

SUPERNOVA™

Motor Protection Circuit Breakers



About us

Larsen & Toubro 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, a 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 five decades of experience in this field, the Company today enjoys a leadership position in the Indian market with a growing international presence.

It offers a complete range of products including powergear, controlgear, industrial automation, building electricals & automation, reactive power management, energy meters, and protective relays. These products conform to Indian and International Standards.



Switchgear Factory, Mumbai



Switchgear Factory, Ahmednagar

SUPERNOVA™ Product Range

L&T introduces complete range of Supernova products 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



L&T offers higher efficiency 3 phase LT motors, synonymous with ruggedness and reliability, suitable for all industrial applications upto 400 kW.

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.

Circuit Breaker Functions

- Short circuit protection
- Overcurrent protection
- Line protection

Thermal Overload Relay Functions

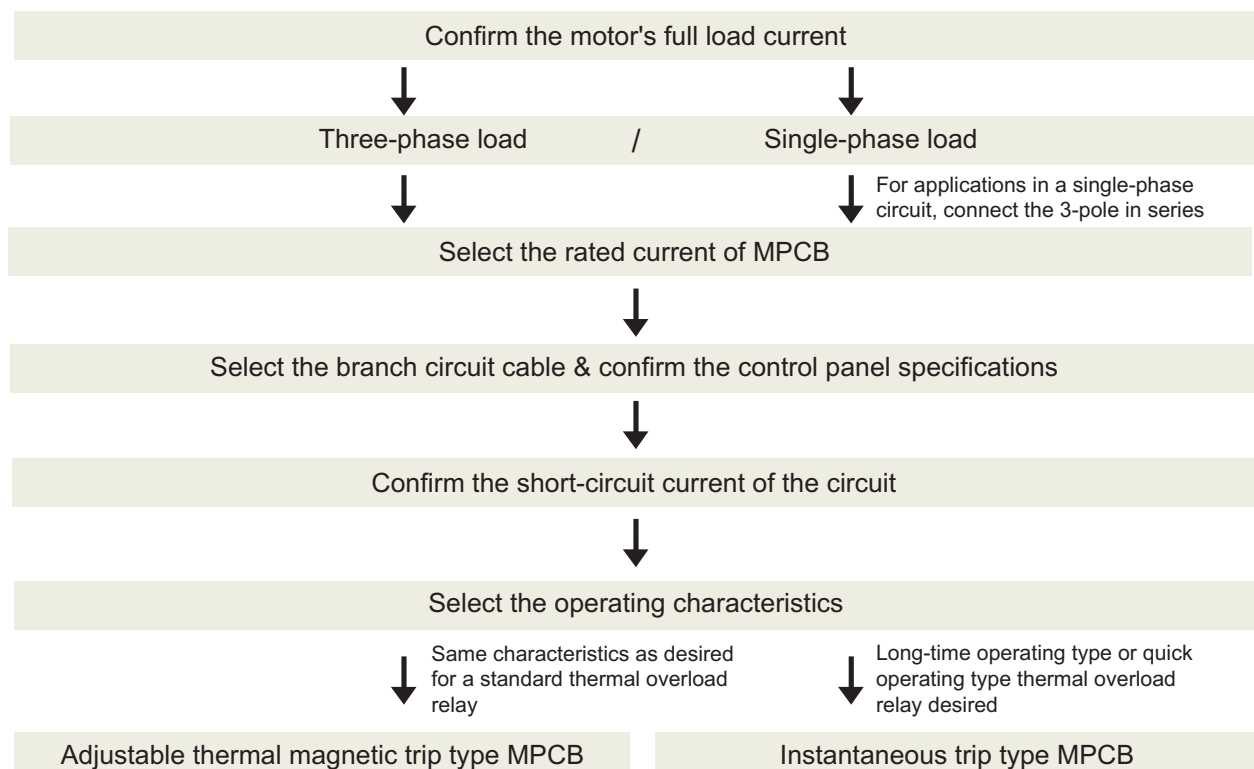
- Overload protection
- Phase loss protection
- Rated current adjustment
- Ambient temperature compensation

MPCB - Advantages

- Compactness
- High Breaking Capacity
- Short circuit protective coordination
- Reduction in wiring work
- Ecological design standards

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 provides high-performance short-circuit current breaking. They eliminate the need for an upstream circuit breaker for back-up use.

Overload Protection

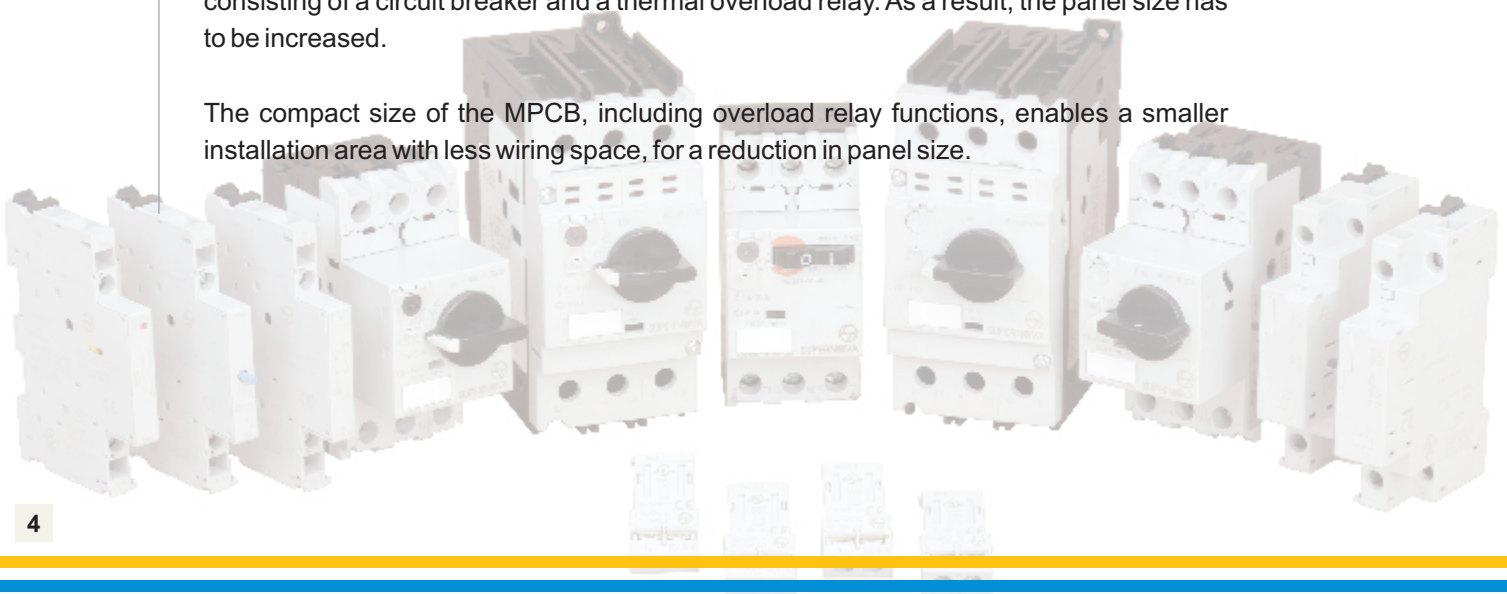
Motor Protection breakers cannot be adjusted to match the rated current of the motor being protected.

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.



Technical Specifications



Type		MOG - S1		MOG - H1		MOG - H2		MOG - H1M		MOG - H2M	
Standards		IEC60947 -1, -2, -4 -1		IEC60947 -1, -2, -4 -1		IEC60947 -1, -2, -4 -1		IEC60947 -1, -2, -4 -1		IEC60947-1, -2, -4 -1	
Handle type		Rocker		Rotary		Rotary		Rotary		Rotary	
Number of poles		3		3		3		3		3	
Frame size available (up to A)		13A		32A		63A		32A		63A	
Rated insulation voltage (Ui)		AC690V		AC690V		AC1000V		AC690V		AC1000V	
Rated operational voltage (Ue)		AC200 - 690V		AC200 - 690V		AC200 - 690V		AC200 - 690V		AC200 - 690V	
Rated impulse withstand voltage (Uimp)		6KV		6KV		8KV		6KV		8KV	
Rated frequency		AC50 / 60Hz		AC50 / 60Hz		AC50 / 60Hz		AC50 / 60Hz		AC50 / 60Hz	
Class of protection		10		10		10		10		10	
Utilization Category (IEC947 - 4 - 1 / 947 - 2)		AC - 3 / Cat. A		AC - 3 / Cat. A		AC - 3 / Cat. A		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)		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)	
AC3 Electrical/Mechanical endurance		100000 (32A:70000) / 100000 (32A:70000), (25cycles / hour)		100000 (32A:70000) / 100000 (32A:70000), (25cycles / hour)		25000 / 50000, (25cycles / hour)		100000 (32A:70000) / 100000 (32A:70000), (25cycles / hour)		25000 / 50000, (25cycles / hour)	
Tripping device		Thermal - Magnetic		Thermal - Magnetic		Thermal - Magnetic		Magnetic		Magnetic	
Ambient temperature compensation		-20°C ~ + 60°C		-20°C ~ + 60°C		-20°C ~ + 60°C		-20°C ~ + 60°C		-20°C ~ + 60°C	
Overload, Phase loss protection		yes (according to IEC60947 - 4 - 1)		yes (according to IEC60947 - 4 - 1)		yes (according to IEC60947 - 4 - 1)		None		None	
Trip Indicator		Yes		Yes		Yes		Yes		Yes	
Test Trip Function		Yes		Yes		Yes		Yes		Yes	
Instantaneous release		13 X Ie max.		13 x Ie max.		13 x Ie max.		13 x Ie max.		13 x Ie max.	
Terminal type		Screw terminal, M4 slotted		Screw terminal, M4 slotted		Box terminal, M6 slotted		Screw terminal, M4 slotted		Box terminal, M6 slotted	
Wire size	Solid/Stranded	1 - 10mm ² x 1 / 18 - 8 AWG x 1		1 - 10mm ² x 1 / 18 - 8 AWG x 1		1 - 25mm ² x 1 / 18 - 4 AWG x 1		1 - 10mm ² x 1 / 18 - 8 AWG x 1		1 - 25mm ² x 1 / 18 - 4 AWG x 1	
	Without/With end sleeve	1 - 6mm ² x 2 / 18 - 10 AWG x 2		1 - 6mm ² x 2 / 18 - 10 AWG x 2		1 - 16mm ² x 2 / 18 - 4 AWG x 2		1 - 6mm ² x 2 / 18 - 10 AWG x 2		1 - 16mm ² x 2 / 18 - 4 AWG x 2	
Product weight (Kg)		0.35		0.35		0.78		0.37		0.78	
Dimensions (mm) W x H x D		45 x 90 x 66		45 x 90 x 66		55 x 110 x 96		45 x 90 x 79		55 x 110 x 96	
Standard service condition	Relative humidity	45 ~ 85%Rh	No dew formation or freezing due to rapid temperature change allowed	45 ~ 85% Rh	No dew formation or freezing due to rapid temperature change allowed	45 ~ 85% Rh	No dew formation or freezing due to rapid temperature change allowed	45 ~ 85% Rh	No dew formation or freezing due to rapid temperature change allowed	45 ~ 85% Rh	No dew formation or freezing due to rapid temperature change allowed
	Operation altitude	Up to 2000m		Up to 2000m		Up to 2000m		Up to 2000m			
	Atmosphere	Atmosphere having no excess Vapour, Steam, Dust,		Atmosphere having no excess Vapour, Steam, Dust,		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		Corrosive gas, Salt, Flammable gas		Corrosive gas, Salt, Flammable gas	

Breaking Capacity at Different Voltages

MOG - S1

Rating	Ie (A)	AC240V AC230V	AC415V AC400V	AC460V AC440V	AC500V	AC690V AC600V
		Icu (A)				
0016	0.1 - 0.16	100	100	100	100	100
0025	0.16 - 0.25	100	100	100	100	100
0040	0.25 - 0.4	100	100	100	100	100
0063	0.4 - 0.63	100	100	100	100	100
0100	0.63 - 1	100	100	100	100	100
0160	1 - 1.6	100	100	100	100	100
0250	1.6 - 2.5	100	100	100	100	3
0400	2.5 - 4	100	100	100	100	3
0630	4 - 6.3	100	100	50	50	3
1000	6.3 - 10	100	100	15	10	3
1300	9 - 13	100	50	10	6	3

MOG - H1

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

MOG - H1M

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

MOG - H2

Rating	Ie (A)	AC240V AC230V	AC415V AC400V	AC460V AC440V	AC500V	AC690V AC600V
		Icu (A)				
3200	24 - 32	100	50	35	10	5
4000	28 - 40	100	50	35	10	5
5000	35 - 50	100	50	35	10	5
6300	45 - 63	100	50	35	10	5

MOG - H2M

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

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
45mm	0.16A	-	MOG - S1	0.1 - 0.16A	ST4188900000	100kA
	0.25A	-		0.16 - 0.25A	ST4189000000	
	0.4A	0.09		0.25 - 0.4A	ST4189100000	
	0.63A	0.12		0.4 - 0.63A	ST4189200000	
	1.0A	0.25		0.63 - 1.0A	ST4189300000	
	1.6A	0.55		1.0 - 1.6A	ST4189400000	
	2.5A	0.75		1.6 - 2.5A	ST4189500000	
	4.A	1.50		2.5 - 4A	ST4189600000	
	6.3A	2.20		4.0 - 6.3A	ST4189700000	
	10.0A	4.00		6.3 - 10.0A	ST4189800000	
	13.0A	5.40		9.0 - 13.0A	ST4189900000	50kA

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
45mm	0.16A	-	MOG - H1	0.1 - 0.16A	ST4190400000	100kA
	0.25A	-		0.16 - 0.25A	ST4190500000	
	0.4A	0.09		0.25 - 0.4A	ST4190600000	
	0.63A	0.12		0.4 - 0.63A	ST4190700000	
	1.0A	0.25		0.63 - 1.0A	ST4190800000	
	1.6A	0.55		1.0 - 1.6A	ST4190900000	
	2.5A	0.75		1.6 - 2.5A	ST4191000000	
	4.0A	1.50		2.5 - 4.0A	ST4191100000	
	6.3A	2.20		4.0 - 6.3A	ST4191200000	
	10.0A	4.00		6.3 - 10.0A	ST4191300000	
	13.0A	5.40		9.0 - 13.0A	ST4191400000	50kA
	16.0A	7.50		11.0 - 16.0A	ST4191500000	
	20.0A	9.00		14.0 - 20.0A	ST4191600000	
	25.0A	12.50		19.0 - 25.0A	ST4191700000	
	32.0A	15.00		24.0 - 32.0A	ST4191800000	
	32.0A	15.00	MOG - H2	24.0 - 32.0A	ST4191900000	
55mm	40.0A	20.00		28.0 - 40.0A	ST4192000000	
	50.0A	25.00		35.0 - 50.0A	ST4192100000	
	63.0A	34.00		45.0 - 63.0A	ST4192200000	

Instantaneous Trip - Rotary Type

Frame size (mm)	Rating (A)	Motor Rating at 415V, 50Hz (kW)	Type Designation	Instantaneous Trip Current	Cat. Nos.	Breaking Capacity
45mm	0.16	-	MOG - H1M	2.1	ST4192300000	100kA
	0.25A	-		3.3	ST4192400000	
	0.4A	0.09		5.2	ST4192500000	
	0.63A	0.12		8.2	ST4192600000	
	1.0A	0.25		13	ST4192700000	
	1.6A	0.55		20.8	ST4192800000	
	2.5A	0.75		32.5	ST4192900000	
	4.0A	1.50		52	ST4193000000	
	6.3A	2.20		81.9	ST4193100000	
	10.0A	4.00		130	ST4193200000	
	13.0A	5.40		169	ST4193300000	50kA
	16.0A	7.50		208	ST4193400000	
	20.0A	9.00		260	ST4193500000	
	25.0A	12.50		328	ST4193600000	
	32.0A	15.00		416	ST4193700000	
55mm	32.0A	15.00	MOG - H2M	416	ST4193800000	
	40.0A	20.00		520	ST4193900000	
	50.0A	25.00		650	ST4194000000	
	63.0A	34.00		819	ST4194100000	

Accessories

Features

- All accessories can be used with MOG S1 (45mm wide), MOG H1 (45mm wide) and MOG H2 (55mm wide) frames
- Shunt trip and undervoltage trip devices are available in a wide range of operating voltages
- IP20 terminal cover prevents accidental contact to electrically charged parts

Auxiliary contact blocks : MOG-AXF, MOG-AXL

These blocks are linked to the ON/OFF operation of the MPCB. Up to two contact blocks can be mounted to the right/left front and up to two contact blocks can be mounted to the left side.



Alarm contact blocks : MOG-TAF

This block operates when the MPCB trips due to overload, phase-loss, or short-circuit. It is not linked to the ON/OFF operation of the MPCB.

Note : Operation can be checked with the test trip function.



Auxiliary and alarm contact blocks : MOG-ATL

- This contact block combines auxiliary contact and alarm contact that operate in the event of an overload, phase loss, or short-circuit. Alarm contact is not linked to the ON/OFF operation of the MPCB
 - An alarm is displayed in the contact block's indicator when the alarm contact operates
- Note : Operation can be checked with the test trip function.



Short-circuit alarm contact block : MOG-SAL

- The contacts operate only when the MPCB has tripped due to a short-circuit
- When these contacts operate, the blue reset button extends out, and a trip indication is displayed
- The power to the MPCB can be turned ON after pressing the reset button

Note : Operation can not be checked with the test trip function. Be sure to press the reset button before mounting to the MPCB.



Shunt trip devices : MOG-ST

This device is used to remotely trip the MPCB.

Notes:

- This device cannot be used together with an undervoltage trip device
- When the MPCB trips with the shunt trip device, press the reset button before turning ON the power



Accessories

Undervoltage trip devices : MOG-UV

This device automatically trips the MPCB when the control circuit voltage drops below the specified value.

Notes:

- This device cannot be used together with a shunt trip device
- When the MPCB has been tripped with the undervoltage trip device, press the reset button before turning ON the power



External operating handles : MOG-EH

- To operate the MPCB without opening the panel door
- Equipped with an interlock mechanism that prevents someone from opening the panel door when the MPCB is in the ON state
- The shaft can be cut to match the distance between the MPCB and the panel door
- Door interlock function
- OFF lock function

Note: Padlocks not included.

- Release screw allows the door to be opened with the handle in the ON position
- IP54 enclosure



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
Part number		MOG-AXF	MOG-AXL	MOG-TAF	MOG-ATL	MOG-SAL
Standard		IEC 60947-5-1				
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
Min. voltage and current		17V, 5mA				

Accessory type		Shunt trip device MOG-ST	Undervoltage device MOG-UV
Standard		IEC 60947-1	
Rated insulation voltage (V AC)		690	
No. of ON-OFF operations		5000	
Operating time (ms)		20	
Power consumption	Inrush (VA/W)	21/12	
	Sealed (VA/W)	8/1.2	
Voltage range	Tripping voltage (V)	0.7 to 1.1Ue	0.35 to 0.7Ue
	Closing voltage (V)	-	0.85 to 1.1Ue
Time rating of coil (s)		AC: Continuous DC: 5	AC: Continuous

Note: Ue: Rated Voltage

Selection Chart

Fuseless Protection for DOL Starter Feeders

with MPCB MOG-H1M/H2M, MO Contactor and RTO1 Overload Relay

Type '2' Co-ordination, I_q=50 kA at 415V, 3Ø, 50 Hz

as per Standards : IEC 60947-4-1, IS 13947 (Part 4/Sec. 1), EN 60947-4-1

- 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' Co-ordination, I_q=50kA at 415V, 3Ø, 50Hz

Sr. No.	Motor Rating: 3Ø, 415V, 50Hz			Contactor Type	Overload Relay		MPCB	
	hp	kW	FLC, In (A)		Type	Range (A)	Type	Rating
1	0.125	0.09	0.4	MO 9	RTO1	0.3 - 0.45	MOG-H1M	0.63
2	0.16	0.12	0.45	MO 9	RTO1	0.3 - 0.45	MOG-H1M	0.63
3	0.2	0.15	0.57	MO 9	RTO1	0.45 - 0.67	MOG-H1M	1
4	0.25	0.19	0.75	MO 9	RTO1	0.67 - 1.0	MOG-H1M	1
5	0.33	0.25	0.88	MO 9	RTO1	0.67 - 1.0	MOG-H1M	1.6
6	0.5	0.37	1.2	MO 9	RTO1	1.0 - 1.5	MOG-H1M	1.6
7	0.75	0.55	1.6	MO 9	RTO1	1.2 - 2.1	MOG-H1M	2.5
8	1	0.75	2.1	MO 9	RTO1	1.8 - 2.7	MOG-H1M	2.5
9	1.5	1.1	2.7	MO 9	RTO1	2.4 - 3.6	MOG-H1M	4
10	1.75	1.3	3	MO 9	RTO1	2.4 - 3.6	MOG-H1M	4
11	2	1.5	3.5	MO 9	RTO1	3.5 - 5.0	MOG-H1M	6.3
12	2.5	1.8	4.8	MO 9	RTO1	3.5 - 5.0	MOG-H1M	6.3
13	3	2.25	5	MO 9	RTO1	4.0 - 6.0	MOG-H1M	6.3
14	4	3	6.4	MO 9	RTO1	6.3 - 9.0	MOG-H1M	10
15	5	3.7	7.9	MO 9	RTO1	6.3 - 9.0	MOG-H1M	10
16	5.5	4	8.5	MO 9	RTO1	6.3 - 9.0	MOG-H1M	10
17	6	4.5	9	MO 12	RTO1	8.5 - 12.5	MOG-H1M	13
18	7.5	5.5	11.2	MO 12	RTO1	8.5 - 12.5	MOG-H1M	16
19	10	7.5	14.8	MO 18	RTO1	12.5 - 18	MOG-H1M	20
20	12.5	9.3	19	MO 25	RTO1	17 - 24	MOG-H1M	25
21	15	11	22	MO 25	RTO1	17 - 24	MOG-H1M	32
22	17.5	13	24	MO 32	RTO1	22 - 32	MOG-H1M	32
23	20	15	29	MO 32	RTO1	22 - 32	MOG-H2M	40
24	25	18.6	35	MO 40	RTO1	30 - 40	MOG-H2M	50
25	30	22.5	40	MO 40	RTO1	35 - 45	MOG-H2M	50
26	35	26	47	MO 50	MN 5	30 - 50	MOG-H2M	63

Selection Chart

Fuseless Protection for DOL Starter Feeders
with MPCB MOG-S1/H1/H2 and MO Contactor

Type '2' Co-ordination, I_q=50 kA at 415V, 3Ø, 50 Hz

as per Standards : IEC 60947-4-1, IS 13947 (Part 4/Sec. 1), EN 60947-4-1

Sr. No.	Motor Rating: 3Ø, 415V, 50Hz			Contactor Type	Overload Relay		MPCB	
	hp	kW	FLC, In (A)		Type	Range (A)	Type	Rating
1	0.125	0.09	0.40	MO 9	-	-	MOG-S1/MOG-H1	0.4 - 0.63
2	0.16	0.12	0.45	MO 9	-	-	MOG-S1/MOG-H1	0.4 - 0.63
3	0.2	0.15	0.57	MO 9	-	-	MOG-S1/MOG-H1	0.63 - 1
4	0.25	0.19	0.75	MO 9	-	-	MOG-S1/MOG-H1	0.63 - 1
5	0.33	0.25	0.90	MO 9	-	-	MOG-S1/MOG-H1	1 - 1.6
6	0.5	0.37	1.20	MO 9	-	-	MOG-S1/MOG-H1	1 - 1.6
7	0.75	0.55	1.60	MO 9	-	-	MOG-S1/MOG-H1	1.6 - 2.5
8	1	0.75	2.10	MO 9	-	-	MOG-S1/MOG-H1	1.6 - 2.5
9	1.5	1.10	2.70	MO 9	-	-	MOG-S1/MOG-H1	2.5 - 4
10	1.75	1.30	3.00	MO 9	-	-	MOG-S1/MOG-H1	2.5 - 4
11	2	1.50	3.50	MO 9	-	-	MOG-S1/MOG-H1	4 - 6.3
12	2.5	1.80	4.80	MO 9	-	-	MOG-S1/MOG-H1	4 - 6.3
13	3	2.25	5.00	MO 9	-	-	MOG-S1/MOG-H1	4 - 6.3
14	4	3.00	6.40	MO 9	-	-	MOG-S1/MOG-H1	6.3 - 10
15	5	3.70	7.90	MO 9	-	-	MOG-S1/MOG-H1	6.3 - 10
16	5.5	4.00	8.50	MO 9	-	-	MOG-S1/MOG-H1	6.3 - 10
17	6	4.50	9.00	MO 12	-	-	MOG-S1/MOG-H1	9 - 13
18	7.5	5.50	11.20	MO 12	-	-	MOG-H1	11 - 16
19	10	7.50	14.80	MO 18	-	-	MOG-H1	14 - 20
20	12.5	9.30	19.00	MO 25	-	-	MOG-H1	19 - 25
21	15	11.00	22.00	MO 25	-	-	MOG-H1	24 - 32
22	17.5	13.00	24.00	MO 32	-	-	MOG-H1	24 - 32
23	20	15.00	29.00	MO 32	-	-	MOG-H2	28 - 40
24	25	18.60	35.00	MO 40	-	-	MOG-H2	35 - 50
25	30	22.50	40.00	MO 40	-	-	MOG-H2	35 - 50
26	35	26.00	47.00	MO 50	-	-	MOG-H2	45 - 63



Selection Chart

**Fuseless Protection for DOL Starter Feeders
with MPCB MOG-S1/H1/H2 and MNX Contactor**

Type '2' Co-ordination, I_q=50 kA at 415V, 3Ø, 50 Hz

as per Standards : IEC 60947-4-1, IS 13947 (Part 4/Sec. 1), EN 60947-4-1

Sr. No.	Motor Rating: 3Ø, 415V, 50Hz			Contactor Type	Overload Relay		MPCB	
	hp	kW	FLC, In (A)		Type	Range (A)	Type	Rating
1	0.125	0.09	0.4	MNX 9	-	-	MOG-S1/MOG-H1	0.25 - 0.4
2	0.16	0.12	0.45	MNX 9	-	-	MOG-S1/MOG-H1	0.4 - 0.63
3	0.2	0.15	0.57	MNX 9	-	-	MOG-S1/MOG-H1	0.4 - 0.63
4	0.25	0.19	0.75	MNX 9	-	-	MOG-S1/MOG-H1	0.63 - 1
5	0.33	0.25	0.88	MNX 9	-	-	MOG-S1/MOG-H1	0.63 - 1
6	0.5	0.37	1.2	MNX 9	-	-	MOG-S1/MOG-H1	1 - 1.6
7	0.75	0.55	1.6	MNX 9	-	-	MOG-S1/MOG-H1	1 - 1.6
8	1	0.75	2.1	MNX12	-	-	MOG-S1/MOG-H1	1.6 - 2.5
9	1.5	1.1	2.7	MNX 12	-	-	MOG-S1/MOG-H1	2.5 - 4
10	1.75	1.3	3	MNX 12	-	-	MOG-S1/MOG-H1	2.5 - 4
11	2	1.5	3.5	MNX 12	-	-	MOG-S1/MOG-H1	2.5 - 4
12	2.5	1.8	4.8	MNX 12	-	-	MOG-S1/MOG-H1	4 - 6.3
13	3	2.25	5	MNX 12	-	-	MOG-S1/MOG-H1	4 - 6.3
14	4	3	6.4	MNX 12	-	-	MOG-S1/MOG-H1	6.3 - 10
15	5	3.7	7.9	MNX 12	-	-	MOG-S1/MOG-H1	6.3 - 10
16	6	4.5	9	MNX 12	-	-	MOG-S1/MOG-H1	6.3 - 10
17	7.5	5.5	11.2	MNX 12	-	-	MOG-S1/MOG-H1	9 - 13
18	10	7.5	14.8	MNX 18	-	-	MOG-H1	11 - 16
19	12.5	9.3	19	MNX 25	-	-	MOG-H1	14 - 20
20	15	11	22	MNX 25	-	-	MOG-H1	19 - 25
21	17.5	13	24	MNX 32	-	-	MOG-H1	19 - 25
22	20	15	29	MNX40	-	-	MOG-H1	24 - 32
23	25	18.6	35	MNX 40	-	-	MOG-H2	28 - 40
24	30	22.5	40	MNX 45	-	-	MOG-H2	28 - 40
25	35	26	47	MNX70			MOG-H2	35 - 50
26	45	33.5	60	MNX 80			MOG-H2	45 - 63

Selection Chart

Fuseless Protection for DOL Starter Feeders
with MPCB MOG-H1M/H2M , MNX Contactor and MN 2 Overload Relay
Type '2' Co-ordination, I_q=50 kA at 415V, 3Ø, 50 Hz
as per Standards : IEC 60947-4-1, IS 13947 (Part 4/Sec. 1), EN 60947-4-1

Sr. No.	Motor Rating: 3Ø, 415V, 50Hz			Contactor Type	Overload Relay		MPCB	
	hp	kW	FLC, In (A)		Type	Range (A)	Type	Rating
1	0.125	0.09	0.4	MNX 9	MN 2	0.3 - 0.5	MOG-H1M	0.4
2	0.16	0.12	0.45	MNX 9	MN 2	0.3 - 0.5	MOG-H1M	0.63
3	0.2	0.15	0.57	MNX 9	MN 2	0.45 - 0.75	MOG-H1M	0.63
4	0.25	0.19	0.75	MNX 9	MN 2	0.6 - 1	MOG-H1M	1
5	0.33	0.25	0.88	MNX 9	MN 2	0.6 - 1	MOG-H1M	1
6	0.5	0.37	1.2	MNX 9	MN 2	0.9 - 1.5	MOG-H1M	1.6
7	0.75	0.55	1.6	MNX 9	MN 2	1.4 - 2.3	MOG-H1M	1.6
8	1	0.75	2.1	MNX 9	MN 2	1.4 - 2.3	MOG-H1M	2.5
9	1.5	1.1	2.7	MNX 12	MN 2	2 - 3.3	MOG-H1M	4
10	1.75	1.3	3	MNX 12	MN 2	2 - 3.3	MOG-H1M	4
11	2	1.5	3.5	MNX 12	MN 2	3 - 5	MOG-H1M	4
12	2.5	1.8	4.8	MNX 25	MN 2	3 - 5	MOG-H1M	6.3
13	3	2.25	5	MNX 25	MN 2	4.5 - 7.5	MOG-H1M	6.3
14	6	4.5	9	MNX 25	MN 2	9 - 15	MOG-H1M	10
15	7.5	5.5	11.2	MNX 25	MN 2	9 - 15	MOG-H1M	13
16	10	7.5	14.8	MNX 25	MN 2	9 - 15	MOG-H1M	16
17	12.5	9.3	19	MNX 32	MN 2	14 - 23	MOG-H1M	25
18	15	11	22	MNX 32	MN 2	14 - 23	MOG-H1M	25
19	17.5	13	24	MNX 32	MN 2	20 - 33	MOG-H1M	25
20	20	15	29	MNX 40	MN 2	20 - 33	MOG-H1M	32
21	25	18.6	35	MNX 45	MN 5	30 - 50	MOG-H2M	40
22	30	22.5	40	MNX 45	MN 5	30 - 50	MOG-H2M	40
23	35	26	47	MNX 70	MN 5	30 - 50	MOG-H2M	50
24	40	30	55	MNX 70	MN 5	45 - 75	MOG-H2M	63
25	45	33.5	60	MNX 70	MN 5	45 - 75	MOG-H2M	63

Selection Chart

**Fuseless Protection for DOL Starter Feeders
with MPCB MOG-H1M/H2M and MNX Contactor**

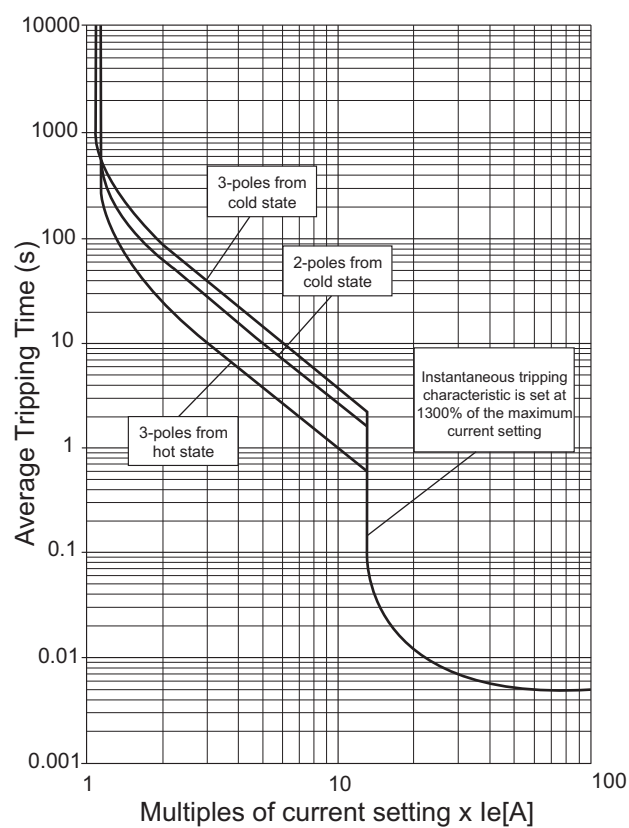
Type '2' Co-ordination, I_q=50 kA at 415V, 3Ø, 50 Hz

as per Standards : IEC 60947-4-1, IS 13947 (Part 4/Sec. 1), EN 60947-4-1

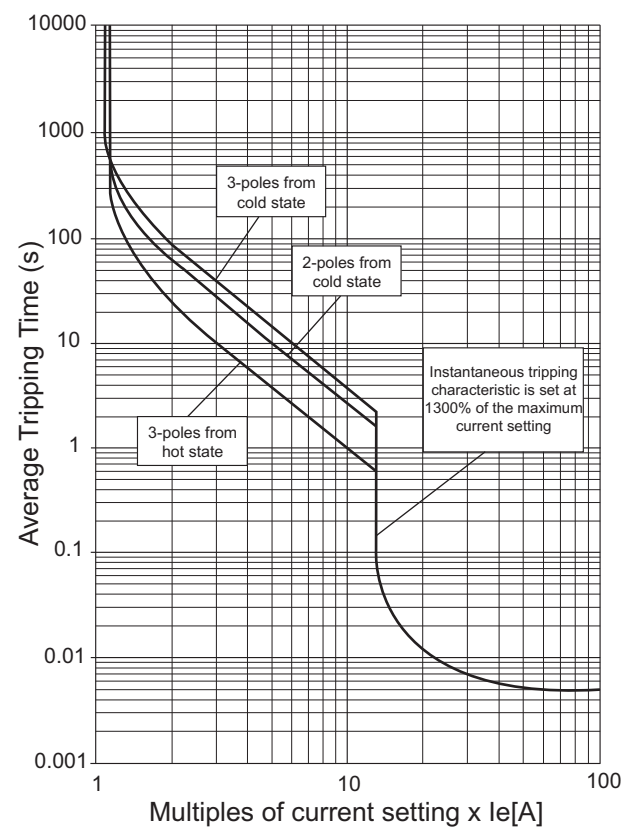
Sr. No.	Motor Rating: 3Ø, 415V, 50Hz			Contactor Type	Overload Relay		MPCB	
	hp	kW	FLC, In (A)		Type	Range (A)	Type	Rating
1	0.125	0.09	0.4	MNX 9	RTX 1	0.3 - 0.45	MOG-H1M	0.63
2	0.16	0.12	0.45	MNX 9	RTX 1	0.3 - 0.45	MOG-H1M	0.63
3	0.2	0.15	0.57	MNX 9	RTX 1	0.45 - 0.67	MOG-H1M	1
4	0.25	0.19	0.75	MNX 9	RTX 1	0.67 - 1.0	MOG-H1M	1
5	0.33	0.25	0.88	MNX 9	RTX 1	0.67 - 1.0	MOG-H1M	1.6
6	0.5	0.37	1.2	MNX 9	RTX 1	1.0 - 1.5	MOG-H1M	1.6
7	0.75	0.55	1.6	MNX 9	RTX 1	1.2 - 2.1	MOG-H1M	2.5
8	1	0.75	2.1	MNX 9	RTX 1	1.8 - 2.7	MOG-H1M	2.5
9	1.5	1.1	2.7	MNX 9	RTX 1	2.4 - 3.6	MOG-H1M	4
10	1.75	1.3	3	MNX 9	RTX 1	2.4 - 3.6	MOG-H1M	4
11	2	1.5	3.5	MNX 9	RTX 1	3.5 - 5.0	MOG-H1M	6.3
12	2.5	1.8	4.8	MNX 9	RTX 1	3.5 - 5.0	MOG-H1M	6.3
13	3	2.25	5	MNX 9	RTX 1	4.0 - 6.0	MOG-H1M	6.3
14	4	3	6.4	MNX 9	RTX 1	6.3 - 9.0	MOG-H1M	10
15	5	3.7	7.9	MNX 9	RTX 1	6.3 - 9.0	MOG-H1M	10
16	5.5	4	8.5	MNX 9	RTX 1	6.3 - 9.0	MOG-H1M	10
17	6	4.5	9	MNX 12	RTX 1	8.5 - 12.5	MOG-H1M	13
18	7.5	5.5	11.2	MNX 12	RTX 1	8.5 - 12.5	MOG-H1M	16
19	10	7.5	14.8	MNX 18	RTX 1	12.5 - 18	MOG-H1M	20
20	12.5	9.3	19	MNX 25	RTX 1	17 - 24	MOG-H1M	25
21	15	11	22	MO 25	RTX 1	17 - 24	MOG-H1M	32
22	17.5	13	24	MNX 25	RTX 1	22 - 32	MOG-H1M	32
23	20	15	29	MNX 32	RTX 1	22 - 32	MOG-H2M	40
24	25	18.6	35	MNX 45	RTX 1	30 - 40	MOG-H2M	50
25	30	22.5	40	MNX 45	RTX 1	35 - 45	MOG-H2M	50

I-t Characteristics

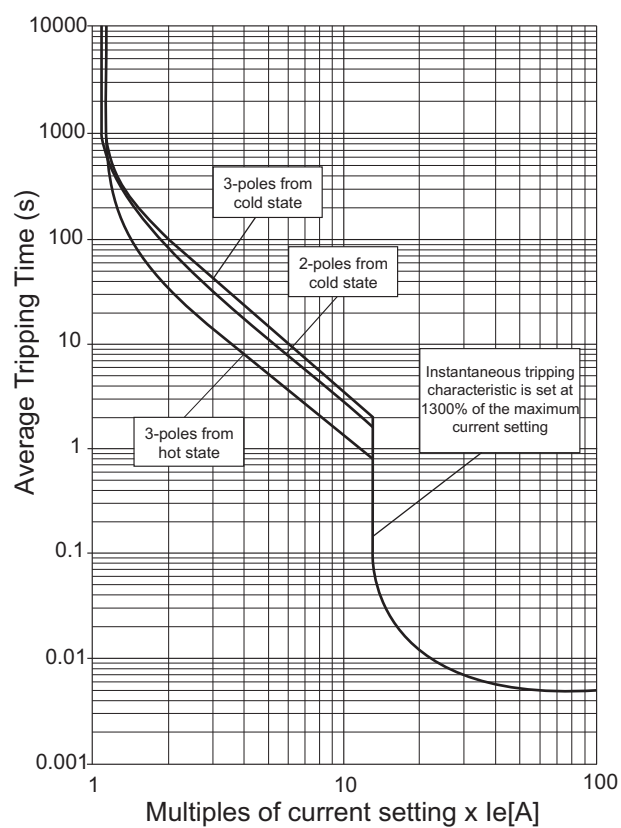
Type MOG - S1 (0.16A - 13A)



Type MOG - H1 (0.16A - 32A)

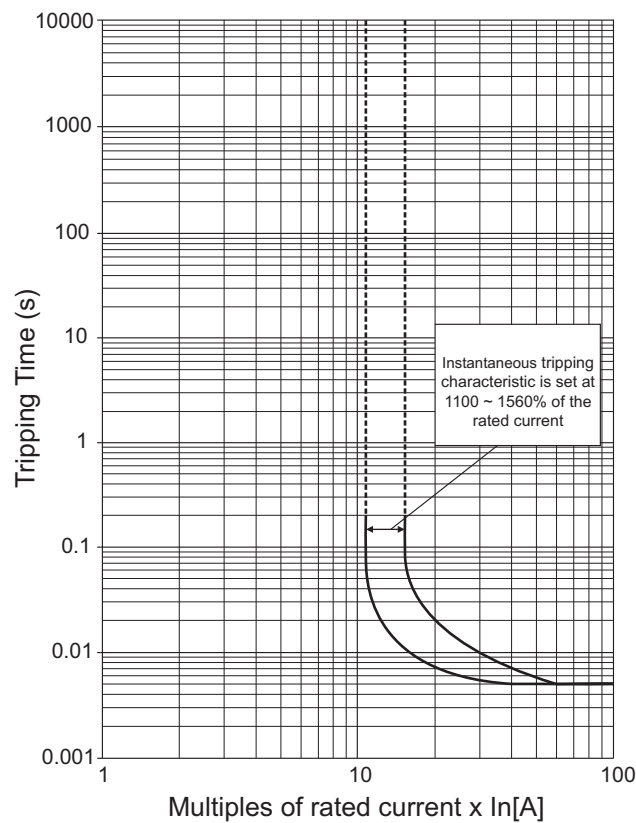


Type MOG - H2 (32A - 63A)

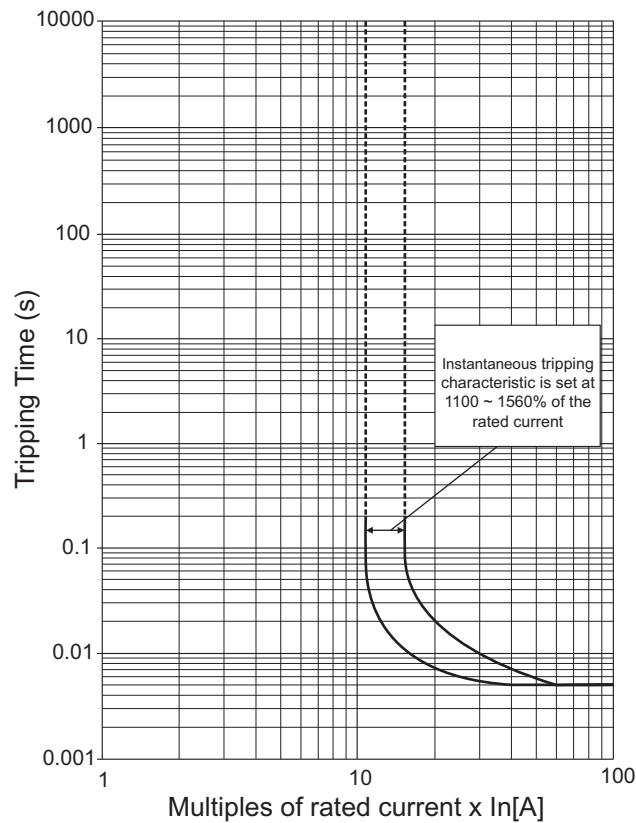


I-t Characteristics

Type MOG - H1M (0.16A - 32A)

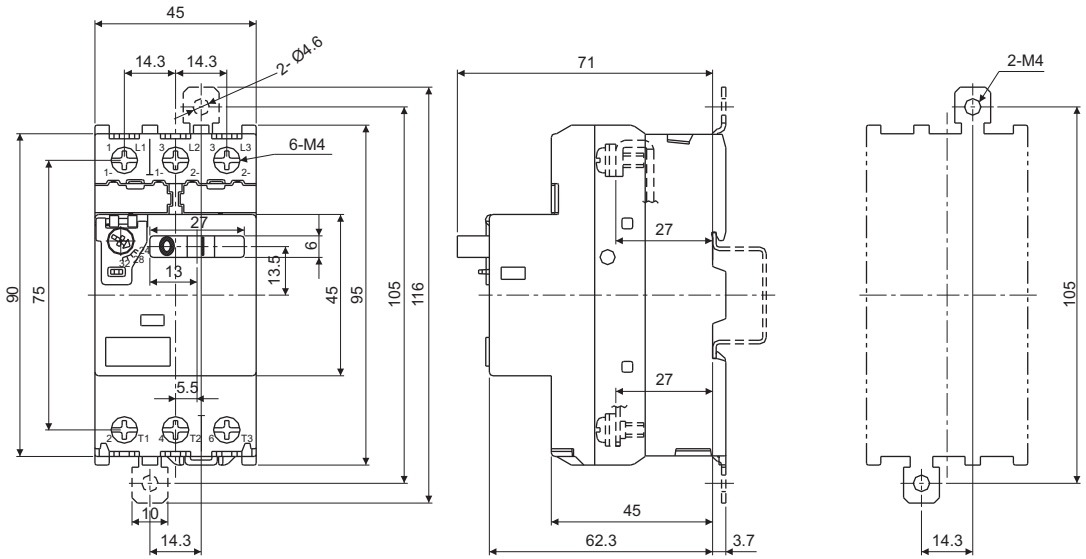


Type MOG - H2M (32A - 63A)

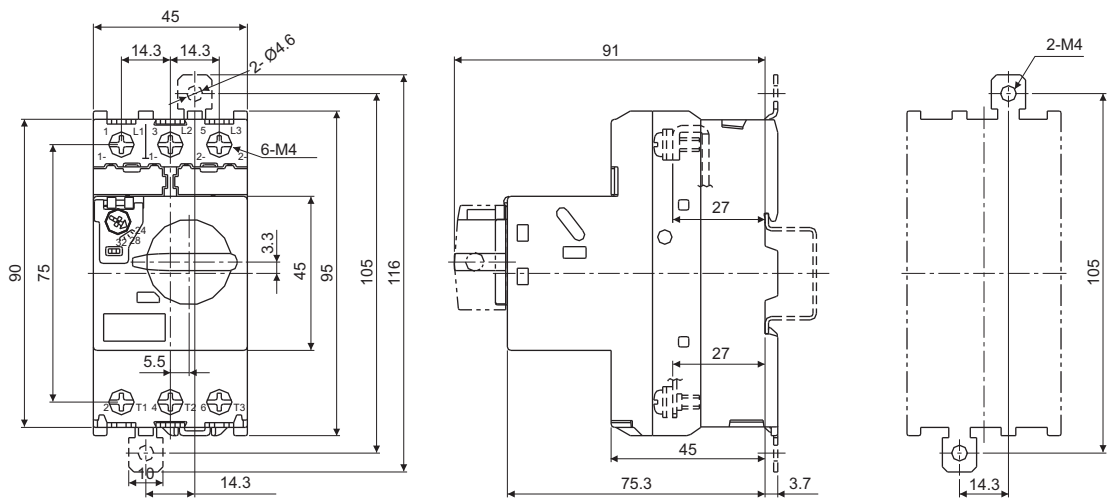


Overall Dimensions

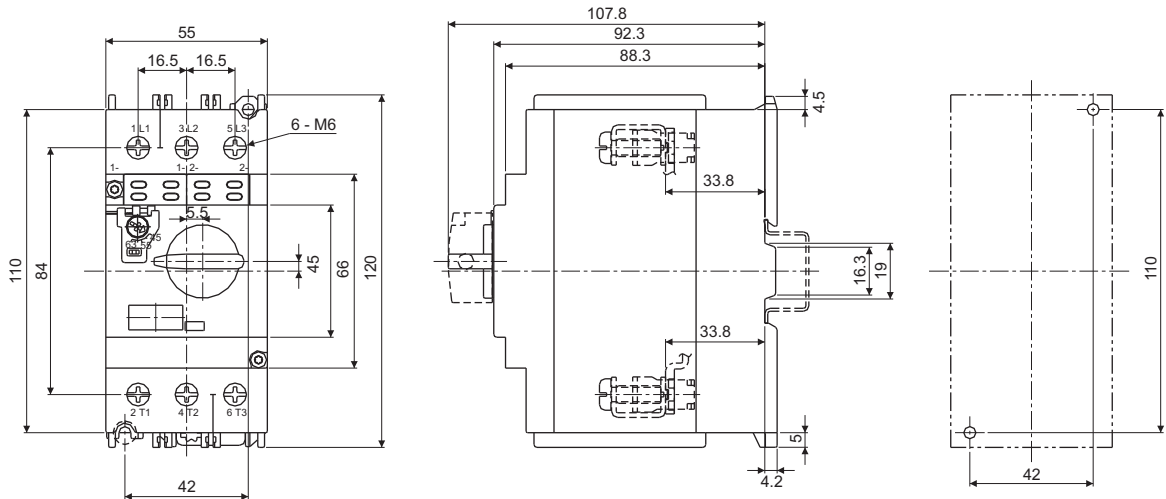
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Type MOG - H1 & MOG - H1M (0.16A - 32A)

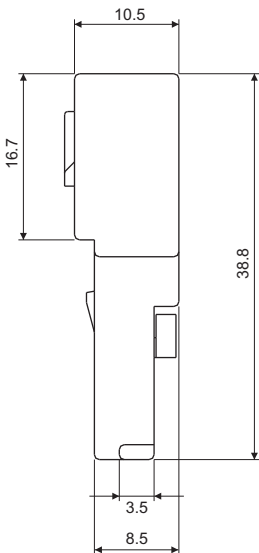
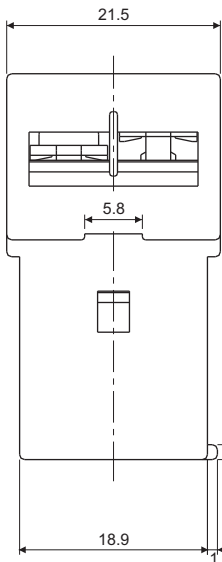
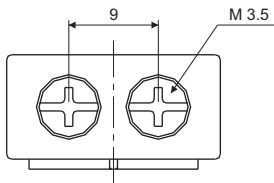


Type MOG - H2 & MOG - H2M (32A - 63A)

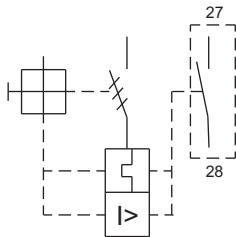


Overall Dimensions

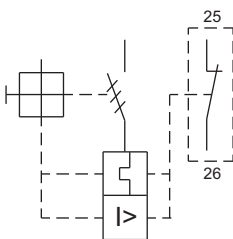
Trip Alarm Contact Front 1NO



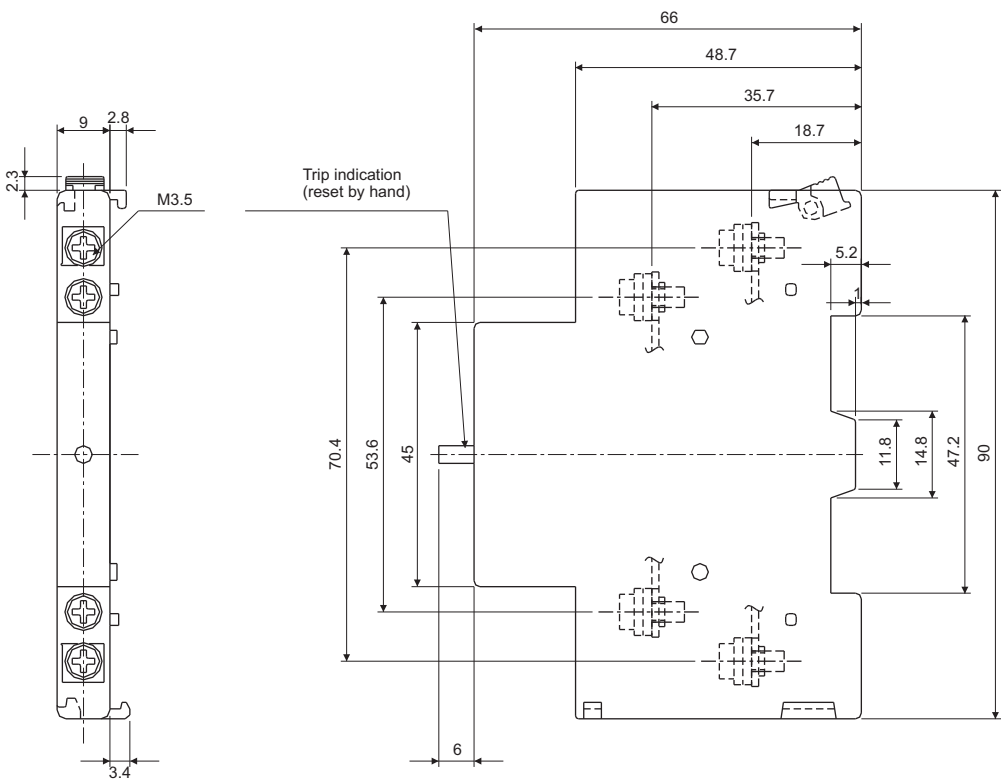
MOG-TAF 1NO



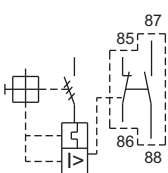
MOG-TAF 1NC



S / C Alarm Left 1NO + 1NC

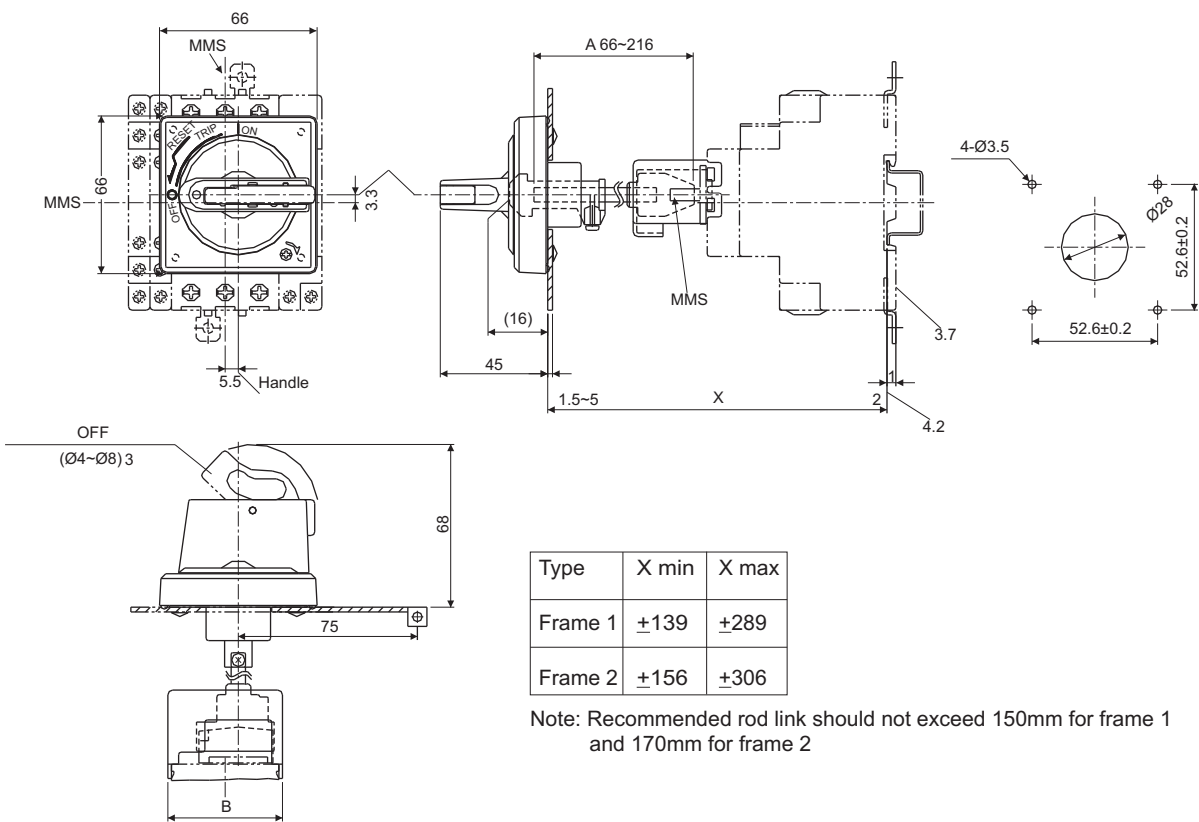


MOG-SAL 1CO

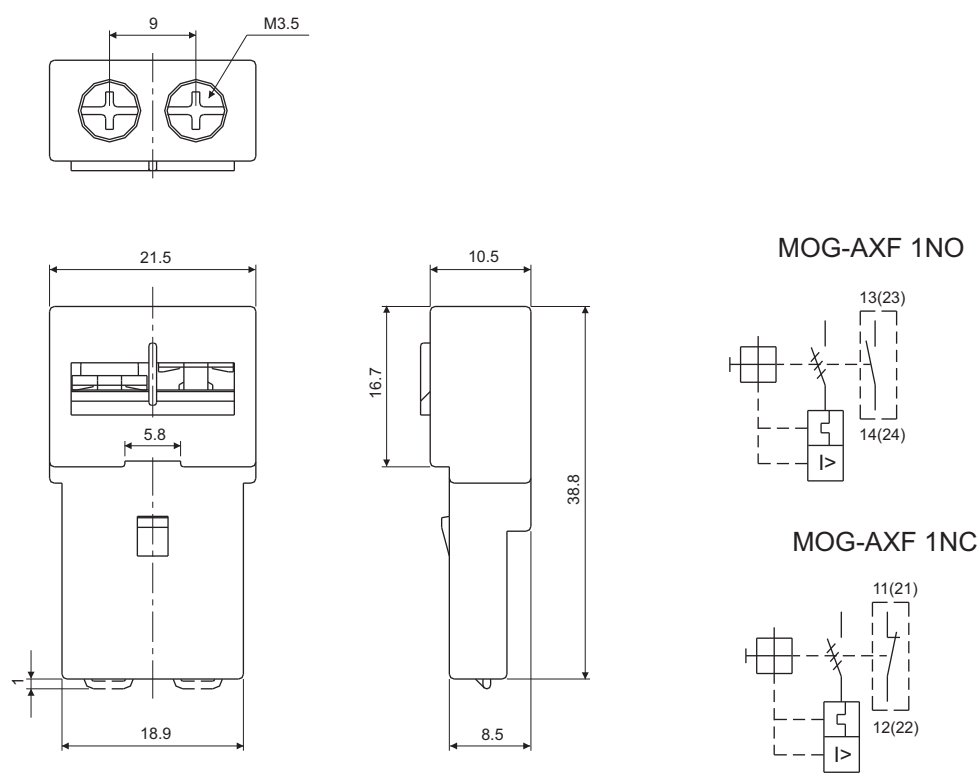


Overall Dimensions

External Operating Handle (Applicable for Frame 1 & 2)

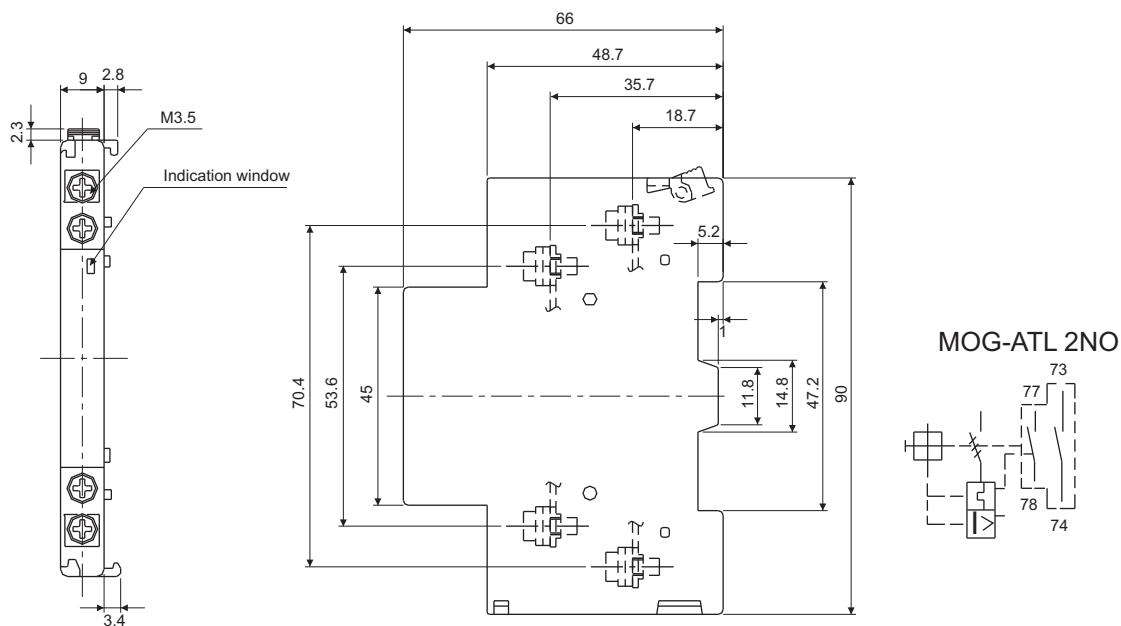


Aux. Contact Front 1NO

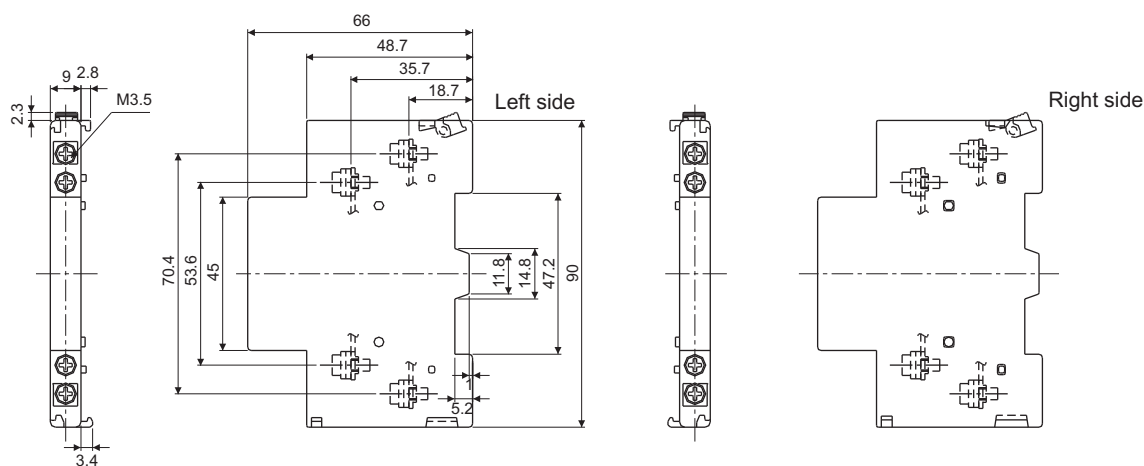


Overall Dimensions

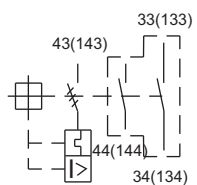
Aux. Alarm Left 2NO



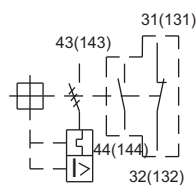
Aux. Contact Left 2NO



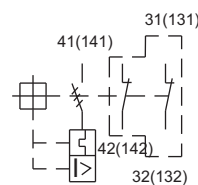
MOG-AXL 2NO



MOG-AXL 1CO

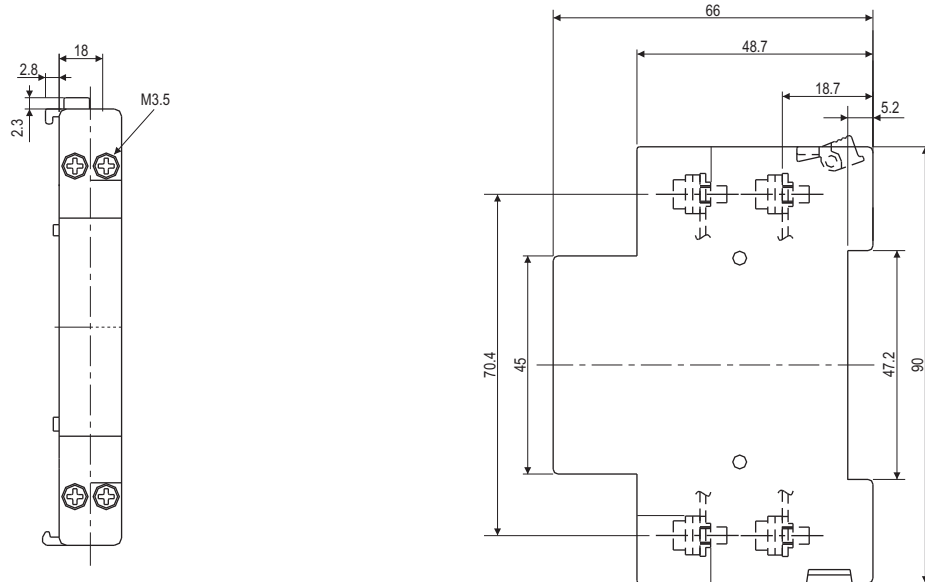


MOG-AXL 2NC



Overall Dimensions

Shunt trip and under voltage release MOG - ST & MOG - UV



Accessories for MPCB

Cat. Nos.	Description	Model Numbers	Position	Terminal Marking	
				NO	NC
ST419420000	Auxiliary Contact Front mtg. 1NO	MOG-AXF 1NO	F (Slot1 / Slot 2)	13, 14 (23, 24)	
ST419430000	Auxiliary Contact Front mtg. 1NC	MOG-AXF 1NC	F (Slot1 / Slot 2)		11, 12 (21, 22)
ST419440000	Auxiliary Contact Left side mtg. 2NO	MOG-AXL 2NO	L	"33, 34 (133, 134) 43, 44 (143, 144)"	
ST419450000	Auxiliary Contact Left side mtg. 1NO + 1NC	MOG-AXL 1CO	L	43, 44 (143, 144)	31, 32 (131, 132)
ST419460000	Auxiliary Contact Left side mtg. 2NC	MOG-AXL 2NC	L		"31, 32 (131, 132) 41, 42 (141, 142)"
ST419470000	Trip Alarm Contact Front mtg. 1NO	MOG-TAF 1NO	F (Slot 2 only)	27, 28	
ST419480000	Trip Alarm Contact Front mtg. 1NC	MOG-TAF 1NC	F (Slot 2 only)		25, 26
ST419490000	Auxiliary + Alarm Left side mtg. 2NO	MOG-ATL 2NO	L	"73, 74 77, 78"	
ST419500000	Short circuit alarm Left side mtg. 1NO + 1NC	MOG-SAL 1CO	L	87, 88	85, 86
ST419510000	Shunt trip 24V DC	MOG-ST	R (one at a time)	C1, C2	
ST419520000	Shunt trip 110V, 50Hz	MOG-ST			
ST429520000	Shunt trip 230V, 50Hz	MOG-ST			
ST419530000	Under Voltage release, 110V, 50Hz	MOG-UV		D1, D2	
ST419540000	Under Voltage release, 415V, 50Hz	MOG-UV			

F - Front Mounting

L - LHS Mounting

R - RHS Mounting

Note:

1) On LHS any 2 accessories can be fitted (Alarm contact followed by Auxiliary contact)

- MOG-ATL 2NO + MOG-AXL 1CO
- MOG-SAL 1CO + MOG-AXL 1CO

2) On RHS only 1 accessory can be fitted (Shunt trip release or Undervoltage release)

3) Any 2 Front mounted accessories are possible at a time.

- Front mounted TAF to be fitted only in slot 2
- Front mounted auxiliary contact can be fitted in slot1 / slot 2

[illegible]

Electrical Standard Products (ESP) Branch Offices:

REGISTERED OFFICE AND HEAD OFFICE

L&T House, Ballard Estate
P. O. Box 278
Mumbai 400 001
Tel: 022-67525656
Fax: 022-67525858
Website: www.Larsentoubro.com

ELECTRICAL STANDARD PRODUCTS (ESP)

501, Sakar Complex I
Opp. Gandhigram Rly. Station
Ashram Road
Ahmedabad 380 009
Tel: 079-66304006-11
Fax: 079-66304025
e-mail: esp-ahm@LNTEBG.com

38, Cubbon Road, P. O. Box 5098
Bangalore 560 001
Tel: 080-25020100/25020324
Fax: 080-25580525
e-mail: esp-blr@LNTEBG.com

131/1, Zone II
Maharana Pratap Nagar
Bhopal 462 011
Tel: 0755-4098721/7/ 8 / 9
Fax: 0755-2769264
e-mail: esp-bho@LNTEBG.com

Plot No. 559, Annapurna Complex
Lewis Road
Bhubaneswar 751 014
Tel: 0674-6451342, 2436696
Fax: 0674-2537309
e-mail: esp-bbi@LNTEBG.com

SCO 32, Sector 26-D
Madhya Marg, P. O. Box 14
Chandigarh 160 026
Tel: 0172-4646840, 4646853
Fax: 0172-4646802
e-mail: esp-chd@LNTEBG.com

10, Club House Road,
Annasalai
Chennai 600 002
Tel: 044-28462072 / 4 / 5 / 2109
Fax: 044-28462102 / 3
e-mail: esp-maa1@Lntebg.com

67, Appuswamy Road
Post Bag 7156
Opp. Nirmala College
Coimbatore 641 045
Tel: 0422-2588120 / 1 / 5
Fax: 0422-2588148
e-mail: esp-cbe@LNTEBG.com

L&T House, Group MIG-5
Padmanabhpur
Durg 491 001
Tel: 0788-2213833 / 14 / 21 / 29
Fax: 0788-2213820
e-mail: esp-durg@LNTEBG.com

Khairasol, Degaul Avenue
Durgapur 713 212
Tel: 2559848, 2559849, 2559844
Fax: 0343-2553614
e-mail: esp-dgp@LNTEBG.com

Milanpur Road, Bamuni Maidan
Guwahati 781 021
Tel: 0361-2550562 / 65
Fax: 0361-2551308
e-mail: hazrasudipto@LNTEBG.com

II Floor, Vasantha Chambers
5-10-173, Fateh Maidan Road
Hyderabad 500004
Tel: 040-66720250
Fax: 040-23296468
e-mail: esp-hyd@LNTEBG.com

D-24, Prithvi Raj Road, C-Scheme
Jaipur 302 001
Tel: 0141-2385915 / 16 / 17 / 18
Fax: 0141-2373280
e-mail: esp-jai@LNTEBG.com

Akashdeep Plaza, 2nd Floor
P. O. Golmuri
Jamshedpur 831 003
Jharkhand
Tel: 0657-2312205 / 38
Fax: 0657-2341250
e-mail: esp-jam@LNTEBG.com

Skybright Bldg; M. G. Road
Ravipuram Junction, Ernakulam
Kochi 682 016
Tel: 0484-4409420 / 4 / 5 / 7
Fax: 0484-4409426
e-mail: esp-cok@LNTEBG.com

3-B, Shakespeare Sarani
Kolkata 700 071
Tel: 033-44002572 / 3 / 4
Fax: 033-22821025/7587
e-mail: esp-ccu@LNTEBG.com

A28, Indira Nagar, Faizabad Road
Lucknow 226 016
Tel: 0522-2312904 / 5 / 6
Fax: 0522-2311671
e-mail: esp-Lko@LNTEBG.com

No: 73, Karpaga Nagar, 8th Street
K. Pudur
Madurai 625007
Tel: 0452-2537404, 2521068
Fax: 0452-2537552
e-mail: esp-mdu@LNTEBG.com

EBG North Wing Office-Level 2
Gate 7, Powai Campus
Mumbai 400 072
Tel: 022-67052874 / 2737 / 1156
Fax: 022-67051112
e-mail: esp-bom@LNTEBG.com

12, Shivaji Nagar
North Ambazari Road
Nagpur 440 010
Tel: 0712-2260012/3
Fax: 0712-2260020/30
e-mail: esp-nag@LNTEBG.com

32, Shivaji Marg
P. O. Box 6223
New Delhi 110 015
Tel: 011-41419514 / 5 / 6
Fax: 011-41419600
e-mail: esp-del@LNTEBG.com

L&T House
P. O. Box 119
191/1, Dhole Patil Road
Pune 411 001
Tel: 020-26135048/26164048
Fax: 020-26124910, 26135048
e-mail: esp-pnq@LNTEBG.com

3rd Floor
Vishwakarma Chambers
Majura Gate, Ring Road
Surat 395 002
Tel: 0261-2473726
Fax: 0261-2477078
e-mail: esp-sur@LNTEBG.com

Radhadaya Complex
Old Padra Road
Near Charotar Society
Vadodara 390 075
Tel: 0265-6613610 / 1 / 2
Fax: 0265-2336184
e-mail: esp-bar@LNTEBG.com

48-8-16, Dwarakanagar
Visakhapatnam 530 016
Tel: 0891-6620411-2 / 3
Fax: 0891-6620416
e-mail: esp-viz@LNTEBG.com

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Electrical Standard Products
Larsen & Toubro Limited
Powai Campus, Mumbai 400 072
Customer Interaction Center (CIC)
BSNL / MTNL (toll free) : 1800 233 5858
Reliance (toll free) : 1800 200 5858
Tel : 022 6774 5858
Fax : 022 6774 5859
E-mail : cic@LNTEBG.com
Website : www.LNTEBG.com

