LARSEN & TOUBRO

Infusing enhanced safety & ease of use with high product reliability!

Introducing MO C Capacitor Duty Contactors from the SUPERNOVA™ family

L&T SWITCHGEAR
SAFE & SURE

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. Majority of these products conform to Indian and International Standards.

Switchgear Factory, Mumbai

Switchgear Factory, Ahmednagar

Capacitor Duty Contactors - Type MO C

In industrial application, capacitors are mainly used for power factor correction. Capacitor Duty Contactors are used to switch power capacitors depending upon the amount of reactive power compensation required.

Capacitor Duty Contactors are required because conventional contactors when used for capacitor switching are unable to meet the operational requirements. At the time of switching, a capacitor effectively appears as a short-circuit. The magnitude of capacitor inrush or charging current will depend upon value of AC voltage level along with impedance of feeder cables and supply transformers.

When switching individual capacitor bank, charging current can reach a peak value of up to 30 times the rated capacitor current and in case of multistage capacitors it can reach up to 180 times the rated capacitor current. The resultant high inrush current peak caused due to capacitor switching depends upon the following factors:

- Network Inductance
- Transformer MVA and short-circuit impedance
- Type of power factor correction; fixed or automatic
- Harmonic content in the system

This large current can flow through the contactor since initial inrush current is taken from both main supply and capacitor already connected. Conventional power contactors will simply allow the inrush current to flow through them. As a result, both contactors and capacitors will be heavily stressed. This will in turn greatly reduce the life of conventional power contactors and capacitors. Sometimes it may also result in welding of main contacts of conventional power contactors. It is therefore, essential to limit the current peak by inserting series damping resistors provided in specific Capacitor Duty Contactors.

Hence, special purpose Capacitor Duty Contactors are used to meet capacitor switching application requirements and they are designed to withstand:

1. Permanent current that can reach 1.5 times the nominal current of capacitor bank
2. Short but high peak current on pole closing

Contactors are fitted with block of three early make auxiliary contacts in series with six damping resistors (2 per phase) to limit peak current to a value within contactor making capacity.

After successful damping of high inrush current, when the main contacts close, the auxiliary contacts are automatically disconnected from the circuit by De-Latching mechanism.

Benefits of using Capacitor Duty Contactors:

- Since switching of capacitor banks involves high transient inrush currents, the size of the contactor required to switch these high currents becomes higher. Hence, current limiting inductors are used in series to attenuate this inrush current. This increases the system cost and panel space.

  A typical case below illustrates the magnitude of transient inrush current for switching of a capacitor bank.

  For a 12.5 KVAR Capacitor bank:

  Rated current of 12.5 KVAR 415V Capacitor = 18A

  Peak Inrush current without Damping Resistors = 1200A

- Capacitor Duty Contactors are designed to limit this high transient inrush current by introducing damping resistors with early make auxiliary contacts. The current limiting due to damping resistors protects the APFC system from harmful effects of the capacitor charging inrush current.

  Peak Inrush current with Damping Resistors = 260A

  It is observed that peak inrush current with damping resistors is one fifth of that without damping resistors.

As the contactor is now required to switch the rated capacitor current, the size of the contactor required is smaller. Thus the system cost and panel space are significantly lower when Capacitor Duty Contactors are used.

MO C Capacitor Duty Contactors:

MO C Capacitor Duty Contactors are designed for switching 3 phase, single or multi-step capacitor bank.

- In conventional capacitor switching contactors, early make auxiliary contacts used for insertion of damping resistors used to remain in the circuit continuously. During current breaking these auxiliary contacts would also carry and break the currents due to higher arc resistance in the main pole during arcing. This current breaking by auxiliary contacts at higher transient recovery voltage causes unreliable product performance and premature product failures.
- MO C range of capacitor switching contactors have patented mechanism which disconnects the early make auxiliary contacts after the main contacts are closed. This completely eliminates the possibility of auxiliary contacts carrying and breaking the currents during breaking operation. This enhances the product switching performance and improves the product life.

Features and benefits of MO C Capacitor Duty Contactors

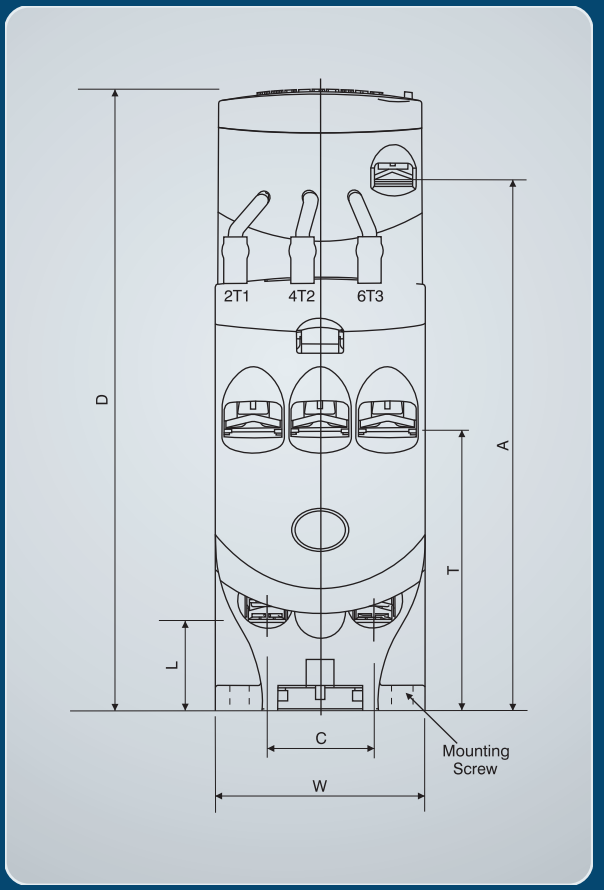
Feature	Customer Benefits
De-latching auxiliary contacts	Improved switching performance
	Reduced losses in auxiliary
Dual contact gap for auxiliary contacts	Higher electrical life
Encapsulated Resistor Assembly	Enhanced product safety
	No flash over between phases
Separate termination of damping resistors	Ease of wiring
	Enhanced operational reliability
Wide and chatter-free operating band	Improved switching performance
	Higher electrical life
	Higher product reliability

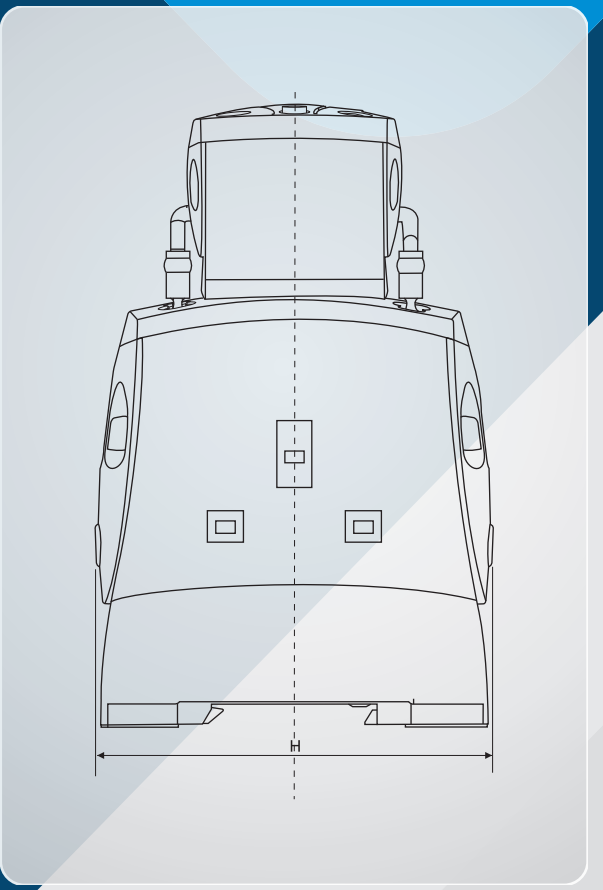
Separate termination of damping resistors for enhanced operational reliability

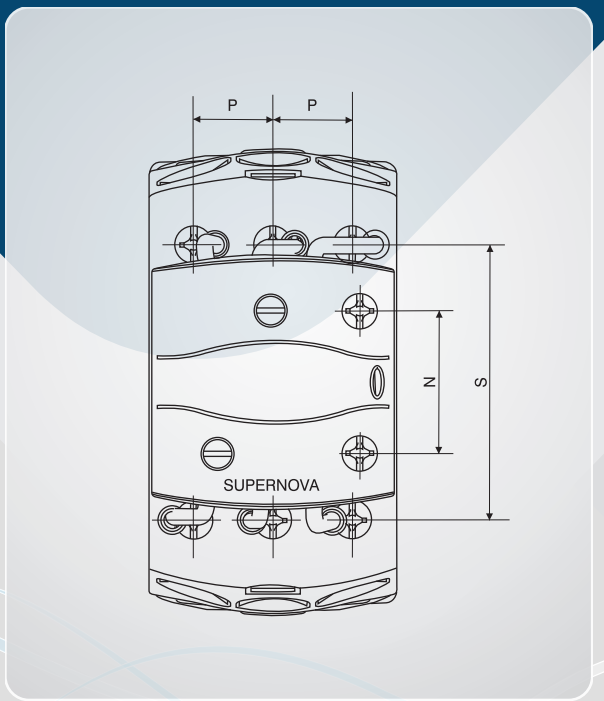
Technical Specification

Type Designation				MO C8.5	MO C12.5	MO C15	MO C20	MO C25	MO C33.5	MO C50	MO C70	MO C80
Catalogue No.	Built in Aux Contacts	1NO		CS96320	CS96321	CS90019	CS90021	CS96322	CS96323	CS96324	CS96325	CS96326
		1NC		CS96337	CS96338	CS90020	CS90022	CS96339	CS96340	CS96341	CS96342	CS96343
Conformance to Standards				EN 60947-4-1 IEC 60947-4-1 IS/IEC 60947-4-1								
Rated Operational Current (AC - 6b) 3 phase delta connected capacitor bank at 415V , 50Hz		I_e	A	12	18	21	28	35	50	70	95	110
Short circuit protection				gG type fuses rated at 1.5 - 2 I_e								
kVAr Rating	230 Vac		kVar	5.0	7.5	8.5	11	14.5	20	30	40	45
	415 Vac		kVar	8.5	12.5	15	20	25	33.5	50	70	80
Max. Operational Voltage		U_e	V	415	415	415	415	415	415	415	415	415
Rated Insulation Voltage		U_i	V	690	690	690	690	690	1000	1000	1000	1000
Rated Impulse withstand Voltage		U_{imp}	kV	8	8	8	8	8	8	8	8	8
Degree of Protection									IP 20			
Overall Dimensions	Height	H	mm	83.5	83.5	83.5	83.5	83.5	123.5	123.5	135	135
	Width	W	mm	45	45	45	45	45	55	55	70	70
	Depth	D	mm	133.5	133.5	133.5	133.5	133.5	163.0	163.0	175.0	175.0
	Mounting Dimensions		mm	35 x 60 - 65 - 70	35 x 60 - 65 - 70	35 x 60 - 65 - 70	35 x 60 - 65 - 70	35 x 60 - 65 - 70	45 x 100 - 105	45 x 100 - 105	60 x 115 - 120	60 x 115 - 120
No. of built in Aux. Contacts				1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC
Main Terminal Capacity	Solid Conductor		mm^2	2 x 10	2 x 10	2 x 10	2 x 10	2 x 10	-	-	-	-
	Stranded Conductor		mm^2	2 x 10	2 x 10	2 x 10	2 x 10	2 x 10	2 x 35	2 x 35	2 x 70	2 x 70
	Finely Stranded Conductor		mm^2	2 X 6	2 X 6	2 X 6	2 X 6	2 X 6	2 X 25	2 X 25	2 X 50	2 X 50
Coil Operating Band	Pick - Up	% Uc	V	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110
	Drop - Off	% Uc	V	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65
Coil Consumption	Pick - Up		VA	77	77	77	77	77	144	144	240	240
	Hold - On		VA	9	9	9	9	9	15	15	25	25
			W	2.8	2.8	2.8	2.8	2.8	5	5	6.5	6.5
Life (Operating Cycles)		Mechanical	Million	10	10	10	10	10	10	10	10	10
		Electrical	Million	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Max. Operating Frequency		Operations / Hr		240	240	240	240	240	240	240	240	240
Operating Sequence	Making			Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main	Early Make / Main
	Breaking			Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break	Main Contacts Break

Dimensional Drawings







LABEL	MO C8.5 - 25	MO C33.5 - 50	MO C70 - 80
W	45	55	70
D	133.5	163	175
H	83.5	123.5	135
N	26	26	26
T	60	68	68
C	22.8	27	35
L	19.6	29.5	30
S	50	82	93
P	14.4	18	23
A	113	142	154

All dimensions are in mm.

Ordering Information - Contactors

Product Designation	Kvar Rating @ 415V 50Hz	In Built Aux contacts	Cat No*
MO C8.5	8.5	1NO	CS96320…
MO C8.5	8.5	1NC	CS96337…
MO C12.5	12.5	1NO	CS96321…
MO C12.5	12.5	1NC	CS96338…
MO C15	15	1NO	CS90019…
MO C15	15	1NC	CS90020…
MO C20	20	1NO	CS90021…
MO C20	20	1NC	CS90022…
MO C25	25	1NO	CS96322…
MO C25	25	1NC	CS96339…
MO C33.5	33.3	1NO	CS96323…
MO C33.5	33.5	1NC	CS96340…
MO C50	50	1NO	CS96324…
MO C50	50	1NC	CS96341…
MO C70	70	1NO	CS96325…
MO C70	70	1NC	CS96342…
MO C80	80	1NO	CS96326…
MO C80	80	1NC	CS96343…

* *Add four digit suffix as per coil voltage*
Note: *For MO C70 and MO C80 kindly contact the nearest branch office*

Ordering Information - Accessories & Spares

Add on Blocks

Mounting Position	Contacts	Cat No
First Left	1NO + 1NC	CS94580OOOO
First Right	1NO + 1NC	CS94581OOOO
Second Left	1NO + 1NC	CS94582OOOO
Second Right	1NO + 1NC	CS94583OOOO

Spare Coils

For Contactor	Cat No
MO C8.5 - MO C25	CS96317…
MO C33.5 - 50	CS96318…
MO C70 - 80	CS96319….

* *Add four digit suffix as per coil voltage*

Ordering Suffix for Coil Voltages

Std Coil Voltage at 50Hz	24	42	110	220	240	360	415	525
Ordering Suffix	GOOO	HOOO	AOOO	KOOO	BOOO	COOO	DOOO	MOOO

L & T offers comprehensive reactive power management products covering Capacitors, Reactors and Thyristor switches to name a few.

New LTXL Capacitors - The benchmark in quality and performance

Reactive Power Management Products

Higher operating life and performance due to:

- High over current withstand capability (3 times rated current)
- High inrush current withstand capability (500 times rated current)
- Lower operating losses (0.35 W / kVAr)

L&T offers a complete range of Reactive Power Management products that includes the new LTXL range of capacitors.

The products, ranging from 5 kVAr to 100 kVAr, are available in box type construction, as single unit. With an enhanced, 300000 hour operating life, they withstand temperature levels from - 25^{0}C to 70^{0} C.

L&T's range of Reactive Power Management products are setting industry benchmarks in quality, availability and performance. The best keeps getting better.

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Product improvement is a continuous process. For the latest information and special applications, please contact any of our offices listed here.

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