



C-POWER Air Circuit Breakers

About us

Larsen & Toubro is a technology-driven company that 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.



Switchgear Factory, Mumbai



Switchgear Factory, Ahmednagar

C-POWER Air Circuit Breakers

L&T's Air Circuit Breakers (ACBs) are specially designed for extreme tropical conditions and have a proven track record of more than 30 years. Presently more than 3,50,000 Air Circuit Breakers supplied by L&T are being used for diverse applications. The **C-POWER** Air Circuit Breakers provide technologically driven solutions to meet customer needs.



Complete selectivity

Unique feature of $I_{cu}=I_{cs}=I_{cw}$ for 1 second across the entire range. This ensures complete selectivity for system with time based discrimination.

Perfect for Indian conditions

Inherent design to perform in extreme tropical conditions. Typical site conditions like high ambient temperature, humidity and dusty environment are best handled by **C-POWER** ACBs without compromising on performance and safety.

Optimal compactness

Designed to ensure

- Low inherent temperature rise
- Adequate interface clearances

Widest choice of over current protection releases

- Advance micro-controller based with option of communication & metering-SR71
- Micro processor based releases-SR18/SR18G/SR21i
- Thermo-magnetic release-DN1

Elegant design & rugged construction

- Common door cutout for entire range
- Left aligned cutout for all ratings
- Uniform height and depth for ACBs upto 4000 Amp

Range to meet every customer's need

Various options to choose from

- Breaking capacity from 50kA to 100kA
- 3 Pole or 4 Pole configuration
- Fixed or Drawout version
- Auto or Manual reset mechanism
- Independent manual or stored energy type, manual or electrically operated mechanism
- Different terminal orientations : Flat, Horizontal and Vertical

User friendly features

- **Front accessible** over current release settings, telescopic racking handle and various racking interlocks; no need to open the panel door
- Unique '**Maintenance position**' in drawout type ACBs to facilitate maintenance & inspection without removing ACB from the panel
- **Multitap CTs** for enhancing protection range in DN1 release
- **Wide variety** of Amperemetric and Voltmetric releases
- **Fully rated neutral pole** for the entire range
- Lockable **sliding shutters** to prevent unauthorized access to "TRIP" and "CLOSE" push buttons
- Can be used as an **ON / OFF Load Isolator**
- Extendable **Electrical Life**:
 - By replacing the arcing contacts at site, for all ratings
 - Without changing pole assembly
- **Programmable SICs**: Auxiliary contacts in drawout ACBs are programmable for only Service, Only Test, Test and Service, and All Positions
- Protection releases are easily **interchangeable** at site
- Facility for site conversion of **manually operated** ACBs to **electrically operated** ACBs
- Jaws on breaker facilitate ease of maintenance & replacement of contact jaws

Safety

- "CE" marked for C, S1 & H ranges
- Superior quality engineering grade plastics used for insulation purpose; conforms to **Glow wire test** (Ref: IEC 60695-2-1)
- In-built **mechanical anti-pumping** to prevent auto-reclosing of ACB on persisting faults
- In-built **rating error preventor** in drawout ACBs ensure correct rating of drawout portion in corresponding cradle
- **Safety shutters** prevent accidental contact with live cradle terminals
- Variety of **Safety Interlocks**
- Easily removable **arc chutes** without use of any tool
- Operating voltage ranges from **10% Un to 110% Un** for shunt release ensures intentional tripping even at high voltage drops during short circuit
- Transparent safety shutter offers easy inspection of cradle contacts & reduces the maintenance time

Conformance to standards

- IEC - 60947 (Part 1 & 2)
- IS/IEC - 60947 (Part 1 & 2)
- IEC 60695 - 2 - 1
- BS EN 60947 - 2

C-POWER Range



Breaking capacities:

	Icu = Ics = Icw											
Rated Current	400A	630A	800A	1000A	1250A	1600A	2000A	2500A	3200A	4000A	5000A	6300A
CN-CS : E	50kA	50kA	50kA	50kA	50kA	50kA	50kA					
	Frame-1											
CN-CS : S1		50kA	50kA	50kA	50kA	50kA	50kA	60kA	60kA			
		Frame-1						Frame-2				
CN-CS : C	50kA	50kA	50kA	50kA	50kA	55kA	60kA				95kA	95kA
CN-CS : H			65kA	65kA	65kA	65kA	75kA	75kA				
CN-CS : H0									75kA	75kA		
CN-CS : H/H1									100kA	100kA		
		Frame-1					Frame-2		Frame-3		Frame-4	

Technical Data Sheet



Rating (A)		400	630			800			1000				1250				1600				2000				2500			3200			4000		5000	6300				
Type Designation		E	E	S1	E	S1	C	H	E	S1	C	H	E	S1	C	H	E	S1	C	H	E	S1	C	H	S1	C	H	S1	H0	H1	H0	H	C	C				
Rated current (A) at 50°C	I_n	400	630			800			1000				1250				1600				2000				2500			3200			4000	5000	6300					
Rated operational voltage (V), 50/60Hz	U_o^*	415	415			415			415				415				415				415				415			415			415	415	415					
Rated insulation voltage (V), 50/60Hz	U_i	1000	1000			1000			1000				1000				1000				1000				1000			1000			1000	1000	1000					
No. of poles		3	3	3/4	3	3/4			3	3/4			3	3/4			3	3/4			3	3/4			3/4			3/4			3/4	3/4	3/4					
Rated ultimate short circuit breaking capacity 50/60Hz (kA rms)	I_{cu}	380/415/500V	50	50	50	50	50	50	65	50	50	50	65	50	50	50	65	50	50	50	65	50	50	55	75	60	60	75	60	75	100	75	100	95	95			
		690V	-	-	-	-	-	35	50	-	-	35	50	-	-	35	50	-	-	35	50	-	-	40	65	-	40	65	-	65	85	65	85					
Rated service short circuit breaking capacity 50/60Hz (kA rms)	I_{cs}	380/415/500V	50	50	50	50	50	50	65	50	50	50	65	50	50	50	65	50	50	50	65	50	50	55	75	60	60	75	60	75	100	75	100	95	95			
		690V	-	-	-	-	-	35	50	-	-	35	50	-	-	35	50	-	-	35	50	-	-	40	65	-	40	65	-	65	85	65	85					
Rated short time withstand capacity 50/60Hz (kA rms)	I_{cw}^{**}	0.5 sec	50	50	50	50	50	50	65	50	50	50	65	50	50	50	65	50	50	50	65	50	50	55	75	60	60	75	60	75	100	75	100	95	95			
		1 sec	50	50	50	50	50	50	65	50	50	50	65	50	50	50	65	50	50	50	65	50	50	55	75	60	60	75	60	75	100	75	100	95	95			
		3 sec	-	-	-	-	-	35	50	-	-	35	50	-	-	35	50	-	-	35	50	-	-	50	65	-	55	65	-	70	85	70	85					
Rated making capacity 50/60Hz (kA peak)	I_{cm}	380/415/500V	105	105	105	105	105	105	143	105	105	105	143	105	105	105	143	105	105	105	143	105	105	121	165	132	132	165	132	165	220	165	220	209	209			
		690V	-	-	-	-	-	73.5	105	-	-	73.5	105	-	-	73.5	105	-	-	73.5	105	-	-	84	143	-	84	143	-	143	187	143	187					
Rated impulse withstand voltage of main circuit (kV)	U_{imp}	8	8	12	8	12			8	12			8	12			8	12			8	12			12			12			12	12						
Rated impulse withstand voltage of aux. circuit (kV)	U_{imp}	4	4		4			4				4				4				4				4			4			4	4							
Typical opening time (ms)		40	40		40			40				40				40				40				40			40			40	40							
Typical closing time (ms)		60	60		60			60				60				60				60				60			60			60	60							
Utilization category		B	B		B			B				B				B				B				B			B			B	B							
Suitability for isolation		✓	✓		✓			✓				✓				✓				✓				✓			✓			✓	✓							
Fixed		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	x	✓	✓	x	x	x	x	x	x	x			
Draw out		x	x	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Manual		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Electrical		x	x	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Electrical & Mechanical life (operating cycles) †		15000	15000	20000	15000	20000			15000	20000			20000				20000				20000				20000			10000			10000	5000	5000					
Electrical life without maintenance		6000	6000	8000	6000	8000	8000	8000	6000	8000	8000	8000	6000	7000	7000	7000	6000	7000	7000	7000	4500	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	2500	2500				
Dimensions (in mm)	Fixed	H	385	385	394	385	394			385	394			385	394			385	-	394			-	394			-				-	-						
		W	3 Pole	316	316	326	316	326			316	326			316	326			316	-	482			-	482			-				-	-					
			4 Pole	-	-	414	-	414			-	414			-	414			-	-	628			-	628			-				-	-					
		D	423.5	423.5	431	423.5	431			423.5	431			423.5	431			423.5	-	431			-	431			-				-	-						
Draw out	H		-	-	468	-	468			-	468			-	468			-	468	468			468			468	468	468	468	468	468	468	468	468	468	468	468	
		W	3 Pole	-	-	399	-	399			-	399			-	399			-	399	555			555			555	701	701	701	701	701	701	701	701	701	701	701
			4 Pole	-	-	487	-	487			-	487			-	487			-	487	701			701			701	909	909	909	909	909	909	909	909	909	909	909
		D	-	-	587	-	587			-	587			-	587			-	587	587			587			587	587	587	587	587	587	587	587	587	587	587	587	587

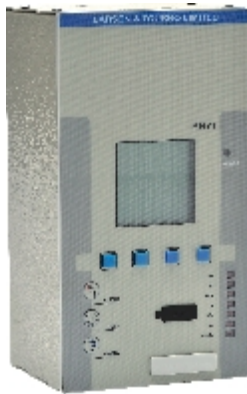
* Please consult us for application at dc voltages & higher operational voltage upto 690V AC.

** I_{cw} values are indicated based on thermal considerations. While selecting a breaker please ensure that I_{cw} requirement for the application is not more than I_{cs} / I_{cu} at the point of installation.

† Electrical life = Mechanical life. However, arcing contacts need to be replaced depending upon wear & tear. Please consult us.

Protection releases

Microprocessor-based, Communication-capable Release - SR71



Salient Features

- True RMS sensing
- Offers comprehensive protection for overload, short circuit, instantaneous, earth fault and neutral overload
- High resolution backlit LCD display
- Intelligent Pre-trip alarm to prevent system shutdown
- Password protected settings and commands
- MODBUS RTU protocol with intrinsic RS 485 port
- LED indication for POWER ON, different faults and Pre-trip alarm
- 2 sets of storable protection settings
- Last 5 trips & 128 Event records with time & date stamping
- 3 programmable contacts-1 for micro controller failure, 2 for basic fault annunciation
- 4 relay contacts for indication of exceeding maximum demand, Pre-trip alarm and control on breaker (closing and opening)
- Rating-plug for precise protection at lower load currents
- Auto-doubling features to prevent nuisance tripping
- Selectable I^2t based current for short-time and earth fault zones
- Thermal reflectivity enables faster tripping on recurrent overloads
- Inbuilt Zone Selective Interlocking
- Provision for Self-diagnostic test
- Conformance to EMI/EMC standards

	Parameter	Screen Abbreviation	Details	Factory Settings	
Overload (Phase)	Current Settings (A), $I_r = I_n \times \dots$	PICKUP	0.4 to 1.0 I_n in steps of 0.05 I_n	1.0 I_n	
	Time Delay, T_r (sec) at 6 x I_r	TMS-tr	0.5-1-2-4-6-12-18-24-30	30 sec	
	Pre-trip Alarm Settings	PREALAR	0.5 to 0.95 I_r in steps of 0.05 I_r	0.95 I_r	
	Thermal Reflectivity	THM-MEM	ON / OFF	OFF	
	Function	FUNC	Enable / Disable		
Neutral Fault	Current Settings (A), $I_n = I_r \times \dots$	PICKUP	0.5-1.0	1.0 I_r	
	Time Delay (sec)	DELAY	Same as 'Overload (Phase)'	30 sec	
Short Circuit	Current Settings (A), $I_{sd} = I_n \times \dots$	PICKUP	2 to 10 I_n in steps of 0.5 I_n	10 I_n	
	Time Delay, t_{sd} (msec) at 10 x I_n	I^2t OFF	DELAY	20-100-200-300-400	400 msec
		I^2t ON	DELAY	20-100-200-300-400	400 msec
	Pre-trip Alarm Settings	PREALAR	0.5 to 0.95 I_s in steps of 0.05 I_s	0.95 I_s	
	I^2t	I^2t	ON / OFF		
	Cold-load Pickup	COLDPIC	Enable / Disable	Disable	
	Cold-load Pickup Delay	CP-DLY	0.1 to 10 sec in steps of 0.1 sec	0.1 sec	
Instantaneous	Function	FUNC	Enable / Disable	Enable	
	Current Settings (A), $I_i = I_n \times \dots$	PICKUP	2 to 16 I_n in steps of 0.1 I_n	16 I_n	
Earth Fault	Function	FUNC	Enable / Disable	Enable	
	Current Settings (A), $I_g = I_n \times \dots$	PICKUP	0.1 to 0.6 in steps of 0.05 I_n for I^2t ON	0.6 I_n	
			0.1 to 0.6 in steps of 0.01 I_n for I^2t OFF		
	Time Delay (sec), t_g	DELAY	100 to 400 msecs in steps of 100 msec for I^2t ON	3 sec	
			0.1 to 5 sec in steps of 100 msec for I^2t OFF		
	Pre-trip Alarm Settings	PREALAR	0.5 to 0.95 I_g in steps of 0.05 I_g	0.95 I_g	
I^2t	I^2t	ON / OFF	OFF		
Cold-load Pickup	COLDPIC	Enable / Disable	Disable		

Note: Both Protection Groups 1 & 2 carry the same factory settings.

Additional Protections

Parameter		Screen Abbreviation	Details	Factory Settings
Under Current	Function	FUNC	Enable / Disable	Disable
	Current Setting (A) x In	PICKUP	15% to 80% in steps of 5% In	0.8 In
	Time Delay (secs)	DELAY	1 to 255 in steps of 1 second	1 second
	Trip / Alarm	MODE	Either / Both	Alarm
Current Unbalance	Function	FUNC	Enable / Disable	Disable
	Current Setting (A) x In	PICKUP	10% to 95% in steps of 5% In	0.2 In
	Time Delay (secs)	DELAY	1 to 10 in steps of 5 secs	2.0 secs
Over Voltage #	Function	FUNC	Enable / Disable	Disable
	Voltage Setting (V) $V_s = V_n \times \dots$	PICKUP	105% to 150% in steps of 5% V_n	1.2 V_n
	Time Delay (secs)	DELAY	0.1 to 100 in steps of 0.1 secs	5.0 secs
	Reset Voltage	RSTSET	85% to 98% in steps of 1% V_s	0.95 V_s
	Trip / Alarm	MODE	Either / Both	Alarm
Under Voltage #	Function	FUNC	Enable / Disable	Disable
	Voltage Setting (V) $V_n \times \dots$	PICKUP	45% to 65% in steps of 5% V_n	0.6 V_n
	Time Delay (secs)	DELAY	0.1 to 5 in steps of 0.1 secs	1 second
	Reset Voltage	RSTSET	102% to 115% in steps of 1% V_s	1.02 V_s
	Trip / Alarm	MODE	Either / Both	Alarm
Under Frequency #	Function	FUNC	Enable / Disable	Disable
	Frequency Setting (Hz)	PICKUP	45 to 50Hz for 50Hz in steps of 0.01Hz	48.0Hz
			57 to 60Hz for 60Hz in steps of 0.01Hz	59.0Hz
	Time Delay (secs)	DELAY	0.1 to 100 secs in steps of 0.1 Second	0.2 secs
	Drop Off Frequency	DRPOFF	0.02 to 0.10Hz in steps of 0.1Hz	0.1Hz
	Trip / Alarm	MODE	Either / Both	Alarm
Over Frequency #	Function	FUNC	Enable / Disable	Disable
	Frequency Setting (Hz)	PICKUP	50 to 55Hz for 50Hz in steps of 0.01Hz	52.0Hz
			60 to 62Hz for 60Hz in steps of 0.01Hz	61.0Hz
	Time Delay (secs)	DELAY	0.1 to 100 secs in steps of 0.1 second	0.2 secs
	Drop Off Frequency	DRPOFF	0.02 to 0.10Hz in steps of 0.1Hz	0.1Hz
	Trip / Alarm	MODE	Either / Both	Alarm
Reverse Power #	Function	FUNC	Enable / Disable	Disable
	Settings (kW)	PICKUP	0.02 to 0.4 in steps of 0.01 Pn	0.2 Pn
	Time Delay (secs)	DELAY	1 to 100 in steps of 0.1 secs	2.0 secs
	Trip Alarm	MODE	Either / Both	Alarm
Phase Sequence #	Function	FUNC	Enable / Disable	Disable
	Settings	PICKUP	123 - 132	123
	Time Delay (secs)	DELAY	0 to 5 in steps of 0.5 secs	2 secs
	Trip / Alarm	MODE	Either / Both	Alarm
Breaker Failure	Function	FUNC	Enable / Disable	Disable
	Time Delay (secs)	DELAY	0.05 to 2 secs in steps of 0.01 secs	1.0 second
Maximum Demand Exceed	Function	FUNC	Enable / Disable	Disable
	Settings (kW)	PICKUP	40 kW - 1600 kW	100 kW
	Step	DELAY	10 kW - 1000 kW	10 kW
<i>i</i> -Discrimination		<i>i</i> -Discrimination	Enable / Disable	Disable

Requires SR71-PM module

Metering

Parameter	Screen Abbreviation	Details
Current	I	Phase, Earth and Neutral
	I _{max}	Maximum running Current per Phase
	%Load	Percent Loading
Voltage#	V	Phase-Neutral
	V _{ph-Vph}	Phase-Phase
Frequency #	F	System Frequency
Power Factor #	PF	System Power Factor
Power #	kW	Active Power per Phase and Total (kW)
	kVA _r	Reactive Power per Phase and Total (kVA _r)
	kVA	Apparent Power per Phase and Total (kVA)
	kW	Maximum Demand (kW)
Energy #	kWh	Total Active Energy (kWh)
	kVA _r h	Total Reactive Energy (kVA _r h)
	kVAh	Total Apparent Energy (kVAh)
Harmonic-Current	I1HAR	R-Phase Current Harmonics
	I2HAR	Y-Phase Current Harmonics
	I3HAR	B-Phase Current Harmonics
Harmonic-Voltage #	V1HAR	R-Phase Voltage Harmonics
	V2HAR	Y-Phase Voltage Harmonics
	V3HAR	B-Phase Voltage Harmonics
Display		High Resolution Backlit LCD

Requires SR71-PM module

Additional Features

Parameter	Screen Abbreviation	Details
LED Indications	Auxiliary Power ON	✓
	Overload	✓
	Short Circuit	✓
	Instantaneous	✓
	Earth Fault	✓
	Neutral Fault	✓
	Trip	✓
Alarm	✓	
Auxiliary Supply		24V DC
Digital Inputs		4 Nos.
Output Relays		3 Internal + 4 External Relays
		240V AC / 5A, 30V DC / 5A (resistive load)
Rating Plug	In Multiplier	630-800-1000-1250-2000-3200-5000
Communication	Protocol	MODBUS RTU
	Link used	RS 485
Maintenance Indication		I ² t based
Event Records (128)		Pick-up, Alarm, Trip, Date, Time and Cause of Event, voltage and current readings in all phases
Trip Records		Last 5 records with date and time stamping,
Testing	Self-Diagnostic Test	✓
Supplementary Modules	Communication Module (SR71-COM)	MODBUS RTU using RS485
	Power Supply Module (UN-PS)	Input:26V to 60V DC, 90 to 300V AC/DC Output:24V DC
	Power Metering Module (SR71-PM)	240V AC, 415V AC
	Relay Module (SR71-REL)	4 Relay Outputs (Breaker OPEN, Breaker CLOSE, Pre Trip alarm and MD Exceed)
No. of Storable Settings		2

Protection releases

Microprocessor Based Release - SR21i



Salient Features

- Self-powered & true RMS sensing
- Inbuilt Zone Selective Interlocking (ZSI)
- Provision for Self-diagnostic test (without tripping the breaker)
- Switchable thermal memory takes care of residual heat in case of repetitive overloads
- Multi-state LED to indicate
 - Power ON condition
 - Test mode
- Individual fault annunciation through LEDs
- Provision for AN1 module for remote fault indication through LEDs with changeover contact for each kind of fault
- Direct tripping of breaker-reliable tripping with minimum time delay
- Test kit available for testing the release (SRT-2)
- Realistic hot and cold curves which take into account integrated heating effect
- Conformance to EMI/EMC standards

Type of Protection	Setting Range	
	Pickup Current	Time Delay
Long Time	I_r - 0.5 to 1.0 times I_n Steps : 0.50, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.9, 0.95, 1.00	0.2 to 30 sec. at 6 times I_r Steps : 0.2, 0.5, 1, 1.5, 2, 3.5, 6, 12, 17, 30 Sec
Short Time	2 to 10 times I_n Steps : 2, 3, 4, 5, 6, 7, 8, 9, 10	20 ms to 600 ms Steps : 20, 60, 100, 160, 200, 260, 300, 400, 500, 600 ms
Instantaneous	2 to 16 times I_n Steps : 2, 3, 4, 6, 8, 10, 12, 14, 16, OFF	-
Ground Fault*	0.2 to 0.6 times I_n Steps : 0.2, 0.3, 0.4, 0.5, 0.6	100 to 400 ms Steps : 100, 200, 300, 400 ms & OFF

In 3 phase, 4 wire system, Neutral CT is required for ground fault protection.

Test-kit SRT-2

Salient Features

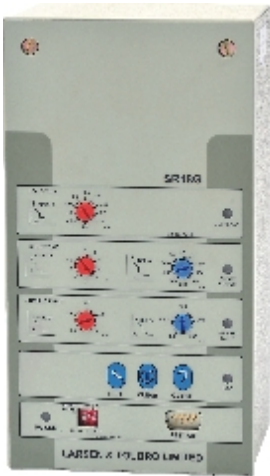


- Test-Kit for SR18/SR18G/SR21i Releases
- Operates from 230V AC supply & generates single-phase voltage test signals
- Tests the release for
 - Phase fault i.e. for long time, short time and instantaneous protection
 - Ground fault protection
- Test current multiples
 - For phase faults: 2.5 I_n , 4.5 I_n , 6.5 I_n , 9.5 I_n , 11 I_n , 13 I_n
 - For ground fault: 0.25 I_n , 0.35 I_n , 0.45 I_n , 0.55 I_n
- Five 7-segments LED display indicates the trip time (two places after decimal)

Protection releases

Microprocessor Based Release - SR18 & SR18G

Salient Features



- Self-powered & true RMS sensing
- Comprehensive protection
 - SR18; Long Time and Short Time
 - SR18G; Long Time, Short Time and Ground fault protection
- True Hot & Cold characteristics & switchable thermal memory
- Multi-state LED to indicate
 - Power ON condition
 - Test mode
- Individual fault annunciation through LEDs
- AN1 module for remote fault indication through LEDs with changeover contact for each kind of fault
- Provision for Self-diagnostic test (without tripping the breaker)
- Test kit (SRT-2) available for testing the releases
- Conformance to EMI/EMC standards

Type of Protection	Setting Range	
	Pickup Current	Time Delay
Long Time	I_r - 0.5 to 1.0 times I_n Steps : 0.50, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.9, 0.95, 1.00	2.5 sec at 6 times I_r
Short Time	2 to 10 times I_n Steps : 2, 3, 4, 5, 6, 7, 8, 9, 10	20 to 600 ms Steps: 20, 60, 100, 160, 200, 260, 300, 400, 500, 600 ms
Instantaneous	6 & 12 I_n	-
Ground Fault*	0.2 to 0.6 times I_n Steps : 0.2, 0.3, 0.4, 0.5, 0.6	100 to 400 ms Steps : 100, 200, 300, 400 ms & OFF

* Available in SR18G release only
 In 3 phase, 4 wire system, Neutral CT is required for ground fault protection.

Thermo-magnetic Release Type - DN1

DN1 thermo-magnetic release offers reliable protection against overload, short circuit and ground faults via multitap Cts. with ambient temperature compensation from -5°C to 50°C.

Protection

Overload Protection

- Unique individual phase O/L setting adjustment helps to avoid the nuisance tripping of ACBs in unbalance load condition (due to single phase loads) on distribution transformer. Long time pick-up range: 0.75 to 1 times I_n

Short Circuit Protection

- Two taps on CTs (working as rating plug) help in selecting operating threshold. Short-time pickup range: 5.5 to 7.5 times I_n with minimum impulsion time of 25ms to prevent nuisance tripping due to transients

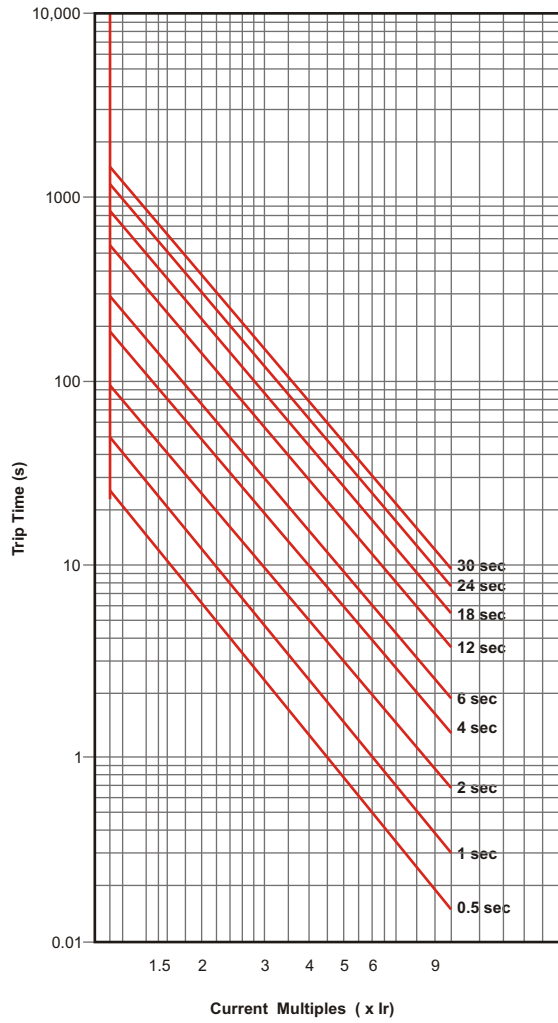
Ground Fault Protection

- Offered with auxiliary earth fault release module. Ground-fault pick-up range: 0.2 to 0.5 times I_n



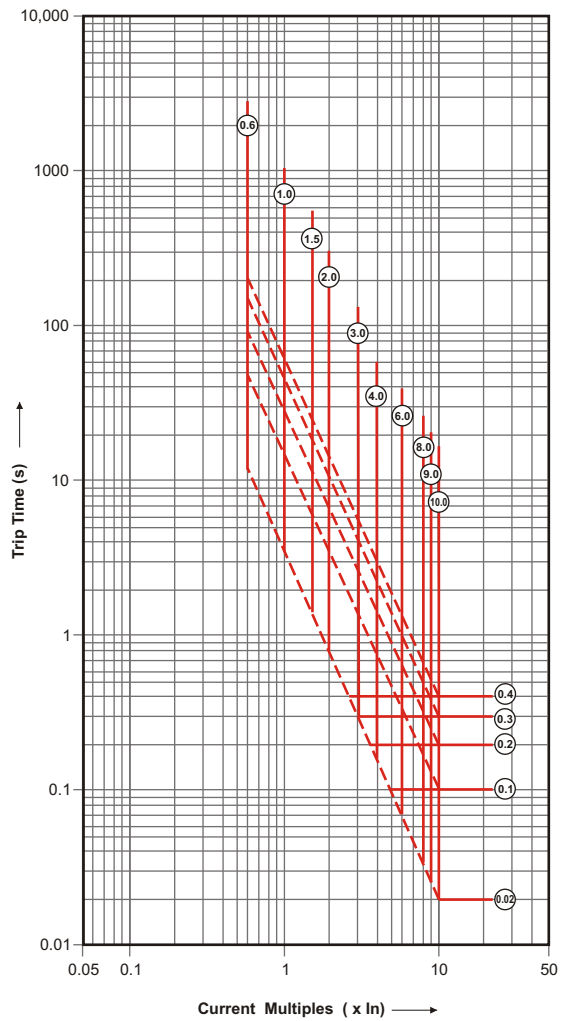
Protection Characteristic

Overload Curve (SR71)



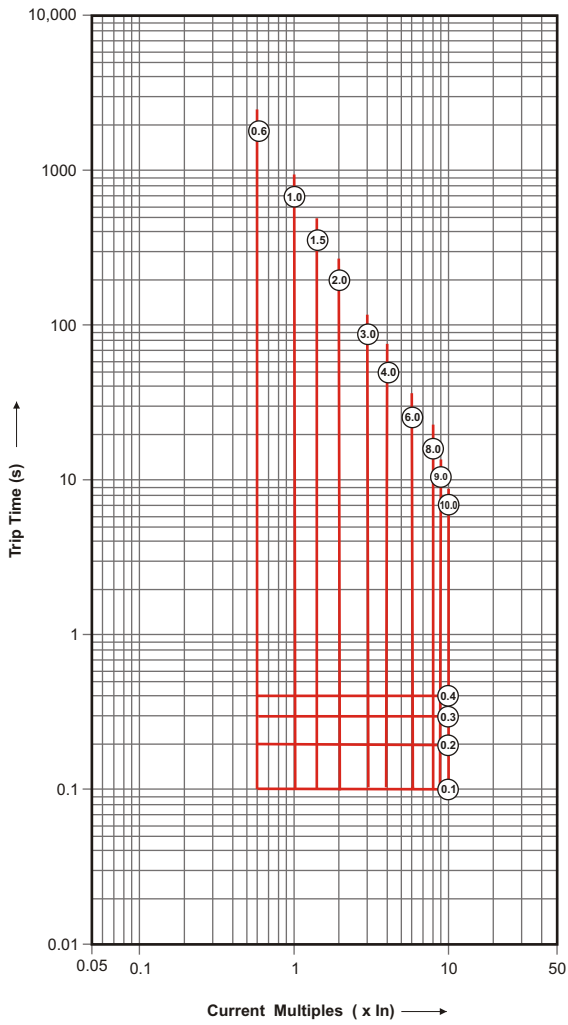
Tolerance:
Trip Time: ±20%

Short Circuit - I²t ON (SR71)

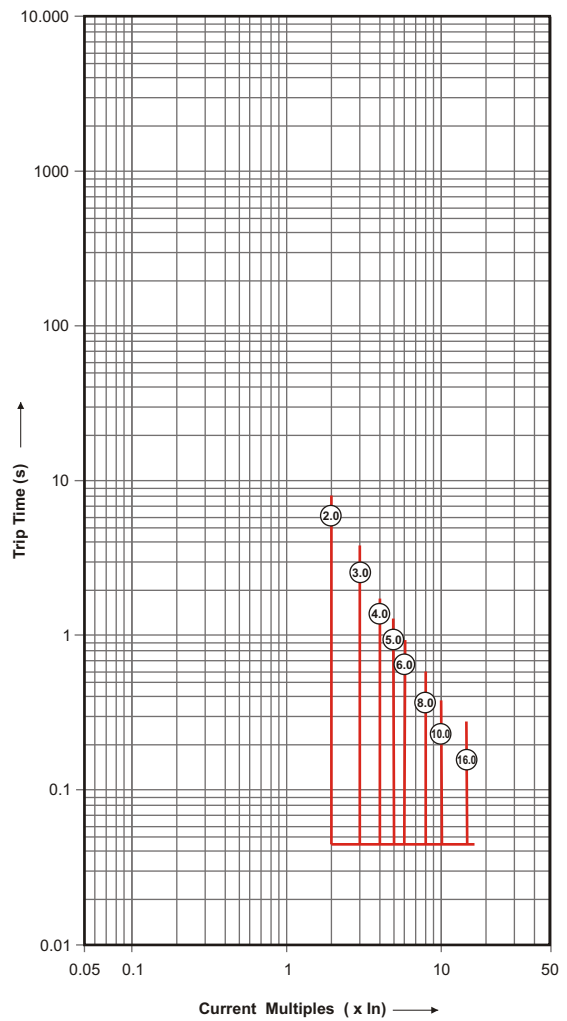


Protection Characteristic

Short Circuit - I^2t OFF (SR71)

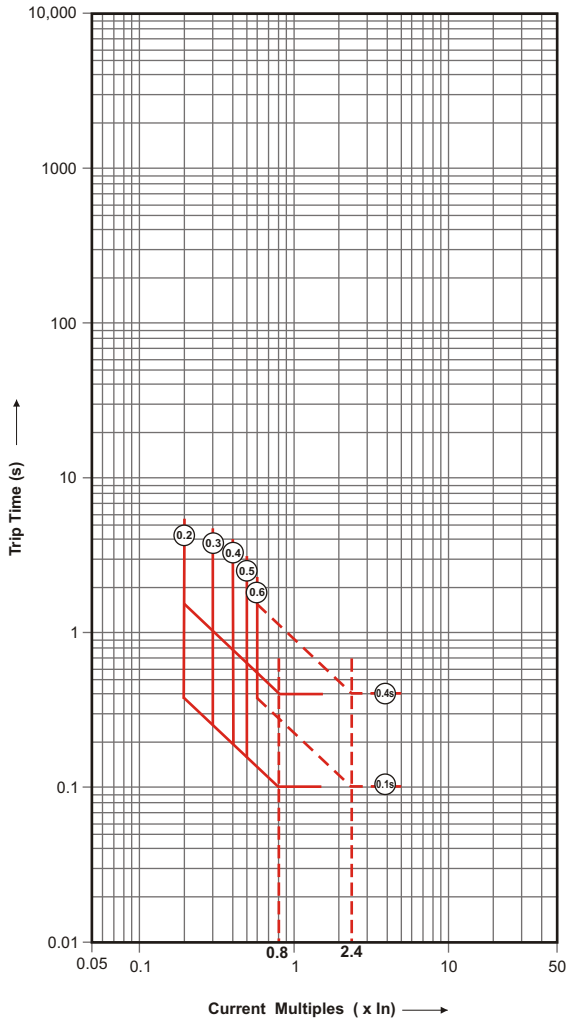


Instantaneous (SR71)

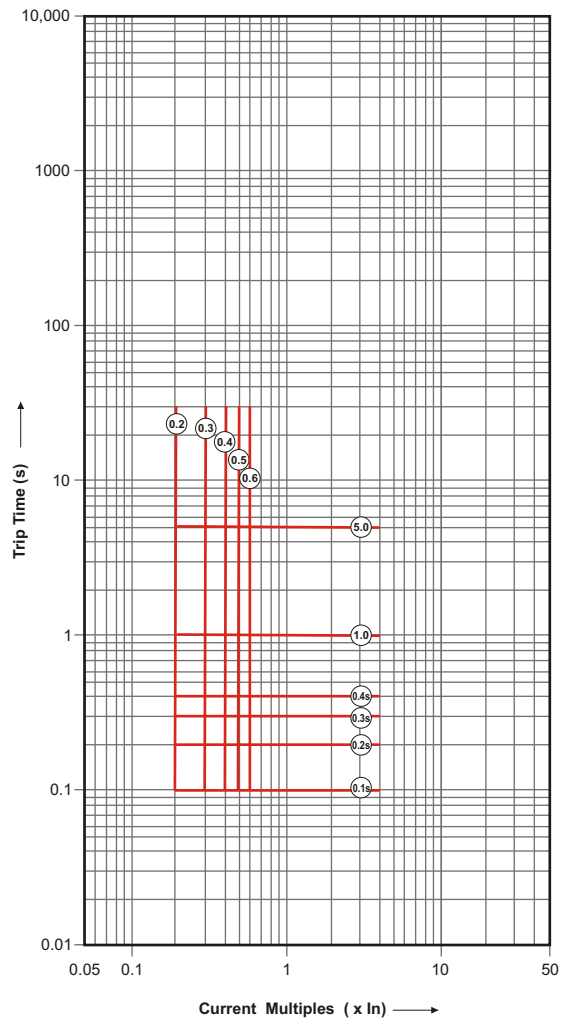


Protection Characteristic

Earth Fault - I²t ON (SR71)

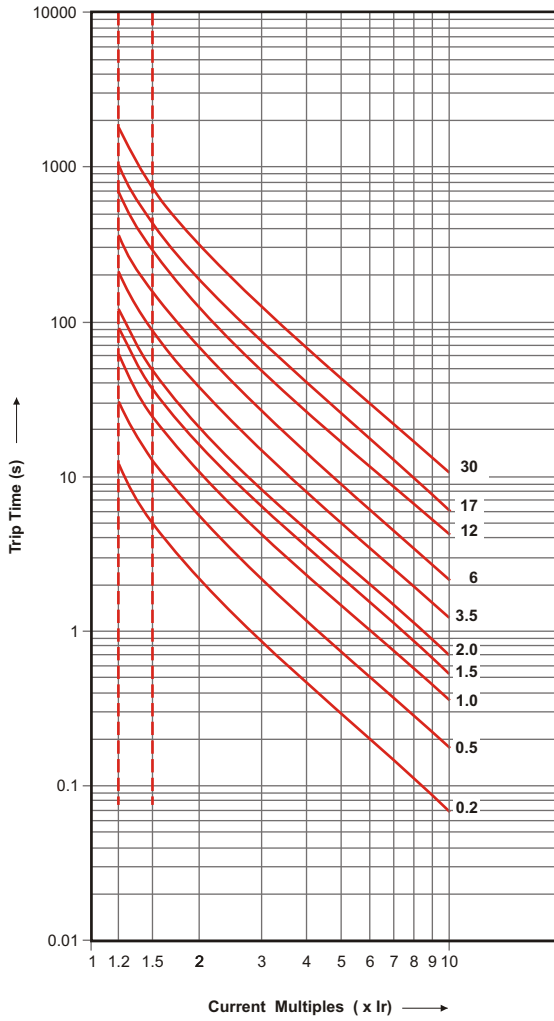


Earth Fault - I²t OFF (SR71)

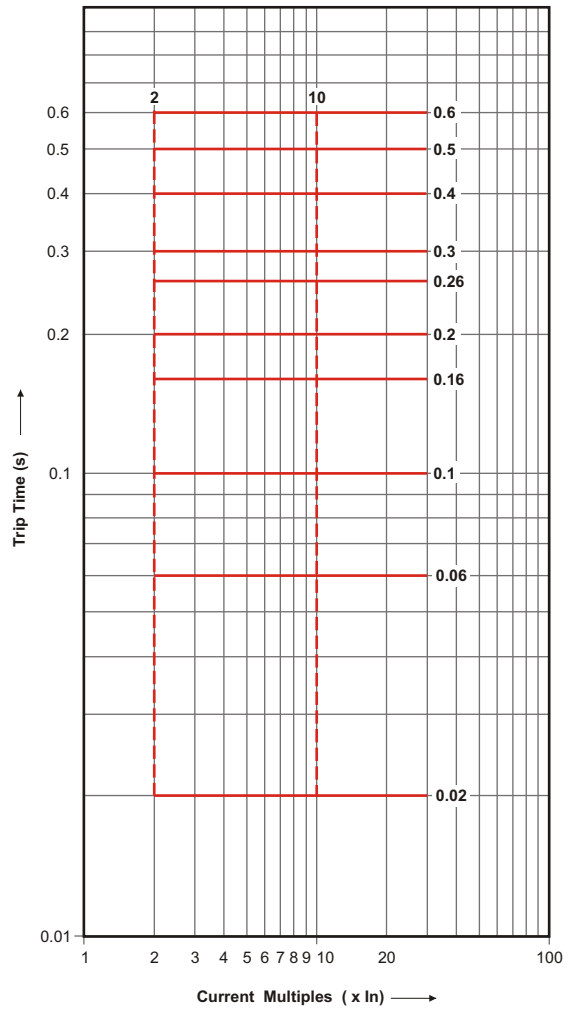


Protection Characteristic

Overload (SR21i)

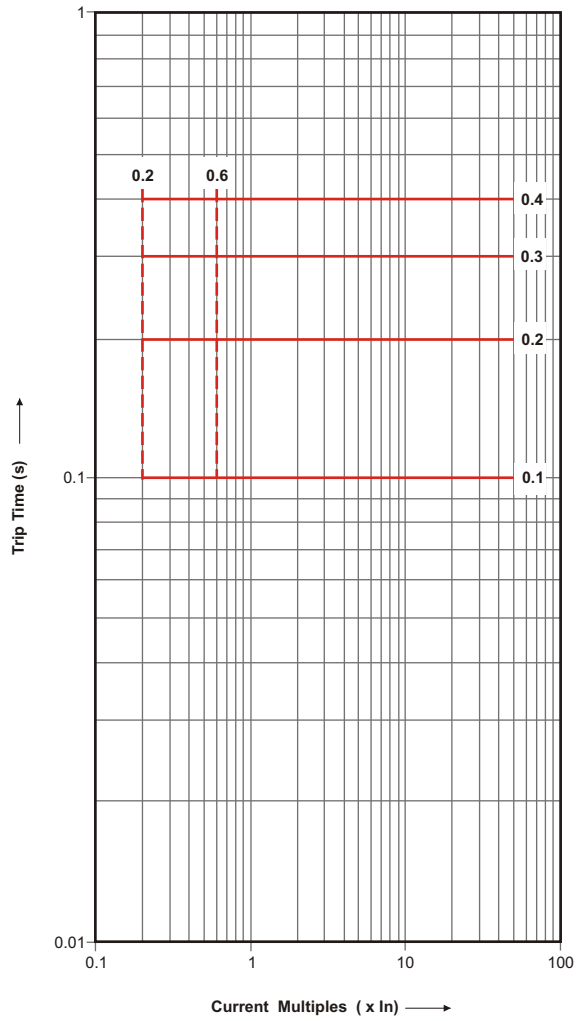


Short Circuit (SR21i)

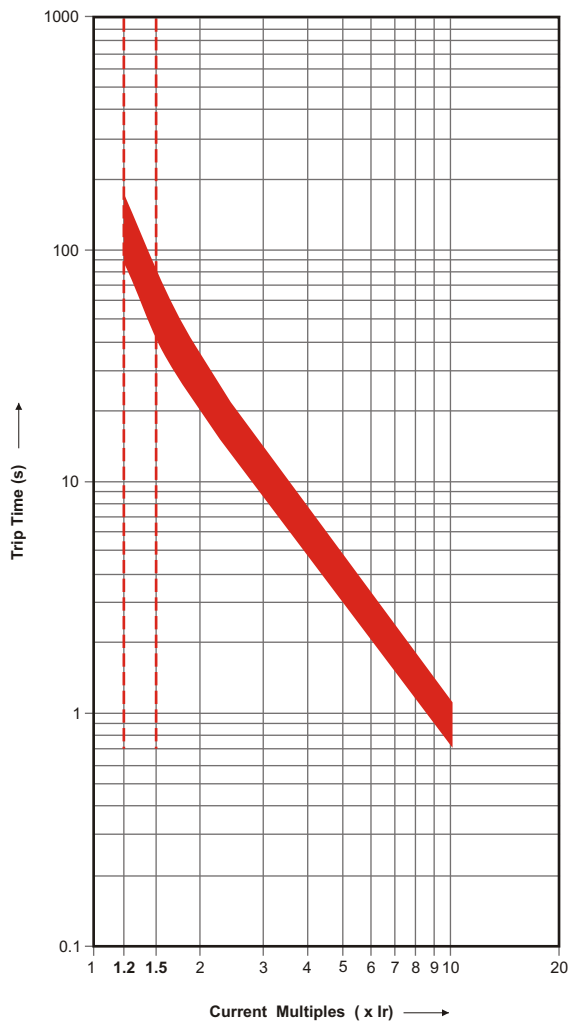


Protection Characteristic

Ground Fault (SR21i)

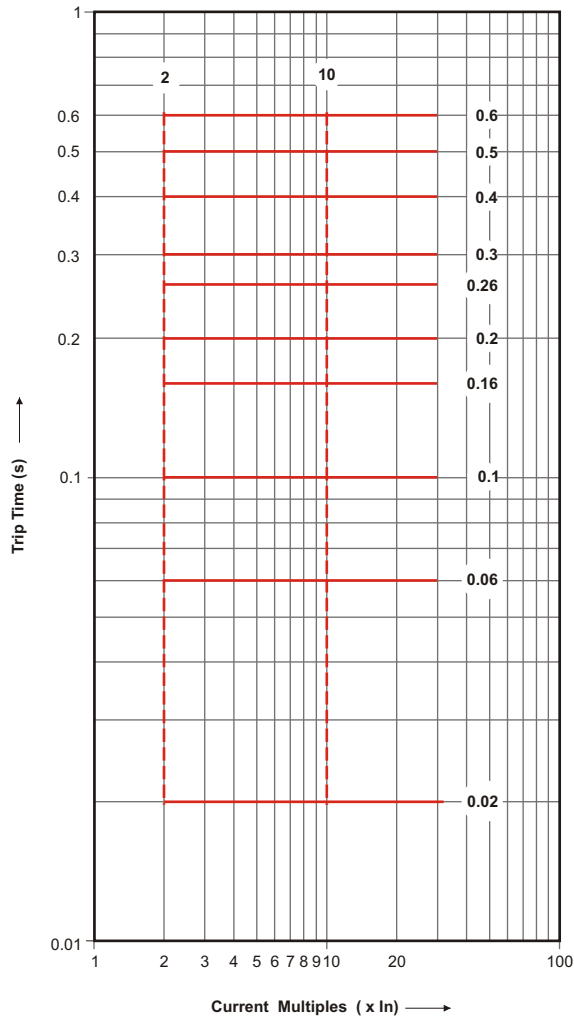


Overload (SR18/18G)

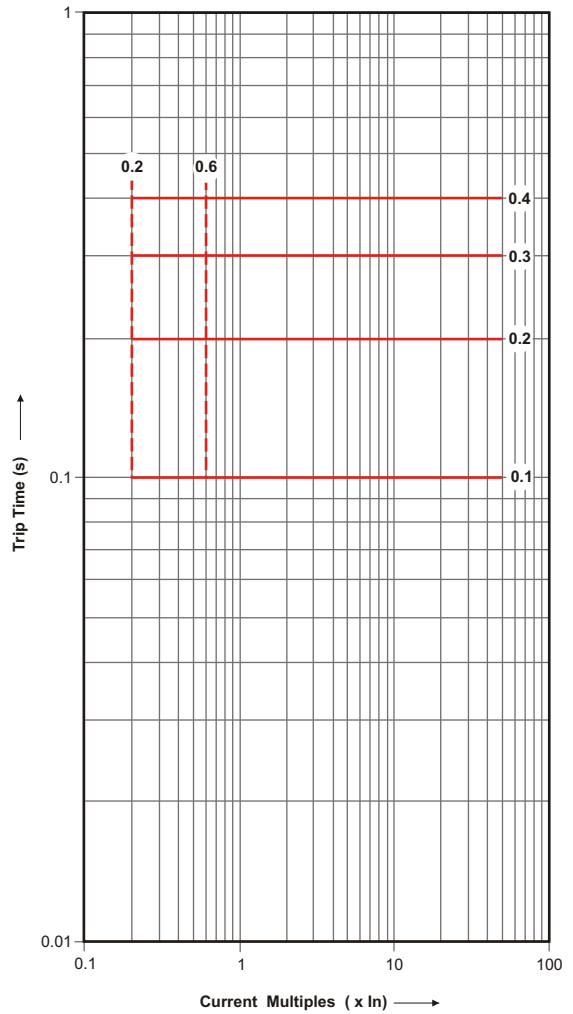


Protection Characteristic

Short Circuit (SR18/18G)

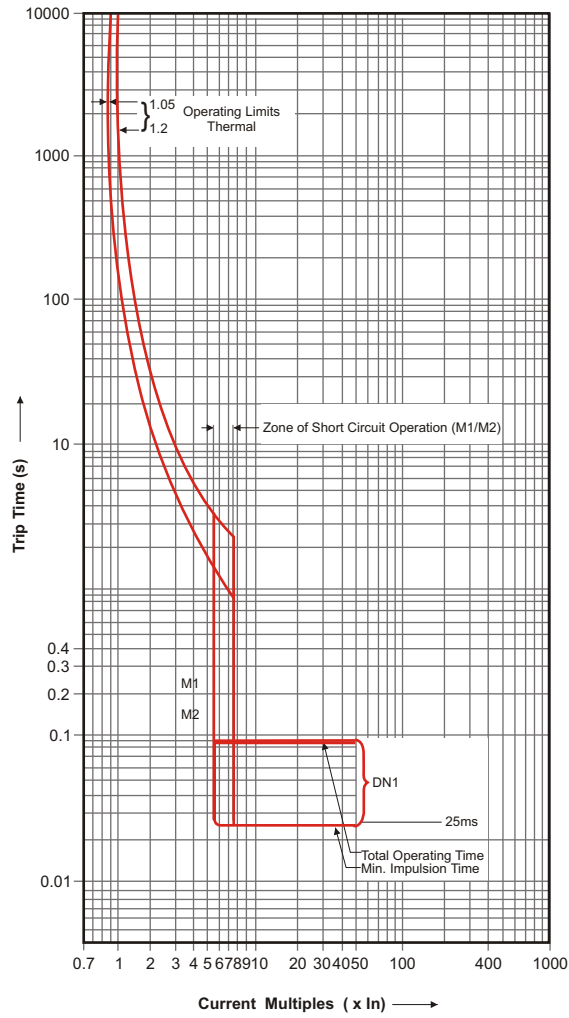


Ground Fault (SR18G)

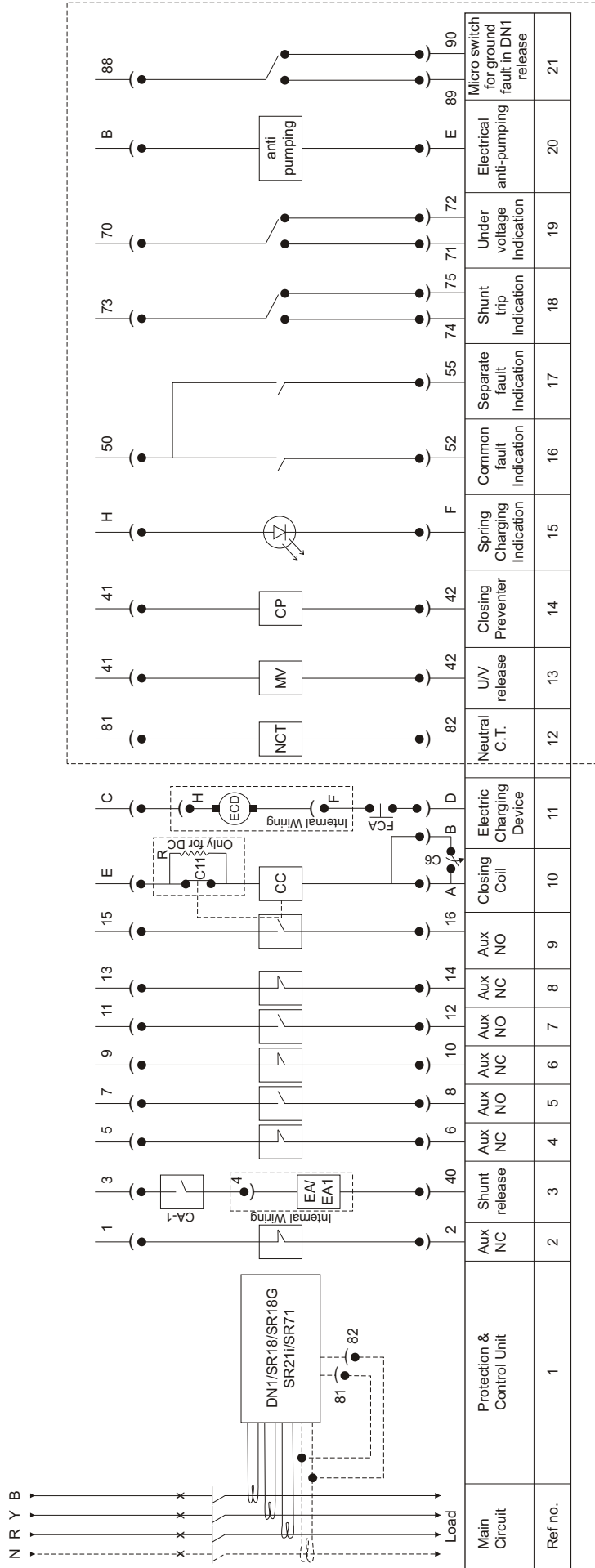


Protection Characteristic

Time-current (DN1)



Wiring Diagram



As per order/requirement

The above drawing is for EDO breakers.

1) For MDO/MIF versions

Ref no. 3, 10, 11 are not applicable

E, B, C, D, A, 15 are applicable only in electrical breakers.

2) For EF versions

The ref. no. 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 are provided as per customer requirement.

- FCA Limit switch (Shown in breaker reset condition)
- R Economy Resistor
- C11 Limit switch operates when closing electromagnet is held on
- C6 'Service' position microswitch for withdrawable circuit breakers (shown in 'test' position)

For SR21: release (P&C unit)

- SI, SO → i discrimination → Short circuit i/p & o/p
- GI, GO → i discrimination → Ground fault i/p & o/p
- G → Ground → Ground






Accessories

Type	Data
<p>Lockable Trip Push Button (LTPB)</p> 	<p>Mounted in place of normal trip push button. With this, ACB can be locked in trip condition. For interlocking, LTPBs are offered in the following combinations:</p> <ul style="list-style-type: none"> • 4 different types of keys i.e. AA, BB, CC and DD suitable for 2 I/C & 1 B/C schemes • Combination of L, M, N, LM and MN locks, which are suitable for 3 I/C & 2 B/C schemes • Combination of K, L, M, N, KL, LM and MN locks, which are suitable for 4 I/C & 3 B/C schemes • Combination of J, K, L, M, N, JK, KL, LM and MN locks, which are suitable for 5 I/C & 4 B/C schemes
<p>View of the Cradle</p>  <p>Door Interlock Racking Interlock Locking in 'Isolated' Position</p>	<p>Locking in Isolated Position (LIP) The facility of locking the ACB in Isolated position is available in Drawout ACBs. This is useful to achieve interlocking between Main & Standby source. Similar lock is available as LOCK IN ANY POSITION.</p> <p>Door Interlock This ensures:</p> <ul style="list-style-type: none"> • Unless the panel door is closed, breaker cannot be racked in or out • Unless the breaker is in Isolated Position, it is not possible to open the panel door <p>Racking Interlock This ensures that breaker cannot be racked in/out unless the ACB is in tripped/open condition.</p>
<p>Mechanical Interlock</p> 	<p>It is possible to provide 'Mechanical Interlock' between two breakers of the same or different ratings in vertical or horizontal configurations. Mechanical interlock is available for ACBs up to 4000A. Mechanical interlocking for ACBs in vertical configuration can be provided by links or by flexible cables. Same for horizontal configuration can be provided by flexible cables.</p>

Accessories

Type	Data
 <p>A close-up photograph of a micro-switch labeled 'C1' mounted inside a metal assembly, likely an ACB. A red arrow points to the switch mechanism.</p>	<p>Common indication of tripping due to overload, short circuit and ground faults.</p> <ul style="list-style-type: none"> • Provided by micro-switch C1 fitted inside the ACB • Available as an option in all releases
 <p>A photograph of a micro-switch labeled 'C2' mounted on a terminal block. A red arrow points to the switch.</p>	<p>Separate indication of tripping due to overload, short circuit and ground faults.</p> <ul style="list-style-type: none"> • For release type DN1, this is provided by micro-switch C1 & C2 (C2 fitted inside release)
<p>AN1-Annunciator Module</p>  <p>A photograph of the AN1-Annunciator Module, a rectangular metal unit with a front panel. The panel has three LEDs labeled 'LONG TIME FAULT', 'SHORT TIME FAULT', and 'GROUND FAULT', along with a 'TEST' button and a 'RESET' button. The text 'ANNUNCIATOR AN1' is visible at the top.</p>	<p>Remote indication of tripping due to overload, short circuit and ground faults.</p> <ul style="list-style-type: none"> • Can be used with releases type SR18/SR18G/SR21i • Individual fault indication provided by three separate LEDs for <ul style="list-style-type: none"> - Long time faults - Short time fault/instantaneous fault - Ground fault - One potential free contact rated 5A at 230V AC available for each type of fault • Flush mounting on panel (H-W-D=92mm x 46mm x 105mm) • Operating voltage: 240V AC
 <p>A photograph of a micro-switch labeled 'C5' mounted on a shunt release mechanism. A red arrow points to the switch.</p>	<p>Indication for operation of shunt release or undervoltage release.</p> <ul style="list-style-type: none"> • Provided by micro-switch C5 fitted on the shunt release or undervoltage release

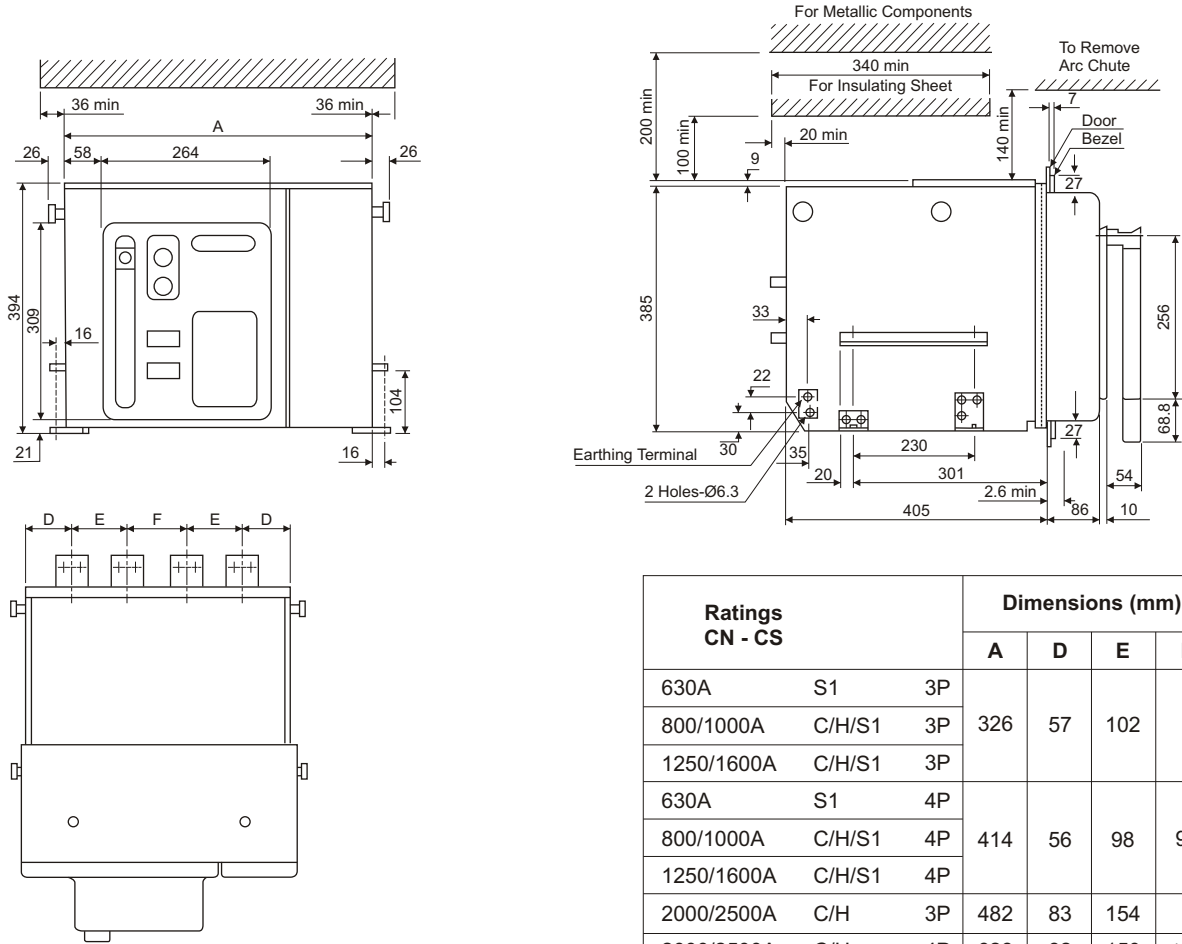
Accessories

Type	Data	Technical Data																
<p>Shunt Release</p> 	<ul style="list-style-type: none"> For remote tripping of the breaker Shunt release coil is short time rated and is disconnected from the circuit by an auxiliary contact when the ACB trips (Refer to wiring diagram) Low power consumption Two types available: <ul style="list-style-type: none"> EA for DC application EA1 for AC application 	<table border="1"> <thead> <tr> <th>Type of Release</th> <th>Rated Operational voltage (Ue)</th> <th>Power consumption at pick-up</th> <th>Operation Limit</th> </tr> </thead> <tbody> <tr> <td>EA1</td> <td>240 AC 415 AC</td> <td>800 VA 800 VA</td> <td>10-130% Ue</td> </tr> <tr> <td>EA</td> <td>24V DC 48V DC 110 DC 220 DC</td> <td>32 W 125 W 45 W 30 W</td> <td>65-130% Ue</td> </tr> </tbody> </table> <p>Note : Other voltages available on request</p>	Type of Release	Rated Operational voltage (Ue)	Power consumption at pick-up	Operation Limit	EA1	240 AC 415 AC	800 VA 800 VA	10-130% Ue	EA	24V DC 48V DC 110 DC 220 DC	32 W 125 W 45 W 30 W	65-130% Ue				
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EA	24V DC 48V DC 110 DC 220 DC	32 W 125 W 45 W 30 W	65-130% Ue															
<p>Undervoltage Release</p> 	<ul style="list-style-type: none"> Type MV With no intentional time delay <p>Notes: When undervoltage release is provided, the ACB can be closed only when supply is available to the undervoltage release.</p>	<table border="1"> <thead> <tr> <th>Parameter</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>Rated Operational voltage (Ue)</td> <td>240V & 415V: 50Hz 220V & 415V: 60Hz</td> </tr> <tr> <td>Pick up (V)</td> <td>80% Ue</td> </tr> <tr> <td>Drop OFF (V)</td> <td>35-65% Ue</td> </tr> <tr> <td>Consumption (VA)</td> <td>Pick up - 23 VA Hold on - 10 VA</td> </tr> <tr> <td>Watt loss</td> <td>6 W</td> </tr> </tbody> </table>	Parameter	Specification	Rated Operational voltage (Ue)	240V & 415V: 50Hz 220V & 415V: 60Hz	Pick up (V)	80% Ue	Drop OFF (V)	35-65% Ue	Consumption (VA)	Pick up - 23 VA Hold on - 10 VA	Watt loss	6 W				
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Watt loss	6 W																	
<p>Closing Release</p> 	<p>Closing release remotely closes the circuit breaker if the mechanism spring is already charged.</p>	<table border="1"> <thead> <tr> <th rowspan="2">Rated operational voltage (Ue)</th> <th colspan="2">Power consumption</th> <th rowspan="2">Range of operation</th> </tr> <tr> <th>Pick-up</th> <th>Hold-up</th> </tr> </thead> <tbody> <tr> <td>110V AC 240V AC 220V AC</td> <td>320VA</td> <td>50VA</td> <td rowspan="4">85-110% Ue</td> </tr> <tr> <td>110V DC 220V DC</td> <td>300W</td> <td>50W</td> </tr> <tr> <td>24V DC</td> <td>350W</td> <td>50W</td> </tr> </tbody> </table>	Rated operational voltage (Ue)	Power consumption		Range of operation	Pick-up	Hold-up	110V AC 240V AC 220V AC	320VA	50VA	85-110% Ue	110V DC 220V DC	300W	50W	24V DC	350W	50W
Rated operational voltage (Ue)	Power consumption			Range of operation														
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24V DC	350W	50W																
<p>Spring charging Motor</p> 	<p>Electrical charging device automatically charges the mechanism spring of the circuit-breaker. After circuit-breaker closing, the geared motor immediately recharges the closing spring. Thus instantaneous reclosing of the circuit-breaker is possible following opening operation.</p>	<table border="1"> <thead> <tr> <th>Rated operational voltage (Ue)</th> <th>Power consumption</th> <th>Range of operation</th> </tr> </thead> <tbody> <tr> <td>240V AC</td> <td>320VA</td> <td rowspan="2">85-110% Ue</td> </tr> <tr> <td>110V DC 220V DC</td> <td>154W</td> </tr> </tbody> </table>		Rated operational voltage (Ue)	Power consumption	Range of operation	240V AC	320VA	85-110% Ue	110V DC 220V DC	154W							
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<p>Auxiliary Contacts</p> 	<p>Two combinations available:</p> <ul style="list-style-type: none"> 2 NO + 2 NC 6 NO + 6 NC 	<table border="1"> <thead> <tr> <th>Electrical circuit</th> <th>Voltage (V)</th> <th>Rated current (A)</th> </tr> </thead> <tbody> <tr> <td>Resistive</td> <td>24 to 415 AC 250V AC</td> <td>16 1.2</td> </tr> <tr> <td>Non-resistive</td> <td>24 to 415 AC 250V AC</td> <td>16 1.0 #</td> </tr> </tbody> </table> <p># L/R = 15ms with two contacts in series</p>	Electrical circuit	Voltage (V)	Rated current (A)	Resistive	24 to 415 AC 250V AC	16 1.2	Non-resistive	24 to 415 AC 250V AC	16 1.0 #							
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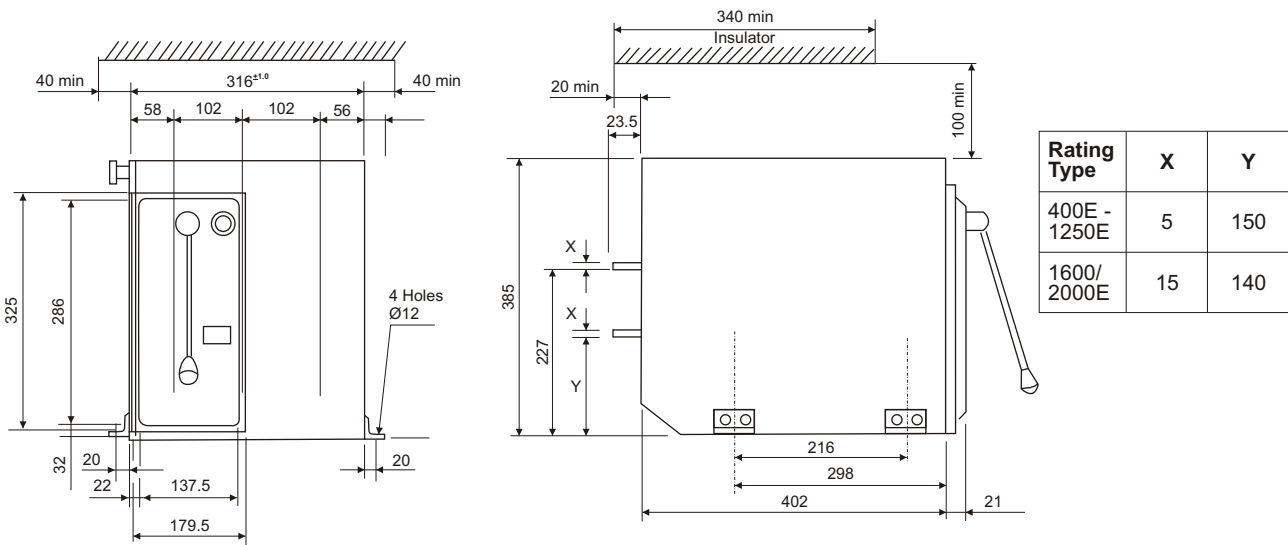
Overall Dimensions

Fixed Breakers

For 800A to 2500A 3P/4P C/H & 630A to 1600A 3P/4P S1



For CN-CS...E 400A-2000A 3P

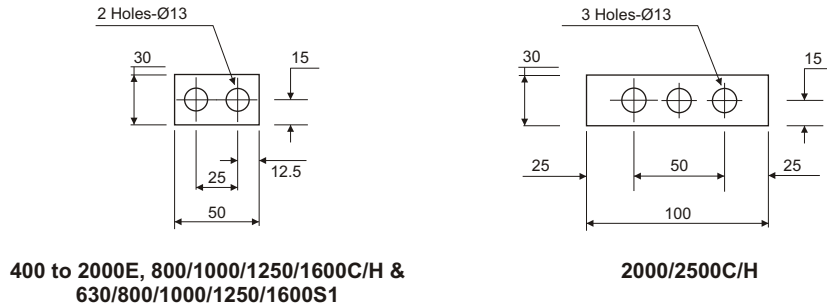


Note : All Dimensions are in mm.

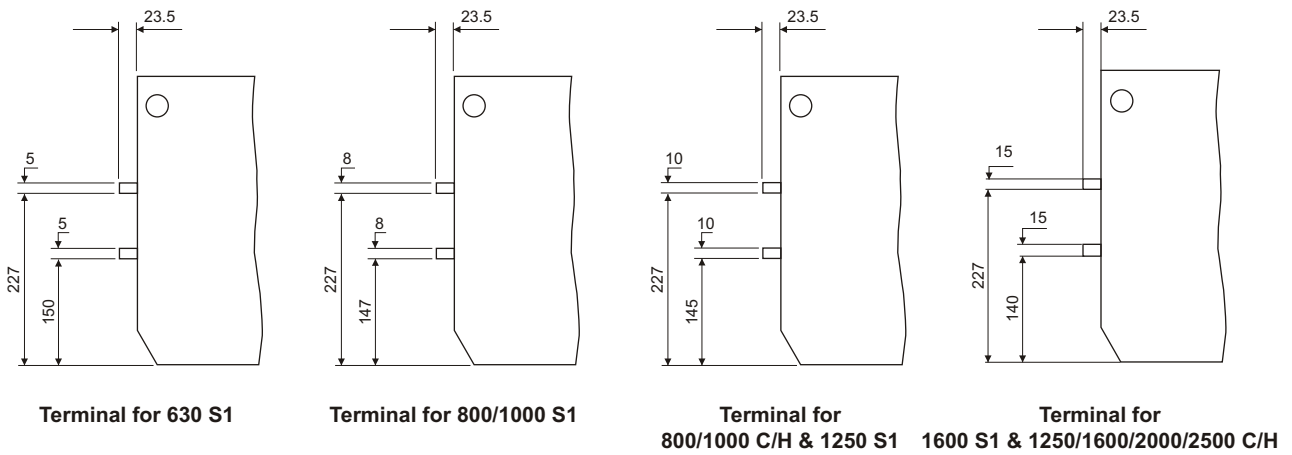
Overall Dimensions

Fixed Breakers

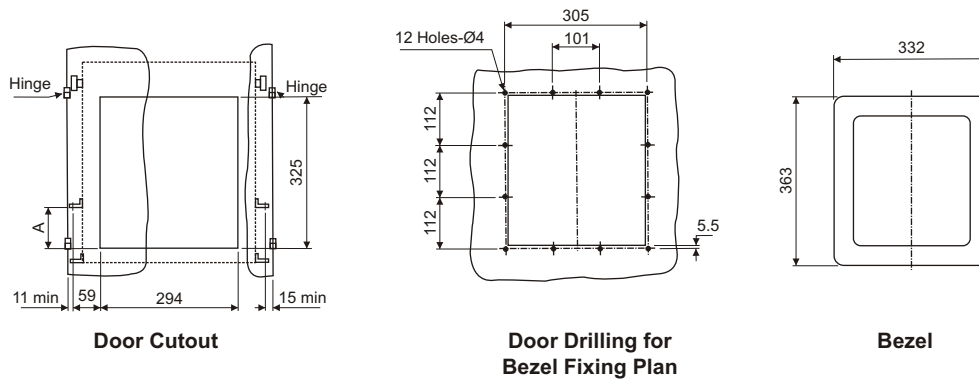
Terminal



Terminal Connections



Bezel Fixing Plan for all Fixed Breakers



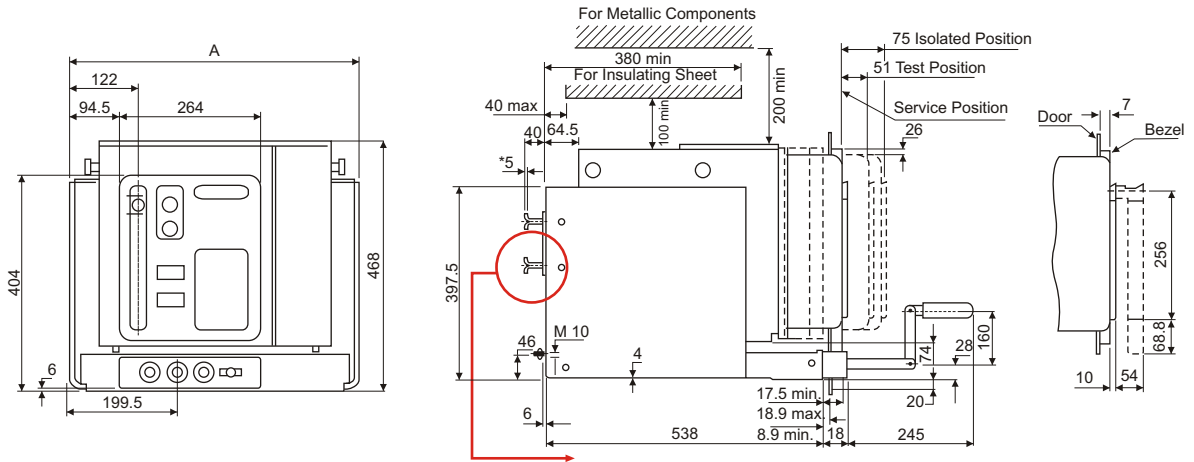
Note:
A = 89 for 4000C
A = 91 for other fixed ACBs

Note : All Dimensions are in mm.

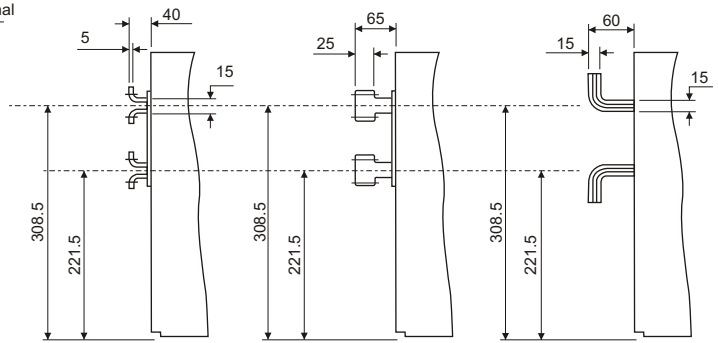
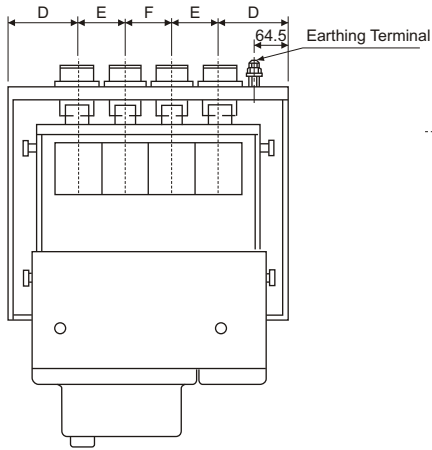
Overall Dimensions

Drawout Breakers

For 630A to 3200A C/H/S1 3P/4P, 3200H1/4000H 3P/4P



*Terminal For 630/800/1000 C/H/S1, 1250/2500S1 & 2000C/H



*Terminal for 1250/1600/2500C/H & 800/1000H

*Terminal for 3200S1

*Terminal for 3200H0/H1 & 4000H0/H

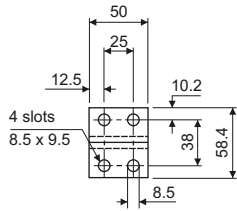
Ratings CN - CS			Dimensions (mm)			
			A	D	E	F
630/800/1000A	C/H/S1	3P	399	97.5	102	-
2000A	S1	3P				
1250/1600A	C/H/S1	3P				
630/800/1000A	C/H/S1	4P	487	96.5	98	98
2000A	S1	4P				
1250/1600A	C/H/S1	4P				
2000/2500A	C/H	3P	555	123.5	154	-
2500/3200A	S1	3P				
2000/2500A	C/H	4P				
2500/3200A	S1	4P	701	122.5	150	156
3200A	H0/H1	3P				
4000A	H0/H	3P				
3200A	H0/H1	4P	909	151.5	202	202
4000A	H0/H	4P				

Note : All Dimensions are in mm.

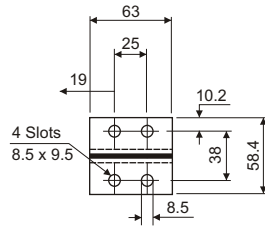
Overall Dimensions

Drawout Breakers

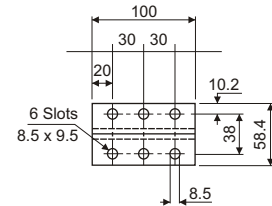
Flat Terminal Connections



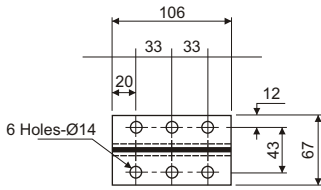
800 - 1000C & 630 - 1250S1



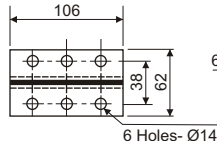
800 - 1000H, 1250/1600C/H & 1600 - 2000S1



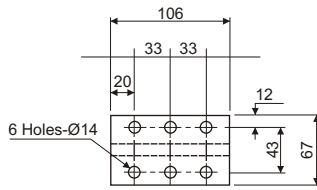
2000C



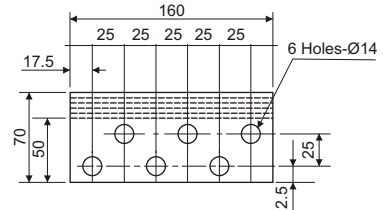
2500C/H & 2000H



2500S1

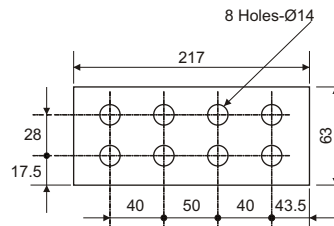
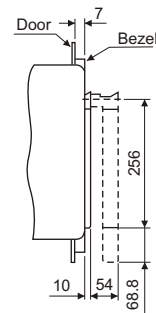
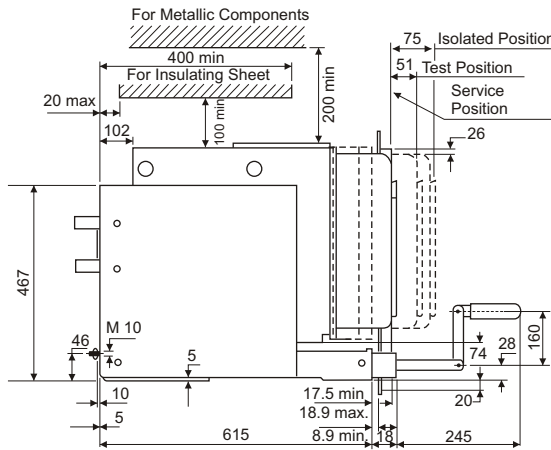
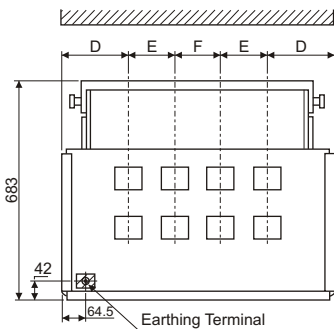
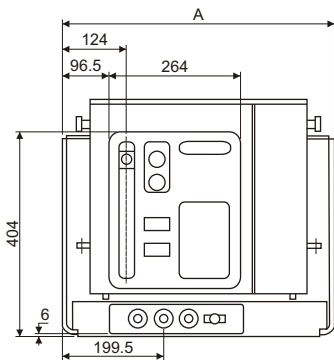


3200S1



3200H0/H & 4000H0/H1

For 5000C/6300C 3P/4P



Terminal Connections
5000C/6300C

Ratings		Dimensions (mm)			
		A	D	E	F
5000A	C 3P	913	187.5	269	-
6300A	C 3P	913	187.5	269	-
5000A	C 4P	1182	187.5	269	269
6300A	C 4P	1182	187.5	269	269

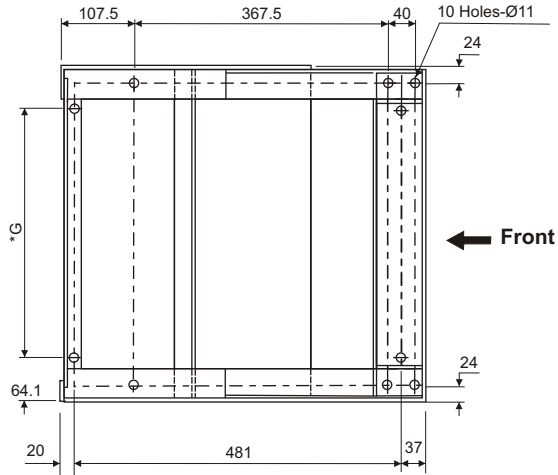
Note : All Dimensions are in mm.

Overall Dimensions

Mounting Details

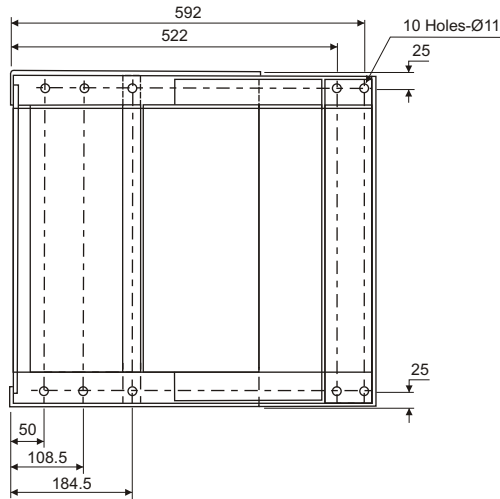
For Horizontal Mounting of all Draw-out Breakers

For 630A to 3200A C/H/S1 3P/4P 3200 H0/H1, 4000 H0/H 3P/4P

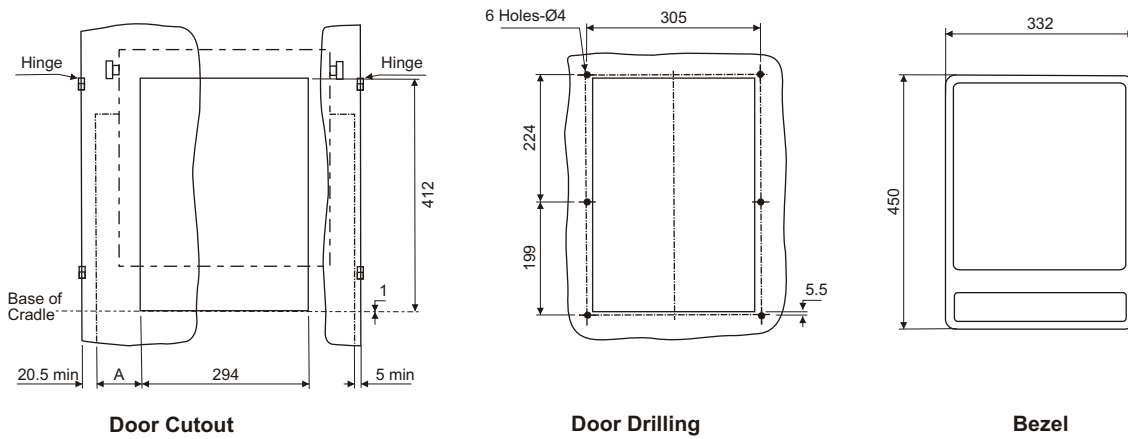


Ratings	Type	G (mm)
800A - 1600A 3P	C/H	280.3
630A - 2000A 3P	S1	280.3
800A - 1600A 4P	C/H	368.3
630A - 2000A 4P	S1	368.3
2000/2500A 3P	C/H	436.3
2000/2500A 4P	C/H	582.3
2500/3200A 3P	S1	436.3
2500/3200A 4P	S1	582.3
3200A 3P	H0/H1	582.3
3200A 4P	H0/H1	790.3
4000A 3P	H0/H	582.3
4000A 4P	H0/H	790.3
5000/6300A 3P	C	863
5000/6300A 4P	C	1132

For 5000C/6300C 3P/4P



Bezel Fixing Plan for all Draw-out Breakers



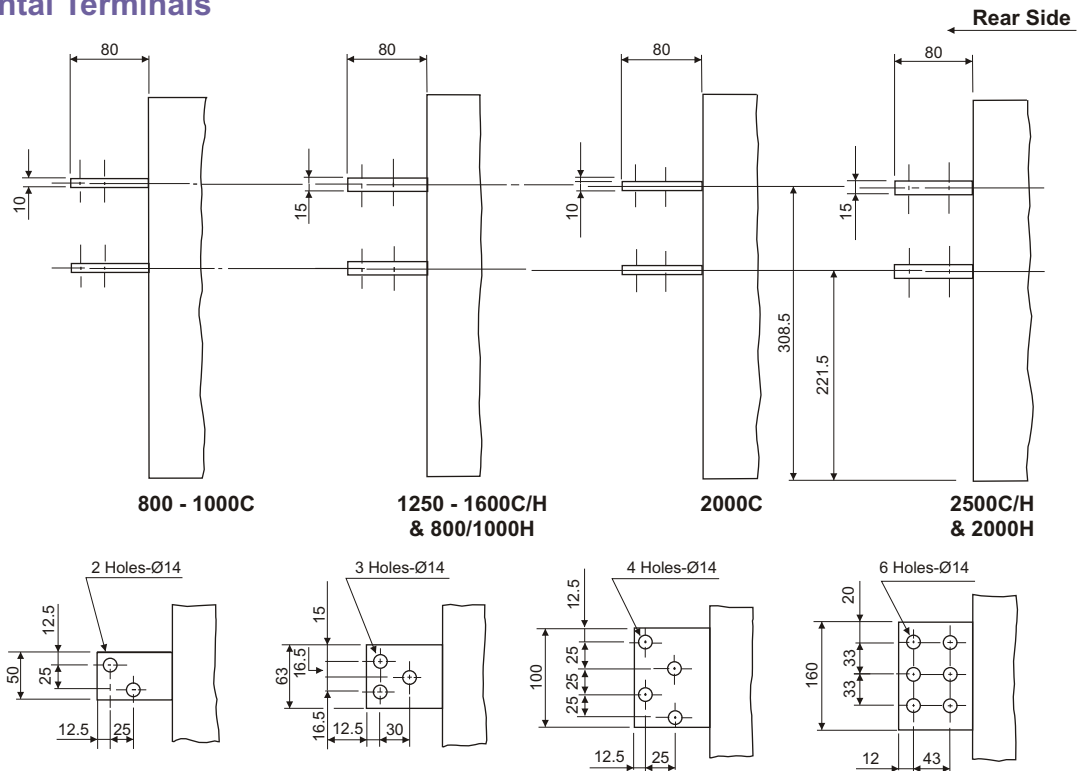
Note: For 4000A C 3P/4P, 5000C/6300C 3P/4P ACB, A = 81.5
For other Drawout Breakers A = 79.5

Note : All Dimensions are in mm.

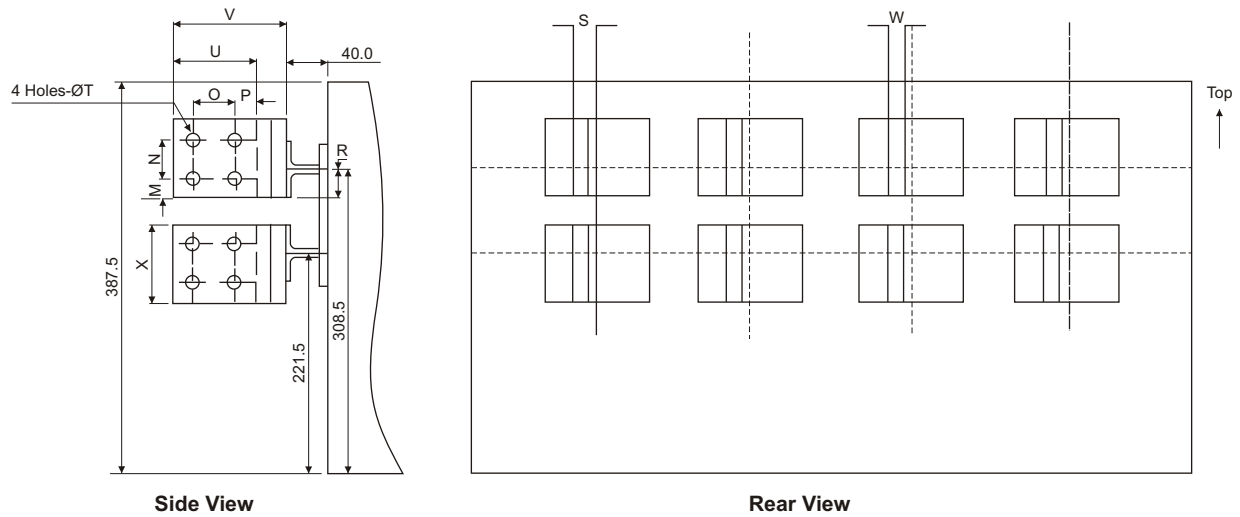
Overall Dimensions

Terminals

Horizontal Terminals



Vertical Terminals



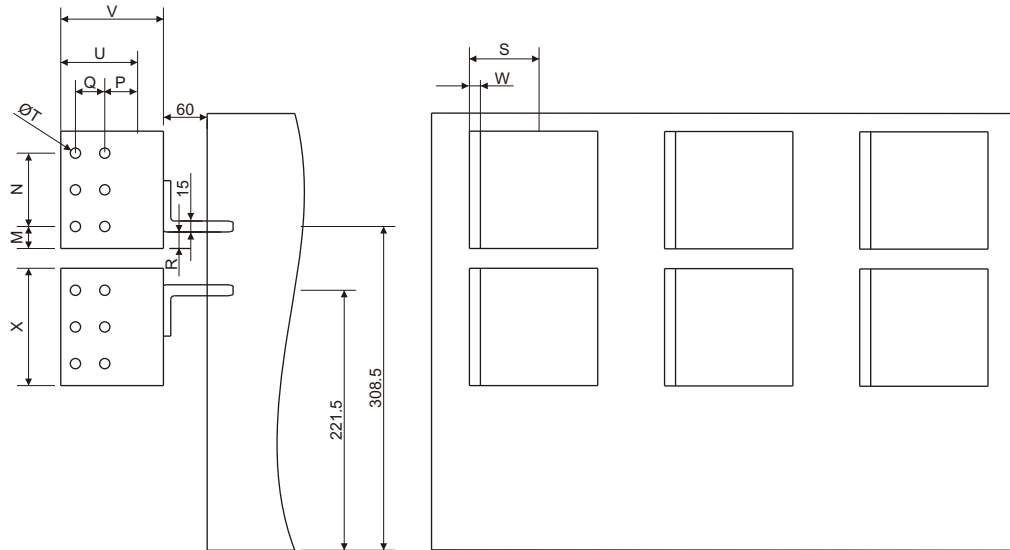
Ratings	M	N	P	Q	R	S	T	U	V	W	X
630-1250 S1 & 800-1000 C	10.2	38	20	25	29.2	5	9	65	95	10	58.4
1600-2000 S1 & 1250-1600 C/H	20	40	20	25	29.2	5	9	65	95	10	80
800-1000 H											
2000C	20	40	20	40	29.2	22.5	14	80	110	15	80
2500 C/H	20	40	20	40	33.5	7.5	14	80	110	15	80
2000 H											

Note : 1) All Dimensions are in mm. 2) Consult us for other Terminal Orientations.

Overall Dimensions

Terminals

Vertical Terminals



The dimensions for 3200 H1/H0 and 4000 H0 are as under:

Ratings	M	N	P	Q	R	S	T	U	V	W	X
3200 H1/H0 & 4000 H0	30	100	45	40	29.5	95	14	80	140	15	160

Note : 1) All Dimensions are in mm. 2) Consult us for other Terminal Orientations.

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Please contact any of the training centres for participation and detailed training programme schedule.



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



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