



HG Modular Devices

MCB, MSD, RCCB, RCBO, MCCB (HBD Type),
MC (HIC Type), MMS, SPD, FUSE

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Essential for Today, Potential for Tomorrow

Hyundai Electric solely pursues the growth of our customers' business. From power generation to power distribution, we focus on developing and commercializing products and solutions aimed at increasing the efficiency of energy equipment as well as at proactively monitoring and controlling assets in an integrated manner to improve our customers' productivity and management efficiency. We are well aware that our efforts add to the driving force behind our customers' growth and contribute to the creation and maintenance of a more dynamic world. We focus on achieving innovation and strive to evolve continuously to shape a better tomorrow based on today's technological advancement.

Solution

INTEGRICT

Energy Solution

Energy solution business refers to the business of designing, procuring and establishing a system that enables the efficient use of power energy through integrated management of the production, consumption, sales and operation of power energy.



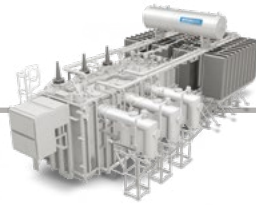
Generation

Power Plants

Primary Substation

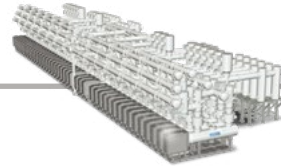
- Supplied more than 1.2 million MVA in total to 70 countries around the world for the past 40 over years since 1978
- Satisfies the various demands of customers through the acquisition of quality certifications from international accredited institute
- Participates in the world's key technical committee such as CIGRE and others, pioneering the establishment of technology standard related to power network

Utility



Power Transformer

• up to 800 kV, 1,500 MVA



Gas Insulated Switchgear

• up to 800 kV



Generators



Generators

• 2-4 pole



Asset Management Solution

Asset management solution is a business that maximizes the overall business efficiency by systematically managing the performance, risk, maintenance cost and others as well as by providing an asset management solution suitable to the customer's circumstance depending on the product lifecycle (PLC) of various products.

Transmission

Secondary Substation

- Can be installed in spaces smaller than the open type of substation by using SF₆ gas with outstanding insulation and arc extinguishing characteristics
- Secures advanced reliability by producing products that are resistant to external environment and climate effects through the sealing at the charge part
- Extensive project experiences around the world
- Reduces installation period and cost due to simple installation and transportation, convenient maintenance
- Design considering the safety of the workers as priority



Gas Insulated Switchgear

- GIS for 245 ~ 550 kV



Power Transformer

- 800 kV, 1,500 MVA



Gas Insulated Switchgear

- GIS for 170 kV

- Enhanced reliability and secured safety with production of products based on the world's best equipment and stringent quality system
- Realized high efficiency by selecting slot based on FEM
- Realized small and lightweight with optimal design based on FEM analysis method
- Satisfies the quality standards of international accredited institutes (IEC, IEEE, CSA, NEMA, API etc.)



Synchronous Generator

- 100 ~ 50,000 kVA
- 220 ~ 22,000 V, 50/60 Hz
- over 4 pole



Wind Turbine Generator

- up to 5 MW



H+C Series Motor

- 150-1,300 HP
- 2,000 ~ 7,200 V, 50/60 Hz
- 2-8 pole

Distribution



Cubicle GIS

- up to 38 kV

- Produces high quality products using angle-less type
- Multi-functional digital protection relay (HiMAP) applied
- High reliability secured, provides various operation information such as protection, measurement and control
- Firm external box, size and compact, making it safe
- Maintains high quality through stringent quality control system and continuous research and development



Cast Resin Transformer

- up to 36 kV, 20 MVA



Metal Clad Switchgear

- up to 38 kV
- IEC, ANSI



Low Voltage Switchgear & Motor Control Center

- H8PU : 660 V, 3,000 A, 80 kA
- H5600 : 660 V, 3,000 A, 100 kA
- HiMCC : 1,000 V, 5,000 A, 100 kA



Vacuum Circuit Breaker

- IEC, ANSI, UL
- up to 36/38 kV, 50 kA, 4,000 A



Air Circuit Breaker

- up to 150 kA, 6,300 A



Vacuum Contactor

- up to 12 kV, 400 A



Power System Monitoring and Protection Relay

- HGMAP Type
- HGCAM Type



High Voltage AC Drive

- 220 ~ 440 V, ~ 132 kW

- Realizes powerful control performance through Sensor-less Vector Control and Auto Tuning
- High speed response due to Digital Signal Processor and High Speed My Com
- Compact design, enabling application in various environments
- Inverter manufactured using accumulated technology and know-how (outstanding technology of developing inverter for high-speed rail)



Medium & High Voltage Induction Motor

- 150-30,000 HP
- 2-30 pole



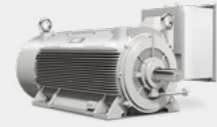
Inverter Shield Motor

- 1-250 HP
- 2-6 pole

- Production of high quality marine devices satisfying the regulations and standards of key marine associations (LRS, ABS, DNV, GL, BV, NK etc.) and world's renowned institutes
- High quality safety secured through the latest equipment and stringent quality control system
- Realization of optimal high efficiency by converging SWGR, Generator, Motor, Telecom, Automation and others



Marine Switchgear



Marine Motor



Molded Case Circuit Breaker

- AC : up to 150 kA, 1,600 A
- DC : up to 100 kA, 800 A



Earth Leakage Circuit Breaker

- up to 85 kA, 800 A, 1,000 mA



Miniature Circuit Breaker

- up to 10 kA, 125 A



Contactor and Overload Relay

- up to 800 A



Surge Protection Device

- up to 200 kA
- AC, DC



Residual Current Circuit Breaker

- MCB : up to 10 kA, 125 A
- RCCB : up to 100 A, 500 mA



Installation Contactor

- up to 63 A



Manual Motor Starter

- up to 100 kA, 80 A



Fuse

- up to 1,250 A

- Wide range of breaking capacities and frames to meet all customer requirements
- Optimized design providing high performance
- Compact and reliable products type-tested by DEKRA and KERI



Digital Motor Protection Relay

- up to 60 A



NEMA Premium Efficiency Motor

- 1-500 HP
- 2-6 pole

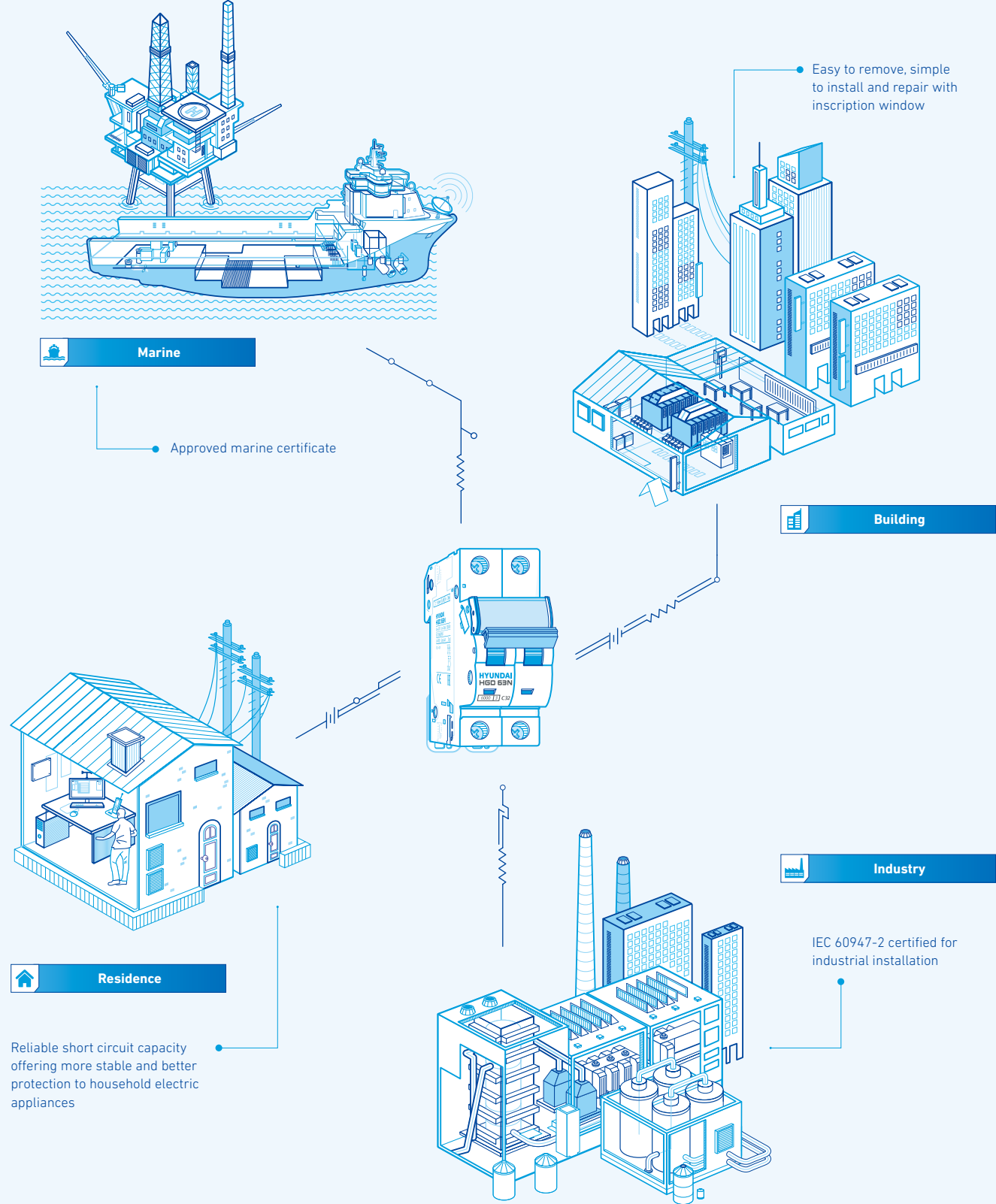


Explosion-Proof (Class 1 Div.1) Motor

- 1-500 HP
- 2-6 pole
- Hazardous Locations

Features

Applicable to Various Location



Series Features

HYUNDAI ELECTRIC Miniature Series

Satisfy client requirement by focusing on safety, easy installation and user-friendliness with high reliability qualified by international test authorities based on IEC standards.



Inscription Window

Ensures circuit identification and hence reduces maintenance downtime



Safety Terminals

They guide the cable towards the cage terminal and avoid improper cable termination



Dual Termination

Two types of busbars can be used-fork type and pin type



Large Cable Terminals

The terminals are suitable for cables up to 50 mm² cross section area thus making it suitable for copper and aluminium cables

MCB

1. IEC 60947-2 certificated
2. Selectable AUX/ALT with knob
3. Available with enclosure (Option-IP40)
4. Breaking capacity up to 15 kA (IEC 60898-1)

RCCB

1. Advance neutral
2. Conditional short circuit capacity 10 kA

MSD

1. Longer electrical life
2. Low power consumption, thus cost effective and energy saving



Recognized with IF Design Award 2016

Product Overview

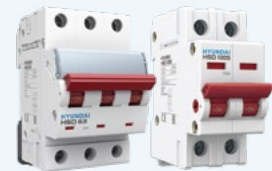
Miniature Circuit Breaker

Model	Deluxe	Standard
Type	HGD63N, 63H, 125	HGD32NS, 63E, 63S, 63M, 63P, 63U, 100S
Breaking Capacity	6, 10 kA	3, 4.5, 6, 10, 15 kA
Pole	1, 2 (1+N), 3, 4 (3+N)	1, 2 (1+N), 3, 4 (3+N)
Rated Current	0.5~125 A	1~125 A
Tripping Curve	B, C, D	B, C, D
Standard	IEC/EN 60898-1, 60947-2	IEC/EN 60898-1, 60947-2



Miniature Switch Disconnecter

Model	Deluxe	Standard
Type	HSD63, HSD125	HSD100S
Utilization Category	AC22 A	AC22 A
Pole	1, 2, 3, 4	1, 2, 3, 4
Rated Current	16~125 A	16~100 A
Standard	IEC/EN 60947-3	IEC/EN 60947-3



Residual Current Circuit Breaker

Model	Deluxe	Standard
Type	HRC63, HRC100	HRC63S, HRC100S
Operating Characteristics	AC, A	AC, A
Pole	2, 4	2, 4
Residual Current	30~500 mA	30~500 mA
Rated Current	16~125 A	16~125 A
Standard	IEC/EN 61008-1	IEC/EN 61008-1



Residual current Circuit Breaker with Overcurrent protection

Model	2 Module Type			RCD Type		Compact Type						
Type	HRO63S	HRO63A	HRO63B	HRO63M	HRO63P	HRO40L	HRO40T	HRO40HT	HRO40M	HRO40P	HRO40ML	HRO40PL
Breaking Capacity	4.5 kA	6 kA	10 kA	6 kA	10 kA	6 kA	6 kA	10 kA	6 kA	10 kA	6 kA	10 kA
Pole	1+N	2P		1, 2(1+N), 3, 4(3+N)		1+N			N+1			
Rated Current	1~63 A	6~63 A		1~63 A		6~40 A			6~40 A			
Operating Characteristics	AC, A	AC, A		AC, A		AC, A			AC, A			
Residual Current	10~500mA	30~300mA		10~500 mA		10~300 mA			10~300 mA			
Tripping Curve	B, C, D	B, C, D		B, C, D		B, C			B, C			
Standard	IEC/EN 61009-1											



Electronic Circuit Breaker

Model	HEC
Type	HEC20
Rated Current	2~20 A
Current Setting Interval	0.1 A
Pole	2
Overloading Cut-off Delay	10 sec



Molded Case Circuit Breaker (HBD Type)

Model	Plug-in		Lug-to-Lug	
	HBD51D~53D	HBD51hD~53hD	HBD51~53	HBD51h~53h
Type				
Breaking Capacity	5 kA	10 kA	5 kA	10 kA
Pole	1P~3P	1P~3P	1P~3P	1P~3P
Rated Current	10~50 A	10~50 A	10~50 A	10~50 A
Standard	IEC 60947-2			



Installation Contactor

Model	HIC
Type	HIC25, 40, 63
Rated Voltage (Ue)	2P: 230 V, 4P: 400 V
Pole	2P, 4P
Rated Current (Ie)	25 A, 40 A, 63 A
Rated Control Voltage (Uc)	24 V, 48 V, 230 V
Standard	IEC/EN 61095



Manual Motor Starter

Model	Rotary	Push Button	
Type	HMMS32R	HMMS32K	HMMS80K
Pole	3	3	3
Rated Current	0.1~32 A	0.1~32 A	25~80 A
Standard	IEC 60947-2, IEC 60947-4		



Surge Protection Device

Model	Din-rail Type		Box Type			
			Standard		Deluxe	
Type	HSP20	HSP13/25	HSP40S/80S	HSP120S/200S	HSP40H	HSP160H/320H
Pole	2,3(AC/DC),4(AC)	2,3,4	(2,3,4) W+G	(2,3,4) W+G	(2,3,4) W+G	(2,3,4) W+G
Class	II	I	II	I	II	I
Voltage Type	AC/DC	AC	AC	AC	AC	AC
In (8/20 μs) kA/Mode	20	-	20~40	-	20	-
Iimp (10/350 μs) kA/Mode	-	L-N: 12.5~25 N-PE: 50~100 L-PE: 12.5~25	-	6.5~12.5	-	L-N: 12.5~25 N-PE: 50~100 L-PE: 12.5~25
Standard	AC/DC: IEC 61643-11		AC: IEC 61643-11			



Low Voltage Fuse

Model	Fuse Link (Cylindrical Type)	Fuse Link (NT/NH Type)
Fuse Size	8 x 32, 10 x 38, 14 x 51, 22 x 58	00C, 00, 0, 1, 2, 3, 4
Rated Current	0.5~125 A	2~1,250 A
Fuse Holder/Switch	Fuse Holder (FH Type)	Fuse Switch (FS Type)



HGD

Miniature Circuit Breaker

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Features

HGD Miniature Circuit Breaker

Electric distribution needs are continuously evolving in residential, commercial and industrial sectors. Improved operational safety, continuity of service, greater convenience and operating cost have assumed a tremendous significance. Miniature circuit breakers have been designed to continuously adapt to these changing needs.





Product Features

HGD series MCBs rating covers from 0.5 A to 125 A. The range offers a variety of feature benefits such as uniform breaking capacity of 15 kA across entire range in accordance with IEC/EN 60898-1 and IEC/EN 60947-2. HGD also incorporates features like inscription window, safety terminal, large cable terminals, bi stable clip, positive contact indication and field fittable AUX, ALT, SHT, UVT, OVT.

Deluxe Type

Standard Type

Product Performance

- Low power consumption, thus cost effective & energy saving
- Longer electrical life
- Energy limiting class 3 to ensure low let through energy to limit thermal & mechanical stress on cables.

- Compact structure and external design.
- Customers can choose between deluxe type and standard type depending on the need for inscription window
- Under the standard of IEC 60898-1, all ranges are available with a short circuit capacity of 3 kA~15 kA and it is designed to use both pin type and fork type busbar

Product Structure

- Precise hammer action
- Easy DIN-Rail extraction
- 13 plates arc chute for effective arc quenching
- Dual termination for bus-bar as well as cable connection
- Trip free mechanism: MCB trips even if held in ON position

- 13 plates arc chute for effective arc quenching
- Dual termination for bus-bar as well as cable connection
- Trip free mechanism: MCB trips even if held in ON position

Accessories

- Selectable AUX/ALT with knob
- Available with enclosure (Option-IP40)

- AUX, ALT, SHT, UVT options are available.
- SHT with AUX function together

Specification

- IEC 60898-2 for DC application
- IEC 60947-2 for industrial application
- IEC 60898-1 for household application

- IEC 60898-1 for household application

Product Overview






Deluxe Type (6 kA, 10 kA)



Standard Type (3 kA, 4.5 kA, 6 kA, 10 kA, 15 kA)








Selection Table

HGD (Deluxe Type)

Model	HGD63N, 63 AF, 6 kA	HGD63H, 63 AF, 10 kA	HGD125, 125 AF, 10 kA
			
Reference Standard	IEC/EN 60898-1	IEC/EN 60898-1 ; IEC/EN 60947-2	IEC/EN 60947-2
No. of Poles	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P
Rated Current (In)	0.5, 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	0.5, 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	80 A, 100 A, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz
Rated Short Circuit Current (Icn)	6 kA (Ics=100 % Icn)	10 kA (Ics=75 % Icn)	10 kA (Ics=75 % Icu)
Magnetic Release Setting	(3-5) In-B Curve (5-10) In-C Curve (10-20) In-D Curve	(3-5) In-B Curve (5-10) In-C Curve (10-20) In-D Curve	(3-5) In-B Curve (6-9) In-C Curve (8-12) In-D Curve
Rated Insulation Voltage (Ui)	500 V	500 V	690 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000	10,000/20,000
Operating Temperature	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C
Humidity	95 % RH	95 % RH	95 % RH
Energy Limit Class	3	3	3
Terminal Capacity (max)	35 mm ²	35 mm ²	50 mm ²
Tightening Torque	2 N·m	2 N·m	3.5 N·m
Vibration	3 g	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.125 kg	0.125 kg	0.215 kg
Dimensions (H x D x W)/Pole in mm	87.5 x 71.7 x 17.7 mm	87.5 x 71.7 x 17.7 mm	81 x 74.5 x 26.5 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material
Busbar Connections Top/Bottom Side	Pin/Fork type (Bottom)	Pin/Fork type (Bottom)	-
AUX/ALT/SHT/UVT/OVT	Yes	Yes	Yes (AUX/ALT)

※ HGD63N, 63H The appearance are the same.

HGD (Standard Type)

HGD63E, 63 AF, 3 kA ¹⁾	HGD63S, 63 AF, 4.5 kA ¹⁾	HGD32NS, 32 AF, 6 kA	HGD63M, 63 AF, 6 kA ²⁾	HGD63P, 63 AF, 10 kA ²⁾	HGD63U, 63 AF, 15 kA	HGD100S, 100 AF, 10 kA
						
IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60898-1, IEC/EN 60947-2	IEC/EN 60898-1, IEC/EN 60947-2	IEC/EN 60898-1	IEC/EN 60947-2
1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P	N + 1P (N-left)	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P+N, 2P, 3P, 3P + N, 4P
1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 32 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63 A	63, 80, 100, 125 A
AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V
50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
3 kA (Ics=100 % Icn)	4.5 kA (Ics=100 % Icn)	6 kA (Ics=100 % Icn)	6 kA (Ics=100 % Icn)	10 kA (Ics=75 % Icn)	15 kA (Ics=50 % Icn)	10 kA (Ics=75 % Icu)
(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (6-9)In-C Curve (8-12)In-D Curve
500 V	500 V	500 V	500 V	500 V	500 V	500 V
4 kV	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV
2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV
10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000
-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C
95 % RH	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH
1	1	3	3	3	3	1
25 mm ²	25 mm ²	10 mm ²	25 mm ²	25 mm ²	25 mm ²	35 mm ²
2 N·m	2 N·m	1.2 N·m	2 N·m	2 N·m	2.5 N·m	3.5 N·m
3 g	3 g	3 g	3 g	3 g	3 g	3 g
40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall
IP20	IP20	IP20	IP20	IP20	IP20	IP20
Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
0.090 kg	0.090 kg	0.109 kg	0.100 kg	0.115 kg	0.130 kg	0.155 kg
80.5 x 71.0 x 17.8 mm	80.5 x 71.0 x 17.8 mm	83.0 x 71.0 x 17.8 mm	81 x 71.0 x 17.8 mm	81 x 71.0 x 17.8 mm	83.0 x 71.8 x 17.8 mm	81.0 x 71.0 x 26.8 mm
Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material
Pin type	Pin type	-	Pin/Fork type	Pin/Fork type	Pin type	-
No	No	Yes	Yes	Yes	Yes (Separate inquiry)	Yes (SHT/UVT)

※ 1) HGD63E, 63S The appearance are the same.

2) HGD63M, 63P The appearance are the same.

Accessories (Deluxe Type)

Auxiliary Contact + Alarm Trip (AXT-for 63 AF MCB)

Technical Specification

Standard Conformity	IEC/EN 60947-5-4
Current Carrying Capacity (max)	6 A
Rated Voltage (Ue)	AC 240 V
Contact Configuration	1NO + 1NC
Rated Insulation voltage	AC 500 V
Rated Frequency (F)	50/60 Hz
Utilization Category	AC 12
Electrical Endurance (no. of operations)	10,000
Terminal Capacity(max)	2.5 mm ²
Protection Class	IP20
Power Loss	3 Watts
Dimensions (H x D x W)	88.9 x 71 x 8.85 mm
Net Weight	36 g
AUX/ALT Selection knob	AUX(Clockwise)/ALT(Counter clockwise)
Mounting	Left side of MCB (HGD63N/H)

※ Attachment used for signalling, indication and interlocking.

AXT Combination (Position = Pos)

AXT				MCB			
POS4	POS3	POS2	POS1	1P	2P	3P	4P
AUX4	AUX3	AUX2	AUX1	o	o	o	o
-	-	ALT2	ALT1	o	o	o	o
AUX2	AUX1	ALT2	ALT1	o	o	o	o

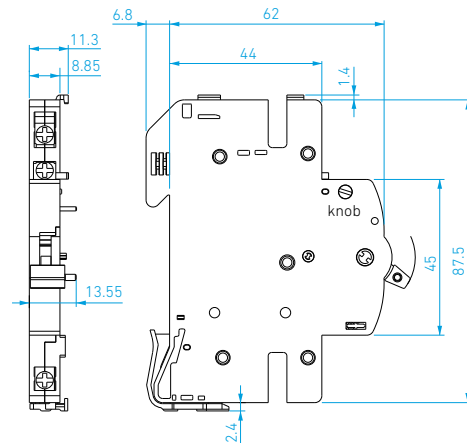
Ordering Information

AXT HGD63H	AUX/ALT
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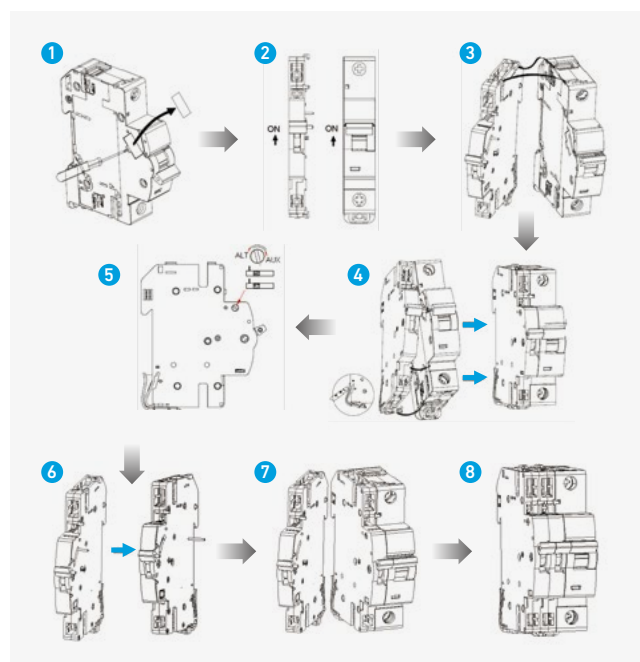
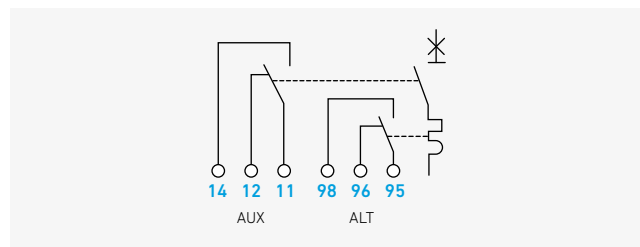
Assembling with MCB (HGD Accessories)

- Remove the window sticker of the protection device with screw driver or by hand
- Make sure the knob is in ON position
Caution don't mount in OFF position
- Adjust the U-shaped locks present at the Upper end of the AXT in such a way that they get fitted into the slots present in the protection device.
- Rotate the AXT so as to bring it nearer to the protection device for final locking. Adjust the U-shaped locks present at the upper end of the AXT in such a way that they get fitted into the slots present in the protection during this snap lock shall remain pressed until the U-Lock of the snap lock gets fitted into the slot provided in the protection.
- AUX-Type: The AXT contacts will signal whether the breaker is in the ON or OFF position.
ALT-Type: The ALT-Type includes a set of contacts that will only signal when the breaker has tripped due to any fault. Typically, the contacts would be connected to an alarm to signal the operator that an overload/short circuit has occurred.
- For multiple mounting of AXT remove the pin from secondary AXT for mounting as shown below with help of any tool.
- Mount the secondary AXT as per previous steps such that the coupling link from secondary AXT gets linked to first one for proper linkage of mechanism with each other in ON position.
- Check for the working of the AXT by switching it ON & OFF.
Set the working of secondary AXT as per step no.5.

Dimension



Circuit Diagram



Shunt Trip (SHT)

Technical Specification

Standard Conformity	IEC 60947-1
Rated Voltage (Ue)	AC 110-415 V DC 110-130 V
Frequency	50/60 Hz
Max Release Duration	10 ms
Operational Voltage	70 %-110 % Ue
Coil Resistance	120 Ω
Terminal Capacity (max)	6 mm ²
Mechanical Status Indicator	Front
Tightening Torque	0.8 N·m
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm
Net Weight	72 g
Electrical Endurance (no. of operations)	4,000
Wiring Connection Type	Bottom
Mounting	Left side of MCB (HGD63N/H)

Ordering Information

SHT HGD63H S2	AC 240 V
SHT HGD63H S5	DC 24 V
SHT HGD63H S7	DC 48 V
SHT HGD63H S9	DC 12 V

Under Voltage Trip (UVT)

Technical Specification

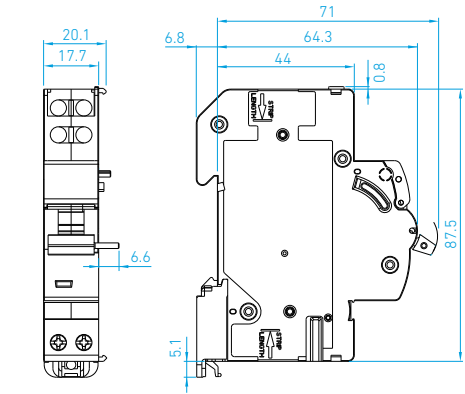
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1	
Rated Voltage	AC 240 V	
Frequency	50/60 Hz	
Under Voltage Trip Voltage	$V \leq 0.7 U_e$	
Terminal Size	6 mm ²	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening Torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no. of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

※ Causes the device with which it is associated to trip when input voltage decreases (between 70 % and 35 % of U_n). Associated device can be manually reclosed when voltage reaches back to 85 %.

Ordering Information

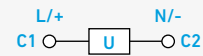
UVT HGD63H US2	Single phase
UVT HGD63H UT2	Three phase

Dimension

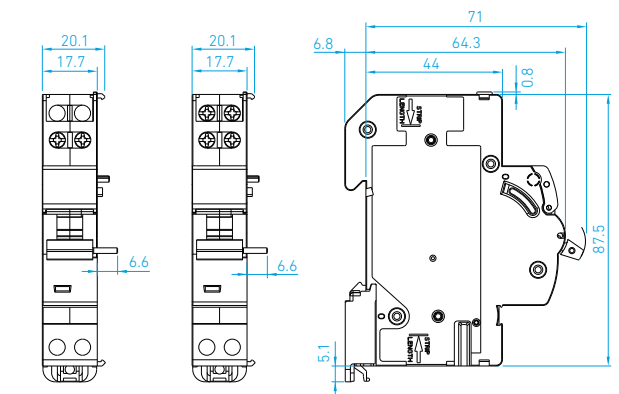


SINGLE PHASE

Circuit Diagram



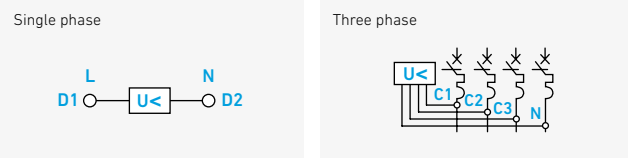
Dimension



SINGLE PHASE

THREE PHASE

Circuit Diagram



Accessories (Deluxe Type)

Under Voltage Trip + Time Delayed (UVT + t)

Technical Specification

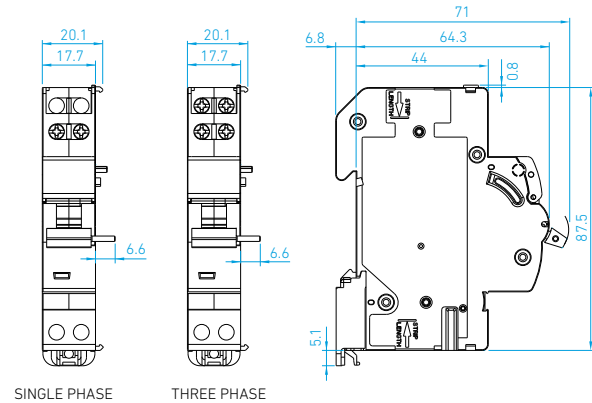
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1	
Rated Voltage	AC 240 V	
Frequency	50/60 Hz	
Under Voltage Trip Voltage	$V \leq 0.7 U_e$	
Trip Delay	0.2 sec	
Terminal Size	6 mm ²	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no. of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

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

Ordering Information

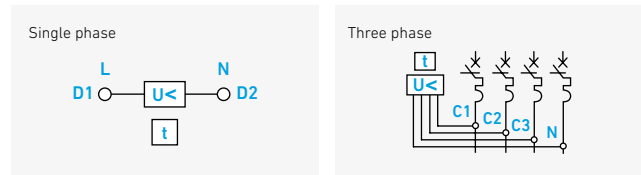
UVT HGD63H DUS2	Single phase
UVT HGD63H DUT2	Three phase

Dimension



SINGLE PHASE THREE PHASE

Circuit Diagram



Over Voltage Trip (OVT)

Technical Specification

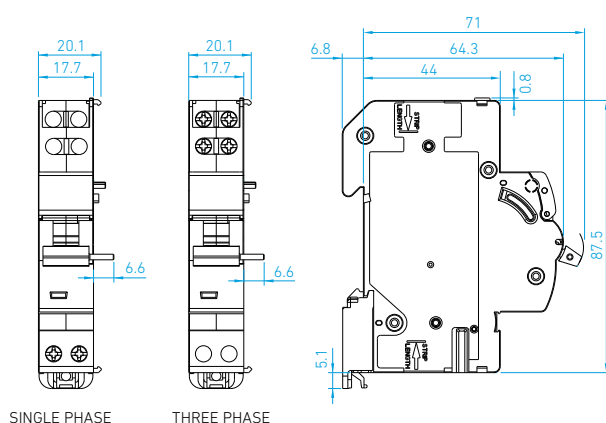
Phase	Single phase	Three phase
Standard Conformity	EN50550	
Rated Voltage	AC 240 V	AC 240 V (L-N)
Frequency	50/60 Hz	
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)
Max Duration of Impulse Command	10 ms	
Terminal Size	6 mm ²	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening Torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no. of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

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

Ordering Information

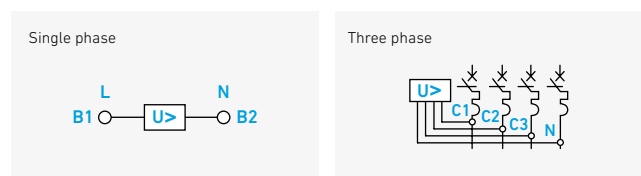
OVT HGD63H OS2	Single phase
OVT HGD63H OT2	Three phase

Dimension



SINGLE PHASE THREE PHASE

Circuit Diagram



Under + Over Voltage Trip (UOVT)

Technical Specification

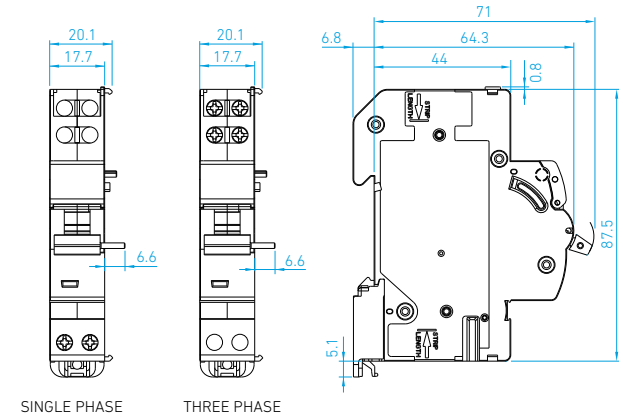
	Single phase	Three phase
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1, EN 50550	
Rated Voltage	AC 240 V	AC 240 V (L-N)
Frequency	50/60 Hz	
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)
Under Voltage Trip Voltage	$V \leq 0.7 U_e$	
Max Duration 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 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no. of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

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

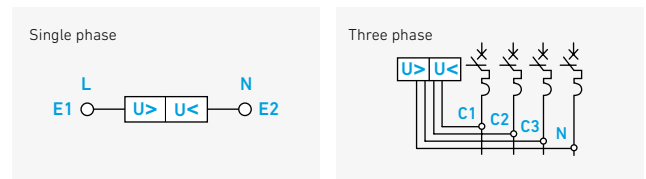
Ordering Information

UOVT HGD63H U0S2	Single phase
UOVT HGD63H U0T2	Three phase

Dimension

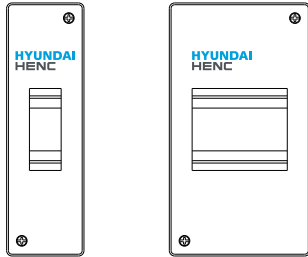


Circuit Diagram



Accessories (Deluxe Type)

Enclosure for MCB-PLASTIC (ENC)



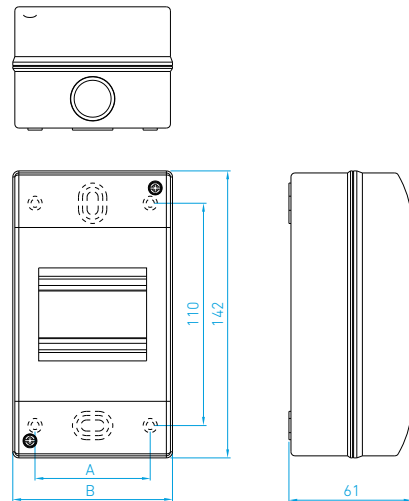
No. of Ways	Dimensions (In mm)	
	A	B
1P/2P	29.4	43.4
3P/4P	57	79

※ Enclosures for independent cut off/connection of the electrical appliances.

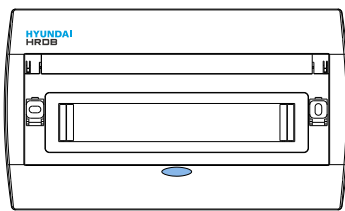
Ordering Information

ENC HGD63H 2P	For 1P, 2P MCB Enclosure
ENC HGD63H 4P	For 3P, 4P MCB Enclosure

Dimension



Distribution Board

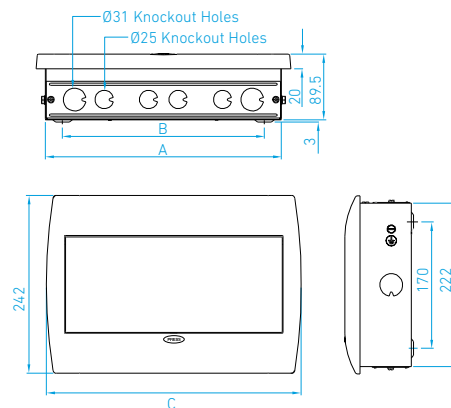


No. of Ways	A	B	C	Top		Bottom		Side
				Ø25	Ø31	Ø25	Ø31	
8	247	195	272	2	2	2	2	1
12	319	267	344	4	2	4	2	1
16	391	339	416	4	2	4	2	1

Specification

- IEC61439-3
- These are most elegantly designed DBs, to suit the décor of homes
- Raised neutral link for easy wiring
- Spring loaded outer cover swings open by just pressing the lock button
- Supplied with masking sheets to protect components from cement during plastering
- Supplied with neutral & earth link, top & bottom detachable plates
- IP 42

Dimension



Ordering Information

ENC HRDB SPN8W	8 Ways
ENC HRDB SPN12W	12 Ways
ENC HRDB SPN16W	16 Ways

Accessories (Deluxe Type -125 AF)

Auxiliary Contact + Alarm Trip (AXT-for 125 AF MCB)

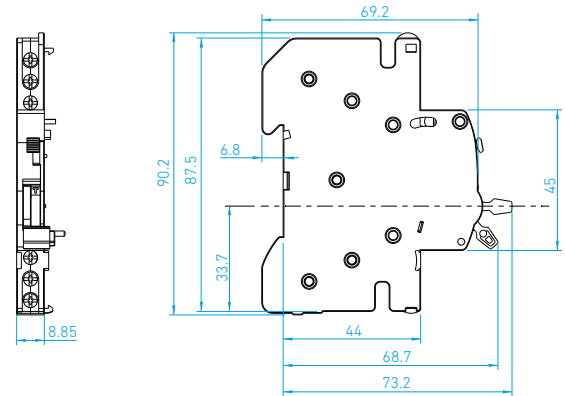
Technical Specification

Standard Conformity	IEC/EN 60947-5-4
Coil Consumption	6 VA
Rated Voltage (Ue)	AC240 V
Contact Configuration	1NO + 1NC
Rated Insulation Voltage (Ui)	AC500 V
Rated Frequency (F)	50/60 Hz
Utilization Category	AC 12
Electrical Endurance (no. of operations)	10,000
Terminal Capacity (max)	2.5 mm ²
Protection Class	IP20
Dimensions (H x D x W)	90.2 x 73.2 x 8.85
Net Weight	36 g
Mounting	Left side of MCB (HGD125) common use of AXT for RCCB

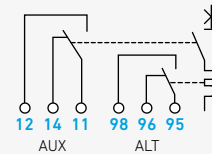
Ordering Information

AXT HGD125	AUX/ALT
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Dimension



Circuit Diagram

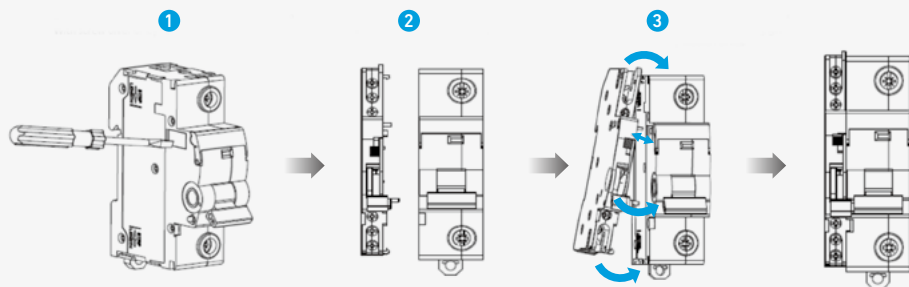


Assembling with MCB (HGD125)

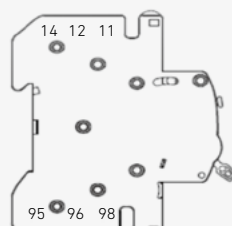
- 1 Remove the window sticker of the protection device with screw driver or by hand

- 2 Make sure the knob is in OFF position
Caution: Don't mount in ON position

- 3 Rotate the AXT so as to bring it nearer to the protection device for locking. Adjust the locks present at the upper end of AXT in such a way that they get fitted in slots present in protection device



Terminal No.



11-12 - ON } AUX
11-14 - OFF

95-96 - ON/OFF } ALT
95-98 - TRIP

Accessories (Standard Type)

Auxiliary Contact (AUX)

Technical Specification

Standard Conformity	IEC/EN 60947-5-4		
Current Carrying Capacity (max)	6 A		
Rated Voltage (Ue)	AC 240 V		
Contact Configuration	1NO + 1NC		
Rated Insulation Voltage (Ui)	AC 500 V		
Rated Frequency (F)	50/60 Hz		
Utilization Category	AC 12		
Electrical Endurance (no. of operations)	10,000		
Terminal Capacity (max)	2.5 mm ²		
Protection Class	IP20		
Dimensions (H x D x W)	81.5 x 74.5 x 8.8 mm		
Net Weight	32 g		
Mounting	Left side of MCB (HGD63M/P)/Max. 4 EA		
	Operating Power	Current	
Operating Current	AC	415 V	3 A
		240 V	6 A
	DC	130 V	1 A
		48 V	2 A
		24 V	6 A

※ Attachment used for signalling, indication and interlocking point 11 and 14 are connected when circuit is closed. Point 11 and 12 are connected when circuit is open.

Ordering Information

AUX HGD63P	AUX
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Alarm Trip (ALT)

Technical Specification

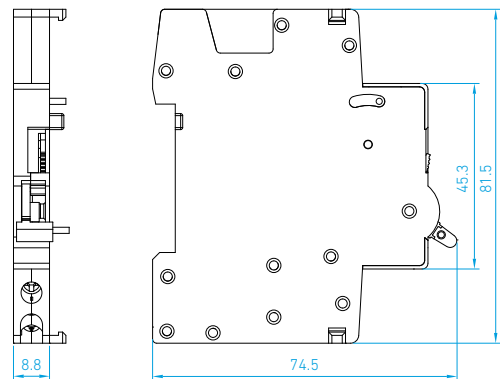
Standard Conformity	IEC/EN 60947-5-4		
Current Carrying Capacity (max)	6 A		
Rated Voltage (Ue)	AC 240 V		
Contact Configuration	1NO + 1NC		
Rated Insulation Voltage (Ui)	AC 500 V		
Rated Frequency (F)	50/60 Hz		
Utilization Category	AC 12		
Electrical Endurance (no. of operations)	10,000		
Terminal Capacity (max)	2.5 mm ²		
Protection Class	IP20		
Dimensions (H x D x W)	81.5 x 74.5 x 8.8 mm		
Net Weight	32 g		
Mounting	Left side of MCB (HGD63M/P)/Max. 2 EA		
	Operating Power	Current	
Operating Current	AC	415 V	3 A
		240 V	6 A
	DC	130 V	1 A
		48 V	2 A
		24 V	6 A

※ Attachment used for signalling, indication and interlocking
 ※ Point 91 and 92 are connected when circuit is closed.
 Point 91 and 94 are connected when the breaker trips due to fault.
 Point 91 and 92 are connected when the breaker trips by manual operation.
 Meanwhile, point 91 and 94 are disconnected.
 ※ ALT Should be assembled with in 18 mm on the left side of MCB.

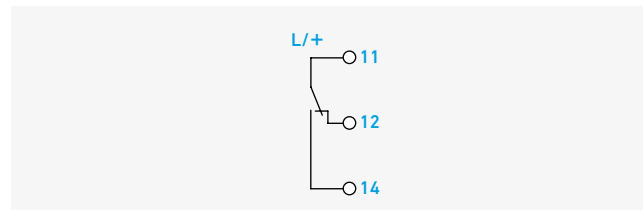
Ordering Information

ALT HGD63P	ALT
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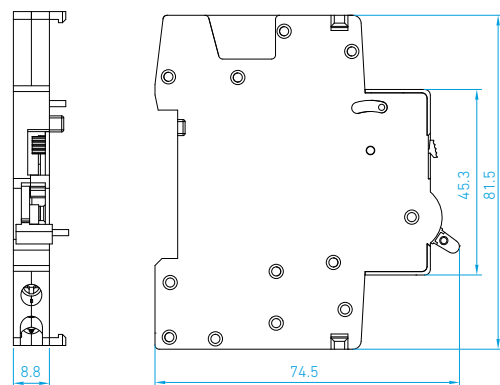
Dimension



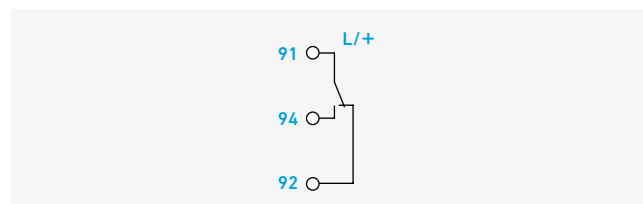
Circuit Diagram



Dimension



Circuit Diagram



Shunt Trip (SHT) + Auxiliary Contact (AUX)

Technical Specification

Standard Conformity	IEC/EN 60947-1, 60947-5-4
Coil Consumption	6 VA
Rated Voltage (ac) (Ue)	AC 240 V
Rated Voltage (dc) (Ue)	12, 24, 48 V
Contact Configuration	1NO + 1NC
Rated Insulation Voltage (Ui)	AC 500 V
Rated Frequency (F)	50/60 Hz
Operating Voltage Range	85 % to 110 % of rated voltage
Electrical Endurance (no. of operations)	4,000
Terminal Capacity(max)	6 mm ²
Protection Class	IP20
Dimensions (H x D x W)	81.5 x 74.5 x 18 mm
Net Weight	64 g
Mounting	Left side of MCB (HGD63M/P)

※ Attachment used for remote tripping, signaling and indication.

Ordering Information

SHT HGD63P S2	AC 240 V
SHT HGD63P S5	DC 24 V
SHT HGD63P S7	DC 48 V
SHT HGD63P S9	DC 12 V

Under Voltage Trip (UVT)

Technical Specification

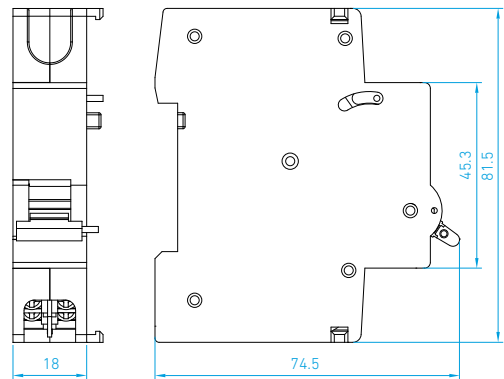
Standard Conformity	IEC 60947-1
Coil Consumption	6 VA
Rated Voltage (ac) (Ue)	AC 240 V
Rated Insulation Voltage (Ui)	AC 500 V
Rated Frequency (F)	50/60 Hz
Operating Voltage Range	$V \leq 0.7 U_e$
Electrical Endurance (no. of operations)	4,000
Terminal Capacity (max)	6 mm ²
Protection Class	IP20
Dimensions (H x D x W)	81.5 x 74.5 x 18 mm
Net Weight	60 g
Mounting	Left side of MCB (HGD63M/P)

※ Attachment used for tripping when its input voltage decreases $170 V \pm 5 \%$

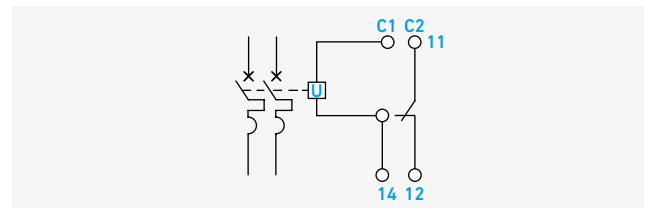
Ordering Information

UVT HGD63P U2	AC 240 V
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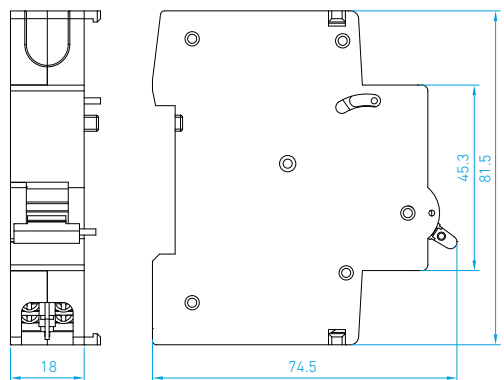
Dimension



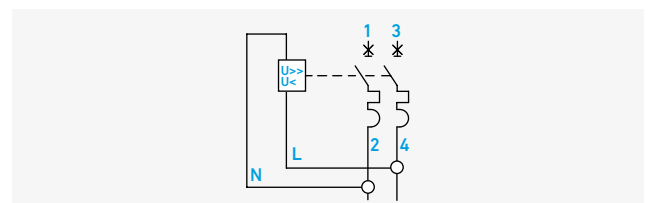
Circuit Diagram



Dimension



Circuit Diagram



Accessories (Standard Type-125 AF)

Shunt Trip (SHT)

Technical Specification

Standard Conformity	IEC/EN 60947-1
Coil Consumption	6 VA
Rated Voltage (Ue)	AC110 - 415 V DC110 - 130 V
Rated Insulation Voltage (Ui)	AC500 V
Rated Frequency (F)	50/60 Hz
Operating Voltage Range	85 % to 110 % of rated voltage
Electrical Endurance (no. of operations)	4,000
Terminal Capacity (max)	6 mm ²
Protection Class	IP20
Dimensions (H x D x W)	80.2 x 66.0 x 17.8
Net Weight	60 g
Mounting	Right side of MCB (HGD100S)

※ Attachment used for remote tripping.

Ordering Information

SHT HGD100S S2	AC 240 V
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Under Voltage Trip (UVT)

Technical Specification


Standard Conformity	IEC/EN 60947-1
Coil Consumption	6 VA
Rated Voltage (Ue)	AC240 V
Rated Insulation Voltage (Ui)	AC500 V
Rated Frequency (F)	50/60 Hz
Operating Voltage Range	$V \leq 0.7 U_e$
Electrical Endurance (no. of operations)	4,000
Terminal Capacity (max)	6 mm ²
Protection Class	IP20
Dimensions (H x D x W)	81 x 77.7 x 17.8
Net Weight	73 g
Mounting	Right side of MCB (HGD100S)

※ Attachment used for tripping when its input voltage decreases 170 V±5 %

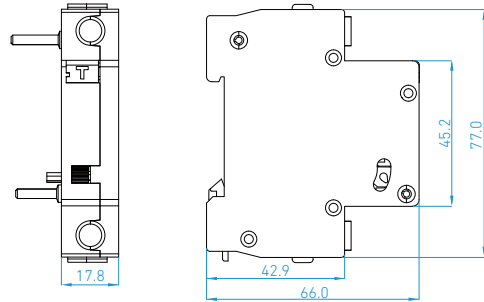
Ordering Information

UVT HGD100S U2	AC 240 V
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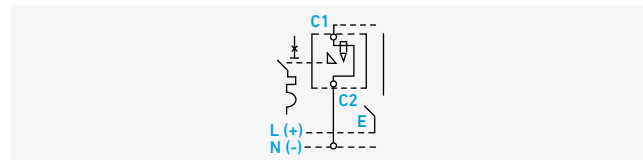
Handle Padlock Device (For 63 AF MCB)

Function	MCB handle can be locked either at "ON" position or at "OFF" position to prevent unwanted operation of the product
General	Diameter of the padlock : 8mm max. Locking in the ON position does not prevent the circuit breaker from tripping in the event of a fault
Standard Conformity	IEC/EN 60947-2
Application Type	HGD63
Ordering Information	PLD M63 A
Appearance	

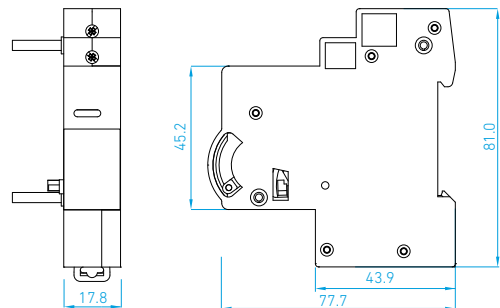
Dimension



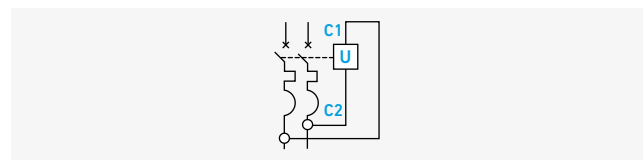
Circuit Diagram



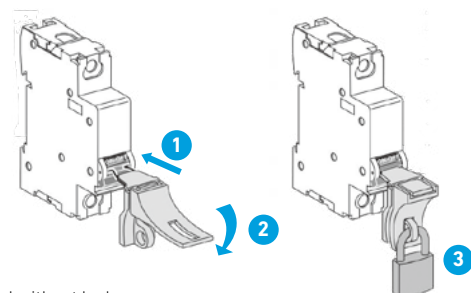
Dimension



Circuit Diagram



Installation



※ Supplied without lock

Accessories Ordering Information

Deluxe Type

Type	Code	Description	
HGD63N/HGD63H	AXT	AXT HGD63H	AUX/ALT
	SHT	SHT HGD63H S2	AC 240 V
		SHT HGD63H S5	DC 24 V
		SHT HGD63H S7	DC 48 V
		SHT HGD63H S9	DC 12 V
		UVT	UVT HGD63H US2
	UVT (Time Delayed Type)	UVT HGD63H UT2	Three phase (AC 415 V)
		UVT HGD63H DUS2	Single phase (AC 240 V)
	OVT	UVT HGD63H DUT2	Three phase (AC 415 V)
		OVT HGD63H OS2	Single phase (AC 240 V)
	UVT + OVT	OVT HGD63H OT2	Three phase (AC 415 V)
		UOVT HGD63H UOS2	Single phase (AC 240 V)
	ENCLOSURE	UOVT HGD63H UOT2	Three phase (AC 415 V)
		ENC HGD63H 2P	for 1P/2P MCB
		ENC HGD63H 4P	for 3P/4P MCB
	Distribution Board	ENC HRDB SPN8W	8 Ways
		ENC HRDB SPN12W	12 Ways
		ENC HRDB SPN16W	16 Ways
HGD125	AXT	AXT HGD125	AUX/ALT

Standard Type

Type	Code	Description	
HGD63M/HGD63P/ HGD32NS	AUX	AUX HGD63P	
	ALT	ALT HGD63P	
	SHT + AUX	SHT HGD63P S2	AC 240 V
		SHT HGD63P S5	DC 24 V
		SHT HGD63P S7	DC 48 V
		SHT HGD63P S9	DC 12 V
	UVT	UVT HGD63P U2	Single phase (AC 240 V)
	PADLOCK	PLD M63 A	Common use with Deluxe Type
HGD100S	SHT	SHT HGD100S S2	AC 240 V
	UVT	UVT HGD100S U2	Single phase (AC 240 V)

Technical Data

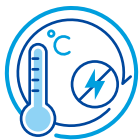
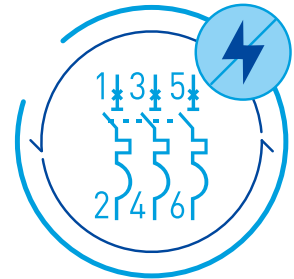
Description

Construction

Miniature circuit breakers have precisely formed molded case & cover of flame retardant high strength thermoplastic material having high melting point, low water absorption, high dielectric strength and temperature withstand.

The switching mechanism is independent, manual and trip free, i.e., the breaker trips internally even if the operating knob is held in ON position.

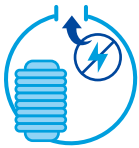
The contact mechanism comprises of fixed & moving contacts specially designed for reliability, long life and anti-weld properties. The arc extinguishing device comprises of 13 plates arc chute. The arc under the influence of the magnetic field and arc guide is moved into the arc chute where it is rapidly split and quenched. The tripping mechanism is thermal magnetic type.



Thermal Operation

The thermal operation provides protection from moderate overloads.

Under overload condition, a thermo-metallic element (bimetallic strip) deflects until it operates a latching mechanism allowing the main contacts to open.

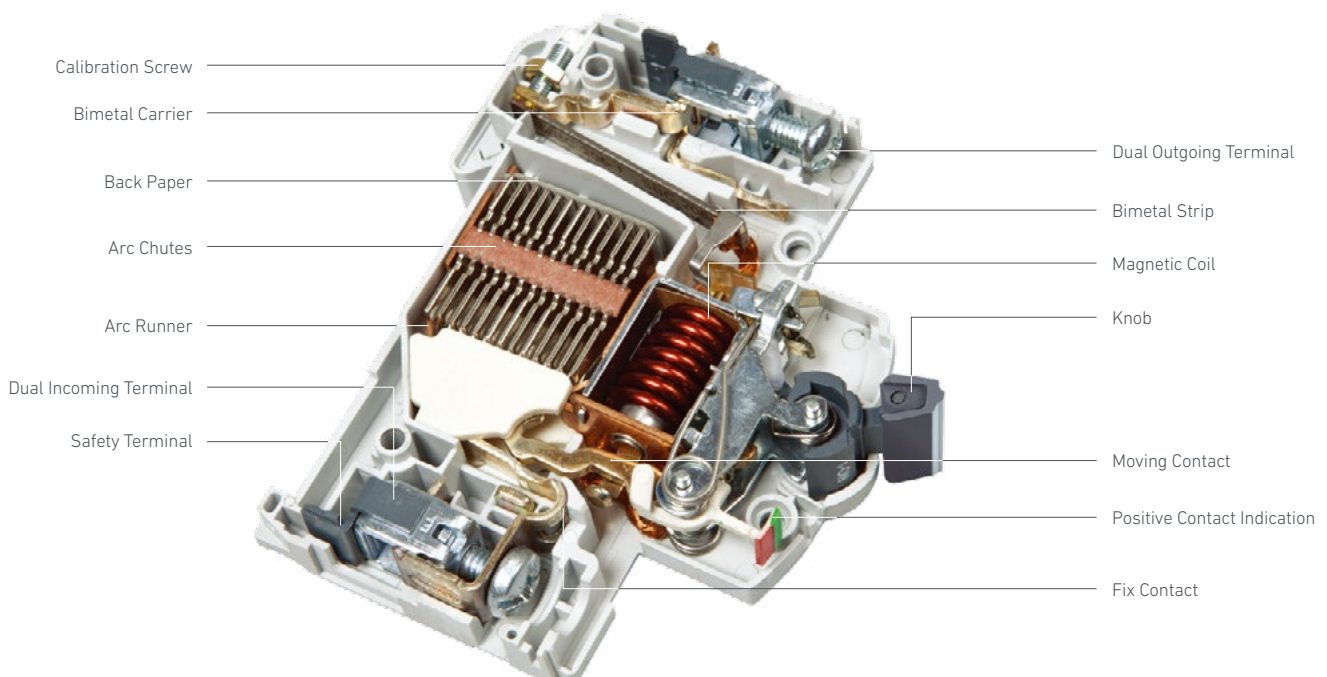


Magnetic Operation

In magnetic operation, large overloads or short circuit current actuates

a solenoid causing a plunger to strike the latching mechanism rapidly opening the main contacts.

Internal View



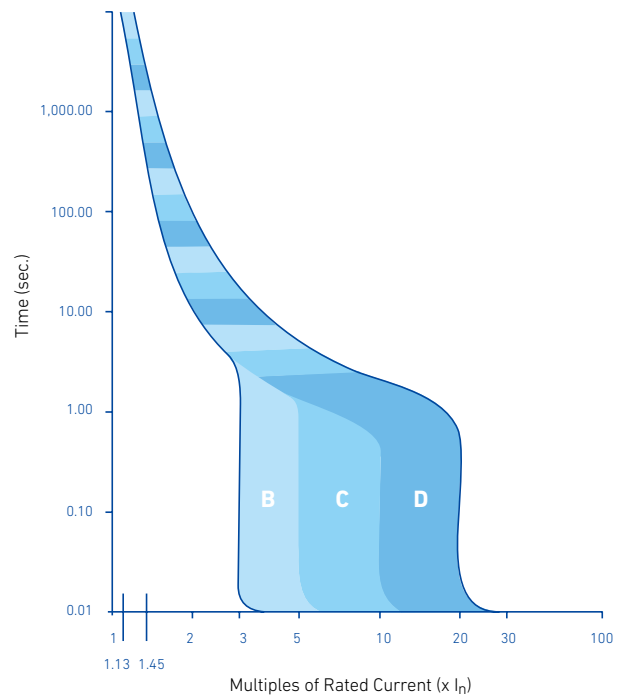
Characteristics Curves

As per	Thermal Tripping			Magnetic Tripping		
	No Tripping	Tripping	Time	Hold	Trip	Time
IEC/EN 60898-1	Current	Current	Limits	Current	Current	Limits
	I_1	I_2	t	I_4	I_5	t
B Curve	$1.13 \times I_n$		≥ 1 h	$3 \times I_n$		≥ 0.1 s
		$1.45 \times I_n$	< 1 h		$5 \times I_n$	< 0.1 s
C Curve	$1.13 \times I_n$		≥ 1 h	$5 \times I_n$		≥ 0.1 s
		$1.45 \times I_n$	< 1 h		$10 \times I_n$	< 0.1 s
D Curve	$1.13 \times I_n$		≥ 1 h	$10 \times I_n$		≥ 0.1 s
		$1.45 \times I_n$	< 1 h		$20 \times I_n$	< 0.1 s
$I_3 = 2.55 \times I_n$	$1 \text{ s} < t < 60 \text{ s}$ for $I_n \leq 32 \text{ A}$ $1 \text{ s} < t < 120 \text{ s}$ for $I_n > 32 \text{ A}$					

Tripping Characteristics

Based on the tripping characteristics, MCBs are available in 'B', 'C' and 'D' curve to suit different types of applications.

- **'B' Curve:** for protection of electrical circuits with equipment that does not cause surge current (lighting and distribution circuits). Short circuit release is set to (3-5) I_n
- **'C' Curve:** for protection of electrical circuits with equipment that causes surge current (inductive loads and motor circuits). Short circuit release is set to (5-10) I_n
- **'D' Curve:** for protection of electrical circuits which causes high inrush current, typically 12-15 times the thermal rated current (transformers, X-ray machines etc.) Short circuit release is set to (10-20) I_n



Technical Data

Temperature Derating Table

Rated Current (A)	Ambient Temperature (°C)													
	-5 °C	0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
0.5	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.5	0.48	0.46	0.44	0.42	0.40	0.38
1.0	1.28	1.24	1.20	1.16	1.12	1.08	1.04	1.0	0.96	0.92	0.88	0.84	0.80	0.76
2.0	2.56	2.48	2.40	2.32	2.24	2.16	2.08	2.0	1.92	1.84	1.76	1.68	1.60	1.52
3.0	3.84	3.72	3.60	3.48	3.36	3.24	3.12	3.0	2.88	2.76	2.64	2.52	2.40	2.28
4.0	5.12	4.96	4.80	4.64	4.48	4.32	4.16	4.0	3.84	3.68	3.52	3.36	3.20	3.04
5.0	6.40	6.20	6.00	5.80	5.60	5.40	5.20	5.0	4.80	4.60	4.40	4.20	4.00	3.80
6.0	7.68	7.44	7.20	6.96	6.72	6.48	6.24	6.0	5.76	5.52	5.28	5.04	4.80	4.56
10.0	12.80	12.40	12.00	11.60	11.20	10.80	10.40	10.0	9.60	9.20	8.80	8.40	8.00	7.60
16.0	20.50	19.80	19.60	18.60	17.90	17.70	16.60	16.0	15.40	14.70	14.10	13.40	12.80	12.20
20.0	25.60	24.80	24.00	23.20	22.40	21.60	20.80	20.0	19.20	18.40	17.60	16.80	16.00	15.20
25.0	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.0	24.00	23.00	22.00	21.00	20.00	19.00
32.0	41.00	39.70	38.40	37.10	35.00	34.60	33.30	32.0	30.70	29.40	28.20	26.90	25.60	24.30
40.0	51.20	49.60	48.00	46.40	44.80	43.20	41.60	40.0	38.40	36.80	35.20	33.60	32.00	30.40
50.0	64.00	62.00	60.00	58.00	56.00	54.00	52.00	50.0	48.00	46.00	44.00	42.00	40.00	38.00
63.0	80.60	78.10	75.60	73.10	70.60	68.00	65.50	63.0	60.50	58.00	55.40	52.90	50.90	47.90
80.0	95.10	93.10	91.00	88.90	86.80	84.60	82.30	80.0	77.60	75.10	72.60	70.00	67.20	64.40
100.0	121.10	118.30	115.50	112.50	109.50	106.50	103.30	100.0	96.60	93.10	89.60	85.60	81.60	77.50
125.0	144.30	141.70	139.00	136.60	133.60	130.80	127.90	125.0	121.90	118.90	115.70	112.40	109.10	105.60

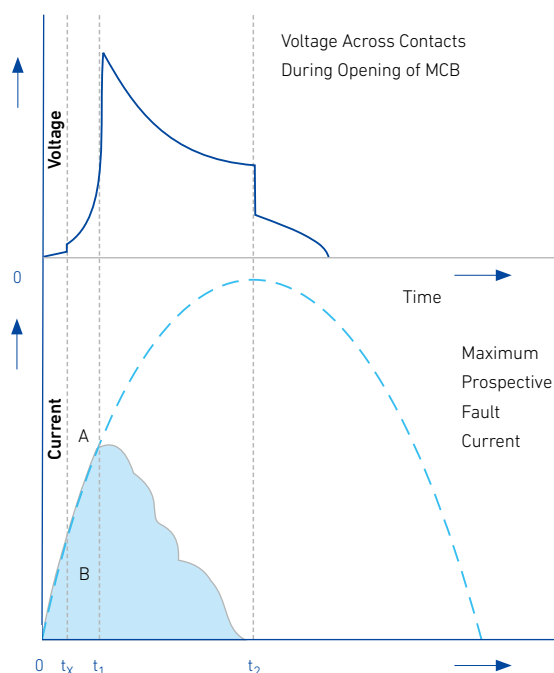
Current Limiting Design

In a current limiting breaker, the tripping & arc control mechanism are designed that under short circuit conditions, the contacts are physically separated and the electrodynamic forces set up by fault current, assist the extinction in less than half cycle.

The figure shows the current limiting effect of circuit breakers.

Fault traces for voltage & current

- 0 = Point of fault initiation
- t_x = Contact opening time (i.e., creation of arc)
- t_1 = Current/Voltage peak (i.e., current limitation)
- t_2 = Time to total extinction of arc (i.e., complete shutdown of fault current)

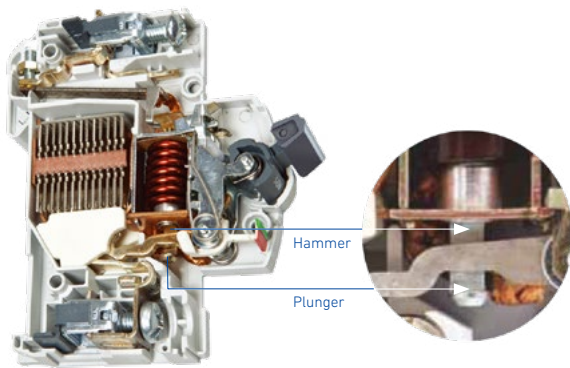


Standard Use Environment

Hammer Trip Mechanism

Current limiting design in itself may not fulfill the requirement of quick breaking (instantaneous action) mainly due to inertia of the latch mechanism and interconnected sequence of operations.

A hammer directly connected to the plunger strikes the moving contact arm with a force proportional to the peak current there by forcibly separating the moving contact from the fixed contact much before the latch mechanism operates. This further reduces the opening time of the circuit breaker.



Effect of Frequency Variation

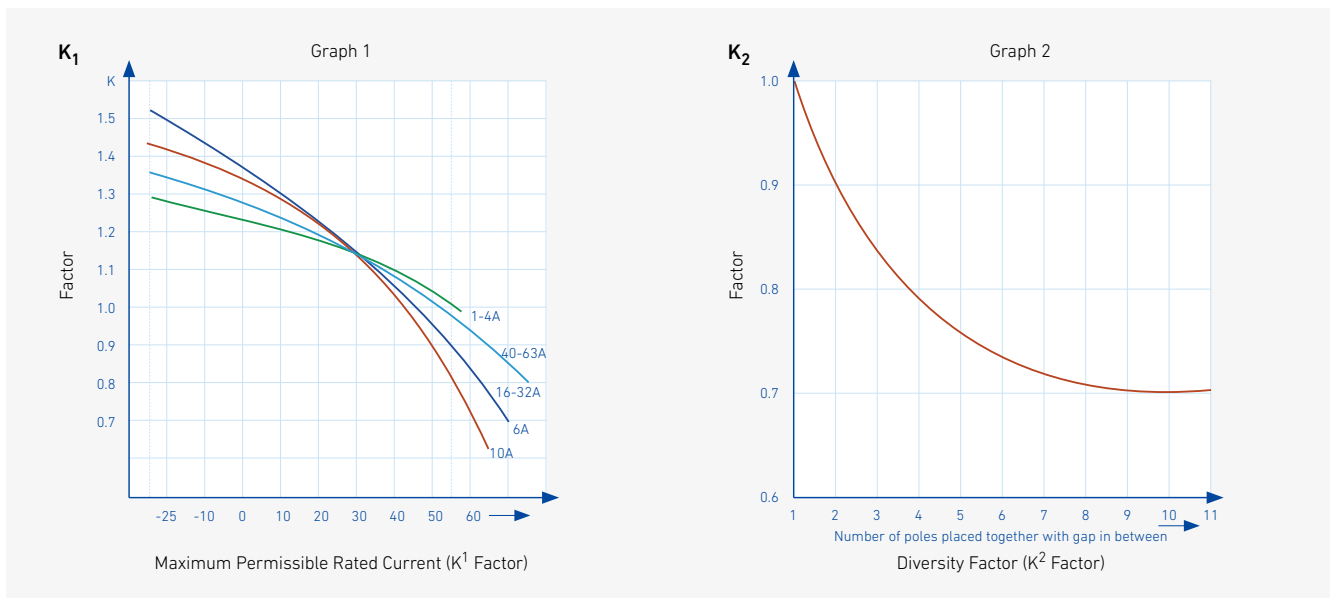
MCBs are designed to operate at AC frequency 50/60 Hz. However, MCBs specially suitable for DC applications and for frequencies upto 400 Hz can be supplied on request.

These can be used on different frequencies in supply from 50-60 Hz without any deration.

For higher frequencies, normal MCBs can be used with a multiplication factor which shall only affect its magnetic trip current.

Supply	AC			DC
	100 Hz	200 Hz	400 Hz	
Frequency				
Multiplication Factor	1.1	1.2	1.5	1.5

Ambient Temperature Compensation/Diversity Factor Chart



Calculation

$$I_n / \text{MCB} = K_1 \times K_2 \times I_n$$

Example

4 MCBs with $I_n = 10$ A, and the amb. temp. is 50°C kept with no gap in between

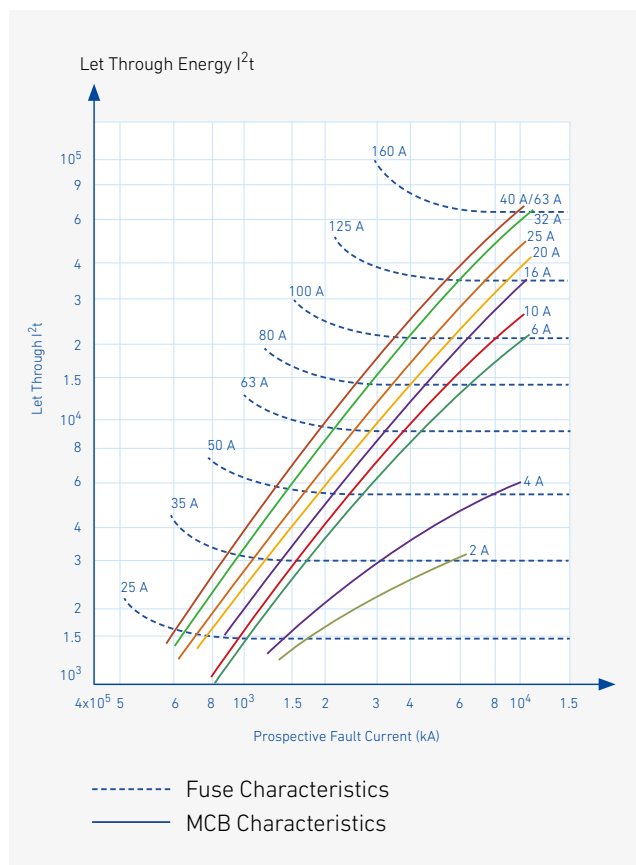
Solution

$K_1 = 0.89$ (from graph 1)

$K_2 = 0.78$ (from graph 2)

$$I_n / \text{pole} = 0.89 \times 0.78 \times 10 = 6.94 \text{ A}$$

Technical Data



Energy Limiting Class 3

MCBs are designed to have low let through energy during faults, thus ensuring better protection of cables and equipment.

Maximum Backup Protection

At site, no. of MCBs are used for outgoing connection. To protect the MCBs under short circuit (higher breaking capacity), we need to put fuses in the incoming side. The current rating of fuses should not be more than the values given in the table.

MCB Current Rating	Backup Fuse Rating
1 A	25 A
2 A	35 A
4 A	50 A
6 A	80 A
10-63 A	100 A

Cold Resistance & Power Loss Details

The power loss value declared at rated current.

Rated Current I_n (A)	Cold Resistance R_l (mΩ)	Power Loss per Pole P_v (W)
0.5	3,100.00	0.8
1	860.80	1.0
2	280.00	1.2
4	70.00	1.2
6	25.00	1.3
10	11.68	1.4
13	10.10	1.6
16	8.00	2.2
20	4.50	2.3
25	3.78	3.1
32	2.57	3.3
40	1.94	3.6
63	1.30	6.2
80	1.00	10.0
100	0.85	11.0
125	0.80	12.5

※ Remarks: Tolerance $\pm 5\%$

DC Application

MCBs for DC application are specially designed to meet tough arc quenching conditions. While selecting circuit breaker for DC applications following parameters have to be taken into consideration.

Normal Circuit Currents

The rating and normal running temperature of the MCB are unaffected by DC. The MCB can be selected using the thermal section of the standard time/current curves.

Magnetic tripping on DC is different from the equivalent AC by a peak factor of 1.4

ie., for 'B' curve AC MCB, magnetic range = $(3-5)I_n$
 for DC MCB, magnetic range = $1.4(3-5)I_n = (4-7)I_n$
 for 'C' curve AC MCB, magnetic range = $(5-10)I_n$
 for DC MCB, magnetic range = $1.4(5-10)I_n = (7-14)I_n$

Short Circuit Currents

The maximum short circuit current possible on a DC system is determined by the voltage of the battery and the total internal resistance of the cells.

It is given by Ohm's law: $I_{SC} = V_b/R_b$

Where, I_{SC} is the short circuit current

V_b is the voltage of the battery (with 100 % charged battery)

R_b is the internal resistance of the battery cells
 (this is usually stated by the manufacturer)

Circuit Time Constant

The time constant is given by: $L/R = 15$ ms max where L is the inductance of the circuit

R is The Resistance Of The Circuit

The time constant is usually given in milliseconds (ms.). Ideally, DC circuits would be mainly resistive (i.e. a low number), as inductive circuits produce a back emf when the current suddenly falls. This in turn tends to prolong arcing during switching operations, and so reduce contact life.

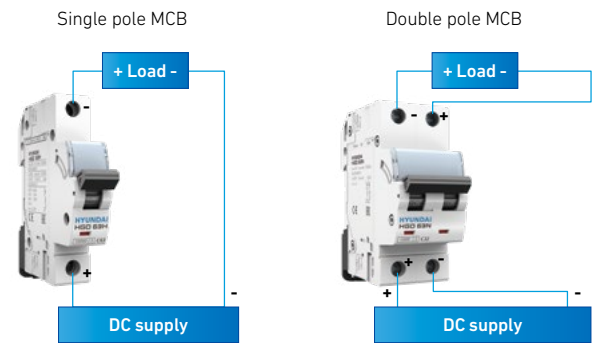
Circuit Voltage

The voltage of the circuit is dependent on the power supply. The lower the voltage the easier switching operations will be, but the voltage makes no difference to the running of the MCBs. Contact life can be significantly increased by reducing the voltage, drop across each pole. This can be achieved by wiring poles in series.

Technical Data

Correct polarity connections for DC MCBs

- Connection diagram



- All HGD type MCB can be applied in DC.

Rated Current (I_n)	A	0.5-63
Rated Voltage (U_e)	V=	250/500/750/1,000
No. of Poles		1P, 2P, 3P, 4P
Rated Short Circuit Breaking Capacity	kA	6

※ Also available in DC 110-130 V

Technical Data

Discrimination Table

MCB Downstream	MCB Upstream C Curves									
	C Curve	10 A	13 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
0.5 to 5 A	50	65	80	100	125	160	200	250	315	
6 A		65	80	100	125	160	200	250	315	
10 A				100	125	160	200	250	315	
13 A					125	160	200	250	315	
16 A						160	200	250	315	
20 A							200	250	315	
25 A								250	315	
32 A										315
40 A										
50 A										

MCB Downstream	MCB Upstream B Curves										
	B Curve	6 A	10 A	13 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
0.5 to 5 A			30	39	48	60	75	96	120	150	189
6 A			30	39	48	60	75	96	120	150	189
10 A					48	60	75	96	120	150	189
13 A						60	75	96	120	150	189
16 A							75	96	120	150	189
20 A								96	120	150	189
25 A									120	150	189
32 A											189

MCB Downstream	MCCB Upstream																						
	C Curve	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	320 A	400 A	500 A	630 A	800 A	1,000 A	1,250 A	1,600 A	
0.5 to 6 A	1,100	1,200	1,400	1,700	2,000	2,500	3,400	4,800	5,800	6,700	T	T	T	T	T	T	T	T	T	T	T	T	T
10 A		1,100	1,200	1,400	1,700	2,100	2,500	3,000	3,500	4,300	T	T	T	T	T	T	T	T	T	T	T	T	T
16 A				1,300	1,600	1,900	2,100	2,400	2,700	3,200	8,300	T	T	T	T	T	T	T	T	T	T	T	T
20 A					1,600	1,900	2,100	2,400	2,700	2,500	8,300	T	T	T	T	T	T	T	T	T	T	T	T
25 A						1,700	1,800	2,000	2,200	2,500	5,400	8,700	T	T	T	T	T	T	T	T	T	T	T
32 A							1,800	2,000	2,200	2,500	5,400	8,700	T	T	T	T	T	T	T	T	T	T	T
40 A								1,500	1,700	2,000	4,300	7,000	T	T	T	T	T	T	T	T	T	T	T
50 A									1,300	1,500	3,600	5,900	9,000	T	T	T	T	T	T	T	T	T	T
63 A										1,100	2,800	5,200	8,200	T	T	T	T	T	T	T	T	T	T

※ Prospective fault levels to which selectivity is achieved (T=Total selectivity)

Discrimination With Fuses (HRC FUSE Upstream Type gG)

MCBs Downstream	HRC FUSE Link Upstream									
	20 A	25 A	32 A	40 A	50 A	63 A	80 A	100 A	125 A	160 A
0.5 to 6 A	700	850	960	1,200	1,350	1,750	2,800	4,500	5,200	6,000
10 A		700	960	1,200	1,350	1,750	2,800	4,500	5,200	6,000
13 A			850	1,200	1,200	1,750	2,800	4,500	5,200	6,000
16 A				960	1,100	1,500	2,500	3,200	5,200	6,000
20 A					1,100	1,500	2,500	3,200	4,500	5,200
25 A					960	1,350	2,000	3,200	4,500	5,200
32 A						1,200	1,750	2,800	4,500	5,200
40 A							1,750	2,800	4,500	5,200
50 A								2,500	3,200	4,500
63 A									3,200	4,500

Technical Data

MCB Selection Chart For Household Applications

Appliances	Capacity/Watt (Load) (240 V~1 ph)	Current Rating of MCB	Type of MCB
Air Conditioner	1.0 ton	10 A ¹⁾	"C" series
	1.5 ton	16 A ¹⁾	"C" series
	2.0 ton	20 A ¹⁾	"C" series
Refrigerator	165 litres	3 A ¹⁾	"C" series
	350 litres	4 A ¹⁾	"C" series
Oven Cum Griller	4,500 W	32 A	"B" series
	1,750 W	10 A	"B" series
Oven only Hot Plate only Room Heater	750 W	6 A	"B" series
	2,000 W	10 A	"B" series
	1,000 W	6 A	"B" series
	2,000 W	10 A	"B" series
Washing Machine	300 W	2 A	"C" series
Washing Machine (with heater)	1,300 W	8 A	"C" series
(Storage/Instant)	1,000 W	6 A	"B" series
	2,000 W	10 A	"B" series
	3,000 W	16 A	"B" series
	6,000 W	32 A	"B" series
Electric Iron	750 W	6 A	"B" series
	1,250 W	8 A	"B" series
(2 Slices)	1,200 W	8 A	"B" series
Electric Kettle	1,500 W	10 A	"B" series

※ 1) The values vary depending on manufacturers.

Rating of MCBs for Specified No. of Fittings ("B" Series MCBs)

Lamp (Watt)	Number of Lamps	Rating (A)
20 W	8	1
	12	1.5
40 W	2	0.5
	10	2
	12	2.5
60 W	1	0.5
	4	1.5
	8	3
	12	4
80 W	1	0.5
	2	1
	5	2
	8	4
	12	5
100 W	1	1
	2	1.5
	4	2.5

※ "B" series MCB is used for all lighting applications

MCB Selection Chart for Motor Protection

S. No.	kW	HP	1 Phase 230 V DOL Starting		3 Phase 400 V DOL Starting		3 Phase 400 V Assisted Starting Star Delta		
			Full Load Current	MCB Selection	Full Load Current	MCB Selection	Full Load Current	MCB Selection	
1	0.18	0.24	2.8	10	0.9	2			
2	0.25	0.34	3.2	10	1.2	2			
3	0.37	0.50	3.5	10	1.2	2			
4	0.55	0.74	4.8	16	1.8	3			
5	0.75	1.01	6.2	20	2.0	3			
6	1.1	1.47	8.7	25	2.6	6			
7	1.5	2.01	11.8	32	3.5	10			
8	2.2	2.95	17.5	50	4.4	10			
9	3	4.02	20.0	63	6.3	16	6.3	16	10
10	3.75	5.03	24.0	80	8.2	20	8.2	20	10
11	5.5	7.37	26.0	80	11.2	25	11.2	32	16
12	7.5	10.05	47.0	125	14.4	40	14.4	40	25
13	10	13.40			21.0	50	21.0	50	32
14	15	20.11			27.0	100	27.0	63	40
15	18.5	24.80			32.0	125	32.0		50
16	22	29.49			38.0	125	38.0		63
17	30	40.21			51.0	125	51.0		63

※ Calculation formulae:

- Incomer current rating, for single phase: $\frac{\text{Total Load in Watts}}{240 V}$

- Incomer current rating, for single phase: $\frac{\text{Total Load in Watts}}{\sqrt{3} \times 240 V}$

"C" series MCB is used for all motor applications

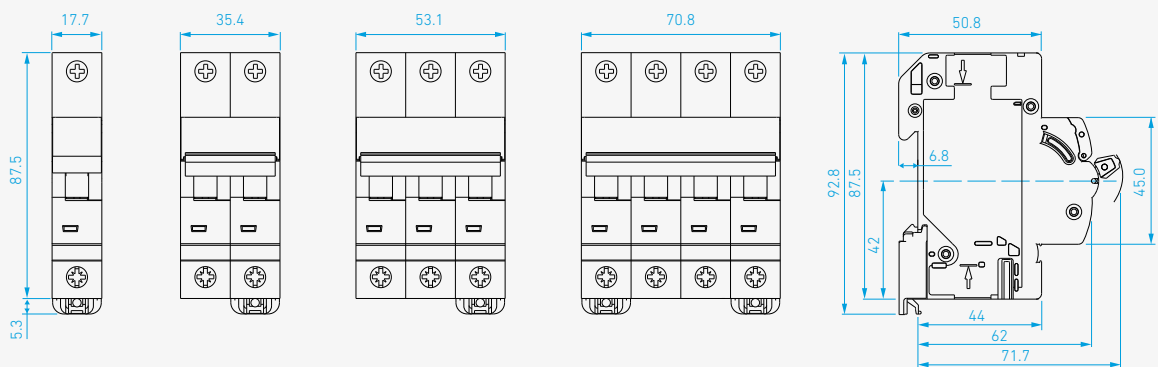
※ Note: One lighting circuit can have up to 800 W or up to 10 lighting points.

One power circuit can have up to 2,000 W or 1 power points.

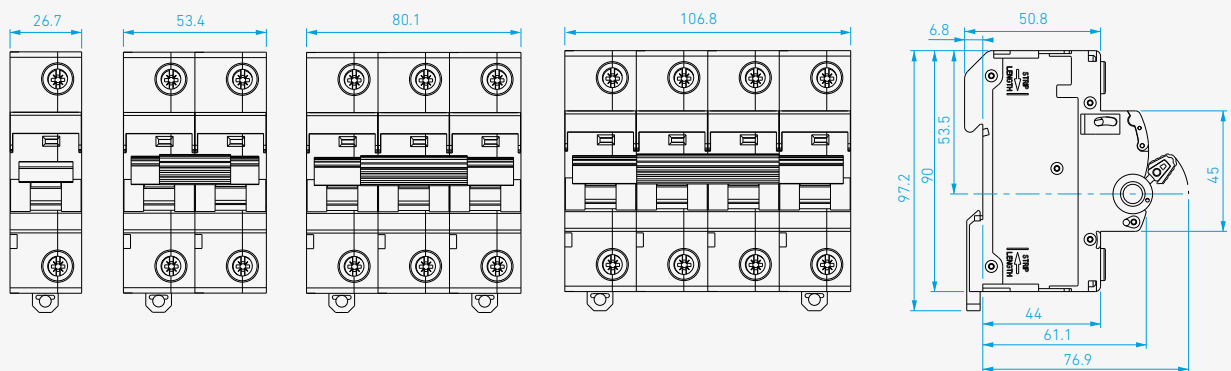
Dimensions

HGD (Deluxe Type)

HGD63N/H, 63 AF



HGD125, 125 AF

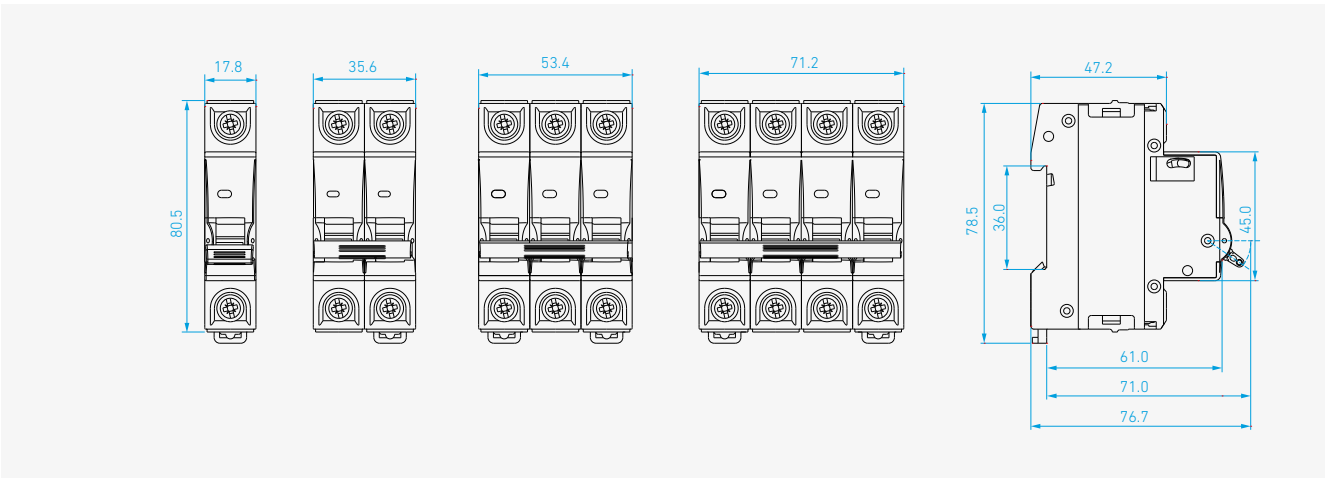


HGD (Standard Type)

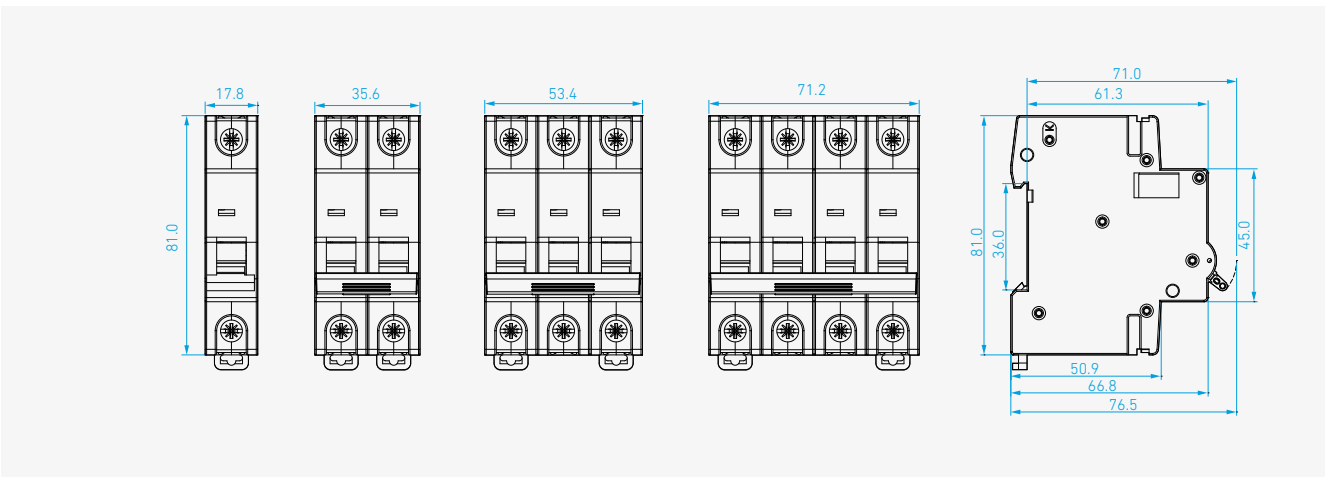
HGD32NS, 32 AF



HGD63E/S, 63 AF



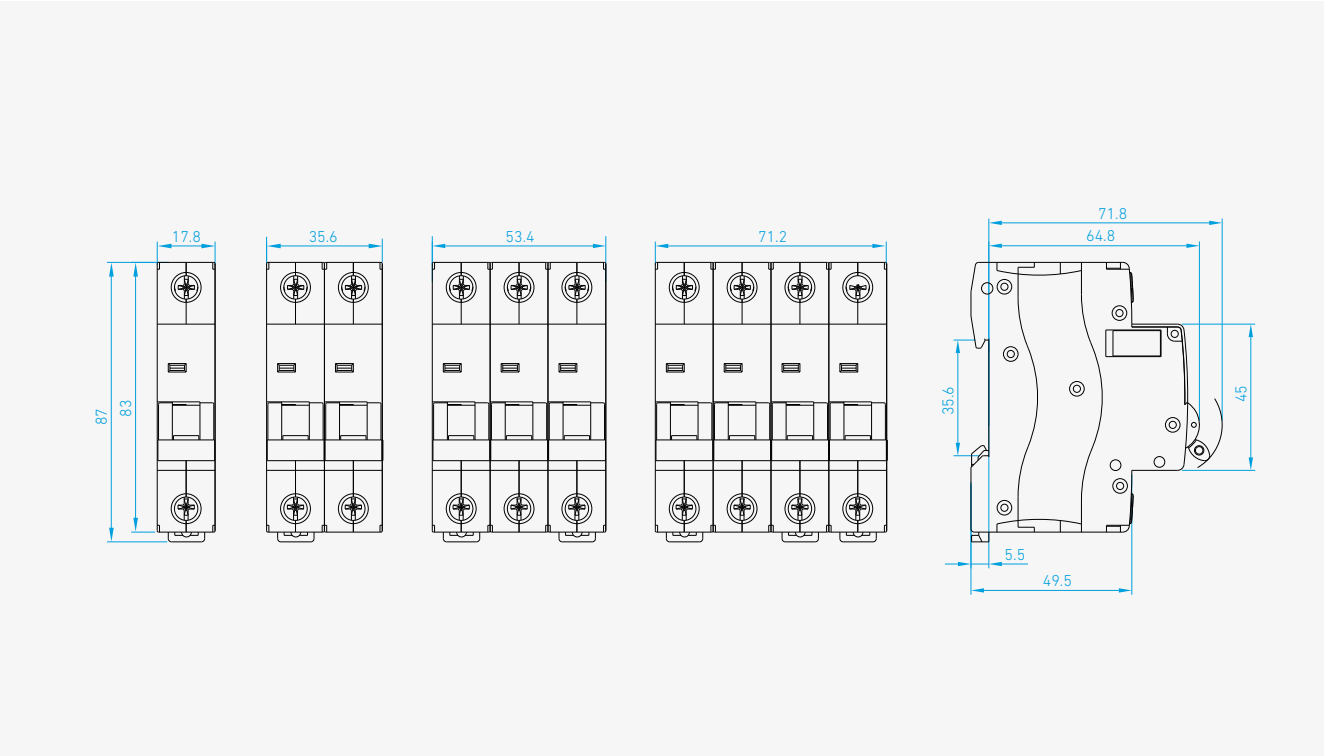
HGD63M/P, 63 AF



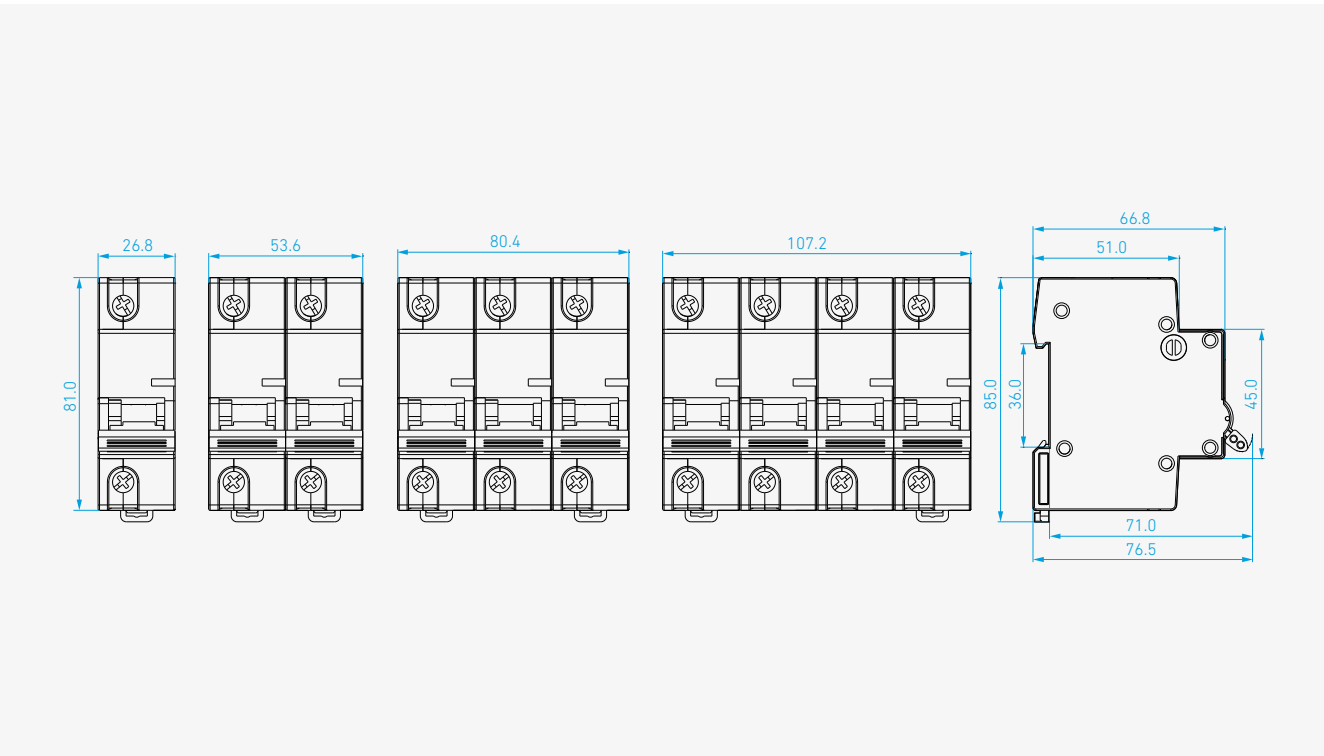
Dimensions

HGD (Standard Type)

HGD63U, 63 AF

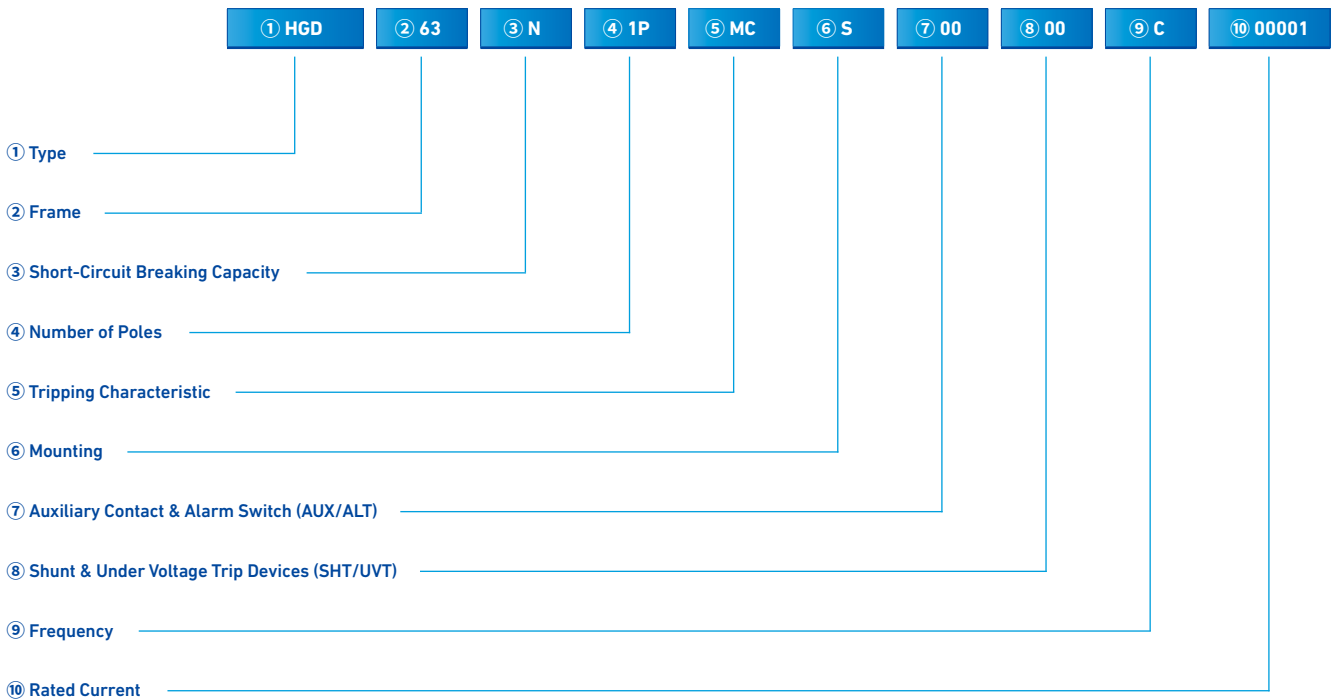


HGD100S, 100 AF



MCB Ordering Information

Ordering Guidelines (Deluxe Type)



① Type	
HGD	Miniature circuit breaker

⑤ Tripping Characteristic	
MB	B Curve
MC	C Curve
MD	D Curve

⑨ Frequency	
C	50/60 Hz

② Frame	
63	63 AF (Deluxe type)
125	125 AF (Deluxe type)

⑥ Mounting	
S	Front connection

⑩ Rated Current	
000P5	0.5 A
00001	1 A
00002	2 A
00003	3 A
00004	4 A
00005	5 A
00006	6 A
00010	10 A
00016	16 A
00020	20 A
00025	25 A
00032	32 A
00040	40 A
00050	50 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

③ Short-Circuit Breaking Capacity	
N	6 kA (Deluxe type), 63 AF
H	10 kA (Deluxe type), 63 AF

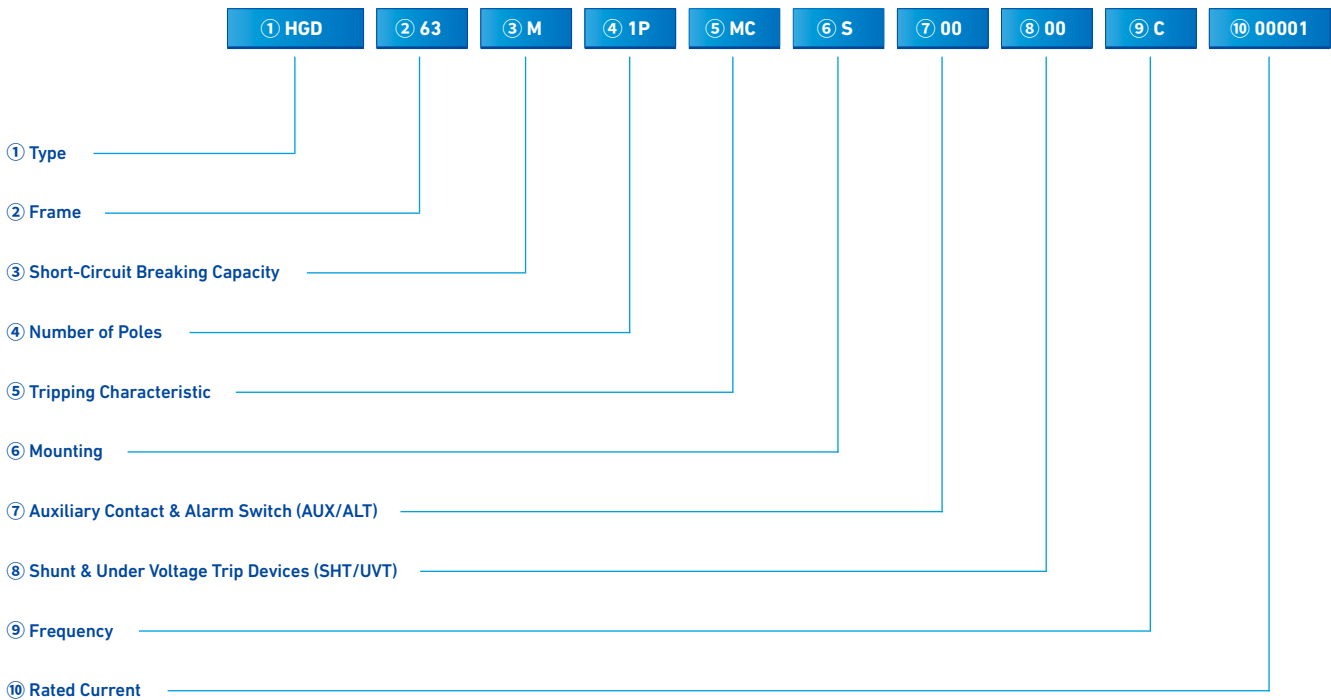
⑦ Auxiliary Contact & Alarm Switch	
00	Non-attachment

④ Number of Poles	
1P	1 Pole
1N	1 Pole + Neutral
N1	Neutral +1 Pole
2P	2 Pole
3P	3 Pole
3N	3 Pole + Neutral
N3	Neutral +3 Pole
4P	4 Pole

⑧ Shunt & Under Voltage Trip Devices	
00	Non-attachment

MCB Ordering Information

Ordering Guidelines (Standard Type)



① Type	
HGD	Miniature circuit breaker

② Frame	
32NS	32 AF(Neutral + 1 Pole)
63	63 AF (Standard type)
100S	100 AF (Standard type)

③ Short-Circuit Breaking Capacity	
E	3 kA (Standard type), 63 AF
S	4.5 kA (Standard type), 63 AF
M	6 kA (Standard type), 63 AF
P	10 kA (Standard type), 63 AF
U	15 kA (Standard type), 63 AF

④ Number of Poles	
1P	1 Pole
1N	1 Pole + Neutral
N1	Neutral + 1 Pole
2P	2 Pole
3P	3 Pole
3N	3 Pole + Neutral
N3	Neutral + 3 Pole
4P	4 Pole

⑤ Tripping Characteristic	
MB	B Curve
MC	C Curve
MD	D Curve

⑥ Mounting	
S	Front connection

⑦ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑧ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑨ Frequency	
C	50/60 Hz

⑩ Rated Current	
00001	1 A
00002	2 A
00003	3 A
00004	4 A
00005	5 A
00006	6 A
00010	10 A
00016	16 A
00020	20 A
00025	25 A
00032	32 A
00040	40 A
00050	50 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

HSD

Miniature Switch Disconnecter

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Features

HSD Miniature Switch Disconnecter

HYUNDAI ELECTRIC introduces the HSD series of MSDs rating from 6 A to 125 A.

They are switch disconnectors with independent manual operation, capable of making, carrying and breaking currents under normal circuit conditions, which may includes operating under overload condition. They also carry currents under specified abnormal circuit conditions such as those of short circuit for a specified time.





Product Features

Hyundai HSD type switch disconnectors are mainly used for isolation and switching in the terminal combined electric appliances under the alternating current 50/60 Hz, rated voltage AC 240 V or AC 415 V and with rated current 6 to 125 A.

The double point direct moving structure enlarges the current capacity while making full use of the electrical power supplement. In addition, power reserving handle mechanism with high on/off speed promotes the working reliability. HSD type breakers comply with IEC/EN standard, and can be applied to industry, commerce, high-rise buildings, household and other similar installations.

Deluxe Type

Standard Type



Product Performance

- Longer electrical life
- Low power consumption, thus cost effective&energy saving
- To avoid improper cable termination, the safety terminals guide the cable towards the cage terminal for systematic termination

- Low watt loss
- Wide range



Product Structure

- Dual termination for simultaneous connection of bus-bars and wires
- Inscription window
- Safety terminal

- Positive contact Indication
- Bi-stable clip
- Compact construction
- Large cable terminals



Specification

- IEC/EN 60947-3

- IEC/EN 60947-3

Product Overview





Deluxe Type



Standard Type

Selection Table

HSD (Deluxe Type)

Model	HSD63, 63 AF	HSD125, 125 AF
		
Reference Standard	IEC/EN 60947-3	IEC/EN 60947-3
No. of Poles	1P, 2P, 3P, 4P	1P, 2P, 3P, 4P
Utilization Category	AC-22 A	AC-22 A
Rated Current (In)	16, 25, 32, 40, 63 A	80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz
Rated Insulation Voltage (Ui)	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000
Operating Temperature	-40 °C to + 55 °C	-40 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	35 mm ²	50 mm ²
Tightening Torque	2 N·m	2.5 N·m
Vibration	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.090 kg	0.079 kg
Dimensions (H x D x W)/Pole in mm	87.5 x 71.7 x 17.7 mm	87.5 x 73.4 x 17.7 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type (Bottom)	Pin/Fork type (Bottom)

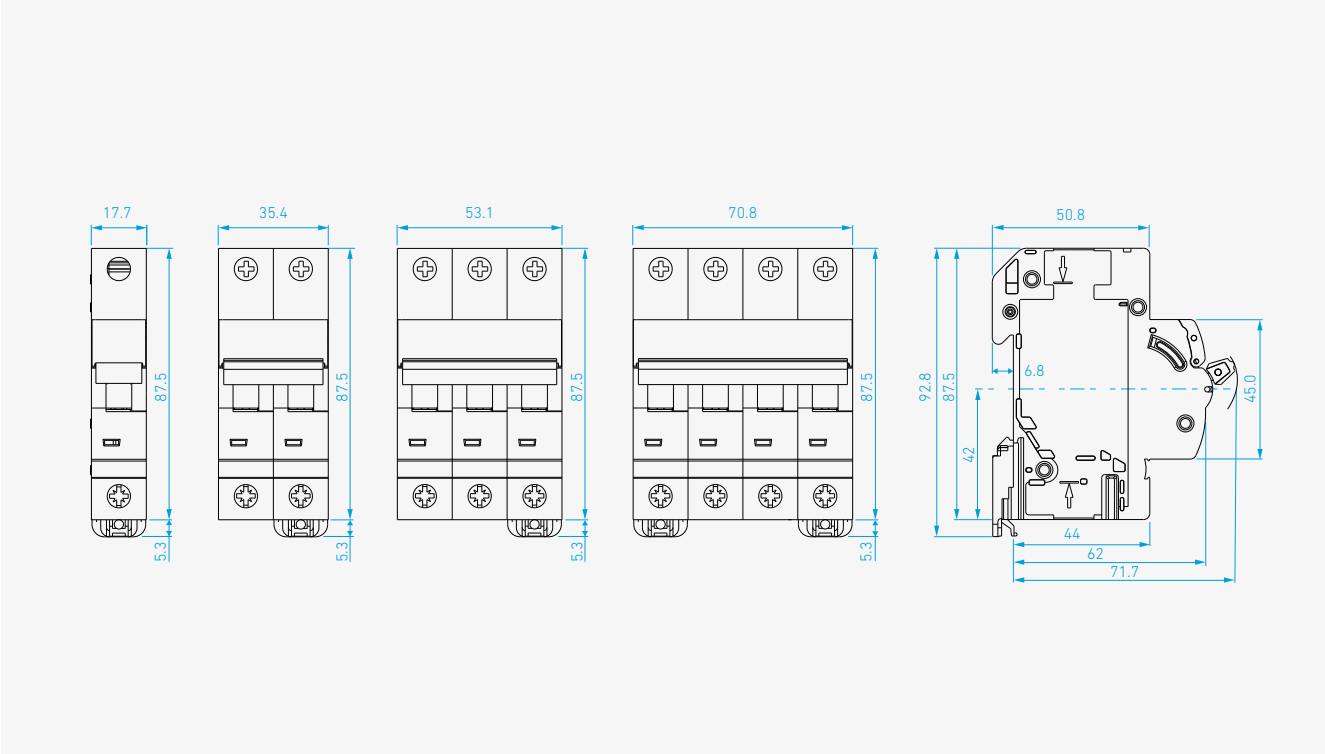
HSD (Standard Type)

Model	HSD100S, 100 AF
	
Reference Standard	IEC/EN 60947-3
No. of Poles	1P, 2P, 3P, 4P
Utilization Category	AC-22 A
Rated Current (In)	6, 10, 16, 20, 25, 32, 40, 50, 63, 70, 80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V
Rated Frequency (F)	50/60 Hz
Rated Insulation Voltage (Ui)	690 V
Rated Impulse Voltage (Uimp)	6 kV
Dielectric Strength	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000
Operating Temperature	-40 °C to + 55 °C
Humidity	95 % RH
Terminal Capacity (max)	35 mm ²
Tightening Torque	2.5 N·m
Vibration	3 g
Shock Resistance	40 mm free fall
Protection Class	IP20
Positive Contact Indication	Red-ON, Green-OFF
Net Weight/Pole in kg	0.080 kg
Dimensions (H x D x W)/Pole in mm	81.0 x 76.8 x 17.6 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type

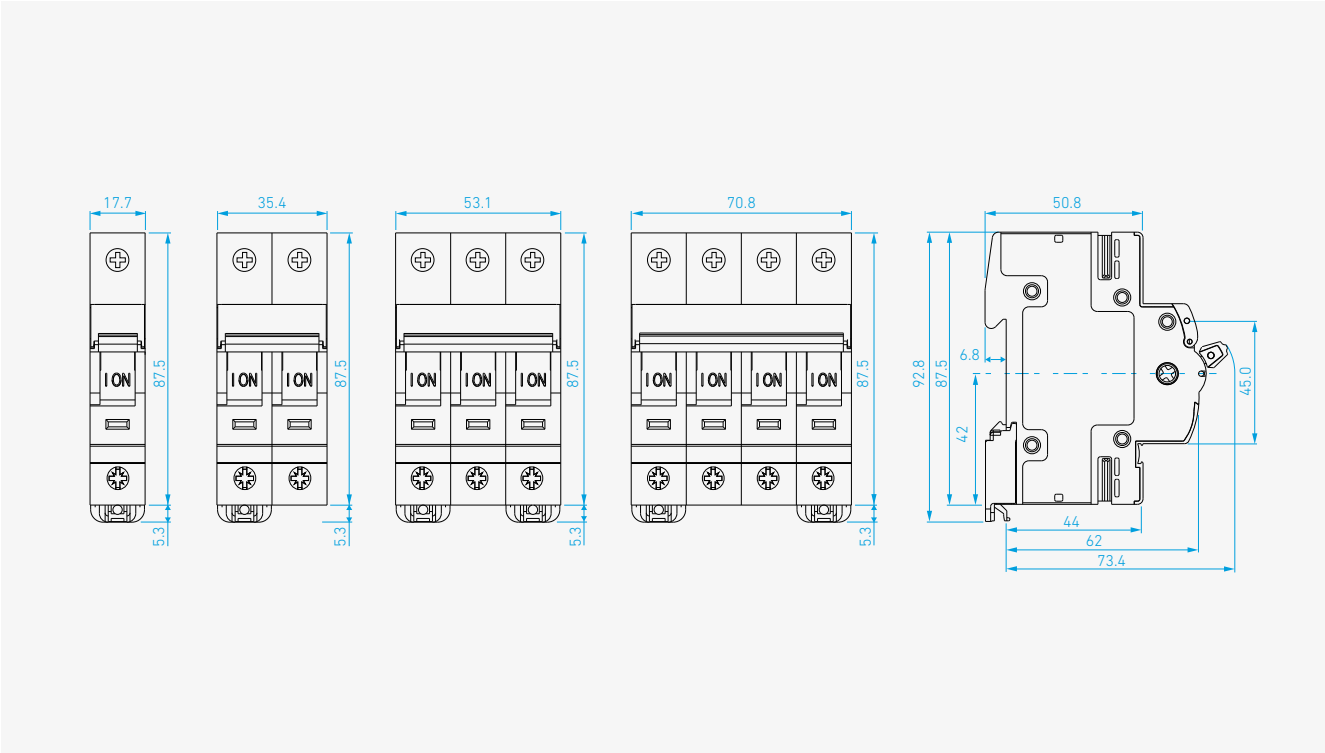
Dimensions

HSD (Deluxe Type)

HSD63, 63 AF

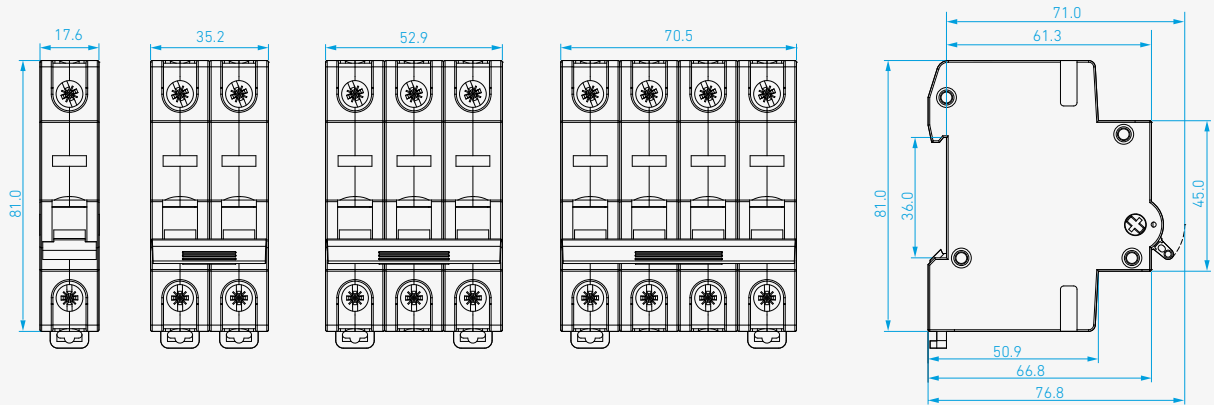


HSD125, 125 AF



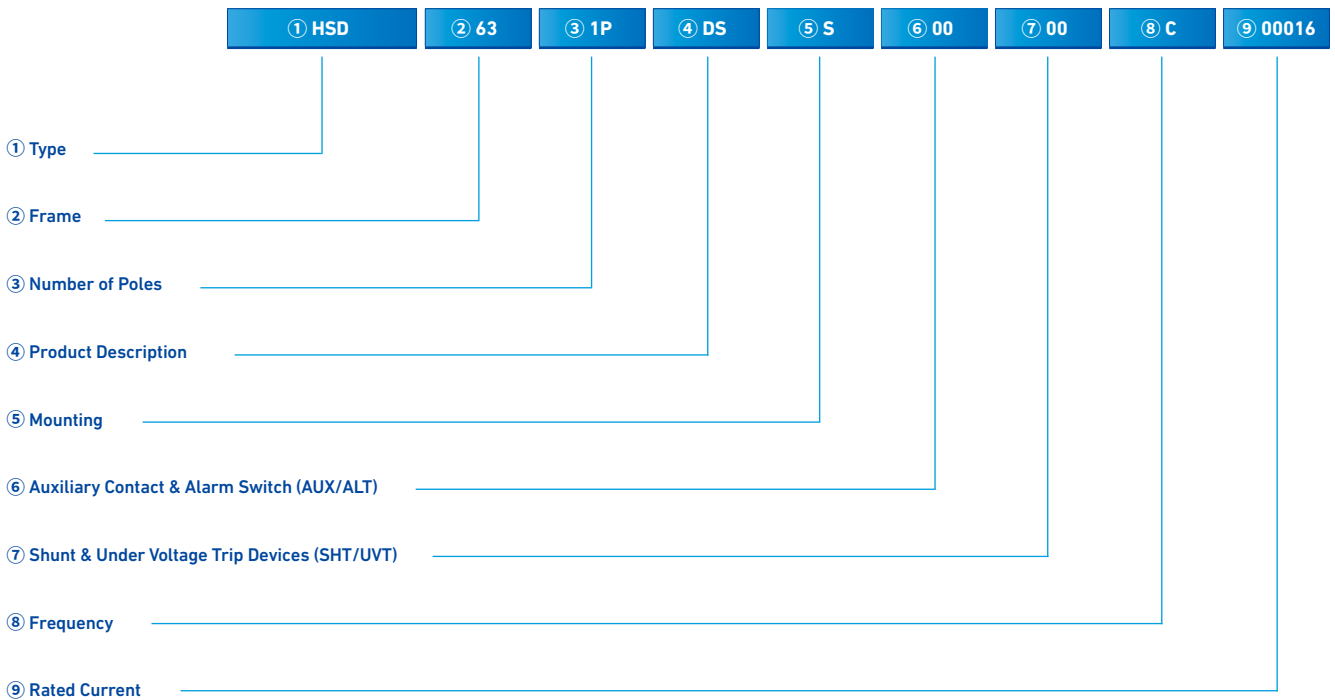
HSD (Standard Type)

HSD100S, 100 AF



HSD Ordering Information

Ordering Guidelines (Deluxe Type)



① Type	
HSD	Miniature switch disconnecter

② Frame	
63	63 AF (Deluxe type)
125	125 AF (Deluxe type)

③ Number of Poles	
1P	1 Pole
2P	2 Pole
3P	3 Pole
4P	4 Pole

④ Product Description	
DS	Disconnection switch

⑤ Mounting	
S	Front connection

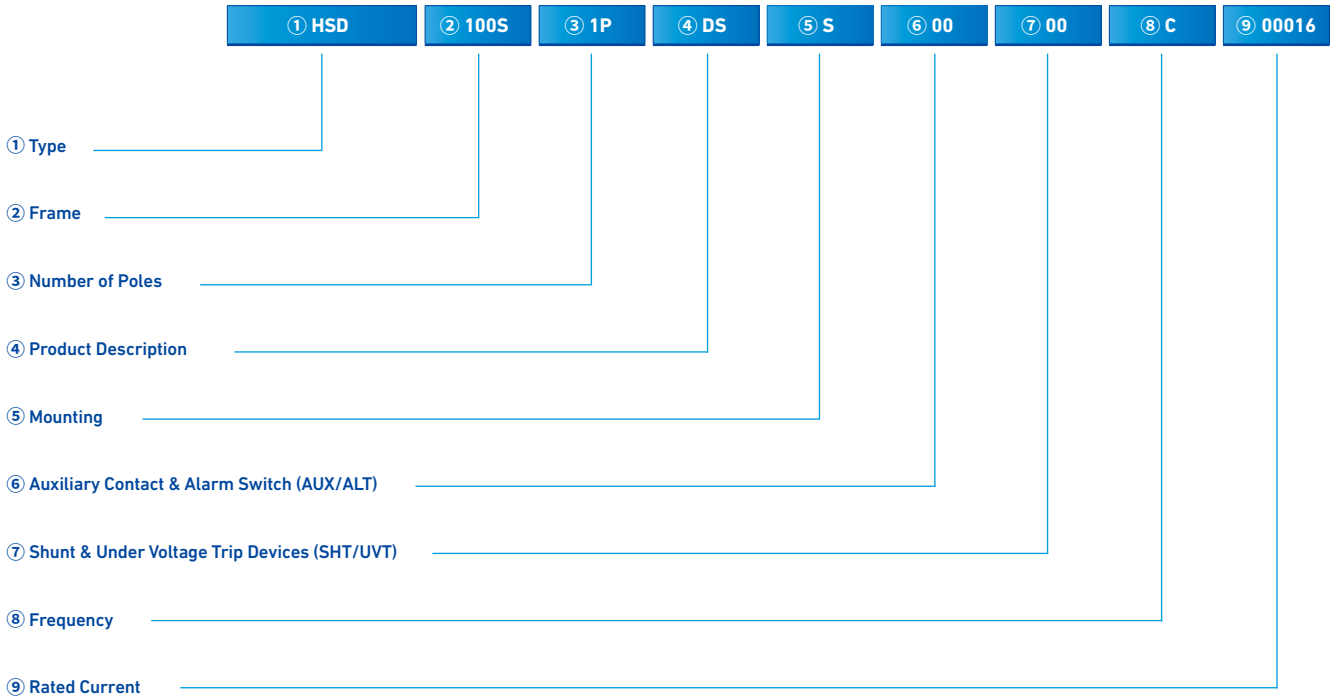
⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

⑨ Rated Current	
00016	16 A
00025	25 A
00032	32 A
00040	40 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

Ordering Guidelines (Standard Type)



① Type	
HSD	Miniature switch disconnecter

② Frame	
100S	100 AF (Standard type)

③ Number of Poles	
1P	1 Pole
2P	2 Pole
3P	3 Pole
4P	4 Pole

④ Product Description	
DS	Disconnection switch

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

⑨ Rated Current	
00016	16 A
00025	25 A
00032	32 A
00040	40 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

HRC

Residual Current Circuit Breaker

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Features

HRC Residual Current Circuit Breaker

RCCB (also popularly known as ELCB) is a mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the leakage current attains a given value under specified conditions. Hyundai offers a wide range of RCCBs for protecting human life against fatal electric shocks as well as for providing protection against fire caused by earth faults.





Product Features

HYUNDAI ELECTRIC introduces the HRC series of RCCBs rating from 16 A to 100 A. The range offers a variety of feature such as conditional short circuit breaking capacity of 10 kA across entire range in accordance with IEC/EN 61008-1, it also incorporates features like inscription window, safety terminal, dual termination, positive contact indication, field fittable auxiliary contacts, test button for regular inspection.

Deluxe Type

Standard Type



Product Performance

- Test button for regular inspection
- Conditional short-circuit current capacity 10 kA
- Advance neutral

- Type AC and type A
- RCCB test button for regular inspection
- Compact structure and external design
- Conditional short-circuit current capacity 6 kA



Product Structure

- Simple and robust operating mechanism
- Dual termination for bus-bar as well as cable connection
- N phase at the right pole
- Test button

- Dual termination for bus-bar as well as cable connection
- N phase at the left pole
- There are two indication windows on the surface, the upper one is for ON/OFF indication and the lower one is for leakage fault indication
- The special shape is added to the cage lug so that the cable is firmly fastened and does not fall easily
- Test button



Accessories

- AUX/ALT



Specification

- IEC/EN 61008-1

- IEC/EN 61008-1

Product Overview





Deluxe Type (10 kA)





Standard Type (6 kA)

Selection Table

HRC (Deluxe Type)

Model	HRC63, 63 AF	HRC100, 100 AF
		
Reference Standard	IEC/EN 61008-1	IEC/EN 61008-1
No. of Poles	2P (1P + N), 4P (3P + N)	2P (1P + N), 4P (3P + N)
N Phase Position	Left	Left
Rated Current (In)	16, 25, 32, 40, 50, 63 A	80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz
Rated Conditional Short Circuit Current (Isc)	10 kA	10 kA
Rated Residual Operating Current (IΔn)	30, 100, 300	30, 100, 300
Rated Making Breaking Capacity (Im)	630 A or 10 In whichever is greater	630 A or 10 In whichever is greater
Operating Characteristics in Presence of Residual Current with d.c Components	'A' type & 'AC' type	'A' type & 'AC' type
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
Rated Insulation Voltage (Ui)	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000
Operating Temperature	-40 °C to + 55 °C	-40 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	35 mm ²	50 mm ²
Tightening Torque	2 N·m	2.5 N·m
Vibration	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight in kg	0.215 kg (for 2P) ; 0.335 kg (for 4P)	0.230 kg (for 2P) ; 0.404 kg (for 4P)
Dimensions (H x D x W)/Pole in mm	87.5 x 73.0 x 35.9 mm (for 2P) ; 87.5 x 73.0 x 71.8 mm (for 4P)	87.5 x 73.0 x 35.9 mm (for 2P) ; 87.5 x 73.0 x 71.8 mm (for 4P)
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type	Pin/Fork type
Auxiliary Contacts	Yes	Yes

HRC (Standard Type)

Model	HRC63S, 63 AF	HRC100S, 100 AF
		
Reference Standard	IEC/EN 61008-1	IEC/EN 61008-1
No. of Poles	2P (N + 1P), 4P (N + 3P)	2P (N + 1P), 4P (N + 3P)
N Phase Position	Left	Left
Rated Current (In)	16, 25, 32, 40, 50, 63 A	80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz
Rated Conditional Short Circuit Current (Isc)	6 kA	6 kA
Rated Residual Operating Current (IΔn)	10, 30, 100, 300, 500 mA (10 mA: up to 40 A)	30, 100, 300, 500 mA
Rated Making Breaking Capacity (Im)	500 A or 10 In whichever is greater	500 A or 10 In whichever is greater
Operating Characteristics in Presence of Residual Current with d.c Components	'A' type & 'AC' type	'A' type & 'AC' type
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
Rated Insulation Voltage (Ui)	690 V	690 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000
Operating Temperature	-40 °C to + 55 °C	-40 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	25 mm ²	50 mm ²
Tightening Torque	2.5 N·m	2.5 N·m
Vibration	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight in kg	0.200 kg (for 2P) ; 0.310 kg (for 4P)	0.230 kg (for 2P) ; 0.370 kg (for 4P)
Dimensions (H x D x W)/Pole in mm	81.0 x 74.0 x 35.8 mm (for 2P) 81.0 x 74.0 x 71.6 mm (for 4P)	90.9 x 74.0 x 35.8 mm (for 2P) 90.9 x 74.0 x 71.6 mm (for 4P)
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type	Pin/Fork type
Auxiliary Contacts	No	No

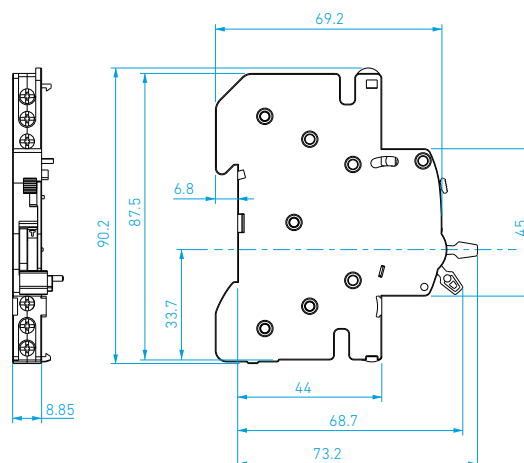
Accessories (Deluxe Type)

Auxiliary Contact + Alarm Trip (AXT)

Technical Specification

Standard Conformity	IEC/EN 60947-5-4
Current Carrying Capacity (max)	6 A
Rated Voltage (Ue)	AC 240 V
Contact Configuration	1NO + 1NC
Rated Insulation Voltage	AC 500 V
Rated Frequency (F)	50/60 Hz
Utilization Category	AC 12
Electrical Endurance (no. of operations)	10,000
Terminal Capacity (max)	2.5 mm ²
Protection Class	IP20
Power Loss	3 Watts
Dimensions (H x D x W)	90.2 x 73.2 x 8.85 mm
Net Weight	36 g
Mounting	Left side of RCCB (HRC63/100), Common use of AXT HGD125

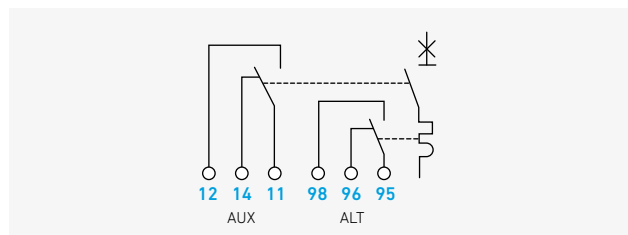
Dimension



Ordering Information

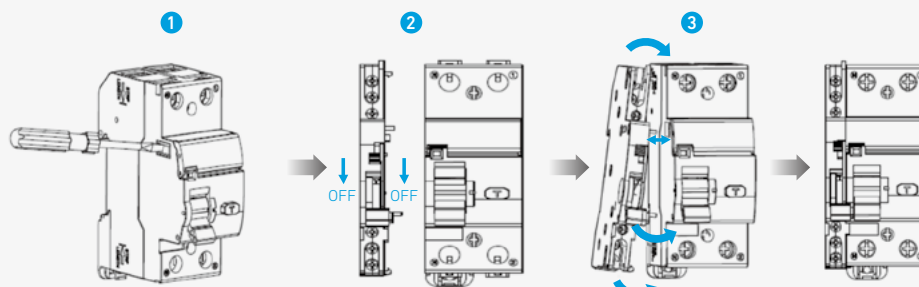
AXT HGD125	AUX/ALT
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Circuit Diagram

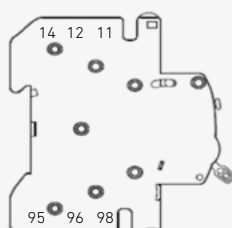


Assembling with RCCB (HRC Accessories)

- 1 Remove the window sticker of the protection device with screw driver or by hand
- 2 Make sure the knob is in OFF position
Caution: Don't mount in ON position
- 3 Rotate the AXT so as to bring it nearer to the protection device for locking. Adjust the locks present at the upper end of AXT in such a way that they get fitted in slots present in protection device



Terminal No.



11-12 - ON } AUX
11-14 - OFF } AUX

95-96 - ON/OFF } ALT
95-98 - TRIP } ALT

Accessories Ordering Information

Deluxe Type

Type		Code	Description
HRC63	AXT	AXT HGD125	AUX/ALT

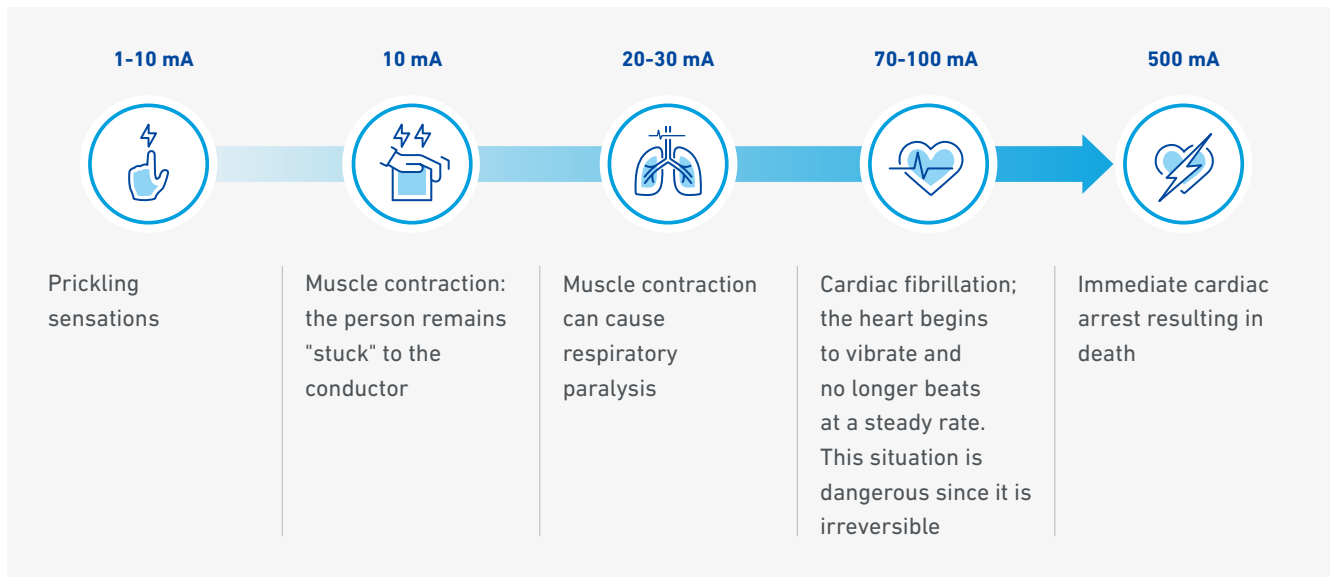
Technical Data

Standard Use Environment

The use of exposed, substandard, badly wired, wrongly connected or damaged equipment as well as frayed or badly repaired cables reduces the safety of an installation and increases the risk of person receiving an electric shock. RCCBs are electrical devices which afford a very high degree of protection against the risks of electrocution and fire caused by earth faults.

Protection Against Electrocution

Electrocution is a passage of current through human body, which is dangerous. The flow of current through human body affects vital functions of breathing & heartbeat. Effect of electric current through human body has been well researched and following chart summarizes the results:



However, electrocution should not be viewed in terms of "current" alone, but in terms of "contact voltage". A person gets electrocuted by coming in contact with an object that has a different potential from his/her own. The difference in potential causes the current to flow through the body.

The human body has known limits:

- Under normal dry conditions, voltage limit = 50 V
- In damp surroundings, voltage limit = 25 V

A correctly chosen RCCB can detect small currents flowing to earth and reduces the risk of electrocution.

Protection Against Indirect Contact

Over current protection devices like MCB are unable to act promptly on small earth leakage currents. To comply with wiring regulations, the earth fault loop impedance in Ohms, multiplied by the rated tripping current of the RCCB in amperes must not exceed 50.

Example

For an RCCB with a rated tripping current of 30 mA, the maximum permissible earth fault loop impedance is calculated as follows:

$$Z_s (\text{max}) = 50 / I_n = 50 / 0.03 = 1,666$$

Protection Against Fire

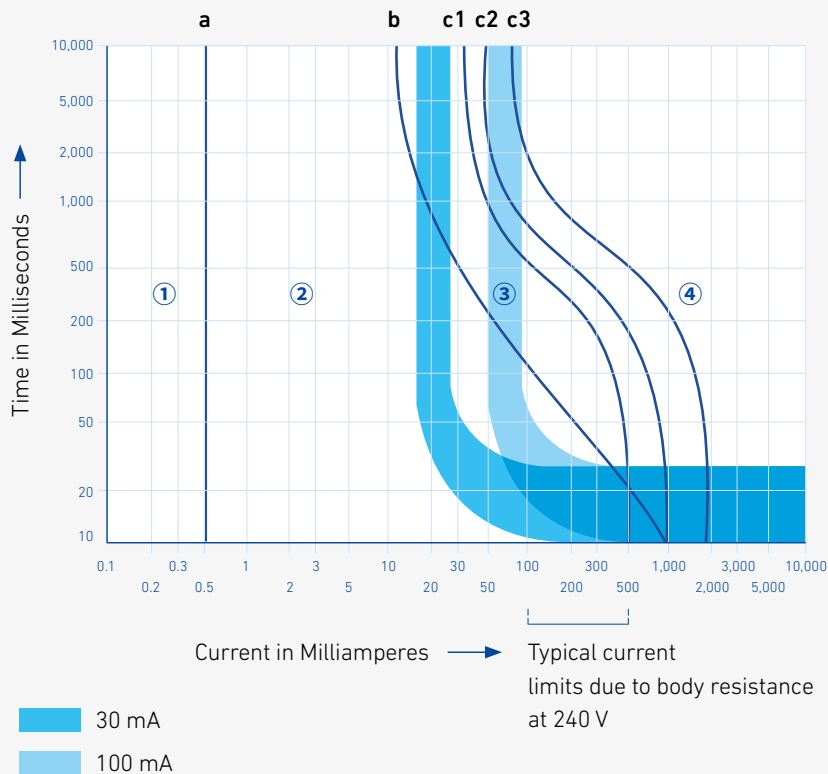
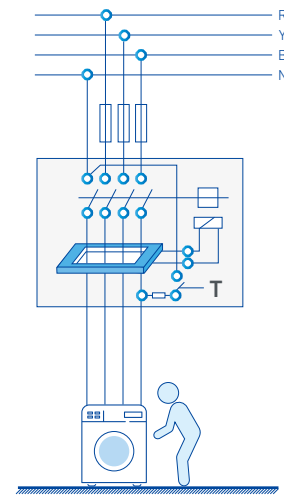
The majority of fires which occur as a result of faulty wiring are started by current flowing to earth. Fire can be started by fault current of less than 1 amp. The normal domestic overload protective device such as a fuse or MCB will not detect such a small current. A correctly chosen RCCB will detect this fault current and interrupt the supply, hence, reducing the risk of a fire starting.

Rated Tripping Current of the RCCB	Maximum Permissible Earth Fault Loop Impedance in
10 mA	5,000
30 mA	1,666
100 mA	500
300 mA	166

Working Principle

The RCCB works on the current balance principle. The supply conductors, i.e. the phases and the neutral, are passed through a toroid and form the primary windings of a current transformer. Its secondary winding is connected to a highly sensitive electromagnetic trip relay, which operates the trip mechanism.

In a normal circuit, sum of the currents in phases, is equal to the current in the neutral and the vector sum of all currents is equal to zero. If there is any insulation fault in the current and leakage current flows to earth, the currents do not balance and their vector sum is not equal to zero. This imbalance is detected by the core balanced current transformer, and the RCCB is tripped and supply to load is interrupted. The trip mechanism is operated at a residual current between 50-100 % of its rated tripping current.



Zone Physiological effects

Zone 1 Usually no reactions

Zone 2 Usually no harmful physiological effects

Zone 3 Usually no organic damage to be expected. Likelihood of muscular contraction and difficulty in breathing, reversible disturbances of formation and conduction of impulse in the heart and transient cardiac arrest without ventricular fibrillation increases with current magnitude and time.

Zone 4 In addition to the effects of Zone 3, probability of ventricular fibrillation increased upto 5 % (curve C₂) upto 50 % (curve C₃) and above 50 % beyond curve C₃. It increases with magnitude and time, and pathophysiological effects such as cardiac arrest, breathing arrest and heavy burns may occur.

Technical Data

Residual Current Circuit Breaker 16 A-100 A

Sensitivity Selection

• 30 mA

A 30 mA RCCB will provide a high degree of protection against electrocution in an accidental shock hazard situation.

The current flowing through human body could be between 80 mA and 240 mA depending on the resistance of the human body and the voltage across it.

To be within zone of the IEC curve, it is necessary for the RCCB to operate within 50 ms at 240 mA and 150 ms at 80 mA.

Both these conditions are satisfied by 30 mA RCCB.

For households, individual outlets, wet areas and temporary installations, RCCB with sensitivity not exceeding 30 mA is advisable.

• 100 mA

A 100 mA RCCB will normally give high degree of protection against electrocution but there is a possibility that the shock current could fall below the tripping level of RCCB. This could occur if additional resistances to that of human body are included in the earth path.

The 100 mA RCCB protects against leakage currents and indirect contact with earth loop impedance up to 500 ohms.

• 300/500 mA

A 300/500 mA RCCB may be used where only fire protection is required. e.g., on lighting circuits, where the risk of electric shock is small. 300/500 mA RCCB will not give any protection against electrocution.

Selection of RCCB Type

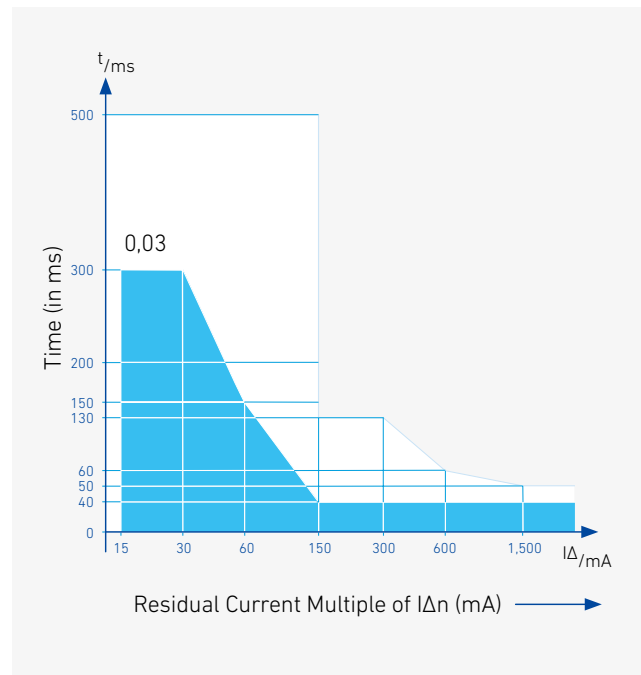
RCCB Type AC

AC type RCCB are used for residual sinusoidal alternating current.

RCCB Type A

A type RCCB is used for residual sinusoidal alternating currents and residual pulsating direct currents, whether suddenly applied or slowly rising. It can therefore handle the residual current waveforms which can occur in the power supply units of single-phase loads with electronic components (e.g. ECG, dimmer switches). This type of residual current protective.

Actuation Time Characteristics

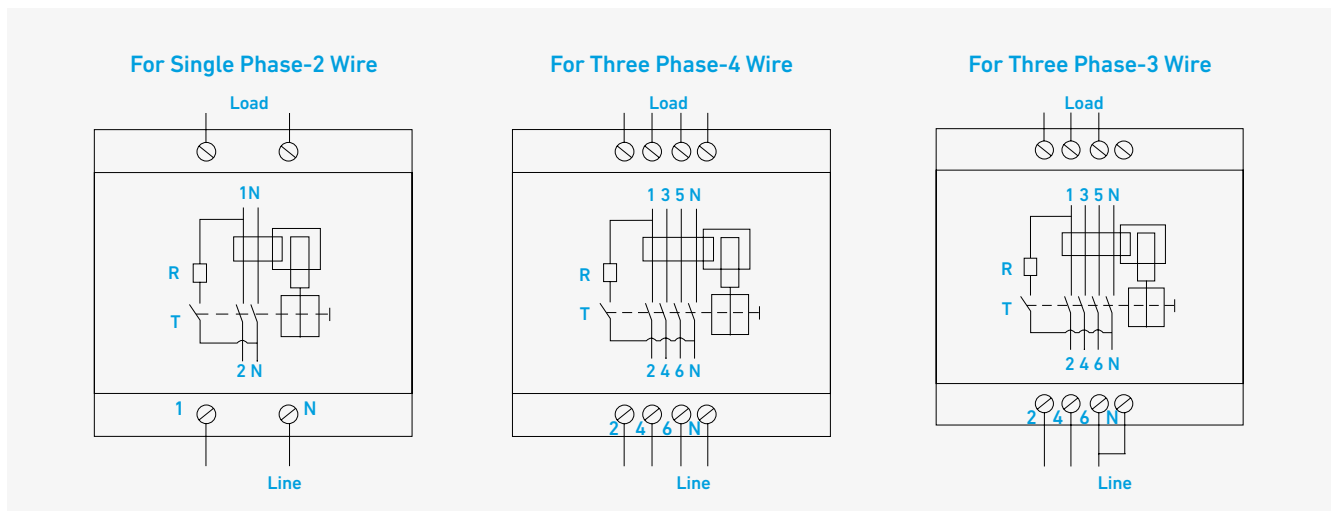


Selection of RCCB Type

Suitable RCD-Type		Circuit	Load Current	Residual Current	
A	AC	1			
		2			
		3			
		4			
		5			
		6			

Device is suitable for electronic equipment with input current circuits 1 to 6 in below table.

Wiring Diagram

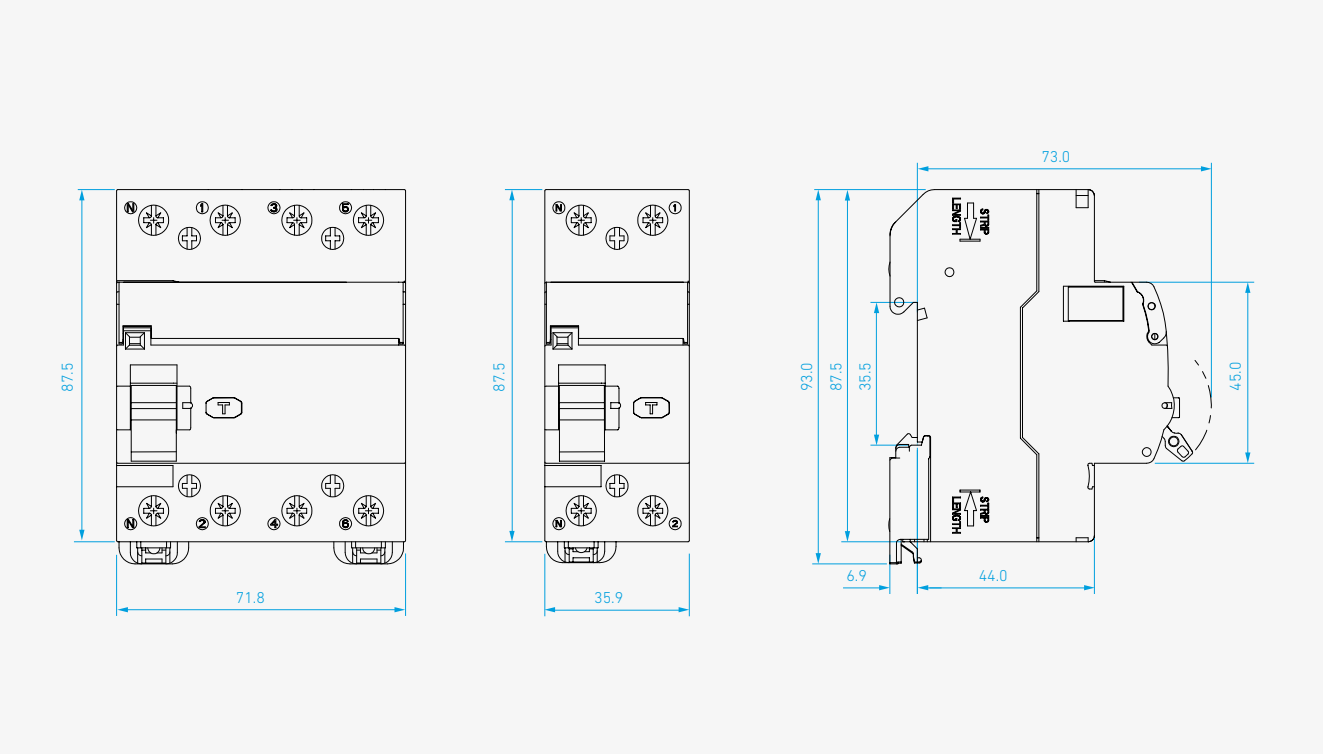


The Hyundai range of four pole RCCBs can be used to provide residual current protection in 3 phase. For 3 wire circuits (no neutral), a link from the neutral to an incoming should be made on the supply side of the RCCB, to enable the operation of the RCCB.

Dimensions

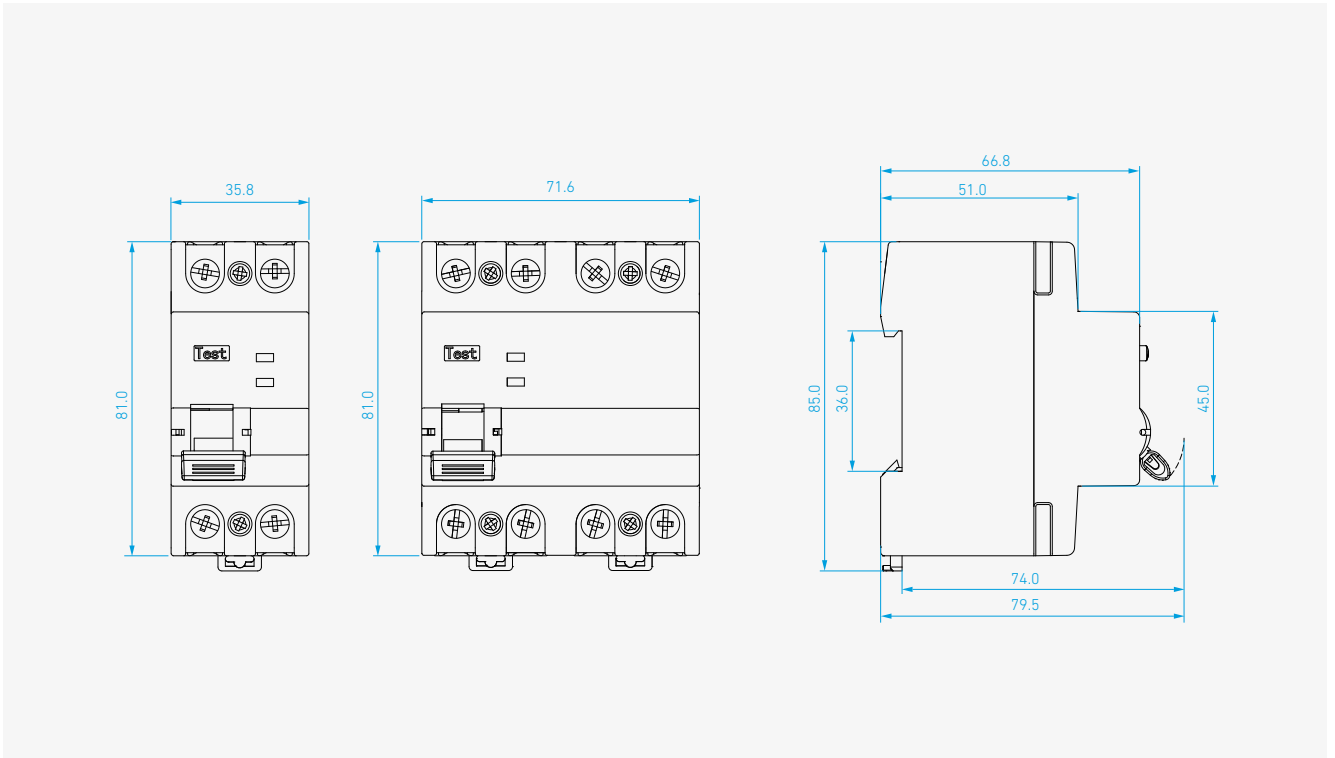
HRC (Deluxe Type)

HRC63, 63 AF/HRC100,100 AF

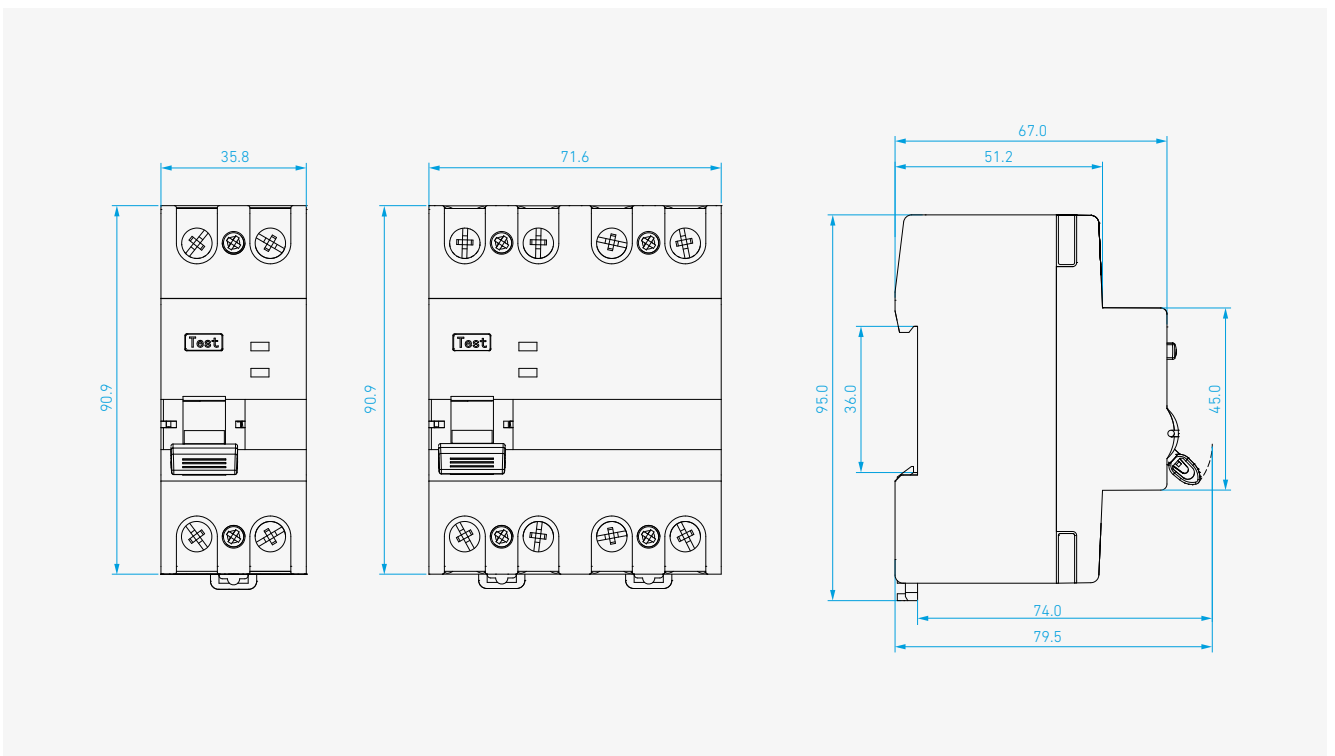


HRC (Standard Type)

HRC63S, 63 AF

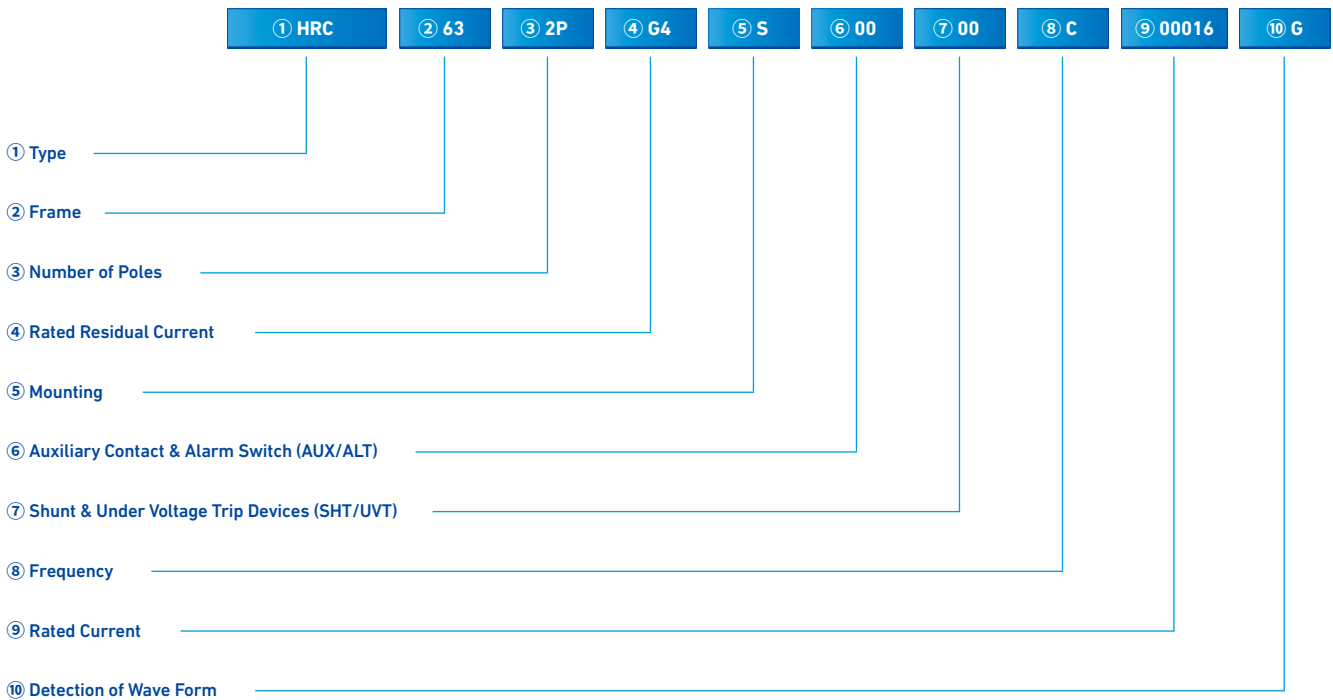


HRC100S, 100 AF



RCCB Ordering Information

Ordering Guidelines (Deluxe Type)



① Type	
HRC	Residual current circuit breaker

② Frame	
63	63 AF (Deluxe type), N-left
100	100 AF (Deluxe type), N-left

③ Number of Poles	
2P	2 Pole (N + 1 Pole)
4P	4 Pole (N + 3 Pole)

④ Rated Residual Current	
G4	30 mA
G5	100 mA
G7	300 mA

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

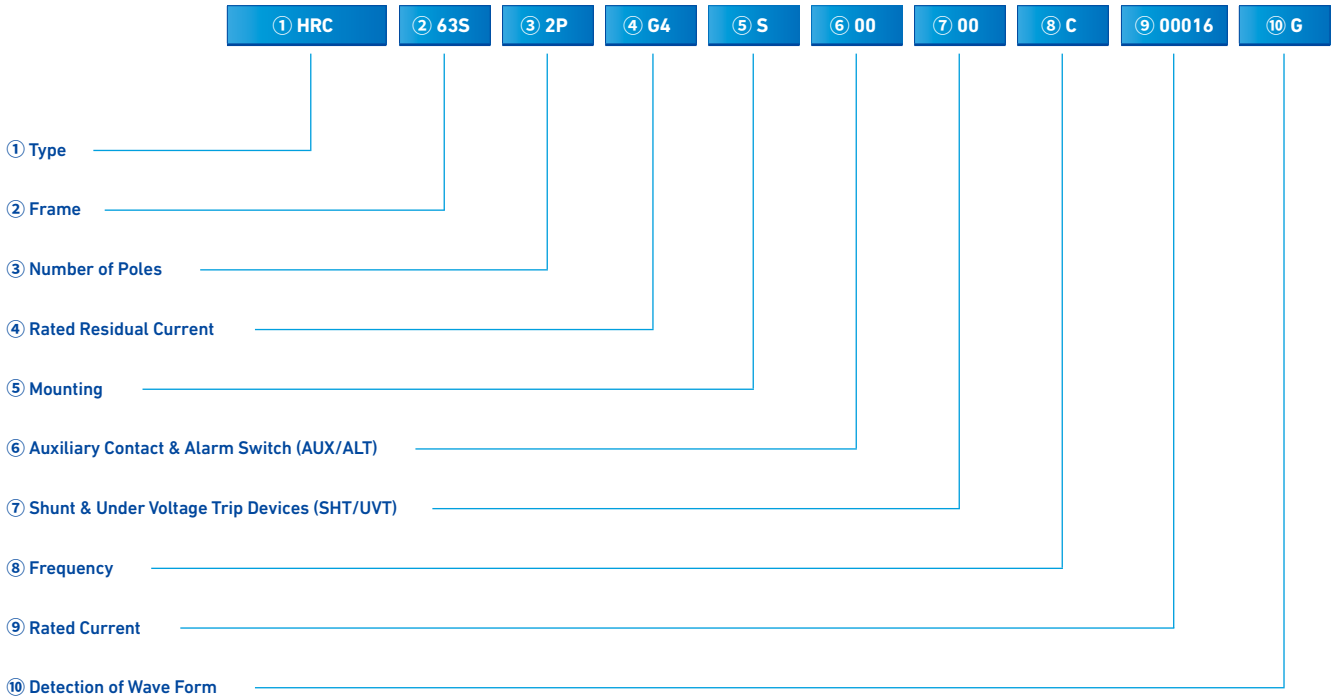
⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

⑨ Rated Current	
00016	16 A
00025	25 A
00040	40 A
00050	50 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

⑩ Detection of Wave Form	
G	AC type
F	A type

Ordering Guidelines (Standard Type)



① Type	
HRC	Residual current circuit breaker

② Frame	
63S	63 AF (Standard type), N-left
100S	100 AF (Standard type), N-left

③ Number of Poles	
2P	2 Pole (N + 1 Pole)
4P	4 Pole (N + 3 Pole)

④ Rated Residual Current	
G2	10 mA
G4	30 mA
G5	100 mA
G7	300 mA
G8	500 mA

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

⑨ Rated Current	
00016	16 A
00025	25 A
00032	32 A
00040	40 A
00050	50 A
00063	63 A
00080	80 A
00100	100 A
00125	125 A

⑩ Detection of Wave Form	
G	AC type
F	A type

HRO

Residual Current Circuit Breaker with Overcurrent Protection

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Features

HRO Residual current Circuit Breaker with Overcurrent protection

RCBOs are a combination of an RCCB and a miniature circuit breaker in a compact design for personnel, fire and line protection. For personnel protection and fire protection, the residual current part of the type AC trips in the event of sinusoidal AC residual currents, type A also trips in the event of pulsating DC residual currents.





Product Features

HYUNDAI ELECTRIC introduces the HRO series of RCBOs rating from 1 A to 63 A. RCBOs with a rated residual current of maximum 30 mA are used for personnel, material and fire protection, as well as for protection against direct contact. RCBOs with a rated residual current of 10 mA are primarily used in areas that represent an increased risk for personnel and in the outdoor installations of residential buildings. Devices with a rated residual current of maximum 300 mA are used as preventative fire protection in case of insulation faults. The MCB part of the RCBO protects lines against overload and short circuits and is available in characteristics B and C.

2 Module Type / RCD Type

Compact Type



Product Performance

- Short circuit, overcurrent and earth leakage protection
- Breaking capacity up to 10 kA
- Rated current up to 63 AF
- Rated residual operating current 10~500 mA
- Type AC and type A
- Tripping characteristics: B, C, D curve

- Short circuit, overcurrent and earth leakage protection
- Breaking capacity up to 10 kA
- Rated current up to 40 AF
- Rated residual operating current 10~300 mA
- Type AC and type A
- Tripping characteristics: B, C curve



Product Structure

- Same series with Standard type MCB.
- Same rating current with MCB.
- Equipped 1P + N, 2P, 3P, 3P + N, 4P for use various load condition.

- 1 Module 18 mm compact (Long type)/1 Module 18 mm compact (Short type)
- Compact size RCBO in same physical size as a conventional single pole MCB.
- Dual termination for bus-bar as well as cable connection
- Supply can be connected on either side









Specification

- IEC/EN 61009-1
- DEKRA/INTERTEK CB certification







- IEC/EN 61009-1
- AS/NZS 61009-1
- DEKEA CB certification

Selection Table

HRO (Standard Type)

Model	2 Module Type			RCD Type		Compact Type
	HRO63S, 63 AF, 4.5 kA	HRO63A, 63 AF, 6 kA	HRO63B, 63 AF, 10 kA	HRO63M, 63 AF, 6 kA	HRO63P, 63 AF, 10 kA	HRO40L, 40 AF, 6 kA (Cable Type)
						
Reference Standard	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1
No. of Poles	1P + N	2P	2P	1P + N, 2P, 3P, 3P + N, 4P	1P + N, 2P, 3P, 3P + N, 4P	1P + N (1 module)
N Phase Position	Right	No N phase	No N phase	Right	Right	-
N Phase Type	Neutral switched	2P switched	2P switched	Neutral directly connected	Neutral directly connected	Neutral directly connected
Rated Current (In)	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	6, 10, 16, 20, 25, 32, 40, 50, 63 A	6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	6, 10, 16, 20, 25, 32, 40 A
Rated Voltage (Ue)	AC 240 V	AC 240 V	AC 240 V	AC 240/415 V	AC 240/415 V	AC 240 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated Short Circuit Current (Icn)	4.5 kA (Ics = 100 % Icn)	6 kA (Ics = 100 % Icn)	10 kA (Ics = 75 % Icn)	6 kA (Ics = 100 % Icn)	10 kA (Ics = 75 % Icn)	6 kA (Ics = 100 % Icn)
Rated Residual Operating Current (IΔn)	10, 30, 100, 300, 500 mA	30, 100, 300 mA	30, 100, 300 mA	10, 30, 100, 300, 500 mA	10, 30, 100, 300, 500 mA	10, 30, 100, 300 mA
Magnetic Release Setting	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve (10-20)In-D Curve	(3-5)In-B Curve (5-10)In-C Curve
Rated Residual Making Breaking Capacity (IΔm)	3 kA	4.5 kA	4.5 kA	3 kA	3 kA	500 A
Operating Characteristics in Presence of Residual Current with d.c Components	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
Rated Insulation Voltage (Ui)	500 V	500 V	500 V	500 V	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of Operations) Minimum	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000
Operating Temperature	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C
Humidity	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH
Energy Limit Class	3	3	3	3	3	3
Terminal Capacity (max)	25 mm ²	25 mm ²	25 mm ²	25 mm ²	25 mm ²	25 mm ²
Tightening Torque	2 N·m	2 N·m	2 N·m	2 N·m	2 N·m	2 N·m
Vibration	3 g	3 g	3 g	3 g	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20	IP20	IP20	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight in kg	1P + N : 0.180 kg	0.258 kg	0.260 kg	1P + N : 0.229 kg 2P : 0.330 kg 3P : 0.490 kg 3P + N : 0.490 kg 4P : 0.597 kg	1P + N : 0.258 kg 2P : 0.386 kg 3P : 0.574 kg 3P + N : 0.574 kg 4P : 0.709 kg	0.176 kg
Dimensions (H x D x W)/Pole in mm	1P + N : 81.0 x 73.5 x 35.5 mm	83.0 x 71.7 x 35.6 mm	83.0 x 71.7 x 35.6 mm	1P + N : 89.0 x 73.5 x 53.8 mm 2P : 89.0 x 73.5 x 71.6 mm 3P : 89.0 x 73.5 x 116.4 mm 3P + N : 89.0 x 73.5 x 116.4 mm 4P : 89.0 x 73.5 x 134.2 mm	1P + N : 89.0 x 73.5 x 53.8 mm 2P : 89.0 x 73.5 x 71.6 mm 3P : 89.0 x 73.5 x 116.4 mm 3P + N : 89.0 x 73.5 x 116.4 mm 4P : 89.0 x 73.5 x 134.2 mm	122.5 x 71.5 x 17.8 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Cable Length	-	-	-	-	-	N (87 cm)/FE (85 cm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
AUX/ALT/SHT/UVT	YES (Same with standard type MCB options)	No	No	YES (Same with standard type MCB options)	YES (Same with standard type MCB options)	NO
Certifications	DEKRA CB	INTERTEK CB	INTERTEK CB	DEKRA CB	DEKRA CB	DEKRA CB

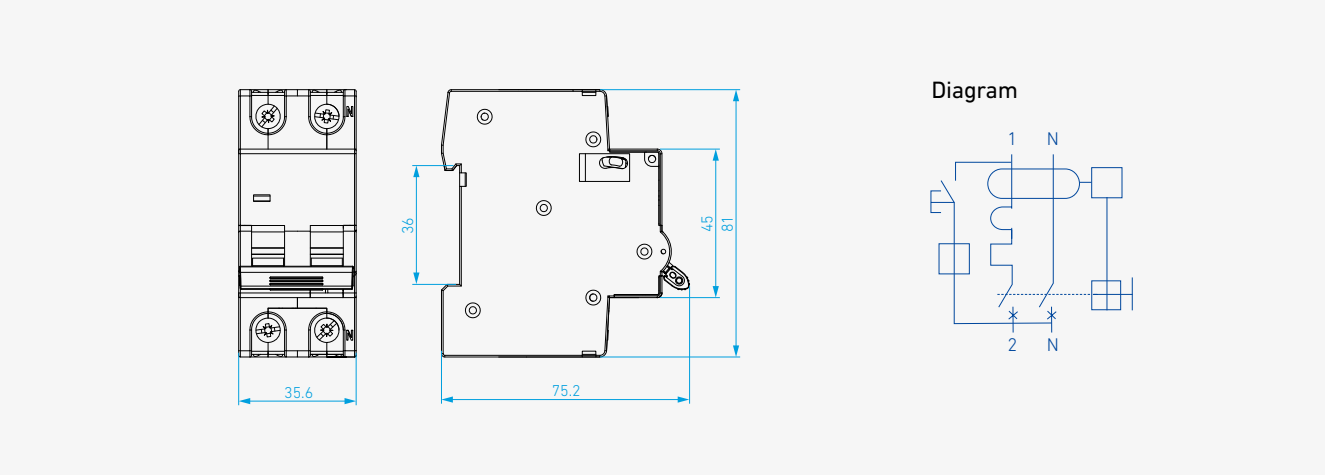
Compact Type

HRO40T, 40 AF, 6 kA (Cable Type)	HRO40HT, 40 AF, 10 kA (Cable Type)	HRO40M, 40 AF, 6 kA (Non-Cable Type)	HRO40P, 40 AF, 10 kA (Non-Cable Type)	HRO40ML, 40 AF, 6 kA (Cable Type)	HRO40PL, 10 kA (Cable Type)
					
IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1
1P + N (1 module)	1P + N (1 module)	N + 1P (1 module)	N + 1P (1 module)	N + 1P (1 module)	N + 1P (1 module)
Right	Right	Left	Left	Left	Left
Neutral directly connected	Neutral directly connected	Neutral switched	Neutral switched	Neutral directly connected	Neutral directly connected
6, 10, 16, 20, 25, 32, 40 A	6, 10, 16, 20, 25, 32, 40 A	6, 10, 13, 16, 20, 25, 32, 40 A	6, 10, 13, 16, 20, 25, 32, 40 A	6, 10, 13, 16, 20, 25, 32, 40 A	6, 10, 13, 16, 20, 25, 32, 40 A
AC 240 V	AC 240 V	AC 240 V	AC 240 V	AC 240 V	AC 240 V
50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
6 kA (Ics = 100 % Icn)	10 kA (Ics = 75 % Icn)	6 kA (Ics = 100 % Icn)	10 kA (Ics = 75 % Icn)	6 kA (Ics = 100 % Icn)	10 kA (Ics = 75 % Icn)
10, 30, 100, 300 mA	10, 30, 100, 300 mA	10, 30, 100, 300 mA	10, 30, 100, 300 mA	10, 30, 100, 300 mA	10, 30, 100, 300 mA
(3-5)In-B Curve (5-10)In-C Curve	(3-5)In-B Curve (5-10)In-C Curve	(3-5)In-B Curve (5-10)In-C Curve	(3-5)In-B Curve (5-10)In-C Curve	(3-5)In-B Curve (5-10)In-C Curve	(3-5)In-B Curve (5-10)In-C Curve
500 A	500 A	3 kA	3 kA	3 kA	3 kA
'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type	'A' type & 'AC' type
1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
500 V	500 V	500 V	500 V	500 V	500 V
4 kV	4 kV	4 kV	4 kV	4 kV	4 kV
2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV	2.5 kV
10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000	10,000/20,000
-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C	-25 °C to + 55 °C
95 % RH	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH
3	3	3	3	3	3
25 mm ² (Top) 10 mm ² (Bottom)	25 mm ² (Top) 10 mm ² (Bottom)	10 mm ²	10 mm ²	10 mm ² (Top) 25 mm ² (Bottom)	10 mm ² (Top) 25 mm ² (Bottom)
2 N·m (Top) 1.6 N·m (Bottom)	2 N·m (Top) 1.6 N·m (Bottom)	1.2 N·m	1.2 N·m	1.2 N·m (Top) 2 N·m (Bottom)	1.2 N·m (Top) 2 N·m (Bottom)
3 g	3 g	3 g	3 g	3 g	3 g
40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall
IP20	IP20	IP20	IP20	IP20	IP20
Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
0.178 kg	0.180 kg	0.126 kg	0.138 kg	0.176 kg	0.178 kg
110.0 x 71.5 x 17.8 mm	110.0 x 71.5 x 17.8 mm	83.0 x 71.8 x 17.8 mm	92.5 x 71.8 x 17.8 mm	87.0 x 71.8 x 17.8 mm	87.0 x 71.8 x 17.8 mm
Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
N (87 cm)/FE (85 cm)	N (87 cm)/FE (85 cm)	-	-	N (96 cm)/FE (96 cm)	N (96 cm)/FE (96 cm)
Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
NO	NO	NO	NO	NO	NO
DEKRA CB	DEKRA CB	INTERTEK CB	INTERTEK CB	INTERTEK CB	INTERTEK CB

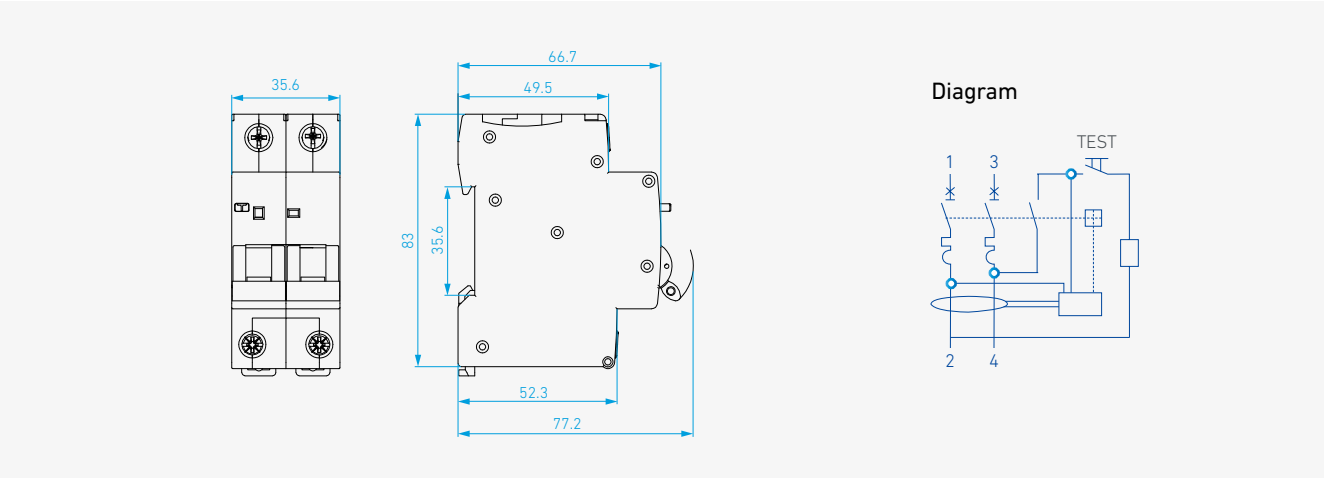
Dimensions

HR0 (Standard Type)

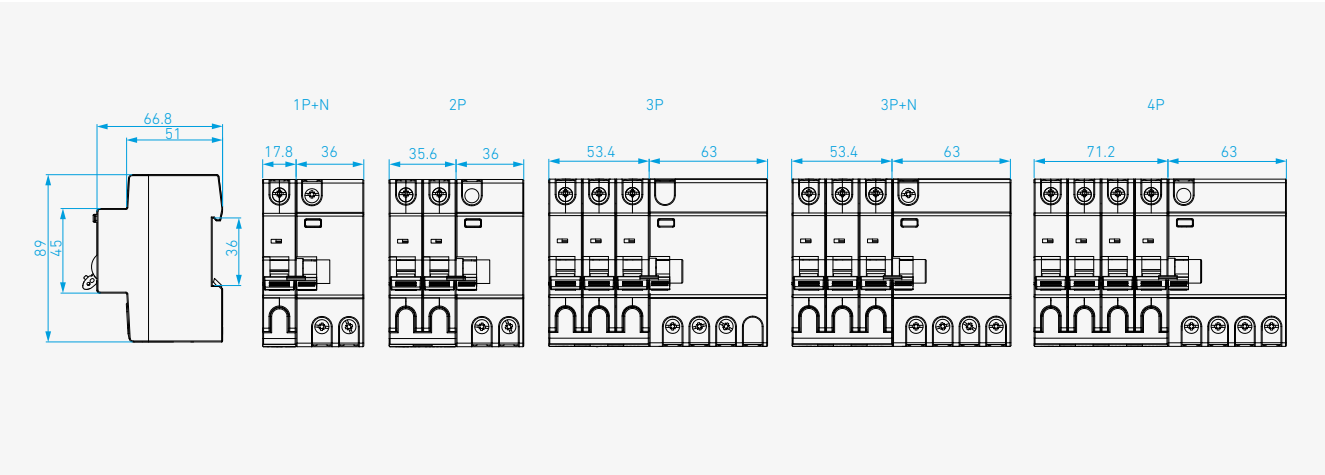
HR063S, 63 AF



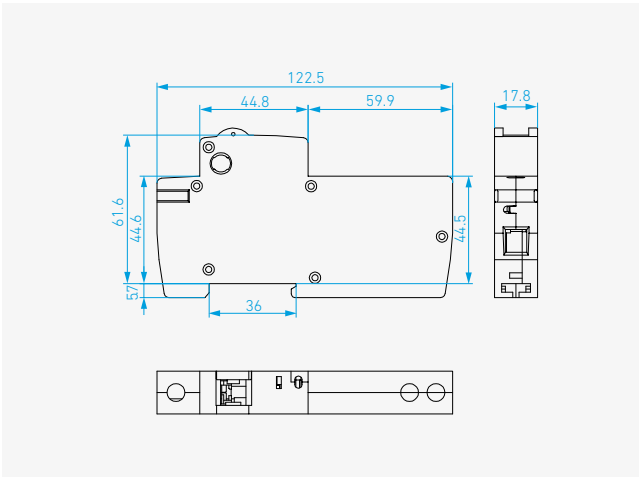
HR063A/B, 63 AF



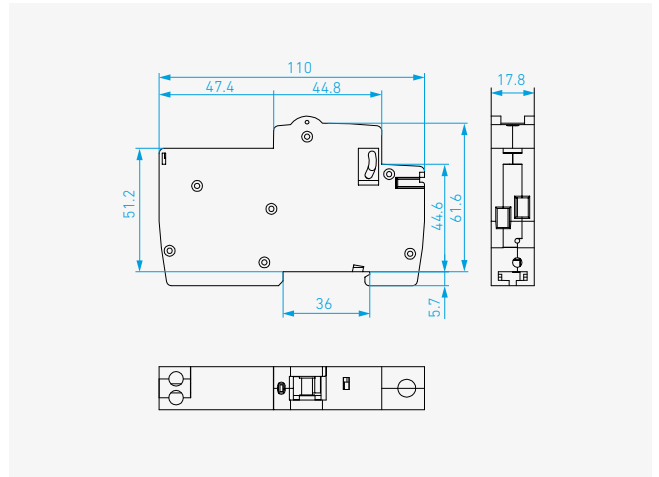
HR063M/P, 63AF



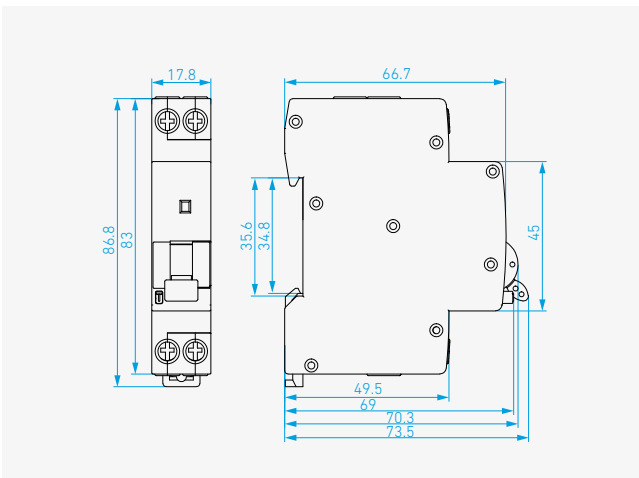
HRO40L, 40 AF



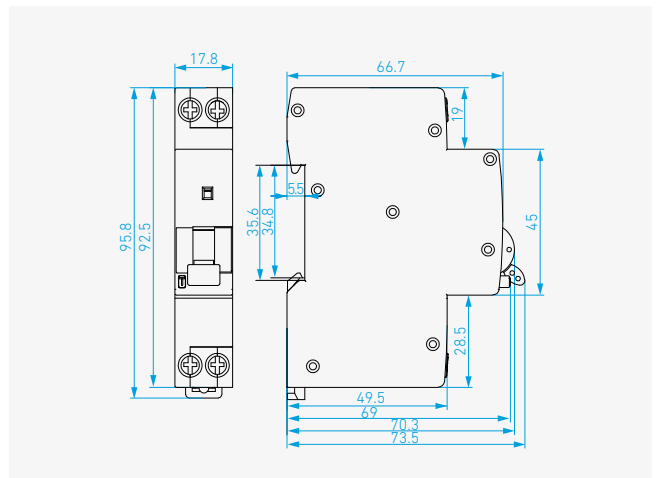
HRO40T/HT, 40 AF



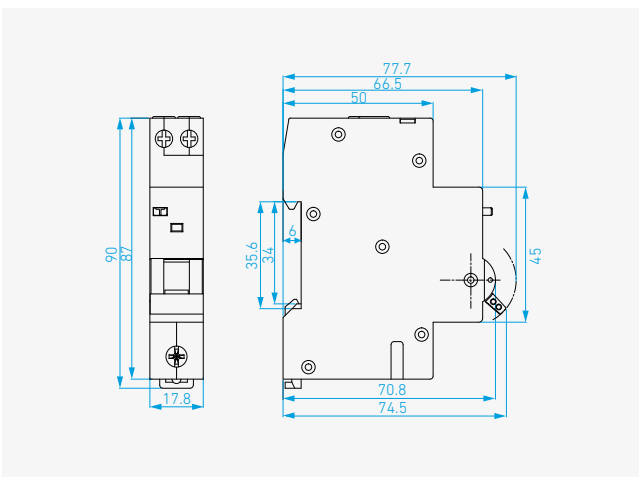
HRO40M, 40 AF



HRO40P, 40 AF

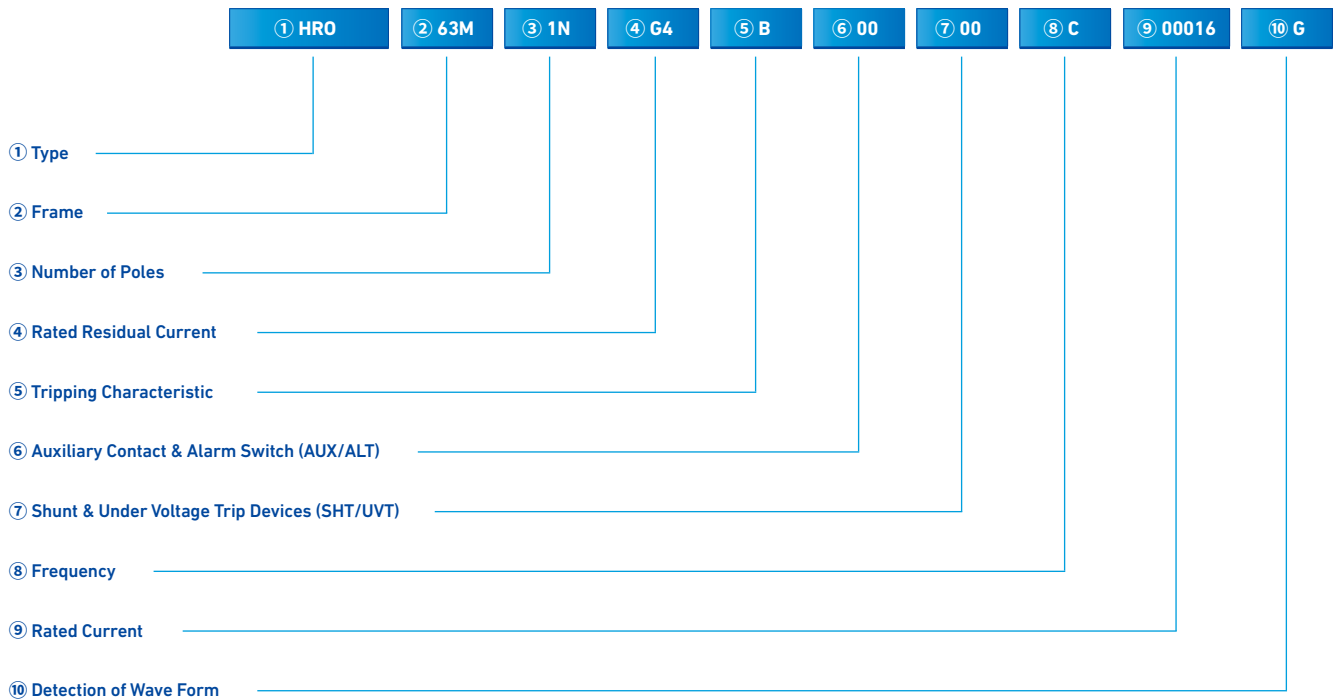


HRO40ML/PL, 40 AF



RCBO Ordering Information

Ordering Guidelines (Standard Type)



① Type

HRO	Residual current circuit breaker with overcurrent protection
-----	--

② Frame

63S	63 AF, 4.5 kA (2 Module type)
63A	63 AF, 6 kA (2 Module type)
63B	63 AF, 10 kA (2 Module type)
63M	63 AF, 6 kA (RCD type)
63P	63 AF, 10 kA (RCD type)
40L	40 AF, 6 kA, (Line long type + cable)
40T	40 AF, 6 kA, (Load long type + cable)
40HT	40 AF, 10 kA, (Load long type + cable)
40M	40 AF, 6 kA, (Compact type)
40P	40 AF, 10 kA, (Compact type)
40ML	40 AF, 6 kA, (Compact type + cable)
40PL	40 AF, 10 kA, (Compact type + cable)

③ Number of Poles

1N	1 Pole + Neutral (63 AF)
N1	Neutral + 1 Pole (40 AF)
2P	2 Pole (63 AF, 63A/B type)
3P	3 Pole (63 AF)
3N	3 Pole + Neutral (63 AF)
4P	4 Pole (63 AF)

④ Rated Residual Current

G2	10 mA
G4	30 mA
G5	100 mA
G7	300 mA
G8	500 mA

⑤ Tripping Characteristic

B	B Curve
C	C Curve
D	D Curve

⑥ Auxiliary Contact & Alarm Switch

00	Non-attachment
----	----------------

⑦ Shunt & Under Voltage Trip Devices

00	Non-attachment
----	----------------

⑧ Frequency

C	50/60 Hz
---	----------

⑨ Rated Current

00001	1 A
00002	2 A
00003	3 A
00004	4 A
00005	5 A
00006	6 A
00010	10 A
00016	16 A
00020	20 A
00025	25 A
00032	32 A
00040	40 A
00050	50 A
00063	63 A

⑩ Detection of Wave Form

G	AC type
F	A type

HEC

Electronic Circuit Breaker

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Features



HEC Electronic Circuit Breaker

In developing countries mostly there is an alternative source of supply being used to ensure continuous supply of power to the installation. Current limiters comes handy in those application as it limits the load of the user when consumed above the sanctioned limit.





Product Features

Electronic current limiter (HEC) is new generation power distribution automation tool which is created keeping in view the power instability in many countries which creates the need of another power backup source.

In modern era, most of the residential as well as commercial complexes are found to have genset backup supply being largely distributed by single genset entity. In those areas, it is essential to restrict the load of users as per the sanctioned limit. HYUNDAI ELECTRIC offers HEC which is fully automated high precision microcontroller based current limiter. Also, one additive feature of HEC is that it comes with the feature that user load can be changed from 2 A to 20 A with 0.1 A interval.

HEC Type

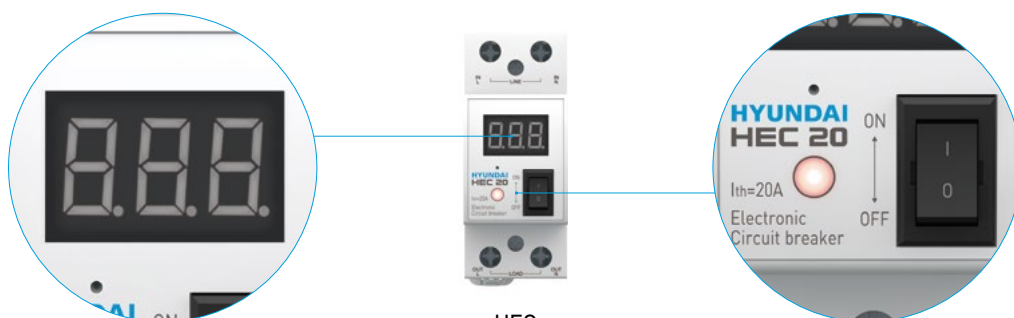
Product Performance

- Overloading protection
- Low power self consumption
- Automatic reset

Product Structure

- Microcontroller based design
- Adjustable current setting
- LCD display of current consumption
- Pre-trip LED Indication
- Mounting: DIN-Rail mounting


Product Overview



HEC
2 A-20 A (Setting 0.1 A interval)

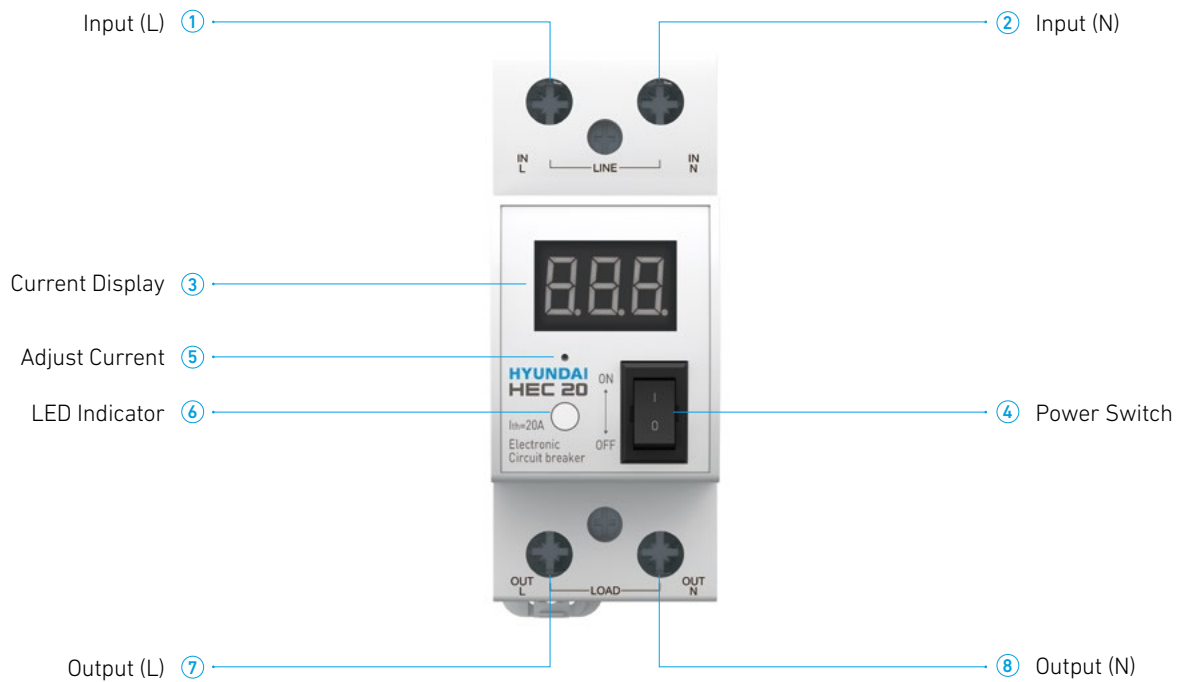
Selection Table

HEC Type

Model	HEC20
	
Rated Current	2 A-20 A (Setting 0.1 A interval)
Rated Voltage	AC 240 V
Rated Operational Voltage	AC 140 V-AC 290 V
Frequency	50 Hz
Current Setting Time Delay	10 sec.
Overloading Cut-Off Delay	10 sec.
Operating Temperature	10-55 °C
Rated Impulse Voltage Withstand	4 kV
Weight	180 gram

Operation

Product Description



Controls and Settings

- After a switch (4) is on, a current display (3) will blink for 10 seconds.
- Press a (5) to adjust current and to enter current setting mode. Every time the user presses the button, it will increase current by 0.1 A. If you hold the key for more than 1 second, current setting will increase at faster rate.
- Whenever overloading current [$I_n \rightarrow I$ flowing $\rightarrow 2 I_n$] in the circuit is detected, a lamp (6) will flash in red color for 1 minute and then electricity is cut-off.
- The breaker will reconnect to the power supply soon after power supply is cut off for 10 seconds and lamp (6) is dimmed.
- In the event that value of overloading is twice as high as [I flowing $2 I_n$] the values of set current, the breaker cuts off the power supply in 4 seconds and lamp (6) will glow in red color.
- The breaker will connect to the power supply after 10 seconds and dim the lamp (6).

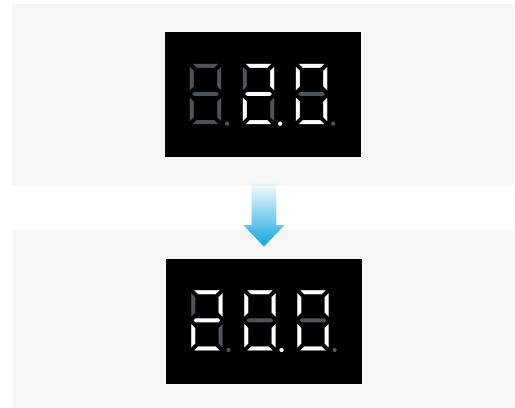
Technical Data

Functions

Functioning of current limiter on a broader spectrum can be explained as:

Current Sanctioning

Whenever the user switches on the current limiter for the first time, the 7-segment display will blink for about 10 to 12 seconds. During this interval, user can set the sanctioning limit of current by pressing ADJ current button. The value of current will change in interval of 0.1 A on pressing of ADJ current button once. Value of current can be set from 2 A to 20 A.



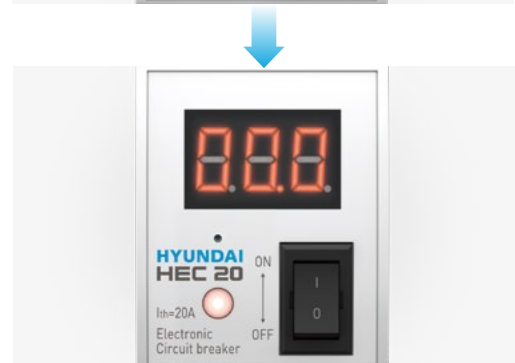
Pre-Trip Indication

During the event of fault the pre-trip LED will blink for 1 minute and the supply will be cut-off.



Overloading/Current Limiting

In the case user starts consuming current more than the sanctioned limit, the HEC will detect the fault situation and the pre-trip LED will start to blink and soon the breaker will cut-off the supply. HEC response time is inversely proportional to the fault current. That means more the fault current lesser will be the response time of HEC in disconnecting the load connected to the output supply.



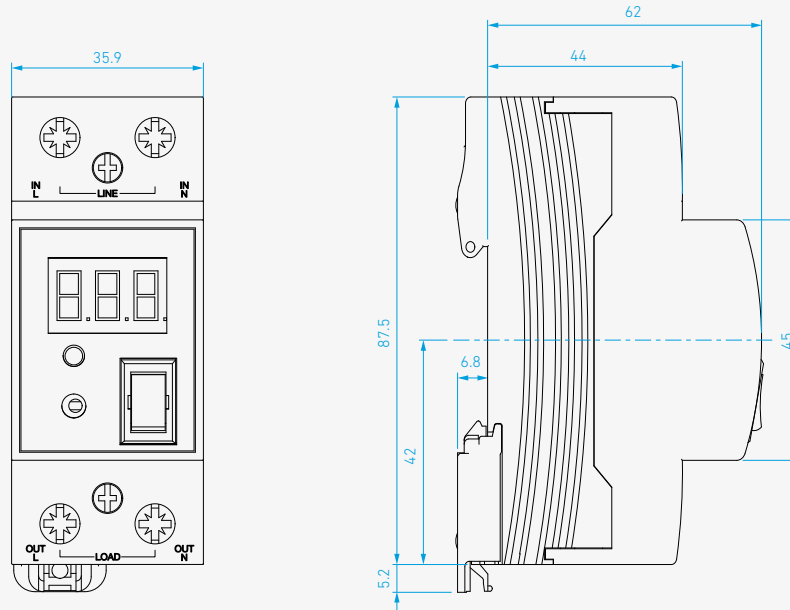
Automatic Reset Facility

Once the HEC trips in the event of the fault, 10 seconds. If user has already switched off and brought load in sanctioned limits, it will run smoothly. Else, it will again disconnect the load.

Dimensions

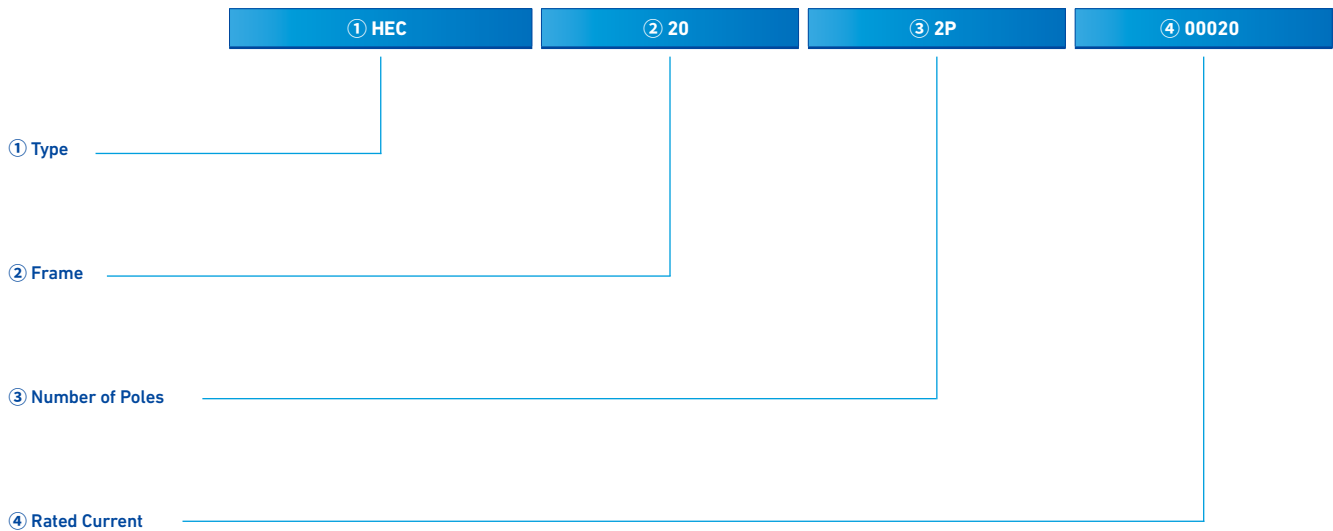
HEC

HEC20



HEC Ordering Information

Ordering Guidelines



① Type	
HEC	Electronic circuit breaker

③ Number of Poles	
2P	2 Pole

④ Rated Current	
00020	2 A-20 A

② Frame	
20	HEC20

HBD

Mini Breaker

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Selection Table

HBD breaker

Standard	IEC 60947-2
Protection	Overload, short-circuit
Specification	5, 10 kA at AC220/240 V
	10, 15, 20, 30, 40, 50 A
	1, 2, 3 Pole
	Plug-in and lug-to-lug type

Ratings




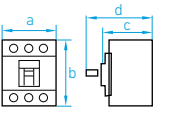
Plug-in type (Terminal: screw)

Model	HBD51D			HBD52D			HBD53D			HBD51hD			HBD52hD			HBD53hD		
																		
Standard	IEC 60947-2						IEC 60947-2											
Ampere Frame Size	50 AF						50 AF											
Number of Poles (P)	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
Degree of Protection	IP20						IP20											
Utilization Category	A						A											
Protection	Overload, short-circuit						Overload, short-circuit											
Rating	Rated Current (A)		10, 15, 20, 30, 40, 50			10, 15, 20, 30, 40, 50												
	Rated Insulation Voltage [Ui] (V)		AC460			AC460												
	Rated Operational Voltage [Ue] (V)		AC240/460 ¹⁾			AC240/460 ¹⁾												
	Rated Impulse withstand Voltage [Uimp] (kV)		6			6												
Rated Short-Circuit Breaking Capacity	Ultimate [Icu] (kA r.m.s.)		AC220/240 V, 50-60 Hz			5			10									
	DC125 V		5			10												
	Service [Ics] % of (Icu)		50			50												
Trip Mechanism	Thermal magnetic						Thermal magnetic											
Mounting	Plug-in						o											
Terminal Connection	Line Side						Plug-in											
	Load Side						Screw (Plug-in: for domestic order)											
Dimensions (mm)	a		Width			20			50			75						
	b		Height			74.5			74.5			74.5						
	c		Depth			60			60			60						
	d					77			79			79						
Weight (kg)	0.14			0.28			0.42			0.14			0.28			0.42		

※ 1) AC 460 V is not applicable for 1P breaker.

Ratings

Lug-to-lug type (Terminal: screw)

Model		HBD51	HBD52	HBD53	HBD51h	HBD52h	HBD53h	HiBC32S				
												
Standard		IEC 60947-2			IEC 60947-2			IEC 60947-2				
Ampere Frame Size		50 AF			50 AF			30 AF				
Number of Poles (P)		1	2	3	1	2	3	2 (2P1E)				
Degree of Protection		IP20			IP20			IP20				
Utilization Category		A			A			A				
Protection		Overload, short-circuit			Overload, short-circuit			Overload, short-circuit				
Rating	Rated Current (A)	10, 15, 20, 30, 40, 50			10, 15, 20, 30, 40, 50			10, 15, 20, 30				
	Rated Insulation Voltage [Ui] (V)	AC460			AC460			AC500				
	Rated Operational Voltage [Ue] (V)	AC240/460 ¹⁾			AC240/460 ¹⁾			AC220				
	Rated Impulse withstand Voltage [Uimp] (kV)	6			6			6				
Rated Short-Circuit Breaking Capacity	Ultimate [Icu] (kA r.m.s.)	AC400/460 V, 50-60 Hz	2.5			5			-			
		AC380 V, 50-60 Hz	2.5			5			-			
		AC220/240 V, 50-60 Hz	5			10			1.5			
		DC125 V	5			10			-			
	Service [Ics] % of (Icu)	50			50			50				
Trip Mechanism		Thermal magnetic			Thermal magnetic			Thermal magnetic				
Mounting		Direct Mounting by Screw			o			o				
Terminal Connection	Line Side	Clip & Screw			Clip & Screw			Screw				
	Load Side	Clip & Screw			Clip & Screw			Screw				
Dimensions (mm)		a	Width			25	50	75	25	50	75	33
		b	Height			95	95	95	95	95	95	70
		c	Depth			60	60	60	60	60	60	42
		d				77	79	79	77	79	79	57
Weight (kg)		0.16	0.34	0.5	0.16	0.34	0.5	0.1				

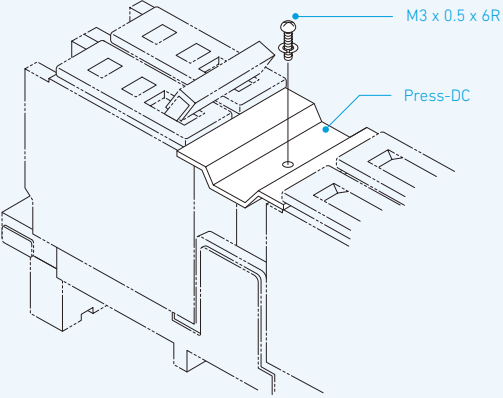
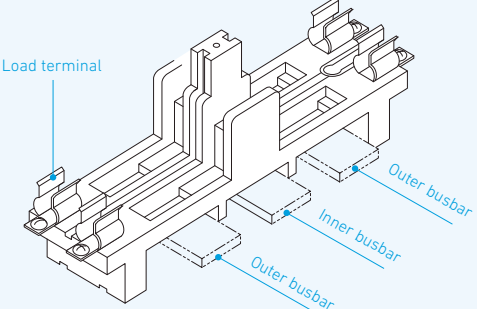
※ 1) AC 460 V is not applicable for 1P breaker.

Accessories

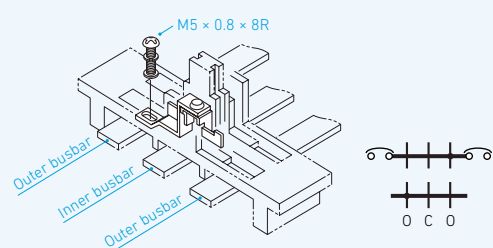
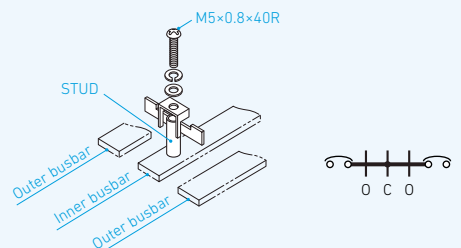
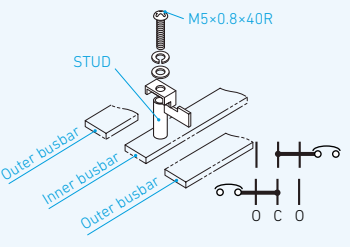
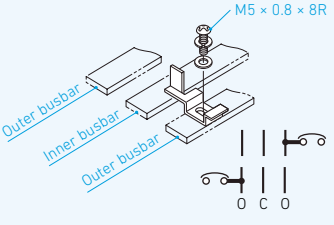
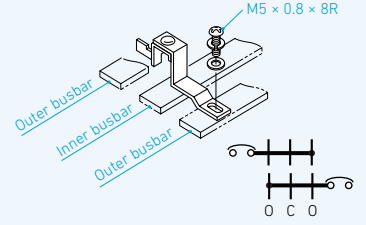
Purchased Parts when Using a HBD52D Plug-in Breaker

Plug-in Base

2 rows of mounting stands (for 4 circuits)

Ordering Information	PRESS-DC	TDA 50DC
Installation	<p>Used to fix the breaker on the plug-in mount (TDA-50DC)</p>  <p>M3 x 0.5 x 6R Press-DC</p>	<p>Plug-in Base</p>  <p>Load terminal Outer busbar Inner busbar Outer busbar</p>

Branch conductor

Ordering Information	2RT-LC	2S-LC	
Installation	 <p>M5 x 0.8 x 8R Outer busbar Inner busbar Outer busbar</p> <p>O C O</p>	 <p>M5 x 0.8 x 40R STUD Outer busbar Inner busbar Outer busbar</p> <p>O C O</p>	
Ordering Information	1S-LC	1RT-LC	1T-LC
Installation	 <p>M5 x 0.8 x 40R STUD Outer busbar Inner busbar Outer busbar</p> <p>O C O</p>	 <p>M5 x 0.8 x 8R Outer busbar Inner busbar Outer busbar</p> <p>O C O</p>	 <p>M5 x 0.8 x 8R Outer busbar Inner busbar Outer busbar</p> <p>O C O</p>

※ 1S-LC or 2S-LC, STUD must be used together. (Purchase separately)

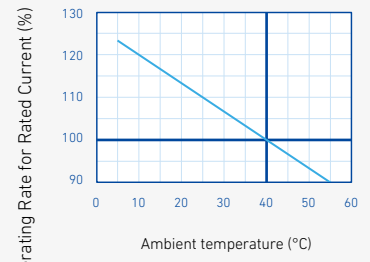
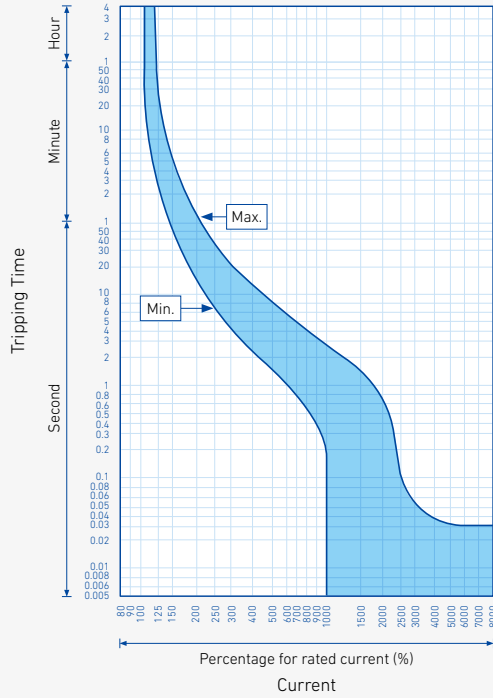
Technical Data

Tripping & Temperature Derating Curves

HBD Breaker, 5-10 kA, 10-50 A



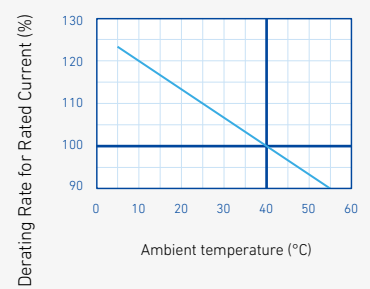
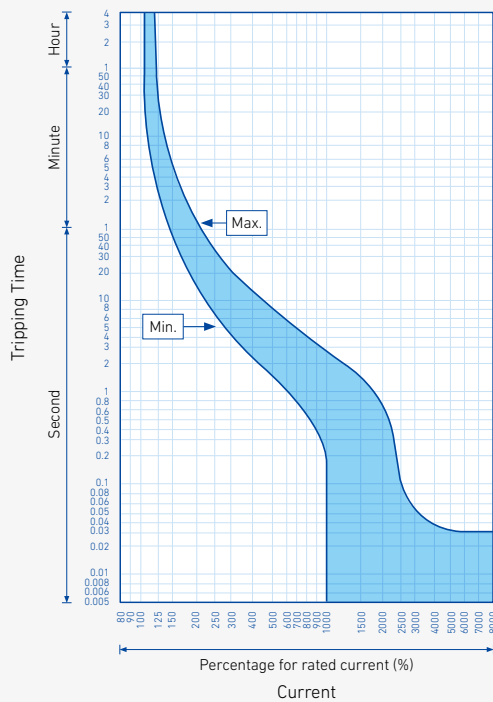
- HBD51D
- HBD52D
- HBD53D
- HBD51hD
- HBD52hD
- HBD53hD



HBD breaker, 5-10 kA, 10-50 A



- HBD51
- HBD52
- HBD53
- HBD51h
- HBD52h
- HBD53h

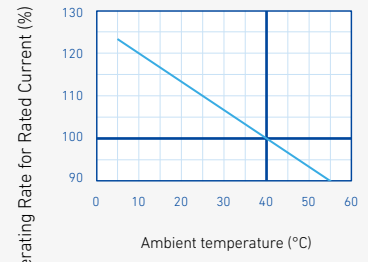
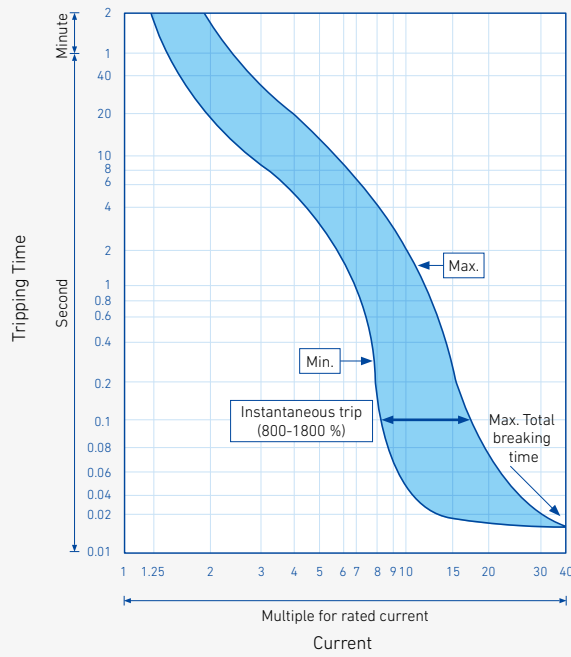


Technical Data

HiBC Breaker, 30 AF, 1.5 kA, 10-30 A



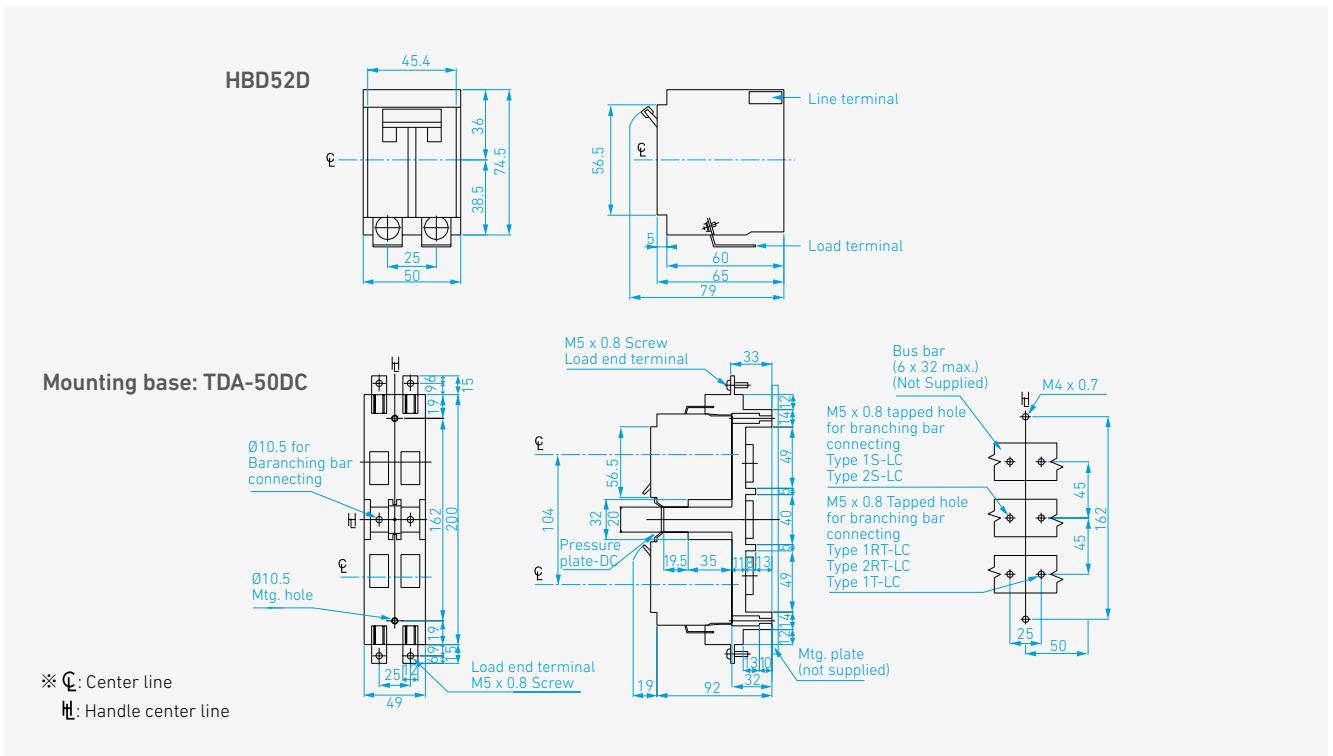
• HiBC32SC



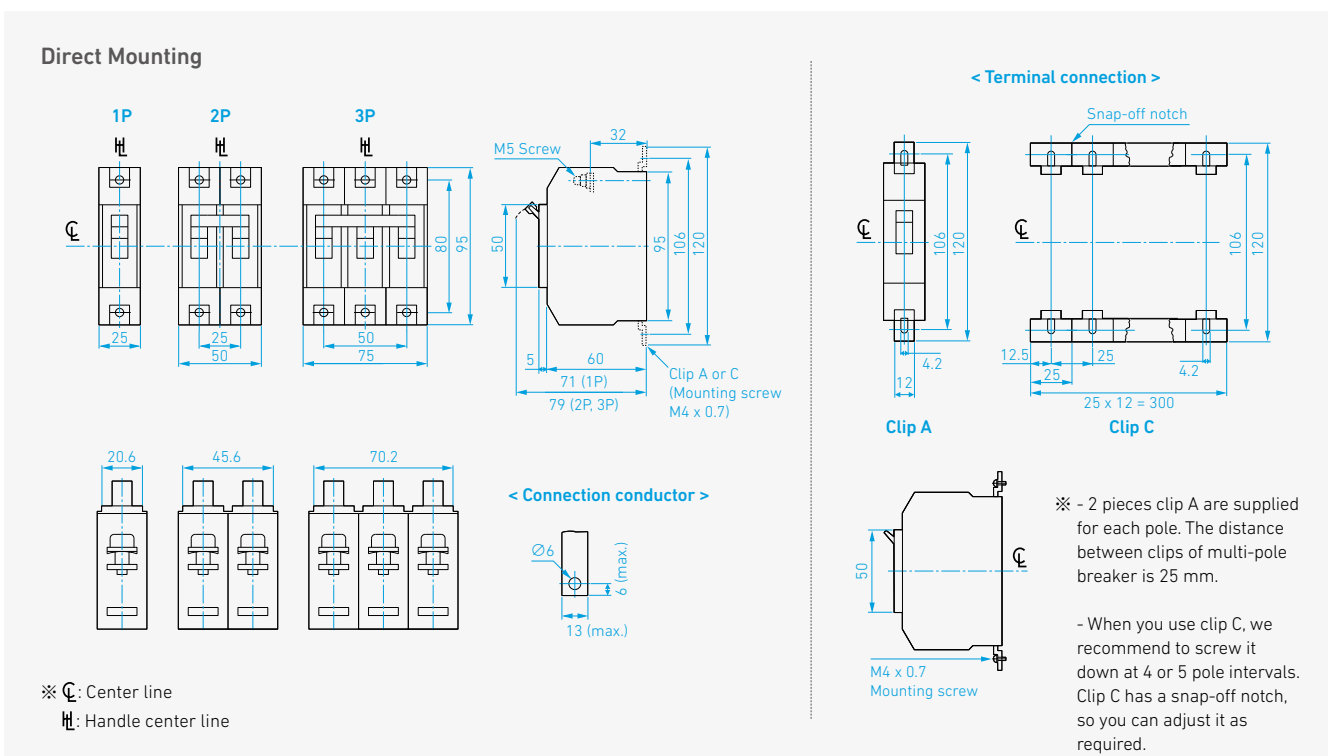
Dimensions

HBD (5-10 kA 10-50 A)

HBD51D, 52D, 53D, 51hD, 52hD, 53hD



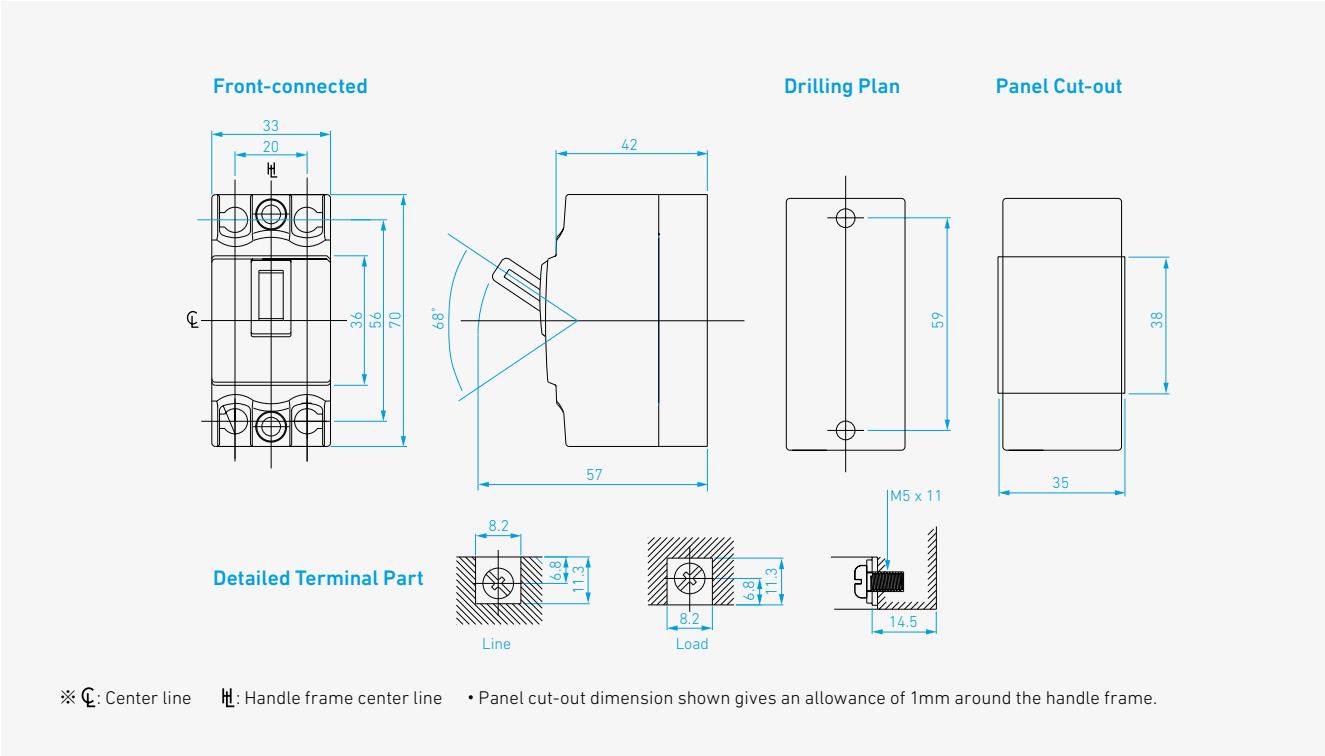
HBD51, 52, 53, 51h, 52h, 53h



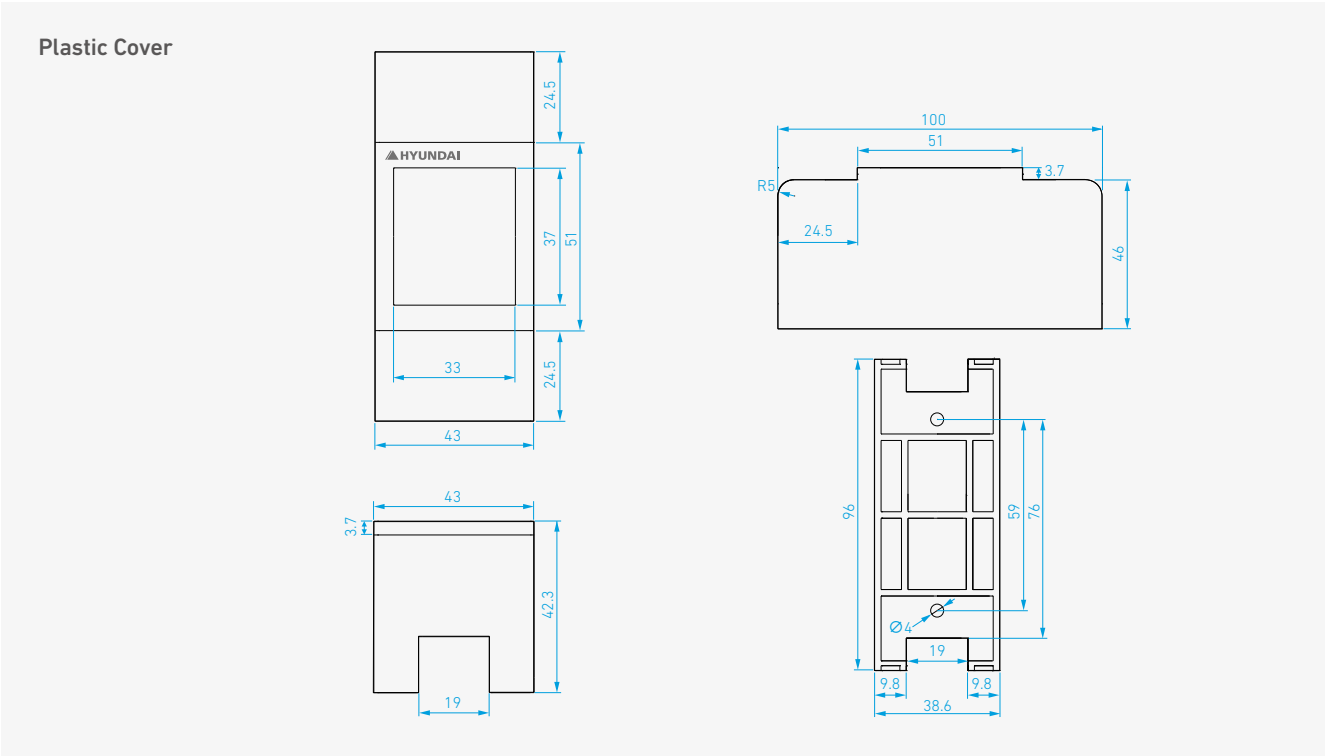
Dimensions

HiBC (30 AF 1.5 kA 10-30 A)

HiBC32S




HiBC32SC



HBD Ordering Information

HBD Breaker/5, 10 kA 10-50 A

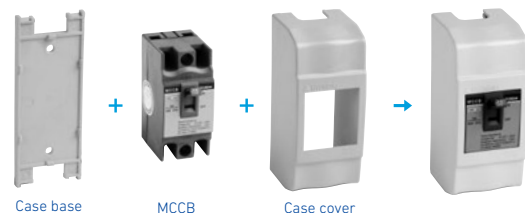
Rating	1 Pole		2 Pole		3 Pole	
		Code		Code		Code
 50 AF, 5 kA Plug-in Type	10 A	HBD51D 1PT4S0000C 00010	HBD52D 2PT4S0000C 00010	HBD53D 3PT4S0000C 00010		
	15 A	HBD51D 1PT4S0000C 00015	HBD52D 2PT4S0000C 00015	HBD53D 3PT4S0000C 00015		
	20 A	HBD51D 1PT4S0000C 00020	HBD52D 2PT4S0000C 00020	HBD53D 3PT4S0000C 00020		
	30 A	HBD51D 1PT4S0000C 00030	HBD52D 2PT4S0000C 00030	HBD53D 3PT4S0000C 00030		
	40 A	HBD51D 1PT4S0000C 00040	HBD52D 2PT4S0000C 00040	HBD53D 3PT4S0000C 00040		
	50 A	HBD51D 1PT4S0000C 00050	HBD52D 2PT4S0000C 00050	HBD53D 3PT4S0000C 00050		
 50 AF, 10 kA Plug-in Type	10 A	HBD51HD 1PT4S0000C 00010	HBD52HD 2PT4S0000C 00010	HBD53HD 3PT4S0000C 00010		
	15 A	HBD51HD 1PT4S0000C 00015	HBD52HD 2PT4S0000C 00015	HBD53HD 3PT4S0000C 00015		
	20 A	HBD51HD 1PT4S0000C 00020	HBD52HD 2PT4S0000C 00020	HBD53HD 3PT4S0000C 00020		
	30 A	HBD51HD 1PT4S0000C 00030	HBD52HD 2PT4S0000C 00030	HBD53HD 3PT4S0000C 00030		
	40 A	HBD51HD 1PT4S0000C 00040	HBD52HD 2PT4S0000C 00040	HBD53HD 3PT4S0000C 00040		
	50 A	HBD51HD 1PT4S0000C 00050	HBD52HD 2PT4S0000C 00050	HBD53HD 3PT4S0000C 00050		
 50 AF, 5 kA Lug-to-lug Type	10 A	HBD51 1PT4S0000C 00010	HBD52 2PT4S0000C 00010	HBD53 3PT4S0000C 00010		
	15 A	HBD51 1PT4S0000C 00015	HBD52 2PT4S0000C 00015	HBD53 3PT4S0000C 00015		
	20 A	HBD51 1PT4S0000C 00020	HBD52 2PT4S0000C 00020	HBD53 3PT4S0000C 00020		
	30 A	HBD51 1PT4S0000C 00030	HBD52 2PT4S0000C 00030	HBD53 3PT4S0000C 00030		
	40 A	HBD51 1PT4S0000C 00040	HBD52 2PT4S0000C 00040	HBD53 3PT4S0000C 00040		
	50 A	HBD51 1PT4S0000C 00050	HBD52 2PT4S0000C 00050	HBD53 3PT4S0000C 00050		
 50 AF, 10 kA Lug-to-lug Type	10 A	HBD51H 1PT4S0000C 00010	HBD52H 2PT4S0000C 00010	HBD53H 3PT4S0000C 00010		
	15 A	HBD51H 1PT4S0000C 00015	HBD52H 2PT4S0000C 00015	HBD53H 3PT4S0000C 00015		
	20 A	HBD51H 1PT4S0000C 00020	HBD52H 2PT4S0000C 00020	HBD53H 3PT4S0000C 00020		
	30 A	HBD51H 1PT4S0000C 00030	HBD52H 2PT4S0000C 00030	HBD53H 3PT4S0000C 00030		
	40 A	HBD51H 1PT4S0000C 00040	HBD52H 2PT4S0000C 00040	HBD53H 3PT4S0000C 00040		
	50 A	HBD51H 1PT4S0000C 00050	HBD52H 2PT4S0000C 00050	HBD53H 3PT4S0000C 00050		

Mini Molded Case Circuit Breaker

Rating	Code	Rating	Code
HiBC32S 1.5 kA, 2 P (2P1E)	10 A	HIBC32S 2PT4S0000C 00010 E	HiBC32SC 1.5 kA, 2 P (2P1E) with Plastic Case
	15 A	HIBC32S 2PT4S0000C 00015 E	
	20 A	HIBC32S 2PT4S0000C 00020 E	
	30 A	HIBC32S 2PT4S0000C 00030 E	
		10 A	HIBC32SC 2PT4S0000C 00010 E
		15 A	HIBC32SC 2PT4S0000C 00015 E
		20 A	HIBC32SC 2PT4S0000C 00020 E
		30 A	HIBC32SC 2PT4S0000C 00030 E

Plastic Case for HiBC32S

Code	HiBC32S Cover
Dimensions (mm)	43 (W) × 100 (H) × 49.7 (D)



HIC

Installation Contactor

Features	90
Selection Table	93
Dimensions/Circuit Diagram	94
Order Information	96

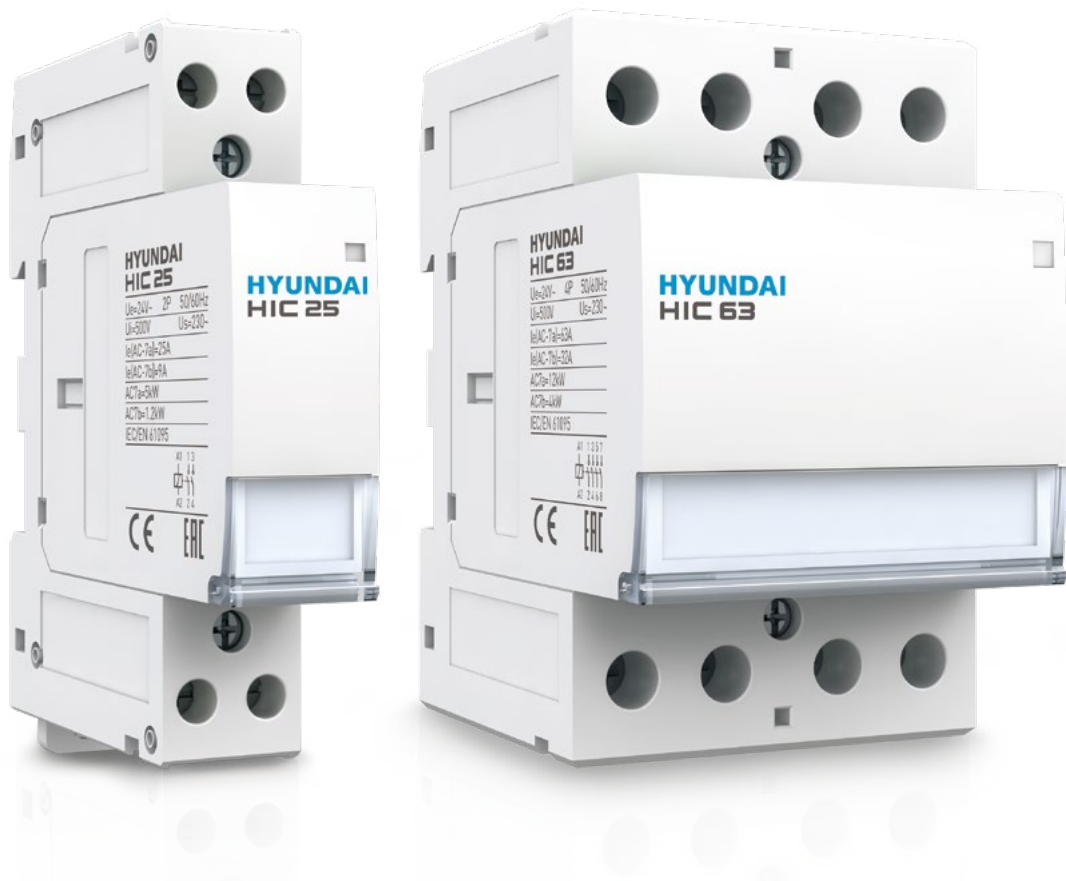
Features



HIC Installation Contactor

HYUNDAI ELECTRIC introduces the HIC series of Installation contactor rating from 25 A to 63 A.

HIC series AC household contactor (hereinafter contactor) is suitable for using in the circuit up to the rated working voltage 400 V AC 50 Hz (or 60 Hz), rated working current up to 63 A, to control household electric appliances and low inductive reactance load and micro inductive reactance load of similar usage, can also bounded to control household motor load of which the controlling power needs to be relatively decreased.





Product Features

- Hyundai HIC applies to places such as household, hotels, apartments, etc to realize the automation of large-scale produced household electric appliances.
- It can be used to control various loads, for example, building automation, ventilation, heating, fire prevention system, small pump and so on.
- The switching noise is quiet and suitable for especially residential space.
- The customer can choose from various models with different rated currents and control circuit voltage.

HIC Type



Product Performance

- The ambient air temperature: $-5\sim+40\text{ }^{\circ}\text{C}$, average not more than $+35\text{ }^{\circ}\text{C}$ within 24 hours
- Altitude (m): Not exceed 2,000 meters
- Atmospheric conditions: When the highest temperature is $+40\text{ }^{\circ}\text{C}$, the air relative humidity should not be higher than 50 %. The higher relative humidity should be allowed at the lower temperature, for instance, 90 % humidity when $20\text{ }^{\circ}\text{C}$. Special measures should be taken when condensate dew happens occasionally due to temperature changes.
- Pollution degree: Class 2
- Installation category: II
- Mounting: Din Rail TH35-7.5 mounting rail installation
- Protection degree: IP20



Specification

- Standard: IEC/EN 61095

Product Overview



HIC25



HIC40

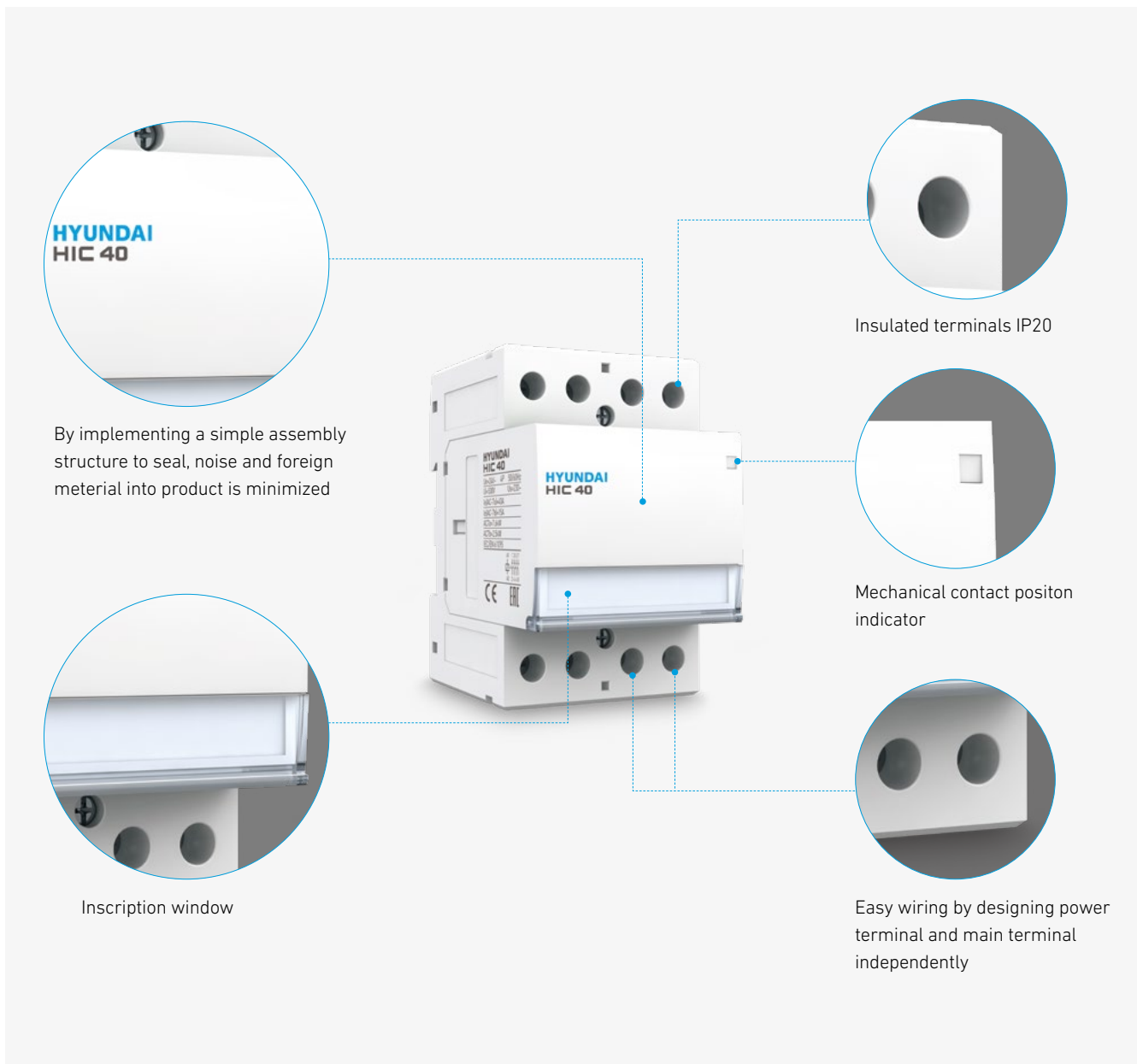


HIC63

Product Features




External Structure

- By implementing a simple assembly structure to seal, noise and foreign material into product is minimized.
- They guide the cable towards the cage terminal and avoid improper cable termination.
- Easy wiring by designing power terminal and main terminal independently.
- Ensures circuit identification and hence reduces maintenance downtime.
- Inscription window
- Mechanical contact position indicator
- Insulated terminals IP20



Selection Table

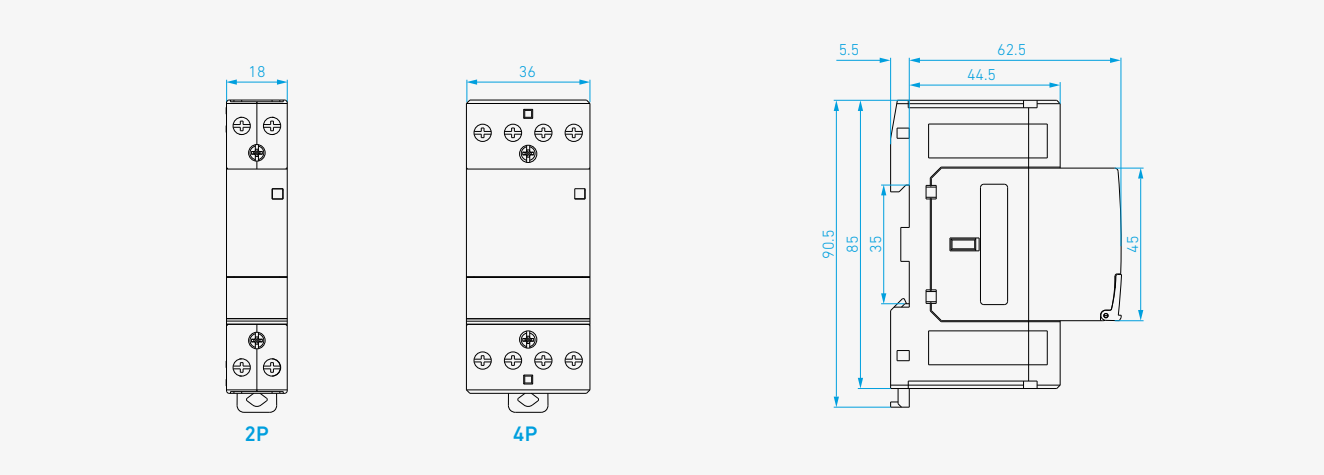
HIC Type

Model	HIC25	HIC40	HIC63
			
Reference Standard	IEC/EN 61095	IEC/EN 61095	IEC/EN 61095
No. of Poles	2P, 4P	2P, 4P	2P, 4P
Rated Current (In)	25 A	40 A	63 A
Rated Voltage (Ue)	2P: 230 V 4P: 400 V	2P: 230 V 4P: 400 V	2P: 230 V 4P: 400 V
Rated Insulation Voltage (Ui)	500 V	500 V	500 V
Rated Control Voltage (Uc)	24 V, 48 V, 230 V	24 V, 48 V, 230 V	24 V, 48 V, 230 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz
Using Category	AC-1 AC-7a AC-7b	AC-1 AC-7a AC-7b	AC-1 AC-7a AC-7b
Electrical Endurance	100,000 cycles	100,000 cycles	100,000 cycles
Mechanical Endurance	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles
Rated Power	2P - 5 kW (AC-7a) - 1.2 kW (AC-7b) 4P 4NO/3NO + 1NC/4NC: - 14 kW (AC-7a) - 4 kW (AC-7b) 2NO + 2NC - 5 kW (AC-7a) - 1.2 kW (AC-7b)	2P - 7.6 kW (AC-7a) - 2.5 kW (AC-7b) 4P 4NO/3NO + 1NC/4NC: - 26.5 kW (AC-7a) - 6.5 kW (AC-7b) 2NO + 2NC - 7.6 kW (AC-7a) - 2.5 kW (AC-7b)	2P - 12 kW (AC-7a) - 4 kW (AC-7b) 4P 4NO/3NO + 1NC/4NC: - 40 kW (AC-7a) - 14 kW (AC-7b) 2NO + 2NC - 12 kW (AC-7a) - 4 kW (AC-7b)
Rated Operation Current (Ie)	25 A (AC-1/AC-7a) 9 A (AC-7b)	40 A (AC-1/AC-7a) 15 A (AC-7b)	63 A (AC-1/AC-7a) 32 A (AC-7b)
Operating Temperature	-40 °C to + 55 °C	-40 °C to + 55 °C	-40 °C to + 55 °C
Humidity	90 % (@ 20 °C) 50 % (@ 40 °C)	90 % (@ 20 °C) 50 % (@ 40 °C)	90 % (@ 20 °C) 50 % (@ 40 °C)
Terminal Capacity (max)	6 mm ²	25 mm ²	25 mm ²
Tightening Torque	1.2 N·m	2.5 N·m	2.5 N·m
Protection Class	IP20	IP20	IP20
Net Weight/Pole in kg	2P: 134.8 g; 4P: 235.6 g	2P: 242.6 g; 4P: 340.4 g	2P: 242.6 g; 4P: 340.4 g
Dimensions (H x D x W)/Pole in mm	2P 18 x 85 x 62.5 mm 4P 36 x 85 x 62.5 mm	2P 36 x 85 x 62.5 mm 4P 54 x 85 x 62.5 mm	2P 36 x 85 x 62.5 mm 4P 54 x 85 x 62.5 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Busbar Connection Top/Bottom Side	Pin type	Pin type	Pin type

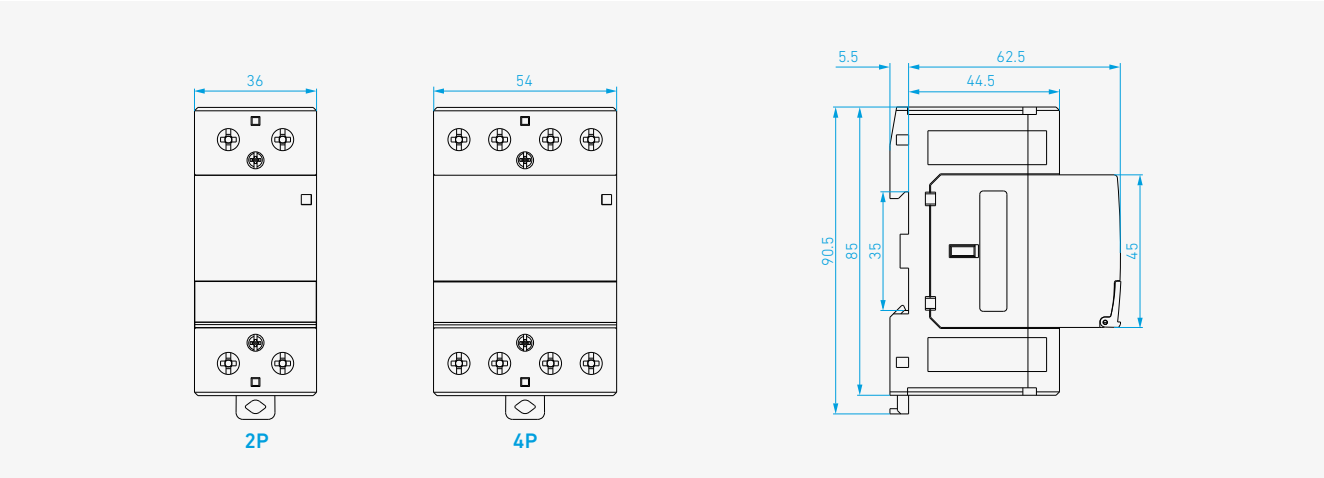
Dimensions

HIC

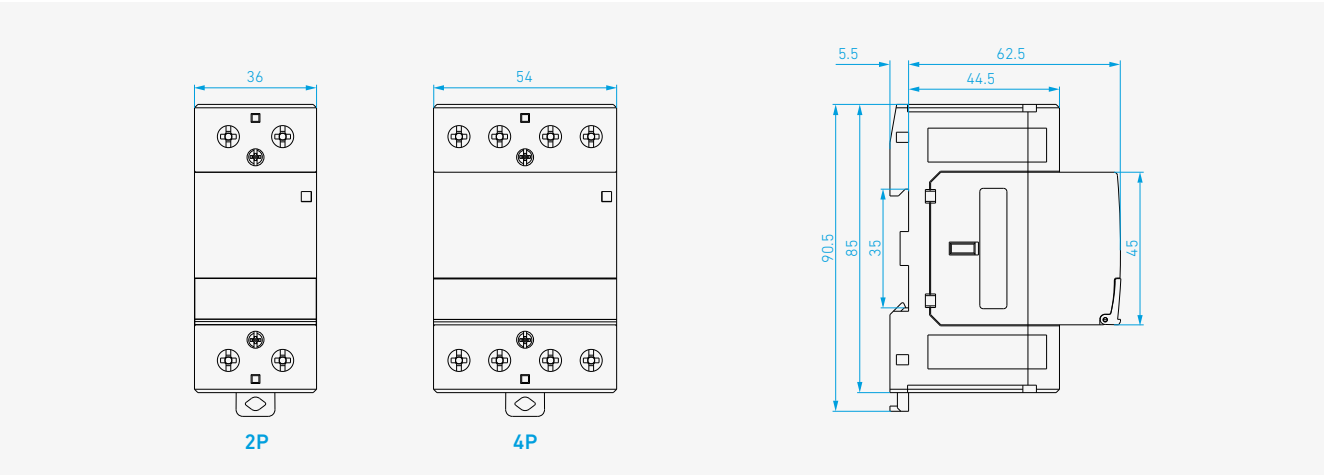
HIC25, 25 AF



HIC40, 40 AF



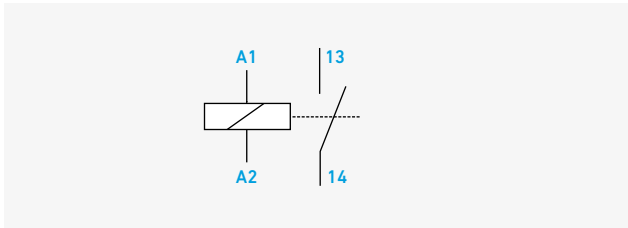
HIC63, 63 AF



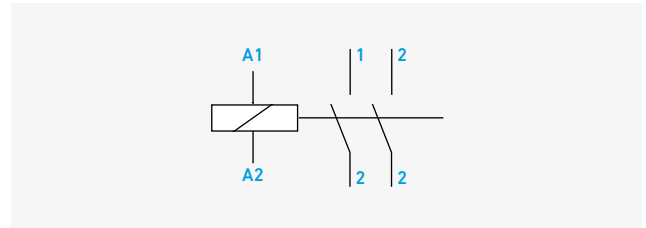
Circuit Diagram

HIC 2P

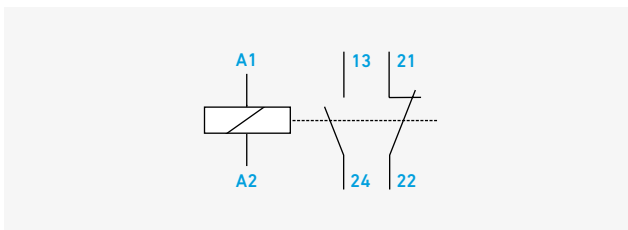
1NO



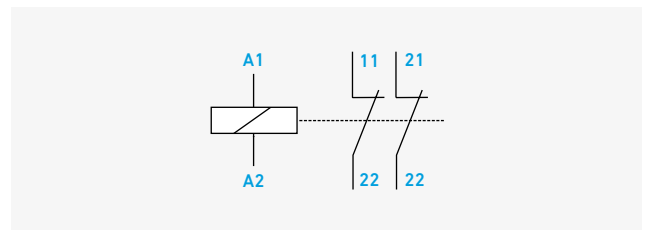
2NO



1NO + 1NC

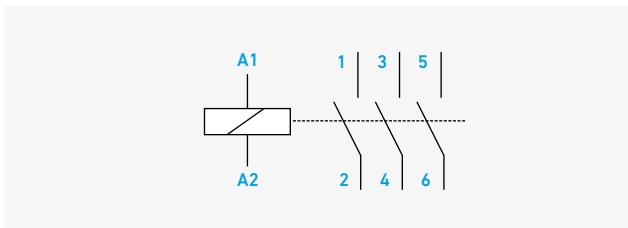


2NC

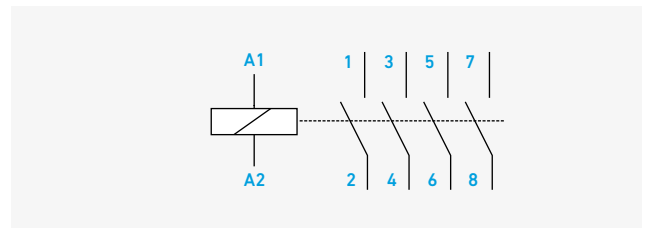


HIC 4P

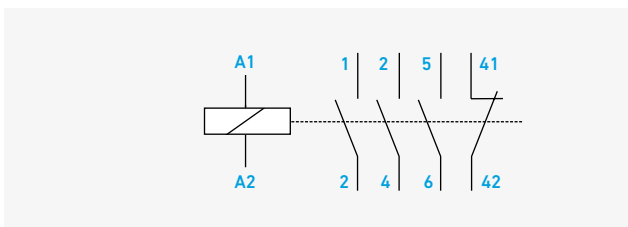
3NO



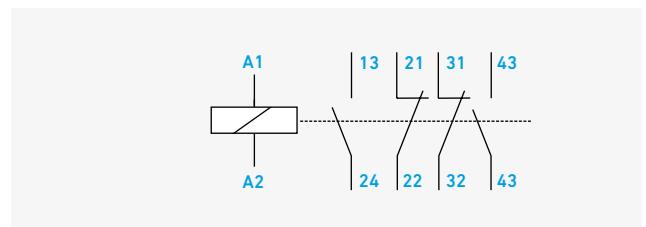
4NO



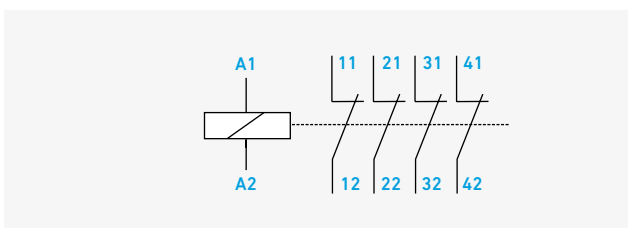
3NO + 1NC



2NO + 2NC

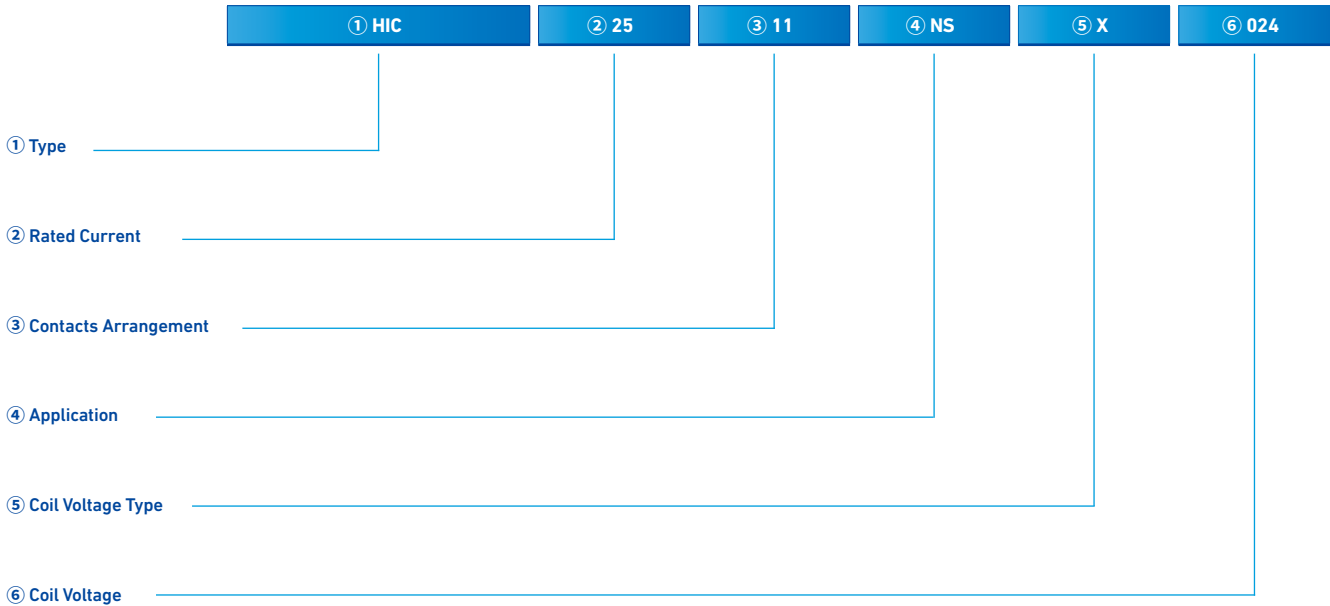


4NC



HIC Ordering Information

Ordering Guidelines



① Type	
HIC	Installation contactor

② Rated Current	
25	25 A
40	40 A
63	63 A

③ Main Contact Arrangement	
10	1NO + 0NC
20	2NO + 0NC
11	1NO + 1NC
02	0NO + 2NC
30	3NO + 0NC
40	4NO + 0NC
31	3NO + 1NC
22	2NO + 2NC
04	0NO + 4NC

※ N/A: 1NO + 0NC (63 AF, 2P)

⑤ Coil Voltage Type	
X	AC 50/60 Hz

⑥ Coil Voltage	
024	24 V
048	48 V
230	230 V

④ Application	
NS	Normal

HMMS

Manual Motor Starter

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Features

HMMS Manual Motor Starter

Hyundai Manual Motor Starter, MMS series, realizes the function of molded case circuit breaker and thermal overload relay in one module. It enables perfect protection for overload, phase loss, short circuit and infrequent start control of 3-phase motors. MMS also can be used for the protection of distribution line as well as satisfied with the international standard IEC 60947-2 and IEC 60947-4-1.



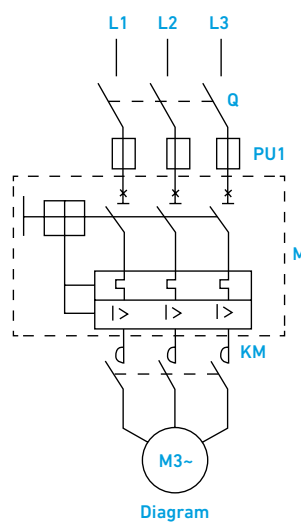


Product Features

HYUNDAI ELECTRIC introduces the Rotary handle type of new MMS rating from 1 A to 32 A.

Function

- Phase-failure protection
- Short circuit protection
- Overload protection
- Frequent operation
- Disconnect switch



Features

- Standard: IEC 60947-2 / IEC 60947-4
- 50 % Less wiring: MCCB + Contactor + TOR -> MMS + Contactor
- Compact size: save 57 % space
- Green design: Recyclable plastic, no cadmium connection, RoHs
- Tool free installation: 35 mm Din-rail mounting


Comply with IEC Standard

50 % Less Wiring







※ 44.5 mm width up to 32 AF, 61.2 mm width up to 80 AF.

Selection Table

HMMS Type

Model			HMMS32K									
												
Operation Type			Push-button									
No. of Poles			3									
Rated Current (In)			0.1~32 A									
Rated Operational Voltage (Ue)			Up to 690 V									
Rated Frequency (F)			50/60 Hz									
Rated Insulation Voltage (Ui)			690 V									
Rated Impulse Voltage (Uimp)			6 kV									
Utilization Category	IEC 60947-2 (Breaker)		Cat. A									
	IEC 60947-4 (Motor Starter)		AC 3									
Electrical/Mechanical Endurance (no. of Operations) Minimum			100,000/100,000									
Max Operating Frequency Per Hour (Ope./h)			25									
Temperature Compensation (Operation)			-20~+60 °C									
Instantaneous Short Circuit Release			13 × Ie max.									
Humidity			95% RH									
Altitude (m)			2,000									
Terminal Capacity (max)			10 mm ²									
Tightening Torque			2.5 N·m									
Function	Overload Protection		o									
	Phase Failure Protection		o									
	Test Button		o									
Weight (kg)			0.250									
Dimensions (H x D x W)			89.0 x 78.2 x 44.5									
Mounting			Clip in DIN Rail (35 mm x 7.5 mm)									
Installation Position			Vertical/Horizontal									
Options			AUX/AXT/SHT/UVT/Enclosure									
Rated Breaking Capacity (kA)	Rated Operational Current (Ie)	Setting Range (A)	AC220 V AC230 V AC240 V		AC400 V AC415 V		AC440 V AC460 V		AC500 V AC525 V		AC600 V AC690 V	
			Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
	0.16	0.1-0.16	100	100	100	100	100	100	100	100	100	100
	0.25	0.16-0.25	100	100	100	100	100	100	100	100	100	100
	0.4	0.25-0.4	100	100	100	100	100	100	100	100	100	100
	0.63	0.4-0.63	100	100	100	100	100	100	100	100	100	100
	1	0.63-1	100	100	100	100	100	100	100	100	100	100
	1.6	1-1.6	100	100	100	100	100	100	100	100	100	100
	2.5	1.6-2.5	100	100	100	100	100	100	100	100	3	2.25
	4	2.5-4	100	100	100	100	100	100	100	100	3	2.25
	6.3	4-6.3	100	100	100	100	50	50	50	50	3	2.25
	10	6-10	100	100	100	100	15	15	10	10	3	2.25
	14	9-14	100	100	15	7.5	8	4	6	4.5	3	2.25
	18	13-18	100	100	15	7.5	8	4	6	4.5	3	2.25
	23	17-23	50	50	15	6	6	3	4	3	3	2.25
	25	20-25	50	50	15	6	6	3	4	3	3	2.25
	32	24-32	50	50	10	5	6	3	4	3	3	2.25
	40	25-40	-	-	-	-	-	-	-	-	-	-
	63	40-63	-	-	-	-	-	-	-	-	-	-
	80	56-80	-	-	-	-	-	-	-	-	-	-

Accessories

Accessories	Ordering Information	Electrical Diagram	Contact	Category				Weight (g)
				Ui (AC/V)	Ue (V)	Ie (A)	VA	
Auxiliary Switch Front Mounting 	MMS32K AUX T11		1NO 1NC	250	240	2.5	120	16
	MMS32K AUX T20		2NO					
Auxiliary Switch Side Mounting 	MMS32K AUX S11		1NO 1NC	690	690	6	720	40
	MMS32K AUX S20	 AUX S11 AUX S20	2NO					
Auxiliary Switch Side Mounting 	MMS80K AUX S11		1NO 1NC	690	690	6	720	40
	MMS80K AUX S20	 AUX S11 AUX S20	2NO					
Failure Alarm Side Mounting 	MMS32K AXT 0110		Failure contact: NC Auxiliary contact: NC	690	240	2.5 (95-96 & 97-98) Failure contact	72	40
	MMS32K AXT 0101		Failure contact: NC Auxiliary contact: NC					
	MMS32K AXT 1010		Failure contact: NO Auxiliary contact: NO	690	690	6 (51-52 & 53-54) Auxiliary contact	720	
	MMS32K AXT 1001		Failure contact: NO Auxiliary contact: NC					
Shunt Trip Relay 	MMS32K SHT 110		Uc = 110 V, 50/60 Hz				90	
	MMS32K SHT 240		Uc = 220/240 V, 50/60 Hz					
	MMS32K SHT 380		Uc = 380 V, 50/60 Hz					
Under Voltage Trip Relay 	MMS32K UVT 110		Uc = 110 V, 50/60 Hz				90	
	MMS32K UVT 240		Uc = 220/240 V, 50/60 Hz					
	MMS32K UVT 380		Uc = 380 V, 50/60 Hz					

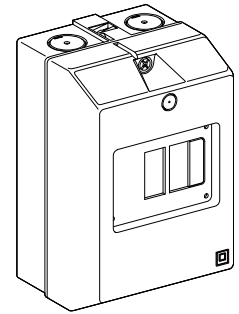
Enclosure

• MMS32K ENC

Case cover of MMS enclosure is specifically designed with dust-proof and corrosive-proof structure.

Therefore, it is the optimum product to use in dusty areas such as cement plants, cotton mills as well as in the presence of corrosive gas or liquid (ex: explosive, flammable gas) such as fertilizer, refinery, and plating plant.

- Operating temp.: -20 ~ +60 °C
- Degree of protection: IP55
- Conforming to standards: IEC 60947-2, IRC 60947-4-1
- Operational voltage U_e : 690 V
- Material: Polycarbonate



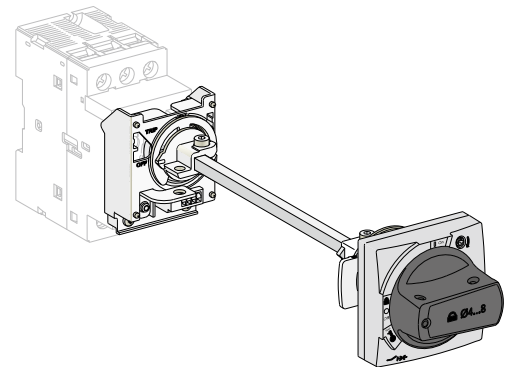
Extension Handle (TFH)

• TFH MMS32R

MMS extension handle is a rotary type handle accessory which can be attached to the front to control and verify the On, Trip, Off condition of manual.

Motor starters under the situation of closing panel.

- Application model: MMS32R
- Operating temp.: -20~+60 °C
- Degree of protection: IP65
- Locking device: Lockable in on/off position
- Material: PA66



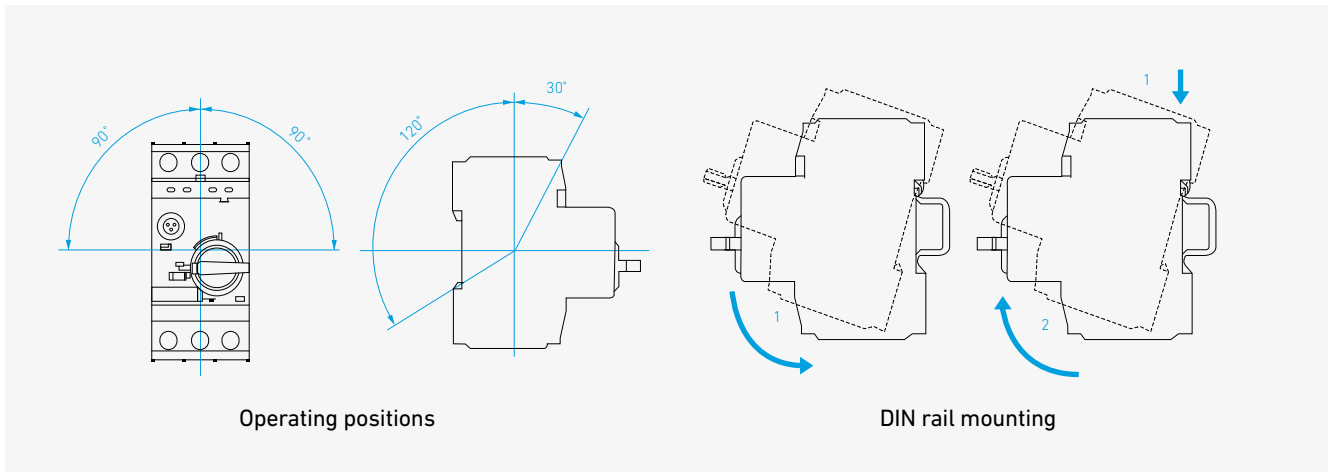
Mounting



Technical Data

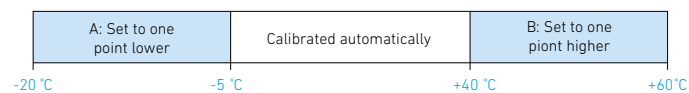
Mounting

35 mm Din-Rail for mounting

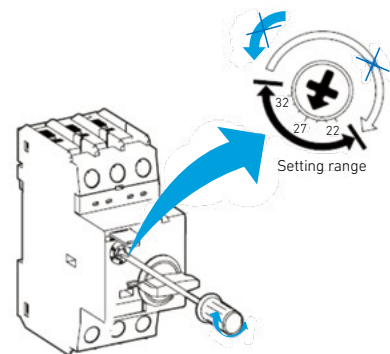


Caution for thermal adjustments

1. Keep the setting range as shown below.
2. Moving counterclockwise out of the setting range may cause the damage of the device.
3. Calibration by ambient air temperature



In case of using out of the standard air temperature range (-5°C~ +40°C) it needs to be calibrated by one point



Dial setting method

Environment

Ambient air temperature

storage: -50... + 80 °C

operation: -20... + 60 °C

Ambient temperature compensation: -20... + 60 °C

Maximum operating altitude: 2,000 m

Protection degree: IP20

Shock resistance: 25 g

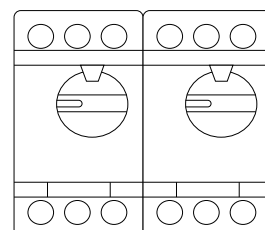
Vibration resistance: 5~150 Hz

Product side by side

When several products MMS32K/MMS32R/MMS80K are mounted side by side, the thermal trip setting I_r maybe need to be adjusted up to 1.1 I_n .

Don't exceed the maximum thermal setting I_r .

(ex: MMS32K 0010, thermal setting range: 6...10, don't adjust I_r above 10 A)



Terminals

Model	Terminal Screw	Applicable Wire Size (mm ²)	Ring Tongue Terminal (mm ²)	Screwing Torque (kgf.cm)
0.1-0.16 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
0.16-0.25 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
0.25-0.4 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
0.4-0.63 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
0.63-1 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
1-1.6 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
1.6-2.5 A	M4	1~10mm ² (Hard cooper cable) 1~6mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
2.5-4 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
4-6.3 A	M4	1~10mm ² (Hard cooper cable) 1~6mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
6-10 A	M4	1~10 mm ² (Hard Cooper Cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
9-14 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
13-18 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
17-23 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
20-25 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
24-32 A	M4	1~10 mm ² (Hard cooper cable) 1~6 mm ² (Softcable)	Boreφ3.5, Maximum outsideφ 8.0	1.2 N.M
25-40 A	M8	2.5~25 mm ² (Hard cooper cable) 2.5~16 mm ² (Softcable)	-	3.5 N.M
40-63 A	M8	2.5~25 mm ² (Hard cooper cable) 2.5~16 mm ² (Softcable)	-	3.5 N.M
56-80 A	M8	2.5~25 mm ² (Hard cooper cable) 2.5~16 mm ² (Softcable)	-	3.5 N.M

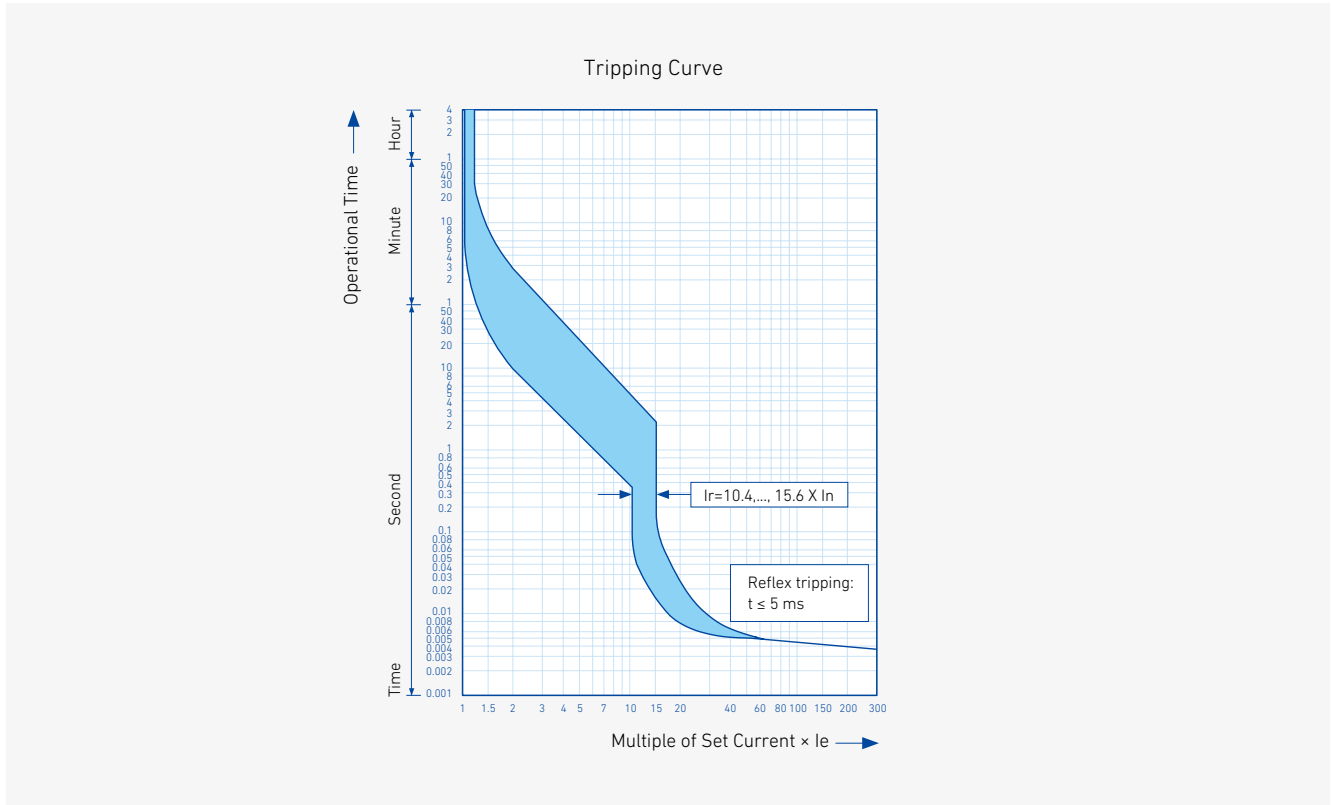
Technical Data

Application for-3Phase Motors, AC-3

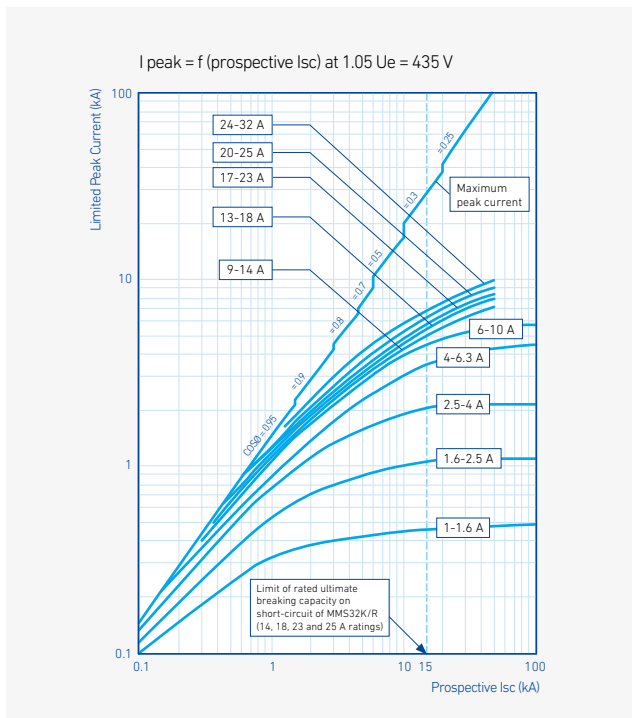
Rated Current (A)	Setting Range (A)	3-Phase [kW] (50/60 Hz)					
		AC230/240 V	400 V	415 V	440 V	500 V	690 V
0.16	0.1-0.16	-	-	-	-	-	-
0.25	0.16-0.25	-	0.06	0.06	-	-	-
0.4	0.25-0.4	-	0.09	0.09	-	-	-
0.63	0.4-0.63	-	0.12	0.12	0.2	0.25	0.37
1	0.63-1	-	0.25	0.25	0.5	0.5	0.55
1.6	1-1.6	-	0.37	0.37	0.55	0.75	1.1
2.5	1.6-2.5	0.5	0.75	0.75	1.1	1.1	1.5
4	2.5-4	0.5	1.5	1.5	2	2.2	3
6.3	4-6.3	1.1	2.2	2.2	3	3.7	4
10	6-10	2.2	4	4	5	5.5	7.5
14	9-14	3	5.5	5.5	7.5	7.5	9
18	13-18	5	7.5	7.5	9	9	15
23	17-23	6.5	11	11	11	11	18.5
25	20-25	6.5	11	11	15	15	18.5
32	24-32	10	15	15	18.5	20	22
40	25-40	10	20	20	25	30	30
63	40-63	20	30	35	40	50	60
80	56-80	25	35	40	50	55	60

HMMS32K/R

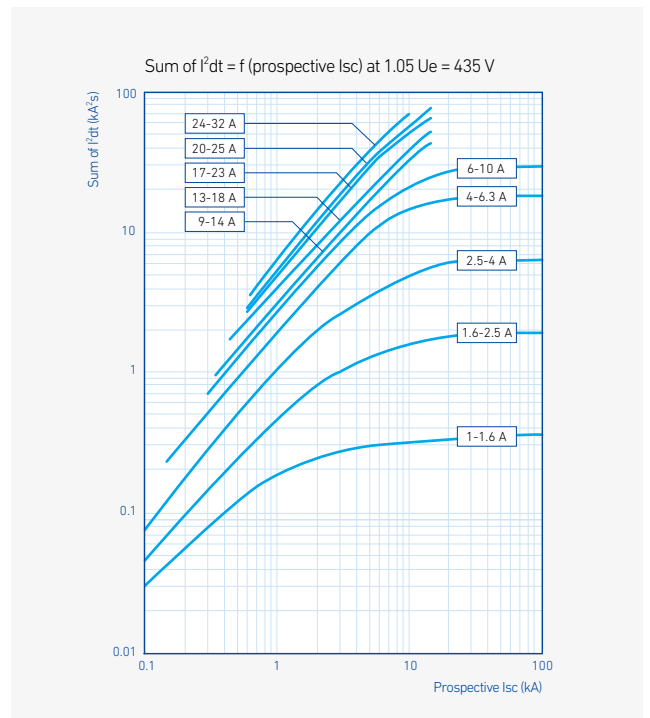
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit HMMS32K/R



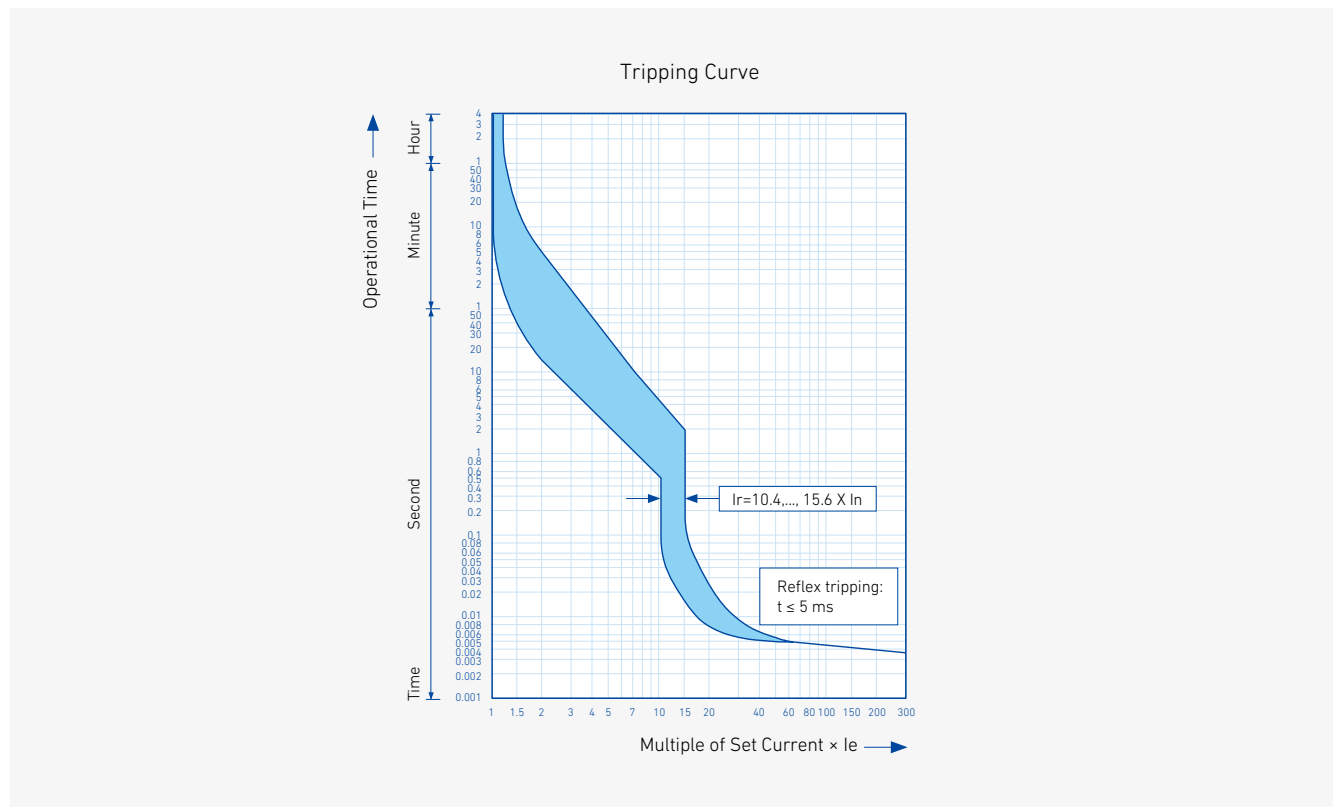
Thermal Limit on Short Circuit HMMS32K/R



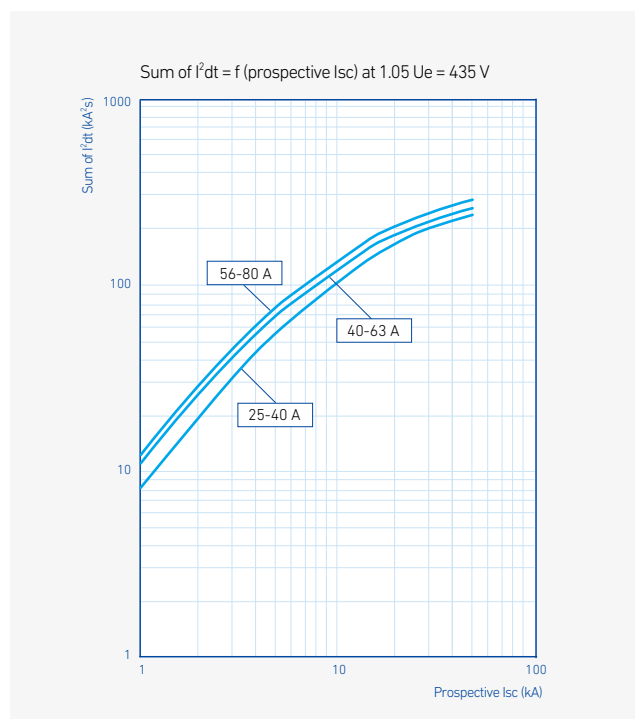
Technical Data

HMMS80K

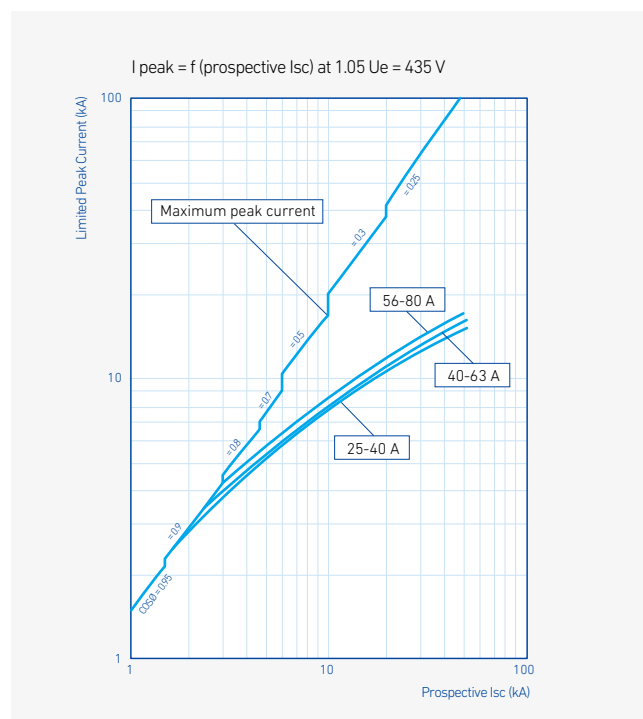
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit



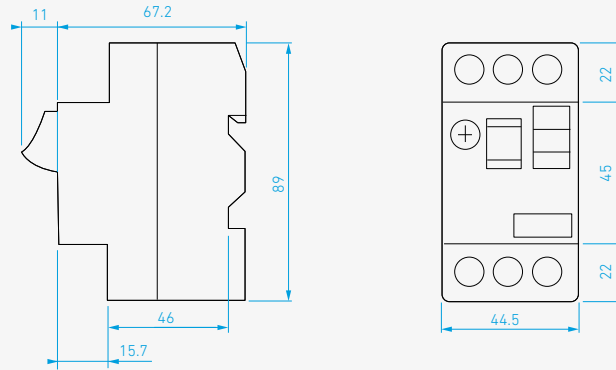
Thermal Limit in kA^2 in the Magnetic Operating Zone



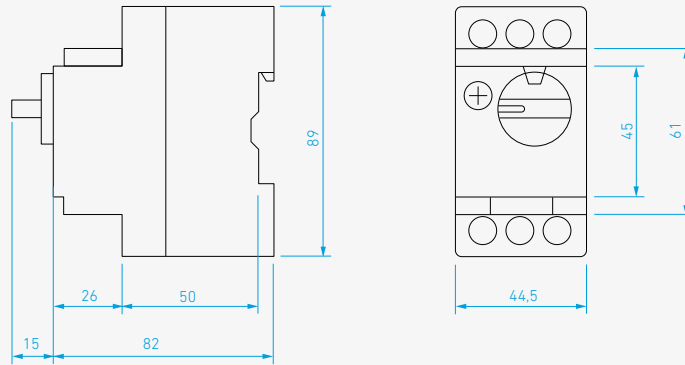
Dimensions

HMMS

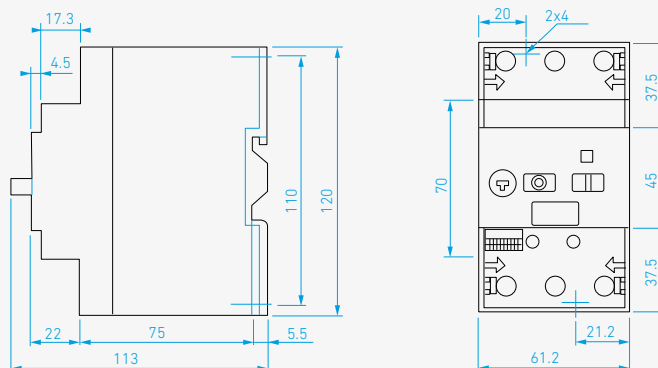
HMMS32K



HMMS32R



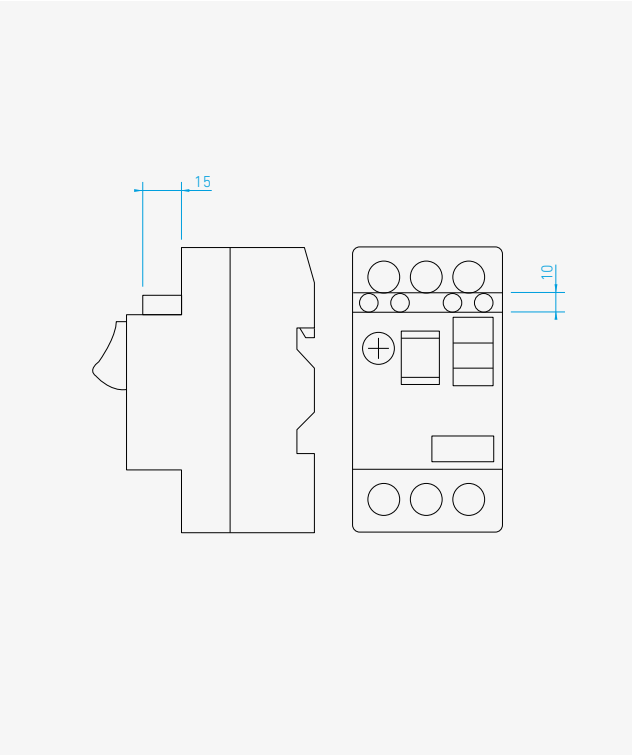
HMMS80K



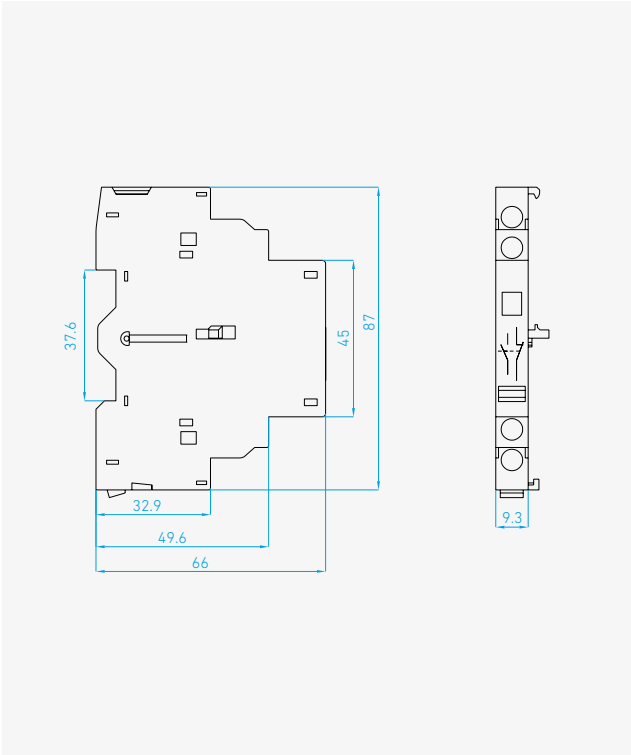
Dimensions

Accessories

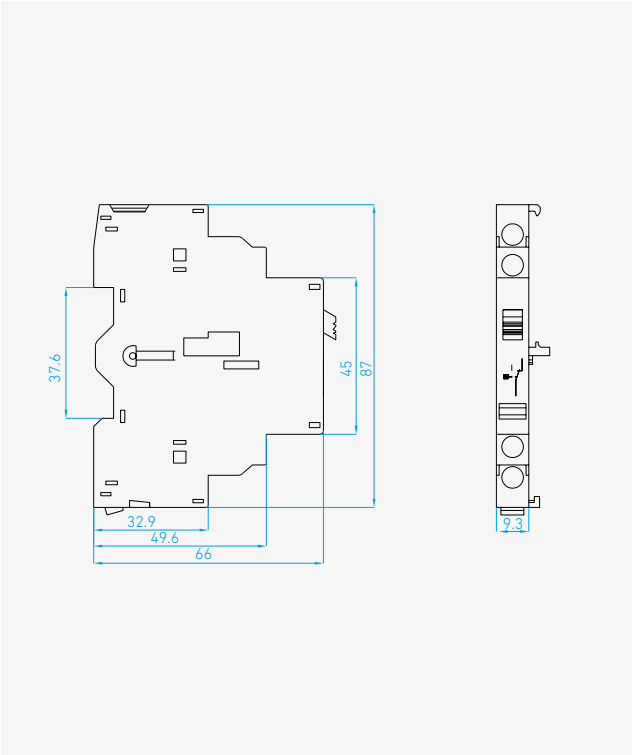
Top Mounting: Auxiliary Switch



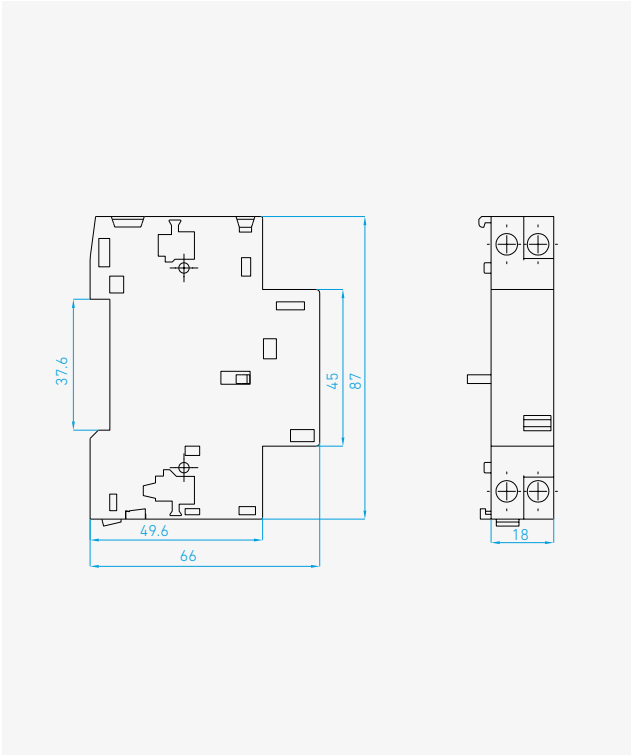
Side Mounting: Auxiliary Switch



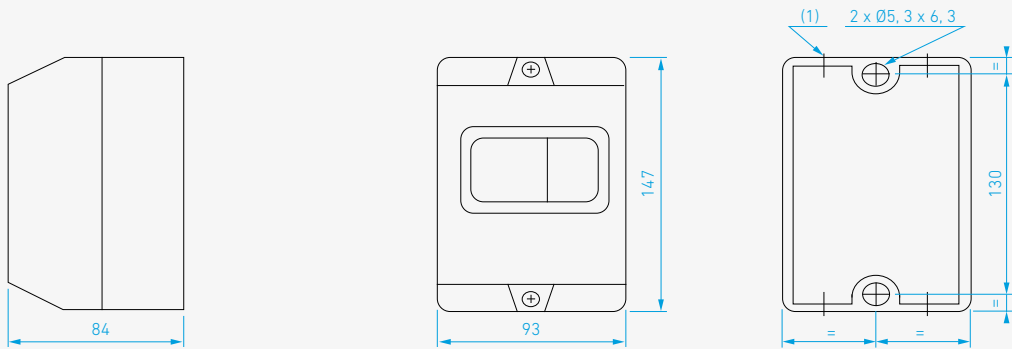
Side Mounting: Alarm Switch



Side Mounting: Shunt Trip/UVT

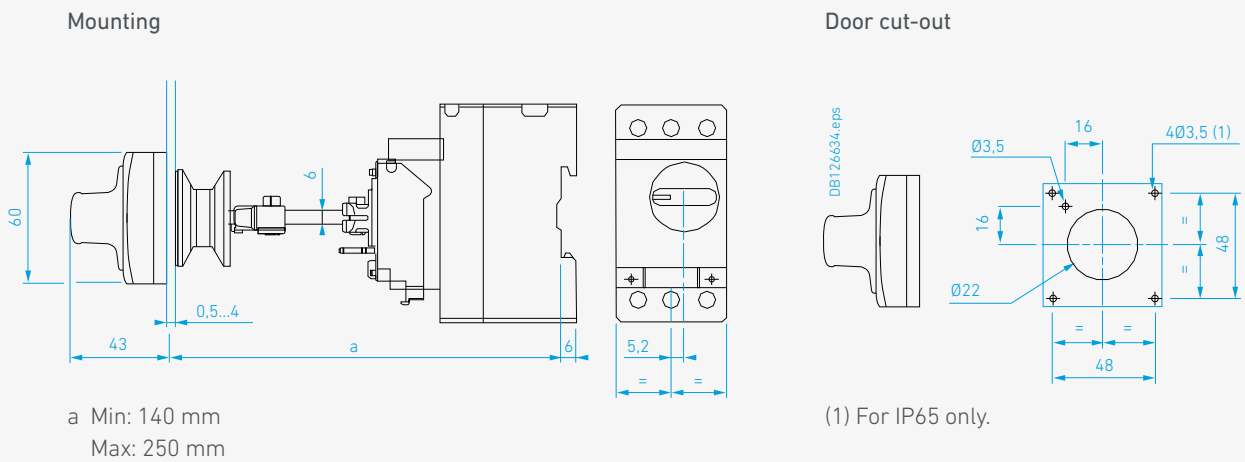


Enclosure



- (1) Top face: 2 knock-outs for ISO20/25 cable glands or Pg16 or 16 mm conduits.
 Bottom face: 2 knock-outs for ISO20/25 cable glands or Pg16 or 16 mm conduits.

Extension Handle



HMMS Ordering Information

Ordering Guidelines

Code	Rated Current Setting Range (A)	Unit (EA)	Handle Type
MMS32K 0P16	0.1-0.16	50	Push button
MMS32K 0P25	0.16-0.25		
MMS32K 0P40	0.25-0.4		
MMS32K 0P63	0.4-0.63		
MMS32K 1P00	0.63-1		
MMS32K 01P6	1-1.6		
MMS32K 02P5	1.6-2.5		
MMS32K 0004	2.5-4		
MMS32K 06P3	4-6.3		
MMS32K 0010	6-10		
MMS32K 0014	9-14		
MMS32K 0018	13-18		
MMS32K 0023	17-23		
MMS32K 0025	20-25		
MMS32K 0032	24-32		
MMS32R 0P16	0.1-0.16	50	Rotary
MMS32R 0P25	0.16-0.25		
MMS32R 0P40	0.25-0.4		
MMS32R 0P63	0.4-0.63		
MMS32R 1P00	0.63-1		
MMS32R 01P6	1-1.6		
MMS32R 02P5	1.6-2.5		
MMS32R 0004	2.5-4		
MMS32R 06P3	4-6.3		
MMS32R 0010	6-10		
MMS32R 0014	9-14		
MMS32R 0018	13-18		
MMS32R 0023	17-23		
MMS32R 0025	20-25		
MMS32R 0032	24-32		
MMS80K 0040	25-40	14	Push button
MMS80K 0063	40-63		
MMS80K 0080	56-80		

HSP

Surge Protection Device

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Features

SPD Surge Protection Device

Over-voltage surges are a major cause of electronic equipment failure and business disruption in our society. Over-voltage surge caused by lightning, lasting only some millionths of a second, are responsible for 25 % to 40 % of all damage to equipment.

If the transient over-voltage caused by other phenomena are added to this, close to 60 % of all electrical damage could be avoided by installing surge protection devices.

In the low-voltage systems, the surge protector is essential to ensure complete protection.





Product Features

HG SPD can prevent damage to communication devices and power sources by inhibiting the surges coming from the various places.

In particular, it also applies Class 1 to Din-rail products to provide more solutions.

In addition, we have recently reinforced the required line-up of eco-friendly DC products. With SPD DC products, you can protect a wide variety of products in more areas.

The HYUNDAI SPD is double composed of surge and temperature fuses to prevent thermal runaway to enhance safety.

Also, we prepared for Smart Grid by embedding remote monitoring functions such as monitoring and communication functions.

Din-Rail Type

Box Type



Product Performance

- Application of temperature fuse to prevent thermal runaway.
- Systematic SPD management with product monitoring and communication functions.

- Improved thermal stability (double protection configuration with surge and temperature fuses)
- Strengthen product safety by protecting steel box.



Product Structure

- Din-rail type (AC/DC)

- Deluxe box type + counter
- Standard box type + counter



Specification

- IEC 61643-11 (AC/DC)

- IEC 61643-11 (AC)

Product Overview



Din-Rail Type



Box Type


Selection Table

Din-Rail Type (AC)

Type	HSP40 1P	HSP40 2P	HSP40 3P	HSP40 4P
------	----------	----------	----------	----------




Standard	IEC 61643-11		IEC 61643-11	IEC 61643-11	IEC 61643-11
Class	II		II	II	II
No. of Poles	Pole	1P	2P (1P2W)	3P (3P3W)	4P (3P4W)
Rated Frequency	Hz	50/60	50/60	50/60	50/60
Rated Voltage	U _o	~255 V	~255 V	~440 V	~ 440/255 V
Maximum Continuous Operating Voltage	U _c	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	-	-	-	-
Maximum Discharge Current	I _{max} (8/20μs)	40 kA	40 kA	40 kA	40 kA
Nominal Discharge Current	I _n (8/20μs)	20 kA	20 kA	20 kA	20 kA
Short-circuit Current Rating	I _{sc cr}	5 kA	5 kA	5 kA	5 kA
Voltage Protection Level	U _p	≤ 1.5 kV	≤ 1.5 kV	≤ 1.5 kV	≤ 1.5 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		-	L-N, N-PE	L-PE	L-N, N-PE
Mounting		36mm Din-rail	36 mm Din rail	36 mm Din rail	36 mm Din rail
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-
Types of Earthing System		-	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP 20	IP 20	IP 20	IP 20
Net Weight	kg	0.13	0.25	0.38	0.5
Dimensions (WxHxD)/Pole in mm		18x90x66.5	36 x 90 x 66.5	54 x 90 x 66.5	72 x 90 x 66.5
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L: 6 mm ² PE:10 mm ²	L, N: 6 mm ² PE: 10 mm ²


Type		HSP13 1P	HSP13 2P	HSP13 3P	HSP13 4P	HSP25 1P	HSP25 2P	HSP25 3P	HSP25 4P
									
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		I	I	I	I	I	I	I	I
No. of Poles	Pole	1P	2P (1P2W)	3P (3P3W)	4 (3P4W)	1P	2P (1P2W)	3P (3P3W)	4 (3P4W)
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated Voltage	U _o	~255 V	~255 V	~440 V	~440/255 V	~255V	~255 V	~440 V	~440/250 V
Maximum Continuous Operating Voltage	U _c	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	12.5 kA	L-N : 12.5 kA N-PE : 50 kA	L-PE : 12.5 kA	L-N : 12.5 kA N-PE : 50 kA	25kA	L-N: 25 kA N-PE: 50 kA	L-PE: 25 kA	L-N: 25 kA N-PE: 100 kA
Maximum Discharge Current	I _{max} (8/20μs)	-	-	-	-	-	-	-	-
Nominal Discharge Current	I _n (8/20μs)	-	-	-	-	-	-	-	-
Short-circuit Current Rating	I _{scCR}	25 kA	25 kA	25 kA	25 kA	50 kA	50 kA	50 kA	50 kA
Voltage Protection Level	U _p	≤ 1.2 kV	L-N: 1.2 kV N-PE: 1.8 kV	L-PE: 1.2 kV	L-N: 1.2 kV N-PE: 1.8 kV		L-N: 1.3 kV N-PE: 1.8 kV	L-PE: ≤ 1.3 kV	L-N : ≤ 1.3 kV N-PE: ≤2.0 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		-	L-N, N-PE	L-PE	L-N, N-PE	-	L-N, N-PE	L-PE	L-N, N-PE
Mounting		36 mm Din rail	36 mm Din rail	36 mm Din rail	36 mm Din rail	36 mm Din rail	36 mm Din rail	36 mm Din rail	36 mm Din rail
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-	-	-	-	-
Types of Earthing System		-	TN/TT/IT	TN/TT/IT	TN/TT/IT	-	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Net Weight	kg	0.23	0.45	0.68	0.9	0.23	0.45	0.68	0.9
Dimensions (WxHxD)/Pole in mm		36×90×68	72 x 90 x 68	108 x 90 x 68	144 x 90 x 68	36×90×68	72 x 90 x 68	108 x 90 x 68	144 x 90 x 68
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L: 6 mm ² PE: 10 mm ²	L: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²

Selection Table

Din-Rail Type (DC)

Type		HSP40 2P	HSP40 3P	HSP40 3P	HSP40 3P(UL)	HSP40 3P(UL)
						
Standard		IEC 61643-31	IEC 61643-31	IEC 61643-31	UL 1449 4th	UL 1449 4th
Class		II	II	II	Type 1ca	Type 1ca
No. of Poles	Pole	2P	3P	3P	3P	3P
Maximum Continuous Operating Voltage	Uc	1,000 Vdc	1,000 Vdc	1,500 Vdc	1,120 Vdc	1,500 Vdc
Nominal Discharge Current	In (8/20μs)	40 kA	40 kA	40 kA	50 kA	50 kA
Maximum Discharge Current	I _{max} (8/20μs)	20 kA	20 kA	20 kA	20 kA	20 kA
Voltage Protection Level	Up	≤ 4.0 kV	≤ 4.0 kV	≤ 5.2 kV	≤ 2.5 kV	≤ 4.0 kV
Diagnostics Indicator (LED lamp)		Green : protected Red : replace	Green : protected Red : replace	Green : protected Red : replace	Green : protected Red : replace	Green : protected Red : replace
Mounting		36mm Din-rail	36mm Din-rail	36mm Din-rail	36mm Din-rail	36mm Din-rail
IP Class		IP20	IP20	IP20	IP20	IP20
Net Weight	kg	0.25	0.38	0.42	0.42	0.42
Dimenstions (WxHxD)/Pole in mm		36 x 90 x 66.5	54 x 90 x 66.5	54 x 90 x 66.5	54 x 90 x 66.5	54 x 90 x 66.5
Wiring Size		≥ 4 mm ²	≥ 4 mm ²	≥ 4 mm ²	≥ 4 mm ²	≥ 4 mm ²

Box Type/Standard

Type		HSP40SS	HSP40ST	HSP40SY	HSP80SS	HSP80ST	HSP80SY
							
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II	II	II	II
No. of Poles	Pole	2W+G	3W+G	4W+G	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated Voltage	U _o	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	U _c	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	-	-	-	-	-	-
Maximum Discharge Current	I _{max} (8/20μs)	40 kA	40 kA	40 kA	80 kA	80 kA	80 kA
Nominal Discharge Current	I _n (8/20μs)	20 kA	20 kA	20 kA	40 kA	40 kA	40 kA
Voltage Protection Level	U _p	≤ 2.5 kV	≤ 2.5 kV	≤ 2.5 kV	≤ 3 kV	≤ 3 kV	≤ 3 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-N, N-PE	L-PE	L-N, N-PE	L-N, N-PE	L-PE	L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-	-	-
Types of Earthing System		TN	TN	TN	TN	TN	TN
IP Class		IP 20	IP20	IP20	IP 20	IP20	IP20
Net Weight	kg	1.31	1.6	1.6	1.42	2.32	2.32
Dimensions (WxHxD)/Pole in mm		68 x 110 x 80	112 x 160 x 80	112 x 160 x 80	95 x 137 x 80	130 x 190 x 80	130 x 190 x 80
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6mm ² PE: 10mm ²	L, N: 6 mm ² PE: 10 mm ²

Selection Table

Box Type/Standard


Type		HSP120SS	HSP120ST	HSP120SY	HSP200SS	HSP200ST	HSP200SY
							
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		I	I	I	I	I	I
No. of Poles	Pole	2W+G	3W+G	4W+G	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated Voltage	Uo	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	Uc	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac
Impulse Discharge Current	Iimp (10/350µs)	6.5 kA	6.5 kA	6.5 kA	12.5 kA	12.5 kA	12.5 kA
Maximum Discharge Current	I _{max} (8/20µs)	120 kA/	120 kA	120 kA	200 kA	200 kA	200 kA
Nominal Discharge Current	I _n (8/20µs)	-	-	-	-	-	-
Voltage Protection Level	Up	≤ 2.0 kV	≤ 2.0 kV	≤ 2.0 kV	≤ 2.0 kV	≤ 2.0 kV	≤ 2.0 kV
Response Time	tA	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-N, N-PE	L-PE	L-N, N-PE	L-N, N-PE	L-PE	L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-	-	-
Types of Earthing System		TN	TN	TN	TN	TN	TN
IP Class		IP 20	IP20	IP20	IP 20	IP20	IP20
Net Weight	kg	1.65	2.8	2.8	1.88	3.74	3.74
Dimensions (WxHxD)/Pole in mm		160 x 230 x 85	160 x 230 x 88	160 x 230 x 88	168 x 200 x 80	172 x 250 x 80	172 x 250 x 80
Terminal Capacity		L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²


Box Type/Standard + Counter

Type		HSP40CSS	HSP40CST	HSP40CSY	HSP200CSS	HSP200CST	HSP200CSY
							
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II	I	I	I
No. of Poles	Pole	2W+G	3W+G	4W+G	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated Voltage	U _o	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	U _c	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	-	-	-	12.5 kA	12.5 kA	12.5 kA
Maximum Discharge Current	I _{max} (8/20μs)	40 kA	40 kA	40 kA	200 kA	200 kA	200 kA
Nominal Discharge Current	I _n (8/20μs)	20 kA	20 kA	20 kA	-	-	-
Voltage Protection Level	U _p	≤ 2.5 kV	≤ 2.5 kV	≤ 2.5 kV	≤ 2 kV	≤ 2 kV	≤ 2 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-N, N-PE	L-PE	L-N, N-PE	L-N, N-PE	L-PE	L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		0	0	0	0	0	0
Types of Earthing System		TN	TN	TN	TN	TN	TN
IP Class		IP20	IP20	IP20	IP20	IP20	IP20
Net Weight	kg	1.31	1.6	1.6	1.88	3.74	3.74
Dimensions (WxHxD)/Pole in mm		95 x 164 x 95	112 x 160 x 95	112 x 160 x 95	167 x 200 x 95	172 x 250 x 95	172 x 250 x 95
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²

Selection Table

Box Type/Deluxe

Type		HSP40HS	HSP40HT	HSP40HY	HSP160HS	HSP160HT
						
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II	I	I
No. of Poles	Pole	2W+G	3W+G	4W+G	2W+G	3W+G
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60
Rated Voltage	U _o	~255 V	~480 V	~480/277 V	~255 V	~480 V
Maximum Continuous Operating Voltage	U _c	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	-	-	-	L-PE: 12.5 kA L-N: 12.5 kA N-PE: 50 kA	L-PE: 12.5 kA
Maximum Discharge Current	I _{max} (8/20μs)	40 kA	40 kA	40 kA	-	-
Nominal Discharge Current	I _n (8/20μs)	20 kA	20 kA	20 kA	-	-
Short-circuit Current Rating	I _{sc}	5 kA	5 kA	5 kA	25 kA	25 kA
Voltage Protection Level	U _p	L-PE: ≤ 1.8 kV L-N: ≤ 1.8 kV N-PE: ≤ 1.5 kV	L-PE: ≤ 1.8 kV L-N: ≤ 1.8 kV N-PE: ≤ 1.5 kV	L-PE: ≤ 1.8 kV L-N: ≤ 1.8 kV N-PE: ≤ 1.5 kV	L-PE: ≤ 1.5 kV L-N: ≤ 1.5 kV N-PE: ≤ 2 kV	L-PE: ≤ 1.8 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-PE, L-N, N-PE	L-PE	L-PE, L-N, N-PE	L-PE, L-N, N-PE	L-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-	-
Types of Earthing System		TN/TT/IT	TN/TT/IT	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20	IP20	IP20
Net Weight	kg	1.31	1.6	1.6	2.28	2.28
Dimensions (WxHxD)/Pole in mm		95 × 164 × 95	112 × 160 × 95	112 × 160 × 95	127 × 165 × 79	162 × 250 × 79
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²

Type		HSP160HY	HSP320HS	HSP320HT	HSP320HY
					
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		I	I	I	I
No. of Poles	Pole	4W+G	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60	50/60
Rated Voltage	U _o	~480/277 V	~255 V	~480 V	~480/277 V
Maximum Continuous Operating Voltage	U _c	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	I _{imp} (10/350μs)	L-PE: 12.5 kA L-N: 12.5 kA N-PE: 50 kA	L-PE: 25 kA L-N: 25 kA N-PE: 100 kA	L-PE: 25 kA	L-PE: 25 kA L-N: 25 kA N-PE: 100 kA
Maximum Discharge Current	I _{max} (8/20μs)	-	-	-	-
Nominal Discharge Current	I _n (8/20μs)	-	-	-	-
Short-circuit Current Rating	I _{sc cr}	25 kA	25 kA	50 kA	50 kA
Voltage Protection Level	U _p	L-PE: ≤ 1.5 kV L-N: ≤ 1.5 kV N-PE: ≤ 2 kV	L-PE: ≤ 2 kV L-N: ≤ 1.8 kV N-PE: ≤ 3 kV	L-PE: ≤ 1.8 kV	L-PE: ≤ 2 kV L-N: ≤ 1.8 kV N-PE: ≤ 3 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-PE, L-N, N-PE	L-PE, L-N, N-PE	L-PE	L-PE, L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-
Types of Earthing System		TN/TT/IT	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20	IP20
Net Weight	kg	2.8	2.42	3.18	3.18
Dimensions (WxHxD)/Pole in mm		162 x 250 x 79	127 x 165 x 79	162 x 250 x 79	162 x 250 x 79
Terminal Capacity		L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²

Selection Table

Box Type/Deluxe + Counter

Type		HSP40CHS	HSP40CHT	HSP40CHY
				
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11
IEC 61643-11 Class		II	II	II
No. of Poles	Pole	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60
Rated Voltage	U _o	~255 V	~440 V	~440/255 V
Maximum Continuous Operating Voltage	U _c	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	I _{imp} (10/350µs)	-	-	-
Maximum Discharge Current	I _{max} (8/20µs)	40 kA	40 kA	40 kA
Nominal Discharge Current	I _n (8/20µs)	20 kA	20 kA	20 kA
Short-circuit Current Rating	I _{sc cr}	5 kA	5 kA	5 kA
Voltage Protection Level	U _p	L-PE: ≤ 1.8 kV L-N: ≤ 1.8 kV N-PE: ≤ 1.5 kV	L-PE: ≤ 1.8 kV	L-PE: ≤ 1.8 kV L-N: ≤ 1.8 kV N-PE: ≤ 1.5 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-PE, L-N, N-PE	L-PE	L-PE, L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		0	0	0
Types of Earthing System		TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20
Net Weight	kg	1.31	1.6	1.6
Dimensions (WxHxD)/Pole in mm		95 × 164 × 95	112 × 160 × 95	112 × 160 × 95
Terminal Capacity		L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²	L, N: 6 mm ² PE: 10 mm ²

Type		HSP160CHS	HSP160CHT	HSP160CHY
				
Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11
IEC 61643-11 Class		I	I	I
No. of Poles	Pole	2W+G	3W+G	4W+G
Rated Frequency	Hz	50/60	50/60	50/60
Rated Voltage	Uo	~255 V	~440 V	~440/255 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	Iimp (10/350μs)	L-PE: 12.5 kA L-N: 12.5 kA N-PE: 50 kA	L-PE: 12.5 kA	L-PE: 12.5 kA L-N: 12.5 kA N-PE: 50 kA
Maximum Discharge Current	I _{max} (8/20μs)	-	-	-
Nominal Discharge Current	I _n (8/20μs)	-	-	-
Short-circuit Current Rating	I _{sc}	25 kA	25 kA	25 kA
Voltage Protection Level	Up	L-PE: ≤ 1.5 kV L-N: ≤ 1.5 kV N-PE: ≤ 2.0 kV	L-PE: ≤ 1.5 kV	L-PE: ≤ 1.5 kV L-N: ≤ 1.5 kV N-PE: ≤ 2.0 kV
Response Time	t _A	≤ 5 ns	≤ 5 ns	≤ 5 ns
Protection Mode		L-PE, L-N, N-PE	L-PE	L-PE, L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)		Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		0	0	0
Types of Earthing System		TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20
Net Weight	kg	2.28	2.28	2.8
Dimensions (WxHxD)/Pole in mm		127 x 165 x 79	162 x 250 x 79	162 x 250 x 79
Terminal Capacity		L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²

Technical Data

Structure



Din Rail Type

- 1. Remote communication
- 2. Operation display
- 3. MOV
- 4. Cable terminal
- 5. Din Rail
- 6. Common bar



Box Type

- 1. Remote communication
- 2. Counter display
- 3. Cable bushing
- 4. Mounting hole
- 5. Power signal lamp
- 6. Fault signal lamp

Class Table

Model			Type 1ca	Class I	Class II
Din-rail Type	AC	HSP40			●
		HSP13		●	
		HSP25		●	
	DC	HSP40			●
		HSP40 UL	●		
Box Type	Standard	HSP40S			●
		HSP80S			●
		HSP120S		●	
		HSP200S		●	
	Deluxe	HSP40H			●
		HSP160H		●	
		HSP320H		●	

Class I: A place of great lightning damage where the electric shock current is partially propagated.

Class II: Low voltage switchgear with relatively little lightning damage, industrial distribution boards, etc.

Type 1ca : The range that can be used from the first switchboard on the secondary side of the transformer to the lower class.

Definiton of SPD

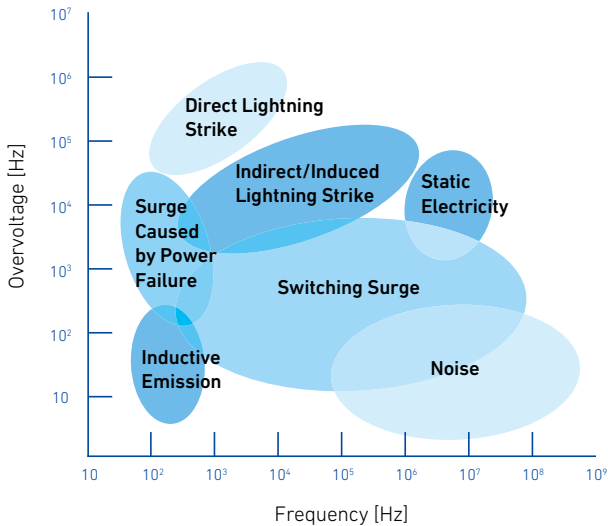


Fig 1. Various Electrical hazards
Lightning SURGE & Switching SURGE

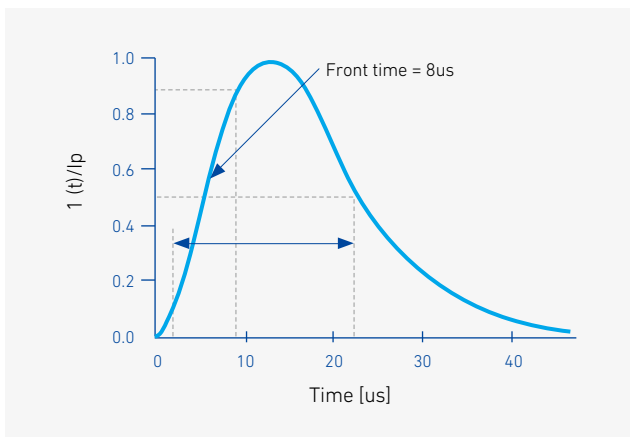
Surge

Transient Overvoltage due to Lightning, Utility grid switching, Switching external/internal inductive or capacitive loads and other sources travel on power line conductors throughout the electrical distribution system, causing system operating problems and equipment downtime.

SPD (Surge Protective Device)

A device that is intended to limit transient overvoltages and divert surge current.
It contains at least one nonlinear component.

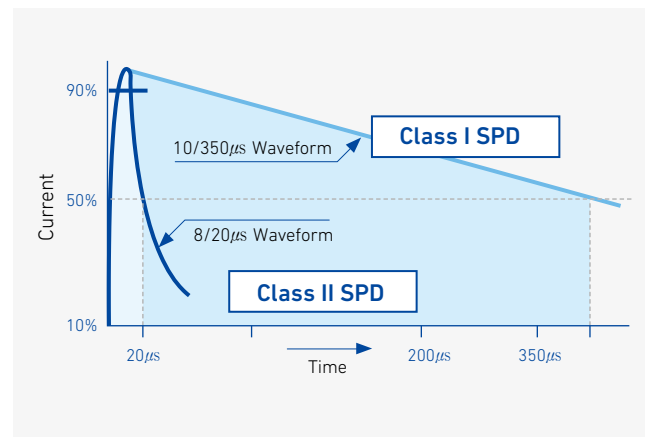
Waveforms of Surges



Nominal Discharge Current (In), 8/20 μ s

The crest value of the current through the SPD having a current waveshape of 8/20.

This is used for the classification of the SPD for class II test and also for preconditioning of the SPD for class I and II tests. [definition of IEC 61643-1]



Impulse Current (Iimp), 10/350 μ s

It is defined by three parameters, a current peak value/peak, a charge Q and a specific energy W/R. Tested according to the test sequence of the operating duty test. This is used for the classification of the SPD for class I test.

If the maximum current values of direct and inductive lightning are the same, the amount of energy of direct lightning is approximately 16 to 20 times that of the inductive lightning.

Technical Data

Classification of SPD Test Waveforms

IEC 61643-11

Surge protective Device of low voltage distribution systems

- Section one: Performance and test methods

Table 1. Type I, II, III Test

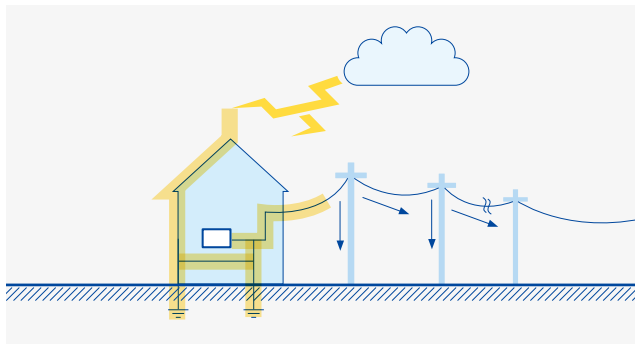
Test Type	Parameters	Test Waveforms
Type I	I_{imp}	10/350 μ s
Type II	I_n	8/20 μ s
Type III	U_{oc}	1.2/50 μ s, 8/20 μ s

Structure According to Different Points of Strike of Lightning

IEC 62305-4

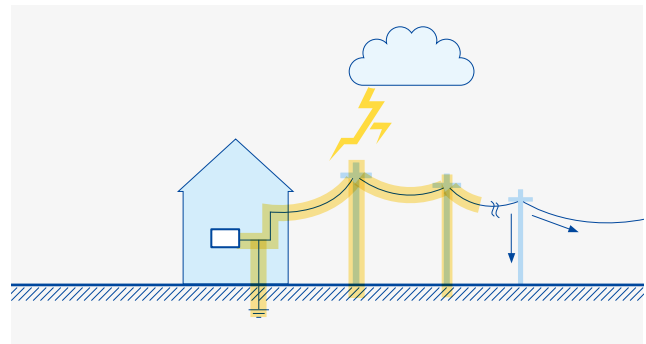
S1

Direct lightning strike to the building or structure-structure : lightning rod



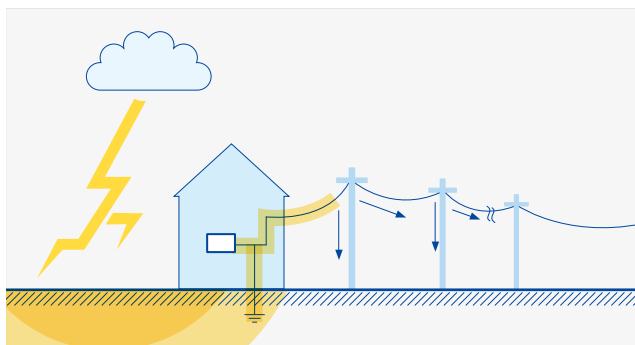
S3

Direct lightning strike to the entering



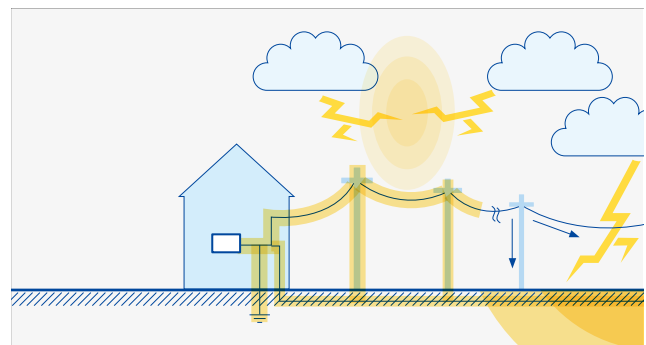
S2

Lightning strike to the earth near the building or structure



S4

Lightning strike to the earth close to the entering supply line



LPZ (Lighting Protection Zone)

Zone where the lightning electromagnetic environment is defined

NOTE The zone boundaries of an LPZ are not necessarily physical boundaries. (e.g. walls, floor and ceiling)

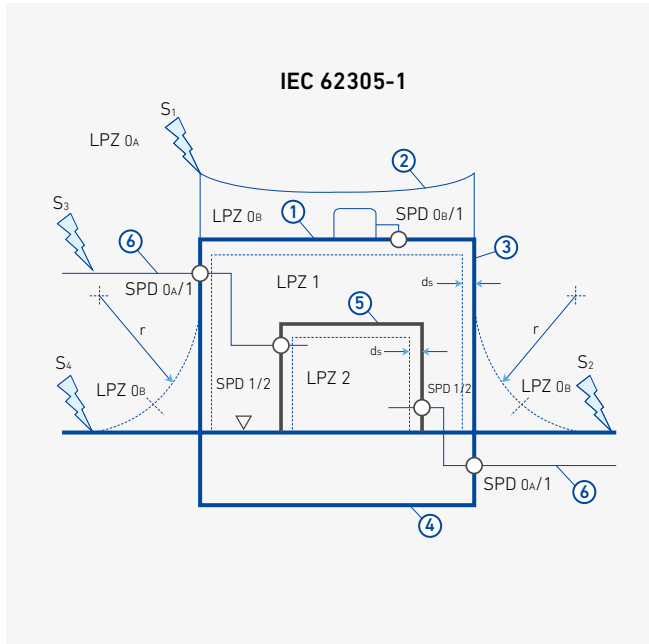
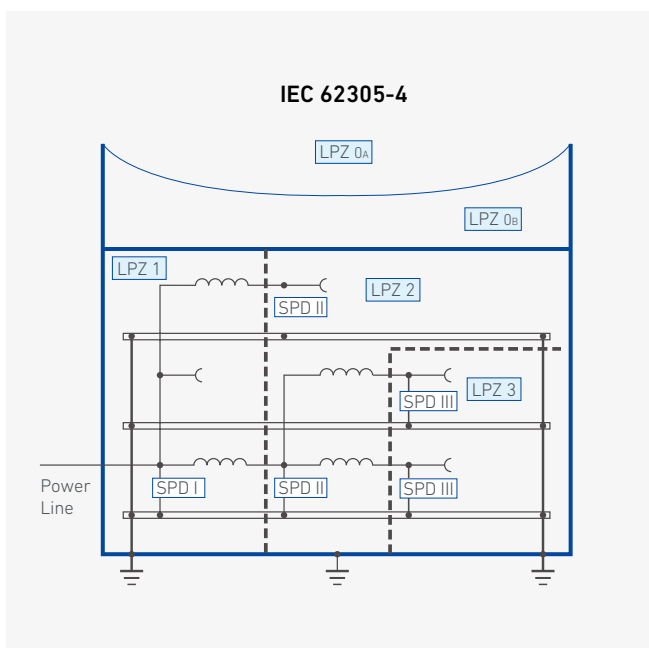


Table 1. Sources of Damage to a Structure According to the Point of Strike

S1	Flashes to the structure
S2	Flashes near the structure
S3	Flashes to the lines connected the structure
S4	Flashes near the lines connected to the structure

IEC 62305-1

Example for the application of SPD in power distribution systems



LPZ 0A/LPZ 1

Type I SPD

I_{imp} 10/350 μ s 12.5 kA / 25 kA (L-N mode)
50 kA / 100 kA (N-PE mode)

I_n 8/20 μ s 12.5 kA / 25 kA / 50 kA / 100 kA

The SPDs selected and their integration into the overall electrical system inside the structure shall ensure that the partial lightning current will mainly be diverted into the earthing system at the interface LPZ 0A/LPZ 1.

LPZ 1/LPZ 2

Type II SPD

I_n 8/20 μ s 20 kA / 40 kA / 80 kA /

LPZ 2/LPZ 3

Type III SPD

U_{oc} 1.2/50 μ s (8/20 μ s)

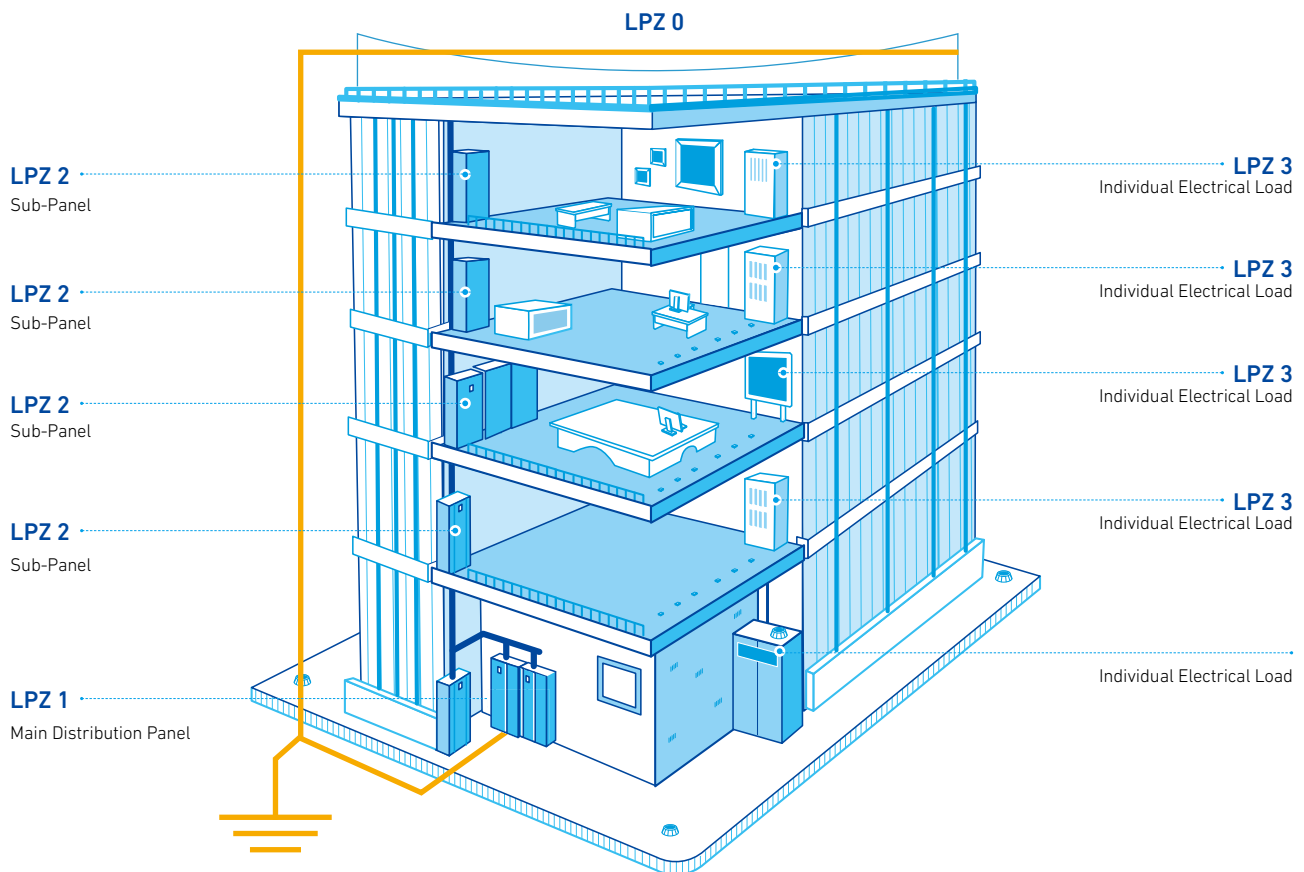
6 kV (3 kA) / 10 kV (5 kA) / 20 kV (10 kA)

The SPDs are installed in sequence.

They are chosen according to the requirements at their particular installation point.

Technical Data

Lightning Protection Zones and Surge Protection of Commercial & Residential Buildings



LPZ 1

Type I SPD Main Distribution Panel (LM/LEM/PM), ACB Panel

LPZ 2

Type II SPD Sub-Panel / MCC / Control Panel etc.

LPZ 3

Type III SPD Home Panel / Individual Electrical Load

Type I SPD Impulse Current selection

LPL	Impulse Current (kA) 10/350 μ s	Type1 SPD current per mode (kA) 10/350 μ s
I	200	L-N: limp 25 kA N-PE: limp 100 kA
II	150	L-N: limp 18.75 kA N-PE: limp 75 kA
III/IV	100	L-N: limp 12.5 kA N-PE: limp 50 kA

* Based on 3 phase TN-S or TN-C-S system: 4 conductors (L1, L2, L3, N) plus earth-4 modes to earth

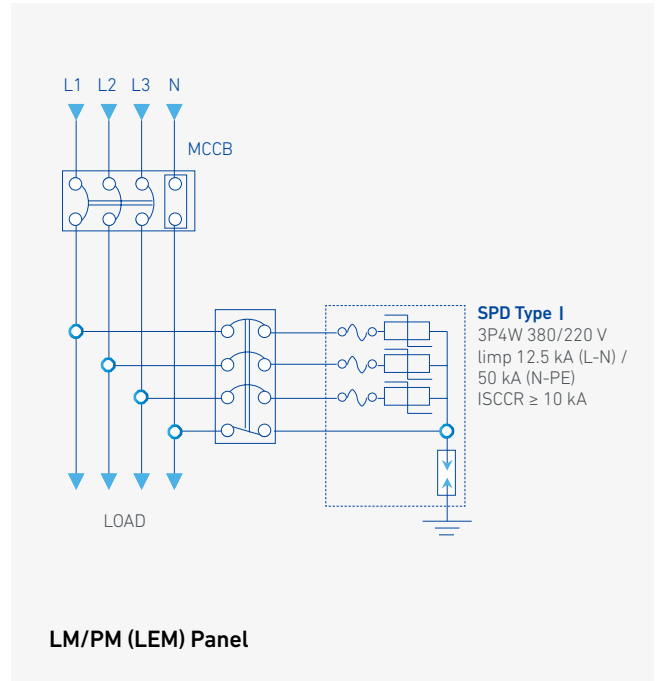
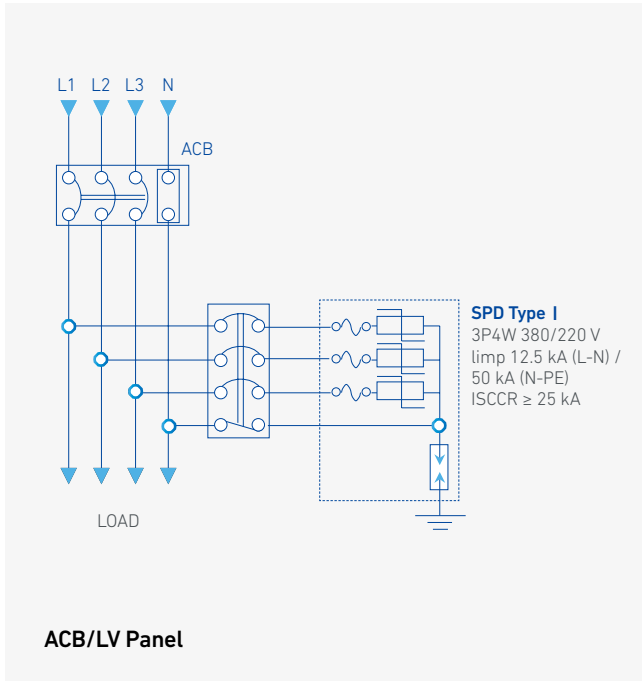
LPL (lightning protection level)

Number related to a set of lightning current parameter values relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning.

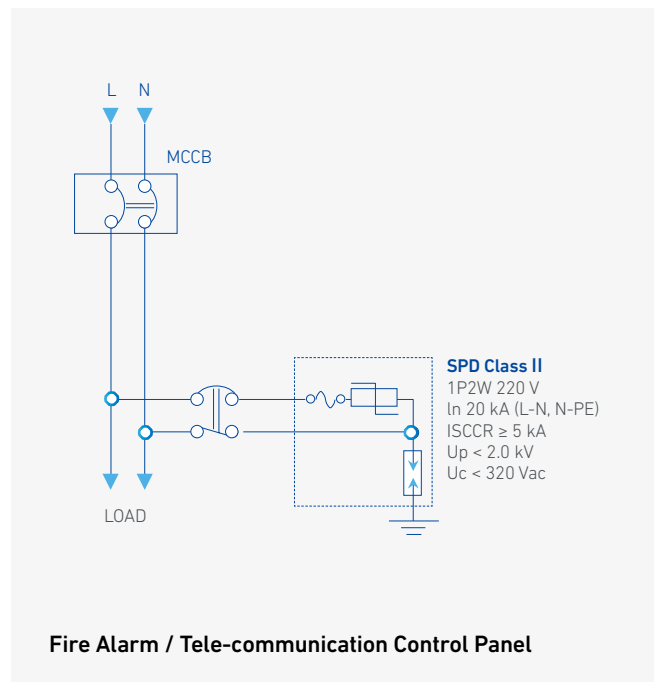
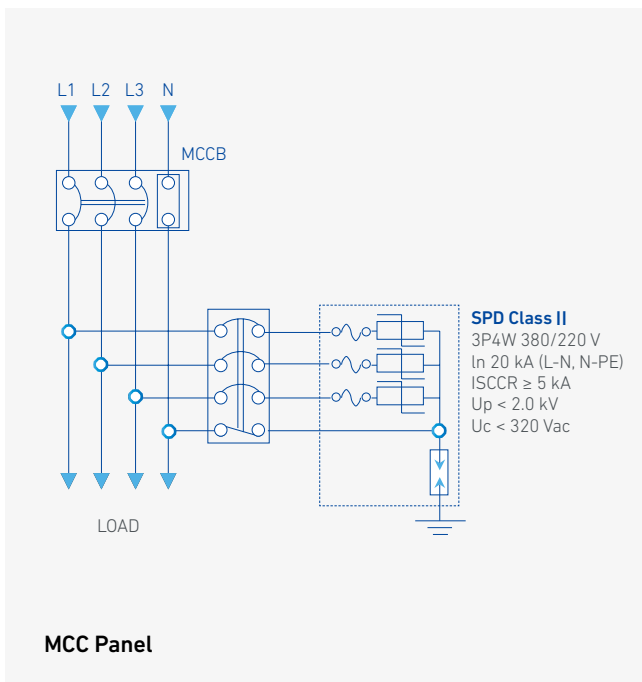
NOTE Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

Example of SPD Installation

Examples of Type I SPD installations



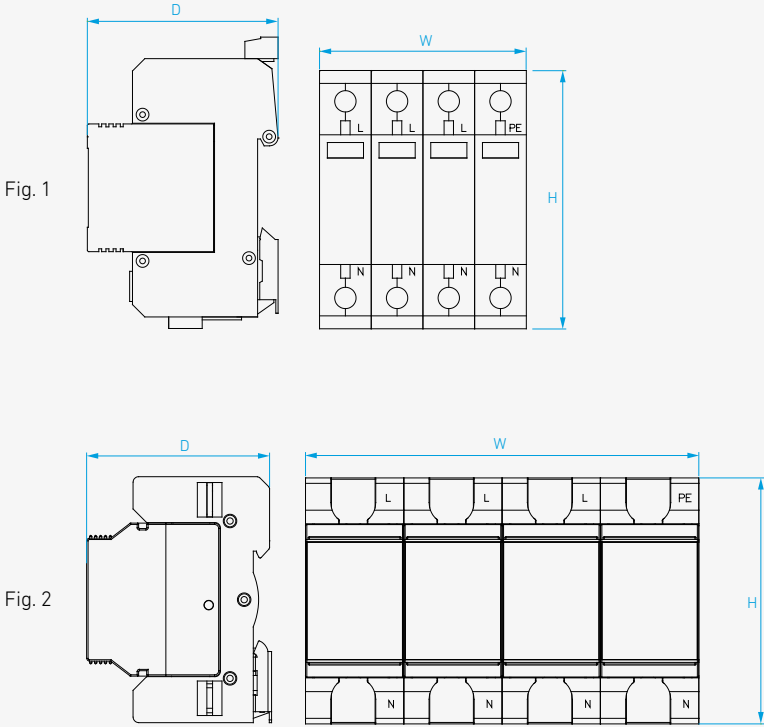
Examples of Type II SPD installations



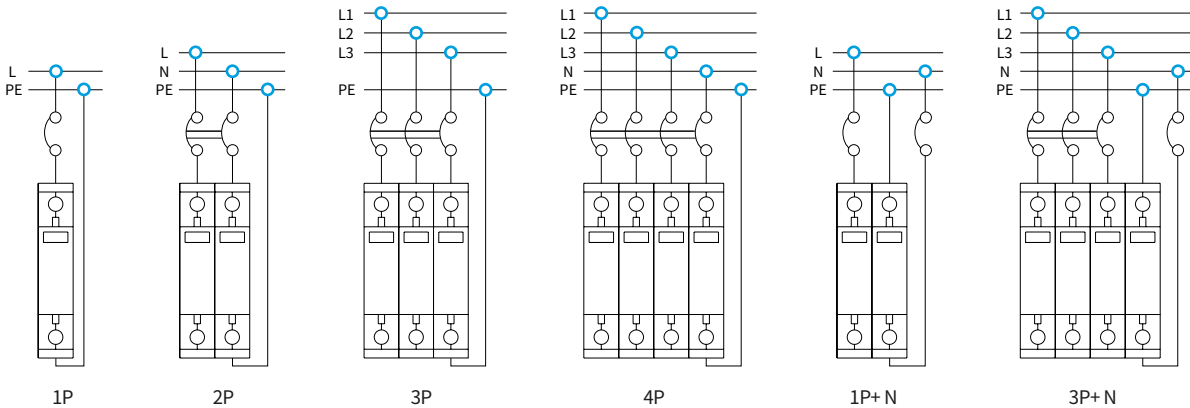
Dimension & Diagram

Din-Rail Type (AC)

HSP40/13/25

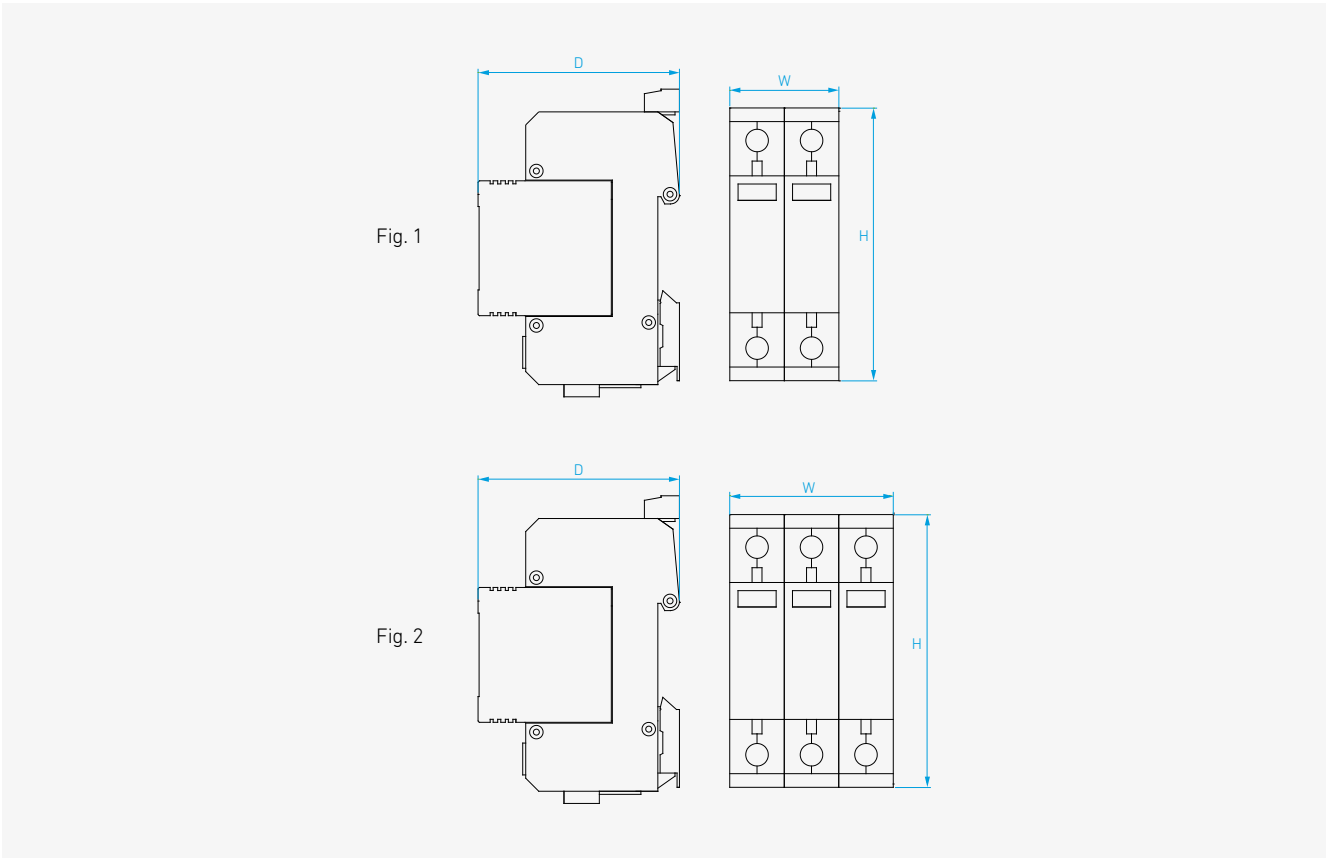


	HSP40 (Fig. 1)			HSP13/25 (Fig. 2)		
	W	H	D	W	H	D
1P	18	90	66.5	36	90	68
2P	36	90	66.5	72	90	68
3P	54	90	66.5	108	90	68
4P	72	90	66.5	144	90	68



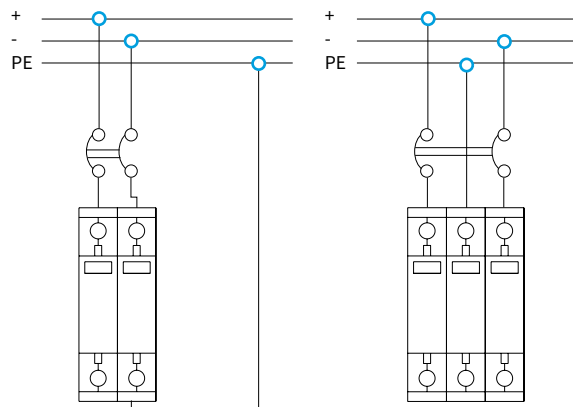
DIn-Rail Type (DC)

HSP40



HSP40 DC Type

	W	H	D	Note
2P	36	90	66.5	Fig. 1
3P	54	90	66.5	Fig. 2



Dimension & Diagram

Standard Box Type

HSP40/80/120/200

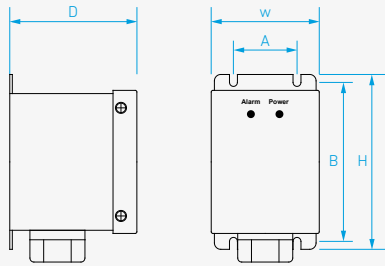


Fig. 1

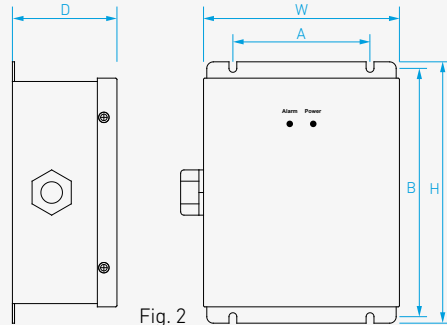


Fig. 2

	S (2W + G)					Note
	W	A	B	H	D	
HSP40	68	40	100	110	80	Pig. 1
HSP80	95	70	127	137	80	Pig. 1
HSP120	160	100	210	230	85	Pig. 1
HSP200	168	105	190	200	80	Pig. 2

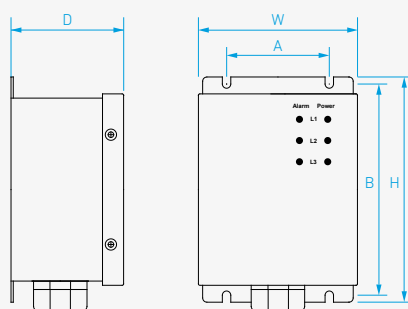
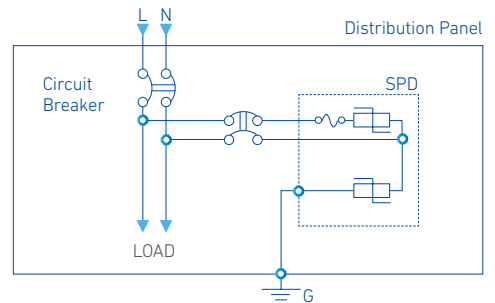


Fig. 1

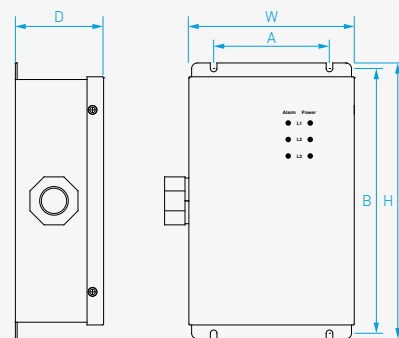
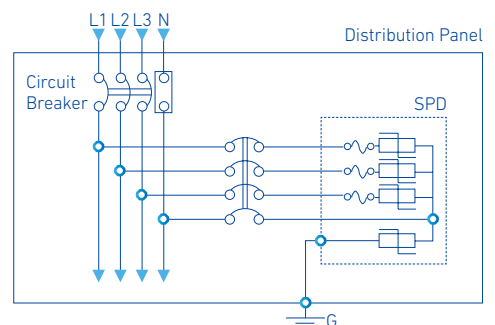


Fig. 2

	T (3W + G), Y (4W + G)					Note
	W	A	B	H	D	
HSP40	112	73	150	160	80	Pig. 1
HSP80	130	90	180	190	80	Pig. 1
HSP120	160	100	210	230	88	Pig. 1
HSP200	172	105	240	250	80	Pig. 2



Standard Box Type + Counter

HSP40/200

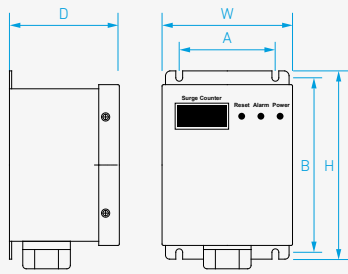


Fig. 1

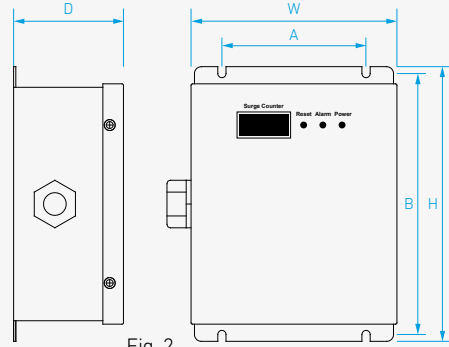


Fig. 2

	S (2W + G)				D	Note
	W	A	B	H		
HSP40	95	70	127	146	95	Fig. 1
HSP200	167.4	105	190	200	95	Fig. 2

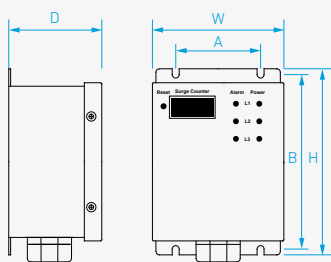
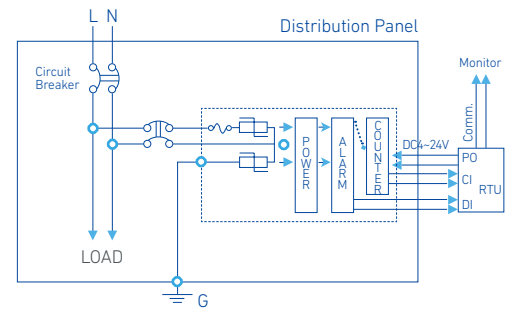


Fig. 1

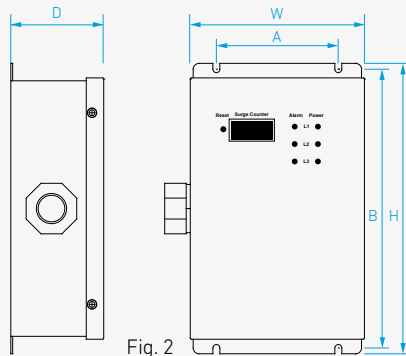
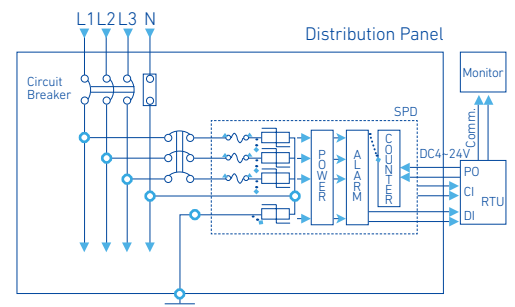


Fig. 2

	T (3W + G), Y (4W + G)				D	Note
	W	A	B	H		
HSP40	112	73	150	160	95	Fig. 1
HSP200	172	105	240	250	95	Fig. 2



Dimension & Diagram

Deluxe Box Type

HSP40/160/320

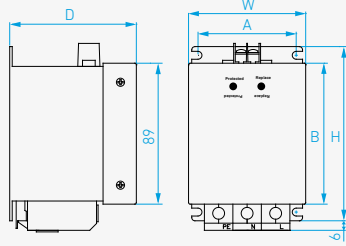


Fig. 1

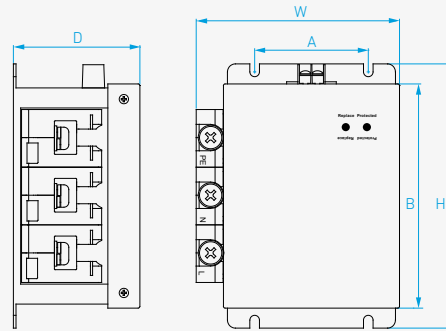


Fig. 2

	S (2W+G)				D	Note
	W	A	B	H		
HSP40	74	62	99	110	80	Pig. 1
HSP160	127	71	155	165	79	Pig. 2
HSP320	127	71	155	165	79	Pig. 2

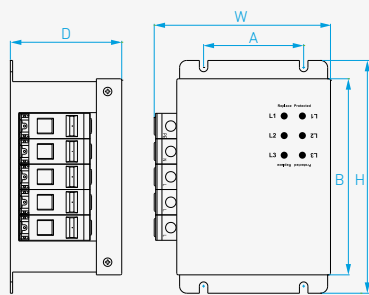
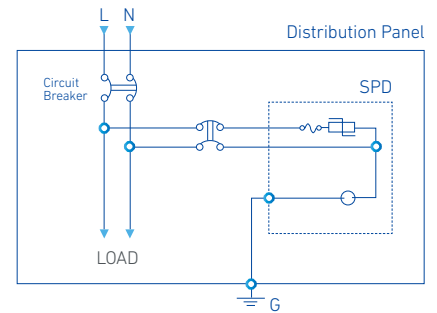


Fig. 1

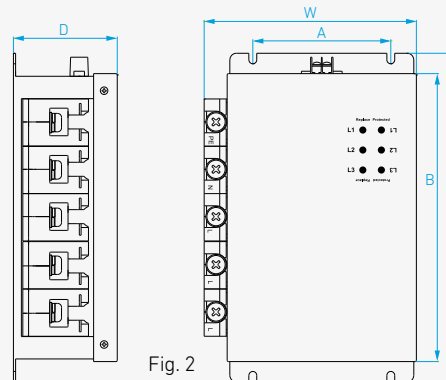
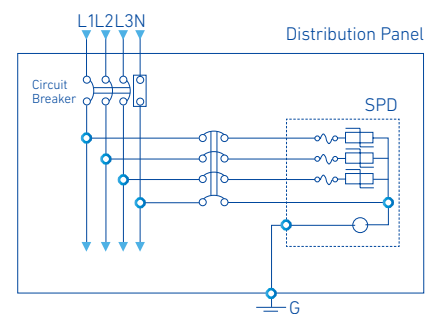


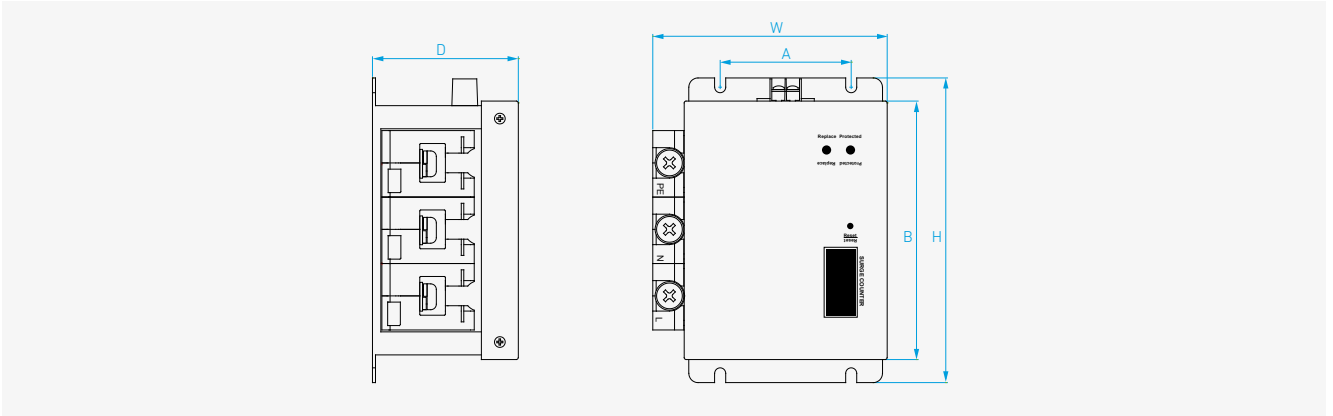
Fig. 2

	T (3W+G), Y (4W+G)				D	Note
	W	A	B	H		
HSP40	125	71	155	165	79	Pig. 1
HSP160	161.5	105	240	250	79	Pig. 2
HSP320	161.5	105	240	250	79	Pig. 2

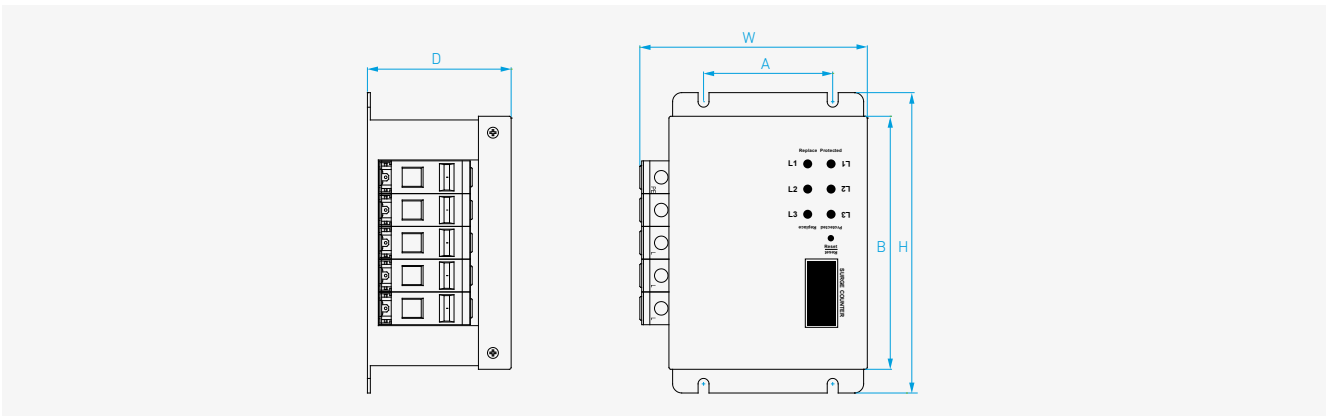
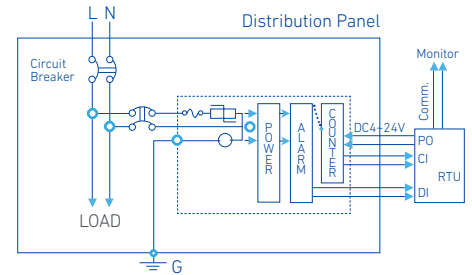


Deluxe Box Type + Counter

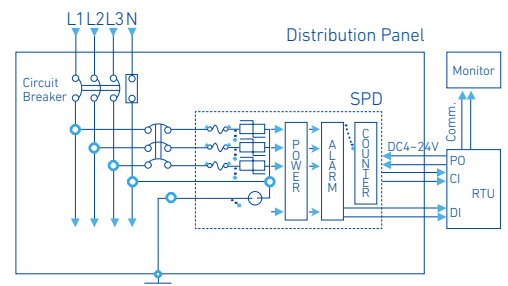
HSP40/160



	S (2W + G)				
	W	A	B	H	D
HSP40	125	71	155	165	79
HSP160	125	71	155	165	79

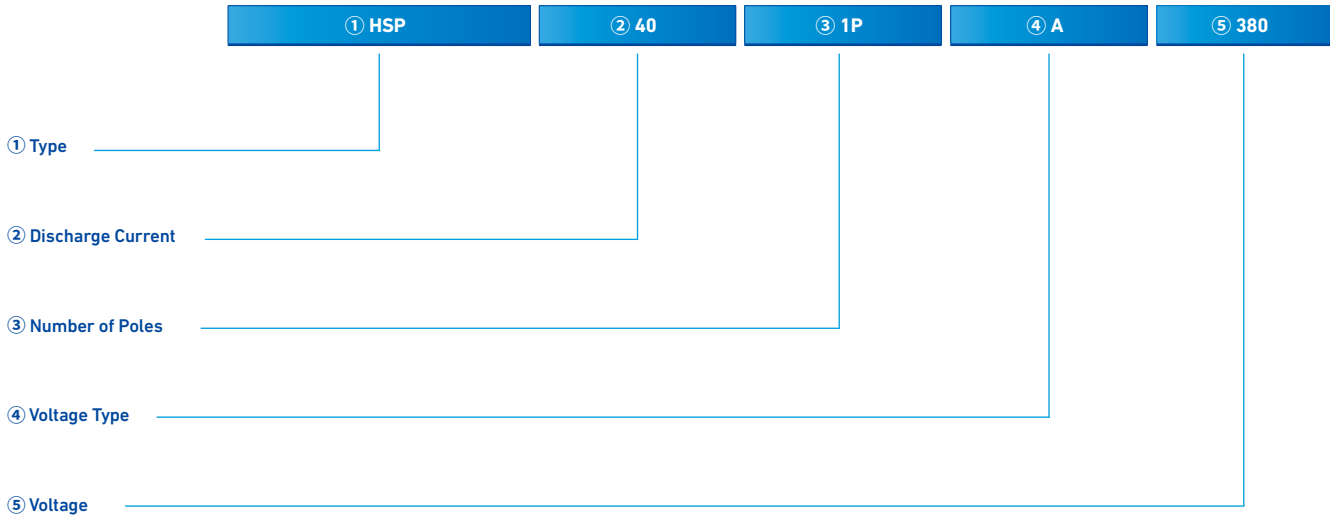


	T (3W + G), Y (4W + G)				
	W	A	B	H	D
HSP40	125	71	155	165	79
HSP160	162	105	240	250	79



SPD Ordering Information

DIN Rail Type



① Type	
HSP	Surge protection device

② Discharge Current	
40 ¹⁾	I _{max} 40 kA (Class II)/(AC/DC)
13	I _{imp} 12.5 kA (Class I)/(AC)
25	I _{imp} 25 kA (Class I)/(AC)

※ 1) DC(UL) : I_{max} 50kA

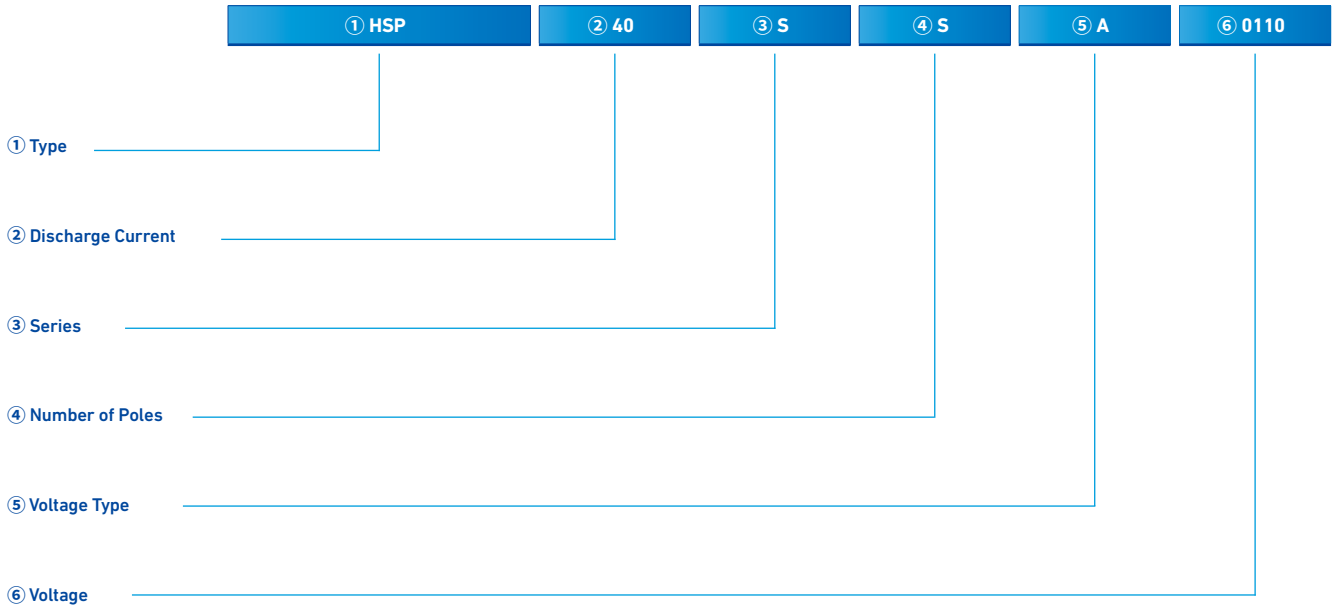
③ Number of Poles	
1P	1 Pole (AC)
2P	2 Pole (AC/DC)
3P	3 Pole (AC/DC)
4P	3 Pole + N (AC)

④ Voltage Type	
A	AC
D	DC

⑤ Voltage	
380	380 VAC / 320 V(U _c)
440	440 VAC / 385 V(U _c)
1000	1,000 VDC
1000U	1,000 VDC (UL)
1500	1,500 VDC
1500U	1,500 VDC (UL)

※ If the voltage is above 480 V, please contact us.
 ※ IT system requires separate check as the line voltage may be transferred between L-G.

Standard BOX Type



① Type	
HSP	Surge protection device

③ Series	
S	Standard type
CS	Counter + standard type

⑤ Voltage Type	
A	AC

② Discharge Current	
40	I _{max} 40kA (Class II)
80	I _{max} 80kA (Class II)
120	I _{limp} 6.5 kA (Class I)
200	I _{limp} 12.5 kA (Class I)

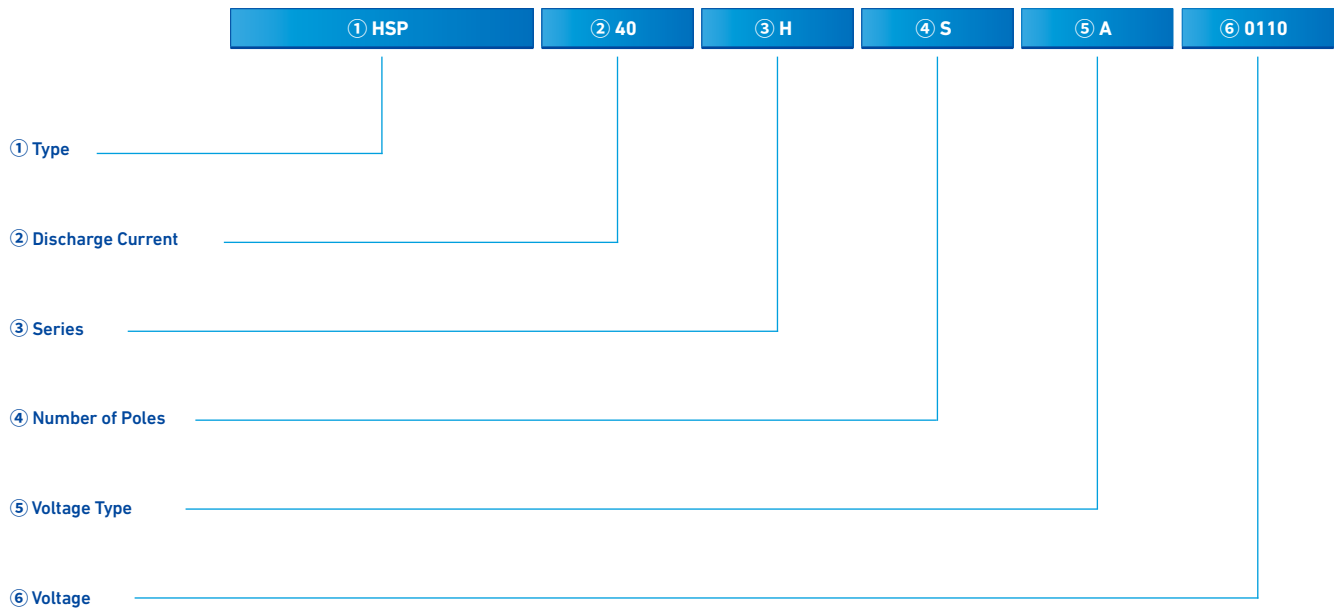
④ Number of Poles	
S	2 W + G
T	3 W + G
Y	4 W + G

⑥ Voltage	
0110	110 VAC
0220	220 VAC
0380	380 VAC
0440	440 VAC

※ Counter : HSP40, HSP200 only

SPD Ordering Information

Deluxe BOX Type



① Type	
HSP	Surge protection device

③ Series	
H	Deluxe type
CH	Counter + deluxe type

⑤ Voltage Type	
A	AC

② Discharge Current	
40	I _{max} 40kA (Class II)
160	I _{imp} 12.5 kA (Class I)
320	I _{imp} 25 kA (Class I)

④ Number of Poles	
S	2 W + G
T	3 W + G
Y	4 W + G

⑥ Voltage	
0110	110 VAC
0220	220 VAC
0380	380 VAC
0440	440 VAC

※ Counter: HSP40, HSP160 only

FUSE

Fuse Links & Switches

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Fuse Link	145
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Fuse Switch	151
Order Information	158

Technical Data

Low Voltage Fuse Links Selection Guide

The purpose of using fuses is to cut off the line safely and correctly to protect discrete components or the whole line in case of circuit errors. The following are the necessary conditions to be considered when selecting fuses

Usual Service Conditions And Installation Conditions

Ambient temperature: -50 °C ~ +40 °C

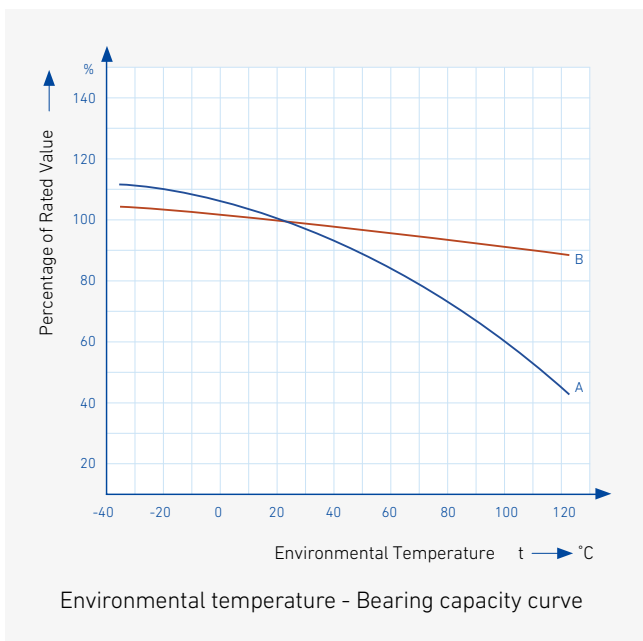
Height above sea level : not more than 2,000 m Atmospheric condition, humidity : the installation site's relative air humidity does not exceed 50 % while the maximum temperature is +40 °C, And it can allow to have higher relative humidity under lower temperature. The average temperature does not exceed +25 °C while in the wettest month, and the maximum relative humidity does not exceed 90 % in this month. We must take measures when there is condensation on the products which due to the changed temperature.

Class of pollution: third class

Sort of installation: III

Ambient Temperature

Ambient temperature means the air temperature directly around the fuse, and should not be understood as the room temperature. In many application cases, fuses are at rather high temperature as they are installed with supporting devices or bases in different structures and they are closed in the distributing or controlling boxes.



Derating

We recommend that the actual working current of a fuse should not exceed its rated current under the ambient temperature of 20 °C.

While selecting the fuses, environment and working conditions should be considered. such as the variation of situation of closing, air flow, wire sizes (length and section) and instantaneous peak value etc.

The current load capability of fuse links are tested under the ambient temperature of 20 °C. however the actual load capability is affected by the ambient temperature. The higher the ambient temperature, the higher the working temperature and the shorter the service life of a fuse will be. on the other hand, the service life of a fuse can be longer when working under a lower ambient temperature.

The following is the typical curve showing the affection to the current load capability be the ambient temperature.

e.g. when gG type fuse of 63 A rating is used under ambient temperature of 20°C, reduction in working current is necessary when the ambient temperature is changed to 70 °C. The ambient temperature-load capacity curve. A shows that the rating should be 78 % at 70 °C, and the new rating should be determined as:

$$I_n = 63 \text{ A} / 0.78 = 80.77 \text{ A}$$

So fuse links of 80 A rating should be selected for the new ambient temperature.

Note: A: (gG) type for line protection

B: (aR) type for semi-conductor protection

Malfunction

Malfunction is usually a result of incomplete analysis on the design of circuit, special attention should be given to 1) normal rated current, 3) ambient temperature, and 6) overload increment of factors to be considered for selection of fuses listed below. For example, frequent reasons for malfunction under normal working conditions are insufficient consideration to the start current of capacitor circuit and the ambient temperature around the fuse link.

Rated Breaking Capacity

Rated breaking capacity is the maximum short-circuit current allowed for the fuse link to cutout reliably under rated voltage. The instantaneous current loaded to the fuse link is much larger than the normal working current when short-circuit occurs. The fuse link is supported to cutout the line in an undamaged condition without bursting. The rated breaking capacity of HYUNDAI fuses is up to 120 kA and the excellent current limiting characteristics reliably protect the equipment from damages by electric power.

Fuse Supporter (Fuse Base)

In many application cases, fuse links are installed on fuse supporters/fuse bases. They are not to be used as switches for connection and disconnection of the load.

Factors To Be Considered For Selection Of Fuses

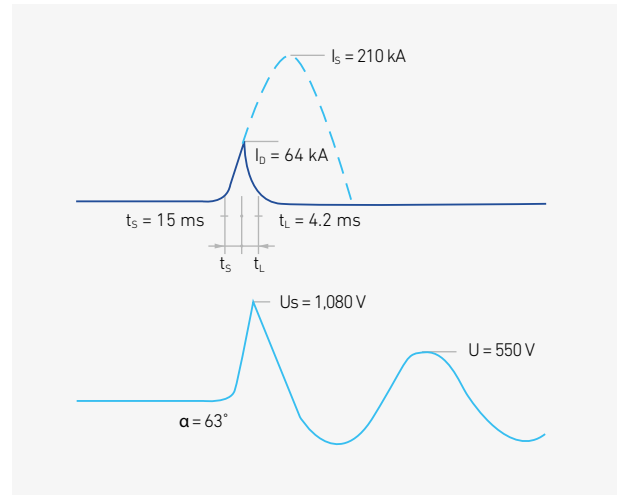
1. normal working current
2. working voltage
3. ambient temperature
4. overload current and cutout time
5. possible malfunction current
6. impulse current, surge current, starting current and transient value of the line
7. size and dimensions, connection methods, indicators, etc.

Threshold Value Of "aM" Fuses

Gate limit of "aM" type fuse links:

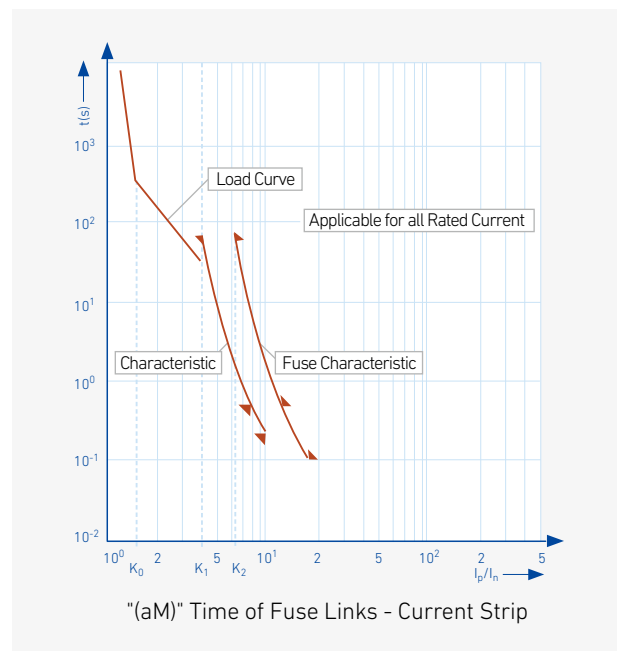
IP (In)	4	6.3	8	10	12.5	19
t Fuse < (S)	-	60	-	-	0.5	0.10
t Before arc > (S)	60	-	0.5	0.2	-	-

Note: Ip - Perspective current
In - Rate current of fuse link



Wave curve of current limiting characteristics of fuse link
Where :

- I_s - Peak value of maximum asymmetric current at 100 kA perspective current
Ip (The impulse factor of a short circuit should be 1.5)
- I_D - The actual current at breaking (limiting current)
- U_s - Arc voltage
- U - Voltage
- t_s - Melting time
- t_L - Arcing time
- α - Burning corner of arc after zero voltage



Technical Data

1. Fuse Holder

Applications

These fuse holders are supporters for fuses with size up to 22 x 58 mm. They are capable of working under heat caused by rated current and expected short impacting current up to 100 kA. It can also function as a fuse disconnecting switch by multi-phase combination.

The Fuse63, Fuse125 type has a safety lock to lock the fuse carrier when disconnected to avoid wrong operation; it can also be equipped with an indicator, which goes on when the fuse link breaks.


- Rated insulate voltage up to 690 V
- Working frequency 50 Hz AC
- Conventional free air thermal current up to 125 A
- Compliant with IEC 60269, IEC 60947-3.

Design Features

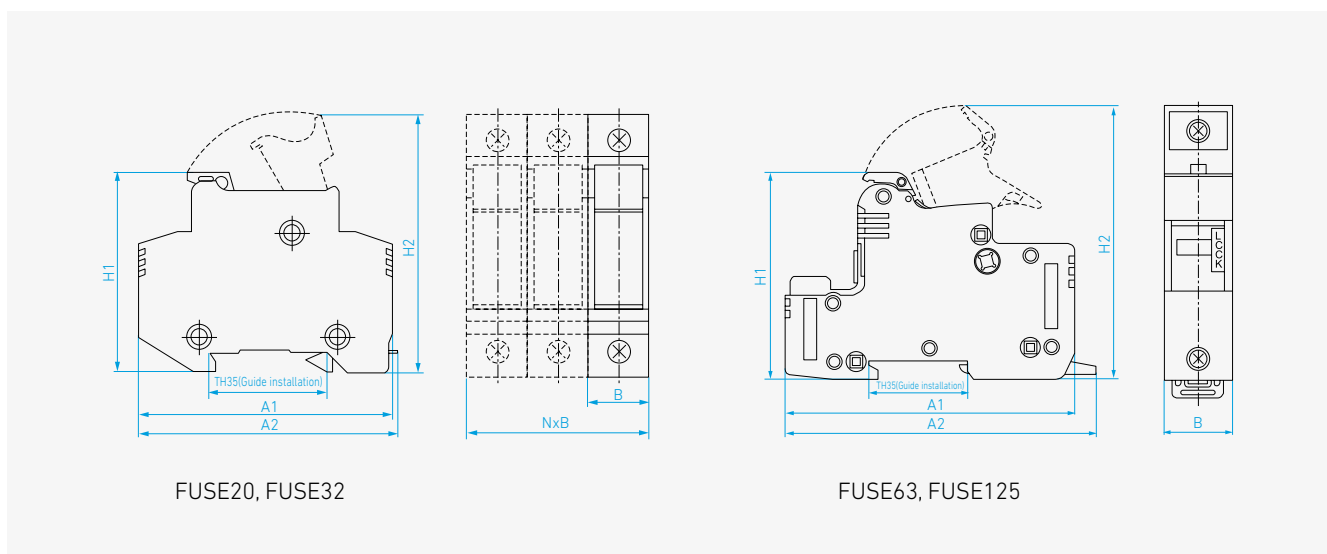
After the plastic-injected case is equipped with contacts and fuse links, the bases are formed by welding or riveting both capable of being multi-phase structured.

Fuse bases are all DIN rail installed, among which the Fuse63, Fuse125 are equipped with safety lock against wrong operation in the breaking state.

Specification

Figure	Type	Matching with Fuse's Size	Rated Voltage (V)	Rate Current (A)	Dimension (mm) A1 x A2 x B x H1 x H2
	FUSE20	8 x 32	690 V	0.5, 1, 2, 3, 4, 5, 6, 10, 12, 16, 20	80 x 83 x 18 x 61 x 80
	FUSE32	10 x 38	690 V	0.5, 1, 2, 3, 4, 5, 6, 10, 12, 16, 20, 25, 32	78 x 81 x 17.5 x 60 x 80
	FUSE63	14 x 51	690 V	2, 3, 4, 5, 6, 10, 12, 16, 20, 25, 32, 40, 50, 63	108 x 112 x 27 x 77.5 x 102
	FUSE125	22 x 58	690 V	10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125	124 x 128.5 x 36 x 77 x 105

Dimensions



2. Fuse Link

Applications

The fuses with fuse links with cylindrical contact caps are designed for protection of electrical distributing installations of rated voltage of 690 V AC, with rated current up to 125 A against overload and short circuit.

Fuse links with the striker are supplied for the purpose of protecting motors against motor single phasing operation when fitted in fuse isolators.


Protection against overload and short circuit in electric lines(type gG), also available for protection of semiconductor parts and equipments against short-circuit(type aR) and protection of motors(type aM).

- Rated voltage up to 690 V
- Rated current up to 125 A
- Working frequency 50 Hz AC
- Rated breaking capacity up to 100 kA
- Compliant with IEC 60269

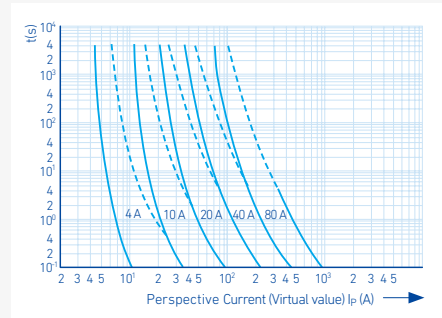
Design Features

Variable cross-section fuse element made from pure metal sealed in cartridge made from high-duty ceramic or epoxy glass. Fuse tube filled with chemically treated high-purity quartz sand as arc-extinguishing medium. Dot-welding of fuse element ends to the caps ensures reliable electric connection; Striker may be attached to the fuse link to provide immediate activation of micro-switch to give various signals or cut the circuit automatically.

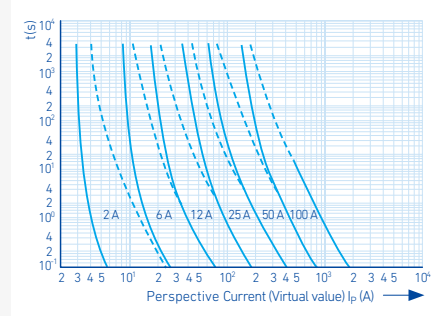
Specification

Figure	Dimension (mm)	Rated Voltage (V)	Rated Current (A)	L		ØD ±0.1 mm	Weight (g)	
	8 x 32	500	0.5, 1, 2, 3, 4, 5, 6, 10, 12, 16, 20	31.5±0.5		8.5	4.4	
	10 x 38	500/690	0.5, 1, 2, 3, 4, 5, 6, 10, 12, 16, 20, 25, 32	38±0.6		10.3	7.7	
	14 x 51	500/690	2, 3, 4, 5, 6, 10, 12, 16, 20, 25, 32, 40, 50, 63	51	+0.6 -1.0		14.3	20.5
	22 x 58	500/690	10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125	58	+0.1 -2.0		22.2	58

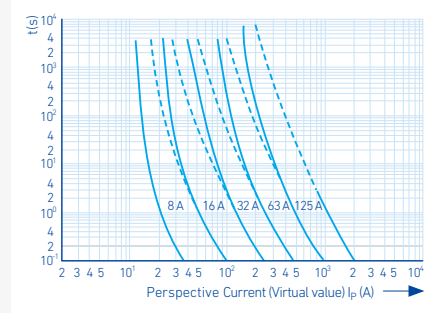
Characteristics Curve



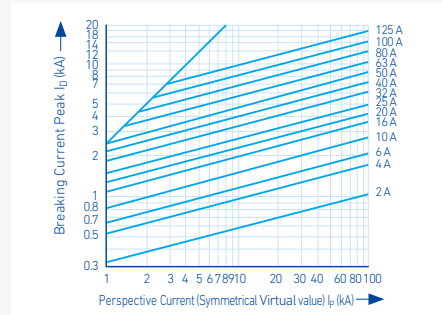
Time-current Range of "gG" Fuse Links



Time-current Range of "gG" Fuse Links



Time-current Range of "gG" Fuse Links



Breaking Current Characteristics Curve

Technical Data

3. NT Type Fuse

3-1) NT Type Fuse Link

Applications

NT low voltage H.R.C. fuse features light in weight, small in size, low in power loss and high in breaking capacity. This product has been widely used in overload and short circuit protection of electric installation. This product conforms to IEC 60269 standards with all of the rating at the world advanced level. Protection against overload and short circuit in electric lines(type gG), also available for protection of semiconductor parts and equipments against short-circuit(type aR) and protection of motors(type aM).

- Rated voltage up to 1,140 V
- Rated current up to 1,250 A
- Working frequency 50 Hz AC
- Rated breaking capacity up to 100 kA
- Compliant with IEC 60269

Design Features

Variabe cross-section fuse element made from pure copper or silver sealed in cartridge made from high-duty ceramic. Fuse tube filled with chemically treated high-purity quartz sand as arc-extinguishing medium. Dot-welding of fuse element ends to the terminals ensures reliable electric connection and forms insert knife type contacts. Indicator or striker may be attached to the fuse link to show cutout of fuse or to give various signals and to cut the circuit automatically.

3-2) Fuse Base

Applications

Supporters for NT(NH)00C-NT(NH)4 fuses of all kinds(gG, aM, aR) in electric lines(type gG), capable of working under the heat caused by rated current and prospective short-circuit impacting current up to 100 kA.

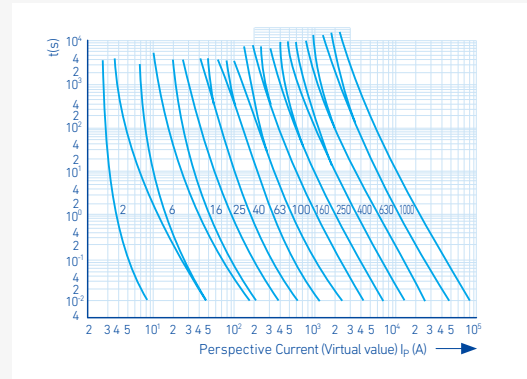
- Rated insulate voltage up to 660 V
- Rated current up to 1,000 A
- Working frequency 50 Hz AC
- Compliant with IEC 60269

Design Features

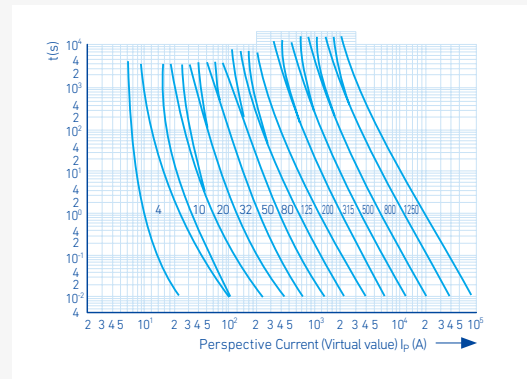
The bases are made up of high-density ceramic, heat-resistant resin board and wedge-shaped static contacts in a open structure.

The product is featured with good heat sinking, hegh mechanic density, reliable connection and simple operation. It is available for all NT(NH)00C-NT(NH)4 fuses.

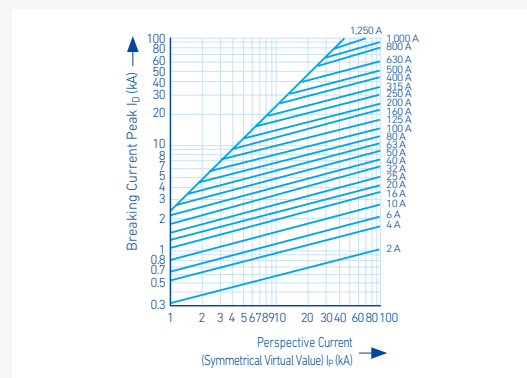
Characteristics Curve



Time-current Range of "gG" Fuse Links






Time-current Range of "gG" Fuse Links







Breaking Current Characteristics Curve of "gG" Fuse Links

Specification

Figure	Type	Fuse Link				Fuse Base		
		Rated Current (A)	Rated Voltage(V)	Rated Power Loss (W)	Weight (kg)	Type	Rated Current (A)	Weight (kg)
 NT00C	FL NT00C	2	500, 690	0.41	0.12	FB NT00 0160	160	0.19
		4		0.62				
		6		0.81				
		10		1.08				
		16		1.6				
		20		1.81				
		25		2.31				
		32		3.07				
		40		4.05				
		50		4.25				
		63		4.7				
		80		5.7				
		100		7				
 NT00	FL NT00	4	500, 690	0.67	0.17	FB NT00 0160	160	0.19
		6		0.89				
		10		1.14				
		16		1.65				
		20		1.94				
		25		2.5				
		32		3.32				
		36		3.56				
		40		4.3				
		50		4.5				
		63		4.6				
		80		6				
		100		7.3				
		125	7.6					
		160	9.6					
 NT0	FL NT0	6	500, 690	1.03	0.25	FB NT0 0160	160	0.29
		10		1.42				
		16		2.45				
		20		2.36				
		25		2.7				
		32		3.74				
		40		4.7				
		50		5.5				
		63		6.9				
		80		7.6				
		100		8.9				
		125	10.1					
		160	15.2					
		500						

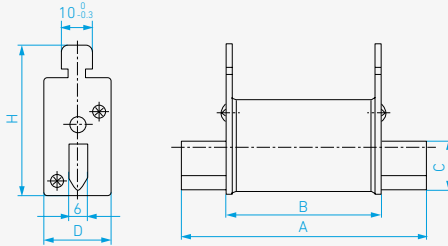
Technical Data

Specification

Figure	Type	Fuse Link				Fuse Base		
		Rated Current (A)	Rated voltage(V)	Rated Power Loss (W)	Weight (kg)	Type	Rated Current (A)	Weight (kg)
 NT1	FL NT1	32	500, 690	2.1	0.45	FB NT1 0250	250	0.55
		40		3.3				
		50		4.5				
		63		5.2				
		80		6.2				
		100		7.5				
		125		10.2				
		160		13				
		200		15.2				
		224		16.8				
		250	18.3					
		 NT2	FL NT2	80				
100	7.3							
125	9							
160	11.5							
200	15							
224	16.6							
250	18.4							
300	21							
315	19.2							
355	24.5							
400	26							
 NT3	FL NT3			160	500, 690	14.8	0.88	FB NT3 0630
		200	15.9					
		224	17.2					
		250	18.8					
		300	20.5					
		315	21.7					
		355	22.7					
		400	26.8					
		425	28.9					
		500	32					
		630	40.3					
		 NT4	FL NT4	500	500	37		
630	48							
700	56							
800	62							
1000	68							
1250	75							

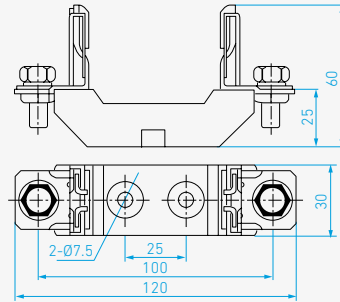
Dimension

Fuse Link (NT00C)

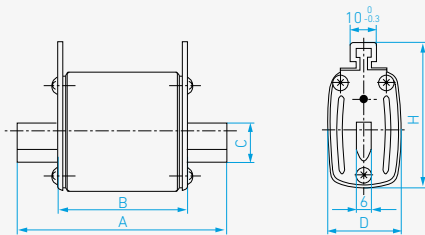


NT00C A78 x B49 x C15 x D21 x H48

Fuse Base (NT00)

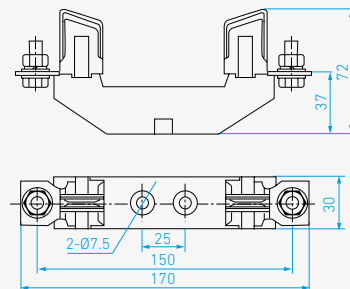


Fuse Link (NT00, NT0)

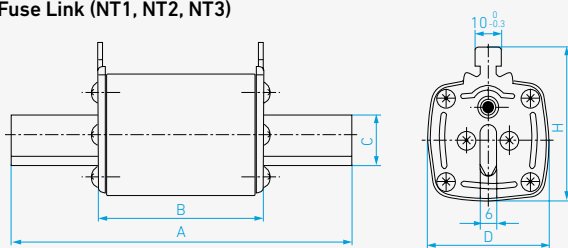


NT00 A78 x B49 x C15 x D29 x H56
NT0 A125 x B68 x C15 x D29 x H56

Fuse Base (NT0)



Fuse Link (NT1, NT2, NT3)



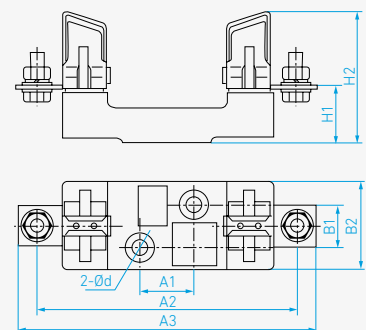
NT1 A135 x B68 x C20 x D48 x H60
NT2 A150 x B68 x C25 x D58 x H70
NT3 A150 x B68 x C32 x D68 x H80

Fuse Base

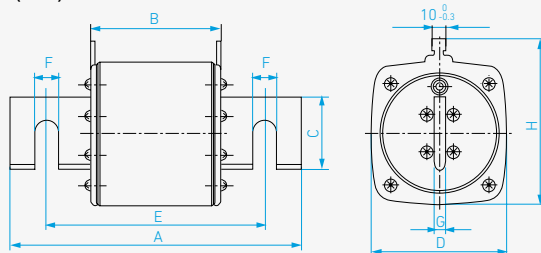
NT1 A1:25 x A2:175 x
A3:200 x B1:27 x B2:58 x
H1:38 x H2:84 x Ød:10.5

NT2 A1:25 x A2:200 x
A3:225 x B1:30 x B2:60 x
H1:38 x H2:100 x Ød:10.5

NT3 A1:25 x A2:210 x
A3:250 x B1:41 x B2:60 x
H1:40 x H2:105 x Ød:10.5

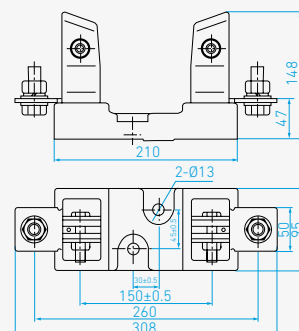


Fuse Link (NT4)



NT4 A200 x B90 x C50 x D97 x G8 x E150 x F16.5 x H113

Fuse Base



Technical Data

4. FUSE Carrier

Applications

Uploading and downloading of NT(NH)00C-NT(NH)4 insert type fuses of all sizes to and from the bases.

Reliable insulation. Safe and convenient operation. Small manual power requirements.

- Rated insulate voltage up to 1000 V.
- Working frequency 50Hz AC

Design Features

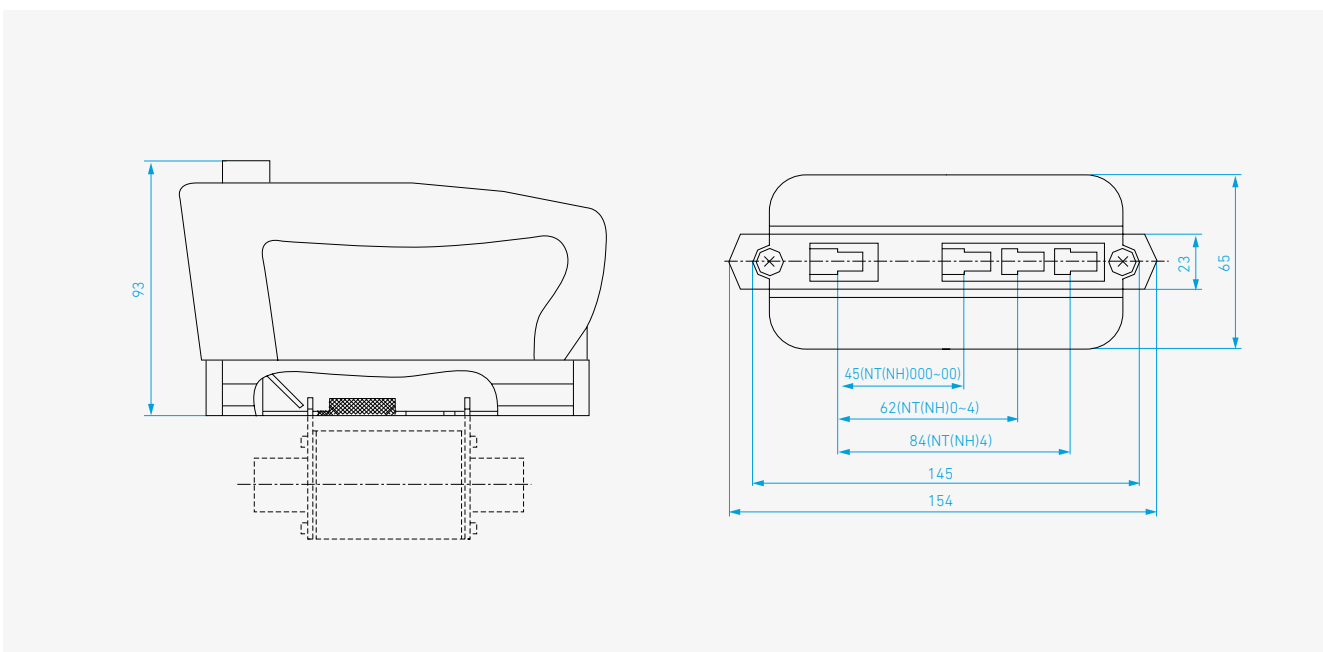
The fuse carrier is made up of catching holes, push button, guard board and handle.

There are three position for the catching holes for NT(NH)00C-NT(NH)00, NT(NH)0-NT(NH)3, and NT(NH)4 fuses.



Type	Assorted Fuse
FUSECARRIER	NT00/NT0/NT1/NT2/NT3/NT4

Dimensions



5. FUSE Switch

5-1 HA type

Applications

HA series of fuse disconnecting switch are mainly used in circuit with high short-circuit current and motor circuit as power switch, disconnecting

switch or emergency switch and for AC protection.

HA series are unfit for directly opening and shutting single electric motor.

- Rated insulate voltage up to 800 V
- Working frequency 50 Hz AC
- Rated working voltage up to 690 V
- Reted working current up to 630 A
- Rated limiting short-circuit is 100 kA at the voltage of 500 V and 50 kA at 690 V
- Compliant with IEC/EN 60947-3

Design Features

The switch with half sealed structures is made up of two parts : the seat and the cover(melt-loading device).

The front operation can observe the rated data of the fuse links and indicator status.

HA1P/160 is single phase can be matched with 00C and 00 fuses.

HA3P/160 with three phase abreast structure can be matched with 00C and 00 fuses.

HA1P/250, HA1P/400, HA1P/630 are single phase can be matched with 1, 2, and 3 fuses respectively.

HA3P/250, HA3P/400, HA3P/630 with three phase abreast structure can be matched with 1, 2 and 3 fuses respectively.

HA3P/160 with three phase abreast structure can be assembled with the single phase which makes four phase abreast structure.

The switch has the features of small volume, reliable operation, convenient fuse install and removal and small require manual operation power.



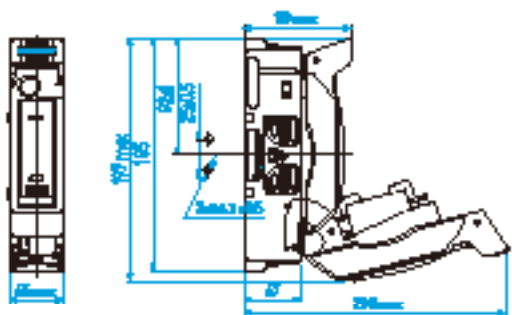
Specification

Type	Assorted Fuse	Poles	Rated Current (A)
HA1P/160	NT00	1P	4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HA1P/250	NT1		32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HA1P/400	NT2		80, 100, 125, 160, 200, 224, 250, 300, 315, 355, 400
HA1P/630	NT3		160, 200, 224, 250, 300, 315, 355, 400, 425, 500, 630
HA3P/160	NT00	3P	4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HA3P/250	NT1		32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HA3P/400	NT2		80, 100, 125, 160, 200, 224, 250, 300, 315, 355, 400
HA3P/630	NT3		160, 200, 224, 250, 300, 315, 355, 400, 425, 500, 630
HA4P/160	NT00	4P	4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HA4P/250	NT1		32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HA4P/400	NT2		80, 100, 125, 160, 200, 224, 250, 300, 315, 355, 400
HA4P/630	NT3		160, 200, 224, 250, 300, 315, 355, 400, 425, 500, 630

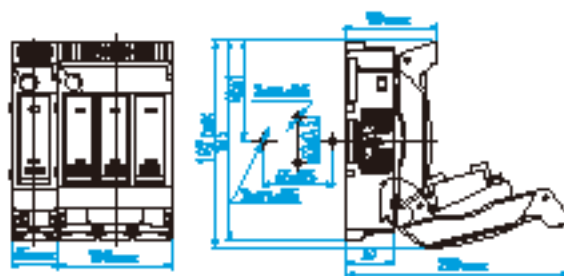
Dimension

Fuse Switch

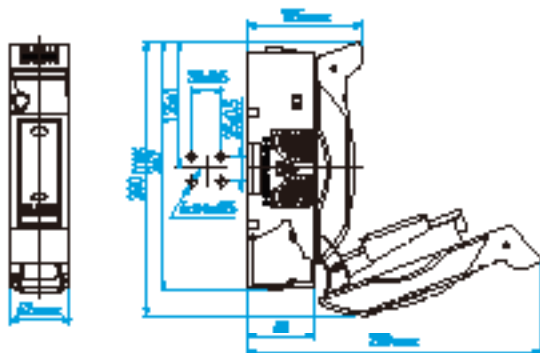
HA 1P / 160 AF



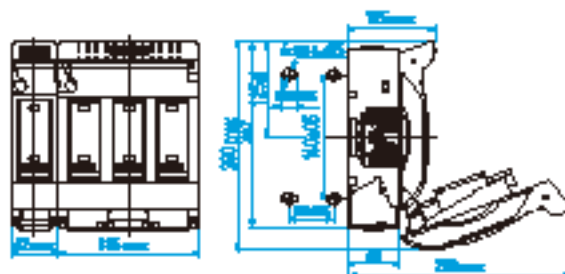
HA 3P, 4P / 160 AF



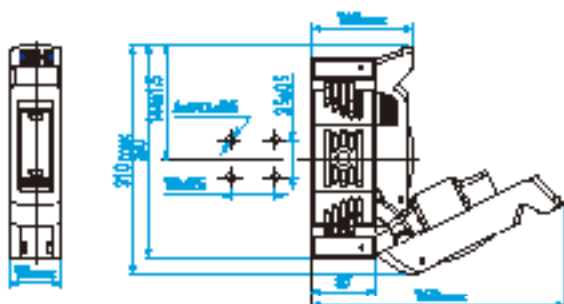
HA 1P / 250 AF



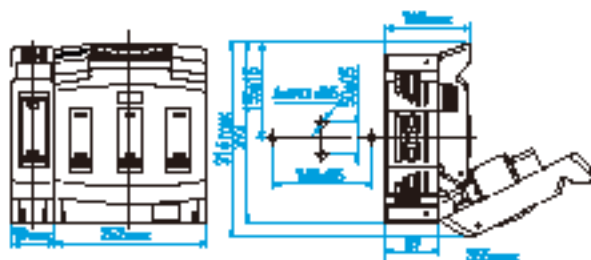
HA 3P, 4P / 250 AF



HA 1P / 400, 630 AF



HA 3P, 4P / 400, 630AF



Technical Data

The Working Current of the Switch at Different Voltages and Different Applications

Models	Rated Working Voltage (V)	Rated Working Current (A)	Application	Fuse Link Models	The Rated Breaking Capacity of the Fuse Links (kA)
HA1P/160	690	100	AC21B	00, 00C	50
	500	125	AC22B	00	100
	400	160	AC23B	00	100
HA3P/160 HA4P/160	690	100	AC21B	00, 00C	50
	500	125	AC22B	00	100
	400	160	AC23B	00	100
HA1P/250	690	160	AC21B	1	50
	500	200	AC22B	1	100
	400	250	AC23B	1	100
HA3P/250	690	160	AC21B	1	50
	500	200	AC22B	1	100
	400	250	AC23B	1	100
HA1P/400	690	250	AC21B	2	50
	500	315	AC22B	2	100
	400	400	AC23B	2	100
HA3P/400	690	250	AC21B	2	50
	500	315	AC22B	2	100
	400	400	AC23B	2	100
HA1P/630	690	400	AC21B	3	50
	500	500	AC22B	3	100
	400	630	AC23B	3	100
HA3P/630	690	400	AC21B	3	50
	500	500	AC22B	3	100
	400	630	AC23B	3	100

Rated Open and Breaking Capacity of the Switch

Rated Working Voltage (V)	Rated Working Current (A)	Applications	Rated Open and Breaking Capacity					
			Connecting			Breaking		
			I/le	U/Ue	COSØ	Ic/le	Ur/Ue	COSØ
690	All current	AC21B	1.5	1.05	0.95	1.5	1.05	0.95
500	All current	AC22B	3	1.05	0.65	3	1.05	0.65
400	≤ 100	AC23B	10	1.05	0.45	8	1.05	0.45
	> 100	AC23B	10	1.05	0.35	8	1.05	0.30

Note: I - connecting current
le - rated working current
Ir - breaking current

U - post connecting voltage
Ue - rated working voltage
Ur - recovery current

Technical Data

5. FUSE Switch

5-2 HB type & HC type

Applications

HB, HC series of fuse disconnecting switch are mainly used in circuit with high short-circuit current and motor circuit as power switch, disconnecting switch or emergency switch and for AC protection.

- Rated insulate voltage up to 1,000 V
- Working frequency 50 Hz AC
- Rated working voltage up to 690 V
- Rated working current up to 630 A
- Rated limiting short-circuit is 100 kA at the voltage of 500 V and 50 kA at 690 V
- Rated short-time withstand current (Valid): 20 Ith/1 s
- Compliant with IEC/EN 60947-3

Design Features

The switch is made up of two parts: the seat and the cover(melt-loading device), three phase and sealed.

The front operation can observe the rated data of the fuse links and indicator status. The switch is molded designed.

HB/HC160 (52 mm in width) can be directly installed on 185 mm busbar through the input line.

Both of the installation methods have up output line and down output line, and three phases make and break separately or simultaneously.

This switch is suitable for 00C and 00 fuses.

HB/HC400 (102 mm in width) can be directly installed on 185mm busbar through the output line.

It can also be installed on the supporter by two 12x18 installation hole.

Both of the installation methods have up output line and down output line, and three phases make and break separately or simultaneously.

This switch is suitable for NT(NH)1 and NT(NH)2 fuses.

HB/HC630 (102 mm in width) can be directly installed on 185 mm busbar through the input line.

It can also be installed on the supporter by two 12x18 installation hole.

Both of the installation methods have up output line and down output line, and three phases make and break separately or simultaneously.

This switch is suitable for NT(NH)3 fuses.

The switch has the features of small volume, reliable operation, convenient fuse install and removal and small require manual operation power.

HB type



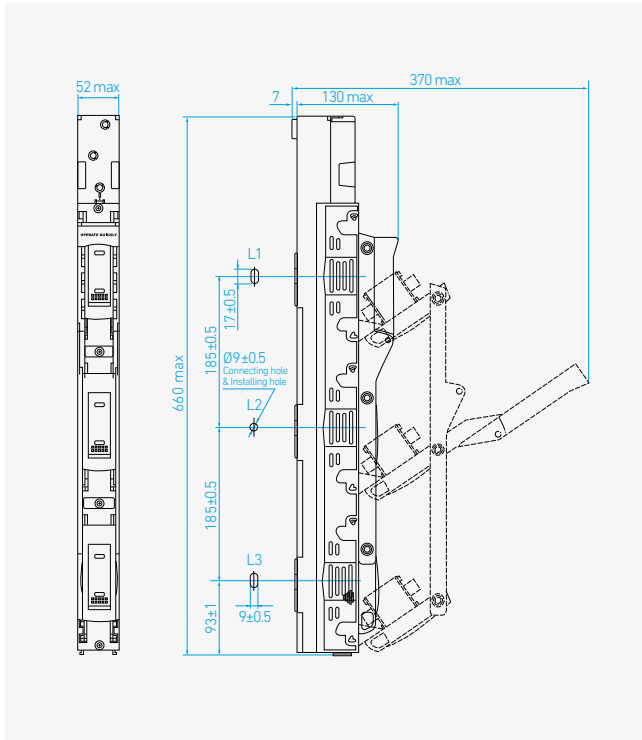
Specification

Type	Assorted Fuse	Poles	Rated Current (A)
HB-U, D/160	NT00	3P	4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HB-U, D/250	NT1	3P	32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HB-U, D/400	NT2	3P	80, 100, 125, 160, 200, 224, 250, 300, 315, 355, 400
HB-U, D/630	NT3	3P	160, 200, 224, 250, 300, 315, 355, 400, 425, 500, 630

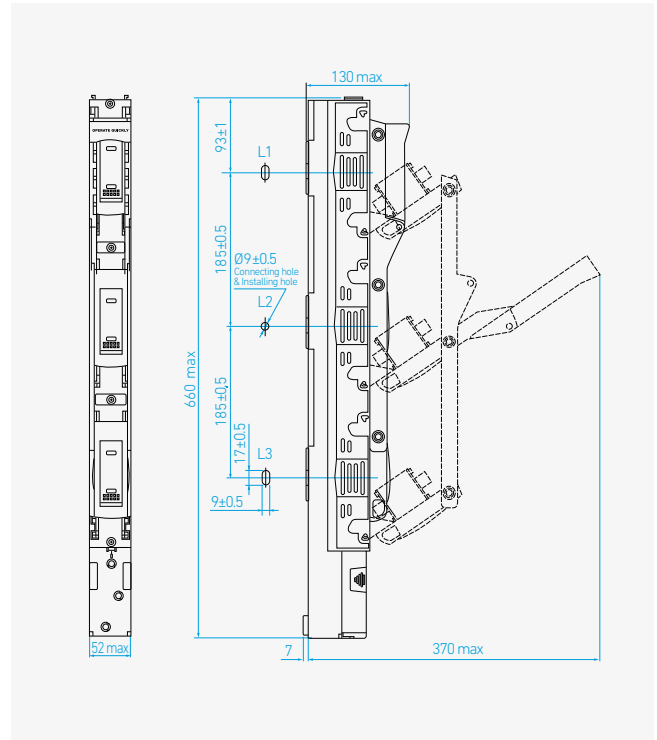
Dimension

Fuse Switch

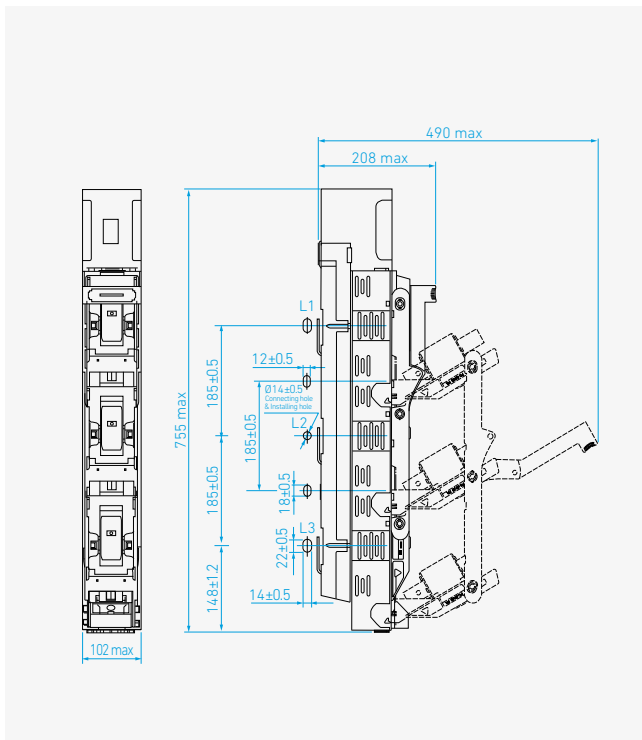
HB-U / 160 AF



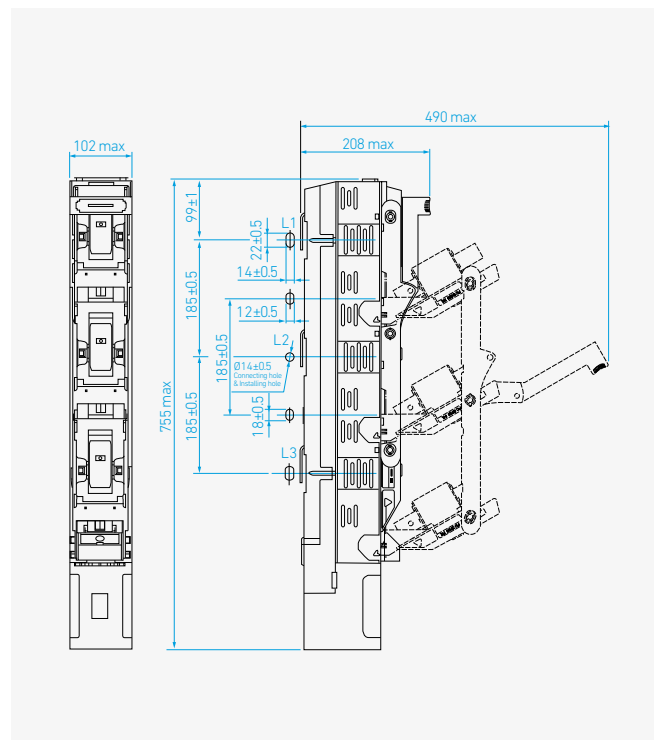
HB-D / 160 AF



HB-U / 250, 400, 630 AF



HB-D / 250, 400, 630 AF



Technical Data

5. FUSE Switch

HC Type



Specification

Type	Assorted Fuse	Poles	Rated Current (A)
HC-U, D/160	NT00	3P	4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HC-U, D/250	NT1	3P	32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HC-U, D/400	NT2	3P	80, 100, 125, 160, 200, 224, 250, 300, 315, 355, 400
HC-U, D/630	NT3	3P	160, 200, 224, 250, 300, 315, 355, 400, 425, 500, 630

The Working Current of the Switch at Different Voltages and Different Applications

Models	Rated Working Voltage (V)	Rated Working Current (A)	Application	Fuse Link Models	The Rated Breaking Capacity of the Fuse Links (kA)
HB, HC/160	690	80	AC21B	00C	50
	500	100	AC22B		100
	400	100	AC23B		100
	690	100	AC21B	00	50
	500	125	AC22B		100
	400	160	AC23B		100
HB, HC/400	690	160	AC21B	1, 2	50
	690	200	AC21B		50
	690	250	AC21B		50
	500	315	AC22B		100
	400	400	AC23B		100
	690	400	AC21B		3
500	500	AC22B	100		
400	630	AC23B	100		

Rated Open and Breaking Capacity of the Switch

Rated Working Voltage (V)	Rated Working Current (A)	Applications	Rated Open and Breaking Capacity					
			Connecting			Breaking		
			I/Ie	U/Ue	COSØ	Ic/Ie	Ur/Ue	COSØ
690	All current	AC21B	1.5	1.05	0.95	1.5	1.05	0.95
500	All current	AC22B	3	1.05	0.65	3	1.05	0.65
400	≤ 100	AC23B	10	1.05	0.45	8	1.05	0.45
	> 100	AC23B	10	1.05	0.35	8	1.05	0.30

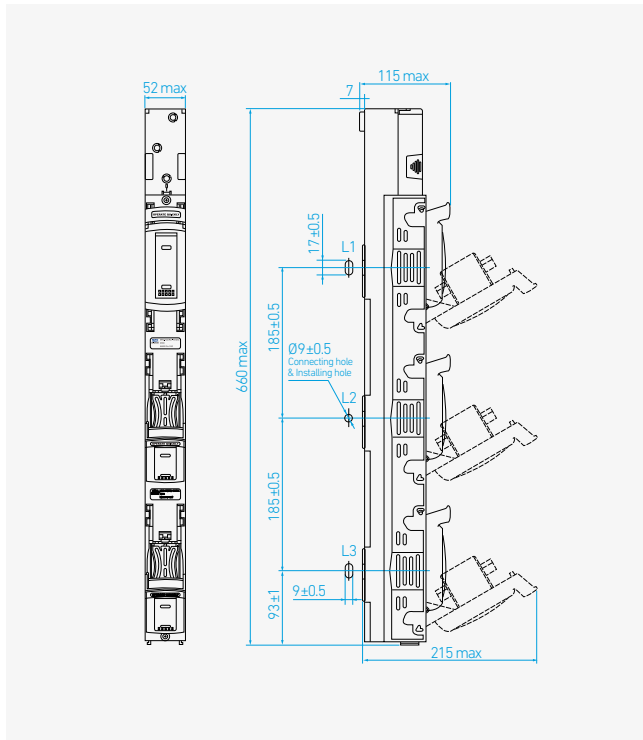
Note: I - connecting current
Ie - rated working current
Ir - breaking current

U - post connecting voltage
Ue - rated working voltage
Ur - recovery current

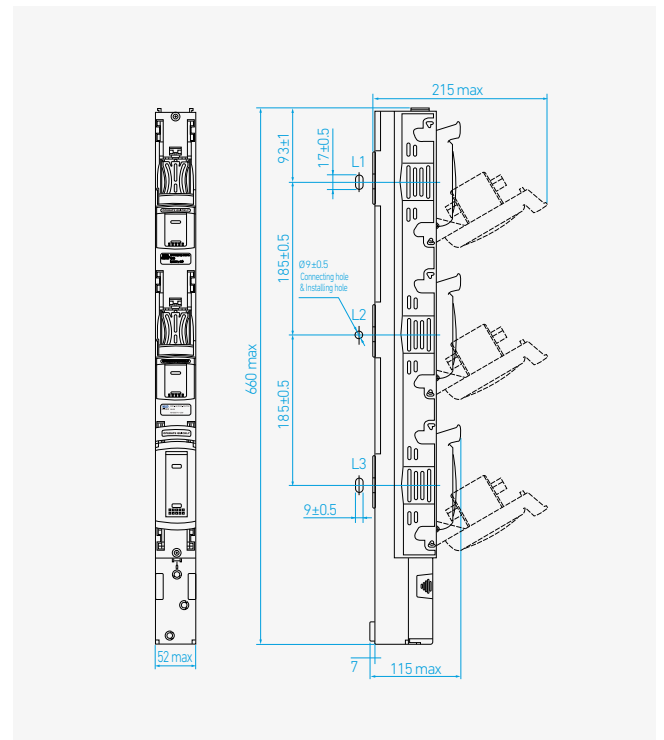
Dimension

Fuse Switch

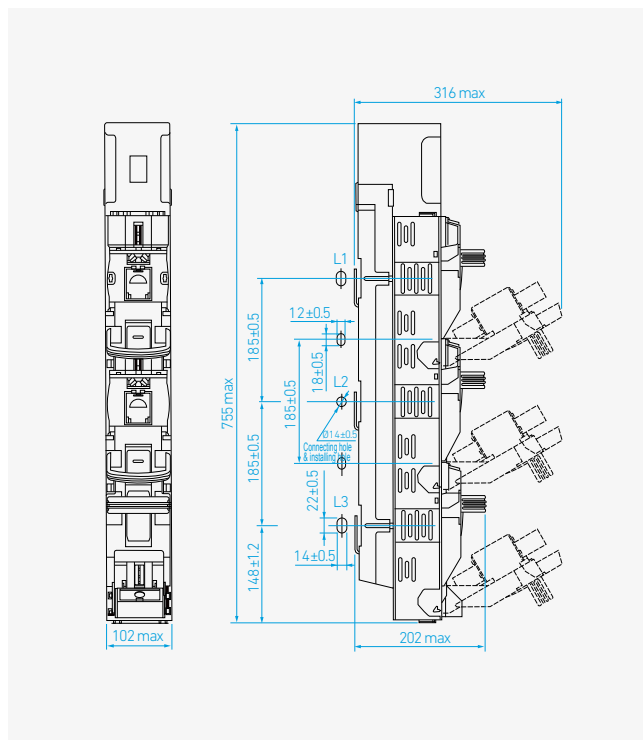
HC-U / 160 AF



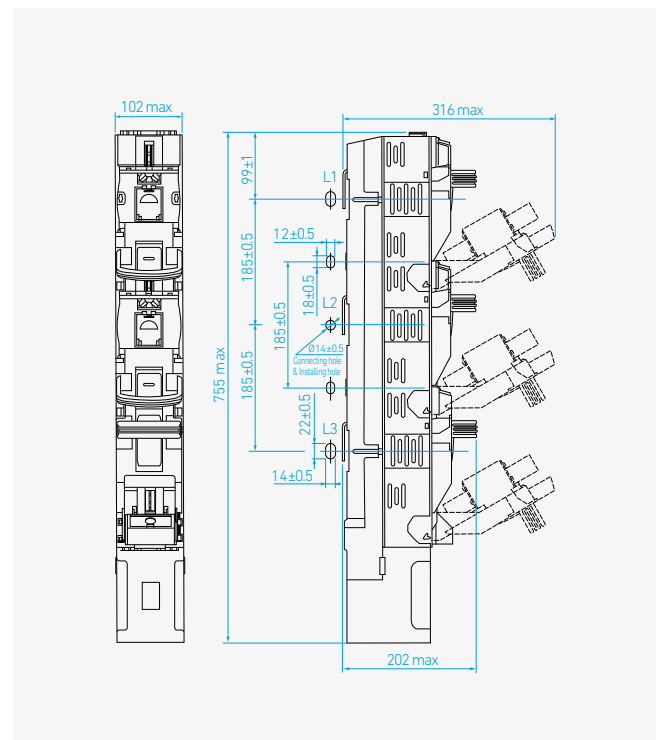
HC-D / 160 AF



HC-U / 250, 400, 630 AF

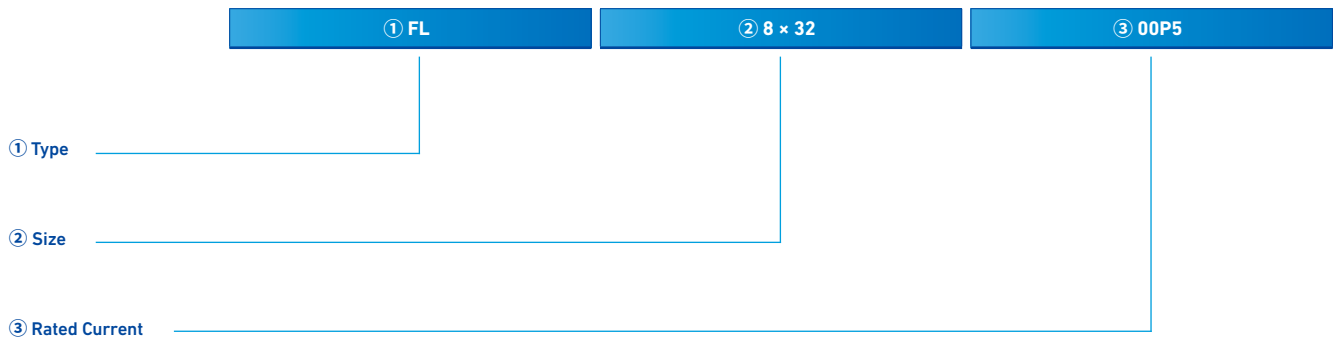


HC-D / 250, 400, 630 AF



FUSE Ordering Information

Fuse Link



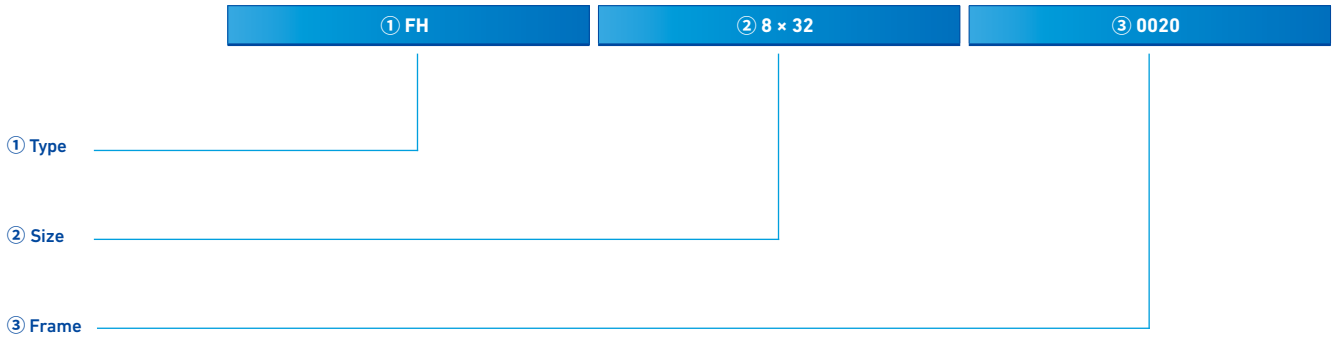
① Type	
FL	Fuse link

② Size	
8 x 32	00P5 ~ 0016 range
10 x 38	00P5 ~ 0032 range
14 x 51	0002 ~ 0063 range
22 x 58	0010 ~ 0125 range
NT00C	0002 ~ 0100 range (NT type)
NT00	0004 ~ 0160 range (NT type)
NT0	0006 ~ 0160 range (NT type)
NT1	0032 ~ 0250 range (NT type)
NT2	0080 ~ 0400 range (NT type)
NT3	0160 ~ 0630 range (NT type)
NT4	0500 ~ 1,250 range (NT type)

※ NH Fuse type: please contact sales dept'.

③ Rated Current	
00P5	0.5 A
0001	1 A
0002	2 A
0004	4 A
0006	6 A
0010	10 A
0016	16 A
0020	20 A
0025	25 A
0032	32A
0040	40 A
0050	50 A
0063	63 A
0080	80 A
0100	100 A
0125	125 A
0160	160 A
0200	200 A
0224	224 A
0250	250 A
0300	300 A
0315	315 A
0355	355 A
0400	400 A
0425	425 A
0500	500 A
0630	630 A
0700	700 A
0800	800 A
1000	1,000 A
1250	1,250 A

Fuse Holder



① Type

FH	1 Pole
FH2	2 Pole
FH3	3 Pole
FH4	4 Pole

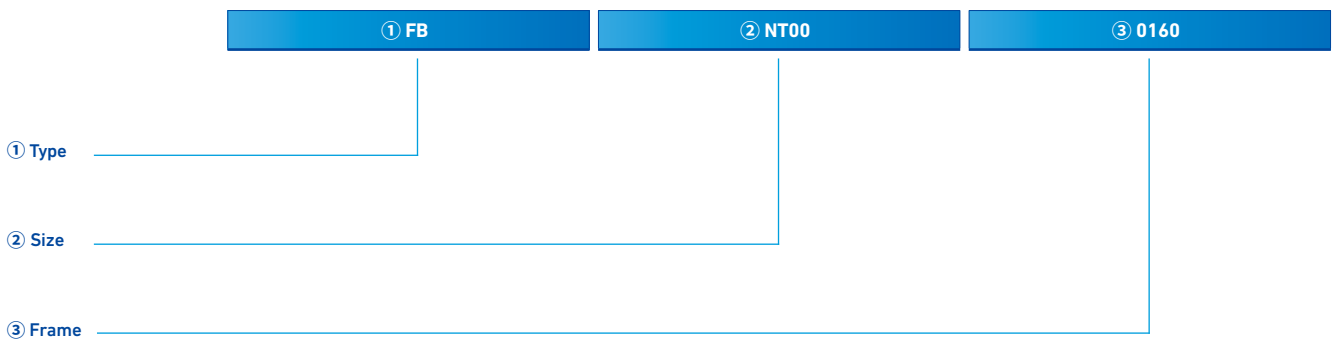
② Size

8 x 32	Fuse holder(20AF)
10 x 38	Fuse holder(32AF)
14 x 51	Fuse holder(63AF)
22 x 58	Fuse holder(125AF)

③ Frame

0020	20 AF
0032	32 AF
0063	63 AF
0125	125 AF

Fuse Base



① Type

FB	Fuse base
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② Size

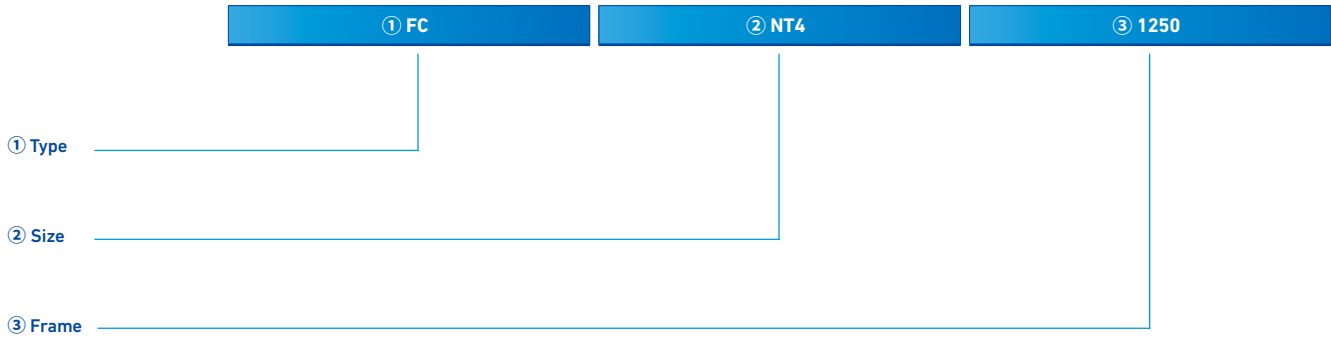
NT00	Fuse base (160AF)
NT0	Fuse base (160AF)
NT1	Fuse base (250AF)
NT2	Fuse base (400AF)
NT3	Fuse base (630AF)
NT4	Fuse base (1,250AF)

③ Frame

0160	160 AF
0250	250 AF
0400	400 AF
0630	630 AF
1250	1,250 AF

FUSE Ordering Information

Fuse Carrier

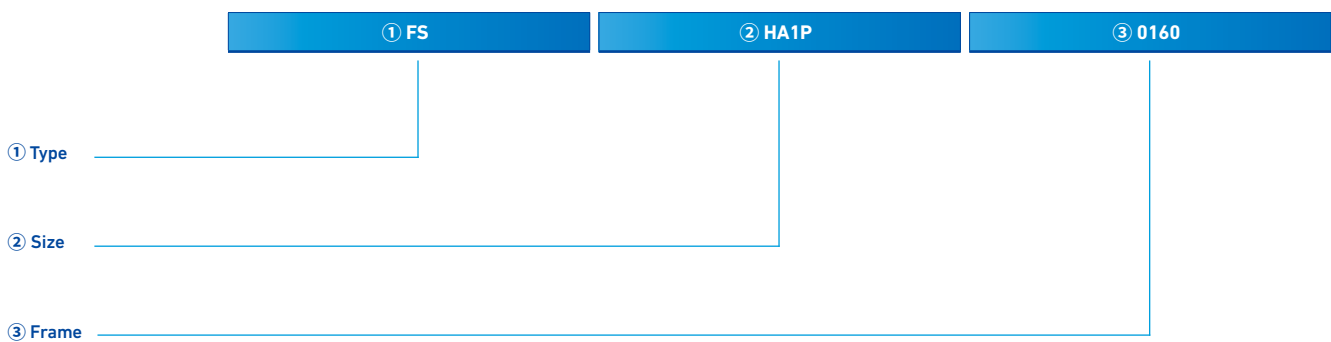


① Type	
FC	Fuse carrier

② Size	
NT4	Fuse carrier (NT00-NT4)

③ Frame	
1250	1,250 AF

Fuse Switch



① Type	
FS	Fuse switch

② Size	
HA1P	HA type fuse switch
HA3P	HA type fuse switch
HA4P	HA type fuse switch
HB-U	HB type fuse switch
HB-D	HB type fuse switch
HC-U	HC type fuse switch
HC-D	HC type fuse switch

③ Frame	
0160	160 AF
0250	250 AF
0400	400 AF
0630	630 AF

Handling and Maintenance Inspection

Storage and Transportation

Storage Precaution

| Ambient temperature | -40~55 °C (SPD: -40~70°C)

| Altitude | Below 2,000 m above sea level

| Relative humidity | Within 45 %~95 %

The surrounding environment may affect the insulation function and endurance of the miniature and earth leakage circuit breakers so the environmental condition for usage must be accurately checked before application.



- **Do not store in places with corrosive gas**
Do not leave it around gas containing sulfurous gas or sulfur or ammonia gas and others.



- **Do not store in places with high humidity for a long period of time**



- **Do not leave under direct sunlight for a long period of time**



- **Avoid places with a lot of dust**
Do not store in expose places, use cover or packaging material to prevent dust from piling up on the circuit breaker.



- **Avoid storage in high or low temperature**
Storage temperature must be maintained between -40 °C~+55 °C.

Transportation Precautions



Caution

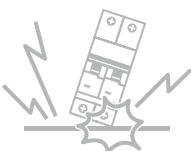
- Do not apply impact during transportation. Dropping or applying strong impact may cause defect.
- Do not handle while holding the circuit breaker's accessory or the external plug-in wire of the accessory. It may cause injury to the handler or a malfunction of the circuit breaker.



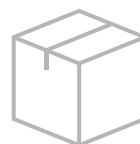
- **Hold the main unit of the circuit breaker during transportation**
Do not handle while holding the external guide line of the accessory or the terminal bar.



- **Pay attention when handling metal accessories**
Sharp planes or edges in the metal accessories may cause injury.



- **Do not apply impact during transportation**
Dropping or applying strong impact may cause defect.



- **Pay attention to the packaging of the circuit breaker before transportation.**
Inappropriate packaging may cause damage in the circuit breaker during transportation.

Handling and Maintenance Inspection

Installation

Installation Precautions

- **Install the circuit breaker in a place that satisfies the following environmental conditions**

Installing the circuit breaker in places and environment other than the following may cause malfunction of circuit breaker, fire and others.

- Ambient temperature of -40 °C to +55 °C
(However, the 24-hour average temperature must not exceed 35 °C.)
- Relative humidity to be within 45~95 %
- Excessive vibration or impact to be avoided
- Altitude to be below 2,000 m
- To be used in an environment without excessive water vapor, oil vapor, smoke, dust, alkaline, corrosive material and others
- To avoid direct sunlight



- **Arc gas exhaust hole must not be blocked**
It may drop the breaking capacity.



- **Attention to be paid to dust, metal fragments and others**
After installation, protection cover and covers to be covered during work



- **The insulation plate attached to the bottom of the circuit breaker must not be separated**
It may destroy insulation and drop the insulation performance.

Connection Precautions



- **When fastening the terminal screw, it should be fastened according to the specified torque**
Incomplete fastening of terminal screw may cause overheating so each terminal screw must be fastened completely according to the specified torque. In addition, excessive fastening torque may cause damage in the terminal screw and the circuit breaker case.



- **Exposed conductor must be insulated**
Insulating tube or insulating tape must be used for complete insulation between the bare conductors of the MCB.
In case the terminals are not insulated, it may cause secondary short-circuit during short-circuit accidents.



- **In case of 4 pole circuit breaker, the neutral wire of 3 phase 4 wire must be connected to the N phase.**
It may not function in overcurrent which may cause fire.



- **Use of lubricant at the terminal screw part is prohibited**
Lubricant reduces the friction of the screw, causing the screw to loosen, ultimately leading to an increase in temperature.



- **Stud must not be deformed**
Excessive force must not be applied to the stud at the conductor connecting part of the rear connection type.
In addition, stud must not be deformed during wiring.



- **The conductor must be fixed firmly on a flat state.**
As for the connecting conductor, electromagnetic force between conductors is generated by extremely big fault current so it must be fixed firmly.

Connection Precautions

The following table is the impact force generated by fault current.

Impact force per 1m conductor

Regulated Short-Circuit Current kA () Power Factor	Force (In Case of 3 Phase Short Circuit) N (kgf)	
	10 cm Conductor Interval	20 cm Conductor Interval
10 (0.4)	490 (50)	245 (25)
18 (0.3)	1,863 (190)	932 (95)
25 (0.2)	4,412 (450)	2,206 (225)
35 (0.23)	8,630 (880)	4,315 (440)
42 (0.2)	12,455 (1,270)	6,277 (635)
50 (0.2)	17,652 (1,800)	8,826 (900)
65 (0.2)	29,910 (3,050)	14,955 (1,525)
85 (0.2)	51,190 (5,22)	25,595 (2,510)
100 (0.2)	70,804 (7,220)	35,402 (3,610)
125 (0.2)	110,815 (11,300)	55,408 (5,560)

- **Contact surface must be clean**

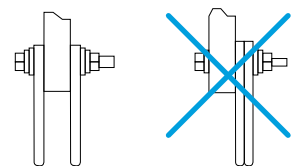
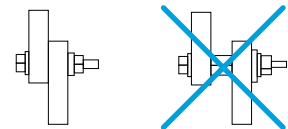
Dust and others must be removed from the contact surface to prevent increase in connection resistance at the contact surface.

- **Conductor must be connected so that it has direct contact with the contact surface**

Do not use bolt or nut between the contact surfaces of the conductor.
If there is no direct contact between conductors, it may cause increase in temperature and fire.

- **Do not overlap the conductors**

When numerous conductors are connected to the terminal bar, do not overlap and assemble. Assemble at both ends of the terminal bar.



Handling and Maintenance Inspection

Maintenance Inspection

Initial Inspection

- Residues of steel plate, grinded materials of the wire, other conductor's foreign substances and others must not be left around the terminal of the circuit breaker
- There must be no crack and damage in the cover and base
- The fastening status of the terminal fastening part must be checked
- Check if the rated voltage and breaking capacity of the circuit breaker are correct
- When the insulation resistance is measured using a 500 V insulation-resistance tester, it must be above 5 MΩ

Withstand voltage

Main Circuit		Auxiliary Circuit or Control Circuit ¹⁾	
Rated Insulation Voltage	Test Voltage (Effective Value of Interchange)	Rated Insulation Voltage of Operational Circuit	Test Voltage (Effective Value of Interchange)
$U_i \leq 300 \text{ V}$	2,000 V for 1 min	$U_{is} \leq 60 \text{ V}$	1,000 V for 1 min
$300 < U_i \leq 600 \text{ V}$	2,500 V for 1 min	$60 \text{ V} < U_{is} \leq 600 \text{ V}$	2- U_{is} 1,000 V (min. 1,500 V) for 1 min

※ Based on the abovementioned table, do not conduct withstand voltage test above it.

1) Between terminal and grounding

Installation

Regular Inspection

Inspection shall be conducted 1 month before/after the commencement of the equipment operation in order to maintain the performance of the circuit breaker and to prevent unexpected accidents. After that, regular inspection is required depending on the environment.

Standard inspection period

Extent	Environment	Standard of Inspection Period
Standard Usage State	Clean and dry state of air	Less than 10 years after installation-Once in 2~3 years
		More than 10 years after installation-Once a year
		More than 15 years after installation-Once in 6 months
	Place without corrosive gas even though there is dust inside	Less than 10 years after installation-Once a year
		More than 10 years after installation-Once in 6 months
		More than 15 years after installation-Once a month
Bad Environment	Place containing sulfurous acid, hydrogen sulfide, salinity, vapor and others	Less than 5 years after installation-Once in 6 months
		More than 5 years after installation-Once a year
	Places with specially more corrosive gas	Once a month

Regular Inspection Item

Inspection Item	Procedure	Countermeasure
Tightening of Terminal Screw	<ul style="list-style-type: none"> Inspect tightening of terminal screw, conductor connecting screw 	<ul style="list-style-type: none"> Tighten according to the specified torque Ensure that it is not tightened excessively
Dust and Foreign Substance	<ul style="list-style-type: none"> Check foreign substance such as dust on the circuit breaker's surface, especially the top of the live part. There must be no dust or foreign substance to secure insulation distance 	<ul style="list-style-type: none"> Remove dust, foreign substance and others using cloth with clean surface types (Do not use thinner or detergent)
Damage in Mold Case	<ul style="list-style-type: none"> Check damage or crack on the circuit breaker's cover and base 	<ul style="list-style-type: none"> Replace circuit breaker
Arc Exhaust Hole	<ul style="list-style-type: none"> Check pollution in the arc exhaust hole 	<ul style="list-style-type: none"> If there are burns or excessive pollution due to melted metal particles and others, replace the circuit breaker
Switch Operation	<ul style="list-style-type: none"> If the circuit breaker was maintained at closed state at normal times, operate the switch multiple times. Friction caused by hardened grease and others will be reduced and the contact resistance can be stabilized Press the trip button to trip the circuit breaker multiple times 	<ul style="list-style-type: none"> If there is a problem in the switch operation of the circuit breaker, replace or contact the nearest store If the specified limit value of the switch operation has exceeded, replace it
Discoloration of Terminal Part	<ul style="list-style-type: none"> Check severe discoloration in the terminal part or conductor part If there is severe discoloration in the copper conductor or silver coated part, check the insulation performance caused by thermal damage 	<ul style="list-style-type: none"> Slight discoloration in the silver coated part is not a problem. If there is a problem in insulation due to thermal damage, replace the circuit breaker
Insulation Resistance	<ul style="list-style-type: none"> Separate all conductors connected to the circuit breaker and measure the insulation resistance between the poles, terminals and groundings 	<ul style="list-style-type: none"> If the insulation resistance is not more than 5 MΩ, replace it

Inspection and Processing After Blocking Fault Current

In case the circuit breaker has blocked the fault current, determine whether it can be re-used or whether it has to be replaced with a new product depending on the size of the fault current.

- In case the arc exhaust hole is not polluted or there are no other abnormalities, it can be reused.
- In case there is pollution such as dark burns around the arc exhaust hole and in case the insulation resistance is above 5 MΩ, there is no dielectric breakdown when the specified withstand voltage is applied and in case there is no excessive temperature increase in the terminal part, it can be reused.
- If there are burns at the handle part, severe pollution around the arc exhaust hole, melted metal particles and others, replace the circuit breaker immediately.

Handling and Maintenance Inspection

Installation

Countermeasures with Regards to Abnormal Phenomenon




In case there is abnormal phenomenon during the use of circuit breakers, take appropriate action according to the following table.

Type of Abnormality	Phenomenon	Assumed Cause	Action to be Taken
Abnormal Heating	Heating at terminal part	• Loose terminal screw, conductor connecting screw	Re-tighten according to the specified torque
		• Increased resistance of contact	Replace circuit breaker
	Damage in insulation material at terminal part	• Loose terminal screw, conductor connecting screw	Replace circuit breaker
		• Defect in contact between circuit breaker's terminal and terminal bar or cable lugs due to loose screw tightening and interference caused by foreign substance	
	Abnormal heating in the circuit breaker's external case	• Increased resistance of contact	Replace circuit breaker
		• Loosening at the internal connection part	
• Increased current density due to disconnection			
Defect in Current Flow	Abnormal voltage at load side	• Big consumption at contact	Replace circuit breaker
		• Foreign substance between contacts	
		• Fusing at conductive part (excessive opening/closing and corrosion due to corrosive gas)	
Does not Function	ON does not function	• No reset in trip state	ON after reset
		• Damage in trip mechanism due to excessive opening/closing	Replace circuit breaker
		• Demagnetized state of under-voltage trip device	Apply specified voltage
	OFF does not function	• Fusing at contact	Replace circuit breaker
	RESET does not function	• Demagnetized state of under-voltage trip device	Apply specified voltage
		• Bimetal has not been cooled sufficiently	Reset after sufficient cooling
		• Corrosion or deformation of bimetal	Replace circuit breaker
		• Abnormality in mechanism	
		• Can't be used due to excessive opening/closing	
		• Damage in mechanism due to excessive breaking current	

Type of Abnormality	Phenomenon	Assumed Cause	Action to be Taken
Frequent Breaking	Trip under rated current	• High ambient temperature (above 40°C)	Lower the ambient temperature using wind and others
		• Abnormal heating due to loosening of screw at terminal part	Re-tighten according to the specified torque
		• Internal heating at the circuit breaker	Replace circuit breaker
		• In case the cross sectional area of connecting conductor is smaller than the regulation	Change the connecting conductor or change the circuit breaker's rated current
	Trip in running current	• Trip in running inrush current	Change the instantaneous trip current setting or replace with circuit breaker with bigger rated current
		• Trip during switching at Y-Δ operation	
		• Trip during switching in reversible operation	
		• Trip in big running current	Replace with circuit breaker with bigger rated current
		• Trip in long running current	
		• Short circuit between motor layer • Wrong connection of SHT/UVT's operational circuit	Repair or replace motor Inspect wiring
Overcurrent does not Function	Does not function above specified operational current	• When current limiting breaking of upper fuse or cooperation with upper circuit breaker is low	Review cooperation again
		• When the ambient temperature is significantly low	Check the compensating current
		• Inappropriate rated current	Check the rated current
Abnormality in Accessory	Abnormal operation of shunt trip device (SHT)	• Abnormal voltage of operational circuit	Check the rated voltage
		• Does not function due to voltage drop in operational circuit	Maintain the rated voltage
		• Coil damage due to difference in the coil's rated voltage, non-operation of damage prevention switch and others	Replace accessory
	Abnormal operation of under-voltage trip device (UVT)	• Defect in mechanism	Replace accessory
		• Difference in voltage used	Check the rated voltage
		• Damage in UVT controller	Replace and check disconnection
	Abnormal operation of auxiliary switch (AUX) and alarm switch (ALT)	• Contact damage due to excessive micro switch rating	Replace and check the micro switch load
• Defect in mechanism		Replace and repair accessory	

Current Status of Acquired Standards

Approvals & Certificates

Type		Approvals		Certificate
Certificate		Safety Certification	IEC	IEC
Mark				
Testing Institute		KTC	CE	KEMA
Certification Region		Korea	Europe	Netherlands
MCB	HGD63N/H (Deluxe type)		●	●
	HGD125 (Deluxe type)		●	●
	HGD32NS (Standard type)		●	●
	HGD63E/S/U (Standard type)		●	●
	HGD63M/P (Standard type)	●	●	●
	HGD100S (Standard type)	●	●	●
RCCB	HRC63/100 (Deluxe type)		●	●
	HRC63S/100S (Standard type)	●	●	●
RCBO	HRO63S (Standard type)		●	●
	HRO63M/P (Standard type)		●	●
	HRO40L/T/HT (Standard type)		●	●
	HRO40M/ML/P/PL (Standard type)		●	●
MSD	HSD125 (Deluxe type)		●	●
	HSD100S (Standard type)		●	●
HBD	HBD51h/51hD HBD52h/52hD HBD53h/53hD	●	●	●
	HBD51/51D HBD52/52D HBD53/53D	●	●	●



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