HAVELLS

Low Voltage Switchgear & Power Quality Solutions

LV Switchgear Portfolio & Major Applications

Manufacturing Plant
Industry 4.0

Hotel

Indian Space Research
Organization

Indian Railways

Commercial Buildings

Top Hospitals in NCR

Contents

Contactors & Overload Relays

Havells Global Series
New Range

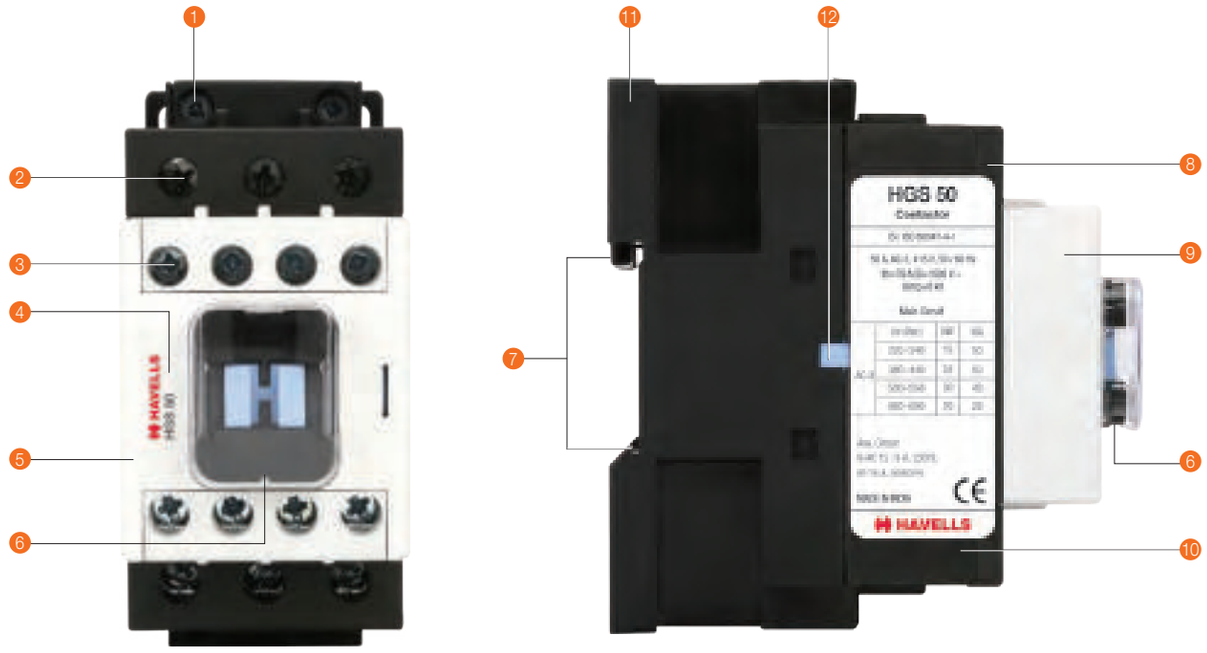
Contactor HGS 9 AF - 800 AF
Thermal Overload Relays HGST 9 AF - 800 AF

	18 AF	40 AF	65 AF	100 AF
HGS **Rated Current** **Rated Insulation Voltage**	9 A, 12 A, 18 A 800 V	25 A, 32 A, 40 A 800 V	50 A, 65 A 1,000 V	75 A, 85 A, 100 A 1,000 V
HGST **Setting Current**	0.12 A - 18 A	7 A - 40 A	7 A - 65 A	17 A - 100 A

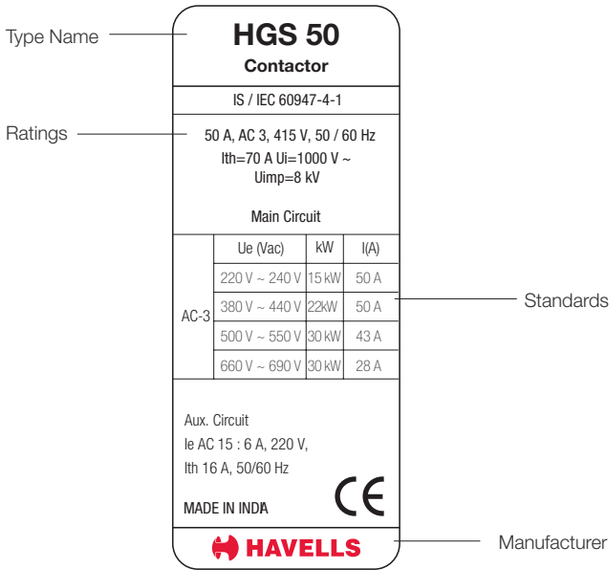
150 AF	265 AF	500 AF	800 AF
115 A, 130 A, 150 A 1,000 V	185 A, 225 A, 265 A 1,000 V	300 A, 400 A, 500 A 1,000 V	630 A, 800 A 1,000 V
48 A - 150 A	48 A - 265 A	90 A - 500 A	378 A - 800 A

External Structure and Contents of Name plate

Contactors



1. Control Power Terminal
2. Main Terminal
3. Auxiliary Terminal
4. Type Name
5. Manufacturer Name
6. Safety Cover
7. Din-Rail Mounting Part
8. Upper Frame
9. Upper Cover
10. Name Plate
11. Screw Mounting Hole
12. Mounting Hole for Auxiliary Devices on Sides



Contactor (HGS)

9 AF - 100 AF

Enhanced Safety

Front Protection Cover

- Minimizes foreign input
- Prevents unexpected operation due to user's error

Sealed Structure of Mounting Hole for Auxiliary Devices

- Contact bridge seals the structure when contactor is switched ON / OFF

Removable Terminal Cover

- Applicable for main contact, auxiliary contact, coil contact
- IP20

Improved Customer's Convenience

Upper Arrayed Auxiliary Contacts

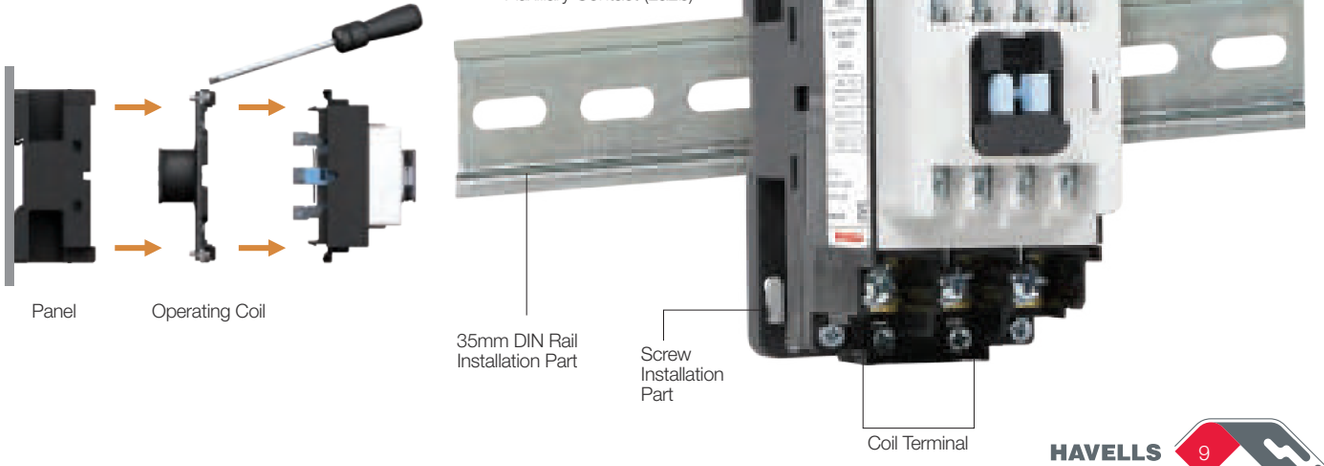
- Easy wiring control cable for HGS 50 AF - 100 AF (default, 2a2b).
- Easy wiring control cable for HGS 9 AF - 40 AF (default, 1a / 1b).

Easy Coil Replacement Structure

- Easy maintenance and replacement of coil inside the panel

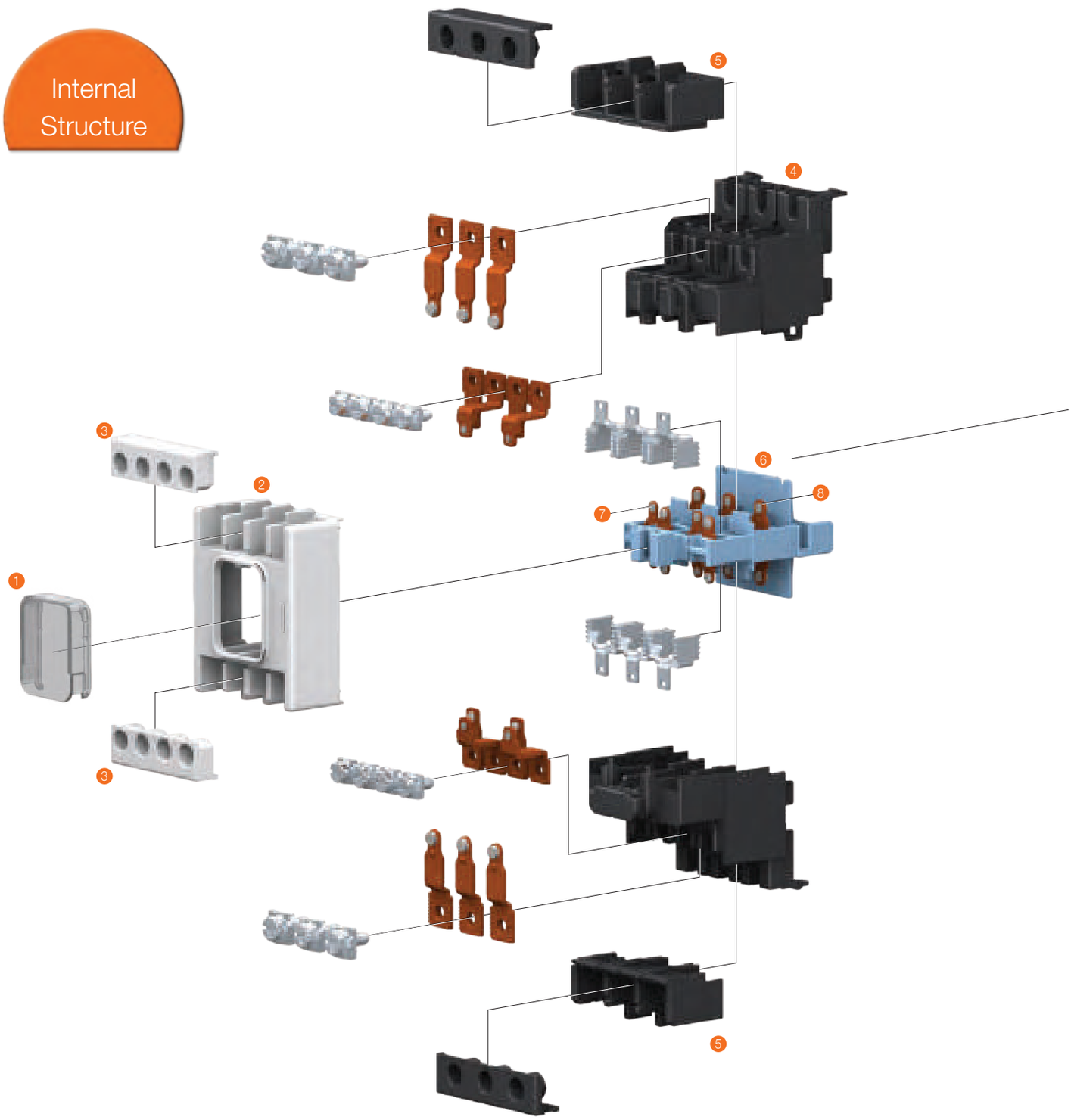
Various Attachment Methods inside panel

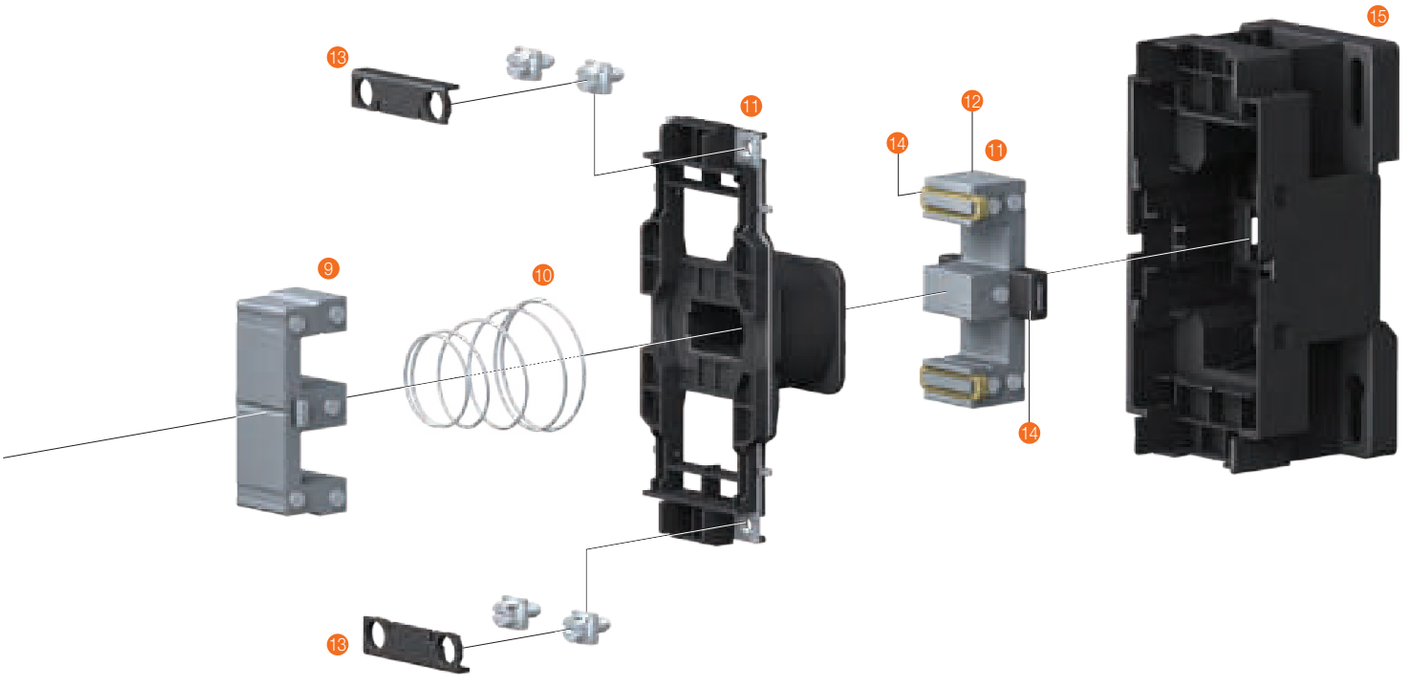
- DIN rail and screw type



Contactor (HGS)

Internal Structure





1. Safety Cover: Prevents pushing contact bridge arbitrarily.
2. Top Cover: Assembles arc chamber. Auxiliary contact part is stored inside.
3. Auxiliary Terminal Protection Cover: Protects users from electrical parts
4. Arc Chamber: Cuts off arc during on/off
5. Screw Terminal: Device to connect terminals
6. Contact Bridge: Assembled with a moving contact and a moving core to operate on/off. Assembly mounting hole is stored inside.
7. Auxiliary Contact: Operational point of auxiliary contact terminal
8. Moving Contact: Operational point of main contact terminal
9. Moving Core: Contactor is closed when coil is energized and moving core slides into fixed core.
10. Return Spring: When coil is de-energized, it separates moving core from fixed core.
11. Coil Assembly: Energized part to make fixed core an electromagnet
12. Fixed Core: The part where it becomes an electromagnet when coil is energized.
13. Coil Protection Cover: Protects the user from energized coil
14. Rubber Damper: Reduces on/off operation impact on magnetic contact.
15. Frame: The bottom part of contact that stores coil and fixed core

Contactor (HGS)

115 AF - 800 AF

Easy Coil Replacement

- Easy maintenance and replacement without removal from panel
- Applying plastic case to fix coil unit
- Minimizes movement of coil unit

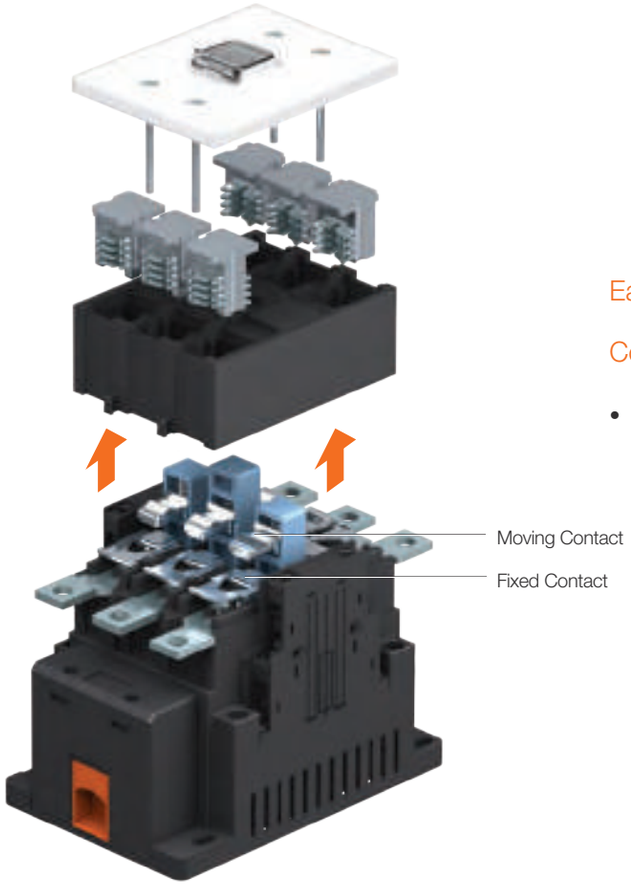
Design for Noise Reduction

- DC energizing method using electronic circuit

Wide Range of Coil Control Voltage

Nominal Voltage	Rated Voltage (AC/DC)
24 V	AC: 24 V - 26 V, DC: 24 V
48 V	AC: 44 V - 52 V, DC: 48 V
220 V	AC: 100 V - 240 V, DC: 110 V - 220 V
440 V	AC: 380 V - 450 V

*Rated voltage depending on the types
(Table is only for HGS115 - 265)



Easy Maintenance and Replacement for Main Contacts

- As top cover is disassembled, main contacts are revealed to have easy maintenance and testing from outside.

Control Relay (HGR)

Accessories

- HGR has AC types, and 5 types of possible contact configurations.
- HGR follows IEC 60947 and protection degree is IP20.
- Usable temperature range is -25 ^{0}C to + 40 ^{0}C.
- HGR which has fast response time is appropiate for application of control circuit and factory automation.
- Applicable standard IEC 60947-5-1 for HGR

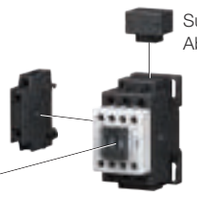
Accessories

Front Safety Cover

Auxiliary Contact Block (Front Mounting)

Mechanical Latching Block

Electronic Timer



Maximum combination of front mounting auxilliary contact (HGS-TB) is 4NC. when more than 4NC is applied, it might cause misoperation.

HGR-X (AC)

Rating

Model			SI Unit	HGR-X (AC)
Rated Insulation Voltage Ui		IEC 60947	V	AC750
		VDE0660	V	AC1,000
Rated Thermal Current [Ith] (AC1)			A	16 A
Rated Current [Ie]	AC15	220 V	A	4 A
		380 V		3 A
		440 V		3 A
		500 V		2 A
		690 V		2 A
	DC12 (Resistive Load)	24 V		4 A
		48 V		2.5 A
		125 V		1.1 A
		250 V		0.3 A
	DC13 (Coil Load)	24 V		4 A
		48 V		2.5 A
		125 V		1.1 A
		250 V		0.3 A
Mechanical Lifetime			X 10,000	1,500
Cable Size				2 x 0.75-2.5
Operating Frequency (per hour)			Times	3,000
Maximum Fuse Rating		Plug-fuse (Fast/Slow)	A	35/25
		MCB (C curve)		16
		HRC fuse (DIN/BS88)		25
Mounting Method				Screw & DIN-Rail
Auxiliary Contacts				4NC
				1NO + 3NC
				2NO + 2NC
				3NO +1NC
				4NO
Coil Power Consumption	A/C (50 Hz)	Inrush	VA/W	80/64
		Hold		8/2.5
Dimensions	A/C	W x H x D	mm	45 x 75 x 85.95
Weight	A/C		kg	0.3

1) Contact Rating Code: A300 - P150

Please be careful in wiring of coil terminal +,- polarity with HGS-P model.

Model Selection Table

Contactors: 9 AF - 100 AF

Model				SI Unit	HGS9	HGS12	HGS18	HGS25	HGS32	HGS40
IEC 60947-4-1	Rated Insulation Voltage Ui			V	800	800	800	800	800	800
	Rated Operational Voltage Ue			V	690	690	690	690	690	690
	Rated Impulse Withstand Voltage Uimp			kV	6	6	6	6	6	6
	Rated Thermal Current [Ith] (AC1)			A	25	25	40	45	55	60
	AC3	200 V - 240 V		kW/A	2.5/9	3.5/12	4.5/18	5.5/25	7.5/32	11/40
		380 V - 440 V			4/9	5.5/12	7.5/18	11/25	15/32	18.5/40
		500 V - 550 V			4/7	7.5/12	8.5/13	15/22	18.5/28	22/32
		660 V - 690 V			4/6	7.5/9	7.5/9	15/17	18.5/20	22/23
		1,000 V			-	-	-	-	-	-
		Lifetime	Electrical	10,000 Times	250	250	250	250	200	200
			Mechanical		1,500	1,500	1,500	1,500	1,500	1,500
	AC4	200 V - 240 V		kW/A	1.5/8	2.2/11	3.7/16	3.7/18	4.5/22	5.5/25
		380 V - 440 V			2.2/6	4/9	4/11	5.5/13	7.5/17	11/24
		Electrical Lifetime		10,000 Times	3	3	3	3	3	3
Mounting Method					Screw & DIN-Rail			Screw & DIN-Rail		
Contacts	Main	AC			1NO / 1NC			1NO / 1NC		
	Auxiliary	AC			2NO2NC			2NO2NC		
Dimensions	AC	W x H x D		mm	45 x 75 x 85.95			54 x 84 x 90.35		

Model				SI Unit	HGS50	HGS65	HGS75	HGS85	HGS100
IEC 60947-4-1	Rated Insulation Voltage Ui			V	1,000	1,000	1,000	1,000	1,000
	Rated Operational Voltage Ue			V	690	690	690	690	690
	Rated Impulse Withstand Voltage Uimp			kV	8	8	8	8	8
	Rated Thermal Current [Ith] (AC1)			A	70	85	115	125	145
	AC3	200 V - 240 V		kW/A	15/50	18.5/65	22/75	25/85	30/100
		380 V - 440 V			22/50	30/65	37/75	45/85	55/100
		500 V - 550 V			30/43	33/60	37/64	50/75	55/85
		660 V - 690 V			30/28	33/35	37/42	45/45	50/65
		1,000 V			-	-	-	-	-
		Lifetime	Electrical	10,000 Times	200	200	200	200	200
			Mechanical		1,500	1,500	1,000	1,000	1,000
	AC4	200 V - 240 V		kW/A	7.5/35	11/50	13/55	15/65	17/72
		380 V - 440 V			15/32	22/47	25/52	30/62	33/68
		Electrical Lifetime		10,000 Times	3	3	3	3	3
Mounting Method					Screw & DIN-Rail			Screw & DIN-Rail	
Contacts	Main	AC			1NO1NC or 2NO2NC			1NO1NC or 2NO2NC	
	Auxiliary	AC			2NO2NC			2NO2NC	
Dimensions	AC	W x H x D		mm	55 x 123.6 x 129			70 x 146 x 153	

Model Selection Table

Contactors: 115 AF - 800 AF

Model				SI Unit	HGS115	HGS130	HGS150	HGS185	HGS225	HGS265
IEC 60947-4-1	Rated Insulation Voltage Ui			V	1,000	1,000	1,000	1,000	1,000	1,000
	Rated Operational Voltage Ue			V	1,000	1,000	1,000	1,000	1,000	1,000
	Rated Impulse Withstand Voltage Uimp			kV	8	8	8	8	8	8
	Rated Thermal Current [Ith] (AC1)			A	160	180	210	275	315	350
	AC3	200 V - 240 V		kW/A	37/115	40/130	45/150	55/185	75/225	80/265
		380 V - 440 V			60/115	65/130	75/150	90/185	132/225	147/265
		500 V - 550 V			59/100	70/120	90/140	110/180	132/200	150/225
		660 V - 690 V			55/65	75/82	90/120	110/120	132/150	160/173
		1,000 V			65/50	75/54	90/66	110/78	132/96	160/113
		Lifetime	Electrical	10,000 Times	100	100	100	100	100	100
			Mechanical		500	500	500	500	500	500
	AC4	200 V - 240 V		kW/A	19/80	22/93	30/125	37/150	45/185	50/200
		380 V - 440 V			37/75	45/90	55/110	75/150	90/185	102/200
		Electrical Lifetime		10,000 Times	3	3	3	3	3	3
Mounting Method					Screw			Screw		
Contacts	Main				2NO2NC			2NO2NC		
	Auxiliary				2NO2NC			2NO2NC		
Dimensions	W x H x D			mm	103 x 155 x 145.1			138 x 204 x 174.2		

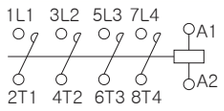
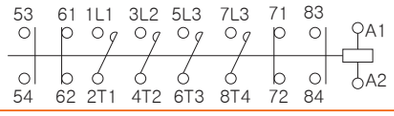
Model				SI Unit	HGS300	HGS400	HGS500	HGS630	HGS800
IEC 60947-4-1	Rated Insulation Voltage Ui			V	1,000	1,000	1,000	1,000	1,000
	Rated Operational Voltage Ue			V	1,000	1,000	1,000	1,000	1,000
	Rated Impulse Withstand Voltage Uimp			kV	8	8	8	8	8
	Rated Thermal Current [Ith] (AC1)			A	400	500	550	750	900
	AC3	200 V - 240 V		kW/A	90/300	125/400	140/500	190/630	220/800
		380 V - 440 V			160/300	220/400	250/500	330/630	440/800
		500 V - 550 V			200/273	250/300	300/426	330/500	500/720
		660 V - 690 V			200/220	250/300	335/360	400/412	500/630
		1,000 V			200/141	250/178	275/192	300/213	400/284
		Lifetime	Electrical	10,000 Times	100	100	50	50	50
			Mechanical		500	500	500	500	500
	AC4	200 V - 240 V		kW/A	55/220	75/300	90/350	110/400	160/630
		380 V - 440 V			110/220	150/300	175/350	200/400	300/630
		Electrical Lifetime		10,000 Times	3	3	3	3	3
Mounting Method					Screw			Screw	
Contacts	Main				2NO2NC			2NO2NC	
	Auxiliary				2NO2NC			2NO2NC	
Dimensions	W x H x D			mm	163 x 243 x 203			276 x 314 x 255.3	

Contactors : 16 A- 60 A (4 Pole)

AC1 Series 4 pole contactor

Model		SI Unit	HGS16	HGS20	HGS25	HGS32	HGS40	HGS50	HGS60
IEC 60947-4-1	Rated Insulation Voltage Ui	V	800	800	800	800	800	800	800
	Rated Operational Voltage Ue	V	690	690	690	690	690	690	690
	Rated Impulse Withstand Voltage Uimp	KV	6	6	6	6	6	6	6
	Rated Thermal Current (AC1)	A	16	20	25	32	40	50	60
	Mechanical Life "10,000 Times"	Nos	1500	1500	1500	1500	1500	1500	1500
Mounting Method		Screw & Rail Mounting							
Weight		kg	0.45					0.65	
Dimension (W X H X D)		mm	45 x 75 x 85.95					54 x 84 x 90.35	

Contact Arrangement

Main	Main	4a	
Main + Auxillary (2a 2b)	Main	4a	
	Auxillary	2a 2b	

Applicable Wire Size and Screwing Torque

Main Circuit

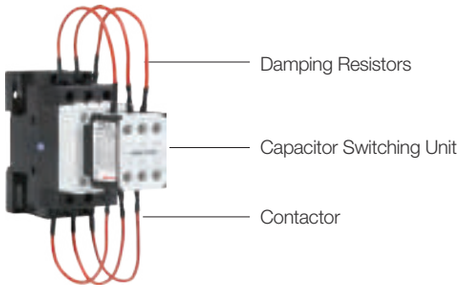
Model	Terminal Screw	Single Wire Size (mm^2)	Stranded Wire size (mm^2)	Screwing Torque (kgf.cm)
HGS9	M4	(1 - 10) mm^2	(1-10) mm^2	15 kgf.cm
HGS12				
HGS18				
HGS25	M5	(2.5 - 16) mm^2	(2.5 - 16) mm^2	(26) mm^2
HGS32				
HGS40				
HGS50	M6	(6 - 25) mm^2	(6 - 25) mm^2	(40) mm^2
HGS65				
HGS75	M8	(10 - 50) mm^2	(10 - 50) mm^2	(60) mm^2
HGS85				
HGS100				
HGS115		(35 - 95) mm^2	(35 - 95) mm^2	
HGS130				
HGS150				
HGS185	M10	(50 - 185) mm^2	(50 - 185) mm^2	(100) mm^2
HGS225				
HGS265				
HGS300	M12	(95 - 240) mm^2	(95 - 240) mm^2	(140) kgf.cm
HGS400		(185 ~ 185x2) mm^2	(185 ~ 185x2) mm^2	
HGS500		(185 ~ 240x2) mm^2	(185 ~ 240x2) mm^2	
HGS630		(240 ~ 240x2) mm^2	NA	
HGS800		(2xbusbar (60x5)) mm^2	NA	

Control Circuit

Model	Terminal Screw	Single Wire Size (mm^2)	Stranded Wire size (mm^2)	Screwing Torque (kgf.cm)
HGS 9 - 100	M3.5	(0.75 - 5.5) mm^2	(0.75 - 5.5) mm^2	(12) kgf.cm
HGS 115 - 800				

Capacitor Duty Contactor

Capacitor Duty Contactor



Making & Breaking Frequency and Lifetime

Making & Breaking Frequency		240 Cycles/hour
Electrical Lifetime (AC-6b)	Ue ≤ 440 Vac	250,000
	500 Vac ≤ Ue ≤ 690 Vac	100,000

1) Operation Voltage
- 50 Hz: 24 V, 110 V, 240 V, 250 V to 440 V, 415 V

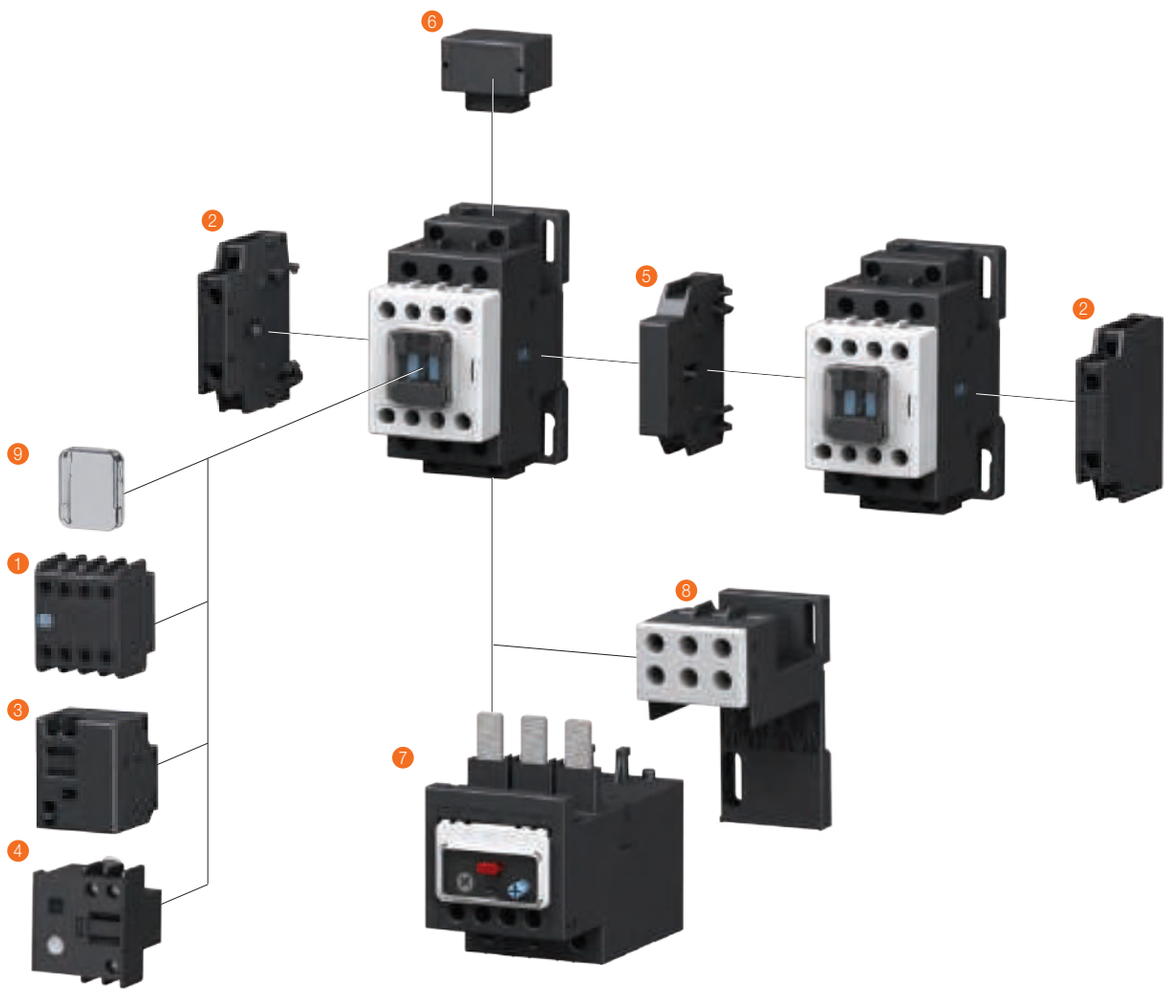
- Range: 3 kVAr to 66 kVAr
- Complies 60947-4-1
- Utilization Category AC-6b
- Capacitor duty contactor is combined with contactor
- Contactor is assembled with damping resistors which limit the high in-rush current when the capacitors are switched on. They are assembled with early-make contact block, which is switched on before the main contacts, thus, limiting the in-rush current.
- Capacitor duty contactor is composed of 3 Pole main contacts with inbuilt auxiliary contacts.
- When power is supplied, capacitor creates oscillation frequency (1~15) kHz and generates transient current (over 180 In). Capacitor switching unit limits the transient current, thus, protects main contacts.
- When power is supplied to contactor, the value of maximum current is reduced as following cases.

  - Inductance of main power supply is too high.
  - Rating of line transformer is too low.
  - Short circuit of transformer is too high.

Products		Rating						
Exterior	Model	Capacitor Capacity, kVAr (Appropriate Ambient Temperature 55 °C, 50 Hz / 60 Hz)						Components
		220 V	240 V	415 V	440 V	500 V	690 V	Auxiliary Contacts
	HGS 3C	1.6 kVAr	1.6 kVAr	3 kVAr	3 kVAr	4.5 kVAr	4.5 kVAr	1NO / 1NC
	HGS 5C	2.5 kVAr	2.5 kVAr	5 kVAr	5 kVAr	8 kVAr	8 kVAr	1NO / 1NC
	HGS 10C	5 kVAr	5 kVAr	10 kVAr	10 kVAr	14 kVAr	14 kVAr	1NO / 1NC
	HGS 12.5C	6.7 kVAr	6.7 kVAr	12.5 kVAr	12.5 kVAr	15 kVAr	15 kVAr	1NO / 1NC
	HGS 15C	8.5 kVAr	8.5 kVAr	15 kVAr	15 kVAr	24 kVAr	24 kVAr	1NO / 1NC
	HGS 20C	10 kVAr	10 kVAr	20 kVAr	20 kVAr	26 kVAr	26 kVAr	1NO / 1NC
	HGS 25C	13 kVAr	13 kVAr	25 kVAr	25 kVAr	30 kVAr	30 kVAr	1NO / 1NC
	HGS 33.3C	15 kVAr	15 kVAr	33.3 kVAr	33.3 kVAr	35 kVAr	35 kVAr	1NO / 1NC
	HGS 40C	19 kVAr	19 kVAr	40 kVAr	40 kVAr	45 kVAr	45 kVAr	2NO + 2NC
	HGS 50C	28 kVAr	28 kVAr	50 kVAr	50 kVAr	60 kVAr	60 kVAr	2NO + 2NC
	HGS 66C	35 kVAr	35 kVAr	66 kVAr	66 kVAr	80 kVAr	80 kVAr	2NO + 2NC

Accessories

9 AF - 800 AF



9 AF - 100 AF

1. Auxiliary Contact Block (Front Side) HGS TB
2. Auxiliary Contact Block (Left/Right Side) HGS SB
3. Mechanical Latching Block HGS LB 100
4. Timer HGS ET
5. Interlock Unit HGS IU
6. Surge Absorber HGS RC/CD
7. Thermal Overload Relay HGST
8. Separate Mounting Base HGSTMB
9. Front Safety Cover

Thermal Overload Relay

Protection Cover

- Operating side is covered with transparent cover in order to avoid any unauthorised changes in setting and any operation arbitrarily.
- Settings can be changed by lifting up the protection cover.

Test Button

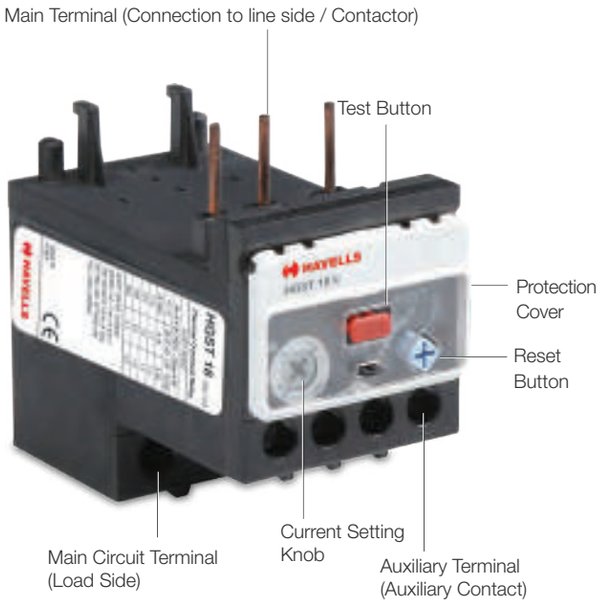
- When motor needs emergency stop during operation, it is possible to stop the motor by cutting off its contact from the magnetic contact with test button.
- In order to test the operation of thermal overload relay contacts, immediate testing is possible by pulling up test button which changes NO/NC contact.

Current Setting Knob

It is possible to set the rated current as 3 steps by using a +/- screwdriver.

Reset Button

A (Auto) Mode: Auto reset
H (Manual) Mode: Manual reset



Main Circuit Terminal
Screw type terminal is standard model

Safety Structures of TOR

- Attachment of protection cover
  - Prevents test function during operation and misoperation by user.
- Separation of reset button and test button
  - Prevents malfunction during operation.

Thermal Overload Relays: 18 AF - 100 AF

Model (Basic)		SI Unit	HGST18	HGST40	HGST65	HGST100
3 Phase, 3 Elements (Loss Phase Protection)			HGST18K	HGST40K	HGST65K	HGST100K
Nominal Current		A	0.12 - 18	7 - 40	7 - 65	17 - 100
Setting Current (Min. - Max.)		A	0.12 - 0.18 0.18 - 0.26 0.25 - 0.35 0.34 - 0.5 0.5 - 0.7 0.6 - 0.9 0.8 - 1.2 1.1 - 1.6 1.5 - 2.1 2 - 3 2.8 - 4.2 3 - 5 4 - 6 5.6 - 8 6 - 9 8 - 12 12 - 18	7 - 10 8 - 12 12 - 18 15 - 22 17 - 25 22 - 32 28 - 40	7 - 10 8 - 12 12 - 18 15 - 22 17 - 25 22 - 32 28 - 40 34 - 50 45 - 65	17 - 25 22 - 32 28 - 40 34 - 50 45 - 65 52 - 75 59 - 85 70 - 100
Auxiliary Contacts			1NO1NC	1NO1NC	1NO1NC	1NO1NC
Applicable Cable Size (mm^2)		Main Circuit	1-2.5	2-10	2-25	6-38
		Auxiliary Circuit	1-2.5	1-2.5	1-2.5	1-2.5
Reset			Manual & Automatic	Manual & Automatic	Manual & Automatic	Manual & Automatic
Dimensions	W x H x D	mm	45 x 77.2 x 82.7	45 x 78.7 x 95.5	55 x 89.3 x 110.7	70 x 105 x 128.1
Weight		kg	0.12	0.16	0.29	0.47
Applicable contactor			HGS 9, HGS12, HGS 18	HGS 25, HGS 32, HGS 40	HGS 50, HGS 65	HGS 75, HGS 85, HGS 100

Thermal Overload Relays: 150 AF - 800 AF

Model (Basic)		SI Unit	HGST150	HGST265	HGST500	HGST800
3 Phase, 3 Elements (Loss Phase Protection)			HGST150K	HGST265K	HGST500K	HGST800K
Nominal Current		A	48 - 150	48 - 265	90 - 500	378 - 800
Setting Current (Min. - Max.)		A	48 - 80 69 - 115 78 - 130 90 - 150	48 - 80 69 - 115 78 - 130 90 - 150 111 - 185 135 - 225 159 - 265	90 - 150 111 - 185 135 - 225 159 - 265 180 - 300 240 - 400 300 - 500	378 - 630 480 - 800
Auxiliary Contacts			1NO1NC	1NO1NC	1NO1NC	1NO1NC
CT Ratio			80:5, 115:5, 130:5, 150:5	80:5, 115:5, 130:5, 150:5, 185:5, 225:5, 265:5	150:5, 185:5, 225:5, 265:5, 300:5, 400:5, 500:5	630:5, 800:5
Applicable Cable Size		(mm^2)	1-2.5	1-2.5	1-2.5	1-2.5
Reset			Manual & Automatic	Manual & Automatic	Manual & Automatic	Manual & Automatic
Dimensions	W x H x D	mm	180 x 159 x 179.3	180 x 185 x 179.3	180 x 205.2 x 179.3	245 x 197 x 209.9
Weight		kg	2.0	2.2	2.4	6.2
Applicable contactor			HGS 115, HGS 130, HGS150	HGS 185, HGS 225, HGS 265	HGS 300, HGS 400, HGS 500	HGS 630, HGS 800

Technical Information

Features and Applications

Contactors can be selected according to categories: Rated thermal current (Ith), rated operating current (Ie), making and breaking capacities, electrical and mechanical endurance, and utilization.

IEC 60947

AC1	Non-inductive or slightly inductive loads, resistance furnaces
AC2	Slip-ring motors: starting, plugging
AC3	Squirrel cage motors: starting, switching off motors during running
AC4	Squirrel cage motors: plugging, inching
AC12	Resistive heating loads
AC15	Coil loads
DC1	Non-inductive or slightly inductive loads, resistance furnaces
DC3	Shunt motors: starting, plugging, and inching
DC5	Series motors: starting, plugging, and inching
DC12	Resistive heating loads
DC13	Coil loads

Making and Breaking Capacities According to Utilization Categories

Category	Making				Making & Breaking			
	Current	Voltage	Cos ϕ	Cycles	Current	Voltage	Cos ϕ	Cycles
AC1	-	-	-	-	1.5 Ie	1.05 Ue	0.8	50
AC2	-	-	-	-	4.0 Ie	1.05 Ue	0.65	50
AC3	10 Ie	Ue	0.45 (≤100 A)	50	8.0 Ie	1.05 Ue	0.45 (≤100 A)	50
AC4	12 Ie	Ue	0.35 (100 A)	50	10.0 Ie	1.05 Ue	0.35 (100 A)	50
AC15	-	-	-	-	10 Ie	1.1 Ue	0.3	10
DC1	-	-	-	-	1.5 Ie	1.05 Ue	1	50
DC3	-	-	-	-	4.0 Ie	1.05 Ue	2.5	50
DC5	-	-	-	-	4.0 Ie	1.05 Ue	15	50
DC13	-	-	-	-	1.1 Ie	1.1 Ue	6P	10

Operating Times According to Utilization Categories

Category	Making & Breaking				
	Current	Voltage	Cos ϕ	On-Time	Cycles
AC1	1.0 Ie	1.05 Ue	0.8	0.05 S	6,000
AC2	2.0 Ie	1.05 Ue	0.65	0.05 S	6,000
AC3	2.0 Ie	1.05 Ue	0.45 (Ie≤100 A)	0.05 S	6,000
AC4	6.0 Ie	1.05 Ue	0.35 (Ie 100 A)	0.05 S	6,000
AC15	10 Ie	1.1 Ue	0.3	0.05 S	6,000
DC1	1.0 Ie	1.05 Ue	1	0.05 S	6,000
DC3	2.5 Ie	1.05 Ue	2	0.05 S	6,000
DC5	2.5 Ie	1.05 Ue	7.5	0.05 S	6,000
DC13	1.1 Ie	1.1 Ue	6P	0.05 S	6,000

Electrical Endurance According to Utilzation Categories

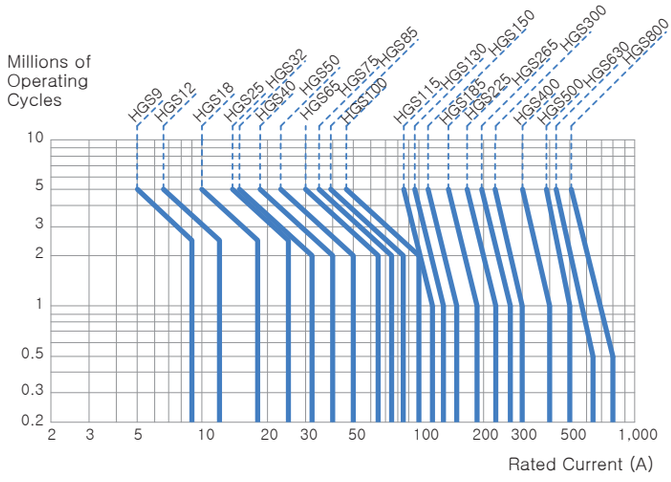
Category	Making			Breaking		
	Current	Voltage	Cos ϕ	Current	Voltage	Cos ϕ
AC1	1.0 Ie	1 Ue	0.95	1 Ie	1 Ue	0.95
AC2	2.5 Ie	1 Ue	0.65	2.5 Ie	1 Ue	0.65
AC3	6 Ie	1 Ue	0.65 (Ie≤17 A)	6 Ie	0.17 Ue	0.65 (Ie≤17 A)
AC4	6 Ie	1 Ue	0.35 (Ie 17 A)	6 Ie	1 Ue	0.35 (Ie 17 A)
DC1	1 Ie	1 Ue	1	1 Ie	1 Ue	1
DC3	2.5 Ie	1 Ue	2	2.5 Ie	1 Ue	2
DC5	2.5 Ie	1 Ue	7.5	2.5 Ie	1 Ue	7.5

Ie: Rated operational current Ue: Rated operational voltage

Selections of AC3 and AC4 Contactors

- When operation frequency is lower than the recommendation, the load capacities can be increased, but should not exceed the rated making and breaking capacities of the contactors. If the thermal overload relay is used, the short-circuit protection should be carefully considered and the recommended fuse ratings should be obeyed.
- The contactors can be chosen according to the electrical lifetime by means of the following diagrams.

AC3 Electrical Lifetime Curve 380 Vac- 440 Vac

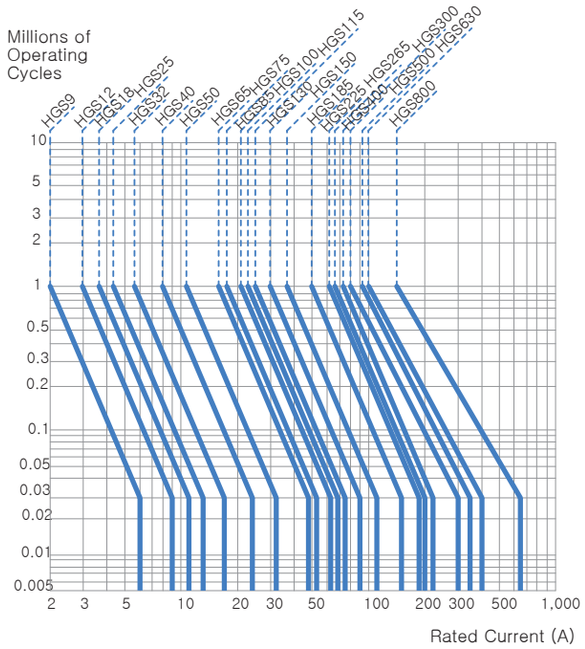


The electrical lifetime is calculated by the following formula if the load consist of AC3 and AC4 category.

$$L = \frac{1}{P1/L1 + P2/L2 + \ldots + Pn/Ln}$$

- L: Electrical lifetime of contactor
- L1: Electrical lifetime in AC3 duty
- L2: Electrical lifetime in AC4 duty
- P1: Coefficient of use in AC3 duty
- P2: Coefficient of use in AC4 duty
- P1 + P2 + … + Pn = 1

AC4 Electrical Lifetime Curve 380 Vac- 440 Vac



Example
Motor: 80 A full load current at AC 440 V, 480 starting current (6 times of rated current)
AC3 use: 70 A rated current with 95 % coefficient
AC4 use: 70 A rated current (420 A starting current) with 5 % coefficient

$$L = \frac{10^6}{0.95/2.0 + 0.05/0.03} = 0.47 \times 10^6$$

- On AC3 electrical lifetime curve, the life time of HGS is 2.0 x 106
- (When operation current is 70 A)
- On AC4 electrical lifetime curve, the life time of HGS100 is 0.03 x 106 (When operation current is 400 A)

Technical Information

Rated Operational Current with DC Load

Connection	Application	Operation Voltage	HGS9	HGS12	HGS18	HGS25	HGS32	HGS40	HGS50	HGS65	HGS75	HGS85	HGS100
2 Poles in Series	DC1 Resistive Load (L/R≤1ms)	24 V	10 A	12 A	18 A	20 A	25 A	35 A	50 A	65 A	65 A	75 A	80 A
		48 V	10 A	12 A	18 A	20 A	25 A	35 A	40 A	65 A	65 A	65 A	65 A
		110 V	6 A	10 A	13 A	15 A	25 A	25 A	35 A	45 A	45 A	50 A	50 A
		220 V	3 A	7 A	8 A	10 A	12 A	12 A	15 A	15 A	15 A	20 A	20 A
	DC3,DC5 DC Motor Load (L/R≤15ms)	24 V	8 A	12 A	12 A	20 A	25 A	35 A	45 A	45 A	45 A	65 A	65 A
		48 V	4 A	6 A	6 A	15 A	20 A	20 A	25 A	25 A	25 A	40 A	40 A
		110 V	2.5 A	4 A	4 A	8 A	10 A	10 A	15 A	15 A	15 A	20 A	20 A
		220 V	0.8 A	1.2 A	1.2 A	2 A	3 A	3 A	3.5 A	3.5 A	3.5 A	5 A	5 A
	DC13 Coil Load (L/R≤40ms)	24 V	8 A	12 A	12 A	20 A	25 A	35 A	-	-	-	-	-
		48 V	4 A	6 A	6 A	12 A	15 A	15 A	-	-	-	-	-
		110 V	2 A	3 A	3 A	3 A	4 A	4 A	-	-	-	-	-
		220 V	0.3 A	0.5 A	0.5 A	1.2 A	1.2 A	1.2 A	-	-	-	-	-
3 Poles in Series	DC1 Resistive Load (L/R≤1ms)	24 V	10 A	12 A	18 A	20 A	25 A	35 A	50 A	65 A	65 A	75 A	80 A
		48 V	10 A	12 A	18 A	20 A	25 A	35 A	50 A	65 A	65 A	75 A	80 A
		110 V	8 A	12 A	18 A	20 A	25 A	35 A	50 A	65 A	65 A	75 A	80 A
		220 V	8 A	12 A	18 A	20 A	25 A	30 A	40 A	50 A	50 A	55 A	60 A
	DC3,DC5 DC Motor Load (L/R≤15ms)	24 V	8 A	12 A	12 A	20 A	25 A	35 A	50 A	50 A	50 A	80 A	80 A
		48 V	6 A	10 A	10 A	20 A	25 A	30 A	35 A	35 A	35 A	60 A	60 A
		110 V	4 A	8 A	8 A	15 A	20 A	20 A	30 A	30 A	30 A	50 A	50 A
		220 V	2 A	4 A	4 A	8 A	10 A	10 A	12 A	12 A	12 A	20 A	20 A
	DC13 Coil Load (L/R≤40 ms)	24 V	8 A	12 A	12 A	20 A	25 A	35 A	-	-	-	-	-
		48 V	6 A	10 A	10 A	15 A	25 A	35 A	-	-	-	-	-
		110 V	3 A	5 A	5 A	10 A	12 A	12 A	-	-	-	-	-
		220 V	0.8 A	2 A	2 A	4 A	4 A	4 A	-	-	-	-	-

Connection	Application	Operation Voltage	HGS115	HGS130	HGS150	HGS185	HGS225	HGS265	HGS300	HGS400	HGS500	HGS630	HGS800
2 Poles in Series	DC1 Resistive Load (L/R≤1ms)	24 V	100 A	120 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	800 A
		48 V	100 A	100 A	120 A	180 A	180 A	220 A	240 A	240 A	300 A	630 A	800 A
		110 V	80 A	80 A	100 A	150 A	150 A	180 A	200 A	200 A	220 A	630 A	630 A
		220 V	50 A	50 A	100 A	150 A	150 A	180 A	200 A	200 A	220 A	630 A	630 A
	DC3,DC5 DC Motor Load (L/R≤15ms)	24 V	100 A	120 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	800 A
		48 V	60 A	60 A	100 A	150 A	150 A	180 A	200 A	200 A	260 A	630 A	800 A
		110 V	40 A	40 A	80 A	120 A	120 A	130 A	150 A	150 A	180 A	630 A	630 A
		220 V	30 A	30 A	60 A	80 A	80 A	80 A	90 A	90 A	130 A	210 A	210 A
	DC13 Coil Load (L/R≤40ms)	24 V	-	-	-	-	-	-	-	-	-	-	-
		48 V	-	-	-	-	-	-	-	-	-	-	-
		110 V	-	-	-	-	-	-	-	-	-	-	-
		220 V	-	-	-	-	-	-	-	-	-	-	-
3 Poles in Series	DC1 Resistive Load (L/R≤1ms)	24 V	100 A	120 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	800 A
		48 V	100 A	120 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	800 A
		110 V	100 A	100 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	630 A
		220 V	80 A	80 A	150 A	180 A	220 A	260 A	300 A	300 A	400 A	630 A	630 A
	DC3,DC5 DC Motor Load (L/R≤15ms)	24 V	100 A	120 A	150 A	180 A	220 A	260 A	300 A	400 A	500 A	630 A	800 A
		48 V	90 A	90 A	130 A	180 A	220 A	260 A	280 A	280 A	400 A	630 A	800 A
		110 V	80 A	80 A	120 A	150 A	150 A	180 A	200 A	200 A	260 A	630 A	630 A
		220 V	50 A	50 A	80 A	100 A	100 A	130 A	150 A	150 A	180 A	310 A	310 A
	DC13 Coil Load (L/R≤40 ms)	24 V	-	-	-	-	-	-	-	-	-	-	-
		48 V	-	-	-	-	-	-	-	-	-	-	-
		110 V	-	-	-	-	-	-	-	-	-	-	-
		220 V	-	-	-	-	-	-	-	-	-	-	-

Specification for Transformer and Capacitor Load

Load	Operational Voltage		HGS9	HGS12	HGS18	HGS25	HGS32	HGS40	HGS50	HGS65	HGS75	HGS85	HGS100
Transformer (kVA)	Single Phase	AC220 V	1 A	1.5 A	2 A	2.5 A	3 A	4 A	5 A	7 A	8 A	9 A	10 A
		AC440 V	1.5 A	2 A	3 A	4 A	5 A	7.5 A	10 A	15 A	17 A	18 A	20 A
	Three Phase	AC220 V	2 A	3 A	3.5 A	4 A	5 A	6.5 A	10 A	12 A	13 A	15 A	18 A
		AC440 V	2.5 A	4 A	5 A	7.5 A	10 A	12 A	18 A	25 A	27 A	30 A	35 A
Capacitor (kVAr)	Three Phase	AC220 V	2 A	3 A	4 A	5 A	9 A	11 A	13 A	17 A	20 A	22 A	24 A
		AC440 V	3 A	4 A	6 A	10 A	16 A	20 A	24 A	34 A	40 A	45 A	48 A

Load	Operational Voltage		HGS115	HGS130	HGS150	HGS185	HGS225	HGS265	HGS300	HGS400	HGS500	HGS630	HGS800
Transformer (kVA)	Single Phase	AC220 V	-	15 A	17 A	20 A	25 A	30 A	33 A	44 A	55 A	65 A	90 A
		AC440 V	-	25 A	33 A	40 A	50 A	57 A	66 A	90 A	110 A	130 A	175 A
	Three Phase	AC220 V	-	25 A	30 A	35 A	42 A	48 A	57 A	75 A	90 A	110 A	150 A
		AC440 V	-	42 A	60 A	70 A	85 A	95 A	100 A	150 A	180 A	220 A	300 A
Capacitor (kVAr)	Three Phase	AC220 V	-	29 A	35 A	42 A	58 A	63 A	69 A	92 A	115 A	145 A	185 A
		AC440 V	-	58 A	70 A	84 A	115 A	125 A	139 A	185 A	230 A	291 A	369 A

- The inrush current of transformer shall be less than 30 times of rated current (RMS).
- Electrical Lifetime: 100,000 times (IEC 60947-4-1, AC6a, 6b)

Light load - Maximum Incandescent Lamp Quantity Per Contactor

Lighting Load Application

The contactor for lighting load can be selected by the rated thermal current (Ith) on the condition that inrush current does not exceed contactor's breaking capacity. Usually, lighting load switching frequency is smaller than the other applications, so electrical lifetime would not be the major parameter to select contactor.

Incandescent Lamp

The contactor for incandescent lamps can be selected according to AC3 utilization category considering inrush current at hot condition. The resistance of the incandescent lamp filament is small at cold condition, so the inrush current can be 13 - 16 times of the rated current instantaneously. However, the inrush current at hot condition is limited to 7 - 10 times of rated current by circuit impedance and self-heating. Therefore, it is recommended to consider the inrush current at hot condition rather than cold condition to select contactor.

Power Voltage		110 V							
Lamp Power		100 W	150 W	200 W	250 W	300 W	500 W	1,000 W	1,500 W
Contactor Model	HGS9	11 A	7 A	5 A	4 A	2 A	2 A	1 A	-
	HGS12	14 A	8 A	6 A	5 A	4 A	2 A	1 A	-
	HGS18	19 A	13 A	10 A	7 A	6 A	3 A	1 A	1 A
	HGS25	20 A	13 A	10 A	8 A	6 A	3 A	1 A	1 A
	HGS32	28 A	18 A	14 A	11 A	9 A	5 A	2 A	1 A
	HGS40	38 A	25 A	19 A	15 A	12 A	7 A	3 A	2 A
	HGS50	55 A	35 A	27 A	22 A	16 A	10 A	5 A	3 A

Power Voltage		220 V							
Lamp Power		100 W	150 W	200 W	250 W	300 W	500 W	1,000 W	1,500 W
Contactor Model	HGS9	22 A	14 A	11 A	8 A	7 A	4 A	2 A	1 A
	HGS12	26 A	18 A	14 A	10 A	8 A	5 A	2 A	1 A
	HGS18	38 A	25 A	20 A	15 A	13 A	7 A	3 A	2 A
	HGS25	40 A	27 A	20 A	16 A	13 A	8 A	3 A	2 A
	HGS32	55 A	36 A	28 A	22 A	18 A	11 A	5 A	3 A
	HGS40	75 A	50 A	38 A	30 A	25 A	15 A	7 A	4 A
	HGS50	105 A	70 A	54 A	43 A	35 A	22 A	10 A	6 A

Technical Information

Inching and Plugging Duty

- AC4 Utilization Category

Category	Voltage	Ratio	Electrical Lifetime		HGS9	HGS12	HGS18	HGS25	HGS32	HGS40	HGS50	HGS65	HGS75	HGS85	HGS100
Inching	220 V	10 %	100,000	kW	2.2 kW	2.7 kW	3.7 kW	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW	19 kW	25 kW
			500,000		1 kW	1.5 kW	2.7 kW	3.7 kW	4.5 kW	5.5 kW	7.5 kW	11 kW	15 kW	15 kW	15 kW
		50 %	100,000		1 kW	1.5 kW	2.7 kW	3.7 kW	4.5 kW	5.5 kW	7.5 kW	11 kW	15 kW	15 kW	19 kW
			500,000		0.5 kW	0.75 kW	1.1 kW	1.5 kW	2.2 kW	3.7 kW	3.7 kW	5.5 kW	7.5 kW	7.5 kW	9 kW
		100 %	100,000		0.75 kW	1.1 kW	1.5 kW	2.5 kW	4.5 kW	4.5 kW	5.5 kW	7.5 kW	9 kW	11 kW	11 kW
			500,000		0.3 kW	0.5 kW	0.75 kW	1.1 kW	1.8 kW	2.7 kW	3.7 kW	4 kW	4 kW	5.5 kW	5.5 kW
	440 V	10 %	100,000		2.7 kW	4 kW	4 kW	7.5 kW	11 kW	15 kW	22 kW	30 kW	37 kW	37 kW	50 kW
			500,000		1.5 kW	2.2 kW	3.7 kW	7.5 kW	9 kW	11 kW	15 kW	22 kW	30 kW	30 kW	37 kW
		50 %	100,000		1.5 kW	3.7 kW	4 kW	7.5 kW	9 kW	11 kW	15 kW	22 kW	30 kW	30 kW	37 kW
			500,000		0.75 kW	1.5 kW	2.2 kW	3.7 kW	4.5 kW	5.5 kW	7.5 kW	11 kW	15 kW	15 kW	18.5 kW
		100 %	100,000		1.1 kW	2.2 kW	3.7 kW	5.5 kW	7.5 kW	11 kW	15 kW	15 kW	15 kW	22 kW	25 kW
			500,000		0.5 kW	1.1 kW	1.5 kW	2.2 kW	3.7 kW	3.7 kW	5.5 kW	7.5 kW	7.5 kW	11 kW	13 kW
Plugging	220 V	Plugging Brake 100 %	100,000		0.75 kW	0.75 kW	1.5 kW	2.2 kW	2.5 kW	3.7 kW	5.5 kW	7.5 kW	9 kW	9 kW	11 kW
			500,000		0.2 kW	0.4 kW	0.5 kW	0.75 kW	1.1 kW	1.5 kW	22 kW	3 kW	3.7 kW	3.7 kW	4.5 kW
	440 V		100,000		0.75 kW	1 kW	2.2 kW	3.7 kW	4.5 kW	4.5 kW	7.5 kW	11 kW	18.5 kW	18.5 kW	22 kW
			500,000		0.2 kW	0.4 kW	0.75 kW	1.5 kW	2.2 kW	2.2 kW	3.7 kW	5.5 kW	7.5 kW	7.5 kW	11 kW

Category	Voltage	Ratio	Electrical Lifetime		HGS 115	HGS 130	HGS 150	HGS 185	HGS 225	HGS 265	HGS 300	HGS 400	HGS 500	HGS 630	HGS 800
Inching	220 V	10 %	100,000	kW	30 kW	30 kW	37 kW	45 kW	55 kW	65 kW	75 kW	110 kW	132 kW	160 kW	200 kW
			500,000		15 kW	22 kW	25 kW	30 kW	37 kW	45 kW	50 kW	65 kW	70 kW	75 kW	132 kW
		50 %	100,000		22 kW	22 kW	30 kW	37 kW	45 kW	50 kW	55 kW	75 kW	80 kW	90 kW	150 kW
			500,000		9 kW	9 kW	11 kW	15 kW	19 kW	22 kW	25 kW	30 kW	32 kW	37 kW	45 kW
		100 %	100,000		11 kW	15 kW	19 kW	25 kW	30 kW	32 kW	37 kW	45 kW	50 kW	55 kW	75 kW
			500,000		5.5 kW	7.5 kW	9 kW	11 kW	15 kW	17 kW	22 kW	25 kW	30 kW	37 kW	45 kW
	440 V	10 %	100,000		50 kW	60 kW	75 kW	90 kW	110 kW	132 kW	150 kW	200 kW	250 kW	300 kW	400 kW
			500,000		37 kW	45 kW	55 kW	75 kW	90 kW	110 kW	125 kW	132 kW	140 kW	150 kW	190 kW
		50 %	100,000		37 kW	45 kW	55 kW	75 kW	90 kW	110 kW	132 kW	150 kW	167 kW	190 kW	220 kW
			500,000		18.5 kW	22 kW	30 kW	37 kW	37 kW	42 kW	50 kW	75 kW	80 kW	90 kW	110 kW
		100 %	100,000		25 kW	30 kW	45 kW	55 kW	60 kW	65 kW	75 kW	110 kW	120 kW	132 kW	160 kW
			500,000		13 kW	15 kW	22 kW	25 kW	30 kW	32 kW	37 kW	55 kW	63 kW	75 kW	90 kW
Plugging	220 V	Plugging Brake 100 %	100,000		11 kW	15 kW	19 kW	22 kW	25 kW	30 kW	37 kW	45 kW	50 kW	55 kW	75 kW
			500,000		4.5 kW	5.5 kW	7.5 kW	11 kW	13 kW	15 kW	18.5 kW	22 kW	25 kW	30 kW	37 kW
	440 V		100,000		22 kW	30 kW	37 kW	45 kW	45 kW	49 kW	55 kW	75 kW	90 kW	110 kW	150 kW
			500,000		11 kW	15 kW	19 kW	22 kW	25 kW	26 kW	30 kW	37 kW	40 kW	45 kW	75 kW

The inching limit of making and breaking frequency is below 10 continuous operation (1 sec/1 cycle)

$$\text{Ratio of Inching Operation (\%)} = \frac{\text{Inching Operations}}{\text{Standard Operations + Inching Operations}} \times 100$$

Technical Information

Effect of Cable Length on Contactor

Voltage Drop by Inrush Current and Resistive Circuit

Voltage drop occurs on control circuit when inrush current caused by resistance of conductor is supplied to coil. Excessive voltage drop on power control cable (for both AC and DC) might cause coil to burn. Therefore, the length of connection cable should be decided considering input power, supply voltage, and cross sectional area of conducting wire.

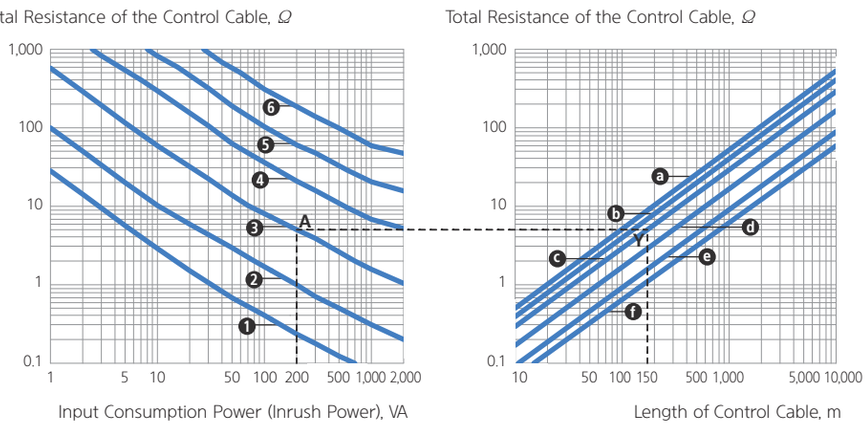
Selection for Conductor C.S.A. According to Inrush Power

These graphs show maximum 5 % line voltage drop.

AC Circuit

Supply Voltage
❶ : AC24 V
❷ : AC48 V
❸ : AC115 V
❹ : AC230 V
❺ : AC400 V
❻ : AC690 V

C.S.A. of Cu Cables
ⓐ : 0.75 mm²
ⓑ : 1 mm²
ⓒ : 1.5 mm²
ⓓ : 2.5 mm²
ⓔ : 4 mm²
ⓕ : 6 mm²

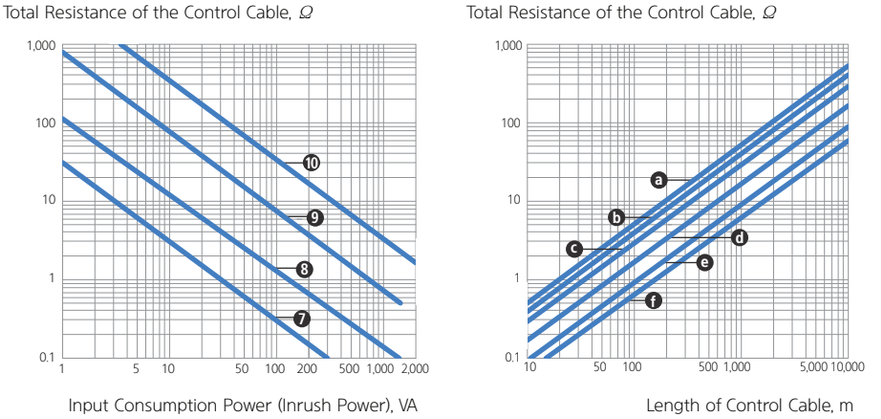


Example: The maximum length of conductor required when using 1.5 mm 2 Cu control cable, HGS 40 A, 115 V with inrush power 200 VA is 150 m.

DC Circuit

Supply Voltage
❼ : DC24 V
❽ : DC48 V
❾ : DC125 V
❿ : DC250 V

C.S.A. of Cu Cables
ⓐ : 0.75 mm²
ⓑ : 1 mm²
ⓒ : 1.5 mm²
ⓓ : 2.5 mm²
ⓔ : 4 mm²
ⓕ : 6 mm²



Maximum Cable Distance Calculation

$$L = \frac{U^2}{SA}.s.K$$

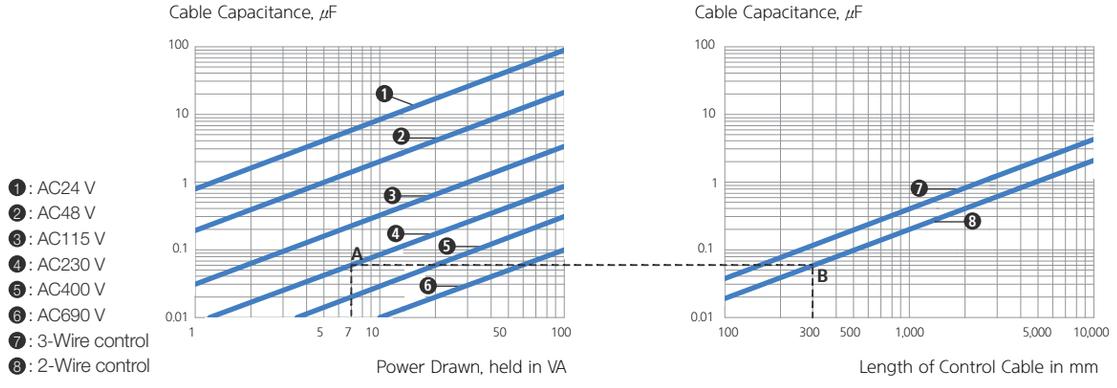
L: Distance between conductors and controlling equipment (length of cable)
U: Power supply in V
SA: Apparent inrush power for coil in VA
s: Conductor C.S.A. in mm^2
K: Factors given in following table

AC Supply	SA (VA)	20	40	100	150	200
	K	1.38	1.5	1.8	2	2.15
DC Supply	Irrespective of the apparent inrush power SA, expressed in W					
	k = 1.38					

Trip Failure Due to Cable Capacitance (AC)

Control cable's capacitance might cause trip failure when the control circuit of contactors is opened.
This phenomenon can be worsened by the following conditions, so when deciding the length of conducting cable, the following should be considered.

- Too long distance between coil terminal and power source or between coil terminal and contactors.
- Too high of control circuit voltage
- Too low of coil power consumption
- Too low of drop-out voltage



Example: The maximum distance for control cable of HGS12 contact which is operated by 230 V and 2-wire control with hold in power of 7 VA, is 300 m.

Maximum Cable Distance Calculation According to Cable Capacitance

$$L = 455.\frac{S}{U^2.Co}$$

L: Distance between contact and control equipment m (cable length)
S: Apparent sealed power VA
U: Control voltage V
Co: Line capacitance capacity for cable

Selection Method Thermal Overload Relay

Short Starting Time Motors

- For the normal starting time motors within a few seconds relays can be selected by the table of page 56. The full load current (FLC) of the motor must be in the setting range of the thermal overload relay. The starting time of high-inertia motor is an important factor at the selection of thermal overload relays
- The tripping time of the motors, whose starting current is 6-7 times of the rated current, can be obtained from the HGST tripping curves. This time should be longer than about 125 % of the motor starting time.

Long Starting Time Motors

- If the starting time of the motor is longer than the tripping time of HGST, the current transformer type is applicable.
- The current transformer type relays include the non-tripping features during the motor starting time. The rated current can be decreased by looping primary cable several times on the transformer according to the following table.

Current Configuration Ratio According to Loop Turns (Example: 130 A)

Primary Loop Turns	Current Range (A)	Current Ratio
1	78 A - 130 A	130/5
2	39 A - 65 A	65/5
3	26 A - 26.7 A	26.7/5
4	19.5 A - 43.3 A	43.3/5
5	15.6 A - 26 A	26/5
6	13 A - 21.7 A	21.7/5
7	11.14 A - 18.5 A	18.5/5
8	9.75 A - 16.25 A	16.25/5

$$\text{Setting Current (A)} = \frac{\text{Rated Current of Motor}}{\text{Current Ratio}}$$

- The second rated current of current transformer is 5 A, the overload relay is able to control the current between 3 A and 5 A.
- The corresponding setting value for the relay can be calculated by using the following formula.

Making and Breaking Current of Auxiliary Contacts

Class	AC15 [1]		Class	DC13 [2]	
Voltage (V)	Aux. Contact 95 - 96	Alarm Contact 97 - 98	Voltage (V)	Aux. Contact 95 - 96	Alarm Contact 97 - 98
	Ie (A)	Ie (A)		Ie (A)	Ie (A)
110	2	1.2	24	1	1
220	1.5	1	110	0.4	0.4
500	1	0.5	220	0.15	0.15
660	0.5	0.3	440	0.07	0.07

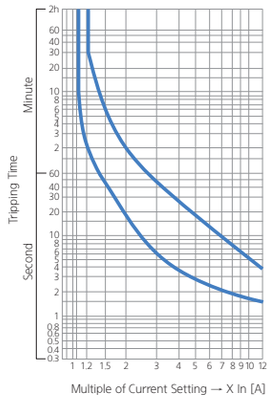
1) AC15: Making/Breaking Current = Ie×10
2) DC13: Making/Breaking Current = Ie×1.1

Technical Information

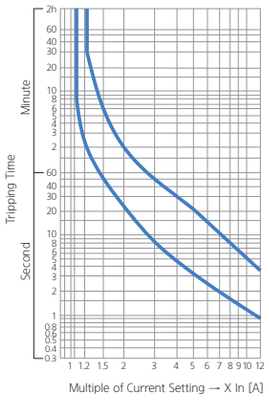
Characteristic Curve of Thermal Overload Relay

- Tripping curve of 3 phase overloaded condition shows the average tripping time based on the cold starting at + 20 ambient temperaure. (Tripping time of hot starting is 20 - 40 % of cold starting)
- Average tripping time of single phase overloaded condition is 40 - 60 % of three phase overload.

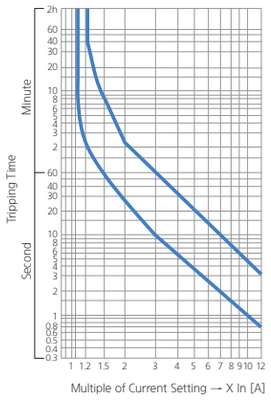
HGST18K



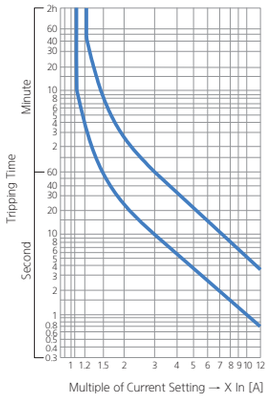
HGST40K



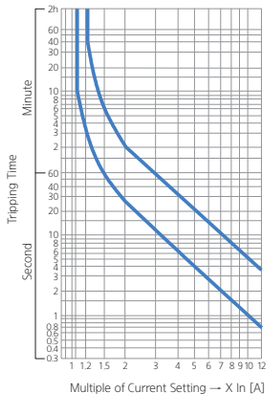
HGST65K



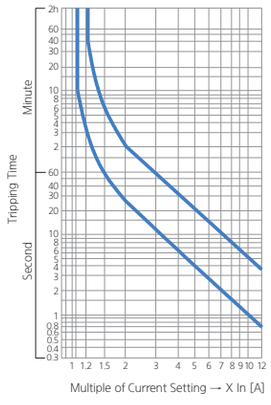
HGST100K



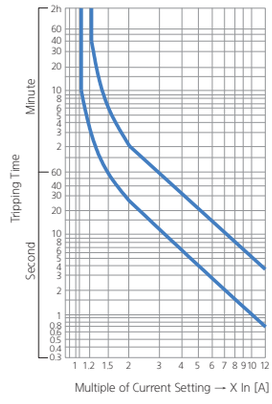
HGST150K



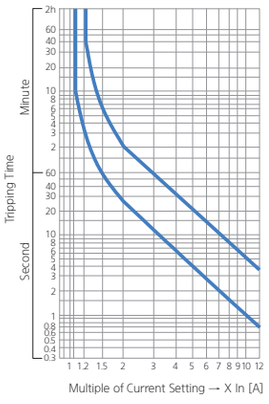
HGST265K



HGST400K



HGST800K

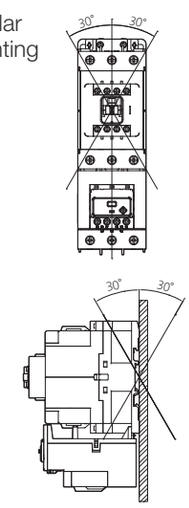


Technical Information

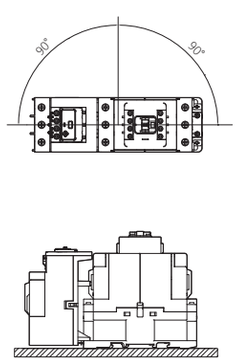
Cautions for Installing

- Install the contactor in a place free from moisture and vibration.
- It is recommended to install the contactor in a vertical plane, but +30^0 slant is acceptable as standard installation.
- Lateral or horizontal installation could decrease the mechanical lifetime and electrical performance of contactor compared with standard installation.
- The contactor may get damaged by arc if the insulation distance stated in the below table is not followed.
- Ambient temperature (Standard) : -5 ^{0}C ~ + 40 ^{0}C

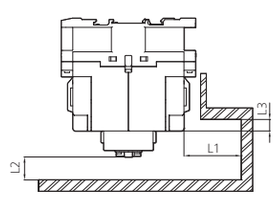
Regular Mounting



Vertical and Horizontal Mounting



Insulation Distance



(Unit: mm)

Distance \ Model	Above HGS75				
	HGS75 - 100	HGS115 - 150	HGS185 - 265	HGS300 - 500	HGS630 - 800
L1	30	30	80	80	80
L2	5	15	15	15	20
L3	6	11	32	32	40

Precautions

⚠ Safety Precautions

- All procedures must be conducted only by qualified persons. Otherwise, electrical shock, personal injury, or a fire could occur.
- The product shall not be stored or operated in abnormal environment, such as, but not limited to, high temperature, high humidty, over vibration, dust, and corrosive gas.
- All care must be taken to prevent dust, moisture, and foreign objects from entering the product.

⚠ Transportation and Storage

- Do not open the package.
- Do not leave the products on the ground. Place it on a table or similar.
- Do not store in high temperature, high humidty, or corrosive gas areas.

⚠ Check Point Before Operation

- Do not operate before setting and adjustment.

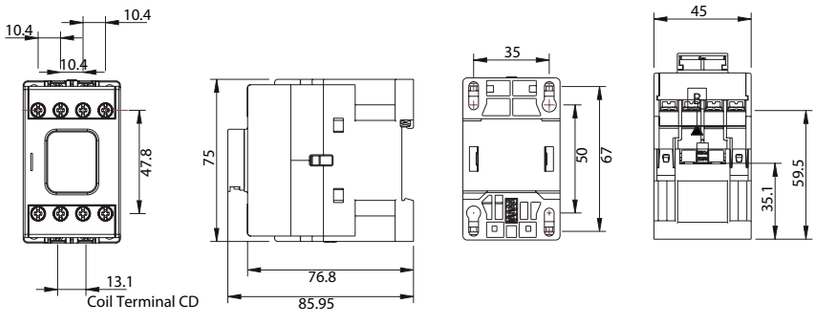
⚠ Precautions for Installation, Operation, and Maintenance

- The product, bolt tightness, assembled status, and operating condition shall be checked visually and electrically from time to time. If any damage occurs, the product or parts must be replaced immediately.
- Rated current, rated voltage, load capacity, frequency, but not limited to, of the product must meet the load.
- Power must be OFF before wiring work.
- Supply voltage should be applied with right rating of the product. Otherwise, electrical shock, personal injury, or a fire could occur.
- Cable and terminal must be suitable for the product and the load.
- All wirings, especially for main terminal and coil terminal, shall be tightened by proper torque in correct manner.
- Routine check for the connection of circuit is needed.
- The funcion of product and contacts shall be checked occasionally and if defect is found, proper replacement is needed.
- Lubrication is prohibited on the product, parts, and wirings.
- Proper tool should be used for maintenance.

Contactor

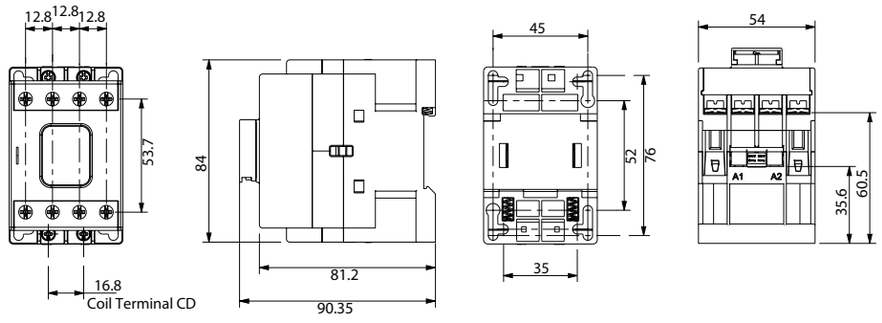
Dimensions (in mm)

HGS9 / HGS12 / HGS18



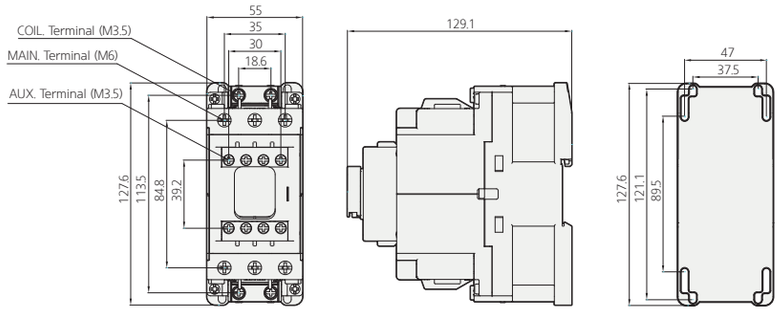
Accessories	A (mm)
Aux. Contact HGSTB	35
Latching Block HGSLB	42.5
Timer HGSET	39

HGS25 / HGS32 / HGS40



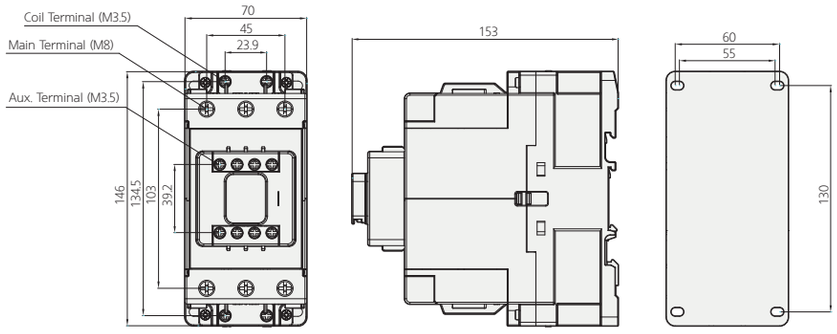
Accessories	A (mm)
Aux. Contact HGSTB	35
Latching Block HGSLB	42.5
Timer HGSET	39

HGS50 / HGS65 (AC)



Accessories	A (mm)
Aux. Contact HGSTB	35
Latching Block HGSLB	42.5
Timer HGSET	39

HGS75 / HGS85 / HGS100 (AC)

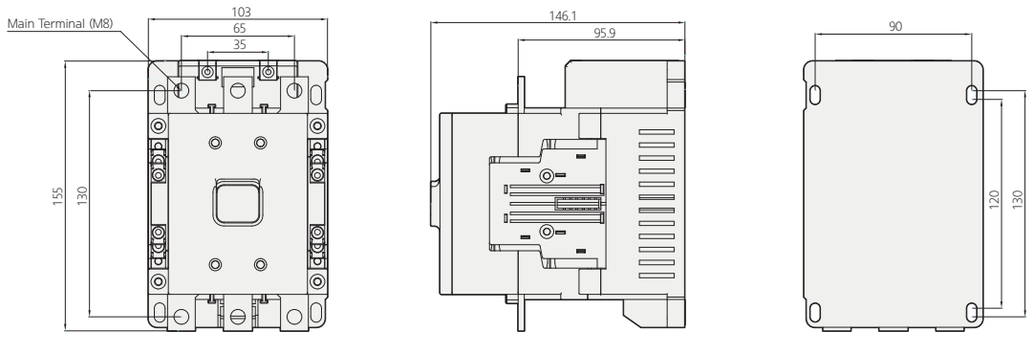


Accessories	A (mm)
Aux. Contact HGSTB	35
Latching Block HGSLB	42.5
Timer HGSET	39

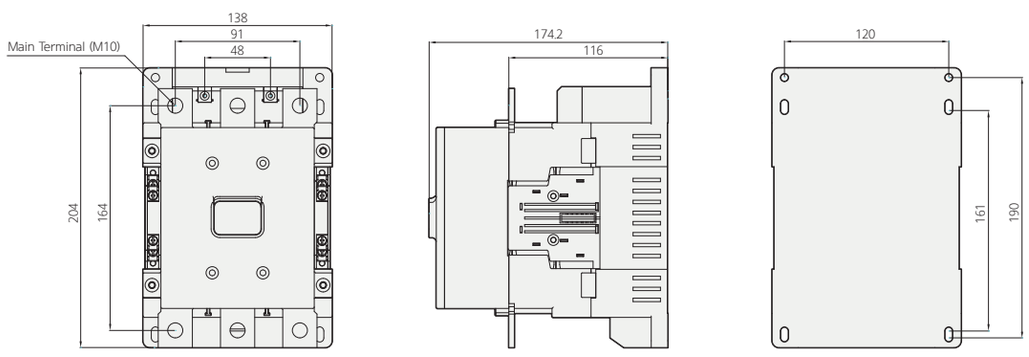
Contactor

Dimensions (in mm)

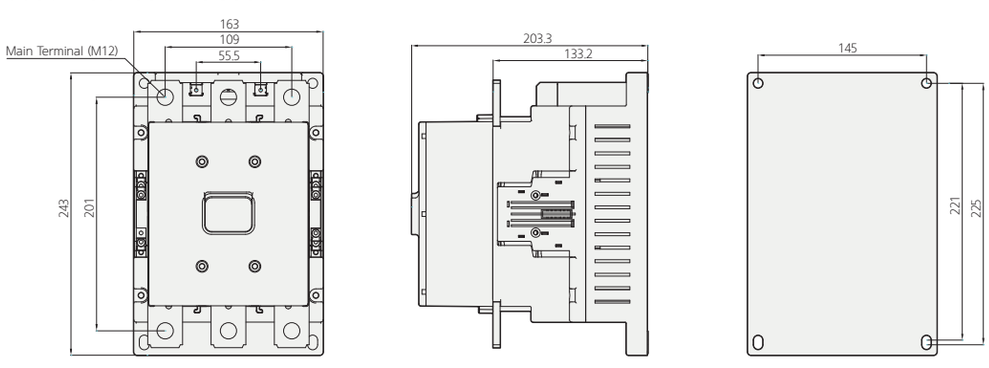
HGS115 / HGS130 / HGS150



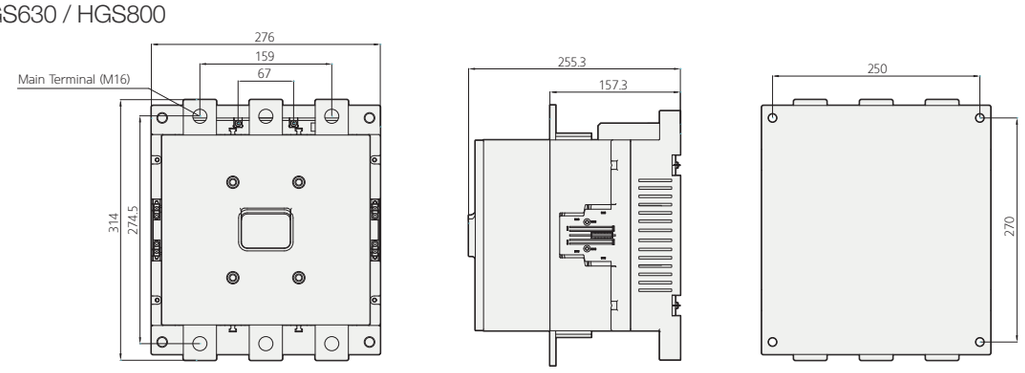
HGS185 / HGS225 / HGS265



HGS300 / HGS400 / HGS500



HGS630 / HGS800

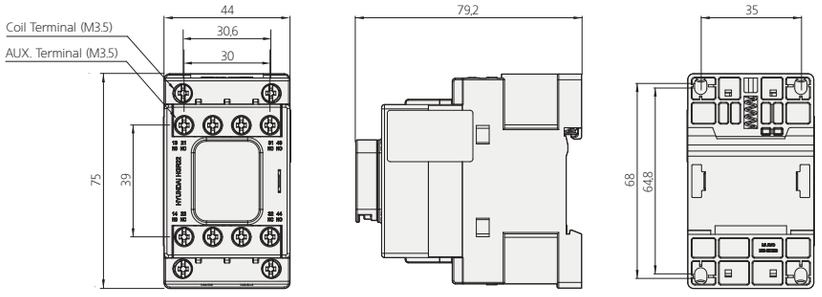


Contactor

Dimensions (in mm)

Control Relay

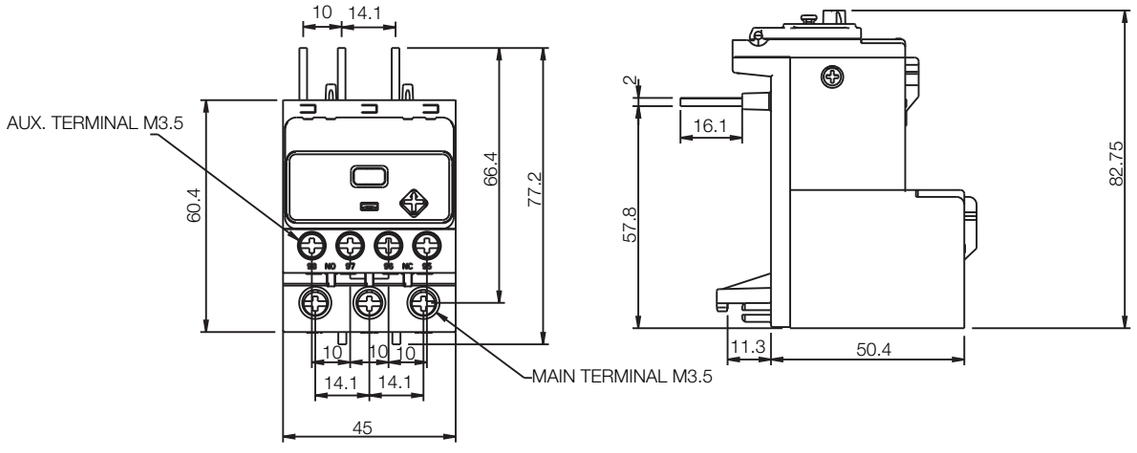
HGR (AC)



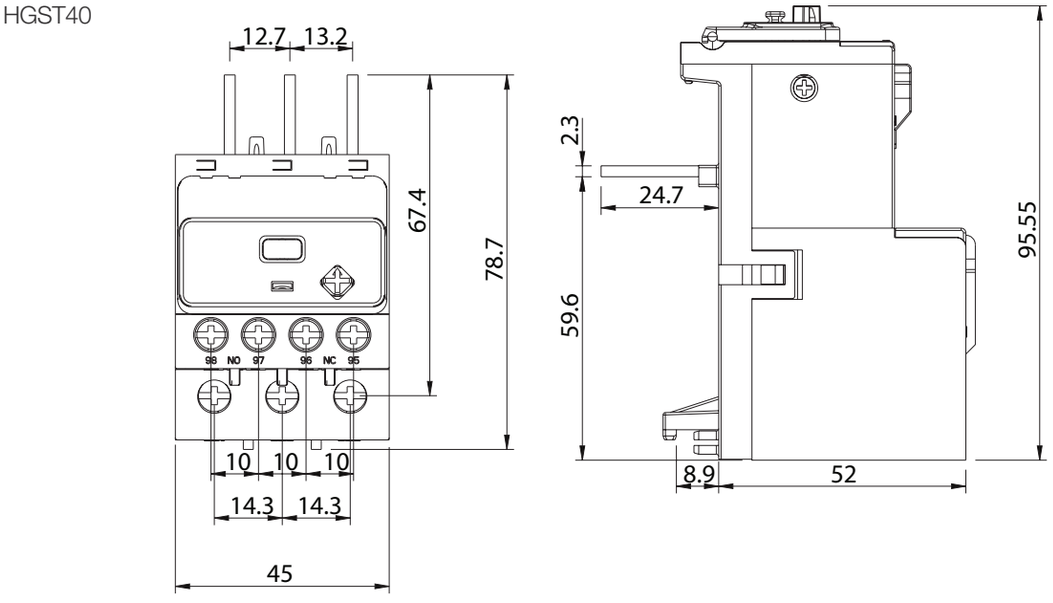
Accessories	A (mm)
Aux. Contact HGSTB	35
Latching Block HGSLB	42.5
Timer HGSET	39

Thermal Overload Relay

HGST18



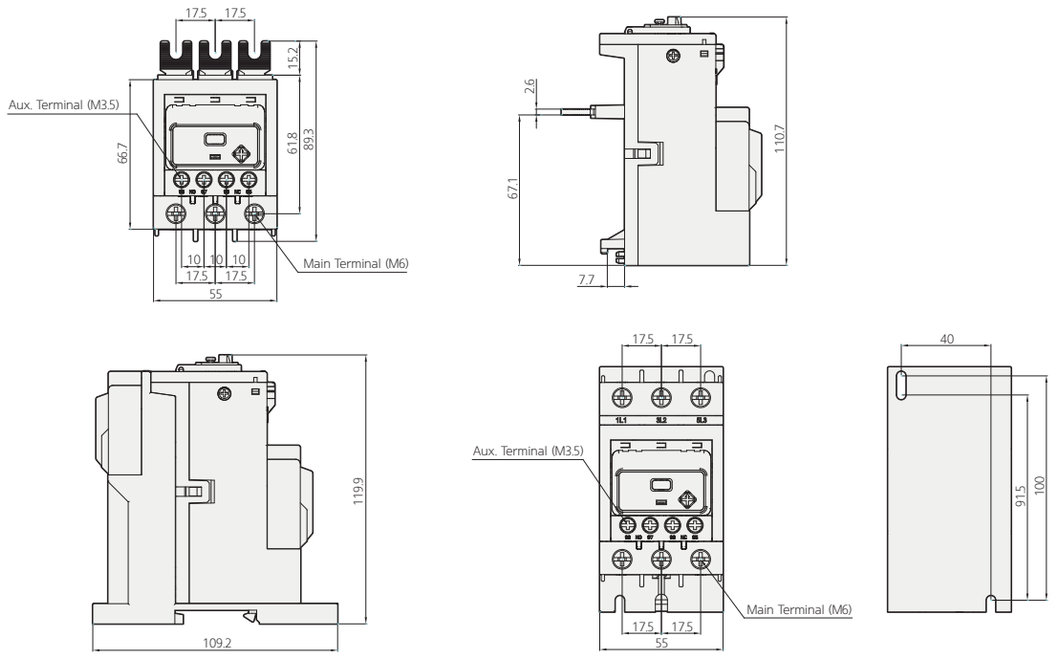
HGST40



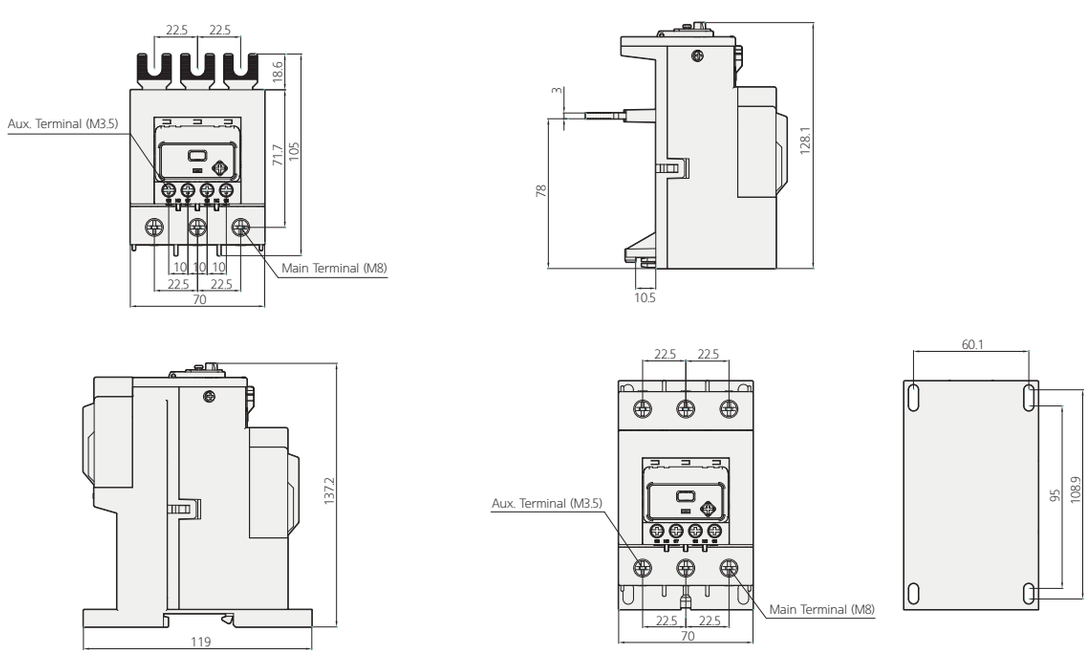
Thermal Overload Relay

Dimensions (in mm)

HGST65

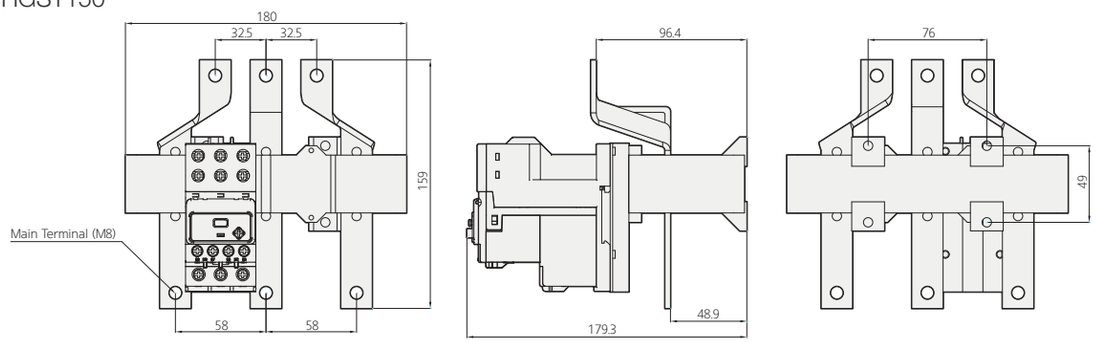


HGST100

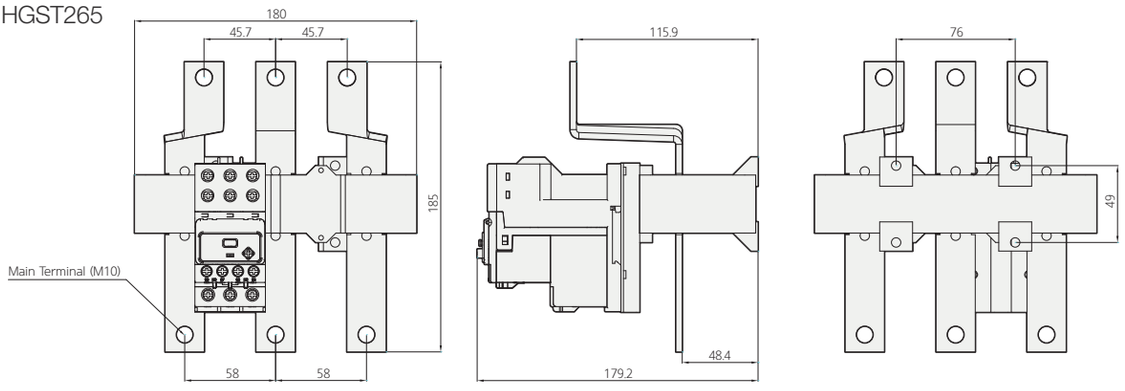


Dimensions (in mm)

HGST150



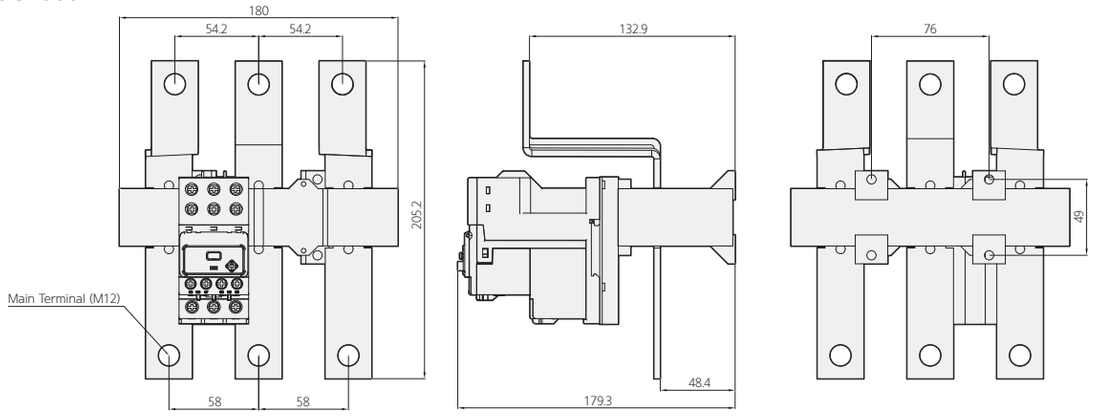
HGST265



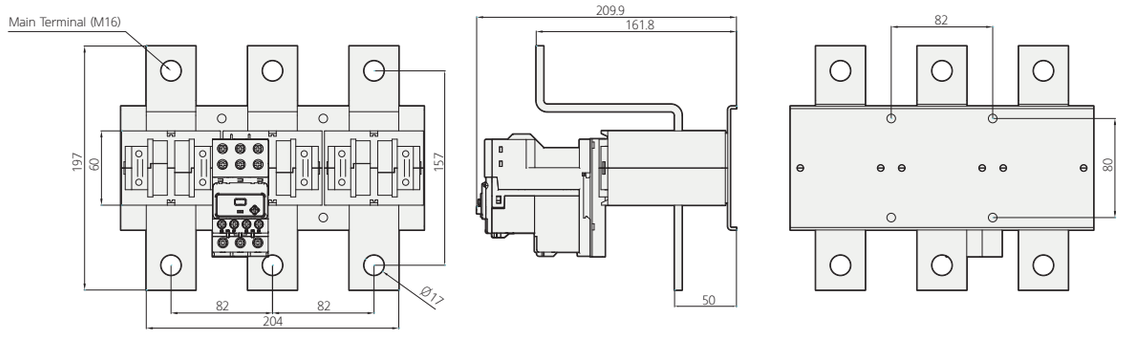
Thermal Overload Relay

(Unit: mm)

HGST500



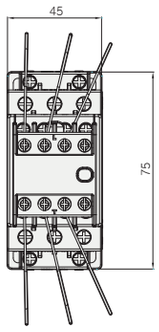
HGST800

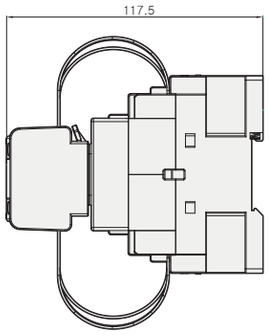


Capacitor Duty Contactor

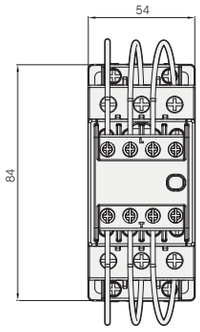
Dimensions (in mm)

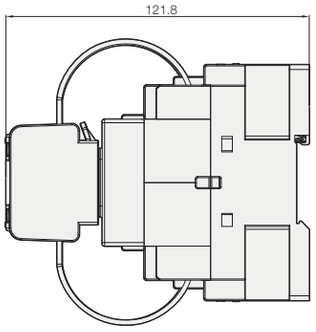
HGS 3C-HGS 15C



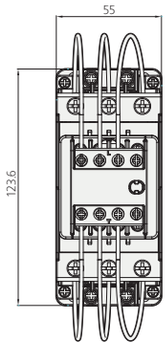


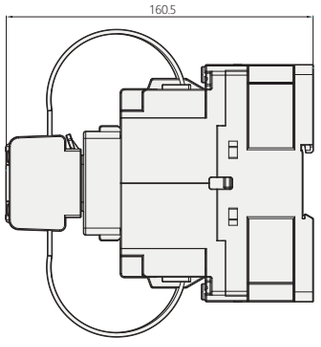
HGS 20C-HGS 33.3C



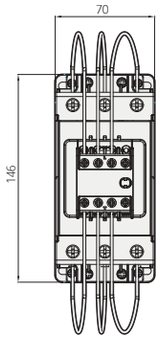


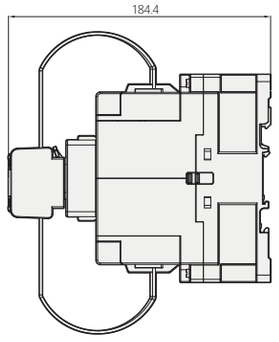
HGS 40C





HGS 50C-HGS 66C

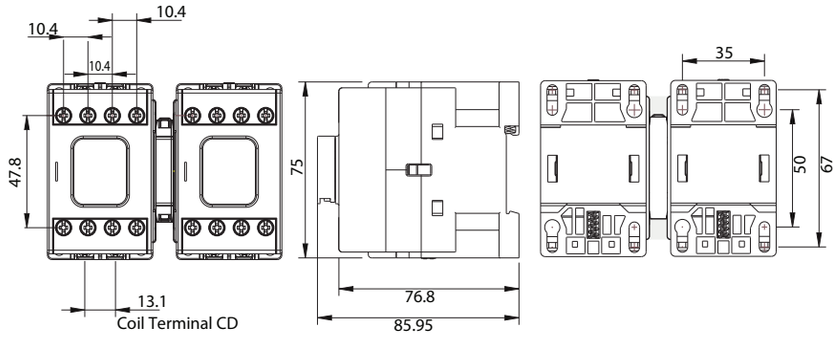




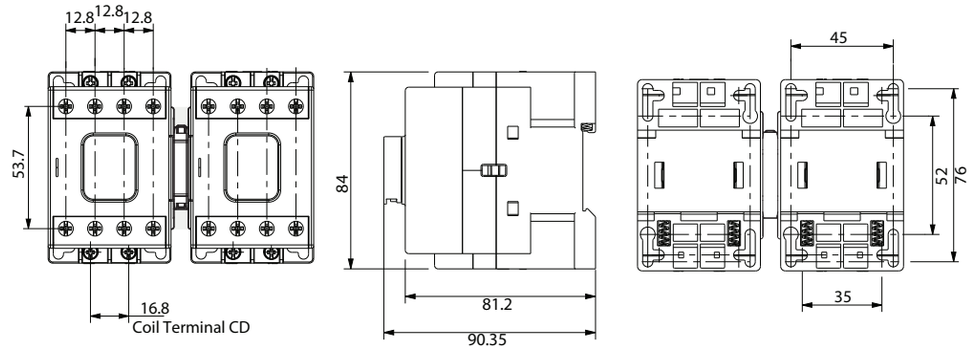
Reversing Contactor (With Interlock Unit)

Dimensions (in mm)

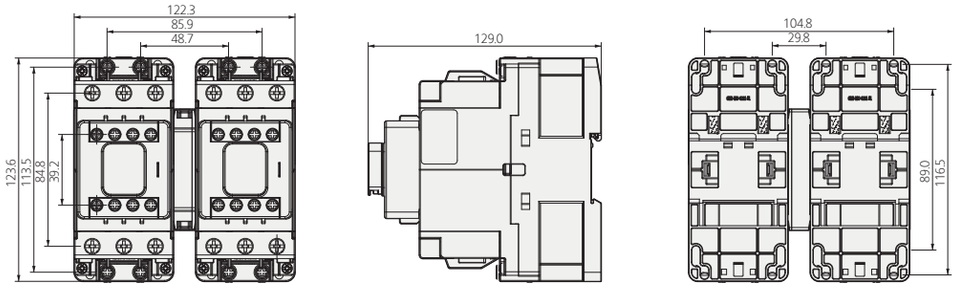
HGS18R



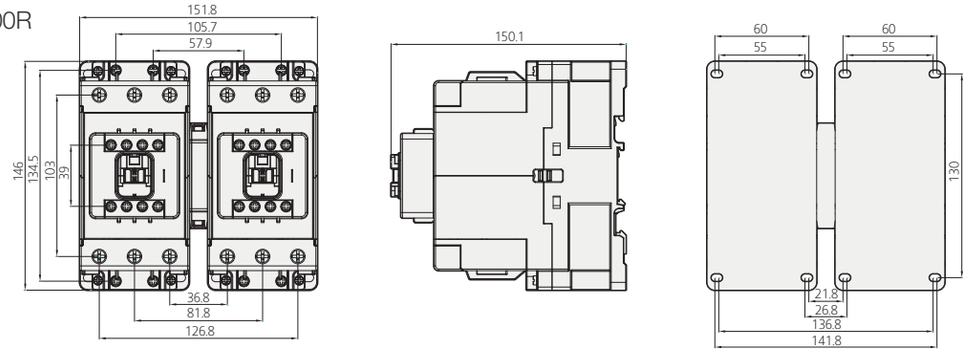
HGS40R



HGS65R



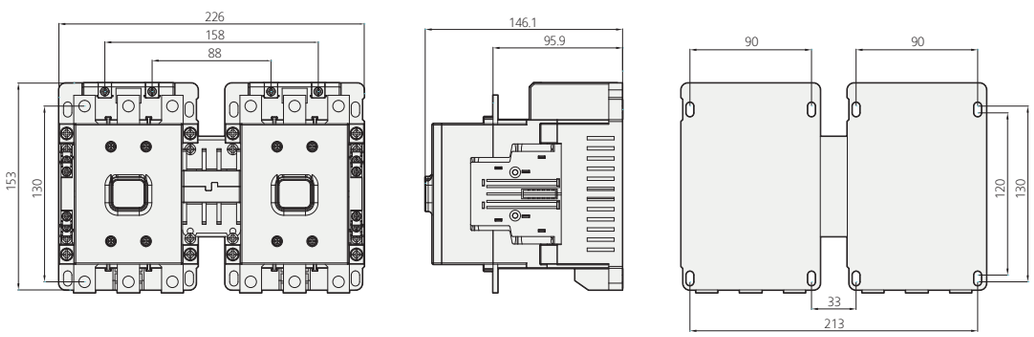
HGS100R



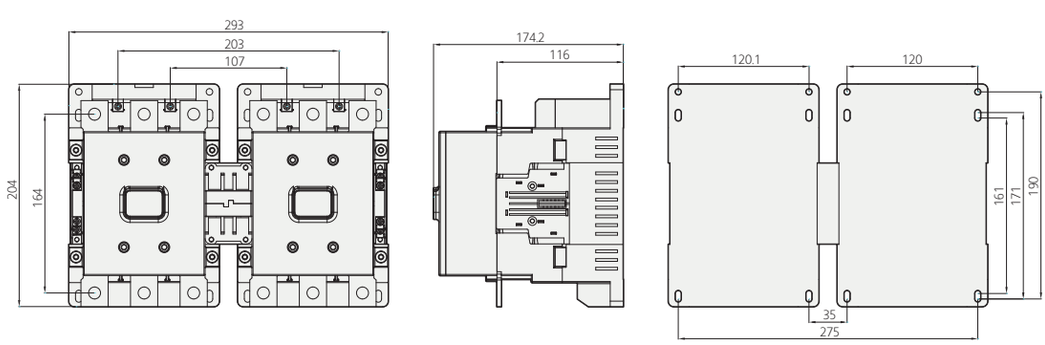
Reversing Contactor (With Interlock Unit)

Dimensions (in mm)

HGS150R

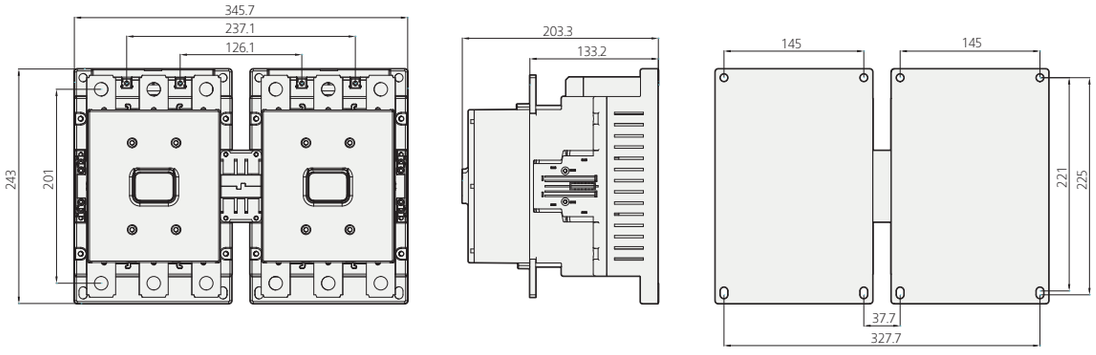


HGS265R

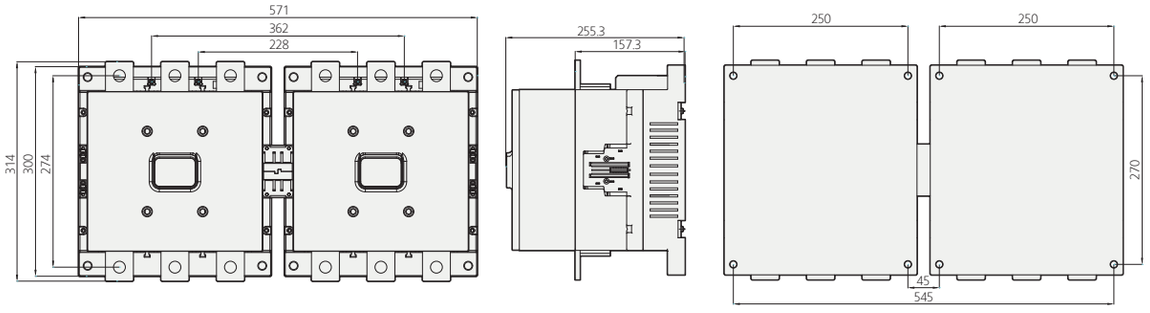


Dimensions (in mm)

HGS500R



HGS800R



HGSM32 Series Motor Protection Circuit Breaker

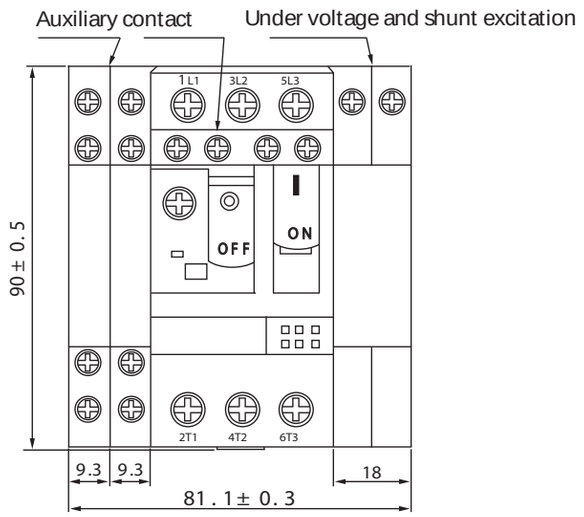
Main technical parameters

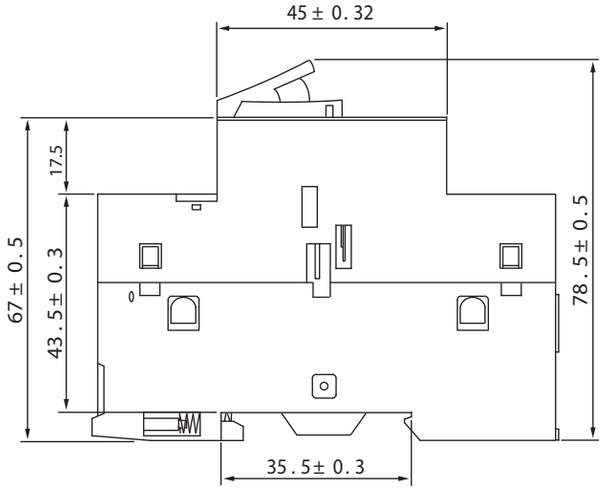
Shell rating current In (A)	32
Rated insulation voltage Ui (V)	690
Rated impulse withstand voltage Uimp (kV)	6
Rated working voltage Ue (V)	400 V, 415 V, 690
Rated frequency (Hz)	50 / 60 Hz
Megnetic tripping	13 In max
Tripping class	10 A
Mechanical Life	100000
Electrical Life	100000
Protection grade	IP20
Pollution class	2
Wiring capacity $(mm)^2$	1 ~ 35
Operating Temperature (^{0})	-5^0 ~ + 40^0
Altitude (m)	≤ 2000
Relative air temperature	when + 20^0, not more than 95%, when + 40^0, not more than 50%
Wire Incoming mode	Top Installation

Specification of circuit breaker and short circuit breaking capacity

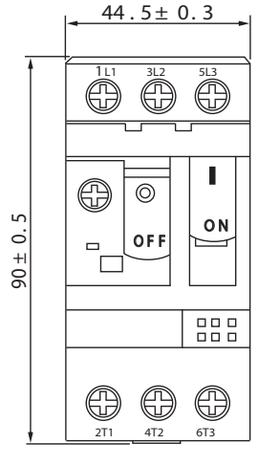
Model	Release rated current In (A)	Setting current regulation range of thermal element (A)	Starter instantaneous electromagnetic release current setting value Ir (A)	Rated limit short circuit breaking capacity Icu/ rated operation short circuit breaking capacity Ics						Arc distance mm
				230V/240V		400V/415V		690V		
				Icu	Ics	Icu	Ics	Icu	Ics	
HGSM-32	0.16	0.1-0.16	1.5	100	100	100	100	100	100	40
	0.25	0.16-0.25	2.4	100	100	100	100	100	100	
	0.4	0.25-0.4	5	100	100	100	100	100	100	
	0.63	0.4-0.63	8	100	100	100	100	100	100	
	1	0.63-1	13	100	100	100	100	100	100	
	1.6	1-1.6	22.5	100	100	100	100	100	100	
	2.5	1.6-2.5	33.5	100	100	100	100	3	2.25	
	4	2.5-4	51	100	100	100	100	3	2.25	
	6.3	4-6.3	78	100	100	100	100	3	2.25	
	10	6-10	138	100	100	100	100	3	2.25	
	14	9-14	170	100	100	15	7.5	3	2.25	
	18	13-18	223	100	100	15	7.5	3	2.25	
	23	17-23	327	50	50	15	6	3	2.25	
	25	20-25	327	50	50	15	6	3	2.25	
	32	24-32	416	50	50	10	5	3	2.25	

Dimensions





HGSM -32 accessories and dimensions



Manufacturing Plant Industry 4.0

Air Circuit Breakers

Maximized customer's range of selection and level of satisfaction with model dualization and compact size.

- 400 A – 6300 A
- Reference Product Standard: IEC 60947-1, IEC 60947-2
- No. of Poles: TP, FP, Fixed & Draw out Versions
- Rated Insulation Voltage: 1000 V
- Rated Operational Voltage: 690 V
- High Breaking Capacity with Ics = 100% Icu
- High Breaking Capacity up to 150 kA
- Rated Impulse Withstand Voltage: 12 kV

3200 A - 6300 A

Titania+
Air Circuit Breaker

400 A - 2500 A

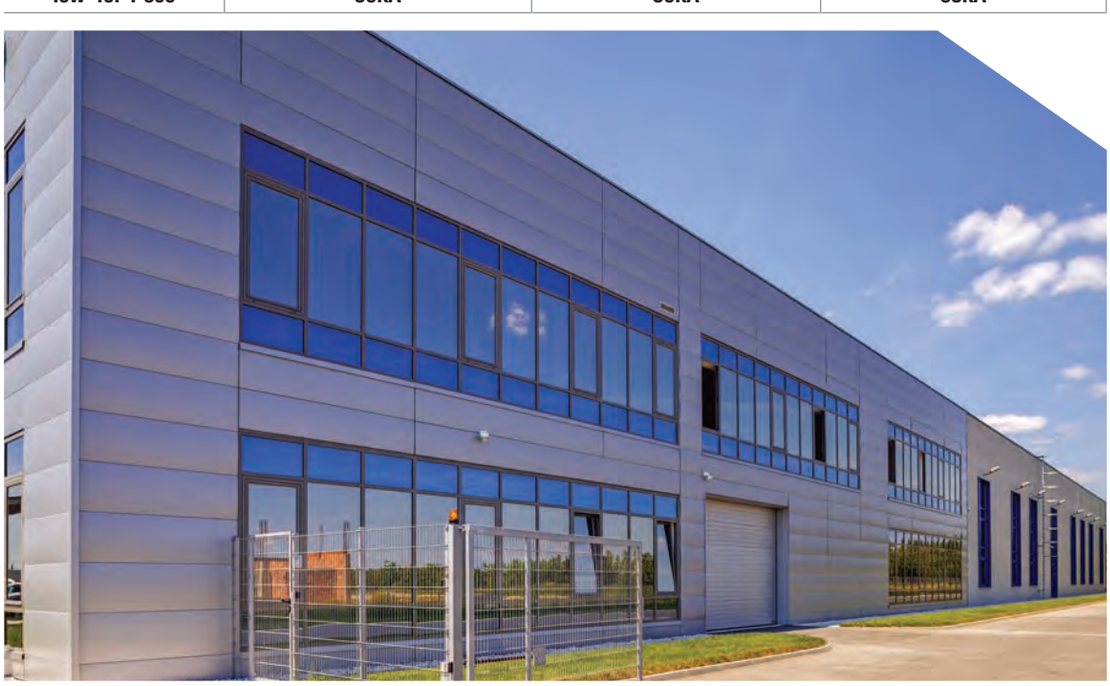
Titania
Air Circuit Breaker

Titania

Air Circuit Breaker

400 A – 2500 A

Breaking Capacity @ 415 V	E Frame	S Frame	H Frame
	400 A - 2000 A	400 A - 2000 A	2500 A
Ics=100% Icu	50 kA	65kA	75kA
Icw for 1 sec	50kA	50kA	65kA



Titania+

Air Circuit Breaker

3200 A – 6300 A

Breaking Capacity @ 415 V	B Frame	C Frame	D Frame
	3200 A - 4000 A	5000 A	6300 A
Ics=100% Icu	100kA	100kA	150kA
Icw for 1 sec	85kA	85kA	100kA

Titania
Air Circuit Breaker

Construction

Operating Mechanism is of stored energy type, which operates using pre-charged springs. The springs are charged manually with the help of charging handle or with the help of charging motor, if provided. The same operating mechanism is used for the entire range. Mechanism has been developed using less number of parts resulting in more reliability, longer mechanical life and requiring very less maintenance.

Contact Mechanism

Conductor Unit is of modular design. Each pole consists of Main and Arcing contacts which are housed in the moulded housing The contacts are made from sintered silver alloy for reliability, longer life and anti-weld properties. The construction of the contact is such that arcing contact closes before and opens later than the main contact, this substantially reduces erosion of main contact under normal and short circuit conditions.

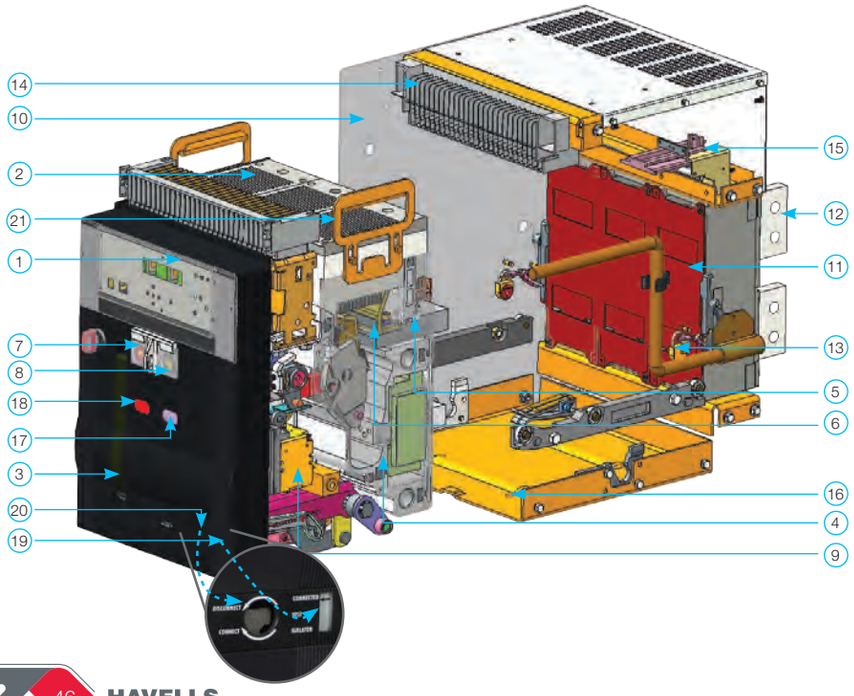
The current transformer is placed inside the pole unit around the lower terminal.

Arc Chutes are provided for quenching the arc. Arc chute comprises of grid plates mounted in parallel in the insulated housing. The arc is divided between these grid plates which helps in its fast quenching. The arc is thus confined, divided and extinguished in the arc chute. The excellent insulation between the conducting parts and better energy dissipation after short circuit makes it possible to make the load and line connections on either side.

The Tripping Mechanism comprises of magnet holder trigger which is linked to the trip bar unit. The electronic circuit gives a signal to this unit in case of over current fault and this unit mechanically trips the Circuit Breaker.

In Over Current Protection the sensing of the current is through the current transformers fitted on the main terminals. In case of any fault the secondary output of the CT increases. This secondary output of CT goes to the micro controller based electronic circuit. The micro controller is programmed to give a signal as per inverse time characteristics. The signal in the form of DC supply is given to magnet holder trigger which trips the ACB. The required tripping time and tripping current can be set with the help of the switches provided on the front panel of the electronic release.

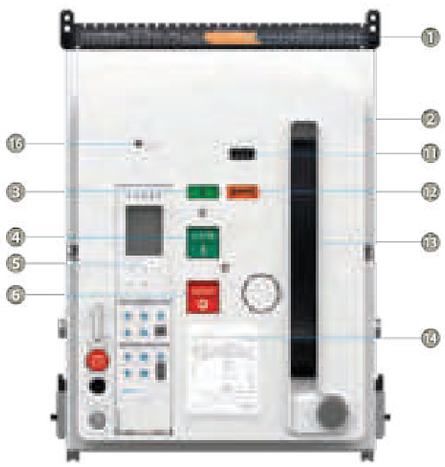
Internal View of ACB



1. Over Current Release
2. Arc Chute
3. Charging Handle
4. Pole Unit
5. Terminal assembly
6. Moving Contact assembly
7. Push Button “OFF”
8. Push Button “ON”
9. Shunt Trip Coil
10. Cradle Unit
11. Safety Shutter
12. Terminals
13. Pad lock facility for safety shutter
14. Control Terminals
15. Position Indication Switch (Optional)
16. Mounting Holes
17. Spring charge indicator
18. ACB ON OFF indicator
19. ACB connection status indication
20. Cradle rake in / out slot
21. Lifting Plate

Technical Data

External Structure

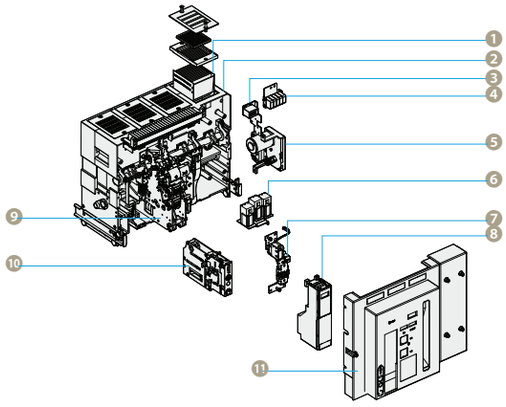


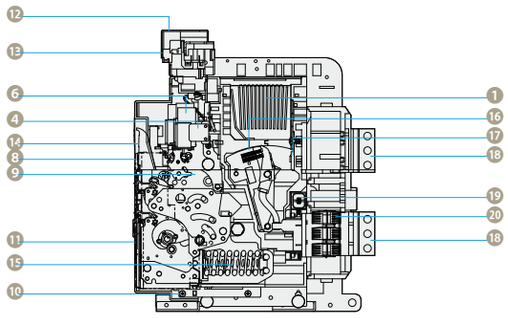
Fixed Type

Draw-In/Out Type (Including Cradle)

1. Control Circuit Terminal
2. Front Cover
3. Close/Open Indicator
4. Close Button
5. Overcurrent Relay Device
6. Open Button
7. Position Padlock
8. Position Lock Release Button
9. Draw-In/Out Handle Insertion Hole
10. Position Indicator
11. Counter
12. Charged/Discharged Indicator
13. Manual Charging Handle
14. Rating Nameplate
15. Terminal Busbar
16. OCR & Alarm S/W Reset Button
17. Draw-In/Out Guide Rail

Internal Structure





1. DI Grid
2. CO Unit
3. Counter
4. AUX Switch
5. Motor
6. Closing/Trip/UVT Coil
7. MHT Device
8. OCR
9. Mechanism
10. DR Device
11. Cover
12. Control Terminal Protection Cover
13. Control Terminal
14. Manual Charging Handle
15. Closing Spring
16. Moving Contact
17. Fixed Contact
18. Terminal
19. Current Transformer (CT)
20. Terminal Clip

※ Titania + Series air circuit breaker has been designed so that upon closing, the N phase is closed earlier than R, S, T phase and upon opening, the N phase is disconnected last in order to reduce burden of main contact and to prevent ripple effect of accident of N phase.

Titania
Air Circuit Breaker

Technical Information (400 A - 2500 A)

Standard Conformity : IEC 60947-2 & IS 13947-2

Performance Series		SI Unit	E	S	H
Rated Current (In) (Ref. Temp. 45 °C)		A	400	400	2500
			630	630	
			800	800	
			1000	1000	
			1250	1250	
			1600	1600	
			2000	2000	
Rated Service voltage (Ue)		V	690 Vac 250 Vdc	690 Vac 250 Vdc	690 Vac 250 Vdc
Rated Insulation voltage (Ui)		V	1000 V	1000 V	1000 V
Rated impulse withstand voltage (Uimp)					
		kV	12 kV	12 kV	12 kV
Frequency		(Hz)	50/60	50/60	50/60
No. of Poles*			3, 4	3, 4	3, 4
Rated short-circuit breaking capacity (Ics=100%Icu) -220 / 380 / 415 / 440 Vac -500 / 660 / 690 Vac -250 Vdc		(kA)	50 40 40	65 55 55	75 65 65
Rated short-time withstand current (Icw) 1 second 3 second		(kA)	50 36	50 36	65 50
Rated short-circuit making capacity (peak value) (Icm) -220 / 380 / 415 / 440 -500 / 660 / 690		(kA)	105 84	143 121	165 143
Utilization category			B	B	B
Isolation behavior			Yes	Yes	Yes
Closing time		ms	<70	<70	<70
Break time (max)			30	30	30
Mechanical life (No. of operations) (with regular maintenance)			25000	25000	20000
Electrical life (at 440 Vac) (No. of operations)			400 A - 800 A : 15000	400 A - 800 A : 10000	10000
			1000 A,1250 A : 12000	1000 A,1250 A : 10000	
			1600 A : 12000	1600 A : 8000	
			2000 A : 10000	2000 A : 8000	
Overall Dimensions	(mm)				
Fixed (WxHxD)	3P	mm	291x421x307		400x421x307
	4P	mm	381x421x307		525x421x307
Draw out (WxHxD)	3P	mm	330x460x386		435x460x386
	4P	mm	420x460x386		560x460x386

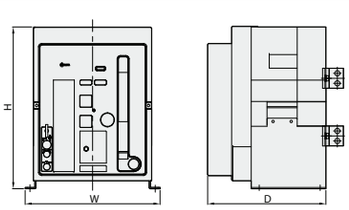
Technical Information (3200 A - 6300 A)

Performance Series			SI Unit	B Frame	C Frame	D Frame
Rated Current [In max]	Based on 40		A	3,200	5,000	6,300
				4,000		
Rated Operational Voltage [Ue]			V	690		
Rated Insulation Voltage [Ui]			V	1,000		
Frequency			Hz	50/60		
No. of Poles			P	3, 4		
Current Setting Range (…× In max)			A	0.4 ~ 1.0		
Rated Current of Neutral Pole (N) (… %×In)			A	100 %	100 %	100 %
Rated Breaking Capacity [Icu] [Sym]						
IEC 60947-2 Category “B” KS C 4620	AC	(690/600/550) V	kA	85	85	100
		(500/480/460) V		100	100	150
		(415/380/230/220) V		100	100	150
Rated Service Short-Circuit Breaking Capacity [Ics] …%×Icu			kA	100 %	100 %	100 %
Rated Closing Current [Icm] [Peak]						
IEC 60947-2 Category “B” KS C 4620	AC	(690/600/550) V	kA	187	187	220
		(500/480/460) V		220	220	330
		(415/380/230/220) V		220	220	330
Rated Short-Time withstand Voltage [Icw] (Without Inst)						
1 second			kA	85	85	100
2 seconds				75	75	85
3 seconds				65	65	75
Rated Impulse withstand Voltage [Uimp]			kV	12		
Total Breaking-Time			ms	40		
Closing Operational Time						
Motor Charging Time (sec) max.				10		
Rated Trip Time (ms) max.				80		
Lifecycle (Cycles)						
Mechanical	Without Maintenance			20,000	10,000	5,000
	With Maintenance			30,000	15,000	10,000
Electrical	Without Maintenance			20 : 5,000 25 ~ 40 : 3,000	2,000	2,000
	With Maintenance			20 : 10,000 25 ~ 40 : 8,000	5,000	5,000
Weight						
3 Pole	Draw-Out Type		kg	87 (107) [2]	145	169
	Fixed Type			44 (61) [2]	76	108
4 Pole	Draw-Out Type			103 (140) [2]	173	214
	Fixed Type			55 (80) [2]	81	137
(W×H×D)						
3 Pole	Draw-Out Type		mm	399×460×368.4	624×460×368.4	766×460×368.4
	Fixed Type		mm	408.4×404.4×295.8	633.4×404.4×295.8	775.4×404.4×295.8
4 Pole	Draw-Out Type		mm	514×460×368.4	794×460×368.4	996×460×368.4
	Fixed Type		mm	523.4×404.4×295.8	803.4×404.4×295.8	1005×404.4×295.8

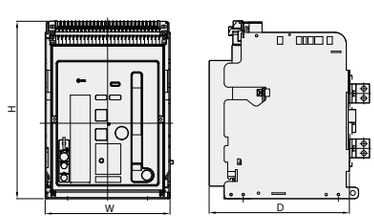
1) 4,000 AF
2) In case of MCR and override setting, INST is 50 ms.

Life time is the limit lifespan and is not the guaranteed lifespan. In case of maintenance, it is charged. In the event of abnormalities in accessories during use, it can be replaced. Quality Assurance: Based on IEC 60947-2's number of opening/closing within the warranty period.

Fixed Type



Draw-Out Type



Titania
Air Circuit Breaker

Release Protection Feature (400 A - 2500 A)




S. No.	Features		IPR E+	IPR 1+	IPR 3+	IPR 5+
	Release settings:		●	●	●	●
1	LTD	Current Setting	●	●	●	●
		Time Setting	●	●	●	●
2	STD	Current Setting		●	●	●
		Time Setting		●	●	●
3	INST	Current Setting	●	●	●	●
4	GFT	Current Setting		●	●	●
		Time Setting		●	●	●
5	PTA	Current Setting			●	●
		Time Setting			●	●
6	Function Blocking		●	●	●	●
7	Field Test Function		●	●	●	●
8	IPR Fit Indicator				●	●
9	Load Shedding Function				●	●
10	Reset Function		●	●	●	●
11	Thermal Memory				●	●
12	LED Indications		●	●	●	●
13	Fault History on Display				●	●
14	Making Current Release		●	●	●	●
15	Zone Selectivity				●	●
16	Circuit Breaker Fail Protection				●	●
17	Operation Counter				●	●
18	Contact Erosion Indicator				●	●
19	Ready to Close (RTC)*				●	●
20	I2t ON/OFF				●	●
21	LCD Display				●	●
22	Bar Graphs Indication				●	●
23	External Relay Card*				●	●
	Advanced Protection				●	●
24	Under Voltage Release				●	●
25	Over Voltage Release				●	●
26	Under Frequency protection				●	●
27	Over Frequency protection				●	●
28	Voltage unbalance protection				●	●
29	Phase sequence protection				●	●
30	Over Temperature Protection				●	●
	Measurement Module				●	●
31	Current (Both in 3 phase & neutral)				●	●
32	Voltage (both Line & Phase)				●	●
33	Frequency (Hz.)				●	●
34	Temperature (deg. C)				●	●
35	Maximum Demand					●
36	Apparent Power (KVA)					●
37	Real Power (KW)					●
38	Reactive Power (KVAr)					●
39	Power factor					●
40	Communication Enabled (MODBUS)					●

*Provided on request. #Communication software provided on requrest.
Note: IPR+ releases do not require any extenrnal power supply for their basic protection functioning. For other functions and display to run, they require an external power supply of 12 Vdc - 24 Vdc.

Release Protection Feature (3200 A - 6300 A)

Model Name	N Type	A Type	P Type	H Type
	LN	LA	LP	LH
Frequency				
50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Control Power				
External Power	-	●	●	●
Self-Power	●	●	●	●
Protection Function				
LTD (Long Time)	●	●	●	●
STD (Short Time)	●	●	●	●
INST (Instantaneous)	●	●	●	●
Pre-Trip Alarm	-	●	●	●
Ground Fault Trip	●	●	●	●
Thermal Function	●	●	●	●
Field Test	-	●	●	●
Fail Safe	●	●	●	●
Indication				
True RMS Detection Method	●	●	●	●
LED Indication per Trip Type	-	●	●	●
Fault LED	L[1)]	PTA, L, S/I, G	PTA, L, S/I, G	PTA, L, S/I, G
Real-Time LCD Indication of Load Rate per Phase	-	●	●	●
Measurement LCD	-	●	●	●
3 Phase current	-	●	●	●
Voltage	-	-	●	●
Power	-	-	●	●
Power factor & power quantity	-	-	●	●
Demand	-	-	●	●
Zone selective interloacking	-	●	●	●
Voltage / current harmonics (1st ~ 63 th)	-	-	-	●
3 Phase wave form	-	-	-	●
TDH, TDD	-	-	-	●
Output Contact				
Integrated Instantaneous Contact (1a)	●	-	-	-
Individual Continuous Contact (4a)	-	●	●	●
Operation				
MCR	-	❍	❍	❍
Communication	NFC	Modbus-RTU	Modbus-RTU	Modbus-RTU
Event/Fault Recording	●	●	●	●

● Standard ❍: Option

1) Indicates reserve before operation during long time delay.
2) ZCT designated by the customer is used.
3) ZCT designated by our company is used.
4) As for marine type, individual continuous contact is 3a.

Titania
Air Circuit Breaker

Intelligent Protection Releases (400 A - 2500 A)

New Intelligent Protection Releases - Plus (IPR +) are the multifunctional dedicated protection units for ACB, using advanced micro-controller with full benefits of microprocessor technology offering overload & short circuit protection functions, advance protection functions, measurement & advanced monitoring functions, LCD display, MODBUS communication etc.

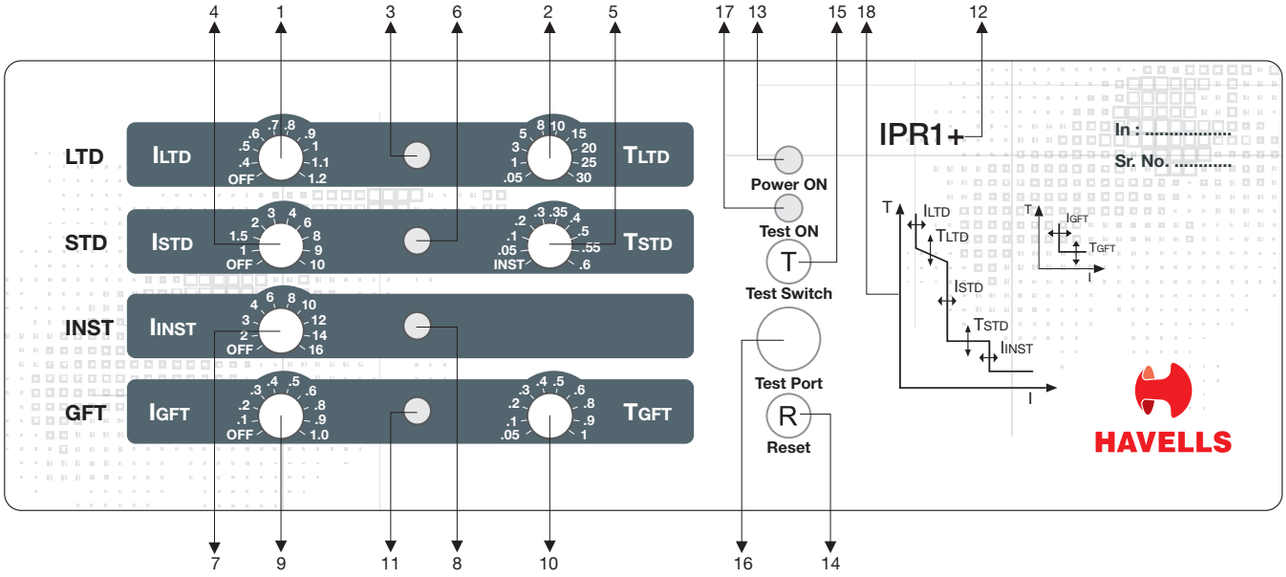
For meeting all the application requirements, ACBs come with a wide variety of new electronic releases, categorized into 4 different categories as IPR E+, IPR 1+, IPR 3+, and IPR 5+. IPR 1+ being the basemodel and IPR E+ as the economical version. The next four new models IPR 3+ and IPR 5 + are of premium segment with High-end Features.

IPR+ Specification

- Overload function (LTD)
  LTD Current — OFF, 40% to 100% of I_{CT}
  LTD Time — 0.5 s to 30 s
- Short Circuit function (STD)
  STD Current — OFF, 100% to 1000% of I_{CT}
  STD Time — 50 ms to 600 ms
- Instantaneous function (INST)
  INST Current — OFF, 200% to 1600% of I_{CT}
- Ground fault function (GFT)
  GFT Current — OFF, 10% to 100% of I_{CT}
  GFT Time — 50 ms to 1000 ms

Features (IPR E + & IPR 1+):

- Self powered by built in Current Transformer
- User friendly settings of current and time delay using Rotary Switches
  - For IPR E+ : Adjustable LTD & INST settings (Economical Version)
  - For IPR 1+ : Adjustable LTD, STD, INST & GFT settings
- Both Three Phase and Earth fault protection in same unit (IPR 1+)
- More Reliable and repetitive accuracy, using high end micro-controller
- True RMS sensing with immunity to system disturbances
- Compatible with both 5P10 & 5P10 CTs
- LED Indication for fault discrimination
- Function blocking facility provided
- Compact Size & light weight
- Elegant Aesthetics

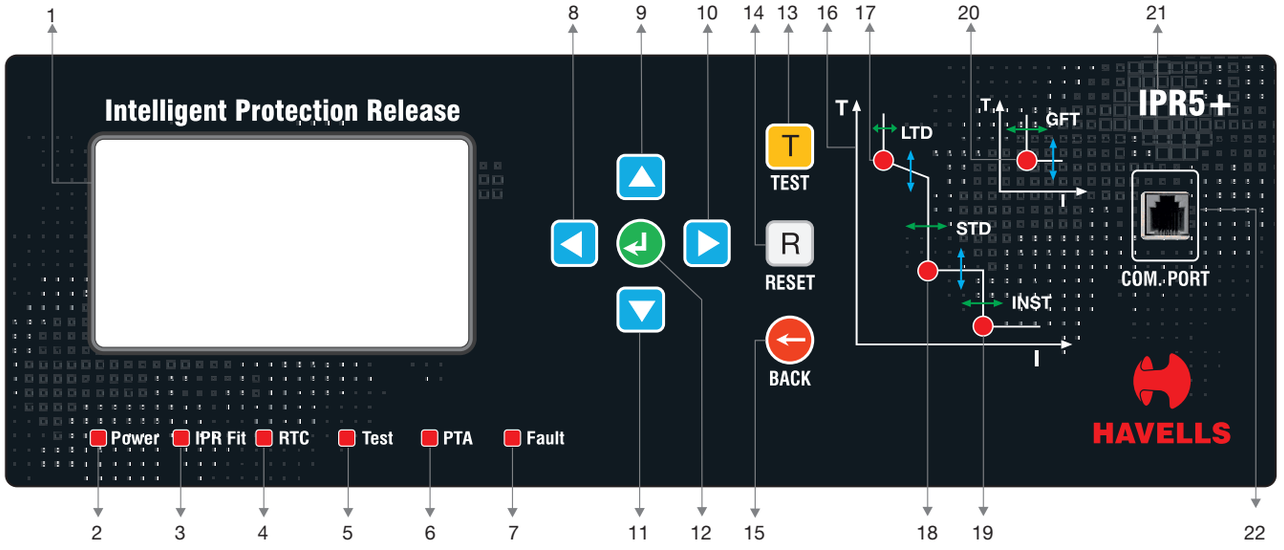


Ref.	Description	Ref.	Description
1	Rotary switch for setting LTD current	10	Rotary switch for setting GFT time
2	Rotary switch for setting LTD Time	11	LED indication for GFT fault
3	LED indication for LTD fault	12	Product identification code
4	Rotary switch for setting STD current	13	LED for “Power ON”
5	Rotary switch for setting STD time	14	Reset push button
6	LED indication for STD fault	15	Test push button
7	Rotary switch for setting INST current	16	Socket for test supply
8	LED indication for INST fault	17	LED for “Test ON”
9	Rotary switch for setting GFT current	18	Time current characterstics curve

Intelligent Protection Releases (400 A - 2500 A)

Features (IPR3+ and IPR5+) :

- Advanced Protection Functions
- In-built Measurement Module
- Wide LCD Display
- Zone Selective Interlocking
- Making Current Release Function
- Thermal Memory
- *Ready To Close Feature
- I^2t ON/OFF Feature
- Contact Erosion Indicator
- Bar Graphs for Current & Voltage
- Fault History on Display
- Circuit Breaker Failure Function
- Downstream CB Fail Feature
- Digital Operation Counter
- LED Annunciations on Front Fascia
- Maximum Demand
- Over Temprature Protection
- RS-485 MODBUS Communication facility



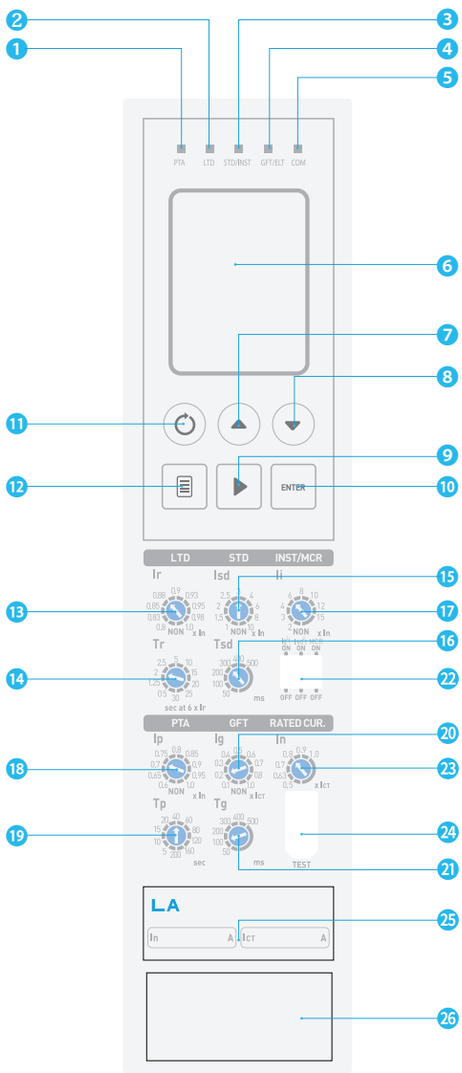
Ref.	Description	Ref.	Description
1	LCD Screen	12	Enter / Save Push Button
2	LED for “Power ON”	13	Test Push Button
3	LED for “IPR Fit”	14	Reset Push Button
4	#LED for “RTC (Ready to Close)”	15	Back Push Button
5	LED for “Test ON”	16	Time Current Characterstic Curvev
6	LED for “PTA (Pre-Trip Alarm)”	17	LED Indication for LTD Fault
7	LED for “Faults”	18	LED Indication for STD Fault
8	Scroll “Left” Push Button	19	LED Indication for INST Fault
9	Scroll “Up” Push Button	20	LED Indication for GFT Fault
10	Scroll “Right” Push Button	21	Product Identification Code
11	Scroll “Down” Push Button	22	MODBUS RS-485 Communication Port

*Provided on request
#LED is functional only when RTC feature is requested

Titania+
Air Circuit Breaker

Protection Release (3200 A - 6300 A)

External



1. PTA Signal LED
2. LTD Signal LED
3. STD/INST Signal LED
4. GFT/ELT Signal LED
5. Com. Signal LED
6. LCD/NFC Antenna (LN, SN)
7. STD/INST Test Button
8. LTD Test Button
9. Movement Button
10. Enter Button
11. Reset Button
12. Menu Button
13. LTD Pick Up Setting
14. LTD Operational Time Setting
15. STD Pick Up Setting
16. STD Operational Time Setting
17. INST Pick Up Setting
18. PTA Pick Up Setting
19. PTA Operational Time Setting
20. GFT/ELT Pick Up Setting
21. GFT/ELT Operational Time Setting
22. GFT/STD (Inverse Time Setting)., MCR ON/OFF Setting Switch
23. In (Rated Current) Setting
24. Temporary Test Connection Jack
25. Model Name
26. Battery

※ Self-power functions normally in the case of 10 % for 3 phases and 30 % for a single phase. However, when 200 A ~ 320 A CT is used, it functions normally in case of 50 % for 3 phase and more than 100 % for single phase.
When using MCR function, mark B8 in the name of order type. Auxiliary contact point is 4a5b.
The lifespan of the battery is usually 10 years so in case it is time for replacement, contact our customer support division and services can be received at a cost.
High/low test function is automatically disabled when a load current is applied.

Protection Release (3200 A - 6300 A)

Enhancement of Protection Release Functions

Protection Release built in the Titania+ Series air circuit breaker has reinforced power monitoring functions such as temperature monitoring, fault recording other than the basic protection function, ultimately enabling stable power supply.

Model Name	N Type	A Type	P Type	H Type
	LN	LA	LP	LH
Externals				
Frequency 50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Frequency 60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Main Functions	· L/S/I/G · Thermal · Self-Power · Fail Safe · Integrated Instantaneous Contact · 10 ea Fault Recording (Check Via Communication) · Last Fault's Waveform Recording (4 Cycles, Check Via Communication)	· L/S/I/G · Thermal · Self-Power · Fail Safe · Communication (Modbus) · External Power · ZSI · Remote Reset Function · Individual Continuous Contact : LTD, STD/INST, GFT, PTA · 256 ea Fault Recording · Last Fault's Waveform Recording (4 Cycles, Check Via Communication) · 200 ea Event Recording (Check Via Communication)	· L/S/I/G · Thermal · Self-Power · Fail Safe · Communication (Modbus) · External Power · ZSI · Remote Reset Function · Individual Continuous Contact : LTD, STD/INST, GFT, PTA · 256 ea Fault Recording · Last Fault's Waveform Recording (4 Cycles, Check Via Communication) · 200 ea Event Recording (Check Via Communication) · Over-Voltage/ Under-Voltage · Imbalance Type (Voltage/Current) · Reverse Power · 3 Phase Voltage/Current RMS/Vector · Power (P, Q, S), Power Factor (3 Phase) · Energy (Normal/Reverse Direction) · Demand	· L/S/I/G · Thermal · IDMTL · Self-Power · Fail Safe · Communication (Modbus) · External Power · ZSI · Remote Reset Function · Individual Continuous Contact : LTD, STD/INST, GFT, PTA · 256 ea Fault Recording · Last Fault's Waveform Recording (4 Cycles, Check Via Communication) · 200 ea Event Recording · Over-Voltage/Under-Voltage · Imbalance Type (Voltage/Current) · Reverse Power · 3 Phase Voltage/Current RMS/Vector · Power (P, Q, S), Power Factor (3 Phase) · Energy (Normal/Reverse Direction) · Frequency, Demand · Minute Current Adjustment at Long Time, Short Time, Instantaneous, Ground Setting · Voltage/Current Harmonics (1 st ~ 63 th) · View 3 Phase Waveform · THD, TDD

Titania
Air Circuit Breaker

Accessories (400 A - 2500 A)

Electrical Accessories:

Charging Motor:

These are available in 110 V and 220 Vac / DC. The VA burden of this motor is 150 VA only and the charging time is 3 to 4 seconds.

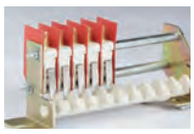
Shunt Trip Coil / Closing Coil:

These coils are available in 24 V, 110 Vac/DC, 220 Vac / DC & 415 Vac. The same coil can be used as a shunt trip coil or closing coil. The inrush power is 200 VA.

Undervoltage release:

These coils are available in 24 Vdc, 110 Vac / DC, 220 Vac / DC & 415 Vac.

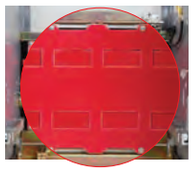
Inrush power of this coil is 200 VA and the continuous power is 5 VA only.



Auxillary Contacts:

A set of five changeover switches are provided in the circuit breaker which can be used for external circuit. Additional five changeover switches can also be provided as an optional.

Drawout Accessories:



Safety Shutter for main circuit

It is provided on the cradle which automatically isolates the Main circuit terminals when the breaker is drawn out. A provision is also there for locking the safety shutter in the closed position with the help of Pad Lock (not supplied with ACB).

Position Indication Switch:

A set of 5 micro switches is provided in the cradle which indicates the position of breaker in the cradle i.e. CONNECTED, TEST, or DISCONNECTED position. Two switches each are provided for CONNECTED AND DISCONNECTED position and one switch is for TEST position.

Adaptor terminals for Cradle:

Special Adaptor Terminals can also be provided for Ist frame ACB which can make the terminals suitable for taking horizontal as well as vertical bus bar connections. The standard cradles are supplied with horizontal terminals. Adaptor terminals are factory fitted and are available at extra cost.

Mal-insertion prevention device:

It prevents the breaker of a different rating being inserted into the cradle of different rating.

Drawout position lock

This feature is available to lock the breaker into different drawout positions i.e. CONNECTED, TEST, or DISCONNECTED position with the help of padlock (not supplied with ACB).

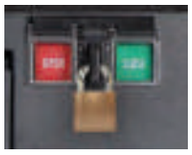
Other Accessories:

Close open cycle Counter

It indicates the number of mechanical operations of the circuit breaker and the same is visible on the front of ACB Cover.

Key Lock/ Key Interlock:

It is provided to lock the ACB in open position. Once the ACB is locked it can not be switched on. For interlocking purpose three locks with two keys or two locks with one key can be supplied.



ON/OFF push button cover

A special cover can be provided on the front cover on which a pad lock (not supplied with ACB) can be fitted for locking the ON & OFF push buttons.

Trip Indication Switch

It is provided to get a remote signal indicating that ACB has tripped due to the operation of over current release.

Spring charge Indication Switch

A micro switch is provided to get a remote signal indicating the status of Circuit Breaker closing spring.

Door Interlock:

It prevents the opening of panel door, if the ACB is in closed (ON) position. When this interlock is fitted in the Circuit Breaker it is necessary to switch off the breaker, before opening the panel door.

Lifting Plates

Air Circuit Breakers are fitted with specially designed lifting plates which makes the lifting of these ACBs very convenient.

Safety shutter padlock feature

For the safety of the personnel, safety shutter can be padlocked once the breaker has been withdrawn from the cradle.

Accessories (3200 A - 6300 A)

Spring Charging Switch or Ready to Close Switch

- Spring charging switch delivers the charged status when mechanism spring charge is complete.
- Read to close switch delivers only when the circuit breaker is open and simultaneously only when the mechanism spring charge is complete.
- Two accessories cannot be ordered simultaneously.

Closing Coil (CC)

- A control device which closes a circuit breaker remotely from outside.
- The circuit breaker is closed by applying power of at least more than 150 ms within the range of 85 ~ 110 % of the rated control voltage to the control power terminal.
- It can be purchased separately.
- Use a separate switch externally to apply power to the closing coil.

Trip Coil (TC)

- A control device which trips a circuit breaker remotely.
- The circuit breaker is tripped by applying power of at least more than 150 ms within the range of 70 ~ 110 % of the rated control voltage to the control power terminal.
- It can be purchased separately.
- Use a separate switch externally to apply power to the closing coil.

UVT Coil

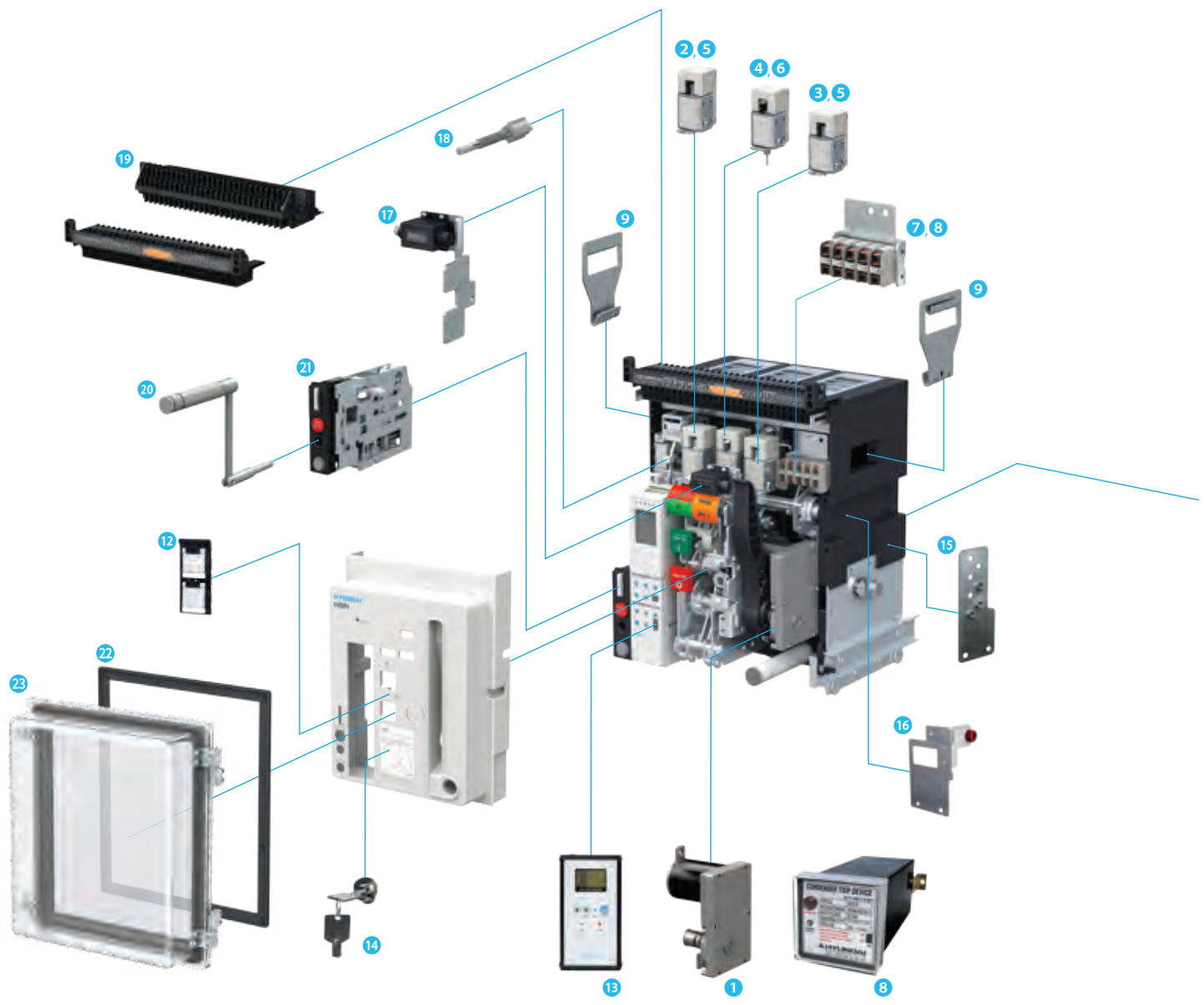
- Under-voltage trip device is a device that automatically trips the circuit breaker if the load voltage drops to below 70 % of the standard or to prevent accidents at the load part during a black out.
- Under-voltage trip device is classified into instantaneous and time delay type for use. As for instantaneous type, directly connect to control power terminal for use and as for time delay type, the Time Delay Controller can be used.
- The circuit breaker trips when the load voltage at the UVT coil becomes less than 35 %, becomes an interlocked state that cannot be closed and when load voltage of 85% is applied, normal closing is possible.
- When instantaneous type of UVT is used, dual trip coil cannot be used.
- It can be purchased separately.

AUX Switch

- It is an output contact to remotely monitor the On/Off state of the ACB.
- As for Titania + Type, 5a5b is provided as standard without separate indication in the order form.
- AUX switch can be expanded up to 6a6b maximum.
- When using the monitoring contact for trip coil, 3a3b can be used for the AUX switch and when using the MCR function of OCR, it can be used as 4a3b.
- When short “b” is added, it will be attached to ‘b’ contacts 51, 52 for outgoing and upon additional mounting, the short “b” sealed and released can be mounted additionally depending
- on the number of b contacts.
- 5a5b can be purchased separately.

Titania+
Air Circuit Breaker

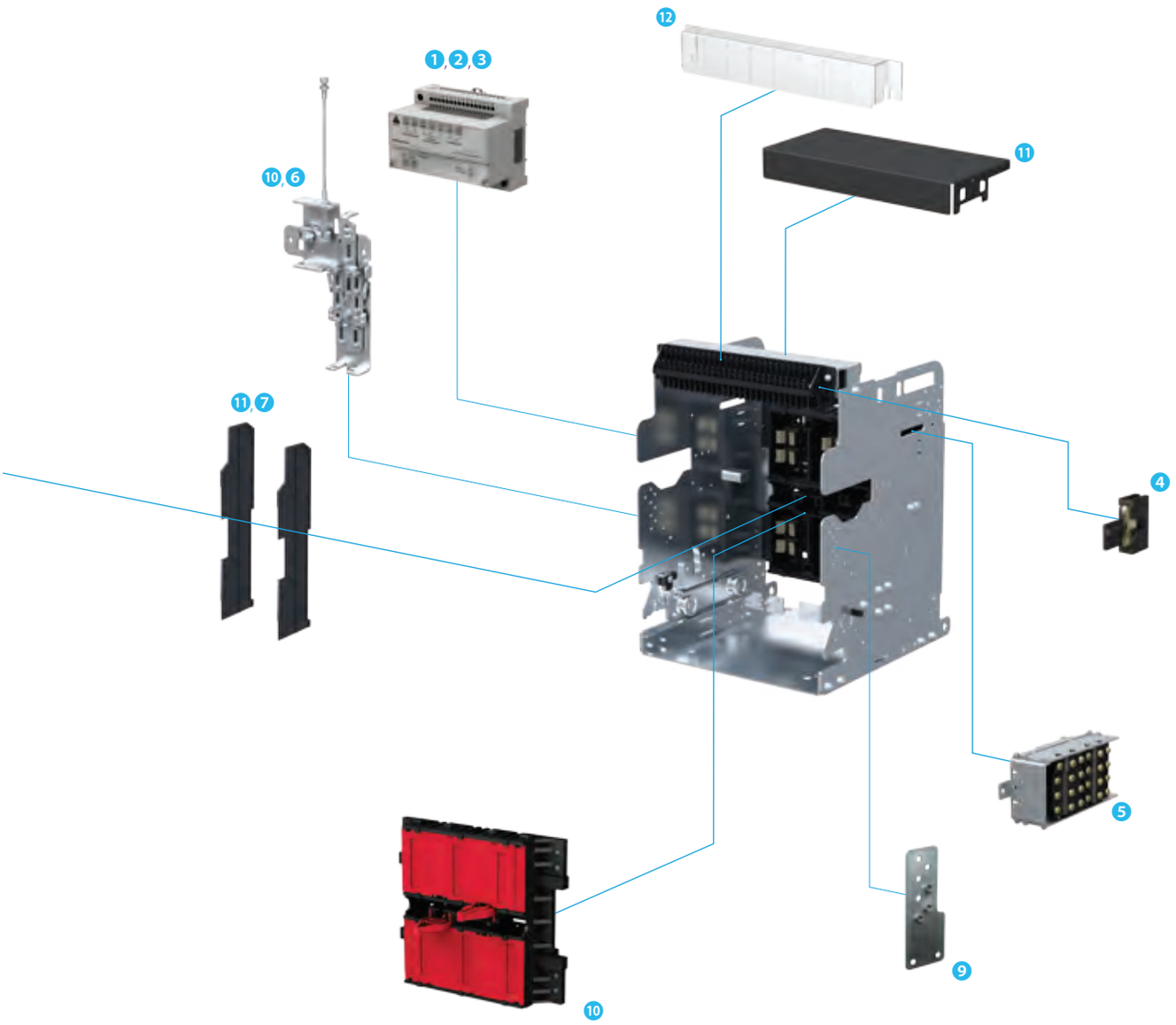
Accessories (3200 A - 6300 A)



Accessories for Circuit Breaker

1. Spring Charge Geared Motor
2. Closing Coil
3. Trip Coil
4. Secondary Trip Coil
5. Trip Coil Supervision
6. UVT Coil
7. AUX Switch
8. Condenser Trip Device (CTD)
9. Lifting Lug
10. Mechanical Interlock
11. Phase Insulation Barrier
12. ON/OFF Button Lock
13. OCR Portable Checker
14. Key Lock
15. Miss-Insertion Preventer
16. Fixing Block
17. Counter
18. OCR & Alarm S/W Reset Button
19. Test Jumper
20. Draw-In/Out Handle
21. Position Pad Lock
22. Door Flange
23. Dust Cover

Various Accessories (Cradle)



Accessories for Cradle

1. UVT Time Delay Controller
2. Remote Closing Prevention Module
3. Temperature Monitoring Device Module
4. Short “b” Contact
5. Position Switch
6. Mechanical Interlock
7. Phase Insulation Barrier
8. Mechanical Operated Cell Switch
9. Miss-Insertion Preventer
10. Safety Shutter
11. Arc Shield
12. Control Terminal Protection Cover

Titania
Air Circuit Breaker

Order Form

Please check ☑ in front of appropriate box. Fill separate sheet for each type of ACB

Order Form

Please check ☑ in front of appropriate box. Fill seperate sheet for each type of ACB

CUSTOMER/ DEALER NAME	ORDER NO./DATE	END USER NAME

Rating of ACB

630 A ☐ 1000 A ☐ 1600 A ☐ 2500 A ☐ 4000 A ☐ 6300 A ☐ Qty.

800 A ☐ 1250 A ☐ 2000 A ☐ 3200 A ☐ 5000 A ☐

Breaking Capacity Icu

Upto 2500 A — 50 kA ☐ 65 kA ☐ 75 kA ☐

3200 A to 6300 A — 100 kA ☐ 150 kA ☐

No. of Poles

3 ☐ 4 ☐ (100% Neutral) 4 ☐ (50% Neutral for V-Series only)

Mounting

Fixed ☐ Drawout ☐ — Standard (for E&S series) ☐ / Vertical terminals (for H&V series) ☐

Note: For E & S series - Adapter terminals are on demand

Spring Charging Operation

Manual ☐ Electrical ☐ — Closing Coil _____VAC/DC; Tripping Coil_____ VAC/DC; Motor _____ V

Release

Upto 2500 A: ☐ Without Release ☐ IPR E+ ☐ IPR 1+ ☐ IPR 3+ ☐ IPR 5+

3200 A to 6300 A: ☐ Without Release ☐ LN ☐ LA ☐ LP ☐ LH

Setting: O/L _____ A, S/C _____ A, Inst. _____ A, GFT _____ A, CT Rating _____ A, Neutral CT ☐

Note: Unless otherwise specified O/L will be set at maximum value and all other settings would be set at mid values.

Other Accessories

Close open cycle counter	☐	Five c/o additional Aux. contacts	☐
Field test unit	☐	Shunt Trip	☐
Position Indication Switch	☐	UVT	☐
Spring Charge Indication Switch	☐	Trip Indication Switch	☐
Mechanical Interlock	☐	Key Lock	☐
Mal Insertion Prevention device	☐		
Door Interlock	☐	Key Interlock — 2L+1K ☐ / 3L+2K ☐	

OFV-6

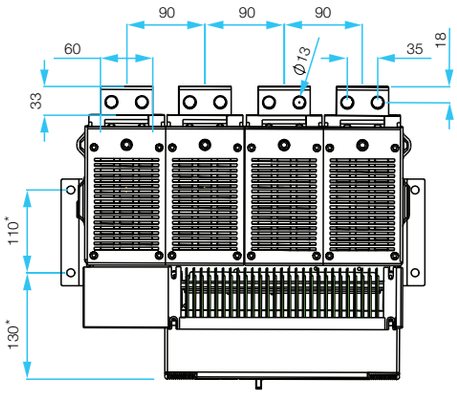
Note :
1. Please specify the voltages for closing coil, shunt trip coil and UVT, available voltages are 24 VDC, 110 VAC / DC, 220 VAC / DC and 415 VAC and for motor available voltages are 220 VAC / DC and 110 VAC / DC.
2. For details of Protection Releases, please refer the chart of technical features.
*3. Communication Software on Chargeble basis.

Out Line Dimensions, Mounting Detail & Terminal Arrangement

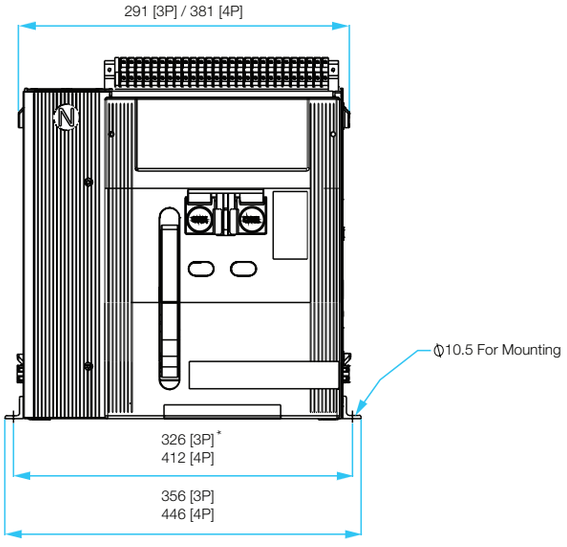
Rating: 630A to 2000A (E & S Series) Fixed Type

Dimensions (in mm)

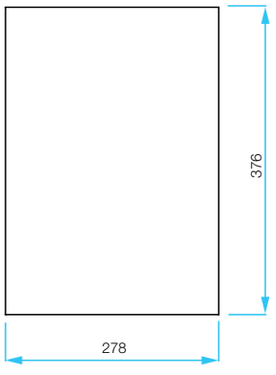
Top View



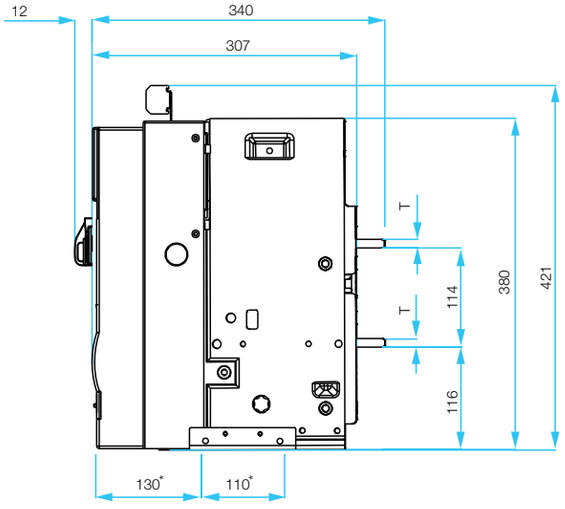
Front View



Door Frame



Panel Door Cut Out



Side View

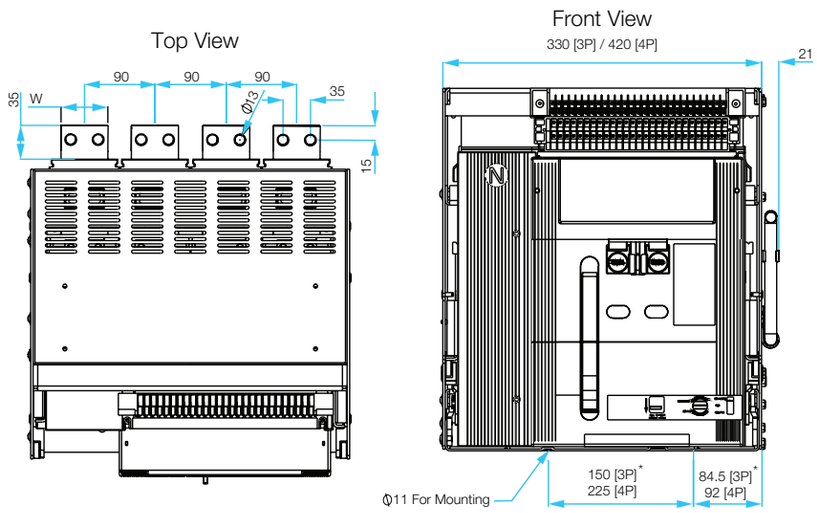
* Mounting hole dimensions
All dimensions are in mm.

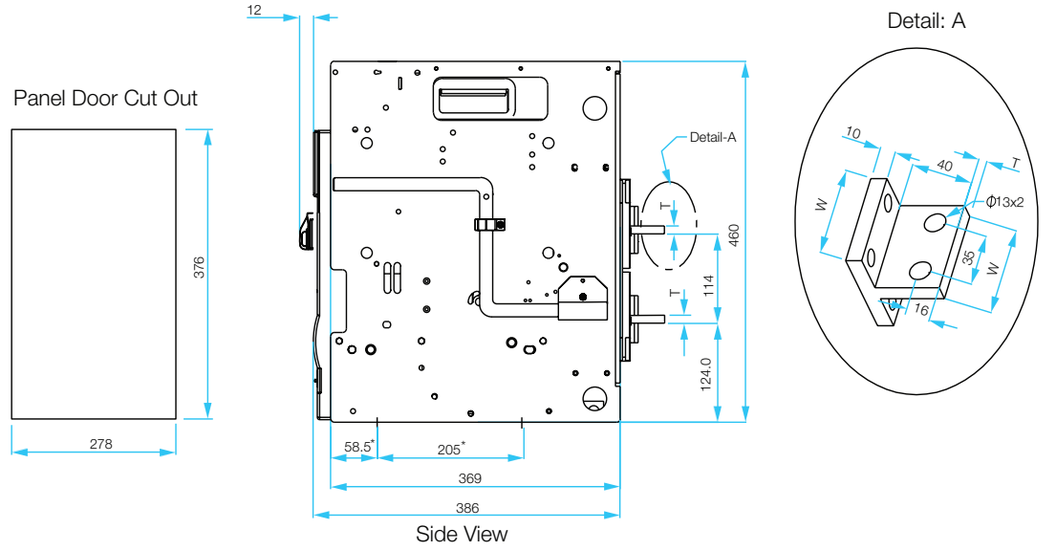
Thickness - 'T'		
	E- Series	S- Series
630-800A	10	20
1000-1250A	15	20
1600A	20	20
2000A	25	25

Out Line Dimensions, Mounting Detail & Terminal Arrangement

Rating: 400 A to 1600 A (E & S Series) Drawout Type

Dimensions (in mm)





Thickness - 'T'	E- Series	S- Series
400-800 A	10	20
1000-1250 A	15	20
1600 A	20	20
2000 A	25	25

Width - 'W'	E- Series	S- Series
400-800 A	50	50
1000-1250 A	60	60
1600 A	60	60
2000 A	60	60

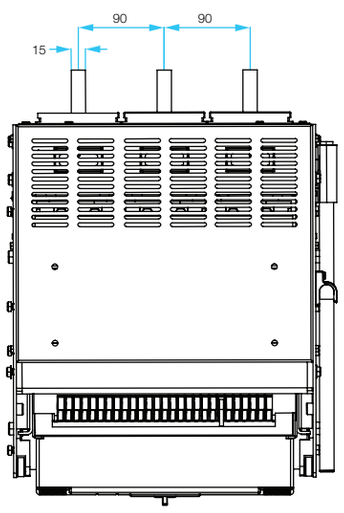
* Mounting hole dimensions
All dimensions are in mm.

Out Line Dimensions, Mounting Detail & Terminal Arrangement

Rating: 2000 A (E & S Series) Drawout Type

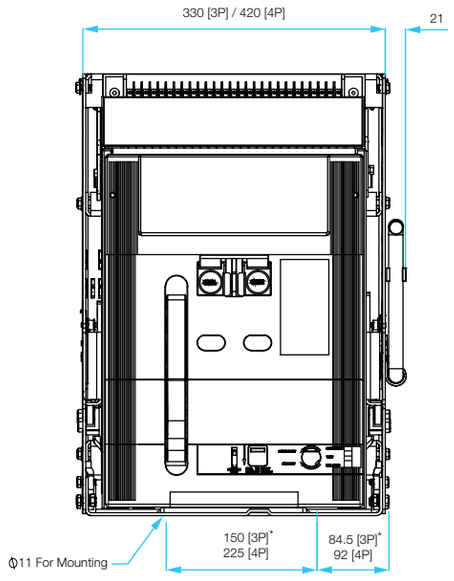
Dimensions (in mm)

Top View

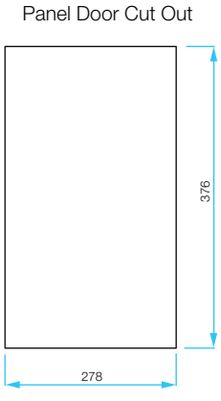


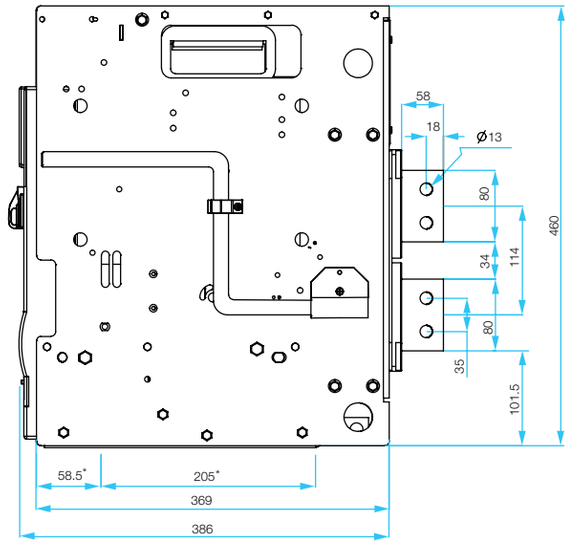
Top View

Front View



Door Frame
Panel Door Cut Out





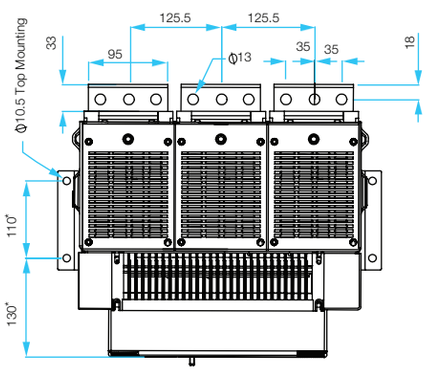
Titania
Air Circuit Breaker

Out Line Dimensions, Mounting Detail & Terminal Arrangement

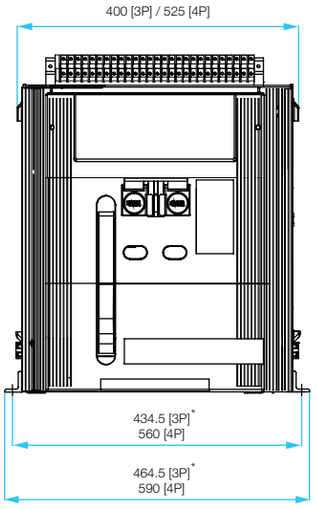
Rating: 2500 A (H Series) Fixed Type

Dimensions (in mm)

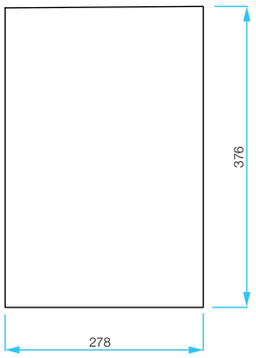
Top View

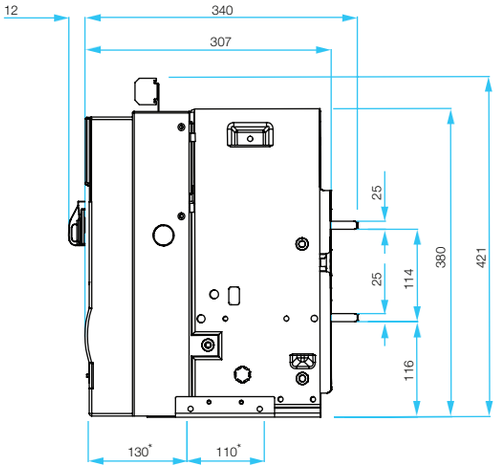


Front View



Door Frame
Panel Door Cut Out





Side View

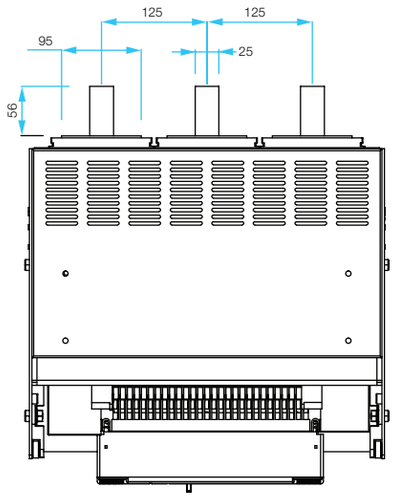
* Mounting hole dimensions
All dimensions are in mm.

Out Line Dimensions, Mounting Detail & Terminal Arrangement

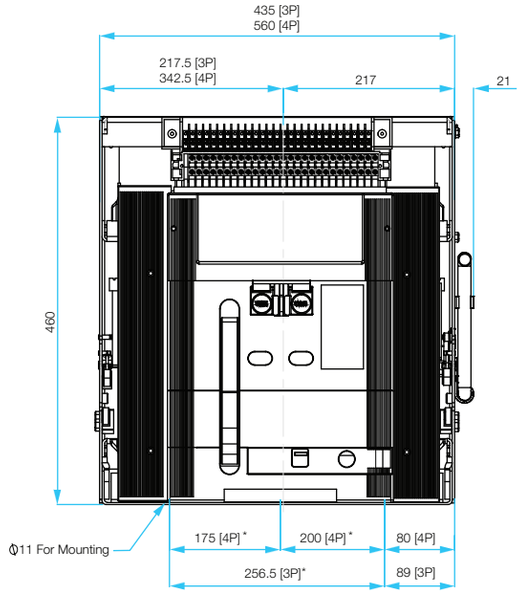
Rating: 2500 A (H Series) Drawout Type

Dimensions (in mm)

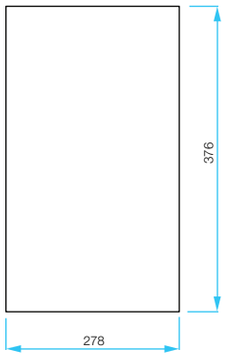
Top View

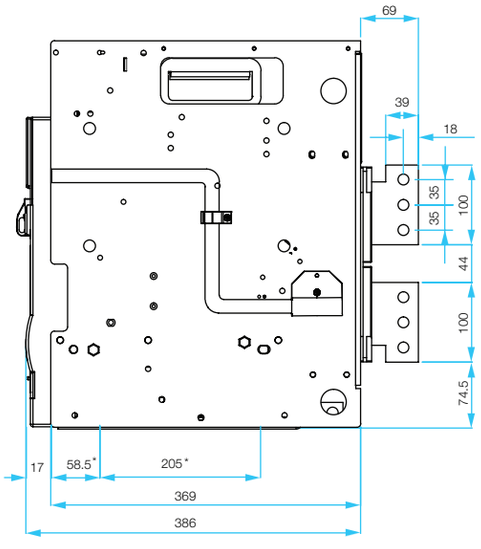


Front View



Door Frame
Panel Door Cut Out



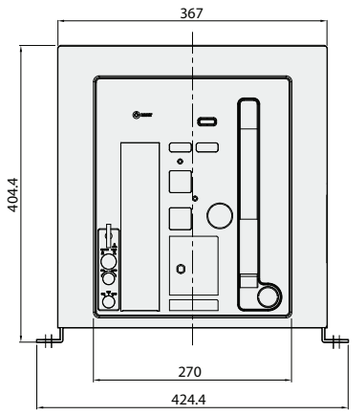


* Mounting hole dimensions
All dimensions are in mm.

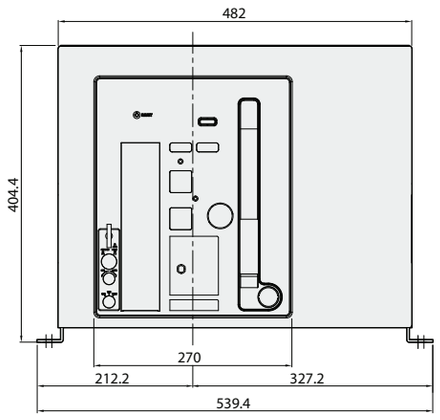
Fixed Type 3200 A - B Frame

Dimensions (in mm)

Front

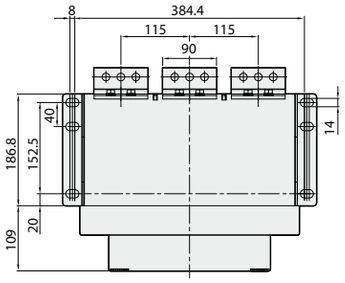


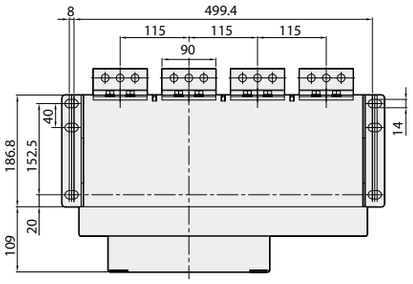
3P



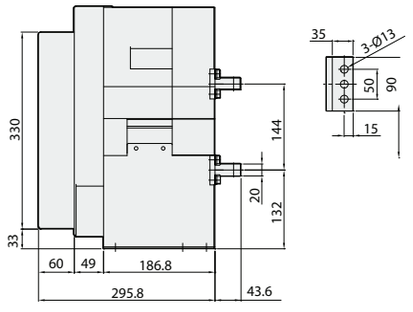
4P

Horizontal Type



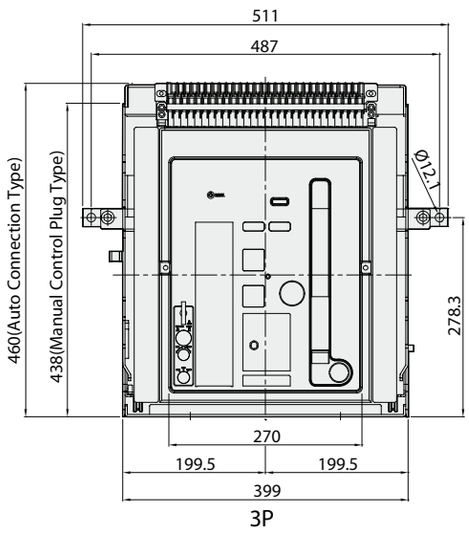


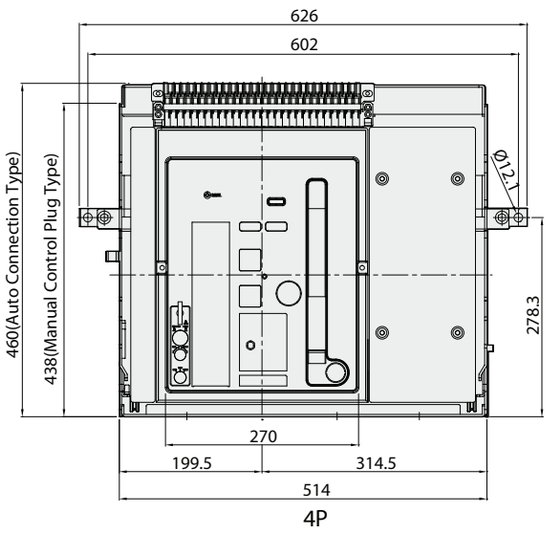
Model Name	Detail"A"
3200 A	90



Draw-Out Type 3200 A - B Frame

Front

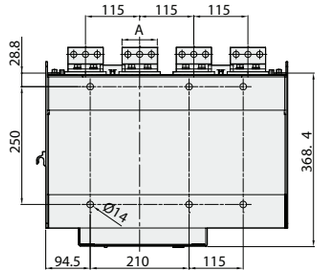




Draw-Out Type 3200 A - B Frame

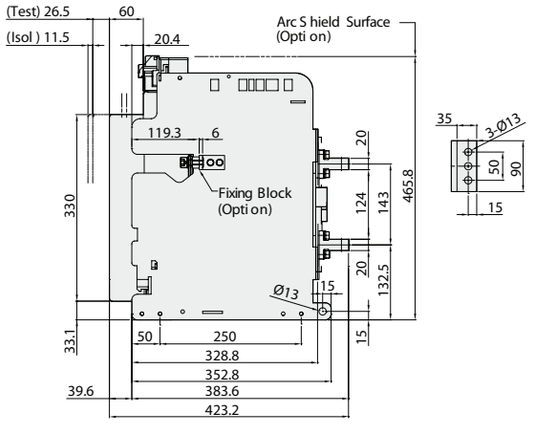
Dimensions (in mm)

Horizontal Type



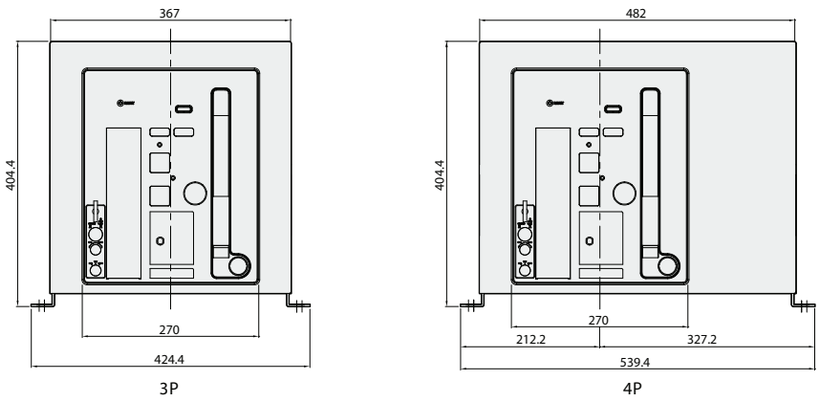
Model Name	Detail"A"
3200 A	90

[3,200 A]

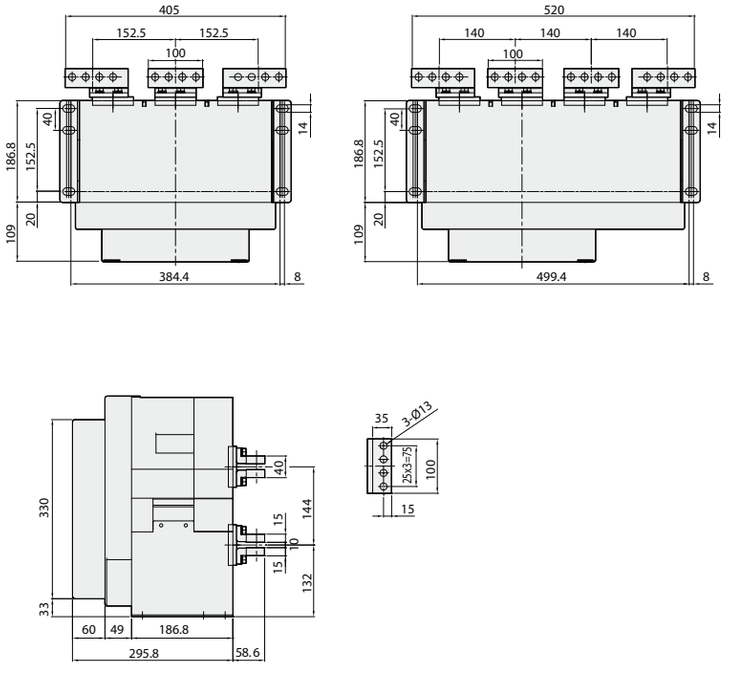


Fixed Type 4000 A - B Frame

Front



Horizontal Type

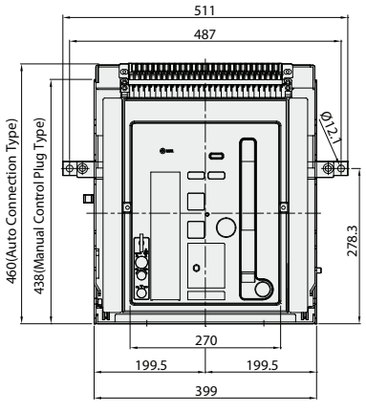


The drawing dimension of this page may be subject to change without prior notice.

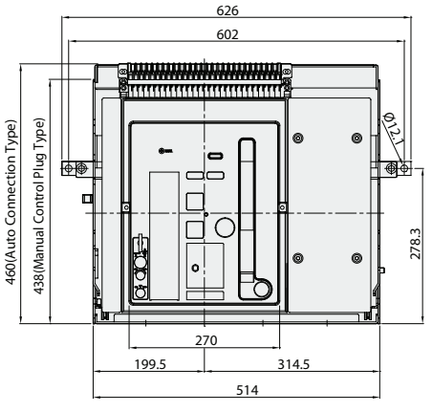
Draw-Out Type 4000 A - B Frame

Dimensions (in mm)

Front

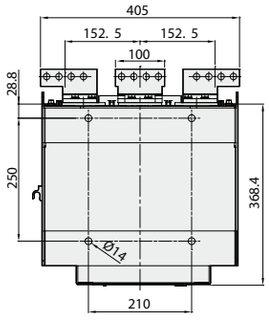


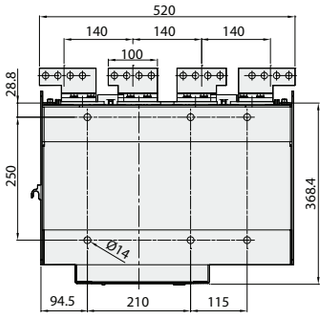
3P



4P

Horizontal Type





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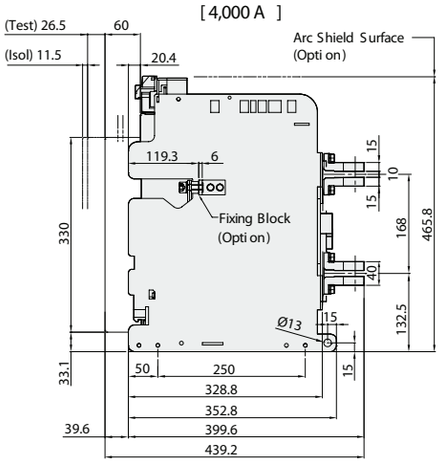
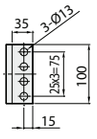


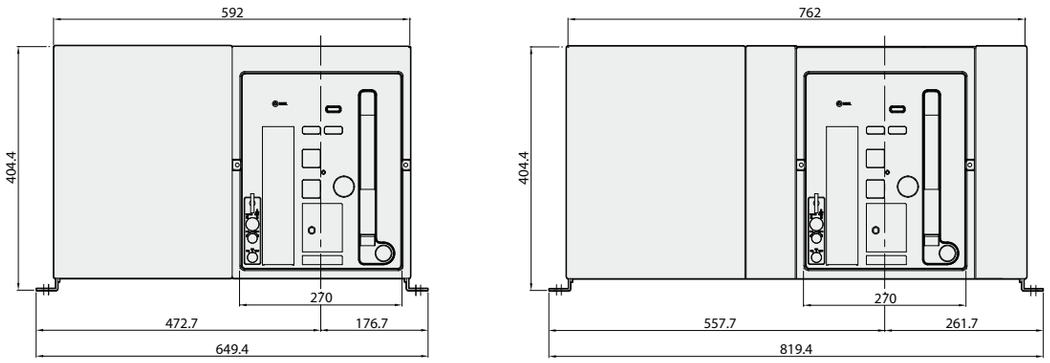


The drawing dimension of this page may be subject to change without prior notice.

Fixed Type 5000 A - C Frame

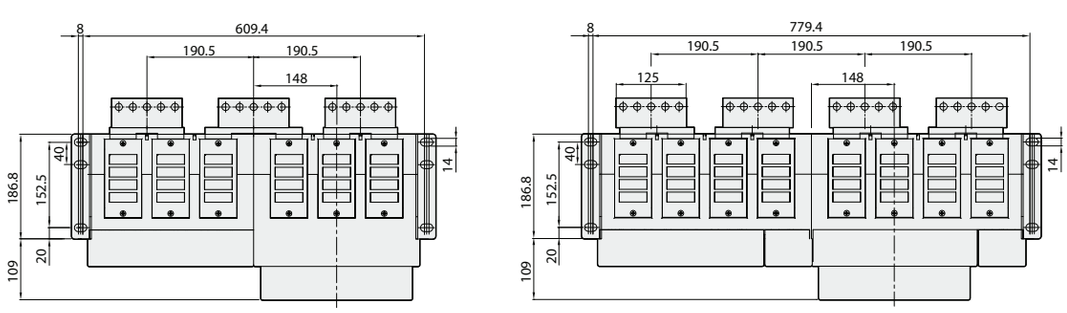
Dimensions (in mm)

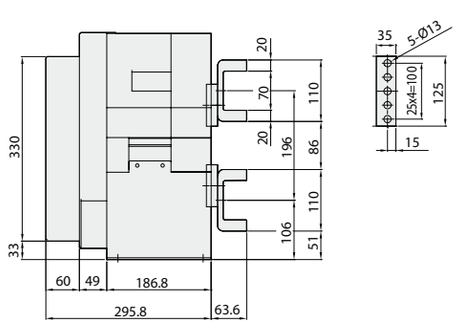
Front



3P 4P

Horizontal Type





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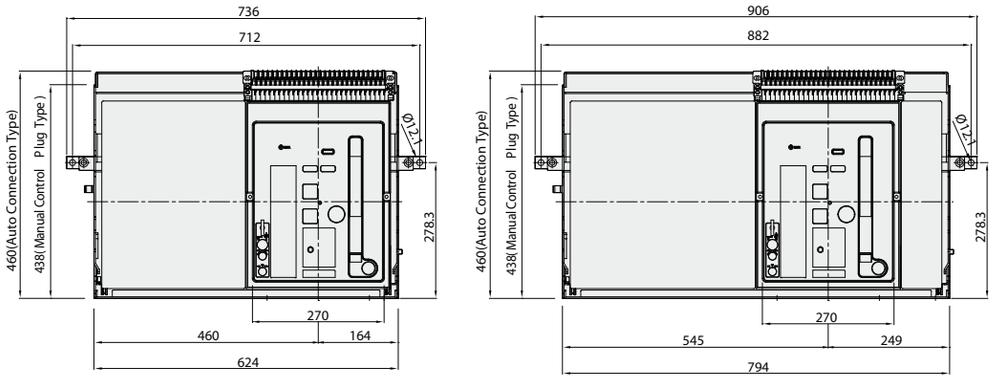
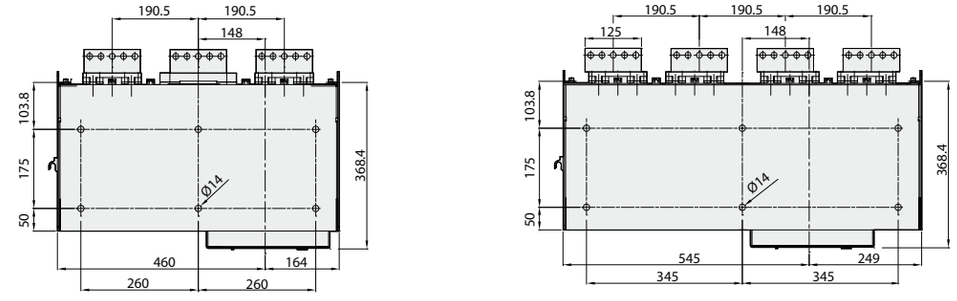
Draw-Out Type 5000 A - C Frame

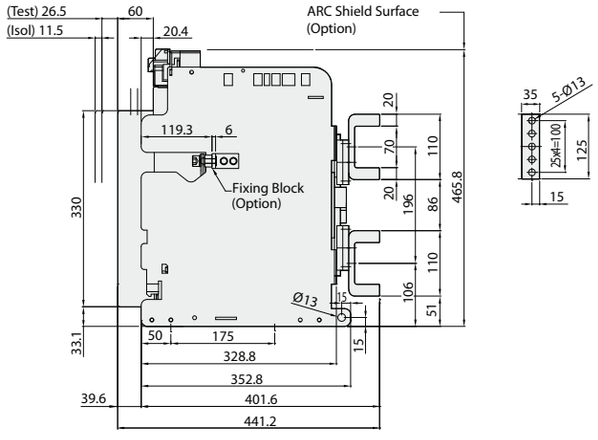
Dimensions (in mm)

Front



Horizontal Type





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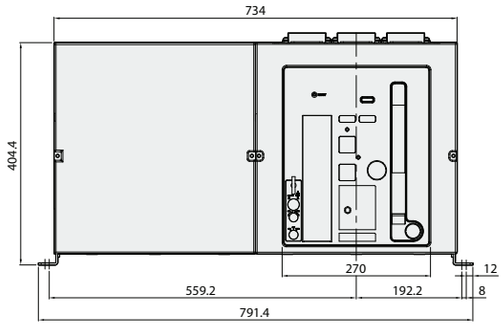
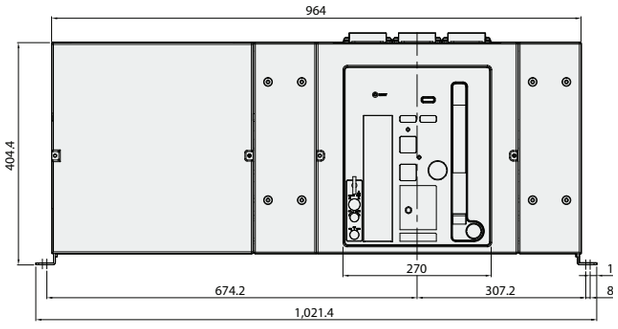
Fixed Type 6300 A - D Frame

Dimensions (in mm)

Front

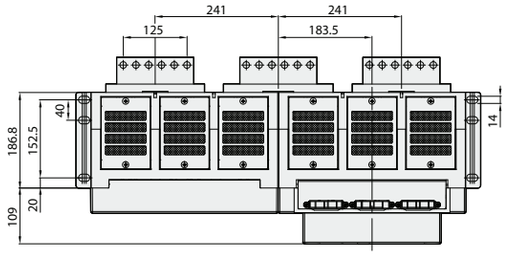


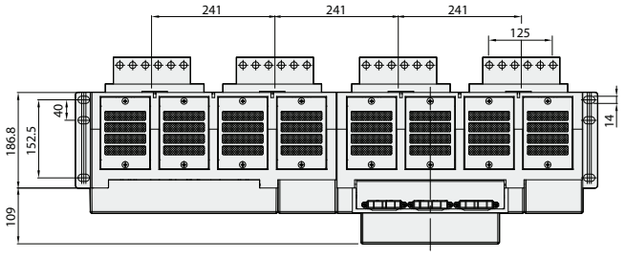
3P

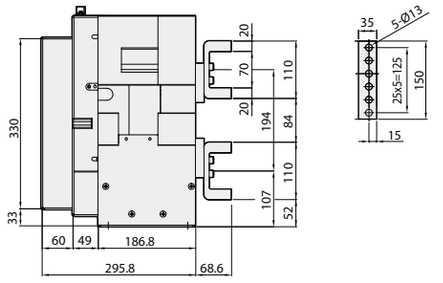


4P

Horizontal Type





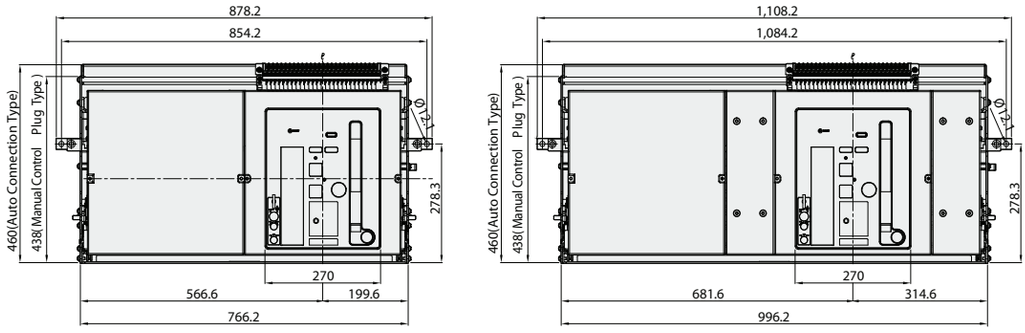


The drawing dimension of this page may be subject to change without prior notice.

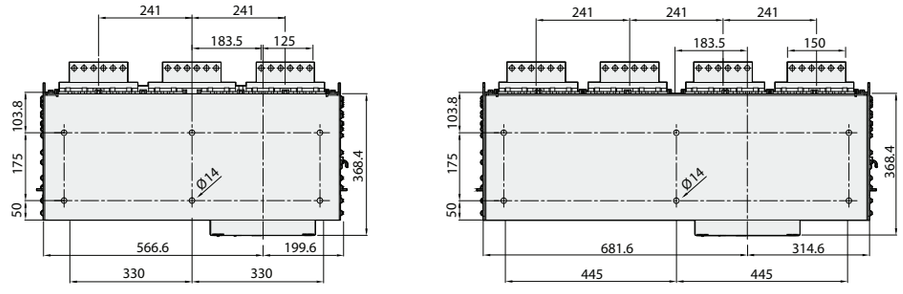
Draw-Out Type 6300 A - D Frame

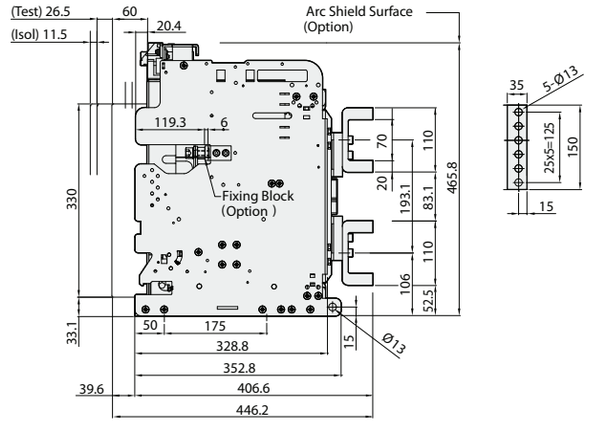
Dimensions (in mm)

Front



Horizontal Type





The drawing dimension of this page may be subject to change without prior notice.

Current of Status Acquired Standards

Approvals & Certificates

ACB

● : Acquired
❍ : In Progress (Expected)

Type of Certification	Approvals				
Type of Standard	KS	IEC	IEC	IEC	ANSI
Mark					
Testing Institute	KS	CE	DEKRA	Nuclear	KERI
Certification Country	Korea	Europe	Netherlands	Korea	Korea
3200 A- B Frame	●	●	●	❍	●
4000 A- B Frame	●	●	●		●
5000 A- C Frame	●	●	●		●
6300 A- D Frame		●	●		

Type of Certification	Vessel								
Type of Standard	Korea	U.K	U.S.A	France	Japan	Germany	Germany	Italy	Russia
Mark									
Testing Institute	KR	LR	ABS	BV	NK	GL	DNV	RINA	RMRS
Certification Country	Korea	U.K.	USA	France	Japan	Germany	Germany	Italy	Russia
3200 A- B Frame	●	●	●	●	●	●	●	●	●
4000 A- B Frame	●	●	●	●	●	●	●	●	●
5000 A- C Frame	●	●	●	●	●	●	●	●	●
6300 A- D Frame	●	●	●	●	●	●	●	●	●

HIM Series

Moulded Case Circuit Breakers

Features:

- High breaking capacity up to 85 kA with Ics=100% Icu
- Thermal Adjustability in entire range
- Rated Insulation Voltage, Ui = 1000 V
- Rated Operational Voltage, Ue = 690 V
- Impulse Withstand Voltage, Uimp = 8 kV
- Standardized Height of Products by Frame (AF)

Range :

- 16 A - 800 A in 5 Frame (AF) Sizes

Specification :

IS / IEC 60947-1 & 2

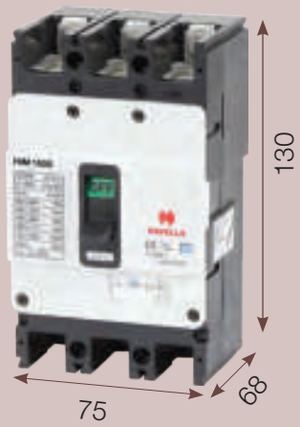
Essential for Today, Potential for Tomorrow

Advanced Breaking Performance and Various Selectivity

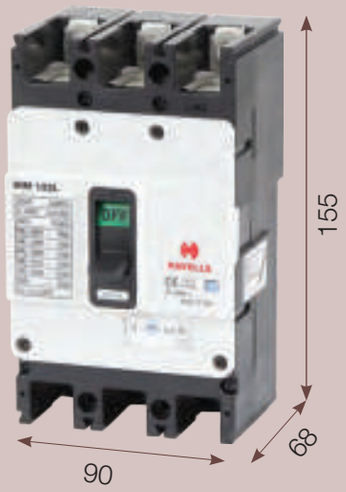
- Product Range: 16 A - 800 A in 5 Frame (AF) Sizes
- High breaking capacity up to 85 kA with Ics=100% Icu
- Thermal Adjustability in entire range
- Rated Insulation Voltage, Ui = 1000 V
- Rated Operational Voltage, Ue = 690 V
- Impulse Withstand Voltage, Uimp = 8 kV
- Standardized Height of Products by Frame (AF)

Dimensions in (mm)

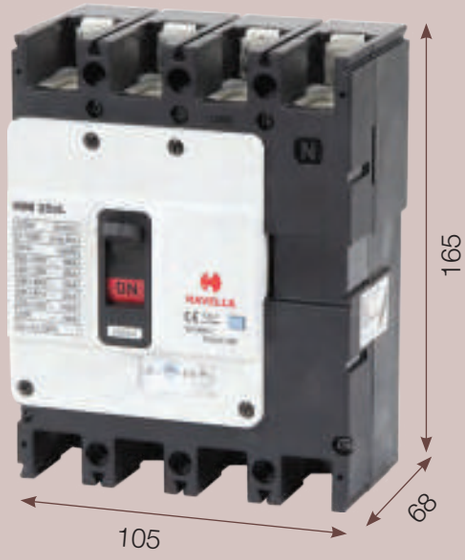
100 AF (16-100A)



125 AF (16-125A)

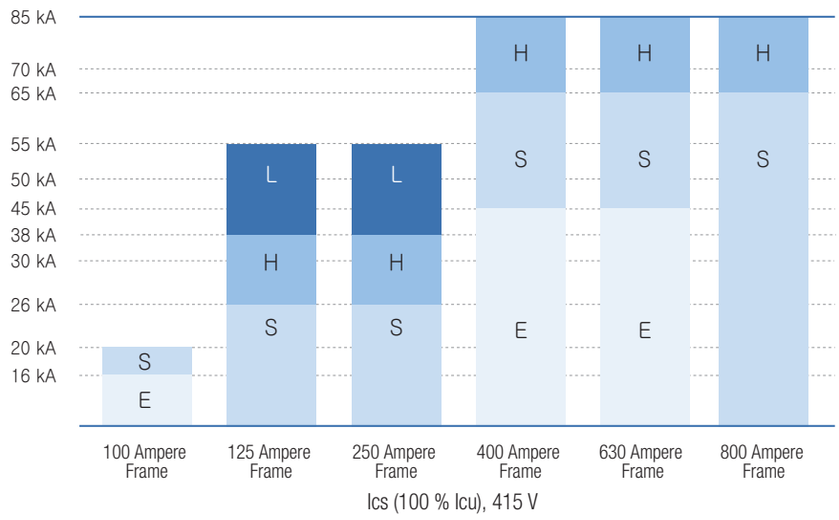


250 AF (150-250A)



HIM series

Rated Short-Circuit Current by AF, (Ics = 100 % Icu)



400 AF (300-400A)

630AF (500-630A)
800 AF (700-800A)

NEW

Technical Information

MCCB (HIM Series): 16A-800A

Rated Insulation Voltage, Ui	1,000 V
Rated Operational Voltage, Ue	690 V
Impulse Withstand Voltage, Uimp	8 kV
Protective Function	Overload, short-circuit and instantaneous protection
Suitablilty for Isolation	Yes
Utilization Category	A
Polution Degree	3
Reference Standard	IEC 60947-1 & 2

Model			SI Unit	HIM100		HIM125			HIM250			
Frame (AF)				100		125			250			
Pole (P)				2, 3, 4 [1]		2, 3, 4 [1]			3, 4 [1]			
Rated current, at 40 °C			A	16, 20, 25, 32, 40, 50, 63, 80, 100		16, 20, 25, 32, 40, 50, 63, 80, 100, 125			150, 160, 200, 225, 250			
Rated short-circuit breaking capacity [Icu] (kA rms)	Recognition code for order			E	S	S	H	L	E	S	H	L
	AC660 V / 690 V			2.5	5	7.5	8	10	7.5	8	8	10
	AC480 V / 500 V			7.5	10	14	26	35	14	20	26	35
	AC440 V / 460 V			16	20	26	38	55	20	26	38	55
	AC380 V / 415 V			16	20	26	38	55	20	26	38	55
	AC220 V / 240 V			35	50	65	85	100	50	65	85	100
	DC250 V (2P)			5	10	15	20	30	10	15	20	30
Service breaking capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100
Endurance (Durability)	Mechanical			30,000		30,000			25,000			
	Electrical			10,000		10,000			10,000			
Trip Device												
Thermal magnetic	Long time [LT]	Fixed		(1.0) x In		(1.0) x In			(1.0) x In			
		Adjustable		(0.8 - 0.9 - 1.0) x In		(0.8 - 0.9 - 1.0) x In			(0.8 - 0.9 - 1.0) x In			
	Instantaneous [INST]			16 - 32 A: 400 A, 40 - 100 A: 10 x In		16 - 32 A: 400 A, 40 - 125 A: 10 x In			10 x In			
Accessory												
Internal	Auxiliary switch		AUX	●		●			●			
	Alarm switch		ALT	●		●			●			
	Shunt trip		SHT	●		●			●			
	Undervoltage trip		UVT	●		●			●			
	Auxiliary + Alarm Switch		AXT	●		●			●			
External	Rotary handle	Front contact	TFG	●		●			●			
		Extended	TFH	●		●			●			
	Motor operator		MOT	●		●			●			
	Mechanical interlock		MIF	●		●			●			
	Padlock device		PLD	●		●			●			
	Din Rail Adaptor		DRA	●		●			●			
	Terminal cover		TCF	●		-			-			
	Phase barrier		TQQ	●		●			●			
	Terminal extentions		TBB	-		-			●			
Installation and Dimensions												
Connection/Installation	Front connection			Terminal screw					Terminal screw, Terminal busbar			
	Rear connection			Horizontal/Vertical					Horizontal/Vertical			
	DIN rail installation			Possible for using DIN rail adapter		-			-			
Dimensions (mm)	W (2/3/4P)			50/75/100 (mm)		60/90/120 (mm)			105/105/140 (mm)			
	H			130 (mm)		155 (mm)			165 (mm)			
	D			68 (mm)		68 (mm)			68 (mm)			
Weight (kg)	2/3/4P			0.6/0.8/1.0 (kg)		0.8/1.0/1.3 (kg)			1.1/1.3/1.7 (kg)			

● 4 pole arrangement: Basic specification is R-S-T-N

Approvals and Certifications

HIM Series MCCB has acquired the certification from the TEST Agency registered in STL

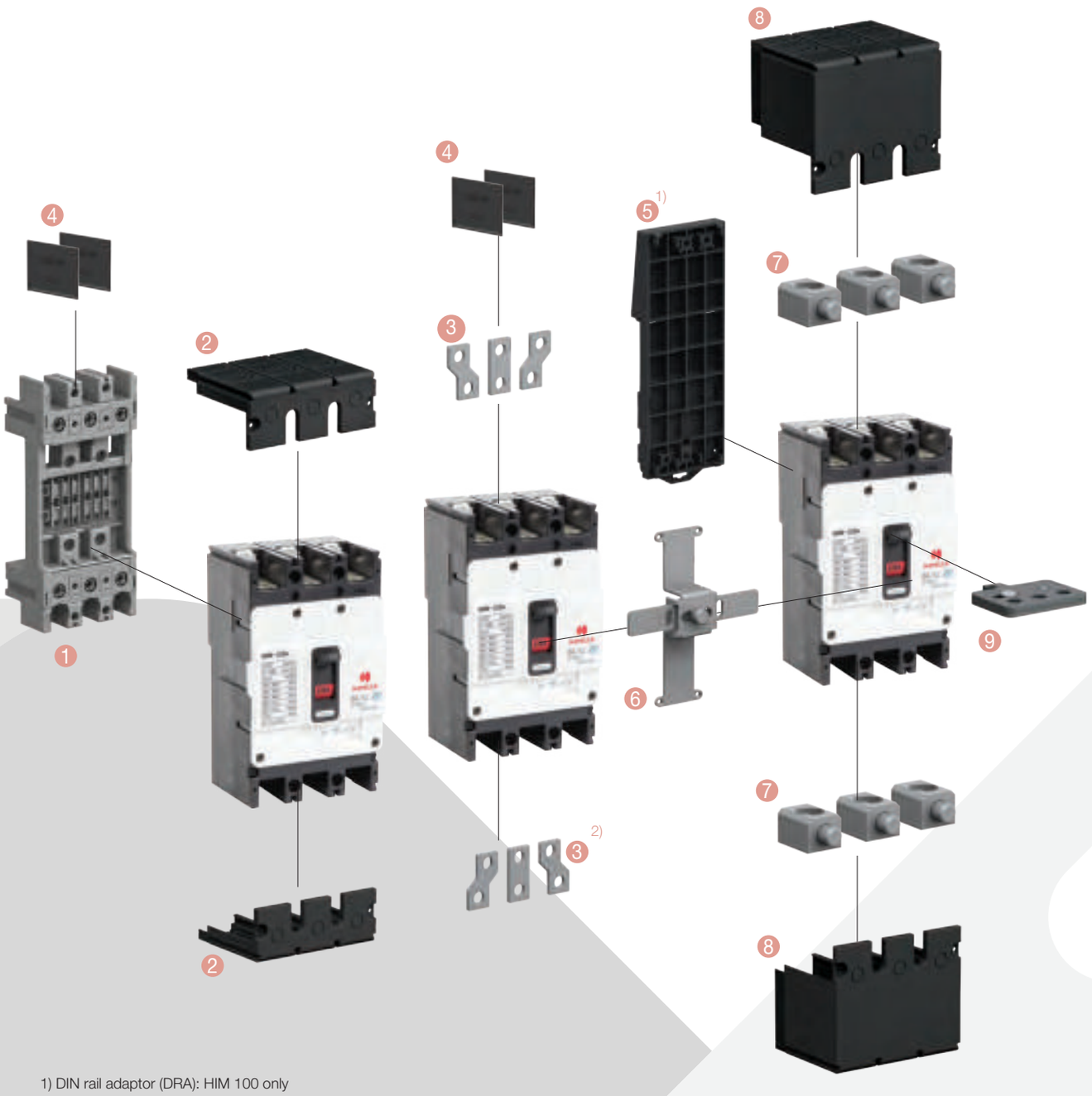
- CB certification (DEKRA)
- Safety certification scheme for electrical applications
- KS (Korean industrial standards)
- Marine approvals (8's classifications)

Vibration/Shock Withstand Test Certification Acquisition

HIM Series MCCB has acquired the vibration/shock withstand test certification in accordance with IEC 60068-2-6 standard which is the required level of IACS, international vessel inspection institute.

Model			SI Unit	HIM400			HIM 630			HIM800	
Frame (AF)				400			630			800	
Pole (P)				3, 4 [1]			3, 4 [1]			3, 4 [1]	
Rated current, at 40 °C			A	300, 350, 400			500, 630			700, 800	
Rated short-circuit breaking capacity [Icu] (kA rms)	Recognition code for order			E	S	H	E	S	H	S	H
	AC660 V / 690 V			5	8	10	5	8	10	8	10
	AC480 V / 500 V			18	35	50	25	45	50	45	50
	AC440 V / 460 V			38	50	70	38	50	70	50	70
	AC380 V / 415 V			45	65	85	45	65	85	65	85
	AC220 V / 240 V			50	75	100	50	75	100	75	100
	DC250 V (2P)			20	25	40	20	25	40	25	40
Service breaking capacity [Ics = % Icu]				100	100	100	100	100	100	100	100
Endurance (Durability)	Mechanical			4,000			2,500			2,500	
	Electrical			1,000			1,000			500	
Trip Device											
Thermal magnetic	Long time [LT]	Fixed		(1.0) x In			(1.0) x In			(1.0) x In	
		Adjustable		(0.63 - 0.8 - 1.0) x In			(0.63 - 0.8 - 1.0) x In			(0.63 - 0.8 - 1.0) x In	
	Instantaneous [INST]			10 x In			10 x In			10 x In	
Accessory											
Internal	Auxiliary switch		AUX	●			●			●	
	Alarm switch		ALT	●			●			●	
	Shunt trip		SHT	●			●			●	
	Undervoltage trip		UVT	●			●			●	
	Auxiliary + Alarm Switch		AXT	-			-			-	
External	Rotary handle	Front contact	TFG	●			●			●	
		Extended	TFH	●			●			●	
	Motor operator		MOT	●			●			●	
	Mechanical interlock		MIF	●			●			●	
	Pad Lock device		PLD	●			●			●	
	Din Rail Adaptor		DRA	-			-			-	
	Terminal cover		TCF	●			●			●	
	Phase barrier		TQQ	●			●			●	
	Terminal extentions		TBB	●			●			●	
Installation and Dimensions											
Connection/Installation	Front connection			Terminal Screw			Terminal Screw, Terminal Busbar			Terminal screw, Terminal busbar	
	Rear connection			Horizontal/Vertical wiring			Horizontal/Vertical wiring			Horizontal/Vertical wiring	
Dimensions (mm)	W (2/3/4P)			140/140/184 (mm)			210/210/280 (mm)			210/210/280 (mm)	
	H			257 (mm)			280 (mm)			280 (mm)	
	D			110 (mm)			110 (mm)			110 (mm)	
Weight (kg)	2/3/4P			4/4.5/5.4 (kg)			8.7/9.5/12.5 (kg)			8.7/9.5/12.5 (kg)	

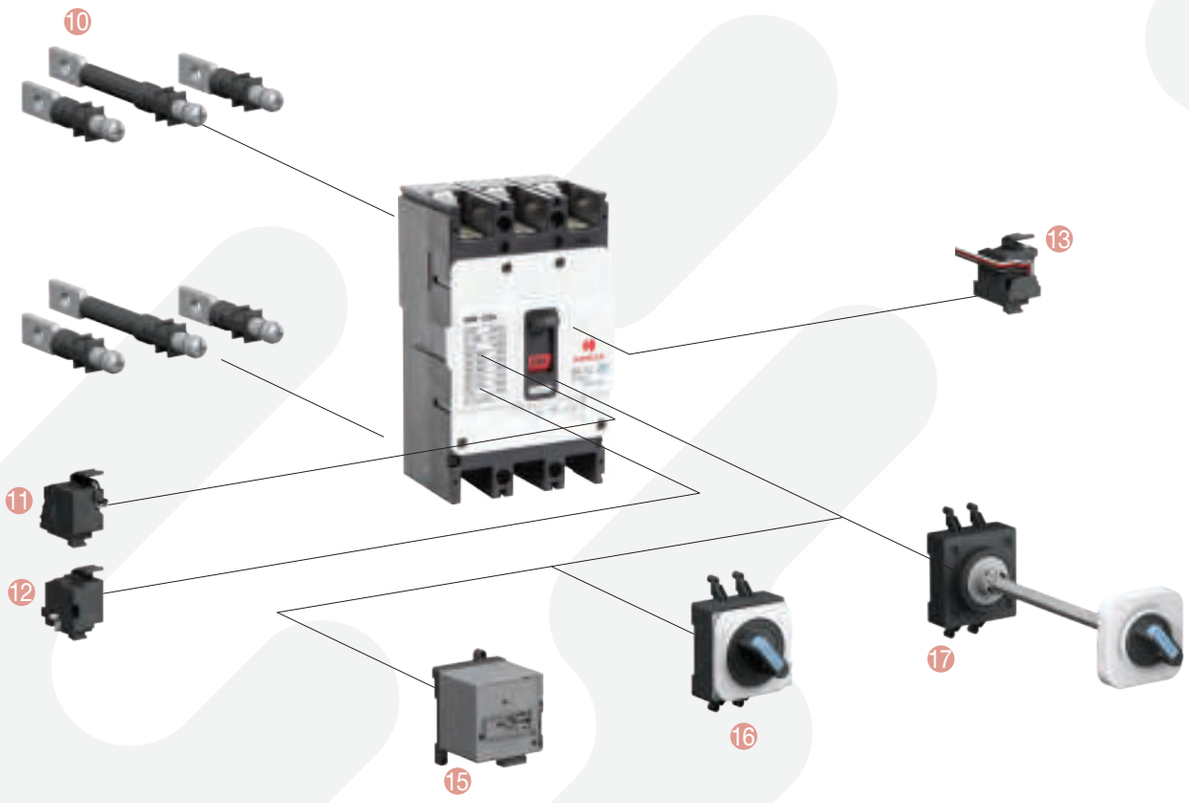
Accessories



1) DIN rail adaptor (DRA): HIM 100 only
2) Busbar (TBB): HIM 250 only

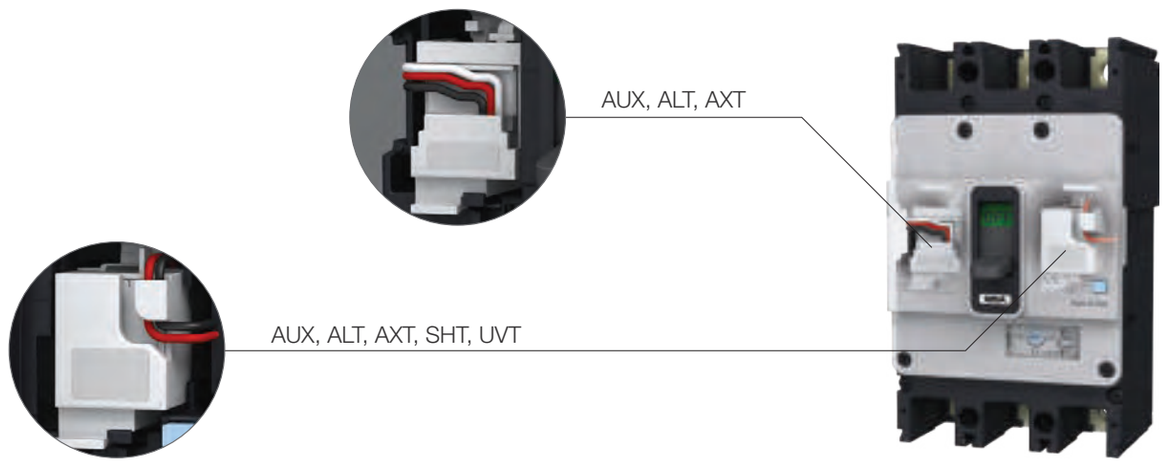
HIM Series MCCB

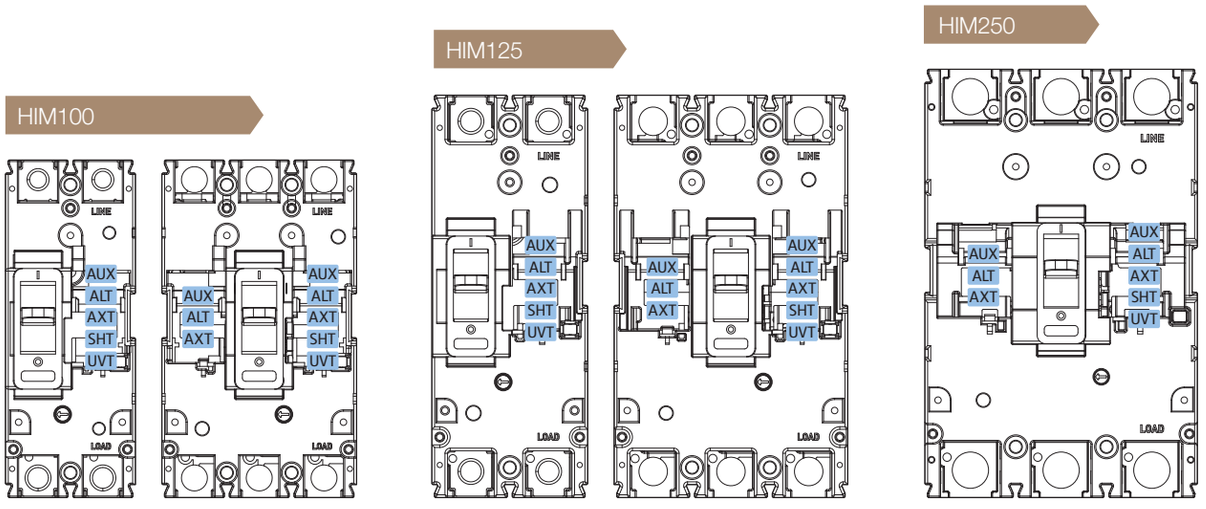
1. Plug in Devices
2. Terminal Cover for Plug-In Type
3. Busbar
4. Insulation Barrier
5. DIN Rail Adaptor
6. Mechanical Interlock
7. Lug Terminal
8. Terminal Cover
9. Padlock for Rotary Handle



10 Rear Connection Terminal
11 Shunt Trip Coil
12 Undervoltage Trip Coil
13 Auxiliary Switch
14 Trip Alarm Switch
15 Motor Operator
16 Direct Rotary Handle
17 Extended Rotary Handle

Internal Accessories





Combinations of Internal Accessories (250 A or less)

Type	Pole	AUX	ALT	SHT	UVT	AXT	AUX ALT	AUX ALT	SHT AUX	UVT AUX	SHT ALT	UVT ALT	SHT AXT	UVT AXT
HIM100 HIM125	2	●	☐	■	☒	☐■								
HIM100 HIM125 HIM250	3/4	●	☐	■	☒	☐■	●	☐	■	☒	■	☒	☐■	☐■

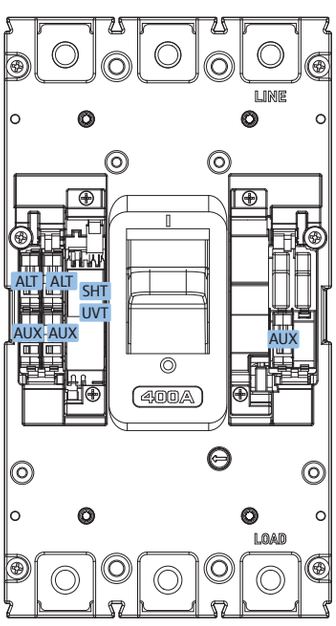
● AUX: Auxiliary switch ☐ / ALT: Alarm switch ■ / SHT: Shunt trip ☒ / UVT: Under-voltage trip ☒ / AXT: Auxiliary alarm switch ☐■

Installation of Internal Accessories

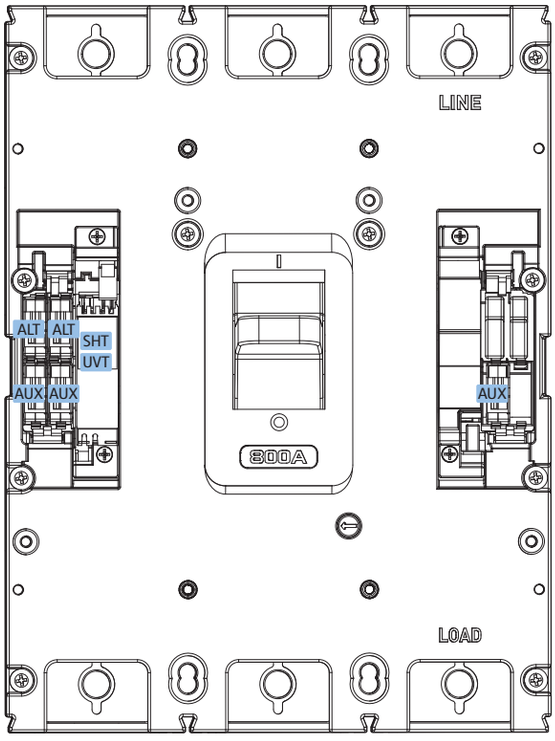
HIM series

- Auxiliary switch (AUX)
- Alarm switch (ALT)
- Auxiliary + Alarm switch (AXT)
- Shunt trip (SHT)
- Undervoltage trip (UVT)

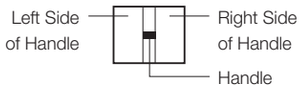
HIM400



HIM800



Combinations of Internal Accessories (above 250 A)



Type	Pole	AUX	ALT	SHT	UVT	AUX ALT	SHT AUX	UVT AUX	SHT ALT	UVT ALT	SHT AUX ALT	UVT AUX ALT
HIM400	2/3/4											
HIM630, 800	2/3 4RSTN											
HIM630, 800	4NRST											

• AUX: Auxiliary switch ■ / ALT: Alarm switch ■ / SHT: Shunt trip ☑ / UVT: Under-voltage trip ☒

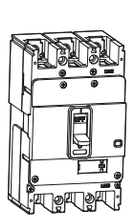
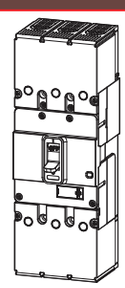
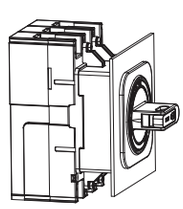
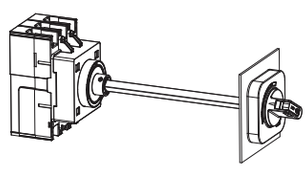
Accessories for HIM Series Moulded Case Circuit Breakers

Description	HIM 100 Frame	HIM 125 Frame	HIM 250 Frame	HIM 400 Frame	HIM 630 Frame	HIM 800 Frame
Shunt Trip						
24 Vdc	●	●	●	●	●	●
48 Vdc	●	●	●			
60 Vdc	●	●	●			
100 Vdc -120 Vdc	●	●	●			
125 Vdc	●	●	●			
100 Vdc -125 Vdc				●	●	●
100 Vac -120 Vac / 200 Vac -250 Vac	●	●	●	●	●	●
Under Voltage Release						
24 Vdc	●	●	●	●	●	●
48 Vdc	●	●	●			
100 Vdc - 110 Vdc	●	●	●			
100 Vac - 120 Vac / 200 Vac - 230 Vac	●	●	●	●	●	●
380 Vac - 415 Vac	●	●	●	●	●	●
Rotary Handle - Direct Mounting	●	●	●	●	●	●
Rotary Handle - Door Mounting	●	●	●	●	●	●
Auxiliary Contact (250 Vac / 250 Vdc) (450 Vac / 250 Vdc)						
1-Changeover	●	●	●	●	●	●
2-Changeover	●	●	●			
Alarm Switch - (Left side only)	●	●	●	●	●	●
Alarm Switch - (Right side only)	●	●	●			
Auxiliary + Alarm Switch - Left / Right side only	●	●	●			
Mechanical Interlock						
2 Pole	●	●				
3 Pole / 4 Pole (N-R-S-T)	●	●	●	●	●	●
Motor Operator						
24 Vdc	●	●	●	●	●	●
110 Vac / Vdc / 240 Vac / Vdc	●	●	●	●	●	●
Pad Lock Device	●	●	●	●	●	●
Auxiliary Handle				●	●	●
Terminals - Standard Type						
3 Pole (Set of 3)			●		●	●
4 Pole (Set of 4)			●		●	●
Terminals - Extended Type						
3 Pole (Set of 3)	POR	POR	●	●		
4 Pole (Set of 4)	POR	POR	●	●		
Terminal Cover - Short Type						
2 Pole	●	●				
3 Pole / 4 Pole	●	●	●	●	●	●
Terminal Cover - Long Type						
2 Pole	●	●				
3 Pole / 4 Pole	●	●	●	●	●	●
Phase Barrier						
2 Pole (Set of 1)	●	●	●			
3 Pole (Set of 2) / 4 Pole (Set of 3)	●	●	●	●	●	●
DIN Rail Adaptor	●					

Technical Information

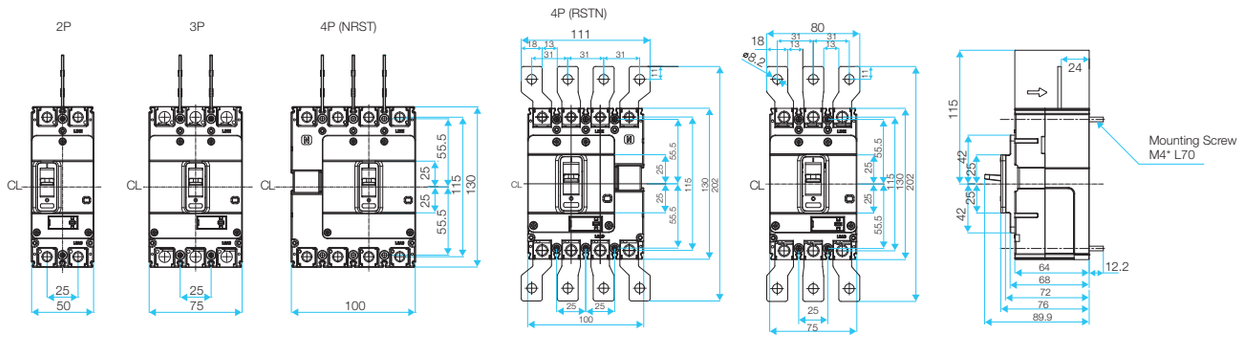
Degree of Protection

By stipulating the IP degree of MCCB based on IEC 60529 standard, the IP degree is changed according to the product condition.

Condition	Circuit Breaker	Circuit Breaker + Terminal Cover	Circuit Breaker + Terminal Cover + Rotary Handle (Front Contact)	Circuit Breaker + Terminal Cover + Rotary Handle (Extended)
Exteriors				
Degree of protection	IP20	IP40	IP40	IP40

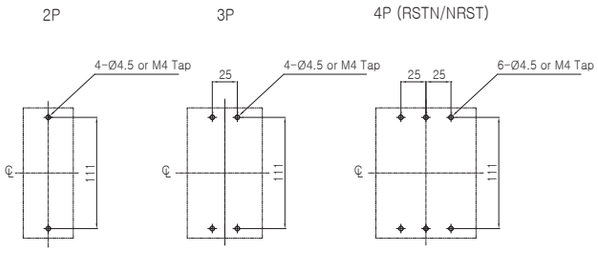
Front Connection Type HIM 100

Dimension (in mm)

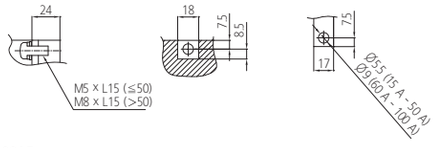


- Insulation barriers for line side are provided as basic option.

Dimensions for Mounting Body



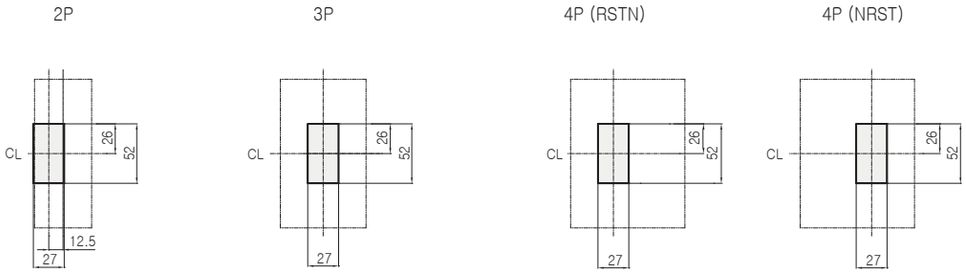
Terminal/Connection Bus Dimension



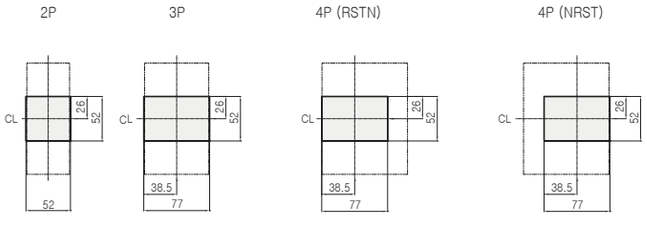
100AF

Specification of Mounting Screw: M4 x L70 P/W
Specification of Terminal Screw: (Less than 50 A) M5 x L15 P/W P/W
(Excess than 50 A) M8 x L15 S/W P/W

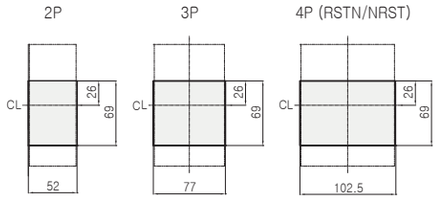
Panel Cover Cutting Dimensions for Handle



Panel Cover Cutting Dimensions for Handle/Test Button



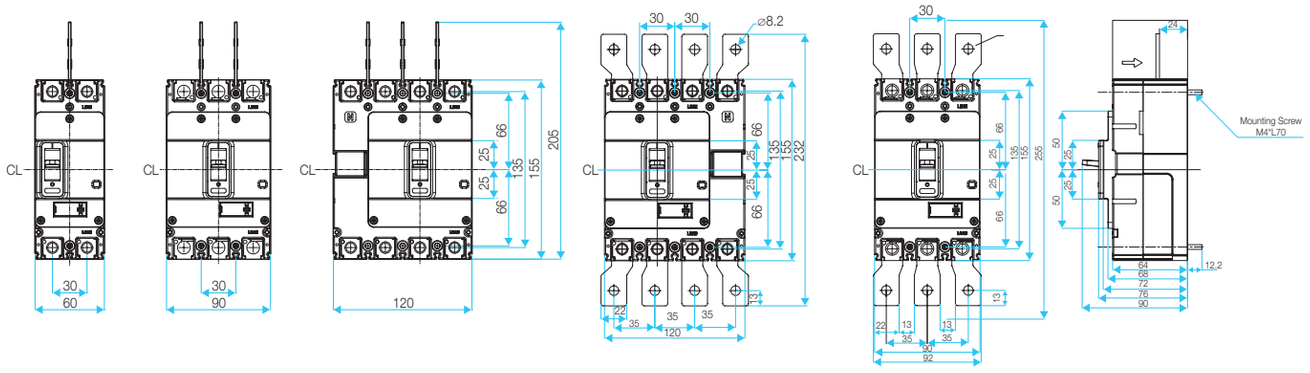
Panel Cover Cutting Dimensions for Handle/Trip Unit



Front Connection Type HIM 125

Dimension (in mm)

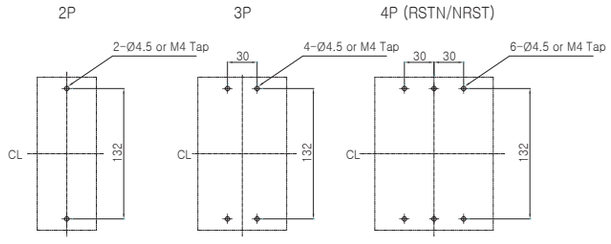
2P 3P 4P (NRST) 4P (RSTN)



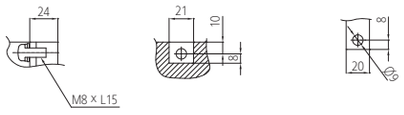
• Insulation barriers for line side are provided as basic option.

Dimensions for Mounting Body

2P 3P 4P (RSTN/NRST)



Terminal/Connection Bus Dimension

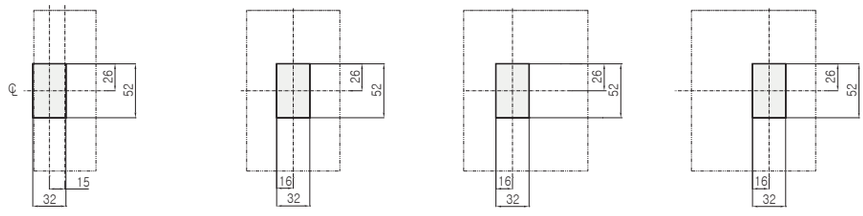


125AF

Specification of Mounting Screw: M4 × L70 P/W
Specification of Terminal Screw: M8 × L15 S/W P/W

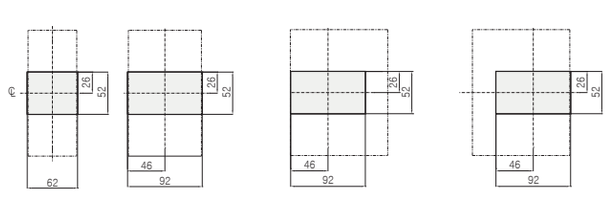
Panel Cover Cutting Dimensions for Handle

2P 3P 4P (RSTN) 4P (NRST)



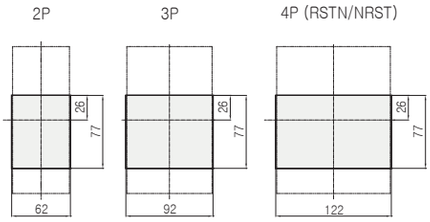
Panel Cover Cutting Dimensions for Handle/Test Button

2P 3P 4P (RSTN) 4P (NRST)



Panel Cover Cutting Dimensions for Handle/Trip Unit

2P 3P 4P (RSTN/NRST)

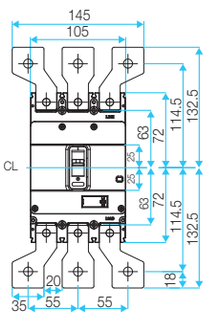


Front Connection Type HIM 250

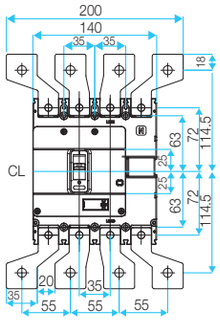
HIM series

Dimension (in mm)

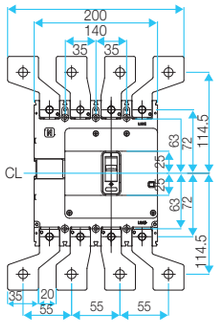
2/3P

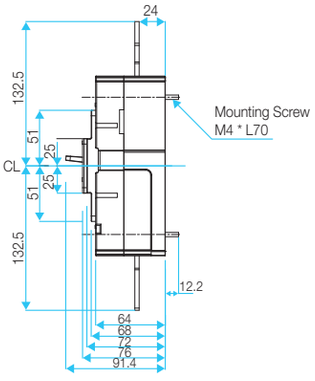


4P (RSTN)



4P (NRST)

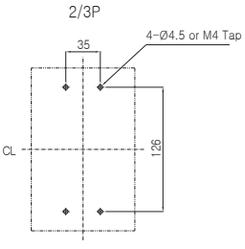




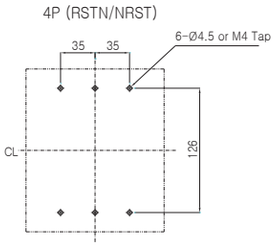
- Insulation barriers for line side are provided as basic option.

Dimensions for Mounting Body

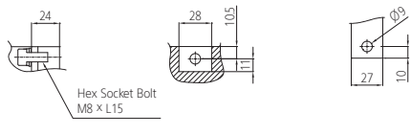
2/3P



4P (RSTN/NRST)



Terminal/Connection Bus Dimension

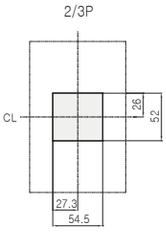


250AF

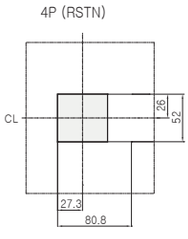
Specification of Mounting Screw: M4 x L70 P/W
Specification of Terminal Screw: Hex Socket Bolt M8 x L15 S/W P/W

Panel Cover Cutting Dimensions for Handle

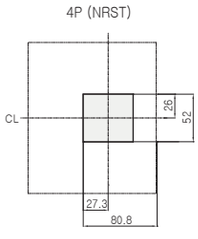
2/3P



4P (RSTN)

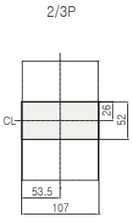


4P (NRST)

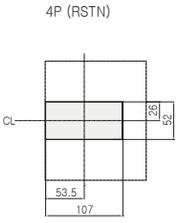


Panel Cover Cutting Dimensions for Handle/Test Button

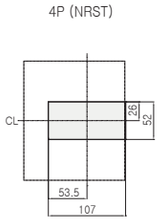
2/3P



4P (RSTN)

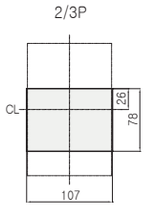


4P (NRST)

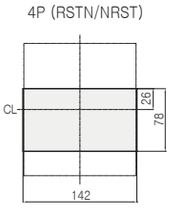


Panel Cover Cutting Dimensions for Handle/Trip Unit

2/3P

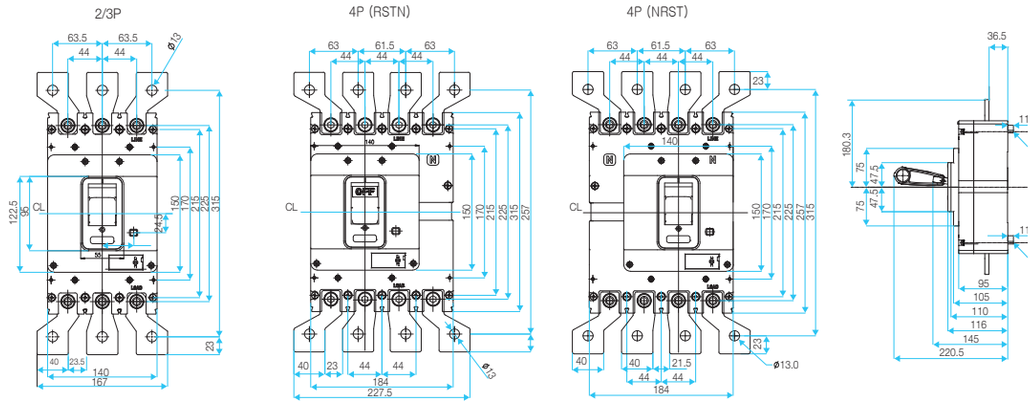


4P (RSTN/NRST)



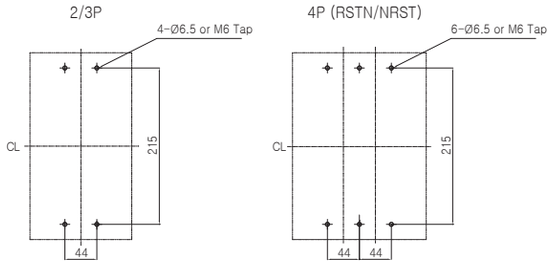
Front Connection Type HIM 400

Dimension (in mm)

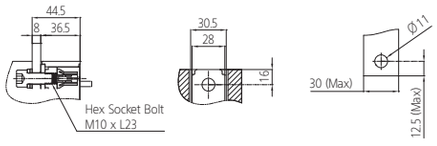


- Insulation barriers for line side are provided as basic option.

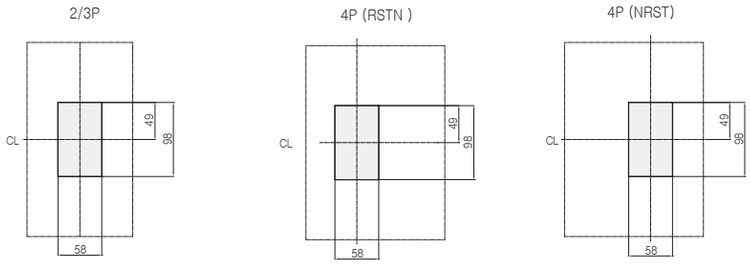
Dimensions for Mounting Body



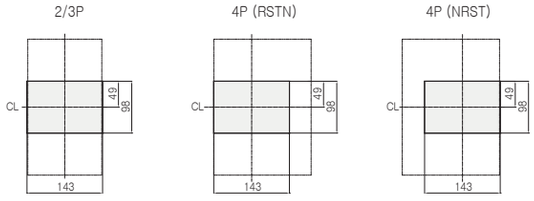
Terminal/Connection Bus Dimension



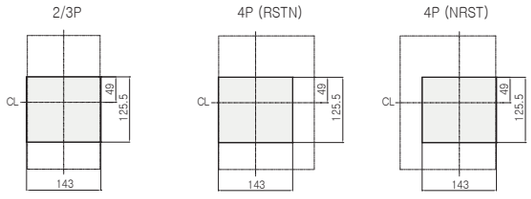
Panel Cover Cutting Dimensions for Handle



Panel Cover Cutting Dimensions for Handle/ Test Button



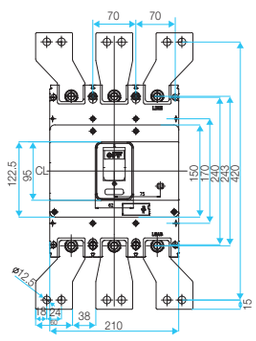
Panel Cover Cutting Dimensions for Handle/Trip Unit



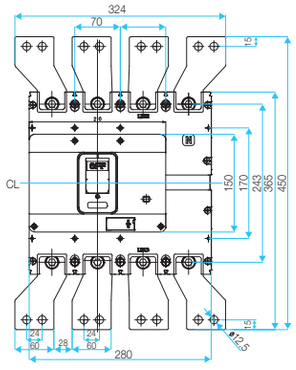
Front Connection Type HIM 800

Dimension (in mm)

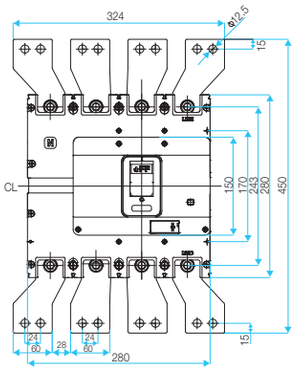
2/3P

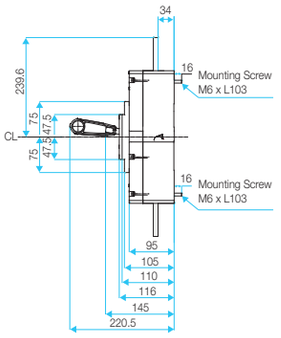


4P (RSTN)



4P (NRST)

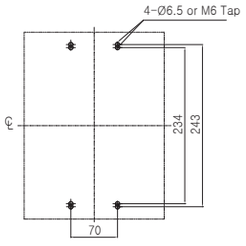




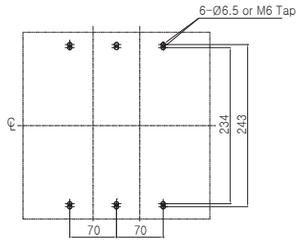
- Insulation barriers for line side are provided as basic option.

Dimensions for Mounting Body

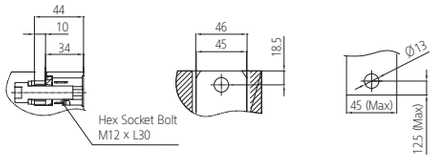
2/3P



4P (RSTN/NRST)

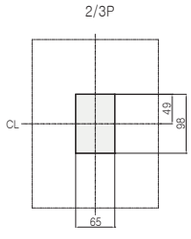


Terminal/Connection Bus Dimension

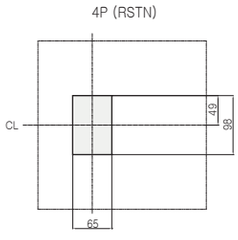


Panel Cover Cutting Dimensions for Handle

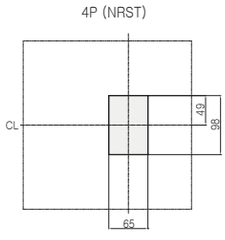
2/3P



4P (RSTN)

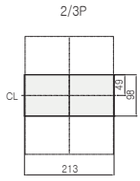


4P (NRST)

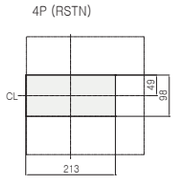


Panel Cover Cutting Dimensions for Handle/Test Button

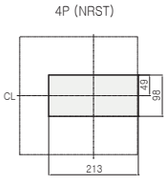
2/3P



4P (RSTN)

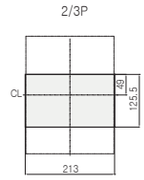


4P (NRST)

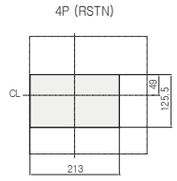


Panel Cover Cutting Dimensions for Handle/Trip Unit

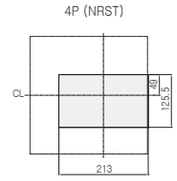
2/3P



4P (RSTN)

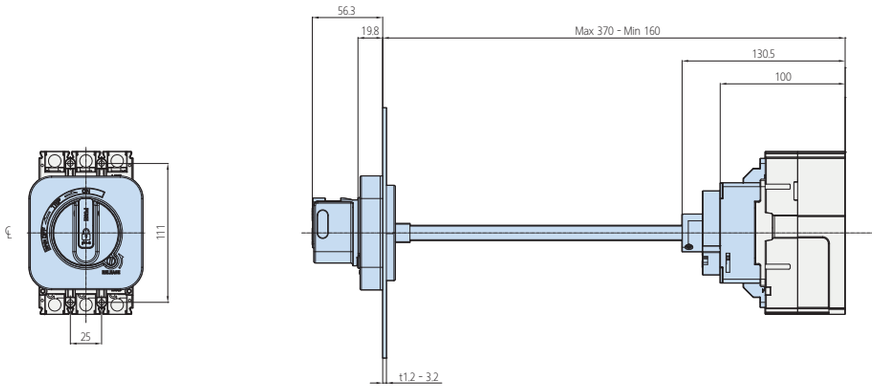


4P (NRST)

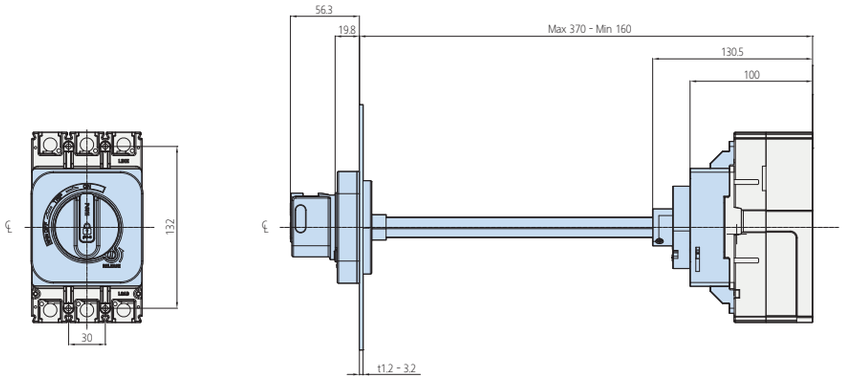


Extended Rotary Handle - HIM 100

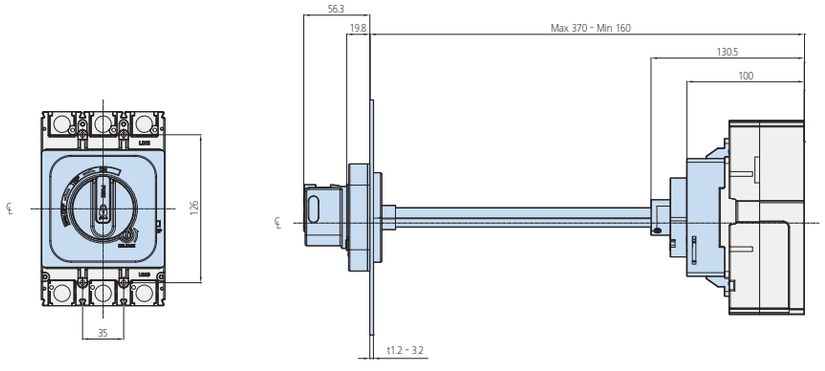
Dimension (in mm)



Extended Rotary Handle - HIM 125

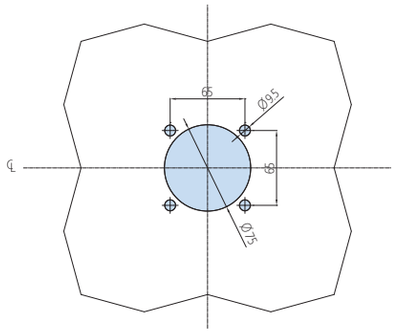


Extended Rotary Handle - HIM 250

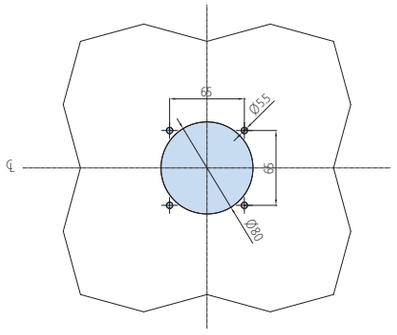


Dimensions for Mounting Body (HIM 100 - HIM 250)

Direct Rotary Handle



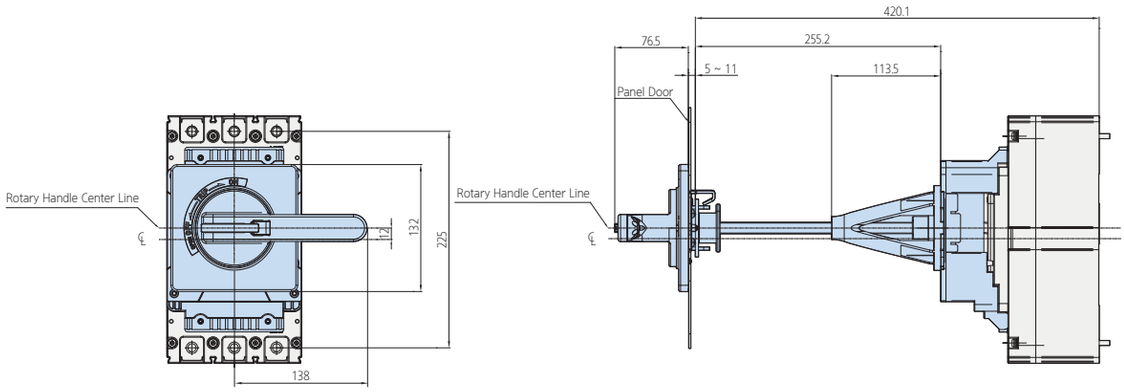
Extended Rotary Handle



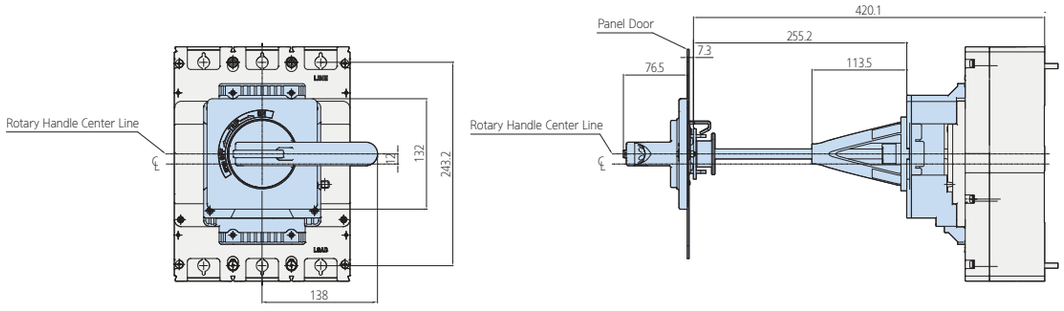
HIM series

Extended Rotary Handle - HIM 400

Dimension (in mm)

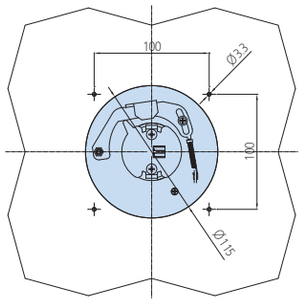


Extended Rotary Handle - HIM 800

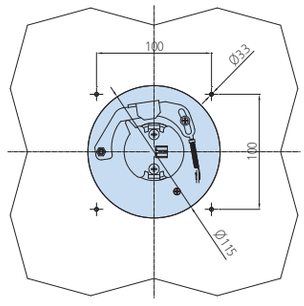


Dimensions for Mounting Body - HIM 400

Direct Rotary Handle

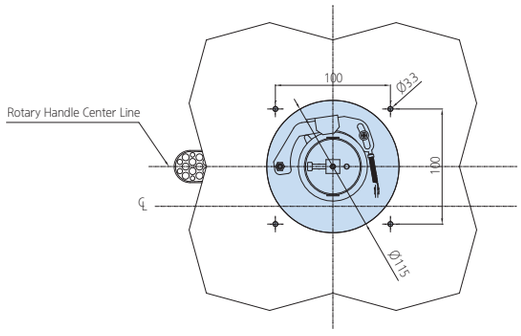


Extended Rotary Handle

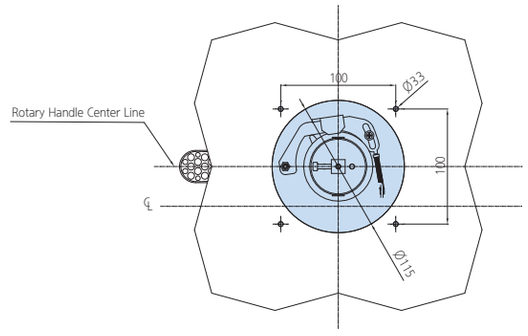


Dimensions for Mounting Body - HIM 800

Direct Rotary Handle

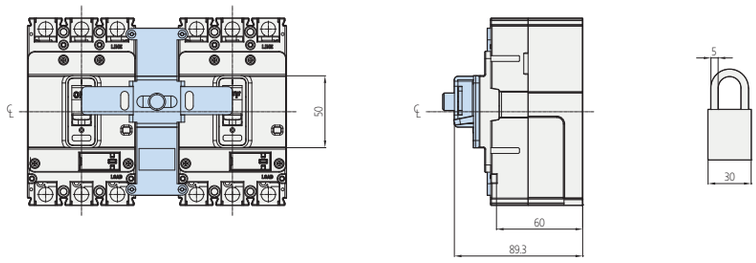


Extended Rotary Handle

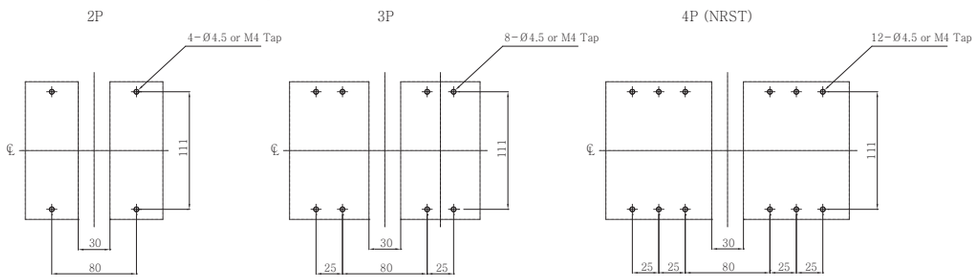


Mechanical Interlock HIM 100

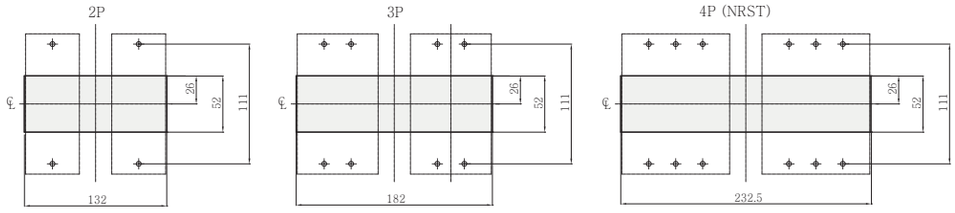
Dimension (in mm)



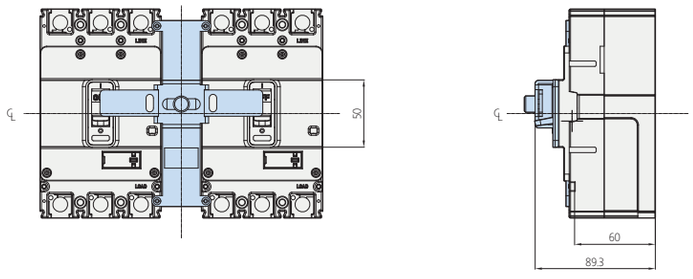
Dimensions for Mounting Body



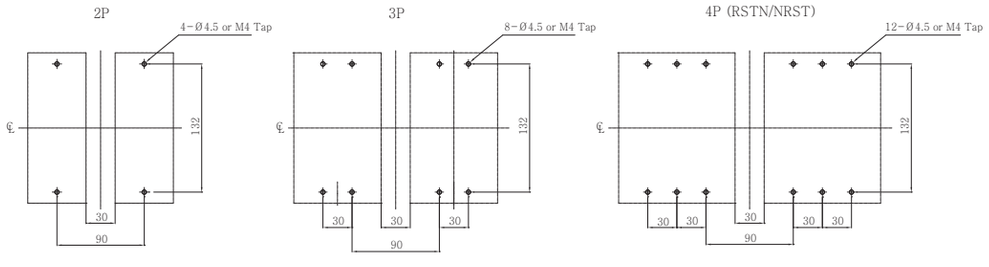
Panel Cover Cutting Dimension



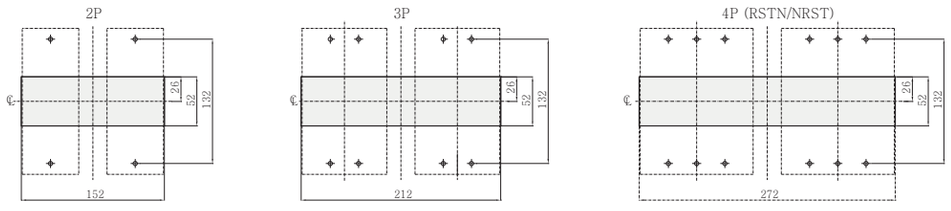
Mechanical Interlock HIM 125



Dimensions for Mounting Body

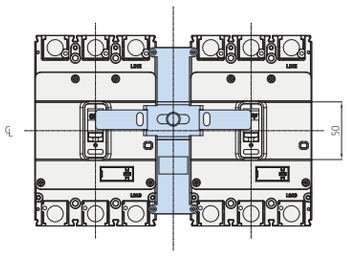


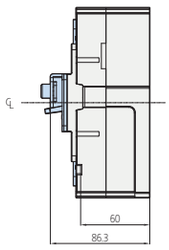
Panel Cover Cutting Dimension



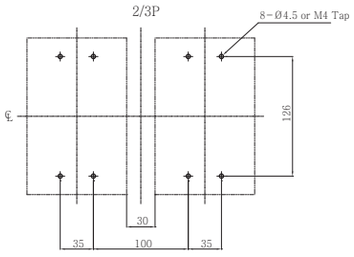
Mechanical Interlock HIM 250

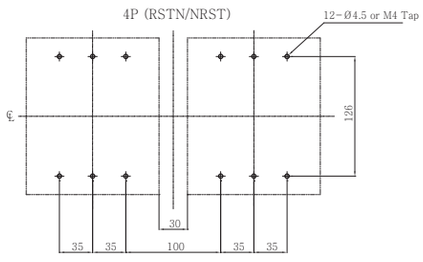
Dimension (in mm)



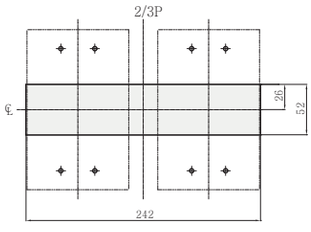


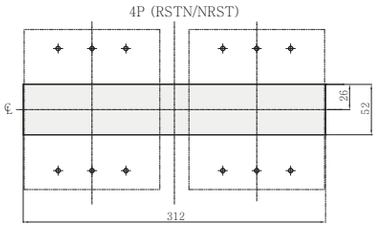
Dimensions for Mounting Body



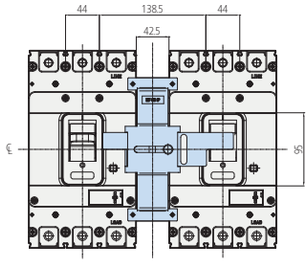


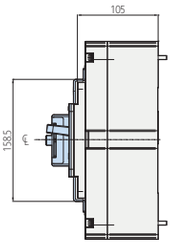
Panel Cover Cutting Dimension



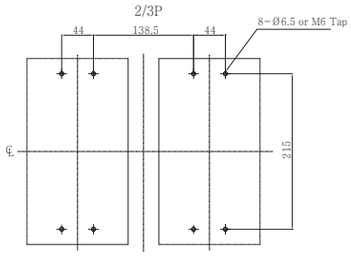


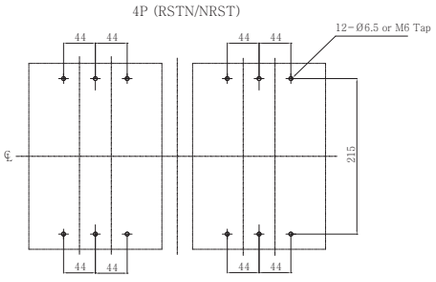
Mechanical Interlock HIM 400



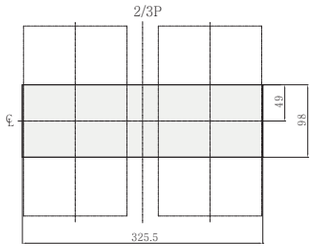


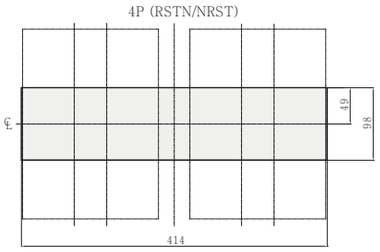
Dimensions for Mounting Body





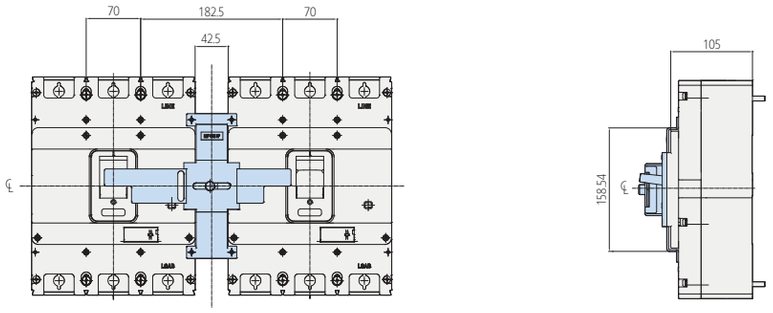
Panel Cover Cutting Dimension



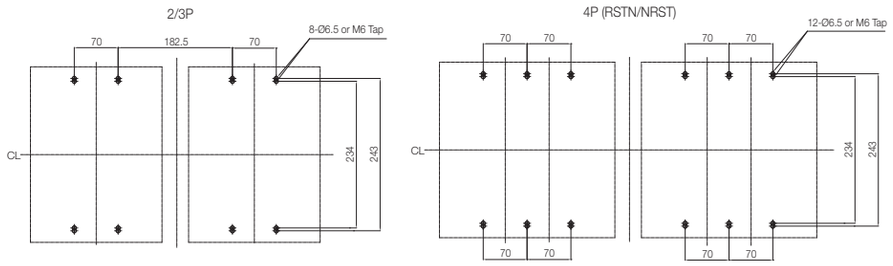


Mechanical Interlock HIM 800

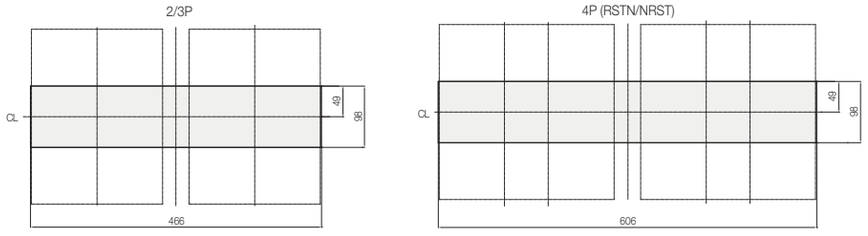
Dimension (in mm)



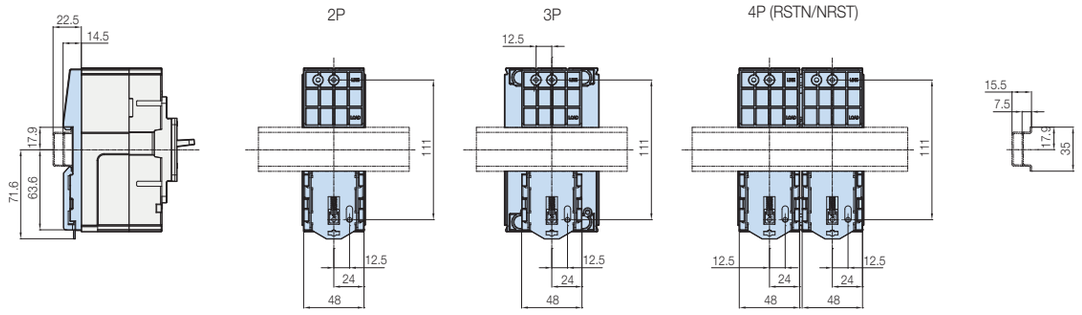
Dimensions for Mounting Body



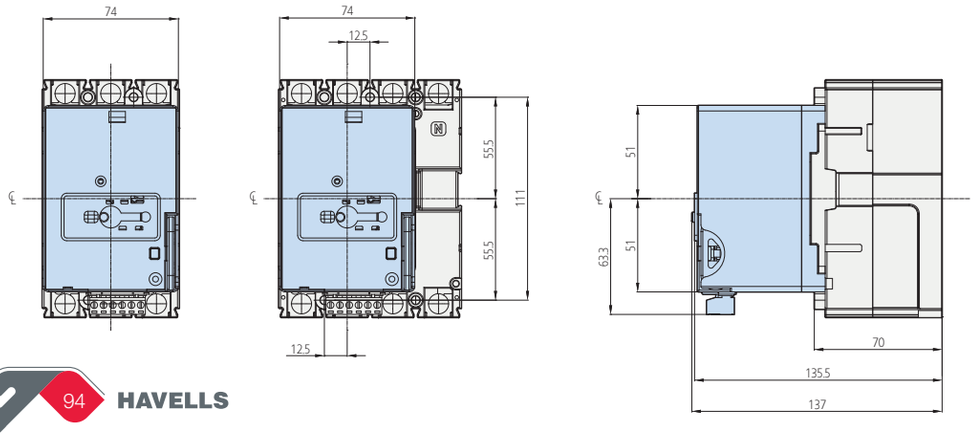
Panel Cover Cutting Dimension



DIN Rail Adaptor - DIN Rail Mounting Hole



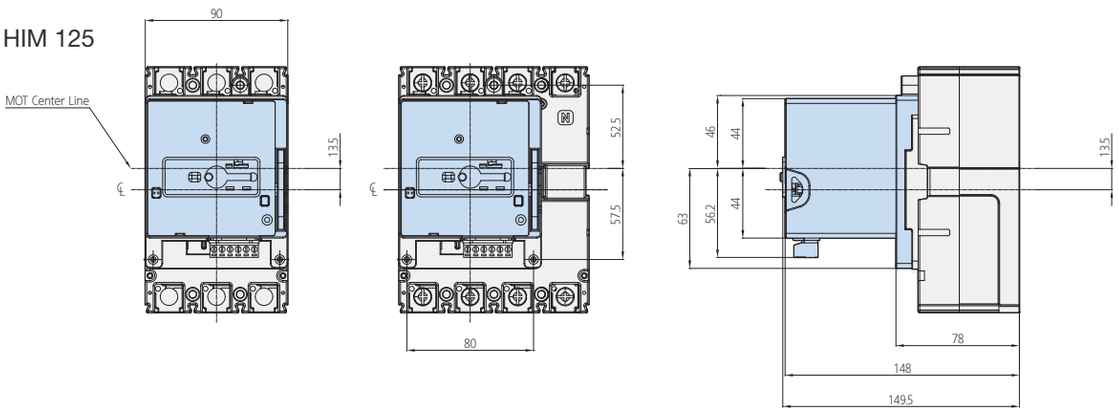
Motor Operator HIM 100



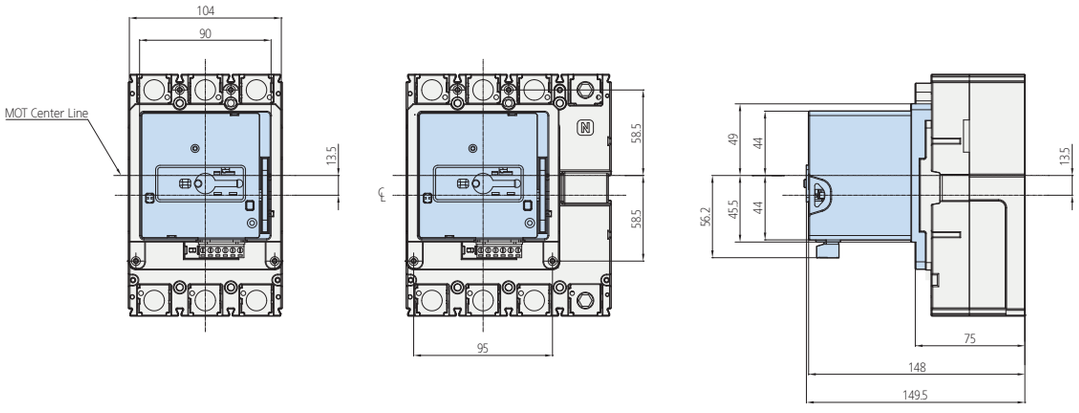
HIM series

Dimension (in mm)

HIM 125

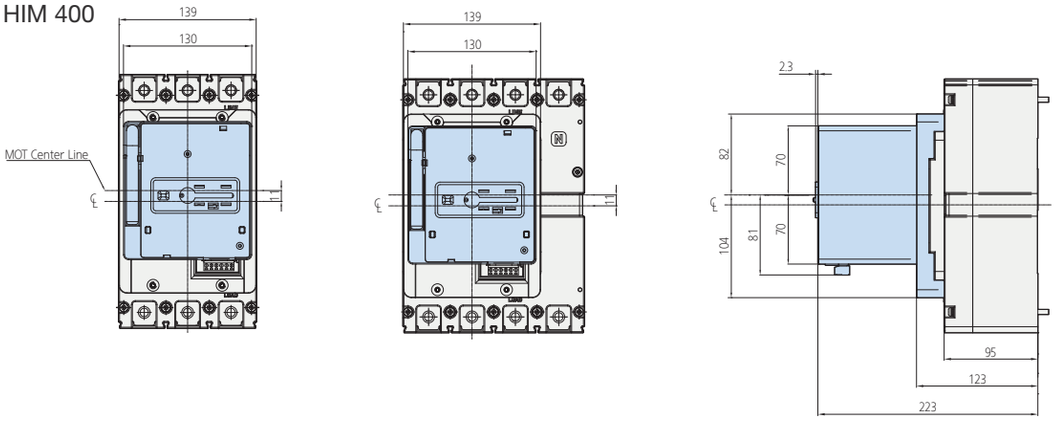


HIM 160, 250

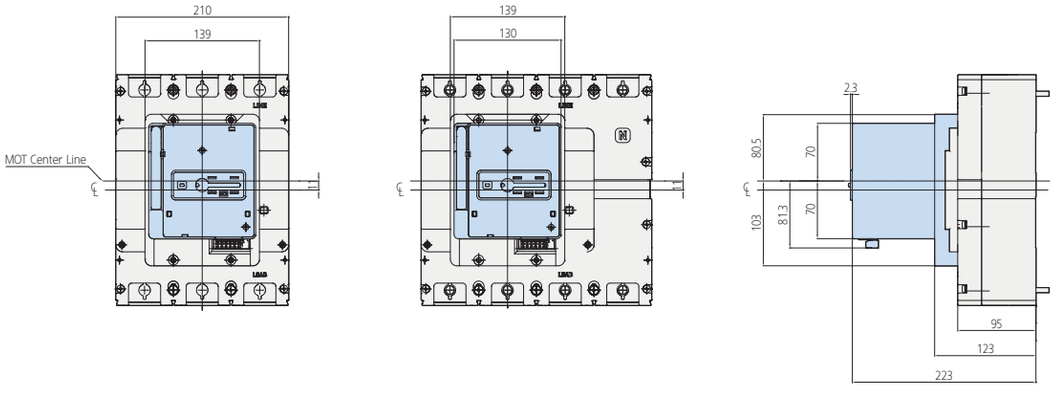


Motor Operator

HIM 400



HIM 630, 800



Certifications

Molded Case Circuit Breakers (MCCB)

Type		Approvals			CB Certificates
Cerficate		Safety Certi	KS	IEC (CE)	DEKRA
Mark					
Country		KOREA	KOREA	EUROPE	NETHERLANDS
HIM100	E	•	•	•	•
	S	•	•	•	•
HIM125	S	•	•	•	•
	H	•	•	•	•
	L	•	•	•	•
HIM250	S	•	•	•	•
	H	•	•	•	•
	L	•	•	•	•
HIM400	E	•	•	•	•
	S	•	•	•	•
	H	•	•	•	•
HIM630	E		•	•	•
	S		•	•	•
	H		•	•	•
HIM800	S		•	•	•
	H		•	•	•

Marine Certifications

Type		Approvals							
Cerficate		KR	LR	BV	ABS	DNV•GL	RS	RINA	ClassNK
Mark									
National Certification		KOREA	U.K	FRANCE	U.S.A	GERMANY	RUSSIA	ITALY	JAPAN
HIM100	E	•	•	•	•	•	•	•	•
	S	•	•	•	•	•	•	•	•
HIM125	S	•	•	•	•	•	•	•	•
	H	•	•	•	•	•	•	•	•
	L	•	•	•	•	•	•	•	•
HIM250	S	•	•	•	•	•	•	•	•
	H	•	•	•	•	•	•	•	•
	L	•	•	•	•	•	•	•	•
HIM400	E	•	•	•	•	•	•	•	•
	S	•	•	•	•	•	•	•	•
	H	•	•	•	•	•	•	•	•
HIM630	E	•	•	•	•	•	•	•	•
	S	•	•	•	•	•	•	•	•
	H	•	•	•	•	•	•	•	•
HIM800	S	•	•	•	•	•	•	•	•
	H	•	•	•	•	•	•	•	•

MCCB

Moulded Case Circuit Breakers

Features:

- Wide range : 16 A to 1600 A (AC)
- Compact dimensions
- Adjustable thermal setting (70-100%) I_n.
- Adjustable magnetic setting (5-10 times / 4-10 times) I_n.
- In 4P wSN version, neutral makes first and breaks last
- Uniform front escutcheon plate
- Positive dolly position indication
- Wide range of accessories

Range :

16 A to 1600 A in single pole, double pole, three pole and four pole with switched neutral execution.

Specification :

Conforms to IS / IEC: 60947-2

Technical Information

G-Frame

Standard conformity	:	IEC 60947-2 / IS:13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Thermal Magnetic
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Ambient Temperature	:	40 °C (50 °C on request)
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	6 kV (1P) 8 kV (3P/4P)

Frame	SI Unit	GS		GN		GH	
No. of Poles		1P	3P / 4P wSN	1P	3P / 4P wSN	1P	3P / 4P wSN
Standard current range / rating (In)	A	16-160*	16-160*	16-160*	16-160*	16-160*	16-160*
Thermal release setting		Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Magnetic release setting for current rating :							
16 A - 32 A	A	800	800	800	800	800	800
40 A - 50 A	A	800	800	800	800	800	800
63 A - 80 A	A	800	800	800	800	800	800
100 A - 160 A	A	1000	1000	1000	1000	1000	1000
Rated short circuit making capacity							
(Peak) I cm at 415 Vac	kA	17†	17	32†	32	52.5†	52.5
Rated ultimate short circuit breaking							
capacity (Icu), kA	240 V	10	16	16	25	25	40
(at different voltages)	415 V	-	10	-	16	-	25
	440 V	-	10	-	14	-	16
	500 V	-	7.5	-	10	-	12
Ics = % Icu		100%	100%	75%	75%	50%	50%
Weight SP	kg	0.35		0.35		0.35	
TP	kg	-	0.93	-	0.93	-	0.93
4P wSN	kg	-	1.2	-	1.2	-	1.2
Terminal capacity (cable)	mm^2	70	70	70	70	70	70
Bus bar (width)	mm	10	10	10	10	10	10
Recommended Torque	Nm	2.5	2.5	2.5	2.5	2.5	2.5
Internal Accessories							
Trip Alarm Contact (Factory fitted)		-	•	-	•	-	•
Auxiliary Switch (1 C/O or 2C/O)		-	•	-	•	-	•
Shunt Trip		-	•	-	•	-	•
Under Voltage Release		-	•	-	•	-	•
External Accessories							
Earth Fault Relay		-	•	-	•	-	•
Rotary Handle - Direct, Extended		-	•	-	•	-	•
Extended Terminals (above 63 A)		+	+	+	+	+	+
Dolly Extension		-	-	-	-	-	-
Phase Barriers		+	+	+	+	+	+
Terminal Shrouds		-	•	-	•	-	•
Dolly pad locking Device		-	•	-	•	-	•

* Current Ratings - 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 150 A, 160 A

• Available, - Not Available, + Supplied alongwith the MCCB as standard.

Δ Available in single pole

† At 240 V

1P - Single Pole

3P - Three Pole

4P wSN - Four Pole with Switched Neutral

Technical Information

AA-Frame (TAMF)

Standard conformity	:	IEC 60947-2 / IS:13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Thermal Magnetic
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Ambient Temperature	:	40 °C (50 °C on request)
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	6 kV (1P) 8 kV (3P/4P)

Frame	SI Unit	AAS		AAN	
No. of Poles		1P	3P / 4P wSN	1P	3P / 4P wSN
Standard current range / ratings (In)	A	25-125	160-250	25-125	160-250
Thermal release setting (Adjustable)		70-100% of In		70-100% of In	
Magnetic release setting for current rating :					
25 A - 63 A		400 A	400 A	400 A	400 A
80 A - 125 A		800 A	800 A	800 A	800 A
160 A - 250 A		1600 A	1600 A	1600 A	1600 A
50 A -125 A AM Frame		-	-	-	-
160 A -250 A AM Frame		-	-	-	-
Rated short circuit making capacity (Peak) I cm	kA	52.5†	32	52.5†	52.5
Rated ultimate short circuit breaking					
capacity (Icu), kA	240 V	16	25	25	40
(at different voltages)	415 V	-	16	-	25
	440 V	-	16	-	25
	500 V	-	12	-	18
Ics = % Icu	%	100%	100%	75%	75%
Weight SP (Single Pole)	kg	0.7	-	0.7	-
TP (Triple Pole)	kg	-	1.8	-	1.8
FPwSN (Four Pole Switched Neutral)	kg	-	2.4	-	2.4
Terminal capacity (Cable)	mm^2	70 (upto 100 A) / 150 (125 A - 250 A)		70 (upto 100 A) / 150 (125 A - 250 A)	
(Bus bar width)	mm	25 (125 A - 250 A)		25 (125 A - 250 A)	
Recommended Torque	Nm	10	10	10	10
Internal Accessories					
Auxiliary Switch (1 C/O or 2C/O)		-	•	-	•
Shunt Trip		-	•	-	•
Under Voltage Release		-	•	-	•
Trip Alarm Contact (1 C/O) (Factory Fitted)		-	•	-	•
External Accessories					
Earth Fault Relay		-	•	-	•
Rotary Handle - Direct, Extended		-	•	-	•
Extended Terminals (80 A & Above)		+	+	+	+
Dolly Extension		-	-	-	-
Phase Barriers		+	+	+	+
Terminal Shrouds		•	•	•	•
Dolly pad locking Device		•	•	•	•

* Current Ratings - 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A

• Available, - Not Available, + Supplied alongwith the MCCB above 63 A

† At 240 V

1P - Single Pole

3P - Three Pole

4P wSN - Four Pole with Switched Neutral

Technical Information

A Frame (TAMA) MCCB

Standard conformity	:	IEC 60947-2 / IS:13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Thermal Magnetic
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Ambient Temperature	:	40 °C (50 °C on request)
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	8 kV

Frame	SI Unit	AS		AN	
No. of Poles		3P / 4P wSN	3P / 4P wSN	3P / 4P wSN	3P / 4P wSN
Current range, (I_n) at 40°C	A	80-125*	160-250	80-125	160-250*
Rated operational voltage	V	415	415	415	415
Rated insulation voltage	V	750	750	750	750
Rated frequency	Hz	50	50	50	50
Thermal release setting (Adjustable)		70-100% of I_n	70-100% of I_n	70-100% of I_n	70-100% of I_n
Magnetic release setting (Adjustable)		560 A - 800 A	1120 A - 1600 A	560 A - 800 A	1120 A - 1600 A
Rated ultimate short circuit breaking capacity (Icu)	kA	25	16	35	25
Ics = % Icu		75%	100%	75%	75%
Accessories					
Auxiliary Switch (1 C/O or 2C/O)		•	•	•	•
Shunt Trip		•	•	•	•
Under Voltage Release		•	•	•	•
Trip Alarm Contact (1 C/O) (Factory fitted)		•	•	•	•
Earth Fault Relay		•	•	•	•
Rotary Handle - Direct, Extended		•	•	•	•
Dolly pad locking Device		•	•	•	•

Note: Phase barriers & extended terminals supplied with MCCB as standard, • Available

Havells new **A frame MCCBs with adjustable thermal and magnetic release** are designed and manuafactured to world class standard in accordance to IS / IEC 60947-2 Standard. The user friendly MCCBs provide accurate and reliable protection against overload and short circuit.

Current Rating: 80 A - 250 A
Execution: 3 pole & 4 pole with switched netural
Breaking Capacity: 16 kA, 25 kA & 35 kA

- Compact size and light weight
- Adjustable thermal and magnetic release
- Precise and reliable overload and short circuit protection

Loadline
Moulded Case Circuit Breaker

Technical Information

F-Frame

Standard conformity	:	IEC 60947-2 / IS:13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Thermomagnetic
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Ambient Temperature	:	40 °C (55 °C on request)
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	8 kV

Frame	SI Unit	FN	FH
No. of Poles		3P / 4P wSN	3P / 4P wSN
Standard Current ratings (I_n)	A	160-250*	160-250*
Thermal release setting		Fixed	Fixed
Magnetic release setting for current rating		Fixed	Fixed
	160 A - 250 A	1600 A	1600 A
Rated short circuit making capacity (Peak) Icm kA		73.5	105
Rated ultimate short circuit breaking			
capacity (Icu), kA	240 V	50	70
(at different voltages)	380 V	35	50
	415 V	35	50
	500 V	25	35
Ics = % Icu	%	100	75
Weight TP (Triple Pole) / FPwSN	kg	2.9 / 3.8	2.9 / 3.8
Terminal Type		M8	M8
Terminal capacity (Cable) (Bus bar width)	mm^2 mm	185 18	185 18
Internal Accessories			
Auxiliary Switch (1 C/O or 2C/O)		•	•
Shunt Trip		•	•
Under Voltage Release		•	•
Trip Alarm contact (1 C/O) (Factory fitted)		•	•
External Accessories			
Earth Fault Relay		•	•
Rotary Handle - Extended		•	•
Extended Terminals (80 A & Above)		+	+
Dolly Extension		-	-
Phase Barriers		+	+
Terminal Shrouds (only in 3P MCCB)		•	•
Dolly pad locking Device		•	•

* Current Ratings - 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A

• Available, - Not Available, + Supplied alongwith the MCCB above 63A.

\# Factory Fitted

3P - Three Pole

4P wSN - Four Pole with Switched Neutral

Technical Information

L-Frame

Ref. Standard	:	IS / IEC 60947-2
Rated operational Voltage	:	415 Vac
Rated insulation Voltage	:	750 Vac
Rated impulse Voltage	:	8 kV
Type of Release	:	Thermal Magnetic
Utilisation category	:	A
Rated frequency	:	50 Hz / 60 Hz
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Suitability of Isolation	:	Yes

Frame	SI Unit	LS	LN
No. of Poles		3P / 4P wSN	3P / 4P wSN
Standard Current Ratings (In)	A	200, 250, 320, 400, 500, 630	200, 250, 320, 400, 500, 630
Thermal release setting (Adjustable)		80-100% In	80-100% In
Magnetic release setting (Fixed)			
250 A - 400 A		4000 A	4000 A
500 A - 630 A		6300 A	6300 A
Magnetic release setting (Adjustable)			
250 A - 400 A		2000 A - 4000 A	2000 A - 4000 A
500 A - 630 A		2500 A - 6300 A	2500 A - 6300 A
Rated S.C. Making Capacity at 415 V (Icm)	kA	75.6	105
Rated Ultimate S.C breaking capacity (Icu) at 240 V	kA	50	65
415 V	kA	36	50
500 V	kA	25	35
Rated Service S.C Breaking Capacity at 415 V, Ics = % Icu	%	100	75
Weight			
Three Pole (3P)	kg	5.6	5.6
Four Pole with Switched Neutral (4P wSN)	kg	7	7
Terminal capacity (Max.)	mm^2	1 x 240 (250 A-400 A)	1 x 240 (250 A-400 A)
		2 x 185 (500 A-630 A)	2 x 185 (500 A-630 A)
Bus bar width	mm	30	30
Overall dimension			
Three Pole (3P) (W x H x D)	mm	140 x 254 x 110	140 x 254 x 110
Four Pole with Switched Neutral (4P wSN) (W x H x D)	mm	186 x 254 x 110	186 x 254 x 110
Internal Accessories #			
Auxillary Switch (1C/O or 2C/O)		•	•
Shunt Trip (bulit-in auxillary switch)		•	•
Under Voltage Release		•	•
Trip Alarm Contact (Factory fitted)		•	•
External Accessories			
Rotary Handle - Extended		•	•
Extended Terminals		•	•
Terminal Shroud		•	•
Phase Barriers		•	•
Dolly pad locking device		•	•
Earth Fault Relay		•	•

• Available

Only 2 accessories at a time can be fitted in the MCCB

3P - Three Pole

4P wSN - Four Pole with Switched Neutral

3P - Three Pole

Technical Information

CN / CH - Frame

Standard conformity	:	IEC 60947-2 / IS:13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Thermomagnetic
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Ambient Temperature	:	40 °C (55 °C on request)
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	8 kV

Frame	SI Unit	CN	CH
No. of Poles		3P/4P wSN	3P/4P wSN
Standard current ratings (In)	A	800*	800*
Thermal release setting (Adjustable)		70-100% of In	70-100% of In
Magnetic release setting		Adjustable	Adjustable
400 A - 800 A CN / CH Frame		4 - 10 times In	4 - 10 times In
Rated short circuit making capacity (Peak) Icm	kA	73.5	105
Rated ultimate short circuit breaking			
capacity(Icu), kA	240 V	50	70
(at different voltages)	380 V	35	50
	415 V	35	50
	500 V	25	35
Ics = % Icu		75%	50%
Weight TP (Triple Pole)	kg	9.2	9.2
FP wSN (Four Pole with Switched Neutral)	kg	11.6	11.6
Terminal capacity (Cable)	mm^2	-	-
(Busbar width)	mm	40	40
Internal Accessories			
Auxiliary Switch (1 C/O or 2 C/O)		•	•
Shunt Trip		•	•
Under Voltage Release		•	•
Trip Alarm Contact (1 C/O) # Factory Filled		•	•
External Accessories			
Earth Fault Relay		•	•
Rotary Handle - Extended		•	•
Extended Terminals		+	•
Dolly Extension		•	•
Phase Barriers		+	-
Terminal Shrouds		-	-
Dolly pad locking Device		•	•

* Current Ratings - 160 A, 200 A, 250 A, 315 A, 400 A, 500 A, 630 A, 800 A, 1000 A, 1250 A, 1600 A.
• Available, - Not Available, + Supplied alongwith the MCCB as standard.
** Terminals at Front
# Terminals at back / rear

3P - Three Pole
4P wSN - Four Pole with Switched Neutral

Technical Information (DC MCCBs)

GN / AN / CH - Frame

DC MCCBs

Standard conformity : IEC 60947-2 / IS:13947-2
Rated operational voltage : 250 Vdc
Rated Insulation Voltage : 690 Vdc
Type of release : Thermomagnetic
Utilisation Category : A
Ambient Temperature : 40 °C
Operating altitude : 2000 m
Humidity : 0-90%

Frame	SI Unit	GN	AAN	CH
No. of Poles		3P / 4P wSN	3P / 4P wSN	3P / 4P wSN
Standard current ratings In	A	25-125*	160-250*	800*
Thermal release setting		Fixed	Adjustable	Adjustable
			(70-100% of In)	(70-100% of In)
Magnetic release setting for current rating :				
25 - 50 A GN Frame		800 A	-	-
63 - 80 A GN Frame		800 A	-	-
100 - 125 A GN Frame		1000 A	-	-
160 - 200 A AN Frame		-	1600 A	-
160 - 315 A CH Frame		-	-	5 - 10 times In
400 - 800 A CH Frame		-	-	4 - 10 times In
Rated ultimate short circuit	kA	5	10	20
breaking capacity (Icu), at 250 Vdc				
Ics = % Icu		75%	75%	50%
Weight	kg	0.93	1.8	9.2
Terminal capacity (Cable)	mm^2	70	70 (upto 100 A) / 150 (125 A - 250 A)	-
(Busbar width)	mm	10	25	40
Recommended Torque	Nm	2.5	10	-
Internal Accessories				
Auxiliary Switch (1 C/O or 2 C/O)		•	•	•
Shunt Trip		•	•	•
External Accessories				
Earth Fault Relay		•	•	•
Rotary Handle		•	•	•
Back Studs		-	•	•
Extended Terminals		+	+	+
Dolly Extension		-	-	+
Phase Barriers		+	+	+
Terminal Shrouds		•	•	-
Dolly pad locking Device		•	•	•

* Current Ratings - 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A, 315 A, 400 A, 500 A, 630 A, 800 A, 1000 A, 1250 A, 1600 A.
• Available, - Not Available, + Supplied alongwith the MCCB as standard. ** Terminals at Front, # Terminals at Rear.

Loadline DC MCCBs

DC MCCBs are available in three pole version from 25 A-1600 A with breaking capacity of 5 kA, 10 kA & 20 kA. The selection of the circuit breaker for DC applications depends on these criteria :-

• Rated current of the equipment. • Rated voltage, which determines the number of poles in series for breaking. For voltages upto 250 Vdc, two poles of the breaker are connected in series to form the positive pole and the third pole to be used as a negative pole or three poles can be used in series. • The maximum short-circuit current at the point of installation, which determines the breaking capacity. • The (L/R) ratio for the application should be $\leq$ 15 ms • In D Frame Rear Terminals are available in place of Back Studs

Accessories for Loadline Moulded Case Circuit Breakers

Loadline
Moulded Case Circuit Breaker

Description	'G' / 'ML' Frame	'A' Frame	'L' Frame	'F' Frame	'C' Frame
Shunt Trip					
100 Vac - 110 Vac	●	●	●	●	●
220 Vac - 240 Vac	●	●	●	●	●
380 Vac - 415 Vac	●	●	●	●	●
Under Voltage Release					
110 Vac - 120 Vac	●	●	●	●	●
220 Vac - 240Vac	●	●	●	●	●
380 Vac - 440 Vac	●	●	●	●	●
Auxiliary Contact (250Vac/250Vdc) (450Vac/250Vdc)					
1-Changeover	●	●	●	●	●
2-Changeover	●	●	●	●	●
Rotary Handle					
Direct mounting	●	●			
Door Mounting	●	●	●	●	●
Trip Alarm Contact (Factory Fitted)	●	●	●	●	●

Note : Following additional accessories are available on request :
- Terminal Shrouds for G, A, F frame
- Dolly Pad Lock for G, A, F, C & L frame
- Factory fitted Castell Lock available in C and D frame

$ - Back Studs (Price on Request)
* - Factory Fitted only
# - Replace '#' with rating

Earth Fault Relay for MCCBs

Sl. No.	MCCBs Current Range (A)	Per Unit LP (₹)
1	25 A- 100 A	●
2	125 A- 200 A	●
3	250 A- 400 A	●
4	500 A- 800 A	●

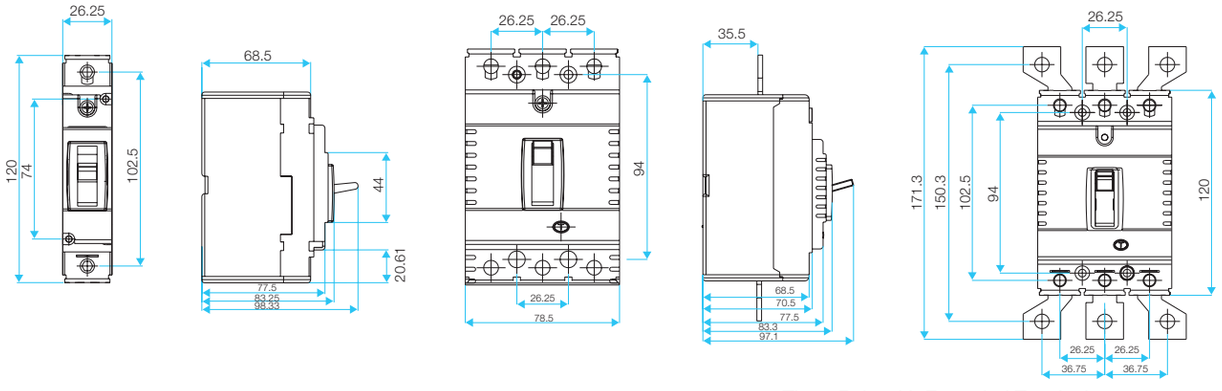
- The above prices are inclusive of CBCT.

** For operating the Earth Fault Relay a Shunt trip or an UVR has to be used.

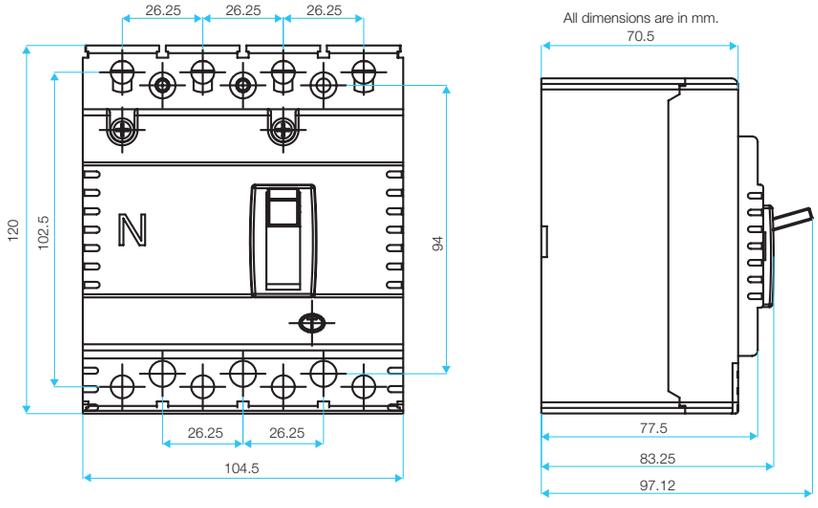
Note : *For operating Shunt Trip for G Frame, a separate auxiliary switch would be required in which case one c/o. will be used with the shunt trip, leaving one c/o. free for use. Door mounting clamps for G & AA Frame are supplied free of cost on request basis.

G Frame

Dimension (in mm)

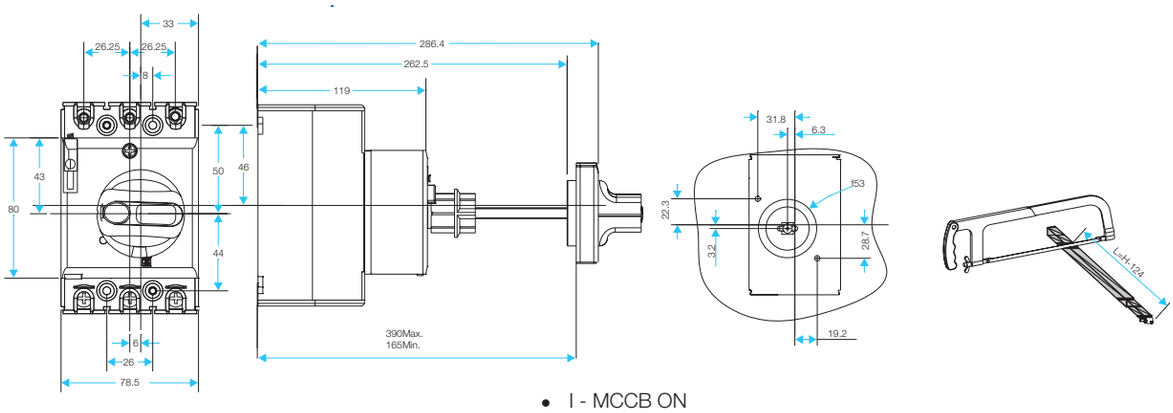


Single Pole | Three Pole | Three Pole with Extended Terminals



Four Pole with Switched Neutral

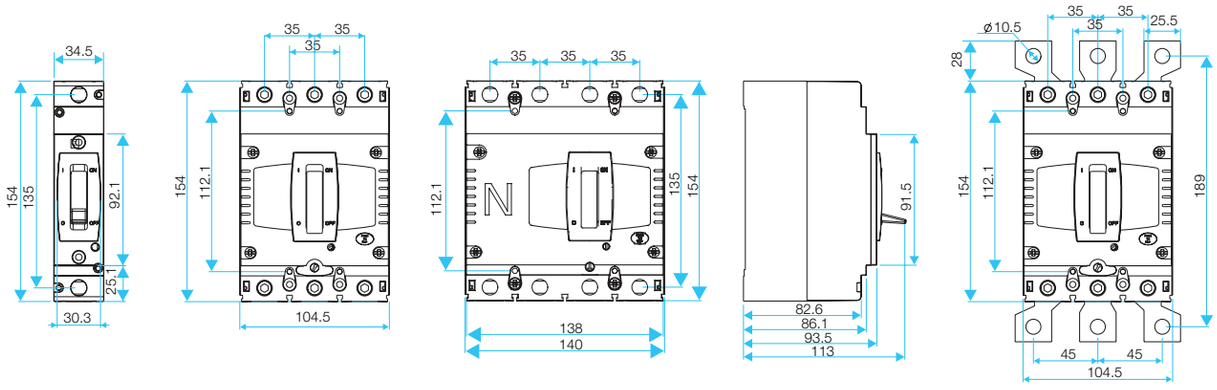
Handle Fixing Details - 'G' Frame



- I - MCCB ON
- O - MCCB OFF
- Trip - (In between I and O positions)MCCB tripped by release or push to trip
- To re-close the MCCB move the handle towards position 'RESET' first till MCCB resets and then switch to position - 'I'.

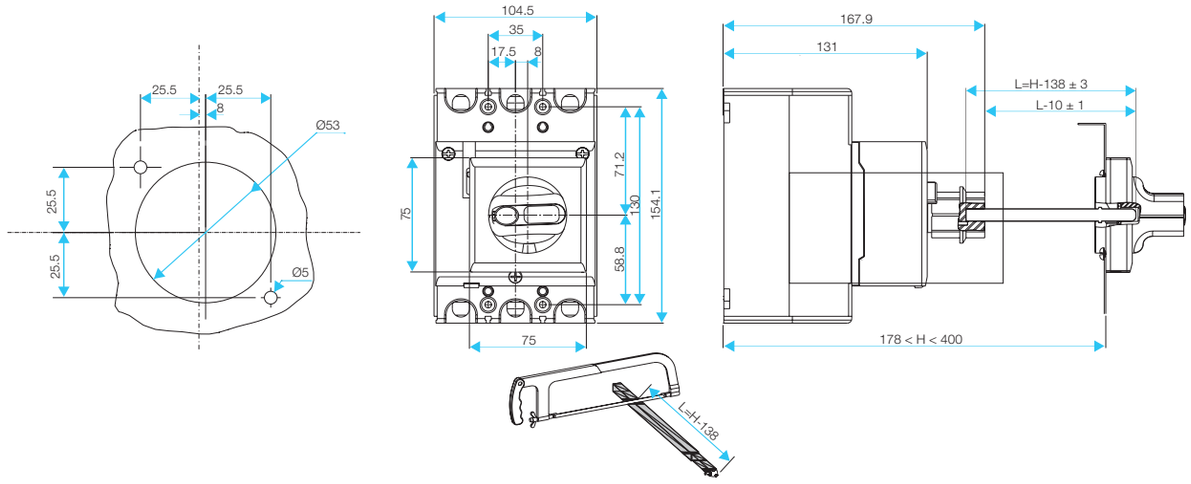
AA Frame

Dimension (in mm)



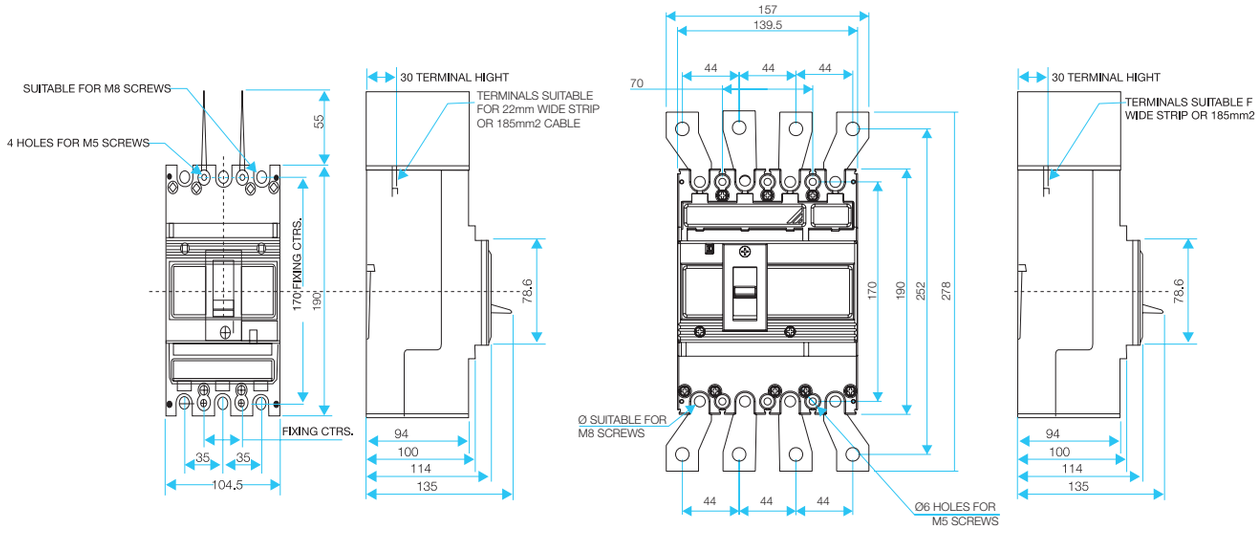
Single Pole | Three Pole | Four Pole with Switched Neutral | Three Pole with Extended Terminals

Handle Fixing Details - 'A' Frame



F Frame

Dimension (in mm)



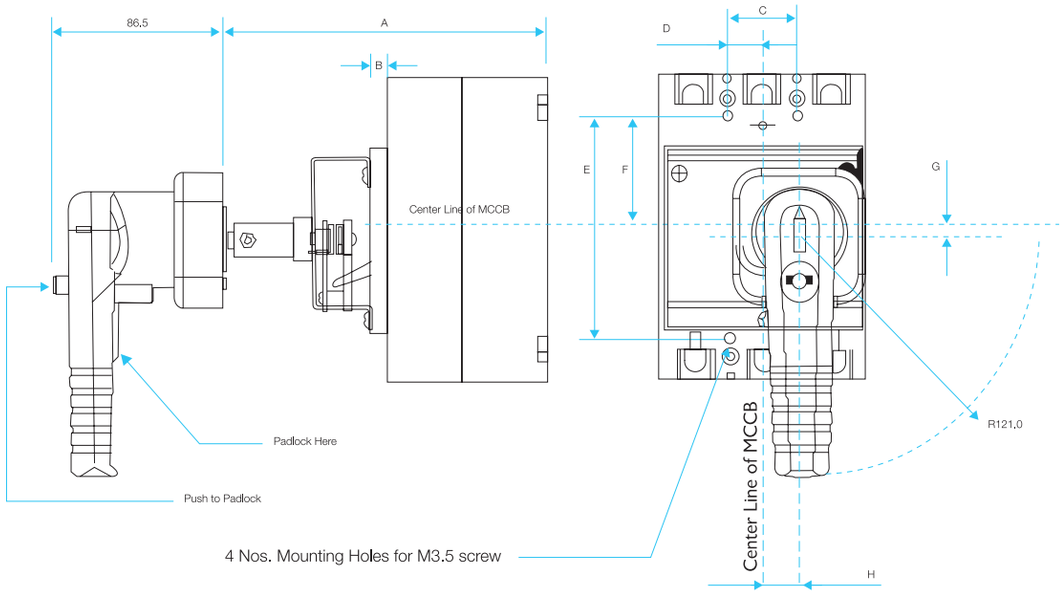
Three Pole

Four Pole with Switch Neutral

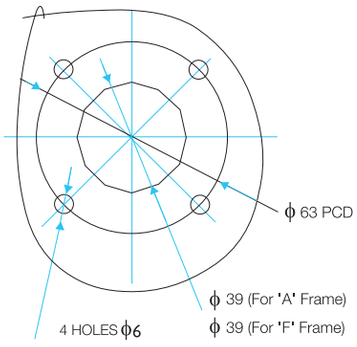
Rotary Handle

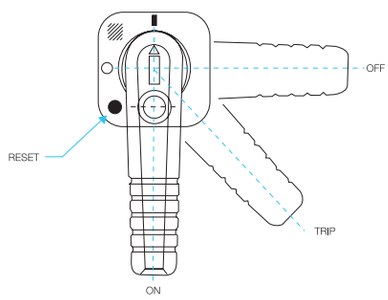
Dimension (in mm)

Handle Fixin Details - 'F' Frame



S. No.	Frame	A	B	C	D	E	F	G	H
1	F	190.0	4.25	35.0	17.5	170.0	85.0	3.75	15.0



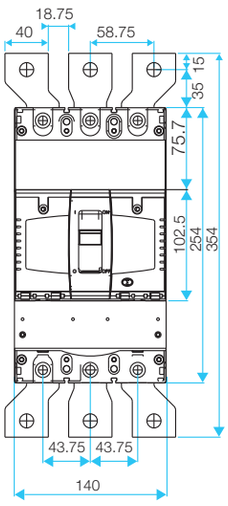


- I - MCCB ON
- O - MCCB OFF
- Trip - (In between I and O positions)MCCB tripped by release or push to trip
- To re-close the MCCB move the handle towards position 'RESET' first till MCCB resets and then switch to position - 'I'.

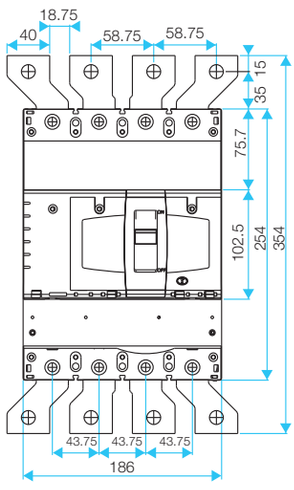
LS / LN Frame Accessories

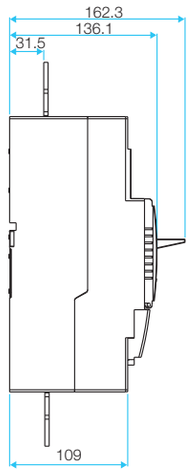
Dimension (in mm)

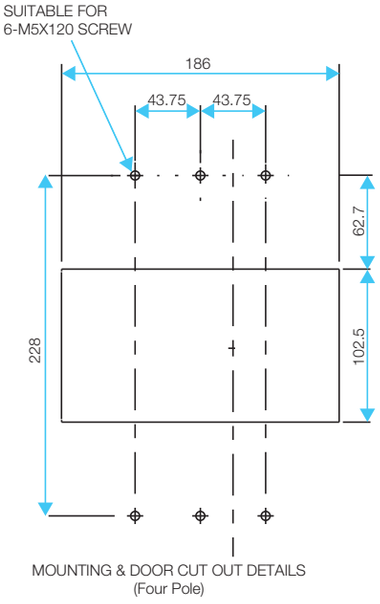
Three Pole



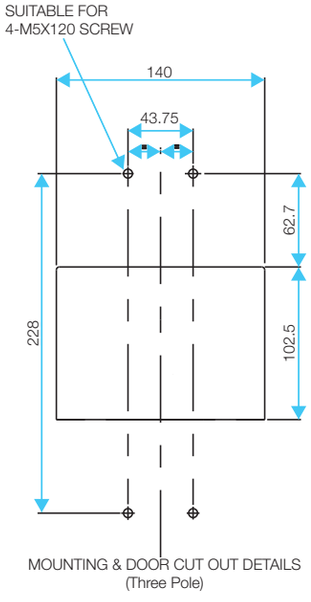
Four Pole







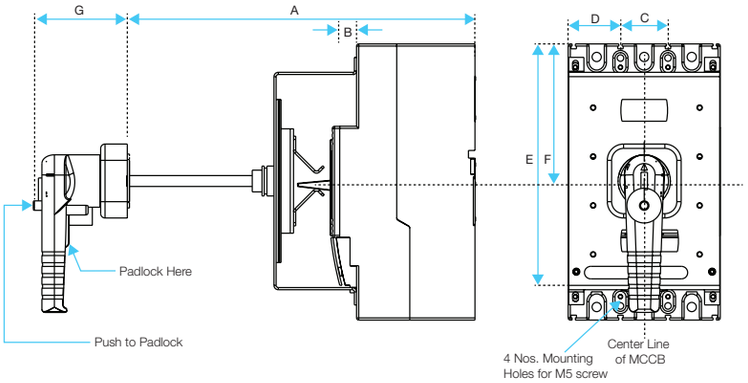
MOUNTING & DOOR CUT OUT DETAILS
(Four Pole)



MOUNTING & DOOR CUT OUT DETAILS
(Three Pole)

Dimension (in mm)

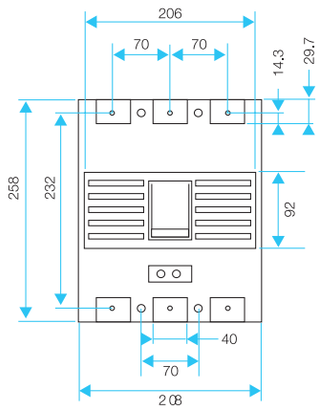
Rotary Handle



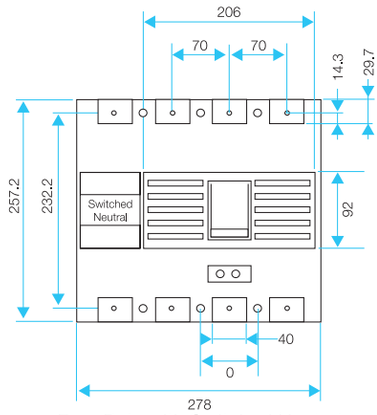
Frame	A	B	C	D	E	F	G
L	415.0	6.8	43.75	21.87	211.0	104.5	86.5

CN/CH Frame MCCBs

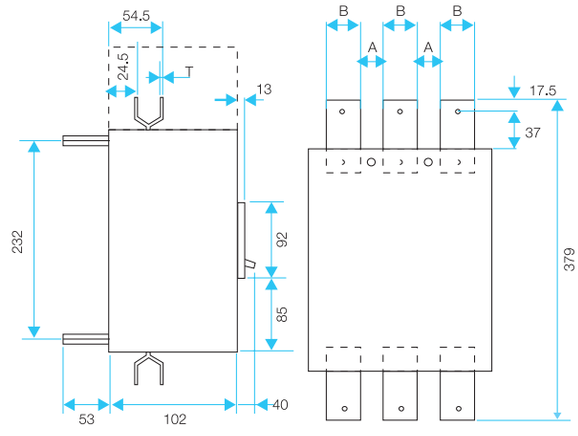
Dimension (in mm)



Three Pole



Four Pole with Switched Neutral



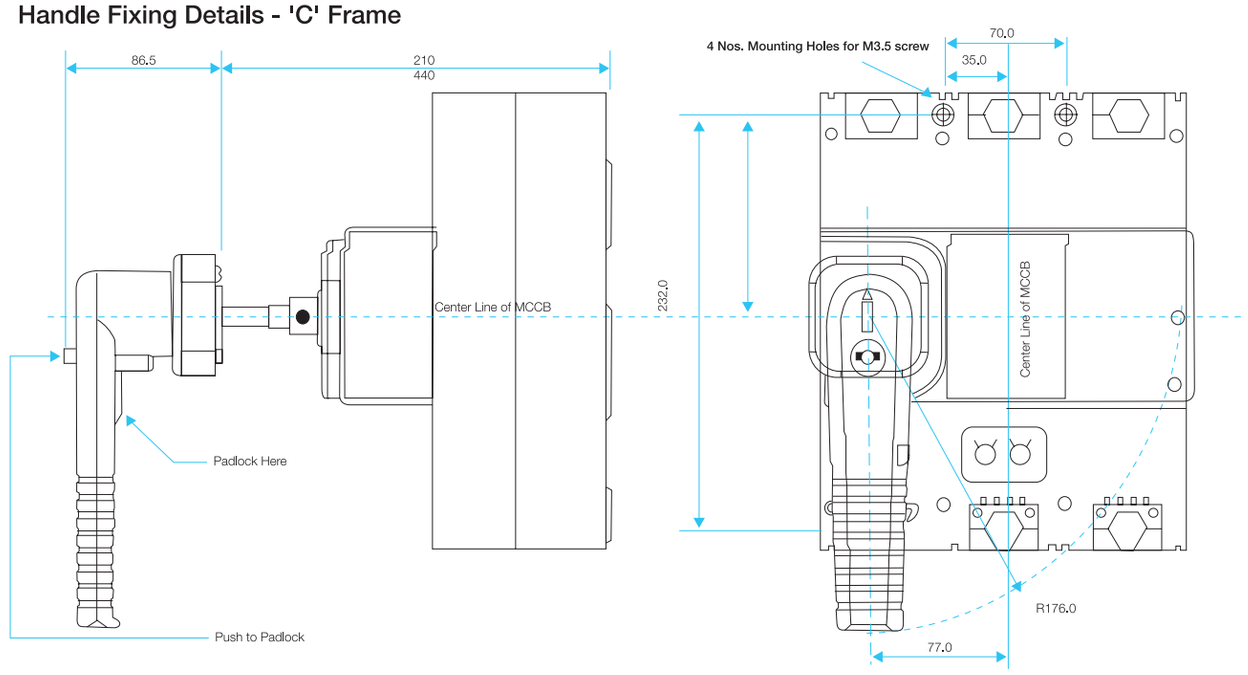
Three Pole with Extended Terminals

S. No.	Frame	A	B	T
1	16 - 250A	40	30	5
2	315 - 400A	20	50	5
3	500 - 800A	20	50	6

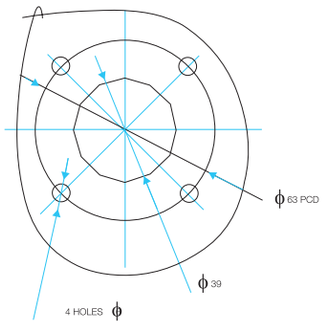
Rotary Handle

Dimension (in mm)

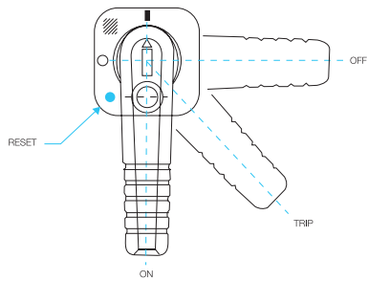
Handle Fixing Details - 'C' Frame



Door Cut-Out



Rotary Handle Position



- I - MCCB ON
- O - MCCB OFF
- Trip - (In between I and O positions) MCCB tripped by release or push to trip
- To re-close the MCCB move the handle towards position 'RESET' first till MCCB resets and then switch to position - 'I'.

MCCB

Digital Moulded Case Circuit Breakers

Features:

- True RMS sensing-accurate and close protection.
- High repeat accuracy-reliable protection.
- Flexibility through multiple adjustment option-versatility and closer protection.
- Time delay on overload and short-circuit faults-suitable for discrimination.
- Built in adjustable electronic overload sensing (40% to 110% of In).
- Built in adjustable short-circuit current sensing (600% to 1000% of Ir.)
- Built in operation-check function with Field Testing Provision.
- Accurate setting by use of DIP switches, ensuring reliable system protection/co-ordination.)

Range :

25 A to 630 A in three pole and four pole execution.

Specification :

IS / IEC : 60947-1 & 2

Technical Information

Standard conformity	:	IEC 60947-2 / IS13947-2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Microprocessor Based Electronic Release
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Operating altitude	:	2000 m
Humidity	:	0 - 90%
Rated impulse voltage	:	8 kV

Frame	SI Unit	FEN	FEH
No. of Poles		3, 4	3, 4
Standard Current ratings (In)	A	25, 40, 63, 100, 125, 160, 200, 250	
Rated ultimate short circuit breaking capacity (Icu),	kA		
	380 V	40	50
	415 V	35	50
Rated service short circuit Breaking Capacity (% of Icu)	(Ics)	100%	75%
Rated short circuit Making capacity (Peak), Icm	kA	73.5	105
Weight TP (Triple Pole)	kg	3.4	3.4
FP (Four Pole)		4	4
Terminal Type Cable		M8	M8
Terminal capacity (Cable)	mm^2	185	185
(Bus bar width)	mm	18	18
Internal Accessories #			
Auxiliary Switch	(1 C/O or 2C/O)	•	•
Shunt Trip (built-in auxilliary contact)		•	•
Under Voltage Release		•	•
Trip Alarm Contact (Factory fitted)	(1 C/O)	•	•
External Accessories			
Earth Fault Relay		•	•
Rotary Handle		•	•
Extended Terminals (above 63 A)		+	+
Phase Barriers		+	+
Terminal Shrouds		•	•
Dolly pad locking Device		•	•
Field Test Unit		•	•
Characteristics of Microprocessor Based Release			
Overload Current I1	xIn (A)	0.4-1.1 in steps of 0.1©	0.4-1.1 in steps of 0.1©
Overload Time Delay t1	s	1, 5, 10,15, 20, 25, 30, 35	1, 5, 10,15, 20, 25, 30, 35
Short Circuit Current Setting I2	xI1 (A)	6-9 in steps of 1	6-9 in steps of 1
Short Circuit Time Delay t2	ms	25, 50, 100, 200	25, 50, 100, 200
Instantaneous Pick up Threshold	xI1 (A)	10 times	10 times
Ground Fault Current Ig (4-pole only)	xI1 (A)	0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 (with function block feature)	
Ground Fault Trip Time Tg (4-pole only)	s	0.1, 0.2, 0.4, 0.6, 0.8, 1.0, 3.0, 5.0	
Field Test Switch		•	•
Auxiliary Power Module for Field Testing		•	•

• Available, + Supplied alongwith the MCCB above 63 A

only one accessory can be fitted in the MCCB

© At 1.1 time In for max. 2 hours only

Technical Information

Loadline Digital
Moulded Case Circuit Breaker

Standard conformity	:	IS/IEC 60947 – 2
Rated operational voltage	:	415 Vac
Rated Insulation Voltage	:	750 Vac
Type of release	:	Microprocessor Based Electronic Release
Utilisation Category	:	A
Rated frequency	:	50 Hz / 60 Hz
Operating altitude	:	2000 m
Humidity	:	0 - 95%
Rated impulse voltage	:	8 kV

Frame	SI Unit	LES	LEN
No. of Poles		3P / 4P wSN	
Standard Current Ratings, I_n	A	250, 320, 400, 500, 630	
Microprocessor Release	LSI	•	•
	LSIG	•	•
Rated S.C Making Capacity at 415 V Icm	kA	75.6	105
Rated Ultimate S.C Breaking Capacity (Icu), at 240 V 415 V 500 V	kA	50 36 25	65 50 35
Rated Service S.C Breaking Capacity at 415 V Ics = % Icu	%	100	75
Weight 3P	kg	7	7
4P wSN	kg	9	9
Terminal Capacity (Cable)	sq. mm	1 x 240 (upto 400 A) 2 x 185 (500 A-630 A)	1 x 240 (upto 400 A) 2 x 185 (500 A-630 A)
(Bus bar width)	mm	30	30
Overall Dimension (W x H x D) TP	mm	140 x 254 x 110	140 x 254 x 110
FP wSN	mm	186 x 254 x 110	186 x 254 x 110
Internal Accessories			
Auxiliary Switch (1 C/O or 2 C/O)		•	•
Shunt Trip		•	•
Under Voltage Release		•	•
Trip Alarm Contact (Factory fitted)		•	•
External Accessories			
Rotary Handle - Extended		•	•
Extended Terminals		•	•
Dolly Extension		•	•
Phase Barriers		•	•
Terminal Shroud		•	•
Dolly Pad Locking Device		•	•
Earth Fault Relay		•	•
Characteristics of Microprocessor Release			
Overload Current, I_r	I_n (A)	0.4 – 1.0 in steps of 0.1	
Overload Time Delay, t_r	s	3, 4, 6, 8, 10, 12, 16, 18	
Short Circuit Current Setting, I_s	I_r (A)	2, 2.5, 3, 4, 6	
Short Circuit Time Delay, t_s	s	0.05, 0.1, 0.2, 0.3, 0.4, 0.6, 0.8, 1	
Instantaneous Short Circuit Current Setting, I_i	I_n (A)	2 – 8 in steps of 2	
Pre-Trip Indication, I_p	I_r	0.6, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1	
Ground Fault Current, I_g (in 4P wSN only)	I_n (A)	0.2 – 0.8 in steps of 0.1	

• Available
LSI - Long Delay, Short Delay & Instantaneous
LSIG - Long Delay, Short Delay, Instantaneous & Ground Fault
\# only one accessory can be fitted in the MCCB

3 P - Three Pole
4 P wSN - Four Pole with Switched Neutral

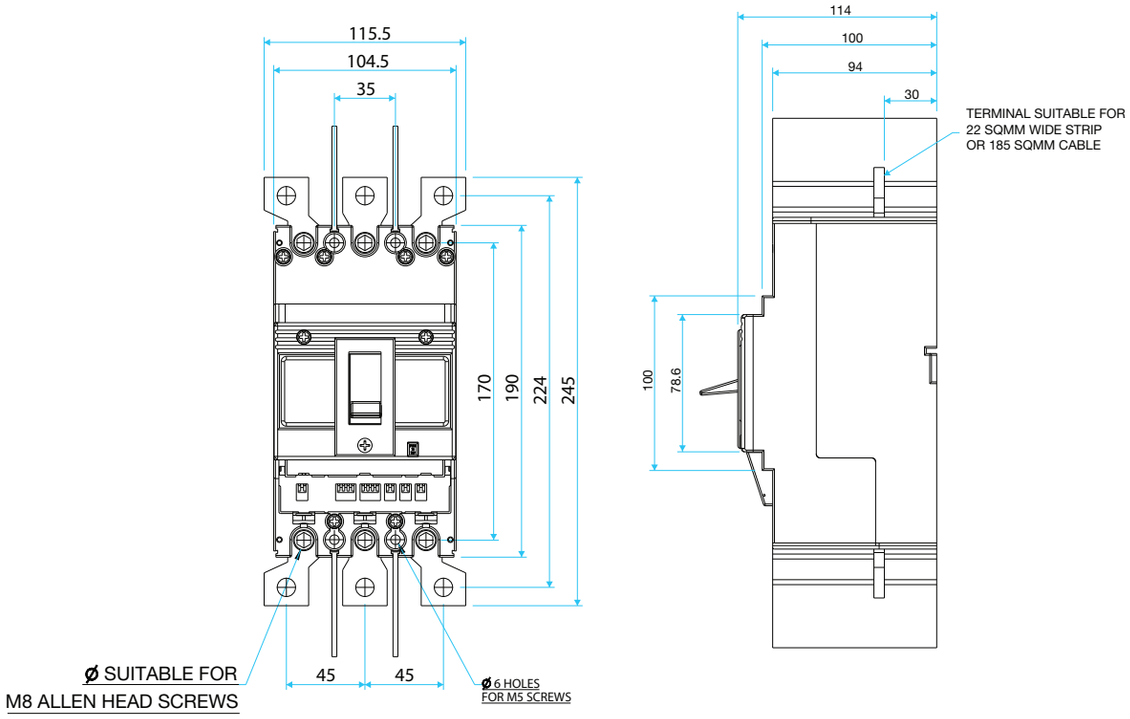
Accessories for Loadline Moulded Case Circuit Breakers

Description	'A' Frame	'L' Frame	'F' Frame
Shunt Trip			
100 Vac - 110 Vac	●	●	●
220 Vac - 240 Vac	●	●	●
380 Vac - 415 Vac	●	●	●
Under Voltage Release			
110 Vac - 120 Vac	●	●	●
220 Vac - 240Vac	●	●	●
380 Vac - 440 Vac	●	●	●

Description	'A' Frame	'L' Frame	'F' Frame
Auxiliary Contact (250Vac/250Vdc) (450Vac/250Vdc)			
1-Changeover	●	●	●
2-Changeover	●	●	●
Rotary Handle			
Direct mounting	●		
Door Mounting	●	●	●
Trip Alarm Contact (Factory Fitted)	●	●	●

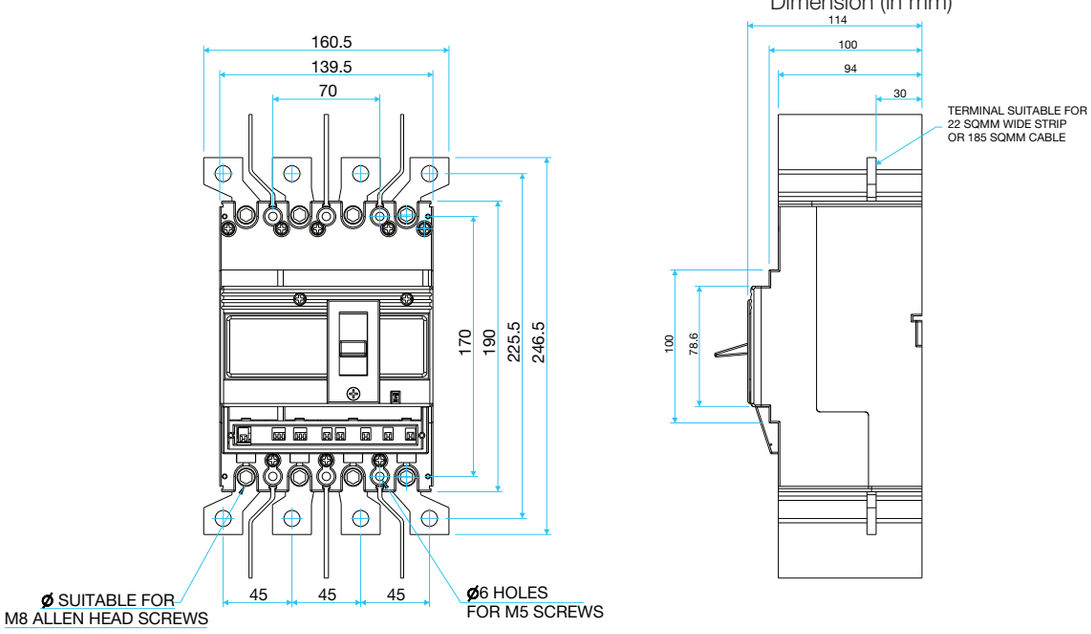
F Frame - Three Pole With Extended Terminal

Dimension (in mm)



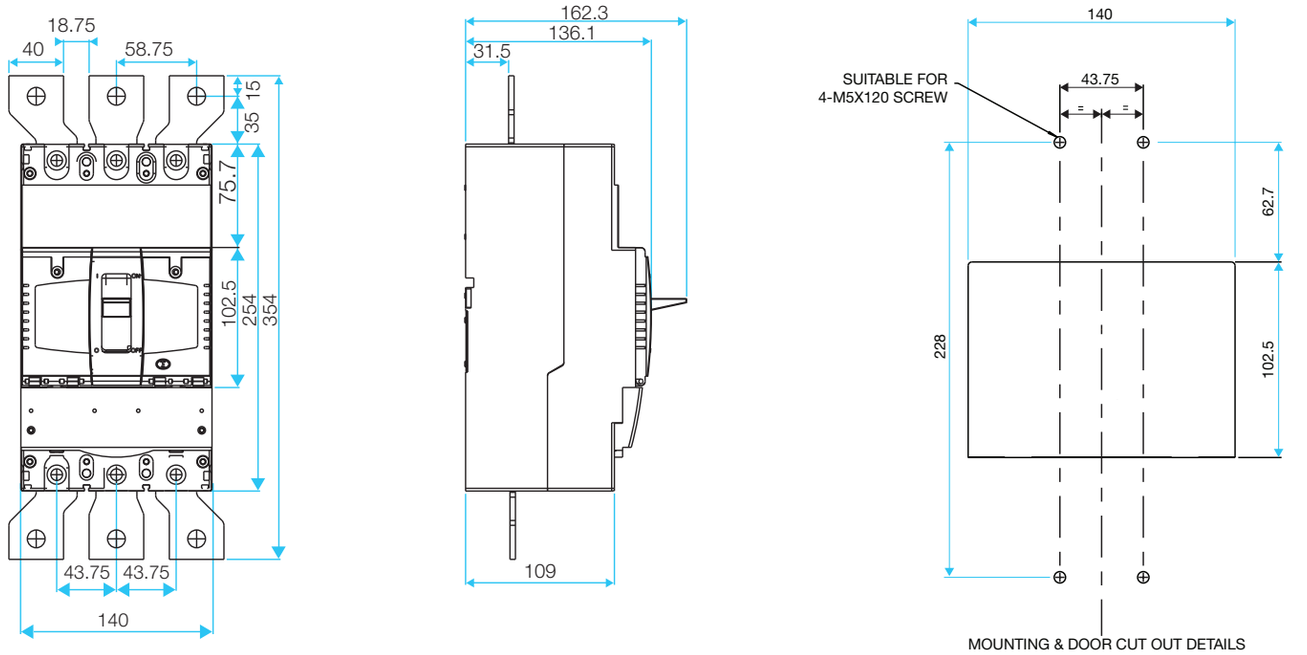
F Frame - Four Pole With Extended Terminal

Dimension (in mm)



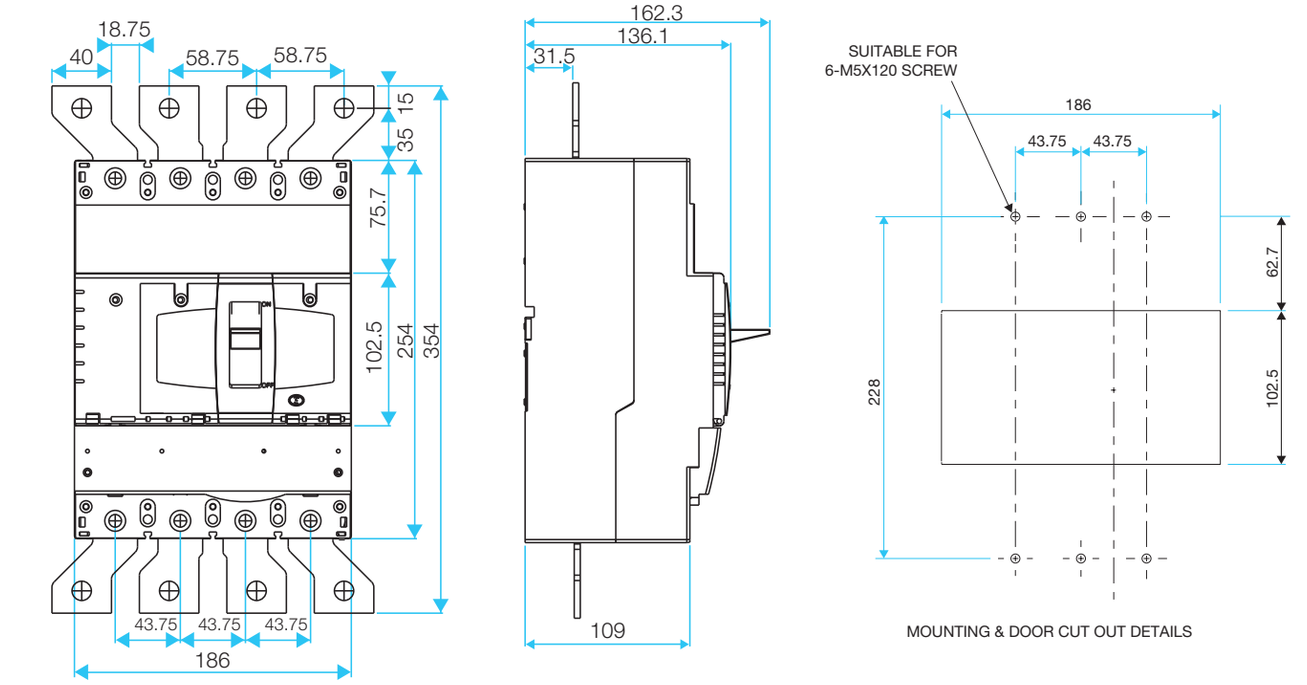
L Frame - Three Pole with extended terminals

Dimension (in mm)



L Frame - FP wSN with extended terminals

Dimension (in mm)



HID Series

Moulded Case Circuit Breakers

Range:

- Rating: 40 A to 160 A
- Execution: 1P, 2P, 3P & 4P
- Breaking Capacity: 27 kA & 36 kA
- Ics = Icu = 100%
- Thermal Adjustable (70 to 100% of I_n)

Range :

16 A to 1600 A in 7 frame sizes in single pole, double pole, three pole and four pole with switched neutral execution.

Specification :

IS / IEC : 60947-1 & 2

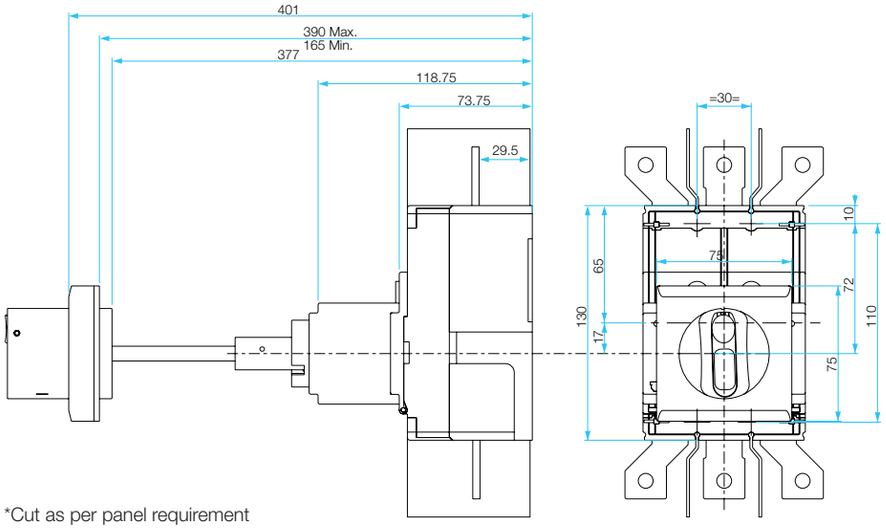
Technical Information

HID Series (Frame 1)

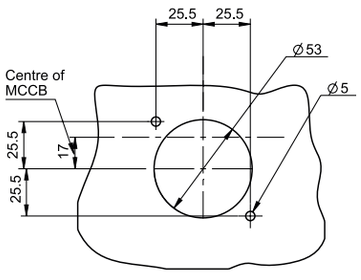
Frame	SI Unit	HID (Frame 1) - D	HID (Frame 1) - E
No. of Poles		1P / 2P / 3P / 4P	
Standard current rating (I_n)	A	40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A	
Rated operational voltage	V	415 Vac (1P @ 240 Vac)	
Rated impulse voltage	kV	8 kV	
Rated Insulation Voltage	V	800 Vac	
Rated frequency	Hz	50 Hz / 60 Hz	
Ambient temp	^{0}C	40 ^{0}C (50 ^{0}C on request)	
Utilisation Category	A / B	A	
Operating altitude	m	2000 m	
Type of release		Thermomagnetic	
Thermal release setting (Adjustable)		70-100% of I_n (in 3P & 4P only)	
Magnetic release setting (Fixed)		12 times of I_n	
Rated ultimate short circuit breaking capacity (Icu)	kA	27 kA	36 kA
Rated Service short circuit breaking capacity (Ics)	kA	27 kA	36 kA
Weight			
1P	kg	0.37 kg	
2P	kg	0.75 kg	
3P	kg	1.1 kg	
4P	kg	1.5 kg	
Dimensions (W X H X D)			
1P	mm	(37 X 130 X 73.8) mm	
2P	mm	(67 X 130 X 73.8) mm	
3P	mm	(90 X 130 X 73.8) mm	
4P	mm	(120 X 130 X 73.8) mm	

Accessories Dimensions & Mounting Details

Rotary Handle (Remote Type)



*Cut as per panel requirement

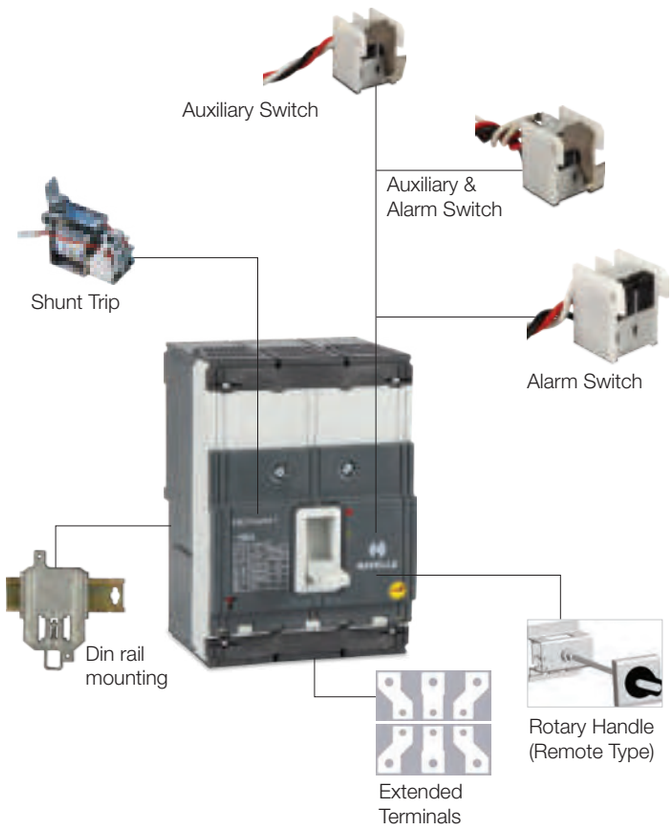


*Cut as per panel requirement

HID series

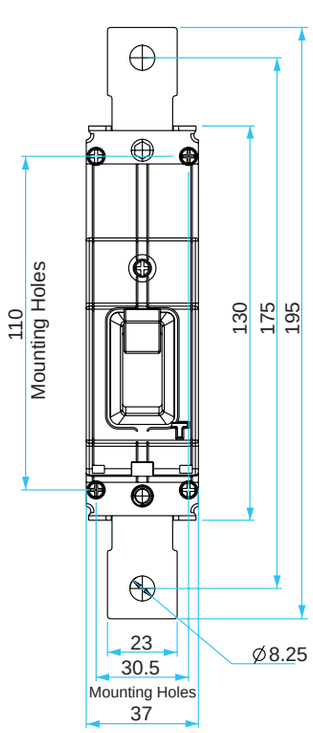
Accessories

Description	E1 / HID Frame
Shunt Trip	
100 Vac - 110 Vac	●
220 Vac - 240 Vac	●
380 Vac - 415 Vac	●
Auxiliary Contact (250 Vac / 250 Vdc) (450 Vac / 250 Vdc)	
1-Changeover	●
2-Changeover	●
Rotary Handle	
Direct mounting	
Door Mounting	●
Trip Alarm Contact (Factory Fitted)	●

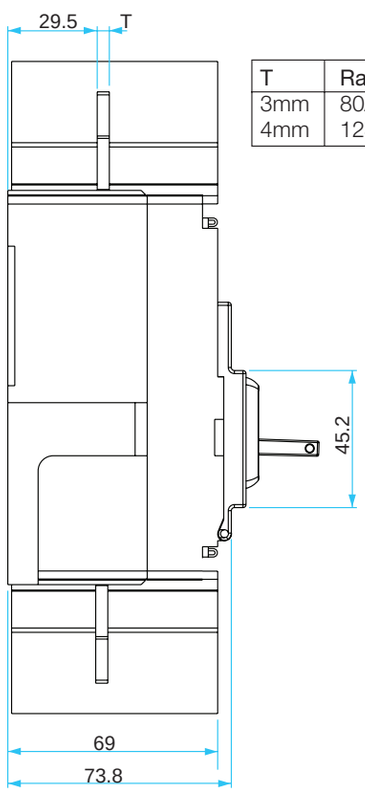


Outline Dimensions & Mounting Details

Dimension (in mm)



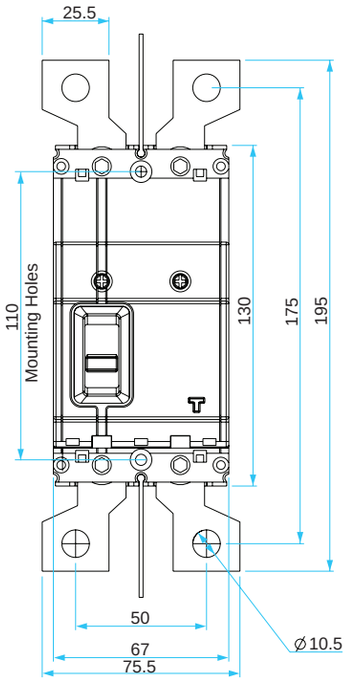
Single Pole



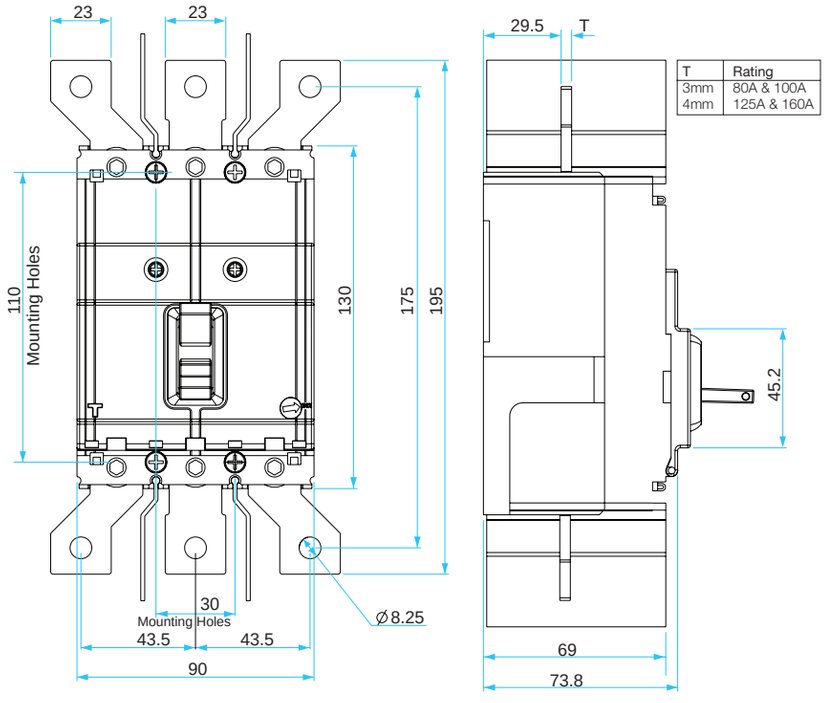
T	Rating
3mm	80A & 100A
4mm	125A & 160A

Outline Dimensions & Mounting Details

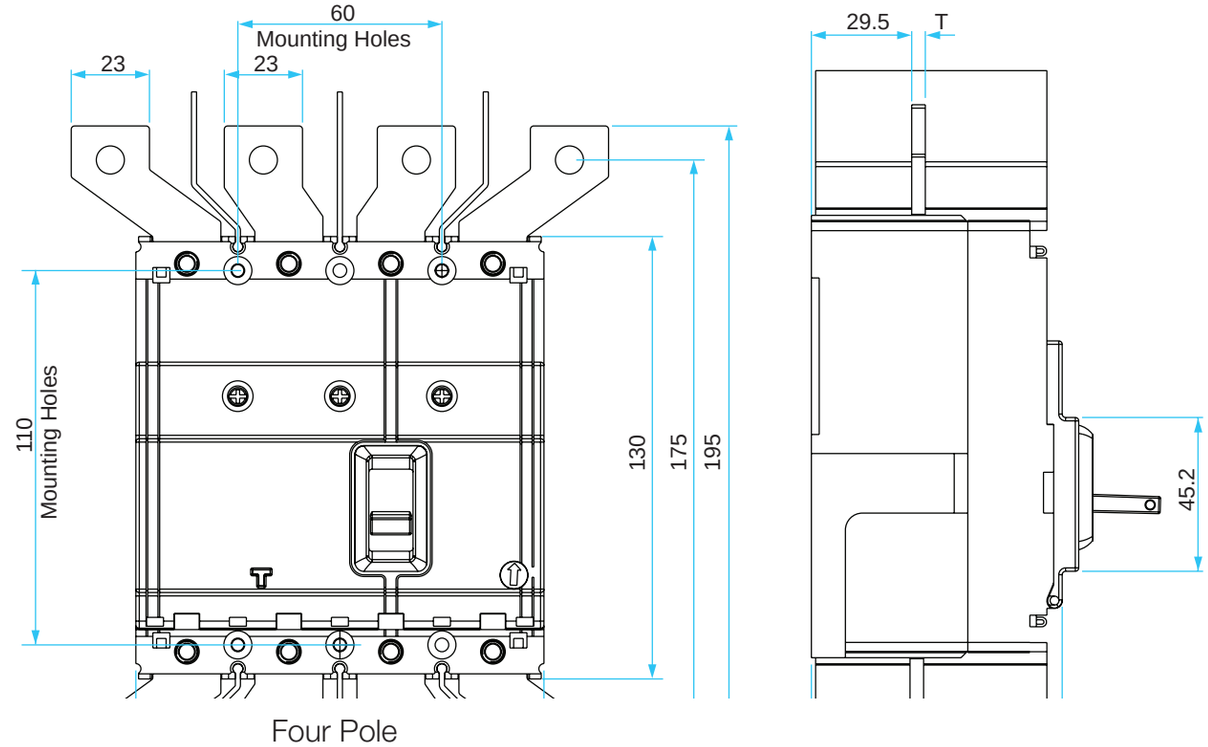
Dimension (in mm)



Double Pole



Three Pole



Four Pole

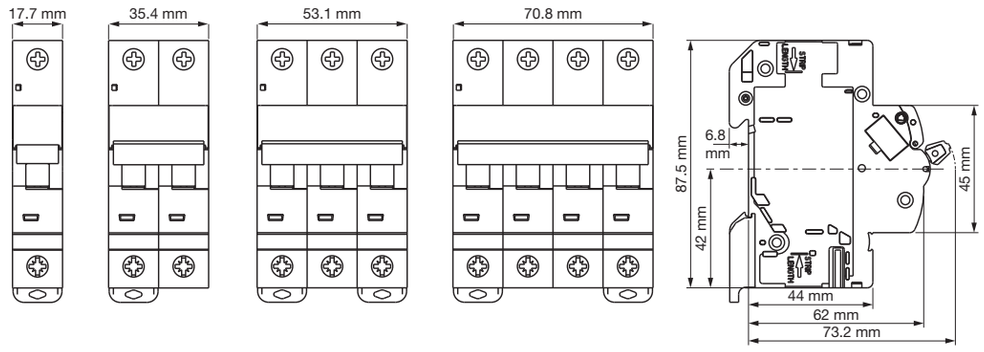
ST-Dx

Smart Technology Advantage

Miniature Circuit Breaker (Upto 63A)

Technical Specification	
Reference Standard	IS/IEC 60898-1 ; IEC 60947-2
Type / Series	C & D Curve
No. of Poles	1P, 1P+N, 2P, 3P, 3P+N, 4P
Rated Current (In)	0.5 A, 1 A, 2 A, 3 A, 4 A, 5 A, 6 A, 10 A, 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A
Rated Voltage (Ue)	240 Vac/415 Vac
Rated Frequency	50 Hz
Rated Short Circuit Breaking Capacity	10 kA - C Curve, 10 kA - D Curve ≤32 A, 4.5 kA - D Curve >32 A
Magnetic Release Setting	(5-10) In - C Curve, (10-20) In - D Curve
Rated Insulation Voltage (Ui)	690 V
Rated Impulse Voltage (Uimp)	4 kV
Dielectric Strength	2.5 kV
Electrical / Mechanical Endurance (no. of operations) minimum	10000/20000
Operating Temperature	-5 °C to +55 °C
Humidity	95% RH
Energy Limit Class	3
Terminal Capacity (max)	35 mm^2
Tightening Torque	2 N-m
Vibration	3 g
Shock Resistance	40 mm free fall
Protection Class	IP 20
Positive Contact Indication	Yes, Through Flag Indication (Red-ON, Green-OFF)
Net Weight / Pole in kg	125 g
Dimensions (H x D x W) / Pole in mm	87.5 mm x 62 mm x 17.7 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical / Horizontal
Case & Cover	Moulded, flame-retardant thermoplastic material
Busbar Connections Top Side	Pin Type
Busbar Connections Bottom Side	Pin / Fork Type
Auxiliary Contacts	Yes
Shunt Trip	Yes

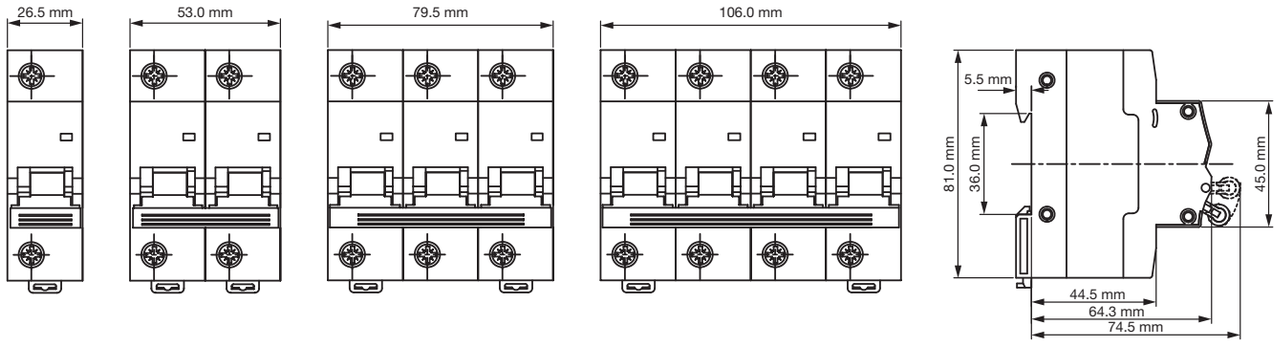
Dimensions (in mm)



Miniature Circuit Breaker (80 A-125 A)

Technical Specification	
Reference Standard	IEC 60947-2
Type / Series	C curve
No. of Poles	1P, 2P, 3P, 4P
Rated Current (In)	80 A, 100 A, 125 A
Rated Voltage (Ue)	240 Vac / 415 Vac
Rated Frequency (f)	50 Hz
Rated Ultimate Short Circuit Breaking Capacity (Icu)	10 kA
Rated Service Short Circuit Breaking Capacity (Ics)	75% of Icu
Magnetic Release Setting	(5-10) In
Rated Insulation Voltage (Ui)	690 V
Rated Impulse Voltage (Uimp)	6 kV
Dielectric Strength	2.5 kV
Electrical / Mechanical Endurance (no. of operations) minimum	5000/20000
Operating Temperature	-5 °C to +55 °C
Humidity	95% RH
Energy Limit Class	3
Terminal Capacity (max)	50 mm^2
Tightening Torque	3.5 N-m
Vibration	3 g
Shock Resistance	40 mm free fall
Protection Class	IP 20
Positive Contact Indication	Yes, Through Flag Indication (Red-ON, Green-OFF)
Net Weight / Pole in g	150 g
Dimensions (H x D x W) / Pole in mm	81 mm x 64.3 mm x 26.5 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical / Horizontal
Case & Cover	Moulded, flame retardant thermoplastic material
Busbar Connections Top Side	Pin Type
Busbar Connections Bottom Side	Pin Type

Dimensions (in mm)



Auxiliary Contact

Attachment used for signalling, indication and interlocking.

Technical Specilification	
Standard Conformity	IEC/EN 60947-5-4
Current Carrying Capacity (max)	6 A
Rated Voltage (Ue)	240 Vac
Contact Configuration	1NO + 1NC
Rated Insulation voltage	500 Vac
Rated Frequency	50 Hz/60 Hz
Utlization Category	12 ~
Electrical Endurance (no.of operations)	10,000
Terminal Capacity(max)	2.5 mm²
Protection Class	IP20
Power Loss	<3 W
Dimensions (H x D x W)	81.5 mm x 74.5 mm x 8.8 mm
Net Weight	36 g
Mounting	Left side of MCB

Under Voltage Trip

Causes the device with which it is associated to trip when input voltage decreases below 70 % of Un. It will also trip the associated device on the power failure or in case voltage reaches nearly 0 volts.

Technical Specilification	
Phase	Single phase / Three phase
Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	240 Vac / 415 Vac
Frequency	50 Hz/60 Hz
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue
Terminal Size	6 mm²
Protection Degree	IP20
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm
Net Weight	78 g / 90 g
Electrical Endurance (no.of operations)	4,000
Wiring Connection Type	Bottom / Top
Mounting	Left side of MCB

Shunt Trip

Shunt trips are devices used for the remote instantaneous opening of the circuit breaker.

Technical Specilification				
Standard Conformity	IEC 60947-1			
Rated Voltage (Ue)	AC 110-415 V	DC 12 V	DC 24 V	DC 48 V
	DC 110-130 V			
Frequency	50 Hz/60 Hz			
Max Release Duration	10 ms			
Operational Voltage	70% - 110% Ue			
Coil Resistance	120 Ω			
Terminal Capacity (max)	6 mm²			
Mechanical Status Indicator	Front			
Tightening Torque	0.8 N·m			
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm			
Net Weight	72 g			
Electrical Endurance (no.of operations)	4,000			
Wiring Connection Type	Bottom			
Mounting	Left side of MCB			

Under Voltage Trip + Time Delayed

Causes the device with which it is associated to trip when input voltage decrease (between 70% and 35% of Un). No tripping in case of transient voltage drop (up to 0.2 s).

Technical Specilification	
Phase	Single phase / Three phase
Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	240 Vac / 415 Vac
Frequency	50 Hz/60 Hz
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue
Trip Delay	0.2 s
Terminal Size	6 mm²
Protection Degree	IP20
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm
Net Weight	78 g / 90 g
Electrical Endurance (no.of operations)	4,000
Wiring Connection Type	Bottom / Top
Mounting	Left side of MCB

Over Voltage Trip

Cuts off the supply power by opening with which it is associated when the phase & neutral voltage is exceeded.

Technical Specilification	
Phase	Single phase / Three phase
Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	240 Vac / 415 Vac
Frequency	50 Hz/60 Hz
Max Non-Tripping Voltage	255 Vac
Max Tripping Voltage	280 Vac
Max Duration of Impulse Command	10 ms
Terminal Size	6 mm^2
Protection Degree	IP20
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm
Net Weight	78 g / 90 g
Electrical Endurance (no. of operations)	4,000
Wiring Connection Type	Bottom / Top
Mounting	Left side of MCB

Phase Loss

Causes the device with which it is associated to trip when input voltage decreases below 70 % of Un. It will also trip the associated device on the power failure or in case voltage reaches nearly 0 volts.

Technical Specilification	
Phase	Single phase
Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	220 Vac - 240 Vac
Frequency	50 Hz/60 Hz
Under Voltage Trip Voltage	0 Ue ≥ V ≥ 0.7 Ue
Terminal Size	6 mm^2
Protection Degree	IP20
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm
Net Weight	78 g
Electrical Endurance (no. of operations)	1,000
Wiring Connection Type	Bottom
Mounting	Left side of MCB

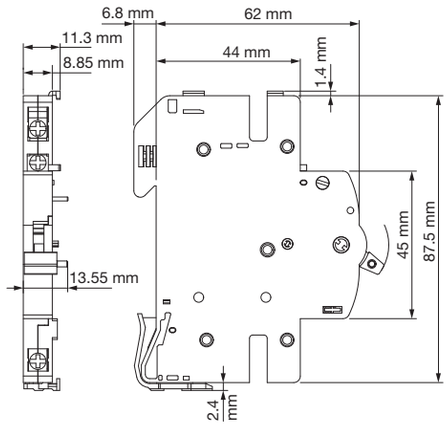
Under Voltage Trip + Over Voltage Trip

Cuts the supply power by opening with which it is associated when the phase & neutral voltage is in not with in the limits.

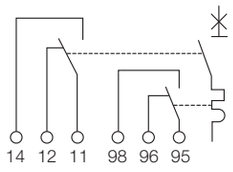
Technical Specilification	
Phase	Single phase / Three phase
Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	240 Vac / 415 Vac
Frequency	50 Hz/60 Hz
Max Non-Tripping Voltage	255 Vac
Max Tripping Voltage	280 Vac
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue
Max Duration of Impulse Command	10 ms
Terminal Size	6 mm^2
Protection Degree	IP20
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 mm x 71 mm x 17.7 mm
Net Weight	78 g / 90 g
Electrical Endurance (no.of operations)	4,000
Wiring Connection Type	Bottom / Top
Mounting	Left side of MCB

Auxiliary Contact

Dimensions (in mm)

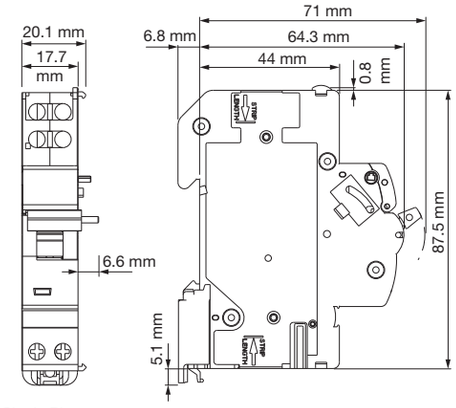


Circuit Diagram



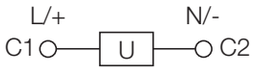
Shunt Trip

Dimensions (in mm)



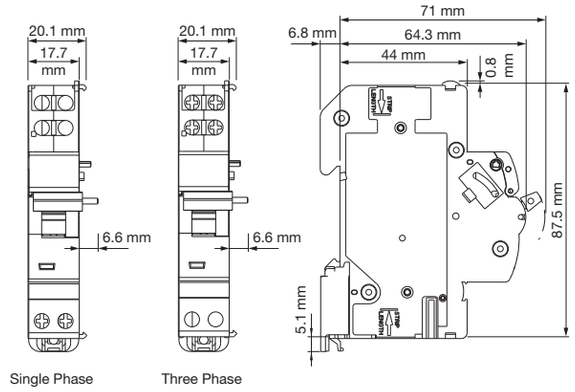
Single Phase

Circuit Diagram



Under Voltage Trip

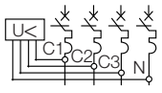
Dimensions (in mm)



Single Phase Three Phase

Circuit Diagram

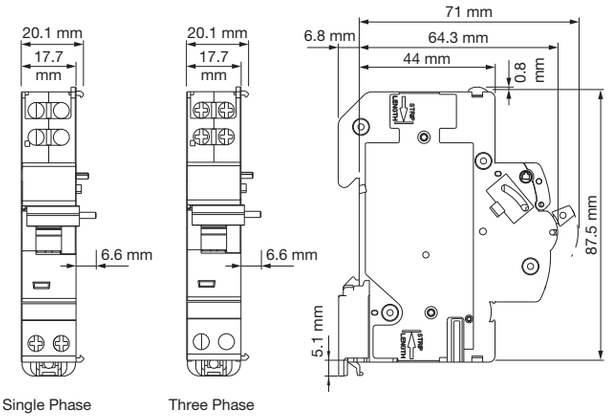
Single Phase



Three Phase

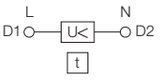
Under Voltage Trip + Time Delayed

Dimensions (in mm)

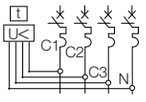


Single Phase Three Phase

Circuit Diagram



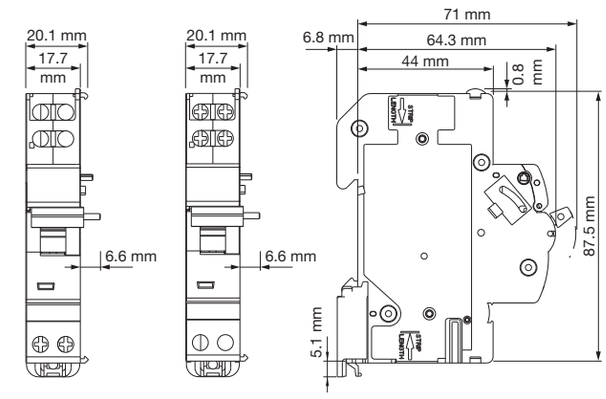
Single Phase



Three Phase

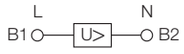
Over Voltage Trip

Dimensions (in mm)

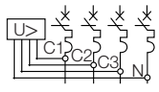


Single Phase Three Phase

Circuit Diagram



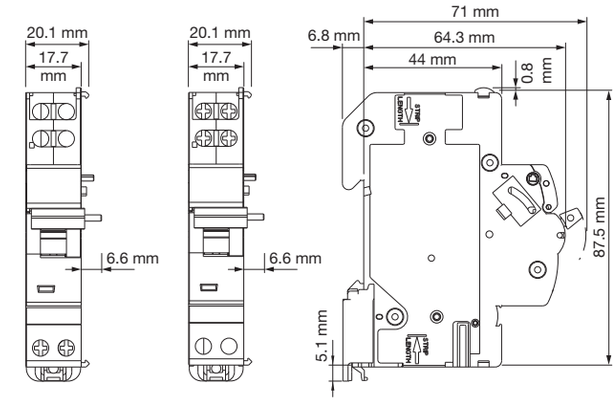
Single Phase



Three Phase

Under Voltage Trip + Over Voltage Trip

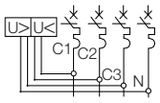
Dimensions (in mm)



Single Phase Three Phase

Circuit Diagram

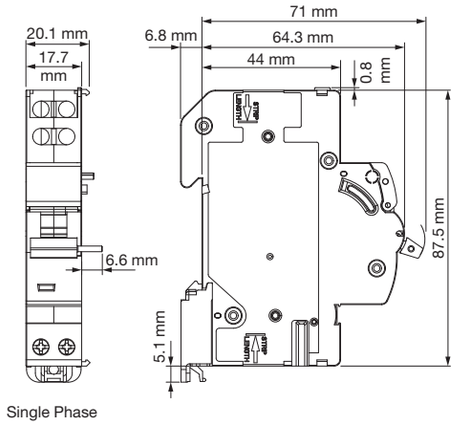
Single Phase



Three Phase

PHASE LOSS

Dimensions (in mm)



Single Phase

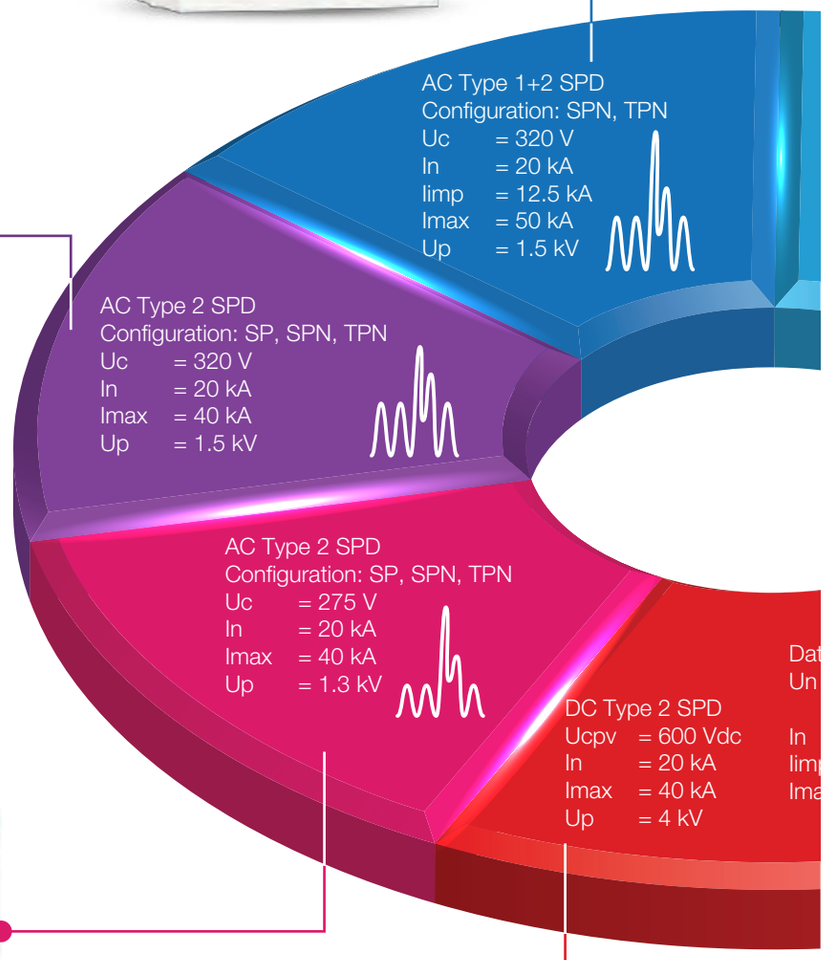
Circuit Diagram

Surge Protection Devices

Presenting A Range Of Stadx SPD

Type 1+2 AC SPD

They provide first level of protection in incoming power supply panels, in areas with risk of surge voltages due to direct lightning as well as indirect lightning strikes and switching surges.



Type 2 AC SPD (320 V)

They are installed in supply distribution panels and protect installations from transient over voltages due to indirect lightning strikes and switching surges.

Type 2 AC SPD (275 V)

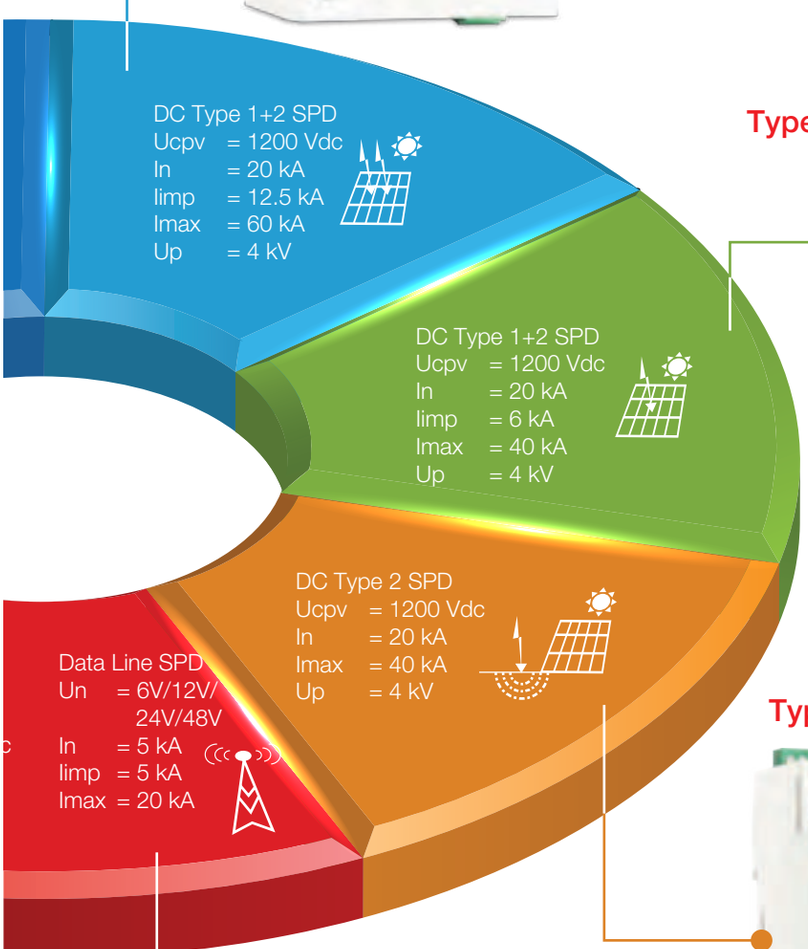
They provide fine protection of installations from transient over voltages due to indirect lightning strikes and switching surges (lower Up).

Type 2 DC SPD (600 V)

They are suitable for all PV applications: large-scale, rooftop and self-consumption (off-grid) DC installations.

Type 1+2 Photovoltaic SPD (12.5 kA)

They are heavy duty surge protectors designed to protect photovoltaic power supply network against surge voltages due to direct lightning, indirect lightning and switching surges.



Type 1+2 Photovoltaic SPD (6 kA)

They are compact surge protectors designed to protect photovoltaic power supply network against surge voltages due to direct/ indirect lightning strikes and switching surges.

Type 2 Photovoltaic SPD

They protect photovoltaic system against surge voltages due to indirect lightning strikes and switching surges.

Data Line SPD

They are designed to protect, against surge voltages due to lightning & switching surges, terminal equipment connected to industrial buses, telecom lines or data lines.

Surge Protection Devices

Type 1+2 Ac Surge Protection Devices

These are very compact SPDs which protect both from overvoltage surges due to direct lightning strikes (10 µs/350 µs waveform) as well as indirect lightning strikes and switching surges (8 µs/20 µs waveform). They are an integrated solution, equivalent to an automatically coordinated Type 1 and Type 2 SPDs.

They are used as the first step of protection in incoming power supply panels and areas with exposure to the atmosphere, where installations are usually provided with an external lightning protection system.

Configuration

SPN, TPN

Specification

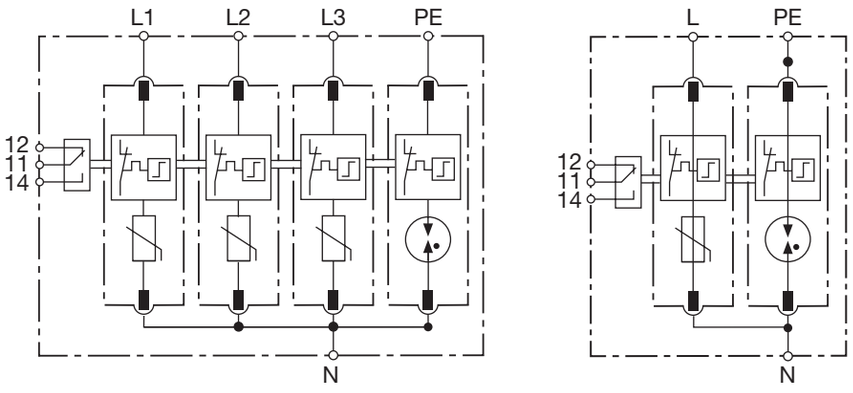
IEC 61643-11: 2011, EN 61643-11: 2012

Features

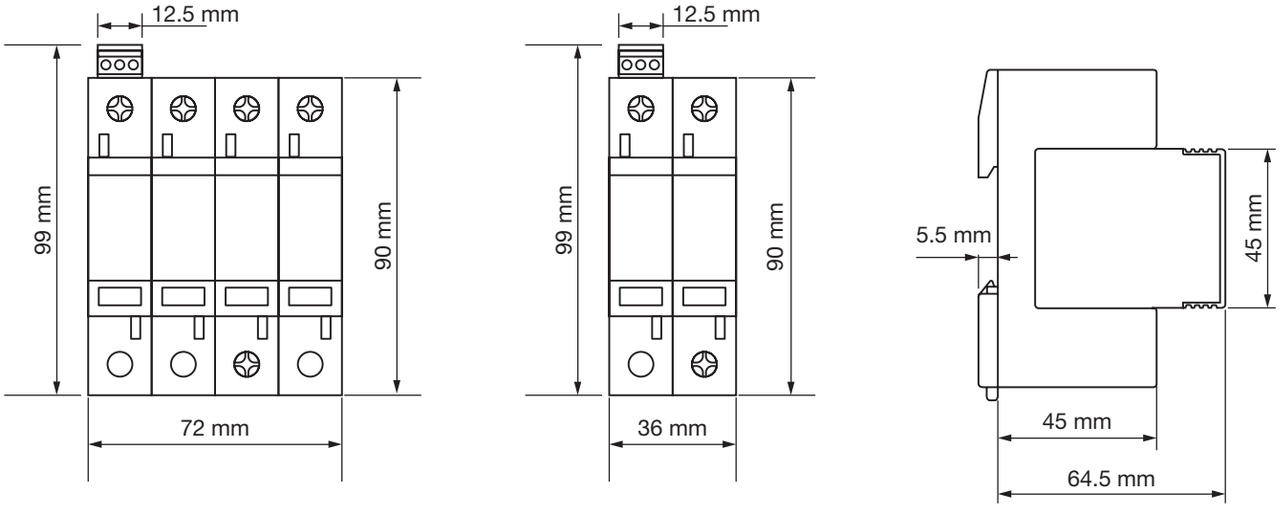
- Tested and approved by TUV.
- High Discharge Current (Imax 50 kA (L – N) 70 kA (N – E)).
- Compact Size Integrated Type-1 & Type-2 protection in small module width (Ideal in all reduced-size spaces).
- Better Protection due to reduced Up(Voltage protection level 1.5 kV).
- Both Common & DIfferential Mode Protection.

Technical Specification	
Standard Compliance	IEC/EN 61643-11
Type / Class	Type 1+2 / Class I+II
Max Continuous Operating AC Voltage Uc	320 V (L - N), 255 V (N - PE)
Lightning Impulse (10/350 microsecond) Iimp	12.5 kA
Nominal Discharge Current (8/20 microsecond) In	20 kA (L - N), 40 kA (N - PE)
Max Discharge Current (8/20 microsecond) Imax	50 kA (L - N), 70 kA (N - PE)
Voltage Protection Level Up	<1.5 kV
Voltage Protection Level 5 kA Up	<1.2 kV
Max Backup Fuse	125 A gL/gG
Temporary Overvoltage Charactersitcs (5 second) Ut	335 V
Residual Current At Uc - Ipe	<100 µA
Response Time	<25 ns
Short Circuit Current Rating I_{SCCR}	3 kA
Follow Current extinguishing Capability [N-PE] a.c. Ifi	100 Arms
Number of Ports	One Port SPD
Location	Indoor
Humidity	5% - 95%
Operating Temperature Range	–40 °C - 80 °C
Operating State/Fault Indication	Green/Red
Cross-section Area	4 mm^2 - 35 mm^2
For Mounting on	35 mm Din Rail
Enclosure Material	Thermoplastic UL94-V0
Degree of Protection	IP20

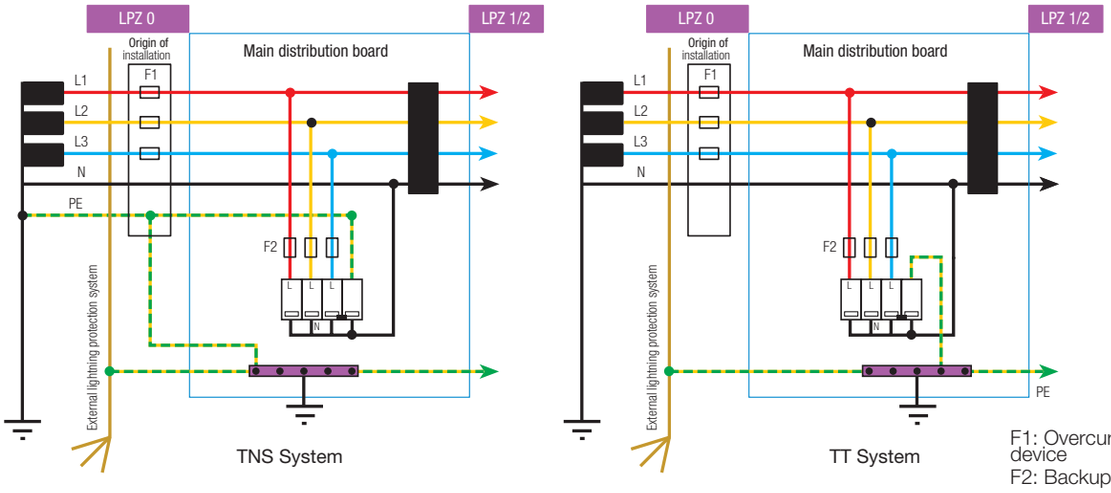
Circuit Diagram



Dimensions (in mm)



Connection Diagram



F1: Overcurrent protection device
F2: Backup protection

Type 2 Ac Surge Protection Devices

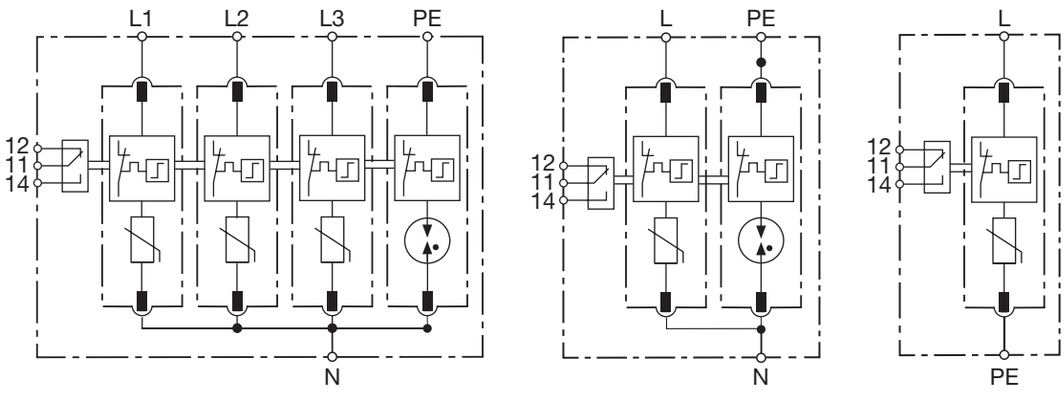
Type 2 SPDs provide protection from over-voltage surges due to indirect lightning strikes hitting the building or surrounding area and switching surges (8 µs/20 µs waveform). They are necessary for second level of protection in applications where Type 1 protectors are installed upstream. They are also used for first stage of protection in residential, commercial or industrial applications not exposed to direct strikes or with no external lightning protection system.

Type 2 SPDs are suitable for use at the entrance of the installation (main DB), in intermediate distribution boards (sub DB) and by the terminal equipment.

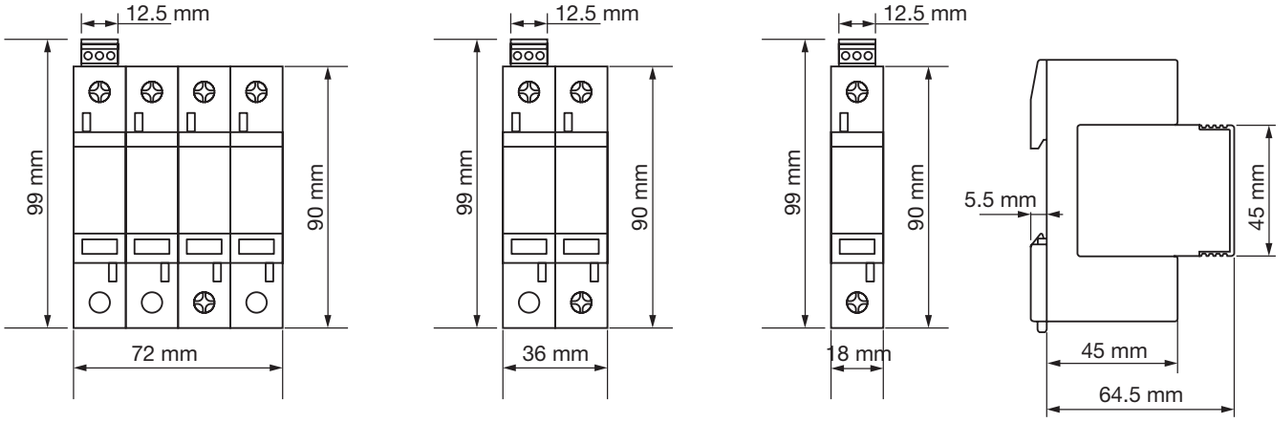
Configuration
SP, SPN, TPN
Specification
IEC 61643-11: 2011, EN 61643-11: 2012
Features
- Tested and Approved by TUV.
- Applicable in Two Voltage Rating - Uc 320 V & 275 V.
- Both Common & DIfferential Mode Protection.
- Better Protection (Voltage protection level Up upto 1.3 kV, suitable for protection of all terminal equipments).

Technical Specification		
Standard Compliance	IEC/EN 61643-11	IEC/EN 61643-11
Type/Class	Type 2/Class II	Type 2/Class II
Max Continuous Operating AC Voltage Uc	275 V	320 V
Max Continuous Operating AC Voltage [N-PE] Uc	255 V	255 V
Nominal Discharge Current (8/20 microsecond) In	20 kA	20 kA
Max Discharge Current (8/20 microsecond) Imax	40 kA	40 kA
Voltage Protection Level Up	<1.3 kV	<1.5 kV
Voltage Protection Level 5 kA Up	<1 kV	<1.2 kV
Voltage Protection Level [N-PE] Up	<1.5 kV	<1.5 kV
Temporary Overvoltage with Stand (5 second) Ut	335 V	335 V
Residual Current At Uc- Ipe	<100 µA	<100 µA
Short Circuit Current Rating I_{SCCR}	3 kA	3 kA
Follow Current extinguishing Capability [N-PE] a.c. Ifi	100 Arms	100 Arms
Max Backup Fuse	125 A gL/gG	125 A gL/gG
Response Time	<25 ns	<25 ns
Response Time [N-PE]	<100 ns	<100 ns
Operating Temperature Range	–40 °C - 80 °C	–40 °C - 80 °C
Operating State/Fault Indication	Green/Red	Green/Red
Cross-section Area	4 mm^2 - 35 mm^2	4 mm^2 - 35 mm^2
For Mounting on	35 mm Din Rail	35 mm Din Rail
Enclosure Material	Thermoplastic UL94-V0	Thermoplastic UL94-V0
Degree of Protection	IP 20	IP 20

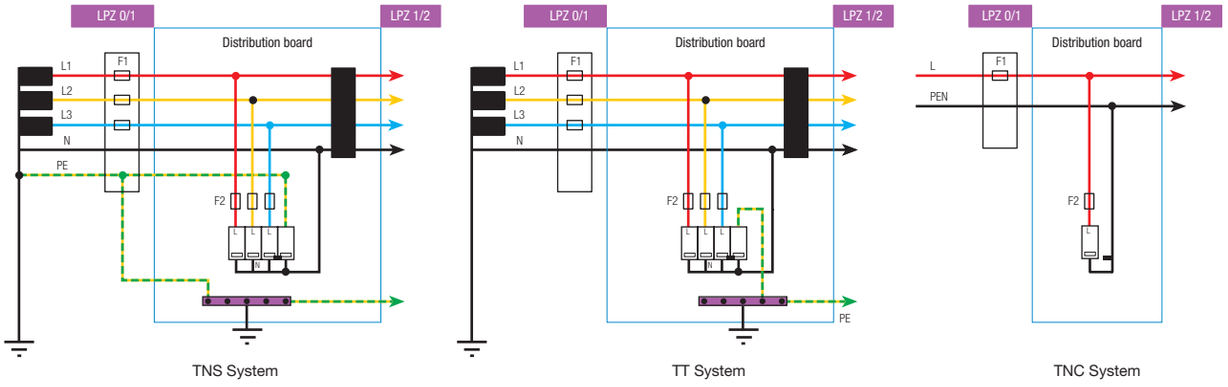
Circuit Diagram



Dimensions (in mm)



Connection Diagram



F1: Overcurrent protection device

F2: Backup protection

Type 1+2 Photovoltaic Surge Protection Devices

For photovoltaic systems, often located in isolated and exposed locations and with a generally large surface area, the threat of lightning is quite common. The risk is multiple: direct effect (lightning strike on the panels) and indirect (surge on cells, solar chargers, inverters), or on other lines (data). When the PV system is located on industrial sites, the risk of switching overvoltage surges must also be taken into account. For this reason, and given the high value of the components and the high cost of any down time, SPDs are highly recommended.

The Type 1+2 PV SPD range allows the DC side of each PV installation to be effectively protected against over voltages, both due to direct lightning strikes (10/350 µs discharge current wave) as well as indirect lightning strike and switching surges (8/20 µs discharge current wave).

Range

Type 1+2 Photovoltaic Surge Protection Devices

Specification

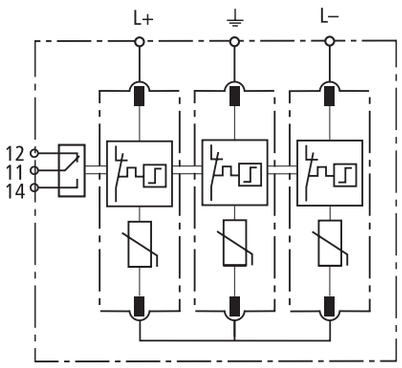
EN 50539-11: 2013

Features

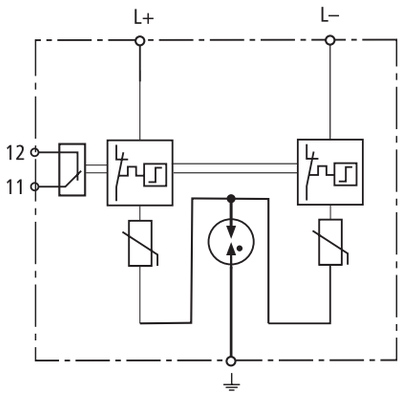
- Tested and Approved by TUV.
- High Operating Voltage (Ucpv1200 Vdc).
- High Discharge Current:
  Imax 60 kA for 4-module SPD (Iimp 12.5 kA)
  Imax 40 kA for 3-module SPD (Iimp 6 kA)
- Remove Monitoring Option.

Technical Specification		
	Type 1+2 (12.5 kA)	Type 1+2 (6 kA)
Standard Compliance	EN 50539-11	EN 50539-11
Type	Type 1+2	Type 1+2
Max Continuous Operating DC Voltage Ucpv	1200 Vdc	1200 Vdc
Lightning Impulse (10/350 microsecond) Iimp	12.5 kA	6 kA
Nominal Discharge Current (8/20 microsecond) In	20 kA	20 kA
Max Discharge Current (8/20 microsecond) Imax	60 kA	40 kA
Voltage Protection Level Up	<4 kV	<4 kV
Short Circuit Current with Stand Iscpv	1000 A	1000 A
Leakage Current	<100 µA	<100 µA
Response Time	<25 ns	<25 ns
Operating State/Fault Indication	Green/No Light	Green/Red
Thermal Disconnector	Internal	Internal
Fuses	Without	Without
Operating Temperature Range	-40 °C - 80 °C	-40 °C - 80 °C
Cross-section Area	4 sq. mm - 35 sq. mm	4 sq. mm - 35 sq. mm
For Mounting on	35 mm Din Rail	35 mm Din Rail
Enclosure Material	Thermoplastic UL94-V0	Thermoplastic UL94-V0
Degree of protection	IP20	IP20

Circuit Diagram

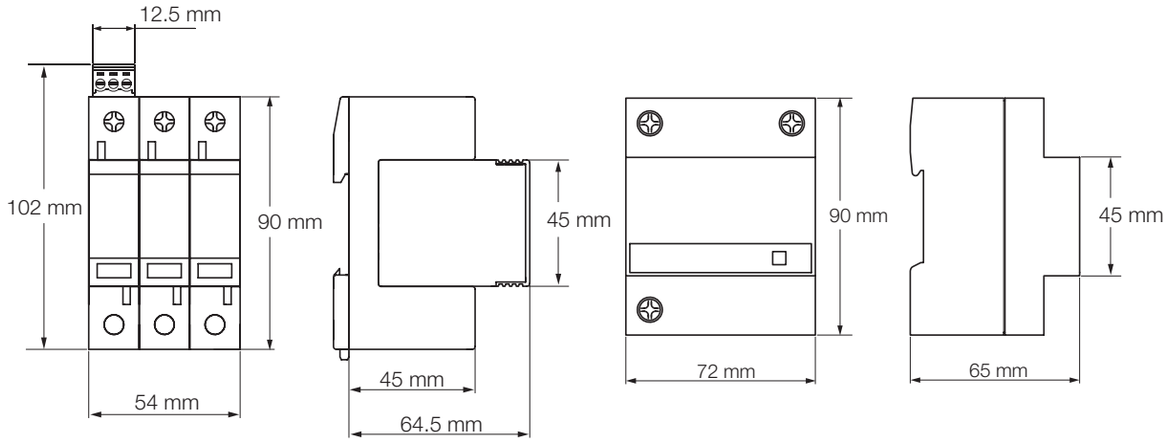


Type 1+2 SPD (6kA)



Type 1+2 SPD (12.5kA)

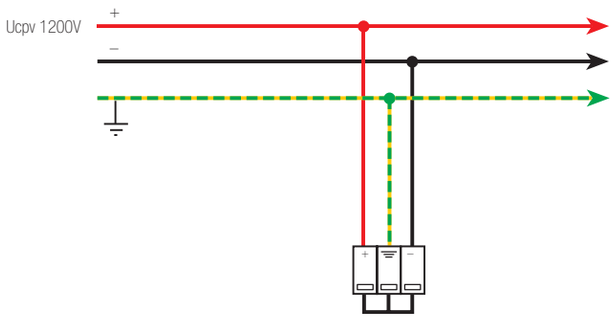
Dimensions (in mm)



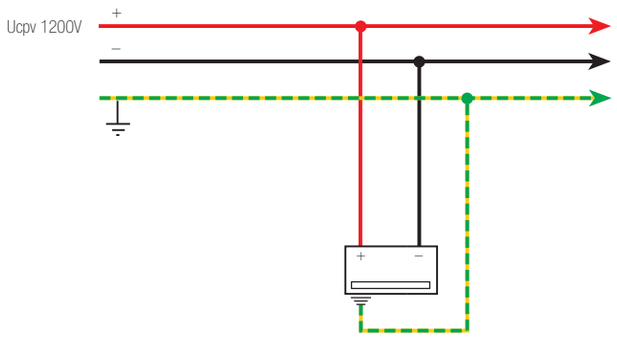
Type 1+2 SPD (6 kA)

Type 1+2 SPD (12.5 kA)

Connection Diagram



Type 1+2 SPD (6kA)



Type 1+2 SPD (12.5kA)

Type 2 Photovoltaic Surge Protection Devices

The Type 2 PV SPD range allows the DC side of each PV installation to be effectively protected against over voltages due to indirect lightning strikes and switching surges (8/20 µs discharge current wave).

They are suitable for all PV applications: large-scale, rooftop and self-consumption (off-grid) DC installations.

Range

Type 2 Photovoltaic Surge Protection Devices

Specification

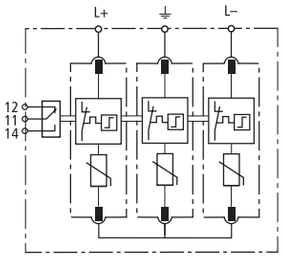
EN 50539-11: 2013

Features

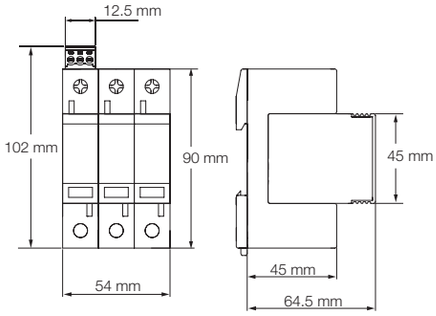
- Tested and Approved by TUV.
- High Operating Voltage (Ucpv 1200 Vdc).
- High Discharge Current:
  Maximum discharge current 40 kA.
- Both Common and Differential Mode Protection.
- Remote Monitoring Option.

Technical Specification	
Standard Compliance	EN 50539-11
Type	Type 2
Max Continuous Operating DC Voltage Ucpv	1200 Vdc
Nominal Discharge Current (8/20 microsecond) In	20 kA
Max Discharge Current (8/20 microsecond) Imax	40 kA
Voltage Protection Level Up	<4 kV
Short Circuit Current Withstand Iscpv	1000 A
Leakage Current	<100 µA
Response Time	<25 ns
Operating Temperature Range	-40 °C - 80 °C
Humidity	5% - 95%
Installation	Indoor
Thermal Disconnector	Internal
Fuses	Without
Operating State/Fault Indication	Green/Red
Cross-section Area	4 sq. mm - 35 sq. mm
For Mounting on	35 mm Din Rail
Enclosure Material	Thermoplastic UL94-V0
Degree of protection	IP20
Degree of protection	IP20

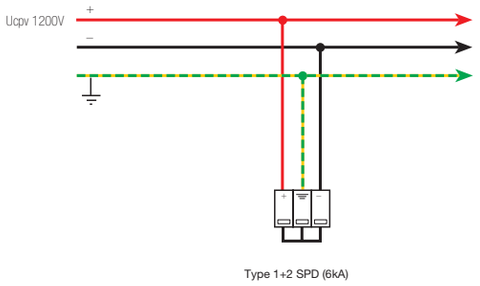
Circuit Diagram



Dimensions (in mm)



Connection Diagram



Type 2 Dc 600 V Surge Protection Devices

The Type 2 PV SPD range allows the DC side of each PV installation to be effectively protected against over voltages due to indirect lightning strikes and switching surges (8/20 µs discharge current wave).

Range

Type 2 DC 600 V Surge Protection Devices

Specification

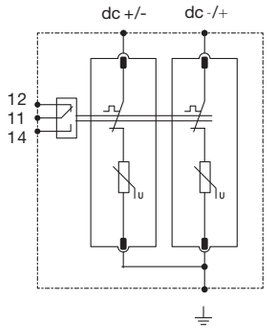
EN 50539-11: 2013

Features

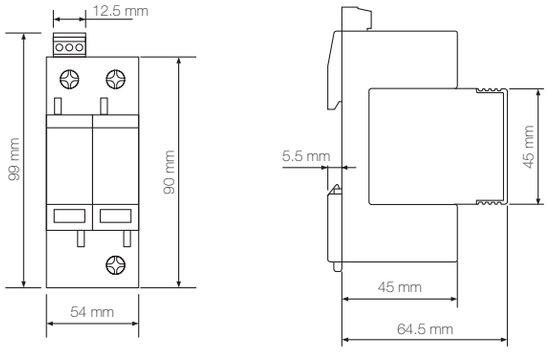
- Tested and Approved by TUV.
- High Operating Voltage (Ucpv 600 Vdc).
- High Discharge Current:
  Maximum discharge current 40 kA.
- Both Common and Differential Mode Protection.
- Remote Monitoring Option.

Technical Specification		
SPD Classification According to EN61643-11		Type 2
SPD Classification According to EN61643-11		Class II
Max. Continuous Operating dc Voltage	Ucpv	≤ 600 V
Nominal Discharge Current (8/20 µs)	In	20 kA
Max. Discharge Current (8/20 µs)	Imax	40 kA
Voltage Protection Lavel	Up	≤ 2.6 kV
Response Time	tA	≤ 25 ns
Operating Temperature Range	Tu	–40 °C - 80 °C
Operating state / fault indication		green / red
Cross-section area (Minimum)		4 mm^2
Cross-section area (Maximum)		35 mm^2
For Mounting on		35 mm Din Rail
Enclosure Material		Thermoplastic UL94-V0
Degree of Protection		IP20

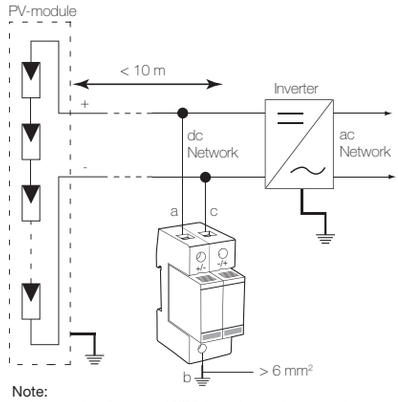
Circuit Diagram



Dimensions (in mm)



Wiring Diagram



Note:

- In case the distance of SPD from the equipment to be protected is more than 10 m, additional SPD closer to the equipment must be installed.
- The length of connecting cables (a, b, c) of SPD should be as short as possible.

Data Line Surge Protection Devices

Lightning can also propagate through telecommunications and data networks. It can damage all the equipment connected to these networks: telephones, modems, computers, servers, faxes, fire alarms etc.

Today's telecommunication and data transmission devices are increasingly more vulnerable to lightning induced voltage surges due to their sensitive and complex nature as well as possible connection across several different networks. As these devices are critical to a companies' communications and information processing, it is advisable to insure them against potentially costly and disruptive events.

A data line SPD installed in-line, directly in front of a sensitive piece of equipment will increase their useful life and maintain the continuity of flow of your information.

Range

Data Line Surge Protection Devices (6 V, 12 V, 24 V, 48 V)

Specification

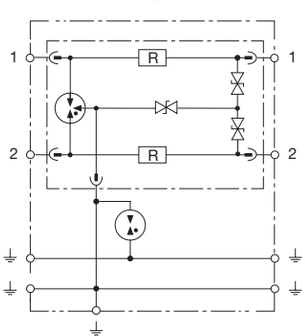
IEC 61643-21

Features

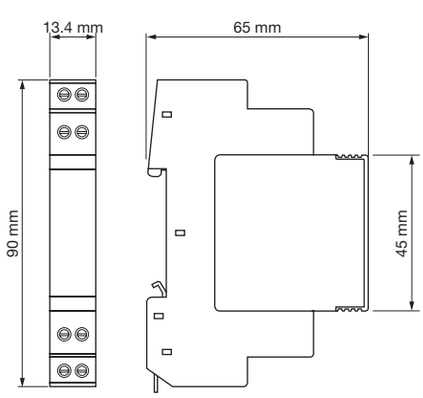
- Reduced Dimensions (only 13.4 mm module width).
- Pluggable Cartridges.
- Operational Continuity (Faulty module can be changed with mains voltage ON).
- Quick Response (Less than 1 nano second).
- Shield wire protection facility.

Technical Specification				
Nominal Voltage type	6 V	12 V	24 V	48 V
Network	RS 422	RS 232, RS 485	4 mA - 20 mA, Analog Signals, Digital Signals	ISDN, 48 V Line
SPD Configuration	1 Pair + Shielded	1 Pair + Shielded	1 Pair + Shielded	1 Pair + Shielded
Nominal Line Voltage Un	6 V	12 V	24 V	48 V
Max DC Operating Voltage Uc	8 V	15 V	28 V	53 V
Max Load Current IL	300 mA	300 mA	300 mA	300 mA
Max Frequency fmax	>3 MHz	>3 MHz	>3 MHz	>3 MHz
Insertion Loss	<1 dB	<1 dB	<1 dB	<1 dB
Nominal Discharge Current (8/20 Microsec) In	5 kA	5 kA	5 kA	5 kA
Max Discharge Current (8/20 Microsecond) Imax	20 kA	20 kA	20 kA	20 kA
Impulse Current (10/350 microsecond) Iimp	5 kA	5 kA	5 kA	5 kA
Voltage Protection Level Up	20 V	30 V	40 V	70 V
Response Time	<1 ns	<1 ns	<1 ns	<1 ns
Series Resistance	2 Ω	2 Ω	2 Ω	2 Ω
Humidity	5% - 95%	5% - 95%	5% - 95%	5% - 95%
Operating Temperature Range	–40 °C - 80 °C			
For Mounting on	35 mm Din Rail			
Cross-section Area	0.4 sq. mm-2.5 sq. mm			
Enclosure Material	Thermoplastic UL94-0			
Degree of Protection	IP 20			

Circuit Diagram



Dimensions (in mm)



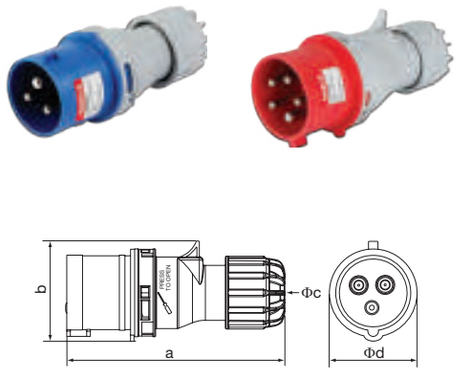
Industrial Plug & Connector
Industrial Wall-Mounted Socket & Panel Socket

LATEST.
SAFEST.

INDUSTRIAL PLUG & CONNECTOR

Industrial Plug

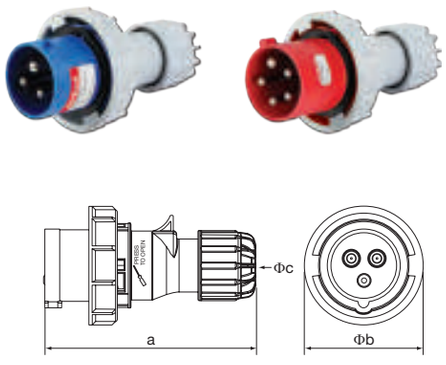
IP-44



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	120	133	150	155
b	57	75.5	80.5	89.5
c	15	17	22	22
d	53.5	68	72	79.5
Cable Size	1 sq. mm ~2.5 sq. mm	1 SQ. mm ~2.5 SQ. mm	2.5 SQ. mm ~6 SQ. mm	2.5 SQ. mm ~6 SQ. mm
Order Code	DHQBA63016	DHQBA65016	DHQBA63032	DHQBA65032
Std. / Master Packing (No. of Unit/s)	4 N	4 N	4 N	4 N

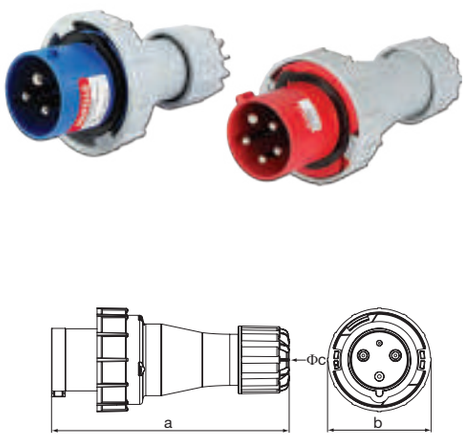
IP-67



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	120	133	150	155
b	71	87	93	99.5
c	15	17	22	22
Cable Size	1 SQ. mm ~2.5 SQ. mm	1 SQ. mm ~2.5 SQ. mm	2.5 SQ. mm ~6 SQ. mm	2.5 SQ. mm ~6 SQ. mm
Order Code	DHQBB63016	DHQBB65016	DHQBB63032	DHQBB65032
Std. / Master Packing (No. of Unit/s)	4 N	4 N	4 N	2 N

IP-67

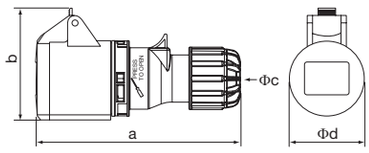


High Rating (63 A)

	63 A	63 A
	2P+E	**3P+N+E**
Dimensions (mm)		
a	260	260
b	113.5	113.5
c	32	32
Cable Size	6 SQ. mm ~16 SQ. mm	6 SQ. mm ~16 SQ. mm
Order Code	DHQBB63063	DHQBB65063
Std. / Master Packing (No. of Unit/s)	1 N	1 N

Industrial Connector

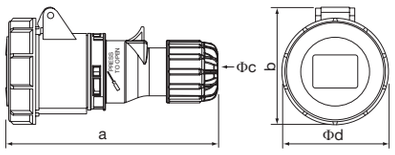
IP-44



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	130	142	162	163.5
b	75.6	89.5	94	100
c	15	17	22	22
d	52	62.8	64.6	71
Cable Size	1 SQ. mm ~2.5 SQ. mm	1 SQ. mm ~2.5 SQ. mm	2.5 SQ. mm ~6 SQ. mm	2.5 SQ. mm ~6 SQ. mm
Order Code	DHQDA63016	DHQDA65016	DHQDA63032	DHQDA65032
Std. / Master Packing (No. of Unit/s)	4 N	4 N	4 N	4 N

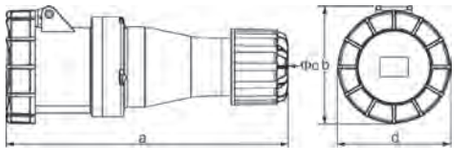
IP-67



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	134	146	166	171
b	78.5	93	98	104
c	15	17	22	22
d	71	86.5	93.5	99.5
Cable Size	1 SQ. mm ~2.5 SQ. mm	1 SQ. mm ~2.5 SQ. mm	2.5 SQ. mm ~6 SQ. mm	2.5 SQ. mm ~6 SQ. mm
Order Code	DHQDB63016	DHQDB65016	DHQDB63032	DHQDB65032
Std. / Master Packing (No. of Unit/s)	4 N	4 N	4 N	2 N

IP-67

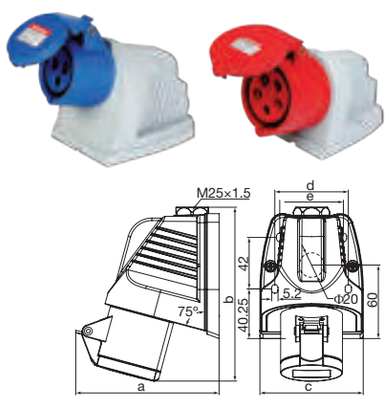


High Rating (63 A)

	63 A
	3P+N+E
Dimensions (mm)	
a	260
b	113.5
c	32
c	111
Cable Size	6 SQ. mm ~16 SQ. mm
Order Code	DHQDB65063
Std. / Master Packing (No. of Unit/s)	1 N

Industrial Wall-mounted Socket

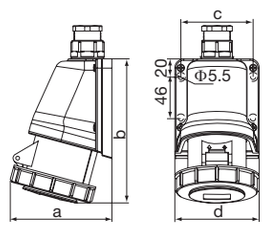
IP-44



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	117	118.5	120	119
b	142	114.5	156	158
c	84.4	84.4	84.4	84.4
d	60	60	60	60
e	52	52	52	52
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm
Order Code	DHQSA63016	DHQSA65016	DHQSA63032	DHQSA65032
Std. / Master Packing (No. of Unit/s)	2 N	2 N	2 N	2 N

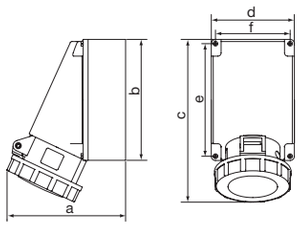
IP-67



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	101	107	114	116
b	150	151	162	163
c	80	80	80	80
d	93.5	93.5	93.5	93.5
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm
Order Code	DHQSB63016	DHQSB65016	DHQSB63032	DHQSB65032
Std. / Master Packing (No. of Unit/s)	2 N	2 N	2 N	2 N

IP-67



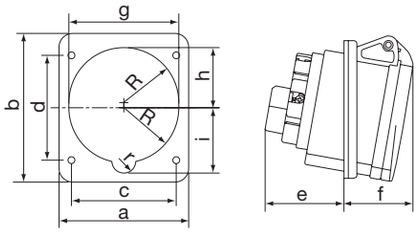
High Rating (63 A)

	63 A
	3P+N+E
Dimensions (mm)	
a	171
b	170
c	230
d	118
e	135
f	105
Cable Size	6 sq. mm ~25 sq. mm
Order Code	DHQSB65063
Std. / Master Packing (No. of Unit/s)	1 N

Industrial Panel Socket

EURO-II

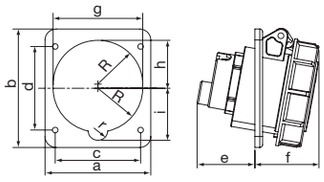
IP-44



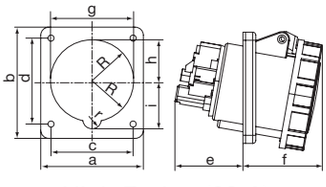
Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	75.5	75.5	75.5	80
b	86.5	86.5	86.5	90
c	61	61	61	65
d	61	61	61	70
e	36	40	55	51
f	37	41	42	45
g	57.5	64	64	70
h		35	35	37.5
i		38	38	40.5
R		32	32	35
r		7	7	7
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm
Order Code	DHQCA63016	DHQCA65016	DHQCA63032	DHQCA65032
Std. / Master Packing (No. of Unit/s)	6 N	4 N	4 N	4 N

IP-67



Low Rating (16 A & 32 A)



High Rating (63 A)

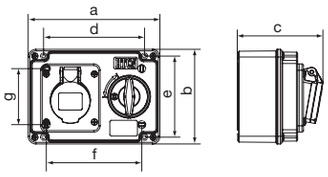
Low Rating (16 A & 32 A) and High Rating (63 A)

	16 A		32 A		63 A
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**	**3P+N+E**
Dimensions (mm)					
a	75.5	75.5	75.5	80	100
b	86.5	86.5	86.5	90	110
c	61	61	61	65	80
d	61	61	61	70	85
e	41	41.5	52.5	51.5	66.5
f	45	46	49.5	52.5	77.5
g	64	64	64	70	81
h	35	35	35	37.5	42.5
i	38	38	38	40.5	45.5
R	32	32	32	35	9
r	7	7	7	7	40.5
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm	6 sq. mm ~25 sq. mm
Order Code	DHQCB63016	DHQCB65016	DHQCB63032	DHQCB65032	DHQCB65063
Std. / Master Packing (No. of Unit/s)	4 N	4 N	4 N	3 N	1 N

INDUSTRIAL INTERLOCKING SOCKET

Industrial Interlocking Socket

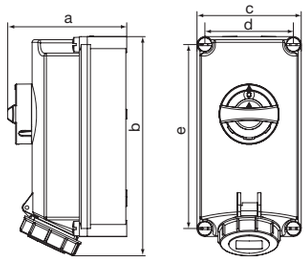
IP-44



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	167	167	167	167
b	120	120	120	120
c	108	112	118	120.5
d	128	128	128	128
e	102.8	102.8	102.8	102.8
f	121	121	121	121
g	71	71	71	71
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm
Order Code	DHQIA63016	DHQIA65016	DHQIA63032	DHQIA65032
Std. / Master Packing (No. of Unit/s)	1 N	1 N	1 N	1 N

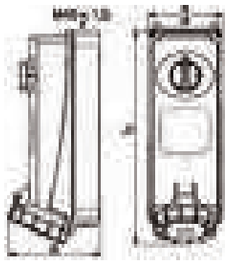
IP-67



Low Rating (16 A & 32 A)

	16 A		32 A	
	2P+E	**3P+N+E**	**2P+E**	**3P+N+E**
Dimensions (mm)				
a	135.8	135.8	142.5	147
b	248	248	256.5	256.5
c	119	119	119	119
d	101	101	101	101
e	208	208	208	208
Cable Size	1.5 sq. mm ~4 sq. mm	1.5 sq. mm ~4 sq. mm	2.5 sq. mm ~10 sq. mm	2.5 sq. mm ~10 sq. mm
Order Code	DHQWB63016	DHQWB65016	DHQWB63032	DHQWB65032
Std. /Master Packing (No. of Unit/s)	1 N	1 N	1 N	1 N

IP-67



High Rating (63 A)

Provision to install switching devices (MCB/RCCB/RCBO) upto 4 module width

	63 A	
	2P+E	**3P+N+E**
Dimensions (mm)		
a	203	203
b	467	467
c	162.5	162.5
d	115	115
Cable Size	6 sq. mm ~25 sq. mm	6 sq. mm ~25 sq. mm
Order Code	DHQEB63063	DHQEB65063
Std. / Master Packing (No. of Unit/s)	1 N	1 N

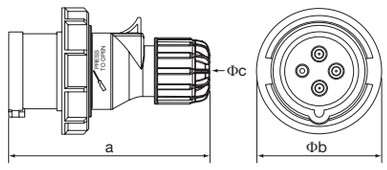
EURO-II

Plug & Socket for Reefer Container

On ships and in harbor terminals, power loss spells disaster. To meet with strict requirement of these applications, Havells has watertight (IP-67) plug & sockets, with earth sleeve in 3 O'clock position, according to IEC/EN 60309-2.

Plug

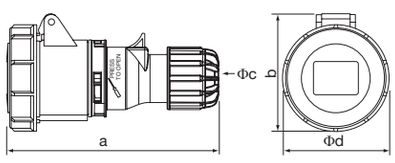
(32 A, 380 V-440 V~, 3P+E)



Dimensions (mm)	
a	150
b	93
c	22
Cable Size	2.5 sq. mm ~6 sq. mm
Order Code	DHQBB34032
Std. / Master Packing (No. of Unit/s)	4 N

Connector

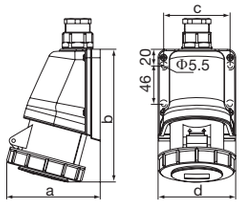
(32 A, 380 V-440 V~, 3P+E)



Dimensions (mm)	
a	166
b	98
c	22
d	93.5
Cable Size	2.5 sq. mm ~6 sq. mm
Order Code	DHQDB34032
Std. / Master Packing (No. of Unit/s)	4 N

Wall Mounted Socket

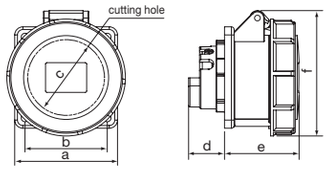
(32 A, 380 V-440 V~, 3P+E)



Dimensions (mm)	
a	114
b	162
c	80
d	93.5
Cable Size	2.5 sq. mm ~10 sq. mm
Order Code	DHQSB34032
Std. / Master Packing (No. of Unit/s)	2 N

Panel Socket

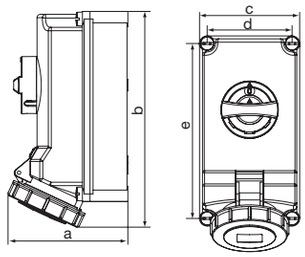
(32 A, 380 V-440 V~, 3P+E)



Dimensions (mm)	
a	75
b	60
c	57.5
d	29.2
e	64.5
f	97.5
Cable Size	2.5 sq. mm ~10 sq. mm
Order Code	DHQCB34032
Std. / Master Packing (No. of Unit/s)	4 N

Inter locking Socket

(32 A, 380 V-440 V~, 3P+E)



Dimensions (mm)	
a	142.5
b	256.5
c	119
d	101
e	208
Cable Size	2.5 sq. mm ~10 sq. mm
Order Code	DHQWB34032
Std. / Master Packing (No. of Unit/s)	1 N

Top Hospital in NCR

Euroload

Changeover Switch

Features:

- Quick make & quick break mechanism.
- High electrical & mechanical endurance.
- Advance neutral.
- Staggered terminals upto 800 A.
- Load and Line reversibility.
- Provision of phase separators, add-on auxiliary switch
- Door interlock and padlock facility.
- Extended outgoing terminals.
- Available in open execution.

Range :

- 40 A to 3150 A in 7 frame sizes in 4 Pole.

Specification :

IS / IEC 60947-1 & 3.

Technical Information

Frame Size 00

Frame size	SI Unit	Size 00			
Rated Operational Current I_e	A	40	63	80	100
Nos. of Poles		4	4	4	4
Conventional free air thermal current I_{th}	A	40	63	80	100
Rated uninterupted current I_u	A	40	63	80	100
Rated Operational Voltage AC U_e	V	415	415	415	415
Rated Insulation Voltage AC U_i	V	1000	1000	1000	1000
Rated Impulse Voltage U_{imp}	kV	8	8	8	8
Rated Frequency	Hz	50	50	50	50
Design temp./ Ambient Temp.	^{0}C	40	40	40	40
Utilization Category		AC23 A			
Conventional Enclosed Thermal Current at 40° C I_{the}	A	40	63	80	100
Rated Operational Power at 415 V, 3ø	kW	23	36	46	58
Rated Making Capacity at 436 V Rated AC 23 A, PF-0.45	A	400	630	800	1000
Rated Breaking Capacity Rated AC 23 A, PF-0.45	A	320	504	640	800
Conditional Short circuit current	kA rms	80	80	80	80
With Havells Fuse Ratings gG	A	40	63	80	100
Electrical Endurance	Operations	1500	1500	1500	1500
Mechanical Endurance	Operations	10000	10000	10000	10000
Temperature withstand range (Ambient)	^{0}C	-5 to 40	-5 to 40	-5 to 40	-5 to 40
Min. Cu cable section	mm^2	10	16	25	35
Min. Al. cable section	mm^2	16	25	35	50
Terminal Bolt Size Metric thread diameter x length		M6 X 16			
Overall Dimensions H X W X D	mm	136.5 X 144 X 158			
Weight Open Execution	kg	1.5	1.5	1.6	1.6
In Enclosure	kg	4.5	4.5	4.6	4.6

Technical Information

Frame Size	SI Unit	Size 0		
Rated operational current, I_e	A	125	160	200
Conventional free air thermal current, I_{th}	A	125	160	200
Rated uninterupted current, I_u	A	125	160	200
No. of Poles		4	4	4
Rated insulation voltage, U_i	Vac	1000	1000	1000
Rated operational voltage, U_e	Vac	415	415	415
Di-electric strength, 50 Hz	kV	5	5	5
Rated impulse withstand voltage, U_{imp}	kV	8	8	8
Conventional Enclosed Thermal Current at 40 °C, I_{the}	A	125	160	200
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35	A	1250	1600	2000
Rated breaking capacity A, 436 Vac 23 A, p.f.- 0.35	A	1000	1280	1600
Rated operational power at 415 V, 3ø	kW	72	92	115
Rated conditional short circuit current	kA rms	80	80	80
Max. Allowed cut off current	kA_{peak}	17	18	22
Electrical Durability				
No. of operating cycles AC - 23 A		1000	1000	1000
Mechanical Durability				
No. of no load operating cycles		8000	8000	8000
Temperature withstand range (Ambient)	°C	-5 to 40	-5 to 40	-5 to 40
Terminal connection				
Al. Cable/Bus Bar cross section	mm^2	70	95	150
Cu. Cable/Bus Bar cross section	mm^2	50	70	95
Weight				
Open Execution	kg	3.6	4	4
In Enclosure	kg	8.6	9.00	9.2

Frame Size	SI Unit	Size 1		Size 2	
Rated operational current, I_e	A	250	320	400	630
Conventional free air thermal current, I_{th}	A	250	320	400	630
Rated uninterupted current, I_u	A	250	320	400	630
No. of Poles		4	4	4	4
Rated insulation voltage, U_i	Vac	1000	1000	1000	1000
Rated operational voltage, U_e	Vac	415 V	415 V	415 V	415 V
Di-electric strength, 50 Hz	kV	5	5	5	5
Rated impulse withstand voltage, U_{imp}	kV	8	8	8	8
Conventional Enclosed Thermal Current at 40° C, I_{the}	A	250	320	400	630
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35		2500	3200	4000	6300
Rated breaking capacity A, 436 Vac 23 A, p.f.- 0.35		2000	2560	3200	5040
Rated operational power at 415 V, 3ø	kW	144	184	230	362
Rated conditional short circuit current	kA rms	80	80	80	80
Max. Allowed cut off current	kA_{peak}	27	33	39	55
Electrical Durability					
No. of operating cycles AC-23 A		1000	1000	1000	1000
Mechanical Durability					
No. of no load operating cycles		8000	5000	5000	5000
Temperature withstand range (Ambient)	°C	-5 to 40	-5 to 40	-5 to 40	-5 to 40
Terminal connection					
Al. Cable/Bus Bar cross section	mm^2	185	240	300	40 x 8 x 2
Cu. Cable/Bus Bar cross section	mm^2	120	185	240	40 x 5 x 2
Weight					
Open Execution	kg	7.50	8.00	15.50	16.50
In Enclosure	kg	17.00	17.50	31.20	32.20

For ratings 630A & above Bus Bar Termination Recommended

Technical Information

Frame Size	SI Unit	Size 3		Size 4	
Rated operational current, I_e	A	800	1000	1250	1600
Conventional free air thermal current, I_{th}	A	800	1000	1250	1600
Rated uninterupted current, I_u	A	800	1000	1250	1600
No. of Poles		4	4	4	4
Rated insulation voltage, U_i	Vac	1000	1000	1000	1000
Rated operational voltage, U_e	Vac	415 V	415 V	415 V	415 V
Dielectric strength, 50 Hz, V	kV	5	5	5	5
Rated impulse withstand voltage, U_{imp}	kV	8	8	8	8
Conventional Enclosed Thermal Current at 40° C, I_{the}	A	800	1000	1250	1600
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35		8000	10000	12500	16000
Rated breaking capacity A, 436 Vac 23 A, p.f.- 0.35		6400	8000	10000	12800
Rated operational power at 415 V, 3ø	kW	460	575	719	920
Rated conditional short circuit current	kA rms	80	80	80	-
Max. Allowed cut off current	kA_{peak}	70	86	100	-
Electrical Durability					
No. of operating cycles AC-23 A		500	500	500	500
Mechanical Durability					
No. of no load operating cycles		3000	3000	3000	3000
Temperature withstand range (Ambient)	°C	-5 to 40	-5 to 40	-5 to 40	-5 to 40
Terminal connection					
Al. Cable/Bus Bar cross section	mm^2	50 x 8 x 2	50 x 10 x 2	63 x 12 x 2	50 x 8 x 4
Cu. Cable/Bus Bar cross section	mm^2	50 x 5 x 2	60 x 5 x 2	80 x 5 x 2	100 x 5 x 2
Weight					
Open Execution	kg	27.00	46.00	48.00	51.00
In Enclosure	kg	44.50	82.00	84.00	87.00

Frame Size	SI Unit	Size 5		
Rated operational current, I_e	A	2000	2500	3150
Conventional free air thermal current, I_{th}	A	2000	2500	3150
Rated uninterupted current, I_u	A	2000	2500	3150
No. of Poles		4	4	4
Rated insulation voltage, U_i	Vac	1000	1000	1000
Rated operational voltage, U_e	Vac	415 V	415 V	415 V
Dielectric strength, 50 Hz	kV	5	5	5
Rated impulse withstand voltage, U_{imp}	kV	8	8	8
Conventional Enclosed Thermal Current at 40° C, I_{the}	A	2000	2500	3150
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35		20000	25000	31500
Rated breaking capacity A, 436 Vac 23 A, p.f.- 0.35		16000	20000	25200
Rated operational power at 415 V, 3ø	kW	1150	1438	1811
Rated conditional short circuit current	kA rms	80	80	80
Electrical Durability				
No. of operating cycles AC-23 A		500	500	500
Mechanical Durability				
No. of no load operating cycles		3000	3000	2000
Temperature withstand range (Ambient)	°C	-5 to 40	-5 to 40	-5 to 40
Terminal connection				
Al. Cable/Bus Bar cross section	mm^2	100 x 10 x 3	100 x 10 x 4	150 x 10 x 4
Cu. Cable/Bus Bar cross section	mm^2	100 x 5 x 3	100 x 5 x 4	100 x 10 x 3
Weight				
Open Execution	kg	88.00	91.50	98.00

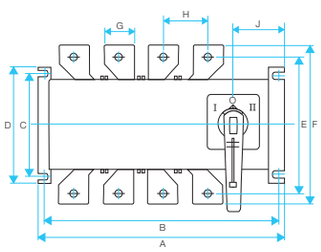
* For ratings 630A & above Bus Bar Termination Recommended

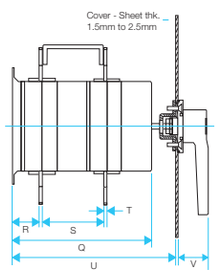
Euroload
Changeover Switch

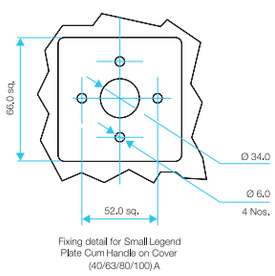
Open Execution

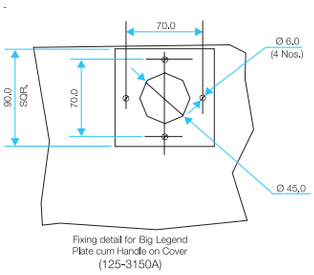
Dimension (in mm)

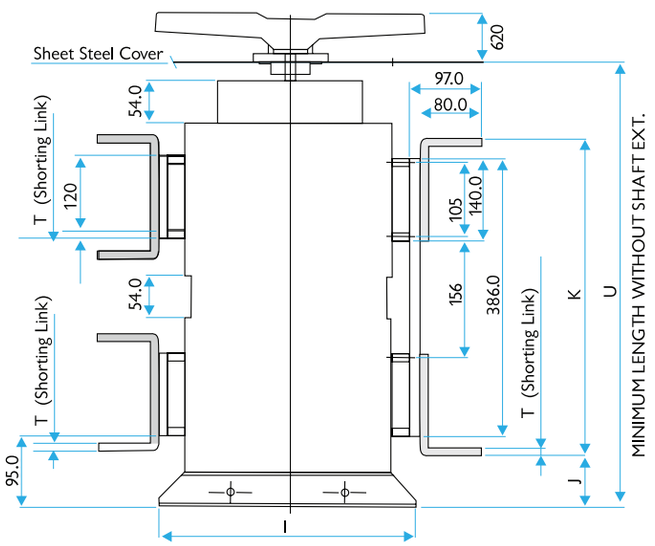
Current (A)	A	B	C	D	E	F	G	H	J	Q	R	S	T	U	V
40A-100A	156	140	94.5	111	96.5/106.5	126	12	25.5	21	125	24.5	49	2.5	156	44
125A-200A	220	207	113	132	122	148	20/24	46	34	174	54	69	3.2	215	62
250A-320A	315	306	134	156	147/165	177/198	28/35	58/63	54	220	57	89	4	260	62
400A-630A	405	378	184	206	221/241	251/281	40/55	80	76	270	67	110	5	308	62
800A	464	430	212	234	280	330	45	97	76	292	71	120	8	342	62
1000A	575	440	290	315	331	380	60x10	100	79	362	100	143	10	416	62
1250A	575	440	290	315	331	380	70x12	100	79	362	100	143	12	416	62
1600A	575	440	290	315	331	380	70x15	100	79	362	100	143	15	416	62





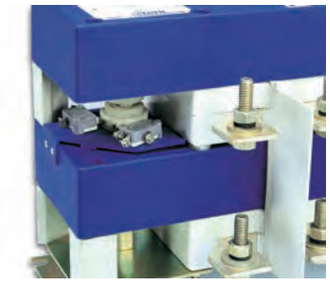






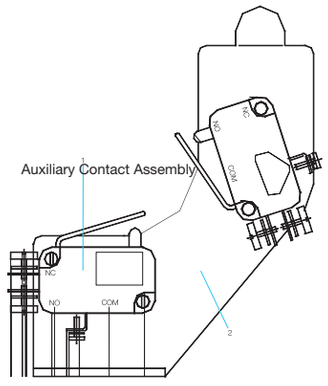
Dimensions (in mm) - Open Execution

Current (A)	A	B	C	D	E	F	G	H	J	Q	R	S	T	U	V
2000A	575	440	290	315	420	470	75	100	68.5	570	66/68.5	120	12	620	62
2500A	575	440	290	315	420	470	75	100	68.5	570	66/68.5	120	15	620	62
3150A	575	440	290	315	420	470	75	100	68.5	570	66/68.5	120	15	620	62



Accessories
Auxiliary Contact
1 No. 1 NC
2 No. 2 NC.

1. Micro Switch 1NO - 1NC
2. Mounting Frame



Euroload

By-Pass Changeover Switch

Features:

- Robust and reliable mechanism provides total disconnection.
- Quick make and break operation, independent of the operating speed enables the switches to open and close under stringent conditions, namely AC 23 A utilizations.
- The switch housing is made of fiber glass reinforced polyester, which has excellent mechanical, di-electric and thermal properties.

Range :

In current ratings of 63 A-1600 A in 6 frame sizes in 4 Pole execution.

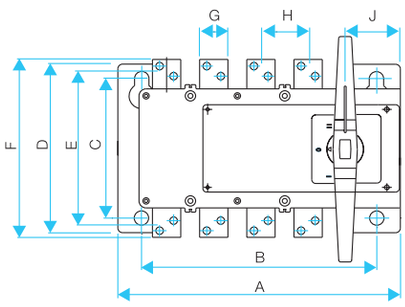
Specification :

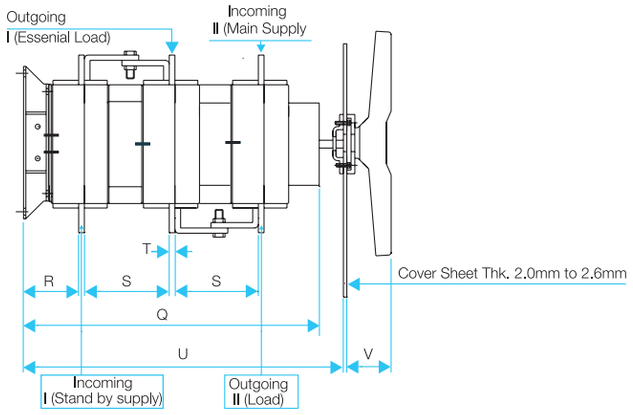
IS / IEC: 60947-1 & 3

Euroload

By-Pass Changeover Switch

Dimension (in mm)





Current (A)	A	B	C	D	E	F	G	H	J	Q	R	S	T	U	V
Size 63 A	144	128	95	111	120	136	12	25	29	178	26	51	2.5	210	44
Size 100 A	144	128	95	111	135	150	12	25	29	178	26	51	2.5	210	44
125	220	207	113	132	122	148	20	46	34	250	54	69	3.2	272	62
160	220	207	113	132	122	148	24	46	34	250	54	69	3.2	272	62
200	220	207	113	132	122	148	24	46	34	250	54	69	3.2	272	62
250	315	300	134	156	165	198	28	58	54	331	57	89	4.0	337	62
320	315	300	134	156	165	198	35	63	54	331	57	89	4.0	337	62
400	405	378	184	206	221	251	40	80	76	385	67	110	5.0	405	62
630	405	378	184	206	241	281	55	80	76	385	67	110	5.0	405	62
800	464	430	212	234	280	330	45	80	76	420	71	120	8.0	440	62
1000	575	440	290	315	331	380	70	100	85	514	101	145	10.0	534	62
1250	575	440	290	315	331	380	70	100	85	514	100	143	12.0	534	62
1600	575	440	290	315	331	380	70	100	85	514	98.5	140	15.0	534	62

Technical Information

Frame size	SI Unit	Size 00		Size 0			Size 1		Size 2		Size 3	Size 4		
Rated Operational Current I_e	A	63	100	125	160	200	250	320	400	630	800	1000	1250	1600
Rated Insulation Voltage U_i	Vac	1000												
Conventional free air thermal crrent I_{th}	A	63	100	125	160	200	250	320	400	630	800	1000	1250	1600
Conventional enclosed thermal crrent I_e	A	63	100	125	160	200	250	320	400	630	800	1000	1250	1600
Rated uninterrupted current I_u	A	63	100	125	160	200	250	320	400	630	800	1000	1250	1600
Rate Operational Voltage U_e	Vac	415												
Di-electric Strength 50 Hz	kV	5	5	5	5	5	5	5	8	8	10	10	10	10
Rated impulse withstand voltage (Uimp)	kV	8												
Conditional short circuit current	kA rms	80												
Making Capacity 436 V, AC 23 A PF-0.45 (100 A) / - 0.35 (I_e > 100 A)	A	630	1000	1250	1600	2000	2500	3200	4000	6300	8000	10000	12500	16000
Breaking Capacity 436 V, AC 23 A PF-0.45 (100 A) / - 0.35 (I_e > 100 A)	A	504	800	1000	1280	1600	2000	2560	3200	5040	6400	8000	10000	12800
Mechanical Durability		10000		8000			8000	5000	5000		3000	3000		
Electrical Durability		1500		1000			1000		1000		500	500		
Terminal Connection Aluminium Cable/Busbar Cross-section	mm^2	25	50	70	95	150	185	240	300	40x8x2	50x8x2	50x10x2 63x12x2 50x8x4		
Copper Cable / Busbar Cross-section	mm^2	16	35	50	70	95	120	185	240	40x5x2	50x5x2	60x5x2 80x5x2 100x5x2		


LIGHTING & POWER PANEL
DANGER

Automatic Transfer Switch

Instaprime

40 A to 125 A in 4 Pole Execution

Instaline

100 A to 630 A

Features:

- High speed transfer
- Superior making & breaking capacity
- Compact & light weight design
- Positive indication through flag indicator
- Neutral point transfer
- Liberal terminals
- Phase barriers Range
- Release operates in 2 modes - automatic and manual

Range :

Current rating from 40 A to 630 A

Specification :

Conforms to IS/IEC:60947-6-1

Instaprime Automatic Transfer Switch

Range :

Current rating from 40 A to 125 A

In Four pole execution

Specification :

Conforms to IS/IEC:60947-1 & 60947-6-1

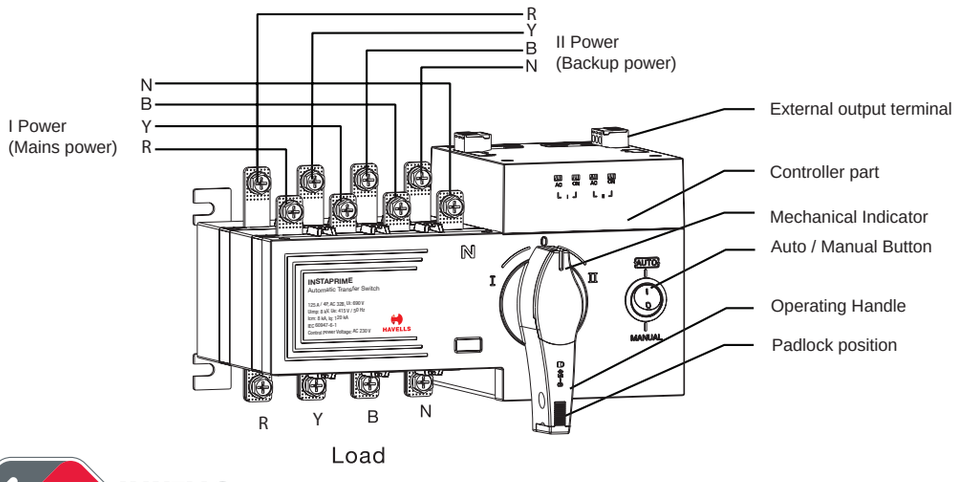
Technical Specifications

Rated Current In (A)		40 A	63 A	80 A	100 A	125 A
Rated Thermal Current Ith		40	63	80	100	125
No. of Poles		4				
Rated Insulation Voltage Ui (V)		690				
Rated Operational Voltage Ue (V)		415				
Dielectric Strength (kV)		5				
Rated Impulse Withstand Voltage Uimp (kV)		8				
Rated Short-time Withstand Current Icw (kA rms) 0.1s/ 1s		9/5				
Rated Limit short-circuit current (kA), protected by Fuse		120				
Rated Short Circuit Making Capacity (kA)		8				
Rated Control Power Voltage (V)		AC 230 V, 50 Hz				
Transfer Time	I-0-II	1 s				
Weight (kg)	4 pole	4.2	4.2	4.2	4.2	4.2
Utilization Category		AC- 33 B				
Standard Conformity		IEC 60947-1, IEC 60947-6-1				
Ambient Temperature		-20 °C to + 50 °C				
Atmospheric Conditions		Humidity not more than 50% at max. 50°C, higher humidity is allowed at lower temperature, at most wet month, the average max humidity is 90% at the average minimum temperature of +25°C, and have consideration on the product surface due to the temperature variation				
Altitude		Up to 2000 m				
Pollution Class		Class 3				

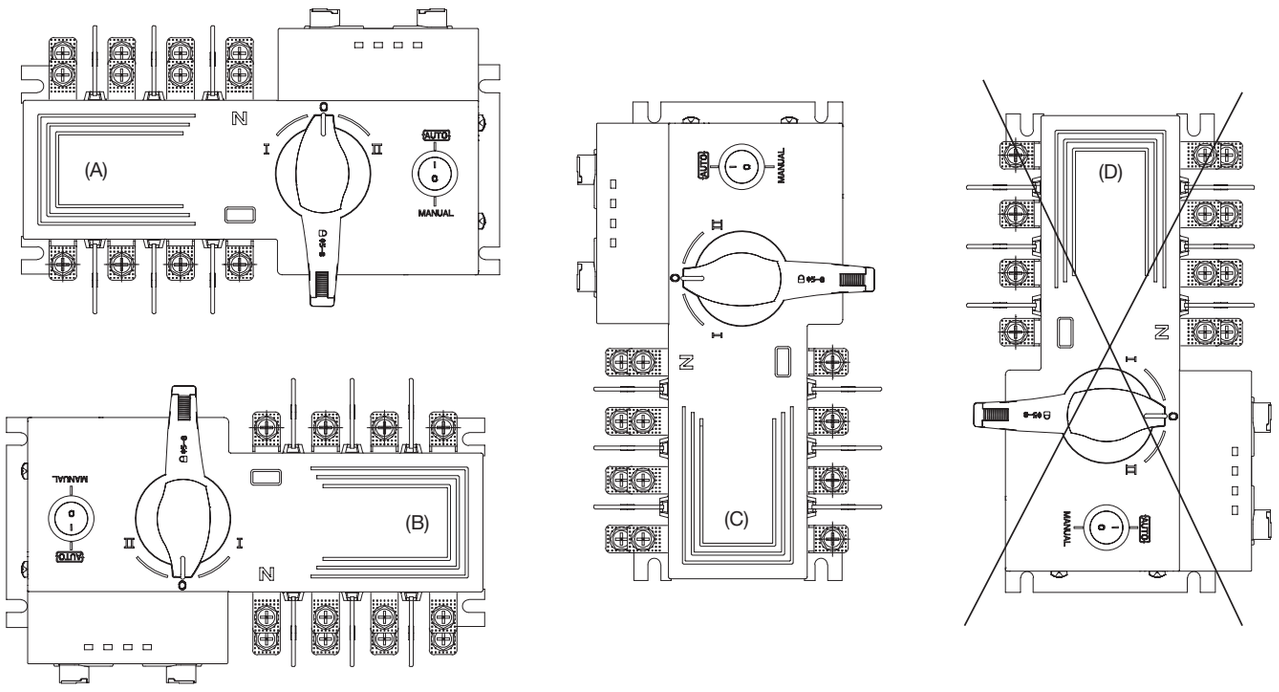
Controller Features:

- Suitable for two way Main and Backup power system
- Works in both auto and manual modes
- Auto transfer with auto recovery
- Passive fire-linkage feature
- Generator start function
- Multiple LED annunciations

Switch Description



Product Installation

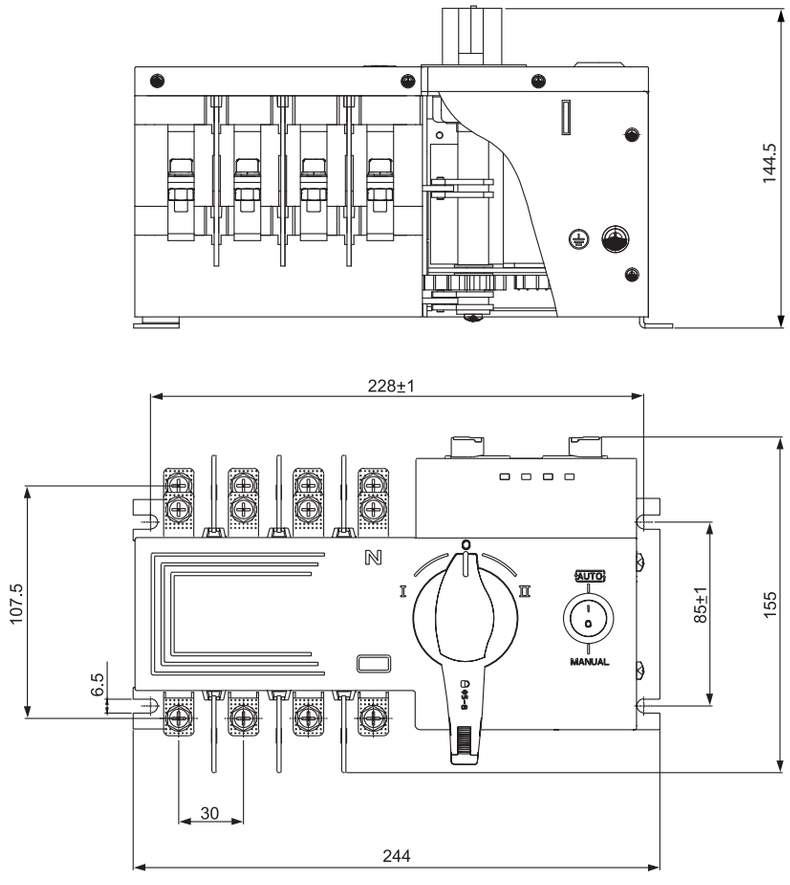


A, B, C: Correct installation

D: Wrong Installation

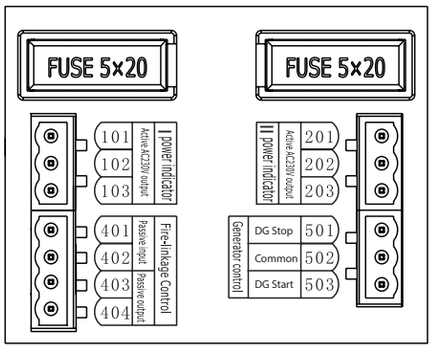
Without Enclosure

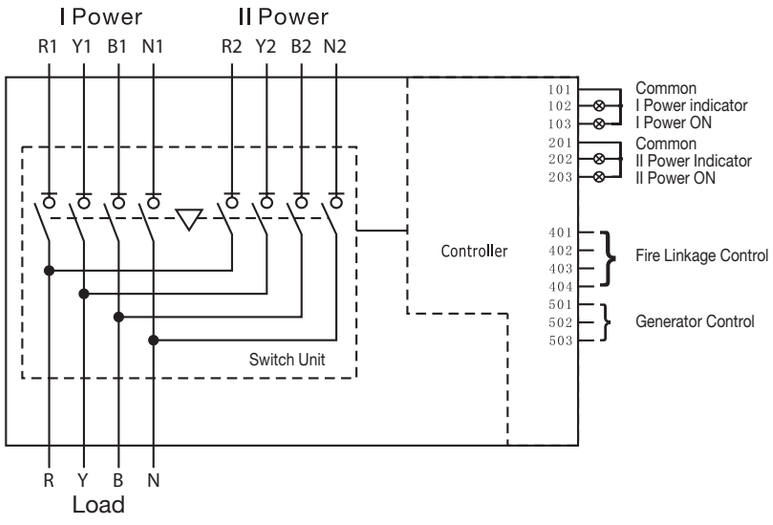
Dimension (in mm)



Instaprime
Automatic Transfer Switch

Wiring Instructions





Terminal Number	Description
101 – 103 : Main Power External Indicator Signal	
101	Common for Mains Signal output
102	Main power availability indicator signal output
103	Main Power ON signal output
201 – 203 : Backup Power External Indicator Signal	
201	Common for Backup Signal output
202	Backup power availability indicator signal output
203	Backup power ON signal Output
401 – 404 : Fire Linkage Control Signal Input & Feedback Signal Output	
401	Fire Linkage Control Signal Passive input, if the signal from fire-fighting equipment is an active signal, that is if the terminal 401 & 402 are NC (shorted) then the ATS will come to OFF (Trip) position and will not switch to mains or backup power side even if they are available.
402	
403	Feedback signal for ATS transfer to OFF position when the active fire linkage signal is present.
404	
501 – 503 : Generator Start Control Signal Output (Set of Passive Relay Contact Point) **	
501	Relay / Control signal NO Point
502	Relay / Control signal Common Terminal
503	Relay / Control signal NC Point

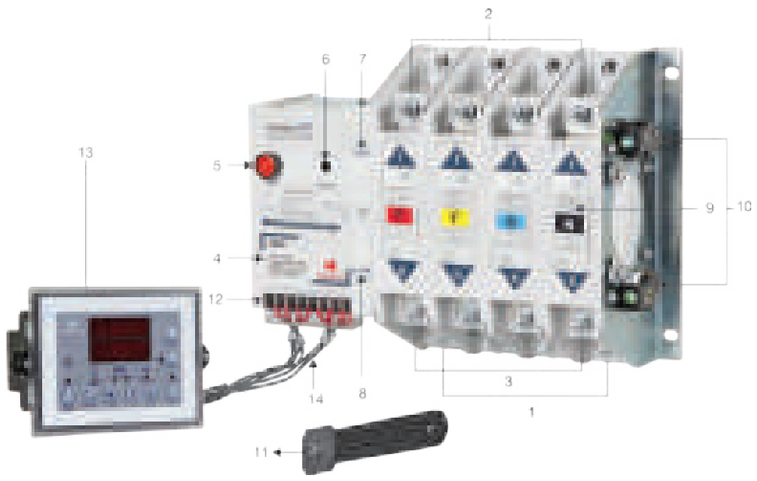
*When the fire- linkage function is active, the ATS will stop working. To enable it to work again, one must first clear up the fire-fighting signal and then switch the Auto/ Manual control switch one time, then the ATS will recover to normal working.

**When the backup power is Auto start generator type, the users can connect the 501 – 503 terminals to the generator controller to achieve the generator auto start function. When Mains power is normal then 501 & 502 are closed, 503 & 501 are open. If Mains power failure occurs then 501 & 502 are open, meanwhile 503 & 502 are closed, to send generator start signal.

Instaline Automatic Transfer Switch

Instaline
Automatic Transfer Switch

External view with identification of parts



1. Terminals For Load
2. Main Supply Terminals
3. Standby Supply Terminals
4. Name Plate
5. Trip Button
6. Selector (Source-II)
7. On / Off Indicators (Source I)
8. On / Off Indicators (Source II)
9. Arc Extinguishing Chambers
10. Auxilliary Switch (2 nos.)
11. Manual Operating Handle
12. Control Circuit Terminal Block
13. ATS Controller Unit
14. Control Wiring

Operation

I - Automatic

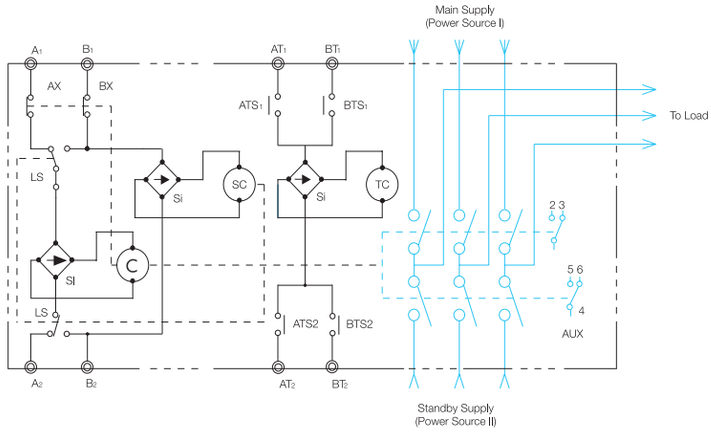
In the event of main supply being available, the ATS can be instantaneously switched ON, by the closing coil C, through terminals A1, A2, from its OFF / Neutral position.

If the ATS is ON at the standby supply position, then it is first tripped by the trip coil TC, through terminals BT1 - BT2. This ensures that the two sources of supply are not paralleled. A suitable external control circuit will ensure this, as shown in circuit diagram for Automatic Instantaneous Changeover mode.

The Auxiliary Switches AX or BX, disconnect the closing coil C, once the ATS is ON, thereby the power consumption of the coil C is zero, when the ATS is closed.

To switch the ATS to standby supply, the selective coil SC is first energised. Then the closing coil C is powered through limit swtiches LS and terminals B_1, B_2.

The Trip Coil TC, can be energised through AT_1 - AT_2 or BT1 - BT_2 to switch off the main supply or standby supply.



II - Manual

Click to lock

ATS can be operated manually, but as an off-load switch only.

Close on to Main Supply

A manual handle rotates the operating shaft by about 45^0 in anticlockwise direction, to achieve closure, under off-load conditions.

Close on to Standby Supply

Closure on to standby supply side is achieved, when the “selective” mode is continously pressed and the manual handle rotates the operating shaft by about 45^0 in anticlockwise direction.

Trip: Tripping can be achieved manually by pressing momentarily through the “Trip Button”.

Keep selector pressed using a screwdriver

Closing ATS manually to source-II

1. Keep selector pressed using a screwdriver through the selector hole as shown
2. Switch to source-II (mains) by rotating the handle upwards though an angle (approximately 45°)

Closing ATS manually to source-I

Switch to source-I (mains) by rotating the handle upwards though an angle (approximately 45°)

Technical Information

Frame Size	SI Unit	TNFO1			TNFO2	
Rated Operational Current I_e	A	100	125	160	200	250
Conventional free air thermal current I_{th}	A	100	125	160	200	250
Rated Operational Current I_{the}	A	100	125	160	200	250
Rated uninterrupted Current I_u	A	100	125	160	200	250
No. of Poles		3P / 4P	3P / 4P	3P / 4P	3P / 4P	3P / 4P
Rated Insulation Voltage U_i	V	1000	1000	1000	1000	1000
Rated Operational Voltage U_e	V	415 Vac / 110 Vdc			415 Vac / 110 Vdc	
Rated frequency	Hz	50	50	50	50	50
Class		PC	PC	PC	PC	PC
Utilization Category		AC 31 A	AC 31 A	AC 31 A	AC 31 A	AC 31 A
Di-electric Strength	kV	5	5	5	5	5
Rated Impulse withstand Voltage U_{imp}	kV	8	8	8	8	8
Rated making capacity at 415 V (Cosø = 0.80)	A	150	187.5	240	300	375
Rated breaking capacity at 415 V (Cosø = 0.80)	A	150	187.5	240	300	375
Rated short time withstand current (1 second)	kA rms	5	6	7	10	11
Rated Conditional short circuit current	kA rms	80	80	80	80	80
Rated Short circuit making capacity	kA rms	7.65	14	17	17	17
Mech. Life (No. of ops.)		10,000	10,000	10,000	10,000	10,000
Elect. Life (No. of ops.)		6,000	6,000	6,000	6,000	6,000
Switching frequency (ops. per hour)		60	60	60	60	60
Terminal Position		Front	Front	Front	Front	Front
Terminal Capacity - Cu (cable)	mm^2	35	50	70	95	150
Al (cable)	mm^2	50	70	95	150	185
Busbar	mm	---	---	---	---	---
Weight 3P kg		8.3	8.3	8.7	10.5	10.5
4P kg		9.3	9.3	9.7	11.5	11.5
Mounting		Vertical	Vertical	Vertical	Vertical	Vertical
Coil						
Operating Voltage	V	200 / 220	200 / 220	200 / 220	200 / 220	200 / 220
Operating Current	A					
Main Coil 3P / 4P		3.0 /3.5	3.0 /3.5	3.0 /3.5	4.0/4.5	4.0/4.5
Trip Coil		0.5	0.5	0.5	0.5	0.5
Operating Time	(ms)					
Main Power Source Make		55	55	55	55	55
Break		20	20	20	20	20
Standby Power Source Make		80	80	80	80	80
Break		20	20	20	20	20
Changeover time		(Using Controller Mode)				
Changeover time				min	-	0.1 s
				max	-	60 s

3 P - Three Pole, 4 P - Four Pole

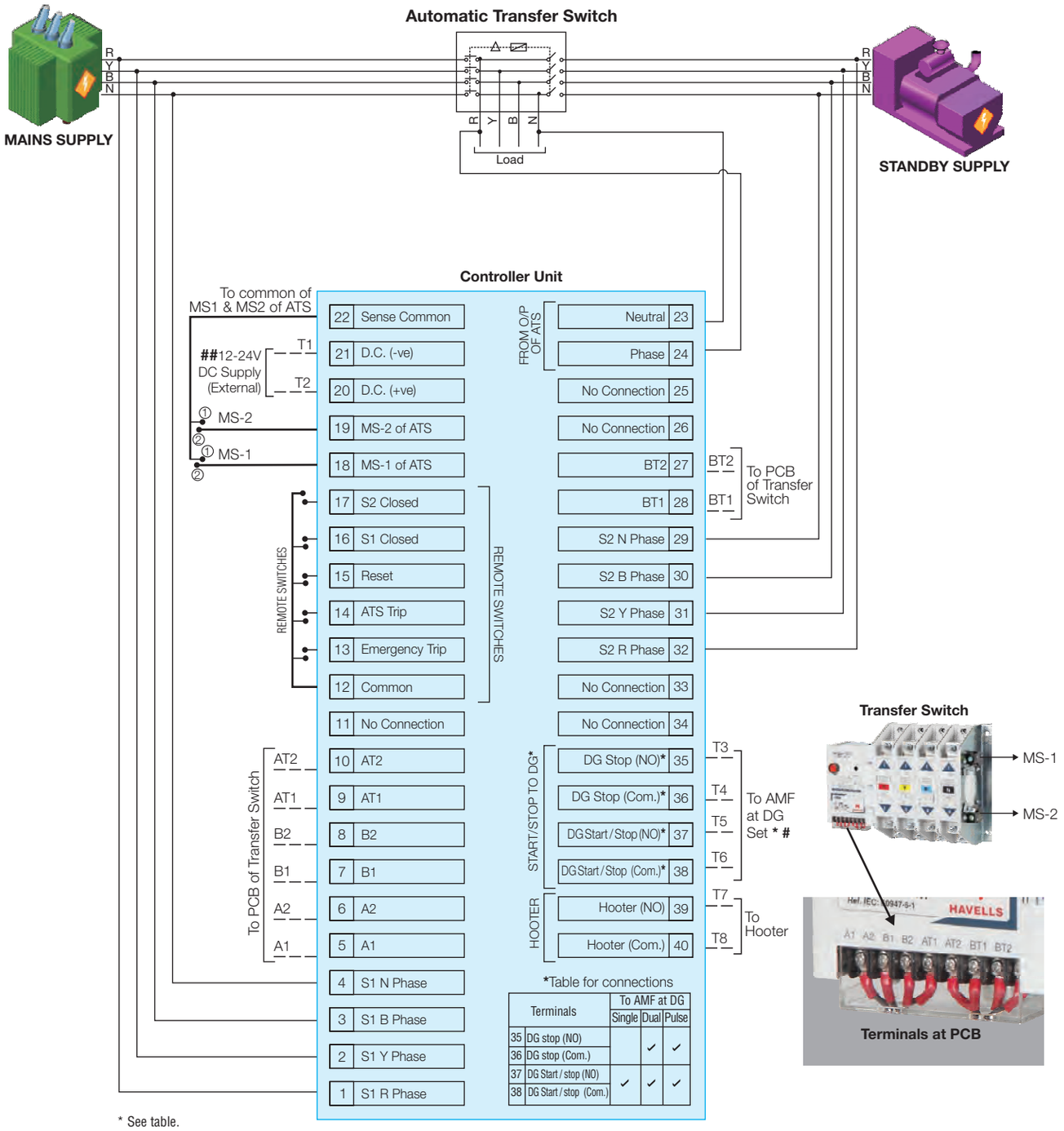
Technical Information

Frame Size	SI Unit	TNFO3		TNFO4	
Rated Operational Current Ie	A	315	400	500	630
Conventional free air thermal current I_{th}	A	315	400	500	630
Rated Operational Current I_{the}	A	315	400	500	630
Rated uninterrupted Current I_u	A	315	400	500	630
No. of Poles		3P/4P	3P / 4P	3P / 4P	3P / 4P
Rated Insulation Voltage Ui	V	1000	1000	1000	1000
Rated Operational Voltage Ue	V	415 Vac / 110 Vdc	415 Vac / 110 Vdc	415 Vac / 110 Vdc	
Rated frequency	Hz	50	50	50	50
Class		PC	PC	PC	PC
Utilization Category		AC31 A	AC 31 A	AC 31 A	AC31 A
Dielectric Strength	kV	5	5	5	5
Rated Impulse withstand Voltage Uimp	kV	8	8	8	8
Rated making capacity at 415 V (Cosø = 0.80)	A	473	600	750	945
Rated breaking capacity at 415 V (Cosø = 0.80)	A	473	600	750	945
Rated Conditional short circuit current	kA rms	12	12	12	15
Fuse protected S/C withstand current	kA rms	80	80	80	80
Rated Short circuit making capacity	kA rms	17	17	17	25.2
Mech. Life (No. of ops.)		10,000	10,000	10,000	10,000
Elect. Life (No. of ops.)		4,000	4,000	4,000	2,000
Switching frequency (ops. per hour)		60	60	60	60
Terminal Position		Front	Front	Front	Front
Terminal Capacity - Cu (cable)	mm^2	185	240	---	---
Al (cable)	mm^2	240	300	---	---
Busbar	mm	---	40 x 5 x 2	40 x 6 x 2	40 x 8 x 2
Weight 3P kg		11	18	18	19.5
4P kg		12	21	21	22.5
Mounting		Vertical	Vertical	Vertical	Vertical
Coil					
Operating Voltage	V	200 / 220	200 / 220	200 / 220	200 / 220
Operating Current	A				
Main Coil 3P / 4P		4.0/4.5	8.0/10.5	8.0/10.5	8.0/10.5
Trip Coil		0.5	0.7	0.7	0.7
Operating Time	(ms)				
Main Power Source Make		55	60	60	60
Break		20	25	25	25
Standby Power Source Make		80	90	90	90
Break		20	25	25	25
Changeover time		0.1 s			
Changeover time		60 s			

3 P - Three Pole
4 P - Four Pole

Circuit Diagram

Circuit Wiring Diagram



* See table.
\# Not required in Changeover (C) mode.
##Not required in Changeover (C) mode for operation.

ATS Controller

Introduction

- Havells ATS controller can be programmed for both ATS and Changeover (C) configurations.
- Both these configurations can be further operated in both Auto and Manual modes.
- Communication (Start / Stop) feature with DG for automatic starting and stopping of DG.
- In the Changeover mode, no external 12 Vdc supply is required for its operation.
- 3 types of provision for DG start/ stop command- Single Contact, Dual Contact or Pulse Contact.
- Capable of measuring 1 Phase / 3 Phase Voltage of both mains & DG, along with the mains frequency.
- Inbuilt protection for mains against Under/Over Voltage, Under/Over Frequency and the phase failure.
- Suitable for both Utility-DG and Utility-Utility applications
- Eight LED annunciations on its front panel to indicate the Source & Contacts Status.
- Records the last 50 events with date and time stamping
- 6 Digit, 2 Row, Alpha Numeric LCD Display with 7 segments for ease of readout.
- True RMS measurement of all measured parameters.
- Display of parameters in the auto scrolling mode which can be enable and disabled.
- Plug in connectors for prompt and error free replacement.

ATS Configuration:

ATS controller monitors the Mains (S1) supply, if Mains (S1) supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time, ATS releases the Mains (S1) contacts, trips and the potential free contact(s)* becomes NC to send a command to the AMF controller at DG Set (Source 2) to start it. On restoration of healthy Mains (S1) supply continuously for the programmed duration, the ATS releases the DG Set (Source 2) contacts, trips and the potential free contact(s)* becomes NO which in itself acts as a command to the AMF controller at DG Set (Source 2) to stop it. The load is transferred to the mains (S1) and the generator is stopped after the programmed re-cooling time delay.

Changeover Configuration:

This is similar to ATS configuration only except that the communication (Start/Stop) with the DG Set (Source2) is disabled. Also, in this mode, no external 12-24 Vdc. supply is required for its operation. The controller monitors the Mains supply, if Mains (S1) supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time, the ATS releases the Mains (S1) contacts and trips. In case, the source 2 becomes available in healthy condition, it shifts the contacts to DG (Source 2), otherwise it rests in TRIP position only. On restoration of healthy Mains (S1) supply continuously for the programmed duration, the ATS releases the source 2 contacts, trips and shifts the contacts to source1 to transfer the load to the Mains (S1) supply. In this configuration, in case if both the Mains (S1) and DG (S2) supplies are unavailable / unhealthy, then only to turn ON the display, the external 12-24 Vac supply is required.

*Potential Free Contacts for DG Start/Stop:

There are three types of potential free contacts for DG Start/Stop:

i) Single Contact: Single potential free contact (at 37-38) is used for both Start & Stop. This potential free contact becomes NC to send a command to the AMF controller at DG Set (Source 2) to start it. And to give the Stop command, these contacts become NO and the same is the position by default also.

ii) Dual Contact: Two separate potential free contacts are used, one each for Start & Stop to the AMF controller at DG Set (Source 2). To give the Start command, the potential free contact at 37-38 becomes NC and the other at 35-36 remains at NO position. Similarly, to give the Stop command the potential free contact at 35-36 becomes NC while the other at 37-38 becomes NO and the same is the position by default also.

iii) Pulse Contact: This is similar to Dual contact (ii) only, except that the Start/Stop commands are given for a pulse duration (1 second) to the AMF controller at DG Set (Source 2). By default, both the potential free contacts remain at NO position. To give the Start command, the potential free contact at 37-38 becomes NC for a pulse duration of 1 second and then comes back to the NO position. Similarly, to give the Stop command, the potential free contact at 35-36 becomes NC for a pulse duration of 1 second and then comes back to the NO position.

Display / Front Panel

- 6 Digit, 2 Row, Alpha Numeric, 7 segment display for ease of readout. Parameters are displayed in English. Normally the display auto scrolls and displays a parameter for 10 seconds, but any time the Next key (✓) can be pressed to select the next parameter window.

Measurements, Protection and Supervision

Measurements

- 1 Phase/ 3 Phase Voltage of mains
- Mains Frequency
- 1 Phase/ 3 Phase Voltage of DG

Protection / Supervision Mains

- Under/Over Voltage
- Under/Over Frequency
- Phase Fail

View Event Recording

Last 50 events can be viewed with date and time stamping

Faults

- Trip Fail
- S1 Close Fail
- S2 Close Fail
- Emergency Trip (ATS)
- Fail To Start (DG/ Source 2)
- Fail To Stop (DG/ Source 2)

Input and Output

Potential Free Output:

ATS controller has 3 potential free output as below:

- Hooter (Com.)
- DG Start/Stop (Com.)
- DG Stop (Com.)
- Hooter (NO)
- DG Start / Stop (NO)
- DG Stop (NO)

Digital Input:

ATS controller has 6 digital input as below

- MS-1 of ATS
- MS-2 of ATS
- Reset
- Emergency Trip
- S1 Closed
- S2 Closed
- ATS Trip

Output:

ATS Controller has 8 outputs :

- A1
- A2
- B1
- B2
- AT1
- AT2
- BT1
- BT2

Specifications

AC voltage withstand	330 Vac (Phase to neutral)
Surge 1.2/50Usec	2.5 kV
Control Supply Supply	Suitable for 12 Vac - 24 Vac (External)
Cut out Dimensions	154 mm X 116 mm
Depth	72 mm

Setting Procedure:

Press Next & Reset switches simultaneously. The LCD shall display, "Edit"

To enter edit Parameter setting mode press Next Switch For any change in value in edit parameter press S1 switch and S2 switch.

Edit:

Parameter Name on LCD & Icon	Explanation of Parameter	Factory Setting	Setting Range
SYS Ph	It is possible to select ATS and changeover configurations for any combination of Mains phases (1/3) and DG phases (1/3), where "C" indicates the changeover configuration. e.g. the factory setting " C 3M 3G" indicates to operate the ATS in changeover configuration and both Mains and DG are 3-phase systems.	C 3M 3G	C 1M 1G C 3M 1G C 3M 3G 1M 1G 3M 1G 3M 3G
S1 OV	Max. Permissible Mains voltage, above this the Mains voltage is treated unhealthy or over voltage condition.	270 V	80 V - 300 V
S1 UV	Min. permissible voltage, below this the voltage is treated unhealthy or under voltage condition.	180 V	80 V - 300 V
VD	Duration for which Mains Over / Under voltage condition is to be tolerated before tripping the ATS.	10	1-999 Second
OF	Max. permissible Mains frequency, above this frequency the Main is treated unhealthy or over frequency condition.	55.0 Hz	40.0-65.0 Hz
UF	Min. permissible Mains frequency, below this frequency the Mains is treated unhealthy or under frequency condition.	45.0 Hz	40.0-65.0 Hz
S1 Fd	Time for which the unhealthy Mains frequency is to be tolerated (under or over frequency as defined above) before tripping the ATS.	10	1-999 Second
S2 PV	This parameter specifies the generator voltage at which it is considered to be in healthy condition.	200 V	80 V -270 V
S1 FL	Some application require to trip the ATS on failure of one of the phases. Others want all the 3 phases to become unhealthy before tripping the ATS. The ATS Controller can handle both situations.	1P FAIL	1P FAIL 3P FAIL
StRT T	The time, for which the Controller will give starting command to the Generator*	150 Second	0-999 Second
S2 WT	DG (S2) warm up time after DG build up voltage has crossed the set limit (S2 PV).	0 Second	0-999 Second
S1 S2 d	User programmable delay when the load is transferred from Generator to Mains.	2.0 Second	0-99.9 Second
S1 RT	The time for which Mains should be continuously healthy before the load is transferred from DG (S2) to Mains (S1).	10 Second	1-999 Second
RCOL	The time for which after transfering load to Mains from DG (S2), the DG is allowed to run at no load for cooling. After this time the stop command is sent to the DG (S2).	10 Second	1-999 Second
C Ty	The type of potential free contacts which goes to the AMF at DG to give the start / stop command (Refer page 10 for potential free contacts).	S CO	P CO (Pulse) d CO (Dual) S CO (Single)
StOP T	The time for which the controller gives the stopping command to DG (S2).	20 Second	0-999 Second
HOOTER	Duration for which the hooter shall be ON (if not externally reset), while announcing a fault or emergency trip.	30 Second	0-999 Second
AUTO S	Setting ON will enable Auto Scroll of display. Disabling this will not scroll and the next parameters can be viewed by pressing next switch.	ON	ON / OFF

*Not required in Changeover (C) mode.

View Event:

Press Next and Reset Switches simultaneously. The LCD shall display "Edit".

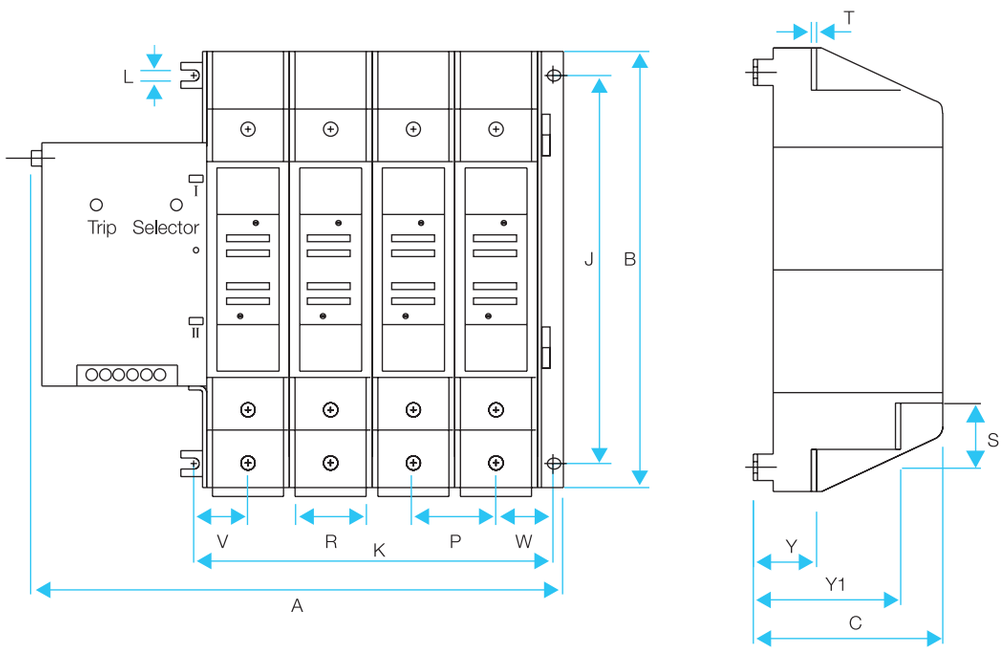
To go to next menu after the "Edit" press S1 Switch, the LCD shall display **"View Event"**. To View Display Event mode press Next Switch. ATS keeps a log of last 50 events. Parameter change, RTC Change, Mode Change and Fault are considered as event. Events are stamped along with date and time and to view them, keep on pressing Next Switch. To come out of this **"View Event"** mode, press the Reset Switch.

RTC Set:

After the "View Event" is displayed press S1 Switch, the LCD shall display **"RTC set"**. To change the RTC (real time clock) press Next Switch. Firstly, the YEAR shall be displayed. For feeding value, use the S1 & S2 switches. Then pressing the Next switch, MON (Month) will be displayed. Similarly, then date, then SEC (seconds), MIN (minutes) and HOUR (hours) can be edited.

I- Open Execution

Dimension (in mm)



Frame Size	Current rating (A)	No. of Poles	Over all dimensions			Switch mounting			Connection Terminals								Terminal Bolt Size (mm)	Weight (kg)
			A	B	C	J	K	L	P	R	S	T	V	W	Y	Y 1		
1	100 A - 160 A	3P	257	241	122	201	139	Φ9	38	15	30	4	30	32	40	90	M8X25	8.3 (100 A,125 A), 8.7 (160 A)
		4P	295	241	122	201	177	Φ9	38	15	30	4	30	32	40	90	M8X25	9.3 (100 A,125 A), 9.7 (160 A)
2	200 A - 250 A	3P	290	253	122	213	172	Φ9	49	30	30	4.5	35	38	40	90	M8X30	10.5 (200 A), 11 (250 A)
		4P	338	253	122	213	221	Φ9	49	30	30	4.5	35	38	40	90	M8X30	11.5 (200 A), 12 (250 A)
3	315 A - 400 A	3P	311	253	122	213	193	Φ10	56	40	28	5	46	52	38	110	M10X25	13.1 (315 A), 13.5 (400 A)
		4P	367	253	122	213	249	Φ10	56	40	28	5	46	52	38	110	M10X25	14.1 (315 A), 14.5 (400 A)
4	500 A - 630 A	3P	340	337	144	290	208	Φ10	60	44	40	7	42	42	38	110	M10X40	20.6 (500 A), 21 (630 A)
		4P	400	337	144	290	270	Φ10	60	44	40	7	42	42	38	110	M10X40	20.6 (500 A), 22.5 (630 A)

Kompact

Switch Disconnector Fuse

Features:

- Front operated, positive break double isolation switch mechanism
- Multi Break arcing contacts per pole for higher electrical life
- Stationary Fuse Links prevent loosening of fuses
- Handle with Padlock, Door interlock and defeat mechanism facility
- Add-on auxiliary switch
- Available in open execution and in sheet steel enclosure.
- Suitable for Aluminium cable termination

Range :

- 32 A to 800 A with bolted type fuse links
- 32 A to 800 A with knife type fuse links
- 32 A to 800 A isolator version.

Specification :

- Single Pole with Switched Neutral
- Double Pole / Triple Pole
- Triple Pole & Neutral / Triple Pole with Switched Neutral
- Four Pole

Technical Information

Frame Size	SI Unit	Size I		Size II	
Rated Operational Current I_e	A	32	63	100	125
Conventional free air thermal current I_{th}	A	32	63	100	125
Conventional enclosed thermal current I_{the}	A	32	63	100	125
Rated Operational Voltage U_e	Vac	415	415	415	415
Rated uninterrupted current I_u	A	32	63	100	125
Rated Insulation Voltage U_i	Vac	1000	1000	1000	1000
Rated Impulse withstand Voltage $U_{imp.}$	kV	8	8	8	8
Rated Frequency	Hz	50	50	50	50
Design temp./ Ambient Temp.	^{0}C	40	40	40	40
Utilization category		AC 23 A			
Rated Enclosed Thermal Current	A	32	63	100	125
Rated Operational Power at 415V, 3ø	kW	23	36	58	72
Rated Making Capacity AC 23 A	A	320	630	1000	1250
Rated Breaking Capacity AC 23 A	A	256	504	800	1000
Conditional short circuit current	kA_{rms}	80	80	80	80
Rated Short-time withstand current (without) fuses for (1 s)	kA	2	2	3.75	3.75
Type of HBC Fuse links - BS Type TIA/A2 , TSS/A3,TSD/A4,TSF/B2,TSK/B3,TSMF/B4,TTS/C2,TLM/C3 - DIN Type CD/00, CD/1,CD/2,CD/3		H-TIA H-CD-00	H-TSS H-CD-00	H-TSD H-CD-00	H-TSD H-CD-00
Electrical Endurance	No. of Operations	1500	1500	1500	1500
Mechanical Endurance	No. of Operations	10000	10000	10000	10000
Temperature withstand range (Ambient)	^{0}C	5 to 40	5 to 40	5 to 40	5 to 40
Min. Cu cable section	mm^2	6	16	35	50
Min. Al. cable section	mm^2	10	25	50	70
Terminal Bolt Size Metric thread diameter x length	M6 x 16	M6 x 16	M6 x 16	M6 x 16	
Weight Open Execution	kg	1.2	1.2	1.5	1.5
In Enclosure	kg	4.2	4.2	4.5	4.5

Technical Information

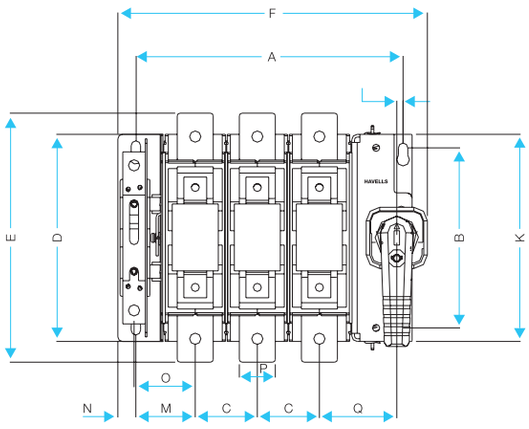
(Kompact Ezo)

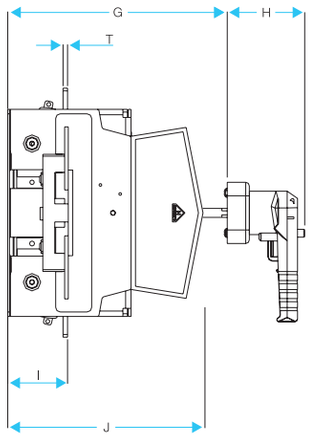
Frame Size	SI Unit	Size III			Size IV		Size V	
Rated Operational Current I_e		160 A	200 A	250 A	320 A	400 A	630 A	800 A
Conventional free air thermal current I_{th}		160 A	200 A	250 A	320 A	400 A	630 A	800 A
Conventional enclosed thermal current I_{the}		160 A	200 A	250 A	320 A	400 A	630 A	800 A
No. of Poles		TPN & FP						
Rated uninterrupted current I_u		160 A	200 A	250 A	320 A	400 A	630 A	800 A
Rated operational Voltage U_e	Vac	415	415	415	415	415	415	415
Rated Insulation Voltage U_i	Vac	690	690	690	690	690	690	690
Rated Frequency	Hz	50	50	50	50	50	50	50
Rated impulse withstand voltage (Uimp)	kV	8	8	8	8	8	8	8
Utilization Category		AC 23 A						
Rated making capacity	A	1600	2000	2500	3200	4000	6300	8000
Rated breaking capacity	A	1280	1600	2000	2560	3200	5040	6400
Rated fused short-circuit current (Icn) With Havells fuses	kA	80	80	80	80	80	80	80
Capacitor duty-Connected-415 V, 50 Hz - 60 Hz	kVAr	57	92	115	145	175	250	270
Endurance (operations) Mechanical	Nos.	8000	8000	8000	5000	5000	5000	3000
Endurance (operations) Electrical	Nos.	1000	1000	1000	1000	1000	1000	500
Rated Short-time withstand current (Icw) with shorted links for (1.0 s)	kA rms	5	5	5	10	10	10	10
Type of HBC Fuse links BS Type DIN Type		B2 Size 1	B2 Size 1	B3 Size 1	B3 Size 2	B4 Size 2	C2 Size 3	C3 Size 3
Min. Cu cable section	mm^2	70	95	120	185	240	40x5x2	50x5x2
							(Bus Bar)	(Bus Bar)
Min. Al. cable section	mm^2	95	150	185	240	300	40x8x2	50x8x2
							(Bus Bar)	(Bus Bar)
Terminal Screw	mm	M10x30	M10X30	M10X30	M10X30	M10X30	M10X30	M10X30
Aprox Wt. of TP Switch (without fuse links)	kg	6.1	6.1	6.1	12.5	12.5	17.0	17.0

* TPN - Three Pole & Neutral; FP - Four Pole
For ratings 630A and above, bus bar termination is required

Switch can be used for **DC application** upto 250V by using 2 poles in series.

Dimension (in mm)





Rating	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	T
32 A to 63 A	DP	100	60	34	75	117	148	150-225	86.5	40	137	74	2	30	9	32	12	38	2
	TPN	134	60	34	75	117	182	150-225	86.5	40	137	74	2	30	9	32	12	38	2
	FP	168	60	34	75	117	216	150-225	86.5	40	137	74	2	30	9	32	12	38	2
100 A to 125 A	DP	100	60	34	107	156	148	150-225	86.5	40	137	74	2	30	9	32	20	38	2
	TPN	134	60	34	107	156	182	150-225	86.5	40	137	74	2	30	9	32	20	38	2
	FP	168	60	34	107	156	216	150-225	86.5	40	137	74	2	30	9	32	20	38	2
160 A to 250 A	TPN	235	159	57	190	190	284	203	86.5	50	174	179	4	48.5	19	51.5	30	68.5	4
	FP	292	159	57	190	190	341	203	86.5	50	174	179	4	84.5	19	51.5	30	68.5	4
320 A to 400 A	TPN	302	200	70	230	282	349	260	86.5	67	212	230	7	70	20	67.5	40	85	5
	FP	372	200	70	230	282	419	260	86.5	67	212	230	7	70	20	67.5	40	85	5
630 A	TPN	340	200	82.5	240	285	387	290	86.5	71	261	230	7	74	20	78.5	50	94	7
	FP	422.5	200	82.5	240	285	469.5	290	86.5	71	261	230	7	74	20	78.5	50	94	7

Euroload

Switch Disconnector

Features:

- High electrical & mechanical endurance
- Suitable for Copper and Aluminium cable lug termination
- Double break contacts per pole
- Staggered terminals for cable termination upto 400 A / 800 A in 3 pole / 4 pole execution
- Provision of Phase separators
- Easy add-on Auxiliary switch kit
- Handle with door interlock and padlock facility
- Front operated with two stable position : 0 - 1

Range :

- 80 A to 400 A in 2 frame sizes in 3 pole .
- 40 A to 3150 A in 7 frame sizes in 4 pole execution with advance neutral.

Specification :

Conforms to IS / IEC:60947-1&3

Technical Information

Utilizational Category AC-23 A

Frame Size	SI Unit	Size 00			
Rated Operational Current at 40 ^{0}C I_e	A	40	63	80	100
Conventional free air thermal crrent I_{th}	A	40	63	80	100
Conventional enclosed thermal crrent I_e	A	40	63	80	100
Rated uninterrupted current I_u	A	40	63	80	100
Nos. of Poles		4	4	4	4
Rated Operational Voltage U_e	Vac	415	415	415	415
Rated Insulation Voltage U_i	Vac	1000	1000	1000	1000
Rated Impulse Voltage U_{imp}	kV	8	8	8	8
Dielectric strength, 50 Hz,	kV	5	5	5	5
Pollution Degree		3	3	3	3
Rated Operational Power 415 Vac	kW	23	36	46	58
Rated Making Capacity AC 23 A at PF-0.45 436 V	A	400	630	800	1000
Rated Breaking Capacity AC 23 A at PF-0.45 436 V	A	320	504	640	800
Max. Allowed cut off current	kA_{peak}	8.8	8.8	8.8	8.8
Conditional Short circuit current 415 Vac	kA	80	80	80	80
Fuse Ratings gG	A	40	63	80	100
Rated Short Time Withstand Current for 1 second rms value	kA	5	5	5	5
Mechanical Endurance Operations		10000	10000	10000	10000
Electrical Endurance Operations		1500	1500	1500	1500
Cu cable section	mm^2	10	16	25	35
Al. cable section	mm^2	16	25	35	50
Overall Dimensions H X W X D	mm	105 X 122 X 101			
Weight Open Execution	kg	0.8	0.8	0.9	0.9

Frame Size	SI Unit	Size 0				
Rated Operational Current I_e	A	80	100	125	160	200
Conventional free air thermal current I_{th}	A	80	100	125	160	200
Conventional enclosed thermal current I_{the}	A	80	100	125	160	200
Rated uninterrupted current I_u	A	80	100	125	160	200
Nos. of Poles		3	3	3/4	3/4	3/4
Rated operational voltage, U_e	Vac	415	415	415	415	415
Rated insulation voltage, U_i	Vac	1000	1000	1000	1000	1000
Rated impulse withstand voltage, U_{imp}	kV	8	8	8	8	8
Di-electric strength, 50 Hz	kV	5	5	5	5	5
Pollution Degree		3	3	3	3	3
Rated Operational Power 415 V	kW	46	58	72	92	115
Rated making capacity at 436 Vac p.f.- 0.45	A	800	1000	1250	1600	2000
Rated breaking capacity at 436 Vac p.f.- 0.45	A	640	800	1000	1280	1600
Rated conditional short circuit current	kA_{rms}	80	80	80	80	80
With Havells Fuse rating gG	A	80	100	125	160	200
Max. Allowed cut off current	kA_{peak}	12	15	17	18	22
Rated short time withstand current (1 s)	kA_{rms}	7.5	7.5	7.5	7.5	8
Electrical Endurance		1500	1500	1000	1000	1000
Mechanical Endurance		10000	10000	8000	8000	8000
Temperature withstand range (ambient)	°C	-5 to 40	-5 to 40	-5 to 40	-5 to 40	-5 to 40
Al. Cable /Bus Bar cross section	mm^2	35	50	70	95	150
Cu. Cable /Bus Bar cross section	mm^2	25	35	50	70	95
Weight Open Execution	kg	1.4	1.4	1.4/1.8	1.6/2.0	1.6/2.0

Technical Information

Euroload
Switch Disconnector

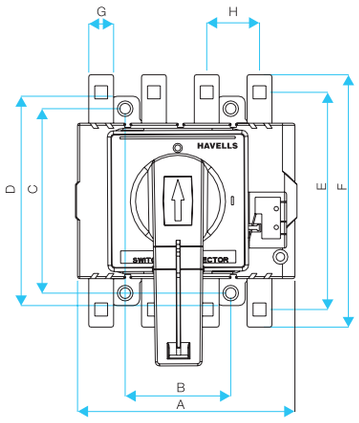
Frame Size	SI Unit	Size I		Size II		Size III
Rated operated Current I_e	A	250	320	400	630	800
Conventional free air thermal crrent I_{th}	A	250	320	400	630	800
Conventional enclosed thermal crrent I_{the}	A	250	320	400	630	800
Rated uninterrupted current I_u	A	250	320	400	630	800
Nos. of Poles		3/4	3/4	4	4	4
Rated operational voltage, U_e	Vac	415	415	415	415	415
Rated insulation voltage, U_i	Vac	1000	1000	1000	1000	1000
Rated impulse withstand voltage, U_{imp}	kV	8	8	8	8	8
Di-electric strength, 50 Hz	kV	5	5	8	8	10
Pollution Degree		3	3	3	3	3
Rated Operational Power 415 V, 3ø	kW	144	184	230	362	460
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35	A	2500	3200	4000	6300	8000
Rated breaking capacity A,436 Vac 23 A, p.f.- 0.35	A	2000	2560	3200	5040	6400
Rated conditional short circuit current	kA_{rms}	80	80	80	80	80
With Havells Fuse rating gG	A	250	320	400	630	800
Max. Allowed cut off current	kA_{peak}	27	33	39	55	70
Rated short time withstand current (1 s)	kA_{rms}	15	15	30	30	35
Electrical Endurance		1000	1000	1000	1000	500
Mechanical Endurance		8000	5000	5000	5000	3000
Temperature withstand range (ambient)	°C	-5 to 50	-5 to 50	-5 to 50	-5 to 50	-5 to 50
Al. Cable / Bus Bar cross section	mm^2	185	240	300	40x8x2	50x8x2
Cu. Cable / Bus Bar cross section	mm^2	120	185	240	40x5x2	50x5x2
Weight Open Execution	kg	2.8/3.6	3.1/3.9	3.1	8.20	11.80
In Enclosure	kg	10.0/13.1	10.0/13.4	10.0	23.90	28.00

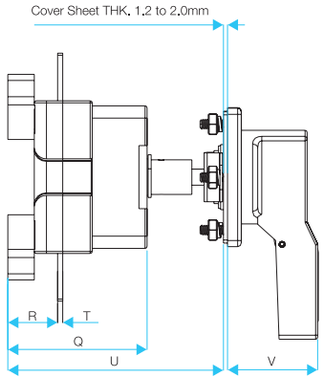
* For ratings 630A & above bus bar terminals in recommended.

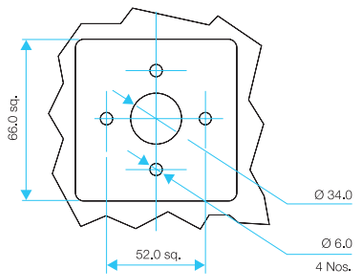
Frame Size	SI Unit	Size IV			Size V		
Rated Operated Current I_e	A	1000	1250	1600	2000	2500	3150
Conventional free air thermal crrent I_{th}		1000	1250	1600	2000	2500	3150
Conventional enclosed thermal crrent I_{the}		1000	1250	1600	2000	2500	3150
Rated uninterrupted current I_u		1000	1250	1600	2000	2500	3150
Nos. of Poles		4	4	4	4	4	4
Rated operational voltage, U_e	Vac	415	415	415	415	415	415
Rated insulation voltage, U_i	Vac	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage, U_{imp}	kV	8	8	8	8	8	8
Di-electric strength, 50 Hz	kV	5	5	5	5	5	5
Pollution Degree		3	3	3	3	3	3
Rated operational current, I_e at 415 Vac 23 A	A	1000	1250	1600	2000	2500	3150
Rated making capacity A, 436 Vac 23 A, p.f.- 0.35		10000	12500	16000	20000	25000	31000
Rated breaking capacity A, 436 Vac 23 A, p.f.- 0.35		8000	10000	12800	16000	20000	25200
Rated operational power at 415 V, 3ø	kW	575	519	920	1150	1438	1811
Rated conditional short circuit current	kA_{rms}	80	80	80	80	80	80
With Havells Fuse rating gG	A	1000	1250	1600	2000	2500	3150
Electrical Endurance		500	500	500	500	500	500
Mechanical Endurance		3000	3000	3000	3000	3000	2000
Temperature withstand range (ambient)	°C	-5 to 50	-5 to 50	-5 to 50	-5 to 50	-5 to 50	-5 to 50
Al. Cable / Bus Bar cross section	mm^2	50x10x2	63x12x2	50x8x4	100x10x3	100x10x4	150x10x4
Cu. Cable / Bus Bar cross section	mm^2	60x5x2	80x5x2	100x5x2	100x5x3	100x5x4	100x10x3
Weight							
Open Execution	kg	22.00	23.70	25.00	45.00	51.20	58.60
In Enclosure	kg	52.00	53.50	55.00	**	**	**

** Details on request

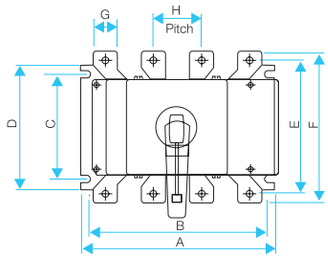
Dimension (in mm)

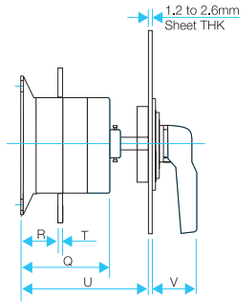


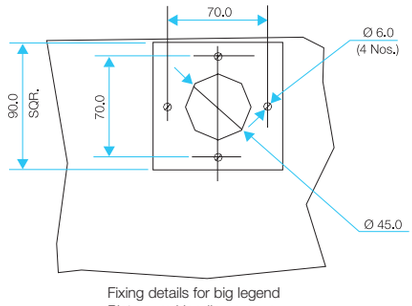




Fixing details for small legend
Plate cum Handle on cover
(40/63/80/100/125/160/200) A-FP
(80/100/125/160/200) A-TP







Fixing details for big legend
Plate cum Handle on cover
(200-3150) A-FP
(250-400) A-TP

DIMENSIONS (in mm) - OPEN EXECUTION

CURRENT (A)	A	B	C	D	E	F	G	H	Q	R	T	U	V
80/100/125 A TP	136	122	113	132	124	148	15	34	90	36	3.2	148	44
160 A TP	136	122	113	132	124	148	24	34	90	36	3.2	148	62
200 A TP	136	122	113	132	124	148	24	52	90	36	3.2	148	62
250 A TP	186	172	134	156	147	177	28	58	112	40	4	158	62
320 A TP	186	172	134	156	165	198	35	63	112	40	4	158	62
400 A TP	186	172	134	156	165	198	35	63	109	40	4	158	62
40/63 A FP	105	51	89	101	93	110	12	26	68	24	2.5	98	44
80/100 A FP	105	51	89	101	105	122	12	26	68	24	3.2	98	44
125 A FP	170	156	113	132	122	148	20	46	90	37.5	3.2	148	62
160/200 A FP	170	156	113	132	122	148	24	46	90	37.5	3.2	148	62
250 A FP	234	223	134	156	147	177	28	58	110	40	4	158	62
320 A FP	234	223	134	156	165	198	35	63	110	40	4	158	62
400 A FP	325	297	184	206	221	251	40	80	134	47	5	208	62
630 A FP	325	297	184	206	241	281	55	80	134	47	5	208	62
800 A FP	368	336	212	234	280	331	45	97	144	52	8	210	62
1000 A FP	480	440	290	315	340	380	70	100	204	101	10	276	62
1250 A FP	480	440	290	315	340	380	70	100	204	101	12	276	62
1600 A FP	480	440	290	315	340	380	70	100	204	101	15	276	62
2000/2500/3150 A FP	480	440	290	315	387	480	80	100	308	74	15	402	62

HiBreak

Fuse Link & Fuse Base

HiBreak Fuse Link

Features :

- Excellent AC and DC performance
- Low watt loss
- Interchangeable with compatible brands
- ISI Marked

Range :

- 2 A - 800 A in Bolted design (BS Type)
- 6 A - 630 A in Blade Contact design (DIN Type)
- 4 A - 63 A in Round Head design (RH Type)

Specification :

Conforms to IEC:60269-1 & 2-1 / IS:13703-1 & 2-1

HiBreak DIN Fuse Base

Features :

- Fibre glass reinforced Thermoplastic / Thermoset material provide exellent mechanical, thermal & electrical properties.
- Ease and Speed of installation - by Screws or on DIN Rail.
- Snap on mounting of phase barriers.

Type :

- Modular / Fixed

Range :

100 A to 630 A.

Specification :

IEC 60269-1 & 2-1 / IS 13703-1 & 2-1.

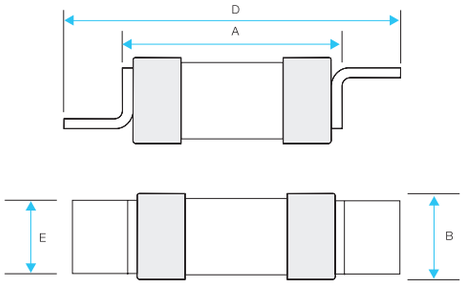
HiBreak Fuse Link

Technical Information

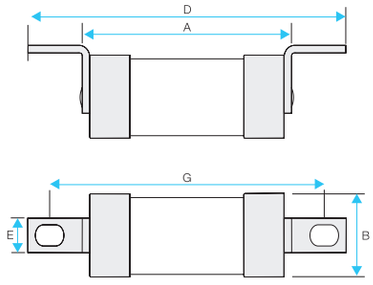
Type	BS (Bolted Connection)	DIN (Blade Contact)	RH (Cylindrical Cap)
Rated Voltage	415 V	415 V	415 V
Rated Current	2 A - 800 A*	6 A - 630 A*	4 A - 63 A*
Rated Frequency	50 Hz	50 Hz	50 Hz
Breaking Capacity	80 kA	80 kA	80 kA
Utilization Category	“gG”	“gG”	“gG”
Non Fusing Current	1.25 In	1.25 In	1.25 In
Fusing Current	1.6 In	1.6 In	1.6 In
Size	F-1, A-2, A-3, A-4 B-1, B2, B-3, B-4 C-1, C-2, C-3	CD-000, CD-00, CD-1, CD-2, CD-3	--
Cut-off Characteristics	As per specification	As per specification	As per specification
Material of Body	Steatite ceramic	Steatite ceramic	Steatite ceramic
Material of Filler	Silica Quartz	Silica Quartz	Silica Quartz
Material of Blade	Brass (6 A - 63 A) Copper (80 A - 630 A)	Brass (6 A - 400 A) Copper (425 A - 630 A)	--
Indication of Blown Fuse	--	Provided	--

* Current Ratings : 2 A, 4 A, 6 A, 10 A, 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A, 315 A, 350 A, 400 A, 425 A, 500 A, 630 A, 800 A.

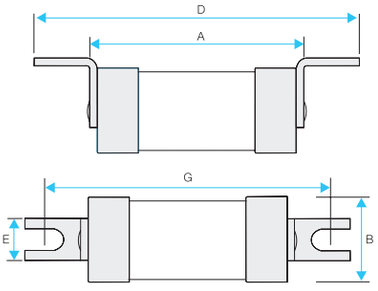
Dimension (in mm)



(Size F1)



(Size A2, A4)

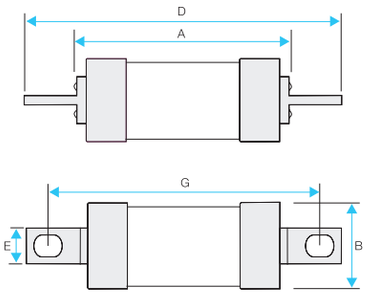


(Size A3)

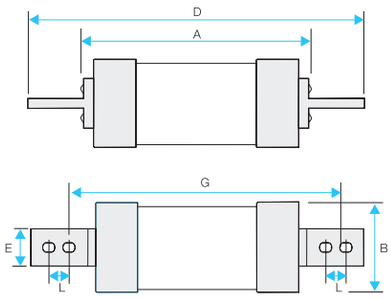
Dimensions (in mm) - BS Type with Bolted Connections

IS Size	Rating (A)	Cat. No.	A	B	D	E	G	L
F-1	2,4,6,10,16,20,25,32	IHHNS00002-032	33.5	13.4	60	11.5	-	-
A-2	2,4,6,10,16,20,25,32	IHHTIA0002-32	55	22	84.6	9	73	-
A-3	36, 40, 50, 63	IHHTSS0036-63	55	22	89.6	13	73	-
A-4	80, 100, 125	IHHTSD0080-125	56.5	24	109	19	94	-

Dimension (in mm)



(Size B1, B2, B3, B4,C1)

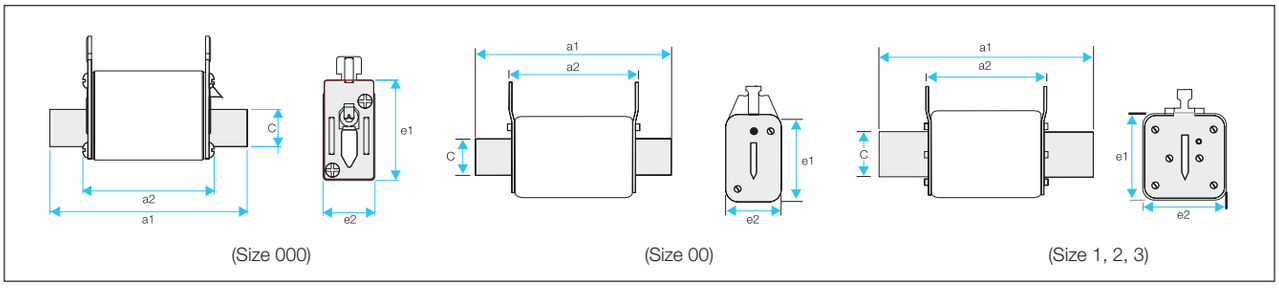


(Size C2, C3)

Dimensions (in mm) - BS Type with Bolted Connections

IS Size	Rating (A)	Cat. No.	A	B	D	E	G	L
B-1	80, 100, 125	IHHTSDC080-125	57	24	134	19	111	-
B-2	125, 160, 200, 250	IHHTSF0125-250	64	33	135	19	111	-
B-3	225, 250, 300-315	IHHTSK0225-315	72.6	39.5	134	25.4	111	-
B-4	400	IHHTSMF400	74.5	51.2	134	25.4	111	-
C-1	400	IHHTSMS400	75	51.2	156	25.4	133	-
C-2	400,500	IHHTTS0400-500	72.5	73	164	25.4	133	-
C-2	400, 500	IHHTTM0400-500	72	73	208	25.4	133	25.4
C-2	630	IHHTLM0630	72	73	208	25.4	133	25.4
C-3	800	IHHTLM0800	72	73	208	25.4	133	25.4

Dimension (in mm)

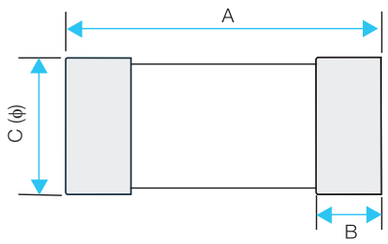


(Size 000) (Size 00) (Size 1, 2, 3)

Din Type with Blade Contact

IS Size	Rating (A)	Cat. No.	a_1	a_2	c	e_1	e_2
000	6,10,16, 20,25,40 32,50,63,80,100	IHHCD11***	78.5	52.6	15	40	20
00	6,10,16, 20,25,40 32,50,63,80,100,125,160	IHHCD00***	78.5	52.6	15	49	29.4
1	32,40,50,63,80,100 125,160,200,250	IHHCD01***	137	72	20	46	46
2	200,250,315,350,400	IHHCD02***	150	72	25	57	57
3	425,500,630	IHHCD03***	150	72	35	72	72

*** Rating



RH Type with Cylindrical Cap

Rating (A)	Cat. No.	A	B	C(ϕ)
2, 4, 6, 10, 16, 20, 25 32, 40, 50, 63	IHHRH	50.5	9.8	14.3

HiBreak DIN Fuse Base

Technical Information

Type-single phase	IHMC00O160*	IHMC01O250	IHMC02O400	IHMC03O630
IEC Size -Din	0	1	2	3
Size of fuse link	0	1	2	3
Accommodated Fuse link current	6 A - 160 A	32 A - 250 A	200 A - 400 A	425 A - 630 A
Rated current of fuse base	160 A	250 A	400 A	630 A
Rated voltage of fuse base	415 Vac			
Rated insulation voltage	1000 Vac			
Weight g / (kg)	120 / (0.12)	140 / (0.40)	150 / (0.50)	165 / (0.65)

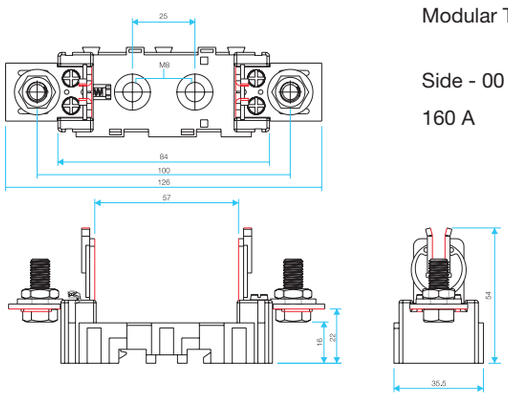
* Size 00 Fuse base is suitable for mounting both size 000 & size 00 fuse links.

Dimension (in mm)

Modular Type:

Side - 00

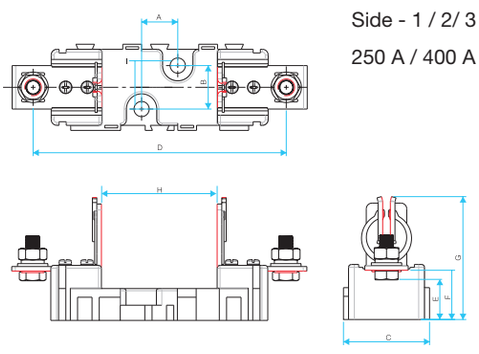
160 A



Dimension (in mm)

Side - 1 / 2/ 3

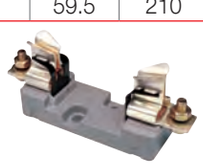
250 A / 400 A / 630 A



Dimension

Size	A	B	C	D	E	F	G	H	I
1	25	30	59.5	175	27	34	84.9	80	M10
2	25	30	59.5	200	28	35	98	80	M10
3	25	30	59.5	210	29	36	109	80	M10

Construction Fixed Type



Moulding (Casing)

The Bases are manufactured from high grade thermosetting plastics. These are non-inflammable & non-hygroscopic.

Contacts

Current carrying parts of the holders are made from precisely pressed copper/brass material and have extruded brass base contacts. The current carrying parts of the fuse base are electro plated with silver to ensure long life & non-deteriorating contact surface for high efficiency mating.

Back up Clips

Back up pressure clips are precisely formed from Phosphor Bronze/Spring Steel material.

Terminals

Copper/Brass terminals are used for cable termination through Cable lugs for open type Fuse Bases complete with Cable holding fasteners.

Dimension (in mm)

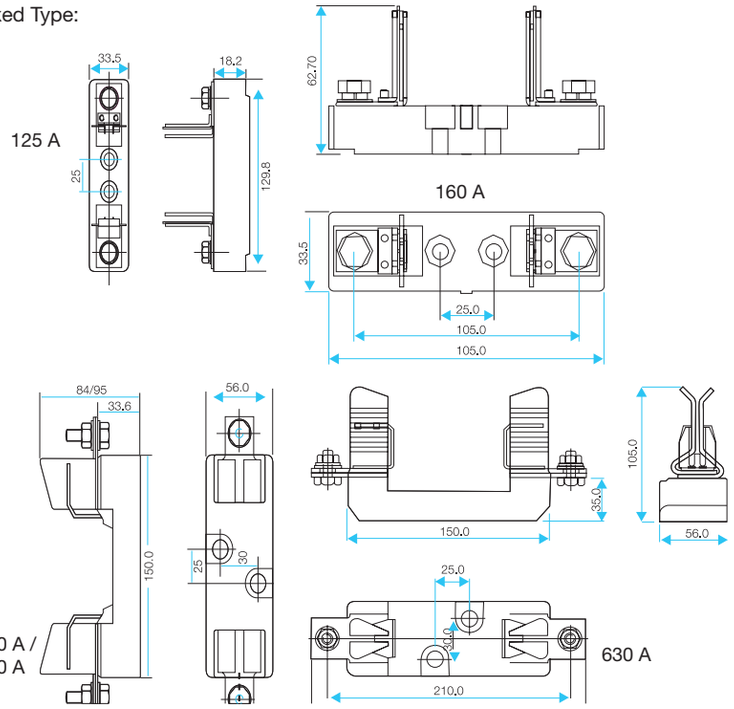
Fixed Type:

125 A

160 A

250 A / 400 A

630 A



Power Quality Solution

- Basics of Power Factor
- Table & Selection Chart
- Harmonic Duty Power Capacitor
- IOT Enabled IPFC Relay
- HD Harmonic Detuned Reactor
- Active Harmonic Filter

Basics of Power Factor

Load in electrical distribution system can be categorized into three types - resistive, inductive and capacitive. In modern Electrical systems, the mostly load is the inductive type simply due to the nature of loads that consume electricity. Typical examples include transformers, Induction Motors, fluorescent lighting etc.

Motor Image-1

Mainly all inductive loads from fan to transformers have common characteristics i.e. they comprise a coil/winding of some kind. This winding creates an magnetic field that allows the motor or transformer to function. A certain part of electrical power goes to maintain this magnetic field.

All inductive loads require two kinds of power to function properly:

– Active power (kW) which actually performs the real work

– Reactive power (kVAR) that sustains the magnetic field

Common example of reactive power can be seen in an unloaded AC motor. When complete load is removed from the motor, one might expect the no-load current to drop near zero. In reality, the no-load current will generally show a value between 25% and 30% of full load current. This is because of the magnetic current is require by motor in any inductive load to function. (Image-2).

What is power factor?

Power factor (p.f.) is the relationship between working (active) power and total power consumed (apparent power). Essentially, power factor is a measurement of how effectively electrical power is being used. The higher the power factor, the more effectively electrical power is being used.

Generally, power factor decreases (angle Φ increases) with increased motor load. This geometric relationship of apparent power to active power is traditionally expressed by the right triangle (Image-2) relationship of:

Cos Φ = p.f. = kW/kVA

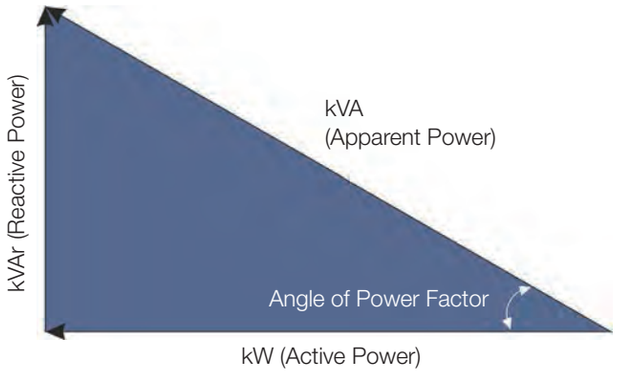


Image 2

Why to improve low PF and there benefits

Low p.f. simply means poor utilization efficiency. CosΦ varies between 0 and 1, hence a value between 0.9 and 1.0 is considered good power factor and essentially means that metered power and used power are almost equal. From a consumer's perspective, it simply means you are using what you paid for, with minimal wastage. When p.f. is low, the utility must provide the non-productive reactive power in addition to productive active power. For the utility that means larger generators, transformers, conductors and other system devices that pushes up their own capital expenditures and operating costs, which they simply pass on to industrial users in the form of power factor penalties. Hence, improved power factor helps avoid those penalties.

Benefits of improved power factor = XX INR savings!!

Good p.f. minimizes or eliminates utility p.f. penalties

Good PF improves the overall voltage of system

Good p.f. helps improve operating life of equipment

Good p.f. expands system capacity in terms of power utilization

Image-3 illustrates the relationship of power factor to total current consumed. With a p.f. = 1.0 given a constant load, the 100% figure represents the required useful current. As the power factor drops from 1.0 to 0.9, power is used less effectively. Therefore, 10% more current is required to handle the same load. A power factor of 0.7 requires approximately 43% more current; and a power factor of 0.5 requires approxi-mately 200% (twice as much!!) current to handle the same load.

Solution for low PF

Low p.f. is a problem that can be solved by adding power factor improvement (PFI) capacitors to the plant distribution system. As illustrated in Image-4, capacitors work as reactive current generators "supplying" reactive power (kVAR) to the system.

By generating their own reactive power, industrial users free the utility from having to supply it; therefore, the total apparent power (kVA) supplied by the utility will be less, which is immediately reflected in proportionately smaller bills. Capacitors also reduce the total current drawn from the distribution system and subsequently increase system capacity.

Capacitor Rating

Power factor correction capacitors are rated in electrical units called "vars". One VAR = one Volt Ampere of Reactive power. VARs are units of measurement for indicating how much reactive power the capacitor will supply. As reactive power is usually measured in thousands of vars, the prefix "k" (for "kilo") is added to create the more familiar "kVAR" term. The capacitor kVAR rating shows how much reactive power the capacitor will supply. Each unit of kVAR supplied will decrease the inductive reactive power demand by the same amount.

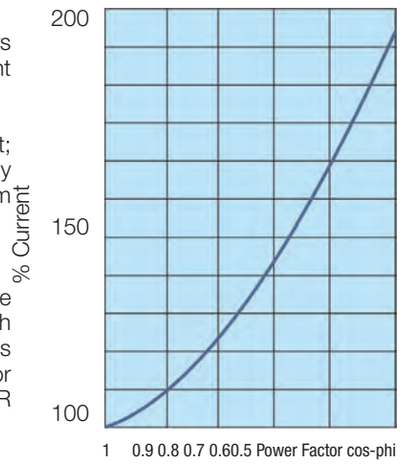


Image-3

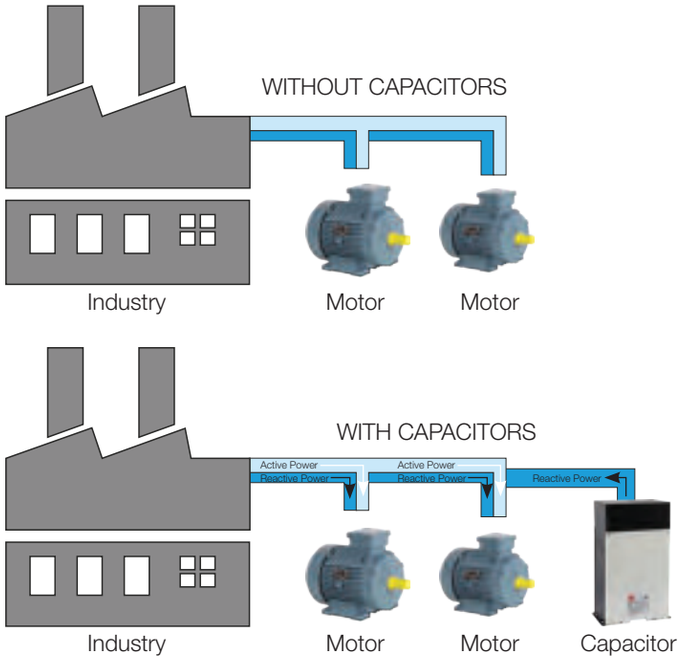
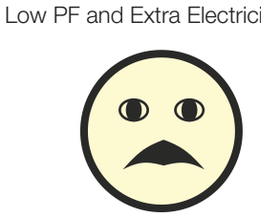
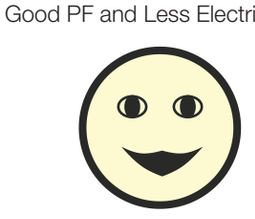


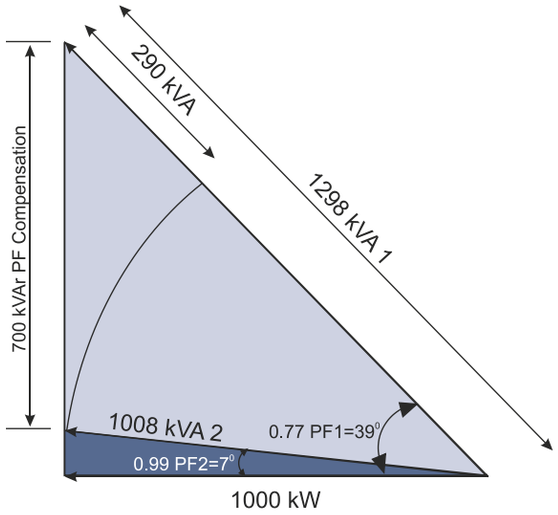
Image-4





Example (Image-5):

A LT System requires 1000 kW active power at full load, and the running power factor is measured to be 0.77. Therefore, the system's full load consumption of apparent power is 1289.7 kVA. If 700 kVAr Reactive power is installed, the power factor will improve to 0.992 and the kVA demand will be reduced from 1298.7 to 1008 kVA. Thus, savings can vary from 25~35% or even more in some cases, which cumulatively translates to considerable money savings with the Power factor improvement pays of it cost within 6 to 9 months.



Capacitor (kVAr) Selection Chart

Current Power Factor cos φ	Achievable (Target) cos φ 0.9	0.91	0.92	0.93	0.94	0.95	Target cos φ = 0.96 Q 0.96	0.97	0.98	0.99	1
0.51	1.20	1.23	1.26	1.29	1.32	1.36	1.40	1.44	1.48	1.54	1.69
0.52	1.16	1.19	1.22	1.25	1.28	1.31	1.35	1.39	1.44	1.50	1.64
0.53	1.11	1.14	1.17	1.20	1.24	1.27	1.30	1.35	1.40	1.46	1.60
0.54	1.08	1.10	1.13	1.16	1.20	1.23	1.27	1.31	1.36	1.42	1.56
0.55	1.04	1.06	1.09	1.12	1.16	1.19	1.23	1.27	1.32	1.38	1.52
0.56	1.00	1.02	1.05	1.09	1.12	1.15	1.19	1.23	1.28	1.34	1.48
0.57	0.96	0.99	1.02	1.05	1.08	1.11	1.15	1.19	1.24	1.30	1.44
0.58	0.92	0.95	0.98	1.01	1.04	1.08	1.11	1.15	1.20	1.26	1.41
0.59	0.89	0.91	0.94	0.97	1.01	1.04	1.08	1.12	1.17	1.23	1.37
0.60	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.08	1.13	1.19	1.33
0.61	0.82	0.84	0.87	0.90	0.94	0.97	1.01	1.05	1.10	1.16	1.30
0.62	0.78	0.81	0.84	0.87	0.90	0.94	0.97	1.02	1.06	1.12	1.27
0.63	0.75	0.78	0.81	0.84	0.87	0.90	0.94	0.98	1.03	1.09	1.23
0.64	0.72	0.75	0.78	0.81	0.84	0.87	0.91	0.95	1.00	1.07	1.20
0.65	0.69	0.71	0.74	0.77	0.81	0.84	0.88	0.92	0.97	1.03	1.17
0.66	0.65	0.68	0.71	0.74	0.78	0.81	0.85	0.89	0.94	1.00	1.14
0.67	0.62	0.65	0.68	0.71	0.75	0.78	0.82	0.86	0.91	0.97	1.11
0.68	0.59	0.62	0.65	0.68	0.72	0.75	0.79	0.83	0.88	0.94	1.08
0.69	0.57	0.59	0.62	0.65	0.69	0.72	0.76	0.80	0.85	0.91	1.05
0.70	0.54	0.56	0.59	0.63	0.66	0.69	0.73	0.77	0.82	0.88	1.02
0.71	0.51	0.54	0.57	0.60	0.63	0.66	0.70	0.74	0.79	0.85	0.99
0.72	0.48	0.51	0.54	0.57	0.60	0.64	0.67	0.71	0.76	0.82	0.96
0.73	0.45	0.48	0.51	0.54	0.57	0.61	0.64	0.69	0.73	0.79	0.94
0.74	0.43	0.45	0.48	0.51	0.55	0.58	0.62	0.66	0.71	0.77	0.91
0.75	0.40	0.43	0.46	0.49	0.52	0.55	0.59	0.63	0.68	0.74	0.88
0.76	0.37	0.40	0.43	0.46	0.49	0.53	0.56	0.60	0.65	0.71	0.86
0.77	0.35	0.37	0.40	0.43	0.47	0.50	0.44	0.58	0.63	0.69	0.83
0.78	0.32	0.35	0.38	0.41	0.44	0.47	0.51	0.55	0.60	0.66	0.80
0.79	0.29	0.32	0.35	0.38	0.41	0.45	0.48	0.53	0.57	0.63	0.78
0.80	0.27	0.29	0.32	0.36	0.39	0.42	0.46	0.50	0.55	0.61	0.75
0.81	0.24	0.27	0.30	0.33	0.36	0.40	0.43	0.47	0.52	0.58	0.72
0.82	0.21	0.24	0.27	0.30	0.34	0.37	0.41	0.45	0.50	0.56	0.70
0.83	0.19	0.22	0.25	0.28	0.31	0.34	0.38	0.42	0.47	0.53	0.67
0.84	0.16	0.19	0.22	0.25	0.28	0.32	0.35	0.40	0.44	0.50	0.65
0.85	0.14	0.16	0.19	0.23	0.26	0.29	0.33	0.37	0.42	0.48	0.62
0.86	0.11	0.14	0.17	0.20	0.23	0.26	0.30	0.34	0.39	0.45	0.59
0.87	0.08	0.11	0.14	0.17	0.20	0.24	0.28	0.32	0.36	0.43	0.57
0.88	0.06	0.08	0.11	0.15	0.18	0.21	0.25	0.29	0.34	0.40	0.54
0.89	0.03	0.06	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.37	0.51
0.90	0.00	0.03	0.58	0.89	0.12	0.16	0.19	0.23	0.28	0.34	0.48
0.91		0.00	0.03	0.06	0.09	0.13	0.16	0.21	0.25	0.31	0.46
0.92			0.00	0.03	0.06	0.10	0.13	0.18	0.22	0.28	0.43
0.93				0.00	0.03	0.07	0.10	0.14	0.19	0.25	0.40
0.94					0.00	0.03	0.07	0.11	0.16	0.22	0.36
0.95						0.00	0.04	0.08	0.13	0.19	0.33

Example:

Actual Motor Power	P=100 kW		
Actual cos φ	0.61	Factor F from table	1.01
Target cos φ (Q)	0.96	Capacitor reactive power Qc = 100 x 1.01 = 101 kVAr	

Refer following table for the capacitor duty based on type of Industry / Applicaiton

Power Capacitor Selection Chart on the basis of Application				
Capacitor	**Splendid Duty (SD)**	**HD Plus / Heavy Duty (HD)**	**Super Heavy Duty (SHD) / SHD Plus / Ultra Heavy Duty**	**HD Plus + Reactor / Heavy Duty (HD) + Reactor**
% Non linear load	≤ 10%	Up to 15%	Up to 20%	Between 20% to 30%
Square	Master	Champ	Champion / UHDXL / UXDXL	Warrior + Reactor / Champ + Reactor
Cylindrical	Torrent	Warrior	Optimus	
Application	These Capacitors are designed for normal loads where non linear factor is <10%. Do not use normal duty capacitors for the application of Heavy Duty and Super Heavy Duty capacitors.	Commercial building with CFL lamps, SMPS, UPS etc.	Heavy Chemical Industries	Steel plant
		Garment industries (Sewing Industry)	Pharmaceutical Industries	Cement Industries
		Bakeries	Automobile plants	Stone crushing
		Flour mills	Paper industries	Textiles (Production of Yarn/cloth)
		Oil mills	Food processing plants	Forging Industries
		Glass industries	IT industries	Power frequency induction furnaces
		Rice mills	Fabrication shops	Sugar plants
		Cold storage	Welding shops	Rolling mills
			Machine and tool shop	
Example for Calculating Non Linear Load Installed Transformer Rating = 1000 kVA Linear Load / Transformer Rating) X 100 = (100/1000) X 100 = 10%				Non Linear Loads = 100 kVA % Non Linear Load = (Non
Example of Non Linear Loads: UPS, Arc / Induction furnace, Rectifiers, AC / DC Drives, Computer, CFL, CNC Machines.				

For Load Flow Analysis - Please connect with nearest branch

Reactive Power Solution - Square Capacitor

Introduciton: The electrical energy is more expensive day by day. By improving power factor with Havells Square Cap Power Factor Correction capacitors we can save a lot of energy.

Improved Power factor means

- Reduced line losses
- Improved voltage profile
- Reduced system current
- Reduced cable sizes
- Optimum usage of transformer - Monetary saving

We are pleased to offer MPP Film Square Capacitors with enhance performance.
It helps you to achieve better economy by selecting an application specific capacitor type.

Square Capacitors are available in:

Mini Master/Master
Splendid Duty (SD) Capacitors
For < 10 % Nonlinear load

Champ
Heavy Duty (HD) Capacitors
For up to 15 % Nonlinear load

Champion
Super Heavy Duty (SHD) Capacitors
For up to 20 % Nonlinear load

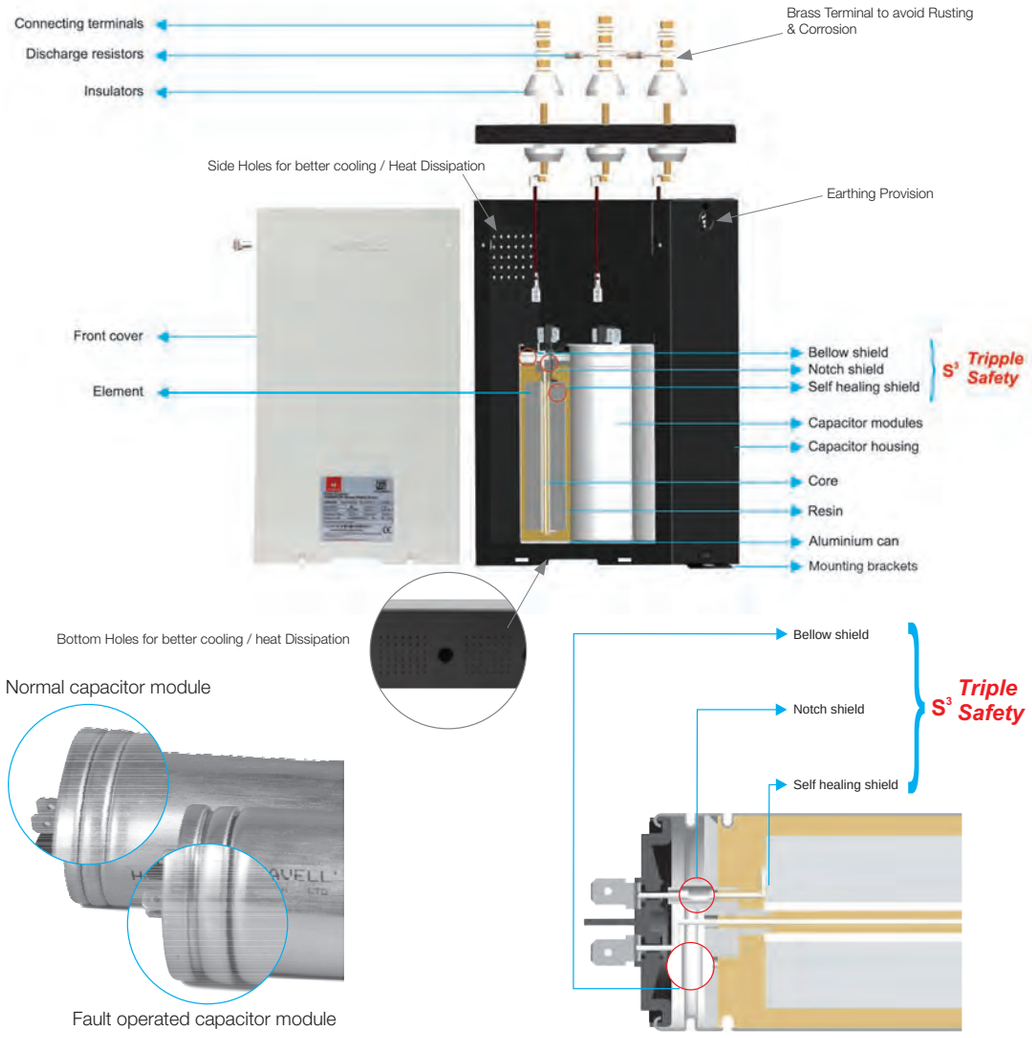
Square Capacitors are ISI Marked and comply with IS:13340

Basic Construciton of the capacitor

1. Film: The Multi-layer Metalized Polypropylene Film (MPP) with heavy edge gives advantage of higher stability obtained from Zinc, and longer shelf life obtained from Aluminum. Heavy edge provide better bonding with end metal spray. Enable higher current carrying capacity. And withstand higher electro-mechanical stress occurs due to switching surges.
   MPP is with self-healing property.
2. Winding: Basic capacitor element wound on world class CNC machines in the air conditioned clean room (Dust free + Temperature and humidity controlled) with an air curtain at entry.
3. Safety System:
   a) Burst proof sefety device - Over pressure disconnector –If any fault created inside the capacitor, the internal pressure increases, it produce expansion of the fold (groove) and the capacitor get separated from the electrical network to prevent the capacitor from the bursting.
   b) Self healing property - In the event of thermal or electrical overload, an electric breakdown occurs. The dielectric in the breakdown channel is broken down into highly compressed plasma that explodes out of the breakdown channel and pushes the dielectric layers apart. The discharge continues within the spreading charge continues within the spreading plasma via the metal layers so that the metal surrounding the faulty area is completely burnt out. This produces perfect isolation of the faulty area within microseconds. The self-healing process results in negligible capacitance loss – less than 100 pF per event. The capacitor remains fully functional during the entire process.
   c) Resin - Due to polyurethane resin filling and non use of oil or PCB there is no risk of fire caused by spurting or leaking oil.
4. Modular construction: Modular construction using hermetically sealed single phase capacitors. These are housed in metalic container and are connected in delta to form three phase capacitor. This construction enables easy and inexpensive repair at site.
5. Discharge resistor: All Capacitors provided with discharge resistors to discharge the capacitors to voltage less than 50V within 1 minute. For the extreme safety of operator it is advice to discharge capacitor before handling.

Reactive Power Solution - Square Capacitor

Construction and Features :



Overall Dimensions and Current for 440V Three Phase Capacitors

KVAr	Current A	Mini Master/Master			Champ			Champion		
		Splendid Duty			Heavy Duty			Super Heavy Duty		
		Ordering Code	Module Value X Qty. µF	Dimension W x D x H mm	Ordering Code	Module Value X Qty. µF	Dimension W x D x H mm	Ordering Code	Module Value X Qty. µF	Dimension W x D x H mm
1	1.31	QHNTMC5001X0	5.5 x 3	125 x 50 x 180	QHBTMC5001X0	5.5 x 3	125 x 50 x 180	QHSTMC5001X0	5.5 x 3	150 x 60 x 225
2	2.62	QHNTMC5002X0	11 x 3	125 x 50 x 180	QHBTMC5002X0	11 x 3	125 x 50 x 180	QHSTMC5002X0	11 x 3	195 x 75 x 290
3	3.94	QHNTMC5003X0	16.4 x 3	150 x 60 x 225	QHBTMC5003X0	16.4 x 3	150 x 60 x 225	QHSTMC5003X0	16.4 x 3	225 x 80 x 290
4	5.25	QHNTMC5004X0	21.9 x 3	150 x 60 x 225	QHBTMC5004X0	21.9 x 3	150 x 60 x 225	QHSTMC5004X0	21.9 x 3	225 x 80 x 290
5	6.56	QHNTMC5005X0	27.4 x 3	150 x 60 x 225	QHBTMC5005X0	27.4 x 3	195 x 75 x 290	QHSTMC5005X0	27.4 x 3	225 x 80 x 390
6	7.87	QHNTMC5006X0	32.9 x 3	195 x 75 x 290	QHBTMC5006X0	32.9 x 3	195 x 75 x 290	QHSTMC5006X0	32.9 x 3	225 x 80 x 390
7.5	9.84	QHNTMC5007X5	41.1 x 3	195 x 75 x 290	QHBTMC5007X5	41.1 x 3	195 x 75 x 290	QHSTMC5007X5	41.1 x 3	225 x 80 x 390
8	10.5	QHNTMC5008X0	43.8 x 3	195 x 75 x 290	QHBTMC5008X0	43.8 x 3	225 x 80 x 290	QHSTMC5008X0	43.8 x 3	225 x 80 x 390
10	13.12	QHNTMC5010X0	54.8 x 3	195 x 75 x 290	QHBTMC5010X0	54.8 x 3	225 x 80 x 290	QHSTMC5010X0	54.8 x 3	225 x 80 x 390
12.5	16.4	QHNTMC5012X5	68.5 x 3	225 x 80 x 290	QHBTMC5012X5	68.5 x 3	225 x 80 x 290	QHSTMC5012X5	68.5 x 3	225 x 80 x 390
15	19.68	QHNTMC5015X0	82.2 x 3	225 x 80 x 290	QHBTMC5015X0	82.2 x 3	225 x 80 x 290	QHSTMC5015X0	82.2 x 6	225 x 160 x 400
20	26.24	QHNTMC5020X0	54.8 x 6	225 x 80 x 290	QHBTMC5020X0	54.8 x 6	225 x 160 x 300	QHSTMC5020X0	54.8 x 6	225 x 160 x 400
25	32.8	QHNTMC5025X0	68.5 x 6	225 x 80 x 390	QHBTMC5025X0	68.5 x 6	225 x 160 x 300	QHSTMC5025X0	68.5 x 6	225 x 160 x 400
30	39.37	QHNTMC5030X0	82.2 x 6	225 x 160 x 300	QHBTMC5030X0	82.2 x 6	225 x 160 x 300	QHSTMC5030X0	82.2 x 12	225 x 410 x 425
50	65.61	QHNTMC5050X0	68.5 x 12	225 x 410 x 325	QHBTMC5050X0	68.5 x 12	225 x 410 x 325	QHSTMC5050X0	68.5 x 12	225 x 410 x 425
					QHBTMC5075X0	68.5 x 18	225 x 570 x 325	QHSTMC5075X0	68.5 x 18	225 x 570 x 425
					QHBTMC5100X0	68.5 x 24	225 x 725 x 390	QHSTMC5100X0	68.5 x 24	225 x 725 x 490

Other ratings on request.

Reactive Power Solution - Square Capacitor

Range:

- 1 kVAr to 100 kVAr
- 220 Vac to 1000 Vac
- Soft Sticky Resin / Gas Filled
- IS: 13340 / IEC: 60831

Features:

- High inrush current withstand capability.
- Soft sticky resin to withstand high temperature.
- Special imported metallised hazy film profile to withstand high voltage and current stress.
- Penta safety protection (Self healing, internal notch mechanism & over pressure disconnector, safety cover, high grade resin).
- Explosion proof, low losses & high over current withstand capabilities.

Technical Data:

Parameter		Mini Master / Master	Champ	Champion
Duty Type		Splendid Duty	Heavy Duty	Super Heavy Duty (Double Dielectric)
Reference Standard		IS 13340 / IEC 60831		
Power (Rated Capacitance)	Q_n	1 to 50 kVAr	1 to 100 kVAr	1 to 100 kVAr
Tolerance		0 to 10%		
Connection		Delta		
Rated Voltage	V_R	440 V, 480 V & 525 V	440 V, 480 V & 525 V	440 V, 480 V & 525 V
Rated Frequency	F_R	50 / 60 Hz		
Max. persisible Voltage	V_{max}	V_R + 10% (Up to 8 h daily) V_R + 15% (Up to 30 min daily) V_R + 20% (Up to 5 min daily) V_R + 30% (Up to 1 min daily)		
Max. persisible current	I_{max}	1.6 x I_R	2.4 x I_R	3.2 x I_R
Max. Transient Inrush Current handling Capacity	I_S	Up to 250 x I_R	Up to 350 x I_R	Up to 500 x I_R
Test data				
Ac Test Voltage Terminal to Terminal	V_{TT}	2.15 x V_R AC 2s		
Insulation Voltage Between Terminal and Container	V_{TC}	3700 VAC		
Losses				
Dielectric	Q_L	< 0.2 W/KVAr		
Climatic Category				
Ambient Temperature	°C	-25 °C to 55 °C	-25 °C to 60 °C	-25 °C to 65 °C
Max. Humidity	H_{rel}	Max 95%		
Max. Permisible Altitude		Max. 4000M above sea level		
Design data				
Case Material / Shape		Powder Coated Sheet metal / Rectangular		
Dielectric		Polypropylene Film		
Impregnation		Non PCB Soft Resin		
Fixing		Base Mounting		
Mounting Position		Upright		
Terminals		Threaded Stud Terminals with Ceramic Bush		
Safety				
Degree of Protection safety		IP 30		
Mechanical safety		Over Pressure Disconnector		
Discharge Device		Resistor		
Discharge Device Time		≤ 60 sec (50V)		
Cooling		Natural or Forced		
Max. Switching Operations	Nos.	35,000	52,500	80,000
Operating life in hours	hr	1,20,000	2,15,000	3,00,000

Cylindrical Capacitor

Range:

- 1 kVAr to 50 kVAr
- 220 Vac to 1000 Vac
- Soft Sticky Resin / Gas Filled
- IS: 13340 / IEC: 60831

Features:

- High inrush current withstand capability.
- Soft sticky resin to withstand high temperature.
- Special imported metallised hazy film profile to withstand high voltage and current stress.
- Penta safety protection (Self healing, internal notch mechanism & over pressure disconnector, safety cover, high grade resin).
- Explosion proof, low losses & high over current withstand capabilities.

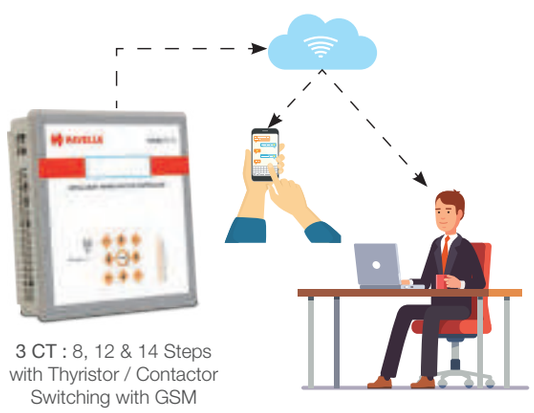
Technical Data:

Parameter		Torrent	Warrior
Duty Type		Splendid Duty	Super Heavy Duty
Reference Standard		IS 13340 / IEC 60831	
Power (Rated Capacitance)	Qn	1 to 30 KVAr	1 to 30 KVAr
Tolerance		0 to 10%	
Connection		Delta	
Rated Voltage	V_R	440 V	440, 480 and 525 V
Rated Frequency	F_R	50 / 60 Hz	
Max. persisible Voltage	V_{max}	V_R + 10% (Up to 8 h daily) V_R + 15% (Up to 30 min daily) V_R + 20% (Up to 5 min daily) V_R + 30% (Up to 1 min daily)	
Max. persisible current	I_{max}	Up to 1.6 x I_R	Up to 3.0 xIr (upto 2.8 xIr incl. combined effects of harmonincs, over voltages and capacitance)
Max. Transient Inrush Current handling Capacity	I_S	Up to 250 x I_R	Up to 500 x I_R
Test data			
Ac Test Voltage Terminal to Terminal	V_{TT}	2.15 x V_R AC 2s	
Insulation Voltage Between Terminal and Container	V_{TC}	3600 Vac, 2 s	
Losses			
Dielectric	Q_L	< 0.2 W/KVAr	
Total	Q_L	< 0.45 W/KVAr	
Climatic Category			
Ambient Temperature	°C	-25 °C to 55 °C	
Max. Humidity	H_{rel}	Max. 95%	
Max. Permisible Altitude		Max. 4000M above sea level	
Design data			
Case Material / Shape		Aluminum / Cylindrical	
Dielectric		Polypropylene Film	
Impregnation		Non PCB Soft Resin	
Fixing		Threaded Bolt M8 / M12	
Max. torque for fixing	N_m	4 Nm / 10 Nm	
Mounting Position		Upright. Horizintal mounting with additional head support possible	
Terminals		Upto 5 KVAr fast on and above terminal clamp	
Safety			
Degree of Protection safety		IP 54	
Mechanical safety		Over Pressure Disconnector	
Discharge Device		Resistor	
Discharge Device Time		≤ 60 sec (50V)	
Cooling		Natural or Forced	
Max. Switching Operations		35,000 Nos.	65,000 Nos.
Operating life in Hrs.		1,20,000	2,50,000

Dimensions for Cylinderical Capacitor

Ratings		Splendid Duty	HD Plus	SHD
kVAr Value	Voltage	Can Size	Can Size	Can Size
1 kVAr	440 V	50 mm x 145 mm	50 mm x 145 mm	50 mm x 170 mm
2 kVAr	440 V	50 mm x 145 mm	50 mm x 145 mm	50 mm x 170 mm
3 kVAr	440 V	50 mm x 145 mm	63.5 mm x 145 mm	63.5 mm x 170 mm
4 kVAr	440 V	50 mm x 170 mm	63.5 mm x 145 mm	63.5 mm x 170 mm
5 kVAr	440 V	63.5 mm x 170 mm	68 mm x 170 mm	68 mm x 203 mm
6 kVAr	440 V	68 mm x 170 mm	68 mm x 203 mm	75 mm x 210 mm
7.5 kVAr	440 V	75 mm x 170 mm	75 mm x 210 mm	85 mm x 210 mm
8 kVAr	440 V	75 mm x 170 mm	75 mm x 210 mm	85 mm x 210 mm
10 kVAr	440 V	75 mm x 210 mm	85 mm x 210 mm	75 mm x 285 mm
12.5 kVAr	440 V	85 mm x 210 mm	75 mm x 285 mm	85 mm x 285 mm
15 kVAr	440 V	75 mm x 285 mm	85 mm x 285 mm	90 mm x 285 mm
20 kVAr	440 V	85 mm x 285 mm	90 mm x 285 mm	90 mm x 360 mm
25 kVAr	440 V	85 mm x 360 mm	90 mm x 360 mm	100 mm x 360 mm

Intelligent Power Factor Controller



3 CT : 8, 12 & 14 Steps with Thyristor / Contactor Switching with GSM

Advance kVAr Sensing Technology

Range:

- 8, 12 & 14 steps
- Size 96 mm X 96 mm and 144 mm X 144 mm
- Single CT & Three CT sensing APFC Relay
- Contactor Switching
- Thyristor switching
- LED & LCD Display.
- IEC: 61010-1

Features:

- Wide band of Auxiliary supply 90 Vac - 550 Vac
- Temper proof
- Plug & Play with Auto programming
- Dual Password protection
- Dual Source PF Relay (E.B./DG)
- IOT enabled with Data logging facility
- 4 digit display (0.xxx) PF
- Automatic CT Polarity Detection
- Advanced 32-bit Micro-controller based logic
- NTC Temperature sensor
- Communication interface through Wi-fi, RS 485, GSM & Modbus RTU

Display	:	4 Digit, 7 Segment LED display / LCD display, height : 0.56”
Auxiliary Supply	:	90 Vac - 550 Vac, 50 Hz - 60 Hz
Rated input voltage	:	40 V - 300 V (L-N), 50 V - 530 V (L-L), 45 Hz - 65 Hz
Rated input current	:	Nominal 5A AC (MIN 50 mA, MAX 6 A), Single CT Sensing
Burden	:	20 Ω
CT Primary	:	1-9999 A (For CT.S=1); 5-9999 A (For CT.S=5)
CT Secondary	:	1 or 5A
Current Senstivity	:	40 ma/11 ma
No. of relay stages	:	For IPFC CS 1001-108 : 8 Relay For IPFC CS 1001-112 : 12 Relay
Trip indication	:	Alarm relay turns ON & ALM (Alarm) LED blinks (Refer LED indication chart)
Controlling Range	:	Target PF : 0.8 lag to 0.8 lead Control sensitivity : 55 to 100% Step time : 1 s to 999 s Discharge time : 1 s to 999 s Switching program : Automatic/Linear/Rotational Control Mode : Automatic/Manual Auto initialization : Yes / No

Output	:	Relay output Alarm mode : Under voltage, Over voltage, CT polarity error, Under compensate, Over compensate
Programmable Hysteresis	:	Voltage : 1 to 10% Power Factor : 1 to 5%
Power Consumption	:	15 VA max.
Environmental Condition	:	Operating : 0 °C to 60 °C Storage : -20 °C to 60 °C
Humidity	:	0% to 95% without moisture consideration
Accuracy	:	

Measurement	Accuracy
Power factor	±0.01

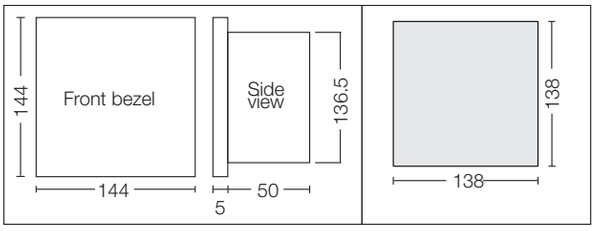
Mounting : Panel Mounting

Weight :

QHOSBS5N0008	IPFC CS 1001-108	400gms
QHOSBS5N0012	IPFC CS 1001-112	420gms

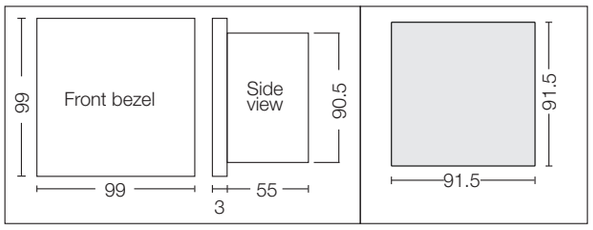
Mechanical Installation / Dimensions

Outline Dimensions (in mm) Panel Cutout (in mm)



Zero Programing Relay (New)

Outline Dimensions (in mm) Panel Cutout (in mm)



HD Harmonic Detuned Reactor

Range:

- Copper / Aluminum
- 1 kVAr to 100 kVAr
- 5.67%, 7% & 14% filtering factor
- 185% to 225% Linearity
- IS: 5553 / IEC: 61558

Features:

- High linearity 185% to 225%
- Insulation Class H
- High harmonic loading capability
- Temperature protection-NC contact (UL approved)
- Long expected life time
- Low noise

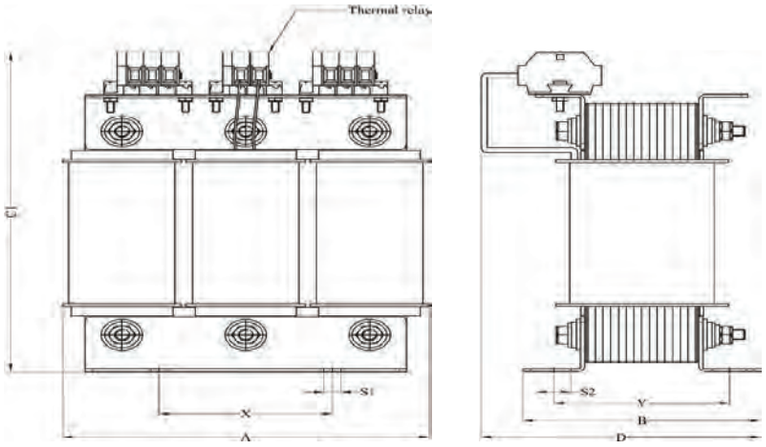
Product Specifications - 440V 7 % Aluminium DTR

Description	Specificaiton
Reference Standard	IEC 61558-2-20 EN 61558-2-20 IS-5553-1989
Detuning Factor	7%
Input Voltage	440 Vac, 3 Phase
Frequency	50 Hz
Cooling	Air Natural
Insulation	Class Class-H
Ambient Temperature	50 °C Max
Conductor	Aluminum
Enclosure	Not Applicable
Protection	Class IP00
Linearity	1.85 x Irms
BDV Winding to Core	2.5 kVac / 5 mA / 1min
Thermal Relay	NC Contact (UL Approved)

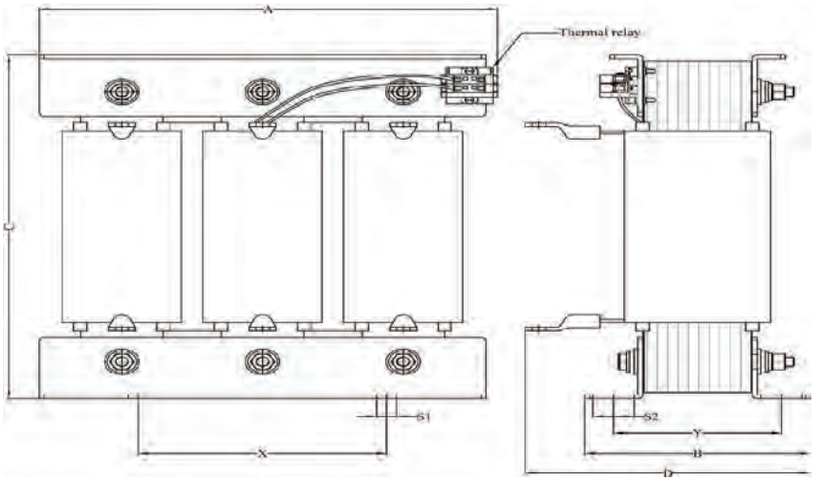
Electrical Parameters & Termination Details – 440V 7% Aluminium DTR

Rating (kVAr)	Current (A)	Inductance (mH)	Total Loss (Watts Appx)	Weight in kg (Apx)	Termination Type
1 kVAr	1.3 A	49.85 mH	20 W	3.50 kg	4mm² Connector
2 kVAr	2.6 A	24.92 mH	29 W	4.50 kg	4mm² Connector
3 kVAr	3.9 A	16.62 mH	35 W	5.50 kg	4mm² Connector
4 kVAr	5.2 A	12.46 mH	42 W	5.80 kg	4mm² Connector
5 kVAr	6.6 A	9.97 mH	50 W	6.30 kg	4mm² Connector
10 kVAr	13.1 A	4.53 mH	78 W	8.90 kg	4mm² Connector
12.5 kVAr	16.4 A	3.84 mH	90 W	9.20 kg	16mm² Cu Lug
15 kVAr	19.7 A	3.12 mH	104 W	10.30 kg	16mm² Cu Lug
20 kVAr	26.2 A	2.27 mH	124 W	13.50 kg	16mm² Cu Lug
25 kVAr	32.8 A	1.85 mH	145 W	15.80 kg	25mm² Cu Lug
30 kVAr	39.4 A	1.56 mH	170 W	18.10 kg	25mm² Cu Lug
50 kVAr	65.6 A	0.92 mH	245 W	25.20 kg	50mm² Cu Lug
65 kVAr	85.3 A	0.71 mH	290 W	30.00 kg	50mm² Cu Lug
75 kVAr	98.4 A	0.61 mH	327 W	35.40 kg	50mm² Cu Lug
100 kVAr	131.2 A	0.46 mH	440 W	43.50 kg	70mm² Cu Lug

Mechanical Drawing - 1 kVAr to 10 kVAr 440V 7% Aluminium DTR



Mechanical Drawing - 12.5 kVAr to 100 kVAr 440V 7% Aluminium DTR



440V 7% Aluminium DTR Mechanical dimensions (Appx)

Rating (kVAr)	A (Max)	B (Max)	C (Max)	C1 (Max)	D (Max)	X ±3mm	Y ±3mm	S1 (Sot Width)	S2 (Slot Depth)
1	150	115	-	200	-	70	51	7	14
2	150	125	-	200	-	70	56	7	14
3	160	125	-	210	-	70	61	7	14
4	160	125	-	220	-	70	61	7	14
5	160	125	-	230	-	70	71	7	14
10	210	125	-	250	-	80	73	7	14
12.5	230	125	210	-	180	80	76	7	14
15	230	130	210	-	180	150	79	10	20
20	230	130	230	-	180	80	81	7	14
25	250	160	230	-	210	150	91	7	14
30	260	160	230	-	210	130	96	10	20
50	285	180	290	-	230	150	101	12	25
65	290	180	300	-	240	150	97	12	25
75	270	270	330	-	270	150	106	12	25
100	280	220	340	-	270	150	117	12	25

SVG (Static Var Generator) & Active Harmonic Filter

Range:

- Rating: 10 A - 5000 A

AHF Technology & Innovation

- Heavy Duty IGBT used for Switching Technology
- Latest technology & Ultra-Fast algorithm used for sensing and control which provides smooth & precise compensation.
- Advanced LCD display with intelligent 32 bit microprocessor.
- User friendly programs and customization as per customer requirement for data display.
- Modular design enclosure fabricated by latest Amada CNC Machines & painted through fully automatic powder coating plant after 11 tank process.

AHF Features:

- The Havells make AHF is a unique innovation solution for Power Quality that address all power quality issues effectively. Major features are:
- Ultra- fast response
- No deration up-to 50 ^{0}C ambient temperature
- Havells unique Quad Pro feature- These features enables user to program AHF as per its priority for following compensation :
  - ❑ Current harmonics
  - ❑ Reactive compensation
  - ❑ Load balancing
  - ❑ Neutral compensation
- Priority selection feature for maximum capacity utilization as per the system requirement.

Applications:

- Compliance of IEEE-519
- Printing Press
- Pharmaceutical
- Data Centre
- IT Park
- Automobile
- Textile
- Hospitals
- Airports
- Harmonic rich environment

Technical Specification

System Connection	3 P / 4 W or 4 P / 4 W
Input Voltage	415 V (+/-10%) and 50 Hz (+/-)5% other rating on request
Phase compensation current range	15 A - 1000 A (other ratings on request)
Neutral Current Compensation	Available
Technology	Two Level Topology / Three Level Topology
Harmonic filtration range	2nd to 51st order
Individual harmonic selection	Available
Harmonic Attenuation Ratio in %	>96% at rated load
Power factor compensation	100% (Lead / Lag)
Load Balancing	Negative Sequence Compensation (Zero Sequence compensation in 4 P / 4 W range)
Reaction time	<0.3 ms
Function Selection	Quad Pro (Harmonic filtering, Power Factor correction, Load Balancing, Neutral current compensation)
Overload (peak value)	Upto 160% of rated peak (instantaneous)
Current Transformer: Secondary o/p	5 A / 1 A
CT Class and VA (recommended)	Class: 0.5 or better, Power: 15 VA or more
Interface (Communication)	GSM, MODBUS RTU, USB, Ethernet, Profibus
IP Protection Class	IP-41 and higher on request
System Cooling	Forced air colling
Overheating Protection	Yes
Cable entry	Top / Bottom & Front / Back
Panel Mounting	Wall / Floor
Ambient Temperature	No deration upto 500C
Relative Humidity	96% (Non condensing)
Maximum operating altitude	1000 m
Acoustic noise at 1m	< 60 dB
Man Machine Interface	17.78 cm (7) LCD touch screen MMI with easy and customer friendly navigation pages
Protections	Hardware & Software Protections

Notes

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