

MAIN CATALOG 2020

# Motor protection and control

Manual motor starters,  
contactors and overload relays



# AF40 ... AF96 3-pole contactors

18.5 to 30 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF40-30-11



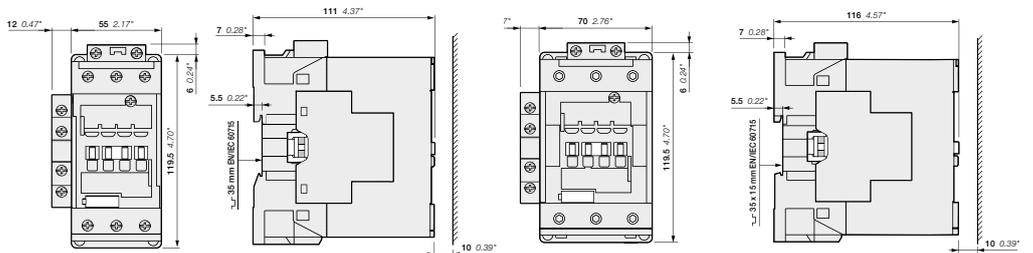
AF80-30-11

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- with 1 N.O. + 1 N.C. side mounted auxiliary contact block
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

IEC		UL / CSA		Rated control circuit voltage		Auxiliary contacts fitted	Type	Order code	Weight
Rated operational power	current $\theta \leq 40^\circ\text{C}$	3-phase motor rating	General use rating	Uc min. ... Uc max.					
400 V AC-3 kW	AC-1 A	hp	600 V AC A	V 50/60 Hz	V DC				kg
185	70	30	60	24...60	20...60 (1)	1 1	AF40-30-11-11	1SBL347001R1111	1.010
				48...130	48...130	1 1	AF40-30-11-12	1SBL347001R1211	1.010
				100...250	100...250	1 1	AF40-30-11-13	1SBL347001R1311	0.990
				250...500	250...500	1 1	AF40-30-11-14	1SBL347001R1411	0.990
22	100	40	80	24...60	20...60 (1)	1 1	AF52-30-11-11	1SBL367001R1111	1.010
				48...130	48...130	1 1	AF52-30-11-12	1SBL367001R1211	1.010
				100...250	100...250	1 1	AF52-30-11-13	1SBL367001R1311	0.990
				250...500	250...500	1 1	AF52-30-11-14	1SBL367001R1411	0.990
30	105	50	90	24...60	20...60 (1)	1 1	AF65-30-11-11	1SBL387001R1111	1.010
				48...130	48...130	1 1	AF65-30-11-12	1SBL387001R1211	1.010
				100...250	100...250	1 1	AF65-30-11-13	1SBL387001R1311	0.990
				250...500	250...500	1 1	AF65-30-11-14	1SBL387001R1411	0.990
37	125	60	105	24...60	20...60 (1)	1 1	AF80-30-11-11	1SBL397001R1111	1.260
				48...130	48...130	1 1	AF80-30-11-12	1SBL397001R1211	1.260
				100...250	100...250	1 1	AF80-30-11-13	1SBL397001R1311	1.210
				250...500	250...500	1 1	AF80-30-11-14	1SBL397001R1411	1.210
45	130	60	115	24...60	20...60 (1)	1 1	AF96-30-11-11	1SBL407001R1111	1.260
				48...130	48...130	1 1	AF96-30-11-12	1SBL407001R1211	1.260
				100...250	100...250	1 1	AF96-30-11-13	1SBL407001R1311	1.210
				250...500	250...500	1 1	AF96-30-11-14	1SBL407001R1411	1.210

(1) For control by PLC-output, use RA4 interface relay.



AF40, AF52, AF65-30-11...

AF80, AF96-30-11...

Main dimensions mm, inches

# AF40 ... AF96 3-pole contactors

## Technical data

### Main pole - Utilization characteristics according to IEC

Contactors types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1				
Rated operational voltage $U_e$ max.		690 V				1000 V
Rated frequency (without derating)		50 / 60 Hz				
Conventional free-air thermal current $I_{th}$						
acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$		105 A	105 A	105 A	130 A	130 A
With conductor cross-sectional area		35 mm <sup>2</sup>	35 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	50 mm <sup>2</sup>
AC-1 Utilization category						
For air temperature close to contactor						
$I_e$ / Rated operational current AC-1	$\theta \leq 40^\circ\text{C}$	70 A	100 A	105 A	125 A	130 A
$U_e$ max. $\leq 690\text{ V}$ , 50/60 Hz	$\theta \leq 60^\circ\text{C}$	60 A	80 A	90 A	100 A	105 A
	$\theta \leq 70^\circ\text{C}$	50 A	70 A	80 A	85 A	90 A
With conductor cross-sectional area		25 mm <sup>2</sup>	35 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	50 mm <sup>2</sup>
AC-3, AC-3e Utilization category						
For air temperature close to contactor $\theta \leq 60^\circ\text{C}$						
$I_e$ / Max. rated operational current AC-3, AC-3e (1)						
AC-3e $U_e \leq 690\text{ V}$	220-230-240 V	40 A	53 A	65 A	80 A	96 A
	380-400 V	40 A	53 A	65 A	80 A	96 A
	415 V	40 A	53 A	65 A	80 A	96 A
	440 V	40 A	53 A	65 A	80 A	96 A
	500 V	35 A	45 A	55 A	65 A	80 A
	690 V	25 A	35 A	39 A	49 A	57 A
	1000 V	-	-	-	25 A	30 A
Rated operational power AC-3, AC-3e (1)						
AC-3e $U_e \leq 690\text{ V}$	220-230-240 V	11 kW	15 kW	18.5 kW	22 kW	25 kW
	380-400 V	18.5 kW	22 kW	30 kW	37 kW	45 kW
	415 V	22 kW	30 kW	37 kW	45 kW	55 kW
	440 V	22 kW	30 kW	37 kW	45 kW	55 kW
	500 V	22 kW	30 kW	37 kW	45 kW	55 kW
	690 V	22 kW	30 kW	37 kW	45 kW	55 kW
	1000 V	-	-	-	35 kW	40 kW
Rated making capacity AC-3, AC-3e		10 x $I_e$ AC-3, 12 x $I_e$ AC-3e acc. to IEC 60947-4-1				
Rated breaking capacity AC-3, AC-3e		8 x $I_e$ AC-3, 8.5 x $I_e$ AC-3e acc. to IEC 60947-4-1				
AC-8a Utilization category						
(without thermal overload relay						
$U_e$ 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$ )						
$I_e$ / Rated operational current AC-8a		53 A	70 A	85 A	105 A	120 A
Rated operational power AC-8a		25 kW	37 kW	45 kW	55 kW	65 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		100 A	125 A	160 A	160 A	200 A
Rated short-time withstand current $I_{cw}$	1 s	1000 A	1000 A	1000 A	1200 A	1200 A
at $40^\circ\text{C}$ ambient temperature,	10 s	600 A	600 A	600 A	780 A	780 A
in free air from a cold state	30 s	350 A	350 A	350 A	450 A	450 A
	1 min	250 A	250 A	250 A	300 A	300 A
	15 min	110 A	110 A	110 A	140 A	140 A
Maximum breaking capacity						
$\cos \phi = 0.45$	at 440 V	950 A	950 A	950 A	1150 A	1150 A
	at 690 V	600 A	600 A	600 A	750 A	750 A
Power dissipation per pole	$I_e$ / AC-1	3 W	6.3 W	7 W	7.6 W	8.2 W
	$I_e$ / AC-3, AC-3e	1 W	1.7 W	2.7 W	3 W	4.5 W
Max. electrical switching frequency	AC-1	600 cycles/h				
	AC-3, AC-3e	1200 cycles/h				
	AC-2, AC-4	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".

## AF40 ... AF96 3-pole contactors

### Technical data

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

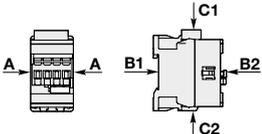
Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Standards		UL 60947-4-1, CSA C22.2 N°60947-4-1				
Maximum operational voltage		600 V				
NEMA size		2	-	-	3	-
NEMA continuous amp rating	Thermal current	45 A	-	-	90 A	-
NEMA maximum horse power ratings						
1-phase, 60 Hz	115 V AC	3 hp	-	-	-	-
	230 V AC	7.5 hp	-	-	-	-
NEMA maximum horse power ratings						
3-phase, 60 Hz	200 V AC	10 hp	-	-	25 hp	-
	230 V AC	15 hp	-	-	30 hp	-
	460 V AC	25 hp	-	-	50 hp	-
	575 V AC	25 hp	-	-	50 hp	-
UL / CSA general use rating						
	600 V AC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
1 pole	80 V DC	60 A	80 A	90 A	105 A	115 A
2 poles in serie	160 V DC	60 A	80 A	90 A	105 A	115 A
3 poles in serie	240 V DC	60 A	80 A	90 A	105 A	115 A
With conductor cross-sectional area		AWG 6	AWG 4	AWG 3	AWG 2	AWG 2
UL / CSA maximum 1-phase motor rating						
Full load current	120 V AC	34 A	34 A	56 A	80 A	80 A
	240 V AC	40 A	50 A	68 A	68 A	88 A
Horse power rating	120 V AC	3 hp	3 hp	5 hp	7-1/2 hp	7-1/2 hp
	240 V AC	7-1/2 hp	10 hp	15 hp	15 hp	20 hp
UL / CSA maximum 3-phase motor rating						
Full load current (1)	200-208 V AC	32.2 A	48.3 A	62.1 A	78.2 A	92 A
	220-240 V AC	42 A	54 A	68 A	80 A	80 A
	440-480 V AC	40 A	52 A	65 A	77 A	77 A
	550-600 V AC	41 A	52 A	62 A	77 A	77 A
Horse power rating (1)	200-208 V AC	10 hp	15 hp	20 hp	25 hp	30 hp
	220-240 V AC	15 hp	20 hp	25 hp	30 hp	30 hp
	440-480 V AC	30 hp	40 hp	50 hp	60 hp	60 hp
	550-600 V AC	40 hp	50 hp	60 hp	75 hp	75 hp
UL / CSA - DC motor starting - 3 poles in series						
Full Load Amps (FLA)	125 V DC	40 A	58 A	76 A	76 A	110 A
	250 V DC	38 A	55 A	72 A	89 A	106 A
Horse power rating	125 V DC	5 hp	7-1/2 hp	10 hp	10 hp	15 hp
	250 V DC	10 hp	15 hp	20 hp	25 hp	30 hp
Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded						
High fault current		100 kA				
Fuse rating		150 A	150 A	150 A	200 A	200 A
Fuse type, 600 V		J				
Maximum 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".

# AF40 ... AF96 3-pole contactors

## Technical data

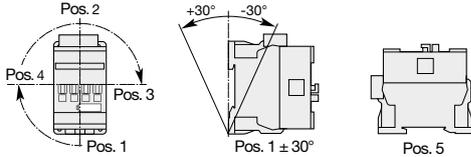
### General technical data

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Rated insulation voltage $U_i$ acc. to IEC 60947-4-1 acc. to UL / CSA		690 V 600 V			1000 V	
Rated impulse withstand voltage $U_{imp}$ .		6 kV			8 kV	
Electromagnetic compatibility		Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1)				
Ambient air temperature close to contactor						
Operation	Fitted with thermal overload relay Without thermal overload relay	-40...+70 °C -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	25 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 3 g closed position / 3 g open position				

### Magnet system characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Coil operating limits acc. to IEC 60947-4-1	AC supply DC supply	At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$				
AC control voltage 50/60 Hz						
Rated control circuit voltage $U_c$		24...500 V AC				
Coil consumption	Average pull-in value Average holding value	25 VA 4 VA / 2 W			40 VA	
DC control voltage						
Rated control circuit voltage $U_c$		20...500 V AC				
Coil consumption	Average pull-in value Average holding value	25 W 2 W			40 W	
PLC-output control		-				
Drop-out voltage		$\leq 60$ % of $U_c \text{ min}$ .				
Voltage sag immunity acc. to SEMI F47-0706		conditions of use on request				
Dips withstand -20 °C $\leq \theta \leq$ +60 °C		20 ms average				
Operating time						
Between coil energization and:	N.O. contact closing N.C. contact opening	42...100 ms 38...95 ms				
Between coil de-energization and:	N.O. contact opening N.C. contact closing	17...100 ms 19...105 ms				

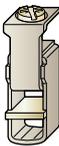
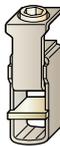
### Mounting characteristics and conditions

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
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 AF40 ... AF96				
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			35 x 15 mm	
By screws (not supplied)		2 x M4 or 2 x M6 screws placed diagonally				

# AF40 ... AF96 3-pole contactors

## Technical data

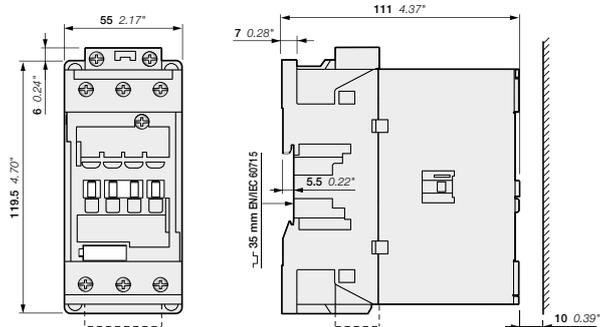
### Connecting characteristics

Contactor types	AC / DC operated	AF40	AF52	AF65	AF80	AF96
Main terminals						
		Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth)			Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth)	
Connection capacity (min. ... max.)						
Main conductors (poles)						
 Rigid	Stranded ( $\geq 6 \text{ mm}^2$ )	1 x	6...35 mm <sup>2</sup>			6...70 mm <sup>2</sup>
 Flexible with non insulated ferrule		2 x	6...35 mm <sup>2</sup>			6...50 mm <sup>2</sup>
 Flexible with insulated ferrule		1 x	4...35 mm <sup>2</sup>			6...50 mm <sup>2</sup>
 Flexible with insulated ferrule		2 x	4...35 mm <sup>2</sup>			6...50 mm <sup>2</sup>
 Flexible with insulated ferrule		1 x	4...35 mm <sup>2</sup>			6...50 mm <sup>2</sup>
 Flexible with insulated ferrule		2 x	4...35 mm <sup>2</sup>			6...50 mm <sup>2</sup>
 Bars or lugs		L <	9.2 mm			12.2 mm
Connection capacity acc. to UL/CSA	1 or 2 x	AWG 10...2			AWG 6...1	
Stripping length		16 mm			17 mm	
Tightening torque		4 Nm / 35 lb.in			6 Nm / 53 lb.in	
Auxiliary conductors (built-in auxiliary terminals + coil terminals)						
 Rigid solid		1 x	1...2.5 mm <sup>2</sup>			
 Rigid solid		2 x	1...2.5 mm <sup>2</sup>			
 Flexible with non insulated ferrule		1 x	0.75...2.5 mm <sup>2</sup>			
 Flexible with non insulated ferrule		2 x	0.75...2.5 mm <sup>2</sup>			
 Flexible with insulated ferrule		1 x	0.75...2.5 mm <sup>2</sup>			
 Flexible with insulated ferrule		2 x	0.75...1.5 mm <sup>2</sup>			
 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		IP10 *				
Coil terminals		IP20				
Built-in auxiliary terminals		IP20				
Screw terminals		Delivered in open position, screws of unused terminals must be tightened				
Main terminals			M6		M8	
	Screwdriver type	Flat Ø 6.5 / Pozidriv 2			Hexagon socket (s = 4 mm)	
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				

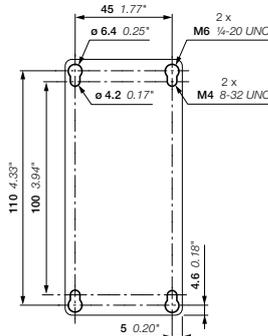
\* For IP20 degree of protection, use LT terminal shroud accessory.

# AF40 ... AF65 3-pole contactors

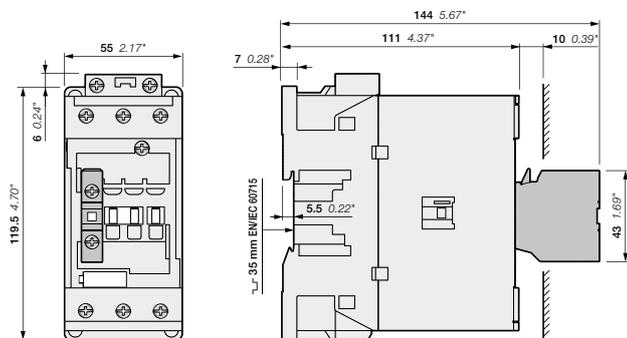
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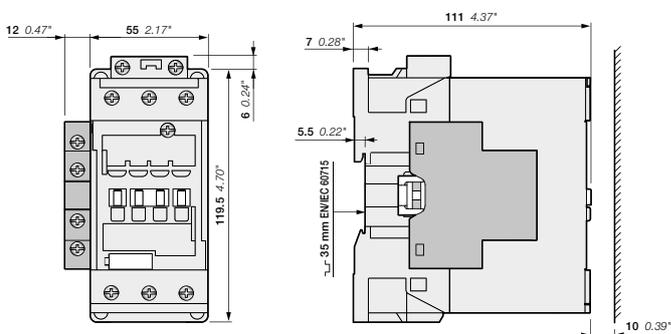
AF40, AF52, AF65



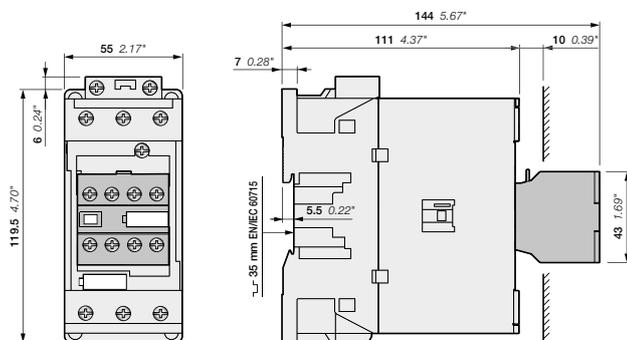
AF40, AF52, AF65



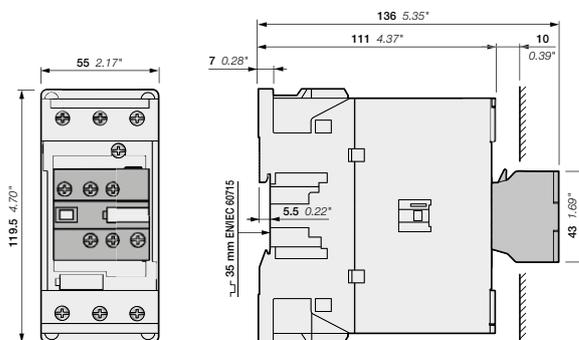
AF40, AF52, AF65  
+ CA4, CC4 1-pole auxiliary contact block



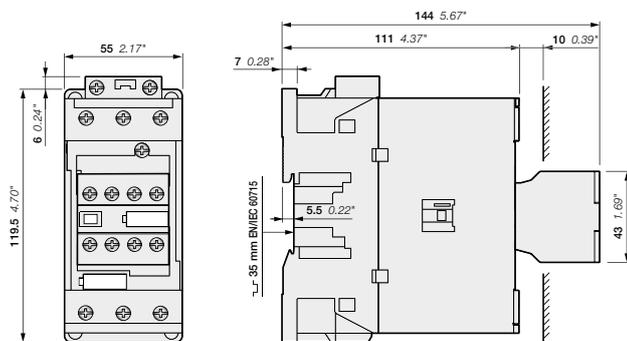
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block  
AF40, AF52, AF65-30-11



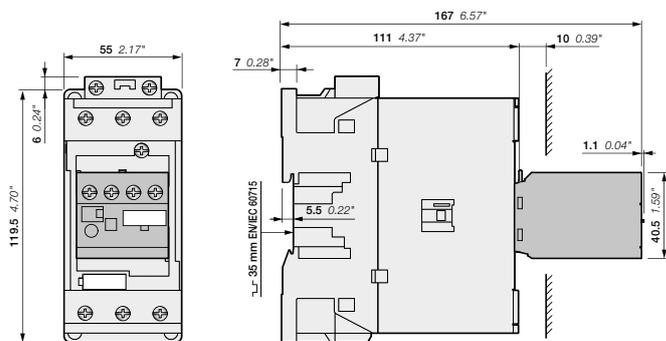
AF40, AF52, AF65  
+ CA4 4-pole auxiliary contact block



AF40, AF52, AF65  
+ CAT4 2-pole auxiliary contact and coil terminal block



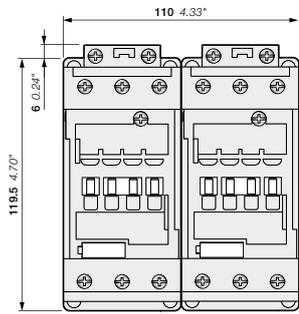
AF40, AF52, AF65...-30-22



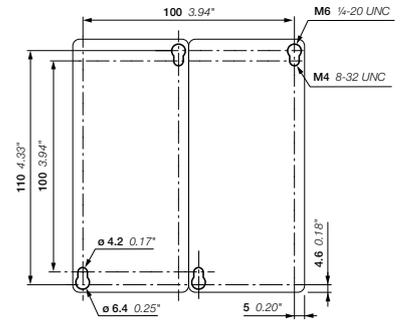
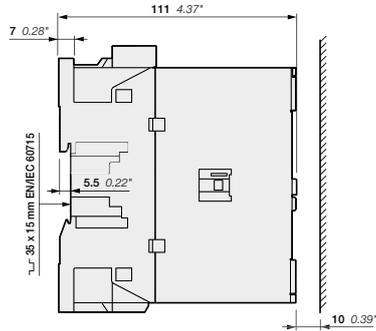
AF40, AF52, AF65  
+ TEF4 electronic timer

# AF40 ... AF65 3-pole contactors

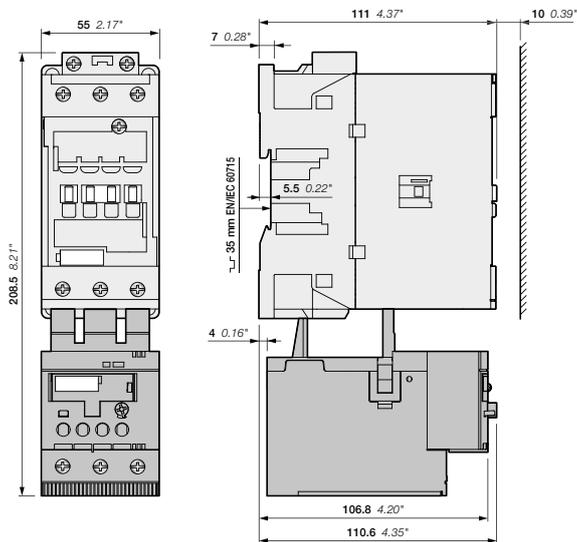
## Dimensions



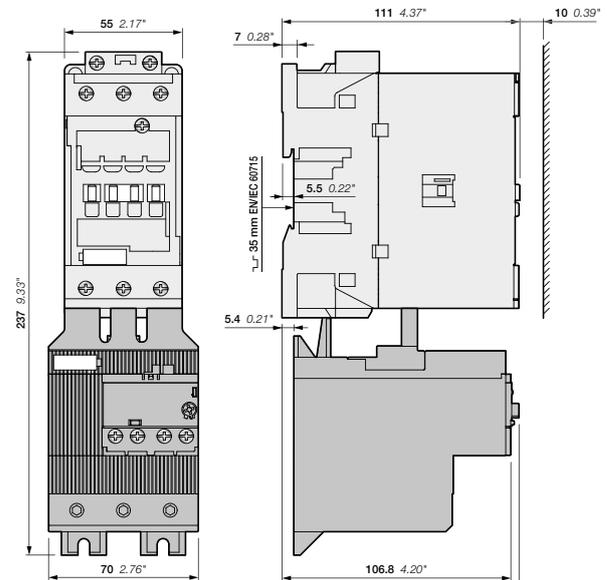
AF40, AF52, AF65  
+ VM96-4 mechanical interlock unit



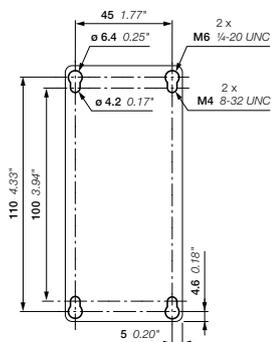
AF40, AF52, AF65  
+ VM96-4 mechanical interlock set



AF40, AF52, AF65  
+ TF65 thermal overload relay



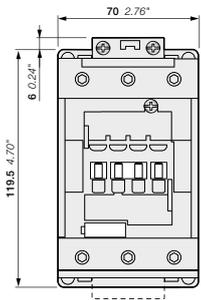
AF40, AF52, AF65  
+ EF65 electronic overload relay



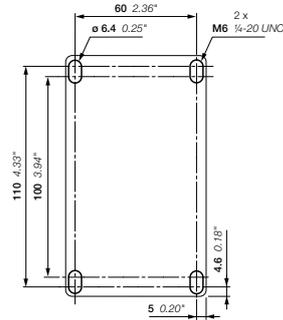
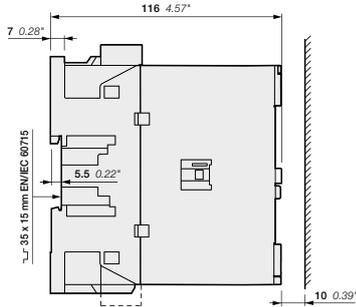
AF40, AF52, AF65  
+ TF65, EF65

# AF80 ... AF96 3-pole contactors

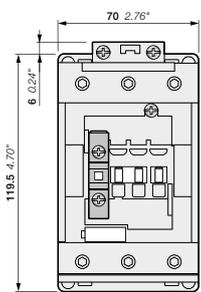
## Dimensions



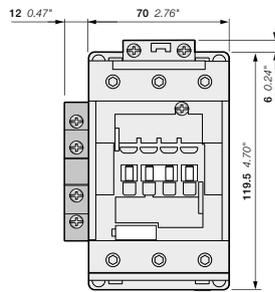
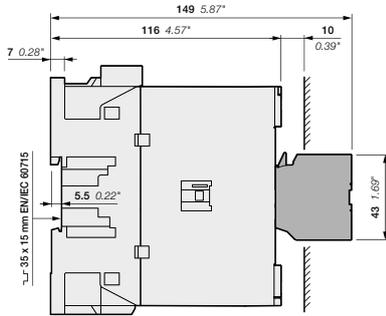
AF80, AF96



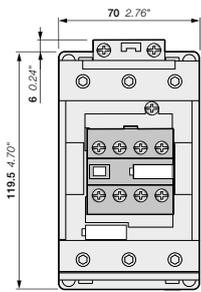
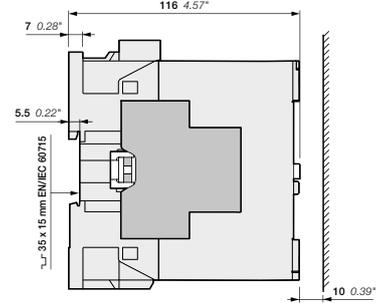
AF80, AF96



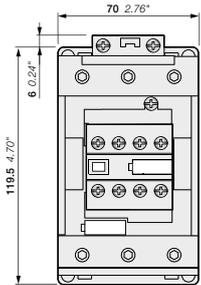
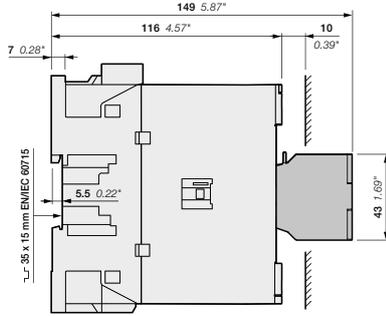
AF80, AF96  
+ CA4, CC4 1-pole auxiliary contact block



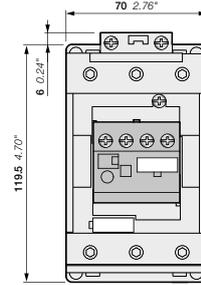
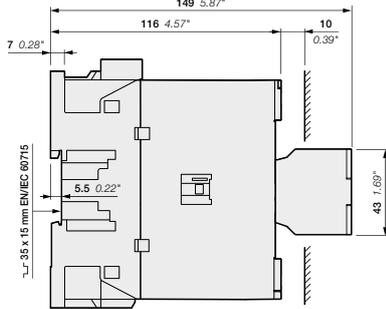
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block  
AF80, AF96-30-11



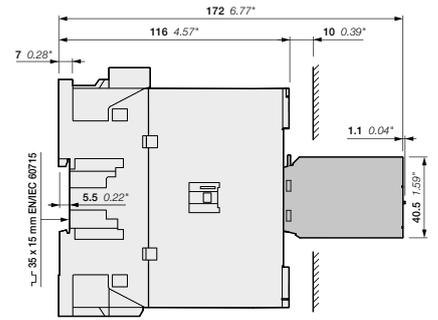
AF80, AF96  
+ CA4 4-pole auxiliary contact block



AF80, AF96...-30-22

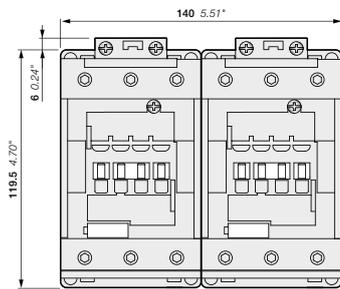


AF80, AF96  
+ TEF4 electronic timer

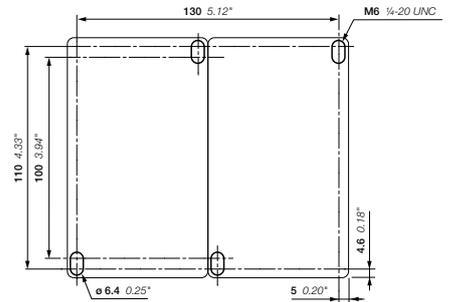
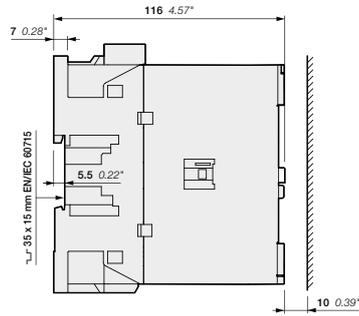


# AF80 ... AF96 3-pole contactors

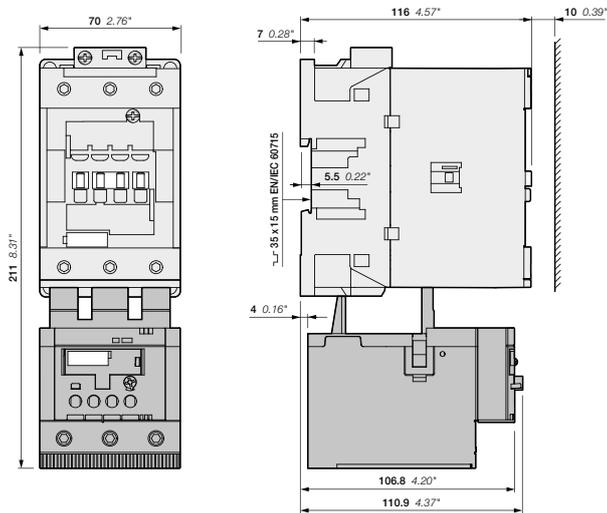
## Dimensions



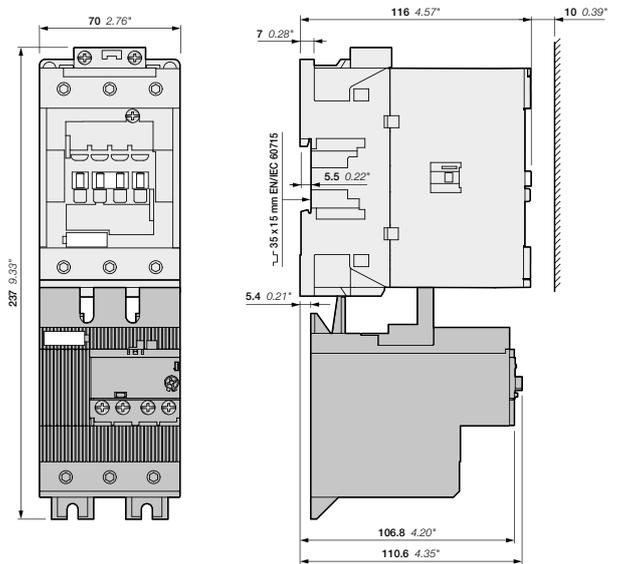
AF80, AF96  
+ VM96-4 mechanical interlock unit



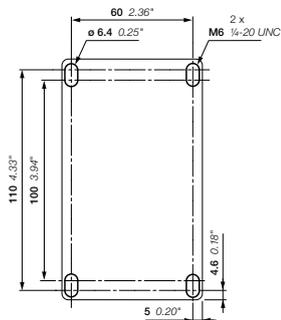
AF80, AF96  
+ VM96-4 mechanical interlock set



AF80, AF96  
+ TF96 thermal overload relay



AF80, AF96  
+ EF96 electronic overload relay



AF80, AF96  
+ TF96, EF96