

SUPERNOVA™

# Motor Protection Circuit Breakers




## About us

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Larsen & Toubro is a technology-driven USD 8.5 billion company that infuses engineering with imagination. The Company offers a wide range of advanced solutions in the field of Engineering, Construction, Electrical & Automation Machinery and Information Technology.

L&T Switchgear, which forms part of the Electrical & Automation business, is India's largest manufacturer of low voltage switchgear, with the scale, sophistication and range to meet global benchmarks. With over four decades of experience in this field, the Company today enjoys a leadership position in the Indian market with growing presence in international markets.

It offers a complete range of products including controlgear, powergear, motor starters, energy meters, wires and host of other accessories. Most of our product lines conform to international standards, carry CE markings and are *KEMA*  certified.



Switchgear Factory, Mumbai

# SUPERNOVA™ Product Range

L&T introduces complete range of Supernova product covering Motor Protection Circuit Breakers, Contactors / Thermal Overload Relays & Motors.

## Motor Protection Circuit Breakers

The new range of MPCBs is meant for protection against short circuit & overload.



## MO Contactors & RTO Thermal Overload Relays



The latest range of Contactors & Thermal Overload relays, rated from 9A to 110A.

## Motors



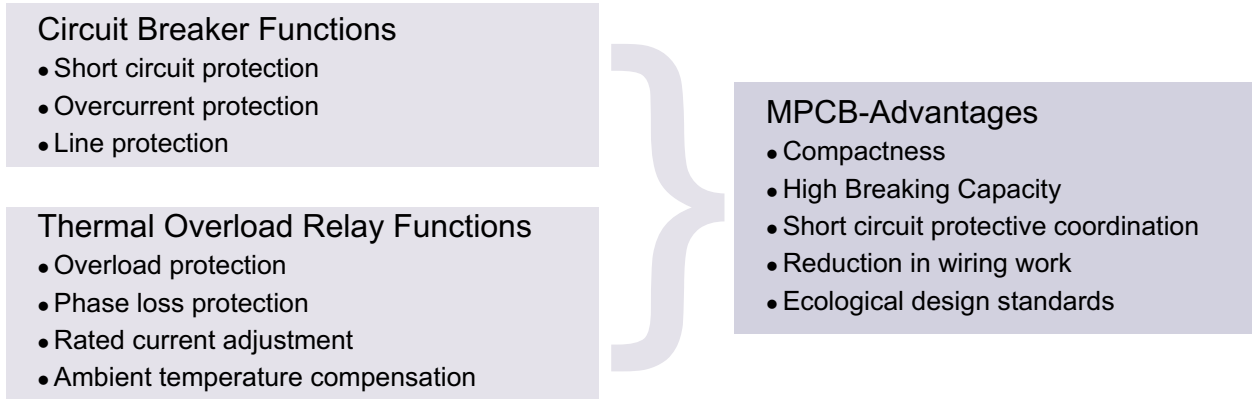
The unique range of 3 Phase Inverter Duty Motors (LTI Series) operate at desirable base speed, reducing the cost of switchgear, cable & inverter. These motors can operate from its rated speed to 10% of rated speed without any reduction in torque. They are suitable for lower speed or lower frequency operation. They can be offered for constant power application in field weakening mode.

# Motor Protection Circuit Breakers



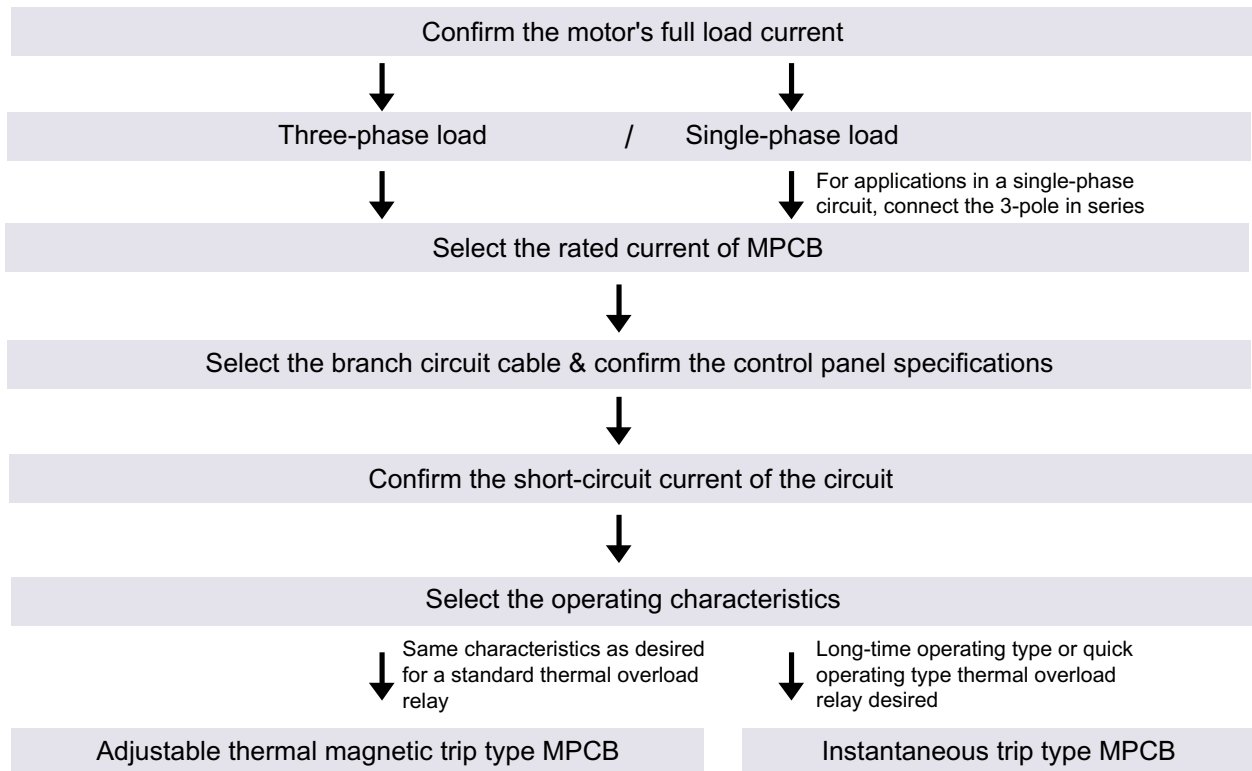
## Functions

Moulded Case Circuit Breaker and Thermal Overload Relay functions integrated into a highly compact unit known as Motor Protection Circuit Breaker.



## Selecting the Appropriate Model

Procedure for selecting the appropriate model:



# Typical Problem in the Conventional System and their Solution by using MPCB

## Short-Circuit Breaking Capacity

When numerous small and medium motor loads exist in a circuit requiring high breaking capacity, there is no high breaking capacity circuit breaker with a small rated current for a short circuit protection.

The **MPCB** can be used in 100kA short circuit current circuits for three-phase, 240V motors with rated capacity upto 15kW, and in 50kA short circuit current circuits for three phase, 415V motors with rated capacity up to 30kW.

## Back-up breaking system

When back-up **MCCB** is installed upstream to solve the problem described in “ Short-circuit breaking protection ” above, a short in one of the load circuits also trips the upstream breaker and stops the other operating circuits.

Despite their compact size, the **MPCB** provide high-performance short-circuit current breaking. They eliminate the need for an upstream circuit breaker for back-up use.

## Overload Protection

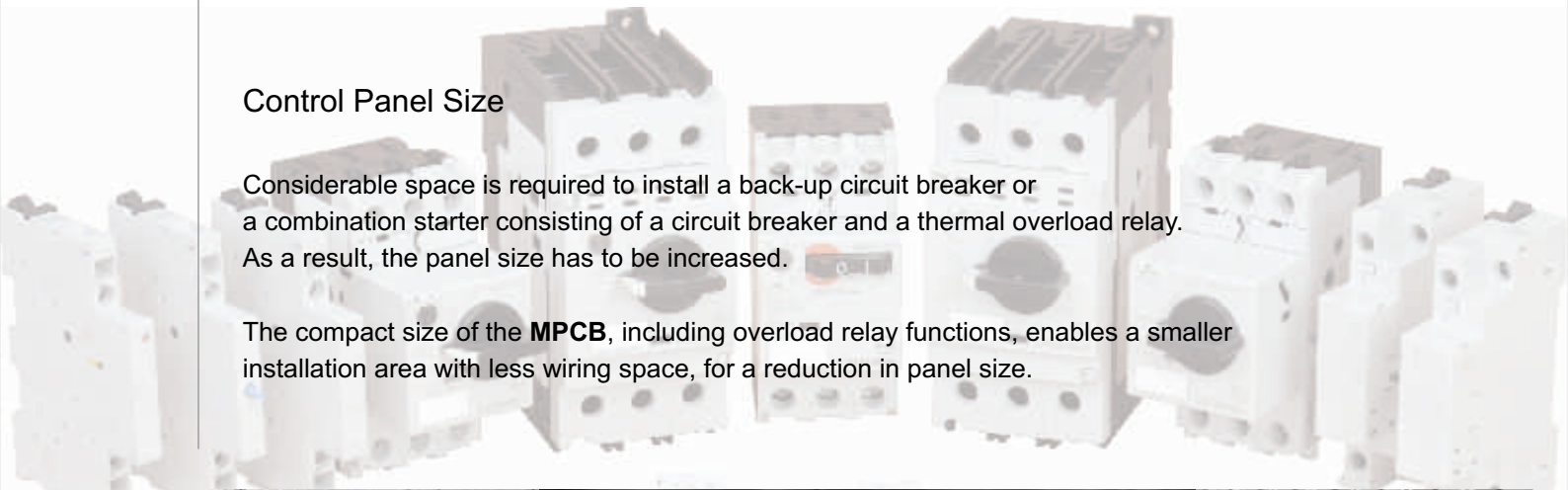
Motor Protection breakers cannot be adjusted to match the rated current of the motor being protected.

Equipped with a wide range current adjustment dial (with maximum/minimum ratio of 1.4 to 1.6), the **MPCB** easily adjusts to match the rated current of the motor, for optimum protection.

## Control Panel Size

Considerable space is required to install a back-up circuit breaker or a combination starter consisting of a circuit breaker and a thermal overload relay. As a result, the panel size has to be increased.

The compact size of the **MPCB**, including overload relay functions, enables a smaller installation area with less wiring space, for a reduction in panel size.



## Ordering Information

### Thermal & Magnetic Trip - Rocker Type

Frame size (mm)	Rating (A)	Motor Rating at 415V, 50Hz (kW)	Type Designation	Thermal Release Range (A)	Cat Nos.	Breaking Capacity
45 mm	0.16A	-	MOG-S1	0.1-0.16A	ST418890000	100kA
	0.25A	0.16		0.16-0.25A	ST418900000	
	0.4A	0.09		0.25-0.4A	ST418910000	
	0.63A	0.12		0.4-0.63A	ST418920000	
	1.0A	0.25		0.63-1.0A	ST418930000	
	1.6A	0.55		1.0-1.6A	ST418940000	
	2.5A	0.75		1.6-2.5A	ST418950000	
	4A	1.50		2.5-4A	ST418960000	
	6.3A	2.20		4.0-6.3A	ST418970000	
	10.0A	4.00		6.3-10.0A	ST418980000	
	13.0A	5.40		9.0-13.0A	ST418990000	

### Thermal & Magnetic Trip - Rotary Type

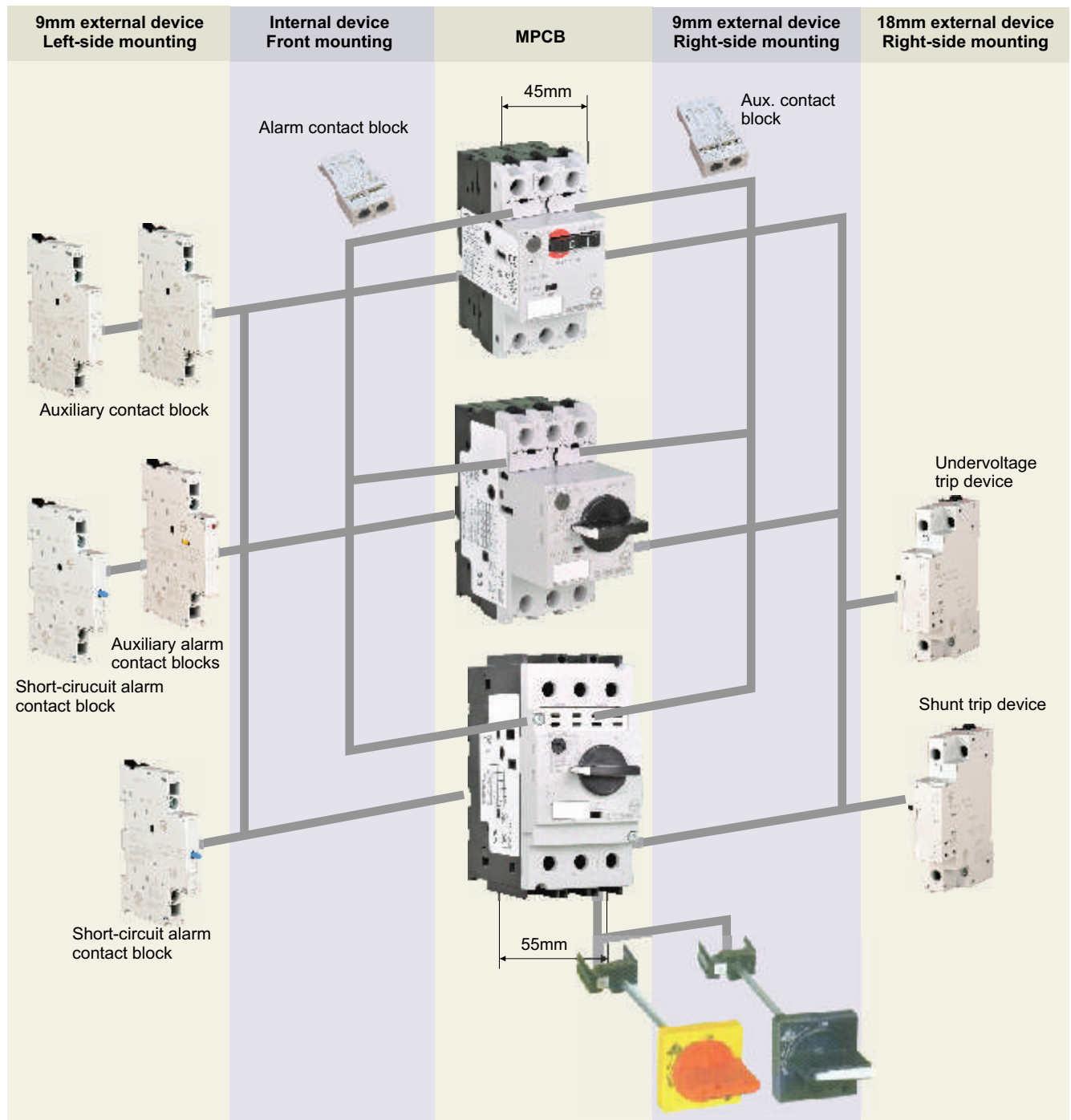
Frame size (mm)	Rating (A)	Motor Rating at 415V, 50Hz (kW)	Type Designation	Thermal Release Range (A)	Cat Nos.	Breaking Capacity	
45 mm	0.16A	-	MOG-H1	0.1-0.16A	ST419040000	100kA	
	0.25A	0.16		0.16-0.25A	ST419050000		
	0.4A	0.09		0.25-0.4A	ST419060000		
	0.63A	0.12		0.4-0.63A	ST419070000		
	1.0A	0.25		0.63-1.0A	ST419080000		
	1.6A	0.55		1.0-1.6A	ST419090000		
	2.5A	0.75		1.6 - 2.5A	ST419100000		
	4.0A	1.50		2.5-4.0A	ST419110000		
	6.3A	2.20		4.0-6.3A	ST419120000		
	10.0A	4.00		6.3-10.0A	ST419130000		
	13.0A	5.40		9.0-13.0A	ST419140000		50kA
	16.0A	7.50		11.0-16.0A	ST419150000		
	20.0A	9.00		14.0-20.0A	ST419160000		
	25.0A	12.50		19.0-25.0A	ST419170000		
	32.0A	15.00		24.0-32.0A	ST419180000		
32.0A	15.00	24.0-32.0A	ST419190000				
55 mm	40.0A	20.00	MOG-H2	28.0-40.0A	ST419200000	50kA	
	50.0A	25.00		35.0-50.0A	ST419210000		
	63.0A	34.00		45.0-63.0A	ST419220000		

### Instantaneous Trip - Rotary Type

Frame size (mm)	Rating (A)	Motor Rating at 415V, 50Hz (kW)	Type Designation	Thermal Release Range (A)	Cat Nos.	Breaking Capacity
45 mm			MOG-H1M	0.16A	ST419230000	100kA
	0.25A	0.16		0.25A	ST419240000	
	0.4A	0.09		0.4A	ST419250000	
	0.63A	0.12		0.63A	ST419260000	
	1.0A	0.25		1.0A	ST419270000	
	1.6A	0.55		1.6A	ST419280000	
	2.5A	0.75		2.5A	ST419290000	
	4.0A	1.50		4.0A	ST419300000	
	6.3A	2.20		6.3A	ST419310000	
	10.0A	4.00		10.0A	ST419320000	
	13.0A	5.40		13.0A	ST419330000	
	16.0A	7.50		16.0A	ST419340000	
	20.0A	9.00		20.0A	ST419350000	
	25.0A	12.50		25.0A	ST419360000	
	32.0A	15.00		32.0A	ST419370000	
55 mm	32.0A	15.00	MOG-H2M	32.0A	ST419380000	50kA
	40.0A	20.00		40.0A	ST419390000	
	50.0A	25.00		50.0A	ST419400000	
	63.0A	34.00		63.0A	ST419410000	

# Accessories

A wide variety of accessories enables a flexible response to change in specifications. Snap-on fittings speed up mounting.



Cat Nos.	Description
ST419420000	Auxillary Contact Front mtg. 1NO
ST419430000	Auxillary Contact Front mtg. 1NC
ST419440000	Auxillary Contact Left side mtg. 2NO
ST419450000	Auxillary Contact Left side mtg. 1NO +1NC
ST419460000	Auxillary Contact Left side mtg. 2NC
ST419470000	Trip Alarm Contact Front mtg. 1NO
ST419480000	Trip Alarm Contact Front mtg. 1NC
ST419490000	Auxillary + Alarm Left side mtg. 1NO +1NC
ST419500000	Short circuit alarm Left side mtg. 1NO +1NC
ST419510000	Shunt trip 24V DC
ST419520000	Shunt trip 110V, 50Hz
ST419530000	Under Voltage release, 110V,50Hz
ST419540000	Under Voltage release, 415V,50Hz
ST419550000	External operating handle, (Black) Frame 1
ST419560000	External operating handle, (Black) Frame 2

# Technical Specifications



Type		MOG-S1		MOG-H1	
Standards		IEC60947-1, -2, -4-1		IEC60947-1, -2, -4-1	
Handle type		Rocker		Rotary	
Number of poles		3		3	
Frame		13A		32A	
Rated insulation voltage (Ui)		AC690V		AC690V	
Rated operational voltage (Ue)		AC200-690V		AC200-690V	
Rated impulse withstand voltage (Uimp)		6KV		6KV	
Rated frequency		AC50/60Hz		AC50/60Hz	
Utilization Category (IEC947-4-1/947-2)		AC-3/Cat. A		AC-3/Cat. A	
Maximum motor capacity AC3		7.5 kW (at 200-240V), 15 kW (at 380-440V)		7.5 kW (at 200-240V), 15 kW (at 380-440V)	
AC3 Electrical/Mechanical endurance		100000 (32A:70000)/100000 (32A:70000), (25cycles/hour)		100000 (32A:70000)/100000 (32A:70000), (25cycles/hour)	
Tripping device		Thermal-Magnetic		Thermal-Magnetic	
Ambient temperature compensation		-20~ + 60°C		-20~ + 60°C	
Overload, Phase loss protection		yes (according to IEC60947-4-1)		yes (according to IEC60947-4-1)	
Trip Indicator		Yes		Yes	
Test Trip Function		Yes		Yes	
Instantaneous release		13 X Ie max.		13 X Ie max.	
Terminal type		Screw terminal, M4 slotted		Screw terminal, M4 slotted	
Wire size	Solid/Stranded	1-10mm <sup>2</sup> x 1 / 18-8 AWG X 1		1-10mm <sup>2</sup> x 1 / 18-8 AWG X 1	
	Without/With end sleeve	1-6mm <sup>2</sup> x 2 / 18-10 AWG X 2		1-6mm <sup>2</sup> x 2 / 18-10 AWG X 2	
Product weight (Kg)		0.35		0.35	
Dimensions (mm) W x H x D		45 x 90 x 66		45 x 90 x 66	
Standard service condition	Relative humidity	45 ~ 85%RH	No dew formation or freezing due	45 ~ 85%RH	No dew formation or freezing due
	Operation altitude	Up to 2000m	to rapid temperature change allowed	Up to 2000m	to rapid temperature change allowed
	Atmosphere	Atmosphere having no excess Vapour, Steam, Dust,		Atmosphere having no excess Vapour, Steam, Dust,	
		Corrosive gas, Salt, Flammable gas		Corrosive gas, Salt, Flammable gas	



MOG-H2		MOG-H1M		MOG-H2M	
IEC60947-1, -2, -4-1,		IEC60947-1, -2, -4-1,		IEC60947-1, -2, -4-1,	
Rotary		Rotary		Rotary	
3		3		3	
63A		32A		63A	
AC1000V		AC690V		AC1000V	
AC200-690V		AC200-690V		AC200-690V	
8KV		6KV		8KV	
AC50/60Hz		AC50/60Hz		AC50/60Hz	
AC-3/Cat. A		AC-3/Cat. A		AC-3/Cat. A	
15 kW (at 200-240V), 30 kW (at 380-440V)		7.5 kW (at 200-240V), 15 kW (at 380-440V)		15 kW (at 200-240V), 30 kW (at 380-440V)	
25000/50000, (25cycles/hour)		100000 (32A:70000)/100000 (32A:70000), (25cycles/hour)		25000/50000, (25cycles/hour)	
Thermal-Magnetic		Magnetic		Magnetic	
-20~ + 60°C		None		-20~ + 60°C	
yes (according to IEC60947-4-1)		None		yes (according to IEC60947-4-1)	
Yes		Yes		Yes	
yes		Yes		Yes	
13 X Ie max.		13 X Ie max.		13 X Ie max.	
Box terminal, M6 slotted		Screw terminal, M4 slotted		Box terminal, M6 slotted	
1-25mm <sup>2</sup> x 1 / 18-4 AWG X 1		1-10mm <sup>2</sup> x 1 / 18-8 AWG X 1		1-25mm <sup>2</sup> x 1 / 18-4 AWG X 1	
1-16mm <sup>2</sup> x 2 / 18-4 AWG X 2		1-6mm <sup>2</sup> x 2 / 18-10 AWG X 2		1-16mm <sup>2</sup> x 2 / 18-4 AWG X 2	
0.78		0.37		0.78	
55 x 110 x 96		45 x 90 x 79		55 x 110 x 96	
45 ~ 85%RH	No dew formation or freezing due	45 ~ 85%RH	No dew formation or freezing due	45 ~ 85%RH	No dew formation or freezing due
Up to 2000m	to rapid temperature change allowed	2000m	to rapid temperature change allowed	Up to 2000m	to rapid temperature change allowed
Atmosphere having no excess Vapour, Steam, Dust,		Atmosphere having no excess Vapour, Steam, Dust,		Atmosphere having no excess Vapour, Steam, Dust,	
Corrosive gas, Salt, Flammable gas		Corrosive gas, Salt, Flammable gas		Corrosive gas, Salt, Flammable gas	

# Breaking Capacity at Different Voltages

## MOG-S1

Rating	I <sub>e</sub> (A)	AC240V AC230V		AC415V AC400V		AC460V AC440V		AC500V		AC690V AC600V	
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
0016	0.1-0.16	100	100	100	100	100	100	100	100	100	100
0025	0.16-0.25	100	100	100	100	100	100	100	100	100	100
0040	0.25-0.4	100	100	100	100	100	100	100	100	100	100
0063	0.4-0.63	100	100	100	100	100	100	100	100	100	100
0100	0.63-1	100	100	100	100	100	100	100	100	100	100
0160	1-1.6	100	100	100	100	100	100	100	100	100	100
0250	1.6-2.5	100	100	100	100	100	100	100	100	3	2
0400	2.5-4	100	100	100	100	100	100	100	100	3	2
0630	4-6.3	100	100	100	100	50	38	50	38	3	2
1000	6.3-10	100	100	100	100	15	11	10	8	3	2
1300	9-13	100	100	50	38	10	8	6	5	3	2

## MOG-H1

Rating	I <sub>e</sub> (A)	AC240V AC230V		AC415V AC400V		AC460V AC440V		AC500V		AC690V AC600V	
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
0016	0.1-0.16	100	100	100	100	100	100	100	100	100	100
0025	0.16-0.25	100	100	100	100	100	100	100	100	100	100
0040	0.25-0.4	100	100	100	100	100	100	100	100	100	100
0063	0.4-0.63	100	100	100	100	100	100	100	100	100	100
0100	0.63-1	100	100	100	100	100	100	100	100	100	100
0160	1-1.6	100	100	100	100	100	100	100	100	100	100
0250	1.6-2.5	100	100	100	100	100	100	100	100	8	6
0400	2.5-4	100	100	100	100	100	100	100	100	8	6
0630	4-6.3	100	100	100	100	100	100	100	100	6	5
1000	6.3-10	100	100	100	100	50	38	50	38	6	5
1300	9-13	100	100	100	100	50	38	42	32	6	5
1600	11-16	100	100	50	38	35	27	10	8	4	3
2000	14-20	100	100	50	38	35	27	10	8	4	3
2500	19-25	100	100	50	38	35	27	10	8	4	3
3200	24-32	100	100	50	38	35	27	10	8	4	3

## MOG-H2

Rating	I <sub>e</sub> (A)	AC240V AC230V		AC415V AC400V		AC460V AC440V		AC500V		AC690V AC600V	
		I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>	I <sub>cu</sub>	I <sub>cs</sub>
3200	24-32	100	100	50	38	35	27	10	8	5	4
4000	28-40	100	100	50	38	35	27	10	8	5	4
5000	35-50	100	100	50	38	35	27	10	8	5	4
6300	45-63	100	100	50	38	35	27	10	8	5	4

## MOG-H1M

Rating	In (A)	AC240V AC230V		AC415V AC400V		AC460V AC440V		AC500V		AC690V AC600V	
		Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
0016	0.16	100	100	100	100	100	100	100	100	100	100
0025	0.25	100	100	100	100	100	100	100	100	100	100
0040	0.4	100	100	100	100	100	100	100	100	100	100
0063	0.63	100	100	100	100	100	100	100	100	100	100
0100	1	100	100	100	100	100	100	100	100	100	100
0160	1.6	100	100	100	100	100	100	100	100	100	100
0250	2.5	100	100	100	100	100	100	100	100	8	6
0400	4	100	100	100	100	100	100	100	100	8	6
0630	6.3	100	100	100	100	100	100	100	100	6	5
1000	10	100	100	100	100	50	38	50	38	6	5
1300	13	100	100	100	100	50	38	42	32	6	5
1600	16	100	100	50	38	35	27	10	8	4	3
2000	20	100	100	50	38	35	27	10	8	4	3
2500	25	100	100	50	38	35	27	10	8	4	3
3200	32	100	100	50	38	35	27	10	8	4	3

## MOG-H2M

Rating	In (A)	AC240V AC230V		AC415V AC400V		AC460V AC440V		AC500V		AC690V AC600V	
		Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
3200	32	100	100	50	38	35	27	10	8	5	4
4000	40	100	100	50	38	35	27	10	8	5	4
5000	50	100	100	50	38	35	27	10	8	5	4
6300	63	100	100	50	38	35	27	10	8	5	4



## Selection Chart : Fuseless Protection for DOL starter feeders with MPCB

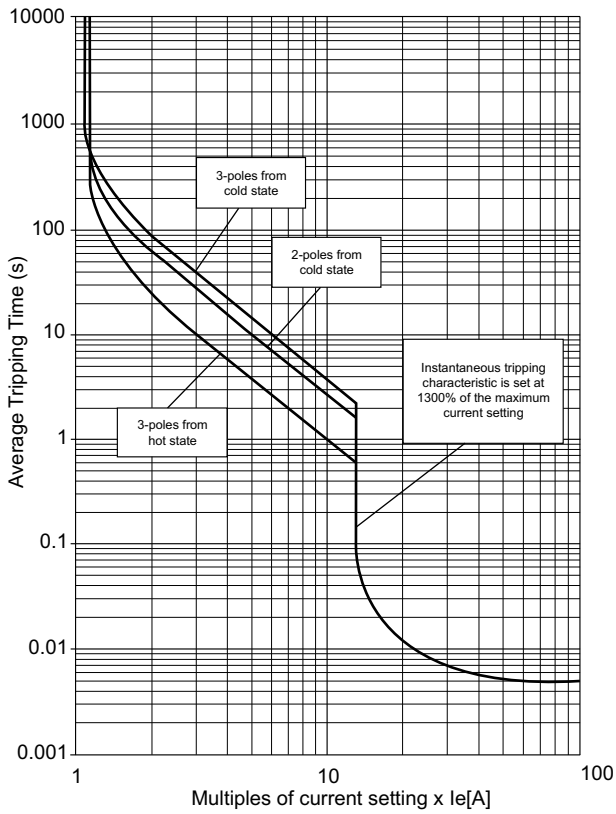
- The selection is valid only for complete L&T combinations i.e. MPCB + Relay + Contactor
- In any case if this combination is changed to accommodate another brand / rating of MPCB etc. it shall be the responsibility of the person making such a change to assure type 2 performance
- Selection is for normal starting conditions with starting time

According to Type '2' coordination,  $I_q = 50\text{kA}$  at 415V, 3 , 50Hz

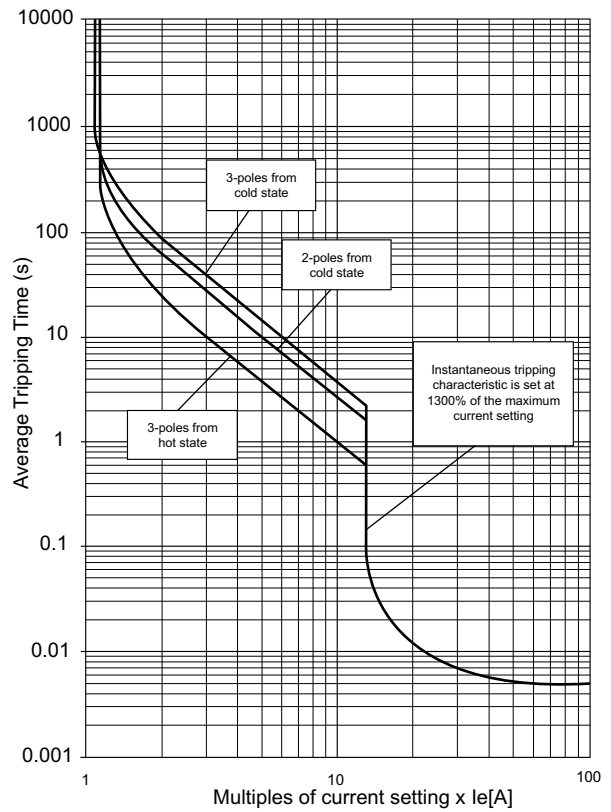
Sr No.	Motor Rating: 3 , 415V, 50Hz			Contactor	Overload Relay		MPCB (Only Magnetic)	
	hp	kW	$I_L$	Type	Type	Range (A)	Type	Rating $I_m$ (A)
1	0.125	0.09	0.40	MO 9	MO - RTO1	0.3 - 0.45	MOG - H1M	0.63
2	0.16	0.12	0.45	MO 9	MO - RTO1	0.3 - 0.45	MOG - H1M	0.63
3	0.2	0.15	0.57	MO 9	MO - RTO1	0.45 - 0.67	MOG - H1M	1
4	0.25	0.19	0.75	MO 9	MO - RTO1	0.67 - 1.0	MOG - H1M	1
5	0.33	0.25	0.90	MO 9	MO - RTO1	0.67 - 1.0	MOG - H1M	1.6
6	0.5	0.37	1.20	MO 9	MO - RTO1	1.0 - 1.5	MOG - H1M	1.6
7	0.75	0.55	1.60	MO 9	MO - RTO1	1.2 - 2.1	MOG - H1M	2.5
8	1	0.75	2.10	MO 9	MO - RTO1	1.8 - 2.7	MOG - H1M	2.5
9	1.5	1.10	2.70	MO 9	MO - RTO1	2.4 - 3.6	MOG - H1M	4
10	1.75	1.30	3.00	MO 9	MO - RTO1	2.4 - 3.6	MOG - H1M	4
11	2	1.50	3.50	MO 9	MO - RTO1	3.5 - 5.0	MOG - H1M	6.3
12	2.5	1.80	4.80	MO 9	MO - RTO1	3.5 - 5.0	MOG - H1M	6.3
13	3	2.25	5.00	MO 9	MO - RTO1	4.0 - 6.0	MOG - H1M	6.3
14	4	3.00	6.40	MO 9	MO - RTO1	6.3 - 9.0	MOG - H1M	10
15	5	3.70	7.90	MO 9	MO - RTO1	6.3 - 9.0	MOG - H1M	10
16	5.5	4.00	8.50	MO 9	MO - RTO1	6.3 - 9.0	MOG - H1M	10
17	6	4.50	9.00	MO 12	MO - RTO1	8.5 - 12.5	MOG - H1M	13
18	7.5	5.50	11.20	MO 12	MO - RTO1	8.5 - 12.5	MOG - H1M	16
19	10	7.50	14.80	MO 18	MO - RTO1	12.5 - 18	MOG - H1M	20
20	12.5	9.30	19.00	MO 25	MO - RTO1	17 - 24	MOG - H1M	25
21	15	11.00	22.00	MO 25	MO - RTO1	17 - 24	MOG - H1M	32
22	17.5	13.00	24.00	MO 32	MO - RTO1	22- 32	MOG - H1M	32
23	20	15.00	29.00	MO 32	MO - RTO1	22 - 32	MOG - H2M	40
24	25	18.60	35.00	MO 40	MO - RTO1	30 - 40	MOG - H2M	50
25	30	22.50	40.00	MO 40	MO - RTO1	35 - 45	MOG - H2M	50
26	35	26.00	47.00	MO 50	MN 5	30 - 50	MOG - H2M	63

# IT Characteristics

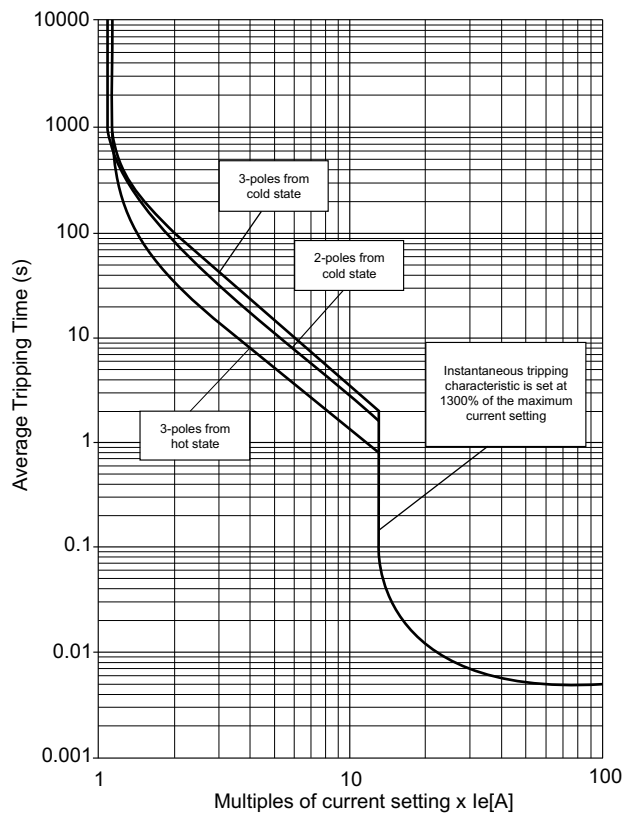
Type MOG-S1 (0.16-13A)



Type MOG-H1 (0.16-32A)

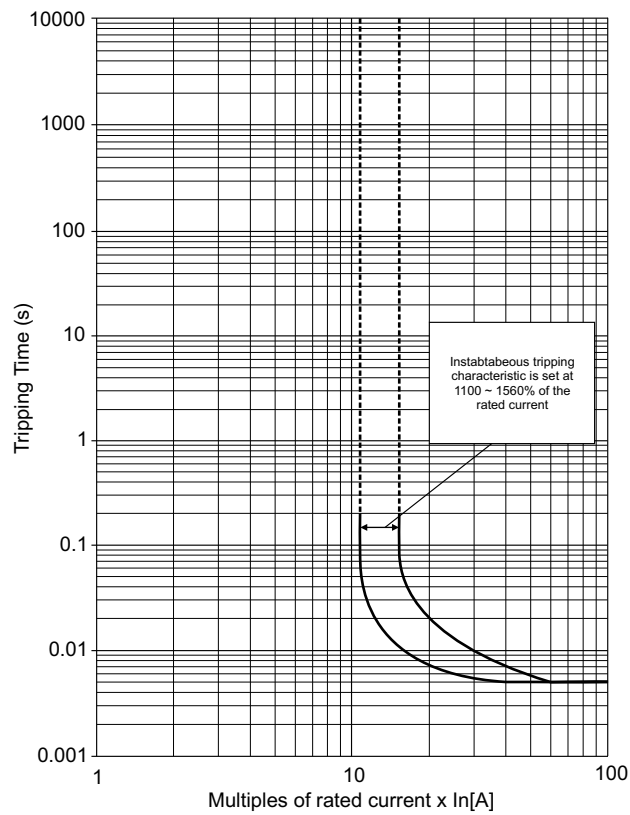


Type MOG-H2 (10-63A)

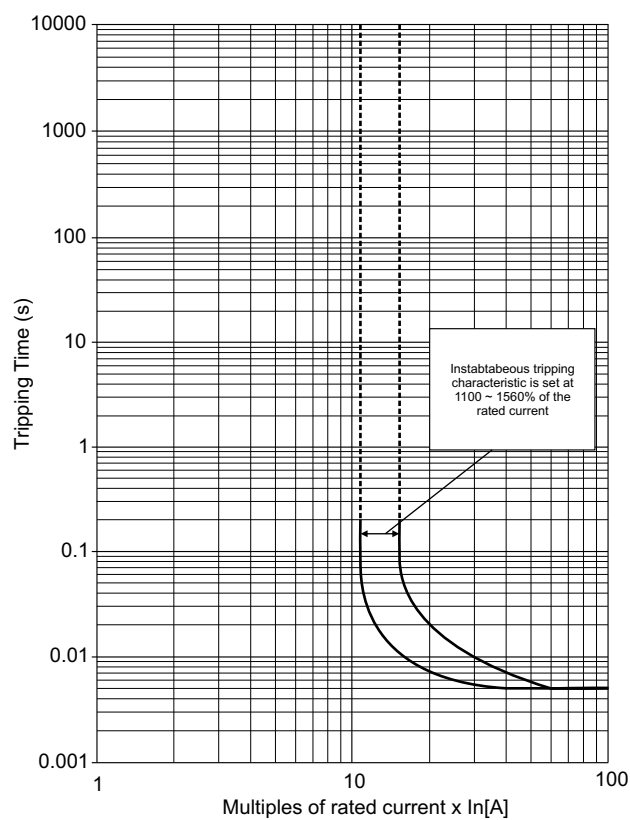


# IT Characteristics

### Type MOG-H1M (0.16-32A)

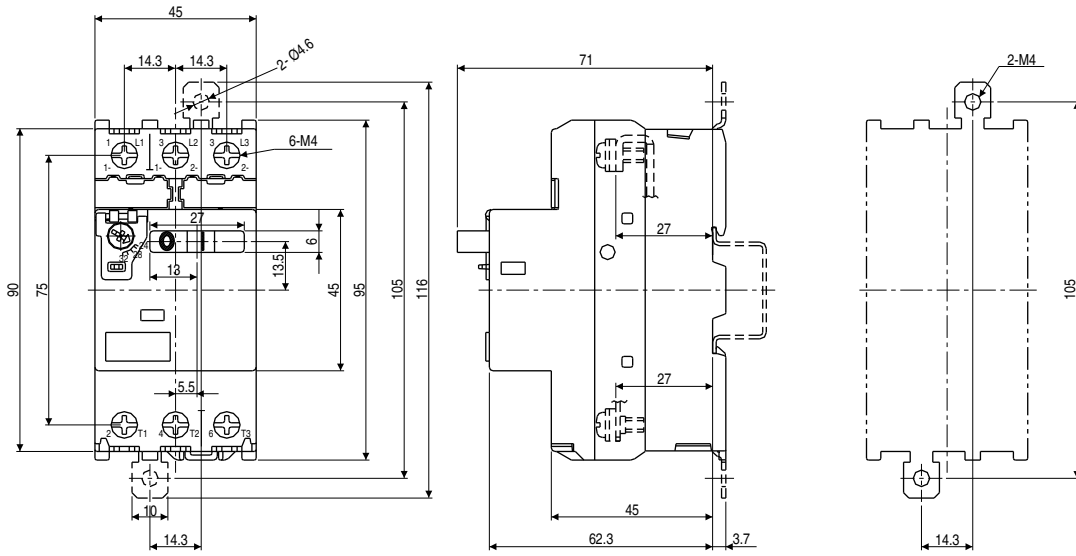


### Type MOG-H2M (10-32A)

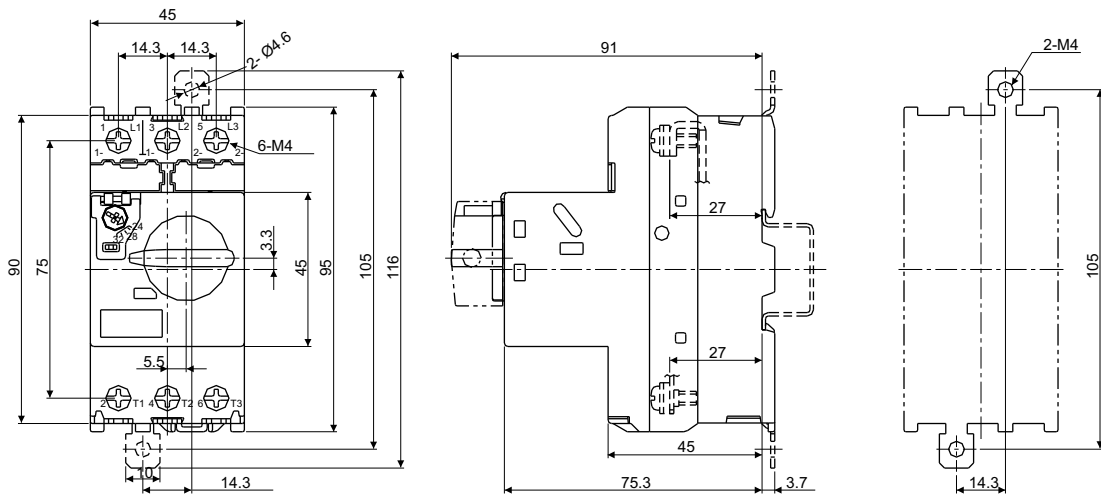


# Overall Dimensions

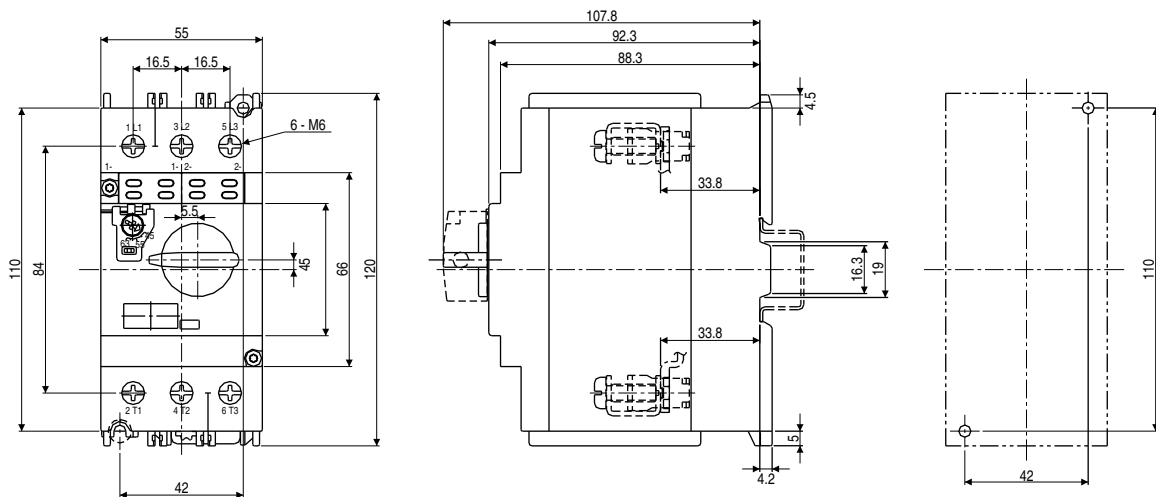
## Type MOG-S1



## Type MOG-H1



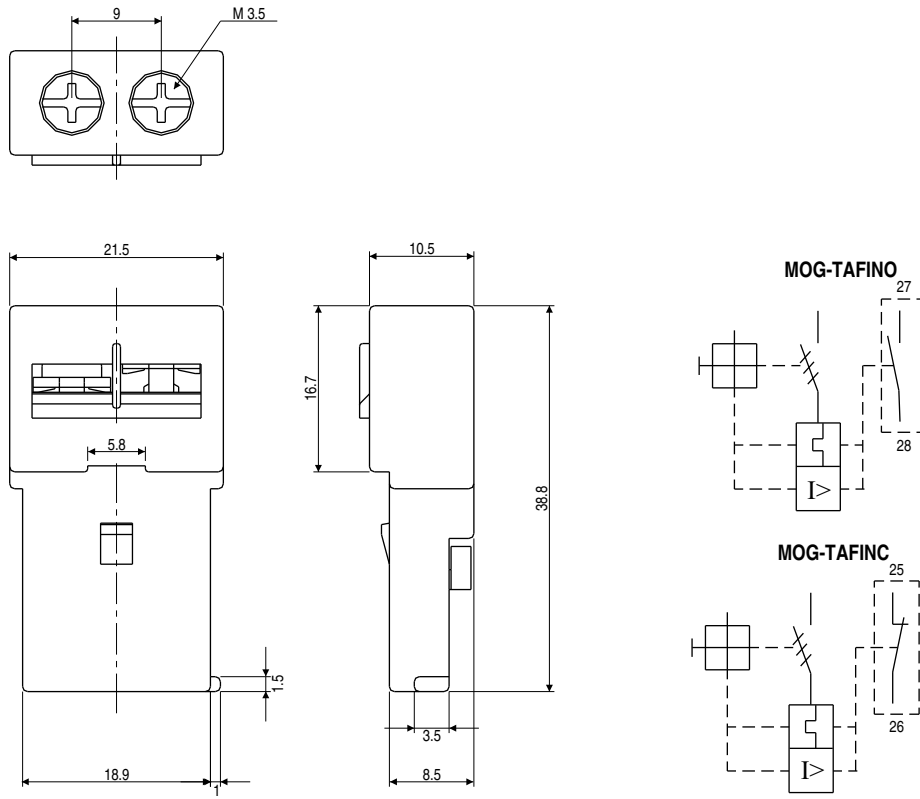
## Type MOG-H2



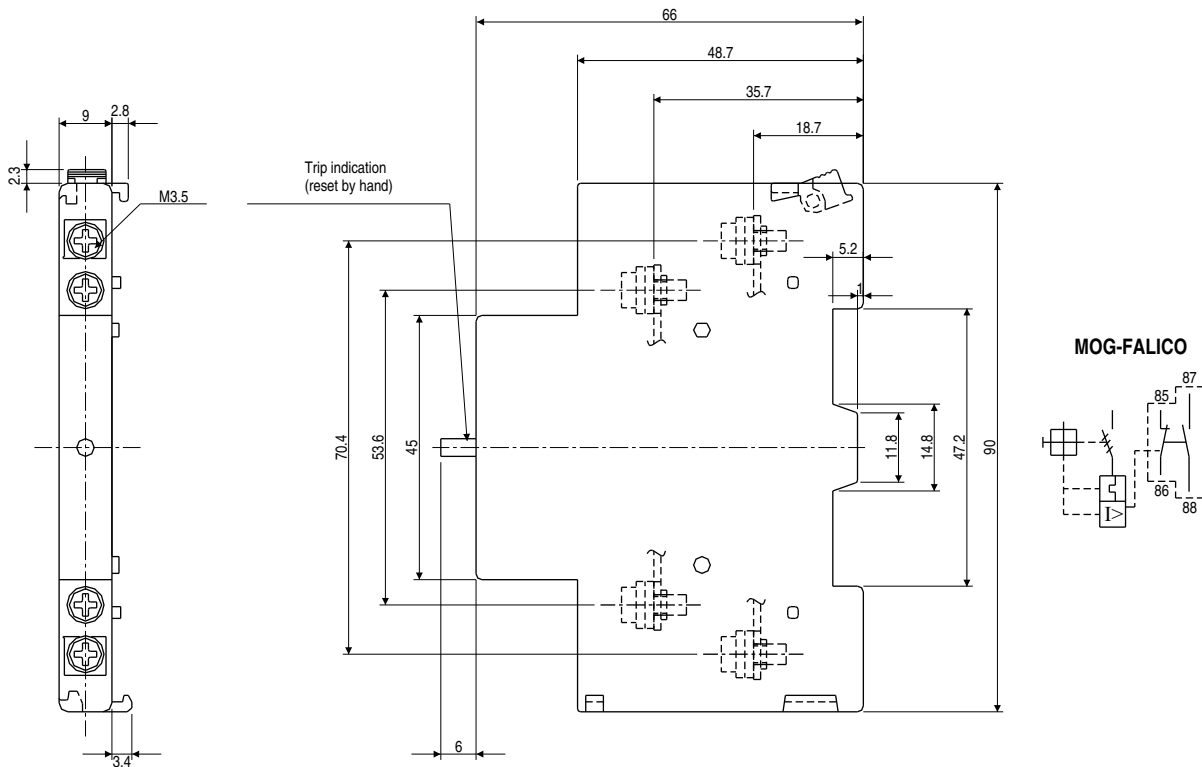


# Overall Dimensions

## Trip Alarm Contact Front 1NO

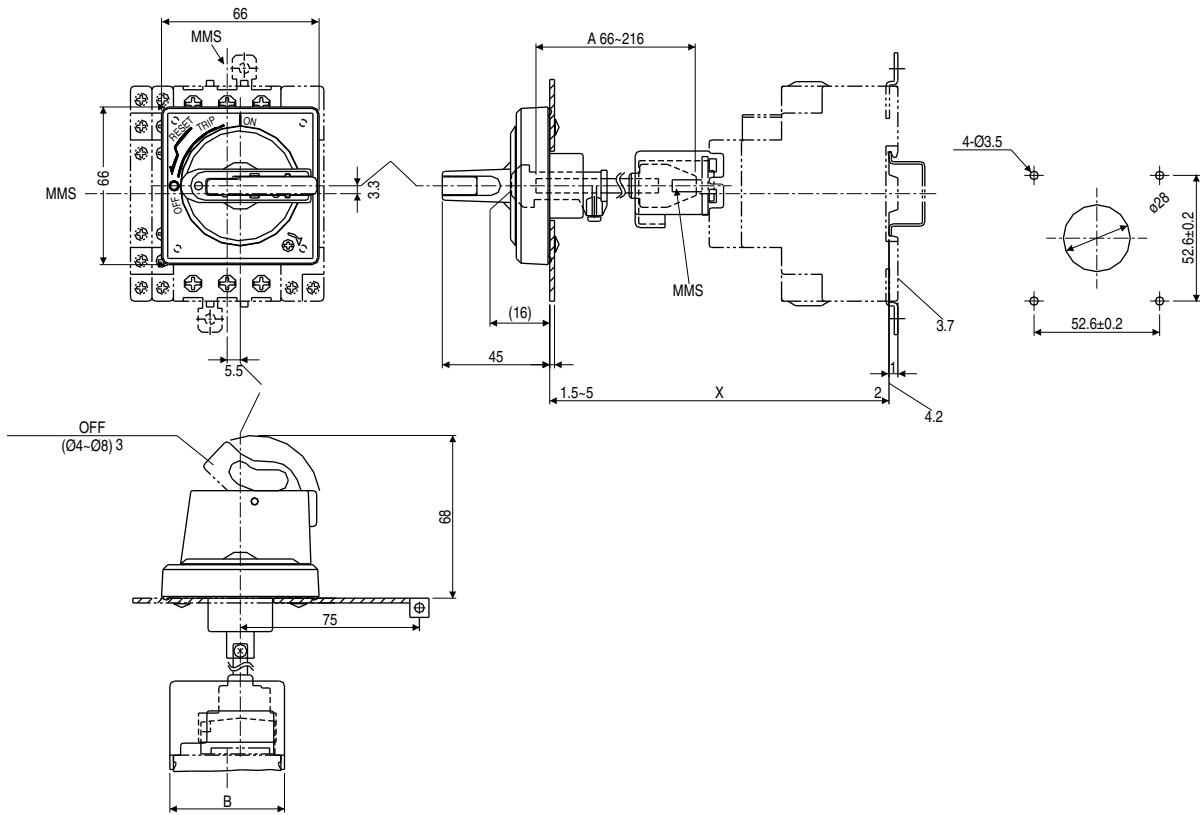


## S / C Alarm Left 1NO + 1NC

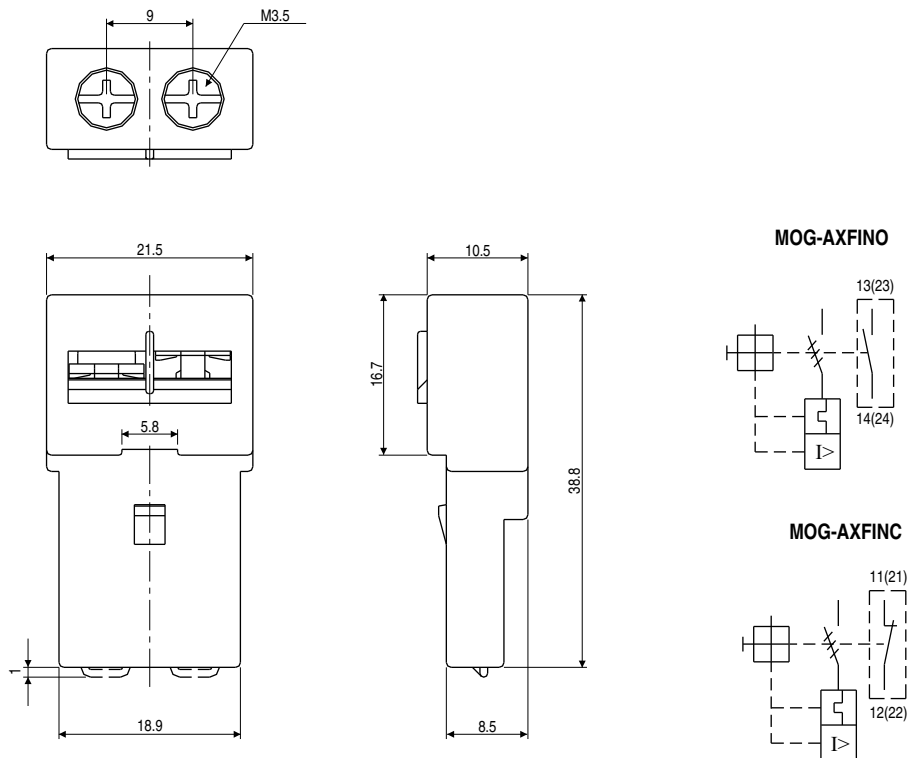


# Overall Dimensions

## External Operating Handle

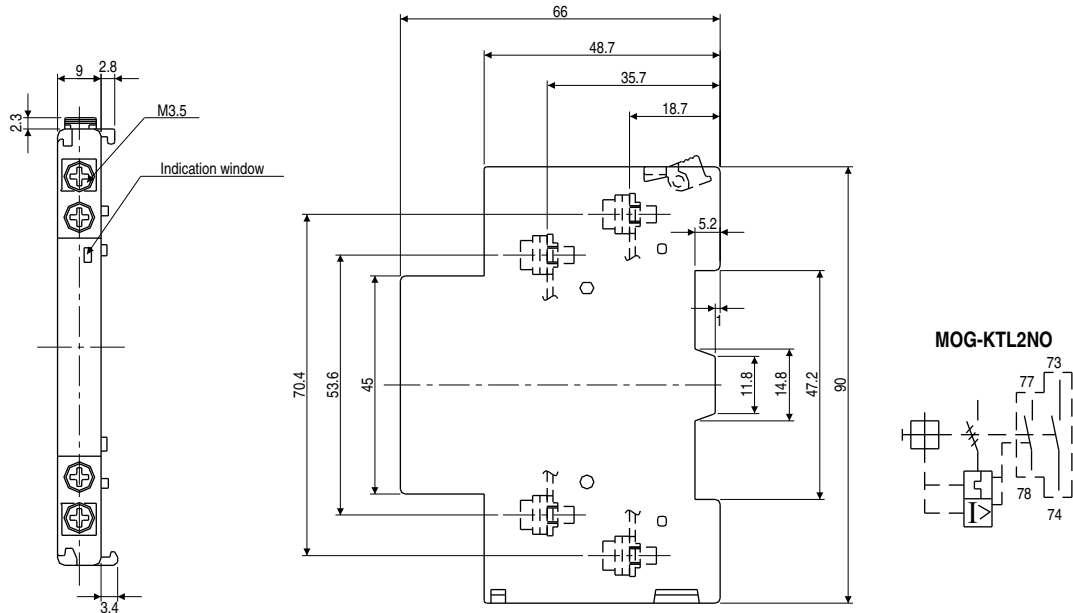


## Aux. Contact Front 1NO

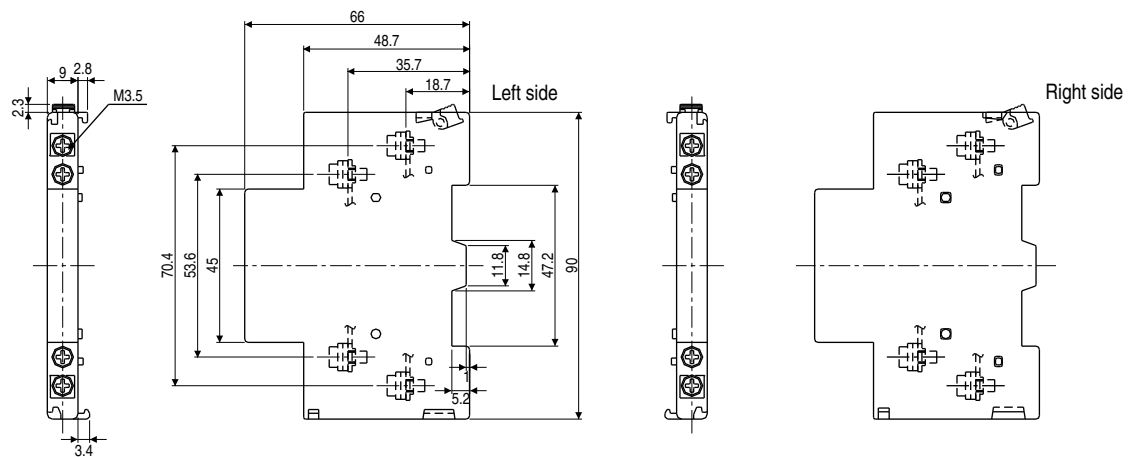


# Overall Dimensions

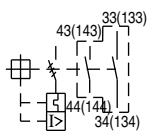
## Aux. Alarm Left 1NO + 1NC



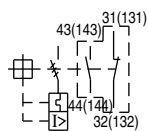
## Aux. Contact Left 2NO



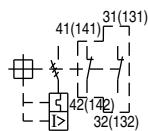
### MOG-AXL2NO



### MOG-AXL1CO



### MOG-AXL2NC



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