Motor protection circuit breakers

- Wide adjustment range 0.1 to 100A
- IEC breaking capacity Icu 50kA (400V) up to 100A
- Suitable for isolation
- Certified UL Type E
- Comprehensive line of accessories
- Magnetic-only version
- Automatic trip indicators
- High reliability and accuracy of tripping.

Page 1-4

SM1P...
- Motor protection
- Push button control
- Ranges 0.1...40A (16 choices)
- IEC breaking capacity Icu at 400V: from 100 to 10kA
- Suitable for mounting in modular panels.

Page 1-4

SM1R...
- Motor protection
- Rotary knob type
- Ranges 0.1...40A (16 choices)
- IEC breaking capacity Icu at 400V: from 100 to 20kA
- Thermal and magnetic trip indicator
- UL 60947-4-1 Type E.

Page 1-4

SM1RM...
- Starter protection (magnetic only)
- Rotary knob type
- Rated current from 0.16 to 40A
- IEC breaking capacity Icu at 400V: from 100 to 20kA.

Page 1-5

SM2R...
- Motor protection
- Rotary knob type
- Ranges 34...63A (2 choices)
- IEC breaking capacity Icu at 400V: 50kA
- UL 60947-4-1 Type E.

Page 1-5

SM3R...
- Motor protection
- Rotary knob type
- Ranges 55...100A (3 choices)
- IEC breaking capacity Icu at 400V: 50kA
- Thermal and magnetic trip indicator
- UL 60947-4-1 Type E via accessory.

Page 1-5

SM1PF...
- Fuse monitoring function
- Push button control
- Fixed thermal protection: 0.2A
- Magnetic trip threshold: 1.2A.

IE3 READY

LOVATO Electric motor protection circuit breakers are suitable for new motors with high IE3 efficiency values

Lovato electric

IEC ratings

Motor protection (magnetic and thermal protection)

SM1P...

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

Starter protection (magnetic protection)

SM1RM...

	SM1P...	SM1R...	SM2R...	SM3R...	SM1RM...
Rated current	0.1...40A	0.1...40A	34...63A	55…100A	0.1…40A
Thermal protection	●	●	●	●	
Magnetic protection	●	●	●	●	●
TRIP position		●		●	●
Phase failure sensitive	●	●	●	●	
Padlockable in O	●	●	●	●	●

Choice	230V		400V		440V		500V		690V		230V		400V		440V		500V		690V		230V		400V		440V		500V		690V	
	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
[A]	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA
0.1...0.16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.16...0.25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.25...0.4	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.4...0.63	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.63...1	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1...1.6	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1.6...2.5	100	100	100	100	100	100	100	100	3	3	100	100	100	100	100	100	100	100	10	10	100	100	100	100	100	100	100	100	10	10
2.5...4	100	100	100	100	100	100	100	100	3	3	100	100	100	100	100	100	100	100	10	10	100	100	100	100	100	100	100	100	10	10
4...6.5	100	100	100	100	100	100	100	100	3	3	100	100	100	100	100	100	100	100	4	2	100	100	100	100	100	100	100	100	4	2
6.3...10	100	100	100	100	25	12.5	25	12.5	3	3	100	100	100	100	42	42	42	42	4	2	100	100	100	100	42	42	42	42	4	2
9...14	100	100	25	12.5	10	5	10	5	3	3	100	100	100	100	42	42	42	42	4	2	100	100	100	100	42	42	42	42	4	2
13...18	100	50	25	12.5	10	5	10	5	3	3	100	100	100	100	10	5	10	5	4	2	100	100	100	100	10	5	10	5	4	2
17...23	50	50	15	5	10	5	10	5	3	2	100	100	50	25	10	5	10	5	4	2	100	100	50	25	10	5	10	5	4	2
20...25	50	50	15	5	10	5	10	5	3	2	100	100	50	25	10	5	10	5	4	2	100	100	50	25	10	5	10	5	4	2
24...32	50	50	10	5	10	5	10	5	3	2	100	100	50	25	10	5	10	5	4	2	100	100	50	25	10	5	10	5	4	2
30...40	20	20	10	5	10	5	10	5	3	2	100	100	20	10	10	5	10	5	4	2	100	100	20	25	10	5	10	5	4	2
34…50	-	-	-	-	-	-	-	-	-	-	100	100	50	50	35	27	10	8	5	5	-	-	-	-	-	-	-	-	-	-
45…63	-	-	-	-	-	-	-	-	-	-	100	100	50	50	35	27	10	8	5	5	-	-	-	-	-	-	-	-	-	-
55…75	-	-	-	-	-	-	-	-	-	-	100	100	50	38	40	30	8	6	5	4	-	-	-	-	-	-	-	-	-	-
70…90	-	-	-	-	-	-	-	-	-	-	100	100	50	38	40	30	8	6	5	4	-	-	-	-	-	-	-	-	-	-
80…100	-	-	-	-	-	-	-	-	-	-	100	100	50	38	40	30	8	6	5	4	-	-	-	-	-	-	-	-	-	-

SM1P... MODULAR SIZE
- Mounting on front of panels or in modular panels for rapid access to buttons, avoiding the opening of the door by non-technical staff.
- Auxiliary contacts, indicator contacts and releases compatible with modular panels.

40A IN 45mm
- From 0.1A to 40A in a device just 45mm wide.
- High short-circuit breaking capacity up to 40A.
- Small, cost-effective starters.

SM1R... TRIP INDICATION
- Thermal and magnetic trip indication with trip position of knob.
- Specific optical indication for short-circuit tripping; guarantees maximum safety for operators and reliability of the system.
- Auxiliary trip indication contacts with ability to distinguish overload from short circuit.

UL Type E
- The entire rotary knob type is certified UL Type E.
- Type E is a specific requirement of the UL standards that requires, of short-circuit protection devices, increased terminal isolation distances and strict breaking capacity tests.
- Eliminates the need for further short-circuit protection devices upstream of the motor protection.

SM1... HIGH-PERFORMANCE PLASTICS
- IEC/EN 60335-compliant plastics for domestic and similar applications. Can be used in catering equipment.
- EN 45545-compliant plastics: fire behaviour and emissions of fumes. Suitable for railway applications.

UL508 ratings (horse power ratings on page 1-12)

Fuse monitoring

SM1PF...

SM1P...

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

	0.2A										UL508 / UL 60947-4-1 Manual Motor Controller - Short circuit current in kA											UL508 / UL 60947-4-1 Manual Self Protected Combination Motor Controller (Type E) Short circuit current in kA		
	●										Motor Disconnect Group Motor Installation			Protection	Motor Disconnect		Group Motor Installation		Protection	Tap Conductor Protection				
	●																							
	●																							
	●																							
	230V		400V		440V		500V		690V		240V	480V	600V		480V	600V	480V	600V		480Y/277V	600Y/347V	240V	480Y/277V	600Y/347V
	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics														
	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA	kA		kA	kA	kA	kA		kA	kA	kA	kA	kA
	-	-	-	-	-	-	-	-	-	-	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	100	100	100	100	100	100	100	100	100	100	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	-	-	-	-	-	-	-	-	-	-	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	-	-	-	-	-	-	-	-	-	-	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	-	-	-	-	-	-	-	-	-	-	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	-	-	-	-	-	-	-	-	-	-	50	50	50	Fuse or CB	50	50	50	50	Fuse or CB	50	50	50	50	50
	-	-	-	-	-	-	-	-	-	-	30	30	30	100A Class J	30	30	30	30	Fuse or CB	30	30	30	30	30
	-	-	-	-	-	-	-	-	-	-	30	30	30	100A Class J	30	30	30	30	Fuse or CB	30	30	30	30	30
	-	-	-	-	-	-	-	-	-	-	30	30	30	100A Class J	30	30	30	30	Fuse or CB	30	30	30	30	30
	-	-	-	-	-	-	-	-	-	-	30	30	30	100A Class J	30	30	30	30	100A Class J	65❶	30❶	65❶	65❶	30❶
	-	-	-	-	-	-	-	-	-	-	30	30	-	100A Class J	30	30	30	30	200A Class J	65❶	30❶	65❶	65❶	30❶
	-	-	-	-	-	-	-	-	-	-	30	30	-	100A Class J	30	30	30	30	200A Class J	65❶	-	65❶	65❶	-
	-	-	-	-	-	-	-	-	-	-	5	5	-	Fuse or CB	30	30	30	30	200A Class J	30❶	-	30❶	30❶	-
	-	-	-	-	-	-	-	-	-	-	5	5	-	Fuse or CB	30	30	30	30	200A Class J	30❶	-	30❶	30❶	-
	-	-	-	-	-	-	-	-	-	-	5	5	-	Fuse or CB	30	30	30	30	200A Class J	10❶	-	10❶	10❶	-
	-	-	-	-	-	-	-	-	-	-	5	5	-	Fuse or CB	30	30	30	30	200A Class J	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	10	50	10	Fuse or CB	50	10	100	50	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	10	50	10	Fuse or CB	50	10	100	50	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	10	40	10	Fuse or CB	40	10	100	40	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	10	40	10	Fuse or CB	40	10	100	40	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	10	40	10	Fuse or CB	40	10	100	40	-

❶ Values valid for SM1RE... only.

ENCLOSURES
- Various types of plastic enclosures are available for rotating and button-controlled motor protection circuit breakers up to 40A.
- Surface and flush mount.
- Ideal for small machines and isolated motors.
- IP65 (UL Type 4X) protection rating and UV-ray resistant.
- Very robust plastics, IK07; pass even the strict UL "ball impact" test.
- UL-certified.

DOOR COUPLING HANDLES
- Padlockable door coupling handles for the entire rotary knob type. Make systems compliant with safety regulations.
- Tough, easy and quick to install.

SM1... PADLOCKABILITY
- Padlockability as standard on the entire rotary knob type and push button-controlled motor protection circuit breaker range. For greater operator safety during maintenance and bypassing of the equipment.

Motor protection circuit breakers SM1… up to 40A. Magnetic and thermal protection

SM1P…

SM1R…

Order code	Thermal trip adjustment range	Short circuit breaking capacity at 400V Icu	Ics	Qty per pkg	Wt
	[A]	[kA]	[kA]	n°	[kg]
Push button control. For UL ratings see page 1-12.					
SM1P 0016	0.1...0.16	100	100	1	0.280
SM1P 0025	0.16...0.25	100	100	1	0.280
SM1P 0040	0.25...0.4	100	100	1	0.280
SM1P 0063	0.4...0.63	100	100	1	0.280
SM1P 0100	0.63...1	100	100	5	0.280
SM1P 0160	1...1.6	100	100	5	0.280
SM1P 0250	1.6...2.5	100	100	5	0.350
SM1P 0400	2.5...4	100	100	5	0.350
SM1P 0650	4...6.5	100	100	5	0.350
SM1P 1000	6.3...10	100	100	5	0.350
SM1P 1400	9...14	25	12.5	5	0.350
SM1P 1800	13...18	25	12.5	5	0.350
SM1P 2300	17...23	15	5	1	0.350
SM1P 2500	20...25	15	5	1	0.350
SM1P 3200	24...32	10	5	1	0.350
SM1P 4000	30...40	10	5	1	0.350
Rotary knob type. For UL ratings see page 1-12.					
SM1R 0016	0.1...0.16	100	100	1	0.320
SM1R 0025	0.16...0.25	100	100	1	0.320
SM1R 0040	0.25...0.4	100	100	1	0.320
SM1R 0063	0.4...0.63	100	100	1	0.320
SM1R 0100	0.63...1	100	100	5	0.320
SM1R 0160	1...1.6	100	100	5	0.320
SM1R 0250	1.6...2.5	100	100	5	0.320
SM1R 0400	2.5...4	100	100	5	0.390
SM1R 0650	4...6.5	100	100	5	0.390
SM1R 1000❶	6.3...10	100	100	5	0.390
SM1R 1400❶	9...14	100	100	5	0.390
SM1R 1800❶	13...18	100	100	5	0.390
SM1R 2300❶	17...23	50	25	1	0.390
SM1R 2500❶	20...25	50	25	1	0.390
SM1R 3200❶	24...32	50	25	1	0.390
SM1R 4000	30...40	20	10	1	0.390

❶ For SM1R... breakers, certified UL Type E, add E letter to the code. Ex. SM1R**E** 1000.
❷ 10In max for 0.1...0.16A and 0.16...0.25A setting ranges.

General characteristics
SM1P... and SM1R... are modern circuit breakers 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 40A.
The dimensions of SM1P… breakers are compliant with the DIN43880 standard, allowing them to be mounted in all modular enclosures on the market.
A magnetic trip indicator integrated on the SM1R… breakers avoids dangerous closing operations during short-circuit conditions, previously disconnected by the breaker.
SM1R… up to 32A breakers, with SM1X90 00R accessory, are Type E-certified according to UL 60947-4-1; only for range from 6.5 to 32A the Type E version must be ordered with specific code SM1RE...❶.
SM1P… and SM1R… motor protection circuit breakers 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 Ui: 690V
- IEC rated impulse withstand voltage: 6kV
- IEC rated frequency: 50/60Hz
- Maximum rated current: 40A
- Adjustment ranges: 16
- IEC breaking capacity: See table on page 1-2
- 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: Ø4mm/0.16”
- IEC degree of protection: IP20.

Certifications and compliance
Certifications obtained: cULus, EAC.
SM1R… breakers are Type E-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.

Motor protection circuit breakers SM1RM… up to 40A. Magnetic protection

SM1RM…

Order code	Rated and magnetic trip current Rat.	Trip.	Short circuit breaking capacity at 400V Icu	Ics	Qty per pkg	Wt
	[A]	[A]	[kA]	[kA]	n°	[kg]
Rotary knob type. For UL ratings see page 1-12.						
SM1RM 0016	0.16	1.6	100	100	1	0.320
SM1RM 0025	0.25	3.2	100	100	1	0.320
SM1RM 0040	0.4	5.2	100	100	1	0.320
SM1RM 0063	0.63	8.2	100	100	1	0.320
SM1RM 0100	1	13	100	100	5	0.320
SM1RM 0160	1.6	21	100	100	5	0.320
SM1RM 0250	2.5	33	100	100	5	0.320
SM1RM 0400	4	52	100	100	5	0.390
SM1RM 0650	6.5	85	100	100	5	0.390
SM1RM 1000	10	130	100	100	5	0.390
SM1RM 1400	14	182	100	100	5	0.390
SM1RM 1800	18	234	100	100	5	0.390
SM1RM 2300	23	299	50	25	1	0.390
SM1RM 2500	25	325	50	25	1	0.390
SM1RM 3200	32	416	50	25	1	0.390
SM1RM 4000	40	420	20	10	1	0.390

General characteristics
SM1RM… are motor protection circuit breakers with magnetic tripping only and high breaking capacity.
They are typically used to protect starters where there is a thermal relay or other overload protection.
Starter control and protection of up to 22kW (400V) are possible by choosing the suitable adjustment range, from 0.1 to 40A.

Operational characteristics
- IEC rated insulation voltage Ui: 690V
- IEC rated impulse withstand voltage: 6kV
- IEC rated frequency: 50/60Hz
- Maximum rated current: 40A
- IEC breaking capacity: See table on page 1-3
- Heat dissipation per phase: 0.7...3.3W
- Magnetic tripping: 13In max.
- 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: Ø4mm
- IEC degree of protection: IP20.

Certifications and compliance
Certifications obtained: cULus, EAC.
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.

Motor protection circuit breakers SM2… and SM3… up to 100A. Magnetic and thermal protection

SM2R…

SM3R…

Order code	Thermal trip adjustment range	Short circuit breaking capacity at 400V Icu	Ics	Qty per pkg	Wt
	[A]	[kA]	[kA]	n°	[kg]
Rotary knob type. For UL ratings see page 1-12.					
SM2R 5000	34…50	50	50	1	1.000
SM2R 6300	45…63	50	50	1	1.000
Rotary knob type. For UL ratings see page 1-12.					
SM3R 7500	55…75	50	38	1	2.200
SM3R 9000	70…90	50	38	1	2.200
SM3R 9900	80…100	50	38	1	2.200

General characteristics
SM2R... and SM3R... are modern circuit breakers 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… breakers 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.
SM3… 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.

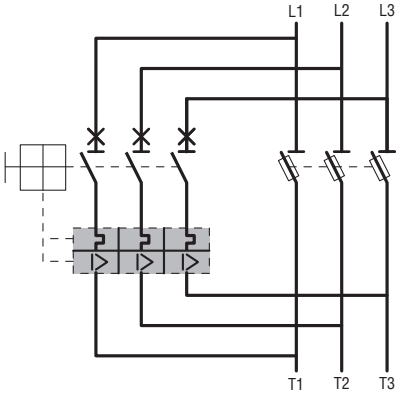
Operational characteristics
- IEC rated insulation voltage Ui: 1000V
- IEC rated impulse withstand voltage: 8kV
- IEC rated frequency: 50/60Hz
- Maximum rated current:
  63A (for SM2...); 100A (for SM3...)
- Adjustment ranges: 2 (for SM2...); 3 (for SM3...)
- IEC breaking capacity: See table on page 1-2 and 1-3
- 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: Ø4mm/0.16”
- IEC degree of protection: IP20 on front.

Certifications and compliance
Certifications obtained: cULus, EAC.
SM2… and SM3… circuit breakers are Type E-certified (Self-Protected Combination Motor Controllers) according to UL 60947-4-1; for Type E certification, SM3 only with accessory SM3X90 00R.
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.

SM1PF… circuit breakers Fuse monitoring function

SM1PF…

Order code	Fixed thermal release current	Short circuit breaking capacity at 400V Icu	Ics	Qty per pkg	Wt
	[A]	[kA]	[kA]	n°	[kg]
Push button control. For UL ratings see page 1-12.					
SM1PF 0020	0.20	100	100	5	0.280



General characteristics
SM1PF… are breakers with magnetic-thermal tripping intended specifically for monitoring the status of fuses.
By connecting every phase of the breaker to a fuse, when it blows, the motor protection breaks.
Through the auxiliary contacts fitted on the motor protection, the blown fuses are signalled electrically.

Operational characteristics
- IEC rated insulation voltage Ui: 690V
- IEC rated impulse withstand voltage: 6kV
- IEC rated frequency: 50/60Hz
- Rated current: 0.2A
- Magnetic tripping: 1.2A.
- 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: Ø4mm/0.16”
- IEC degree of protection: IP20.

Certifications and compliance
Certifications obtained: cULus, EAC.
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.


SM1X11…


SM1X12…


SM1X13…


SM1X14…
SM1X15…


SM1X16…


SM1X18 200R


SM1X9000R


SM1X18 S


SM1X89 02


BFX89 01

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Add-on auxiliary contacts.			
SM1X11 20	Front mount 2NO	10	0.016
SM1X11 11	Front mount 1NO+1NC	10	0.016
SM1X12 20	Side mount 2NO	1	0.036
SM1X12 11	Side mount 1NO+1NC	10	0.016
SM1X12 02	Side mount 2NC	1	0.036
SM1X13 11	Side mount. Contacts for thermal and magnetic tripping indication 1NO+1NC	1	0.036
SM1X13 11M	Side mount. Contacts for magnetic tripping indication 1NO+1NC	1	0.036
Undervoltage trip releases.			
SM1X14 024	24VAC 50Hz	1	0.130
SM1X14 110	110VAC 50Hz; 120VAC 60Hz	1	0.130
SM1X14 230	230VAC 50Hz	1	0.130
SM1X14 400	400VAC 50Hz; 440VAC 60Hz	1	0.130
SM1X15 024R❶	With early-make contacts 24VAC 50Hz	1	0.140
SM1X15 110R❶	With early-make contacts 110VAC 50Hz; 120VAC 60Hz	1	0.140
SM1X15 230R❶	With early-make contacts 230VAC 50Hz	1	0.140
SM1X15 400R❶	With early-make contacts 400VAC 50Hz	1	0.140
Shunt trip releases.			
SM1X16 024	24VAC 50/60Hz	1	0.130
SM1X16 110	110VAC 50/60Hz	1	0.130
SM1X16 230	230VAC 50/60Hz	1	0.130
SM1X16 400	400VAC 50/60Hz	1	0.130
Adjuster sealing kit.			
SM1X18 12	With wire and lead included	1	0.006
IP65 (4X) padlockable door coupling handle for SM1R...			
SM1X18 200R	Red/yellow complete with rod length 200mm/7.87”	1	0.115
SM1X18B 200R	Black complete with rod length 200mm/7.87”	1	0.115
SM1X18 S❷	Support for rod >145mm/5.71”	1	0.030
Phase separation barriers for SM1R…			
SM1X9000R	For Type E as UL60947-4-1	5	0.016
Three-phase connection busbars 45mm/1.77” spacing.			
11 SMX90 32	For 2 breakers	10	0.028
11 SMX90 33	For 3 breakers	10	0.050
11 SMX90 34	For 4 breakers	10	0.071
11 SMX90 35	For 5 breakers	10	0.092
Three-phase connection busbars 54mm/2.13” spacing.			
11 SMX90 42	For 2 breakers	10	0.031
11 SMX90 43	For 3 breakers	10	0.056
11 SMX90 44	For 4 breakers	10	0.081
11 SMX90 45	For 5 breakers	10	0.090
Terminal block for busbar supply.			
11 SMX90 30	For all busbar types	10	0.048
Safety cover.			
11 SMX90 31	For unused terminals	10	0.004
Accessories for motor protection breaker fixing.			
SM1X89 02	Metal bracket for fixing SM1... motor protection with screws	10	0.006
BFX89 01	Universal plastic base for screw-fixing SM1... motor protection circuit breaker	2	0.016

General and operational characteristics

ADD-ON AUXILIARY CONTACTS
- Connectable to the left side of the breaker 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...2.5mm 2 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 breaker
- 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...2.5mm 2 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 breaker
- In-rush consumption: 20VA
- Operating voltage: 0.7...1.1Us
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm 2 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 breaker.

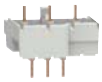
TERMINAL BLOCKS FOR BUSBAR SUPPLY
- Imax 63A
- Screw tightening tool: Phillips 2
- Maximum tightening torque: 2.3Nm / 20lbin
- Conductor cross section minimum-maximum: 4...25mm 2 or 10...4AWG.

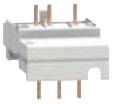
Certifications and compliance

Certifications obtained: cULus (except terminal block for busbar supply), 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.

❶ Only suitable for SM1R... motor protection circuit breakers
❷ Mounting also possible with side-mount auxiliary contacts SM1X12... and SM1X13...

Dimensions pag. 1-13 and 14
Wiring diagrams page 1-16


SM1X30…


SM1X31…
SM1X32…


SM1Z17 01P


SM1Z17 02P


SM1Z17 05P


SM1Z17 15R


SM1Z17 25R


SM1X17 40P


SM1X17 45P


SM1X17 46P


SM1X17 024R

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Rigid SM1 breaker-contactor connections.			
SM1X30 40P	For motor protection breaker SM1P... with BG… mini-contactors	10	0.019
SM1X31 41P	For motor protection breaker SM1P... with BF09..25A contactors	10	0.035
SM1X32 41P	For motor protection breaker SM1P... with BF26..38A contactors (max 32A)	10	0.045
SM1X30 40R	For motor protection breaker SM1R... with BG… mini-contactors	10	0.019
SM1X31 41R	For motor protection breaker SM1R... with BF09..25A contactors	10	0.035
SM1X31 42R	For motor protection breaker SM1R... with contactors BF09..25D and BF09…25L	10	0.044
SM1X32 41R	For motor protection breaker SM1R... with contactors BF26..38A (max 32A)	10	0.045
Surface mount enclosures IP65 (4X) for SM1P...			
SM1Z17 01P	Width 80mm/3.15"❶	1	0.235
SM1Z17 02P	Width 80mm/3.15". With button for emergency stop	1	0.275
SM1Z17 11P	Width 100mm/3.94"❶	1	0.315
SM1Z17 12P	Width 100mm/3.94". With button for emergency stop	1	0.345
Flush mount enclosure IP65 (4X) for SM1P...			
SM1Z17 05P	Width 87mm/3.42"❶	1	0.205
Surface mount enclosures IP65 (4X) for SM1R...			
SM1Z17 15R	With rotary actuator red/yellow. Width 100mm/3.94"	1	0.350
SM1Z17 10R	With black rotary actuator Width 100mm/3.94"	1	0.350
Flush mount enclosures IP65 for SM1R (UL type 4X)			
new **SM1Z17 25R**	With rotary actuator yellow/red Width 87mm/3.42"	1	0.245
SM1Z17 20R	With rotary actuator black Width 87mm/3.42"	1	0.245
ENCLOSURE ACCESSORIES AND SPARE PARTS. For SM1Z...P enclosures.			
SM1X17 40P	Emergency stop button. IP65 (4X)	1	0.044
SM1X17 45P	Rubber membrane with rim. IP65 (4X)	1	0.016
SM1X17 46P	Lockable block. IP65 (4X)	1	0.030
LED pilot lights IP65.			
SM1X17 024G	Green 24VAC/DC	1	0.007
new **SM1X17 024R**	Red 24VAC/DC	1	0.007
SM1X17 400G	Green 110...400VAC	1	0.007
SM1X17 400R	Red 110...400VAC	1	0.007
Plastic M25 to ½" NPT entry adapter.			
11 LM M25 PG16	For enclosures SM1Z17 01P and SM1Z17 02P	10	0.009
Starter assembly adapter plates.			
11 SMX90 10	Adapter plate for direct starter comprising breaker SM1... and contactor BG..., BF09A...BF38A	1	0.058
11 SMX90 12	Adapter plate for reversing switch comprising breaker for motor protection SM1… contactors BG..., BF09A...BF38A	1	0.095
11 SMX90 14	Adapter plate for starter star-delta comprising motor protection breaker SM1... and contactors BF09A...BF38A	1	0.118
11 SMX90 18	35mm rail for passage of wires underneath to contactor; for SMX90 14	1	0.025
11 SMX90 19	DIN rail extension 35mm/1.38"	1	0.025


11 SMX90 10


11 SMX90 12

General and operational characteristics
RIGID SM1 BREAKER-CONTACTOR CONNECTIONS
The SM1X3… connections electrically and mechanically fasten the motor protection breaker together with the contactor. This forms a highly compact single-unit starter for quick installation on a single 35mm DIN rail.
The SM1X3… connections can also be mounted in combination with reversing switches and star-delta starters made with the rigid connections indicated in section 2.

SURFACE MOUNT ENCLOSURES
- Top or bottom cable entry:
  - SM1Z17 01P and SM1Z17 02P 4 M25-threaded knock-outs
  - SM1Z17 11P and SM1Z17 12P 4 knock-out with Ø20.5mm/0.81" or Ø26.5mm/1.04"
  - SM1Z17 10R e SM1Z17 15R 4 - knock-out with Ø20.5mm/0.81" or Ø26.5mm/1.04"
- Possibility of rear entry too
- Protection rating: IP65 (UL Type 4X)
- Holds a breaker, one front-mount auxiliary contact block either one shunt or undervoltage release and one pilot light; only for SM1Z17 10R and SM1Z17 15R, 2 side-mount auxiliary contact blocks can be fitted as well
- The SM1Z17 10R and SM1Z17 15R rotary actuators can be padlocked with a maximum of 3 padlocks Ø4...8mm/0.16...0.31"
- Earth/ground terminal included
- Operating temperature: -25…+60°C
- Storage temperature: -50...+80°C.

FLUSH MOUNT ENCLOSURES FOR SM1P AND SM1R
- Holds a SM1P breaker, one front-mount auxiliary contact block and either one shunt or undervoltage release
- Protection rating: IP65 (UL Type 4X)
- Earth/ground terminal included
- 70x115mm/2.76x4.53" cutout for SM1P 70x143mm/2.77x5.65" cutout for SM1R
- Operating temperature: -25…+60°C
- Storage temperature: -50...+80°C.

ENCLOSURE ACCESSORIES
Emergency stop button:
- Turn to release
- Red button Ø35mm/1.38".

Lockable block:
- Prevents closing operation; 3 padlocks maximum Ø4...8mm/0.16...0.31".

STARTER ASSEMBLY ADAPTER PLATES
These accessories permit the assembly of starters, making slim and compact equipment that's easy and quick to install.
The starter adapter plates install on DIN rail 35mm/1.38".

Certifications and compliance
Certifications obtained: cULus except SM1X17 024..., SM1X17 400..., SMX90.... and 11 LM M25 PG16), EAC.
Certifications pending: CCC for rigid connections and enclosures (maximum current enclosures for cULus: 25A).
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.
For cURus pilot lights, please contact Technical support (Tel. 035 4282422; E-mail: service@LovatoElectric.com).

❶ Complete with rubber membrane.

SM2X11…

SM2X12…

SM2X13 11

SM2X14…

SM2X16…

SM2X18…

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Add-on auxiliary contacts.			
SM2X11 20	Front mount 2NO	10	0.020
SM2X11 11	Front mount 1NO+1NC	10	0.020
SM2X11 02	Front mount 2NC	10	0.020
SM2X12 20	Side mount 2NO	2	0.040
SM2X12 11	Side mount 1NO+1NC	10	0.040
SM2X12 02	Side mount 2NC	2	0.040
SM2X13 11	Side mount. Indicator contacts for thermal and magnetic tripping 1NO+1NC	2	0.040
Undervoltage trip releases.			
SM2X14 230	230VAC 50/60Hz	5	0.100
SM2X14 400	400VAC 50/60Hz	5	0.100
SM2X14 440	440VAC 50/60Hz	5	0.100
Shunt trip releases.			
SM2X16 024	24VAC 50/60Hz	5	0.100
SM2X16 110	110VAC 50/60Hz	5	0.100
SM2X16 230	230VAC 50/60Hz	5	0.100
SM2X16 400	400VAC 50/60Hz	5	0.100
SM2X16 440	440VAC 50/60Hz	5	0.100
Padlockable IP65 (4X) door coupling handle for SM2R and SM3R.			
SM2X18 200R	Red/yellow complete with rod length 200mm/7.87”	1	0.115
SM2X18 B200R	Black complete with rod with rod length 200mm/7.87”	1	0.115
Phase separation barriers set for SM3R…			
SM3X90 00R	For Type E as per UL60947-4-1	1	0.175

General and operational characteristics

ADD-ON AUXILIARY CONTACTS
- Insert on the top front or snap on the left side of the breaker
- Maximum combinations: 3 SM2X… 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 SM2X11...)
- IEC rated insulation voltage Ui: 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...2.5m or 18...14AWG
- Screw tightening tool: Pz 2
- Maximum tightening torque: 1.2Nm / 10bin
- Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules.

UNDERVOLTAGE TRIP RLEASES
- Snap on to the right side of the breaker 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...2.5mm 2 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.

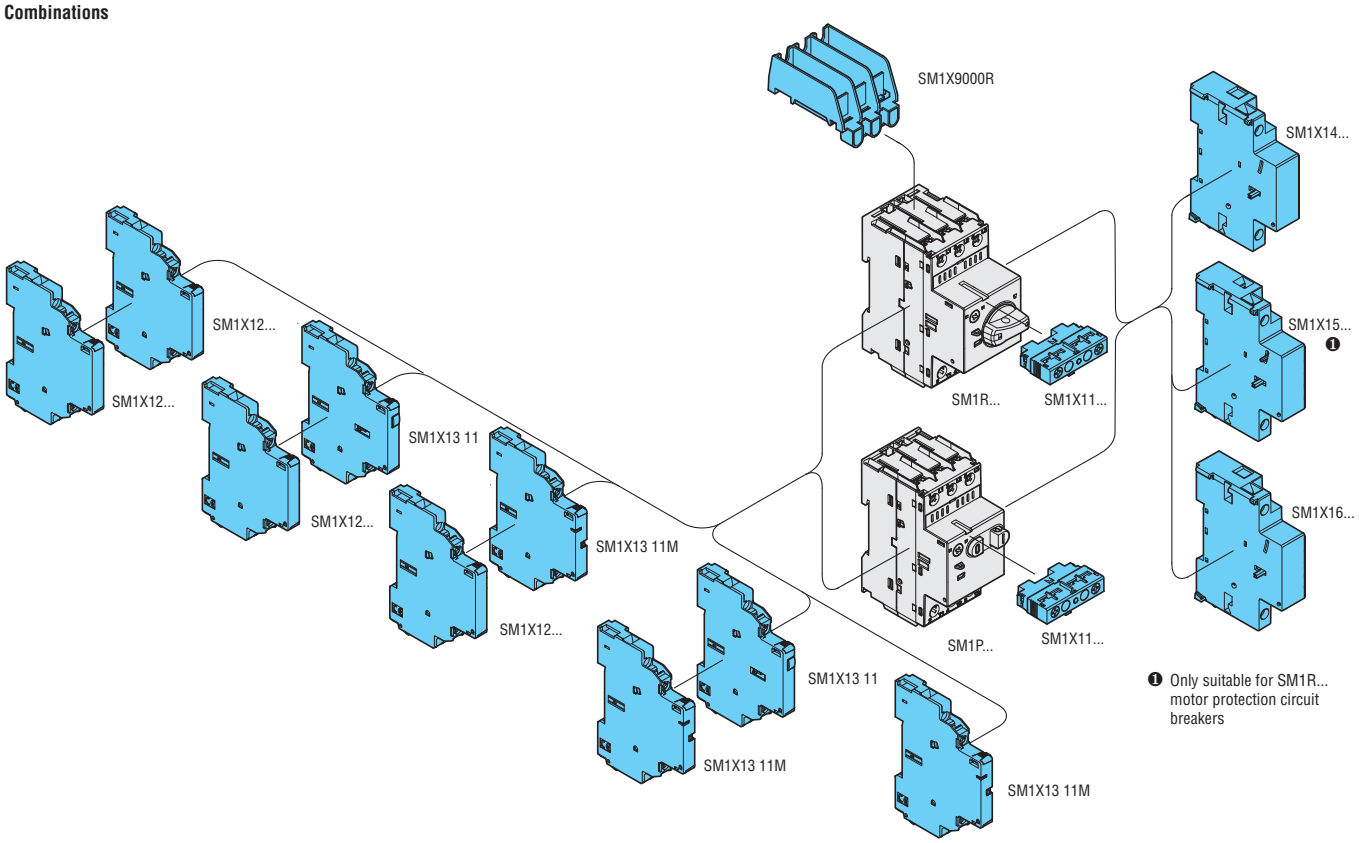
SHUNT TRIP RELEASES
- Snap on to the right side of the breaker
- In-rush consumption: 20VA
- Operating limits: 0.85...1.1Us
- Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm 2 or 18...14AWG
- Screw tightening tool: Pz 2
- Maximum tightening torque: 1.2Nm / 10lbin
- Width of side-mount 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

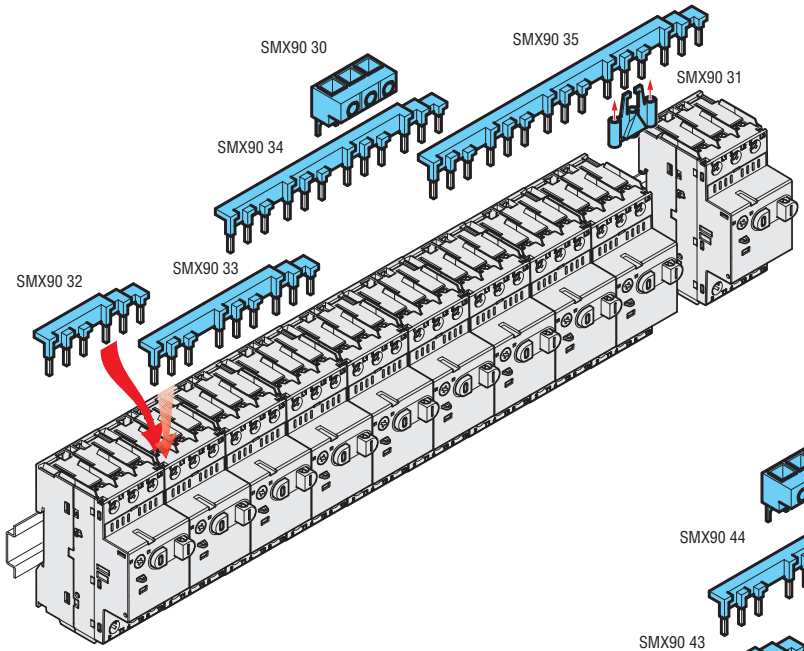
Certifications obtained: cULus, EAC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Combinations

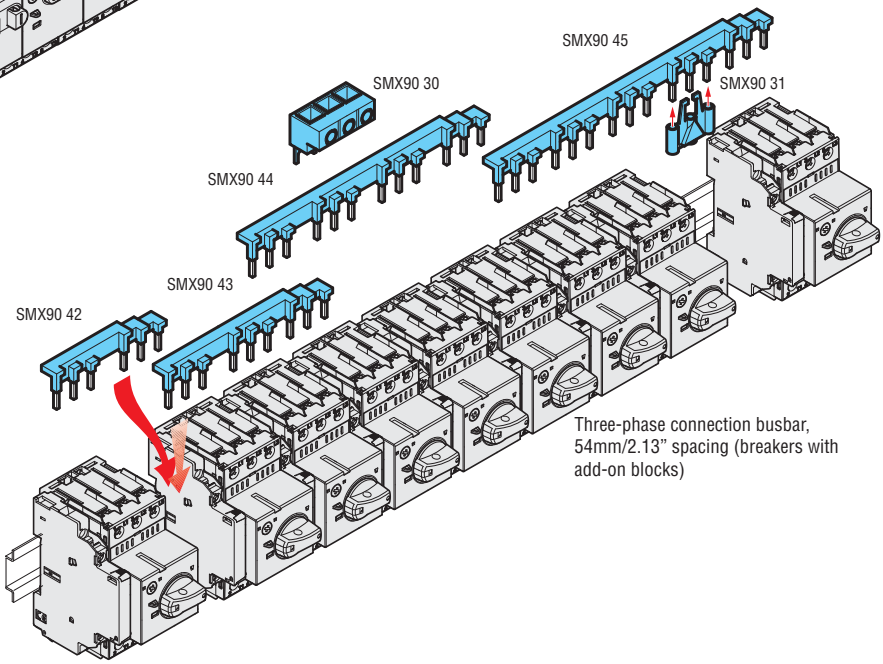


❶ Only suitable for SM1R... motor protection circuit breakers

Three-phase connection busbars.



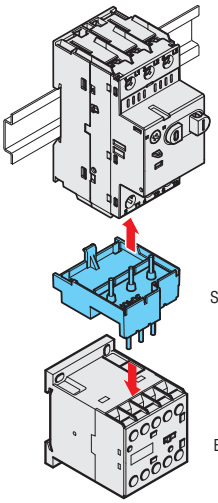
Three-phase connection busbar, 45mm/1.77" spacing (breakers without add-on blocks).

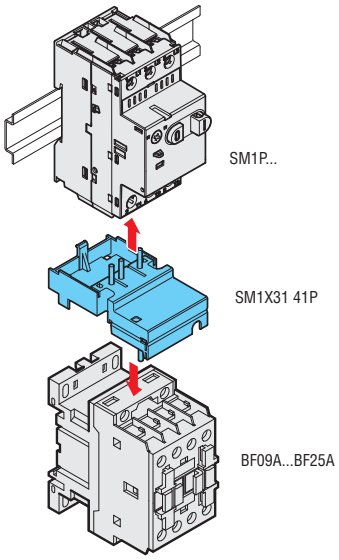


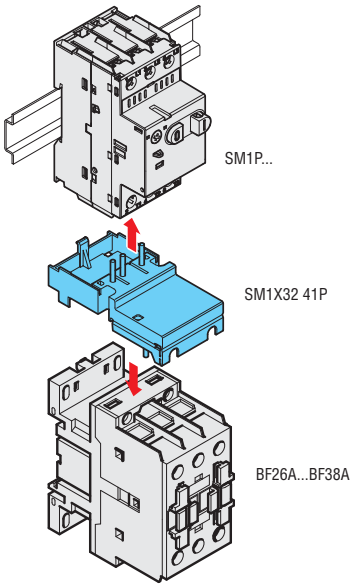
Three-phase connection busbar, 54mm/2.13" spacing (breakers with add-on blocks)

Combinations

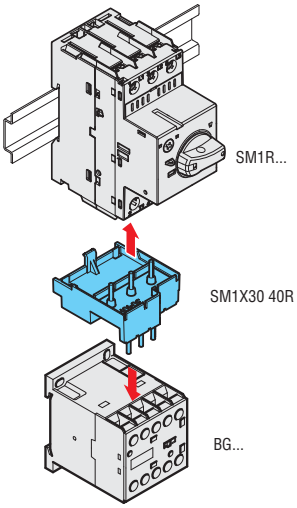
Rigid SM1P... breaker - contactor connections.

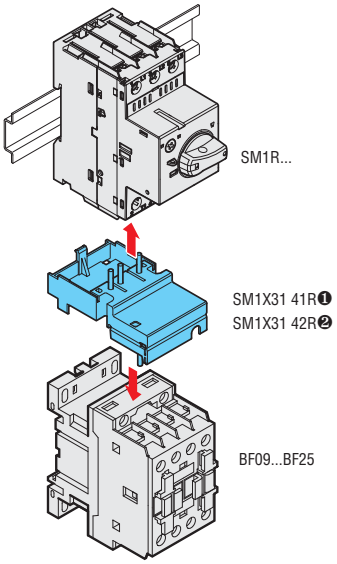


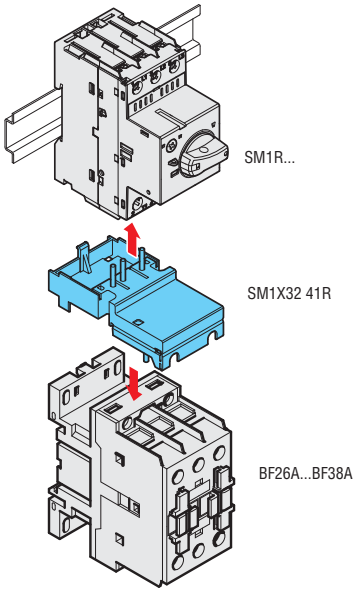




Rigid SM1R... breaker - contactor connections.

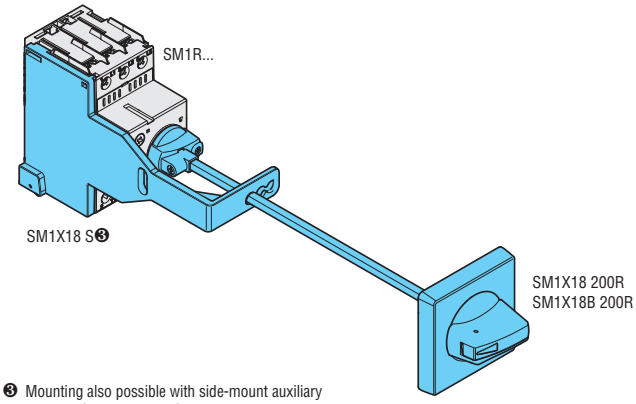






❶ For BF09A...BF25A contactors.
❷ For BF09D…BF25D and BF09L…BF25L contactors.

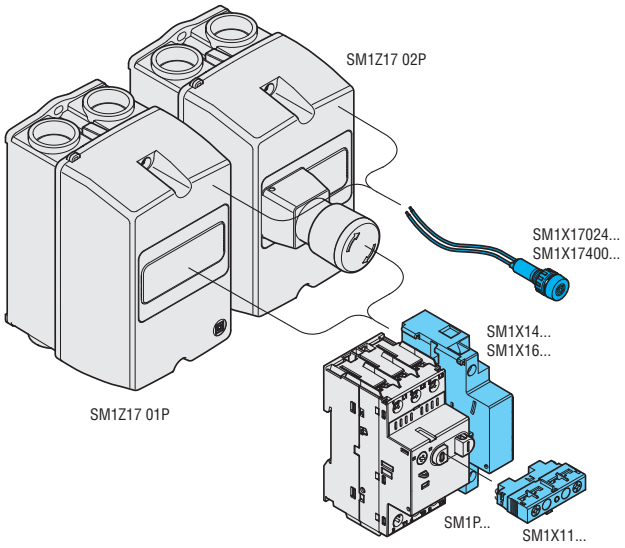
Padlockable door coupling handle.



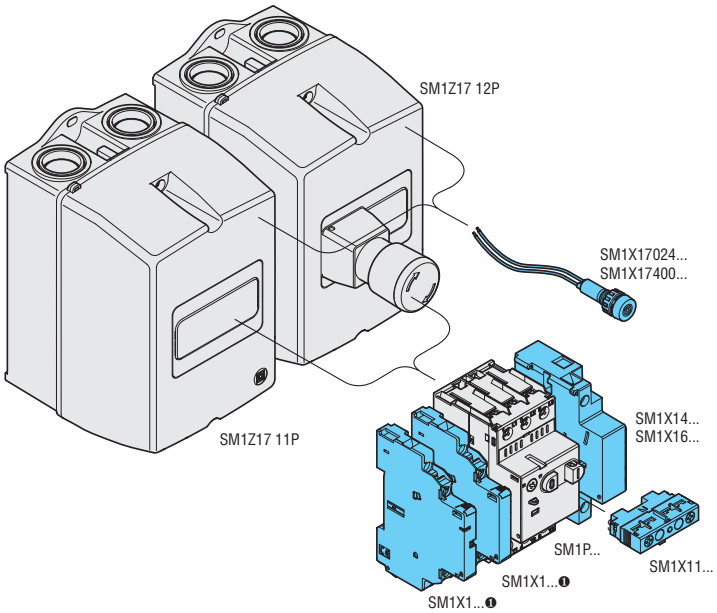
❸ Mounting also possible with side-mount auxiliary contacts SM1X12... and SM1X13...

Combinations

Surface mount enclosures for SM1P... Width 80mm.

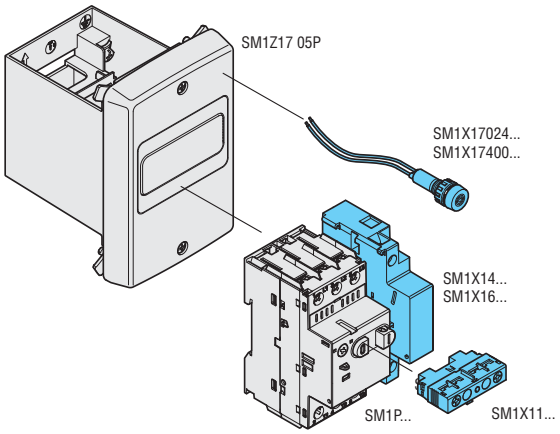


Surface mount enclosures for SM1P... Width 100mm.

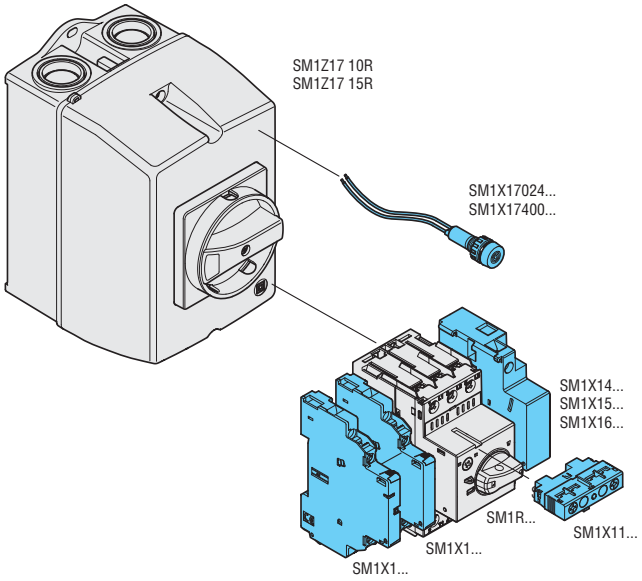


❶ Contacts for magnetic tripping indication SM1X13 11M when mounted in SM1Z17 11P and SM1Z17 12P, can't be mounted alone, but shall be mounted in combination with SM1X12... on SM1X 1311.

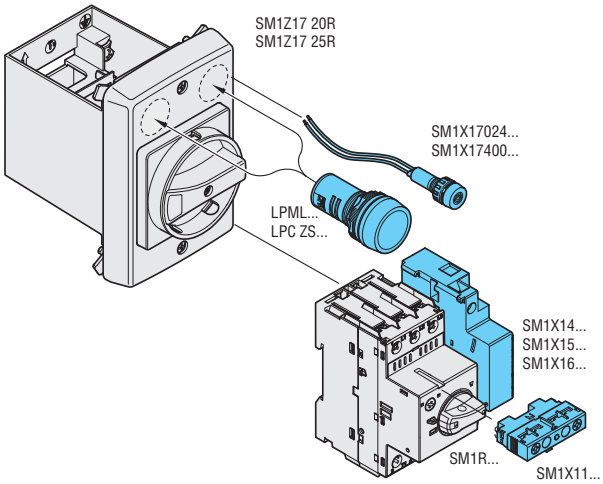
Flush mount enclosures for SM1P... Width 87mm/3.42".



Surface mount enclosures for SM1R... Width 100mm/3.94".

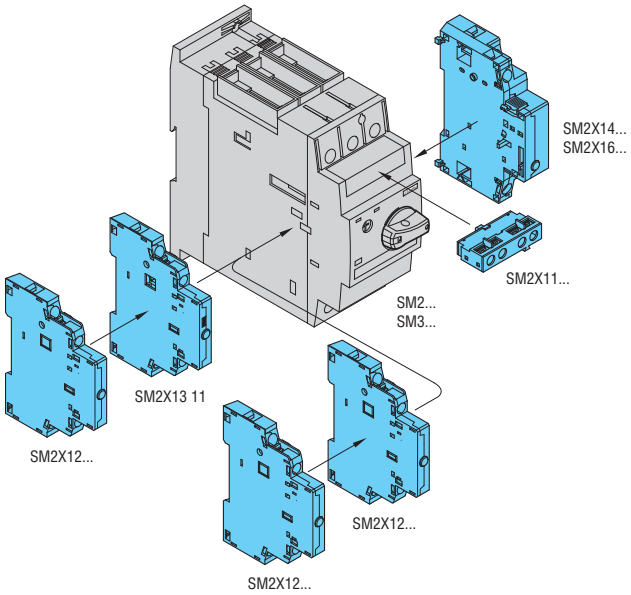


Flush mount enclosures for SM1R... width 87mm/3.42".

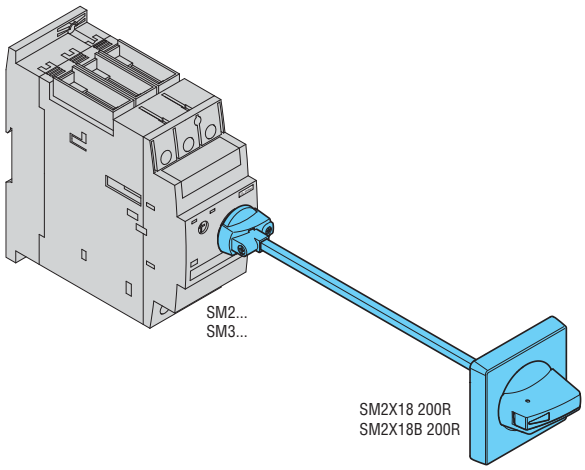


Combinations

Combinations of SM2... and SM3... motor protection circuit breakers



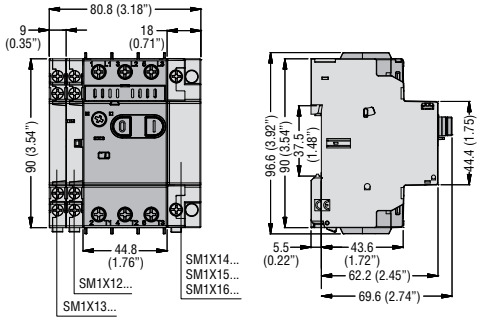
Padlockable door coupling handle.



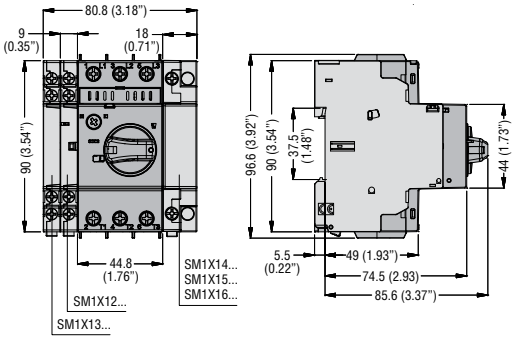
MAXIMUM UL/CSA HORSEPOWER RATINGS

		Single-phase		Three-phase, 3-pole			
		110V-120V	220V-240V	200V-208V	220-240V	440/-480V	550V-600V
		[HP]	[HP]	[HP]	[HP]	[HP]	[HP]
SM1R0016	**SM1P0016**	–	–	–	–	–	–
SM1R0025	**SM1P0025**	–	–	–	–	–	–
SM1R0040	**SM1P0040**	–	–	–	–	–	–
SM1R0063	**SM1P0063**	–	–	–	–	–	–
SM1R0100	**SM1P0100**	–	–	–	–	1/2	1/2
SM1R0160	**SM1P0160**	–	1/10	–	–	3/4	1
SM1R0250	**SM1P0250**	–	1/6	1/2	1/2	1	1.5
SM1R0400	**SM1P0400**	1/8	1/3	3/4	3/4	2	3
SM1R0650	**SM1P0650**	1/4	1/2	1.5	1.5	3	5
SM1R1000	**SM1P1000**	1/2	1.5	2	3	5	7.5
SM1R1400	—	3/4	2	3	3	10	10
SM1R1800	—	1	3	5	5	10	15
SM1R2300	—	1.5	3	5	7.5	15	20
SM1R2500	—	2	3	5	7.5	15	20
SM1R3200	—	2	5	10	10	20	30
SM1R4000	—	3	7.5	10	10	30	30
—	**SM1P1400**	3/4	2	3	3	10	–
—	**SM1P1800**	1	3	5	5	10	–
—	**SM1P2300**	1.5	3	5	7.5	15	–
—	**SM1P2500**	2	3	5	7.5	15	–
—	**SM1P3200**	2	5	10	10	20	–
—	**SM1P4000**	3	7.5	10	10	30	–
SM2R5000	—	3	10	15	15	30	40
SM2R6300	—	5	10	20	20	40	60
SM3R7500	—	5	15	20	25	50	60
SM3R9000	—	7 1/2	20	25	30	60	75
SM3R9900	—	10	20	30	30	75	100

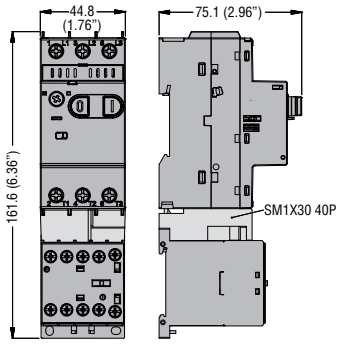
SM1P... with side-mount auxiliary contacts



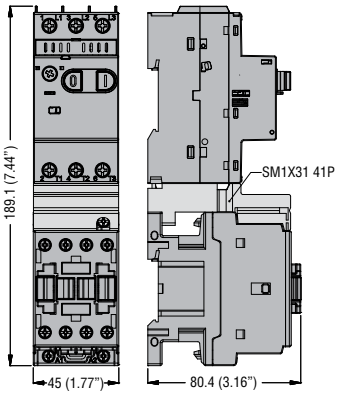
SM1R... with side-mount auxiliary contacts



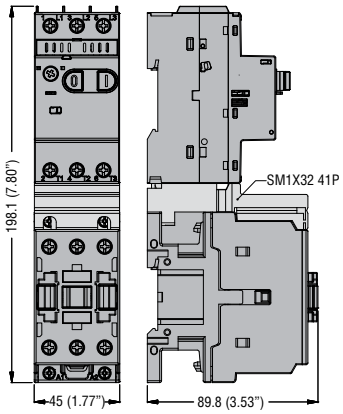
SM1P... with BG... mini-contactors and connection **SM1X30 40P**



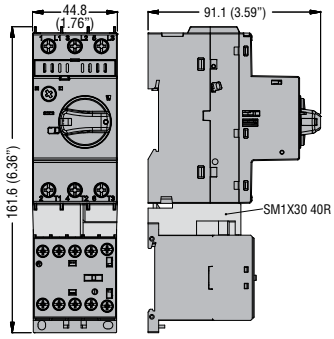
SM1P... with BF09 A...BF25 A... contactors and connection **SM1X31 41P**



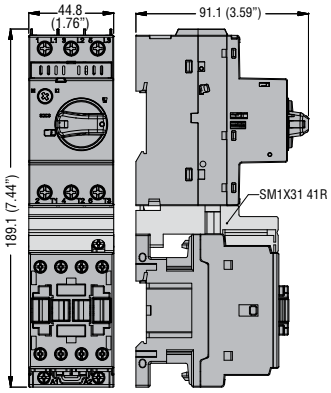
SM1P... with BF26 A...BF38 A... contactors and connection **SM1X32 41P**



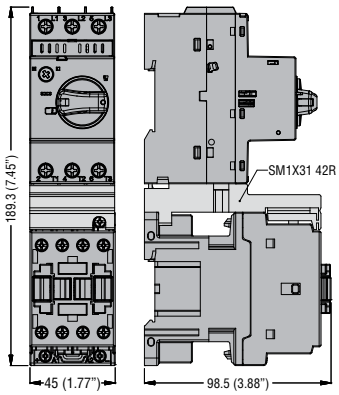
SM1R... with BG... mini-contactors and connection **SM1X30 40R**



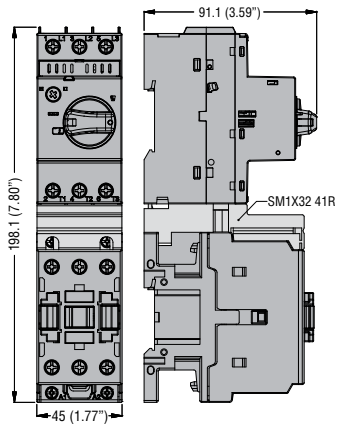
SM1R... with BF09 A...BF25 A... contactors and connection **SM1X31 41R**



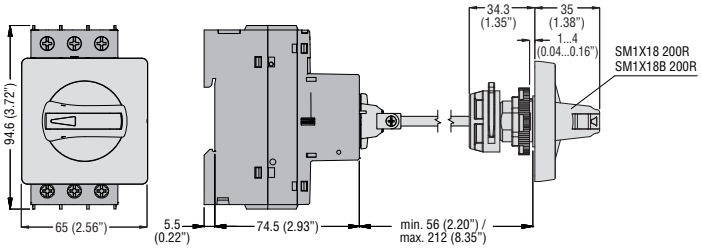
SM1R... with BF09 D...BF25 D... contactors BF09 L...BF25 L... and connection **SM1X31 42R**



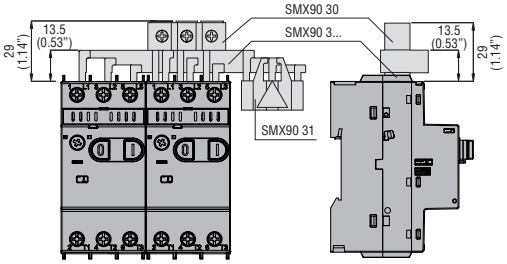
SM1R... with BF26 A...BF38 A... contactors and connection **SM1X32 41R**



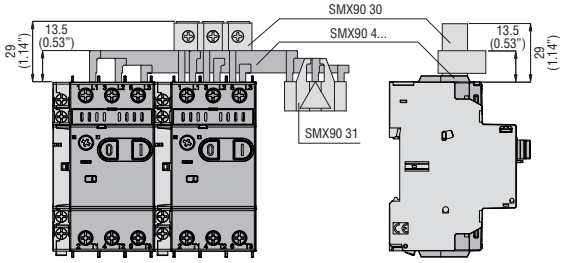
SM1R... padlockable door coupling handle **SM1X18 200R** or **SM1X18B 200R**



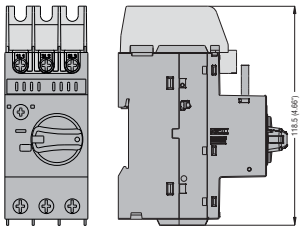
These elements mounted with **SM1… breakers** without side-mount auxiliary contacts



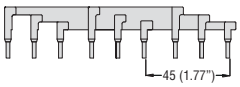
These elements mounted with **SM1… breakers** with side-mount auxiliary contacts **SMX12…** or **SMX13 11**



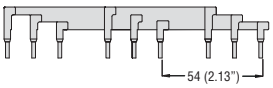
SM1X90 03R



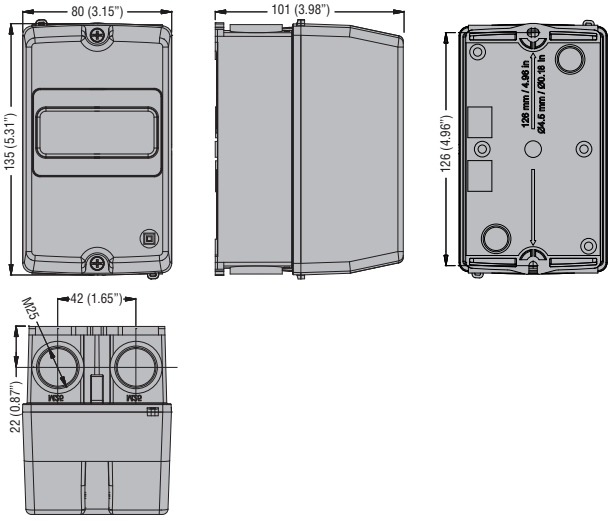
SMX90 32 - SMX90 33 - SMX90 34 - SMX90 35
Connection busbars – 45mm/1.77" spacing



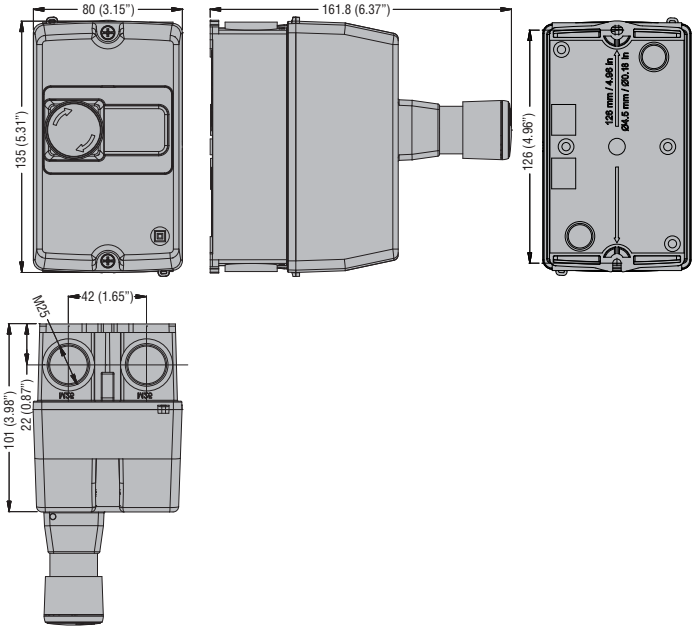
SMX90 42 - SMX90 43 - SMX90 44 - SMX90 45
Connection busbars – 54mm/2.13" spacing



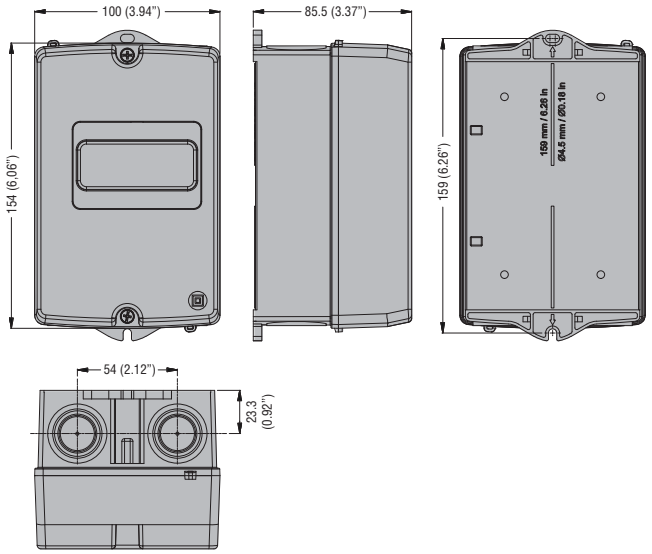
Enclosures **SM1Z17 01P**



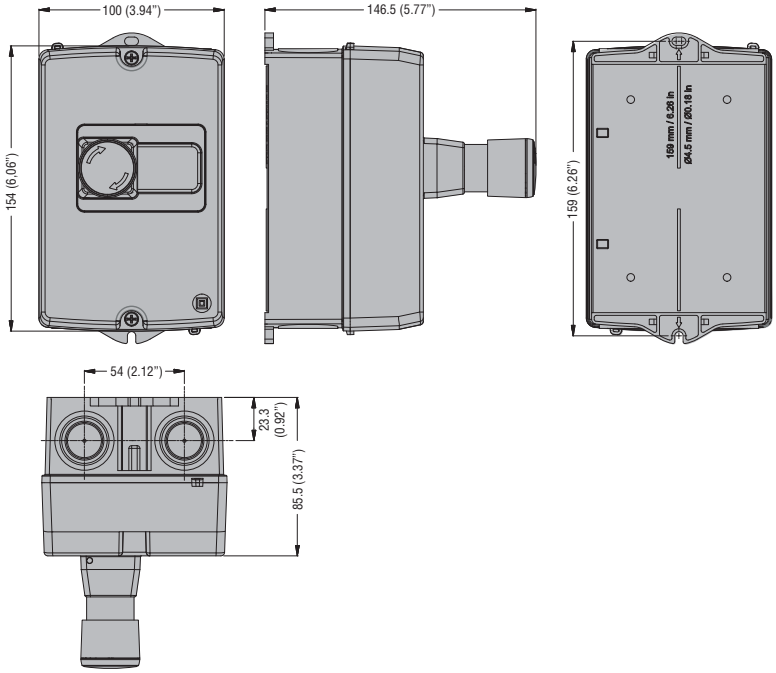
Enclosures **SM1Z17 02P**



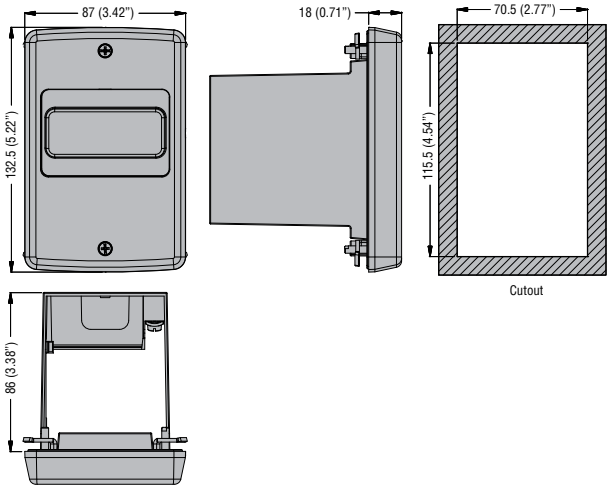
Enclosures **SM1Z17 11P**



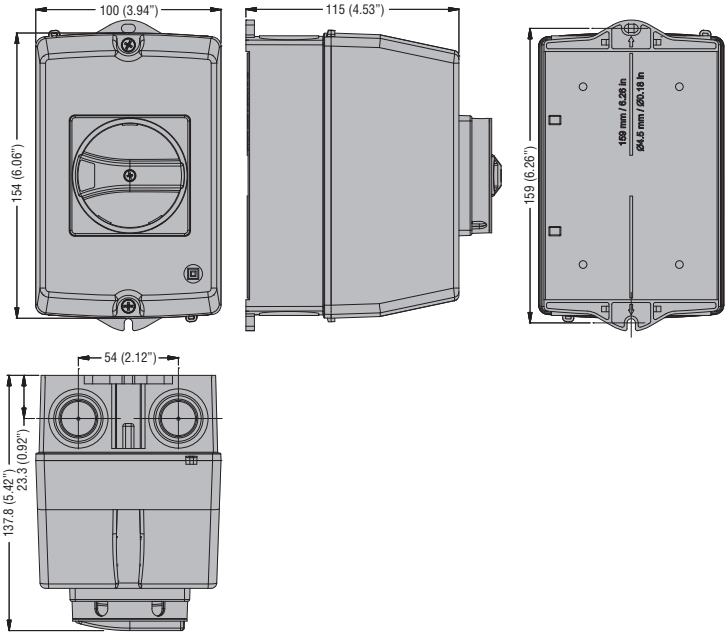
Enclosures **SM1Z17 12P**



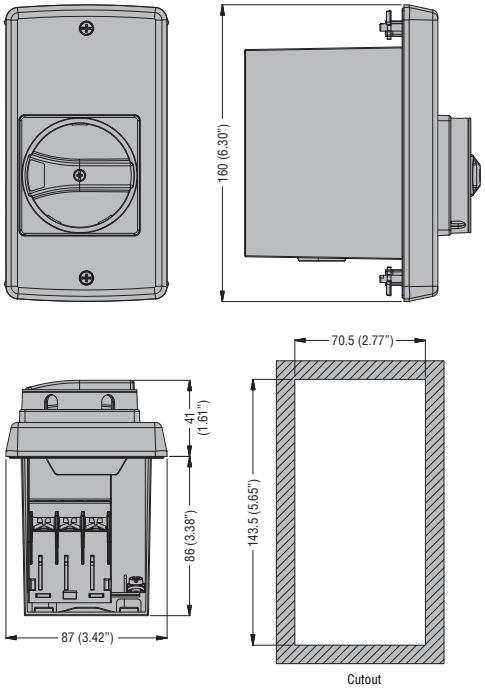
Enclosures **SM1Z17 05P**



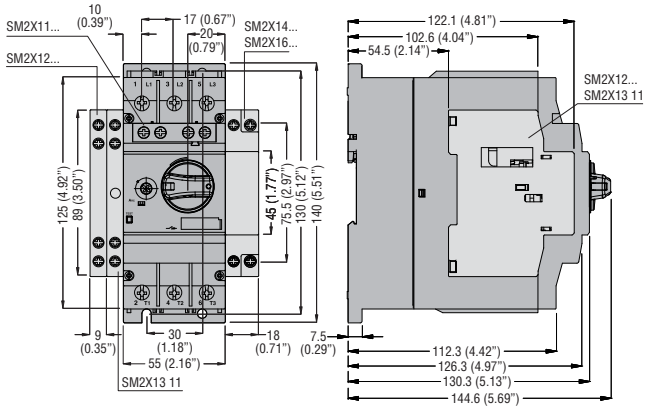
Enclosures **SM1Z17 15R** and **SM1Z17 10R**



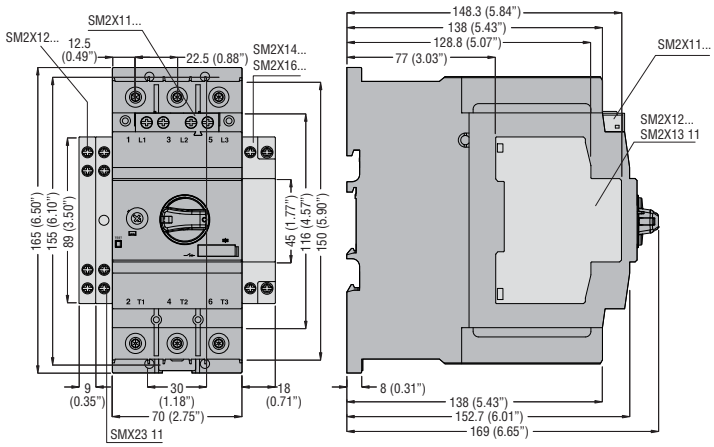
Enclosures **SM1Z17 20R** and **SM1Z17 25R**



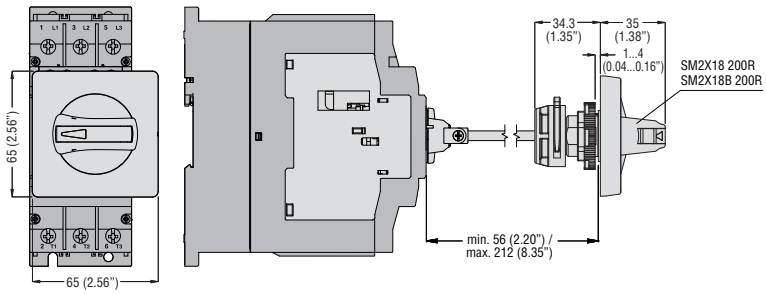
SM2… with side-mount auxiliary contacts



SM3… with side-mount auxiliary contacts

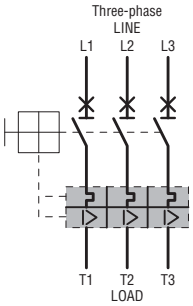


SM2… and **SM3…** padlockable door coupling handle
SM2X18 200R or **SM2X18B 200R**

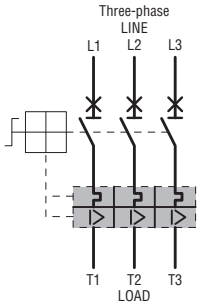


Wiring diagrams

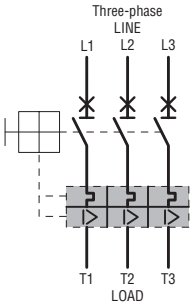
MOTOR PROTECTION CIRCUIT BREAKERS
SM1P…



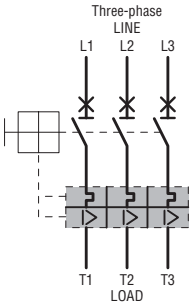
SM1R… - SM2R… - SM3R… - SM1RE…



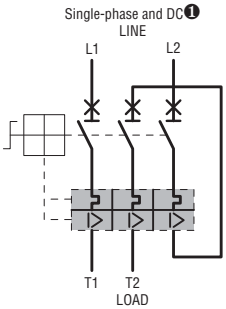
SM1RM…



CIRCUIT BREAKERS
SM1PF…



For all motor protection circuit breakers



❶ Consult our Technical support for DC use.

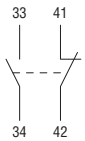
ADD-ON BLOCKS
For SM1… types
Front mount auxiliary contacts

SM1X11 20

SM1X11 11

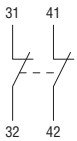
Side mount auxiliary contacts

SM1X12 11

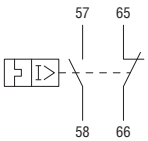


SM1X12 20

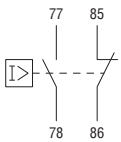
SM1X12 02



SM1X13 11

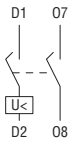


SM1X13 11M

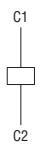


Side mount undervoltage trip releases
SM1X14…

SM1X15…



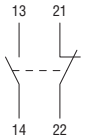
Side mount shunt trip release
SM1X16…



For SM2R… and SM3R types
Front mount auxiliary contacts

SM2X11 20

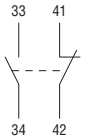
SM2X11 11



SM2X11 02

Side mount auxiliary contacts

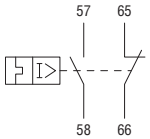
SM2X12 11



SM2X12 20

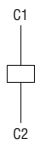
SM2X12 02

SM2X13 11



Side mount undervoltage trip release
SM2X14…

Side mount shunt trip release
SM2X16…



TYPE			SM1P...	SM1R...	SM2R...	SM3R...
Rated insulation voltage Ui		V	690		1000	
Rated impulse withstand voltage		kV	6			
Rated frequency: 50/60Hz						
Maximum rated current		A	40	40	63	100
Number of adjustment ranges		No.	16	16	2	3
Total power dissipation at maximum current		W	5…15	5…15	7.1...20	10...38
Magnetic tripping		A	13 x In❶	13 x In	13 x In	13 x In
Mechanical life		cycles	100,000	100,000	50,000	50,000
Electrical life (Ie max AC3)		cycles	100,000	100,000	25,000	25,000
Terminal tightening torque		Nm	2.5...3	2.5...3	4.5	6
		lbft	1.8...2.2	1.8...2.2	40	53
		Tool	PH2	PH2	PZ2	Allen 4mm
Conductor section minimum and maximum (1 or 2 wires)	AWG	No.	16…8	16…8	18...3	10...1/0
Flexible without lug		mm^2	1…10	1…10	0.75...25	10...50
AMBIENT CONDITIONS						
Temperature	operating	°C	-20...+60❷	-20...+60❷	-20...+70❷	-20...+70❷
	storage	°C	-50...+80	-50...+80	-50...+80	-50...+80
	compensation	°C	-20...+50	-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	

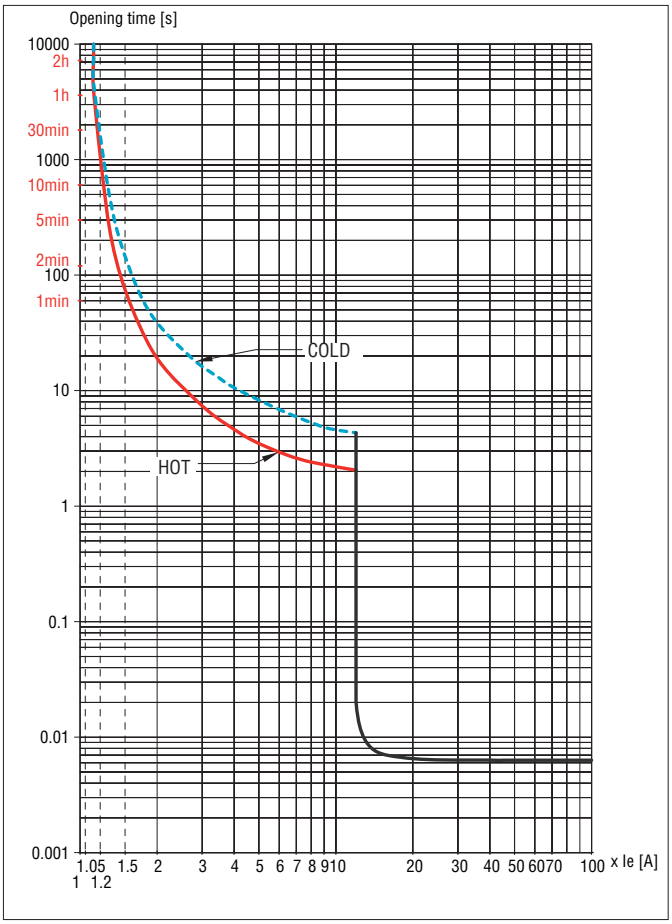
E.g. PH = Phillips; PZ = Pozidriv; Allen is metric type.

❶ SM1PF00 20 has a single 0.2A thermal adjustment and magnetic tripping at 6 x In (1.2A).

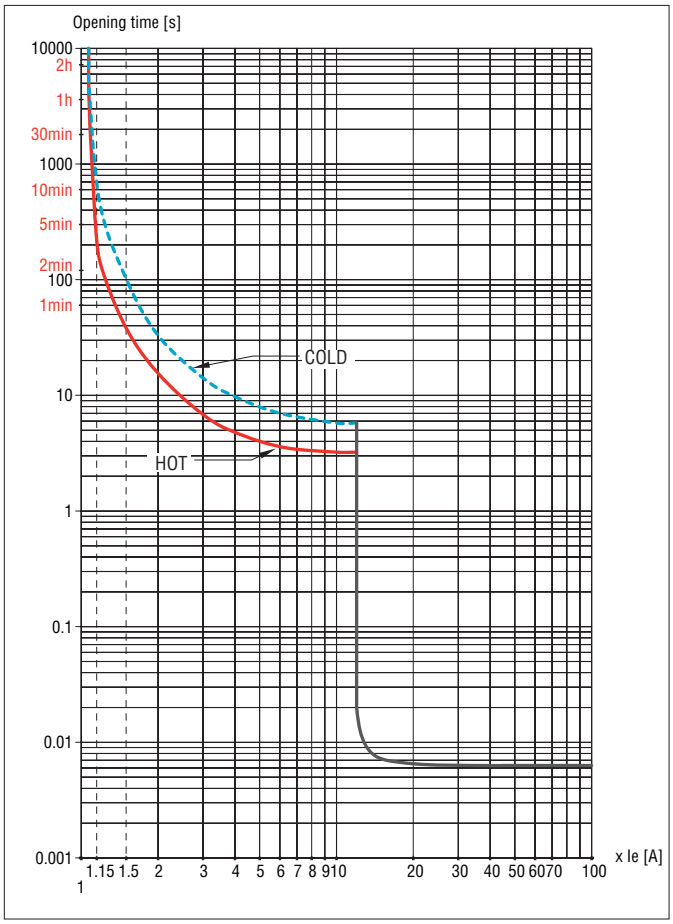
❷ When fitting more than one breaker side by side, without leaving space between each to consent free air circulation on the breaker sides, and have simultaneous operation, the thermal trip adjuster must be positioned at a value 15% higher than the rated motor current.

THERMAL TRIPPING CURVE (AVERAGE TIMES)

Three-phase balanced operation



Two-phase operation (phase failure/single phasing)



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

Contactors

- Three-pole versions up to 630A in IEC AC3 duty
- Four-pole versions up to 1600A in IEC AC1 duty
- Versions for power factor correction up to 100kvar at 400VAC
- Four-pole versions with 2NO+2NC or 4NC main poles
- Versions for photovoltaic application
- Versions with AC, AC/DC or DC control
- Low-consumption versions with DC control circuit for control relays and 9-38A contactors in IEC AC3 duty
- Extensive choice of add-on blocks and accessories
- Certified by primary international authorities.

Page 2-4

THREE-POLE CONTACTORS
- IEC Ith ratings in AC1 duty at ≤40°C: 16 to 1600A
- IEC Ie ratings in AC3 440V duty: 6 to 630A
- IEC Power ratings in AC3 400V duty: 2.2 to 335kW
- UL/CSA ratings: 3 to 500HP at 480V and 600V
- AC, AC/DC, DC and DC low-consumption coil.

Page 2-8

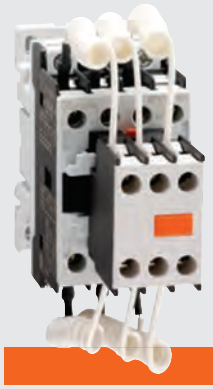
FOUR-POLE CONTACTORS
- IEC Ith ratings in AC1 duty at ≤40°C: 20 to 1600A
- IEC Power ratings in AC1 400V duty: 14 to 950kW
- UL/CSA general use: 16 to 1000A
- AC, AC/DC, DC and DC low-consumption coil.

Page 2-12

FOUR-POLE CONTACTORS WITH 2NO+2NC MAIN POWER POLES
- IEC Ith ratings in AC1 duty at ≤40°C: 20 to 115A
- UL/CSA general use: 20 to 115A
- AC, AC/DC, DC and DC low-consumption coil.

Page 2-13

FOUR-POLE CONTACTORS WITH 4 NC POLES FOR PHOTOVOLTAIC APPLICATIONS
- IEC Ith ratings in AC1 duty at ≤40°C: 25 to 40A
- UL/CSA general use: 20 to 55A for 4NC types
- Operational current up to 125A (DC1 at ≤55°C with 4 NO poles in series) for photovoltaic applications.
- AC, AC/DC, DC and DC low-consumption coil.



Page 2-14

CONTACTORS FOR POWER FACTOR CORRECTION
- With limiting resistors included
- IEC Power ratings at 400V: 7.5 to 100kvar
- UL/CSA ratings: 9 to 100kvar at 480V; 10 to 120kvar at 600V
- AC coil.

Page 2-15

CONTROL RELAYS
- AC, DC and DC low-consumption coil
- Screw or Faston termination
- 4, 8 or 11 auxiliary contact composition.

IE3 READY

LOVATO Electric contactors are suitable for new motors with high IE3 efficiency values

Lovato electric

BG series mini-contactors

- Highly conductive auxiliary contacts with four contact points
- AC and DC versions of same size
- Quick connect - snap on accessory mounting
- Distinct contact status indication
- Up to four auxiliary contacts can be mounted
- Mechanical interlock only 5mm deep
- Positive (force) guided contacts (mechanically-linked per IEC)

- Three-pole mini-contactors, 6 to 12A IEC AC3 duty / 3 to 7.5HP 480V - 3 to 10HP 600V UL/CSA
- Four-pole mini-contactors, 20A IEC AC1 duty
- Versions with 2NO+2NC main power poles
- Highly conductive auxiliary contacts
- Coils with AC or DC supply
- Low-consumption DC versions
- Screw, faston and rear PCB solder pin termination.

	3 poles			4 poles		
	Ie (AC3)	AC	DC	Ith (AC1)	AC	DC
BG06	6A	●	●	—	—	—
BG09	9A	●	●	20A	●	●
BGF09	9A	●	●	20A	●	●
BGP09	9A	●	●	20A	●	●
BG12	12A	●	●	—	—	—

BF series contactors

- Highly conductive auxiliary contacts
- Quick connect - snap on accessory mounting
- Distinct contact status indication
- Up to four auxiliary contacts can be mounted
- Mechanical interlock only 5mm deep
- Positive (force) guided contacts (mechanically-linked per IEC)

- Three-pole contactors, 9 to 150A IEC AC3 duty / 5 to 75HP 480V - 7.5 to 100HP 600V UL/CSA
- Four-pole contactors, 25 to 165A in AC1 duty
- Power factor correction contactors, 7.5 to 100kvar at 400V IEC / 9 to 110kvar at 480V UL/CSA
- Types with 2NO+2NC or 4NC main power poles
- Types for photovoltaic applications
- Highly conductive auxiliary contacts
- Coils with AC or DC supply
- Wide-range coils with electronic control for contactors from 40 to 150A AC3
- Low-consumption versions for control relays and 9-38A contactors in IEC AC3 duty.

	3 poles				
	Ie AC3	AC	DC	DC❶	AC/DC❷
BF09	9A	●	●	●	—
BF12	12A	●	●	●	—
BF18	18A	●	●	●	—
BF25	25A	●	●	●	—
BF26	26A	●	●	●	—
BF32	32A	●	●	●	—
BF38	38A	●	●	●	—
BF40	40A	●	—	—	●
BF50	50A	●	—	—	●
BF65	65A	●	—	—	●
BF80	80A	●	—	—	●
BF94	95A	●	—	—	●
BF95	95A	●	—	—	●
BF115	115A	●	—	—	●
BF150	150A	●	—	—	●

	4 poles				
	Ith AC1	AC	DC	DC❶	AC/DC❷
BF09	25A	●	●	●	—
BF12	28A	●	—	—	—
BF18	32A	●	●	●	—
BF26	45A	●	●	●	—
BF38	56A	●	●	●	—
BF40	70A	●	—	—	—
BF50	90A	●	—	—	—
BF65	100A	●	—	—	●
BF80	115A	●	—	—	●
BF95	140A	●	—	—	●
BF115	160A	●	—	—	●
BF150	165A	●	—	—	●

❶ Low-consumption version.
❷ Wide-range coil with electronic control.

B series contactors

- 3 frame sizes offering 11 different contactors
- Coil operates indifferently on AC or DC supply voltage
- Coil with low in-rush and holding
- Coil removable without disconnecting power wiring
- Red indicator when contactor is energised
- Unique right-angle magnet design - limits contact bounce
- Safety feature prevents contactor to be energised without arc chute in place and locked
- Convertible auxiliary contact block (2NO + 1NC or 1NO + 2NC), maximum of 4 blocks per contactor for a total of 12 contacts
- Contactor terminals with bolt, washer and nut
- Simple horizontal or vertical interlock
- Positive (force) guided contacts (mechanically-linked per IEC)

- Three-pole contactors, 150A to 630A IEC AC3 duty
- Four-pole contactors, 250A to 1600A IEC AC1 duty
- 100 to 500HP 600V UL/CSA
- Coils with AC/DC supply
- Screw termination.

	3 poles			4 poles		
	Ie (AC3)	AC	DC	Ith (AC1)	AC	DC
B145	150A	●	●	250A	●	●
B180	185A	●	●	275A	●	●
B250	265A	●	●	350A	●	●
B310	320A	●	●	450A	●	●
B400	420A	●	●	550A	●	●
B500	520A	●	●	700A	●	●
B630	630A	●	●	800A	●	●
B630 1000	❶	●	●	1000A	●	●
B1250	❶	●	—	1250A	●	—
B1600	❶	●	—	1600A	●	—

❶ For AC1 / general use duty only.

THE IDEAL SOLUTION!

45mm WIDE CONTACTORS
Ratings up to 38A in AC3 (18.5kW) 400V 30HP 480V UL - merely 45mm wide: exceptional benefit for electric panel dimensions.

55mm WIDE CONTACTORS
Ratings up to 95A in AC3 (45kW) 400V / 60HP 480V UL - merely 55mm wide: exceptional benefit for electric panel dimensions.

75mm WIDE CONTACTORS
Ratings up to 150A in AC3 (75kW) 400V / 100HP 480V UL - merely 75mm wide: exceptional benefit for electric panel dimensions.

COILS WITH WIDE OPERATING RANGE
BF...D contactors are equipped with a wide operating range coil and are particularly useful in applications subject to considerable voltage variations, such as in electric traction railway equipment.

4-TERMINAL COIL
Connecting cables can be coupled to the coil both on the line and load ends of the contactor.

ELECTRONIC COIL
Contactors from 40 to 150A AC3 can be equipped with AC/DC electronic coil with wide operating range.
Example: single 100 to 250V AC/DC coil.

BUILT-IN SURGE SUPPRESSOR
BF series contactors up to 150A AC3 with voltages in DC or AC/DC already have a built-in surge suppressor.

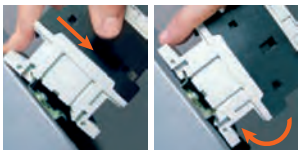
LOW-CONSUMPTION COILS
The BF...L contactors feature a 2.4W low consumption. This characteristic widely allows their direct control by PLC outputs.

SIDE ADD-ON FOURTH POLE

For the 45A to 165A AC1 ratings, a side-mount fourth power pole can be snapped on the three-pole contactor.
This solution permits the optimisation of inventory.

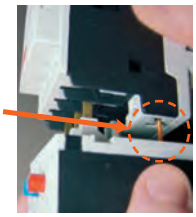
MECHANICAL INTERLOCK

Smaller-size contactors, 9 to 25A in AC3, can be mechanically and electrically interlocked with larger-size contactors, 9 to 38A AC3.
The BFX50 01 and BFX53 01 mechanical interlock comprises two built-in NC auxiliary contacts to make the electrical interlock as well.

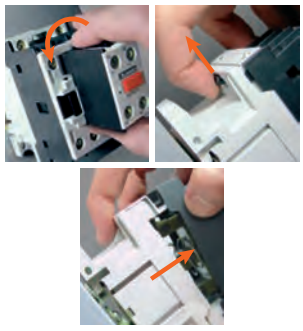
35MM IN RAIL MOUNTING AND FIXING

Contactor mounting on and removal from a 35mm DIN rail are tool-less operations and are done by simply applying pressure on the contactor.

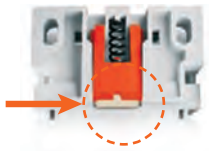
STARTER ASSEMBLY

The assembly and wiring of electromechanical starters is extremely fast and reliable. Versatile electrical and mechanical connecting systems provide easy and foolproof assembly of compact starters.

EFFORTLESS THERMAL OVERLOAD RELAY LINK RF38, RF82 AND RF110 TYPES

During the connection of the thermal overload relay to the contactor, its auxiliary contact is simultaneously linked to the contactor coil terminal rigid connector.
The complete overload relay fixing is obtained with one single operation and without other connections.

TERMINAL ADAPTABILITY
Terminals are suitable for every type of cable: flexible, rigid, according to AWG standards and interlocked with any type of cable terminal.
For BF09...BF38 contactors, a single type of screwdriver tightens the screws for the power contacts, auxiliary contacts and coil.

SNAP-ON INSTALLATION

On the contactors, it's quick and easy to fit and remove auxiliary contacts and accessories, without using tools; the same applies to replacing the coil in the AC BF09…BF38 contactors.

RUBBER PAD INSERT TO PREVENT DIN RAIL SLIDING

A rubber insert prevents the contactors from sliding on the 35mm DIN rail even when out of tolerance or mounted vertically.

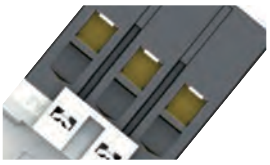
BREAKER-CONTACTOR CONNECTIONS

The rigid connections between breaker and contactor allow complete compact starters to be created easily, quickly and with less space used in the panel.
It is fitted on a single DIN rail.

IP20 CONNECTION SECURITY

For BF09...BF38 contactors, the easy access and space for the terminals is combined with IP20 protection, preventing accidental contact with live parts.

DOUBLE LUG TERMINALS
40 to 150A AC3 contactors are equipped with double lug terminals for easy, functional access for power cables.
It is extremely simple to create star-delta starters, reversing switches, changeovers and arrange parallel supply for several contactors.



ELECTRONIC COIL
Contactors from 40 to 150A AC3 can be equipped with AC/DC electronic coil with the following advantages:
- wide operating range: 20...48V, 60...110V, 100...250V
- low consumption in service
- no chattering in the event of irregular voltage.


BG06 A…BG12 A


BF09 A…BF25 A


BF26 A…BF38 A


BF40 A…BF94 A

new


BF95 A…BF150 A


B145…B180


B250…B400

Order code	Three-phase motor control in AC3 duty: IEC operating current Ith (AC1)			Ie (AC3)	Maximum IEC power at ≤55°C (AC3)							UL/CSA details: Maximum UL/CSA horsepower ratings Single phase		Three phase			
AC coil	≤40°C	≤55°C	≤70°C	≤440V at ≤55°C	230V	400V	415V	440V	500V	690V	1000V	120V	240V	200V	240V	480V	600V
[A]	[A]	[A]	[A]	[A]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[HP]	[HP]	[HP]	[HP]	[HP]	[HP]
11 BG06 01 A❶	16	14	12	6	1.5	2.2	2.4	2.5	3	3	—	1/3	1	1 1/2	2	3	3
11 BG06 10 A❶																	
11 BG09 01 A❶	20	18	15	9	2.2	4	4.3	4.5	5	5	—	1/2	1 1/2	2	3	5	5
11 BG09 10 A❶																	
11 BGF09 01 A❶	20	18	15	9	2.2	4	4.3	4.5	5	5	—	1/2	1 1/2	2	3	5	5
11 BGF09 10 A❶																	
11 BGP09 01 A❶	20	18	15	9	2.2	4❼	4.3❼	4.5❼	5❼	—	—	1/2	1 1/2	2	3	5❼	—
11 BGP09 10 A❶																	
11 BG12 01 A❶⓬	20	18	15	12	3.2	5.7	6.2	5.5	5	5	—	1/2	1 1/2	3	3	7 1/2	10
11 BG12 10 A❶⓬																	
BF09 01 A❶⓬	25	20	18	9	2.2	4.2	4.5	4.8	5.5	7.5	—	3/4	2	3	3	5	7 1/2
BF09 10 A❶⓬																	
BF12 01 A❶⓬	28	23	20	12	3.2	5.7	6.2	6.2	7.5	10	—	1	2	5	5	7 1/2	10
BF12 10 A❶⓬																	
BF18 01 A❶⓬	32	26	23	18	4	7.5	9	9	10	10	—	1	3	5	5	10	15
BF18 10 A❶⓬																	
BF25 01 A❶	32	26	23	25	7	12.5	13.4	13.4	15	11	—	2	3	7 1/2	7 1/2	15	15
BF25 10 A❶																	
BF26 00 A❶⓬	45	36	32	26	7.3	13	14	14	15.6	18.5	—	2	5	7 1/2	7 1/2	15	20
BF32 00 A❶⓬	56	45	40	32	8.8	16	17	17	20	22	—	3	7 1/2	10	10	20	25
BF38 00 A❶	56 (60⓾)	45 (48⓾)	40 (42⓾)	38	11	18.5	18.5	18.5	20	22	—	3	7 1/2	10	15	30	30
BF40 00A ❶	70	60	50	40	11	18.5	22	22	22	30	18.5	3	7 1/2	10	15	30	40
BF50 00A ❶⓬	90	75	65	50	15	22	30	30	30	37	22	5	10	15	20	40	40
BF65 00A ❶⓬	100	80	70	65	18.5	30	37	37	37	45	30	—	—	20	25	50	60
BF80 00A ❶	115	95	80	80	22	45	45	45	55	55	37	—	—	25	30	60	75
BF94 00A ❶	115	95	80	95	30	55	55	55	55	55	37	—	—	25	30	60	75
BF95 00A ❶	140	115	100	95	30	55	55	55	75	90	45	—	—	30	30	60	75
BF115 00A ❶	160	130	115	115	37	55	55	55	75	110	55	—	—	40	40	75	100
BF150 00A ❶	165	135	118	150	45	75	75	75	90	110	55	—	—	50	50	100	125
11 B145 00❷❸	250	235	190	150	46	80	88	93	100	120	75	—	—	50	50	100	125
11 B180 00❷❸	275	250	200	185	57	100	108	115	123	144	103	—	—	60	75	150	150
11 B250 00❷❸	350	300	250	265	83	140	155	164	176	212	156	—	—	75	100	200	250
11 B310 00❷❺	450	370	300	320	100	170	188	200	213	256	180	—	—	100	125	250	300
11 B400 00❷❸	550	430	360	420	130	225	247	263	271	352	208	—	—	125⓫	150⓫	350⓫	400⓫
11 B500 00❷❸	700	550	500	520	156	290	306	328	367	416	312	—	—	150⓫	200⓫	400⓫	450⓫
11 B630 00❷❸	800	640	540	630	198	355	368	368	368	440	368	—	—	200	250	500	500
11 B630 1000 00❷❺	1000	850	700	—	For AC1/Resistive duty only, see page 2-8.							—	—	—	—	—	—
11 B1250 24❺❻	1250	1050	880	—	For AC1/Resistive duty only, see page 2-8.							No UL	—	—	—	—	—
11 B1600 24❺❻	1600	1360	1120	—	For AC1/Resistive duty only, see page 2-8.							No UL	—	—	—	—	—

❶ Complete order code with coil voltage digit or with voltage digit followed by 60 (if 60Hz).
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: 11 BG06 10 A230 for mini-contactor BG06, three poles, with one NO contact and 230VAC 50/60Hz coil.
11 BG06 10 A460 60 for mini-contactor BG06 with one NO contact and 460VAC 60Hz coil.

❷ The coil of the contactor can be powered indifferently in AC or DC. Complete the order code only with the digit of the coil voltage. Standard voltages are:
– AC/DC 24 / 48 / 60 / 110-125 (indicate 110) / 220-240 (indicate 220) / 380-415 (indicate 380) / 440-480V (indicate 440).
Example: 11 B145 00 110 for contactor B145, three poles, without auxiliary contacts and with 110-125VAC/DC coil.
The 24VAC/DC voltage is not possible for B500-B630 1000 contactors.
Other voltages available on request.

❸ If predisposed for mechanical latch (G495), the order code becomes 11 B…SL.00 ❷
If already fitted with mechanical latch (G495), the order code becomes 11 B…L.00 ❷ ❹.

❹ Indicate rated voltage of the mechanical latch, preceded by the letter C if in DC. Available voltages are:
– AC 50/60Hz 48 / 110-125 indicate 110 / 220-240 indicate 220 / 380-415V indicate 380
– DC 48 / 110-125 indicate 110 / 220-240V indicate 220.
Example: 11 B145L 00 110 220 for contactor B145 without auxiliary contacts, with 110-125VAC/DC coil and mechanical latch powered at 220-240VAC.

❺ G495 mechanical latch cannot be mounted.

❻ Complete the order code with the digit of the coil voltage. For 110-125VAC (50/60Hz) indicate 110 or 220-240VAC (50/60Hz) indicate 220.
Example: 11 B1250 24 110 for contactor B1250, three poles, with 2NO+4NC auxiliary contacts and 110-125VAC 50/60Hz coil.

❼ Maximum voltage is limited at 300V for UL. For certified type up to 600V, consult Technical support for information; see contact details on inside front cover.

❽ For voltages 024 / 230 / 400VAC 50-60Hz: 10 pieces/package.
For all other voltages: 1 piece/package.

❾ Highly conductive auxiliary contact.

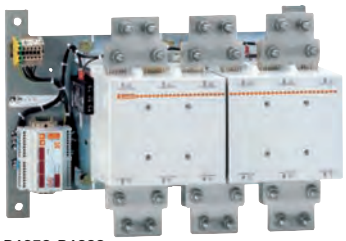
❿ For use at this other current value, a 16mm² cable, headed with a fork terminal, must be used.

⓫ No UL/CSA ratings; data given for indication and reference purposes only.

⓬ Definite-purpose (DP) contactors are available. Consult Technical support for information; see contact details on inside front cover.


B500-B630


B630 1000


B1250-B1600

	UL/CSA General (purpose) use	UL/CSA Fuse class	Short circuit current RMS sym. 600VAC	Type of terminal	Incorporated auxiliary contacts		Quantity per pkg	Weight
	[A]	Type/[A]	[kA] UL/CSA		NO	NC	n°	[kg]
	16	K5/30	5	Clamp-screw	—	1⑨	10	0.180
					1⑨	—	10	0.180
	20	K5/30	5	Clamp-screw	—	1⑨	10	0.180
					1⑨	—	10	0.180
	20	K5/30	5	Faston	—	1⑨	10	0.180
					1⑨	—	10	0.180
	20	K5/30	5	Rear PCB solder pin	—	1⑨	10	0.197
					1⑨	—	10	0.197
	20	K5/30	5	Clamp-screw	—	1⑨	10	0.180
					1⑨	—	10	0.180
	25	RK5/60	5	Clamp-screw	—	1⑨	1	0.367
					1⑨	—	⑧	0.367
	28	RK5/70	5	Clamp-screw	—	1⑨	1	0.367
					1⑨	—	⑧	0.367
	32	RK5/80	5	Clamp-screw	—	1⑨	1	0.367
					1⑨	—	⑧	0.367
	32	RK5/100	5	Clamp-screw	—	1⑨	1	0.367
					1⑨	—	⑧	0.367
	45	RK5/100	5	Clamp-screw	—	—	1	0.437
	55	RK5/125	5	Clamp-screw	—	—	1	0.437
	55	RK5/150	5	Clamp-screw	—	—	1	0.437
	70	RK5/150	10	Lug-clamp⑱	—	—	1	1.020
	90	RK5/150	10	Lug-clamp⑱	—	—	1	1.020
	100	RK5/200	10	Lug-clamp⑱	—	—	1	1.020
	115	RK5/200	10	Lug-clamp⑱	—	—	1	1.020
	115	RK5/200	10	Lug-clamp⑱	—	—	1	1.020
	140	RK5/250	10	Lug-clamp⑱	—	—	1	2.020
	160	RK5/250	10	Lug-clamp⑱	—	—	1	2.020
	165	RK5/250	10	Lug-clamp⑱	—	—	1	2.020
	250	RK5/500	5	Screw-nut	—	—	1	5.400
	275	RK5/500	10	Screw-nut	—	—	1	5.400
	350	L/800	18	Screw-nut	—	—	1	9.575
	450	L/800	18	Screw-nut	—	—	1	9.575
	550	L/800 ⑪	18⑪	Screw-nut	—	—	1	9.575
	700	L/1200 ⑪	18⑪	Screw-nut	—	—	1	18.000
	800	L/1500 ⑪	18⑪	Screw-nut	—	—	1	18.620
	1000	L/1500	18	Screw-nut	—	—	1	21.400
	No UL	—	—	Screw-nut	2	4	1	48.000
	No UL	—	—	Screw-nut	2	4	1	50.000

⑱ IEC/EN 60947-1 designation: Pillar terminal.

Certifications and compliance
Certifications obtained:

Type	cULus	UL	CSA	EAC	CCC	Register of shipping RINA	Register of shipping LROS
BG06 A	●			●	●		
BG09 A	●			●	●		
BG12 A	●			●	●		
BGF09 A	●			●	●		
BGP... A⑦	●			●	●		
BF09 A	●		●	●	●	●	
BF12 A	●		●⑭	●	●	●	
BF18 A	●		●	●	●	●	
BF25 A	●		●⑭	●	●	●	
BF26 A	●		●	●	●	●	
BF32 A	●		●	●	●	●	
BF38 A	●		●⑭	●	●	●	
BF40 A	●			●	●		
BF50 A	●			●	●		
BF65 A	●			●	●		
BF80 A	●			●	●		
BF94 A	⑮						
BF95 A	●						
BF115 A	●						
BF150 A	●						
B145		●	●	●	●	●	●
B180		●	●	●	●	●	●
B250		●	●	●	●	●	●
B310		●	●	●	●	●	●
B400		●	●	●	●	●	●
B500	●			●			
B630	●			●			
B630 1000	●			●			
B1250				●			
B1600				●			

● Certified products.

UL - UL Listed, for USA and Canada (cULus - File E93602) for BG…BF150 types indicated, as Motor Controllers – Contactors, except for BGP09… types which are UL Recognized, for USA and Canada (cULus File E93602 – Component - Products having this type of marking are intended for use as components of complete workshop-assembled equipment).
BGP is UL rated up to 300V; for type with rating up to 600V, consult Technical support for information – see contact details on inside front cover.
UL Listed for USA only (File E93602) for B145…B400 types indicated, as Motor Controllers – Contactors.
UL Listed for USA and Canada (cULus - File E172189) for B500... B630 1000 and B500 SL... B630 SL types as Industrial Control Switches.

CSA - BF09…BF95 and B145…B400 contactors are also CSA certified, for Canada only (File 54332).
In addition, BF12…, BF25… and BF38… types are CSA certified as "Elevator Equipment" (File 54332, class 2411); BF65 is UL certified as "Elevator Equipment (File E 93602).
See technical characteristics on page 2-63 for BF12-BF38 and page 2-65 for BF65.

⑭ This contactor has also achieved CSA elevator equipment certification.

⑮ cULus pending.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14; UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for all BF09…BF38 versions only, add suffix V260 to the standard product order code.
Example: BF09 10 A230V260 for BF09, three poles, with one NO contact and 230V 50/60Hz coil with compliant plastic materials.


BG06 D…BG12 D
BG09 L


BF09 D…BF25 D
BF09 L…BF25 L


BF26 D-BF38 D
BF26 L-BF38 L


BF40 E…BF94 E

new


BF95 E…BF150 E


B145…B180


B250…B400

Order code DC coil	DC coil Low consumption	IEC operating current Ith (AC1) ≤40°C [A]	≤55°C [A]	≤70°C [A]	Ie (AC3) ≤440V at ≤55°C [A]	Maximum IEC power at ≤55°C (AC3) 230V [kW]	400V [kW]	415V [kW]	440V [kW]	500V [kW]	690V [kW]	1000V [kW]	UL/CSA details: Maximum UL/CSA horsepower ratings Single phase 120V [HP]	240V [HP]	Three phase 200V [HP]	240V [HP]	480V [HP]	600V [HP]
Three-phase motor control																		
11 BG06 01 D❶	—	16	14	12	6	1.5	2.2	2.4	2.5	3	3	—	1/3	1	1 1/2	2	3	3
11 BG06 10 D❶	—																	
11 BG09 01 D❶	**11 BG09 01 L❷**	20	18	15	9	2.2	4	4.3	4.5	5	5	—	1/2	1 1/2	2	3	5	5
11 BG09 10 D❶	**11 BG09 10 L❷**																	
11 BGF09 01 D❶	**11 BGF09 01 L❷**	20	18	15	9	2.2	4	4.3	4.5	5	5	—	1/2	1 1/2	2	3	5	5
11 BGF09 10 D❶	**11 BGF09 10 L❷**																	
11 BGP09 01 D❶	—	20	18	15	9	2.2	4❽	4.3❽	4.5❽	5❽	—	—	1/2	1 1/2	2	3	5❽	—
11 BGP09 10 D❶	—																	
11 BG12 01 D❶⓬	—	20	18	15	12	3.2	5.7	6.2	5.5	5	5	—	1/2	1 1/2	3	3	7 1/2	10
11 BG12 10 D❶⓬	—																	
BF09 01 D❶⓬	**BF09 01 L❷⓬**	25	20	18	9	2.2	4.2	4.5	4.8	5.5	7.5	—	3/4	2	3	3	5	7 1/2
BF09 10 D❶⓬	**BF09 10 L❷⓬**																	
BF12 01 D❶⓬	**BF12 01 L❷⓬**	28	23	20	12	3.2	5.7	6.2	6.2	7.5	10	—	1	2	5	5	7 1/2	10
BF12 10 D❶⓬	**BF12 10 L❷⓬**																	
BF18 01 D❶⓬	**BF18 01 L❷⓬**	32	26	23	18	4	7.5	9	9	10	10	—	1	3	5	5	10	15
BF18 10 D❶⓬	**BF18 10 L❷⓬**																	
BF25 01 D❶	**BF25 01 L❷**	32	26	23	25	7	12.5	13.4	13.4	15	11	—	2	3	7 1/2	7 1/2	15	15
BF25 10 D❶	**BF25 10 L❷**																	
BF26 00 D❶⓬	**BF26 00 L❷⓬**	45	36	32	26	7.3	13	14	14	15.6	18.5	—	2	5	7 1/2	7 1/2	15	20
BF32 00 D❶⓬	**BF32 00 L❷⓬**	56	45	40	32	8.8	18	17	17	20	22	—	3	7 1/2	10	10	20	25
BF38 00 D❶	**BF38 00 L❷**	56 (60⓾)	45 (48⓾)	40 (42⓾)	38	11	18.5	18.5	18.5	20	22	—	3	7 1/2	10	15	30	30
BF40 00 E❸	—	70	60	50	40	11	18.5	22	22	22	30	18.5	3	7 1/2	10	15	30	30
BF50 00 E❸⓬	—	90	75	65	50	15	22	30	30	30	37	22	5	10	15	20	40	40
BF65 00 E❸⓬	—	100	80	70	65	18.5	30	37	37	37	45	30	—	—	20	25	50	60
BF80 00 E❸	—	115	95	80	80	22	45	45	45	55	55	37	—	—	25	30	60	75
BF94 00 E ❸	—	115	95	80	95	30	55	55	55	55	55	37	—	—	25	30	60	75
BF95 00 E ❸	—	140	115	100	95	30	55	55	55	75	90	45	—	—	30	30	60	75
BF115 00 E ❸	—	160	130	115	115	37	55	55	55	75	110	55	—	—	40	40	75	100
BF150 00 E ❸	—	165	135	118	150	45	75	75	75	90	110	55	—	—	50	50	100	125
11 B145 00❹❺	—	250	235	190	150	46	80	88	93	100	120	75	—	—	50	50	100	125
11 B180 00❹❺	—	275	250	200	185	57	100	108	115	123	144	103	—	—	60	75	150	150
11 B250 00❹❺	—	350	300	250	265	83	140	155	164	176	212	156	—	—	75	100	200	250
11 B310 00❹❼	—	450	370	300	320	100	170	188	200	213	256	180	—	—	100	125	250	300
11 B400 00❹❺	—	550	430	360	420	130	225	247	263	271	352	208	—	—	125	150	350	400
11 B500 00❹❺	—	700	550	500	520	156	290	306	328	367	416	312	—	—	150⓫	200⓫	400⓫	450⓫
11 B630 00❹❺	—	800	640	540	630	198	335	368	368	368	440	368	—	—	200⓫	250⓫	500⓫	500⓫
11 B630 1000 00❹❼	—	1000	850	700	—	For AC1/Resisteve duty only, see page 2-8.							—	—	—	—	—	—

❶ Complete order code with coil voltage digit.
For BG09…D 24VDC version complete with built-in surge suppressor, add suffix **V120** to the standard order code.
The BF09-BF38D types already have a standard supplied built-in TVS (Transient Voltage Suppressor).
Standard voltages are as follows:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220V.
Example: 11 BG06 10 D012 for mini-contactor BG06, three poles, with one NO contact and 12VDC coil.
11 BG09 10 D024 V120 for mini-contactor BG09, three poles, with one NO contact and 24VDC coil, complete with built-in TVS (diode) suppressor.

❷ Low-consumption version.
No add-on auxiliary contacts or mechanical interlock can be mounted on BG... type contactors.
Complete order code with coil voltage digit.
The BF09-BF38L types already have a standard supplied built-in TVS (Transient Voltage Suppressor).
Standard voltages are as follows:
– DC 024 / 048V.
Example: 11 BG09 01 L024 for mini-contactor BG09, three poles, with one NC contact and 24VDC low-consumption coil.

❸ The contactor coil is controlled electronically; it can have either an AC or a DC supply and has a wide operating range.
The order code must be completed with the coil voltage digit.
The standard voltages are as follows:
– AC/DC 024 = 20...48V; 110 = 60...110V; 230 = 100...250V.

❹ The coil of the contactor can be powered indifferently in AC or DC. Complete the order code only with the digit of the coil voltage.
Standard voltages are:
– AC/DC 24 / 48 / 60 / 110-125 (indicate 110) / 220-240 (indicate 220) / 380-415 (indicate 380) / 440-480V (indicate 440).
Example: 11 B145 00 110 for contactor B145, three poles, without auxiliary contacts and with 110-125VAC/DC coil.
The 24VAC/DC voltage is not possible for B500-B630 1000 contactors.
Other voltages available on request.

❺ If predisposed for mechanical latch (G495), the order code becomes 11 B…SL.00 ❹.
If already fitted with mechanical latch (G495), the order code becomes 11 B…L.00 ❹ ❻.

❻ Indicate rated voltage of the mechanical latch, preceded by the letter C if in DC.
Standard voltages are:
– AC 50/60Hz 48 / 110-125 indicate 110 / 220-240 indicate 220 / 380-415V indicate 380
– DC 48 / 110-125 indicate 110 / 220-240V indicate 220.
Example: 11 B145L 00 110 C48 for contactor B145, three poles, without auxiliary contacts, with 110-125VAC/DC coil and mechanical latch powered at 48VDC.

❼ G495 mechanical latch cannot be mounted.

❽ Maximum voltage is limited at 300V for UL. For certified type up to 600V, consult Technical support for information; see contact details on inside front cover.

❾ Highly conductive auxiliary contact.

B500-B630

B630 1000

	UL/CSA General (purpose) use	UL/CSA Fuse class	Short circuit current RMS sym. 600VAC	Type of terminal	Incorporated auxiliary contacts		Quantity per pkg	Weight
	[A]	Type/[A]	[kA] UL/CSA		NO	NC	n°	[kg]
	16	K5/30	5	Clamp-screw	—	1❾	10	0.214
					1❾	—	10	0.214
	20	K5/30	5	Clamp-screw	—	1❾	10	0.214
					1❾	—	10	0.214
	20	K5/30	5	Faston	—	1❾	10	0.210
					1❾	—	10	0.210
	20	K5/30	5	Rear PCB solder pin	—	1❾	10	0.240
					1❾	—	10	0.240
	20	K5/30	5	Clamp-screw	—	1❾	10	0.214
					1❾	—	10	0.214
	25	RK5/60	5	Clamp-screw	—	1❾	1	0.494
					1	—	1	0.494
	28	RK5/70	5	Clamp-screw	—	1❾	1	0.494
					1	—	1	0.494
	32	RK5/80	5	Clamp-screw	—	1❾	1	0.494
					1	—	1	0.494
	32	RK5/100	5	Clamp-screw	—	1❾	1	0.494
					1	—	1	0.494
	45	RK5/100	5	Clamp-screw	—	—	1	0.559
	55	RK5/125	5	Clamp-screw	—	—	1	0.559
	55	RK5/150	5	Clamp-screw	—	—	1	0.559
	70	RK5/150	5	Lug-clamp ⓲	—	—	1	1.050
	90	RK5/150	5	Lug-clamp ⓲	—	—	1	1.050
	100	RK5/200	10	Lug-clamp ⓲	—	—	1	1.050
	115	RK5/200	10	Lug-clamp ⓲	—	—	1	1.050
	115	RK5/200	10	Lug-clamp ⓲	—	—	1	1.050
	140	RK5/250	10	Lug-clamp ⓲	—	—	1	2.060
	160	RK5/250	10	Lug-clamp ⓲	—	—	1	2.060
	165	RK5/250	10	Lug-clamp ⓲	—	—	1	2.060
	250	RK5/500	10	Screw-nut	—	—	1	5.400
	275	RK5/500	10	Screw-nut	—	—	1	5.400
	350	L/800	18	Screw-nut	—	—	1	9.635
	450	L/800	18	Screw-nut	—	—	1	9.635
	500 ⓲	L/800	18	Screw-nut	—	—	1	9.635
	700 ⓲	L/1200 ⓫	18 ⓫	Screw-nut	—	—	1	18.060
	800 ⓲	L/1500 ⓫	18 ⓫	Screw-nut	—	—	1	18.620
	1000	L/1500	18	Screw-nut	—	—	1	21.400

⓾ For use at this other current value, a 16mm² cable, headed with a fork terminal, must be used.
⓫ No UL/CSA ratings; data given for indication and reference purposes only.
⓬ Definite-purpose (DP) contactors are available. Consult Technical support for information; see contact details on inside front cover.
⓲ IEC/EN 60947-1 designation: Pillar terminal.

Certifications and compliance
Certifications obtained:

Type	c UL us	UL	CSA	EAC	CCC	RINA
BG06 D	●			●	●	
BG09 D	●			●	●	
BG12 D	●			●	●	
BGF09 D	●			●	●	
BGP09 D⓼	c UL us	●	●			
BF09 D - BF09 L	●		●	●	●	●
BF12 D - BF12 L	●		●⓮	●	●	●
BF18 D - BF18 L	●		●	●	●	●
BF25 D - BF25 L	●		●⓮	●	●	●
BF26 D - BF26 L	●		●	●	●	●
BF32 D - BF32 L	●		●	●	●	●
BF38 D - BF38 L	●		●⓮	●	●	●
BF40 E	●			●	●	
BF50 E	●			●	●	
BF65 E	●			●	●	
BF80 E	●			●	●	
BF94 E	⓯					
BF95 E	●					
BF115 E	●					
BF150 E	●					
B145		●	●	●	●	●
B180		●	●	●	●	●
B250		●	●	●	●	●
B310		●	●	●	●	●
B400		●	●	●	●	●
B500	●			●		
B630	●			●	●	
B630 1000	●			●		

● Certified products.

UL - UL Listed, for USA and Canada (cULus File E93602) for BG…BF110 types indicated, as Motor Controllers – Contactors, except for BGP09… types which are UL Recognized, for USA and Canada (c UL us File E93602 – Component). Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
BGP is UL rated up to 300V; for type with rating up to 600V, consult Technical support for information – see contact details on inside front cover.
UL Listed for USA only (File E93602) for B145…B400 types indicated, as Motor Controllers – Contactors.
UL Listed for USA and Canada (cULus - File E172189) for B500... B630 1000 and B500 SL... B630 SL types as Industrial Control Switches.

CSA - BF09…BF95 and B145…B400 contactors are also CSA certified, for Canada only (File 54332).
In addition, BF12…, BF25… and BF38… types are CSA certified as "Elevator Equipment" (File 54332, class 2411); BF65 is UL certified as "Elevator Equipment (File E 93602).
See technical characteristics on page 2-63 for BF12-BF38 and page 2-65 for BF65.

⓮ This contactor has also achieved CSA elevator equipment certification.

⓯ cULus pending.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14; UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for all BF09…BF38 versions only, add suffix V260 to the standard product order code.
Example: BF09 10 D024 V260 for BF09, three poles, with one NO contact and 24VDC coil with compliant plastic materials.


BG09 T4 A


BF09A T4 A…BF18 T4 A


BF26 T4 A…BF38 T4 A


BF40 T4 A…BF80 T4 A

new


BF95 T4 A…BF150 T4 A


B145 4…B180 4


B250 4…B400 4

Resistive load control												UL/CSA details
Order code	IEC operating current Ith (AC1)			Ie (AC3)	Maximum IEC power at ≤40°C (AC1)							UL/CSA General
AC coil	≤40°C	≤55°C	≤70°C	≤440V at ≤55°C	230V	400V	415V	440V	500V	690V	1000V	(purpose) use
	[A]	[A]	[A]	[A]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[A]
11 BG09 T4 A❶⑩	20	18	15	9	8	14	14	15	16	22	—	20
11 BGF09 T4 A❶	20	18	15	9	8	14	14	15	16	22	—	20
11 BGP09 T4 A❶	20	18	15	9	8	14❼	14❼	15❼	16❼	—	—	20
BF09 T4 A❶⑩	25	20	18	9	9.5	16	17	18	21	27	—	25
BF12 T4 A❶⑩	28	23	20	12	10	18	19	20	23	32	—	28
BF18 T4 A❶⑩	32	26	23	18	12	21	22	23	26	36	—	32
BF26 T4 A❶❽⑩	45	36	32	26	17	30	31	33	37	51	—	45
BF38 T4 A❶❽	56 (60❾)	45 (48❾)	40 (42❾)	38	21	36	38	40	45	62	—	55
BF40 T4 A❶	70	60	50	40	26	46	48	51	58	79	115	70
BF50 T4 A❶	90	75	65	50	34	59	61	65	74	102	148	90
BF65 T4 A❶	100	80	70	65	38	65	68	72	82	114	165	100
BF80 T4 A❶	115	95	80	80	43	76	79	83	95	120	185	115
BF95 T4 A❶	140	115	100	95	53	92	96	101	115	159	230	140
BF115 T4 A❶	160	130	115	115	61	105	109	116	132	182	263	160
BF150 T4 A❶	165	135	118	150	62	110	113	119	136	187	271	165
11 B145 4 00❷❸	250	235	190	150	91	150	162	180	196	270	390	250
11 B180 4 00❷❸	275	250	200	185	95	160	177	200	213	298	430	275
11 B250 4 00❷❸	350	300	250	265	124	214	234	255	282	380	560	350
11 B310 4 00❷❺	450	370	300	320	158	270	293	325	350	488	700	450
11 B400 4 00❷❸	550	430	360	420	200	345	377	400	452	598	870	550
11 B500 4 00❷❸	700	550	500	520	252	438	478	500	575	755	1100	700
11 B630 4 00❷❸	800	640	540	630	288	500	545	580	655	860	1250	800
11 B630 1000 4 00❷❺	1000	850	700	—	350	600	630	725	750	1000	1600	1000
11 B1250 4 24❺❻	1250	1050	880	—	480	830	900	905	1100	1450	2000	No UL/CSA
11 B1600 4 24❺❻	1600	1360	1120	—	550	950	1000	1160	1200	1650	2500	No UL/CSA

❶ Complete order code with coil voltage digit or voltage digit followed by 60 if 60Hz.
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: 11 BG09 T4 A230 for mini-contactor BG09, four poles, with 230VAC 50/60Hz coil.
11 BG09 T4 A460 60 for mini-contactor BG09, four poles, with 460VAC 60Hz coil.

❷ The coil of the contactor can be powered indifferently in AC or DC. Complete the order code only with the digit of the coil voltage. Standard voltages are:
– AC/DC 24 / 48 / 60 / 110-125 (indicate 110) / 220-240 (indicate 220) / 380-415 (indicate 380) / 440-480V (indicate 440).
Example: 11 B145 4 00 110 for contactor B145, four poles, without auxiliary contacts and with 110-125VAC/DC coil.
The 24VAC/DC voltage is not possible for B500-B630 1000 contactors.
Other voltages available on request.

❸ If predisposed for mechanical latch (G495), the order code becomes 11 B…4SL 00 ❷.
If already fitted with mechanical latch (G495), the order code becomes 11 B…4L.00 ❷ ❹.

❹ Indicate rated voltage of the mechanical latch, preceded by the letter C if in DC.
Standard voltages are:
– AC 50/60Hz 48 / 110-125 indicate 110 / 220-240 indicate 220 / 380-415V indicate 380
– DC 48 / 110-125 indicate 110 / 220-240V indicate 220.
Example: 11 B145 4L 00 110 C220 for contactor B145, four poles, without auxiliary contacts, with 110-125VAC/DC coil and mechanical latch powered at 220-240VDC.

❺ G495 mechanical latch cannot be mounted.

❻ Complete the order code with the digit of the coil voltage. For 110-125VAC 50/60 Hz indicate 110 or 220-240VAC 50/60 Hz indicate 220.
Example: 11 B1250 4 24 110 for contactor B1250, four poles, with 2NO+4NC auxiliary contacts and 110-125VAC/DC 50/60Hz coil.

❼ Maximum voltage is limited at 300V for UL. For certified type up to 600V. Consult Technical support for information; see contact details on inside front cover.

❽ Whenever the BF26 T4 or BF38 T4 types need to be mechanically interlocked with either the BFX50 00 or BFX50 01, the add-on fourth pole of one of the contactors needs to be removed from the right side and fitted on the left side.

❾ For use at this other current value, a 16mm² cable, headed with a fork terminal, must be used.

❿ Definite-purpose (DP) contactors are available. Consult Technical support for information; see contact details on inside front cover.


B500 4-B630 4


B630 1000 4


B1250-B1600 4

	UL/CSA Fuse class	Short circuit current RMS sym. 600VAC	Type of terminal	Incorporated auxiliary contacts		Quantity per pkg	Weight
	Type / [A]	[kA] UL/CSA		NO	NC	n°	[kg]
	K5 / 30	5	Clamp-screw	none	none	10	0.180
	K5 / 30	5	Faston	none	none	10	0.180
	K5 / 30	5	Rear PCB solder pin	none	none	10	0.197
	RK5 / 60	5	Clamp-screw	none	none	1	0.367
	RK5 / 70	5	Clamp-screw	none	none	1	0.367
	RK5 / 80	5	Clamp-screw	none	none	1	0.367
	RK5 / 100	5	Clamp-screw	none	none	1	0.508
	RK5 / 150	5	Clamp-screw	none	none	1	0.508
	RK5 / 150	5	Lug-clamp ⓫	—	—	1	1.240
	RK5 / 150	5	Lug-clamp ⓫	—	—	1	1.240
	RK5 / 200	10	Lug-clamp ⓫	—	—	1	1.240
	RK5 / 200	10	Lug-clamp ⓫	—	—	1	1.240
	RK5 / 250	10	Lug-clamp ⓫	—	—	1	2.420
	RK5 / 250	10	Lug-clamp ⓫	—	—	1	2.420
	RK5 / 250	10	Lug-clamp ⓫	—	—	1	2.420
	RK5 / 500	10	Screw-nut	none	none	1	6.340
	RK5 / 500	10	Screw-nut	none	none	1	6.340
	L/800	18	Screw-nut	none	none	1	11.195
	L/800	18	Screw-nut	none	none	1	11.195
	L/800 ⓬	18 ⓬	Screw-nut	none	none	1	11.195
	L/1200 ⓬	18 ⓬	Screw-nut	none	none	1	20.910
	L/1500 ⓬	18 ⓬	Screw-nut	none	none	1	21.880
	L/1500	18	Screw-nut	none	none	1	25.620
	—	—	Screw-nut	2	4	1	57.500
	—	—	Screw-nut	2	4	1	58.400

⓫ IEC/EN 60947-1 designation: Pillar terminal.
⓬ No UL/CSA ratings; data given for indication and reference purposes only.

IEC utilisation current with poles in parallel
If the poles of the contactors are arranged in parallel, the operating current is the one indicated in the table multiplied by the **K** factor given below, which account for the unequal distribution of the current in the various poles.
To limit distribution inequality, it is advisable to use paralleling links (see pages 2-16, 2-21 and 2-26).

2 POLES in parallel: **K** = 1.6
3 POLES in parallel: **K** = 2.2
4 POLES in parallel: **K** = 2.8

Certifications and compliance
Certifications obtained:

Type	c UL us	UL	CSA	EAC	CCC	RINA
BG09 T4 A	●			●	●	
BGF09 T4 A	●			●	●	
BGP09 T4 A⓱	●			●	●	
BF09 T4 A	●		●	●	●	●
BF12 T4 A	●		●⓯	●	●	●
BF18 T4 A	●		●	●	●	●
BF26 T4 A	●		●⓯	●	●	●
BF38 T4 A	●		●⓯	●	●	●
BF40 T4 A	●			●	●	
BF50 T4 A	●			●	●	
BF65 T4 A	●			●	●	
BF80 T4 A	●			●	●	
BF95 T4 A	●					
BF115 T4 A	●					
BF150 T4 A	●					
B145 4		●	●	●	●	
B180 4		●	●	●	●	
B250 4		●	●	●	●	
B310 4		●	●	●	●	
B400 4		●	●	●	●	
B500 4	●			●		
B630 4	●			●	●	
B630 1000 4	●			●		
B1250 4				●		
B1600 4				●		

● Certified products.

UL - UL Listed, for USA and Canada (cULus File E93602) for BG…BF150 types indicated, as Motor Controllers – Contactors, except for BGP09… types which are UL Recognized, for USA and Canada (c UL us File E93602 – Component). Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
BGP is UL rated up to 300V; for type with rating up to 600V, consult Technical support for information – see contact details on inside front cover.
UL Listed for USA only (File E93602) for B145…B400 types indicated, as Motor Controllers – Contactors.
UL Listed for USA and Canada (cULus - File E172189) for B500 4... B630 1000 4 and B500 4SL... B630 4SL types as Industrial Control Switches.

CSA - BF09…BF80 and B145…B400 contactors are also CSA certified, for Canada only (File 54332).
In addition, BF12…, BF25…, BF38… and BF65… types are CSA certified as "Elevator Equipment" (File 54332, class 2411).
See technical characteristics on page 2-63 for BF12-BF38 and page 2-65 for BF65.

⓯ This contactor has also achieved CSA elevator equipment certification.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14; UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for all BF09…BF38 versions only, add suffix V260 to the standard product order code.
Example: BF09 T4 A230 V260 for BF09, four poles, 230V 50/60Hz coil with compliant plastic materials.


BG09 T4 D


BF09 T4 D-BF18 T4 D
BF09 T4 L-BF18 T4 L


BF26 T4 D-BF38 T4 D
BF26 T4 L-BF38 T4 L


BF65 T4 E
BF80 T4 E

new


BF95 T4 E…BF150 T4 E


B145 4…B180 4


B250 4…B400 4

Resistive load control

Order code DC coil	DC coil Low consumption	IEC operating current Ith (AC1) ≤40°C	≤55°C	≤70°C	Ie (AC3) ≤440V at ≤55°C	Maximum IEC power at ≤40°C (AC1) 230V	400V	415V	440V	500V	690V	1000V	UL/CSA details UL/CSA General (purpose) use
		[A]	[A]	[A]	[A]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]	[A]
11 BG09 T4 D❶	—	20	18	15	9	8	14	14	15	16	22	—	20
11 BGF09 T4 D❶	—	20	18	15	9	8	14	14	15	16	22	—	20
11 BGP09 T4 D❶	—	20	18	15	9	8	14❽	14❽	15❽	16❽	—	—	20
BF09 T4 D❶	**BF09 T4 L❷**	25	20	18	9	9.5	16	17	18	21	27	—	25
BF18 T4 D❶	**BF18 T4 L❷**	32	26	23	18	12	21	22	23	26	36	—	32
BF26 T4 D❶	**BF26 T4 L❷**	45	36	32	26	17	30	31	33	37	51	—	45
BF38 T4 D❶	**BF38 T4 L❷**	56 (60❾)	45 (48❾)	40 (42❾)	38	21	26	38	40	45	62	—	55
BF65 T4 E❸	—	100	80	70	65	38	65	68	72	82	114	165	100
BF80 T4 E❸	—	115	95	80	80	43	76	79	83	95	120	185	115
BF95 T4 E❸	—	140	115	100	95	53	92	96	101	115	159	230	140
BF150 T4 E❸	—	165	135	118	150	62	110	113	119	136	187	271	165
11 B145 4 00❹❺	—	250	235	190	150	91	150	162	180	196	270	390	250
11 B180 4 00❹❺	—	275	250	200	185	95	160	177	200	213	298	430	275
11 B250 4 00❹❺	—	350	300	250	265	124	214	234	255	282	380	560	350
11 B310 4 00❹❼	—	450	370	300	320	158	270	293	325	350	488	700	450
11 B400 4 00❹❺	—	550	430	360	420	200	345	377	400	452	598	870	550
11 B500 4 00❹❺	—	700	550	500	520	252	438	478	500	575	755	1100	700
11 B630 4 00❹❺	—	800	640	540	630	288	500	545	580	655	860	1250	800
11 B630 1000 4 00❹❼	—	1000	850	700	—	350	600	630	725	750	1000	1600	1000

❶ Complete order code with coil voltage digit.
The BF09-BF38D types already have a standard supplied built-in TVS (Transient Voltage Suppressor).
Standard voltages are as follows:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220VDC.
Example: 11 BG09 T4 D012 for mini-contactor BG09, four poles, with 12VDC coil.

❷ Low consumption version. Complete the order code with coil voltage digit.
The BF09-BF38L types already have a standard supplied built-in TVS (Transient Voltage Suppressor).
Standard voltages are as follows:
– DC 024 / 048V
Example: BF09 T4 L024 for contactor BF09, four poles, with 24VDC low-consumption coil.

❸ The contactor coil is controlled electronically; it can have either an AC or a DC supply and has a wide operating range.
Complete the order code only with the digit of the coil voltage.
Standard voltages are:
– AC/DC 024 = 20...48V; 110 = 60...110V; 230 = 100...250V.

❹ The coil of the contactor can be powered indifferently in AC or DC. Complete the order code only with the digit of the coil voltage.
Standard voltages are:
– AC/DC 24 / 48 / 60 / 110-125 indicate 110 / 220-240 indicate 220 / 380-415 indicate 380 / 440-480V indicate 440.
Example: 11 B145 00 110 for contactor B145, four poles, without auxiliary contacts and with 110-125VAC/DC coil.
The 24VAC/DC voltage is not possible for B500-B630 1000 contactors.
The 24V voltage is not possible for B500-B630 1000 contactors.
Other voltages available on request.

❺ If predisposed for mechanical latch (G495), the order code becomes 11 B…4SL 00 ❹.
If already fitted with mechanical latch (G495), the order code becomes 11 B…4L.00 ❹ ❻.

❻ Indicate rated voltage of the mechanical latch, preceded by the letter C if in DC.
Standard voltages are:
– AC 50/60Hz 48 / 110-125 indicate 110 / 220-240 indicate 220 / 380-415V indicate 380
– DC 48 / 110-125 indicate 110 / 220-240V indicate 220.
Example: 11 B145L 00 110 C48 for contactor B145, four poles, without auxiliary contacts, with 110-125VAC/DC coil and mechanical latch powered at 48VDC.

❼ G495 mechanical latch cannot be mounted.

❽ Maximum voltage is limited at 300V for UL. For certified type up to 600V consult Technical support for information; see contact details on inside front cover.

❾ For use at this other current value, a 16mm² cable, headed with a fork terminal, must be used.

B500 4-B630 4

B630 1000 4

	UL/CSA Fuse class	Short circuit RMS sym. 600VAC	Type of terminal	Incorporated auxiliary contacts		Quantity per pkg	Weight
	Type / [A]	[kA] UL/CSA		NO	NC	n°	[kg]
	K5 / 30	5	Clamp-screw	—	—	10	0.220
	K5 / 30	5	Faston	—	—	10	0.220
	K5 / 30	5	Rear PCB solder pin	—	—	10	0.242
	RK5 / 60	5	Clamp-screw	—	—	1	0.498
	RK5 / 80	5	Clamp-screw	—	—	1	0.498
	RK5 / 100	5	Clamp-screw	—	—	1	0.665
	RK5 / 150	5	Clamp-screw	—	—	1	0.665
	RK5 / 225	10	Lug-clamp⑩⑪	—	—	1	1.280
	RK5 / 250	10	Lug-clamp⑩⑪	—	—	1	1.280
	RK5 / 250	10	Lug-clamp⑩⑪	—	—	1	2.460
	RK5 / 250	10	Lug-clamp⑩⑪	—	—	1	2.460
	RK5 / 500	10	Screw-nut	—	—	1	6.340
	RK5 / 500	10	Screw-nut	—	—	1	6.340
	L/800	18	Screw-nut	—	—	1	11.195
	L/800	18	Screw-nut	—	—	1	11.195
	L/800	18	Screw-nut	—	—	1	11.195
	L/1200 ⑩	18 ⑩	Screw-nut	—	—	1	20.910
	L/1200 ⑩	18 ⑩	Screw-nut	—	—	1	21.880
	L/1500 ⑩	18 ⑩	Screw-nut	—	—	1	25.600

⑩ No UL/CSA ratings; data given for indication and reference purposes only.
⑪ IEC/EN 60947-1 designation: Pillar terminal.

IEC utilisation current with poles in parallel
If the poles of the contactors are arranged in parallel, the operating current is the one indicated in the table multiplied by the **K** factor given below, which account for the unequal distribution of the current in the various poles.
To limit distribution inequality, it is advisable to use paralleling links (see pages 2-16, 2-21 and 2-26).

2 POLES in parallel: **K** = 1.6
3 POLES in parallel: **K** = 2.2
4 POLES in parallel: **K** = 2.8

Certifications and compliance
Certifications obtained:

Type	cULus	UL	CSA	EAC	CCC	RINA
BG09 T4 D	●			●	●	
BGF09 T4 D	●			●	●	
BGP09 T4 D⑦	cULus			●	●	
BF09 T4 D - BF09 T4 L	●		●	●	●	●
BF18 T4 D - BF18 T4 L	●		●	●	●	●
BF26 T4 D - BF26 T4 L	●		●⑫	●	●	●
BF38 T4 D - BF38 T4 L	●		●⑫	●	●	●
BF65 T4 E	●			●	●	
BF80 T4 E	●			●	●	
BF95 T4 E	●					
BF150 T4 E	●					
B145 4		●	●	●	●	
B180 4		●	●	●	●	
B250 4		●	●	●	●	
B310 4		●	●	●	●	
B400 4		●	●	●	●	
B500 4	●			●		
B630 4	●			●	●	
B630 1000 4	●			●		

● Certified products.

UL - UL Listed, for USA and Canada (cULus File E93602) for BG…BF150 types indicated, as Motor Controllers – Contactors, except for BGP09… types which are UL Recognized, for USA and Canada (cULus File E93602 – Component). Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
BGP is UL rated up to 300V; for type with rating up to 600V, consult Technical support for information – see contact details on inside front cover.
UL Listed for USA only (File E93602) for B145…B400 types indicated, as Motor Controllers – Contactors.
UL Listed for USA and Canada (cULus - File E172185) for B500 4... B630 1000 4 and B500 4SL... B630 4SL types as Industrial Control Switches.

CSA - BF09…BF95 and B145…B400 contactors are also CSA certified, for Canada only (File 54332).
In addition, BF12…, BF25…, BF38… and BF65… types are CSA certified as "Elevator Equipment" (File 54332, class 2411).
See technical characteristics on page 2-63 for BF12-BF38 and page 2-65 for BF65.

⑫ This contactor has also achieved CSA elevator equipment certification.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14; UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for all BF09…BF38 versions only, add suffix V260 to the standard product order code.
Example: BF09 T4 D024 V260 for BF09, four poles, 24VDC coil with compliant plastic materials.

Mini-contactor four power poles, 2 NO and 2 NC BG series

11 BG09 T2...

Order code	IEC rated conventional free air thermal current Ith ≤40°C	≤55°C	≤60°C	Qty per pkg	Wt
	[A]	[A]	[A]	n°	[kg]
AC COIL. Terminals: clamp screw.					
11 BG09 T2 A❶	20	18	15	1	0.170
DC COIL. Terminals: clamp screw.					
11 BG09 T2 D❷	20	18	15	1	0.175

Operational characteristics

Type	UL/CSA General use	Protection fuse IEC gG	Protection fuse UL K5	Conductor section	
	[A]	[A]	[A]	[mm²]	[AWG]
BG09...T2	20	20	30	0.75-2.5	18-12

Certifications and compliance
Certifications obtained: CCC, EAC; UL Listed, for USA and Canada (cULus - File E93602), as Motor Controllers - Contactors.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Contactors four power poles, 2 NO and 2 NC BF series

BF09 T2...

Order code	IEC rated conventional free air thermal current Ith ≤40°C	≤55°C	≤60°C	Qty per pkg	Wt
	[A]	[A]	[A]	n°	[kg]
AC COIL. Terminals: clamp screw.					
BF09 T2 A❶	25	20	18	1	0.340
BF18 T2 A❶	32	26	23	1	0.340
BF26 T2 A❶	45	36	32	1	0.420
BF38 T2 A❶	56 (60❺)	45 (48❺)	40 (42❺)	1	0.420
BF80 T2 A❶	115	95	75	1	1.075
DC COIL. Terminals: clamp screw.					
BF18 T2 D❷❻	32	26	23	1	0.470
BF26 T2 D❷❻	45	36	32	1	0.540
BF38 T2 D❷❻	56 (60❺)	45 (48❺)	40 (42❺)	1	0.540
BF80 T2 E❹❼	115	95	75	1	1.125
DC COIL. Low consumption (2.4W). Terminals: clamp screw.					
BF18 T2 L❸❻	32	26	23	1	0.470
BF26 T2 L❸❻	45	36	32	1	0.540
BF38 T2 L❸❻	56 (60❺)	45 (48❺)	40 (42❺)	1	0.540

Operational characteristics

Type	UL/CSA General use	Protection fuse IEC gG	Protection fuse UL RK5	Conductor section	
	[A]	[A]	[A]	[mm²]	[AWG]
BF09 T2	25	32	60	1-6	16-10
BF18 T2	32	40	80	1-6	16-10
BF26 T2	45	50	100	1.5-10	14-6
BF38 T2	55	80	150	2.5-16	14-6
BF80 T2	115	115	250	6-50	18-2

Certifications and compliance
Certifications obtained: EAC, CCC, RINA; UL Listed for USA and Canada (cULus - File E93602) and CSA certified for Canada (File 54332), as Motor Controllers - Contactors.
Compliant with standards: IEC/EN 60947-1,IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for all BF09…BF38 versions only, add suffix V260 to the standard product order code.
Example: BF09 T2 A230 V260 for BF09, 2NO+2NC main poles, 230V 50/60Hz coil with compliant plastic materials).

❶ Complete with coil voltage digit if 50/60Hz or with voltage digit followed by 60 if 60Hz. N.B.: For BF80 T2, 50/60Hz coils are suitable for 50Hz only.
Standard voltages are:
– AC 50/60Hz 024 / 048 /110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).

Example:
– 11 BG09 T2 A230 for mini-contactor BG09 T2, 2 poles NO and 2 poles NC, with 230VAC 50/60Hz coil.
– 11 BG09 T2 A460 60 for mini-contactor BG09 T2, 2 poles NO and 2 poles NC, with 460VAC 60Hz coil.

❷ Complete the order code with coil voltage digit.
Standard voltages are:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220V.
The BF18-BF26-BF38 T2D types already have a standard supplied built-in TVS (Transient Voltage Suppressor).
Example:
– 11 BG09 T2 D012 for mini-contactor BG09 T2, 2 poles NO and 2 poles NC, with 12VDC coil.

❸ Low consumption version with built-in TVS. Complete the order code with coil voltage digit.
Standard voltages are:
– DC 024 / 048V.
Example:
– BF18 T2 L024 for contactor BF18 T2, 2 poles NO and 2 poles NC, with 24VDC low-consumption coil, supplied with TVS.

❹ The contactor coil is controlled electronically; it can have either an AC or a DC supply and has a wide operating range.
Complete the order code with coil voltage digit.
Standard voltages are:
– AC/DC 024 = 20...48V; 110 = 60...110V; 230 = 100...250V.

❺ For use at this other current value, a 16mm² cable, headed with a fork terminal, must be used.

❻ Maximum combinations of add-on blocks are given on page 2-19.

❼ For BF80 T2 E… contactors supply voltage must be AC or smoothed DC. For pulsating DC please consult our Technical support.

Contactors four power poles, 4 NC
BF series

BF18 T0...

Order code	IEC rated conventional free air thermal current Ith ≤40°C	≤55°C	≤60°C	Qty per pkg	Wt
	[A]	[A]	[A]	n°	[kg]
AC COIL. Terminals: clamp screw.					
BF18 T0 A❶	32	26	23	1	0.340
BF26 T0 A❶	45	36	32	1	0.420
DC COIL. Terminals: clamp screw.					
BF18 T0 D❷❻	32	26	23	1	0.470
BF26 T0 D❷❻	45	36	32	1	0.540
DC COIL. Low consumption (2.4W). Terminals: clamp screw.					
BF18 T0 L❸❻	32	26	23	1	0.470

Operational characteristics

Type	UL/CSA General use	Protection fuse IEC gG	Protection fuse UL RK5	Conductor section	
	[A]	[A]	[A]	[mm²]	[AWG]
BF18 T0	32	40	80	1-6	16-10
BF26 T0	45	50	150	1.5-10	14-6

Certifications and compliance
Certifications obtained: EAC, CCC, RINA; UL Listed for USA and Canada (cULus - File E93602) and CSA certified for Canada (File 54332), as Motor Controllers - Contactors.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Plastic materials are compliant with standards IEC/EN 60335; for BF18 and BF26 versions only, add suffix V260 to the standard product order code.
Example: BF18 T0 A230 V260 for BF18, four NC main poles, 230VAC 50/60Hz coil with compliant plastic materials).

NOTE: The BF18-BF26 T0D and BF18 T0L types have a standard supplied built-in TVS (Transient Voltage Suppressor).

Contactors four NO power poles to connect in series for photovoltaic applications
BF series

BFD80 T4...

new

BFD150 T4 E

Order code	Operational current at 600V in DC1 ≤55°C with 4 poles in series	Qty per pkg	Wt
	[A]	n°	[kg]
AC COIL. Terminals: lug clamp❺.			
BFD80 T4 A❶	100	1	1.100
AC/DC COIL. Terminals: lug clamp❺.			
BFD80 T4 E❹	100	1	1.100
BFD150 T4 E❹	165	1	2.550

❶ Complete with coil voltage digit if 50/60Hz or with voltage digit followed by 60 if 60Hz. Standard voltages are:
– AC 50/60Hz 024 / 048 /110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example:
– BF18 T0 A230 for contactor BF18 T0, 4 NC power poles, with 230VAC 50/60Hz.
– 11 BFD80 40 024 for contactor BFD80 40, 4 NO power poles, with 24V 50/60Hz for photovoltaic application.
❷ Complete the order code with coil voltage digit.
Standard voltages are:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220V.
Example:
– BF18 T0 D012 for micro-contactor BF18 T0, 4 NC power poles, with 12VDC coil.
❸ Low-consumption version. Complete the order code with coil voltage digit.
Standard voltages are:
– DC 024 / 048V.
Example:
– BF18 T2 L024 (low-consumption BF18 T2 contactor with 2 NO poles and 2 NC poles supplied at 24VDC).
❹ The contactor coil is controlled electronically; it can have either an AC or a DC supply and has a wide operating range.
Complete the order code with coil voltage digit.
Standard voltages are:
– AC/DC 024 = 20...48V; 110 = 60...110V; 230 = 100...250V.
❺ IEC/EN 60947-1 designation: Pillar terminal.
❻ Maximum combinations of add-on blocks are given on page 2-19.

General characteristics
The contactors are specifically made with magnetic elements in the arc extinction chambers to obtain high DC load operational capabilities. They are used to disconnect and isolate the load between the photovoltaic panel and the AC/DC inverter.
For add-on contact blocks, accessories and spare parts, consider indications of the corresponding standard (BF80 T4 A..., BF80 T4 E... and BF150 T4 E...).

Italian Fire Department Directives
These directives provide for a disconnecting device for all current-carrying elements, that can be operated by remote control switch, placed in an easily reached and marked position, in order to safely isolate each part of the installation within the fire system compartment including the photovoltaic (PV) generator.
As an alternative, the PV generator must be installed, either externally of the fire system compartment or internally but in a dedicated compartment with adequate fire-resistant features. For such function, specifically designed contactors for on-load use in IEC DC1 duty up to 1000VDC are available.

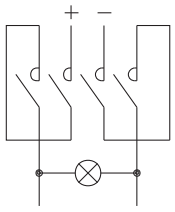
Operational characteristics

Use in IEC DC1 duty

Type	IEC operational voltage Ue			
	400V	600V	800V	1000V
	IEC max current Ie in DC1 with L/R ≤1ms with 4 poles in series			
	[A]	[A]	[A]	[A]
BFD80 T4 A...	100	100	76	60
BFD80 T4 E...	100	100	76	60
BFD150 T4 E...	165	165	125	100

Wiring scheme

4 poles



Certification and compliance
Certification obtained: cULus for BFD80 T4 A.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

BFK contactors (including limiting resistors)

BFK...

new

Order code	Maximum IEC operational power at ≤50°C (AC-6b)❶ 240V 400V 440V 690V 480V					Qty per pkg	Wt
	[kvar]	[kvar]	[kvar]	[kvar]	NO ❷	n°	[kg]
AC COIL.							
BFK09 10A❸	4.5	7.5	9	10	1	10	0.413
BFK12 10A❸	7	12.5	14	16	1	10	0.413
BFK18 10A❸	9	15	17	20	1	10	0.413
BFK26 00A❸	11	20	22	25	–	10	0.472
BFK32 00A❸	14	25	27.5	30	–	10	0.472
BFK38 00A❸	17	30	33	36	–	10	0.472
BFK50 00A❸	22	40	41	46	–	5	1.080
BFK65 00A❸	26	45	50	56	–	5	1.080
BFK80 00A❸	30	50	56	65	–	5	1.080
BFK95 00A❸	34	60	75	80	–	5	2.095
BFK115 00A❸	45	75	85	135	–	5	2.095
BFK150 00A❸	50	100	115	150	–	5	2.095

❶ To use the contactor in the delta, consult our Technical support, see contact details on front cover.
❷ NO auxiliary contacts available.
❸ The order code must be completed either with the coil voltage digit if 50/60Hz or with the coil voltage digit followed by the number 60 if 60Hz. Standard voltages are:
- AC 50-60Hz 024 / 048 / 110 / 230 / 400VAC
- AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).

Example: BFK09 10 A230 for contactor BFK09 with one NO contact and 230VAC 50/60Hz coil.
BFK09 10 A460 60 for contactor BFK09 with one NO contact and 460VAC 60Hz coil.

❹ Note: the maximum thermal current Ith of the BF110K contactor is 125A.

UL/CSA details
Maximum UL/CSA kvar ratings

	240V	480V	600V
	kVAR	kVAR	kVAR
BFK09 10A	4.5	9	10
BFK12 10A	7	14	16
BFK18 10A	9	17	20
BFK26 00A	11	22	27.5
BFK32 00A	14	27.5	32
BFK38 00A	17	33	36
BFK50 00A	22	41	46
BFK65 00A	26	50	56
BFK80 00A	30	60	75
BFK95 00A	40	80	100
BFK115 00A	45	90	120
BFK150 00A	50	100	125

Operational characteristics

Type	IEC rated operational current ≤440V	IEC - UL/CSA protection fuse gG-SC
	[A]	[A]
BFK09	12	16
BFK12	18	25
BFK18	23	40
BFK26	30	40
BFK32	36	63
BFK38	43	63
BFK50	58	80
BFK65	65	100
BFK80	75	125
BFK95	90	125
BFK115	115	160
BFK150	144	160

Ambient operating temperature: ≤50°C. For ambient temperatures higher than 50°C and up to 70°C, the maximum operating power values indicated in the table must be reduced by a percentage equal to the difference between the operating ambient temperature and 50°C.
E.g.: Using a BFK26 00 contactor at the ambient temperature of 60°C, the maximum operating power
(at 400V) of the contactor will be equal to 20kvar – 10% = 18kvar.
Operating cycle: ≤120 cycles/h
Electrical life: ≥400,000 cycles.

Add-on auxiliary contacts
The following contact blocks, can be fitted on the BFK contactors: BFX12..., 11 G418..., 11 G481..., 11 G482... and 11 G218.

Certifications and compliance
Certification obtained:UL Listed for USA and Canada (cULus - File E93602), as Motor Controllers - Magnetic Capacitive Switches; CCC, EAC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14.
Plastic materials are compliant with standards IEC/EN 60335; for BFK versions only, add suffix V260 to the standard product order code.

Kit to assemble BFK contactors

new

11 G46...

Order code	For contactor	Qty per pkg	Wt
		n°	[kg]
11 G460	BF09 10A - BF12 10A - BF18 10A - BF26 00A - BF32 00A - BF38 00A	10	0.072
BFX10K3	BF50 00A - BF65 00A - BF80 00A	10	0.078
BFX10K4	BFK95 00A - BF115 00A - BF150 00A	10	0.080

General characteristics
To optimise contactor stock management, a kit is available to transform normal three-pole contactors into BFK types for power factor correction. The table to the left indicates which kits to purchase depending on the standard contactor in stock.

Control relays BG00 type

11 BG00...

11 BGF00...

Order code	Configuration and n°of contacts❺		Quantity per pkg.	Wt
	NO	NC	n°	[kg]
AC COIL. Terminals: clamp screw.				
11 BG00 40 A❶	4	0	1	0.170
11 BG00 31 A❶	3	1	1	0.170
11 BG00 22 A❶	2	2	1	0.170
Terminals: Faston.				
11 BGF00 40 A❶	4	0	1	0.160
11 BGF00 31 A❶	3	1	1	0.160
11 BGF00 22 A❶	2	2	1	0.160
DC COIL. Terminals: clamp screw.				
11 BG00 40 D❷	4	0	1	0.175
11 BG00 31 D❷	3	1	1	0.175
11 BG00 22 D❷	2	2	1	0.175
Terminals: Faston.				
11 BGF00 40 D❷	4	0	1	0.165
11 BGF00 31 D❷	3	1	1	0.165
11 BGF00 22 D❷	2	2	1	0.165
DC COIL. Low-consumption (2.3W). Terminals: clamp screw.				
11 BG00 40 L❸	4	0	1	0.175
11 BG00 31 L❸	3	1	1	0.175
11 BG00 22 L❸	2	2	1	0.175
Terminals: Faston.				
11 BGF00 40 L❸	4	0	1	0.165
11 BGF00 31 L❸	3	1	1	0.165
11 BGF00 22 L❸	2	2	1	0.165

Operational characteristics
- IEC rated insulation voltage Ui: 690V
- IEC rated conventional free air thermal current Ith: 10A
- UL/CSA and IEC/EN 60947-5-1 designation:
  - BG types: A600-Q600
  - BF types: A600-P600
- Low-consumption version of BG types cannot accept additional contacts.

NOTE: No coil change or replacement is possible.

Certifications and compliance
Certification obtained: CCC, EAC, UL Listed for USA and Canada (cULus - File E93602), as Motor Controllers - Auxiliary contactors for all; RINA for BF00 types.
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.
Plastic materials are compliant with standards IEC/EN 60335; for BF00 version only, add suffix V260 to the standard product order code.
Example: BF00 40 A230 V260 for BF00 control relay having 4 NO auxiliary contacts and 230VAC 50/60Hz coil with compliant plastic materials.

NOTE: The BF00...D and BF00...L types have a standard supplied built-in TVS (Transient Voltage Suppressor).

Control relays BF00 type

BF00... A...

BF00... D...
BF00... L...

Order code	Configuration and n°of contacts ❺		Quantity per pkg.	Wt
	NO	NC	n°	[kg]
AC COIL. Terminals: clamp screw.				
BF00 40 A❶	4	0	1	0.340
BF00 31 A❶	3	1	1	0.340
BF00 22 A❶	2	2	1	0.340
BF00 04 A❶	0	4	1	0.340
DC COIL. Terminals: clamp screw.				
BF00 40 D❷❹	4	0	1	0.470
BF00 31 D❷❹	3	1	1	0.470
BF00 22 D❷❹	2	2	1	0.470
BF00 04 D❷❹	0	4	1	0.470
DC COIL. Low consumption (2.4W). Terminals: clamp screw.				
BF00 40 L❸❹	4	0	1	0.470
BF00 31 L❸❹	3	1	1	0.470
BF00 22 L❸❹	2	2	1	0.470
BF00 04 L❸❹	0	4	1	0.470

❶ The order code must be completed either with the coil voltage digit if 50/60Hz or with the coil voltage digit followed by the number 60 if 60Hz. Standard voltages are:
– AC 50760Hz 024 / 048 / 110 - 230 / 400V
– AC 60Hz 024 60 / 048 60 /- 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: 11 BG00 40 A230 (auxiliary mini-contactor 4 NO auxiliary contacts supplied at 230VAC 50/60Hz).
BF00 40 A460 60 (auxiliary contactor with 4 NO auxiliary contacts supplied at 460VAC 60Hz).

❷ Complete the order code with coil voltage digit. Standard voltages are:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220V.
Example: BF00 40 D012 (auxiliary contactor with 4 NO auxiliary contacts supplied at 12VDC).

❸ Low-consumption version. Complete the order code with coil voltage digit. Standard voltages are:
– DC 024 / 048V.
Example: 11 BG00 40 L024 (low-consumption auxiliary mini-contactor with 4 NO auxiliary contacts supplied at 24VDC).

❹ Maximum combinations of add-on blocks are given on page 2-19.

❺ All contacts are highly conductive.

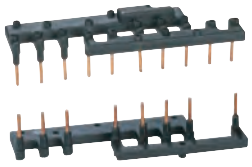
11 BGX10... (20-11-02)
11 BGX11 11

11 BGX10... (40-31-22-13-04)
11 BGX11 22

11 BGXF...

11 BGX77... -
11 BGX78 225 -
11 BGX79...

11 BGX50 00



11 SMX90 21
11 SMX90 22

Order code	Characteristics	Max qty per contactor	Qty per pkg	Wt
		n°	n°	[kg]
Auxiliary contacts. Screw terminals.				
11 BGX10 02❶	2NC	1	10	0.021
11 BGX10 11❶	1NO + 1NC	1	10	0.021
11 BGX10 20❶	2NO	1	10	0.021
11 BGX10 04❷	4NC	1	10	0.028
11 BGX10 13❷	1NO + 3NC	1	10	0.028
11 BGX10 22❶	2NO + 2NC	1	10	0.028
11 BGX10 31❶	3NO + 1NC	1	10	0.028
11 BGX10 40❶	4NO	1	10	0.028
Auxiliary contacts for reversing and changeover assemblies. Screw terminals.				
11 BGX11 11❸	1NO + 1NC	1	10	0.021
11 BGX11 22❸	2NO + 2NC	1	10	0.028
Auxiliary contacts. Faston terminals.				
11 BGXF10 02❶	2NC	1	10	0.021
11 BGXF10 11❶	1NO + 1NC	1	10	0.021
11 BGXF10 20❶	2NO	1	10	0.021
11 BGXF10 04❷	4NC	1	10	0.028
11 BGXF10 13❷	1NO + 3NC	1	10	0.028
11 BGXF10 22❶	2NO + 2NC	1	10	0.028
11 BGXF10 31❶	3NO + 1NC	1	10	0.028
11 BGXF10 40❶	4NO	1	10	0.028
Mechanical interlock.				
11 BGX50 00❶	For BG...A and BG...D	1	10	0.008
Quick connect surge suppressors.				
11 BGX77 048	≤48VAC/DC (Varistor)	10		0.007
11 BGX77 125	48...125VAC/DC (Varistor)	10		0.007
11 BGX77 240	125...240VAC/DC (Varistor)	10		0.007
11 BGX78 225	≤225VDC (Diode)	10		0.007
11 BGX79 048	≤48VAC (Resistor-Capacitor)	10		0.007
11 BGX79 125	48...125VAC (Resistor-Capacitor)	10		0.007
11 BGX79 240	125...240VAC (Resistor-Capacitor)	10		0.007
11 BGX79 415	240...415VAC (Resistor-Capacitor)	10		0.007
Modular shroud.				
11 BGX80 00❹	IP40 front protection	20		0.006
Paralleling links.				
11 G323❺	For 2 poles	10		0.009
11 G324		10		0.009
11 G325❺	For 4 poles	10		0.014
11 G326		10		0.014
Rigid connecting kits.				
11 SMX90 21❻	Rigid connections for star-delta starter with BG... mini-contactors	10		0.040
11 SMX90 22❻	Rigid connections for reversing switches with BG... mini-contactors	1		0.026

❶ Cannot be used with BG...L types.
❷ Cannot be used with BG...D and BG...L types.
❸ Suitable for left-hand mini-contactor only of BGT and BGTP reversing and BGC changeover assemblies.
❹ The shroud can be used with BG... types with screw termination only and with no auxiliary contacts, surge suppressor or mechanical interlock mounted. It raises the front degree of protection of the mini-contactor when these are used in consumer switchboards.
❺ Cannot be used with BGX80 00 shroud.
❻ Contactors with one NC auxiliary contact, 01 type, are usually used.
The SM1 breaker can be directly fitted with rigid connector; type connection SM1X30 40P for SM1P... breaker and connection SM1X30 40R for SM1R... breaker.
The relay cannot be directly mounted on the contator. Use the RF38 type and the RFX38 04 independent mounting base.

Operational characteristics

Type			BGX10... BGX11...	BGXF10...
IEC rated conventional free air thermal current Ith		A	10	10
IEC rated insulation voltage Ui		V	690	690
Terminals	Screw		M3	Faston 1x6.3mm 2x2.8mm
	Width	mm	6.9	6.9
Tightening torque		Nm	0.8...1	—
		lbin	7...9	—
Conductor section maximum (with 1 or 2 cables)				
	flexible without lug	mm^2	2.5	2.5
	flexible with lug	mm^2	2.5	2.5
	AWG	n°	14	14
UL/CSA and IEC/EN 60947-5-1 designation		AC	A600	A600
		DC	Q600	Q600
Mechanical life (million)		cycles	20	20

SM1 breaker - mini-contactor connecting kit
See page 1-5.

Certifications and compliance
Certifications obtained:

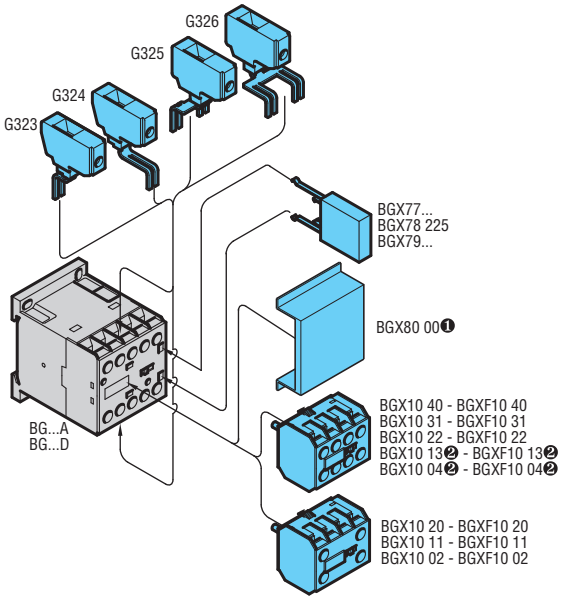
Type	UL	cULus	EAC	CCC
BGX10...	—	●	●	●
BGX11...	—	●	●	●
BGXF10...	—	●	●	—
BGX50 00	—	●	●	—
BGX7...	—	●	●	—
BGX80 00	—	—	●	—
G32...	—	—	●	—
SMX90...	ᴿᵁ	—	—	—

● Certified products;

ᴿᵁ - UL Recognized for USA only (File E197069) as Panel and Switchboard Accessories - Component. Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
cULus - UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices - Component.

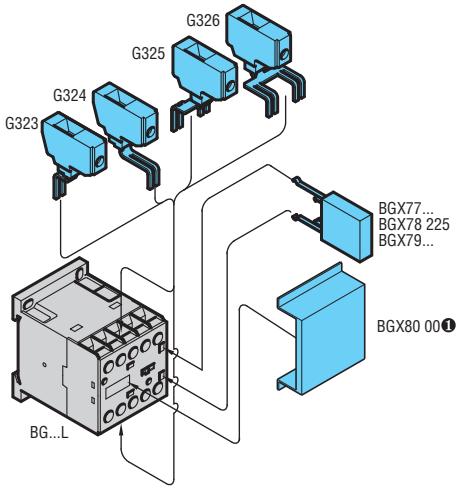
Compliant with standards: UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1; IEC/EN 60947-1; IEC/EN 60947-5-1 for auxiliary contacts.

Combinations: mounting position on BG...A and BG...D mini-contactors

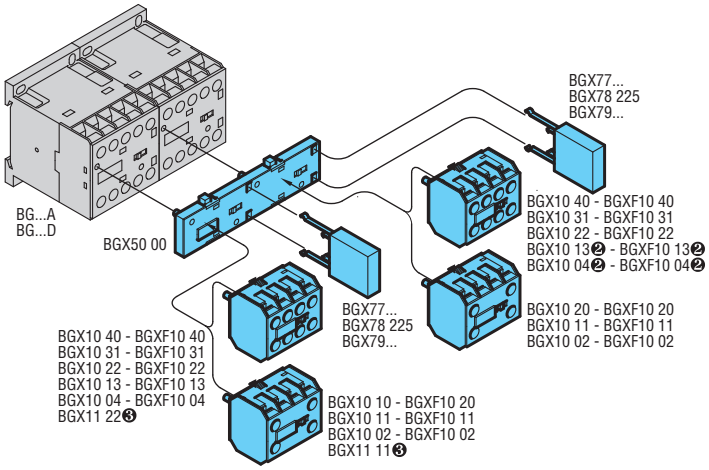


❶ Not suitable for mini-contactors BG... with auxiliaries contacts BGX10..., surge suppressor BGX7... and interlock BGX50 00.
❷ Not suitable for BG...D types.

Combinations: mounting position on BG...L mini-contactors

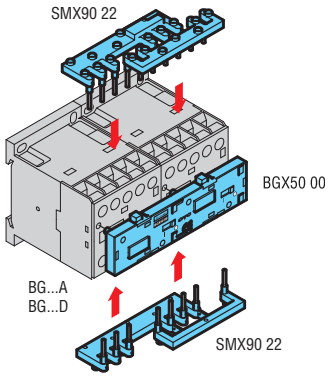


Combinations for reversing and changeover contactors assembled with BG...A and BG...D types

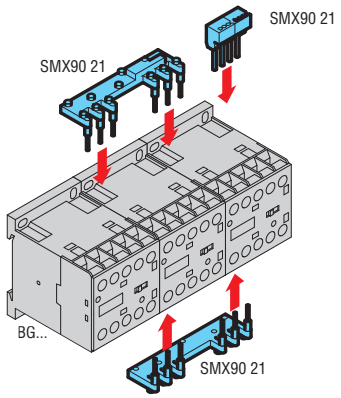


❷ Not suitable for BG...D types.
❸ For left-hand mini-contactor of BGT, BGTP and BGC contactor assemblies only.
See page 4-5.

Connections for reversing contactor assembly



Connections for star-delta assembly




BFX10...


11 G484...


BFX10...


11 G418...


11 G218


11 G481...
11 G482


BFX12...


11 G428...


11 G485...
11 G486...
11 G487

Order code	Characteristics	Max qty per cont.	Qty per pkg.	Wt
		n°	n°	[kg]
Auxiliary contacts with front center mounting ❷. Screw terminals.				
BFX10 02❶	2NC	1	5	0.030
BFX10 11❶	1NO + 1NC	1	5	0.030
BFX10 20❶	2NO	1	5	0.030
11 G484 03❶	3NC	1	5	0.039
11 G484 12❶	1NO + 2NC	1	5	0.039
11 G484 21❶	2NO + 1NC	1	5	0.039
11 G484 30❶	3NO	1	5	0.039
BFX10 04	4NC	1	5	0.048
BFX10 13	1NO + 3NC	1	5	0.048
BFX10 22	2NO + 2NC	1	5	0.048
BFX10 31	3NO + 1NC	1	5	0.048
BFX10 40	4NO	1	5	0.048
BFX10 11 11	1NO+1NC and 1EM+1LB❸❹	1	5	0.048
Auxiliary contacts with front lateral mounting. Screw terminals❻.				
11 G418 01	1NC	2	10	0.014
11 G418 01D	1LB❸	2	10	0.014
11 G418 10	1NO	2	10	0.014
11 G418 10A	1EM❹	2	10	0.014
Auxiliary contacts with front lateral mounting. Faston terminals❼.				
11 G218	1NO or 1NC reversible	2	10	0.011
11 G481 02	2NC	2	10	0.013
11 G481 11	1NO + 1NC	2	10	0.013
11 G481 20	2NO	2	10	0.013
11 G482❷❺	Changeover contact	2	10	0.013
Adapter for auxiliary contact side mounting.				
11 G280	for G218	2	10	0.008
11 G419	for G418	2	10	0.010
11 G483	for G481 and G482	2	10	0.010
Auxiliary contacts with low side mounting. Screw terminals.				
BFX12 02❷	2NC for BF00, BF09...BF94	2	5	0.044
BFX12 11❷	1NO+1NC for BF00, BF09...BF94	2	5	0.044
BFX12 20❷	2NO for BF00, BF09...BF94	2	5	0.044
11 G428 01	1NC	2	10	0.024
11 G428 01D	1LB❸	2	10	0.024
11 G428 10	1NO	2	10	0.024
11 G428 10A	1EM❹	2	10	0.024
Delayed auxiliary contacts 1NO + 1NC (pneumatic operation) on energisation for front center mounting ❶❽. Screw terminals.				
11 G485 3	3s	1	1	0.040
11 G485 6	6s	1	1	0.040
11 G485 15	15s	1	5	0.040
11 G485 30	30s	1	5	0.040
11 G485 60	60s	1	5	0.040
11 G485 120	120s	1	1	0.040
Delayed auxiliary contacts 1NO + 1NC (pneumatic operation) on de-energisation for front center mounting ❶❽. Screw terminals.				
11 G486 3	3s	1	1	0.040
11 G486 6	6s	1	1	0.040
11 G486 15	15s	1	5	0.040
11 G486 30	30s	1	5	0.040
11 G486 60	60s	1	5	0.040
11 G486 120	120s	1	1	0.040
11 G487	70ms	1	1	0.040

Operational characteristics for add-on auxiliary contacts

Type			G418❻ G428❻ G485❽ G486❽ G487❽	G484 BFX10 BFX12	G218❼ G481❼	G482❺
IEC conventional free air thermal current Ith		A	10	10	10	0.1❺
IEC rated insulation voltage Ui		V	690	690	690	690
Terminals	Screw		M3.5	M3	—	—
	Width	mm	7	7	—	—
	Faston		—	—	1x6.35 2x2.8	1x6.35 2x2.8
Tightening torque		Nm	0.8...1	0.8...1	—	—
		lbin	7...9	7...9	—	—
Conductor section maximum with (1 or 2 cables						
	flexible w/o lug	mm2	2.5	2.5	—	—
	flexible c/w lug	mm2	2.5	2.5	2.5	2.5
	AWG	n°	14	14	14	14
Terminal protection per IEC/EN60529			IP20 ❻❽	IP20	IP20❼	IP20❺
UL/CSA and IEC/EN 60947-5-1 designation		AC	A600	A600	A600	A600
		DC	P600❻	Q600	P600	P600
Mechanical life (million)		cycles	10❽	10	10	10

SM1 breaker - contactor connecting kit
See page 1-5.

Maximum assembly combination of add-on blocks
See pages 2-19 and 2-22...25.

Certifications and compliance
Certifications obtained:

Type	UL	cULus	CSA	EAC	CCC
BFX10...	—	●	—	●	●
BFX12...	—	●	—	●	—
G218	𝑹	—	●	●	—
G418..., G428...	𝑹	—	●	●	—
G481...	𝑹	—	●	●	—
G482	𝑹	—	●	●	—
G484...	𝑹	—	●	●	—
G485...	𝑹	—	●	●	—
G486...	𝑹	—	●	●	—
G487...	𝑹	—	●	●	—

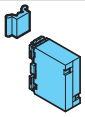
● Certified products; pending for BFX10 1111
𝑹 - UL Recognized for USA only (File E93601) as Auxiliary Devices - Component.
Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
cULus - UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices.
CSA - CSA certified for Canada only (File 54332) as Auxiliary Devices for motor controllers.

Add-on auxiliary contacts are compliant with the following standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-1, UL 60947-5-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-5-1;

❶ The contacts can also be fitted on B type contactors using the adapter G358. See pages 2-26 and 2-28.
❷ Highly conductive contacts.
❸ Normally closed late-break contact.
❹ Normally open early-make contact.
❺ Gold-plated contacts inside tight casing for use in pollutant environments. The Ith value refers to 125VAC and 30VDC. IEC IP20 protection is warranted to equipment wired with insulated Faston terminals.
❻ IEC IP20 protection is warranted to equipment wired with minimum 0.75mm² conductor section. Designation in DC is Q600 for G418 and G419 types.
❼ IEC IP20 protection is warranted to equipment wired with insulated Faston terminals.
❽ IEC IP20 protection is warranted to equipment wired with minimum 1mm² conductor section. Mechanical life is 3 million cycles.

BF00 A, BF09 A...BF150 A, BF40 E...BF150 E

Maximum assembly combination for alternating-current contactors BF00 A, BF09 A...BF150.
Maximum assembly combination for alternating/direct-current contactors BF40 E...BF150 E.

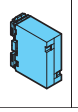
			Front centre mount					Front lateral mount			Side mount	
												
			BFX10 02	BFX10 04	G485...	G222...❹		BFX50 02	BFX53 03	G418...	G428...	BFX12 02
			BFX10 11	BFX10 13	G486...	G272...❹		BFX50 03 ❶	BFX54 03 ❾	G218	G419+ G418...	BFX12 11
			BFX10 20	BFX10 22	G487	BFX64 1... ❹				G481...	G280+ G218	BFX12 20
				BFX10 31						G482	G483+ G481...	BFX50 00 ❸❽
				BFX10 40							G483+ G482	BFX50 01 ❸❽
			n° of blocks 1 type only			n° of blocks		n° of blocks 1 type only		n° of blocks	n° of blocks	n° of blocks
Contactors	Control relay	BF00 A	1	1	1	1 ❺		1	—	1 o 2 ❶	1 o 2 ❶	1 ❸
	Three poles	BF09 A...BF25 A	1	1	1	1 ❺		1	—	1 o 2 ❶	1 o 2 ❶	1 ❸
		BF26 A...BF38 A	1	1	1	1 ❺		1	—	1 o 2 ❶	1 o 2 ❶	1 ❸
		BF40 A...BF150 A	1	1	1	1 ❻		—	1 ❿	1 o 2 ❶	2	1 ❸
		BF40 E...BF150 E	1	1	1	1 ❻		—	1 ❿	1 o 2 ❶	2	1 ❸
	Four poles	BF09 A...BF25 A	1	1	1	1 ❺		1	—	1 o 2	1 o 2 ❶	1 ❸
		BF26 A...BF38 A	1	1	1	1 ❺		1 ❷	—	1 ❶	1 o 2 ❶	1 ❸
		BF40 A...BF150 A	1	1	1	1 ❻		—	1 ❿	1 o 2	2	1 ❸
		BF40 E...BF150 E	1	1	1	1 ❻		—	1 ❿	1 o 2	2	2

OR + OR OR OR

❶ Cannot be fitted with BFX10… with 4 contacts and G222.
❷ To fit the mechanical interlock, the add-on fourth pole needs to be mounted on the left side of the one of the contactors.
❸ One only side-mount block can be fitted on each contactor whenever the BFX50 0... interlock is mounted.
❹ One BFX10... or delayed G48... contact block can be mounted on the G222 or G272 mechanical latch.
❺ G222 mechanical latch.
❻ G272 mechanical latch.
❽ For BF40...BF94 code BFX53 00 or BFX53 01; for BF95...BF150 code BFX54 00 or BFX54 01.
❾ BFX53 03 for BF40...BF94; BFX54 03 for BF95...BF150.
❿ BFX5303 cannot be mounted if a contact block BFX10... with 4 contacts (BFX10 04, BFX10 13, BFX10 22, BFX10 31, BFX10 40) is installed.

BF00 D, BF09 D...BF38 D, BF00 L, BF09 L...BF38 L

Maximum assembly combination for direct-current contactors BF00 D, BF09 D...BF38 D
Maximum assembly combination for direct-current contactors BF00 L, BF09 L...BF38 L with low absorption

			Front centre mount										Front lateral mount		Side mount	
														
			BFX10...				BFX10...				G485...	G222... ❹	1 type only BFX50...			BFX12... ❸
			...02	...11	...20	...04	...13	...22	...31	40	G486... G487		...02	...03 ❶	...00	...01
			n° of blocks 1 type only									n° of blocks	n° of blocks 1 type only			
Contactors	Control relay	BF00 D	1			1		1			1	1	1	1	1	1
		BF00 L	1			—		1			—	1	1	1	—	—
	Three poles	BF09 D-BF25 D	1			1		1			1	1	1	1	1	1
		BF26 D-BF38 D	1			1		1			1	1	1	1	1	1
		BF09 L-BF25 L	1			—		1			—	1	1	1	—	—
		BF26 L-BF38 L	1			—		1			—	1	1	1	—	—
	Four poles	BF09 D-BF25 D	1			1		1			1	1	1	1	1	1
		BF26 D-BF38 D	—	1		—		—			—	1	1❼	1❼	1	1
		BF09 L-BF25 L	1			—		1			—	1	1	1	—	—
		BF26 L-BF38 L	—	1	—	—		—			—	—	1❼	1❼	—	—

OR +

❶ Mounting of BFX50 03 interlock is not possible when BFX10... block with 4 contacts and G222 latch are mounted.
❸ One only side-mount block can be fitted on each contactor whenever the BFX50 0... interlock is mounted.
❹ One BFX10... or delayed G48... contact block can be mounted on the G222 or G272 mechanical latch.
❼ To fit the mechanical interlock, the add-on fourth pole needs to be mounted on the left side of the one of the contactors.
For other assembly combination, consult Technical support (E-mail: service@LovatoElectric.com).

BFX42
BFXD42

BFX50 00
BFX53 00
BFX54 00

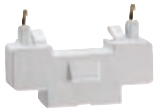
BFX50 01
BFX53 01
BFX54 01

BFX50 02

BFX50 03
BFX53 03
BFX54 03

11 G222...
11 G272...
BFX64 1...

BFX64 2



BFX77...
BFX79...

Order code	Characteristics	Max qty per cont.	Qty per pkg	Wt
		n°	n°	[kg]
Fourth pole.				
BFX42	For BF26 A, BF32 A, BF38 A	1	1	0.100
BFXD42	For BF26 D, BF32 D, BF38 D, BF26 L, BF32 L, BF38 L	1	1	0.108
BFX43	For BF40 A... BF94 A and BF40 E...BF94 E	1	1	0.150
BFX44	For BF95 A...BF150 A and BF95 E...BF150 E	1	1	0.500
Mechanical interlock.				
BFX50 00❶	Side mount for BF00, BF09...BF38	1	5	0.039
BFX50 01❶	Side mount with 2NC contacts for BF00, BF09...BF38	1	5	0.052
BFX50 02	Front mount, low profile for BF00, BF09...BF38	1	5	0.006
BFX50 03	Front mount for BF00, BF09...BF38	1	5	0.023
BFX89 10	Spacer for interlocking BF09...BF38 AC/DC with types in DC	1	10	0.017
BFX53 00	Side mount for BF40...BF94 A/E	1	5	0.039
BFX53 01	Side mount with 2NC contacts for BF40...BF94 A/E	1	5	0.052
BFX53 03	Front mount for BF40...BF94 A/E	1	5	0.034
BFX54 00	Side mount for BF95...BF150 A/E	1	5	0.039
BFX54 01	Side mount with 2NC contacts for BF95...BF150 A/E	1	5	0.052
BFX54 03	Front mount for BF95...BF150 A/E	1	5	0.034
Mechanical latch. Screw terminals				
11 G222❷	For BF00, BF09...BF38	1	1	0.070
11 G272❷	For BF40...BF94	1	1	0.070
BFX64 1...❷	For BF95...BF150	1	1	0.070
Manual closing mechanism.				
11 G454	For BF00, BF09...BF38	1	1	0.021
11 G455	For BF40...BF94	1	1	0.021
BFX64 2	For BF95...BF150	1	1	0.021
Quick connect surge suppressors for BF00A, BF09A...BF150A contactors.				
BFX77 048	≤48VAC/DC (Varistor)		5	0.012
BFX77 125	48...125VAC/DC (Varistor)		5	0.012
BFX77 240	125...240VAC/DC (Varistor)		5	0.012
BFX79 048	≤48VAC (Resistor-Capacitor)		5	0.012
BFX79 125	48...125VAC (Resistor-Capacitor)		5	0.012
BFX79 240	125...240VAC (Resistor-Capacitor)		5	0.012
BFX79 415	240...415VAC (Resistor-Capacitor)		5	0.012

❶ Different sized contactors can be interlocked.
Example: BF09...BF25 with BF26...BF38.

❷ Replace with the digit of the voltage if 50 or 60Hz and with the letter C followed by the digit of the voltage if DC.
Standard voltages are:
– AC 50/60Hz 24 (indicate 24) - 48 (indicate 48) - 110...125 (indicate 110) 220...240 (indicate 220) - 380...415V (indicate 380).
– DC 12 (indicate 12) - 24 (indicate 24) - 48 (indicate 48) 110...125 (indicate 110) - 220...240V (indicate 220).

NOTE: All contactors BF series, equipped with DC or AC/DC electronic coil, have built-in surge suppressor filter.

Operational characteristics

Type		BFX42 BFXD42	BFX43	BFX44	BFX50 01 BFX53 01 BFX54 01
IEC conventional free air thermal current Ith	A	56	115	165	10
IEC rated insulation voltage Ui	V	690	1000	1000	690
Terminals: Screw		M4	M6	M8	M3
Width	mm	12.5	9.6	14.5	7
Tightening torque	Nm	2.5...3	4...5	5.5...6.5	0.8...1
	lbin	21.6...26.4	35.4...44.2	48...57	7...9
Conductor section maximum with 1 or 2 cables flexible w/o lug	mm^2	16	35	70	2.5
flexible c/w lug	mm^2	16	35	70	2.5
AWG	n°	6	2	2/0	14
Terminal protection per IEC/EN60529		IP20❸	IP20❸	IP20❸	IP20
UL/CSA and IEC/EN 60947-5-1 designation	AC	—	—	—	A600
	DC	—	—	—	Q600
Mechanical life (million)	cycles	20	15	15	10

Type			G222...	G272...	BFX64 1
Rated control circuit voltage	AC (50/60Hz)	V	24...415	24...415	24...415
	DC	V	12...240	12...240	12...240
Power consumption with control:	AC	VA	40	40	40
	DC	W	70	70	70
Minimum energising: drop-out		ms	10	10	10
pick-up		ms	100	200	200
Tightening torque		Nm	0.8...1	0.8...1	0.8...1
		lbin	7...9	7...9	7...9
Conductor section Maximum with 1 or 2 cables flexible w/o lug		mm^2	4	4	4
flexible c/w lug		mm^2	2.5	2.5	2.5
AWG		n°	14...12	14...12	14...12

❸ The condition is front IP20 protection.

Maximum assembly combination of add-on blocks
See pages 2-19, 2-22...25.

Certifications and compliance
Certifications obtained:

Type	UL	cULus	CSA	EAC
BFX42 - BFXD42 - BFXD43	—	●	—	●
BFX50...	—	●	—	●
BFX77...	—	●	—	●
BFX79...	—	●	—	●
BFX5...	ᴿᵁ	—	—	—
G222...	ᴿᵁ	—	●	●
G272...	ᴿᵁ	—	●	●

● Certified products.
ᴿᵁ - UL Recognized for USA only (File E93601) as Auxiliary Devices Component.
Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
cULus - UL Listed for USA and Canada (cULus - File E93602) as Magnetic motor controllers.
CSA - CSA certified for Canada only (File 54332) as Auxiliary Devices for motor controllers.

Compliant with standards: IEC/EN 60947-1, UL 60947-1, CSA C22.2 n° 60947-1. IEC/EN 60947-5-1, UL 60947-5-1, CSA C22.2 n° 60947-5-1 for auxiliary contacts IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-4-1 for four poles.

BFX31…
BFX32…

BFX 80

BFX89 01

BFX89 02

11 BA135
11 BA235

11 BA435

11 G231
11 G232

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Rigid connecting kits for three-pole reversing contactor assembly.			
BFX31 01	For contactors BF09...BF25 side by side with BFX50 02 and BFX50 03 mechanical interlock	1	0.052
BFX31 02	For contactors BF09...BF25 side by side with BFX50 00 or BFX50 01 mechanical interlock	1	0.054
BFX32 01	For contactors BF26...BF38 side by side with BFX50... mechanical interlock	1	0.060
Rigid connecting kits for star-delta starters.			
BFX31 31	For contactors BF09...BF25	1	0.058
BFX32 31	For contactors BF26...BF38	1	0.064
BFX32 32	For contactors BF26...BF38 (L/Δ) BF09...BF25 (λ)	1	0.064
Sealing cover.			
BFX80	Sealing cover for contactors BF00 and BF09 ... BF38	10	0.001
Screw fixing adapters for contactors.			
BFX89 01	Universal base to screw fix BF09...BF38 contactors	5	0.016
BFX89 02	Screw fixing brackets for BF09...BF38 contactors	10	0.002
Paralleling links.			
11 BA135	2 poles for contactors BF09...BF25 types	10	0.001
11 BA235	2 poles for contactors BF26...BF38 types	10	0.003
11 BA435	3 poles for contactors BF95...BF150 types	10	0.030
One-pole enlarged terminals.			
11 G231	1x6mm² for contactors BF09...BF25 types	12	0.009
11 G232	1x16mm² for contactors BF26...BF38 types	12	0.014
Marking element for BF00, BF09...BF150 contactors.			
BFX30	Blank label for writing	50	0.001

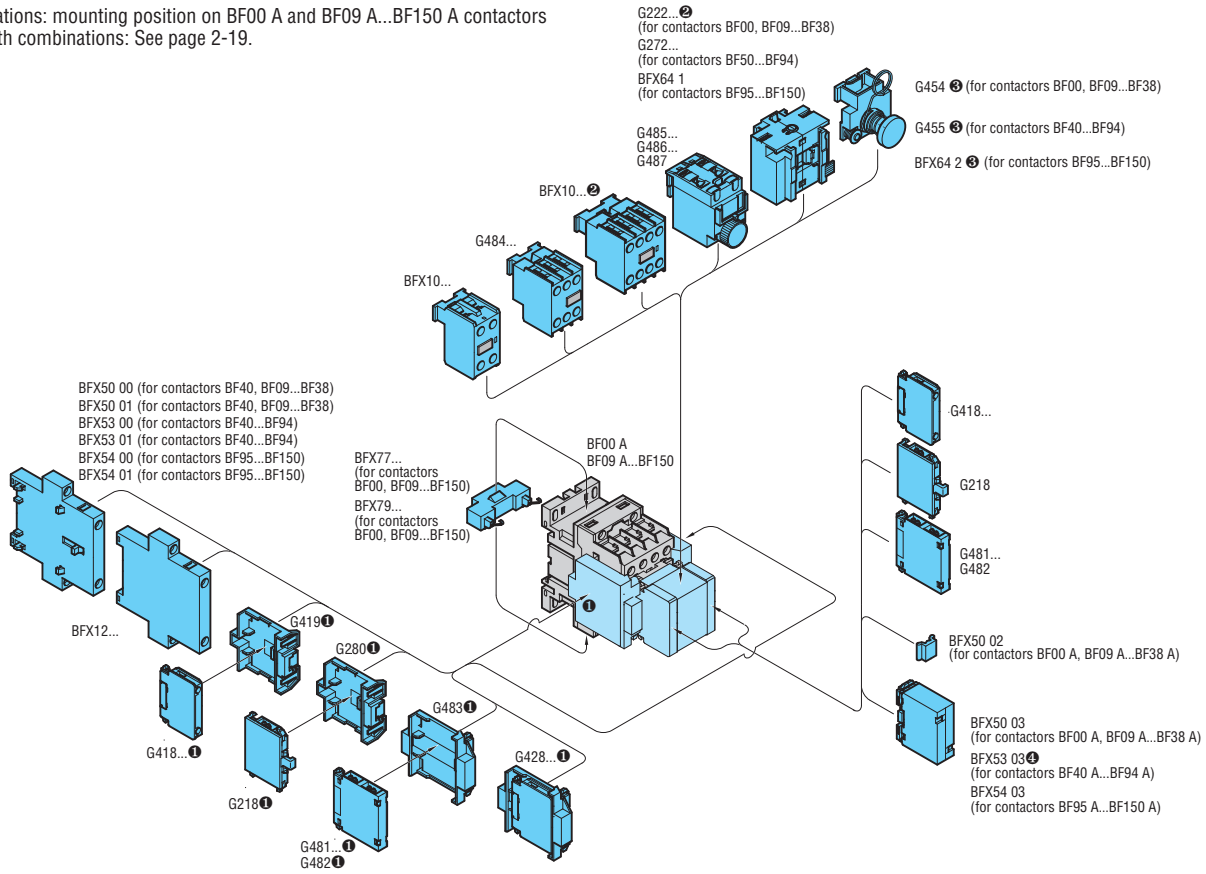
Operational characteristics

Type		G231	G232
Tightening torque	Nm	1.5-1.8	2.5-3
	lbin	13.2-18	7-9
Tool	Type	PH1	PH2

Certifications and compliance
Certifications obtained: GOST for all; UL Listed, for USA and Canada (cULus - File E93602), under Magnetic Motor Controllers for BFX31 01, BFX31 02, BFX32 01, BFX31 31, BFX32 31 and BFX32 32 as rigid kits, G271 and G288 as enlarged terminal kits; EAC for all.
Compliant with standards: IEC/EN 60947-1, UL 60947-1, CSA C22.2 n° 60947-1.

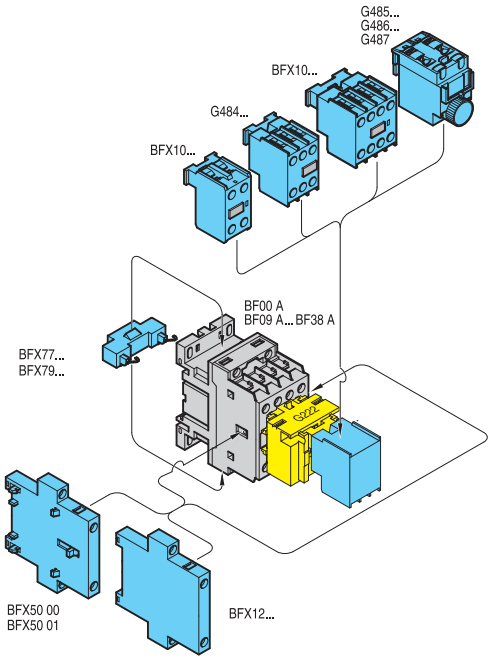
Add-on blocks for AC and AC/DC contactors

Combinations: mounting position on BF00 A and BF09 A...BF150 A contactors
Table with combinations: See page 2-19.

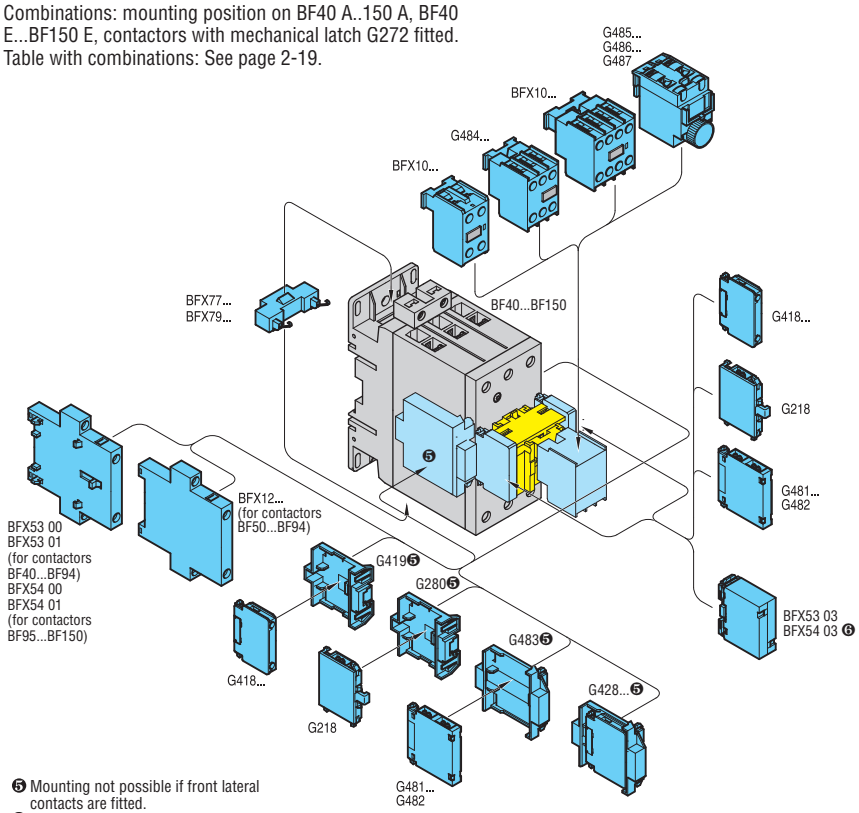


❶ Mounting is not possible if front lateral contacts or mechanical interlock BFX50 00 or BFX50 01 are mounted. BF00, BF09...38 cannot be fitted with BFX10 with 4 contacts or G222…
❷ Refer to the diagram below for use with G222… on contactors BF00 A and BF09 A...BF38 A and to the table of combinations on page 2-19.
❸ No add-on block can be mounted on front when the manual closing mechanism G454 or G455 is fitted.
❹ BFX53 03 cannot be mounted if a contact block BFX10... with 4 contacts (BFX10 04, BFX10 13, BFX10 22, BFX10 31, BFX10 40) is installed.

Combinations: mounting position on BF00 A and BF09 A-BF38 A contactors with mechanical latch G222 fitted.
Table with combinations: See page 2-19.



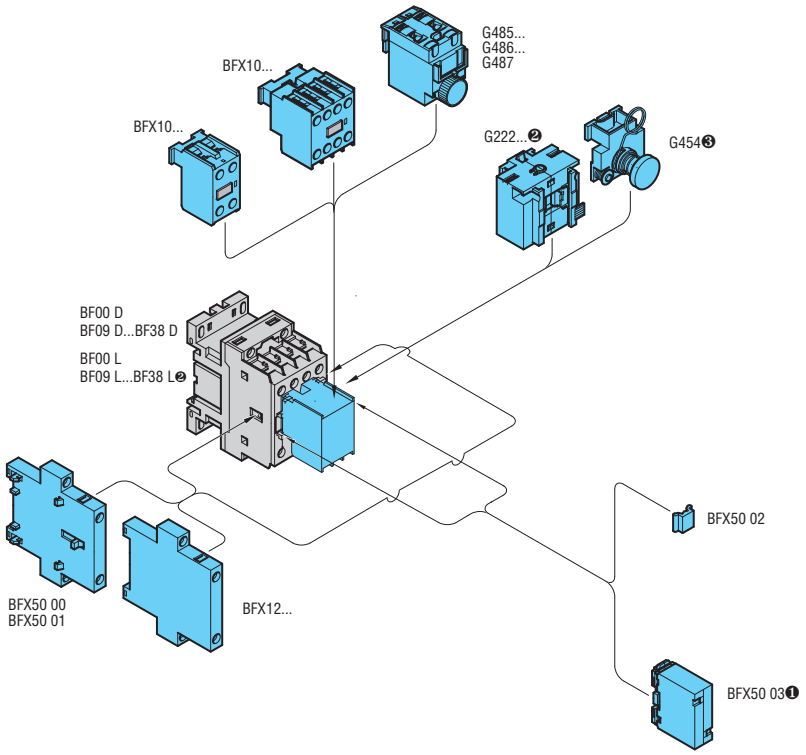
Combinations: mounting position on BF40 A..150 A, BF40 E...BF150 E, contactors with mechanical latch G272 fitted.
Table with combinations: See page 2-19.



❺ Mounting not possible if front lateral contacts are fitted.
❻ Mounting only for BF95...BF150

Add-on blocks for DC and DC low consumption contactors

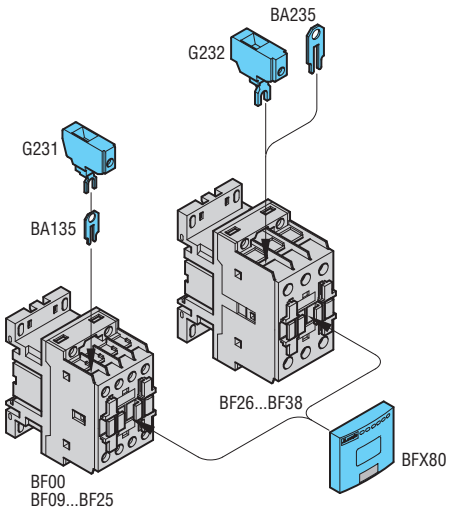
Combinations: mounting position on BF00 and BF09-BF38, D and L versions
Table with combinations: See page 2-19.



❶ Mounting not possible when the G222 mechanical latch is fitted.
❷ The G222 mechanical latch cannot be fitted on BF26 L - BF38 L four-pole types.
❸ No add-on block can be mounted on front when the G454 manual closing mechanism is fitted.

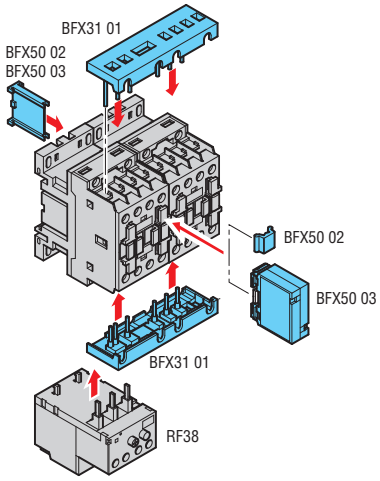
Accessories for AC, DC and DC low consumption contactors

Combinations

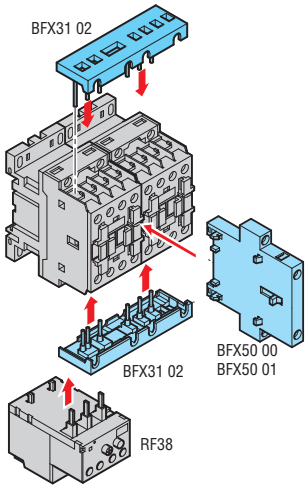


Accessories for AC, DC and DC low consumption contactors

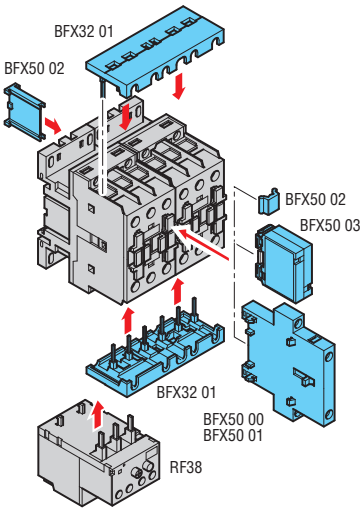
Connections for reversing contactors with contactors BF09...BF25



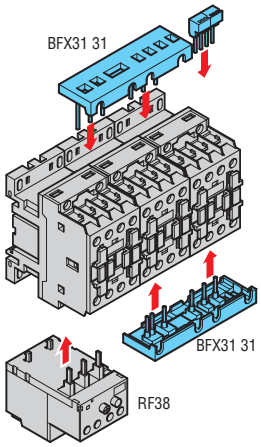
Connections for reversing contactors with contactors BF09...BF25 and mechanical interlock BFX50 00 or BFX50 01



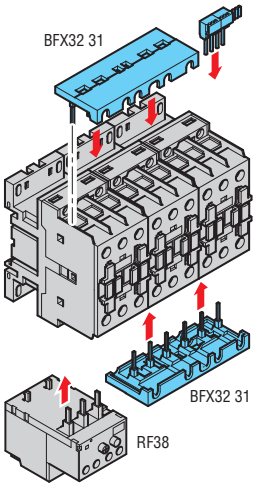
Connections for reversing contactors with contactors BF26...BF38



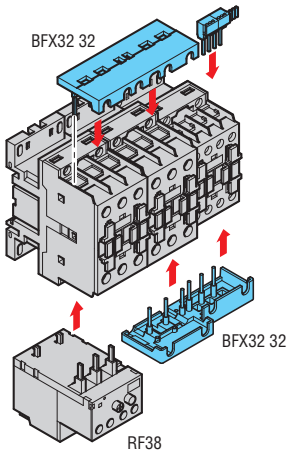
Rigid star-delta starter assembly connecting kits for BF09...BF25 contactors



Rigid star-delta starter assembly connecting kits for BF26...BF38 contactors



Rigid star-delta starter assembly connecting kits for BF26...BF38 (line-delta) and BF09...BF25 (star) contactors



Add-on blocks

11 G350 - 11 G354

11 G358

Order code	Characteristics	Max qty per. contactor	Qty per pk	Wt sg
		n°	n°	[kg]
Auxiliary contacts. Faston terminals. Side mountinge.				
11 G350❶	2NO+1NC or 1NO+2NC reversible	4	1	0.082
11 G354❶	1NO+1NC	4	1	0.078
Adapter.				
11 G358	For fitting auxiliary contacts BFX10..., with 2 contacts, G484..., G485..., G486... and G487 on contactors B145...B630 1000 described on p. 2-26	4	5	0.050
Mechanical interlock.				
11 G355❷❸	Side by side	1	1	0.026
11 G356 1❷❹	One on top of other	1	1	0.120
11 G356 2❷❹	One on top of other	1	1	0.126
11 G356 3❷❹	One on top of other	1	1	0.132
11 G356 4❷❹	One on top of other	1	1	0.140
11 G356 5❷❹	One on top of other	1	1	0.146
11 G356 6❷❺	One on top of other	1	1	0.150
Mechanical latch.				
11 G495❻❼❽	For B145...B630❽	1	1	0.795

Accessories

11 G361 - 11 G363

11 G527 - 11 G528 - 11 G529
11 G530

11 G370

11 G371

Order code	Characteristics	Qty per pkg	Wt
		n°	[kg]
Power terminal protection.			
11 G361❾	For contactors B145-B180	6	0.026
11 G363❾	For contactors B250-B310-B400	6	0.046
11 G527	For contactor B500	1	0.238
11 G528	For contactor B500 4	1	0.265
11 G529	For contactor B630	1	0.238
11 G530	For contactor B630 4	1	0.266
3 pole star connecting bars.			
11 BA1595	For contactors B145-B180	1	0.065
11 BA1721	For contactors B250-B310-B400	1	0.140
11 BA1846	For contactors B500-B630	1	0.341
2 pole bars for parallel arrangement.			
11 BA1594	For contactors B145-B180	1	0.095
11 BA1720	For contactors B250-B310-B400	1	0.149
11 BA1845	For contactors B500-B630	1	0.322
Terminal adapter.			
11 G370	To transform Faston terminals of auxiliary contacts and coils into screw terminals	10	0.003
11 G371	To transform both coil Faston terminals into screw terminals	5	0.022

Operational characteristics of auxiliary contacts

Type			G350-G354
IEC conventional free-air thermal current Ith		A	16
IEC rated insulation voltage Ui		V	690
Terminals	Faston		1-6.35x0.8 2-2.8x0.8
Conductor section maximum (with 1 or 2 cables)			
	flexible c/w lug	mm^2	2.5
	AWG	n°	14
UL/CSA and IEC/EN 60947-5-1 designation		AC	A600
		DC	P600
Mechanical life (million)		cycles	5

Type			G495❼
Rated AC control circuit voltage	AC (50/60Hz)	V	48...480
	DC	V	48...480
Power consumption with control in:			
	AC	VA	1500
	DC	W	1100
Minimum energising:			
	drop-out	ms	40
	pick-up	ms	300
Terminals	Faston		1-6.3x0.8

Type		G370-G371
Tightening torque	Nm	1
	lbin	8.9
Tool	Type	PH2
Conductor section (with 1 or 2 cables)	mm^2	4
	AWG	10

Certifications and compliance
Certifications obtained:

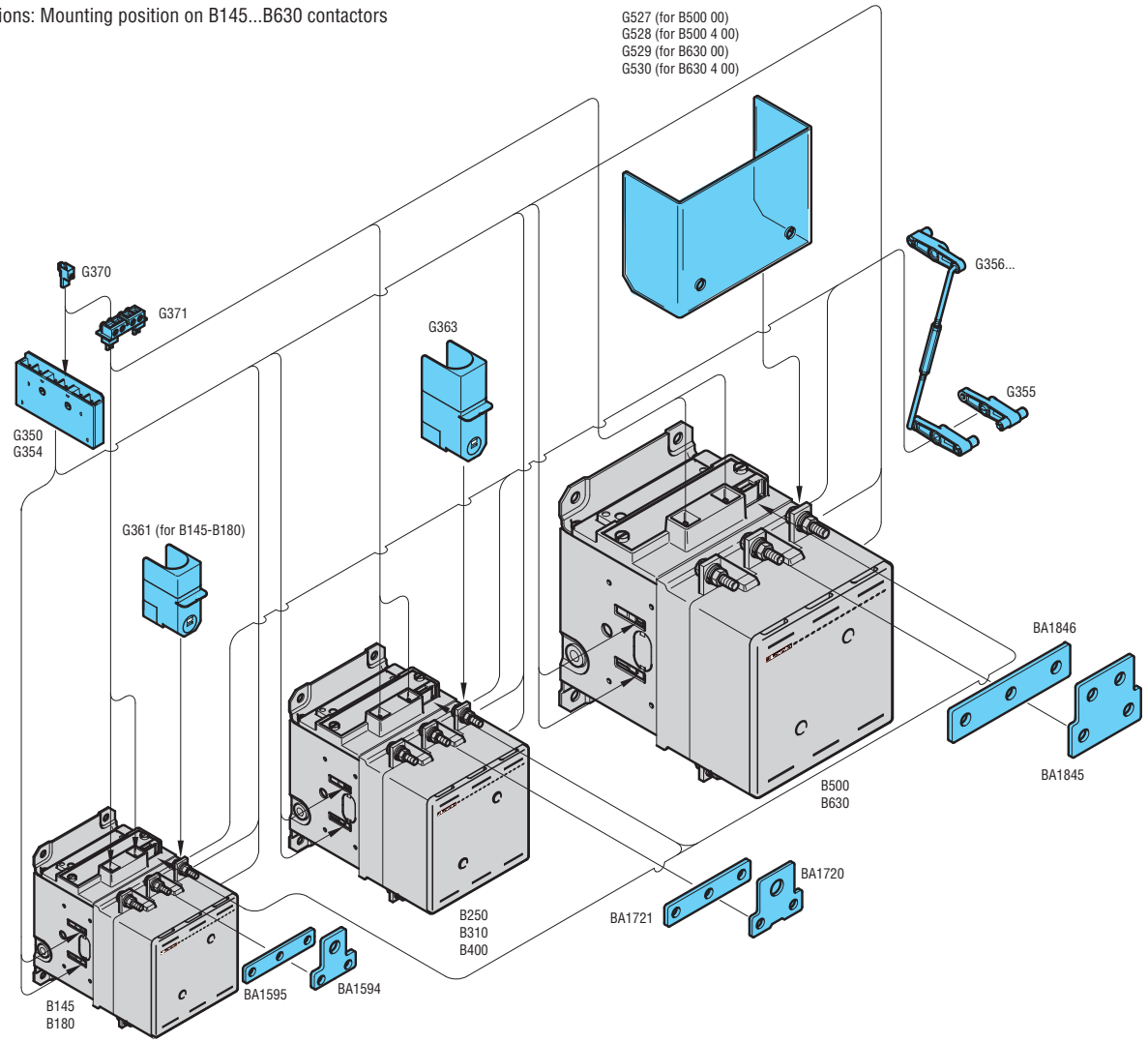
Type	UL	CSA	EAC	CCC
G350	●	●	●	●
G354	●	●	●	—
G355	—	●	●	—
G356 ...	—	●	●	—
G361	—	●	●	—
G362	—	●	●	—
G363	—	●	●	—
G370	—	●	●	—

● Certified products.
UL - UL Recognized for USA only (File E93601) as Auxiliary Devices - Component.
Products having this type of marking are intended for use as components of complete workshop-assembled equipment.
CSA - CSA certified for Canada only (File 54332) as Auxiliary Devices for motor controllers.

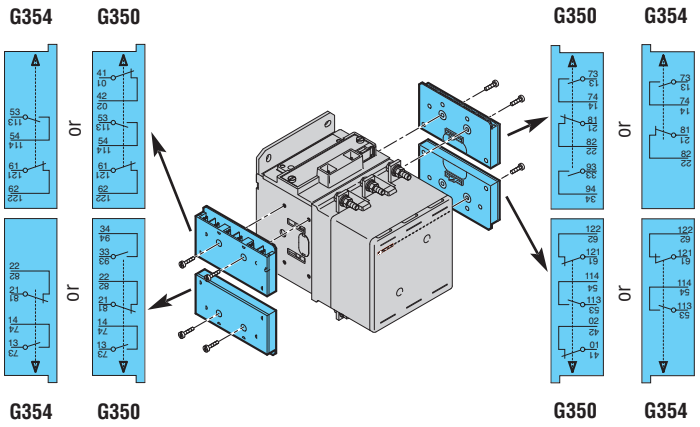
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, IEC/EN 60947-4-1, UL508, CSA C22.2 n° 14; add-on auxiliary contacts also comply with: IEC/EN 60947-5-1, UL 60947-5-1, CSA C22.2 n° 60947-5-1.

❶ Only for B145-B180-B250-B310-B400-B500-B630-B630 1000.
❷ Not suitable for B630 1000-B1250-B1600 ❺.
❸ For use with three-pole B630 1000, consult Technical support for information; see contact details on inside front cover.
❹ Allowed distances see page 2-68.
❺ For contactors B1250 and B1600, two G356 6 mechanical interlocks are required.
❻ Replace with the digit of the voltages if 50 or 60 Hz or with the letter C followed by voltage if DC. The standard voltages are:
– AC 50/60Hz 48 - 110...125 (indicate 110) - 220...240 (indicate 220) - 380...415 (indicate 380)
– DC 48 - 110...125 (indicate 110) - 220...240 (indicate 220).
❼ It can be mounted only in contactors if predisposed for it. Technical support for information; see contact details on inside front cover.
❽ Not suitable for B310 and B310 4.
❾ Provided for one pole terminal only. Example: For three-pole contactors, purchase 3 pieces for the upper terminals only or 6 pieces for all upper and lower terminals.
❿ Replace with the required alphanumeric symbol; each package contains 100 pieces of the same symbol.

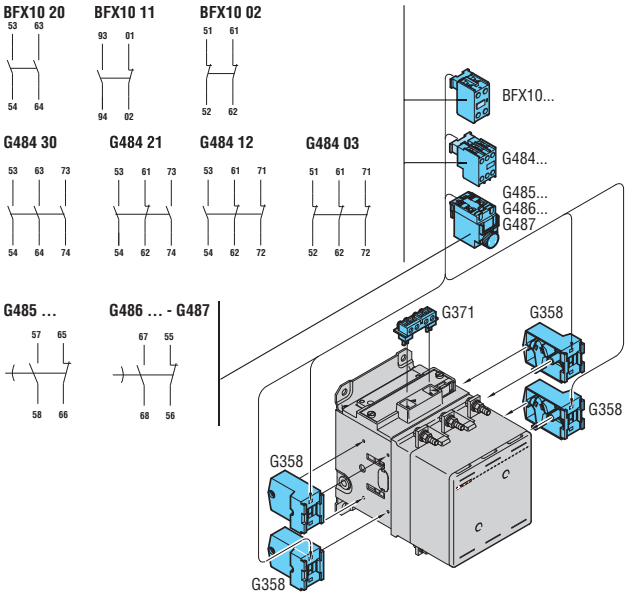
Combinations: Mounting position on B145...B630 contactors



The add-on auxiliary contact blocks G350 and G354 can be applied to contactors B145-B630 1000 only up to a maximum of four pieces for each contactor, for a total of 12 contacts.
The contact block G350 provides a 2NO+1NC or 1NO+2NC combination depending on its mounting position; see the drawing below. The G354 block consists of 1NO+1NC.



Contact blocks, BFX10 with 2 contacts, G484, G485, G486 and G487 types, can be mounted using the G358 adapter, refer to page 2-18 for exact types and order codes of the blocks.
A maximum of four adapters can be possibly used per contactor and each adapter can hold one BFX10, G484, G485, G486 and G487.



AC coils

BFX91A...

BFX92A...

BFX93A...

BFX94 A...

Order code	Rated frequency and voltage		Qty per pkg	Wt
	[Hz]	[V]	n°	[kg]
For contactors BF00 A-BF09 A-BF12 A-BF18 A-BF25 A.				
BFX91 A024❶	50/60	24VAC	1	0.085
BFX91 A048❶		48VAC	1	0.085
BFX91 A110❶		110VAC	1	0.085
BFX91 A230❶		230VAC	1	0.085
BFX91 A400❶		400VAC	1	0.085
BFX91 A024 60❶	60	24VAC	1	0.085
BFX91 A048 60❶		48VAC	1	0.085
BFX91 A120 60❶		120VAC	1	0.085
BFX91 A220 60❶		220VAC	1	0.085
BFX91 A230 60❶		230VAC	1	0.085
BFX91 A460 60❶		460VAC	1	0.085
BFX91 A575 60❶		575VAC	1	0.085
For contactors BF26 A-BF32 A-BF38 A.				
BFX92A 024❶	50/60	24VAC	1	0.088
BFX92A 048❶		48VAC	1	0.088
BFX92A 110❶		110VAC	1	0.088
BFX92A 230❶		230VAC	1	0.088
BFX92A 400❶		400VAC	1	0.088
BFX92A 024 60❶	60	24VAC	1	0.088
BFX92A 048 60❶		48VAC	1	0.088
BFX92A 120 60❶		120VAC	1	0.088
BFX92A 220 60❶		220VAC	1	0.088
BFX92A 230 60❶		230VAC	1	0.088
BFX92A 460 60❶		460VAC	1	0.088
BFX92A 575 60❶		575VAC	1	0.088
For contactors BF40 A-BF50 A-BF65 A-BF80 A-BF94 A.				
BFX93 A024❶	50/60	24VAC	1	0.150
BFX93 A048❶		48VAC	1	0.150
BFX93 A110❶		110VAC	1	0.150
BFX93 A230❶		230VAC	1	0.150
BFX93 A400❶		400VAC	1	0.150
BFX93 A024 60❶	60	24VAC	1	0.150
BFX93 A048 60❶		48VAC	1	0.150
BFX93 A120 60❶		120VAC	1	0.150
BFX93 A220 60❶		220VAC	1	0.150
BFX93 A230 60❶		230VAC	1	0.150
BFX93 A460 60❶		460VAC	1	0.150
BFX93 A575 60❶		575VAC	1	0.150
For contactors BF95 A-BF115 A-BF150 A.				
BFX94 A024❶	50/60	24VAC	1	0.185
BFX94 A048❶		48VAC	1	0.185
BFX94 A110❶		110VAC	1	0.185
BFX94 A230❶		230VAC	1	0.185
BFX94 A400❶		400VAC	1	0.185
BFX94 A024 60❶	60	24VAC	1	0.185
BFX94 A048 60❶		48VAC	1	0.185
BFX94 A120 60❶		120VAC	1	0.185
BFX94 A220 60❶		220VAC	1	0.185
BFX94 A230 60❶		230VAC	1	0.185
BFX94 A460 60❶		460VAC	1	0.185
BFX94 A575 60❶		575VAC	1	0.185

new

❶ Four-terminal coil.

Operational characteristics for BFX91 A, BFX92 A, BFX93 A and BFX94 A coils

AC control

Rated voltage at 50/60, 60Hz			V	12...600	
Operating voltage limits					
50/60Hz coil powered at 50Hz		pick-up	% Us	80...110	
		drop-out	% Us	20...55	
60Hz		pick-up	% Us	85...110	
		drop-out	% Us	20...55	
60Hz coil powered at 60Hz		pick-up	% Us	80...110	
		drop-out	% Us	20...55	
Average coil consumption at ≤20°C				BFX91 BFX92	BFX93 / BFX94
50/60Hz coil powered at 50Hz		in-rush	VA	75	210 / 300
		holding	VA	9	15 / 20
60Hz		in-rush	VA	70	195 / 275
		holding	VA	6.5	13 / 17
60Hz coil powered at 60Hz		in-rush	VA	75	210 / 300
		holding	VA	9	15 / 20
Dissipation	at 50Hz		W	2.5	5 / 6.5

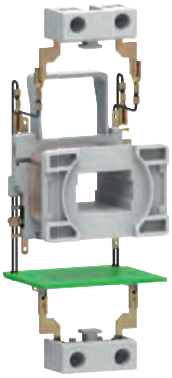
Materials

Class F enamelled copper wire.

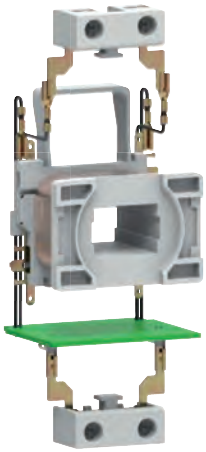
Special versions

For coils with non standard voltages, consult Technical support for information; see contact details on inside front cover.

AC/DC and DC coils



BFX93 E...



BFX94 E...

Order code	Rated voltage	Qty per pkg	Wt
	[V]	n°	[kg]
For contactors BF40 E-BF50 E-BF65 E-BF80 E-BF94 E❶.			
BFX93 E024❷	20...48V AC/DC	1	0.190
BFX93 E110❷	60...110V AC/DC	1	0.190
BFX93 E230❷	100...250V AC/DC	1	0.190
For contactors BF95 E-BF115 E-BF150 E.			
BFX94 E024❷	20...48V AC/DC	1	0.225
BFX94 E110❷	60...110V AC/DC	1	0.225
BFX94 E230❷	100...250V AC/DC	1	0.225

new

NOTE: no coil replacement for contactors BF00 D, BF09 D-BF38 D, BF00 L, BF09 L-BF38 L is possible.

❶ For BF80 T2 E... contactors the coil supply voltage must be AC or smoothed DC. For pulsating DC please consult our Technical support.
❷ Four-terminal coil.

Operational characteristics for BFX93 E coil
AC/DC control

Rated voltage		V	20...250
Operating voltage limits: 50/60 Hz coil powered at or in DC	pick-up	% Us	80...110❶
	drop-out	% Us	20...25❷
Average coil cons. at ≤20°C	in-rush	W	45...75
	holding	W	1.2...2.1

Operational characteristics for BFX94 E...
AC/DC control

Rated voltage		V	20...250
Operating voltage limits: 50/60 Hz coil powered at or in DC	pick-up	% Us	80...110❶
	drop-out	% Us	20...25❷
Average coil cons. at ≤20°C	in-rush	W	65...110
	holding	W	1.8...3

❶ For electronically controlled AC/DC coils 80% of Us min. and 110% of Us max.
❷ For electronically controlled AC/DC coils 20% of Us min. and 55% of Us max.

Materials
Class F enamelled copper wire.

Special versions
For coils with non standard voltages, consult Technical support for information; see contact details on inside front cover.

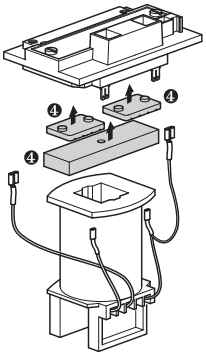
AC/DC coils

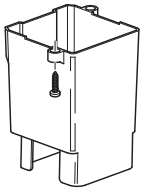
Coil

Bridge rectifier

Coil protection

Coil assembly





Order code	Rated voltage AC 50/60Hz and DC	Qty per pkg	Wt
	[V]	n°	[kg]
Coil for B145-B180 contactors.			
11 BA11574 24	24VAC/DC	1	0.800
11 BA11574 48	48VAC/DC	1	0.800
11 BA11574 60	60VAC/DC	1	0.800
11 BA11574 110	110...125VAC/DC	1	0.800
11 BA11574 220	220...240VAC/DC	1	0.800
11 BA11574 380	380...415VAC/DC	1	0.800
11 BA11574 440	440...480VAC/DC	1	0.800
Coil for B250-B310-B400 contactors.			
11 BA1699 24	24VAC/DC	1	1.800
11 BA1699 48	48VAC/DC	1	1.800
11 BA1699 60	60VAC/DC	1	1.800
11 BA1699 110	110...125VAC/DC	1	1.800
11 BA1699 220	220...240VAC/DC	1	1.800
11 BA1699 380	380...415VAC/DC	1	1.800
11 BA1699 440	440...480VAC/DC	1	1.800
Coil for B500-B630-B630 1000 contactors.			
11 BA1800 48	48VAC/DC	1	3.400
11 BA1800 60	60VAC/DC	1	3.400
11 BA1800 110	110...125VAC/DC	1	3.400
11 BA1800 220	220...240VAC/DC	1	3.400
11 BA1800 380	380...415VAC/DC	1	3.400
11 BA1800 440	440...480VAC/DC	1	3.400
Coil for B1250-B1600 contactors.			
11 BA1800 110❶	110...125VAC❶	1	3.400
11 BA1800 220❶	220...240VAC❶	1	3.400

Order code	For contactor	Qty per pkg	Wt
		n°	[kg]
Bridge rectifier (Faston terminals).			
11 BA1575 1❺	B145-B180	1	0.170
11 BA1700 1❺	B250-B310-B400	1	0.230
11 BA1799❺	B500-B630-B630 1000 B1250-B1600	1	0.520
Coil protection.			
11 BA1553	B145-B180	1	0.042
11 BA1678	B250-B310-B400	1	0.079
11 BA1803	B500-B630-B630 1000 B1250-B1600	1	0.164
Coil assembly (Coil, rectifier and coil protection).			
11 BA1546❷	B145-B180	1	1.220
11 BA1671❷	B250-B310-B400	1	2.290
11 BA1796❸	B500-B630-B630 1000 B1250-B1600	1	4.650

❶ Available for AC supply only.
❷ Add the coil voltage digit. Standard voltages are:
- AC/DC 24 - 48 - 60 - 110...125 (indicate 110) - 220...240 (indicate 220) - 380...415 (indicate 380) - 440...480V (indicate 440).

Example: 11 BA1546 110 for B145-B180 contactor coil assembly suitable for 110-125VAC/DC supply.

❸ Add the coil voltage digit. Standard voltages are:
- AC/DC 48 - 60 - 110...125 - 220...240 - 380...415 - 440...480V.

Example: 11 BA1796 110 for B500-B1600 contactor coil assembly suitable for 110-125VAC/DC supply.

For B1250 and B1600 only 110...125 and 220...240VAC voltages are available.
❹ When replacing the coil, retrieve the dampers (1 pair for B145...B180 and 2 pairs for B250...B1600) and the fixed core and refit them with the new coil.
❺ For contactors with coil voltage up to 415V. For higher voltages add suffix 440 to the code. E.G.: 11 BA1575 1 440.

Operational characteristics
AC and DC control

For contactor type			B145 - B180
Supply voltage			AC and DC
Rated control voltage		V	24...480
Operating limits	pick-up	% Us	80...110
	drop-out	% Us	20...60
Consumption	in-rush	VA/W	300
	holding	VA/W	10
Dissipation		W	10

For contactor type			B250 - B310 - B400
Supply voltage			AC and DC
Rated control voltage		V	24...480
Operating limits	pick-up	% Us	80...110
	drop-out	% Us	20...60
Consumption	in-rush	VA/W	300
	holding	VA/W	10
Dissipation		W	10

For contactor type			B500 - B630 - B630 1000
Supply voltage			AC and DC
Rated control voltage		V	48...480
Operating limits	pick-up	% Us	80...110
	drop-out	% Us	20...60
Consumption	in-rush	VA/W	400
	holding	VA/W	18
Dissipation		W	18

For contactor type			B1250 - B1600
Supply voltage			AC
Rated control voltage		V	110/240
Operating limits	pick-up	% Us	80...110
	drop-out	% Us	20...60
Consumption	in-rush	VA/W	800
	holding	VA/W	45
Dissipation		W	40

Materials
Class F enamelled copper wire.

Coil assembly
Comprises the coil, bridge rectifier, fixed core, coil protection, cross piece and fixing screws.

Special versions
For coils with non standard voltages, consult Technical support for information; see contact details on inside front cover.

Main contacts for BF contactors

BFX99...

Order code	For contactor	Qty per pkg	Wt
		n°	[kg]
Main contacts. 3 or 4 pole set complete with screws.			
BFX99 026T	BF26 00	1	0.038
BFX99 026F	BF26 T4	1	0.051
BFX99 032T	BF32 00	1	0.070
BFX99 038T	BF38 00	1	0.070
BFX99 038F	BF38 T4	1	0.093
BFX99 040T	BF40 00	1	0.095
BFX99 040F	BF40T4	1	0.127
BFX99 050T	BF50 00	1	0.095
BFX99 050F	BF50 T4	1	0.127
BFX99 065T	BF65 00	1	0.095
BFX99 065F	BF65 T4	1	0.127
BFX99 080T	BF80 00	1	0.100
BFX99 080F	BF80 T4	1	0.130
BFX99 094T	BF94 00	1	0.100
BFX99 095T	BF95 00	1	0.210
BFX99 095F	BF95 T4	1	0.280
BFX99 115T	BF115 00	1	0.225
BFX99 115F	BF115 T4	1	0.300
BFX99 150T	BF150 00	1	0.225
BFX99 150F	BF150 T4	1	0.300

new

Special versions
For non standard spare contact configurations, contact Technical support; see contact details on inside front cover.

NOTE: For B1250 and B1600 contactor spares, consult Technical support for information; see contact details on inside front cover.

Main contacts and arc chutes for B contactors

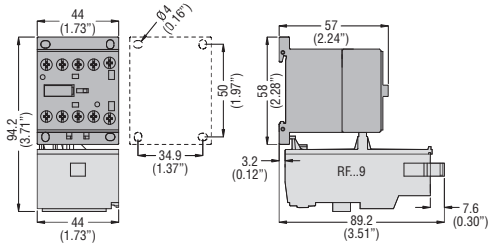
11 G381... - 11 G382...
11 G383... - 11 G384... - 11 G385...
11 G525... - 11 G526... - 11 G537...

Order code	For contactor	Qty per pkg	Wt
		n°	[kg]
Main contacts. 3 or 4 pole set complete with Allen screws and key for contact replacement.			
11 G381	B145	1	0.440
11 G381 4	B145 4	1	0.580
11 G382	B180	1	0.440
11 G382 4	B180 4	1	0.580
11 G383	B250	1	0.770
11 G383 4	B250 4	1	1.030
11 G385	B310	1	0.770
11 G385 4	B310 4	1	1.030
11 G384	B400	1	0.770
11 G384 4	B400 4	1	1.030
11 G525	B500	1	2.520
11 G525 4	B500 4	1	3.360
11 G526	B630	1	2.660
11 G526 4	B630 4	1	3.550
11 G537	B630 1000	1	2.660
11 G537 4	B630 1000 4	1	3.550
11 G538	B1250 24	1	5.040
11 G538 4	B1250 4 24	1	6.720
11 G539	B1600 24	1	5.320
11 G539 4	B1600 4 24	1	7.100
Arc chutes.			
11 BA1588	B145-B180	1	0.755
11 BA1589	B145 4-B180 4	1	1.000
11 BA1713	B250-B310-B400	1	1.210
11 BA1714	B250 4-B310 4-B400 4	1	1.600
11 BA1838	B500-B630-B630 1000	1	1.910
11 BA1839	B500 4-B630 4-B630 1000 4	1	2.490

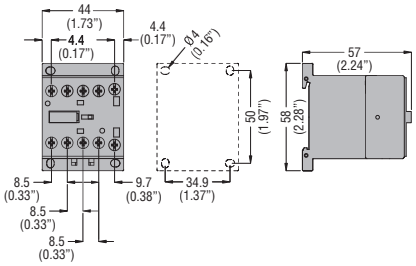
Arc chute

BG... MINI-CONTACTORS WITH AC OR DC SUPPLY VOLTAGE

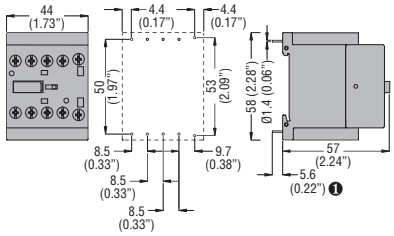
BG… three poles with screw terminals
and **RF…9** thermal overload relay



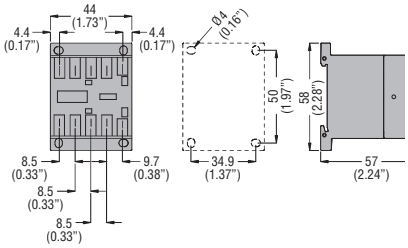
BG…T…
four poles, with screw terminals



BGP…
with rear PCB solder pins



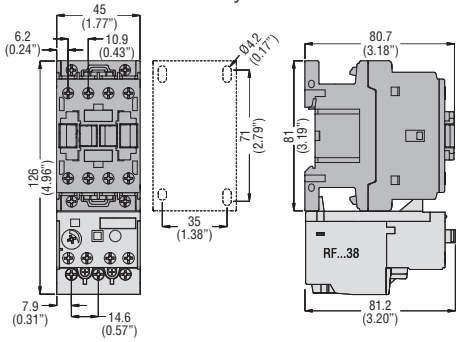
BGF…
with Faston terminals



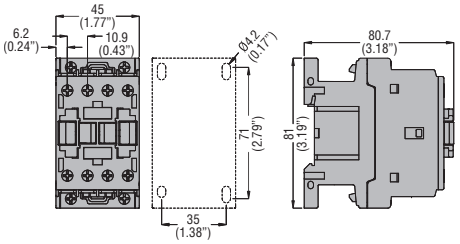
❶ Recommended PCB drillings 1.7-2mm.

BF... CONTACTORS WITH AC SUPPLY VOLTAGE

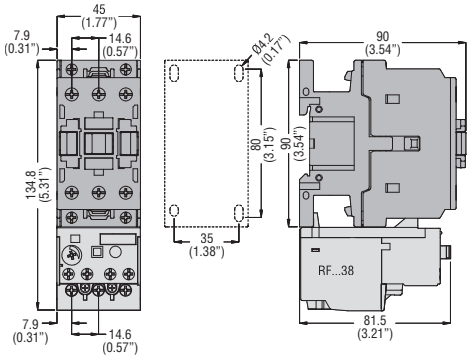
BF00 A… BF09 A… - BF12 A… - BF18 A… - BF25 A… three poles with
RF…38 thermal overload relay



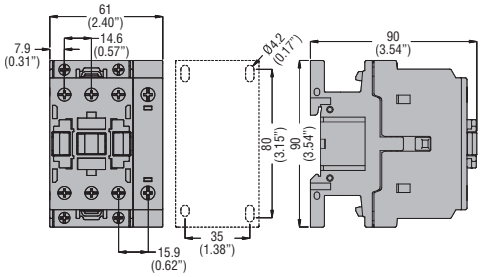
BF09T… A… - BF12T… A… - BF18T… A… four poles



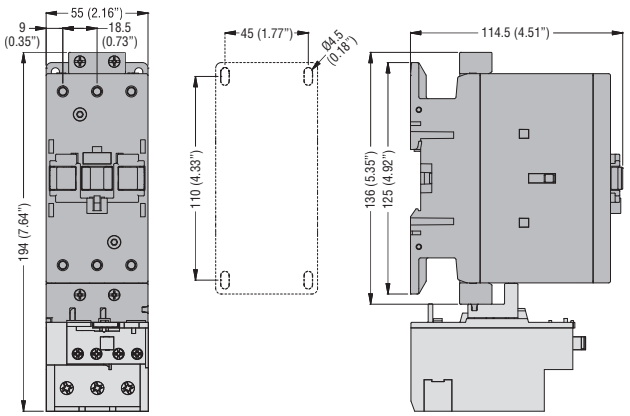
BF26 00A… - BF32 00A… - BF38 00A… three poles with **RF…38** thermal overload relay



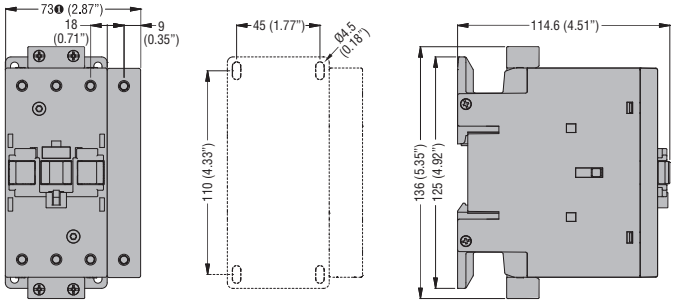
BF26 T…A… - BF38 T…A… four poles



BF40 00A… - BF50 00A… - BF65 00A… - BF80 00A… - BF94 00A…
three poles with **RF82** thermal overload relay

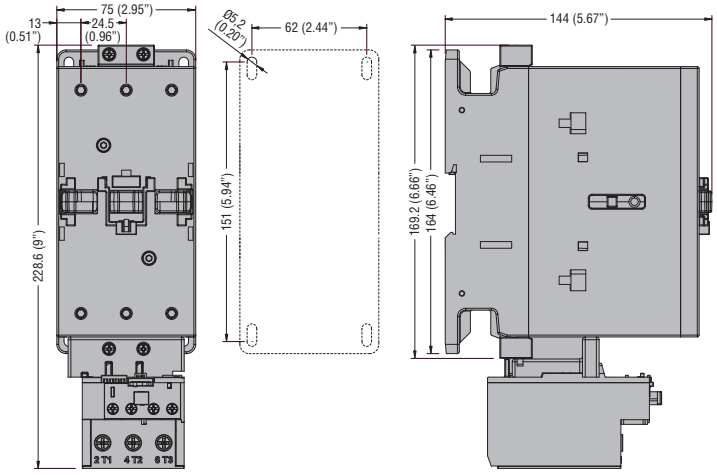


BF40 T4…A… - BF50 T4…A… - BF65 T4…A… -
BF80 T4…A… - BFD80 T4… four poles

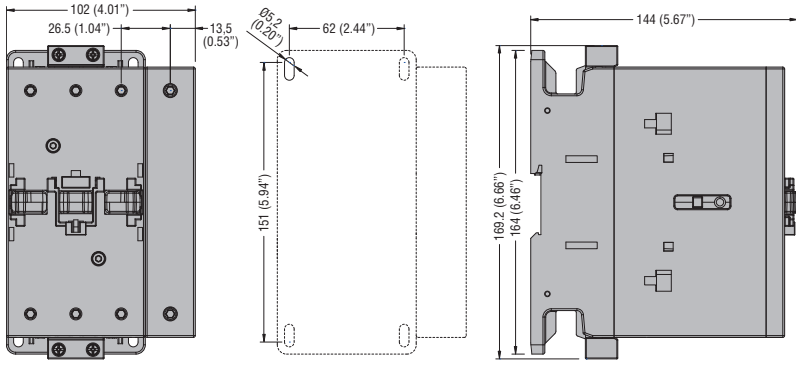


❶ BF80T2 91mm/3.58"

BF95 00A... - BF115 00A... - BF150 00A... three poles with **RF110** thermal relay

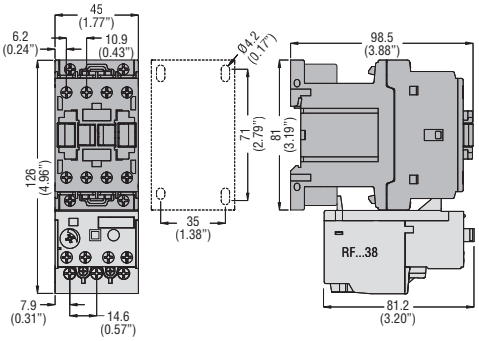


9BF95 T4A... - BF115 T4A... - BF150 T4A... four poles



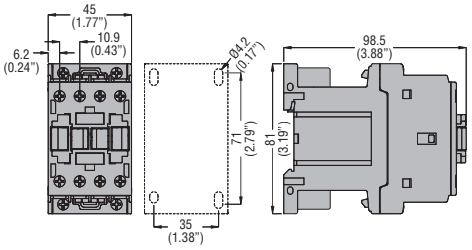
BF...CONTACTORS WITH DC SUPPLY VOLTAGE

BF00...D and **BF00...L - BF09... - BF12... - BF18... - BF25...D** and **L**
three poles with **RF...38** thermal overload relay

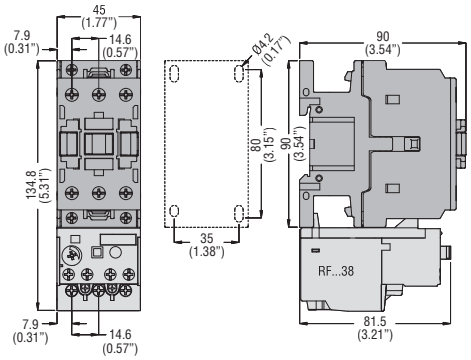


Control relays

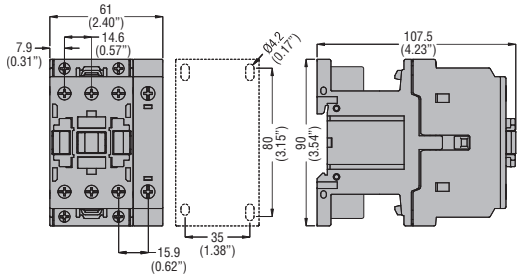
BF00...D and **BF00...L**
BF09 T... - BF18 T... D and **L** four poles



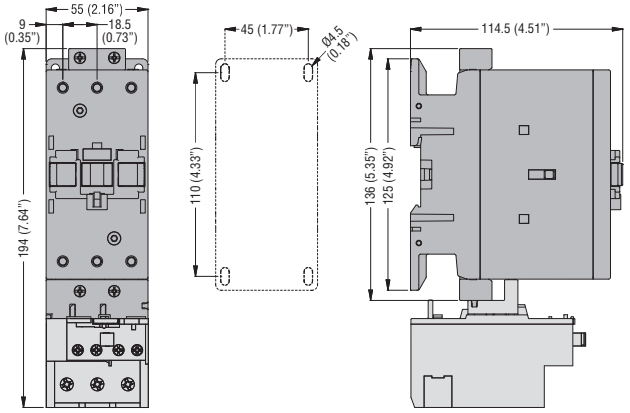
BF26... - BF32... - BF38... D and **L** three poles with **RF...38** thermal overload relay



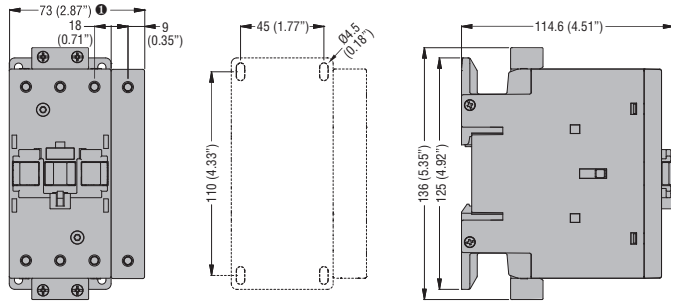
BF26 T... - BF38 T... D and **L** four poles



BF40 00E... - BF50 00E... - BF65 00E... - BF80 00E... - BF94 00E...
three poles with **RF82** thermal overload relay

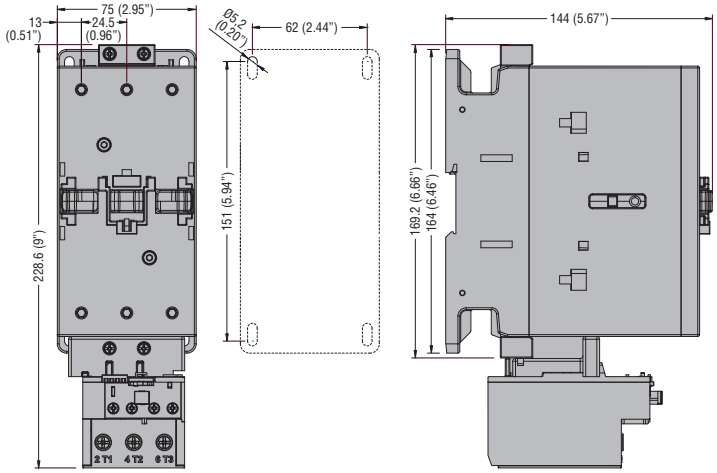


BF65 T4 E... - BF80 T4 E... - BF80 T2 E... four poles

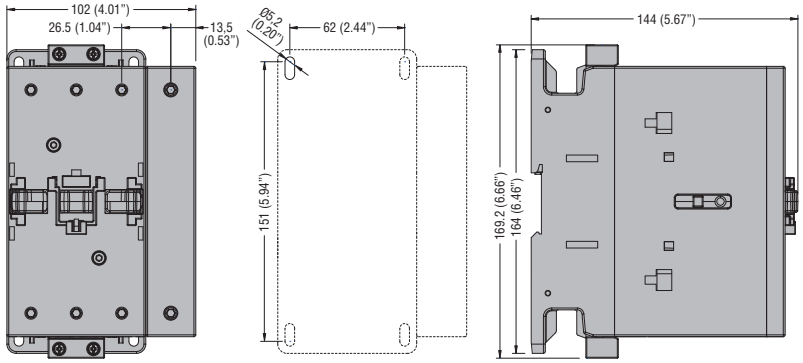


❶ BF80T2 91mm (3.58")

BF95 00E... - BF115 00E... - BF150 00E... three poles with **RF110** thermal relay

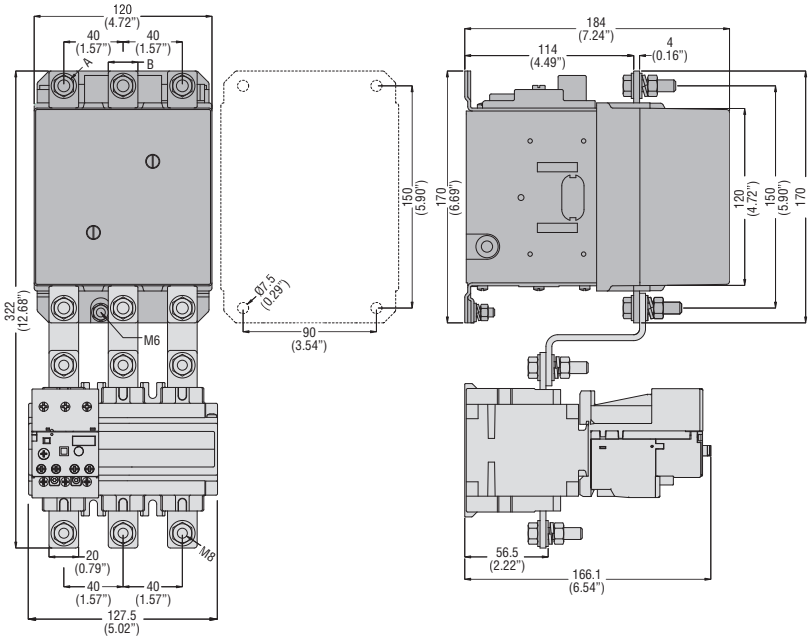


BF95 T4E... - BF115 T4E... - BF150 T4E... - BFD150 T4E... four poles



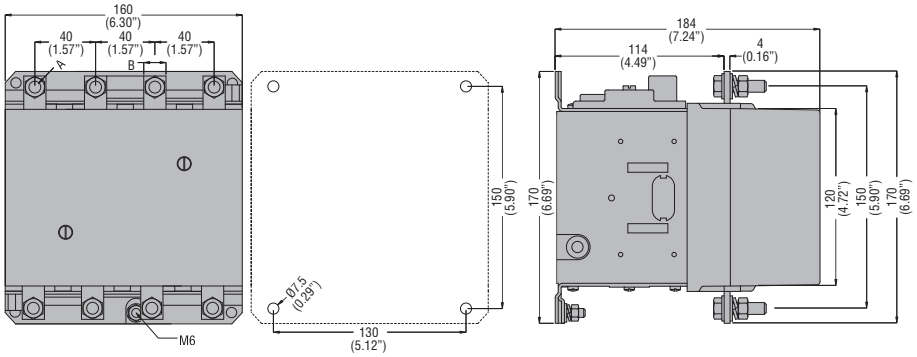
B... CONTACTORS WITH AC OR DC SUPPLY VOLTAGE

B145 - B180 three poles with **RF...200** thermal overload relay



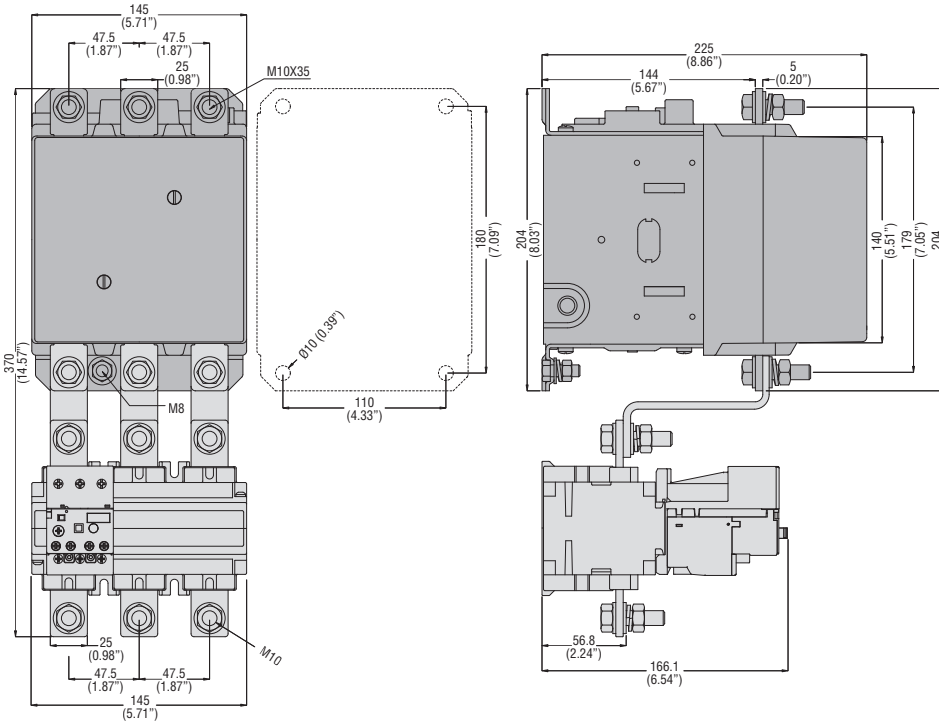
CONTACTOR TYPE	A	B
B145	M8	20 (0.79")
B180	M8	20 (0.79")

B145 4 - B180 4 four poles

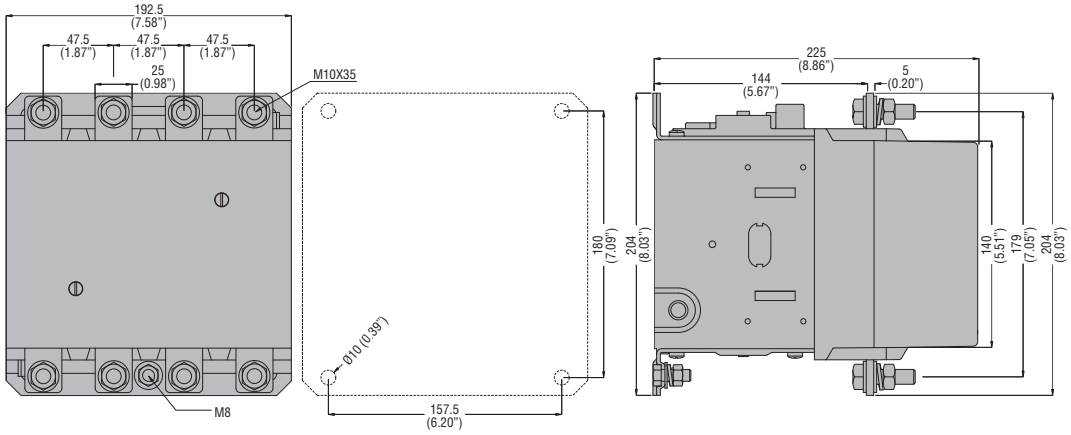


CONTACTOR TYPE	A	B
B145	M8	20 (0.79")
B180	M8	20 (0.79")

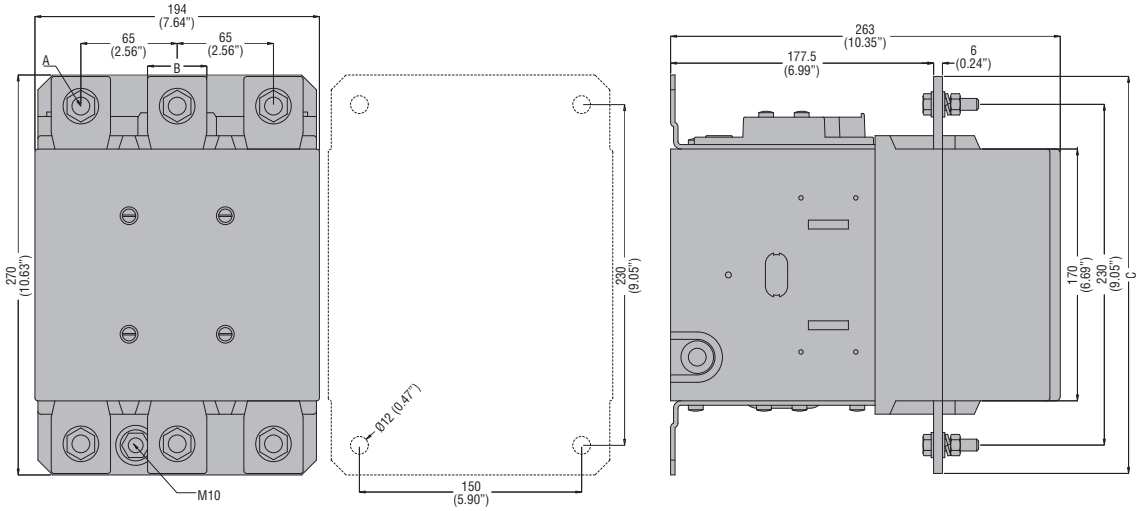
B250 - B310 - B400 three poles with **RF...420** thermal overload relay



B250 4 - B310 4 - B400 4 four poles

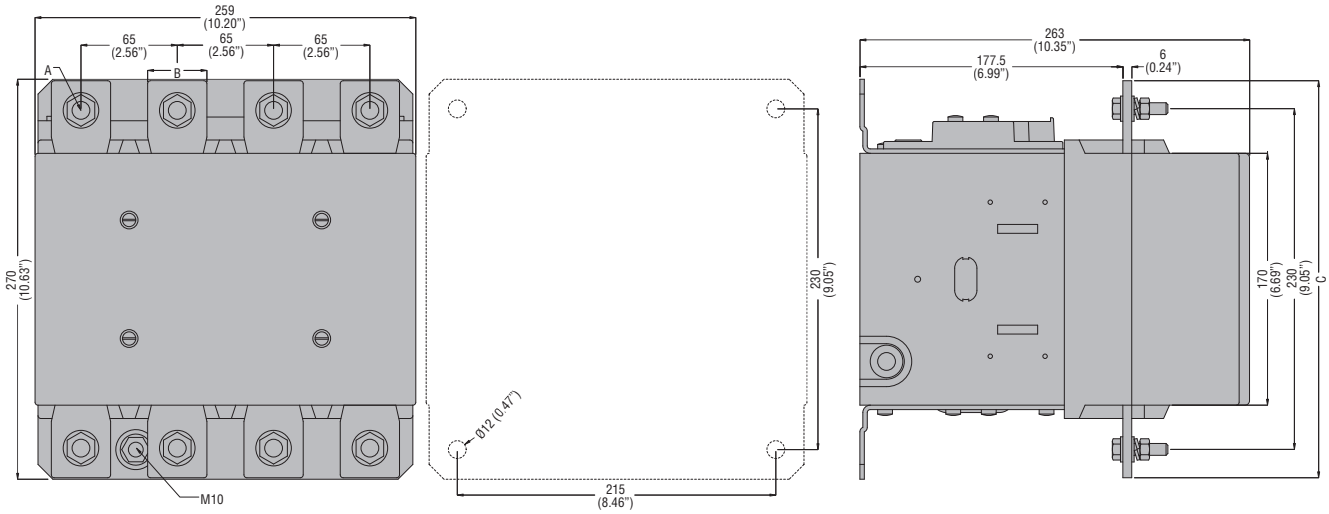


B500 - B630 three poles



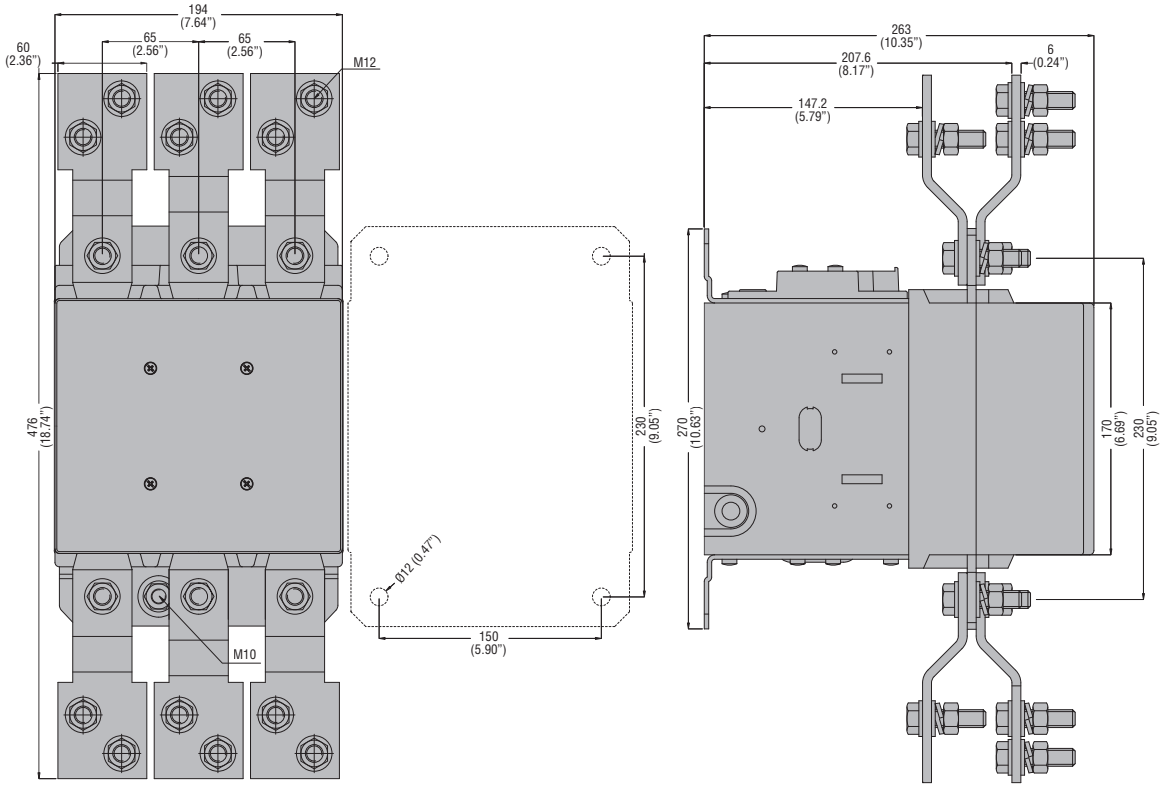
CONTACTOR TYPE	A	B	C
B500	M10	35 (1.38")	265 (10.43")
B630	M12	40 (1.57")	270 (10.63")

B500 4 - B630 4 four poles

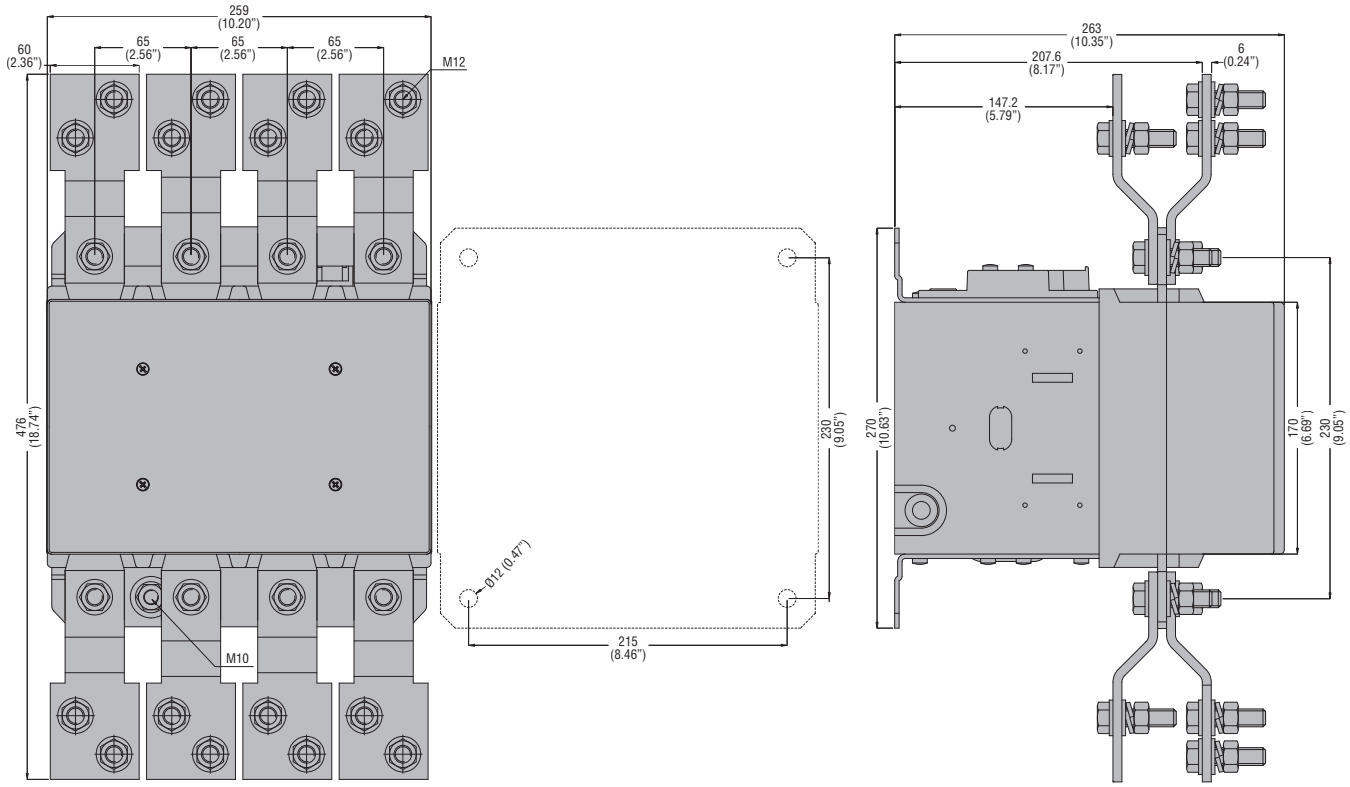


CONTACTOR TYPE	A	B	C
B500	M10	35 (1.38")	265 (10.43")
B630	M12	40 (1.57")	270 (10.63")

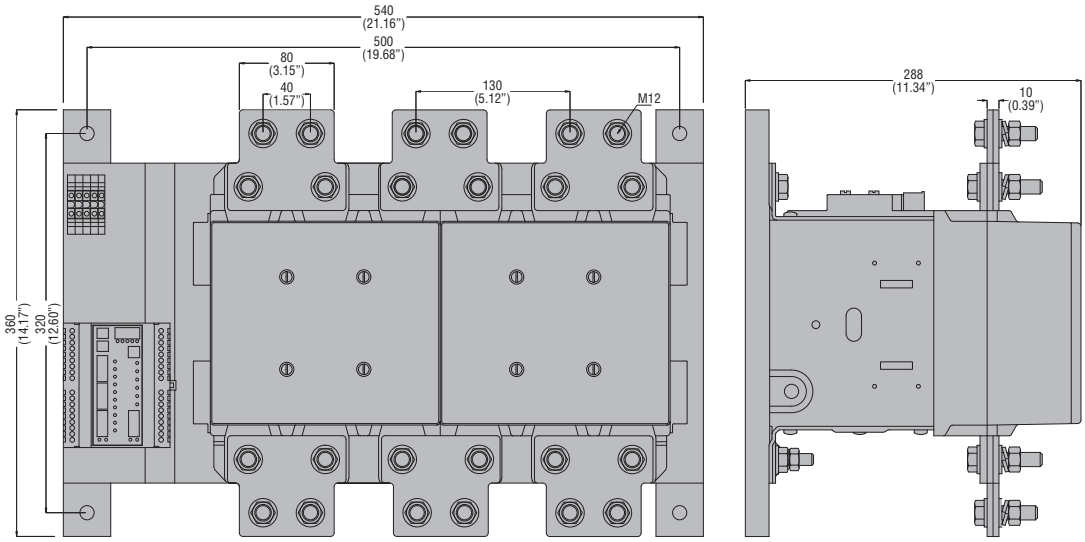
B630 1000 three poles



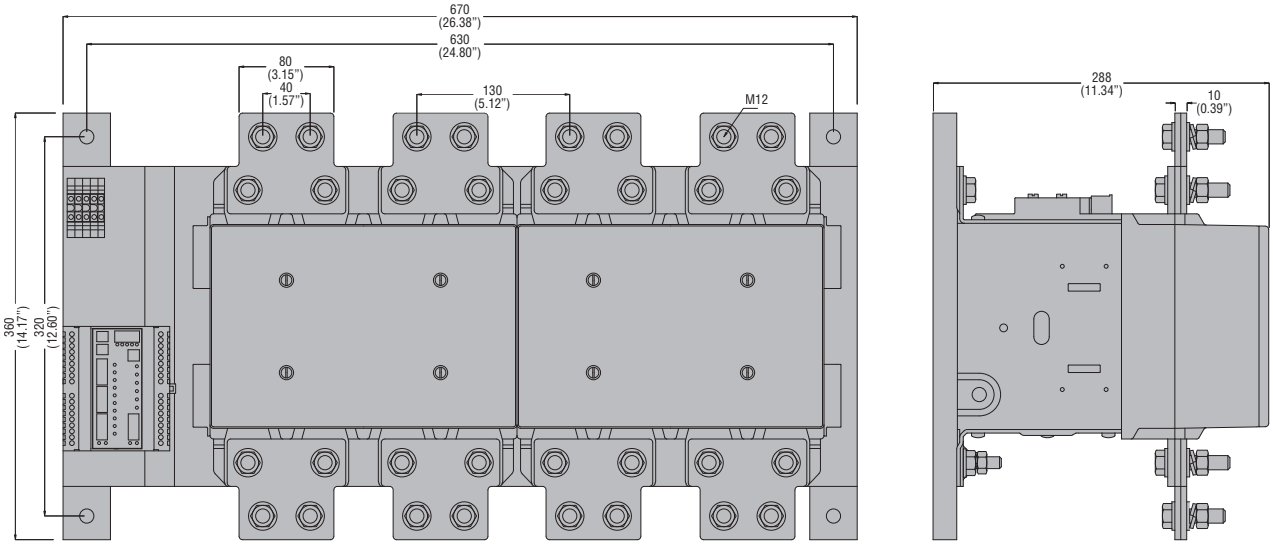
B630 1000 4 four poles



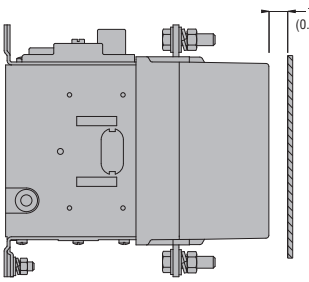
B1250 - B1600 three poles



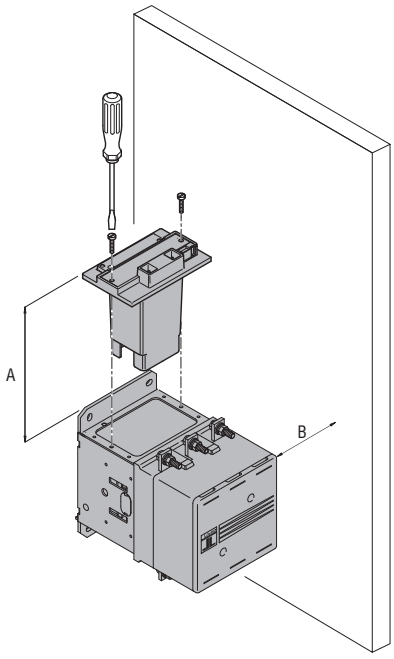
B1250 4 - B1600 four poles



B145 - B180 - B250 - B310 - B400 - B500 - B630 - B630 1000 - B1250 - B1600



Minimum safety distance from metal parts.



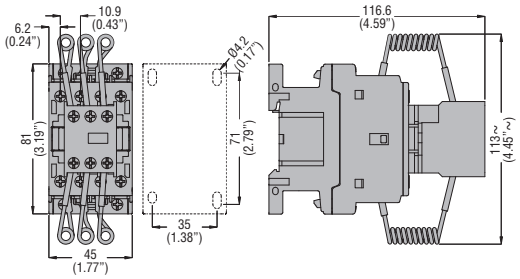
Minimum space needed to replace the coil.

	B145-B180	B250-B310-B400	B500÷B630 1000
A	120 (4.72")	145 (5.71")	170 (6.69")
B	100 (3.94")	110 (4.33")	160 (6.30")

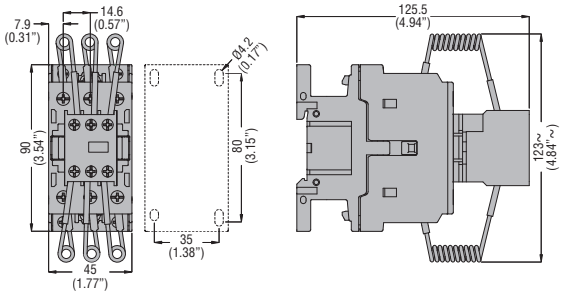
If dimension B is respected, coil replacement is possible without removing power wiring.

CONTACTORS FOR POWER FACTOR CORRECTION

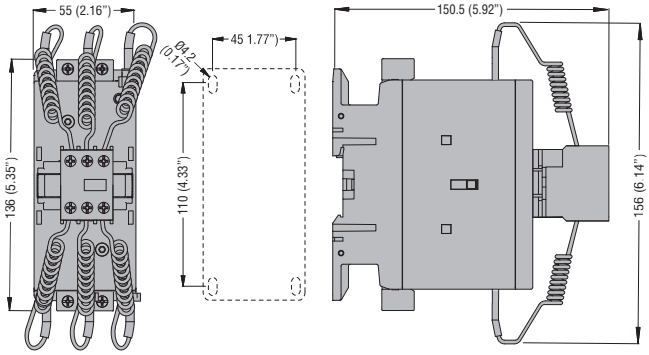
BFK09 10A - BFK12 10A - BFK18 10A



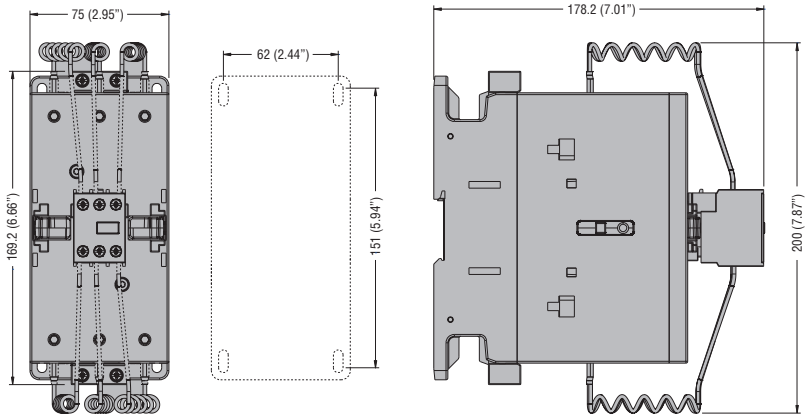
BFK26 00A - BFK32 00A - BFK38 00A



BFK50 - BFK65 - BFK80

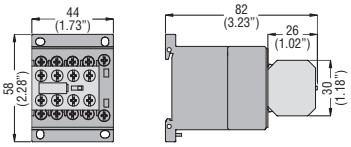


BFK95 - BFK115 - BFK150



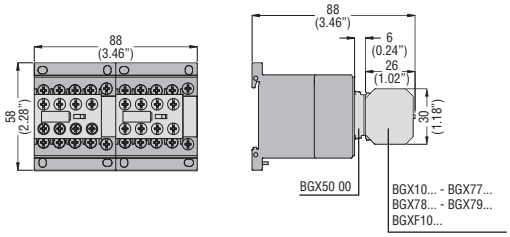
ADD-ON BLOCKS WITH BG MINI-CONTACTORS

BGX10... - BGXF10...
auxiliary contacts ❶

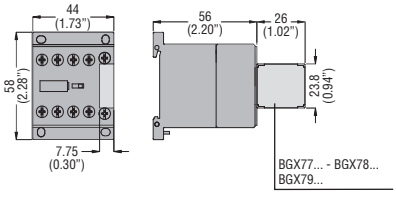


❶ Valid for BGX11... contacts as well when mounted on left-hand contactor of BGT or BGC assembly (p. 4 and 5).

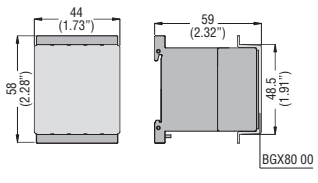
BGX50 00 interlock with **BGX10..., BGXF10...** contacts and **BGX77...** or **BGX78...** or **BGX79...** suppressor



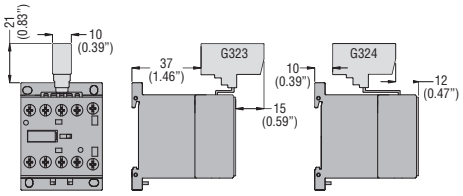
BGX77..., BGX78... or **BGX79...** suppressor only



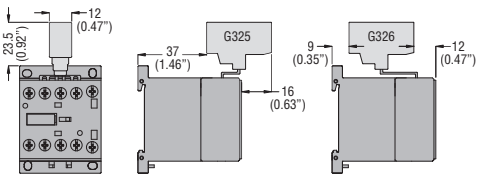
BGX80 00 shroud



Paralleling links
G323, G324

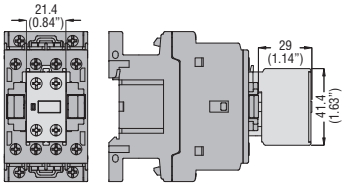


G325, G326

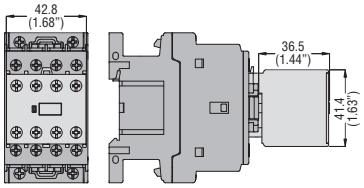


ADD-ON BLOCKS WITH BF CONTACTORS

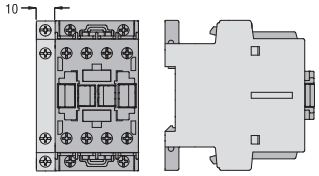
Auxiliary contacts **BFX10...**
w/2 contacts



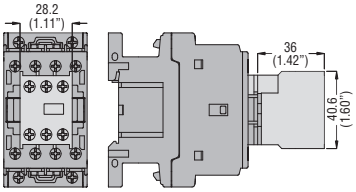
BFX10... w/4 contacts



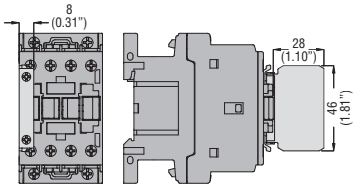
BFX12...



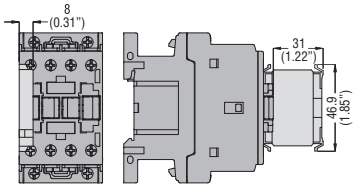
G484...



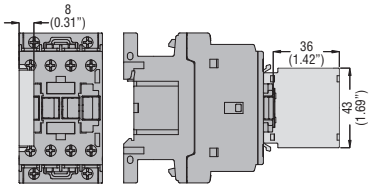
G418...



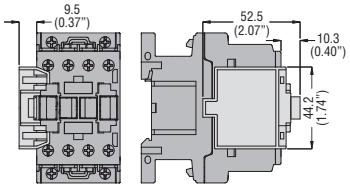
G218



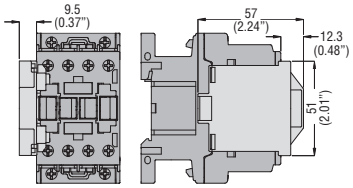
G481..., G482



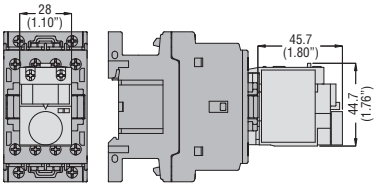
G280 with G218



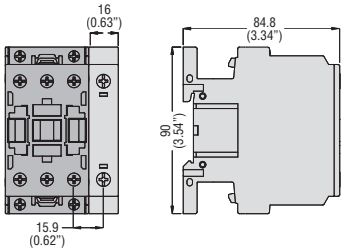
G419, with G418..., **G428..., G483** with G481... or G482



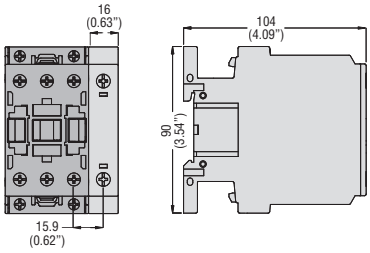
G485..., G486..., G487 delayed contacts



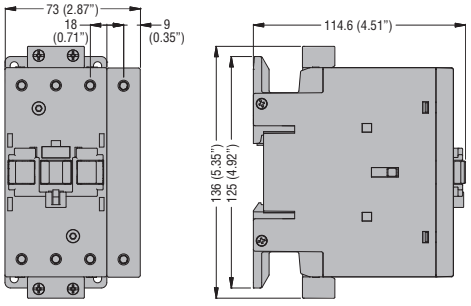
Fourth pole
BFX42



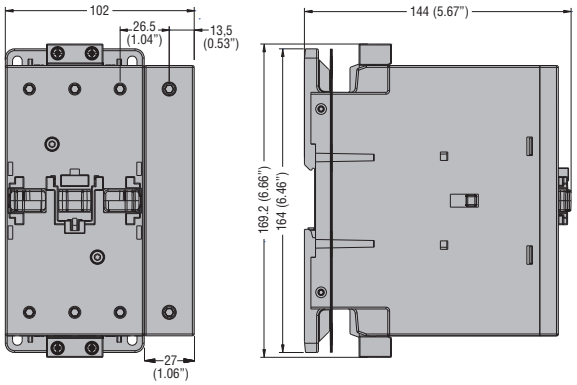
BFXD42



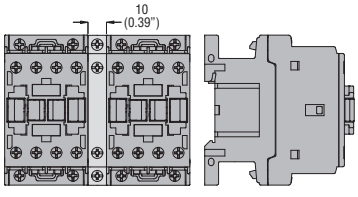
BFX43



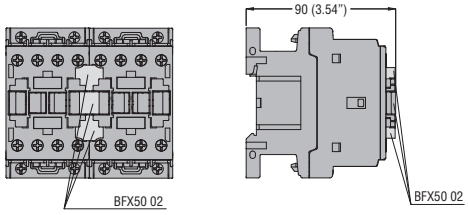
BFX44



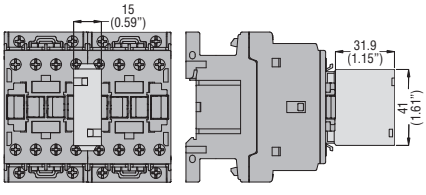
Interlocks
BFX50 00, BFX50 01, BFX53 00, BFX53 01, BFX53 00, BFX53 01



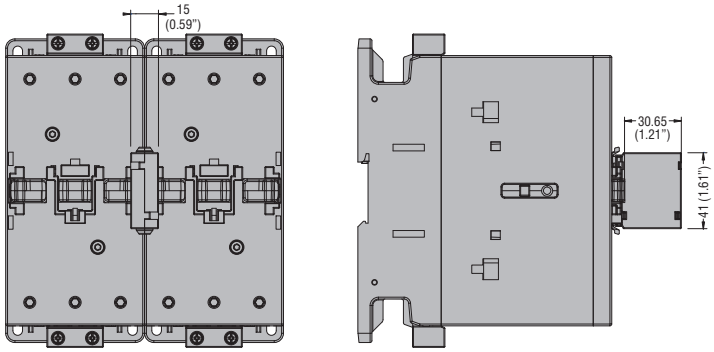
BFX50 02



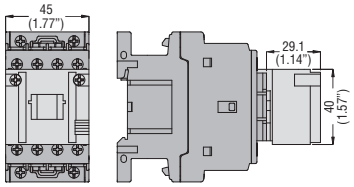
BFX50 03, BFX53 03, BFX54 03



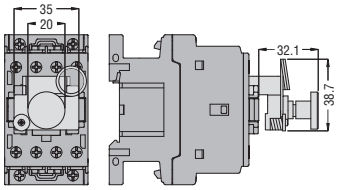
Interlocks
BFX53 03 - BFX54 03



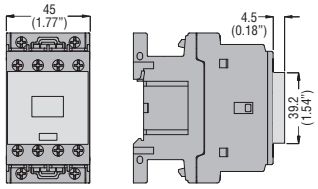
G222, G272, BFX64 1 mechanical latch



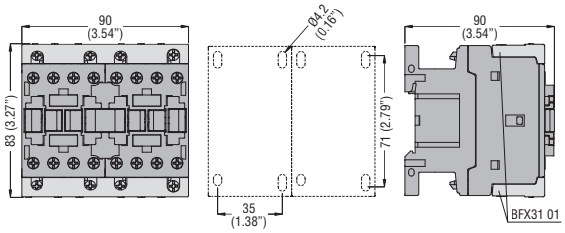
G454, G455 manual closing



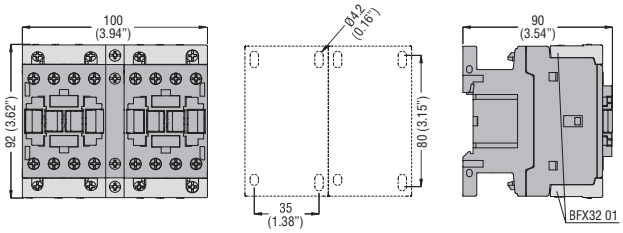
BFX80 sealing cover



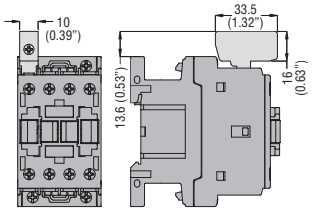
Rigid connecting kit
BFX31 01



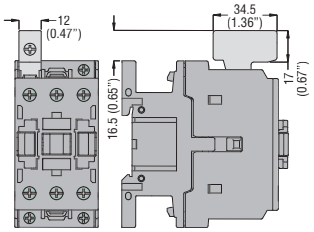
Rigid connecting kit
90mm (3.54") with **BFX5000** and **BFX5001**
100mm (3.94") with **BFX5002** and **BFX5003**



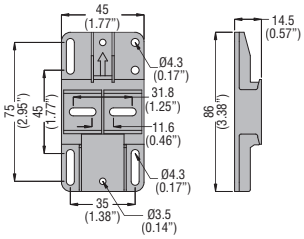
G231 terminal
1-pole



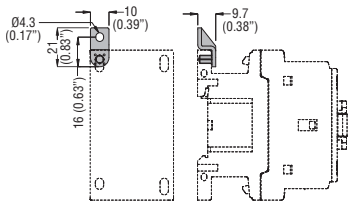
G232 terminal
1-pole



BFX89 01 fixing base

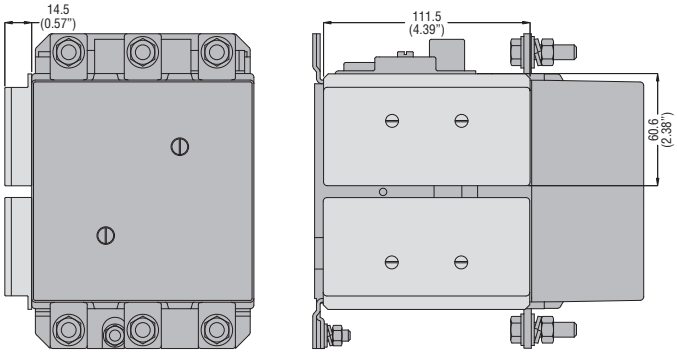


BFX89 02 fixing brackets

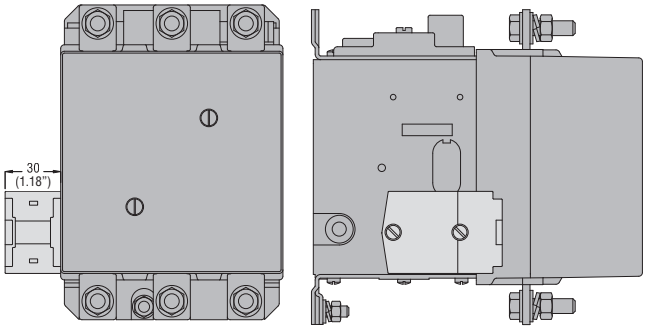


ADD-ON BLOCKS WITH B CONTACTORS

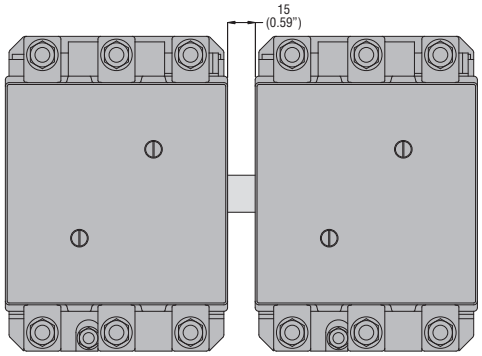
Auxiliary contacts **G350, G354**



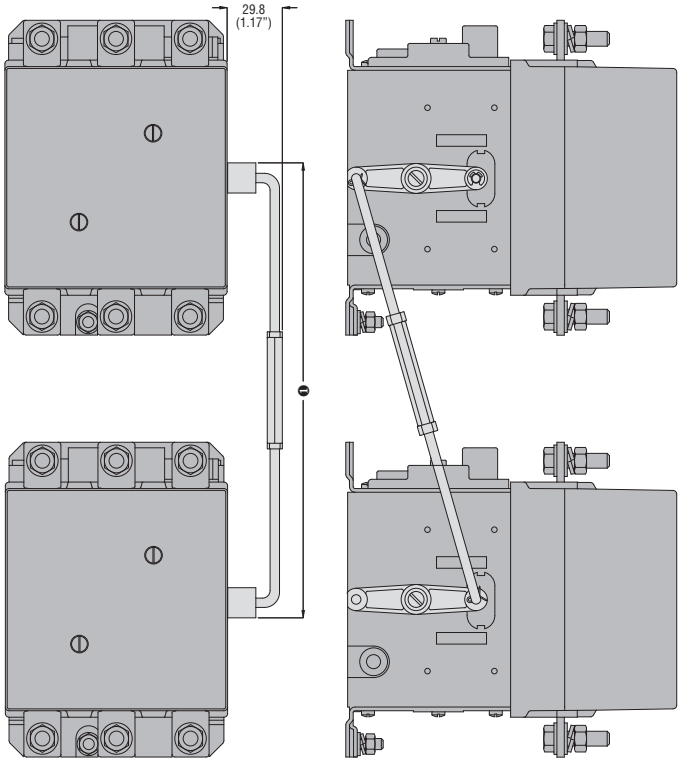
G358 adapter



G355 interlocks

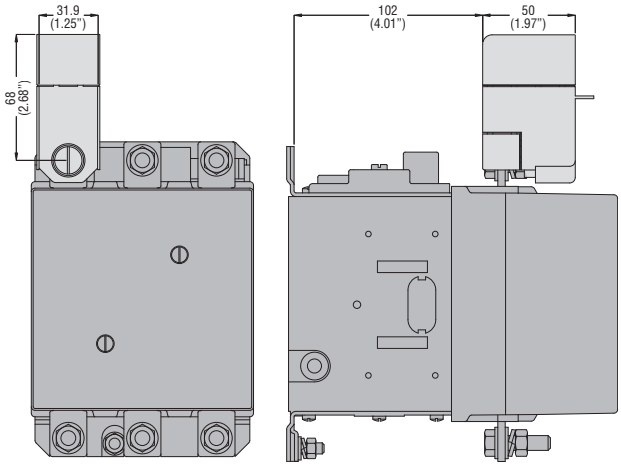


G356...

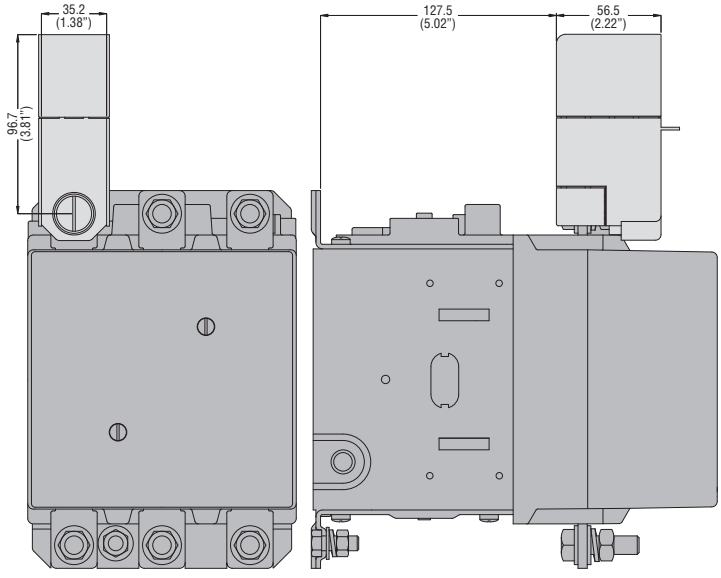


❶ For dimensions, refer to page 2-68.

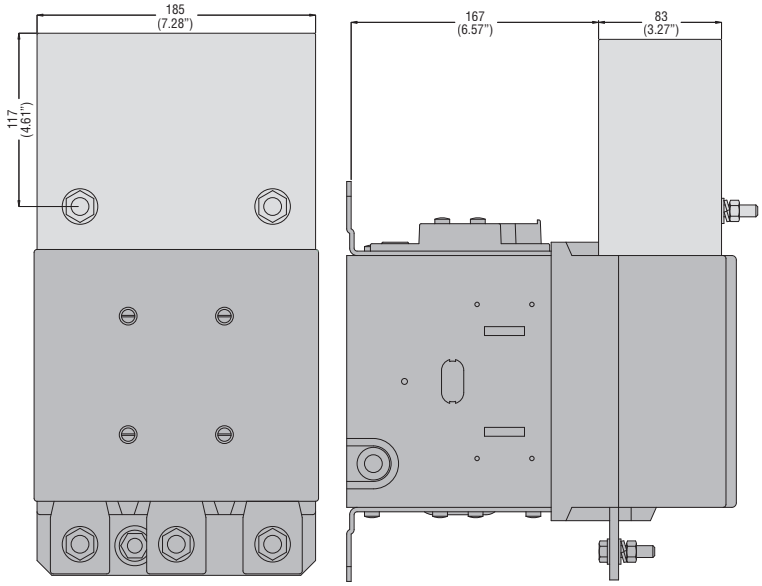
Terminal protection **G361**



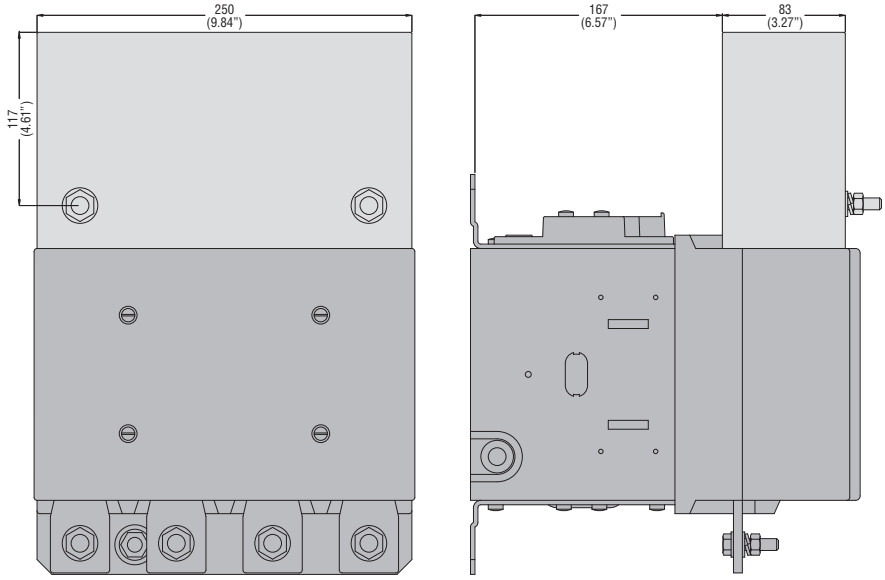
Terminal protection **G363**



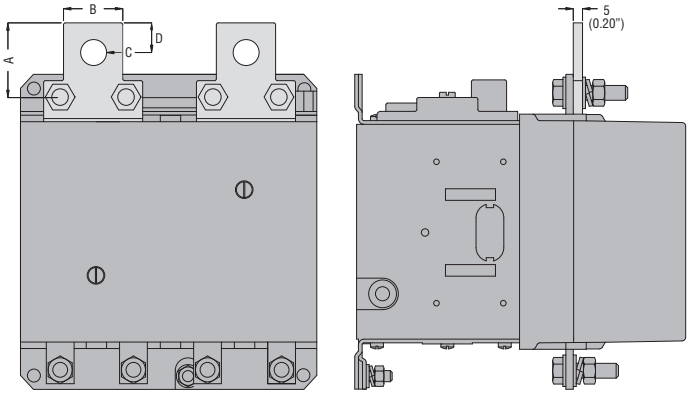
G527, G529



G528, G530

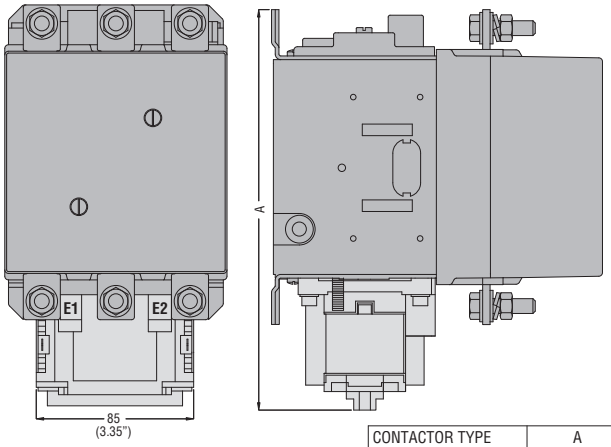


BA1594, BA1720 parallel 2-pole bar



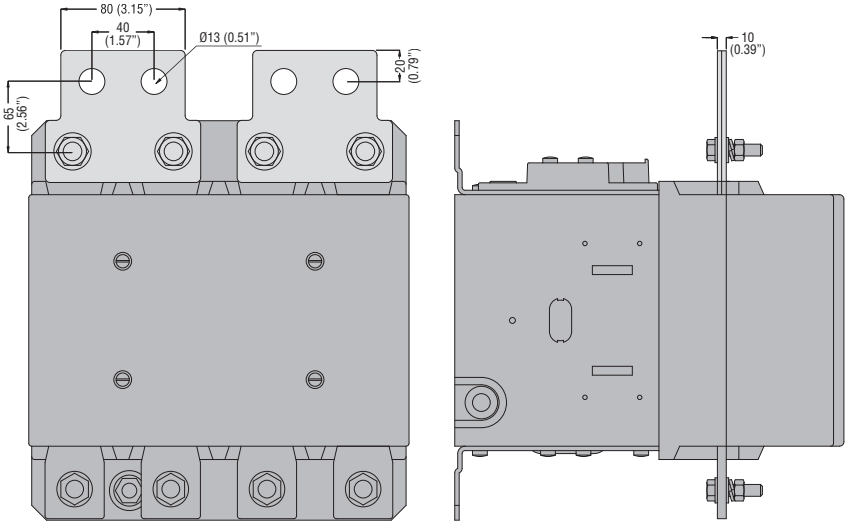
PARALLEL POLE BAR	A	B	C	D
BA1594	45 (1.77")	32 (1.26")	Ø14 (0.55")	16 (0.63")
BA1720	53 (2.09")	50 (1.97")	Ø18 (0.71")	20 (0.79")

G495 mechanical latch



CONTACTOR TYPE	A
B145 - B180	221 (8.70")
B250 - B400	255 (8.86")
B500 - B630	300 (11.81")

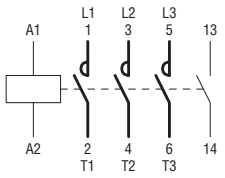
BA1845



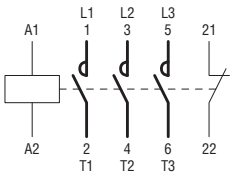
THREE-POLE CONTACTORS IN AC

BG06 A - BG09 A - BGF09 A - BGP09 A - BG12 A
BF09 A - BF12 A - BF18 A - BF25 A

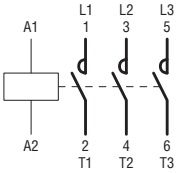
...10



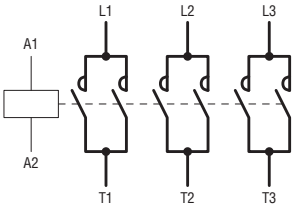
...01



BF26 A - BF32 A - BF38 A
BF40 A - BF50 A - BF65 A - BF80 A
BF94 A - BF95 A - BF115 A - BF150 A
B145...B630



B1250 24 - B1600 24... ❶

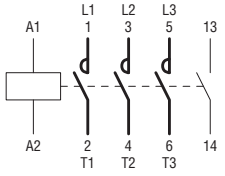


❶ The input electronic circuit of the contactor coil is designed and tested according to IEEEC 62.41 standards and can withstand a 10kV impulse voltage (1.2/50µs) with 50 Joule energy.
The use of an auxiliary reduced voltage transformer is recommended for higher values.

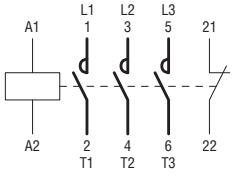
THREE-POLE CONTACTORS IN DC (AC/DC for BF40E...BF150E)

BG06 D - BG09 D - BGF09 D - BGP09 D - BG12 D
BG06 L - BG09 L - BGF09 L - BGP09 L - BG12 L

...10

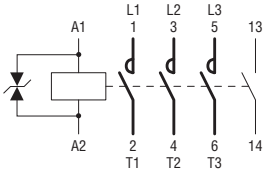


...01

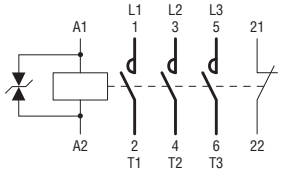


BF09 D - BF12 D - BF18 D - BF25 D
BF09 L - BF12 L - BF18 L - BF25 L

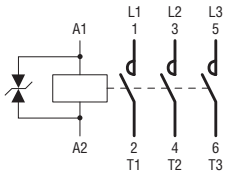
...10



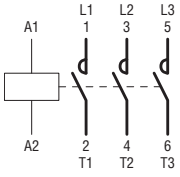
...01



BF26 D - BF32 D - BF38 D
BF26 L - BF32 L - BF38 L

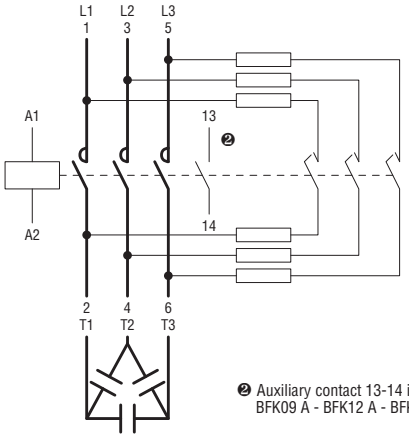


BF40 E - BF50 E - BF65 E - BF80 E - BF94 E
BF95 E - BF115 E - BF150 E



CONTACTORS FOR POWER FACTOR CORRECTION

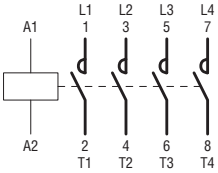
BFK09 A - BFK12 A - BFK18 A
BFK26 A - BFK32 A - BFK38 A - BFK50 A - BFK65 A - BFK80 A - BFK95 A - BFK115 A - BFK150 A



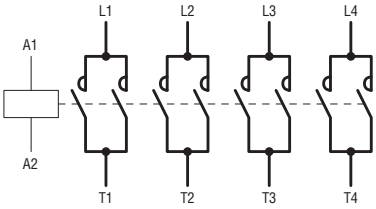
❷ Auxiliary contact 13-14 is found on BFK09 A - BFK12 A - BFK18 A types only.

FOUR-POLE CONTACTORS IN AC

BG09 T4 A - BGF09 T4 A - BGP09 T4 A
BF09 T4 A - BF38 T4 A
BF50 T4 A - BF65 T4 A - BF80 T4 A
BF95 T4 A - BF115 T4 A - BF150 T4 A
BFD80 T4 A
B145...B630 4

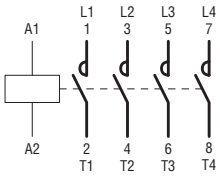


B1250 4 - B1600 4

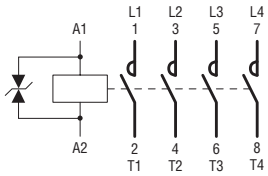


FOUR-POLE CONTACTORS IN DC (AC/DC for BF40E...BF150E)

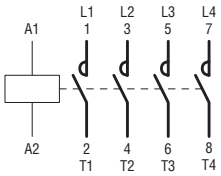
BG09 T4 D - BGF09 T4 D - BGP09 T4 D



BF09 T4 D - BF38 T4 D
BF09 T4 L - BF38 T4 L

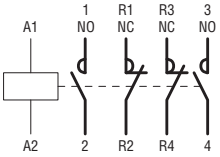


BF65 T4 E - BF80 T4 E - BF95 T4 E - BF150 T4 E - BFD150 T4 E

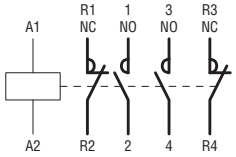


FOUR-POLE CONTACTORS IN AC WITH 2NO AND 2NC POLES

BG09 T2 A

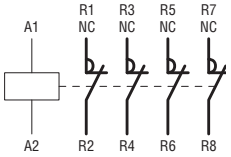


BF09 T2 A - BF18 T2 A - BF26 T2 A - BF38 T2 A
BF80 T2 A



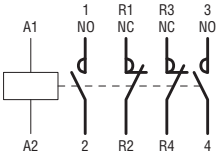
WITH NC FOUR-POLES

BF18 T0 A - BF26 T0 A

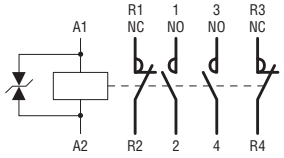


FOUR-POLE CONTACTORS IN DC (AC/DC for BF80T2E) WITH 2NO AND 2NC POLES

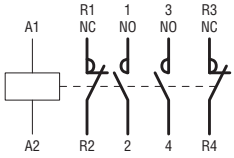
BG09 T2 D



BF18 T2 D - BF26 T2 D - BF38 T2 D - BF80 T2 E
BF18 T2 L - BF26 T2 L - BF38 T2 L

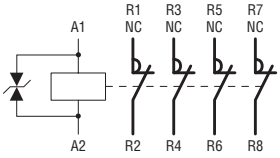


BF80 T2 E



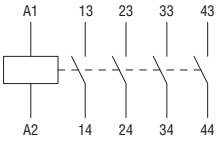
WITH NC FOUR-POLES

BF18 T0 D - BF26 T0 D
BF18 T0 L

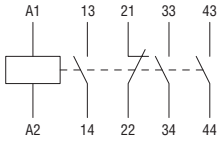


CONTROL RELAY IN AC

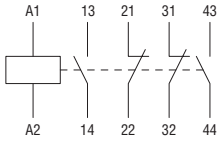
BG00 40 A - BGF00 40 A
BF00 40 A



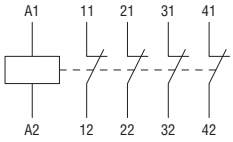
BG00 31 A - BGF00 31 A
BF00 31 A



BG00 22 A - BGF00 22 A
BF00 22 A

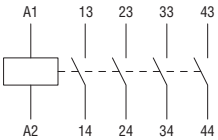


BF00 04 A

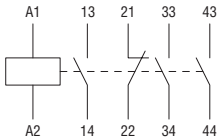


CONTROL RELAY IN DC

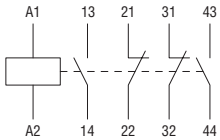
BG00 40 D - BGF00 40 D
BG00 40 L - BGF00 40 L



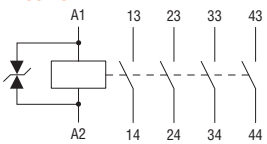
BG00 31 D - BGF00 31 D
BG00 31 L - BGF00 31 L



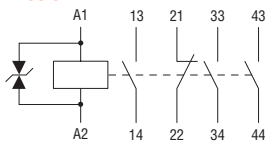
BG00 22 D - BGF00 22 D
BG00 22 L - BGF00 22 L



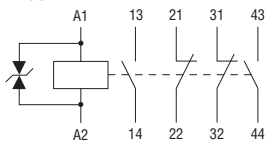
BF00 40 D
BF00 40 L



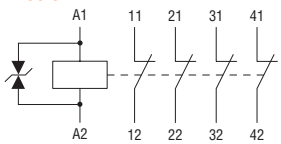
BF00 31 D
BF00 31 L



BF00 22 D
BF00 22 L

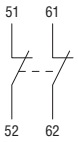


BF00 04 D
BF00 04 L

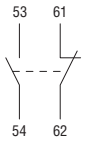


ADD-ON BLOCKS FOR BG MINI-CONTACTORS
Auxiliary contacts

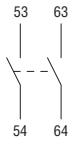
BGX10 02
BGXF10 02



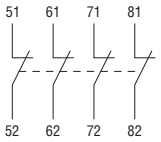
BGX10 11
BGXF10 11



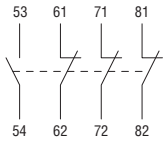
BGX10 20
BGXF10 20



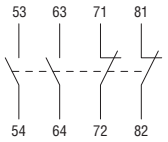
BGX10 04
BGXF10 04



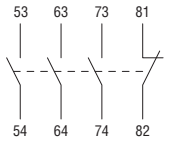
BGX10 13
BGXF10 13



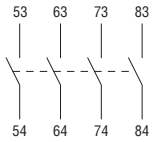
BGX10 22
BGXF10 22



BGX10 31
BGXF10 31

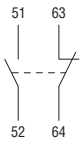


BGX10 40
BGXF10 40

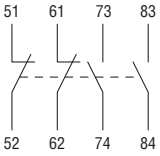


Special auxiliary contacts

BGX11 11

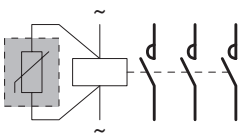


BGX11 22

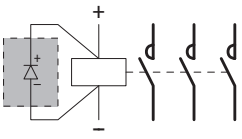


Surge suppressor

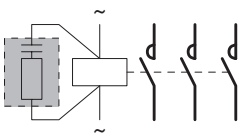
BGX77…



BGX78…

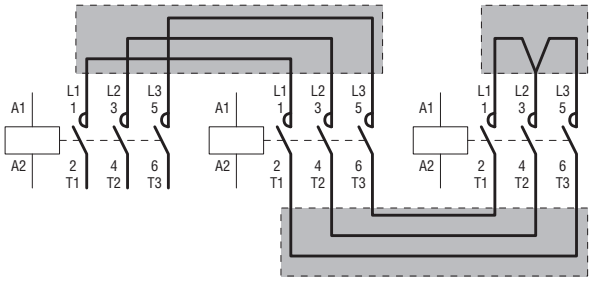


BGX79…

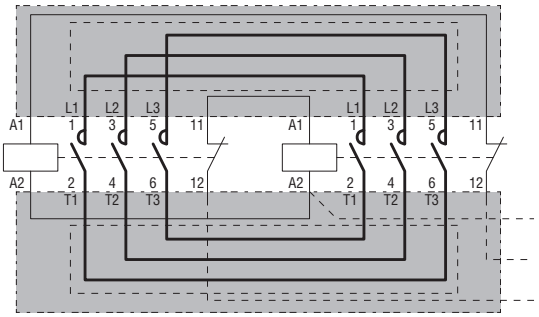


Rigid connections

SMX90 21

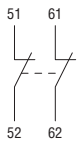


SMX90 22

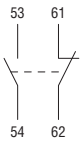


ADD-ON BLOCKS FOR BF CONTACTORS
Auxiliary contacts

BFX10 02

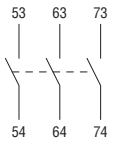


BFX10 11

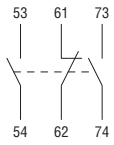


BFX10 20

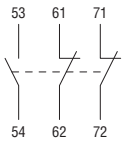
G484 30



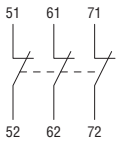
G484 21



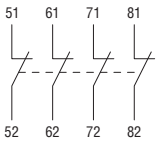
G484 12



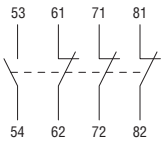
G484 03



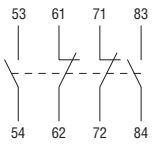
BFX10 04



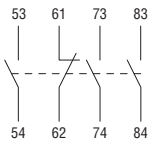
BFX10 13



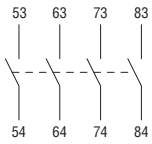
BFX10 22



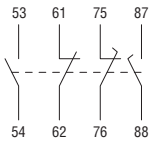
BFX10 31



BFX10 40

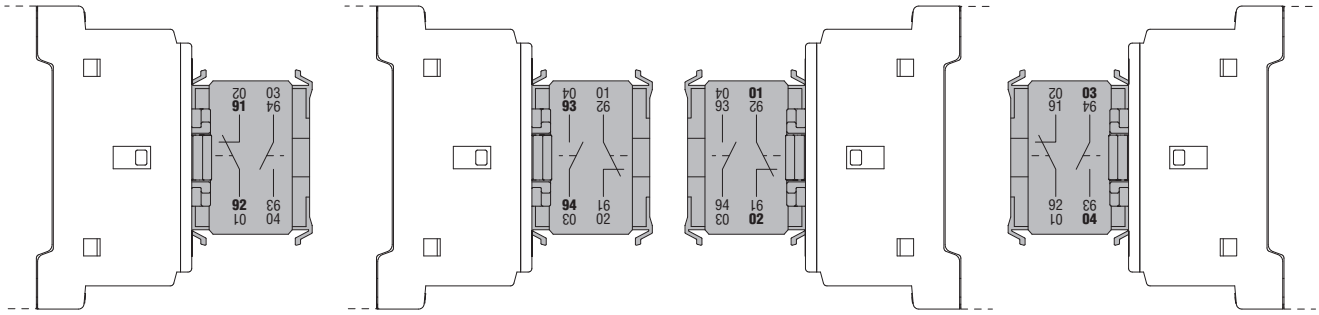


BFX10 11 11



Auxiliary contact

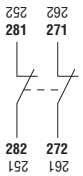
G218



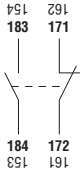
The termination of the G218 auxiliary contact has more than one numbering due to the fact that the block can assume various mounting positions.
See the numbering in boldface for a correct interpretation.

Auxiliary contacts

BFX12 02



BFX12 11



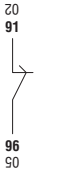
BFX12 20

G418 10
G428 10

G418 10A
G428 10A

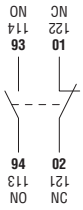
G418 01
G428 01

G418 01D
G428 01D



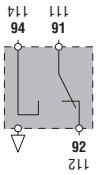
G481 20

G481 11



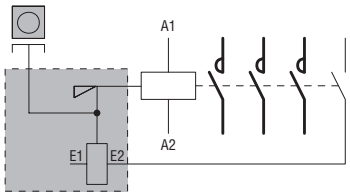
G481 02

G482



Mechanical latch

G222… - G272…



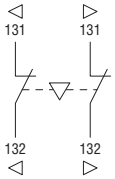
The termination of the BFX12... / G418... / G481... / G482 auxiliary contacts has more than one numbering due to the fact that the block can assume various mounting positions. See the numbering in boldface when the block is mounted on the left side of the contactor.

4th pole

BFX42
BFXD42

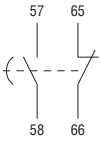
Interlock

BFX50 01

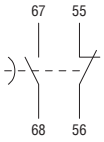


Delayed auxiliary contacts

G485…

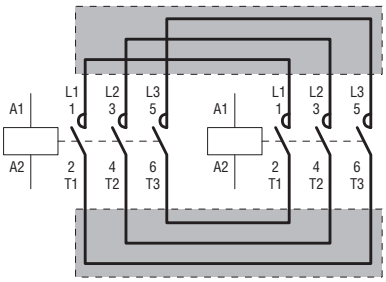


G486… - G487

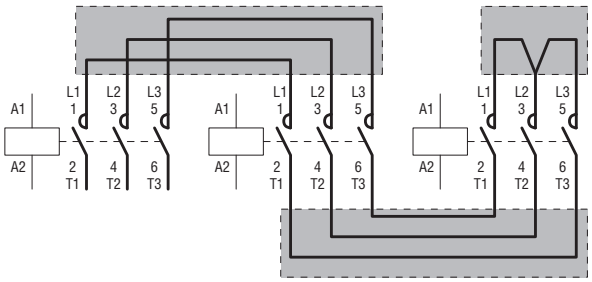


Rigid connecting kits

BFX31 01 - BFX31 02 - BFX32 01



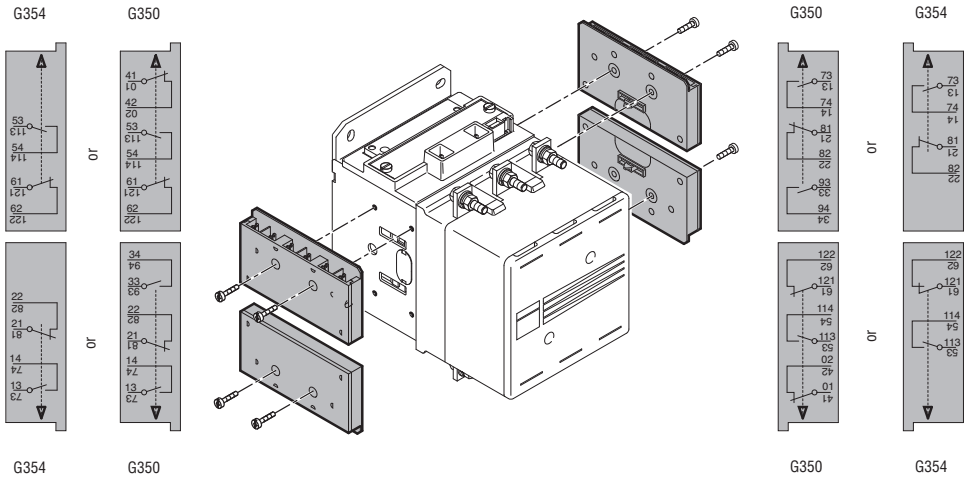
BFX31 31 - BFX32 31 - BFX32 32



ADD-ON BLOCKS FOR B CONTACTORS

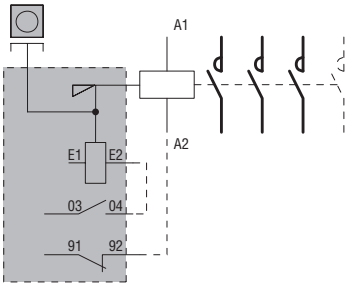
Auxiliary contacts

G350 - G354



Mechanical latch

G495

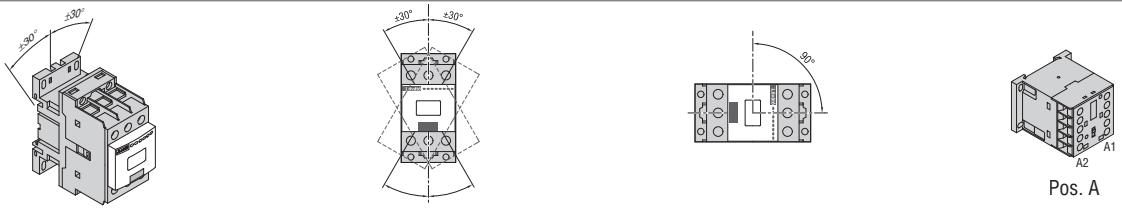


MOUNTING POSITION OF CONTACTORS

ON VERTICAL PLANE

The performances given in this catalogue have been established with contactors mounted on a vertical plane with line terminals facing upwards and load terminals facing downwards.
All contactors can be mounted with a ± 30° inclination to the vertical axis of the contactor without any derating.

For BF series contactors, this inclination can reach ± 90°, that is when the terminals are facing towards left and right.
For BG mini-contactors:
– Position A, with coil terminals A1-A2 facing downwards, is not recommended.
– The position with coil terminals A1-A2 facing upwards is not recommended for mini-contactors with NC contacts.

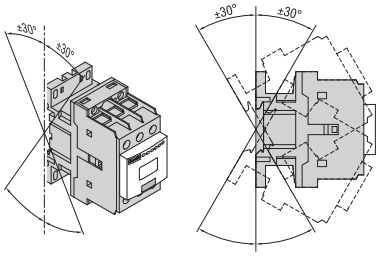


Pos. A

ON VERTICAL PLANE WITH 30° INCLINATION

All contactors can be mounted on a plane which varies in respect to the vertical up to ± 30° angle.
On the average, a 5% increase of the minimum pick-up voltage in -30° position can be noted.

This inclination is greater than the one prescribed by main naval registers.



ON HORIZONTAL PLANE (FOR BF SERIES CONTACTORS)

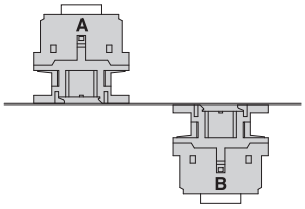
Considerable performance variations can be noted.
It is necessary to check the two possible mounting positions:
– when the contactor is energised, the movable equipment moves upwards.
– when the contactor is energised, the movable equipment moves downwards.

In the first case, it is difficult to close the contactor while in the second, to open it.

The variables which could influence the contactor performance, in addition to the two mounting positions, are:
– type of contactor
– type of control
– contact configuration
– number and type of add-on blocks
– permissible tolerance of auxiliary voltage variation
– ambient temperature.

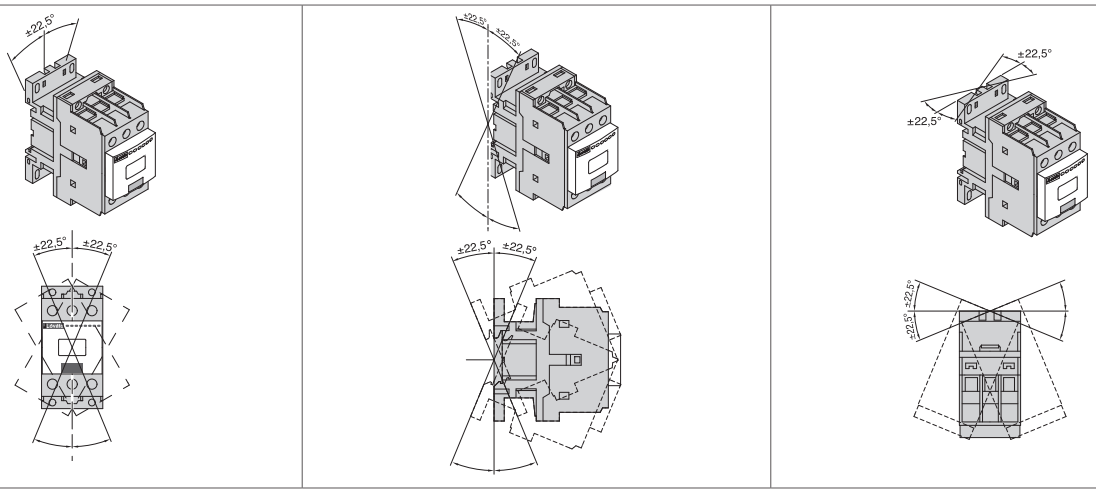
NOTE: Position B is not recommendable.

Our Technical support (Tel. 035 4282422; E-mail: service@LovatoElectric.com) can provide further information concerning operational performance of contactors mounted on a horizontal plane.



DYNAMIC TYPE TESTS

Our contactors have sustained dynamic testing, with contactor mounting position rotated ± 22.5° in respect to the three orthogonal axes.



IEC UTILISATION CATEGORY AC3
POLE CHARACTERISTICS
Squirrel-cage induction motors; breaking at rated motor current.

MAXIMUM IEC OPERATIONAL POWER at ambient temperature ≤55°C.

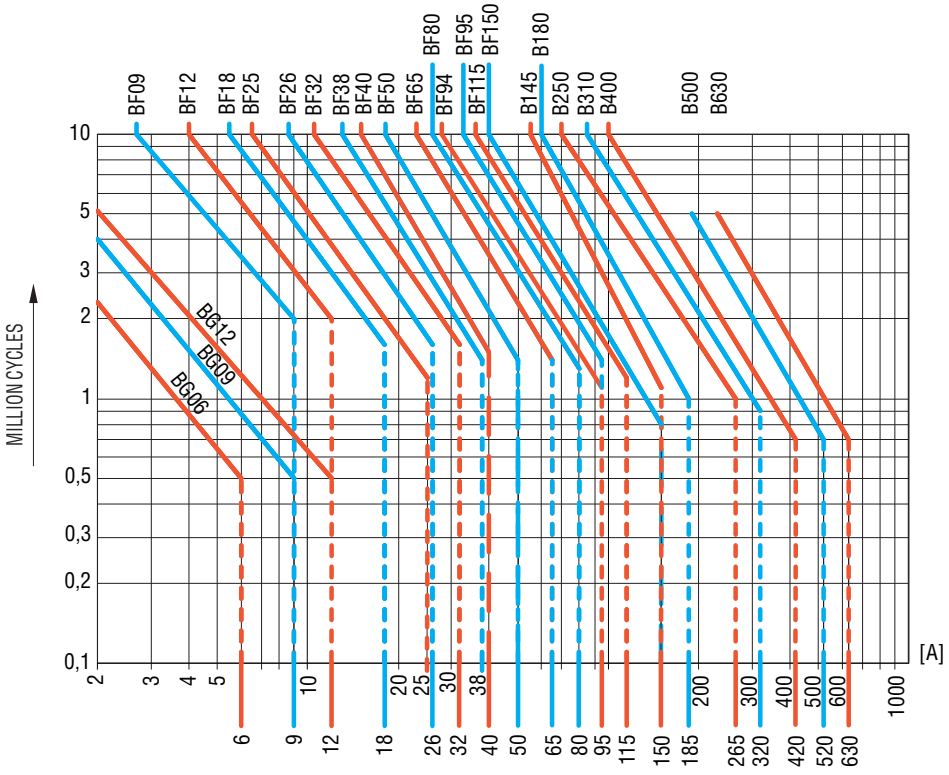
UL/CSA DUTY FOR AC MOTOR SWITCHING

Three-phase AC induction motors; breaking at rated motor current.
UL/CSA RATINGS at ambient temperature ≤55°C

Contactor type	IEC operational current	IEC operational power							Maximum horsepower ratings (60Hz) Three phase			
	(Ue ≤440V) [A]	220/230V [kW]	380/400V [kW]	415V [kW]	440V [kW]	500V [kW]	660/690V [kW]	1000V [kW]	200-208V [HP]	240V [HP]	480V [HP]	600V [HP]
BG06	6	1.5	2.2	2.4	2.5	3	3	–	1½	2	3	3
BG09	9	2.2	4.0	4.3	4.5	5	5	–	2	3	5	5
BG12	12	3.2	5.7	6.2	5.5	5	5	–	3	3	7½	10
BF09	9	2.2	4.2	4.5	4.8	5.5	7.5	–	3	3	5	7 ½
BF12	12	3.2	5.7	6.2	6.2	7.5	10	–	5	5	7½	10
BF18	18	4	7.5	9	9	10	10	–	5	5	10	15
BF25	25	7.0	12.5	13.4	13.4	15	18	–	7½	7½	15	15
BF26	26	7.3	13	14	14	15.6	18.5	–	7½	7½	15	20
BF32	32	8.8	16	17	17	20	22	–	10	10	20	25
BF38	38	11	18.5	18.5	18.5	20	22	–	10	15	30	30
BF40	40	11	18.5	22	22	22	30	18	10	15	30	30
BF50	50	15	22	30	30	30	37	22	15	20	40	40
BF65	65	18.5	30	37	37	37	45	30	20	25	50	60
BF80	80	22	45	45	45	55	55	37	25	30	60	75
BF94	95	30	55	55	55	55	55	37	25	30	60	75
BF95	95	30	55	55	55	75	90	45	30	30	60	75
BF115	115	37	55	55	55	75	110	55	40	40	75	100
BF150	150	45	75	75	75	90	110	55	50	50	100	125
B145	150	46	80	88	93	100	120	75	50	50	100	125
B180	185	57	100	108	115	123	144	103	60	75	150	150
B250	265	83	140	155	164	176	212	156	75	100	200	250
B310	320	100	170	188	200	213	256	180	100	125	250	300
B400	420	130	225	247	263	271	352	208	125	150	350	400
B500	520	156	290	306	328	367	416	312	150 ❶	200 ❶	400 ❶	450 ❶
B630	630	198	335	368	368	368	440	368	200 ❶	250 ❶	500 ❶	500 ❶

❶ No UL/CSA ratings; data given for indication and reference purposes only.

ELECTRICAL IEC LIFE FOR MOTOR CONTROL AC3 ≤440V
Electrical life of contactors



IEC DC UTILISATION CATEGORY
POLE CHARACTERISTICS

MAXIMUM OPERATIONAL CURRENT

IEC Voltage Ue	Contactor	IEC Maximum current Ie [A] in categories: DC1 with L/R ≤ 1ms and poles in series				DC3 - DC5 with L/R ≤ 15ms and poles in series			
	Type	1	2	3	4	1	2	3	4
≤ 24V	**BG06**	9	12	14	–	6	7	9	–
	BG09	12	15	16	16	7	8	10	10
	BG12	12	15	16	–	7	8	10	–
	BF09	15	18	20	20	10	13	15	15
	BF12	17	20	22	20	12	15	18	15
	BF18	17	20	22	22	12	15	18	18
	BF25	20	23	23	–	15	18	22	–
	BF26	25	28	28	28	18	20	25	30
	BF32	30	32	32	–	20	25	30	–
	BF38	35	36	36	36	24	28	32	32
	BF40	40	48	48	–	27	32	40	–
	BF50	45	60	60	60	30	35	50	55
	BF65	50	70	70	70	35	45	55	60
	BF80	70	100	100	100	40	60	80	90
	BF94	77	110	110	115	45	65	86	96
	BF95	140	140	140	140	140	140	140	140
	BF115	160	160	160	160	160	160	160	160
	BF150	165	165	165	165	165	165	165	165
48V	**BG06**	8	11	14	–	5	7	9	–
	BG09	10	14	16	16	6	8	10	10
	BG12	10	14	16	–	6	8	10	–
	BF09	13	18	20	20	9	11	15	15
	BF12	15	20	22	20	11	13	18	15
	BF18	15	20	22	22	11	13	18	18
	BF25	18	23	23	–	13	18	22	–
	BF26	21	28	28	28	15	20	25	30
	BF32	26	32	32	–	17	22	28	–
	BF38	30	34	34	34	20	25	28	28
	BF40	35	48	48	–	23	30	40	–
	BF50	40	60	60	60	25	35	50	55
	BF65	50	70	70	70	25	40	50	60
	BF80	60	100	100	100	30	50	70	90
	BF94	66	110	110	115	33	55	75	95
	BF95	140	140	140	140	44	63	115	110
	BF115	160	160	160	160	50	72	150	120
	BF150	165	165	165	165	60	82	195	130
75V	**BG06**	4	7	8	–	2	4	5	–
	BG09	4	9	10	10	2	5	6	6
	BG12	4	9	10	–	2	5	6	–
	BF09	12	17	20	20	8	10	13	15
	BF12	13	18	20	20	10	12	15	15
	BF18	15	20	20	20	11	13	16	16
	BF25	18	23	23	–	13	16	18	–
	BF26	18	25	25	25	13	18	20	25
	BF32	22	28	32	–	15	20	28	–
	BF38	23	29	33	33	17	22	28	28
	BF40	30	45	48	–	19	27	38	–
	BF50	40	60	60	60	22	30	45	55
	BF65	50	70	70	70	25	40	50	60
	BF80	60	100	100	100	30	50	70	90
	BF94	66	110	110	115	33	55	75	95
	BF95	100	140	155	155	36	60	90	110
	BF115	120	160	160	160	40	65	100	120
	BF150	150	165	165	165	44	70	110	130

POLE CHARACTERISTICS

MAXIMUM OPERATIONAL CURRENT

IEC Voltage Ue	Contactor Type	IEC Maximum current Ie [A] in categories: DC1 with L/R ≤ 1ms and poles in series				DC3 - DC5 with L/R ≤ 15ms and poles in series			
		1	2	3	4	1	2	3	4
110V	**BG06**	3	6	8	–	1	3	4	–
	BG09	3	8	10	10	1	4	5	5
	BG12	3	8	10	–	1	4	5	–
	BF09	6	12	15	16	2	7	11	12
	BF12	6	13	16	16	2	8	12	16
	BF18	6	13	16	18	2	8	12	13
	BF25	6	16	18	–	2	10	15	–
	BF26	6	22	24	24	2	13	18	20
	BF32	8	25	27	–	2,5	15	20	–
	BF38	8	32	34	34	2,5	18	23	23
	BF40	8	42	44	–	3	22	27	–
	BF50	8	50	55	60	3	25	30	45
	BF65	8	60	60	70	3	30	35	50
	BF80	8	80	85	100	3	40	60	75
	BF94	8	90	93	110	3	43	64	80
	BF95	10	110	120	140	6	55	85	105
	BF115	10	130	140	160	6	65	100	125
	BF150	10	150	160	165	6	80	120	150
220V	**BG06**	–	–	1	–	–	–	0,5	–
	BG09	–	–	2	2	–	–	0,8	0,8
	BG12	–	–	2	–	–	–	0,8	–
	BF09	–	1	10	12	–	2	6	7
	BF12	–	1	11	12	–	2	6	7
	BF18	–	1	11	13	–	2	6	8
	BF25	–	1	12	–	–	2	8	–
	BF26	–	2	20	26	–	3	19	15
	BF32	–	3	23	–	–	3	23	–
	BF38	–	4	30	38	–	3	25	15
	BF40	–	5	56	70	–	5	32	40
	BF50	–	7	75	90	–	5	40	50
	BF65	–	9	90	110	–	5	52	65
	BF80	–	9	95	115	–	5	64	80
	BF94	–	9	95	115	–	5	64	80
	BF95	–	12	125	140	–	7	76	95
	BF115	–	14	145	160	–	7	92	115
	BF150	–	14	150	165	–	7	120	150

IEC DC UTILISATION CATEGORY
POLE CHARACTERISTICS

MAXIMUM OPERATIONAL CURRENT

IEC Voltage Ue	Contactor Type	IEC Maximum current Ie [A] in categories: DC1 with L/R ≤ 1ms and poles in series 1	2	3	4	DC3 - DC5 with L/R ≤ 15ms and poles in series 1	2	3	4
75V	**B145**	220	220	220	220	160	160	160	160
	B180	260	260	260	260	180	180	180	180
	B250	350	350	350	350	280	280	280	280
	B310	375	375	375	375	310	310	310	310
	B400	400	400	400	400	350	350	350	350
	B500	650	650	650	650	550	550	550	550
	B630	800	800	800	800	800	800	800	800
110V	**B145**	110	150	150	150	80	120	140	140
	B180	120	170	170	170	90	140	160	160
	B250	160	300	300	300	150	250	280	280
	B310	195	350	350	350	170	290	310	310
	B400	250	400	400	400	200	350	350	350
	B500	320	550	600	600	320	550	550	550
	B630	460	800	800	800	460	800	800	800
220V	**B145**	–	130	150	150	–	90	120	140
	B180	–	150	170	170	–	100	140	160
	B250	–	250	300	300	–	200	250	280
	B310	–	300	350	350	–	230	290	310
	B400	–	350	400	400	–	280	350	350
	B500	–	450	600	600	–	450	550	550
	B630	–	700	800	800	–	700	800	800
330V	**B145**	-	-	130	150	–	–	90	140
	B180	–	–	150	170	–	–	100	160
	B250	–	–	250	300	–	–	200	280
	B310	–	–	300	350	–	–	230	310
	B400	–	–	350	400	–	–	280	350
	B500	–	–	450	600	–	–	450	550
	B630	–	–	700	750	–	–	650	700
460V	**B145**	–	–	–	130	–	–	–	90
	B180	–	–	–	150	–	–	–	100
	B250	–	–	–	250	–	–	–	200
	B310	–	–	–	300	–	–	–	230
	B400	–	–	–	350	–	–	–	280
	B500	–	–	–	450	–	–	–	450
	B630	–	–	–	700	–	–	–	700

IEC UTILISATION CATEGORIES DC1, DC3 AND DC5.
POLE CHARACTERISTICS

CHOICE CRITERIA
The elements to be considered for the contactor choice are:
– Rated operational current Ie
– Rated operational voltage Ue
– Utilisation category and L/R time constant
– Eventual verification of electrical life.

OPERATING CONDITIONS
Indicated current is valid for:
– Ambient temperature ≤ 55°C
– Operating cycles: up to 120 cy/h with 60% on-load factor
up to 250 cy/h with 30% on-load factor.

POLES IN SERIES
It is important to use contactors with the indicated number of poles in series depending on operating voltage.
The poles in series can be connected to one single polarity or divided between the two polarities of the circuit indifferently.
NOTE. For voltages lower than 30V, the diagrams given in figures 3 and 4 are not recommendable since voltage drops can take place. In these cases, it is better to use poles in parallel considering the notes given in the following section.

Examples of poles in series:

1 POLE

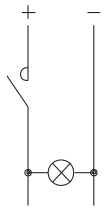


Fig. 1

2 POLES

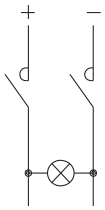


Fig. 2

3 POLES

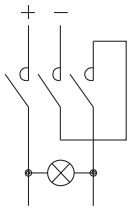


Fig. 3

4 POLES

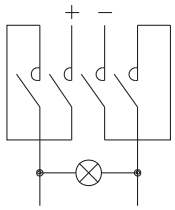


Fig. 4

POLES IN PARALLEL
It is possible to increase the electrical life by placing poles in series when using voltages which require 1 or 2 poles in parallel.
Poles in parallel do not increase the maximum operational current given in the previous pages; that is, if one pole has a maximum operational current in DC5 of 8A, two poles in parallel, it will always be 8A.
With poles in parallel, it is possible to increase the rated contact capacity (Ith) only if the contactor opens and closes in no-load conditions or when used as resistance shunts.
In this case, the contact capacity can be increased.
The value can be obtained by multiplying the rated current of one pole by the K factor given below; e.g.: if one pole carries 10A, three poles in parallel can carry 10 x 2.2 = 22A.
Therefore, the operating current is the one indicated in the tables, multiplied by the K factor given below which takes into consideration the unequal current division on the various poles.
2 POLES in parallel K = 1.6
3 POLES in parallel K = 2.2
4 POLES in parallel K = 2.8

Examples of poles in parallel:

1 POLE in series and 2 POLES in parallel


Fig. 5

1 POLE in series and 3 POLES in parallel

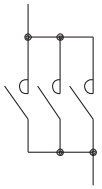


Fig. 6

1 POLE in series and 4 POLES in parallel

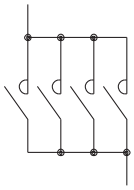


Fig. 7

2 POLE in series and 2 POLES in parallel

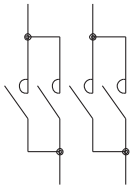


Fig. 8

MAXIMUM OPERATIONAL CURRENT
See tables on pages 2-50 to 2-52.

OTHER CONDITIONS
For different operating conditions or voltage not included among those indicated in the tables, on pages 2-50 to 2-52, consult Technical support (Tel. 035 4282422; E-mail: service@LovatoElectric.com).

IEC SELECTION GUIDE FOR LIGHTING CIRCUIT SWITCHING

GENERAL INFORMATION

The elements which are to be considered for the contactor choice are:
- Type of lamp
- Power factor (cosφ)
- With or without power factor correction
- Value of current when switching on and in running conditions.

Depending on the number and type of lamps, it is also important to bear in mind the main discriminating characteristics given below for the contactor choice:
- Incandescent lamps → contactor making capacity
- Lamps not corrected → rated contactor current in AC1
- Lamps corrected → rated contactor current in AC3

The table below summarises the major characteristics depending on the more commonly used type of lamps:

Type of lamps	Switching on Multiple of In❶	cosφ	Switching off Multiple of In❶	cosφ
Incandescent	15	1	1	1
Mixed light	1.3	1	1	1
Fluorescent	1.15 - 1.3	0.2	1	0.3 - 0.5 (not corrected) 1 (corrected)
High-pressure mercury vapour	1.5 - 1.75	0.2	1	0.45 - 0.7 (not corrected)
High-pressure sodium vapour	1.3 - 1.5	0.2	1	0.3 - 0.5 (not corrected)
Low-pressure sodium vapour	1	0.2 - 0.5	1	0.2 - 0.5 (not corrected)
Metal halide	1.7 - 2.1	0.2	1	0.4 - 0.5 (not corrected)
LED	20...40 ❺	0.6...0.95	1	0.6...0.95

Lamp features		Lamp power [W]	Rated current [A]	Capacitor capacity [µF]	Maximum number [n] of lamps for each contactor pole ❷ BG06 BG09 BG12	BF09 BF12 BF18	BF25	BF26 BF32	BF38	BF40 BF50	BF65 BF80 BF94	BF95	BF115 BF150	B145	B180
LED 220...240V 50/60Hz	See note ❻				Each pole can carry 67% of the rated current AC3 ❻										
INCANDESCENT	50/60Hz	60	0.27	-	30	48	92	118	129	203	240	296	370	425	462
220...240V		100	0.45	-	18	28	55	71	77	122	144	177	222	255	277
		200	0.91	-	8	14	27	35	38	60	71	87	109	126	137
		300	1.4	-	5	9	17	22	25	39	46	57	71	82	89
		500	2.3	-	3	5	10	13	15	23	28	34	43	50	54
		1000	4.6	-	1	2	5	6	7	11	14	17	21	25	27
MIXED LIGHT	50/60Hz	100	0.45	-	20	33	57	77	88	122	144	177	244	311	377
220...240V		160	0.72	-	12	20	36	48	55	76	90	111	152	194	236
		250	1.13	-	8	13	23	30	35	48	57	70	97	123	150
		500	2.3	-	4	6	11	15	17	23	28	34	47	60	73
		1000	4.6	-	1	3	5	7	8	11	14	17	23	30	36
ELECTRONIC BALLAST FLUORESCENT	Single mounting	16 / 18	0.1	(6.8) ❸	48	80	160	220	220	400	450	500	750	1050	1200
		32 / 36	0.18	(6.8) ❸	27	44	88	122	122	222	250	277	416	583	666
220...240V 50/60Hz (EVG)		50 / 58	0.27	(10) ❸	17	29	59	82	82	148	166	185	277	388	444
	Dual mounting	2x16 / 18	0.18	(10) ❸	26	44	88	122	122	222	250	277	416	583	666
		2x32 / 36	0.35	(10) ❸	13	22	45	62	62	114	128	142	214	300	342
		2x50 / 58	0.52	(22) ❸	9	15	30	42	42	76	86	96	144	201	230
STANDARD FLUORESCENT	Not corrected Single mounting	15	0.35	-	25	42	74	100	114	157	185	228	314	400	485
220...240V 50/60Hz		20	0.37	-	24	40	70	94	108	148	175	216	297	378	459
		40	0.44	-	20	34	59	79	90	125	147	181	250	318	386
		65	0.7	-	12	21	37	50	57	78	92	114	157	200	242
		115	1.5	-	6	10	17	23	26	36	43	53	73	93	113
		140	1.5	-	6	10	17	23	26	36	43	53	73	93	113
	Corrected Single mounting	15	0.11	4.5	24	40	62	94	94	200	200	200	533	533	533
		20	0.16	4.5	24	40	62	94	94	200	200	200	533	533	533
		40	0.24	4.5	24	40	62	94	94	200	200	200	458	500	520
		65	0.4	7	15	25	40	50	57	125	128	128	275	300	312
		115	0.7	18	6	10	15	23	23	50	50	50	133	133	133
		140	0.7	18	6	10	15	23	23	50	50	50	133	133	133
	DUO circuit	2 x 20	0.26 ❹	-	54	57	100	153	153	211	250	307	423	538	653
		2 x 40	0.46 ❹	-	19	32	56	86	86	119	141	173	239	304	369
		2 x 65	0.7 ❹	-	12	21	37	57	57	78	92	114	157	200	242
		2 x 115	1.3 ❹	-	6	11	20	30	30	42	50	61	84	107	130
		2 x 140	1.5 ❹	-	6	10	17	26	26	36	43	53	73	93	113

❶ In = Rated lamp current.
❷ For 220/240V circuits, either single-phase (between phase and neutral) or 2-wire (between phase and phase), the maximum number of lamps is as per the table.
For three-phase circuits with neutral 380/415V or 220/240V, the maximum number of lamps controlled by the same contactor is n • 3.
For three-phase 380/415V circuits without neutral, the maximum number of lamps controlled by the same contactor is n • √3.
Electrical life is 100,000 cycles up to 55°C.
❸ Incorporated capacitor.
❹ Total.
❺ With reference to the AC side of the power supplies.
❻ Usually, each light has its own power supply. If a power supply controls several lights, the number of power supplies must be factored into the calculation. The sum of the rated currents of the power supplies connected to each pole of the contact must not exceed 67% of the rated current AC-3 of the contactor indicated on page 2-4.
e.g. BF18 has a rated current AC-3 of 18A; it can control 18x0.67=12.06A per pole at most.

Lamp features		Lamp power	Rated current	Capacitor capacity	Maximum number [n] of lamps for each contactor pole❶										
					BG06 BG09 BG12	BF09 BF12 BF18	BF25	BF26 BF32	BF38	BF40 BF50	BF65 BF80 BF94	BF95	BF115 BF150	B145	B180
		[W]	[A]	[µF]											
HIGH-PRESSURE MERCURY VAPOUR 220/240V 50/60Hz	Not corrected	50	0.61	-	10	16	26	36	44	65	73	82	122	172	196
		80	0.8	-	7	12	20	27	33	50	56	62	93	131	150
		125	1.2	-	5	8	13	18	22	33	37	41	62	87	100
		250	2.2	-	3	4	7	10	12	18	20	22	34	47	54
		400	3.4	-	2	3	5	6	7	11	13	14	22	30	35
		700	5.5	-		1	3	4	4	7	8	9	13	19	21
		1000	8	-		1	2	2	3	5	5	6	9	13	15
	Corrected	50	0.29	7	15	25	40	60	60	128	128	128	258	342	342
		80	0.42	8	13	22	35	52	53	95	107	112	178	250	285
		125	0.7	10	8	14	22	31	35	57	64	71	107	150	171
		250	1.3	18	4	7	12	16	19	30	34	38	57	80	92
		400	2.1	25	2	4	7	10	11	19	21	23	35	50	57
		700	3.6	40	-	2	4	6	6	11	12	13	20	29	33
		1000	5.3	60	-	1	3	4	4	7	8	9	14	19	22
380/415V 50/60Hz	Not corrected	2000	8	-		-	1	2	2	3	3	4	5	8	9
	Corrected	2000	5.5	35		-	1	2	2	4	5	5	8	11	13
HIGH-PRESSURE SODIUM VAPOUR 220/240V 50/60Hz	Not corrected	150	1.8	-	3	5	8	12	15	22	25	27	41	58	66
		250	3	-	2	3	5	7	9	13	15	16	25	35	40
		400	4.7	-	1	2	3	4	5	8	9	10	15	22	25
		600	7.1	-	-	1	2	3	3	5	6	6	10	15	16
		1000	10.4	-		-	1	2	2	3	4	4	7	10	11
	Corrected	150	0.83	20	-	9	14	19	21	45	45	45	90	120	120
		250	1.5	36	-	5	7	10	11	25	25	25	50	66	66
		400	2.4	48	-	3	5	6	7	16	18	18	31	43	50
		600	3.5	68	-	2	3	4	4	10	12	12	20	28	34
		1000	6.3	120	-	1	1	2	2	6	7	7	11	16	19
LOW-PRESSURE SODIUM VAPOUR 220/240V 50/60Hz	Not corrected	35	1.5	-	4	6	10	14	18	26	30	33	50	70	80
		55	1.5	-	4	6	10	14	18	26	30	33	50	70	80
		90	2.4	-	3	4	6	9	11	16	18	20	31	43	50
		135	3.1	-	2	3	5	7	8	12	14	16	24	33	38
		150	3.2	-	2	3	5	6	8	12	14	15	23	32	37
		180	3.3	-	2	3	4	6	8	12	13	15	22	31	36
	Corrected	35	0.31	20	-	6	10	14	18	45	45	45	120	120	120
		55	0.42	20	-	6	10	14	18	45	45	45	120	120	120
		90	0.63	30	-	4	6	9	11	30	30	30	80	80	80
		135	0.94	40	-	3	5	7	8	22	22	22	60	60	60
		150	1	40	-	3	5	6	8	22	22	22	60	60	60
		180	1.2	40	-	3	4	6	8	22	22	22	60	60	60
METAL HALIDE 220/240V 50/60Hz	Not corrected	35	0.3	-	-	28	50	66	80	100	150	167	250	330	400
		70	0.5	-	-	16	28	40	50	60	90	100	150	200	240
		150	1	-	-	8	14	20	25	30	45	50	75	100	120
		250	3	-	-	3	5	7	9	13	15	16	25	35	40
		400	3.5	-	-	2	4	6	7	11	12	14	21	30	34
		1000	10	-	-	1	1	2	2	4	4	5	7	10	12
		2000	17	-		-	-	1	1	2	2	2	4	6	7
	Corrected	35	0.17	6	-	33	60	65	65	200	240	260	400	420	440
		70	0.28	12	-	20	36	40	40	120	145	155	240	255	265
		150	0.6	20	-	9	17	18	18	56	68	74	112	118	120
		250	1.5	32	-	5	7	8	10	26	28	28	46	50	53
		400	2	35	-	4	5	6	7	20	22	25	35	37	40
		1000	5.8	95	-	1	1	2	2	6	7	8	12	12	13
		2000	11.5	148	-	-	-	1	1	3	3	4	6	6	6
380/415V 50/60Hz	Not corrected	2000	10.3	-	-	-	-	1	1	2	2	3	4	6	7
		3500	18	-	-	-	-	-	-	1	1	1	2	3	4
	Corrected	2000	6.6	60	-	-	1	1	1	3	3	4	6	7	7
		3500	11.6	100	-	-	-	-	-	2	2	2	3	3	4

❶ For 220/240V circuits, either single-phase (between phase and neutral) or 2-wire (between phase and phase), the maximum number of lamps is as per the table.
For three-phase circuits with neutral 380/415V or 220/240V, the maximum number of lamps controlled by the same contactor is n • 3.
For three-phase 380/415V circuits without neutral, the maximum number of lamps controlled by the same contactor is n • √3.
Electrical life is 100,000 cycles up to 55°C.

POWER FACTOR CORRECTION CAPACITORS

CHOICE CRITERIA

The contactor during the closing transition is influenced by electrical currents having high frequencies and high amplitudes.
The frequencies of these currents range between 1 and 10kHz; the amplitudes must have values lower than the maximum permissible current peak of the contactor to be used.

AMBIENT OPERATING CONDITIONS

Ambient temperature: ≤ 50 °C.
For temperatures higher than 50°C up to 70 °C, stated maximum operational power ratings are to be reduced by a percentage equal to the difference between the ambient temperature and 50°C.
Operating cycle: ≤ 120 cy/h
Electrical life: ≥ 100,000 cycles.

Contactor	IEC rated current ≤400V	Maximum permissible peak current	IEC maximum operational voltage	Fuse	IEC maximum operational power (AC-6b)			
				gG	220V 230V 240V	380V 400V	415V 440V	500V 660/690V
Type	[A]	[A]	[V]	[A]	[kvar]	[kvar]	[kvar]	[kvar]
BF09 A	12	500	690	16	4.5	7.5	9	10
BF12 A	18	550	690	25	7	12.5	12	14
BF18 A	23	1000	690	32	9	15	16	18
BF25 A	23	1000	690	32	9	15	16	18
BF26 A	30	1400	690	40	11	20	22	22
BF32 A	36	1700	690	50	14	25	27	30
BF38 A	43	1900	690	63	17	30	30	34
BF40 A	50	2500	1000	100	20	35	40	45
BF50 A	58	2500	1000	80	22	40	41	45
BF65 A	65	2500	1000	100	26	45	50	52
BF80 A	75	2500	1000	125	30	50	56	70
BF94 A	75	2500	1000	125	30	50	56	70
BF95 A	90	3000	1000	125	34	60	75	80
BF115 A	115	3000	1000	160	45	75	85	135
BF150 A	144	3000	1000	160	50	100	115	150
B145	150	3400	1000	200	57	100	108	130
B180	170	3600	1000	250	65	112	122	150
B250	240	5100	1000	315	91	158	172	210
B310	265	5900	1000	315	105	184	200	245
B400	320	7500	1000	400	122	211	230	280
B500	500	9000	1000	630	190	330	360	430
B630	610	11000	1000	800	230	400	432	520

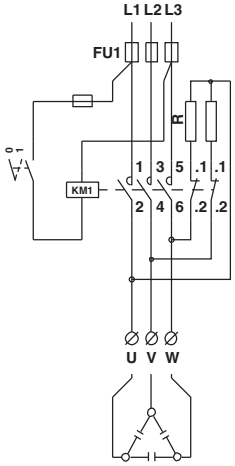
The use of contactors with the above operational powers is allowable only when the peak current, in the installation point of the power factor correction board, is lower than the values stated in the table.
If this condition is not verified, it is necessary to use limiting inductances or specific contactors stated on page 2-14. Consult Technical support (see contact details on inside front cover) to obtain detailed information on the correct use of contactors without limiting inductances.

LIMITING INDUCTANCES

The use of limiting inductances is imperative when the system inductances (line transformer and cables), upstream of the power factor correction panel, are not able to maintain the maximum connecting current within the limit value of the contactor used.

FAST DISCHARGE RESISTANCES OF CAPACITORS

The use of the contactor, according to the wiring diagram given, allows the fast discharge of the capacitors as well as the instantaneous disconnection of the capacitors from the mains when the coil is de-energised.
The resistances, indicated in the following table, guarantee the discharge within a maximum time of 2 seconds.



Capacitor power	Voltage 220...230V		Voltage 380...500V	
[kvar]	[Ω]	[W]	[Ω]	[W]
2.5-5	3900	12	8200	12
10-15	1800	25	4300	25
20-50	1000	50	2200	50

SPECIAL CONTACTORS FOR POWER FACTOR CORRECTION CAPACITORS

GENERAL CHARACTERISTICS

These contactors are equipped with early-make contacts. This special type of contact has the purpose of connecting for a very brief interval, 2-3ms, during the contactor closing, resistors which limit the connecting current of the capacitors. These resistors are then excluded when the closing operation is complete and the current capacity is conveyed to the main contacts. With this type of circuit, it is possible to obtain minor wear of all the components of the system especially fuses and capacitors ensuring a longer life and better reliability.
The contactors are particularly suitable for use in automatic power factor correction panels since there is no need of limiting inductances and a source of heat has been eliminated. In this way, these modular electric switchboards can be more compact.

The BFK version, figure 1, is designed for three-phase switching. The peculiarity of this type is in the contacts, suitable to connect limiting resistors, which close only for the time needed to limit any in-rush current peak and then reopen to avoid eventual flow of residual currents through the resistors.

AMBIENT OPERATING CONDITIONS

Ambient temperature: ≤ 50 °C
For ambient temperature higher than 50°C up to 70°C, maximum operational power ratings, indicated in the table, are to be reduced by a percentage equal to the difference between the ambient temperature and 50°C.
Operating cycles: ≤ 120 cy/h.
Electrical life: ≥ 400,000 cycles.

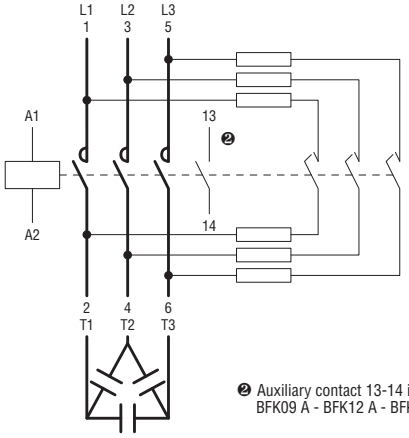


Fig. 1

❷ Auxiliary contact 13-14 is found on BFK09 A - BFK12 A - BFK18 A types only.

Contactor	Built-in auxiliary contacts NO	IEC rated operational current ≤440V	IEC fuse gG	Maximum IEC power at ≤50°C (AC6b) ❶ 220V 230V 240V	380V 400V	415V 440V	500V 690V
Type	n°	[A]	[A]	[kvar]	[kvar]	[kvar]	[kvar]
BFK09 A	1	12	16	4.5	7.5	9	10
BFK12 A	1	18	25	7	12.5	14	16
BFK18 A	1	23	40	9	15	17	20
BFK26 A	—	30	40	11	20	22	25
BFK32 A	—	36	63	14	25	27.5	30
BFK38 A	—	43	63	17	30	33	36
BFK50 A	—	58	80	22	40	41	46
BFK65 A	—	65	100	26	45	50	56
BFK80 A	—	75	125	30	50	56	65
BFK95 A	—	90	125	34	60	75	80
BFK115 A	—	115	160	45	75	85	135
BFK150 A	—	144	160	50	100	115	150

NOTE: See page 2-14 for order codes.
❶ Consult Technical support (Tel. 035 4282422; E-mail: service@LovatoElectric.com) for the use of contactors to switch within delta connection.
❷ The maximum thermal current Ith of the BF110K contactor is 125A

CHOICE OF CONTACTORS TYPE BFK/BF..K ACCORDING TO cULus LISTING

Contactor	Built-in auxiliary contacts NO (SPST)	UL/CSA rated current ≤440V	UL/CSA protection fuse SC/gG	Maximum UL/CSA operational power at voltage: 240V	480V	600V
Type	n°	[A]	[A]	[kvar]	[kvar]	[kvar]
BFK09 A	1	12	16	4.5	9	10
BFK12 A	1	18	25	7	14	16
BFK18 A	1	23	40	9	17	20
BFK26 A	—	30	40	11	22	27.5
BFK32 A	—	36	63	14	27.5	32
BFK38 A	—	43	63	17	33	36
BFK50 A	—	58	80	22	41	46
BFK65 A	—	70	100	26	50	56
BFK80 A	—	75	125	30	60	75
BFK95 A	—	100	125	40	80	100
BFK115 A	—	115	160	45	90	120
BFK150 A	—	121	160	50	100	125

NOTE: See page 2-14 for order codes.
❶ Consult Technical support (see contact details on inside front cover) for information about the use of contactors to switch within delta/wye connection.

IEC OPERATIONAL CHARACHERISTICS BG00 AND BF00

TYPE			BG00	BF00 A	BF00 D	BF00 L
POLE CONTACT CHARACTERISTICS						
Poles❶		n°	4			
Conventional free air thermal current Ith (≤40°C)		A	10			
Rated insulation voltage Ui		V	690			
Frequency limit		Hz	25...400 ❷			
UL/CSA and IEC/EN 60947-5-1 auxiliary contact designation		AC	A600			
		DC	Q600	P600		
Terminals		A	7.5	8.3		
		B	4	3.5		
		Screw	M3	M3.5		
		Phillips	2	2		
Quick-connect		Faston	1x6.35 - 2x2.8	—		
Tightening torque for contact terminals min-max		Nm	0.8...1	1.5...1.8		
		lbft	0.59-0...74	1.03...1.33		
Tightening torque for coil terminals min-max		Nm	0.8...1			
		lbft	0.59...0.74			
		Phillips	2			
Conductor section connectable with 1 or 2 wires min ... max	AWG stranded	n°	18...12	16...10		
	Flexible w/o lug	mm^2	0.75...2.5	1...6		
	Flexible c/w boot-lace ferrule	mm^2	2x1.5 or 1x2.5	1...4		
	Flexible c/w spade lug	mm^2	2x1.5 or 1x2.5	1...4		
Terminal protection according to IEC/EN 60529			IP20❸			
AMBIENT CONDITIONS						
Operating temperature		°C	-40...+60	-50...+70		
Storage temperature		°C	-55...+70	-60...+80		
Maximum altitude		m	3000			
Operation position	Normal		On vertical plane			
	Allowable		±30°			
Fixing			Screw or on 35mm DIN rail			

❶ The built-in auxiliary contacts are high-conductivity
❷ Derating for use at 61-400 Hz. Consult Technical support for information (Tel. 035 4282422; E-mail: service@LovatoElectric.com).
❸ IP20 protection warranted by wired equipment; minimum 0.75mm^2 conductor section for BG00 or 1mm^2 for BF00.

ELECTRICAL RATINGS BASED ON IEC/EN 60947-5-1 UTILIZATION CATEGORIES AND UL508/CSA C22.2 n°14

IEC/EN designation	IEC/EN utilization category	Conventional enclosed thermal current Ithe	Rated operational current Ie [A] at rated operational voltage Ue										VA rating	
UL designation	—	Thermal continuous test current	Maximum Amperes (AC) 60Hz										Maximum VA	
			120VAC		240VAC		380VAC		480VAC		600VAC			
Alternating current		[A]	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A600	AC-15	10	60	6	30	3	19	1.9	15	1.5	12	1.2	7200	720
Direct current			Maximum Amperes (DC) Make or Break											
			125VDC		250VDC		301VDC		400VDC		500VDC		600VDC	300V or less ❺
P600	DC-13	5	1.1		0.55		0.2 ❹		0.31 ❹		0.27 ❹		0.2	138	138
Q600	DC-13	2.5	0.55		0.27		0.1 ❹		0.15 ❹		0.13 ❹		0.1	69	69

❹ Value at 301V is valid for UL/CSA up to 600VDC; the others are valid for IEC/EN.
❺ Voltage valid for UL/CSA only.

TYPE					BG00	BF00 A	BF00 D	BF00 L
AC CONTROL								
Rated control voltage at 50/60Hz or 60Hz				V	12...575	12...600	—	—
Operating voltage limits								
50/60Hz coil powered at	50Hz	pick-up		% Us	75...115	80...110	—	—
		drop-out		% Us	20...55	20...55	—	—
	60Hz	pick-up		% Us	80...115	80...110	—	—
		drop-out		% Us	20...55	20...55	—	—
60Hz coil powered at	60Hz	pick-up		% Us	75...115	80...110	—	—
		drop-out		% Us	20...55	20...55	—	—
Average coil consumption at ≤20°C								
50/60Hz coil powered at	50Hz	in-rush		VA	30	75	—	—
		holding		VA	4	9	—	—
	60Hz	in-rush		VA	25	70	—	—
		holding		VA	3	6.5	—	—
60Hz coil powered at	60Hz	in-rush		VA	30	75	—	—
		holding		VA	4	9	—	—
Dissipation at holding ≤20°C			50Hz	W	0.95	2.5	—	—
DC CONTROL								
Rated control voltage				V	6...250	—	6...415	6...415
Operating voltage limits		pick-up		% Us	75...115	—	70...125	80...110
		drop-out		% Us	10...20	—	10...40	10...40
Average consumption at ≤20°C (in-rush/holding)				W	3.2❶	—	5.4	2.4
OPERATING TIMES								
Average time for Us control in	AC	closing NO		ms	12...21	8...24	—	—
		opening NO		ms	9...18	10...20	—	—
		closing NC		ms	17...26	17...30	—	—
		opening NC		ms	7...17	7...18	—	—
	DC	closing NO		ms	18...25	—	54...66	75...91
		opening NO		ms	2...3	—	14...17	15...19
		closing NC		ms	3...5	—	24...30❷	24...30❸
		opening NC		ms	11...17	—	47...57❷	67...81❸
LIFE								
Mechanical		AC control		cycles	20 million			
		DC control		cycles	20 million			
MAXIMUM OPERATING RATE								
Mechanical operations				cycles/h	3600			

❶ 2.3W for low-consumption BG00...L version.
❷ NC closing time for BF00 04D is 23...29ms while NC opening time is 40...49ms.
❸ NC closing time for BF00 04L is 25...31ms while NC opening time is 56...68ms.

IEC OPERATIONAL CHARACTERISTICS BG06..., BG09... AND BG12...

TYPE				BG06	BG09	BG12
POLE CHARACTERISTICS						
Power poles			n°	3	3-4	3
Rated insulation voltage Ui			V	690	690 ❶	690
Rated impulse withstand voltage Uimp			kV	6	6	6
Operational frequency			Hz	25...400 ❷	25...400 ❷	25...400 ❷
Operational current	Conventional free air thermal Ith (≤40°C)		A	16	20	20
	AC3 (≤440V ≤55°C)		A	6	9	12
	AC4 (400V) ❸		A	3.3	4.0	4.8
Short-time allowable current for 10s (IEC/EN 60947-1)			A	96	96	96
Maximum fuse size coordination Type 2 - 400V - 50kA		gG	A	16	20	20
		aM	A	6	10	16
Making capacity (RMS value)			A	92	92	120
Breaking capacity at voltage		≤ 440V	A	72	72	96
		500V	A	72	72	72
		690V	A	72	72	72
Consumption per pole and resistance (average values)			mΩ	10	10	10
		Ith	W	2.6	4	4
		AC3	W	0.36	0.81	1.44
Terminals			A [mm]	7.5	7.5	7.5
			B [mm]	4	4	4
			screw	M3	M3	M3
			Phillips	2	2	2
		Quick-connect	Faston	—	1x6.35 - 2x2.8	—
		Solder		—	PIN for PCB❹	—
Tightening torque for pole and coil terminals min-max			Nm	0.8...1	0.8...1	0.8...1
			lbft	0.59...0.74	0.59...0.74	0.59...0.74
			Phillips	2	2	2
Conductor section connectable with 1 or 2 wires min...max						
	AWG stranded		N°	18...12		
	Flexible w/o lug		mm^2	0.75...2.5		
	Flexible c/w boot-lace ferrule		mm^2	2x1.5 or 1x2.5		
	Flexible c/w spade lug		mm^2	2x1.5 or 1x2.5		
Terminal protection to IEC/EN 60529				IP20❺		
AUXILIARY CONTACT CHARACTERISTICS						
Type of contact			n°	1-NO or NC based on configuration❻		
Thermal current Ith			A	10		
IEC/EN 60947-5-1 designation			AC	A600		
			DC	Q600		
AMBIENT CONDITIONS						
Operating temperature			°C	-40...+60		
Storage temperature			°C	-55...+70		
Maximum altitude			m	3000		
Operating position		Normal		On vertical plane		
		Allowable		± 30°		
Fixing				Screw or on 35mm DIN rail		

❶ Rated voltage Ui for BGP... types is 500V.
❷ Derating for use at 61-400Hz. Consult Technical support for information (Tel. 035 4282422; E-mail: service@LovatoElectric.com).
❸ Current values guarantee an electrical life of about 50,000 cycles.
❹ Dimensions and drilling distances are given on page 2-32.
❺ IP20 protection warranted by wired equipment; minimum 0.75mm^2 conductor section.
❻ NO or NC auxiliary is highly conductive.
Other characteristics are the same as the mechanical characteristics of the poles.

TYPE				BG06	BG09	BG12
AC CONTROL						
Rated voltage at 50/60Hz, 60Hz			V	12...575		
Operating voltage limits						
50/60Hz coil powered at	50Hz	pick-up	% Us	75...115		
		drop-out	% Us	20...55		
	60Hz	pick-up	% Us	80...115		
		drop-out	% Us	20...55		
60Hz coil powered at	60Hz	pick-up	% Us	75...115		
		drop-out	% Us	20...55		
Average coil consumption at ≤20°C						
50/60Hz coil powered at	50Hz	in-rush	VA	30		
		holding	VA	4		
	60Hz	in-rush	VA	25		
		holding	VA	3		
60Hz coil powered at	60Hz	in-rush	VA	30		
		holding	VA	4		
Dissipation at ≤20°C	at 50Hz		W	0.95		
DC CONTROL						
Rated control voltage			V	6...250		
Operating voltage limits	pick-up		% Us	75...115		
	drop-out		% Us	10...25		
Average consumption at ≤20°C (in rush-holding)			W	3.2	3.2❶	3.2
OPERATING TIMES						
Average time for Us control in	AC	closing NO	ms	12...21	12...21	12...21
		opening NO	ms	9...18	9...18	9...18
		closing NC	ms	17...26	17...26	17...26
		opening NC	ms	7...17	7...17	7...17
	DC	closing NO	ms	18...25	18...25	18...25
		opening NO	ms	2...3	2...3	2...3
		closing NC	ms	3...5	3...5	3...5
		opening NC	ms	11...17	11...17	11...17
LIFE						
Mechanical	AC control		cycles	20 million		
	DC control		cycles	20 million		
Electrical (Ie at 400V AC3)			cycles	500,000		
MAXIMUM OPERATING RATE						
Mechanical operations			cy/h	3600		

❶ 2.3W for low-consumption type BG09...L.

ELECTRICAL RATINGS BASED ON IEC/EN 60947-5-1 UTILIZATION CATEGORIES AND UL508/CSA C22.2 n°14

IEC/EN designation	IEC/EN utilization category	Conventional enclosed thermal current Ithe	Rated operational current Ie [A] at rated operational voltage Ue										VA rating	
UL designation	—	Thermal continuous test current	Maximum Amperes (AC) 60Hz										Maximum VA	
			120VAC		240VAC		380VAC		480VAC		600VAC			
Alternating current		[A]	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A600	AC-15	10	60	6	30	3	19	1.9	15	1.5	12	1.2	7200	720
Direct current			Maximum Amperes (DC) Make or Break											
			125VDC		250VDC		301VDC		400VDC		500VDC		600VDC	300V or less ❸
Q600	DC-13	2.5	0.55		0.27		0.1 ❷		0.15 ❷		0.13 ❷		0.1	69	69

❷ Value at 301V is valid for UL/CSA up to 600VDC; the others are valid for IEC/EN.
❸ Voltage valid for UL/CSA only.

IEC OPERATIONAL CHARACTERISTICS BF09-BF38

TYPE				BF09	BF12	BF18	BF25	BF26	BF32	BF38
POLE CHARACTERISTICS										
Power poles			n°	3-4	3-4	3-4	3	3-4	3	3-4
Rated insulation voltage Ui			V	690						
Rated impulse withstand votage Uimp			kV	6						
Operational frequency			Hz	25...400❶						
Operational current	Conventional free air thermal Ith (≤40°C)		A	25	28	32	32	45	56	56(60❺)
	AC3 (≤440V ≤55°C)		A	9	12	18	25	26	32	38
	AC4 (400V)❷		A	4.9	7.9	8.5	10	11.5	13.5	15.5
Short-time allowable current for 10s (IEC/EN 60947-1)			A	150	150	200	200	210	320	320
Max fuse size coordination Type 2 - 400V - 50kA		gG	A	25	32	32	50	50	63	63
		aM	A	10	12	20	25	32	32	40
Making capacity (RMS value)			A	90	120	180	250	260	320	380
Breaking capacity		≤440V	A	72	96	144	200	208	256	304
at voltage		500V	A	72	96	120	184	184	240	240
		690V	A	71	94	94	102	168	192	192
Consumption and resistance per pole (average values)			mΩ	2.5	2.5	2.5	2.5	2.0	2.0	2.0
		Ith	W	1.6	2.0	2.6	2.6	4.0	6.0	6.0
		AC3	W	0.2	0.4	0.8	1.6	1.4	2.0	2.9
Terminals			Type	Clamp-screw						
			A	9.5	9.5	9.5	9.5	13	13	13
			B	4.5	4.5	4.5	4.5	5.5	5.5	5.5
			Screw	M3.5	M3.5	M3.5	M3.5	M4	M4	M4
			Phillips	2	2	2	2	2	2	2
Tightening torque for pole terminal min-max			Nm	1.5...1.8	1,.5...1.8	1.5...1.8	1.5...1.8	2.5...3	2.5...3	2.5...3
			lbft	1.1...1.5	1.1...1.5	1.1...1.5	1.1...1.5	1.8...2.2	1.8...2.2	1.8...2.2
Tightening torque for coil terminals min-max			Nm	0.8-1	0.8-1	0.8-1	0.8-1	0.8-1	0.8-1	0.8-1
			lbft	0.59-0.74	0.59-0.74	0.59-0.74	0.59-0.74	0.59-0.74	0.59-0.74	0.59-0.74
			Phillips	2	2	2	2	2	2	2
Conductor section connectable with 1 or 2 wires min...max	AWG stranded		n°	16...10	16...10	16...10	16...10	14...6	14...6	14...6
	Flexible w/o lug		mm²	1...6	1...6	1...6	1...6	2.5...16	2.5...16	2.5...16
	Flexible c/w insulated boot-lace ferrule		mm²	1...4	1...4	1...4	1...4	1...10	1...10	1...10
	Flexible c/w insulated spade lug		mm²	1...4	1...4	1...4	1...4	1...10	1...10	1...10
Power terminal protection according to IEC/EN 60529				IP20❸	IP20❸	IP20❸	IP20❸	IP20❹	IP20❹	IP20❹
AUXILIARY CONTACT CHARACTERISTICS										
Type of contact			n°	1-NO or NC based on configuration❻				—		
Thermal current Ith			A	10				—		
IEC/EN 60947-5-1 designation			AC	A600				—		
			DC	P600				—		
AMBIENT CONDITIONS										
Operating temperature			°C	-50...+70						
Storage temperature			°C	-60...+80						
Maximum altitude			m	3000						
Operating position		Normal		On vertical plane						
		Allowable		± 30°						
Fixing				Screw or on 35mm DIN rail						

❶ Derating for use at 61-400Hz. Consult Technical support for information; see contact details on inside front cover.
❷ Current values guarantee an electrical life of about 200,000 cycles.
❸ IP20 protection warranted by wired equipment; minimum 1mm² conductor section.
❹ IP20 protection on front.
❺ For this other current value, use 16mm² wire with spade cable terminal.
❻ NO or NC auxiliary is highly conductive. Other characteristics are the same as the mechanical characteristics of the poles.

ELEVATOR EQUIPMENT - Magnetic Motor Controllers per CSA certification File 54332 - Class 2411-03, to requirements of B44.1-04/SME A17.5-2004.
Contactors, three or four poles, open type, operating coil 600VAC or less, 380VDC or less.

Type	Maximum horsepower ratings Single phase		Three phase				CSA General use
	120V	240V	200-208V	240V	480V	600V	
	[HP]	[HP]	[HP]	[HP]	[HP]	[HP]	[A]
BF12	½	1½	3	3	7½	7½	28
BF25	1½	3	5	7½	15	15	32
BF38	3	5	10	10	20	20	55

TYPE					BF09	BF12	BF18	BF25	BF26	BF32	BF38
AC CONTROL											
Rated voltage at 50/60Hz, 60Hz				V	12...600						
Operating voltage limits											
50/60Hz coil powered at	50Hz	pick-up		% Us	80...110						
		drop-out		% Us	20...55						
	60Hz	pick-up		% Us	85...110						
		drop-out		% Us	20...55						
60Hz coil powered at	60Hz	pick-up		% Us	80...110						
		drop-out		% Us	20...55						
Average coil consumption at ≤20°C											
50/60Hz coil powered at	50Hz	in-rush		VA	75						
		holding		VA	9						
	60Hz	in-rush		VA	70						
		holding		VA	6.5						
60Hz coil powered at 60Hz	60Hz	in-rush		VA	75						
		holding		VA	9						
Dissipation at holding ≤20°C			50Hz	W	2.5						
DC CONTROL - normal and low consumption											
Rated control voltage				V	6...415						
Operating limits											
pick-up	three-pole BF...D		from	% Us	70						
			to	% Us	125						
	four-pole BF...D		from	%Us	70				80		
			to	%Us	125				125		
	three and four pole BF...L		from	% Us	80						
			to	% Us	110						
drop-out	for all versions		from	%Us	10						
			to	%Us	40						
Average coil consumption ≤20°C (in rush-holding)	BF...D			W	5.4						
	BF...L			W	2.4						
OPERATING TIMES											
Average time for Us control in	AC	closing NO		ms	8...24				8...24		
		opening NO		ms	10...20				5...15		
		closing NC		ms	14...28❶				9...20❷		
		opening NC		ms	7...18❶				9...17❷		
	DC BF...D types	closing NO		ms	54...66				53...65		
		opening NO		ms	14...17				14...18		
		closing NC		ms	24...30❸				23...28		
		opening NC		ms	47...57❸				46...56		
	DC BF...L types	closing NO		ms	75...91				76...92		
		opening NO		ms	15...19				16...20		
		closing NC		ms	24...30❹				25...31		
		opening NC		ms	67...81❹				63...77		
LIFE											
Mechanical (million)	AC control			cycles	20	20	20	20	20	20	20
	DC control			cycles	20	20	20	20	20	20	20
Electrical (Ie at 400V AC3) (million)				cycles	2.0	2.0	1.6	1.2	1.6	1.6	1.4
MAXIMUM OPERATING RATE											
Mechanical operations				cy/h	3600						

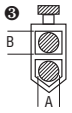
❶ NC closing time for BF...T0A types is 9...25ms while NC opening time is 9...15ms.
❷ NC closing time for BF...T0A types is 11...29ms while NC opening time is 6...14ms.
❸ NC closing time for BF...T0D types is 23...29ms while NC opening time is 40...49ms.
❹ NC closing time for BF...T0L types is 25...31ms while NC opening time is 56...68ms.

ELECTRICAL RATINGS BASED ON IEC/EN 60947-5-1 UTILIZATION CATEGORIES AND UL508/CSA C22.2 n°14

IEC/EN designation	IEC/EN utilization category	Conventional enclosed thermal current Ithe	Rated operational current Ie [A] at rated operational voltage Ue										VA rating	
UL designation	—	Thermal continuous test current	Maximum Amperes (AC) 60Hz										Maximum VA	
			120VAC		240VAC		380VAC		480VAC		600VAC			
Alternating current		[A]	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
A600	AC-15	10	60	6	30	3	19	1.9	15	1.5	12	1.2	7200	720
Direct current			Maximum Amperes (DC) Make or Break											
			125VDC		250VDC		301VDC		400VDC		500VDC		600VDC	300V or less ❻
Q600	DC-13	2.5	0.55		0.27		0.1 ❺		0.15 ❺		0.13 ❺		0.1	69	69

❺ Value at 301V is valid for UL/CSA up to 600VDC; the others are valid for IEC/EN.
❻ Voltage valid for UL/CSA only.

IEC OPERATIONAL CHARACTERISTICS BF40...BF150...

TYPE				BF40	BF50	BF65	BF80	BF94	BF95	BF115	BF150
POLE CHARACTERISTICS											
Power poles			N°	3-4	3-4	3-4	3-4	3	3-4	3-4	3-4
Rated insulation voltage Ui			V	1000							
Rated impulse withstand voltage Uimp			kV	8							
Operational frequency			Hz	25 ... 400❶							
Operational current	Conventional free air thermal Ith (≤40°C)		A	70	90	100	115	115	140	160	165
	AC3 (≤440V ≤55°C)		A	40	50	65	80	95	95	115	150
	AC4 (400V)❷		A	24	28	31	38	45	45	54	70
Short-time allowable current for (IEC/EN 60947-1)		10s	A	400	400	640	640	640	760	920	1200
Maximum fuse size coordination Type 2 - 400V - 50kA		gG	A	100	100	125	125	125	160	200	250
		aM	A	50	50	80	80	100	100	125	160
Making capacity (RMS value)		A		400	500	650	800	950	1200	1500	1500
Breaking capacity at voltage		≤440V	A	320	400	520	640	760	1100	1200	1200
		500V	A	265	352	425	625	660	775	850	1025
		690V	A	256	312	376	456	475	745	905	905
Consumption and resistance per pole (average values)		mΩ		0.8	0.8	0.8	0.6	0.6	0.45	0.45	0.45
		Ith	W	3.9	6.5	8.0	7.9	7.9	8.8	11.5	12
		AC3	W	1.3	2.0	3.4	3.8	5.4	4.1	6.0	10.1
Terminals			Type	Double lug clamp terminal ❸ 							
			A [mm]	9.5					15		
			B [mm]	11					14.5		
			Screw	M6					M8		
			Metric Allen	4					4		
Tightening torque for pole terminal min-max			Nm	4...5					6...7		
			lbft	2.95...3.69					4.4...5.2		
Tightening torque for coil terminals min-max			Nm	0.8...1							
			lbft	0.59...0.74							
			Phillips	2							
Conductor section connectable with 1 or 2 wires min...max		AWG	N°	14...2					16...2/0		
		Flexible w/o lug	mm^2	1.5...35					1.5...70		
		Flexible c/w lug	mm^2	1.5...35					1.5...70		
Power terminal protection according to IEC/EN 60529				IP20 front							
AMBIENT CONDITIONS											
Operating temperature			°C	-50...+70❹							
Storage temperature			°C	-60...+80❺							
Maximum altitude			m	3000							
Operating position		Normal		On vertical plane							
		Allowable		± 30°							
Fixing				Screw or on 35mm DIN rail							

❶ Derating for use at 61-400 Hz. Consult Technical support for information; see contact details on inside front cover.
❷ Current values guarantee an electrical life of about 200,000 cycles.
❸ As per IEC/EN 60947-1 designation. In addition to the main terminal which has dimensions as mentioned above, there is a second terminal entry 12.3x3.8mm for flexible busbars.
❹ -40...+70 for BF40...150E.
❺ -50...+80 for BF40...150E.

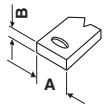
❶ ELEVATOR EQUIPMENT - Magnetic Motor Controllers per CSA certification File 54332 - Class 2411-03, to requirements of B44.1-04/SME A17.5-2004.
Contactors, three or four poles, open type, operating coil 600VAC or less, 380VDC or less.

Type	Maximum horsepower ratings Single phase 120V	240V	Three phase 200-208V	240V	480V	600V	CSA General use
	[HP]	[HP]	[HP]	[HP]	[HP]	[HP]	[A]
BF65	3	10	15	15	40	50	110

TYPE					BF40	BF50	BF65	BF80	BF94	BF95	BF115	BF150
AC CONTROL												
Rated voltage at 50/60Hz, 60Hz				V	12...600 (20...250 electronically controlled AC/DC coil)							
Operating voltage limits												
50/60Hz coil powered at	50Hz	pick-up		% Us	80...110 ❶							
		drop-out		% Us	20...55 (≤70% electronically controlled AC/DC coil)							
	60Hz	pick-up		% Us	85...110 ❶							
		drop-out		% Us	40...55 (≤70% electronically controlled AC/DC coil)							
60Hz coil powered at	60Hz	pick-up		% Us	80...110							
		drop-out		% Us	20...55							
Average coil consumption at ≤20°C												
50/60Hz coil powered at	50Hz	in-rush		VA	210 (35...120 electronically controlled AC/DC coil)					300 (70...175 electronically controlled AC/DC coil)		
		holding		VA	15 (1.5...3.7 electronically controlled AC/DC coil)					20 (1.7...3.5 electronically controlled AC/DC coil)		
	60Hz	in-rush		VA	195 (35...120 electronically controlled AC/DC coil)					275 (70...175 electronically controlled AC/DC coil)		
		holding		VA	13 (1.5...3.7 electronically controlled AC/DC coil)					17 (1.7...3.5 electronically controlled AC/DC coil)		
60Hz coil powered at	60Hz	in-rush		VA	210					300		
		holding		VA	15					20		
Dissipation at ≤20°C	50Hz			W	5 (1...2.5 electronically controlled AC/DC coil)					6.5 (1.5...3 electronically controlled AC/DC coil)		
DC CONTROL												
Rated voltage				V	20...250							
Operating voltage limits	pick-up			% Us	80...110 ❶							
	drop-up			% Us	≤75% Us min							
Average consumption ≤20°C (in rush-holding)				W	23...68 / 1.2...1.9					70...80 / 1.3...1.5		
OPERATING TIMES												
Average time for Us control in	AC	closing NO		ms	12...28 (40...85 electronically controlled AC/DC coil)					16...32 (45...90 electronically controlled AC/DC coil)		
		opening NO		ms	8...22 (20...55 electronically controlled AC/DC coil)					9...24 (24...60 electronically controlled AC/DC coil)		
	DC	closing NO		ms	40...85 (electronically controlled AC/DC coil)					45...90 (electronically controlled AC/DC coil)		
		opening NO		ms	20...55 (electronically controlled AC/DC coil)					24...60 (electronically controlled AC/DC coil)		
LIFE												
Mechanical (million)	AC control			cycles	15	15	15	15	15	15	15	15
	DC control			cycles	15	15	15	15	15	15	15	15
Electrical (Ie at 400V in AC3) (million)				cycles	1.5	1.4	1.4	1.3	1.1	1.4	1.2	0.8
MAXIMUM OPERATING RATE												
Mechanical operations				cy/h	1500 (2000 for BF40...E...BF150...E...)							

❶ For electronically controlled AC/DC coils 80% of Us min. and 110% of Us max; for 20...48V coil powered in AC 85% of Us min.
❷ Electromagnetic compatibility: BF40...94E contactors with electronic coil 20...48VAC/DC are in compliance with IEC/EN60947-1 and IEC/EN 60947-1 standards for Environment B (domestic). The other devices are in compliance for Environment A (industrial) and can be upgraded to Environment B connecting proper filters; consult Technical support for information - see contact details on inside front cover.

IEC OPERATIONAL CHARACTERISTICS B145 - B1600...

TYPE				B145	B180	B250	B310	B400	B500	B630	B630 1000	B1250	B1600
POLE CHARACTERISTICS													
Power poles			n°	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4
Rated insulation voltage Ui			V	1000									
Rated impulse withstand votage Uimp			kV	8									
Operational frequency			Hz	25-400❶									
Operational current	Conventional free air thermal Ith (≤40°C)		A	250	275	350	450	550	700	800	1000	1250	1600
	AC3 (≤440V ≤55°C)		A	150	185	265	320	420	520	630	–	–	–
	AC4 (400V)❷		A	57	65	92	110	133	175	210	–	–	–
Short-time allowable current for 10s (IEC/EN 60947-1)			A	1300	1500	2200	2900	3600	4050	5040	5600	6500	8300
Maximum fuse size coordination Type 2 - 400V - 50kA		gG	A	250	315	400	500	630	800	1000	1000	1250	1600
		aM	A	160	200	250	400	400	500	630	–	–	–
Making capacity (RMS value)			A	1500	1850	2750	3150	4200	5000	6300	6300	6300	6300
Breaking capacity at voltage		≤440V	A	1500	1850	2500	3000	4000	5000	6300	6300	6300	6300
		500V	A	1400	1600	2250	2700	3400	4500	5600	5600	5600	5600
		690V	A	1200	1480	2200	2520	3360	4000	5000	5000	5000	5000
		1000V	A	800	1000	1500	1700	2300	2700	3400	3400	3400	3400
Consumption and resistance per pole (average values)			mΩ	0.30	0.30	0.20	0.20	0.20	0.14	0.14	0.14	0.07	0.07
		Ith	W	14.5	20.3	24.5	40.5	52.0	68.6	90	140	110	180
		AC3	W	6.8	9.7	12.5	20	32	35.0	56	–	–	–
Terminals 			A mm	20 (0.8")	20 (0.8")	25 (1")	25 (1")	25 (1")	35 (1.4")	40 (1.6")	60 (2.4")	80 (3.1")	80 (3.1")
			B mm	4 (0.16")	4 (0.16")	5 (0.2")	5 (0.2")	5 (0.2")	6 (0.23")	6 (0.23")	6 (0.23")	10 (0.39")	10 (0.39")
			Screw + hex nut	M8	M8	M10	M10	M10	M10	M12	2-M12	2-M12	2-M12
			❸ mm	13 (0.51")	13 (0.51")	17 (0.67")	17 (0.67")	17 (0.67")	17 (0.67")	19 (0.75")	19 (0.75")	19 (0.75")	19 (0.75")
	Quick-connect (coil)		Faston	1x6.35mm (0.25") or 2x2.8mm (0.11")									
	Coil with G371❹		Phillips	2 (Ø7mm/0.3in)									
Pole tightening torque	Nm			18	18	35	35	35	35	55	55	55	55
			lbft	13.3	13.3	25.8	25.8	25.8	25.8	40.6	40.6	40.6	40.6
Coil tightening torque with G371❹ fitted			Nm	1									
			lbft	0.74									
Maximum conductor section			mm	25x3 (1x0.12")	25x3 (1x0.12")	30x4 (1.2x0.16")	30x5 (1.2x0.2")	30x5 (1.2x0.2")	50x5 (2x0.2")	60x5 (2.4x0.2")	60x5 (2.4x0.2")	100x5 (4x0.2")	100x5 (4x0.2")
	1 or 2 bars N° 1 wire with lug		mm^2	120	150	240	–	–	–	–	–	–	–
	N° 2 wire with lug		mm^2	–	–	–	150	150	240	240	–	–	–
AMBIENT CONDITIONS													
Operating temperature			°C	-50...+70								-20...+60	
Storage temperature			°C	-60...+80								-30...+80	
Maximum altitude			m	3000									
Operating position	Normal			Vertical									
	Allowable			± 30°									
Fixing				Screw									

❶ Derating for use at 61-400 Hz. Consult Technical support for information (Tel. 035 4282422; E-mail: service@LovatoElectric.com).
❷ Current values guarantee an electrical life of about 200,000 cycles.
❸ Spanner/wrench size.
❹ G371: Adapter to transform coil faston terminals into screw type.

TYPE			B145	B180	B250	B310	B400	B500	B630	B630 1000	B1250	B1600
AC CONTROL												
Supply voltage			Either in AC/DC								Only AC	
Rated control voltage		V	24...480	24...480	24...480	24...480	24...480	48...480	48...480	48...480	110/240	110/240
Operating voltage limits	pick-up	% Us	80...110	80...110	80...110	80...110	80...110	80...110	80...110	80...110	80...110	80...110
	drop-out	% Us	20...60	20...60	20...60	20...60	20...60	20...60	20...60	20...60	20...60	20...60
Consumption at ≤20°C	in-rush	VA/W	300	300	300	300	300	400	400	400	800	800
	holding	VA/W	10	10	10	10	10	18	18	18	45	45
Dissipation at ≤20°C		W	10	10	10	10	10	18	18	18	40	40
OPERATING TIMES												
Making		ms	60...100	60...100	80...120	80...120	80...120	110...180	110...180	110...180	120...210	300...450
Breaking		ms	25...60	25...60	30...75	30...75	30...75	60...100	60...100	60...110	70...130	70...130
LIFE												
Mechanical (million)	AC/DC	cycles	10	10	10	10	10	5	5	5	5	5
Electrical (million) (Ie at 400V in AC3)		cycles	1,1	1	1	0,9	0,7	0,7	0,7	–	–	–
MAXIMUM OPERATING RATE												
Mechanical operations		cy/h	3600 (2000 for BF40...E, BF80...E)									
PARTICULAR CHARACTERISTICS												
Indicator			For contactor open or closed status									
Safety feature			Closing operations are prevented without arc chutes									

CONTROL CIRCUIT UTILISATION
The input electronic circuit of the contactor coil B145-B1600 is designed and tested according to IEEEC 62.41 and can withstand a 10 kV impulse voltage (1.2/50μs) with 50 Joule energy.
For higher values, the use of an auxiliary step-down voltage transformer is recommended.

CONTACTORS WITH MECHANICAL LATCH
Contactors B145-B630 type, can have mechanical latch included or can be predisposed, to be completed with mechanical latch, see pages 2-4 and 2-6 (3-pole version) or 2-8 and 2-10 (4-pole version).
Technical data of mechanical latch G495 type is stated on page 2-26.

MECHANICAL INTERLOCK BETWEEN CONTACTORS ONE ON TOP OF THE OTHER B145.....B1600... (Fig. 1, 2 and 3)
It is G356... type, which is provided in six types to allow different fixing interaxis of contactors.
Contactors of the same size can be interlocked as well as different sizes.

The tables below indicate the interaxis which can be obtained with the various interlock types; with terminal protections (INTERAXIS A) and without terminal protection (INTERAXIS B).

INTERAXIS A [mm] - For contactors with terminal protection (Fig. 1)

KM1	B145-B180			B250-B310-B400			B500-B630		
KM2	B145 B180	B250 B310 B400	B500 B630	B145 B180	B250 B310 B400	B500 B630	B145 B180	B250 B310 B400	B500 B630
G356 1	–	–	–	–	–	–	–	–	–
G356 2	286...305	–	–	–	–	–	–	–	–
G356 3	305...345	330...345	–	330...345	–	–	–	–	–
G356 4	345...385	345...385	375...385	345...385	372...385	–	375...385	–	–
G356 5	390...425	390...425	390...425	390...425	390...425	420...425	390...425	420...425	–
G356 6	470...500	470...500	470...500	470...500	470...500	470...500	470...500	470...500	470...500

INTERAXIS B [mm] - For contactors without terminal protection (Fig. 2)

KM1	B145-B180			B250-B310-B400			B500-B630		
KM2	B145 B180	B250 B310 B400	B500 B630	B145 B180	B250 B310 B400	B500 B630	B145 B180	B250 B310 B400	B500 B630
G356 1	225...265	–	–	–	–	–	–	–	–
G356 2	265...305	265...305	–	265...305	265...305	–	–	–	–
G356 3	305...345	305...345	305...345	305...345	305...345	305...345	305...345	305...345	–
G356 4	345...385	345...385	345...385	345...385	345...385	345...385	345...385	345...385	345...385
G356 5	390...425	390...425	390...425	390...425	390...425	390...425	390...425	390...425	390...425
G356 6	470...500	470...500	470...500	470...500	470...500	470...500	470...500	470...500	470...500

To interlock two contactors B630 1000, use type G356 6 only.
To interlock two contactors B1250 or B1600, it is imperative to use two pieces of type G356 6 (fig. 3), one fixed on the left side and the other on the right.

Interaxis B is 470-500mm for B630 1000, B1250 or B1600.
The B1250 or B1600 cannot be interlocked with the other types of the B series.

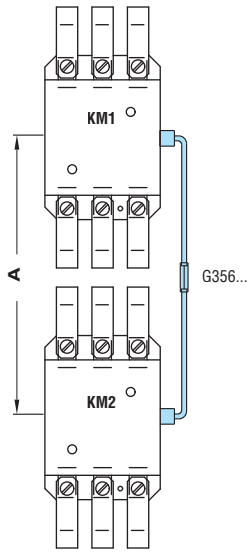


Fig. 1

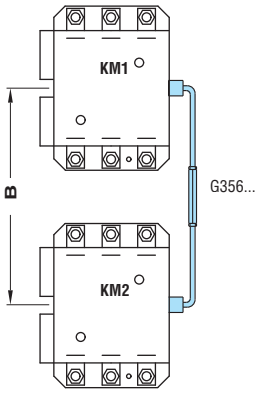


Fig. 2

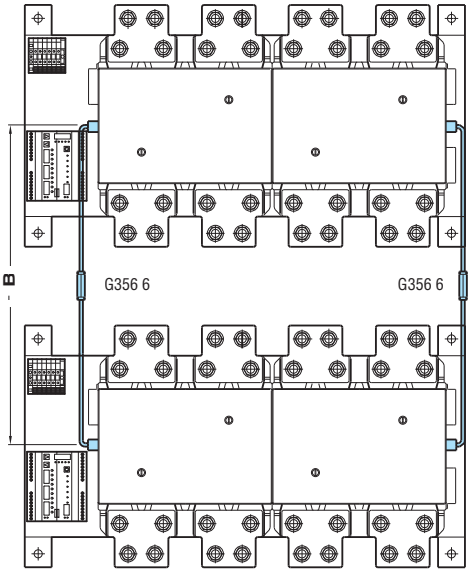
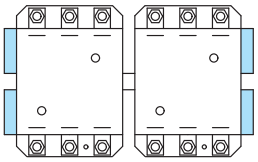


Fig. 3

Horizontal interlock between contactors side by side B145 to B630 1000.
It is G355 type and can interlock both contactors of equal size and contactors of different sizes (e.g. B145 can be interlocked with B630).
For contactor B630 1000 (three-pole), contact our Technical support office.
This interlock cannot be applied to contactors B1250-B1600.

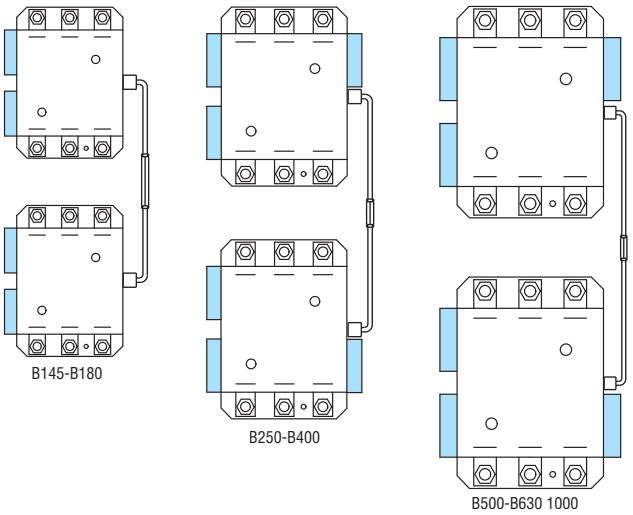
With mechanical interlock:

– horizontal G355



B145-B630

– vertical G356/...



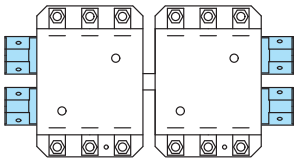
B145-B180

B250-B400

B500-B630 1000

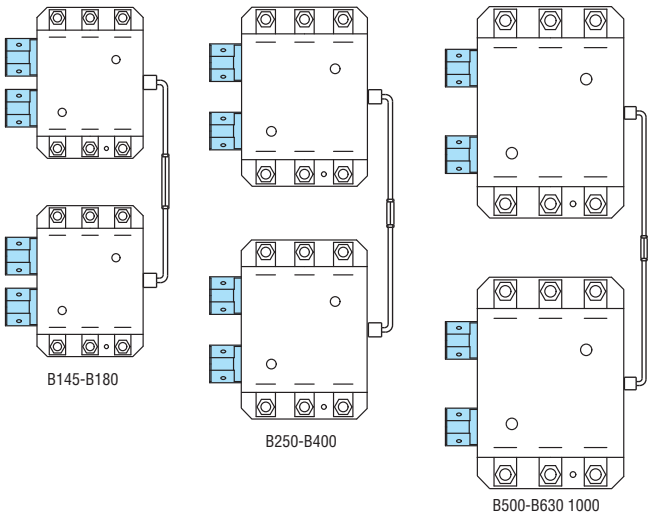
With mechanical interlock:

– horizontal G355



B145-B630

– vertical G356/...



B145-B180

B250-B400

B500-B630 1000

Motor protection relays

- Thermal overload relays for currents between 0.09 and 420A
- Electronic thermal overload relays for currents between 0.4 and 110A
- Electronic thermal overload relays with selectable tripping class: 5-10-20-30
- Phase failure sensitive and non phase failure sensitive versions
- Automatic and/or manual resetting
- Independent or direct mounting on contactor
- Thermistor protection relay.

Type of contactor	TYPE OF THERMAL OVERLOAD RELAY				Pages	ELECTRONIC THERMAL OVERLOAD RELAYS	Pages
	Phase failure / single phase sensitive		Non phase failure / non single phase sensitive			Phase failure / single phase sensitive Manual/hand or automatic reset	
	Manual/hand reset	Automatic reset	Manual/hand reset	Automatic reset			
BG06...BG12	**RF9**	**RFA9**	**RFN9**	**RFNA9**	3-2 and 3-3	—	—
BF09...BF38	**RF38**		**RFN38**		3-4...3-6	RFE45	3-11
BF40...BF94	**RF82**	**RFA82**	**RFN82**	**RFNA82**	3-5 and 3-7	RFE45 / RFE110❶	3-11
BF95...BF150	**RF110**	**RFA110**	**RFN110**	**RFNA110**	3-4...3-7	RFE110❶	3-11
B145...B180	**RF200**		**RFN200**		3-8 and 3-9	—	—
B250...B400	**RF400**		**RFN400**				

❶ Independent mounting RFE110

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FOR BG SERIES MINI-CONTACTORS
- Type RF9, phase failure sensitive, manual resetting
- Type RFA9, phase failure sensitive, automatic resetting
- Type RFN9, non phase failure sensitive, manual resetting
- Type RFNA9, non phase failure sensitive, automatic resetting.

Page 3-4

FOR BF SERIES CONTACTORS
- Type RF38, phase failure sensitive, manual or automatic resetting
- Type RFN38, non phase failure sensitive, manual or automatic resetting
- Type RF82 and RF110, phase failure sensitive, manual resetting
- Type RFA82 and RFA110, phase failure sensitive, automatic resetting
- Type RFN82 and RFN110, non phase failure sensitive, manual resetting
- Type RFNA82 and RFNA110, non phase failure sensitive, automatic resetting.

Page 3-8

FOR B SERIES CONTACTORS
- Type RF200 and RF420, phase failure sensitive, manual or automatic resetting
- Type RFN200 and RFN420, non phase failure sensitive, manual or automatic resetting.

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ELECTRONIC THERMAL OVERLOAD RELAYS FOR BF SERIES CONTACTORS
- Phase failure sensitive, manual or automatic resetting
- Selectable tripping class: 5-10-20-30
- High reliability and accuracy of tripping
- Minimal heat dissipation
- Wide current adjustment range.

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THERMISTOR PROTECTION RELAY
- 24VDC and 24 to 240VAC supply types.

IE3 READY

LOVATO Electric motor protection relays are suitable for new motors with high IE3 efficiency values

RF38 features

FRONT PROTECTION COVER OF THERMAL OVERLOAD RELAYS
A sealable protection cover is available. When fitted on to the relay front, it precludes all possible adjuster tampering and involuntary activation of the "Reset" and "Stop" buttons of the thermal overload relay.

CLEAR IDENTIFICATION OF THERMAL OVERLOAD RELAY MANUAL OR AUTOMATIC RESETTING
The RF38 thermal overload relay is supplied configured for manual resetting. Breaking the plate below the "Reset" button allows for the automatic resetting configuration.

FIXING EASE OF THE THERMAL OVERLOAD RELAY
While the thermal overload relay is being linked to the contactor, its auxiliary contact fits on and connects to the coil terminal by rigid terminal. Complete relay fixing is done in a single operation, with no need of other connections.

SEALABLE RELAY COVER
A handy closing flap feature excludes any tampering of the thermal overload relay adjuster.

Lovato electric

Phase failure / single phase sensitive Three poles (three phase)

11 RF9...

11 RFA9...

Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL K5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL RESETTING. Direct mounting on BG06, BG09, BG12 mini-contactors.						
11 RF9 015	0.09...0.15	0.25	—	—	1	0.116
11 RF9 023	0.14...0.23	0.5	—	1	1	0.116
11 RF9 033	0.2...0.33	0.5	1	1	1	0.116
11 RF9 05	0.3...0.5	1	2	3	1	0.116
11 RF9 075	0.45...0.75	1	2	3	1	0.116
11 RF9 1	0.6...1	2	4	3	5	0.116
11 RF9 1V5	0.9...1.5	2	4	6	5	0.116
11 RF9 2V3	1.4...2.3	4	6	10	5	0.116
11 RF9 33	2...3.3	4	10	10	5	0.116
11 RF9 5	3...5	6	16	15	5	0.116
11 RF9 75	4.5...7.5	8	20	25	5	0.116
11 RF9 10	6...10	10	32	30	5	0.116
11 RF9 15	9...15	16	40	45	5	0.116
AUTOMATIC RESETTING. Direct mounting on BG06, BG09, BG12 mini-contactors.						
11 RFA9 015	0.09...0.15	0.25	—	—	1	0.116
11 RFA9 023	0.14...0.23	0.5	—	1	1	0.116
11 RFA9 033	0.2...0.33	0.5	1	1	1	0.116
11 RFA9 05	0.3...0.5	1	2	3	1	0.116
11 RFA9 075	0.45...0.75	1	2	3	1	0.116
11 RFA9 1	0.6...1	2	4	3	1	0.116
11 RFA9 1V5	0.9...1.5	2	4	6	1	0.116
11 RFA9 2V3	1.4...2.3	4	6	10	1	0.116
11 RFA9 33	2...3.3	4	10	10	1	0.116
11 RFA9 5	3...5	6	16	15	1	0.116
11 RFA9 75	4.5...7.5	8	20	25	1	0.116
11 RFA9 10	6...10	10	32	30	1	0.116
11 RFA9 15	9...15	16	40	45	1	0.116

NOTE: Two-pole (single phase) versions are available on request.
Add the letter "S" in the order code e.g. 11RF9015 is three pole; 11RFS9015 two pole.
The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

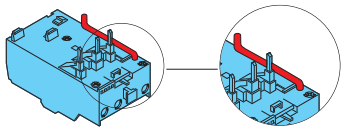
Three-phase IEC motor powers ❶

230V [kW]	400V [kW]	500V [kW]	690V [kW]
❷	❷	❷	0.06
❷	0.06	0.06	0.09
❷	0.09	0.09	0.12
0.06	0.12	0.12	0.18
0.09-0.12	0.18	0.18	0.25-0.37
0.12	0.25	0.25-0.37	0.55
0.18	0.37	0.55	0.75
0.25-0.37	0.55-0.75	0.75	1.1-1.5
0.55	1.1	1.1-1.5	1.5-2.2
0.75	1.5	2.2	3
1.1-1.5	2.2-3	3-4	4-5.5
2.2	4	4-5.5	7.5
3	5.5	7.5	11
❷	❷	❷	0.06
❷	0.06	0.06	0.09
❷	0.09	0.09	0.12
0.06	0.12	0.12	0.18
0.09-0.12	0.18	0.18	0.25-0.37
0.12	0.25	0.25-0.37	0.55
0.18	0.37	0.55	0.75
0.25-0.37	0.55-0.75	0.75	1.1-1.5
0.55	1.1	1.1-1.5	1.5-2.2
0.75	1.5	2.2	3
1.1-1.5	2.2-3	3-4	4-5.5
2.2	4	4-5.5	7.5
3	5.5	7.5	11

❶ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.
❷ No standard power ratings exist; select relay according to current consumption.

NOTE: to facilitate connection between the auxiliary NC contact of the RF...9 thermal relay and terminal A2 of the contactor, insert the conductor into the appropriate conduit as shown.

RF9...
RFA9...



Certifications and compliance
Certifications obtained:

Type	cULus	CSA	EAC	CCC
RF9... - RFA9...	●	●	●	●

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Non phase failure / non single phase sensitive Three poles (three phase)

11 RFN9...

11 RFNA9...

Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL K5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL RESETTING. Direct mounting on BG06, BG09, BG12 mini-contactors.						
11 RFN9 015	0.09...0.15	0.25	—	—	1	0.123
11 RFN9 023	0.14...0.23	0.5	—	1	1	0.123
11 RFN9 033	0.2...0.33	0.5	1	1	1	0.123
11 RFN9 05	0.3...0.5	1	2	3	1	0.123
11 RFN9 075	0.45...0.75	1	2	3	1	0.123
11 RFN9 1	0.6...1	2	4	3	1	0.123
11 RFN9 1V5	0.9...1.5	2	4	6	1	0.123
11 RFN9 2V3	1.4...2.3	4	6	10	1	0.123
11 RFN9 33	2...3.3	4	10	10	1	0.123
11 RFN9 5	3...5	6	16	15	1	0.123
11 RFN9 75	4.5...7.5	8	20	25	1	0.123
11 RFN9 10	6...10	10	32	30	1	0.123
11 RFN9 15	9...15	16	40	45	1	0.123
AUTOMATIC RESETTING. Direct mounting on BG06, BG09, BG12 mini-contactors.						
11 RFNA9 015	0.09...0.15	0.25	—	—	1	0.123
11 RFNA9 023	0.14...0.23	0.5	—	1	1	0.123
11 RFNA9 033	0.2...0.33	0.5	1	1	1	0.123
11 RFNA9 05	0.3...0.5	1	2	3	1	0.123
11 RFNA9 075	0.45...0.75	1	2	3	1	0.123
11 RFNA9 1	0.6...1	2	4	3	1	0.123
11 RFNA9 1V5	0.9...1.5	2	4	6	1	0.123
11 RFNA9 2V3	1.4...2.3	4	6	10	1	0.123
11 RFNA9 33	2...3.3	4	10	10	1	0.123
11 RFNA9 5	3...5	6	16	15	1	0.123
11 RFNA9 75	4.5...7.5	8	20	25	1	0.123
11 RFNA9 10	6...10	10	32	30	1	0.123
11 RFNA9 15	9...15	16	40	45	1	0.123

NOTE: The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

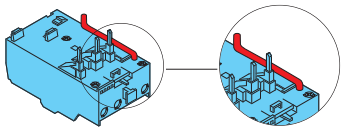
Three-phase IEC motor powers ❶

230V	400V	500V	690V
[kW]	[kW]	[kW]	[kW]
❷	❷	❷	0.06
❷	0.06	0.06	0.09
❷	0.09	0.09	0.12
0.06	0.12	0.12	0.18
0.09-0.12	0.18	0.18	0.25-0.37
0.12	0.25	0.25-0.37	0.55
0.18	0.37	0.55	0.75
0.25-0.37	0.55-0.75	0.75	1.1-1.5
0.55	1.1	1.1-1.5	1.5-2.2
0.75	1.5	2.2	3
1.1-1.5	2.2-3	3-4	4-5.5
2.2	4	4-5.5	7.5
3	5.5	7.5	11
❷	❷	❷	0.06
❷	0.06	0.06	0.09
❷	0.09	0.09	0.12
0.06	0.12	0.12	0.18
0.09-0.12	0.18	0.18	0.25-0.37
0.12	0.25	0.25-0.37	0.55
0.18	0.37	0.55	0.75
0.25-0.37	0.55-0.75	0.75	1.1-1.5
0.55	1.1	1.1-1.5	1.5-2.2
0.75	1.5	2.2	3
1.1-1.5	2.2-3	3-4	4-5.5
2.2	4	4-5.5	7.5
3	5.5	7.5	11

❶ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.
❷ No standard power ratings exist; select relay according to current consumption.

NOTE: to facilitate connection between the auxiliary NC contact of the RFN...9 thermal relay and terminal A2 of the contactor, insert the conductor into the appropriate conduit as shown.

RFN9...
RFNA9...



Certifications and compliance
Certifications obtained:

Type	cULus	CSA	EAC	CCC
RFN9... - RFNA9...	●	●	●	●

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Phase failure / single phase sensitive Three poles (three phase)

RF38...

Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL RK5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL OR AUTOMATIC RESETTING. Direct mounting on BF09...BF38 contactors. Independent mounting with RFX38 04 base.						
RF38 0016	0.1...0.16	0.25	—	1	1	0.160
RF38 0025	0.16...0.25	0.5	—	1	1	0.160
RF38 0040	0.25...0.4	0.5	1	3	1	0.160
RF38 0063	0.4...0.63	1	2	3	1	0.160
RF38 0100	0.63...1	2	4	3	5	0.160
RF38 0160	1...1.6	2	4	6	5	0.160
RF38 0250	1.6...2.5	4	6	10	5	0.160
RF38 0400	2.5...4	4	6	15	5	0.160
RF38 0650	4...6.5	8	16	25	5	0.160
RF38 1000	6.3...10	10	20	40	5	0.160
RF38 1400	9...14	16	32	50	5	0.160
RF38 1800	13...18	25	40	70	5	0.160
RF38 2300	17...23	25	50	90	5	0.160
RF38 2500	20...25	32	50	100	5	0.160
RF38 3200	24...32	40	63	120	1	0.160
RF38 3800	32...38	40	63	150	1	0.160

NOTE: Two pole (single phase) versions are available on request.
Add the letter "S" in the order code e.g. RF381000 is three pole; RFS381000 two pole.
The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

Three-phase IEC motor powers ❸

230V [kW]	400V [kW]	500V [kW]	690V [kW]
❷	❷	❷	0.06
❷	0.06	0.06-0.09	0.09-0.12
0.06	0.09	0.12	0.18
0.09	0.12-0.18	0.18	0.25
0.12	0.25	0.25-0.37	0.37-0.55
0.18-0.25	0.37-0.55	0.55-0.75	0.75
0.37	0.75	1.1	1.1-1.5
0.55-0.75	1.1-1.5	1.5-2.2	2.2-3
1.1-1.5	2.2	3	4
1.5-2.2	3-4	4-5.5	5.5-7.5
3	5.5	5.5-7.5	11
4	7.5	11	15
5.5	11	11	18.5
5.5	11	15	22
7.5	15	18.5	30
11	18.5	22	30

❷ No standard powers ratings exist; select relay according to current consumption.
❸ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.

Certifications and compliance
Certifications obtained:

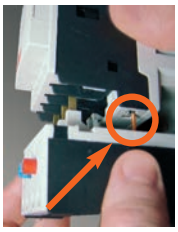
Type	cULus	CSA	EAC	CCC	Register of shipping LROS
RF38	●	—	●	●	—

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 82A FLA range and 10000 Amps RMS for 95A and 110A FLA range; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

FIXING EASE OF THE THERMAL OVERLOAD RELAY
While the thermal overload relay is being linked to the contactor, its auxiliary contact fits on and connects to the coil terminal by rigid terminal. Complete relay fixing is done in a single operation, with no need of other connections.



Phase failure / single phase sensitive Three poles (three phase)

RF82...

RF110...

RFA82...

RFA110...

	Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL RK5	Qty per pkg	Wt
		[A]	[A]	[A]	[A]	n°	[kg]
	MANUAL RESETTING. Direct mounting on BF40...BF94 contactors. Independent mounting with 11 G270 base.						
	RF82 3300	20...33	40	63	110	1	0.365
	RF82 4200	28...42	50	80	150	1	0.365
	RF82 5000	35...50	50	100	175	1	0.365
	RF82 6500	46...65	80	125	200	1	0.365
new	**RF82 8200**	60...82	100	200	250	1	0.365
new	**RF82 9500**	70...95	100	200	250	1	0.365
	MANUAL RESETTING. Direct mounting on BF95...BF150 contactors. Independent mounting with 11 G270 base.						
new	**RF110 082**	60...82	100	200	250	1	0.365
new	**RF110 095**	70...95	100	200	350	1	0.365
new	**RF110 110**	90...110	125	200	350	1	0.365
	AUTOMATIC RESETTING. Direct mounting on BF40...BF94 contactors. Independent mounting with 11 G270 base.						
	RFA82 3300	20...33	40	63	110	1	0.365
	RFA82 4200	28...42	50	80	150	1	0.365
	RFA82 5000	35...50	50	100	175	1	0.365
	RFA82 6500	46...65	80	125	200	1	0.365
new	**RFA82 8200**	60...82	100	200	250	1	0.365
new	**RFA82 9500**	70...95	100	200	250	1	0.365
	AUTOMATIC RESETTING. Direct mounting on BF95...BF150 contactors. Independent mounting with 11 G270 base.						
new	**RFA110 082**	60...82	100	200	250	1	0.365
new	**RFA110 095**	70...95	100	200	350	1	0.365
new	**RFA110 110**	90...110	125	200	350	1	0.365

NOTE: Two pole (single phase) versions are available on request.
Add the letter "S" in the order code e.g. RF828200 is three pole; RFS828200 two pole.
The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

Three-phase IEC motor powers ❷

230V [kW]	400V [kW]	500V [kW]	690V [kW]
7.5	11-15	15-18.5	22-25
9-10	15-18.5	22-25	30-33
10-11	22	30	37-40
15-18.5	25-30	33-40	45-55
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22-25	40-45	55-63	75-80
30	55	75	90
7.5	11-15	15-18.5	22-25
9-10	15-18.5	22-25	30-33
10-11	22	30	37-40
15-18.5	25-30	33-40	45-55
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22-25	40-45	55-63	75-80
30	55	75	90

❷ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range

Certifications and compliance
Certifications obtained:

Type	c UL us	CSA	EAC	Register of shipping LROS
RF82	●	—	●	—
RFA82	●	—	●	—
RF110	●	—	—	—
RFA110	●	—	—	—

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 82A FLA range and 10000 Amps RMS for 95A and 110A FLA range; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

FIXING EASE OF THE THERMAL OVERLOAD RELAY
While the thermal overload relay is being linked to the contactor, its auxiliary contact fits on and connects to the coil terminal by rigid terminal. Complete relay fixing is done in a single operation, with no need of other connections.

Non phase failure / non single phase sensitive Three poles (three phase)

RFN38...

Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL RK5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL OR AUTOMATIC RESETTING. Direct mounting on BF09...BF38 contactors. Independent mounting with RFX38 04 base.						
RFN38 0016	0.1...0.16	0.25	—	1	1	0.160
RFN38 0025	0.16...0.25	0.5	—	1	1	0.160
RFN38 0040	0.25...0.4	0.5	1	3	1	0.160
RFN38 0063	0.4...0.63	1	2	3	1	0.160
RFN38 0100	0.63...1	2	4	3	1	0.160
RFN38 0160	1...1.6	2	4	6	1	0.160
RFN38 0250	1.6...2.5	4	6	10	1	0.160
RFN38 0400	2.5...4	4	6	15	1	0.160
RFN38 0650	4...6.5	8	16	25	1	0.160
RFN38 1000	6.3...10	10	20	40	1	0.160
RFN38 1400	9...14	16	32	50	1	0.160
RFN38 1800	13...18	25	40	70	1	0.160
RFN38 2300	17...23	25	50	90	1	0.160
RFN38 2500	20...25	32	50	100	1	0.160
RFN38 3200	24...32	40	63	125	1	0.160
RFN38 3800	32...38	40	63	150	1	0.160

NOTE: The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

Three-phase IEC motor powers ❸

230V [kW]	400V [kW]	500V [kW]	690V [kW]
❷	❷	❷	0.06
❷	0.06	0.06-0.09	0.09-0.12
0.06	0.09	0.12	0.18
0.09	0.12-0.18	0.18	0.25
0.12	0.25	0.25-0.37	0.37-0.55
0.18-0.25	0.37-0.55	0.55-0.75	0.75
0.37	0.75	1.1	1.1-1.5
0.55-0.75	1.1-1.5	1.5-2.2	2.2-3
1.1-1.5	2.2	3	4
1.5-2.2	3-4	4-5.5	5.5-7.5
3	5.5	5.5-7.5	11
4	7.5	11	15
5.5	11	11	18.5
5.5	11	15	22
7.5	15	18.5	30
11	18.5	22	30

❷ No standard power ratings exist; select relay according to current consumption.
❸ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.

Certifications and compliance
Certifications obtained:

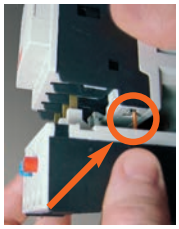
Type	c UL us	CSA	EAC	CCC
RFN38	●	—	●	●

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 82A FLA range and 10000 Amps RMS for 95A and 110A FLA range; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

FIXING EASE OF THE THERMAL OVERLOAD RELAY
While the thermal overload relay is being linked to the contactor, its auxiliary contact fits on and connects to the coil terminal by rigid terminal. Complete relay fixing is done in a single operation, with no need of other connections.



Non phase failure / non single phase sensitive Three poles (three phase)

RFN82...

RFN110...

RFNA82...

RFNA110...

Order code	Adjustment range	Protection fuses IEC aM	gG	UL K5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL RESETTING. Direct mounting on BF40...BF94 contactors. Independent mounting with 11 G270 base.						
RFN82 4200	28...42	50	80	150	1	0.365
RFN82 5000	35...50	50	100	175	1	0.365
RFN82 6500	46...65	80	125	200	1	0.365
RFN82 8200	60...82	100	200	250	1	0.365
RFN82 9500	70...95	100	200	250	1	0.365
MANUAL RESETTING. Direct mounting on BF95...BF150 contactors. Independent mounting with 11 G270 base.						
RFN110 082	60...82	100	200	250	1	0.365
RFN110 095	70...95	100	200	350	1	0.365
RFN110 110	90...110	125	200	350	1	0.365
AUTOMATIC RESETTING. Direct mounting on BF40...BF94 contactors. Independent mounting with 11 G270 base.						
RFNA82 4200	28...42	50	80	150	1	0.365
RFNA82 5000	35...50	50	100	175	1	0.365
RFNA82 6500	46...65	80	125	200	1	0.365
RFNA82 8200	60...82	100	200	250	1	0.365
RFNA82 9500	70...95	100	200	250	1	0.365
AUTOMATIC RESETTING. Direct mounting on BF95...BF150 contactors. Independent mounting with 11 G270 base.						
RFNA110 082	60...82	100	200	250	1	0.365
RFNA110 095	70...95	100	200	350	1	0.365
RFNA110 110	90...110	125	200	350	1	0.365

NOTE: The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

Three-phase IEC motor powers ❷

230V	400V	500V	690V
[kW]	[kW]	[kW]	[kW]
9-10	15-18.5	22-25	30-33
10-11	22	30	37-40
15-18.5	25-30	33-40	45-55
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22-25	40-45	55-63	75-80
30	55	75	90
9-10	15-18.5	22-25	30-33
10-11	22	30	37-40
15-18.5	25-30	33-40	45-55
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22	33-40	45-55	59-75
22-25	40-45	55-63	75-80
30	55	75	90

❷ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.

Certifications and compliance
Certifications obtained:

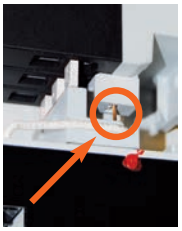
Type	c UL us	CSA	EAC
RFN82	●	—	●
RFNA82	●	—	●
RFN110	●	—	—
RFNA110	●	—	—

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 82A FLA range and 10000 Amps RMS for 95A and 110A FLA range; the trip current is 120% FLA.
CSA – CSA certified for Canada only (File 54332) as Auxiliary Devices for use with magnetic contactors.

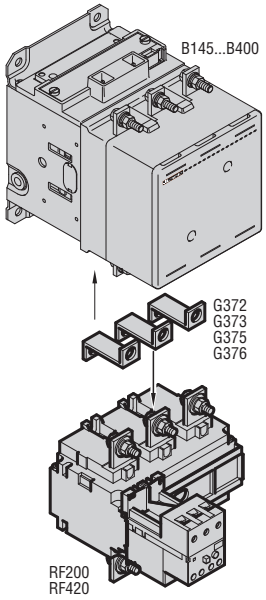
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

FIXING EASE OF THE THERMAL OVERLOAD RELAY
While the thermal overload relay is being linked to the contactor, its auxiliary contact fits on and connects to the coil terminal by rigid terminal. Complete relay fixing is done in a single operation, with no need of other connections.



Phase failure / single phase sensitive Three poles (three phase)

RF200... - RF420...



Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL K5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL OR AUTOMATIC RESETTING. Independent screw fixing or direct mounting on contactors: B145-B180 using G372 links. B250-B310-B400 using G373 links.						
RF200 100	60...100	100	160	500	1	2.150
RF200 125	75...125	125	200	500	1	2.150
RF200 150	90...150	160	250	500	1	2.150
RF200 200	120...200	200	315	500	1	2.150
Independent screw fixing or direct mounting on contactors: B145-B180 using G375 links B250-B310-B400 using G376 links						
RF420 250	150...250	250	400	800	1	2.460
RF420 300	180...300	315	500	800	1	2.460
RF420 420	250...420	500	630	800	1	2.460

NOTE: The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

RELAYS FOR B500 AND B630 CONTACTORS

MANUAL OR AUTOMATIC RESETTING.
Consult Technical support for the relative order codes and detailed information; see contact details on inside front cover.

Three-phase IEC motor powers ❶

230V	400V	550V	690V
[kW]	[kW]	[kW]	[kW]
18.5-25	33-51	45-63	59-92
22-37	40-63	55-80	75-110
25-45	51-80	63-100	92-140
37-59	75-100	92-140	129-184
45-75	92-132	110-162	140-220
55-92	100-162	129-198	180-280
75-110	129-198	180-280	250-368

NOTE: For 1000V powers, consult Technical support for information; see contact details on inside front cover.

❶ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment

Certifications and compliance
Certifications obtained:

Type	c UL us	EAC
RF200	●	●
RF420	●	●

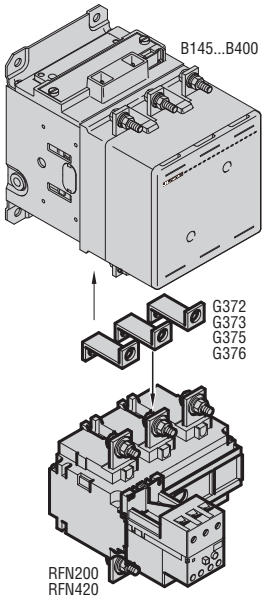
● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 150A FLA range, 10000 Amps RMS for 200A up to 300A FLA range and 18000 Amps for the 420A; the trip current is 120% FLA.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Non phase failure / non single phase sensitive Three poles (three phase)

RFN200... - RFN420...



Order code	Adjustment range	Protection fuses IEC aM	IEC gG	UL K5	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL OR AUTOMATIC RESETTING. Independent screw fixing or direct mounting on contactors: B145-B180 using G372 links. B250-B310-B400 using G373 links.						
RFN200 100	60...100	100	160	500	1	2.150
RFN200 125	75...125	125	200	500	1	2.150
RFN200 150	90...150	160	250	500	1	2.150
RFN200 200	120...200	200	315	500	1	2.150
Independent screw fixing or direct mounting on contactors: B145-B180 using G375 links. B250-B310-B400 using G376 links.						
RFN420 250	150...250	250	400	800	1	2.460
RFN420 300	180...300	315	500	800	1	2.460
RFN420 420	250...420	500	630	800	1	2.460

NOTE: The appropriate adjustment range of the overload relay should be selected on the basis of the motor nameplate full-load current when direct, across the line starting is considered.

RELAYS FOR B500 AND B630 CONTACTORS.

MANUAL OR AUTOMATIC RESETTING.
Consult Technical support for the relative order codes and detailed information; see contact details on inside front cover.

Three-phase IEC motor powers ❶

230V [kW]	400V [kW]	550V [kW]	690V [kW]
18.5-25	33-51	45-63	59-92
22-37	40-63	55-80	75-110
25-45	51-80	63-100	92-140
37-59	75-100	92-140	129-184
45-75	92-132	110-162	140-220
55-92	100-162	129-198	180-280
75-110	129-198	180-280	250-368

NOTE: For 1000V powers, consult Technical support for information; see contact details on inside front cover.

❶ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.

Certifications and compliance
Certifications obtained:

Type	c UL us	EAC
RFN200	●	●
RFN420	●	●

● Certified products.

cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices – Thermal Overload Relays, 600VAC, open type, ambient compensated, 5000 Amps RMS symmetrical short circuit rating up to 150A FLA range, 10000 Amps RMS for 200A up to 300A FLA range and 18000 Amps for the 420A; the trip current is 120% FLA.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

RFX38 02

RFX38 03

RFX38 04

11 G228

Order code	For relay		Qty per pkg	Wt
			n°	[kg]
Set of links for direct contactor mounting.				
11 G372	RF...200 on contactor	B145-B180	1	0.250
11 G373		B250-B310-B400	1	0.360
11 G375	RF...420 on contactor	B145-B180	1	0.313
11 G376		B250-B310-B400	1	0.500
Protection cover for thermal overload relay-contactor assembly.				
RFX38 02	RF38 on contactor BF09-BF12-BF18-BF25		10	0.014
RFX38 03	RF38 on contactor BF26-BF32-BF38		10	0.014
Protection shrouds for power terminals.				
11 G361	RF...200		6	0.026
11 G363	RF...420		6	0.046
Independent mounting. Screw fixing or 35mm DIN rail (IEC/EN 60715) mounting.				
RFX38 04	RF...38		5	0.082
11 G270	RF...82 - RF...110		10	0.148
Electrical reset.				
11 G228❶	RF...9 - RF...82 - RF...110		5	0.072
Sealing device.				
RFX38 01	RF...38 - RF...200 - RF...420		10	0.002
11 G233	RF...9 - RF...82 - RF...110		1	0.006

❶ Replace with voltage digit.
Standard voltages are:
– AC 50/60Hz 24V / 48V / 110-125V / 220-240V / 380-415V.

Operational characteristics
ELECTRICAL RESET G228

Control circuit voltage AC (50/60Hz)	V	12...550
Power consumption in AC	VA	300
Minimum reset time	ms	20
Terminals	Faston	6.3x0.8

NOTE: Coils can remain supplied for a maximum interval of 500ms; 3 consecutive operations are allowed, followed by a 5 minute interval. Reset only if at least 1min has passed from overload tripping.
It is recommended to use the wiring diagram on page 3-14.

INDEPENDENT MOUNTING
– Conductor cross section with one cable:
  • 6...10mm² / AWG 8 for RFX38 04
  • 35mm² / AWG 2 for 11 G270
– Tightening torque:
  • 2...2.5Nm / 1.5...1.8lbft for RFX38 04
  • 3.9Nm / 2.88lbft for 11 G270.

Certifications and compliance
Certifications obtained:

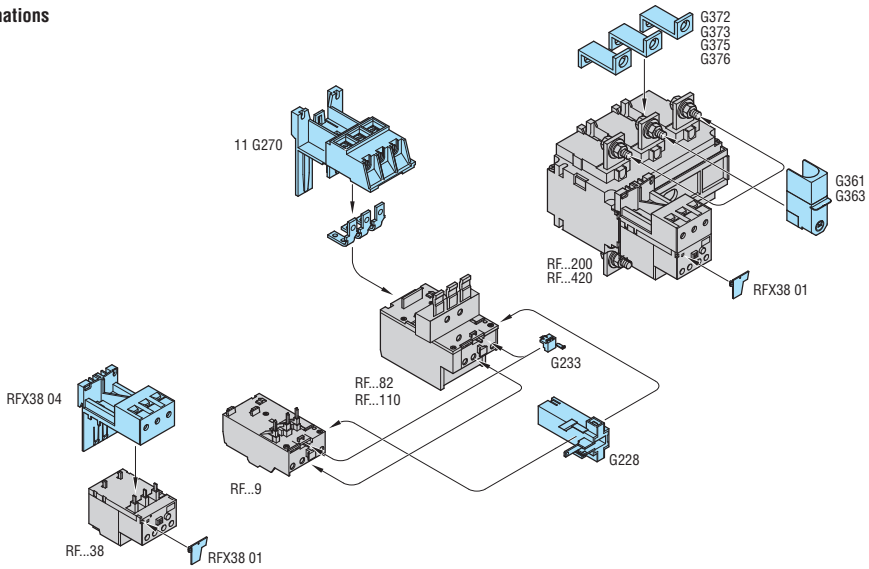
Type	c UL us	CSA	EAC
G361-G363-G372-G373-G375-G376	—	●	●
11 G270	●	—	●
RFX38 04	●	—	●

● Certified products.

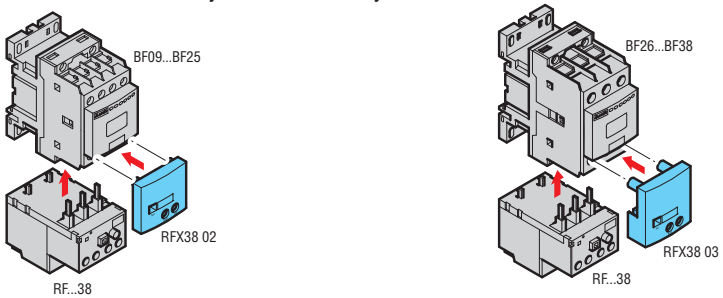
cULus – UL Listed for USA and Canada (cULus - File E93601) as Auxiliary Devices for thermal overload relays.
CSA – CSA certified for Canada only (File 54332) as Kits for industrial control equipment.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Combinations



Protection cover for thermal overload relay-contactor assembly



Phase failure / single phase sensitive Three poles (three phase)

RFE45…

new

RFE110

Order code	Adjustment range	Protection fuses IEC aM	gG	UL Class T	Qty per pkg	Wt
	[A]	[A]	[A]	[A]	n°	[kg]
MANUAL OR AUTOMATIC RESETTING. Direct mounting on BF09...BF38 contactors. Independent mounting with RFX38 04.						
RFE45 0200	0.4...2	4	6	125	1	0.195
RFE45 0800	1.6...8	10	20	125	1	0.195
RFE45 3200	6.4...32	40	63	125	1	0.195
RFE45 4500	9...45	50	63	125	1	0.195
MANUAL OR AUTOMATIC RESETTING. Independent mounting.						
RFE110 110	22...110	125	200	300	1	0.610

Three-phase IEC motor powers ❶

230V	400V	500V	690V
[kW]	[kW]	[kW]	[kW]
0.09...0.37	0.12...0.75	0.18...0.75	0.25...1.1
0.37...0.55	0.75...3	1.1...4	1.1...5.5
1.5...7.5	3...15	6.8...28	5.5...30
3...11	4...22	5.5...30	7.5...45
7.5...30	11...55	15...75	22...90

❶ The indicated powers apply to 4-pole motors; it is advisable to always check that the nameplate motor current is within the relay adjustment range.

General characteristics

The RFE… electronic thermal overload relays for BF series contactors are characterized by a wide current adjustment range and high reliability and accuracy of tripping. They are self powered by the main circuit current and therefore do not require separate auxiliary supply voltage. RFE electronic thermal overload relays are suitable for all types of motor starting thanks to the possibility to select several tripping classes. A single front push button is used to select the reset function, manual or automatic, and to activate or deactivate the STOP function.

Operational characteristics

- IEC power circuit rated insulation voltage Ui: 1000V
- IEC auxiliary circuit rated insulation voltage Ui: 690V
- rated impulse withstand voltage: 8kV
- rated frequency: 50/60Hz
- maximum rated current: 45A for RFE45, 110A for RFE110
- heat dissipation per phase: <1W
- selectable tripping classes: 5-10-20-30
- phase failure sensitive
- mounting position: any
- sealable current adjuster and dip switches for tripping class selection
- degree of protection: IP20 on front.

Certifications and compliance

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

Thermistor protection relays

31 DRPT...

Order code	Rated auxiliary supply voltage	Qty per pkg	Wt.
	[V]	n°	[kg]
DC supply (version for 35mm DIN rail IEC/EN 60715).			
31 DRPTC 24	24VDC❶	1	0.269
AC supply (version for 35mm DIN rail IEC/EN 60715).			
31 DRPT 24	24VAC	1	0.269
31 DRPT 110	110VAC	1	0.269
31 DRPT 220	220...240VAC	1	0.269
Accessories.			
Order code	Description	Qty per pkg	Wt
		n°	[kg]
31 CE106	Adapter for screw fixing of DRPT relay on mounting plate.	10	0.008

❶ Galvanic isolation between supply and measuring circuits does not exist.

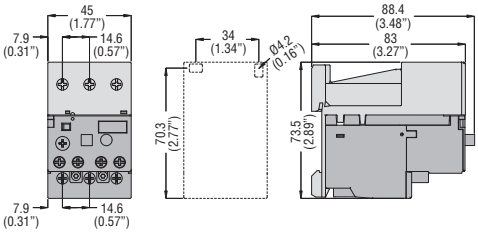
General characteristics
The DRPT is a thermal protection relay for motors equipped with thermistor PTC sensors immersed in the winding heads. The maximum number of thermistors to be used is limited by the resistance of all the sensors connected in series; total ohmic value is not to exceed 1.5kΩ at 25°C.
The DRPT type has fail-safe operation: the protective feature trips even in the case the PTC circuit is disconnected or there is a lack of voltage.
Resetting is manual or automatic.

Operational characteristics
– Supply circuit:
  • Rated frequency: 50-60Hz for AC types only
  • Operational limits: 0.85...1.1 Us
  • Maximum dissipation: 2.5W
  • Connection: permanent
– Measuring circuit:
  • Type of connectable PTC sensor: According to DIN 44081
  • Total PTC resistance at 25°C: ≤1.5kΩ
  • Tripping resistance: 2.7...3.1kΩ
  • Resetting resistance: 1.5...1.8kΩ
  • Voltage at PTC terminals: ≤ 2.5VDC
– Remote resetting:
  • Control: NC contact opening
  • Contact voltage: 5VDC
  • Current consumption: about 1mA
– Relay output:
  • Arrangement: 1 relay with 2 changeover contacts
  • Rated operational voltage Ue: 250VAC
  • Conventional free air thermal current Ith: 5A
  • Designation to IEC/EN 60947-5-1: B300
  • Mechanical life: $50x10^6$ cycles
  • Electrical life (with rated load): $2x10^5$ cycles
– Indications:
  • Green LED indicator for power ON
  • Red LED indicator for relay state TRIP
– Connections:
  • Conductor section $2x1.5mm^2$ with ferrule (max)
  • Tightening torque: 0.8-1.2Nm
– Ambient conditions:
  • Operating temperature: -10...+60°C
  • Storage temperature: -30...+80°C
– Housing:
  • Snap on 35mm DIN rail (IEC/EN 60715)
  • For screw fixing, use CE106 adapter
  • Degree of protection
    – IP40 housing
    – IP20 terminals.

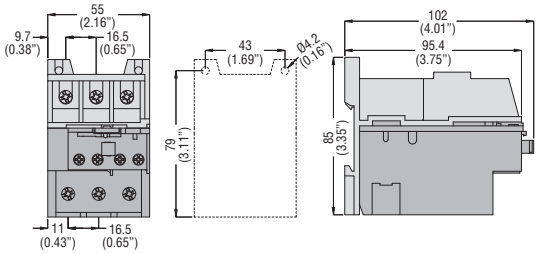
Certifications and compliance
Certifications obtained: EAC.
Compliant with standards: IEC/EN 60255-5.

ACCESSORIES FOR THERMAL OVERLOAD RELAYS

RFX38 04 base c/w RF...38 thermal relay

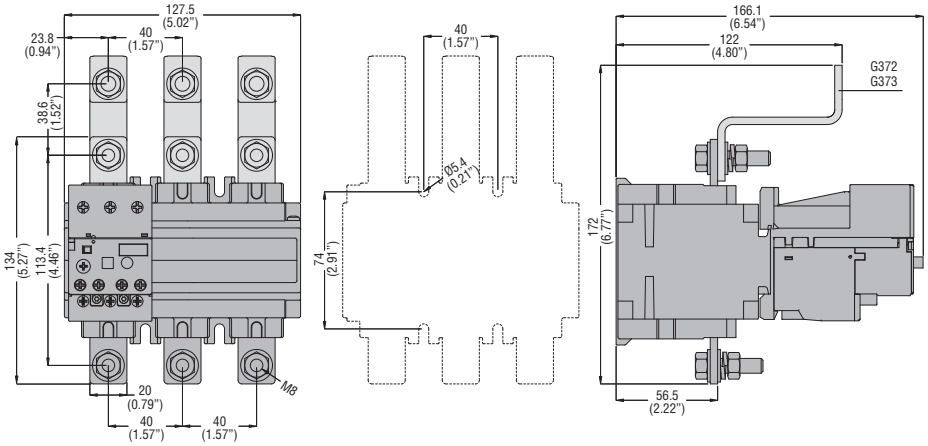


11 G270 base c/w RF...82 and RF...110 thermal relay

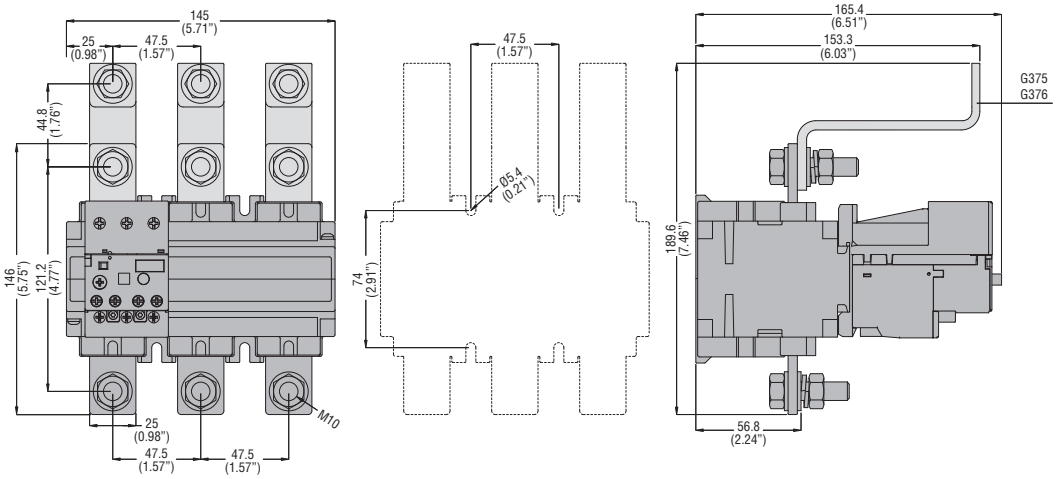


THERMAL RELAYS WITH LINKS

RF...200 with **G372** and **G373**



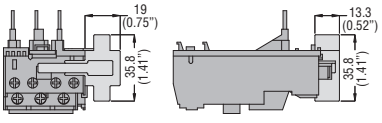
RF...420 with **G375** and **G376**



ADD-ON BLOCKS FOR THERMAL OVERLOAD RELAYS

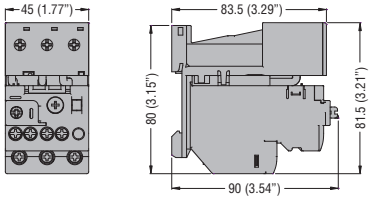
RF...9, RF...82 and RF...110

G228... reset

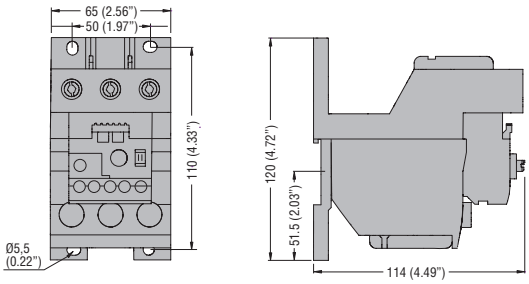


ELECTRONIC THERMAL OVERLOAD RELAYS

RFE45

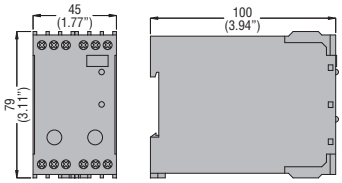


RFE110

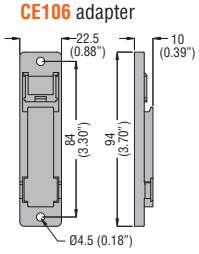


THERMISTOR PROTECTION RELAYS

DRPT

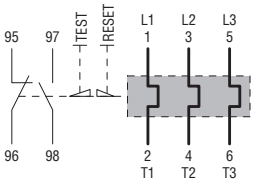


CE106 adapter

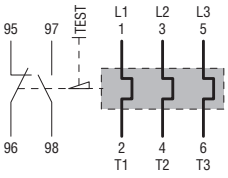


THERMAL OVERLOAD RELAYS FOR BG MINI-CONTACTORS

RF9 - RFN9

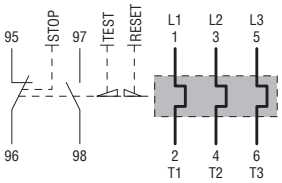


RFA9 - RFNA9

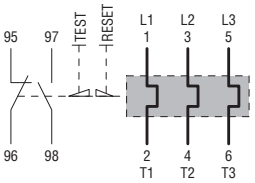


THERMAL OVERLOAD RELAYS FOR BF CONTACTORS

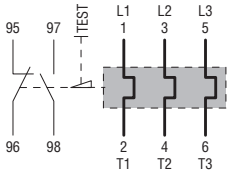
RF38 - RFN38



RF82 - RFN82 - RF110 - RFN110

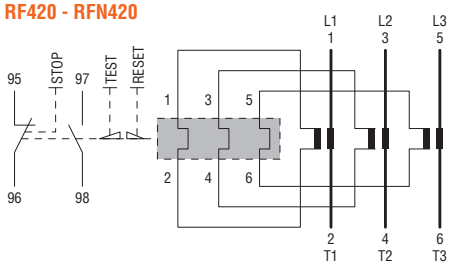


RFA82 - RFNA82 - RFA110 - RFNA110



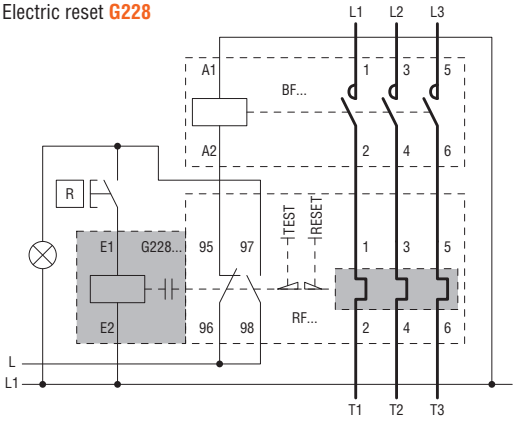
THERMAL OVERLOAD RELAYS FOR B CONTACTORS

RF200 - RFN200
RF420 - RFN420



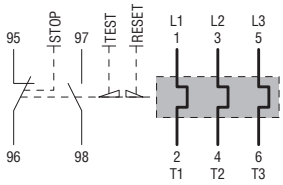
ADD-ON BLOCKS FOR THERMAL OVERLOAD RELAYS RF9 - RF110

Electric reset **G228**



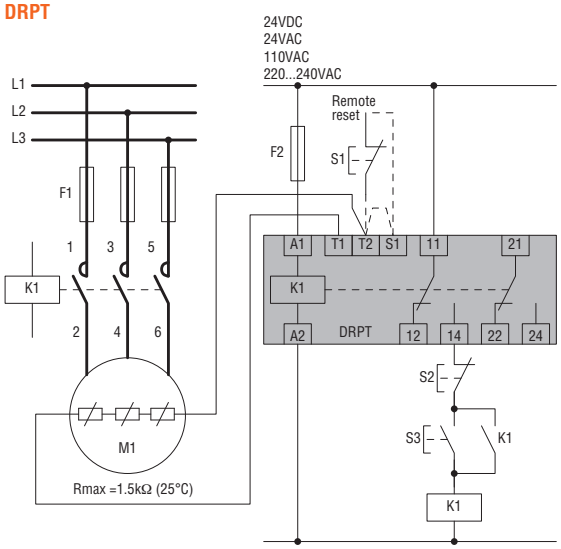
ELECTRONIC THERMAL OVERLOAD RELAYS

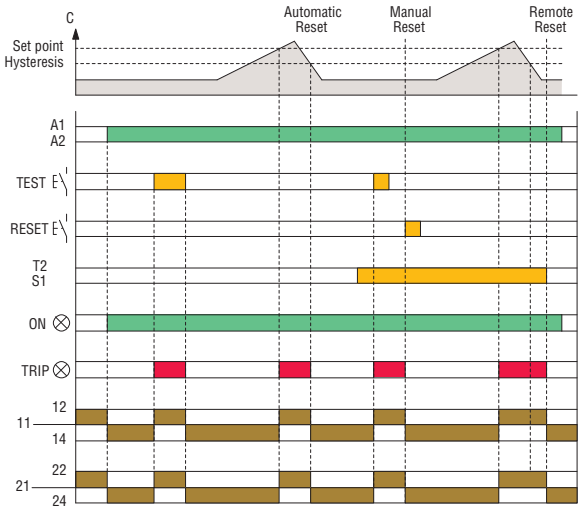
RFE45 - RFE110



THERMISTOR PROTECTION RELAYS

DRPT





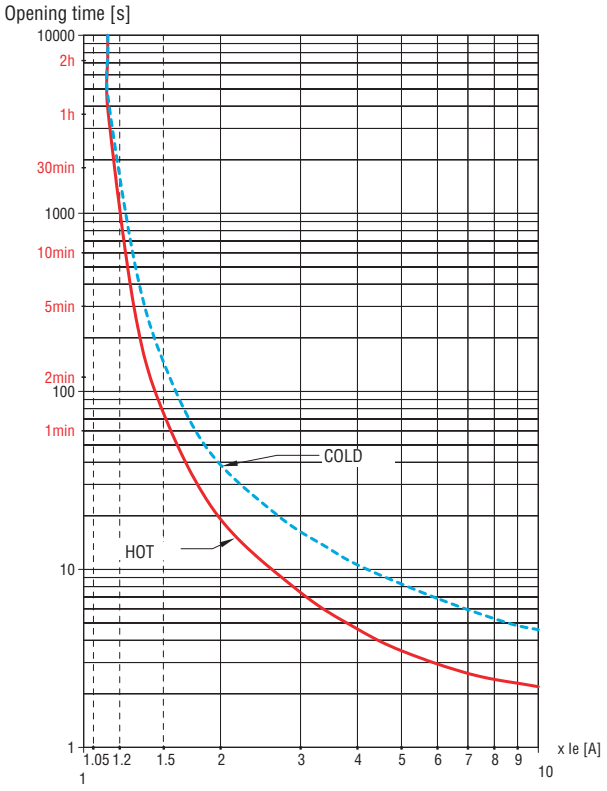
Phase failure/single phase sensitive manual reset Phase failure sensitive automatic reset Non phase failure/non single phase sensitive manual reset Non phase failure/non single phase sensitive automatic reset			RF9 RFA9 RFN9 RFNA9	RF38❶ RFN38❶	RF82-RF110 RFA82-RFA110 RFN82-RFN110 RFNA82-RFNA110		RFE45	RFE110	RF200❶ RFN200❶	RF420❶ RFN420❶
POWER CIRCUIT CHARACTERISTICS										
IEC rated insulation voltage Ui		V	690	690	690		1000	1000	1000	1000
IEC rated impulse withstand voltage Uimp		kV	8❼	6	8❼		6	6	6	6
Frequency limit		Hz	0...400	0...400	0...400		50...60	50...60	50...60	50...60
Operational range	from	A	0.09	0.1	20	60	0.4	22	60	150
	to	A	15	38	95	110	45	110	200	420 ❷
Tripping class			10A				5-10-20-30		10A	
Particular characteristics			Test button - Trip indicator							
Connection			Direct				With current transformers ❸			
Terminals	Type		Screw and washer		Yoke clamp		Screw and washer	Yoke clamp	Screw and flat washer	
	Screw		M4	M4	M5		M4	M6	M8	M10
	Terminal width	mm	9.8	12.6	9		12	9	20	25
	Phillips	n°	2	2	2		2	4❻	13mm❹	18mm❹
Tightening torque for power terminals		Nm	2.3	2...2.5	3.9		3.1	9	18	35
		lbft	1.7	1.5...1.8	2.88		2.3	6.6	13.3	25.9
Maximum conductor section connectable										
	AWG	N°	10	8	2		6	1/0	–	–
	Flexible w/o lug	mm^2	6	10	35		16	50	–	–
	Flexible c/w lug	mm^2	10	6	–		10	35	150	2 x 150
	Bar	mm	–	–	–		–	–	25 x 3	30 x 5
Dissipation per phase		W	0.7...2.4	0.7...2.4	2.0...4.2		<1	<1	0.7...2.4	0.7...2.4
AUXILIARY CIRCUIT CHARACTERISTICS										
Available contacts	NO	N°	1							
	NC	N°	1							
IEC rated insulation voltage		V	690							
IEC conventional free air thermal current Ith		A	10				5		10	
Terminals with screw and washer	Screw		M3.5							
	Terminal width	mm	8				7		8	
	Phillips	n°	1	2	1		2	2	2	2
Maximum conductor section connectable										
	Flexible w/o lug	mm^2	2.5							
	Flexible c/w lug	mm^2	2.5							
Tightening torque for auxiliary terminals		Nm	1	0.8...1	1		0.8	0.8	0.8...1	0.8...1
		lbft	0.74	0.59...0.74	0.74		0.6	0.6	0.59...0.74	0.59...0.74
UL/CSA and IEC/EN 60947-5-1 designation			B600-P600 ❺	B600-R300	B600-P600 ❺		B600-R300	B600-R300	B600-R300	B600-R300
AMBIENT CONDITIONS										
Operating temperature		°C	-20...+55	-25...+60	-20...+55		-25...+70	-25...+70	-25...+60	-25...+60
Storage temperature		°C	-55...+70	-50...+70	-55...+70		-55...+80	-55...+80	-50...+70	-50...+70
Compensation temperature		°C	-15...+55	-20...+60	-15...+55		-25...+70	-25...+70	-20...+60	-20...+60
Maximum altitude		m	3000							
Operation position	normal		On vertical plane							
	Allowable		±30°							
Mounting			On contactor or separately (RFE110 separately only)							

❶ With manual and automatic resetting.
❷ For currents higher than 420A, consult Technical support for information; see contact details on inside front cover.
❸ Standard supplied.
❹ Metric wrench/spanner.
❺ C600-R300 for automatic reset type.
❻ Allen key.
❼ 6kV for auxiliary terminals.

TRIP CHARACTERISTIC FOR RF THERMAL OVERLOAD RELAYS (AVERAGE TIME)

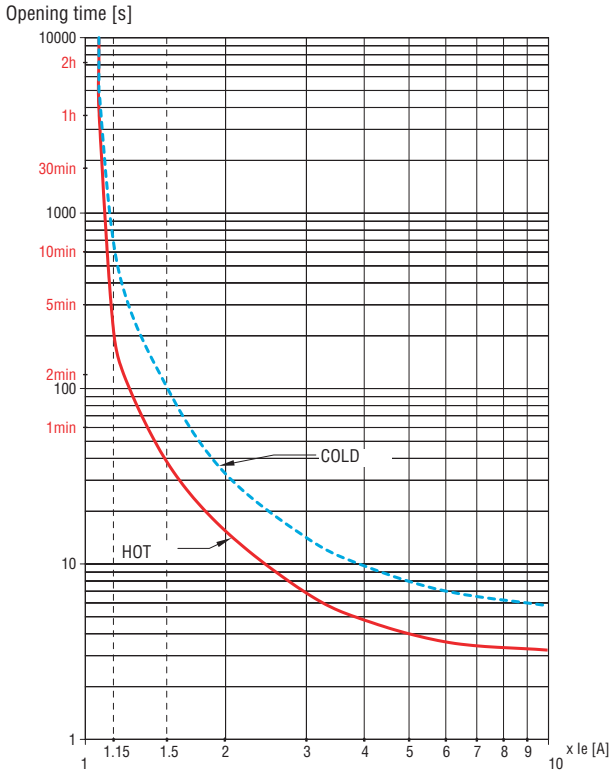
Three-phase balanced operation

RF9 RF38 RF82 RF110
RFA9 RFN38 RFA82 RFA110
RFN9 RFN82 RFN110
RFNA9 RFNA82 RFNA110

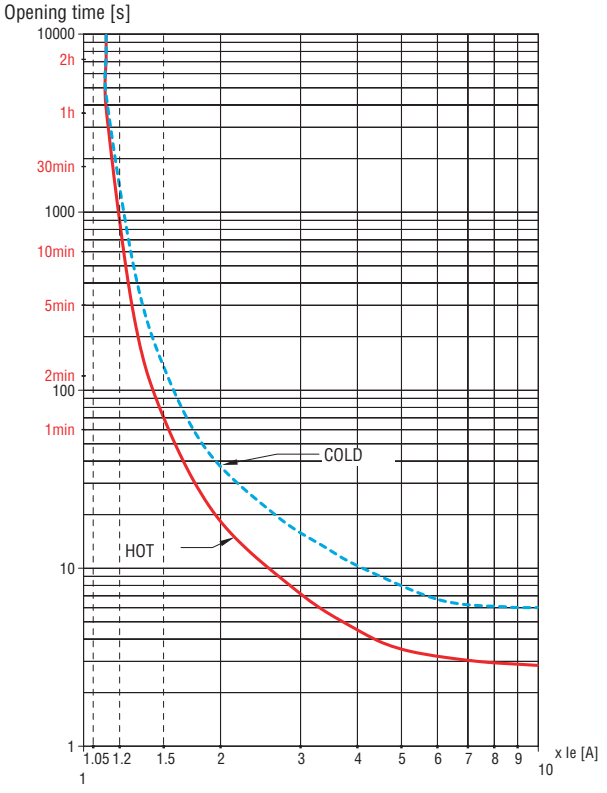


Two-phase operation (phase failure/single phase)

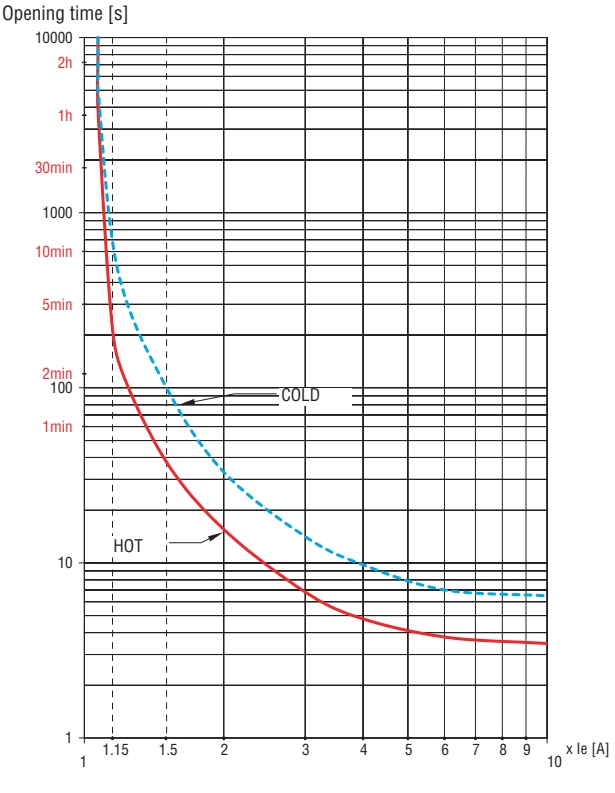
RF9 RF38 RF82 RFA110
RFA9 RFA82 RFNA110



RF200 RF420
RFN200 RFN420



RF200 RF420

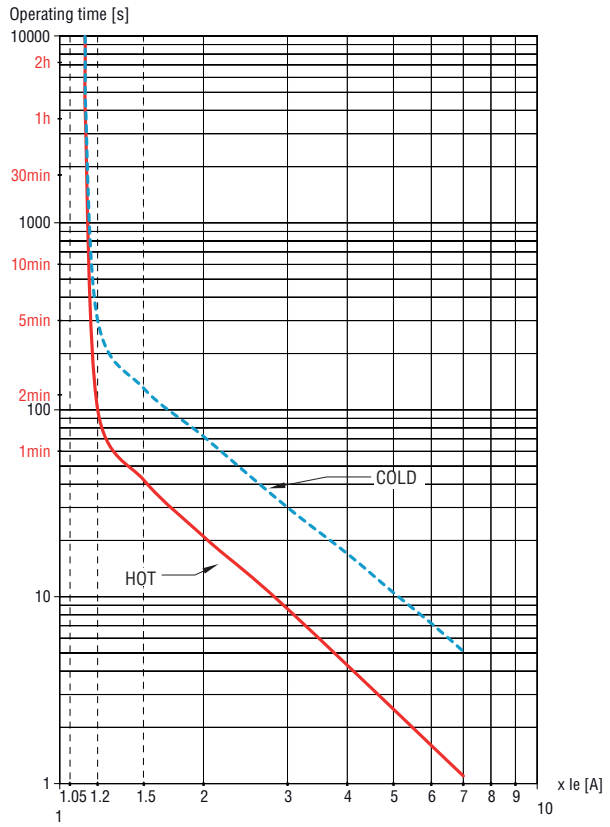


Tripping times can have a ±20% deviation with respect to the average tripping curve values above.

TRIP CHARACTERISTIC FOR RFE ELECTRONIC THERMAL OVERLOAD RELAYS

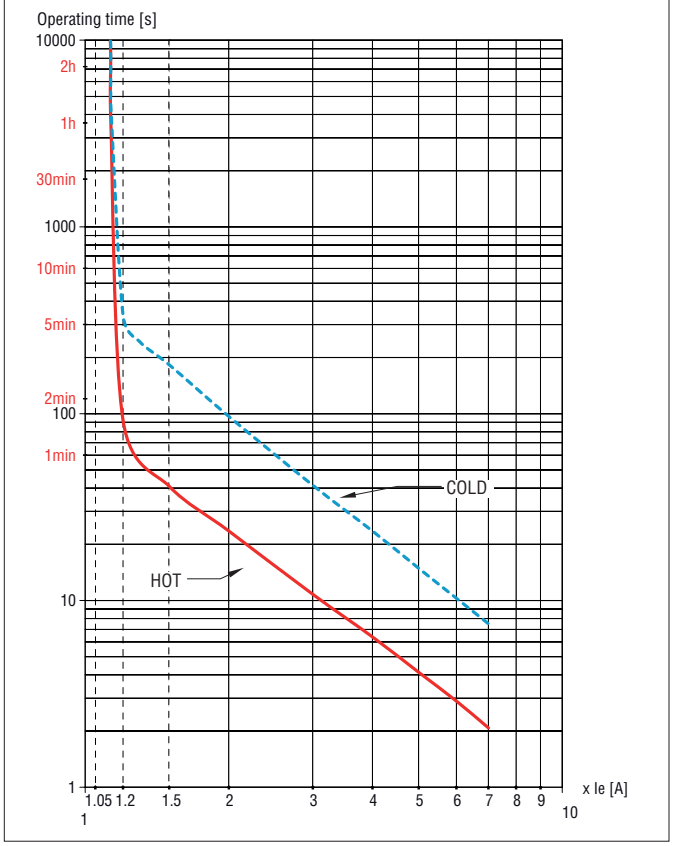
Three-phase balanced operation; class 5

RFE45
RFE110



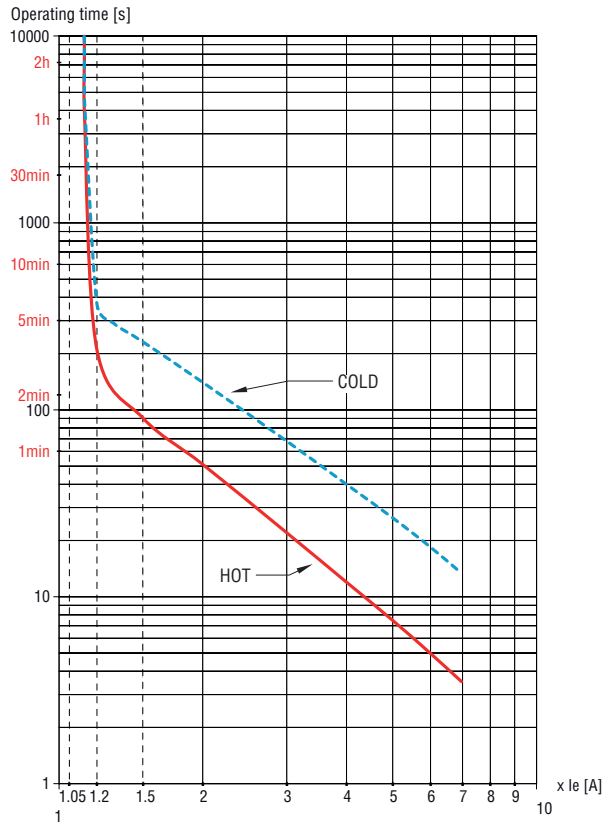
Three-phase balanced operation; class 10

RFE45
RFE110



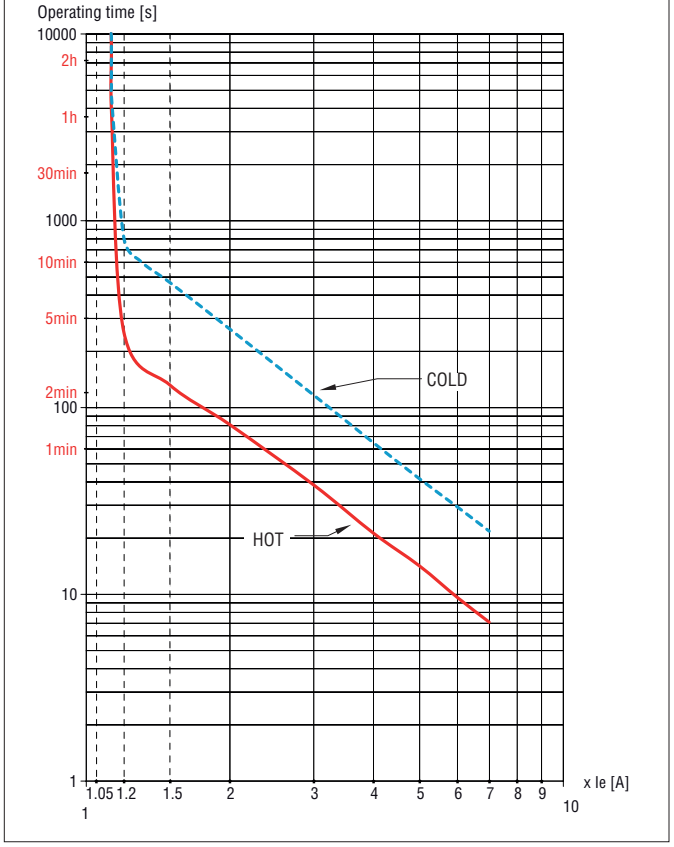
Three-phase balanced operation; class 20

RFE45
RFE110



Three-phase balanced operation; class 30

RFE45
RFE110



Electromechanical starters and enclosures

- Direct-on-line starters in non-metallic enclosure complete with or without thermal relay
- Versions with RESET or START/STOP pushbuttons
- Non-metallic enclosures for customer-assembled starters
- Reversing and changeover contactor assemblies
- Star-delta starters, open frame and in non-metallic enclosure versions.

Page 4-2

DIRECT-ON-LINE STARTERS

- Motor ratings up to 95A 440V in IEC AC3 duty
- Motor rating up to 52A 600V per UL/CSA
- Versions with Start-Stop/Reset buttons or Reset button
- Versions with and without thermal relay
- Versions with motor protection circuit breaker.

Page 4-5

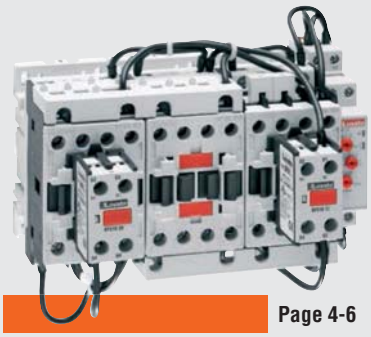
REVERSING CONTACTOR ASSEMBLIES

- For three-phase motor control 9...25A 440V / 4...12.5kW 400V, in IEC AC3 duty and up to 15HP 600V per UL/CSA
- Versions with built-in or external mechanical interlock
- Complete with rigid connections
- PCB version 9A 440V / 4kW 400V in IEC AC3 duty; 5HP 300V per UL/CSA.

Page 4-5

CHANGEOVER CONTACTOR ASSEMBLIES

- For 20A loads at ≤40°C in IEC AC1 duty
- For 20A general use per UL/CSA
- With built-in mechanical interlock.



Page 4-6

STAR-DELTA STARTERS OPEN FRAME

- Suitable for three-phase motor control, 16A...690A 440V / 7.5kW...375kW 400V ratings in IEC AC3 duty.

Page 4-7

STAR-DELTA STARTERS IN NON-METALLIC ENCLOSURE

- Suitable for three-phase motor control, 16...60A 440V / 7.5kW...30kW 400V ratings in IEC AC3 duty.

Page 4-8

EMPTY NON-METALLIC ENCLOSURES

- Versions without pushbuttons, with Reset button only or Start-Stop/Reset buttons
- For starters, with pushbuttons and metal plate
- Suitable to contain BG mini-contactor or BF09A to BF80 contactors, up to 110A 440V rating in IEC AC3 duty; up to 52A at 600V for UL/CSA.

Lovato electric

Enclosed with thermal overload relay


M0 P...12


M0 R...12


M1 P...12


M1 R...12


M2 P...12


M2 R...12


M25 P038 12


M25 R038 12


M3 P...12


M3 R...12

Order code	Relay adj range	IEC technical characteristics (≤440V) Ie	kW	Qty per pkg	Wt
	[A]	[A]	[kW]	n°	[kg]
Starters with Start and Stop/Reset pushbuttons ❷.					
M0 P009 12❶1	0.6-1	1	0.18-0.25	1	0.760
M0 P009 12❶1V5	0.9-1.5	1.5	0.37	1	0.760
M0 P009 12❶2V3	1.4-2.3	2.3	0.55-0.75	1	0.760
M0 P009 12❶33	2-3.3	3.3	1.1	1	0.760
M0 P009 12❶5	3-5	5	1.5-2.2	1	0.760
M0 P009 12❶75	4.5-7.5	7.5	2.2-3	1	0.760
M0 P009 12❶10	6-10	10	3-4	1	0.760
M0 P012 12❶15	9-15	12	5.5	1	0.760
M1 P009 12❶A4	0.63-1	1	0.25	1	1.040
M1 P009 12❶A5	1-1.6	1.6	0.37-0.55	1	1.040
M1 P009 12❶A6	1.6-2.5	2.5	0.75	1	1.040
M1 P009 12❶A7	2.5-4	4	1.1-1.5	1	1.040
M1 P009 12❶A8	4-6.5	6.5	2.2-3	1	1.040
M1 P009 12❶A9	6.3-10	10	3-4	1	1.040
M1 P009 12❶B0	9-14	13	5.5	1	1.040
M1 P018 12❶B1	13-18	18	7.5	1	1.040
M2 P025 12❶B2	17-23	23	11	1	1.220
M2 P025 12❶B3	20-25	25	11	1	1.220
M2 P032 12❶B4	24-32	32	15	1	1.300
M25 P038 12❶B5	32-38	38	18.5	1	2.880
M3 P050 12❶B6	35-50	50	18.5-22	1	3.760
M3 P065 12❶B7	45-65	65	30	1	3.760
M3 P080 12❶B8	60-82	80	37-45	1	3.760
Starters with Reset pushbuttons ❷.					
M0 R009 12❶1	0.6-1	1	0.18-0.25	1	0.720
M0 R009 12❶1V5	0.9-1.5	1.5	0.37	1	0.720
M0 R009 12❶2V3	1.4-2.3	2.3	0.55-0.75	1	0.720
M0 R009 12❶33	2-3.3	3.3	1.1	1	0.720
M0 R009 12❶5	3-5	5	1.5-2.2	1	0.720
M0 R009 12❶75	4.5-7.5	7.5	2.2-3	1	0.720
M0 R009 12❶10	6-10	10	3-4	1	0.720
M0 R012 12❶15	9-15	12	5.5	1	0.720
M1 R009 12❶A4	0.63-1	1	0.25	1	0.995
M1 R009 12❶A5	1-1.6	1.6	0.37-0.55	1	0.995
M1 R009 12❶A6	1.6-2.5	2.5	0.75	1	0.995
M1 R009 12❶A7	2.5-4	4	1.1-1.5	1	0.995
M1 R009 12❶A8	4-6.5	6.5	2.2-3	1	0.995
M1 R009 12❶A9	6.3-10	10	3-4	1	0.995
M1 R009 12❶B0	9-14	13	5.5	1	0.995
M1 R018 12❶B1	13-18	18	7.5	1	0.995
M2 R025 12❶B2	17-23	23	11	1	1.165
M2 R025 12❶B3	20-25	25	11	1	1.165
M2 R032 12❶B4	24-32	32	15	1	1.260
M25 R038 12❶B5	32-38	38	18.5	1	2.600
M3 R050 12❶B6	35-50	50	18.5-22	1	3.410
M3 R065 12❶B7	46-65	65	30	1	3.410
M3 R080 12❶B8	60-82	80	37-45	1	3.410

❶ Complete order code with coil voltage digit (if 50/60Hz) or with voltage digit followed by 60 (if 60Hz).
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: M0 R009 12 024 1 for direct-on-line starter in M0 type enclosure with Reset button, 9A/AC3 contactor with 24VAC 50/60Hz coil and 0.6-1A thermal overload relay.
M0 P009 12 024 60 1 for direct-on-line starter in M0 type enclosure with Start and Stop/Reset buttons , 9A /AC3 contactor with 24VAC 60Hz coil and 0.6-1A thermal overload relay.

❷ Protection fuses are to be mounted externally by the user.

Components

CStarter enclosure	Contactor	Thermal relay	Auxiliary contact block
M0 PA	BG09 10A	RF9 1	—
M0 PA	BG09 10A	RF9 1V5	—
M0 PA	BG09 10A	RF9 2V3	—
M0 PA	BG09 10A	RF9 33	—
M0 PA	BG09 10A	RF9 5	—
M0 PA	BG09 10A	RF9 75	—
M0 PA	BG09 10A	RF9 10	—
M0 PA	BG12 10A	RF9 15	—
M1 PA	BF09 10A	RF38 0100	—
M1 PA	BF09 10A	RF38 0160	—
M1 PA	BF09 10A	RF38 0250	—
M1 PA	BF09 10A	RF38 0400	—
M1 PA	BF09 10A	RF38 0650	—
M1 PA	BF09 10A	RF38 1000	—
M1 PA	BF09 10A	RF38 1400	—
M1 PA	BF18 10A	RF38 1800	—
M2 PA	BF25 10A	RF38 2300	—
M2 PA	BF25 10A	RF38 2500	—
M2 PA	BF32 00A	RF38 3200	G418 10
M25 PA	BF38 00A	RF38 3800	G418 10
M3 PA	BF50 00A	RF82 5000	G418 10
M3 PA	BF65 00A	RF82 6500	G418 10
M3 PA	BF80 00A	RF82 8200	G418 10
M0 RA	BG09 10A	RF9 1	—
M0 RA	BG09 10A	RF9 1V5	—
M0 RA	BG09 10A	RF9 2V3	—
M0 RA	BG09 10A	RF9 33	—
M0 RA	BG09 10A	RF9 5	—
M0 RA	BG09 10A	RF9 75	—
M0 RA	BG09 10A	RF9 10	—
M0 RA	BG12 10A	RF9 15	—
M1 RA	BF09 10A	RF38 0100	—
M1 RA	BF09 10A	RF38 0160	—
M1 RA	BF09 10A	RF38 0250	—
M1 RA	BF09 10A	RF38 0400	—
M1 RA	BF09 10A	RF38 0650	—
M1 RA	BF09 10A	RF38 1000	—
M1 RA	BF09 10A	RF38 1400	—
M1 RA	BF18 10A	RF38 1800	—
M2 RA	BF25 10A	RF38 2300	—
M2 RA	BF25 10A	RF38 2500	—
M2 RA	BF32 00A	RF38 3200	G418 10
M25 RA	BF38 00A	RF38 3800	G418 10
M3 RA	BF50 00A	RF82 5000	G418 10
M3 RA	BF65 00A	RF82 6500	G418 10
M3 RA	BF80 00A	RF82 8200	G418 10

Certifications and compliance
Refer to page 4-3 for details.

Special M3... versions
Refer to page 4-3 for details.

UL/CSA HP ratings
See page 4-22.

Enclosed without thermal overload relay


M0 P...10


M0 R...10


M1 P...10


M1 R...10


M2 P...10


M2 R...10


M25 P038 10


M25 R038 10


M3 P...10


M3 R...10

Order code	Maximum operating current (≤440V)	Qty per pkg	Wt
	[A]	n°	[kg]
Starters with Start and Stop/Reset pushbuttons ❷.			
M0 P009 10❶	10	1	0.667
M0 P012 10❶	12	1	0.667
M1 P009 10❶	13	1	0.910
M1 P018 10❶	18	1	0.910
M2 P025 10❶	25	1	1.060
M2 P032 10❶	32	1	1.162
M25 P038 10❶	38	1	2.360
M3 P050 10❶	50	1	3.110
M3 P065 10❶	65	1	3.110
M3 P080 10❶	80	1	3.110
Starters with Reset pushbutton ❷.			
M0 R009 10❶	10	1	0.627
M0 R012 10❶	12	1	0.627
M1 R009 10❶	13	1	0.867
M1 R018 10❶	18	1	0.867
M2 R025 10❶	25	1	1.020
M2 R032 10❶	32	1	1.110
M25 R038 10❶	38	1	2.320
M3 R050 10❶	50	1	3.070
M3 R065 10❶	65	1	3.070
M3 R080 10❶	80	1	3.070

❶ Complete order code with coil voltage digit if 50/60Hz or with voltage digit followed by 60 if 60Hz.
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: M0 R009 10 024 1 for direct-on-line starter in M0 type enclosure with Reset button, 9A /AC3 contactor with 24VAC 50/60Hz coil.
M0 P009 10 024 60 1 for direct-on-line starter in M0 type enclosure with Start and Stop/Reset buttons , 9A /AC3 contactor with 24VAC 60Hz coil.
❷ Protection fuses are to be mounted externally by the user.

Components

Starter enclosure standard supplied	Contactor standard supplied	Thermal relay to purchase separately	Auxiliary contact standard supplied
M0 PA	BG09 10A	RF9❸	—
M0 PA	BG12 10A	RF9❸	—
M1 PA	BF09 10A	RF38❹	—
M1 PA	BF18 10A	RF38❹	—
M2 PA	BF25 10A	RF38❹	—
M2 PA	BF32 00A	RF38❹	G418 10
M25 PA	BF38 00A	RF38❹	G418 10
M3 PA	BF50 00A	RF82❺	G418 10
M3 PA	BF65 00A	RF82❺	G418 10
M3 PA	BF80 00A	RF82❺	G418 10
M0 RA	BG09 10A	RF9❸	—
M0 RA	BG12 10A	RF9❸	—
M1 RA	BF09 10A	RF38❹	—
M1 RA	BF18 10A	RF38❹	—
M2 RA	BF25 10A	RF38❹	—
M2 RA	BF32 00A	RF38❹	G418 10
M25 RA	BF38 00A	RF38❹	G418 10
M3 RA	BF50 00A	RF82❺	G418 10
M3 RA	BF65 00A	RF82❺	G418 10
M3 RA	BF80 00A	RF82❺	G418 10

❸ For thermal overload relay selection, refer to pages 3-2 or 3-3.
❹ For thermal overload relay selection, refer to pages 3-4.
❺ For thermal overload relay selection, refer to pages 3-4 or 3-5.

General characteristics
The M0..., M1..., M2..., M25... and M3...UL enclosures are made in UV protected polycarbonate. They are ideal to assemble starters for stand alone motors; robust and easily customizable adding pushbuttons, selector switches, pilot lights, modular time relays, modular level controls, etc.
M3 enclosures are made in ABS plastic material: a version in polycarbonate is available by adding the UL suffix at the end of the code.

Operational characteristics
– Cable entry:
  • M0/M1… - 2 knockouts PG13.5/M20 on enclosure top and bottom
  • M2… - 2 knockouts PG13.5/M20 or PG16/M25 on enclosure top and bottom
  • M25… - 2 knockouts PG16/M25-PG29/M32 on enclosure top and bottom
  • M3… - Smooth surfaces; can be drilled by customer
– Ambient conditions:
  • Operating temperature: -25...+60°C
  • Storage temperature: -40...+70°C
– Degree of protection: IP65 for all; type 4/4X industrial control environment for M1 / M2 / M25... and M3... UL versions.

Special M3… versions
In addition to standard-indicated versions, cULus certified starters are available up to 52A motor control or 65A general use rating max.
Add suffix **UL** to the order code, e.g. M3 P050 10 024**UL**.

UL/CSA HP ratings
See page 4-22.

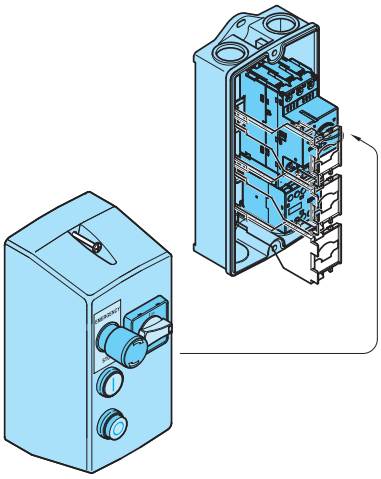
Certifications and compliance
Certifications obtained: EAC for all; UL Listed for USA and Canada (cULus – File E93602) and CSA certified for Canada and USA (cCSAus – File 94157) as Magnetic Motor Controllers, enclosed type, for all M0-M1-M2-M25P/R… starters and M3P/R50-65…UL types as indicated in “Special M3” above.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Enclosed with motor protection circuit breaker

M2 P009 11....

Order code	Thermal trip adjustment range	IEC technical characteristics (≤440V) Ie	kW	Qty per pkg	Wt
	[A]	[A]	[kW]	n°	[kg]
M2 P009 11❶A4	0.63-1	1	0.25	1	1.450
M2 P009 11❶A5	1-1.6	1.6	0.37-0.55	1	1.450
M2 P009 11❶A6	1.6-2.5	2.5	0.75	1	1.515
M2 P009 11❶A7	2.5-4	4	1.1-1.5	1	1.515
M2 P009 11❶A8	4-6.5	6.5	2.2-3	1	1.515
M2 P009 11❶A9	6.3-10	10	3-5	1	1.515
M2 P009 11❶B0	9-14	13	5.5	1	1.515

❶ Complete order code with coil voltage digit (if 50/60Hz) or with voltage digit followed by 60 (if 60Hz).
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: M2 P009 11 400 A8 for direct-on-line starter in M2 type with reset and reset/emergency button, 9A/AC3 contactor with 400VAC 50/60Hz coil and motor protection circuit breaker 4...6.5A.



General characteristics
M2P009.. is ideal to achieve starters on small machines.
It is robust and complete of all the functions for a machine control: start, stop, emergency stop, overload protection, short circuit protection and disconnecting (insulation function) padlockable in OFF position.

General characteristics
The M2 P009 11... starters are composed of an IP65 plastic enclosure where the following devices are mounted:
– a motor protection circuit breaker type SM1R... with the short circuit and overload protection function
– a contactor with start / stop function of the motor
– 2 push-buttons for the start and stop
– a mushroom push-button for the emergency stop
– a padlockable rotary actuator, that operates the circuit breaker, for the isolation.

These starters are easily and quickly installable. They are especially suitable to operate the motor of smaller machines where there is no electrical panel.
Inside the enclosure, other components can be added like timers, level relays, protection relays, etc.

Operational characteristics
– M2… - 2 knockouts PG13.5/M20 or PG16/M25 on enclosure top and bottom
– Ambient conditions:
  • Operating temperature: -25...+60°C
  • Storage temperature: -40...+70°C
– Degrre of protection: IEC IP65, type 4/4X for UL version.

Certifications and compliance
Certifications obtained: EAC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1.

Reversing contactor assemblies

11 BGR...

BFA...

11 BGT...

11 BGTP...

Order code	IEC Ie (AC3) ≤440V ≤55°C	Max. IEC power AC3 400V at ≤55°C	Built-in auxiliary contacts		Qty per pkg	Wt
	[A]	[kW]	NO	NC	n°	[kg]
AC COIL. Terminals: clamp screw. External interlock with power and auxiliary wiring.						
11 BGR09 01 A❶	9	4	0	1❸	1	0.394
11 BGR12 01 A❶	12	5.7	0	1❸	1	0.394
BFA009 42❶	9	4.2	0	1❸	1	0.760
BFA012 42❶	12	5.7	0	1❸	1	0.760
BFA018 42❶	18	7.5	0	1❸	1	0.760
BFA025 42❶	25	12.5	0	1❸	1	0.760
Built-in interlock with power wiring only.						
11 BGT09 10 A❶	9	4	1❸	0	1	0.380
11 BGT12 10 A❶	12	5.7	1❸	0	1	0.380
Rear terminals: PCB solder pins. Built-in interlock only.						
11 BGTP09 01 A❶	9	4❹	0	1❸	1	0.400
DC COIL. Terminals: clamp screw. External interlock with power and auxiliary wiring.						
11 BGR09 01 D❷	9	4	0	1❸	1	0.460
11 BGR12 01 D❷	12	5.7	0	1❸	1	0.460
Built-in interlock with power wiring only.						
11 BGT09 10 D❷	9	4	1❸	0	1	0.445
11 BGT12 10 D❷	12	5.7	1❸	0	1	0.445
Rear terminals: PCB solder pins. Built-in interlock only.						
11 BGTP09 01 D❷	9	4❹	0	1❸	1	0.460

Changeover contactor assemblies

11 BGC09 ...

Order code	IEC Operating current (AC1)			UL/CSA General Use	Qty per pkg	Wt
	≤40°C	≤55°C	≤60°C			
	[A]	[A]	[A]	[A]	n°	[kg]
AC COIL. Terminals: clamp screw. Built-in interlock only.						
11 BGC09 T4 A❶	20	18	15	20	1	0.365
DC COIL. Terminals: clamp screw. Built-in interlock only.						
11 BGC09 T4 D❷	20	18	15	20	1	0.450

❶ Complete order code with coil voltage digit or with voltage digit followed by 60 if 60Hz.
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).
Example: 11 BGR09 01 A024 for reversing contactor assembly with 2 mini-contactors BG09 having 1 NC auxiliary contact each and 24VAC 50/60Hz coil.
11 BGR09 01 A024 60 for reversing contactor assembly with 2 mini-contactors BG09 having 1 NC auxiliary contact each and 24VAC 60Hz coil.

❷ Complete order code with coil voltage digit.
Standard voltages are:
– DC 012 / 024 / 048 / 060 / 110 / 125 / 220V.
Example: 11BGC09 T4 D012 is a changeover contactor assembly with 2 mini-contactors BG09 having 4 main poles each and 12VDC coil.

❸ One auxiliary contact for each contactor.

❹ Maximum voltage is limited at 300V for UL. For certified type up to 600V, consult Technical support; see contact details on front inside cover.

General characteristics

REVERSING CONTACTOR ASSEMBLIES
Supplied complete, ready for quick mounting.
The various versions are composed as follows:
BGR... Screw termination, external mechanical interlock BGX50 00, power and auxiliary wiring.
BGT... Screw termination, built-in mechanical interlock and power wiring only.
BGTP... Rear PCB solder pin termination, built-in mechanical interlock only.
No thermal overload relay can be directly mounted to BG... reversing contactor assemblies.
BFA... Screw termination, mechanical interlock BFX50 02 and power wiring.
The thermal overload relay RF38... can be directly mounted to BFA... reversing contactor assemblies; for selection, refer to section 3.

CHANGEOVER CONTACTOR ASSEMBLIES
Supplied complete, ready for quick mounting as follows: BGC09 T4 Four-pole contactors with built-in mechanical interlock. No power or auxiliary wiring included.

Operational characteristics

Type	Maximum IEC operational power at ≤55°C (AC3)					
	230V	400V	415V	440V	500V	690V
	[kW]	[kW]	[kW]	[kW]	[kW]	[kW]
BGR09	2.2	4	4.3	4.5	5	5
BGT09	2.2	4	4.3	4.5	5	5
BGTP09❹	2.2	4	4.3	4.5	5	–
BGR12	3.2	5.7	6.2	5.5	5	5
BGT12	3.2	5.7	6.2	5.5	5	5
BFA009	2.2	4.2	4.5	4.8	5.5	7.2
BFA012	3.2	5.7	6.2	6.2	7.5	10
BFA018	4	7.5	9	9	10	10
BFA025	7	12.5	13.4	13.4	15	11
	at ≤40°C (AC1)					
BGC09 T4	8	14	14	15	16	22

	Maximum UL/CSA horsepower rating					
	Single phase		Three phase			
	120V	240V	208V	240V	480V	600V
	[HP]	[HP]	[HP]	[HP]	[HP]	[HP]
BGR09	½	1½	2	3	5	5
BGT09	½	1½	2	3	5	5
BGTP09	½	1½	2	3	5❹	-❹
BGR12	½	1½	3	3	7½	10
BGT12	½	1½	3	3	7½	10
BFA009	¾	2	3	3	5	7½
BFA012	1	2	5	5	7½	10
BFA018	1	3	5	5	10	15
BFA025	2	3	7½	7½	15	15

NOTE: BGR09, BGT09, BGR12, BGT12... types are UL Listed for USA and Canada as "Magnetic Motor Controller – Reversing Contactors". All these are rated 20A general (purpose) use and suitable for use on a circuit capable of delivering more than 5kA symmetrical amps at 600V max when protected by fuses class K5 rated no more than 30A.
BGTP09 type is UL Recognized for USA and Canada as "Magnetic Motor Controller – Component – reversing contactors". Max HP rating up to 300VAC only; rated 20A general (purpose) use.
BGC... types are UL Listed for USA and Canada as "Magnetic Motor Controller – Changeover contactor".
No coil change or replacement is possible for any BG... types.

Add-on blocks

Refer to section 2, page 2-16.
Special add-on auxiliary contacts 11 BGX11 11 or 11 BGX11 12 must be used on the left-side contactor of the BGT reversing assemblies.
For the right-side contactor, normal 11 BGX10... types of auxiliary contacts can be used instead.
Refer to page 2-16 for details.

Certifications and compliance

Certifications obtained: UL Listed for USA and Canada (File E93602) for BGR09, BGT09, BGR12, BGT12, BFA... and BGC... (see NOTE above), EAC.
UL Recognized, for USA and Canada (cULus - File E93602 Component), for BGTP09; products having this type of marking are intended for use as components of complete workshop-assembled equipment.
Compliant with standards IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Open frame

BFA009…BFA025

Order code	Three-phase motor control. Max IEC operating current (≤440V)	Thermal overload relay	Qty per pkg	Wt
	[A]		n°	[kg]
Complete star-delta starters, open frame, for starting time up to 12s and a maximum of 30 operations/hour.				
BFA009 70❶❷	16	No	1	1.700
BFA012 70❶❷	22	No	1	1.700
BFA018 70❶❷	28	No	1	1.700
BFA025 70❶❷	35	No	1	1.800
BFA026 70❶❷	43	No	1	1.800
BFA032 70❶❷	50	No	1	1.900
BFA038 70❶❷	60	No	1	1.900
BFA050 70❶❷	85	No	1	5.200
BFA065 70❶❷	110	No	1	5.200
BFA080 70❶❷❹	140	No	1	6.265
new **BFA095 70❶❷**	160	No	1	6.900
new **BFA115 70❶❷❺**	195	No	1	7.500
new **BFA150 70❶❷❺**	230	No	1	7.500

Operational characteristics
IEC standard motor powers

230V [kW]	400V [kW]	440V [kW]	500V [kW]
4	7.5	7.5	7.5
5.5	11	11	11
7.5	15	11	11
11	18.5	18.5	22
11	22	22	25
15	25	25	25
15	30	30	30
25	45	45	59
30	55	55	75
45	75	75	90
45	90	90	110
55	110	110	132
75	132	132	160

❶ Complete order code with the coil voltage digit or the coil voltage digit followed by 60 if 60Hz. Standard voltage are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 (V).
Example: BFA009 70 024 for BFA009 star-delta starter with 24VAC 50/60Hz power supply.
BFA009 70 024 60 for BFA009 star-delta starter with 24VAC 60Hz power supply.

❷ The thermal overload relay is not included and must be purchased separately.
Refer to the example given under Thermal relay adjustment range, for a correct choice and then to page 3-4 for the order code.

❸ TM ST with auxiliary supply 24...240VAC.
TM ST A440 with auxiliary supply 380...440VAC.

❹ For motors with rated current >115A connect the line side with 50mm² wires crimped with pin terminals or with 2x 25mm² wires connected in parallel.

❺ For motors with rated current >175A connect the line side with insulated flexible copper bars or with 2x50mm² wires in parallel.

NOTE: For higher powers and voltages, or suitable for heavy-duty starting (centrifugal fans, mills, crushers) that is with starting time exceeding 12s, consult Technical support; see contact details on inside front cover.

Thermal relay adjustment range
Choose the thermal relay adjustment range considering a value equal to 58% of rated motor current (Ie).
Example: Ie=100A; 58% Ie=58A.
The suitable relay range is 46-65A.
During the setup, the relay is to be regulated at 58A.

Components

Starter	Contactors			Thermal overload relay	Time relay	Auxiliary contacts fitted on contactor:			Rigid connections
	Line	Delta	Star			Line	Delta	Star	
BFA009 70	BF09 10A	BF09 01A	BF09 10A	❷ RF38	TM ST❸	BFX10 20	—	BFX10 11	BFX31 31
BFA012 70	BF12 10A	BF12 01A	BF09 10A	❷ RF38	TM ST❸	BFX10 20	—	BFX10 11	BFX31 31
BFA018 70	BF18 10A	BF18 01A	BF12 10A	❷ RF38	TM ST❸	BFX10 20	—	BFX10 11	BFX31 31
BFA025 70	BF25 10A	BF25 01A	BF18 10A	❷ RF38	TM ST❸	BFX10 20	—	BFX10 11	BFX31 31
BFA026 70	BF26 00A	BF26 00A	BF18 10A	❷ RF38	TM ST❸	BFX10 20	BFX10 11	BFX10 11	BFX32 32
BFA032 70	BF32 00A	BF32 00A	BF25 10A	❷ RF38	TM ST❸	BFX10 20	BFX10 11	BFX10 11	BFX32 32
BFA038 70	BF38 00A	BF38 00A	BF25 10A	❷ RF38	TM ST❸	BFX10 20	BFX10 11	BFX10 11	BFX32 32
BFA050 70	BF50 00A	BF50 00A	BF32 00A	❷ RF82	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—
BFA065 70	BF65 00A	BF65 00A	BF32 00A	❷ RF82	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—
BFA080 70	BF80 00A	BF80 00A	BF50 00A	❷ RF82	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—
BFA095 70	BF95 00A	BF95 00A	BF65 00A	❷ RF110	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—
BFA115 70	BF115 00A	BF115 00A	BF80 00A	❷ RF200	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—
BFA150 70	BF150 00A	BF150 00A	BF80 00A	❷ RF200	TM ST❸	BFX10 20	BFX10 11	BFX10 11	—

Certifications and compliance
Certifications obtained: EAC.
Compliant with stardards: IEC/EN 60947-1, IEC/EN 60947-4-1.

Enclosed starters

M3 P…70… - M3 PA70

Order	Three-phase motor control. Max IEC operating current (≤440V)	Qty per pkg	Wt
	[A]	n°	[kg]
Star-delta starters in enclosure with Start and Stop/Reset buttons. Starting time up to 12s and a maximum of 30 operations/hour.			
M3 P009 70❶❷	16	1	3.540
M3 P012 70❶❷	22	1	3.540
M3 P018 70❶❷	28	1	3.540
M3 P025 70❶❷	35	1	3.650
M3 P026 70❶❷	43	1	3.650
M3 P032 70❶❷	50	1	3.800
M3 P038 70❶❷	60	1	3.800
With switch disconnector, rotary door-coupling handle GAX61 and Start and Stop/Reset buttons.			
M3 P009 73❶❷	16	1	3.700
M3 P012 73❶❷	22	1	3.700
M3 P018 73❶❷	28	1	3.700
M3 P025 73❶❷	35	1	3.800
M3 P026 73❶❷	43	1	3.800
M3 P032 73❶❷	50	1	4.300
M3 P038 73❶❷	60	1	4.300
Enclosure for star-delta starter, complete with Start and Stop/Reset buttons, metal plate fixed with piece of 35mm DIN (IEC/EN 60715) rail.			
M3 PA70 ❸	—	1	2.240

❶ Complete order code with the coil voltage digit or the coil voltage digit followed by 60 if 60Hz. Standard voltage are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 (V).
Example: M3P009 70 024 for M3P009 star-delta starter with 24VAC 50/60Hz power supply.
M3P009 70 02460 for M3P009 star-delta starter with 24VAC 60Hz power supply.

❷ The thermal overload relay is not included and must be purchased separately.
Choose the thermal relay adjustment range considering a value equal to 58% of rated motor current (Ie).
Example: Ie=10A; 58% Ie = 5.8A. The suitable relay range is 4-6.5A, set at 5.8A, so the order code to select is RF380650).
Refer to page 3-4 for the order codes available.

❸ Suitable for BFA...70 starters.

❹ TM ST with auxiliary supply 24...240VAC;
TM ST A440 with auxiliary supply 380...400VAC.

NOTE: For higher powers and voltage ratings or suitable for heavy-duty starting (centrifugal fans, mills, crushers) that is with starting time exceeding 12s, consult Technical support; see contact details on inside front cover.

Operational characteristics
IEC standard motor powers

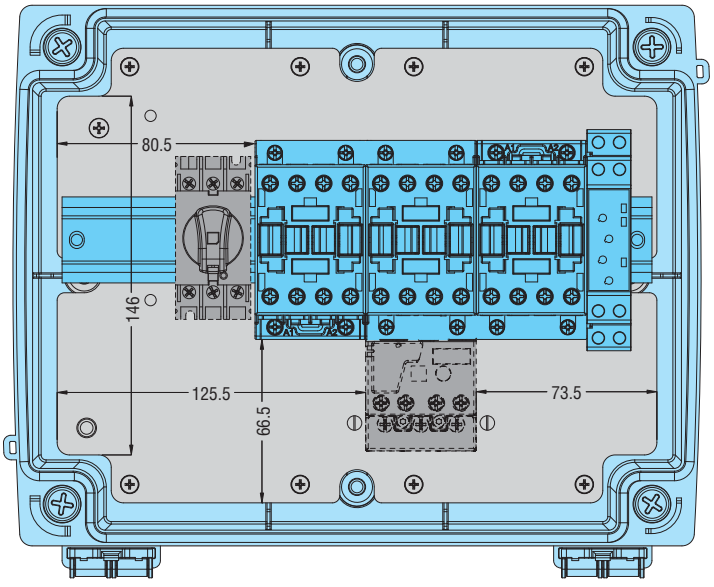
230V	400V	440V	500V
[kW]	[kW]	[kW]	[kW]
4	7.5	7.5	7.5
5.5	11	11	11
7.5	15	11	11
11	18.5	18.5	22
11	22	22	25
15	25	25	25
15	30	30	30

– Enclosure is made in ABS plastic material
– Cable entry: Smooth surface; can be drilled by customer
– Ambient conditions:
  • Operating temperature: -25...+60°C
  • Storage temperature: -40...+70°C
– Degree of protection: IEC IP65 for M3P…; UL Type 1, 12, 4/4X for M3…UL versions.

Special M3… versions
In addition to standard-indicated versions, cULus certified starters are available up to 52A motor control rating max. This is also valid for the enclosure with general use rating of 65A.
Add suffix **UL** to the order code, e.g. M3 PA70**UL**.

Certifications and compliance
Certifications obtained: UL Listed, for USA and Canada (File E93602), as Magnetic Motor Controllers - Enclosed (starters) and - Enclosures for M3...PUL types.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Maximum available space inside M3P…70/73 with star-delta starters BFA…70…



Components

Type	Enclosure	Contactors			T/o relay ❷	Time relay	Auxiliary contacts fitted on contactor:			Rigid connec-tions	Switch disconnector ❺
		Line	Delta	Star			Line	Delta	Star		
M3P009 70/73	M3 PA70	BF09 10A	BF09 01A	BF09 10A	(RF38)	TM ST❹	BFX10 20	—	BFX10 11	BFX31 31	GA016 A
M3P012 70/73	M3 PA70	BF12 10A	BF12 01A	BF09 10A	(RF38)	TM ST❹	BFX10 20	—	BFX10 11	BFX31 31	GA025 A
M3P018 70/73	M3 PA70	BF18 10A	BF18 01A	BF12 10A	(RF38)	TM ST❹	BFX10 20	—	BFX10 11	BFX31 31	GA032 A
M3P025 70/73	M3 PA70	BF25 10A	BF25 01A	BF18 10A	(RF38)	TM ST❹	BFX10 20	—	BFX10 11	BFX31 31	GA040 A
M3P026 70/73	M3 PA70	BF26 00A	BF26 00A	BF18 10A	(RF38)	TM ST❹	BFX10 20	BFX10 11	BFX10 11	BFX32 32	GA063 SA
M3P032 70/73	M3 PA70	BF32 00A	BF32 00A	BF25 10A	(RF38)	TM ST❹	BFX10 20	BFX10 11	BFX10 11	BFX32 32	GA063 SA
M3P038 70/73	M3 PA70	BF38 00A	BF38 00A	BF25 10A	(RF38)	TM ST❹	BFX10 20	BFX10 11	BFX10 11	BFX32 32	GA063 SA

❺ For M3P...73 types

Empty enclosures


M…PA

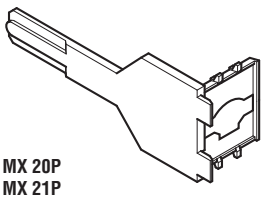

M…RA


M…N

Order code	Contactor type ❶	Thermal relay ❷	Degree of protect.	Qty per pkg	Wt
				n°	[kg]
Enclosures with Start-Stop/Reset pushbuttons.					
M0PA	BG06, BG09, BG12	RF9	IP65	1	0.490
M1PA	BF09A, BF12A, BF18A	RF38	IP65	1	0.545
M2PA	BF25A, BF26A BF32A	RF38	IP65	1	0.715
M25PA❸	BF38A	RF38	IP65	1	0.990
M3PA❹	BF40A, BF50A, BF65A, BF80A, BF94A	RF82 RF82	IP65	1	1.900
Enclosures with Reset pushbutton.					
M0RA	BG06, BG09, BG12	RF9	IP65	1	0.445
M1RA	BF09A, BF12A, BF18A	RF38	IP65	1	0.500
M2RA	BF25A, BF26A BF32A	RF38	IP65	1	0.670
M25RA❸	BF38A	RF38	IP65	1	0.970
M3RA❹	BF40A, BF50A, BF65A, BF80A, BF94A	RF82 RF82	IP65	1	1.850
Enclosures without external pushbuttons.					
M0N	BG06, BG09, BG12	RFA9	IP65	1	0.405
M1N	BF09A, BF12A, BF18A	RF38	IP65	1	0.460
M2N	BF25A, BF26A BF32A	RF38	IP65	1	0.640
M24N❸❺	BG.../ BF09A...BF25A	❷	IP65	1	0.625
M25N❸	BF38A	RF38	IP65	1	0.940
M3N	BF40A, BF50A, BF65A, BF80A, BF94A	RF82 RF82	IP65	1	1.800

❶ To be purchased separately; refer to page 2-4 for contactor choice.
❷ To be purchased separately.
Refer to pages 3-2 to 8 for thermal overload relay choice.
For use of the overload relay in the M24N, consult Technical support; see contact details on inside front cover.
❸ MX 31 metal mounting plate included.
❹ MX 30 metal mounting plate included.
❺ To install eventual pushbuttons, selectors and/or other control accessories, use the PLatinum series and mount the relay contact elements on the cover using the LPX AU120 mounting adapter. See section 7.

Accessories and spare parts


MX 20P
MX 21P

Order code	Description	Qty per pkg	Wt
		n°	[kg]
MX 01	Threaded plug for unused holes, grey RAL7035	10	0.007
MX 10P	Stop/Reset button extension rod for M0 enclosure	5	0.010
MX 11P	Stop/Reset button extension rod for M1 enclosure	5	0.010
MX 12P	Stop/Reset button extension rod for M2, M25 enclosures	5	0.010
MX 20P	Mounting base for LPX C... contact on M0 enclosure	5	0.014
MX 21P	Mounting base for LPX C... contact on M1, M2, M25 enclosures	5	0.014
MX 30	Metal mounting plate for M3N	1	0.500
MX 31	Metal mounting plate for M24N and M25 enclosures	1	0.400

General characteristics
The M0..., M1..., M2..., M25... and M3...UL enclosures are made in UV protected polycarbonate.
M3 enclosure is made in ABS plastic material.

Operational characteristics

Enclosure type	Maximum operating current (≤440V) [A]
M0...	12
M1...	18
M2...	32
M24N	38
M25...	38
M3...	80

General characteristics
Enclosures are supplied with the following accessories:

Accessory		Type of enclosure							
Description	Type	M0 PA	M1 PA	M2 PA	M25 PA	M0 RA	M1 RA	M2 RA	M25 RA
Contact holder	MX 20P	1							
	MX 21P		1	1	1				
Buttons: - Start/Reset - Start	LPC B1176					1	1	1	1
	LPC B2104	1	1	1	1				
	LPC B1113	1	1	1	1				
Contact for Start button	LPX C10	1	1	1	1				
Stop/Reset button extension	MX 10P	1				1			
	MX 11P		1				1		
	MX 12P			1	1			1	1
Unused hole threaded plug	MX 01					1	1	1	1

– M3 PA enclosure: 2 Start and Stop/Reset pushbuttons and 1 MX30 mounting plate
– M3 RA enclosure: 1 Reset pushbutton and 1 MX30 mounting plate
– M3N enclosure: Supplied without accessories to be purchased separately including MX 30 mounting plate.

Enclosures can house the following devices:
M0 = BG… with/without RF9
M1 = BF09A-BF12A-BF18A with/without RF38
M2 = BF25A-BF26A-BF32A, assemblies BFA…42 with/without RF38
M24N = BG..., BF09A...BF25A, assemblies BGR/BGT/BGC and BFA…42 without overload
M25 = BF26…BF38A, assemblies BGR/BGT/BGC and BFA…42 with/without overload
M3 = BF40…BF94 and all assemblies with/without overload.

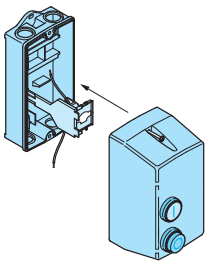
Operational characteristics:
– Cable entry:
  • M0/M1//M2… - 2 knockouts PG13.5/M20 on enclosure top and bottom
  • M24N/M25… - 2 knockouts PG16/M25-PG29/M32 on enclosure top and bottom
  • M3… - Smooth surfaces; can be drilled by customer
– Ambient conditions:
  • Operating temperature: -25...+60°C
  • Storage temperature: -40...+70°C
– Degree of protection: IEC IP65 for all; UL Type 1, 12, 4/4X for M0/M1/M2/M24N/M25… types and M3…UL versions.

Special M3… versions
In addition to standard-indicated versions, cULus certified starters and enclosures are available up to 52A - motor control and 65A general use rating max (MX30 plate, earth/ground and neutral terminal plates are always included in this case). Add suffix **UL** to the order code of enclosures e.g. M3N **UL**.

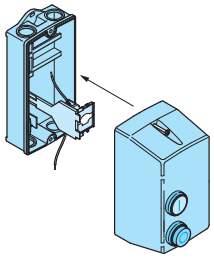
Certifications and compliance
Certifications obtained: EAC for all; for M3NUL type, UL Listed for USA and Canada (cULus – File E300050) as Industrial control panels; for M0/M1/M2PA/RA/N and other M3…UL types, UL Listed for USA and Canada (cULus – File E93602) under magnetic motor controllers as Polymeric enclosures - and CSA certified for Canada and USA (cCSAus – File 94157) as Non-metallic enclosures.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

M...PA EMPTY ENCLOSURES

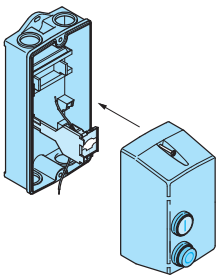
M0PA



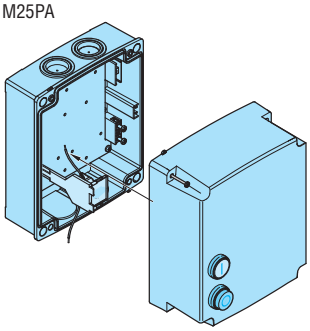
M1PA



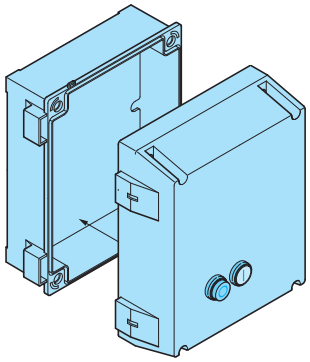
M2PA



M25PA

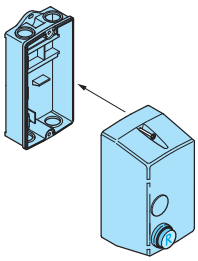


M3PA

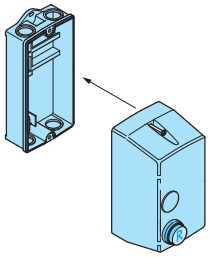


M...RA EMPTY ENCLOSURES

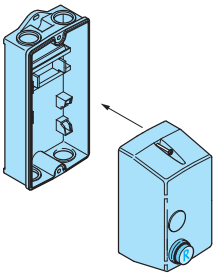
M0RA



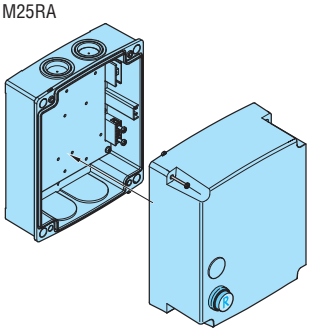
M1RA



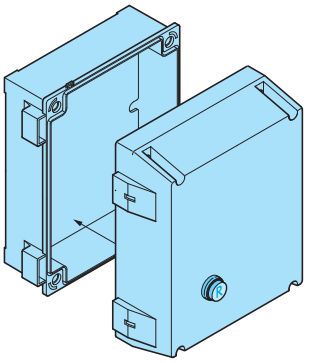
M2RA



M25RA

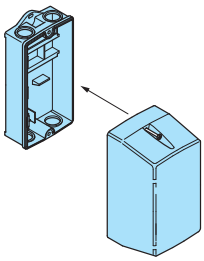


M3RA

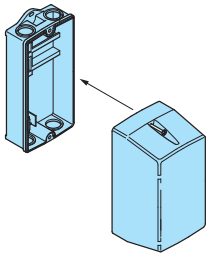


M...N EMPTY ENCLOSURES

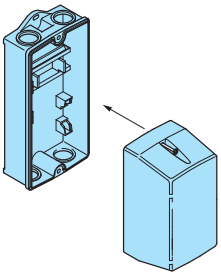
M0N



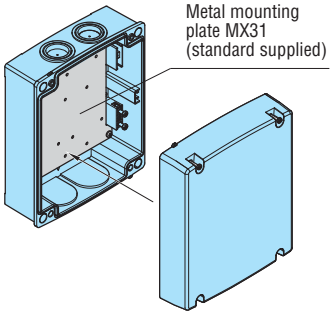
M1N



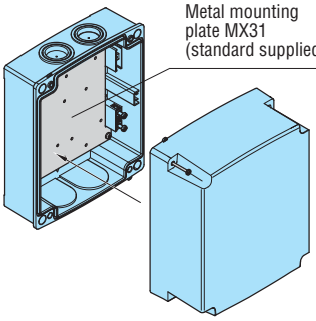
M2N



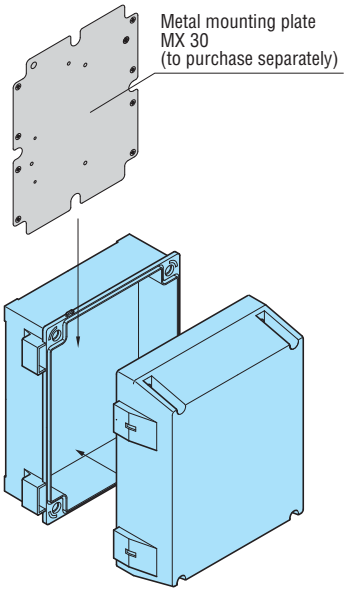
M24N



M25N



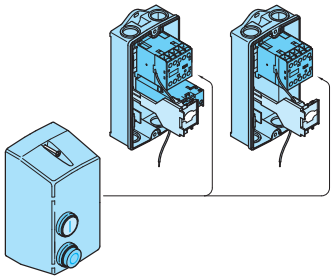
M3N



M...P... STARTERS, ENCLOSED

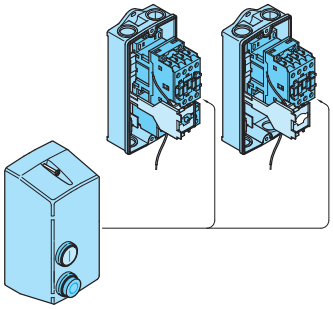
M0 P009 12...
M0 P012 12...

M0 P009 10...
M0 P012 10...



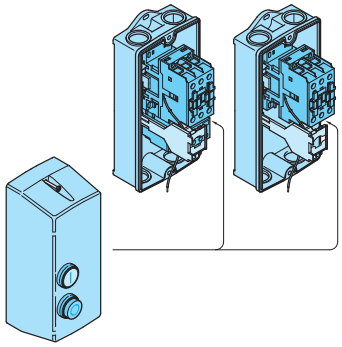
M1 P009 12...
M1 P018 12...

M1 P009 10...
M1 P018 10...



M2 P025 12...
M2 P032 12...

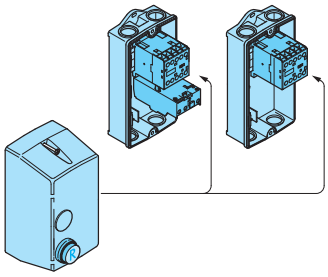
M2 P025 10...
M2 P032 10...



M...R... STARTERS, ENCLOSED

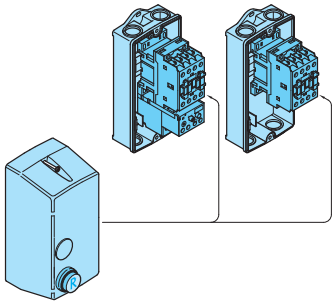
M0 R009 12...
M0 R012 12...

M0 R009 10...
M0 R012 10...



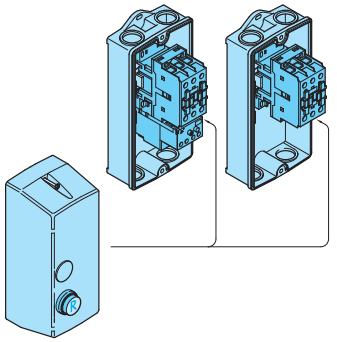
M1 R009 12...
M1 R018 12...

M1 R009 10...
M1 R018 10...



M2 R025 12...
M2 R032 12...

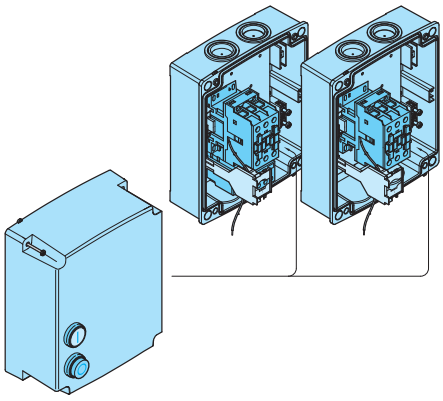
M2 R025 10...
M2 R032 10...



M25... STARTERS, ENCLOSED

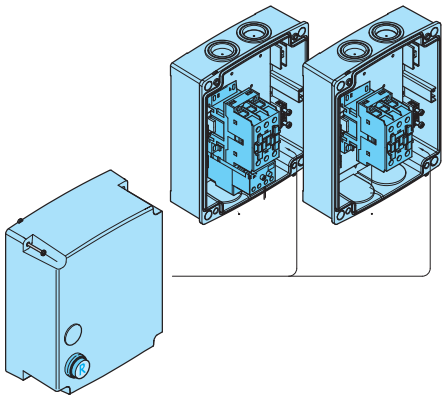
M25 P03812...

M25 P03810...



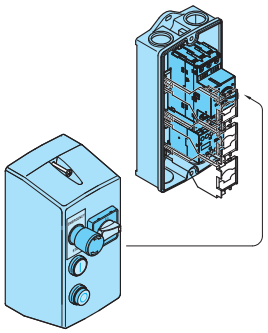
M25 R03812...

M25 R03810...



M2... STARTERS, ENCLOSED

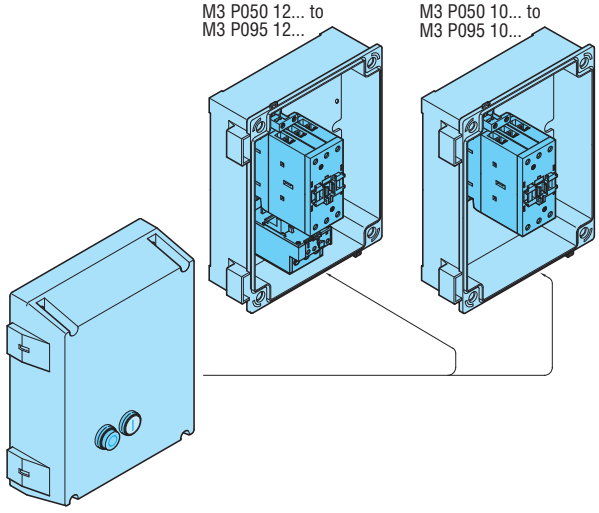
M2 P00911



M3... STARTERS, ENCLOSED

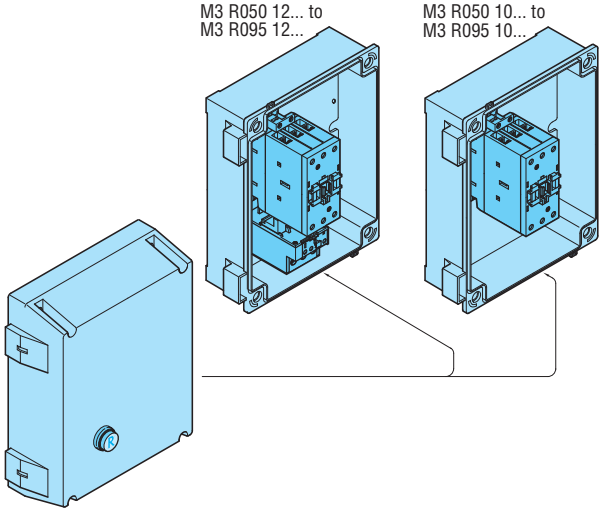
M3 P050 12... to
M3 P095 12...

M3 P050 10... to
M3 P095 10...



M3 R050 12... to
M3 R095 12...

M3 R050 10... to
M3 R095 10...

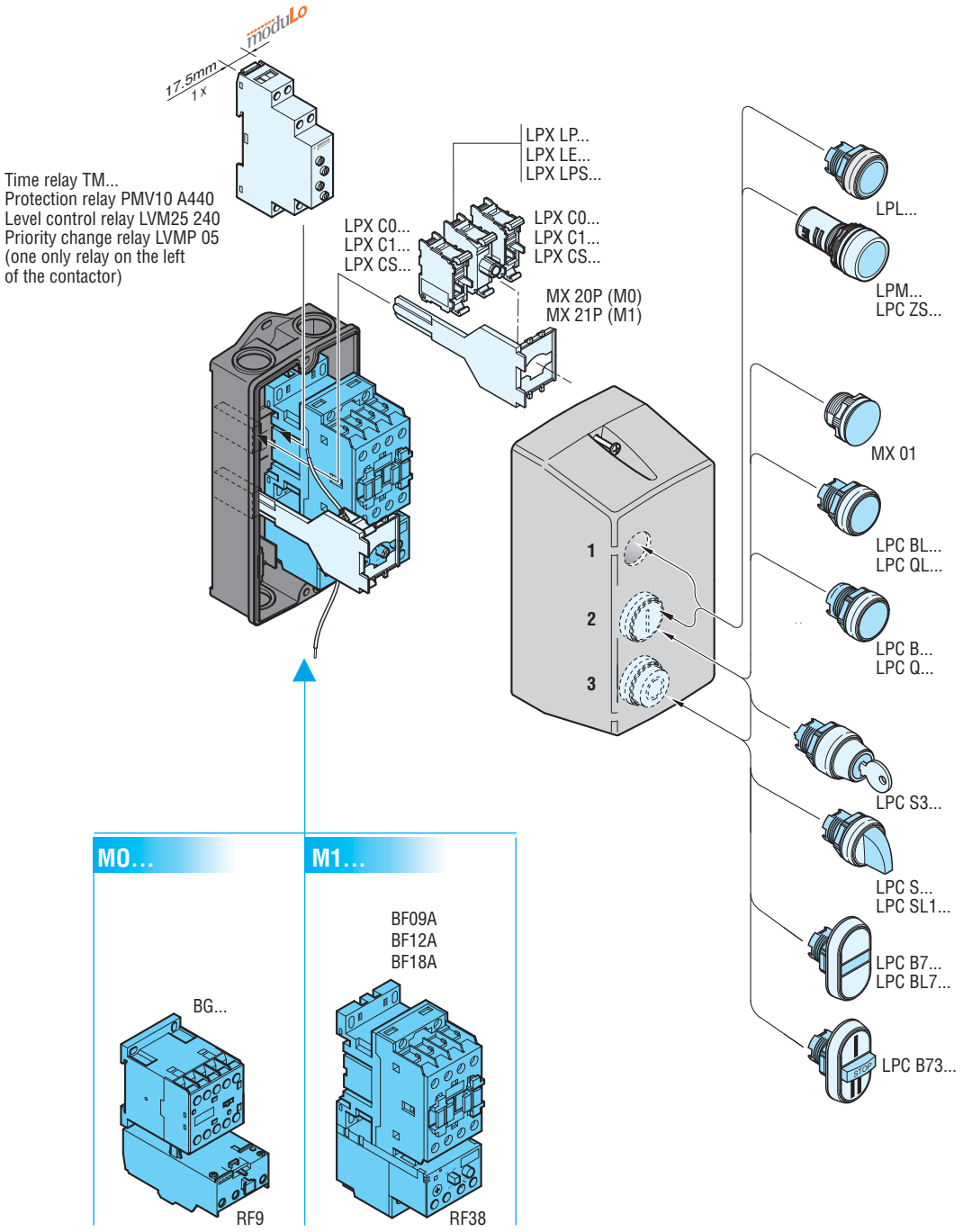


Maximum combinations for M0… and M1… starters in enclosure

For the fitting of add-on blocks and electronic relays in the starters, consult our Technical support; see contact details on inside front cover.

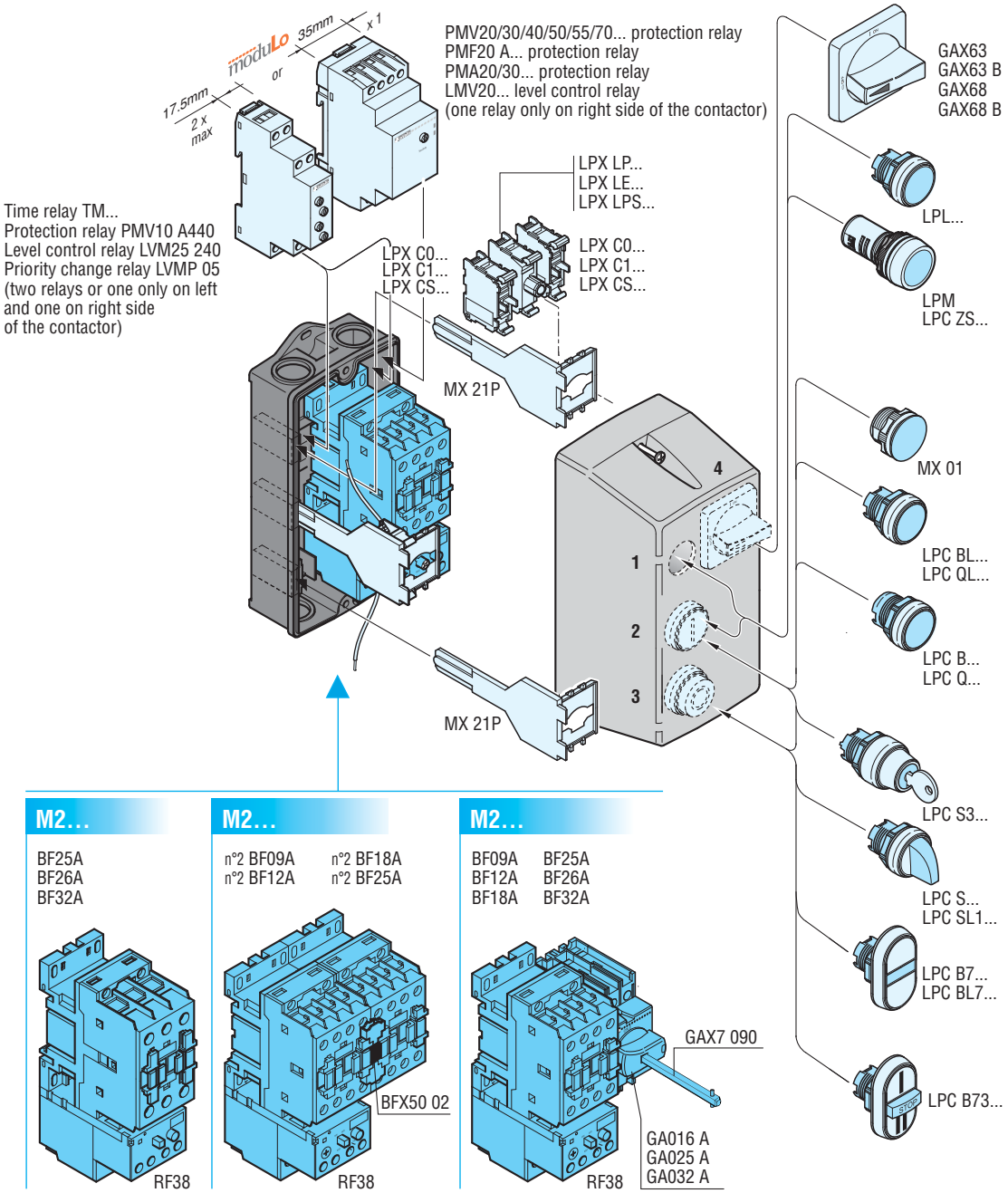
The enclosure cover can be equipped with various types of actuators and pilot lights, per following details:

1) Upper position 1
   The cover must be drilled in this position, with a 22.5mm hole, by the user and LPL..., LPM... and LPC ZS... pilot light can be fitted.
   To fit the LPL... (not type 8 LP2T IL…P) pilot light head, the mounting base, type MX 20P for M0 enclosure or type MX 21P for M1 enclosure, must also be purchased. The LED element is snapped onto this mounting base.
   No adapter or base is needed for LPL..., LPM... and LPC ZS...
2) Middle position 2
   Based on the enclosure type, in this position, the user finds either the Start button or threaded plug. Various PLatinum actuators can be fitted in this position, such as flush or extended buttons, selectors or pilot lights, as illustrated below.
   To fit the actuators, the mounting base, type MX 20 for M0 enclosure, or type MX 21P for M1 enclosure, must also be purchased. The contact or LED elements are snapped onto this mounting base.
   No adapter or base is needed for LPL..., LPM... and LPC ZS...
3) Lower position 3
   The STOP/RESET button is mounted in this position, except for the enclosure without buttons.
   This button activates the thermal overload relay via a mechanical actuator.
   In eventual applications without thermal overload relay, this button can be removed and the hole closed up by the threaded plug MX 01.



Maximum combinations for M2… starters in enclosure
For the fitting of add-on blocks and electronic relays in the starters, consult our Technical support; see contact details on inside front cover.
The enclosure covers can be equipped with various types of actuators and pilot lights, per following details:

1) Upper position 1
   The cover must be drilled in this position with a 22.5mm hole by the user; LPL..., LPM... or LPC ZS... pilot light can be fitted.
   To fit the LPL... pilot light, the mounting base type MX 21P must also be purchased. The LED element is snapped onto this mounting base.
   No adapter or base is needed for LPL..., LPM... and LPC ZS...
2) Middle position 2
   Based on the enclosure type, in this position, the user finds either the Start button or threaded plug.
   Various PLatinum actuators can be fitted in this position, such as flush or extended buttons, selectors or pilot lights, as illustrated in the side figure.
   To fit the actuators (not required for 8 LP2T IL…P pilot light), the mounting base type MX 21P must also be purchased.
   The contact or LED elements are snapped onto this mounting base.
   No adapter or base is needed for LPL..., LPM... and LPC ZS...
3) Lower position 3
   The STOP/RESET button is mounted in this position, except for the enclosure without buttons.
   This button activates the thermal overload relay via a mechanical actuator. In eventual applications without thermal overload relay, this button can be removed and the hole closed up by the threaded plug MX 01.
   Various PLatinum actuators can be fitted in this position, such as flush or extended buttons, selectors or pilot lights, as illustrated in the drawing below. To fit the actuators (not required for 8 LP2T IL…P pilot light), the mounting base type MX 21P must also be purchased. The contact or LED elements are snapped onto this mounting base.
   No adapter or base is needed for LPL..., LPM... and LPC ZS...
4) Upper position 4
   The cover must be drilled in this position with a 22.5mm hole by the user whenever an external handle is needed for a switch disconnector fitted in the enclosure.



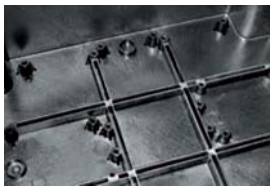
Maximum combinations for starters in M24N enclosure
In addition to a direct-on-line, full voltage across the line, starter or reversing contactor assembly, various other electromechanical devices can be fitted. The cover of the M24N enclosure can be used across the entire surface to mount pushbuttons, measuring instruments, switch disconnectors GA016A…GA040A and GA063SA type.
No contact blocks or other additional accessories can be mounted on the contactor face of AC BF series; they can only be fitted on the contactor side since the cover is shallow.
Eventually pushbuttons, selector switches and/or other control accessories of the PLatinum series can be used and contact or LED elements can be mounted directly inside on the cover with the LPX AU120 mounting adapter; refer to section 7.
MX 31 internal metal mounting plate is standard-supplied.

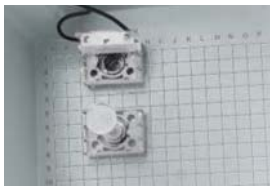
The wall fixing holes and the cover closing captive **screws** are positioned **outwards** with respect to the sealing gasket. This guarantees the protection degree of the enclosure against infiltrations liquid (IEC IPX5 / UL Type 4X).

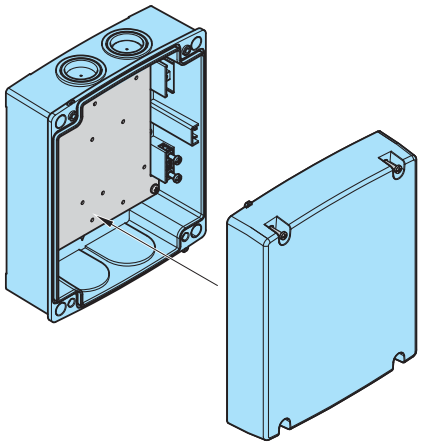
The base has **ribbing** which facilitates the fixing of DIN rails, metal mounting plates and electronic printed boards.

Grid references, marked by letters and numbers, are engraved on the interior surface of the cover. This grid allows to quickly identify the exact drilling points where pushbuttons, handles or pilot lights will be mounted.

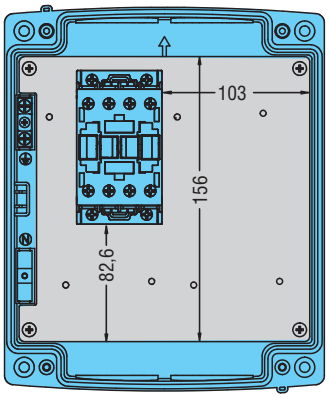
A **safety sealing** system keeps the cover and base together to avoid inopportune opening and tampering.

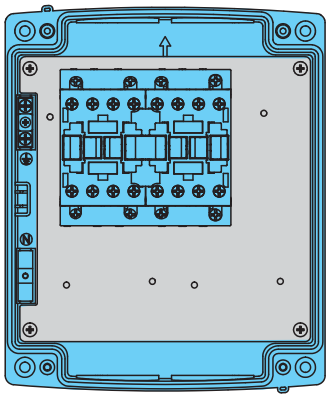


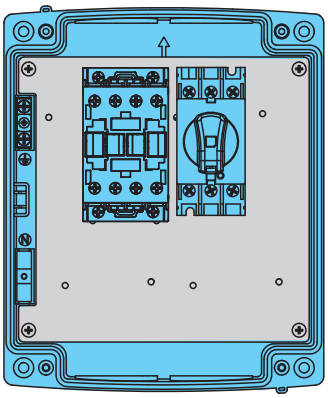




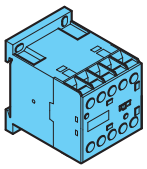
Available space for fitting other electrical or electronic devices



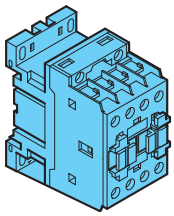




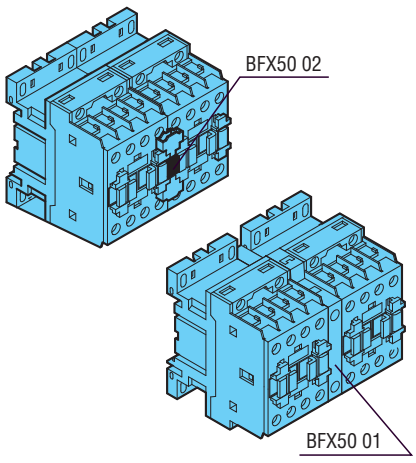
M24N
BG06
BG09
BG12
without overload



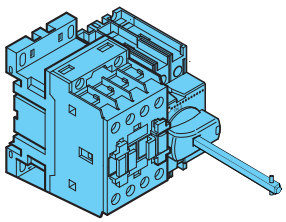
M24N
BF09A...BF25A
without overload



M24N
BGR... - BGT... - BGC... without overload
n° 2 BF09A n° 2 BF12A
n° 2 BF18A n° 2 BF25A
All without overload
BFA...42 without overload



M24N
BF09A BF12A
BF18A BF25A
with GA016A...GA040A and GA063SA



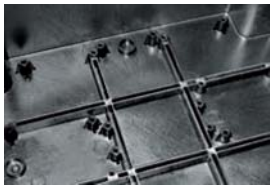
Maximum combinations for starters in M25… enclosure
In addition to a direct-on-line, full voltage across the line, starter or reversing contactor assembly, various other electromechanical devices can be fitted. The cover of the M25 enclosure can be used across the entire surface to mount pushbuttons, measuring instruments, switch disconnectors GA016A…GA040A and GA063SA type. Possible contact blocks or other additional accessories can be mounted on the contactor face of AC or DC BF series or on the contactor side since the cover is deep. Eventually pushbuttons, selector switches and/or other control accessories of the PLatinum series can be used and contact or LED elements can be mounted directly inside on the cover with the LPX AU120 mounting adapter; refer to section 7.
MX 31 internal metal mounting plate is standard-supplied.

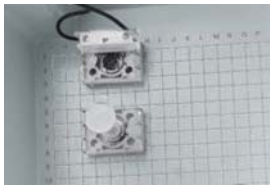
The wall fixing holes and the cover closing captive **screws** are positioned **outwards** with respect to the sealing gasket. This guarantees the protection degree of the enclosure against liquid infiltrations (IEC IPX5 / UL Type 4X).

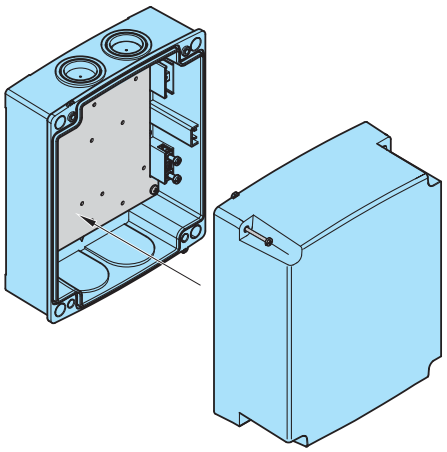
The base has **ribbing** which facilitates the fixing of DIN rails, metal mounting plates and electronic printed boards.

Grid references, marked by letters and numbers, are engraved on the interior surface of the cover. This grid allows to quickly identify the exact drilling points where pushbuttons, handles or pilot lights will be mounted.

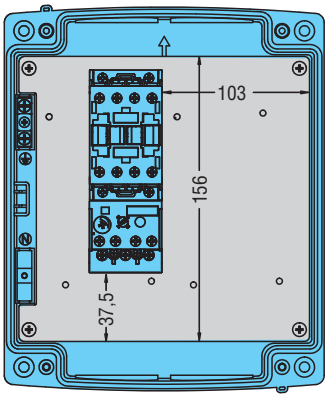
A **safety sealing** system keeps the cover and base together to avoid inopportune opening and tampering.

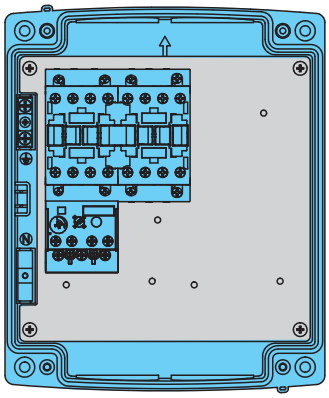


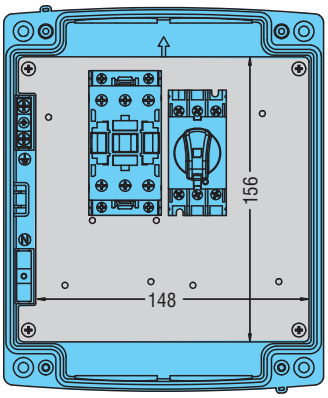




Available space for fitting other electrical or electronic devices

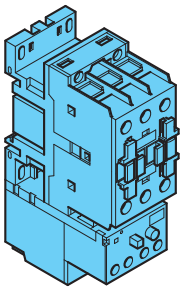






M25…038…

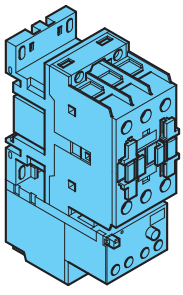
BF38
with or without overload



RF38...

M25…

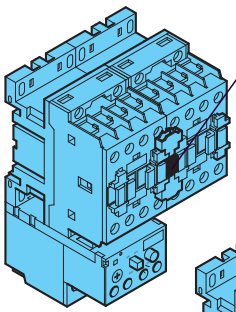
BF26 - BF32
with or without overload



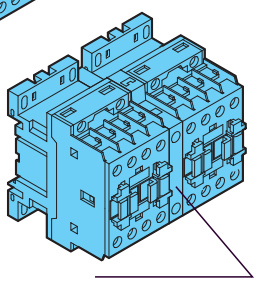
RF38...

M25…

BGR... - BGT... - BGC with or without overload RF9
n° 2 BF26 - n° 2 BF32 - n° 2 BF38 with or without overload RF38
BFA...42 with or without overload RF38

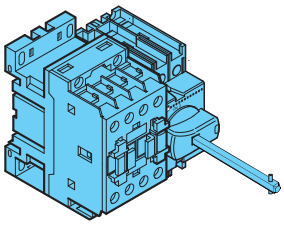


RF38...



M25…

BF09 BF12 BF18
BF26 BF32 BF38
with GA016A...GA040A and GA063SA



Dimensions page 4-17
Wiring diagrams page 4-20

Maximum combinations for starters in M3… enclosure
In addition to a direct-on-line, full voltage across the line, starter or reversing contactor assembly, star-delta starters can be installed as illustrated at the lower right as well as various other electromechanical devices. The cover of the M3 enclosure can be used across the entire surface to mount pushbuttons, measuring instruments or switch disconnectors GA016A…GA125A, etc.
MX 30 internal metal mounting plate is standard supplied with M3P… and M3R… types; not included with the M3N, it can be purchased separately.

With the specifically designed **hinges**, the cover remains attached to the base, fully open, while the wiring work is being carried out. By applying **slight pressure** on the hinges, the cover can be released from the base.

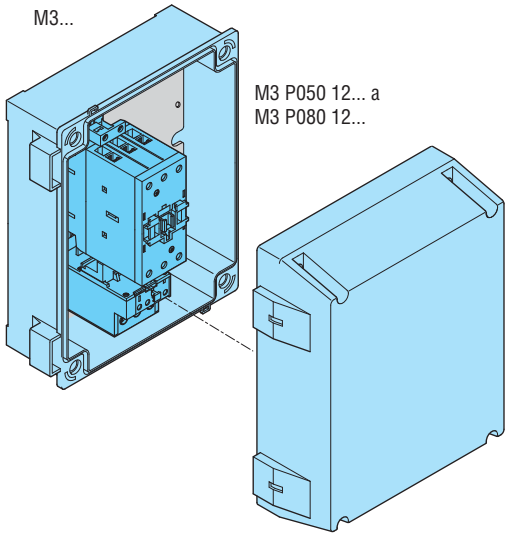
The cover closing captive **screws** and the wall fixing holes are positioned **outwards** with respect to the sealing gasket. This guarantees the protection degree of the enclosure against liquids infiltrations (IEC IPX5 / UL Type 4X).

A **safety sealing** system keeps the cover and base together to avoid inopportune opening and tampering.

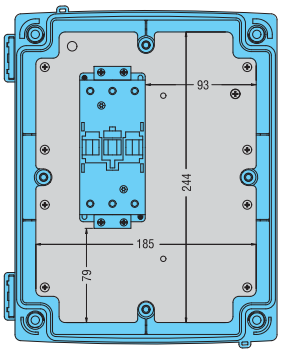
Grid references, marked by letters and numbers, are engraved on the interior surface of the cover. This grid allows to quickly identify the exact drilling points where pushbuttons, handle or pilot lights will be mounted.

A properly predrilled metal mounting plate (MX 30 standard supplied except for M3N) permits to quickly and precisely fix equipment in place.

The base has **ribbing** which facilitates the fixing of DIN rails, metal mounting plates and electronic printed boards.

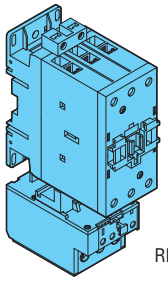


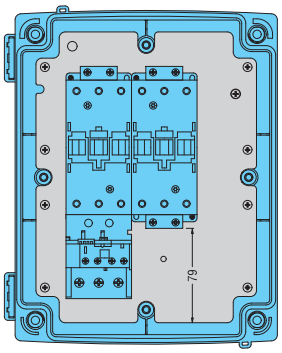
Available space for fitting other electrical or electronic devices



M3…

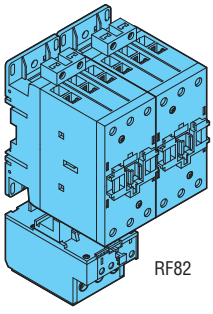
n° 1 BF40 n° 1 BF80
n° 1 BF50 n° 1 BF94
n° 1 BF65

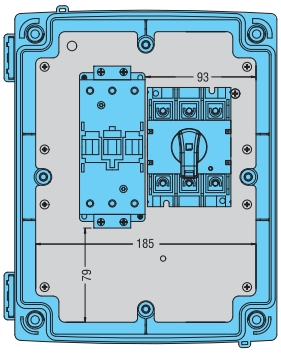




M3…

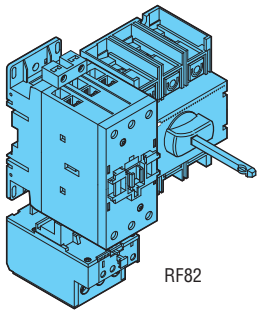
n° 2 BF40 n° 2 BF65 n° 2 BF94
n° 2 BF50 n° 2 BF80

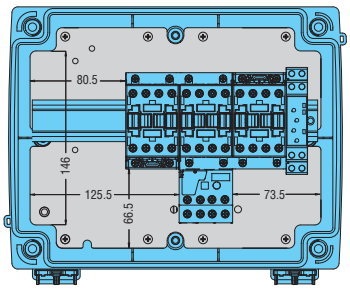




M3…

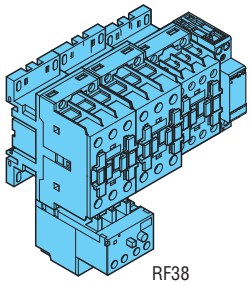
n° 1 BF40 n° 1 BF65 n° 1 BF94 + n° 1 GA...
n° 1 BF50 n° 1 BF80





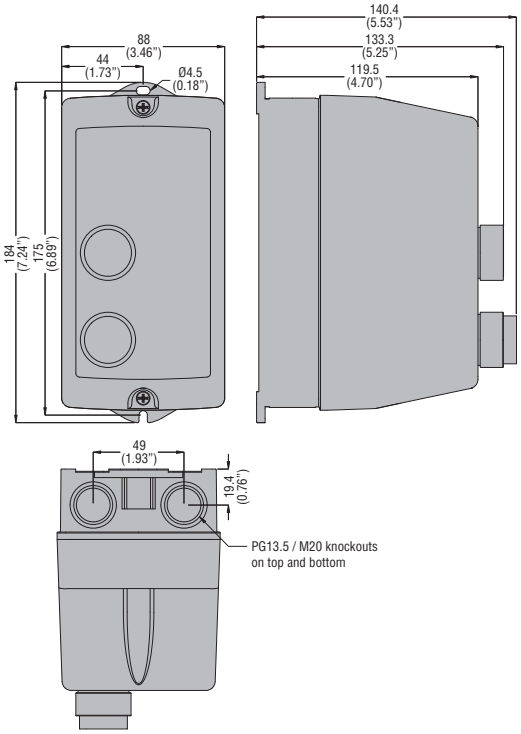
M3P…70

Star-delta configuration with RF38 relay, TM ST time relays and contactors:
BF09A BF12A BF18A
BF25A BF26A BF38A

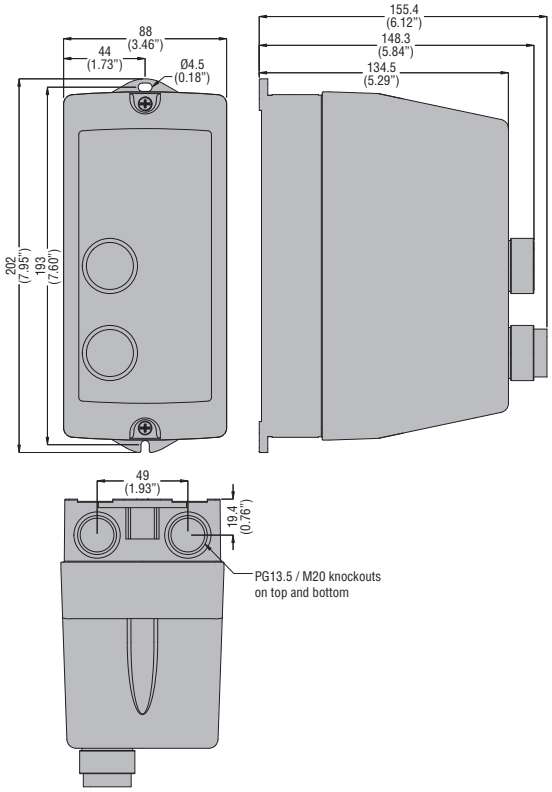


DIRECT-ON-LINE STARTERS - EMPTY ENCLOSURES

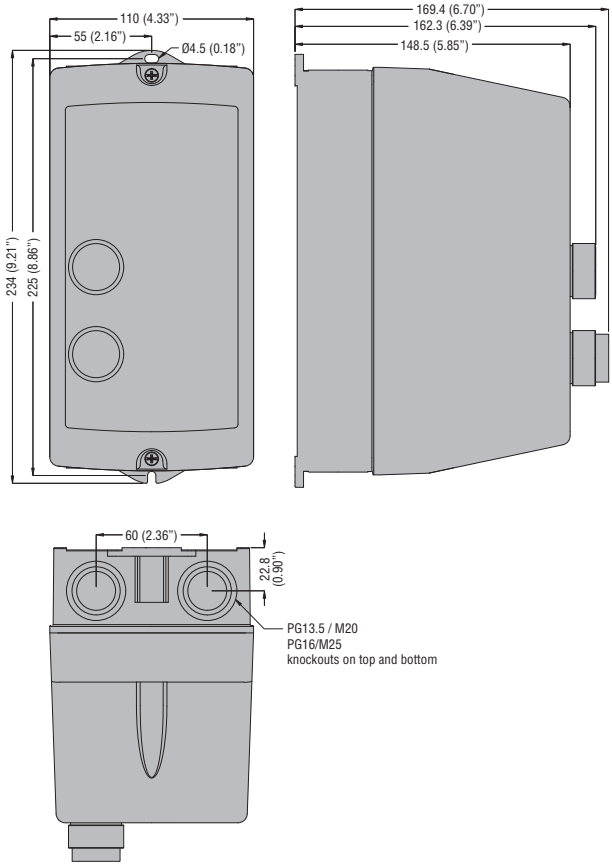
M0

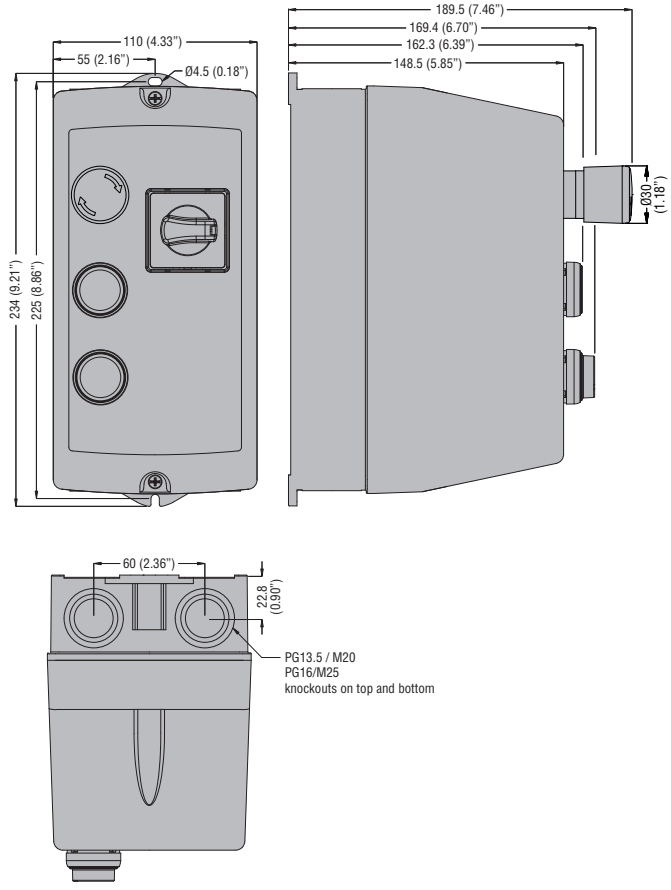


M1

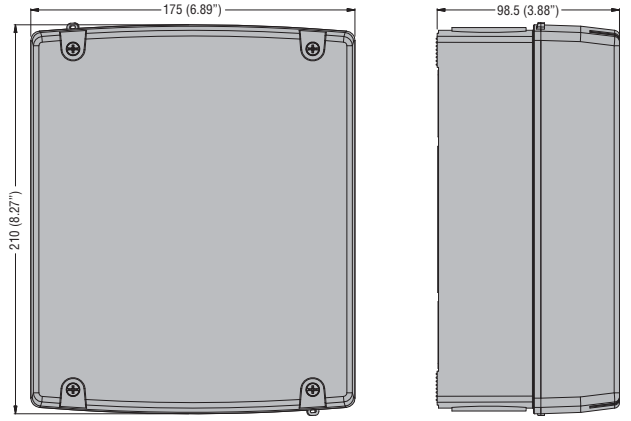


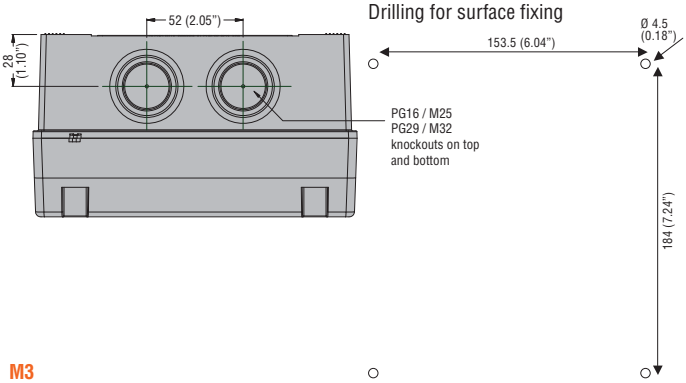
M2



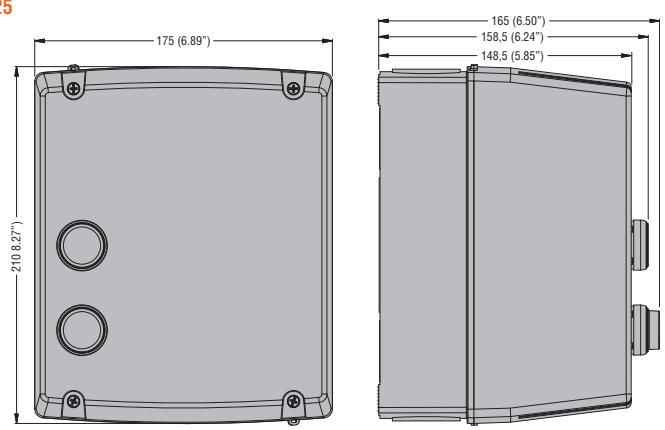


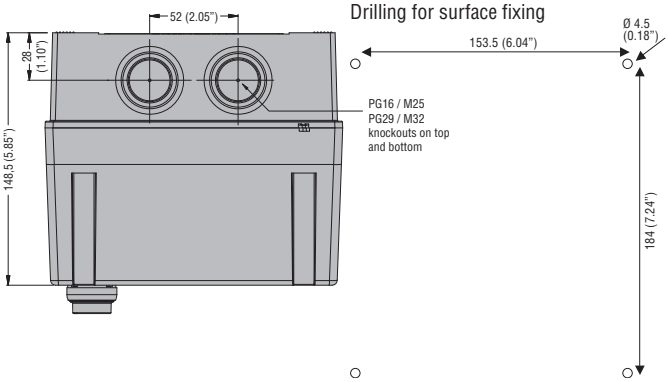
M24N



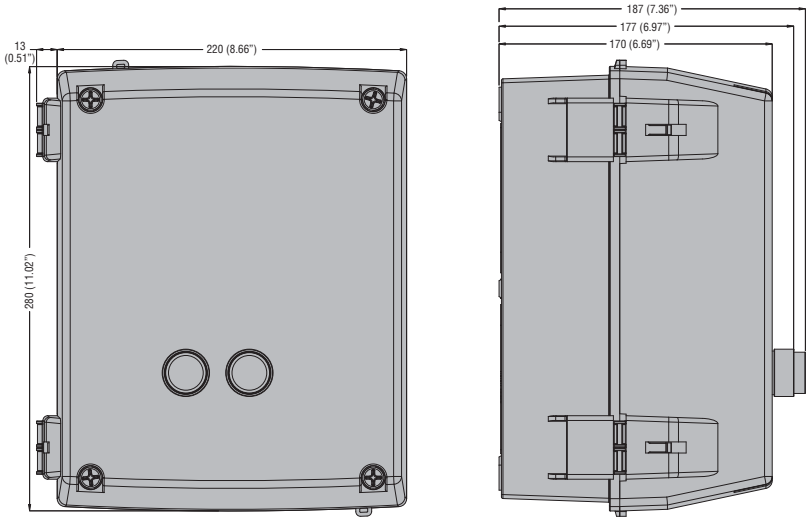


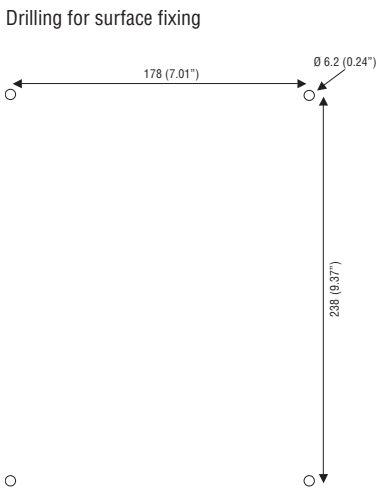
M25





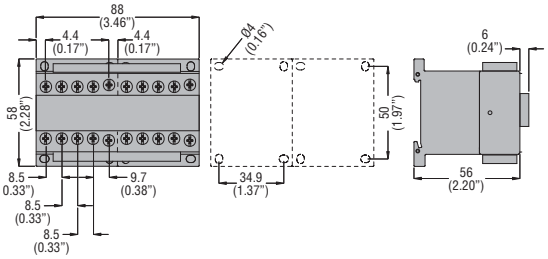
M3



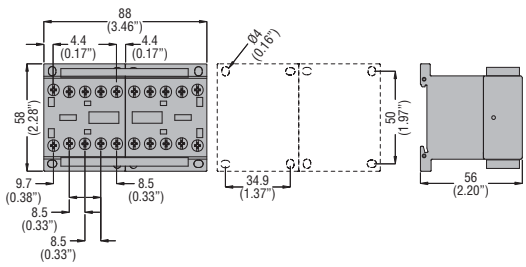


REVERSING CONTACTOR ASSEMBLIES

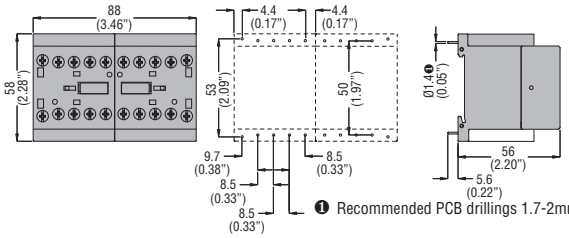
BGR...



BGT...

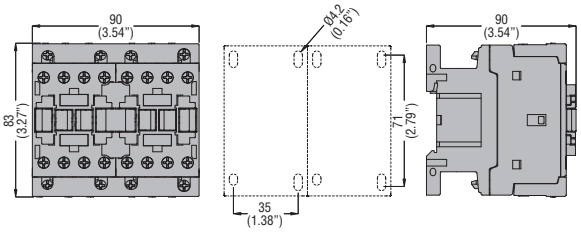


BGTP...



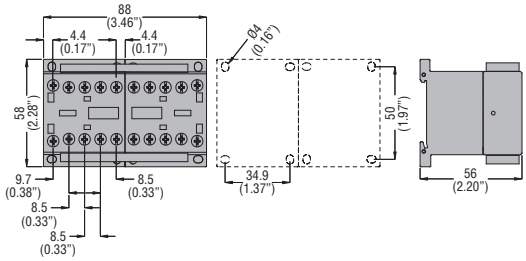
❶ Recommended PCB drillings 1.7-2mm (0.07-0.08").

BFA...42



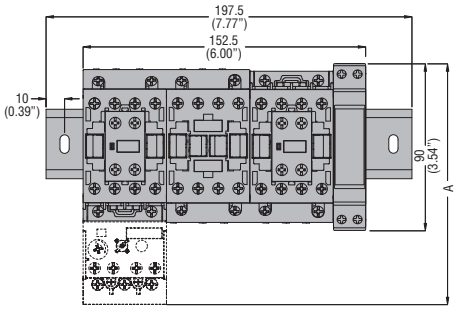
CHANGEOVER CONTACTOR ASSEMBLIES

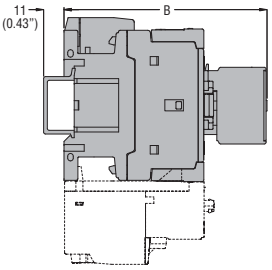
BGC09 T4...



STAR-DELTA STARTERS OPEN FRAME

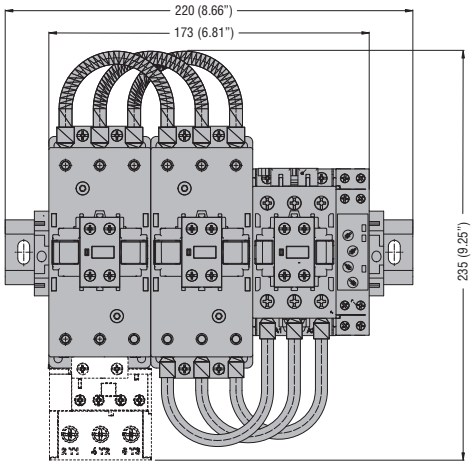
BFA009 70...BFA038 70

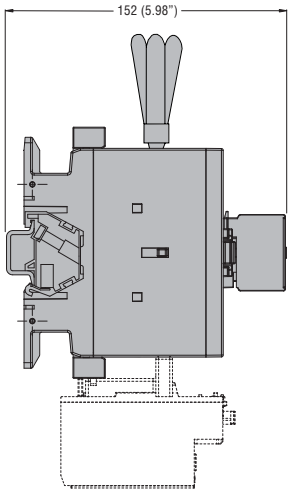




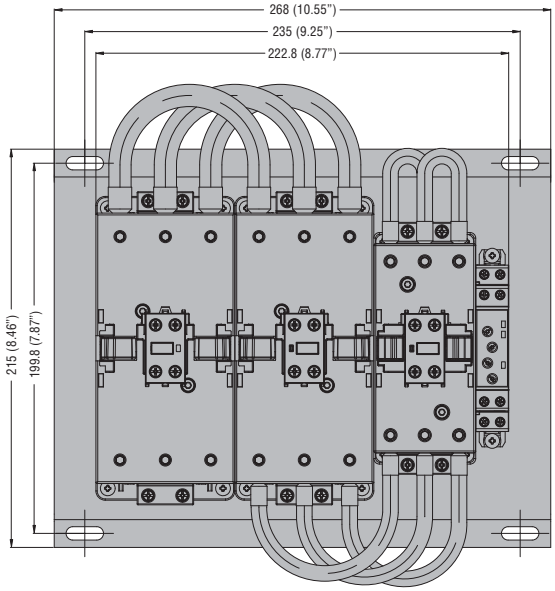
STARTER TYPE	A	B
BFA009 70	130.5 (5.14")	109.5 (4.31")
BFA012 70	130.5 (5.14")	109.5 (4.31")
BFA018 70	130.5 (5.14")	109.5 (4.31")
BFA025 70	130.5 (5.14")	109.5 (4.31")
BFA026 70	135 (5.14")	119 (4.68")
BFA032 70	135 (5.14")	119 (4.68")
BFA038 70	135 (5.14")	119 (4.68")

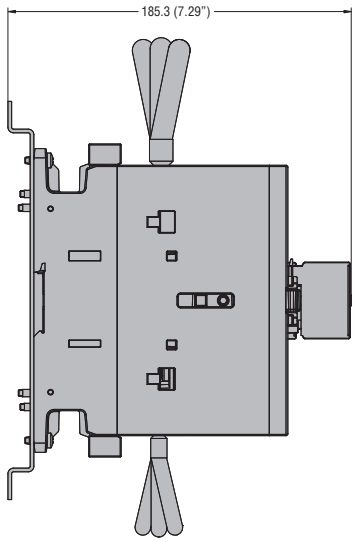
BFA050 70...BFA080 70





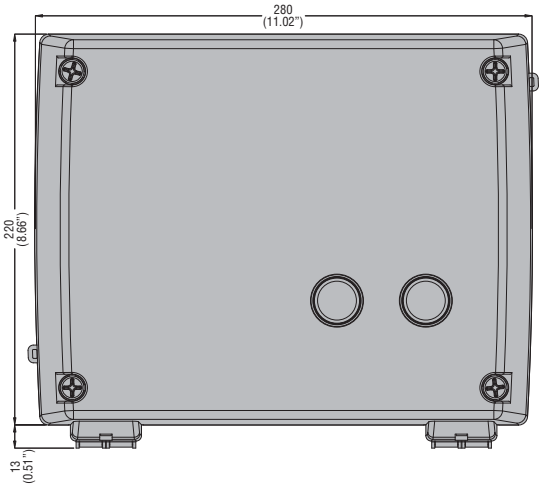
BFA095 70...BFA150 70

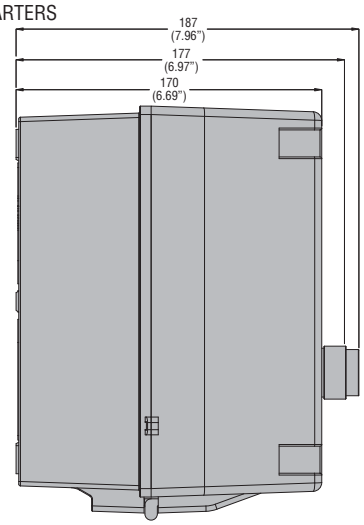




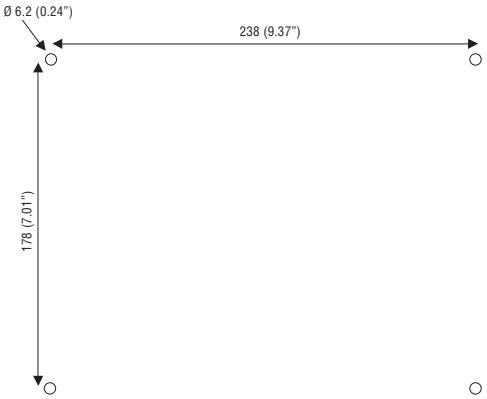
STAR-DELTA STARTERS IN ENCLOSURE - EMPTY ENCLOSURE FOR STAR-DELTA STARTERS

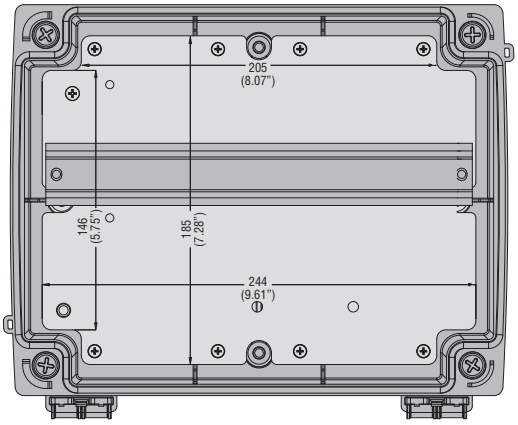
M3P...70 - M3 PA70



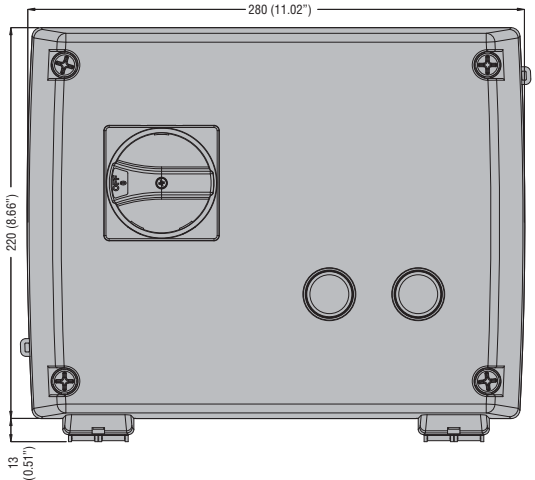


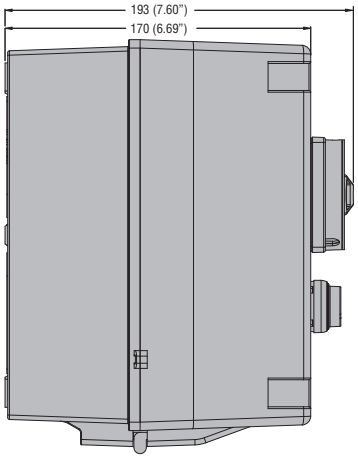
Drilling for surface fixing

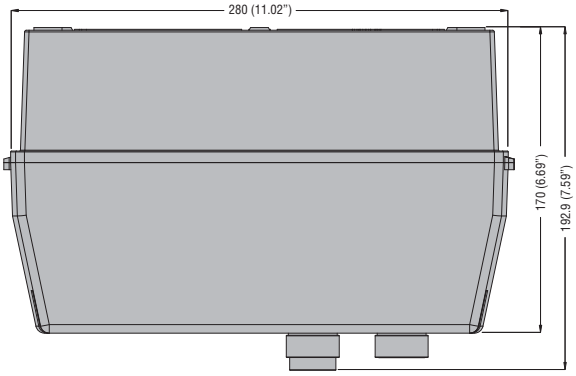




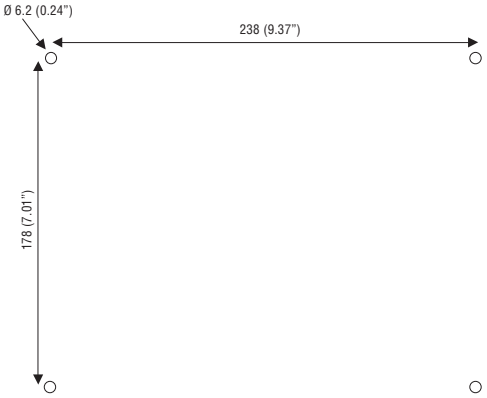
M3P...73







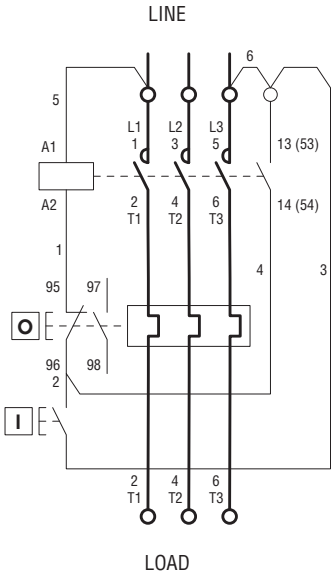
Drilling for surface fixing



DIRECT-ON-LINE STARTERS IN ENCLOSURE

M...P

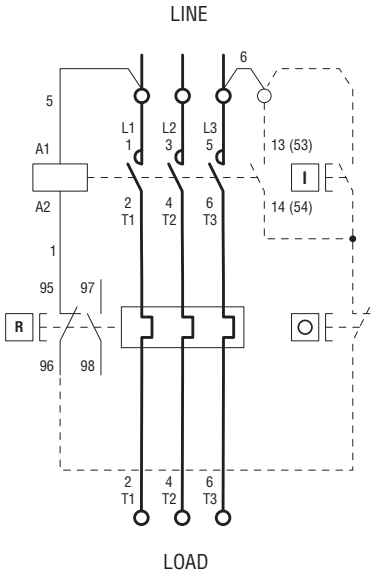
Diagram 1 - Incorporated button control for 3-phase motors



I = Start; O = Stop/Reset

M...R

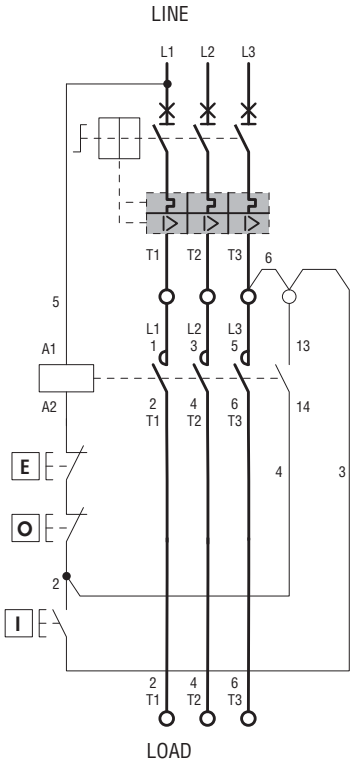
Diagram 2 - External button control for 3-phase motors



R = Reset; I = Start; O = Stop

M2 P00911...

Diagram 3 - Incorporated button control and rotary actuator for 3-phase motors



I = Start; O = Stop; E = Emergency Stop

Diagram 4 - Power connection for 1-phase motors

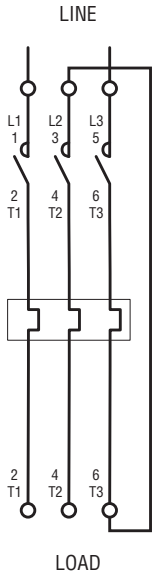
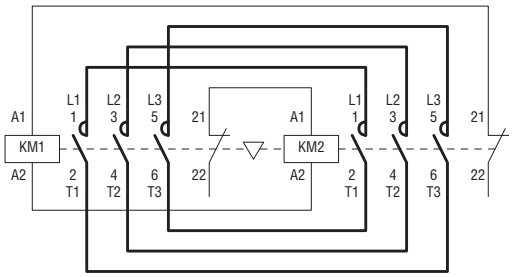


DIAGRAM 2:
Connect the eventual two-wire control (e.g. automatism) between terminal 3 of the contactor and terminal 96 of the thermal overload relay.

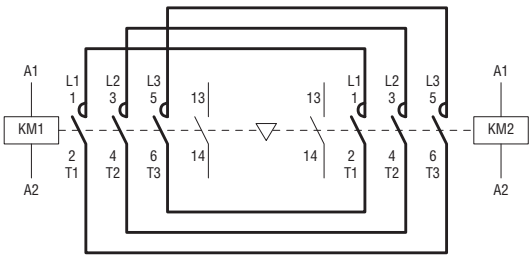
IMPORTANT
- Remove jumpers 5 and 6 and connect the auxiliary line to terminals A1 and 3 for a control circuit with a voltage value different than the supply.
- Remove jumper 5 and connect the neutral to terminal A1 for a control circuit between phase and neutral.
- SINGLE-PHASE SUPPLY
  The main circuit must be configured according to Diagram 3 in the case of a single-phase line or motor.
- FUSES
  A set of three fuses must be connected upstream of the starter in the event no appropriate protection is included in the system.

REVERSING CONTACTOR ASSEMBLY

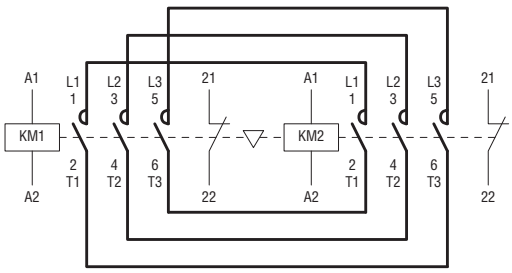
BGR...



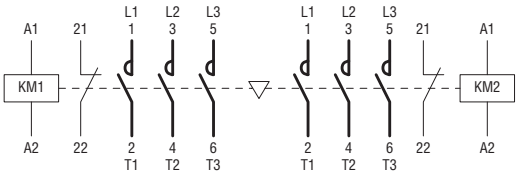
BGT...



BFA...42

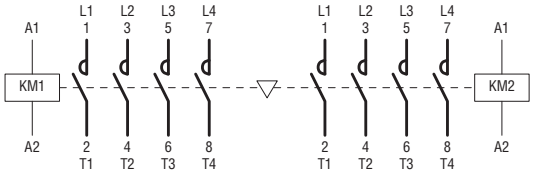


BGTP09...



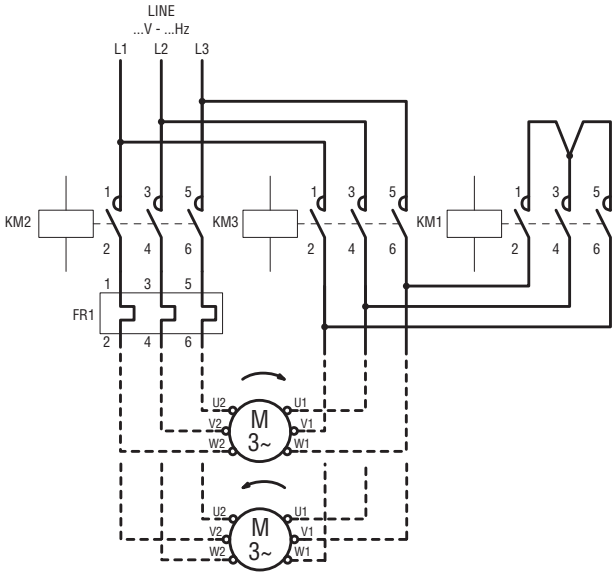
CHANGEOVER CONTACTOR ASSEMBLY

BGC09...

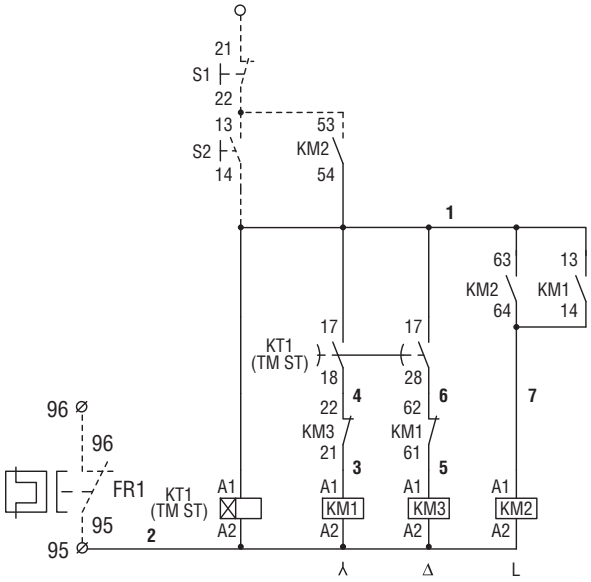


STAR-DELTA STARTERS, OPEN FRAME

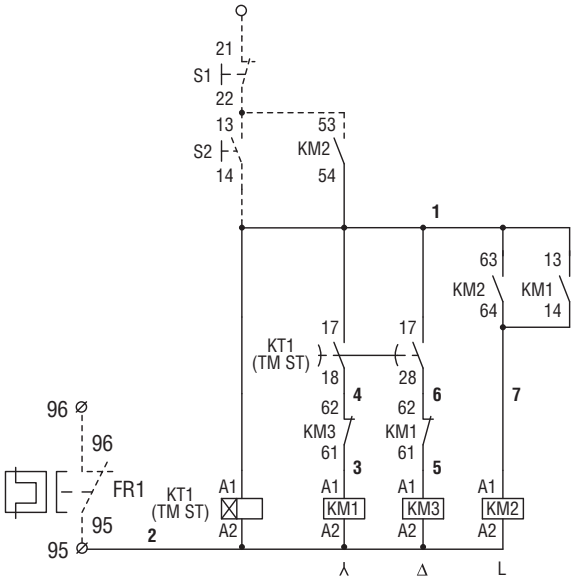
BFA009…038 70 - M3P009…038 70



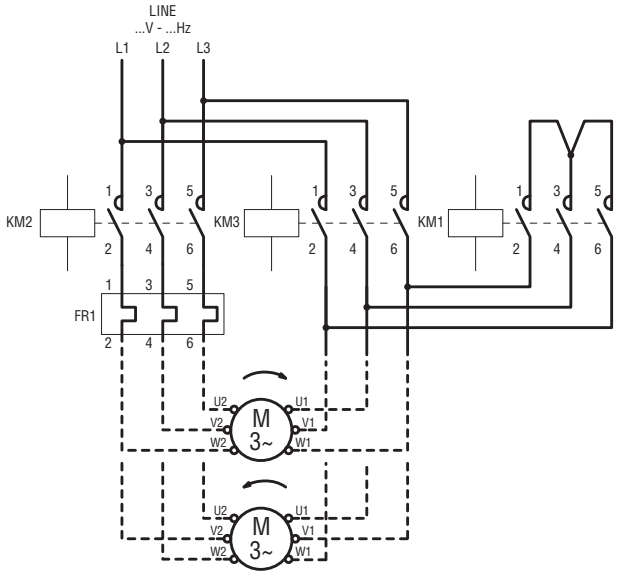
BFA009 70… BFA025 70
M3P009 70…M3P025 70

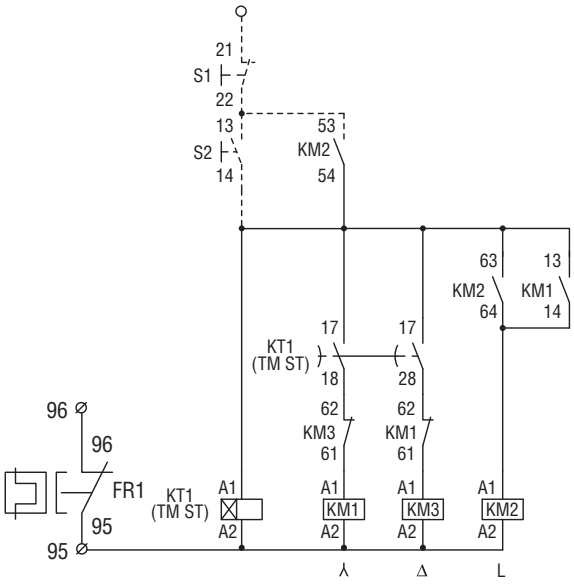


BFA26 70… - BFA038 70
M3P026 70…M3P038 70



BFA050…BFA150





RATINGS FOR USA AND CANADA.

Order code for magnetic motor starters in non-metallic enclosure with 2 push buttons	T/O RELAY ADJ RANGE	MAX UL/CSA HP RATINGS INDICATED ON STARTER (based on t/o relay adj range)					
		Single phase		Three phase			
	[A]	120V	240V	200V	240V	480V	600V
M0P009❶❷1	0.6 - 1	-	-	-	-	½	½
M0P009❶❷1V5	0.9 - 1.5	-	-	-	-	¾	¾
M0P009❶❷2V3	1.4 - 2.3	-	-	-	½	1	1
M0P009❶❷33	2 - 3.3	-	¼	¾	1½	1½	2
M0P009❶❷5	3 - 5	-	½	1	1	3	3
M0P009❶❷75	4.5 - 7.5	-	¾	1½	2	5	5
M0P009❶❷10	6 - 10	½	1½	2	3	5	5
M0P012❶❷15	9 - 15	½	1½	3	3	7½	10
M1P009❶❷A4	0.63 - 1	-	-	-	-	-	½
M1P009❶❷A5	1 - 1.6	-	-	-	-	½	¾
M1P009❶❷A6	1.6 - 2.5	-	-	½	½	1	1½
M1P009❶❷A7	2.5 - 4	-	-	¾	¾	2	3
M1P009❶❷A8	4 - 6.5	¼	½	1	1½	3	5
M1P009❶❷A9	6.3 - 10	½	1½	2	3	5	7½
M1P009❶❷B0	9 - 14	¾	2	3	3	5	7½
M1P012❶❷B0	9 - 14	1	2	5	5	7½	10
M1P018❶❷B1	13 - 18	1	3	5	5	10	15
M2P025❶❷B2	17 - 23	1½	3	5	7½	15	15
M2P025❶❷B3	20 - 25	2	3	7½	7½	15	15
M2P026❶❷B2	17 - 23	1½	3	5	7½	15	20
M2P026❶❷B3	20 - 25	2	5	7½	7½	15	20
M2P026❶❷B4	24 - 32	2	5	7½	7½	15	20
M2P032❶❷B4	24 - 32	3	7½	10	10	20	25
M25P038❶❷B5	32 - 38	3	7½	10	15	30	30
M3P050❶❷B6UL	35 - 50	5	10	15	20	40	40
M3P065❶❷B7UL❸	46 - 65	-	-	20	25	50	60
M3P080❶❷B8❹	60 - 82	-	-	25❹	30❹	60❹	75❹

NOTE: The HP / FLA values vary from one motor to another; if possible, always verify the HP and FLA (or rated current) on the motor nameplate.
Enclosure UL Type 1, 12, 4 and 4X industrial control environment for M1, M2, M25 and M3…UL versions; designation of control units can be:
N – without push buttons
R – with reset button only
P – per table, with start-stop push buttons.
Consult Technical support for any other combination required (e.g. with other type of contactors, contactor assemblies or definite-purpose version, different overload version or range, additional pilot lights, extra electrical or electronic elements); see contact details on inside front cover. Refer to ❶ below for specified standard configurations.

❶ Complete the order code by indicating:
– 10 if required without thermal overload relay
– 12 if required with three-phase overload relay
– 17 if required with disconnect switch for M2 and M3 types.

❷ Complete order code with coil voltage digit (if 50/60Hz) or with voltage digit followed by 60 (if 60Hz).
Standard voltages are as follows:
– AC 50/60Hz 024 / 048 / 110 / 230 / 400V
– AC 60Hz 024 60 / 048 60 / 120 60 / 220 60 / 230 60 / 460 60 / 575 60 (V).

❸ Maximum UL ratings is 52A for motor control and 65A for general use.

❹ No CSA or UL certification. Indicated values correspond to UL/CSA magnetic contactor ratings and for indication and reference purposes only.

Certifications obtained:
– CSA certified for Canada and USA (cCSAus - File 94157) as Magnetic Motor Controllers at max 600VAC, max 15HP per single phase, max 60HP three phase, max 125A with general purpose enclosure.
– UL Listed for USA and Canada (cULus - File E93602) as Magnetic Motor Controllers – Enclosed.

THREE-PHASE POWER RATINGS		Rated motor current								
		200V	230V	**220-240V**	**380-415V**	400V	**440-480V**	500V	**550-600V**	690V
[HP]	**[kW]**	**[A]**	[A]	**[A]**	**[A]**	[A]	**[A]**	[A]	**[A]**	[A]
-	0.37	-	1.9	-	-	1.1	-	0.88	-	0.64
1/2	-	**2.5**	-	**2.2**	**1.3**	-	**1.1**	-	**0.9**	-
-	0.55	-	2.6	-	-	1.5	-	1.2	-	0.87
3/4	-	**3.7**	-	**3.2**	**1.8**	-	**1.6**	-	**1.3**	-
1	-	**4.8**	-	**4.2**	**2.3**	-	**2.1**	2	**1.7**	-
-	0.75	-	3.3	-	-	1.9	-	1.5	-	1.1
-	1.1	-	4.7	-	-	2.7	-	2.2	-	1.6
1-1/2	-	**6.9**	-	**6**	**3.3**	-	**3**	-	**2.4**	-
2	-	**7.8**	-	**6.8**	**4.3**	-	**3.4**	-	**2.7**	-
-	1.5	-	6.3	-	-	3.6	-	2.9	-	2.1
-	2.2	-	5.5	-	-	4.9	-	3.9	-	2.8
3	-	-	11.3	-	-	6.5	-	5.2	-	3.8
-	4	-	15	-	-	8.5	-	6.8	-	4.9
5	-	**17.5**	-	**15.2**	**9.7**	-	**7.6**	-	**6.1**	-
-	5.5	-	20	-	-	11.5	-	9.2	-	6.7
7-1/2	-	**25.3**	-	**22**	**14**	-	**11**	-	**9**	-
10	-	**32.2**	-	**28**	**18**	-	**14**	-	**11**	-
-	7.5	-	27	-	-	15.5	-	12.4	-	8.9
-	11	-	38	-	-	22	-	17.6	-	12.8
15	-	**48**	-	**42**	**27**	-	**21**	-	**17**	-
20	-	**62.1**	-	**54**	**34**	-	**27**	-	**22**	-
-	15	-	51	-	-	29	-	23	-	17
-	18.5	-	61	-	-	35	-	28	-	21
25	-	**78.2**	-	**68**	**44**	-	**34**	-	**27**	-
-	22	-	72	-	-	41	-	33	-	24
30	-	**92**	-	**80**	**51**	-	**40**	-	**32**	-
40	-	**120**	-	**104**	**66**	-	**52**	-	**41**	-
-	30	-	96	-	-	55	-	44	-	32
-	37	-	115	-	-	66	-	53	-	39
50	-	**150**	-	**130**	**83**	-	**65**	-	**52**	-
60	-	**177**	-	**154**	**103**	-	**77**	-	**62**	-
-	45	-	140	-	-	80	-	64	-	47
-	55	-	169	-	-	97	-	78	-	57
75	-	**221**	-	**192**	**128**	-	**96**	-	**77**	-
100	-	**285**	-	**248**	**165**	-	**124**	-	**99**	-
-	75	-	230	-	-	132	-	106	-	77
-	90	-	278	-	-	160	-	128	-	93
125	-	**359**	-	**312**	**208**	-	**156**	-	**125**	-
-	110	-	340	-	-	195	-	156	-	113
150	-	**414**	-	**360**	**240**	-	**180**	-	**144**	-
-	132	-	400	-	-	230	-	184	-	134
200	-	**552**	-	**480**	**320**	-	**240**	-	**192**	-
-	160	-	487	-	-	280	-	224	-	162
250	-	-	-	**604**	**403**	-	**302**	-	**242**	-
-	200	-	609	-	-	350	-	280	-	203
300	-	-	-	**722**	**482**	-	**361**	-	**289**	-
-	250	-	748	-	-	430	-	344	-	250
350	-	-	-	**828**	**560**	-	**414**	-	**336**	-
400	-	-	-	**954**	**636**	-	**477**	-	**382**	-
-	315	-	940	-	-	540	-	432	-	313
450	-	-	-	**1030**	-	-	**515**	-	**412**	-
-	355	-	1061	-	-	610	-	488	-	354
500	-	-	-	**1180**	**786**	-	**590**	-	**472**	-

SINGLE-PHASE POWER RATINGS	Rated motor current	
[HP]	**[A] at 120V**	**[A] at 240V**
1/10	3	1.5
1/8	3.8	1.9
1/6	4.4	2.2
1/4	5.8	2.9
1/3	7.2	3.6
1/2	9.8	4.9
3/4	12.8	6.9
1	16	8
1-1/2	20	10
2	24	12
3	34	17
5	56	28
7-1/2	80	40
10	100	50
15	135	68

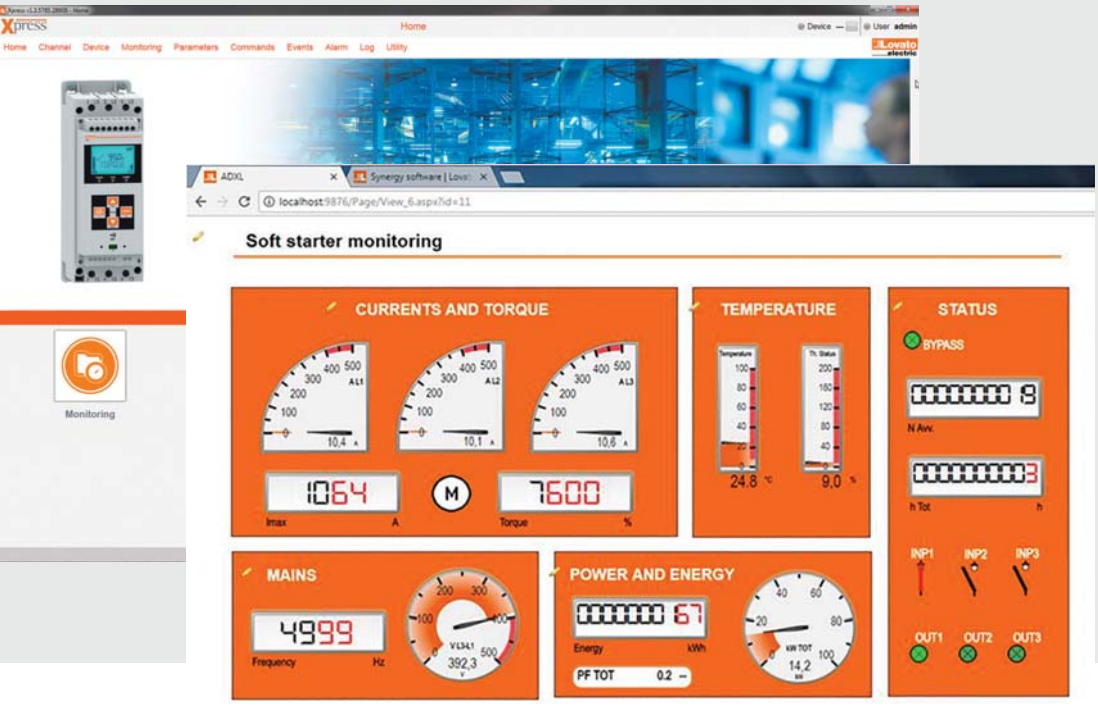
The information in the chart has been obtained from the IEC/EN 60947-4-1 standards. The kW ratings are preferred rated values according to IEC 60072-1 (primary series) at 50/60Hz while Horsepower and corresponding current values are according to UL 508 Industrial Control Standard at 60Hz.

The full load current values listed are for motors running at standard speeds with normal torque characteristics. Motors which are non-standard, such as low speed, high torque or other special applications may have higher full load currents.

Caution: For accurate and reliable motor protection, motor nameplate current should be used to obtain actual motor full load amps for all motors. The information given is for indication and reference purposes only.

Soft starters

- 12A to 1200A soft starter ratings
- Standard and severe duty types
- Internal bypass contactor up to 320A rating
- Startup with torque control, voltage ramp or current limit
- Integrated total motor protection
- Clock calendar
- Digital control and adjustment
- RS232 and RS485 for monitoring and remote control
- Modbus-RTU and proprietary ASCII communication protocols.



Page 5-4

ADXC

- Two phase control
- IEC rated starter current Ie 12...45A
- IEC rated motor power 5.5...22kW at 400VAC and 9...37kW at 600VAC
- UL/CSA ratings 3 to 25HP at 400VAC and 10 to 40HP at 600VAC
- Built-in bypass relay
- Total protection against over temperature and wrong phase sequence
- Initial voltage, ramp up and ramp down time adjustable on front
- LED indication for starter status
- DIN rail mount and only 45mm wide.

Page 5-5

ADXL...

- Two phase control
- For standard and severe duty
- Reduced voltage starter with torque control and built-in bypass relay
- Rated operational voltage 208...600VAC
- IEC rated starter current Ie 18....320A
- Selectable motor current from 50 to 100% of the rated starter current
- IEC rated motor power 7.5...160kW (400VAC)
- Maximum starting current limitation
- PC remote control
- Programming, data download and diagnostics via optical port
- Parameter programming via NFC and APP
- Modbus-ASCII, Modbus-RTU and Modbus-TCP communication protocols
- Backlit LCD icon display
- Integrated protections for the motor and soft starter
- LED for the signalling of the status of the soft starter.

Page 5-6

ADX...

- Three phase control
- Reduced voltage starter with torque control and built-in bypass contactor up to 245A
- For severe duty, IEC starting current 5•Ie
- Rated operational voltage 208...500VAC (ADX...B) 208...415VAC (ADX...)
- IEC rated starter current Ie 17...1200A
- IEC rated motor power 7.5...710kW (400VAC)
- Maximum starting current limitation
- PC remote control supervision
- Modbus-RTU and property ASCII communication protocols
- Backlit LCD icon display.

Guide for selecting



	ADXC	ADXL	ADX
Controlled phases	2	2	3
Built-in bypass	●	●	● (up to 245A)
Built-in display and keypad	—	●	●
Languages	—	6	4
View measurements	—	●	●
Torque control	—	●	●
Adjustable current limit	—	●	●
Dynamic braking	—	—	●
Kick Start function	—	●	●
Motor overload electronic protection	—	●	●
Motor protection PTC input	—	●	●
Protection against phase reversal	●	●	●
Protection against phase inversion	●	●	●
Protection against locked rotor	—	●	●
Protection against thyristor overtemperature	●	●	●
Protection against low load	—	●	●
Programmable alarm functions	—	●	●
Programmable digital inputs	—	●	●
Programmable analog inputs	—	—	●
Programmable digital outputs	—	●	●
Programmable analog output	—	—	●
Monitoring communication via RS485	—	○	●
Programming communication	—	●	●
Event log	—	●	●
Motor hour counter	—	●	●
Startup counter	—	●	●
Clock calendar	—	—	●
Remotable external keypad	—	○	○

● Standard
○ Optional
— Not available

Lovato electric

ADXL SERIES
SIMPLE, EFFICIENT AND SAFE MOTOR CONTROL

SIMPLE
The new ADXL soft starter series is equipped with a backlit LCD display with icons and NFC connectivity, for a simple configuration, possible also via smartphones and tablets. They are ideal for simple "plug and play" applications, thanks to the installation AUTO SET wizard, and for high-performance applications, with control and protection during the motor startup and operation.

EFFICIENCY
The two-phase control during the start and stop of the motor allows a reduction of the heat dissipation.
After the start-up is completed, the soft starter closes the internal bypass contacts and reduces energy consumption.

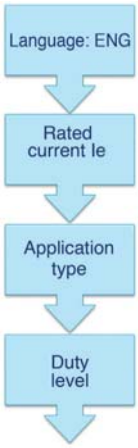
SAFETY
ADXL built-in functions allow to protect the connected motor and the starter; it's capable of monitoring the motor thermal status, to manage the thermal protection, and its internal temperature, in order to protect the thyristors from overtemperature. Furthermore, a motor overtemperature protection can be enabled through an external PTC temperature sensor.

AUTO SET
Upon startup, the soft starter launches a user wizard to simplify the setup. The user can set the device through 4 simple parameters:
- **language:** it is possible to choose the text view by selecting the preferred language. The available languages are: English, Italian, French, Spanish, Portuguese, German;
- **motor current size:** the motor nominal current (can be set between 50 and 100% of the starter size);
- **application type:** it includes predefined setups for the most common applications: centrifugal pump, fire pump, conveyor belt, fan, mixer and general purpose. By selecting one type, the soft starter automatically updates the parameter programming to adapt to the requested application.
- **soft starter duty level:** the same application, based on the load connected to the motor, can be more or less heavy-duty. ADXL is capable of automatically adapting to standard or heavy-duty startups by adjusting the related parameters based on the user selection.

Expert users can customize the settings through the complete parameter menu.

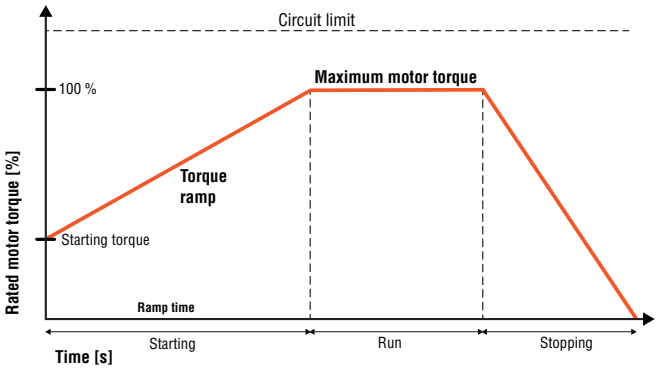
EASY SETUP
The ADXL series soft starters are equipped with NFC technology to simplify the parameter setting procedure. Using a compatible smartphone or tablet, the user, even with the soft starter turned off, can download, save and edit the parameter menu using the LOVATO NFC configurator app. The device front includes an optical port compatible with the CX01 dongles, to connect via USB it to the PC through the Xpress software, and the CX02 dongles, for Wi-Fi connection to the PC or the Sam1 app.

ADXL: from start-up to operation in 4 steps



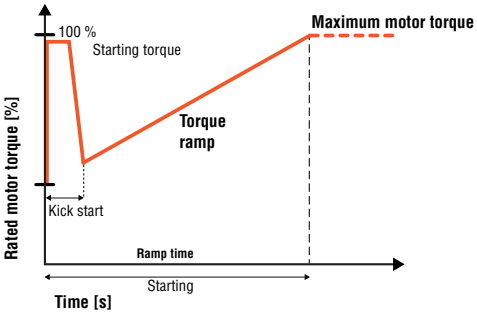
TORQUE CONTROL

The new two-phase control range includes the torque control. This motor starter solution allows to perform gradual accelerations and decelerations, with consequent significant reduction of mechanical faults and wear of the transmission devices.



KICK START

This function allows to start the motor when the initial torque is not sufficient to overcome friction forces; it transmits a high torque during the very first moments of the startup..



FIRE PUMP PRESET SETUP

While choosing the application in the AUTO SET wizard, is possible to select the fire pump function. This parameter setting is optimized to start fire pumps overriding all alarms and protections. In this situation, the main priority is the pump start-up, without considering the possible consequences for the pump starter and motor.

INPUTS, OUTPUTS, LIMITS AND REMOTE VARIABLES

The input and output functions are preset with the most common settings; the user can easily edit the preset configuration to adapt the soft starter to the application needs. All inputs and outputs can be edited. There are three types of programmable internal variables:
– limit thresholds;
– remote variables;
– user alarms.

MAINTENANCE COUNTERS

ADXLs have two counters dedicated to count the number of start-ups and the motor operation hours. It is possible to set a threshold for the operation hours; when this threshold is exceeded, a dedicated alarm is triggered.

COOLING FAN

The fan is supplied as an accessory for sizes from 18 to 115A, while it is built-in for all larger sizes. In order to increase its life span, the fan is activated only when necessary. Furthermore, the ADXL is capable of checking the fan conditions; any blocks or faults are signalled through two specific alarms.

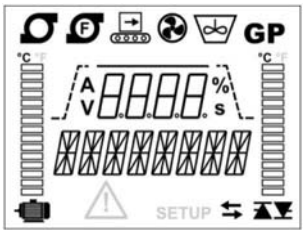
DIN MOUNT GUIDE

For sizes from 18 to 115A, the EXP8003 accessory is available to mount the soft starter on a 35mm DIN rail.

USER INTERFACE

A backlit icon display shows the data to the user in a clear and immediate way.

- Alarm texts available in 6 languages (ENG-ITA-FR-ES-POR-DE)
- 6 icons indicate the default setup in use: centrifugal pump, fire pump, conveyor belt, fan, mixer and general purpose;
- Two graphic bars show the motor and thyristors temperature;
- Two alphanumeric displays allow to view texts and measures;
- A status bar shows the starter, start, bypass, stop status.



PASSWORD

Access to the soft starter parameters can be protected by user customizable passwords. There are two access levels, user and advanced.
Furthermore, it's possible to block the serial communication using the remote control password.

RS485 COMMUNICATION AND REMOTE KEYPAD

All ADXL series soft starters are equipped with a slot to house the EXC1042 MiniCard, an expansion dedicated to the RS485, Modbus protocol. RS485 communication can be used to connect the EXCRDU1 remote keypad, to view the measures or to perform the setup through the touch screen installed on the front panel, command the start and stop of the motor.

MONITORING AND REMOTE CONTROL

Through the optional EXC1042 communication module and compatibility with the supervision and energy management software Synergy, setup and remote control software Xpress, it's possible to constantly monitor all the measures available on the Modbus, the soft starter status, see live trends and edit the setup parameters.

ADXC... type

ADXC 012...
ADXC 032...

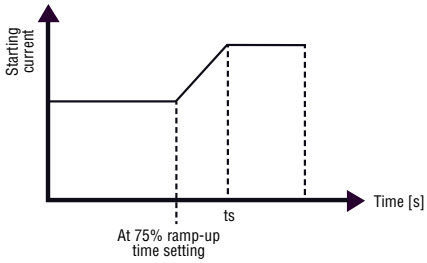
ADXC 037...
ADXC 045...

Order code	IEC rated starter current Ie	Rated motor power ≤40°C ❶ IEC	UL/CSA	Qty per pkg	Wt
	[A]	[kW]	[HP]	n°	[kg]
With built-in bypass relay. Three-phase 400VAC motor control. Supply: power circuit 220…400VAC (L1-L2-L3 inputs); start command 110...400VAC (A1-A2 terminals).					
ADXC 012 400	12	5.5	5	1	0.500
ADXC 016 400	16	7.5	7.5	1	0.500
ADXC 025 400	25	11	10	1	0.500
ADXC 032 400	32	15	15	1	0.500
ADXC 037 400	37	18.5	20	1	0.700
ADXC 045 400	45	22	25	1	0.700
With built-in bypass relay. Three-phase 400VAC motor control. Supply: power circuit 220…400VAC (L1-L2-L3 inputs); start command 24VAC/DC (A1-A2 terminals).					
ADXC 012 400 24	12	5.5	5	1	0.500
ADXC 016 400 24	16	7.5	7.5	1	0.500
ADXC 025 400 24	25	11	10	1	0.500
ADXC 032 400 24	32	15	15	1	0.500
ADXC 037 400 24	37	18.5	20	1	0.700
ADXC 045 400 24	45	22	25	1	0.700
With built-in bypass relay. Three-phase 600VAC motor control. Supply: power circuit 220…600VAC (L1-L2-L3 inputs), auxiliary supply 100...240VAC (terminals A1-A2); start command: 100...240VAC (ST terminals) With 2 relay outputs.					
ADXC 012 600 R2	12	9	10	1	0.500
ADXC 016 600 R2	16	11	15	1	0.500
ADXC 025 600 R2	25	20	20	1	0.500
ADXC 032 600 R2	32	22	30	1	0.500
ADXC 037 600 R2	37	30	30	1	0.700
ADXC 045 600 R2	45	37	40	1	0.700

❶ For operating temperature higher than 40°C, derate starter power; see page 5-16.

Current control

ADXC… gradually increases the current limit at 75% ramp-up time if the motor speed has yet to reach rated value, to avoid locked rotor state before time elapses.

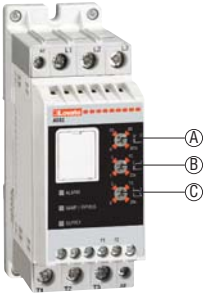


Typical settings

The following settings are standard ones for the different applications; they are for indication and reference purposes only.
After the installation, it is recommended to always parameterise the soft starter with the motor connected to find the best settings and then test it. Initial voltage adjustment is the first operation followed by the ramp-up time setting and the ramp-down time is last, if any is required.

Type of application	Initial voltage	Accel. time	Decel. time
	[%]	[s]	[s]
Hydraulic lift	40	2	0
Piston compressor	40	3	0
Screw compressor	50	10	0
Scroll compressor (with revolving spiral)	40	1	0
Low inertia fan	40	10	0
High inertia fan	40	15-20	0
Pump	40	10	10
Centrifugal blower	40	5	0
Conveyor	50	10	5

ADXC... adjustments



Ⓐ Initial voltage: 0-85% of the motor control power.
Ⓑ Ramp up time: 1-20 seconds. Initial to maximum load voltage time.
Ⓒ Ramp down time: 0-20 seconds. Maximum to no load voltage time.

General characteristics

ADXC… is a compact type of soft starter, 45mm wide and easy to use, for three phase squirrel-cage induction motors; soft starts and soft stops rated motor load currents up to 45A.
It is based on a current limiting starting methodology to limit the maximum starting current. ADXC… reduces the mechanical stress on motor shafts, gearboxes and drive belts.
Ramp up, ramp down and initial voltage time settings can be independently adjusted by built-in potentiometers.
Main features are:
- For three phase induction motors up to 22kW / 25HP at 400VAC and 37kW / 40HP at 600VAC
- Maximum input voltage: 400VAC 50/60Hz for ADXC… 400…; 600VAC 50/60Hz for ADXC…600…
- Built-in bypass relay
- Wrong phase sequence and over temperature protection
- Alarm for wrong phase sequence; line voltage and/or frequency out of limits (over and undervoltage); overcurrent, over temperature, irregular ramp up and current flow during bypass; motor voltage unbalance
- Simple setup and installation
- 2 relay outputs for alarms (NC) and bypass closing (NO) for ADXC…600 R2
- 35mm DIN rail mounting (IEC/EN 60715)
- Ideal for hydraulic lifts, conveyor belts, compressors, pumps, hoisting devices, blowers, fans, mixers.

Operational characteristics

- Two phase control
- Input voltage L1-L2-L3:
  - 220...400VAC -15%...+10% for ADXC…400 and ADXC…400 24
  - 220...600VAC -15%…+10% for ADXC…600 R2
- Frequency range: 50/60Hz ±10% self-configurable
- Self powered for ADXC…400… types
- Separate single phase auxiliary power supply A1-A2: 100...240VAC -15%...+10% for ADXC…600 R2
- Start command:
  - A1-A2 24VAC/DC -15%…+10% (ADXC…400 24)
  - A1-A2 110…400VAC -15%...+10% (ADXC…400)
  - ST 100…240VAC -15%...+10% (ADXC…600 R2)
- Ramp up time: 1-20 seconds
- Ramp down time: 0-20 seconds
- Initial voltage: 0-85%
- 3 indication LEDs “alarm” (red – alarm conditions with diverse number of flashes), “ramp/bypass” (yellow – flashing in ramp phase / constantly on with bypass relay connected) and “supply” (green – constantly on with power supply flow)
- Degree of protection: IEC IP20.

Certifications and compliance

Certifications obtained: UL Listed for USA and Canada (cULus – File E223223) under Solid State Motor Controllers as reduced voltage starters; EAC, RCM.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-2, UL 508, CSA C22.2 n°14.

ADXL... types

NFC

new

ADXL 0018 600 ... ADXL 0060 600

ADXL 0075 600 ... ADXL 0115 600

new

ADXL 0135 600 ... ADXL 0162 600

new

ADXL 0195 600 ... ADXL 0320 600

Order code	IEC rated starter current Ie	Rated motor power ≤40°C IEC (400V)		Qty per pkg	Wt
	[A]	[kW❷]	[HP]	n°	[kg]
For standard and heavy-duty applications. With built-in bypass relay. Auxiliary supply: 100...240VAC. Rated operational voltage 208...600VAC					
ADXL 0018 600	18	7.5	10	1	2.100
ADXL 0030 600	30	15	15	1	2.100
ADXL 0045 600	45	22	25	1	2.100
ADXL 0060 600	60	30	30	1	2.100
ADXL 0075 600	75	37	40	1	2.900
ADXL 0085 600	85	45	50	1	2.900
ADXL 0115 600	115	55	60	1	2.900
ADXL 0135 600	135	75	75	1	7.800
ADXL 0162 600	162	90	75	1	7.800
ADXL 0195 600	195	110	100	1	13.900
ADXL 0250 600	250	132	150	1	13.900
ADXL 0320 600	320	160	200	1	13.900

IEC ratings ≤40°C (50Hz)

Order code	Starter current Ie	Motor power ❶		
		230V	400V	500V
	[A]	[kW]	[kW]	[kW]
ADXL 0018 600	18	4	7.5	11
ADXL 0030 600	30	7.5	15	18.5
ADXL 0045 600	45	11	22	30
ADXL 0060 600	60	15	30	37
ADXL 0075 600	75	22	37	45
ADXL 0085 600	85	22	45	55
ADXL 0115 600	115	37	55	75
ADXL 0135 600	135	37	75	90
ADXL 0162 600	162	45	90	110
ADXL 0195 600	195	55	110	132
ADXL 0250 600	250	75	132	160
ADXL 0320 600	320	90	160	200

UL ratings ≤40°C (60Hz)

Order code	Starter current FLA	Motor power ❷				
		208V	220-240V	380-415V	440-480V	550-600V
	[A]	[HP]	[HP]	[HP]	[HP]	[HP]
ADXL 0018 600	18	5	5	10	10	15
ADXL 0030 600	28	10	10	15	20	25
ADXL 0045 600	44	10	15	25	30	40
ADXL 0060 600	60	20	20	30	40	50
ADXL 0075 600	75	25	25	40	50	60
ADXL 0085 600	83	25	30	50	60	75
ADXL 0115 600	114	40	40	60	75	100
ADXL 0135 600❸	130	40	50	75	100	125
ADXL 0162 600❸	156	50	60	75	125	150
ADXL 0195 600❸	192	60	75	100	150	200
ADXL 0250 600❸	248	75	100	150	200	250
ADXL 0320 600❸	320	100	125	200	250	300

❶ Preferred rated values according to IEC 60072-1.
❷ Horsepower and currents values according to UL 508 (60Hz).
❸ Terminal lug kits and shrouds are required for UL. See page 5-7.

General characteristics
The new series of ADXL soft starters allow control of the start and stop of three-phase asynchronous motors on two-phases with built-in bypass. ADXLs are equipped with a backlit display with icons and NFC technology, for a simple configuration, possible also from smartphones and tablets. ADXLs are ideal for simple "plug and play" applications, thanks to the installation wizard, and for high-performance applications, with control and protection during the motor start-up and operation.
The ADXLs include protection features for the starter and motor, and it's possible to enable specific alarms to signal maintenance needs, such as the number of startups performed or the operation hours of the motor.

It has the following main features:
- Backlit LCD display
- Texts available in 6 languages (ENG-ITA-FR-ES-POR-DE)
- IEC rated starter current Ie from 18 to 320A
- rated motor current selectable from 50 to 100% of rated starter current
- rated motor power 7.5...160kW (400VAC) and 15...300HP (600VAC)
- Voltage ramp startup
- Torque control
- Kick start
- Limited maximum starting current
- Free wheel or controlled stop
- Built-in bypass relay
- Optical port for programming data download and diagnostics through the software Xpress and APP Sam1
- NFC technology for parameter programming through the APP NFC
- Optional RS485 communication
- Modbus-ASCII, Modbus-RTU and Modbus-TCP communication protocols
- Supervision and energy management software Synergy.

Operational characteristics
- Two phase control
- Input voltage: 208...600VAC ±10%
- Network frequency 50 or 60Hz ±10% self-configurable
- 100...240VAC auxiliary power supply
- Signalling LED: power supply, startup or bypass phase, alarm
- Three programmable outputs: 1 changeover contact 2 normally open contacts
- 2 programmable digital inputs
- 1 programmable digital input, that can be used as PTC
- Protection rating: IP00
- Number of starts per hour: see page 5-18.

Displayed measures:
Maximum current, L1 current, L2 current, L3 current, %-torque, average line voltage, total active power, total PF, motor thermal status, starter temperature.

Protections
- Motor: separate starting and running overload class settings thermal protection, PTC protection, locked rotor, current asymmetry, startup too long, minimum torque
- Power supply: no power supply, phase loss, wrong phase sequence and out-of-range frequency
- Starter: overtemperature, overcurrent, SCR fault, bypass relay fault, temperature sensor fault and fan fault.

Certifications and compliance
Certificates: cULus; EAC, RCM.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-4-2, UL508, CSA C22.2 n° 14.

ADX... type

51 ADX 0017B...51 ADX 0045B

51 ADX 0060B...51 ADX 0085B

51 ADX 0110B...51 ADX 0125B

Order code	IEC rated starter current Ie	IEC rated motor power ≤40°C (380/415V)		Qty per pkg	Wt
	[A]	[kW]	[Hp]	n°	[kg]
For standard duty (starting current 5•Ie). With built-in bypass contactor. Auxiliary supply: starter Us 208...240VAC; start command 24VDC. Rated operational voltage 208...500VAC.					
51 ADX 0017B	17	7.5	7.5	1	8.970
51 ADX 0030B	30	15	15	1	9.240
51 ADX 0045B	45	22	25	1	9.240
51 ADX 0060B	60	30	30	1	14.200
51 ADX 0075B	75	37	40	1	14.400
51 ADX 0085B	85	45	50	1	14.400
51 ADX 0110B	110	55	60	1	17.700
51 ADX 0125B	125	55	60	1	17.700
51 ADX 0142B	142	75	75	1	28.000
51 ADX 0190B	190	90	100	1	37.300
51 ADX 0245B	245	132	150	1	39.300
For severe duty (starting current 5•Ie). Predisposed for external bypass contactor. Auxiliary supply: starter Us 208...240VAC; start command 24VDC. Rated operational voltage 208...415VAC.					
51 ADX 0310	310	160	150	1	48.900
51 ADX 0365	365	200	200	1	49.300
51 ADX 0470	470	250	250	1	95.000
51 ADX 0568	568	315	350	1	95.000
51 ADX 0640	640	355	400	1	106.000
51 ADX 0820	820	400	500	1	164.000
51 ADX 1200	1200	710	900	1	234.000

General characteristics
ADX... is a three-phase control soft starter used to start and gradually stop three-phase asynchronous squirrel-cage motors. The startup can be performed through a voltage ramp with torque control and limitation of the maximum startup current. The integrated bypass contactor (only for ADX...B types) drastically limits dissipation, as a result, equipment for electric panel cooling ventilation can be eliminated and the enclosure size can be reduced as well. It's equipped with RS232 and RS485 interfaces.

CONTROL
During starting: Torque control acceleration, current limit control and booster.
During stopping: Torque control deceleration, dynamic braking and free-wheel.
In emergency conditions: Starting without protection direct-on-line starting using integrated bypass contactor.
Remote control: PC supervision by connection with RS232/RS485 converter, modem or GSM modem. Automatic call function (Autocall) in case of alarm conditions by sending a message to a cellular phone (SMS-Short Message Service) and/or to a mailbox.
Proprietary ASCII and Modbus-RTU communication protocols.

KEYPAD OPERATIONS
- Backlit LCD 2-line 16-character display
- Multilanguage capability (Italian, English, French, Spanish)
- Basic, advanced and function programming menus
- Keypad stop and start
- Motor and mains parameter readings:
  - line voltage values (L-L)
  - phase current
  - active and apparent power values per phase
  - power factor per phase
  - energy
- Time sequential events log
- Clock calendar with backup battery.

PARTICULAR FUNCTIONS
Digital inputs and programmable relay outputs. Analog input (0...10V, 0...20mA or 4...20mA) for ramp acceleration and/or deceleration, motor start and stop control thresholds, programmable relay enable and disable control thresholds.
Analog output
(0...10V, 0...20mA or 4...20mA) for current, torque, motor thermal status and power factor readings.
Input programming for second motor.

PROTECTION
- Motor: Dual thermal protection class (one during starting phase and the other during running) or by PTC sensor, locked rotor, current asymmetry, minimum torque and starting time too long
- Auxiliary voltage: Voltage value too low
- Power voltage: Phase failure, phase sequence and frequency out of limits
- Control inputs and analog output: Static 24VDC short-circuit protection with automatic resetting.
- Starter: Overcurrent, high temperature, SCR and bypass contactor malfunction.

Operational characteristics
- Input voltage:
  - 208...500VAC ±10%❶ (ADX...B)
  - 208...415VAC ±10%❷ (ADX...)
- Mains frequency: 50/60Hz ±5%
- Auxiliary supply voltage: 208...240VAC ±10%
- Auxiliary consumption: 20VA
- Rated starter current Ie:
  - 17A...245A (ADX...B)
  - 310A...1200A (ADX...)
- Motor current: 0.5...1 Ie
- Overload current:
  - 105% Ie for ADX...B
  - 115% Ie for ADX...

Certifications and compliance
Certifications obtained: EAC for all; CCC for ADX 0110B and ADX 0125B types only.
Compliant with standard: IEC/EN 60947-1, IEC/EN 60947-4-2.

❶ 208-600VAC ±10% on request.
❷ Voltages on request: higher than 415V to 690V maximum.

Accessories for ADXL... types


CX 01


CX 02

EXC RDU1


EXC 1042


EXP 8003


EXA01


EXA02


EXA03


EXA04

Order code	Description	Qty per pkg	Wt
		n°	[kg]
CX 01	USB connection dongle PC ↔ ADXL with optical connector for programming, data download, diagnostics and firmware update	1	0.090
CX 02	Wi-Fi connection dongle PC ↔ ADXL for data download, programming, diagnostics and cloning	1	0.090
EXC RDU1	Remote keypad, LCD display with touchscreen, IP65 protection and NEMA 4X, 3m cable included	1	0.360
EXC 1042	RS485 communication board	1	0.020
EXC CON 01	RS485/Ethernet converter, 12…48VDC, including DIN mounting guide kit	1	0.400
EXC M3G 01	RS485 gateway/3G modem, 9.5…27VAC/9.5…35VDC, including antenna and programming cable	1	0.340
EXP80 03	35mm DIN rail mounting accessory for ADXL 0018 600... ADXL 0115 600	1	0.200
EXP80 04	Fan for ADXL 0018 600... ADXL 0115 600 (codes ADXL 0075 600...ADXL 0115 600 max. of two EXP80 04 fans)	1	0,040
EXA 01	Kit of 3 UL terminal lugs for ADXL 0135 600, ADXL 0162 600, and ADXL 0195 600	1	0.141
EXA 02	Kit of 3 terminals protection covers for ADXL 0135 600, ADXL 0162 600 and ADXL 0195 600	1	0.125
EXA 03	Kit of 3 UL terminal lugs for ADXL 0250 600 and ADXL 0320 600	1	0.314
EXA 04	Kit of 3 terminals protection covers for ADXL 0250 600 and ADXL 0320 600	1	0.154

new

General characteristics
Communication devices to connect LOVATO Electric products to:
– Personal computer (PC)
– Smartphones
– Tablets.

CX 01
This USB/optical dongle, complete with cable, allows the frontal connection of products compatible with PCs without having to disconnect the power supply from the electric panel.
The PC identifies the connection as a standard USB.

CX 02
Via Wi-Fi connection, compatible LOVATO Electric products can be viewed on PCs, smartphones and tablets with no need for cabling.

For dimensions, wiring diagrams and technical characteristics, consult the manuals available online in the Download section of the following website: www.LovatoElectric.com

EXC RDU1
Through the EXC RDU1 remote keypad, it is possible to command and monitor up to 32 starters at choice between soft starters ADXL series or variable speed drives VLB3 series, even in mixed congfiguration.
For ADXL series is possible to setting the parameters, command the start and stop of the motor, read the measures, signaling alarms and motor status.
– 100...240VAC / 110...250VDC power supply
– 128x112 pixel touchscreen LCD display
– Built-in buzzer
– Opto-isolated RS485 communication port, Modbus RTU protocol
– 96x96mm flush mount and ANSI 4”
– Compatible with ADXL... equipped with communication card RS485, cod. EXC 1042
– 3m cable included
– Degree of protection IP65 and NEMA 4X.

EXC M3G 01
For details please see section 30.

Certifications and compliance
Certification obtained: EAC (except EXA...), cULus for EXA..., EXC RDU1, EXP80 03, EXP80 04.
Compliant with stardard: IEC 61000-6-1.

Remote keypad for 51 ADX... types

51 ADX TAST

51C4

Order code	Description	Qty per pkg	Wt
		n°	[kg]
51 ADX TAST	Remote keypad 96x96mm, 2x16 backlit LCD, 208-240VAC supply c/w 3m/10ft long connecting cable	1	0.350
31 PA 96X96	Protective cover (IP54) for remote keypad ADX TAST	1	0.076
51 C2	PC ↔ ADX connecting cable, 1.8m/6ft long	1	0.062
51 C4	PC ↔ RS232/RS485 converter drive connecting cable, 1.8m/6ft long	1	0.147
51 C6	ADX ↔ RS232/RS485 converter drive connecting cable, 1.8m/6ft long	1	0.102
51 C8	ADX ↔ remote keypad connecting cable, 3m/10ft long	1	0.080

ADX TAST remote keypad
The flush-mount ADX TAST remote keypad is identical to the one on board the soft starter except for the start and stop controls of the motor, which are permanently disabled. With this keypad, starter setup can be conducted, motor readings and operating data displayed and data and parameter transfer (ADX ↔ remote keypad) made as well.
A backup copy of the starter data and parameter setup is obtainable with the transfer functions.
It is supplied standard with a 3m long cable and suitable connectors to complete the link to the ADX RS485 port.

Advantages
- Flush mount
- Messages in selectable language
- Readings display
- Parameter setup
- Two-way data and parameter transfer.

Operational characteristics
- Auxiliary supply voltage: 208...240VAC ±10%
- Power consumption: 6.9VA
- Dissipation: 3.2W
- Mains frequency: 50/60Hz
- RS485 port: RJ4/4 connector
- Supply: Removable 3-pole 2.5 mm² terminal block.
- Display: 2 line, 16 character backlit LCD
- LED indication (3): POWER, RUN and FAULT
- Keys (6) ENTER/START, RESET/STOP, ←PREVIOUS, NEXT→, ▼ and ▲
- Ambient conditions:
  • Operating temperature: -10...+60°C
  • Storage temperature: -20...+70°C
- Flush mount enclosure
- Degree of protection on front: IP41; IP54 with protective cover (code 31 PA 96x96).

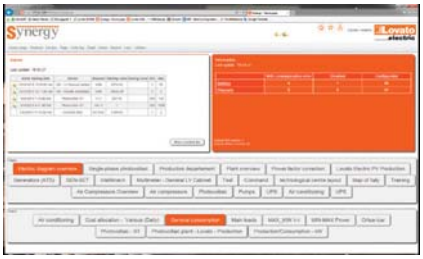
Certifications and compliance
Certifications obtained: EAC.
Compliant to standards: IEC/EN 61000-6-1.

Dimensions
page 5-14

For ADXL...

Xpress configuration and remote control software

Synergy supervision and energy management software



Sam1 APP

NFC APP

Xpress
By using the Xpress software, the quick setup of the soft starter can be carried out via PC, avoiding possible parameter programming errors.
The parameter programming of ADXL... soft starters can also be PC saved and quickly uploaded into another device requiring the same programming.
It allows the following operations:
- Graphical and numerical display of measurements
- Soft starter status monitoring
- Access all setup parameters
- Saving / loading parameters
- Highlighting of changed values
- Resetting to default values
- Send comands
- See live trends
- Reading of events list.

Synergy
Synergy software allows to remotely control and monitor the soft starters. The software structure and applications are based on MS SQL relational databases and the data can be consulted via the most common browsers. It is an extremely versatile system that can be accessed via intranet network, VPN or internet by several users/units at the same time.

For details, consult section 29 or our Technical support office; see contact details on inside front cover.

Sam1 APP for smartphones and tablets
The application Sam1 allows the user to set the soft starter, view the alarms, send commands, read the measures, download the events and submit the data collected via e-mail. The connection is made by Wi-Fi with a smartphone or tablet using the CX 02 device.
It is iOS and Android compatible.

For details, consult section 29 or our Technical support office; see contact details on inside front cover.

NFC APP for smartphones and tablets
The ADXL soft starters are equipped with built-in NFC technology. Using the LOVATO App NFC it is possible to program the parameters and save them on smartphones and tablets. Available only for Android devices.

For details, consult section 29 or our Technical support office; see contact details on inside front cover.

For ADX...

51 ADX SW

Order code	Description	Qty per pkg	Wt
		n°	[kg]
51 ADX SW	PC-ADX remote control software with proprietary ASCII and Modbus-RTU protocols and a set of connecting cables 51 C2, 51 C3, 51 C5, 51 C7 for communications via RS232 port, analog or GSM modem	1	0.550

The remote control software consents to the PC supervision of all ADX soft starter functions, including: parameter setup, real-time readout display, graphics of monitored parameter data during operation and starter events log display, each with time and date entry.
The PC-ADX connection is made by cable via the RS232 port, RS232/RS485 converter, analog or GSM modem.
The RS232 port is not suitable for permanent connections.
The connection via modem permits the ADX starter to advise alarm conditions, that is an automatic link to the remote PC.
GSM modem represents the ultimate solution for unmanned applications or where there are no telephone lines.
Interesting communication features are available with this type of modem, such as:

- SMS (Short Message Service): At alarm conditions, the ADX can send its ID and alarm code, with time and date entry. The advantage is the possibility of reaching service people, without delay, wherever they are located.
- Email (via Internet): a message with the same structure as mentioned above can be transmitted to a specified mailbox. The advantages of this type of message with respect to the SMS are that any communication, received through Internet mail server, is permanent and a vast number of these can be received and reviewed at any time.

General characteristics

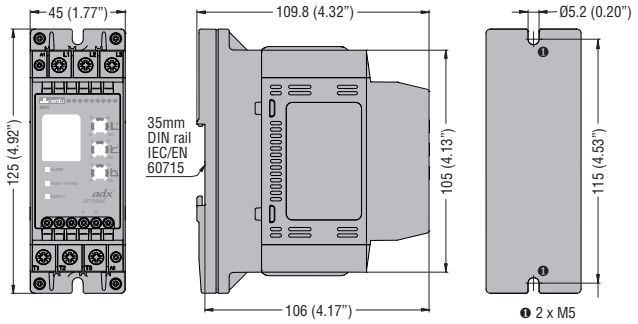
- Display of all the monitored data by the ADX starter
- Virtual ADX keypad with access to all functions
- Parameter adjustment, only accessible with password, saving on disc and subsequent reloading on ADX starter
- Display of starter events log showing time and date entry
- Graphic display of monitored data during operation
- Connection through RS232/RS485 converter or modem
- GSM-modem management with SMS or e-mail transmission
- AUTOCALL function for automatic PC call
- Program configuration in 4 languages (Italian, English, Spanish and French)
- Easy installation and setup.

Advantages

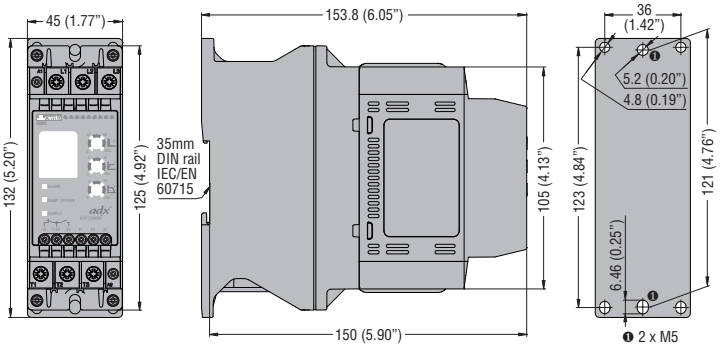
- GSM network management for inaccessible applications where there are no telephone lines
- Call management during alarm conditions for SMS or email transmission
- No limit for remote control distance
- Possibility of remote motor starting
- Reduction of service time
- Reduction of maintenance and downtime.

SOFT STARTER

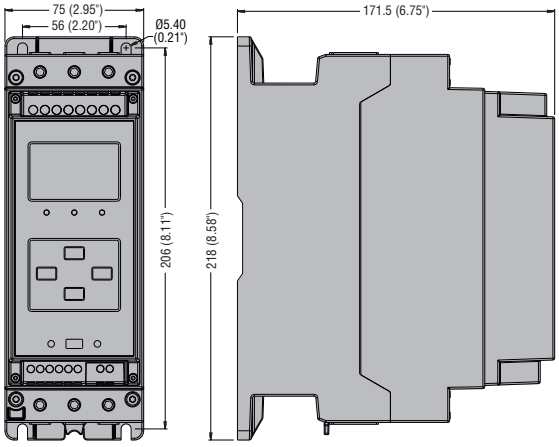
ADXC 012...ADXC 032...



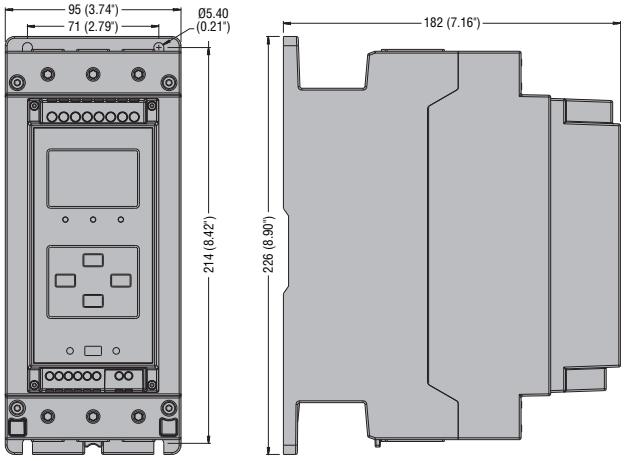
ADXC 037...ADXC 045...



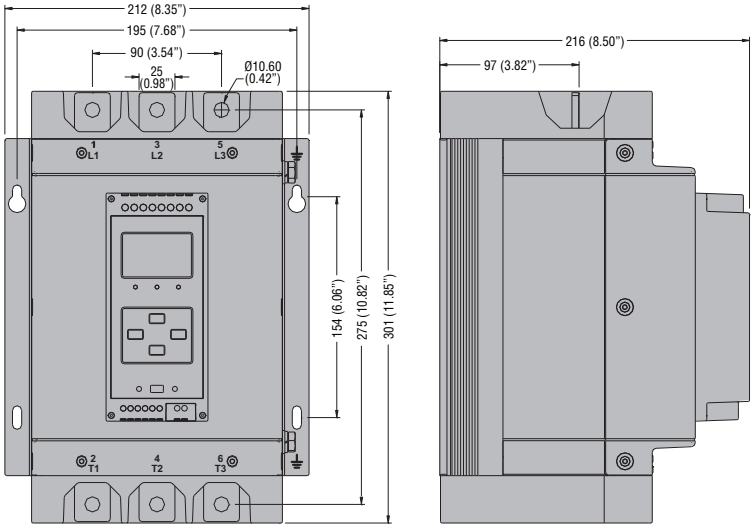
ADXL 0018 600...ADXL 0060 600



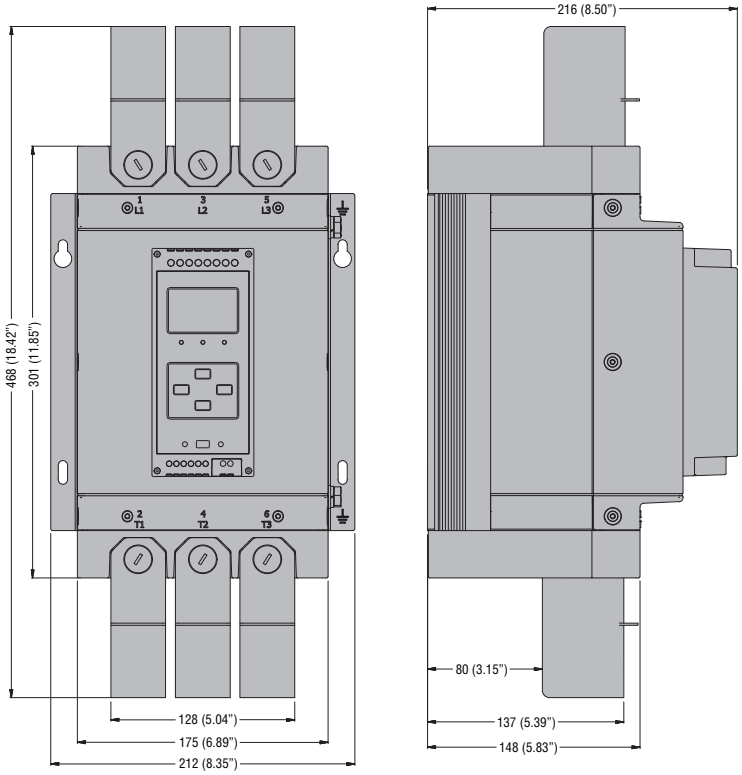
ADXL 0075 600...ADXL 0115 600



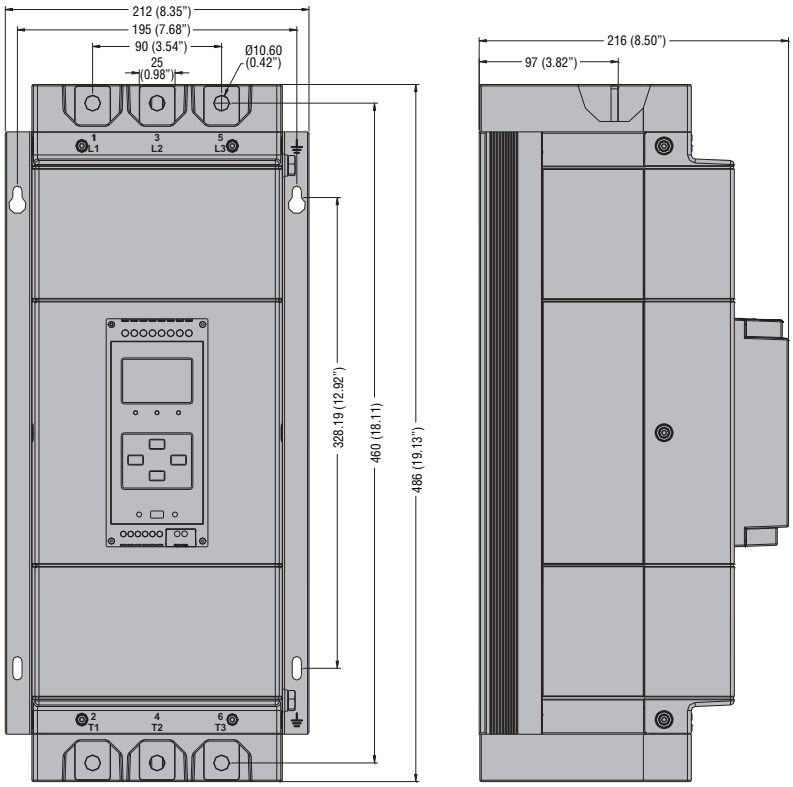
ADXL 0135 600 - ADXL 0162 600



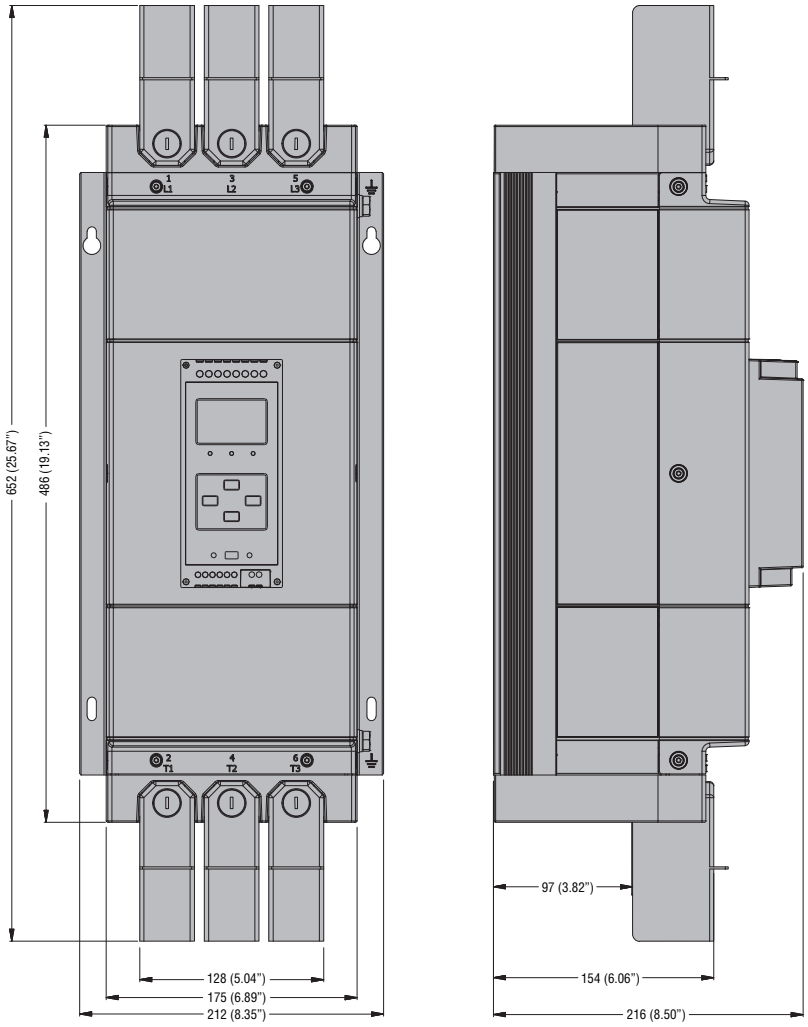
ADXL 0135 600 - ADXL 0162 600 complete with terminal lugs for UL code EXA 01 and terminals protection code EXA 02.



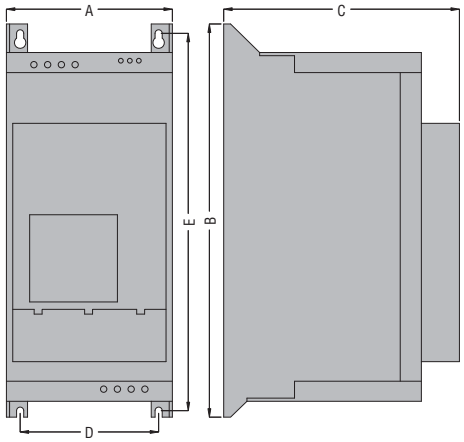
ADXL 0195 600...ADXL 0320 600



ADXL 0195 600 complete with terminal lugs for UL code EXA 01 and terminals protection code EXA 02.
ADXL 0250 600 - ADXL 0320 600 complete with terminal lugs for UL code EXA 03 and terminals protection code EXA 04.

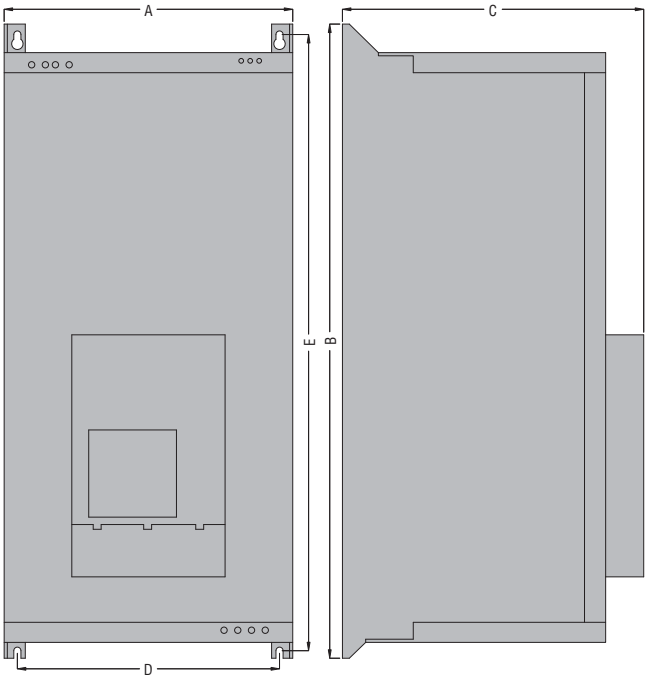


ADX 0017 B...ADX 0125 B



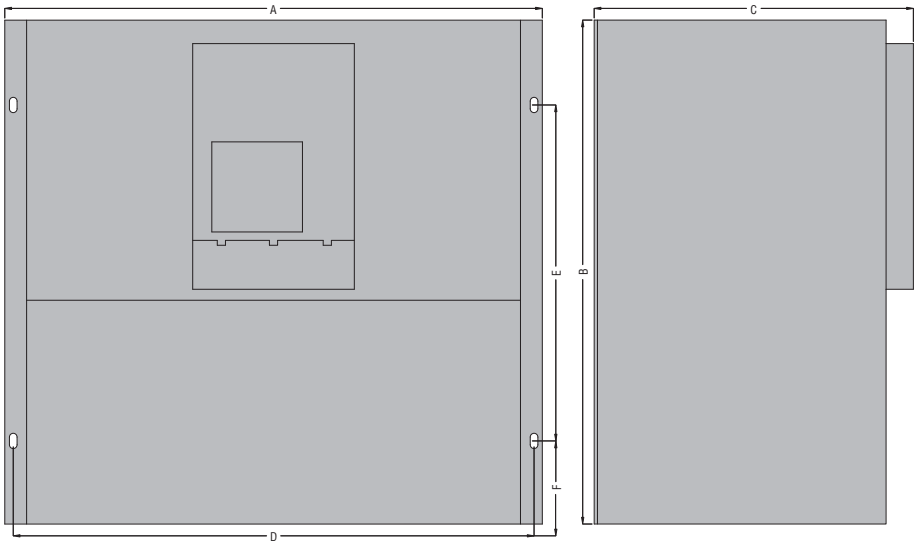
TYPE	A	B	C	D	E
ADX 0017B	157 (6.18")	372 (14.64")	223 (8.78")	131 (5.16")	357 (14.05")
ADX 0030B	157 (6.18")	372 (14.64")	223 (8.78")	131 (5.16")	357 (14.05")
ADX 0045B	157 (6.18")	372 (14.64")	223 (8.78")	131 (5.16")	357 (14.05")
ADX 0060B	157 (6.18")	534 (21.02")	250 (9.84")	132 (5.20")	517 (20.35")
ADX 0075B	157 (6.18")	534 (21.02")	250 (9.84")	132 (5.20")	517 (20.35")
ADX 0085B	157 (6.18")	534 (21.02")	250 (9.84")	132 (5.20")	517 (20.35")
ADX 0110B	157 (6.18")	584 (22.99")	250 (9.84")	132 (5.20")	567 (22.32")
ADX 0125B	157 (6.18")	584 (22.99")	250 (9.84")	132 (5.20")	567 (22.32")

ADX 0142 B...ADX 0245 B



TYPE	A	B	C	D	E
ADX 0142B	273 (10.75")	600 (23.62")	285 (11.22")	230 (9.05")	560 (25.20")
ADX 0190B	273 (10.75")	680 (26.77")	310 (12.20")	230 (9.05")	640 (25.20")
ADX 0245B	273 (10.75")	680 (26.77")	310 (12.20")	230 (9.05")	640 (25.20")

ADX 0310...ADX 1200

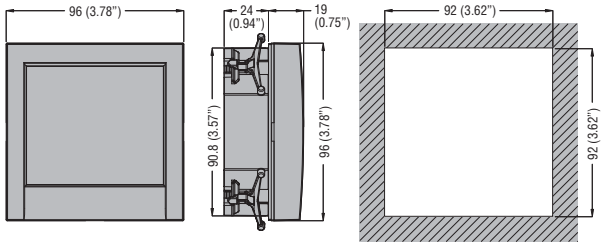


TYPE	A	B	C	D	E	F
ADX 0310	640 (25.20")	600 (23.62")	380 (14.96")	620 (24.41")	400 (15.75")	100 (3.94")
ADX 0365	640 (25.20")	600 (23.62")	380 (14.96")	620 (24.41")	400 (15.75")	100 (3.94")
ADX 0470	790 (31.10")	650 (25.59")	430 (16.93")	770 (30.31")	450 (17.72")	100 (3.94")
ADX 0568	790 (31.10")	650 (25.59")	430 (16.93")	770 (30.31")	450 (17.72")	100 (3.94")
ADX 0640	790 (31.10")	650 (25.59")	430 (16.93")	770 (30.31")	450 (17.72")	100 (3.94")
ADX 0820	910 (35.83")	950 (37.40")	442 (17.40")	830 (32.68")	920 (36.22")	❶
ADX 1200	910 (35.83")	950 (37.40")	442 (17.40")	830 (32.68")	920 (36.22")	❶

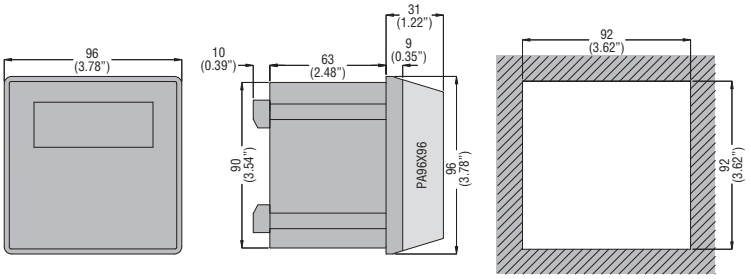
❶ Consult Technical support; see contact details on inside front cover.

REMOTE KEYPAD

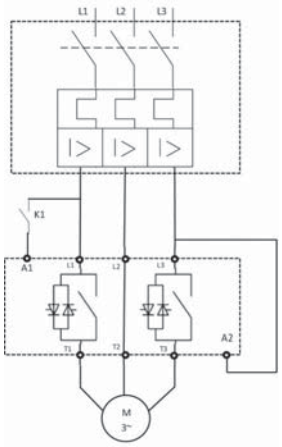
EXC RDU1



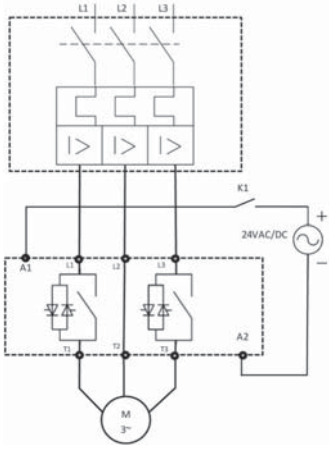
ADX TAST



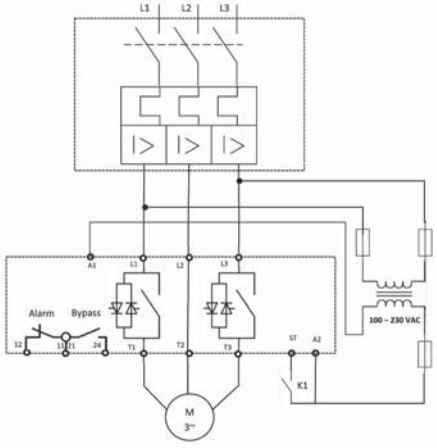
ADXC...400



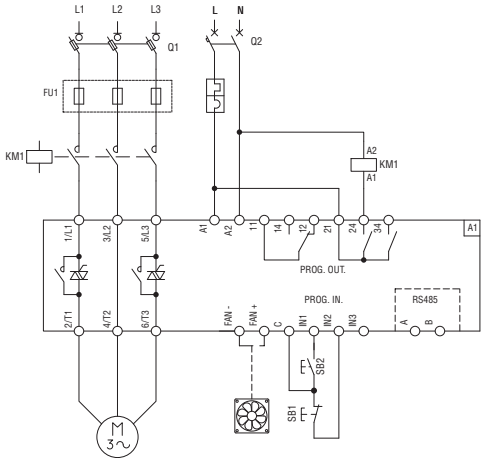
ADXC...400 24



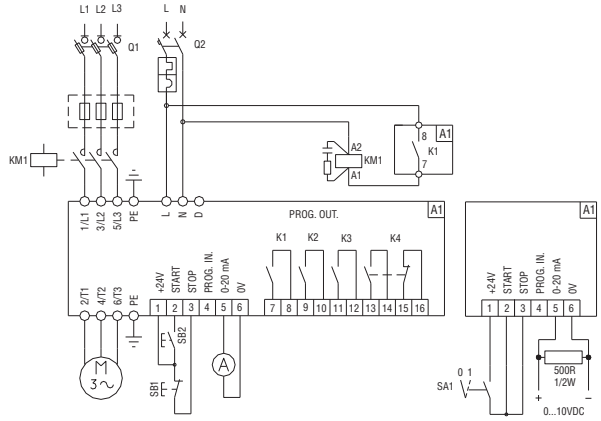
ADXC...600 R2



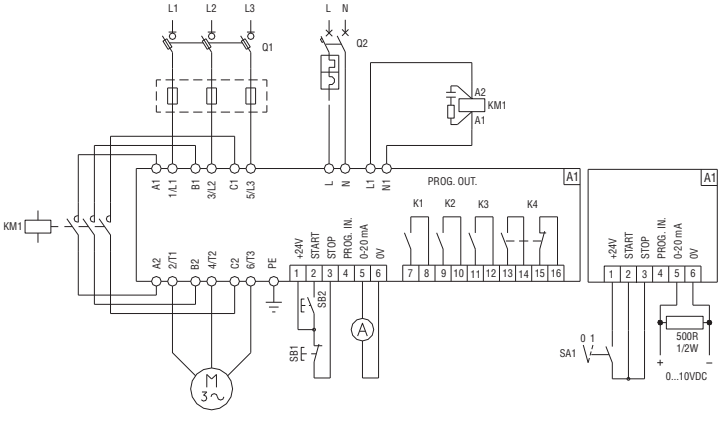
ADXL...



ADX...B



ADX...



TYPE			ADXC012	ADXC016	ADXC025	ADXC032	ADXC037	ADXC045
			With built-in bypass relay					
Motor	Type		Asynchronous three phase					
	Power (40°C)	at 220…240VAC	3kW / 3HP	4kW / 5HP	5.5kW / 7.5HP	9kW / 10HP	9kW /10HP	11kW / 15HP
		at 380…415VAC	5.5kW / 5HP	7.5kW / 7.5HP	11kW / 10HP	15kW / 15HP	18.5kW /20HP	22kW / 25HP
		❶ at 440…480VAC	5.5kW 7.5HP	9kW / 10HP	11kW / 15HP	18.5kW / 20HP	22kW / 25HP	22kW / 30HP
		❶ at 550…600VAC	9kW / 10HP	11kW /15HP	20kW / 20HP	22kW / 30HP	30kW / 30HP	37kW / 40HP
Supply voltage	Input voltage Ue (L1-L2-L3)		220…400VAC -15…+10% (ADXC…400…); 220…600VAC -15…+10% (ADXC…600R2)					
	Start command Uc		A1-A2: 24VAC/DC -15...+10% (ADXC…40024); A1-A2: 110…400VAC -15…+10% (ADXC…400); ST: 100…240VAC -15…+10% (ADXC…600R2)					
	Auxiliary power Us		A1-A2: 100…240VAC -15%...+10% for ADXC…600R2 (Self powered for ADXC…400… from L1-L2-L3)					
	Frequency		50/60Hz ±10% self-configurable					
Undervoltage recovery			174VAC (ADXC…)					
Overvoltage recovery			466VAC (ADXC…400…); 700VAC (ADXC…600R2)					
Control input current			0.4…1mA (ADXC…40024); 0.5…5mA (ADXC…400); 0.4…3mA (ADXC…600R2)					
Number of controlled phases			2					
Starting / stopping method			Current limitation					
Number of starts/hour at 40°C			20 (Overload cycle: AC53B: 3-5: 175)			10 (Overload cycle: AC53B: 4-6: 354)		10 (Overload cycle: AC53B: 3.5-5: 355)
Minimum load current			1A	1A	5A	5A	5A	5A
Rated current In (according to IEC test results)		at 40°C IEC	12A	16A	25A	32A	37A	45A
		at 50°C IEC	11A	15A	23A	28A	34A	40A
		at 60°C IEC	10A	13.5A	21A	24A	31A	34A
FLA current (based on UL test results)		at 40°C UL	12A	17A	25A	32A	37A	45A
		at 50°C UL	11A	15A	23A	28A	34A	40A
		at 60°C UL	10A	14A	21A	24.3A	31A	34A
Motor protection			Wrong phase sequence					
Cooling system			Natural					
Status indication LEDs			1 red ALARM; 1 yellow RAMP/BYPASS; 1 green SUPPLY					
STARTUP SETTINGS								
Acceleration ramp			1…20 seconds					
Deceleration ramp			0…20 seconds					
Startup voltage			0…85%					
RELAY OUTPUTS (ADXC…600R2 only)								
NC alarm contact (11, 12) / NO bypass contact (21, 24)			3A 250VAC / 3A 30VDC					
INPUT POWER CIRCUIT CONNECTIONS (L1, L2, L3, T1, T2, T3)								
Number and type of terminals			6 fixed M4 screw					
Conductor cross section (min…max)			2.5…10mm² (AWG 2x10…2x14)					
Tightening torque /Tool			2.5Nm (22lbin) / Pozidriv 2					
Cable stripping length			8mm/0.31”					
AUXILIARY SUPPLY CONNECTIONS (A1, A2)								
Number and type of terminals			9 fixed M3 screw					
Conductor cross section (min…max)			0.5…1,5mm² (AWG 10…18)					
Tightening torque / Tool			0.65Nm (5.3lbin) / Pozidriv 0					
Cable stripping length			6mm/0.24”					
AUXILIARY CONNNECTIONS (11, 12, 21, 24, ST, F1, F2)								
Type of terminals			M3 screw					
Conductor cross section (min…max)			0.05…1.5mm² (with cable terminal) (AWG 14…12)					
Tightening torque / Tool			0,45Nm (4lbin) / Pozidriv 0					
Cable stripping length			6mm/0.24”					
INSULATION								
IEC rated insulation voltage Ui			630VAC (ADX…400…); 690VAC (ADXC…600R2)					
AMBIENT CONDITIONS								
Operating temperature			-20°C…+40°C with no derating; >40°C…+60°C with derating (see IEC/UL rated current values given above)					
Storage temperature			-40°C…+80°C					
Relative humidity			<95% non condensing at 40°C					
Maximum pollution degree			2					
Installation category			III					
Maximum altitude			1000m					
HOUSING								
Mounting			Screw fixing on mounting plate or on 35mm DIN rail (IEC/EN 60715)					
IEC degree of protection			IP20					

❶ For ADXC...600R2 types.

TYPE (with 2 controlled phases)		**ADXL...600**
Motor	Type	Asynchronous three phase squirrel cage
	Power	7.5...160kW (400VAC) 15...300HP (550...600VAC)
	Rated current	18...320A
Supply voltage	Power circuit	208...600VAC ±10%
	Auxiliary power Us	100...240VAC±10%
	Frequency	50 or 60Hz ±5% self-configurable
Cooling system	natural	ADXL 0018 600...ADXL 0115 600
	forced	ADXL 0135 600...ADXL 0320 600 Optional for ADXL 0018 600...ADXL 0115 600
PROTECTIONS		
Auxiliary supply		Voltage too low
Power supply		Lack of line voltage, lack of phase, out-of-range frequency, minimum and maximum voltage and phase sequence
Motor		Overload at starting (trip class 2, 10A, 10, 15, 20, 25, 30, 35 and 40), overload during running (trip class 2, 10A, 10, 15, 20, 25 and 30), locked rotor, current asymmetry, minimum torque and maximum starting time
Starter		Overcurrent and high temperature
STARTUP AND STOP SETTINGS		
Startup		Torque ramp with current limit, Voltage ramp with current limit, Constant torque with current limit
Stop		Torque ramp, voltage ramp, free-wheel stop
Braking		—
DISPLAY AND PROGRAMMING		
		Using the built-in keyboard and display, PC with CX01 and CX02, App NFC Configurator, App SAM1 with CX02 and remote keyboard with EXC1042
Display		Backlit icon LCD display
Measure view		Maximum current, L1 current, L2 current, L3 current, torque, line voltage, total PF, thermal status motor, starter temperature, active power, motor counter, startup counter
Other views		Operational status, events, alarms, measures
LED		Red “ALARM”, green “POWER” and green “RUN”
DIGITAL INPUTS		
Number of inputs		3
Input type		2 input with dry contact - 1 input with dry contact or PTC
Input function		OFF, motor startup, motor stop, free-range stop, motor preheating, local control, alarm disabling, thermal status reset, keyboard lock, motor selection, user alarm, command
RELAY OUTPUTS		
Number of outputs		3
Output arrangement		- 2 NA: 3A 250V~ AC1 - 3A 30V= AC1 - 1 changeover: NO contact 5A 250V~ AC1 - 5A 30V= ; NC contact 3A 250V~ AC1 - 3A 30V=
Output functions		OFF, motor powered, ramp completed, global alarm, limits, remote variable, alarm
COMMUNICATION INTERFACES		
		NFC, front optical port, optional RS485 (EXC1042)
VARIOUS FUNCTIONS		
Clock		—
Event memory		60
Operational data memory		Startup counter, motor operation counter and maintenance counter
AMBIENT CONDITIONS		
Operating temperature		-20...+40°C (up tp 60°C with derating of starter current of 0.5%/°C)
Storage temperature		-30°...+80°C
Maximum altitude		1000m (higher up with derating of starter current of 0.5%/100mt)
Pollution degree		2
Operating position		Vertical ±15°
HOUSING		
Mounting		Screw-mount on panel or 35mm DIN rail (IEC/EN 60715) with EXP8003 accessory for ADXL 0018 600...ADXL 0115 600
IEC degree of protection		IP00

NUMBER OF STARTS PER HOUR
The following data are based on an ambient temperature of 40°C, starting current of 4*Ie and ramp time 6 seconds.

WITHOUT FAN																				
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
16A	ADXL0018600										ADXL0030600									
30A	ADXL0030600								ADXL0045600				ADXL0060600							
37A	ADXL045600							ADXL0060600			ADXL0075600									
45A	ADXL0045600					ADXL0060600		ADXL0075600				ADXL0085600								
60A	ADXL0060600			ADXL0075600			ADXL0085600	ADXL0115600												
66A	ADXL0075600					ADXL0085600		ADXL0115600												
75A	ADXL0075600			ADXL0085600		ADXL0115600														
85A	ADXL0085600			ADXL0115600																
97A	ADXL0115600																			
115A	ADXL0115600																			
135A	ADXL0135600...ADXL0320600 have two integrated fans as standard																			
162A																				
195A																				
250A																				
320A																				

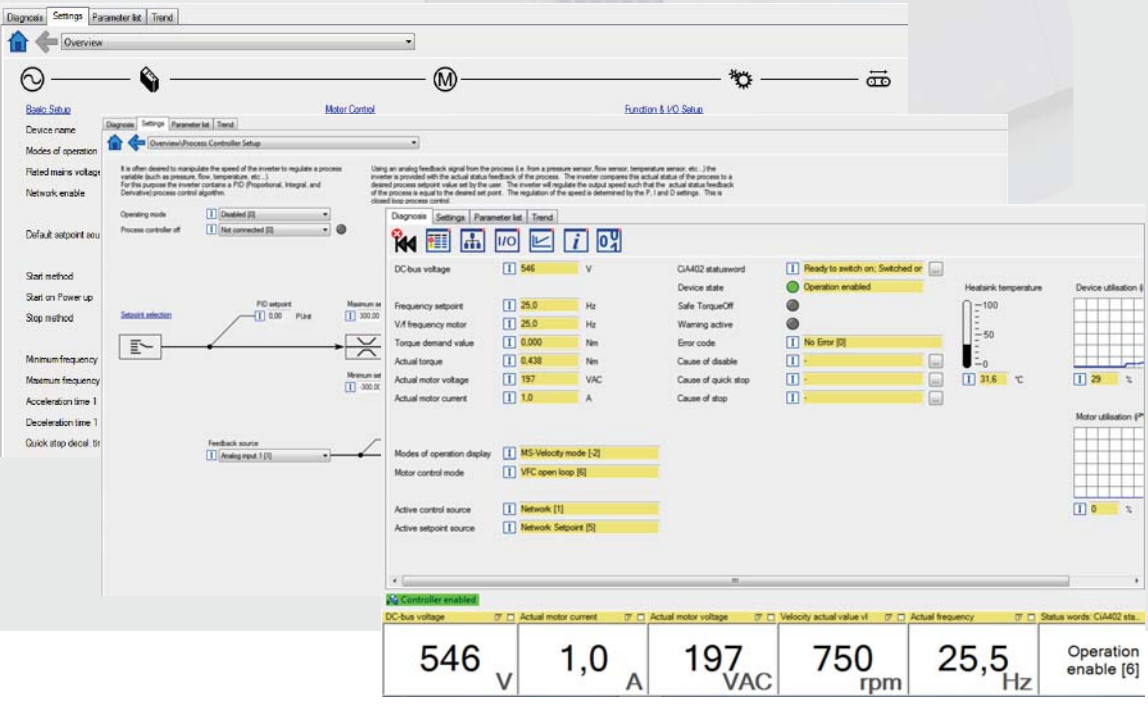
WITH FAN																				
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
16A	ADXL0018600														ADXL0030600					
30A	ADXL0030600												ADXL0045600				ADXL0060600			
37A	ADXL0045600													ADXL0060600					ADXL0075600	
45A	ADXL0045600												ADXL0060600				ADXL0075600		ADXL0085600	
60A	ADXL0060600									ADXL0075600					ADXL0085600			ADXL0115600		
66A	ADXL0075600													ADXL0085600			ADXL0115600			
75A	ADXL0075600												ADXL0085600			ADXL0115600		ADXL0135600		
85A	ADXL0085600											ADXL0115600				ADXL0135600			ADXL0162600	
97A	ADXL0115600										ADXL0135600			ADXL0162600				ADXL0195600		
115A	ADXL0115600									ADXL01355600				ADXL0162600			ADXL0195600			
135A	ADXL0135600										ADXL0162600					ADXL0195600			ADXL0250600	
162A	ADXL0162600								ADXL0195600				ADXL0250600				ADXL0320600			
195A	ADXL0195600								ADXL0250600						ADXL0320600					
250A	ADXL0250600						ADXL0320600													
320A	ADXL0320600																			

TYPE (with 3 controlled phases)		**ADX...B** (with integrated bypass contactor)	**ADX...** (prearranged for external bypass contactor)
Motor	Type	Asynchronous three phase squirrel cage	
	Power at 400VAC	7.5...132kW	160...710kW
	Rated current	17...245A	310...1200A
Supply voltage	Power circuit	208...500VAC ±10% standard (208...600VAC ±10% on demand)	208...415VAC ±10% standard (other voltages up to 690VAC maximum demand)
	Auxiliary power Us	208...240VAC ±10%	208...240VAC ±10%
	Frequency	50 or 60Hz ±5% self-configurable	
Cooling system	Natural	ADX0017...45B	—
	Forced	ADX0060...245B	All types
PROTECTION			
Auxiliary supply		Voltage too low	
Power supply		Phase failure, frequency out of limits, minimum and maximum, voltage and phase sequence, 24VDC static short circuit	
Motor		Overload at starting (trip class 2, 10A, 10, 15, 20, 25, 30, 35, and 40), overload during running (trip class 2, 10A, 10, 15, 20, 25 and 30), locked rotor, current asymmetry, minimum torque and maximum starting time	
Starter		Overcurrent and high temperature	
Analog inputs and outputs		Protection against 24VDC short-circuit	
STARTUP AND STOP SETTINGS			
Startup		Torque ramp with maximum current control	
Stop		Torque control free-range or deceleration	
Braking		DC dynamic with external relay	
DISPLAY AND PROGRAMMING			
		By incorporated or remote keypad or PC	
Display		Backlit LCD 2x16 character	
Selectable languages		Italian, English, French, Spanish	
Measure view		Voltage, current, torque, power (kVA, kW), PF, thermal status of motor and starter, energy consumption	
Other views		Operating status, events, alarms, event log, data	
LED		“POWER”, “RUN” and “FAULT”	
DIGITAL AND ANALOGUE INPUTS			
Number of inputs		4	
Input type		24VDC (no need for external feeder)	
Fixed functions		2 for starting and stopping/reset	
Multifunction input (digital)		Free-wheel stopping, external alarm, motor preheat, on board control, alarm inhibition, thermal protection, manual reset, cascade starting and keypad lock	
Multifunction input (analog)		Motor protection via PTC probes, acceleration and/or deceleration ramp via analog input, analog input thresholds for motor starting and stopping, analog input thresholds for programmable relay enable and disable, PT100 input thresholds for motor starting and stopping and PT100 input thresholds for programmable relay enable and disable	
RELAY OUTPUTS			
Number of outputs		4	
Output arrangement		1 NO+NC: 5A 250V~ AC1 General alarm / 3 NO: 5A 250V~ AC1 Programmable	
Output functions		Motor in running mode, started motor, braking, current threshold triggering, maintenance schedule, cascaded startup, PROG-IN thresholds, alarm	
ANALOG OUTPUT			
Format configuration		0...20mA, 4...20mA or 0...10V	
Associated source		Current, torque, motor thermal status, power factor and active power	
COMMUNICATIONS INTERFACE			
RS232		Setup and remote control	
RS485		Used for remote keypad only	
VARIOUS FUNCTIONS			
Clock		Calendar-clock with back-up battery	
Event memory		20 sequential storing of alarms/events with date and hour	
Operational data memory		Energy consumption counter, startup counter, motor operation counter and maintenance counter	
AMBIENT CONDITIONS			
Operating temperature		-10...+45°C (up to +55°C, with derating of the starter current of 1.5%/°C)	
Storage temperature		-30°...+70°C	
Maximum pollution degree		3	
Maximum altitude		1000m (higher up with derating of of the starter current of 0.5%/100mt)	
Operating position		Vertical ±15°	
HOUSING			
Mounting		Screw-mount on panel	
IEC degree of protection		IP00❶	

❶ IEC IP20 for ADX0017B...ADX0125B types only.

Variable speed drives

- Versions for single-phase up to 2.2kW / 3HP and three-phase up to 110kW / 150HP
- Special function for pump and fan control using PID algorithm
- Active earth leakage protection
- EMC suppressor built-in all versions
- Selectable motor control mode: V/f, vector, energy saving
- Selectable digital and analog input and output functions.



Page 6-3 and 4

VLA1…

- Single-phase 200...240VAC supply
- Three-phase motor power 0.25…2.2kW / 0.33…3HP ratings at 240VAC
- Compliant with standard IEC/EN 61800-3 cat.C2 without external filters
- Optional USB module for parameter programming.

Page 6-5

VFNC3…

- Single-phase 200...240VAC supply
- Three-phase motor power 0.2…2.2kW / 0.25…3HP ratings at 230VAC
- Compliant with standard IEC/EN 61800-3 cat.C1 or cat.C2 without external filters
- Built-in RS485 port, protocol Modbus-RTU
- Optional three-phase motor inductances
- Optional USB module for parameter programming.

Page 6-6

VLB3…

- Three-phase 400…480VAC supply
- Three-phase motor power 0.4…110kW / 0.5…150HP for heavy load, up to 132kW / 175HP for standard load, ratings at 400VAC
- Compliant with standard IEC/EN 61800-3 cat.C1 or cat.C2 without external filters
- Integrated dynamic braking circuit
- Optional STO safety input module
- Optional three-phase motor inductances
- Optional braking resistors
- Communication protocols available: Modbus-RTU, CANopen, Profibus, Profinet and Ethercat
- Optional USB and Wi-Fi modules for parameter programming.

Page 6-6

VFS15…

- Three-phase 380…575VAC supply
- Three-phase motor power 0.4…15kW / 0.5…20HP ratings at 400VAC
- Compliant with standard IEC/EN 61800-3 cat.C2 or cat.C3 without external filters
- Built-in RS485 port, protocol Modbus-RTU
- Integrated dynamic braking circuit
- Integrated STO safety input
- Optional three-phase motor inductances
- Optional braking resistors
- Optional USB module for parameter programming.

Description		 VLA1 1-phase	 VFNC3 1-phase	 VLB3 3-phase	 VFS15 3-phase
Three-phase motor power (kW)	standard load	—	—	5.5...132 (400V)	0.75...18.5 (400V)
	heavy load	0.25...2.2 (240V)	0.2...2.2 (240V)	0.4...110 (400V)	0.4...15 (400V)
Method of control					
	Constant torque V/f	●	●	●	●
	Sensorless vector	●	●	●	●
	Automatic torque boost	—	●	●	●
	Variable torque (for pump and fan)	●	●	●	●
	Energy saving	—	●	●	●
	Vector with encoder feedback	—	—	●	—
Maximum output frequency		599Hz	400Hz	599Hz	500Hz
Overload		150% for 60s	150% for 60s	150% for 60s	150% for 60s
Serial communications RS485		—	n° 1	n° 1	n° 1
Protocols		—	Modbus-RTU	Modbus-RTU, ProfiNET, CANopen, Ethercat, ProfiBUS,	Modbus-RTU, ProfiBUS
Digital inputs (inputs marked with ❶ can be configured as analog or digital)		5	4+1❶	5	6+2❶
Digital outputs		2	2	2	3
Analog inputs (inputs marked with ❶ can be configured as analog or digital)		2	1❶	2	1+2❶
Analog outputs		1	1	1	1
Sequencer (frequency/time cycles)		●	—	●	—
Onboard potentiometer		—	●	—	●
Auto-tuning		—	●	—	●
PID adjustment		●	●	●	●
PID SLEEP function		●	●	●	●
PID WAKE-UP function		●	—	●	—
Motor potentiometer		●	●	●	●
3-wire motor running		●	●	●	●
DC braking		●	●	●	●
Preset speed frequency		●	●	●	●
Pump and fan functions		●	●	●	●
Flying restart		●	●	●	●
Motor PTC thermistor input		—	—	●	●
S.T.O. (Safe Torque Off) per EN ISO 13849-1		—	—	Optional	●

VLA1 type

VLA1...

new

Order code	Output current	3-phase motor power at 240VAC		Qty per pkg	Weight
	[A]	[kW]	[HP]	n°	[kg]
Single phase supply 200…240VAC 50/60Hz. Three-phase motor output 240VAC max. Built-in EMC suppressor, cat. C2.					
VLA1 02 A240	1.7	0.25	0.33	1	0.750
VLA1 04 A240	2.4	0.4	0.5	1	0.750
VLA1 07 A240	4.2	0.75	1	1	0.950
VLA1 15 A240	7	1.5	2	1	1.350
VLA1 22 A240	9.6	2.2	3	1	1.350

Accessories for VLA1

VLAX C01

VLAX C02

VLAX P01

new

Order code	Descrizione	Qty per pkg	Weight
		n°	[kg]
VLAX C01	Display and keypad	1	0.050
VLAX C02	USB communication module	1	0.050
VLAX P01	Door-mount installation kit for the keypad VLAX C01. IP65, Type 4/4X. Connecting cable included, 3m long.	1	0.340

General characteristics
VLA1 is an ultra-compact drive with high performance. It integrates different motor control modes, like V/f linear and quadratic and sensorless vector control. VLA1 is extremely versatile and can be used in several applications such as conveyor belts, machine tools, control of automatic doors, packaging machines and in particular to manage pumps and fans thanks to specific integrated functions like the PID control and flying restart. Simple to install and configure. The user interface, which comprises of a built-in keypad and display, allows to access the setting parameters easily, thanks to the use of extended texts describing the functions and codes. Using the optional USB communication module, the programming, monitoring and diagnostic can be performed using a PC with software VLBXSW, downloadable from the website www.LovatoElectric.com.

SPEED REFERENCE SIGNALS
Reference signals for speed adjustment are obtained by:
- External potentiometer 1…10kΩ
- Voltage signal 0…10VDC or current signal 0/4…20mA
- Buttons on front keypad
- Door-mount installation kit
- 15 preset speeds via digital inputs
- Motor potentiometer.

PROGRAMMABLE INPUTS
- Selectable pNp or nPn I/O logic
- 5 digital inputs
- 1 digital output, 1 changeover relay output
- 2 analog inputs configurable as voltage inputs 0…10VDC or current inputs 0/4…20mA
- 1 analog output configurable as voltage output 0…10VDC or current output 0/4…20mA.

PROTECTIONS
- Overcurrent
- Output short circuit and earth/ground leakage
- Overvoltage
- Undervoltage
- Phase loss
- Motor heat overload (i2t)
- Overspeed
- Speed reverse.

FUNCTIONS
- Speed control
- V/f linear or squared curves
- Sensorless vector control
- Flying restart
- DC braking and DC injection at start
- Integrated PID with sleep and wake-up thresholds
- Programmable frequency/time cycles
- Different parameter configurations
- User menu (favorite parameters)
- Programming and monitoring software VLBX SW, downloadable from the website www.LovatoElectric.com.

Operational characteristics
- Input voltage: 200…240VAC single-phase
- Rated operational current Ie: 1.7…9.6 A
- Mains frequency: 50/60Hz
- Output frequency: 0…599Hz
- Frequency modulation: 2…16kHz
- Current overload: 150% for 60s; 200% for 3s
- IEC degree of protection: IP20
- Ambient conditions:
  - Operating temperature: -10…+55°C (45°C without derating)
  - Maximum altitude: 2000m (without derating)
  - Relative humidity: 5…95% (with no condensing)
- Side-by-side installation
- Built-in EMC suppressor (EN61800-3), cat. C2
- IE2 efficiency level (EN50598-2).

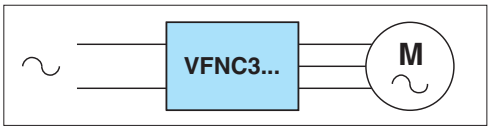
Certifications and compliance
Certifications: cULus, EAC, RCM.
Compliant with standards: EN61800-5-1, UL61800-5-1, CSA 22.2 No. 274.

VFNC3 type

VFNC3...

Order code	Output current ❶	3-phase motor power at 240V		Qty per pkg	Weight
	[A]	[kW]	[HP]	n°	[kg]
Single-phase supply 200...240VAC 50/60Hz. Three-phase motor output 240VAC max. Built-in EMC suppressor, cat. C1.					
VFNC3S 2002 PLW	1.4	0.2	0.25	1	1.100
VFNC3S 2004 PLW	2.4	0.4	0.5	1	1.260
VFNC3S 2007 PLW	4.2	0.75	1	1	1.348
VFNC3S 2015 PLW	7.5	1.5	2	1	1.960
VFNC3S 2022 PLW	10	2.2	3	1	1.985

❶ Operation up to 50°C without derating.



"Side by Side" installation
Multiple units can be installed without side clearance for space saving.

Standard installation with gaps between one drive and the next one.

General characteristics
VFNC3 is an ultra-compact drive with high performance and extremely reliable (printed circuit surface protection per IEC/EN 60721-3-3).
Easily installed, VFNC3 is equipped with a front display and innovative jog dial control, which simplifies the programming and control processes of the drive and motor. The on-board RS485 interface permits an overall remote control (supervision and communication protocols). VFNC3 can be used in simple applications such as exhaust fans, ventilators, conveyor belts, machine tools, car washes, fitness equipment, but also in applications of intermediate complexity, such as pumps, waterworks.
The vector control and the possibility to enable the motor auto-tuning warrants efficiency and high torques even with very low operating frequencies.
Using the optional USB module USB001Z, the programming can be performed by using a PC with software PCM001Z.
For details see page 6-9 or contact our Technical support.

SPEED REFERENCE SIGNALS
Reference signals for speed adjustment are obtained by:
- Front jog dial control (potentiometer)
- External potentiometer: 1...10kΩ
- Voltage signal: 0...10V
- Current signal: 4...20mA
- Remote keypad option
- 15 preset speeds via digital inputs
- RS485 serial signals.

PROGRAMMABLE INPUTS
- Selectable pNp or nPn I/O logic
- 4 digital multifunction inputs
- 1 digital configurable as analog input.

PROGRAMMABLE OUTPUTS
- 1 relay with changeover contact
- 1 static configurable as analog 0...10V/4...20mA.

PROTECTION
- Overcurrent and overvoltage
- Input phase loss
- Output phase loss
- Motor drive overload
- Motor overload
- Output short circuit
- Motor stall.

SPECIAL FUNCTIONS
- PID function for pump and fan application
- Dual set of independent parameters and ramps for two different motor controls
- Automatic restarting and instantaneous speed tuning
- 15 viewable frequency values
- Start-up DC injection
- DC injection braking
- Motor control: constant torque V/f, sensorless vector, variable torque.

Operational characteristics
- Input voltage: 200...240VAC single-phase
- Output voltage: ≤ input voltage
- Rated operational current: 1.4...10A
- Mains frequency: 50/60Hz
- Output frequency: 0.1...400Hz
- Frequency modulation: 2...16kHz
- Current overload: 150% for 60s; 200% for 0.5s
- IEC degree of protection: IP20
- Ambient conditions
  - Operating temperature: -10...+60°C (50°C with non derating)
  - Maximum altitude: 3000m (with derating)
  - Relative humidity: 5...95% (with no condensing).

Certifications and compliance
Certifications obtained: UL Listed for USA and Canada (File E204788) as Power Conversion Equipment;
CSA certified for Canada (File 231252) as Motor Controllers - Miscellaneous, EAC.
Compliant with standards: IEC/EN 61800-5-1, IEC/EN 61800-3 - first environment cat. C1, IEC/EN 60721-3-3, UL508 C, CSA C22.2 n° 14.

VLB3 type

VLB3...

VLB3...XX

Order code	Output❸ current	3-phase motor power at 400VAC with heavy load❹		Qty per pkg.	Weight
	[A]	[kW]	[HP]	n°	[kg]
COMPLETE DRIVES❶ Three-phase supply 400…480VAC 50/60Hz. Three-phase motor output max 480VAC. Built-in EMC suppressors.					
VLB3 0004 A480	1.3	0.4	0.5	1	0.850
VLB3 0007 A480	2.4	0.75	1	1	1.100
VLB3 0015 A480	3.9	1.5	2	1	1.380
VLB3 0022 A480	5.6	2.2	3	1	1.380
VLB3 0040 A480	9.5	4	5	1	2.450
VLB3 0055 A480	13	5.5	7.5	1	2.450
VLB3 0075 A480	16.5	7.5	10	1	3.950
VLB3 0110 A480	23.5	11	15	1	3.950
VLB3 0150 A480	32	15	20	1	10.650
VLB3 0185 A480	40	18.5	25	1	10.650
VLB3 0220 A480	47	22	30	1	10.650
VLB3 0300 A480	61	30	40	1	17.500
POWER UNITS❷ Three-phase supply 400…480VAC 50/60Hz. Three-phase motor output max 480VAC. Built-in EMC suppressors.					
VLB3 0004 A480XX	1.3	0.4	0.5	1	0.800
VLB3 0007 A480XX	2.4	0.75	1	1	1.000
VLB3 0015 A480XX	3.9	1.5	2	1	1.350
VLB3 0022 A480XX	5.6	2.2	3	1	1.350
VLB3 0040 A480XX	9.5	4	5	1	2.300
VLB3 0055 A480XX	13	5.5	7.5	1	2.300
VLB3 0075 A480XX	16.5	7.5	10	1	3.700
VLB3 0110 A480XX	23.5	11	15	1	3.700
VLB3 0150 A480XX	32	15	20	1	10.300
VLB3 0185 A480XX	40	18.5	25	1	10.300
VLB3 0220 A480XX	47	22	30	1	10.300
VLB3 0300 A480XX	61	30	40	1	17.200
VLB3 0370 A480XX	76	37	50	1	17.200
VLB3 0450 A480XX	89	45	60	1	17.200
VLB3 0550 A480XX	110	55	75	1	24.000
VLB3 0750 A480XX	150	75	100	1	24.000
VLB3 0900 A480XX	180	90	120	1	35.600
VLB3 1100 A480XX	212	110	150	1	35.600

new

IE2 COMPLIANT

The drive efficiency is 25% higher than the reference value for the IE1 class.

Operational characteristics for standard load❺

Order code		Ie❸	3-phase motor power at 400VAC with standard load	
Complete drives❶	Power units❷	[A]	[kW]	[HP]
VLB3 0004 A480	**VLB3 0004 A480XX**	❻	❻	❻
VLB3 0007 A480	**VLB3 0007 A480XX**	❻	❻	❻
VLB3 0015 A480	**VLB3 0015 A480XX**	❻	❻	❻
VLB3 0022 A480	**VLB3 0022 A480XX**	❻	❻	❻
VLB3 0040 A480	**VLB3 0040 A480XX**	11.9	5.5	7.5
VLB3 0055 A480	**VLB3 0055 A480XX**	15.6	7.5	10
VLB3 0075 A480	**VLB3 0075 A480XX**	23	11	15
VLB3 0110 A480	**VLB3 0110 A480XX**	28.2	15	20
VLB3 0150 A480	**VLB3 0150 A480XX**	38.4	18.5	25
VLB3 0185 A480	**VLB3 0185 A480XX**	48	22	30
VLB3 0220 A480	**VLB3 0220 A480XX**	56.4	30	40
VLB3 0300 A480	**VLB3 0300 A480XX**	73.2	37	50
–	**VLB3 0370 A480XX**	91.2	45	60
–	**VLB3 0450 A480XX**	107	55	75
–	**VLB3 0550 A480XX**	132	75	100
–	**VLB3 0750 A480XX**	180	90	120
–	**VLB3 0900 A480XX**	216	110	150
–	**VLB3 1100 A480XX**	254	132	175

❶ Complete drive: power unit + logic unit with Modbus-RTU + control unit with keypad and display.
❷ To be completed with logic unit VLBX L.. and control unit VLBX C...
❸ Operation up to 45°C without power derating.
❹ Heavy load: 150% overload for 60s
❺ Standard load: 120% overload for 60s
❻ Functioning for standard load not available for this size.

General characteristics

VLB3 is a compact drive with three-phase supply input.
It is ideal for general applications and, in particular, to control and manage pumps and fans, thanks to several specific built-in functions (S Curve, PID, torque squared control). It does not require any space for side ventilation, allowing to install several side-by-side drives. The user interface, which comprises of a built-in keyboard and display, allows to access the setting parameters easily, thanks to the use of extended texts describing the functions and codes. Using the USB or Wi-Fi connection accessories, the programming, monitoring and diagnostics can be performed using a PC with software VLBX SW, downloadable from the website www.LovatoElectric.com. The RS485 communication port with built-in modbus RTU (integrated in the complete drives VLB3... A480) and EMC filter complete the hardware supply. The logic unit can be replaced with one of the VLBXL... codes, obtaining a communication port with different protocol.

SPEED REFERENCE SIGNALS
- External potentiometer: 0…10kΩ
- Voltage signals: -10…10VDC (two-pole)
- Current signals: 0/4…20mA
- Buttons on front keyboard
- Remote control panel
- 15 preset speeds via digital inputs
- Motor potentiometer
- Setting via modbus protocol (RS485).

PROGRAMMABLE INPUTS/OUTPUTS
- pNp or nPn connections
- 5 digital inputs
- 1 digital output, 1 changeover relay output
- 2 voltage analog inputs -10…10VDC (two-pole) or current analog inputs 0/4…20mA
- 1 voltage analog output 0…10VDC (two-pole) or current analog output 0/4…20mA.

PROTECTIONS
- Overcurrent
- Output short circuit and earth/ground leakage
- Overvoltage
- Undervoltage
- Phase loss
- Motor heat overload (I^2t)
- Motor PTC heat protection
- Drive, motor and braking resistor overload
- Overspeed
- Speed reverse.

FUNCTIONS
- Speed or torque control
- V/f linear or squared curves
- Open or closed ring vector control
- Energy-saving ECO control
- S curves
- Quick speed search
- Access to DC bus
- DC braking and DC injection at start
- Built-in PID with sleep and wake-up thresholds
- Programmable frequency/time cycles
- Ideal for asynchronous or synchronous motors (up to 22kW)
- Different parameter configurations
- User menu (favorite parameters)
- Safe Torque Off (STO) input accessory class SIL 3 (EN62061 / EN61800-5-2)
- Programming and monitoring software VLBX SW downloadable from the website www.LovatoElectric.com.

Operational characteristics
- Input voltage: 400...480VAC three-phase
- Rated operational current: 1.3…212A
- Mains frequency: 45...65Hz
- Output frequency: 0...599Hz
- Frequency modulation: 2...16kHz
- Current overload: 150% for 60s; 200% for 3s
- IEC degree of protection: IP20
- Ambient conditions
  - Operating temperature: -10...+55°C (45°C without derating)
  - Maximum altitude: 4000m (with power derating)
  - Relative humidity: 5...95% (with no condensing)
- Side-by-side installation
- Built-in EMC suppressor (EN61800-3)
  motor cable length: up to 3m for cat. C1 (for sizes 0.4 and 0.75kW); up to 20m for cat. C2
- IE2 efficiency level (EN50598-2).

Certifications and compliance

Certifications obtained: cULus, EAC, RCM.
Compliant with standards: EN61800-5-1, UL61800-5-1, CSA 22.2 No. 274.

Accessories for VLB3

VLBX C01

VLBX C02

VLBX C03

VLBX SM

VLBX L...

EXC RDU1

VLBX P01

Order code	Description	Qty per pkg.	Wt
		n°	[kg]
VLBX C00	Blanking cover	4	0.128
VLBX C01	Keypad and display	1	0.080
VLBX C02	USB communication module	1	0.080
VLBX C03	Wi-Fi communication module	1	0.080
VLBX SM	Safe Torque Off (STO) module	1	0.080
VLBX L01	Logic unit with CANopen	1	0.209
VLBX L02	Logic unit with ProfiBUS	1	0.209
VLBX L03	Logic unit with ProfiNET	1	0.209
VLBX L04	Logic unit with Ethercat	1	0.209
VLBX L06	Logic unit with Modbus RTU	1	0.209
VLBX P01	Door-mount installation kit for the keypad VLBX C01, IP65, Type 4/4X, connecting cable included 3m long.	1	0.340
EXC RDU1	Remote display unit, LCD graphic touch screen, RS485 port integrated, for monitoring and control of up to 32 drives, IP65 and 4X, cable included 3m long	1	0.360

General characteristics

CONTROL UNITS VLBX C…
The variable speed drives VLB3 series can be programmed with the control unit VLBX C01 (keypad and display) or alternatively from a PC with the software VLBX SW (freely downloadable from the website www.LovatoElectric.com) by using the communication modules VLBX C02 (USB) and VLBX C03 (Wi-Fi).

SAFE TORQUE OFF (STO) MODULE VLBX SM
The VLBX SM module allows to increase and optimize the safety functions of the drive providing two inputs dedicated to the function Safe Torque Off (STO) with performance level ISO 13849-1 (EN 954-1), safety class SIL 3 (EN62061 / EN 61800-5-2).

LOGIC UNITS VLBX L…
Thanks to their modular structure, on the VLB3 series variable speed drives it is possibile to replace the logic unit with Modbus RTU protocol (integrated as standard on the complete drives VLB3...A480) with one of the logic units VLBX L.., available in the versions with the most common fieldbus, obtaining a drive with a different communication port, which allows its integration inside control systems.

DOOR-MOUNT INSTALLATION KIT VLBX P01
With the kit VLBX P01 is possible to mount the keypad and display VLBX C01 (provided as standard on the complete drives VLB3…A480 or purchased as an optional accessory for the power units VLB3…A480XX) on the panel door.
The door-mounting kit has an IP65 and Type 4/4X degree of protection and it is provided with an Ethernet connection cable 3 meters long.

REMOTE DISPLAY UNIT EXC RDU1
The remote display unit EXC RDU1 allows the command and monitoring of up to 32 variable speed drives VLB3 series, connected in RS485 (Modbus RTU protocol).
It provides the following functions:
- Command of the start and stop of the motor
- Adjustment of the speed of the motor
- Inversion of the sense of rotation of the motor
- Monitoring of the main electrical measures of the system
- Control of the status of the drive and presence of alarms
- PID control and monitoring of the status.

Technical characteristics:
- Auxiliary supply 100...240VAC / 110...250VDC
- Graphic LCD display with touch screen, 128x112 pixel
- Opto-isolated RS485 port, Modbus RTU protocol
- Flush mount housing, compatible with DIN 96x96mm and ANSI 4”
- Compatible with VLB3 drives equipped with Modbus RTU logic unit
- Cable for RS485 connection included, 3 meters long
- Degree of protection on front IP65 and 4X.

Certifications and compliance

Certifications obtained:
- VLBX C..., VLBX SM, VLBX L...: cULus, EAC, RCM
- VLBX P01 and EXC RDU1: cULus, EAC

Compliant with standards: EN61800-5-1, UL61800-5-1, CSA 22.2 No. 274.

VFS15 type

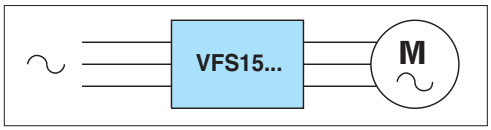
VFS15...

Order code	Output current ❶	3-phase motor power at 400V heavy load ❷		Qty per pkg	Weight
	[A]	[kW]	[HP]	n°	[kg]
Three-phase supply 380...500VAC 50/60Hz ❸. Three-phase motor output 500VAC max. Built-in EMC suppressor, cat. C3.					
VFS15 4004 PLW	1.5	0.4	0.5	1	1.800
VFS15 4007 PLW	2.3	0.75	1	1	1.800
VFS15 4015 PLW	4.1	1.5	2	1	1.800
VFS15 4022 PLW	5.5	2.2	3	1	3.200
VFS15 4037 PLW	9.5	4	5	1	3.200
VFS15 4055 PLW	14.3	5.5	7.5	1	5.500
VFS15 4075 PLW	17	7.5	10	1	5.500
VFS15 4110 PLW	27.7	11	15	1	8.400
VFS15 4150 PLW	33	15	20	1	8.400

Operational characteristics for standard load conditions

Type	Current ❶	3-phase motor power at 400VAC with standard load❷	
VFS15 4004 PLW	2.1A	0.75kW	1HP
VFS15 4007 PLW	3A	1.1kW	1.5HP
VFS15 4015 PLW	5.4A	2.2kW	3HP
VFS15 4022 PLW	6.9A	3kW	4HP
VFS15 4037 PLW	11.1A	5.5kW	7.5HP
VFS15 4055 PLW	17A	7.5kW	10HP
VFS15 4075 PLW	23A	11kW	15HP
VFS15 4110 PLW	31A	15kW	20HP
VFS15 4150 PLW	38A	18.5kW	25HP

❶ Operation up to 50°C without derating.
❷ Heavy-duty load: 150% overload for 60s.
Standard load: 120% overload for 60s.
❸ 200-240VAC three-phase version available on request; consult Technical support for details; see contact details on inside front cover.



"Side by Side" installation
Multiple units can be installed without side clearance for space saving.

Standard installation with gaps between one drive and the next one.

General characteristics
The high quantity of functions available and the construction characteristics allow to use the VFS15... speed drive in many fields: waterworks and methane piping ducts, cement, paper, chemical and petrochemical industries.
The EASY function key allows direct switching to a customised menu with typical programming parameters for a dedicated application in order to quickly reach them for eventual consultation or changes.

SPEED REFERENCE SIGNALS
Reference signals for speed adjustment are obtained by:
- Front potentiometer
- External potentiometer: 1...10kΩ
- Voltage signal: 0...10V
- Current signal: 4...20mA
- Keypad on front
- Remote keypad option
- 15 preset speeds via digital inputs
- RS485 serial signals.

PROGRAMMABLE INPUTS
- Selectable pNp or nPn I/O logic
- 6 digital multifunction inputs
- 2 digital configurable as analog input.

PROGRAMMABLE OUTPUTS
- 1 relay with changeover contact and 1 relay with NO contact; 1 transistor and 1 analog configurable as 0...10VDC or 4...20mA.

PROTECTION
- Overcurrent and overvoltage
- Input and output phase loss
- Drive, motor and braking resistor overload
- Drive overtemperature and excessive torque
- Earth/ground fault.

SPECIAL FUNCTIONS
- PID function for pump and fan application
- Dual set of independent parameters and ramps for two different motor controls
- Automatic restarting and instantaneous speed tuning
- 15 viewable frequency values
- DC-Bus access for DC power supply
- Integrated dynamic braking circuit; optional external braking resistor
- Motor control: constant torque V/f, variable torque, sensorless vector
- Automatic motor torque boost control
- DC injection braking
- Auto-tuning
- Motor potentiometer
- Sequential starting control for sets of motors
- SLEEP function: automatic motor stopping after continuous running at minimum frequency
- Start-up DC injection
- OVERRIDE function for summing analog VIA-VIB inputs
- Built-in STO (Safe Torque Off) input class SIL 2 (EN 61800-5-2).

Operational characteristics
- Input voltage: 380...500VAC three-phase
- Output voltage: ≤ input voltage
- Rated operational current: 1.5...38A three-phase
- Mains frequency: 50/60Hz
- Output frequency: 0...500Hz
- Frequency modulation: 2...16kHz
- Current overload for 60s: 120% for normal load; 150% for heavy load
- Low speed torque: 200% 0.3Hz
- IEC degree of protection: IP20;
- Ambient conditions
  - Operating temperature: -10...+60°C (50°C without derating)
  - Maximum altitude: 1000m
  - Relative humidity: 20-93% (with no condensing).

Certifications and complience
Certifications obtained: UL Listed for USA and Canada (File E204788) as Power Conversion Equipment;
CSA certified for Canada (File 231252) as Motor Controllers - Miscellaneous; AS C-tick, EAC.
Compliant with standards: EN 50178, IEC/EN 61800-3 - first environment cat. C2 or second environment cat. C3, UL508 C, CSA C22.2 n° 14.

Three-phase inductances

IND...

new

Order code	Ie	Induc-tance	Power	Qty per pkg.	Weight
	[A]	[mH]	[kW]	n°	[kg]
Inductances for VLB3... variable speed drives.					
VLBX L590	50	0.59	22...30	1	8.350
VLBX L370	80	0.37	37	1	12.500
VLBX L330	90	0.33	45	1	16.000
VLBX L300	100	0.30	55	1	19.000
VLBX L190	160	0.19	75	1	26.000
VLBX L140	200	0.14	90...110	1	32.000
Inductances for VF... variable speed drives.					
IND2020	12	1	0.75...4	1	1.850
IND2030	25	0.6	5.5...11	1	2.670
IND3040	50	0.2	15	1	7.220

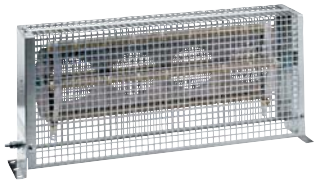
General characteristics
VLBX L... three-phase inductance applies to VLB3... drives, from 22kW to 110 kW.
The three-phase inductances, IND type, can be connected to the drives type VFNC3... and VFS15... in the following ways:
– Drive input, to reduce the harmonic content upstream, with consequent reduction of the input current absorbed by the drives;
– Drive output, to reduce the voltage peaks generated by the drive towards the motor, or when several parallel motors are simultaneously controlled by the drives.
Inductances can be applied also on the input of drives with single-phase power supplies.
For the correct choice, select the inductance with Ie current rating equal to or greater than the rated current of the drive they will be used with.

Operational characteristics VLBX L... type
– Current: 50...200A.
– Operating temperature: -10...+55°C (40°C without derating)

Operational characteristics IND...type
– Current: 12...50A
– Operating temperature: -25...+100°C.

Certifications and compliance
Certifications obtained: EAC.
Compliant with standards: IEC/EN 61558-1.

Braking resistors



ROF...

Order code	Output	Resis-tance	Power	Qty per pkg.	Wt
	[W]	[Ω]	[kW]	n°	[kg]
Resistors for VLB3... variable speed drives.					
VLBX R390	100	390	0.4...0.75	1	0.260
VLBX R180	200	180	1.5...2.2	1	0.630
VLBX R047	200	47	4...5.5	1	0.500
VLBX R027	200	27	7.5...11	1	0.500
VLBX R018	800	18	15	1	4.200
VLBX R015	800	15	18.5...22	1	4.200
VLBX R007	1900	7.5	30...75	1	9.500
Resistors for VF... variable speed drives.					
ROF20150	200	150	0.4...0.75	1	0.220
ROF20100	200	100	1.5...2.2	1	0.210
ROF35060	350	60	3.7...5.5	1	0.610
ROF50035	500	35	7.5	1	0.773
ROF80030	800	30	11...15	1	1.570

General characteristics
Braking resistors can be connected to drives in order to absorb the power generated during the motor stop phase.

Operational characteristics
– Maximum applicable voltage: 1000V
– Connection: With 250mm cable for ROF; directly on the resistor terminal for ROPPE
– IEC degree of protection: IP54 for ROF; IP20 for ROPPE.

Certifications and compliance
Certifications obtained: EAC.
Compliant with standards: IEC/EN 60204-1, IEC/EN 60664-1.

Others

MITOS...

LPC PA001

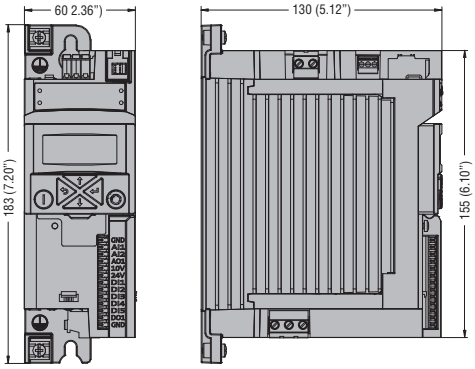
Order code	Description	Qty per pkg.	Wt
		n°	[kg]
For VFNC3...-VFS15... variable speed drives.			
MITOSVT6	Remote control panel with functions: motor running, inverse rotation, speed adjustment and quantities control. IP65. 16 character-2 line display. Cable excluded ❶	1	0.200
MITOSVT6ECO	Remote control panel for quantities retention and control of a system (PID: pressure, temperature, etc). IP65. 16 character-2 line display. Cable excluded ❶	1	0.200
RJ45SH05000	RJ45 wire for MITOS... connection RKP002Z and USB001Z on the drive. 5m long	1	0.140
RKP002Z	Remote control panel with functions: motor running, speed adjustment, quantities control and parameter setting. IP20. 4 character-7 segment display. Cable excluded ❶	1	0.280
USB001Z	Drive programming module❶❷❸	1	0.260
For VLA1...-VLB3...-VFNC3...-VFS15... variable speed drives.			
LPC PA001	1kOhm potentiometer 1 turn, complete with operating knob. IP66, IP67 and IP69K❹	10	0.040

❶ RJ45 cable to be purchased separately; order code RJ45SH05000.
❷ For USB001Z module → PC USB port connection, use a normal USB cable, USB1.1/2.0 compatible, type A-B connection, maximum recommendable length 1m only.
❸ Consult our Technical support to request the drive remote control software; see contact details on inside front cover.
❹ For more information consult page 7-14.

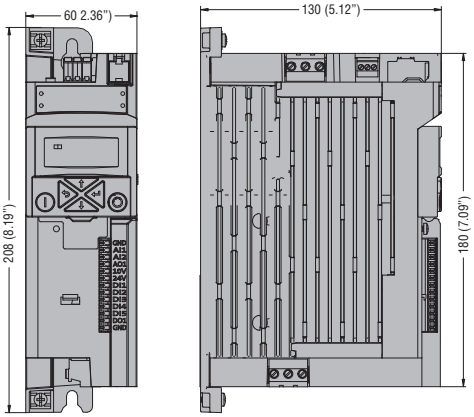
Certifications and compliance
Certifications obtained: EAC.
Compliant with standards: EN 50178, IEC/EN 61000-6-2, IEC/EN 61000-6-3 for MITOS... and RKP....

SINGLE-PHASE VARIABLE SPEED DRIVES

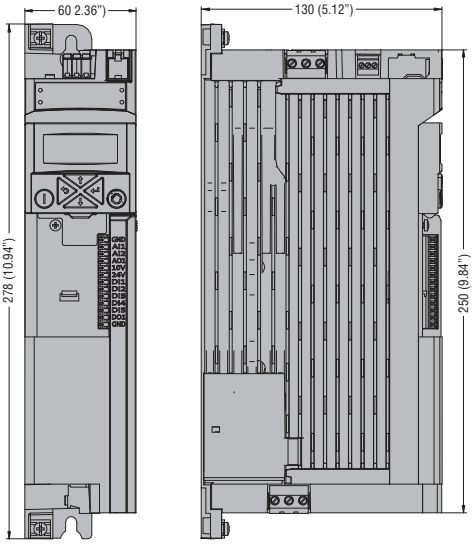
VLA1 02 A240 - VLA1 04 A240



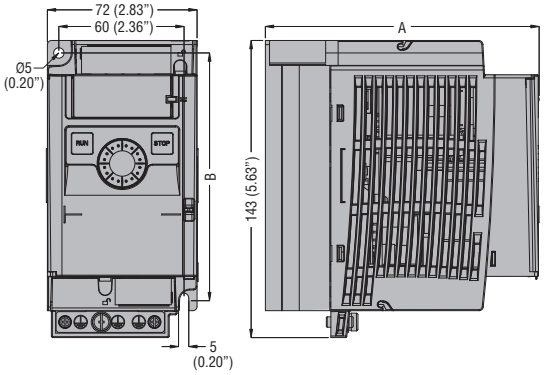
VLA1 07 A240



VLA1 15 A240 - VLA1 22 A240

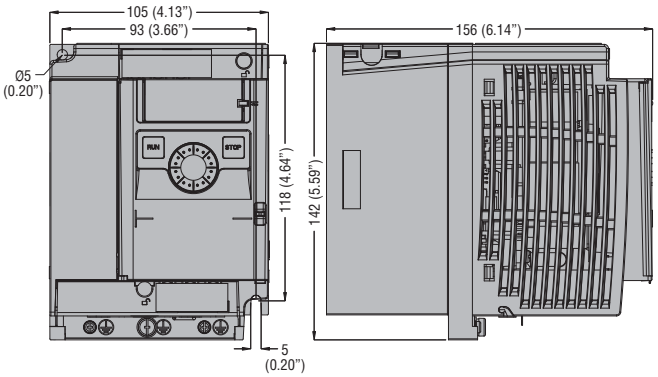


VFNC3S 2002 PLW...VFNC3S 2007 PLW



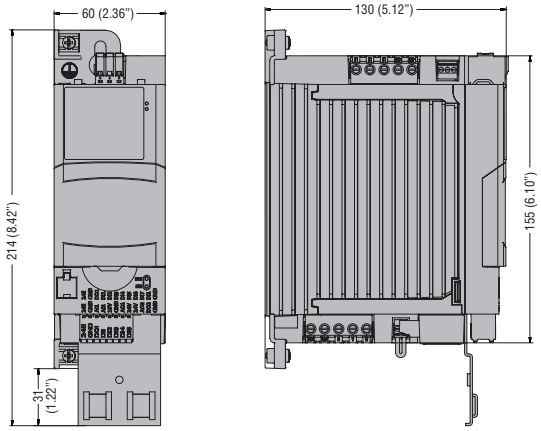
TYPE	A	B
VFNC3S 2002PL W	102 (4.01")	131 (5.16")
VFNC3S 2004PL W	121 (4.76")	118 (4.64")
VFNC3S 2007PL W	131 (5.16")	118 (4.64")

VFNC3S 2015 PLW - VFNC3S 2022 PLW

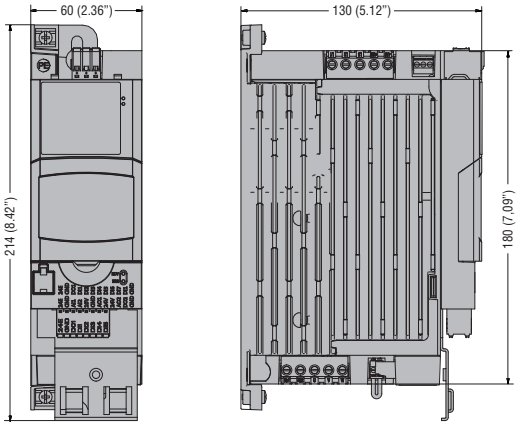


THREE-PHASE VARIABLE SPEED DRIVES

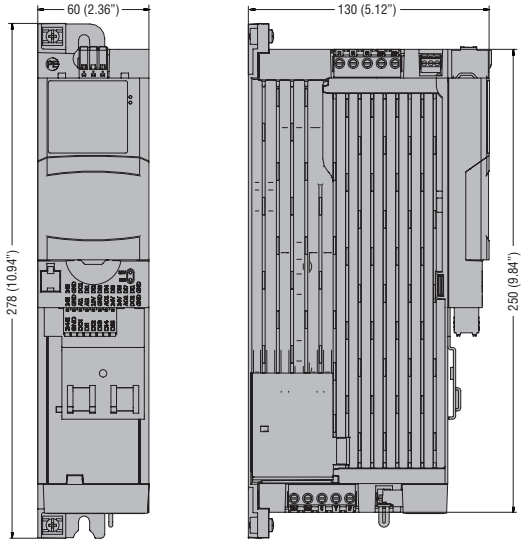
VLB3 0004 A480



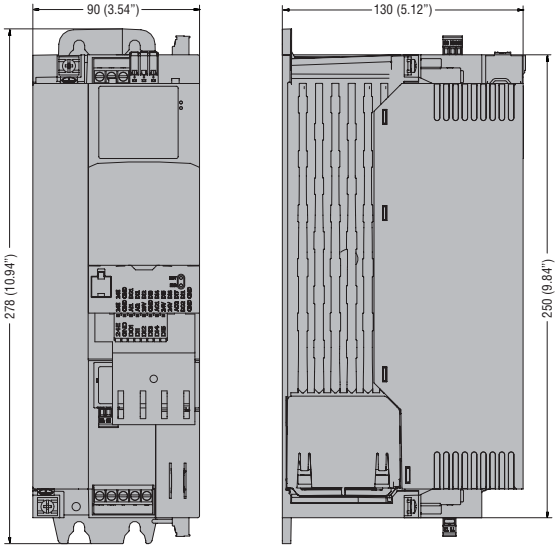
VLB3 0007 A480



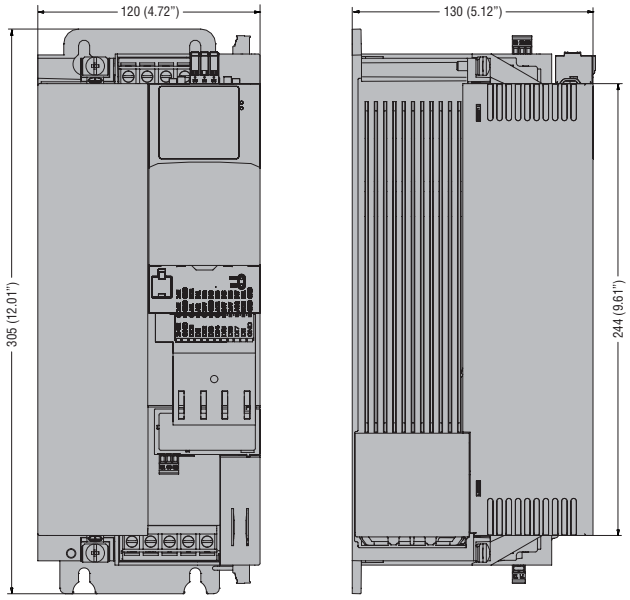
VLB3 0015 A480 - VLB3 0022 A480



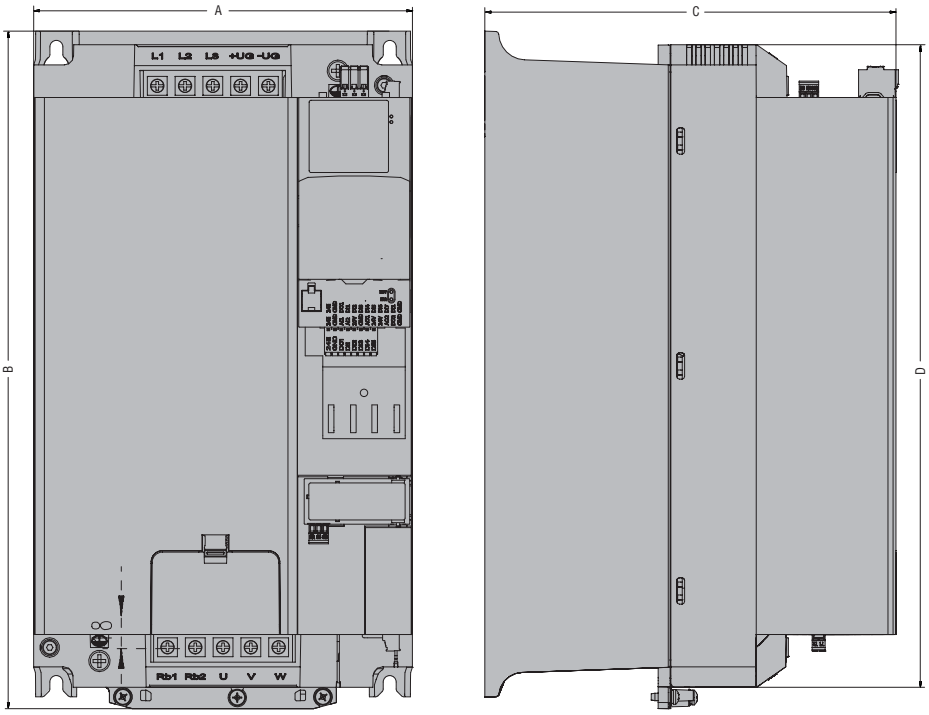
VLB3 0040 A480 - VLB3 0055 A480



VLB3 0075 A480 - VLB3 0110 A480



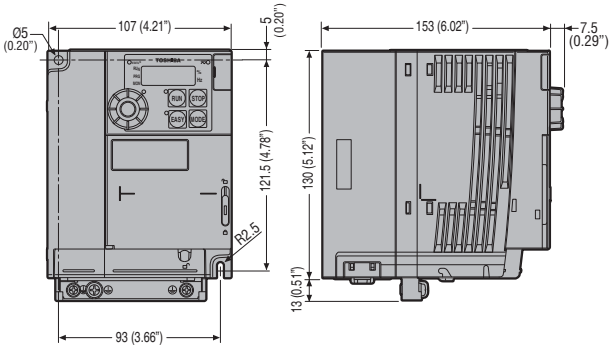
VLB3 0150 A480 - VLB3 0185 A480 - VLB3 0220 A480 - VLB3 0300 A480



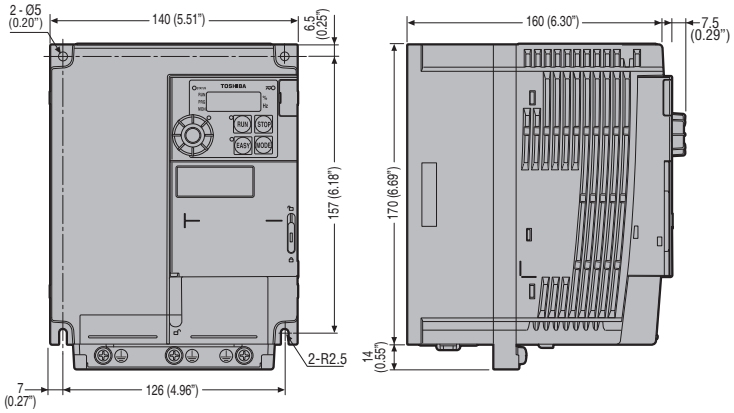
TYPE	A	B	C	D
VLB3 0150 A480	204.5 (8.05")	366 (14.41")	222 (8.74")	347 (13.66")
VLB3 0185 A480	204.5 (8.05")	366 (14.41")	222 (8.74")	347 (13.66")
VLB3 0220 A480	204.5 (8.05")	366 (14.41")	222 (8.74")	347 (13.66")
VLB3 0300 A480	250 (9.84")	520 (20.47")	230 (9.05")	450 (17.72")
VLB3 0370 A480	250 (9.84")	520 (20.47")	230 (9.05")	450 (17.72")
VLB3 0450 A480	250 (9.84")	520 (20.47")	230 (9.05")	450 (17.72")
VLB3 0550 A480	250 (9.84")	623 (24.53")	265 (10.43")	536 (21.10")
VLB3 0750 A480	250 (9.84")	623 (24.53")	265 (10.43")	536 (21.10")
VLB3 0900 A480	258 (10.16")	775 (30.51")	304 (11.97")	685 (26.97")
VLB3 1100 A480	258 (10.16")	775 (30.51")	304 (11.97")	685 (26.97")

THREE-PHASE VARIABLE SPEED DRIVES

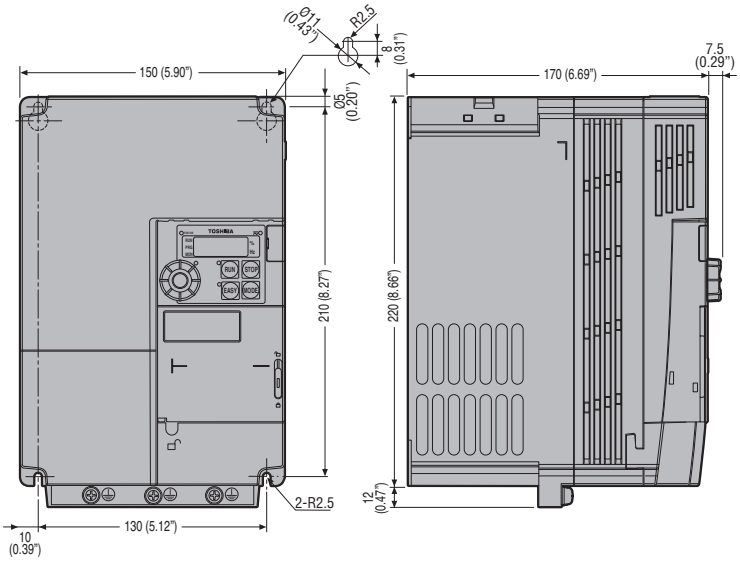
VFS15 4004 PLW - VFS15 4007 PLW - VFS15 4015 PLW



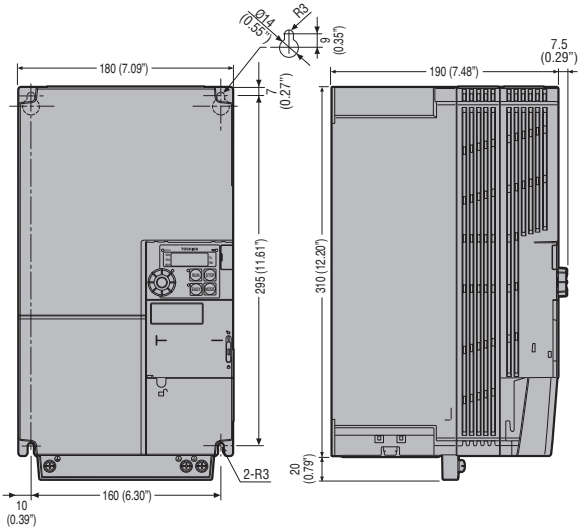
VFS15 4022 PLW...VFS15 4037 PLW



VFS15 4055 PLW - VFS15 4075 PLW

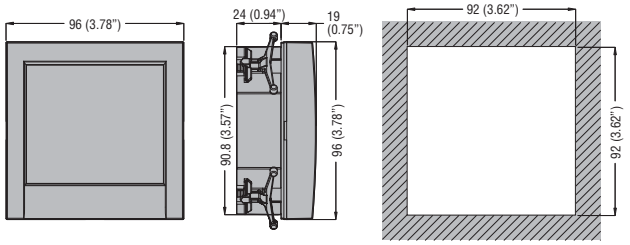


VFS15 4110 PLW - VFS15 4150 PLW

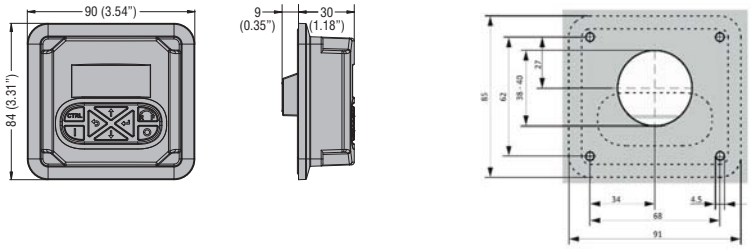


Remote keypads

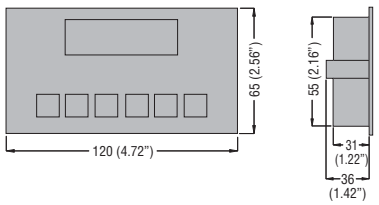
EXC RDU1



VLBX P01



MITOS...



RKP002Z