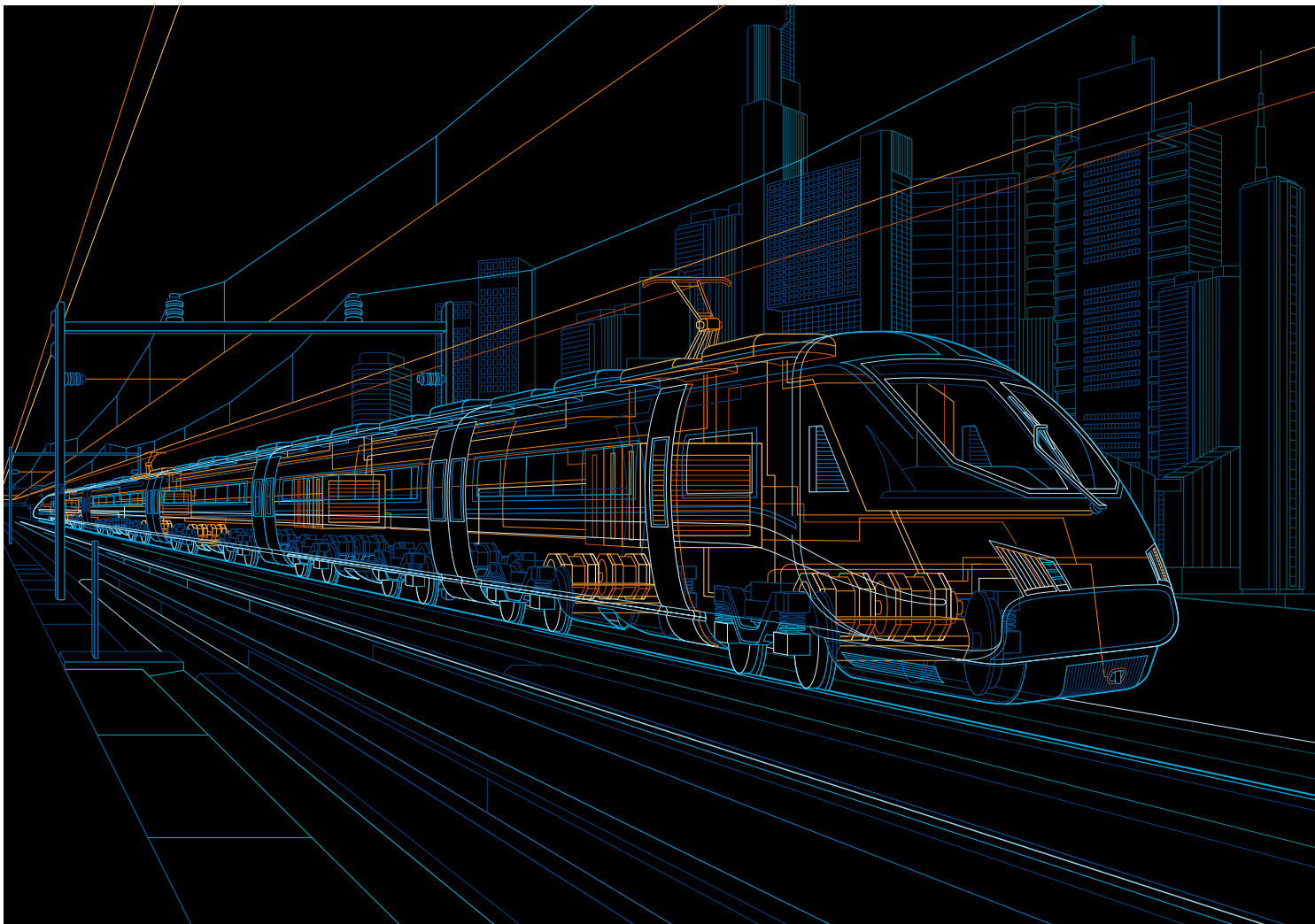




Main catalog

AF..ZB contactors and NFZB contactor relays for rolling stock application

Power and productivity
for a better world™





AF..ZB contactors and NFZB contactor relays

Connection with standard ferrules

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Advantages compared to conventional technology

DC operated contactors

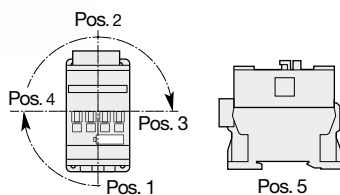
New generation of first-class specialized contactors and contactor relays with real benefits for rolling stock applications

- Compact and modular, decreasing the space required in installations
- Light weight, resulting in less energy by axle
- Specifically designed to meet the latest rolling stock application requirements
- Low coil consumption for energy saving
- Less codes for optimized stocks
- Flexible, with high ratings and service capability.



The AF..ZB contactors can be installed in any environment including passenger or driver cabins, for main or urban line trains, underground trains or trams circulating frequently in tunnels or underground passages. Contactors and contactor relays are used in a wide variety of rolling stock applications including lighting, heating, breaking, air conditioning, ventilation and door control.

Flexible and easy-to-use



- Non-detachable screw connections on all main and auxiliary terminals for standard or ring tongue ferrules for an easy assembly
- Coil connection at the top, bottom or front
- 1-pole auxiliary contact block meeting any contact configuration with only two part numbers (N.O. or N.C. contacts)
- Fixing up to 6 auxiliary contacts regardless of the mounting positions.

Same contactor or contactor relay dimension regardless of the connection type with standard (AF..ZB) or ring tongue (AF..ZB..RT) ferrules.

Improve the compactness of the installations

- Weight reduced by up to 45 %
- Depth reduced by up to 20 %
- Standard 45 mm width modules for both 3-pole and 4-pole contactors
- Side-by-side mounted devices require 15 % less width (without spacing) from -40 °C up to +70 °C.
- There is no need for additional spacing inbetween contactors when electrically or mechanically interlocking.

Turn to the environment with low coil holding consumption reduced up to 68 %

Compliant with RoHS directives

Meet all main rolling stock standards

- Designed in accordance with IEC 60947-4-1, IEC 60947-5-1, IEC 60077 standards and applicable parts of EN 50155 standard
- Withstands shocks and vibrations in compliance with IEC 61373 category 1, class B:
 - functional random vibration tests: 5...150 Hz 1 ms⁻² eff axe / 20 min
 - accelerated random vibration tests: 5...150 Hz 5.70 ms⁻² eff axe / 5 hours
 - shock tests: 5 g 30 ms all axes OX, OY, OZ / 3 shocks per sens.

Reach the highest levels in fire and smoke behavior according to national or european requirements without mounting restriction

French standard: NF F 16-101 / NF F 16-102 category A1 (1)

- weight part > 100 g: severity level 3
- parts close to electrical arc: severity level 4.

Italian standard: UNI CEI 11170, LR4 severity level (1)

- Reaction to fire, ignitability according to EN ISO 11925-2: 30 s
- Smoke class to NF F 16-101: F2 max.

German standard: DIN5510-2

European standard project: CEN/TS 45545 hazard level HL2.

(1) 4-pole AF26/38ZB with standard ferrules, please consult us.

Optimize the number of needed codes

- Electronic coil interface accepting a wide DC control voltage range (0.85 Uc min. ... 1.1 Uc max. acc. to IEC 60947-4-1) including several Uc control voltages used for battery supply (0.7 ... 1.25 Uc according to IEC 60077)
- Only 3 low consumption coil codes to cover all main Uc control voltages
 - 20...60 V DC coil suitable for e.g. 24, 33 and 48 V DC
 - 48...130 V DC coil suitable for e.g. 72, 96 and 110 V DC
 - 100...250 V DC coil suitable for e.g. 220 V DC
- Built-in surge protection: surges and surge suppressors are eliminated.

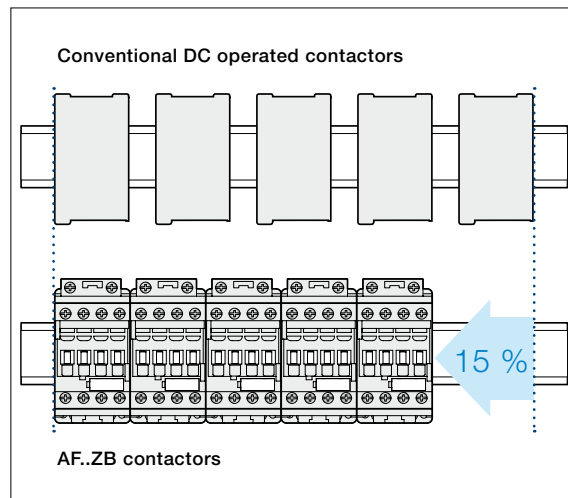


ABB has IRIS certification since 2009 (International Railway Industry Standard certification created by the European Union of railways industry).

ABB manages the manufacturing company and always focuses on optimizing all processes as required by IRIS certification.

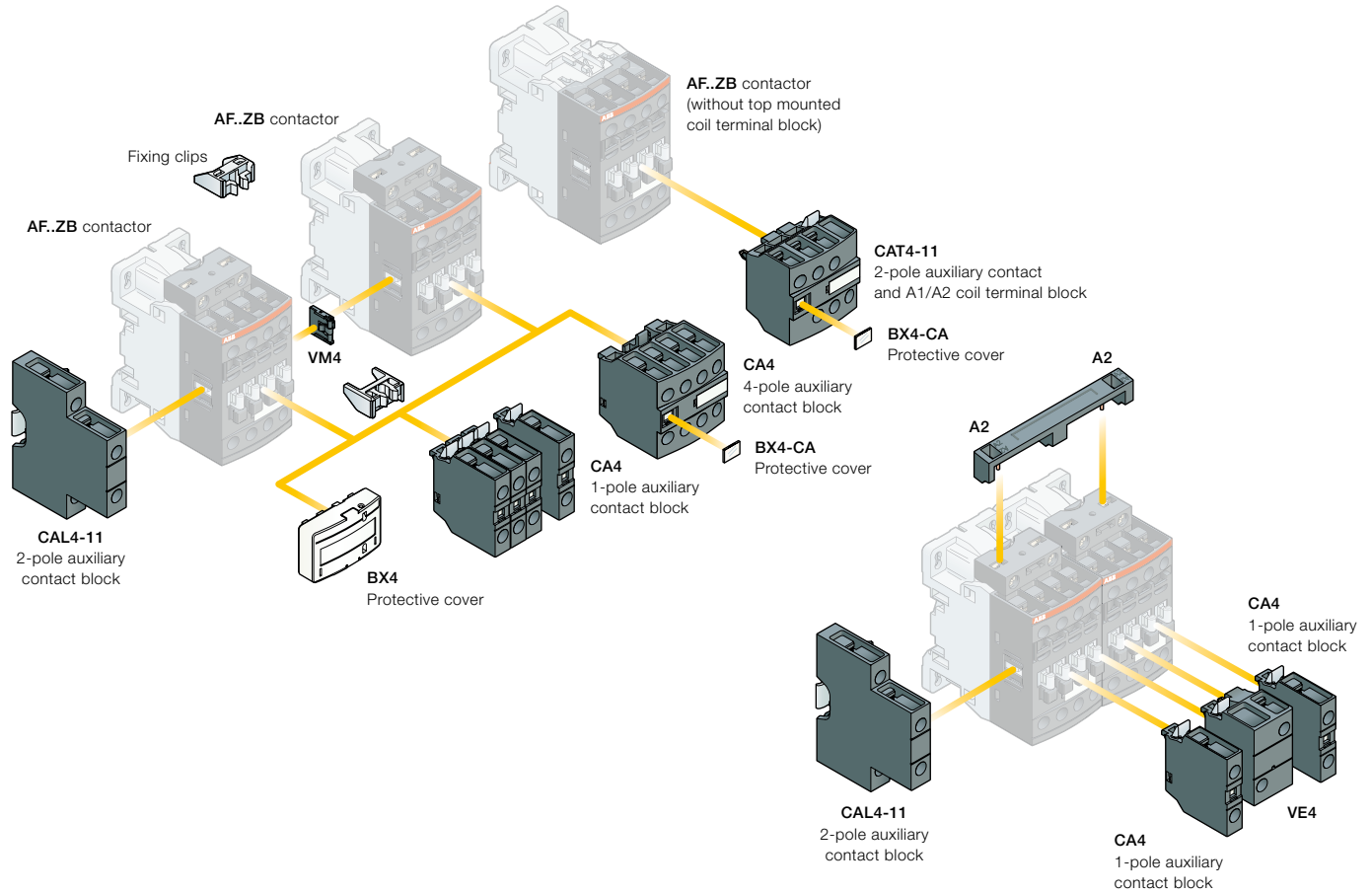


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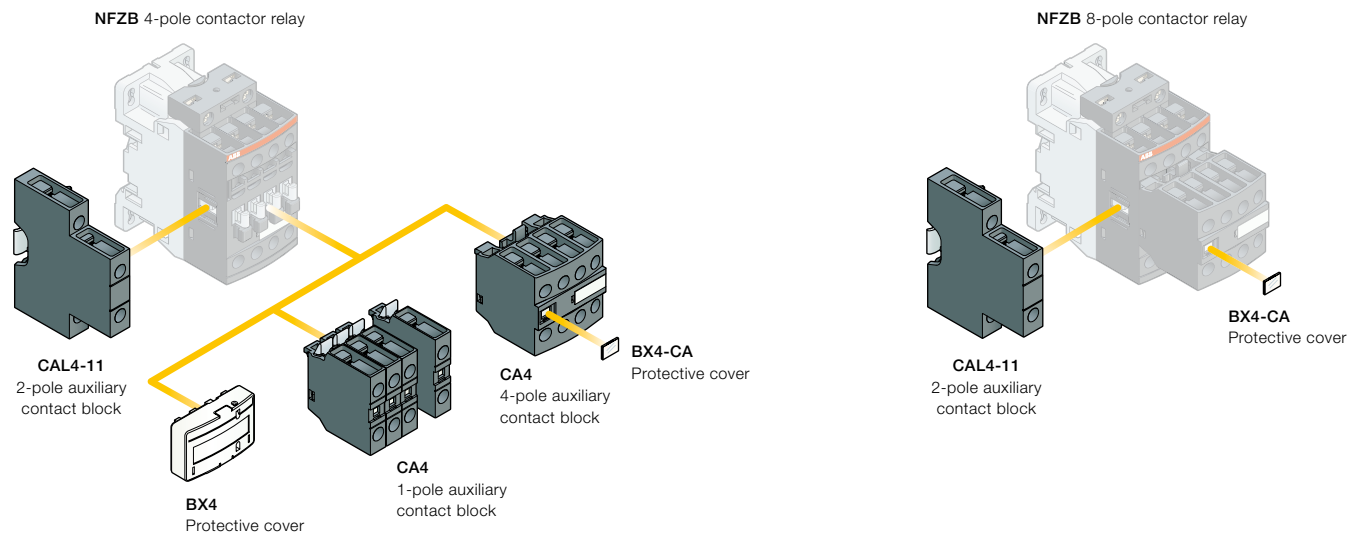
AF..ZB 3 & 4-pole contactors and NFZB contactor relays

Main accessories

Main accessories for AF..ZB 3 & 4-pole contactors



Main accessories for NFZB contactor relays



AF..ZB 3 & 4-pole contactors and NFZB contactor relays

Connection with standard ferrules



AF..ZB 3-pole contactors

IEC	AC-3 Rated operational power	$\theta \leq 60^{\circ}\text{C}$, 400 V	kW	4	5.5	7.5	11	15	18.5
UL/CSA	3-phase motor rating	480 V	hp	—	—	—	—	—	—
DC Control supply			Type	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
IEC	AC-3 Rated operational current	$\theta \leq 60^{\circ}\text{C}$, 400 V	A	9	12	18	26	32	38
	AC-1 Rated operational current	$\theta \leq 40^{\circ}\text{C}$	A	25	28	30	45	50	50
	Ue max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60^{\circ}\text{C}$	A	25	28	30	40	42	42
		$\theta \leq 70^{\circ}\text{C}$	A	22	24	26	32	37	37
With conductor cross sectional area			mm ²	4	6	6	10	10	10
UL/CSA	General use rating	600 V	A	—	—	—	—	—	—
NEMA	NEMA Size			—	—	—	—	—	—



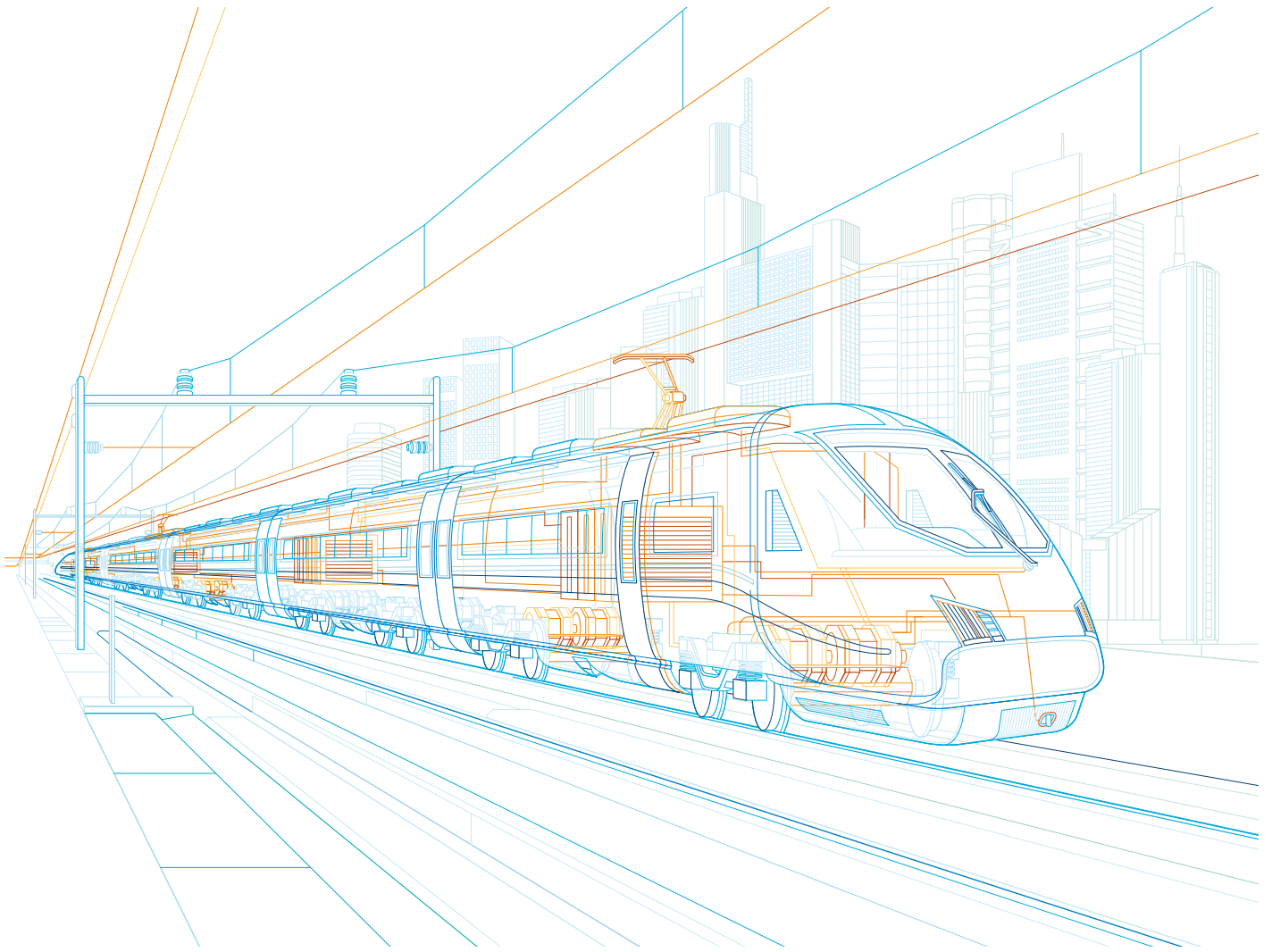
AF..ZB 4-pole contactors

DC Control supply			Type	AF09ZB	AF16ZB	AF26ZB	AF38ZB
IEC	AC-1 Rated operational current Ue max. ≤ 690 V, 50/60 Hz	θ ≤ 40 °C	A	25	30	45	55
		θ ≤ 60 °C	A	25	30	40	45
		θ ≤ 70 °C	A	22	26	32	37
	With conductor cross sectional area		mm²	4	6	10	16
UL/CSA	General use rating	600 V	A	—	—	—	—



NFZB contactor relays

Number of contacts										
DC Control supply 				Type	NFZB22E	NFZB31E	NFZB40E	NFZB44E	NFZB62E	NFZB80E
IEC	AC-15 Rated operational current	240 V	A	4	4	4	4	4	4	4
		400 V	A	3	3	3	3	3	3	3
		690 V	A	2	2	2	2	2	2	2
	DC-13 Rated operational current	24 V	A	6	6	6	6	6	6	6
		250 V	A	0.27	0.27	0.27	0.27	0.27	0.27	0.27
UL/CSA	Pilot Duty			—	—	—	—	—	—	—



AF09ZB ... AF38ZB 3-pole contactors

4 to 18.5 kW

DC operated - connection with standard ferrules



AF09ZB-30-10

1SBC101090F0014



AF26ZB-30-00

1SBC101091R0014

Description

AF09ZB ... AF38ZB 3-pole contactors comply with the latest railway rolling stock standards and allow installation in passengers or driver cabins for trains frequently operating tunnels or undergrounds. They are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with 3 main poles.

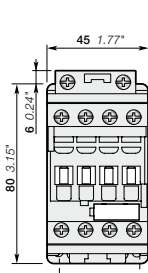
- designed in accordance to IEC 60077 and applicable parts of EN 50155 standard
- shocks and vibration withstand conforming to IEC 61373 (category 1, class B)
- fire and smoke safety compliance to NF F 16-101 / 16-102 (Category A1, severity levels 3 & 4), UNI CEI 11170 (LR4 severity level), DIN 5510-2
- electronic coil interface accepting a wide DC control voltage range (0.85 U_c min. ... 1.1 U_c max. according to IEC 60947-4-1) including several U_c control voltages (0.7 ... 1.25 U_c according to IEC 60077) used for battery supply
- low coil consumption
- built-in surge suppression
- side by side mounting without restriction from -40 °C up to +70 °C
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

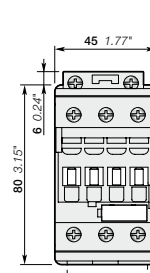
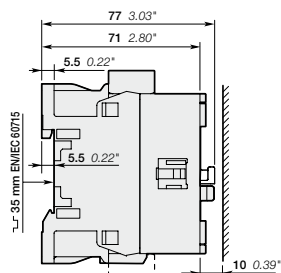
IEC		UL / CSA		Supply	Rated	Auxiliary	Type	Order code	Weight
Rated operational power	current	3-phase motor rating	General use rating	control voltage	control circuit voltage	contacts fitted			Pkg
400 V AC-3	$\theta \leq 40^\circ\text{C}$	480 V	600 V AC	U_c (IEC 60077)	U_c min. ... U_c max. (IEC 60947-4-1)	(1)			(1 pce)
kW	A	hp	A	V DC	V DC				kg
4	25	-	-	24, 33, 48	20...60	1 0	AF09ZB-30-10-21	1SBL136061R2110	0.310
						0 1	AF09ZB-30-01-21	1SBL136061R2101	0.310
				72, 96, 110	48...130	1 0	AF09ZB-30-10-22	1SBL136061R2210	0.310
						0 1	AF09ZB-30-01-22	1SBL136061R2201	0.310
				220	100...250	1 0	AF09ZB-30-10-23	1SBL136061R2310	0.310
5.5	28	-	-	24, 33, 48	20...60	1 0	AF09ZB-30-01-23	1SBL136061R2301	0.310
						0 1	AF12ZB-30-10-21	1SBL156061R2110	0.310
				72, 96, 110	48...130	1 0	AF12ZB-30-01-21	1SBL156061R2101	0.310
						0 1	AF12ZB-30-10-22	1SBL156061R2210	0.310
				220	100...250	1 0	AF12ZB-30-01-22	1SBL156061R2201	0.310
7.5	30	-	-	24, 33, 48	20...60	1 0	AF12ZB-30-10-23	1SBL156061R2310	0.310
						0 1	AF16ZB-30-01-23	1SBL176061R2301	0.310
				72, 96, 110	48...130	1 0	AF16ZB-30-10-21	1SBL176061R2110	0.310
						0 1	AF16ZB-30-01-21	1SBL176061R2101	0.310
				220	100...250	1 0	AF16ZB-30-10-22	1SBL176061R2210	0.310
11	45	-	-	24, 33, 48	20...60	0 0	AF16ZB-30-01-22	1SBL176061R2201	0.310
						0 0	AF16ZB-30-01-23	1SBL176061R2310	0.310
				72, 96, 110	48...130	0 0	AF16ZB-30-00-21	1SBL176061R2100	0.310
						0 0	AF16ZB-30-00-22	1SBL176061R2200	0.310
				220	100...250	0 0	AF16ZB-30-00-23	1SBL176061R2300	0.310
15	50	-	-	24, 33, 48	20...60	0 0	AF26ZB-30-00-21	1SBL236061R2100	0.370
						0 0	AF26ZB-30-00-22	1SBL236061R2200	0.370
				72, 96, 110	48...130	0 0	AF26ZB-30-00-23	1SBL236061R2300	0.370
						0 0	AF30ZB-30-00-21	1SBL276061R2100	0.370
				220	100...250	0 0	AF30ZB-30-00-22	1SBL276061R2200	0.370
18.5	50	-	-	24, 33, 48	20...60	0 0	AF30ZB-30-00-23	1SBL276061R2300	0.370
						0 0	AF38ZB-30-00-21	1SBL296061R2100	0.370
				72, 96, 110	48...130	0 0	AF38ZB-30-00-22	1SBL296061R2200	0.370
				220	100...250	0 0	AF38ZB-30-00-23	1SBL296061R2300	0.370

(1) Other control voltages, see voltage code table.

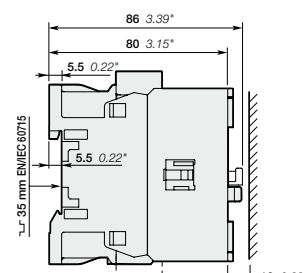
Main dimensions mm, inches



AF09ZB, AF12ZB, AF16ZB



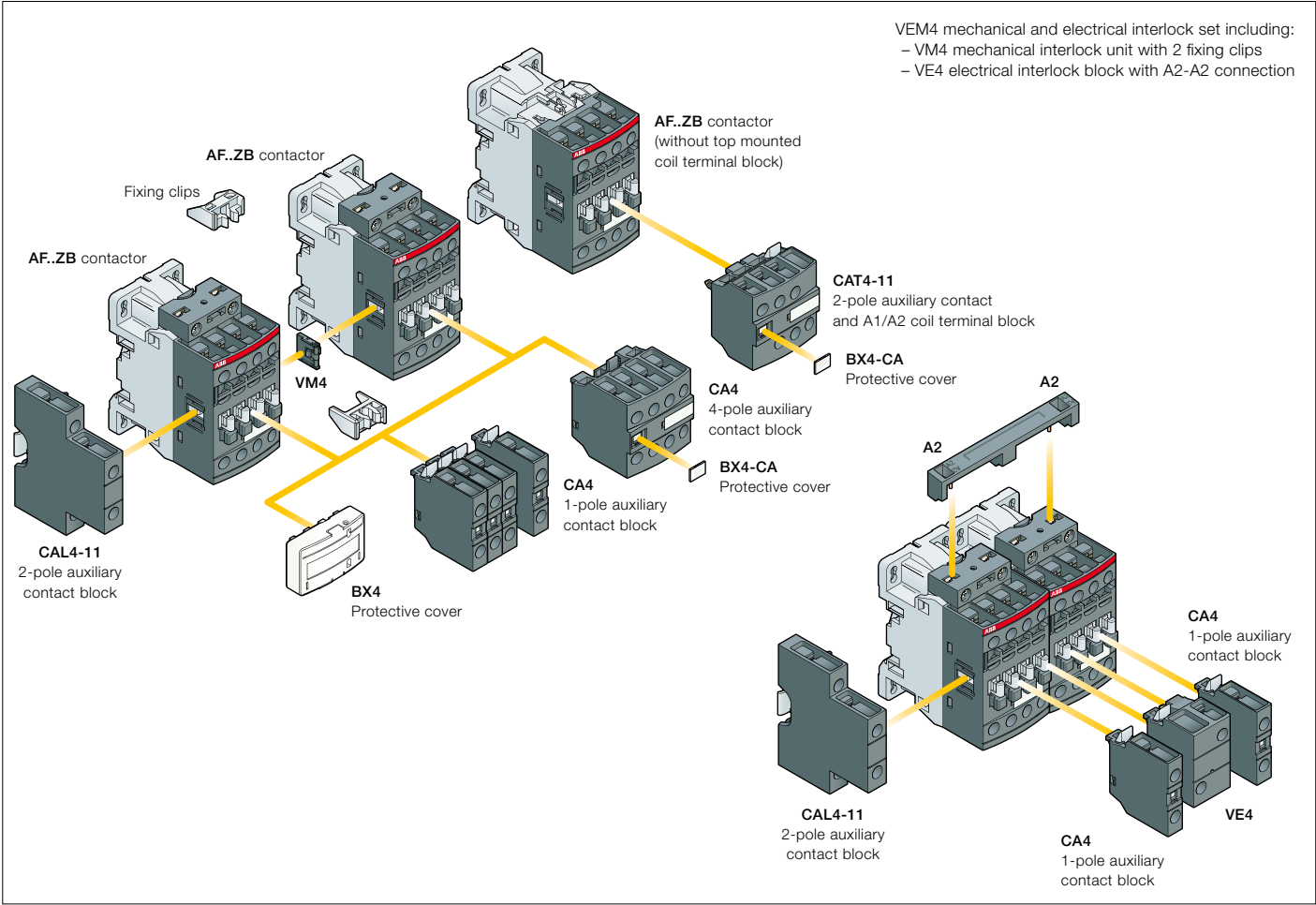
AF26ZB, AF30ZB, AF38ZB



AF09ZB ... AF38ZB 3-pole contactors

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles		Built-in auxiliary contacts		Front-mounted accessories						Side-mounted accessories	
					Auxiliary contact blocks				Electrical and mechanical interlock set		Auxiliary contact blocks	
									(between 2 contactors)			
					1-pole CA4 2-pole CAT4-11 4-pole CA4 VEM4						Left side Right side	
2-pole CAL4-11												
Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on position 5												
AF09ZB ... AF16ZB	3	0	0	1	4 max.	or 1	or 1	–	–	+	1	–
AF09ZB ... AF16ZB	3	0	1	0	2 max.	or 1	–	–	–	+	1	+ 1
AF26ZB ... AF38ZB	3	0	0	0	3 max.	–	–	+	1	+	1	or 1

AF09ZB ... AF38ZB 3-pole contactors

Main accessories

Connection with standard ferrules



CA4-10-T



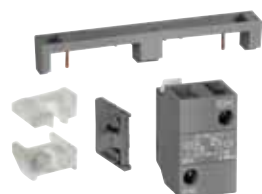
CA4-22M



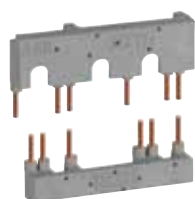
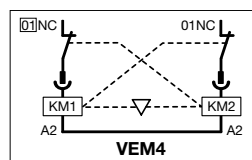
CAL4-11-T



CAT4-11E



VEM4



BER16-4



LDC4



BX4



BX4-CA



BP38-4

Ordering details (1)

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

Front-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 0	- -	CA4-10-T	1SBN010110T1010	10	0.014
	0 1	- -	CA4-01-T	1SBN010110T1001	10	0.014
AF09ZB ... AF16ZB-30-10	2 2	- -	CA4-22M	1SBN010140R1122	1	0.055
	3 1	- -	CA4-31M	1SBN010140R1131	1	0.055
	1 3	- -	CA4-13M	1SBN010140R1113	1	0.055
	0 4	- -	CA4-04M	1SBN010140R1104	1	0.055
AF26ZB ... AF38ZB-30-00	2 2	- -	CA4-22E	1SBN010140R1022	1	0.055
	3 1	- -	CA4-31E	1SBN010140R1031	1	0.055
	4 0	- -	CA4-40E	1SBN010140R1040	1	0.055
	0 4	- -	CA4-04E	1SBN010140R1004	1	0.055
AF09ZB ... AF16ZB-30-01	2 2	- -	CA4-22U	1SBN010140R1322	1	0.055
	3 1	- -	CA4-31U	1SBN010140R1331	1	0.055
	4 0	- -	CA4-40U	1SBN010140R1340	1	0.055

Side-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 1	- -	CAL4-11-T	1SBN010120T1011	10	0.040
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Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09ZB ... AF16ZB-30-10	1 1	- -	CAT4-11M	1SBN010151R1111	1	0.040
AF26ZB ... AF38ZB-30-00	1 1	- -	CAT4-11E	1SBN010151R1011	1	0.040
AF09ZB ... AF16ZB-30-01	1 1	- -	CAT4-11U	1SBN010151R1311	1	0.040

Mechanical interlock unit

AF09ZB ... AF38ZB		VM4	1SBN030105T1000	10	0.005
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Note: VM4 includes 2 fixing clips (BB4) to maintain together both contactors.

Mechanical and electrical interlock set

AF09ZB ... AF16ZB	0 2	- -	VEM4	1SBN030111R1000	1	0.035
AF26ZB ... AF38ZB						

Note: VEM4 includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block.
VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

Connection sets for reversing contactors

AF09ZB ... AF16ZB	BER16-4	1SBN081311R1000	1	0.045
AF26ZB ... AF38ZB	BER38-4	1SBN082311R1000	1	0.100

Additional coil terminal block

AF09ZB ... AF38ZB	LDC4	1SBN070156T1000	10	0.010
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Protective covers

All 1-stack contactors	BX4	1SBN110108T1000	10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA	1SBN110109W1000	50	0.001

Mounting piece

AF09ZB ... AF38ZB	BP38-4	1SBN112303T1000	10	0.003
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(1) For more information, refer to "Accessories" section.

AF09ZB ... AF38ZB 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Fire and smoke		IEC 60077-1, IEC 60077-2, EN 50155 (applicable parts)					
Rated operational voltage U _e max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free-air thermal current I _{th}							
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ °C}$		35 A	35 A	35 A	50 A	50 A	50 A
With conductor cross-sectional area		6 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²
AC-1 Utilization category							
For air temperature close to contactor							
I _e / Rated operational current AC-1	$\theta \leq 40\text{ °C}$	25 A	28 A	30 A	45 A	50 A	50 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60\text{ °C}$	25 A	28 A	30 A	40 A	42 A	42 A
	$\theta \leq 70\text{ °C}$	22 A	24 A	26 A	32 A	37 A	37 A
With conductor cross-sectional area		4 mm ²	6 mm ²	6 mm ²	10 mm ²	10 mm ²	10 mm ²
AC-3 Utilization category							
For air temperature close to contactor $\theta \leq 60\text{ °C}$							
I _e / Max. rated operational current AC-3 (1)							
	220-230-240 V	9 A	12 A	18 A	26 A	33 A	40 A
	380-400 V	9 A	12 A	18 A	26 A	32 A	38 A
	415 V	9 A	12 A	18 A	26 A	32 A	38 A
	440 V	9 A	12 A	18 A	26 A	32 A	38 A
	500 V	9.5 A	12.5 A	15 A	23 A	28 A	33 A
	690 V	7 A	9 A	10.5 A	17 A	21 A	24 A
Rated operational power AC-3 (1)							
	220-230-240 V	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW
	380-400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
	415 V	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW
	440 V	4 kW	5.5 kW	9 kW	15 kW	18.5 kW	22 kW
	500 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
	690 V	5.5 kW	7.5 kW	9 kW	15 kW	18.5 kW	22 kW
Rated making capacity AC-3		10 x I _e AC-3 acc. to IEC 60947-4-1					
Rated breaking capacity AC-3		8 x I _e AC-3 acc. to IEC 60947-4-1					
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded (2)							
U _e $\leq 500\text{ V AC}$ - gG type fuse		25 A	32 A	32 A	50 A	63 A	63 A
Rated short-time withstand current I _{cw}	1 s	300 A	300 A	300 A	700 A	700 A	700 A
at 40 °C ambient temperature,	10 s	150 A	150 A	150 A	350 A	350 A	350 A
in free air from a cold state	30 s	80 A	80 A	80 A	225 A	225 A	225 A
	1 min	60 A	60 A	60 A	150 A	150 A	150 A
	15 min	35 A	35 A	35 A	50 A	50 A	50 A
Maximum breaking capacity							
cos $\varphi = 0.45$	at 440 V	250 A	250 A	250 A	500 A	500 A	500 A
	at 690 V	106 A	106 A	106 A	200 A	200 A	200 A
Power dissipation per pole	I _e / AC-1	0.8 W	1 W	1.2 W	1.8 W	2.4 W	2.4 W
	I _e / AC-3	0.1 W	0.2 W	0.35 W	0.6 W	0.9 W	1.3 W
Max. electrical switching frequency	AC-1	600 cycles/h					
	AC-3	1200 cycles/h					
	AC-2, AC-4	300 cycles/h				150 cycles/h	

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

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

AF09ZB ... AF38ZB 3-pole contactors

Technical data

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

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Standards							
Maximum operational voltage							
NEMA size							
NEMA continuous amp rating	Thermal current						
NEMA maximum horse power ratings							
1-phase, 60 Hz	115 V AC						
	230 V AC						
NEMA maximum horse power ratings							
3-phase, 60 Hz	200 V AC						
	230 V AC						
	460 V AC						
	575 V AC						
UL / CSA general use rating							
600 V AC							
With conductor cross-sectional area							
UL / CSA maximum 1-phase motor rating							
Full load current	120 V AC						
	240 V AC						
Horse power rating	120 V AC						
	240 V AC						
UL / CSA maximum 3-phase motor rating							
Full load current	200-208 V AC						
	220-240 V AC						
	440-480 V AC						
	550-600 V AC						
Horse power rating	200-208 V AC						
	220-240 V AC						
	440-480 V AC						
	550-600 V AC						
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded							
Fuse rating							
Fuse type, 600 V							
Maximum electrical switching frequency							
For general use							
For motor use							

AF09ZB ... AF38ZB 3-pole contactors

Technical data

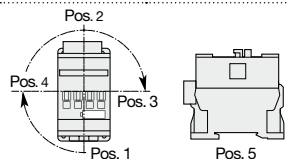
General technical data

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Rated insulation voltage U_i acc. to IEC 60947-4-1 acc. to UL / CSA		690 V					
Rated impulse withstand voltage U_{imp}		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A EN 50121-3-2					
Ambient air temperature close to contactor							
Operation	Fitted with thermal overload relay	-20...+60 °C					
	Without thermal overload relay	-40...+70 °C					
Storage		-60...+80 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability							
Number of operating cycles		10 millions operating cycles					
Maximum switching frequency		3600 cycles/h					
Shock and vibration withstand acc. to IEC 61373		Category 1, class B					

Magnet system characteristics

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Coil operating limits acc. to IEC 60947-4-1							
DC control voltage							
Rated control circuit voltage U_c		20 ... 250 V DC					
Coil consumption	Average pull-in value	(AF..Z) 12 ... 16 W					
	Average holding value	(AF..Z) 1.7 W					
PLC-output control		(AF..Z) ≥ 500 mA 24 V DC					
Drop-out voltage		≤ 60 % of U_c min.					
Operating time							
Between coil energization and:	N.O. contact closing	40...95 ms					
	N.C. contact opening	38...90 ms					
Between coil de-energization and:	N.O. contact opening	11...95 ms					
	N.C. contact closing	13...98 ms					

Mounting characteristics and conditions for use

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Mounting positions							
		Max. N.C. built-in add add-on N.C. auxiliary contacts : see accessory fitting details for a 3-pole contactor AF09ZB ... AF38ZB					
Mounting distances		The contactors can be assembled side by side					
Fixing							
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

AF09ZB ... AF38ZB 3-pole contactors

Technical data

Connecting characteristics

Contactors types		DC operated	AF09ZB	AF12ZB	AF16ZB	AF26ZB	AF30ZB	AF38ZB
Main terminals			 Screw terminals with cable clamp					
Connection capacity (min. ... max.)								
Main conductors (poles)								
	Rigid	Solid ($\leq 4 \text{ mm}^2$)	1 x	1...6 mm ²			2.5...10 mm ²	
		Stranded ($\geq 6 \text{ mm}^2$)		1...6 mm ²			2.5...10 mm ²	
	Flexible with non insulated ferrule		1 x	0.75...6 mm ²			1.5...10 mm ²	
			2 x	0.75...6 mm ²			1.5...10 mm ²	
	Flexible with insulated ferrule		1 x	0.75...4 mm ²			1.5...10 mm ²	
			2 x	0.75...2.5 mm ²			1.5...4 mm ²	
	Bars or lugs		L <	9.6 mm			12.5 mm	
Connection capacity acc. to UL/CSA			1 or 2 x					
Stripping length			10 mm			14 mm		
Tightening torque			1.5 Nm			2.5 Nm		
Auxiliary conductors								
(built-in auxiliary terminals + coil terminals)								
	Rigid solid		1 x	1...2.5 mm ²				
			2 x	1...2.5 mm ²				
	Flexible with non insulated ferrule		1 x	0.75...2.5 mm ²				
			2 x	0.75...2.5 mm ²				
	Flexible with insulated ferrule		1 x	0.75...2.5 mm ²				
			2 x	0.75...1.5 mm ²				
	Lugs		L <	8 mm				
Connection capacity acc. to UL/CSA			1 or 2 x					
Stripping length			10 mm					
Tightening torque								
Coil terminals			1.2 Nm					
Built-in auxiliary terminals			1.2 Nm					
Degree of protection								
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529								
Main terminals			IP20					
Coil terminals			IP20					
Built-in auxiliary terminals			IP20					
Screw terminals			Delivered in open position, screws of unused terminals must be tightened					
Main terminals			M3.5			M4		
Screwdriver type			Flat Ø 5.5 / Pozidriv 2			Flat Ø 6.5 / Pozidriv 2		
Coil terminals			M3.5					
Screwdriver type			Flat Ø 5.5 / Pozidriv 2					
Built-in auxiliary terminals			M3.5					
Screwdriver type			Flat Ø 5.5 / Pozidriv 2					

AF09ZB ... AF38ZB 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB
Rated operational voltage U _e max.		690 V		
Rated frequency (without derating)		50 / 60 Hz		
Conventional free air thermal current I _{th} - θ ≤ 40 °C		16 A		
I _e / Rated operational current AC-15				
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A		
	220-240 V 50/60 Hz	4 A		
	400-440 V 50/60 Hz	3 A		
	500 V 50/60 Hz	2 A		
	690 V 50/60 Hz	2 A		
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		
I _e / Rated operational current DC-13				
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W		
	48 V DC	2.8 A / 134 W		
	72 V DC	1 A / 72 W		
	110 V DC	0.55 A / 60 W		
	125 V DC	0.55 A / 69 W		
	220 V DC	0.27 A / 60 W		
	250 V DC	0.27 A / 68 W		
	400 V DC	0.15 A / 60 W		
	500 V DC	0.13 A / 65 W		
	600 V DC	0.1 A / 60 W		
Short-circuit protection device gG type fuse		10 A		
Rated short-time withstand current I _{cw}	for 1.0 s	100 A		
	for 0.1 s	140 A		
Minimum switching capacity		12 V / 3 mA		
with failure rate acc. to IEC 60947-5-4		10 ⁻⁷		
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms		
Power dissipation per pole at 6 A		0.1 W		
Maximum electrical switching frequency	AC-15	1200 cycles/h		
	DC-13	900 cycles/h		
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts.		
acc. to annex L of IEC 60947-5-1				
Mirror contacts		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts.		
acc. to annex F of IEC 60947-4-1				

Built-in auxiliary contacts according to UL / CSA

Contactor types	DC operated	AF09ZB	AF12ZB	AF16ZB
Maximum operational voltage				
Pilot duty				
AC thermal rated current				
AC maximum volt-ampere making				
AC maximum volt-ampere breaking				
DC thermal rated current				
DC maximum volt-ampere making-breaking				

AF09ZB ... AF38ZB contactors

DC circuit switching

General

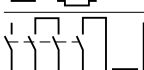
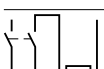
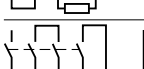
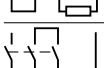
The arc switching on DC is more difficult than on AC.

- 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 $-25...+70$ °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	4-pole	AF30	AF38	4-pole
	3 or 4-pole			3-pole		3-pole	3-pole	
Utilization category DC-1, L/R ≤ 1 ms								
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	10 A	15 A	20 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	220 V	10 A	15 A	20 A	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	≤ 72 V	25 A	-	30 A	-	45 A	-	55 A
	110 V	25 A	-	30 A	-	45 A	-	55 A
	220 V	25 A	-	30 A	-	45 A	-	55 A
	440 V	10 A	-	20 A	-	-	-	-
Utilization category DC-3, L/R ≤ 2 ms								
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	50 A
	110 V	6 A	7 A	8 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 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	-	-	-	-
	≤ 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
	≤ 72 V	25 A	-	30 A	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-
	220 V	25 A	-	30 A	-	-	-	-
	440 V	6 A	-	8 A	-	-	-	-
Utilization category DC-5, L/R ≤ 7.5 ms								
	≤ 72 V	9 A	12 A	16 A	20 A	-	25 A	25 A
	110 V	4 A	4 A	4 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 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	-	-	-	-
	≤ 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
	≤ 72 V	25 A	-	30 A	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-
	220 V	10 A	-	20 A	-	-	-	-
	440 V	4 A	-	4 A	-	-	-	-

AF09ZB ... AF38ZB 3-pole contactors

Electrical durability and utilization categories

General

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

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

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

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

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

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

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

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

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

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

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

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

Case of uninterrupted duty

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

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

AF09ZB ... AF38ZB 3-pole contactors

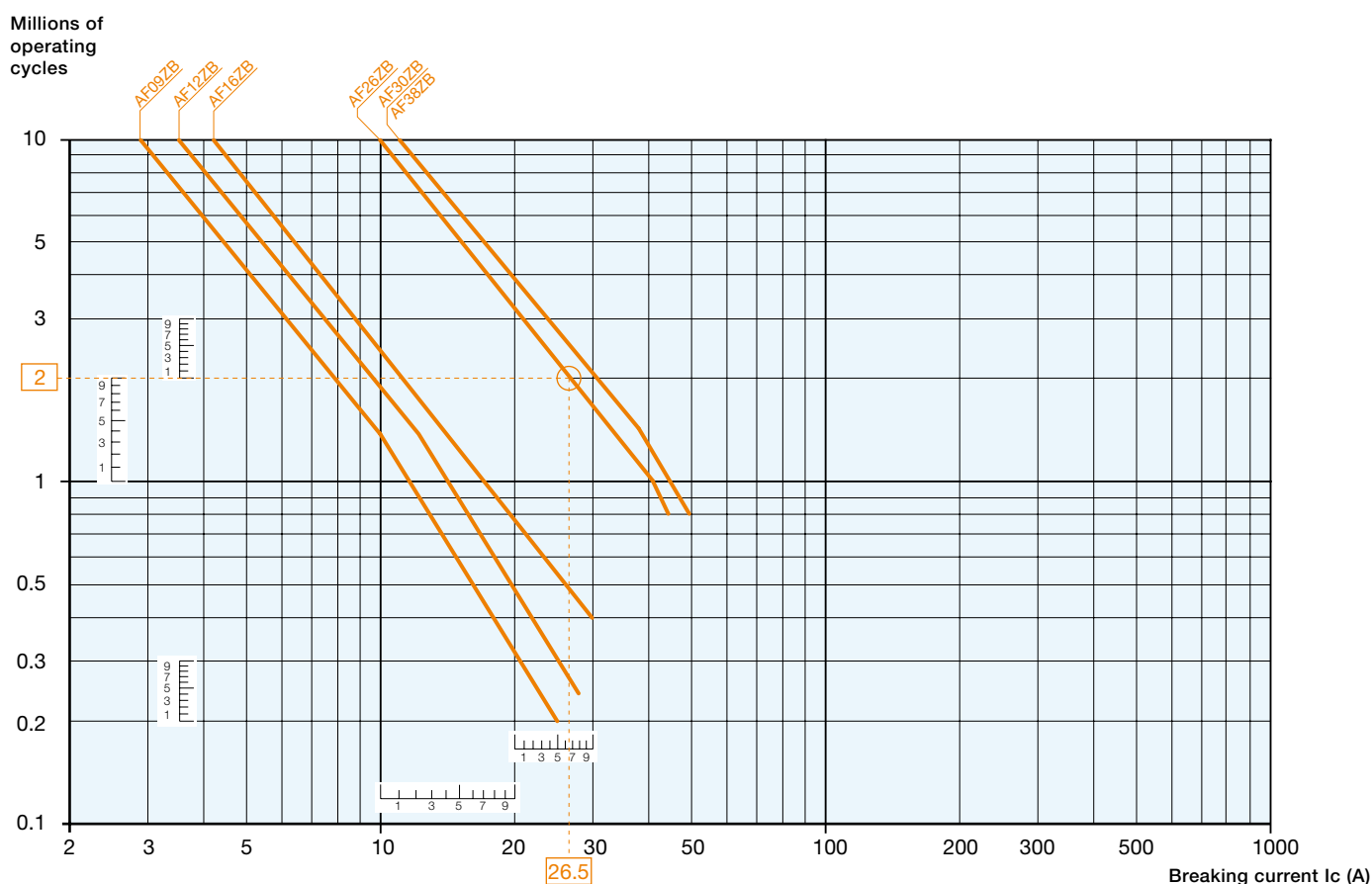
Electrical durability

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

Ambient temperature $\leq 60 \text{ °C}$

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".



Example:

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

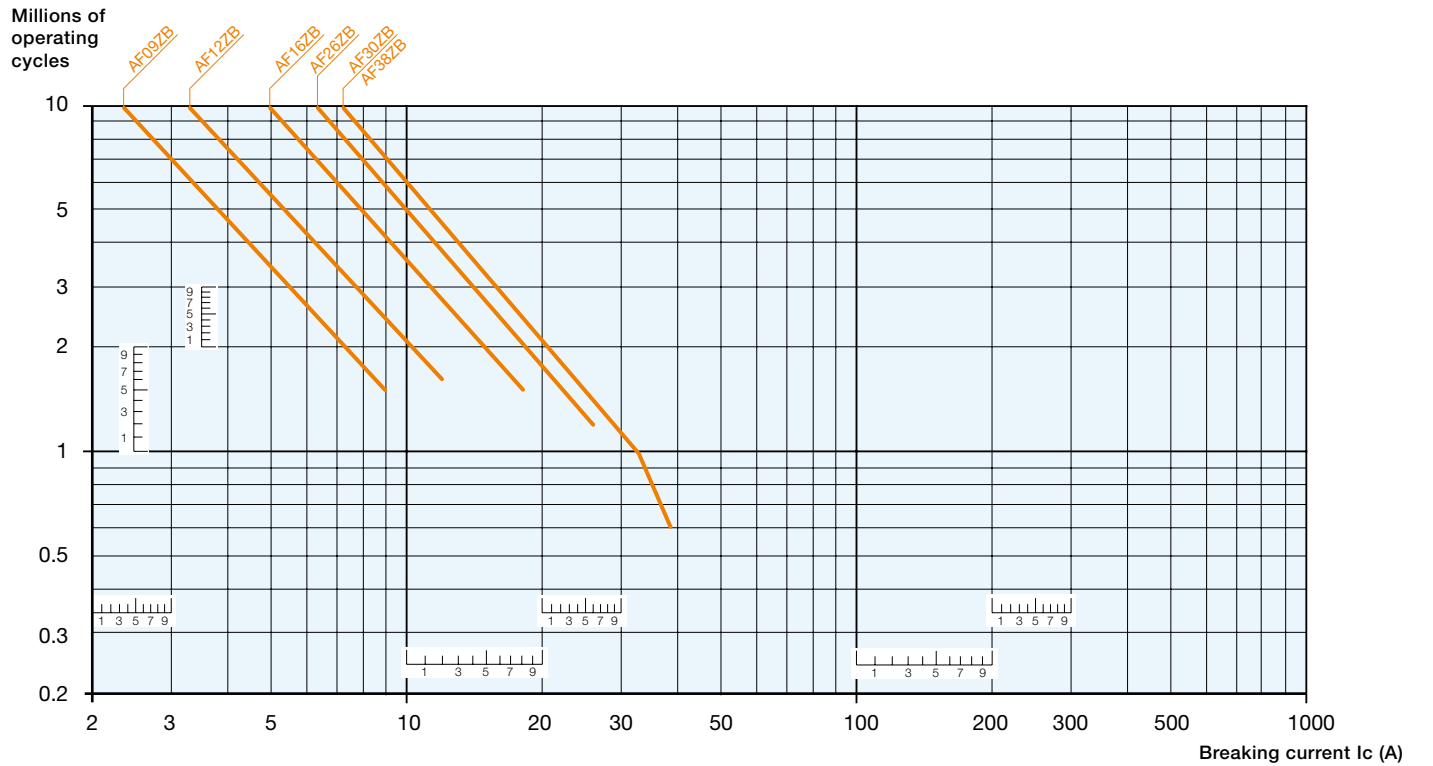
Using the AC-1 curves above select the AF26ZB contactor at intersection "○" (26.5 A / 2 millions operating cycles).

AF09ZB ... AF38ZB 3-pole contactors

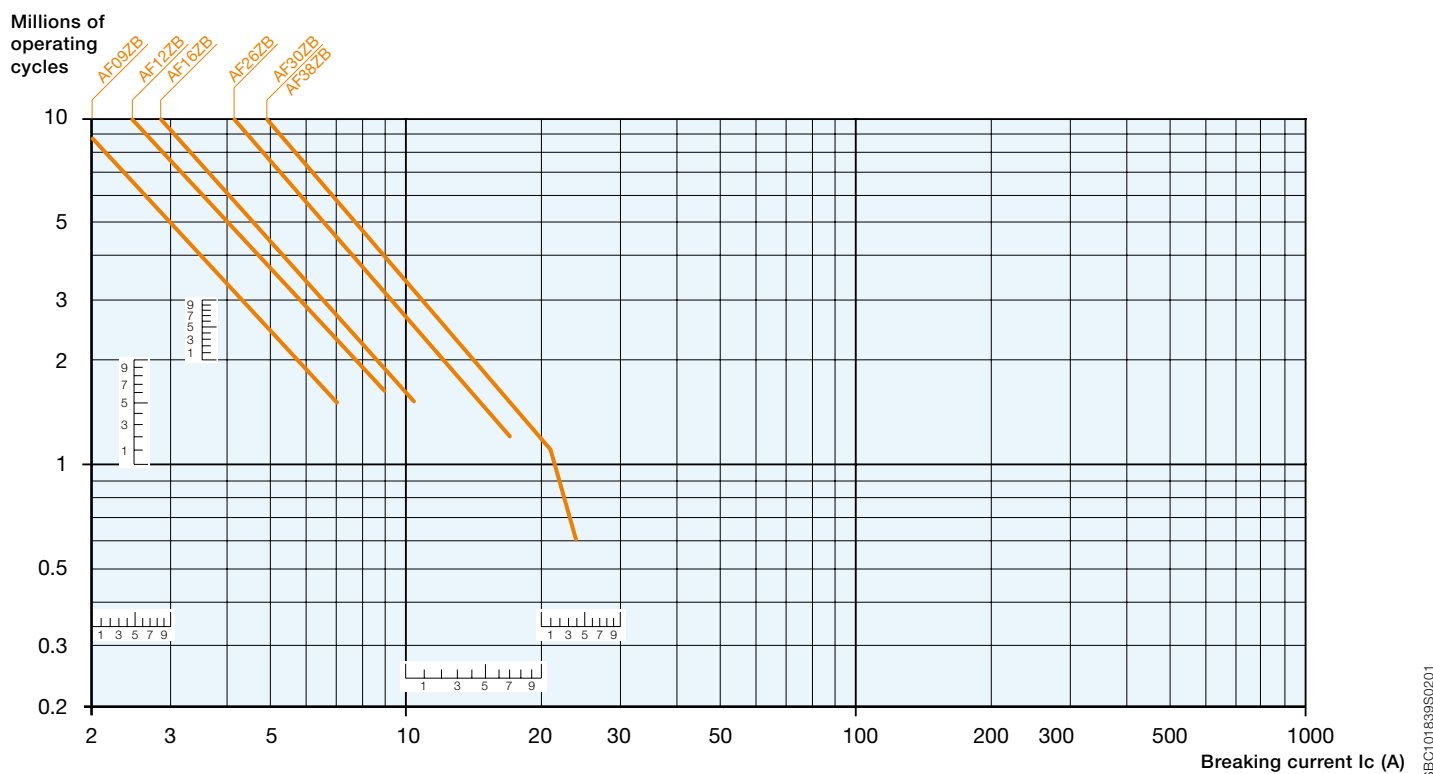
Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440\text{ V}$. Ambient temperature $\leq 60\text{ }^\circ\text{C}$

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-3 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$. Ambient temperature $\leq 60\text{ }^\circ\text{C}$



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AF09ZB ... AF38ZB 3-pole contactors

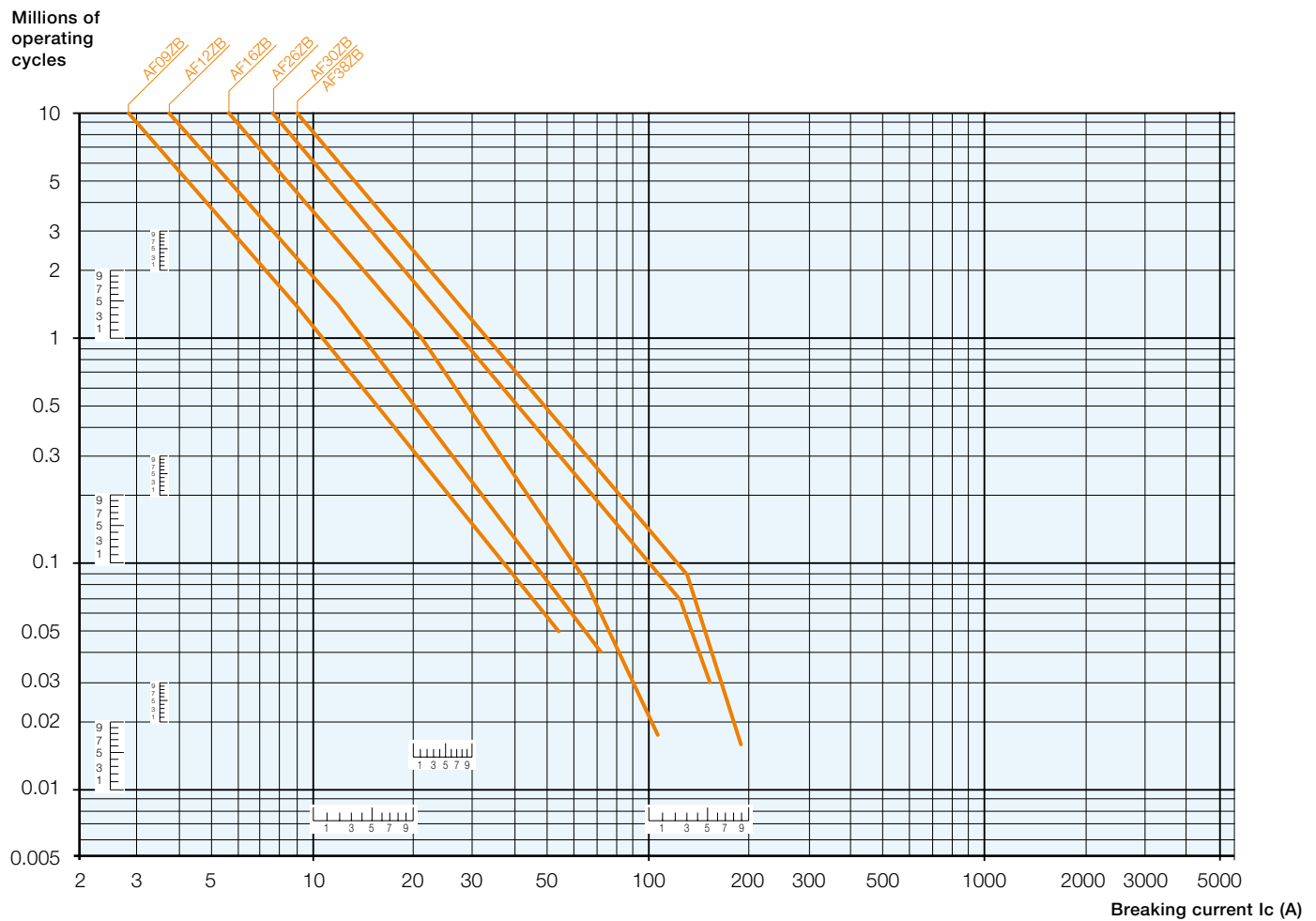
Electrical durability

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

Ambient temperature $\leq 60\text{ °C}$

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".



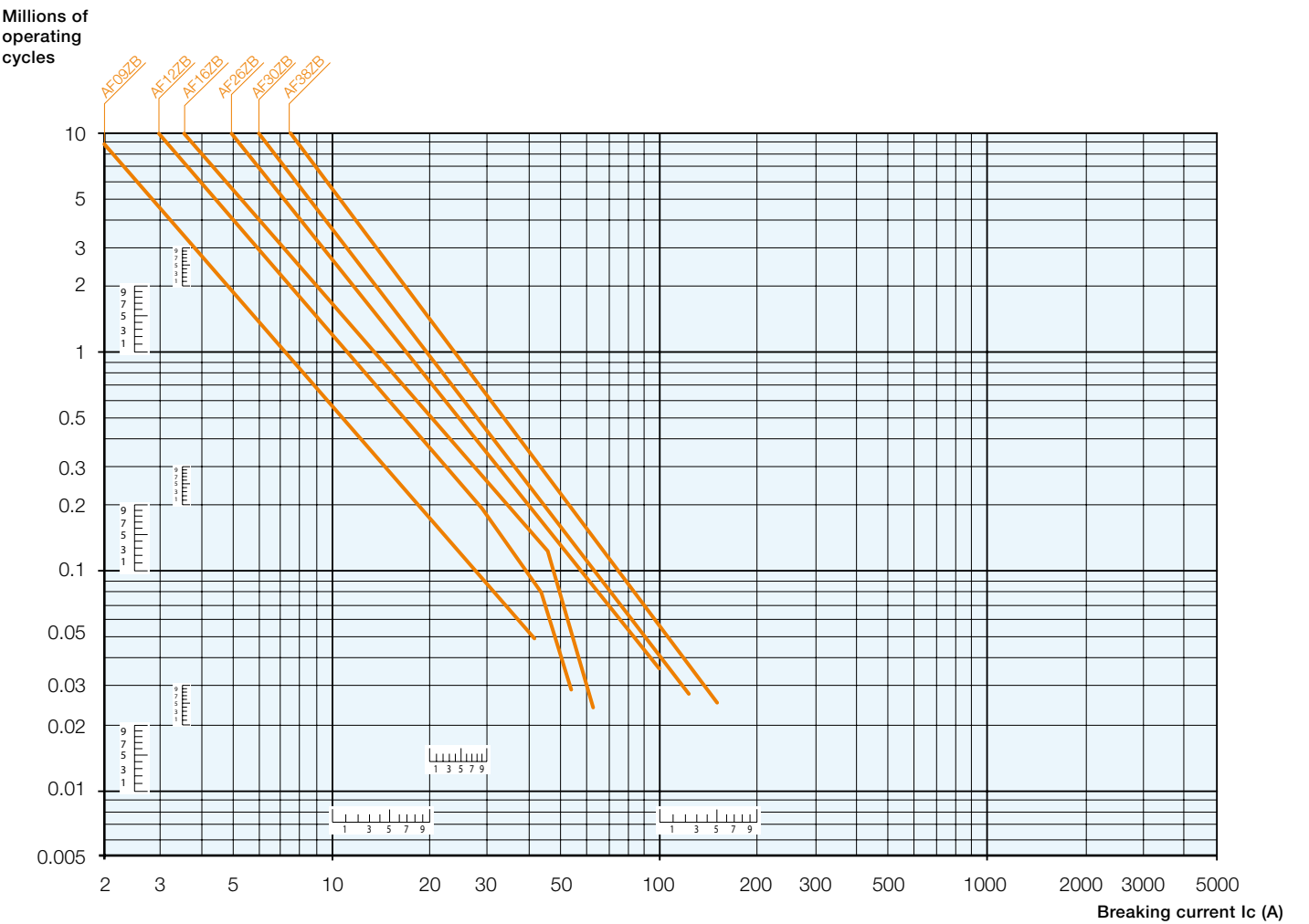
AF09ZB ... AF38ZB 3-pole contactors

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$

Ambient temperature $\leq 60\text{ }^{\circ}\text{C}$

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 tha I_e is the motor rated operational current (I_e = motor full load current). Maximum electrical switching frequency: see "Technical data".

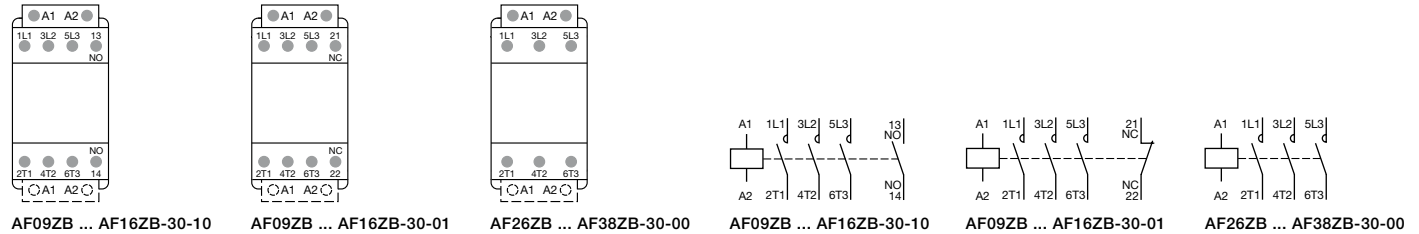


AF09ZB ... AF38ZB 3-pole contactors

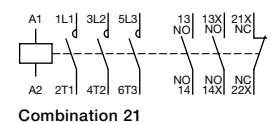
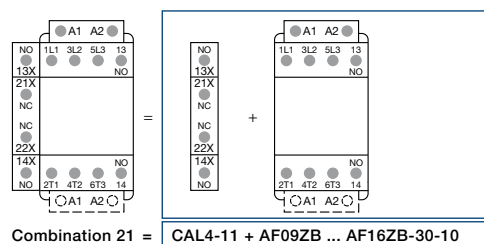
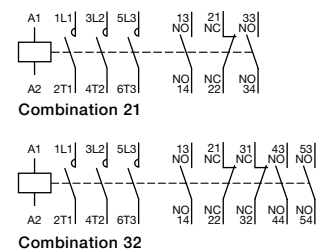
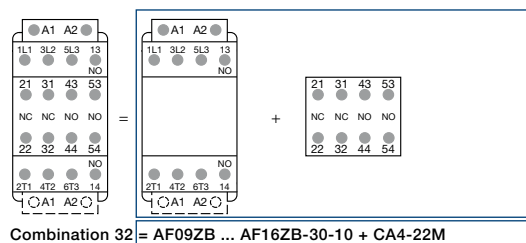
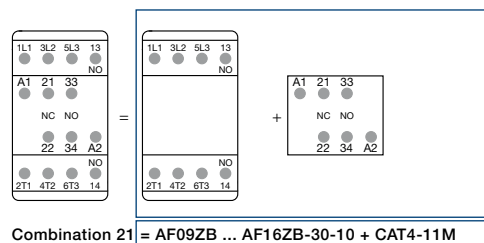
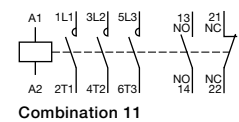
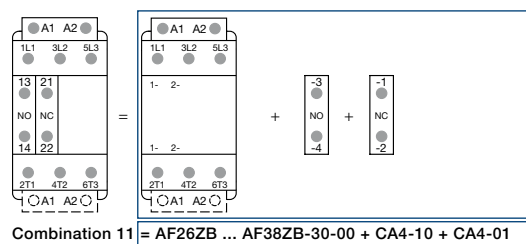
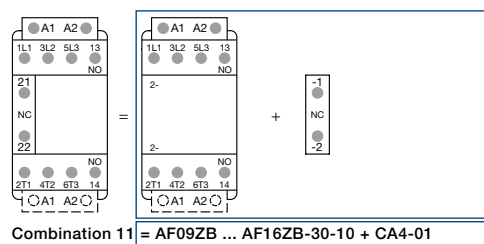
Terminal marking and positioning

AF09ZB ... AF38ZB contactors - DC operated

Standard devices without addition of auxiliary contacts

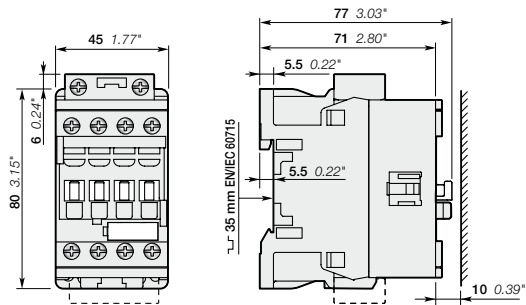


Other possible contact combinations with auxiliary contacts added by the user

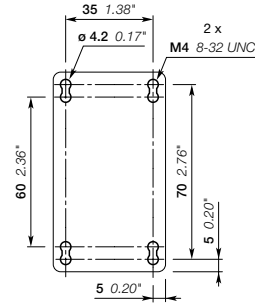


AF09ZB, AF12ZB, AF16ZB 3-pole contactors

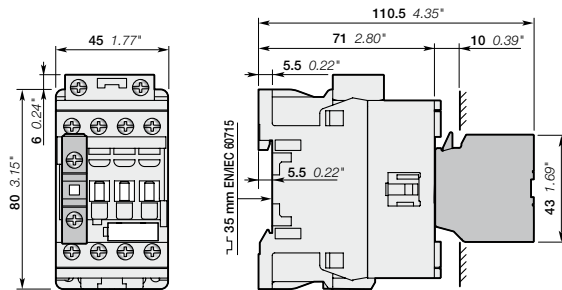
Main dimensions mm, inches



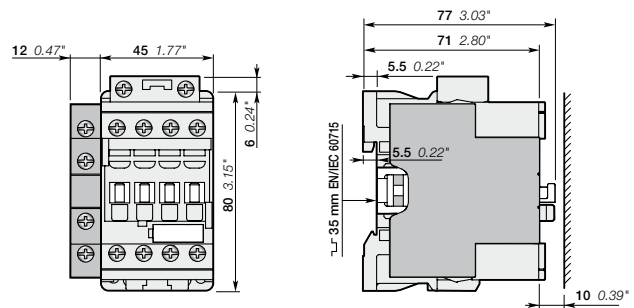
AF09ZB, AF12ZB, AF16ZB



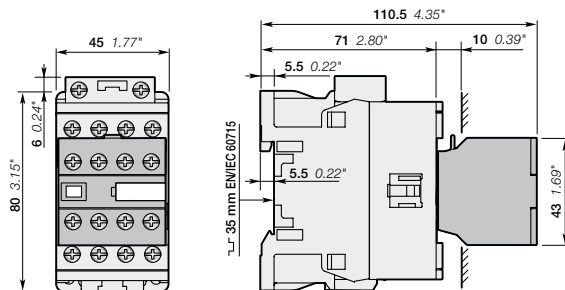
AF09ZB, AF12ZB, AF16ZB



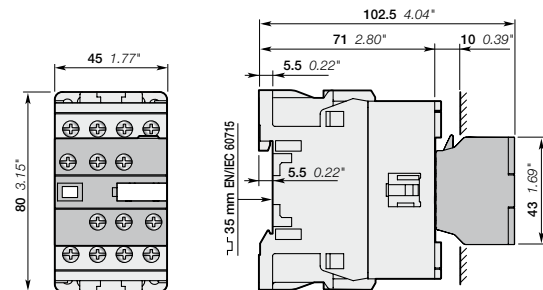
AF09ZB, AF12ZB, AF16ZB
+ CA4 1-pole auxiliary contact block



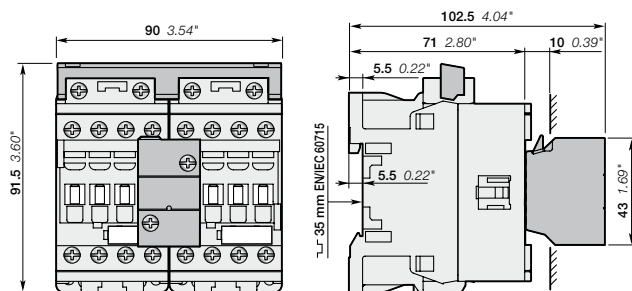
AF09ZB, AF12ZB, AF16ZB
+ CAL4-11 2-pole auxiliary contact block



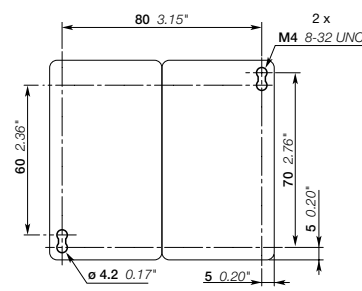
AF09ZB, AF12ZB, AF16ZB
+ CA4 4-pole auxiliary contact block



AF09ZB, AF12ZB, AF16ZB
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09ZB, AF12ZB, AF16ZB
+ VEM4 mechanical and electrical interlock set

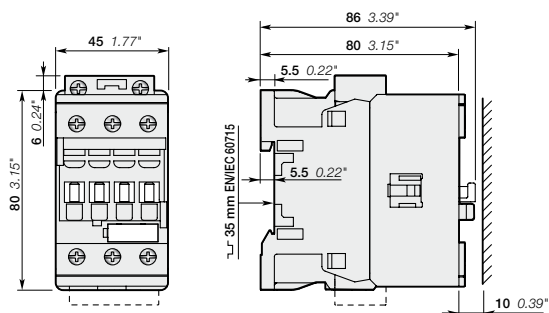


AF09ZB, AF12ZB, AF16ZB
+ VEM4 mechanical and electrical interlock set

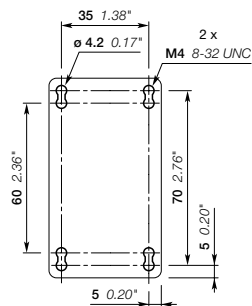
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

AF26ZB, AF30ZB, AF38ZB 3-pole contactors

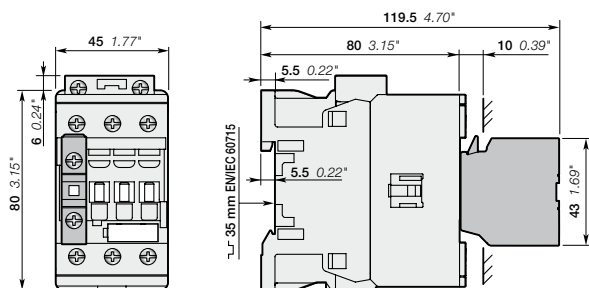
Main dimensions mm, inches



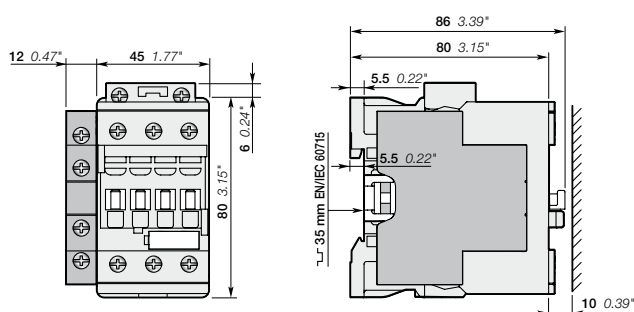
AF26ZB, AF30ZB, AF38ZB



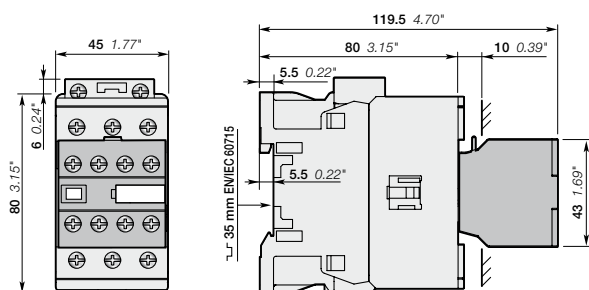
AF26ZB, AF30ZB, AF38ZB



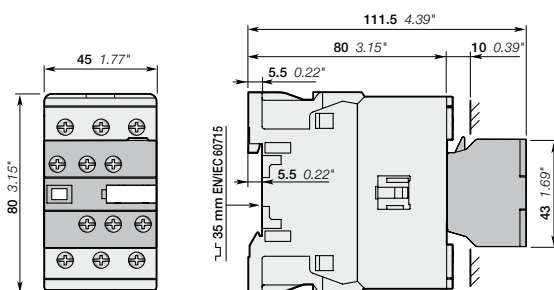
AF26ZB, AF30ZB, AF38ZB
+ CA4 1-pole auxiliary contact block



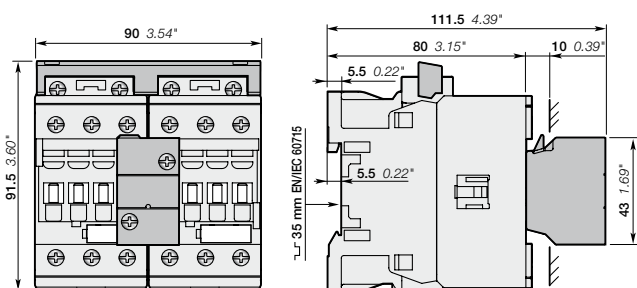
AF26ZB, AF30ZB, AF38ZB
+ CAL4-11 2-pole auxiliary contact block



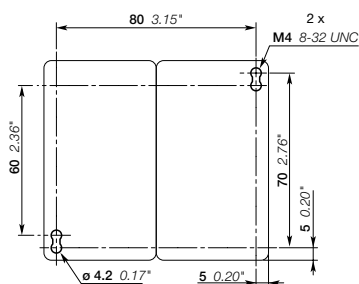
AF26ZB, AF30ZB, AF38ZB
+ CA4 4-pole auxiliary contact block



AF26ZB, AF30ZB, AF38ZB
+ CAT4 2-pole auxiliary contact and coil terminal block

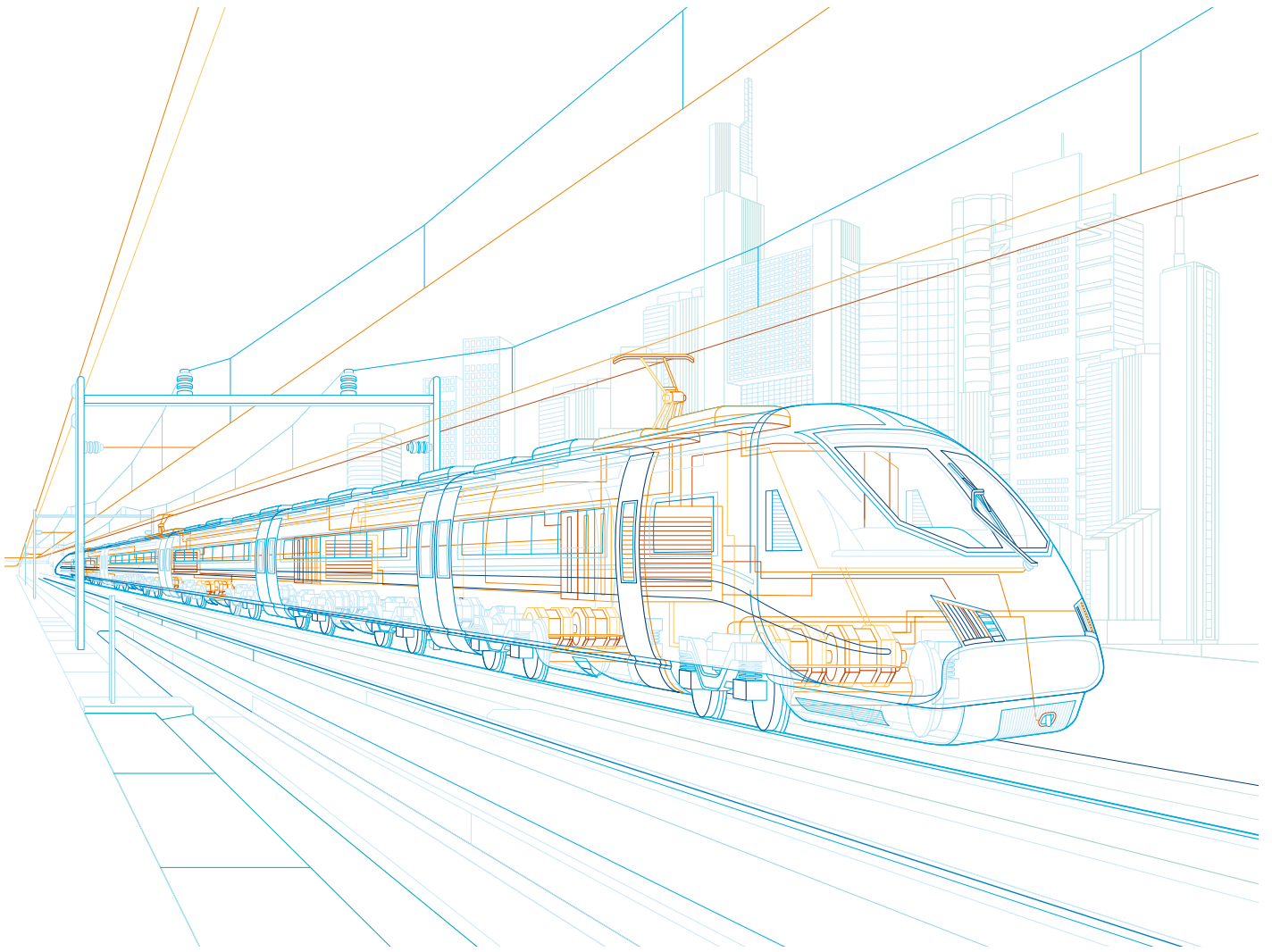


AF26ZB, AF30ZB, AF38ZB
+ VEM4 mechanical and electrical interlock set



AF26ZB, AF30ZB, AF38ZB
+ VEM4 mechanical and electrical interlock set

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



AF09ZB ... AF38ZB 4-pole contactors

25 to 55 A AC-1

DC operated - connection with standard ferrules



AF09ZB-40-00



AF26ZB-40-00

Description

AF09ZB ... AF38ZB 4-pole contactors comply with the latest railway rolling stock standards and allow installation in passengers or driver cabins for trains frequently operating tunnels or undergrounds. They are mainly used for controlling non-inductive or slightly inductive loads and generally for controlling power circuits up to 690 V AC and 440 V DC.

These contactors are of the block type design with 4 main poles.

- designed in accordance to IEC 60077 and applicable parts of EN 50155 standard
- shocks and vibration withstand conforming to IEC 61373 (category 1, class B)
- fire and smoke safety compliance to NF F 16-101 / 16-102 (Category A1), UNI CEI 11170 (LR4 severity level), DIN 5510-2
- electronic coil interface accepting a wide DC control voltage range (0.85 U_c min. ... 1.1 U_c max. according to IEC 60947-4-1) including several U_c control voltages (0.7 ... 1.25 U_c according to IEC 60077) used for battery supply
- low coil consumption
- built-in surge suppression
- side by side mounting without restriction from -40 °C up to +70 °C
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

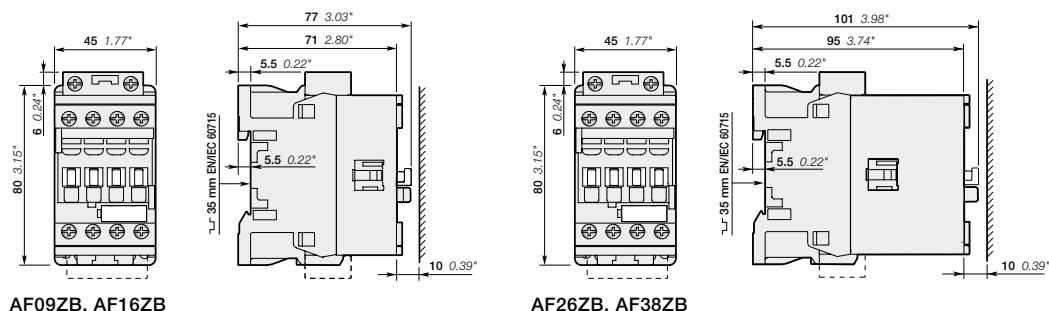
IEC Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1	UL / CSA General use rating 600 V AC	Supply control voltage U_c (IEC 60077) (1)	Rated control circuit voltage U_c min. ... U_c max. (IEC 60947-4-1) (1)	Auxiliary contacts fitted Y L	Type	Order code	Weight Pkg (1 pce) kg
A	A	V DC	V DC				
4 N.O. main poles							
25	-	24, 33, 48	20...60	0 0	AF09ZB-40-00-21	1SBL136261R2100	0.310
		72, 96, 110	48...130	0 0	AF09ZB-40-00-22	1SBL136261R2200	0.310
		220	100...250	0 0	AF09ZB-40-00-23	1SBL136261R2300	0.310
30	-	24, 33, 48	20...60	0 0	AF16ZB-40-00-21	1SBL176261R2100	0.310
		72, 96, 110	48...130	0 0	AF16ZB-40-00-22	1SBL176261R2200	0.310
		220	100...250	0 0	AF16ZB-40-00-23	1SBL176261R2300	0.310
45	-	24, 33, 48	20...60	0 0	AF26ZB-40-00-21	1SBL236261R2100	0.410
		72, 96, 110	48...130	0 0	AF26ZB-40-00-22	1SBL236261R2200	0.410
		220	100...250	0 0	AF26ZB-40-00-23	1SBL236261R2300	0.410
55	-	24, 33, 48	20...60	0 0	AF38ZB-40-00-21	1SBL296261R2100	0.410
		72, 96, 110	48...130	0 0	AF38ZB-40-00-22	1SBL296261R2200	0.410
		220	100...250	0 0	AF38ZB-40-00-23	1SBL296261R2300	0.410

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

25	-	24, 33, 48	20...60	0 0	AF09ZB-22-00-21	1SBL136561R2100	0.310
		72, 96, 110	48...130	0 0	AF09ZB-22-00-22	1SBL136561R2200	0.310
		220	100...250	0 0	AF09ZB-22-00-23	1SBL136561R2300	0.310
30	-	24, 33, 48	20...60	0 0	AF16ZB-22-00-21	1SBL176561R2100	0.310
		72, 96, 110	48...130	0 0	AF16ZB-22-00-22	1SBL176561R2200	0.310
		220	100...250	0 0	AF16ZB-22-00-23	1SBL176561R2300	0.310
45	-	24, 33, 48	20...60	0 0	AF26ZB-22-00-21	1SBL236561R2100	0.410
		72, 96, 110	48...130	0 0	AF26ZB-22-00-22	1SBL236561R2200	0.410
		220	100...250	0 0	AF26ZB-22-00-23	1SBL236561R2300	0.410
55	-	24, 33, 48	20...60	0 0	AF38ZB-22-00-21	1SBL296561R2100	0.410
		72, 96, 110	48...130	0 0	AF38ZB-22-00-22	1SBL296561R2200	0.410
		220	100...250	0 0	AF38ZB-22-00-23	1SBL296561R2300	0.410

(1) Other control voltages, see voltage code table.

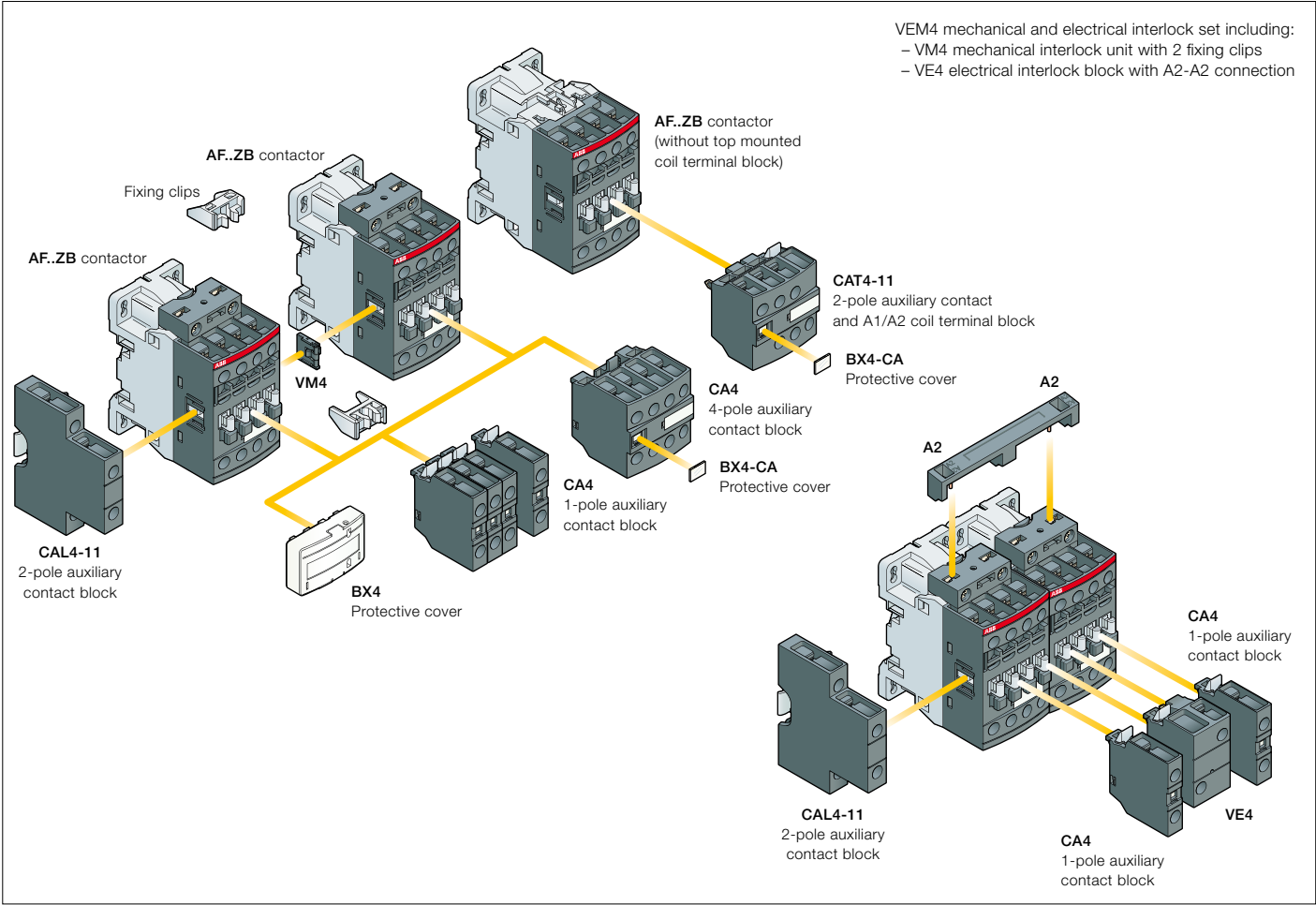
Main dimensions mm, inches



AF09ZB ... AF38ZB 4-pole contactors

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

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

Contactor types	Main poles	Built-in auxiliary contacts	Front-mounted accessories				Side-mounted accessories	
			Auxiliary contact blocks			Electrical and mechanical interlock set (between 2 contactors)	Auxiliary contact blocks	
			1-pole CA4	2-pole CAT4-11	4-pole CA4	VEM4	Left side 2-pole CAL4-11	Right side
Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on position 5								
AF09ZB, AF16ZB	4	0	0	0				
			4 max.	or 1	or 1	-	+	1
			2 max.	or 1	-	-	+	1
AF26ZB, AF38ZB	4	0	0	0				
			4 max.	or 1	or 1	-	+	1
			2 max.	or 1	-	-	+	1
AF09ZB, AF16ZB	2	2	0	0				
			4 max.	or 1	or 1	-	+	1
			2 max.	or 1	-	-	+	1

AF09ZB ... AF38ZB 4-pole contactors

Main accessories

Connection with standard ferrules



CA4-10-T

1SBC101109F0014



CA4-22E

1SBC101120F0014



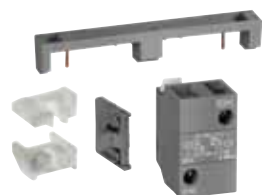
CAL4-11-T

1SBC101112F0014



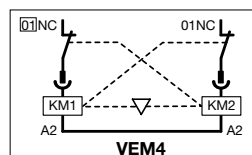
CAT4-11E

1SBC101114F0014



VEM4

1SBC101228F0014



VEM4



LDC4

1SBC101133F0014



BX4

1SBC101136F0014



BX4-CA

1SBC101138F0014



BP38-4

1SBC101138F0014

Ordering details (1)

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

Front-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 0	- -	CA4-10-T	1SBN010110T1010	10	0.014
	0 1	- -	CA4-01-T	1SBN010110T1001	10	0.014
AF09ZB ... AF38ZB-40-00	2 2	- -	CA4-22E	1SBN010140R1022	1	0.055
AF09ZB ... AF38ZB-22-00	3 1	- -	CA4-31E	1SBN010140R1031	1	0.055
	4 0	- -	CA4-40E	1SBN010140R1040	1	0.055
AF09ZB ... AF16ZB-40-00	0 4	- -	CA4-04E	1SBN010140R1004	1	0.055

Side-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 1	- -	CAL4-11-T	1SBN010120T1011	10	0.040
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Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

AF09ZB ... AF38ZB-40-00	1 1	- -	CAT4-11E	1SBN010151R1011	1	0.040
AF09ZB ... AF38ZB-22-00						

Mechanical interlock unit

AF09ZB ... AF38ZB-40-00		VM4	1SBN030105T1000	10	0.005
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Note: VM4 and VM96-4 include 2 fixing clips (BB4) to maintain together both contactors.

Mechanical and electrical interlock set

AF09ZB ... AF16ZB-40-00	0 2	- -	VEM4	1SBN030111R1000	1	0.035
AF26ZB ... AF38ZB-40-00						

Note: VEM4 includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4 electrical interlock block.
VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

Additional coil terminal block

AF09ZB ... AF38ZB		LDC4	1SBN070156T1000	10	0.010
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Protective covers

All 1-stack contactors		BX4	1SBN110108T1000	10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks		BX4-CA	1SBN110109W1000	50	0.001

Mounting piece

AF09ZB ... AF38ZB		BP38-4	1SBN112303T1000	10	0.003
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(1) For more information, refer to "Accessories" section.

AF09ZB ... AF38ZB 4-pole contactors

Technical data

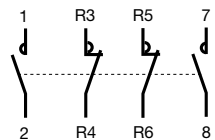
Main pole - Utilization characteristics according to IEC

Contactor types	DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1			
Fire and smoke		IEC 60077-1, IEC 60077-2, EN 50155 (applicable parts)			
Rated operational voltage U _e max.		690 V			
Rated frequency (without derating)		50 / 60 Hz			
Conventional free-air thermal current I _{th}					
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		35 A	35 A	55 A	55 A
With conductor cross-sectional area		6 mm ²	6 mm ²	16 mm ²	16 mm ²
AC-1 Utilization category					
For air temperature close to contactor					
I _e / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	25 A	30 A	45 A	55 A
U _e max. $\leq 690\text{ V}$, 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 ²	6 mm ²	10 mm ²	16 mm ²
Short-circuit protection device for contactors					
without thermal overload relay - Motor protection excluded					
U _e $\leq 500\text{ V AC}$ - gG type fuse		25 A	32 A	50 A	63 A
Rated short-time withstand current I _{cw}	1 s	300 A	300 A	450 A	450 A
at 40 °C ambient temperature,	10 s	150 A	150 A	300 A	300 A
in free air from a cold state	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
Power 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			

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

Contactor types	DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Standards					
Maximum operational voltage					
UL / CSA general use rating					
600 V AC					
With conductor cross-sectional area					
Maximum electrical switching frequency					
For general use					

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



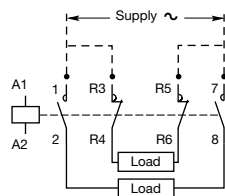
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK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



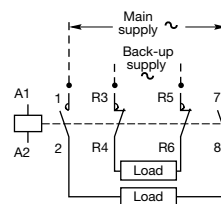
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

– Single supply and 2 separate loads



– 2 separate supplies and 2 separate loads



AF09ZB ... AF38ZB 4-pole contactors

Technical data

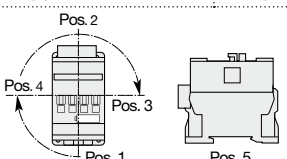
General technical data

Contactor types	DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Rated insulation voltage U_i acc. to IEC 60947-4-1 acc. to UL / CSA		690 V			
Rated impulse withstand voltage U_{imp}		6 kV			
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A EN 50121-3-2			
Ambient air temperature Operation in free air Storage		-40...+70 °C -60...+80 °C			
Climatic withstand		Category B according to IEC 60947-1 Annex Q			
Maximum operating altitude (without derating)		3000 m			
Mechanical durability Number of operating cycles Maximum switching frequency		10 millions operating cycles 3600 cycles/h			
Shock and vibration withstand acc. to IEC 61373		Category 1, class B			

Magnet system characteristics

Contactor types	DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Coil operating limits acc. to IEC 60947-4-1	DC supply	At $\theta \leq 70\text{ °C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$			
DC control voltage Rated control circuit voltage U_c Coil consumption	Average pull-in value Average holding value	20 ... 250 V DC (AF..Z) 12 ... 16 W (AF..Z) 1.7 W			
PLC-output control		(AF..Z) $\geq 500\text{ mA}$ 24 V DC			
Drop-out voltage		$\leq 60\%$ of $U_c \text{ min.}$			
Operating time Between coil energization and: Between coil de-energization and:	N.O. contact closing N.C. contact opening N.O. contact opening N.C. contact closing	40...95 ms 38...90 ms 11...95 ms 13...98 ms			

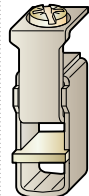
Mounting characteristics and conditions for use

Contactor types	DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Mounting positions		 Max. add-on N.C. auxiliary contacts : see accessory fitting details for a 4-pole contactor AF09ZB ... AF38ZB			
Mounting distances		The contactors can be assembled side by side			
Fixing On rail according to IEC 60715, EN 60715 By screws (not supplied)		35 x 7.5 mm or 35 x 15 mm 2 x M4 screws placed diagonally			

AF09ZB ... AF38ZB 4-pole contactors

Technical data

Connecting characteristics

Contactors types		DC operated	AF09ZB	AF16ZB	AF26ZB	AF38ZB
Main terminals						
			Screw terminals with cable clamp		Screw terminals with double connector 2 x (5.5 width x 6.8 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
	Rigid	Solid ($\leq 4 \text{ mm}^2$)	} 1 x 1...6 mm ² 2 x 1...6 mm ²		1.5...16 mm ²	1.5...16 mm ²
		Stranded ($\geq 6 \text{ mm}^2$)			1.5...16 mm ²	1.5...16 mm ²
	Flexible with non insulated ferrule		1 x 0.75...6 mm ²		1.5...16 mm ²	1.5...16 mm ²
			2 x 0.75...6 mm ²		1.5...16 mm ²	1.5...16 mm ²
	Flexible with insulated ferrule		1 x 0.75...4 mm ²		1.5...16 mm ²	1.5...16 mm ²
			2 x 0.75...2.5 mm ²		1.5...16 mm ²	1.5...16 mm ²
	Bars or lugs		L < 9.6 mm			
Connection capacity acc. to UL/CSA			1 or 2 x			
Stripping length				10 mm	12 mm	
Tightening torque				1.5 Nm	2.5 Nm	
Auxiliary conductors						
(coil terminals)						
	Rigid solid		1 x 1...2.5 mm ²			
			2 x 1...2.5 mm ²			
	Flexible with non insulated ferrule		1 x 0.75...2.5 mm ²			
			2 x 0.75...2.5 mm ²			
	Flexible with insulated ferrule		1 x 0.75...2.5 mm ²			
			2 x 0.75...1.5 mm ²			
	Lugs		L < 8 mm			
Connection capacity acc. to UL/CSA			1 or 2 x			
Stripping length				10 mm		
Tightening torque				1.2 Nm		
Degree of protection						
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
Main terminals			IP20			
Coil terminals			IP20			
Screw terminals						
Main terminals			Delivered in open position, screws of unused terminals must be tightened			
			M3.5		M4.5	
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2		
Coil terminals				M3.5		
			Screwdriver type	Flat Ø 5.5 / Pozidriv 2		

AF09ZB ... AF38ZB 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 le 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 $-25...+70$ °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	4-pole	AF30	AF38	4-pole
	3 or 4-pole			3-pole		3-pole	3-pole	
Utilization category DC-1, L/R ≤ 1 ms								
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	10 A	15 A	20 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	220 V	10 A	15 A	20 A	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	110 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	220 V	25 A	27 A	30 A	45 A	45 A	50 A	55 A
	≤ 72 V	25 A	-	30 A	-	45 A	-	55 A
	110 V	25 A	-	30 A	-	45 A	-	55 A
	220 V	25 A	-	30 A	-	45 A	-	55 A
	440 V	10 A	-	20 A	-	-	-	-
Utilization category DC-3, L/R ≤ 2 ms								
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	-
	110 V	6 A	7 A	8 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	-
	110 V	25 A	27 A	30 A	45 A	-	50 A	-
	220 V	6 A	7 A	8 A	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	-
	110 V	25 A	27 A	30 A	45 A	-	50 A	-
	220 V	25 A	27 A	30 A	45 A	-	50 A	-
	≤ 72 V	25 A	-	30 A	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-
	220 V	25 A	-	30 A	-	-	-	-
	440 V	6 A	-	8 A	-	-	-	-
Utilization category DC-5, L/R ≤ 7.5 ms								
	≤ 72 V	9 A	12 A	16 A	20 A	-	25 A	-
	110 V	4 A	4 A	4 A	-	-	-	-
	220 V	-	-	-	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	-
	110 V	10 A	15 A	20 A	45 A	-	50 A	-
	220 V	4 A	4 A	4 A	-	-	-	-
	≤ 72 V	25 A	27 A	30 A	45 A	-	50 A	-
	110 V	25 A	27 A	30 A	45 A	-	50 A	-
	220 V	9 A	12 A	16 A	20 A	-	25 A	-
	≤ 72 V	25 A	-	30 A	-	-	-	-
	110 V	25 A	-	30 A	-	-	-	-
	220 V	10 A	-	20 A	-	-	-	-
	440 V	4 A	-	4 A	-	-	-	-

AF09ZB ... AF38ZB 4-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to. If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then $I_c = I_e$ 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.

AF09ZB ... AF38ZB 4-pole contactors

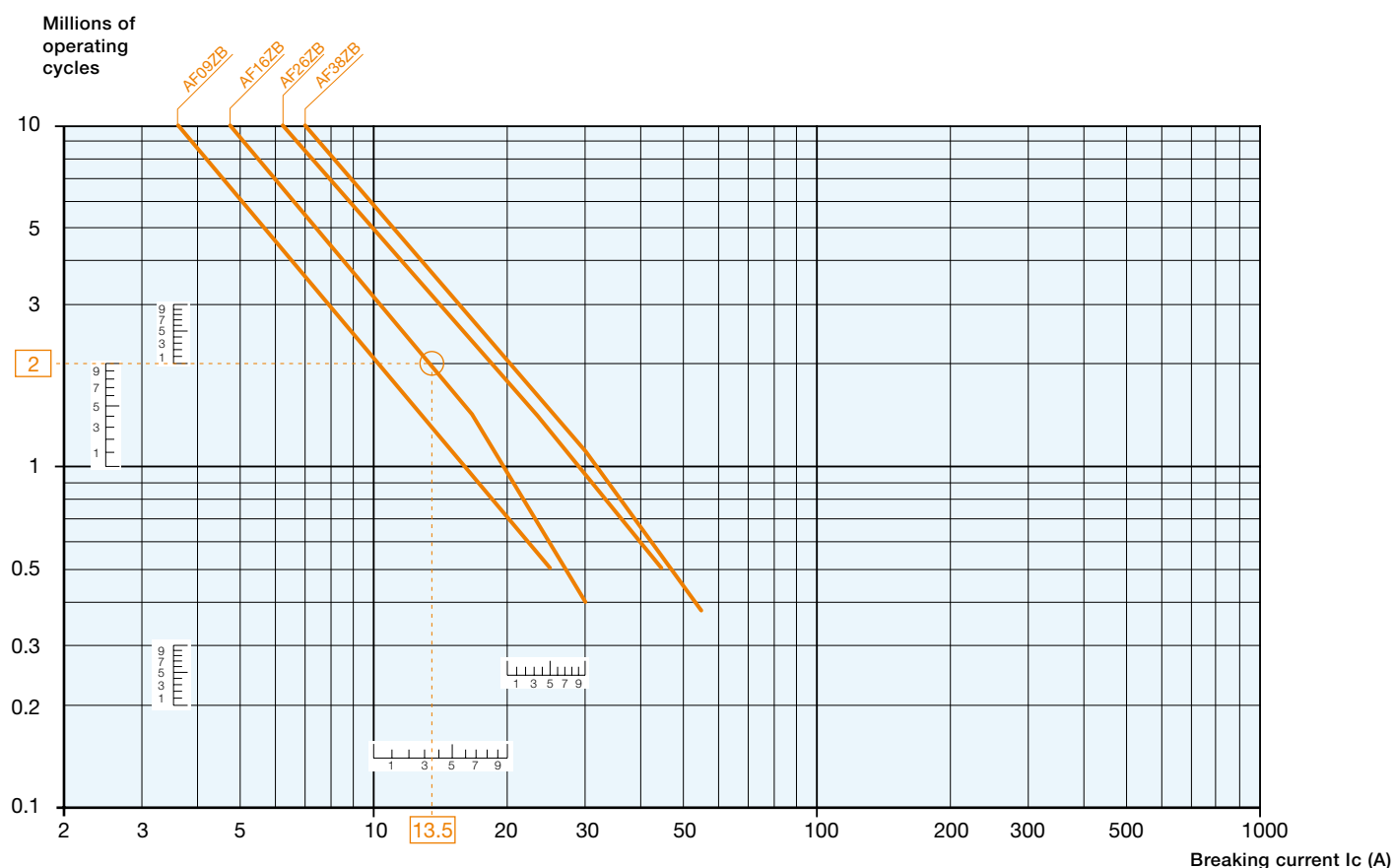
Electrical durability

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

Ambient temperature $\leq 60 \text{ °C}$

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".



Example:

$I_c / \text{AC-1} = 13.5 \text{ A}$ – Electrical durability required = 2 millions operating cycles.

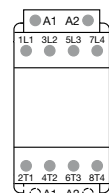
Using the AC-1 curves above select the AF16 contactor at intersection "○" (13.5 A / 2 millions operating cycles).

AF09ZB ... AF38ZB 4-pole contactors

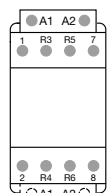
Terminal marking and positioning

AF09ZB ... AF38ZB contactors - DC operated

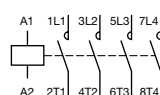
Standard devices without addition of auxiliary contacts



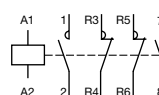
AF09ZB ... AF38ZB-40-00



AF09ZB ... AF38ZB-22-00

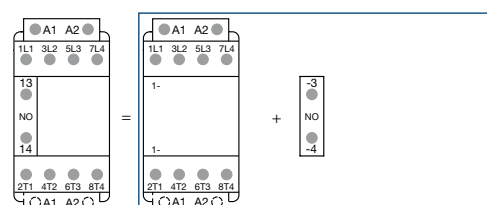


AF09ZB ... AF38ZB-40-00

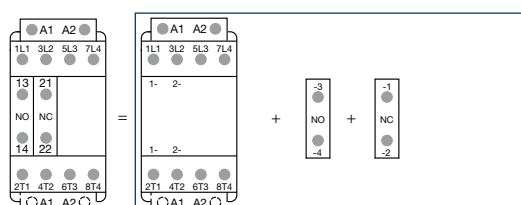


AF09ZB ... AF38ZB-22-00

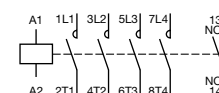
Other possible contact combinations with auxiliary contacts added by the user



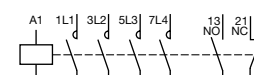
Combination 10 = AF09ZB ... AF38ZB-40-00 + CA4-10



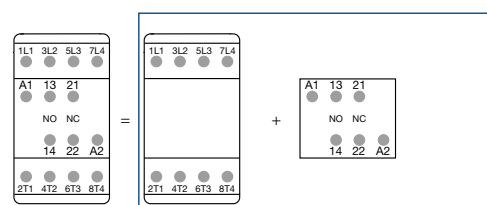
Combination 11 = AF09ZB ... AF38ZB-40-00 + CA4-10 + CA4-01



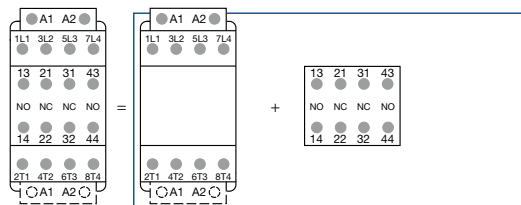
Combination 10



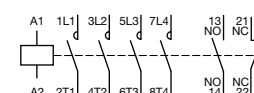
Combination 11



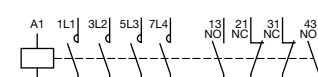
Combination 11 = AF09ZB ... AF38ZB-40-00 + CAT4-11E



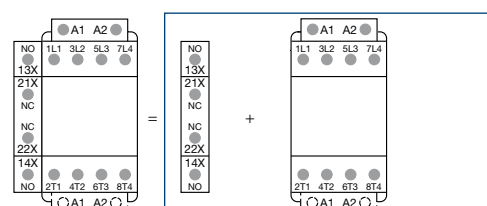
Combination 22 = AF09ZB ... AF38ZB-40-00 + CA4-22E



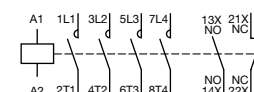
Combination 11



Combination 22



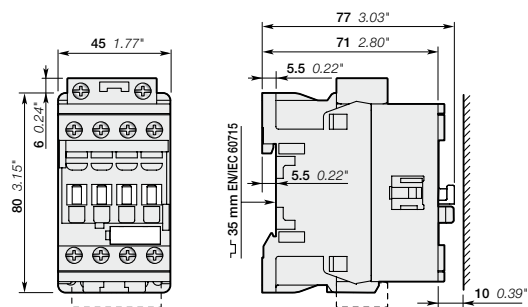
Combination 11 = CAL4-11 + AF09ZB ... AF38ZB-40-00



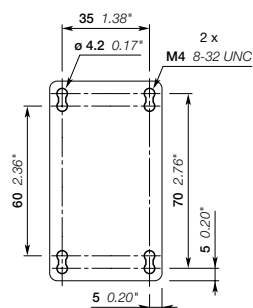
Combination 11

AF09ZB, AF16ZB 4-pole contactors

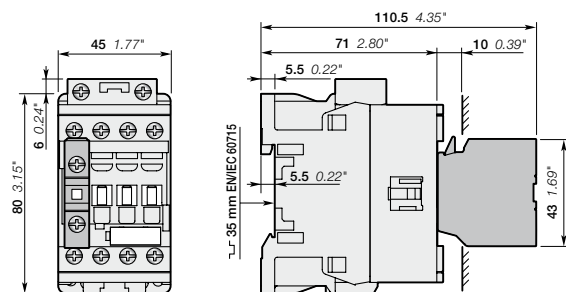
Main dimensions mm, inches



AF09ZB, AF16ZB

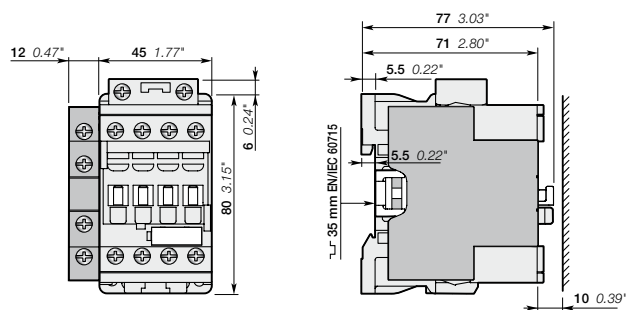


AF09ZB, AF16ZB



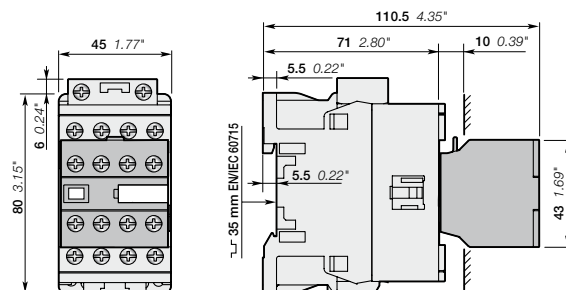
AF09ZB, AF16ZB

+ CA4 1-pole auxiliary contact block



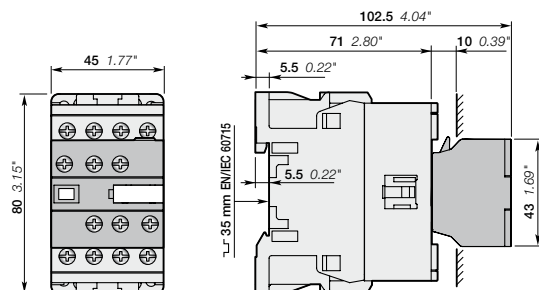
AF09ZB, AF16ZB

+ CAL4-11 2-pole auxiliary contact block



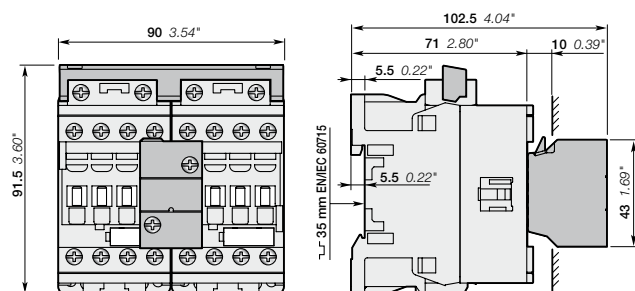
AF09ZB, AF16ZB

+ CA4 4-pole auxiliary contact block



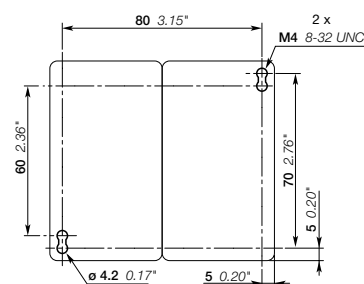
AF09ZB, AF16ZB

+ CAT4 2-pole auxiliary contact and coil terminal block



AF09ZB-40-00, AF16ZB-40-00

+ VEM4 mechanical and electrical interlock set



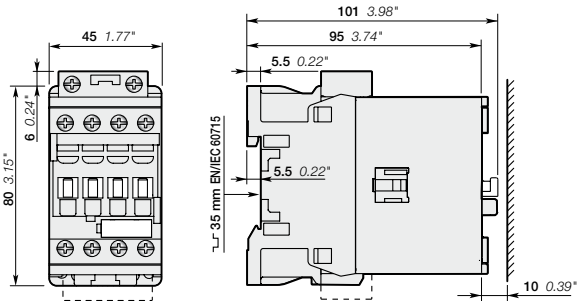
AF09ZB-40-00, AF16ZB-40-00

+ VEM4 mechanical and electrical interlock set

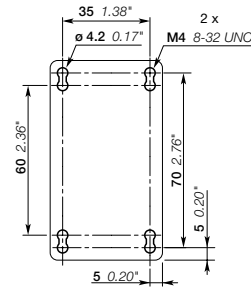
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

AF26ZB, AF38ZB 4-pole contactors

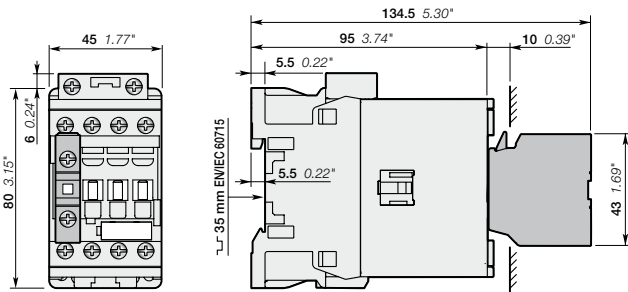
Main dimensions mm, inches



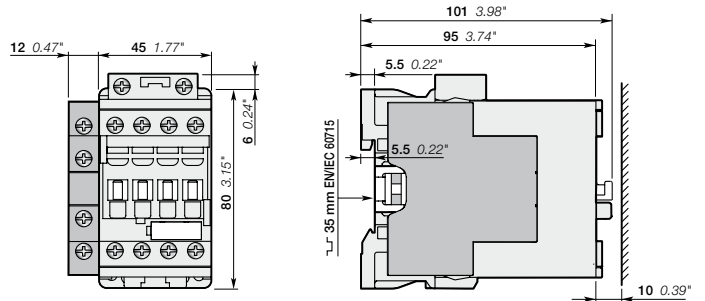
AF26ZB, AF38ZB



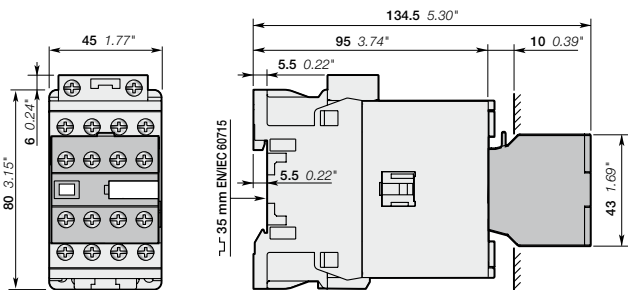
AF26ZB, AF38ZB



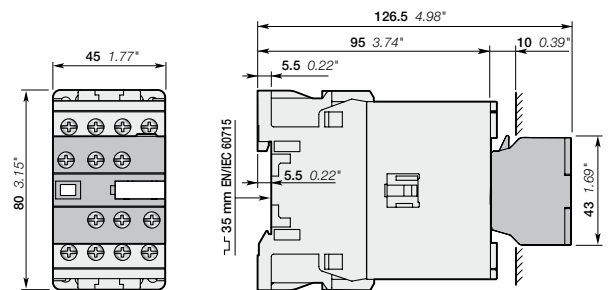
AF26ZB, AF38ZB
+ CA4 1-pole auxiliary contact block



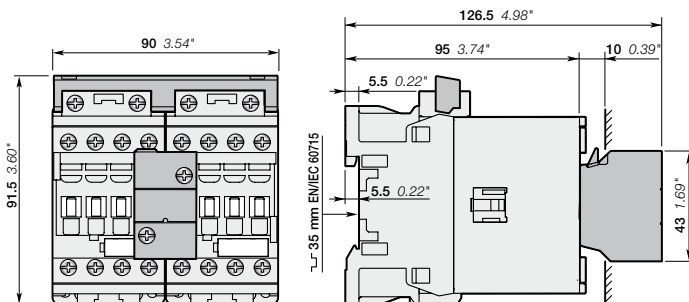
AF26ZB, AF38ZB
+ CAL4-11 2-pole auxiliary contact block



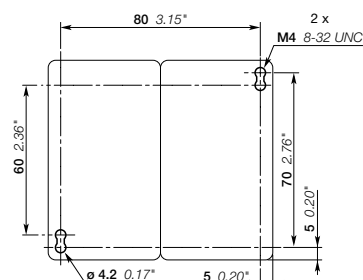
AF26ZB, AF38ZB
+ CA4 4-pole auxiliary contact block



AF26ZB, AF38ZB
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26ZB-40-00, AF38ZB-40-00
+ VEM4 mechanical and electrical interlock set



AF26ZB-40-00, AF38ZB-40-00
+ VEM4 mechanical and electrical interlock set

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

NFZB 4 and 8-pole contactor relays

DC operated - connection with standard ferrules



NFZB22E



NFZB44E

Description

NFZB contactor relays comply with the latest railway rolling stock standards and allow installation in passenger or driver cabins for trains frequently operating tunnels or undergrounds. They are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with 4 or 8 main poles.

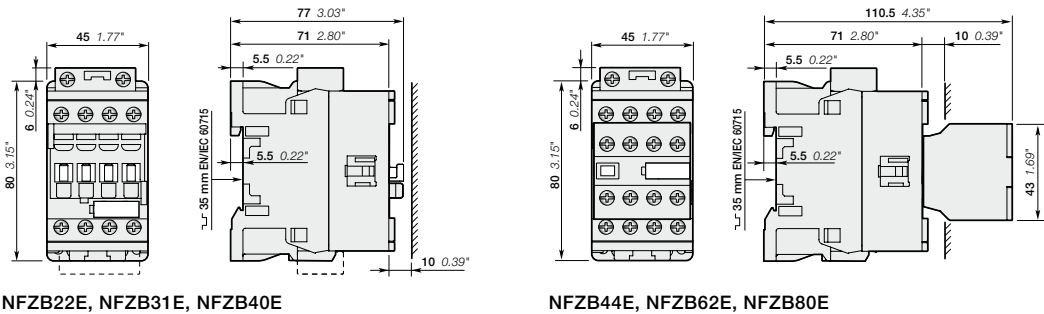
- designed in accordance to IEC 60077 and applicable parts of EN 50155 standard
- shocks and vibration withstand conforming to IEC 61373 (category 1, class B)
- fire and smoke safety compliance to NF F 16-101 / 16-102 (Category A1, severity levels 3 & 4), UNI CEI 11170 (LR4 severity level), DIN 5510-2
- electronic coil interface accepting a wide DC control voltage range (0.85 U_c min. ... 1.1 U_c max. according to IEC 60947-4-1) including several U_c control voltages (0.7 ... 1.25 U_c according to IEC 60077) used for battery supply
- low coil consumption
- built-in surge suppression
- side by side mounting without restriction from -40 °C up to +70 °C
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

Ordering details

Number of contacts	Supply control voltage U_c (IEC 60077) (1)	Rated control circuit voltage U_c min. ... U_c max. (IEC 60947-4-1) (1)	Type	Order code	Weight Pkg (1 pce) kg
	24, 33, 48	20...60	NFZB22E-21	1SBH136061R2122	0.310
	72, 96, 110	48...130	NFZB22E-22	1SBH136061R2222	0.310
	220	100...250	NFZB22E-23	1SBH136061R2322	0.310
	24, 33, 48	20...60	NFZB31E-21	1SBH136061R2131	0.310
	72, 96, 110	48...130	NFZB31E-22	1SBH136061R2231	0.310
	220	100...250	NFZB31E-23	1SBH136061R2331	0.310
	24, 33, 48	20...60	NFZB40E-21	1SBH136061R2140	0.310
	72, 96, 110	48...130	NFZB40E-22	1SBH136061R2240	0.310
	220	100...250	NFZB40E-23	1SBH136061R2340	0.310
	24, 33, 48	20...60	NFZB44E-21	1SBH136061R2144	0.370
	72, 96, 110	48...130	NFZB44E-22	1SBH136061R2244	0.370
	220	100...250	NFZB44E-23	1SBH136061R2344	0.370
	24, 33, 48	20...60	NFZB62E-21	1SBH136061R2162	0.370
	72, 96, 110	48...130	NFZB62E-22	1SBH136061R2262	0.370
	220	100...250	NFZB62E-23	1SBH136061R2362	0.370
	24, 33, 48	20...60	NFZB80E-21	1SBH136061R2180	0.370
	72, 96, 110	48...130	NFZB80E-22	1SBH136061R2280	0.370
	220	100...250	NFZB80E-23	1SBH136061R2380	0.370

(1) Other control voltages, see voltage code table.

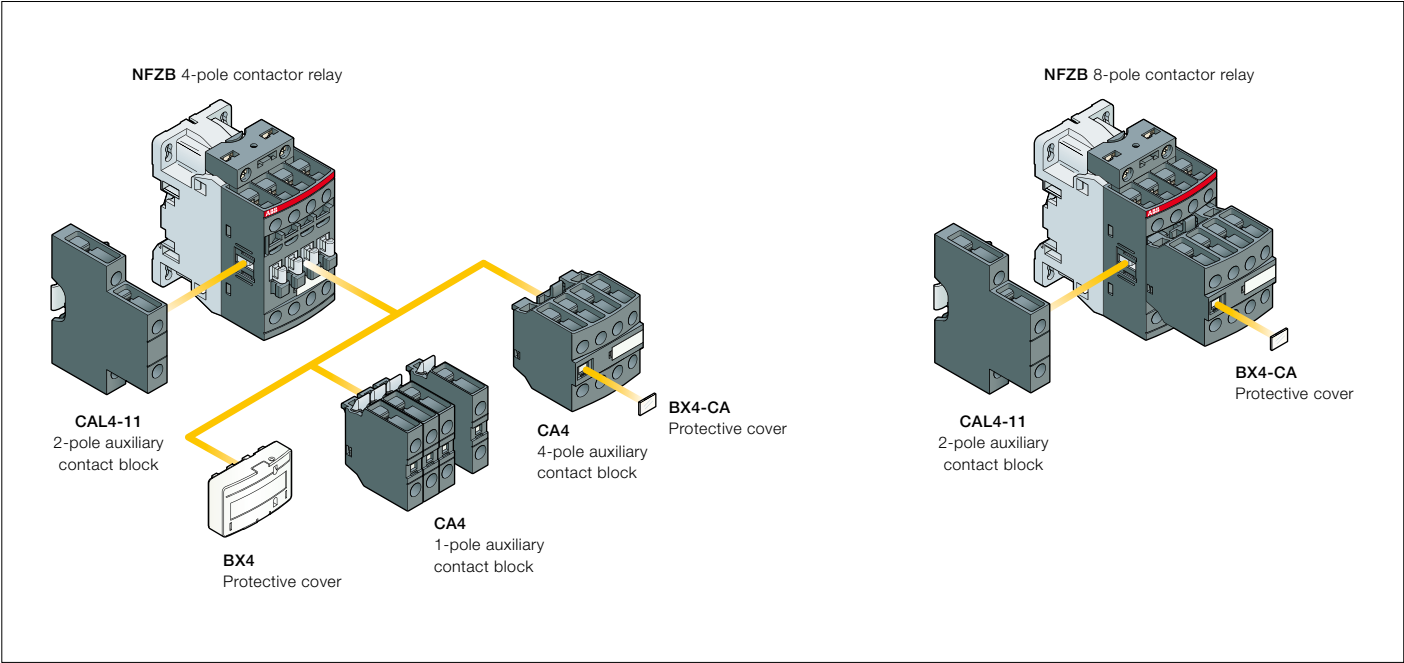
Main dimensions mm, inches



NFZB 4 and 8-pole contactor relays

Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

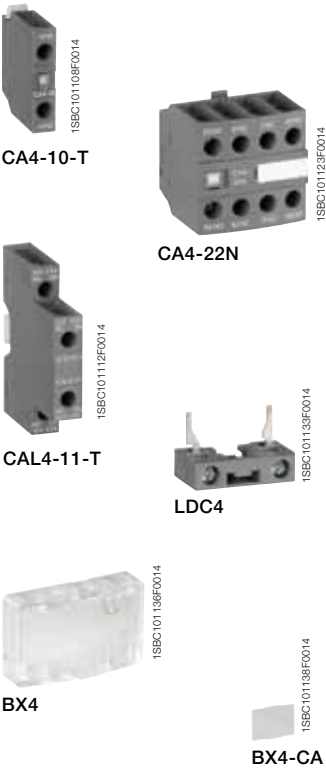
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

Contactor relay types	Main poles	Front-mounted accessories				Side-mounted accessories			
		Auxiliary contact blocks				Auxiliary contact blocks			
		1-pole CA4		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 position 5							
NFZB	2 2 E	4 max.	or 1			+	1		–
	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 position 5							
NFZB	4 0 E	4 max.	or 1			+	1		–
		2 max.	–			+	1	+	1
NFZB	4 4 E	–	–			+	1		–
	6 2 E								
	8 0 E								

NFZB 4 and 8-pole contactor relays

Main accessories

Connection with standard ferrules



Ordering details (1)

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

Front-mounted instantaneous auxiliary contact blocks

4-pole NFZB	1 0	- -	CA4-10-T	1SBN010110T1010	10	0.014
	0 1	- -	CA4-01-T	1SBN010110T1001	10	0.014
4-pole NFZB	4 0	- -	CA4-40N	1SBN010140R1240	1	0.055
	3 1	- -	CA4-31N	1SBN010140R1231	1	0.055
	2 2	- -	CA4-22N	1SBN010140R1222	1	0.055
	1 3	- -	CA4-13N	1SBN010140R1213	1	0.055
NFZB40E	0 4	- -	CA4-04N	1SBN010140R1204	1	0.055

Side-mounted instantaneous auxiliary contact blocks

NFZB	1 1	- -	CAL4-11-T	1SBN010120T1011	10	0.040
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Additional coil terminal block

NFZB		LDC4	1SBN070156T1000	10	0.010
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Protective covers

All 1-stack contactor relays	BX4	1SBN110108T1000	10	0.006
For 4-pole CA4 auxiliary contact blocks	BX4-CA	1SBN110109W1000	50	0.001

(1) For more information, refer to "Accessories" section.

NFZB 4 and 8-pole contactor relays

Technical data

Contact utilization characteristics according to IEC

Contactor relay types	DC operated	NFZB
Standards		IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1 IEC 60077-1, IEC 60077-2, EN 50155 (applicable parts)
Fire and smoke		NF F 16-101 / NF F 16-102 according to category A1
Rated operational voltage U_e max.		690 V
Rated frequency (without derating)		50 / 60 Hz
Conventional free-air thermal current - $I_{th} \theta \leq 40^\circ\text{C}$		16 A
I_e / Rated operational current AC-15		
acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
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
I_e / Rated operational current DC-13		
acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse		10 A
Rated short-time withstand current I_{cw}	for 1.0 s	100 A
at 40 °C ambient temperature, in free air from a cold state	for 0.1 s	140 A
Minimum switching capacity		12 V / 3 mA
with failure rate acc. to IEC 60947-5-4		10^{-7}
Non-overlapping time between N.O. and N.C. contacts		≥ 2 ms
Power dissipation per pole at 6 A		0.1 W
Maximum electrical switching frequency	AC-15	1200 cycles/h
	DC-13	900 cycles/h
Mechanically linked contacts		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts
acc. to annex L of IEC 60947-5-1		

Contact utilization characteristics according to UL / CSA

Contactor relay types	DC operated	NFZB
Standards		
Maximum operational voltage		
Pilot duty		
AC thermal rated current		
AC maximum volt-ampere making		
AC maximum volt-ampere breaking		
DC thermal rated current		
DC maximum volt-ampere making-breaking		

NFZB 4 and 8-pole contactor relays

Technical data

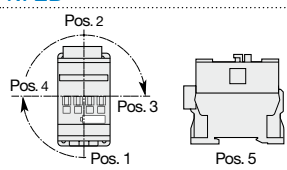
General technical data

Contactor relay types	DC operated	NFZB
Rated insulation voltage U_i		
acc. to IEC 60947-5-1		690 V
acc. to UL / CSA		
Rated impulse withstand voltage U_{imp}		6 kV
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A EN 50121-3-2
Ambient air temperature close to contactor relay		
Operation in free air		-40...+70 °C
Storage		-60...+80 °C
Climatic withstand		Category B according to IEC 60947-1 Annex Q
Maximum operating altitude (without derating)		3000 m
Mechanical durability		
Number of operating cycles		20 millions operating cycles
Maximum switching frequency		6000 cycles/h
Shock and vibration withstand		
acc. to IEC 61373		Category 1, class B

Magnet system characteristics

Contactor types	DC operated	NFZB
Coil operating limits	DC supply	At $\theta \leq 70$ °C $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$
acc. to IEC 60947-5-1		
DC control voltage		
Rated control circuit voltage U_c		20 ... 250 V DC
Coil consumption	Average pull-in value	(NFZ) 12 ... 16 W
	Average holding value	(NFZ) 1.7 W
PLC-output control		(NFZ) ≥ 500 mA 24 V DC
Drop-out voltage		≤ 60 % of $U_c \text{ min.}$
Operating time		
Between coil energization and:	N.O. contact closing	40...95 ms
	N.C. contact opening	38...90 ms
Between coil de-energization and:	N.O. contact opening	11...95 ms
	N.C. contact closing	13...98 ms

Mounting characteristics

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

NFZB 4 and 8-pole contactor relays

Technical data

Connecting characteristics

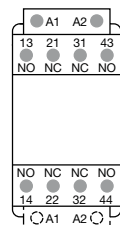
Contactor types	DC operated	NFZB
Main terminals		
	Screw terminals with cable clamp	
Connection capacity (min. ... max.)		
Pole and coil terminals		
 Rigid	1 x	1...2.5 mm ²
 Flexible with non insulated ferrule	2 x	1...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	2 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	1 x	0.75...2.5 mm ²
 Flexible with insulated ferrule	2 x	0.75...1.5 mm ²
 Lugs	L <	8 mm
Connection capacity acc. to UL / CSA	1 or 2 x	
Stripping length		10 mm
Tightening torque		
Coil terminals		1.2 Nm
Built-in auxiliary terminals		1.2 Nm
Degree of protection		
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529		
All terminals		IP20
Screwdriver type	Delivered in open position, screws of unused terminals must be tightened	
Main terminals		M3.5
	Screwdriver type	Flat Ø 5.5 / Pozidriv 2

NFZB contactor relays

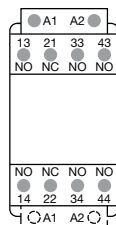
Terminal marking and positioning

NFZB contactors - DC operated

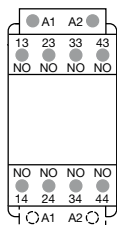
Standard devices without addition of auxiliary contacts



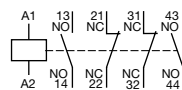
NFZB22E



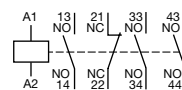
NFZB31E



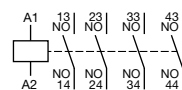
NFZB40E



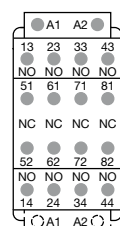
NFZB22E



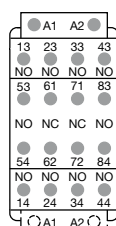
NFZB31E



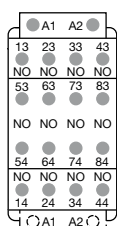
NFZB40E



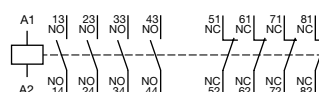
NFZB44E



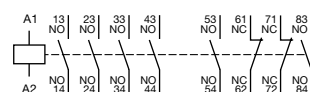
NFZB62E



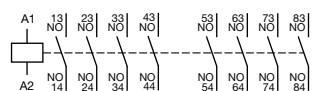
NFZB80E



NFZB44E

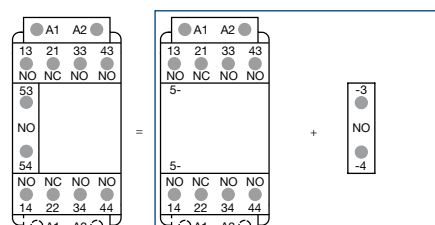


NFZB62E

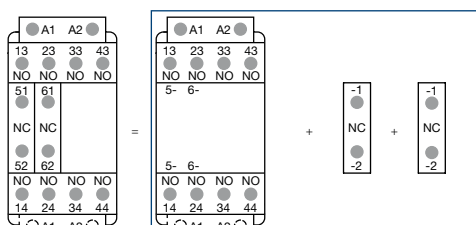


NFZB80E

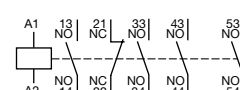
Other possible contact combinations with auxiliary contacts added by the user



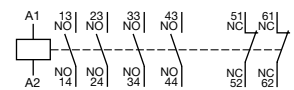
Combination 41 = NFZB31E + CA4-10



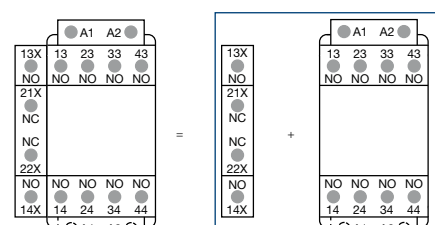
Combination 42 = NFZB40E + CA4-01+CA4-01



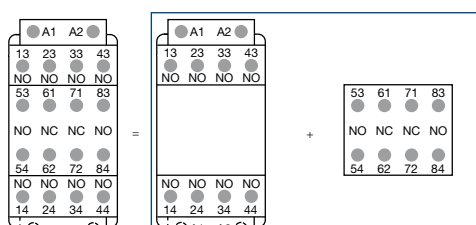
Combination 41 E



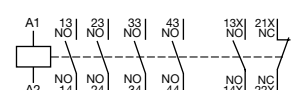
Combination 42 E



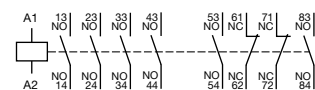
Combination 51 = CAL4-11 + NFZB40E



Combination 62 = NFZB40E + CA4-22N



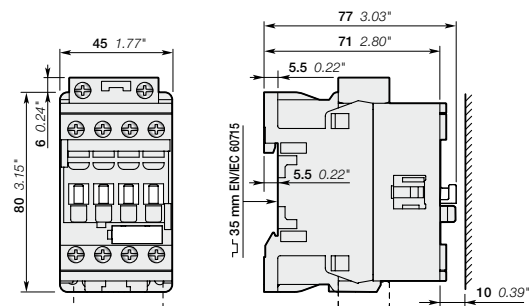
Combination 51 E



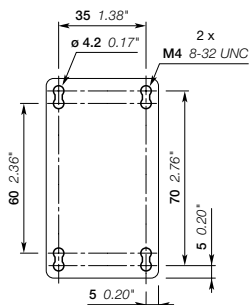
Combination 62 E

NFZB contactor relays

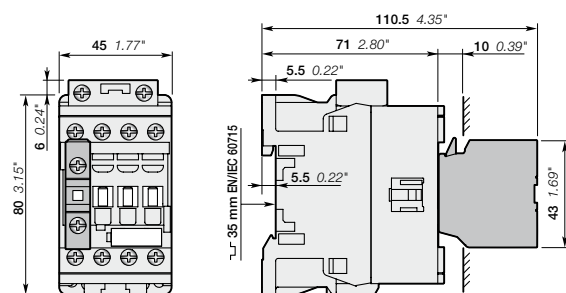
Main dimensions mm, inches



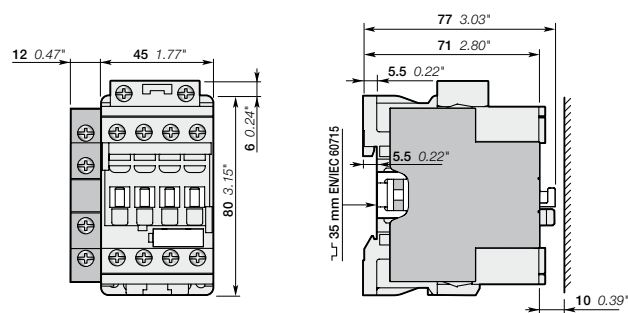
NFZB22E, NFZB31E, NFZB40E



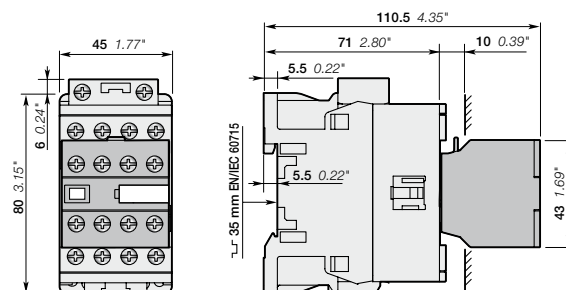
NFZB



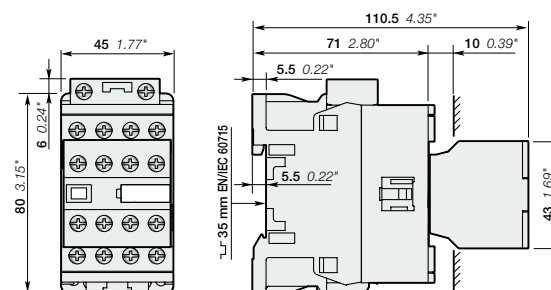
NFZB22E, NFZB31E, NFZB40E
+ CA4 1-pole auxiliary contact block



NFZB22E, NFZB31E, NFZB40E
+ CAL4-11 2-pole auxiliary contact block



NFZB22E, NFZB31E, NFZB40E
+ CA4 4-pole auxiliary contact block



NFZB44E, NFZB62E, NFZB80E

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

Notes

Auxiliary contact blocks

Connection with standard ferrules



CA4-10-T



CA4-22M



CAL4-11-T



CAT4-11E

Description

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

Types of auxiliary contact blocks for front mounting:

- CA4 1 or 4-pole block, with instantaneous N.O., N.C. contacts
- CAT4 2-pole block, with instantaneous N.O. + N.C. contacts and A1 / A2 coil terminal connection on front face.

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

Types of auxiliary contact blocks for side mounting:

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

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

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

Ordering details (1)

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

Front-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 0 - -	CA4-10-T	1SBN010110T1010	10	0.014
4-pole NFZB	0 1 - -	CA4-01-T	1SBN010110T1001	10	0.014
AF09ZB ... AF16ZB-30-10	2 2 - -	CA4-22M	1SBN010140R1122	1	0.055
	3 1 - -	CA4-31M	1SBN010140R1131	1	0.055
	1 3 - -	CA4-13M	1SBN010140R1113	1	0.055
	0 4 - -	CA4-04M	1SBN010140R1104	1	0.055
AF26ZB ... AF38ZB-30-00	2 2 - -	CA4-22E	1SBN010140R1022	1	0.055
AF09ZB ... AF38ZB-40-00	3 1 - -	CA4-31E	1SBN010140R1031	1	0.055
AF09ZB ... AF38ZB-22-00	4 0 - -	CA4-40E	1SBN010140R1040	1	0.055
AF26ZB ... AF38ZB-30-00	0 4 - -	CA4-04E	1SBN010140R1004	1	0.055
AF09ZB ... AF16ZB-40-00					
AF09ZB ... AF16ZB-30-01	2 2 - -	CA4-22U	1SBN010140R1322	1	0.055
	3 1 - -	CA4-31U	1SBN010140R1331	1	0.055
	4 0 - -	CA4-40U	1SBN010140R1340	1	0.055
4-pole NFZB	4 0 - -	CA4-40N	1SBN010140R1240	1	0.055
	3 1 - -	CA4-31N	1SBN010140R1231	1	0.055
	2 2 - -	CA4-22N	1SBN010140R1222	1	0.055
	1 3 - -	CA4-13N	1SBN010140R1213	1	0.055
NFZB40E	0 4 - -	CA4-04N	1SBN010140R1204	1	0.055

Side-mounted instantaneous auxiliary contact blocks

AF09ZB ... AF38ZB	1 1 - -	CAL4-11-T	1SBN010120T1011	10	0.040
NFZB					

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

AF09ZB ... AF16ZB-30-10	1 1 - -	CAT4-11M	1SBN010151R1111	1	0.040
AF09ZB ... AF38ZB-40-00	1 1 - -	CAT4-11E	1SBN010151R1011	1	0.040
AF09ZB ... AF38ZB-22-00					
AF26ZB ... AF38ZB-30-00					
AF09ZB ... AF16ZB-30-01	1 1 - -	CAT4-11U	1SBN010151R1311	1	0.040

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

Auxiliary contact blocks

Connection with standard ferrules

Technical data

Contact utilization characteristics according to IEC

Types	1-pole CA4 , 4-pole CA4 , 2-pole CAT4 , 2-pole CAL4	
Standards	IEC 60947-5-1 and EN 60947-5-1	
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated operational voltage U_e max.	24 ... 690 V	
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	16 A	
Rated frequency (without derating)	50 / 60 Hz	
I_e / Rated operational current AC-15 acc. to IEC 60947-5-1	24-127 V 50/60 Hz	6 A
	220-240 V 50/60 Hz	4 A
	400-440 V 50/60 Hz	3 A
	500 V 50/60 Hz	2 A
	690 V 50/60 Hz	2 A
Making capacity	10 x I_e AC-15 acc. to IEC 60947-5-1	
Breaking capacity	10 x I_e AC-15 acc. to IEC 60947-5-1	
I_e / Rated operational current DC-13 acc. to IEC 60947-5-1	24 V DC	6 A / 144 W
	48 V DC	2.8 A / 134 W
	72 V DC	1 A / 72 W
	110 V DC	0.55 A / 60 W
	125 V DC	0.55 A / 69 W
	220 V DC	0.27 A / 60 W
	250 V DC	0.27 A / 68 W
	400 V DC	0.15 A / 60 W
	500 V DC	0.13 A / 65 W
	600 V DC	0.1 A / 60 W
Short-circuit protection device gG type fuse	10 A	
Rated short-time withstand current I_{cw} $\theta \leq 40^\circ\text{C}$	for 1.0 s	100 A
	for 0.1 s	140 A
Minimum switching capacity with failure rate acc. to IEC 60947-5-4	12 V / 3 mA	
Power dissipation per pole at 6 A	10 ⁻⁷	
Mechanical durability Number of operating cycles	0.1 W	
Max. switching frequency	10 millions operating cycles	
Max. electrical switching frequency	AC-15	3600 cycles/h
	DC-13	1200 cycles/h
Mechanically linked contacts acc. to annex L of IEC 60947-5-1	Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts.	
Mirror contacts acc. to annex F of IEC 60947-4-1	Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts.	

Contact utilization characteristics according to UL / CSA

Types	1-pole CA4 , 4-pole CA4 , 2-pole CAT4 , 2-pole CAL4	
Standards	UL 508, CSA C22.2 N°14	
Max. operational voltage	600 V AC, 600 V DC	
Pilot duty	A600, Q600	
AC thermal rated current	10 A	
AC maximum volt-ampere making	7200 VA	
AC maximum volt-ampere breaking	720 VA	
DC thermal rated current	2.5 A	
DC maximum volt-ampere making-breaking	69 VA	

Connecting characteristics

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

Auxiliary contact blocks for AF09ZB ... AF38ZB contactors and NFZB contactor relays

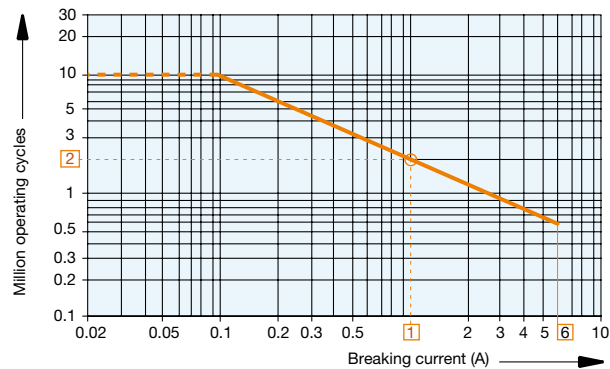
Electrical durability

Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \varphi = 0.7$ and U_e
- breaking current: I_e with $\cos \varphi = 0.4$ and U_e .

These curves represent the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current. The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

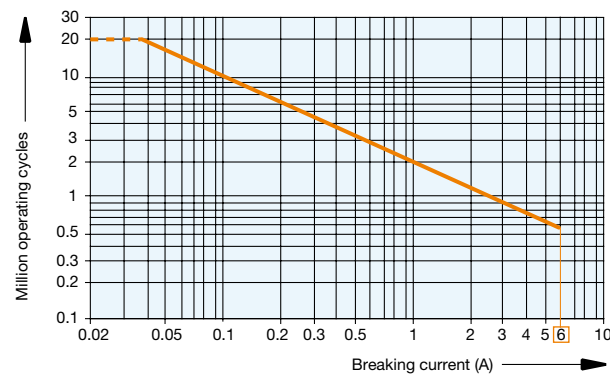


- AF09ZB ... AF38ZB contactor built-in auxiliary contacts
- CA4, CAT4 and CAL4 add-on auxiliary contacts.

Example:

Breaking current = 1 A

On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

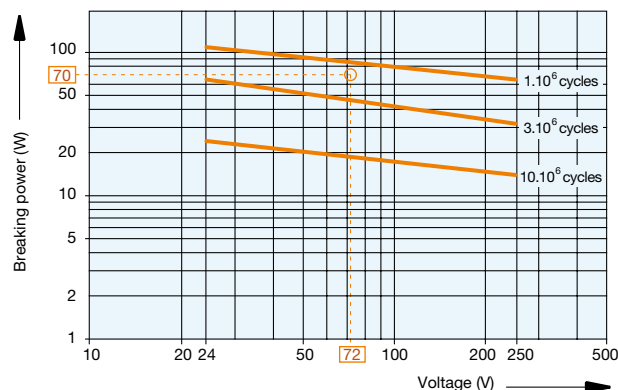


NFZB contactor relays.

(For add on auxiliary contacts see curve above).

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current I_e and U_e .



- AF09ZB ... AF38ZB contactor built-in auxiliary contacts
- CA4, CAT4 and CAL4 add-on auxiliary contacts
- NFZB contactor relays.

Example:

Control of DC electro-magnet:

U_e voltage = 72 V DC and breaking power = 70 W.

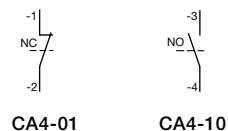
On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Add-on auxiliary contacts

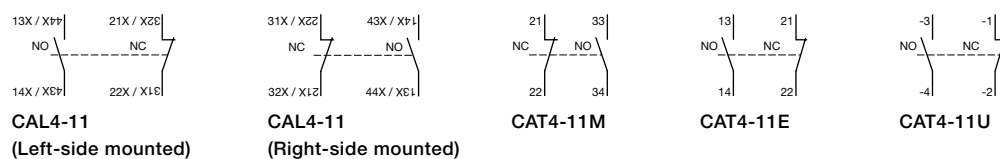
Terminal marking and positioning

Connection with standard ferrules

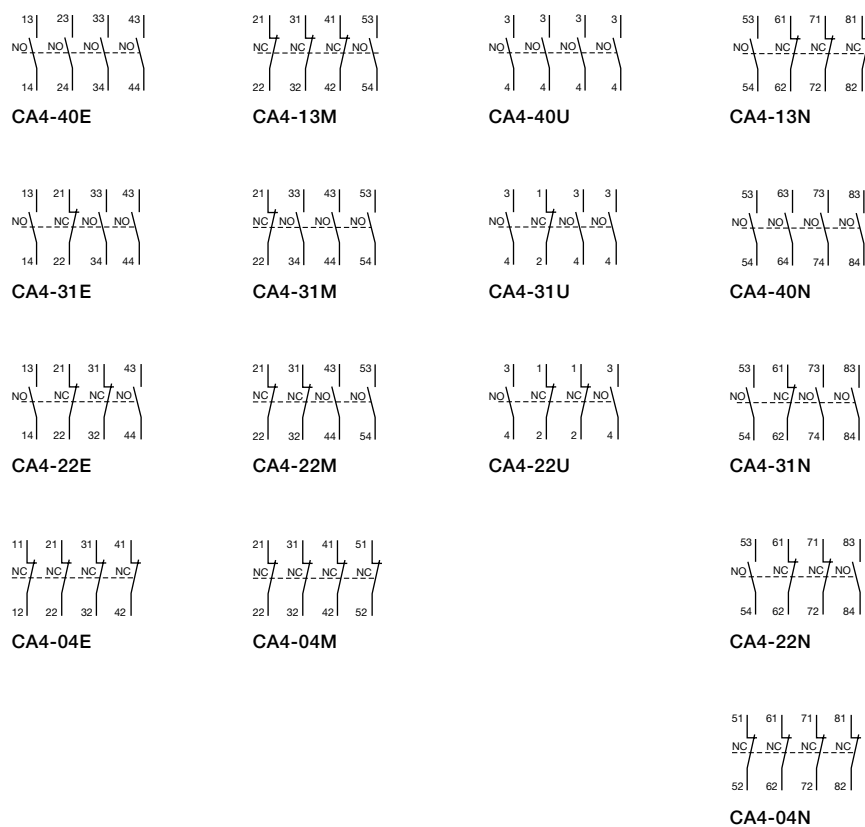
1-pole auxiliary contacts



2-pole auxiliary contacts



4-pole auxiliary contacts

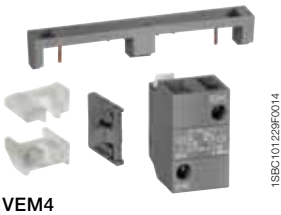


Interlocks and connection sets

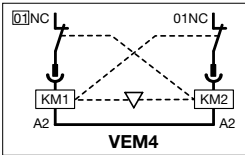
Connection with standard ferrules



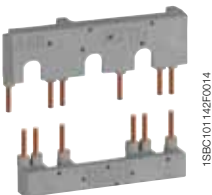
VM4



VEM4



BB4



BER16-4

Mechanical interlock units

Description

The VM mechanical interlock units are designed for the interlocking of two AF contactors. When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed. The mechanical interlock unit includes 2 fixing clips (BB4).

Ordering details

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09ZB ... AF38ZB...-30-..	VM4	1SBN030105T1000	10	0.005
AF09ZB ... AF38ZB...-40-00				

Mechanical and electrical interlock sets

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	Type	Order code	Pkg qty	Weight (1 pce) kg
Mechanical and electrical interlock set					
AF09ZB ... AF16ZB...-30-..	0 2	VEM4	1SBN030111R1000	1	0.035
AF26ZB ... AF38ZB...-30-00					
AF09ZB, AF16ZB...-40-00					
AF26ZB, AF38ZB...-40-00					
Fixing clips					
AF09ZB ... AF38ZB		BB4	1SBN110120W1000	50	0.002

Connection sets for reversing contactors

Description

The BER16-4 and BER38-4 connection sets are used to connect the main poles of two 3-pole contactors mounted side by side. The BER connection sets are made up of 1 upstream and 1 downstream connections: insulated, solid copper bars.

Ordering details

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
AF09ZB ... AF16ZB...-30-..	BER16-4	1SBN081311R1000	1	0.045
AF26ZB ... AF38ZB...-30-..	BER38-4	1SBN082311R1000	1	0.100

Interlocks

Connection with standard ferrules

Technical data

Mechanical interlock unit

Contact utilization characteristics according to IEC

Types	VM4
Mechanical durability	Number of operating cycles
	Max. mechanical switching frequency
	5 millions operating cycles
	1800 cycles/h

Mechanical and electrical interlock set

Contact utilization characteristics according to IEC

Types	VEM4
Standards	IEC 60947-5-1 and EN 60947-5-1
Rated insulation voltage U_i acc. to IEC 60947-5-1	690 V
Rated impulse withstand voltage U_{imp}	6 kV
Rated control voltage U_c	
	DC control voltage
	20...500 V DC
Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$	16 A
Mechanical durability	Number of operating cycles
	Max. mechanical switching frequency
	5 millions operating cycles
	1800 cycles/h
Electrical durability	Max. electrical switching frequency
	1200 cycles/h

Contact utilization characteristics according to UL / CSA

Types	VEM4
Standards	UL 508, CSA C22.2 N°14
Max. operational voltage	500 V AC, 500 V DC

Connecting characteristics

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

Other accessories

Connection with standard ferrules



Ordering details

For contactors	Type	Order code	Pkg qty	Weight (1 pce) kg
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Additional coil terminal blocks

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

AF09ZB ... AF38ZB NFZB	LDC4	1SBN070156T1000	10	0.010
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Protective covers

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

All 1-stack contactors and contactor relays	BX4	1SBN110108T1000	10	0.006
For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks	BX4-CA	1SBN110109W1000	50	0.001



Mounting piece

Mounting piece for replacing TAL26 ... TAL40 contactors fixed by screws by AF..ZB contactors in 45 mm width.

AF09ZB ... AF38ZB	BP38-4	1SBN112303T1000	10	0.003
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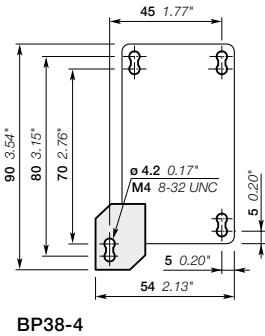
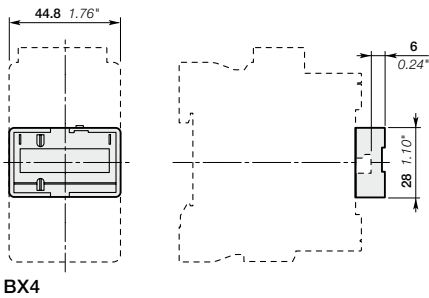
Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.
Marker dimensions: 7 x 20 mm (.276" x .787").



Box of 16 black cards	BA4	1SNA235156R2700	16	0.011
AMS 500 support plate for 8 BA4	SPRC 1	1SNA360010R1500	1	0.220
HTP500 support plate	HTP500-BA4	1SNA235712R2400	1	0.290

Main dimensions mm, inches

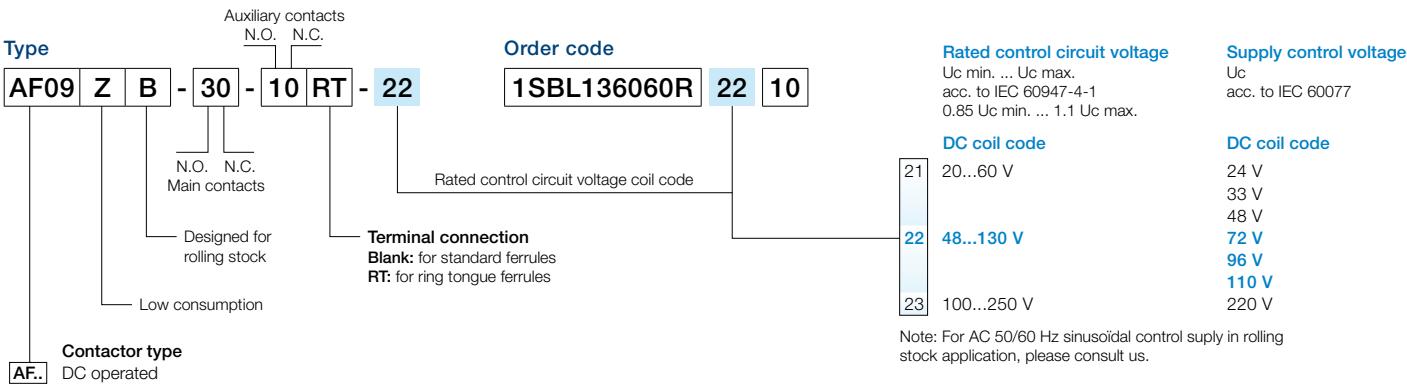


Voltage code table

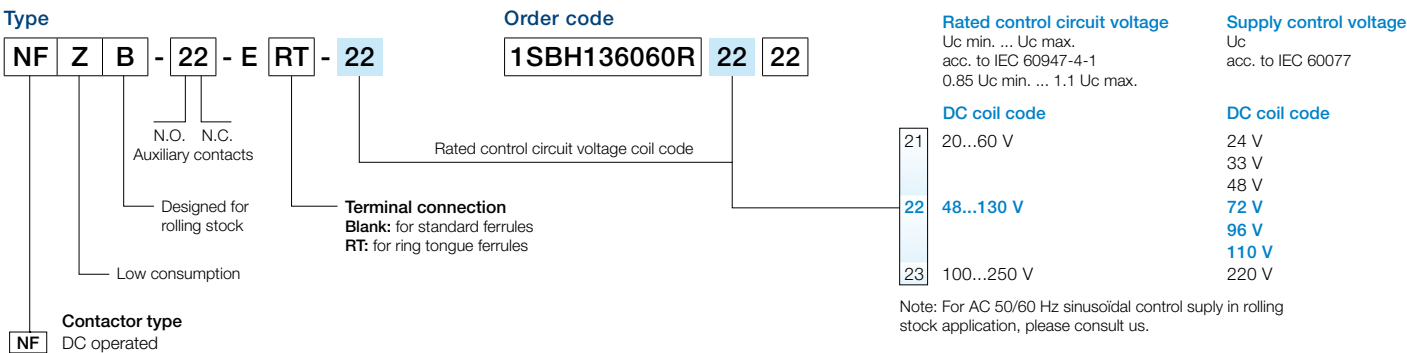
The below tables indicate the available voltage ranges U_c min. ... U_c max. usually used in rolling stock application according to IEC 60077 standard. When placing an order, please check the required control supply and select the corresponding AF..ZB / NFZB control voltage range. Select a standard contactor from ordering detail pages. Change the **coil voltage code** in the order code according to the table below. Example: for contactor AF09ZB-30-10RT and coil 48...130 V DC, type is AF09ZB-30-10RT-22 and order code is 1SBL136060R2210.

Control supply	Rated control circuit voltage	Coil code
U_c min. ... U_c max. acc. to IEC 60077	U_c min. ... U_c max. acc. to IEC 60947-4-1 0.85 U_c min. ... 1.1 U_c max.	
V DC	V DC	
17...32 23...42.5 23...44.5 25...45 33...60 36...65	20...60	21
42...78 50...90 55...96 63...113 67...120 77...143	48...130	22
87.5...162.5 90...150 105...183 120...167 152...264 187...253	100...250	23

AF..ZB 3 & 4-pole contactors



NFZB contactor relays



Contact us

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