L&T SWITCHGEAR
SAFE & SURE

d sine

Moulded Case Circuit Breakers

LARSEN & TOUBRO

Introduction

Larsen & Toubro infuses engineering with imagination. The Company offers a wide range of advanced solutions in the field of Engineering, Construction, Electrical & Automation, Machinery and Information Technology.

L&T Switchgear, a part of the Electrical & Automation business, is India's largest manufacturer of low voltage switchgear, with the scale, sophistication and range to meet global benchmarks. With over five decades of experience in this field, the Company today enjoys a leadership position in the Indian market with a growing international presence.

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

The d sine range, a new generation of MCCBs, stands out due to its state-of-the-art design, contemporary user-friendly features, wide choice of protective releases, ergonomics, aesthetics and compactness.

The d sine range complies with the latest standards like IEC 60947-2, EN 60947-2 & IS 13947-2.The products conform to international standards, carry CE markings and are KEMA & CB certified. The range is specially designed for tropical conditions, ensuring reliable performance at high ambient and humid environments.

The d sine range is designed to meet the changing needs of users after extensive analysis and user feedback. The range can satisfy the most demanding system requirements.

The d sine range, complimented by a wide range of accessories, offer total solution to customer applications ensuring operational safety, reliability and versatility.

Switchgear Factory, Mumbai

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DN0 DN1 DN2 DN3 DN4

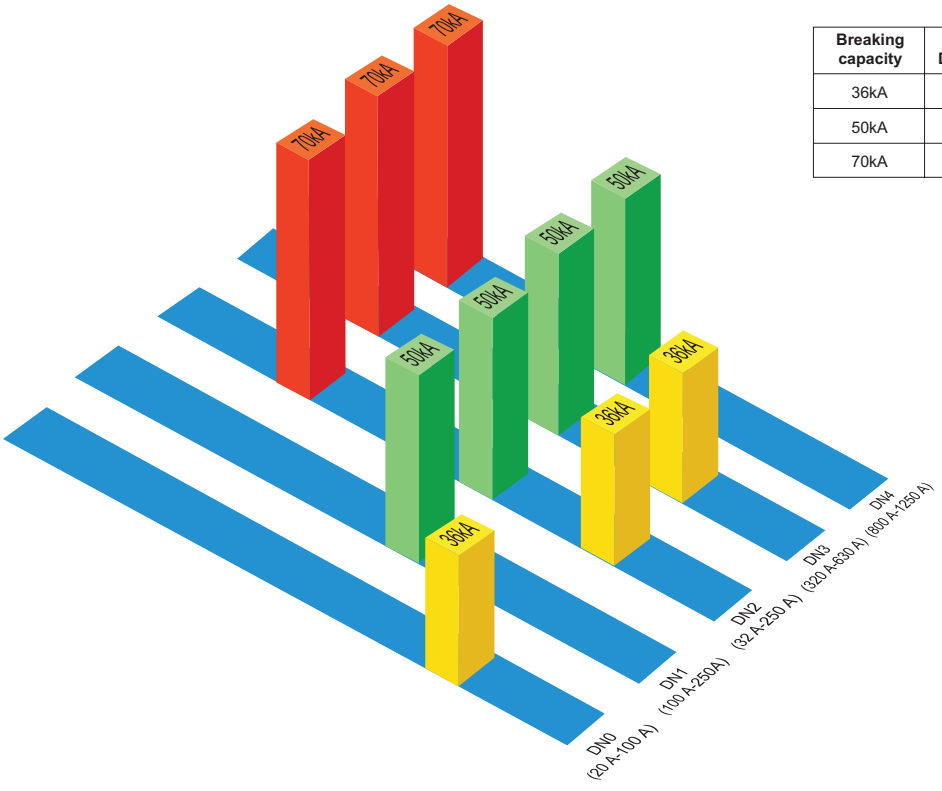
The Complete Range

Features

- From 20 A to 1250 A
- 3 Pole & 4 Pole
- Choice of 36kA/50kA/70kA breaking capacities.
- With protection releases in Microprocessor, Thermal-Magnetic and only Magnetic
- MCCBs for motor backup protection
- MCCBs for distribution and SD versions
- Manual, rotary or motorised versions
- Wide range of internal and external accessories

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

Breaking Capacities



Breaking capacity	Old Type Designation	New Type Designation
36kA	S (35kA)	D
50kA	H	N
70kA	L	S

Note : Since there is no change in the constructional aspect of the MCCBs, the product Certification with old designation remain valid with new type designation.

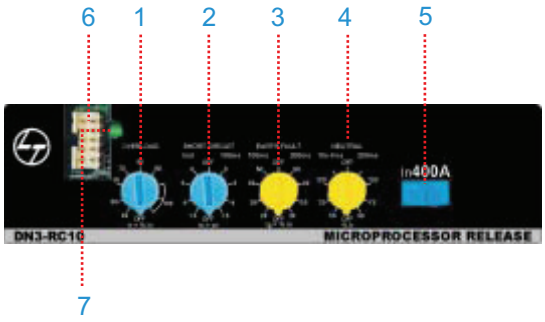
Thermal-Magnetic Release

Protection	Settings	
	DN0 & DN1	DN2 & DN3
Overload	80% - 100% *In*	80% - 100% *In*
Short circuit	9 *In (fixed)*	6 - 10 *In*
Earth fault	External	External

Features of Thermal-Magnetic Release

- Adjustable overload settings
- Adjustable short circuit settings
- True RMS sensing
- No contact with live parts

Microprocessor Release



Features of RC10 Microprocessor Release

- Overload protection with inverse time delay ①
- Short circuit protection with selectable time delay ②
- Instantaneous over ride protection
- Earth fault protection with selectable time delay ③
- Neutral protection with selectable time delay ④
- Push to trip button ⑤
- Port for release testing and thermal memory bypass ⑥
- Power ON LED ⑦
- Self powered protections
- True RMS sensing

RC10	
Rated Current In (A)	From 40 to 1250 A
Overload (Phase)	
Current setting, *Ir* (*Ir* = X*In*)	OFF, 0.4 to 1.0 in steps of 0.1
Time delay, *tr* (Inverse)	10 sec at 6*Ir*
Protection mode	ON / OFF
Overload (Neutral)	
Current setting, *Ir* (*Ir* = X*In*)	0.5,0.75 & 1.00 *Ir*
	Inverse 10 sec at 6 *Ir* / Fixed 200ms
Protection mode	ON / OFF
Short Circuit	
Current setting, *Is* (*Is* =X*Ir*)	1.5, 4 & 6*Ir*, 8*Ir*
Time delay, *ts*	Inst. / 100 msec
Protection mode	ON / OFF
Instantaneous Over ride	
Current setting, *Ip*	DN2-8*In*, DN3-400-12*In*, DN3-630-8*In*, DN4-8*In*
Earth Fault	
Current setting, *Ig*	0.2 to 0.5*In* steps of 0.1
Time delay, *tg*	100 / 200 msec
Protection mode	ON / OFF

Microprocessor Release

Features of RC20 - Communication Capable

- Communication using RS 485
- Power on LED
- Backlit LCD display
- Scroll buttons
- Push to trip button
- All features of RC10 release are incorporated
- Metering for current parameters
- Protection against unbalanced load / single phasing
- I^2t protection
- Neutral protection
- Cold load protection
- User friendly navigation system
- Self powered
- MODBUS RTU protocol

RC20	
Rated Current In (A)	From 160 to 630 A
Overload (Phase)	
Current setting (A), *Ir* (*Ir* = *xIn*)	0.4 to 1.0 in steps of 0.1
Time delay, *tr* (s) (Inverse)	3, 6, 10, 15, 30 at 6*Ir*
Protection mode	ON / OFF
Preset trip alarm setting	0.8 to 1.0*Ir* in steps of 0.05
Thermal memory	ON / OFF
Overload (Neutral)	
Current setting (A), *Ir*	50%, 100%, 150% *Ir*
Protection mode	ON / OFF
Short Circuit	
Current setting (A), *Is*	1.5, 4, 6, 8*Ir*
Time delay (ms), *ts*	For – I^2t OFF 20 to 200 in steps of 20
	For – I^2t ON 60 to 200 in steps of 20
Protection mode	ON / OFF
Preset trip alarm setting	0.8 to 1.0 times *Is* in steps of 0.05 *Is*
Cold load pickup	Enable / Disable
Instantaneous	
Instantaneous	1.5 to 8*In* in steps of 0.5*In* / *Ir*
Protection mode	ON / OFF
Cold load pickup	Enable / Disable
Instantaneous Over ride	
Current setting (A), *Ip*	DN2-8*In*, DN3-400-12*In*, DN3-630-8*In*, DN4-8*In*
Earth Fault	
Current setting (A), *Ig*	0.2 to 0.5*In* steps of 0.1*In*
Time delay (ms), *tg*	0.1, 0.2, 0.5, 1, 3 sec.
Preset trip alarm setting	0.8 to 1.0 *Ig* in steps of 0.05
Protection mode	ON / OFF
Cold load pickup	Enable / Disable

Additional Features of RC20

Current Unbalance	
Current setting (A) *xIn*	10% to 100% *In* in steps of 5%
Time delay (s)	1 to 10 in steps of 0.5
Protection mode	ON / OFF
Cold load pickup	Enable / Disable
Temperature Rise	
Alarm / Trip	At 80ºC / At 100ºC
Metering	
Current	Phase, Neutral and Earth
Display	Backlit LCD
Communication*	
Protocol	MODBUS RTU
Link used	RS 485
Event records	Pickup, Trip, Alarm upto 128 records-volatile memory
Trip history	Last 5 trips records - non volatile memory
Trip counter record	Counts for total number of trips

Only Magnetic release (for Motor backup protection)

- Only magnetic with instantaneous protection upto 10In
- Fault level protection for complete starter upto 50kA
- Type 2 charts available for DOL & Star/delta starters

Frame	250 A	400 A	630 A
Type	DN2-250M	DN3-400M	DN3-630M
Current Range (A)	100-250	320-400	500-630
Poles	3P only		
Icu(kA) @ 415V AC, 50Hz	50		

Switch Disconnector version (without protection release)

- Can be used as switching or Isolator devices
- Higher withstand capacities
- Wide range of accessories for remote operation

Frame	250 A	400 A	630 A
Type	DN2-250SD	DN3-400SD	DN3-630SD
Current Range (A)	100-250	320-400	500-630
Poles	3/4	3/4	3/4
Icw (kA) for 1sec.	3.6	6	6

* To establish communication with computer every MCCB with RC20 will require a communication module.

- **Faster tripping**

  The unique speed contact system accelerates the opening of contacts during short circuit. This ensures faster tripping an ultimate current limiting feature. The result-very low let-through, cut-off current and fault clearing time

- **Mechanical Anti-reclosing**

  This unique feature ensures that under short circuit conditions, the contacts open and latch even before the release gives a trip command to the mechanism. This avoids contact re-closing and bounce

- **Low watt loss**

  The entire current carrying path is optimally designed to achieve very low watt loss

- **Positive Isolation**

  The MCCB knob indicates the true position of the contacts

- **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

- **Marking**

  CE Marking ensures use of superior engineering plastic, meeting all requirements of flammability and glow wire testing path is optimally designed to achieve very low watt loss

- **Common Internal accessories**

  The internal accessories remain same across DN0 / DN1 & DN2 / DN3 / DN4* and they are easy to install snap fit type

- **No load line bias**

  Either side of MCCB terminal can be used as load or line

- **Terminal finger proofing**

  Front terminal plates conceal the terminals to prevent human contact thus achieving complete finger proofing

- **Release shrouding**

  Release is shrouded from the front thus preventing tampering by unauthorized person

- **Safer release adjustments**

  No live parts are in contact during release adjustments

- **Common front adjustments for protection release**

  Overload & short circuit setting can be adjusted from front using a common knob for all the poles

- **Visibility**

  Push to trip button and release ratings are visible even when release plate is fitted

* Except under voltage release.

Internal Accessories

Auxiliary Contact

d sine Range of MCCBs are offered with snap-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.

List of Internal Accessories

- Auxiliary Contact 1 C/O
- Auxiliary Contact 2 C/O
- Trip Alarm Contact
- Auxiliary & Trip Alarm Contact
- Shunt Release
- Under Voltage Release

MCCB with mid cover opened & Internal accessories fitted

External Accessories

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 with ROM mounted
- Direct access to push to trip button with ROM mounted
- 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

Extended Rotary Handle: Panel Mounted

Panel Door Mounted Key lock
(To be used along with extended rotary handles)

Rotary Operating Mechanism

The rotary operating mechanism (ROM) for d sine MCCBs are available in Direct & Extended versions.

Direct rotary handle (MCCB mounted)

These versions are available for the entire family of d sine MCCBs.

Mechanical Interlocking Schemes

1. Mechanical Interlocking Kit:

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

Features

- For 3 Pole & 4 Pole versions
- For DN2 & DN3 frames
- Site fittable

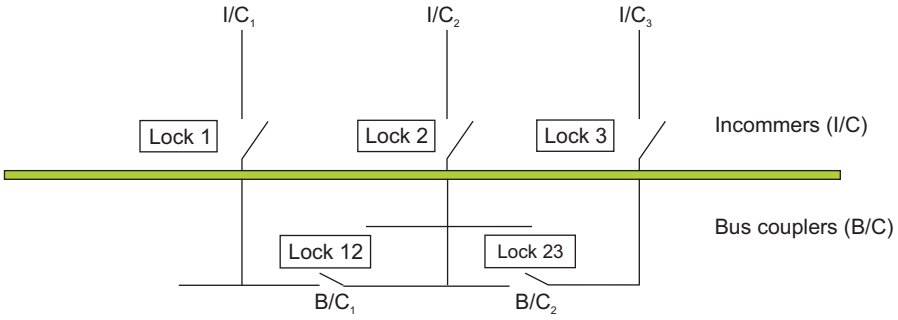
MIL with Base Plate

2. 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 following details,

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

External Neutral CTs

Features

- Add on accessory for 3P MCCB
- Reliable solution for Earth / Neutral fault protection for 3 Phase 4 wire system

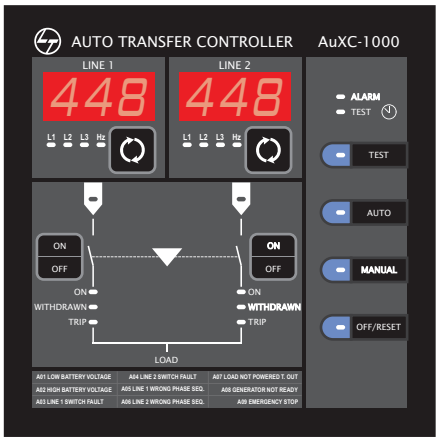
Stored Energy Electrical Operating Mechanism

Features

- ON / OFF & Charged/Discharged indication
- Foolproof mounting
- Selector switch for Auto/Manual operation
- Padlock facility for locking in OFF position(3 nos locks)
- Resetting time < 250msec & Closing time< 90 msec
- 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

DN3 SE EOM data sheet	
Operating voltage (V AC)	240
Operating voltage (%)	85-110%
Closing time (ms)	90
Opening time (ms)	250
Power consumption (VA)	500
Life / No. of operations	5000
Door cut out (mmXmm)	96X96
IP protection, on the front	IP30
Operating frequency	1/min
Min. control impulse time (ms)	200

Automatic Source Transfer Switch Controller AuXC-1000



The AuXC-1000 controller brings simplicity and flexibility to an auto source transfer system. It has been developed to control and supervise the automatic or manual transfer of a utility load from a principal power supply source to a stand-by. It sets a new benchmark in Auto source transfer switch controller technology.

It includes all the necessary features to supervise and control power supply sources, composed by energy distribution systems or generating sets, and the relative transfer equipment, such as contactors, motorized moulded case circuit breakers and air circuit breakers.

The automatic transfer takes place through AuXC-1000 whenever conditions predefined by the user take place, for example:

- Power supply source not respecting programmed limits
- The need to have a very reliable power source
- The need to use the most economical power source

Some of the key features of this controller are:

- Front display for monitoring the system voltage and frequency and for onsite controller programming
- Six programmable inputs and five programmable outputs
- Front test feature to simulate the operation of the diesel generator set
- Status indication through 22 LEDs
- Flush mounting arrangement
- Communication capable

The AuXC-1000 controller is compatible with U-Power range of Air circuit breakers, d sine range of MCCBs and MCX range of contactors.

MIL with Base Plate & EOM

+

AuXc-1000

Technical Data

KEMA TESTED

Frame			100 A	250 A	250 A			400 A			630 A			800 / 1000 / 1250 A	
Type			DN0-100	DN1-250	DN2-250			DN3-400			DN3-630			DN4-1250	
			D	N	D	N	S	D	N	S	D	N	S	N	S
Current Range (A)			20, 25, 32, 40, 50, 63, 80 & 100 A	100, 125, 160, 200, 250 A	32, 40, 50, 63, 100, 125, 160, 200 & 250 A			63, 160, 250, 320, 400			63, 160, 250, 320, 400, 630 A			800, 1000, 1250	
Poles			3 / 4	3 / 4	3 / 4			3 / 4			3 / 4			3 / 4	
Impulse withstand Voltage (kV)			6	6	8			8			8			8	
Rated Operational Voltage (V) (MAX)			600	600	690			690			690			690	
Rated Insulation Voltage (V)			690	690	750			750			750			750	
Utilisation Category			A	A	A			A			A			A	
Standard			IEC / EN / IS	IEC / EN / IS	IEC / EN / IS			IEC / EN / IS			IEC / EN / IS			IEC / EN / IS	
IEC-60947-2	Icu (kA)	230 / 240 V	65	65	65	70	100	65	70	100	65	70	100	70	100
		400 / 415 V	36	50	36	50	70	36	50	70	36	50	70	50	70
		500 V	10	10	25	36	42	25	36	42	25	36	42	25	36
		550 V	8	8	18	25	36	15	20	25	15	20	25	20	25
		600 V	5	5	16	18	22	12	18	22	12	18	22	16	20
		690 V	*	*	10	15	20	8	15	20	8	10	15	10	18
		250 V DC (3P in series)	15	15	15	25	36	15	25	36	15	25	36	-	-
		500 V DC (3P in series) L/ R<15msec	5	10	5	10	20	5	10	20	5	10	16	-	-
	Ics as % Icu		50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Life span		Mechanical	30000	10000	25000			15000			15000			8000	
		Electrical @1.0 In	4000	3000	10000			4000			2000			750	
Operating Frequency (Hz)			50 / 60												
Total Opening Time			<10 msec											<20 msec	
Finger-proof Terminals			Yes												
Ambient Temperature			-5° to 55° C												
Storage Temperature			-35° to 70° C												
Mounting Positions			Vertical and 90° in both directions												
Dimensions (W x D x H) mm³		3-Pole	75 x 60 x 130	105 x 60 x 165	105 x 96 x 179			140 x 111.5 x 266			140 x 111.5 x 266			278 x 143 x 370	
		4-Pole	100 x 60 x 130	140 x 60 x 165	140 x 96 x 179			183.5 x 111.5 x 266			183.5 x 111.5 x 266			278 x 143 x 370	
Weight (kg) (3/4 Pole)			1 / 1.25	1.45 / 1.8	2.5 / 3.3			5.5 / 7.2			6 / 7.8			15 / 16	
ACCESSORIES	Internal	Auxiliary Contact	1C/O or 2C/O	1C/O or 2 C/O	1C/O or 2C/O			1C/O or 2C/O			1C/O or 2C/O			1C/O or 2C/O	
		Trip Alarm Contact	1C/O or 2C/O	1C/O or 2 C/O	1C/O			1C/O			1C/O			1C/O	
		Auxiliary & Trip Alarm Contact	1C/O + 1C/O	1C/O + 1 C/O	1C/O + 1C/O			1C/O + 1C/O			1C/O + 1C/O			1C/O + 1C/O	
		Shunt Release $	240 / 415 V AC 50 / 60 Hz	240 / 415 V AC 50 / 60 Hz	110 / 415 V AC 50 / 60 Hz, 110 / 220 V DC			110 / 415 V AC 50 / 60 Hz,110 / 220 V DC			110 / 415 V AC 50 / 60 Hz,110 / 220 V DC			110 / 415 V AC 50 / 60 Hz, 110 / 220 V DC	
		Under Voltage Release	240 V AC 50 Hz	240 V AC 50 Hz	220 - 240 V AC 50 Hz			220 - 240 V AC 50 Hz			220 - 240 V AC 50 Hz			220 - 240 V AC 50 Hz	
		Rotary Operating Mechanism	✓	✓	✓			✓			✓			✓	
		Electrical Operating Mechanism	x	x	✓			✓			✓			x	
	External	Earth Fault Release	Available with external GF module with TM release		Available with external GF module with TM release and Inbuilt protection with Microprocessor release										
		Mechanical Interlock	x	x	✓			✓			✓			x	
		Spreader Links	✓	✓	✓			✓			✓			✓	
		Key lock	x	x	✓			✓			✓			✓	
		Pad lock through ROM	✓#	✓	✓			✓			✓			✓	

$: 'NO' of control contactor to be connected in series for 220V DC application.

Note:
- Any two internal accessories can be mounted at a time
- For special application like capacitor switching, DC please contact nearest branch office
- For motor application, use 'M' series MCCBs (DN2M, DN3M)

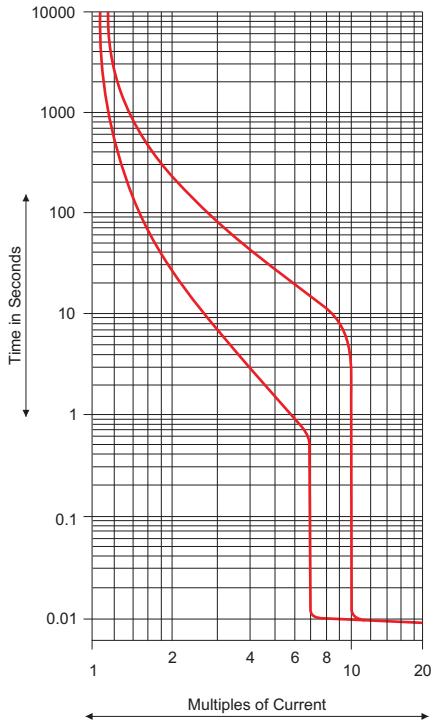
* Available on request.

\# Direct Pad locking available

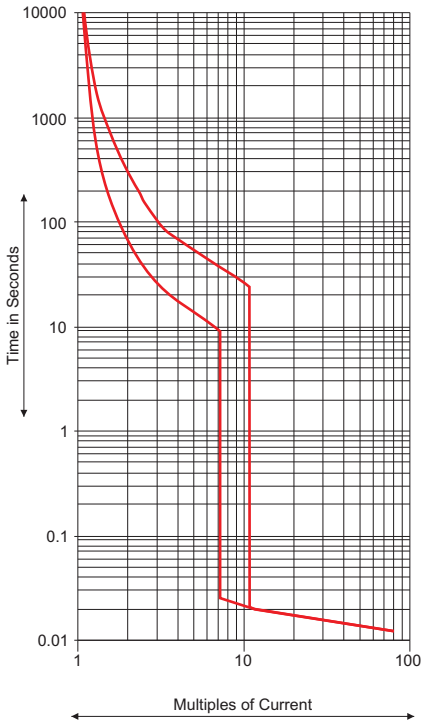
Time - Current Characteristic Curves

Thermal-Magnetic Release

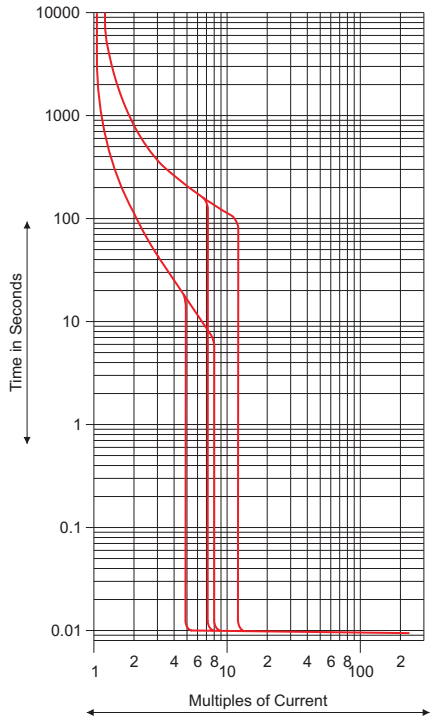
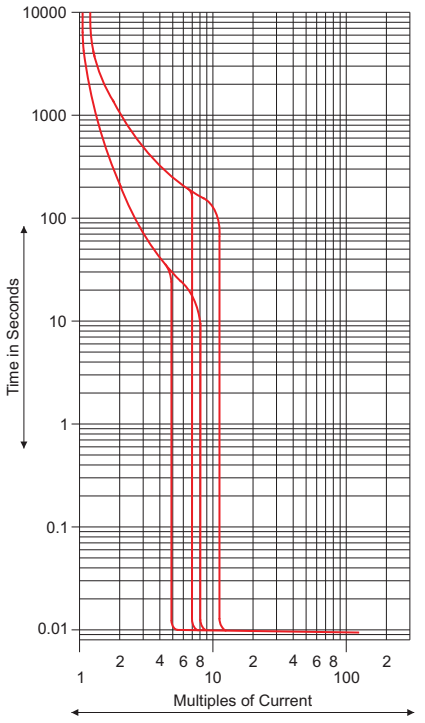
DN0-100



DN1-250



DN2-160/250



DN3-400/630