

MOTOR CONTROL

Manual Motor Starters and Magnetic Contactors

BM3 and SK Series



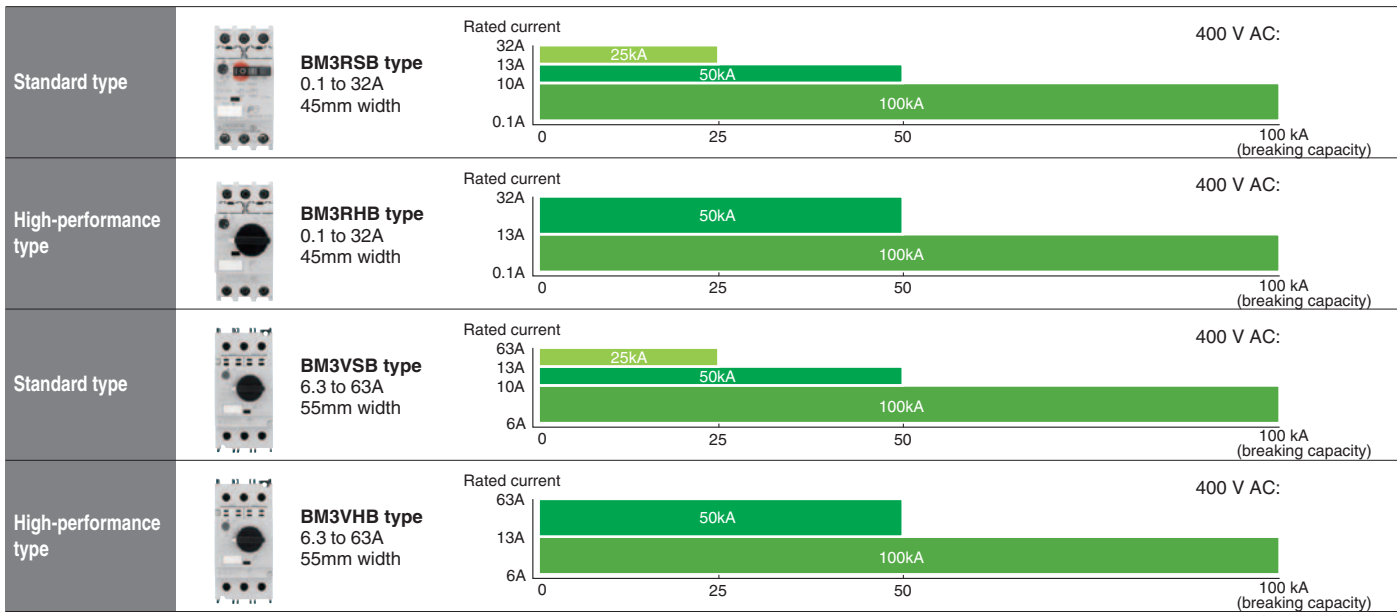
Manual Motor Starter BM3 Series

Advantages of Manual Motor Starter (MMS)

Compact	Mounting floor space Molded case circuit breaker + Thermal overload relay: 100% → Manual Motor Starter (MMS) : 43% (57% reduced) (our comparison)
High breaking capacity	400 V AC: 25, 50, 100 kA (standard type) 50, 100 kA (high-performance type)
Short-circuit protective coordination	IEC 60947-4-1 Types 1, 2
Reduced wiring time	Molded case circuit breaker + Magnetic contactor + Thermal overload relay: 100% → Manual Motor Starter (MMS) + contactor: 50% (50% reduced)
Standard	<ul style="list-style-type: none"> IEC 60947-1, IEC 60947-2, IEC 60947-4-1 UL 60947-4-1, CSA C22.2 No. 14, GB 14048.2
Ecological design	<ul style="list-style-type: none"> Compatible with RoHs Recyclable thermoplastic resin is adopted in plastic components Material name displayed Cadmium-free contact adopted

Performance

High breaking capacity achieved with industry-leading technology.

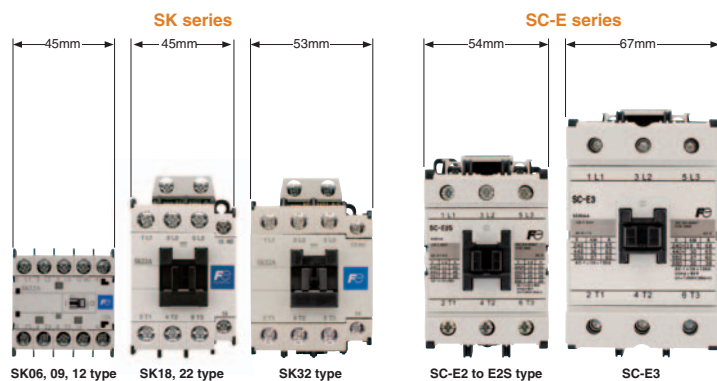


Magnetic Contactor, Thermal Overload Relay SK, SC-E Series

SK Series that is compatible with 400 V AC/2.2 to 15 kW and SC-E Series that is compatible with 400 V AC / 18.5 to 30 kW are available.

Appearance

Has an ideal width in combination with MMS and adopts a finger-protection terminal structure in light of safety.



Performance

400 V AC and 2.2 kW to 30 kW types are provided.

Rated capacity [kW] (AC-3 400V)	Rated capacity [kW]				
	0kW	10kW	20kW	30kW	40kW
SK06, 09, 12		5.5kW			
SK18, 22			11kW		
SK32				15kW	
SC-E2 to E2S				22kW	
SC-E3					30kW

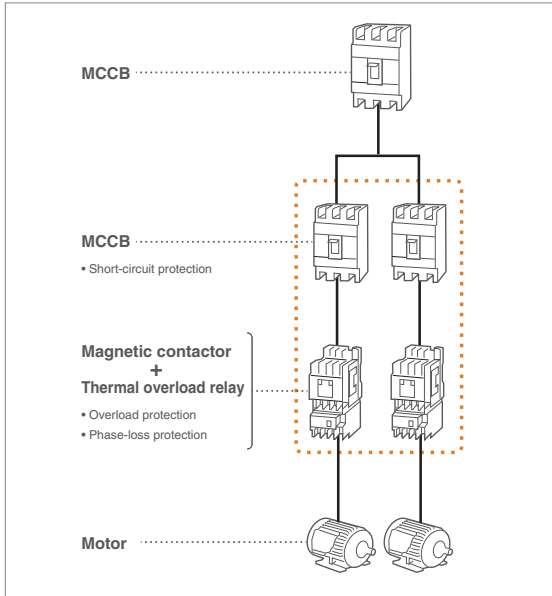
Note: The ratings compliant with the IEC standard are shown.

Combination Starters

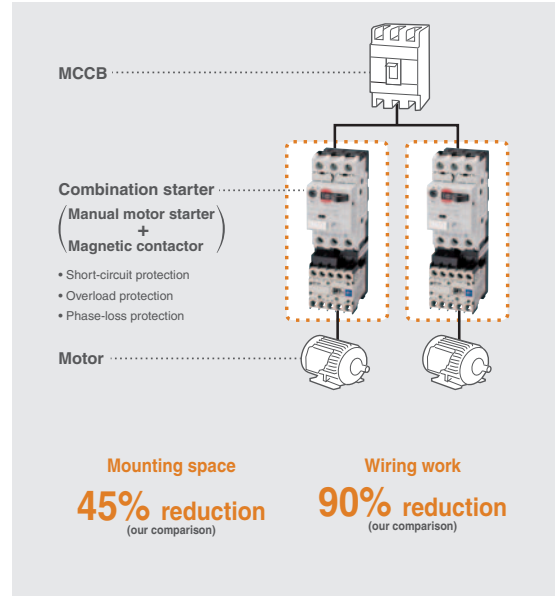
Compact, high breaking performance, and usefulness by combining various components.

Space-saving and reduced wiring

Conventional system



System using an Manual motor starter



Configuration of Combination starter

Combination starter can be easily configured by combining MMS, magnetic contactor, and other connecting components.

	Combination with SK06, SK09, SK12 types	Combination with SK18, SK22, SK32 types	Combination with SC-E series
MMS + Magnetic contactor	MMS BM3R series	MMS BM3R series	MMS BM3V series
	Link module BZ0LRK12AA	Link module BZ0LRK22AA BZ0LRK32AA	Link module + Base plate
	Magnetic contactor SK series SK06, SK09, SK12	Magnetic contactor SK series SK18, SK22, SK32	Magnetic contactor SC-E series
		Spacer BZ0LRKACA ①	

① For AC-operated type (SK18A, SK22A, SK32A)

Combination examples

BM3RSB-013 +	BM3RSB-016 +	BM3RSB-025 +	BM3RSB-032 +	BM3VHB-050 +
SK12	SK18	SK22	SK32	SC-E2S
5.5kW	7.5kW	11kW	15kW	22kW
400V AC AC3				

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- For safe operation, wiring should be conducted only by qualified engineers who have sufficient technical knowledge about electrical work or wiring.
- Follow the regulations of industrial wastes when the product is to be discarded.
- For further questions, please contact your Fuji sales representative or Fuji Electric FA.

Manual Motor Starters and Magnetic Contactors

BM3 and SK Series










		Page
DUO Series MMS	Manual motor starters	
	Quick reference guide.....	6
	Adjustable thermal-magnetic trip types	8
	Instantaneous trip types	10
	UL listed.....	11
	Characteristic curves	12
	Optional accessories	13
	Dimensions.....	19
	Wiring diagrams.....	22
	Operating conditions.....	23
Busbar system	24	
DUO Series Combination Starters	Features	28
	Protective coordination.....	29
	Combinations meeting for UL market.....	31
	Optional accessories.....	32
	Configuration.....	33
	Dimensions	35
DUO Series Contactors	SK series	
	Quick reference guide.....	42
	Standard Models and Production Models.....	44
	Type number nomenclature	45
	Rating	46
	Magnetic contactors	52
	Reversing magnetic contactors	56
	Thermal overload relay	60
	Auxiliary relays.....	64



DUO series Manual Motor Starters

Quick reference guide

■ 32AF types and ratings

Adjustable thermal-magnetic trip type Instantaneous trip type		Standard breaking capacity BM3RSB-□  KKD08-146						High breaking capacity BM3RHB-□ BM3RHBK-□  KKD08-143															
Number of poles		3						3															
Handle type		Rocker						Rotary															
Rated current I _n (A)		0.16 to 32																					
Rated operational voltage U _e (V)		200 to 690																					
Rated frequency (Hz)		50/60																					
Rated insulation voltage U _i (V)		690																					
Rated impulse withstand voltage U _{imp} (kV)		6																					
Utilization category		Cat. A																					
IEC 60947-2 Circuit breaker category		AC-3																					
IEC 60947-4-1 Motor starter																							
Trip class IEC 60947-4-1 *1		10																					
Instantaneous trip characteristic		13 × I _n max.																					
Power loss (total of 3-pole)		7W: I _n =0.16 to 25A 8.5W: I _n =32A																					
Mechanical durability (operations)		100,000: I _n =0.16 to 25A 70,000: I _n =32A																					
Electrical durability (operations)		100,000: I _n =0.16 to 25A 70,000: I _n =32A																					
Max. operations per hour (motor start-up)		25																					
Phase-loss protection		Provided																					
Tripping state indication		Provided																					
Test trip function		Provided																					
Rated breaking capacity (kA)	Adjustable current range	240V 230V	415V 400V	460V 440V	500V	690V 600V	240V 230V	415V 400V	460V 440V	500V	690V 600V												
	Code	I _e : Min.–Max. (A)		I _{cu}	I _{cs}	I _{cu}	I _{cs}	I _{cu}	I _{cs}	I _{cu}	I _{cs}	I _{cu}	I _{cs}										
IEC 60947-2																							
Replace the □ mark in the type number by current range codes.	P16	0.1–0.16		100	100	100	100	100	100	100	100	100	100										
	P25	0.16–0.25		100	100	100	100	100	100	100	100	100	100										
	P40	0.25–0.4		100	100	100	100	100	100	100	100	100	100										
	P63	0.4–0.63		100	100	100	100	100	100	100	100	100	100										
	001	0.63–1		100	100	100	100	100	100	100	100	100	100										
	1P6	1–1.6		100	100	100	100	100	100	100	100	100	100										
	2P5	1.6–2.5		100	100	100	100	100	100	3	2	100	100	8	6								
	004	2.5–4		100	100	100	100	100	100	3	2	100	100	8	6								
	6P3	4–6.3		100	100	100	100	50	38	50	38	3	2	100	100	6	5						
	010	6.3–10		100	100	100	100	15	11	10	8	3	2	100	100	6	5						
	013	9–13		100	100	50	38	10	8	6	5	3	2	100	100	50	38	42	32	6	5		
	016	11–16		100	100	25	19	10	8	6	5	3	2	100	100	50	38	35 ^{*2}	27	10	8	4	3
	020	14–20		50	38	25	19	10	8	6	5	3	2	100	100	50	38	35 ^{*2}	27	10	8	4	3
	025	19–25		50	38	25	19	10	8	6	5	3	2	100	100	50	38	35 ^{*2}	27	10	8	4	3
032	24–32		50	38	25	19	10	8	6	5	3	2	100	100	50	38	35 ^{*2}	27	10	8	4	3	
040	28–40		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
050	35–50		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
063	45–63		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Dimensions (mm) W×H×D	45×90×66						45×90×79																
Mass (g)	350						370																
Optional accessory	Auxiliary contact block	○						○															
	Alarm contact block	○						○															
	Auxiliary and alarm contact block	○						○															
	Short-circuit alarm contact block	○						○															
	Shunt trip device	○						○															
	Undervoltage trip device	○						○															
	External operating handle	–						○															
Standards	    																						








Note: *1 Adjustable thermal-magnetic trip type only

*2 When the breaking duty is once "0" in JEM 1195, the breaking capacity is 50kA.

○ Available

– Not available

■ 63AF types and ratings

Adjustable thermal-magnetic trip type Instantaneous trip type		Standard breaking capacity BM3VSB-□  <small>KKD08-152</small>						High breaking capacity BM3VHB-□ BM3VHBK-□  <small>KKD08-149</small>														
Number of poles		3						3														
Handle type		Rotary						Rotary														
Rated current I_n (A)		10 to 63																				
Rated operational voltage U_e (V)		200 to 690																				
Rated frequency (Hz)		50/60																				
Rated insulation voltage U_i (V)		1000																				
Rated impulse withstand voltage U_{imp} (kV)		8																				
Utilization IEC 60947-2 Circuit breaker category		Cat. A																				
IEC 60947-4-1 Motor starter category		AC-3																				
Trip class IEC 60947-4-1 *1		10																				
Instantaneous trip characteristic		13 × I_n max.																				
Power loss (total of 3-pole)		11W: $I_n=10$ to 32A 15W: $I_n=40$ to 50A 17W: $I_n=63$ A																				
Mechanical durability (operations)		50,000																				
Electrical durability (operations)		25,000																				
Max. operations per hour (motor start-up)		25																				
Phase-loss protection		Provided																				
Tripping state indication		Provided																				
Test trip function		Provided																				
Rated breaking capacity (kA) IEC 60947-2	Adjustable current range	240V	415V	460V	500V	690V	240V	415V	460V	500V	690V	240V	415V	460V	500V	690V						
	Code	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V						
Replace the □ mark in the type number by current range codes.	I_e : Min.–Max. (A)																					
		Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics					
	P16	0.1–0.16	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	P25	0.16–0.25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	P40	0.25–0.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	P63	0.4–0.63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	001	0.63–1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	1P6	1–1.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	2P5	1.6–2.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	004	2.5–4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	6P3	4–6.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
	010	6.3–10	100	100	100	100	15	12	10	8	4	3	100	100	100	100	50	38	50	38	6	5
	013	9–13	100	100	50	38	10	8	6	5	4	3	100	100	100	100	50	38	42	32	6	5
	016	11–16	100	100	25	19	10	8	6	5	4	3	100	100	50	38	50	38	12	9	5	4
	020	14–20	50	38	25	19	10	8	6	5	4	3	100	100	50	38	50	38	12	9	5	4
	025	19–25	50	38	25	19	10	8	6	5	4	3	100	100	50	38	35 ^{*2}	27	12	9	5	4
032	24–32	50	38	25	19	10	8	6	5	4	3	100	100	50	38	35 ^{*2}	27	10	8	5	4	
040	28–40	50	38	25	19	10	8	6	5	4	3	100	100	50	38	35 ^{*2}	27	10	8	5	4	
050	35–50	50	38	25	19	10	8	6	5	4	3	100	100	50	38	35 ^{*2}	27	10	8	5	4	
063	45–63	50	38	25	19	10	8	6	5	4	3	100	100	50	38	35 ^{*2}	27	10	8	5	4	
Dimensions (mm) W×H×D		55×110×96																				
Mass (g)		780																				
Optional accessory	Auxiliary contact block	<input type="radio"/>																				
	Alarm contact block	<input type="radio"/>																				
	Auxiliary and alarm contact block	<input type="radio"/>																				
	Short-circuit alarm contact block	<input type="radio"/>																				
	Shunt trip device	<input type="radio"/>																				
	Undervoltage trip device	<input type="radio"/>																				
	External operating handle	<input type="radio"/>																				
Standards		    																				

Note: *1 Adjustable thermal-magnetic trip type only

*2 When the breaking duty is once "0" in JEM 1195, the breaking capacity is 50kA.

Available

– Not available



Adjustable thermal-magnetic trip types

■ Features

- A wide rated operational current range of up to 32A for the 45mm wide and 63A for the 55mm wide starters.
- ON/OFF and trip indications ensure instant status recognition.
- Suitable for 3-phase motors up to 30kW at 440V AC, AC-3.
- Accessories like auxiliary contact blocks, shunt trip devices, and undervoltage trip devices have been standardized for the 45mm and 55mm wide frame sizes of the BM3R and BM3V.
- Enclosures and external operating handles are available as optional accessories.

■ Standards

IEC 60947-1, 60947-2, 60947-4-1, UL 60947-4-1, CSA C22.2 No.14, CCC, K60947-1³, 60947-2³

■ Types and ratings

• 32AF standard breaking capacity, rocker handle types

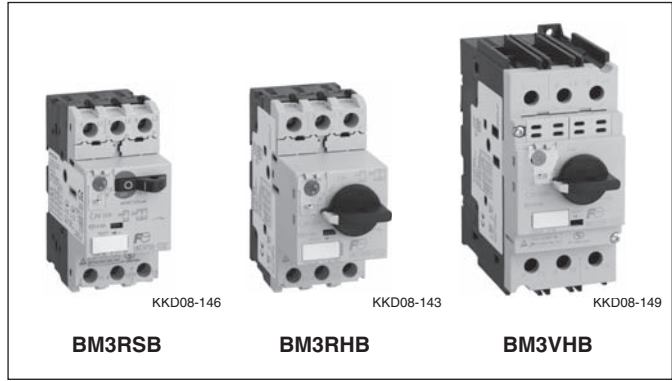
Max. motor capacity and full-load current 3-phase *1 (IEC)				Rated current In (A)	Thermal current setting range Ie (A)	Instantaneous trip current (A)	Rated breaking capacity Icu (kA)			Type
200-240V AC (kW)	200-240V AC (A)	380-440V AC (kW)	380-440V AC (A)				240V AC	415V AC	440V AC	
–	–	–	–	0.16	0.1–0.16	2.1	100	100	100	BM3RSB-P16
–	–	0.06	0.2	0.25	0.16–0.25	3.3	100	100	100	BM3RSB-P25
0.06	0.35	0.09	0.3	0.4	0.25–0.4	5.2	100	100	100	BM3RSB-P40
0.09	0.52	0.18	0.6	0.63	0.4–0.63	8.2	100	100	100	BM3RSB-P63
0.12	0.7	0.25	0.85	1	0.63–1	13	100	100	100	BM3RSB-001
0.25	1.5	0.55	1.5	1.6	1–1.6	20.8	100	100	100	BM3RSB-1P6
0.37	1.9	0.75	1.9	2.5	1.6–2.5	32.5	100	100	100	BM3RSB-2P5
0.75	3.3	1.5	3.6	4	2.5–4	52	100	100	100	BM3RSB-004
1.5	6.3	2.2	4.9	6.3	4–6.3	81.9	100	100	50	BM3RSB-6P3
2.2	8.5	4	8.5	10	6.3–10	130	100	100	15	BM3RSB-010
3	11.3	5.5	11.5	13	9–13	169	100	50	10	BM3RSB-013
4	15	7.5	15.5	16	11–16	208	100	25	10	BM3RSB-016
4	15	7.5	15.5	20	14–20	260	50	25	10	BM3RSB-020
5.5	20	11	22	25	19–25	325	50	25	10	BM3RSB-025
7.5	27	15	29	32	24–32	416	50	25	10	BM3RSB-032

• 32AF high breaking capacity, rotary handle types

Max. motor capacity and full-load current 3-phase *1 (IEC)				Rated current In (A)	Thermal current setting range Ie (A)	Instantaneous trip current (A)	Rated breaking capacity Icu (kA)			Type
200-240V AC (kW)	200-240V AC (A)	380-440V AC (kW)	380-440V AC (A)				240V AC	415V AC	440V AC	
–	–	–	–	0.16	0.1–0.16	2.1	100	100	100	BM3RHB-P16
–	–	0.06	0.2	0.25	0.16–0.25	3.3	100	100	100	BM3RHB-P25
0.06	0.35	0.09	0.3	0.4	0.25–0.4	5.2	100	100	100	BM3RHB-P40
0.09	0.52	0.18	0.6	0.63	0.4–0.63	8.2	100	100	100	BM3RHB-P63
0.12	0.7	0.25	0.85	1	0.63–1	13	100	100	100	BM3RHB-001
0.25	1.5	0.55	1.5	1.6	1–1.6	20.8	100	100	100	BM3RHB-1P6
0.37	1.9	0.75	1.9	2.5	1.6–2.5	32.5	100	100	100	BM3RHB-2P5
0.75	3.3	1.5	3.6	4	2.5–4	52	100	100	100	BM3RHB-004
1.5	6.3	2.2	4.9	6.3	4–6.3	81.9	100	100	100	BM3RHB-6P3
2.2	8.5	4	8.5	10	6.3–10	130	100	100	50	BM3RHB-010
3	11.3	5.5	11.5	13	9–13	169	100	100	50	BM3RHB-013
4	15	7.5	15.5	16	11–16	208	100	50	35	BM3RHB-016
4	15	7.5	15.5	20	14–20	260	100	50	35	BM3RHB-020
5.5	20	11	22	25	19–25	325	100	50	35	BM3RHB-025
7.5	27	15	29	32	24–32	416	100	50	35	BM3RHB-032

Notes: *1 These values are based on IEC60947-4-1 Annex G. Check the actual full-load current of the motor before use.

*2 Max. thermal current setting value



• 63AF standard breaking capacity, rotary handle types

Max. motor capacity and full-load current 3-phase *1 (IEC)				Rated current *2 In (A)	Thermal current setting range le (A)	Instantaneous trip current (A)	Rated breaking capacity Icu (kA)			Type
200-240V AC (kW) (A)		380-440V AC (kW) (A)					240V AC	415V AC	440V AC	
2.2	8.5	4	8.5	10	6.3-10	130	100	100	15	BM3VSB-010
3	11.3	5.5	11.5	13	9-13	169	100	50	10	BM3VSB-013
4	15	7.5	15.5	16	11-16	208	100	25	10	BM3VSB-016
4	15	7.5	15.5	20	14-20	260	50	25	10	BM3VSB-020
5.5	20	11	22	25	19-25	325	50	25	10	BM3VSB-025
7.5	27	15	29	32	24-32	416	50	25	10	BM3VSB-032
11	38	18.5	35	40	28-40	520	50	25	10	BM3VSB-040
11	38	22	41	50	35-50	650	50	25	10	BM3VSB-050
15	51	30	55	63	45-63	819	50	25	10	BM3VSB-063

• 63AF high breaking capacity, rotary handle types

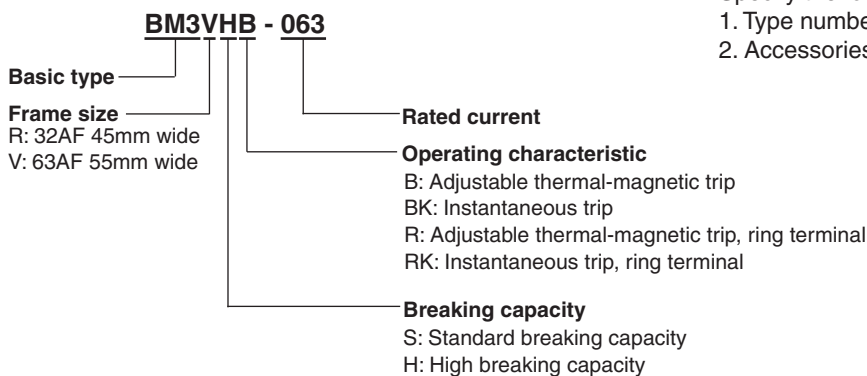
Max. motor capacity and full-load current 3-phase *1 (IEC)				Rated current *2 In (A)	Thermal current setting range le (A)	Instantaneous trip current (A)	Rated breaking capacity Icu (kA)			Type
200-240V AC (kW) (A)		380-440V AC (kW) (A)					240V AC	415V AC	440V AC	
2.2	8.5	4	8.5	10	6.3-10	130	100	100	50	BM3VHB-010
3	11.3	5.5	11.5	13	9-13	169	100	100	50	BM3VHB-013
4	15	7.5	15.5	16	11-16	208	100	50	50	BM3VHB-016
4	15	7.5	15.5	20	14-20	260	100	50	50	BM3VHB-020
5.5	20	11	22	25	19-25	325	100	50	35	BM3VHB-025
7.5	27	15	29	32	24-32	416	100	50	35	BM3VHB-032
11	38	18.5	35	40	28-40	520	100	50	35	BM3VHB-040
11	38	22	41	50	35-50	650	100	50	35	BM3VHB-050
15	51	30	55	63	45-63	819	100	50	35	BM3VHB-063

Notes: *1 These values are based on IEC60947-4-1 Annex G. Check the actual full-load current of the motor before use.

*2 Max. thermal current setting value

*3 Excludes BM3VSB-063 and BM3VHB-063.

■ Type number nomenclature



■ Ordering information

Specify the following:

1. Type number
2. Accessories if required

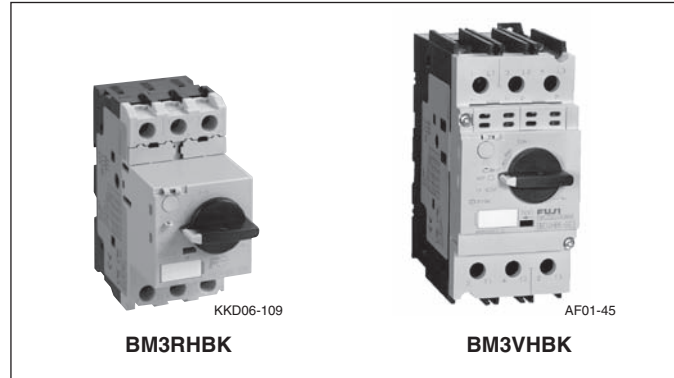


Instantaneous trip types

Instantaneous trip types

■ Features

- Instantaneous trip type for short-circuit or overcurrent protection of three-phase motors up to 63A (240V AC, 15kW, or 440V AC, 30kW).
- A motor overload protection function is not provided. Protecting the motor circuits is possible by using the starter together with a thermal overload relay that is matched to the thermal characteristics and startup time of the motor.
- Two modules, 45mm or 55mm wide, cover current ratings from 0.1 to 63A.
RHBK: 45mm wide, rated current of 0.1 to 32A
VHBK: 55mm wide, rated current of 6.3 to 63A
- Rotary handle
- Versatile accessories
Internal and external auxiliary contact blocks, alarm contact block
Short-circuit alarm contact block
Shunt trip device
Undervoltage trip device



■ Standards

IEC 60947-1, 60947-2, 60947-4-1, UL 60947-4-1
CSA C22.2 No.14, CCC, K60947-1², 60947-2²

■ Types and ratings

• 32AF high breaking capacity, rotary handle type

Max. motor capacity and full-load current 3-phase ^{*1} (IEC)				Rated current I _n (A)	Instantaneous trip current (A)	Rated breaking capacity I _{cu} (kA)			Type
200-240V AC (kW)		380-440V AC (kW)				240V AC	415V AC	440V AC	
—	—	—	—	0.16	2.1	100	100	100	BM3RHBK-P16
—	—	0.06	0.2	0.25	3.3	100	100	100	BM3RHBK-P25
0.06	0.35	0.09	0.3	0.4	5.2	100	100	100	BM3RHBK-P40
0.09	0.52	0.18	0.6	0.63	8.2	100	100	100	BM3RHBK-P63
0.12	0.7	0.25	0.85	1	13	100	100	100	BM3RHBK-001
0.25	1.5	0.55	1.5	1.6	20.8	100	100	100	BM3RHBK-1P6
0.37	1.9	0.75	1.9	2.5	32.5	100	100	100	BM3RHBK-2P5
0.75	3.3	1.5	3.6	4	52	100	100	100	BM3RHBK-004
1.5	6.3	2.2	4.9	6.3	81.9	100	100	100	BM3RHBK-6P3
2.2	8.5	4	8.5	10	130	100	100	50	BM3RHBK-010
3	11.3	5.5	11.5	13	169	100	100	50	BM3RHBK-013
4	15	7.5	15.5	16	208	100	50	35	BM3RHBK-016
4	15	7.5	15.5	20	260	100	50	35	BM3RHBK-020
5.5	20	11	22	25	325	100	50	35	BM3RHBK-025
7.5	27	15	29	32	416	100	50	35	BM3RHBK-032

Notes: ^{*1} These values are based on IEC60947-4-1Annex G. Check the actual full-load current of the motor before use.
• Select appropriate thermal overload relay for starter.

• 63AF high breaking capacity, rotary handle type

Max. motor capacity and full-load current 3-phase ^{*1} (IEC)				Rated current I _n (A)	Instantaneous trip current (A)	Rated breaking capacity I _{cu} (kA)			Type
200-240V AC (kW)		380-440V AC (kW)				240V AC	415V AC	440V AC	
2.2	8.5	4	8.5	10	130	100	100	50	BM3VHBK-010
3	11.3	5.5	11.5	13	169	100	100	50	BM3VHBK-013
4	15	7.5	15.5	16	208	100	50	50	BM3VHBK-016
4	15	7.5	15.5	20	260	100	50	50	BM3VHBK-020
5.5	20	11	22	25	325	100	50	35	BM3VHBK-025
7.5	27	15	29	32	416	100	50	35	BM3VHBK-032
11	38	18.5	35	40	520	100	50	35	BM3VHBK-040
11	38	22	41	50	650	100	50	35	BM3VHBK-050
15	51	30	55	63	819	100	50	35	BM3VHBK-063

Notes: ^{*1} These values are based on IEC60947-4-1Annex G. Check the actual full-load current of the motor before use.
^{*2} Excludes BM3VHBK-063.
• Select appropriate thermal overload relay for starter.



■ UL listed

FUJI MMS is certified for Group Installation according to UL 60947-4-1.

When it is used with a specific current rated BCP (Branch Circuit Protective Device) such as MCCB and Fuse, two or more motors can be connected to one branch circuit as in NEC 430.53.

The followings are some of the major rules for this application.

1. The Conductor size to the motor shall be the same as the branch circuit.
2. The Conductor size to the motor shall not be less than 1/3 of the branch circuit and the length from the BCP to the MMS must not be more than 7.5m (25 feet).
3. The MMS must be "Suitable for tap conductor Protection" and the Conductor size between the BCP and MMS shall not be less than 1/10 of the BCP and the length from the BCP to the MMS must not be more than 3m (10 feet).
4. The rating of the Fuse or MCCB must be smaller than the following table.

BM3RSB, BM3RSR

Adjustable current range Ie (A)	3-pole motor capacity in horsepower (HP) AC				Group installation			Max. Fuse / MCCB Rated current (A)
	200-208V	220-240V	440-480V	550-600V	Breaking capacity (kA)			
					240V AC	480V AC	600V AC	
0.1-0.16	-	-	-	-	100	50	10	500
0.16-0.25	-	-	-	-	100	50	10	500
0.25-0.4	-	-	-	-	100	50	10	500
0.4-0.63	-	-	-	-	100	50	10	500
0.63-1	-	-	1/2	1/2	100	50	10	500
1-1.6	1/4	1/3	3/4	3/4	100	50	10	500
1.6-2.5	1/2	1/2	1	1-1/2	100	50	10	500
2.5-4	3/4	3/4	2	3	100	50	10	500
4-6.3	1	1-1/2	3	5	100	50	10	500
6.3-10	2	3	5	7-1/2	100	22	10	500
9-13	3	3	7-1/2	10	100	22	10	500
11-16	3	5	10	10	100	22	10	500
14-20	5	5	10	15	50	22	10	500
19-25	7-1/2	7-1/2	15	20	50	22	10	500
24-32	10	10	20	30	50	22	10	500

BM3RHB, BM3RHR

Adjustable current range Ie (A)	3-pole motor capacity in horsepower (HP) AC				Group installation			Max. Fuse / MCCB Rated current (A)
	200-208V	220-240V	440-480V	550-600V	Breaking capacity (kA)			
					240V AC	480V AC	600V AC	
0.1-0.16	-	-	-	-	100	50	10	500
0.16-0.25	-	-	-	-	100	50	10	500
0.25-0.4	-	-	-	-	100	50	10	500
0.4-0.63	-	-	-	-	100	50	10	500
0.63-1	-	-	1/2	1/2	100	50	10	500
1-1.6	1/4	1/3	3/4	3/4	100	50	10	500
1.6-2.5	1/2	1/2	1	1-1/2	100	50	10	500
2.5-4	3/4	3/4	2	3	100	50	10	500
4-6.3	1	1-1/2	3	5	100	50	10	500
6.3-10	2	3	5	7-1/2	100	50	10	500
9-13	3	3	7-1/2	10	100	50	10	500
11-16	3	5	10	10	100	50	10	500
14-20	5	5	10	15	100	50	10	500
19-25	7-1/2	7-1/2	15	20	100	50	10	500
24-32	10	10	20	30	100	50	10	500

BM3VSB, BM3VHB

Adjustable current range Ie (A)	3-pole motor capacity in horsepower (HP) AC				Group installation			Max. Fuse / MCCB Rated current (A)
	200-208V	220-240V	440-480V	550-600V	Breaking capacity (kA)			
					240V AC	480V AC *	600V AC	
6.3-10	2	3	5	7-1/2	100	50 (22)	10	600
9-13	3	3	7-1/2	10	100	50 (22)	10	600
11-16	3	5	10	10	100	50 (22)	10	600
14-20	5	5	10	15	100	50 (22)	10	600
19-25	7-1/2	7-1/2	15	20	100	50 (22)	10	600
24-32	10	10	20	30	100	50 (22)	10	600
28-40	10	10	30	30	100	50 (22)	10	600
35-50	15	15	30	40	100	50 (22)	10	600
45-63	20	20	40	60	100	50 (22)	10	600

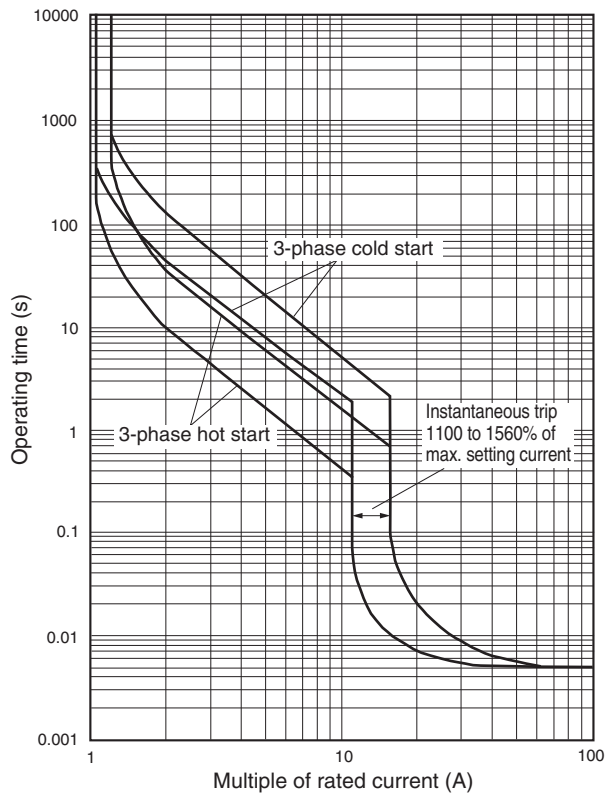
* Value in () is for BM3VSB.



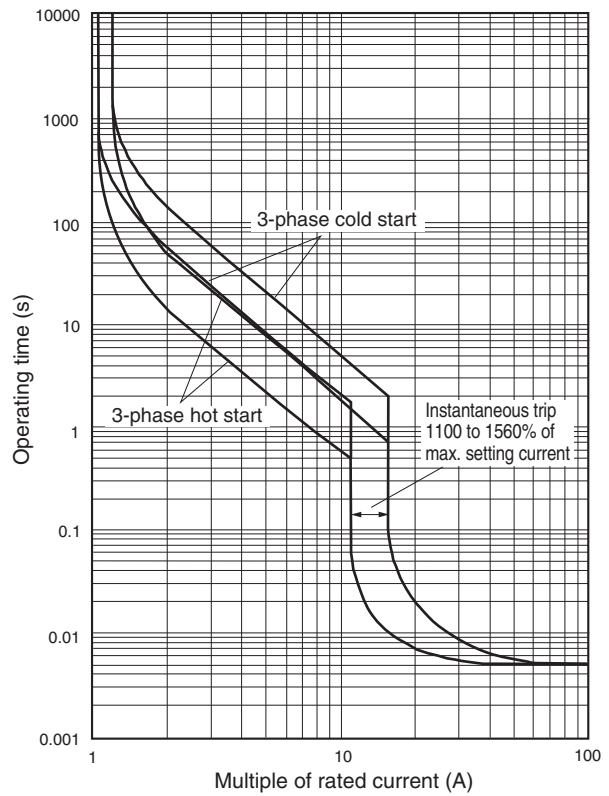
Characteristics curves

■ Characteristics curves

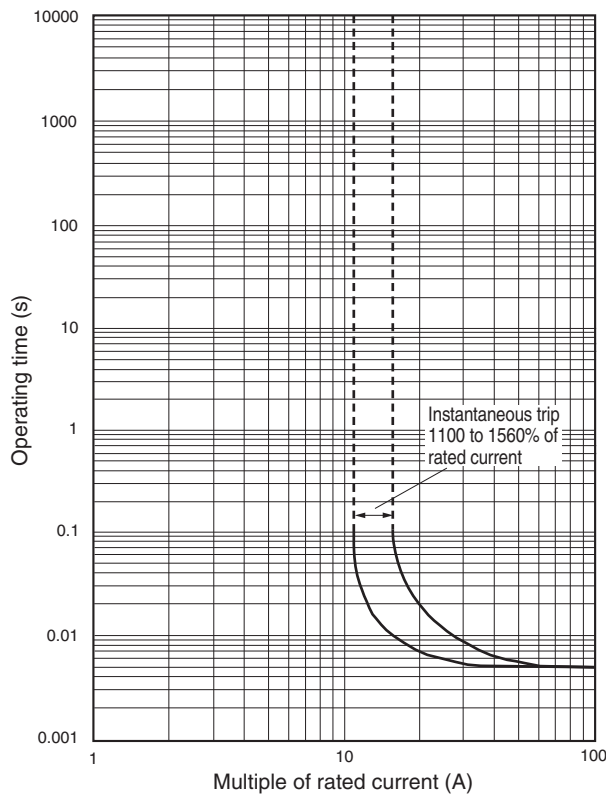
• BM3RSB, RHB, RSR, RHR



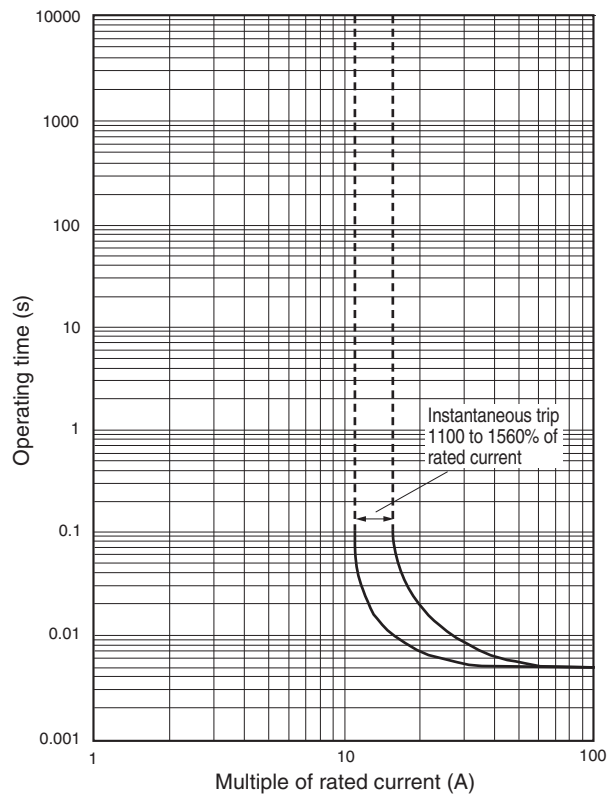
• BM3VSB, VHB



• BM3RHBK, RHRK



• BM3VHBK

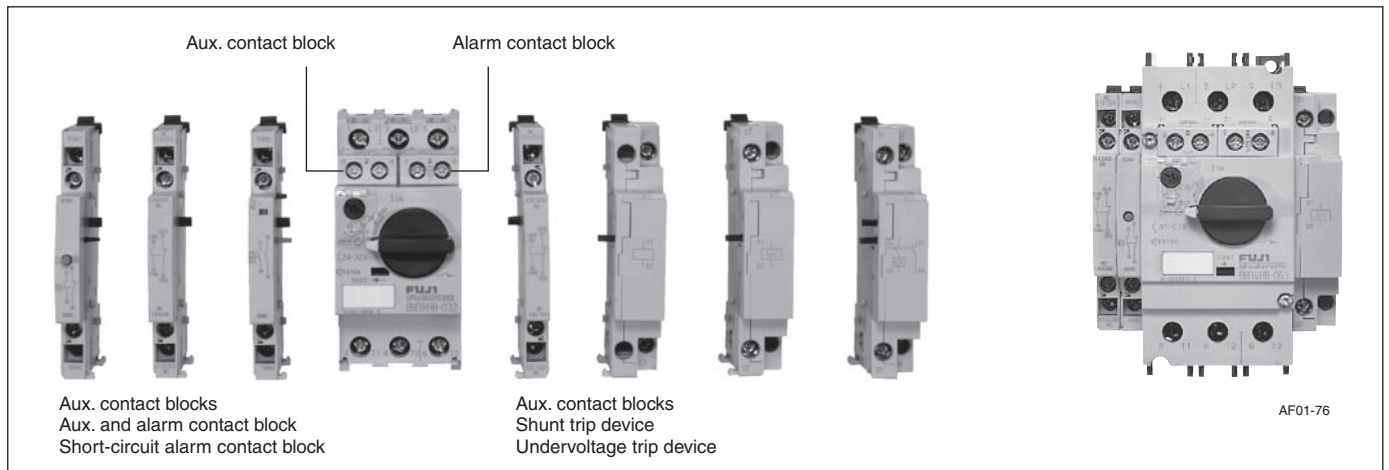




Optional accessories



■ Features

- Auxiliary contact blocks, alarm contact blocks, and shunt/undervoltage trip devices can be used with BM3R (45mm wide) and BM3V (55mm wide) frames.
- Accessories are easily mounted.
- Internally mountable auxiliary contact blocks and alarm contact blocks can be frontally mounted.
- Externally mountable auxiliary contact blocks can be mounted on either the right or left side.
- Shunt trip and undervoltage trip devices are available in a wide operating coil voltage range.
- Standard and emergency external handles are available.
- IP20 terminal cover prevents accidental finger touch to electrically charged parts.




■ Types and ratings

• Auxiliary contact blocks/W

Description	Starter type	Mounting	Contact arrangement	Type	Mass (g)
 AF01-60L  AF01-59, 01-58 These blocks are linked to the ON/OFF operation of the MMS. Up to two internally mountable contact blocks can be mounted to the right/left front, and up to two externally mountable contact blocks can be mounted to the right/left sides.	BM3R BM3V	Front	1NO 1NC	BZ0WIA BZ0WIB	9
		Left side	2NO 1NO+1NC 2NC	BZ0WUAAL BZ0WUABL BZ0WUBBL	45
		Right side	2NO 1NO+1NC 2NC	BZ0WUAAR BZ0WUABR BZ0WUBBR	45


• Alarm contact blocks/K

Description	Starter type	Mounting	Contact arrangement	Type	Mass (g)
 AF01-60R This block operates when the MMS trips due to overload, phase-loss, or short-circuit. It is not linked to the ON/OFF operation of the MMS. Note: Operation can be checked with the test trip function.	BM3R BM3V	Front (Right side only)	1NO 1NC	BZ0KIA BZ0KIB	9




Optional accessories


• Auxiliary and alarm contact blocks/WK

Description	Starter type	Mounting	Contact arrangement	Type	Mass (g)
 <p>• This contact block combines auxiliary contact and alarm contact that operates in the event of an overload, phase-loss, or short-circuit. Alarm contact is not linked to the ON/OFF operation of the MMS.</p> <p>• An alarm is displayed in the contact block's indicator when the alarm contact operates.</p> <p>Note: Operation can be checked with the test trip function.</p> <p>AF01-57</p>	BM3R BM3V	Left	1NO (Aux.)+ 1NO (Alarm)	BZ0WKUAA	45
			1NC (Aux.)+ 1NO (Alarm)	BZ0WKUBA	
			1NO (Aux.)+ 1NC (Alarm)	BZ0WKUAB	
			1NC (Aux.)+ 1NC (Alarm)	BZ0WKUBB	

• Short-circuit alarm contact blocks/KI


Description	Starter type	Mounting	Contact arrangement	Type	Mass (g)
 <p>• The contacts operate only when the MMS has tripped due to a short-circuit.</p> <p>• When these contacts operate, the blue reset button extends out, and a trip indication is displayed.</p> <p>• The power to the MMS can be ready to be turned on after pressing the reset button.</p> <p>Note: Operation can not be checked with the test trip function. Be sure to press the reset button before mounting to the MMS.</p> <p>AF01-56</p>	BM3R BM3V	Left	1NO+1NC	BZ0TKUAB	45

• Shunt trip devices/F



Description	Starter type	Mounting	Coil voltage	Type	Mass (g)
 <p>This device is used to remotely trip the MMS.</p> <p>Notes:</p> <ul style="list-style-type: none"> • This device cannot be used together with an undervoltage trip device. • When the MMS has been tripped with the shunt trip device, press the reset button before turning on the power. <p>AF01-55</p>	BM3R BM3V	Right	24V 50/60Hz 48V 60Hz 48V 50Hz/60V 60Hz	BZ0FAZU BZ0FBZU BZ0FCZU	115
			100V 50Hz/100–110V 60Hz 110–127V 50Hz/120V 60Hz 200V 50Hz/200–220V 60Hz 220–230V 50Hz/240–260V 60Hz 240V 50Hz/277V 60Hz	BZ0F1ZU BZ0FDZU BZ0FEZU BZ0FFZU BZ0FGZU	
			380–400V 50Hz/400–440V 60Hz 415–440V 50Hz/460–480V 60Hz 500V 50Hz/600V 60Hz 24–60V DC * 110–240V DC *	BZ0FHZU BZ0F4ZU BZ0FJZU BZ0FKZUD BZ0FLZUD	

Note: * The time rating of coil is 5s.

• Undervoltage trip devices/R



Description	Starter type	Mounting	Coil voltage	Type	Mass (g)
 <p>R types This device automatically trips the MMS when the control circuit voltage drops below the specified value.</p> <p>Notes:</p> <ul style="list-style-type: none"> • This device cannot be used together with a shunt trip device. • When the MMS has been tripped with the undervoltage trip device, press the reset button before turning on the power. <p>AF01-54</p>	BM3R BM3V	Right	24V 50Hz 24V 60Hz 48V 50Hz 48V 60Hz	BZ0RAZ1U BZ0RAZ2U BZ0RBZ1U BZ0RBZU	115
			100V 50Hz/100–110V 60Hz 110–127V 50Hz/120V 60Hz 200V 50Hz/200–220V 60Hz 220–230V 50Hz/240–260V 60Hz 240V 50Hz/277V 60Hz	BZ0R1ZU BZ0RDZU BZ0REZU BZ0RFZU BZ0RGZU	
			380–400V 50Hz/400–440V 60Hz 415–440V 50Hz/460–480V 60Hz 500V 50Hz/600V 60Hz	BZ0RHZU BZ0R4ZU BZ0RJZU	

• Undervoltage trip device with early make contacts/Re




Description	Starter type	Mounting	Coil voltage	Type	Mass (g)
 <p>This device automatically trips the MMS when the control circuit voltage drops below the specified value. The control circuit voltage can be turned completely off by turning off the MMS.</p> <p>Notes:</p> <ul style="list-style-type: none"> • This device cannot be used together with a shunt trip device. • When the MMS has been tripped with the undervoltage trip device, press the reset button before turning on the power. 	BM3RS	Right	24V 50Hz 24V 60Hz 48V 50Hz 48V 60Hz 100V 50Hz/100–110V 60Hz 110–127V 50Hz/120V 60Hz 200V 50Hz/200–220V 60Hz 220–230V 50Hz/240–260V 60Hz 240V 50Hz/277V 60Hz 380–400V 50Hz/400–440V 60Hz 415–440V 50Hz/460–480V 60Hz 500V 50Hz/600V 60Hz	BZ0RAZ1LKU BZ0RAZ2LKU BZ0RBZ1LKU BZ0RBZLKU BZ0R1ZLKU BZ0RDZLKU BZ0REZLKU BZ0RFZLKU BZ0RGZLKU BZ0RHZLKU BZ0R4ZLKU BZ0RJZLKU	115
		BM3RH BM3V	Right	24V 50Hz 24V 60Hz 48V 50Hz 48V 60Hz 100V 50Hz/100–110V 60Hz 110–127V 50Hz/120V 60Hz 200V 50Hz/200–220V 60Hz 220–230V 50Hz/240–260V 60Hz 240V 50Hz/277V 60Hz 380–400V 50Hz/400–440V 60Hz 415–440V 50Hz/460–480V 60Hz 500V 50Hz/600V 60Hz	BZ0RAZ1LTU BZ0RAZ2LTU BZ0RBZ1LTU BZ0RBZLTU BZ0R1ZLTU BZ0RDZLTU BZ0REZLTU BZ0RFZLTU BZ0RGZLTU BZ0RHZLTU BZ0R4ZLTU BZ0RJZLTU

Note: Refer to page 02/24 for details on how this device operates with the MMS, and on its external connection.

• External operating handles

Description	Starter type	Handle type	Type	Mass (g)	
 <p>KK02-305</p>  <p>KK02-306</p> <ul style="list-style-type: none"> • Used to operate an MMS installed inside a panel, from the outside of the panel. • Equipped with an interlock mechanism that prevents someone from mistakenly opening the panel door when the MMS is in the ON state. • The shaft can be cut to match the distance between the MMS and the panel door. • Door interlock function • OFF lock function • Can be locked OFF with up to three padlocks. Note: Padlocks are to be provided by the customer. • Release screw allows the door to be opened with the handle in the ON position. • IP54 protection degree 	BM3RH	Standard (black)	BZ0VBBL	160	
			Emergency (red handle on yellow plate)	BZ0VYRL	160
		BM3V	Standard (black)	BZ0VBBM	160
			Emergency (red handle on yellow plate)	BZ0VYRM	160


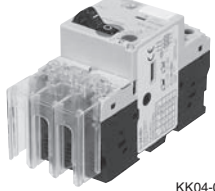
• Others

Description	Starter type	Type	Mass (g)
Push-in lug  <p>Used for screw mounting.</p>	BM3R	BZ0SET (10 pcs)	2.0 par piece
Terminal cover for IP20  <p>Prevents accidental finger touch to charged parts.</p>	BM3V	BZ0TCV (6 pcs)	0.6 par piece
Open space cover  <p>KK02-39</p> <ul style="list-style-type: none"> • Used to cover the open space if an internally mountable accessory become unnecessary. • Mounts to either the left-front or right-front position. 	BM3R BM3V	BZ0CFG (10 pcs)	1.4 par piece



Optional accessories

• Others

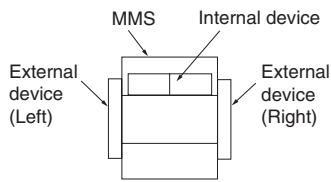
Description	Starter type	Type	Mass (g)
Power supply side terminal cover  <ul style="list-style-type: none"> When mounted on the power supply side and combined with the optional BZ0TKUAB short-circuit alarm contact block, the configuration conforms to UL 60947-4-1 type E and F standards. 	BM3RSB BM3RHB	BZ0TCRE	30 per piece
Long terminal cover  <small>KK04-059</small> <ul style="list-style-type: none"> Prevents exposure between crimp terminals and finger contact Mountable to both power supply and load sides Straight wiring connection is also possible in addition to ring terminal connection. When mounted on the power supply side and combined with the optional BZ0TKUAB short-circuit alarm contact block, the configuration conforms to UL 60947-4-1 type E and F standards. Minimum quantity: 2 pieces (1 set) 	BM3RSR BM3RHR	BZ0RTCRE	11 per piece

■ Ratings of accessories

Accessory type		Auxiliary contact block/front	Auxiliary contact block/side	Alarm contact block	Aux. and alarm contact block	Short-circuit alarm contact block
		BZ0WI	BZ0WU	BZ0KI	BZ0WKU	BZ0TKUAB
Standard		IEC 60947-5-1, UL 60947-4-1				
Rated operational current (A)	48V AC AC-15	5	6	5	6	6
	125V AC	3	4	3	4	4
	230V AC	1.5	4	1.5	4	4
	400V AC	—	2.2	—	2.2	2.2
	500V AC	—	1.5	—	1.5	1.5
	690V AC	—	0.6	—	0.6	0.6
	48V DC DC-13	1.38	5	1.38	5	5
110V DC	0.55	1.3	0.55	1.3	1.3	
220V DC	0.27	0.5	0.27	0.5	0.5	
Contact rating code UL 508		B300 Q300	A600 P300	B300 Q300	A600 P300	A600 P300
Min. voltage and current		17V 5mA				

Accessory type		Shunt trip device	Undervoltage device
		BZ0F	BZ0R
Standard		IEC 60947-1, UL 60947-4-1	
Rated insulation voltage (V AC)	IEC 60947	690	
	UL 60947-4-1	600	
Operation performance capability (operations)		5000	
Operating time (ms)		20	
Power consumption	Inrush (VA/W)	21/12	
	Shealed (VA/W)	8/1.2	
Voltage range	Tripping voltage (V)	0.7 to 1.1Ue	
	Closing voltage (V)	—	
Time rating of coil (s)	AC: Continuous	AC: Continuous	
	DC: 5	DC: —	

Available accessory configuration



Internal devices

- Auxiliary contact block (W)
- Alarm contact block (K)

External devices

- Auxiliary contact (W2)
- Auxiliary and alarm contact block (WK)
- Short-circuit alarm contact block (KI)
- Shunt trip device (F)
- Undervoltage trip device (R) or undervoltage trip device with early make contacts (Re)

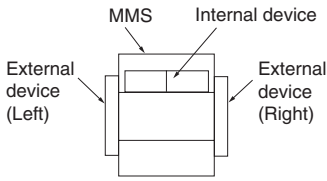
Adj. thermal-magnetic trip type MMS		BM3RSB, BM3RHB, BM3RSR, BM3RHR						BM3VSB, BM3VHB					
Instantaneous trip type MMS		BM3RHBK, BM3RHRK						BM3VHBK					
Internal accessory													
External accessory	W2 (Left)												
	W2 (Right)												
	WK (Left)												
	KI (Left)												
	F (Right)												
	R (Re) (Right)												
	W2 (Left)+F												
	W2 (Left)+R (Re)												
	WK+F												
	WK+R (Re)												
	KI+F												
	KI+R (Re)												
	W2 (Left)+W2 (Left)												
W2 (Left)+W2 (Right)													

Note: Do not use an alarm contact block/K together with an undervoltage trip device with early make contacts/Re for the BM3RSB frame. If used together, the alarm contact block will not operate correctly when the MMS is automatically tripped due to undervoltage.



Optional accessories

Available accessory configuration (continued)



Internal devices

□ Auxiliary contact block (W) ◻ Alarm contact block (K)

External devices

◻ Auxiliary contact (W2) ◻ Auxiliary and alarm contact block (WK) ◻ Short-circuit alarm contact block (KI)
 ◻ Shunt trip device (F) ◻ Undervoltage trip device (R) or undervoltage trip device with early make contacts (Re)

Adj. thermal-magnetic trip type MMS	BM3RSB, BM3RHB, BM3RSR, BM3RSHR						BM3VSB, BM3VHB						
Instantaneous trip type MMS	BM3RHBK, BM3RHRK						BM3VHBK						
Internal accessory													
External accessory	W2 (Right)+ W2 (Right)												
	W2 (Left)+ WK												
	W2 (Right)+ WK												
	W2 (Left)+ KI												
	W2 (Right)+ KI												
	KI+WK												
	W2 (Left)+ W2 (Left)+F												
	W2 (Left)+ W2 (Left)+R (Re)												
	W2 (Left)+ WK+F												
	W2 (Left)+ WK+R (Re)												
	W2 (Left)+ KI+F												
	W2 (Left)+ KI+R (Re)												
	KI+WK+F												
	KI+WK+R (Re)												

Note: Do not use an alarm contact block/K together with an undervoltage trip device with early make contacts/Re for the BM3RSB frame. If used together, the alarm contact block will not operate correctly when the MMS is automatically tripped due to undervoltage.

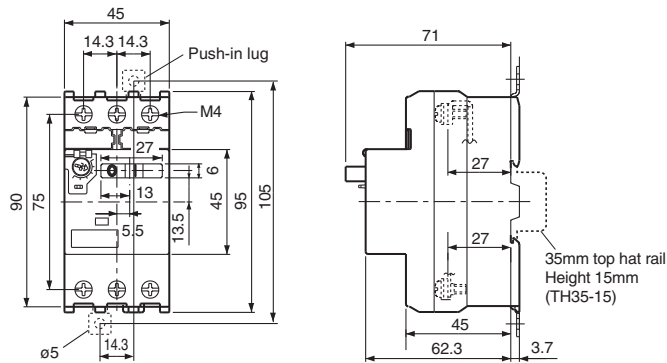


DUO series Manual Motor Starters

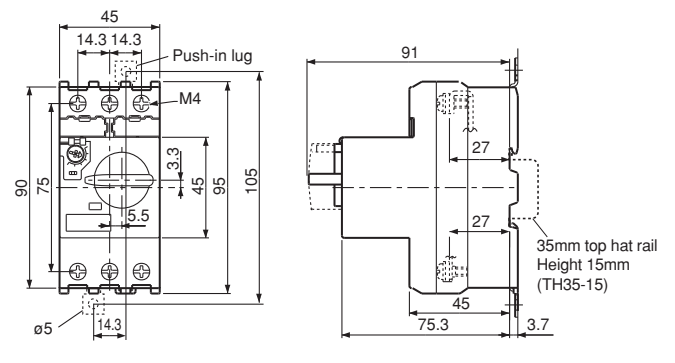
Dimensions

■ Dimensions, mm

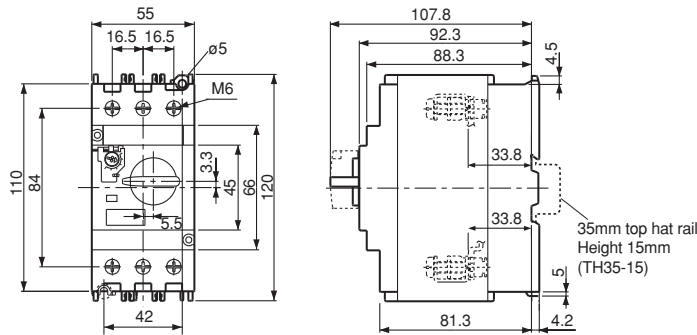
• Rocker handle types BM3RSB, BM3RSR



• Rotary handle types BM3RHB, BM3RHR

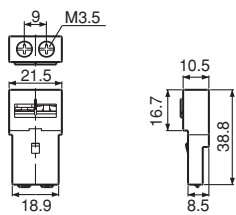


• Rotary handle types BM3VSB, BM3VHB

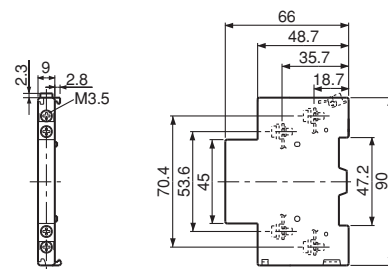


Accessories

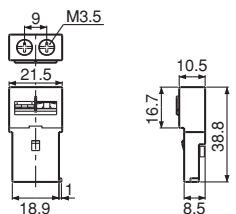
• Auxiliary contact blocks, front mounting BZ0WI



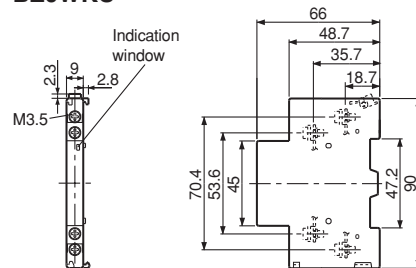
• Auxiliary contact blocks, side mounting BZ0WU



• Alarm contact blocks, front mounting BZ0KI



• Auxiliary and alarm contact blocks BZ0WКУ





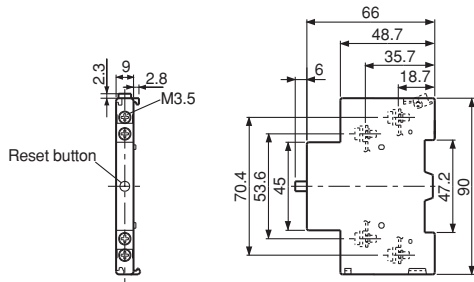
DUO series Manual Motor Starters

Dimensions

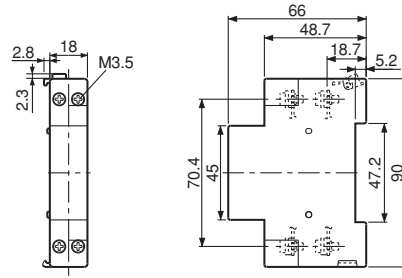
■ Dimensions, mm

Accessories

- Short-circuit alarm contact block BZ0TKUAB

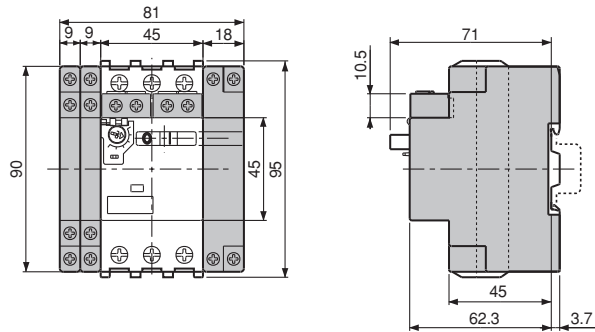


- Shunt trip devices BZ0F
- Undervoltage trip devices BZ0R

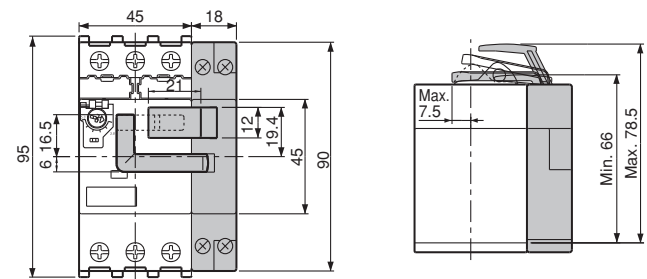


MMS with accessories

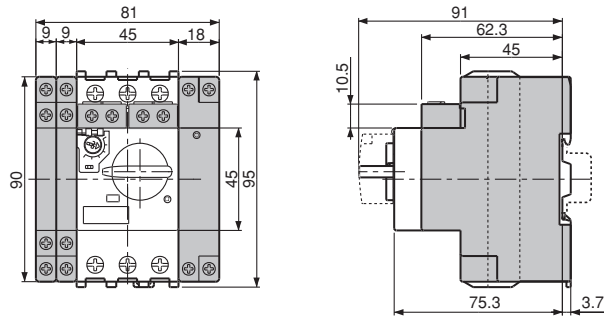
- BM3RSB + BZ0
- BM3RSR + BZ0



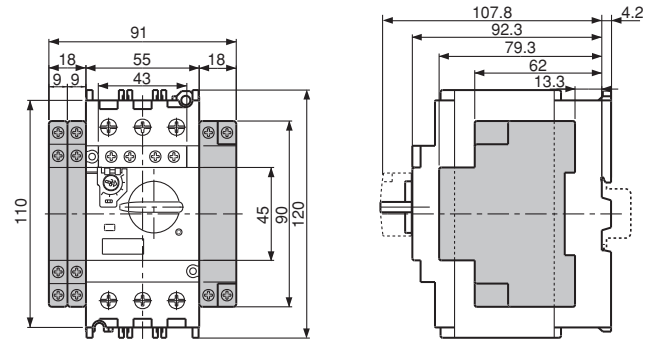
- BM3RSB + BZ0R□LKU (Undervoltage trip device)
- BM3RSR + BZ0R□LKU



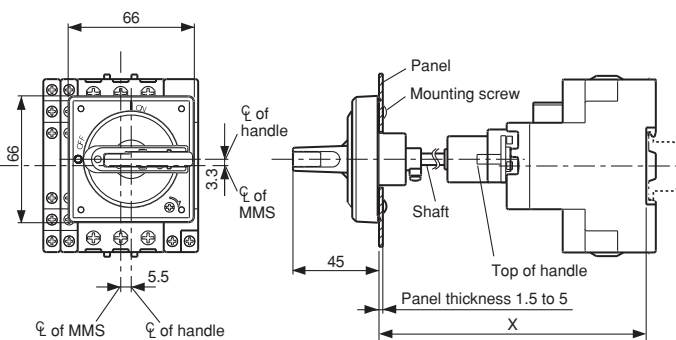
- BM3RHB + BZ0
- BM3RHR + BZ0



- BM3V□B + BZ0

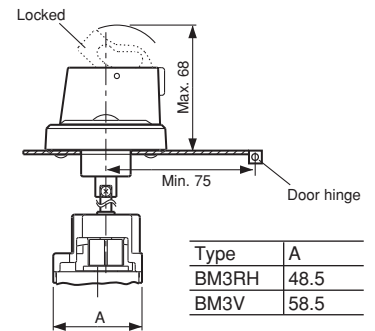
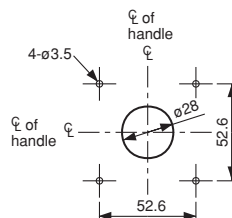


External operation handle BZ0V



Type	X min.	X max.
BZ0VBBL, BZ0VYRL	1392	2892
BZ0VBBM, BZ0VYRM	1562	3062

Panel drilling

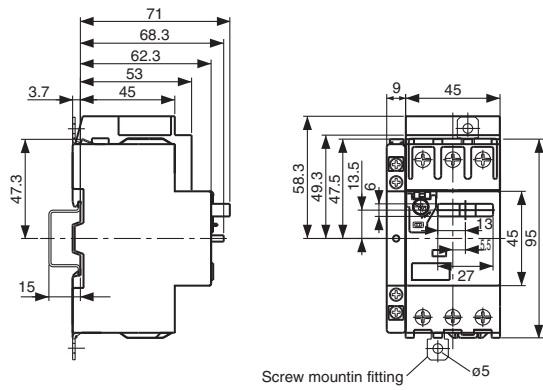


Type	A
BM3RH	48.5
BM3V	58.5

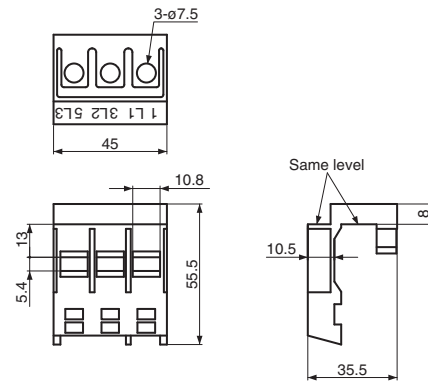
■ Dimensions, mm

• UL 60947-4-1 Type E

MMS + Terminal cover + short-circuit alarm contact block

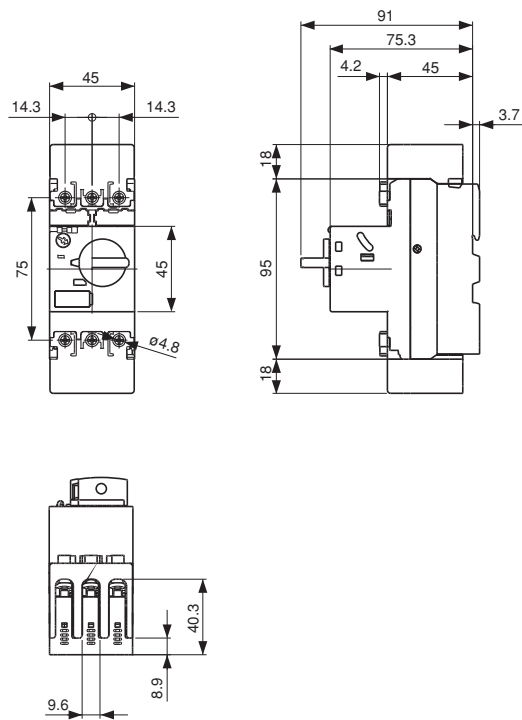


Terminal cover

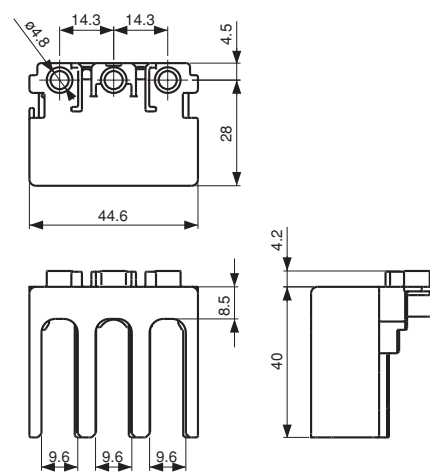


• MMS with long terminal cover

MMS + long terminal cover



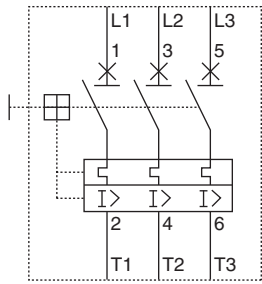
Long terminal cover





■ Wiring diagrams

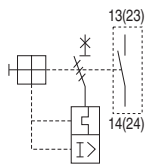
• MMS



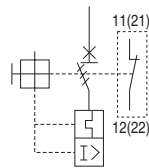
• Auxiliary contact blocks

Front mounting

BZ0WIA



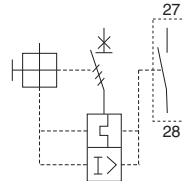
BZ0WIB



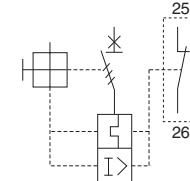
• Alarm contact blocks

Front mounting

BZ0KIA

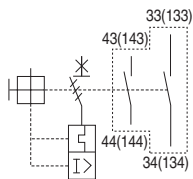


BZ0KIB

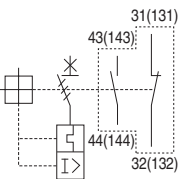


Side mounting

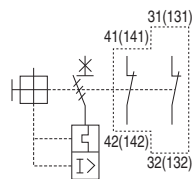
BZ0WUAAAL



BZ0WUABL

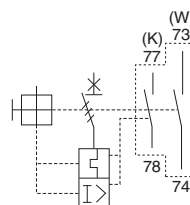


BZ0WUBBL

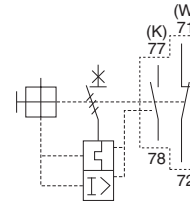


• Auxiliary and alarm contact blocks

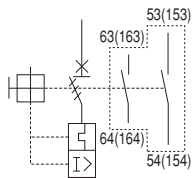
BZ0WKUAA



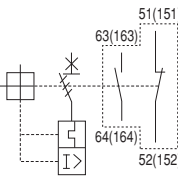
BZ0WKUBA



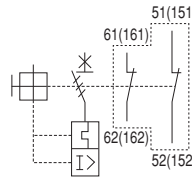
BZ0WUAAR



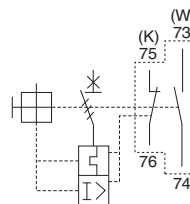
BZ0WUABR



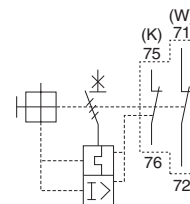
BZ0WUBBR



BZ0WKUAB

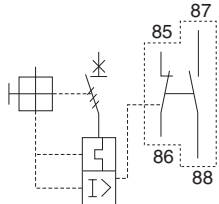


BZ0WKUBB



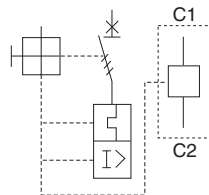
• Short-circuit alarm contact blocks

BZ0TKUAB



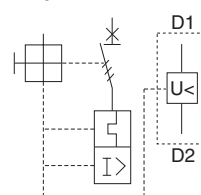
• Shunt trip devices

BZ0F



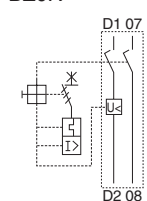
• Undervoltage trip devices

BZ0R



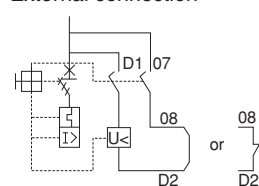
• Undervoltage trip devices with early make contacts

BZ0R



There may be no trip indication and no opening of the auxiliary contact even though the MMS is tripped due to short-circuit, overcurrent, or phase-loss.

External connection



In addition to the functions of the undervoltage trip device, this device completely opens the main circuit and control circuit when the MMS is turned OFF. However, when the MMS is tripped by a drop in the control circuit voltage, it must be reset.



Operating conditions

Standard operating conditions

Ambient temperature	Operating: -5 to +55°C Storage: -40 to +65°C	No sudden temperature changes resulting in condensation or icing.
Humidity	45 to 85%RH	
Altitude	2000m or lower	
Atmosphere	No excessive dust, smoke, corrosive gases, flammable gases, steam or salt.	
Vibration	10 to 55Hz 15m/s ²	No abnormal shock or vibration
Shock	50m/s ²	

Mountings

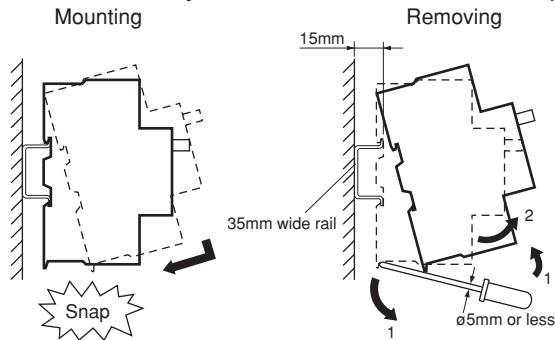
Rail mounting

The MMS can be mounted to a 35mm top hat rail. Secure the rail with screws at mounting pitch of less than 400mm for the BM3R type and less than 300mm for the BM3V type.

Applicable rail:

Use a 15mm-high TH35-15 rail conforming to EN-50022 and IEC715.

The standard rail mounting direction is horizontal. When using the MMS on a vertically mounted rail, use FUJI end clamp kits.

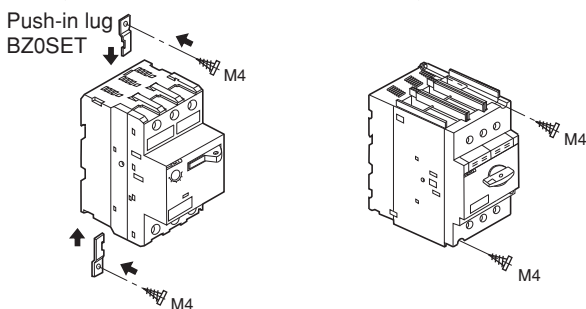


Screw mounting

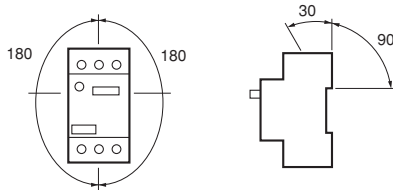
The separately sold push-in lug (BZ0SET) is required for screw mounting the BM3R frame. The BM3V frame can be screw mounted directly to the panel.

BM3RSB, RSBK
BM3RHB, RHBK

BM3VSB, VSBK
BM3VHB, VHBK



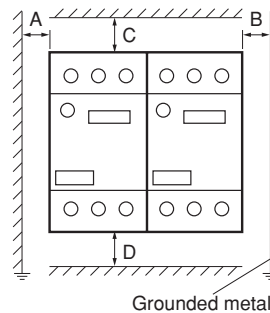
Mounting angle



Arc space

The arc space required when mounting is shown in the table below.

Type	Rated operational voltage U _e (V)	Min. distance to grounded metal (mm)	
		A, B	C, D
BM3RS	Up to 460	15	20
	UP to 500	15	30
	Up to 690	40	40
BM3RH	Up to 500	15	30
	Up to 690	40	50
BM3V	Up to 500	15	40
	Up to 690	40	50



When frames are mounted side-by-side, operating conditions such as a high ambient temperature or using the maximum setting for continuous carrying current may cause slight changes in operating characteristics due to temperature rises. Under such conditions, it is recommended that the frames be separated by at least 5mm.

Wirings

While pressing the wire with a screwdriver, tighten the screw to the specified tightening torque.

Type	BM3R	BM3V	BZ0 Accessories
Solid wire (mm)	ø1.6 to 2.6	ø1.6 to 2.6	ø1 to 1.6
Stranded wire (mm ²)	Single-wire	1 to 10	0.5 to 2.5
	2-wire	1 to 6	0.5 to 2.5
AWG	Single-wire	18 to 8	18 to 14
	2-wire	18 to 10	18 to 14
Sheath stripping length (mm)	Approx.10	Approx.13	Approx.10
Terminal screw	Pan head screw (PZ2)	Pan head screw (PZ2)	Pan head screw (PZ2)
	M4	M6	M3.5
Tightening torque (N·m)	2	4	0.8

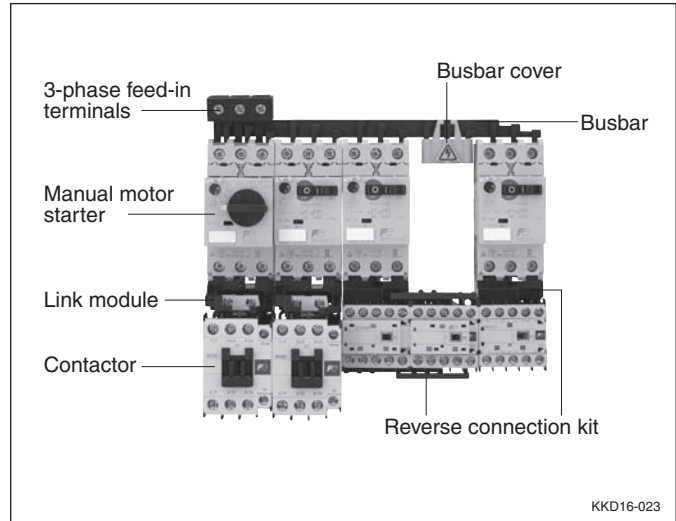
Note: There is no need for a crimp terminal or any other terminal on the end of the connection wire.



Busbar system

■ Features

- The busbar system reduces wiring time and saves floorspace.
- The busbar makes it easy to power from 2 to 5 manual motor starters – with no wiring needed.
- The 3-phase feed-in terminals are used to connect the wire for the power supply circuit.
- The busbar cover guards against accidental touching of non-connected busbar terminals (charged parts).



■ Types and ratings

Description	Used with	Specification	Type	Mass (g)	
 KKD02-164	BM3R	Continuous current: 64A max. Pin connection ¹	2-BM3R, modular space: 45mm 3-BM3R, modular space: 45mm 4-BM3R, modular space: 45mm 5-BM3R, modular space: 45mm	BZ0BR02A BZ0BR03A BZ0BR04A BZ0BR05A	30 50 70 90
	BM3R+1-external accessory, 9mm wide	(Black)	2-BM3R, modular space: 54mm 3-BM3R, modular space: 54mm 4-BM3R, modular space: 54mm 5-BM3R, modular space: 54mm	BZ0BR12A BZ0BR13A BZ0BR14A BZ0BR15A	30 55 80 105
	BM3R+2-external accessory, 9mm wide or BM3R+1-external accessory, 18mm wide	Continuous current: 64A max. Fork connection (White)	2-BM3R, modular space: 63mm 4-BM3R, modular space: 63mm	BZ0BR22A ² BZ0BR24A ²	45 100
	BM3V	Continuous current: 126A max. Pin connection (Black)	2-BM3V, modular space: 55mm 3-BM3V, modular space: 55mm 4-BM3V, modular space: 55mm	BZ0BV02A BZ0BV03A BZ0BV04A	140 240 340
	BM3V+1-external accessory, 9mm wide		2-BM3V, modular space: 64mm 3-BM3V, modular space: 64mm 4-BM3V, modular space: 64mm	BZ0BV12A BZ0BV13A BZ0BV14A	150 270 380
	BM3V+2-external accessory, 9mm wide or BM3V+1-external accessory, 18mm wide		2-BM3V, modular space: 73mm 4-BM3V, modular space: 73mm	BZ0BV22A BZ0BV24A	165 425
	3-phase feed-in terminal KKD11-139	BM3R	Continuous current: 64A max. Applicable cable size: 25mm ² max.	BZ0BFRA	40
		BM3V	Continuous current: 126A max. Applicable cable size: 50mm ² max.	BZ0BFVA	190
	3-phase feed-in terminal (Ring crimp terminal) KKD11-140	BM3R	Continuous current: 64A Applicable cable size: 25mm ² max.	BZ0BFRAR	90
	Busbar cover AF01-70L	BZ0BR	For pin connection	BZ0BCRA	10
		BZ0BV	For pin connection	BZ0BCVA	5

Notes: • When three or more busbar are used, a gap of 6mm will occur between the MMS at the connector point.

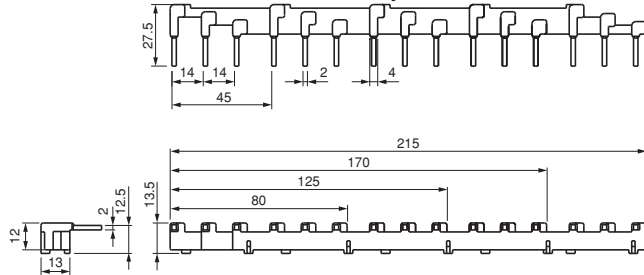
¹Maximum number of MMS that can be mounted side by side using the two busbar (ex. BZ0BR05A × 2)

²Fork connection type busbar cannot be combined with power input terminal block. Connection should be made using round type crimp terminal.

■ Dimensions, mm

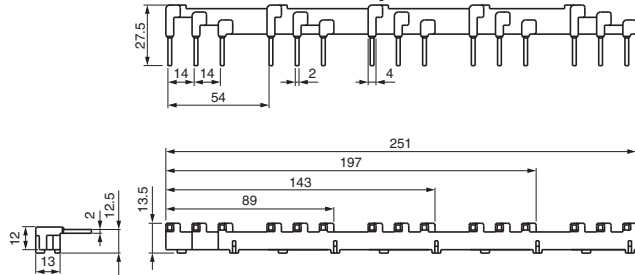
• For BM3R

BZ0BR0 Without external accessory



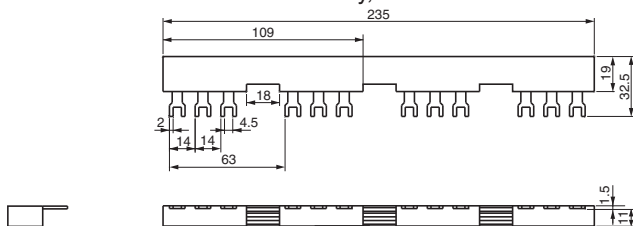
BZ0BR02A: 80mm
 BZ0BR03A: 125mm
 BZ0BR04A: 170mm
 BZ0BR05A: 215mm

BZ0BR1 With 1-external accessory



BZ0BR12A: 89mm
 BZ0BR13A: 143mm
 BZ0BR14A: 197mm
 BZ0BR15A: 251mm

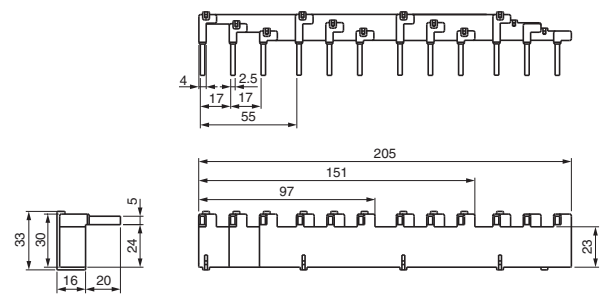
BZ0BR2 With 2-external accessory, 9mm wide With 1-external accessory, 18mm wide



BZ0BR22A: 109mm
 BZ0BR24A: 235mm

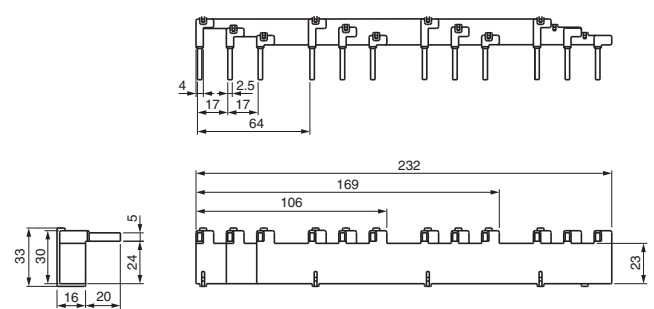
• For BM3V

BZ0BV0 Without external accessory



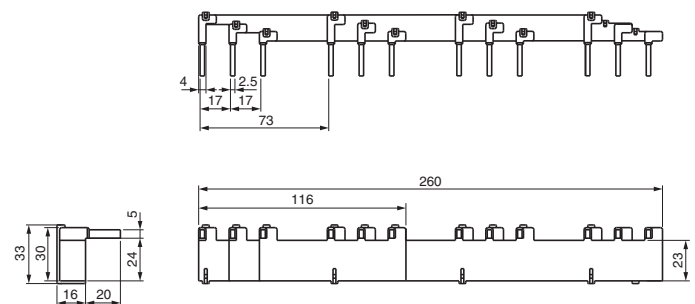
BZ0BV02A: 97mm
 BZ0BV03A: 151mm
 BZ0BV04A: 205mm

BZ0BV1 With 1-external accessory, 9mm wide



BZ0BV12A: 106mm
 BZ0BV13A: 169mm
 BZ0BV14A: 232mm

BZ0BV2 With 2-external accessory, 9mm wide With 1-external accessory, 18mm wide



BZ0BV22A: 116mm
 BZ0BV24A: 260mm

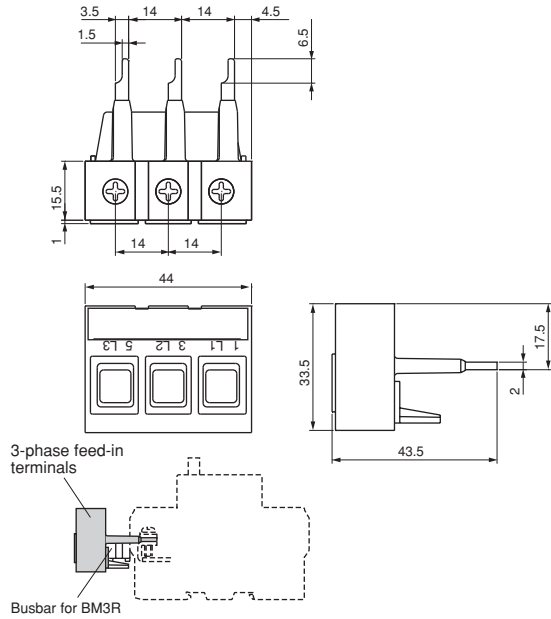


DUO series Manual Motor Starters

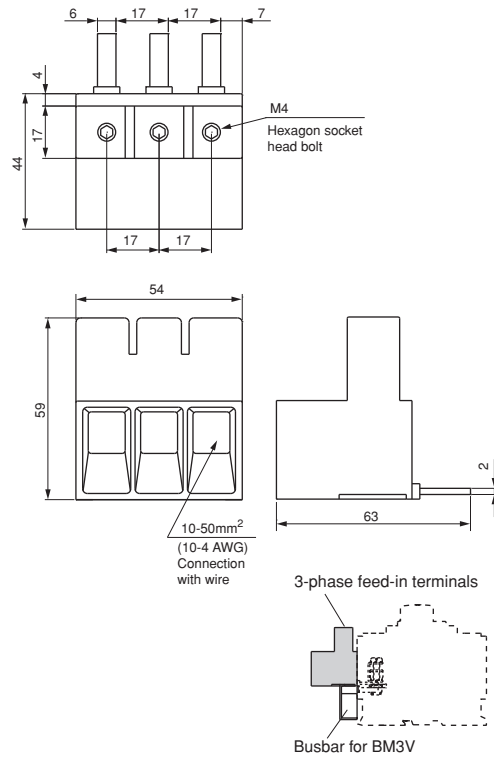
Busbar system

■ Dimensions, mm

• 3-phase feed-in terminals BZ0BFRA



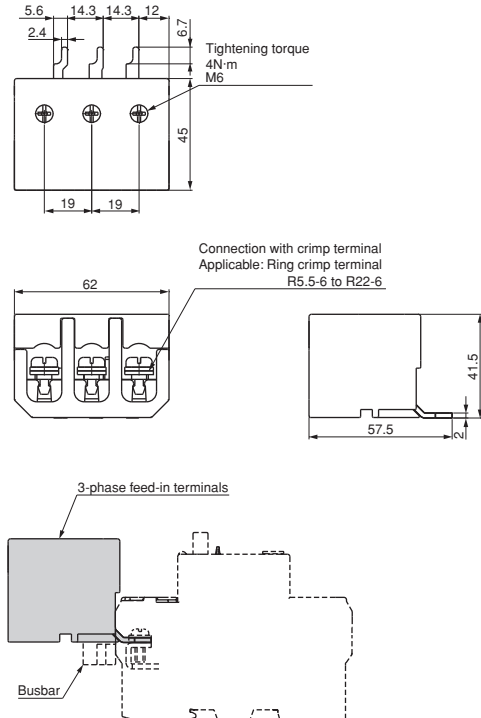
BZ0BFVA



Specifications

Type	BZ0BFRA	BZ0BFVA	BZ0BFRAR		
Applicable MMS	BM3R□□	BM3V□□	BM3R□□		
Standards	IEC/EN60947, UL 60947-4-1, CSA C22.2		IEC/EN60947, UL 60947-4-1 (Conform to Type E, F), CSA C22.2		
Maximum voltage IEC/UL (V)	690/600	690/600	690/600		
Maximum current IEC/UL (A)	64/63	126/120	64/63		
Impulse withstand voltage (kV)	8	8	8		
Direct Connection	Stranded wire	(mm ²)	6 to 25	10 to 50	—
		AWG	10 to 6	8 to 0	—
	Flexible stranded wire with end sleeve	(mm ²)	6 to 16	10 to 35	—
		AWG	10 to 6	8 to 2	—
Stripped length of stranded wire (mm)	14	15	—		
Sleeve length (mm)	12-18	16-22	—		
Connection with crimp terminal	Flexible stranded wire	(mm ²)	—	—	6 to 25
		AWG	—	—	4
	Ring crimp terminal	—	—	1	2
A 17mm or less B 8.3mm以下		JIS C 2805 or product conforming to JIS R5.5-6 to R22-6			
Terminal shape	Dual (philips/slotted) screw (PZ2)	Hexagon socket head bolt	M6 (Dual (philips/slotted) pan head screw)		
Tightening torque (N·m)	2	6	4		

BZ0BFRAR



Note 1: Be careful that the peeling length of the connecting wire is different from the MMS unit.

Note 2: Put and crimp a sleeve at the end of flexible twisted wire.

The sleeve should conform with DIN46228 standard.

Also, follow the manufacturer's specification for peeling length and sleeve crimping tool.

Note 3: To connect a wire, put the crimped part of wire up (toward the cover), as is shown in the figure.

Note 4: To connect two wires, the casing length for crimping wire C should be more than 9.5 mm at lower crimp terminal (toward the chassis).

(Note) The fork connection busbar cannot be combined with 3-phase feed-in terminals.

■ Busbar connection

• For BM3R

Example of two pin-connection busbars + 3-phase feed-in terminal

(1) Insert the busbar 1 in the left side of MMS terminal screw.

(2) Insert the busbar 2 in the right side of MMS terminal screw.

1: BZ0BR03A



2: BZ0BR02A

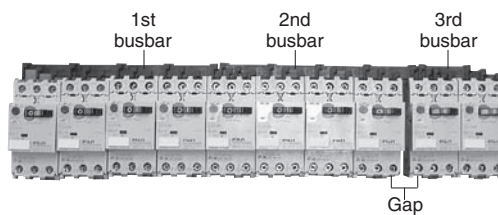


(3) Attach the 3-phase feed-in terminal (BZ0BFRA) to the MMS from which the busbar has been inserted in the right side of terminal screw. (The mounting position of 3-phase feed-in terminal is same too even if one busbar is to be attached.)



Note: When three or more busbars are used, a gap of 6mm will occur as shown below.

The number of gaps is determined by how many busbars you use, as shown in the table below.



MMS quantity	2		3		4		5		6		7		8		9		10								
Busbar quantity	1	1	2	1	2	3	1	2	2	3	4	2	2	3	3	4	5	2	2	3	3	4	4	5	6
Busbar for 2 MMSs	1		2		1	3		1		2	4	1		2	1	3	5			1		3	2	4	6
Busbar for 3 MMSs		1			1				2	1			1		2	1			1		1	3		2	1
Busbar for 4 MMSs				1				1				1	1					2	1			1			
Busbar for 5 MMSs						1						1						1		1					
No. of clearances	0	0	0	0	0	1	0	0	0	1	2	0	0	1	1	2	3	0	0	1	1	2	2	3	4
MMS quantity	8												9												
Busbar quantity	2	3	3	3	4	4	4	5	6	7	2	3	3	3	4	4	4	5	5	6	6	7	8		
Busbar for 2 MMSs		1		1	3	2	1	3	5	7		1		2	1	2	1	4	4	3	5	4	6	8	
Busbar for 3 MMSs		1	2			1	3	2	1			2	1	1	2	4		1		2	1				
Busbar for 4 MMSs	1		1	2		1					1		2		1			1	1						
Busbar for 5 MMSs	1	1			1						2	1	1		1			1							
No. of clearances	0	1	1	1	2	2	2	3	4	5	0	1	1	1	2	2	2	3	3	4	4	5	6		
MMS quantity	10																								
Busbar quantity	3	3	4	4	4	4	5	5	5	5	6	6	6	7	7	8	9								
Busbar for 2 MMSs			2	1		1	3	2	3	1	5	4	3	6	5	7	9								
Busbar for 3 MMSs	1			2	3	1	1	2		4		1	3		2	1									
Busbar for 4 MMSs	1	3	1		1	2		1	2			1		1											
Busbar for 5 MMSs	1		1	1			1				1														
No. of clearances	1	1	2	2	2	2	3	3	3	3	4	4	4	5	5	6	7								

Notes: (Number of clearances) = (Busbar quantity) - 2. However, when the calculation results in a negative value, the number of clearances should be zero.

• For BM3V

Example of two busbars + 3-phase feed-in terminal

(1) Insert the busbar 1 in the lower side of MMS terminal plate.

(2) Insert the busbar 2 in the upper side of MMS terminal plate.



1: BZ0BV02A

2: BZ0BV02A



(3) Attach the 3-phase feed-in terminal (BZ0BFVA) to the MMS from which the busbar has been inserted in the lower side of terminal plate. (The mounting position of 3-phase feed-in terminal is same too even if one busbar is to be attached.)



Note: When three or more busbars are to be connected, insert 3rd busbar or later up and down of the terminal plate alternately. (The MMSs are capable of side-by-side mounting.)



Features

■ Description

- The combination starter protects the motor from short-circuit and overcurrent accidents in the three-phase motor circuit within a range between 15kW at 240V AC and 22kW at 415V AC, up to a current level of 50A.
- The manual motor starter provides overload, phase-loss, and short-circuit protections for the motor circuit, and incorporates a dial for flexible adjustment to match the total load current of the motor.
- The magnetic contactor allows remote ON/OFF operation of the motor circuit with high frequency, and features a electrical durability of one million operations.
- The manual motor starter and magnetic contactor are connected via link module and mounted to a base plate.

■ Features

Reduction and space-saving design

- The combination starter consists of a manual motor starter and magnetic contactor that can be assembled by the user to achieve a compact motor control circuit.
- The modular wiring system reduces wiring works, shortens required mounting time, and decreases the mounting area.
- The busbar system and connecting modules make it possible to reduce complicated wiring work.

Conforms to IEC standard

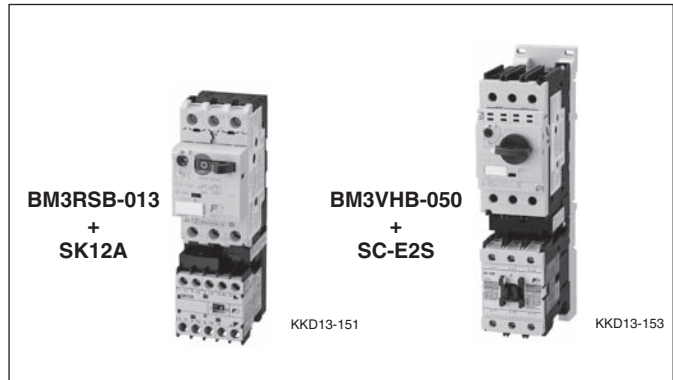
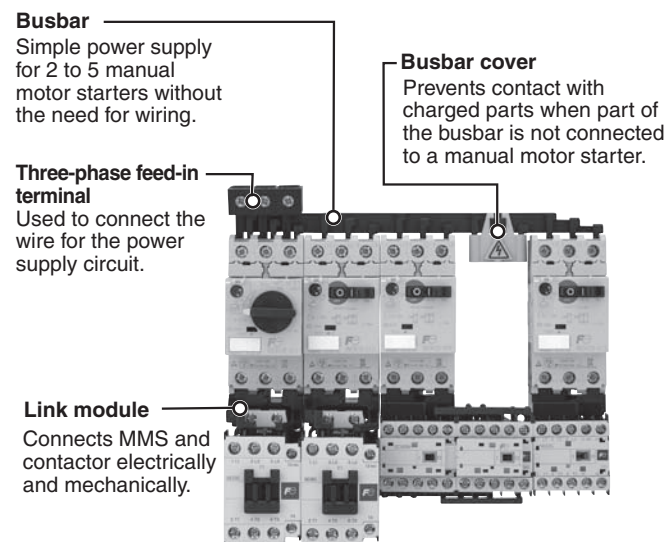
- The combination starter conforms to IEC 60947 requirements for magnetic motor starters and short circuit protective device of coordination types 1 and 2, thus greatly reducing the possibility of an accident spreading to affect other equipment.
- The combination starter can be mounted to IEC top hat rail using the base plate.

Protection against exposure to charged parts

- A busbar system, busbar cover, and terminals with finger protection prevent exposure to charged parts.

■ Busbar system

Various wiring materials available to reduce both wiring and wiring steps.

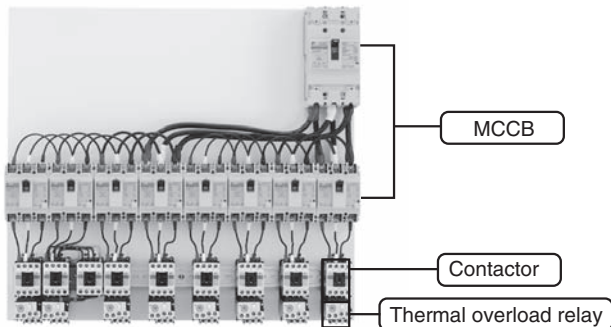


■ Application example

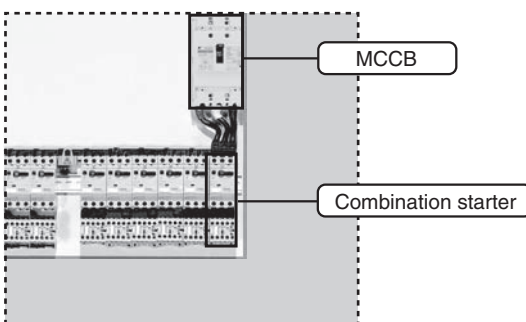
Combining modular equipment enables compact control panel configurations. Combination starters and busbar systems help to downsize equipment.

• Example of 8-motor control circuit

Conventional control panel



New control panel



Mounting space: 45% reduction

Wiring space: 90% reduction



■ Protective coordination between MMSs and contactors/combination starters

• IEC 60947-4-1 Type 1 The rated conditional short-circuit current $I_q=50kA/240V$ AC, 415V AC

Motor capacity and full load current 3-phase				Manual motor starter		Magnetic contactor	
200–240V AC		380–415V AC		Type	Adjustable current range (A)	Type	Rated operational current AC-3 (A)
Capacity (kW)	Current (A)	Capacity (kW)	Current (A)				
–	–	–	–	BM3RS □-P16 BM3RH □-P16	0.1-0.16	SK06	6
–	–	0.06	0.2	BM3RS □-P25 BM3RH □-P25	0.16-0.25	SK09 SK12	9 12
0.06	0.35	0.09	0.3	BM3RS □-P40 BM3RH □-P40	0.25-0.4		
–	–	0.12	0.44	BM3RS □-P63 BM3RH □-P63	0.4-0.63		
0.09	0.52	0.18	0.6	BM3RS □-P63 BM3RH □-P63	0.4-0.63		
0.12	0.7	0.25	0.85	BM3RS □-001 BM3RH □-001	0.63-1.0		
0.18	1	0.37	1.1	BM3RS □-1P6 BM3RH □-1P6	1.0-1.6		
0.25	1.5	0.55	1.5	BM3RS □-1P6 BM3RH □-1P6	1.0-1.6		
0.37	1.9	0.75	1.9	BM3RS □-2P5 BM3RH □-2P5	1.6-2.5		
0.55	2.6	1.1	2.7	BM3RS □-004 BM3RH □-004	2.5-4.0		
0.75	3.3	1.5	3.6	BM3RS □-004 BM3RH □-004	2.5-4.0		
1.1	4.7	2.2	4.9	BM3RS □-6P3 BM3RH □-6P3	4.0-6.3	SK09 SK12	9 12
1.5	6.3	3	6.5	BM3RS □-010 BM3RH □-010	6.3-10	SK18 SK22	18 22
–	–	3	6.5	BM3RS □-010 BM3RH □-010	6.3-10	SK32	32
2.2	8.5	4	8.5	BM3RS □-010 BM3RH □-010	6.3-10		
3	11.3	5.5	11.5	BM3RS □-013 BM3RH □-013	9-13		
4	15	7.5	15.5	BM3RH □-016	11-16		
4	15	7.5	15.5	BM3RH □-020	14-20		
5.5	20	11	22	BM3RH □-025	19-25	SK22 SK32	22 32
7.5	27	15	29	BM3RH □-032 BM3VHB -032	24-32 24-32	SK32 SC-E1	32 32
11	38	18.5	35	BM3VHB -040	28-40	SC-E2	40
–	–	22	41	BM3VHB -050	35-50	SC-E2S	50

Notes: • The full-load current of each three-phase motor is a reference value.
Check the actual full-load current of the motor before use.



Protective coordination

• IEC 60947-4-1 Type 2 The rated conditional short-circuit current $I_q=50\text{kA}/240\text{V AC}, 415\text{V AC}$

Motor capacity and full load current 3-phase				Manual motor starter		Magnetic contactor	
200–240V AC		380–415V AC		Type	Adjustable current range (A)	Type	Rated operational current AC-3 (A)
Capacity (kW)	Current (A)	Capacity (kW)	Current (A)				
–	–	–	–	BM3RS□-P16 BM3RH□-P16	0.1-0.16	SK06	6
–	–	0.06	0.2	BM3RS□-P25 BM3RH□-P25	0.16-0.25	SK09 SK12	9 12
0.06	0.35	0.09	0.3	BM3RS□-P40 BM3RH□-P40	0.25-0.4		
–	–	0.12	0.44	BM3RS□-P63 BM3RH□-P63	0.4-0.63		
0.09	0.52	0.18	0.6	BM3RS□-P63 BM3RH□-P63	0.4-0.63		
0.12	0.7	0.25	0.85	BM3RS□-001 BM3RH□-001	0.63-1.0		
0.18	1	0.37	1.1	BM3RS□-1P6 BM3RH□-1P6	1.0-1.6		
0.25	1.5	0.55	1.5	BM3RS□-1P6 BM3RH□-1P6	1.0-1.6		
0.37	1.9	0.75	1.9	BM3RS□-2P5 BM3RH□-2P5	1.6-2.5		
0.55	2.6	1.1	2.7	BM3RS□-004 BM3RH□-004	2.5-4.0		
0.75	3.3	1.5	3.6	BM3RS□-004 BM3RH□-004	2.5-4.0		
1.1	4.7	2.2	4.9	BM3RS□-6P3 BM3RH□-6P3	4.0-6.3	SK18 SK22	18 22
1.5	6.3					SK32	32
–	–	3	6.5	BM3RS□-010 BM3RH□-010	6.3-10		
2.2	8.5	4	8.5	BM3RS□-010 BM3RH□-010	6.3-10		
3	11.3	5.5	11.5	BM3RS□-013 BM3RH□-013	9-13		
4	15	7.5	15.5	BM3RH□-016	11-16		
4	15	7.5	15.5	BM3RH□-020	14-20		
5.5	20	11	22	BM3RH□-025 BM3VHB-025	19-25 19-25	SC-E1	32
7.5	27	15	29	BM3VHB-032	24-32		
11	38	18.5	35	BM3VHB-040	28-40	SC-E2	40

Notes: • The full-load current of each three-phase motor is a reference value.
Check the actual full-load current of the motor before use.



DUO series Combination Starters

Combinations meeting for UL market

■ Combinations meeting for UL market

• BM3RSB, BM3RHB, BM3RSR, BM3RHR

3-phase motor				Manual motor starters		Adjustable current range (A)	Magnetic contactor
Rated capacity (HP) 220-240V AC	Rated operational current (A)	Rated capacity (HP) 440-480V AC	Rated operational current (A)				
—	—	—	—	BM3RS□-P16	BM3RH□-P16	0.1-0.16	SK06 SK09
—	—	—	—	BM3RS□-P25	BM3RH□-P25	0.16-0.25	SK12
—	—	—	—	BM3RS□-P40	BM3RH□-P40	0.25-0.4	
—	—	—	—	BM3RS□-P63	BM3RH□-P63	0.4-0.63	
—	—	—	—	BM3RS□-001	BM3RH□-001	0.63-1.0	
—	—	3/4	1.6	BM3RS□-1P6	BM3RH□-1P6	1.0-1.6	
1/2	2.2	1	2.1	BM3RS□-2P5	BM3RH□-2P5	1.6-2.5	
3/4	3.2	2	3.4	BM3RS□-004	BM3RH□-004	2.5-4	
1-1/2	6	3	4.8	BM3RS□-6P3	BM3RH□-6P3	4-6.3	
—	—	5	7.6	BM3RS□-010	BM3RH□-010	6.3-10	SK09 SK12
3	9.6	7-1/2	11	BM3RS□-013	BM3RH□-013	9-13	SK12
5	15.2	10	14	BM3RS□-016	BM3RH□-016	11-16	SK18 SK22
5	15.2	10	14	BM3RS□-020	BM3RH□-020	14-20	SK32
7-1/2	22	15	21	BM3RS□-025	BM3RH□-025	19-25	SK22 SK32
10	28	20	27	BM3RS□-032	BM3RH□-032	24-32	SK32

• BM3VSB, BM3VHB

3-phase motor				Manual motor starters		Adjustable current range (A)	Magnetic contactor
Rated capacity (HP) 220-240V AC	Rated operational current (A)	Rated capacity (HP) 440-480V AC	Rated operational current (A)				
3	9.6	5	7.6	BM3VSB-010	BM3VHB-010	6.3 to 10	SC-E1
3	9.6	7-1/2	11	BM3VSB-013	BM3VHB-013	9 to 13	SC-E1
5	15.2	10	14	BM3VSB-016	BM3VHB-016	11 to 16	SC-E1
5	15.2	10	14	BM3VSB-020	BM3VHB-020	14 to 20	SC-E1
7-1/2	22	15	21	BM3VSB-025	BM3VHB-025	19 to 25	SC-E1
10	28	20	27	BM3VSB-032	BM3VHB-032	24 to 32	SC-E1
10	28	30	40	BM3VSB-040	BM3VHB-040	28 to 40	SC-E2
15	42	30	40	BM3VSB-050	BM3VHB-050	35 to 50	SC-E2S
20	54	40	52	BM3VSB-063	BM3VHB-063	45 to 63	SC-E3



Optional accessories

■ Optional accessories

• Link modules and Spacers

The link module connects the manual motor starter and magnetic contactor electrically and mechanically.

Description	Applicable MMS	Applicable magnetic contactor	Operating coil	Link modules		Spacers		
				Type	Mass(g)	Type	Mass(g)	
 (No.KK11-101)	BM3RSB BM3RHB BM3RSR BM3RHR	SK06A, SK09A, SK12A	AC	BZ0LRK12AA	25	-	-	
		SK06G, SK09G, SK12G	DC					
		SK06L, SK09L, SK12L						
		SK18A, SK22A	AC	BZ0LRK22AA	35	BZ0LRKACA	20	
	SK18G, SK22G	DC						
	SK32A	AC	BZ0LRK32AA	41	BZ0LRKACA	20		
	SK32G	DC						
	BM3VSB BM3VHB	SC-E1, E2, E2S	AC	BZ0LVE51AA	45	-	-	
		SC-E1/G, E2/G, E2S/G	DC					
		SC-E3	AC	BZ0LVE65AA	65	-	-	
SC-E3/G		DC						

• Base plates

The base plate is a plastic plate to which the combination starter is mounted. The base plate can then be mounted to a panel with screws or to a IEC top hat rail.

Description	Applicable MMS	Applicable magnetic contactor	Operating coil	Type	Mass(g)
 (No.KK01-155)	BM3VSB BM3VHB	SC-E1, E2, E2S	AC	BZ0BPVE51A	160
		SC-E1/G, E2/G, E2S/G	DC		
		SC-E3	AC	BZ0BPVE65A	195
		SC-E3/G	DC		

• Base plate coupling kit

The base plate coupling kit is used to couple two base plates that are mounted with combination starters consisting of manual motor starters and SC-EMRM reversing magnetic contactors.

Description	Applicable base plate	Type	Mass(g)
 (No.KK03-036)	BZ0BPVE51A	BZ0BPVCA	4
	BZ0BPVE65A		

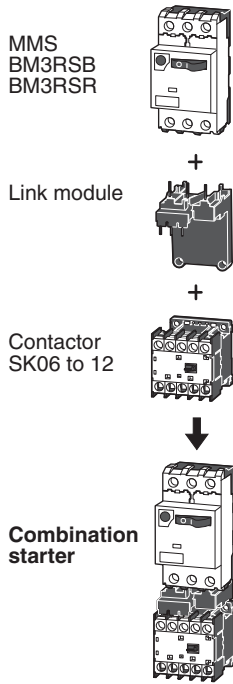


DUO series Combination Starters

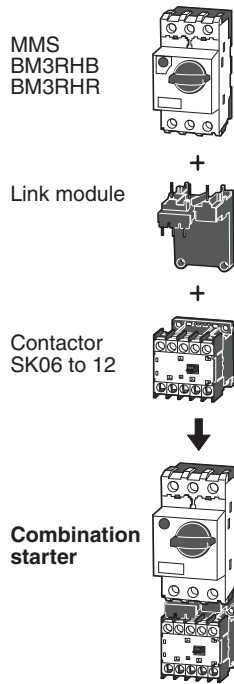
Configuration

■ Combination starter configurations

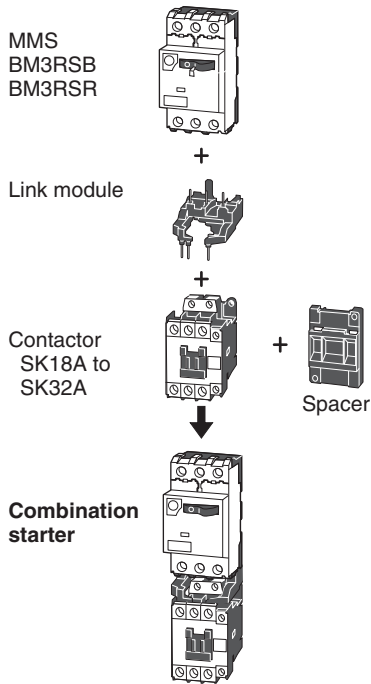
• BM3RS□+SK06 to 12



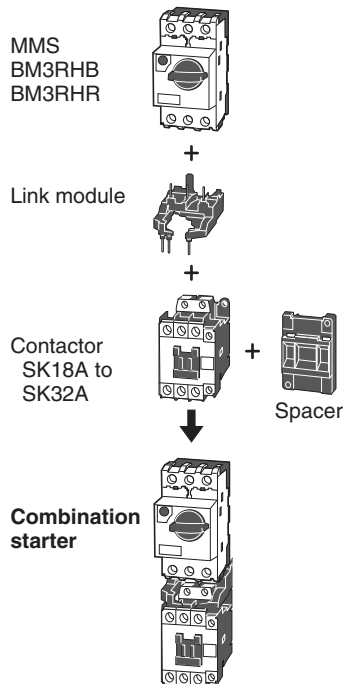
• BM3RH□ + SK06 to 12



• BM3RS□+SK18A to SK32A



• BM3RH□+SK18A to SK32A

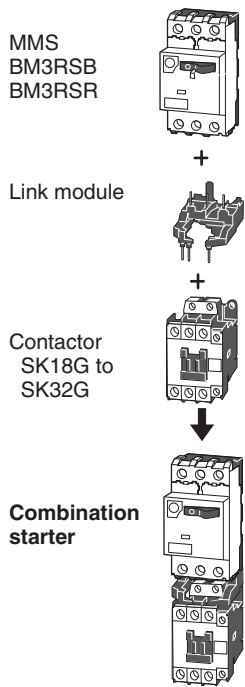




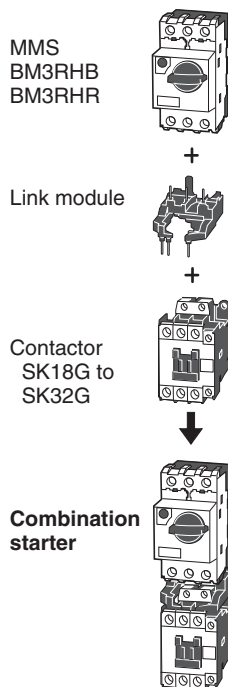
DUO series Combination Starters

Configuration

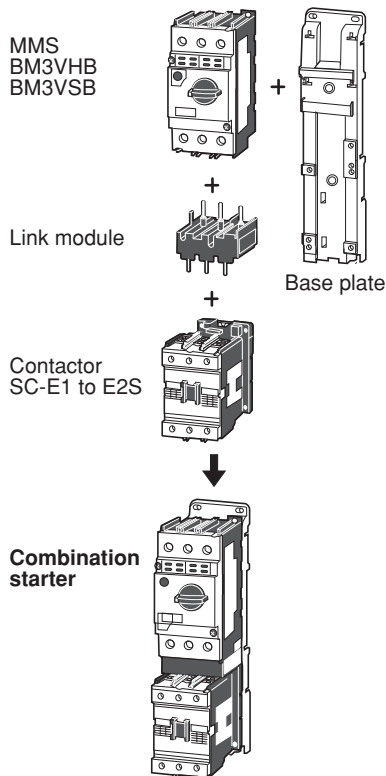
• BM3RS□+SK18G to SK32G



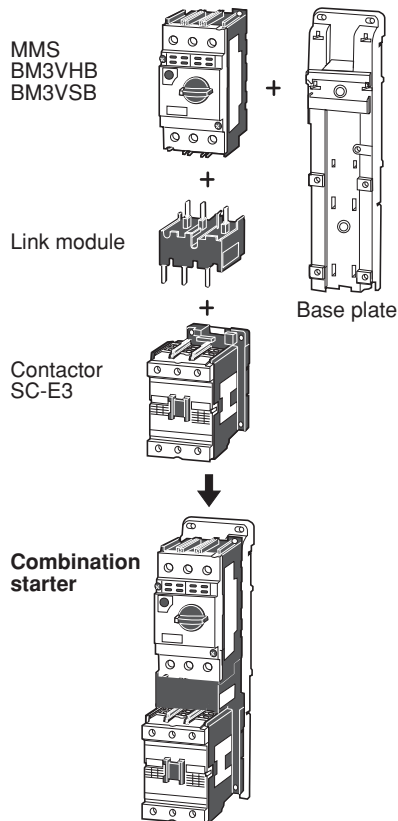
• BM3RH□+SK18G to SK32G



• BM3V□B+SC-E1 to E2S



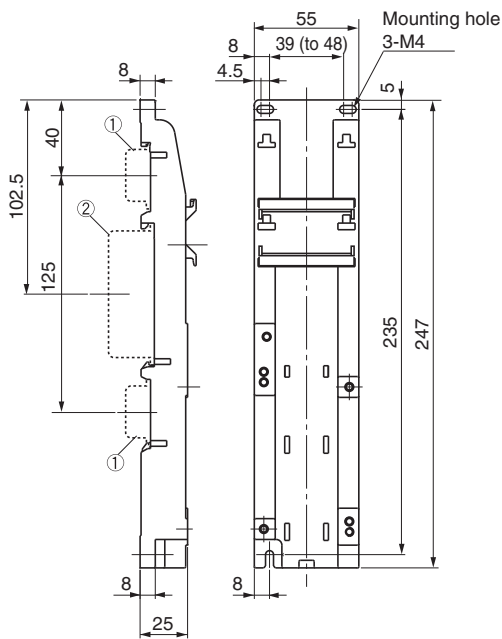
• BM3V□B+SC-E3





■ Dimensions, mm

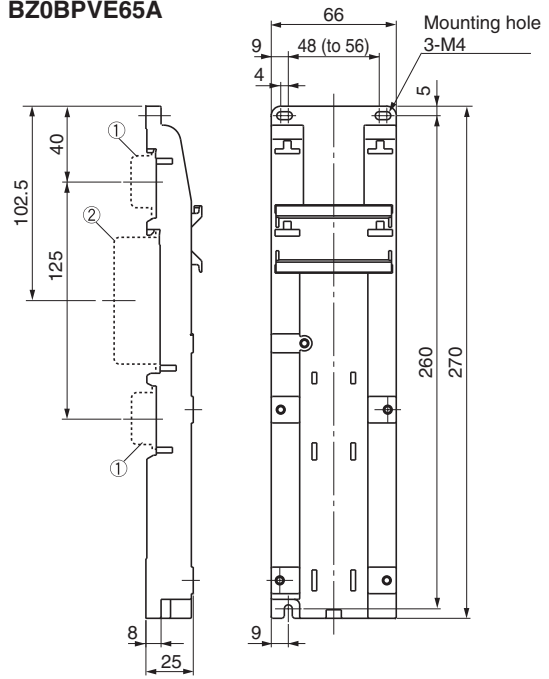
• Base plates BZ0BPVE51A



- ① 35mm wide rail (height 15mm) x 2
- ② 75mm wide rail (height 25mm) x 1

Base plate type	Applicable type	
	MMS	Contactors
BZ0BPVE51A	BM3VSB BM3VHB	SC-E1, E2, E2S, E1/G, E2/G, E2S/G

BZ0BPVE65A



- ① 35mm wide rail (height 15mm) x 2
- ② 75mm wide rail (height 25mm) x 1

Base plate type	Applicable type	
	MMS	Contactors
BZ0BPVE65A	BM3VSB BM3VHB	SC-E3, E3/G



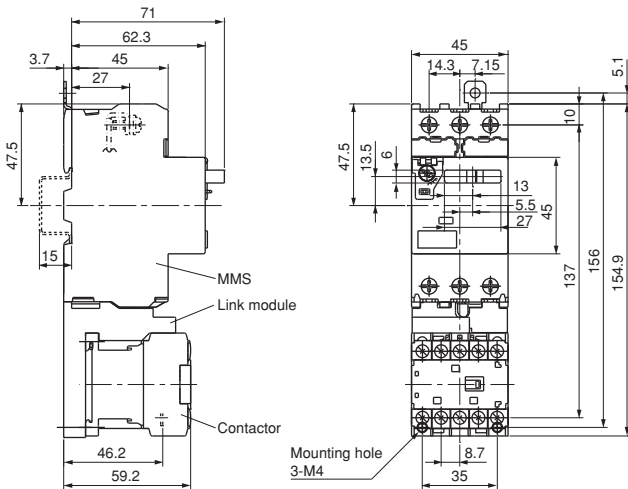
DUO series Combination Starters

Dimensions

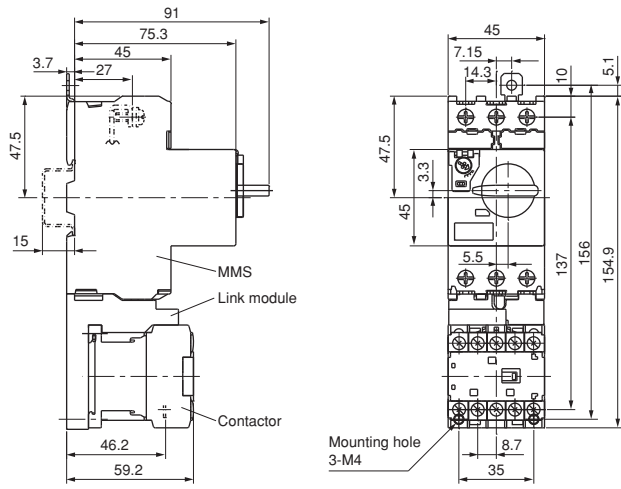
■ Dimensions, mm

• Combination

BM3RS□ + SK06 to SK12



BM3RH□ + SK06 to SK12



Rail mounting \varnothing 35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RSB	SK06A, SK09A, SK12A	BZ0LRK12AA	520
BM3RSR	SK06G, SK09G, SK12G SK06L, SK09L, SK12L		550

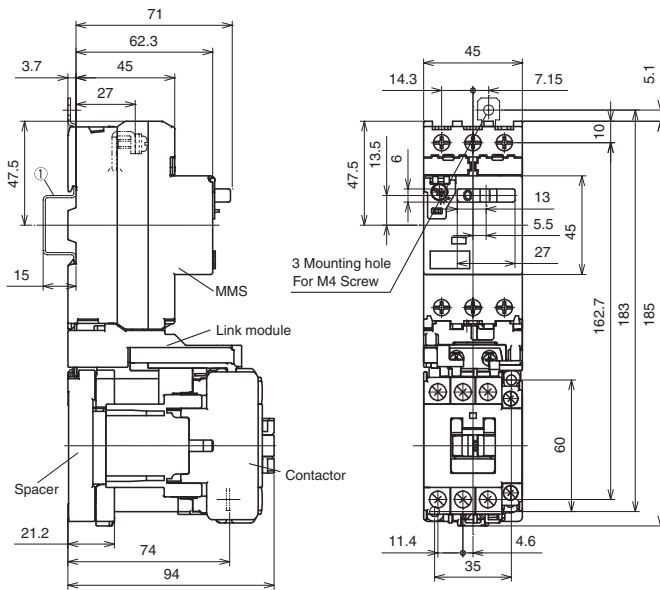
Rail mounting \varnothing 35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RHB	SK06A, SK09A, SK12A	BZ0LRK12AA	540
BM3RHR	SK06G, SK09G, SK12G SK06L, SK09L, SK12L		570

■ Dimensions, mm

• Combination

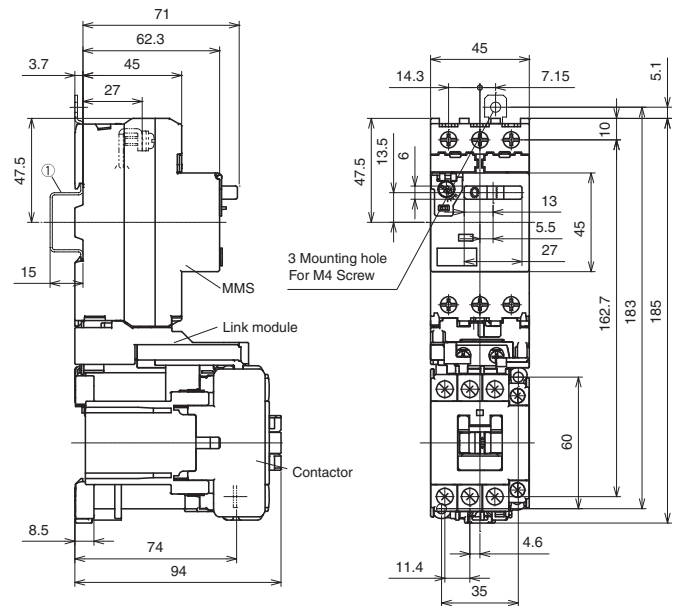
BM3RS□ + SK18A, SK22A



Rail mounting ①35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RSB	SK18A, SK22A	BZ0LRK22AA	750
BM3RSR		+ BZ0LRKACA	

BM3RS□ + SK18G, SK22G



Rail mounting ①35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RSB	SK18G, SK22G	BZ0LRK22AA	840
BM3RSR			



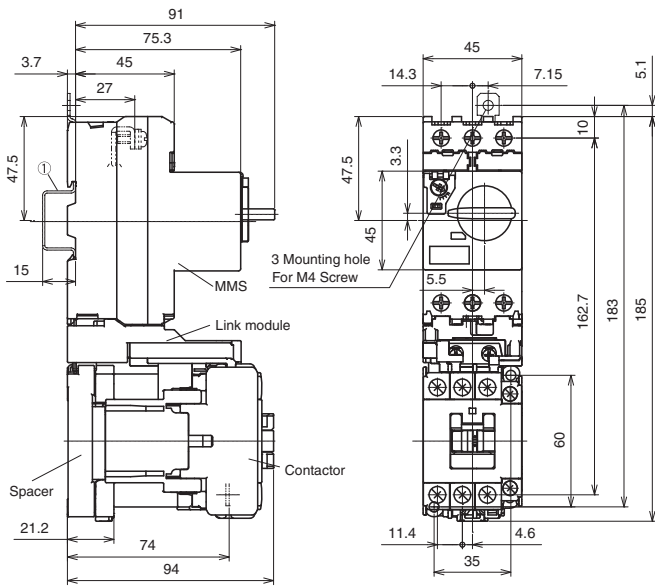
DUO series Combination Starters

Dimensions

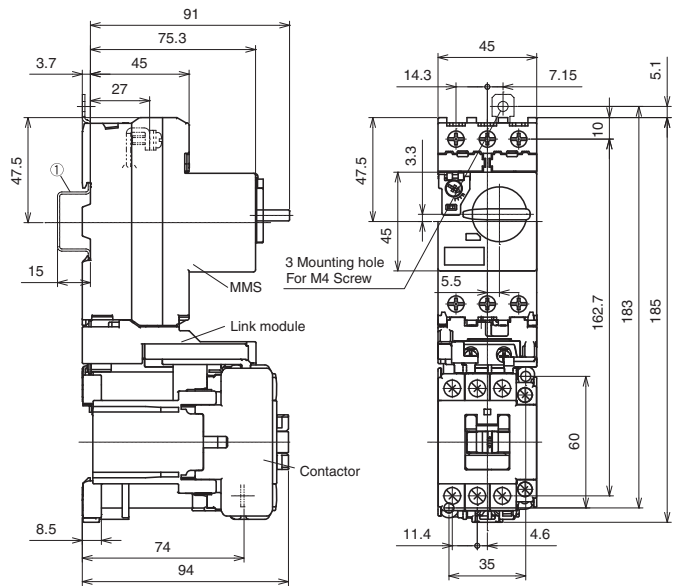
■ Dimensions, mm

• Combination

BM3RH□ + SK18A, SK22A



BM3RH□ + SK18G, SK22G



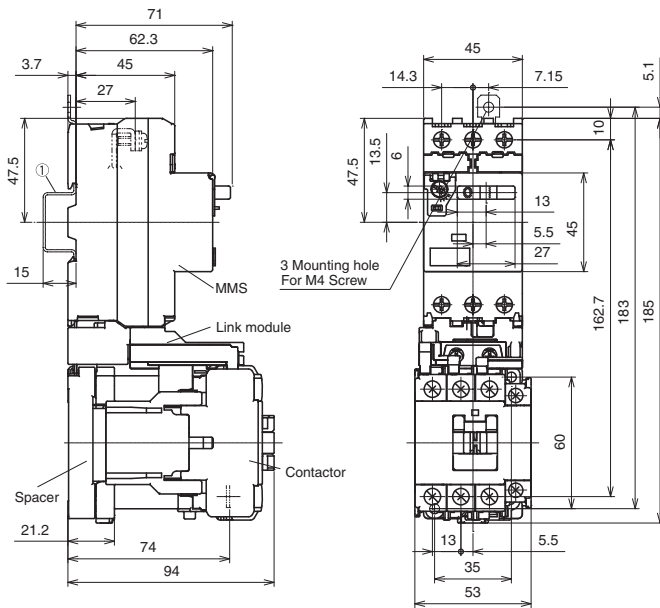
Rail mounting ①35mm wide rail (height 15mm) × 1

MMS	Contactors	Link module	Mass (g)
BM3RHB	SK18A, SK22A	BZ0LRK22AA	770
BM3RHR		+ BZ0LRKACA	

Rail mounting ①35mm wide rail (height 15mm) × 1

MMS	Contactors	Link module	Mass (g)
BM3RHB	SK18G, SK22G	BZ0LRK22AA	860
BM3RHR			

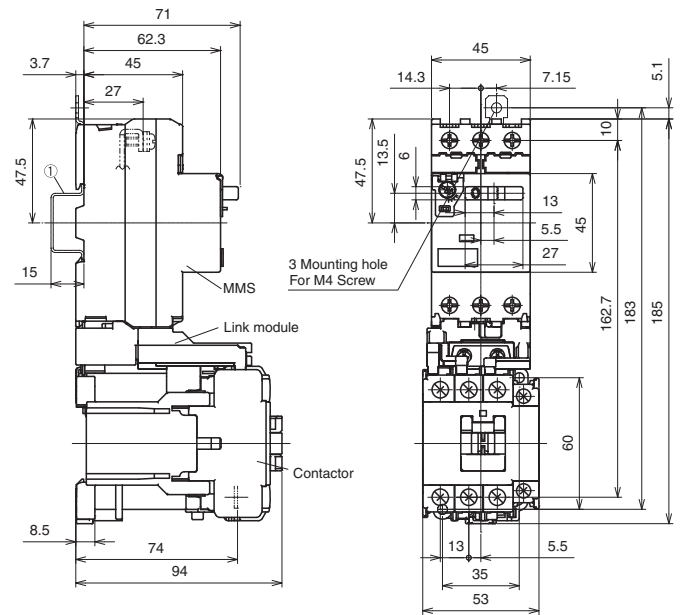
■ Dimensions, mm
• Combination
BM3RS□ + SK32A



Rail mounting ①35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RSB	SK32A	BZ0LRK32AA	780
BM3RSR		+ BZ0LRKACA	

BM3RS□ + SK32G



Rail mounting ①35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RSB	SK32G	BZ0LRK32AA	870
BM3RSR			



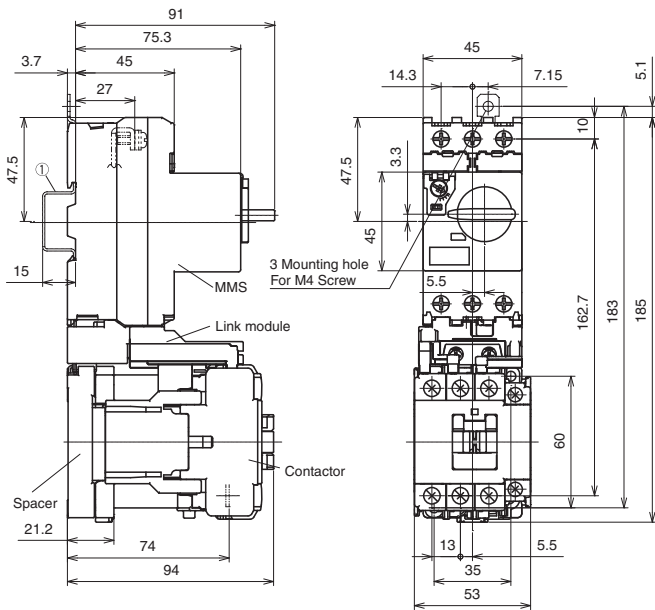
DUO series Combination Starters

Dimensions

■ Dimensions, mm

• Combination

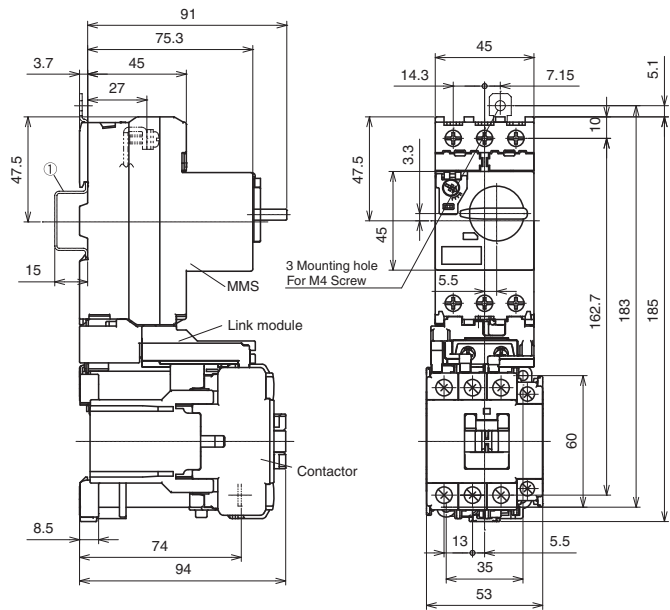
BM3RH□ + SK32A



Rail mounting ①35mm wide rail (height 15mm) x 1

MMS	Contactors	Link module	Mass (g)
BM3RHB	SK32A	BZ0LRK32AA	800
BM3RHR		+ BZ0LRKACA	

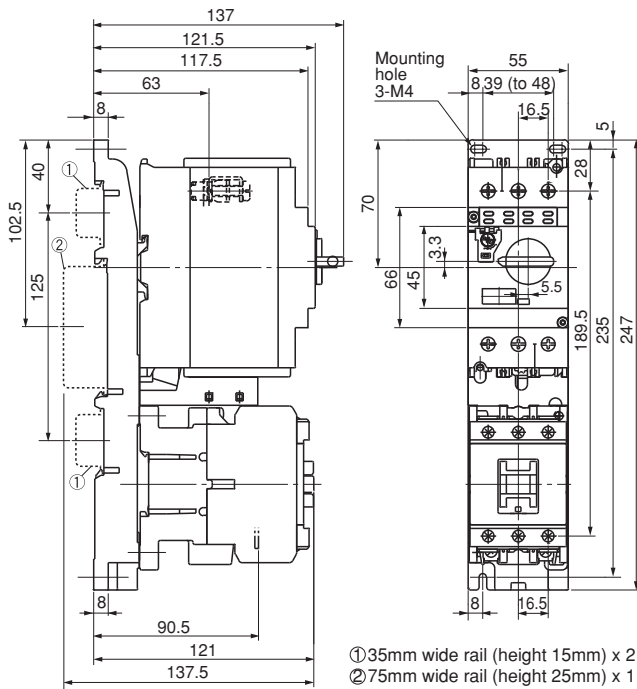
BM3RH□ + SK32G



Rail mounting ①35mm wide rail (height 15mm) x 1

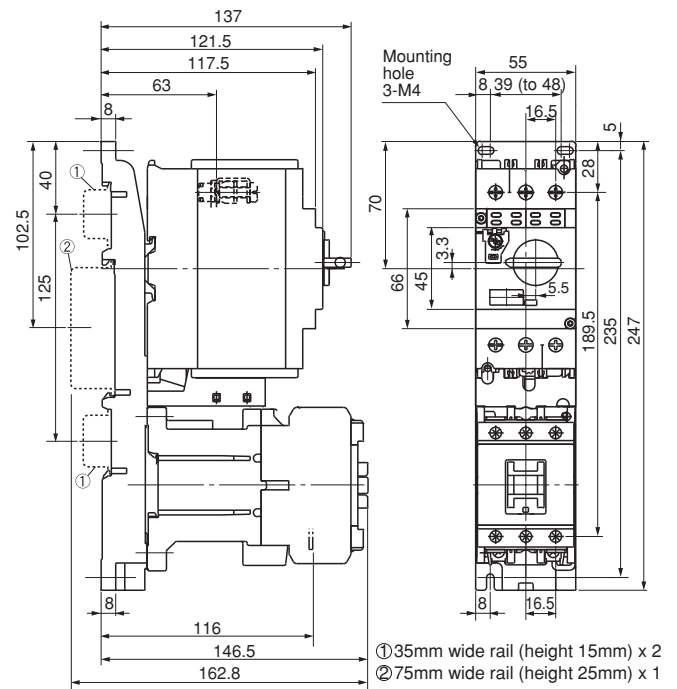
MMS	Contactors	Link module	Mass (g)
BM3RHB	SK32G	BZ0LRK32AA	890
BM3RHR			

■ Dimensions, mm
 • Combination
BM3V□B + SC-E1, E2, E3



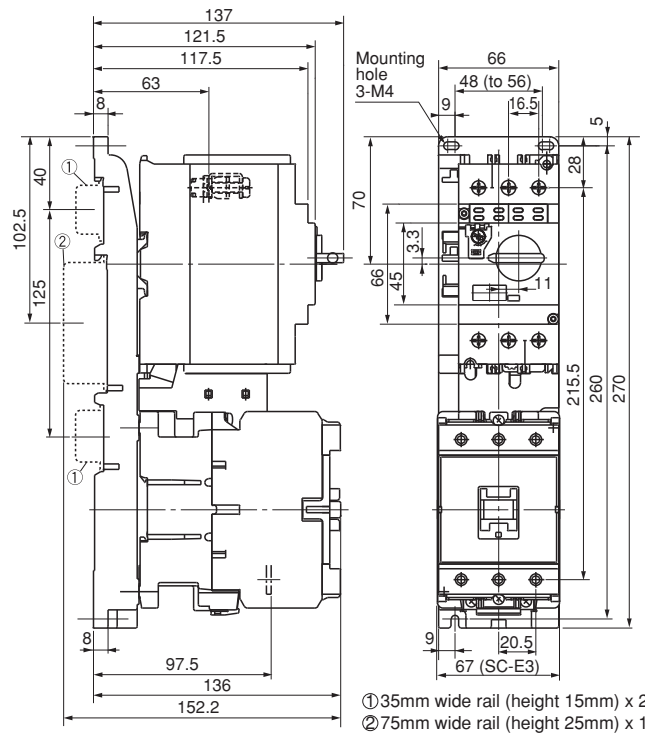
MMS	Contactors	Link module	Base plate	Mass (g)
BM3VSB	SC-E1, E2, E2S	BZ0LVE51AA	BZ0BPVE51A	1,580
BM3VHB				

BM3V□B + SC-E1/G, E2/G, E2S/G



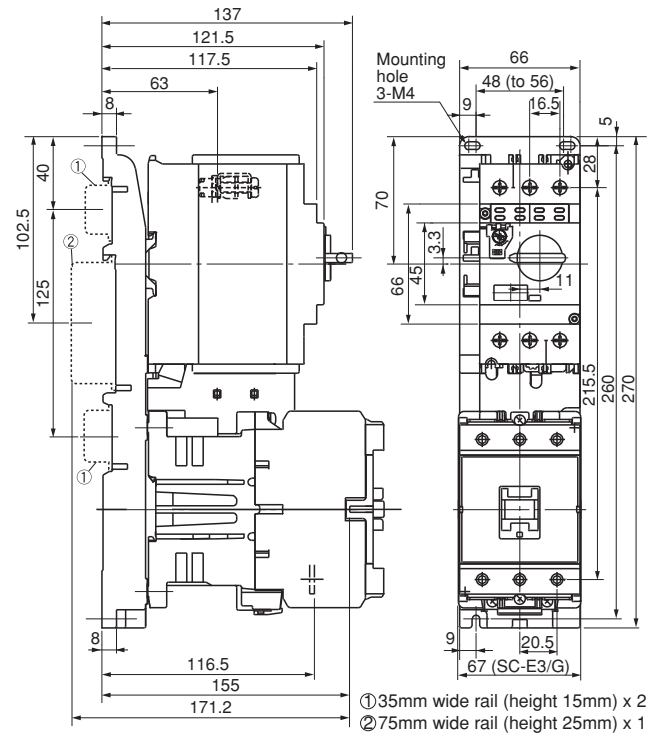
MMS	Contactors	Link module	Base plate	Mass (g)
BM3VSB	SC-E1/G, E2/G, E2S/G	BZ0LVE51GA	BZ0BPVE51A	1,810
BM3VHB				

BM3V□B + SC-E3



MMS	Contactors	Link module	Base plate	Mass (g)
BM3VSB	SC-E3	BZ0LVE65AA	BZ0BPVE65A	2,080
BM3VHB				

BM3V□B + SC-E3/G










MMS	Contactors	Link module	Base plate	Mass (g)
BM3VSB	SC-E3/G	BZ0LVE65GA	BZ0BPVE65A	2,400
BM3VHB				



DUO series Contactors




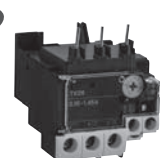





Quick reference guide

■ Standard Models

Series			SK Series		
Frame			06	09	12
Magnetic Contactor appearance			 (KKD14-157)		
Thermal Overload Relay appearance			 (KKD14-166)		
Type	Magnetic Contactors	AC-operated models	SK06A	SK09A	SK12A
		DC-operated models (2.4W)	SK06G	SK09G	SK12G
		DC-operated models (1.2W)	SK06L	SK09L	SK12L
	Thermal Overload Relay	TK12			
Rated insulation voltage (IEC)			690V	690V	690V
Rated impulse withstand voltage (IEC)			6kV	6kV	6kV
Rated frequency			50-60Hz	50-60Hz	50-60Hz
Main circuit ratings	3-phase squirrel-cage motor capacity [kW] AC-3 IEC60947-4-1	200-240V	1.5kW	2.2kW	3kW
		380-440V	2.2kW	4kW	5.5kW
		500-550V	3kW	4kW	5.5kW
	Rated current Ie [A] AC-3	200-240V	6A	9A	12A
		380-440V	6A	9A	12A
		500-550V	5A	7A	9A
	Conventional free air thermal current (Rated continuous current) Ith [A]		20A	20A	20A
Performances	Operating cycles per hour [times/hour]		1800	1800	1800
	Durability	Mechanical	10 million	10 million	10 million
		Electrical (AC-3, 200V)	1 million	1 million	1 million
Dimensions WxHxD [mm]			45x48x49	45x48x49	45x48x49
Options	Auxiliary Contact Blocks	Head-on (2-pole)	⊙		
		Head-on (4-pole) *1	⊙		
	Interlock Unit		⊙		
	Coil Surge Suppression Unit		⊙		
	Main Circuit Surge Suppression Unit		⊙		
Standards			    		

Note: *1 These products cannot be combined with the SK□L.

■ Standard Models




Series			SK Series		
Frame			18	22	32
Magnetic Contactor appearance			 (KKD14-095)		 (KKD14-113)
Thermal Overload Relay appearance			 (KKD14-083)		 (KKD14-179)
Type	Magnetic Contactors	AC-operated models	SK18A	SK22A	SK32A
		DC-operated models (2.4W)	SK18G	SK22G	SK32G
DC-operated models (1.2W)		—	—	—	
	Thermal Overload Relay		TK25	TK26	
Rated insulation voltage (IEC)			690V	690V	690V
Rated impulse withstand voltage (IEC)			6kV	6kV	6kV
Rated frequency			50-60Hz	50-60Hz	50-60Hz
Main circuit ratings	3-phase squirrel-cage motor capacity [kW] AC-3 IEC60947-4-1	200-240V	4.5kW	5.5kW	7.5kW
		380-440V	7.5kW	11kW	15kW
		500-550V	7.5kW	11kW	15kW
	Rated current I _e [A] AC-3	200-240V	18A	22A	32A
		380-440V	18A	22A	32A
		500-550V	13A	17A	24A
Conventional free air thermal current (Rated continuous current) I _{th} [A]		32A	32A	40A	
Performances	Operating cycles per hour [times/hour]		1800	1800	1200
	Durability	Mechanical	5 million	5 million	5 million
		Electrical (AC-3, 200V)	1 million	1 million	1 million
Dimensions W×H×D [mm]	AC-operated		45×81×81	45×81×81	53×81×81
	DC-operated		45×81×94	45×81×94	53×81×94
Options	Auxiliary Contact Blocks	Head-on (2-pole)	☉		
		Head-on (4-pole)	—		
		Side-on	☉		
	Interlock Unit		☉		
	Coil Surge Suppression Unit		☉		
Main Circuit Surge Suppression Unit		☉			
Standards			    		



DUO series Contactors

Standard Models and Production Models

■ Thermal Overload Relays

Thermal Overload Relay appearance	 (KKD14-166)	 (KKD14-095)	 (KKD14-113)
Type	TK12	TK25	TK26
Protection	Overload and phase-loss protection		
Ampere setting range The heating element code is given in brackets.	0.1-0.15A [P10] 0.13-0.2A [P13] 0.18-0.27A [P18] 0.24-0.36A [P24] 0.34-0.52A [P34] 0.48-0.72A [P48]	0.64-0.96A [P64] 0.8-1.2A [P80] 0.95-1.45A [P95] 1.1-1.65A [1P1] 1.4-2.1A [1P4] 1.7-2.6A [1P7]	2.2-3.4A [2P2] 2.8-4.2A [2P8] 4-6A [004] 5-7.5A [005] 6-9A [006] 7-10.5A [007]
	9-13A [009] 12-18A [012]*1 16-22A [016]*1 20-26A [020]*2 26-32A [026]*2		

Note: *1 For TK25, TK26 only.
*2 For TK26 only.

■ Production Models

Magnetic Contactors

Product	Type *1	Frame size						
		06	09	12	18	22	32	
Magnetic Contactors	AC-operated models	SK □ A	○	○	○	○	○	○
	DC-operated models (standard)	SK □ G	○	○	○	○	○	○
	DC-operated models (low power consumption)	SK □ L	○	○	○	—	—	—
Reversing Contactors	AC-operated models	SK □ AR	○	○	○	○	○	○
	DC-operated models (standard)	SK □ GR	○	○	○	○	○	○
	DC-operated models (low power consumption)	SK □ LR	○	○	○	—	—	—

Note: *1 In the □ mark, is replaced with the frame size.



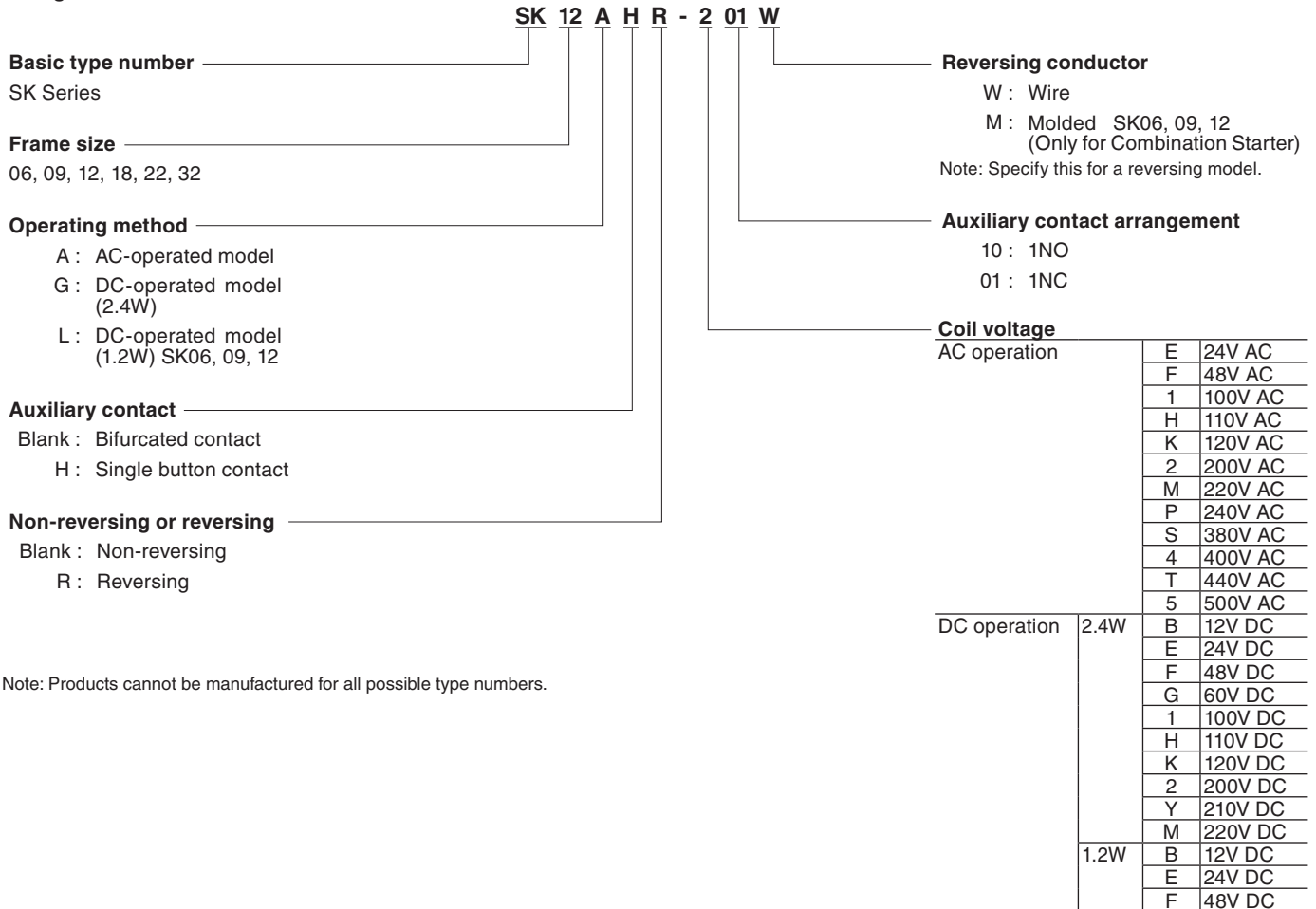
DUO series Contactors

Type Number Nomenclature

■ Type Number Nomenclature

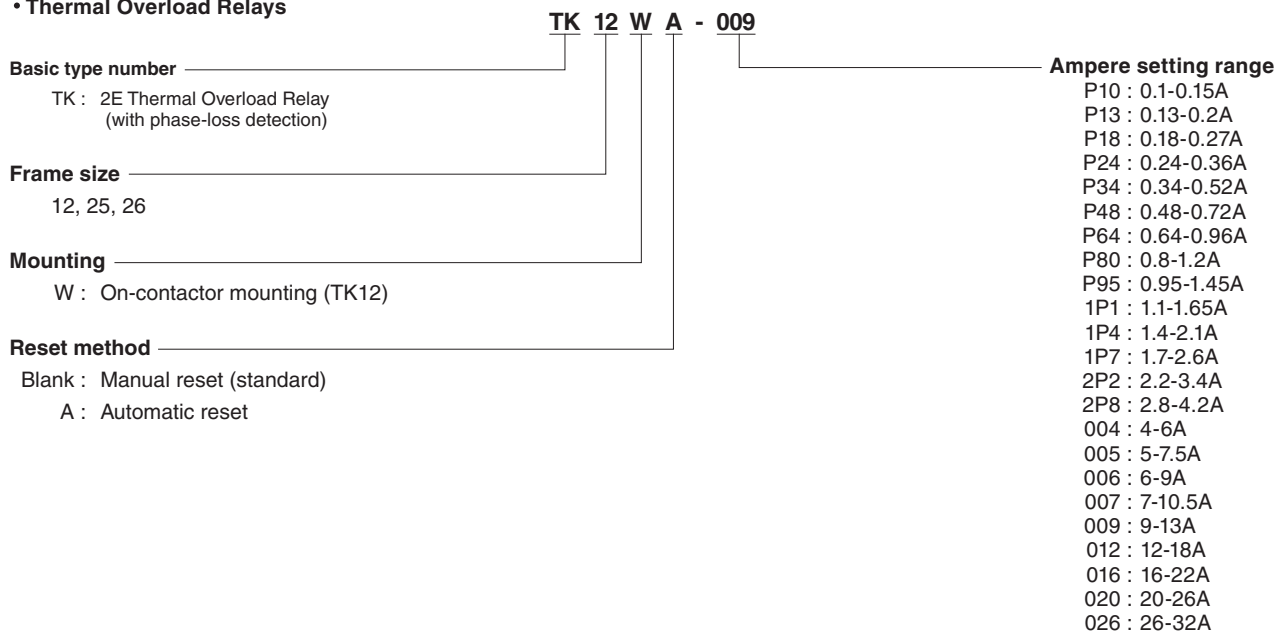
● Type Number Nomenclature (Type Number = Product Code)

• Magnetic Contactors



Note: Products cannot be manufactured for all possible type numbers.

• Thermal Overload Relays





Ratings

■ Main Circuit Ratings

● IEC-conformance Ratings (IEC 60947-4-1, EN 60947-4-1, and VDE 0660)

Type	Max. motor capacity [kW]				Operational current [A]				Conventional free air thermal current [A] (Rated thermal current)
	3-phase squirrel-cage motor (AC-3)				3-phase squirrel-cage motor (AC-3)				
	200-240V	380-440V	500-550V	600-690V	200-240V	380-440V	500-550V	600-690V	
SK06	1.5	2.2	3	3	6	6	5	3.5	20
SK09	2.2	4	4	4	9	9	7	5	20
SK12	3	5.5	5.5	4	12	12	9	5	20
SK18	4.5	7.5	7.5	7.5	18	18	13	9	32
SK22	5.5	11	11	7.5	22	22	17	9	32
SK32	7.5	15	15	11	32	32	24	15	40

Note: AC-3 200V electrical durability: 1,000,000 operations

● UL/CSA-conformance Ratings (UL60947-4-1A and CSA C22.2)

Type	Max. motor capacity [HP]				Operational current [A]				Rated continuous current [A]
	3-phase motor				3-phase motor				
	200V	220-240V	440-480V	550-600V	200V	220-240V	440-480V	550-600V	
SK06	1-1/2	2	3	5	6.9	6.8	4.8	6.1	20
SK09	2	3	5	5	7.8	9.6	7.6	6.1	20
SK12	3	3	5	5	11	9.6	7.6	6.1	20
SK18	5	5	10	7-1/2	17.5	15.2	14	9	32
SK22	5	7-1/2	15	10	17.5	22	21	11	32
SK32	7-1/2	10	20	15	25.3	28	27	17	40

Type	Max. motor capacity [HP]			Operational current [A]			Rated continuous current [A]
	Single-phase motor			Single-phase motor			
	110-120V	200V	220-240V	110-120V	200V	220-240V	
SK06	1/2	3/4	1	9.8	7.9	8	20
SK09	3/4	1	1-1/2	13.8	9.2	10	20
SK12	1	1-1/2	2	16	11.5	12	20
SK18	1	2	2	16	13.8	12	32
SK22	1-1/2	3	3	20	19.6	17	32
SK32	2	3	5	24	19.6	28	40

Note: Use wires that are rated for 75°C.

■ Auxiliary Circuit Ratings

● IEC-conformance Ratings (Standard Models: Bifurcated Contact)

Type	Conventional free air thermal current [A] (Rated thermal current)	Making and breaking current (AC)	Rated operational current [A]						Minimum voltage and current
			AC rated operational voltage [V]	AC-15 (Ind. load)	AC-12 (Res. load)	DC rated operational voltage [V]	DC-13 (Ind. load)	DC-12 (Res. load)	
SK06 SK09 SK12 SKH4	10	30	100-120	3	6	24	2	3	5V DC, 3mA
		30	200-240	3	6	48	1	2	
		10	380-440	1	6	110	0.3	1.5	
		5	500-600	0.5	3	220	0.2	0.5	
SK18 SK22 SK32	10	60	100-120	6	10	24	3	5	5V DC, 3mA
		30	200-240	3	8	48	1.5	3	
		15	380-440	1.5	5	110	0.55	2.5	
		12	500-600	1.2	5	220	0.27	1	

Note: The failure level is 10^{-7} for a normal environment without dust, dirt, or corrosive gas.
The ratings of additional auxiliary contacts are the same as those given above.

● IEC-conformance Ratings (Single Button Contact)

Type	Conventional free air thermal current [A] (Rated thermal current)	Making and breaking current (AC)	Rated operational current [A]						Minimum voltage and current
			AC rated operational voltage [V]	AC-15 (Ind. load)	AC-12 (Res. load)	DC rated operational voltage [V]	DC-13 (Ind. load)	DC-12 (Res. load)	
SK06□H SK09□H SK12□H SKH4□H	10	60	100-120	6	10	24	4	8	24V DC, 10mA
		60	200-240	3	10	48	1	3.5	
		60	380-440	1.5	10	110	0.5	2.5	
		30	500-600	1.2	5	220	0.25	0.8	
SK18□H SK22□H SK32□H	10	60	100-120	6	10	24	5	10	24V DC, 10mA
		60	200-240	6	10	48	1.5	5	
		40	380-440	4	10	110	0.7	4	
		40	500-600	4	10	220	0.27	1	

Note: The failure level is 10^{-7} for a normal environment without dust, dirt, or corrosive gas.
The ratings of additional auxiliary contacts are the same as those given above.

● UL/CSA-conformance Ratings (Bifurcated Contact or Single Button Contact)

Type	Rated continuous current [A]	Rated operational current [A]						Rating code	
		AC			DC			AC	DC
		Rated operational voltage [V]	Making	Breaking	Rated operational voltage [V]	Making	Breaking		
SK06 SK09 SK12 SK18 SK22 SK32 SKH4	10	120	60	6	125	0.55	0.55	A600	Q300
		240	30	3					
		480	15	1.5	250	0.27	0.27		
		600	12	1.2					



■ Operating Coil Voltages

● AC-operated Models

Type	Order voltage	Code	Coil voltage and frequency
SK06A	24V AC	E	24V 50Hz / 24-26V 60Hz
SK09A	48V AC	F	48V 50Hz / 48-52V 60Hz
SK12A	100V AC	1	100V 50Hz / 100-110V 60Hz
SK18A	110V AC	H	100-110V 50Hz / 110-120V 60Hz
SK22A	120V AC	K	110-120V 50Hz / 120-130V 60Hz
SK32A	200V AC	2	200V 50Hz / 200-220V 60Hz
	220V AC	M	200-220V 50Hz / 220-240V 60Hz
	240V AC	P	220-240V 50Hz / 240-260V 60Hz
	380V AC	S	346-380V 50Hz / 380-420V 60Hz
	400V AC	4	380-400V 50Hz / 400-440V 60Hz
	440V AC	T	415-440V 50Hz / 440-480V 60Hz
	500V AC	5	480-500V 50Hz / 500-550V 60Hz

● DC-operated Models (2.4W)

Type	Order voltage	Code	Coil voltage
SK06G	12V DC	B	12V DC
SK09G	24V DC	E	24V DC
SK12G	48V DC	F	48V DC
SK18G	60V DC	G	60V DC
SK22G	100V DC	1	100V DC
SK32G	110V DC	H	110V DC
	120V DC	K	120V DC
	200V DC	2	200V DC
	210V DC	Y	210V DC
	220V DC	M	220V DC

● DC-operated Models (1.2W)

Type	Order voltage	Code	Coil voltage
SK06L	12V DC	B	12V DC
SK09L	24V DC	E	24V DC
SK12L	48V DC	F	48V DC

■ Operating Coil Characteristics

● AC-operated Models

Type	Power consumption [VA]				Watt loss [W]		Pick-up voltage [V]		Drop-out voltage [V]		Operating times [ms]	
	Inrush		Sealed		200V 50Hz	220V 60Hz	50Hz	60Hz	50Hz	60Hz	Coil ON → Contact ON	Coil OFF → Contact OFF
	200V 50Hz	220V 60Hz	200V 50Hz	220V 60Hz								
SK06A SK09A SK12A	22	25	4.5	4.5	1.2	1.3	122-135	128-138	80-89	83-96	17-26	8-11
SK18A SK22A	90	95	9	9	2.7	2.8	118-136	130-146	75-106	88-120	9-20	5-16
SK32A	90	95	9	9	2.7	2.8	118-136	130-146	75-106	88-120	9-20	5-16

Note 1. The characteristics are for the following coil ratings: 200V, 50Hz/200 to 220V, 60Hz.

Note 2. The electromagnet capacity is the same even when the rated coil voltage is not 200V AC.

Note 3. The operating times are for 200V AC, 50Hz.

Note 4. The pick-up voltage and drop-out voltage for a 100V (100V AC, 50 Hz/100 to 110V, 60Hz) coil are approximately half of the values that are given in the above table.

Note 5. The values in the above table are examples for a cold status at 20°C.

● DC-operated Models (2.4W)

Type	Power consumption [W]		Time constant [ms]	Pick-up voltage [V]	Drop-out voltage [V]	Operating times [ms]	
	Inrush	Sealed	Sealed			Coil ON → Contact ON	Coil OFF → Contact OFF
	24V	24V					
SK06G SK09G SK12G	2.4	2.4	20	10-11	4-6	22-24	5-6
SK18G SK22G	2.4	2.4	33	15-16	3.5-5	65-72	18-23
SK32G	2.4	2.4	33	15-16	3.5-5	65-72	18-23

Note 1. The characteristics are for the following coil rating: 24V DC.

Note 2. The electromagnet capacity is the same even when the rated coil voltage is not 24V DC.

Note 3. The values in the above table are examples for a cold status at 20°C.

● DC-operated Models (1.2W)

Type	Power consumption [W]		Time constant [ms]	Pick-up voltage [V]	Drop-out voltage [V]	Operating times [ms]	
	Inrush	Sealed	Sealed			Coil ON → Contact ON	Coil OFF → Contact OFF
	24V	24V					
SK06L SK09L SK12L	1.2	1.2	20	13-14	4-5	30-33	8-9

Note 1. The characteristics are for the following coil rating: 24V DC.

Note 2. The electromagnet capacity is the same even when the rated coil voltage is not 24V DC.

Note 3. The values in the above table are examples for a cold status at 20°C.



DUO series Contactors

Ratings

■ Performances

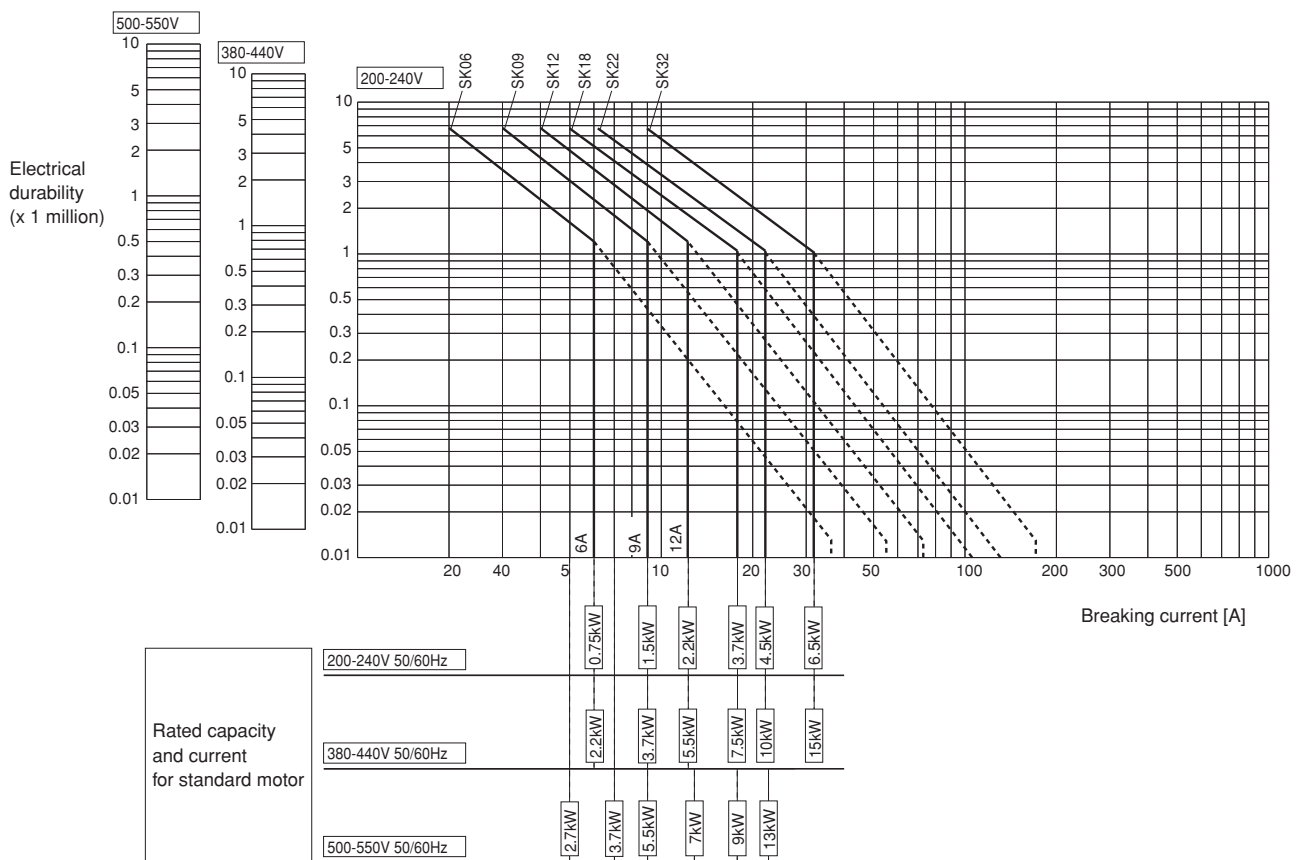
Type	Rated operational voltage [V]	Rated operational current [A]	Making/breaking current [A]		Operating cycles per hour [times/hour]	Durability (Operations)	
			Making	Breaking		Mechanical	Electrical *1*2
SK06	220	6	72	60	1800	10 million	1 million
	440	6	72	60			
SK09	220	9	108	90			
	440	9	108	90			
SK12	220	12	144	120			
	440	12	144	120			
SK18	220	18	216	180	5 million		
	440	18	180	144			
SK22	220	22	264	220			
	440	22	220	176			
SK32	220	32	320	260	1200		
	440	32	320	256			

Note: *1 Electrical durability is based on a value of 200 V, which will differ depending on the load conditions and characteristics of the motor being used. Electrical durability may degrade and contact welding may occur if the starting current of the motor is high.

*2 The electrical durability will differ when the primary side of an inverter's driving control device is being used and the capacitor charging current is flowing. The peak value for the current is up to six times rated operational current, and the electrical durability is 100,000 cycles. In addition to taking precautions concerning the rated operational current, make sure that the total capacitor charging current does not exceed six times the rated capacity when connecting multiple driving control devices.

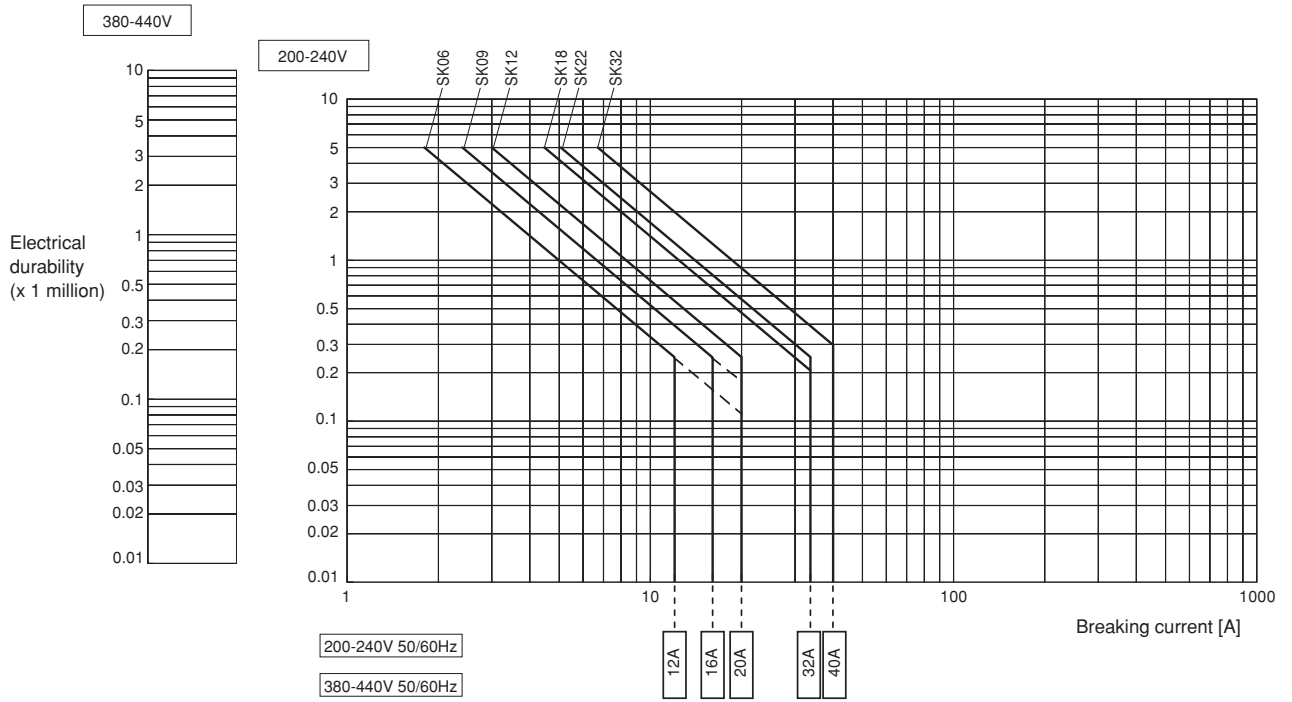
■ AC-3 Breaking Current and Electrical Durability

● SK06 to SK32



■ AC-1 Breaking Current and Electrical Durability

- SK06 to SK32





Magnetic Contactors

■ Features

- International safety standards for standard models (IEC, GB, JIS, UL, and CSA).
- Models available with AC or DC operating coils (DC: 2.4W and 1.2W models only).
- Many optional units.
 - Auxiliary Contact Blocks (2-pole or 4-pole)
 - Coil Surge Suppression Units
 - Interlock Units
- Easier Thermal Overload Relay wiring.
The terminal arrangement separates main circuit wires and auxiliary circuit wires for easier wiring.



■ Ordering Information (Types)

- Magnetic Contactors

SK 06 A H - E 10
① ② ③ ④ ⑤ ⑥

- ① Series
- ② Frame size
- ③ Operating coil specification
- ④ Auxiliary contact specification
- ⑤ Coil voltage specification
- ⑥ Auxiliary contact arrangement

■ Ratings and Types

- Magnetic Contactors SK06, 09, 12

Frame size ②	Max. motor capacity [kW]			Rated operational current [A]			Resistive load (AC-1)		Conventional free air thermal current [A] (Rated thermal current)	Operating coil specification ③	Auxiliary contact specification ④	Auxiliary contact arrangement ⑥	Type
	3-phase squirrel-cage motor (AC-3)			3-phase squirrel-cage motor (AC-3)			Resistive load (AC-1)						
	200-240V	380-440V	500-550V	200-240V	380-440V	500-550V	200-240V	380-440V					
6A [06]	1.5	2.2	3	6	6	5	12	12	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK06A-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK06AH-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK06G-□▲
9A [09]	2.2	4	4	9	9	7	16	16	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK06GH-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK06L-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK06LH-□▲
12A [12]	3	5.5	5.5	12	12	9	20	20	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK09A-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK09AH-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK09G-□▲
12A [12]	3	5.5	5.5	12	12	9	20	20	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK09GH-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK09L-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK09LH-□▲
12A [12]	3	5.5	5.5	12	12	9	20	20	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK12A-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK12AH-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK12G-□▲
12A [12]	3	5.5	5.5	12	12	9	20	20	20	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK12GH-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK12L-□▲
										DC-operated (1.2W) [L]	Bifurcated [blank] Single [H]		SK12LH-□▲

Note 1. "□" in the type column is replaced with the coil voltage code.

Note 2. "▲" in the type column is replaced with the auxiliary contact arrangement code.

Note 3. Numbers and letters in brackets [] are used in the product code.

● Magnetic Contactors SK18, 22, 32

Frame size ②	Max. motor capacity [kW]			Rated operational current [A]					Conventional free air thermal current [A] (Rated thermal current)	Operating coil specification ③	Auxiliary contact specification ④	Auxiliary contact arrangement ⑥	Type
	3-phase squirrel-cage motor (AC-3)			3-phase squirrel-cage motor (AC-3)			Resistive load (AC-1)						
	200-240V	380-440V	500-550V	200-240V	380-440V	500-550V	200-240V	380-440V					
18A [18]	4.5	7.5	7.5	18	18	13	-	-	32	AC-operated [A]	Bifurcated [blank] Single [H]	1NO [10] 1NC [01]	SK18A-□▲
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		SK18AH-□▲ SK18G-□▲ SK18GH-□▲
22A [22]	5.5	11	11	22	22	17	-	-	32	AC-operated [A]	Bifurcated [blank] Single [H]	SK22A-□▲ SK22AH-□▲ SK22G-□▲ SK22GH-□▲	
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		
32A [32]	7.5	15	15	32	32	24	-	-	40	AC-operated [A]	Bifurcated [blank] Single [H]	SK32A-□▲ SK32AH-□▲ SK32G-□▲ SK32GH-□▲	
										DC-operated (2.4W) [G]	Bifurcated [blank] Single [H]		

Note 1. "□" in the type column is replaced with the coil voltage code.

Note 2. "▲" in the type column is replaced with the auxiliary contact arrangement code.

Note 3. Numbers and letters in brackets [] are used in the product code.

● Coil voltage ⑤

AC-operated	Order Voltage	24	48	100	110	120	200	220	240	380	400	440	500
	Product code	E	F	1	H	K	2	M	P	S	4	T	5
DC-operated (2.4W)	Order Voltage	12	24	48	60	100	110	120	200	210	220		
	Product code	B	E	F	G	1	H	K	2	Y	M		
DC-operated (1.2W)	Order Voltage	12	24	48									
	Product code	B	E	F									

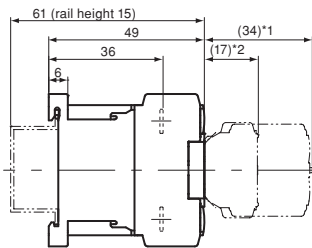


DUO series Contactors

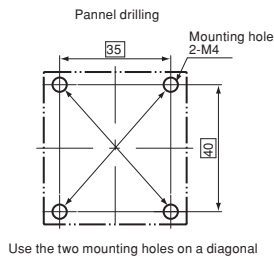
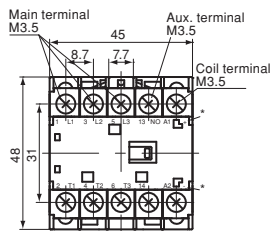
Magnetic Contactors

■ Dimensions, mm

● Magnetic Contactors SK06, SK09, SK12



Note:
*1 With SZ1KA□ auxiliary contact blocks.
*2 With SZ1FA□ auxiliary contact blocks.

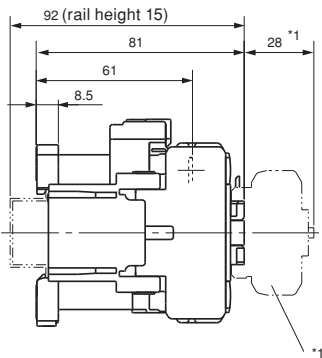


Aux. contact	Contact arrangement
1NO	
1NC	

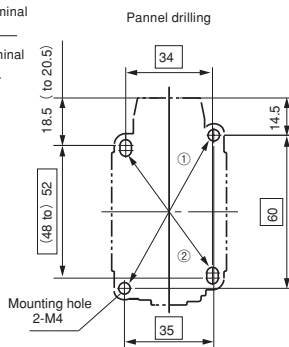
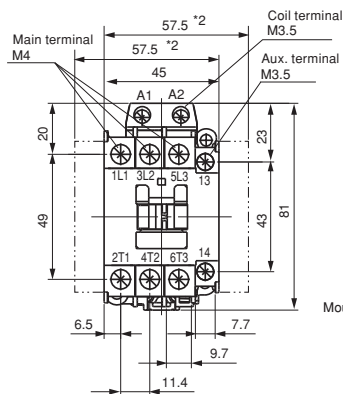
*: For DC-operated

Mass:
0.14kg (For AC-operated)
0.17kg (For DC-operated)

SK18A, SK22A



Note:
*1 With front mounting auxiliary contact block
*2 With side mounting auxiliary contact block

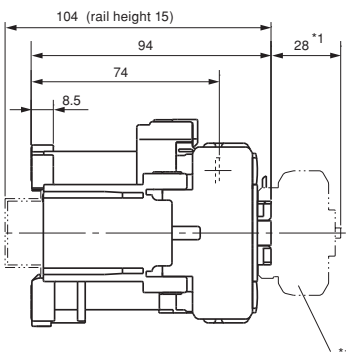


Use the two mounting holes on a diagonal
① 35 x 60
② 34 x (48 to) 52: Convertible with SC-4-0,SC-4-1

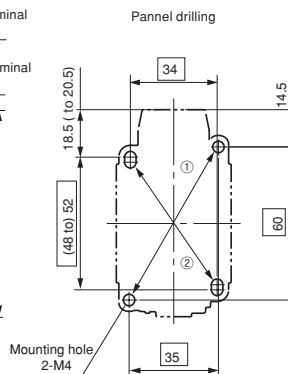
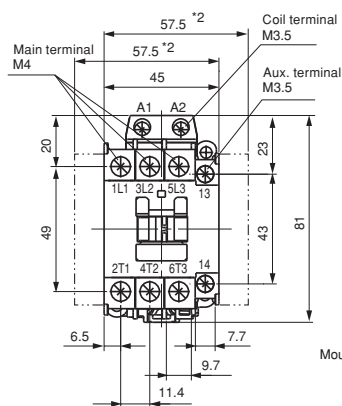
Aux. contact	Contact arrangement
1NO	
1NC	

Mass: 0.34kg

SK18G, SK22G



Note:
*1 With front mounting auxiliary contact block
*2 With side mounting auxiliary contact block

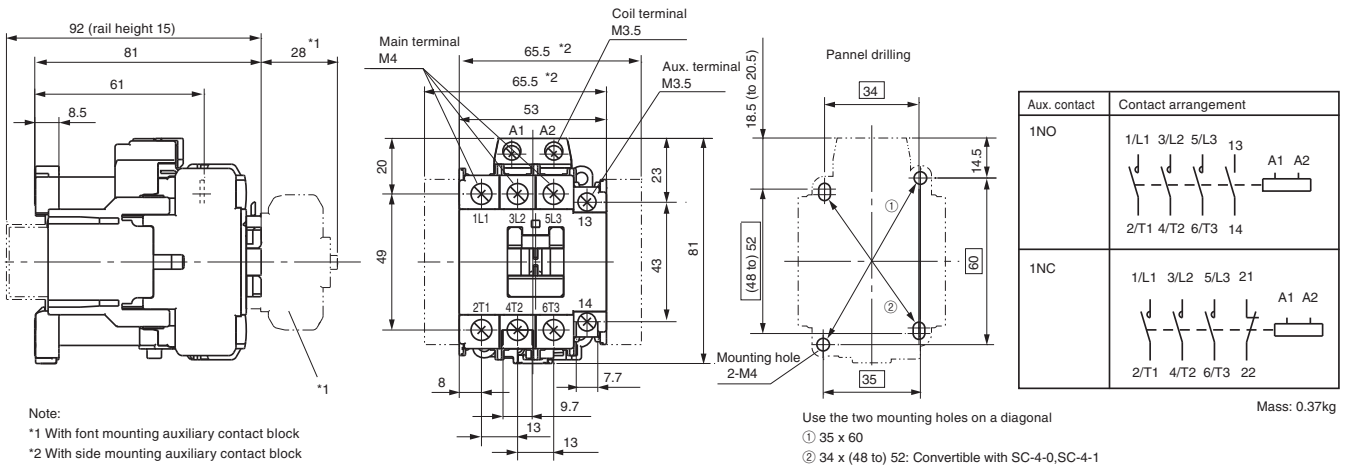


Use the two mounting holes on a diagonal
① 35 x 60
② 34 x (48 to) 52: Convertible with SC-4-0/G,SC-4-1/G

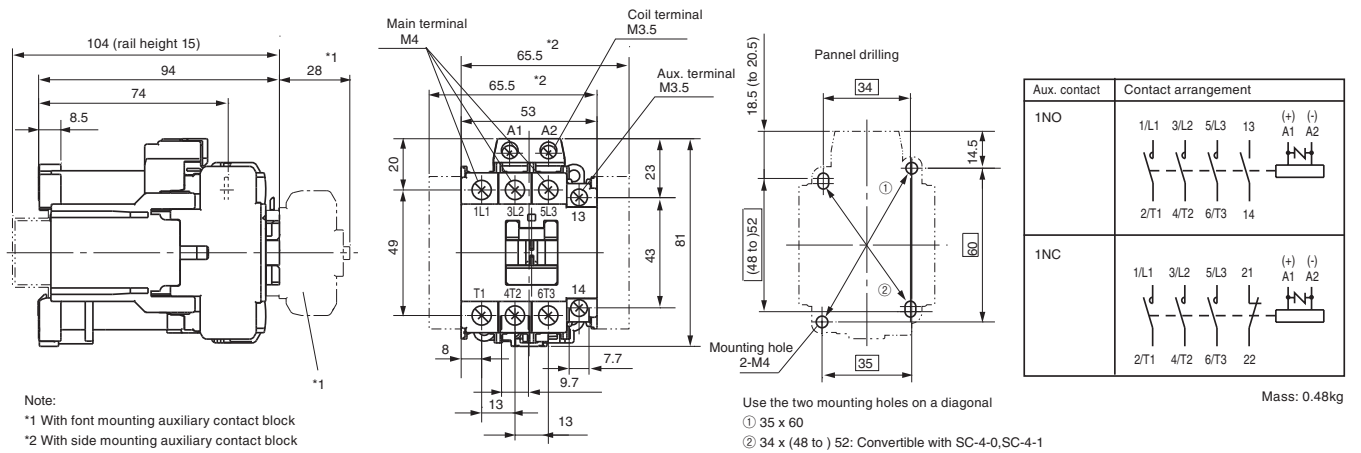
Aux. contact	Contact arrangement
1NO	
1NC	

Mass: 0.43kg

SK32A



SK32G





DUO series Contactors

Reversing Magnetic Contactors

Reversing Magnetic Contactors

■ Features

- Ideal for forward/reverse motor operation and plugging.
- Mechanical interlock provided as a standard feature.

■ Ordering Information (Types)

- Reversing Magnetic Contactors

SK 06 A □ R - E 10 W
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① Series
- ② Frame size
- ③ Operating coil specification
- ④ Auxiliary contact specification
- ⑤ Reversing
- ⑥ Coil voltage specification
- ⑦ Auxiliary contact arrangement
- ⑧ Reversing connection



■ Ratings and Types

- Reversing Magnetic Contactors SK06, SK09, SK12

Frame size ②	Max. motor capacity [kW]			Rated operational current [A]			Conventional free air thermal current [A]		Operating coil specification ③ (Rated thermal current)	Auxiliary contact specification ④	Auxiliary contact arrangement ⑦	Type	
	3-phase squirrel-cage motor (AC-3)			3-phase squirrel-cage motor (AC-3)			Resistive load (AC-1)						
	200-240V	380-440V	500-550V	200-240V	380-440V	500-550V	200-240V	380-440V					
6A [06]	1.5	2.2	3	6	6	5	12	12	20	AC-operated [A]	Bifurcated [blank]	1NO x 2 [10] 1NC x 2 [01]	SK06AR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK06AHR-□▲W
										DC-operated (1.2W) [L]	Bifurcated [blank]		SK06GR-□▲W SK06GHR-□▲W SK06LR-□▲W SK06LHR-□▲W
9A [09]	2.2	4	4	9	9	7	16	16		AC-operated [A]	Bifurcated [blank]		SK09AR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK09AHR-□▲W
										DC-operated (1.2W) [L]	Bifurcated [blank]		SK09GR-□▲W SK09GHR-□▲W SK09LR-□▲W SK09LHR-□▲W
12A [12]	3	5.5	5.5	12	12	9	20	20		AC-operated [A]	Bifurcated [blank]		SK12AR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK12AHR-□▲W
										DC-operated (1.2W) [L]	Bifurcated [blank]		SK12GR-□▲W SK12GHR-□▲W SK12LR-□▲W SK12LHR-□▲W

Note 1. "□" in the type column is replaced with the coil voltage code.

Note 2. "▲" in the type column is replaced with the auxiliary contact arrangement code.

Note 3. Numbers and letters in brackets [] are used in the product code.

Note 4. An electrical interlock is not implemented on Magnetic Contactors with an auxiliary contact arrangement of 1NOx2. When using these Magnetic Contactors, always implement an electrical interlock in the external control circuits to prevent short-circuit faults when power is turned ON.

Note 5. An electrical interlock is implemented in the auxiliary circuit configurations of the Magnetic Contactor. If you need to use an auxiliary contact, add an option Auxiliary Contact Blocks.

● Reversing Magnetic Contactors SK18, SK22, SK,32

Frame size ②	Max. motor capacity [kW]			Rated operational current [A]					Conventional free air thermal current [A] (Rated thermal current)	Operating coil specification ③	Auxiliary contact specification ④	Auxiliary contact arrangement ⑦	Type
	3-phase squirrel-cage motor (AC-3)			3-phase squirrel-cage motor (AC-3)			Resistive load (AC-1)						
	200-240V	380-440V	500-550V	200-240V	380-440V	500-550V	200-240V	380-440V					
18A [18]	4.5	7.5	7.5	18	18	13	-	-	32	AC-operated [A]	Bifurcated [blank]	1NO x 2 [10] 1NC x 2 [01]	SK18AR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK18AHR-□▲W
22A [22]	5.5	11	11	22	22	17	-	-	32	AC-operated [A]	Bifurcated [blank]		SK18GR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK18GHR-□▲W
32A [32]	7.5	15	15	32	32	24	-	-	40	AC-operated [A]	Bifurcated [blank]		SK22AR-□▲W
										DC-operated (2.4W) [G]	Bifurcated [blank]		SK22AHR-□▲W
													SK22GR-□▲W
													SK22GHR-□▲W
													SK32AR-□▲W
													SK32AHR-□▲W
													SK32GR-□▲W
													SK32GHR-□▲W

Note 1. "□" in the type column is replaced with the coil voltage code.

Note 2. "▲" in the type column is replaced with the auxiliary contact arrangement code.

Note 3. Numbers and letters in brackets [] are used in the product code.

Note 4. An electrical interlock is not implemented on Magnetic Contactors with an auxiliary contact arrangement of 1NOx2. When using these Magnetic Contactors, always implement an electrical interlock in the external control circuits to prevent short-circuit faults when power is turned ON.

Note 5. An electrical interlock is implemented in the auxiliary circuit configurations of the Magnetic Contactor. If you need to use an auxiliary contact, add an option Auxiliary Contact Blocks.

● Coil voltage ⑥

AC-operated	Order Voltage	24	48	100	110	120	200	220	240	380	400	440	500
	Product code	E	F	1	H	K	2	M	P	S	4	T	5
DC-operated (2.4W)	Order Voltage	12	24	48	60	100	110	120	200	210	220		
	Product code	B	E	F	G	1	H	K	2	Y	M		
DC-operated (1.2W)	Order Voltage	12	24	48									
	Product code	B	E	F									

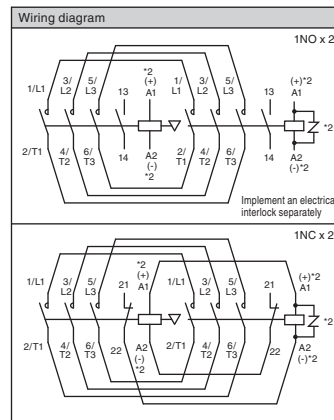
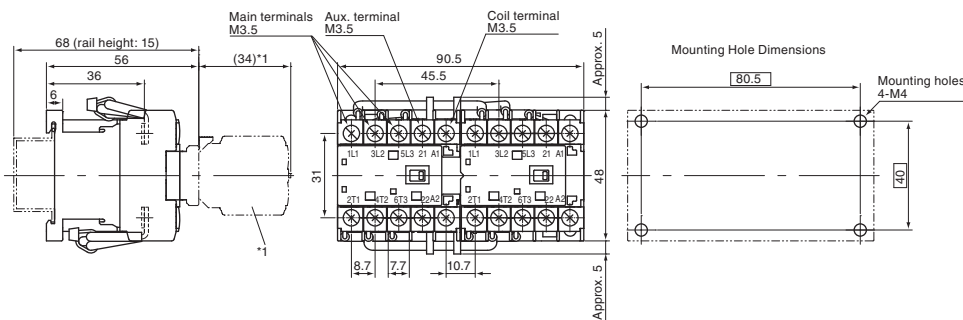


DUO series Contactors

Reversing Magnetic Contactors and Magnetic Starters

■ Dimensions, mm

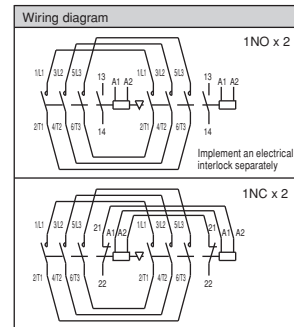
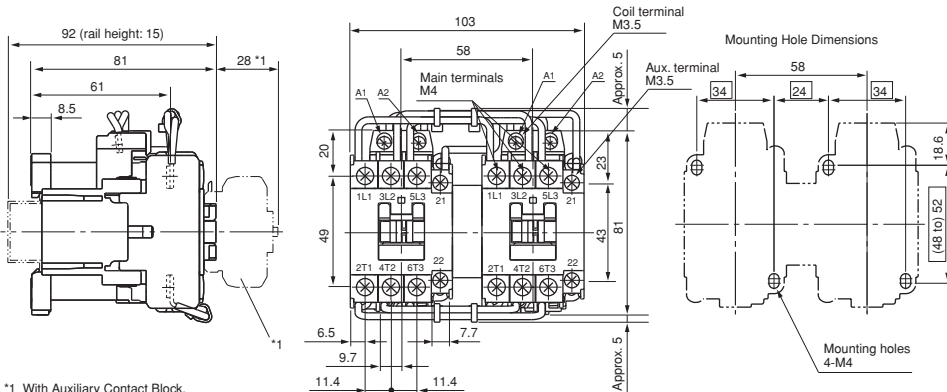
● Magnetic Contactors SK06□R, SK09□R, SK12□R



[NOTE]
*1 With Auxiliary Contact Blocks
*2 For DC-operated models.

Mass: 0.32kg (AC-operated model)
0.38kg (DC-operated model)

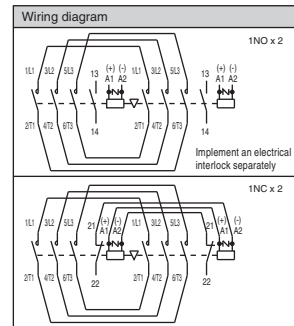
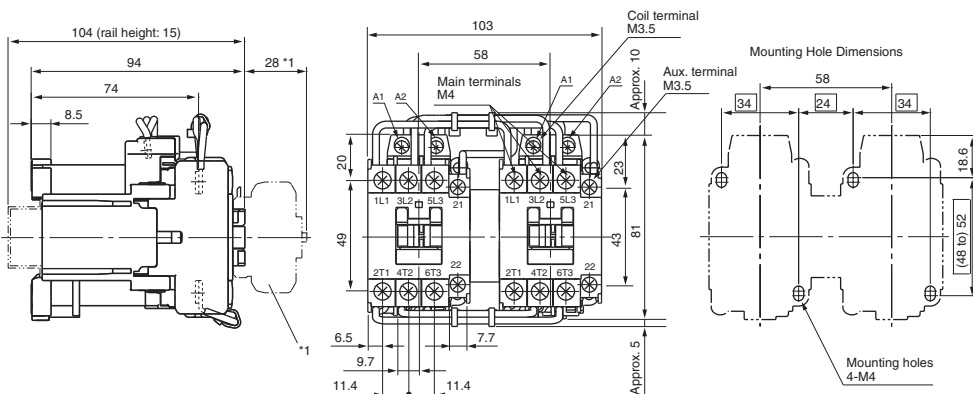
SK18AR, SK22AR



*1 With Auxiliary Contact Block.

Mass: 0.73kg

SK18GR, SK22GR

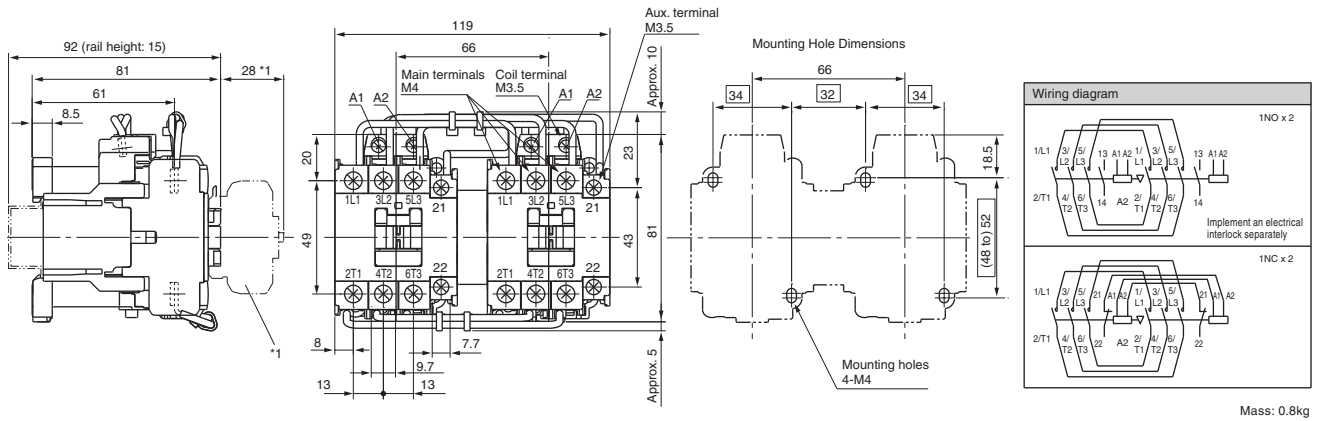


*1 With Auxiliary Contact Block.

Mass: 0.9kg

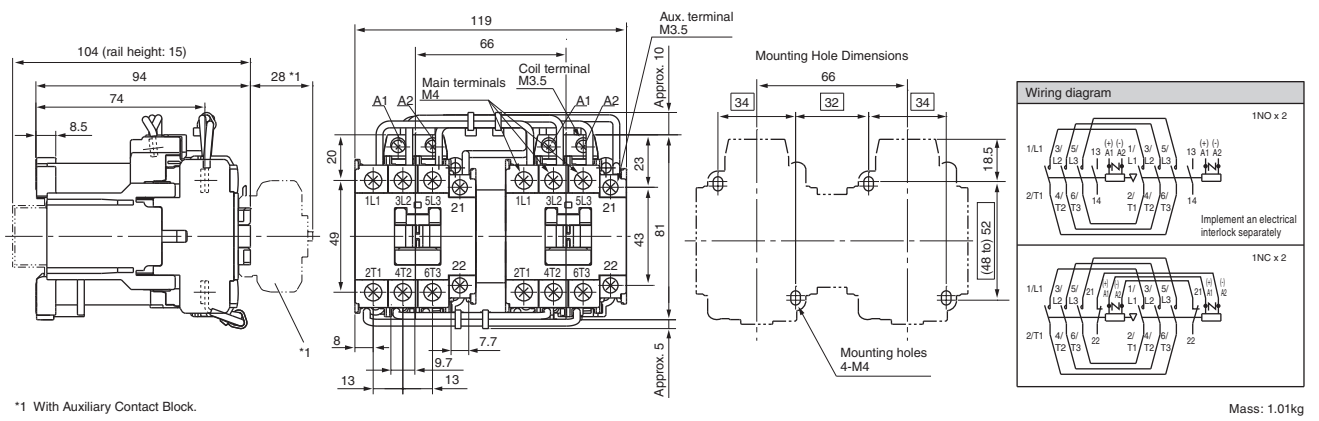
■ Dimensions, mm

SK32AR



*1 With Auxiliary Contact Block.

SK32GR



*1 With Auxiliary Contact Block.



DUO series Contactors

Thermal Overload Relay

Thermal Overload Relay

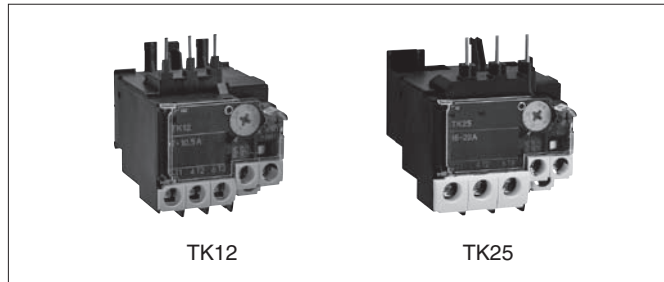
■ Features

- International safety standards for standard models (IEC, GB, JIS, UL, and CSA).
- A terminal cover and dial cover are provided as standard features.
- Highly reliable 1NO1NC isolated auxiliary contacts to enable using NC and NO contacts at different potentials.
- Easily switch between manual and automatic reset.
- Parallel arrangement of main terminals and auxiliary terminals for easier wiring.

■ Ratings and Types

Type
TK12W□-■■■■
TK25□-■■■■
TK26□-■■■■

Note. "□" in the type column is replaced with the reset method code.
 "■■■■" is replaced by the specified code for the current setting range.



■ Ordering Information (Types)

- Thermal Overload Relay

TK 12 W A - 009

① ② ③ ④ ⑤

- ① Type
- ② Frame size
- ③ Mounting (TK12)
- ④ Reset method
- ⑤ Ampere setting range *

* Refer to Heat Element Rating Specification Codes.

■ Ampere Setting Range Specification Codes

Type			Ampere setting range (A)	Ordering code	Applicable magnetic contactors					
TK12	TK25	TK26	0.1 - 0.15	P10	SK06	SK09	SK12	SK18	SK22	SK32
			0.13 - 0.2	P13						
			0.18 - 0.27	P18						
			0.24 - 0.36	P24						
			0.34 - 0.52	P34						
			0.48 - 0.72	P48						
			0.64 - 0.96	P64						
			0.8 - 1.2	P80						
			0.95 - 1.45	P95						
			1.1 - 1.65	1P1						
			1.4 - 2.1	1P4						
			1.7 - 2.6	1P7						
			2.2 - 3.4	2P2						
			2.8 - 4.2	2P8						
			4 - 6	004						
			5 - 7.5	005						
			6 - 9	006						
			7 - 10.5	007						
			9 - 13	009						
			12 - 18	012						
16 - 22	016									
20 - 26	020									
26 - 32	026									
-	-	-	-	-	-	-	-	-	-	-

■ Auxiliary Circuit Ratings

● Ratings for IEC Standard Compliance

Type	Conventional free air thermal current [A] (Rated continuous current)	Rated operational current [A]					Minimum voltage and current
		Rated operational voltage [V]	AC-15 (Ind. load)		DC-13 (Ind. load)		
			NC contacts	NO contacts	NC contacts	NO contacts	
TK12	5	24	3 (0.5)	3 (0.5)	1.1(0.3)	1.1 (0.3)	DC5V, 3mA
		100-120	2.5 (0.5)	2.5 (0.5)	0.28	0.28	
		200-240	2 (0.5)	1.5 (0.5)	0.14	0.14	
		380-440	1 (0.5)	0.75 (0.5)	–	–	
		500-600	0.6 (0.5)	0.6 (0.5)	–	–	
TK25 TK26	5	24	3 (0.5)	3 (0.5)	1.1(0.3)	1.1 (0.3)	DC5V, 3mA
		100-120	2.5 (0.5)	2.5 (0.5)	0.28	0.28	
		200-240	2 (0.5)	2 (0.5)	0.14	0.14	
		380-440	1 (0.5)	1 (0.5)	–	–	
		500-600	0.6 (0.5)	0.6 (0.5)	–	–	

Numbers in brackets () are for automatic reset.

● Ratings for UL and CSA Standard Compliance

Type	Rated continuous current [A]	Rated operational current [A]						Rating code	
		AC			DC			AC	DC
		Rated operational voltage [V]	Making	Breaking	Rated operational voltage [V]	Making	Breaking		
TK12 TK25 TK26	5	120	30	3	125	0.22	0.22	B600	R300
		240	15	1.5					
		480	7.5	0.75	250	0.11	0.11		
		600	6	0.6					

■ Operating Characteristics (Specifications)

● 3-pole Circuits

Standard	Operating limit		Overload (hot start)	Locked rotor (cold start)	Ambient temperature
	Non-tripping	Tripping			
IEC 60947-4-1	105% I _e (for less than 2h)	120% I _e (for less than 2h)	Tripping class 10A: 150% I _e for less than 2min	Tripping class 10A: 720% I _e for 2 to 10 s max.	20°C

● 2-pole Circuits

Standard	Phase-loss protection	Non-tripping	Operation (hot start)	Ambient temperature
IEC 60947-4-1	Provided.	2-pole: 100% I _e 1-pole: 90% I _e	{ 2-pole: 115% I _e (for less than 2h) 1-pole: 0% I _e	20°C



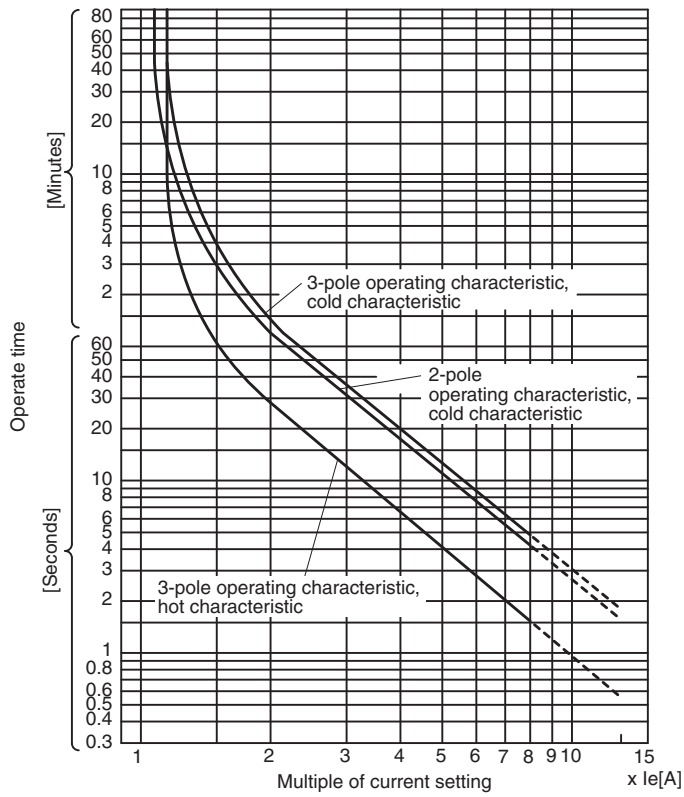
DUO series Contactors

Thermal Overload Relay

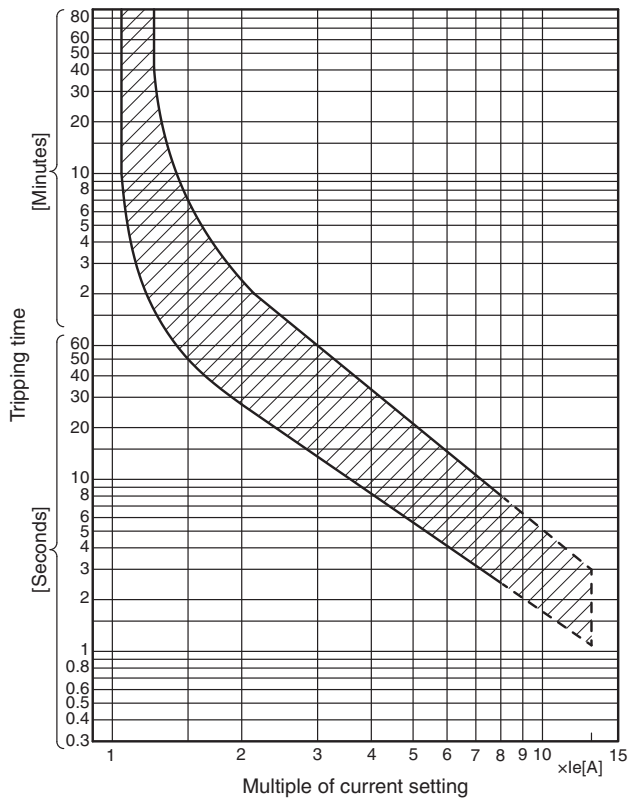
■ Operating Characteristics Curves (Average Values)

- Tripping Class 10A

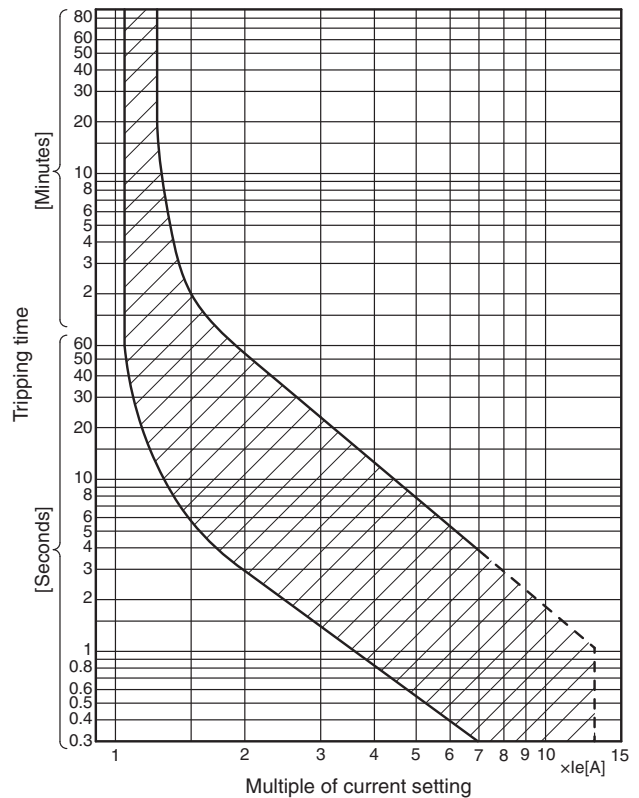
Ambient temperature: 20°C



Cold starting characteristics : 20°C

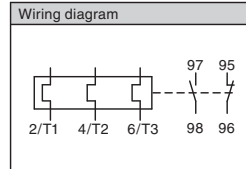
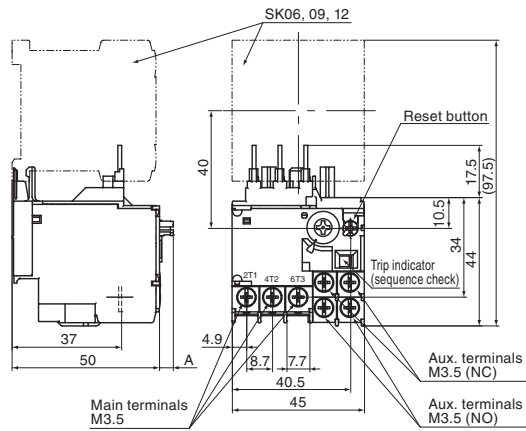


Hot starting characteristics : 20°C



■ Dimensions, mm

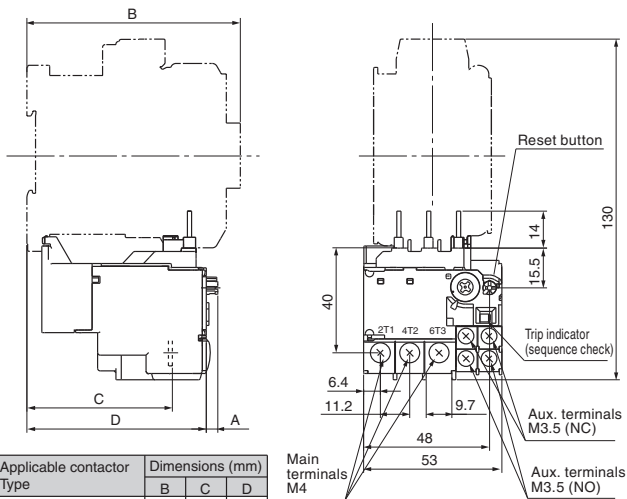
● Thermal Overload Relay TK12



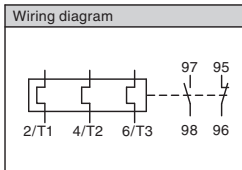
Mass : 0.1kg

Dimension A
- Manually reset state: 5mm
- Automatically reset state: 2mm

TK25



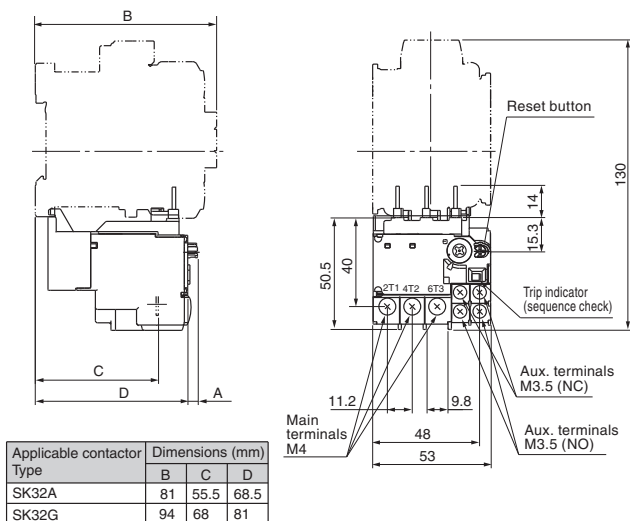
Applicable contactor Type	Dimensions (mm)		
	B	C	D
SK18A SK22A	81	55.5	68.5
SK18G SK22G	94	68.5	81.5



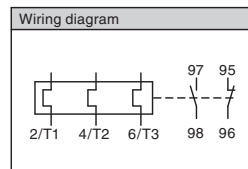
Mass: 0.11kg

Dimension A
- Manually reset state: 5mm
- Automatically reset state: 2mm

TK26



Applicable contactor Type	Dimensions (mm)		
	B	C	D
SK32A	81	55.5	68.5
SK32G	94	68	81



Mass: 0.11kg

Dimension A
- Manually reset state: 5mm
- Automatically reset state: 2mm



Auxiliary Relays

■ Type Number Nomenclature

- Type Number Nomenclature
 - SK-Series Auxiliary Relays

SKH4 A H - 1 22

Basic type ————— SK-Series Auxiliary Relay

Operating method —————

- A : AC-operated models
- G : DC-operated models (2.4W)
- L : DC-operated models (1.2W)

Auxiliary contact —————

- Blank : Bifurcated contact
- H : Single button contact

Auxiliary contact arrangement

- 40 : 4NO
- 31 : 3NO+1NC
- 22 : 2NO+2NC

Coil voltage

AC operation			
		E	24V AC
		F	48V AC
		1	100V AC
		H	110V AC
		K	120V AC
		2	200V AC
		M	220V AC
		P	240V AC
		S	380V AC
		4	400V AC
		T	440V AC
		5	500V AC
DC operation			
2.4W		B	12V DC
		E	24V DC
		F	48V DC
		G	60V DC
		1	100V DC
		H	110V DC
		K	120V DC
		2	200V DC
		Y	210V DC
		M	220V DC
1.2W		B	12V DC
		E	24V DC
		F	48V DC

■ Features

- International safety standards for standard models (IEC, GB, JIS, UL, and CSA).
- Models available with AC, DC, or low-power DC operating coils.
- Bifurcated contact for more reliable contact for micro-loads of 3mA at 5V DC.
- Models with high-capacity contacts (single button contact) are also available.
- Configure a wide range of contacts in combination with Auxiliary Contact Blocks.



SKH4A

■ Ordering Information (Types)

- Auxiliary Relays

SKH4 A H - E 22

① ② ③ ④ ⑤

① Series ② Operating coil ③ Contact specification ④ Coil voltage specification ⑤ Contact arrangement

■ Ratings

Refer to Auxiliary Contact Ratings on page 11.

■ Types

Operating coil specification ②	Contact specification ③	Coil voltage specification ④	Contact arrangement ⑤	Type
AC-operated models [A]	Bifurcated contact [blank]	24V [E] 120V [K] 380V [S]	4NO	SKH4A-□40
		48V [F] 200V [2] 400V [4]	3NO+1NC	SKH4A-□31
		100V [1] 220V [M] 440V [T]	2NO+2NC	SKH4A-□22
	Single button contact [H]	110V [H] 240V [P] 500V [5]	4NO	SKH4AH-□40
			3NO+1NC	SKH4AH-□31
			2NO+2NC	SKH4AH-□22
DC-operated models (2.4W) [G]	Bifurcated contact [blank]	12V [B] 100V [1] 210V [Y]	4NO	SKH4G-□40
		24V [E] 110V [H] 220V [M]	3NO+1NC	SKH4G-□31
		48V [F] 120V [K]	2NO+2NC	SKH4G-□22
	Single button contact [H]	60V [G] 200V [2]	4NO	SKH4GH-□40
			3NO+1NC	SKH4GH-□31
			2NO+2NC	SKH4GH-□22
DC-operated models (1.2W) [L]	Bifurcated contact [blank]	12V [B]	4NO	SKH4L-□40
		24V [E]	3NO+1NC	SKH4L-□31
		48V [F]	2NO+2NC	SKH4L-□22
	Single button contact [H]		4NO	SKH4LH-□40
			3NO+1NC	SKH4LH-□31
			2NO+2NC	SKH4LH-□22

Note: "□" in the type column is replaced with the coil voltage code.



DUO series Contactors

Auxiliary Relays

■ Performances

● Durability (Based on IEC 60947-5-1)

Type	Number of contacts	Operating cycles per hour [times/hour]	Mechanical durability	Electrical durability					
				AC-15		AC-12		DC-13	DC-12
				220V	440V	220V	440V	220V	220V
SKH4	4	1800	10 million	500,000	500,000	250,000	250,000	250,000	500,000

■ Combinations with Auxiliary Contact Blocks

SK-Series Auxiliary Relays and Auxiliary Contacts Blocks can be combined as shown in the following table. Other combinations are not possible.

Auxiliary Relay type	Auxiliary Contact Block Type	SZ1KA40	SZ1KA31	SZ1KA22	SZ1KA13	SZ1KA04	SZ1KA20	SZ1KA11	SZ1KA02	SZ1FA11
		SZ1KA40H	SZ1KA31H	SZ1KA22H	SZ1KA13H	SZ1KA04H	SZ1KA20H	SZ1KA11H	SZ1KA02H	SZ1FA11H
	Auxiliary contact arrangement	4NO	3NO+1NC	2NO+2NC	1NO+3NC	4NC	2NO	1NO+1NC	2NC	1NO+1NC
	Combined auxiliary contact arrangement									
SKH4A SKH4AH SKH4G SKH4GH	4NO	8NO	7NO+1NC	6NC+2NC	5NO+3NC	4NO+4NC	6NO	5NO+1NC	4NO+2NC	5NO+1NC
	3NO+1NC	7NO+1NC	6NO+2NC	5NO+3NC	4NO+4NC	3NO+5NC	5NO+1NC	4NO+2NC	3NO+3NC	4NO+2NC
	2NO+2NC	6NO+2NC	5NO+3NC	4NO+4NC	3NO+5NC	2NO+6NC	4NO+2NC	3NO+3NC	2NO+4NC	3NO+3NC
SKH4L SKH4LH	4NO	—	—	—	—	—	6NO	5NO+1NC	4NO+2NC	5NO+1NC
	3NO+1NC	—	—	—	—	—	5NO+1NC	4NO+2NC	3NO+3NC	4NO+2NC
	2NO+2NC	—	—	—	—	—	4NO+4NC	3NO+3NC	2NO+4NC	3NO+3NC

■ Linked Contact Compliance (Compliance with Requirements of IEC60947-5-1 Annex L)

Auxiliary Relay type	Auxiliary Contact Block	No Auxiliary Contact Block	SZ1KA□		SZ1FA11	SZ1KA□H		SZ1FA11H
			4-pole	2-pole		4-pole	2-pole	
SKH4A SKH4AH		○	×	×	×	×	×	×
SKH4G SKH4GH		○	×	×	○	○	○	○
SKH4L SKH4LH		○	—	○	○	—	○	○

○ : Complies.
× : Does not comply.

■ Dimensions, mm

SKH4

61 (rail height: 15)
49
36
6
(34) *1
(17) *2
Terminal M3.5
45
8.7
7.7
Coil terminal M3.5
48
31
Mounting Hole Dimensions
35
2-M4 mounting holes
100

[NOTE]
*1: With SZ1KA□ Auxiliary Contact Blocks.
*2: With SZ1FA□ Auxiliary Contact Blocks.

Auxiliary contacts	Contact arrangement
4NO	 13 23 33 43 A1 (+) [※] 14 24 34 44 A2 (-) [※]
3NO+1NC	 13 21 33 43 A1 (+) [※] 14 22 34 44 A2 (-) [※]
2NO+2NC	 13 21 31 43 A1 (+) [※] 14 22 32 44 A2 (-) [※]

Mounting screws: 2-M4 screws
Mount the Auxiliary Relay with two mounting holes in diagonally opposed corners.

※For DC-operated models.
Mass : 0.14kg (SKH4A)
0.17kg (SKH4G and SKH4L)

Safety Considerations

- Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure.
- For safe operation, before using the product read the instruction manual or user manual that comes with the product carefully or consult the Fuji sales representative from which you purchased the product.
- Products introduced in this catalog have not been designed or manufactured for such applications in a system or equipment that will affect human bodies or lives.
- Customers, who want to use the products introduced in this catalog for special systems or devices such as for atomic-energy control, aerospace use, medical use, passenger vehicle, and traffic control, are requested to consult with Fuji Electric FA.
- Customers are requested to prepare safety measures when they apply the products introduced in this catalog to such systems or facilities that will affect human lives or cause severe damage to property if the products become faulty.
- For safe operation, wiring should be conducted only by qualified engineers who have sufficient technical knowledge about electrical work or wiring.
- Follow the regulations of industrial wastes when the product is to be discarded.
- For further questions, please contact your Fuji sales representative or Fuji Electric FA.

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