Lauritz Knudsen
Electrical & Automation





d sine

DN MOULDED CASE CIRCUIT BREAKER

ABOUT US

Lauritz Knudsen Electrical & Automation, formerly known as L&T Switchgear, is a leading player in the electrical industry owing to its 70+ years of strong legacy and commitment to the nation's growth. The brand is dedicated to providing a wide range of electrical and automation products and solutions to vital sectors of the economy, including industries, utilities, infrastructure, buildings, and agriculture. Our extensive portfolio includes low-voltage and medium-voltage switchgear, automation solutions, tailored software, and services.

With manufacturing operations in Ahmednagar, Vadodara, and Coimbatore, we adhere to global standards of excellence. Our operations are supported by well-equipped, in-house design and development centers, as well as tooling facilities, ensuring precision in manufacturing.

We proudly operate six Switchgear Training Centers (STCs) across Pune, Lucknow, Coonoor, Vadodara, Delhi, and Kolkata. These centers offer tailor-made classroom courses and lab learning experiences for technicians, customers, engineers, professionals, and students.

With a deep national presence and one of the largest electrical distribution networks, comprising over 1500 partners across the country, we are committed to driving excellence and delivering superior products and solutions that power India's growth journey.

Stability: Activated

Up and Running, Uninterrupted

In every industry, big or small, electrical power supply is critical. Even a few seconds of interruption or instability can result in huge financial losses, even loss of life. We have little or no control over the nature or stability of power supply. The unpredictable nature of power makes it important to take appropriate steps for the protection and safety of your organisation's employees and equipment.

In line with this objective, Lauritz Knudsen Electrical & Automation presents DN a highly advanced and sophisticated range of Moulded Case Circuit Breakers (MCCBs).

The d sine DN range of MCCBs, is a combination of state-of-the-art design and modern user-friendly features. It also boasts a wide choice of protective releases, ergonomics, aesthetics and compactness. The range, designed to meet the changing needs of users after extensive analysis and user feedback, can satisfy the most demanding system requirements.

Complemented by a wide array of accessories, the range offers comprehensive solutions to customer applications ensuring operational safety, reliability and versatility.

d sine DN

Moulded Case Circuit Breaker



Lauritz Knudsen Electrical & Automation Turning technology to your advantage

Over the last five decades, Lauritz Knudsen Electrical & Automation has earned a place among the world's leading manufacturers of Low Voltage Switchgear with the scale, sophistication and range to meet global benchmarks.

In keeping with our leadership position in the Indian market, we also provide expert assistance in product selection, installation and effective after-sales service, across the country.

Lauritz Knudsen Electrical & Automation is one of the first companies to introduce MCCBs in India. Over the years, we have developed our products to meet the ever-evolving demands of the market.

Obstacles: Deleted



Overcoming Challenges

Original Equipment Manufacturers (OEMs)

For Original Equipment Manufacturers (OEMs), every moment poses a new challenge. The dsine range of MCCBs has been created keeping this in mind. Built in accordance with the highest technical standards, dsine MCCBs assure reliable and maintenance-free operation. They have been designed to adapt to changes and overcome the challenges of your day-to-day operations. Besides being available in 4P version to serve OEMs, such as DG sets, dsine MCCBs come with an external neutral CT for the microprocessor-based version to offer neutral and earth fault protection with 3P MCCBs. Equipped with common accessories for the entire range, these MCCBs assure excellent savings by reducing your inventory costs. What's more, our experienced sales & service team is just a call away. Our team is adept at handling queries and complaints and is trained to offer you techno-commercial solutions... on time, every time.

After all, forging long-term associations has always been the cornerstone of our business.



d sine DN
Moulded Case
Circuit Breaker



Versatitlity: Downloaded



Paper Industry



Sugar Industry



Oil Industry



Gas Industry

Meeting Diverse Demands

Industries

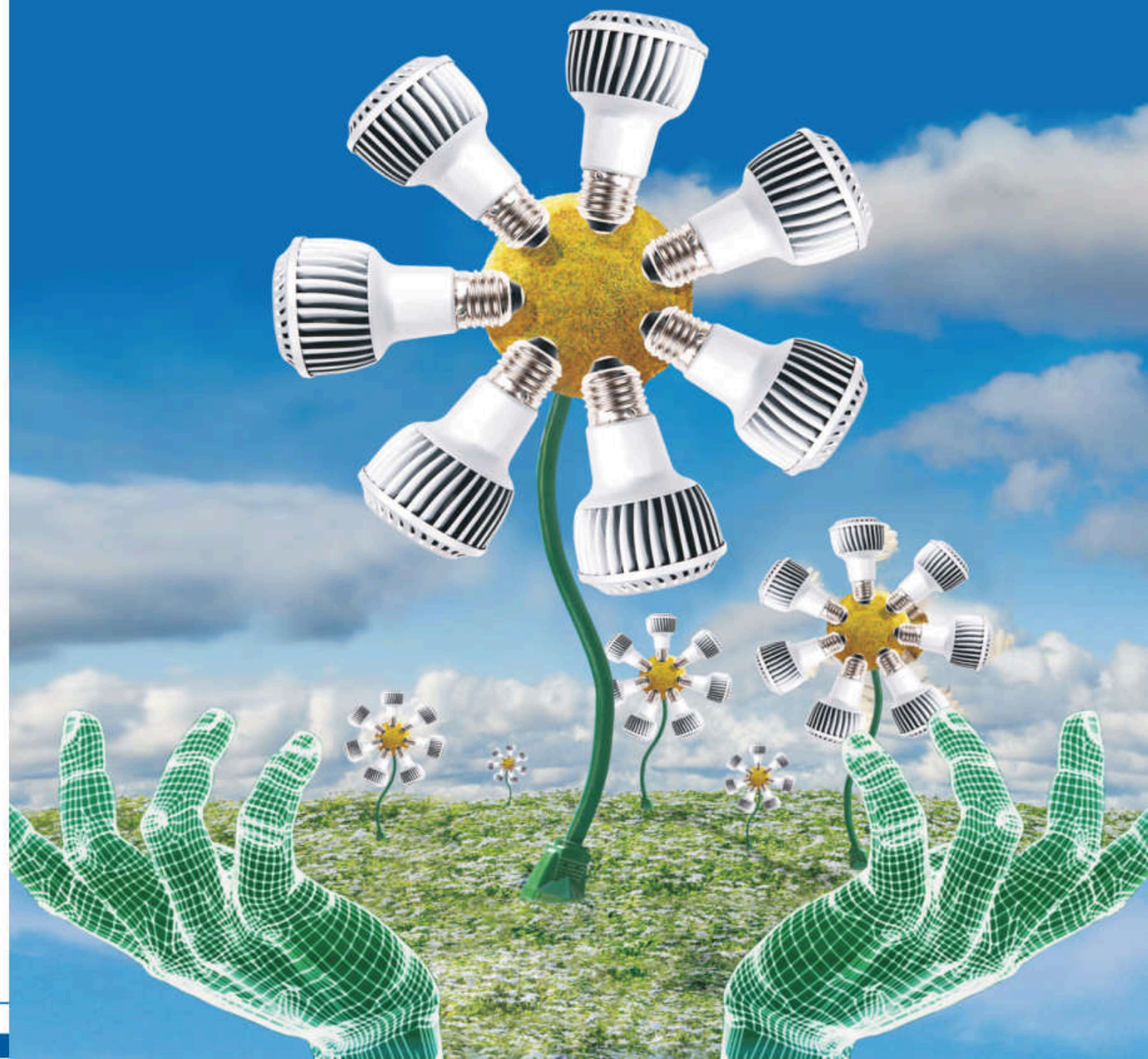
Every industry is unique, and so are its requirements. Industries as diverse as paper, sugar, oil & gas have different sets of needs. Thankfully, dsine MCCBs, available in various current ranges (20A to 1250A), are designed to efficiently handle such diversity.

Our Thermal Magnetic as well as Microprocessor-based releases with various breaking capacities cater to multiple industrial needs. Built with the latest technology, dsine MCCBs deliver optimum efficiency even in the most adverse environmental conditions.

MCCBs with high breaking capacities cater to high voltage applications such as windmills and mines. They are compact so the panel builder can optimise panel size. They are thoroughly factory-tested with adequate quality controls in place. Moreover, since these MCCBs are designed to handle high-value capacitive inrush currents, no nuisance tripping is observed in APFC panels. Motor loads being most vital, our design team has also developed special dsine-M series for motor back-up protection ranging from 32A to 630A.



Effciency: Initiated



Paving The Path to Progress

Building Sector

Today, efficient energy management holds the key to growth and development in any sector. Moreover, in most sectors, such as the building sector, energy management has become mandatory. Our new range of dsine MATRIX releases with advanced technology is specially designed with energy management in mind. MTX3.0 releases with power metering and communication capabilities are ideal for remote annunciation in Data Centers and IT Parks.

Choose from a variety of communication protocols including MODBUS RTU and Bluetooth available with our new MATRIX releases. In today's world of high-end residential buildings or commercial malls, our motorised dsine MCCBs with the fastest changeover from mains to DG in less than 300 milliseconds are indeed the most reliable choice. Our Auto Source Transfer System has almost eliminated the risk of loss of data.



Performance: Delivered



Delivering Unparalleled Results

DC Systems, UPS, Battery Chargers

Unlike AC breaking, DC breaking is a critical phenomenon that causes severe damage. That's why, we offer DC MCCBs from the dsine family. A range that has been designed and developed specially for DC applications such as UPS and battery chargers.

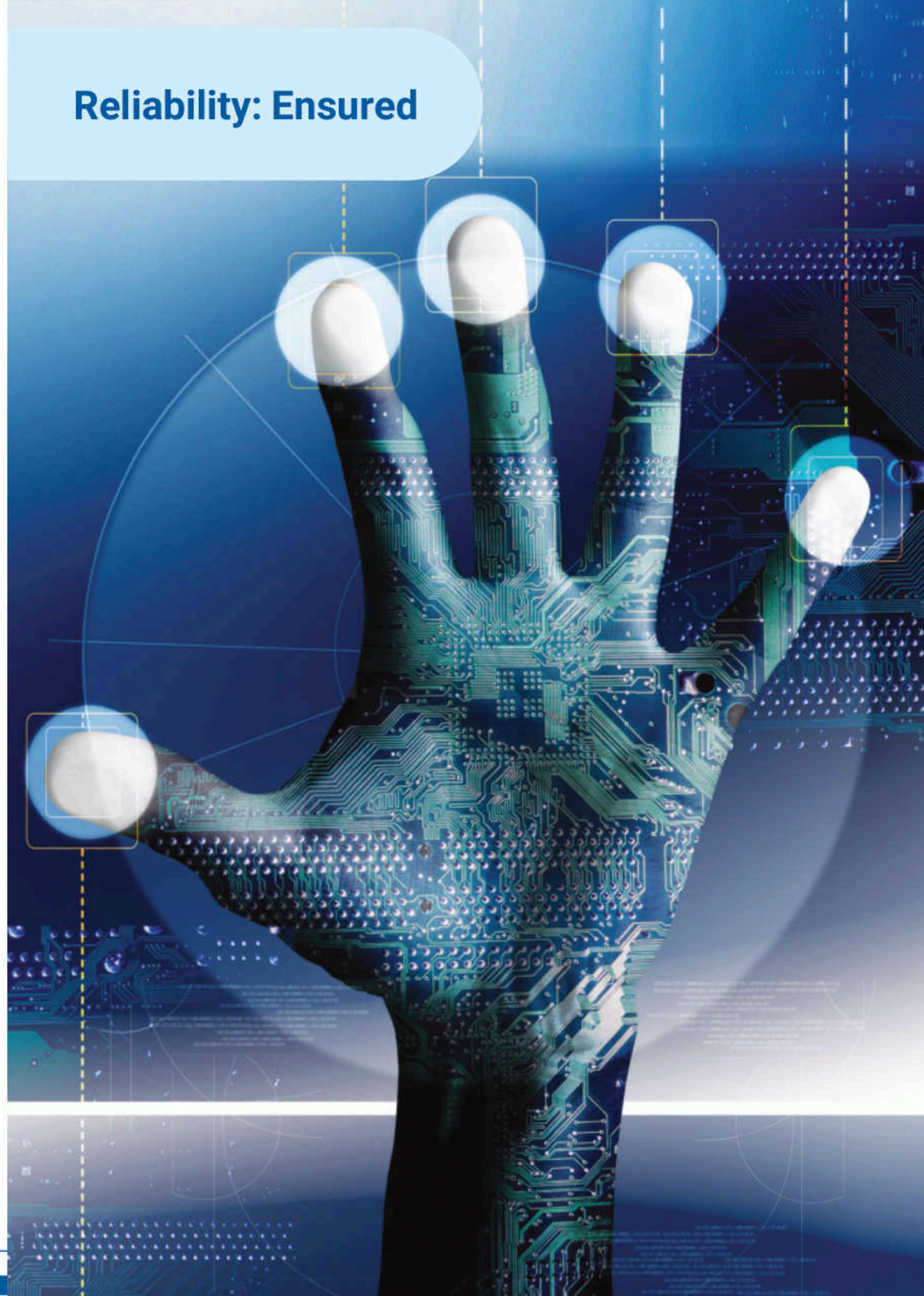
Choose from a wide range of DC voltages (up to 500V) and DC breaking capacities (up to 36kA) available as per various application requirements.

They are also available for lower DC voltages such as battery chargers.

The SD (Switch Disconnector) version of dsine MCCBs can be used at the incoming and outgoing terminals of UPS for isolation. Our SD is designed to withstand high currents without compromising on Service Performance.



Reliability: Ensured



Soaring High with Consistency

Infrastructure

Monitoring and controlling electrical installations at places like airports, hospitals etc. demands high-end, reliable solutions. MATRIX releases are built precisely for such purposes.

Communication capable MATRIX releases with power and energy metering help in modernisation. These releases are made compatible with HMI (Human Machine Interface) and DCS (Data Control System).

As power supply is critical for airports and hospitals, our dsine MCCBS with ASTS offer changeovers in less than 300 milliseconds coupled with a variety of other protections in case of under voltage, phase unbalance, etc.

A variety of settings in MATRIX releases helps in choosing the correct selection for fault clearing, while trip & event recording with MATRIX releases helps in analysing the faults in detail.



Our dsine MCCBs are shipped to Europe, Africa, Australia, Middle East, South East Asia, China and America. In India, we have the largest stockist network with over 700 stockists. To find the ideal dsine MCCB suitable for your requirements, turn the page.



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Overview

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d sine DN Range



DN 4 DN 3 DN 2 DN 1 DN 0

State-of-the-art design, user-friendly features and a wide spectrum of protection releases form the hallmarks of the dsine range. Also recognised for its ergonomics, aesthetics and compactness, it belongs to a new generation of MCCBs. Specially designed and developed for extreme tropical conditions, it promises reliable performance at high ambient and humid environment.

dsine, unfailingly, caters to the ever-evolving needs of customers, derived after in-depth analysis and customer feedback. Because we understand our customers' requirements and demands, our contemporary range of MCCBs never fall short of ensuring complete customer satisfaction. Moreover, complemented by a host of accessories, the dsine range delivers comprehensive solutions to customer applications ensuring operational safety, reliability and versatility.

d sine DN Range

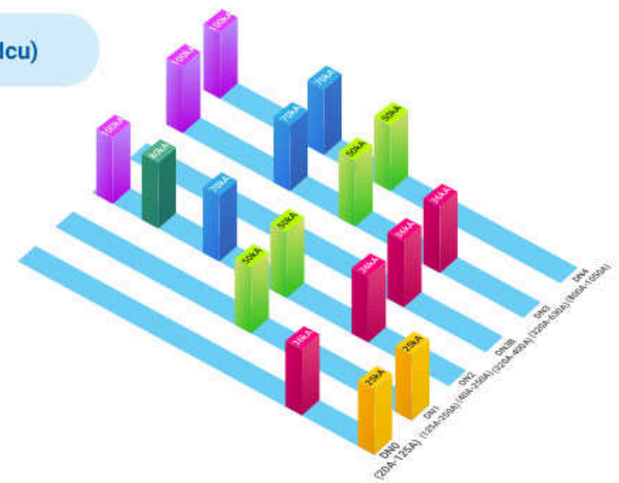
Features

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

	DN0	
Rated Current	20, 25, 32, 40, 50, 63, 80, 100, 125*A	
Release	Thermal-Magnetic	
	DN1	
Rated Current	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
	DN3B	
Rated Current	320, 400A	
Release	Thermal-Magnetic	
	DN3	
Rated Current	320, 400, 500, 630A	400, 630A
Release	Thermal-Magnetic	Microprocessor
	DN4	
Rated Current	800, 1000, 1250A	
Release	Microprocessor	

*Available only in DNO-D

Breaking Capacities (Icu)



Structure & Features



Low Watt Loss

- The entire current carrying path is optimally designed to achieve low watt loss
- Silver contacts offer low contact resistance thus helping in low watt loss



MCCB Mechanism

- Quick make, quick break & trip free mechanism

Positive Isolation

- Indicates the true position of the contacts- ensures operator safety

No Load Line Bias

- Either side of MCCB terminals can be used as load or line



Arc Chutes

- Arc chutes are designed for efficient and faster arc quenching



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

Front Fascia

- Knob designed for better grip
- Indicates "ON", "OFF" and "TRIP" position of MCCB

Release

- Thermal & Microprocessor based releases are available

Protection Releases

Thermal Magnetic Releases

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



Variable Thermal, Variable Magnetic (DN2, DN3)

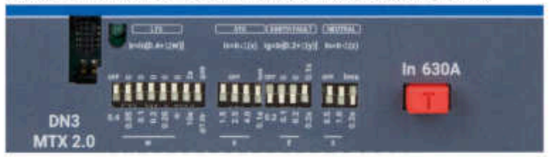


Microprocessor Releases

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)



Magnetic Release

Motor Protection Release (DN0, DN1, DN2, DN3 - Magnetic Protection only)

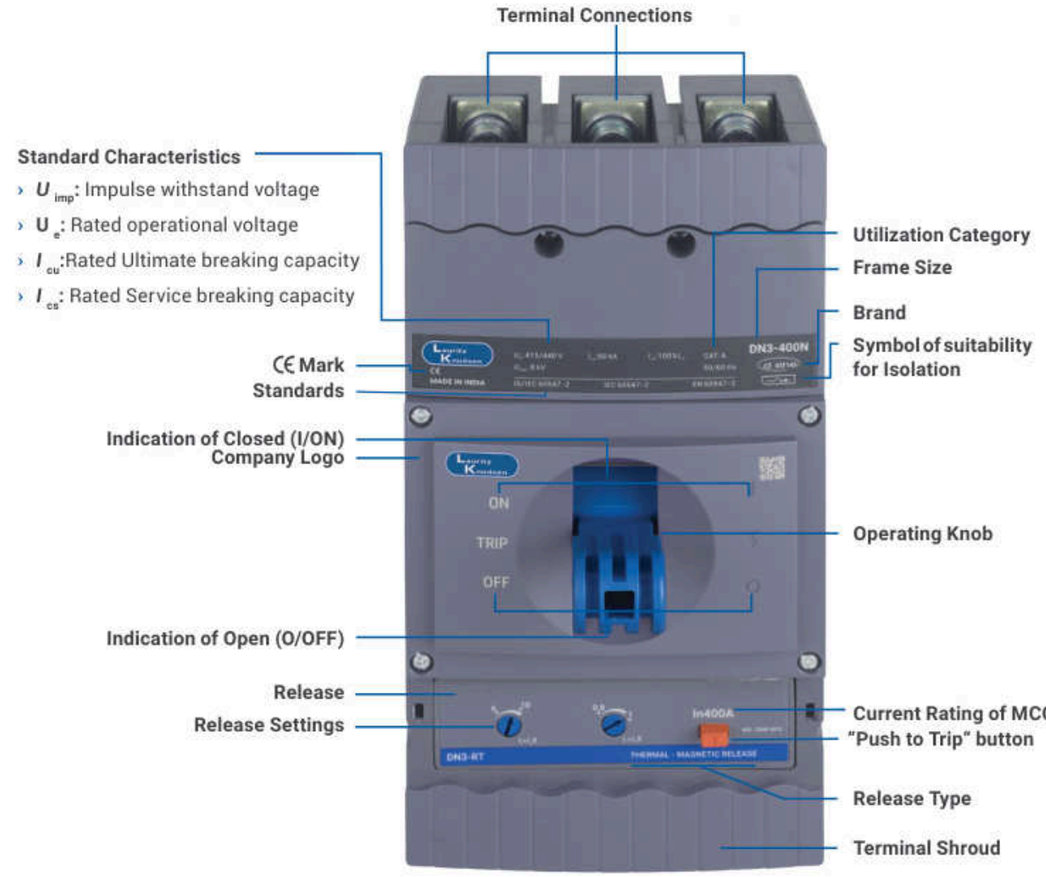


Isolator

Switch Disconnector (DN0, DN2, DN3, DN4)



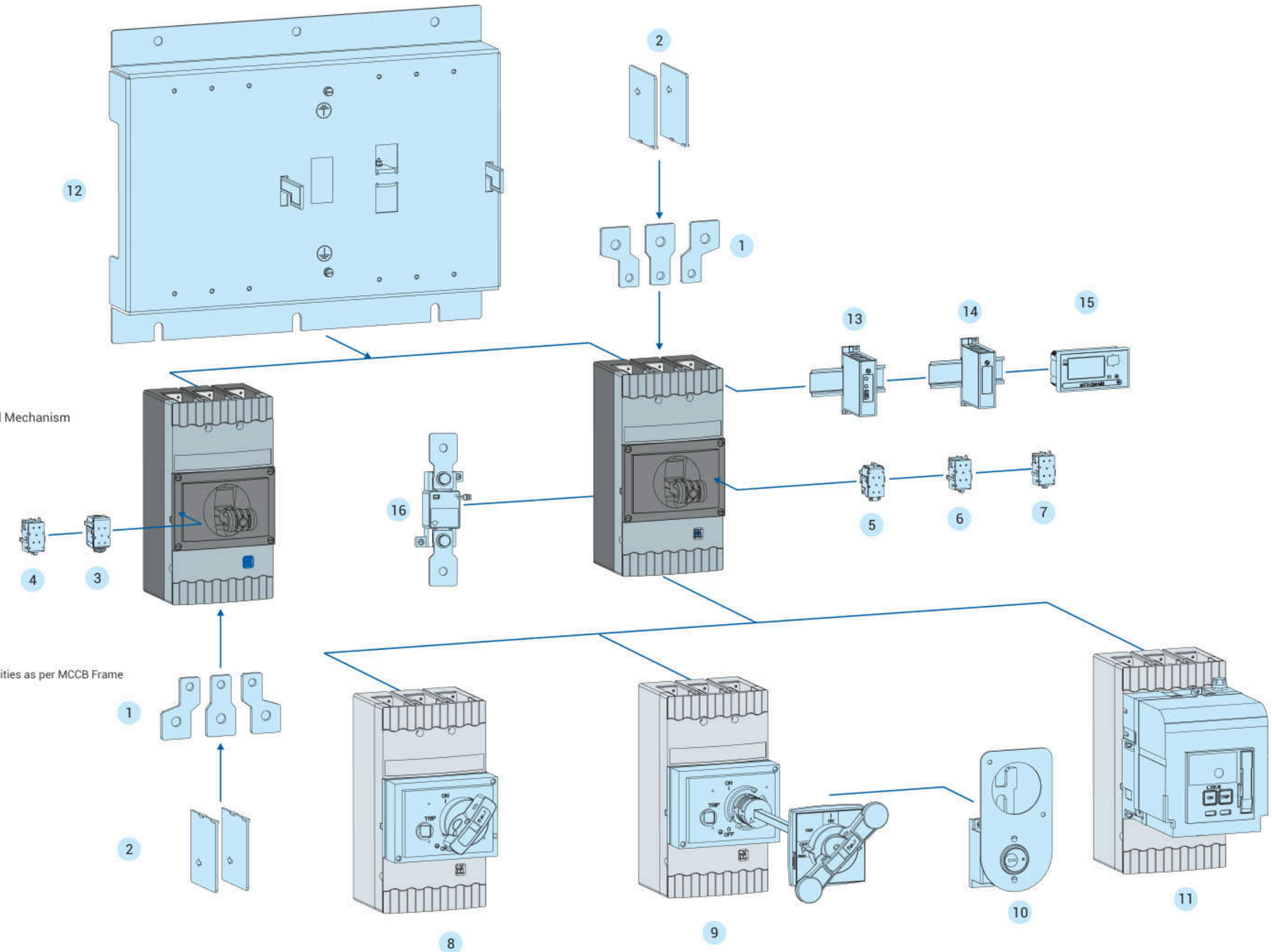
Marking & Configuration



Accessories

1. Spreader Terminals
2. Phase Barriers
3. Undervoltage Release
4. Shunt Release
5. Auxiliary Contact
6. Trip Alarm Contact
7. Auxiliary + Trip Alarm Contact
8. Direct Rotary Handle
9. Extended Rotary Handle
10. Panel Mounted Keylock
11. Stored Energy Electrically Operated Mechanism
12. Mechanical Interlock Kit
13. Communication Module
14. Voltage Module
15. Display Module
16. External Neutral CT with Adaptor Kit)

* For Enclosure please refer page no. 50
* Accessories are indicative with respect to Cavities as per MCCB Frame



Standards & Approvals

d sine DN range of MCCBs and Accessories comply with following International Standards

- **IEC 60947-1, EN 60947-1, IS/IEC 60947-1**
  Low-voltage switchgear and controlgear, Part 1: General Rules
- **IEC 60947-2, EN 60947-2, IS/IEC 60947-2**
  Low-voltage switchgear and controlgear, Part 2: Circuit-breakers
- **IEC 60947-3, EN 60947-3, IS/IEC 60947-3**
  Low-voltage switchgear and controlgear, Part 3: Switches, disconnectors, switch-disconnectors and fuse combination units
- **IEC 60947-4, EN 60947-4, IS/IEC 60947-4**
  Low-voltage switchgear and controlgear, Part 4: Motor Protection MCCBs, Contactors and Motor-starters
  Third party certificates (ERDA/CPRI) available for E&A's range of MCCBs



NABL

E&A's Switchgear Testing Lab holds NABL accreditation, acknowledging its technical competence in testing as per the ISO/IEC 17025:2005 Standard. Accredited labs must consistently meet accreditation criteria, verified through Surveillance and Re-assessment visits by NABL. Additionally, accredited labs demonstrate technical proficiency through participation in recognized Proficiency Testing Programmes.

All MCCBs undergo testing at E&A's NABL accredited Switchgear Testing Lab, contingent upon ongoing compliance with these standards and NABL's additional requirements



CE Marking

A CE marking signifies that a product meets the essential requirements of relevant European laws or directives concerning safety, health, environment, and consumer protection. It is typically achieved through self-declaration and is mandatory for products within the European Economic Area (EEA) to facilitate intra-regional trade. The responsibility for affixing the CE marking lies with the manufacturer or their authorized representative within the EEA. This marking serves as proof that the product complies with unified regulations across EEA countries, promoting unrestricted trade among member states. E&A's MCCBs complies with the Low Voltage Directive 73/23/EEC as amended by Directive 93/68/EEC, provided they are used as intended, installed, and maintained according to industry standards and operating instructions.



IECEE CB SCHEME - DEKRA Certified

The IECEE CB Scheme is an international agreement involving multiple countries and certification bodies. Manufacturers can utilize a CB test certificate issued by a recognized National Certification Body (NCB) to obtain certification marks from other accepted NCBs in the countries where they are located. E&A's MCCBs are certified under the IECEE CB Scheme by DEKRA, a globally recognized organization with a 150-year history in testing, inspections, certification, risk management, and verification.



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AUTO SOURCE TRANSFER APPLICATION

MCCBs for Power Distribution

Technical Datasheet

Frame			100A		125A	250A		250A					400A	400A			630A				1250A		
			DN0-100		DN0-125	DN1-250		DN2					DN3B	DN3-400			DN3-630				DN4		
Type			C	D	D	C	N	D	N	S	H	V	D	D	N	S	D	N	S	V	N	S	V
Number of Poles Offered			3/4		3/4	3/4		3/4					3/4	3/4			3/4				3/4		
Size		A	125		125	250		250					400A	400A			630A				1250		
Rated Current I_n		A	20, 25, 32, 40, 50, 63, 80, 100		125	125, 160, 200, 250		40, 63, 80, 100, 125, 160, 200, 250					320, 400	320, 400			500, 630			400, 630	800, 1000, 1250		
Frequency		Hz	50		50	50		50					50	50			50				50		
Electrical Characteristics According to IEC-60947- 2																							
Rated Operational Voltage U_e 50/60 Hz AC		V	600		600	600		690					690	690			690				690		
Rated Operational Voltage U_e DC		V	500		500	500		750					750	750			750				NA		
Rated Insulation Voltage U_i		V	800		800	800		800					800	800			800				800		
Rated Impulse Withstand Voltage U_{imp}		kV	8		8	8		8					8	8			8				8		
Version			Fixed		Fixed	Fixed		Fixed					Fixed	Fixed			Fixed				Fixed		
Breaking Capacity Acc to IEC 60947-2																							
Rated Ultimate Short Circuit Breaking Capacity, I_{cu} AND Rated service short-circuit breaking capacity, I_{cs} AND Rated short-circuit making capacity, I_{cm}	240V AC 50/60 Hz	I_{cu}	40	65	65	65	65	50	70	100	100	100	50	50	70	100	50	70	100	100	70	100	100
		I_{cs}	100%	50%	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		I_{cm}	84	143	143	143	143	110	154	220	220	220	110	110	154	220	110	154	220	220	154	220	220
	400V/415V AC 50/ 60 Hz	I_{cu}	25	36	36	25	50	36	50	70	80	100	36	36	50	70	36	50	70	100	50	70	100
		I_{cs}	100%	50%	50%	100%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		I_{cm}	52.5	75.6	75.6	52.5	105	75.6	105	154	176	220	75.6	75.6	105	154	75.6	105	154	220	105	154	220
	440V AC 50/60 Hz	I_{cu}	-	-	-	-	-	36	50	70	80	100	-	36	50	70	36	50	70	100	50	70	100
		I_{cs}	-	-	-	-	-	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		I_{cm}	-	-	-	-	-	75.6	105	154	176	220	-	75.6	105	154	75.6	105	154	220	105	154	220
	500V/525V AC 50/60 Hz	I_{cu}	10	10	10	10	10	25	36	42	65	65	25	25	36	42	25	36	42	65	25	36	65
		I_{cs}	100%	50%	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		I_{cm}	17	17	17	17	17	52.5	75.6	88.2	143	143	52.5	52.5	75.6	88.2	52.5	75.6	88.2	143	52.5	75.6	143
	600 V AC 50/60 Hz	I_{cu}	5	5	5	5	5	16	18	22	22	36	12	12	18	22	12	18	22	50	16	20	50
		I_{cs}	100%	50%	50%	50%	50%	100%	100%	100%	100%	50%	100%	100%	100%	100%	100%	100%	100%	50%	100%	100%	50%
		I_{cm}	7.65	7.65	7.65	7.65	7.65	32	36	46.2	46.2	79.2	24	24	36	46.2	24	36	46.2	110	32	40	105
	690 V AC 50/60 Hz	I_{cu}	-	-	-	-	-	10	15	20	20	36	5	8	15	20	8	10	15	50	10	18	50
		I_{cs}	-	-	-	-	-	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
		I_{cm}	-	-	-	-	-	17	30	40	40	75.6	7.65	13.6	30	40	13.6	17	30	105	17	36	105
	250V DC 50/60 Hz 2 Pole in Series	I_{cu}	20		20	20		20	30	36	-		25	20	30	36	20	30	36	-	NA	NA	NA
		I_{cs}	50%		50%	50%		50%	50%	50%	-		50%	50%	50%	50%	50%	50%	50%	-	NA	NA	NA
	500V DC 50/60 Hz 3 Pole in Series	I_{cu}	15		15	15		15	20	25	-		10	15	20	25	15	20	25	-	NA	NA	NA
		I_{cs}	50%		50%	50%		50%	50%	50%	-		50%	50%	50%	50%	50%	50%	50%	-	NA	NA	NA
	750V DC 50/60 Hz 4 Pole in Series	I_{cu}	NA		NA	NA		10	15	20	-		-	10	15	20	10	15	20	-	NA	NA	NA
		I_{cs}	NA		NA	NA		50%	50%	50%	-		-	50%	50%	50%	50%	50%	50%	-	NA	NA	NA

MCCBs for Power Distribution

Technical Datasheet

Frame			100A		125A	250A		250A					400A	400A			630A				1250A		
			DN0-100		DN0-125	DN1-250		DN2					DN3B	DN3-400			DN3-630				DN4		
Type			C	D	D	C	N	D	N	S	H	V		D	N	S	D	N	S	V	N	S	V
Utilization Category			A																				
Reference Standard			IS/IEC60947-2, IEC60947-2 & EN60947-2																				
Isolation Behaviour			Positive Isolation																				
Mechanical Life		No. Operations	40000		40000	15000		25000					10000	15000			15000			15000	20000		
		No. Hourly Operations	120	120	120	120	120	120	120	120	120	120	60	60	60	60	60	60	60	60	20	20	20
Electrical Life @ 415V AC	I_n	No. Operations	12000	8000	4000	10000		10000					4000	4000			4000			4000	3000		
		No. Hourly Operations	120	120	120	120	120	120	120	120	120	120	60	60	60	60	60	60	60	60	20	20	20
Trip Units for Power Distribution	VTFM		✓	✓	✓	✓		✓					✓	×			×				×		
	VTVM		×	×	×	×		✓				×	×	✓			✓			×	×		
	MTX1.0		×	×	×	×		✓					×	✓			✓				✓		
	MTX2.0		×	×	×	×		✓					×	✓			✓				✓		
	MTX3.0		×	×	×	×		✓					×	✓			✓				✓		
Trip Units for Motor Protection	M		✓	×	✓	✓		✓					×	✓			✓				×		
Swicth Disconnector	SD		✓			×		✓					✓	✓			✓				✓		
Permissible Ambient Temperature Range	Ambient		-5°C to 55°C																				
	Storage		-35°C to 70°C																				
Mounted on DIN Rail			Possible			No Provision																	
Permissible Mounting Orientations			Vertical and 90° in both directions																				
Pole to Pole Distance (Pitch in mm)			25			35		35					44.5	43.5			43.5				68		
Dimensions in mm (Width x Depth x Height)	Fixed	3P	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		
		4P	100 x 60 x 130			140 x 60 x 165		140 x 96 x 179					184 x 111 x 205	184 x 111.5 x 266			184 x 111.5 x 266				278 x 143 x 370		
	Motorized	3P	NA			NA		105 x 237.5 x 179					NA	140 x 256 x 266			140 x 256 x 266				210 x 290 x 370		
		4P	NA			NA		140 x 237.5 x 179					NA	184 x 256 x 266			184 x 256 x 266				278 x 290 x 370		
Approx Weight in Kg	Fixed	3P/4P	0.8/1.1	0.73/1	0.73/1	1.55/2		2.7/3.5					4.0/5.0	5.5/7.2			6/7.8		6.3/8		17/22		
	Motorized	3P/4P	NA			NA		4.5/5.3					NA	9.1/10.8			9.1/11.4		9.9/11.6		22/27		
IP Protection	At Termination		IP20			IP20		IP20					IP20	IP20			IP20				IP20		
	At Panel Cutout		IP40			IP40		IP40					IP40	IP40			IP40				IP40		
	At SEOM Level		NA			NA		IP30					NA	IP30			IP30				IP30		

MCCBs for Power Distribution

Technical Datasheet

Frame			100A		125A	250A		250A					400A	400A			630A				1250A		
			DN0-100		DN0-125	DN1-250		DN2					DN3B	DN3-400			DN3-630				DN4		
Type			C	D	D	C	N	D	N	S	H	V		D	N	S	D	N	S	V	N	S	V
Accessories	Internal	Auxiliary Contact 1 C/O		✓		✓				✓			✓				✓					✓	
		Auxiliary Contact 2 C/O		✓		✓				✓			✓				✓					✓	
		Trip Alarm Contact 1C/O		✓		✓				✓			✓				✓					✓	
		Trip Alarm Contact 2C/O		✓		✓				×			×				×					×	
		Auxiliary 1 C/O + TAC 1 C/O		✓		✓				✓			✓				✓					✓	
		Shunt Release - 24V DC		✓		✓				✓			✓				✓					✓	
		Shunt Release - 110V DC		×		×				✓			✓				✓					×	
		Shunt Release - 110V AC		✓		✓				✓			✓				✓					✓	
		Shunt Release - 240V AC		✓		✓				✓			✓				✓					✓	
		Shunt Release - 415V AC		✓		✓				✓			✓				✓					✓	
		Under Voltage Release - 240V AC		✓		✓				✓			✓				✓					✓	
	External	Rotary Operating Mechansim (Direct)		✓		✓				✓			✓				✓					×	
		Rotary Operating Mechansim (Extended)		✓		✓				✓			✓				✓					✓	
		Mechanical Interlocking Kit		×		×				✓			×				✓					×	
		Keylocks	✓	✓	✓	✓	✓			✓			✓				✓					✓	
		Motor Mechanism		×		×				✓			×				✓					✓	
		Spreader Terminals		✓		✓				✓			✓				✓					✓	
		Neutral CT with Adaptor Kit		×		×		Available for 3P MCCBs with MTX2.0 & MTX3.0 Release only														✓	
		Current Metering Module		×		×		Available for MTX2.0 Release for Current metering only @															
		Voltage Module		×		×		Available for MTX3.0 Release for Communication & Energy metering															
		Communication Module		×		×																	
		Display Module		×		×																	
		MTX Test Kit		×		×		✓					×	✓								✓	
		Enclosure		✓		✓		×					×	×			×					×	
		Earth Fault Module		✓		✓		✓					✓	✓			✓					×	

$: 'NO' of control contactor to be connected in series for 220V DC, 24V DC
@ : Contains display module & metering module, separate cable required for connection
^ : 440V AC reduce breaking capacity for DN0 & DN1
* : at 415V
DN2 - 1500 @ 690V
DN3 - 1000 @ 690V
DN4N - 800A - 2500 @ 415V
DN4S - 800A - 5000 @ 415V

Note:
- Any two internal accessories can be mounted at a time
- V version MCCBs, to be used with extended ROM only
- Separate earth fault module required for earth fault protection using TM releases
- I_{cu}: Rated ultimate short-circuit breaking capacity
- I_{cs}: Rated service short-circuit breaking capacityc
- Reference temperature : 40°C (For Ref Temp Requirement of 50°C, contact Product Team)

Motor Backup Application

AC induction motors are essential components in production processes, making up the majority of loads in industrial and other installations. The M version MCCBs in the dsine range are specifically designed to provide short circuit protection for all types of motors. Using our type 2 charts ensures reliable motor performance by selecting the appropriate MCCB.



Frame			100A	160A	250A		400A	630A	
Type			DN0-100	DN1-160	DN2-250		DN3-400	DN3-630	
			M	M	M	MH	M	M	MV
Current range (A)			32-100	100-160	100-250	63-250	320-400	500-630	320-630
Poles			3	3	3	3	3	3	3
Rated Short Circuit Breaking Capacity	I_{cu}(kA)	400 / 415 V	50	50	50	80	50	50	100
		480 V	10	10	36	65	36	36	65
		690 V	-	-	15	20	15	10	50
	I_q(kA)	415 V	50	50	50	80	50	50	100
		480 V	-	-	-	65	-	-	65
	I_{cs}as % Icu	400 / 415 V	25%	50%	100%	100%	100%	100%	100%
		480 V	25%	50%	100%	100%	100%	100%	100%
		690 V	-	-	100%	100%	100%	100%	50%
			9/$_n$	10/$_n$	10/$_n$				

Note: MV version MCCBs to be used with extended ROM only.

Switch Disconnector

dsine DN MCCBs in Switch Disconnector versions provide a solution for switching various loads like UPS, Battery Banks, etc., offering several advantages. These MCCBs are similar to standard MCCBs but lack protection trip units. They are suitable for isolation purposes in the following applications:

- Typically installed at the entrance of sub-distributions
- Used as an isolator for bus couplers
- Functions as an automatic switch
- Suitable for switching applications involving motors with VFDs or soft starters

SD MCCBs are always supported by a Short Circuit Protection Device (SCPD) to safeguard downstream loads and installations from short circuits.



Our dsine DN SD MCCBs offer following advantages:

- Ideal for ensuring positive isolation
- Offered in 3P and 4P configurations
- Compatible with Under Voltage Protection
- Remote tripping capability via Shunt release
- Available with motor-operated options
- Support status feedback functionality

Following are the specifications of SD MCCBs

Frame	160A	250A	400A	400A	630A	800A	1000A	1250A
Type	DN0-160SD	DN2-250SD	DN3B-400SD	DN3-400SD	DN3-630SD	DN4-1250SD		
Current Range (A)	32-160	100-250	320-400	320-400	500-630	800	1000	1250
Rated operating current (A)	32-160	100-250	320-400	320-400	500-630	800	1000	1250
Poles	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
I_{cw} (kA)	2	3.6	5.5	5.5	7.6	10	12	15
Duration (sec)	1	1	1	1	1	1	0.5	0.1

Note: Icw - Rated short-time with stand current

DC Application

DC power distribution is an upcoming technology in this modern era due to its most rigorous network power applications such as

- AC-DC Power System
- DC-DC Converter Systems
- DC-AC Inverter Systems
- DC UPS
- Batteries & Accessories
- Solution to alternative energy-Solar Power

We offer dsine MCCBs for the protection of DC systems in variety of current ratings from 20A-630A, voltage ratings upto 750V and various breaking capacities ranging from 5kA to 36kA.

Frame		DN0-125*		DN1-250		DN2-250			DN3-400			DN3B-400	DN3-630		
Type		C	D	C	N	D	N	S	D	N	S	D	D	N	S
Release		TM													
Poles		3 or 4													
Rated current In (A)		20, 25, 32, 40, 50, 63, 80, 100, 125		125, 160, 200, 250		63, 80, 100, 125, 160, 200, 250			320, 400			320, 400	500, 630		
I_{cw} (kA rms)	250 V DC	20		20		20	30	36	20	30	36	25	20	30	36
	500 V DC	15		15		15	20	25	15	20	25	10	15	20	25
	750 V DC	-		-		10	15	20	10	15	20	-	10	15	20
Type of connection		3P in series													
L/R (msec)		<15msec													

* Available only in DN0-125D

Switching of DC currents is much severe phenomenon than switching AC currents due to non occurrence of natural zero. Hence DC MCCBs are desired to give less breaking capacity than AC MCCBs for the same voltage & currents.

Note: Suitable for Thermal Magnetic release only

Capacitor Application

For any APFC panel, MCCBs are required for short circuit protection, overload protection and for isolation of capacitors. MCCB selection for capacitive load is tricky because of heavy inrush current, high overload capacity and continuous full load. These inherent traits of a capacitor, complicates the selection process. The selection should be such that the MCCB should not nuisance trip during inrush current and should withstand continuous flow of overload current.

Whenever we use MCCB in an APFC panel, proper measures need to be taken against the ill effects of the inrush current. Normally the inrush current (more than 100 times the rated capacitor current) will remain for a few microseconds and will not be sensed by the MCCB. However the contacts of MCCB may repel and bounce because of the current limiting feature, causing micro-arcs between the contacts of MCCB. This multiple bounce can result in premature failure of MCCB contacts. In order to reduce the magnitude of the peak inrush current, MCCBs must be used along with capacitor duty contactors or inrush current limiting reactors.

The maximum permissible current in a capacitor branch is 1.46 times the rated current. This factor is comprised of the following:

1. Harmonics overload and over voltage - 30%
2. Capacitance tolerance - 10%
3. Frequency variation - 2%

Hence adequate care needs to be taken while selecting switching & protection devices for capacitor applications. It is always advised to limit the switching inrush current within safe limits. For this, MCCB ratings should be chosen at least 1.5 to 2 times of capacitor rated current along with Capacitor Duty Contactors.

Protection Releases

Protection releases, refer to the mechanisms within the MCCB that are responsible for detecting various electrical faults or abnormalities in the circuit. These releases are designed to automatically trip (open) the circuit breaker when such faults occur, thereby protecting the electrical system and equipment from damage or hazards such as overloads, short circuits, and ground faults.

Thermal and microprocessor-based releases are two types of mechanisms used in circuit protection devices, such as circuit breakers, to detect electrical faults and provide appropriate responses. Here's an explanation of each:

Thermal releases : Also known as thermal-magnetic releases, primarily protect against overcurrent conditions, specifically thermal overloads. They rely on a bimetallic strip that responds to the temperature rise caused by sustained overcurrents. When the current exceeds a preset threshold (typically several times the rated current for a sustained period), the bimetallic strip heats up reaches a critical temperature. The heated strip triggers a mechanical trip mechanism that opens the contacts of the circuit breaker, thereby disconnecting the circuit.

Microprocessor-Based Releases: Microprocessor-based releases offer advanced protection capabilities beyond basic thermal-magnetic releases. They use electronic sensors and microprocessor technology to monitor various electrical parameters, including current, voltage, frequency, and sometimes power factor. These devices continuously analyze incoming electrical signals to detect a wide range of fault conditions, including overcurrents, short circuits, ground faults, and other abnormal situations. Response: Upon detecting a fault, the microprocessor-based release can precisely coordinate the tripping action based on the type and severity of the fault. Microprocessor-based releases are commonly found in more complex and critical applications, such as data centers, industrial plants, and facilities where precise and selective protection coordination is necessary. They provide enhanced reliability and flexibility in protecting sensitive equipment and ensuring minimal downtime during fault conditions.

Microprocessor-based releases offer faster response times and more precise fault detection compared to thermal releases. Microprocessor-based releases can be programmed and adjusted to specific application requirements, while thermal releases have fixed operating characteristics. Microprocessor-based releases are typically more complex than thermal releases due to their advanced technology and capabilities.

d sine DN Overview

Protection releases, refer to the mechanisms within the MCCB that are responsible for detecting various electrical faults or abnormalities in the circuit. These releases are designed to automatically trip (open) the circuit breaker when such faults

Frame	DN0	DN1	DN2	DN3B	DN3	DN4
Thermomagnetic trip unit						
TM^ (LS/I)	20, 25, 32, 40, 50, 63, 80, 100, 125•	125, 160, 200, 250	40, 63, 80, 100, 125, 160, 200, 250	320, 400	320, 400, 500, 630	-
Electronic trip units						
MTX1.0 (LS/I)	-	-	40, 63, 100, 160, 250	-	400, 630	800, 1000, 1250
MTX2.0 (LSING + Current Metering)						
MTX3.0 (LSING + Energy Metering + Communication)						
Motor Protection						
M (S)	32, 40, 50, 63, 80, 100	100, 125, 160	100, 125, 160 200, 250	-	320, 400 500, 630	-
Switch Disconnector						
SD (No Protection)	32, 63,100, 125, 160	-	100, 125, 160, 200, 250A	320, 400	500, 630	800, 1000, 1250
DC						
DC	20, 25, 32, 40, 50, 63, 80, 100, 125•	125, 160, 200, 250	63, 80, 100, 125, 160, 200, 250	320, 400	320, 400, 500, 630	-

Thermal-Magnetic Release

- Usable with DN0, DN1, DN2, DN3B and DN3 circuit-breakers (from 20A to 630A) in three-pole and four-pole versions.
- The release works on True RMS Sensing principle.
- Knobs are provided on front side of the release for selection.
- Protections (LI) – Overload and Instantaneous Short Circuit option
  - » Adjustable Overload (L) Settings from 0.8 to 1x In
  - » Instantaneous Short Circuit (I) with -
    - > Fixed setting of 9 x In (for DN0, DN1 and DN3B)
    - > Adjustable setting of 6 to 10 x In (for DN2 and DN3)



Protection Function	Current Setting	Factory Settings
Overload (L)	0.8 to 1x In	1 x In
Instantaneous Short Circuit (I)	9 x In (DN0, DN1, DN3B) 6 to 10 x In (DN2, DN3)	9 x In 10 x In
Earth Fault (G)	External Ground Fault Module Required•	

MTX1.0

- Usable with DN2, DN3 and DN4 circuit-breakers (from 40A to 1250A) in three-pole and four-pole versions.
- The release is self-powered and works on True RMS Sensing principle.
- DIP switches are provided on front side of the release for precise selection.
- Protections (LS/I) – Overload, Short Circuit Setting with delay OR Instantaneous option
  - » Adjustable Overload (L) Settings from 0.4 to 1x In (in steps of 0.05) with adjustable trip time curve
  - » Short Circuit with Delay (S) with fixed time delay of 100ms with settings of 1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x Ir
  - » Instantaneous Short Circuit (I) with settings of 1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x Ir
- Power/ Alarm/ Pick-up LED (Green) -
  - » For Power Indication - Steady glow at 20% of Nominal Current (In)

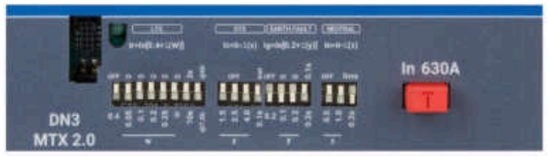


  - » For Overload Indication –
    - > Slower blinking of LED with 1s frequency at 80% of Rated current (Ir)
    - > Faster blinking of LED with 0.5s frequency above 115% of Rated current (Ir)
  - » For Short Circuit Indication – the blinking sequence is as shown below with one ON/OFF Blink of 0.5s OFF-ON-OFF-ON-OFF-OFF-OFF-OFF (Longer OFF time in blinking pattern)
- Provision for Release Testing with Testing Port on the top left side of the release – Release to be connected to Test Kit which conducts trip test for L, S, I at different fault levels.
- Either S or I has to be in ON condition.
- Thermal memory is selectable in Overload (L) Protection.

Protection Function	Current Setting	Time Delay	Protection Mode	Alarm Pick-up	Factory Settings
Overload (L)	0.4 to 1x I_n	10s at 6I_r, 3s at 6I_r, 10s at 7.2I_r, 3s at 7.2I_r	ON/OFF	0.8 I_r	1 x I_n 10s @6I_r ON
Short Circuit with delay (S)	1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x I_r	100ms	ON/OFF	-	5.5 x I_r 100ms ON
Instantaneous Short Circuit (I)	1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x I_r	-	ON/OFF	-	OFF

MTX2.0

- Compatible with DN2, DN3 and DN4 circuit-breakers (from 40A to 1250A) in three-pole and four-pole versions.
- The release is self-powered and works on True RMS Sensing principle.
- The release provides in-built earth fault protection and current metering facility.
- DIP switches are provided on front side of the release for precise selection.
- Protections (LS/ING) - Overload, Neutral, Earth and Short Circuit Setting with delay OR Instantaneous Fault
  - » Adjustable Overload (L) Settings from 0.4 to 1x In in steps of 0.05) with adjustable trip time curve
  - » Short Circuit with Delay (S) with fixed time delay of 100ms with settings of 1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x Ir
  - » Instantaneous Short Circuit (I) with settings of 1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x Ir
  - » Neutral Overload Protection (N) can be selected at 50%, 100% and 150% of the phases with time delay as per overload curve setting or fixed at 200ms
  - » Earth (Ground) Fault Protection (G) can be selected at 20%, 30%, 40% and 50% of rated current with time delay options of 100ms and 200ms.

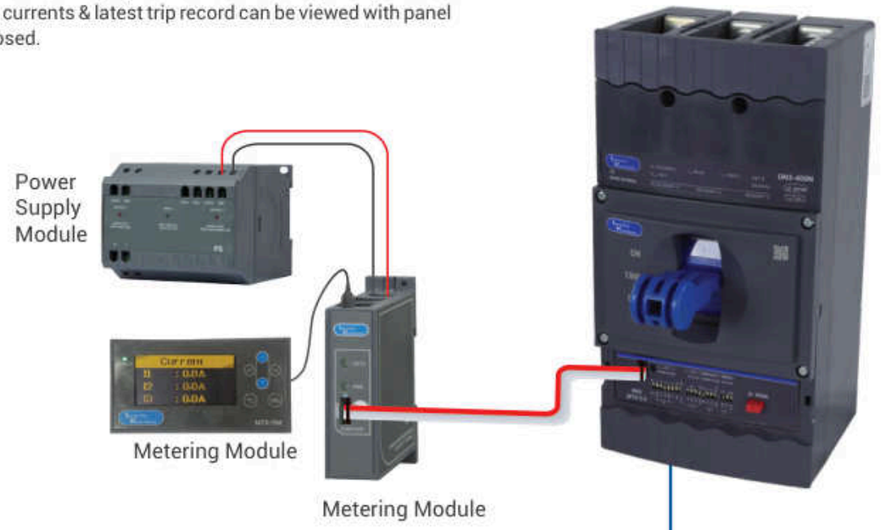


- Power/ Alarm/ Pick-up LED (Green) -
  - » For Power Indication - Steady glow at 30% of Nominal Current (In)
  - » For Overload Indication –
    - > Slower blinking of LED with 1s frequency at 80% of Rated current (Ir)
    - > Faster blinking of LED with 0.5s frequency above 115% of Rated current (Ir)
  - » For Short Circuit Indication – the blinking sequence is as shown below with one ON/OFF Blink of 0.5s OFF-ON-OFF-ON-OFF-OFF-OFF-OFF (Longer OFF time in blinking pattern)
  - » For Earth Fault Indication – the blinking sequence is as shown below with one ON/OFF Blink of 0.5s ON-OFF-ON-OFF-ON-ON-ON-ON (Longer ON time in blinking pattern)
- Provision for Release Testing with Testing Port on the top left side of the release – Release to be connected to Test Kit which conducts trip test for L, S, I at different fault levels.
- Thermal memory is selectable in Overload (L) Protection.

Protection Function	Current Setting	Time Delay	Protection Mode	Alarm Pick-up	Factory Settings
Overload (L)	0.4 to 1x I_n	10s at 6I_r, 3s at 6I_r, 10s at 7.2I_r, 3s at 7.2I_r	ON/OFF	0.8 I_r	1 x I_n 10s @6I_r ON
Short Circuit with delay (S)	1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x I_r	100ms	ON/OFF	-	5.5 x I_r 100ms ON
Instantaneous Short Circuit (I)	1.5, 2.5, 4.0, 5.5, 6.5, 8.0 x I_r	-	ON/OFF	-	OFF
Neutral Overload (N)	0.5, 1.0, 1.5 x I_r	200ms/ Same as Overload Curve	ON/OFF	0.8 I_n	OFF
Earth Fault (G)	0.2, 0.3, 0.4, 0.5 x I_n	100ms/ 200ms	ON/OFF	-	OFF

Advanced features of MTX2.0

- **Panel Mounted Display for Current Metering & Trip Record**
  System currents & latest trip record can be viewed with panel door closed.



Port with Polarized Connector

MTX2.0 release with metering port is implemented with poka-yoke technology using polarized connector to ensure correct insertion of metering harness, thus avoiding unnecessary errors.



Digital Current Metering

MTX releases are designed with protection class CTs which measure true RMS values. Inbuilt current metering does not require separate CTs hence maintenance is easy.

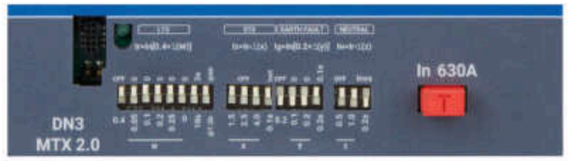
O-LED Display

O-LED display allows the operator a wide viewing angle. O-LEDs showing current metering has got faster response time and also consumes less power, hence saves energy. It has better contrast ratio as well.



Display Module

Various Protection Settings



Overload Protection, (I_r = x I_n)

DIP Switch Position							
Setting	Bypass	40%	45%	50%	55%	60%	65%

DIP Switch Position							
Setting	70%	75%	80%	85%	90%	95%	100%

Thermal Memory

DIP Switch Position		
Setting	Bypass	ON

DIP Switch Position				
Setting	3_s @ $6I_r$	10_s @ $6I_r$	3_s @ $7.2I_r$	10_s @ $7.2I_r$

DIP Switch Position							
Setting	Bypass	1.5	2.5	4.0	5.5	6.5	8.0

Time Delay for Short Circuit Protection

DIP Switch Position		
Setting	Instantaneous	100ms

Earth Fault Setting, (I_g = x I_n)

DIP Switch Position					
Setting	Bypass	20%	30%	40%	50%

Time Delay for Earth Fault Protection

DIP Switch Position		
Setting	100ms	200ms

Neutral Setting, (I_N = x I_r)

DIP Switch Position				
Setting	Bypass	50%	100%	150%*

Time Delay for Neutral Protection

DIP Switch Position		
Setting	200ms	Follows O/L Curve

*With maximum overload setting I_r=0.65I_n

MTX3.0

- Compatible with DN2, DN3 and DN4 circuit-breakers (from 40A to 1250A) in three-pole and four-pole versions.
- The release is self-powered and works on True RMS Sensing principle.
- The release provides advanced current and energy-based protection and metering.
- Fine tuning of Basic Protection settings & Setting of advance protection will be available through Display.
- The release is communication capable through Modbus RTU
- DIP switches are provided on front side of the release for precise selection.
- Protections (LSING) - Overload, Neutral, Short Circuit Setting with delay, Instantaneous and Earth Fault
  - » Adjustable Overload (L) Settings from 0.4 to 1x In (in steps of 0.01) with time delay ranging from 0.5s to 30s in steps of 0.1s
  - » Short Circuit with Delay (S) with fixed time delay options of 100ms, 200ms, 300ms, 400ms with settings of 1.5 to 8x Ir (in steps of 0.1)
  - » Instantaneous Short Circuit (I) with settings of 1.5 to 8 In (in steps of 0.1)
  - » Neutral Overload Protection (N) can be set between 50% to 150% of the phases (in steps of 1%) with time delay as per overload curve setting or fixed at 200ms.
  - » Earth (Ground) Fault Protection (G) can be selected at 10% to 50% of rated current (in steps of 5%) with time delay options ranging from 100ms to 500ms (in steps of 5%)
- Additional Current and Energy based protections - In addition to LSING protection, the release also provides -
  - » Current Protection - Under Current and Current Unbalance Protection
  - » Voltage Protection - Under Voltage, Over Voltage, Residual Voltage and Voltage Unbalance Protection
  - » Frequency Protection - Under Frequency and Over Frequency Protection
  - » Power Protection - Reverse Power, Lead Power factor and Lag Power factor Protection
  - » Other Protections - MD Active, MD Reactive, MD Apparent, Phase Sequence, THD Current and THD Voltage Protections
- In addition to above protections, the release also provides metering of below parameters -
  - » Current - Phase, Neutral and Earth
  - » Voltage - Phase and Line
  - » Frequency and power factor - True RMS
  - » Power - Active, Reactive and Apparent
  - » Energy - Active, Reactive and Apparent
  - » Maximum Demand - Active, Reactive and Apparent
  - » Harmonics (THD) - Current and Voltage
- The release provides last ten Trip and Event records (with non-volatile memory)
- Power/ Alarm/ Pick-up LED (Green) -
  - » For Power Indication - Steady glow at 30% of Nominal Current (In)
  - » **For Overload Indication -**
    - > Slower blinking of LED with 1s frequency at 80% of Rated current (Ir)
    - > Faster blinking of LED with 0.5s frequency above 115% of Rated current (Ir)
  - » For Short Circuit Indication - the blinking sequence is as shown below with one ON/OFF Blink of 0.5s OFF-ON-OFF-ON-OFF-OFF-OFF-OFF (Longer OFF time in blinking pattern)
  - » For Earth Fault Indication - the blinking sequence is as shown below with one ON/OFF Blink of 0.5s ON-OFF-ON-OFF-ON-ON-ON-ON (Longer ON time in blinking pattern)
- Provision for External Neutral CT connection on the left-hand side of the breaker where a micro-USB connector is available, made accessible to the user via a knock-out groove. This connector is used to connect the External Neutral CT in case of 3 pole breaker used in 3 Phase 4 Wire connection.
- Provision for Release Testing with Testing Port on the top left side of the release - Release to be connected to Test Kit which conducts trip test for L, S, I at different fault levels.
- Thermal memory is selectable in Overload (L) Protection.



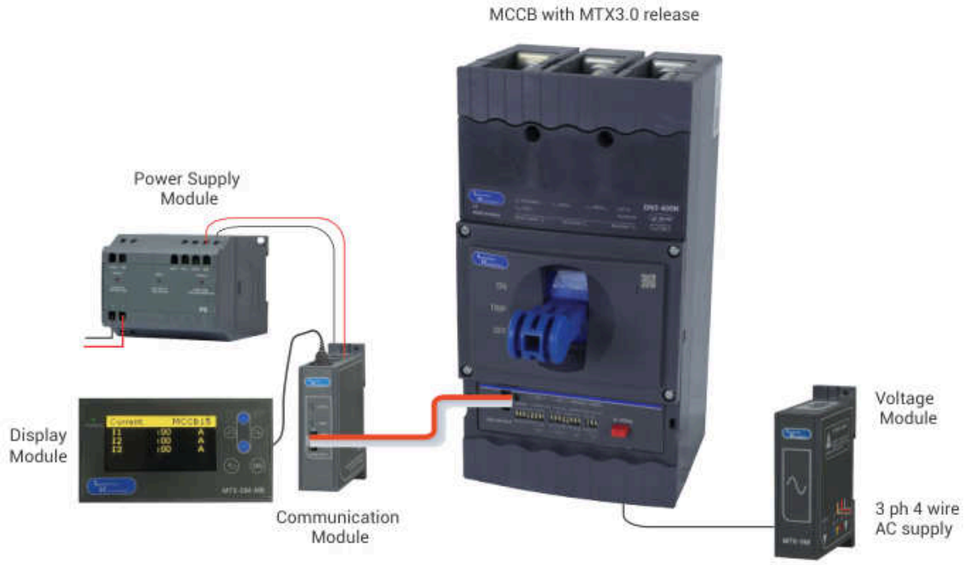
Protection Function	Current Setting	Time Delay	Protection Mode	Alarm Pick-up	Factory Settings
Overload (L)	0.4 to 1x I_n	0.5s to 30	ON/OFF	0.8 I_r	1 x I_n 10s @6I_r ON
Short Circuit with delay (S)	1.5, 3.0, 4.5, 5.5, 6.0, 7.0, 8.5, 10.0 x I_r up to 630A 1.5, 3.0, 3.5, 4.5, 5.0, 6.0, 6.5, 8.0 x I_r for 800A	100ms/200ms	ON/OFF	-	5.5 x I_r 100ms OFF
Instantaneous Short Circuit (I)	1.5 to 12 x I_r (in steps of 0.5) 1.5 to 10 x I_r (in steps of 0.5) for 630A 1.5 to 8 x I_r (in steps of 0.5) for 800A	Max 50ms (Fixed)	ON/OFF	-	OFF
Neutral Overload (N)	0.5, 1.0, 2.0 x I_r	As per Overloa Curve	ON/OFF	0.8 I_r	OFF
Earth Fault (G)	0.2, 0.4, 0.5, 0.7 x I_n	100ms/200ms	ON/OFF	-	OFF

Protection Function	Setting	Time Delay	Protection Mode	Alarm Pick-up	Factory Settings
Under Current	20 to 85% I in steps of 1%	1 to 255 in steps of 1	ON/OFF	110% to 150% Iu in steps of 1%	OFF
Current Imbalance	30 to 90% I_r in steps of 1%	0.5 to 60 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Under Voltage	45 to 80% U_n steps of 1%	0.5 to 60 in steps of 0.1	ON/OFF	110 to 150% Vuv in steps of 1%	OFF
Over Voltage	105 to 150% U_n in steps of 1%	0.5 to 60 in steps of 0.1	ON/OFF	50 to 90%Vov in steps of 1%	OFF
Voltage Unbalance	5 to 20% U_n in steps of 1%	0.5 to 60 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Residual Voltage	5 to 40% U_n in steps of 1%	0.5 to 60 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Under Frequency	F-0.5 to F-5.0 in steps of 0.5	0.1 to 30 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Over Frequency	F+0.5 to F+5.0 in steps of 0.5	0.1 to 30 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Reverse Power	1 to 5000kW in steps of 1kW0.5	0.5 to 60 in steps of 0.5	ON/OFF	50 to 90% PR in steps of 1%	OFF
Lead pf	0.5 to 0.99 in steps of 1%	100 to 500 in steps of 1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Lag pf	0.5 to 0.99 in steps of 1%	100 to 500 in steps of 1	ON/OFF	50 to 90% of set value in steps of 1%	OFF
MD Active	1 to 5000kW in steps of 1kW	--	ON/OFF	50 to 90% PR in steps of 1%	OFF
MD Reactive	1 to 5000kVAr in steps of 1kVAr	--	ON/OFF	50 to 90% of set value in steps of 1%	OFF
MD Apparent	1 to 5000kVA in steps of 1kVA	--	ON/OFF	50 to 90% of set value in steps of 1%	OFF
Phase Sequence	123 or 132	1 to 5 in steps of 0.1	ON/OFF	-	OFF
THD Current	5 to 50%I_r in steps of 1%	5 to 15 in steps of 5	ON/OFF	50 to 90% of set value in steps of 1%	OFF
THD Voltage	5 to 50% U_n in steps of 1%	5 to 15 in steps of 0.1	ON/OFF	50 to 90% of set value in steps of 1%	OFF

Advanced Features of MTX3.0

Energy & Power Measurement

› One of the first steps towards energy efficiency is energy and power measurement. In MTX 3.0 release, in addition to current & voltage measurement, active, reactive and apparent energy & power can also be measured. This would enable monitoring energy at individual feeder level and thus help in implementing effective energy management practices in the plant. Moreover, using communication module, different parameters reading can be viewed on display module.



Energy and Power management functionality using voltage module

› **Reverse Phase:**

This function detects the phase reversal of current from the set sequence. It is especially important in motor feeder applications

› **Reverse Power:**

One can set the direction of power flow in a system from source to load and in case the direction of power flow reverses, the reverse power protection can be activated to trip the system. This is especially important in a DG set or in a ring mains system.

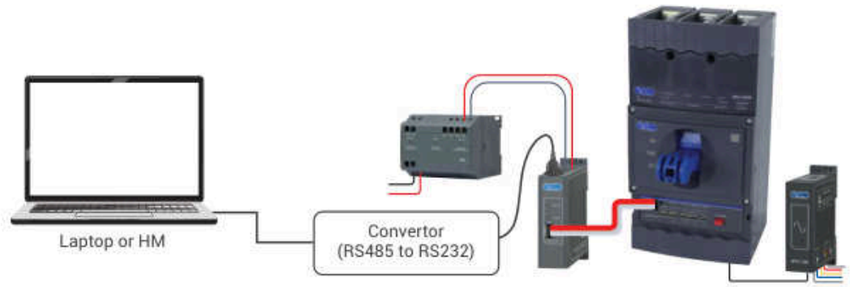
› **Power Quality Control**

MTX3.0 release measures the frequency, power factor and offers protection against leading and lagging values thereby assisting in maintaining the power quality. This release measures THD of current & voltage and gives an alarm / trip in case it exceeds the set thresholds.



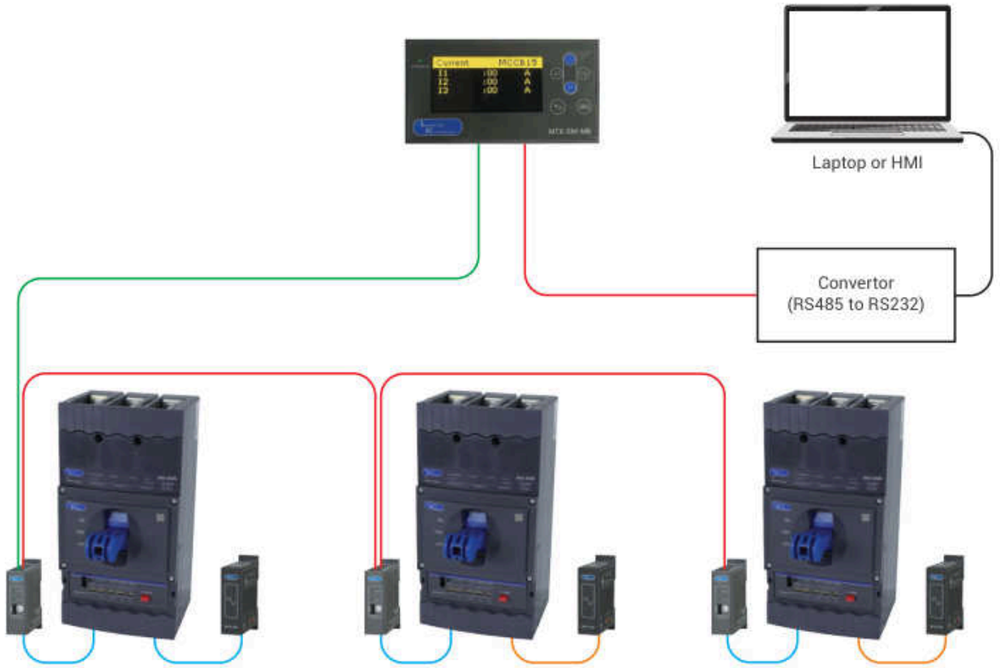


› **Communication Capable**



Most advanced release of MTX series, MTX3.0 is communication capable on MODBUS RTU network. Using MODBUS com module the MCCB release can be connected to a Personal Computer. The metering values can be read remotely. The settings configuration on the other hand can both be read and changed remotely. These releases are also made compatible with HMI (Human Machine Interface) & DCS (Data Control Systems)

› **Multi-looping**



MODBUS Communication through MODBUS looping

A single display module can be used to connect upto 15 MCCBs with MTX3.0 release through MODBUS network.
Highly reliable data yet extremely simple looping reduces operational headaches and enhances remote accessibility.

› **Maintenance Functionality**

MTX3.0 release can store last 10 trip records & last 10 event records which can be used for the system analysis later on. These recorded values can be viewed from display unit as well as PC.

Note: For wiring diagram, please refer page no. 63

MCCBs for Auto Source Transfer Application

AuXC-2000 Controller

There are many electrical services which are required to be powered up always. Interruption of supply to these kinds of services is not desired. These loads are part of any industry, hospital, school, commercial buildings, shopping malls, name any place of importance. These loads can be firefighting system, emergency lighting, control stations, CCTV, emergency pumps, security system etc.E&A's micro-processor based Automatic Transfer Controller AuXC-2000along with LK switchgear is the answer to all auto source transfer requirements.



Changeover Conditions

All the conditions which can help establish whether a power source is or is not suitable are defined by the user through setting following parameters

Parameter	Description
Minimum voltage	One or more phases too low
Maximum voltage	One or more phases too high
Phase loss	Threshold below which the unit intervention is quicker than with a normal decrease.
Asymmetry (unbalance)	Phases within the Maximum-Minimum range but too different from each other
Minimum frequency	Too low frequency
Maximum frequency	Too high frequency
Phase sequence	Reverse rotation of phases

Intuitive user interface

- 5 keys membrane keypad for parameters setting.
- 128x80 pixel, Backlight LCD screen with 4 Grey levels.

Status at a glance

- 4 LEDs for plant synoptic (source line and breakers status).
- 2 LEDs for alarm presence and AUTO mode active.

Flexibility to suit side conditions

- Suitable for switching between Utility-Utility or Utility-Genset or Genset-Genset
- Selectability between auto and manual mode of switching
- Enabling and disabling of priority supply.
- Settable transition time for all events
- Selectability between Open before presence of secondary
- supply (OBP) & open after presence of secondary supply
- (OAP) available

Password access to prevent any unauthorized access

- The password is used to enable or lock the access to setting menu and to commands menu.

Generator setup

- Management of generator set start-stop &\ cooling cycle
- Management of automatic test for generators with emergency and rotation.

Programmable digital inputs, outputs & alarms to control changeover device

- 6 programmable digital inputs (negative).
- 6 + 1 digital outputs:
  - » 6 relays with NO contact 8A 250VAC
  - » 1 relays with changeover contact 8A 250VAC
- 18 alarms (4 user programmable alarms)
- (OAP) available

Failure simulation

- Test the changeover setup without connecting actual load

EJP (Effacement Jours Pointe) function

- Switch from the main supply to standby power for the duration of a tariff period with higher prices.

Event Logger

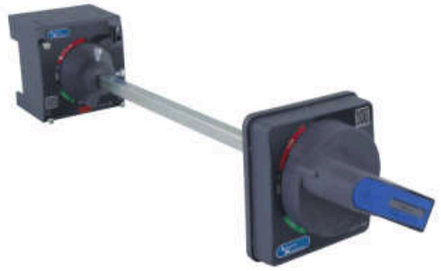
- Storage of last 100 events.

AC Supply : Terminals 13, 14		
Rated Voltage U_s	100 - 240V~	
Operating Voltage Range	90 -264V~ 93.5 - 300V=	
Frequency	45 - 66Hz	
Power Consumption/Dissipation	3.8W - 9.5VA	
Immunity Time for Microbreakings	≤50ms (110V~) ≤250ms (220V~)	
Recommended Fuses	F1A (fast)	
Insulation Voltage		
AC Supply		
Rated Insulation Voltage	U_i 250V~	
Rated Impulse Withstand Voltage	U_{imp} 6kV	
Power Frequency Withstand Voltage	3kV	
Line 1 and Line 2 Voltage Inputs		
Rated Insulation Voltage	U_i 480V~	
Rated Impulse Withstand Voltage	U_{imp} 6kV	
Power Frequency Withstand Voltage	3.8kV	
OUT1 and OUT 2 Outputs		
Insulation Type	Single Between OUT1 and OUT 2 Double Toward the Remaining Groups	
Rated Insulation Voltage	U_i 250V~	
	Single	Double
Rated Impulse Withstand Voltage	U_{imp} 4kV	U_{imp} 6kV
Power Frequency Withstand Voltage	1.5kV	3kV
OUT 3 Output		
Rated Insulation Voltage	U_i 250V~	
Rated Impulse Withstand Voltage	U_{imp} 6kV	
Power Frequency Withstand Voltage	3kV	
OUT4-5 and OUT 6-7 Outputs		
Insulation Type	Single Between OUT4-5 and OUT 6-7 Double Toward the Remaining Groups	
Rated Insulation Voltage	U_i 250V~	
	Single	Double
Rated Impulse Withstand Voltage	U_{imp} 4kV	U_{imp} 6kV
Power Frequency Withstand Voltage	1.5kV	3kV
Line 1 and Line 2 Voltage Inputs: Terminals 1-4 and 5-8		
Maximum Rated Voltage U_e	100...480V~ L-L (277V AC L-N)	
Measuring Range	50...576V~ L-L (333V~L-N)	
Frequency Range	45-65Hz	
Measuring Method	True RMS	
Measuring Input Impedance	> 0.5MW L-N	> 1,0MW L-L
Wiring Mode	Single-Phase, Two-Phase, Three-Phase with or without Neutral or Balanced Three-Phase System.	
Ambient operating conditions		
Operating Temperature +70°C	-30.....	
Vibration Resistance	-30... +80°C	
Climatic Sequence	<80% (IEC/EN 60068-2-78)	
Shock Resistance	2	
Measurement Category	3	
Overvoltage Category	III	

Ambient operating conditions	
Maximum Pollution Degree	Z/ABDM (IEC/EN 60068-2-61)
Relative Humidity	15g (IEC/EN 60068-2-27)
Storage Temperature	0.7g (IEC/EN 60068-2-6)
Measuring Accuracy	
Mains and Generator Voltage	±0.25% f.s. ±1Digit
Real Time Clock	
Energy Storage	Back-up Capacitors
Operating Time Without Supply Voltage	About 5 Minutes
Digital Inputs: Terminals 15 - 20	
Input Type	Negative
Current Input	≤8mA
Input "Low" Voltage	≤2,2
Input "High" Voltage	≥3,4
Input Delay	≥50ms
OUT1 and OUT 2 Outputs: Terminals 9, 10 e 11, 12	
Contact Type	2 x 1 NO
Rated Current	AC1 - 8A 250V~ DC1 - 8A 30V= AC15 -1.5A 250V~
Max Rated Voltage	300V~
Mechanical / Electrical Endurance	$1x10^7$ / $1x10^5$ ops
OUT3 Output: Terminals 22, 23, 24	
Contact Type	1 Changeover
Rated Current	AC1 - 8A 250V~ DC1 - 8A 30V= AC15 -1.5A 250V~
Max Rated Voltage	300V~
Mechanical / Electrical Endurance	$1x10^7$ / $1x10^5$ ops
OUT4 and OUT 5 Outputs: Terminals 25, 26, 27	
Contact Type	2 x 1 NO + Contact Common
Rated Current	AC1 - 8A 250V~ DC1 - 8A 30V= AC15 -1.5A 250V~
Max Rated Voltage	300V~
Mechanical / Electrical Endurance	$1x10^7$ / $1x10^5$ ops
Maximum Current at Contact Common	10A
OUT6 and OUT 7 Outputs: Terminals 28, 29, 30	
Contact Type	2 x 1 NO + Contact Common
Rated Current	AC1 - 8A 250V~ DC1 - 8A 30V= AC15 -1.5A 250V~
Max Rated Voltage	300V~
Mechanical / Electrical Endurance	$1x10^7$ / $1x10^6$ ops
Maximum Current at Contact Common	10A
Connections	
Terminal Type	Plug-in / Removable
Cable Cross Section (min... max)	0.2-2.5 mm² (24... 12 AWG)
Tightening Torque	0.56 Nm (5 lbin)
Housing	
Version	Flushmount
Material	Polycarbonate
Degree of Protection	IP40 on front/ IP20 Terminals
Weight	680g













Accessories

INTERNAL ACCESSORIES 46

AUXILIARY CONTACT

TRIP ALARM CONTACT

AUXILIARY TRIP ALARM CONTACT

SHUNT RELEASE

UNDER VOLTAGE RELEASE

EXTERNAL ACCESSORIES 47

ROTARY OPERATING MECHANISM

MECHANICAL INTERLOCKING KIT

KEYLOCK

SPREADER TERMINALS

EXTERNAL NEUTRAL CT

STORED ENERGY ELECTRICALLY OPERATED MECHANISM

MTX MODULES

MCCB ENCLOSURE

EARTH FAULT MODULE

Accessories

Internal Accessories



MCCB with mid cover opened & Internal accessories fitted

fitteddsine range of MCCBs are offered with-fit type, easily installable internal accessories. There is no need to open main cover and no live parts are accessed during installation. TAC, Aux+TAC to be fitted in the right cavity & under voltage release to be fitted in left cavity.

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.



ATAC



Shunt Release



UV Release

Internal Accessories	Contacts/ Supply Voltage	Frame	Cavity
Auxiliary Contact	1 C/O	DN0, DN1	Right
		DN2, DN3, DN3B, DN4	Right/Left
	2 C/O	DN0, DN1	Right
		DN2, DN3, DN3B, DN4	Right/Left
Trip Alarm Contact	1 C/O	DN0, DN1	Right
		DN2, DN3, DN3B, DN4	Right
	2 C/O	DN0, DN1	Right
Auxiliary + Trip Alarm Contact	1 C/O + 1 C/O	DN0, DN1	Right
		DN2, DN3, DN3B, DN4	Right
Shunt Release	24V DC	DN0	Left
	240/415V AC	DN0, DN1	Left
	110V DC	DN2, DN3	Left
	110/415V AC 50Hz, 110/220V, 24V DC	DN2, DN3, DN3B, DN4	Left
Under Voltage Release	240V	DN0, DN1	Left
		DN2, DN3, DN3B	
		DN4	

Shunt Release

It allows opening of MCCB by means of an electrical command. Operation of the release is guaranteed for a voltage between 70% and 110% of the rated power supply voltage value Ue, both in AC & DC.

Frame	Operational Voltage	Power Consumption
DN0, DN1	240 / 415V AC, 50Hz	1500VA
DN2 / DN3 / DN3B / DN4	110 - 415V AC, 50Hz	1500VA
	110 / 220V DC	85W
	24V DC	10W

UV Release

The Under-voltage release causes the MCCB to trip if the operational voltage falls to a value between 35% and 70% of its rated voltage or not applied. UV release mechanically locks the closing mechanism of MCCB & makes it impossible to close on under-voltage or no voltage, both manually & electrically. With the under-voltage release de-energized, it is not possible to close the MCCB. UV release can also be used for interlocking schemes (for DG synchronization, paralleling of transformers etc) also.

Frame	Operational Voltage	Power Consumption
DN0, DN1	240V AC, 50Hz	5VA
DN2 / DN3 /DN3B	240V AC, 50Hz	5VA
DN4	240V AC, 50Hz	5VA

External Accessories

Rotary Operating Mechanism

Rotary operating mechanism (ROM) for dsine MCCBs are available indirect & extended versions.

1. Direct Rotary Handle (MCCB mounted)

- Available for entire family of dsine MCCBs
- In built pad locking feature

2. Extended Rotary Handle (Panel Mounted)

- ROM mounts directly on MCCB without removal of mid cover
- Clear ON/OFF/TRIP indication•Clear view of MCCB rating label
- Direct access to "Push to Trip" button
- IP 54 degree of protection with extended rotary handle
- Unique coupling to allow ±3mm tolerance
- Door interlock in ON position, with defeat facility
- Door interlock in OFF condition with padlock feature
- Auto restoration of door interlock
- External keylock for mechanical interlocking



Direct Rotary Handle (MCCB mounted)



Extended Rotary Handle: Panel Mounted



Panel Door Mounted Key lock (To be used along with Extended Rotary Handles)

Mechanical Interlocking Schemes

1. Mechanical Interlocking Kit:

Two MCCBs can be interlocked using base plate mechanism, in side-by-side configuration

Features

- For 3P & 4P versions
- For DN2 & Dn3 frames
- Site fittable



MIL with Base Plate

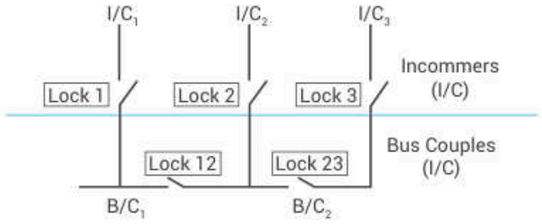
Mechanical Interlocking using Key Locks:

For mechanical interlocking through extended rotary operating mechanism, a panel mounted key lock is available. The selection of the key lock as per the table:

I/C or B/C	Key Lock
2 I/C	Any 1 type of lock for both MCCBs
2 I/C and 1 B/C	Lock 1 and Lock 2 for I/C and Lock 12 for B/C
3 I/C and 2 B/C	Locks 1, 2, 3 for I/Cs and Locks 12, 23 for B/Cs

Key Lock Selection

Type of lock	Exclusively operable by key nos.
1	1
2	2
3	3
12	1, 2 & 12
23	2, 3 & 23





Spreader Terminal

- Available for enhancing termination capacity
- Made of silver plated copper

Terminal capacity without spreader terminals

Rating (A)	16-100		125-250		320-630		800-1250	
dsine Frame	Cable (mm²)	Link (mm)	Cable (mm²)	Link (mm)	Cable (mm²)	Link (mm)	Cable (mm²)	Link (mm)
DN0	35	17						
DN1			120	26				
DN2			95	25				
DN3					120	27$		
DN3B*					185	32		
DN4							-	2 x 40

$ 30mm on request

Terminal capacity with spreader terminals

Rating (A)	16-100		125-250		320-630		800-1250	
dsine Frame	Cable (mm²)	Link(mm)	Cable (mm²)	Link(mm)	Cable (mm²)	Link(mm)	Cable (mm²)	Link(mm)
DN0	50	22						
DN1			185	35				
DN2			185	35				
DN3					2 x 240	2 x 40		
DN3B*					2 x 240	2 x 40		
DN4							2 x 300	2 x 60

* DN3B available in 320A and 400A only
Note: Phase barriers are supplied along with MCCBs; Copper termination recommended for enhanced performance

External Neutral CTs

- Used to provide neutral & earth fault protection to 3P MCCBs in 3 phase 4 wire system
- Available for 3P MCCBs with MTX2.0 & 3.0 releases
- Adapters for NCT available



Stored Energy Electrically Operated Mechanism

- ON / OFF & Charged/Discharged indication
- Foolproof mounting
- Selector switch for Auto/Manual operation
- Padlock facility for locking in OFF position (3 nos. locks)
- Higher mechanical & electrical endurance
- Back up fuse for extended motor protection
- Easy access to the protection setting on MCCB
- True indication for ON/OFF & Trip



Specification	DN2	DN3	DN4
Operating voltage (V AC)	240V AC	240V AC	240V AC
Operating voltage (%)	85-110%	85-110%	85-110%
Closing time (ms)	60	90	95
Opening time (ms)	300	450	600
Power consumption (VA)	350	500	500
Life / No. of operations	16000	15000	8000
2 Door cut out (mm)	96 x 96	96 x 96	130 x 146
IP protection, on the front	IP30	IP30	IP30
Operating frequency	2/min	1/min	1/min
Min. control impulse time (ms)*	800	800	800

Note: For wiring diagram, please refer page no. 60
* At rated voltage

Power Supply (PS) Module

PS module is used to power ON dsine MTX modules when auxiliary 24Vdc supply is not available.

Specification	AC	DC
Input	85-265V	125-300V
Output 1#	-	200mA at 24V DC
Output 2	-	650mA at 24V DC

* For using Output 1, Output 2 should be loaded



Current Metering Module for MTX2.0

It consists of 2 parts viz. Metering module & Display module. Metering module collects the data from the release and sends the same to the Display module. The panel mounted O-LED Display module shows various parameters viz. 3 phase currents, neutral and ground fault currents, if any. We can also view last trip records.



Communication Module for MTX3.0

The Communication module is solution for connecting dsine MCCBs to Modbus network for remote supervision and control of circuit breaker. It is suitable for the MTX3.0 electronic trip units across DN2/DN3/DN4 frames. It is available with DIN rail mounting facility. 2 LEDs in front of the module indicates

- The Power LED - Steady ON - the presence of auxiliary power supply to the module
- The Data LED - Blinking - transmission of data

Its operating temperature is -25°C to 70°C and consumption is 43mA

Voltage Module for MTX3.0

This accessory when connected to MTX 3.0 release in DN2/ DN3/DN4 frames is able to provide the various measurements of the electrical values of the plant like voltage, power, energy & frequency. It can be mounted just beside the MCCB on a DIN plate. Its operating temperature is -25°C to 70°C



Display Module for MTX3.0

It is a panel mounted O-LED display unit that can be integrated with MTX3.0 release . It has one navigation key, a select button & an exit button. Provision for taking D+, D- from this module is also provided. You can simultaneously view parameters remotely & on display. Its operating temperature is -25°C to 70°C and consumption is 12mA



The module displays wide range of parameters as follows

- Phase current, ground current, earth leakage current
- Phase / Line voltage
- Active / Reactive / Apparent Power
- Power factor, Frequency
- Energy
- Maximum demand
- THD

MTX Test Kit

- Universal Test Kit for all MTX releases
- Simulation of overload, short-circuit & earth fault
- Single phase AC supply

MCCB Enclosure

Enclosures refer to protective housings or casings designed specifically for MCCBs (Molded Case Circuit Breakers). Enclosures are designed to house MCCBs safely and securely.

Size I suitable for DN0 frame and Size II for DN1 frame. These standalone enclosures not only provides ample space for cable termination but are also superior in aesthetics. Enclosures ensures that while providing functionality and protection, they also contribute to the visual appeal of the electrical setup.

- Universal enclosure for 3P/4P MCCBs.
- Provides IP30 and IK08 protection.
- Includes built-in neutral link for TPN systems.
- Features mounting holes on the back plate.
- Equipped with louvers for enhanced heat dissipation.
- Effortless Installation
- RoHS compliant.
- Complies with IEC 62208, IEC 62262, and IEC 60529 standards.



Size I Enclosure Size II Enclosure

Enclo-sure	Compatible MCCBs	Height (mm)	Width (mm)	Depth (mm)
Size I	DN0	543	198	97
Size II	DN1	830	337	111

Earth Fault Module

Earth Fault Modules Type GF1, GF2 and GF11. These modules are to be used with MCCBs for earth fault protection. The principle of operation is based on detection of the residual current in the system. They combine safety and versatility, conforming to the high performance standards, the characteristic of all E&A products.



Earth Fault Module GF1
GF1 is suitable upto 200A MCCBs



Earth Fault Module GF2
GF2 is suitable upto 200A-400A MCCBs



Earth Fault Module GF11
GF11 is suitable upto 800A MCCBs

Features

- Compact in size
- Solid state design
- Built-in moulded CBCT for GF1 & GF2. External CTs are to be used for GF11
- Suitable for both 3 phase 3 wire & 3 Phase 4 wire systems. In case of 3 phase 4 wire system, the neutral cable/twisted link should also be passed through the CBCT along with the 3 phase links / cables
- Built-in test facility
- Selection facility for nominal current rating (I) n
- Earth fault setting is adjustable from 10% to 50% of set current
- Selectable trip times (100 ms, 200 ms)
- Manual reset for positive fault acknowledgment
- Potential free NO contact to trip MCCB (through 240 V shunt release)
- Window dimensions suitable for Cable connection only in GF1 and GF2

Note: MCCBs need to be fitted with 110 V / 240 V AC shunt release for Earth Fault Module operation.

Technical Data

Specification	Type GF1 / GF2 / GF11
Current Setting Range, I_s (I_s=x I_n)	10% to 50%In in steps of 10%
Auxiliary Supply	240V AC ±20%
Time Delay (ms)	100/200ms Field selectable
Pick-up Accuracy	±10%I_s
Output Contact	1 NO contact manual reset Type contact rating 5A 240V AC
Indication	a) Power On LED b) Trip LED (manual reset)
Operating Temperature	+10°C to +55°C
Insulation	2 kV 50Hz for one minute across independent circuit 1 kV 50Hz for one minute across open contacts
Mounting	Base plate mounting type
Window for Cable / Busbar entry (mm^2)	GF1-110 x 32 GF2-165 x 61.5
Weight (kg)	GF1 - 1.2, GF2 - 2.2, GF11 - 0.9

Note: For wiring diagram, please refer page no. 61

Additional technical information

Altitude derating of d sine DNMCCBs

Altitude is also one of the important factors which affects the current carrying capacity of any circuit breaker. dsine range of MCCBs does not have much of impact upto 2000m however for the altitude above 2000m, characteristics of MCCBs have impact as tabulated below.

	MCCB Technical parameters	Description	De-rating Factor			
			<2000 m	3000 m	4000 m	5000 m
d sine DN range MCCB altitude De-rating table	Ue	Rated operational voltage	1.0	0.9	0.8	0.7
	In	Rated nominal current	1.00	0.97	0.94	0.91
	Ui	Insulation Voltage	1.00	0.78	0.69	0.61
	Uimp	Impulse withstand voltage	1.00	0.78	0.69	0.61

Note: Breaking capacities would not change. Please see page no 26

Power loss data for d sine DN MCCBs

Power loss of any electrical device is required in order to calculate the efficiency of the entire system. This is measured in watts. Power loss presented below can give some indication of heat generated under specific conditions as per Annex G of IEC-60947-2

Total power loss value of circuit breaker is power loss given per pole multiplied by no of poles. It is measured at rated current in free air and the voltage drop across the terminal in cold condition.

Frame - TM	Rating (A)	Power loss per pole (W)
DN0	20	2.2
	25	4
	32	5.3
	40	7
	50	8.5
	63	8.8
	80	14
	100	11
DN1	100	13
	125	14
	160	15.4
	200	20
	250	18.8
DN2	63	8.3
	80	7
	100	11
	125	10
	160	14
	200	19.5
DN3B	250	25
	320	25.6
DN3	400	27.7
	320	22.5
	400	32
	500	30
	630	47

Frame - MTX	Rating (A)	Power loss per pole (W)
DN2	40	0.5
	63	1.2
	100	3
	160	7.7
	250	18
DN3	400	30
	630	43
DN4-N version	800	35
	1000	50
	1250	65
DN4-S version	800	23
	1000	35
	1250	65

Temperature De-rating chart for DN0 frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)												
		10	15	20	25	30	35	40	45	50	55	60	65	70
DN0	20	23	22.5	22	21.5	21	20.5	20	19.5	19	18.5	18	17.5	17
	25	28.6	28	27.4	26.8	26.2	25.6	25	24.4	23.8	23.2	22.6	22	21.4
	32	35.9	35.3	34.6	33.9	33.3	32.7	32	31.4	30.7	30.1	29.4	28.8	28.1
	40	43.9	43.3	42.6	41.9	41.3	40.7	40	39.4	38.7	38.1	37.4	36.8	36.1
	50	55.1	54.3	53.4	52.6	51.7	50.9	50	49.2	48.3	47.4	46.6	45.8	44.9
	63	69.3	68.3	67.2	66.2	65.1	64.1	63	61.9	60.9	59.9	58.8	57.8	56.7
	80	88.7	87.3	85.8	84.4	82.5	81.5	80	78.6	77.1	75.7	74.2	72.8	71.3
	100	112	110	108	106	102	102	100	98	96	94	92	90	88

For SD VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN0-160SD	32	32	31.4	30.7	30.1
	63	63	61.9	60.9	59.9
	100	100	98	96	94
	125	125	121.9	118.8	115.6
	160	160	156	152	148

For M VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN0-100M	32	32	31.4	30.7	30.1
	40	40	39.4	38.7	38.1
	50	50	49.1	48.3	47.5
	63	63	61.9	60.9	59.9
	80	80	78.6	77.1	75.7
	100	100	98	96	94

Temperature De-rating chart for DN1 frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)												
		10	15	20	25	30	35	40	45	50	55	60	65	70
DN1	100	117.7	115.1	112.4	109.8	106.6	103.4	100	96.6	91.9	87.9	83.8	79.8	75.8
	125	147.3	143.9	140.6	137.2	133.3	129.4	125	120.6	114.8	109.9	104.9	99.8	94.8
	160	188.4	184.2	179.9	175.6	170.6	165.6	160	154.4	147.1	140.7	134.2	127.8	121.4
	200	235.6	230.3	224.9	219.6	213.2	206.9	200	193.1	183.8	175.6	167.5	159.4	151.3
	250	294.4	287.8	281.1	274.4	266.6	258.6	250	241.4	229.8	220	210	200	190

For M VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN1-160M	100	100	95.9	91.9	87.9
	125	125	119.9	114.9	109.9
	160	160	153.5	147.1	140.7

Temperature De-rating chart for DN2 frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)												
		10	15	20	25	30	35	40	45	50	55	60	65	70
DN2	32	36.5	35.8	35	34.3	33.8	32.8	32	31.3	30.5	29.8	29	28.3	27.5
	40	46	45	44	43	42	41	40	39	38	37	36	35	34
	50	53.6	53	52.4	51.8	51.2	50.6	50	49.4	48.8	48.2	47.6	47	46.4
	63	67.9	67.1	66.3	65.5	64.6	63.8	63	62.2	61.4	60.5	59.7	58.9	58.1
	80	86	85	84	83	82	81	80	79	78	77	76	75	74
	100	112	110	108	106	104	102	100	98	96	94	92	92	88
	125	136.2	134.4	132.5	130.6	128.8	126.9	125	123.1	121.3	119.4	117.5	115.7	113.8
	160	184	180	176	172	168	164	160	156	152	148	144	140	136
	200	248	240	232	224	216	208	200	192	184	176	168	160	152
	250	302.5	293.8	285	276.3	267.5	258.8	250	241.3	232.5	223.8	215	206.3	197.5

For M VERSION & SD VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN2	100	100	96	94	92
	125	125	121.3	119.4	117.5
	160	160	152	148	144
	200	200	184	176	168
	250	250	232.5	223.7	215

For MTX VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN2	40	40	38	37	36
	36	63	61.4	60.5	59.72
	100	100	96	94	92
	160	160	152	148	144
	250	250	232.5	223.7	215

Temperature De-rating chart for DN3 frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)												
		10	15	20	25	30	35	40	45	50	55	60	65	70
DN3-400	320	362	355	348	341	334	327	320	313	306	299	292	285	278
	400	454	445	436	427	418	409	400	391	382	373	364	355	346
DN3-630	500	554	545	536	527	518	509	500	491	482	473	464	455	446
	630	684	675	666	657	648	639	630	621	612	603	603	585	576

For MTX VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN3-400	400	400	382	373	364
DN3-630	630	630	612	603	594

For M VERSION & SD VERSION

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN3-400	320	320	306	299	292
	400	400	382	373	364
DN3-630	500	500	482	473	464
	360	630	612	603	594

Temperature De-rating chart for DN3B frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)												
		10	15	20	25	30	35	40	45	50	55	60	65	70
DN3B	320	350	345	340	335	330	325	320	315	310	305	300	295	290
	400	430	425	420	415	410	405	400	395	390	385	380	375	370

Temperature De-rating chart for DN34 frame
(reference temperature of 40°C)

Frame	Rating (A)	Temperature (°C)			
		10-55	60	65	70
DN4	800	800	740	680	620
	1000	1000	930	860	790
	1250	1250	1170	1090	1010

Characteristic Curves

THERMAL MAGNETIC RELEASE 54

DN0

DN1

DN2

DN3B

DN3

MICROPROCESSOR RELEASE 55

MTX1.0-2.0 (O/L CURVES)

I^2T AT $6I_R$ $7.2I_R$

MTX3.0 (O/L CURVES)

DI^2T AT $1.5I_R$, 6IR, $7.2I_R$

I4T AT $1.5I_R$, $6I_R$, $7.2I_R$

SI AT $1.5I_R$, $6I_R$, $7.2I_R$

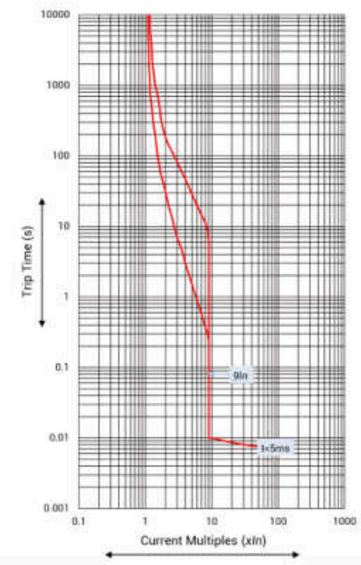
LI-VI AT $1.5I_R$, $6I_R$, $7.2I_R$

SHORT CIRCUIT, EARTH FAULT & NEUTRAL CURVES FOR MTX1.0-2.0-3.0

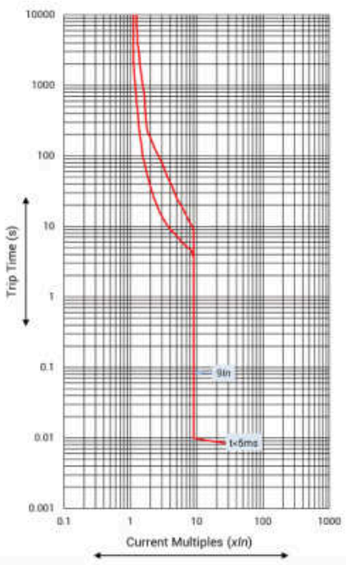
Characteristic Curves

Thermal-Magnetic Release

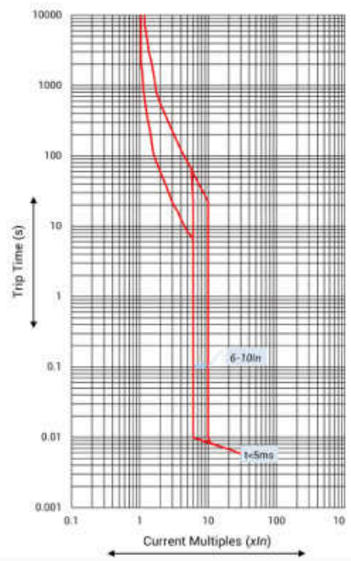
DN0 MCCB



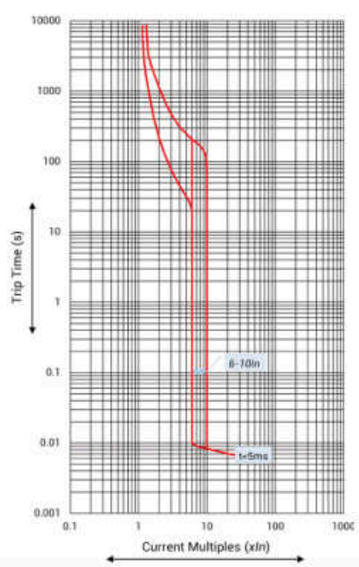
DN1 MCCB



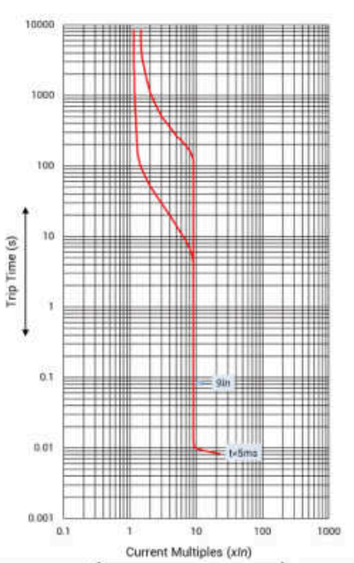
DN2 MCCB



DN3B MCCB



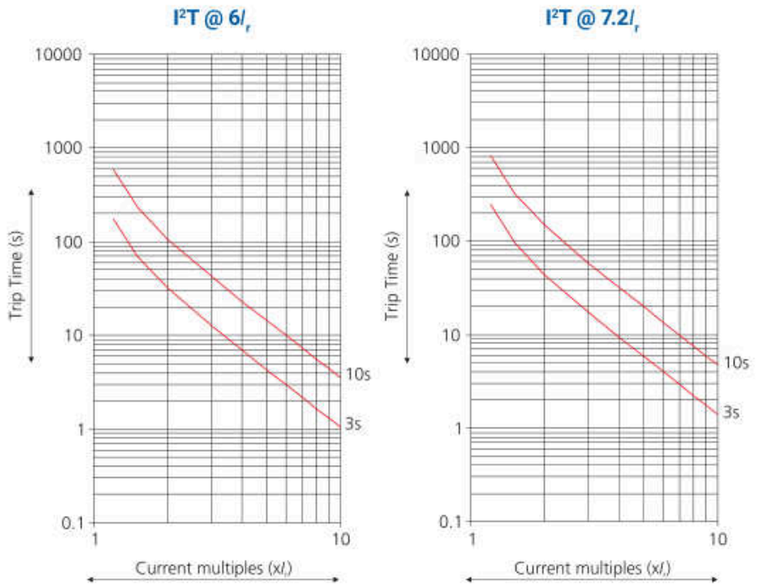
DN3 MCCB



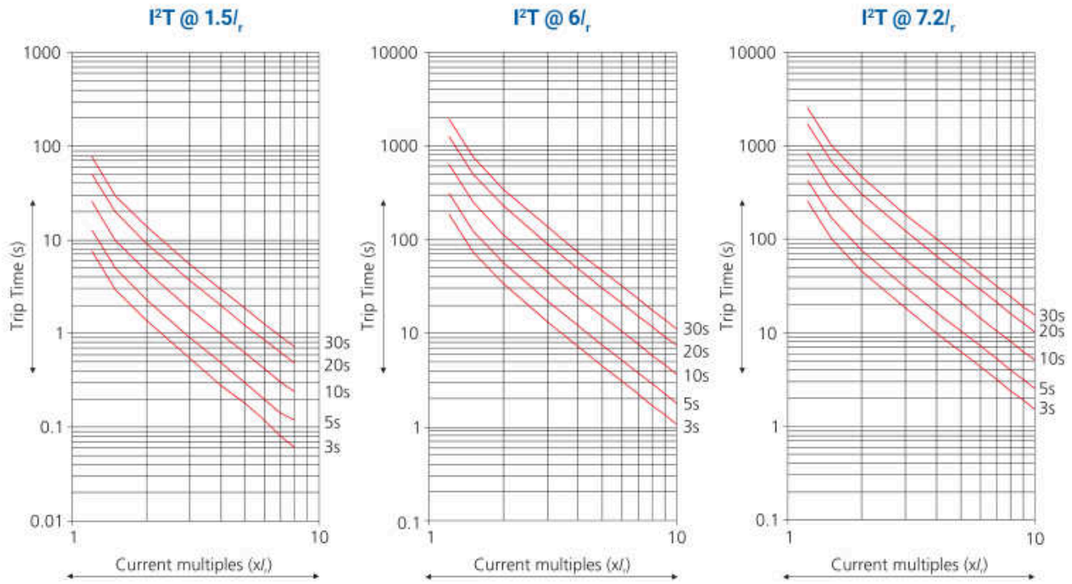
Note: Curves are Ir based till overload zone.

Microprocessor Release

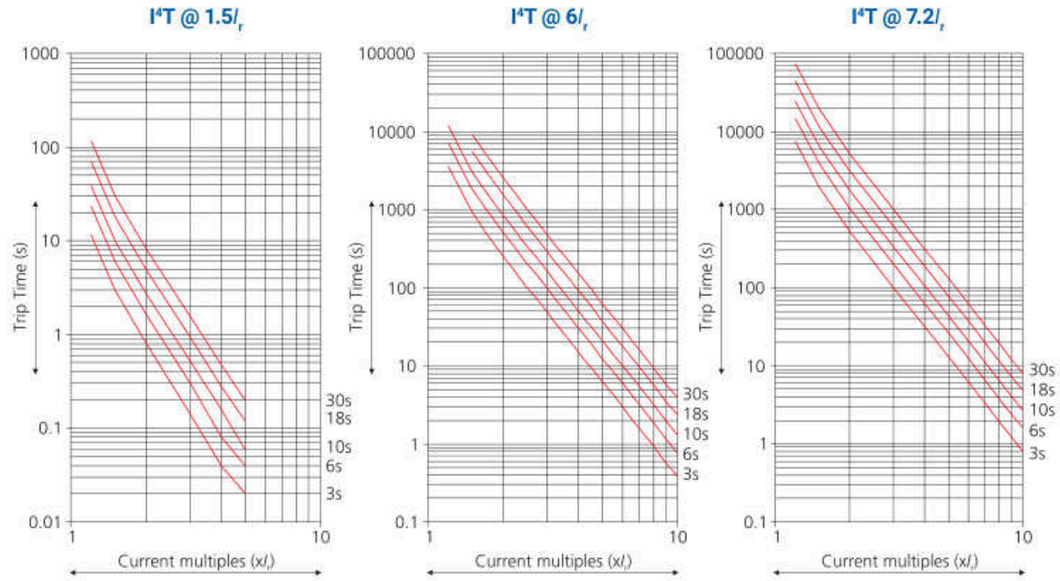
MTX1.0 / 2.0 - DN2 / DN3 / DN4 (O/L curves - I^2t)



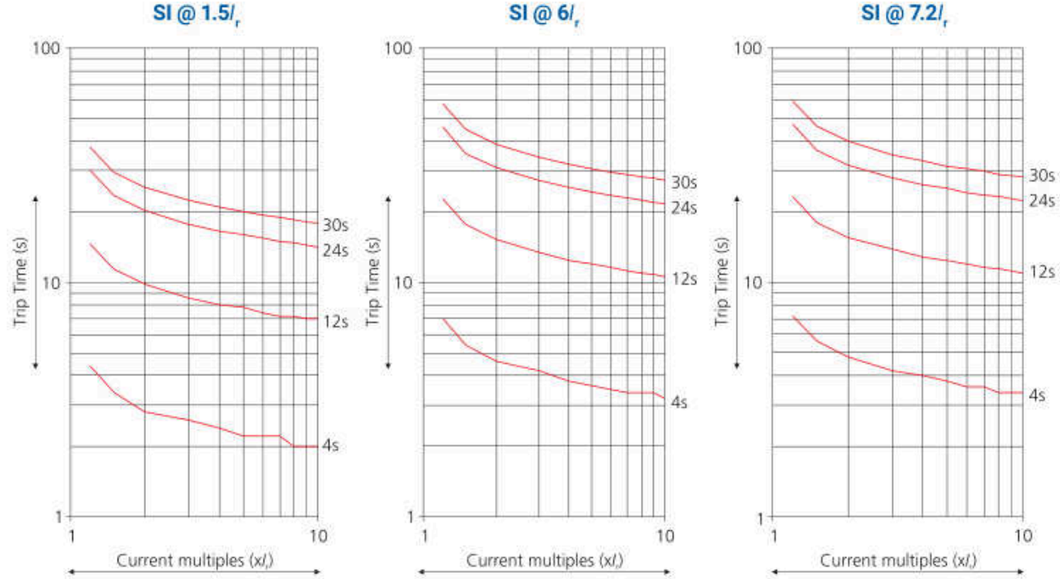
MTX3.0 - DN2 / DN3 / DN4 (O/L curves - I^2t)



MTX3.0 - DN2 / DN3 / DN4 (O/L curves - I^4t)

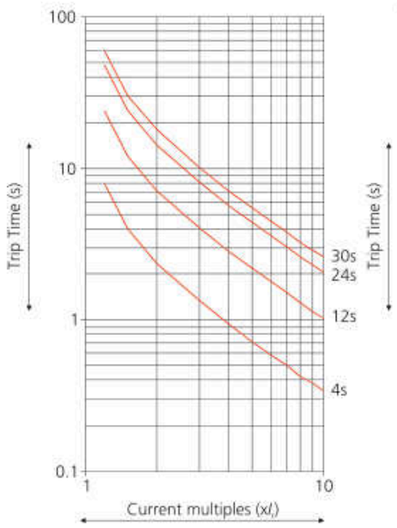


MTX3.0 - DN2 / DN3 / DN4 (O/L curves - Short Inverse)

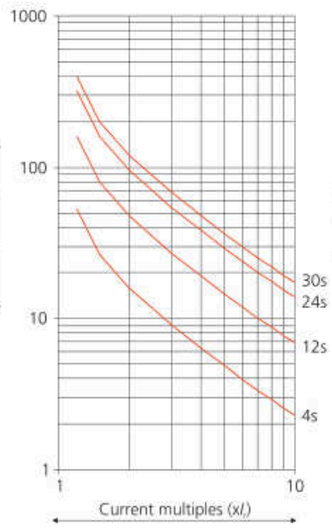


MTX3.0 - DN2 / DN3 / DN4
(O/L curves - Long Inverse / Very Inverse)

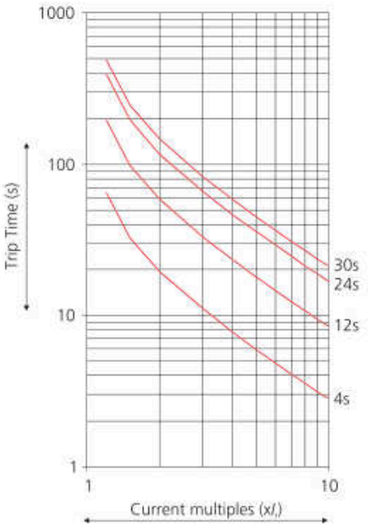
LI-VI @ 1.5/$_r$



LI-VI @ 6/$_r$

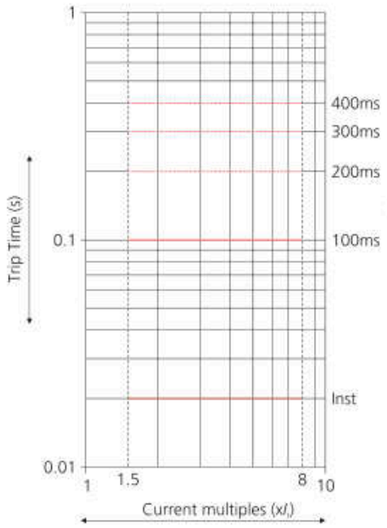


LI-VI @ 7.2/$_r$

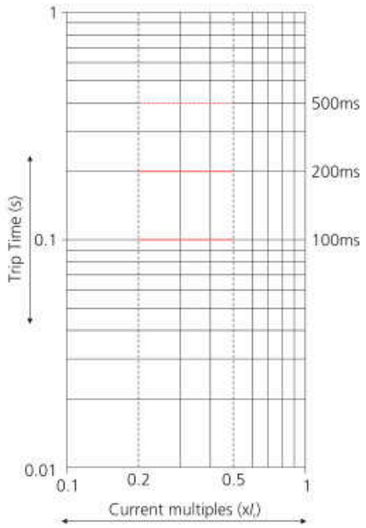


MTX1.0* / 2.0 / 3.0 (S/C, E/F & Neutral Curves)

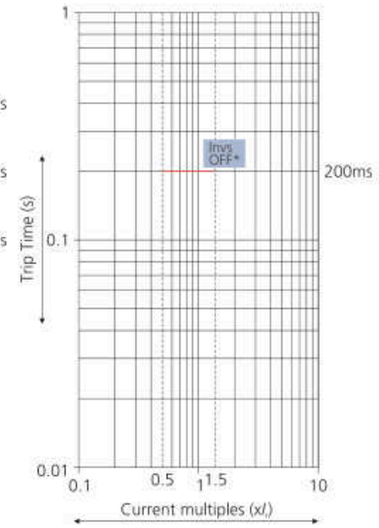
Short Circuit Curves



Earth Fault Curves



Neutral Curves



— For MTX3.0 only

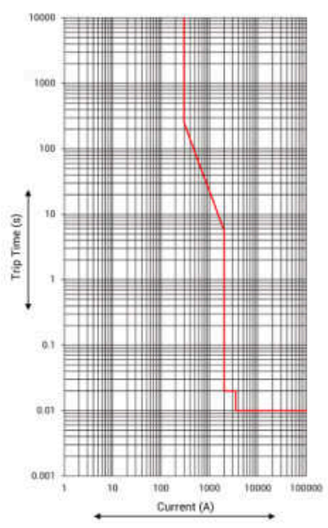
— For MTX3.0 only

*: IDMT disable in case of MTX3.0

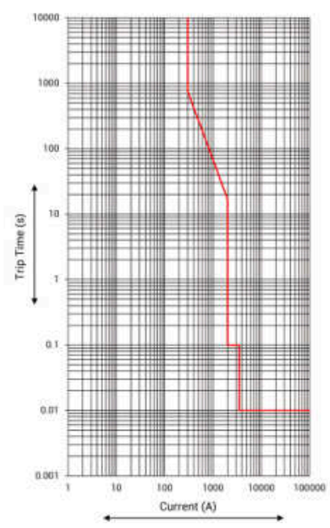
* Only Short Circuit setting available in MTX1.0
• Under Short Circuit fault conditions, MCCBs will clear the fault in less then 10 msecMicroprocessor

Selectivity Version (DN-T MCCBs)

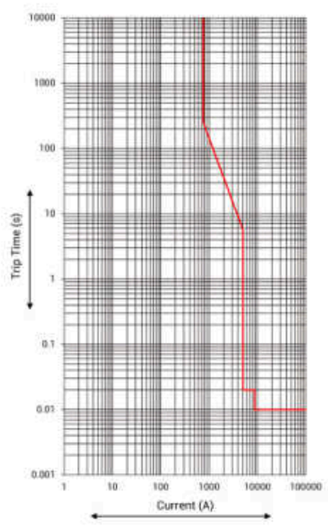
DN2T MTX2.0



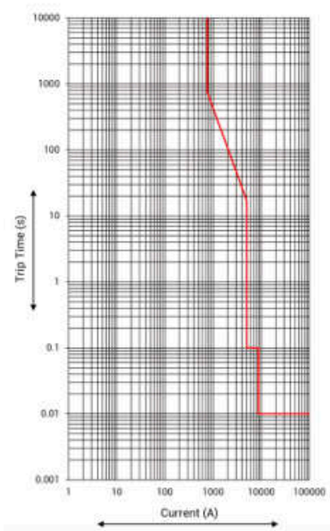
DN2T MTX3.0



DN3T MTX2.0



DN3T MTX3.0



Wiring Diagrams

MOTORISED CIRCUIT BREAKERS CONTROL THROUGH AUXC - 2000 60

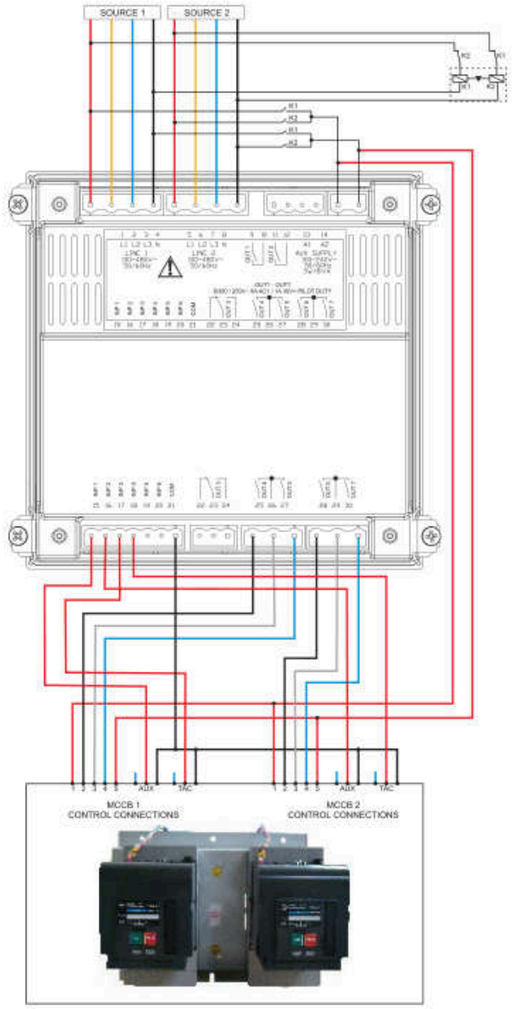
EARTH FAULT MODULES 61

MTX2.0 WITH CURRENT METERING MODULE 62

MTX3.0 WITH COMMUNICATION THROUGH MODBUS 63

Wiring Diagrams

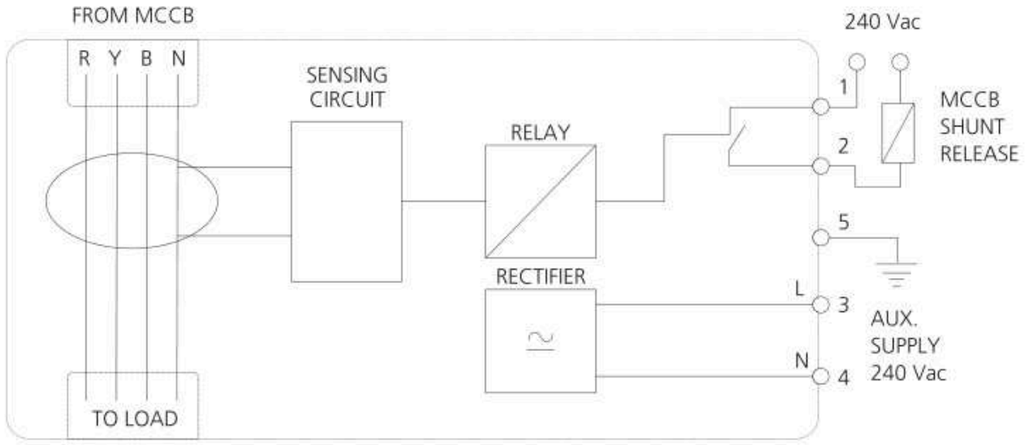
Control to Motorised Moulded Case Circuit Breakers (Without Undervoltage Relay)



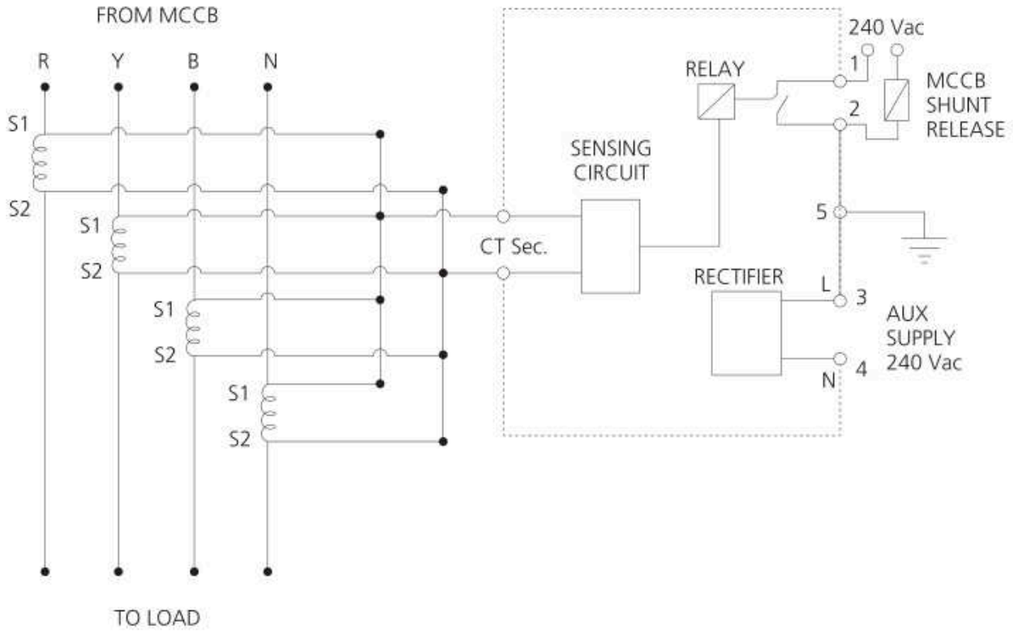
Programming	Connection Terminal	Parameter code	Setting (Description)
Others	-	P05.07	Breaker pulse or breaker continuous
Inputs	15(INP1)	P10.01.01	Line 1 breaker closed (Feedback 1)
	16(INP2)	P10.02.01	Line 2 breaker closed (Feedback 2)
	17(INP3)	P10.03.01	Line 1 circuit breaker protection (Trip 1)
	18(INP4)	P10.04.01	Line 2 circuit breaker protection (Trip 2)
Outputs	25(OUT4)	P11.04.01	Open line 1 contactor/circuit breaker
	27(OUT5)	P11.05.01	Close line 1 contactor/circuit breaker
	28(OUT6)	P11.06.01	Open line 2 contactor/circuit breaker
	30(OUT7)	P11.07.01	Close line 2 contactor/circuit breakerOUT

Earth Fault Modules

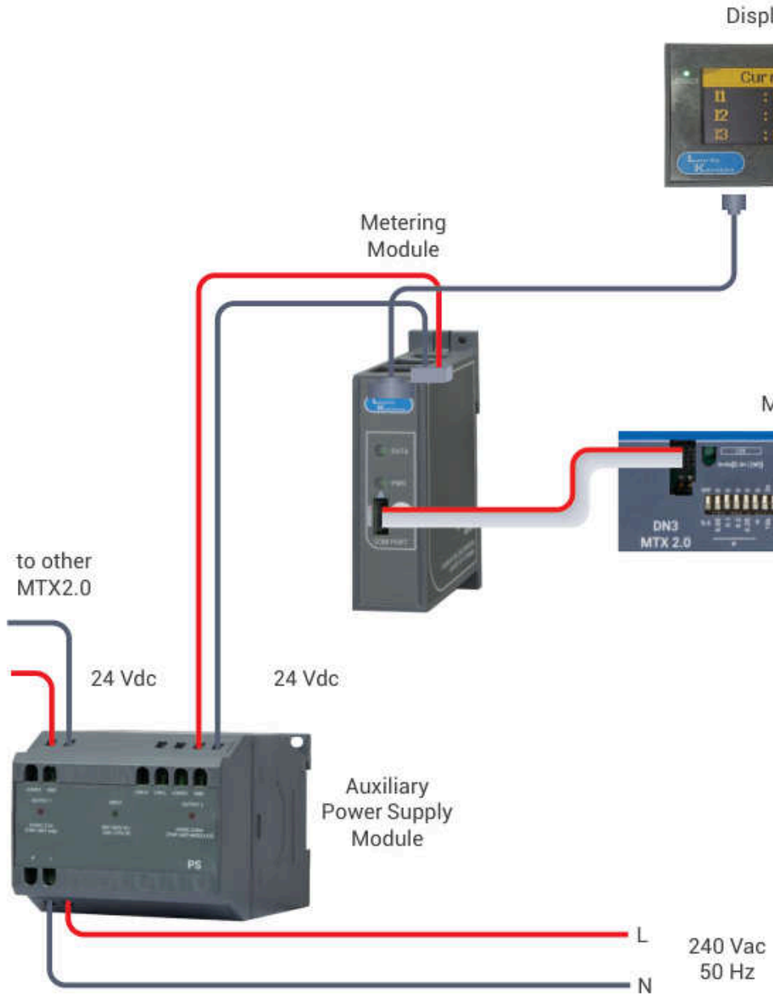
GF1 & GF2



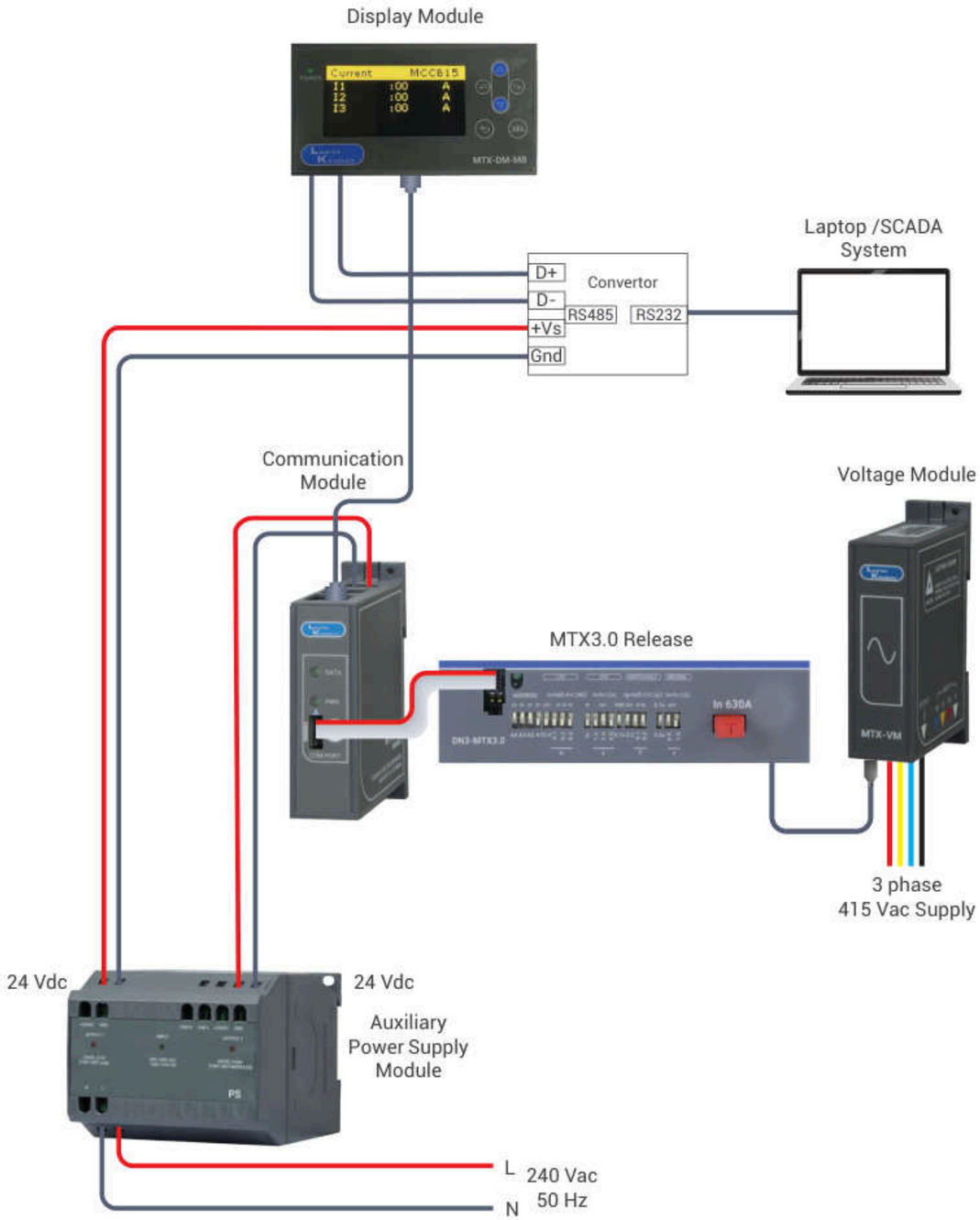
GF11



MTX2.0 with Current Metering Module



MTX3.0 with Communication through Modbus



MCCB Dimensions

DIMENSIONS OF MCCB 66

DNO

DN1

DN2

DN3B

DN3

DN4

DIMENSIONS OF ACCESSORY 72

ROTARY OPERATING MECHANISM

STORED ENERGY ELECTRICALLY OPERATED MECHANISM

PANEL MOUNTED KEY LOCK

MECHANICAL INTERLOCK KIT

EXTERNAL NEUTRAL CTS

MTX MODULES

AUTO SOURCE TRANSFER SWITCH: AUXC-2000

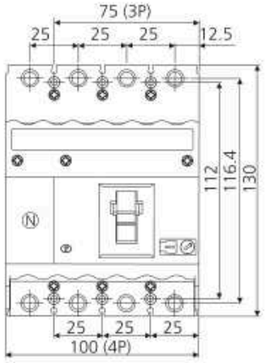
EARTH FAULT MODULES

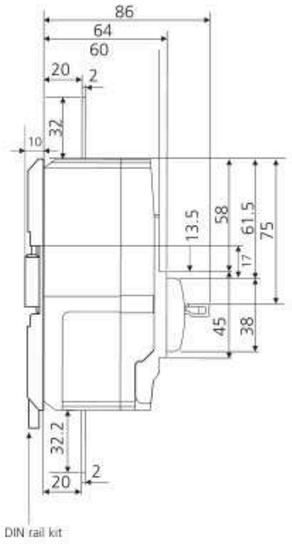
SIZE ENCLOSURE FOR DNO MCCB

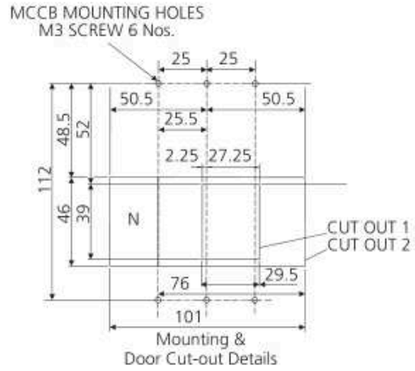
SIZE II ENCLOSURE FOR DN1 MCCB

MCCB Dimensions

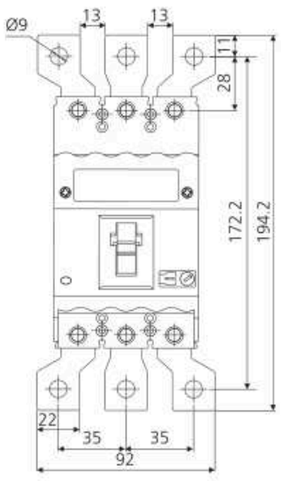
DN0-125 MCCB

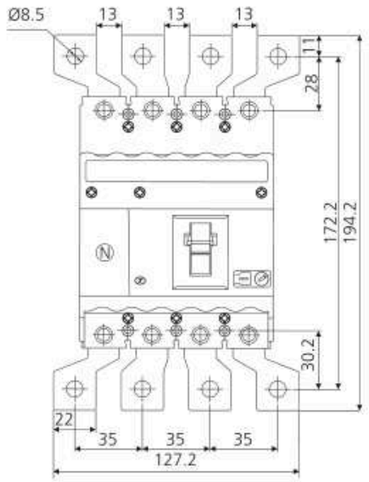


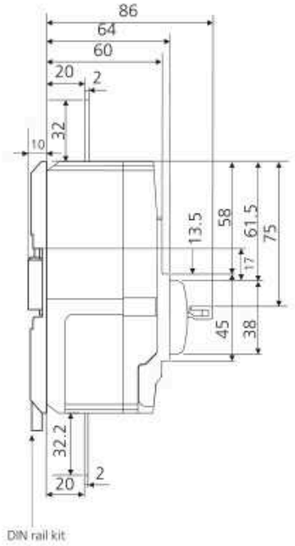




DN0-125 with Spreader Links







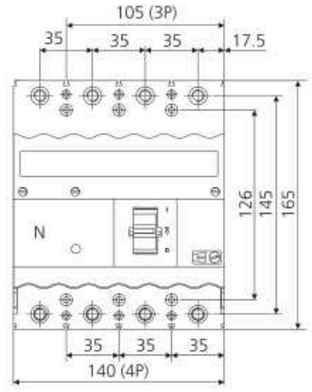
Recommended cat. nos. for DN0 spreaders

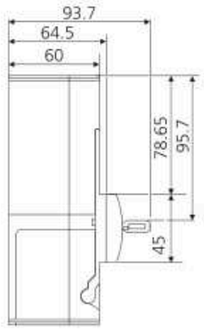
Current	3P	4P
upto 100A	CM977850000	CM979210000
125A	CM906870OLO	CM906880OLO

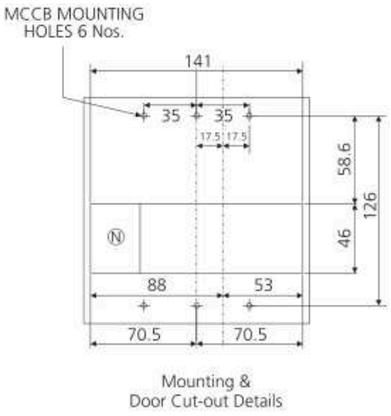
Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN0 / DN0-SD / DN0-M

All dimensions are in mm

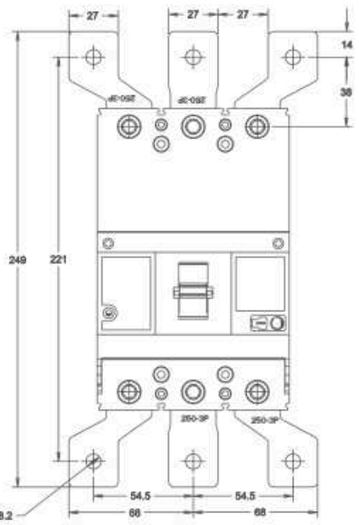
DN1-250 MCCB

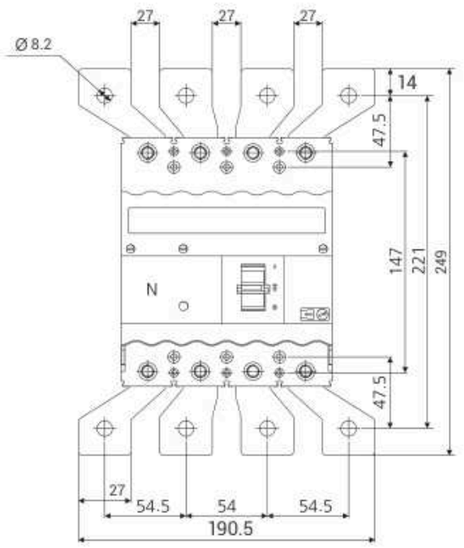


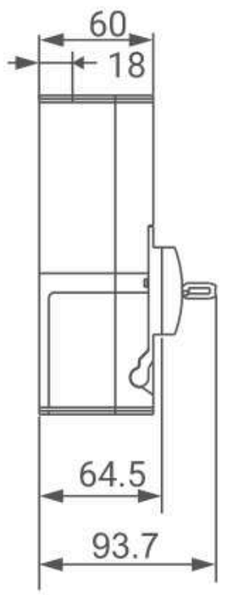




DN1-250 with spreader Links







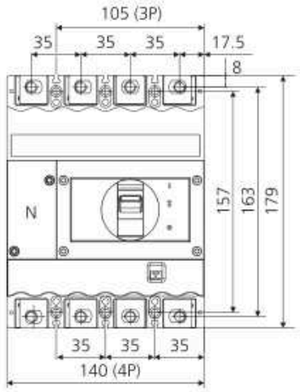
Recommended cat. nos. for DN1 spreaders

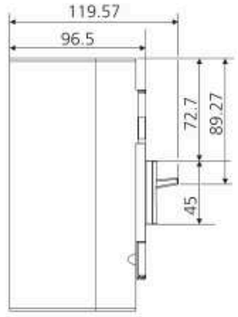
3P	4P
ST980530000	CM920070000

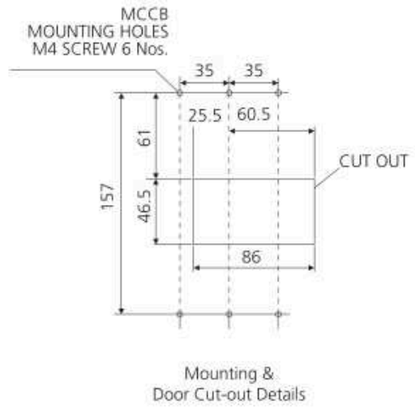
Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN1 / DN1-M

All dimensions are in mm

DN2-250 MCCB

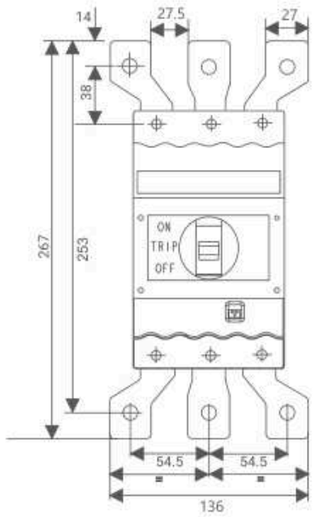


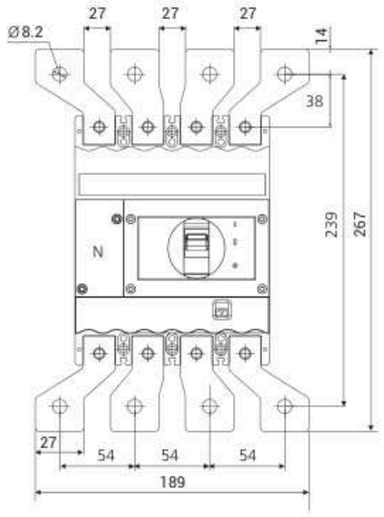


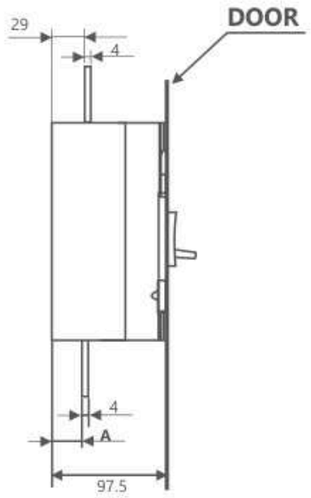


Mounting &
Door Cut-out Details

DN2-250 with spreader Links







Recommended cat. nos. for DN2 spreaders

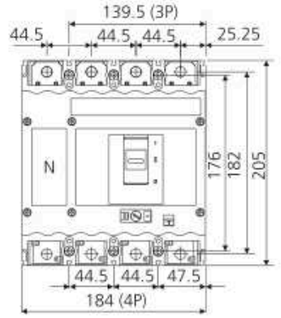
3P	4P
ST980530000	CM920070000

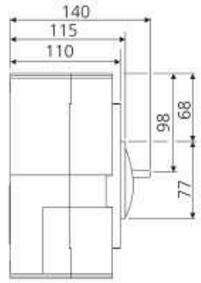
Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN2 / DN2-SD / DN2-M

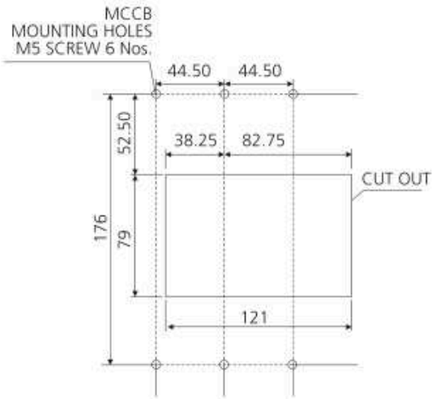
Rating	Dimension (A)
125-250A TM	26
63-100A TM	25.5
32-50A TM	26.25
MTX breakers	28

All dimensions are in mm

DN3B-400 MCCB

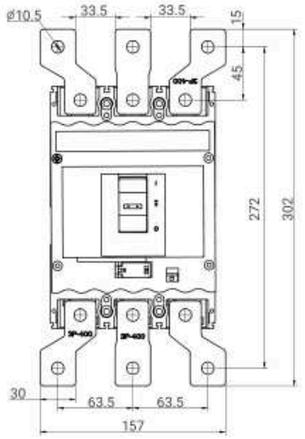


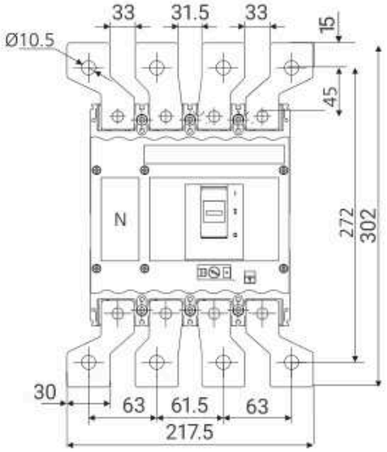


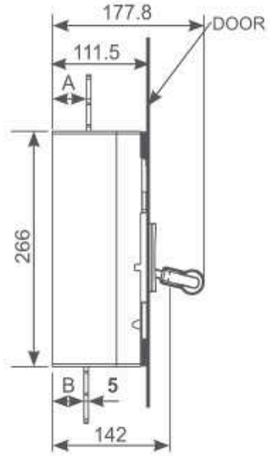


Mounting &
Door Cut-out Details

DN3B-400 with spreader Links







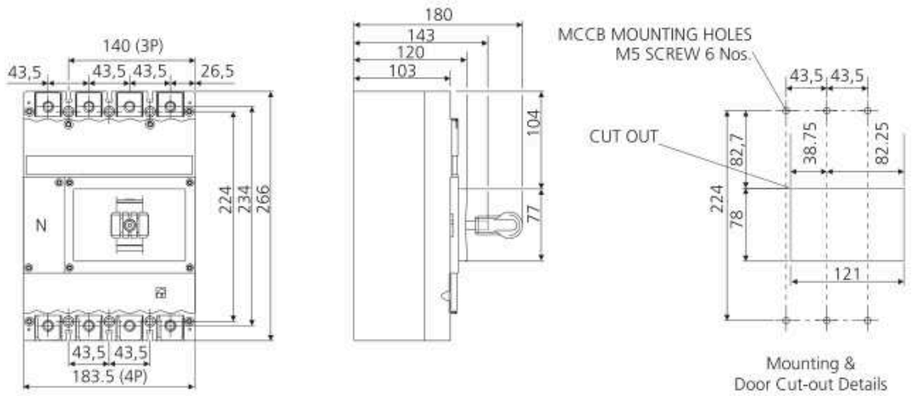
Recommended cat. nos. for DN3B spreaders

3P	4P
ST980650000	ST980660000

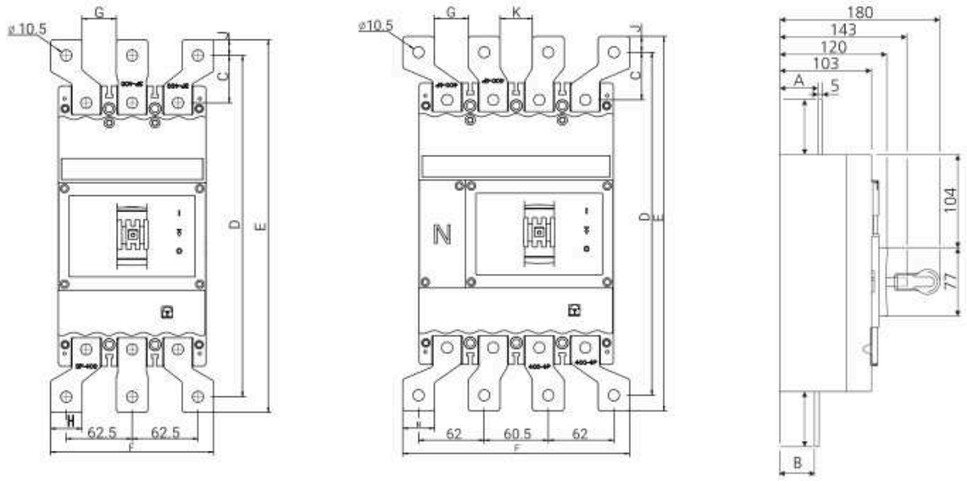
Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN3B / DN3B-SD

All dimensions are in mm

DN3-400/630 MCCB



DN3-400/630 with spreader Links



Recommended cat. nos. for DN3 spreaders

Rating	3P	4P
400A	ST980650000	ST980660000
630A	ST980540000	CM920040000

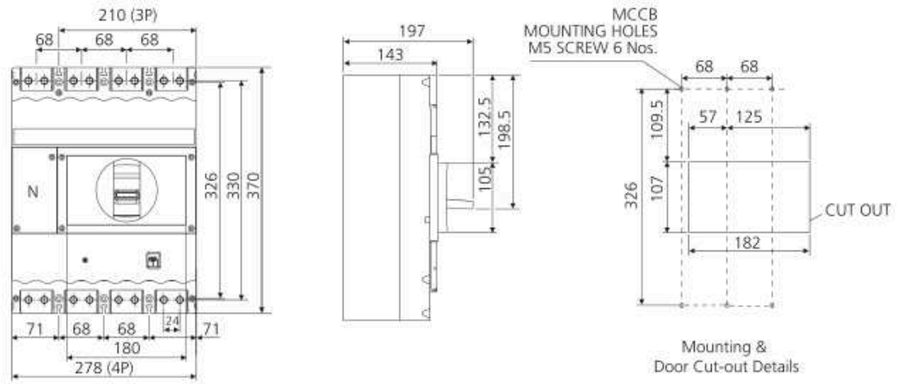
* 38 for MTX
# 38 for 500A TM

Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN3 / DN3-SD / DN3-M

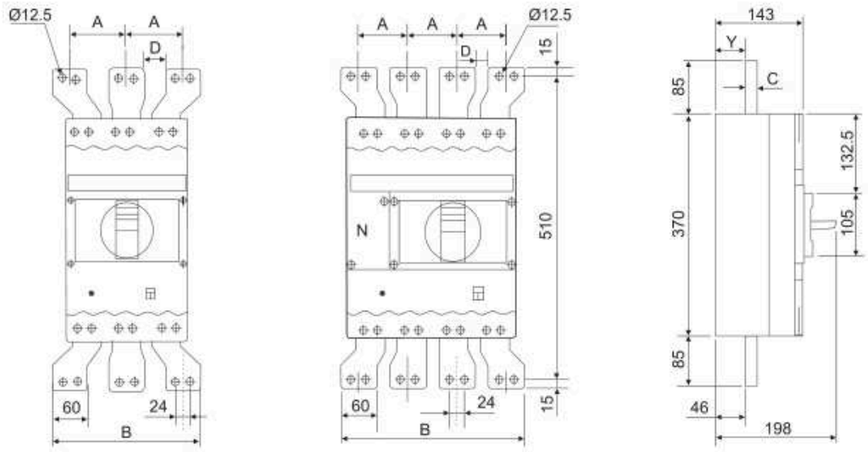
TYPE	DN3-400	DN3-630
A	39	43
B	37*	39#
C	45	55
D	324	344
E	354	390
F	154	164
G	32	22
H	30	40
I	15	23
J	30.5	20.5

All dimensions are in mm

DN4-400/1000/1250 MCCB



DN4-800/1000/1250 with spreader Links



3P Frame

RATING	A	B	C	D
800A	98	256	5	38
1000A	98	256	6	38
1250A	86	232	20	26

4P Frame

RATING	A	B	C	D
800A	88	324	5	28
1000A	88	324	6	28
1250A	80	300	20	20

3/4P Frame

TYPE	Y
N version	46
S version	42

Recommended cat nos. for DN4 spreaders

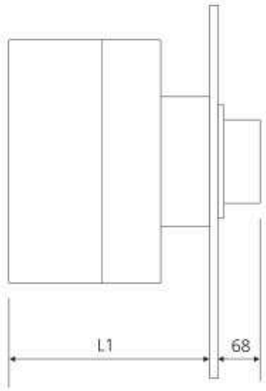
RATING	3P	4P
800A	CM91161OOUO	ST903620000
1000A	CM91161OOVO	CM90064OOVO
1250A	CM91161OOAO	ST980580000

Note:
- Spreaders are available as spare
- It is recommended to use spreader links for enhancing termination capacity
- Frame size is same for DN4 / DN4-SD

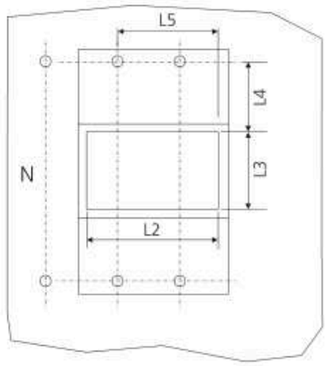
All dimensions are in mm

Dimensions of Accessories

Direct Rotary Operating Mechanism



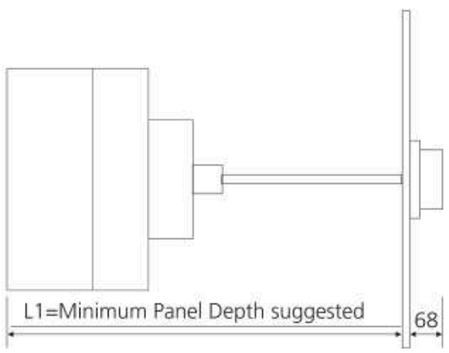
L1 = Mounting Depth
L2/L3 = Panel Cut-out
L4/L5 = Breaker Mounting ReferMounting

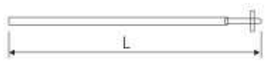


Mounting & Door Cut-out Details

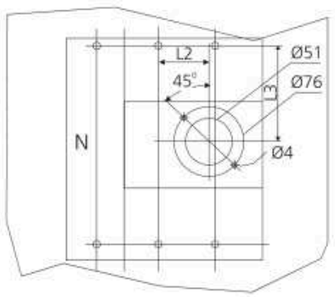
TYPE	L1	L2	L3	L4	L5
DN0	96.5	58	52	43.5	37
DN1	96.5	73	52	56.5	54
DN2	122	96	63	53	66
DN3	146	121	87	78	82
DN3B	146	121	87	49	82.5

Extended Rotary Operating Mechanism





L = Length of Shaft Required for Panel Depth L1
Total Length of Shaft =275mm



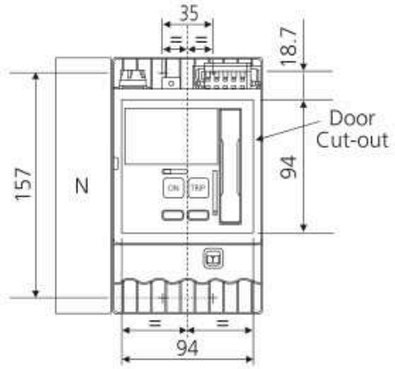
Mounting & Door Cut-out Details

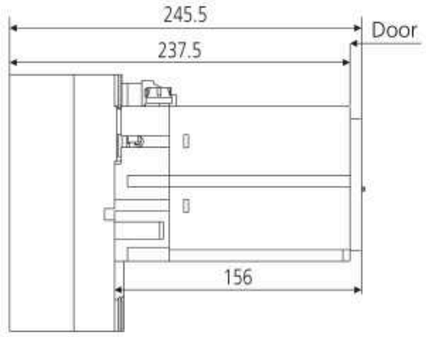
TYPE	L1	L2	L3	L4
DN0	169	L1 - 119	7.5	69.5
DN1	169	L1 - 119	24.5	81.7
DN2	202	L1 - 152	27	84
DN3	233	L1 - 183	39	122
DN3B	233	L1 - 183	39	92
DN4	302	L1 - 252	69	170

All dimensions are in mm

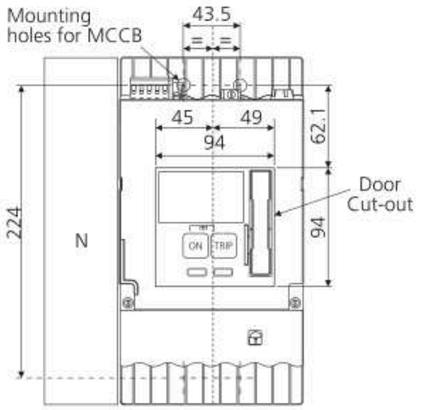
MCCB with Stored Energy Electrically Operated Mechanism (SE-EOM)

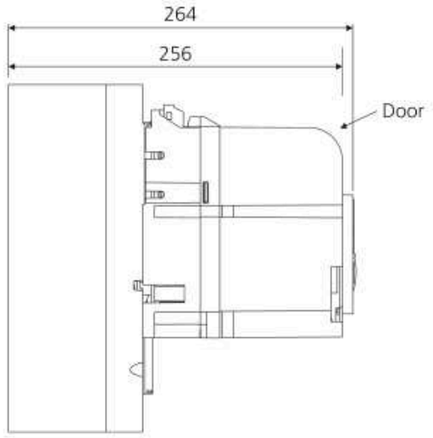
DN2



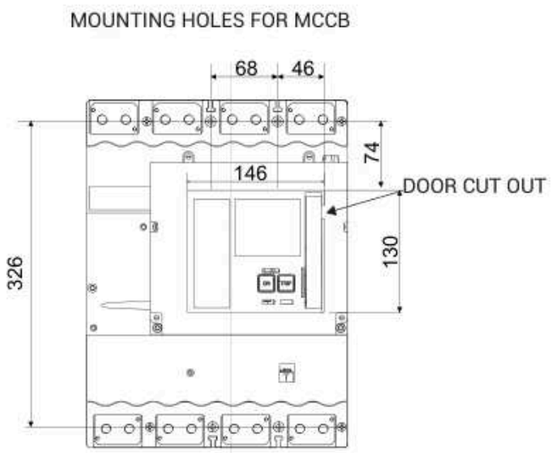


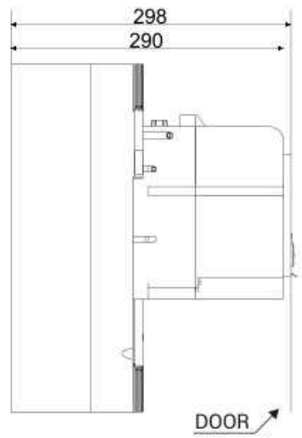
DN3





DN4

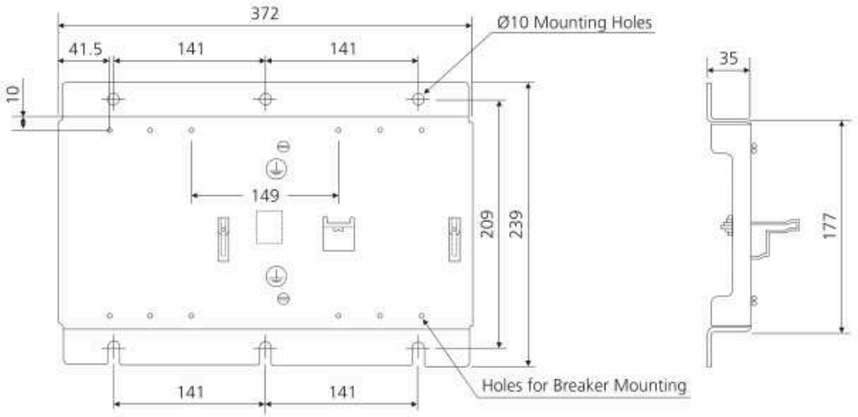




All dimensions are in mm

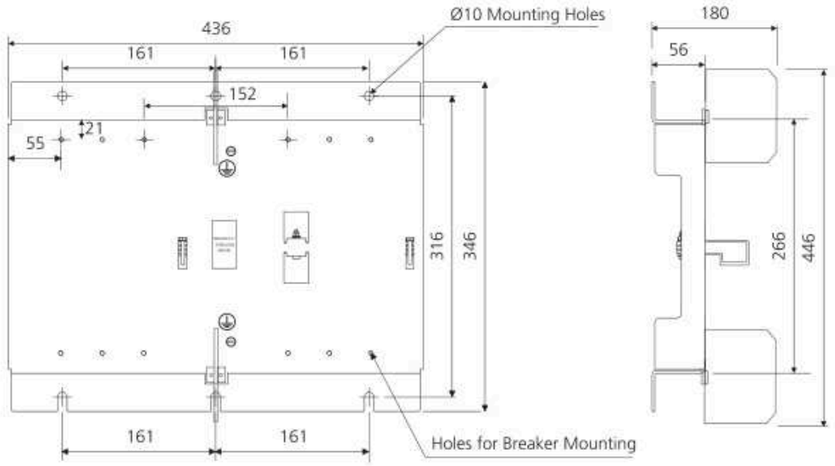
Mechanical Interlocking Kit

DN2



Mounting Details

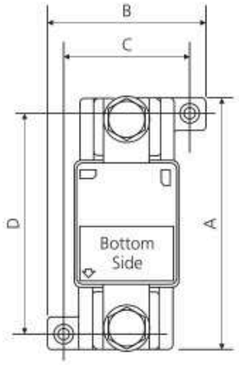
DN3

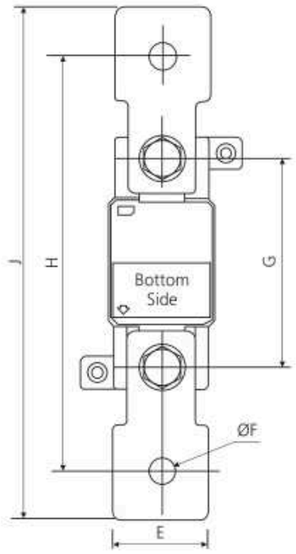


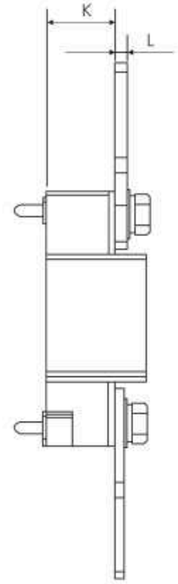
All dimensions are in mm

External Neutral CTs

DN2/DN3



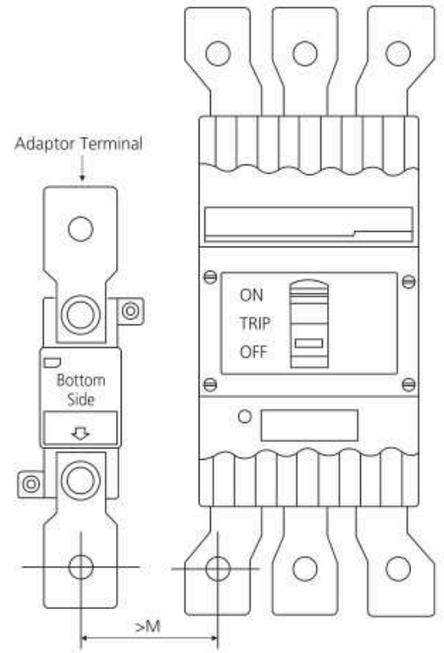




Frame	A	B	C	D	E	F
DN2 250A	93	59	47	81	27	8.2
DN3 400A	93.5	58	46	81.5	30	10.5
DN3 630A	93.5	58	46	81.5	40	10.5

Frame	G	H	J	K	L	M
DN2 250A	77	153	189	26	4	55
DN3 400A	63.5	153.5	189.5	39	5	60
DN3 630A	63.5	173.5	219.5	39	5	60

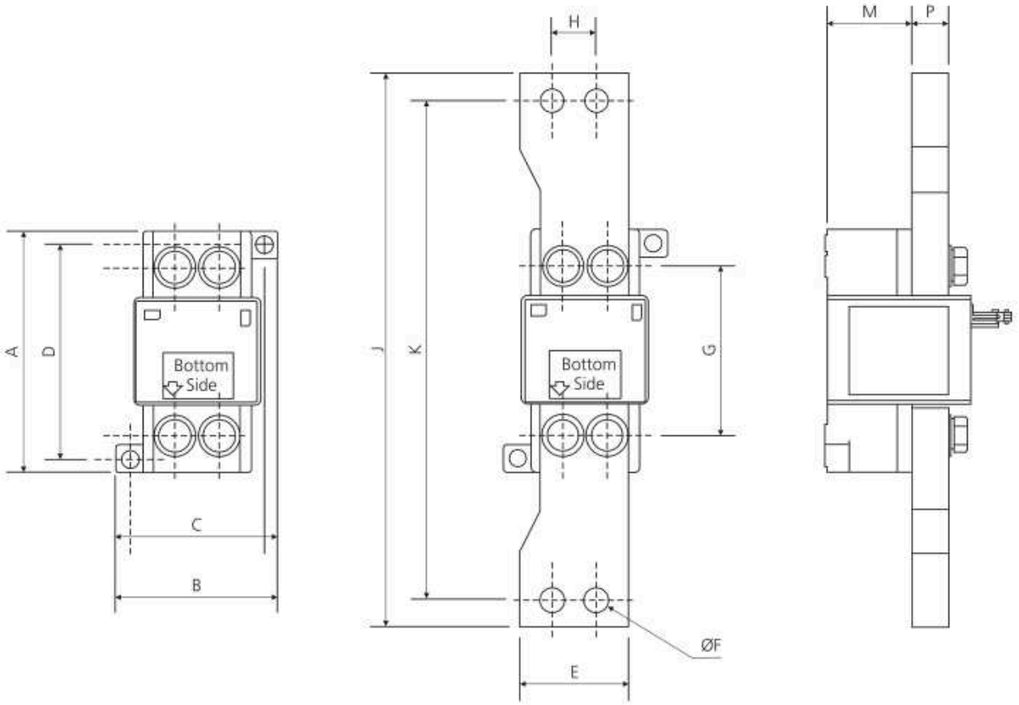
Note:
- Adaptor Terminals shown are not available with product
- Kindly refer accessories data for ordering separately
- Circuit Breaker shown for reference only



All dimensions are in mm

External Neutral CTs

DN4

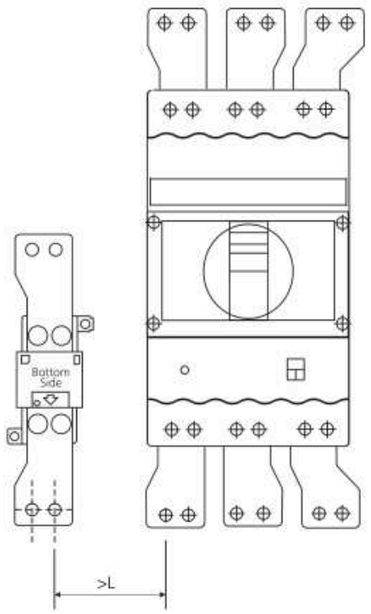


Frame	A	B	C	D	E	F	G
800A	132	88.5	73.5	117	60	12.5	92
1000A	132	88.5	73.5	117	60	12.5	92
1250A	132	88.5	73.5	117	60	12.5	92

Frame	H	J	K	L	M	P
800A	24	302	272	80	47	6
1000A	24	302	272	80	47	12
1250A	24	302	272	80	47	20

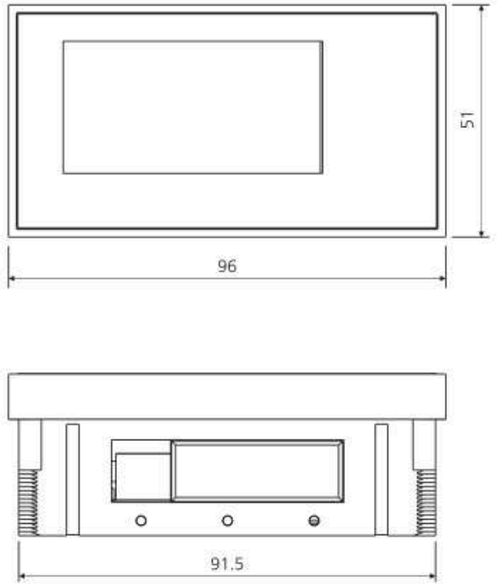
Note:
- Adaptor Terminals shown are not available with product
- Kindly refer accessories data for ordering separately
- Circuit Breaker shown for reference only

Special Note:
- Adaptor Terminals for DN4 range of product are not symmetrical.
- Kindly ensure proper orientation in assembly as shown in figure.

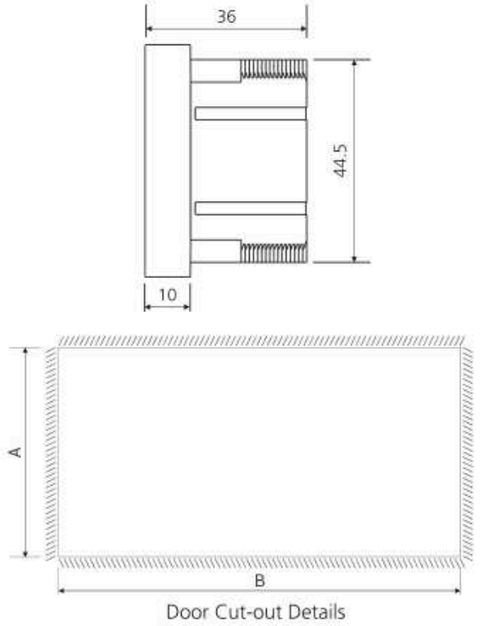


All dimensions are in mm

MTX Modules - Display Module

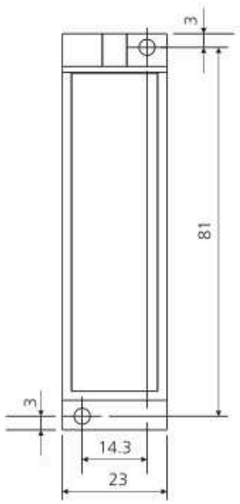


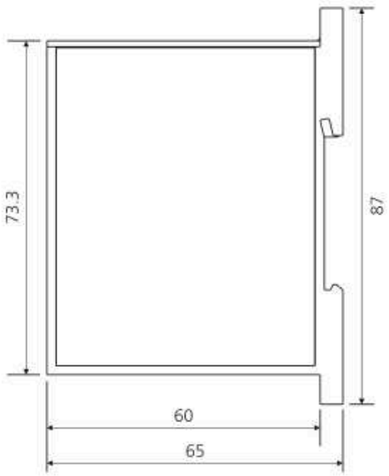
Note: A= 44.5 ± 0.75 mm
B= 91.5 ± 0.75 mm
For Door Cut-out 0.75mm to be considered for tolerance



Door Cut-out Details

MTX Modules - Voltage/Communication/Metering Module



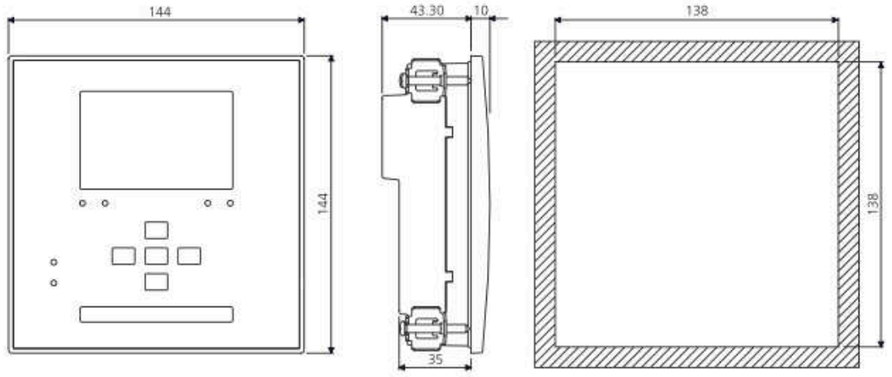




Door Cut-out Details

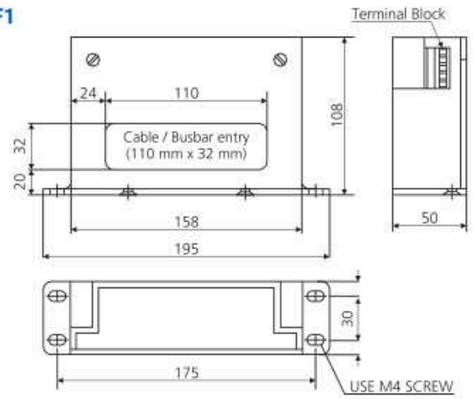
All dimensions are in mm

Auto Source Transfer Switch: AuXC-1000 and AuXC-2000

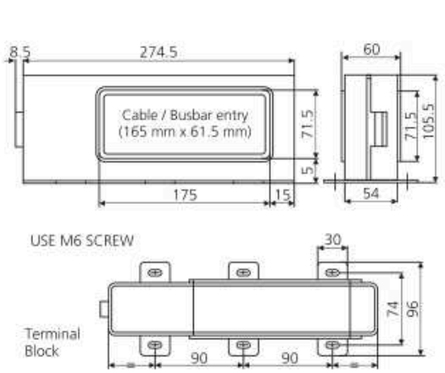


Earth Fault Modules - GF1, GF2, GF11

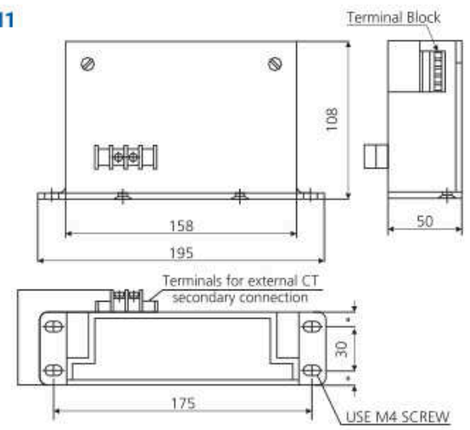
GF1



GF2

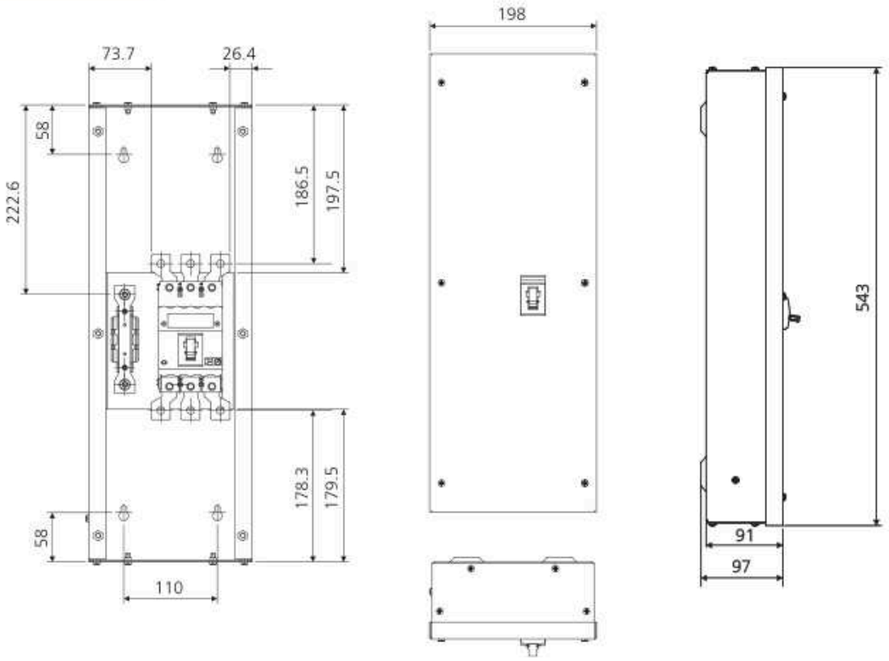


GF11

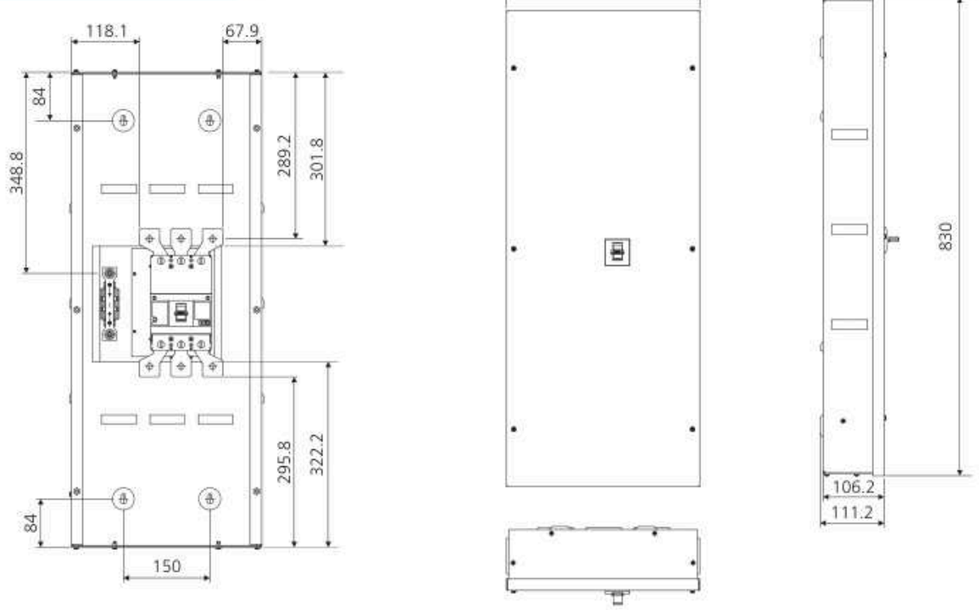


All dimensions are in mm

Size I Enclosure for DN0 MCCB

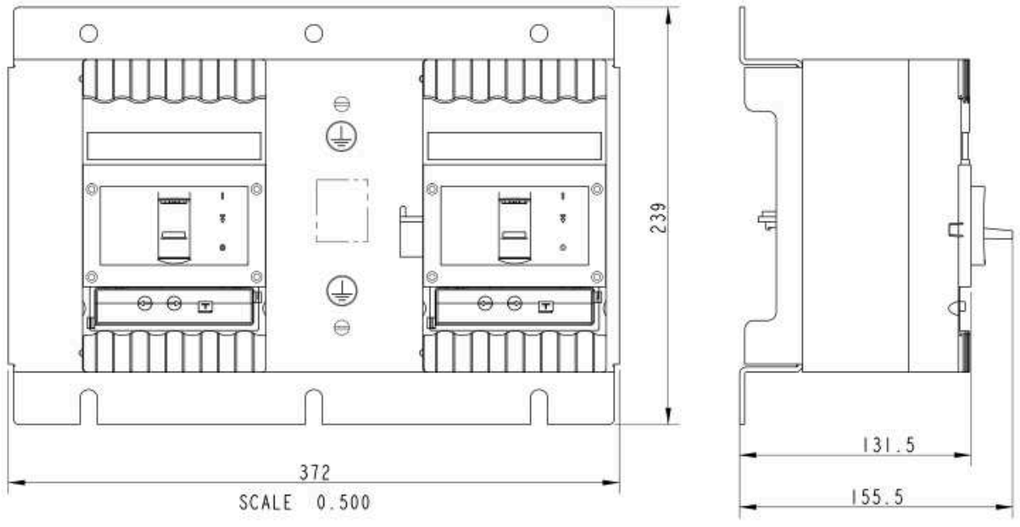


Size II Enclosure for DN1 MCCB

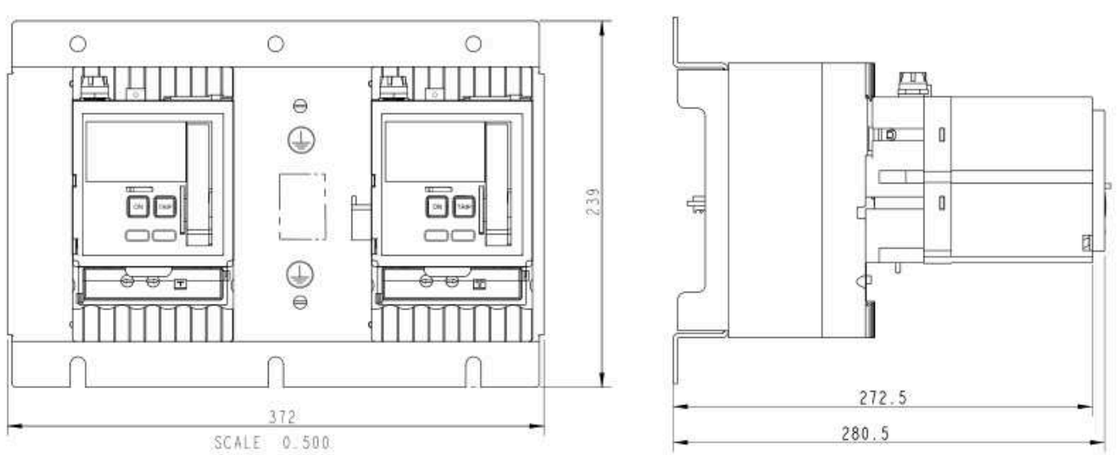


All dimensions are in mm

Mechanical Interlocking Kit - DN2

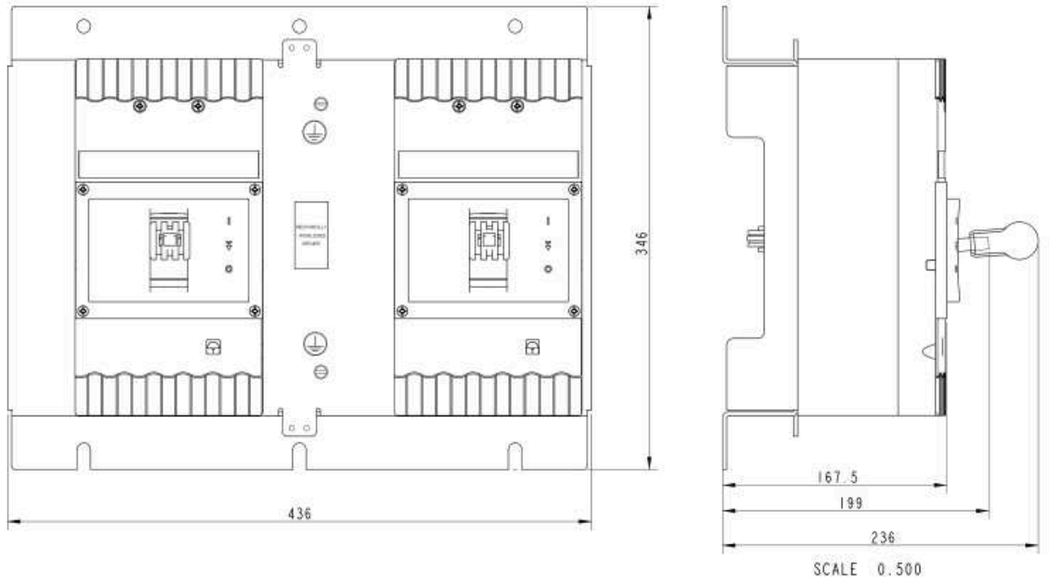


Mechanical Interlocking Kit with Motor Operator - DN2

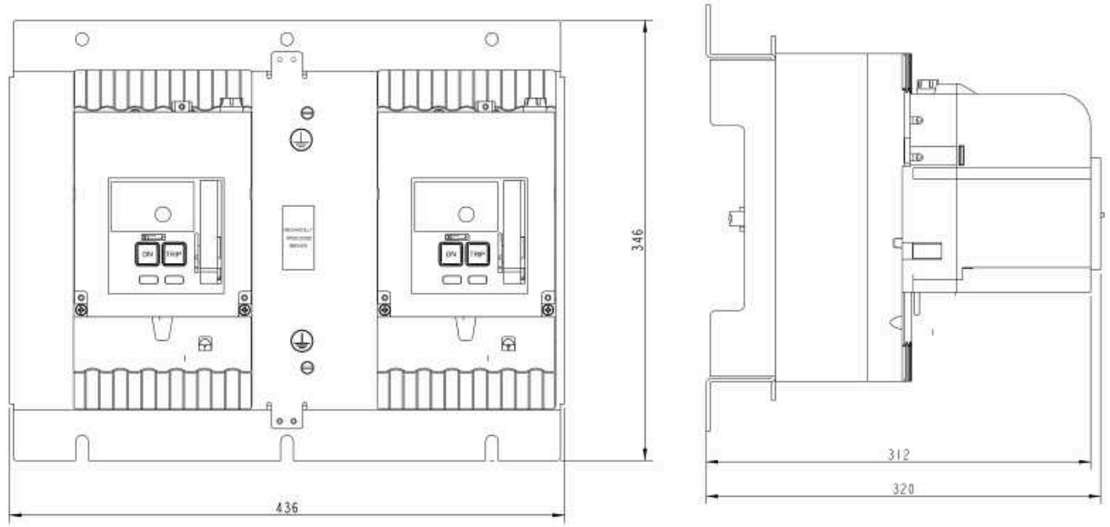


Note: Image shown are generic representation

Mechanical Interlocking Kit - DN3



Mechanical Interlocking Kit with Motor Operator - DN3

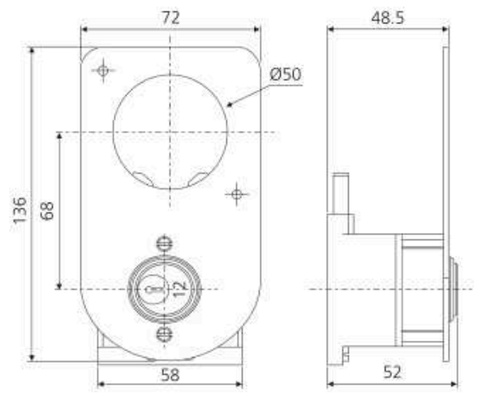


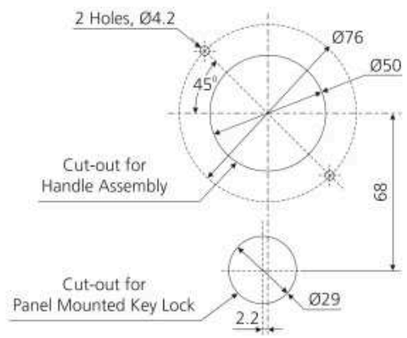
All dimensions are in mm

All dimensions are in mm

Panel Mounted Key Lock

Type 1 / 2 / 3 / 12 / 23





Mounting & Door Cut-out Details

Note: Panel Mounted key lock can be used only with extended ROM

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