

SELF-PROTECTED COMBINATION MOTOR CONTROLLERS



UL TYPE E & F
SM SERIES

 **Lovato**
electric

ENERGY AND AUTOMATION

UL ratings

Type E and Type F combination motor controllers

The UL standard indicates a combination motor controller, also called a combination starter, as equipment consisting of a protected starter incorporating an isolation function. The protection includes both thermal overload and short circuit. In the standard of UL508 (now harmonized with IEC as UL 60947-4-1), we can find

different construction types of starters stated as Type A, Type B, etc... composed of different type of devices intended to control, disconnect and protect a motor. Type E and Type F controllers usually provide the best solution to control and protect a motor.

Type E

A Type E starter is a listed combination starter suitable for use without additional upstream circuit short-circuit protection. The typical Type E starter is a motor protection circuit breaker (MPCB), also known as manual motor protector that includes in a single device the following functions: manual motor control, disconnection, short circuit protection and motor overload protection. A "NON Type E" motor protection circuit breaker, despite including short circuit protection, requires additional upstream short circuit protection.

FUNCTIONS:

- Disconnect
- Branch circuit protection
- Motor control
- Motor overload protection.



- Phase separation barrier (required)
- Motor protection circuit breaker also known as manual motor protector

Type F

A Type F starter has the same functions of Type E but in addition to the motor protection circuit breaker (MPCB) commonly known as manual motor protector, also includes a contactor to have remote or automatic control of the motor.

FUNCTIONS:

- Disconnect (MPCB)
- Branch circuit protection (MPCB)
- Motor control (contactor)
- Motor overload protection (MPCB).



- Phase separation barrier (required)
- Motor protection circuit breaker also known as manual motor protector
- Rigid connection (optional)
- Contactor

CO-ORDINATION TYPE 1 AND CO-ORDINATION TYPE 2

The concept of co-ordination Type 1 and Type 2 was recently introduced in the UL60947-4-1.

In the co-ordination Type 1, after a short-circuit, the starter shall cause no danger to persons or installation, but may not be suitable for further service and may need parts repair and replacement.

In the co-ordination Type 2, after a short-circuit, the starter shall cause no danger to persons or installation and is suitable for further use.

On the next page the co-ordination tables are provided.

TAP CONDUCTOR PROTECTION

SM... motor protection circuit breakers are also suitable as Tap Conductor Protection for Group Installation.

When manual motor starters are employed in group installations, in specified conditions by the standard, it is possible to reduce the wire sections.

The use of smaller wires reduces the cost of the panel and makes the wiring easier.

Furthermore, these motor protection circuit breakers can be used for control transformers protection instead of fuses or circuit breaker certified as UL 489 usually more expensive.

Combination Motor Controllers (Type F)

Coordination Type 1 - In the co-ordination Type 1, after a short-circuit, the starter shall cause no danger to persons or installation, but may not be suitable for further service and may need parts repair and replacement.

Motor protection circuit breaker type	Thermal setting range [A]	Contactor types	SCCR in kA		
			240V	480Y/277V	600Y/347V
SM1R0016	0.1...0.16	BG06...BG12, BF09...BF38	65	65	50
SM1R0025	0.16...0.25	BG06...BG12, BF09...BF38	65	65	50
SM1R0040	0.25...0.4	BG06...BG12, BF09...BF38	65	65	50
SM1R0063	0.4...0.63	BG06...BG12, BF09...BF38	65	65	50
SM1R0100	0.63...1	BG06...BG12, BF09...BF38	65	65	50
SM1R0160	1...1.6	BG06...BG12, BF09...BF38	65	65	50
SM1R0250	1.6...2.5	BG06...BG12, BF09...BF38	65	65	30
SM1R0400	2.5...4	BG06...BG12, BF09...BF38	65	65	30
SM1R0650	4...6.5	BG06...BG12, BF09...BF38	65	65	30
SM1RE1000	6.3...10	BF09...BF38	65	65	30
SM1RE1400	9...14	BF18...BF38	65	65	30
SM1RE1800	13...18	BF18...BF38	65	65	-
SM1RE2300	17...23	BF18...BF38	30	30	-
SM1RE2500	20...25	BF25...BF38	30	30	-
SM1RE3200	24...32	BF32, BF38	10	10	-
SM2R5000	34...50	BF40...BF150	50	50	-
SM2R6300	45...63	BF50...BF150	50	50	-
SM3R7500	55...75	BF65...BF150	40	40	-
SM3R9000	70...90	BF80...BF150	40	40	-
SM3R9900	80...100	BF115...BF150	40	40	-

● BG06 not for 600Y/347V.

Coordination Type 2 - In the co-ordination Type 2, after a short-circuit, the starter shall cause no danger to persons or installation and is suitable for further use.

Motor protection circuit breaker type	Thermal setting range [A]	Contactor types	SCCR in kA		
			240V	480Y/277V	600Y/347V
SM1R0016	0.1...0.16	BF26, BF32, BF38	65	65	50
SM1R0025	0.16...0.25	BF26, BF32, BF38	65	65	50
SM1R0040	0.25...0.4	BF26, BF32, BF38	65	65	50
SM1R0063	0.4...0.63	BF26, BF32, BF38	65	65	50
SM1R0100	0.63...1	BF26, BF32, BF38	65	65	50
SM1R0160	1...1.6	BF26, BF32, BF38	65	65	50
SM1R0250	1.6...2.5	BF26, BF32, BF38	65	65	30
SM1R0400	2.5...4	BF26, BF32, BF38	65	65	30
SM1R0650	4...6.5	BF26, BF32, BF38	65	65	30
SM1RE1000	6.3...10	BF26, BF32, BF38	65	65	30
SM1RE1400	9...14	BF26, BF32, BF38	65	65	30
SM1RE1800	13...18	BF26, BF32, BF38	65	65	-
SM1RE2300	17...23	BF26, BF32, / BF38	10 / 30	10 / 30	-
SM1RE2500	20...25	BF26, BF32, / BF38	10 / 30	10 / 30	-
SM1RE3200	24...32	BF32, BF38	10	10	-
SM2R5000	34...50	BF95, BF115, BF150	50	50	-
SM2R6300	45...63	BF95, BF115, BF150	50	50	-
SM3R7500	55...75	BF95, BF115, BF150	40	40	-
SM3R9000	70...90	BF95, BF115, BF150	40	40	-
SM3R9900	80...100	BF115, BF150	40	40	-

SM1R... up to 32A. Magnetic and thermal protection



SM1R...

Order code ❶	Thermal trip adjustment range	Short circuit breaking capacity at 400V		Qty per pkg	Wt
		Icu [kA]	Ics [kA]		
	[A]	[kA]	[kA]	n°	[kg]
Rotary knob type. For UL ratings see page 10.					
SM1R0016	0.1...0.16	100	100	1	0.320
SM1R0025	0.16...0.25	100	100	1	0.320
SM1R0040	0.25...0.4	100	100	1	0.320
SM1R0063	0.4...0.63	100	100	1	0.320
SM1R0100	0.63...1	100	100	1	0.320
SM1R0160	1...1.6	100	100	1	0.320
SM1R0250	1.6...2.5	100	100	1	0.320
SM1R0400	2.5...4	100	100	1	0.390
SM1R0650	4...6.5	100	100	1	0.390
SM1RE1000	6.3...10	100	100	1	0.390
SM1RE1400	9...14	100	100	1	0.390
SM1RE1800	13...18	100	100	1	0.390
SM1ER 2300	17...23	50	25	1	0.390
SM1RE2500	20...25	50	25	1	0.390
SM1RE3200	24...32	50	25	1	0.390

❶ Phase barrier, SM1X9000R, required for UL Type E and F for all order codes list above.

❷ 10In max for version 0.1...0.16A and 0.16...0.25A.

General characteristics

SM1R... are modern self-protected combination motor controllers with thermal and magnetic trip releases and high breaking capacity. Motor control and protection of up to 22kW (400V) are possible by choosing the suitable adjustment range, 0.1 to 32A. A magnetic trip indicator integrated on the SM1R... avoids dangerous closing operations during short-circuit conditions. SM1R... up to 32A breakers, with SM1X9000R accessory, are Type E and F certified according to UL 60947-4-1. SM1R... self-protected combination motor controllers are suitable for isolation in accordance with IEC/EN 60947 standards and can be padlocked in OFF position without using accessories. Their high breaking capacity consents to exclude protection fuses on the majority of the installations.

Operational characteristics

- IEC rated insulation voltage U_i : 690V
- IEC rated impulse withstand voltage: 6kV
- IEC rated frequency: 50/60Hz
- Maximum rated current: 32A
- Adjustment ranges: 15
- IEC breaking capacity: See table
- Heat dissipation per phase: 0.7...3.3W
- Magnetic tripping: 13In max. ❷
- Tripping class: 10A
- Phase failure sensitive
- Mechanical life: 100,000 cycles
- Electrical life: 100,000 cycles
- Mounting on 35mm DIN rail (IEC/EN 60715)
- Mounting position: Any
- IEC utilisation category: A
- Padlocking in OFF: $\varnothing 4\text{mm}/0.16''$
- IEC degree of protection: IP20.

Certifications and compliance

Certifications obtained: cULus, EAC.
SM1R... circuit breakers are Type E and Type F certified (Self-Protected Combination Motor Controllers) according to UL 60947-4-1.
Certifications pending: CCC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-2, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials compliant with standards: IEC/EN 60335 and EN 45545.

UL horsepower and short-circuit ratings

Order code	Thermal trip adjustment range ❸ [A]	UL maximum horsepower ratings						UL short-circuit ratings (KAIC) Combination motor controller (Type E and F) ❹		
		Single-phase ❶		Three-phase		480V [HP]	600V [HP]	240V [kA]	480V [kA]	600V [kA]
		120V [HP]	240V [HP]	200V [HP]	240V [HP]					
SM1R0016	0.1...0.16	-	-	-	-	-	-	65	65	50
SM1R0025	0.16...0.25	-	-	-	-	-	-	65	65	50
SM1R0040	0.25...0.4	-	-	-	-	-	-	65	65	50
SM1R0063	0.4...0.63	-	-	-	-	-	-	65	65	50
SM1R0100	0.63...1	-	-	-	-	1/2	1/2	65	65	50
SM1R0160	1...1.6	-	1/10	-	-	3/4	1	65	65	50
SM1R0250	1.6...2.5	-	1/6	1/2	1/2	1	1 1/2	65	65	30
SM1R0400	2.5...4	1/8	1/3	3/4	3/4	2	3	65	65	30
SM1R0650	4...6.5	1/4	1/2	1 1/2	1 1/2	3	5	65	65	30
SM1RE1000	6.3...10	1/2	1 1/2	2	3	5	7 1/2	65	65	30
SM1RE1400	9...14	3/4	2	3	3	10	10	65	65	30
SM1RE1800	13...18	1	3	5	5	10	15	65	65	-
SM1RE2300	17...23	1 1/2	3	5	7 1/2	15	20	30	30	-
SM1RE2500	20...25	2	3	5	7 1/2	15	20	30	30	-
SM1RE3200	24...32	2	5	10	10	20	30	10	10	-

❸ The appropriate thermal trip range of the protector should be selected on the basis of the motor nameplate full-load current since the horsepower ratings given in the table are for reference only.

❶ Single-phase horsepower ratings are based on wiring the three poles in series; see wiring scheme on page 10.

❷ "Self-Protected Combination Motor Controller" per UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Add-on blocks and accessories for SM1R...



SM1X11...



SM1X12...



SM1X13...



SM1X14...



SM1X15...R



SM1X16...

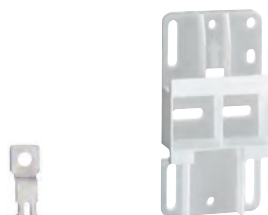


SM1X18 200R



SM1X18 S

SM1X9000R



SM1X89 02

BFX89 01

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Add-on auxiliary contacts.			
SM1X1120	Front mount 2NO	10	0.016
SM1X1111	Front mount 1NO+1NC	10	0.016
SM1X1220	Side mount 2NO	1	0.036
SM1X1211	Side mount 1NO+1NC	10	0.016
SM1X1202	Side mount 2NC	1	0.036
SM1X1311	Side mount. Contacts for thermal and magn. tripping indic. 1NO+1NC	1	0.036
SM1X1311M	Side mount. Contacts for magn. tripping indic. 1NO+1NC	1	0.036
Undervoltage trip releases.			
SM1X14024	24VAC 50Hz	1	0.130
SM1X14110	110VAC 50Hz; 120VAC 60Hz	1	0.130
SM1X1422060	220VAC 60Hz	1	0.130
SM1X14230	230VAC 50Hz	1	0.130
SM1X14400	400VAC 50Hz; 400VAC 60Hz	1	0.130
SM1X1457560	575VAC 60Hz	1	0.130
SM1X15024R	With early-make contacts 24VAC 50Hz	1	0.140
SM1X15110R	With early-make contacts 110VAC 50Hz 120VAC 60Hz	1	0.140
SM1X15230R	With early-make contacts 230VAC 50Hz	1	0.14
SM1X15400R	With early-make contacts 400VAC 50Hz	1	0.14
Shunt trip releases.			
SM1X16024	24VAC 50/60Hz	1	0.130
SM1X16110	110VAC 50/60Hz	1	0.130
SM1X16230	230VAC 50/60Hz	1	0.130
SM1X16400	400VAC 50/60Hz	1	0.130
Adjuster sealing kit.			
SM1X1812	With wire and lead included	1	0.006
IP65 (4X) padlockable door coupling handle for SM1R...			
SM1X18200R	Red/yellow complete with rod length 200mm/7.87"	1	0.115
SM1X18B200R	Black complete with rod length 200mm/7.87"	1	0.115
SM1X18S	Support for rod >145mm/5.71"	1	0.030
Phase separation barriers for SM1R...			
SM1X9000R	For Type E and F as per UL60947-4-1	5	0.016
Three-phase connection busbars 45mm/1.77" spacing.			
11SMX9032	For 2 motor controllers	10	0.028
11SMX9033	For 3 motor controllers	10	0.050
11SMX9034	For 4 motor controllers	10	0.071
11SMX9035	For 5 motor controllers	10	0.092
Three-phase connection busbars 54mm/2.13" spacing.			
11SMX9042	For 2 motor controllers	10	0.031
11SMX9043	For 3 motor controllers	10	0.056
11SMX9044	For 4 motor controllers	10	0.081
11SMX9045	For 5 motor controllers	10	0.090
Terminal block for busbar supply.			
SM1X9050	For all busbar types Type E and F as per UL508 / UL60947-4-1	10	0.004
Safety cover.			
11SMX9031	For unused terminals	10	0.004
Accessories for motor controller fixing.			
SM1X8902	Metal bracket for fixing SM1... motor controller with screws	10	0.006
BFX89 01	Universal plastic base for screw fixing SM1... motor controller	2	0.016
Rigid SM1R motor controller-contactor connections.			
SM1X3040R	SM1R... with BG... mini-contactors	10	0.019
SM1X3141R	SM1R... with BF09...25A contactors	10	0.035
SM1X3142R	SM1R... with contactors BF09...25D and BF09...25L	10	0.044
SM1X3241R	SM1R... with contactors BF26...38A (max 32A)	10	0.045

General and operational characteristics

ADD-ON AUXILIARY CONTACTS

- Connectable to the left side of the motor controllers or on the front
- Maximum combinations: 3 SM1X... blocks with 6 auxiliary contacts in total of which 1 front block and 2 side blocks
- IEC conventional free air thermal current Ith: 10A (5A for SM1X11...)
- IEC rated insulation voltage Ui: 690V (300V for SM1X11...)
- Rated impulse withstand voltage Uimp 6kV (4kV for SM1X11...)
- UL/CSA and IEC/EN 60947-5-1 designation: A600 - Q600 (C300 - R300 for SM1X11...)
- Maximum tightening torque: 1Nm / 9lbin
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG.
- Screw tightening tool: Phillips 2
- Maximum tightening torque: 1Nm / 9lbin
- Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules
- IEC degree of protection: IP20.

UNDERVOLTAGE TRIP RELEASES

- Snap on to the right side of the motor controllers
- Consumption inrush/holding: 12/3.5VA
- Release voltage: 0.35...0.7Us
- Operating voltage: 0.85...1.1Us
- Maximum tightening torque: 1Nm / 9lbin
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG.
- Screw tightening tool: Phillips 2
- Maximum tightening torque: 1Nm / 9lbin
- Width of side-mount auxiliary contacts equal to 1 DIN 46880 module
- IEC degree of protection: IP20.

SHUNT TRIP RELEASES

- Snap on to the right side of the motor controllers
- In-rush consumption: 20VA
- Operating voltage: 0.7...1.1Us
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG.
- Screw tightening tool: Phillips 2
- Maximum tightening torque: 1Nm / 9lbin
- Width of side-mount auxiliary contacts equal to 1 standard DIN 46880 module
- IEC degree of protection: IP20.

PADLOCKABLE DOOR COUPLING HANDLE FOR SM1R...

- IEC degree of protection: IP65
- Degree of protection according to UL: Type 1, 2, 3R, 12, 12K, 4, 4X; external use
- Adjustable rod from 48 to 212mm (1.89" to 8.35")
- Ring-fixing in 22mm/0.87" hole.

THREE-PHASE CONNECTION BUSBARS

- Imax 63A
- SMX90 3... 45mm/1.77" spacing to reduce the width to the minimum
- SMX90 4... 54mm/2.13" spacing to consent to fit one side-mount auxiliary contact block on the motor controller.

TERMINAL BLOCKS FOR BUSBAR SUPPLY

- Imax 63A
- Screw tightening tool: Phillips 2
- Maximum tightening torque: 2.3Nm / 20lbin
- Conductor cross section minimum-maximum: 4...25mm² or 10...4AWG.

Certifications and compliance

Certifications obtained: cULus, EAC.
 Certifications pending: CCC.
 Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

① Mounting also possible with side-mount auxiliary contacts SM1X12... and SM1X13...

SM2R... and SM3R... up to 100A. Magnetic and thermal protection



SM2R...



SM3R...

Order code	Thermal trip adjustment range	Short circuit breaking capacity at 400V		Qty per pkg	Wt [kg]
		Icu [kA]	Ics [kA]		
	[A]	[kA]	[kA]	n°	[kg]
Rotary knob type. For UL ratings see page 10.					
SM2R5000	34...50	50	50	1	1.000
SM2R6300	45...63	50	50	1	1.000
Rotary knob type. For UL ratings see page 10.					
SM3R7500 Ⓢ	55...75	50	38	1	2.200
SM3R9000 Ⓢ	70...90	50	38	1	2.200
SM3R9900 Ⓢ	80...100	50	38	1	2.200

Ⓢ Phase barrier, SM3X9000R, required for UL Type E for all SM3R order codes list above.

General characteristics

SM2R... and SM3R... are modern self-protected combination motor controllers with thermal and magnetic trip releases and high breaking capacity. Motor control and protection, up to 55kW (400V) are possible by choosing the suitable adjustment range, up to 100A. SM2R... and SM3R... motor controllers are Type E- certified according to UL 60947-4-1. The SM2R... and SM3R... types are suitable for isolation according to IEC/EN 60947 standards and can be padlocked in OFF position without using accessories. SM3R... has a trip function which indicates thermal and magnetic tripping. Their high breaking capacity consents to exclude protection fuses on the majority of the installations.

Operational characteristics

- IEC rated insulation voltage U_i : 1000V
- IEC rated impulse withstand voltage: 8kV
- IEC rated frequency: 50/60Hz
- Maximum rated current: 63A (for SM2R...); 100A (for SM3R...)
- Adjustment ranges: 2 (for SM2R...); 3 (for SM3R...)
- IEC breaking capacity: See table
- Max. heat dissipation per phase: 7W
- Magnetic tripping: 13In max.
- Tripping class: 10A
- Phase failure sensitive
- Mechanical life: 50,000 cycles
- Electrical life: 25,000 cycles
- Mounting on 35mm DIN rail (IEC/EN 60715)
- Mounting position: Any
- IEC utilisation category: A
- Padlocking in OFF: $\varnothing 4\text{mm}/0.16''$
- IEC degree of protection: IP20 on front.

Certifications and compliance

Certifications obtained: cULus, EAC. SM2R... and SM3R... motor controllers are Type E-certified (Self-Protected Combination Motor Controllers) according to UL 60947-4-1; for Type E certification, SM3R only with accessory SM3X9000R. Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-2, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

UL horsepower and short-circuit ratings

Order code	Thermal trip adjustment range Ⓢ [A]	UL maximum horsepower ratings						UL short-circuit ratings (KAIC) Combination motor controller (Type E) Ⓢ		
		Single-phase Ⓢ		Three-phase		480V [HP]	600V [HP]	240V [kA]	480V [kA]	600V [kA]
		120V [HP]	240V [HP]	200V [HP]	240V [HP]					
SM2R5000	34...50	3	10	15	15	30	40	100	50	-
SM2R6300	45...63	5	10	20	20	40	60	100	50	-
SM3R7500	55...75	5	15	20	25	50	60	100	40	-
SM3R9000	70...90	7½	20	25	30	60	75	100	40	-
SM3R9900	80...100	10	20	30	30	75	100	100	40	-

Ⓢ The appropriate thermal trip range of the protector should be selected on the basis of the motor nameplate full-load current since the horsepower ratings given in the table are for reference only.

Ⓢ Single-phase horsepower ratings are based on wiring the three poles in series; see wiring scheme on page 10.

Ⓢ "Self-Protected Combination Motor Controller" per UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Add-on blocks and accessories for SM2R... and SM3R...



SM2X11...



SM2X12...



SM2X13 11



SM2X14...



SM2X16...



SM2X18...

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]

Add-on auxiliary contacts.

SM2X1120	Front mount 2NO	10	0.020
SM2X1111	Front mount 1NO+1NC	10	0.020
SM2X1102	Front mount 2NC	10	0.020
SM2X1220	Side mount 2NO	2	0.040
SM2X1211	Side mount 1NO+1NC	10	0.040
SM2X1202	Side mount 2NC	2	0.040
SM2X1311	Side mount. Indicator contacts for thermal and magnetic tripping 1NO+1NC	2	0.040

Undervoltage trip releases.

SM2X14230	230VAC 50/60Hz	5	0.100
SM2X14400	400VAC 50/60Hz	5	0.100
SM2X14440	440VAC 50/60Hz	5	0.100

Shunt trip releases.

SM2X16024	24VAC 50/60Hz	5	0.100
SM2X16110	110VAC 50/60Hz	5	0.100
SM2X16230	230VAC 50/60Hz	5	0.100
SM2X16400	400VAC 50/60Hz	5	0.100
SM2X16440	440VAC 50/60Hz	5	0.100

Padlockable IP65 (4X) door coupling handle for SM2R and SM3R.

SM2X18200R	Red/yellow complete with rod length 200mm/7.87"	1	0.115
SM2X18B200R	Black complete with rod with rod length 200mm/7.87"	1	0.115

Phase separation barriers set for SM3R...

SM3X9000R	For Type E as per UL60947-4-1	1	0.175
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General and operational characteristics

ADD-ON AUXILIARY CONTACTS

- Insert on the top front or snap on the left side of the motor controller
- Maximum combinations: 3 SM1X... blocks with 6 auxiliary contacts in total of which 1 front block and 2 side blocks
- IEC conventional free air thermal current I_{th}: 10A (5A for SM2X11...)
- IEC rated insulation voltage U_i: 690V (250V for SM2X11...)
- UL/CSA and IEC/EN 60947-5-1 designation: A600 – Q300 (B300 - R300 for SM1X11...)
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
- Screw tightening tool: Pz 2
- Maximum tightening torque: 1.2Nm / 10lbin
- Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules.

UNDERVOLTAGE TRIP RELEASES

- Snap on to the right side of the motor controller for motor protection
- Consumption in-rush/holding: 8.5/3VA
- Release voltage: 0.35...0.7Us
- Operating limits: 0.85...1.1Us
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
- Screw tightening tool: Pz 2
- Maximum tightening torque: 1.2Nm / 10lbin
- Width of side-mount auxiliary contacts equal to 1 DIN 46880 module.

SHUNT TRIP RELEASES

- Snap on to the right side of the motor controller
- In-rush consumption: 20VA
- Operating limits: 0.85...1.1Us
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
- Screw tightening tool: Pz 2
- Maximum tightening torque: 1.2Nm / 10lbin
- Width of side-mount auxiliary contacts equal to 1 standard DIN 46880 module.

PADLOCKABLE DOOR COUPLING HANDLE FOR SM2R and SM3R

- IEC degree of protection: IP65
- Degree of protection according to UL: Type 1, 2, 3R, 12, 12K, 4, 4X; external use
- Adjustable rod from 48 to 212mm (1.89" to 8.35")
- Ring-fixing in 22mm/0.87" hole.

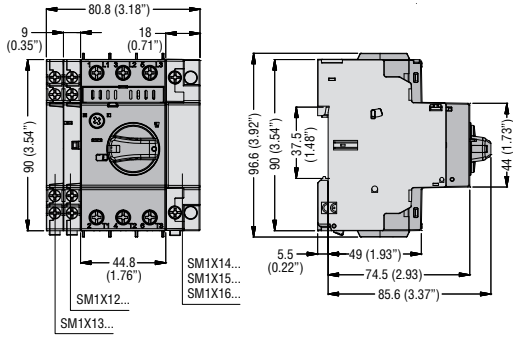
Certifications and compliance

Certifications obtained: cULus, EAC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

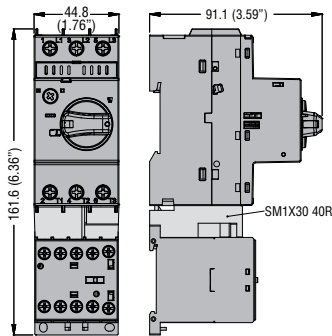
Self-protected combination motor controllers. UL Type E & F, SM series

Dimensions [mm (in)]

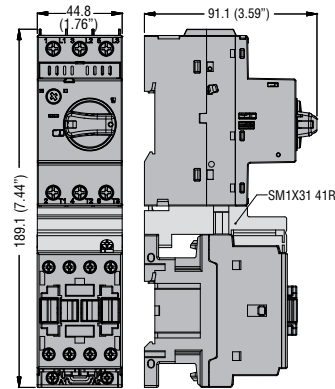
SM1R... with side-mount auxiliary contacts



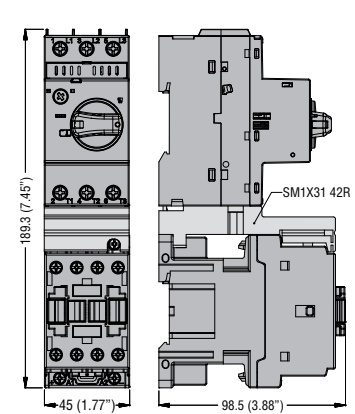
SM1R... with BG... mini-controllers and connection SM1X3040R



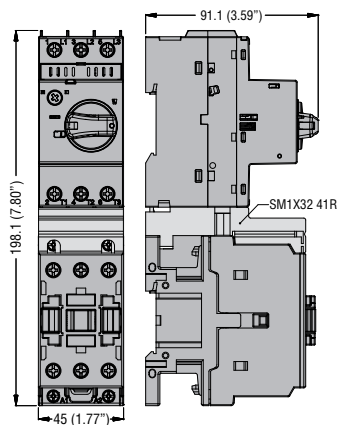
SM1R... with BF09 A...BF25 A... contactors and connection SM1X3141R



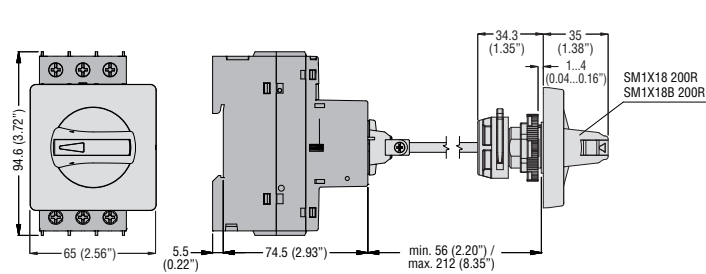
SM1R... with BF09 D...BF25 D... contactors BF09 L...BF25 L... and connection SM1X3142R



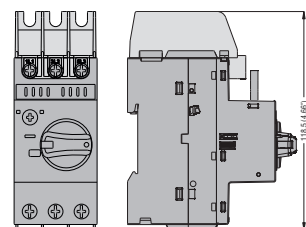
SM1R... with BF26 A...BF38 A... contactors and connection SM1X3241R



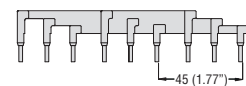
SM1R... padlockable door coupling handle SM1X18200R or SM1X18B200R



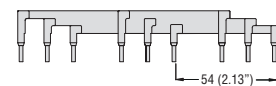
SM1X9000R



SMX9032 - SMX9033 - SMX9034 - SMX9035 Connection busbars – 45mm/1.77" spacing



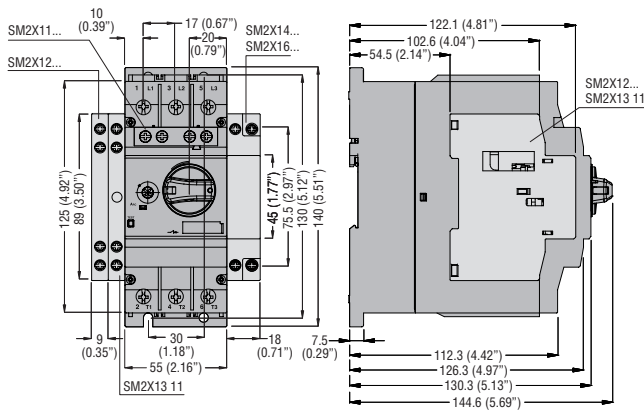
SMX9042 - SMX9043 - SMX9044 - SMX9045 Connection busbars – 54mm/2.13" spacing



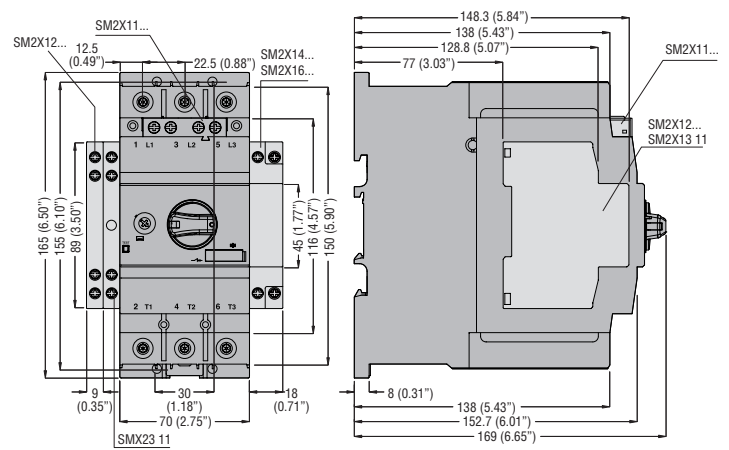
Self-protected combination motor controllers. UL Type E & F, SM series

Dimensions [mm (in)]

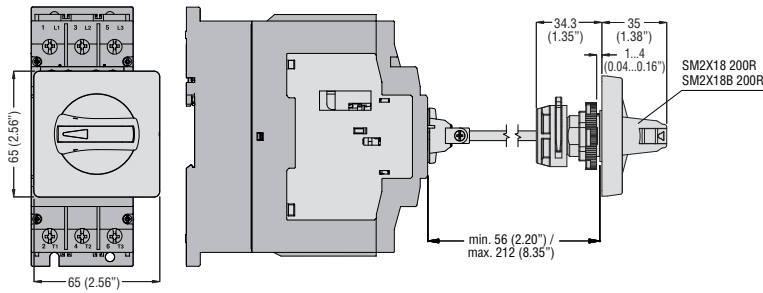
SM2R... with side-mount auxiliary contacts



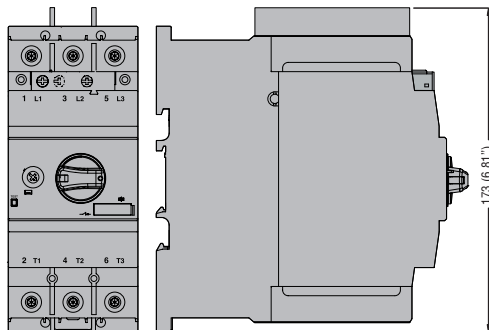
SM3R... with side-mount auxiliary contacts



SM2R... and **SM3R...** padlockable door coupling handle
SM2X18200R or **SM2X18B200R**

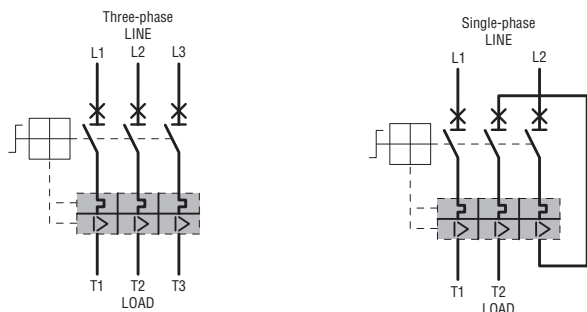


SM3X9000R



Wiring diagrams

SM1R... - SM2R... - SM3R...



ADD-ON BLOCKS

For SM1R... types

Front mount auxiliary contacts

SM1X1120

SM1X1111

Side mount

auxiliary contacts

SM1X1211

SM1X1220

SM1X1202

SM1X1311

SM1X1311M

Side mount

undervoltage trip releases

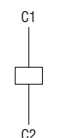
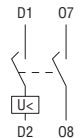
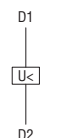
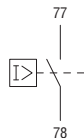
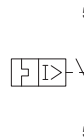
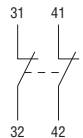
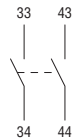
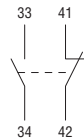
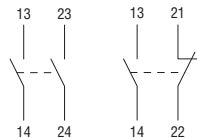
SM1X14...

SM1X15...

Side mount shunt trip

release

SM1X16...



For SM2R... and SM3R types

Front mount auxiliary contacts

SM2X1120

SM2X1111

SM2X1102

Side mount auxiliary contacts

SM2X1211

SM2X1220

SM2X1202

SM2X1311

Side mount undervoltage

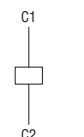
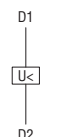
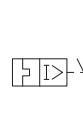
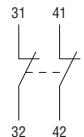
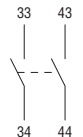
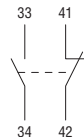
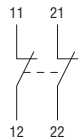
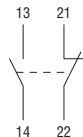
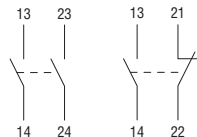
trip release

SM2X14...

Side mount shunt trip

release

SM2X16...



Self-protected combination motor controllers. UL Type E & F, SM series

Technical characteristics

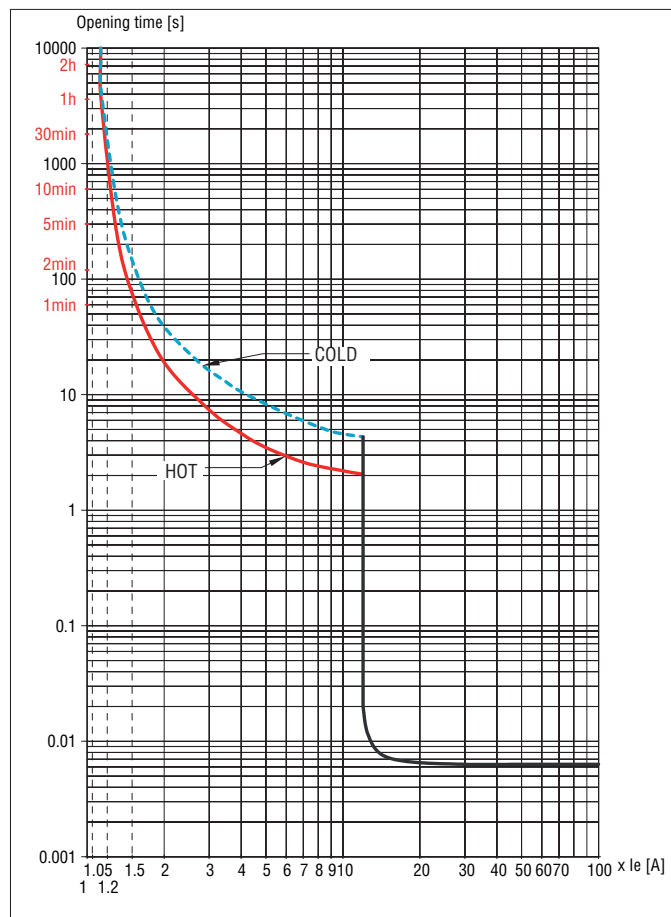
TYPE		SM1R...	SM2R...	SM3R...	
Rated insulation voltage U_i	V	690	1000		
Rated impulse withstand voltage	kV	6			
Rated frequency: 50/60Hz					
Maximum rated current	A	32	63	100	
Number of adjustment ranges	No.	16	2	3	
Total power dissipation at maximum current	W	5...15	7.1...20	10...38	
Magnetic tripping	A	13 x I_n	13 x I_n	13 x I_n	
Mechanical life	cycles	100,000	50,000	50,000	
Electrical life (Ie max AC3)	cycles	100,000	25,000	25,000	
Terminal tightening torque	Nm	2.5...3	4.5	6	
	lbft	1.8...2.2	40	53	
	Tool	PH2	PZ2	Allen 4mm	
Conductor section minimum and maximum (1 or 2 wires)	AWG	No.	16...8	18...3	10...1/0
Flexible without lug	mm ²		1...10	0.75...25	10...50
AMBIENT CONDITIONS					
Temperature	operating	°C	-20...+60❶	-20...+70❶	-20...+70❶
	storage	°C	-50...+80	-50...+80	-50...+80
	compensation	°C	-20...+50	-5...+40	-5...+40
Maximum altitude	m	3000			
Mounting position		Any			
Fixing		On 35mm DIN rail or screw via accessory		On 35mm DIN rail or screw	

E.g. PH = Phillips; PZ = Pozidriv; Allen is metric type.

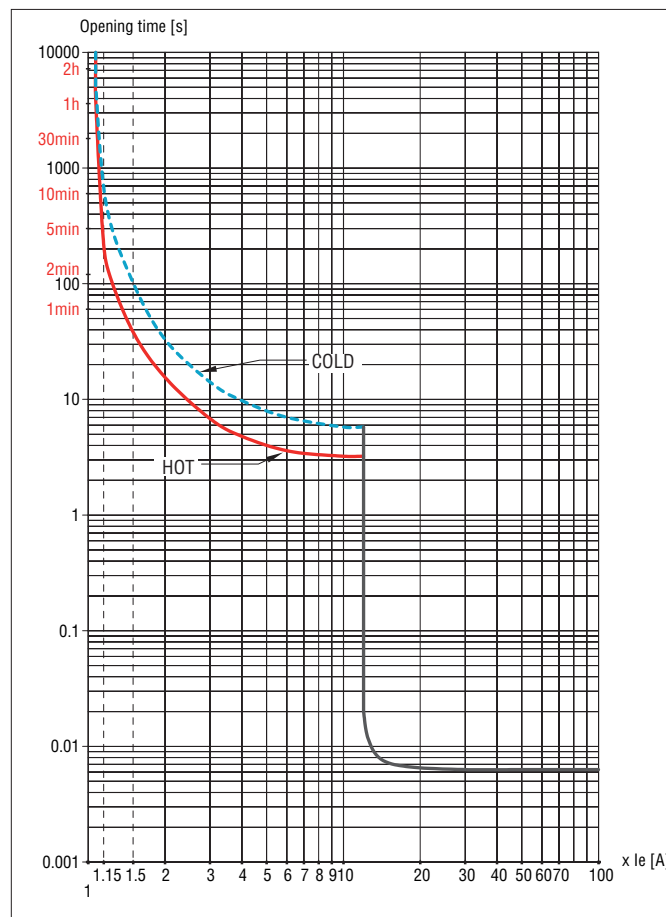
❶ When fitting more than one motor controller side by side, without leaving space between each to consent free air circulation on the motor controller sides, and have simultaneous operation, the thermal trip adjuster must be positioned at a value 15% higher than the rated motor current.

THERMAL TRIPPING CURVE (AVERAGE TIMES)

Three-phase balanced operation



Two-phase operation (phase failure/single phasing)



Tripping times can have a $\pm 20\%$ deviation with respect to the average tripping curve value above.

SELF-PROTECTED COMBINATION MOTOR CONTROLLERS



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