MS116-0.16		1	0.225/0.50
0.16 ... 0.25	5	30	1.95 ... 2.92	MS116-0.25		1	0.225/0.50
0.25 ... 0.40	5	30	3.12 ... 4.68	MS116-0.4		1	0.225/0.50
0.40 ... 0.63	5	30	4.91 ... 7.37	MS116-0.63		1	0.225/0.50
0.63 ... 1.00	5	30	9.20 ... 13.8	MS116-1.0		1	0.225/0.50
1.00 ... 1.60	5	30	14.7 ... 22.1	MS116-1.6		1	0.265/0.58
1.60 ... 2.50	5	30	23.0 ... 34.5	MS116-2.5		1	0.265/0.58
2.50 ... 4.00	5	18	40.0 ... 60.0	MS116-4.0		1	0.265/0.58
4.00 ... 6.30	5	18	63.0 ... 94.5	MS116-6.3		1	0.265/0.58
6.30 ... 10.0	5	18	120 ... 180	MS116-10		1	0.265/0.58
8.00 ... 12.0	5	18	144 ... 216	MS116-12		1	0.265/0.58
10.0 ... 16.0	5	18	192 ... 288	MS116-16		1	0.265/0.58

1) For complete SOCR ratings on MS116 Manual Motor Starters, refer to literature number 1SXU131003L0201.

### Main Dimensions mm, inches








# MS116 Manual Motor Starter

## Technical Data



0.10 ... 16.0 A  
Class 10A

### Main Technical Data

Manual Motor Starter Types				MS116
<b>Standards</b>	Conformity to standards			IEC/EN60947-1, IEC/EN60947-2, IEC/EN60947-4-1, UL 508, CSA C22.2 No. 14
	Phase loss sensitivity	(acc. to IEC/EN 60947-4-1)		yes
	Disconnecting feature	(acc. to IEC/EN 60947-2)		yes
<b>General data</b>	Mounting position			Position 1-6
	Degree of protection	(acc. to IEC 60947-1)		IP 20
	Mechanical durability			100000 cycles
	Electrical durability			100000 cycles
	Utilization category			A
<b>UL/CSA</b>	<b>Main circuit</b>			
	Max. operational voltage			600 V AC
	Short-circuit rating <sup>1)</sup>	480 V AC	0.16 A ≤ I <sub>sc</sub> ≤ 2.5 A	30 kA
			2.5 A < I <sub>sc</sub> ≤ 16 A	18 kA
600 V AC			5 kA	
<b>Connecting capacity</b>	 Stranded	1 or 2 x		AWG 16 ... 12
	 Flexible without ferrule	1 or 2 x		AWG 16 ... 12
	Stripping length			9 mm
	Tightening torque			10 lb.in
	<b>IEC</b>			
<b>Main circuit</b>	Rated operational voltage U <sub>e</sub>			690 V AC
	Rated operational current I <sub>e</sub>			up to 16 A
	Conventional free air thermal current I <sub>th</sub>			up to 16 A
	Rated frequency			50 / 60 Hz
	Trip class			10A
<b>Isolation data</b> (acc. to IEC/EN 60947-1)	Rated impulse withstand voltage U <sub>imp</sub>			6 kV
	Rated insulation voltage U <sub>i</sub>			690 V
<b>Environmental data</b>	Ambient air temperature			
	Operation	Open - compensated		-25 ... +55 °C
		Open		-25 ... +70 °C
	Storage			-50 ... +80 °C
	Vibration (acc. to IEC/EN 60068-2-6)			5 g / 3-150 Hz
	Shock (acc. to IEC/EN 60068-2-27)			25 g / 11 ms
<b>Connecting capacity</b>	 Rigid	1 or 2 x		1 ... 4 mm <sup>2</sup>
	 Flexible with ferrule	1 or 2 x		0.75 ... 2.5 mm <sup>2</sup>
	 Flexible without ferrule	1 or 2 x		0.75 ... 2.5 mm <sup>2</sup>
	Stripping length			9 mm
	Tightening torque			0.8 ... 1.2 Nm

1) For complete SCCR ratings on MS116 Manual Motor Starters, refer to literature number 1SXU131003L0201.

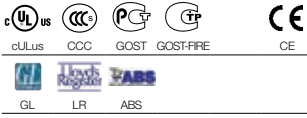


# MS132 Manual Motor Starter

## With Thermal and Electromagnetic Protection



0.10 ... 32.0 A  
Class 10



MS132-10



MS132-32

### Application

- Short-circuit protection
- Overload protection
- Trip class 10
- Phase loss sensitivity
- ON/OFF switching functionality
- Disconnecting feature
- Suitable for three- and single phase applications.

### Description

- 45 mm width
- Lockable handle
- Clear position of the handle ON/OFF/TRIP
- Magnetic tripping optically signalled in the front
- One range of common accessories for MS116 & MS132.

### Ordering Details

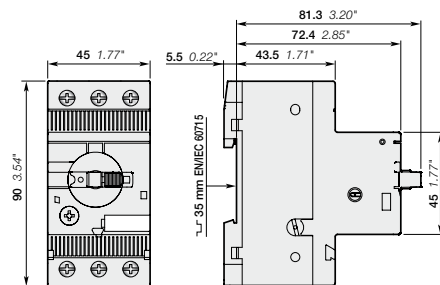
Setting ranges A ... A	Short-circuit <sup>1)</sup>		Rated instantaneous short-circuit current setting A	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
	at 600 V AC kA	at 480 V AC kA					
0.10 ... 0.16	18	30	1.25 ... 1.87	MS132-0.16		1	0.215/0.47
0.16 ... 0.25	18	30	1.95 ... 2.92	MS132-0.25		1	0.215/0.47
0.25 ... 0.40	18	30	3.12 ... 4.68	MS132-0.4		1	0.215/0.47
0.40 ... 0.63	18	30	4.91 ... 7.37	MS132-0.63		1	0.215/0.47
0.63 ... 1.00	18	30	9.20 ... 13.8	MS132-1.0		1	0.215/0.47
1.00 ... 1.60	18	30	14.7 ... 22.1	MS132-1.6		1	0.265/0.58
1.60 ... 2.50	18	30	23.0 ... 34.5	MS132-2.5		1	0.265/0.58
2.50 ... 4.00	18	30	40.0 ... 60.0	MS132-4.0		1	0.265/0.58
4.00 ... 6.30	18	30	63.0 ... 94.5	MS132-6.3		1	0.265/0.58
6.30 ... 10.0	18	30	120 ... 180	MS132-10		1	0.265/0.58
8.00 ... 12.0	18	30	144 ... 216	MS132-12		1	0.310/0.68
10.0 ... 16.0	18	30	192 ... 288	MS132-16		1	0.310/0.68
16.0 ... 20.0	18	30	240 ... 360	MS132-20		1	0.310/0.68
20.0 ... 25.0	18	30	300 ... 450	MS132-25		1	0.310/0.68
25.0 ... 32.0	18	30	384 ... 576	MS132-32		1	0.310/0.68

According to IEC 60947-1

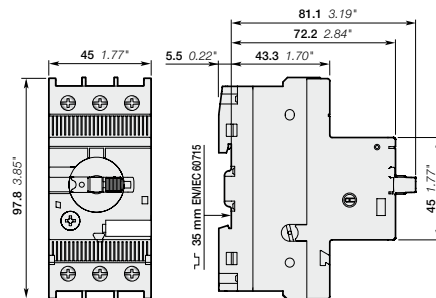
1) For complete SCCR ratings on MS132 Manual Motor Starters, refer to literature number 1SXU131004L0201

### Main Dimensions mm, inches

MS132-0.16 ... MS132-10



MS132-12 ... MS132-32



# MS132 Manual Motor Starter

## Technical Data



0.10 ... 32.0 A

Class 10

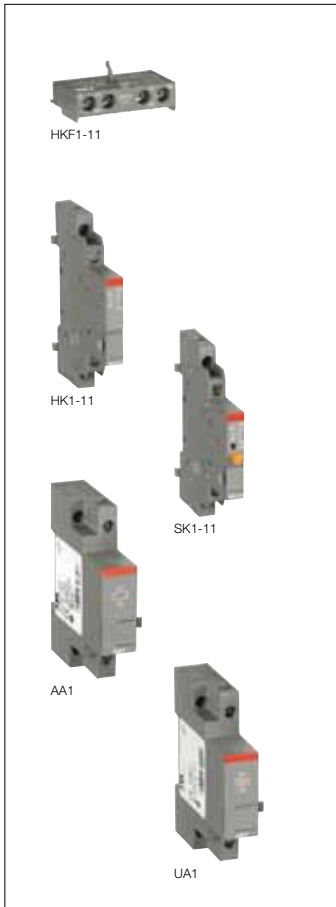
### Main Technical Data

Manual Motor Starter Types		MS132			
		up to 10 A	up to 16 A	up to 32 A	
<b>Standards</b>	Conformity to standards	IEC/EN60947-1, IEC/EN60947-2, IEC/EN60947-4-1, UL 508, CSA C22.2 No. 14			
	Phase loss sensitivity (acc. to IEC/EN 60947-4-1)	yes			
	Disconnecting feature (acc. to IEC/EN 60947-2)	yes			
<b>General data</b>	Mounting position	Position 1-6			
	Degree of protection (acc. to IEC 60947-1)	IP 20			
	Mechanical durability	100000 cycles			
	Electrical durability	50000 cycles			
	Utilization category	A			
<b>UL/CSA</b>					
<b>Main circuit</b>	Max. operational voltage	600 V AC			
	Short-circuit rating <sup>1)</sup>	480 V AC	30 kA		
		600 V AC	18 kA		
<b>Connecting capacity</b>	Stranded	1 or 2 x	AWG 16 ... 12	AWG 16 ... 12	AWG 12 ... 8
	Flexible without ferrule	1 or 2 x	AWG 16 ... 12	AWG 16 ... 12	AWG 12 ... 8
	Stripping length		9 mm	10 mm	10 mm
	Tightening torque		10 ... 12 lb.in	14 lb.in	18 lb.in
<b>IEC</b>					
<b>Main circuit</b>	Rated operational voltage $U_e$	690 V AC			
	Rated operational current $I_e$	up to 10 A	up to 16 A	up to 32 A	
	Conventional free air thermal current $I_{th}$	up to 10 A	up to 16 A	up to 32 A	
	Rated frequency	50 / 60 Hz			
	Trip class	10 (10A for MS132-0.16); 10		10	
<b>Isolation data</b>	Rated impulse withstand voltage $U_{imp}$	6 kV			
	(acc. to IEC/EN 60947-1) Rated insulation voltage $U_i$	690 V			
<b>Environmental data</b>	Ambient air temperature				
	Operation	Open - compensated	-25 ... +60 °C		
		Open	-25 ... +70 °C		
	Storage		-50 ... +80 °C		
	Vibration (acc. to IEC/EN 60068-2-6)	5 g / 3-150 Hz			
Shock (acc. to IEC/EN 60068-2-27)	25 g / 11 ms				
<b>Connecting capacity</b>	Rigid	1 or 2 x	1 ... 4 mm <sup>2</sup>	1 ... 4 mm <sup>2</sup>	2.5 ... 6 mm <sup>2</sup>
	Flexible with ferrule	1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>	1 ... 6 mm <sup>2</sup>
	Flexible without ferrule	1 or 2 x	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>	1 ... 6 mm <sup>2</sup>
	Stripping length		9 mm	10 mm	10 mm
	Tightening torque		0.8 ... 1.2 Nm	1.5 Nm	2.0 Nm

1) For complete SCCR ratings on MS132 Manual Motor Starters, refer to literature number 1SXU131004L0201

# Manual Motor Starters

## Main Accessories



### Auxiliary contacts

Manual Motor Starters		Aux. contacts		Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
MS116	MS132	N.O.	N.C.				
<b>Auxiliary contacts, mountable on front</b>							
•	•	1	1	HKF1-11 <sup>1)</sup>		10	0.016/0.035
<b>Auxiliary contacts, mountable on the right, max. 2 pieces</b>							
•	•	1	1	HK1-11 <sup>1)</sup>		2	0.035/0.077
•	•	2	0	HK1-20 <sup>1)</sup>		2	0.035/0.077
•	•	0	2	HK1-02 <sup>1)</sup>		2	0.035/0.077
<b>Auxiliary contacts with lead contacts, mountable on the right, also to use with undervoltage release</b>							
•	•	2	0	HK1-20L <sup>1)</sup>		2	0.035/0.077

### Signaling contacts

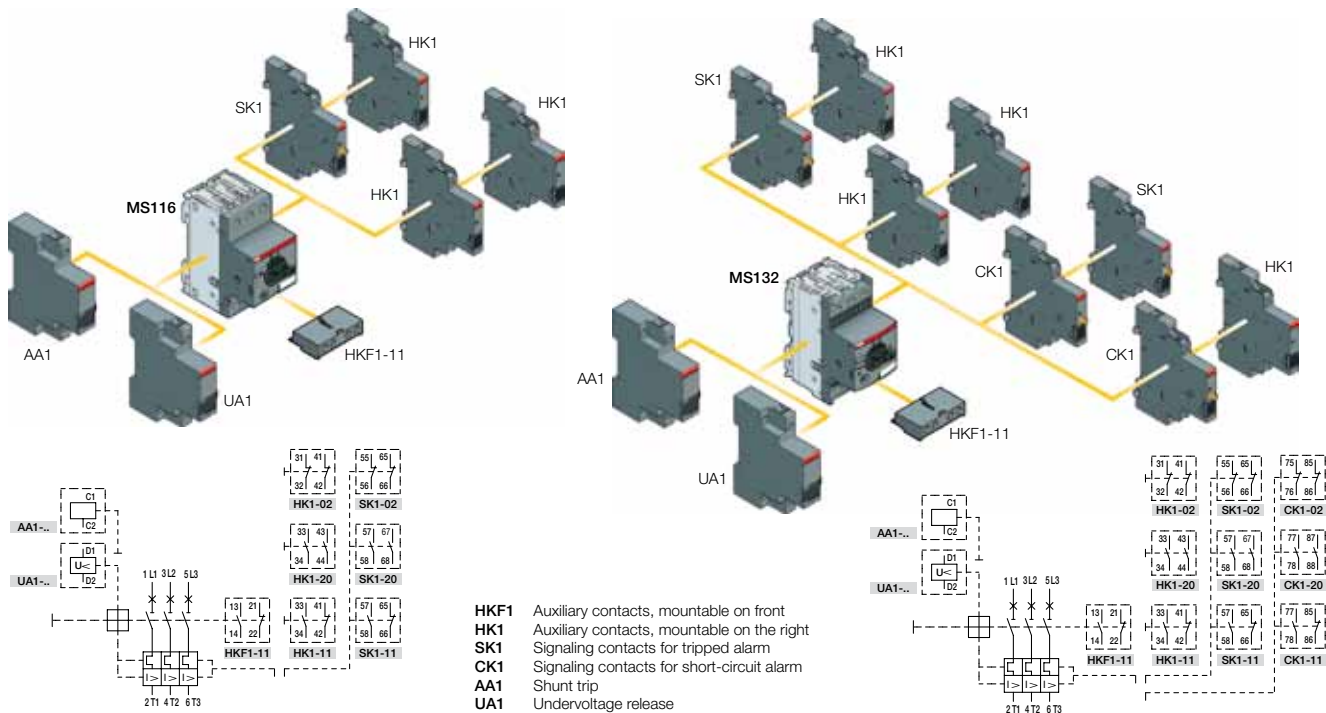
Manual Motor Starters		Aux. contacts		Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
MS116	MS132	N.O.	N.C.				
<b>Signaling contacts for tripped alarm, mountable on the right</b>							
•	•	1	1	SK1-11 <sup>1)</sup>		2	0.035/0.077
•	•	2	0	SK1-20 <sup>1)</sup>		2	0.035/0.077
•	•	0	2	SK1-02 <sup>1)</sup>		2	0.035/0.077
<b>Signaling contacts for short-circuit alarm, mountable on the right</b>							
-	•	1	1	CK1-11		2	0.035/0.077
-	•	2	0	CK1-20		2	0.035/0.077
-	•	0	2	CK1-02		2	0.035/0.077

### Auxiliary trip units

Manual Motor Starters		Rated control supply voltage	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
MS116	MS132					
<b>Shunt trip, mountable on the left</b>						
•	•	24 V 50/60 Hz	AA1-24 <sup>1)</sup>		1	0.10/0.22
•	•	110 V 50/60 Hz	AA1-110 <sup>1)</sup>		1	0.10/0.22
•	•	200 ... 240 V 50/60 Hz	AA1-230 <sup>1)</sup>		1	0.10/0.22
<b>Undervoltage release, mountable on the left</b>						
•	•	24 V 60 Hz	UA1-24 <sup>1)</sup>		1	0.10/0.22
•	•	110 V 50 Hz - 120 V 60 Hz	UA1-120 <sup>1)</sup>		1	0.10/0.22
•	•	208 V 60 Hz	UA1-208 <sup>1)</sup>		1	0.10/0.22
•	•	230 V 50 Hz - 240 V 60 Hz	UA1-230 <sup>1)</sup>		1	0.10/0.22
•	•	575 V 60 Hz	UA1-575 <sup>1)</sup>		1	0.10/0.22

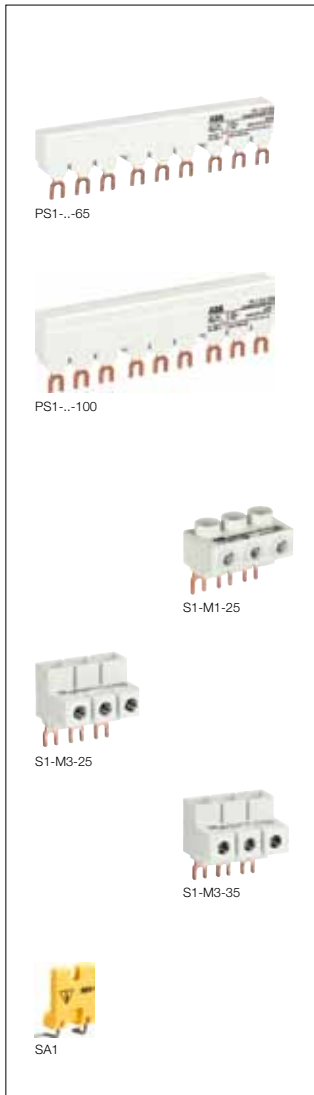
<sup>1)</sup> For ABB Canadian part numbers, add prefix "MS132-" to catalog numbers

### Manual motor starter with accessories



# Manual Motor Starters

## Main Accessories



### 3-phase busbar systems

Manual Motor Starters	Number of MMS	Number of aux. contacts	Catalog number	List price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
MS116	MS132					
<b>3-phase busbar up to 65 A</b>						
●	●	2	0	PS1-2-0-65	10	0.034/0.07
●	●	3	0	PS1-3-0-65	10	0.055/0.12
●	●	4	0	PS1-4-0-65	10	0.077/0.17
●	●	5	0	PS1-5-0-65	10	0.098/0.22
●	●	2	1	PS1-2-1-65	10	0.036/0.08
●	●	3	1	PS1-3-1-65	10	0.060/0.13
●	●	4	1	PS1-4-1-65	10	0.087/0.19
●	●	5	1	PS1-5-1-65	10	0.108/0.24
●	●	2	2	PS1-2-2-65	10	0.040/0.09
●	●	3	2	PS1-3-2-65	10	0.067/0.15
●	●	4	2	PS1-4-2-65	10	0.095/0.21
●	●	5	2	PS1-5-2-65	10	0.122/0.27
<b>3-phase busbar up to 92 A</b>						
●	●	3	0	PS1-3-0-100	10	0.084/0.19
●	●	4	0	PS1-4-0-100	10	0.117/0.26
●	●	5	0	PS1-5-0-100	10	0.154/0.34
●	●	3	1	PS1-3-1-100	10	0.094/0.21
●	●	4	1	PS1-4-1-100	10	0.134/0.30
●	●	5	1	PS1-5-1-100	10	0.172/0.38
●	●	3	2	PS1-3-2-100	10	0.105/0.23

### 3-phase feeder terminals

Busbar types	Remarks	Connecting capacity AWG	Catalog number	List Price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)
65 A	92 A					
<b>3-phase feeder terminals</b>						
●	●	Flat	4	S1-M1-25	10	0.038/0.08
●	-	High	4	S1-M2-25	10	0.051/0.11
<b>3-phase feeder terminals for CSA/UL type E (select sizes MS132 only) <sup>1)</sup></b>						
●	●		4	S1-M3-25	10	0.042/0.09
●	●		2	S1-M3-35	10	0.060/0.13

### Cover for 3-phase busbars

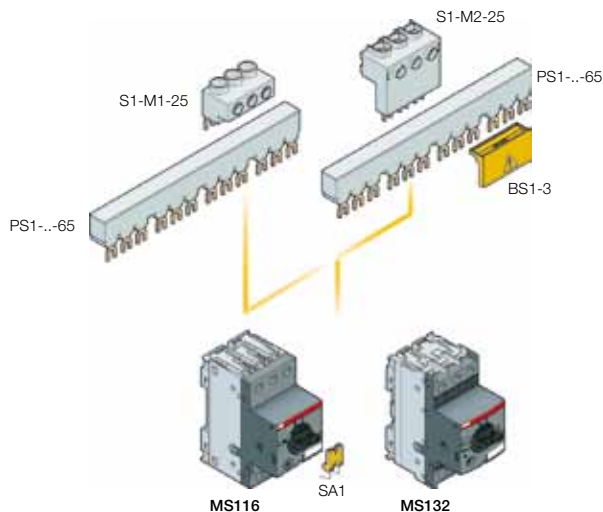
			BS1-3	50	0.003/0.01
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### Locking

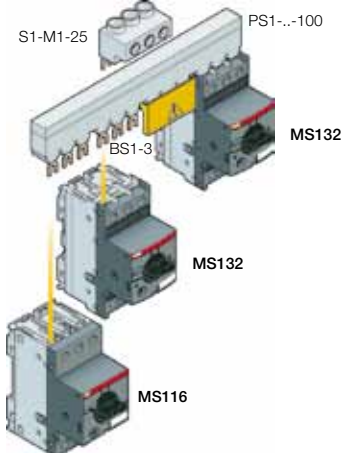
Manual Motor Starters	Catalog number	List Price	Pack <sup>(ing)</sup> pieces	Weight kg/lb (1 pce)	
MS116	MS132				
<b>Locking device</b>					
●	-	Lock adapter	SA1	10	0.003/0.01
●	●	Padlock + 2 keys	SA2	10	0.020/0.04
●	-	Lock adapter + padlock + 2 keys	SA3	10	0.050/0.11

<sup>1)</sup> For UL Type E Combination Motor ratings, refer to literature number 1SXU131004L0201.

### 3-phase busbar up to 65 A



### 3-phase busbar up to 92 A



# MS116 & MS132 Manual Motor Starters

## Main Accessories



MS132-10



MS116

### Door Hardware

Manual Motor Starters		Trip Indicator		Catalog Number	List Price	Package pieces <sup>1)</sup>	Weight kg/lb <sup>1)</sup>
MS116	MS132	with	w/o				
Shaft Coupler							
•	•			MS132-MSMN			
Handle, Black, NEMA 1, 3R, 12, 6 mm							
•	•	•		MSHD-LTB			
•	•		•	MSHD-LB			
Handle, Red/Yellow, NEMA 1, 3R, 12, 6 mm							
•	•	•		MSHD-LTY			
•	•		•	MSHD-LY			
Shaft 180 mm (L), 6 mm (D)							
•	•			OXS6X180			

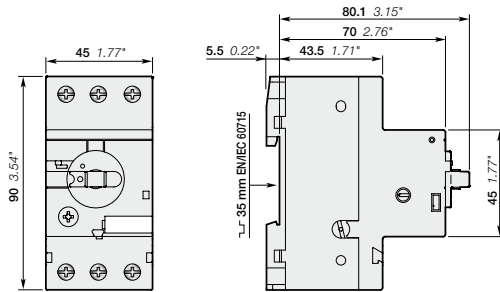
1) For package quantity or unit weight, consult technical support.

# MS116 & MS132 Manual Motor Starters

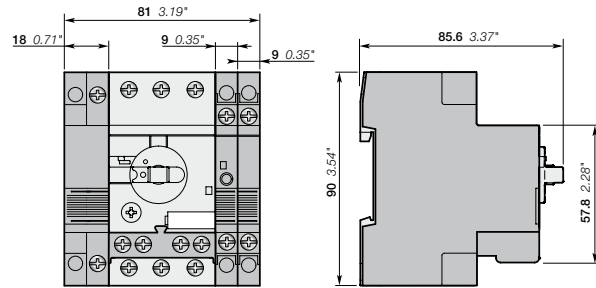
## With Thermal and Electromagnetic Protection



### MS116 Dimensions mm, inches

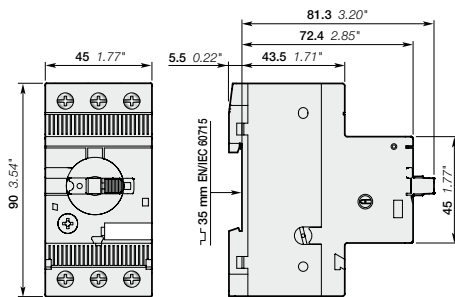


MS116

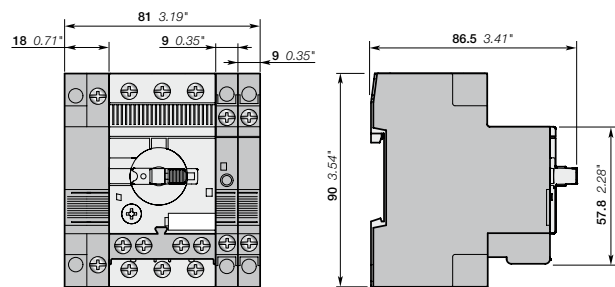


MS116  
+ UA1, AA1, SK1, HK1, HKF1-11

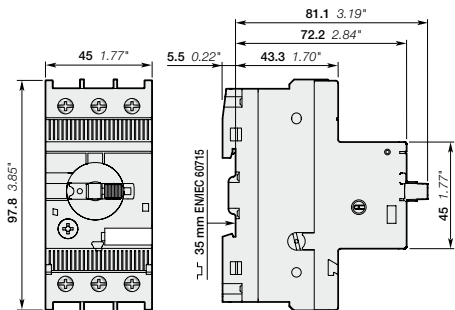
### MS132 Dimensions mm, inches



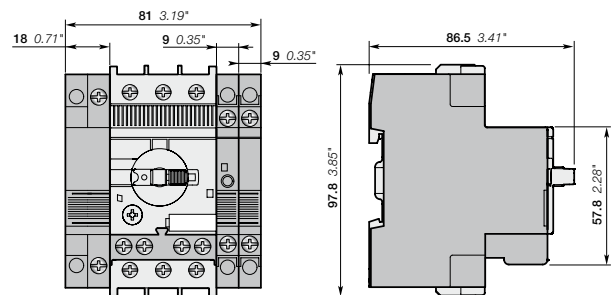
MS132-0.16 ... MS132-10



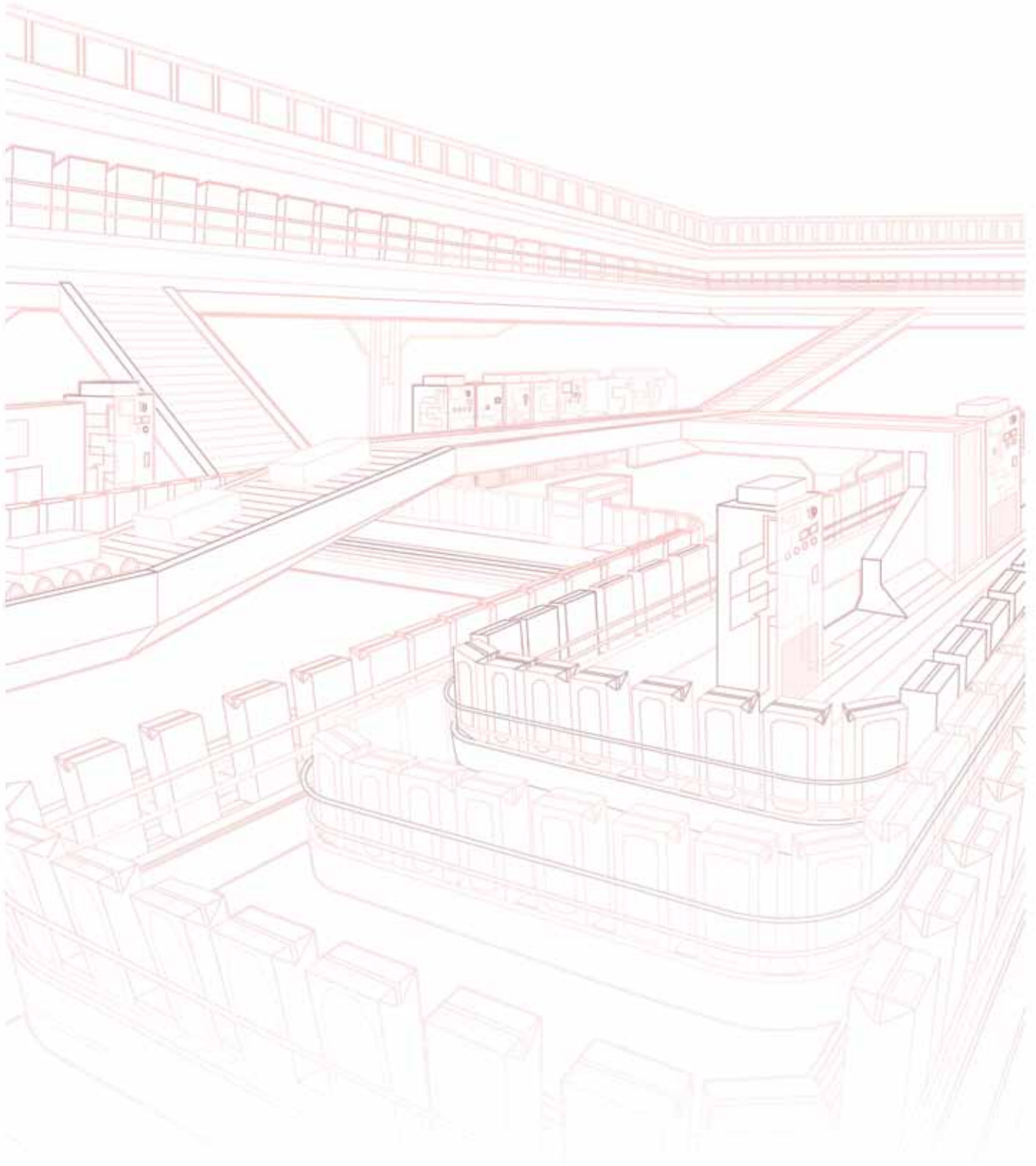
MS132-0.16 ... MS132-10  
+ UA1, AA1, SK1, HK1, CK1, HKF1-11



MS132-12 ... MS132-32



MS132-12 ... MS132-32  
+ UA1, AA1, SK1, HK1, CK1, HKF1-11



# Motor Starting Solutions

Open Type Version, in Kit Form



Overview ..... 98

## Starters Protected by Manual Motor Starters

Across-the-Line Starters ..... 100

Reversing Starters ..... 102

## Dimensions

### Starters Protected by Manual Motor Starters

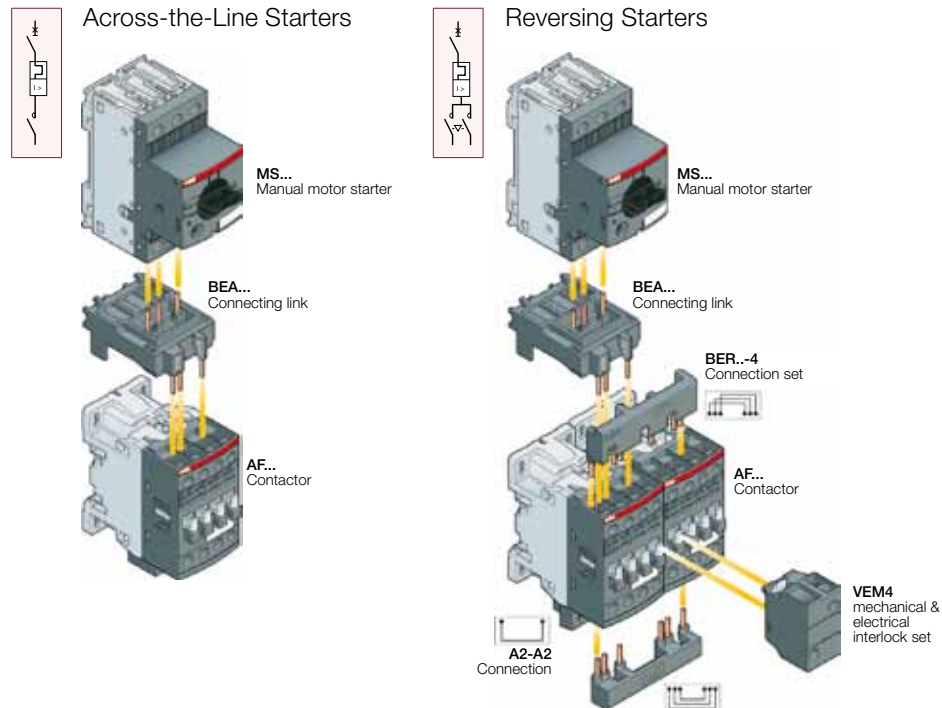
– Across-the-Line Starters ..... 106

– Reversing Starters ..... 107

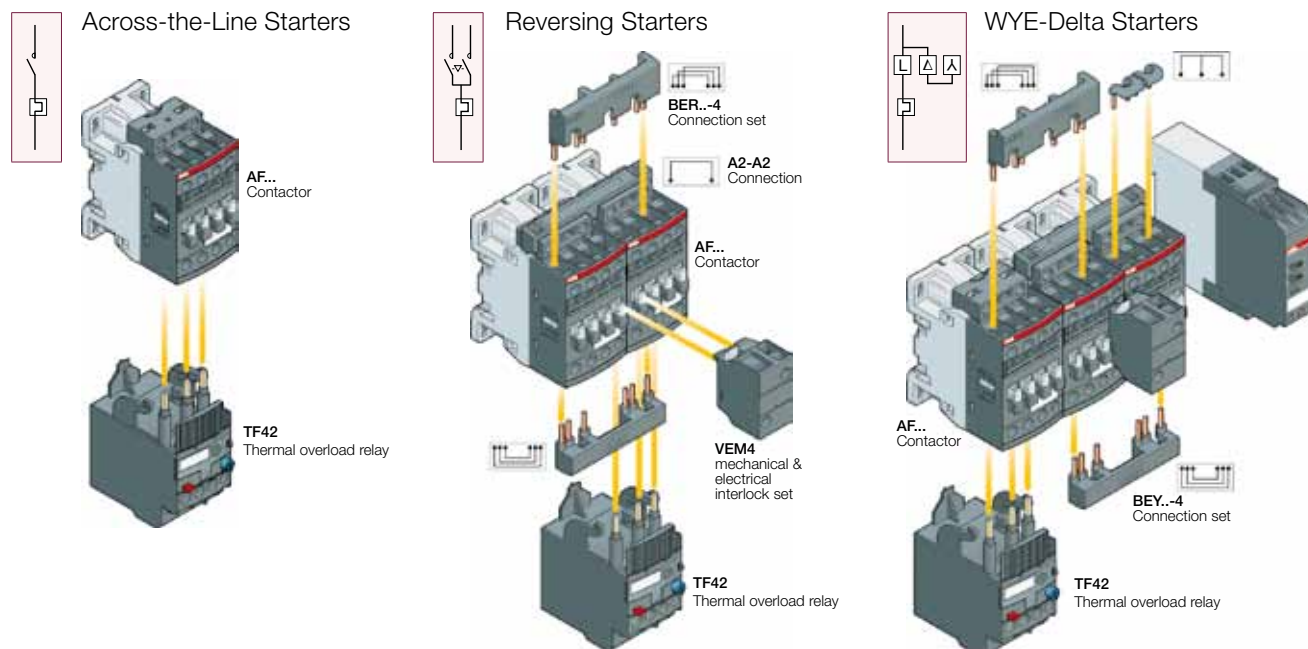


# Motor Starting Solutions Open Type Version, in Kit Form

## Starters Protected by Manual Motor Starters



## Starters Protected by Thermal Overload Relays



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

## Starters Protected by Manual Motor Starters



Switching of 3-phase Cage Motors	
Horsepower rating	480 V
	600 V
Manual motor starters	
Contactors	AC / DC Operated

Across-the-Line Starters

0.1 ... 20 HP
0.1 ... 20 HP
MS116 ... MS132
AF09 ... AF30

Reversing Starters

0.1 ... 20 HP
0.1 ... 20 HP
MS116 ... MS132
AF09 ... AF30

## Starters Protected by Thermal Overload Relays



Switching of 3-phase Cage Motors	
Contactors	AC / DC Operated
Thermal overload relays	

Across-the-Line Starters

AF09 ... AF30
TF42

Reversing Starters

AF09 ... AF30
TF42



Switching of 3-phase Cage Motors	
Contactors	AC / DC Operated
Thermal overload relays	

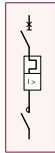
WYE-Delta Starters

AF09 ... AF30
TF42

# Across-the-Line Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form

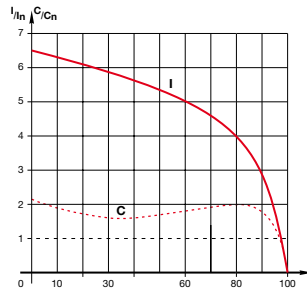


MS132... + BEA...-4 + AF...



## Application

Full voltage across-the-line starting is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current  
C = torque  
In = nominal current  
Cn = nominal torque

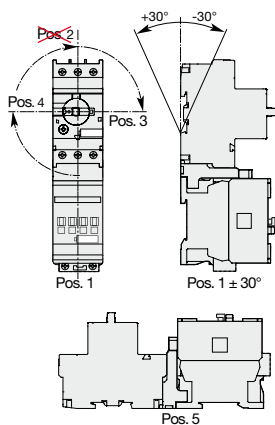
## Description

You can easily assemble an across-the-line starter by using the BEA...-4 3-pole insulated connecting link. It is used to electrically and mechanically connect MMS... manual motor starter and AF... contactor, AC or DC operated.

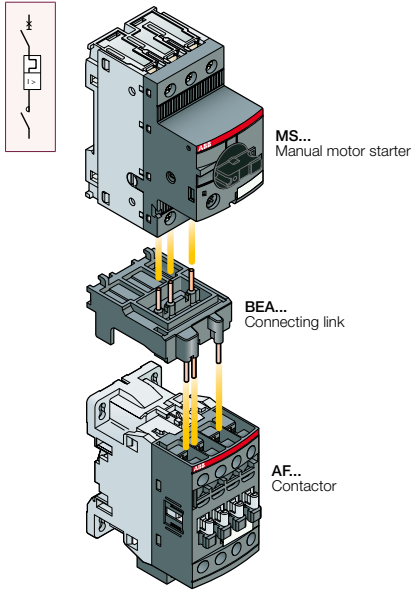
## Main Technical Data

Rated operational voltage $U_e$ max.	600 V
Rated insulation voltage $U_i$	
according to IEC 60947-4-1	690 V
according to UL/CSA	600 V
Max. starting time	1.5 s
Switching frequency	≤ 15 starts/hour - 80 % max. load factor ≤ 30 starts/hour - 50 % max. load factor
Ambient air temperature close to the device	<b>use with MS116</b> : ≤ 55 °C <b>use with MS132</b> : ≤ 60 °C
Degree of protection	IP 20
Standards	CSA C22.2 No. 14, UL508, IEC 60947-4-1 / EN 60947-4-1

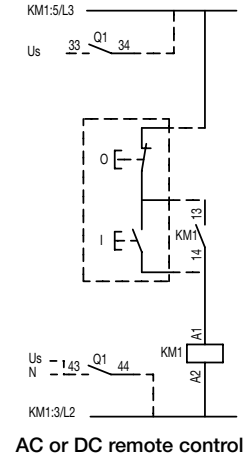
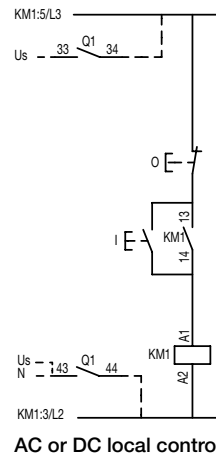
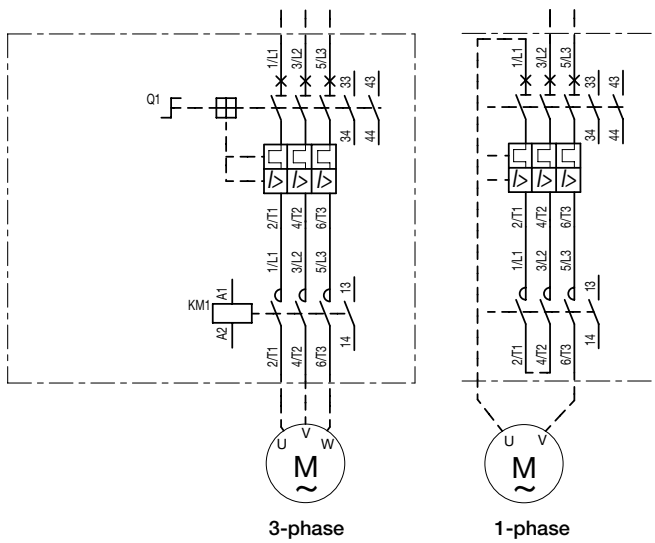
### Mounting positions



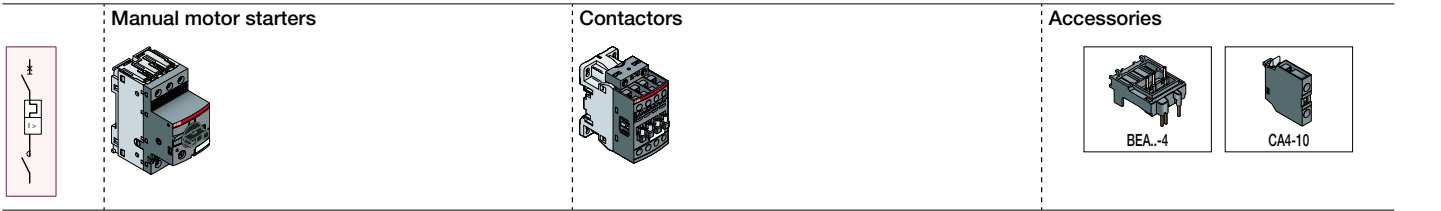
# Across-the-Line Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form



## Wiring Diagrams



# Across-the-Line Starters Protected by MS132 Manual Motor Starters



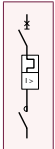
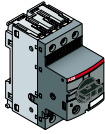
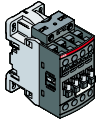
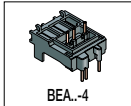

cULus 480 V Rated power HP	Rated current A(3)	Catalog number (1)	Current setting range A	Magnetic tripping current A	Control voltage range $U_c$ min. ... $U_c$ max. (2)		Catalog number	Allowed current setting A	Catalog number
					V 50/60Hz	V DC			
1/10	0.2	MS132-0.25	0.16...0.25	2.44	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	0.25	BEA16-4
1/8	0.3	MS132-0.4	0.25...0.40	3.9	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	0.4	
1/6	0.6	MS132-0.63	0.40...0.63	6.14	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	0.63	
1/4	0.65	MS132-1.0	0.63...1.00	11.5	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	1	
1/3	0.8	MS132-1.0	0.63...1.00	11.5	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	1	
1/2	1.0	MS132-1.6	1.00...1.60	18.4	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	1.6	
3/4	1.4	MS132-1.6	1.00...1.60	18.4	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	1.6	
1	1.8	MS132-2.5	1.60...2.50	29	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	2.5	
1-1/2	2.6	MS132-4.0	2.50...4.00	50	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	4	
2	3.4	MS132-4.0	2.50...4.00	50	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	4	
3	4.8	MS132-6.3	4.00...6.30	79	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	6.3	
5	7.6	MS132-10	6.30...10.0	150	24...60 100...250	20...60 100...250	AF09-30-10-11 AF09-30-10-13	9	
7-1/2	11	MS132-12	8.0...12.0	180	24...60 100...250	20...60 100...250	AF12-30-10-11 AF12-30-10-13	12	
10	14	MS132-16	10.0...16.0	240	24...60 100...250	20...60 100...250	AF16-30-10-11 AF16-30-10-13	16	
15	21	MS132-25	20.0...25.0	375	24...60 100...250	20...60 100...250	AF26-30-00-11 AF26-30-00-13	25	
20	27	MS132-32	25.0...32.0	480	24...60 100...250	20...60 100...250	AF30-30-00-11 AF30-30-00-13	32	

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to: - 10 HP at 480 V - 18 kA

(2) For other control voltages, see "3-pole contactors - Ordering details" pages.

(3) These values of motor full-load current are to be used as guides only. For motor protection setting, always use those appearing on the motor nameplate.

# Across-the-Line Starters Protected by MS132 Manual Motor Starters

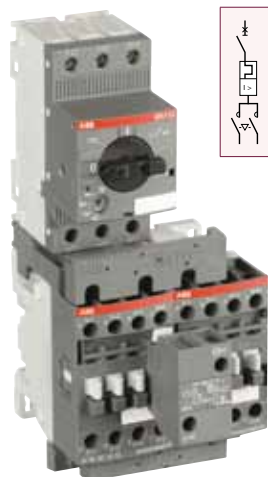
Manual motor starters		Contactors		Accessories					
									
				 					
cULus	600 V	Catalog number (1)	Current setting range	Magnetic tripping current	Control voltage range $U_c$ min. ... $U_c$ max. (2)	Catalog number	Allowed current setting	Catalog number	
Rated power	Rated current		A	A	V 50/60Hz		A		
HP	A(3)								
1/10	0.2	MS132-0.25	0.16...0.25	2.44	24...60 100...250	AF09-30-10-11 AF09-30-10-13	0.25	BEA16-4	
1/8	0.3	MS132-0.4	0.25...0.40	3.9	24...60 100...250	AF09-30-10-11 AF09-30-10-13	0.4		
1/6	0.44	MS132-0.63	0.40...0.63	6.14	24...60 100...250	AF09-30-10-11 AF09-30-10-13	0.63		
1/4	0.52	MS132-0.63	0.40...0.63	6.14	24...60 100...250	AF09-30-10-11 AF09-30-10-13	0.63		
1/3	0.64	MS132-1.0	0.63...1.00	11.5	24...60 100...250	AF09-30-10-11 AF09-30-10-13	1		
1/2	0.9	MS132-1.0	0.63...1.00	11.5	24...60 100...250	AF09-30-10-11 AF09-30-10-13	1		
3/4	1.3	MS132-1.6	1.00...1.60	18.4	24...60 100...250	AF09-30-10-11 AF09-30-10-13	1.6		
1	1.7	MS132-2.5	1.60...2.50	28.75	24...60 100...250	AF09-30-10-11 AF09-30-10-13	2.5		
1-1/2	2.4	MS132-2.5	1.60...2.50	28.75	24...60 100...250	AF09-30-10-11 AF09-30-10-13	2.5		
2	2.7	MS132-4.0	2.50...4.00	50	24...60 100...250	AF09-30-10-11 AF09-30-10-13	4		
3	3.9	MS132-4.0	2.50...4.00	50	24...60 100...250	AF09-30-10-11 AF09-30-10-13	4		
5	6.1	MS132-6.3	4.00...6.30	79	24...60 100...250	AF09-30-10-11 AF09-30-10-13	6.3		
7-1/2	9	MS132-10	6.30...10.0	150	24...60 100...250	AF09-30-10-11 AF09-30-10-13	10		
10	11	MS132-12	8.00...12.0	180	24...60 100...250	AF12-30-10-11 AF12-30-10-13	12		
15	17	MS132-20	16.0...20.0	300	24...60 100...250	AF16-30-10-11 AF16-30-10-13	20		
20	22	MS132-25	20.0...25.0	375	24...60 100...250	AF26-30-00-11 AF26-30-00-13	25		BEA38-4 + CA4-10 (front) or CAL4-11 (side)
-	27	MS132-32	25.0...32.0	480	24...60 100...250	AF30-30-00-11 AF30-30-00-13	32		

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:  
- 10 HP at 600 V AC - 5 kA.

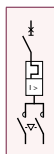
(2) For other control voltages, see «3-pole contactors - Ordering details» pages.

(3) These values of motor full-load current are to be used as guides only. For motor protection setting, always use those appearing on the motor nameplate.

# Reversing Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form

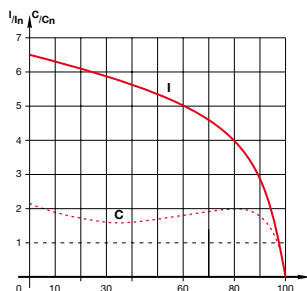


MS132... + BEA...-4 + BER...-4 + VEM4 + AF...



## Application

Full voltage reversing starting is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



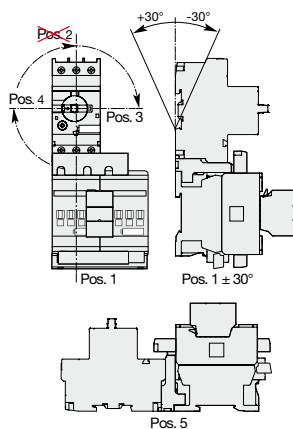
I = current  
C = torque  
In = nominal current  
Cn = nominal torque

## Description

You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA...-4 3-pole insulated connecting link: it is used to electrically and mechanically connect MS... manual motor starter and AF contactor, AC or DC operated.
- VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width. It includes:
  - VE4 electrical interlock block with A2-A2 connection
  - VM4 mechanical interlock unit including 2 fixing clips.
- BER...-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

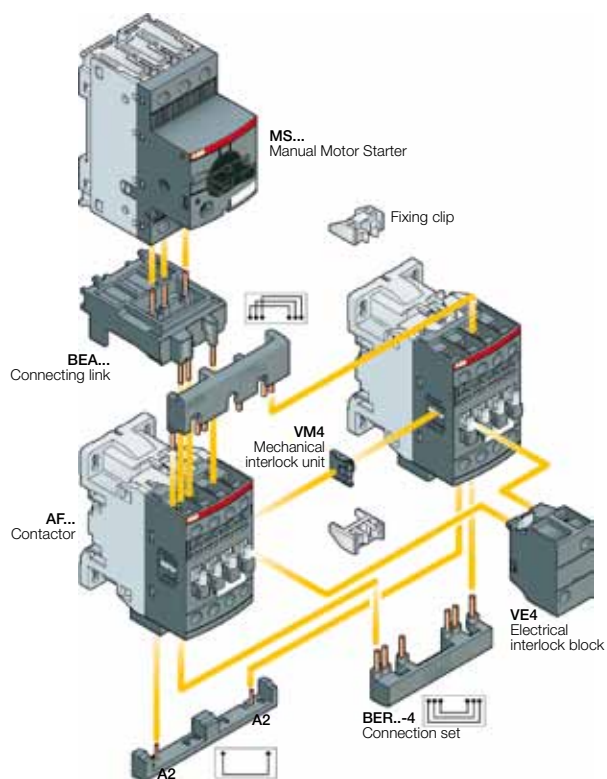
## Mounting positions



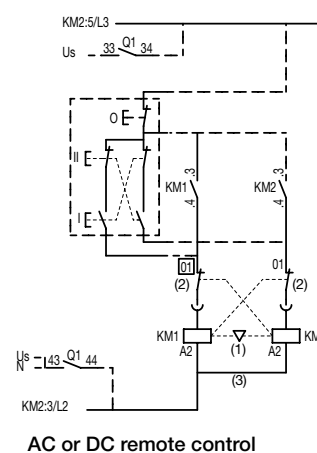
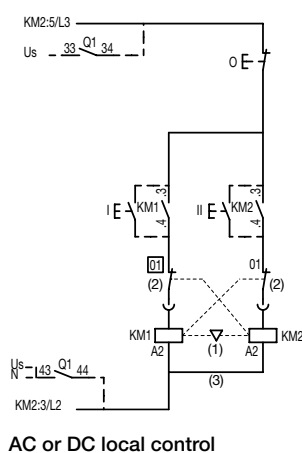
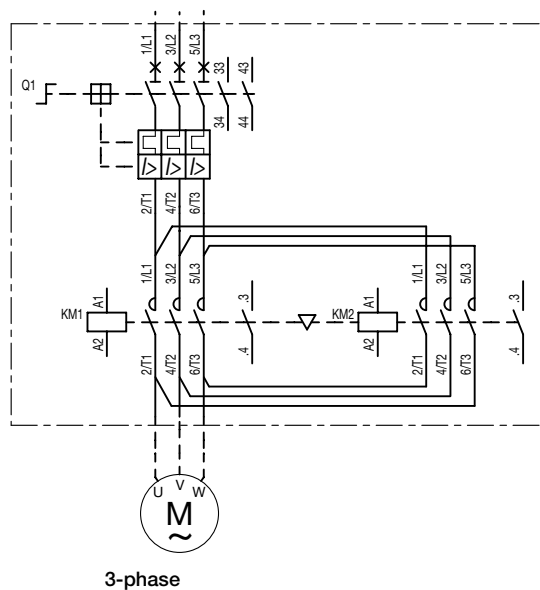
## Main Technical Data

Rated operational voltage $U_o$ , max.	600 V
Rated insulation voltage $U_i$	
according to IEC 60947-4-1	690 V
according to UL/CSA	600 V
Max. starting time	1.5 s
Switching frequency	<ul style="list-style-type: none"> <li>≤ 15 starts/hour - 80 % max. load factor</li> <li>≤ 30 starts/hour - 50 % max. load factor</li> </ul>
Ambient air temperature close to the device	<ul style="list-style-type: none"> <li><b>use with MS116</b> : ≤ 55 °C</li> <li><b>use with MS132</b> : ≤ 60 °C</li> </ul>
Degree of protection	IP 20
Standards	IEC 60947-4-1 / EN 60947-4-1

# Reversing Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form



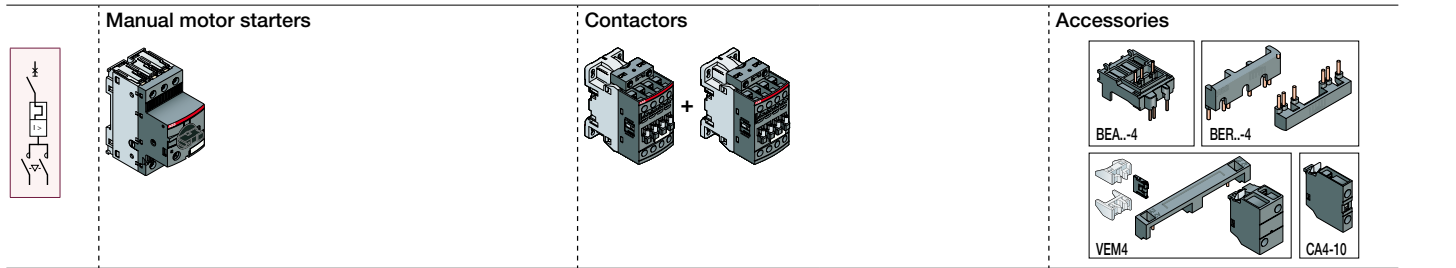
## Wiring Diagrams



VEM4 = VM4 + VE4 with A2-A2 connection  
 (1) (2) (3)



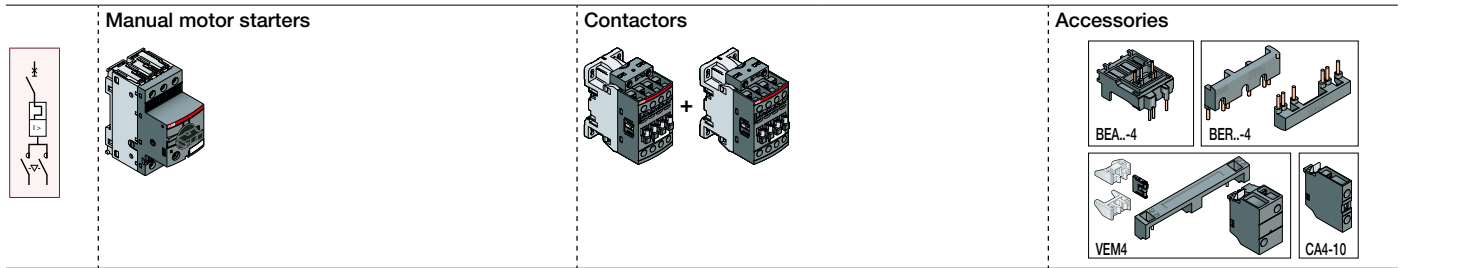
# Reversing Starters Protected by MS132 Manual Motor Starters



HP	Rated power A(3)	Catalog number (1)	Current setting range A	Magnetic tripping current A	Control voltage range U <sub>c</sub> min. ... U <sub>c</sub> max. (2)		Catalog number	Allowed current setting A	Catalog number
					V 50/60Hz	V DC			
1/10	0.2	MS132-0.25	0.16...0.25	2.44	24...60	20...60	AF09-30-10-11	0.25	BEA16-4 + BER16-4 + VEM4
					100...250	100...250	AF09-30-10-13		
1/8	0.3	MS132-0.4	0.25...0.40	3.9	24...60	20...60	AF09-30-10-11	0.4	
					100...250	100...250	AF09-30-10-13		
1/6	0.44	MS132-0.63	0.40...0.63	6.14	24...60	20...60	AF09-30-10-11	0.63	
					100...250	100...250	AF09-30-10-13		
1/4	0.65	MS132-1.0	0.63...1.00	11.5	24...60	20...60	AF09-30-10-11	1	
					100...250	100...250	AF09-30-10-13		
1/3	0.8	MS132-1.0	0.63...1.00	11.5	24...60	20...60	AF09-30-10-11	1	
					100...250	100...250	AF09-30-10-13		
1/2	1.0	MS132-1.6	1.00...1.60	18.4	24...60	20...60	AF09-30-10-11	1.6	
					100...250	100...250	AF09-30-10-13		
3/4	1.4	MS132-1.6	1.00...1.60	18.4	24...60	20...60	AF09-30-10-11	1.6	
					100...250	100...250	AF09-30-10-13		
1	1.8	MS132-2.5	1.60...2.50	29	24...60	20...60	AF09-30-10-11	2.5	
					100...250	100...250	AF09-30-10-13		
1-1/2	2.6	MS132-4.0	2.50...4.00	50	24...60	20...60	AF09-30-10-11	4	
					100...250	100...250	AF09-30-10-13		
2	3.4	MS132-4.0	2.50...4.00	50	24...60	20...60	AF09-30-10-11	4	
					100...250	100...250	AF09-30-10-13		
3	4.8	MS132-6.3	4.00...6.30	79	24...60	20...60	AF09-30-10-11	6.3	
					100...250	100...250	AF09-30-10-13		
5	7.6	MS132-10	6.30...10.0	150	24...60	20...60	AF09-30-10-11	10	
					100...250	100...250	AF09-30-10-13		
7-1/2	11	MS132-12	8.00...12.0	180	24...60	20...60	AF12-30-10-11	12	
					100...250	100...250	AF12-30-10-13		
10	14	MS132-16	10.0...16.0	240	24...60	20...60	AF16-30-10-11	16	
					100...250	100...250	AF16-30-10-13		
15	21	MS132-25	20.0...25.0	375	24...60	20...60	AF26-30-00-11	25	BEA38-4 + BER38-4
					100...250	100...250	AF26-30-00-13		
20	27	MS132-32	25.0...32.0	480	24...60	20...60	AF30-30-00-11	32	VEM4 + 2x CA4-10
					100...250	100...250	AF30-30-00-13		

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:  
- 10 HP at 480 V AC, 18 kA.  
(2) For other control voltages, see "3-pole contactors - Ordering details" pages.  
(3) These values of motor full-load current are to be used as guides only. For motor protection setting, always use those appearing on the motor nameplate.

# Reversing Starters Protected by MS132 Manual Motor Starters



cULus 600 V Rated power HP	Rated current A(3)	Catalog number (1)	Current setting range A	Magnetic tripping current A	Control voltage range U <sub>c</sub> min. ... U <sub>c</sub> max. (2)		Catalog number	List price	Allowed current setting A	Catalog number
					V 50/60Hz	V DC				
1/10	0.2	MS132-0.25	0.16...0.25	2.44	24...60	20...60	AF09-30-10-11		0.25	BEA16-4 + BER16-4 + VEM4
					100...250	100...250	AF09-30-10-13			
1/8	0.3	MS132-0.4	0.25...0.40	3.9	24...60	20...60	AF09-30-10-11		0.4	
					100...250	100...250	AF09-30-10-13			
1/6	0.44	MS132-0.63	0.40...0.63	6.14	24...60	20...60	AF09-30-10-11		0.63	
					100...250	100...250	AF09-30-10-13			
1/4	0.52	MS132-0.63	0.40...0.63	6.14	24...60	20...60	AF09-30-10-11		0.63	
					100...250	100...250	AF09-30-10-13			
1/3	0.64	MS132-1.0	0.63...1.00	11.5	24...60	20...60	AF09-30-10-11		1	
					100...250	100...250	AF09-30-10-13			
1/2	0.9	MS132-1.0	0.63...1.00	11.5	24...60	20...60	AF09-30-10-11		1	
					100...250	100...250	AF09-30-10-13			
3/4	1.3	MS132-1.6	1.00...1.60	18.4	24...60	20...60	AF09-30-10-11		1.6	
					100...250	100...250	AF09-30-10-13			
1	1.7	MS132-2.5	1.60...2.50	29	24...60	20...60	AF09-30-10-11		2.5	
					100...250	100...250	AF09-30-10-13			
1-1/2	2.4	MS132-2.5	1.60...2.50	29	24...60	20...60	AF09-30-10-11		2.5	
					100...250	100...250	AF09-30-10-13			
2	2.7	MS132-4.0	2.50...4.00	50	24...60	20...60	AF09-30-10-11		4	
					100...250	100...250	AF09-30-10-13			
3	3.9	MS132-4.0	2.50...4.00	50	24...60	20...60	AF09-30-10-11		4	
					100...250	100...250	AF09-30-10-13			
5	6.1	MS132-6.3	4.00...6.30	79	24...60	20...60	AF09-30-10-11		6.3	
					100...250	100...250	AF09-30-10-13			
7-1/2	9	MS132-10	6.30...10.0	150	24...60	20...60	AF09-30-10-11		10	
					100...250	100...250	AF09-30-10-13			
10	11	MS132-12	8.00...12.0	180	24...60	20...60	AF12-30-10-11		12	
					100...250	100...250	AF12-30-10-13			
15	17	MS132-20	16.0...20.0	300	24...60	20...60	AF16-30-10-11		20	
					100...250	100...250	AF16-30-10-13			
20	22	MS132-25	20.0...25.0	375	24...60	20...60	AF26-30-00-11		25	BEA38-4 + BER38-4
					100...250	100...250	AF26-30-00-13			
-	27	MS132-32	25.0...32.0	480	24...60	20...60	AF30-30-00-11		32	VEM4 + 2x CA4-10
					100...250	100...250	AF30-30-00-13			

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:  
- 10 HP at 600 V AC, 5 kA.

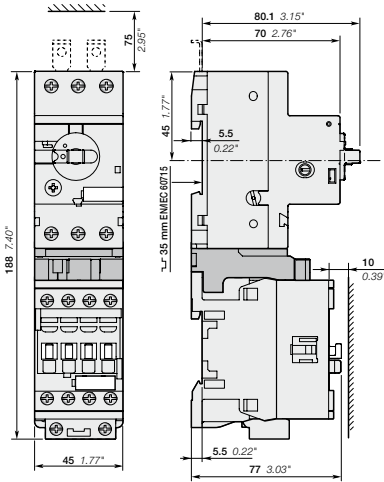
(2) For other control voltages, see "3-pole contactors - Ordering details" pages.

(3) These values of motor full-load current are to be used as guides only. For motor protection setting, always use those appearing on the motor nameplate.

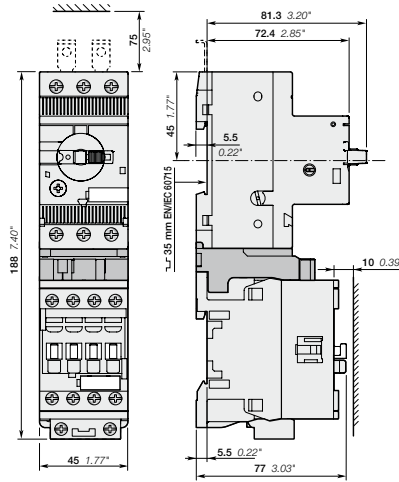
# Direct-On-Line Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form



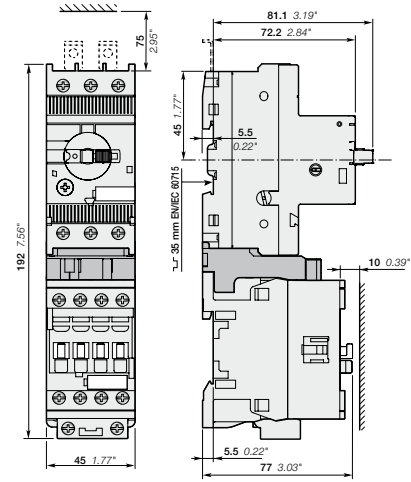
## Dimensions mm, inches



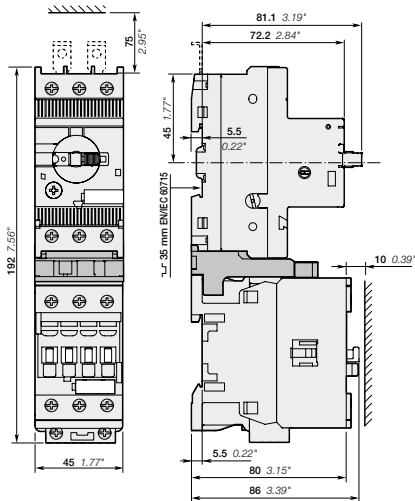
**MS116**  
+ BEA16-4  
+ AF09, AF12, AF16



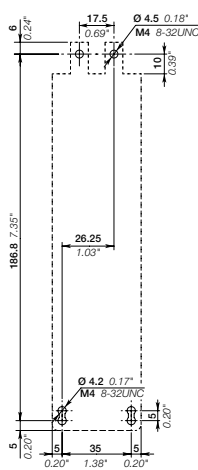
**MS132-0.16 ... MS132-10**  
+ BEA16-4  
+ AF09, AF12, AF16



**MS132-12 ... MS132-32**  
+ BEA16-4  
+ AF09, AF12, AF16



**MS132-12 ... MS132-32**  
+ BEA38-4  
+ AF26, AF30

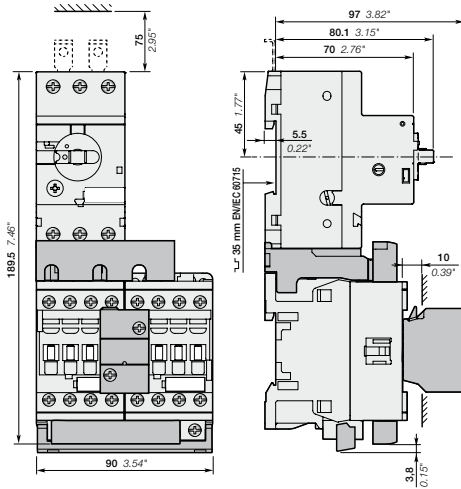


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

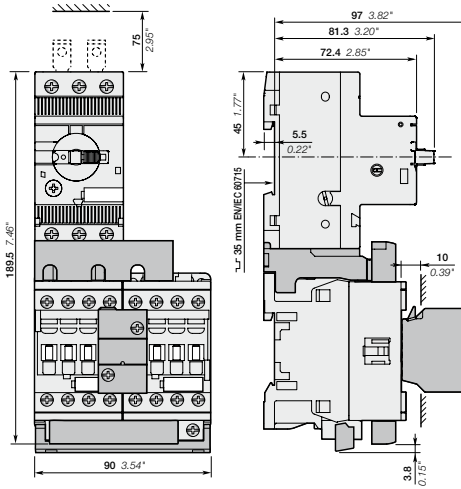
# Reversing Starters Protected by Manual Motor Starters With AF Contactors - Open Type Version in Kit Form



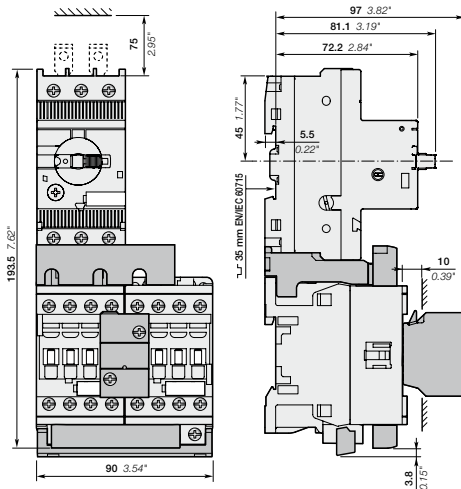
## Dimensions mm, inches



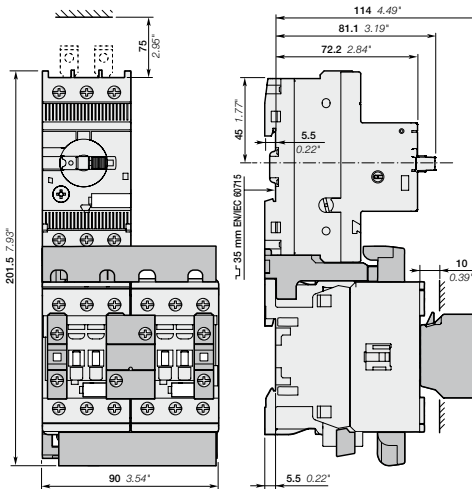
**MS116**  
+ BEA16-4  
+ AF09, AF12, AF16



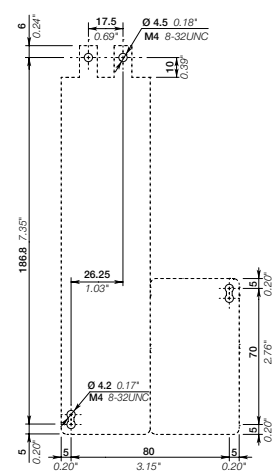
**MS132-0.16 ... MS132-10**  
+ BEA16-4  
+ AF09, AF12, AF16



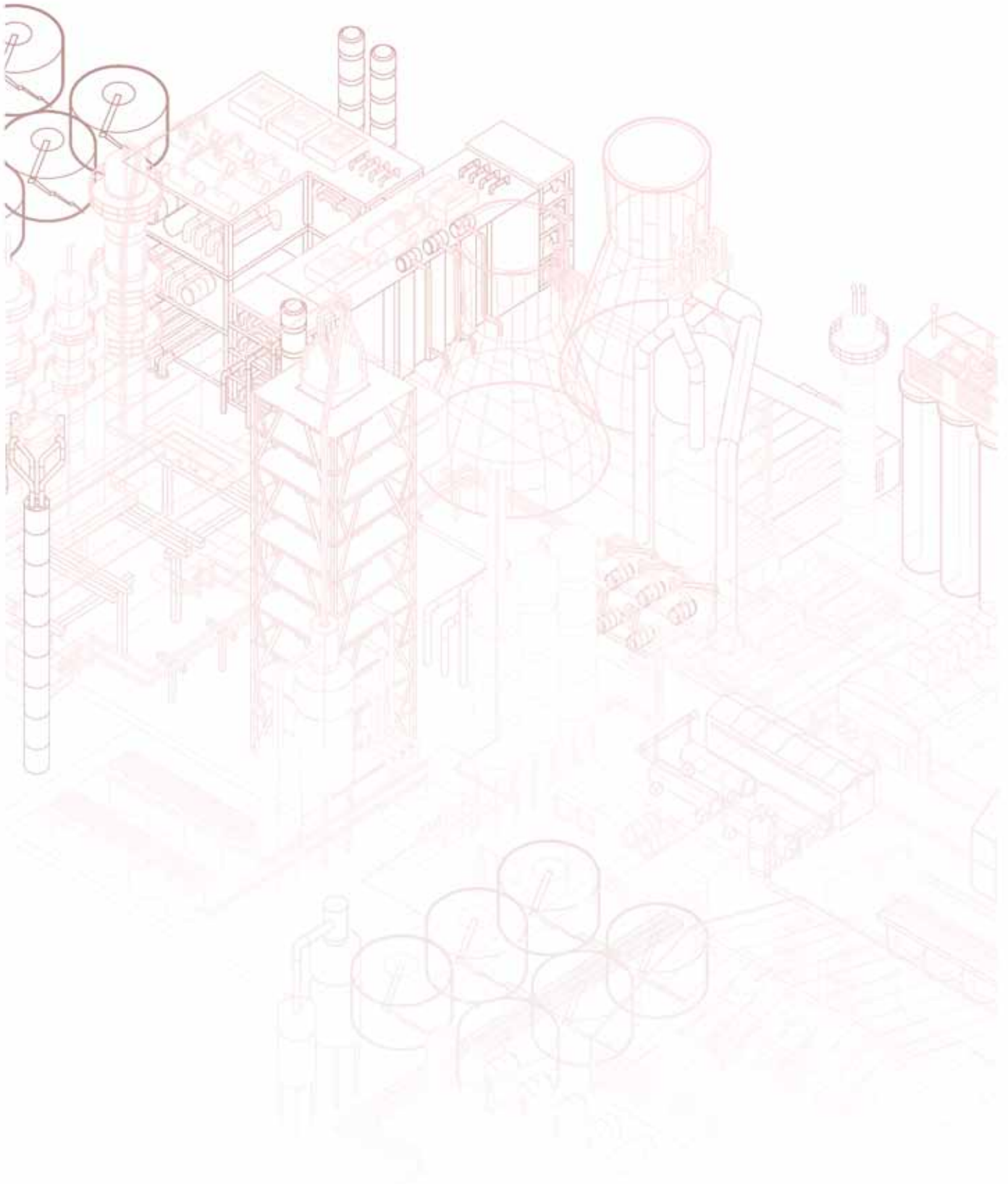
**MS132-12 ... MS132-32**  
+ BEA16-4  
+ AF09, AF12, AF16



**MS132-12 ... MS132-32**  
+ BEA38-4  
+ AF26, AF30



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



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