

AF09 ... AF38 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

Contactors types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1					
Rated operational voltage U _e max.		690 V					
Rated frequency (without derating)		50 / 60 Hz					
Conventional free-air thermal current I _{th}							
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40\text{ }^\circ\text{C}$		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	$\theta \leq 40\text{ }^\circ\text{C}$	25 A	28 A	30 A	45 A	50 A	50 A
U _e max. $\leq 690\text{ V}$, 50/60 Hz	$\theta \leq 60\text{ }^\circ\text{C}$	25 A	28 A	30 A	40 A	42 A	42 A
	$\theta \leq 70\text{ }^\circ\text{C}$	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 $\theta \leq 60\text{ }^\circ\text{C}$							
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					
AC-8a Utilization category							
(without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40\text{ }^\circ\text{C}$)							
I_e / Rated operational current AC-8a		12 A	16 A	22 A	30 A	40 A	50 A
Rated operational power AC-8a		5,5 kW	7,5 kW	11 kW	15 kW	20 kW	25 kW
Short-circuit protection device for contactors							
without thermal overload relay - Motor protection excluded (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}							
at 40 °C ambient temperature, in free air from a cold state							
	1 s	300 A	300 A	300 A	700 A	700 A	700 A
	10 s	150 A	150 A	150 A	350 A	350 A	350 A
	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 $\phi = 0,45$							
	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".

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

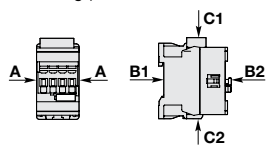
Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Standards		UL 60947-1 / 60947-4-1A and CSA 60947-1 / 60947-4-1A					
Max. operational voltage		600 V					
NEMA size		00	0	-	1	-	-
NEMA continuous amp rating	Thermal current	9 A	18 A		27 A		
NEMA maximum horse power ratings 1-phase, 60 Hz	115 V AC	1/3 hp	1 hp		2 hp		
	230 V AC	1 hp	2 hp		3 hp		
NEMA maximum horse power ratings 3-phase, 60 Hz	200 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	230 V AC	1-1/2 hp	3 hp		7-1/2 hp		
	460 V AC	2 hp	5 hp		10 hp		
	575 V AC	2 hp	5 hp		10 hp		
UL / CSA general use rating	600 V AC	25 A	28 A	30 A	45 A	50 A	50 A
	With conductor cross-sectional area	AWG 10	AWG 10	AWG 10	AWG 8	AWG 8	AWG 8
UL / CSA maximum 1-phase motor rating	Full load current	120 V AC	13.8 A	16 A	20 A	24 A	24 A
		240 V AC	10 A	12 A	17 A	17 A	28 A
	Horse power rating	120 V AC	3/4 hp	1 hp	1-1/2 hp	2 hp	2 hp
		240 V AC	1-1/2 hp	2 hp	3 hp	3 hp	5 hp
UL / CSA maximum 3-phase motor rating	Full load current (1)	200-208 V AC	7.8 A	11 A	17.5 A	25.3 A	32.2 A
		220-240 V AC	6.8 A	9.6 A	15.2 A	22 A	28 A
		440-480 V AC	7.6 A	11 A	14 A	21 A	27 A
		550-600 V AC	9 A	11 A	17 A	22 A	27 A (2)
	Horse power rating (1)	200-208 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp
		220-240 V AC	2 hp	3 hp	5 hp	7-1/2 hp	10 hp
		440-480 V AC	5 hp	7-1/2 hp	10 hp	15 hp	20 hp
		550-600 V AC	7-1/2 hp	10 hp	15 hp	20 hp	25 hp (2)
Short-circuit protection device for contactors		without thermal overload relay - Motor protection excluded					
High fault current		100 kA					
Fuse rating		30 A	30 A	60 A	60 A	100 A	200 A
Fuse type, 600 V		J					
Max. electrical switching frequency		For general use 600 cycles/h					
		For motor use 1200 cycles/h					

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

(2) For contactors produced since week 49-2011.

General technical data

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Rated insulation voltage Ui		acc. to IEC 60947-4-1 690 V					
		acc. to UL / CSA 600 V					
Rated impulse withstand voltage Uimp.		6 kV					
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A					
Ambient air temperature close to contactor		Operation Fitted with thermal overload relay -25...+60 °C					
		Without thermal overload relay -40...+70 °C					
Storage		-60...+80 °C					
Climatic withstand		Category B according to IEC 60947-1 Annex Q					
Maximum operating altitude (without derating)		3000 m					
Mechanical durability		Number of operating cycles 10 millions operating cycles					
		Max. switching frequency 3600 cycles/h					
Shock withstand		acc. to IEC 60068-2-27 and EN 60068-2-27					
Mounting position 1		Shock direction					
		1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position					
		A 30 g					
		B1 25 g closed position / 5 g open position					
		B2 15 g					
		C1 25 g					
		C2 25 g					
Vibration withstand		acc. to IEC 60068-2-6 5...300 Hz 4 g closed position / 2 g open position					



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Magnet system characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Coil operating limits acc. to IEC 60947-4-1	AC supply	At $\theta \leq 60\text{ °C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70\text{ °C}$ $0.85 \times U_c \text{ min...} U_c \text{ max.}$					
	DC supply	At $\theta \leq 60\text{ °C}$ $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$ At $\theta \leq 70\text{ °C}$ (AF) $0.85 \times U_c \text{ min...} U_c \text{ max.}$ - (AF..Z) $0.85 \times U_c \text{ min...} 1.1 \times U_c \text{ max.}$					
AC control voltage 50/60 Hz		24...500 V AC					
Rated control circuit voltage U_c		24...500 V AC					
Coil consumption	Average pull-in value	(AF) 50 VA - (AF..Z) 16 VA					
	Average holding value	(AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W					
DC control voltage		12...500 V DC					
Rated control circuit voltage U_c		12...500 V DC					
Coil consumption	Average pull-in value	(AF) 50 W - (AF..Z) 12...16 W					
	Average holding value	(AF) 2 W - (AF..Z) 1.7 W					
PLC-output control		(AF..Z) $\geq 500\text{ mA}$ 24 V DC					
Drop-out voltage		$\leq 60\%$ of $U_c \text{ min.}$					
Voltage sag immunity acc. to SEMI F47-0706		(AF..Z) conditions of use on request					
Dips withstand $-20\text{ °C} \leq \leq +60\text{ °C}$		(AF..Z) 22 ms average for $U_c \geq 24\text{ V}$ 50/60 Hz or $U_c \geq 20\text{ V}$ DC					
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	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Mounting positions							
Mounting distances		Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38					
Fixing		The contactors can be assembled side by side					
On rail according to IEC 60715, EN 60715		35 x 7.5 mm or 35 x 15 mm					
By screws (not supplied)		2 x M4 screws placed diagonally					

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Connecting characteristics

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38
Main terminals		 <p>Screw terminals with cable clamp</p>					
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	
 Flexible with insulated ferrule		2 x	0.75...6 mm ²			1.5...10 mm ²	
 Flexible with insulated ferrule		1 x	0.75...4 mm ²			1.5...10 mm ²	
 Flexible with insulated ferrule		2 x	0.75...2.5 mm ²			1.5...4 mm ²	
 Bars or lugs		L <	9.6 mm			12.5 mm	
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 16...10			AWG 14...8	
Stripping length			10 mm			14 mm	
Tightening torque			1.5 Nm / 13 lb.in			2.5 Nm / 22 lb.in	
Auxiliary conductors							
(built-in auxiliary terminals + coil terminals)							
 Rigid solid		1 x	1...2.5 mm ²				
 Rigid solid		2 x	1...2.5 mm ²				
 Flexible with non insulated ferrule		1 x	0.75...2.5 mm ²				
 Flexible with non insulated ferrule		2 x	0.75...2.5 mm ²				
 Flexible with insulated ferrule		1 x	0.75...2.5 mm ²				
 Flexible with insulated ferrule		2 x	0.75...1.5 mm ²				
 Lugs		L <	8 mm				
Connection capacity acc. to UL/CSA		1 or 2 x	AWG 18...14				
Stripping length			10 mm				
Tightening torque							
Coil terminals			1.2 Nm / 11 lb.in				
Built-in auxiliary terminals			1.2 Nm / 11 lb.in				
Degree of protection							
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529							
Main terminals		IP20					
Coil terminals		IP20					
Built-in auxiliary terminals		IP20					
Screw terminals		Delivered in open position, screws of unused terminals must be tightened					
Main terminals			M3.5			M4	
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2			Flat Ø 6.5 / Pozidriv 2	
Coil terminals			M3.5				
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2				
Built-in auxiliary terminals			M3.5				
		Screwdriver type	Flat Ø 5.5 / Pozidriv 2				

AF09 ... AF96 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
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										
le / 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										
le / 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 _{ow}	for 1.0 s	100 A										
	for 0.1 s	140 A										
Minimum switching capacity with failure rate acc. to IEC 60947-5-4		12 V / 3 mA										
Non-overlapping time between N.O. and N.C. contacts		10 ⁻⁷										
Power dissipation per pole at 6 A		≥ 2 ms										
Max. electrical switching frequency	AC-15	0.1 W										
	DC-13	1200 cycles/h										
		900 cycles/h										
Mechanically linked contacts acc. to annex L of IEC 60947-5-1		Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts.										
Mirror contacts acc. to annex F of IEC 60947-4-1		Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts.										

Built-in auxiliary contacts according to UL / CSA

Contactor types	AC / DC operated	AF09	AF12	AF16	AF26	AF30	AF38	AF40	AF52	AF65	AF80	AF96
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										