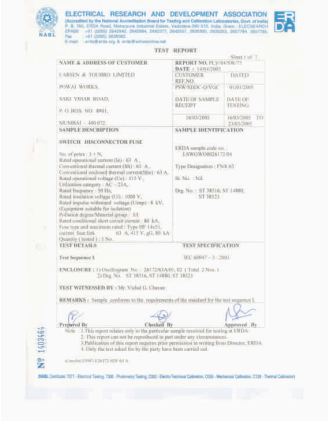
Lauritz Knudsen
Electrical & Automation

PERFORMANCE WITH **SAFETY**

Switch-Disconnector-Fuse
Switch-Disconnector

Contents

Standards & Approvals


ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

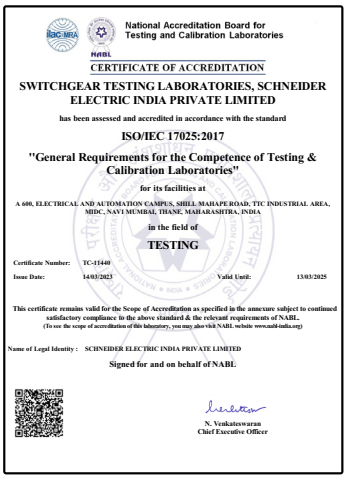
TEST REPORT

SWITCH DISCONNECTOR FUSE

Switch-Disconnector-Fuse range comply with following standards

› **IEC 60947-1, EN 60947-1, IS/IEC 60947-1**
Low-voltage switchgear and controlgear, Part 1: General Rules

› **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


National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

SWITCHGEAR TESTING LABORATORIES, SCHNEIDER ELECTRIC INDIA PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

A 600, ELECTRICAL AND AUTOMATION CAMPUS, SHILL MAHAPE ROAD, TTC INDUSTRIAL AREA, MIDC, NAVI MUMBAI, THANE, MAHARASHTRA, INDIA

in the field of

TESTING

Certificate Number: TC-11440

Issue Date: 14/03/2023 Valid Until: 13/03/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

Name of Legal Identity : SCHNEIDER ELECTRIC INDIA PRIVATE LIMITED

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

› **NABL**
NABL accreditation is a formal recognition of the technical competence of testing, calibration or medical laboratory for a specific task following ISO/IEC 17025:2005 Standard. Accredited laboratories have the responsibility of satisfying the criteria of laboratory accreditation at all times, which are verified during Surveillance and Reassessment visits by NABL. Further the accredited laboratories should prove their technical competence by satisfactory participation in recognized Proficiency Testing Programmes.

Lauritz Knudsen Electrical & Automation Testing Lab is NABL accredited subject to continued satisfactory compliance to above standard & additional requirements of NABL.

Switch-Disconnector-Fuse range is tested in Lauritz Knudsen Electrical & Automation NABL accredited Switchgear Testing Lab.


L&T

CERTIFICATE

OF

TEST AND COMPLIANCE

Works Order / Catalogue No. BL86043

Circuit Breaker Serial No. OV501549

This is to certify that the Air Circuit Breaker bearing the above serial number has been tested for the following :

1. For mechanical operation as per clause : 8.4.1 of IS 13947 (Part 2) / IEC 60947-2.
2. For calibration of release (over - current release, under - voltage release etc.) as per clause: 8.4.2. of IS 13947 (Part2) / 8.4.2 and 8.4.3 of IEC 60947-2.
3. For high voltage as per clause 8.4.3 of IS 13947 (Part 2) / 8.4.5 of IEC 60947-2.

The circuit breaker is found to comply with the requirements.

10/04/13

DATE TEST ENGINEER

LARSEN & TOUBRO LIMITED

› **CE Marking**
A CE marking is an European marking of conformity that indicates a product complies with the essential requirements of the applicable European laws or directives with respect to safety, health and environment and consumer protection. Generally, this conformity to the applicable directives is done through self-declaration and is required on products in the countries of the European Economic Area (EEA) to facilitate trade among the member countries. The manufacturer or their authorized representative established in the EEA is responsible for affixing the CE marking to their product. The CE marking provides a means for a manufacturer to demonstrate that a product complies with a common set of laws required by all countries in the EEA to allow free movement of trade within the EEA countries.

Lauritz Knudsen Electrical & Automation Switch-Disconnector range conform to the Low voltage directive73/23/EEC as amended by directive 93/68/EEC, provided it is used in the application for which it is made and is installed and maintained in accordance with professional practices with relevant installation standards and operating instructions.

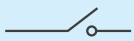
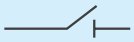
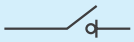
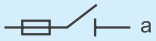
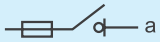
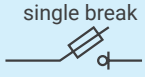
All about switches

Lauritz and Knudsen brings you a basket of switching solutions.

These switches guarantee performance in challenging environment coupled with unmatched reliability, these switching solutions are thriving in ruling in innumerable industrial and commercial installations. These switches are easy to install, use and inspect. All the switches also come with standard protective features such as terminal shrouds, phase barriers and high ground clearances.

Different Switch representations according to IEC 60947-3

Table 1 - Summary of equipment definitions

Function		
Making and breaking current	**Isolating**	**Making, breaking and isolating**
Switch 	Disconnector 	Switch-Disconnector 
Fuse combination units		
Switch-fuse single break 	Disconnector-fuse single break 	Switch-disconnector-fuse single break 
Switch-fuse double break 	Disconnector-fuse double break 	**Switch-disconnector-fuse double break** 
Fuse-switch single break 	Fuse-disconnector single break 	Fuse-switch disconnector single break 
Switch-fuse double break 	Disconnector-fuse double break 	Switch-disconnector-fuse double break 

A disconnector is a mechanical device that fulfills the requirements specified for the isolation function in the open position, as specified in IEC 60947-1.

The purpose of an isolator is to cut off the supply from all or a discrete section of the installation by separating the installation or section from every source of electrical energy for safety reasons.

Load switches (or only “switches”) are mechanical switching devices capable of making, carrying and breaking currents under normal circuit conditions which may include specified operating overload conditions and also carrying for a specified time currents under specified abnormal circuit conditions such as those of short-circuit.

Switch Disconnector Fuses have combined properties of load switches and disconnectors in addition to the protection offered by fuses.

All about switches

Utilization Category of S-D-Fs & S-Ds

The Utilization Category of any equipment indicates the type of electrical load and duty cycle of the load; it is characterized by one or more of the following service conditions:

- Rated operated current
- Rated operated voltage
- Power factor
- Short circuit performance (making & breaking capacity)
- Selection of equipment

Product Standard	Utilization Category	Application
SDFs, Changeovers, SDs IS/IEC 60947 (Part 3)	20	Connecting and disconnecting under no-load
	21	Switching of Resistive loads
	22	Switching of mixed resistive and inductive loads
	23	Switching of motor or highly inductive load

Contains suffix: Category A (frequent) or Category B (infrequent) operation

Utilization Category is very important in defining

- Electrical & Mechanical life of the equipment.
- Making & Breaking Capacity of the equipment.

Operational Performance as per standard

Ie, (A)	Category A			Category B		
	w/o current	With current	Total	w/o current	With current	Total
0-100	8500	1500	10000	1700	300	2000
100-315	7000	1000	8000	1400	200	1600
315-630	4000	1000	5000	800	200	1000
Above 630	2500	500	3000	500	100	600

Category A demands for **5 times more** electrical and mechanical life as compared to B

Utilization Category	Making Power Factor	Breaking Power Factor
AC-22	0.8	0.8
AC-23	0.65	0.65

All about switches

Making & Breaking Capacity as per standard

Utilization Category	Making Capacity		Breaking Capacity	
	I /Ie	Cos Ø	I /Ie	Cos Ø
AC-22	3	0.65	3	0.65
AC-23 (0<Ie<100)	10	0.45	8	0.45
AC-23 (Ie>100)	10	0.35	8	0.35

AC-23 is a far stringent test as current is 3.33 times as that in AC-22. Also, power factor in AC-23 is 0.45 (0.35 in higher ratings).
Operating at stringent power factor in AC 23 implies that thermal performance of the switch would be superior in AC-22 installation.

Benefits of AC-23A Utilization Category

- The electrical and mechanical life of type A switches is 5 times as that of type B switches
- Testing for AC-23A ensures ruggedness
- AC-23A switches run cooler at lighter loads
- AC-23A switches work well in low power factor conditions

Utilization Category of FN Switches is AC-23A

Does Neutral Link need to be isolated? Lets find out...

Clause 8.2 of IEC 60079-14 (2007) requires the provision of suitable means of isolation, such as isolators, fuses, and links, for each circuit or group of circuits in hazardous areas to ensure safe maintenance work. In TN-S systems commonly used in hazardous area installations, the transformer star-point is usually connected to an earth rod or to the earth grid and a neutral connection is connected to the switchgear. This is also called a solidly earthed system. This is necessary to maintain a neutral potential as close to 'zero' as possible. This minimises the risk of electric shock and ensures that the upstream earth fault protection devices clear the fault current very quickly.

In hazardous areas, it is necessary that the neutral is completely isolated when maintenance work is required to be undertaken. If the neutral is not electrically separated and a fault occurs elsewhere in the same network then the neutral in the hazardous area could have its potential elevated sufficiently above zero to cause a spark or electric shock.

Neutral isolation is also necessary in applications that have both a mains supply source and a standby power supply source to prevent harm to maintenance personnel when only one source is feeding and the other is off. The neutral conductor is a current-carrying conductor and must be isolated from the grounding system within a facility to prevent danger from stray currents and electromagnetic fields. It is critical to keep power supply wires balanced to prevent overheating, fire, electrical shock, and premature breakdown of the electrical system.

To achieve neutral isolation, 4-pole or TPN circuit breakers / SDFs or 2-pole SDFs/circuit breakers are required for three-phase and single-phase systems, respectively.

Further when it comes to Switch Disconnector Fuses, the TPN is the most widely used configuration. Here, it is important that the neutral is 'isolable' instead of a solid link. This ensures that neutral is always connected in the system when the feeder is operational and can be disconnected or isolated during maintenance activity by simply unscrewing the neutral link.

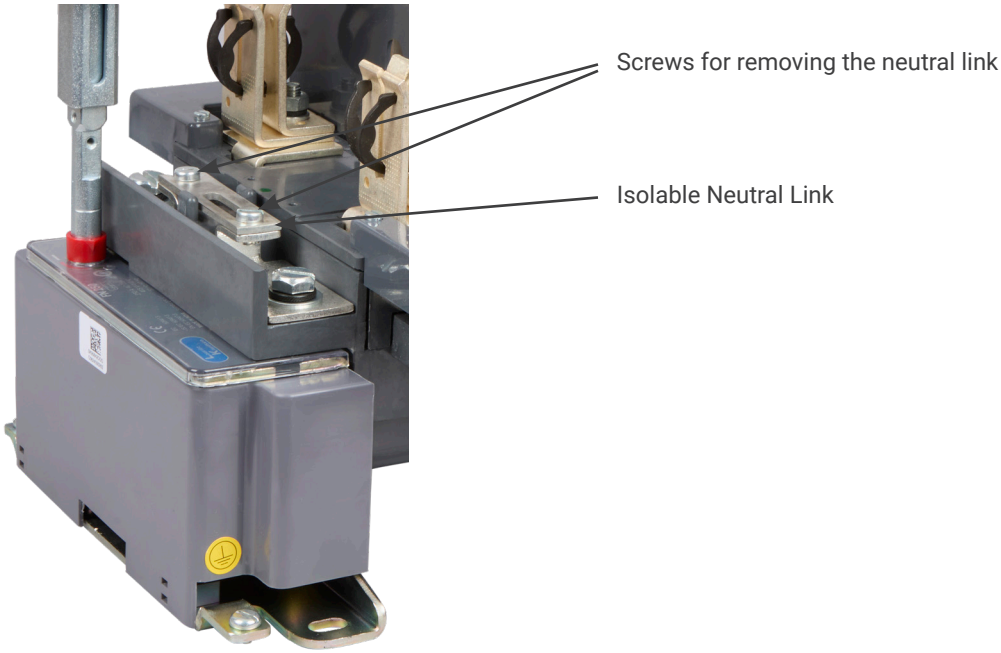
As seen from the below diagram, disconnecting the neutral link is an easy 4-step procedure to ensure safety!

1. Ensure the switch is in OFF condition

2. Remove the link by unscrewing two screws

3. Store the neutral link carefully

4. Proceed for maintenance activity

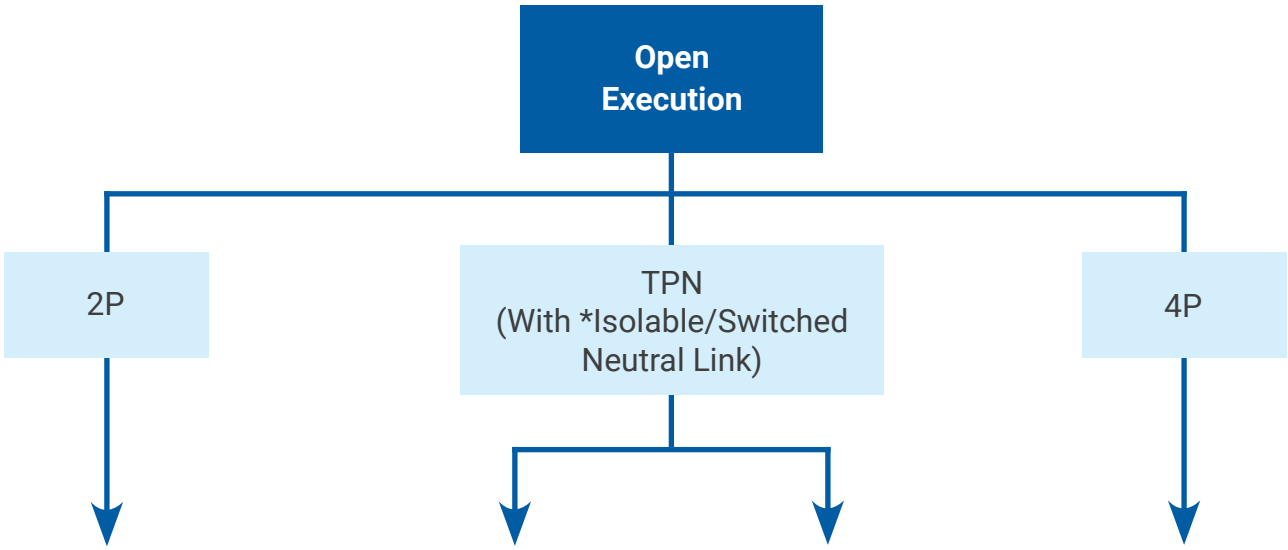


FN

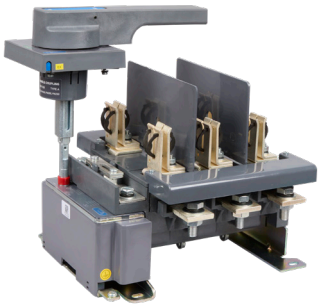
FN offers you a unique series of Switch-Disconnector-Fuse combining compactness with high performance & customer convenience.

Range covers ratings from 32A to 800A in 5 frame sizes catering to:

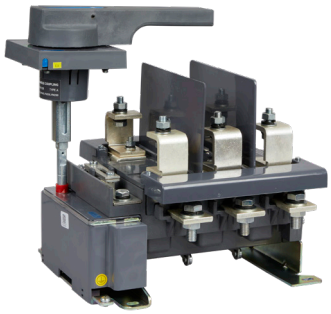
- 2P applications
- 3P applications
- TPN applications
- 4P/Switched Neutral applications
- DC application
- Higher voltage (690V AC)applications



#DIN type Fuse



#DIN type Fuse



Bolted type Fuse

#DIN type Fuse

$415V, 32A to 800A
Frame 1: FN 32/63
Frame 2: FN 100/125/160

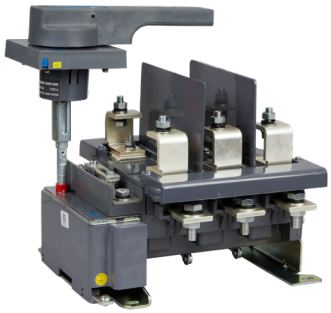
* Switched Neutral in case of FN 32/63
# Upto 63A- Cylindrical fuses
$ 690V and DC ratings indicated in Technical Specifications

Family

Special version for Harsh Environment

FN S-D-F with corrosion protection have been designed for use in sulphur-rich environments.

TPN



Bolted type Fuse

Spacious Sheet Steel Enclosure version

SDF in spacious Sheet Steel Enclosure: Complete range of SDF is also available in attractive powder coated sheet steel enclosures.

FN 32 / 63 in sheet steel enclosure comes fitted with gland plate. Separate cable gland boxes are not required.

TPN

#DIN type Fuse

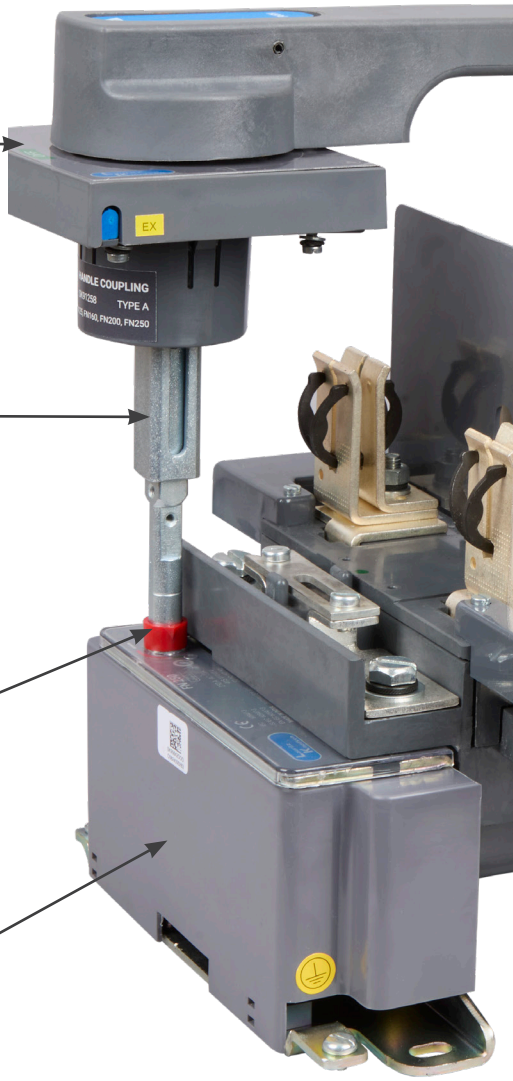
Switch Disconnector Version is also available (2P, TPN, 4P)

Frame 3: FN 200/250

Frame 4: FN 315/400

Frame 5: FN 630/800

FN S-D-F



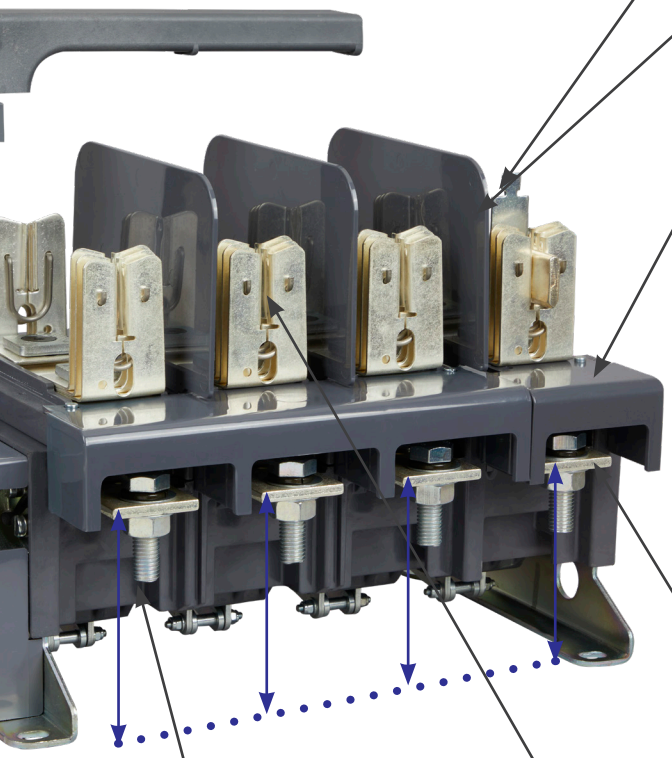
Safety

- Terminal shrouds
- Separate arcing / Current carrying zone
- High clearance & creepages
- Separate bridge for each pole
- Fuse stationary during switching operations & isolated from both sides
- Phase barriers
- Maximum ground clearance

Superior and reliable technology

- Electrodynamic compensation
- Quad break contact system enhances electrical life
- Full AC - 23 A rating for the complete range
- Quick make / Quick break / Positive break

Product Features

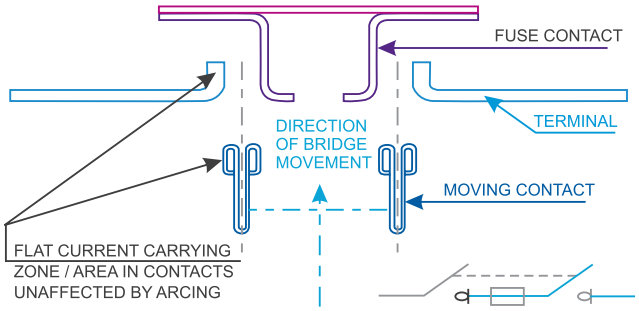


4 **Neutral Pole (Flexibility of choosing left or right end pole as the neutral pole)**

3 **Phase barriers**

2 **Terminal shrouds**

1 **Contact System**



11 **Terminals**

10 **Fuse holder**

9 **Ground Clearance**

Convenience

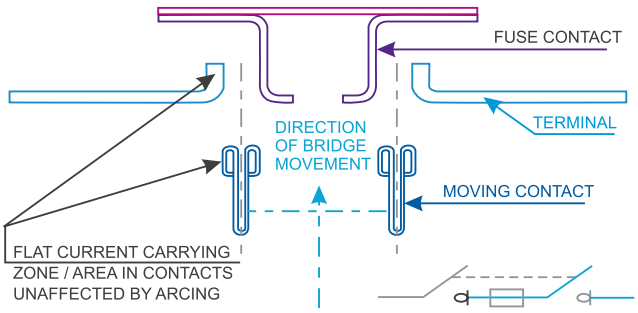
- Light Weight and Low Operating Torque
- Compact design saves panel space
- Clear ON / OFF indicator
- Direct access to mounting & terminal screws
- Generous terminal capacity
- Suitable for vertical & horizontal orientation and can be mounted at any angle in a vertical plane
- No load-line bias

Product Features

1. Contact System

Contact system is QUAD BREAK. There are no. of parallel moving contacts per pole per break resulting in better arc quenching & more electrical life of contacts. Each pole has separate bridge carrying the moving contacts, achieving a high order of interphase separation & avoiding phase-phase flash over.

FN S-D-F

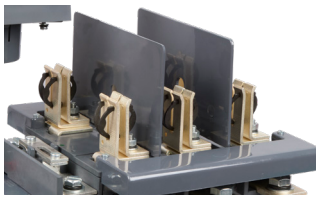


2. Terminal shrouds

The terminals are shrouded for protection against phase-phase short circuit through an external conducting path and also for protection against accidental human contact with live terminals.

3. Phase barriers

Interphase barriers are provided to eliminate the possibility of Interphase short circuit.



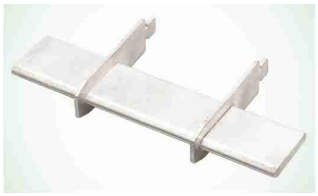
4. Neutral Pole

Switch-Disconnector-Fuse consists of an integral neutral, making the units suitable for 3 phase, 4 - wire application.

› **TPN SDF**
FN 32 / 63 has switched neutral while higher ratings have isolable neutral.

› **4P SDF**
4P FN SDFs have 100% rated switched neutral with in-built neutral isolating link

Flexibility of choosing left or right end pole as the neutral pole



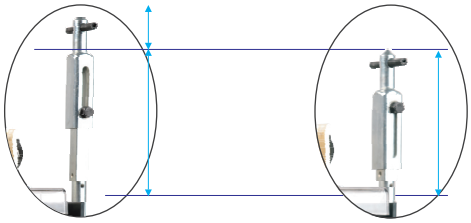
5. Handle

The handle coupling has the following user-friendly features:

› Easy fixing of handle on panel door by four screws.
› Door interlock for safety of operating personnel when switch is 'ON'. The interlock can be defeated if required.
› Built-in padlocking arrangement to lock the unit in either 'ON' or 'OFF' position.
› The handle coupling is suitable for a mismatch or ± 3mm in all directions.

6. Telescopic Shaft

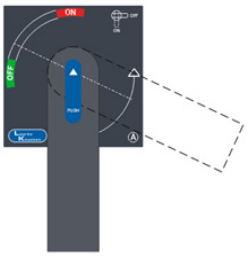
Shaft length can be varied and adjusted as per requirement during installation. This is possible because the telescopic shaft can be adjusted for stepless variable depth.



Product Features

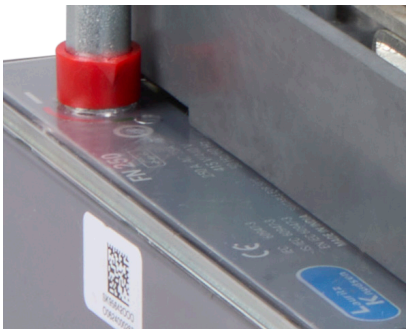
7. ON / OFF indication

Clear ON / OFF indication is provided on the switch (by a red pointer). The position of the operating handle indicates the actual position of the main contacts inside the switch. The isolation position corresponds to the OFF position, in which padlocking is possible. However, in case of fault current if contacts get welded together and the handle shows intermediate position between ON and OFF, which clearly indicates supply is ON.



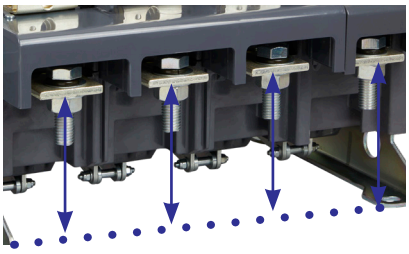
8. Mechanism

This mechanism is front operated quickmake /quick-break and independent of speed of operation.



9. Ground Clearance

Large ground clearance to eliminate possibility of phase-ground flash over.



10. Fuse holder

Fuses remain stationary during switching operation. Fuses are isolated from both sides. This offers safety to operating personnel while replacing fuses.

11. Terminals

To accommodate both Aluminum & Copper cables & busbars.

Technical Specifications

Frame Size			I		
Type Designation		**Unit**	**FN 32**	**FN 63**	**FN 100**
Reference standards		-			
Neutral in TPN SDF		-	Switchable	Switchable	Isolable
Rated operational voltage (Ue)		(V AC)	415	415	415
Rated insulation voltage (Ui)		(V AC)	690	690	690
Rated impulse withstand voltage (imp)		(kV AC)	8	8	8
Rated frequency		(Hz)	50 / 60	50 / 60	50 / 60
Service temperature		(0C)	-20 to 50	-20 to 50	-20 to 50
Pollution degree		-	3	3	3
Conventional enclosed thermal current, Ithe at 40ºC		(A)	32	63	100
Conventional free air thermal current, Ith at 40ºC		(A)	32	63	100
Rated operational current, Ie for AC 21A / AC 22A		(A)	32	63	100
Rated operational current, Ie for AC 23A		(A)	32	63	100
Rated breaking capacity (436 V, cosØ-0.35)		(A)	256	504	800
Rated making capacity (436 V, cosØ-0.35)		(A)	320	630	1000
Capacitor duty - 415 V 50 - 60 Hz		(kVAR)	12	23	36
Mechanical endurance		(operating cycles)	15000	15000	15000
Operating torque		(N-m)	4	4	4
Auxiliary Contact Rated Current, Ith for AC-15		Unit -A	10	10	18
Terminations					
Terminal capacity (main)		mm2	35	35	95
Terminal capacity (neutral)		mm2	35	35	50
Terminal screw		mm	M6 x 12	M6 x 12	M8 x 20
DC Rating for DC 22B					
Rated operational current, Ie at 220 V DC (2P in series)		(A)	32	63	100
Rated operational current, Ie at 440 V DC (3P in series)		(A)	32	63	100
AC Rating for 690 V AC Operational Voltage					
Rated operational current, Ie for AC-22B		(A)	32	63	63
Suitable L&T fuse					
DIN	Rated fused short circuit current	kA	80**	80**	100
	Rating	A / Type / Size	32 / HF / 14 x 51	63 / HF / 14 x 51	100 / HN / 000 & 00
BS	Rated fused short circuit current	kA	80	80	80
	Rating	A / Type / Size	32 / HQ / A1L	63 / HQ / A1L	100 / HQ / A3 & A4

*...Power factor = 0.45 as required in IEC 60947 -3 **...Suitable for cylindrical fuses

II		III		IV		V	
FN 125	FN 160	FN 200	FN 250	FN 315	FN 400	FN 630	FN 800
IEC 60947- 3, EN 60947- 3, IS/IEC 60947 - 3							
Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable	Isolable
415	415	415	415	415	415	415	415
690	690	690	690	690	690	690	690
8	8	8	8	8	8	8	8
50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50
3	3	3	3	3	3	3	3
125	160	200	250	315	400	630	800
125	160	200	250	315	400	630	800
125	160	200	250	315	400	630	800
125	160	200	250	315	400	630	800
1000	1280	1600	2000	2520	3200	5040	6400
1250	1600	2000	2500	3150	4000	6300	8000
45	58	72	90	113	144	226	288
15000	15000	10000	10000	10000	10000	10000	10000
12	12	20	20	25	25	25	25
18	18	18	18	18	18	18	18
95	95	240	240	400	2 x 400	2 x 625	2 x 625
50	50	120	120	240	240	400	400
M8 x 20	M8 x 20	M10 x 20	M10 x 30	M10 x 30	M12 x 40	M16 x 50	M16 x 50
125	125	200	250	315	400	630	800
125	125	200	250	315	400	630	800
100	125	160	200	250	315	400	630
100	100	100	100	100	100	100	100
125 / HN / 000 & 00	160 / HN / 00	200 / HN / 0	250 / HN / 1	315 / HN / 1	400 / HN / 2	630 / HN / 3	800 / HN / 3
80	80	80	80	80	80	80	
125 / HQ / A4	125 / HQ / A4	200 / HQ / B2	250 / HQ / B2 & B3	315 / HQ / B3	400 / HQ / B4	630 / HQ / C2	

Altitude derating chart for FN & COS

De-rating at different altitudes for SD/SDFs & COS							
Altitude	Height	(m)	at 2000	3000	4000	5000	6000
Rated operational voltage	Ue	(v)	415	374	332	291	249
Rated operational current	Ie	(A)	Ie	0.98Ie	0.96Ie	0.94Ie	0.92Ie
Conventional enclosed thermal current	Ithe	(A)	Ithe	0.91Ithe	0.81Ithe	0.76Ithe	0.7Ithe
Impulse withstand voltage	Uimp	(kV)	8	7.2	6.4	5.6	4.8
Impulse withstand voltage	Uimp	(kV)	12	10.8	9.6	8.4	7.2
Rated insulation voltage	Ui	(kV)	690	621	522	483	414
Rated insulation voltage	Ui	(V)	1000	900	800	700	600

Selection Of Handle

FN switch range offers a distinctive feature to mount S-D-F in different quadrants.

This feature aids mounting flexibility.

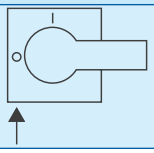
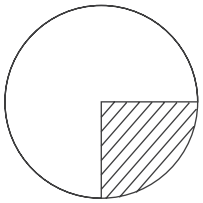
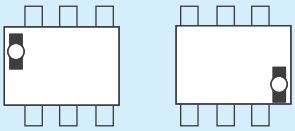
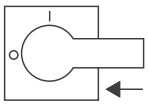
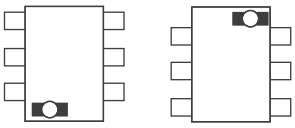
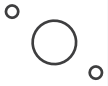
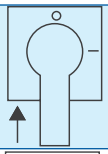
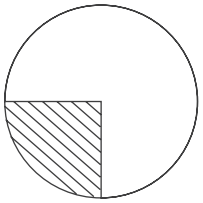
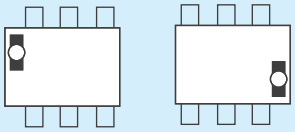
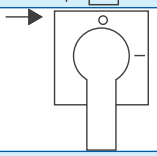
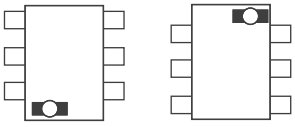
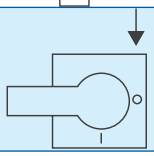
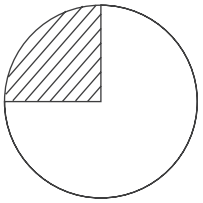
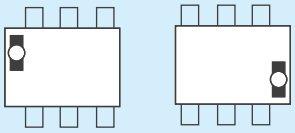
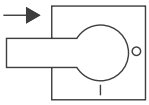
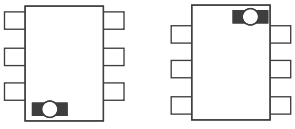
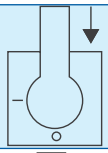
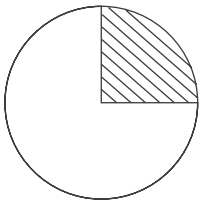
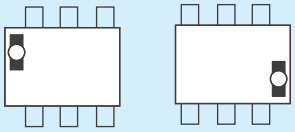
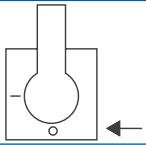
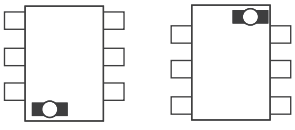
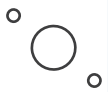
Handle coupling is as per IS 8623.

FN S-D-F operating quadrant chart

(Seen from front of the door) In FN Switch universal mounting is achieved by Type A and Type B handle.

Type A : Supplied as standard with all Switches
Type B : Available as an accessory

Seen from front of the door

Sr. No.	Handle (OFF) Position	Operating Quadrant (hand)	Switch Orientation	Door Cut-out	Handle Coupling Type
1					A
2					B
3					B
4					A
5					A
6					B
7					B
8					A

Ordering Information

FN S-D-F Ordering Information

Operating Current Rating (A)	32	63	100	125
TP SDF with DIN type fuses	ST278920000	ST278930000	ST302870000	ST350870000
TPN SDF with DIN type fuses	SK955180000 SK957030000*	SK954210000 SK957030000*	SK955680000	SK950010000
4P SDF with DIN type fuses	SK955180000 SK957030000*	SK954210000 SK957030000*	SK904960000	SK904970000
TPN SDF with bolted type fuses	SK956530000	SK956510000	SK955700000	SK950090000
TPN SDF with bolted type fuses (suitable for HE)	SK901330000	SK901340000	-	SK900690000
TPN SDF in spacious SS enclosure	SK904830000	SK904840000	SK904850000	SK904860000

Operating Current Rating (A)	160	200	250	315
TP SDF with DIN type fuses	SK959980000	ST278950000	ST317310000	ST278970000
TPN SDF with DIN type fuses	SK957130000	SK954180000	SK956420000	SK954610000
4P SDF with DIN type fuses	SK904980000	SK904710000	SK904720000	SK904730000
TPN SDF with bolted type fuses	SK957140000	SK955880000	SK956820000	SK955900000
TPN SDF with bolted type fuses (suitable for HE)	SK901300000	SK904160000	SK904170000	SK901320000
TPN SDF in spacious SS enclosure	SK904870000	SK904880000	SK904890000	SK904900000

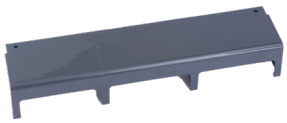
Operating Current Rating (A)	400	630	800
TP SDF with DIN type fuses	ST278980000	ST278990000	ST279000000
TPN SDF with DIN type fuses	SK954810000	SK955210000	SK956790000
4P SDF with DIN type fuses	SK904800000	SK904810000	SK904820000
TPN SDF with bolted type fuses	SK955910000	SK955920000	-
TPN SDF with bolted type fuses (suitable for HE)	SK900990000	SK901280000	-
TPN SDF in spacious SS enclosure	SK904910000	SK904920000	SK904930000

* 'CE' handle has door interlock facility without defeat feature

Spares and Accessories

Wide range of spares & accessories are available for Switch-Disconnector units

Type FN Spares & Accessories



Terminal Shroud

The terminals can be shrouded for protection against phase-short circuit through an external conducting path and against accidental human contact with live terminals.

FN SDF are now fitted with terminal shrouds on both input & load side.

Castell interlock

Switch-Disconnector-Fuse units can be locked on OFF position with help of castell interlock. Castell interlock can also be used to interlock two SDF units. (Different variety of locks are available).

Handle coupling (type A & B)

Irrespective of the switch orientation (vertical or horizontal), operation in any of the four quadrants is possible by selecting right handle coupling (Refer Handle selection table).

Auxiliary contacts

1 NO + 1 NC auxiliary contact is available as an accessory.Also, 2NO + 2NC can be obtained by using additional1NO+ 1NC This can be suitably wired in the control circuit.

- Rated operational current I_e (AC - 15) - 4 A
- Rated operational voltage U_e - 415 V

Fuse Puller

A fuse puller is provided to facilitate easy & safe removal of fuses.

Earthing Assembly

The site-mountable earthing assembly facilitates termination of 25 mm wide earthing bar

Type FN Spares & Accessories

Description	FN 32 / 63	FN 100/125/160	FN 200	FN 250	FN 315	FN 400	FN 630	FN 800
Terminal Shroud Kit	SK911900000	SK913280000	SK913350000		SK913460000		SK913470000	
Aux. Contact (1 NO + 1 NC)	SK913020000	SK912580000	SK913290000		SK913300000			CK9103400000
2nd Aux. Contact (1 NO + 1 NC)	SK906700000	SK906960000						
Handle Coupling (Type - A)	SK912570000	SK912580000	SK912580000		SK912590000		SK912590000	
Handle Coupling (Type - B)	SK912770000	SK912780000	SK912780000		SK912790000		SK912790000	
Handle Coupling (Type - CE)	SK913370000	Not Available						
Fuse Puller	SK911850000	SF901260000			SK912790000			
Castell Lock (Type A-Type D)	Not Available	SK003330000 - SK003360000			SK003450000 - SK003480000			
Earthing Assembly	-	CK903960000						

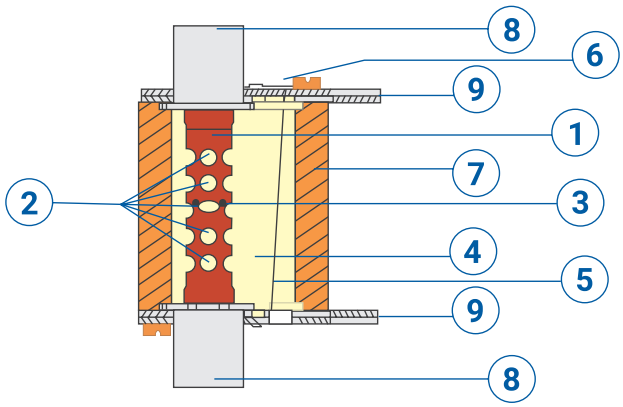
Ordering Suffix - 0000 for all.

HRC Fuses

High Rupturing Capacity Fuse Link - Technical Note

Introduction:
A fuse is a piece of conducting element which is designed to carry rated current in normal conditions and breaks the circuit by rupturing/melting under overload or short circuit faults. Fuse-links are current sensitive devices.

Construction:
A HRC type fuse link typically consists of a fuse element welded in between the blade contacts and enclosed in an insulating tubular fuse body. The blade contacts are placed between cover plates with protruding gripping-lugs which engage with the fuse pulling handle for easy removal of the fuses. An indicating device - flap indicator is fixed to the face end and is released when the fuse blows.



1. Fuse Element
2. Notches / constrictions
3. M-effect solder
4. Filler
5. Indicator Wire
6. Indicator Button
7. Fuse body
8. Fuse blade contact/knife
9. End Plate

- The fuse-element is the vital component of the HRC fuse which determines the overall performance of the fuse link. It is made of copper strip, and manufactured with utmost care and precision. Uniform strip thickness, good conductivity and a precise neck profile ensures low power dissipation. One peculiarity of the fuse element is presence of constrictions at regular intervals which heat up rapidly when abnormal/short circuit flows and start rupturing. The number of constrictions / notches in series is dependent on the recovery voltage (system voltage). Approximately one constriction per 90V is required.
- The insulation body is designed to withstand very high temperatures and internal pressure. It is made of high-quality ceramics and prevents the ejection of hot gases and liquid metal into the environment.
- The cover / end plates are provided with gripping lugs intended to be engaged with the standardized replacement handle (fuse pulling handle) for safe insertion and removal of the fuse- link. Along with the ceramic body, these form a pressure-resistant casing for the switching arc.
- Crystal quartz sand of high chemical and mineralogical purity (SiO_2 content > 99.5%) is generally used. It is completely anhydrous as a result of heat-drying. Sand is important for achieving current limitation as it absorbs the arc energy and pressure generated. A defined grain size distribution and optimum packing density are essential for the performance. It effectively dissipates energy from the arc column by fusion.
- The indicating device allows quick detection of blown fuses.
- The solder is an element which has lower melting point and is chosen specially to react with the material of the fuse-element. It causes the time current characteristic to be shifted to lower melting currents thereby giving protection against overload condition. The quantity and placement of the solder element is crucial for its effective functioning.
- The blade contacts are designed to electrically and mechanically connect the fuse link with the fuse base/ Switch Fuse Disconnector. These are made of copper or copper alloy, the contact surface is generally silver-plated.

HRC Fuses

Fuse works on simple principle of heat generation (I^2t) by the amount of current flowing.

The constrictions on the cross-section of the fuse element are the weakest links in a HRC fuse. These are designed to heat up faster and reach higher temperatures than any other part of the fuse.

When an over current flows for a period long enough to cause the restrictions to melt, current paths breaks which results in development of an arc. Fuse elements made of pure copper are suitable for breaking high over current only (heat energy generated is I^2t) as the melting temperature is $1080^{O}C$.

In case, the melting temperature is reached at extremely slow rate, the fuse link becomes extremely heated, which may result in glowing contacts or destroying adjacent equipment components. Therefore, for fuse elements without any additional low-melting point material, there is always a called "prohibited" current range allowing the elements to be used only in partial range fuses for short-circuit protection.

Utilization Category of HRC fuse:

The area of application is designated by two letters, the first of which specifies the breaking current range and the second the utilization category.

Letter Code	Application (Characteristic)	Breaking Range
gG	General Purpose fuse-link mainly for conductor protection	Full range
gM	Motor circuit Protection	Full range
aM	Short - circuit Protection of motor circuits	Partial range

- The letter "g" indicates full-range fuses that can continuously conduct currents at least up to their rated current In and that can break currents from the smallest melting current up to the rated breaking current.
- The letter "a" signifies partial range fuses that can continuously conduct currents at least up to their rated current In and that can break currents above of a certain multiple of their rated current up to the rated breaking current. Generally, the breaking range begins at over four times the rated current and hence these are solely designed for short-circuit protection.
- Our HF, HN and HG fuses have gG utilization category.

Overload disconnection

For disconnection of smaller over currents, a low-melting-point solder consisting usually of tin or tin alloy is applied on to the centre constriction wherein the fuse-element reaches its highest temperature. As the solder melts, the adjacent restrictions are dissolved and an arc is initiated which continues in both directions. At subsequent current zero, the arc is extinguished.

Intensive cooling of the arc channel caused by the melting quartz sand prevents re-ignition of the arc when the recovery voltage appears. In the arcing area a non-conductive mixture composed of fuseelement metal, solder and quartz is formed. Due to its appearance, it is also called "fulgurite caterpillar".

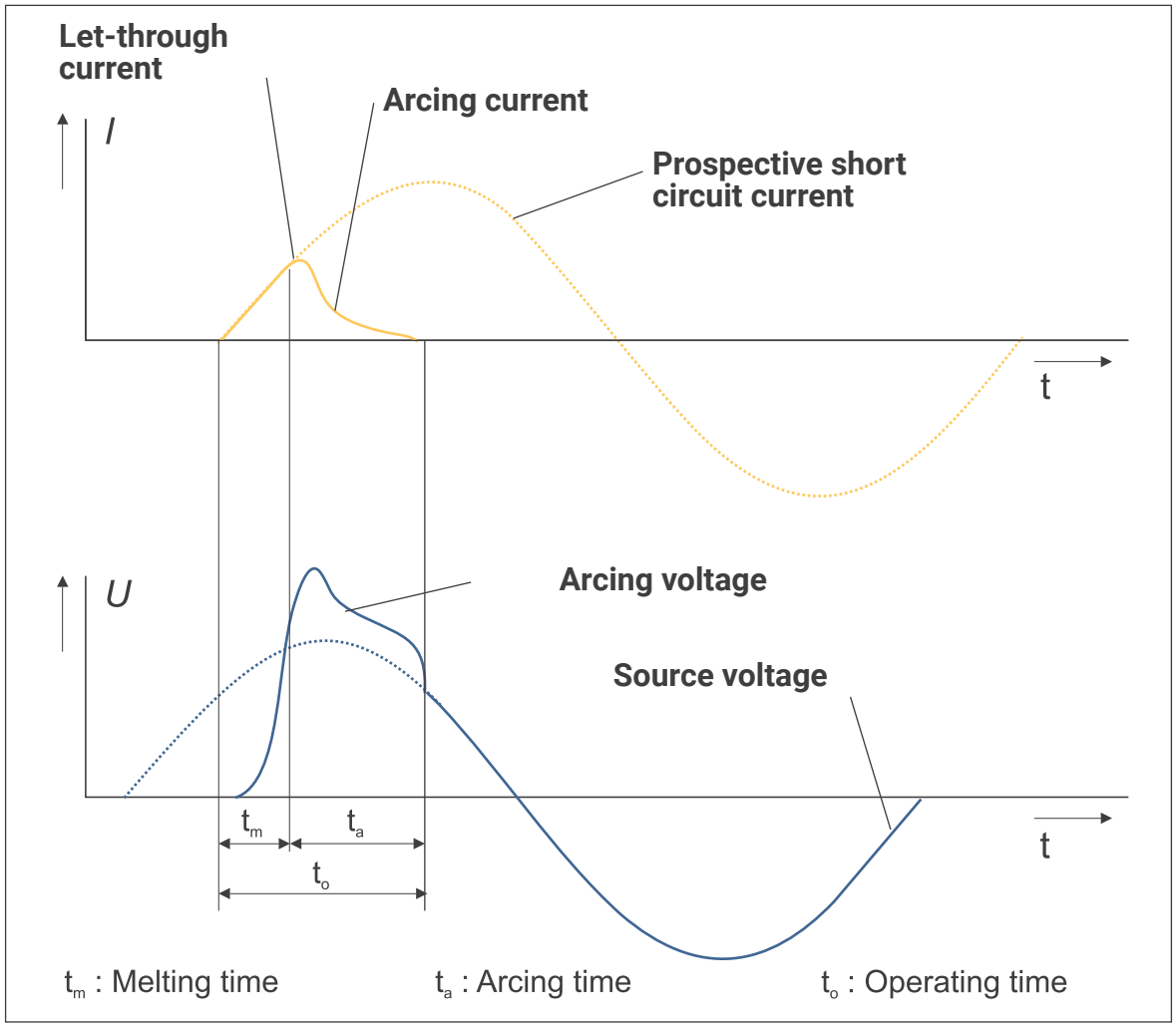
At very high currents, all constrictions melt almost simultaneously, thereby initiating development of several partial arcs depending on the number of constrictions and forming a fulgurite uniformly extended over the whole length of the fuse-element which is typical for short-circuit interruptions.

HRC Fuses

Current-limiting short-circuit disconnection

At very high currents, like caused by short circuits, all constrictions heat up simultaneously at a speedy rate and the fuse element starts evaporating.

If the sand is packed too tightly packed with minute dust particles, extreme high pressure is built inside the fuse which can cause bursting of the fuse body. If the interspatial volume between the grains is too large, the arc can extend up to the inside ceramic surface of the fuse body or the end plates and cause damage the fuse body. Properly graded and carefully prepared sand will intensively cool the arc due to its energy absorbing ability, with the result that when the arcing voltage exceeds the supply voltage, the current is already terminated before natural zero of a 50 / 60 Hz alternative current. The peak value of the prospective short-circuit current is not reached at all.



Therefore, its current-limiting effect is one of the most valuable properties of the fuse, making it superior to any other over current protection device. Short-circuit usually has a very high first peak value known as impulse short-circuit current. Its magnetic force effect causes extraordinary stress to the current-carrying conductors, related clamps and insulation. Using current-limiting fuses help in keeping magnetic short-circuit forces at a low level and allows to easily control them.

Current-limiting fuses are designed to significantly limit not only the maximum current, but also the let-through energy, expressed in I2t values, which occurs, for example, in the case of an arc fault, where a destructive energy is released at the fault location.

Thus, current limitation is synonymous with limitation of damage and risk to personnel working in live condition.

HRC Fuses

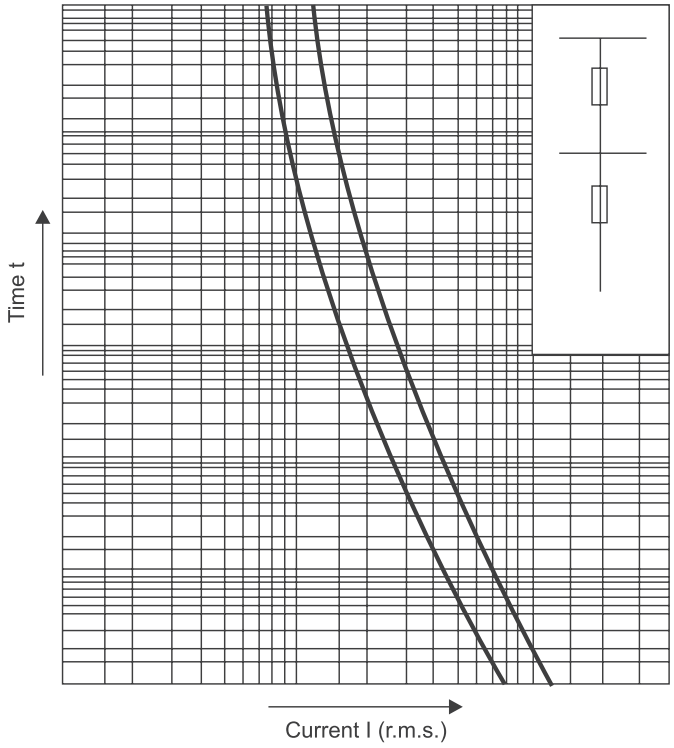
Current limitation & Selectivity of fuse as Short circuit protection device

In buildings and industrial plants, radial distribution networks are the norm. In radial distribution systems there are several protective devices in series, usually with decreasing rated currents from the supply end to the load end. While the operational currents decrease from the supply end to the load end, in the event of a short circuit the same fault current will flow through all the protective devices connected in series. By cascading of the trip characteristics it must be ensured that only the respective protective device that is closest to the location of the fault trips and hence the fault is selectively limited to the smallest possible part of the installation.

The basic prerequisite for selectivity of protective devices connected in series is that the trip characteristic of the downstream (closer to the load) protective device is faster than that of the upstream device. Special attention should be paid to the area of high over currents, where the effects of current limitation and breaking times are significant.

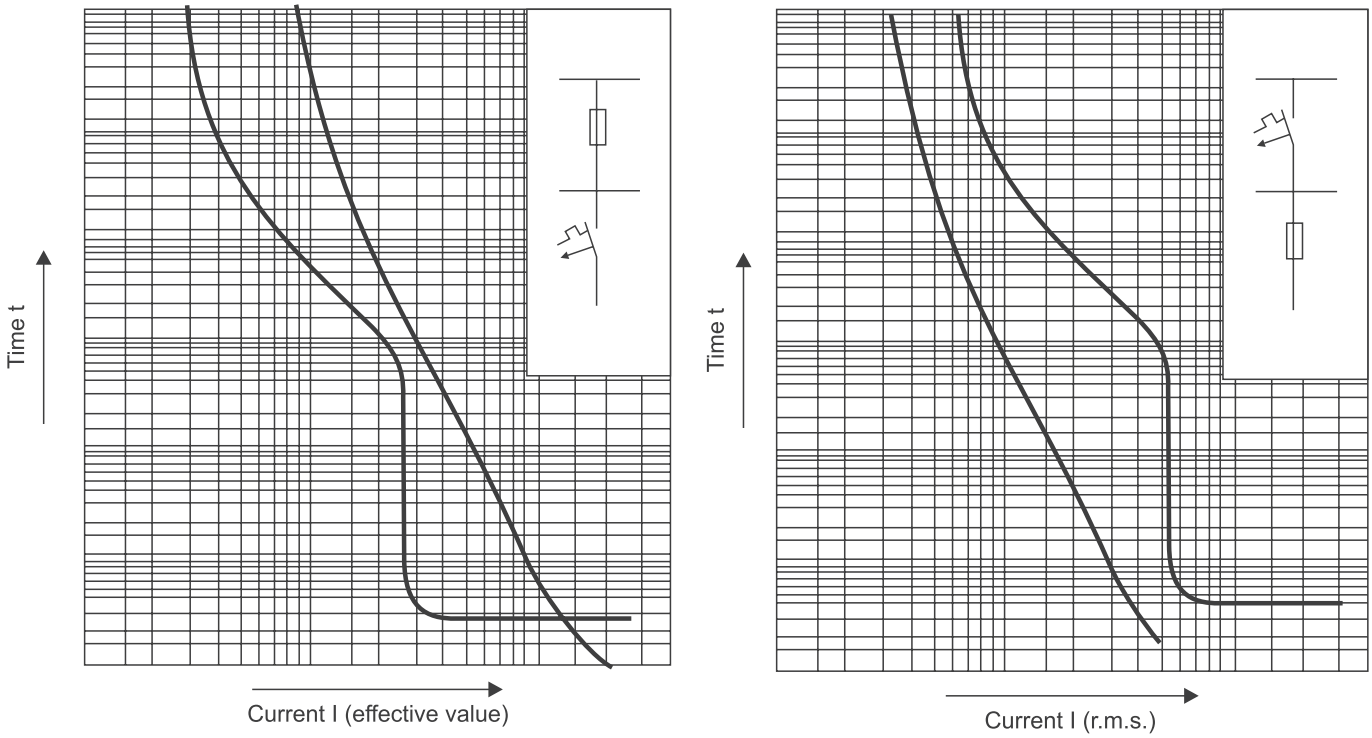
This Cascading & selectivity for the fuses is very simple because of the similarity in the characteristics throughout the range & constant characteristics for complete life of fuse.

Connection of fuses in series



Fuses connected in series act selectively if their time current-characteristic curves have sufficient spacing and their tolerance bands do not touch. At high short-circuit currents the melting I2t value of the upstream fuse must be larger than the breaking I2t value (melting and clearing time) of the smaller downstream fuse. This is usually the case if their rated currents differ by a factor of 1.6 or more

HRC Fuses



Connection of fuse & circuit breaker in series

1. Circuit breaker 2. Fuse

When fuse is installed as a downstream device, co-ordination between the tripping range of the short-circuit release of the circuit breaker and cut of current of the fuse can be seamlessly achieved as the short circuit currents are interrupted instantaneously by the fuse.

E&A HRC fuses Power loss data

Size	Rating	Permitted power loss IS/IEC standard) W	Rated Power loss (W) HN fuse link	% saving in electricity consumed
000	100	7.5	7	7%
0	160	16	12.7	21%
1	250	23	17.3	25%
2	400	34	24.9	27%
3	630	48	42.2	12%

Get the Fuse advantage!

- Let-through energy value of fuse is extremely low compared to circuit breaker
- Low let-through energy leads to low stresses to the down stream protection devices & equipment
- Optimal cable size & contactor rating in case of type two co-ordinations due to low I^2t value.
- Low power loss leads to low running cost & minimum heating.

HRC Fuses - Cylindrical

HRC Fuses - Cylindrical

Fuse Links Type HF
(Fuse links with cylindrical contact caps)

- Conforms to IEC 60269-2, IS 13703-2
- Low watt loss - Saves power
- Low let through energy
- High breaking capacity - 80 kA
- Rated voltage - 415 V
- Instant fault indication through red pop up indicator
- Lower power loss in our fuses result in cooler running of associated products

Ordering Details

Size of the Fuse Link	Rating (A)	Description	Cat. Nos.	Rated Watt Loss (W)	Watt Loss Limits as per IS 13703 (W)	Suitable for S-D-F units type FN/ FNX or Equivalent
Size 14 X 51	2	Suitable for Type FN 32 / 63 / FNX 32 / 63 S-D-F. Also for HCO 32 Fuse base	SF90144	100 Amp, Fuse 7.5 W	5	32, 63
	4		SF90145			32, 63
	6		SF90146			32, 63
	8		SF90147			32, 63
	10		SF90148	100 Amp, Fuse 7.5 W		32, 63
	16		SF90150			32, 63
	20	Suitable for Type FN 63 / FNX 63 S-D-F. Also for HC 63 Fuse base	SF90151		7	32, 63
	25		SF90152			32, 63
	32		SF90142			32, 63
	40		SF90143			63
	50		SF90158			63
	63		SF90159			63

Fuse-pulling handle should be used for safe and easy removal of fuse links
Suitable fuse - pulling handle for type HF : SK91185

HRC Fuses - Blade / Knife type

Fuse Links Type HN

(Fuse links with blade contacts)

- Conforms to IEC 60269-2, IS 13703-2
- Low watt loss - Saves power
- Cooler running of associated products
- Low let through energy
- High breaking capacity - 100 kA
- Instant fault indication
- Rated voltage - 415 V

Ordering Details

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

Fuse-pulling handle should be used for safe and easy removal of fuse links
Suitable fuse - pulling handle for type HN : SF90126

HRC Fuses - Bolted

Fuse Links Type HG and HQ

(Fuse links for bolted connections)

- Conforms to IEC60269 / IS 13703-2
- Low watt loss
- Low let through energy
- High breaking capacity - 80kA
- Rated voltage - 415V

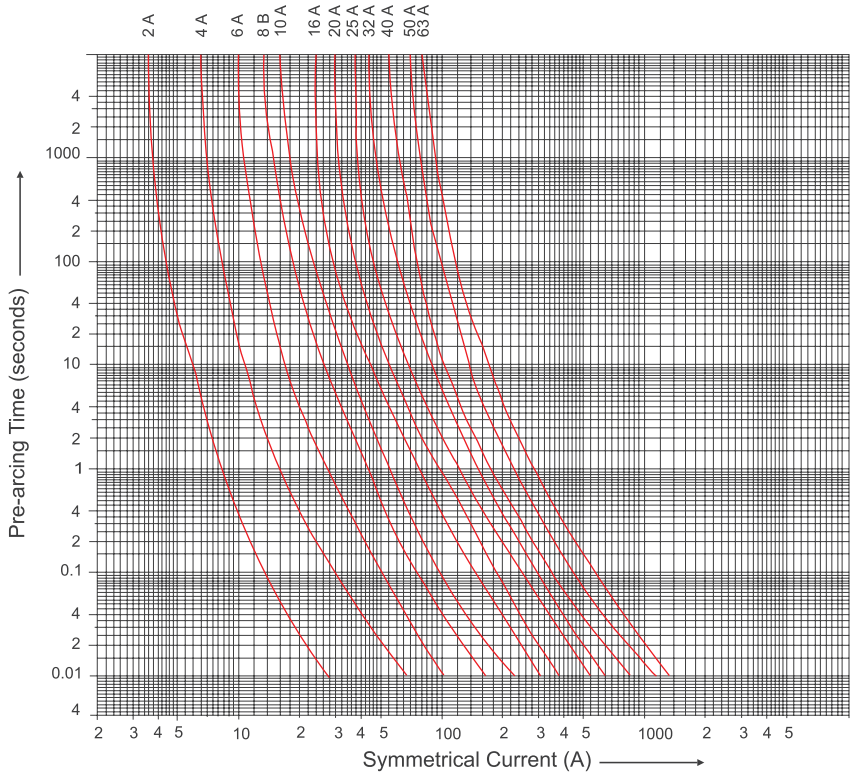
Type HQ & Type HG

Fixing Method	Size	Rating (A)	Description	Cat. No.	Power loss (W)	Watt loss limits as per IS 13703
Offset, Staggered	F1	2	Suitable for type HD20H/20P/20B, HD32H/32P/32B Fuse base	ST30725	0.3	32 A, Fuse - 3.2W
		4		ST30726	0.5	
		6		ST30727	1.2	
		10		ST30728	1.4	
		16		ST30729	1.8	
		20		ST30730	2.2	
		25		ST30731	2.9	
		32		ST30732	3.0	
Offset	A1	2	-	ST30736	0.3	20 A, Fuse - 2.7W
		4		ST30737	0.5	
		6		ST30738	1.2	
		10		ST30739	1.4	
		16		ST30740	1.8	
		20		ST30741	2.2	
		25		ST30742	2.9	
		32		ST30743	3.0	
	A1L	20	Suitable for type FN32/63 Switch disconnector Fuse unit	ST30527	2.4	20 A, Fuse - 3.2W
		25		ST30528	3.1	
		32		ST30529	3.4	
		50		ST30827	4.0	
		63		ST30828	4.7	
	A2	4	Suitable for type HK32H/32B Fuse base	ST30747	0.8	32A, Fuse - 4.4W
		6		ST30748	1.4	
		10		ST30749	1.5	
		16		ST30750	2.0	
		20		ST30751	2.8	
		25		ST30752	3.8	
		32		ST30753	4.4	
	A3	35	Suitable for type FN 100 Switch disconnector Fuse unit, also for HK63B/63H Fuse base	ST30759	4.5	63 A, Fuse - 6.9W
		50		ST30760	6.2	
		63		ST30761	6.8	
	A4	80	Suitable for type FN100/120/160 Switch disconnector Fuse unit, also for HK 125H//125B Fuse base	ST30767	9.1	100 A, Fuse - 9.1W
		100		ST30768	9.5	
		125		ST30769	14	
		160		ST30829	-	

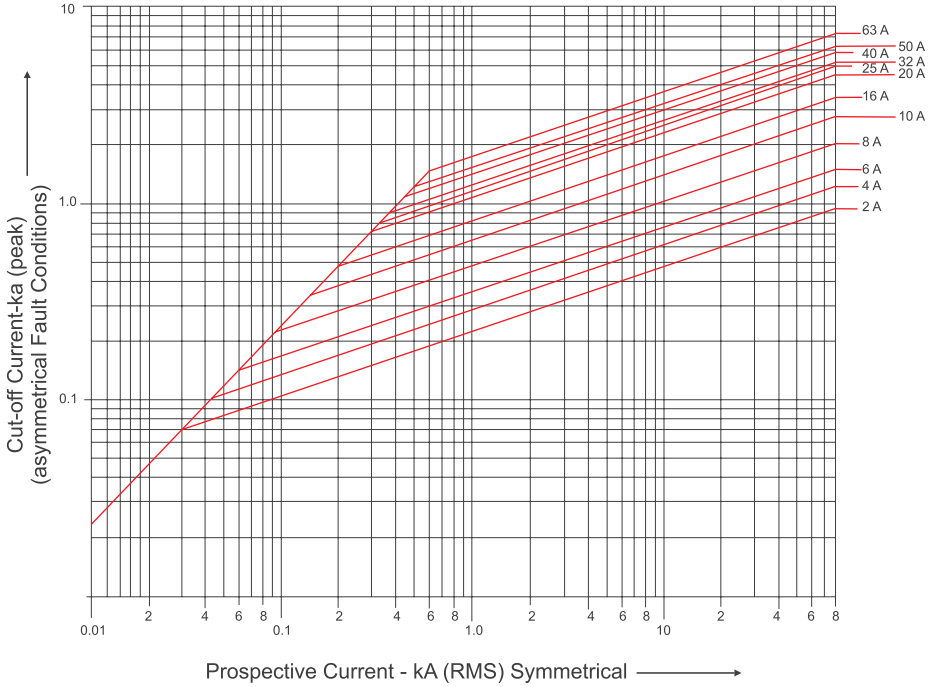
Characteristic Curves

HRC Fuse-link Type HF

› Time-Current Characteristics



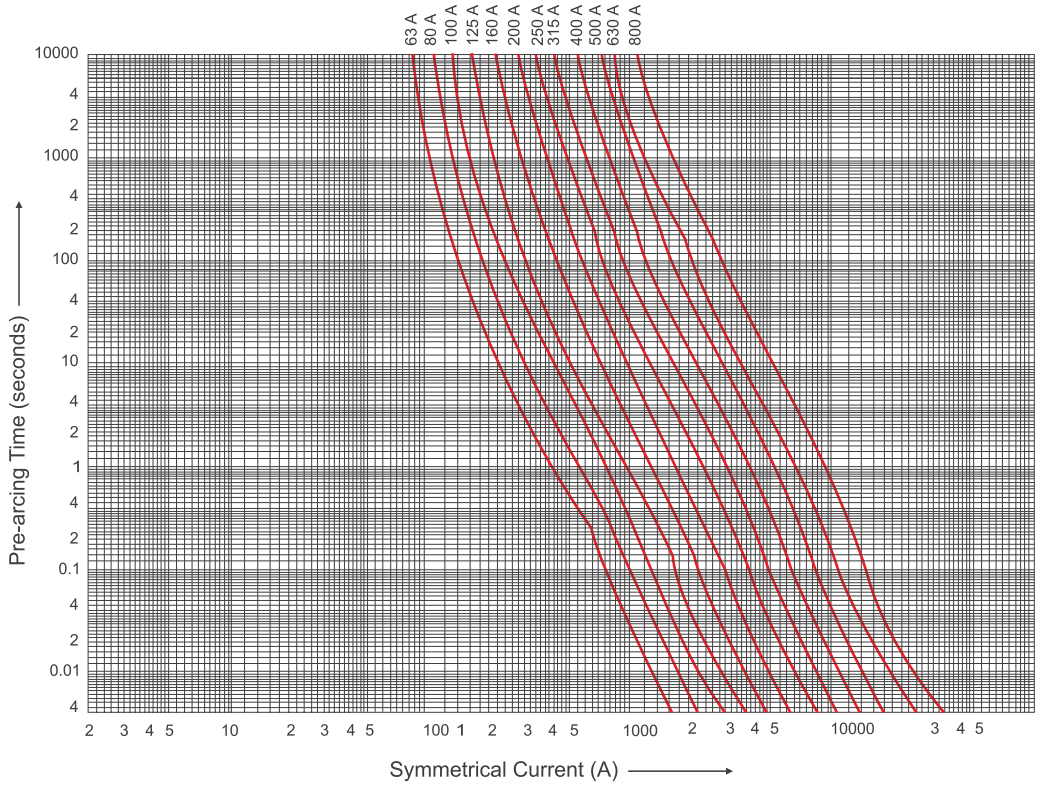
› Cut-off Current Characteristics



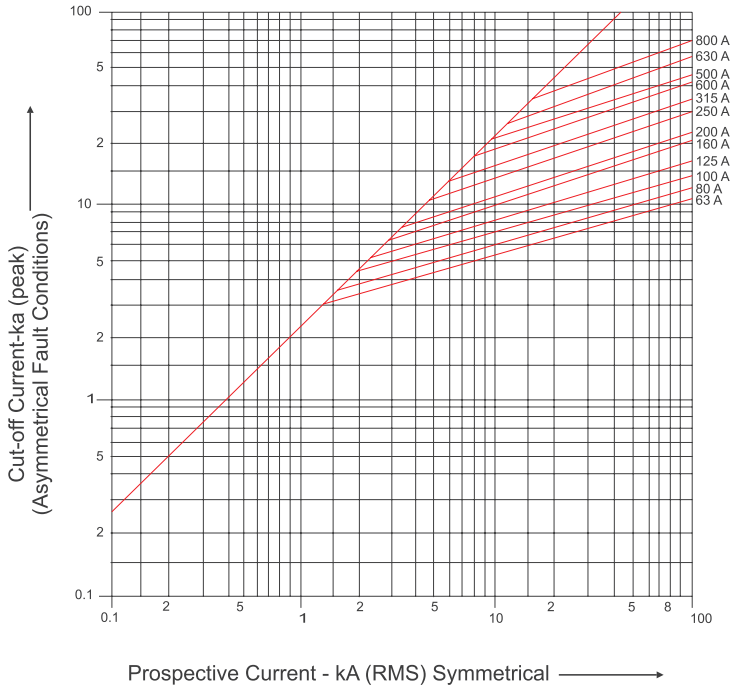
Characteristic Curves

HRC Fuse-link Type HN

› Time-Current Characteristics



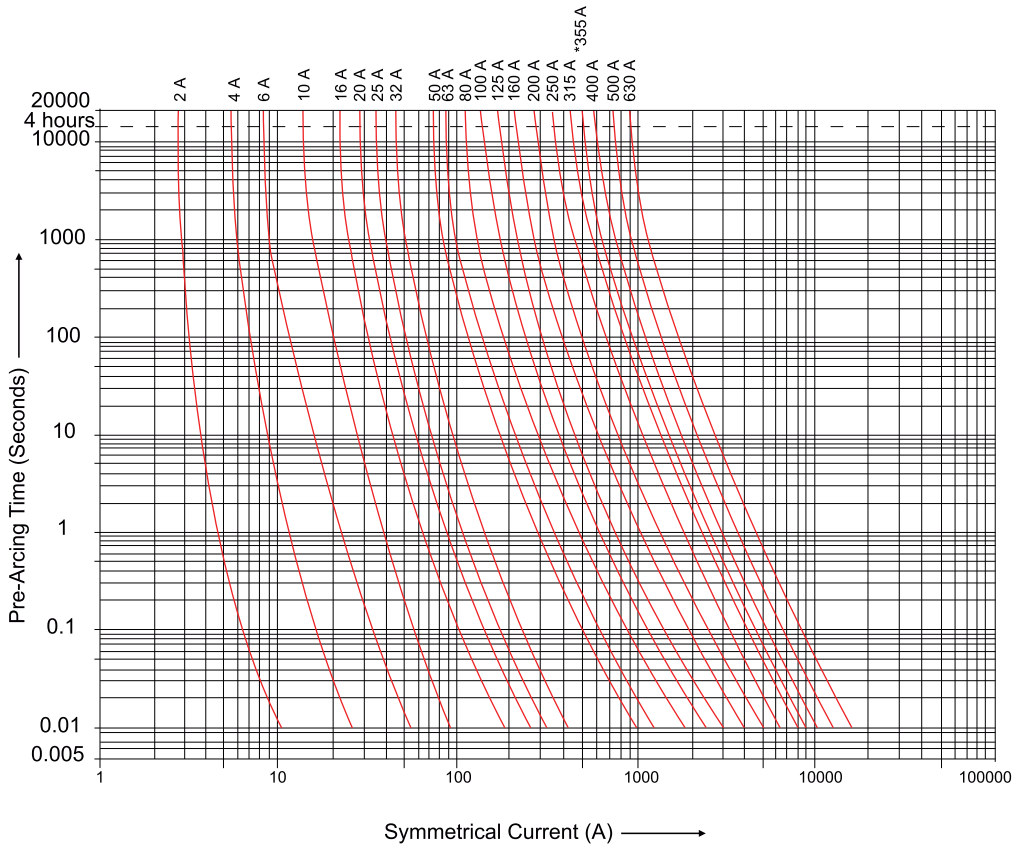
› Cut-off Current Characteristics



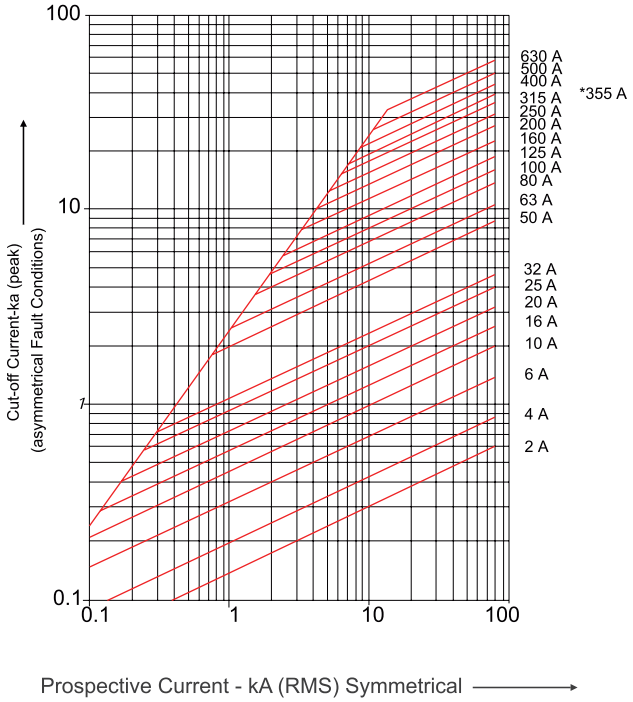
Characteristic Curves

HRC Fuse-link Type HQ

› Time-Current Characteristics



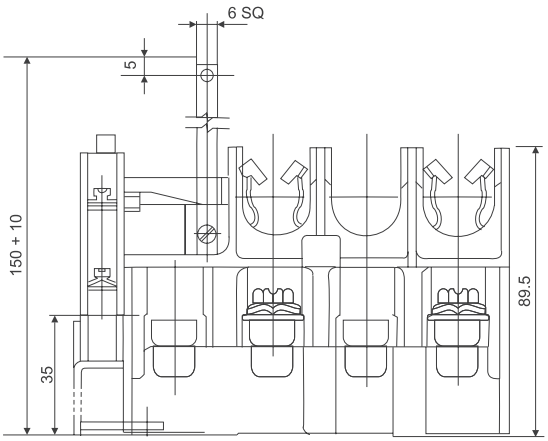
› Cut-off Current Characteristics

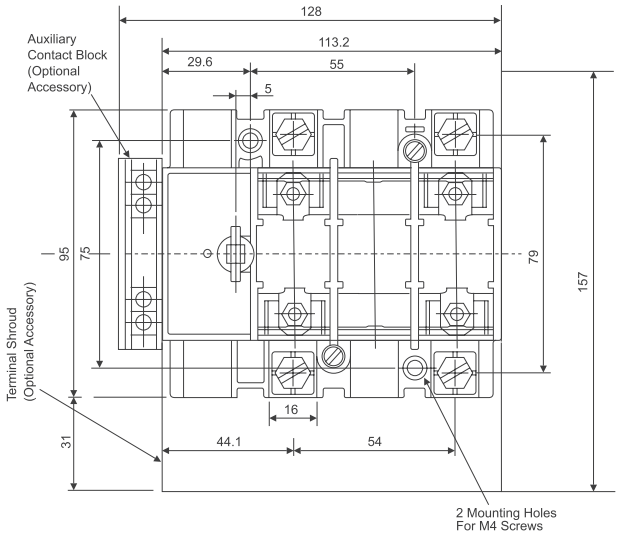


Overall Dimensions
FN 32 / 63

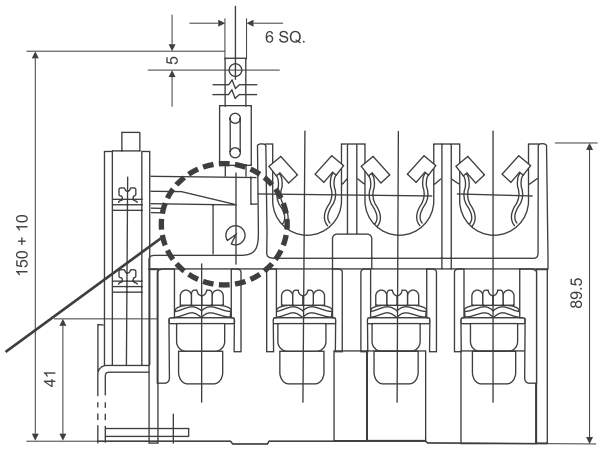
Switch-Disconnector-Fuse (suitable for DIN type fuses)

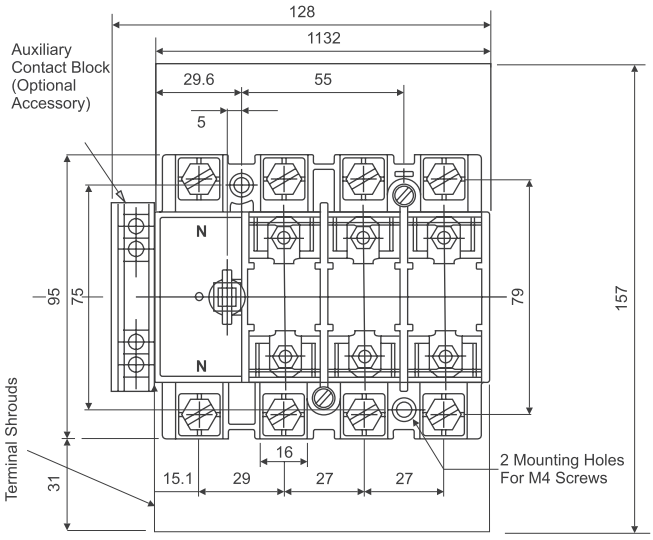
› **SDF - FN 32 / 63 2P**





› **SDF - FN 32 / 63 TPN**



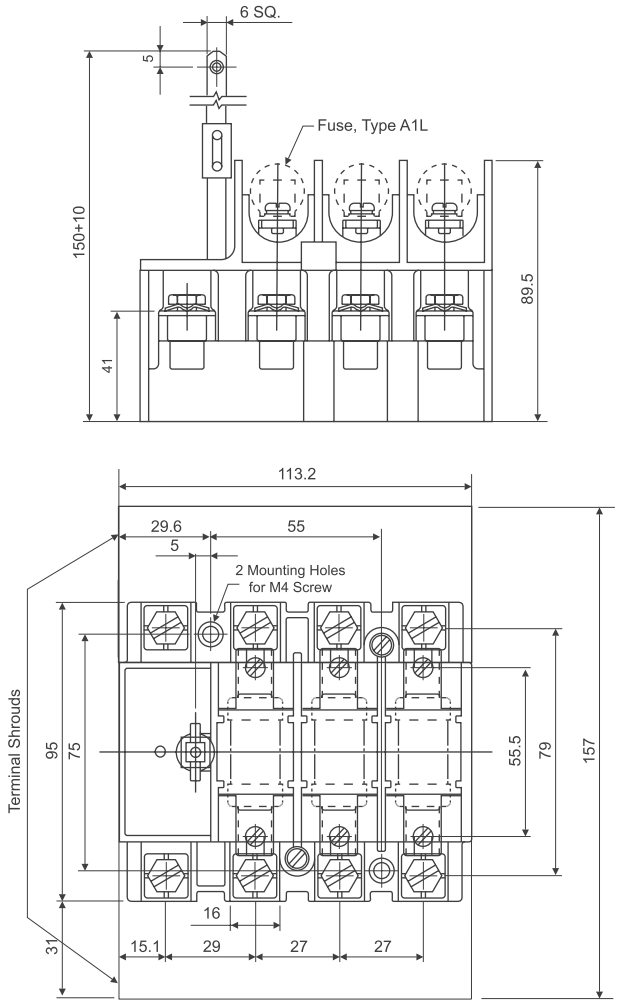


Note : All dimensions are in mm.

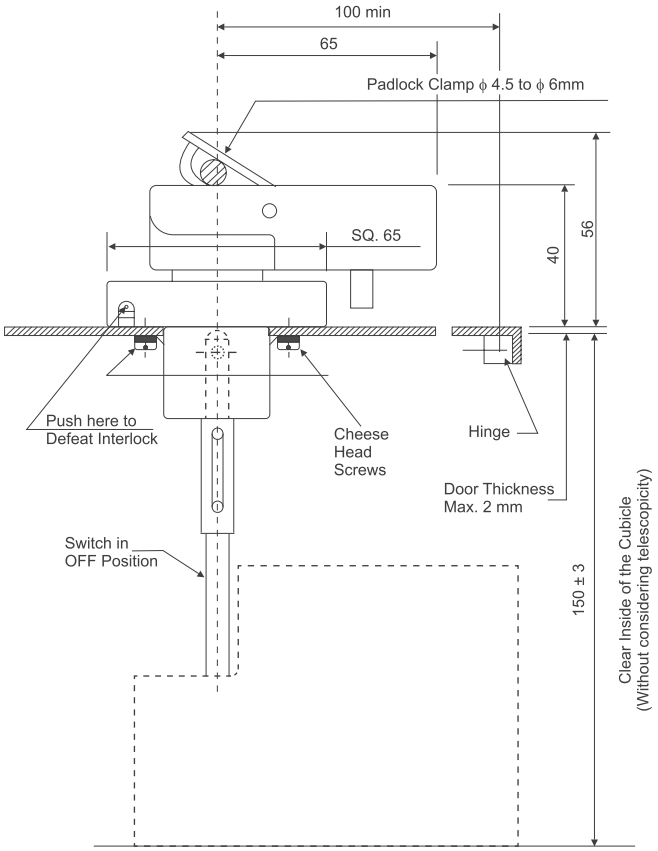
Overall Dimensions FN 32 / 63

Switch-Disconnector-Fuse (suitable for Bolted type fuses)

› SDF - FN 32 / 63 TPN

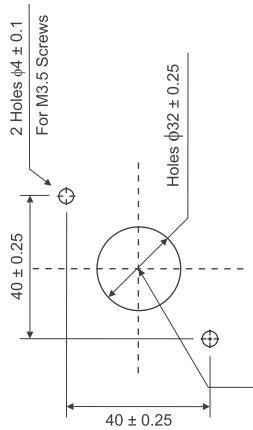


› Assembly of Handle Coupling on Door - FN 32 / 63

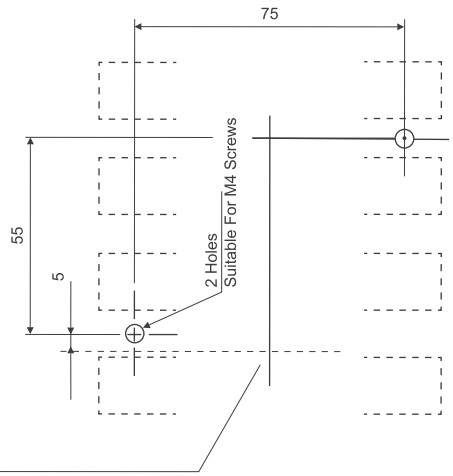


› Drilling details FN 32 / 63

Drilling details on door for mounting handle coupling
seen from front of the door



Drilling details on base plate for mounting switch
seen from front of the door

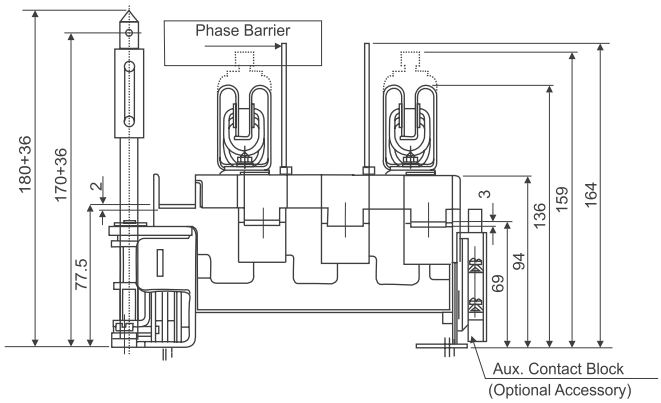


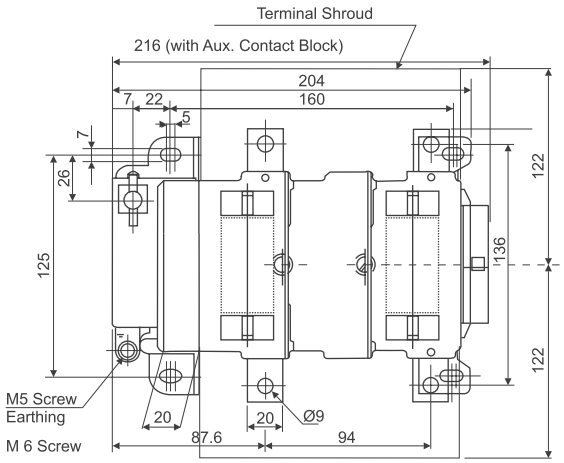
Note : All dimensions are in mm.

Overall Dimensions FN 100 / 125

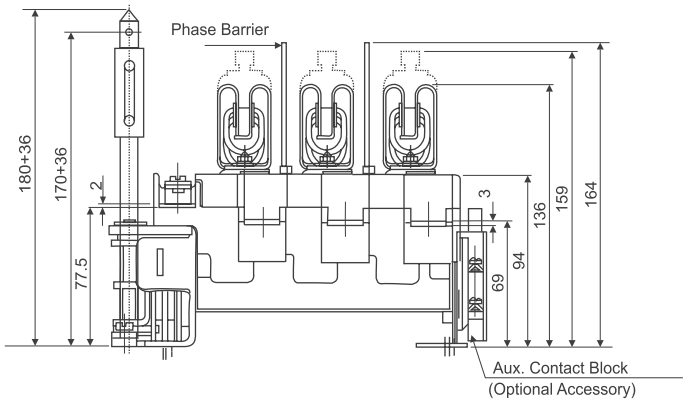
Switch-Disconnector-Fuse (suitable for DIN type fuses)

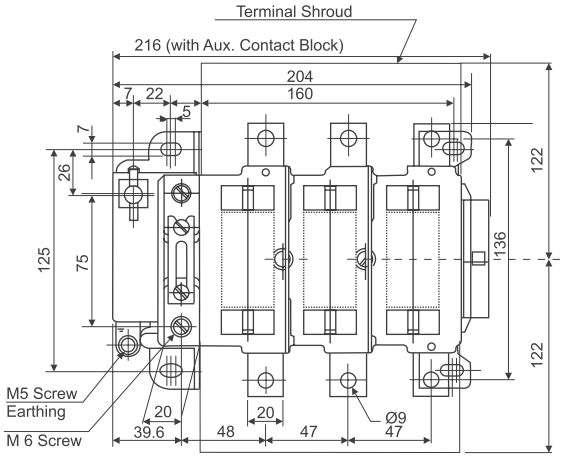
› SDF - FN 100 / 125 2P





› SDF - FN 100 / 125 TPN

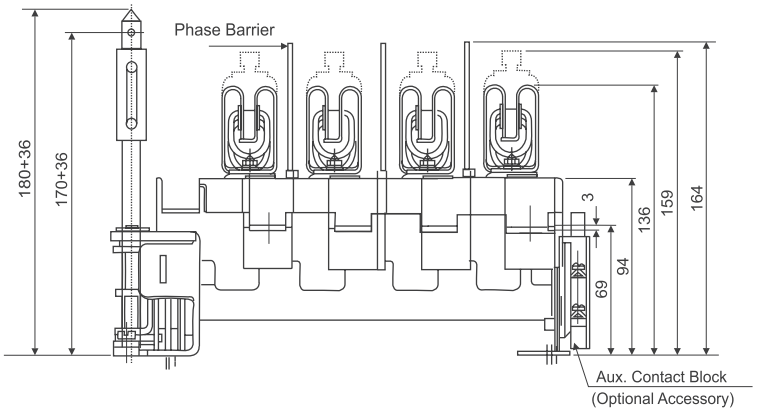


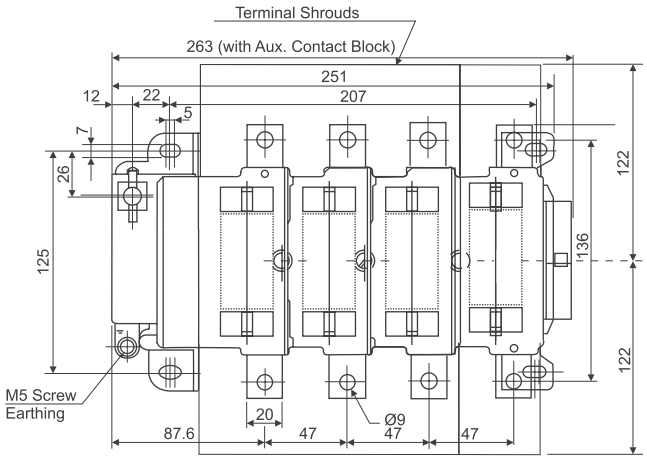


Note : All dimensions are in mm.

Overall Dimensions
FN 100 / 125 / 160

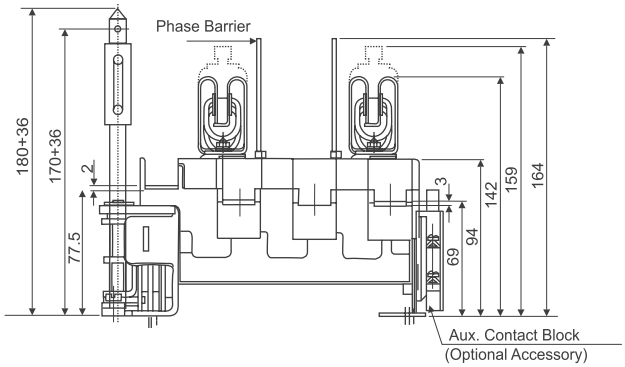
› **SDF - FN 100 / 125 4P**

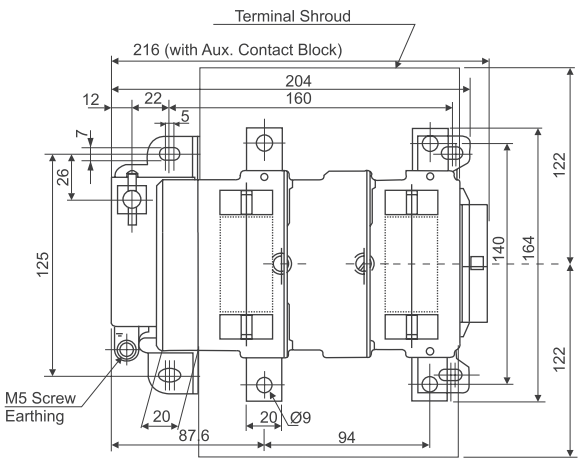




Switch-Disconnector-Fuse (suitable for DIN type fuses)

› **SDF - FN 160 2P**

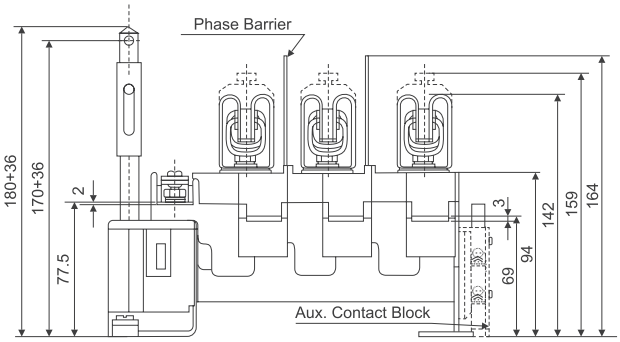


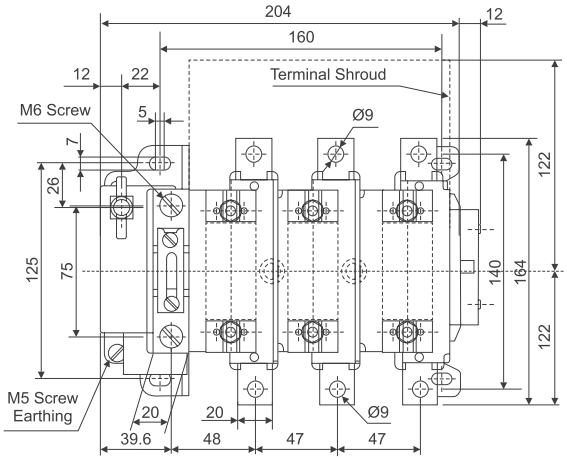


Note : All dimensions are in mm.

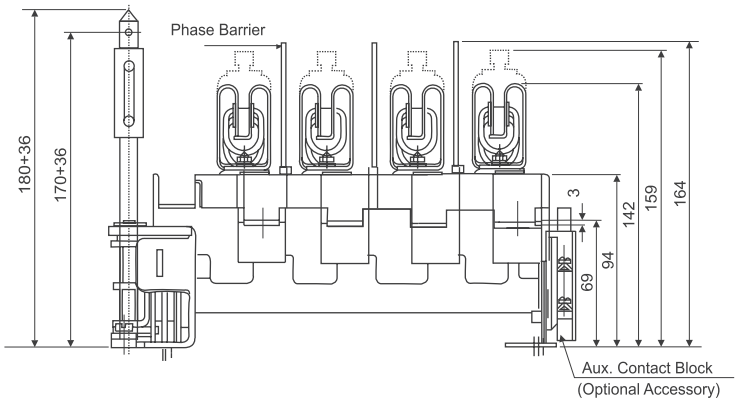
Overall Dimensions
FN 160

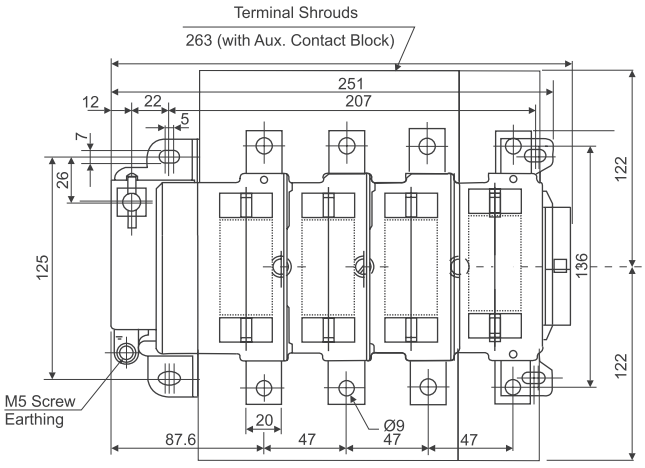
› SDF - FN 160 TPN





› SDF - FN 160 4P



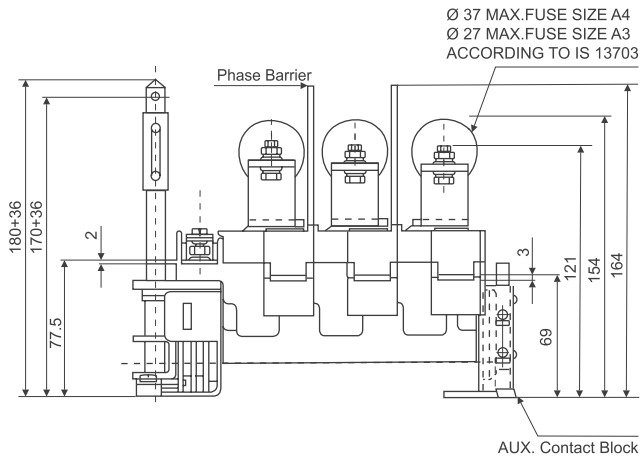


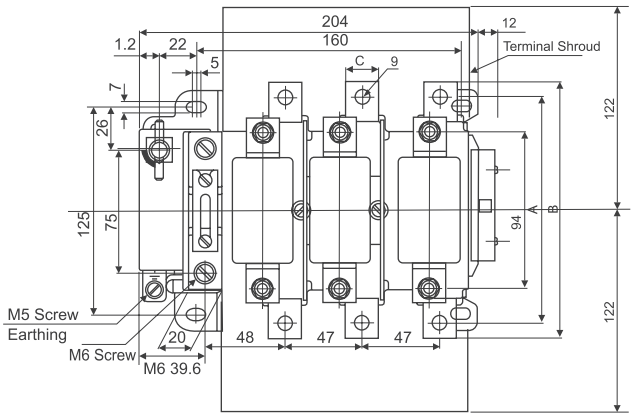
Note : All dimensions are in mm.

Overall Dimensions FN 100 / 125 / 160

Switch-Disconnector-Fuse (suitable for Bolted type fuses)

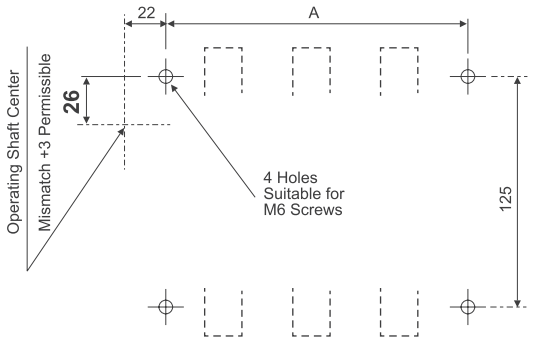
› SDF - FN 100/125/160 TPN





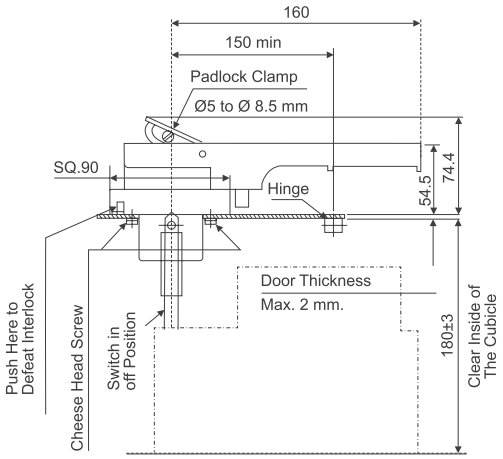
Dimensions	A	B	C
FN 100 / 125	136	154	20
FN 160	140	164	25

› Drilling details on Door FN 100/125/160



Dimensions	For 2P & 3P Switches	For 4P Switches
A	160	207

› Assembly of Handle Coupling on Door FN 100 / 125 / 160



Note : All dimensions are in mm.

Overall Dimensions
FN 100 / 125 / 160

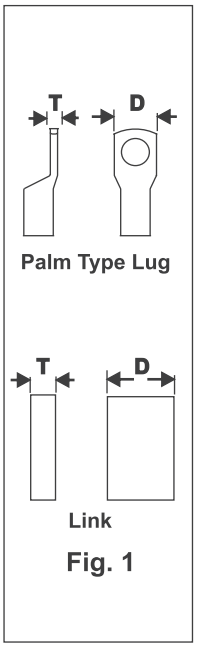


Fig. 1

Conductor sizes as per standard		
	Cu	Al
100 A	35 mm2	50 mm2
125 A	50 mm2	70 mm2
160 A	70 mm2	120 mm2

Termination	FN 100/125/160	
	D (Max) *	T (Max) *
Cable with palm type lug	23	4 X 2
Link	23	4 X 2

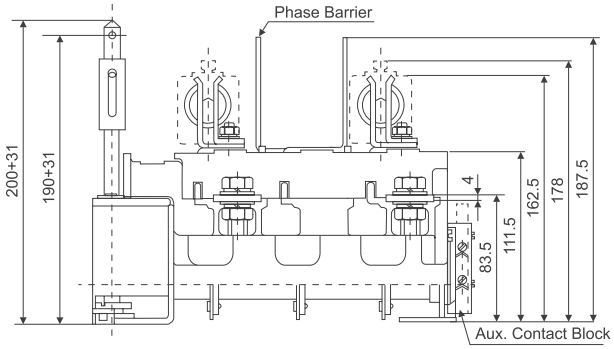
Rating	Terminal scew size & torque	Neutral scew size & torque
FN 100	M8 - 9.6 Nm	M6 - 4.5 Nm
FN 125		
FN 160		

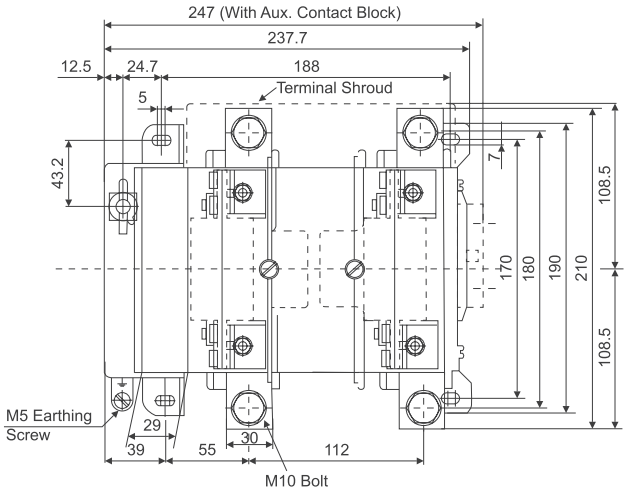
Note : All dimensions are in mm.

Overall Dimensions FN 200

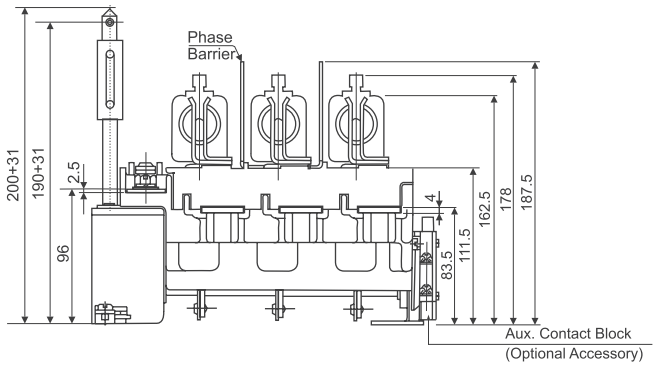
Switch-Disconnector-Fuse (suitable for DIN type fuses)

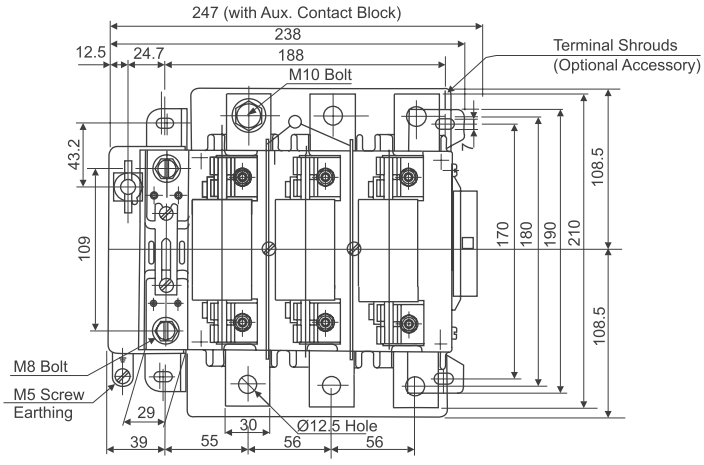
› SDF - FN200 2P





› SDF - FN200 TPN

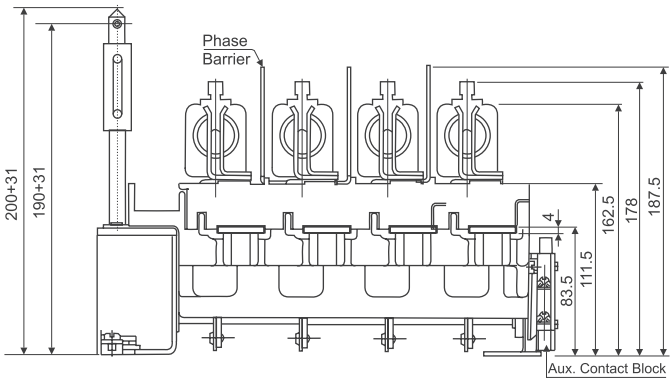


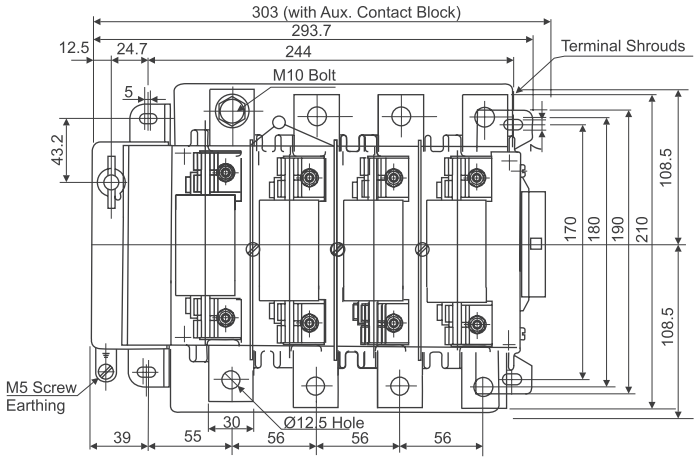


Note : All dimensions are in mm.

Overall Dimensions
FN 200 / 250

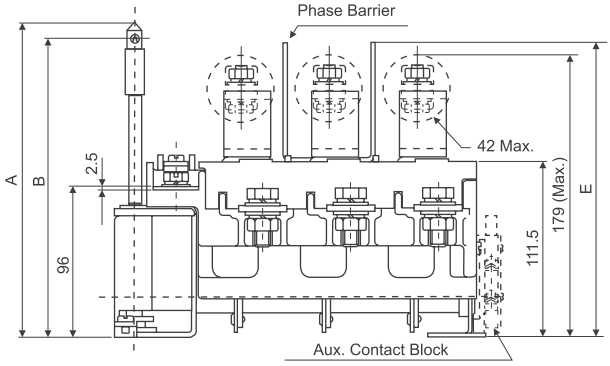
› **SDF - FN 200 4P**

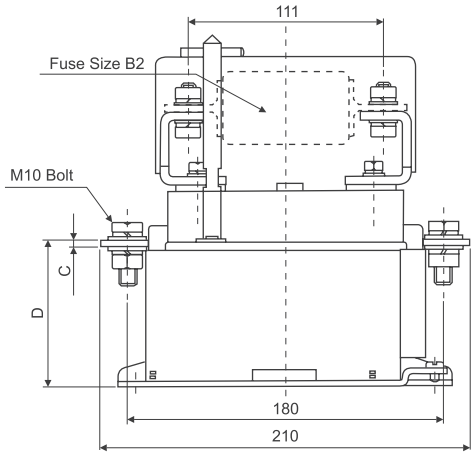


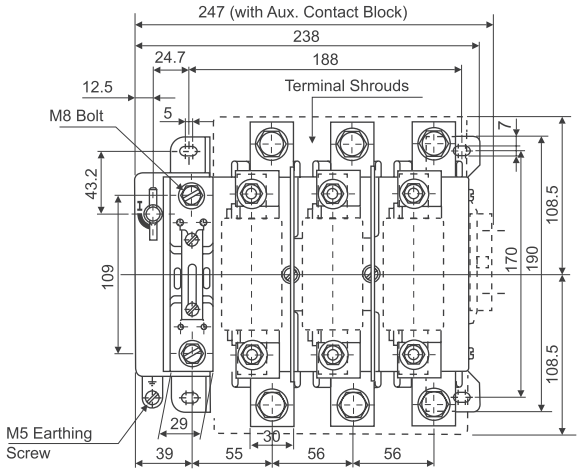


Switch-Disconnector-Fuse
(suitable for BOLTED type fuses)

› **SDF - FN 200 / 250 TPN**





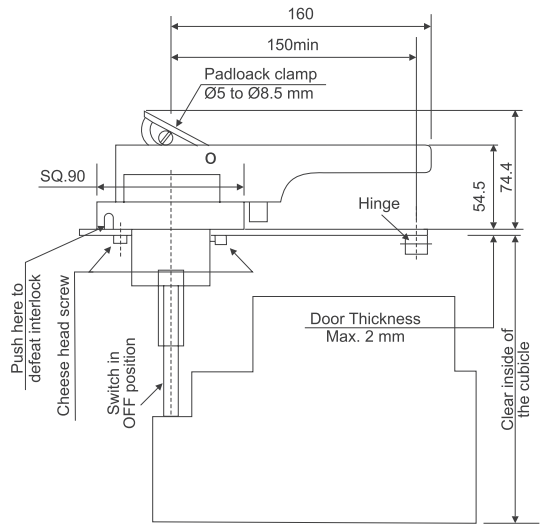


Dimensions	A	B	C	D	E	Fuse
FN 200	200+31	190+31	4	83.5	187.5	200A
FN 250	216+31	206+31	5	84.5	204	250A

Note : All dimensions are in mm.

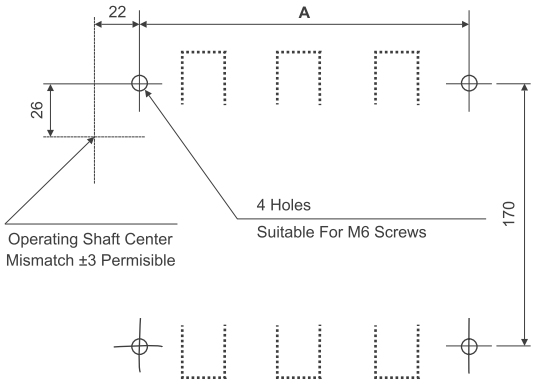
Overall Dimensions
FN 200 / 250 / 315 / 400

› **Assembly of handle coupling on door**



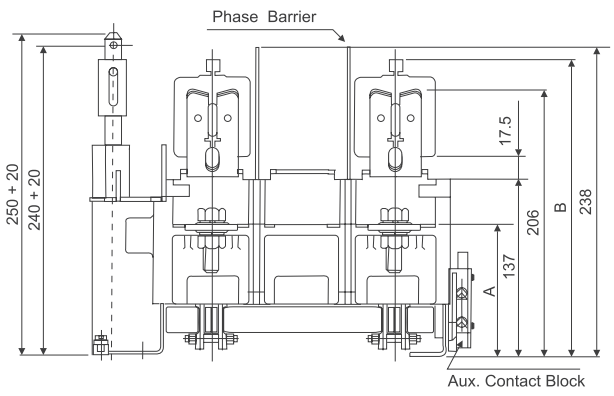
Dimensions	FN 200	FN 250
A	200	216

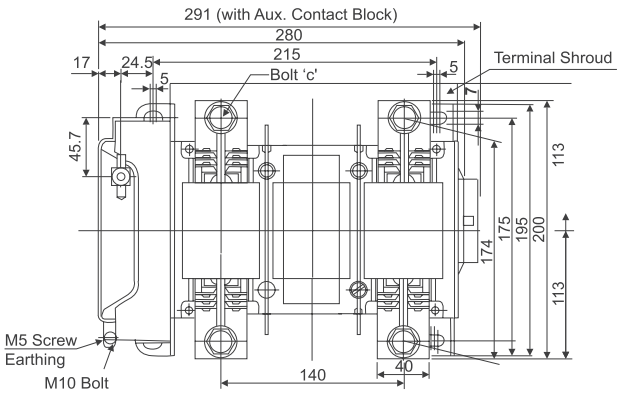
› **Drilling details on base plate for mounting switch**
seen from front of the door



Switch-Disconnector-Fuse (suitable for DIN type fuses)

› **SDF - 315 / 400 2P**



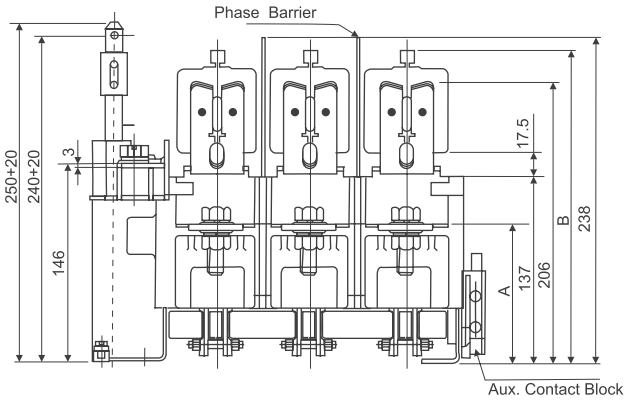


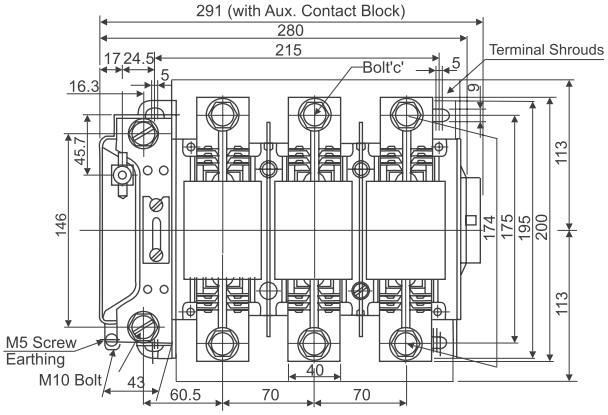
Dimensions	A	B	C
FN 315	103	220	M10
FN 400	102	228	M 12

Note : All dimensions are in mm.

Overall Dimensions
FN 315 / 400

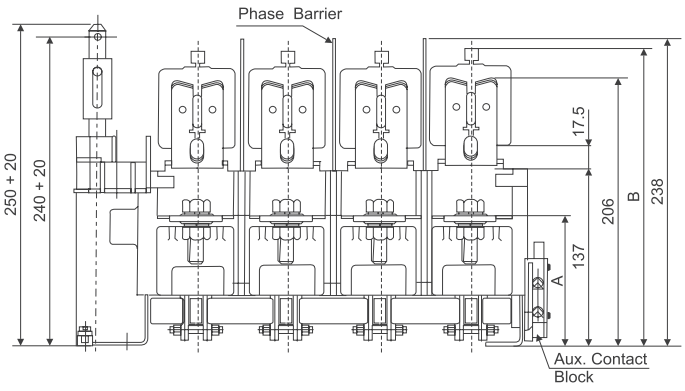
› SDF - 315 / 400 TPN

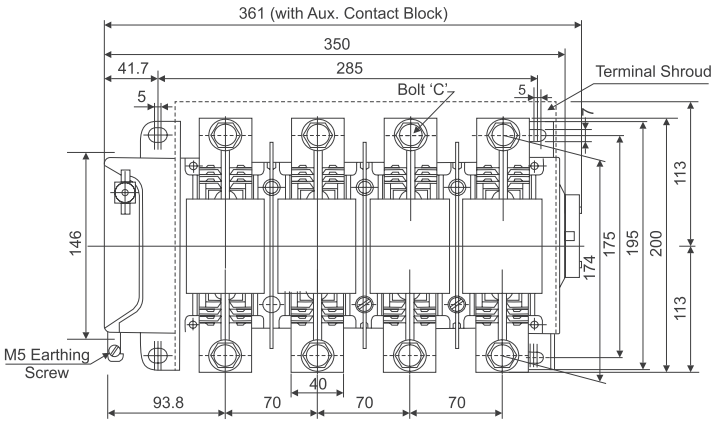




Dimensions	A	B	C
FN 315	103	220	M10
FN 400	102	228	M 12

› SDF - 315 / 400 4P





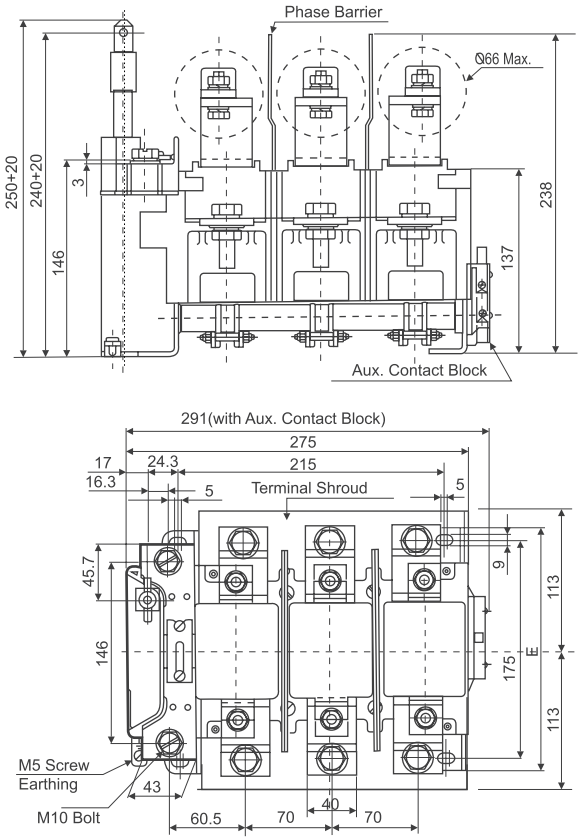
Type	A	B	C
FN 315	103	220	M10
FN 400	102	228	M 12

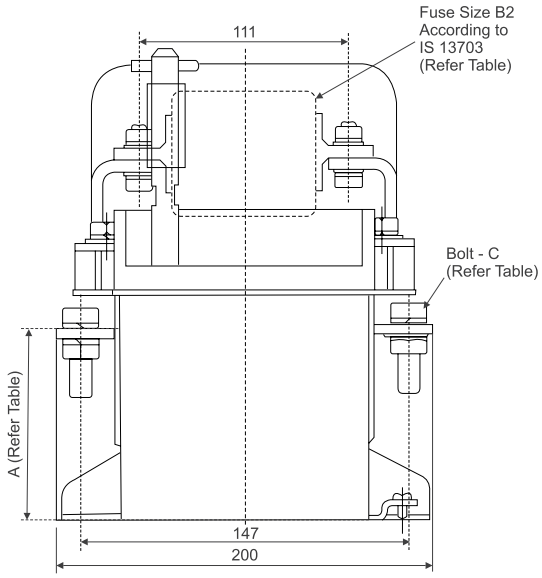
Note : All dimensions are in mm.

Overall Dimensions FN 315 / 400

Switch-Disconnector-Fuse (suitable for BOLTED type fuses)

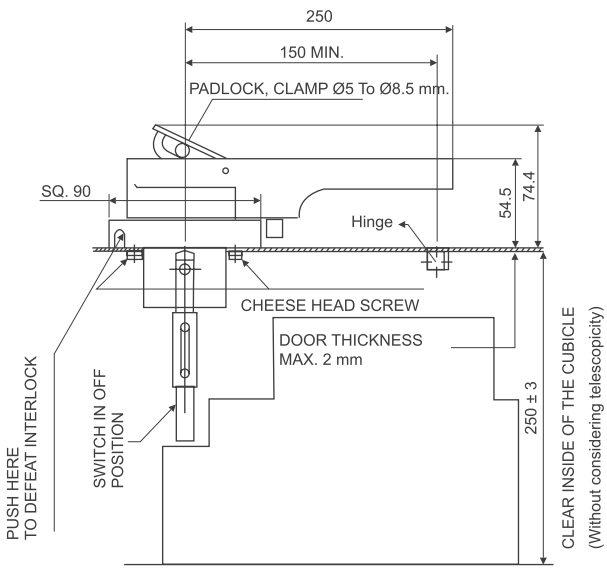
› SDF - FN 315 / 400 TPN





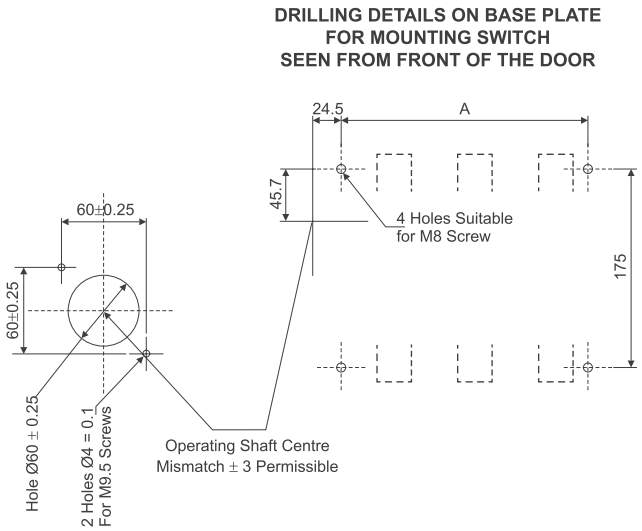
Rating	E
FN 315/250H	195
FN 400	235

› Assembly of handle coupling on door



› Drilling details on door for mounting handle coupling

Seen from front of the door



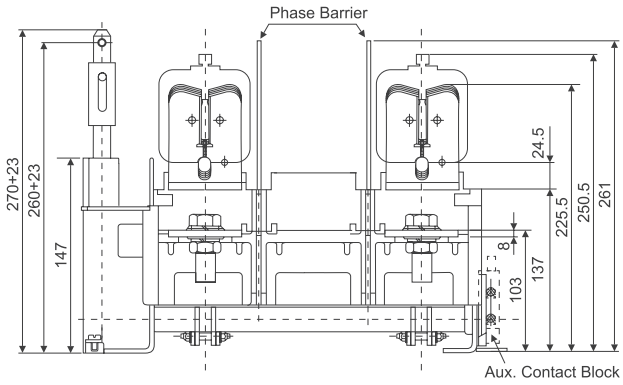
Dimensions	For 2P & 3P Switches	For 4P Switches
A	215	285

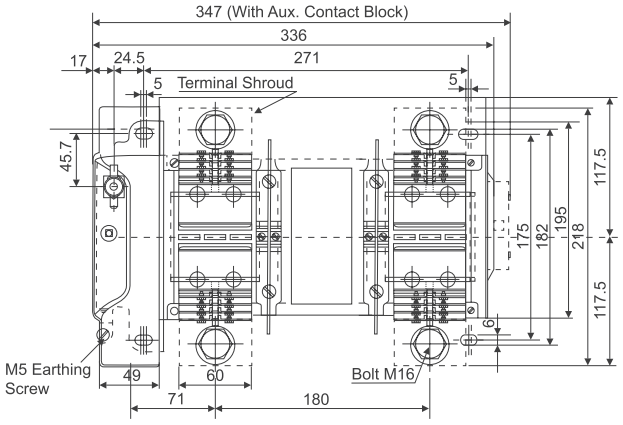
Note : All dimensions are in mm.

Overall Dimensions FN 630 / 800

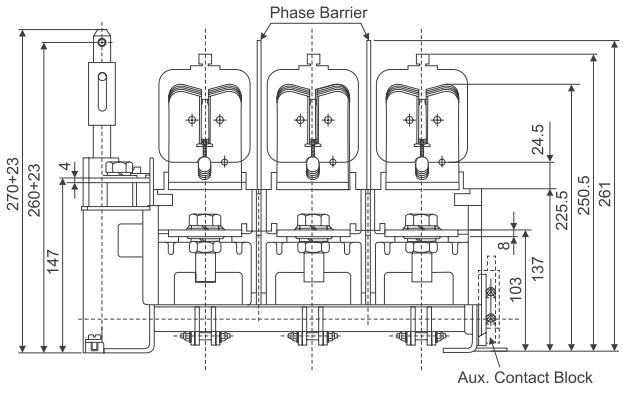
Switch-Disconnector-Fuse (suitable for DIN type fuses)

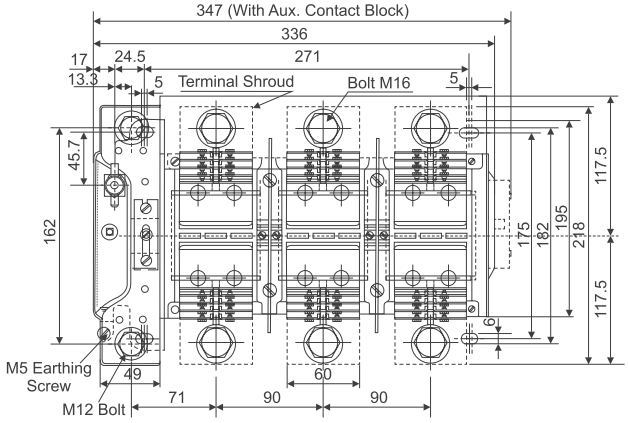
› SDF - FN 630 2P





› SDF - FN 630 TPN

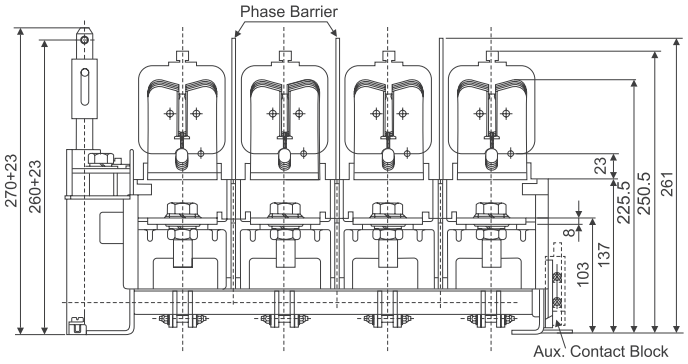


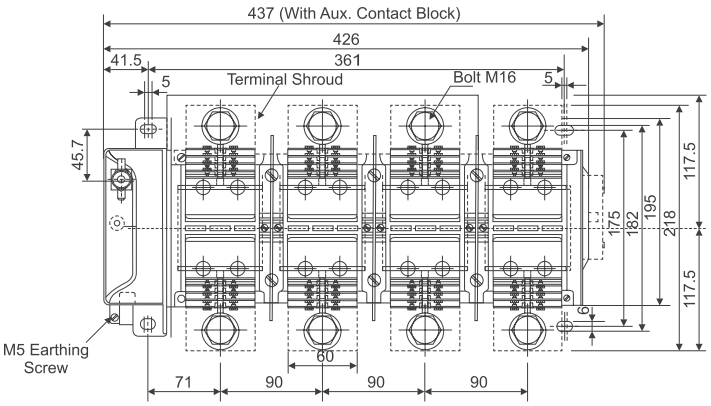


Note : All dimensions are in mm.

Overall Dimensions FN 630 / 800

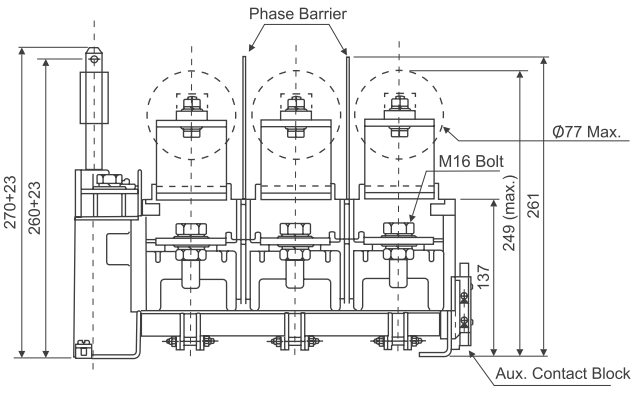
› **SDF - FN 630 4P**

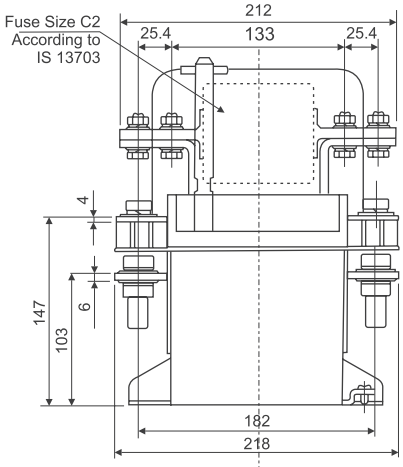


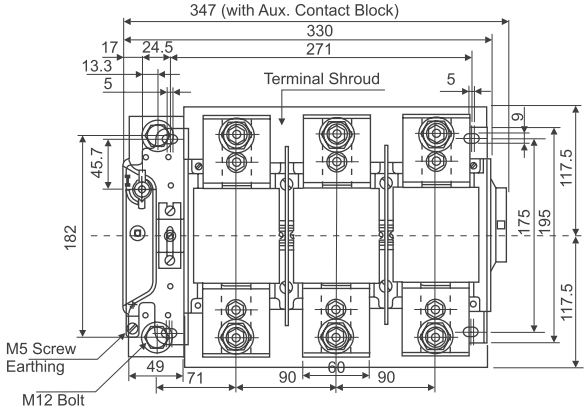


Switch-Disconnector-Fuse (suitable for BOLTED type fuses)

› **SDF - FN 630 TPN**



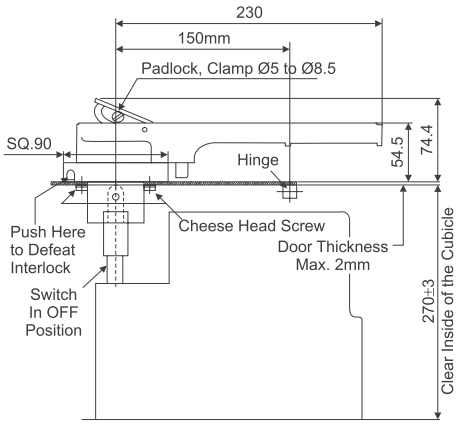




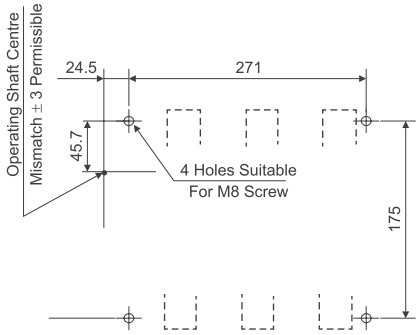
Note : All dimensions are in mm.

Overall Dimensions FN 32 / 63

Assembly of Handle Coupling on Door



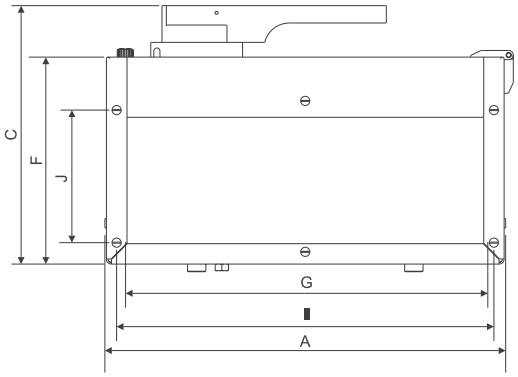
Drilling Details on Base Plate for Mounting Switch Seen From Front of the Door

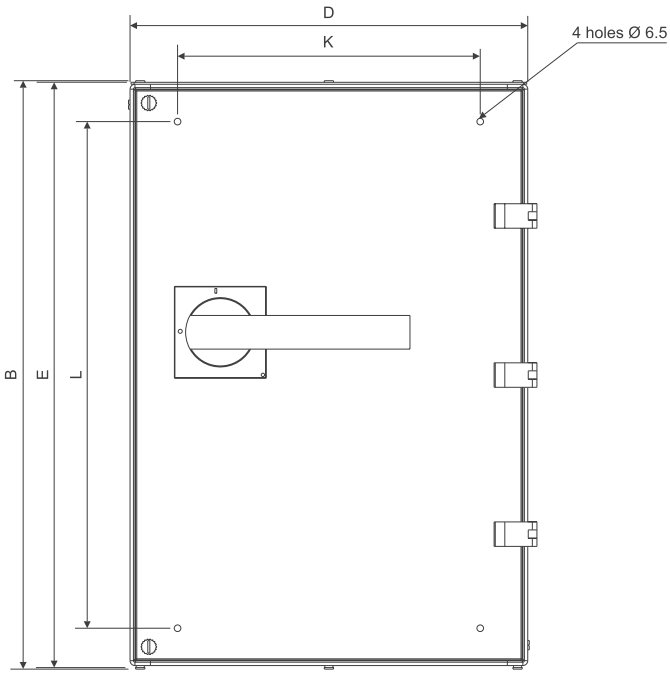


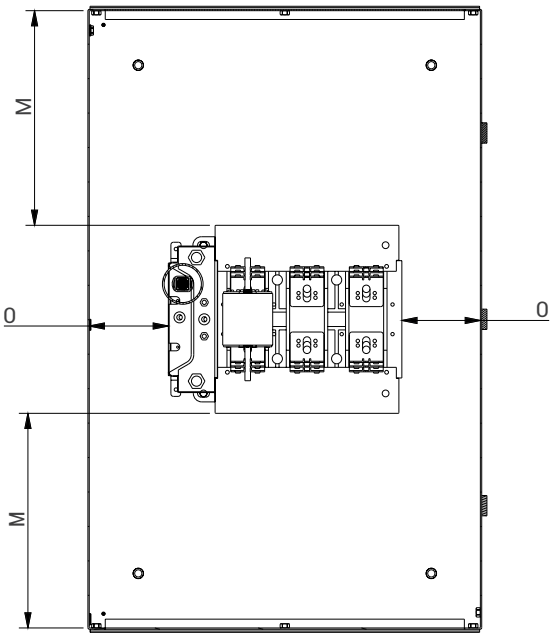
Switch Type	A
2P & 3P	271
4P	361

Note : All dimensions are in mm.

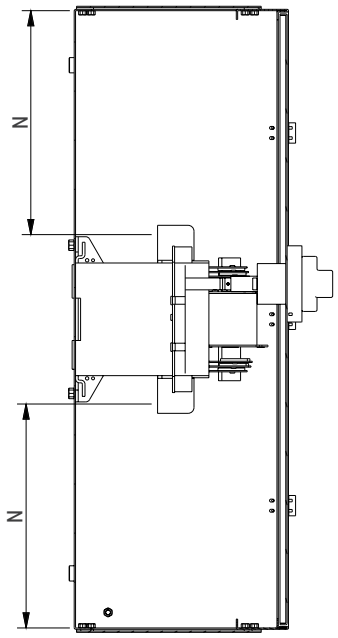
FN in Sheet Steel Enclosure







Section A-A

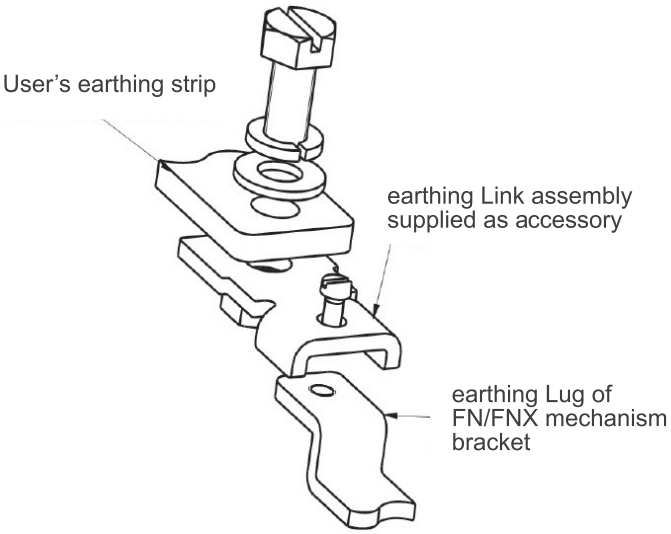


Section B-B

Type	Extreme overall dimension			Basic enclosure dimension			Cutout for Cables		Gl and Plate mounting dimension		Enclosure mounting dimension				
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
FN 32 / 63	277	325	196	262	310	153	222	108	242	113	160	230	75	105	73
FN 100 / 125 / 160	330	448	245	315	433	183	275	108	295	113	213	350	92	132	54
FN 200 / 250	405	585	265	390	570	203	350	130	370	130	213	350	175	171	46
FN 315 / 400	480	747	315	465	732	253	425	171	445	180	346	600	250	264	90
FN 630 / 800	480	747	337	465	732	273	425	171	445	180	346	600	246	255	63

Note : All dimensions are in mm.

Earthing Link Assembly



The earthing link is to be connected to the earth terminal.

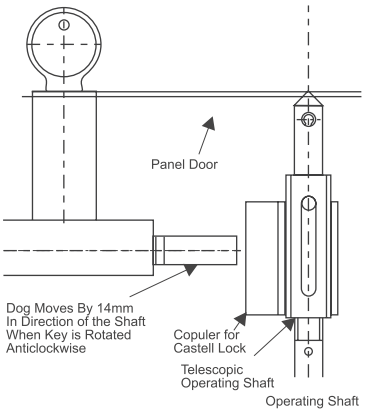
Now, an increased area is available for terminating earth busbar upto 25 mm width.

Note: The earthing link is available as an accessory.
All the necessary hardware is provided with the product

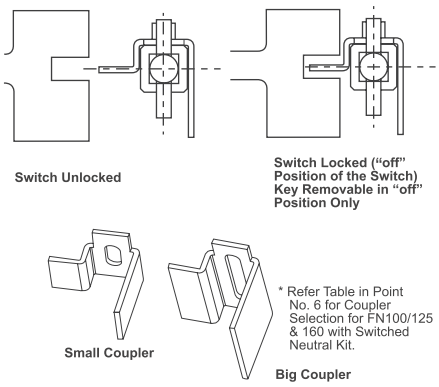
Applicable for ratings, 125A to 1000A		
CAT no.	Order Qty	No. of earthing links
Ck903960000	1	10

Assembly of Castell Lock with Telescopic Shaft

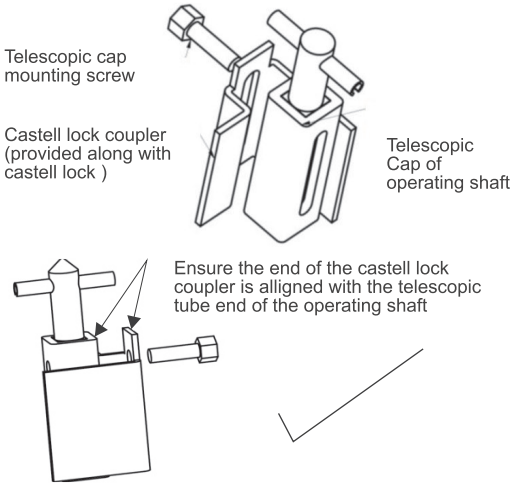
› Arrangement of Castell Lock Inside the Panel



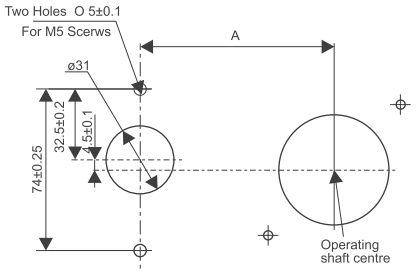
› Castell Lock Positions with Telescopic Shaft



› Mounting of Castell Lock Coupler

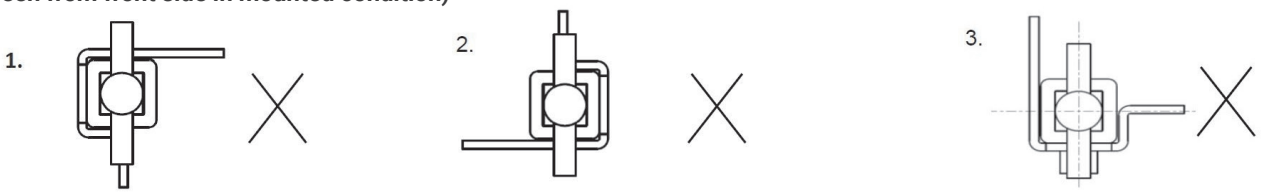


› Drilling Details on Door for Castell Lock



Suitable for	Cat no.	Dim. A
160/200/250 FN 100/125	SK00333	88±0.25
	SK00334	
	SK00335	
	SK00336	
FN 315/400/ 630/800	SK00345	95.5±0.25
	SK00346	
	SK00347	
	SK00348	

› Wrong method of assembly (as seen from front side in mounted condition)



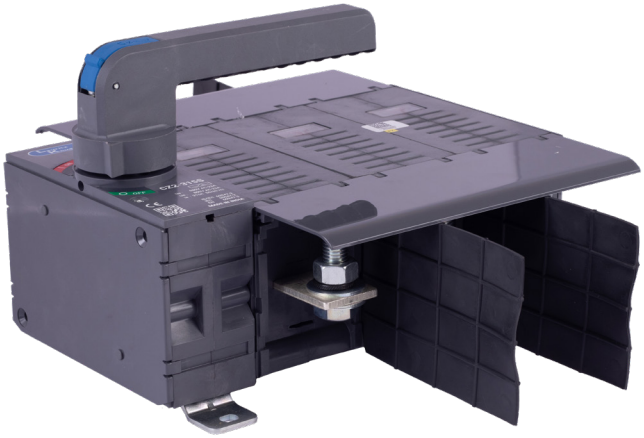
› Coupler selection guide for FN 100/125/160**

Product	Castell Lock No.	Switched Neutral Kit used	Shaft telescopicity used	Castell lock Coupler to be used
FN 100/125/160	SK00333	Yes	No	Small
			Yes	Big
	SK00334		No	Small
			Yes	Big
	SK00335		No	Small
			Yes	Big
	SK00336		No	Small
			Yes	Big
	SK00333	NO	No	Big
			Yes	
	SK00334		No	
			Yes	
	SK00335		No	
			Yes	
	SK00336		No	
			Yes	

** Small coupler not required for FN200/250

Note : All dimensions are in mm.

Contents



CZ Switch Disconnectors

E&A now offers wide range of Switch-Disconnectors suitable for multitude of applications like power distribution, isolation in solar power plants, local ON/OFF control for machines & motor, to name a few. Available in both open and ready to use SS enclosure versions, the CZ Switch Disconnectors are easy to install, operate and inspect. Armored with safety features like terminal shrouds, phase barriers & door interlock, the CZ Switch Disconnectors are designed to battle against accidental faults and inadvertent operations. Robust construction allows to withstand higher fault currents without any deterioration.

Designed For Indian Ambient Conditions

CZ Switch Disconnectors are rugged and suitable to carry rated current at high temperatures experienced in Indian Sub-Continent. Also, the terminals are designed to accommodate Aluminum cables/bus bars.

Safety Guaranteed

CThere is no benefit of the doubt allowed when it comes to safety. Terminal shrouds protect against accidental human contact with the live terminals, phase barriers stand in line of any phase to phase flashovers and high ground clearance eliminates any possibility of grounding live cables/links.

Different Operational Voltages For Different Needs

CZ family of Switch Disconnectors have dedicated range for different voltages (upto800V AC, 1000V DC, 1500V DC). While power distribution normally requires 415V ac rated SDs, other applications like metal furnaces require 690V ac SDs. Also, 800 Vac and 1500 Vdc SDs are common requirement in Solar applications.

Diverse Needs, Varied Options

Both direct and extended handle versions are available to meet diverse application needs. The extended or panel mounted handle is IP54 rated for extreme external environment. Also, the length of the extended shaft can be adjusted to align with different panel sizes.

Contact System & Mechanism

CZ SDs have modular construction with separate cassettes for mechanism and contact system. Contact system cassette (pole assembly) consists of rotor assembly housing moving contacts, terminals and arc-chutes. The contact system is double break knife type. Mechanism is quick make-quick break and multi -cams type for smooth and efficient torque transmission. Moreover, the contacts are visible through transparent window section to know actual status of contact system

For A Sustainable Future

All the materials used for components, welding and plating on metallic components are RoHS compliant. Material used for packaging is recyclable.

Accessories

a) Auxiliary Contacts

Upto 2nos. 1NO + 1NC can be fitted for ON/OFF status indication. The auxiliary contacts module is front mounted, plug-in type and can be fitted at the site. Auxiliary contacts actuation is from the main mechanism shaft. Addition of these contacts does not alter over-all dimensions of the switch.

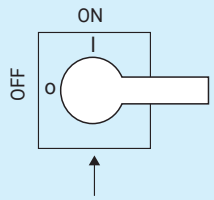
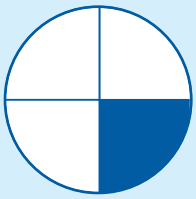
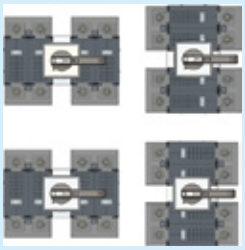
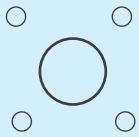
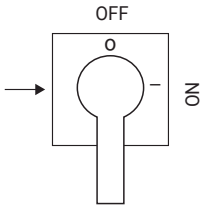
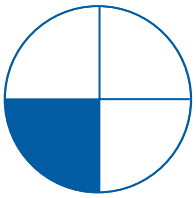
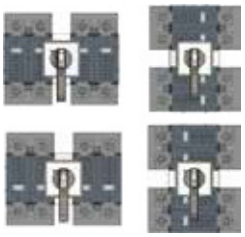
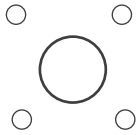
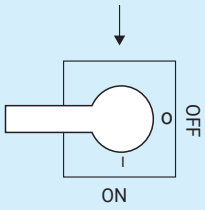
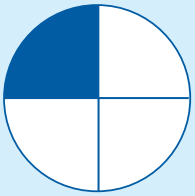
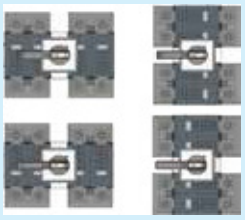
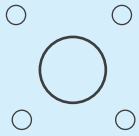
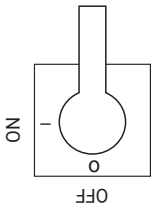
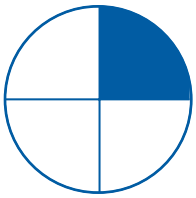
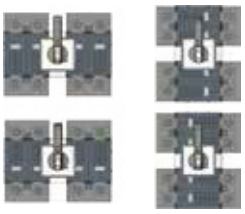
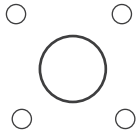
b) Castell Key Lock

The CZ SDs can be interlocked with the help of Castell locks.

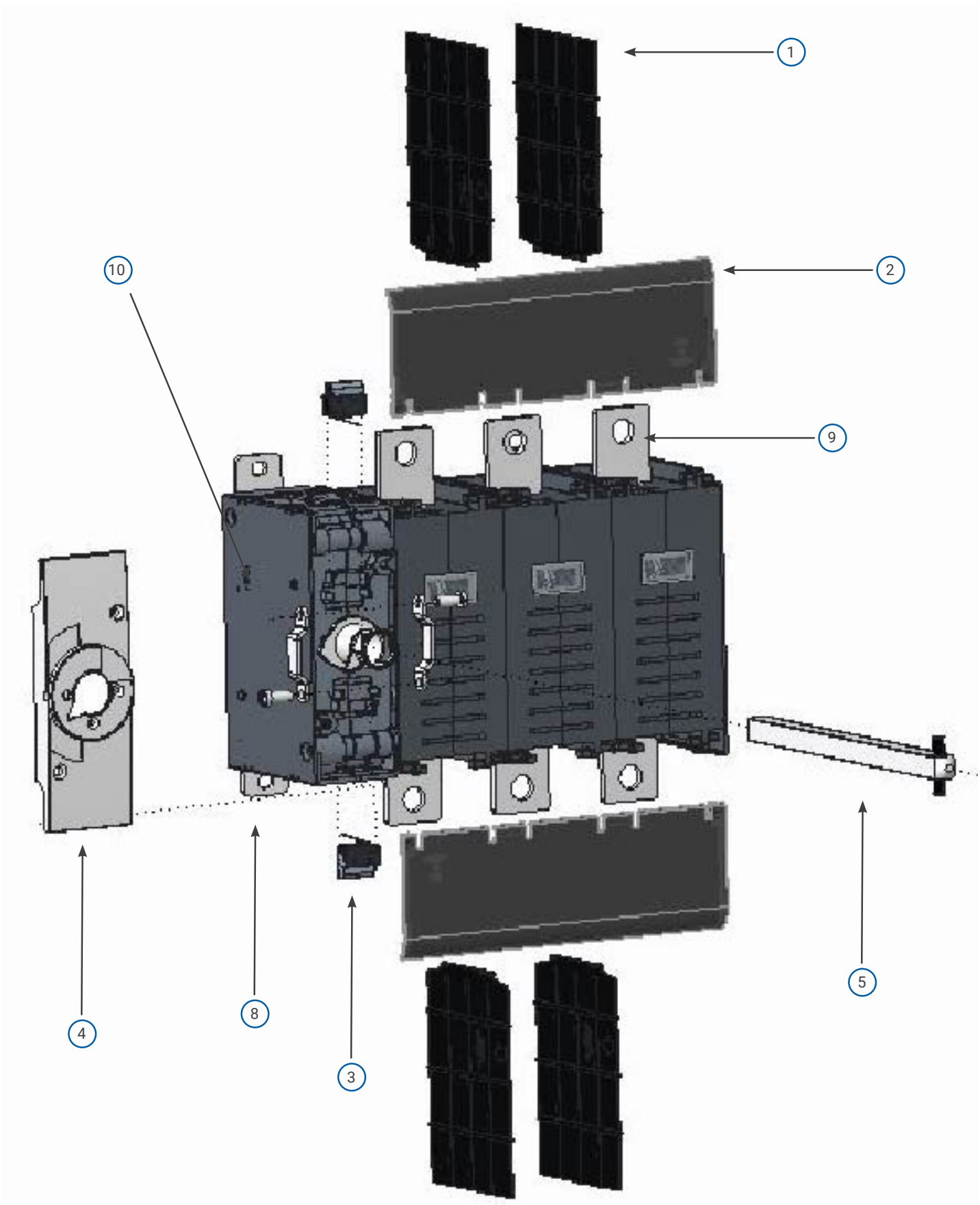
Product Range

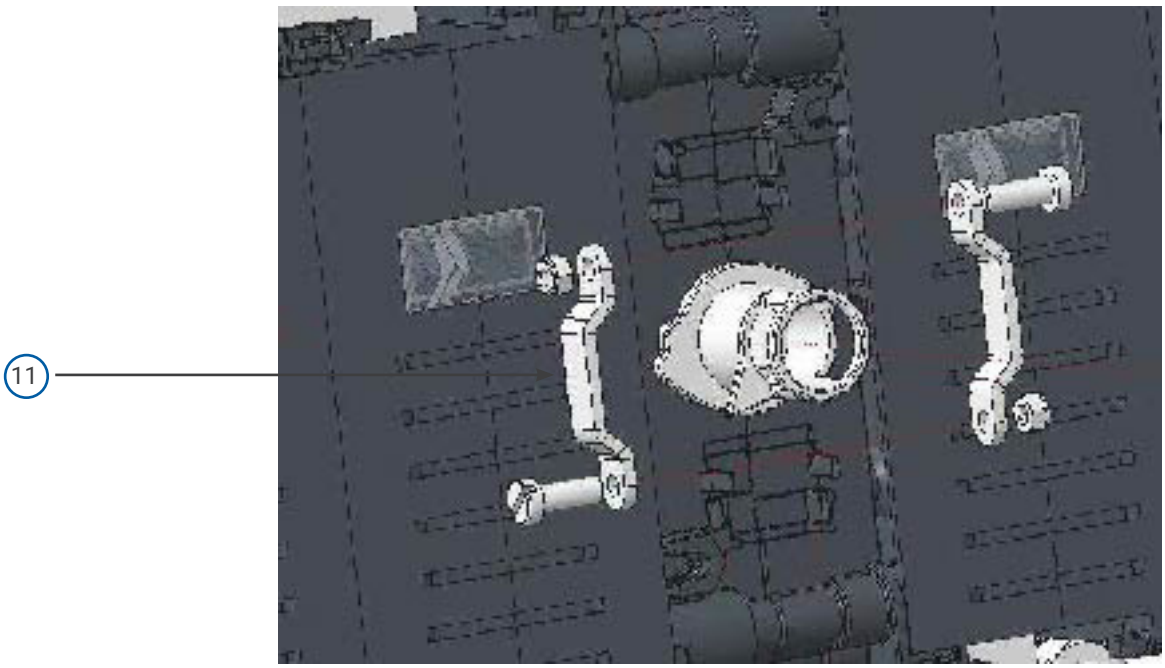
Product Range and Versions	Voltage	No. of poles	Handle Type	% saving in electricity consumed
CZ Switch Disconnector	800 Vac	2P	Extended	Front Operated, Side
	800 Vac	3P	Direct	Front Operated, Side
	800 Vac	3P	Extended	Front Operated, Side
	800 Vac	4P	Direct	Front Operated, Center
	800 Vac	4P	Extended	Front Operated, Center

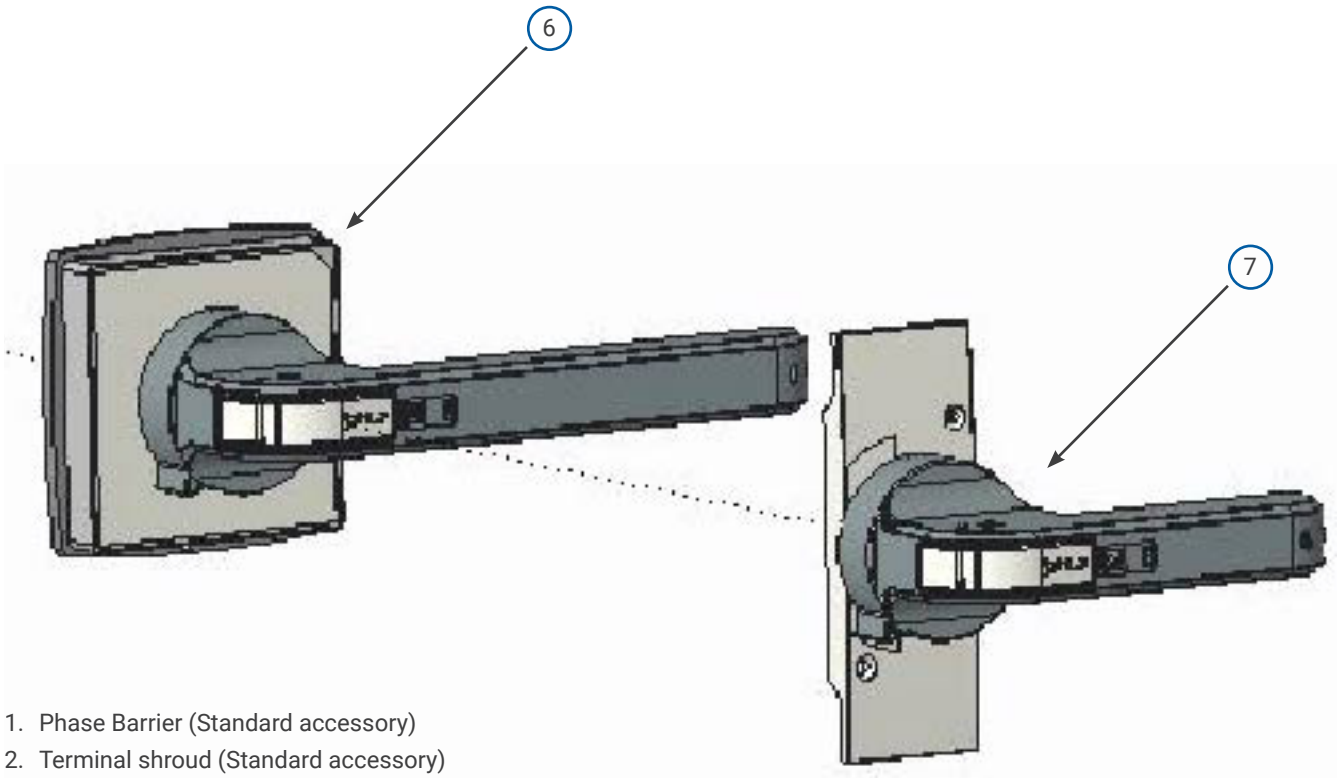
Universal Mounting

Sr. No.	Handle (OFF) Position	Operating Quadrant (hand)	Switch Orientation	Door Cut-out	Shaft Position
1					
2					
3					
4					

Detailed View







1. Phase Barrier (Standard accessory)
2. Terminal shroud (Standard accessory)
3. Auxiliary Contact (Optional accessory)
4. Front cover
5. Extended shaft
6. Extended Handle
7. Direct Handle
8. Mounting bracket
9. Terminals
10. Shaft locking arrangement
11. Detailed view of shaft locking arrangement

Technical Specification for AC Switch Disconnectors

			125A	160A
Model			**CZ-1**	**CZ-1**
Compliance to Standards				
No. of Poles			2,3,4	2,3,4
Conventional enclosed thermal current (Ithe)	40°C	A	125	160
	50°C	A	125	160
Pollution Degree			3	3
Rated Operational Voltage (Ue, Max)		V	800	800
Rated Impulse withstand voltage (Uimp)		kV	12	12
Rated Insulation voltage (Ui)		V	1250	1250
Rated Frequency		Hz		
Rated Operational Current (Ie)	AC-23A at 690Vac	A	125	160
Rated Operational Current/Poles in Series; DC 21B	220Vdc	A	125/1	160/1
	440Vdc	A	125/2	160/2
Rated Short Time Withstand Current (Icw, rms)	1 Sec	kA	8	8
	0.15 sec	kA	15	15
	0.25 Sec	kA	15	15
Rated Short Circuit Making Capacity (Icm, Peak)		kA	30	30
Rated Conditional Short-Circuit Current (Iq, Peak)		kA	100	100
Rated Breaking Capacity	AC-23A at 690 Vac	kA	1.0	1.3
Rated Operational Power, AC-23A	At 415V	kW	75	90
	At 690V	kW	110	160
Power Loss/Pole		W	1.8	2.9
Operational Performance capability	Electrical	Nos.	2000	2000
	Mechanical	Nos.	20000	20000
Operating Torque		N-m	9	9
Maximum Termination Capacity	Lug Size	mm2	2 X 185	2 X 85
	Link Size	mm2	2 X 35 X 10	2 X35 X10
Terminal Bolt size			M10	M10
Terminal Tightening Torque		N-m	20	20
Weight	4P	kg	2.4	2.4

200A	250A	315A	315A	400A	630A
CZ-1	CZ-1	CZ-1	CZ-2	CZ-2	CZ-2
IEC 60947-3, IS/IEC 60947-3, EN 60947-3					
2,3,4	2,3,4	2,3,4	2,3,4	2,3,4	2,3,4
200	250	315	315	400	630
200	250	315	315	400	630
3	3	3	3	3	3
800	800	800	800	800	800
12	12	12	12	12	12
1250	1250	1250	1250	1250	1250
50/60					
200	250	315	315	400	630
200/1	250/1	315/1	315/1	400/1	630/1
200/2	250/2	315/2	315/2	315/2	630/2
8	8	10	16	16	20
15	15	15	31	31	38
15	15	15	24	24	36
30	30	30	45	45	45
100	100	100	100	100	100
1.6	2.0	2.5	2.5	3.2	5.0
110	132	160	160	200	355
180	200	250	250	355	600
4.6	7.1	11.3	7.5	12.2	23.8
2000	2000	2000	2000	2000	2000
20000	20000	20000	20000	20000	20000
9	9	9	18	18	20
2 X 185	2 X 185	2 X 240	2 X 300	2 X 300	2 X 300
2 X 35 X 10	2 X 35 X 10	2 X 35 X 10	2 X 50 X12	2 X 50 X12	2 X 50 X12
M10	M10	M12	M12	M12	M12
20	20	20	27	27	27
2.4	2.4	2.4	4.6	4.6	5.1

Ordering Information

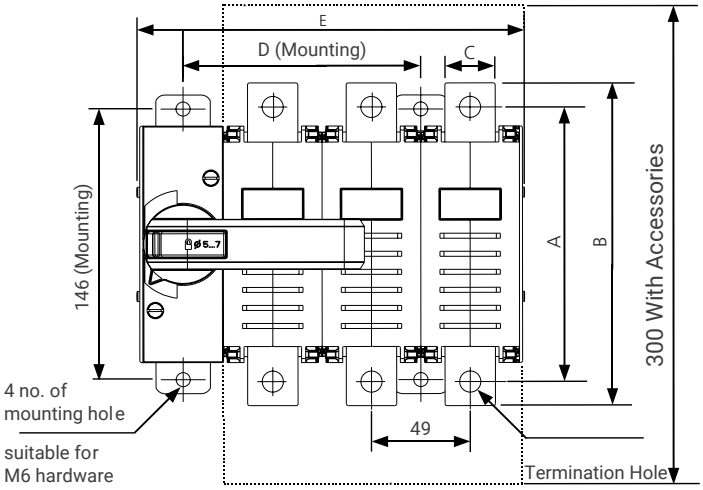
Version	Frame Size	Current Rating(A)	Voltage	No. of poles	Handle type	Mechanism Position	CAT no.
CZ SD Open Execution SD CZ SDSS enclosure	1	125A	800Vac	4P	P	Front, Center	CK90769 OOOO
	1	160A	800Vac	4P	P	Front, Center	CK90770 OOOO
	1	200A	800Vac	4P	P	Front, Center	CK90771 OOOO
	1	250A	800Vac	4P	P	Front, Center	CK90772 OOOO
	1	315A	800Vac	4P	P	Front, Center	CK90773 OOOO
	2	315A	800Vac	4P	P	Front, Center	CK90857 OOOO
	2	400A	800Vac	4P	P	Front, Center	CK90858 OOOO
	2	630A	800Vac	4P	P	Front, Center	CK90859 OOOO
CZ SD SS enclosure	1	125A	800Vac	4P	P	Front, Center	CK90819OOOO
	1	160A	800Vac	4P	P	Front, Center	CK90820OOOO
	1	200A	800Vac	4P	P	Front, Center	CK90821OOOO
	1	250A	800Vac	4P	P	Front, Center	CK90822OOOO
	1	315A	800Vac	4P	P	Front, Center	CK90823OOOO
	2	315A	800Vac	4P	P	Front, Center	CK90878OOOO
	2	400A	800Vac	4P	P	Front, Center	CK90879OOOO
	2	630A	800Vac	4P	P	Front, Center	CK90880OOOO
CZ	1 & 2	125A to 630A	800Vac	2P	P	Front, Side	-
			800Vac	3P	P	Front, Side	
			800Vac	3P	D	Front, Side	
			800Vac	4P	D	Front, Side	
CZ Auxiliary Contact Kit (1 C/O contact)	1 & 2	125A to 630A	-	-	-	-	CK90805OOOO

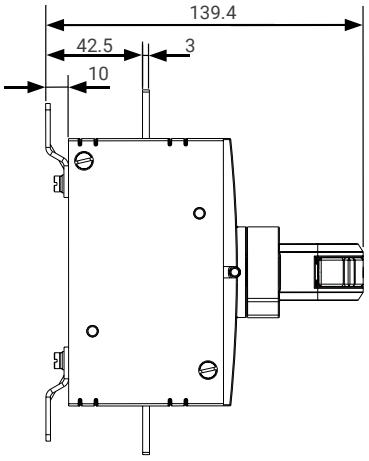
P-Extended handle suitable for panel door mounting
D-Direct handle suitable for direct mounting on the product

Notes:
* Please contact our nearest branch office for further details
Separate offerings for Solar applications (800Vac and 1000Vdc/1500Vdc) are also available.

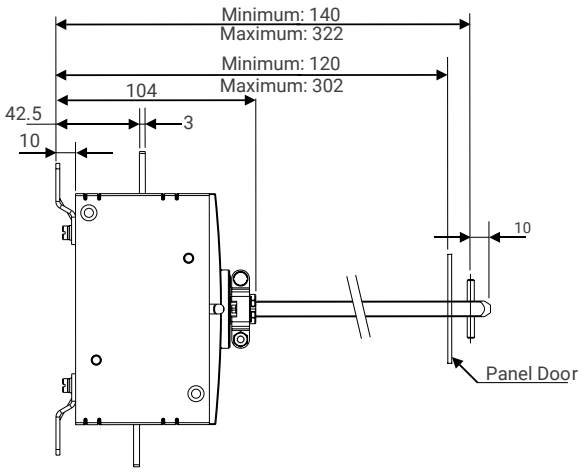
Overall Dimensions

› **CZ1 AC SD 125/160/200/250/315A**





Direct Handle Version



Panel Handle Version

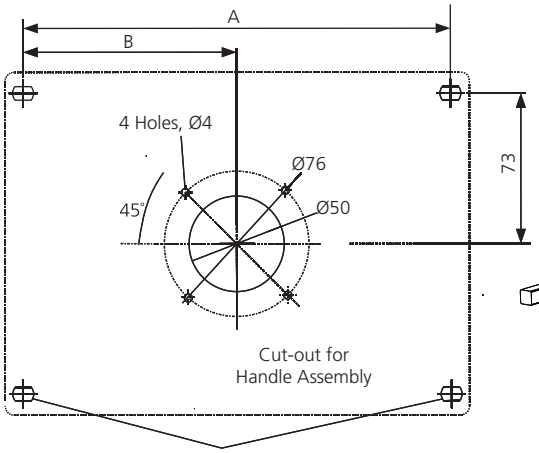
Rating (A)	No. of poles	A	B	C	D	E	Hardware suitable for termination
125-250	2P	137	161	25	69	144	M10
	3P	137	161	25	118	193	
	4P	137	161	25	138	242	
315	2P	150	180	35	69	144	M12
	3P	150	180	35	118	193	
	4P	150	180	35	138	242	

Overall Dimensions

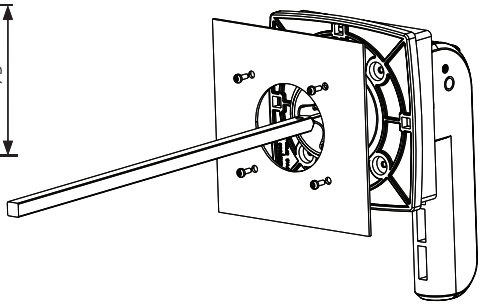
› **CZ1 AC SD 125/160/200/250/315A**

Panel Cutout

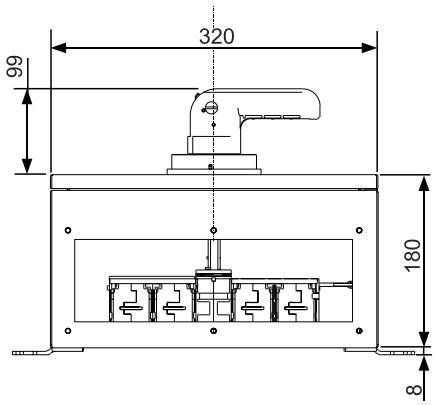
No. of Poles	A	B
2P	69	0
3P	118	0
4P	138	69

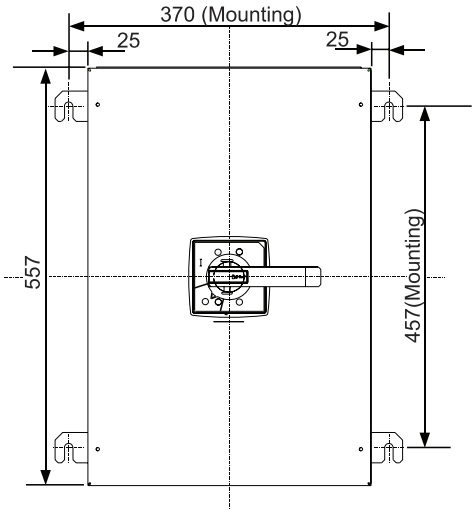


Swich Mounting Holes

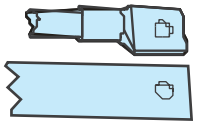


Enclosure size and enclosure mounting





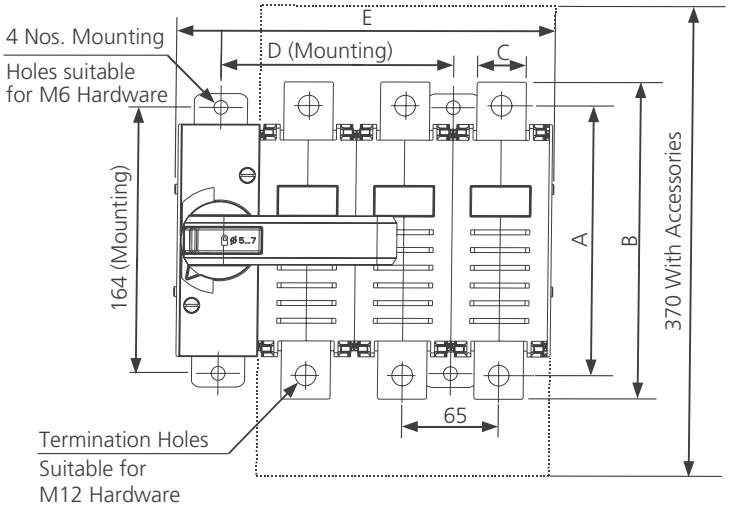
Termination Capacity

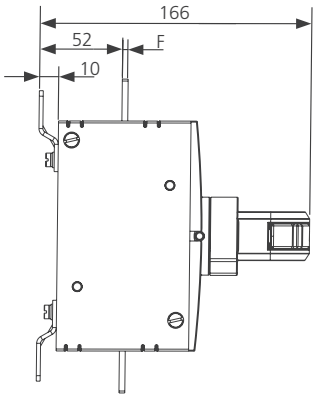
			125/160/200/250A	315 A
	TERMINATION CAPACITY AS PER STANDARD	Cable With Lug	1 X185mm²	1X240 mm²
	MAXIMUM TERMINATION CAPACITY	Cable With Lug	2 X185mm²	2 X 240mm²
		Busbar*	2 X 35mm X 10mm	2 X 35mm X 10mm
	TIGHTENING TORQUE		MAX 20 N-m AT TERMINATION	MAX 20 N-m AT TERMINATION

Note: For Aluminum cable, Tin plated lugs are recommended.
Termination bolt head should be on bottom side as shown in figures
*: Higher length (M10 X 40 for 250A; M12 X 40 for 315A) of termination bolt required to connect 2 busbar of 10mm.

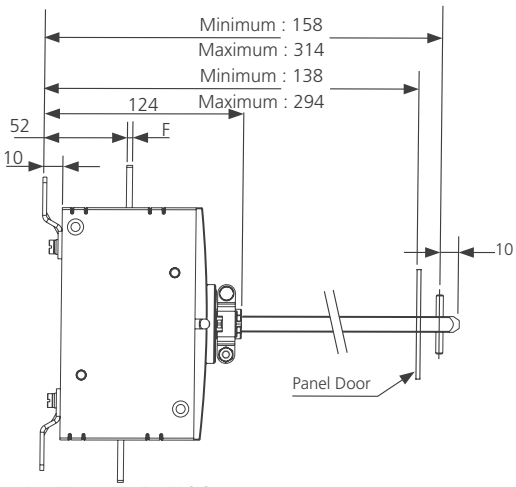
Overall Dimensions

› **CZ2 AC SD 315/400/630A**





DIRECT HANDLE VERSION



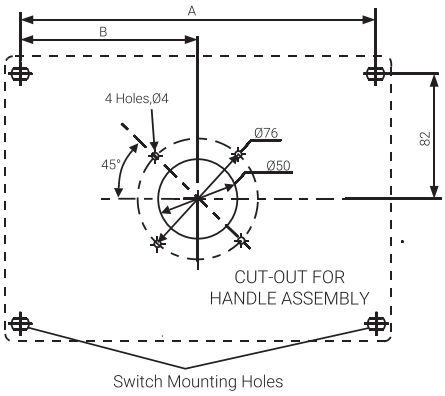
PANEL HANDLE VERSION

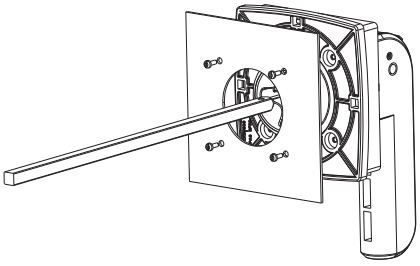
Rating (A)	No. of Poles	A	B	C	D	E	F
315/400	2P	181	206	32	90	186	4
	3P	181	206	32	155	251	4
	4P (SIDE)	181	206	32	220	316	4
	4P (CENTRE)	181	206	32	180	316	4
630	2P	184	222	45	90	186	5
	3P	184	222	45	155	251	5
	4P (SIDE)	184	222	45	220	316	5
	4P (CENTRE)	184	222	45	180	316	5

Overall Dimensions

› **CZ1 AC SD 125/160/200/250/315A**

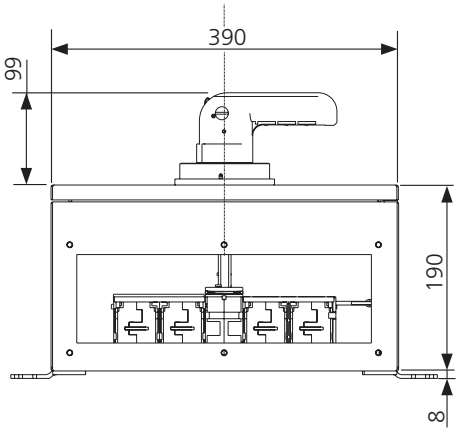
Panel Cutout

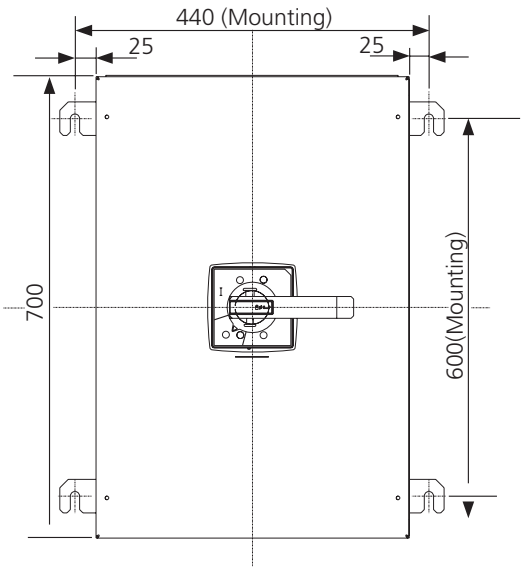




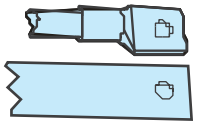
No. of Poles	A	B
2P	90	0
3P	155	0
4P - SIDE	220	0
4P - CENTER	180	90

Enclosure size and enclosure mounting





Termination Capacity

			315/400A	630A
	TERMINATION CAPACITY AS PER STANDARD	Cable With Lug	2 X150mm²	2 X 300mm²
		Busbar*	2 X 25mm X 10mm	2 X 30mm X 12mm
	MAXIMUM TERMINATION CAPACITY	Cable With Lug	2 X 300mm²	2 X 300mm²
		Busbar*	2 X 50mm X 12mm	2 X 50mm X 12mm
	TIGHTENING TORQUE		MAX 27 N-m AT TERMINATION	MAX 27 N-m AT TERMINATION

Note: For Aluminum cable, Tin plated lugs are recommended.
Termination bolt head should be on bottom side as shown in figures

Contents

Product Range

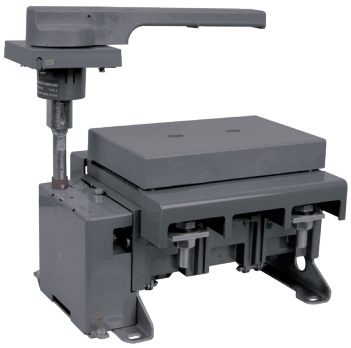
FN & **C-line** offers you a unique series of Switch-Disconnector combining compactness with high performance & Customer convenience.

Range covers ratings from 32 A to 2000 A in 6 frame sizes.

Versions

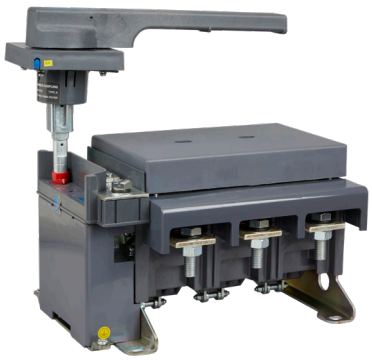
2P FN S-D suitable for open execution

The 2P FN S-D range is available from 32 A to 1000 A, suitable for 220V DC application.



TPN FN S-D suitable for open execution

The TPN FN S-D range is available from 32 A to 1000 A, suitable for 415/690V AC & 440V DC application.

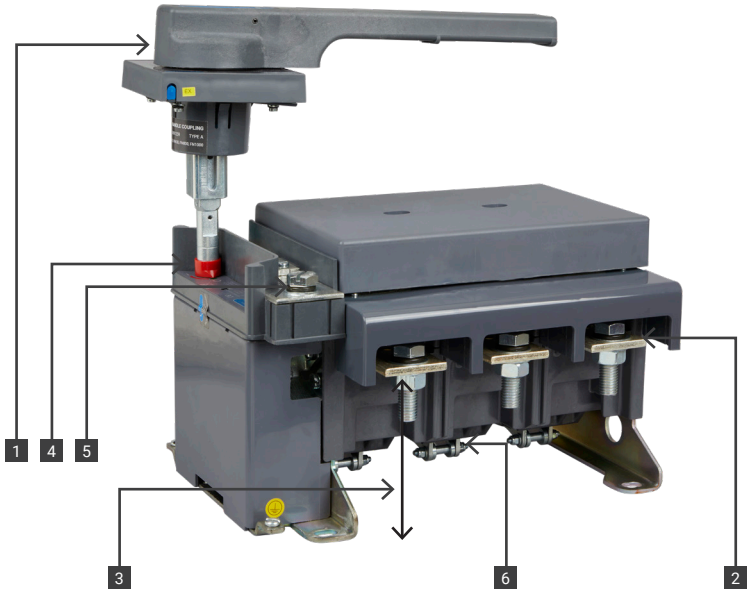


TP & FP C-line S-D suitable for open execution

The 3P & 4P C-line S-D range is available from 1000 A to 2000 A, suitable for 690V AC & 440V DC application.

Type Frame No.	Frame No.	Ratings (A)			
I	I	32	63	-	-
	II	100	125	-	-
	FN m	200	250	-	-
	IV	315	400	-	-
	V	630	800	1000	-
C-Line	VI	1000	1250	1600	2000

FN S-D Product Features



1. Handle

The FN Switch has a unique operating handle with the following features.

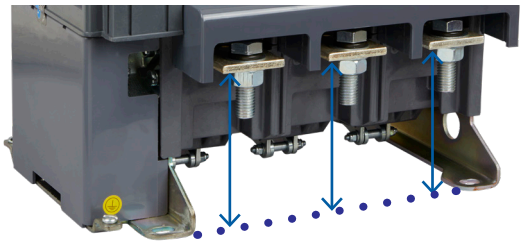
- Door interlock for safety of operating personnel when switch is 'ON'. The interlock can be defeated if required
- Built-in padlocking arrangement to lock the unit in 'OFF' position
- The handle coupling can take a mismatch or ± 3mm in all directions
- IP54 with extended operating handle

2. Maximum termination capacity

FN switch range provides generous terminal capacity in its compact size, facilitating aluminium termination.

3. Ground clearance

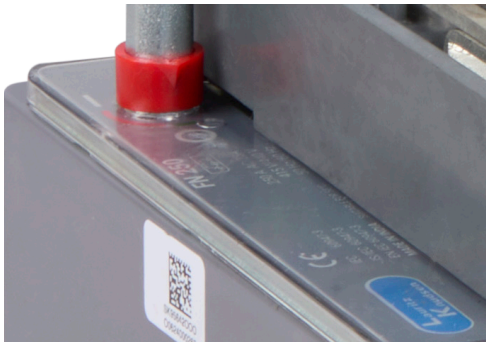
Higher ground clearance between terminals and mounting base plate ensures adequate clearance even after connecting cables. This eliminates the possibility of phase to ground flash over.



Product Range

4. Positive ON / OFF indication of S-D

The FN Switch indicates true position of contacts.
(By a red pointer)

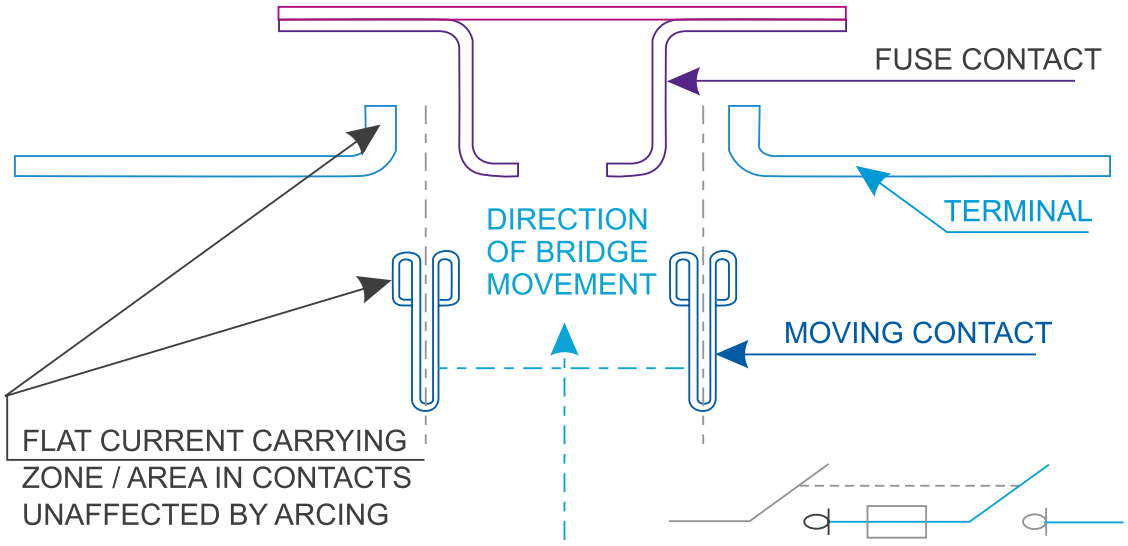


5. Built-in neutral

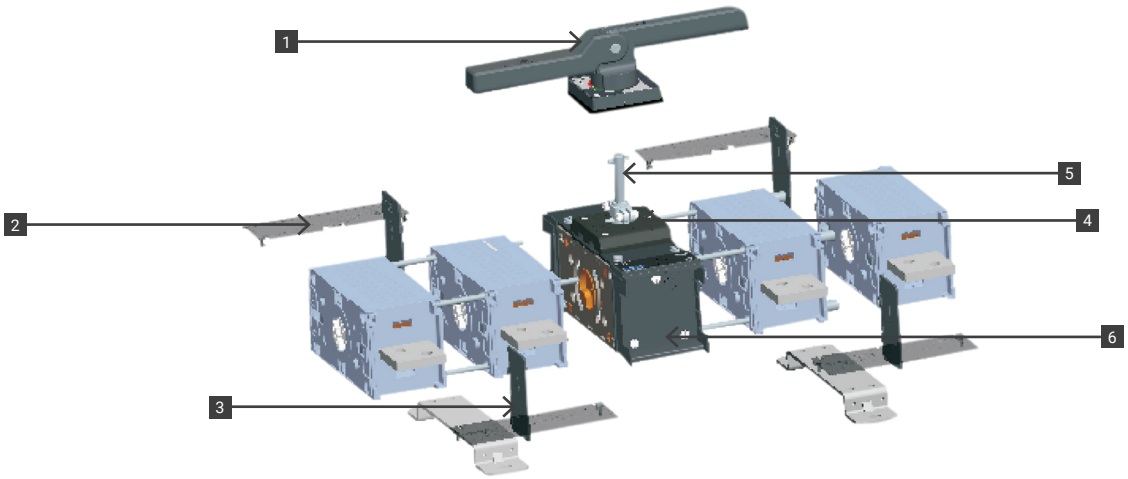
The FN TPN Switch consists of an integral neutral, making the units suitable for 3 phase, 4-wire application.
FN 32 / 63 has switched neutral while higher ratings have isolable neutral. (For higher ratings switchable neutral kit is available as an accessory)

6. Contact system

Contact system is QUAD BREAK. There are number of parallel moving contacts per pole per break. Hence, better arc quenching & more electrical life of contacts. Each pole has separate bridge carrying the moving contacts, achieving a high order of inter phase separation & avoiding phase-phase flash over.



C-Line SD
Product Features



1. Handle

The C-line Switch has a unique flip-able operating handle which enables user to operate the switch with two hands. The handle also offers the following.

Features:

- Door interlock for safety of operating personnel when switch is 'ON'. The interlock can be defeated if required
- Built-in padlocking arrangement to lock the unit in 'OFF' position with 3 padlocks of 05 to 07
- IP54 with extended type operating handle

2. Terminal shroud

These shrouds provide complete touch proof design and prevent accidental touching of live terminals. They are click fit type. Due to the hinge type terminal shrouds, it can be turned by 90 degree, hence terminals can be inspected without removing these shrouds.

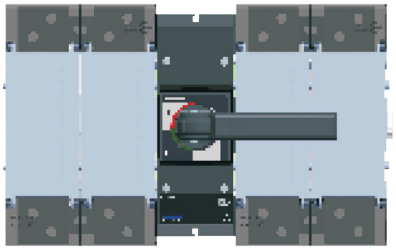
Product Range

3. Inter-phase barriers

Inter-phase barriers are provided for additional safety to eliminate possibility of inter-phase short-circuit.

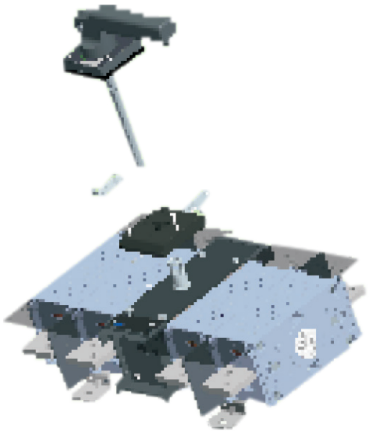
4. Positive ON / OFF indication of S-D

The C-line Switch indicates true position of contacts.



5. Depth adjustable operating shaft

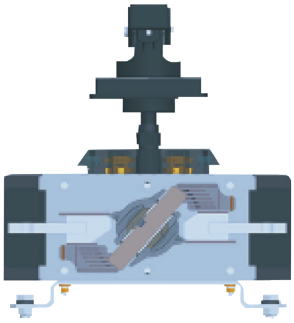
The C-line Switch depth can be varied and fixed as per requirement during the installation which is possible due to stepless adjustment of operating shaft.



6. Mechanism and Contact System

Contact system is of double break, knife type having self wiping action with electrodynamic compensation. This ensures reliable performance during normal as well as short circuit fault conditions, offering higher short-time withstand rating.

C-line switch offers high electrical and mechanical life in compact size. The electrical and mechanical life are two times the requirement of the standard.



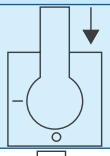
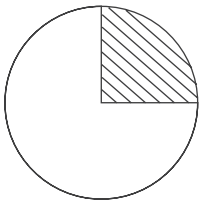
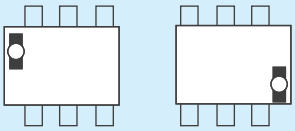
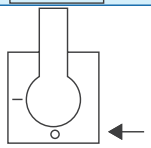
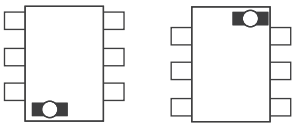
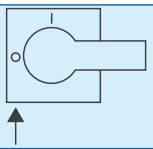
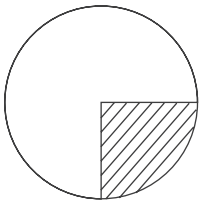
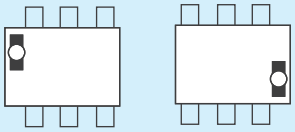
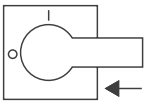
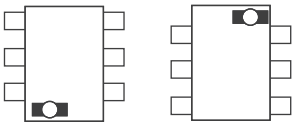
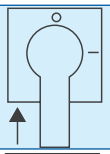
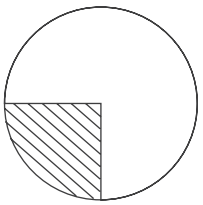
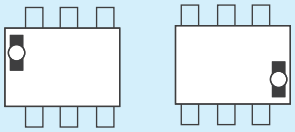
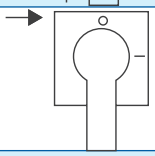
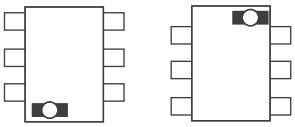
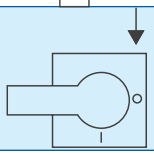
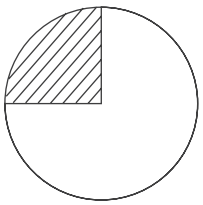
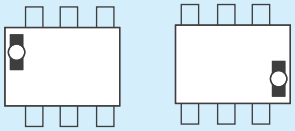
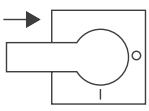
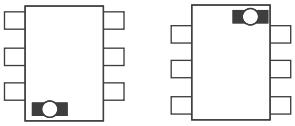
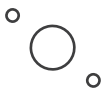
Universal Mounting

FN & C-line switch range offers a distinctive feature to mount S-D in different quadrants. This feature aids mounting flexibility.

FN S-D operating quadrant chart
(Seen from front of the door)

In FN Switch universal mounting is achieved by Type A and Type B handle.

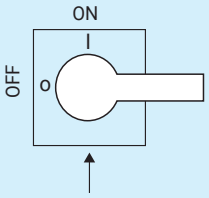
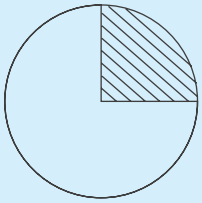
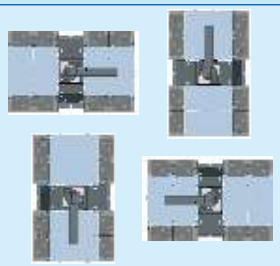
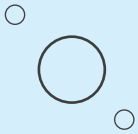
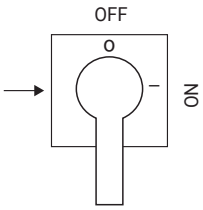
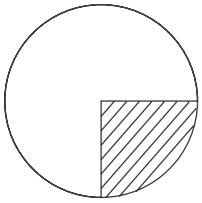
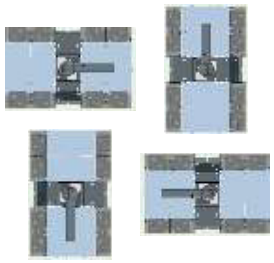
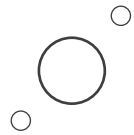
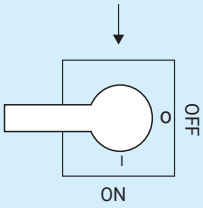
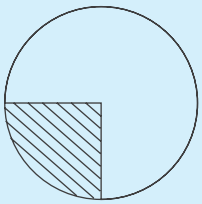
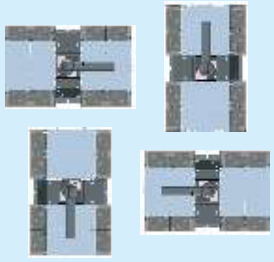
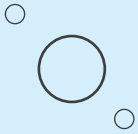
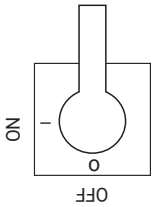
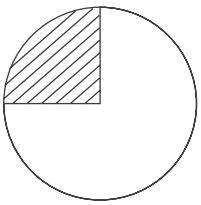
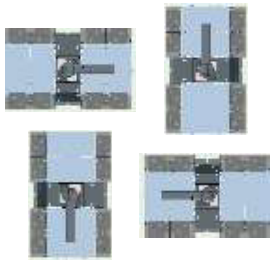
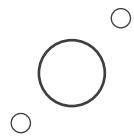
Type A : Supplied as standard with all Switches
Type B : Available as an accessory

Sr. No.	Handle (OFF) Position	Operating Quadrant (hand)	Switch Orientation	Door Cut-out	Handle Coupling Type
1					B
2					A
3					A
4					B
5					B
6					A
7					A
8					B

Note : Arrow (◄) indicates position of Interlock defeat key

Product Range

C-line S-D Operating Quadrant chart
(Seen from front of the door)

Sr. No.	Handle (OFF) Position	Operating Quadrant (hand)	Switch Orientation	Door Cut-out	Shaft Position
1					
2					
3					
4					

Technical Specifications

Frame Size		I		II		III	
Type Designation	Unit	FN 32	FN 63	FN 100	FN 125	FN 200	FN250
Reference standards	-	IEC 60947 - 3, EN 60947 - 3, IS/IEC 60947 - 3					
No. of poles	-	3P+Neutral	3P+Neutral	3P+Neutral	3P+Neutral	3P+Neutral	3P+Neutral
Neutral	-	Switchable	Switchable	Isolable	Isolable	Isolable	Isolable
Rated operational voltage (Ue)	(V AC)	415	415	415	415	415	415
Rated insulation voltage (Ui)	(V AC)	690	690	690	690	690	690
Rated impulse withstand voltage (imp)	(kV AC)	8	8	8	8	8	8
Rated frequency	(HZ)	50/60	50/60	50/60	50/60	50/60	50/60
Service temperature	(°C)	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50
Pollution degree	-	3	3	3	3	3	3
Conventional enclosed thermal current, I_{the} at 40 Deg C	(A)	32	63	100	125	200	250
Conventional free air thermal current, I_{th} at 40 Deg C	(A)	32	63	100	125	200	250
Rated operational current, I_e for AC 21 A / AC 22A	(A)	32	63	100	125	200	250
Rated operational current, I_e for AC 23A	(A)	32	63	100	125	200	250
Rated breaking capacity (436 V, cosø-0.35)	(A)	256	504	800	1000	1600	2000
Rated making capacity (436 V, cosø-0.35)	(A)	320	630	1000	1250	2000	2500
Short time withstand, I_{cw} for 1 sec	(kA)	1.5	1.5	4	4	6	8
Rated operational power for AC 23A, cosø-0.35	(kW)	15	29	47	58	93	117
Capacitor duty -415 V 50 - 60 Hz	(kVAR)	12	23	36	45	72	90
Mechanical endurance	(operating cycles)	15000	15000	15000	15000	10000	10000
Operating torque	(N-m)	4	4	4	12	20	20
Terminal Capacity							
Terminal capacity (main)	(Sq mm)	35	35	95	95	240	240
Terminal capacity (neutral)	(Sq mm)	35	35	50	50	120	120
DC Rating for DC 22B							
Rated operational current, Ie at 220 V DC (2P in series)	(A)	32	63	100	125	200	250
Rated operational current, Ie at 440 V DC (3P in series)	(A)	32	63	100	125	200	250
Rated operational current, Ie at 750 V DC (2P in series, DC-20B)	(A)	-	-	-	-	-	-
AC Rating for 690 V AC Operational Voltage							
Rated operational current. Ie for AC 21A/ AC 228	(A)	32	63	63	100	160	200

IV		V			VI			
FN 315	**FN400**	**FN 630**	**FN 800**	**FN 1000**	**C0S SD 1000**	**C0S SD 1250**	**C0S SD 1600**	**C0S SD 2000**
IEC 60947 - 3, EN 60947 - 3, IS/IEC 60947 - 3								
3P+Neutral	3P+Neutral	3P+Neutral	3P+Neutral	3P+Neutral	3P/4P	3P/4P	3P/4P	3P/4P
Isolable	Isolable	Isolable	Isolable	Isolable	-	-	-	-
415	415	415	415	415	415	415	415	415
690	690	690	690	690	1000	1000	1000	1000
8	8	8	8	8	12	12	12	12
50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50	-20 to 50
3	3	3	3	3	3	3	3	3
315	400	630	800	1000	1000	1250	1600	2000
315	400	630	800	1000	1000	1250	1600	2000
315	400	630	800	1000	1000	1250	1600	2000
315	400	630	800	1000	1000	1250	1250	1250
2520	3200	5040	6400	8000	8000	10000	10000	10000
3150	4000	6300	8000	10000	10000	12500	12500	12500
14	14	20	20	25	50	50	50	50
147	187	294	374	374	467	584	748	934
113	144	226	288	288	546	682	874	1092
10000	10000	10000	10000	5000	6000	6000	6000	6000
25	25	25	25	30	55	55	55	60
400	2 x 400	2 x 625	2 x 625	2 x 625	2 x 5 x 80	2 x 5 x 80	2 x 5 x 100	3 x 5 x 100
240	240	400	400	400	2 x 5 x 80	2 x 5 x 80	2 x 5 x 100	3 x 5 x 100
315	400	630	800	1000	1000	1250	1600	2000
315	400	630	800	1000	1000	1250	1600	2000
-	-	-	-	-	1000	1250	1600	2000
250	315	400	800	1000	1000	1250	1250	1250

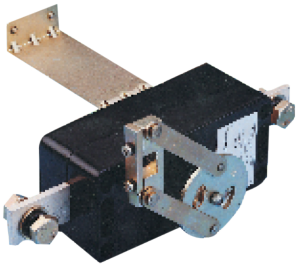
Spares and Accessories

Wide range of spares & accessories are available for Switch-Disconnector units

Type FN Spares & Accessories

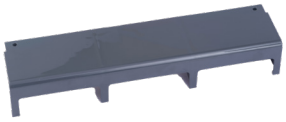
Switched neutral

In FN 32 / 63 Switched-Neutral pole is an integral part of the Switch-Disconnector-Fuse. For higher ratings, a double break, site-fitted switched neutral pole can be provided.
This is operated by the main mechanism.



Terminal shroud

The terminals can be shrouded for protection against phase-short circuit through an external conducting path and against accidental human contact with live terminals.



Castell interlock

Switch-Disconnector-Fuse units can be locked on OFF position with help of castell interlock. Castell interlock can also be used to interlock two SDF units.(Different variety of locks are available).

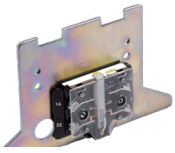
Handle coupling (type A & B)

Irrespective of the switch orientation (vertical or horizontal), operation in any of the four quadrants is possible by selecting right handle coupling (Refer universal mounting table).

Auxiliary contacts

1 NO + 1 NC auxiliary contact is available as an accessory. This can be suitably wired in the control circuit.

- Rated operational current I. (AC -1 5) -4 A
- Rated operational voltage u. -415 V



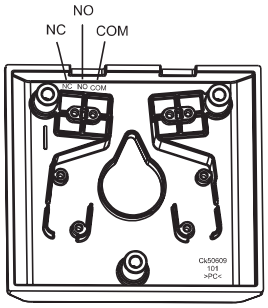
Type C-line Spares & Accessories

Handle

The C-line S-D has a unique flip-able operating handle which enables user to operate the switch with two hands. Irrespective of the orientation, operation in any of the four quadrants is possible. (refer universal mounting table)

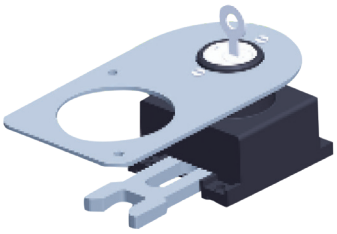
Auxiliary contact kit

It consists of one set of changeover contacts. This kit is pre-wired with terminal blocks and can be fitted at the site without increasing overall dimension



Castell lock

Accessory to lock the switch in OFF state and using this can have interlocking schemes between multiple switches.



Ordering Information

FN S-D suitable for open execution:

Operating Current Rating (A)	32	63	100	125
2P S-D Version	SK90418OOOO	SK904190000	SK904200000	SK904210000
TPN S-D Version	SK95541OOOO	SK955400000	SK955710000	SK954050000

Operating Current Rating (A)	200	250	315	400
2P S-D Version	SK904500000	SK904540000	SK90465OOOO	SK90466OOOO
TPN S-D Version	SK956070000	SK95683OOOO	SK95609OOOO	SK95610OOOO

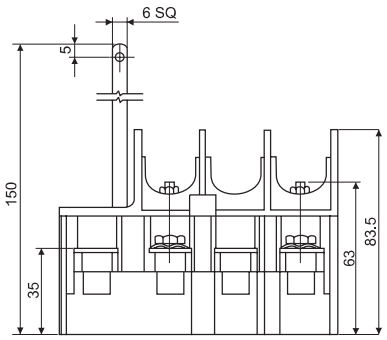
Operating Current Rating (A)	630	800	1000
2P S-D Version	SK904670000	SK904680000	SK904690000
TPN S-D Version	SK956110000	SK955510000	SK957100000

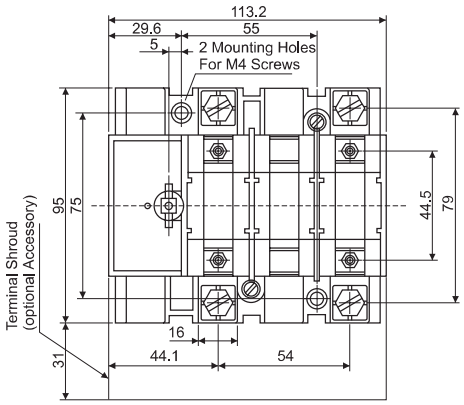
C-line S-D suitable for open execution

Operating Current Rating (A)	1000	1250	1600	400
TP S-D Version	COS10000030	COS1250O03O	COS1600O03O	COS2000O03O
FP S-D Version	COS10000040	COS1250O04O	COS16000040	COS2000O04O

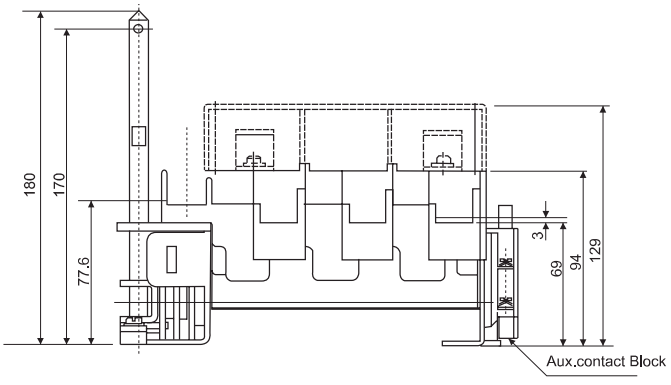
Overall Dimensions

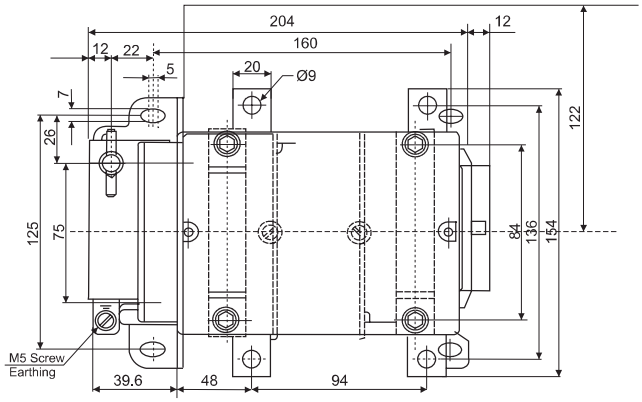
Switch-Disconnector Type FN32 / FN63 2P





Switch-Disconnector Type FN100 / FN125 2P

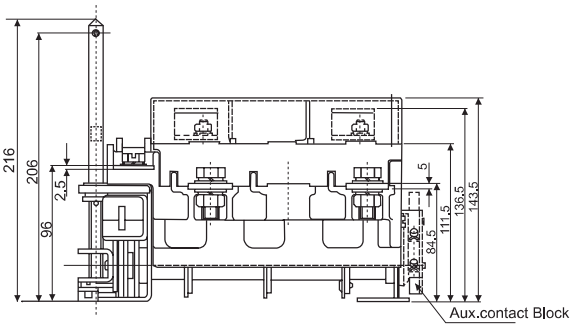


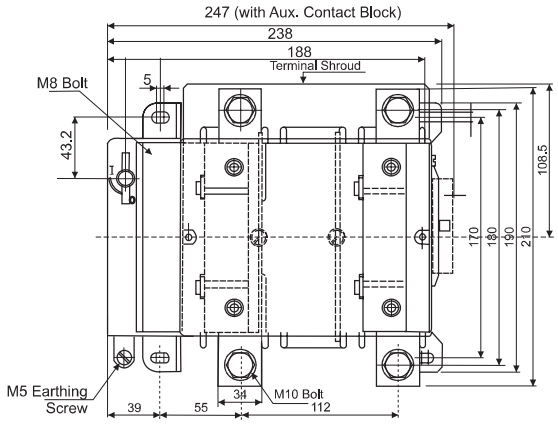


Note : All dimensions are in mm.

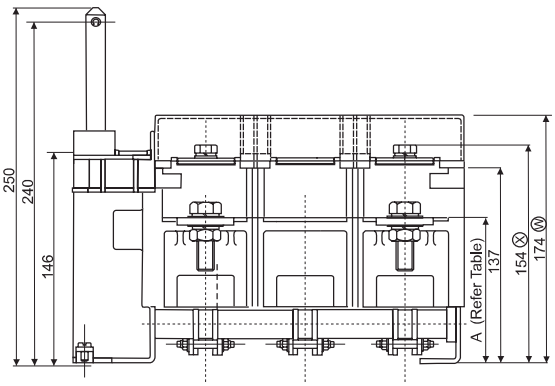
Overall Dimensions

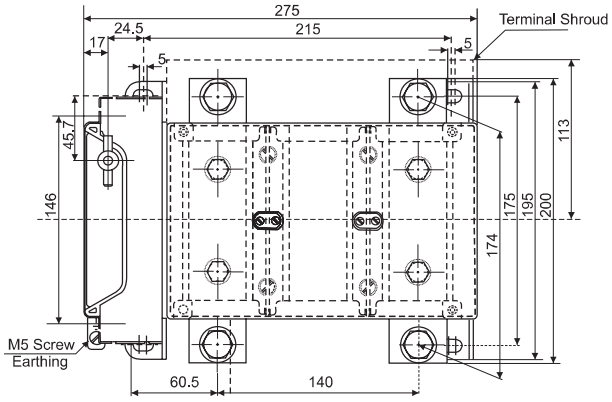
Switch-Disconnector Type FN200 / FN250 2P





Switch-Disconnector Type FN315 / FN400 2P

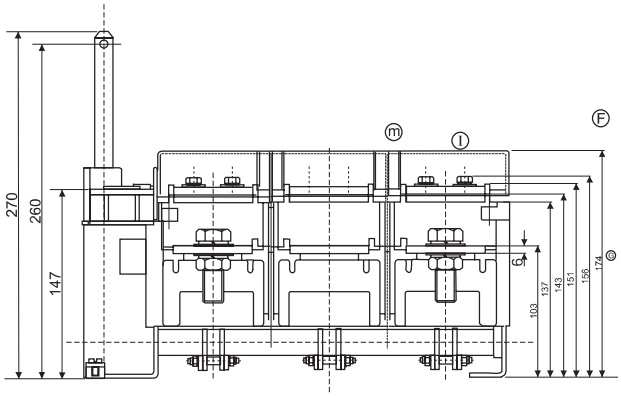


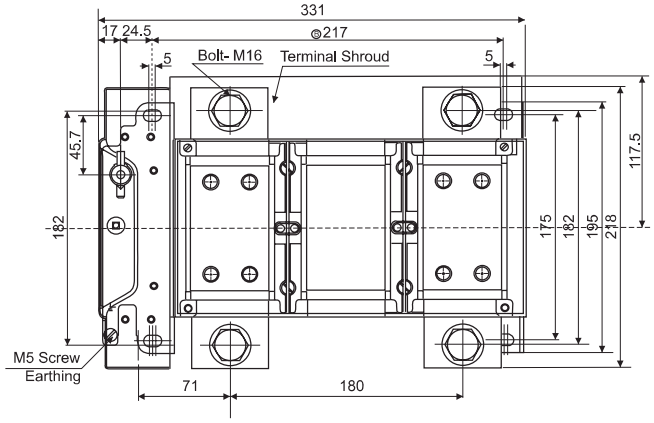


Note : All dimensions are in mm.

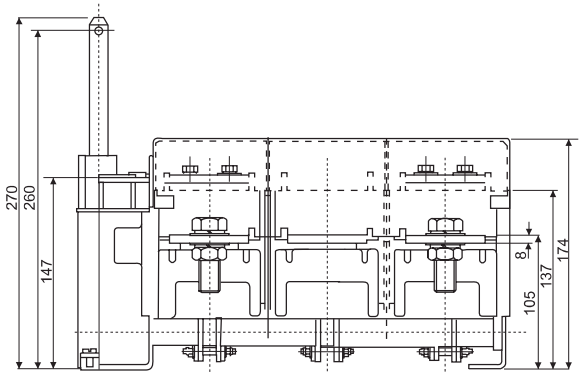
Overall Dimensions

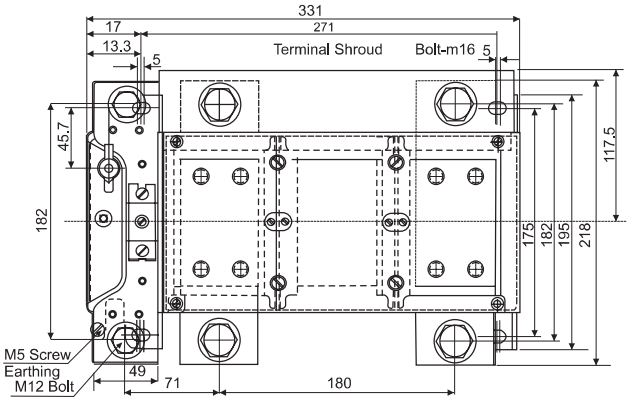
Switch-Disconnector Type FN630 / FN800 2P





Switch-Disconnector Type FN1000 2P

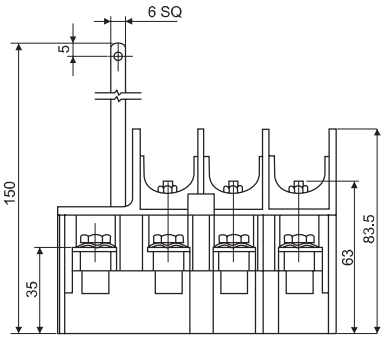


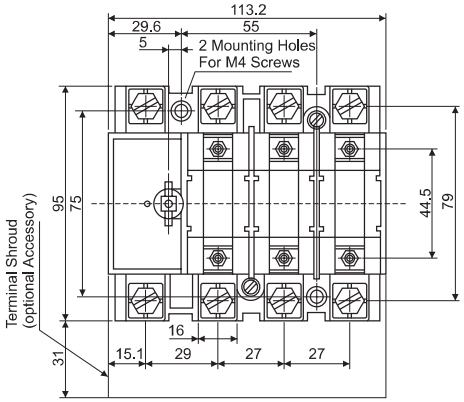


Note : All dimensions are in mm.

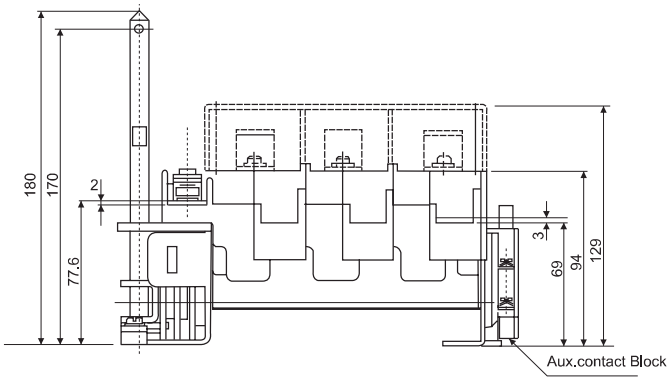
Overall Dimensions

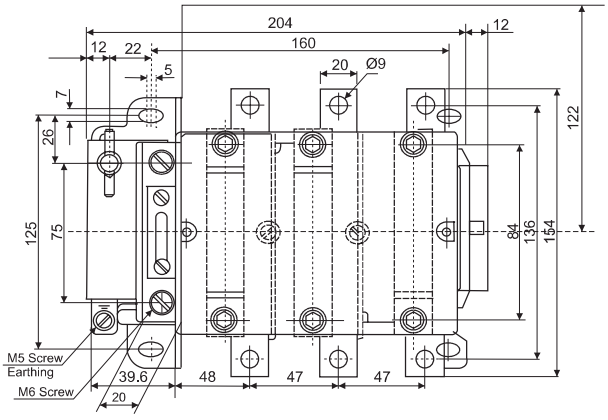
Switch-Disconnector Type FN32 / FN63 TPN





Switch-Disconnector Type FN100 / FN125 TPN

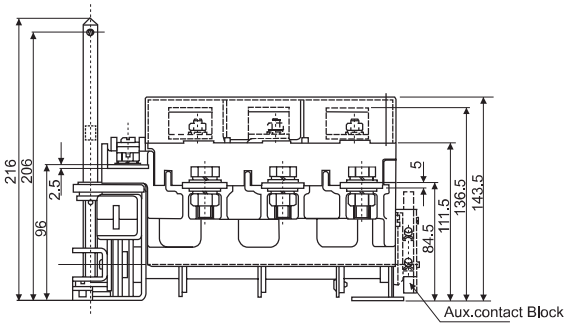


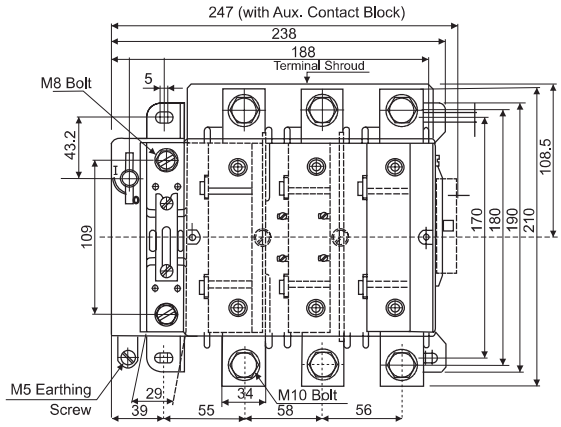


Note : All dimensions are in mm.

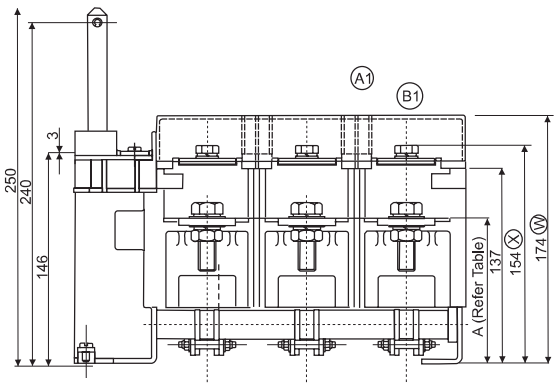
Overall Dimensions

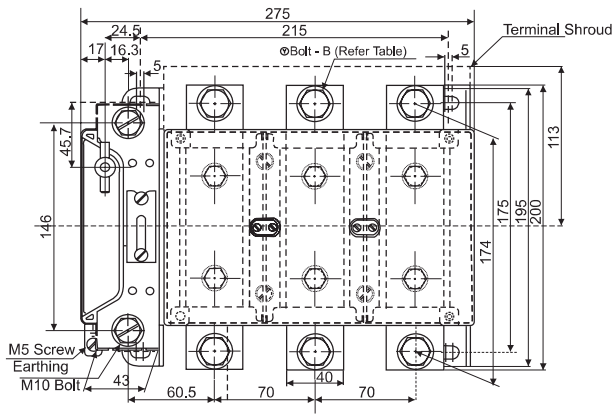
Switch-Disconnector Type FN200 / FN250 TPN





Switch-Disconnector Type FN315 / FN400 TPN

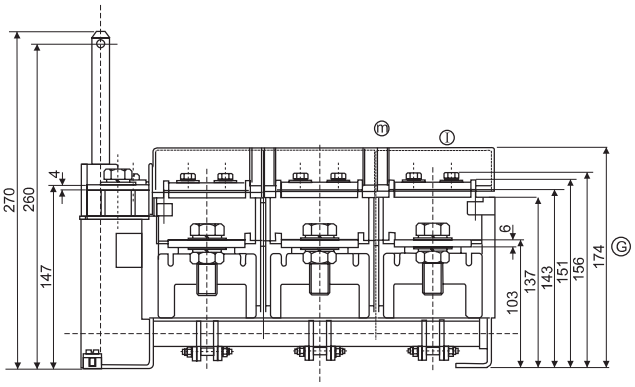


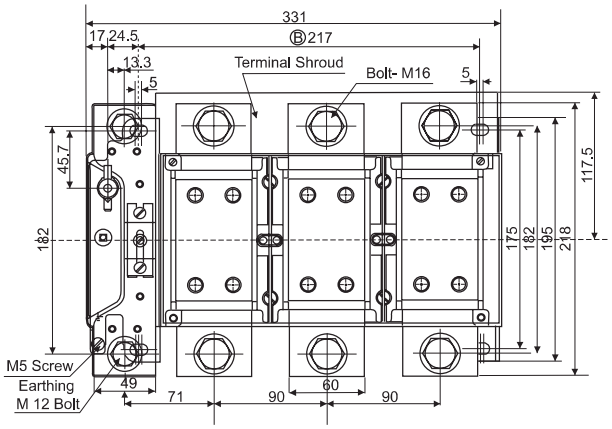


Note : All dimensions are in mm.

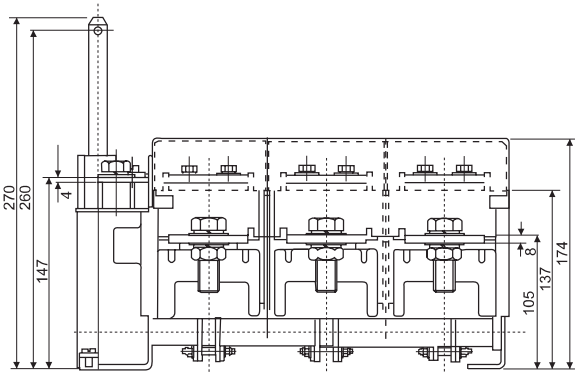
Overall Dimensions

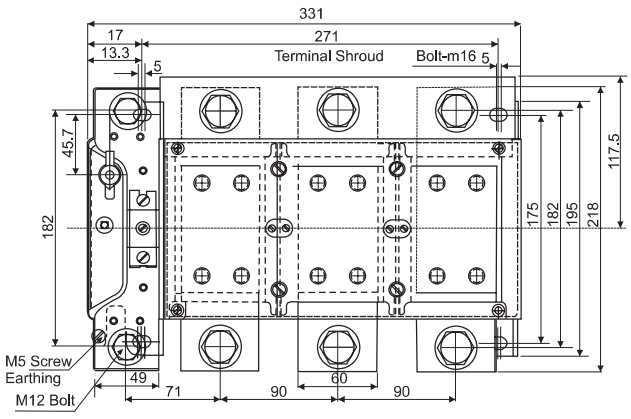
Switch-Disconnector Type FN630 / FN800 TPN





Switch-Disconnector Type FN1000 TPN

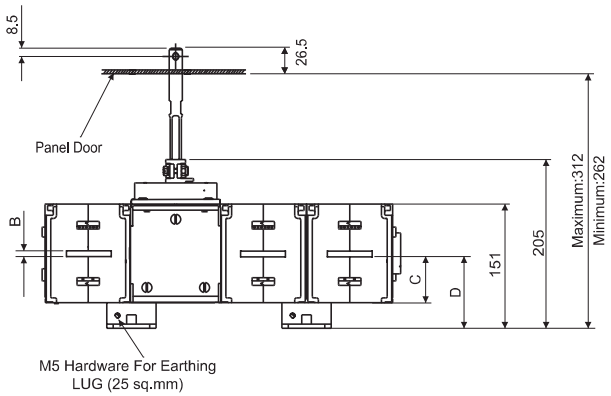


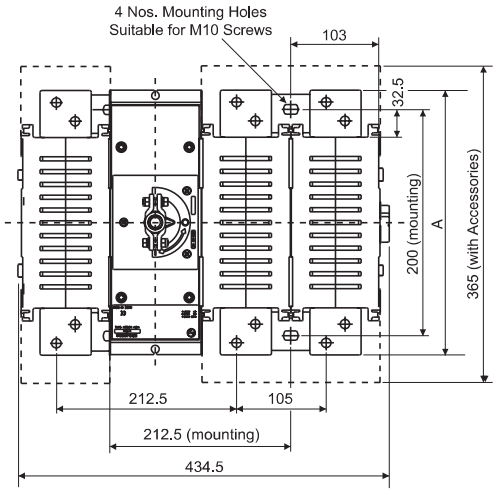


Note : All dimensions are in mm.

Overall Dimensions

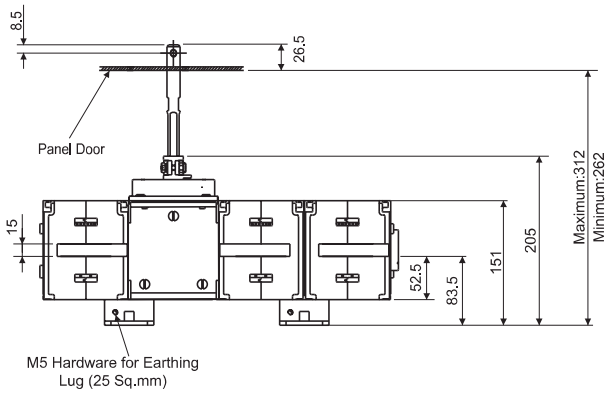
Switch-Disconnector Type COS1000/COS1250/COS1600A 3P

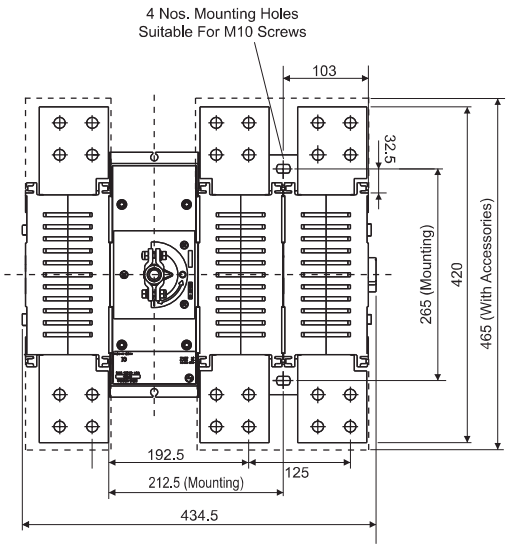




Cat No.	Rating	A	B	C	D
COS1000OO3O	1000	310	8	56	87
COS1250OO3O	1250	310	8	56	87
COS1600OO3O	1600	330	12	54	85

Switch-Disconnector Type COS2000 3P

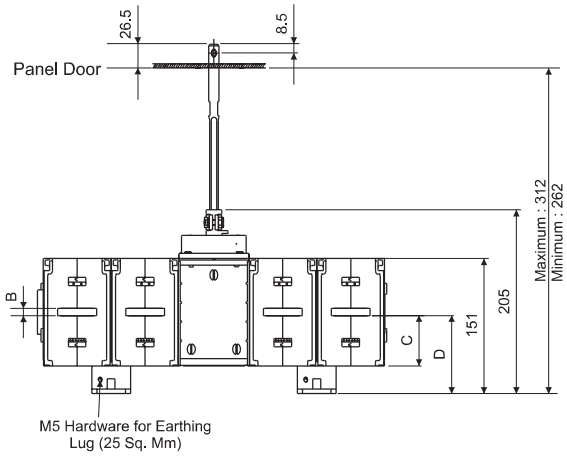


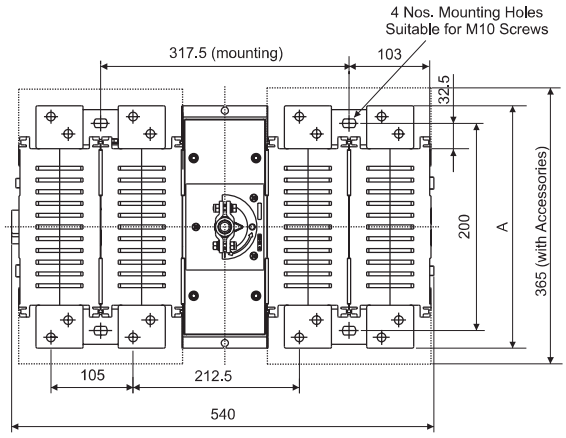


Note : All dimensions are in mm.

Overall Dimensions

Switch-Disconnector Type COS1000/COS1250/COS1600A 4P

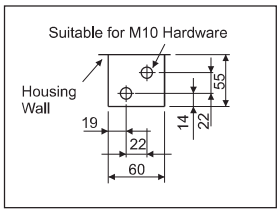




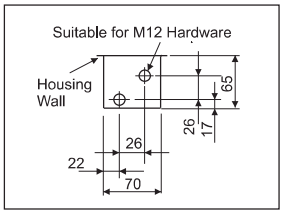
Type Designation	Terminal Screws	Tightening Torque
COS-1000	M10 Hexagonal Head Bolt	20 N-m
COS-1250	M10 Hexagonal Head Bolt	20 N-m
COS-1600	M12 Hexagonal Head Bolt	27 N-m

Cat. No.	Rating	A	B	C	D
COS1000OO4O	1000	310	8	56	87
COS1250OO4O	1250	310	8	56	87
COS1600OO4O	1600	330	12	54	85

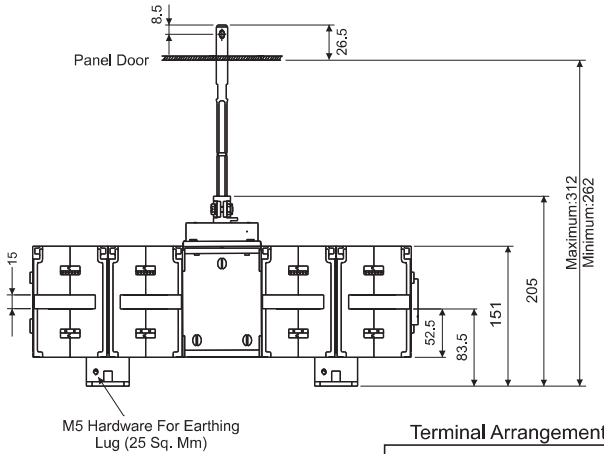
1000/1250 Terminal Arrangement



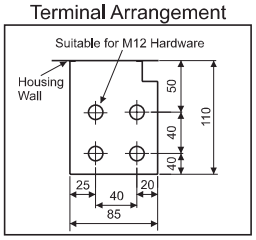
1600 Terminal Arrangement

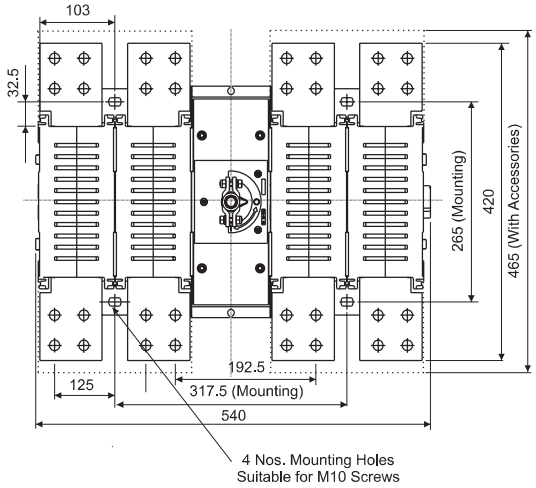


Switch-Disconnector Type COS2000 4P



Terminal Arrangement

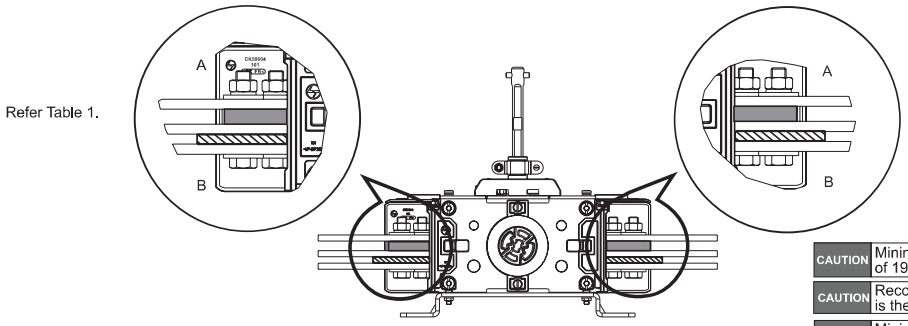




Note : All dimensions are in mm.

Overall Dimensions

Termination Arrangement



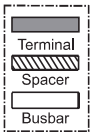
CAUTION Minimum ground clearance of 19 mm is recommended

CAUTION Recommended spacer thickness is the busbar thickness used

CAUTION Minimum interphase clearance of 25mm is recommended for busbars

TABLE 1

		1000/1250 A	1600 A	2000 A
Max Space for Bus Bar (mm)	A	25	22	20
Max Space for Bus Bar (mm)	B	31	30	48

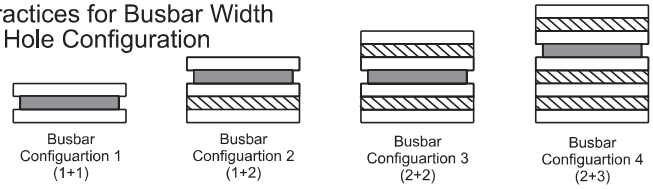


Busbar Sizes as Per Standard (Table 2) :

Busbar	1000 A	1250 A	1600 A	2000 A
Cu	60 x 5 x 2Nos	80 x 5 x 2Nos	100 x 5 x 2Nos	100 x 5 x 3Nos
* Al	50 x 10 x 2Nos	63 x 12 x 2Nos	50 x 8 x 4Nos	100 x 10 x 3Nos

*For Aluminium termination as per standard.
1250A:Factory fitted hardware used.
1600/2000A:Bolt length of 85mm used.

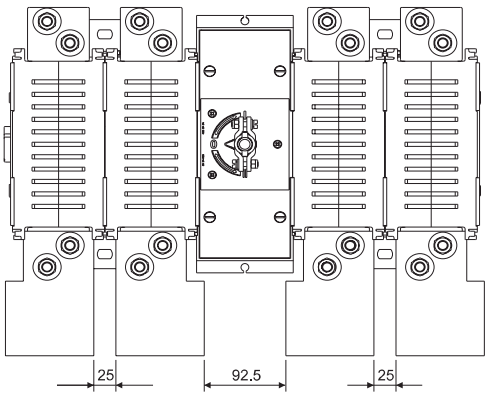
Recommended Termination Practices for Busbar Width 60-80mm With Diagonal Hole Configuration



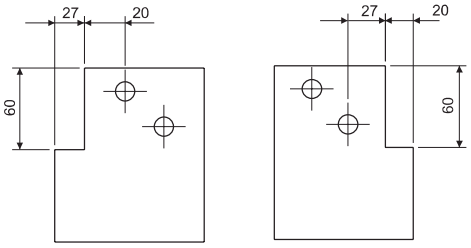
Note : 1. Different configurations of busbars can be used maintaining minimum cross section areas as specified in the table 2.
2. Factory supplied bolt length caters to the copper bus bar termination as per standard in case of different configurations & cross sectional areas. Bolt of higher length may be required.

Termination of 100 mm Bus Bar

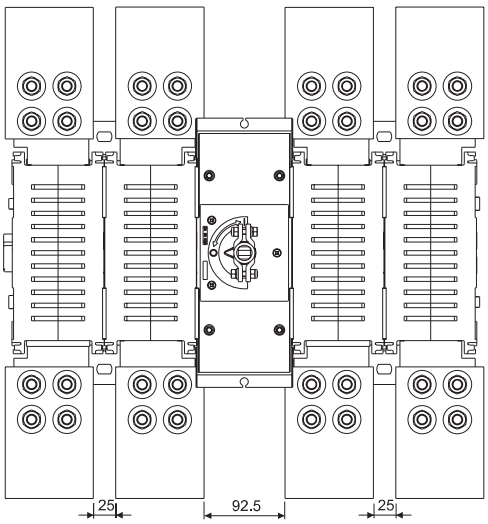
1000 / 1250 / 1600 A



Busbar Dimensions for 1600A



2000 A



Direct Termination of 100 mm Bus Bar Possible in Case of 2000 A.

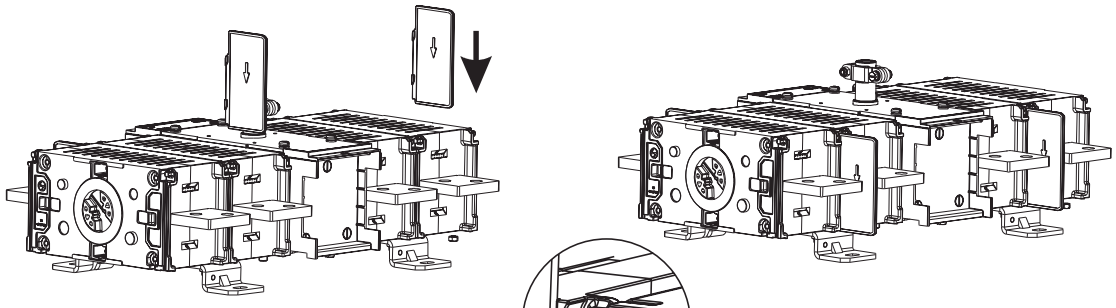
Note : All dimensions are in mm.

Overall Dimensions

Phase Barrier and Terminal Shroud Mounting

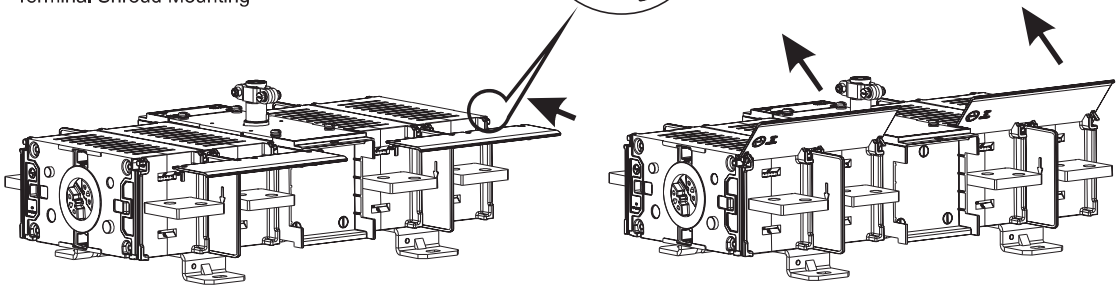
The accessories have to be fitted sequentially in the given order:
1. Phase barriers 2.Terminal shrouds *

1 Phase Barrier Mounting

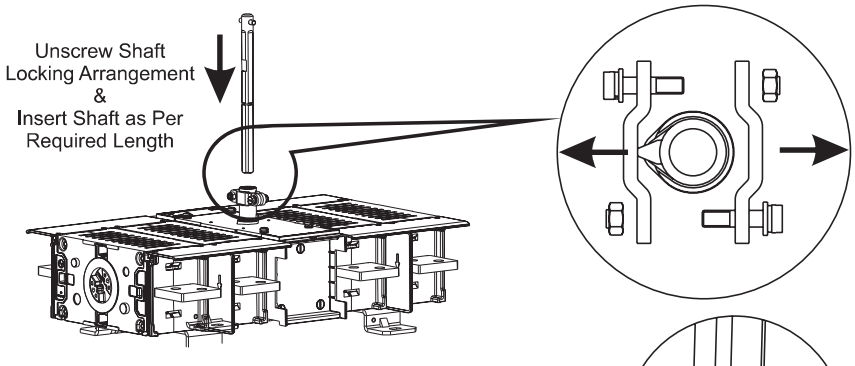


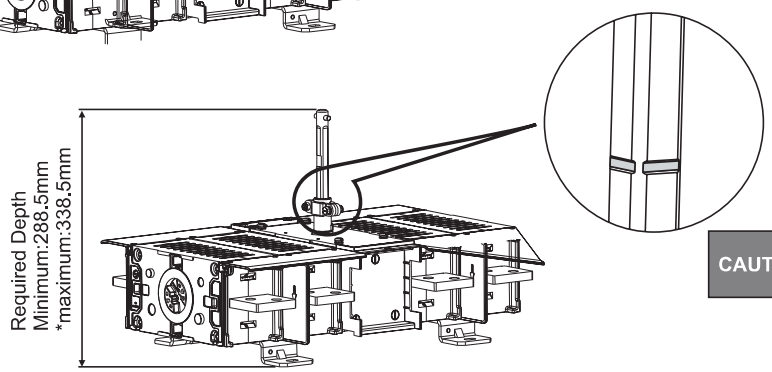
2 Terminal Shroud Mounting

Swivelable Terminal Shrouds with Locking at 0° and 90° Angles



Shaft Adjustability





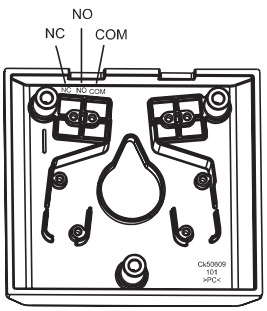
CAUTION	*Maximum depth of 338.5 mm is indicated by the red colour. Do not pull after the red mark.

Note : All dimensions are in mm.

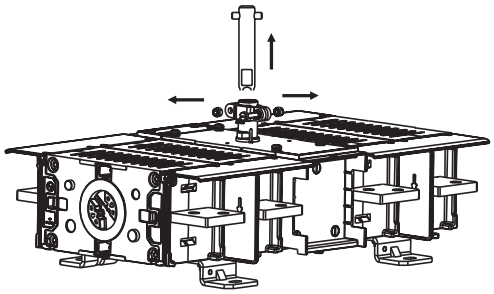
Overall Dimensions

Auxiliary Contact Mounting

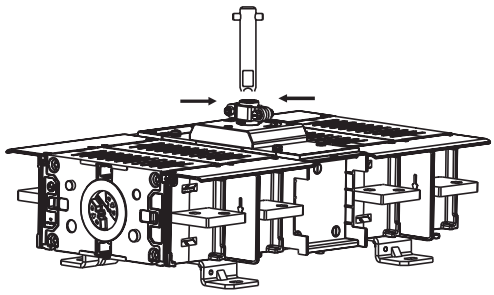
Auxiliary Contact



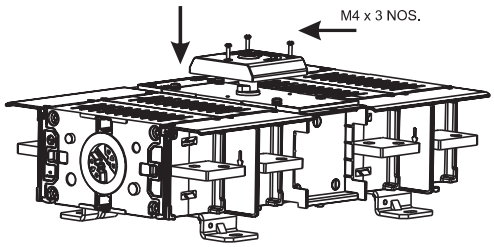
1 Unscrew the Shaft Locking Arrangement and Remove Shaft



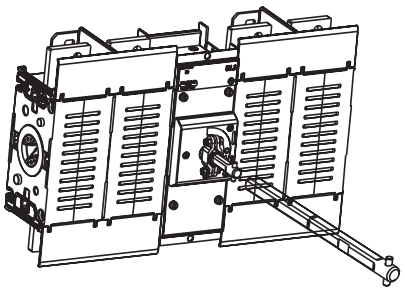
3 Insert Shaft to Required Length & Lock Shaft

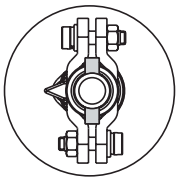


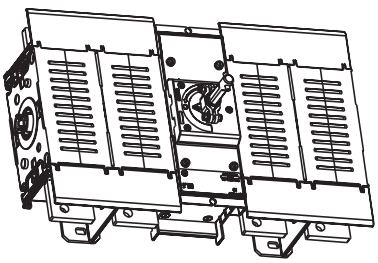
2 Assemble the Aux. Contacts as Shown.

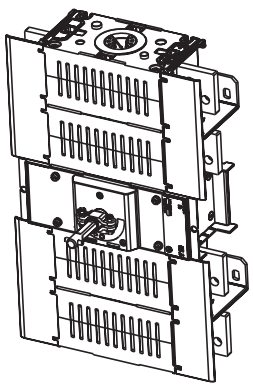


Mounting Orientation

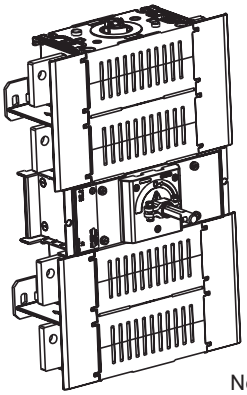








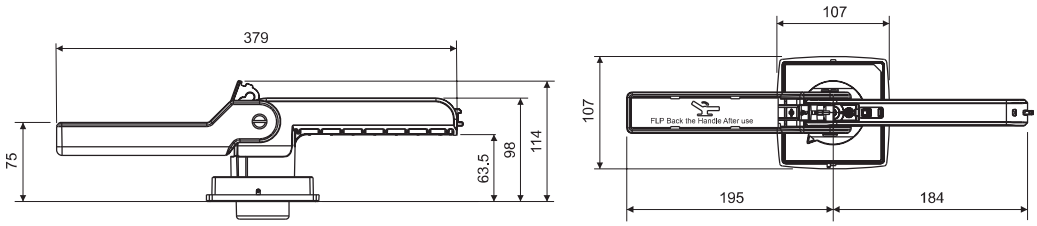
CAUTION	Ensure that the shaft pin is vertical for any mounting orientation of the switch



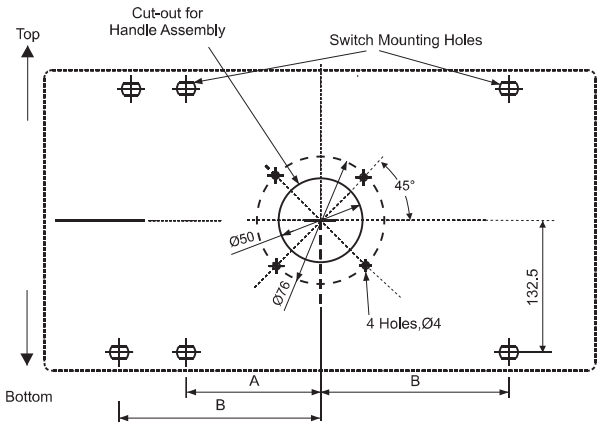
Note : All dimensions are in mm.

Overall Dimensions

Handle Overall Dimensions for Cos -1000 / 1250 / 1600 / 2000

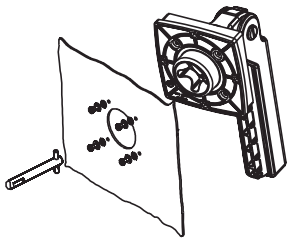


Handle Mounting

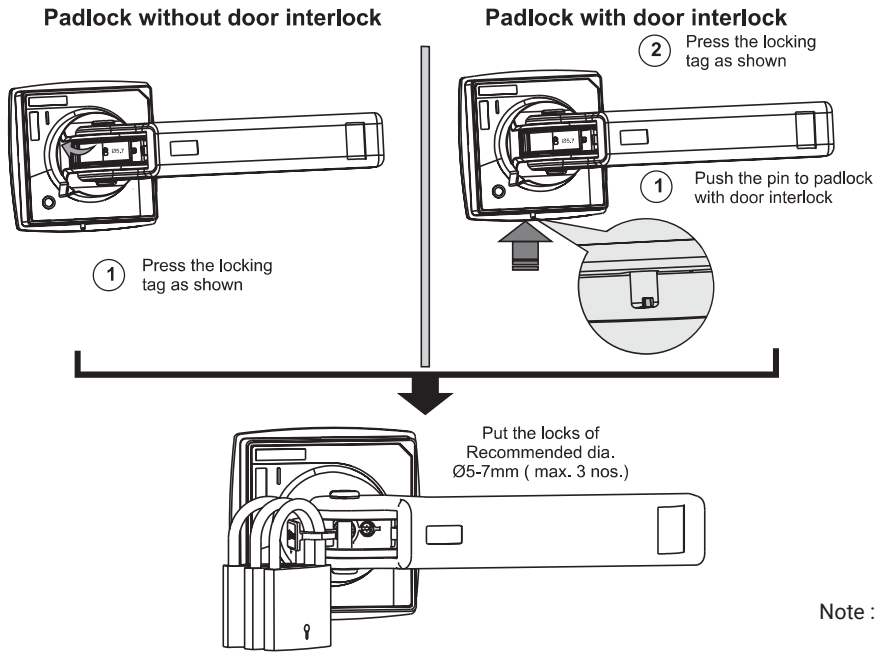


Mounting Dimensions

3-POLE	A:53.6 B:158.9	
4-POLE	B:158.9	



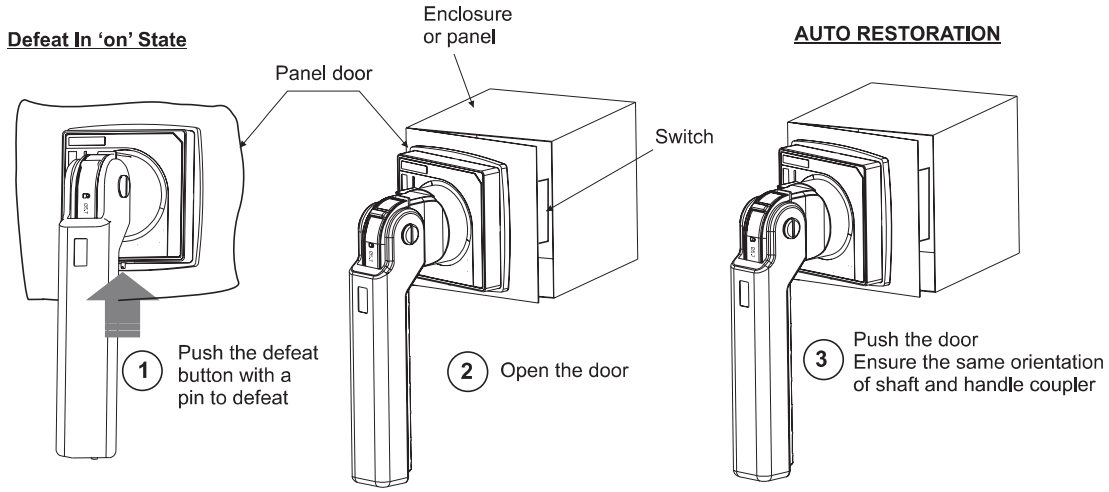
Handle Features



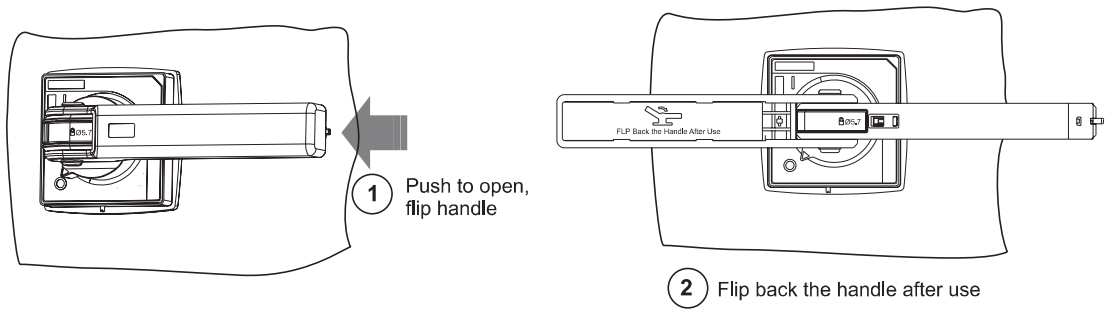
Note : All dimensions are in mm.

Overall Dimensions

Handle Features



Handle Flipping



Note : All dimensions are in mm.