



Motor Starters Type MN

Direct-On-Line Starters
Star-Delta Starters

About us

Larsen & Toubro is a technology-driven USD 7 billion company that infuses engineering with imagination. The Company offers a wide range of advanced solutions in the field of Engineering, Construction, Electrical & Electronics, 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. The products conform to international standards, carry CE markings and are KEMA certified.

L&T introduces the new MN range of starters. These starters are available in Direct-On-Line (DOL) and Star-Delta versions. This product range is the culmination of intensive R&D and extensive field trials. MN starters, comprising MNX contactors and MN relays, provide overload and single phasing protection to your motors.



Switchgear Factory, Mumbai

Salient Features

- Conform to IS 13947 (Part 4) & IEC 60947-4
- Built-in single phasing protection
- In Star Delta Starters, Star contactor has same rating as Hold-on & Delta
- Suitable for Industrial & Rural applications
- Terminal block for ease of termination
- Starter enclosure with IP 54⁰ of protection

Applications

MN starters are available in following versions:

- Direct-On-Line starter
- Semi automatic Star-Delta (SASD) starter
- Fully automatic Star-Delta (FASD) starter

All MN DOL & Star-Delta starters are suitable for 3-Phase Squirrel Cage motors. MN DOL starters are available in following ratings:

- MN 16 DOL-upto 10 HP (7.5kW)
- MN 25 DOL-upto 15 HP (11kW)
- MN 32 DOL-upto 20 HP (15kW)
- MN 45 DOL-upto 30 HP (22.5kW)
- MN 65 DOL-upto 45 HP (33.5kW)

MN Star-Delta starters are available in following ratings:

- MN 16 Star-Delta-upto 15 HP (11kW)
- MN 25 Star-Delta-upto 25 HP (18.5kW)
- MN 32 Star-Delta-upto 35 HP (26kW)
- MN 45 Star-Delta-upto 50 HP (37.5kW)
- MN 65 Star-Delta-upto 75 HP (55kW)
- MN 80 Star-Delta-upto 90 HP (67.5kW)
- MN 110 Star-Delta-upto 125 HP (90kW)
- MN 140 Star-Delta-upto 175 HP (130kW)

MN 45, MN 65, MN 80, MN 110 & MN 140 Star-Delta starters are available only in FASD version.

Construction

MN starters consist of MNX contactors & MN relays. The relay is directly mounted on the contactor. The colour of the sheet steel enclosure is two-toned. The box is powder coated and grey in colour. The cover is powder coated with ivory colour. The push button is flush mounted in an enclosure cover, which has been given an altogether 'new look'.

Operational Details

Relay Setting

A screwdriver is used to set the relay indicator (which is on the dial) to the full load current setting. This ensures optimum protection under Overload and Single Phasing of the motor. In case of Star-Delta Starters, the relay must be set at the values $I_n / 3$ (0.58 I_n) as given in the selection table, since the connected relay carries only the phase current in Motors having Delta connected winding.

MN DOL starters

- MN 16, 25, 32, 45, 65 DOL starters incorporate type MNX contactors.
- MN 16, 25, 32 DOL starters incorporate MN 2 relays.
- MN 45, 65 DOL starters incorporate MN 5 relays.

MN Star-Delta Starters

MN Star-Delta starters are available in semi automatic and fully automatic versions.

MN 16, 25, 32, 45, 65, 80, 110, 140 Star-Delta starters incorporate type MNX contactors.

- MN 16, 25, 32, Star-Delta starters incorporate MN 2 relays.
- MN 45, 65, 80, 110, Star-Delta starters incorporate MN 5 relays.
- MN 140 Star-Delta starters incorporate MN 12L relays.

In case of SASD starters, the motor gets connected in Star connection when the green button is pressed, after releasing the green button motor gets connected in Delta connection. The button must be released only when the motor reaches its normal speed.

In case of FASD starter, motor gets connected in Star connection, when the green button is pressed. An electronic timer automatically performs the change-over function from Star to Delta.



Features & Benefits

Single Phasing Protection

MN relays having phase failure sensitive tripping mechanism provides reliable protection against single phasing & overload conditions. MN relays are compensated for variation in ambient temperature from -5°C to 55°C .

IP 54 degree of protection

Corrosion resistant powder coated enclosure with IP/54 protection class makes MN starters most suitable for chemical factories, polluted industrial and dusty agricultural environment.

Terminal Block

MN Star-Delta starters are provided with terminal block with proper terminal marking for ease of wiring. Terminal block can accommodate both aluminum & copper cables.

Base Plate Mounting

MN Star-Delta starters are mounted on base plate that can absorb vibrations and it makes MN starters maintenance friendly.

Electronic Timer

MN Fully Automatic Star-Delta starters are provided with electronic timer for high repeat accuracy.

Trip Test Facility

This facility enables the user to manually check the operation of the trip mechanism. Move the trip slide in the direction shown on the relay. The relay trips with an audible 'Click' sound, indicating that the trip mechanism is in good working order.

Off / Reset Push-Button

The relay will trip in case of overloads or single phasing conditions.

Simultaneously 'Alarm Contact' (97-98) will close. The motor cannot be restarted until the relay has been reset. To reset the relay, allow the bimetals to cool down sufficiently & push this button to reset the trip contact (95-96).

If the relay is in reset condition, pressing this push-button will open 'Trip Contact'. But now the alarm contact will not close. This indicates healthy operation of the relay mechanism. The trip contact will again close when this button is released.

Auto-Manual Reset Switch

There are two modes of reset available : Manual and Auto. By default the relay is in the Manual reset mode and can be converted to Auto reset mode by moving the switch to Auto position marked on the label.

Chart for MN DOL starters

Type	Maximum Motor Rating at 415V, 3 Ø, 50Hz		Approx. Full Load Current In (A)	Relay Range (A)	Relay	Contactor	Recommended Back-up HRC Fuse		Switch Disconnector Fuse Unit
	HP	KW					Type	Rating (A)	
MN 16 DOL	2	1.5	3.5	3 - 5	MN 2	MNX 18	HF	16	FN 32
	2.5	1.8	4.8	3 - 5			HF	16	FN 32
	3	2.2	5	4.5 - 7.5			HF	16	FN 32
	4	3	6.2	4.5 - 7.5			HF	20	FN 32
	5	3.7	7.5	6 - 10			HF	20	FN 32
	6	4.5	9	6 - 10			HF	25	FN 32
	7.5	5.5	11	9 - 15			HF	32	FN 32
	10	7.5	14	9 - 15			HF	32	FN 32
MN 25 DOL	7.5	5.5	11	9 - 15	MN 2	MNX 25	HF	32	FN 32
	10	7.5	14	9 - 15			HF	32	FN 32
	12.5	9.3	18	14 - 23			HF	50	FN 63
	15	11	21	14 - 23			HF	63	FN 63
MN 32 DOL	15	11	21	20 - 33	MN 2	MNX 32	HF	63	FN 63
	17.5	13	24	20 - 33			HF	63	FN 63
	20	15	28	20 - 33			HN/100	63	FN 100
MN 45 DOL	25	18.5	35	30 - 50	MN 5	MNX 45	HN/100	80	FN 100
	30	22.5	40	30 - 50			HN/100	80	FN 100
MN 65 DOL	30	22.5	40	30 - 50	MN 5	MNX 70	HN/100	80	FN 100
	35	26	47	30 - 50			HN/100	100	FN 100
	40	30	55	45 - 75			HN/100	100	FN 100
	45	33.5	60	45 - 75			HN/100	100	FN 100

Selection Chart for MN DOL Starters

Chart for Star-Delta starters

Type	Maximum Motor Rating at 415V, 3 Ø, 50Hz		Approx. Full Load Current In (A)	Phase Current $i_n / \sqrt{3}$	Relay Range (A)	Relay	Contactor	Recommended Back-up HRC Fuse		Switch Disconnector Fuse Unit
	HP	KW						Type	Rating (A)	
MN 16 SASD/FASD	10	7.5	14	8.08	6 - 10	MN 2	MNX 18	HF	20	FN 32
	12.5	9.3	18	10.4	9 - 15			HF	32	FN 32
	15	11	21	12.1	9 - 15			HF	32	FN 32
MN 25 SASD/FASD	20	15	28	16.2	14 - 23	MN 2	MNX 25	HF	40	FN 63
	25	18.5	35	20.2	14 - 23			HF	50	FN 63
MN 32 SASD/FASD	30	22.5	40	23	20 - 33	MN 2	MNX 32	HF	63	FN 63
	35	26	47	27	20 - 33			HN/00	63	FN 100
MN 45 FASD	40	30	55	31.8	30 - 50	MN 5	MNX 45	HN/00	63	FN 100
	45	33.5	60	34.6	30 - 50			HN/00	80	FN 100
	50	37.5	66	38.2	30 - 50			HN/00	80	FN 100
MN 65 FASD	60	45	80	46.2	45 - 75	MN 5	MNX 70	HN/00	100	FN 100
	65	48.5	87	50	45 - 75			HN/00	100	FN 100
	70	52	94	54.5	45 - 75			HN/00	125	FN 125
	75	55	100	57.5	45 - 75			HN/00	125	FN 125
MN 80 FASD	90	67.5	120	69.2	45 - 75	MN 5	MNX 80	HN/0	160	Fn 200
MN 110 FASD	100	75	135	77.9	66 - 110	MN 5	MNX 110	HN/0	160	FN 200
	125	90	165	95	66 - 110			HN/0	200	FN 200
MN 140 FASD	150	110	200	115	90 - 150	MN 12L	MNX 140	HN/1	250	FN 250
	175	130	230	132.8	90 - 150			HN/1	250	FN 250

Selection Chart for MN Star-Delta Starters

Ordering Information - MN DOL Starter*

Example: MN 16 DOL - 240V with relay range 9-15 A
Ordering Information - SS94015BOBO

Starter Type	Version	MN 16	MN 25	MN 32	MN 45	MN 65
Cat. No.		SS94351	SS94352	SS94353	SS94017	SS94018
Rated control voltage (Us) V _{AC}	Relay Range					
240	3.0 - 5.0	—	—	—	—	—
	4.5 - 7.5	—	—	—	—	—
	6.0 - 10	—	—	—	—	—
	9.0 - 15	—	BOBO	—	—	—
	14 - 23	—	BODO	—	—	—
	20 - 33	—	—	BOEO	—	—
	30 - 50	—	—	—	—	—
	45 - 75	—	—	—	—	—
360	3.0 - 5.0	COSO	—	—	—	—
	4.5 - 7.5	COUO	—	—	—	—
	6.0 - 10	COVO	—	—	—	—
	9.0 - 15	COBO	COBO	—	—	—
	14 - 23	—	CODO	—	—	—
	20 - 33	—	—	COEO	—	—
	30 - 50	—	—	—	—	—
	45 - 75	—	—	—	—	—
415	3.0 - 5.0	DOSO	—	—	—	—
	4.5 - 7.5	DOUO	—	—	—	—
	6.0 - 10	DOVO	—	—	—	—
	9.0 - 15	DOBO	DOBO	—	—	—
	14 - 23	—	DODO	—	—	—
	20 - 33	—	—	DOEO	—	—
	30 - 50	—	—	—	DOGO	—
	45 - 75	—	—	—	—	DOJO

Ordering Information - MN Star-Delta Starter*

Example: MN 16 SASD - 360V with relay range 9-15 A
Ordering Information - SS94019COBO

Starter Type	Version	MN 16	MN 25	MN 32	MN 45	MN 65	MN 80	MN 110	MN 140
Cat. No.	SASD FASD	SS94361 SS94362	SS94363 SS94364	SS94365 SS94366	— SS94021	— SS94022	— SS94705	— SS94706	— SS94707
Rated control voltage (Us) V _{AC}	Relay Range								
360	6.0 - 10	COVO	—	—	—	—	—	—	—
	9.0 - 15	COBO	—	—	—	—	—	—	—
	14 - 23	—	CODO	—	—	—	—	—	—
	20 - 33	—	—	COEO	—	—	—	—	—
	30 - 50	—	—	—	—	—	—	—	—
	45 - 75	—	—	—	—	—	—	—	—
	66 - 110	—	—	—	—	—	—	—	—
	90 - 150	—	—	—	—	—	—	—	—
415	6.0 - 10	DOVO	—	—	—	—	—	—	—
	9.0 - 15	DOBO	—	—	—	—	—	—	—
	14 - 23	—	DODO	—	—	—	—	—	—
	20 - 33	—	—	DOEO	—	—	—	—	—
	30 - 50	—	—	—	DOGO	—	—	—	—
	45 - 75	—	—	—	—	DOJO	DOJO	—	—
	66 - 110	—	—	—	—	—	—	DOKO	—
	90 - 150	—	—	—	—	—	—	—	DOMO

* Note: These are the standard combinations of relay and contactor. Any other combinations can be supplied on request.

Overall Dimensions

