



MMS (Manual Motor Starter)

Manual Motor Starter

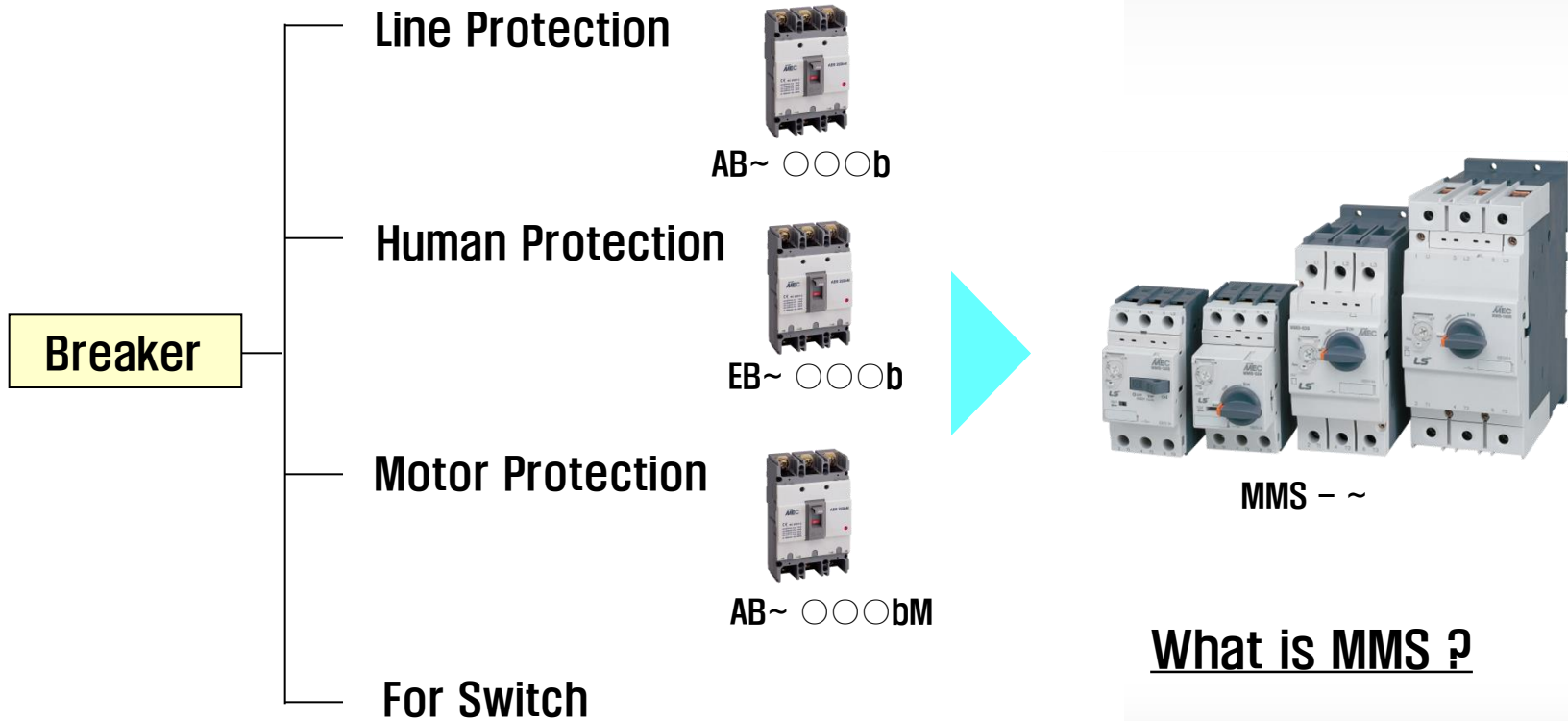


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Types of Breakers

Low voltage breakers is mainly used for protecting a circuit, but there are also the earth leakage circuit breaker for human, the motor protection breaker and the breaker for switch .



Introduction

MMS, has two main function of MCCB and TOR, prevents a motor from being damaged by abnormal current and protects a motor from short-circuit.



MCCB

- ✓ Short Circuit



MC

- ✓ Motor Control



TOR

- ✓ Overload
- ✓ Phase failure



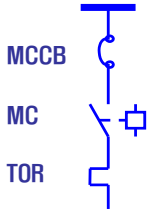
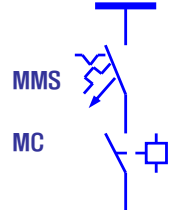
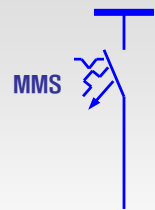
MCCB For Motor Control

- ✓ Short Circuit
- ✓ Overload
- ✓ Phase Loss

Benefit

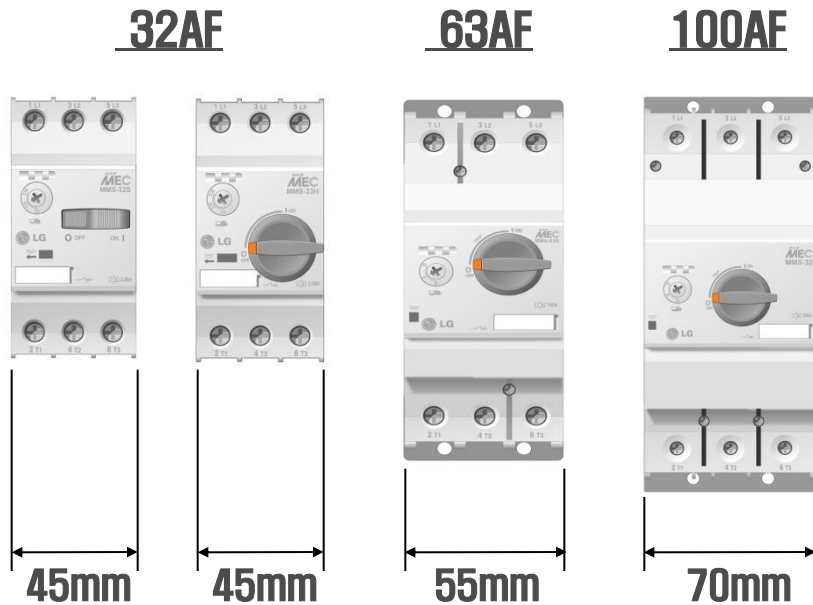
- ✓ Compact size
- ✓ High Interruption : 100kA(Max.)
- ✓ Panel size reduced
- Wiring process simplified
- ✓ Wide Current Set : $\pm 20\%$
 - 'S' Company : Possible to set up to 95A for 100AF
 - LS : Possible to set up to 100A for 100AF

Feature Comparison according to Motor Starter combination

Combination	MCCB + MC + TOR	MMS + MC	MMS
Circuit			
Function	<ul style="list-style-type: none"> *Possible to control the circuit from the remote site by MC *Possible to detect overload and phase failure of loads by TOR *The overload and short circuit exceeding 600~800% current are protected by MCCB 	<ul style="list-style-type: none"> *Possible to control the circuit from the remote site by MC *Possible to detect overload and phase failure of loads by MMS *Possible to protect from short-circuit by MMS 	<ul style="list-style-type: none"> *Not available the remote control *Possible to detect overload and phase failure of loads by MMS *Possible to protect from short-circuit
Feature	<ul style="list-style-type: none"> *Normal combination of Motor Starter circuit *Need a lot of wiring space, time and cost comparatively *Guarantee for the long time open-close life by remote control of MC 	<ul style="list-style-type: none"> *Possible to save the wiring space, time and cost *Guarantee for the long time open-close life by remote control of MC <ul style="list-style-type: none"> - Electrical life : about 250 million (on the basis of 22AF) 	<ul style="list-style-type: none"> *Possible to minimize the wiring space, time and cost *Only possible to open and close by manual control *Open-close life is reduced <ul style="list-style-type: none"> - Electrical life : about 10 million
Saving & Convenience	△	○	●
Overload Protection	●	●	●
Short-circuit Protection	●	●	●
Phase failure Protection	△	●	●

●: very good ○: good △: bad

Ratings



- ✓ 32AF Rocker, Rotary
- 63AF Rotary
- 100AF Rotary
- ✓ Rated breaking current :
6~100kA[@ 460V]
- ✓ Rated Insulation Voltage : 690V
- ✓ Rated Impulse Voltage : 8kV Max.
- ✓ Standard : IEC 60947 , UL508

KEMA



Rated Breaking Capacity_32AF

Frame			32AF																				
Type	Current adjustable type		MMS-32S										MMS-32H										
	Class 20		-										-										
	Instantaneous type		-										MMS-32HI										
Breaking capacity			Standard										High										
Handle			Rocker type										Rotary type										
Rated breaking capacity (kA)	Rated operational current (Ie)		240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	
	Rated current (A)	Thermal current setting range (A)	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	
			Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu
0.16	0.1~0.16		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.25	0.16~0.25		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.4	0.25~0.4		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0.63	0.4~0.63		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	0.63~1		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1.6	1~1.6		100	100	100	100	100	100	100	3	3	100	100	100	100	100	100	100	100	100	100	100	100
2.5	1.6~2.5		100	100	100	100	100	100	50	38	3	3	100	100	100	100	100	100	100	100	100	8	8
4	2.5~4		100	100	100	100	50	38	15	11	3	3	100	100	100	100	100	100	100	100	100	8	8
6	4~6		100	100	100	100	15	11	10	8	3	3	100	100	100	100	100	100	100	100	100	6	6
8	5~8		100	100	100	100	15	11	10	8	3	3	100	100	100	100	50	38	50	38	6	6	
10	6~10		100	100	50	38	15	11	6	5	3	3	100	100	100	100	50	38	50	38	6	6	
13	9~13		100	100	50	38	10	8	6	5	3	3	100	100	100	100	50	38	42	32	6	6	
17	11~17		50	38	20	15	10	8	6	5	3	3	100	100	50	38	20	15	10	8	4	4	
22	14~22		40	30	15	11	8	6	6	5	3	3	100	100	50	38	20	15	10	8	4	4	
26	18~26		40	30	15	11	8	6	5	4	3	3	100	100	50	38	20	15	10	8	4	4	
32	22~32		30	22	15	11	6	4	5	4	3	3	100	100	50	38	20	15	10	8	4	4	
40	28~40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	34~50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	45~63		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	55~75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	70~90		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	80~100		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-


Rated Breaking Capacity_63AF

Frame			63AF																				
Type	Current adjustable type		MMS-63S										MMS-63H										
	Class 20		-										(MMS-63HL)										
	Instantaneous type		-										MMS-63HI										
Breaking capacity			Standard										High										
Handle			Rotary type										Rotary type										
Rated breaking capacity (kA)	Rated operational current (Ie)		240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	240V	415V	460V	525V	690V	
	Rated current (A)	Thermal current setting range (A)	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	230V	400V	440V	500V	600V	
			Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu
0.16	0.1~0.16		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.25	0.16~0.25		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.4	0.25~0.4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.63	0.4~0.63		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0.63~1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.6	1~1.6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	1.6~2.5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.5~4		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	4~6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	5~8		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	6~10		100	100	100	100	15	12	10	8	4	3	100	100	100	100	50	38	50	38	6	5	5
13	9~13		100	100	50	38	10	8	6	5	4	3	100	100	100	100	50	38	42	32	6	5	5
17	11~17		100	100	25	19	10	8	6	5	4	3	100	100	50	50	50	38	12	9	5	5	5
22	14~22		50	38	25	19	10	8	6	5	4	3	100	100	50	50	50	38	12	9	5	5	5
26	18~26		50	38	25	19	10	8	6	5	4	3	100	100	50	50	35	27	12	9	5	5	5
32	22~32		50	38	25	19	10	8	6	5	4	3	100	100	50	50	35	27	10	8	5	5	5
40	28~40		50	38	25	19	10	8	6	5	4	3	100	100	50	50	35	27	10	8	5	5	5
50	34~50		50	38	25	19	10	8	6	5	4	3	100	100	50	50	35	27	10	8	5	5	5
63	45~63		50	38	25	19	10	8	6	5	4	3	100	100	50	50	35	27	10	8	5	5	5
75	55~75		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	70~90		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	80~100		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

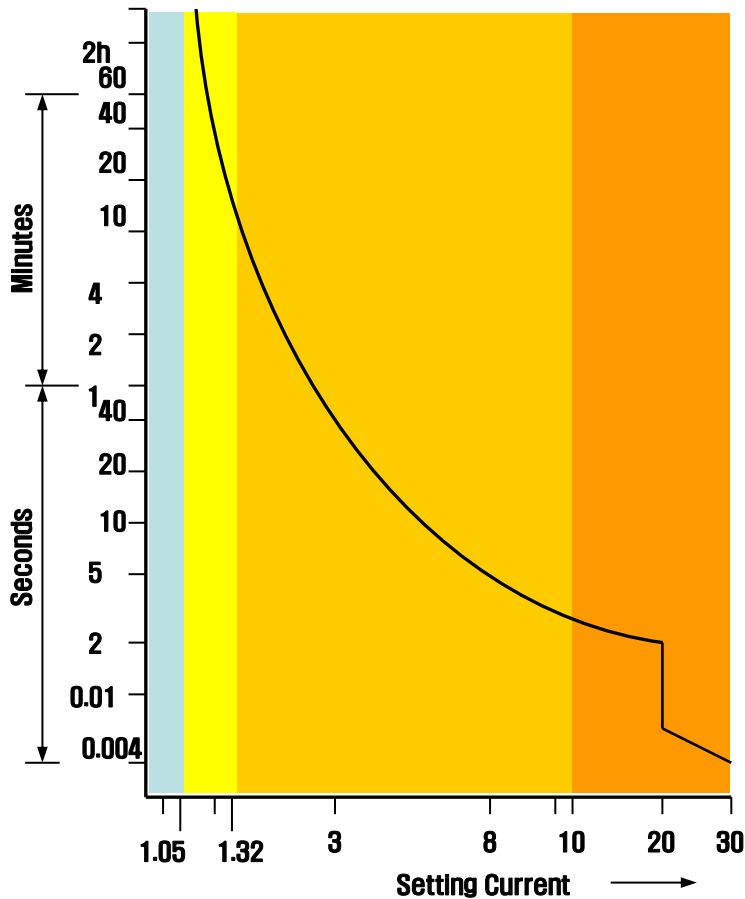
Rated Breaking Capacity_100AF

Frame			100AF																			
Type	Current adjustable type		MMS-100S										MMS-100H									
	Class 20		-										(MMS-100HL)									
	Instantaneous type		-										MMS-100HI									
Breaking capacity			Standard										High									
Handle			Rotary type										Rotary type									
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	Rated current (A)	Thermal current setting range (A)	230V		400V		440V		500V		600V		230V		400V		440V		500V		600V	
			Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
0.16	0.1~0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.25	0.16~0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.4	0.25~0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.63	0.4~0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0.63~1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.6	1~1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	1.6~2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2.5~4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	4~6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	5~8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	6~10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	9~13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	11~17	100	100	50	38	40	30	25	19	10	8	100	100	100	100	50	38	35	27	12	9	9
22	14~22	100	100	50	38	40	30	25	19	10	8	100	100	100	50	50	38	35	27	12	9	9
26	18~26	100	100	50	38	40	30	25	19	10	8	100	100	100	50	50	38	35	27	12	9	9
32	22~32	100	100	50	38	40	30	15	11	10	8	100	100	100	50	50	38	25	19	12	9	9
40	28~40	100	100	50	38	40	30	15	11	6	5	100	100	100	50	50	38	20	15	12	9	9
50	34~50	100	100	50	38	40	30	12	9	6	5	100	100	100	50	50	38	15	11	10	8	8
63	45~63	100	100	50	38	40	30	12	9	6	5	100	100	100	50	50	38	15	11	8	6	6
75	55~75	100	100	50	38	40	30	8	6	5	4	100	100	75	50	50	38	12	9	6	6	6
90	70~90	100	100	50	38	40	30	8	6	5	4	100	100	75	50	50	38	12	9	6	6	6
100	80~100	100	100	50	38	40	30	8	6	5	4	100	100	75	50	50	38	12	9	6	6	6

Rated Setting Current

Frame	32			63			100		
Breaking capacity	Standard	High		Standard	High		Standard	High	
External view									
Type	MMS-32S	MMS-32H	MMS-32HI	MMS-63S	MMS-63H	MMS-63HI	MMS-100S	MMS-100H	MMS-100HI
Protection	Over current, Phase failure, Short circuit	Over current, Phase failure, Short circuit	Short circuit	Over current, Phase failure, Short circuit	Over current, Phase failure, Short circuit	Short circuit	Over current, Phase failure, Short circuit	Over current, Phase failure, Short circuit	Short circuit
Handle	Rocker type	Rotary type		Rotary type			Rotary type		
Terminal type	Screw	Screw		Lug			Lug		
Number of types	16	16	16	9	9	9	10	10	10
Rated current	0.1~0.16	0.1~0.16	0.16						
	0.16~0.25	0.16~0.25	0.25						
	0.25~0.4	0.25~0.4	0.4						
	0.4~0.63	0.4~0.63	0.63						
	0.63~1	0.63~1	1						
	1~1.6	1~1.6	1.6						
	1.6~2.5	1.6~2.5	2.5						
	2.5~4	2.5~4	4						
	4~6	4~6	6						
	5~8	5~8	8						
	6~10	6~10	10	6~10	6~10	10			
	9~13	9~13	13	9~13	9~13	13			
	11~17	11~17	17	11~17	11~17	17	11~17	11~17	17
	14~22	14~22	22	14~22	14~22	22	14~22	14~22	22
	18~26	18~26	26	18~26	18~26	26	18~26	18~26	26
	22~32	22~32	32	22~32	22~32	32	22~32	22~32	32
				28~40	28~40	40	28~40	28~40	40
			34~50	34~50	50	34~50	34~50	50	
			45~63	45~63	63	45~63	45~63	63	
						55~75	55~75	75	
						70~90	70~90	90	
						74~100	74~100	100	

Trip Characteristic Curve



- ✓ Normal operation: $0.8I_e \sim 1.05I_e$
 - It should not be tripped.
- ✓ Overload condition of a Motor: $1.05I_e \sim 1.32I_e$
 - If there is a continuous overload, it should be tripped.
- ✓ Starting current and over current condition of a motor : $1.32I_e \sim 9I_e$
 - During a motor starting time, it does not be tripped. But when the abnormal current flows during normal operation of a motor, it should be tripped according to the trip characteristic that manufacturer sets before.
- ✓ Instantaneous trip condition : $10I_e \text{ max } \sim$
 - It should be tripped by Magnetic operation under the over current such as short-circuit current

Accessories

Auxiliary Switch (LX)
– Side mounting on the left
– 2 pole

Any Trip Alarm Switch (LA)
– Side mounting on the left
– Indicating the Trip condition
– 2 pole

Magnetic Trip Alarm Switch (LAM)
– Side mounting on the left
– Only indicating Mag. Trip condition
– Indicated by button in case of operating
– 2 pole

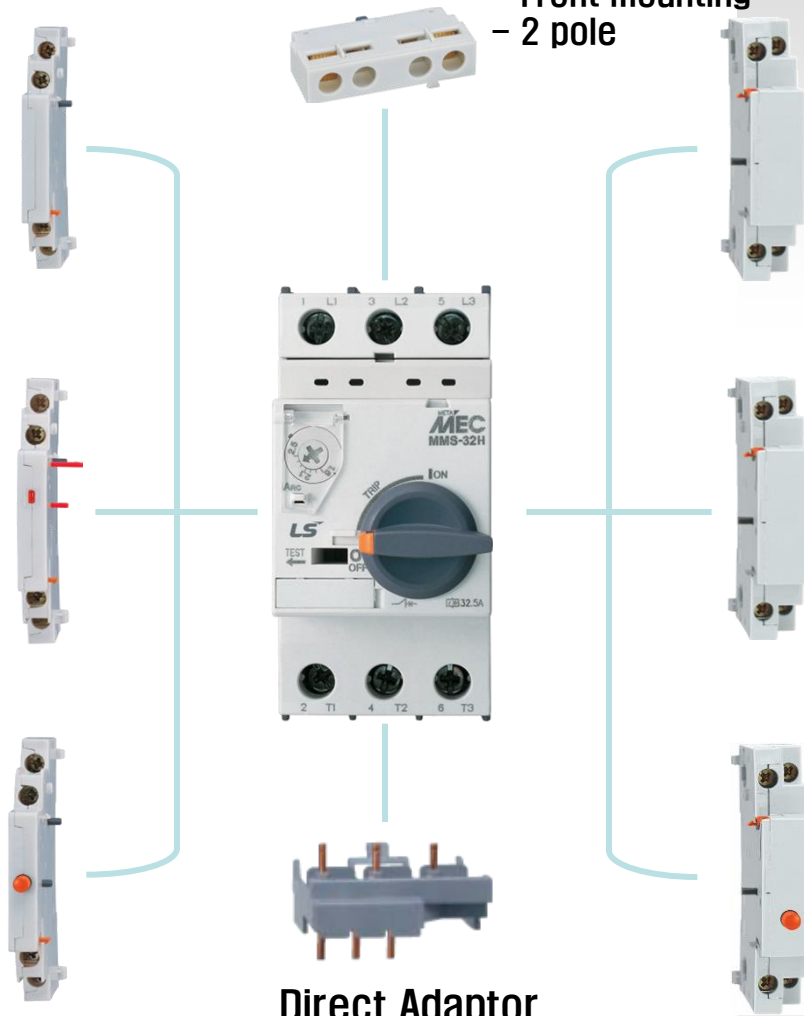
Auxiliary Switch (FX)
– Front mounting
– 2 pole

Shunt Release (RS)
– Side mounting on the right
– 2 pole
– AC24~600V

Under Voltage Release (RU)
– Side mounting on the right
– AC24~600V

Under Voltage Release With Switch (RUX)
– Side mounting on the right
– Indicated by button in case of operating
– AC24~600V

Direct Adaptor
– Connection Kit with Mini-MS, Top MC



Accessories



- ✓ Push-in lug (MP-32)
 - For screwing the MMS on to mounting plates
 - Applied type : Only for MMS 32S, MMS 32H



- ✓ Insulation barriers (IB100)
 - Insulation barriers with increased creepage distance and clearances for UL
 - Applied type : Only for MMS 100S, MMS 100H



- ✓ Dial cover
 - To protect the set value from the operation that is not intended
 - Applied type : For all type MMS

Accessories



•Direct Adaptor (DA type)

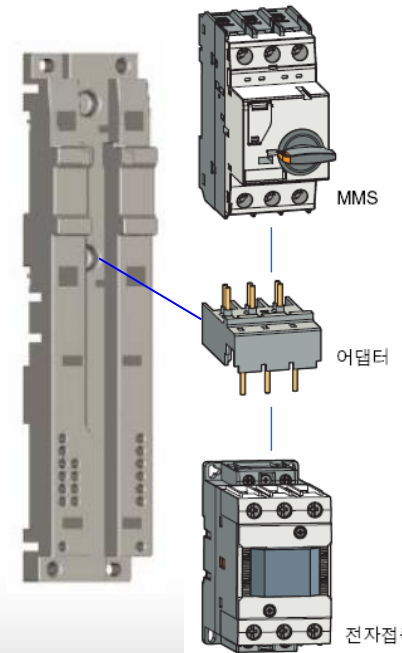
- Possible to directly connect with Contactor and MMS without cable

•Mounting Unit (MU Type)

- Device to connect MMS with MC for reducing wiring works and panel size
- Available with Din rail or screw mounting
- Applied only Susol MC and Meta-MEC Mini-MC



DA	MU	MMS	MC
DA-16SA	MU-45	MMS-32S	GMC-6M~16M
DA-16SD			GMD-6M~16M
DA-32SA			MC-9~32
DA-32SD			MC-9~32 DC
DA-16HA	MU-45	MMS-32H/HI	GMC-6M~16M
DA-16HD			GMD-6M~16M
DA-32HA			MC-9~32
DA-32HD			MC-9~32 DC
DA-63A	MU-55	MMS-63S/H/HI	MC-35~63
DA-63D			MC-35~63 DC
DA-95A	MU-70	MMS-100S/H/HI	MC-65~95
DA-95D			MC-65~95 DC



Accessories

Extended Handle devices_MEH Series

– Type MEH, followed by MMS–32, 63, 100



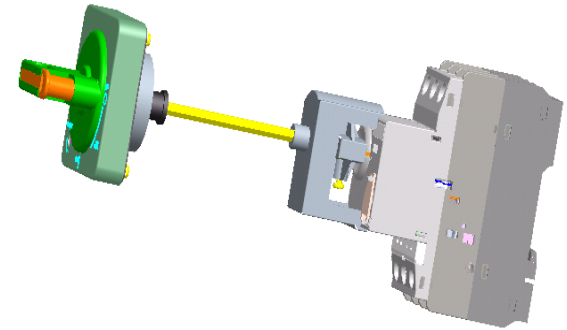
[MEH-32,115 (315)]



[MEH-63,115 (315)]



[MEH-100,115 (315)]



[Application Example]

M

Manual
Motor
Starter

E

Extended
Handle

—

32

Number of ampere frame at MMS	
32	32AF (MMS-32H / MMS-32HI)
63	63AF (MMS-63S / MMS-63H / MMS-63HI)
100	100AF (MMS-100S / MMS-100H / MMS-100HI)

,

115

Length of Shaft	
115	115mm
315	315mm

Accessories

Enclosure, Type EPH followed by MMS-32H/Hi

- These devices are enclosure for manual motor starter.



(E)

(P)

(H)

(32)

(65)

(S)

Enclosure

Material

Operating

Frame size

IP grade

Mounting

P Plastic

M Metallic

H Handle

S Seesaw

32 MMS-32AF

63 MMS-63AF

100 MMS-100AF

65 IP 65

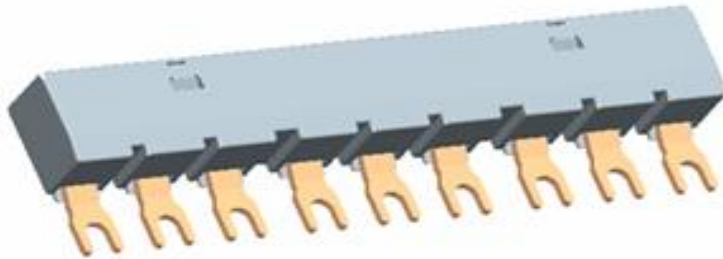
S Surface

F Flush

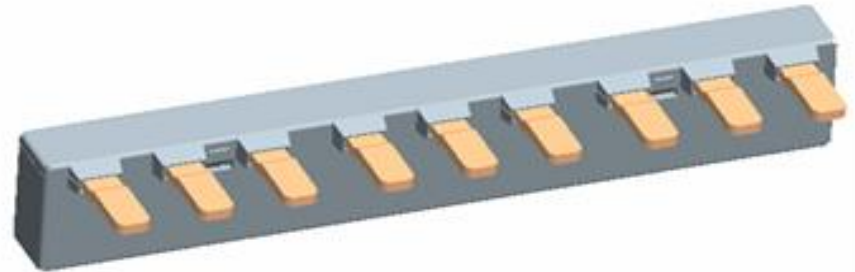
Accessories

Phase-bus devices_PB Series

- Device insulated bus-bar system for feeding several modular circuit breakers
- Type PB, followed by MMS-32, 63



[PB-323]



[PB-633]

P

Phase-
Bus

32

Number of ampere frame at MMS

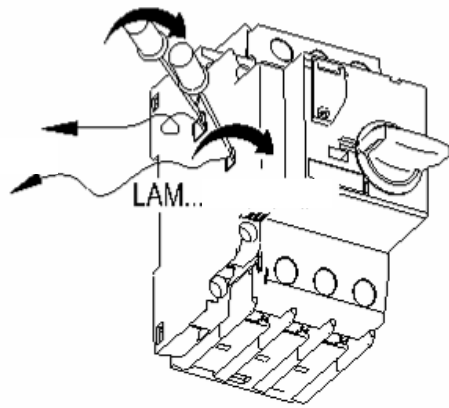
32	32AF (MMS-32S / MMS-32H / MMS-32HI)
63	63AF (MMS-63S / MMS-63H / MMS-63HI)

2

Number of MMS

2	Two MMS by one PB
3	Three MMS by one PB

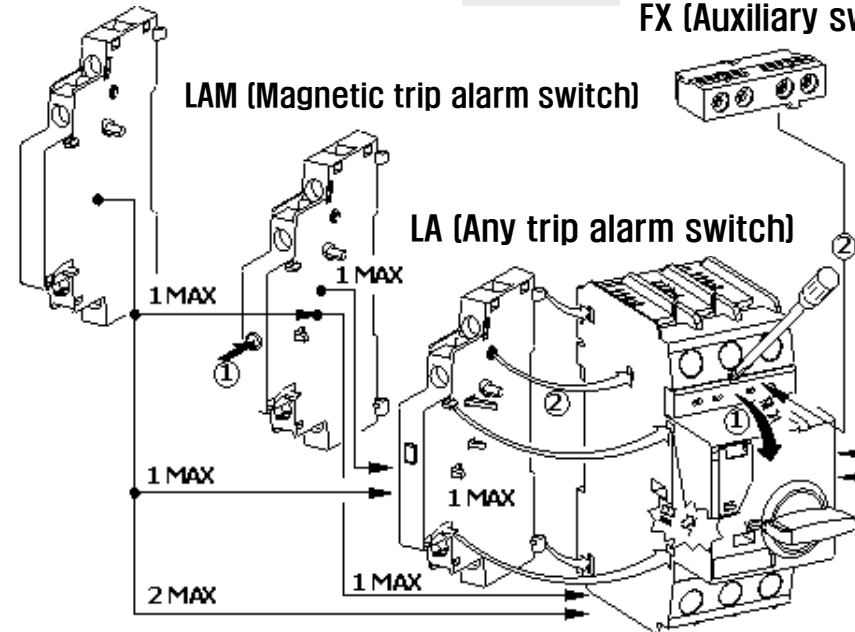
How to install accessories



✓ Only available with 63,100AF

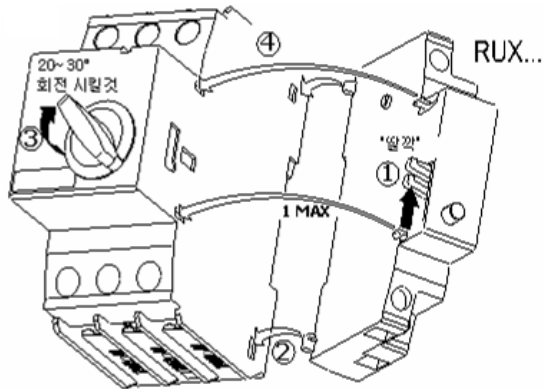
LX (Auxiliary switch)

FX (Auxiliary switch)



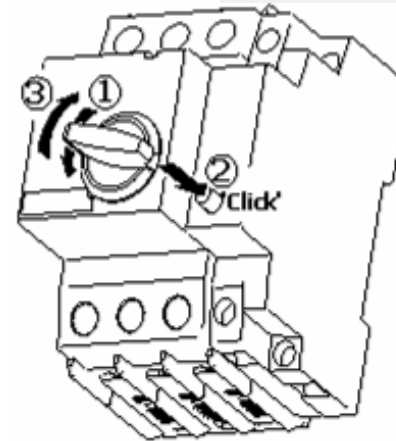
- ✓ When installing, be sure to install LA first before other accessories
- ✓ Do not install LA for 63,100AF
- ✓ Possible to attached 2 Max. [basis for side mounting on the left]

How to install accessories_RUX



- ✓ Not available with MMS-32S
- ✓ To install RUX, Rotate the handle of MMS to the 30 degree

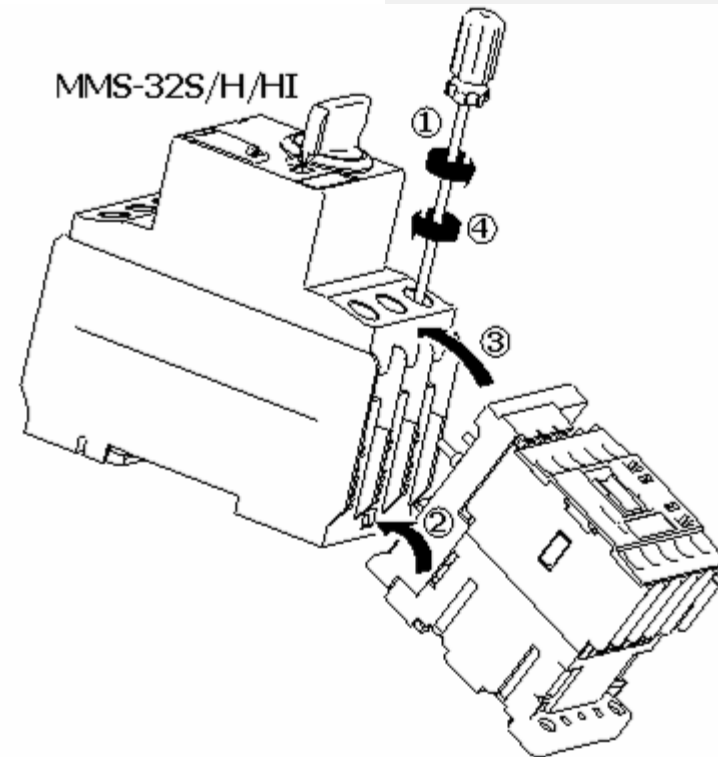
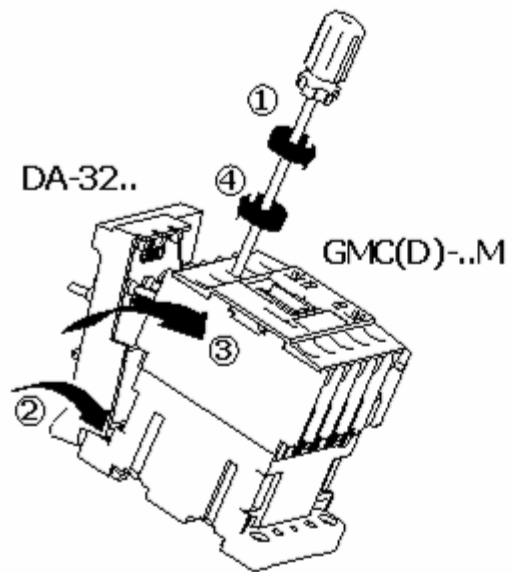
How to reset RUX



The trip button of RUX does not operate in the event of tripping due to under voltage.
→ Use after resetting the MMS.

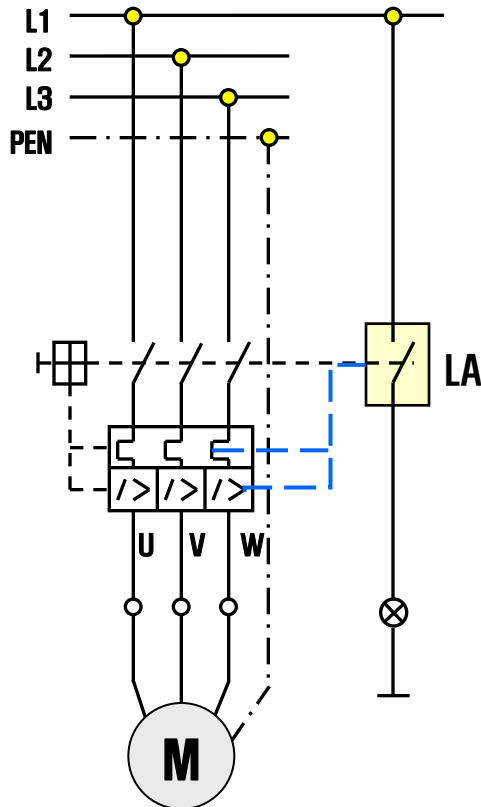
- ① Turn off the MMS and check if the trip button of RUX comes “up”
- ② Push the trip button.
- ③ Rotate the handle to the “ON” position.

How to install accessories_DA

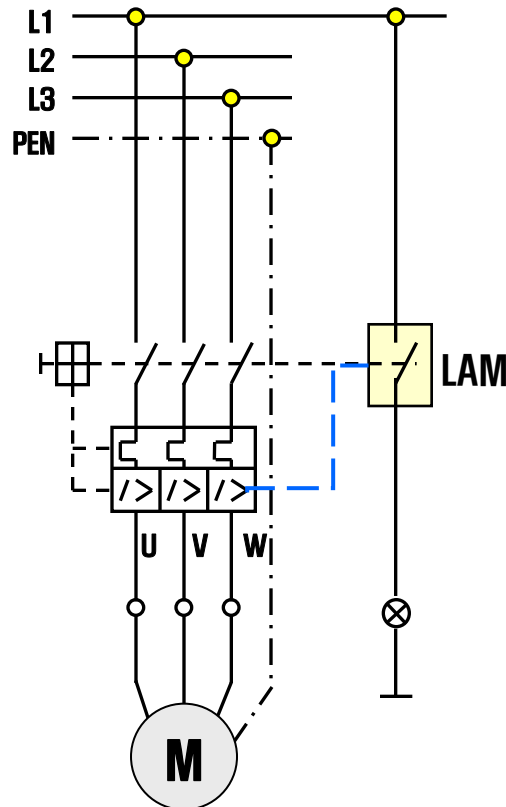


Application of accessories (EX : LA and LAM)

Any Trip Alarm Switch



Magnetic Trip Alarm Switch



✓ LA (Any Trip Alarm Switch)

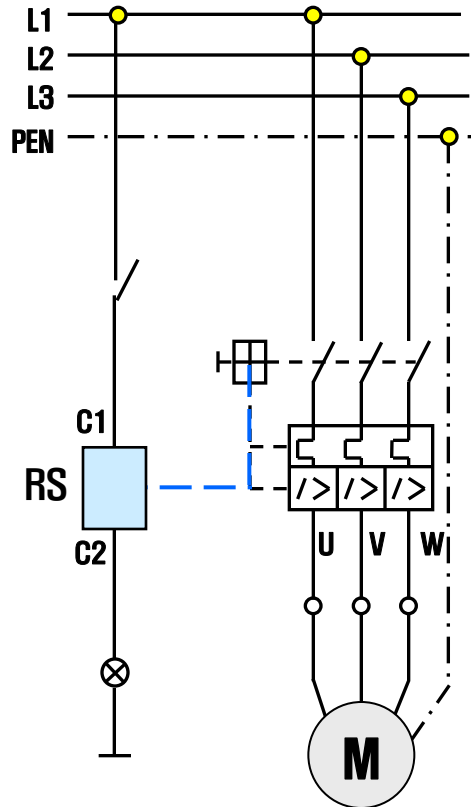
- Simultaneous operation with the main contacts when tripping by over current phase failure and short-circuit
- Auxiliary contacts
: 1NO1NC, 2NO, 2NC - 1a1b, 2a, 2b

✓ LAM (Magnetic Trip Alarm Switch)

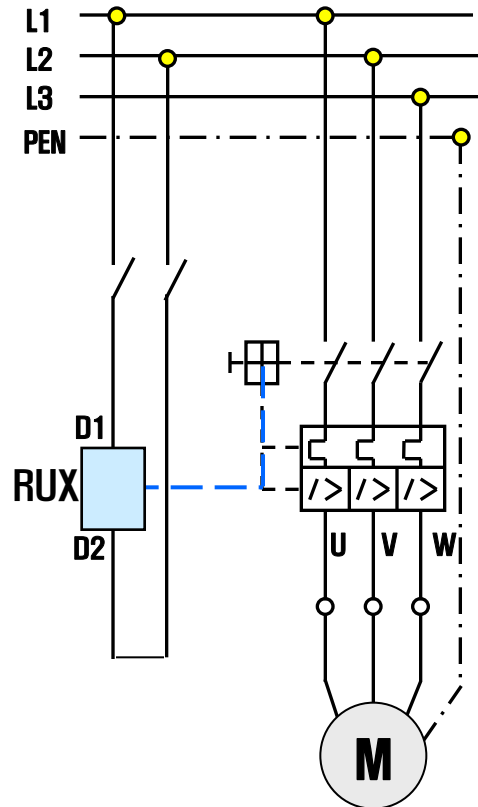
- Simultaneous operation with the main contacts when tripping immediately by short-circuit
- Auxiliary contacts
: 1NO1NC, 2NO, 2NC - 1a1b, 2a, 2b

Application of accessories (EX : RS and RUX)

Shunt Release



Under Voltage Release With Switch



✓ RS (Shunt Release)

-device to control the trip from the remote site

✓ RUX

(Under Voltage Release With Switch)

-Device to protect the circuit from under-voltage

Structure

Front mounted auxiliary contact

Current setting dial



Dial cover

Test trip device



Finger safe terminals

Handle lock device



Operating handle

Identification labels

Types of terminals

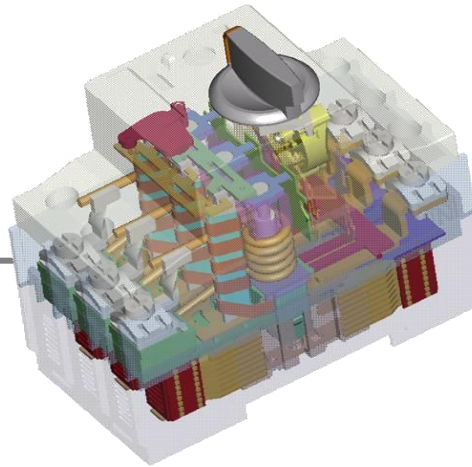


Features

**Simultaneous realization
of the function
of MCCB and TOR**

**Simplified wiring works
by directly connecting
with Mini-MS and Susol-MS**

Compact panel size



**Breaking capacity
MAX. 100kA**

**Completed current ranges
Up to 100A**

**Convenient usage of
the various accessories**

Comparison

Company			LS	Siemens	Fuji/GE	Eaton	ABB	E	F	G
Handle Type Size	Rocker /	45mm	32AF	12AF	32AF	25AF	-	-	25AF	32AF
	Button	61mm	-	-	-	80AF	-	-	-	-
	Rotary	45mm	32AF	25AF	32AF	32AF	16/25AF	25AF	25AF	-
		55mm	63AF	50AF	63AF	-	50AF	63AF	45AF	50AF
		70mm	100AF	100AF	-	-	100AF	-	90AF	100AF
Special type	High Breaking		●	●	●	●	●	-	●	●
	Instant Only		●	-	●	●	●	-	●	-
	Class 20		●	●	-	-	●	-	-	-
Breaking Capacity (kA) (at 415V)	Rocker /	45mm	20~100	50~100	25~100	15~100	-	-	8~100	25~100
	Button	61mm	-	-	-	15~100	-	-	-	-
	Rotary	45mm	50~100	50~100	50~100	50~100	50~75	16~100	15~100	-
		55mm	25~100	50	25~100	-	50	50	50~100	50
		70mm	50	50	-	-	50	-	50~65	50
Life (thousand)	Electrical		100	100	100	100	-	100	100	100
	Mechanical		100	100	100	100	100	100	100	100