LARSEN & TOUBRO

POWERING GROWTH, WITH COMMITMENT

Electrical & Automation Products For All Applications

L&T SWITCHGEAR

SAFE & SURE

Our Facilities

INDIA

Ahmednagar

Coimbatore

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OVERSEAS

Dammam, KSA

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Tamco, Indonesia

Tamco, Malaysia

About Us

L&T Electrical & Automation, part of multi-billion dollar Larsen & Toubro, designs, manufactures and markets low and medium voltage switchgear products, electrical systems, energy meters and automation solutions. Our wide range of products and solutions meet the power distribution and control needs of different industry segments, utility, infrastructure, buildings and homes.

In terms of performance, our products and solutions comprising Power Distribution Boards (Main Distribution Board, Sub Main Distribution Board and Final Distribution Board), Harmonics filters, Changeover systems and Drives are equipped with features that ensure quality and reliability of power and efficient management of energy.

Our switchgear components like air circuit breakers, switch disconnector fuses, moulded case circuit breakers, contactors, relays, starters and fuses seamlessly fit into the circuit for ensuring smooth distribution. In addition, we offer modular devices, switches and integrated automation solutions for commercial buildings, residential complexes and individual homes.

More than five decades of experience in in-house design and development of switchgear as well as a comprehensive tooling facility support the introduction of high quality products. Our products are rigorously tested for their functionality and performance at internationally recognised laboratories and test facilities that open the doors to international markets. Our products are certified by international agencies like ASTA (Intertek), KEMA (Dekra), CE, UL and BIS.

Customers' needs are accorded highest importance in the evolution and design of products with latest tools and techniques that set new norms in quality standards. Over the last 50 years, we have established strong engineering capability and set up facilities and offices closer to the customer. L&T Electrical & Automation operates seven factories in UAE, Saudi Arabia, UK, Australia and South East Asia and six in India.

Cost competitiveness, responsive service teams and respect for time lines make the difference in our association with customers. L&T promotes a culture of innovation that facilitates breaking new grounds in technology, creation of intellectual property and delight for customers. L&T Electrical & Automation practices sustainability principles and works for environment upkeep and social causes.

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Air Circuit Breakers

U-POWER

OMEGA - Air Circuit Breakers

Air Circuit Breakers

Matrix Protection & Control Unit

U-Power Omega - Air Circuit Breakers

Salient Features

- Current rating from 400A to 6300A in 3 frames sizes
- Available in 3 Pole / 4 Pole, Manually & Electrically operated, Fixed / Draw-out version
- Common Height & Depth all across the range
- High short time fault withstand capacity, Icu = Ics = Icw for 1 sec for total selectivity
- 2500A in Fr-1 & 6300A in Fr-3 are the world's most compact air circuit breakers in terms of width & volume
- High mechanical and electrical operating life
- Neutral pole rating: 50%, 100% & 200%
- Available in both NRYB & RYBN configuration in 4 Pole ACBs
- In-built Electrical & Mechanical Anti-Pumping
- Complete range conform to IS / IEC 60947-2 & IEC 60947-2

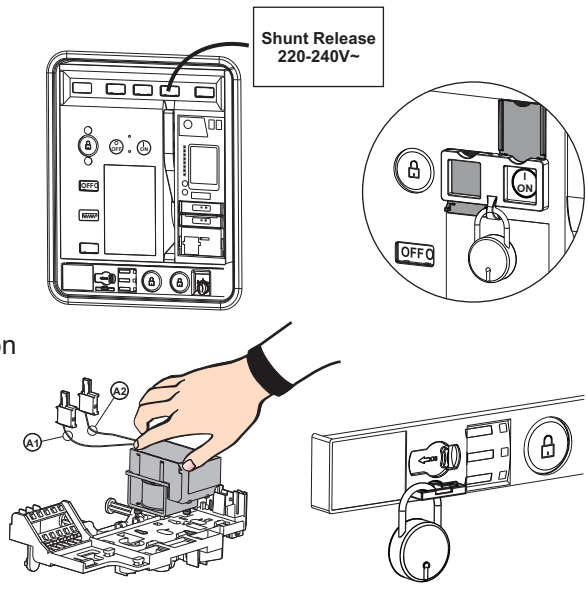
Breaking Capacities

Icu = Ics = Icw

	Rated current	800A	1000A	1250A	1600A	2000A	2500A	3200A	4000A	5000A	6300A
Frame-1	N : 50kA										
	S : 65kA										
	H : 80kA										
		UW1-08	UW1-10	UW1-12	UW1-16	UW1-20	UW1-25				
Frame-2	S : 65kA										
	H : 80kA										
		UW2-08	UW2-10	UW2-12	UW2-16	UW2-20	UW2-25	UW2-32			
Frame-3	H : 80kA										
	V : 100kA										
		UW3-08	UW3-10	UW3-12	UW3-16	UW3-20	UW3-25	UW3-32	UW3-40	UW3-50	UW3-63

Salient Features

- Unique breaker front-facia architecture displays the electrical accessories equipped on the ACB (with rated control voltage & type of operating voltage)
- Superior safety features - arc chute interlock, smart racking shutter, ready to close
- Right aligned design to offer better utilization of space, especially in a multi-tier panel design
- Modular & snap-fit accessories such as UVR, SR, CR, redefine the modularity on time scale of 5 mins.
- Ease of on-site convertibility from Manual to Electrical & Fixed to Draw-out version
- Unipolar, snap-fit control terminals for independent termination of 2 wires of up to 2.5 mm^2 each
- ON & OFF buttons can be independently padlocked to prevent unauthorized access
- Racking shutter can be padlocked to prevent inadvertent racking operation
- Upto 3 breakers can be mechanically interlocked using bowden cable. The Interlock is suitable for fixed, draw-out or a combination in 2/3/5 m



Technical Specification

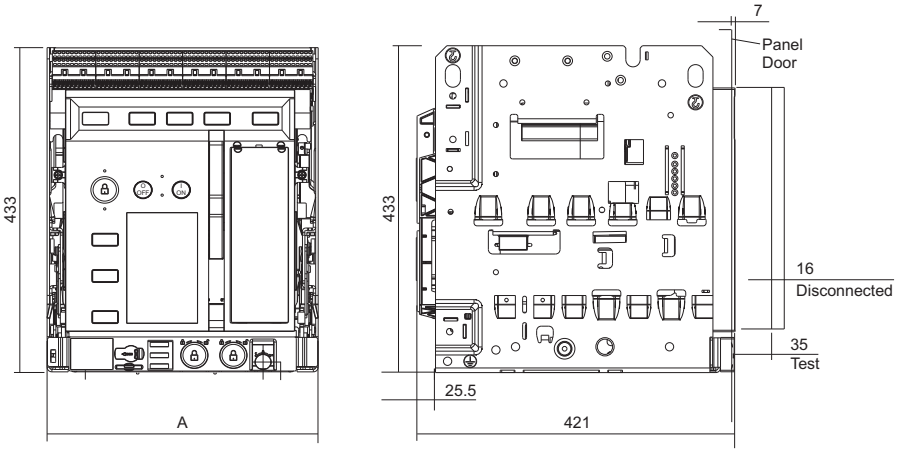
Frame			1							2		3			
Rated uninterrupted current (In) (A) 50°C			400-1600			2000		2500$		400-3200		400-5000		6300 #	
Version			N	S	H	S	H	S	H	S	H	H	V	H	V
Rated operational voltage at 50/60 Hz		Ue	upto 690V												
Rated insulation voltage at 50/60 Hz		Ui	1000V												
Rated impulse withstand voltage		Uimp	12kV (Main Circuit)												
Suitability for isolation			Yes												
Degree of protection on breaker front			IP40 Intrinsic, IP54 Available												
Pollution degree suitability			3												
Utilization category			B												
Compliance			IS/IEC 60947 (Part-2), EN60947-2, IEC 60947-2												
Rating for 4th pole			100% & 200%									50% & 100%			
Rated Ultimate S. C. Breaking Capacity	Icu (kA)	400/415V	50	65	80	65	80	65	80	65	80	80	100	80	100
		500/550V	42	55	70	55	70	55	70	55	70	70	85	70	85
		660/690V	36	50	55	50	55	50	55	50	55	55	75	55	75
Rated Service S. C. Breaking Capacity	Ics (kA)	400/415V	100% Icu												
		500/550V													
		660/690V													
Rated Short Time Withstand Capacity	Icw (kA)	0.5 sec	50	65	80	65	80	65	80	65	80	80	100	80	100
		1.0 sec	50	65	80	65	80	65	80	65	80	80	100	80	100
		3.0 sec	26	36	44	36	44	36	44	42	50	50	75	50	75
Rated S. C. Making Capacity	Icm (kA)	400/415V	105	143	176	143	176	143	176	143	176	176	220	176	220
		500/550V	88	121	154	121	154	121	154	121	154	154	187	154	187
		660/690V	76	105	121	105	121	105	121	105	121	121	165	121	165
Opening time (ms)			40												
Closing time (ms)			60												
Mechanical life	with maintenance		20000							15000		10000			
Electrical life	with maintenance		20000							15000		10000			
	without maintenance		10000*					5000		5000		5000		2000	

*8000 for 1600 N&S version.
Rated uninterrupted current (In) (A) 40°C.
$ Please consult branch office for selection.

Dimensional details

U-POWER Omega offers common depth (421 mm) and height (433 mm) across the entire range.

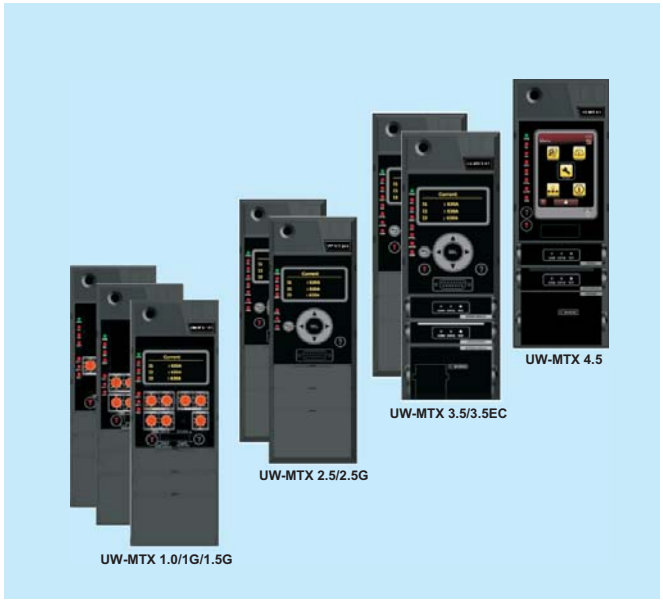
Frame	Poles	A
1	3	347
	4#	447
2	3	447
	4#	581
3**	3	647
	4#	847



Dimensions for 100% N. Contact us for 50% N & 200% N.
** Depth of Frame-3 ACB will be 10 mm additional with use of equalizer link.

(All dimensions in mm)

Matrix Protection & Control Unit



Salient Features

- Available in versions: MTX 1.0/1G/1.5G, MTX 2.5/2.5G, MTX 3.5/3.5EC & MTX 4.5
- Unique O-LED display for wider viewing angle
- Touch Screen technology to provide ease in navigation in MTX 4.5
- Pluggable Communication & Power metering modules for customization & future upgradation
- Dual time-based protection set-groups & Password protection
- Soft-rating plug for precise protection at lower load currents
- Directional & Double Short-circuit protection
- Protection against temperature rise through TM module
- Switchable neutral overload protection (50% to 200% in steps of 5%)
- Advance protection - ZSI, TCS, REF, EL
- Local fault annunciation through LED indication & pre-trip alarm
- Trip & Event recording, Query button for last trip record
- Front accessible test port
- Provision for on-load self-diagnosis of releases
- Modbus, Profibus & Zigbee communication protocols
- Power & Harmonics measurement
- Easy to integrate with HMI & PLC
- Energy monitoring & control through Energy Management System
- Smart Card module for ease of parameterization
- Oscillographs to display pre & post fault current & voltage waveform in MTX 4.5
- Protection releases conform to EMI/EMC standard

UW-PS
Power Supply (24 VDC)
- Available in 2 input versions (85-265 VAC; 120-300 VDC)

CAN BUS

CAN BUS

UW-REL
Relay Output
- 4 Prog. contacts of 240V/6A rating for closing, tripping, fault annunciation & maximum demand

UW-AO
Analog Output
- 4 Analog output
- Output Analog signals of 4-20mA/ 1-10 VDC

UW-TCS
Trip Circuit Supervision
- Monitors healthiness of Shunt Trip Circuit

UW-EL
Earth Leakage Protection
- Range 0.3 to 30A
- Needs specified external CTs

UW-Digital Input/Output
Digital I/O Module
- 4 Isolated digital inputs
- 4 Relay outputs

UW-ZSI
Zone Selective Interlocking
- Intelligent discrimination for short circuit & earth fault

UW-REF
Restricted Earth Fault Protection
- Detects zone of Earth fault
- Needs specified external CTs

UW-TM
Temperature Rise Protection
- Selectable temperature levels (85°C to 115°C)
- Mounted inside breaker

Technical Specification

Features	Parameter	MTX 1.0	MTX 1G	MTX 1.5G	MTX 2.5	MTX 2.5G	MTX 3.5	MTX 3.5EC	MTX 4.5
Basic Protection	Overload - Phase	✓	✓	✓	✓	✓	✓	✓	✓
	Overload - Neutral		✓	✓		✓	✓	✓	✓
	Short Circuit	✓	✓	✓	✓	✓	✓	✓	✓
	Directional Short Circuit						✓	✓	✓
	Instantaneous	✓	✓	✓	✓	✓	✓	✓	✓
	Earth Fault		✓	✓		✓	✓	✓	✓
Additional Protection	Current						✓	✓	✓
	Voltage						*	✓	✓
	Frequency						*	✓	✓
	Reverse Power						*	✓	✓
	Maximum Demand						*	✓	✓
Trip Records	Last 5 Trip Data				✓	✓	✓	✓	✓
Event Records	Last 10 Event Data				✓	✓	✓	✓	✓
Smart Card							*	*	*
Communication	Modbus						*	✓	✓
	Profibus						*	*	*
	Zigbee (wireless)						*	*	*
Advance Protection	Trip Circuit Supervision (TCS)						*	*	*
	Zone Selective Interlocking (ZSI)						*	*	*
	Temperature Rise (TM)						*	*	*
	Earth Leakage (EL)						*	*	*
	Restricted Earth Fault (REF)						*	*	*
Additional Features	Relay Output						*	*	*
	Load Management						*	*	*
	Digital Input & Output						*	*	*
	Analog Output						*	*	*
Metering	Current			✓	✓	✓	✓	✓	✓
	% Loading				✓	✓	✓	✓	✓
	Voltage						*	✓	✓
	Power & Energy						*	✓	✓
	Harmonics								✓
Storable Settings (2 sets)					✓	✓	✓	✓	✓
Power Supply Module (24 VDC)					*	*	*	*	✓

* - available as optional.
For detailed information please refer product literature.

Simulation kit

- Universal test kit for all versions of Matrix P&C Unit
- Generates 3 phase current and voltage with adjustable phase angles
- Graphical display & smart GUI with multi functional key operation
- Portable & hand held device to simulate faults
- Dual Power ON - battery & external supply
- Auto sensing of P&C Unit connectivity
- Memory card for data storage upto 32 GB
- Stores 10 test records

Energy Management System

POWERMAN - Energy Management System

POWERMAN Products

Central Monitoring Station

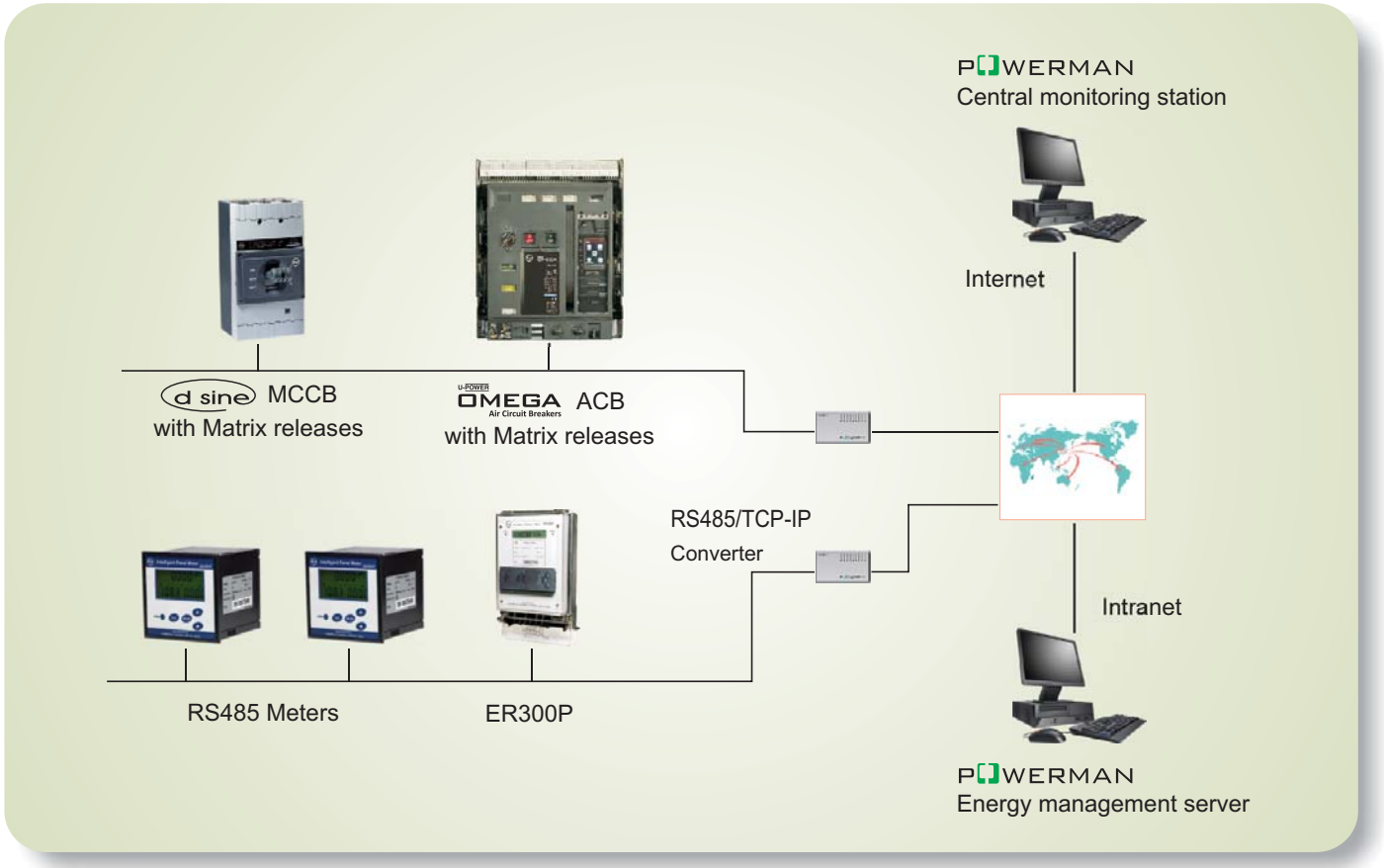
The Central Monitoring Station helps to monitor the energy devices connected in the system, recording events, indicating alarm conditions, displaying consumption data and logging device data, generating reports, etc. from web browser based application.

Com Controller

Meters with RS485 ports through MODBUS protocol shall communicate with POWERMAN through Com Controller. Data is converted from RS485 to TCP/IP by Com Controller. Maximum 20 devices (Meters) can be connected to one Com Controller.

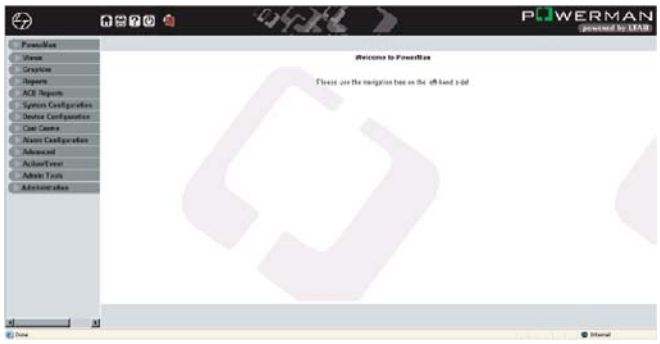
POWERMAN System Architecture

With Breaker & RS485 Meters



POWERMAN System Feature

- Web based application
- Consumption pattern identification
- Real time & historical trend chart to monitor specific parameters
- Comprehensive reporting and alarm management
- Multilevel password protection
- Cost centre invoice / sub tenant billing
- Tariff configuration
- Easier planning of energy consumption
- Areas of wastage can be identified
- Constant monitoring and recording enables faster action plans and take corrective measures
- Areas of optimization can be isolated and monitored
- Metering and billing can be extrapolated on cost centers, profit centers and other operational points
- Easier energy audits
- Virtual channels
- Supports unlimited number of devices
- Monitoring energy with no extra manpower

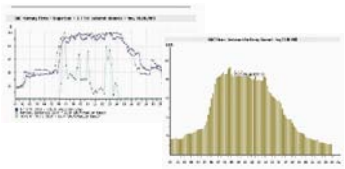


Functionalities & Benefits

Remote Data Readout

- Time synchronous data reading
- All values in central database
- Versatile and safe data transfer
- Comfortable schedule with LOG files

Visualizing

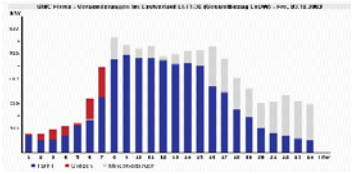


- Transparency for energy consumption, structures and weak spots
- Basis for energetic process-optimisation and changes of consumption habits
- Customised graphs

Rental Object, Cost Center

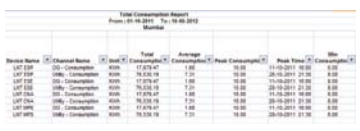
- Centralized Billing management system
- Consumption billing for object, rental period, cost centre, etc.

Planning Data



- Load profile definition @ scheduled energy interchange (1h-values)
- Actual - target comparisons
- Comfortable editor for load profile

Reporting



- Total consumption reports for daily, weekly and yearly
- Load profile erports for daily, weekly and yearly

Moulded Case Circuit Breakers

d sine - Moulded Case Circuit Breakers

DU Range - Moulded Case Circuit Breakers

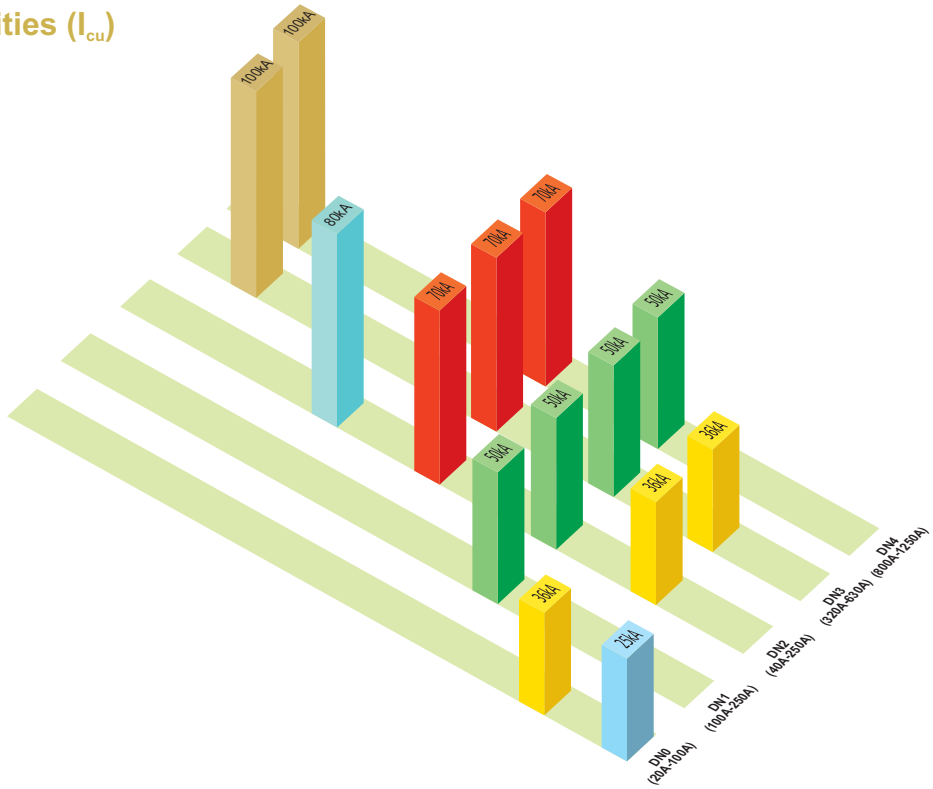
d sine Range

Salient Features

- Range available from 20A to 1250A
- Available in 3 pole & 4 pole
- Range of 25kA / 36kA / 50kA / 70kA / 80kA / 100kA breaking capacities
- Microprocessor and Thermal-Magnetic based protection releases
- MCCBs for Motor backup protection
- MCCBs for Distribution and SD versions
- Manual, Rotary or Motorised versions
- Wide range of Internal and External accessories

DN0		
Rated Current	20, 25, 32, 40, 50, 63, 80, 100A	
Release	Thermal-Magnetic	
DN1		
Rated Current	100, 125, 160, 200, 250A	
Release	Thermal-Magnetic	
DN2		
Rated Current	63, 80, 100, 125, 160, 200, 250A	40, 63, 100, 160, 250A
Release	Thermal-Magnetic	Microprocessor
DN3		
Rated Current	320, 400, 500, 630A	400, 630A
Release	Thermal-Magnetic	Microprocessor
DN4		
Rated Current	800, 1000, 1250A	
Release	Microprocessor	

Breaking Capacities (I_{cu})



MCCBs for Motor Protection

Technical Specification

Frame				250A		400A		630A	
Type			DN0-100	DN2-250		DN3-400		DN3-630	
			M	M	MH	M	MV	M	MV
Current range (A)			32, 40, 50, 63, 80, 100	100, 125, 160, 200, 250	32, 40, 50, 63, 100, 125, 160, 200, 250	320, 400	320, 400	500, 630	500, 630
Poles			3	3	3	3	3	3	3
Impulse withstand voltage U_{imp} (kV)			6	6	8	8	8	8	8
Rated Operational Voltage U_e (V) (MAX)			600	600	690	690	690	690	690
Rated Insulation Voltage U_i (V)			750	750	800	800	800	800	800
Utilisation Category			A	A	A	A	A	A	A
Standard			IEC60947-2 & IS/IEC60947-2						
Rated Short Circuit Breaking Capacity	I_{cu} (kA)	400 / 415V	50	50	80	50	100	50	100
		480V	-	36	65	36	65	36	65
		690V	-	15	36	15	50	10	50
	I_q (kA)	415V	50	50	80	50	100	50	100
		480V	-	-	65	-	65	-	65
	I_{cs} as % I_{cu}	400 / 415V	25%	100%	100%	100%	100%	100%	100%
		480V	-	100%	100%	100%	100%	100%	100%
		690V	-	100%	50%	100%	50%	100%	50%
Life span	Mechanical		30000	25000	25000	15000	15000	15000	15000
	Electrical @1.0 In		4000	10000	10000*	4000	4000*	4000	4000*
Operating Frequency (Hz)			50 / 60						
Total Opening Time			<10 msec						
Finger-proof Terminals			Yes						
Suitable for Isolation			Yes						
IP class			IP40						
Pollution degree			III						
Load Line Bias			No						
Ambient Temperature			-5°C to 55°C						
Storage Temperature			-35°C to 70°C						
Mounting Positions in Vertical Plane			Vertical and 90° in both directions						
Dimensions (WxDxH) mm	*3 Pole*		75 x 60 x 130	105 x 96 x 179		140 x 111.5 x 266		140 x 111.5 x 266	
Weight (kg) (3 Pole)			0.73	2.5		5.8		6.3	
Terminal Capacity	Standard	Cables with Lug (mm^2)	35	95		120		120	
		Link (mm)	17	25		27		27	
	With Spreaders	Cables with Lug (mm^2)	50	185		2*240		2*240	
		Link (mm)	22	35		2*40		2*40	

*at 415V

Note:

- Any two internal accessories can be mounted at a time
- Separate earth fault module required for earth fault protection using Magnetic releases
- Terminal Shroud mandatory for MH and MV versions
- Icu: Rated ultimate short-circuit breaking capacity
  Ics: Rated service short-circuit breaking capacity

MCCBs for Power Distribution

Technical Specification

Frame			100A		250A	250A				400A		400A				630A				800 / 1000 / 1250		
Type			DN0-100		DN1-250	DN2-250				DN3B-400		DN3-400				DN3-630				DN4-1250		
			C	D	N	D	N	S	H	D	N	D	N	S	V	D	N	S	V	N	S	V
Current range (A)			20, 25, 32, 40, 50, 63, 80, 100		100, 125, 160, 200, 250	32, 40, 50, 63, 100, 125, 160, 200, 250				320, 400		320, 400				500, 630				1250		
Poles			2 / 3 / 4		3 / 4	3 / 4				3 / 4		3 / 4				3 / 4				3 / 4		
Impulse withstand voltage U_{imp} (kV)			6		6	8				8		8				8				8		
Rated Operational Voltage U_e (V) (MAX)			600		600	690				690		690				690				690		
Rated Insulation Voltage U_i (V)			690		690	800			800	800		800			800	800			800	800		800
Utilisation Category			A		A	A				A		A				A				A		
Standard			IEC60947-2, EN60947-2 & IS/IEC60947-2																			
Rated Short Circuit Breaking Capacity	I_{cu} (kA)	400 / 415V	25	36	50	36	50	70	80	36	50	36	50	70	100	36	50	70	100	50	70	100
		480V	10	10	10	25	36	42	65	25	37	25	36	42	65	25	36	42	65	25	36	65
		690V	-	-	-	10	15	20	36	8	5	8	15	20	50	8	10	15	50	10	18	50
	I_{cs} as % I_{cu}	400 / 415V	100%	50%	50%	100%	100%	100%	100%	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		480 / 500V	100%	50%	50%	100%	100%	100%	100%	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		690V	-	-	-	100%	100%	100%	50%	100%		100%	100%	100%	50%	100%	100%	100%	50%	100%	100%	50%
Life span	Mechanical		30000	30000	10000	25000			25000	10000		15000			15000	15000			15000	8000		15000
	Electrical @1.0 In		4000	4000	3000	10000			10000*	4000		4000			4000*	4000			4000*	750		750*
Operating Frequency (Hz)			50 / 60																			
Total Opening Time			<10msec																	<20msec		
Finger-proof Terminals			Yes																			
Suitable for Isolation			Yes																			
IP class			IP40																			
Pollution degree			III																			
Load Line Bias			No																			
Ambient Temperature			-5°C to 55°C																			
Storage Temperature			-35°C to 70°C																			
Mounting Positions in Vertical Plane			Vertical and 90° in both directions																			
Dimensions (WxDxH) mm		3-Pole	75 x 60 x 130		105 x 60 x 165	105 x 96 x 179				140 x 111 x 205		140 x 111.5 x 266				140 x 111.5 x 266				210 x 143 x 370		
		4-Pole	100 x 60 x 130		140 x 60 x 165	140 x 96 x 179				184 x 111 x 205		183.5 x 111.5 x 266				183.5 x 111.5 x 266				278 x 143 x 370		
Weight (kg) (3 Pole)			0.8 / 1.1	0.73 / 1	2.5 / 3.3	2.5 / 3.3				4.0 / 5.0		5.5 / 7.2			5.8 / 7.4	6 / 7.8			6.3 / 8	15 / 16		
Terminal Capacity	Standard	Cables with Lug (mm^2)	35		120	95				185		120								-		
		Link (mm)	17		26	25				32		27								2*40		
	With Spreaders	Cables with Lug (mm^2)	50		185	185				2*240		2*240								2*300		
		Link (mm)	22		35	35				2*40		2*40								2*60		

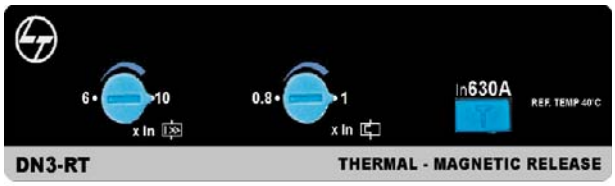
*at 415V
DN2 - 1500 @ 690V
DN3 - 1000 @ 690V

Note:
- Any two internal accessories can be mounted at a time
- Separate earth fault module required for earth fault protection using TM releases
- Terminal shroud mandatory for H and V versions
- Icu: Rated ultimate short-circuit breaking capacity
  Ics: Rated service short-circuit breaking capacity

Trip Unit & Accessories

Thermal Magnetic Releases

Variable Thermal, Fixed Magnetic (DN0, DN1, DN3B)
Variable Thermal, Variable Magnetic (DN2, DN3)



Magnetic Releases

Motor Back up Protection Release
(DN0, DN2, DN3 - Magnetic Protection only)

Isolator

Switch Disconnector (DN2, DN3, DN4)

Microprocessor Releases

MTX1.0 with LSI (DN2, DN3, DN4)

MTX2.0 with LSING + Current Metering
(DN2, DN3, DN4)

MTX3.0 with LSING + Communication capable +
Power Metering (DN2, DN3, DN4)

Accessories

Internal

- Auxiliary Contact
- Trip Alarm Contact
- Aux+Trip Alarm Contact
- Shunt
- UV


Auxiliary Contact


TAC


Shunt Release


UV Release

External

- Stored Energy Electrically Operated Mechanism
- External Neutral CT
- ROMs
- Key Locks
- Spreaders
- Terminal Shrouds
- MIL Kit
- GF Module
- MTX Modules


SEOM


External NCT


ROM


Spreaders

Product Features

Technology

- Current Limiting MCCBs: The unique speed contact system with current limiting feature accelerates the opening of contacts during short circuit resulting in very low let through energy
- No load line bias: Either side of MCCB terminal can be used as load or line*
- MCCB Mechanism: Quick make, quick break & trip free mechanism

Ergonomic Design & User Friendliness

- Knob designed for better grip
- Color indication of ON/TRIP/OFF*
- Current rating on the knob
- Overload adjustment from front*
- Easy ON/OFF/RESET operations
- Wide variety of snap fit accessories*

Compact

- Compact size
- Common depth upto 250A
- Suitable for side by side mounting#

Internal Accessories

- Snap fit type accessories*
- Auxiliary contacts
- Trip alarm contacts*
- Combined Auxiliary + Trip alarm contacts*
- Shunt release
- Under Voltage release*

External Accessories

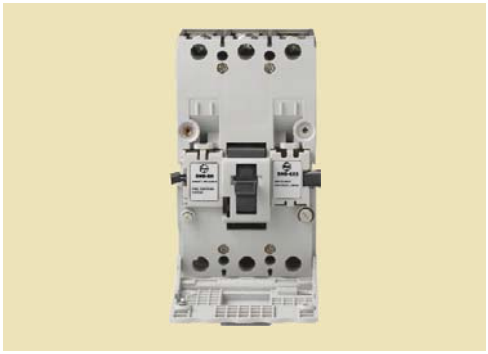
- Direct & Extended ROM
- Spreader links
- Padlock is available (with ROM)
- SS Enclosure**
- GF module for earth fault protection

Easy to Install

- 45mm door cutout upto 250A
- Optional DIN rail mounting available**

Safe to Use

- Finger proof terminals
- Phase barriers supplied to enhance the clearance between the phases
- Lockable shroud on thermal knob to prevent unauthorized operation*
- CE marked range*
- Double Insulation: The internal accessories are housed in insulated casings to ensure first level of insulation. When the front cover is opened for the fixing of internal accessories, the MCCB is totally insulated ensuring the double insulation*



* For DU100H / DU250 / DU400 ** For DU100 / DU125U / DU100H # For DU100H / DU250

DU Series

Technical Specification

Technical Parameters		Specification				
Type Designation		**DU100**	**DU125U**	**DU100H**	**DU250**	**DU400**
No. of Poles		2/3	3	2/3/4	3/4	3/4
Rated Current	I_n (A)	16, 20, 25, 32, 40, 50, 63, 80, 100	125	20, 25, 32, 40, 50, 63, 80, 100	100, 125, 160, 200, 250	320, 400
Impulse withstand voltage	U_{imp} (kV) AC	6				8
Rated operational voltage	U_e (V) AC	415				690
Rated insulation voltage	U_i (V) AC	690				800
Operational frequency (Hz)		50 / 60				
Utilisation Category		A				
Operating Temperature		-5°C to + 55°C				
Standard		IS/IEC60947-2		IS/IEC60947-2, EN60947-2		
I_{cu} (kA)	240V a.c.	25		65	65	65
	415V a.c.	10		30	36	50
	250V d.c. (2P in series) L/R<15 msec	5		10	-	-
	250V d.c. (3P in series) L/R<15 msec	10		15	15	15
	500V d.c. (3P in series) L/R<15 msec	-		5	5	5
Rated Service S. C. Breaking Capacity (I_{cs})		50% of Icu				
Mechanical Life	No. of operations	20000	10000	30000	10000	10000
Electrical Life	No. of operations	6000	1000	4000	3000	4000
IP Protection (from front side)		IP40				
Pollution Degree		III				
Type of Release		**Thermal - Magnetic**				
Thermal		Fixed		Variable (0.8 - 1.0I_n)		
Magnetic		Fixed (9I_n)				
Terminal Capacity (without spreaders)						
Cables with Lug (mm^2)		50		35	120	185
Link (mm)		<17			<26	<32
Overall Dimensions						
Width (mm)		75		75/75/100	105/140	140/184
Height (mm)		130		130	165	205
Mounting Depth (mm)		60		60	60	111
Weight (2/3/4 Pole) (kg)		0.56/0.68	0.8	0.6/0.73/1	1.45/1.8	4/5

Distribution Systems

ENERSYS-M - Main Distribution Board

ENERSYS-S - Sub-Main Distribution Board

Enersys-M - Main Distribution Board

Enersys-M range of main distribution boards are backed by many years of knowledge, switchgear experience in addition to feedback from consulting engineers, electrical contractors and end users.

With Enersys-M, we assure you cutting-edge performance, superior safely, greater reliability, effective use of your capital & space and high class protection for your power distribution systems.

The design verified assembly together with increased versatility makes it competent to accomplish today's challenging demands and move towards fulfilling future expectations.

Enersys-M is a fully compartmentalized and duly complied with the latest international standards and local regulations, elevating your power distribution to a new level

Safety First

Noble Guardian

Enersys-M is divided into distinct compartments (equipment, busbar, cable and auxiliary) segregated by metallic or non-metallic partitions or barriers, to ensure maximum safety level for your operator against electric shock.

Multi Level Safety

The specially designed tool operated and padlockable door knob provides multi level safety for your personnel. Additionally you are protected from accidental access to live parts by our intelligent interlocks.

Trusted bus system

Generous clearances for main busbar and connectors ensure unmatched safety for you.
Supports and insulation materials are flame resistant, track resistant and non-hygroscopic exhibiting outstanding electrical properties.

Environmental Control

Enersys-M gives you protection against access to hazardous parts, solid foreign bodies and liquids.
The innovative design of camlock, hinges and door gasket bolster ingress protection.

Integtal safety-arc protection

The complete closed door operation and limitation of fault within a confined area, Enersys-M ensures total safety for the operator and maintenance personnel as well as plant safety in order to limit the damages.

The Leading Edge

Efficiency expert

Enersys-M is the intelligent modular solution to combine your different installation designs in one section with high efficiency. The flexibility thus achieved, allows for the simple exchange or addition of functional units, giving an edge to your credence.

Design for tropicalization

Enersys-M is well designed & engineered to perform satisfactorily in harsh environments consisting of dust, water and pollution, makes it suitable for all geographical sites or any critical ambience.

Unmistakable, Unmatched performance

Stringent fault withstand capacity of Enersys-M of 50 kA, 3s assure you an exclusive and high quality performance.

Technical sophistication

Enersys-M range believes in future and sets new standards as a technically superior application in infrastructure. This means it is always designed to meet constantly increasing technical challenges offering maximum personal and installation safety, a wide range of possible uses, quick installation, minimal maintenance and timely delivery.

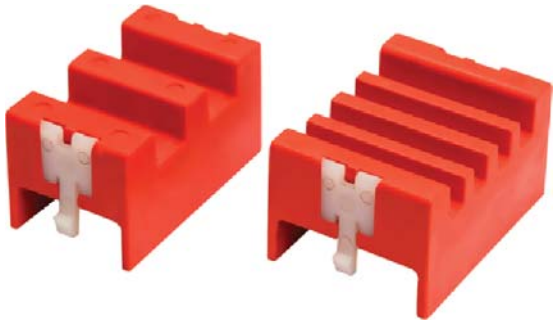
Countering The Time

Need based Delivery

We can offer Enersys-M as functional sub-assemblies, flat-packed versions or fully preassembled for your specifications. Shorter lead time and speedy delivery makes it easy to react to your constant changing needs or enquiries.

Standardization expert

The indispensable compartmentalized design of Enersys-M reduces your installation and maintenance time. Further, usage of single tool for assembly makes Enersys-M a standardized product.



Revolutionary support

The exclusive click fit busbar supporting design requires less effort, thereby lowering assembly time, to achieve timely delivery of your main distribution board.

The Smart Space Saver

New compactness

Enersys-M range of power distribution board is one of the most compact switchboard and has been optimized for different ratings & requirements.
The smart panel configurations gives you flexibility to make optimum use of your available space.

Flexible cable chamber

Enersys-M gives you an option to select front or rear cable entry based on your space requirements.
Moreover, generous space is provided for terminating power cables, ensuring higher bending radius and reducing undue stress on terminals.

Minimum footprint, Maximum Density

Enersys-M can accommodate ACB in a smallest width panel of 500 mm. Further, the higher density of MCCB feeders in a single panel is evident.

The Perfect Harmony

Ergonomic design

Enersys-M is equipped with flexibility to lift it from top using eye bolts or to maneuver with a secured plinth base, acting as a easy-to-use interface for installing your assembly to prevent any injuries to personnel.

Quick installation

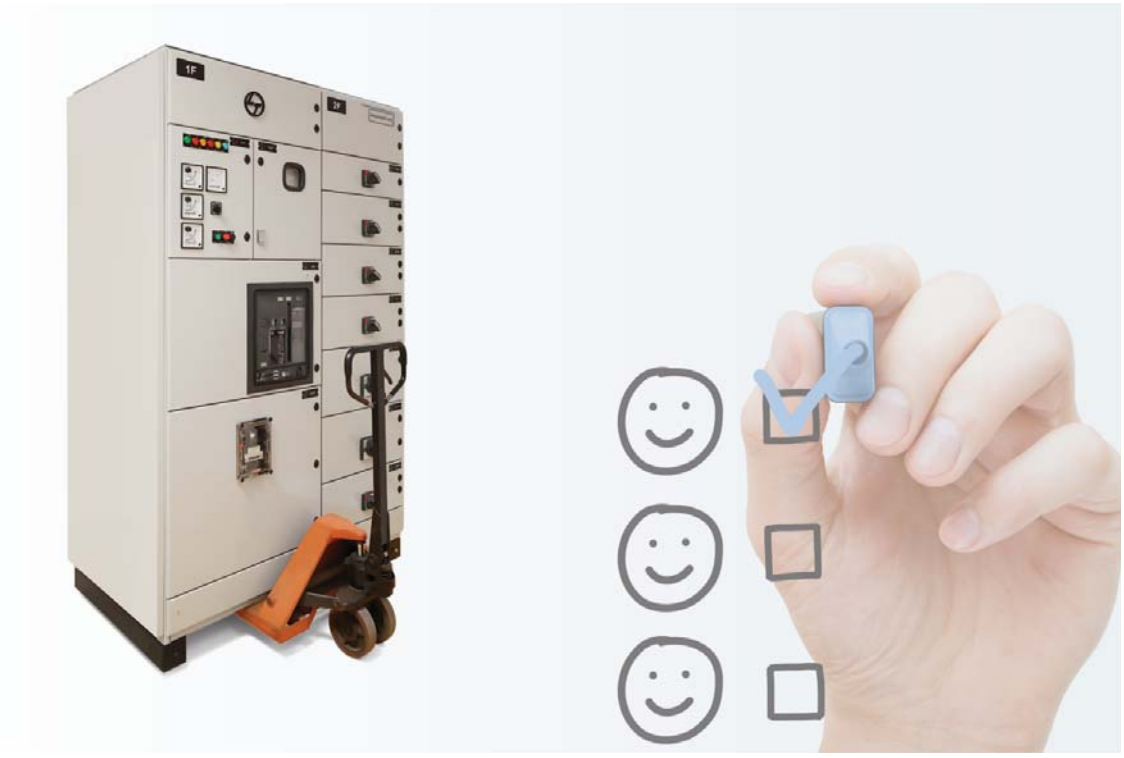
A separate control wire way and horizontal main busbar chamber gives you an easy way in for fishplate or splice joints, in turn speeding up your installation.

A world of data at finger tip

Enersys-M is available with PARTENER - a suit of software, for swift and simple data management of the switchgear assembly you want. This produces the parts list at the press of a button, incorporating our switchgear and protective devices, in no time.

Razor-sharp response

With our project management executives and post-sales teams, we offer the services tailored to your specific needs. They promise the competencies available to support your installation, commissioning and maintenance requirements.



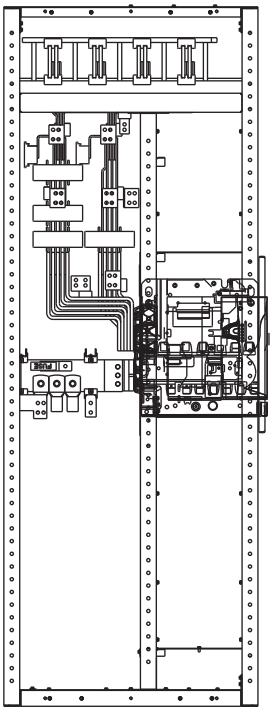
A Global Validation

Enersys-M low voltage switchgear system is subjected to extensive design verifications in compliance with IEC 61439, at reputed international third-party laboratories to assure you best-in-class products.

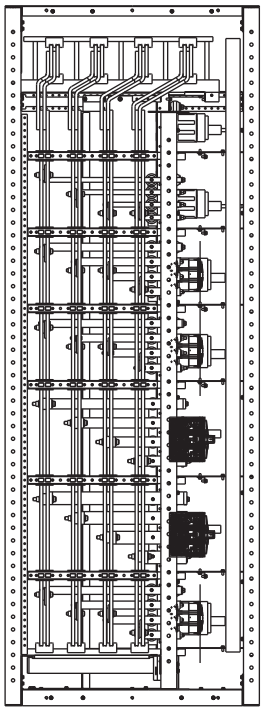
Constructional Characteristics	Enersys-M Verified
Strength of materials and parts	
Resistance to corrosion	✓
Thermal stability of enclosures	✓
Glow wire test	✓
Lifting	✓
Marking	✓
Degree of protection of enclosures	✓
Clearance and creepage distances	✓
Effectiveness of earth circuit for external faults	✓

Performance Characteristics	Enersys-M Verified
Power frequency withstand voltage	✓
Impluse withstand voltage	✓
Temperature rise limits	✓
Short-circuit withstand strength	✓
Electromagnetic compatibility (EMC)	✓
Mechanical operation	✓

Typical Arrangement

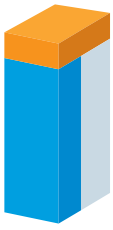


ACB Panel



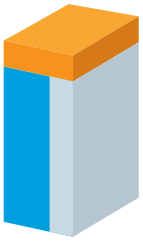
MCCB Panel

ACB Panel
500 / 600 / 800 /
1000(W) x 1000(D)



ACB Panel
500 / 600 / 800(W) x 800(D)

MCCB Panel
600(W) x 800 / 1000(D)

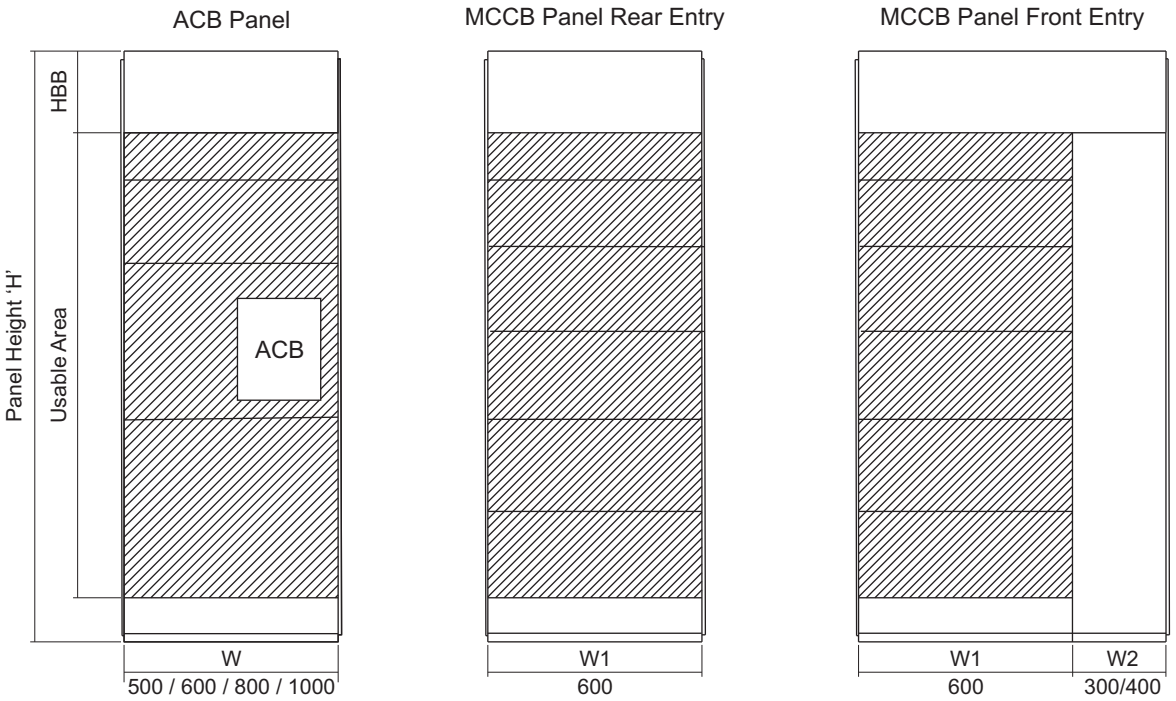


MCCB Panel
900 / 1000(W) x 800 / 1000(D)

Feeders
Cable alley
Busbar*

* Top or bottom busbar options available

Configuration



	ACB Panel	MCCB Panel
Panel Height 'H'	2200	2200
Horizontal Busbar (HBB)	270	270
Usable Area	1740	1740

All dimensions are in mm

Technical Specification

Standards		IEC61439
Electrical characteristics		
Voltage rating	Rated operational voltage(U_e)	415 VAC
	Rated insulation voltage(U_i)	upto 100 VAC
	Rated impulse withstand voltage(U_{imp})	upto 12 kV
	Rated frequency (f_n)	50 / 60 Hz
Current Rating	Main Horizontal busbars	
	Rated current(I_{nA})	upto 4000A
	Rated peak withstand current(I_{pk})	upto 143 kA
	Rated short-time withstand current(I_{cv})	50 kA, 1s 50 kA, 3s 65 kA, 1s
	Vertical Distribution busbars	
	Rated current (I_{nA})	upto 1800A
	Rated peak withstand current(I_{pk})	upto 143 kA
	Rated short-time withstand current(I_{cv})	50 kA, 1s 50 kA, 3s 65 kA, 1s
Insulation characteristics		
	clearance	Bus Zone - 25 mm, Other areas - 20 mm
	Creepage distance	Bus Zone - 25 mm, Other areas - 20 mm
	Overvoltage category	IV
	Pollution degree	3
	Field condition	Inhomogeneous(non-uniform)

Mechanical Characteristics		
Degree of protection	In accordance with IEC 60529	
	External	IP 4X, IP 54 - upto 2500A
	Internal	IP 2X
Forms of seperation	as per IEC 61439-2	upto Form 4b
Dimensions	Height mm)	2200, 2300 (with plinth)
	Width (mm)	500, 600, 800, 1000 (ACB panel)
		600 (MCCB panel - Rear cable access) 900 / 1000 (MCCB panel - Front cable access)
	Depth (mm)	800 / 1000 - upto 2500A 1000 - above 2500A
Surface Treatment	Structure	Powder coated / painted
	Internal Components	Powder coated / painted
	External Components	Powder coated / painted
Resistance to corrosion	Damp heat cycling test	IEC 60068-2-30
	Salt mist test	IEC 60068-2-11
Plastic components	Flame retardant, self-extinguishing, Halogen-free	IEC 60695-2-10, IEC 60695-2-11

The Perfect Match for your Enersys-M System

Our in house design and testing facilities enable us to create customized solutions which combine type-tested Enersys-M switchboards with a wide range of perfectly matched L&T switchgear configurations. All, so that you can achieve the highest levels of cost and design optimization possible with your Enersys-M system.

Air circuit Breakers

- 400A to 6300A in three optimized frame sizes
- Short circuit breaking capacities upto 100 kA
- 50/100/200% Neutrals available
- Common Height and Depth across range
- Arc chute interlocking
- No derating at higher ambients
- Energy saving pole design
- Independent locking of ON/OFF buttons
- Tool-less fixing of voltmetric release
- Display of complete accessory Information on front facia

Moulded Case Circuit Breakers

- 20A to 1250A in 3/4 pole variants
- Positive isolation
- Short Circuit breaking capacities upto 70 kA
- Microprocessor, Thermal Magnetic and Magnetic based Release
- Wide range of snap accessories
- Ergonomic design
- User friendly features

Enersys-S - Sub-main Distribution Board

Enersys-S Power distribution boards from L&T meets the demands of commercial buildings, educational establishments, hospitals, government buildings, manufacturing operations and other applications that require safe, reliable and high performance protection of their electrical power sub-distribution systems.

Enersys-S is a type tested Sub-main Distribution Board (MCCB panel board) used for power distribution. It has MCCBs as incoming and outgoing switching-cum-protection device. It complies with IEC61439-2 and has been designed for easy handling and quick, simple installation. Compact MCCB design ensures maximum cabling area within the enclosures. Removable top & bottom gland plates are provided for ease of installation and cabling. Removable plates allows fitting of additional items such as top and bottom extension boxes and metering panels.

Key Features of SMDB

- Ready-to-use solution for power distribution
- Modular construction and compact design provide economy of space, installation time and cost
- Fully shrouded enclosed tin-plated copper busbar provides increased safety
- Safer as all devices including incomers are located behind a lockable door and front cover screws to prevent unwanted access
- Generous cabling area throughout the range. Compact MCCB design ensures maximum cabling area within the enclosures
- Removable interior allows assemblies to be mounted either way up
- Removable top & bottom gland plates make drilling & access easier. It allows fitting of additional items such as top and bottom extension boxes and metering panels
- External and internal earthing points are provided
- Metering options available

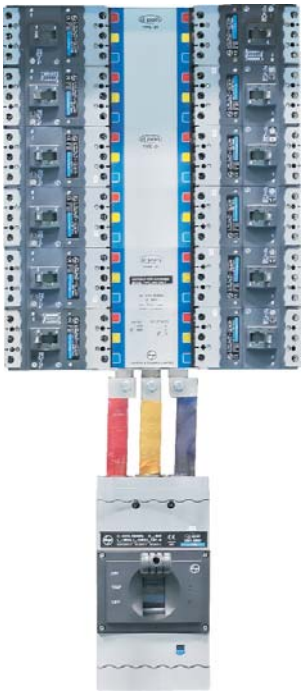
Technical Specification

Attributes		Specification
Busbar ratings (InA)	(A)	250, 400, 630 *
Rated operational voltage (Ue)	(Vac)	415
Rated Frequency (fn)	(Hz.)	50 / 60
Reference Temperature	(°C)	50
Rated Insulated Voltage (Ui)	(Vac)	690
Rated Impulse Voltage (Uimp)	(kV)	8
Busbar short circuit withstand strength (Icw)	(kA)	36 kA for 1 s
Busbar conditional short circuit rating (Icc)	(kA)	36
Neutral & earth bar rating		N : 100% of Ph., E : 50% of Ph.
Busbar material		Tinned Copper
Type of construction		Form 2
Type of connection		3-phase 4-wire with Earthing
Incomer (IC) & Outgoing (OG) Device		MCCB
Incomer MCCB Ratings	(A)	Up to 250A, 400A, 630A *
Incomer breaking capacity (Icu)	(kA)	36 kA - 250A, 400A
		36 kA - 630A *
IC & OG feeder no. of poles		3
Outgoing feeder - No. of ways		4, 8, 12
Applicable std.		IEC61439-2
Application		Indoor
Mounting		Wall-mounted - Up to 630A
Type Designation		TN250D, TN400D, TN630D *

Key Features of PAN Assembly

The distribution busbar system is fully insulated and type tested. This makes the assemblies an ideal and economical solution for applications requiring a high level of safety, compactness and reliability.

- Fully enclosed and totally insulated
- Block-type construction
- Type-tested
- Maintenance-free
- Compact, space saver and economical
- No. of outgoings suitable for MCCBs
- Tinned copper busbar



SMDB rating in Amps	250	400	630*
Icw in kA	36	36	36
Time in sec.	1	1	1
No. of ways	4, 8, 12	4, 8, 12	4, 8, 12

* Available on request, Pl contact nearest branch

Incoming and Outgoing Devices

d sine Range of MCCBs

DN4 DN3 DN2 DN1 DN0

- Range: 20A to 1250A
- Available in 3-pole & 4-pole version
- Breaking capacity up to 70 kA
- Wide range of internal & extern accessories

	Incoming Device			Outgoing Device
MCCB Type	DN1-250D	DN3-400D	DN3-630D *	DN0-100D
Rating in Amps	250	400	630	100
Icu in kA	36	36	36	36

Ordering Details

SMDB					
Sr. No.	FG Cat. No.	Type	Rating	No. of Ways	Description
1	NA20D1044RZZ0	TN250D	250A	4	TN250D, EnerSys-S SMDB, 4 Ways
2	NA20D1084RZZ0	TN250D	250A	8	TN250D, EnerSys-S SMDB, 8 Ways
3	NA20D1124RZZ0	TN250D	250A	12	TN250D, EnerSys-S SMDB, 12 Ways
4	NA40D1044RZZ0	TN400D	400A	4	TN400D, EnerSys-S SMDB, 4 Ways
5	NA40D1084RZZ0	TN400D	400A	8	TN400D, EnerSys-S SMDB, 8 Ways
6	NA40D1124RZZ0	TN400D	400A	12	TN400D, EnerSys-S SMDB, 12 Ways

* For 630A , Available on request

Note: While ordering SMDB, incoming and outgoing MCCBs have to be ordered seperately

Incoming Devices

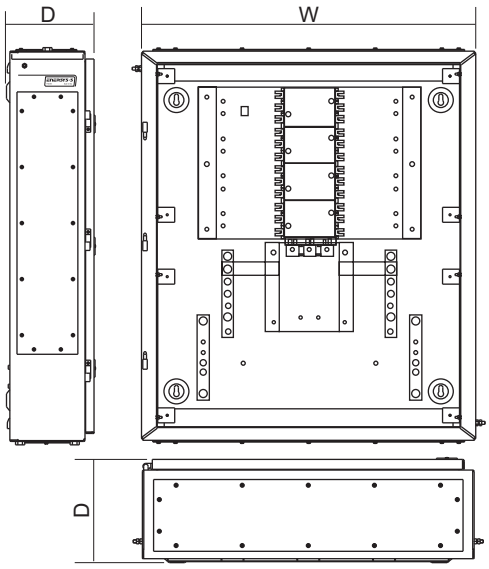
SMDB			Incoming Device			
Sr. No.	Type	Rating	FG Cat. No.	Type	Rating	Description
1	TN250D	250A	CM98646OOPO	DN1-250D	250A	DN1-250D 3POLE MCCB - 250A
2	TN250D	250A	CM98646OONO	DN1-250D	200A	DN1-250D 3POLE MCCB - 200A
3	TN250D	250A	CM98646OOMO	DN1-250D	160A	DN1-250D 3POLE MCCB - 160A
4	TN400D	400A	CM94005OORYOG	DN3-400D	400A	DN3-400D 3 POLE MCCB - 400A
5	TN400D	400A	CM94005OOQYOG	DN3-400D	320A	DN3-400D 3 POLE MCCB - 320A

Outgoing Device

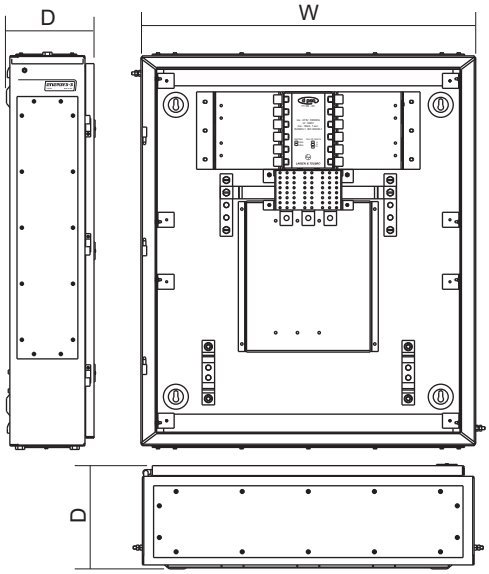
Outgoing Device (Common for TN250D and TN400D SMDBs)				
Sr. No.	FG Cat. No.	Type	Rating	Description
1	CM90141OOCZOG	DN0-100D	20A	DN0-100D 3Pole MCCB 20 A (3 BOX CLAMPS)
2	CM90141OODZOG	DN0-100D	25A	DN0-100D 3Pole MCCB 25 A (3 BOX CLAMPS)
3	CM90141OOEZOG	DN0-100D	32A	DN0-100D 3Pole MCCB 32 A (3 BOX CLAMPS)
4	CM90141OOFZOG	DN0-100D	40A	DN0-100D 3Pole MCCB 40 A (3 BOX CLAMPS)
5	CM90141OOGZOG	DN0-100D	50A	DN0-100D 3Pole MCCB 50 A (3 BOX CLAMPS)
6	CM90141OOHZOG	DN0-100D	63A	DN0-100D 3Pole MCCB 63 A (3 BOX CLAMPS)
7	CM90141OOJZOG	DN0-100D	80A	DN0-100D 3Pole MCCB 80 A (3 BOX CLAMPS)
8	CM90141OOKZOG	DN0-100D	100A	DN0-100D 3Pole MCCB 100 A (3 BOX CLAMPS)

Note: Selection of MCCBs to be done in accordance with IEC61439 guidelines

Dimensional Details



Cat. No.	Height(H)	Width(W)	Depth(D)
NA20D1044RZZ0	637	670	208.5
NA20D1084RZZ0	787	670	208.5
NA20D1124RZZ0	937	670	208.5



Cat. No.	Height (H)	Width (W)	Depth (D)
NA40D1044RZZ0	937	670	208.5
NA40D1084RZZ0	1084	670	208.5
NA40D1124RZZ0	1237	670	208.5

All dimensions are in mm

Busduct System

HENIKWON - Busduct System

Give Your Project The L&T Advantage

Give your prestigious project the winning edge. Give it the advantage of L&T's Henikwon Busduct system - trusted by discerning electrical engineers in 30 countries.

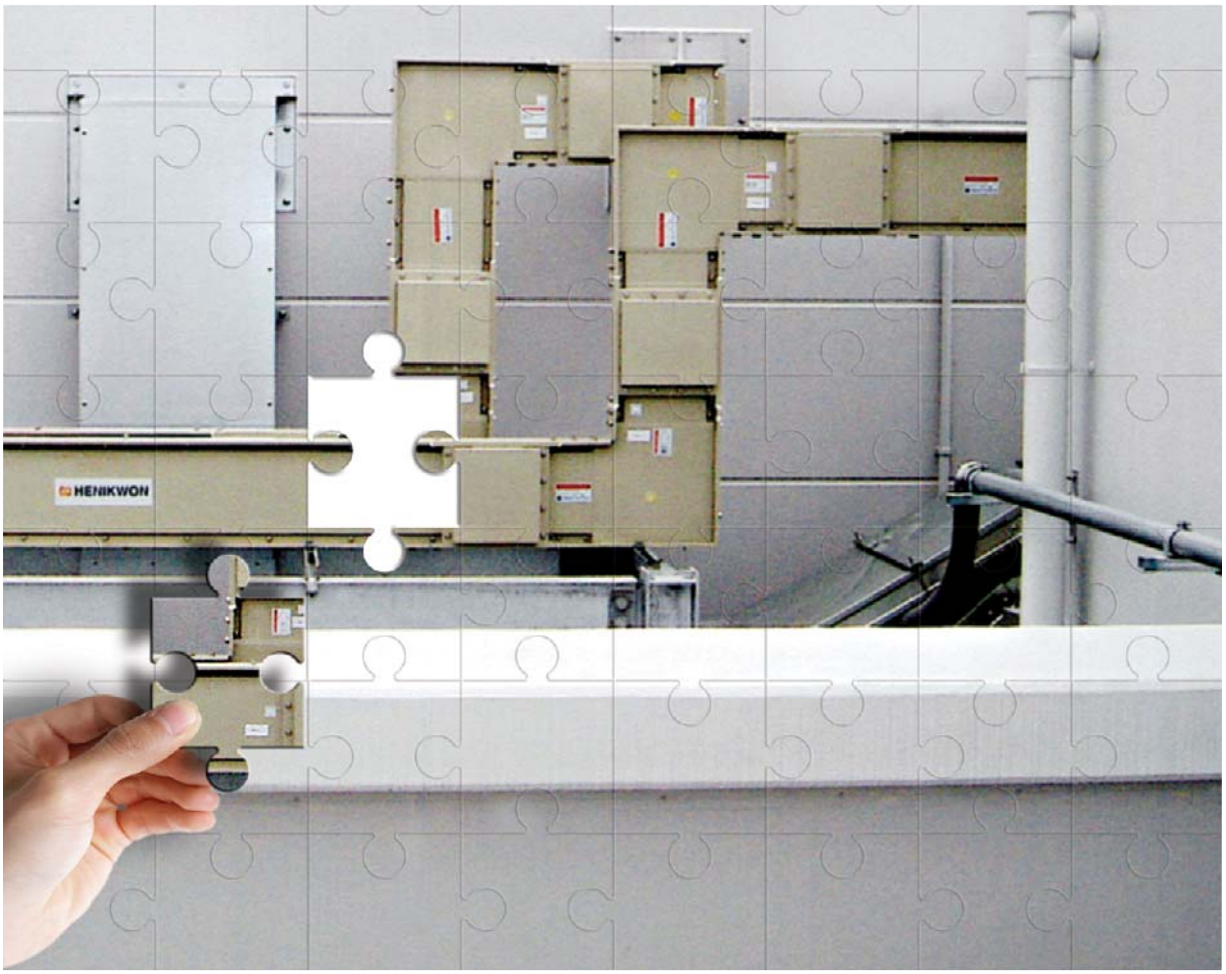
Longer life: Each Henikwon Busbar is epoxy compound-coated with a uniform thickness of 1.6 mm. The epoxy coating matches metallic expansion and contraction, ensuring that it does not crack or allow moisture to seep in. This means reduced corrosion, and a longer life for your system.

Higher savings: A higher joint overlapping area ensures less power loss. More savings – in terms of not just money, but also power, which is becoming scarcer by the day.

Enhanced safety: To ensure the highest degree of safety, Henikwon Busduct systems are totally enclosed and well-insulated.

Greater reliability: Comprehensive manufacturing processes, strict compliance and selection of inputs give you the assurance of reliability. Further, the Henikwon Busduct system is certified by an independent third party.

Across the years, the Henikwon Busduct system has been successfully installed in several locations in over 30 countries.



Busduct Systems for Every Need

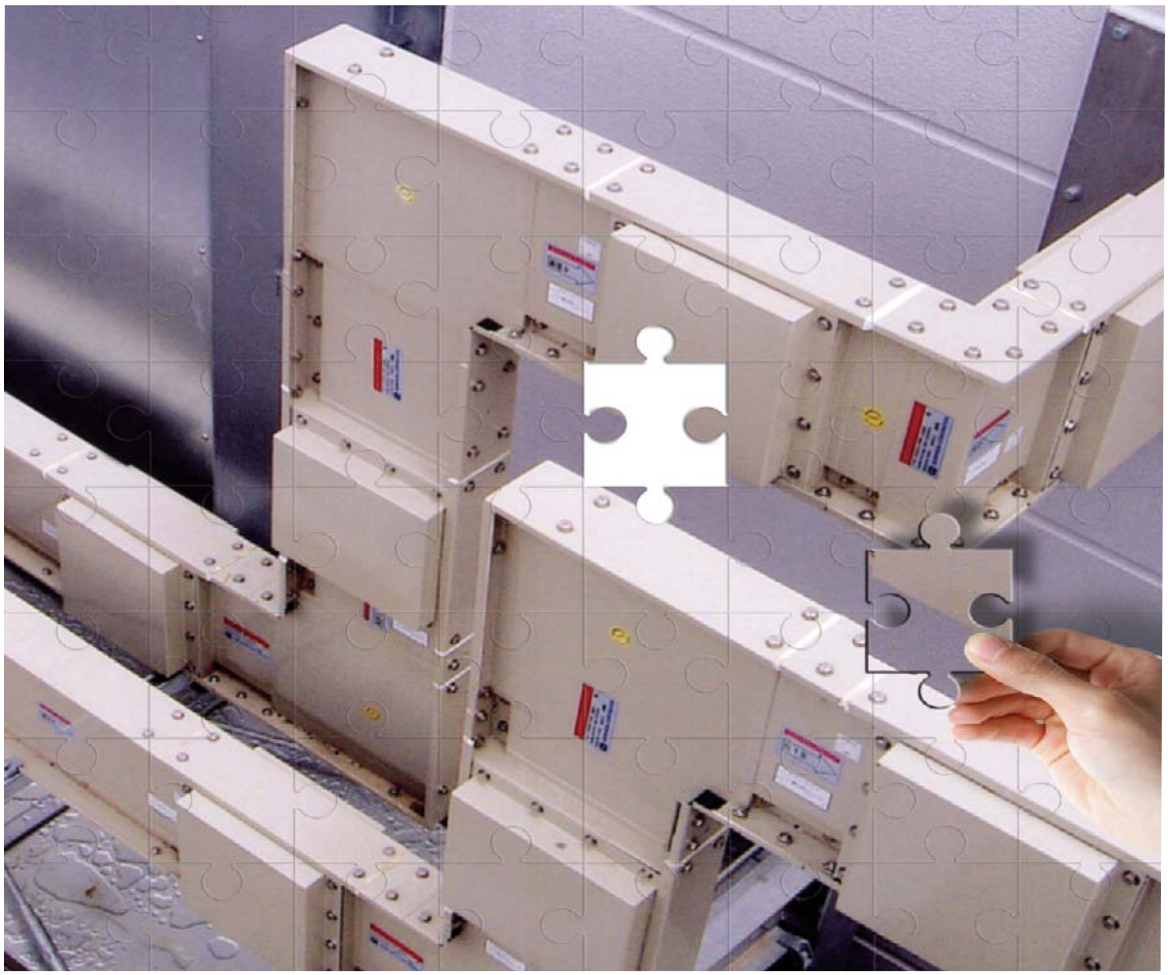
To meet your entire range of power delivery needs, Henikwon offers two Busduct systems from 100A to 6300A.

- Medium Voltage system for power transmission
- Low Voltage system for connection between transformer and for back-up supply to power distributions and as a plug-in in building power systems.

Whatever your project, whatever its size, you can rely on Henikwon to provide a Busduct system that precisely meets your requirements.

Busducts can be used in following areas:

- Residential apartments
- Business premises and commercial complexes
- Resorts and hotels
- Educational institutions
- Shopping centres
- Assembly lines
- Industries
- Airports
- Hospitals
- Oil & Gas platforms
- Electricity generation plants



Sandwich System

The Sandwich System is a lightweight, low impedance, non-ventilated, naturally cooled and totally-enclosed system.

The system is available with 50% or 100% internal earthing, 50% or 100% neutral busbar. To address harmonics, 200% neutral busbar is also available.

Busbars

99.99% pure copper Busbars are tin / silver coated to protect them from water and moisture that can cause reduction in dielectric strength. Likewise, aluminium Busbars are made of high-conductivity electrical grade aluminium (99.6% pure aluminium).

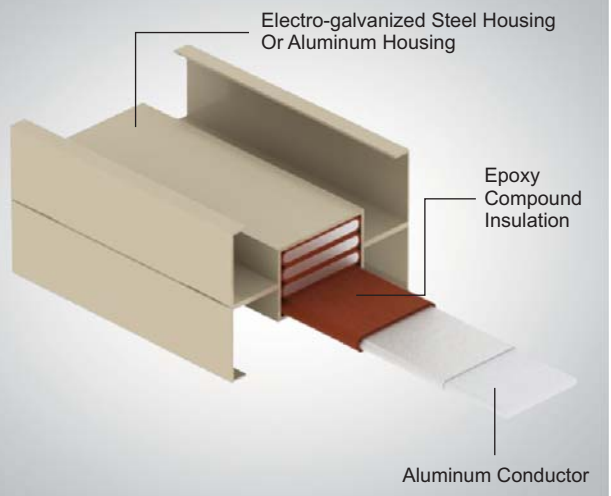
Joint

- Direct contact jointing, which ensures total and higher surface area contact, results in less power-loss and cooler performance
- All joints are maintenance-free. The high-strength bolt is insulated with a high quality insulation material
- For uniform distribution of the clamping force, all bolted connections are equipped with a leaf spring
- A maintenance-free lock nut is provided where the outer head will be twisted off, once it reaches the appropriate torque

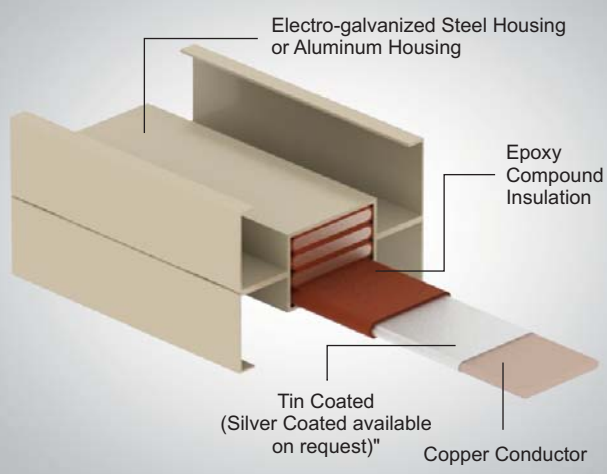
Enclosure / Housing

- Galvanized steel housing or aluminum housing with epoxy powder-coated by an automated process to achieve fire resistance
- The housing also gives integral ground as standard requirement where it acts as an earth conductor
- Due to its compact, sandwich-type construction, it does not require an internal fire-stop barrier

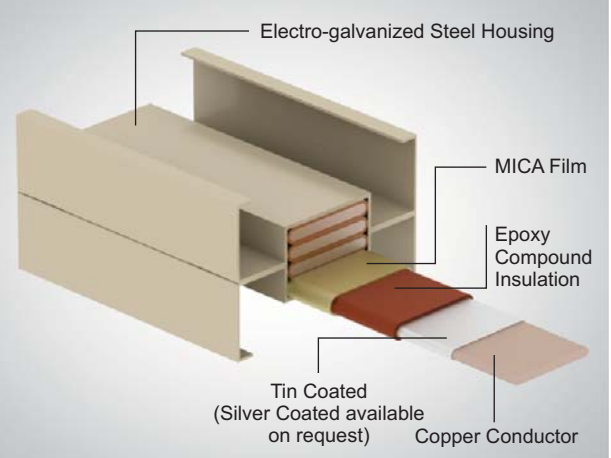
Aluminium Busduct System



Copper Busduct System

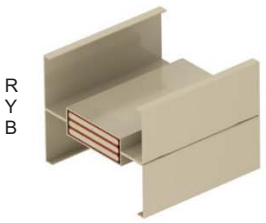


Fire Rated Copper Busduct System

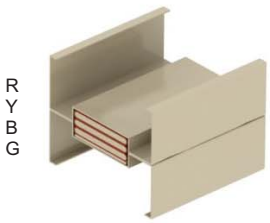


Plug-in Box / Tap-off Box

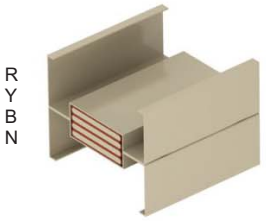
- Built-in interlock system that prevents opening of the cover when the device inside is ON
- Safety provision to prevent the installation or removal of plug-in box when turned ON
- During insertion, the earth conductor makes contact first before the phase conductors This follows the first-in-last-out concept
- The plug-in box is equipped with internal insulation barriers to prevent accidental contact with the conductor
- TOUs are provided with padlocking



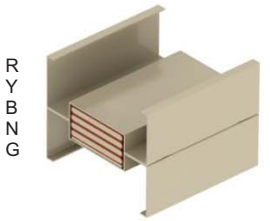
3-phase 3-wire with housing ground



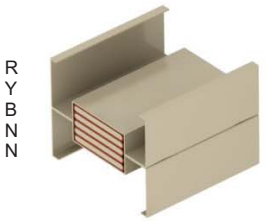
3-phase 3-wire with Internal ground



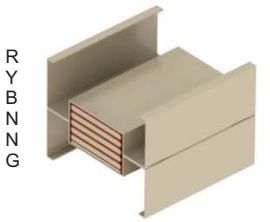
3-phase, 4-wire with housing ground & 50% or 100% Neutral



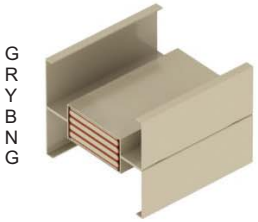
3-phase, 5-wire with Internal ground & 50% or 100% Neutral



3-phase, 5-wire with housing ground & 200% Neutral



3-phase, 6-wire with Internal ground & 200% Neutral



3-phase 6-wire with 25% + 25% Internal ground and 100% Neutral

Type	Sandwich	
Rated Operating Voltage	Up to 1000V	
Rated Current	400A to 6300A	
Rated Insulation Voltage	1000V	
Rated Withstand Voltage	8 kV	
System Frequency	50 Hz & 60 Hz	
Fault Level for 1 Sec	400A	25 kA
	630A	40 kA
	800-1000	50 kA
	1250-2000	65 kA
	2500-6300	100 kA
Design Ambient Temp.	50°C	
Degree of Protection (IP)	IP-54, IP-55, IP-65 IP-66 & IP-67	
Relevant Standard	IEC-60439-1 & 2/IEC-61439	
Enclosure	Galvanized Steel or Aluminum	
Enclosure Coating	Epoxy Powder (RAL 7032)	
Enclosure Thickness	1.6mm (GS) / 2mm or 3mm (Al)	
Conductor Material	Copper or Aluminum	
Configuration	3P with no or 50% or 100% or 200% neutral + internal earth (50% or 100%) or provision for external earth	
Joint	Direct Jointing	
Insulation Class	Class - F	
Insulation Material	Epoxy Compound	

Other Offerings

Conventional System

This is a totally metal-enclosed air-insulated Busduct system which complies with the characteristics and structure specified in BS 5486-2, IEC 60439-2, JIS C 8364, NEMA, ANSI and CSA.

- Low-capacity power supply systems are widely used for various factories, machine shops, school laboratories and commercial buildings
- For most indoor locations where there is a need for small blocks of conveniently available power, the conventional system serves as a highly rationalized solution with various features
- A total of 6 plug-in holes per 3000 mm unit are available for various capacity ranges of the system

Busbars

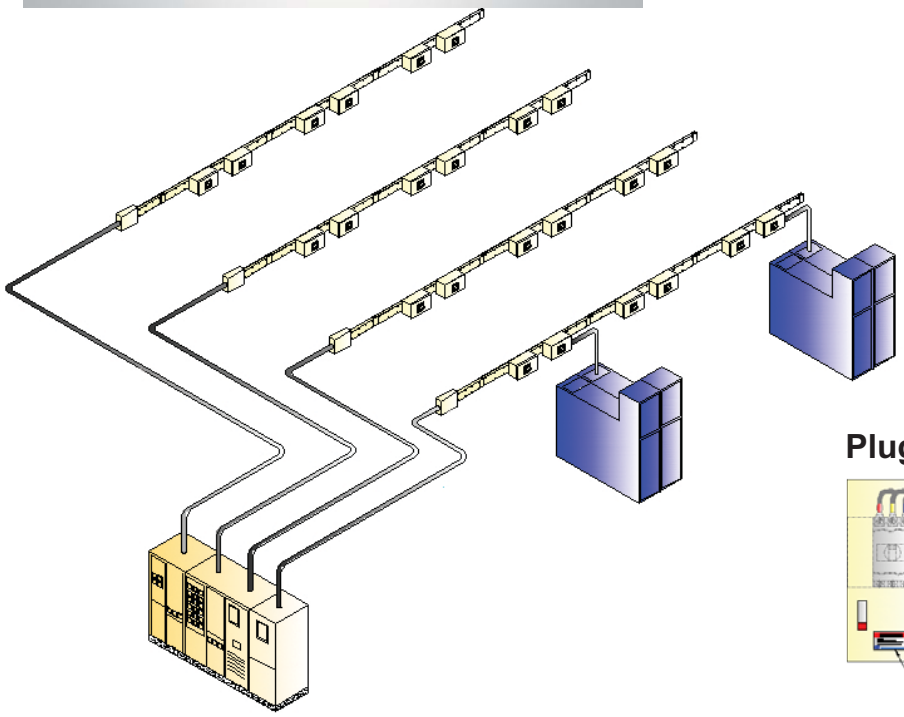
- The bus conductor is available in tin-plated 99.99% pure copper
- Busbar is supported with fiberglass reinforced SMC insulator which withstands above 180°C
- Internal or provision for external earth bars are available, as required

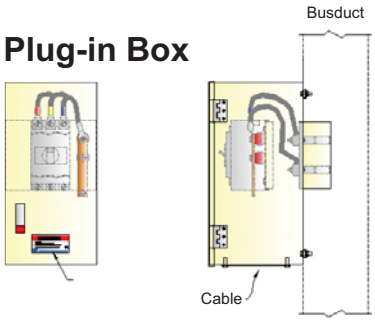
Enclosure/Housing

- The indoor Busduct is totally enclosed in non-ventilated housing made of 1.6 mm thick epoxy powder-coated electro-galvanized steel sheet

Accessories

- A complete set of elbows, tees, terminations for switchgear, floor flanges and end closures are available





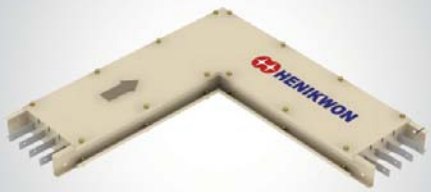
Plug-in Box

- The Plug-in Box is safely grounded with earth springs and they are the first to make contact with the Busduct when the Plug-in Box is installed
- When the Plug-in box is attached to the Bus Duct, the neutral line is the first to connect forming a solid neutral circuit. Likewise, the neutral plug is the last to break circuit while disconnecting the plug-in box from the Bus Duct to provide total neutral line priority over all the energized lines
- The built-in interlock system prevents opening of the cover when the device inside is ON
- A safety provision will prevent the installation or removal of a plug-in box when it is ON

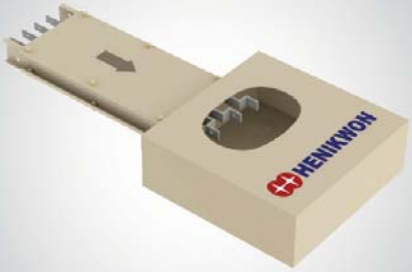
Type	Air-insulated
Rated Current	100A to 400A
Conductor Material	Copper
Rated Operating Voltage	Up to 415V
Peak Impulse Withstand Voltage	6 kV
Power Frequency With-stand voltage for 1min	2.5kV
System Frequency	50 Hz & 60 Hz
Fault Level for 1 Sec	20 kA
Degree of Protection	IP - 54
Enclosure	Galvanize Steel Sheet
Enclosure Coating	Epoxy
Enclosure Thickness	1.6 mm
Configuration	3P4W, 3P5W (with / without Internal earth)
Joint	Multiple Bolt Direct Joint System
Insulator Class	Class – H
Insulator Material	SMC
Reference Standard	IEC – 60439 – 1&2

Flatwise Elbow

Edgewise Elbow



End-Feed Unit



Centre-Feed Unit

Medium Voltage System

The Medium Voltage system is a non-segregated phase Busduct designed for inter-connection of switchgear, power transformers or other related equipment, providing a wide range of ratings to allow proper application for a variety of installation conditions. The Busduct is designed, manufactured and tested in accordance with IEC 62271-200:2003

Busbars

- 99.99% pure copper conductor is available in either tin or silver plating at the contact surface
- Busbars are equipped with heat-shrinkable sleeves
- Busbars are supported by flame-retardant epoxy insulators
- Provision for internal or external earth bars

Joint

Splice plates joint, which are equal in cross section to the main Busduct.

Enclosure/Housing

- Indoor and outdoor ducts are totally enclosed in non-ventilated housings
- Epoxy-powder coated aluminum or electro-galvanized plus stainless steel housings to meet a variety of environment conditions

Space Heaters/Thermostat

- As per customer requirements, space heaters or thermostats are mounted inside the housings, spaced at approximately 2-metre intervals along the length of the Busduct run. These prevent condensation and detect temperature changes.

Accessories

- A complete set of elbows, tees, terminations for transformers and switchgear phase transpositions, expansion joints, wall flanges, flexible conductors, bushing boxes, bushing stud connectors and terminal enclosures are available.

Type	Air-insulated
Rated Current	400A to 5000A
Conductor Material	Copper
Rated Operating Voltage	3.6 kV to 33 kV
Peak Impulse Withstand Voltage for 1 sec	50 kV – 195 kV
Power Frequency With-stand Voltage for 1min	20 kV
System Frequency	50 Hz & 60 Hz
Fault Level for 1 Sec	70 kA
Degree of Protection (IP)	54, 55 & 65
Enclosure	GI+ Stainless Steel & Aluminium
Enclosure Coating	Epoxy
Enclosure Thickness	2 mm
Configuration	3P3W (with/without internal earth
Joint	Splice plate multiple Bolt
Insulator Material	Heat Shrinkable Tube
Reference Standard	IEC – 62271 – 200

Straight Length

Flatwise Elbow

Edgewise Elbow

Modular / Final Distribution Products

MCB - Miniature Circuit Breaker (10 kA & 6 kA)

RCCB - Residual Current Circuit Breaker

RCBO - RCCB with over Current Protection

Electronic RCBO in 1 Module

Isolators

Distribution Boards

MCB (10 kA) - Miniature Circuit Breaker

MCB is a vital protection device. It is essential in every electrical installation to safeguard both your life and valuable property against short circuit & overload.

KEMA certified

Salient Features

- Unique Patented Design gives both Label Holder and True Contact Indication facility for individual poles
- Conforms to EN/IEC 60898-1-2003
- Breaking capacity of 10 kA throughout the range
- Available in B curve in SP, DP & TP and C curve in SP, DP, TP & FP versions from 6A to 63A rating
- Patented terminal shutter design to increase safety level of operator while installation and maintenance. It also avoids false insertion of cables
- Low watt loss - almost 50% of the values prescribed by IEC 60898-1-2003
- Trip free mechanism
- Design based on advanced current limiting hammer trip mechanism
- No Line-Load bias

Technical Specification

Current rating (In)	6, 10, 16, 20, 25, 32, 40, 50, 63A
Rated Voltage @ 50 Hz (Un)	240 / 415V
Short Circuit breaking capacity	10 kA according to EN / IEC - 60898-1-2003
Operational life (Mechanical)	>1,00,000 operations
Operational life (Electrical)	10,000 operations
Energy limiting class	3
Operating temperature	-5^{0}C to +55^{0}C
Calibration temperature	30^{0}C*
Termination	Suitable for both Busbar & Cable, suitable upto 35 sq. mm cable
Impulse withstand voltage	6 kV
Degree of protection	IP20
Rated frequency	50/60 Hz
Vibration resistance (In 'X' 'Y' 'Z' direction)	3g in frequency range of 10 to 55 Hz
Shock resistance (In 'X' 'Y' 'Z' direction)	20g with short duration of 10ms
Mounting position	Horizontal / Vertical / Flat
Mounting	Snap fixing on standard profile 35 x 7.5mm DIN Rail as per EN 50022

Watt Loss

6	10	16	20	25	32	40	50	63
1.36	1.8	1.8	2.49	3.52	3.4	3.75	5.17	5.93

Electro Thermal Characteristics

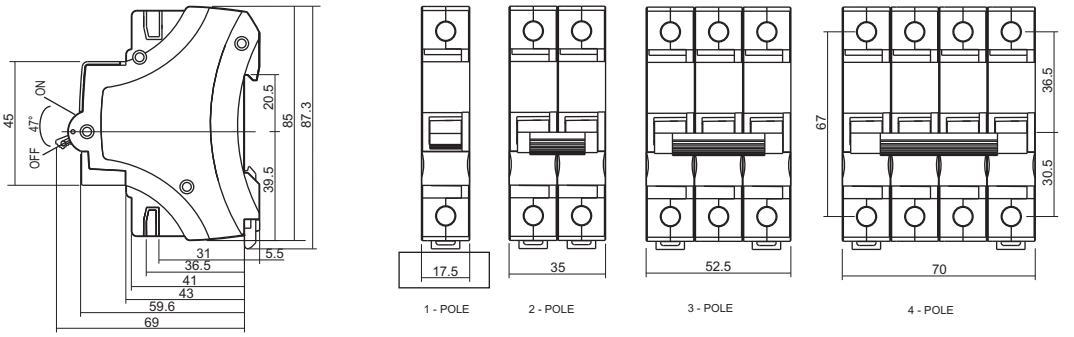
Type of MCB	No tripping current	Tripping current
B Curve	1.13 x In	1.45 x In
C Curve	1.13 x In	1.45 x In

* MCBs calibrated at 50°C can also be supplied as per order.

Electro Magnetic Characteristics

Based on the tripping characteristics, MCBs are available in B and C curve to suit different types of applications:
B Curve: For protection of electrical circuits with equipment that does not cause surge current (lighting and distribution circuits) Short circuit release is set to (3-5) In
C Curve: For protection of electrical circuits with equipment that causes surge current (Inductive loads and motor circuits) Short circuit release is set to (5-10) In

Overall Dimensions



Dimension in mm

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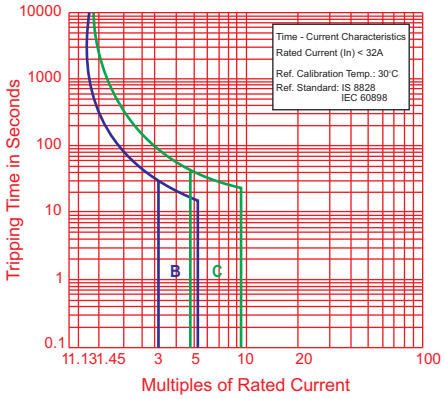
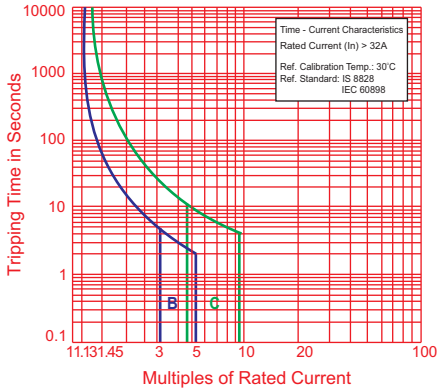




Ordering Information

Current Rating (In)	B-Curve Modules 1 Mod = 17.5mm	B-Curve Cat. Nos.	C-Curve Modules 1 Mod = 17.5mm	C-Curve Cat. Nos.
Single Pole (SP)				
6A	1	BB10060B	1	BB10060C
10A	1	BB10100B	1	BB10100C
16A	1	BB10160B	1	BB10160C
20A	1	BB10200B	1	BB10200C
25A	1	BB10250B	1	BB10250C
32A	1	BB10320B	1	BB10320C
40A	1	BB10400B	1	BB10400C
50A	1	BB10500B	1	BB10500C
63A	1	BB10630B	1	BB10630C
Double Pole (DP)				
6A	2	BB20060B	2	BB20060C
10A	2	BB20100B	2	BB20100C
16A	2	BB20160B	2	BB20160C
20A	2	BB20200B	2	BB20200C
25A	2	BB20250B	2	BB20250C
32A	2	BB20320B	2	BB20320C
40A	2	BB20400B	2	BB20400C
50A	2	BB20500B	2	BB20500C
63A	2	BB20630B	2	BB20630C
Triple Pole (TP)				
6A	3	BB30060B	3	BB30060C
10A	3	BB30100B	3	BB30100C
16A	3	BB30160B	3	BB30160C
20A	3	BB30200B	3	BB30200C
25A	3	BB30250B	3	BB30250C
32A	3	BB30320B	3	BB30320C
40A	3	BB30400B	3	BB30400C
50A	3	BB30500B	3	BB30500C
63A	3	BB30630B	3	BB30630C
Four Pole (FP)				
6A	-	-	4	BB40060C
10A	-	-	4	BB40100C
16A	-	-	4	BB40160C
20A	-	-	4	BB40200C
25A	-	-	4	BB40250C
32A	-	-	4	BB40320C
40A	-	-	4	BB40400C
50A	-	-	4	BB40500C
63A	-	-	4	BB40630C

* MCBs calibrated at 50°C can also be supplied as per order

MCB (6 kA) - Miniature Circuit Breaker

KEMA certified

MCB is a vital protection device. It is essential in every electrical installation to safeguard both your life and valuable property against short circuit & overload.

Salient Features

- Conforms to EN/IEC 60898-1-2003
- Breaking capacity of 6kA throughout the range
- Available in B curve in SP, DP & TP and C curve in SP, DP, TP & FP versions from 6A to 63A rating
- Low watt loss - almost 50% of the values prescribed by IEC 60898-1-2003
- Trip free mechanism
- Design based on advanced current limiting hammer trip principle
- No Line-Load bias

Technical Specification

Current rating (In)	6, 10, 16, 20, 25, 32, 40, 50, 63A
Rated Voltage @ 50 Hz (Un)	240 / 415V
Short Circuit breaking capacity	6 kA according to EN / IEC - 60898-1-2003
Operational life (Mechanical)	>1,00,000 operations
Operational life (Electrical)	10,000 operations
Energy limiting class	3
Operating temperature	-5°C to +55°C
Calibration temperature	30°C*
Termination	Suitable for both Busbar & Cable, suitable upto 35 sq. mm cable
Impulse withstand voltage	4 kV
Degree of protection	IP20
Rated frequency	50/60 Hz
Vibration resistance (In 'X' 'Y' 'Z' direction)	3g in frequency range of 10 to 55 Hz
Shock resistance (In 'X' 'Y' 'Z' direction)	20g with short duration of 10ms
Mounting position	Horizontal / Vertical
Mounting	Snap fixing on standard profile 35 x 7.5mm DIN Rail as per EN 50022

Watt Loss

6	10	16	20	25	32	40	50	63
1.36	1.8	1.8	2.49	3.52	3.4	3.75	5.17	5.93

Electro Thermal Characteristics

Type of MCB	No tripping current	Tripping current
B Curve	1.13 x In	1.45 x In
C Curve	1.13 x In	1.45 x In

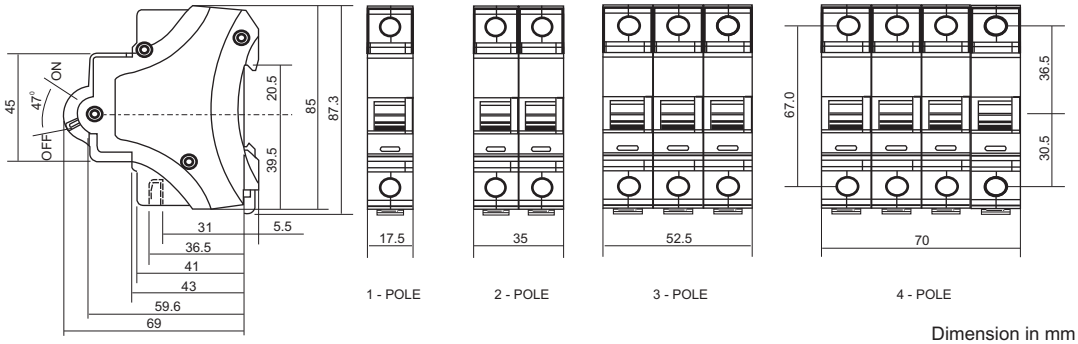
* MCBs calibrated at 50°C can also be supplied as per order.

Electro Magnetic Characteristics

Based on the tripping characteristics, MCBs are available in B and C curve to suit different types of applications:
B Curve: For protection of electrical circuits with equipment that does not cause surge current (lighting and distribution circuits) Short circuit release is set to (3-5) In.
C Curve: For protection of electrical circuits with equipment that causes surge current (Inductive loads and motor circuits) Short circuit release is set to (5-10) In.

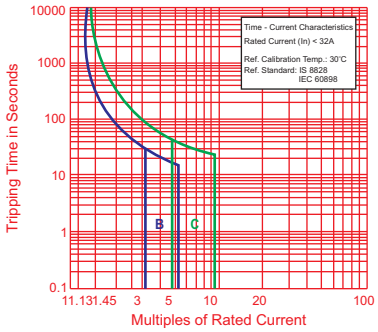
* MCBs calibrated at 50°C can also be supplied as per order

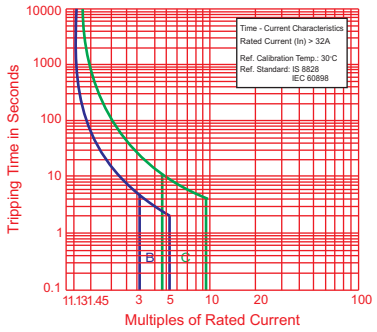
Overall Dimensions



Dimension in mm

i-t characteristics





Ordering Information

Current Rating (In)	B-Curve Modules 1 Mod = 17.5mm	B-Curve Cat. Nos.	C-Curve Modules 1 Mod = 17.5mm	C-Curve Cat. Nos.
Single Pole (SP)				
6A	1	BA10060B	1	BA10060C
10A	1	BA10100B	1	BA10100C
16A	1	BA10160B	1	BA10160C
20A	1	BA10200B	1	BA10200C
25A	1	BA10250B	1	BA10250C
32A	1	BA10320B	1	BA10320C
40A	1	BA10400B	1	BA10400C
50A	1	BA10500B	1	BA10500C
63A	1	BA10630B	1	BA10630C
Double Pole (DP)				
6A	2	BA20060B	2	BA20060C
10A	2	BA20100B	2	BA20100C
16A	2	BA20160B	2	BA20160C
20A	2	BA20200B	2	BA20200C
25A	2	BA20250B	2	BA20250C
32A	2	BA20320B	2	BA20320C
40A	2	BA20400B	2	BA20400C
50A	2	BA20500B	2	BA20500C
63A	2	BA20630B	2	BA20630C
Triple Pole (TP)				
6A	3	BA30060B	3	BA30060C
10A	3	BA30100B	3	BA30100C
16A	3	BA30160B	3	BA30160C
20A	3	BA30200B	3	BA30200C
25A	3	BA30250B	3	BA30250C
32A	3	BA30320B	3	BA30320C
40A	3	BA30400B	3	BA30400C
50A	3	BA30500B	3	BA30500C
63A	3	BA30630B	3	BA30630C
Four Pole (FP)				
6A	-	-	4	BA40060C
10A	-	-	4	BA40100C
16A	-	-	4	BA40160C
20A	-	-	4	BA40200C
25A	-	-	4	BA40250C
32A	-	-	4	BA40320C
40A	-	-	4	BA40400C
50A	-	-	4	BA40500C
63A	-	-	4	BA40630C

RCCB - Residual Current Circuit Breaker

KEMA certified

RCCB provides protection against electrical shocks and earth leakage.

Salient Features

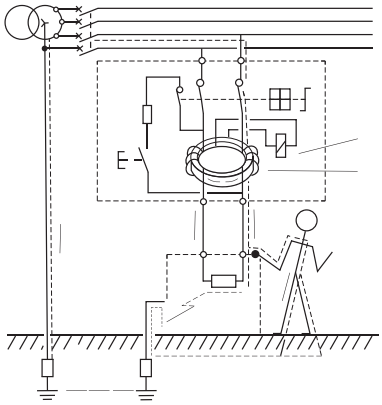
- Conforms to EN/IEC 61008
- Trips within 30 ms at rated residual current
- Operating temperature -5^{0}C to + 55^{0}C
- Repeat accuracy +5%
- 10kA short circuit withstand capacity
- Type AC for which tripping is ensured for residual sinusoidal alternating currents, whether suddenly applied or slowly rising, marked with the symbol
- RCCBs are not suitable for use on DC systems and unearthed networks
- Tripper RCCBs are available in DP and FP versions from 25 to 100A ratings with 30mA or 100mA or 300mA or 500mA sensitivity
- Truly current operated - operation even at nominal 1 volt
- Operates on Core Balance Current Transformer (CBCT) principle
- Operation even in case of neutral failure
- Neutral advance mechanism
- Dual Termination (Cable & Busbar) possible at both side
- Combi-head screws allow all types of screw drivers to be used

Technical Specification

Current rating (In)		25, 40, 63, 100A		
Rated sensitivity (IDn)		30mA	100mA	300mA
Application		Personal protection domestic installation	Limited personal protection	Building fire
Rated Voltage @ 50 Hz* (Un)		240V 415V	240V 415V	240V 415V
No. of poles		DP (SP+N) FP (TP+N)	DP (SP+N) FP (TP+N)	DP (SP+N) FP (TP+N)
Max. earth resistance	10V	333 W	100 W	33 W
	24V	800 W	240 W	80 W
Degree of protection		IP20		
Backup fuse		63A quick break		
Max. rating		50A delayed break		
Max. diameter of terminals		50mm^2		
Operational life		> 20,000 operations (at rated current)		
Operating temperature		-5^{0}C to +55^{0}C		

*other frequencies on request

Working Principle

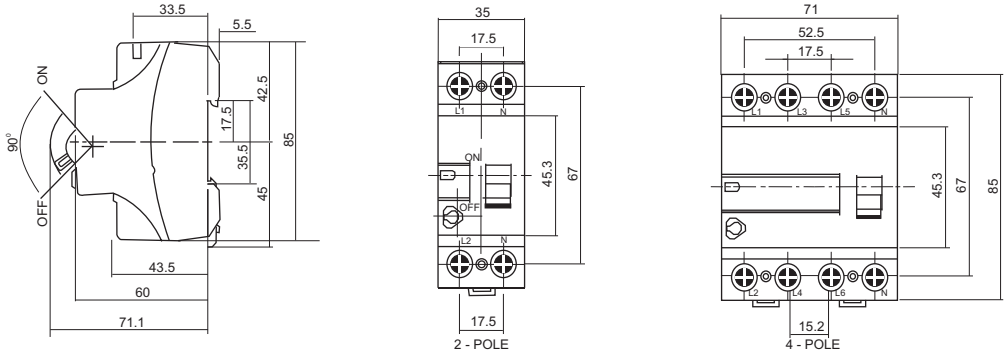


Human bodys reaction to electric shock

Electrical shocks passing through the human body, affect its internal nervous system. This causes the body to react to the passage of current as follows:

3mA	:	A tingling sensation is felt.
10-15mA	:	Muscle spasm and tightening occurs.
20-30mA	:	The heart may fibrillate; severe shock is felt.
>50mA	:	Lethal. Fibrillation of the heart occurs.

Overall Dimensions



Dimension in mm

Ordering Information

Current Rating (In)	Sensitivity	Modules 1 Mod = 17.5mm	Cat. Nos.
Double Pole (DP)			
25A	30 mA	2	BC202503
	100 mA	2	BC202510
	300 mA	2	BC202530
40A	30 mA	2	BC204003
	100 mA	2	BC204010
	300 mA	2	BC204030
63A	30 mA	2	BC206303
	100 mA	2	BC206310
	300 mA	2	BC206330
100A	30 mA	2	BC210003
	100 mA	2	BC210010
	300 mA	2	BC210030
Four Pole (FP)			
25A	30 mA	4	BC402503
	100 mA	4	BC402510
	300 mA	4	BC402530
40A	30 mA	4	BC404003
	100 mA	4	BC404010
	300 mA	4	BC404030
63A	30 mA	4	BC406303
	100 mA	4	BC406310
	300 mA	4	BC406330
100A	30 mA	4	BC410003
	100 mA	4	BC410010
	300 mA	4	BC410030

RCBO with over Current Protection

The RCCB+MCB combination in RCBO provides **3 in 1 protection** against Earth Leakage, Short Circuit and Overload.

Salient Features

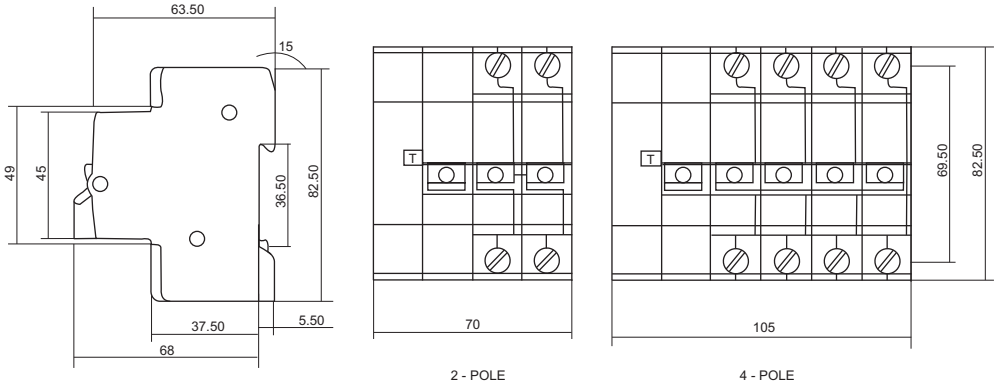
- Conforms to EN / IEC 61009-1
- Breaking capacity 6 kA (C-Curve)
- CE Conformity
- Truly current operated - operation even at nominal 1 volt
- Precise manufacturing to avoid nuisance tripping
- Operation even incase of neutral failure i.e. it operates if leakage occurs even when incoming neutral is disconnected
- Neutral advance mechanism
- Offers 3 in 1 Protection - Earth Leakage, Overload and Short Circuit
- Avoids excessive metering due to leakage
- Ensures 100% presence of neutral while making carrying & breaking operation of EL+MCB

Technical Specifications

Current rating (In)		6, 10, 16, 20, 25, 32, 40, 50, 63A		
Rated sensitivity (IDn)		30mA	100mA	300mA
Application		Personal protection domestic installation 2	Limited personal protection	Building fire
Rated Voltage @ 50 Hz* (Un)		240V 415V	DP (SP+N) FP (TP+N)	240V 415V
No. of poles		DP (SP+N) FP (TP+N)	100 W	DP (SP+N) FP (TP+N)
Max. earth resistance	10V	333 W	240 W	33 W
	24V	800 W		80 W
Degree of protection		IP 0		
Short Circuit breaking capacity		6 kA		
Backup fuse		63A quick break		
Max. rating		50A delayed break		
Max. diameter of terminals		25mm^2		
Operational life		> 20,000 operations (at rated current)		
Operating temperature		-5^{0}C to +55^{0}C		

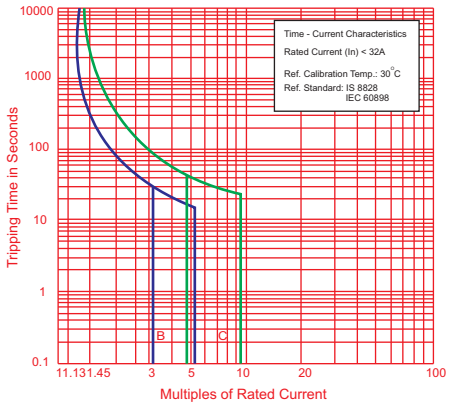
* other frequencies on request

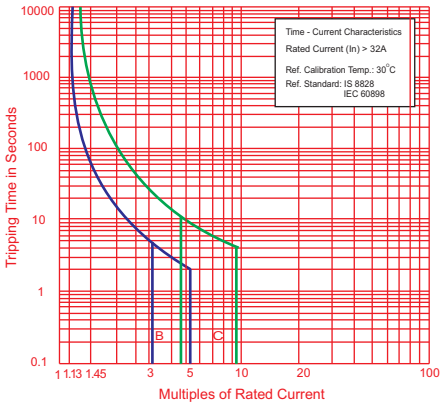
Overall Dimensions



Dimension in mm

i-t characteristics





Ordering Information

		Double Pole (DP)		Four Pole (FP)	
Sensitivity	**Current Rating (In)**	**Modules 1 Mod = 17.5mm**	**Cat. Nos.**	**Modules 1 Mod = 17.5mm**	**Cat. Nos.**
30mA	6	4	CB90001OOTO	6	CB90002OOTO
	10	4	CB90001OOVO	6	CB90002OOVO
	16	4	CB90001OOBO	6	CB90002OOBO
	20	4	CB90001OOCO	6	CB90002OOCO
	25	4	CB90001OODO	6	CB90002OODO
	32	4	CB90001OOEO	6	CB90002OOEO
	40	4	CB90001OOFO	6	CB90002OOFO
	63	4	CB90001OOHO	6	CB90002OOHO
100mA	6	4	CB90003OOTO	6	CB90004OOTO
	10	4	CB90003OOVO	6	CB90004OOVO
	16	4	CB90003OOBO	6	CB90004OOBO
	20	4	CB90003OOCO	6	CB90004OOCO
	25	4	CB90003OODO	6	CB90004OODO
	32	4	CB90003OOEO	6	CB90004OOEO
	40	4	CB90003OOFO	6	CB90004OOFO
	63	4	CB90003OOHO	6	CB90004OOHO
300mA	6	4	CB90005OOTO	6	CB90006OOTO
	10	4	CB90005OOVO	6	CB90006OOVO
	16	4	CB90005OOBO	6	CB90006OOBO
	20	4	CB90005OOCO	6	CB90006OOCO
	25	4	CB90005OODO	6	CB90006OODO
	32	4	CB90005OOEO	6	CB90006OOEO
	40	4	CB90005OOFO	6	CB90006OOFO
	63	4	CB90005OOHO	6	CB90006OOHO

Electronic RCBO in 1 Module

The RCCB+MCB combination in RCBO provides 3 in 1 protection against Earth Leakage, Short Circuit and Overload

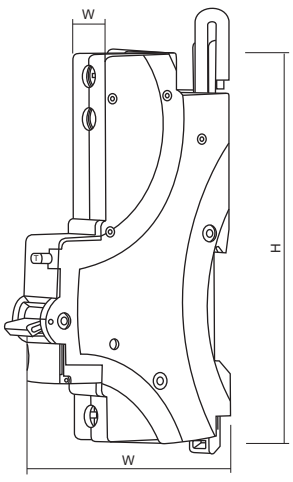
Salient Features

- Confirms to IEC 61009-1
- Breaking capacity 10 kA in C-curve
- Available in 6A to 63A range with 10kA Breaking Capacity
- Tripping characteristics 'C' Curve
- Provides true contact position indication
- Incorporates a filtering circuit preventing the risk of unwanted tripping due to transient voltages and transient currents
- Provides protection against earth leakage even in case of failure of neutral
- Offers 3 in 1 Protection - Earth Leakage, Overload and Short Circuit
- Precise manufacturing to avoid nuisance tripping
- Operation even in case of neutral failure i.e. it operates if leakage occurs even when incoming neutral is snapped

Technical Specification

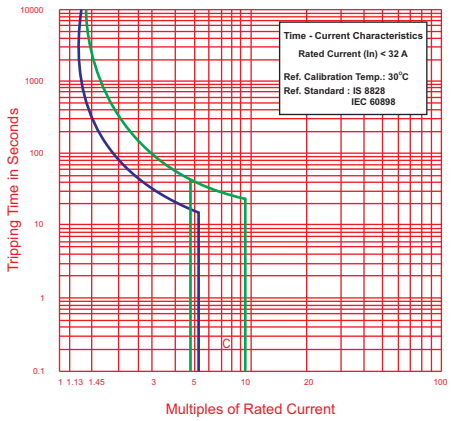
Current rating (In)	6, 10, 16, 20, 25, 32, 40A, 50A*, 63A*		
Rated sensitivity (IDn)	30mA	100mA	300mA
Application	Personal protection domestic installation	Limited personal protection	Building fire
Rated Voltage @ 50 Hz* (Un)	240V	240V	240V
Degree of protection	IP2X		
Short Circuit breaking capacity	10 kA (As per IEC 60898)		
Terminal capacity	25 sq. mm (Supply)		
	16 sq. mm (Load)		
Electrical life	10,000 operations rated current		
Operating temperature	-5°C to +55°C		
Flaying neutral	700-800 mm		

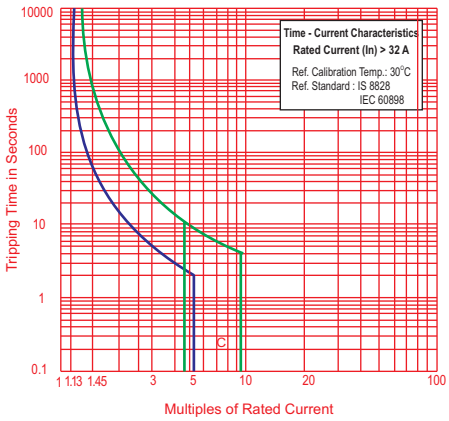
Overall Dimensions



Dimension in mm

i-t characteristics





Ordering Information

Sensitivity	Current Rating (In)	Cat. Nos.
30mA	6	CB90007OOTO
	10	CB90007OOVO
	16	CB90007OOBO
	20	CB90007OOCO
	25	CB90007OODO
	32	CB90007OOEO
	40	CB90007OOFO
	50*	CB90007OOGO
	63*	CB90007OOHO
100mA	6	CB90008OOTO
	10	CB90008OOVO
	16	CB90008OOBO
	20	CB90008OOCO
	25	CB90008OODO
	32	CB90008OOEO
	40	CB90008OOFO
	50*	CB90008OOGO
	63*	CB90008OOHO
300mA	6	CB90009OOTO
	10	CB90009OOVO
	16	CB90009OOBO
	20	CB90009OOCO
	25	CB90009OODO
	32	CB90009OOEO
	40	CB90009OOFO
	50*	CB90009OOGO
	63*	CB90009OOHO

* For product availability please contact nearest L&T office.

Isolators

Isolators are used in electrical installation to MAKE, CARRY and BREAK circuit current. The Isolator ensures that there will be no current at the load side even if impulse voltage appears when the Isolator is OFF.

KEMA certified

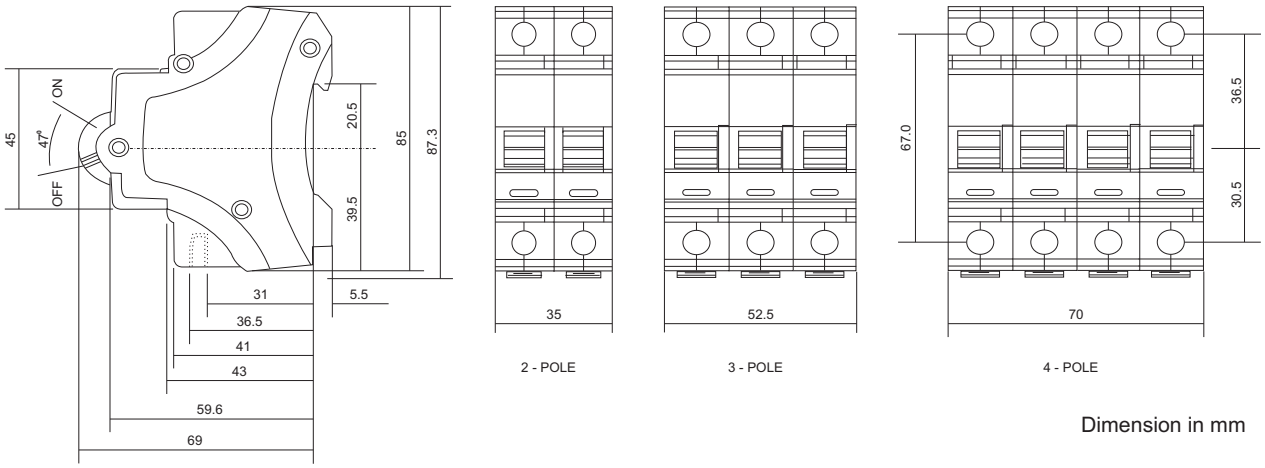
Salient Features

- Conforms to EN/IEC 60947-3
- Suitable for AC22-A and AC22-B utilization category
- CE conformity and KEMA certified
- Available in DP, TP and FP versions in 40A, 63A, 80A & 100A ratings
- Two position DIN rail clip makes easy mounting in distribution boards
- Finger proof terminals - IP20
- Combihead screws allow all types of screw drivers to be used. Body made of fire retardant material
- True contact indication by a separate window with Red & Green colour band in addition to ON/OFF text printed on knob. Dual Termination (Cable & Busbar) possible at incomer side

Technical Specification

Operational Voltage (50 Hz)	240 - 415V
Insulation Voltage	500V
Impulse withstand voltage	4kV
Duty	Uninterrupted duty
Short Time withstand capacity	756A, 1sec
Short Circuit making capacity	1 kA
Utilization category	AC22-A & AC22-B

Overall Dimensions



Dimension in mm

Ordering Information

Current Rating (In)	Modules 1 Mod = 17.5mm	Cat. Nos.
Double Pole (DP)		
40	2	BE204000
63	2	BE206300
80	2	BE208000
100	2	BE210000
Triple Pole (TP)		
40	3	BE304000
63	3	BE306300
80	3	BE308000
100	3	BE310000
Four Pole (FP)		
40	4	BE404000
63	4	BE406300
80	4	BE408000
100	4	BE410000

Distribution Boards - SPN

KEMA certified

Distribution boards provides safe & efficient distribution of electrical power.

Salient Features

- Conforms to IEC60439 - I & III
- Aesthetically superior to suit the interiors of buildings and can be supplied in different colours for bulk requirements
- Distribution boards are suitable for flush and surface mounting
- Ready to use DBs - provided with 100A phase busbar, Neutral bar, Earth bars and inter connecting wires as standard
- Provided with removable top and bottom gland plates with adequate knockout for easy wiring
- For bottom entry, Neutral bar can be shifted to bottom for comfortable wiring
- DBs are made from CRCA sheet steel in standard thickness of 1.2mm, thickness of 1.5mm, 2.0mm is also available on request
- Color - RAL 9002, Powder coated

Technical Specification

Range	SPN
Versions	Single door & Double door
Voltage rating	240 / 415V AC
Mounting	Surface / Flush
Degree of protection	Single door - IP30 Double door - IP43
Operating temperature	-5°C to +55°C
Rating	100A

Provided with 100A copper busbar, wireset, earthbar, neutral bar, blanking plate, circuit identification labels as standard accessories.

Description	Total no of modules 1 Mod = 17.5mm	Cat. Nos.
SPN DB - Single Door		
4 Mod 2 Way	4	YBH104SDB
6 Mod 4 Way	6	YBH106SDB
8 Mod 6 Way	8	YBH108SDB
12 Mod 10 Way	12	YBH112SDB
16 Mod 14 Way	16	YBH116SDB
SPN DB - Double Door		
4 Mod 2 Way	4	YBH104DDB
6 Mod 4 Way	6	YBH106DDB
8 Mod 6 Way	8	YBH108DDB
12 Mod 10 Way	12	YBH112DDB
16 Mod 14 Way	16	YBH116DDB

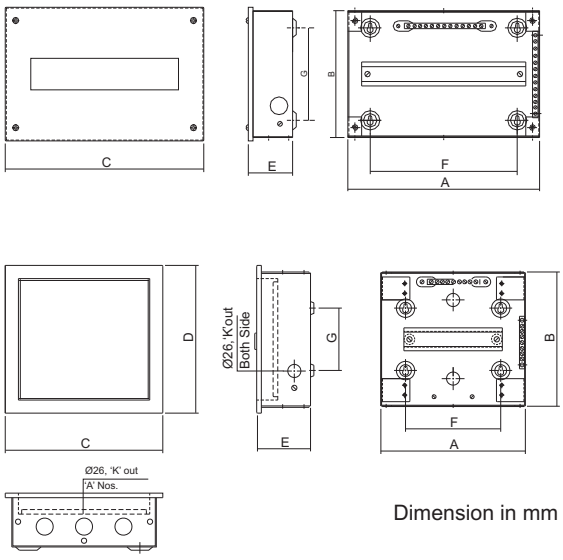
Overall Dimensions

SPN Single Door DBs

Cat. Nos.	A	B	C	D	E	F	G
YBH104SDB	137	185	147	195	65	74	110
YBH106SDB	173	185	183	195	65	110	110
YBH108SDB	209	185	291	195	65	132	110
YBH112SDB	280	185	290	195	65	203	110
YBH116SDB	355	185	365	195	65	278	110

SPN Double Door DBs

Cat. Nos.	A	B	C	D	E	F	G
YBH104DDB	145	205	165	225	82	70	95
YBH106DDB	180	205	200	225	82	105	95
YBH108DDB	220	205	240	225	82	145	95
YBH112DDB	295	205	315	225	82	220	95
YBH116DDB	365	205	385	225	82	290	95



Dimension in mm

Vertical Distribution boards provides safe & efficient distribution of electrical current up to 250A.

Salient Features

- Conforms to IEC 60439 - I & III
- 4 way to 24 way enclosures in fine texture finish powder coated with RAL 9002
- Choice of Metal / Glazed (transparent) door in double door DBs
- Removable door, frame, front plate & gland plate for ease of installation & maintenance
- Fully insulated joint-free vertical busbar assembly rated for 250Amp for each phase
- DB rated for short circuit withstand current of 10kA for 1 sec
- Provision to mount DN (D-Sine) MCCB (TP/FP upto 250A) as incomer
- Provision to mount SP & TP MCBs as outgoing
- DBs are made from CRCA sheet steel in standard thickness of 1.2mm, thickness of 1.5mm, 2.0mm is also available on request

Technical Specification

Range	VTPN - 250A
Versions	Single door & Double door
Voltage rating	250 / 450V AC
Mounting	Surface / Flush
Degree of protection	Single door - IP30 Double door - IP43
Operating temperature	-5°C to +55°C

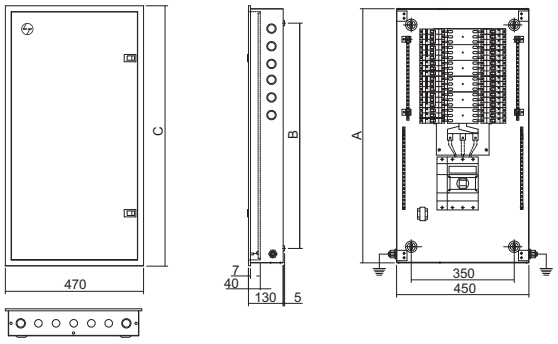
Provided with 250A copper busbar PAN assembly, neutral wire, earthbar, neutral bar, blanking plate, circuit identification labels as standard accessories

Description	Modules	Cat. Nos.
VTPN (250A) - Double Door		
4 Way	* MCCB+12	BVH304DDBQ
6 Way	* MCCB+18	BVH306DDBQ
8 Way	* MCCB+24	BVH308DDBQ
12 Way	* MCCB+36	BVH312DDBQ
16 Way	* MCCB+38	BVH316DDBQ
18 Way	* MCCB+54	BVH318DDBQ
24 Way	* MCCB+72	BVH324DDBQ

* DN (D-Sine) MCCB incomer TP/FP upto 250A (Frame DN2)

Overall Dimensions

Cat. Nos.	A	B	C
BVH304DDBQ	650	550	670
BVH306DDBQ	700	600	720
BVH308DDBQ	755	655	775
BVH312DDBQ	860	760	840
BVH316DDBQ	970	870	990
BVH318DDBQ	1020	920	1040
BVH324DDBQ	1180	1080	1200



Dimension in mm

Distribution Boards - VTPN (125A)

KEMA certified

Vertical Distribution boards provides safe & efficient distribution of electrical current up to 125A.

Salient Features

- Conforms to IEC 60439 - I & III
- 4 way to 24 way enclosures in fine texture finish powder coated with RAL 9002
- Choice of Metal / Glazed (transparent) door in double door DBs
- Removable door, frame, front plate & gland plate for ease of installation & maintenance
- Fully insulated joint-free vertical busbar assembly rated for 125A for each phase
- DB rated for short circuit withstand current of 10kA for 1 sec and 20kA for 0.2 sec
- Provision to mount upto 8 modules as incomer
- Provision to mount SP & TP MCBs as outgoing
- DBs are made from CRCA sheet steel in standard thickness of 1.2mm, thickness of 1.5mm, 2.0mm is also available on request

Technical Specification

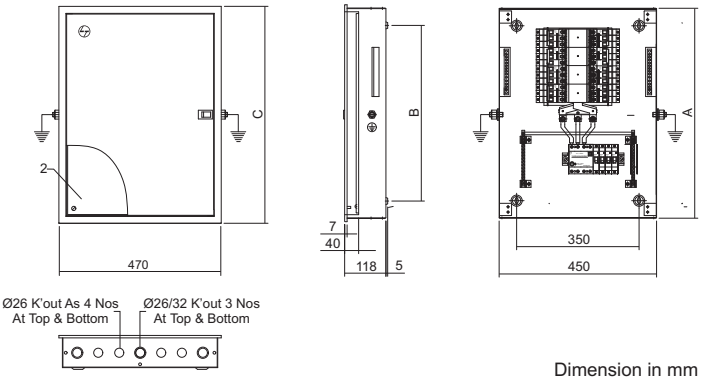
Range	VTPN - 125A
Versions	Single door & Double door
Voltage rating	250 / 450V AC
Mounting	Surface / Flush
Degree of protection	Single door - IP30 Double door - IP43
Operating temperature	-5°C to +55°C

Provided with 125A copper busbar PAN assembly, neutral wire, earthbar, neutral bar, blanking plate, circuit identification labels as standard accessories.

Description	Modules	Cat. Nos.
VTPN (125A) - Double Door		
4 Way	8+12	BVL304DDBQ
6 Way	8+18	BVL306DDBQ
8 Way	8+24	BVL308DDBQ
12 Way	8+36	BVL312DDBQ
16 Way	8+38	BVL316DDBQ
18 Way	8+54	BVL318DDBQ
24 Way	8+72	BVL324DDBQ

Overall Dimensions

Cat. Nos.	Way	A	B	C
BVL304DDBQ	4	500	400	520
BVL306DDBQ	6	550	450	570
BVL308DDBQ	8	600	500	620
BVL312DDBQ	12	700	600	720
BVL316DDBQ	16	800	700	820
BVL318DDBQ	18	900	800	920



Dimension in mm

Vertical TPN Distribution boards with spilt busbar toseparate Lighting Load and Power Load.

Salient Features

- Conforms to IEC 60439 - I & II
- Texture finish powder coated with RAL 9002 shade
- Choice of Metal / Glazed (transparent) door in double door DBs
- Removable door, frame, front plate & gland plate for ease of installation & maintenance
- Fully insulated joint-free two seperate vertical busbar assemblies rated for 125Amp for each phase
- Provision to mount upto 13 module as incomer
- Provision to mount SP & TP MCBs as outgoing
- DBs rated for short circuit withstand current of 10kA for 1 sec
- DBs are made from CRCA sheet steel in standard thickness of 1.2mm, thickness of 1.5mm, 2.0mm is also available on request

Technical Specification

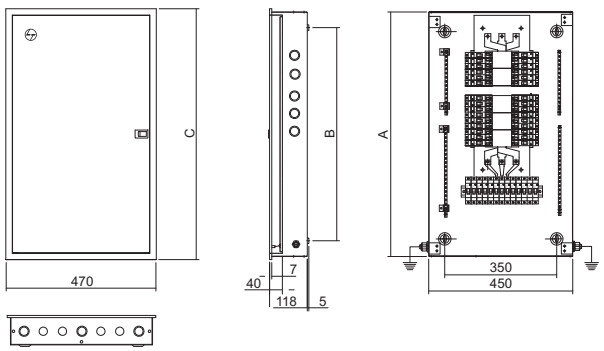
Range	VTPN with Split Busbar
Versions	Single door & Double door
Voltage rating	250 / 450V AC
Mounting	Surface / Flush
Degree of protection	Single door - IP30 Double door - IP43
Operating temperature	-5°C to +55°C

Provided with 2 separate 125A copper busbar PAN assembly, neutral wire, earthbar, neutral bar, blanking plate, circuit identification labels as standard accessories.

No. of ways		Modules	Cat. Nos.
Section I	Section II		
2	2	13+6+6	BVS0202DDBB
4	2	13+12+6	BVS0402DDBB
4	4	13+12+12	BVS0404DDBB
6	4	13+18+12	BVS0604DDBB
6	6	13+18+18	BVS0606DDBB
8	4	13+24+12	BVS0804DDBB
8	6	13+24+18	BVS0806DDBB
8	8	13+24+24	BVS0808DDBB
12	4	13+36+12	BVS1204DDBB

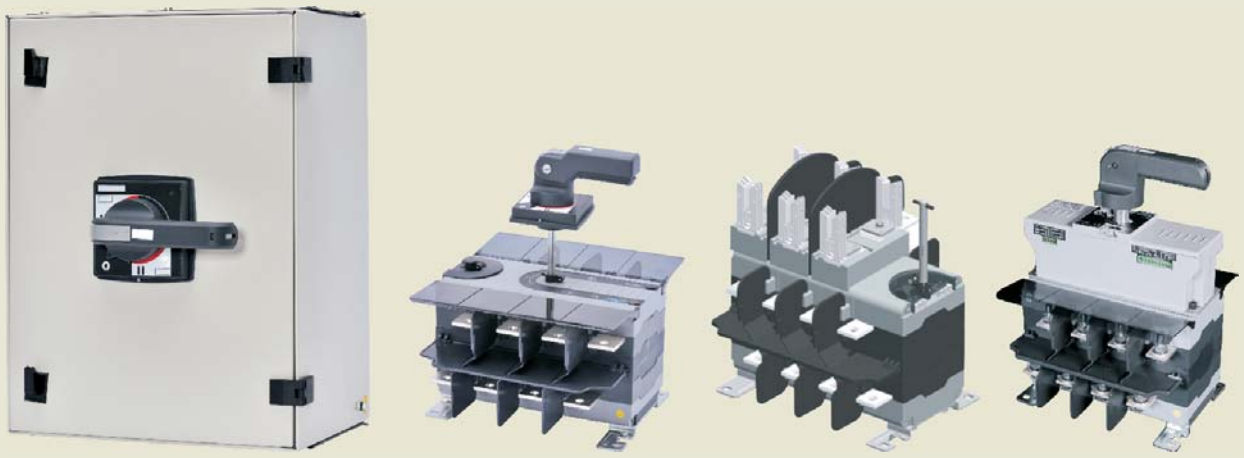
Overall Dimensions

Cat. Nos.	A	B	C	Side kout 32/26
BVS0202DDBB	550	450	570	4
BVS0402DDBB	605	505	625	6
BVS0404DDBB	655	555	675	4
BVS0604DDBB	710	610	730	10
BVS0606DDBB	765	665	785	12
BVS0804DDBB	765	665	785	12
BVS0806DDBB	815	715	835	14
BVS0808DDBB	870	770	890	16
BVS1204DDBB	870	770	890	16



Dimension in mm

Onload Changeover Switches



C-line - Changeover Switches

C-Line offers you a unique series of changeover Switches combining compactness with high performance & Customer convenience, thus, making C-line a state-of-the-art product in changeover technology.
The C-line range covers ratings from 63A to 2000A in 6 frame sizes. These changeover switches are available in open execution, Sheet steel enclosure, fused version (suitable for DIN type fuse - link) and motorised version.

SS Enclosure inclusive of cable gland box

Field-convertible fuse changeover switch

Motorised changeover switch

Basic Function of Changeover Switches

Onload Changeover S-D has 3 Stable Positions as Defined Below

POSITION I
Switch is in ON position with normal supply available at the outgoing terminals.

POSITION O
Switch is in OFF position and outgoing terminals are isolated from both supplies (normal and alternate supplies)

POSITION II
Switch is in ON position with alternate supply available at the outgoing terminals.

Onload Changeover S-D consists of two separate sets of terminals for incoming supplies and a set of output terminals to connect the common load. Thus, changeover switch ensures continuity of supply to the load by alternating between normal and alternate supply.

Product Range

Onload Changeover S-Ds are available from 63 A to 2000 A. The range is covered through 6 frames as shown below.

Frame No.	Ratings (A)		
I	63	100	
II	125	160	200
III	250	315	
IV	400	630	
V	630	800	1000
VI	1250	1600	2000*

*Available on request.

Versions

Changeover S-D suitable for open execution

Changeover S-D, which can be commissioned in panels are of open execution type and provide IP20 protection from front. Range 63A to 2000A.

Changeover S-D in SS enclosures

Changeover S-Ds are available in sheet steel enclosure with adequate space for cable terminations so that additional cable entry boxes are not required. Enclosure provides IP54 protection. Range 63A to 1000A.

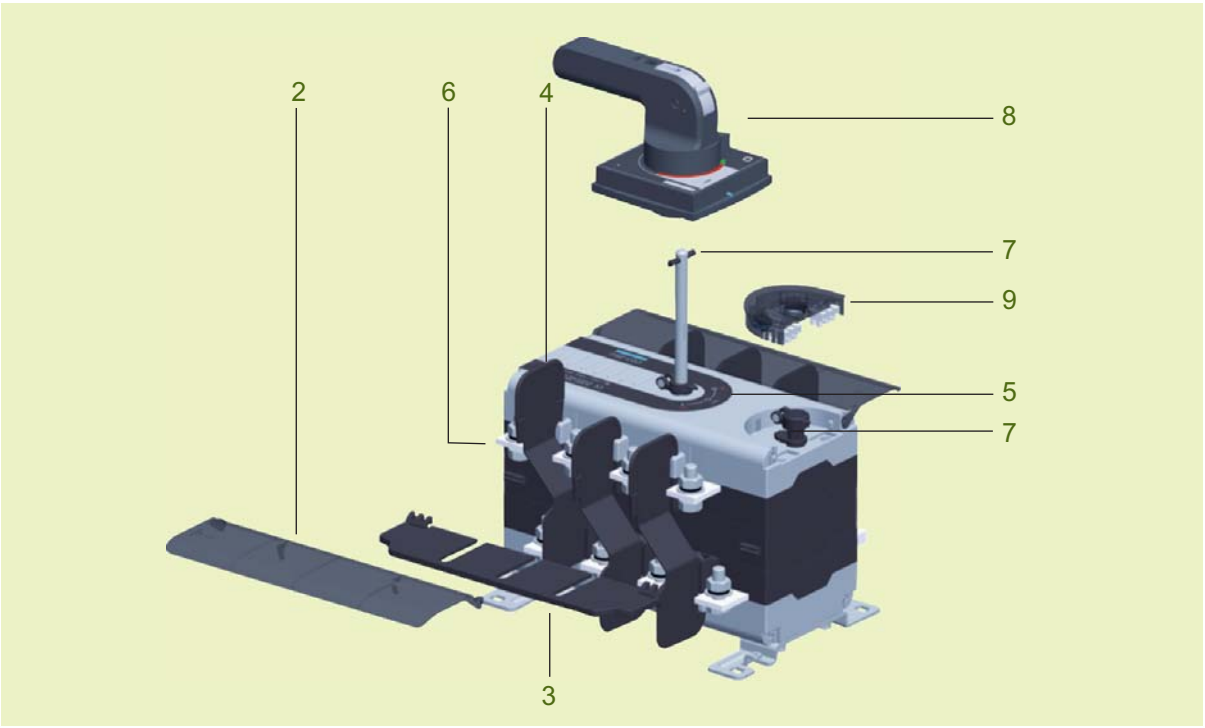
Changeover S-D suitable for HRC fuses

The Changeover S-Ds for open execution can be easily converted to fused version at site by using fuse conversion kit. It is suitable for cylindrical & knife type (DIN) fuse links. Range 63A to 800A.

Motorised Changeover S-D

Onload changeover S-Ds are available in motorised version with control voltage 240 V ac. Range 125A to 2000A.

Manual Changeover Product Feature



Complete Touch Proof Design, Thanks to Terminal Shroud, Source Separator & Inter-phase Barriers.

2. Terminal shroud

3. Source separator

4. Inter-phase barriers

9. Auxiliary Contact Kit

It consists two sets of changeover contacts one for each S-D. This kit is pre-wired with terminal blocks and can be fitted at the site without increasing overall dimension.

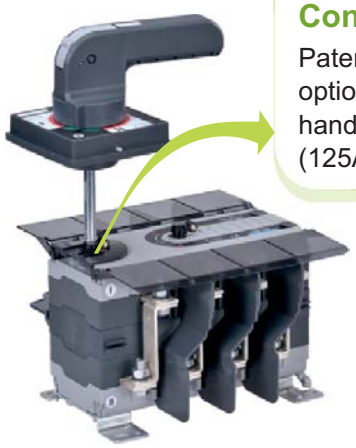
6. Staggered Terminals

The C-line Changeover S-Ds are designed to have staggered terminal arrangement for top and bottom S-Ds. It provides clear access to all terminals from the front, ensuring ease of termination.
All terminal joints can be easily inspected without the need of removing termination of top S-D.

Manual Changeover Product Feature

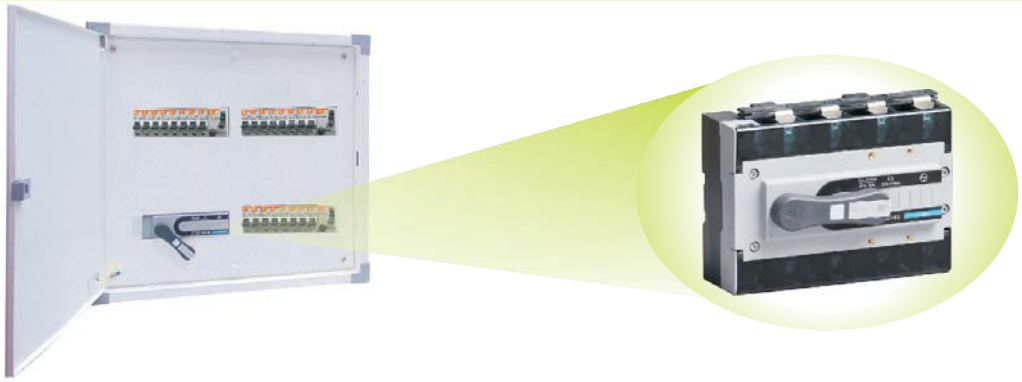
7. Interchangeable Dual Shaft Position with Site Convertibility

Patented dual dead center mechanism enables the user to option between central or side shaft positions for operating handle. This can be easily converted on site as required (125A to 1000A).



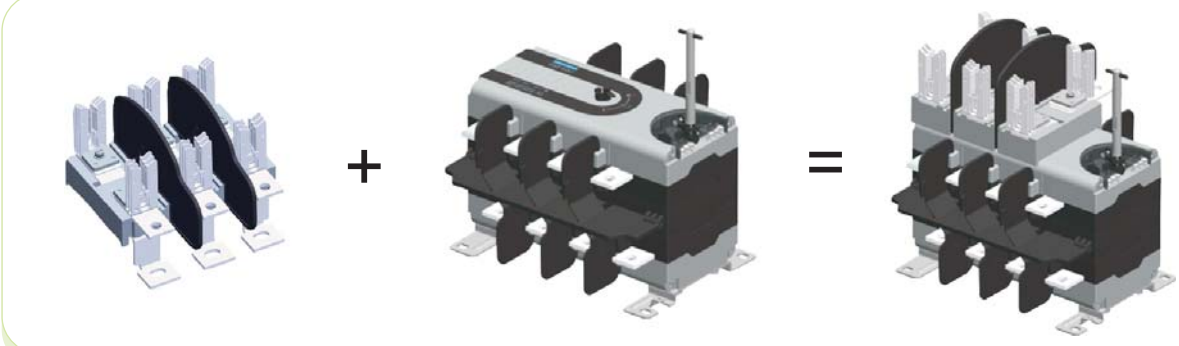
Changeover Switch with Direct Handle

Compact direct handle 63A and 100A changeover switch suitable for double door DB. It occupies only 10 Mod space (45 x 140 cut-out).

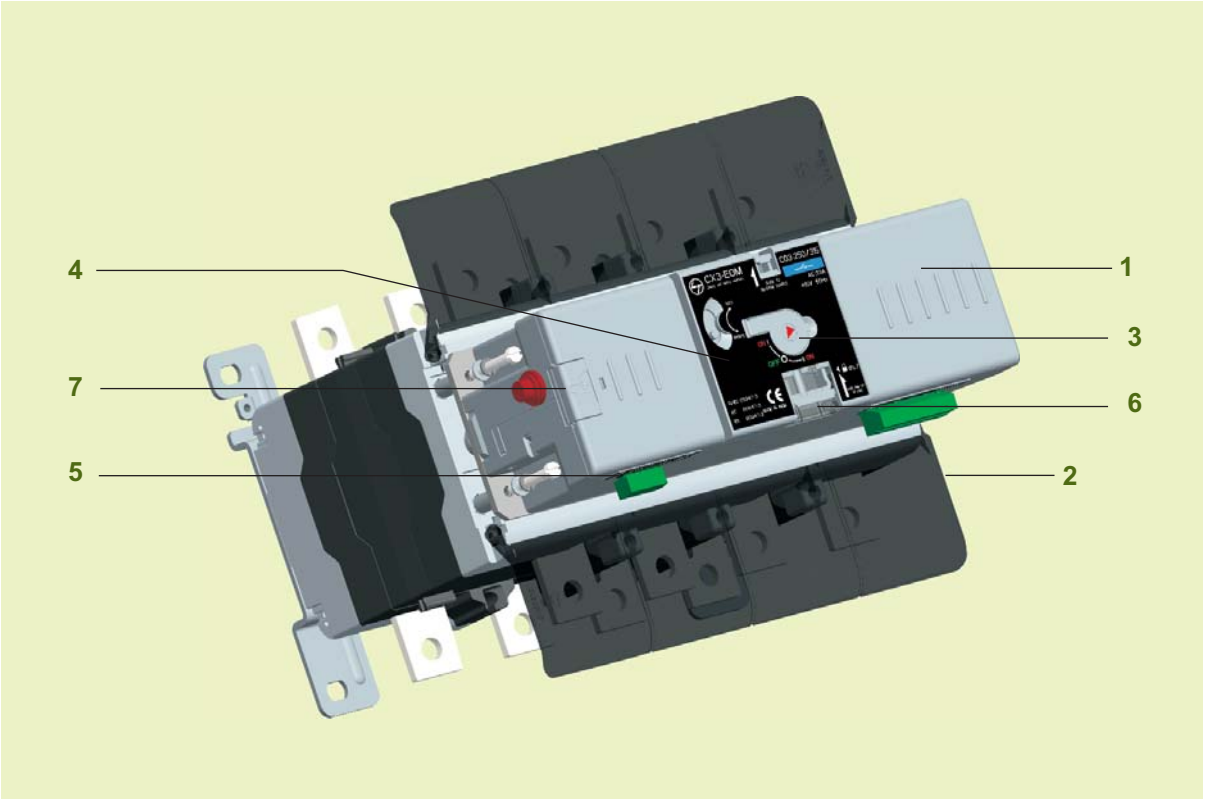


Fuse Changeover Switch

The C-line Changeover S-Ds for open execution can be easily converted to fused version at site by using fuse conversion kit with no load line biasing. It provides the benefits of overload and short circuit protection through the fastest switching device-fuse, and is suitable for cylindrical & knife type (DIN) fuse links.

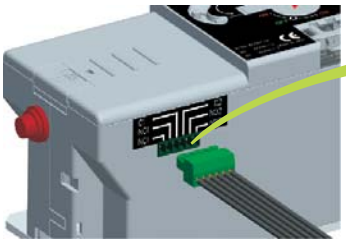


Motorised Changeover Product Features



3. Manual Override

Manual operation of motorised changeover switch is also feasible through the manual override feature.
As a safety feature, the control supply of motorised kit (EOM) is automatically cut off during the insertion of handle.



5. Auxiliary Contacts

It consists two sets of changeover contacts one for each S-D. It is prewired and prefitted in motorised changeover switch.

6. Pad Locking

Provision for padlocking in OFF position with three padlocks of Ø5 to Ø7. Padlocking possible in both auto and manual mode.

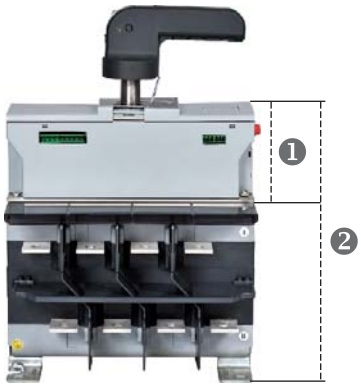
Motorised Changeover Product Features

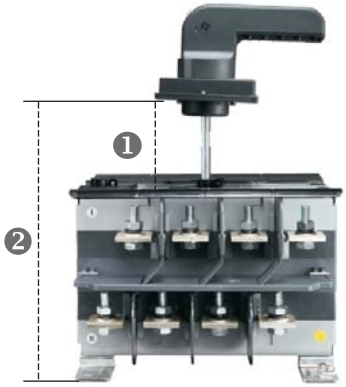
7. Fuse Protection

Inbuilt glass fuse of 5 x 20 size protects the motorised kit (EOM) during abnormalities. Also, spare fuse holder has been provided for storage of fuse.

Compact Design

No change in H x W x D of motorised changeover switch and manual changeover switch





Universal Mounting

Changeover switches offers a distinctive feature to mount changeover in different quadrants.

Accessories

Automatic Source Transfer Solution

Illuminated Push button assembly with Wire harness

UV/OV based AST Controller with Wire Harness

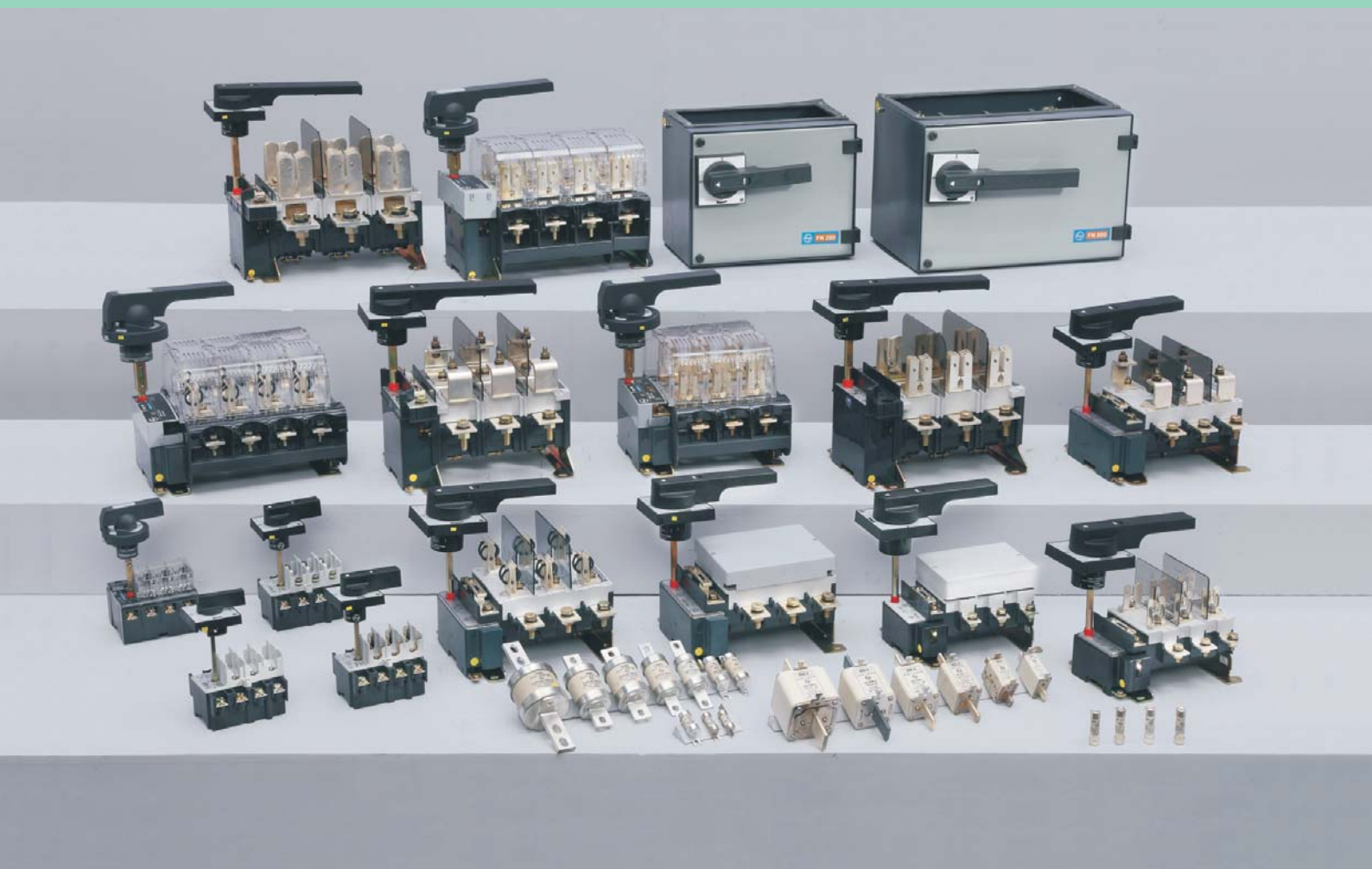
AuxC-1000L Controller with Wire Harness

Technical Specification

Rating (A)		Unit	Frame 1		Frame 2			Frame 3		Frame 4		Frame 5			Frame 6		
			63A	100A	125A	160A	200A	250A	315A	400A	630A	630A	800A	1000A	1250A	1600A	2000A
Reference Standards			IS / IEC 60947-3, EN 60947-3														
Type designation			CO1 - 63	CO1 - 100	CO2 - 125	CO2 - 160	CO2 - 200	CO3 - 250	CO3 - 315	CO4 - 400	CO4 - 630	CO5 - 630	CO5 - 800	CO5 - 1000	CO6 - 1250	CO6 - 1600	CO6 - 2000
No. of Poles			4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole	4 Pole
Rated operational voltage (U_e)		(V)	415	415	415	415	415	415	415	415	415	415	415	415	415	415	415
Rated frequency		(Hz)	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Rated impulse withstand voltage (U_{imp})		(kV)	8	8	12	12	12	12	12	12	12	12	12	12	12	12	12
Pollution degree			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Conventional free air thermal current, I_{th} at 40°C		(A)	63	100	125	160	200	250	315	400	630	630	800	1000	1250	1600	2000
Conventional enclosed thermal current, I_{the} at 40°C		(A)	63	100	125	160	200	250	315	400	630	630	800	1000	1250	1600	2000
Rated operational current, I_e AC-21A# / AC-22A# / AC-23A		(A)	63	100	125	160	200	250	315	400	630	630	800	1000	1250	1600#/1250	2000#/1250
Rated operational power for AC-23A*		(kW)	37	50	65	85	100	132	160	225	315	315	400	450	710	710	710
Rated breaking capacity for AC-23A		(A)	504	800	1000	1280	1600	2000	2520	3200	5040	5040	6400	8000	10000	10000	10000
Rated making capacity for AC-23A		(A)	630	1000	1250	1600	2000	2500	3150	4000	6300	6300	8000	10000	12500	12500	12500
Short time withstand, I_{cw}	1 sec	(kA rms)	4	5	8	8	10	16	18	22	26	35	50	50	50	50	50
	0.2 sec	(kA rms)	7	10	18	18	18	28	28	35	35	70	85	85	85	85	85
Short-circuit making capacity, I_{cm}		(kA peak)	5.9	7.7	14	14	17	32	36	46	55	73.5	105	105	105	105	105
Endurance (category A)	Mechanical	(O-I-O-II-O cycle)	20000	20000	16000	16000	16000	16000	16000	10000	10000	10000	10000	10000	10000	10000	10000
	Electrical	(O-I-O-II-O cycle)	3000	3000	2000	2000	2000	2000	2000	2000	2000	2000	1000	1000	1000	1000	500
Type and size of fuse	DIN/Cylin▲		14 x 51▲	NA	000	00	00	1	1	2	NA	3	3	NA	NA	NA	NA
Rated fused short-circuit current at 415 V, 50/60 Hz	DIN/Cylin▲	(kA rms)	80▲		100	100	100	100	100	100		100	100		NA	NA	NA
Motorised Kit																	
Rated control voltage		(V)			240 V ac			240 V ac		240 V ac		240 V ac			240 V ac		
Control voltage range		(%)			85% - 110%			85% - 110%		85% - 110%		85% - 110%			85% - 110%		
Pollution degree					3			3		3		3			3		
Operating temperature		(°C)			-5 to + 55			-5 to + 55		-5 to + 55		-5 to + 55			-5 to + 55		
Ingress protection (from front)					IP30			IP30		IP30		IP30			IP30		
Max. current at 240 V ac		(A)			2			2		2		2			2		
Operating time (min)	O-I / I-O	(sec)			0.5			0.6		0.7		0.7			0.7		
	I-II / II-I	(sec)			1.4			1.4		1.4		1.4			1.4		
Black out time		(sec)			1.4			1.4		1.4		1.4			1.4		
Control glass fuse current rating	(240 V ac)	(A)			1.25			1		1.25		1.25			1.25		
Termination Capacity																	
Maximum Al. cable with lug		(sq mm)	25	25	95	95	150	185	240	2 x 300	2 x 300	2 x 400	2 x 400	2 x 400	2 x 12 x 63	4 x 8 x 50	3 x 10 x 100
Maximum link width		(mm)	16	16	30	30	30	40	40	50	50	60	60	60	80	80	100
Maximum link thickness		(mm)	2	2.5	5	5	6	8	8	8	2 x 8	2 x 10	2 x 10	2 x 10	3 x 12	3 x 12	3 x 12
Termination tightening torque		(N-m)	4.5	4.5	10	10	20	20	20	27	27	35	35	35	55	55	55
Operating torque center / side operating		(N-m)	4.5	4.5	10 / 13	10 / 13	10 / 13	20 / 25	20 / 25	28 / 32	28 / 32	30 / 40	30 / 40	30 / 40	55	55	55
Weight (without accessories)		(Kg)	2	2.5	4	4	4.5	6.5	7	14	14.5	20	22	22	52	57	75

*These values are for 4 pole squirrel cage induction motors and are provided only for guidance and may vary as per the motor manufacturer
Rated operational current, I_e AC-21A / AC-22A
▲ Type cylindrical fuse

Switches & Fuses

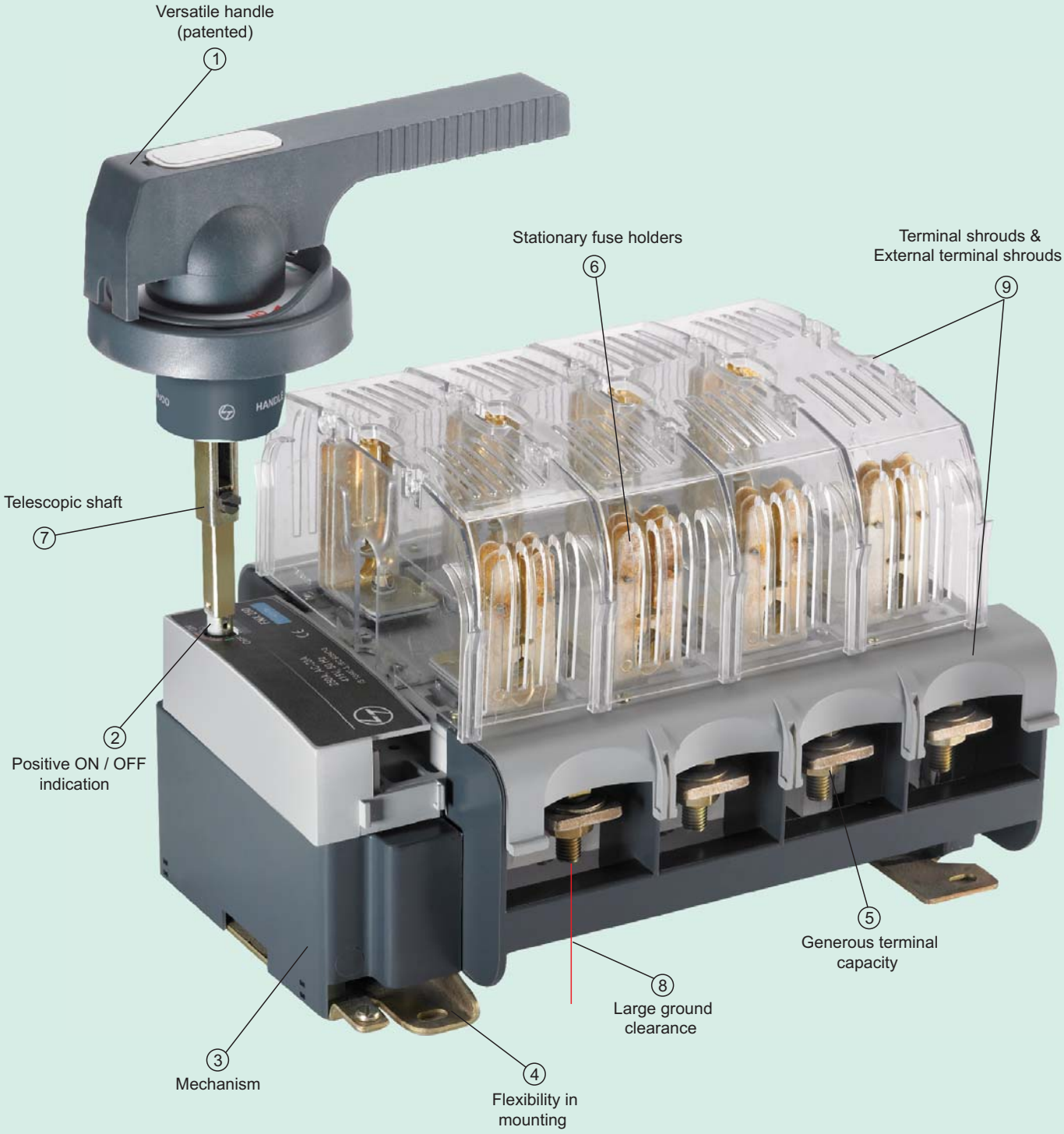


FNX Switch-Disconnector - Fuse

FN Switch-Disconnector

HRC Fuse-links

FNX Switch-Disconnector - Fuse



Salient Features

FNX incorporates state-of-the-art technology and a range with superior design features to deliver key operational advantages.

① **Versatile handle (patented)**
The handle coupling has the following user-friendly features:
- Door interlock (defeatable)
- Padlock with / without door interlock
- Choice of operating quadrant
- Flexibility (± 3 mm mismatch operational quadrant)

② **Positive ON / OFF indication**
Clear ON-OFF indication is provided on the switch by a red pointer.

③ **Mechanism**
The mechanism is front-operated and a quick-make / quick-break one. The contact closing is spring-assisted and is independent of manual speed of operation.

④ **Flexibility in mounting**
The Switch-Disconnector-Fuse unit can be mounted at any angle in a vertical plane.

⑤ **Generous terminal capacity**
Terminals are suitable for Al / Cu links / cable lug connections.

⑥ **Stationary fuse holders**
Fuses remain stationary during switching operation.

⑦ **Telescopic shaft**
Handle depth can be varied and fixed as per requirement during installation. This is possible because the telescopic shaft can be adjusted for stepless variable depth.

⑧ **Large ground clearance**

⑨ **Terminal shrouds & External terminal shrouds**

- **DIN rail mounting**
  Ratings upto 125A can be mounted on 35 mm DIN rail for which the DIN rail mounting is available as an accessory

- **Easy inspection and replacement of contacts**
  Contacts can be easily inspected and replaced (if required) during maintenance. This way the electrical life can be equal to its mechanical life

- **Compact size**
  Being extremely compact, it results in saving of valuable panel space.

- **Easy to operate**
  Low operating torque makes it very convenient to operate

Technical Specification

Frame Size		Unit	I	I	II	III	III	IV	IV	V	V	VI	VI
Type Designation			FNX 32	FNX 63	FNX 100	FNX 125	FNX 160	FNX 200	FNX 250	FNX 315	FNX 400	FNX 630	FNX 800
Conformance to Standard			IEC 60947-3, IS/IEC 60947-3										
No. of Poles			3 Pole + Isolable Neutral, 4 Pole										
Thermal Current (I_{th}) at 40°C		A	32	63	100	125	160	200	250	315	400	630	800
Conventional Enclosed Thermal Current (I_{the})		A	32	63	100	125	160	200	250	315	400	630	800
Ref. Ambient Temperature		°C	40	40	40	40	40	40	40	40	40	40	40
Rated Insulation Voltage (U_i)		V	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated Operational Voltage (U_e)		V	415	415	415	415	415	415	415	415	415	415	415
Rated Impulse withstand Voltage (U_{imp})		kV	8	8	8	12	12	12	12	12	12	12	12
Dielectric Strength		kV	6	6	6	10	10	6	6	6	10	10	10
Rated Operational Current (Ie) at 415V													
AC-21A Utilization Category		A	32	63	100	125	160	200	250	315	400	630	800
AC-22A Utilization Category		A	32	63	100	125	160	200	250	315	500	630	800
AC-23A Utilization Category		A	32	63	100	125	160	200	250	315	400	630	800
Rated Operational Current (Ie) at 690 V (AC-23A)		A	32	32	80	100	125	160	200	250	315	500	630
Breaking Capacity - 436 V, AC-23A		A (rms)	256	504	800	1000	1280	1600	2000	2520	3200	1600	6400
Making Capacity - 436 V, AC-23A		A (rms)	320	630	1000	1250	1600	2000	2500	3150	4000	6300	8000
Mechanical Endurance (Number of operating cycles)			20,000	20,000	15,000	15,000	15,000	10,000	10,000	10,000	10,000	10,000	5000
Maximum Torque (On terminal bolt)		Nm	4.5	4.5	4.5	9.6	9.6	20	20	20	27	45	45
Pollution Degree			III	III	III	III	III	III	III	III	III	III	III
Terminal Capacity	Main	Sq. mm	35	35	50	95	185	240	240	400	400	2 x 625	2 x 625
	Neutral	Sq. mm	35	35	50	50	50	120	120	240	240	400	400
Terminal Width			16	16	20	20	25	30	30	40	40	60	60
Terminal Thickness			1.6	1.6	3	3	3	4	3	3	5	6	8
Terminal Screw		mm	M6 x 12	M6 x 12	M8 x 20	M8 x 20	M8 x 20	M10 x 30	M10 x 30	M10 x 30	M12 x 40	M16 x 50	M16 x 50
Weight 3-Pole / 4-Pole		kg	0.9	0.9	1.7	3 / 3.3	3.2 / 3.65	4 / 4.7	5.2 / 6	6.5 / 7.5	6.5 / 7.5	12.1 / 14	14.2 / 16.1
Rated Capacitor Power (415V, 50/60 Hz)		kVAr	14	29	45	57	57	92	115	145	175	270	270
DC Rating at 220 V DC													
No. of Poles in Series, Utilization Category at Rated Current			3, DC-23A	3, DC-23A	3, DC-23A	2, DC-23A	2, DC-23A	2, DC-23A	2, DC-22A	2, DC-22A	2, DC-22A	2, DC-22A	2, DC-22B
Suitable L&T Fuse													
DIN	Rated Fused Short circuit Current	kA	80*	80*	100	100	100	100	100	100	100	100	100
	Rating	A/Type/Size	32/HF/14 x 51	63/HF/14 x 51	100/HN/000	125/HN/00 & 000	160/HN/00 & 000	200/HN/0	250/HN/1	315/HN/1	400/HN/2	630/HN/3	800/HN/3
Short circuit making Capacity (Icm)		A	320	630	1000	1250	1600	2000	2500	3150	4000	6300	8000
Operating Torque		Kg-m	0.4	0.4	0.4	1.2	1.2	2	2	2.5	2.5	2.5	2.8
Auxiliary Contacts no. of NO + NC (Accessories)			2	2	2	2	2	2	2	2	2	2	2
Overall Dimensions	W	mm	113	113	112	251	251	299	299	352	352	428	428
	H	mm	108	108	144.5	187	187	231	231	230	230	242	242
	D	mm	150 + 10	150 + 10	180 + 10	180 + 36	180 + 36	216 + 31	216 + 31	250 + 20	250 + 20	270 + 23	270 + 23

* Cylindrical Fuse link

Technical Specification

Type Designation		FN 32	FN 63	FN 100	FN 125	FN 200	FN 250	FN 315	FN 400	FN 630	FN 800	FN 1000	FN 1000H
No. of poles		3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral	3+Neutral
Neutral		Switched	Switched	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable
Service temperature	(°C)	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50
Rated operational voltage (Ue)	(V)	415	415	415	415	415	415	415	415	415	415	415	415
Rated insulation voltage (Ui)	(V)	690	690	690	690	690	690	690	690	690	690	690	690
Rated impulse withstand voltage (imp)	(kV)	8	8	8	8	8	8	8	8	8	8	8	8
Rated frequency	(Hz)	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
Conventional enclosed thermal current at 40°C	(A)	32	63	100	125	200	250	315	400	630	800	1000	1000
Rated operational current Ie													
AC 20A utilization category		32	63	100	125	200	250	315	400	630	800	1000	1000
AC 21A utilization category		32	63	100	125	200	250	315	400	630	800	1000	1000
AC 22A utilization category		32	63	100	125	200	250	315	400	630	800	1000	1000
AC 23 A utilization category		32	63	100	125	200	250	315	400	630	800	1000	—
DC rating at 220 V DC No. of poles in series, utilization categoryat rated current		3, DC 23A	3, DC 23A	2, DC 23A	2, DC 23A	2, DC 23A	2, DC 23A	2, DC 22A	2, DC 22A	2, DC 22A	2, DC 22A	2, DC 22A	—
Rated making capacity (436V, cosØ-0.35)	(A)	320	630	1000	1250	2000	2500	3150	4000	6300	8000	10000	10000
Rated breaking capacity (436V, cosØ-0.35)	(A)	256	504	800	1000	1600	2000	2520	3200	5040	6400	8000	3000
Capacitor duty - 415V 50 - 60 Hz	(kVAr)	14	29	45	57	92	115	145	175	270	270	270	—
Mechanical life (operating cycles)		15000	15000	15000	15000	10000	10000	10000	10000	10000	10000	5000	5000
Terminal capacity (main)	(mm^2)	35	35	95	95	240	400	400	2 x 400	2 x 625	2 x 625	2 x 625	2 x 625
Terminal capacity (neutral)	(mm^2)	35	35	50	50	120	120	120	240	400	400	400	400
Terminal screw	(mm)	M 6 x 12	M 6 x 12	M 8 x 20	M 8 x 30	M 10 x 30	M 10 x 30	M 10 x 30	M 12 x 40	M 16 x 50	M 16 x 50	M 16 x 50	—
Short circuit withstand current (duration 1 sec)	(kA)	1.5	1.5	4	4	6	10	14	14	20	20	25	50
Catalogue No. (Interior version)		SK95541	SK95540	SK95571	SK95405	SK95607	SK95683	SK95609	SK95610	SK95611	SK95551	SK95710	SK95992
Catalogue No. (Sheet steel version)		—	—	—	CK90005OOOO	CK90017OOOO	CK90027OOOO	CK90016OOOO	CK90028OOOO	CK90018OOOO	CK90033OOOO	—	—

Cylindrical & Blade Type Product Feature

L&T, India's largest manufacturer of low tension switchgear, offers the new generation of low watt loss HRC fuse-links designed as per the new IS 13703 / IEC 60269 standards.

Type HF & HN

Features & Benefits

- HF 2 - 63A & HN 63 - 800A
- High breaking capacity: 80kA for HF Type & 100kA for HN Type
- Unique offerings: 63A Cylindrical Fuse 125A in Size 000 DIN Type
- Fuse blown indication: Through a red pop-up indicator
- Low let through energy
- Low watt loss leading to power saving and cooler running of associated products like SDFs
- Conform to IS 13703 (Part 2) / IEC 60269-2
- Suitable fuse base & fuse pulling handle




HRC Fuse-links Bolted Type Product Feature

Type HG & HQ

Features & Benefits

- HG 2 - 32A & HQ 2 - 630A
- Breaking capacity: 80 kA at 415 V. for HG & HQ Fuses
- Fuse Size: F1 / A1 - A4 / B1 - B4 / C2 - C3 Sizes - from 2 Amp. to 630 Amp
- Low watt losses ensuring that associated equipment runs cooler
- Can be used with FN series SDF suitable for Bolted type fuses
- Suitable fuse base

Technical Specification

Selection Chart for Cylindrical Type Fuse-Links - HF

• Rated Voltage : 415V • Rated Breaking Capacity : 80 kA at 415V

Size of the fuse link	Rating (A)	Description	Cat. Nos.	Rated watt loss (W)	Watt loss limits as per IS 13703 (W)	Suitable for S-D-F Units type FN / FNX or Equivalent
Size 14x51	2	Suitable for Type FN 32 / 63 / FNX 32/ 63 S-D-F. Also for HCO 32 Fuse base	SF90144	0.6	5	32, 63
	4		SF90145	0.6		32, 63
	6		SF90146	1.1		32, 63
	8		SF90147	1.2		32, 63
	10		SF90148	1.0		32, 63
	16		SF90150	2.4		32, 63
	20		SF90151	2.4		32, 63
	25		SF90152	3.2		32, 63
	32		SF90142	5.0		32, 63
	40	Suitable for Type FN 63/ FNX 63 S-D-F Also for HC 63 Fuse base	SF90143	5.0	7	63
	50		SF90158	5.0		63
	63		SF90159	7.4		63

Selection Chart for Blade Type Fuse-Links - HN

• Rated Voltage : 415V • Rated Breaking Capacity : 100 kA at 415V

Size of the fuse link	Rating	Cat. Nos.	Rated watt loss (W)	Watt loss limits as per IS 13703	Suitable for S-D-F units type FN / FNX or Equivalent
Size 000	63A	SF94940	5.3	100 Amp, Fuse-**7.5**W	100, 125, 160
	80A	SF94941	6.2		100, 125, 160
	100A	SF94942	**7**		100, 125, 160
	125A	SF94946	8.5		100, 125, 160
Size 00	63A	SF94027	5.7	100 Amp, Fuse-**7.5**W	100, 125, 160
	80A	SF94028	6.9		100, 125, 160
	100A	SF94029	**7.5**		100, 125, 160
	125A	SF94030	9.8		125, 160
	160A	SF94939	12		160
Size 0	80A	SF94128	8.3	160 Amp, Fuse-**16**W	200
	100A	SF94129	9.1		200
	125A	SF94130	11.3		200
	160A	SF94131	**12.7**		200
	200A	SF94132	14.5		200
Size 1	125A	SF94230	10.3	250 Amp, Fuse-**23**W	250, 315
	160A	SF94231	12.3		250, 315
	200A	SF94232	14.3		250, 315
	250A	SF94233	**17.3**		250, 315
	315A	SF94234	25.5		315
Size 2	200A	SF94332	14.1	400 Amp, Fuse-**34**W	400
	250A	SF94333	16.9		400
	315A	SF94334	20.2		400
	400A	SF94335	**24.9**		400
Size 3	315A	SF94434	20.5	630 Amp, Fuse-**48**W	630, 800
	400A	SF94435	26.7		630, 800
	500A	SF94436	36.1		630, 800
	630A	SF94437	**42.2**		630, 800
	800A	SF94938	48		800

*Suitable fuse base & fuse pulling handle are detailed in following pages

Guidelines for selection

While selecting fuse-links, the following points should be considered :

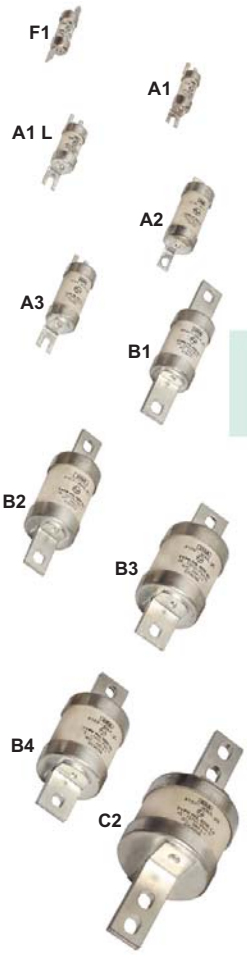
- Fuse-links type HF & HN are suitable for system voltage up to 415 V+
- Select the suitable size and rating of fuse-link for switch-disconnector fuse unit as per the fuse selection chart
- Ensure that the breaking capacity of the fuse link is higher than the prospective fault current
- Fuses should be selected such that discrimination is achieved with other protective devices in the system

Technical Specification

Selection Chart for Bolted Type

• Rated Voltage : 415V • Rated Breaking Capacity : 80 kA • Utilisation Category : gG

Fixing Method	Size	Rating (A)	Description	Cat. No.	Power loss (W)	Watt loss limits as per IS 13703
Offset, stag-gered	F1	2	Suitable for type HD 20H/20P/20B, HD 32H/32P/32B Fuse base	ST30725	0.3	32A, Fuse - 3.2W
		4		ST30726	0.5	
		6		ST30727	1.2	
		10		ST30728	1.4	
		16		ST30729	1.8	
		20		ST30730	2.2	
		25		ST30731	2.9	
		32		ST30732	3.0	
Offset	A1	2	---	ST30736	0.3	20A, Fuse - 2.7W
		4		ST30737	0.5	
		6		ST30738	1.2	
		10		ST30739	1.4	
		16		ST30740	1.8	
		20		ST30741	2.2	
		25		ST30742	2.9	
		32		ST30743	3.0	
	A1L	20	Suitable for type FN 32/63 Switch disconnector Fuse unit	ST34527	2.4	20A, Fuse - 3.2W
		25		ST34528	3.1	
		32		ST34529	3.4	
		50		ST35827	4.0	
		63		ST35828	4.7	
	A2	4	Suitable for type HK 32H/32B Fuse base	ST30747	0.8	32A, Fuse - 4.4W
		6		ST30748	1.4	
		10		ST30749	1.5	
		16		ST30750	2.0	
		20		ST30751	2.8	
		25		ST30752	3.8	
		32		ST30753	4.4	
	A3	35	Suitable for type FN 100 Switch disconnector Fuse unit, also for HK 63B/63H Fuse base	ST30759	4.5	63A, Fuse - 6.9W
		50		ST30760	6.2	
		63		ST30761	6.8	
	A4	80	Suitable for type FN 100/125/160 Switch disconnector Fuse unit, also for HK 125H/125B Fuse base	ST30767	9.1	100A, Fuse - 9.1W
		100		ST30768	9.5	
		125		ST30769	14	
		160		ST35829	-	
Centre Tag, 2 holes	B1	80	Suitable for type FN 200 Switch disconnector Fuse unit	ST30774	9.2	100A, Fuse - 9.1W
		100		ST30775	10.5	
		125		ST30776	16.0	
	B2	125	Suitable for type FN 200/250 Switch discon-nector Fuse unit	ST30777	15.0	200A, Fuse - 17W
		160		ST30778	19.5	
		200		ST30779	20.5	
	B3	250	Suitable for type FN250/315 Switch discon-nector Fuse	ST30781	28	250A, Fuse - 32W
		315		ST30782	32	
	B4	355	Suitable for type FN 400 Switch disconnector Fuse unit	ST30783	34	400A, Fuse - 40W
		400		ST30784	38	
Centre Tag, 4 holes	C2	400	Suitable for type FN 630 Switch disconnector Fuse unit	ST30785	38	630A, Fuse - 55W
		500		ST30786	50	
		630		ST30787	55	
	C3	630	–	ST30788	55	



Contactors & Thermal Overload Relays

MNX 3 Pole Power Contactors

MN Thermal Overload Relays

RTX Thermal Overload Relays

MO 3 Pole Power Contactors

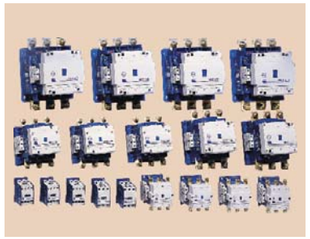
RTO Thermal Overload Relays

MO C Capacitor Duty Contactors

MX Mini Contactors

MCX 4 Pole Power Contactors

MNX 3 Pole Power Contactors



- Range from 9-650A AC3
- Coil on top design 95A and above
- Built-in 2 NO + 2 NC auxiliary contacts for 45A & above
- Entire range is UL listed











Technical Specification

		MNX 9	MNX 12	MNX 18	MNX 22	MNX 25	MNX 32	MNX 40	MNX 45	MNX 50	MNX 70	MNX 80
Catalogue No.	2 Pole	CS 90232	CS 90234	CS 90236	CS 90238	CS 90240	CS 90241	CS 90242	CS 94060	CS 94061	CS 94062	CS 94063
	3 Pole	CS 94106 / 7*	CS 94108 / 9*	CS 94100 / 1*	CS 94980 / 81*	CS 94110	CS 94111	CS 94190	ST 19000	ST 19001	ST 19002	ST 19003
Conformance to standards		IS/IEC 60947-4-1 & IEC 60947-4-1, BSEN 60947-4-1										
Power Contacts												
Rated insulation voltage, U_i		690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	690V
Rated impulse withstand voltage, U_{imp}		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Rated making capacity - (Amp)		450	450	450	450	480	550	550	900	900	900	900
Rated breaking capacity - (Amp)		200	250	250	250	400	500	500	750	750	750	750
Rated operational current, I_e At 55°C Motor duty : 3Ø, 415V, 50Hz	Utilization category AC-1	25A	30A	30A	32A	45A	55A	55A	85A	85A	100A	100A
	Utilization category AC-2	9A	12A	18A	22A	25A	32A	40A	45A	50A	70A	80A
	Utilization category AC-3	4 kW/5.5hp/9A	5.5 kW/7.5hp/12A	9.3 kW/12.5hp/18A	11 kW/15hp/22A	11 kW/15hp/25A	17 kW/22.5hp/32A	22.5 kW/30hp/40A	25 kW/34hp/45A	26 kW/35hp/50A	37 kW/50hp/70A	40 kW/54hp/80A
	Utilization category AC-4	4 kW/5.5hp/9A	5.5 kW/7.5hp/12A	9.3 kW/12.5hp/18A	11 kW/15hp/22A	11 kW/15hp/25A	17 kW/22.5hp/32A	22.5 kW/30hp/40A	25 kW/34hp/45A	26 kW/35hp/50A	30 kW/40hp/63A	37 kW/50hp/70A
Operational current I_e for AC-4 Utilization category at 415V, 3Ø, 50Hz for 2,00,000 operating cycles		5.5A	7.1A	8A	8.5A	13.5A	16A	20A	24A	24A	28.5A	43A
DC ratings (with 3 poles in series) and AC coil operation	DC 1 - 110V	9A	12A	18A	22A	25A	32A	40A	45A	50A	63A	80A
	DC 1 - 220V	9A	12A	18A	22A	25A	32A	40A	45A	50A	63A	80A
	DC 3 - 110V	9A	12A	18A	22A	25A	32A	40A	45A	50A	63A	80A
	DC 3 - 220V	9A	12A	18A	22A	25A	32A	40A	45A	50A	63A	80A
	DC 5 - 110V	9A	12A	18A	22A	25A	32A	40A	45A	50A	63A	80A
	DC 5 - 220V	6A	7.5A	9A	9A	12A	20A	25A	45A	50A	50A	63A
Mechanical life, No. of operating cycles		15 x 10^6	15 x 10^6	15 x 10^6	15 x 10^6	10 x 10^6	10 x 10^6	10 x 10^6	10 x 10^6	10 x 10^6	10 x 10^6	10 x 10^6
Max. frequency of operations: Operating cycles/hr	Mechanical	7200	7200	7200	7200	7200	7200	3600	3600	3600	3600	3600
	Utilization Category AC-1	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Utilization Category AC-2	750	750	750	750	750	750	750	750	750	750	750
	Utilization Category AC-3	750	750	750	750	750	750	750	750	750	750	750
	Utilization Category AC-4	300	300	300	300	300	300	300	300	300	300	300
Service temperature		-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C
Main terminal capacity	Lug (mm^2)	1 x 6	1 x 6	1 x 6	1 x 6	1 x 10	1 x 10	1 x 10	1 x 35	1 x 35	1 x 35	1 x 35
	Link (mm^2)	-	-	-	-	-	-	-	1 x 12.5 mm x 3 mm	1 x 12.5 mm x 3 mm	1 x 12.5 mm x 3 mm	2 x 12.5 mm x 3 mm
	Solid Conductors (mm^2)	2 x 4	2 x 4	2 x 4	2 x 4	2 x 6	2 x 6	2 x 6	-	-	-	-
	Multi strand conductors (mm^2)	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 4	2 x 4	2 x 4	-	-	-	-
Auxiliary Contacts												
No. of built-in auxiliary contacts		1 NO or 1 NC	1 NO or 1 NC	1 NO or 1 NC	1 NO or 1NC	#	#	#	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC
Conventional thermal current, I_{th} at 55°C		10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
AC-15 rating at 415V, 50Hz		4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A
Terminal capacity (Solid or multi strand conductors (mm^2)		2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Coil												
Voltage available for 50Hz	U_c (V)	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525
Pick-up	VA	68	68	68	68	68	68	68	190	190	190	190
	CosØ	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.77	0.77	0.77	0.77
Hold-on	VA	11	11	11	11	11	11	11	21	21	21	21
	Watts	4	4	4	4	4	4	4	5.5	5.5	5.5	5.5
Limits of operation	Pick-up (%U_c)	65 - 120	65 - 120	65 - 120	65 - 120	65 - 120	65 - 120	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110
	Drop-off (%U_c)	35 - 50	35 - 50	35 - 50	35 - 50	35 - 50	35 - 50	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65
Overall dimensions H x W x D in mm		83 x 45 x 88	83 x 45 x 88	83 x 45 x 88	83 x 45 x 88	83 x 45 x 88	83 x 45 x 88	83 x 45 x 88	109 x 89 x 120.5	109 x 89 x 120.5	109 x 89 x 120.5	109 x 89 x 120.5

* With 1NC Auxiliary Contacts # Add - on block can be ordered separately • 60Hz & 50/60Hz Coils available on request

Note: Technical data sheet applicable to both 3P and 2P contactors.

Technical Specification

		MNX 95	MNX 110	MNX 140	MNX 185	MNX 225	MNX 250	MNX 265	MNX 300	MNX 325	MNX 400	MNX 550	MNX 650
Catalogue No.	2 Pole	CS 94064	CS 94065	CS 94066	CS 94978	CS 94979	CS 90301	CS 94067	CS 90346	CS 94068	CS 94069	CS 90243	–
	3 Pole	CS 94136	CS 94137	CS 94138	CS 94139	CS 94140	CS 94141	CS 94142	CS 90280	CS 94143	CS 94144	CS 94145	CS 96327
Conformance to standards		IS/IEC 60947-4-1 & IEC 60947-4-1, BSEN 60947-4-1											
Power Contacts													
Rated insulation voltage, U_i		1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V
Rated impulse withstand voltage, U_{imp}		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Rated making capacity - (Amp)		1680	1680	1800	2220	2400	3000	4000	4500	4500	4500	5500	6500A
Rated breaking capacity - (Amp)		1400	1400	1600	1850	2000	2500	3200	4000	4000	4000	4500	5200A
Rated operational current, I_e At 55°C Motor duty : 3Ø, 415V, 50Hz	Utilization category AC-1	160A	160A	160A	250A	300A	300A	350A	400A	400A	425A	650A	800A
	Utilization category AC-2	95A	110A	140A	185A	225A	250A	265A	300A	325A	400A	550A	650A
	Utilization category AC-3	45 kW / 60hp / 95A	55 kW / 75hp / 110A	75 kW / 100hp / 140A	90 kW / 120hp / 185A	110 kW / 150hp / 225A	132 kW / 180hp / 250A	147 kW / 196hp / 265A	160 kW / 215hp / 300A	180 kW / 245hp / 325A	200 kW / 270hp / 400A	315 kW / 425hp / 550A	355 kW / 475hp / 650A
	Utilization category AC-4	45 kW / 60hp / 95A	55 kW / 75hp / 110A	75 kW / 100hp / 140A	90 kW / 120hp / 160A	100 kW / 136hp / 200A	100 kW / 136hp / 200A	130 kW / 175hp / 235A	130 kW / 175hp / 235A	140 kW / 190hp / 250A	150 kW / 200hp / 275A	168 kW / 225hp / 300A	200 kW / 267hp / 400A
Operational current I_e for AC-4 Utilization category at 415V, 3Ø, 50Hz for 2,00,000 operating cycles		53A	58A	66A	90A	100A	120A	120A	140A	140A	150A	150A	**
DC ratings (with 3 poles in series) and AC coil operation	DC 1 - 110V	95A	110A	140A	185A	225A	225A	265A	300A	325A	400A	550A	650A
	DC 1 - 220V	95A	110A	140A	185A	225A	225A	265A	265A	325A	400A	550A	650A
	DC 3 - 110V	95A	110A	140A	185A	225A	225A	265A	300A	325A	400A	550A	650A
	DC 3 - 220V	95A	110A	140A	185A	225A	225A	265A	265A	325A	400A	550A	650A
	DC 5 - 110V	95A	110A	140A	185A	225A	225A	265A	300A	325A	400A	550A	650A
	DC 5 - 220V	95A	110A	125A	185A	225A	225A	265A	265A	325A	400A	550A	650A
Mechanical life, No. of operating cycles		10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6	10×10^6
Max. frequency of operations: Operating cycles/hr	Mechanical	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	1200	1200
	Utilization Category AC-1	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	750	750
	Utilization Category AC-2	750	750	750	750	750	750	750	750	750	750	750	750
	Utilization Category AC-3	750	750	750	750	750	750	750	750	750	750	750	750
	Utilization Category AC-4	300	300	300	250	150	150	150	150	150	150	150	150
Service temperature		-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C
Main terminal capacity	Lug (mm^2)	1 x 120	1 x 120	1 x 120	1 x 185	1 x 185	1 x 185	2 x 240 / 1 x 300	2 x 240 / 1 x 300	2 x 240 / 1 x 300	2 x 240 / 1 x 300	2 x 50 mm x 5 mm	-
	Link (mm^2)	2 x 25 mm x 3 mm	2 x 25 mm x 3 mm	2 x 25 mm x 3 mm	2 x 30 mm x 5 mm	2 x 30 mm x 5 mm	2 x 30 mm x 5 mm	2 x 50 mm x 5 mm	2 x 50 mm x 5 mm	2 x 50 mm x 5 mm	2 x 50 mm x 5 mm	2 x 50 mm x 5 mm	2 x 60 mm x 5 mm
	Solid Conductors (mm^2)	-	-	-	-	-	-	-	-	-	-	-	-
	Multi strand conductors (mm^2)	-	-	-	-	-	-	-	-	-	-	-	-
Auxiliary Contacts													
No. of built-in auxiliary contacts		2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC
Conventional thermal current, I_{th} at 55°C		10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
AC-15 rating at 415V, 50Hz		4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A
Terminal capacity (Solid or multi strand conductors (mm^2)		2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Coil													
Voltage available for 50Hz	U_c (V)	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	24, 42, 110, 220, 240, 415, 525	110, 220, 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415, 525	110, 220 240, 415	110, 220 240, 415
Pick-up	VA	550	550	550	960	960	960	2100	2100	2100	2100	1000	1000
	CosØ	0.64	0.64	0.64	0.3	0.3	0.3	0.21	0.21	0.21	0.21	-	-
Hold-on	VA	36	36	36	56	56	56	95	95	95	95	25	25
	Watts	10	10	10	16	16	16	35	35	35	35	10	10
Limits of operation	Pick-up (%U_c)	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110
	Drop-off (%U_c)	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65
Overall dimensions H x W x D in mm		175 x 137 x 152	175 x 137 x 152	175 x 137 x 152	208.2 x 147 x 181	208.2 x 147 x 181	208.2 x 147 x 181	275 x 200 x 220	275 x 200 x 220	275 x 200 x 220	275 x 200 x 220	275 x 200 x 220	296 x 200 x 220

** Data Available on request • 60Hz & 50/60Hz Coils available on request

Note: Technical data sheet applicable to both 3P and 2P contactors.

Type MN

- Available in 3 frame sizes from 0.2-570A
- Direct mounting on MNX Contactors
- Trip class 10A (30 available in MN 12L)
- Ambient temperature compensated
- Built-in single phasing protection

		MN 2	MN 5	MN 12	MN 12L
Conformance to standards		IS/IEC 60947-4-1 & IEC 60947-4-1			
Mounting		Direct	Direct	-	-
		Separate	Separate	Separate	Separate
Suitable for Contactors		MNX 9, 12, 18 22, 25, 32, 40	MNX 45, 50, 70 80, 95, 110, 140	MNX 185, 225, 265 325, 400, 550	
Rated Insulation Voltage	U_i	690V	690V	690V	690V
Rated Impulse Voltage	U_{imp}	6 kV	6 kV	6 kV	6 kV
Service Temperature		-5°C to 55°C			
Start / OFF / Reset		1 Start & OFF / Reset			
Built-in Contacts		2 NO + 1 NC	2 NO + 1 NC	2 NO + 1 NC	2 NO + 1 NC
Rated Operational Current for AC-15 utilisation category at 50 Hz	24V	6A	6A	6A	6A
	110V	5A	5A	5A	5A
	220V	3A	3A	3A	3A
	380 / 415V	2A	2A	2A	2A
	500V	2A	2A	2A	2A
Trip Class		10A	10A	10A	30
Max. Frequency of Operations	Cycles / hr.	30	30	30	30
Main Terminal Capacity	Lug (mm^2)	10	50	240	240
Aux. Terminal Capacity	Wires (mm^2)	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5

Note: All relays are Ambient Temperature Compensated.

RTX range of Thermal Overload Relays complement the MNX range of contactors. RTX thermal overload relay is available in 15 ranges from 0.23A to 41A in 45 mm width. It protects the load against overload and phase failure and is modular in design.

Features

- Visual status indication-tripped / non-tripped from front
- Phase failure sensitive
- Ambient temperature compensated
- Auto manual / Reset function
- Trip free feature
- Test function-simulates the tripping of the Relay from the front
- Front access to START and STOP / RESET buttons
- Three contacts: Alarm, Trip and Start
- Isolated alarm circuit (N.O.) contact
- Sealable in OFF condition
- Hingeable shroud
- Sealable transparent top cover

Accessories

- Separate mounting kit

Type	RTX-1
	Main Circuit
Conformance to standards	**IS/IEC 60947-4-1 & IEC 60947-4-1**
Rated insulation voltage (U_i)	690V
Rated impulse withstand voltage (U_{imp})	6 kV
Rated operational voltage	415V, 50 Hz
Type of operation	Direct acting, Trip free mechanism
Trip class	10A
Main terminal capacity	Wires
	Solid - 2 x 2.5 to 1 x 10 sq. mm Finely stranded - 2 x 2.5 to 6 sq. mm Tightening Torque - 1.2 Nm Type of screw - M4, Class 6.8 for power conductors
Temp. compensation	-20°C to +55°C
	Auxiliary Circuit
No. of contacts	1 NO - Alarm
	1 NO - Start
	1 NC - Trip
Rated insulation voltage	690V
Rated impulse withstand voltage	6 kV
AC-15 Rating	2A at 415V, 50Hz
Thermal current	6 Amp
Terminal capacity	2 x 2.5 mm^2, solid or finely stranded Type of screw - M3, Class 6.8 Tightening Torque-1.5 Nm

- Range from 9A-110A AC-3
- Compact dimensions saving precious panel space
- DIN Rail mounting facility upto 110A
- Lug less termination for 50A and above
- Standardized accessories throughout the range
- Low VA consumption
- RoHS compliant

Technical Specification

Catalogue No.		MO 9 CS94833	MO 12 CS94834	MO 18 CS94835	MO 25 CS94567	MO 32 CS94568	MO 40 CS94569	MO 45 CS94570	MO 50 CS94572	MO 60 CS94573	MO 70 CS94574	MO 80 CS94576	MO 95 CS94577	MO 110 CS94578
Conformance to standards		IS/IEC 60947-4-1, IEC 60947-4-1, EN 60947-4-1												
Power Contacts														
No. of poles		3	3	3	3	3	3	3	3	3	3	3	3	3
Rated insulation voltage, U_i		690V	690V	690V	690V	690V	690V	690V	1000V	1000V	1000V	1000V	1000V	1000V
Rated impulse withstand voltage, U_{imp}		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Rated operational current, Ie Motor duty: 3Ø, 415V, 50Hz	Utilization category AC-1	30A	35A	40A	45A	50A	50A	50A	65A	80A	100A	125A	125A	140A
	Utilization category AC-2	9A	12A	18A	25A	32A	40A	45A	50A	60A	70A	80A	95A	110A
	Utilization category AC-3	4 kW / 5.5hp / 9A	5.5 kW / 7.5hp / 12A	9.3 kW / 12.5hp / 18A	11 kW / 15hp / 25A	17.3 kW / 22.5hp / 32A	22.5kW / 30hp / 40A	25kw / 34hp / 45A	30kW / 40hp / 50A	33.5kW / 45hp / 60A	37kW / 50hp / 70A	40kW / 54hp / 80A	45kW / 60hp / 95A	55kW / 75hp / 110A
	Utilization category AC-4	4 kW / 5.5hp / 9A	5.5 kW / 7.5hp / 12A	9.3 kW / 12.5hp / 18A	11 kW / 15hp / 25A	17.3 kW / 22.5hp / 32A	22.5kW / 30hp / 40A	25kw / 34hp / 45A	30kW / 40hp / 50A	33.5kW / 45hp / 60A	37kW / 50hp / 70A	40kW / 54hp / 80A	45kW / 60hp / 95A	55kW / 75hp / 110A
Making capacity		400	450	450	550	550	550	550	1000	1000	1000	1500	1500	1500
Breaking capacity, 415V AC		350	350	350	550	550	550	550	900	900	900	1200	1200	1200
Mechanical life, No. of operating cycles		10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million	10 million
Max. Frequency of operations Operating cycles / hr	Mechanical	7200	7200	7200	7200	7200	7200	7200	3600	3600	3600	3600	3600	3600
	Utilization category AC-2	750	750	750	750	750	750	750	750	750	750	750	750	750
	Utilization category AC-3	750	750	750	750	750	750	750	750	750	750	750	750	750
	Utilization category AC-4	300	300	300	300	300	300	150	300	300	150	150	150	150
Service temperature		-50°C to 55°C												
Main terminal capacity	Solid conductor (mm^2)	2 x 10	2 x 10	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 10	2 x 10	2 x 35	2 x 35	2 x 35	2 x 70	2 x 70	2 x 70
	Finely standard conductor (mm^2)	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 25	2 x 25	2 x 25	2 x 50	2 x 50	2 x 50
No. of built in Auxiliary Contacts		1 NO + 1 NC												
Auxiliary Contacts														
No. of snap on aux. contact poles (Side or Front Mounting)		4	4	4	4	4	4	4	6	6	6	8	8	8
Conventional thermal current, I_{th}		10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A	10A
AC-15 rating at 415V, 50Hz		4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A	4A
Terminal capacity (solid or multi stranded conductors) (mm^2)		2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Coil Characteristics														
Voltages available for AC-50Hz operative, U_c (V)		24, 42, 110, 220, 240, 360, 415, 525												
Pick-up (VA)		78	78	78	77	77	77	77	144	144	144	240	240	240
Hold-On	VA	9	9	9	9	9	9	9	15	15	15	25	25	25
	Watts	2.8	2.8	2.8	2.8	2.8	2.8	2.8	5	5	5	6.5	6.5	6.5
Limits of operations	Pick-up (% U_c)	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110
	Drop-off (% U_c)	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65
Overall Dimensions (mm)	H	83.5	83.5	83.5	83.5	83.5	83.5	83.5	124	124	124	135	135	135
	W	45	45	45	45	45	45	45	55	55	55	70	70	70
	D	89	89	89	93.5	93.5	93.5	93.5	122	122	122	135	135	135

Key Features

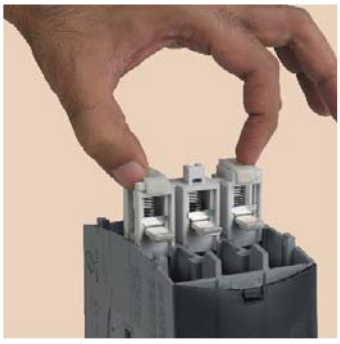
- Completely shrouded and safe
- Compact thus saving panel space
- Unique styling and visual appeal
- Standardized accessories for entire range reducing inventory costs
- Lug less termination for fast termination and significant reduction in wiring costs
- Low VA consumption thus reducing control transformer size
- Wide range of accessories to meet all applications

MO contactor range

Box clamp terminations for faster termination

Safety shrouds for power terminals to ensure safe maintenance environment

Compact mechanical interlock



Cassette type bridge for easy contact replacement

Modular load feeder

L&T introduces RTO range of Thermal Overload Relays to complement the MO range of contactors. RTO thermal overload relays are available in 19 ranges and 3 frame sizes. The range is available from 0.23A to 110A . RTO range of Thermal Overload Relays proved protections against overload and single phasing and are modular in design.

Features

- Visual status indication-tripped / non-tripped from front
- Phase failure sensitive
- Ambient temperature compensated
- Auto manual / Reset function
- Trip free feature
- Test function-simulates the tripping of the Relay from the front
- Front access to START and STOP / RESET buttons
- Three contacts: Alarm, Trip and Start
- Isolated alarm circuit (N.O.) contact
- Sealable in OFF condition
- Sealable transparent top cover
- Direct mounting on MO contactors

Accessories

- Separate mounting kit

Technical Specification

Type	RTO-1	RTO-2	RTO-3
Main Circuit			
Conformance to Standards	IS/IEC 60947-4-1		
Mounting	Direct/Separate		
Direct Mounting on Contactors	MO 9 - 45	MO 50 - 70	MO 80 - 110
Degree of Protection	IP20		
Rated Insulation Voltage Ui	690V		
Rated Impulse withstand Uimp	6kV		
Rated Operational Voltage	415V, 50 Hz		
Type of Operation	Direct Acting, Trip Free Mechanism		
Trip Class	Class 10A, Fixed		
Temp Compensation	(-20 to +55) ^{o}C		
Main Terminal Capacity (Wires)	Solid - 2 x 2.5 to 1 x 10 sq. mm. Finely Stranded - 2 x 2.5 to 6 sq. mm. Tightening Torque - 2.5 Nm. Type of Screw - M4, Class 6.8 for power conductors.	Solid - 2 x 6 - 35 sq. mm Finely stranded cable - 2 x 6 - 25 sq. mm. Tightening Torque - 4 Nm. Type of Screw - M6	Solid - 2 x 10 - 70 sq. mm. Finely stranded cable - 2 x 10 - 50 sq. mm. Tightening Torque - 5 Nm. Type of Screw - M8
Auxiliary Circuit			
No. of contacts	1NO - Alarm		
	1NO - Start		
	1NC - Trip		
Rated Insulation Voltage	690V		
Rated Impulse Withstand	6 kV		
AC-15 Rating	2A @ 415V, 50 Hz		
Thermal Current	6 Amp		
Terminal Capacity	2 x 2.5 sq. mm, Solid or finely stranded. Type of Screw - M3, Class 6.8 Tightening Torque - 1.5 Nm		

Features

- Available for capacitor range from 8.5 - 80 kVAr
- Modular design saving precious panel space
- De-Latching auxiliary contacts
- Separate termination of damping resistors
- Encapsulated resistor assembly ensuring safety

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		1 NO	CS96320	CS96321	CS90019	CS90021	CS96322	CS96323	CS96324	CS96325	CS96326
			1 NC	CS96337	CS96338	CS90020	CS90022	CS96339	CS96340	CS96341	CS96342	CS96343
Conformance to Standards							IS/IEC 60947-4-1, IEC 60947-4-1, EN 60947-4-1					
Rated Operational Current I (AC - 6b) 3 phase delta connected capacitor bank at 415V, 50 Hz		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							IP20					
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	% U_c	V	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110	75 - 110
	Drop-off	% U_c	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					
	Breaking						Main Contacts Break					
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	30 x 60 - 65 - 70	30 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

* Accessories and Spares same as that of MO contactor.
Note: Contact replacement is not permitted in MO C contactors

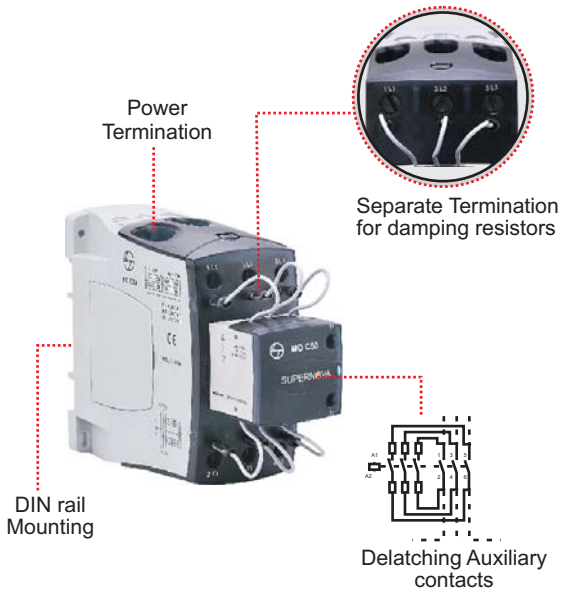
Benefits of using Capacitor Duty Contactors:

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 contacts
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 if wiring
	Enhanced operational reliability
Wide and chatter-free operating band	Improved switching performance
	Higher electrical life
	Higher product reliability

Features

- Range from 6A - 12A AC3
- Control contactors available in all NO/NC combinations (4 Pole)
- Top mounting accessories
- Available with AC or DC control
- Built-in surge suppressor with DC control
- Direct mounting thermal overload relay type MX-R0
- RoHS Compliant

Technical Specification

Type Designation for AC / DC Control		**MX 6 AC / DC**	**MX 9 AC / DC**	**MX 12 AC / DC**
Catalogue no. for AC control		CS94012 / 3	CS94014 / 5	CS94016 / 7
Catalogue no. for DC control		CS94021 / 2	CS94023 / 4	CS94025 / 6
Conformance to standards		**IS/IEC 60947-4-1, IEC 60947-4-1, EN 60947-4-1**		
Rated insulation voltage, U_i		690V		
Service temperature		-5°C to +55°C		
Degree of protection		Protection against direct finger contact from front		
Tightening torque		0.8 Nm		
Power Contacts				
No. of main poles		3		
Conventional thermal current, I_{th}		20A		
Rated current at 415V, 50Hz	Utilization category AC-1	20A		
	Utilization category AC-3	6A / 3 kW / 4hp	9A / 4 kW / 5.5hp	12A / 5.5 kW / 7.5hp
Making capacity at 415V, 50Hz		10 I_e (AC - 3) A		
Breaking capacity at 415V, 50Hz		8 I_e (AC - 3) A		
Short-circuit protection	gG fuse at 415V, 50Hz	20A		
Electrical durability (AC-3) in million		1	0.8	0.6
Frequency of operation at U_c	Utilization category AC-1	3000 Opn / hr		
	Utilization category AC-3	750 Opn / hr		
Main terminal capacity	Solid conductors	2 x 2.5 mm²		
	Multi-stranded conductors	2 x 2.5 mm²		
Auxiliary Contacts				
No. of built-in auxiliary contact		1 NO or 1 NC		
Conventional thermal current, I_{th}		10A		
Rated current at 415V, 50Hz	Utilization category AC-15	4A		
Short-circuit protection	gG fuse at 415V, 50Hz	10A		
Electrical durability (AC-15) at 415V, 50Hz in million		1.5		
Minimum non-overlapping distance		0.5 mm		
Maximum frequency of operation at U_c (AC-15)		1000 Opn / hr		
Auxiliary terminal capacity	Solid conductors	2 x 2.5 mm²		
	Multi-stranded conductors	2 x 2.5 mm²		
Maximum Permissible control cable length for drop-off*	415V	69.30 m		
	240V	207.21 m		
	110V	986.37 m		

CS94012 / 14 / 16 / 21 / 23 / 25 are 3 Main + 1NO auxiliary contact
CS94013 / 15 / 17 / 22 / 24 / 26 are 3 Main + 1NC auxiliary contact
*Cable Capacitance assumed to be 0.2 microfarad/km

MCX 4 Pole Power Contactors

Features

- Range from 16-800A AC1
- Wide operating band upto 100A AC1
- Compact mechanical interlock arrangement upto 80A

Technical Specification

Type		MCX 01	MCX 02	MCX 03	MCX 04	MCX 11	MCX 12	MCX 13	MCX 21	MCX 22	MCX 23	MCX 31
Catalogue no.		CS97009	CS97010	CS97011	CS97012	CS97013	CS97014	CS97015	CS97016	CS97017	CS97018	CS97019
Conformance to standards						IS/IEC 60947-4-1 & IEC 60947-4-1						
Preferred DG ratings (kVA)		7.5	15	20	25	30	40	50	50	62.5	82.5	82.5
Power contacts												
No. of poles		4	4	4	4	4	4	4	4	4	4	4
Number of built-in auxiliary contacts		-	-	-	-	-	-	-	-	-	-	1NO + 1NC
Rated insulation voltage, U_i		690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	1000V
Rated operational voltage, U_e		415V	415V	415V	415V	415V	415V	415V	415V	415V	415V	415V
Rated impulse withstand voltage, U_{imp}		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Conventional thermal current, I_{th}/Utilisation category AC1 at 40°C		**16A**	**25A**	**32A**	**40A**	**50A**	**63A**	**80A**	**80A**	**100A**	**130A**	**130A**
Service temperature		-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C
Main terminal capacity	With lug (sq mm)	1 x 6	1 x 6	1 x 6	1 x 6	1 x 16	1 x 16	1 x 16	1 x 35	1 x 35	1 x 35	1 x 120
	Link	-	-	-	-	-	-	-	1 x (12.5 mm x 3 mm)	1 x (12.5 mm x 3 mm)	1 x (12.5 mm x 3 mm)	2 x (25 mm x 3 mm)
	Solid conductor (sq mm)	2 x 4	2 x 4	2 x 4	2 x 4	2 x 10	2 x 10	2 x 10	-	-	-	-
	Multistrand conductors (sq mm)	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 6	2 x 6	2 x 6	-	-	-	-
Auxiliary terminal capacity	Solid or multistrand conductors (sq mm)	-	-	-	-	-	-	-	-	-	-	-
Coil												
Voltage available for 50Hz opn, U_c (V)		110, 220, 240, 415	110, 220, 240, 415	110, 220, 240, 415	110, 220, 240, 415	110, 220, 240, 415	110, 220, 240, 415	110, 220, 240, 415	240, 415	240, 415	240, 415	110, 240, 415
Pick-up	VA	68	68	68	68	180	180	180	190	190	190	550
Hold-on	VA	11	11	11	11	22	22	22	22	22	22	36
	Watts	4	4	4	4	5	5	5	5.5	5.5	5.5	10
Limits of operation	Pick-up (%U_c)	55 - 120	55 - 120	55 - 120	55 - 120	50 - 120	50 - 120	50 - 120	65 - 120	65 - 120	65 - 120	80 - 110
	Drop-off (%U_c)	30 - 50	30 - 50	30 - 50	30 - 50	25 - 45	25 - 45	25 - 45	40 - 60	40 - 60	40 - 60	35 - 65
Overall dimensions H x W x D in mm		83 x 45 x 83.7	83 x 45 x 83.7	83 x 45 x 83.7	83 x 45 x 83.7	80 x 83.5 x 91.8	80 x 83.5 x 91.8	80 x 83.5 x 91.8	109 x 103 x 120.5	109 x 103 x 120.5	109 x 103 x 120.5	175 x 183.5 x 152
Mounting dimensions H x W in mm		(60 - 65 - 70) x 35	(60 - 65 - 70) x 35	(60 - 65 - 70) x 35	(60 - 65 - 70) x 35	(55 - 58) x 70	(55 - 58) x 70	(55 - 58) x 70	80 x 85	80 x 85	80 x 85	115 x 165

Technical Specification

Type		MCX 32	MCX 33	MCX 34	MCX 41	MCX 42	MCX 43	MCX 44	MCX 45	MCX 46	MCX 47
Catalogue no.		CS97020	CS97021	CS97022	CS97023	CS97024	CS97025	CS97026	CS97027	CS97028	CS94291
Conformance to standards					IS/IEC 60947-4-1 & IEC 60947-4-1						
Preferred DG ratings kVA		100	125	160	200	225	250	320	380	437.5	500
Power contacts											
No. of poles		4	4	4	4	4	4	4	4	4	4
Number of built-in auxiliary contacts		1 NO + 1 NC	1 NO + 1 NC	1 NO + 1 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC	2 NO + 2 NC
Rated insulation voltage, U_i		1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V
Rated operational voltage, U_e		415V	415V	415V	415V	415V	415V	415V	415V	415V	415V
Rated impulse withstand voltage, U_{imp}		8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Conventional thermal current, I_{th} / Utilisation category AC1 at 40°C		**160A**	**200A**	**255A**	**325A**	**360A**	**400A**	**500A**	**600A**	**700A**	**800A**
Service temperature		-20°C to 55°C	-20°C to 55°C	-20°C to 55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C
Main terminal capacity	With lug (sq mm)	1 x 120	1 x 120	1 x 120	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240	2 x 240
	Link	2 x (25 mm x 3 mm)	2 x (25 mm x 3 mm)	2 x (25 mm x 3 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)	2 x (50 mm x 5 mm)
	Solid conductor (sq mm)	-	-	-	-	-	-	-	-	-	-
	Multistrand conductors (sq mm)	-	-	-	-	-	-	-	-	-	-
Auxiliary terminal capacity	Solid or multistrand conductors (sq mm)	-	-	-	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5	2 x 2.5
Coil											
Voltage available for 50Hz opn, U_c (V)		110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415	110, 240, 415
Pick-up	VA	550	550	550	2100	2100	2100	2100	1000	1000	1000
Hold-on	VA	36	36	36	95	95	95	95	25	25	25
	Watts	10	10	10	35	35	35	35	10	10	10
Limits of operation	Pick-up (%U_c)	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110	80 - 110
	Drop-off (%U_c)	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65	35 - 65
Overall dimensions H x W x D in mm		175 x 183.5 x 152	175 x 183.5 x 152	175 x 183.5 x 152	278 x 248 x 221	278 x 248 x 221	275 x 248 x 221	275 x 248 x 221	275 x 248 x 221	275 x 248 x 221	275 x 248 x 221
Mounting dimensions H x W in mm		115 x 165	115 x 165	115 x 165	170 x 225	170 x 225	170 x 225	170 x 225	170 x 225	170 x 225	170 x 225

Motor Starters
Direct On-Line & Star-Delta

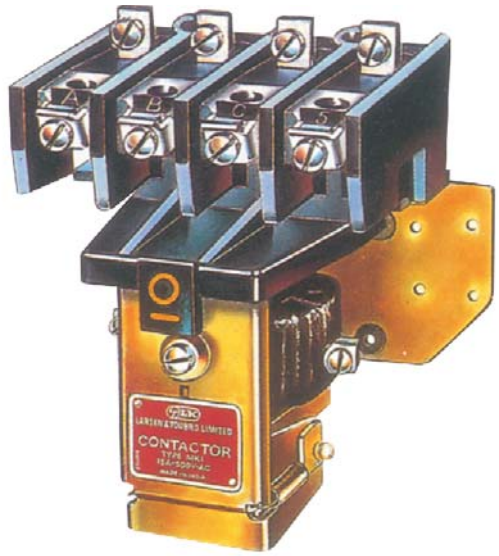
MK1 DOL Motor Starter

Motor Starters (Type MN) - Direct-On-Line & Star-Delta

Submersible Pump Controllers

MK1 DOL Motor Starter

Motor protection starts with a starter that has all the features that guarantee reliability. These features are built into L&T's MK1 - the most wanted starter in India today. L&T's MK1 is manufactured at L&T's modern factories at Ahmednagar where quality systems are ISO-9001 certified by BVQI - one of the world's leading accredited agencies.



Contactors

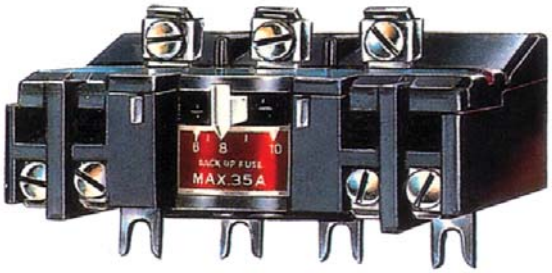
The contactor in the MK1 starter is designed for exceptional endurance. The coil is tropicalised and subjected to rigorous tests for continuity, pick-up and drop-off. It also acts as undervoltage release disconnecting the supply to motor when voltage is low. Each starter or contactor can be fitted with two auxiliary contact blocks of 1NO + 1NC each for indicating lamps, sequence interlocks and other pilot circuits.

Thermal Overload Relay

The thermal overload relay in a motor starter protects the motor against overloads and resulting burnouts. The MK1 relay can be manually reset by just pressing the STOP button. The relays are ambient temperature compensated for operation between 5^0C and 60^0C. You can select from a wide range of relays with easily adjustable current settings. All overload relays are individually tested on an automated test bench to ensure foolproof operation.

Push Button

The 'START-STOP' push buttons are designed for convenient operation. The stop push can be latched in the OFF position to prevent accidental starting.



Remote Control

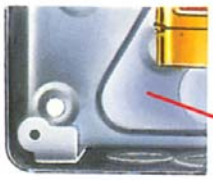
MK1 contactors and starters can be remotely controlled by push button stations, float switches, pressure switches, thermostats or any other auxiliary circuit.

Technical Specification

Main Contacts		**Spares Kit**	
No. of contacts	4	Cat. No.	SS 90983
Nominal rating at 50 Hz	15A at 500V	Contents	4 moving contacts 4 fixed contacts front 4 fixed contacts rear Spring & guides
Motor hp/kW at 415 V, 50 Hz for AC3	7.5/5.5		
Terminal Size		**Also Available As A Spare:**	
Wires upto	6 mm^2	Single moving contact SS91009 Spare Kit with Hardware - SS92845	
Coil Consumption		**Separate Auxiliary Contact Block**	
During closing	57 VA	(1NO + 1NC)	
When closed	13 VA (6W)		
Other Details		Cat. No.	SS 90120
max. number of full starts	30 per hour	Rating at 50 Hz	2A at 500V
Mechanical life	10 million operations	Terminal size - wires upto	2 x 2.5 mm^2
Contact life	More than 5 million operations for 15A, AC3 duty	No. of blocks that can be fitted after tapping the holes provided for the same of the contactor.	2
Making capacity at 50 Hz	88A at 0.3 pf at 457V	For Cat. Nos. of the other coil voltages and spares, please refer to our price list.	
Breaking capacity at 50 Hz	88A at 0.3 pf at 457V		
Weight (unpacked) in kg	2.20 SS. Encl. 1.00 Unenclosed		

Unique Features

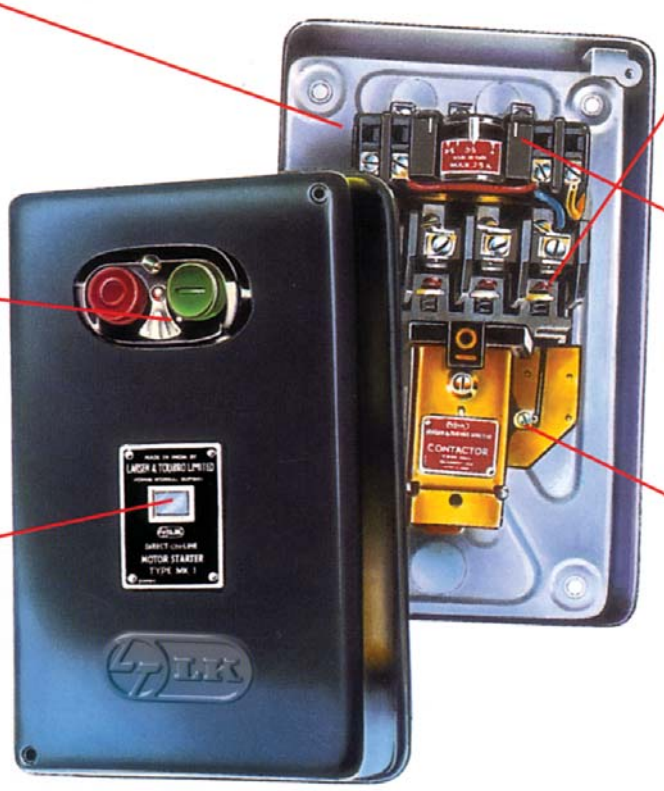
L&T's MK1 comes to you with improved packaging it is wraped in a polythene bag to prevent ingress of dust and water

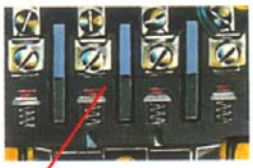


Enclosure
is dust, moisture and vermin proof with cord packing in the cover.

Latch
To prevent accidental starting; this latch keeps stop button pressed when required.

Window
Fool-proof ON/OFF indicator is visible through this window.



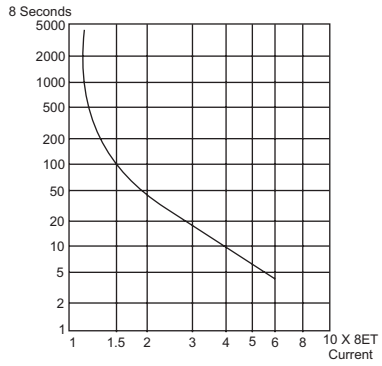


Contact System
Tested for millions of operations without failure. Robust silver tipped contacts. Double break, bounce-free design

Thermal Relay Unit
has accurately calibrated bimetallic elements with ambient temperature compensator for overload protection.

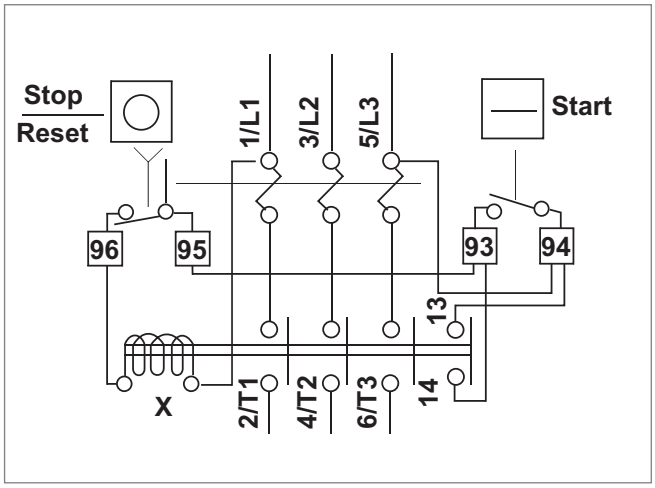
Solenoid Coil
Machine wound, taped; vacuum impregnated and baked; also tested for inter-turn short circuit and subjected to a 4000 Volts impulse test.

Tripping Curve*



* Starting from cold condition

Wiring Diagram



Relay Selection

Cat. No.	Motor Rating 240 V - 1 Phase			Motor Rating 415 V - 3 Phase			Relay Range	Back-up Type HF Fuse
	HP	kW	In (A)	HP	kW	In (A)	Amps.	Rating
				0.05	0.037	0.085	0.15 - 0.25	2A
				0.1	0.074	0.17	0.25 - 0.4	2A
				0.125	0.09	0.4	0.25 - 0.4	2A
				0.15	0.11	1.45	0.4 - 0.65	2A
				0.2	0.15	0.57	0.4 - 0.65	2A
				0.25	0.19	0.7	0.4 - 0.65	2A
				0.25	0.19	0.7	0.6 - 1.0	4A
	0.125	0.11		0.25	0.37	1.2	1.0 - 1.6	6A
				0.5	0.55	1.6	1.0 - 1.6	6A
	0.25	0.12	2	0.75	0.55	1.6	1.5 - 2.6	6A
				1	0.75	1.8	1.5 - 2.5	6A
SS96210	0.5	0.4	3.6	1.25	0.92	2.1	2.5 - 4.0	10A
				1.5	1.1	2.6	2.5 - 4.0	10A
				1.75	1.3	3	2.5 - 4.0	10A
				2	1.5	3.5	2.5 - 4.0	10A
	0.75	0.55		2.5	1.8	4.8	4 - 6.5	16A
				3	2.2	5	4 - 6.5	16A
				4	3	6.2	4 - 6.5	16A
				4	3	6.2	6 - 10	16A
	1	0.75	7.5	5	3.7	7.5	6 - 10	20A
	1.25	0.9	8	6	4.5	9	6 - 10	25A
	1.75	2.33					9 - 4	25A
	2	1.5	9.5	7.5	5.5	11	9 - 14	25A
SS96211	2	1.5	9.5	7.5	5.5	11	11 - 18	25A
SS96228	2	1.5	9.5	7.5	5.5	11	13 - 22	32A

Note: Amp rating of back-up fuse refers to the recommended,
HF type H.R.C. cartridge fuse.

Other Motor Starters Available

Type	For Motors upto kW	HP
DOL		
MU1/MB1	7.5	10
MU2/MB2	11.0	15
ML2	15.0	20
ML3	22.5	30
STAR-DELTA		
MK1	11	15
MU1/MB1	11	15
MU2/MB2	22.5	30
ML2	26	35
ML3	37	50
ML4	55	75
ML6	90	125
ML10	185	250
ML12	300	400

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.

IP54 degree of protection

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

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.

Salient Features

- Conforms to IS/IEC 60947-4-1 & IEC 60947-4-1
- 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 IP54^{0} of protection

Applications

MN starters are available in following versions:

- Direct-On-Line 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 (7.5 kW)
- MN 25 DOL-upto 15 HP (11 kW)
- MN 32 DOL-upto 20 HP (15 kW)
- MN 45 DOL-upto 30 HP (22.5 kW)
- MN 65 DOL-upto 45 HP (33.5 kW)

MN Star-Delta starters are available in following ratings:

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

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 In /$\sqrt{3}$ (0.58 In) 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 only in fully automatic version.

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 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.

MU-G10, MU-G15 & MU-G20

Three - Phase Submersible Pump Controllers

Features

- Protection from Single - Phasing
- Protection from Overload Conditions
- Protection from Phase Reversal
- Protection from Phase Unbalance 55V (±5V)
- Rugged MU Contactor with moulded coil
- Wide band coil, operates from -50% to +110% of rated coil voltage (e.g. 360V coil operates from 180V to 410V)
- Indication of healthy supply connection
- Auto Restart (with 30 Sec ON delay)
- Power ON & Pump ON indication
- Unique Dual Volt-ammeter & Ammeter
- Easy replacement of spares
- Terminal block for easy termination

Range

- MU-G10 DOL - upto 10 HP
- MU-G20 Star Delta - upto 20 HP
- MU-G15 Star-Delta - 7.5 HP to 15 HP

MU-G30 & MU-G50

MU-G75 Star-Delta – upto 75 HP

Features

- Offers wide operating band (65%-110%Uc).
- Fitted with MN5 relay.
- Selector switch to see voltage of three phases.
- Protection from negative phase sequence.
- Protection from overload.

MU-G75

Three - Phase Submersible Pump Controllers

Features

- Protection from single – phasing
- Protection from overload conditions
- Protection from phase reversal
- Protection from phase unbalance 55V (+/-5V)
- Proven & tested ML contactors
- Wideband coil operates from 65% to 110% of rated coil voltage (e.g. 380V Coil operated from 247V to 418V)
- Indication of healthy supply indication
- Auto Restart (with 30 sec ON Delay)
- Power ON & Pump ON indication
- Unique Dual Volt-Ammeter & Ammeter
- Easy replacement of spares
- Terminal block for easy termination

Range

- MU-G75 Star-Delta – upto 75 HP

Numerical Relays
For Protection, Monitoring & Control

The COMP series

Over Current and Earth Fault Relays

Current Sensing Relays

Reverse Power Relay, Under Voltage or Over Voltage Relay

Power Factor Control Monitoring Relays

Motor Protection Relay

Arc - Flash Protection Relay : PGR - 8800

The COMP series

- A complete industrial package for Protection, Control, Metering and Monitoring Fault data
  FCOMP : For Feeder, AC Machines and Transformer protection in LV & MV systems.
  MCOMP+ : Advanced Motor Control, Metering and Protection for Motor Feeder.

Salient Features

- **Modular design :** Facilitates user to select from a wide offering of optional features like voltage protection, additional IO and communications
- **Universal Aux. supply :** 80 - 290 VAC or 110 - 250 VDC
- **Detailed fault analysis :** Facilitated by a bank of 1024 event records and 64 oscillographic records
- **Highly scalable IO :** A default configuration of 2DI/2DO - compassed up to 29DI/23DO in the same unit itself
- **Communication :** Extensive range of standard industrial communication protocols includes Modbus RTU, Modbus TCP/IP, Profibus, IEC 61850-level A

IEC 61850 compliant

Model		FCOMP	MCOMP+
Description		3 phase O/C & E/F	Motor protection
Device code	Default	50P, 50N/50G, 50Q, 51P, 51N/51G, 51Q, 37P, 64, 50SG, 79, 86, 50BF, 47	50P, 50N/50G, 50Q, 51P, 51N/51G, 51Q, 49, 37P, 50SG, 66, 14, 50BF, 47, 87MH
	Optional*	27P, 27S, 59P, 59S, 59N, 47O+, 47O-, 81U, 81O, 81R, 67P, 67N, 67G, 32, 32R, 55, 51V, 60, 25	27P, 27X, 59P, 59X. 59N, 47O-, 81U, 81O, 81R, 32, 32R, 55, 51V, 60, 27LV
Design		Numerical relay	Numerical relay
Function available		Instantaneous Phase OC, Neutral OC/ Ground OC, Negative sequence OC	
		Timed Phase OC, Neutral OC/ Ground OC, Negative sequence OC	
		Under current	Under current, Thermal overload, Locked rotor
		Restricted Earth fault, Sensitive ground fault	Sensitive ground fault
		Phase sequence Monitoring	Phase sequence Monitoring
		Voltage*, Sequence Over voltage*	Voltage*, Negative Sequence Over voltage*
		Frequency*, Frequency Gradient*	Frequency*, Frequency Gradient*
		Directional Phase and Neutral/Ground OC*	Differential protection
		Power*, Power Factor*	Power*, Power Factor*
Other Functions		Breaker Failure, Auto Reclosure & Lockout	Breaker Failure
		VT Fuse Failure*, Voltage Restraint for Phase Timed OC*	
		Synchro Check*	Reacceleration, Max. no. of start, Prolong starting
Burden on CT		< 0.1 VA	
Burden on PT		< 0.1 VA	
Operating temperature		-20°C to 70°C	
Weight		4 kg approx.	
Mounting		Panel mounted	
Dim W x H x D in mm		160 x 285 x 252	
Auxiliary Supply		(80 - 290 VAC) or (110 – 250 VDC)	

Note : * Voltage based protections are enabled upon selection of additional voltage card.

- Three phase over current & earth fault relays

Salient Features

- Microcontroller based Numerical relay for Feeder, AC machines, and transformer protection in LV, MV and HV Systems
- Site selectable IEC Curves - 4 nos. of IDMT curves + 3 Definite time characteristics
- Universal Aux. supply: 24 - 240 VAC/ DC
- Large LCD Display and 4 LED's for fault indication
- Last 15 trip records with Date and Time stamping
- Built in self supervision and relay test facility
- Freely programmable output contacts - 4NO or 2NO + 2NC type with additional relay for IRF

Model	MC31AnX	MC61AnX
Description	3 Phase O/C + E/F	3 Phase O/C + E/F + Highset
Device code	51, 51N	51, 51N, 50, 50N
Design	Numerical relay	Numerical relay
Functions available	Lowset O/C - Is	Lowset O/C - Is
	Lowset E/F - Os	Highset O/C - Ihs
		Lowset E/F - Os
		Highset E/F - Ohs
Settings	O/C Is = 20 - 200% step 1%	O/C Is = 20 - 200% step 1%
	E/F Os = 5 - 80% step 1%	E/F Os = 5 - 80% step 1%
	Time characteristics available -	HS O/C = (0.2 to 40) x In step of -
	NI, VI, EI, definite time	0.1 In or disable
	TMS 0.01 - 1.6 in step of 0.01	HS E/F = (0.05 to 20) x On step of -
		0.1 On or disable
		Time characteristics available -
		NI, VI, EI, definite time
		TMS : 0.01 - 1.6 step of 0.01
Other features	Site selectable trip time char	Site selectable trip time char
		Highset can be disabled
	Display of currents, trip count	Display of currents, trip count
	Self supervision feature	Self supervision feature
Burden on CT	≤ 0.25 VA on CT/Phase	≤ 0.25 VA on CT/Phase
Burden on PT	Not applicable	Not applicable
Operating temperature	0^0C to 60^0C	0^0C to 60^0C
Weight	< 2kg	< 2kg
Burden on auxiliary supply	≤ 10 VA	≤ 10 VA
Output contact	1 N/O Contact for self supervision	1 N/O Contact for self supervision
Construction	Drawout	Drawout
Dim W x H x D in mm	121 x 158 x 224	121 x 158 x 224
Panel cutout	113 x 142	113 x 142
Ordering Information		
Auxiliary supply	24 to 240 V AC / DC	24 to 240 V AC / DC
CT Rating	1 A or 5 A (site selectable)	1 A or 5 A (site selectable)
Output contacts	4 NO or 2 NO + 2 NC	4 NO or 2 NO + 2 NC

- Single phase over current / earth fault relay - MC12
- Instantaneous over current relay - SC14S (for following applications only)
  1. Differential protection of Generator - 87
  2. Restricted Earth fault protection of Generator or Transformer - 87N/64REF

Salient Features

- Easy setting through front panel DIP switches
- Indication for power ON and trip status
- Test feature - helps in better maintenance
- Compact, light weight helps in reducing panel size & thickness

Model		MC12A	SC14S
Description		1 Ph O/C or E/F	Instantaneous current relay
Device code		50/51 or 50N/51N	87 / 87N / 64 REF
Design		Microcontroller based	Static
Functions available		Lowset O/C - Is	
		Highset O/C - Ihs	
		Lowset E/F - Os	
		Highset E/F - Is	
Settings		O/C Is = 50 - 200% Step 10% or	Is = 10 - 40% step 5% or
		E/F Is = 10 - 40% Step 2% or	20 - 80% step 10%
		E/F Is = 20 - 80% Step 4%	
		HS O/C = (2 - 16) xIs step 2 Is	
		HS E/F = (2 - 16) xIs step 2 Is	
		Time characteristics available -	Time characteristics available-
		NI, VI, EI, Definite time	Instantaneous (25ms) or
		3 ranges of def time (1, 10, 100)	time delayed 100ms / 200ms
		TMS : 0.1 - 1.6 Step 0.1	Self powered
Other features		Site selectable trip time char.	Relay testing possible by ext. 24V - Supply
		Highset can be disabled	Flag indication / LED indication
Burden on CT		≤ 0.25 VA on CT	≤ 6 VA
Burden on PT		Not applicable	Not applicable
Operating temperature		0°C - 60°C	0°C to 60°C
Weight		< 1.5kg	< 1.5kg
Burden on auxiliary supply		≤5.5 VA	Not applicable
Output contacts		2 C/O Contacts (S/R)	2 C/O Contacts (S/R)
Construction		Drawout	Drawout
Dim W x H x D in mm		71 x 158 x 224	71 x 158 x 224
Panel cutout		62 x 142	62 x 142
Ordering Information			
Auxiliary supply	Type 1	20 - 110 V AC / DC or	Not applicable
	Type 2	88 - 264 V AC / DC	
CT Rating		1A or 5A	1A or 5A
Range setting		10 - 40% or 20 - 80% or 50 - 200%	10 - 40% or 20 - 80%
		Site selectable	

Salient Features

- Easy setting through front panel DIP switches
- LED indication for power ON and trip status
- Test feature - helps in better maintenance
- Compact, light weight helps in reducing panel size & thickness

Model		MRP11	MV12
Description		Reverse power	1 Ph U/V or O/V
Device code		32	27 or 59
Design		Microcontroller based	Microcontroller based
Functions available		Reverse power level	Lowset U/V - Vs
			Lowset O/V - Vs
Settings		PT input Vn 110 V, 415 V AC	U/V Vs = 95-20% step 5%
		CT input In 1 A / 5 A	O/V Vs = 105-180% step 5%
		Pick up level 1% - 15%	Time characteristics available-
		Min. setting 0.5%	Inverse time, definite time
		TMS 0 to 1.5 step 0.1	TMS : 0.1 - 1.6 Step 0.1
		Definite time characteristics	
Other features		LED indication	Site selectable U/V or O/V
		Test feature	Site selectable trip time char.
Burden on PT		< 0.25 VA	< 0.25 VA
Burden on CT		< 0.05 VA	0.075 VA on PT
Operating temperature		0^0C to 60^0C	0^0C to 60^0C
Weight		< 1.5kg	< 1.5kg
Burden on auxiliary supply		< 8 VA	8 VA
Output contacts		1 N/O + 1 C/O	2 C/O Contacts (S/R)
Construction		Drawout	Drawout
Dim W x H x D in mm		71 x 158 x 224	71 x 158 x 224
Panel cutout		62 x 142	62 x 142
Ordering Information			
Auxiliary supply	Type 1	20 - 110 V AC / DC	20 - 110 V AC / DC
	Type 2	88 - 264 V AC / DC	88 - 264 V AC / DC
CT Rating		1A or 5A	Not applicable
PT Rating		Upto 380 V AC	110V / 240V / 415V (site selectable)

Power Factor Control Monitoring Relays

- Intelligent power factor controller relay

Salient Features

- On line display of system PF
- Easy setting through - front panel push button
- Suitable for non-uniform banks
- LED indication for alarm code, no. of banks selected, PF status-lead / lag / unity
- Auto / Manual mode
- Measurement sensitivity of 1%
- Automatic C/K correction
- Display of Current, Voltage, kVAr, & Capacitor values

Model	RPM-14
Description	Automatic power factor controller 14 stage
Design	Microcontroller based
Functions available	Automatic PF control upto 14 stage
Settings	Switching time 1-255 sec
	in step of 1 sec for same
	Bank switching
	Auto C/K selection
	PF control range 1% to 120% of rated current
Other features	Can accept unequal banks
	Display of PF, V, I, kVAr
	LED indications for faults
	Alarm signal for CT reversal,
	under current, under compensation,
	over compensation, over voltage,
	1A / 5A field selectable
Burden on CT	0.3 VA
Burden on PT	15 VA
Operating temperature	0°C to 60°C
Weight	< 2kg
Output contacts	14 N/O
	1 N/O contact for alarm
Dim W x H x D in mm	144 x 144 x 100
Panel cutout	138 x 138
Ordering Information	
Auxiliary supply	240 V AC

- Intelligent motor protection & control relay - MCOMP
- Economical motor protection relay - MPR 300

MCOMP Relay

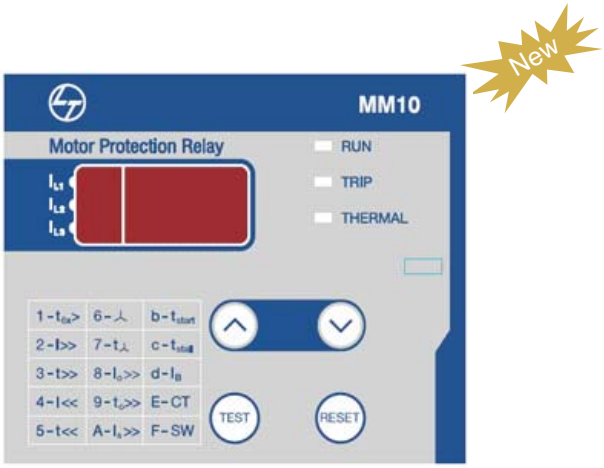
MPR 300

Model	MCOMP	MPR 300
Description	Motor protection	Motor protection
Device code	49, 14, 46, 50N, 37, 59, 27, 47,	49, 51LR, 64, 46, 37
	81H, 81L, 66, 27LV, 47a, 47b	
Design	Numeric	Numeric
Functions available	Thermal over load	Thermal overload
	Locked rotor	Locked rotor
	Current unbalance	Earth fault
	Phase loss	Single phasing
	Under current	No load running
	Over voltage	Phase sequence reversal
	Under voltage	
	Over frequency	
	Under frequency	
	Max. no. of starts	
	Reacceleration	
	Phase reversal	
Other features	Intelligent relay with separate	upto 88A
	protection, display and CT	Trip time characteristics
	modules	as per
	Suitable for 50 / 60 Hz	IEC947
	Can be used with DOL,	
	RDOL and Star delta starters	
	Communication options -	
	Modbus RTU, Modbus TCP IP and Profbus	
Burden on PT	Not applicable	Not applicable
Burden on CT	Not applicable	Not applicable
Operating temperature	10 to 60^{0}C	0-60^{0}C
Weight	< 2kg	< 0.5kg
Burden on auxiliary supply	< 8 VA	< 8 VA
Output contacts	4 C/O	1NO + 1NC
Dim W x H x D in mm	Split protection unit 92 x 123 x 103.95	Not applicable
Auxiliary supply	80 - 240 V AC / DC	240 V AC

- Comprehensive Motor Protection Relay for protection of medium and large size Induction Motors - MM10

Salient Features

- Microprocessor based Numerical relay
- 4 Digit LED display
- 2 C/O output contacts
- Previous trip data recording
- 1 no. programmable binary input
- Programmable protection function settings



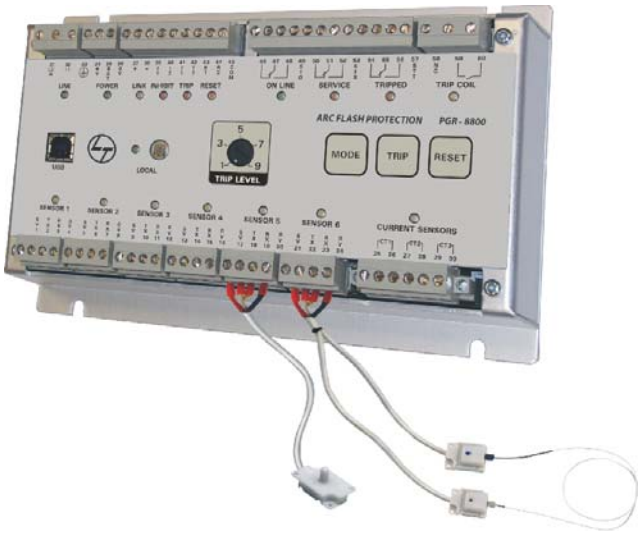
Model	MM10
Description	Motor protection
Device code	37, 46, 49, 50/ 51, 51LR, 64
Frequency	50 Hz
Design	Numerical relay
Functions available	Thermal overload with warning
	Short circuit
	Undercurrent
	Unbalance
	Phase loss
	Phase sequence reversal
	Earth fault
	Prolonged starting, Locked rotor
Burden on CT	0.3 VA at rated current
Burden on PT	not applicable
Maximum power consumption	3 VA typical
Output Contact	2 C/O
Operating temperature	-5^{0}C to +55^{0}C
Weight	0.75 kg
Mounting	Panel mounted
Dim W×H×D in mm	96 × 96 × 110
Panel Cut Out in mm	90 × 90

Ordering Information

Cat nos.	Auxiliary supply	CT input
MM10240X005	110 - 240 V AC/DC	5 A secondary
MM1048X0005	24 - 72 V DC	5 A secondary

Introduction

L&T's PGR-8800 arc flash protection system is a high speed device for protection of electrical power systems against arc flash. It has one local sensor and supports both point and fiber optic sensor technologies for optical arc detection. There are inputs for 6 optical sensors and 3 current sensors.



Salient Features

- Redundant internal trip path
- Continuous sensor health monitoring
- Combination of point and fiber sensors
- CT connections provided to avoid nuisance trips
- Optional upstream tripping
- Settings configuration through simple plug and
- play software
- Interconnection of maximum 4 relays possible
- using 'Link'
- Communication with DCS/SCADA possible using MODBUS

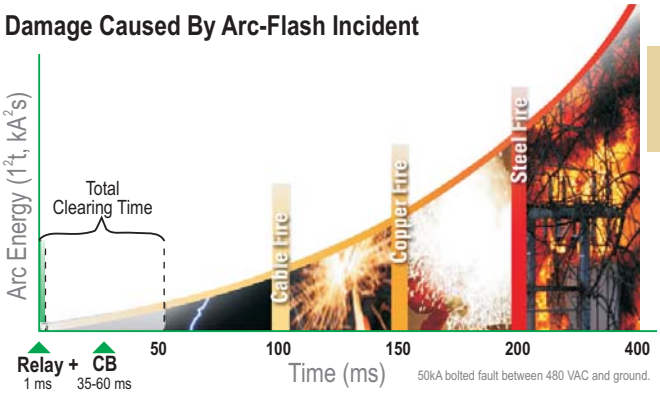
In the event of an arc flash, copper fire occurs within 150 ms of arcing leading to devastation of switch board. System needs to be tripped in less than 100 ms to avoid major damage.

L&T's arc flash protection system PGR-8800 combines the data from reliable optical sensors along with an efficient micro-controller based algorithm to generate a trip within 1 ms of arc detection.

Power may be disconnected within 35-50ms depending on the breaker operation time.

The system is easy to use and can be easily retrofitted into an existing power protection system without major wiring changes. This lowers the hazard risk category of the equipment.

Damage Caused By Arc-Flash Incident



Panel Accessories

Rotary Switches - AC & DC

Load Break Switches

Cable Ducts

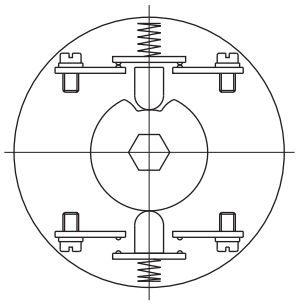
Weather Proof Isolators

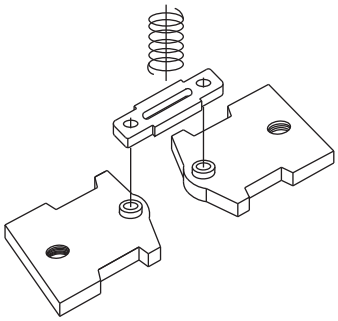
Analog Panel Meters & CT

Digital Panel Meters

Timing Devices & Supply Monitors

Modular Remote Control Units


Cam Assembly


Contact Assembly

General Instruction

Series S, TP, RT and SL Cam Switches incorporate two double break silver alloy contacts per stage at 180 degree disposition. The AC Switches are 'Quick Make-Slow Break' with in-built latching device feature in cam design. The Cam Switches can be offered for DC applications with additional contacts in series according to the DC switching voltage and with suitable duration the DC Switches are 'Quick Make - Quick Break'.

Contacts	:	Double break type AgCdO	Operating temp	:	-15°C to 55°C
Insulation	:	Glass filled polyamide with high tracking index	Operating frequency	:	50 to 60 Hz
			Humidity	:	95%, Rh 48 hours

S Series
Open Version

- Available from 6 to 400A
- Open terminals for easy accessibility

TP Series
Touch Proof

- Available from 6 to 20A
- Finger protection (IP20)

RT Series
Touch Proof &
Rear Termination

- Available from 16 to 63A
- Finger protection
- Convenient accessibility

SL Series
Touch Proof &
Screwless Termination

- Available from 6 & 10A
- Finger protection (IP20)
- Cage clamp

AC Duty Rating

DC Duty Rating

Category	Typical AC Application	Category	Typical DC Application
AC-1	Non-Inductive or slightly inductive loads, Resistance furnaces	DC-1	Non-Inductive or slightly inductive loads, Resistance furnaces
AC-3	Squirrel-cage motors : starting switching off motors during running	DC-22	Switching of resistive loads, Including Control of DC electromagnets
AC-15	Control of AC electromagnetic loads	DC-13	Switching of motor loads or other
AC-21-A	Switching of resistive loads, Including moderate overloads (frequent switching)	DC-23	Highly inductive loads
AC-23-A	Switching of motor loads or other highly inductive loads (frequent switching)	----	-----

Technical Specification

IEC/EN Ratings

AC Rating Code	Unit	S6 TP6	S10 TP10	S16 TP16 RT16	S20 TP20 RT20	S25 RT25	S32 RT32	S40 RT40	S63 RT53	S80	S100	S125	S200
Rated Operational Voltage (U_e)	V	440	440	690	690	690	690	690	690	690	690	690	690
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated Impulse with stand Voltage (U_{imp})	kV	4	4	6	6	6	6	6	6	6	6	6	6
Rated Operational Current (I_e) AC21/AC1	A	6	10	16	20	25	32	40	63	80	100	125	200
Rated Uninterrupted Current (I_{th})	A	8	12	20	25	32	40	50	80	100	125	150	225
Rated Operational Power													
AC23A "3 Ph, 415V"	kW	2.2	3	7.5	7.5	11	15	18.5	22	33	41	45	55
	A	- -	- -	13	13	19	26	32	38	57	71	78	95
AC3	kW	1.5	3	5.5	5.5	7.5	11	15	18.5	22	33	37	45
"3 Ph, 415V"	A	- -	- -	10	10	13	19	26	32	38	57	64	78
Short Circuit Capacity													
Rated Fuse Short Circuit Current	kA	3	3	5	5	10	10	20	20	25	25	25	25
Fuse Size (Type gG/gM)	A	6	10	16	20	25	32	40	63	80	100	125	200
Terminal Cross Section													
Single / Multiple min	mm^2	0.7	0.7	1.5	1.5	1.5	2.5	2.5	4	6	10	10	10
max	mm^2	1.5	1.5	4	4	4	6	10	16	25	35	50	70
Fine strand min	mm^2	0.7	0.7	1	1	1	1.5	2.5	2.5	6	10	10	10
max	mm^2	1.5	1.5	2.5	2.5	2.5	4	6	10	16	25	35	50
Terminal Cross Section	Metric	M3.5	M3.5	M3.5	M3.5	M4	M4	M5	M5	2XM5	2XM5	2XM5	M10
Terminal Tightening Torque	Nm	0.8	0.8	0.8	0.8	1.2	1.2	2	2	2.5	2.5	2.5	2.5

Note : Rated Duty: 8 Hours, Installation, Operation and Maintenance Condition: Suitable for Environment A (for Industrial Application). Switch life under standard operating conditions: Mechanical 100,000 operations @ 300 cycles / hour, Electrical 10,000 operations at 100% rated duty for 120 cycles / hour.

CSA/UL Ratings

AC Rating Code	Unit	S6	S10	S16 TP16 RT16	S20 TP 20 RT 20	S25 RT25	S32 RT32	S40	S63	S80	S100	S125	S200
Ampere Rating	A	6	10	15	20	20	30	40	55	80	100	100	175
Operational Voltage	V	460	460	600	600	600	600	600	600	600	600	600	600
HP Rating 1 Phase													
120V	HP	0.25	0.33	0.33	0.33	1.5	1.5	2	3	-	-	-	-
240V	HP	0.50	0.75	1	1	3	3	5	7.5	-	-	-	-
3 Phase													
120V	HP	0.75	1	1.5	1.5	3	3	5	7.5	10	10	10	15
240V	HP	1	1	3	3	7.5	7.5	10	15	20	20	20	25
480V	HP	1	2	3	3	10	10	20	30	40	40	40	50
600V	HP	-	-	5	5	15	15	24	40	50	50	50	50

Note : AC4 rating = AC3 rating / 2, Star Delta rating = 60% of AC3 rating

Conformance to standards :
European : IEC-60947-1 : 1988
IEC-60947-3 : 1990
IEC-60947-5 : 1992
Canadian : CSA 22.2 No.14-2010
American : UL 508 (2009)

Construction and Features

D16 - D63

D Series Switches are designed for DC switching applications. These switches are constructed using snap action mechanism which provides 'Quick Make Quick Break' of contacts which is essential for DC switching. The contacts are of AgCdO, double break and butt type housed in a glass filled polyamide contact stage and are operated through cams for higher electrical endurance and smooth operation.

Suitable for 90 and 60 degree switching programmes and applicable for both AC and DC switching. Suitable switching programmes for Isolator, Changeover, Multistep and Gang Switches etc. are offered.

DC Switches D100A - D500A

Features

- Housing made up of SMC material for rigidity and higher mechanical strength
- 'Wiping contacts' operations helps in dust free & self cleaning concepts
- Extended terminals for Bus bar / Aluminium cable connections
- Capstone handle operation for better leverage

CPRI Tested

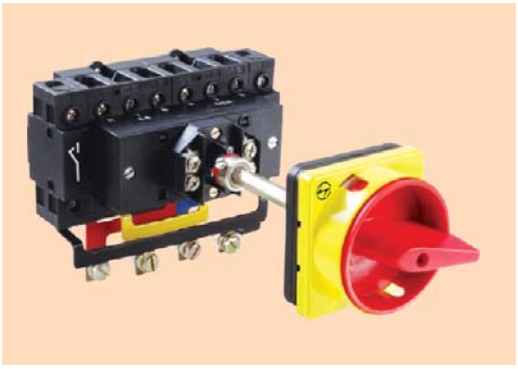
Applications

- D40R - Railway coaches lighting & fan circuits switching
- All DC power circuits - Railways, Telecommunications & Power plants
- Battery charging equipment

DC Ratings	Description		Unit	Rated Operational Current Ie				
				Switch Type				
				D 16	D 25	D 32	D 40	D 63
Rated on Interrupted Current (I_{th})			A	20	32	40	50	80
DC 22A L/R 2m sec								
Rated Operational Voltage	110V	250V	A	16	25	32	40	63
No of Series Contacts	1	2						
AC Ratings	AC3 Rating 3 Phase	380-440 V	HP	7	10	14	20	25
	AC21 Rating		A	16	25	32	40	63
General	Fuse Protection		A	16	25	32	40	63
	Short Circuit Through Fault Current		kA	5	10	10	20	20
	Terminal	[Rigid] min	mm^2	1.5	1.5	1.5	1.5	1.5
	Cross Section	[Flex] max	mm^2	4	4	6	10	16
	Tightening Torque		Nm	0.8	1.2	1.2	2	2
	Maximum Contact Stages			16	10	10	6	6

Description	Unit	D 100	D 200	D 300	D 400	D 500
Duty Rating - DC 22 A L/R 2m sec						
Operational Voltage	V DC	250	250	250	250	250
Voltage for AC Rating	V AC	460	460	460	460	460
Operational Current	A	100	200	300	400	500
Thermal Current (I_{th})	A	125	250	375	500	625
Switching Angle	Deg	90	90	90	90	90
Maximum Contact Stages		9	9	9	9	9

LB Series Load Break Switches comply with the latest specifications for modern low voltage devices.



Outstanding electrical characteristics of LB Switches with compact design, contribute to space saving installation and operational convenience.

Basic construction and design of the switch makes it compact, safe and highly reliable.

The switch uses polyamide glass filled material, having excellent track resistance (CTI) for insulation to prevent flashover between phases in the most severe conditions.

The special contact design and configuration makes the switch highly reliable to withstand high short circuit currents.

Features

- Double break contracts
- Polycarbonate shroud for wired terminal protection is included
- Excellent switching and high short circuit capacity
- Compact and reliable
- Easy installation
- Versatile mounting options, i.e. front mounting, rear mounting DIN 35 and enclosure mounting
- Quick, simple and convenient, dia. 22.5 mm single hole mounting is offered for 16A/20A switches with padlocking option
- Finger protection - IP 20
- Terminal screws with fixed clamp for easy wiring
- Add-on main/neutral/auxiliary contacts can be mounted on both sides of the switch at site
- 4th Pole addition is possible at site

Applications

- Isolator
- Motor Start and Stop
- Manual Motor controller as Motor Disconnect
- Main Switch
- Emergency ON-OFF
- Control Switch
- Changeover Switch

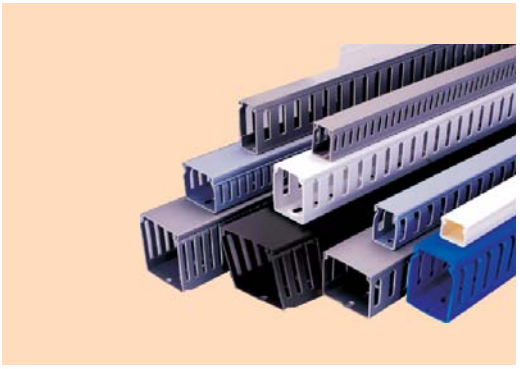
Available in ABS / Sheet Steel Enclosure and Aluminium

Technical Specification

UL Standard	UL508
European Standard	IEC60947-3, EN60947-3

Data	Measure	Switch Code	LB116	LB120	LB225	LB232	LB240	LB263	LB4080	LB4100	LB4125
Rated Operational Voltage, U_e											
IEC/EN	Volts	V	690	690	690	690	690	690	690	690	690
UL	Volts	V	600	600	600	600	600	600	600	600	600
Main Switch: Isolating Voltage upto	Volts	V	750	750	750	750	750	750	750	750	750
Resistance to Surge Pulse Voltage, U_{imp}	Volts	kV	6	6	6	6	6	6	6	6	6
Rated Uninterrupted current, I_u	Amp	A	16	20	25	32	40	63	80	100	125
Rated Uninterrupted current, I_e											
IEC/EN											
AC 22	Amp	A	16	20	25	32	40	63	80	100	125
AC-21A	Amp	A	20	25	32	40	63	80	80	100	125
AC-1	Amp	A	20	25	32	40	63	80	80	100	125
Rated Operational power at 50 to 60 Hz											
AC-23A IEC/EN											
3 Phase, 3 Pole	220-240V	kW	7.5	7.5	11	15	22	30	37	44	60
	380-440V	kW	15	15	22	22	45	45	90	90	90
	500-690V	kW	15	15	22	22	45	45	90	90	90
AC-3 IEC/EN											
3 Phase, 3 Pole	220-240V	kW	4	5.5	8	11	15	22	30	37	44
	380-440V	kW	5.5	11	15	15	30	30	55	55	55
	500-690V	kW	11	11	15	15	30	30	55	55	55
Short Circuit Capacity: (IEC/EN)											
Max. Fuse Size (Type gG)	Amp	A	20	20	32	32	63	63	125	125	125
Rated fused short circuit current	Amp	kA	5	5	30	30	30	30	30	30	30
UL/CSA Rating (Power)											
DOL Rating											
3 Phase 3 Pole	120V	HP	1.5	1.5	3	3	5	7.5	5	7.5	7.5
	240V	HP	3	3	7.5	7.5	10	15	20	20	30
	480V	HP	7.5	7.5	15	20	20	25	30	30	40
	600V	HP	10	10	20	25	30	30	40	40	50
1 Phase	120V	HP	0.5	0.5	1.5	2	3	3	3	3	3
	240V	HP	1.5	1.5	2	3	5	7.5	7.5	7.5	7.5
Short Circuit Capacity (UL)											
Fuse	Type	Class	RK5	RK5	J	J	J	J	J	J	J
Max. Fuse Size	Amp	A	20	20	45	45	70	70	125	125	125
Rated Fused Short Circuit Current	Amp	kA	10	10	10	10	10	10	10	10	10
Terminal Cross Section											
Solid/Multiple Strand Wire		Min-mm^2	1	1	2.5	2.5	2.5	2.5	2.5	2.5	2.5
		Max-mm^2	4	4	10	10	25	25	50	50	50
Fine-Strand Wire with Sleeve		Min-mm^2	0.5	0.5	0.75	0.75	2.5	2.5	4	4	4
		Max-mm^2	4	4	6	6	10	10	50	50	50
American Wire Gauge		AWG	12	12	10	10	6	6	1	1	1
Thread Dimensions for Terminal Screw			M3.5	M3.5	M4	M4	M4	M4	M6	M6	M6
Recommended Tightening Torque for terminals		Nm	0.8	0.8	1.7	1.7	2	2	2.5	2.5	2.5

Features



- Manufactured from specially compounded high-impact rigid polyvinyl chloride
- Will not peel, chip or crack
- Resists oil, salt solution and fungus
- Nonflammable, warp-proof and non-brittle
- High dielectric strength and withstands temperature upto 60^{0}C
- Unique cover locking design prevents popping up of wires while removing cover
- Elongated slots at the bottom allow flexible mounting
- Heavy & robust sections

Applications

- Facilitates systematic Wiring
- Enhances aesthetics and clarity
- Permits faster connections, addition and fault tracing of wires
- Avoids bunching and tapping
- Provides complete electrical insulation
- CE marked

Material Specification

- Material : High impact, self extinguishing, warp-proof rigid PVC
- Other materials such as chlorine free PPO is available on request

Colour

- Standard : Greenish grey for B type and light grey for A type
- Other colours : Black, Ivory, White, Blue and Green are available for large quantities

Mechanical Properties

- Tensile strength - 390 kg/cm^{2} IZOD
- Impact strength - 7 kg.cm/cm

Electrical Property

- Dielectric strength - 36 kV/mm
- Specific resistance - 6.1 x 10^{14}

Thermal Properties

- Flammability - UL 94 VO

Weather Proof Isolators

- Switch mounted in ABS / Polycarbonate / Aluminum / Sheet steel enclosure
- Round padlocking device (max. 3 padlocks) to prevent the Switch from being made to ON by unauthorised personnel
- Knob version available on request
- Switch rear mounted for easy connection
- Degree of protection : IP65
- Red / Yellow-handle colour for Main / Emergency Switches
- Enclosure colour : Dark grey base and light grey cover
- Door Interlock

Technical Specification

European Standard	IEC 60947-1 & 3, EN 60947, VDE 0660-107

Rating		Measure		LB116	LB120	LB225	LB232	LB240	LB263	LB4080	LB4100	LB4125
Rated Operational Voltage, Ue												
IEC/EN/VDE 50 Hz, AC		Volts	V	380-440	380-440	380-440	380-440	380-440	380-440	380-440	380-440	380-440
UL/CSA 50 Hz, AC		Volts	V	600	600	600	600	600	600	600	600	600
Main Switch: Isolating Voltage Upto		Volts	V	750	750	750	750	750	750	750	750	750
Resistance to Surge PulseVoltage, Uimp		Volts	kV	6	6	6	6	6	6	6	6	6
Rated Operational Current, Ie												
IEC/EN/VDE, AC 23A		Amp	A	16	20	25	32	40	63	80	100	125
Short Circuit Size (IEC/EN/VDE)												
Max. Fuse Size (Type gL)		Amp	A	16	25	25	32	40	63	80	100	125
Rated fused short circuit current		Amp	kA	5	5	30	30	30	30	30	30	30
UL/CSA Power Rating: Manual Motor Control, Suitable as Disconnect												
DOL 50 Hz, AC	3 Phase, 3 Pole	120V	HP	1	1	3	3	5	7.5	5	7.5	7.5
		240V	HP	3	3	7.5	7.5	10	15	10	15	15
		480V	HP	7.5	7.5	15	20	20	25	30	30	40
		600V	HP	10	10	20	25	30	30	40	40	50
	1 Phase	120V	HP	0.5	0.5	1.5	2	3	3	3	3	3
		240V	HP	1.5	1.5	2	3	4	7.5	7.5	7.5	10
Short Circuit Capacity (UL/CSA)												
Max. Fuse Size		Amp	A	25	25	50	50	70	70	100	100	125
Fuse Rating, J Type		Amp	A	20	20	45	45	70	70	90	90	90
Rated Fused Short Circuit Current		Amp	kA	10	10	10	10	10	10	10	10	10
Terminal Cross Section												
Single/Multiple Strand Wire		Min-mm^2		1.5	1.5	1	1	4	4	6	6	6
		Max-mm^2		6	6	10	10	16	16	70	70	70
Fine-Strand Wire with Sleeve		Min-mm^2		0.5	0.5	0.75	0.75	2.5	2.5	4	4	4
		Max-mm^2		6	6	6	6	10	10	50	50	50
American Wire Guage		AWG		12	12	8	8	6	6	1	1	1
Recommended Tightening Torque		Nm		0.8	0.8	1.7	1.7	1.7	1.7	2.5	2.5	2.5

L&T's Ivory series of analog panel meters and current transformer provide you with reliable monitoring and indication of various electrical parameters.

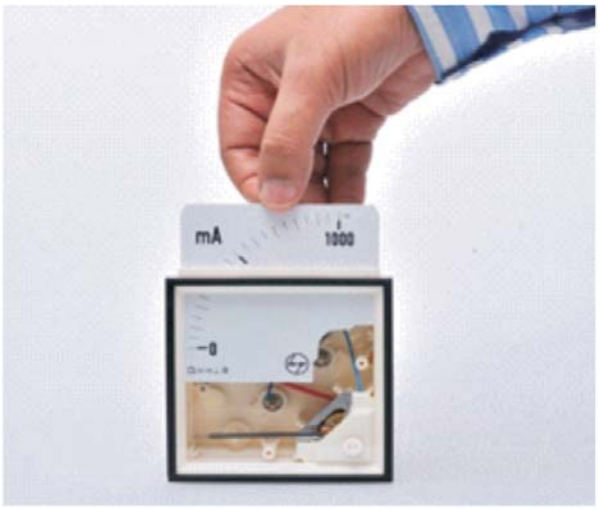
The product range includes

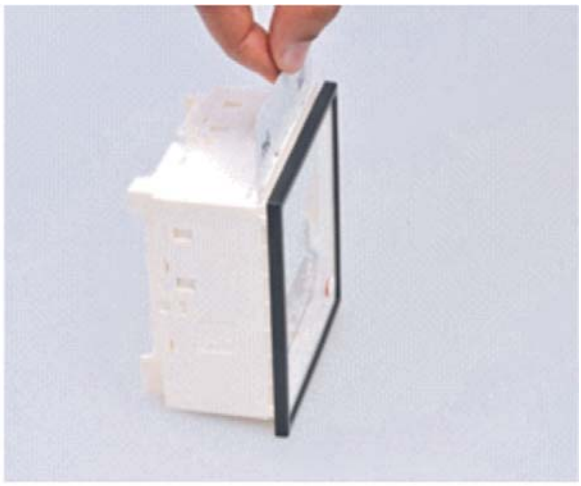
- Ammeters
- Voltmeters
- Wattmeters
- VAR meter
- Power factor meters
- Frequency meters
- Current transformers
  - Rectangular
  - Ring type

Rectangular

Ring type

The analog meters have wide current measuring range of 100 mA to 100 A and voltage measuring range of 6V to 1000V. They provide flexibility and ease in interchange ability of scales thus reducing the inventory levels.





It is available in sizes of 72 x 72, 96 x 96 and 144 x 144 and scale – 90 degree.

The limited range of CTs includes the 7 most popular sizes with ratio ratings from 30/5 to 4000/5. It also has a wide range of current ratings, busbar sizes, case widths and apertures. They have sealable terminal covers with base mounting and busbar mounting option.

They are used in switchgear, distribution system, generator sets, control panels, overload protection.

LED Digital Panel Meter

VEGA Series (96 x 96 mm)

Single Function Digital Panel Meter - VEGA

- Wide operating range of auxiliary supply
- Field programmable CT/PT ratio with password protection
- Auto scaling of Kilo and Mega
- Displays average and phase quantities*
- Inbuilt selector switch
- Auto and manual scrolling*
- Phase indication of displayed parameter through LED*
- Ammeter with secondary currents of 1A and 5A

* Applicable to 3 Phase Meters

VAF Digital Panel Meters - VEGA

- 3 line LED display
- Measures V, A, f, RPM and pf
- Models with secondary current of 5A and 1A
- Password protected programming mode through keypad includes
  - ➢ RPM : Number of poles programmable from 2 to 16
  - ➢ CT/PT ratio
- Suitable for 50/60 Hz electrical systems
- Auto scaling of Kilo & Mega LEDs

Multifunction Digital Panel Meters - VEGA

- 3 Line LED display
- Parameters measured - V, A, f, pf, Neutral Current, Phase angle, Power, Energy, MD kVA, MD kW, average load
- Site selectable secondary current of 5A and 1A
- Unidirectional / bidirectional recording
- Cumulative import & export and recording of reset parameters
- Current reversal indications
- Total Harmonic Distortion (THD) display
- Programmability and communication through RS485 port
- Easy programmability through key pad
- Field programmable CT & PT ratios with password protection
- Two relays provided for tripping fault circuits on preprogrammed abnormal system conditions (Optional)
- Available in three ranges - Model A, B, C
- Auto scaling of Kilo, Mega & Giga LEDs
- Freeze mode feature

LED Digital Panel Meter

Technical Specification

(Common for Single Function, VAF & Multi-Function Panel meters)

Model	VEGA	
Auxiliary Supply	Auxiliary voltage	Single function : 90 to 300 V AC
		VAF : 90 to 300 V AC
		Multifunction : 80 to 300 V AC
	Auxiliary burden	< 4 VA
	Frequency range	50 Hz ± 5%
Measuring Circuit (Parameters as applicable to individual meters)	Class of accuracy	For voltage and current : Class 1.0, Class 0.5#
		For frequency : 0.2% of mid frequency
		(Parameters as applicable to individual meters)
	Measurement circuit burden	< 0.2 VA per phase
	Input voltage measurement range	10V to 300V (P-N) 17.32V (P-P) to 520V (P-P)
	Basic current	-/5A, -/1A
	Input current measurement range	2% to 120% of basic current
	Voltage range for class of accuracy	57.7V (P-N) to 277V (P-N) 100V (P-P) to 480V (P-P)
	Current range for class of accuracy	5% to 120% of basic current
	Input frequency range	45 Hz to 65 Hz
Insulation Properties	Impulse voltage test	±4 kV as per IEC 62053-21
	AC voltage test	4 kV double insulation as per IEC 62053-21
	Insulation resistance	500 V DC as per IS 13779
Electrical Requirements	Test of power consumption	as per IEC 62053-21
	Voltage dips and interrupts	as per IEC 61326-1
	Short time over current protection	For Multifunction, VAF and Ammeter :
		20 times of I_{max} for half a second as per 7.2 of IEC 62053-21
		(Not applicable for Voltmeter and Frequency meter)
Electro-Magnetic Compatibility (EMC)	Fast transients burst test	±4 kV as per IEC 61000-4-4
	Immunity to electrostatic discharge	±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2
	Radiated, radio-frequency, electromagnetic field immunity test	10 V/m as per 61000-4-3
	Immunity to electromagnetic HF fields through conducted lines	3V as per IEC 61000-4-6
	Surge immunity test	±4 kV as per IEC 61000-4-5
	Rated power frequency magnetic fields	1 A/m as per IEC 61000-4-8
	Emission	Class B as per CISPR 22
Operating Conditions	Operating temperature	0°C to +55°C
	Storage temperature	-20°C to +70°C
	Humidity	0 to 95% relative humidity non-condensing
Mechanical Tests	Shock	40 g in 3 planes
	Vibration	10 to 55 Hz, 0.15 mm amplitude
	Casing	Plastic mould protected to IP51 from front side
Dimensions	Weight	Single function : 255 g (approx.) VAF : 350 g (approx.) Multifunction : 400 g (approx.)
	Dimensions	Single Function : 96* 96* 45 mm (approx.) VAF : 96* 96* 45 mm (approx.) Multifunction : 96* 96* 65 mm (approx.)
Certifications	CE	

Class 0.5 applicable for multifunction meters

LCD Digital Panel Meter

Multifunction Meter - QUASAR (96 x 96 mm)

The meter is designed with DSP technology to combine measurement of both instantaneous and cumulative values in an electrical feeder. The parameters are displayed over 22 screens that can be scrolled up & down by front panel push buttons.

- Class 0.5 & 1.0 as per IS & IEC standards
- kWh, kVArh & kVAh
- LCD with back light
- CT/PT ratio programming
- RS485 communication
- Phase sequence
- Harmonic measurement

Technical Specification

Model	QUASAR	
Accuracy	For power Class 1.0 IEC 62052-11, 62053-21/ IS 13779	
	For voltage ±10%	
	For current 0.5% of readout ± 2 digits	
Voltage (Vn)	3 Ph 4W- 415 V AC (-40% to +20%)	
	3 Ph 4W- 110 V AC (-40% to +20%)	
	3 Ph 3W- 110 V AC (-40% to +20%)	
Current (In)	5A or 1 A (I_{max} = 2In)	
Starting Current	0.2% in (Class 1.0)	
Frequency	50 Hz ±5%	
Load Characteristics	< 8 VA in potential circuit	
	< 0.5 VA in current circuit	
Electromagnetic Compatibility:		
Electrical Fast Transient	As Per IEC 62052-11, 62053-21, Test Level: 4 kV, 5k Hz	
Surge Immunity	As Per IEC 62052-11, 62053-21, Test Level: 4 kV	
Influence of Short Time Over Currents	20 times I_{max} for 0.5 sec at rated frequency. As per IEC 62053-21	
Case Material	Plastic moulded protected to IP51- IEC 62052-11, 62053-21/IS 13779 (Class 1.0) (with panel)	
Insulation Properties:		
Insulation Resistance	As per IEC 62052-11, 62053-21 / IS 13779 (Class 1.0)	
AC voltage Test	2 kV AC RMS, 50 Hz for 1 minute as per IEC 62052-11	
Impulse Voltage	6 kV, 1.2/50µ sec, as per IEC 62052-11	
Voltage Dips and Interrupts	As per IEC 61000-4-11	
Display	Backlit LCD, 10 mm height digits	
Pulse Output	**Pulses/kWh**	**Voltage/Current**
	2,500 / (external CT* PT)	3 Ph 4W 415V (L-L) / 5A
	12,500 / (external CT* PT)	3 Ph 4W 415V (L-L) / 1A
	10,000 / (external CT* PT)	3 Ph 4W / 3W 110 V (L-L) / 5A
	50,000 / (external CT* PT)	3 Ph 4W / 3W 110 V (L-L) / 1A
Temperature	-10°C to 60°C for operation	
	-20°C to 70°C for storage	
Humidity	95% RH non condensing	
Dimension	96 x 96 mm - depth 105 mm	
Weight	< 600 gms	

LCD Digital Panel Meter

Multifunction Meter - NOVA

Compact, digital, panel mount meter for kWh measurement. Nova is flush mount 3 Phase 4 Wire CT operated Multifunction meter with (optional) RS485 MODBUS communication.

- Accuracy class - 1.0
- Measures kWh & kW
- Forwarded energy registration in case of current reversal
- Phase wise Voltage, Current & Power on display
- Average Voltage & Current on display
- Phase sequence on display
- RS485 MODBUS communication
- Auto & manual display mode
- User friendly menu driven LCD display
- Field programmable CT/PT ratio
- Customised LCD display & Push Button navigation
- Scroll lock feature for locking of a desired parameter on display
- Low CT/PT burden
- High resolution energy
- Auxiliary supply 88V to 300 V AC/DC

Technical Specification

Model	NOVA
Enclosure	Engineering Plastic complying to IP51
Dimension	96 x 96 mm x 105 mm (HxWxD) Panel Cutout: 92 x 92 mm
Connection	3P 4W
Display	Backlit LCD
Type	kWh Meter
Measurements	kWh / kW / Frequency / Voltage / Current / Power factor
Starting Current	0.2% of rated current (5A)
Class of Accuracy	Class 1.0
Current	5A (rated), 10A (max)
Voltage (P-N)	3 x 240 V (-30 % to +20 % of V Ref)
Frequency	50 Hz ± 5%
Auxiliary Supply	88V to 300 V AC/DC
Weight	450 gm ± 5%
Weight with Packaging	610 gm ± 5%

kWh Meter - Counter Type

ACRUX (96 x96 mm)

Ideal product for control panels to measure kWh energy. Compactness of the meter ensures that it will fit in smartly into any panel. L&T offers this product in 3 phase 4 wire.

- Class 1.0 accuracy
- Active energy measurement
- Stepper motor counter display
- Pulse output LED
- Terminal covers with sealing provision

Technical Specification

Model	ACRUX
Accuracy	Class 1.0 as per IS 13779
Voltage Rating	240 V (3 Phase 4 Wire)
Current Rating (Ib)	5A & 1A
Frequency	50 Hz ± 5%
Maximum Current	200% of Ib
Starting Current	0.4% of Ib
Operating Temperature	0 to 55°C
Display	6 Digit stepper motor counter
Enclosure	Polycarbonate
Weight	500 g (approximate)
Mounting	Flush mounting

Dual Source Meter

GEMiNi (96 x 96)

An innovative panel meter designed for dual source energy measurement. It serves as a replacement for two separate energy meters necessary for metering same application with dual energy sources.

- Class 1.0 accuracy as per IS & IEC standards
- Dual energy register for dual energy source
- RS485 MODBUS communication
- Field programmable CT, PT Values & Meter ID

Technical Specification

Model	GEMiNi
Enclosure	Engineering Plastic complying to IP51
Dimension	96 x 96 mm x 105 mm (HxWxD) Panel Cutout: 92 x 92 mm
Connection	3P 4W
Display	Backlit LCD
Type	kWh Meter
Measurements	kWh / kW / Frequency / Voltage / Current
Starting Current	0.2% of rated current (5A)
Class of Accuracy	Class 1.0
Current	5A (rated), 10A (max)
Voltage (P-N)	3 x 240 V (-30 % to +20 % of V Ref)
Frequency	50 Hz ± 5%
Auxiliary Supply	88 V to 300 V AC/DC
DG Sensing Input	18 V-60 V DC/80 V-300 V AC
Weight	470 gm ± 5%
Weight with Packaging	630 gm ± 5%

DIN Energy Meter

mi-energy (DIN rail type)

Available in 3 phase and 1 phase models, these meters can be mounted inside distribution boxes to monitor electric consumption of identified loads, circuits and areas.

- LCD display
- Class 2 accuracy
- Displays day, week, month and push-to-push kWh consumption
- Push Button for parameter scrolling
- Low starting current
- Reverse current indication*
- Compact size and easy mounting

* For 3 Phase Meter

mi-energy - The Energy Monitor

mi-energy is a small energy monitoring device that helps in increasing awareness of energy consumption at the point of installation. It helps in monitoring of energy guzzling devices to take corrective actions. It shows the amount of money spent in consuming energy.

Ideal applications include residential buildings, shopping malls, factories, etc.

An energy monitor alone can't save any energy - but it makes one aware of level of energy consumption. Therefore it's a great tool to help bring a change in user behavior and cut electricity bills.

It is good to remember that in most cases one is likely to get a return on investment if one reduce their energy usage as a result of buying mi-energy.

The device has a LCD screen to display the readings. Also when used along with Wi-fi module, the entire data can be viewed on laptop, tablet or smart phones in real time.

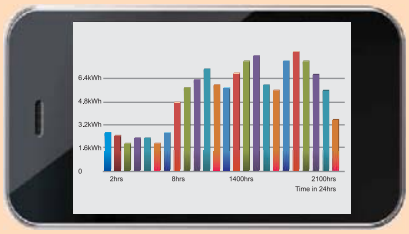
Some of the most convenient features and benefits of mi-energy include:

- A display that shows current energy use
- Wireless connectivity so that it can be viewed anywhere in the hotspot range
- Ease of historical data availability including daily, weekly and monthly usage

All the following....
directly on your Wi-Fi enabled device!

- Energy consumption in rupees
- Instantaneous power parameters
- Present day, week and month consumption
- Previous day, week and month consumption
- Last 24 hours consumption pattern

Consumption Pattern



Applications available on Android and Symbian platform

DIN Energy Meter

Technical Specification

Display	Type	6 digit LCD
	Height	6 mm (10 mm in case of 3 Phase meter)
Measuring Circuit	Class of accuracy	Class 2 as per IEC 62053-21
	Measurement circuit burden	<1W, <8 VA
	Rated Voltage	240V
	Current	3 phase: 10-60A 1 phase: 5-30A
	Starting current	3 phase: 40 mA 1 phase: 20 mA
	Voltage range for class of accuracy	-30% to +20% of rated voltage
	Current range for class of accuracy	5% I_b to I_{max}
	Input frequency range	50 Hz ±5%
Insulation Properties	Impulse voltage test	±6 kV as per IEC 62052-11
	AC voltage test	4 kV double insulation as per IEC 62053-21
	Insulation resistance	500V DC as per IS 13779
Electrical Requirements	Test of power consumption	IEC 62053-21
	Voltage dips and interrupts	IEC 62052-11
	Short time over current protection	20 times of I_{max} for half a second as per IEC 62053-21
Electro-Magnetic Compatibility (EMC)	Fast transients burst test	IEC 61000-4-4
	Immunity to electrostatic discharge	IEC61000-4-2
	Immunity to electromagnetic HF fields	IEC61000-4-3
	Immunity to conducted disturbances by RF field	IEC61000-4-6
	Surge immunity test	±4 kV as per IEC 61000-4-5
Climatic Test	Dry heat test	IS 9000 (part 3)
	Cold test	IS 9000 (part 2)
	Damp heat cyclic test	IS 9000 (part 5)
Operating Conditions	Operating temperature	-10°C to +55°C
	Storage temperature	-20°C to +70°C
Mechanical Tests	Shock	IS 9000 (part 7)
	Vibration	IS 9000 (part 8)
	Resistance to dust and water	IP20
Dimensions	Weight	3 phase: 460 g (approx.) 1 phase: 150 g (approx.)
	Dimensions	3 phase: 125 mm x 83 mm x 63.5 mm (approx.) 1 Phase: 36 mm x 83 mm x 66.73 mm (approx.)

Timing Devices & Supply Monitors

Timers and supply monitoring devices find their use in a wide variety of applications in the industry. L&T's reliable Timing devices and Supply monitors from GIC over the past 3 decades have provided the best solutions to its customers.

GIC Product Range Includes

- Time switches
- Timers
- Supply monitoring devices (Voltage and Current)
- Digital hour meter / Digital counter

Time Switches are used for fixed time based daily / weekly applications. They are ideal for lighting applications and are also used to control air-conditioners / coolers, geysers, conveyers, pumps & exhaust fans etc.

Timers are used to control processing times in a wide range of applications which includes star to delta changeover operations in Motor control / Starter panels, elevators, conveyor belt sequences, air conditioning systems, warning light systems etc.

The supply monitors ensure reliable detection of phase parameters such as phase loss, phase sequence and phase unbalance in all three-phase networks. They find application in HVAC, welding machines, elevators and cranes, etc.

The Current Monitoring Relay provides monitoring and protection of loads against overload, underload, phase loss, phase asymmetry and phase sequence faults. Their applications include all motor and pump protection panels with single phase and three phase supply.

The Earth Leakage Relay monitors, detects and protects power systems from earth leakage faults with wide selectable range of 30 mA to 30 A. They are widely used in mines and in Gen sets.

Remote control units play a crucial role on factory shop floor for operational safety and reliability. Reliable push buttons and indicators from our partners ESBEE, have been trusted by users across industries over the past 3 decades.

ESBEE's Product Range Includes

New Gen Next Range of Products

- Gen Next Actuators & Contact Blocks
- Gen Next Push Button Station
- Gen Next LED Indicators
  - ➢ 16 Ø mm & 22.5 Ø mm
- Gen Next *e*ntegral Actuators

Standard Range of Products

- Standard Actuators & Contact Blocks
- Standard Push Button Stations
- Accessories

The new ranges of Gen Next series products are compact in size and aesthetically appealing.

16 mm Gen Next LED Indicators have sleek and integral design with special fire retardant plastic. They provide uniform and bright illumination with operating life of more than 0.1 million burning hours.

Patented *e*ntegral actuator is a ready to use solution for OEM and Panel builders that provides IP67 protection with shroud. It has isolated terminals for NO+NC applications.

Illuminated actuators with LED have snap fit for ease in assembly with low power consumption of 0.6 W max.

Push button stations provide round ergonomic enclosure with good aesthetics that occupies less space. They are robust, easy to grip, assemble and operate. It is available in standard configuration of actuators and LED indicators.

Industrial Automation Products

AC Drive

Soft Starter

PLC & HMI

Cx2000 : Compact Series

- **Range:** 0.1 to 11kW
- **Features**
  - V/F, Sensorless Vector Control, Slip Compensation
  - Onboard Potentiometer
  - Built-in PID
  - 150% Overload for 60 Sec
  - Built-in RS485 Modbus Communication Protocol
  - Inbuilt 24V Power Source
  - 5DI, 1DO, 1AI, 1AO
- **Applications:** OEM Machines, Plastic & Textile Machines, Fan & Pump, LT / CT Crane Control etc...

Sx2000 : Smart Series

- **Range:** 0.75 to 90kW (IP20) & 0.75 to 22kW (IP66)
- **Features**
  - V/F, Sensorless Vector Control, Slip Compensation
  - Starting Torque at 200% at 0.5Hz for Sensorless Control
  - Conformal Coating Complying to IEC 60721-3-3 class 3C2
  - Built-in RS485 Modbus Communication Protocol
  - Component Life Monitor
  - Peer to Peer Communication to share I/O's
  - Built-in PLC Logic
  - Built-in Brake Control
  - 7DI, 2(R) + 1(TR) DO, 2AI, 2AO
  - Multi Keypad
- **Applications:** OEM Machines, Elevators, Plastic & Textile Machinery, Fan & Pump, LT / CT Crane Control, Compressors, Conveyors, Extruders etc...

Fx2000 : Flexi Series

- **Range:** 0.75 to 450kW
- **Features**
  - Sensorless, Flux Control
  - 250% starting torque at 0 RPM in Closed Loop
  - Built-in Macros for Wobbulation, Hoist etc...
  - Winder Application
  - Auto Sequence
  - Smart PLC Optional
  - Conformal Coating Complying to IEC 60721-3-3 class 3C2
  - Built-in RS485 Modbus Communication Protocol
  - 8DI, 2(R) + 1(TR) DO, 2AI, 2AO
  - Built-in Brake Control for Cranes
- **Applications:** Hoist Control, Plastic & Textile Machinery, Winders etc...

Ex2000 : Energy Saver Series

- **Range:** 5.5 to 450kW
- **Features**
  - V/F, Sensorless Vector Control
  - Specialized functions for Fan & Pump
  - Energy-saving, High-efficiency
  - Built-in Booster Pump Control
  - Component Life Monitor
  - Removable Control Terminal
  - Conformal Coating Complying to IEC 60721-3-3 class 3C2
  - Built-in RS485 Modbus Communication Protocol
  - 8DI, 4(R) + 1(TR) DO + 2AI + 2AO
  - Pre Heat Function
  - Built-in Cascaded PID
- **Applications:** Fan & Pumps

Lx2000 : Lift Series

- **Range:** 3.7 to 22kW
- **Features**
  - Ideal for High Speed Elevator Control
  - Suitable for Geared / Gearless Machines
  - Compatibility with Various Types of Encoders
  - Incremental Encoder card Built-in
  - Anti-roll-back Algorithm
  - Load and Direction based Floor-levelling
  - Built-in ARD Function
  - Conformal Coating Complying to IEC 60721-3-3 class 3C2
  - Built-in RS485 Modbus Communication Protocol
  - 11DI, 4DO, 3AI, 2AO
  - Distance Control through ELIO optional card
- **Applications:** Lift & Elevator

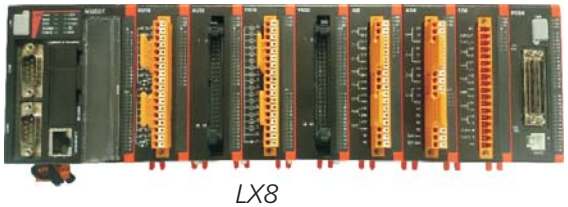
EMX3

- **Range:** 23A to 1600A
- **Features**
  - 3 Phase Operation Control
  - Built-in Bypass Contactor till 1000A
  - XLR-8 Adaptive Acceleration & Deceleration Control for Pumps
  - Conformal Coated PCB
  - Detachable Keypad
  - Electronic Motor overload Protection
  - 99 Event Logs with time Stamping, Last 8 Trip Logs
  - Operating Temperature 50°C
  - 5DI, 4DO, 1AO
  - Communication Options Available
- **Applications:** Centrifugal Pump, Compressor, Conveyor, Crusher Rotary, Crusher Jaw, Fan

CSX & CSXi

- **Range:** 7.5 to 110kW
- **Features**
  - Built-in Bypass Contactor
  - Soft Start / Soft Stop / Adjustable Current Limit
  - Motor Protections
    - Overload
    - Single Phasing
    - Instantaneous Overcurrent
    - Phase Sequence Reversal
    - Abnormality in Supply
  - Unbalanced Current
  - Thermistor Protection through PTC
  - Communication Options Available

PLC



LX8

PLC : LX8

- **Range:** 14 - 2560 IOs
- **Features**
  - Powerful Communication
    - Built-in 100 Mbps Ethernet Port
    - Built-in USB Port & 2 Channels High Speed Serial Port
  - Built-in 4 HSC Channels & 6 PTOs
  - Large Memory
    - 987K byte Program Memory
    - 128K byte Data Memory
  - Supports 4GB SD Card Memory
  - Best Solution for Network Based Applications

LX7

PLC : LX7 / LX7S

- **Features**
  - Basic Control to 28, 48 Points & upto 104 I/O Points
  - Enable 2 Expansion Unit
  - 2 Serial Ports (2 RS232C/RS485 with Modbus RTU)
  - Built-in HSC, Pulse Catch, Pulse output (for TR output unit), RTC

HMI

LN Touch

HMI

- **Range:** 4.3” to 15” screen in 7 models
- **Features**
  - Multi-language, Graphics, Extended Alarms, Recipe, Data Logging, Printing, Password Protection, Trends Serial, Ethernet, Fieldbus Communication

Building Automation

LTAB - Integrated Building Management System

PERIT - Security and Surveillance System

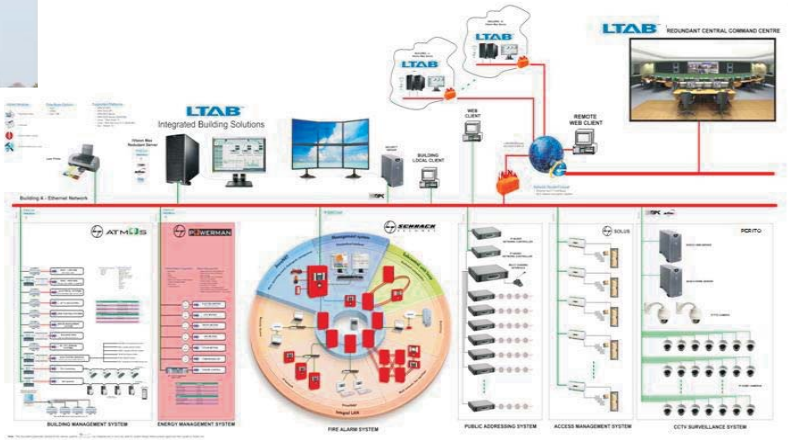
ATMS - Building Management System for HVAC management

SCHRACK SECONET - Fire Alarm system

LiteSense - Occupancy Sensors

LTAB - Integrated Building Management System

LTAB is a comprehensive solution of complete integrated Building Management System. This includes Building Management System, Security and Surveillance System, Access Control, Public Address System and Fire Alarm System.



Remote Install	Client installation without physical media, directly over the web. Automatic project and LTAB update at the client. Minimum LTAB installation. No client-side configuration required. No security problems with shared server directories.
Webserver	Complete HTTP server for static and dynamic HTML pages. Web application with alarm screen, event screen, troubleshooting; simple creation of web reports, server-side scripting in Control. WAP interface for data viewing from modern mobile telephones.
Report	Reporting with Microsoft Excel. Direct linking enables usage as report generator and report viewer. Manual or scheduled reports, automatically saves, prints, publishes to the web or sends e-mail. Track of changes.
Recipes	Recipe management for parameter sets and setpoint lists. Unlimited recipe types, unlimited recipe quantities, access control, creation of recipes from real-time process data. Easy-to-use interface. Import / export of recipes as CSV.
Scheduler	Timer and event programs with simple graphic parameterization. cyclic and acyclic-periodic call-ups, individual events and time lists, special day rules (holidays). Arbitrary actions: value changes, recipe starts, reminders, scripts.
Redundancy	LTAB's redundancy concept fulfils the demands of plant engineers and operators for availability, process security and data security. In case of errors, the system will switch over automatically without the user noticing a difference.
Distributed Systems	Distributed systems in LTAB allow for the coupling of two or more autonomous LTAB systems over a network. Every partial system can be used as a single-site or multiple-site system, with or without redundancy.

PERITO is a sophisticated range of Security and Surveillance System.

Protect your surroundings with PERITO cameras

Dome Camera

Indoor Dome Camera

600 / 700 TVL high resolution camera with 3.6 / 6 mm lens suitable for Day light / Well lit area.*

IR Indoor Day / Night Camera

Indoor Dome IR Camera

600 / 700 TVL high resolution IR camera with 3.6 / 6 mm lens suitable for changing light conditions. B/W image at zero lux.*

IR Outdoor Day / Night Camera

Outdoor Bullet Camera

600 / 700 TVL high resolution weather proof IR camera with 3.6 / 6 mm lens suitable for outdoor application & changing light conditions. B/W image at zero lux.*

PTZ Day / Night Camera

Outdoor PTZ Camera

650 TVL high resolution weather proof, upto 30X PTZ camera suitable for monitoring large areas.*

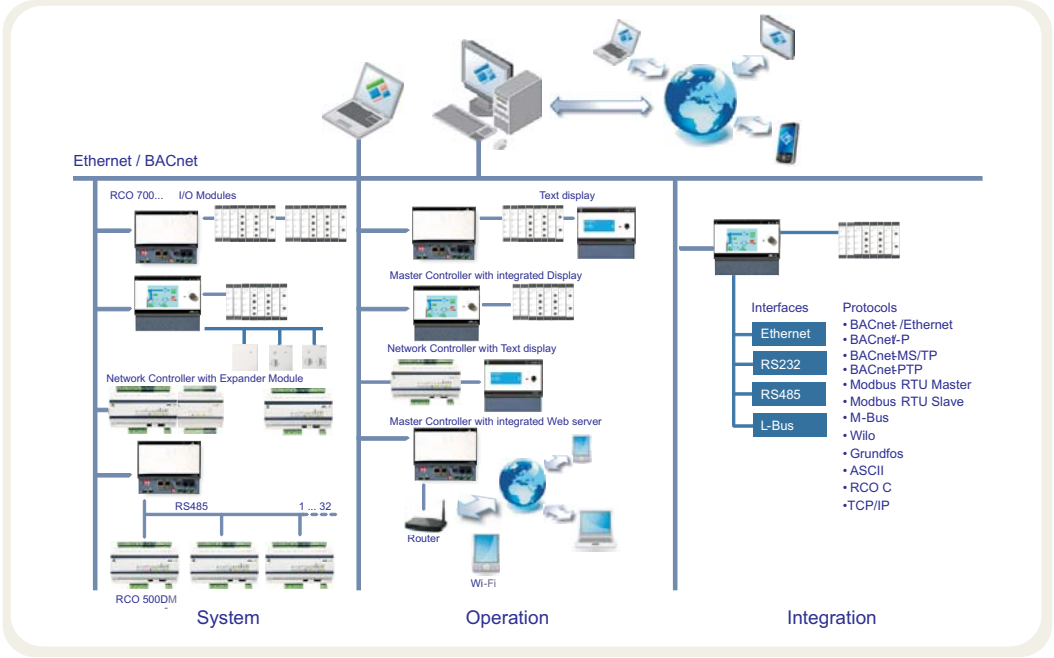
*other resolution available on request

DVRs

4 Channel	8 Channel	16 Channel
• 4-channel, DVRs with 100 FPS, penta-plex operation • H.264 compression • Supports dual stream transmission for all channels • Mobile viewing software (WinCE / Symbian / Iphone / Blackberry / Android)	• 8-channel network DVRs with 200 FPS, multi-plex operation • H.264 compression • Supports dual stream transmission for all channels • Mobile viewing software (WinCE / Symbian / Iphone / Blackberry / Android)	• 16-channel network DVRs with 400 FPS, multi-plex operation • H.264 compression • Support 3G & Wifi Function • Supports dual stream transmission for all channels • Mobile viewing software (WinCE / Symbian / Iphone / Blackberry / Android)

ATMOS - Building Management System for HVAC management

ATMOS is a system of Building Management System for HVAC management.



I/O Modules

	Universal-In	Digital-In	Analogue-Out	Analogue-Out	Digital-Out	Digital-Out
Inputs	8x UI	8x DI	-	-	-	-
Outputs	-	-	4x AO	4x AO	4x DO	4x DO
Application	I-Slave	I-Slave	O-Slave	O-Slave	O-Slave	O-Slave
Functions	0-10V, Ni1000, NTC10K, NTC30K, PT1000, self defined functions	Potential free - or marked contacts (24 VAC/DC), Counting input 24 VAC/DC up to 20 Hz, pulse length > 1ms	0... 10 VDC	0... 10V DC	230 V, 4A	230 V, 4A
Manual override	No	No	No	Auto, 0-100%	No	Auto, 0,1
Feedback signal	-	-	-	Function, value	-	Function, value
L-Bus-1	-	-	-	-	-	-
L-Bus-2	Yes	Yes	Yes	Yes	Yes	Yes
Power supply	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
Mounting	Front / DIN-rail	Front / DIN-rail	Front / DIN-rail	Front / DIN-rail	Front / DIN-rail	Front / DIN-rail

BSRC 720DM

	 RCO 720D-M	 RCO 720D-W
Coloured graphical display 320x240	X	X
Program and data memory	SD-Card 2GB	SD-Card 2GB
Ports	2x RS232	2x RS232
	2x RS485	2x RS485
	2x Ethernet	2x Ethernet
L-Bus-1 (Connection)	RCO C-Modules	RCO C-Modules
L-Bus-2 (Connection)	RCO D-Modules	RCO D-Modules
Protocols	RCO-C bus	RCO-C bus
	BACnet-Ethernet,-IP, -MS/TP, -PTP	BACnet-Ethernet,-IP, -MS/TP, -PTP
	MODBUS Master/Slave	MODBUS Master/Slave
	M-Bus	M-Bus
	Wilo / Grundfos	Wilo / Grundfos
	TCP/IP for RCO-view/-tool	TCP/IP for RCO-view/-tool
Trend-log Display/Browser	X/X	X/X
E-mailing	X	X
Web server	-	-
Mounting	Front	Front

500DM/DW

	 RCO 500D-M	 RCO 500D-W
Inputs	8*UI (0...10 VDC, 0...20mA, Ni1000, NTC10K, NTC30K, Pt1000, self defined function, digital)	8*UI (0...10 VDC, 0...20mA, Ni1000, NTC10K, NTC30K, Pt1000, self defined function, digital)
	6*DI (Potential free-or marked contacts (24 VAC/DC), Counting input 24 VAC/DC up to 20 Hz, pulse length > 1ms)	6*DI (Potential free-or marked contacts (24 VAC/DC), Counting input 24 VAC/DC up to 20 Hz, pulse length > 1ms)
Outputs	4 *AO (0...10VDC, 0...20mA)	4 *AO (0...10VDC, 0...20mA)
	4 *DO (230V/4A)	4 *DO (230V/4A)
Program and data memory	SD-Card 2GB	SD-Card 2GB
Ports	1 x RS232	1xRS232
	2 x RS485 (1 for display)	2 x RS485 (1 for display)
	1 x Ethernet	1 x Ethernet
Protocols	BACnet-Ethernet, -IP, -MS/TP, -PTP	BACnet-Ethernet, -IP, -MS/TP, -PTP
	RCO-C bus	RCO-C bus
	MODBUS Master/Slave/M-Bus	MODBUS Master/Slave/M-Bus
	Wilo / Grundfos (RS232/485)	Wilo / Grundfos (RS232/485)
	TCP/IP for RCO-view/-tool	TCP/IP for RCO-view/-tool
Trend-log Display/Browser	RCO 621D-S/-	RCO 631D-S/X
E-mailing	X	X
Web server	-	X
Mounting	DIN-rail	DIN-rail

Integral IP MXF Fire Alarm Control Panel

The modular, decent ralised Integral IP MX system consists of individual components and is configured and programmed in accordance your specific requirements. To ensure system integrity, all components and electronic elements are fully-redundant.

Each control panel forms an autarchic unit with its own power supply and battery backup supply. These can be connected to external operating panels, fire brigade control panels, printers, detector zones, controllers etc.

If you need several fire alarm control panels, we can network up to 16 control units using the Integral LAN Ethernet mesh network, with different interfaces available for the connections (RS485, optic fibre, DSL). Our cabling topology is freely selectable so that you can optimally adapt the mesh network to the physical constraints of your building, In the event of connection faults, multiple connections between the individual control units ensures that every control unit continues to have a connection to the network.

Integral IP MX control panels can be directly connected into the IT infrastructure of your building, with Internet and intranet access to them being possible at no extra cost. Various parallel indicator tableau or super ordinated centralized indicating devices can, use the existing communications channels of the PC network (as long as they are not also used for notifying emergency services).

Detectors, alarm notification devices, inputs and outputs, as well as special fire alarm and detections systems are connected to the control unit using the Integral X-LINE (loop length up to 3,500 m, with up to 250 devices per loop).The Integral IP MX is available in various different types of cabinet - with or without a log printer, as a black box or with an additional built-in LED indicator panel.

Multiple Sensor Detector MTD 533X

The state-of-the-art MTD 533X is a combined scattered light smoke and temperature detector. It detects smouldering or open fires with or without smoke formation. You can programme it to detect either smoke or heat, or both – depending on the type of system and the area in which it deployed, For difficult prevailing conditions, we have a version that offers greater protection against increased air humidity.

Features

Fire alarm triggered by smoke, heat or both Smoke detection using CUBUS levelling® for adapting automatically to environmental conditions without complicated setting of parameters sensitivity towards smoke and heat class can be set in accordance with EN 54.

- Temperature-based smoke evaluation
- Pre-alarm evaluation when 30% and 75% of the alarm threshold is reached
- 2 level contamination detection
- Integrated short circuit isolator
- Adjustment of alarm thresholds to compensate for environmental influences
- Alarm filter to reduce the number of deceptive alarms
- Alarm output for external indication of alarms operating time / contamination level values can be read out

PIR Occupancy Detector

Power is precious and to help you save it, L&T presents a range of occupancy sensors-LiteSense. Like all occupancy sensors, LiteSense detects the presence and movement of people within its range. and all electrical devices connected to it are switched off when there are no people in the room or when the natural light will suffice. Unlike most occupancy sensors, LiteSense gives you the convenient remote-control option, and value for money.

This highly-accurate passive infra-red detects minute movements, and is perfect for indoors-corridors, entrance halls, lift lobbies, cabins, cubicles, conference rooms, washrooms, etc.

You can adjust time delay and brightness levels using either the control knobs or the remote control.

Depending on your specific needs, you can choose either the surface-mounted or the flush-mounted detector - or a combination of both.

Technical Specifications

- Coverage: 360° in Ø7m (max) at 2.5m high
- 1 channel for lighting control
- Several motion sensors can be connected in parallel
- Detector type: 1 channel surface-ceiling-mounted PIR sensor
- Contact: Admits contactor
- Time delay: 6sec 12min
- Lux setting: 5-1200 Lux
- Sensibility: Adjustable
- Working temperature: 10°C + 45°C
- Protection degree: IP40

Maximum Load

- Incandescence: 3.000W
- Halogens 230V: 3.000W
- Halogens 12V (ferromagnetic): 2.400W
- Halogens 12V (electronic): 3.000W
- Fluorescent Lamp: 1.300W (130µF)
- CFL lamps: 18x7W 12x11W 10x15W 10x20W 10x23W

Remote Control - Fingertip Convenience

To facilitate the maintenance and to change the time gap and lux (intensity of light) settings of your LiteSense, L&T offers remote controls. Now maintenance is a snap, and you don't need a ladder to change the settings of your sensor. What's more, beaing small and light, it is easy to use. A lock that is both automatic and manual prevents undesired or accidental operation, as well as unnecessary power consumption. And a single remote control will service all your LiteSense.

Technical Specifications

- Power supply: 1 battery 3V type CR032 (included)
- Useful life: >4 years (100 pulsation/day)
- Infrareds: Focused and close range transmission (2-3 meters at 35° maximum
- Environmental Protection : IP51
- Operation Temperature: 0°C ~ +45°C
- Storage temperature: -10°C ~ +45°C
- Weight: 33g
- Dimensions: 105 x 50 x 12 mm

Reactive Power Management Solutions

Reactive Power Management Products

Standard Duty Capacitors

Heavy Duty Capacitors

LTXL - Ultra Heavy Duty Capacitor

Reactors - Harmonic Filters

Thyristor Switching Modules

etaSYS - Standard Automatic Power Factor Correction Panels

etaPRO v2.0 - Multi utility Software Package

Power Capacitors

Cylindrical Type

Standard Duty
Range: 1-25 kVAr

Heavy Duty
Gas Filled
Range: 3-25 kVAr

Box Type

Standard Duty
Range: 1-30 kVAr

Heavy Duty
Range: 5-50 kVAr

LTXL:
Ultra Heavy Duty
Range: 5-100 kVAr
(single unit)

Detuned Harmonics
Filter Reactors
(5-100 kVAr)

Thyristor Switching
Modules
(10, 25 & 50 kVAr)

etaSYS
APFC Panels

L&T's Standard Duty Capacitors are metalized polypropylene capacitors from 1kVAr to 25kVAr in cylindrical configuration and 1-50kVAr in box type configuration. These capacitors come with a stacked winding and are impregnated with a biodegradable soft resin. These capacitors are self healing type.

The Capacitors come with an over pressure disconnector and finger proof terminals. They can be used to provide effective power factor correction in industrial and semi industrial applications.

Technical Specification

	Standard Duty	
	Box	**Cylindrical**
Series	YLTBCF (1 to 6 kVAr) and YLTBCD (7.5 kVAr and above)	YLTCCF (1 to 6 kVAr) and YLTCCD (7.5 kVAr and above)
Range	1-30 kVAr	1-25 kVAr
Standards	IS 13340-1993, IS 13341-1992, IEC 60831-1+2	IS 13340-1993, IS 13341-1992, IEC 60831-1+2
Rated Frequency	50Hz	50Hz
Rated Voltage	415 / 440V	415 / 440V
Over Voltage	+10% (12h / 24h), +15% (30m / 24h), +20% (5m / 24hrs), +30% (1m / 24hrs)	+10% (12h / 24h), +15% (30m / 24h), +20% (5m / 24hrs), +30% (1m / 24hrs)
Overcurrent	1.5 x In	1.5 x In
Peak Inrush Current	200 x In	200 x In
Operating Losses (Dielectric)	< 0.2 W/kVAr	< 0.2 W/kVAr
Operating Losses (Total)	< 0.45 W/kVAr	< 0.45 W/kVAr
Tolerance on Capacitance	-5 / +10% as per IS	-5 / +10% as per IS
Test Voltage (Terminal-Terminal)	2.15 times rated voltage for 10 sec	2.15 times rated voltage for 10 sec
Test Voltage (Terminal-Casing)	3 kV (AC) for 1 minute	3 kV (AC) for 1 minute
Degree of Protection	IP20, indoor mounting (IP54 optional)	IP20, indoor mounting (optionally with terminal cap for IP54)
Ambient Temperature	-25°C to 55°C	-25°C to 55°C
Cooling	Natural or forced air cooling	Natural or forced air cooling
Permissible Relative Humidity	max 95%	max 95%
Maximum Operating Altitude	4000m above sea level	4000m above sea level
Mounting	upright	upright
Safety Features	Overpressure disconnector, Self-healing, Finger proof terminals	Overpressure disconnector, Self-healing, Finger-proof terminals
Impregnation	Non PCB Oil, biodegradable oil	Non PCB Oil, biodegradable oil
Casing	MS Sheet metal	Aluminum extruded can
Dielectric Composition	Metalized polypropylene	Metalized polypropylene
Terminals	Ceramic Bushing	Finger-proof Clamptite
Discharge Resistors / Time	Discharge Resistors fitted, Standard discharge time 60 seconds, Other discharge times on request	Discharge Resistors fitted, Standard discharge time 60 seconds, Other discharge times on request
Switching Operations (maximum)	5000 switchings per year	5000 switchings per year

Heavy Duty Capacitors

L&T's Heavy Duty Capacitors are Metalized polypropylene Capacitors available from 3-25kVAr in cylindrical and from 5-50kVAr in box type construction. These capacitors have an inrush current withstand of 300 In and an overload withstand capacity of 1.8 In. These capacitors have all the features of standard capacitors like over pressure disconnector and self healing.

The cylindrical Capacitors are subjected to an extended period of drying after which the casing is filled with an inert gas to prevent corrosion of the winding elements and inner electrical contacts. Compact design ensures space saving. Heavy Duty capacitors have a long life of 150000 hours.

Technical Specification

	Heavy Duty	
	Box	**Cylindrical**
Series	YLTBCH	YLTCCN
Range	5-50 kVAr	3-25 kVAr
Standards	IS 13340-1993, IS 13341-1992, IEC 60831-1+2	IS 13340-1993, IS 13341-1992, IEC 60831-1+2
Rated Frequency	50Hz	50Hz
Rated Voltage	415 / 440 / 480 / 525 V	415 / 440 / 480 / 525 / 690 V
Over Voltage	+10% (12h / 24h), +15% (30m / 24h), +20% (5m / 24hrs), +30% (1m / 24hrs)	+10% (12h / 24h), +15% (30m / 24h), +20% (5m / 24hrs), +30% (1m / 24hrs)
Overcurrent	1.8 x In	1.8 x In
Peak Inrush Current	300 x In	250 x In
Operating Losses (Dielectric)	< 0.2 W/kVAr	< 0.2 W/kVAr
Operating Losses (Total)	< 0.35 W/kVAr	< 0.35 W/kVAr
Tolerance on Capacitance	-5 / +10% as per IS	-5 / +10% as per IS
Test Voltage (Terminal-Terminal)	2.15 times rated voltage for 10 sec	2.15 times rated voltage for 10 sec
Test Voltage (Terminal-Casing)	3 kV (AC) for 1 minute	3 kV (AC) for 1 minute
Degree of Protection	IP20, indoor mounting (IP54 optional)	IP20, indoor mounting (optionally with terminal cap for IP54)
Ambient Temperature	-25°C to 55°C	-40°C to 55°C
Cooling	Natural or forced air cooling	Natural or forced air cooling
Permissible Relative Humidity	max 95%	max 95%
Maximum Operating Altitude	4000m above sea level	4000m above sea level
Mounting	upright	upright or horizontal
Safety Features	overpressure disconnector, Self-healing	Dry type (gas filled), Overpressure disconnector, Self-healing
Impregnation	Non PCB Oil, biodegradable oil	Inert gas
Casing	MS Sheet metal	Aluminum extruded can
Dielectric Composition	Metalized polypropylene	Metalized polypropylene
Terminals	Ceramic Bushing	Finger-proof Clamptite
Discharge Resistors / Time	Discharge resistors fitted, Standard discharge time 60 seconds, Other discharge times on request	Discharge resistors fitted, Standard discharge time 60 seconds, Other discharge times on request
Switching Operations (maximum)	8000 switchings per year	8000 switchings per year

The LTXL range of capacitors are designed for Ultra heavy duty applications and can withstand heavy load fluctuations, high inrush current and harmonics.

Applications

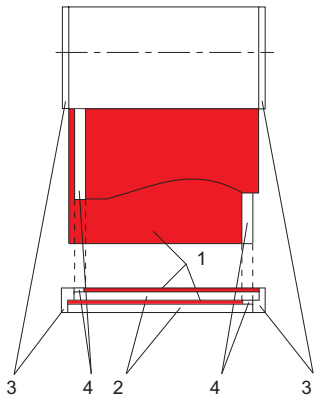
- Applications such as welding, steel rolling, etc., with heavy load fluctuations and high thermal loading
- Systems with high harmonic distortion levels (non linear load >15%)
- Systems with high dv / dt
- Tuned harmonic filter

Features

- Long life expectancy (upto 300000 hrs)
- Maximum inrush current withstand capability (upto 500 times I_R)
- Low power loss (0.35 W/kVAr)
- Shock hazard protected terminals
- Internal fuse

The life of a capacitor largely depends upon its operating temperature. LTXL box type capacitors use advanced APP technology. By employing thicker aluminum foil, thicker polypropylene film and special impregnates, LTXL box type capacitor is able to operate at lower temperatures and hence achieve a longer life. These capacitors are thus able to withstand stringent operating conditions. The higher surface area and special epoxy based coating also ensures better heat dissipation. The capacitor is designed to operate at ambient temperature up to 70°C.

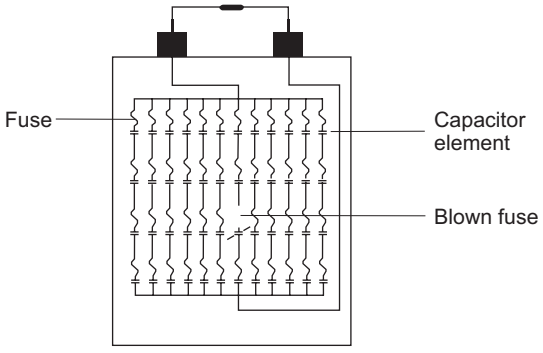
In LTXL box, two polypropylene films and two Al films are grouped together as shown in the figure below. The wave-cut and heavy edge metalized films are then rolled to form a capacitor element. Many such capacitor elements are pressed and stacked together and are internally connected in parallel. Depending upon the rating of the capacitor, the number of stacks differ. These stacks are placed inside a case and are vacuum impregnated with non-PCB, biodegradable impregnates.



1. Al Film
2. Polypropylene Film
3. Electric Contact (schooping)
4. Bare PP Film Edge

Design of LT Capacitor

Each capacitor element is protected by an internal fuse as shown in the figure below. If there is an internal short circuit in any of the capacitor element, the fuse of that corresponding capacitor elements will blow.



Technical Specification

	LTXL - Ultra Heavy Duty Box
Series	LTBCU
Range	5-100 kVAr
Standards	IS 13585-1994, IEC 60931-2002
Rated Frequency	50Hz
Rated Voltage	415 / 440 / 480 / 525 / 690 / 850 / 1000V
Over Voltage	+10% (12h / 24h), +15% (30m / 24h), +20% (5m / 24hrs), +30% (1m / 24hrs)
Overcurrent	Upto 3 x In
Peak Inrush Current	Upto 500 x In
Operating Losses (Dielectric)	< 0.2 W/kVAr
Operating Losses (Total)	< 0.35 W/kVAr
Tolerance on Capacitance	-5 / +10% as per IS
Test Voltage (Terminal-Terminal)	2.15 times rated voltage for 10 sec
Test Voltage (Terminal-Casing)	3 kV (AC) for 1 minute
Degree of Protection	IP20, indoor mounting (optionally with terminal cap for IP54)
Ambient Temperature	-25°C to 70°C
Cooling	Natural or forced air cooling
Permissible Relative Humidity	max 95%
Maximum Operating Altitude	4000m above sea level
Mounting	upright
Safety Features	Internal Fuse
Impregnation	Non PCB Oil, biodegradable oil
Casing	MS Sheet metal
Dielectric Composition	Biaxially oriented polypropylene film with aluminium foil electrode
Terminals	Ceramic Bushing
Discharge Resistors / Time	Discharge Resistors fitted, Standard discharge time 60 seconds, Other discharge times on request
Switching operations (maximum)	20000 switchings per year

The increasing use of modern power electronic apparatus (drives, uninterruptible power supplies, etc.) produces nonlinear current and thus influences and loads the network with harmonics (line pollution).

The capacitance of the power capacitor forms a resonant circuit in conjunction with the feeding transformer. Experience shows that the self-resonant frequency of this circuit is typically between 250 and 500 Hz, i.e. in the region of the 5th and 7th harmonics. Such a resonance can lead to the following undesirable effects:

- Overloading of capacitors
- Overloading of transformers and transmission equipment
- Interference with metering and control systems, computers and electrical gear
- Resonance elevation, i.e. amplification of harmonics
- Voltage distortion

These resonance phenomena can be avoided by connecting capacitors in series with filter reactors in the PFC system. These so called “detuned” PFC systems are scaled in a way that the self-resonant frequency is below the lowest line harmonic and the detuned PFC system is purely inductive as seen by harmonics above this frequency. For the base line frequency (50 or 60 Hz usually), the detuned system on the other hand acts

Features

- Copper & Aluminium wound reactors
- Very low operating losses - 3 to 5 W / kVAr
- High linearity - 1.8 times the rated current
- Low noise
- Auto-thermal cutoff

Reactor tuning factor	Tuning frequency	Application (harmoic orders)	Typical loads
7%	189 Hz	5th harmonic (250 Hz) and above	6 pulse drives (AC / DC), 3 phase UPS, frequency converters
14%	133 Hz	3rd harmonic (150 Hz) and above	Single phase UPS, CFL lamps, SMPS, dimmers

Technical Specification

Standards	IEC 602789
Rated Voltage (V)	440, 690, 850, & 1000V
Rated Frequency (F)	50
Max Permissible Operating Voltage	1.05 Un Continuously, 1.1 Un for 8 hours
Max Permissible Operating Current (Linearity)	1.8 In Continuously
Duty Cycle	100%
Class of Protection	I
Ambient Temperature	40°C
Insulation Class	Class H
Winding	Copper / Aluminium
Protection Wiring	Thermal Switch
De-Tuning	5.67%, 7% & 14%
Harmonics Limit	V_3 = 0.5% V_R (duty cycle = 100%) V_5 = 6.0% V_R (duty cycle = 100%) V_7 = 5.0% V_R (duty cycle = 100%) V_{11} = 3.5% V_R (duty cycle = 100%) V_{13} = 3.0% V_R (duty cycle = 100%)
Effective Current	$I_{rms} = \sqrt{(I_1^2 + I_3^2 + I_5^2 + ...)}$
Fundamental Current	I_1 = 1.06 x I_R

Thyristor Switching Modules

In some modern industries, due to special processes with rapidly fluctuating loads, the demand for reactive power also fluctuates rapidly. Usage of mechanical switch (contactors) has the following negative impacts:

- Average unity power factor cannot be maintained due to delay in capacitor switching
- Reduction in the life of capacitors, contactors and other equipments
- Power quality issues due to current and voltage transients

The solution is dynamic power factor correction system.

With the thyristor module we provide the main component - "The Electronic Switch"- for dynamic power factor correction. The LT-TSM series offers fast electronically controlled, self-observing thyristor switches for capacitive loads up to 50 kVAr, that are capable to switch PFC capacitors within a few milliseconds nearly without a limitation to the number of switchings during the capacitor lifetime. These switching modules are easy to install, have a fast reaction time of 5 msec and come with built-in indications of operations, faults and activation. These thyristor modules are very compact and operate at lower power losses.

Features

- High peak inverse voltage (2.2 kV) ensures long operational life
- Automatic thermal cut-off
- Monitoring of voltage, phase sequence, faults; display of status via LED
- Faster response time (5 ms)
- No system perturbation caused by switching operations (no transients)
- No auxiliary supply needed
- Maintenance free
- No noise during switching
- Compact design ready for connection and easy installation

Application

Industries and applications with high load fluctuations, where the demand for reactive power is also very dynamic:

- Welding
- Elevators and cranes
- Presses
- Wind turbines

Technical Specification

	LT TSM 10	LT TSM 25	LT TSM 50
Rated Voltage (V)	440V		
Frequency (Hz)	50 / 60		
Rating (kVAr)	10	25	50
Losses Power Losses (W)	35	75	150
LED Display Per Phase	2	2	2
Ambient Temperature (^{0}C)	-10 to 55		
Signal Voltage Required	24 Vdc (20 mA)		
Reaction Time (msec)	5		
Peak Inverse Voltage (PIV)	2.2 kV		
Re-switching Time	60 ms		
Indication / Display	2 LEDs per phase. **Green:** Operating voltage activated, thyristor module standby **Flashing Red:** Under voltage / Over-temperature **Permanent Red:** No capacitor connected / Input phase not connected **Yellow:** Module ON and operating		
Termination	Connection from bottom; Cable lug: 25 sq. mm. D: 8 mm		
Protection	Semiconductor fuse (High speed fuse) is mandatory for short circuit protection.		
	10 kVAr: 32A	25 kVAr: 80A	50 kVAr: 160A
Capacitor Discharge resistor	Quick discharge resistors (Default capacitor discharge resistors shall be interchanged with QDR)		
Mounting Position	Vertical, minimum 100 mm space clearance around the module		
Operating Temperature	-10°C to 55°C		

Modern power networks cater to a wide variety of electrical and power electronics loads, which create a varying power demand on the supply system. In case of such varying loads, the power factor also varies as a function of the load requirements. It therefore becomes practically difficult to maintain consistent power factor by the use of fixed compensation i.e. fixed capacitors which shall need to be manually switched to suit the variations of the load. This will lead to situations where the installation can have a low power factor leading to higher demand charges and levy of power factor penalties.

In addition to not being able to achieve the desired power factor it is also possible that the use of fixed compensation can also result in leading power factor under certain load conditions. This is also unhealthy for the installation as it can result in over voltages, saturation of transformers, mal-operation of diesel generating sets, penalties by electricity supply authorities etc.

Consequently the use of fixed compensation has limitations in this context. It is therefore necessary to automatically vary, without manual intervention, the compensation to suit the load requirements. This is achieved by using on Automatic Power Factor Correction (APFC) system which can ensure consistently high power factor without any manual intervention. In addition, the occurrence of leading power factor will be prevented.

APFC panels are fully automatic in operation and can be used to achieve

- Consistently high power factor under fluctuating load conditions
- Elimination of low power factor penalty levied by electrical supply authorities
- Reduced kVA demand charges
- Lower energy consumption in the installation by reducing losses
- Preventive leading power factor in an installation

The basic operation is as follows

- To continuously sense and monitor the load condition by the use of external CT (whose output is fed to the control relay)
- To automatically switch ON and OFF relevant capacitor steps on to ensure consistent power factor
- To ensure easy user interface for enabling reliable system operations
- To protect against any electrical faults in a manner that will ensure safe isolation of the power factor correction equipment

Salient features and advantages

- Pre-selected optimal number of steps and step sizes, for better step resolution and hunt free capacitors switching
- Ideal switchgear selection for reliable short circuit protection, without nuisance tripping
- Right capacitor-reactor combination selection to prevent harmonic amplification and resonance
- Option of capacitor duty contactor or thyristor switch for transient free switching
- Panels with better electrical, mechanical and thermal design for longer life of capacitors and other components
- Panels are with advanced micro controller based APFC relay that offers reliable switching operation with four quadrant sensing

etaSYS Standard APFC Panel Range

Product	kVAr ratings	Description	Capacitors	Incomer	Branch Protection	Switching
etaSYS - MH	35 to 100 kVAr	Wall mountable	Heavy Duty Gas filled Capacitors	MCCB	MCCB	Auto + Manual
	100 to 500 kVAr	Free standing floor mountable	Heavy Duty Gas filled Capacitors	MCCB - upto 350 kVAr; ACB - 400 to 500 kVAr	MCCB	Auto + Manual
etaSYS - FH	35 to 100 kVAr	Wall mountable	Heavy Duty Gas filled Capacitors	MCCB	HRCF	Auto + Manual
	100 to 500 kVAr	Free standing floor mountable	Heavy Duty Gas filled Capacitors	MCCB - upto 350 kVAr; ACB - 400 to 500 kVAr	HRCF	Auto + Manual
etaSYS - MU	100 to 500 kVAr	Free standing floor mountable	LTXL - Ultra Heavy Duty Capacitors	MCCB - upto 350 kVAr; ACB - 400 to 500 kVAr	MCCB	Auto + Manual
etaSYS - FU	100 to 500 kVAr	Free standing floor mountable	LTXL - Ultra Heavy Duty Capacitors	MCCB - upto 350 kVAr; ACB - 400 to 500 kVAr	HRCF	Auto + Manual

etaSYS Basic Design Specifications

Power Range	35 kVAr to 500 kVAr
Rated System Voltage	440V / 415V / 400V / 380V
Rated Frequency	50 Hz
Short Circuit Rating	> 36 kA
Altitude	1000 m
Duty	Continuous
Ambient Temperature	-5°C to 45°C
Power Supply	Three phase, four line
Relay Current Input Signal	– / 5A, from CT on line
Enclosures	The load bearing structure is made of 2 mm sheet steel
	The front door and partition are made of 1.6 mm sheet steel
	The internal components are accessible on opening the front door
	Ingress protection - IP42
Installation	Indoor, wall mounted (upto 100 kVAr), floor mounted (100 kVAr and above) in a well-ventilated, non-dusty environment, cable entry from bottom
Incomer	3 Pole MCCBs upto 630A, 3 Pole ACBs above 630A
Capacitors	1. Heavy duty cylindrical gas filled capacitors.
	2. LTXL Ultra Heavy Duty Capacitors (see below table for step ratings).
Reactors	1. Without Reactors
	2. With 7% Dutuned Reactors
Switching	1. 3 Pole MO C Capacitor duty contactors of adequate ratings for respective steps.
	2. Thyristor Switching Modules of suitable ratings.
Branch Protection	1. MCCBs for providing short circuit protection and isolation.
	2. HRC Fuses of adequate ratings.
	3. High speed fuse / semiconductor fuse for thyristor switched APFC panels.

etaPRO is an innovative, multi-utility and user friendly software package, related to Reactive Power Management. The users will get the benefit of easy and error free selection of products.

Features

- kVAr calculation - Easy calculation of capacitor kVAr rating if initial power factor and final power factor are known
- Detuned harmonic filter selection - Selection of right capacitor-reactor combination (detuned harmonic filter) and the catalogue numbers
- APFC panel Bill of Materials generation - Generation of bill of materials, covering capacitor selection, switchgear selection, switching device selection. The output gives the catalogue numbers and MRP of all the items in the panel, that can be exported to excel format.
  - BoM generation up to 1400 kVAr APFC Panels with maximum 14 steps
  - Auto-calculation of rated incomer and branch currents
  - Switchgear selection options for main incomer (ACB, MCCB and SDF) and branch protection (MCCB, SDF, HRC Fuse and MCB)
  - Accessories selection for the selected switchgear
  - Capacitors and reactor selection
  - Instant catalogue access for selected switchgear/capacitors
  - Final BoM in two forms:
    - Branch-wise list of items
    - Consolidated list of items
- Payback calculation - Monthly payback calculation, after improving the power factor to the desired level
- Technical articles and presentations - 24 technical articles and technical presentations related to reactive power and harmonic management

Benefits

End customers and panel builders will be benefitted by the following ways:

- Easy selection of capacitors and reactors
- Error free switchgear ratings selection
- Time saving while preparing APFC quotations
- Optimum step size selection
- Automatic selection of capacitor-reactor combinations
- BoM can be exported to Microsoft Excel format

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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.

L&T SWITCHGEAR
SAFE & SURE

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