



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.



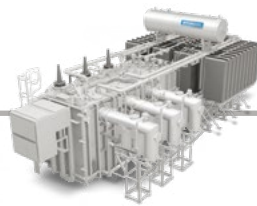
Generation

Power Plants

Primary Substation

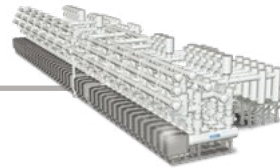
- Supplied more than 1.2 million MVA in total to 70 countries around the world for the past 40 over years since 1978
- Satisfies the various demands of customers through the acquisition of quality certifications from international accredited institute
- Participates in the world's key technical committee 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

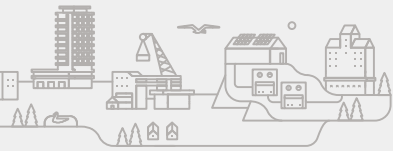


Generators



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



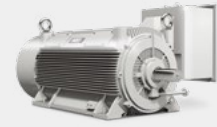
Inverter Shield Motor

- 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

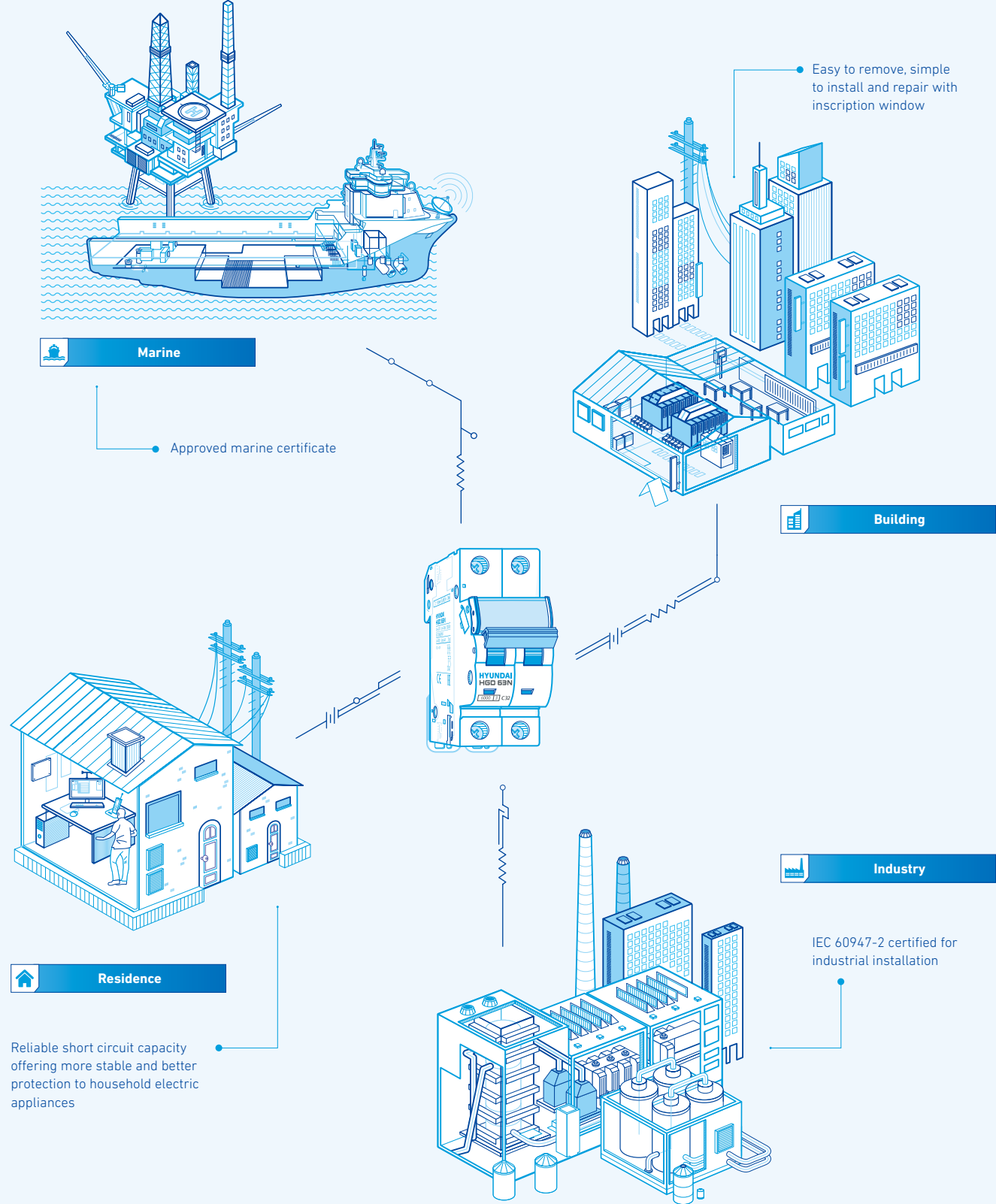


Explosion-Proof (Class 1 Div.1) Motor

- 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

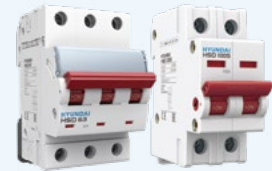
Miniature Circuit Breaker

| 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

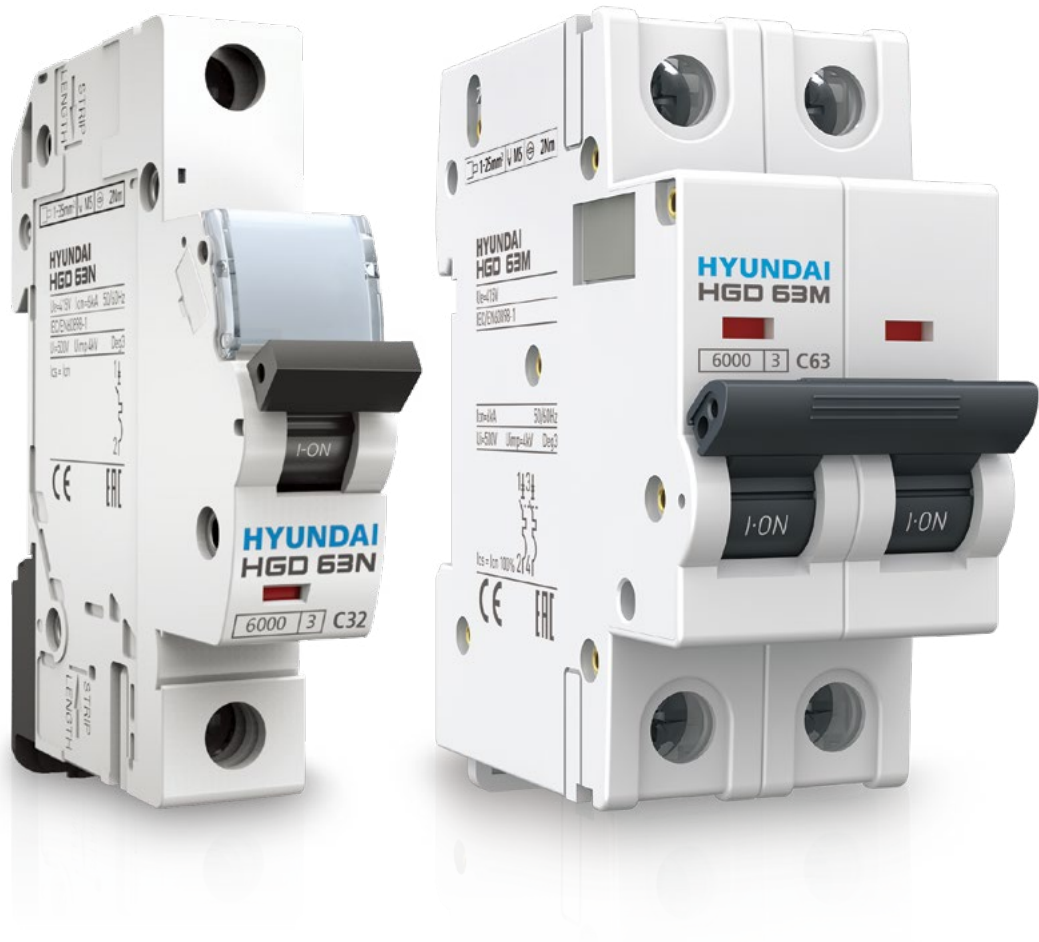
Miniature Circuit Breaker

| | |
|-------------------|----|
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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 | 90 x 76.9 x 26.7 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 |

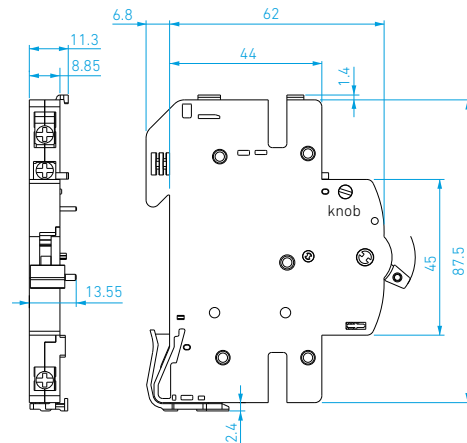
Ordering Information

| | |
|------------|---------|
| AXT HGD63H | AUX/ALT |
|------------|---------|

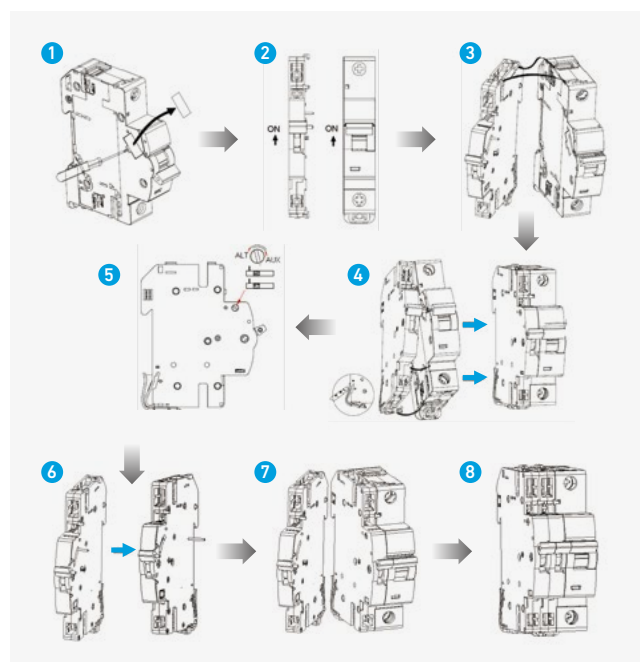
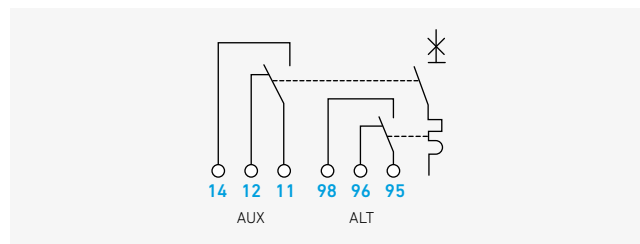
Assembling with MCB (HGD Accessories)

- 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

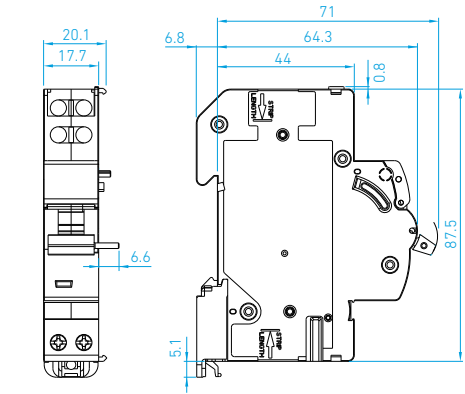
| Phase | Single phase | Three phase |
|--|-----------------------------|-------------|
| Standard Conformity | IEC 60947-1 | |
| Rated Voltage | AC 240 V | |
| Frequency | 50/60 Hz | |
| Under Voltage Trip Voltage | $V \leq 0.7 U_e$ | |
| Terminal Size | 6 mm ² | |
| Protection Degree | IP20 | |
| Mechanical 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

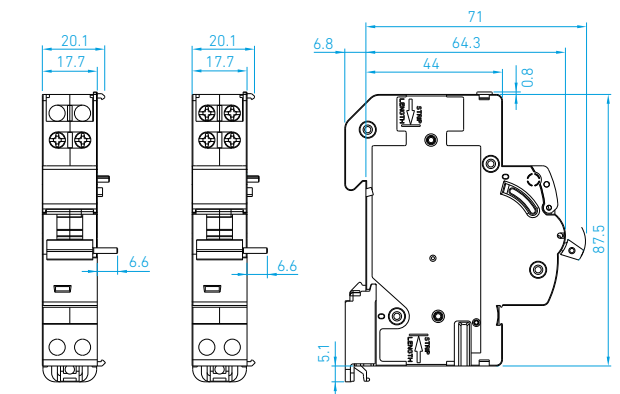


SINGLE PHASE

Circuit Diagram



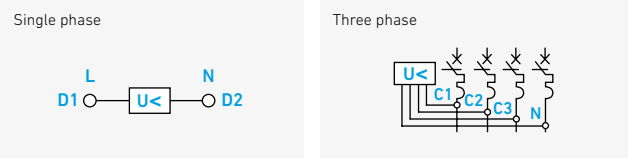
Dimension



SINGLE PHASE

THREE PHASE

Circuit Diagram



Accessories (Deluxe Type)

Under Voltage Trip + Time Delayed (UVT + t)

Technical Specification

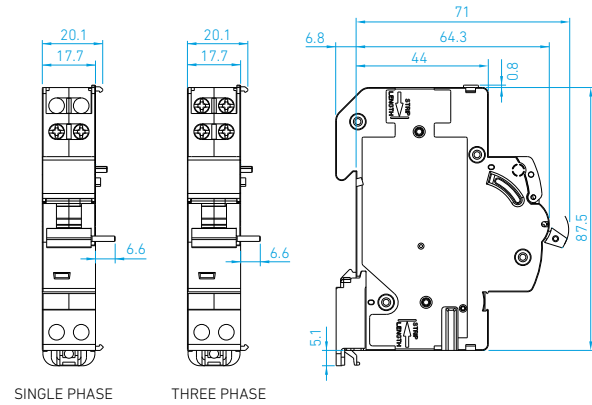
| Phase | Single phase | Three phase |
|--|-----------------------------|-------------|
| Standard Conformity | IEC 60947-1 | |
| Rated Voltage | AC 240 V | |
| Frequency | 50/60 Hz | |
| Under Voltage Trip Voltage | $V \leq 0.7 U_e$ | |
| Trip Delay | 0.2 sec | |
| Terminal Size | 6 mm ² | |
| Protection 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

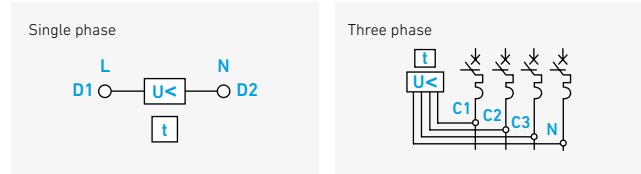
| | |
|-----------------|--------------|
| UVT HGD63H DUS2 | Single phase |
| UVT HGD63H DUT2 | Three phase |

Dimension



SINGLE PHASE THREE PHASE

Circuit Diagram



Over Voltage Trip (OVT)

Technical Specification

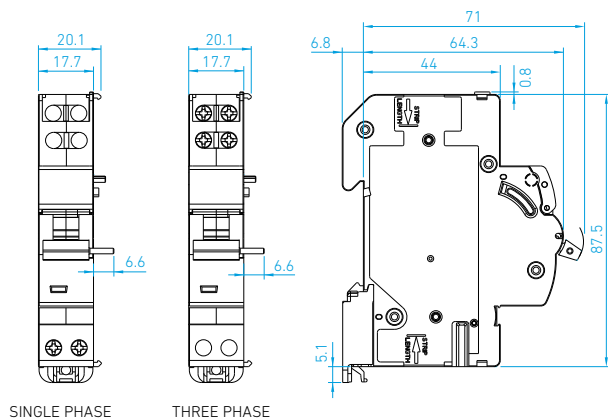
| Phase | Single phase | Three phase |
|--|-----------------------------|----------------|
| Standard Conformity | EN50550 | |
| Rated Voltage | AC 240 V | AC 240 V (L-N) |
| Frequency | 50/60 Hz | |
| Max Non-Tripping Voltage | AC 255 V | AC 255 V (L-N) |
| Max Tripping Voltage | AC 280 V | AC 280 V (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

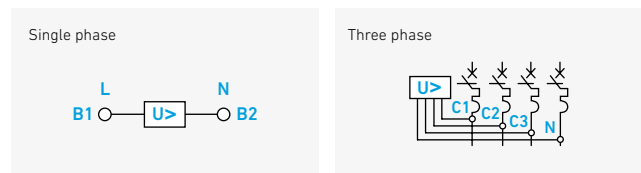
| | |
|----------------|--------------|
| OVT HGD63H OS2 | Single phase |
| OVT HGD63H OT2 | Three phase |

Dimension



SINGLE PHASE THREE PHASE

Circuit Diagram



Under + Over Voltage Trip (UOVT)

Technical Specification

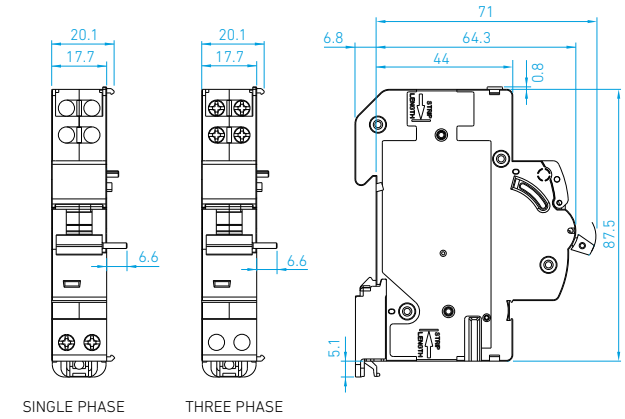
| | Single phase | Three phase |
|--|-----------------------------|----------------|
| Phase | Single phase | Three phase |
| Standard Conformity | IEC 60947-1, EN 50550 | |
| Rated Voltage | AC 240 V | AC 240 V (L-N) |
| Frequency | 50/60 Hz | |
| Max Non-Tripping Voltage | AC 255 V | AC 255 V (L-N) |
| 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.

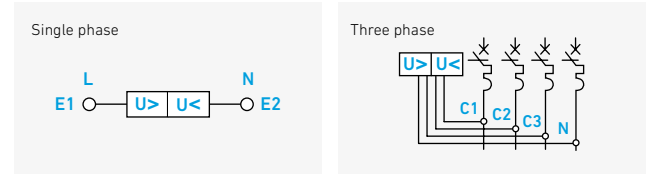
Ordering Information

| | |
|------------------|--------------|
| UOVT HGD63H U0S2 | Single phase |
| UOVT HGD63H U0T2 | Three phase |

Dimension

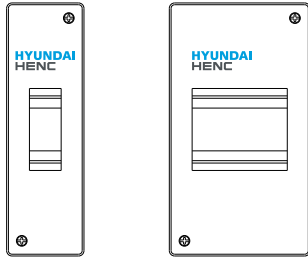


Circuit Diagram



Accessories (Deluxe Type)

Enclosure for MCB-PLASTIC (ENC)



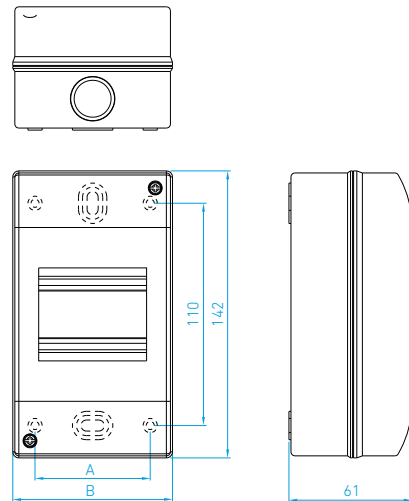
| No. of Ways | Dimensions (In mm) | |
|-------------|--------------------|------|
| | A | B |
| 1P/2P | 29.4 | 43.4 |
| 3P/4P | 57 | 79 |

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

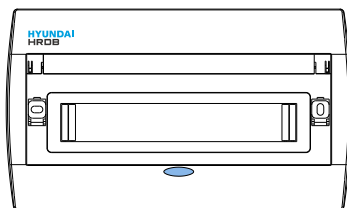
Ordering Information

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

Dimension



Distribution Board

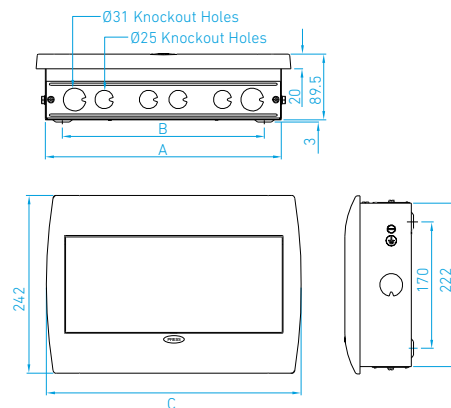


| No. of Ways | A | B | C | Top | | Bottom | | Side |
|-------------|-----|-----|-----|-----|-----|--------|-----|------|
| | | | | Ø25 | Ø31 | Ø25 | Ø31 | |
| 8 | 247 | 195 | 272 | 2 | 2 | 2 | 2 | 1 |
| 12 | 319 | 267 | 344 | 4 | 2 | 4 | 2 | 1 |
| 16 | 391 | 339 | 416 | 4 | 2 | 4 | 2 | 1 |

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)

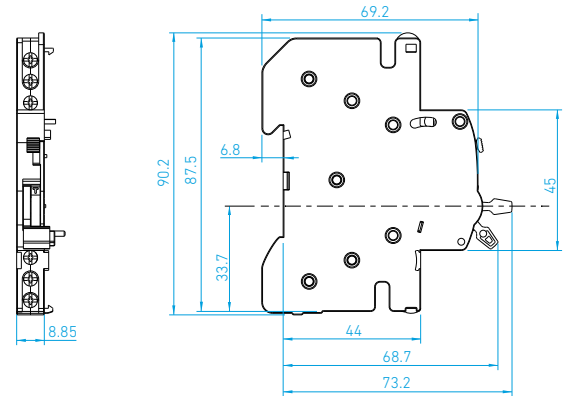
Technical Specification

| | |
|--|---|
| 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 |

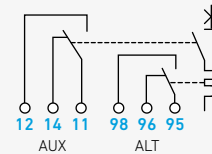
Ordering Information

| | |
|------------|---------|
| AXT HGD125 | AUX/ALT |
|------------|---------|

Dimension



Circuit Diagram

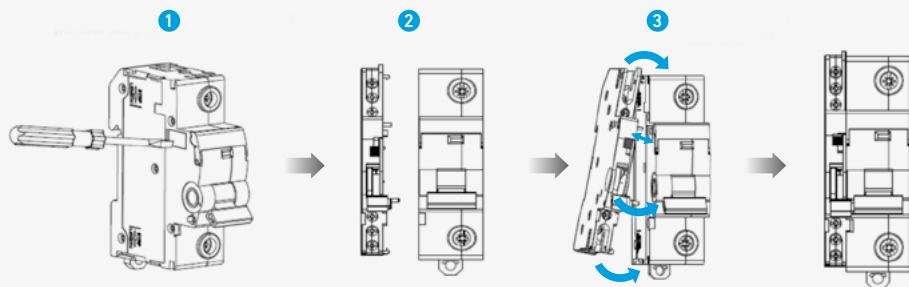


Assembling with MCB (HGD125)

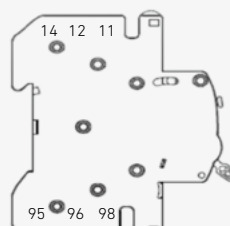
- 1 Remove the window sticker of the protection device with screw driver or by hand

- 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 |
|------------|-----|

Alarm Trip (ALT)

Technical Specification

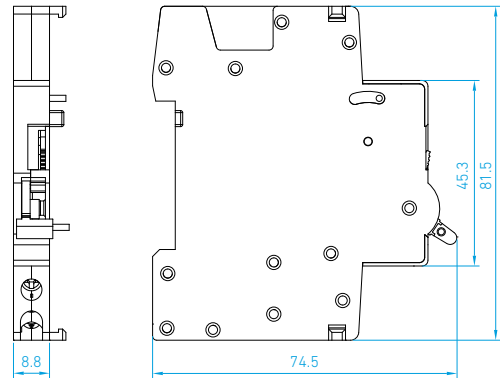
| | | | |
|--|---------------------------------------|---------|-----|
| Standard Conformity | IEC/EN 60947-5-4 | | |
| Current Carrying Capacity (max) | 6 A | | |
| Rated Voltage (Ue) | AC 240 V | | |
| Contact Configuration | 1NO + 1NC | | |
| Rated Insulation Voltage (Ui) | AC 500 V | | |
| Rated 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.

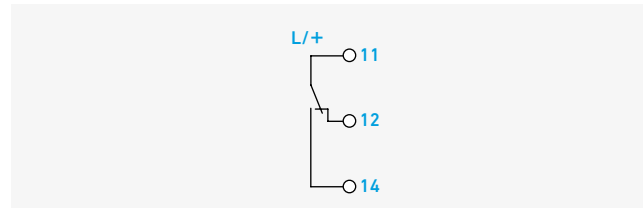
Ordering Information

| | |
|------------|-----|
| ALT HGD63P | ALT |
|------------|-----|

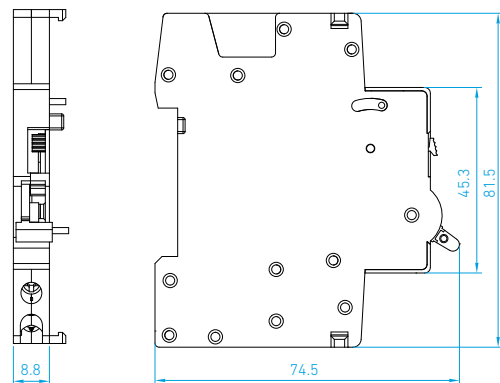
Dimension



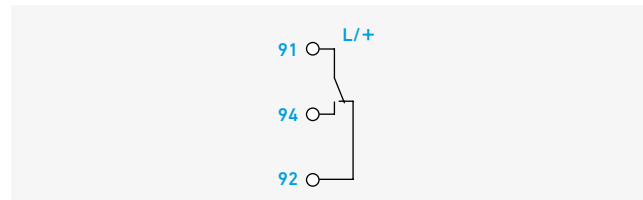
Circuit Diagram



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

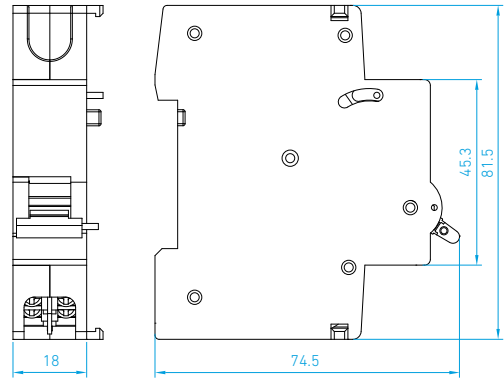
| | |
|--|-----------------------------|
| Standard Conformity | IEC 60947-1 |
| Coil Consumption | 6 VA |
| Rated Voltage (ac) (Ue) | AC 240 V |
| Rated Insulation Voltage (Ui) | AC 500 V |
| Rated Frequency (F) | 50/60 Hz |
| Operating Voltage Range | $V \leq 0.7 U_e$ |
| Electrical Endurance (no. 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 $170 V \pm 5 \%$

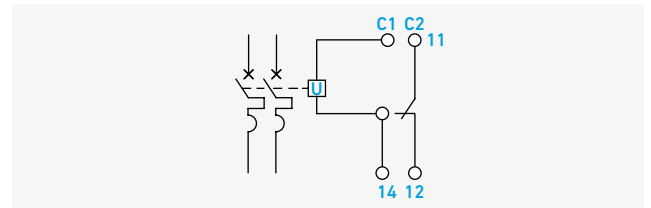
Ordering Information

| | |
|---------------|----------|
| UVT HGD63P U2 | AC 240 V |
|---------------|----------|

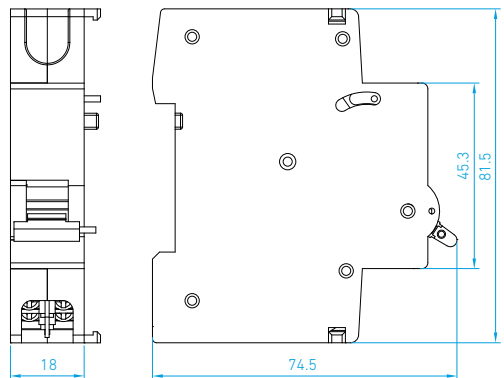
Dimension



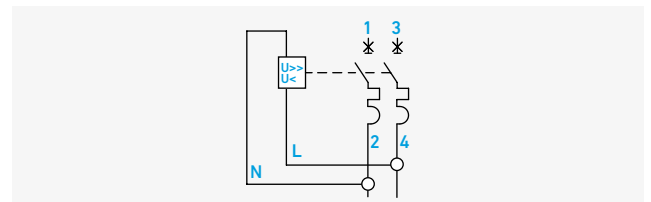
Circuit Diagram



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 |
|----------------|----------|

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 %

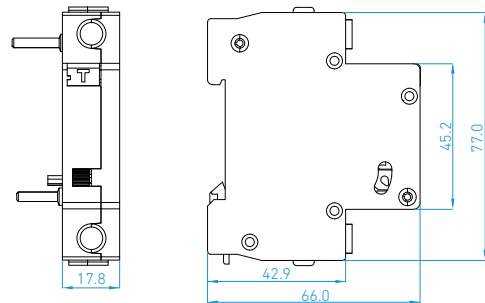
Ordering Information

| | |
|----------------|----------|
| UVT HGD100S U2 | AC 240 V |
|----------------|----------|

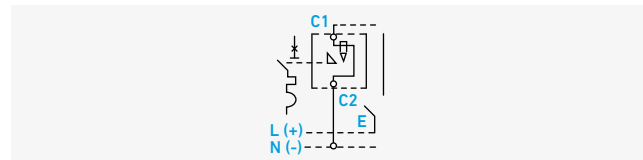
Handle Padlock Device (For 63 AF MCB)

| | |
|----------------------|---|
| 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 |  |

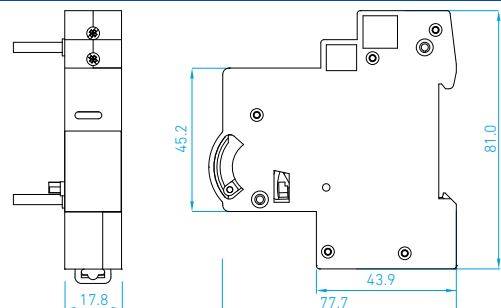
Dimension



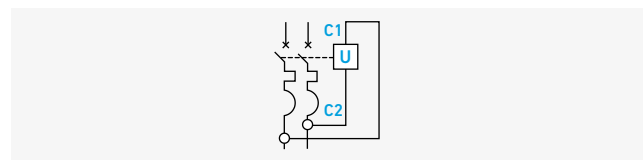
Circuit Diagram



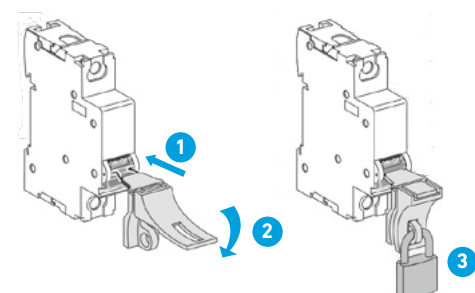
Dimension



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 | Single phase (AC 240 V) |
| | UVT HGD63H UT2 | | Three phase (AC 415 V) | |
| | UVT (Time Delayed Type) | UVT HGD63H DUS2 | Single phase (AC 240 V) | |
| | | UVT HGD63H DUT2 | Three phase (AC 415 V) | |
| | OVT | OVT HGD63H OS2 | Single phase (AC 240 V) | |
| | | OVT HGD63H OT2 | Three phase (AC 415 V) | |
| | UVT + OVT | UOVT HGD63H UOS2 | Single phase (AC 240 V) | |
| | | UOVT HGD63H UOT2 | Three phase (AC 415 V) | |
| | ENCLOSURE | 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

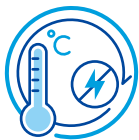
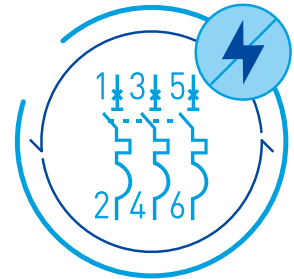
Description

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.

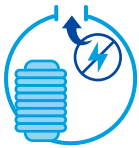
The contact mechanism comprises of fixed & moving contacts specially designed for reliability, long life and anti-weld properties. The arc extinguishing device comprises of 13 plates arc chute. The arc under the influence of the magnetic field and arc guide is moved into the arc chute where it is rapidly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

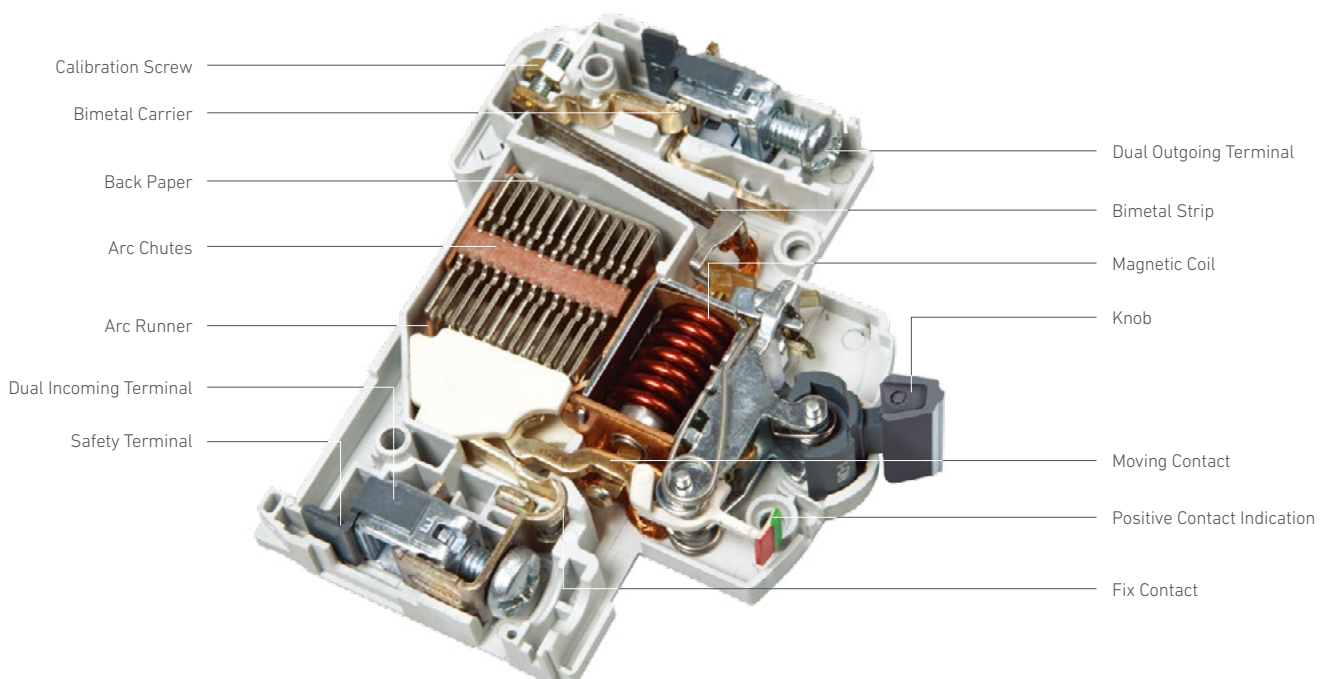


Magnetic Operation

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



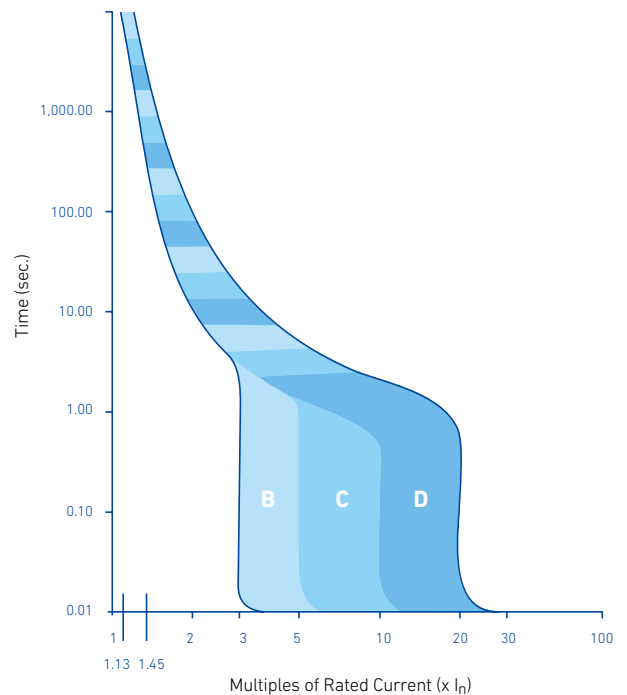
Characteristics Curves

| 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 |

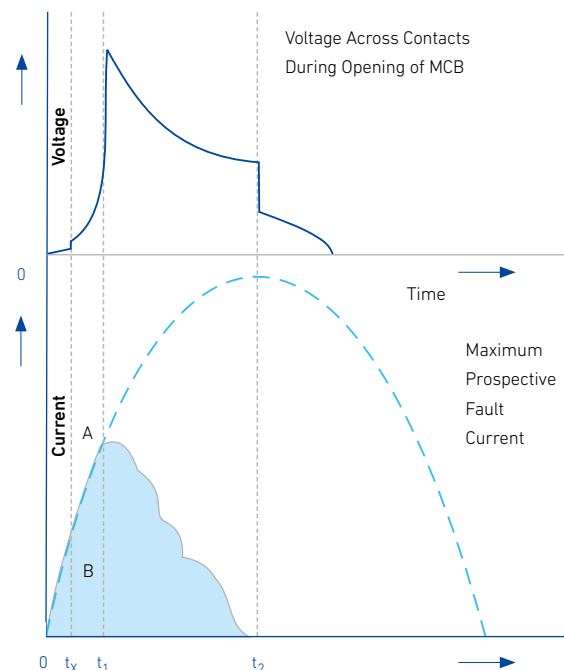
Current Limiting Design

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)

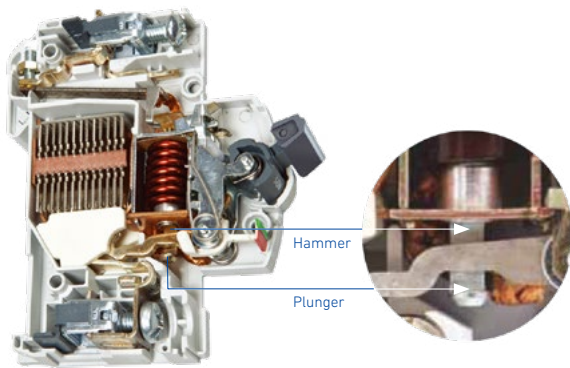


Standard Use Environment

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

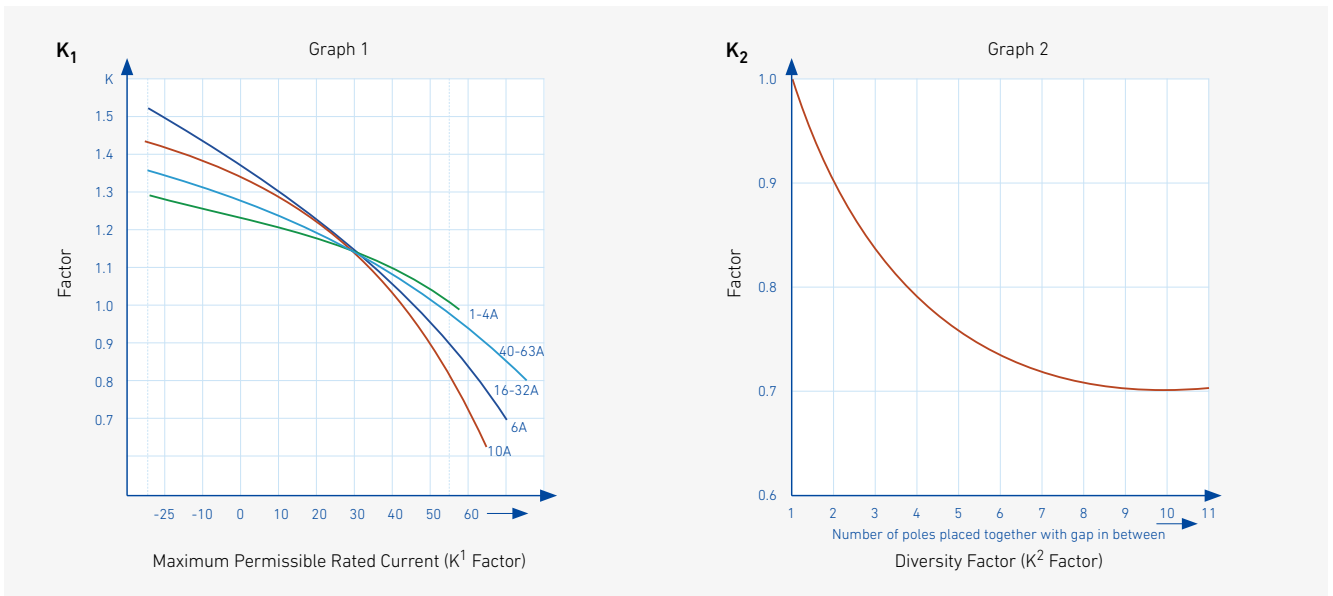
MCBs are designed to operate at AC frequency 50/60 Hz. However, MCBs specially suitable for DC applications and for frequencies upto 400 Hz can be supplied on request.

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

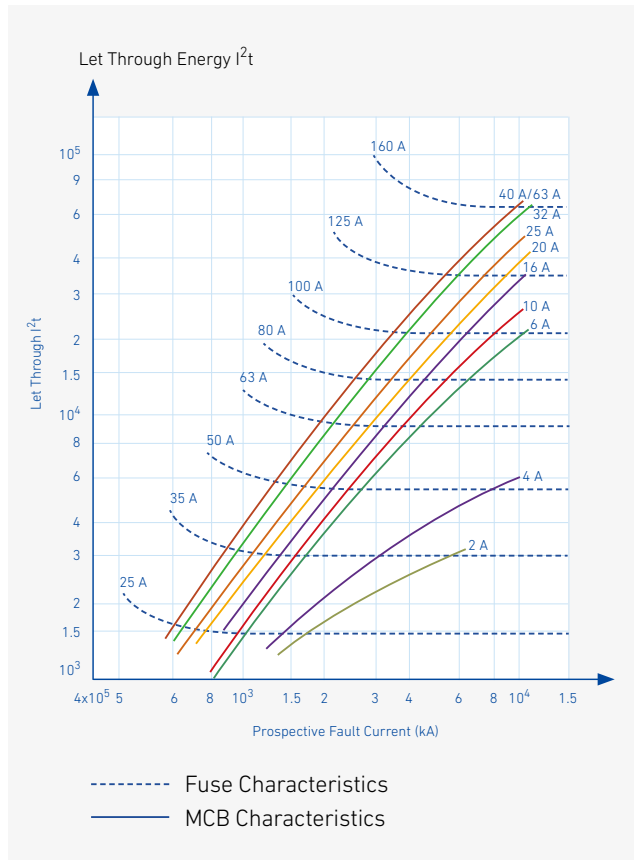
Solution

$K_1 = 0.89$ (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

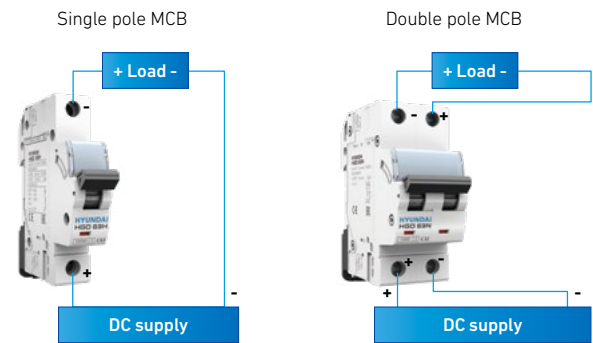
The voltage of the circuit is dependent on the power supply.

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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 32 A | | | | | | | | 1,800 | 2,000 | 2,200 | 2,500 | 5,400 | 8,700 | 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 |
| 50 A | | | | | | | | | | 1,300 | 1,500 | 3,600 | 5,900 | 9,000 | 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 |

※ 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: $\frac{\text{Total Load in Watts}}{\sqrt{3} \times 240 V}$

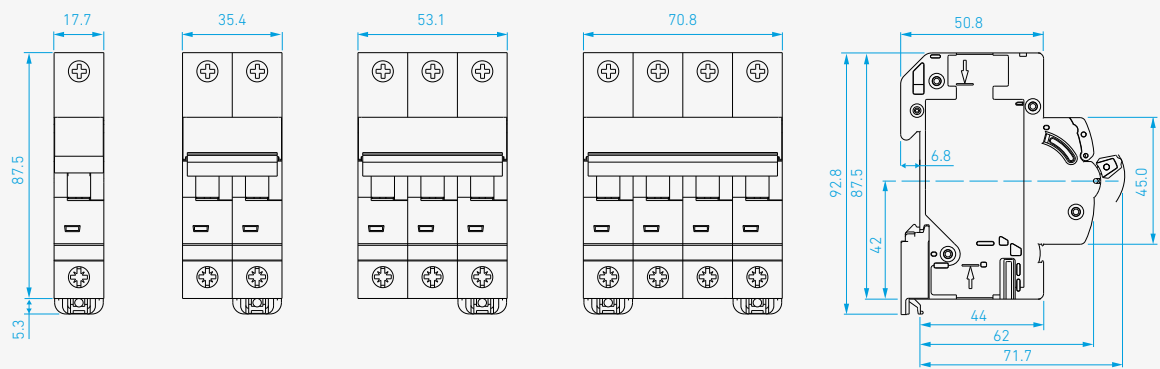
"C" series MCB is used for all motor applications

※ 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.

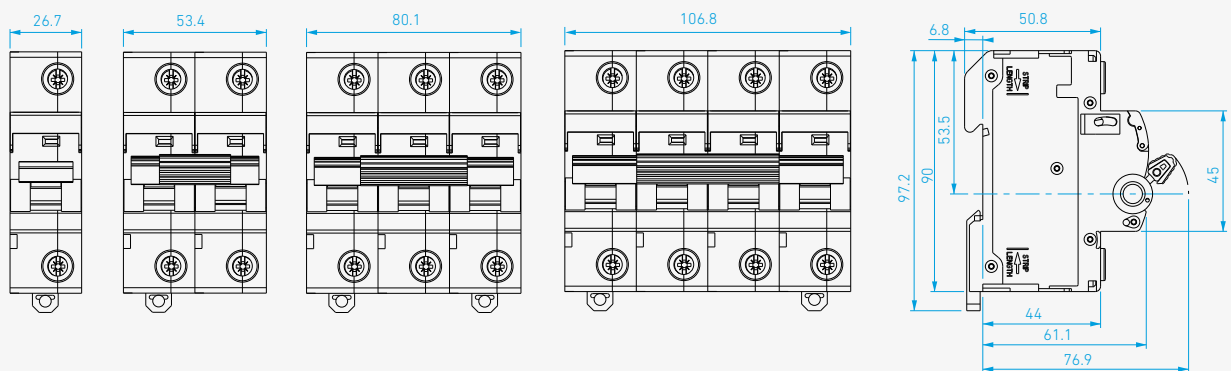
Dimensions

HGD (Deluxe Type)

HGD63N/H, 63 AF

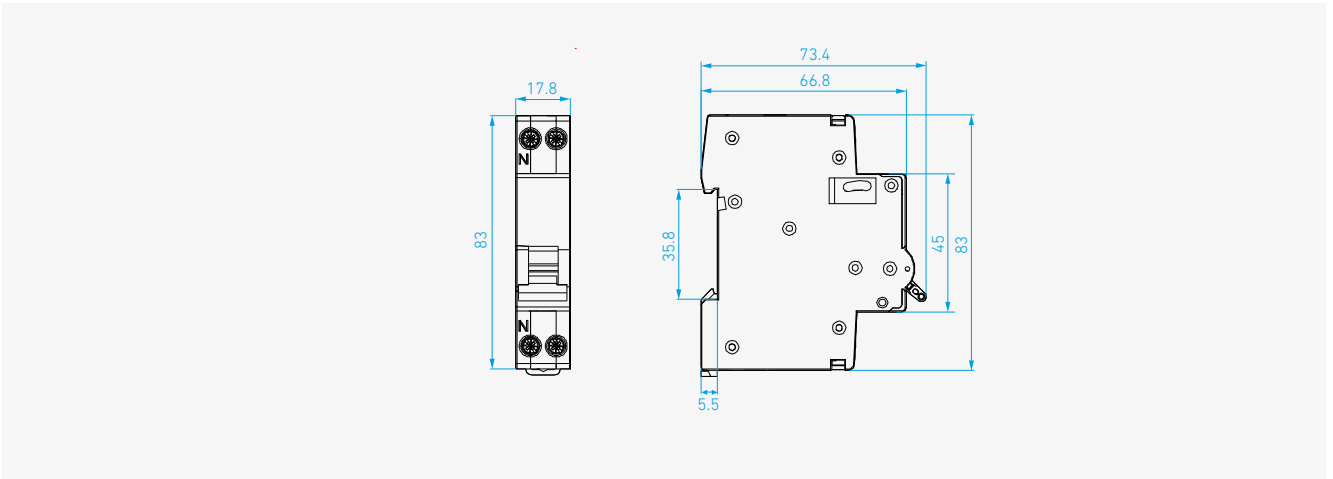


HGD125, 125 AF

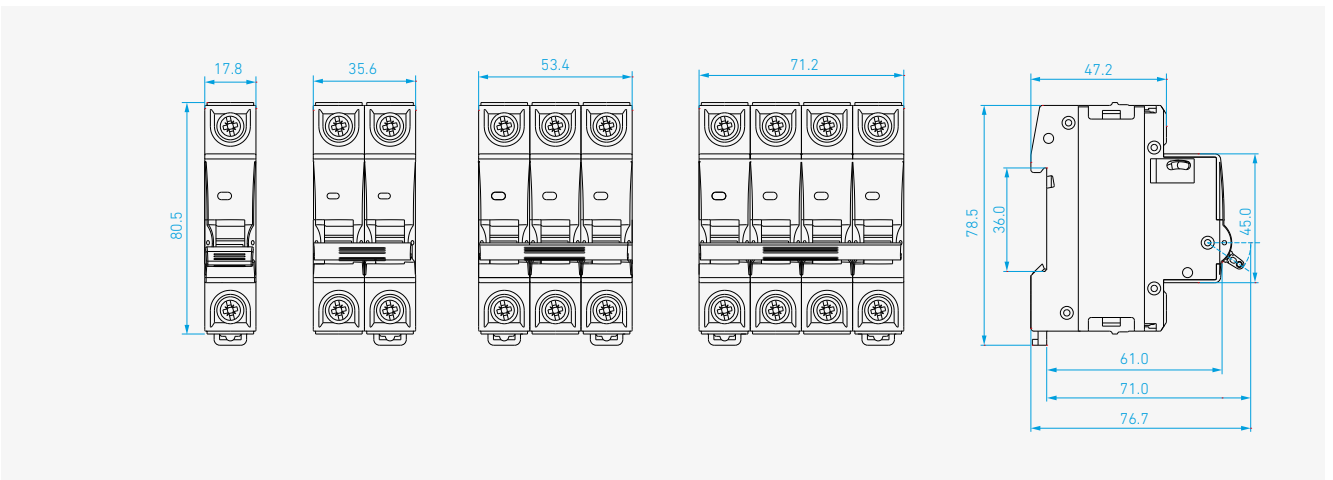


HGD (Standard Type)

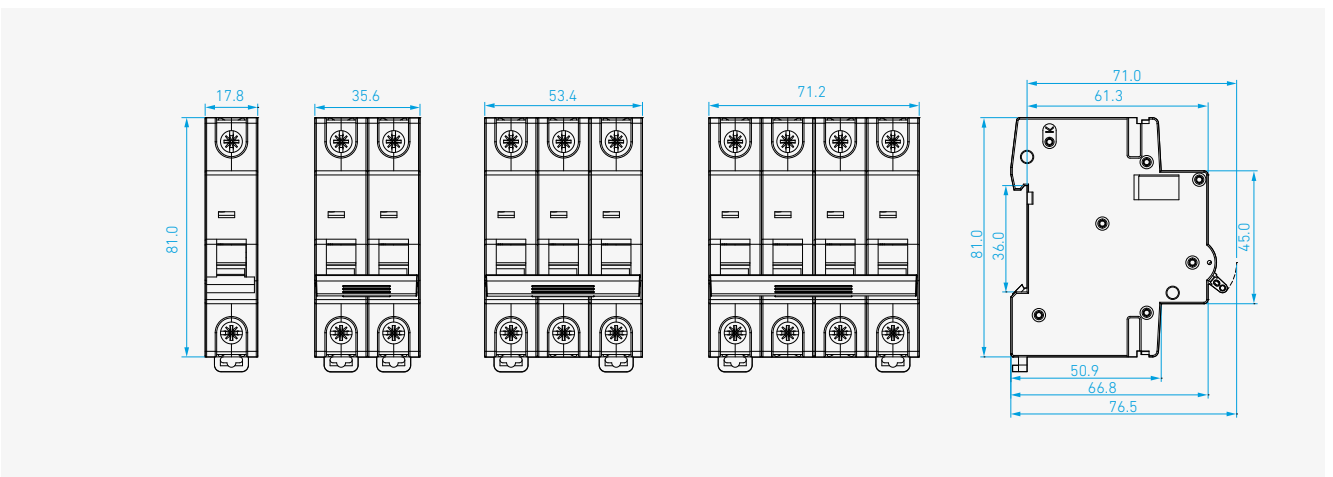
HGD32NS, 32 AF



HGD63E/S, 63 AF



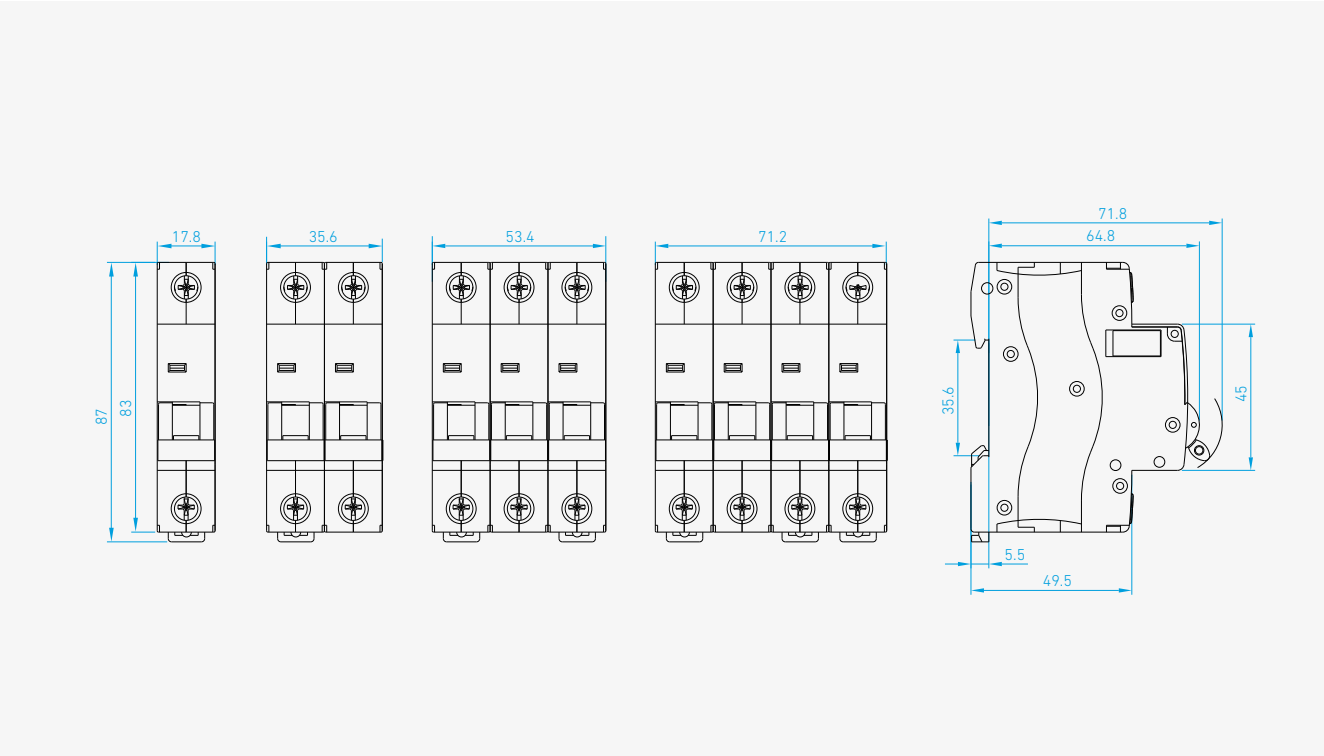
HGD63M/P, 63 AF



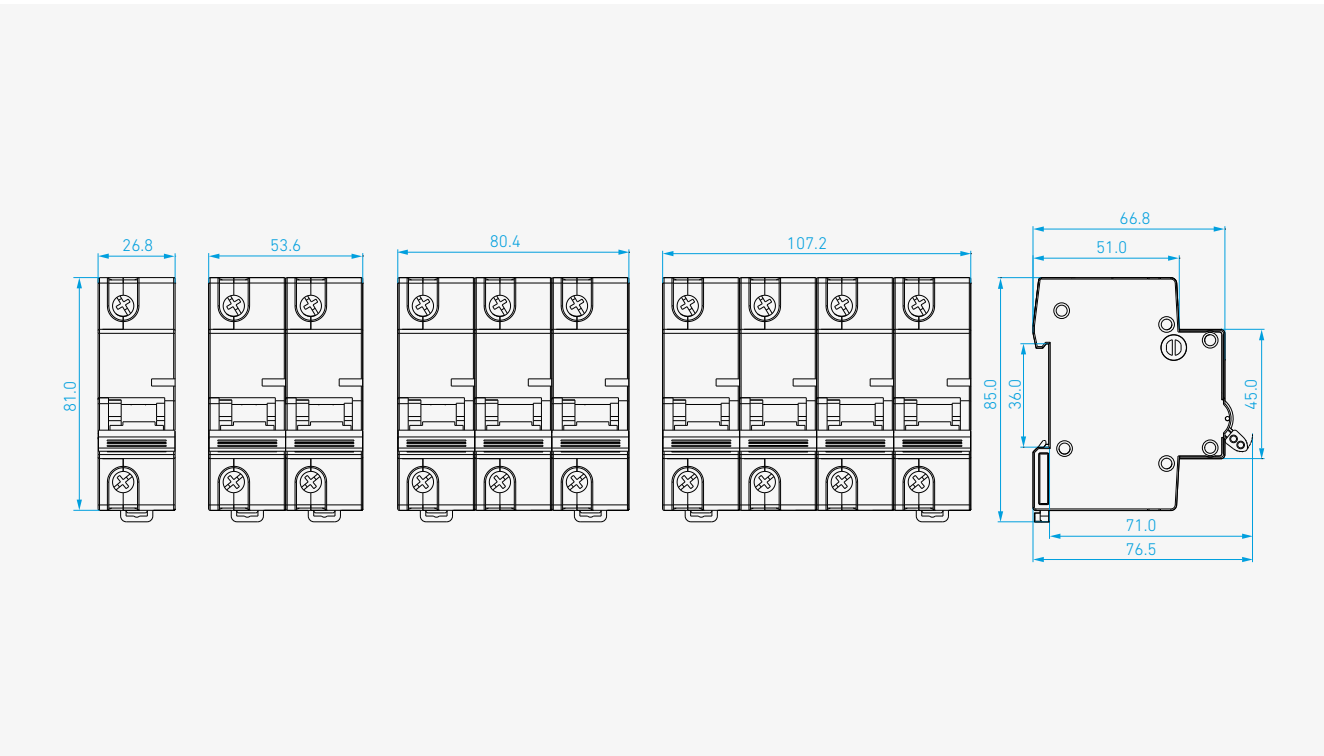
Dimensions

HGD (Standard Type)

HGD63U, 63 AF

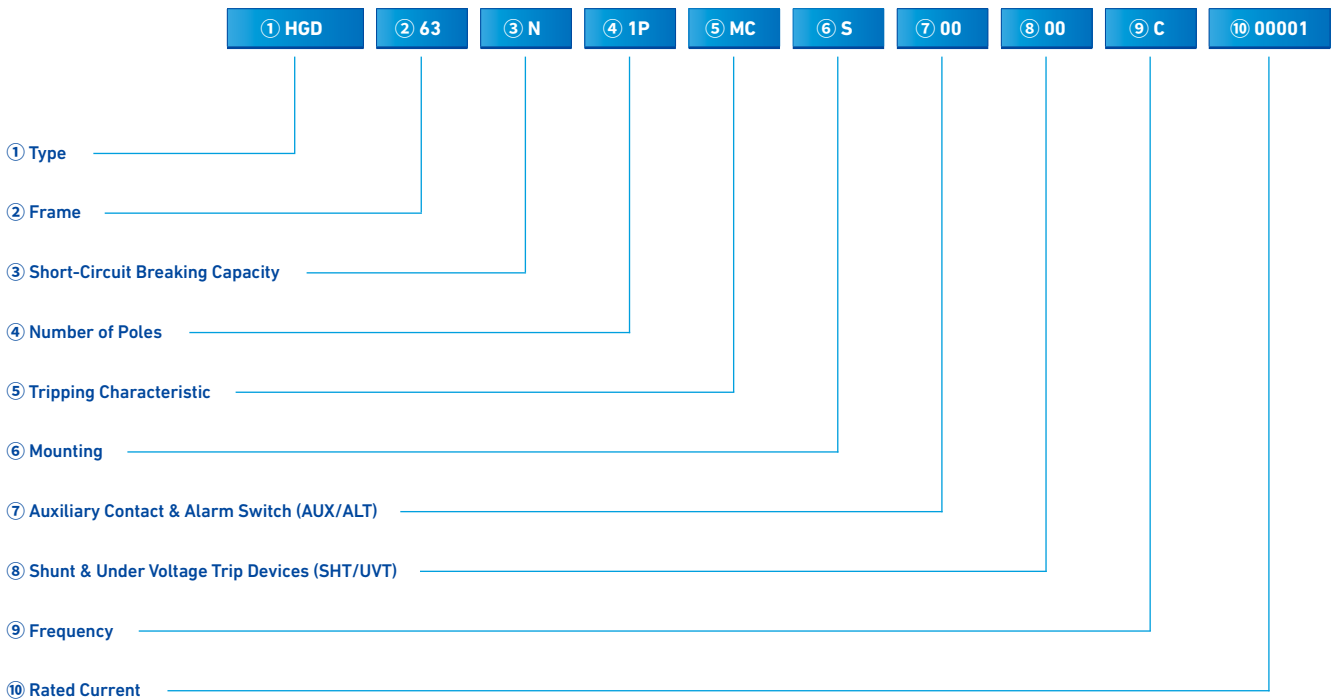


HGD100S, 100 AF



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 |

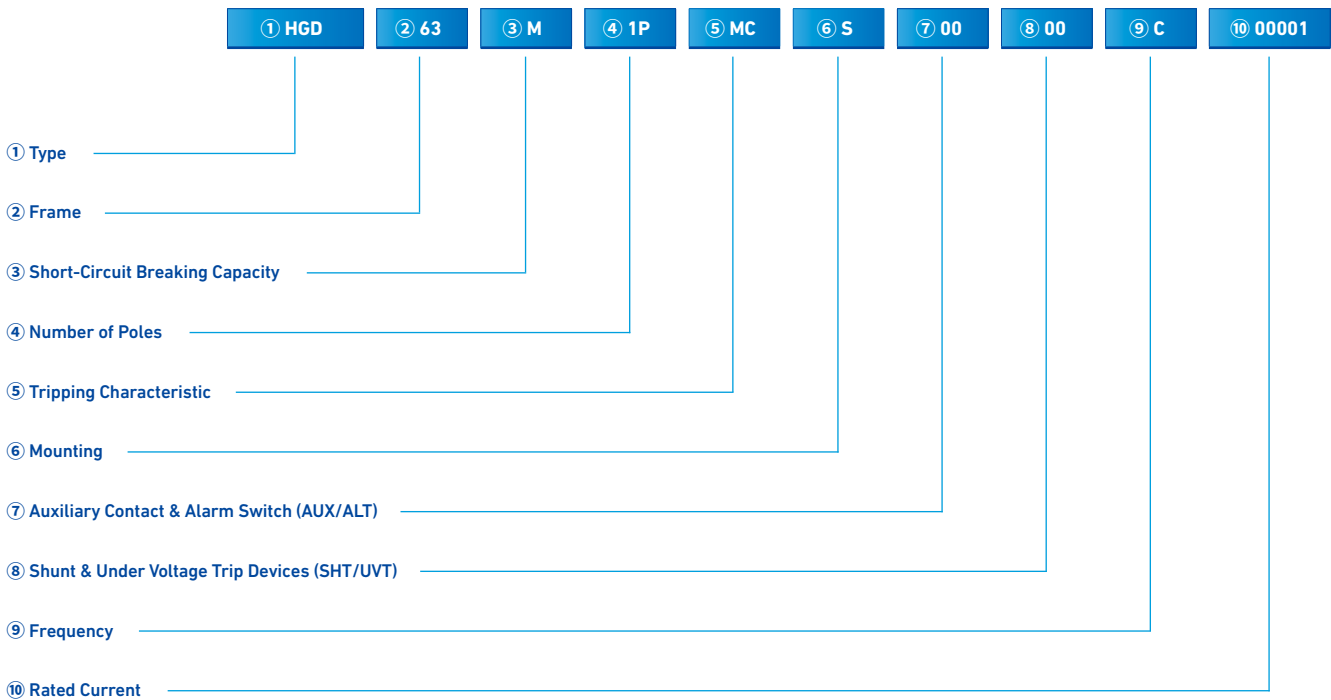
| ⑦ Auxiliary Contact & Alarm Switch | |
|------------------------------------|----------------|
| 00 | Non-attachment |

| 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

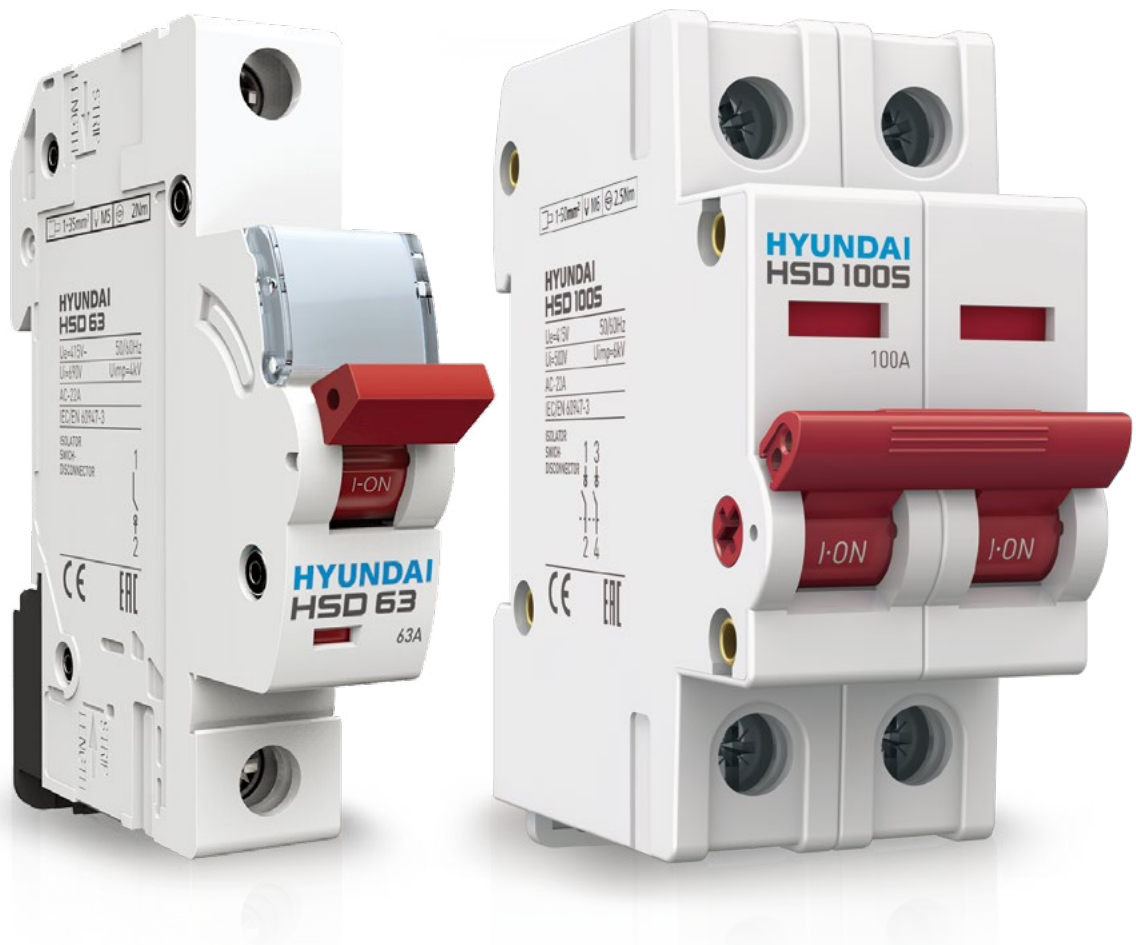
| | |
|-------------------|----|
| Features | 38 |
| Selection Table | 40 |
| Dimensions | 42 |
| Order Information | 44 |

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) |

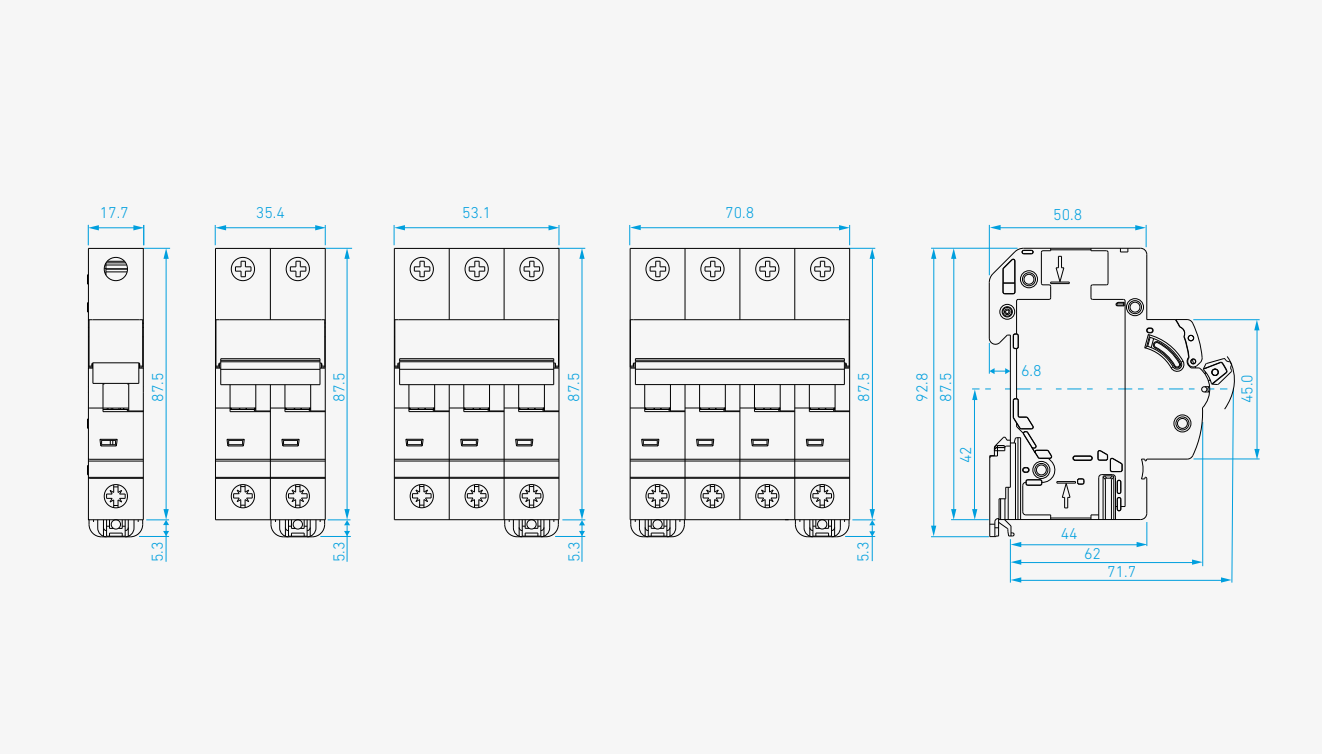
HSD (Standard Type)

| 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 |

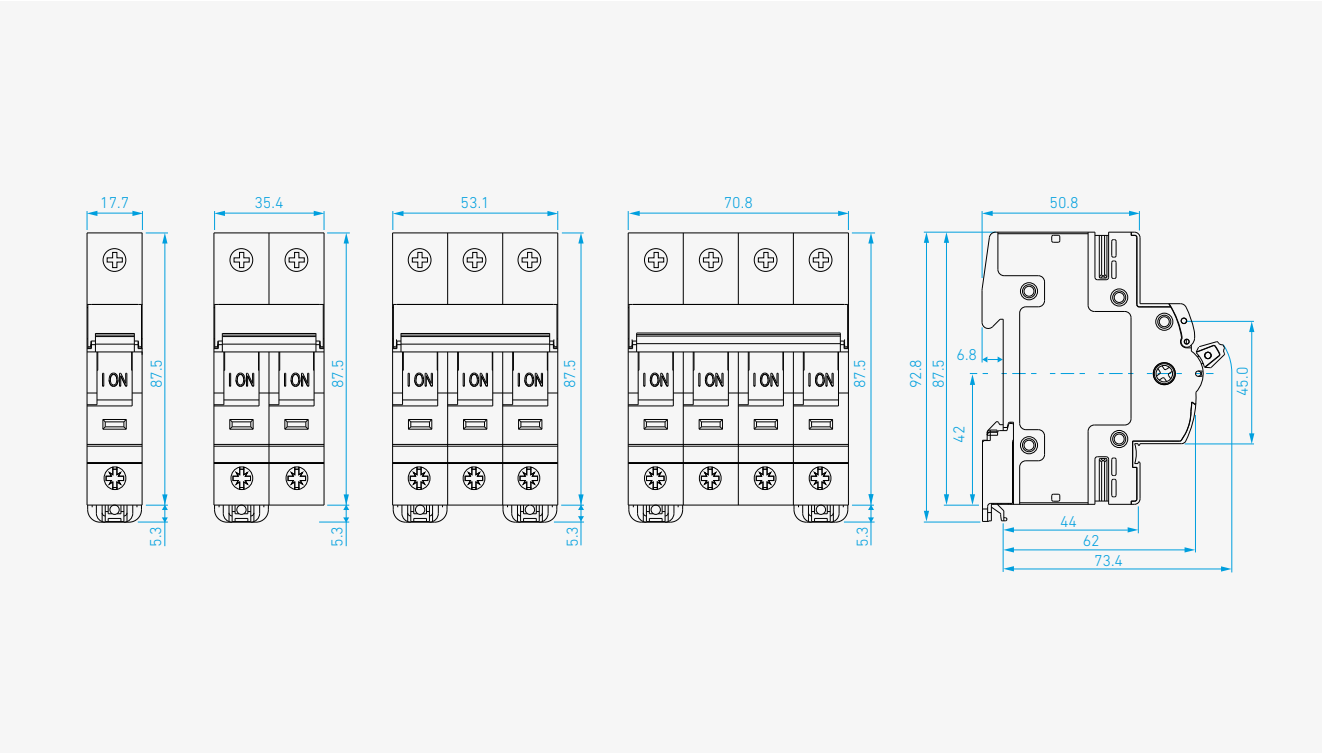
Dimensions

HSD (Deluxe Type)

HSD63, 63 AF

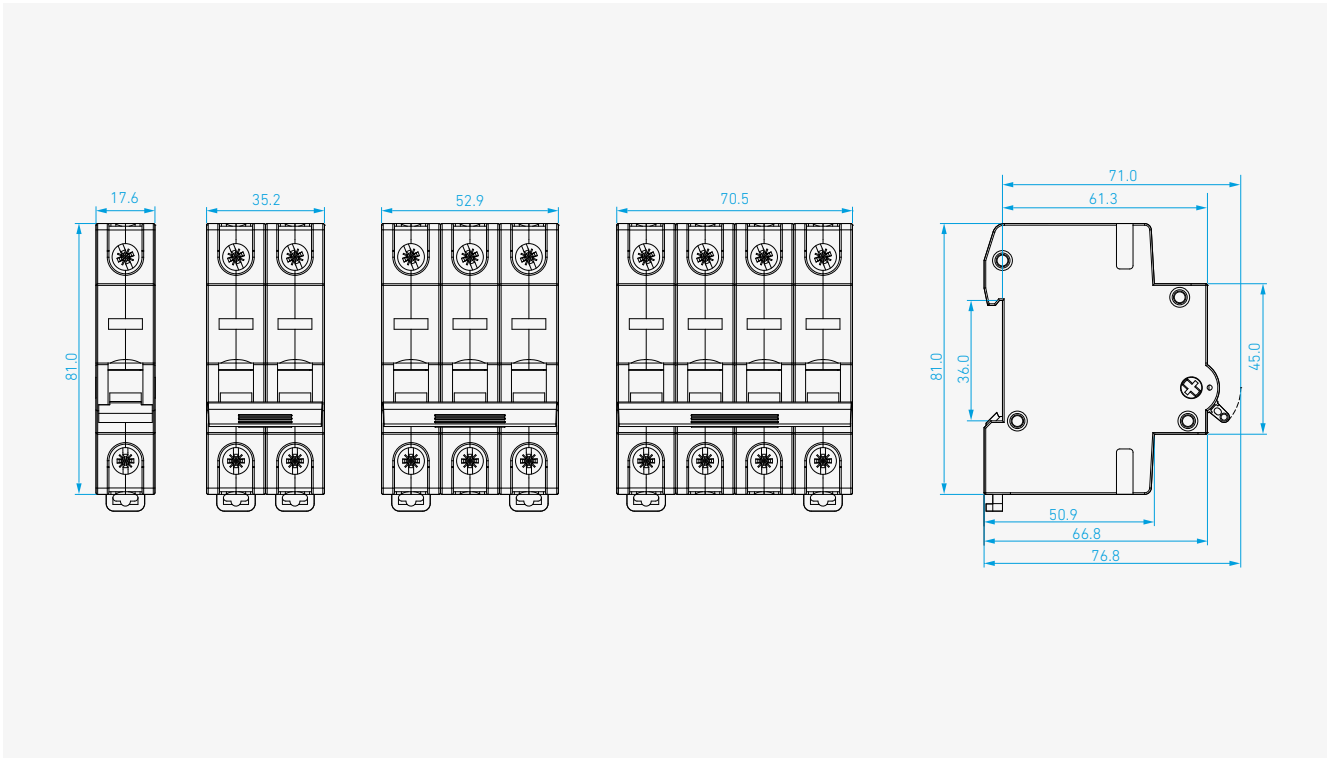


HSD125, 125 AF



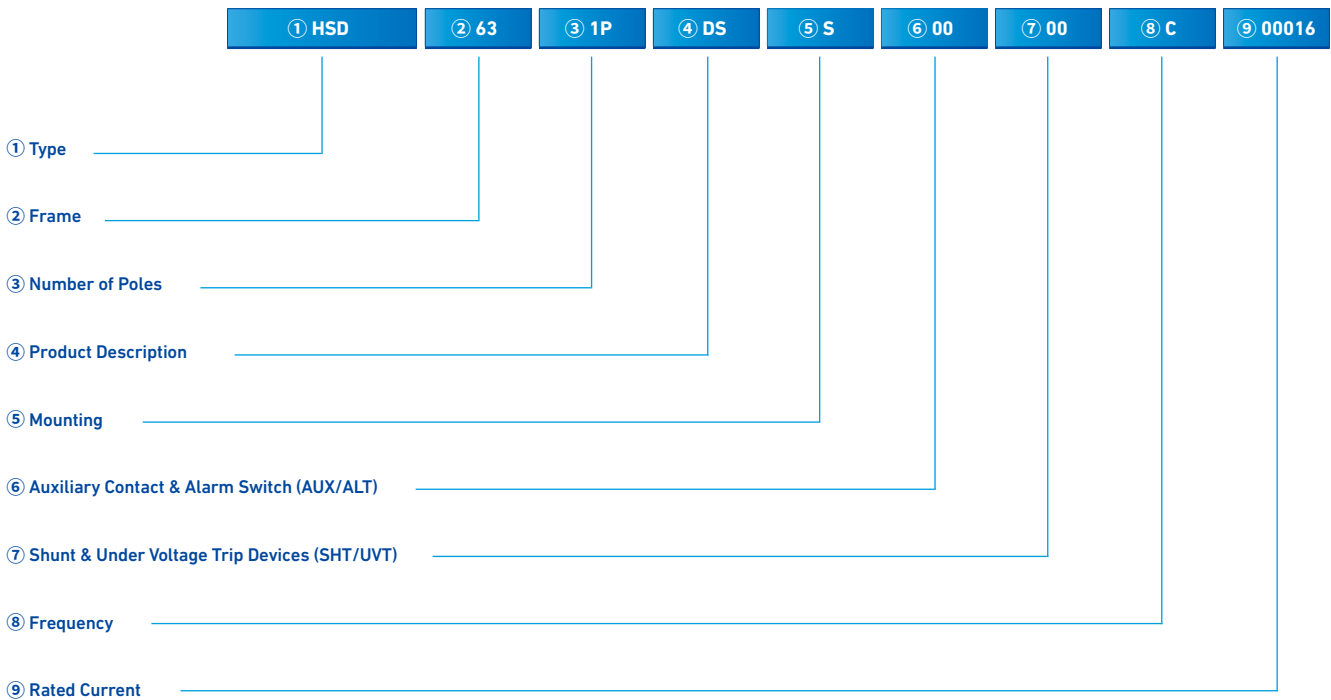
HSD (Standard Type)

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 |

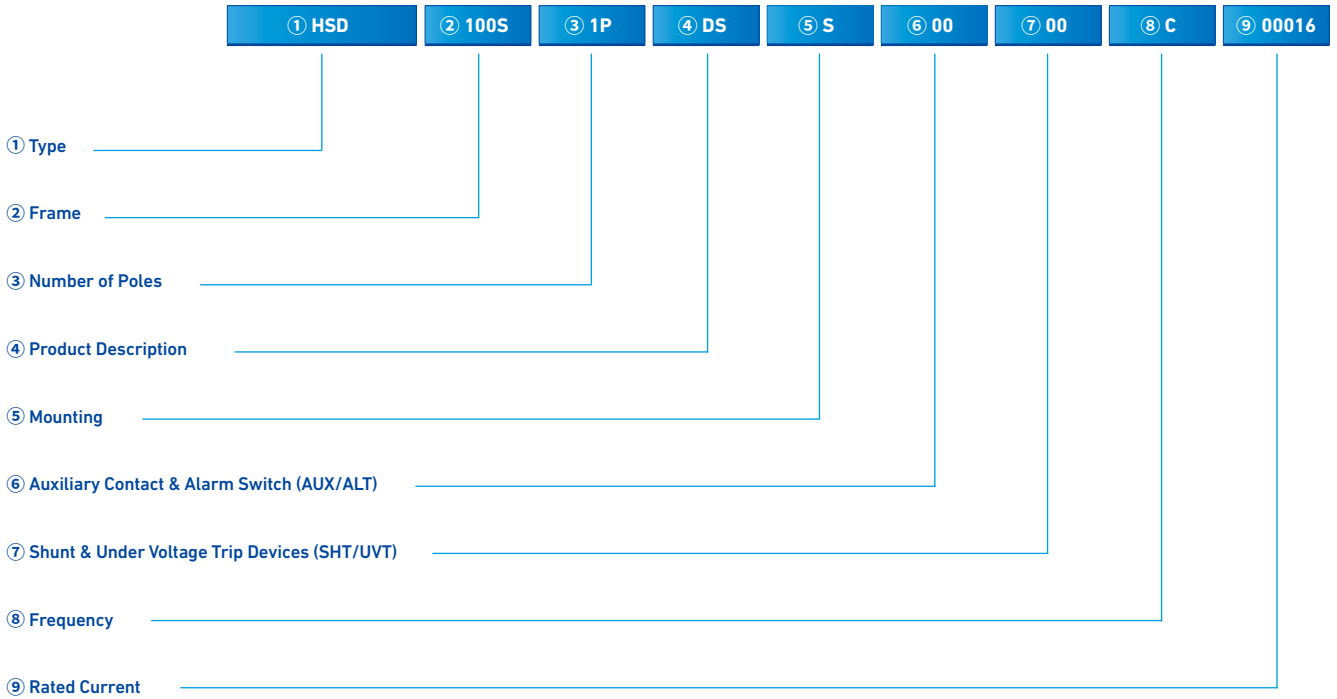
| ⑥ Auxiliary Contact & Alarm Switch | |
|------------------------------------|----------------|
| 00 | Non-attachment |

| 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

| | |
|-------------------|----|
| Features | 48 |
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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 |

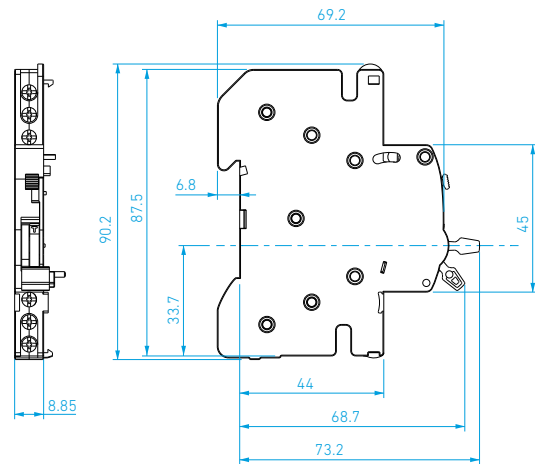
Accessories (Deluxe Type)

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 |

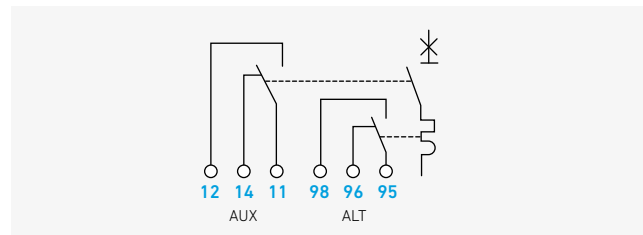
Dimension



Ordering Information

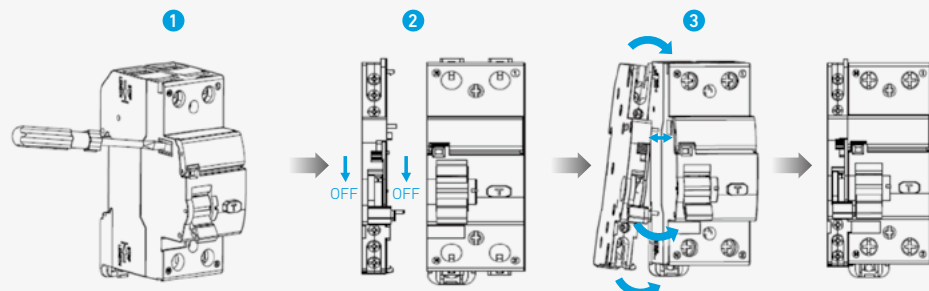
| | |
|------------|---------|
| AXT HGD125 | AUX/ALT |
|------------|---------|

Circuit Diagram

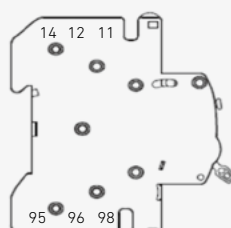


Assembling with RCCB (HRC Accessories)

- 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 |

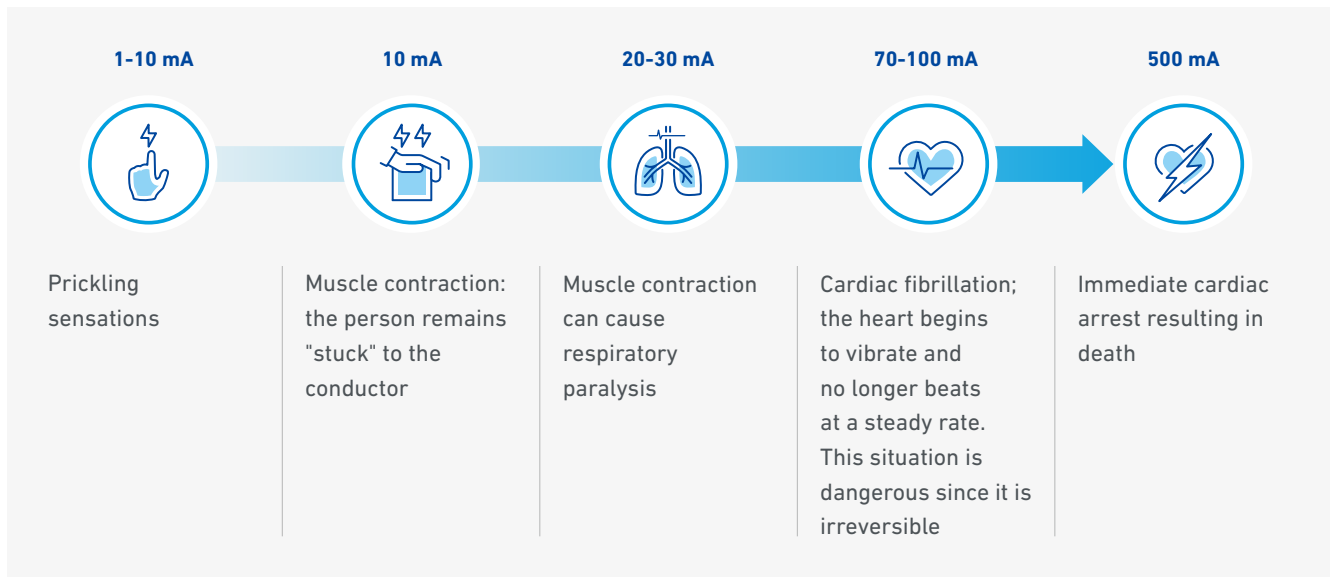
Technical Data

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

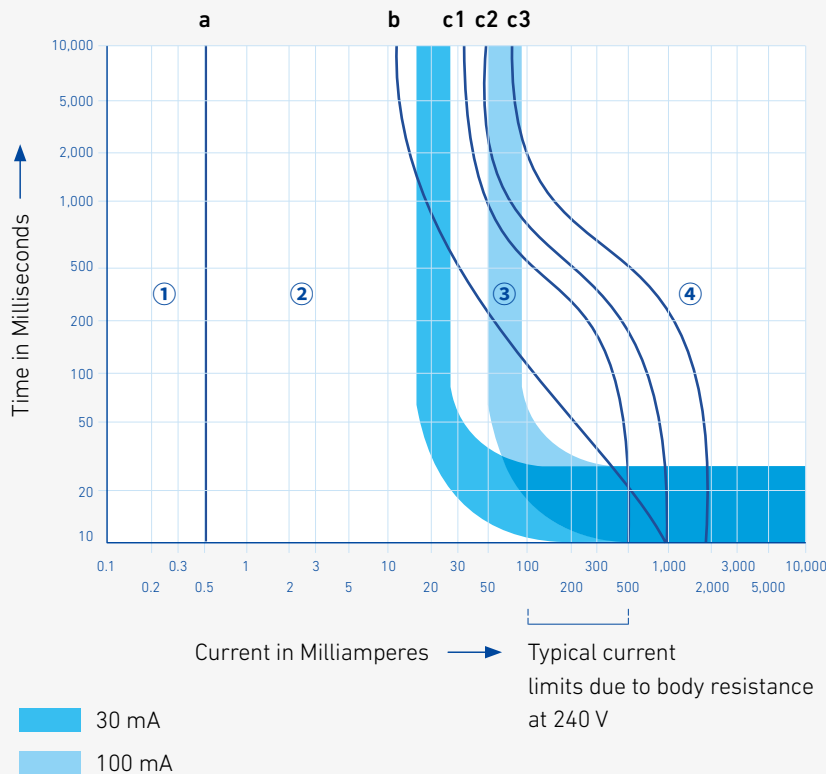
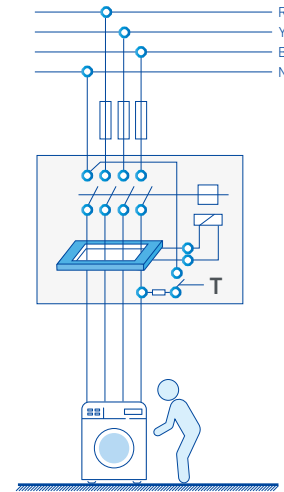
The majority of fires which occur as a result of faulty wiring are started by current flowing to earth. Fire can be started by fault current of less than 1 amp. The normal domestic overload protective device such as a fuse or MCB will not detect such a small current. A correctly chosen RCCB will detect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

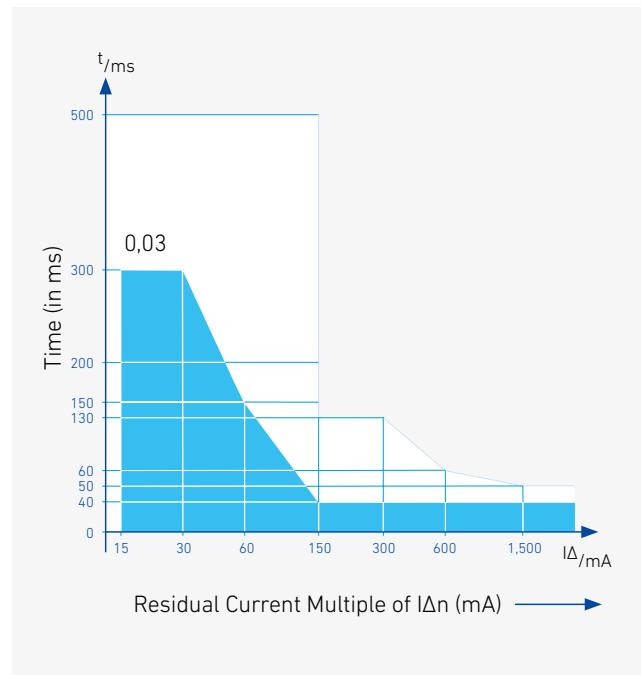
RCCB Type AC

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

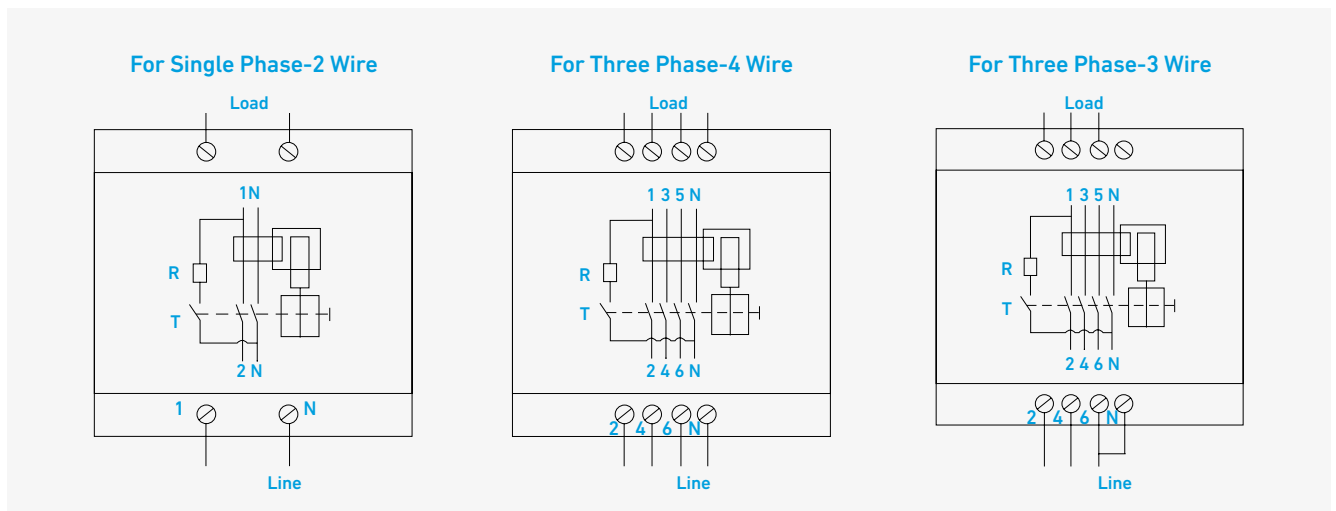


Selection of RCCB Type

| 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

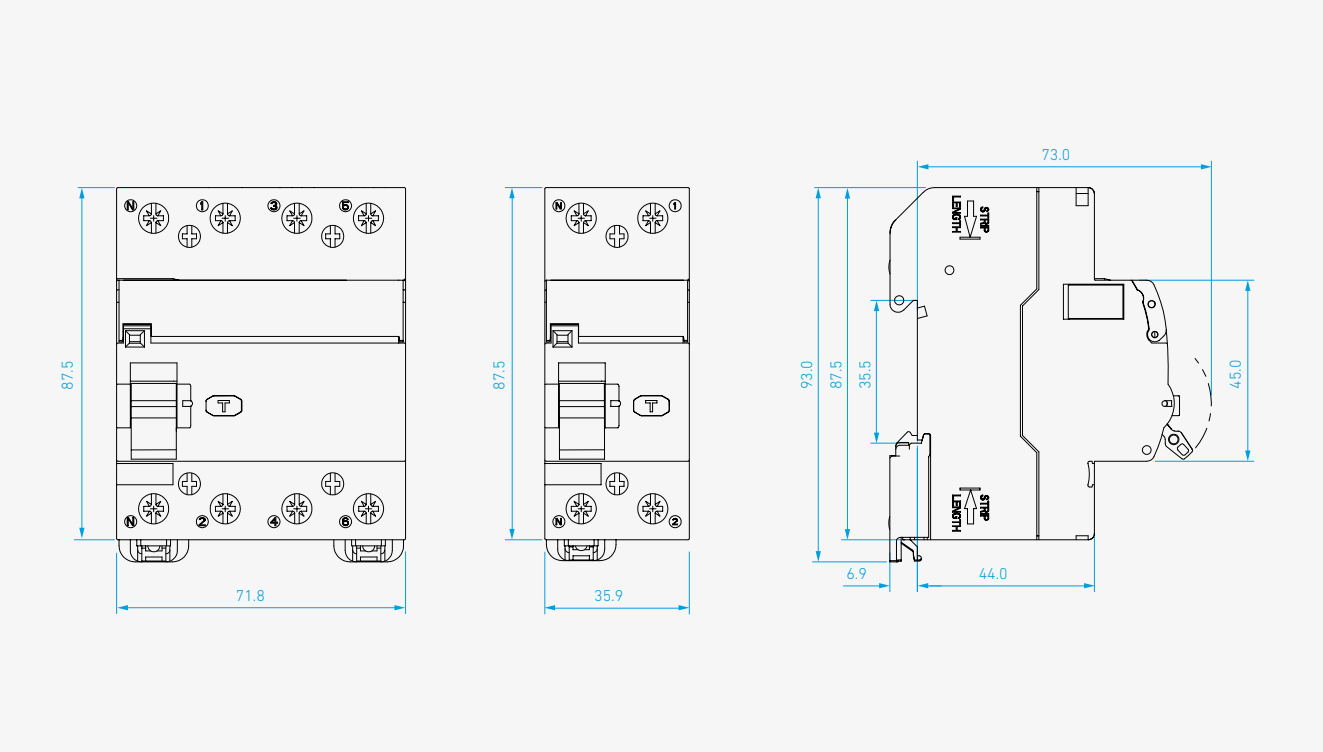


The Hyundai range of four pole RCCBs can be used to provide residual current protection in 3 phase. For 3 wire circuits (no neutral), a link from the neutral to an incoming should be made on the supply side of the RCCB, to enable the operation of the RCCB.

Dimensions

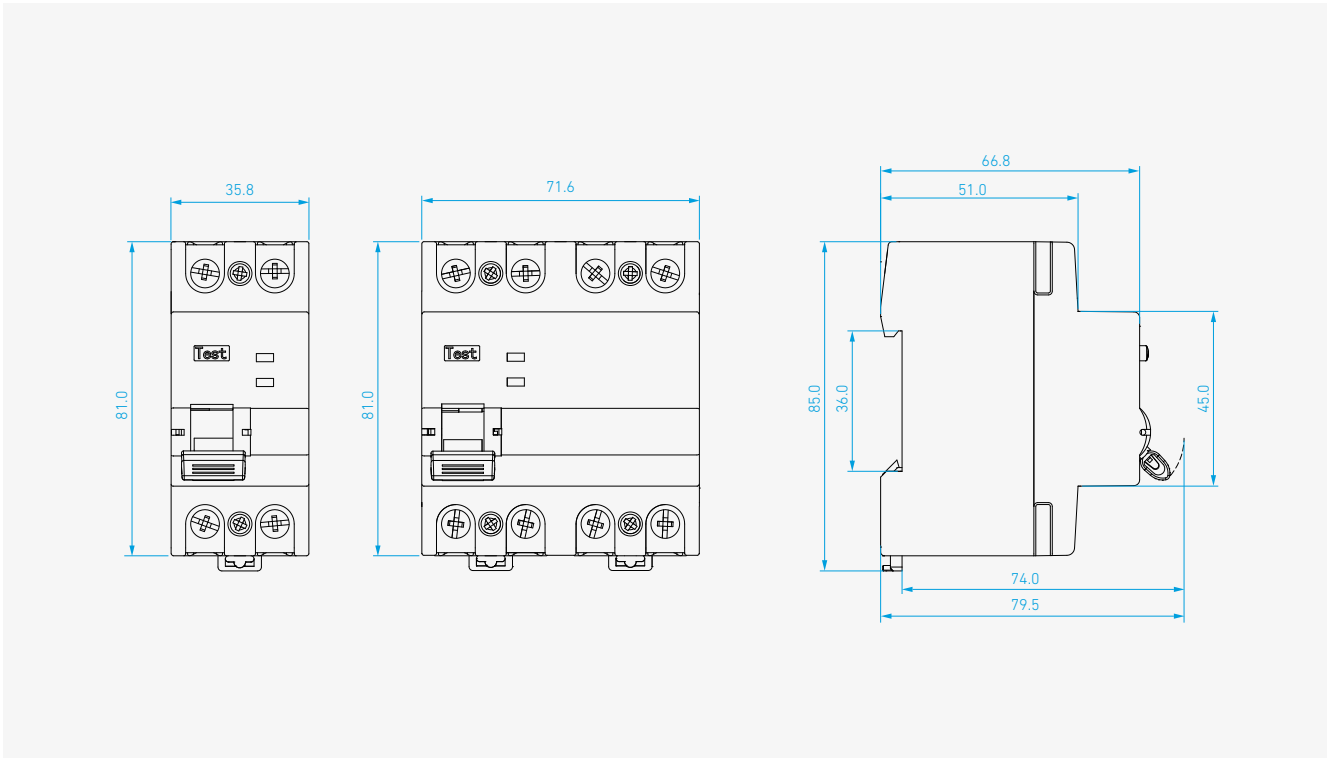
HRC (Deluxe Type)

HRC63, 63 AF/HRC100,100 AF

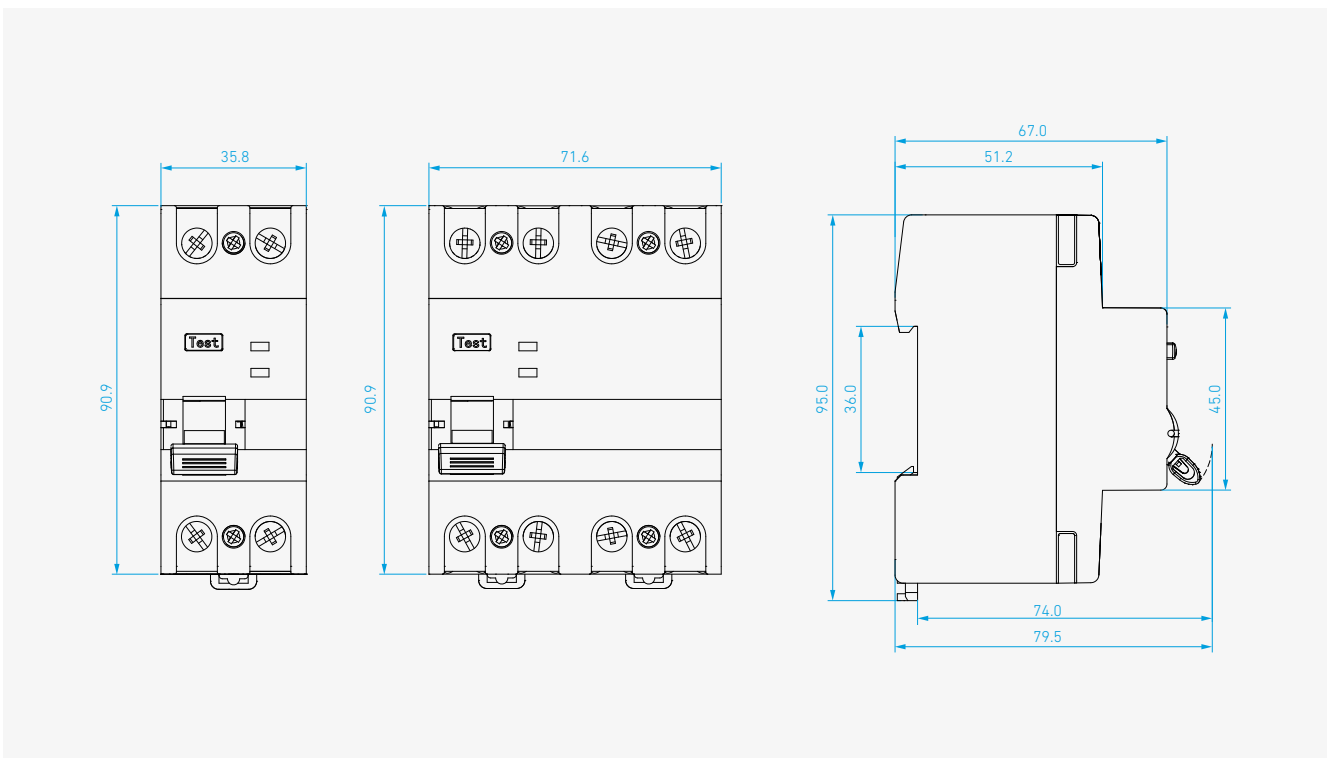


HRC (Standard Type)

HRC63S, 63 AF

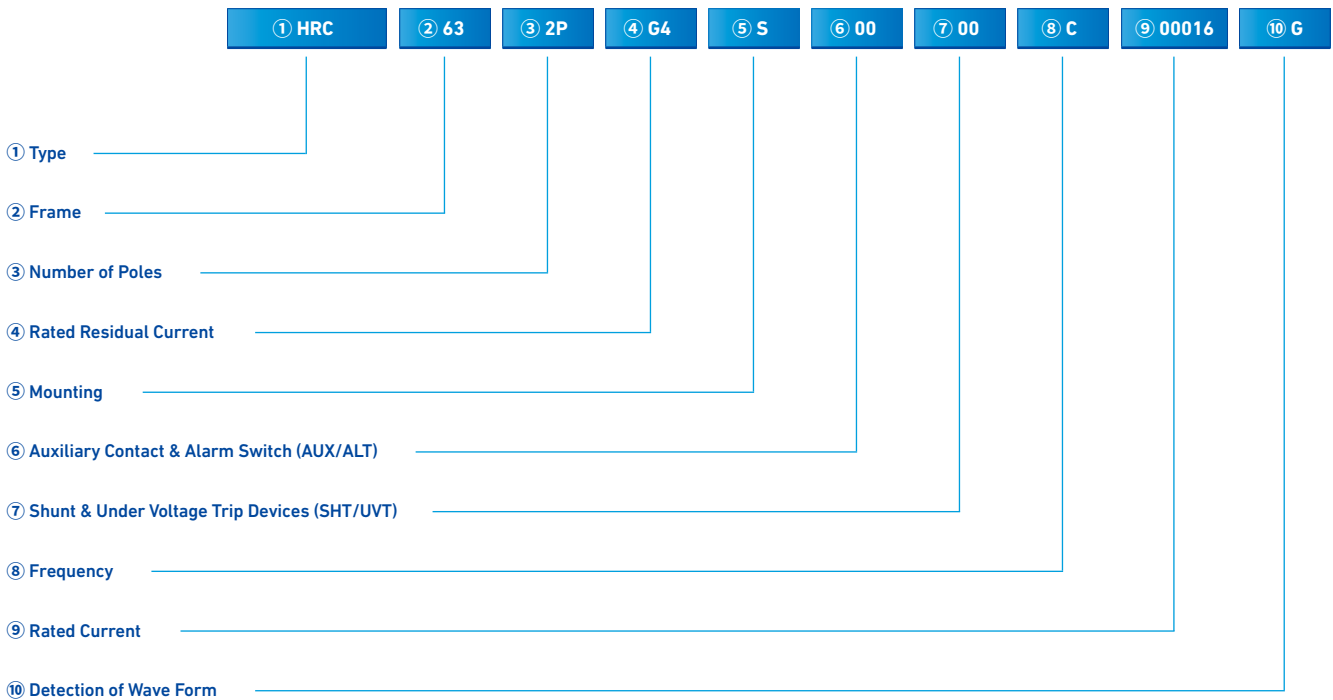


HRC100S, 100 AF



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 |

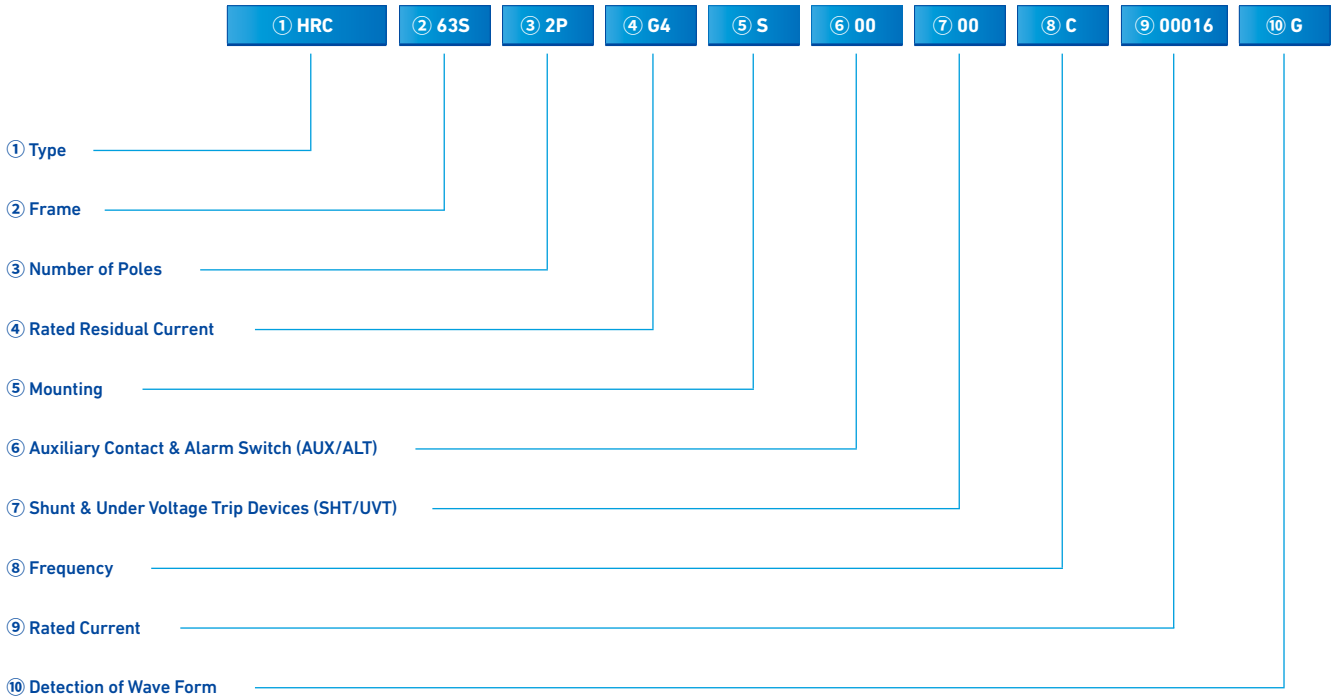
| ⑦ Shunt & Under Voltage Trip Devices | |
|--------------------------------------|----------------|
| 00 | Non-attachment |

| 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

| | |
|----------------------|----|
| Features | 64 |
| Selection Table | 66 |
| Dimensions | 68 |
| Ordering Information | 70 |

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 |

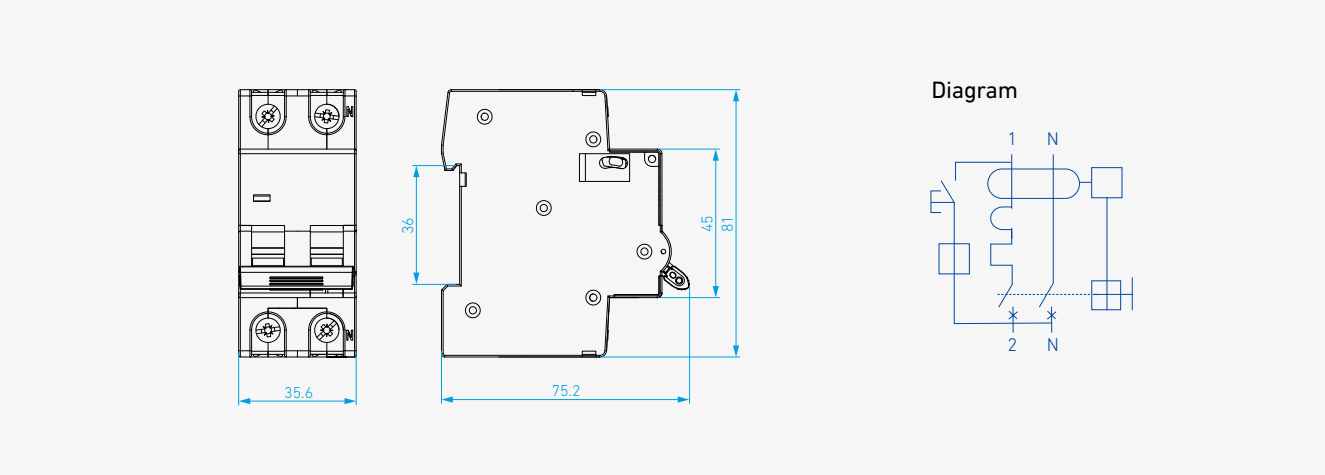
Compact Type

| 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 |

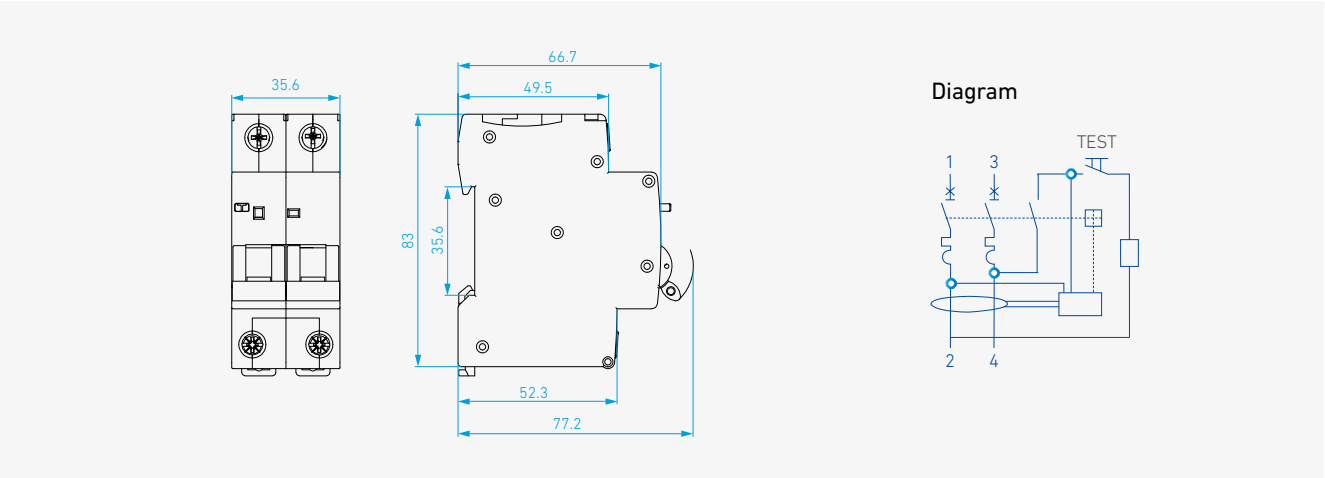
Dimensions

HR0 (Standard Type)

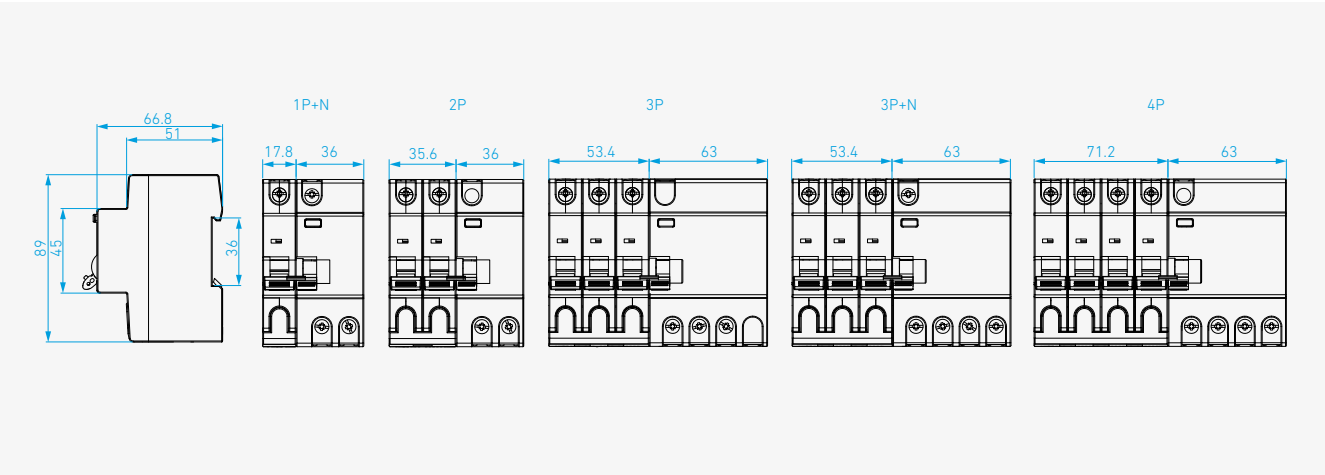
HR063S, 63 AF



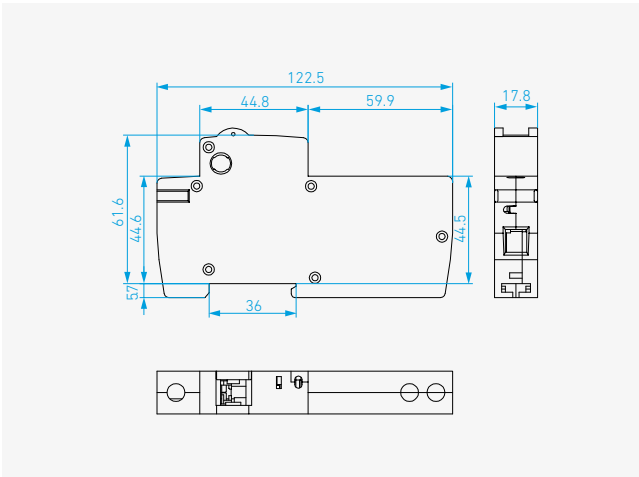
HR063A/B, 63 AF



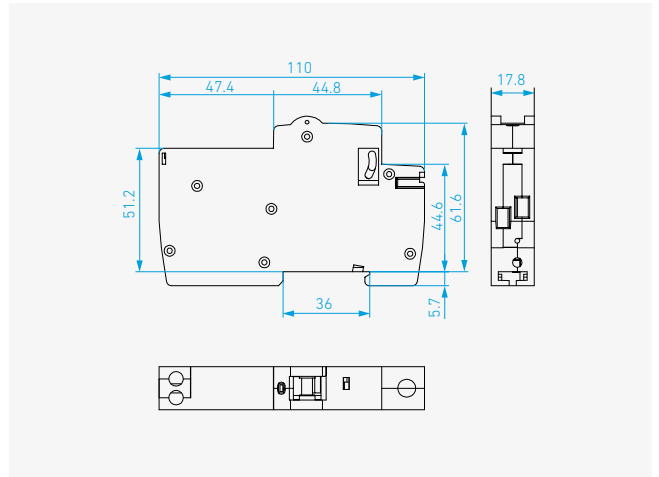
HR063M/P, 63AF



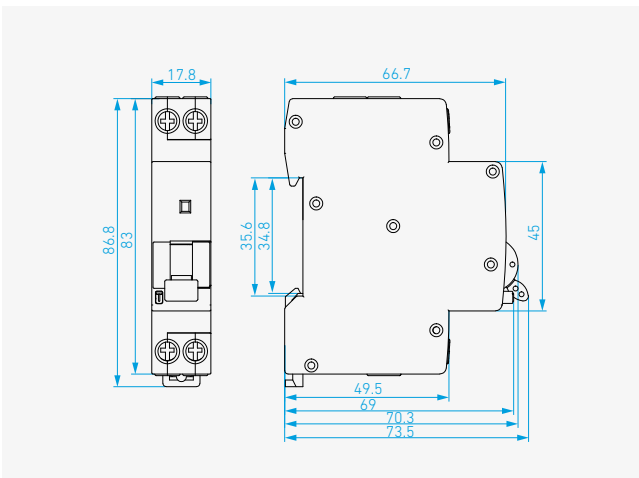
HRO40L, 40 AF



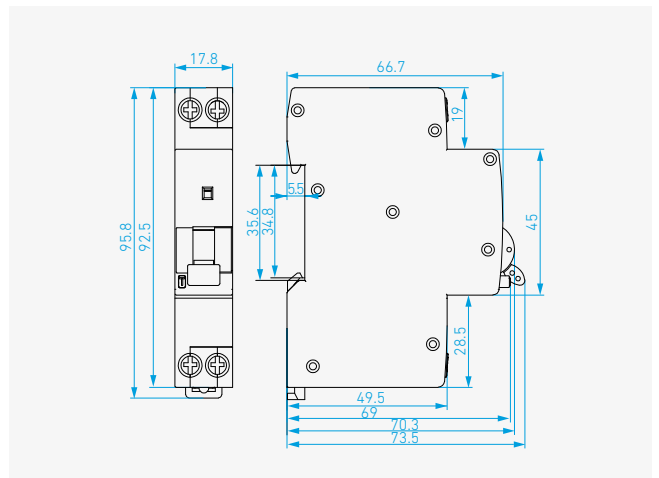
HRO40T/HT, 40 AF



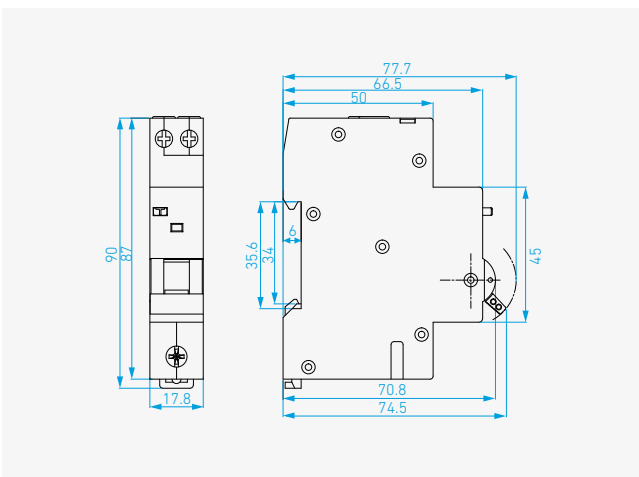
HRO40M, 40 AF



HRO40P, 40 AF

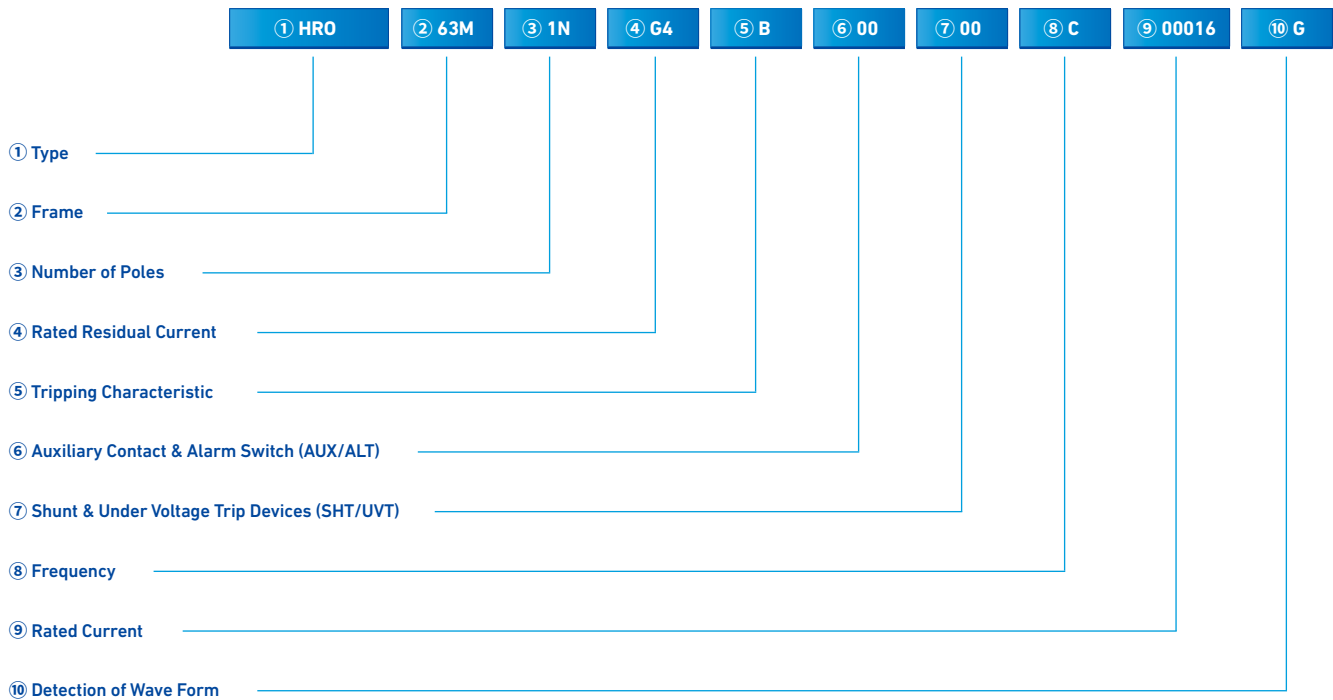


HRO40ML/PL, 40 AF



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

| | |
|----------------------|----|
| Features | 72 |
| Selection Table | 74 |
| Operation | 75 |
| Technical Data | 76 |
| Dimensions | 77 |
| Ordering Information | 78 |

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

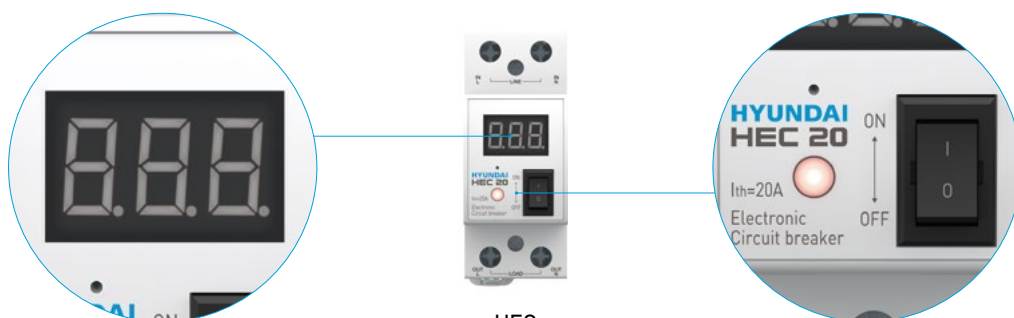
Product Performance

- 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)

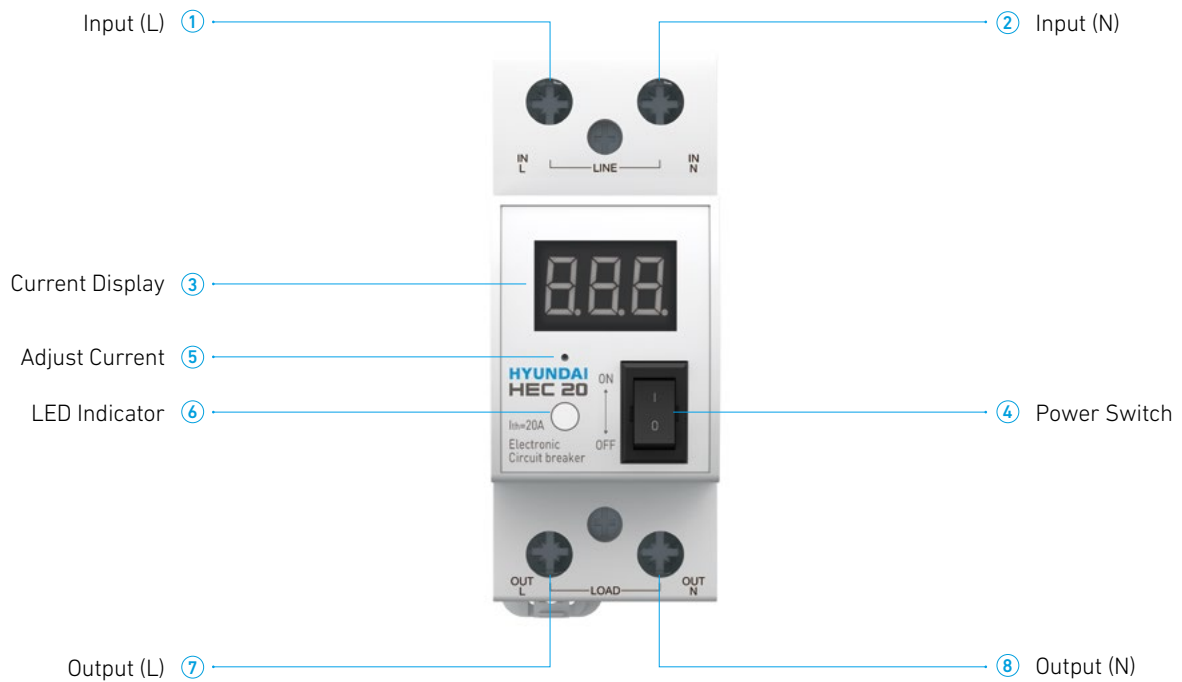
Selection Table

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 [$I_n \leftarrow I$ flowing $\leftarrow 2 I_n$] 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).

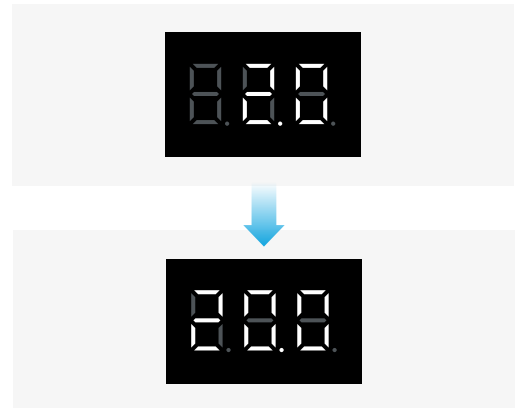
Technical Data

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.



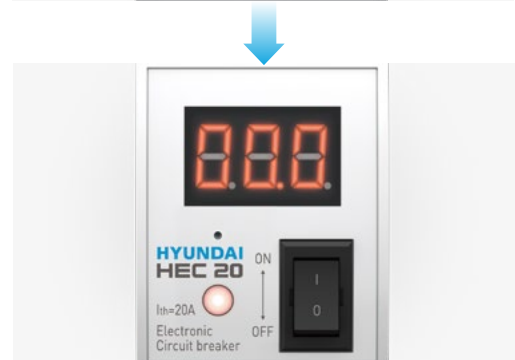
Pre-Trip Indication

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.



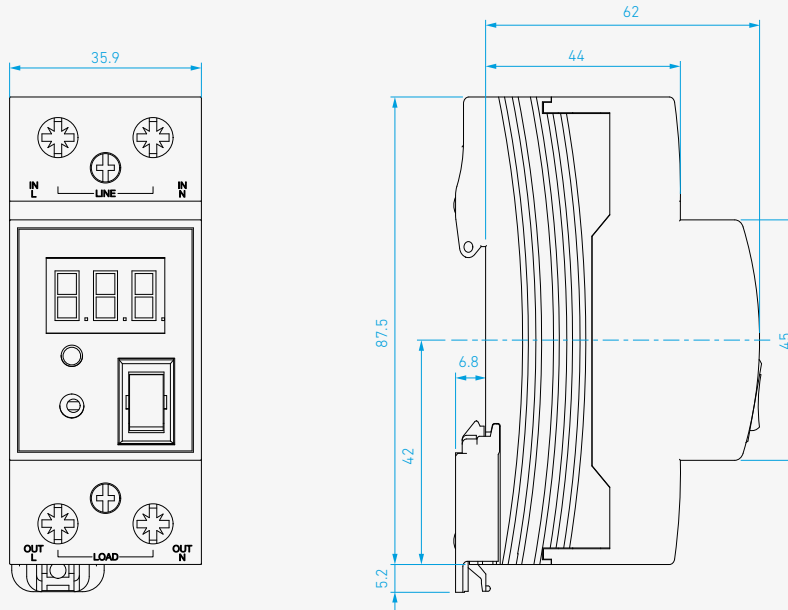
Automatic Reset Facility

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

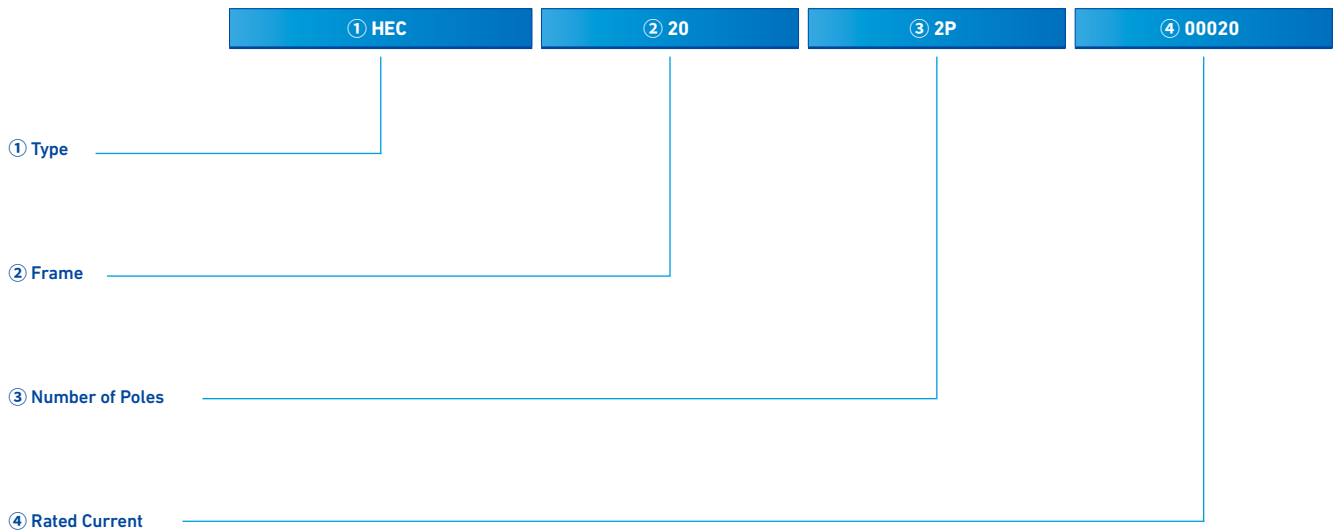
HEC

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

| | |
|-------------------|----|
| Selection Table | 80 |
| Accessories | 82 |
| Technical Data | 83 |
| Dimensions | 85 |
| Order Information | 87 |







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








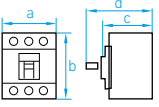
Plug-in type (Terminal: screw)

| 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 | | | 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, 40, 50 | | 10, 15, 20, 30, 40, 50 | | 10, 15, 20, 30, 40, 50 | | 10, 15, 20, 30 | | | | | | | | | |
| | | Rated Insulation Voltage [Ui] (V) | | AC460 | | AC460 | | AC460 | | AC460 | | AC460 | | AC500 | | | | | | | | | |
| | | Rated Operational Voltage [Ue] (V) | | AC240/460 ¹⁾ | | AC240/460 ¹⁾ | | AC240/460 ¹⁾ | | AC240/460 ¹⁾ | | AC240/460 ¹⁾ | | AC220 | | | | | | | | | |
| | | Rated Impulse withstand Voltage [Uimp] (kV) | | 6 | | 6 | | 6 | | 6 | | 6 | | 6 | | | | | | | | | |
| Rated Short-Circuit Breaking Capacity | | Ultimate [Icu] (kA r.m.s.) | | AC400/460 V, 50-60 Hz | | 2.5 | | 5 | | 5 | | 5 | | - | | | | | | | | | |
| | | | | AC380 V, 50-60 Hz | | 2.5 | | 5 | | 5 | | 5 | | - | | | | | | | | | |
| | | | | AC220/240 V, 50-60 Hz | | 5 | | 10 | | 10 | | 10 | | 1.5 | | | | | | | | | |
| | | | | DC125 V | | 5 | | 10 | | 10 | | 10 | | - | | | | | | | | | |
| | | Service [Ics] | | % of (Icu) | | 50 | | 50 | | 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 | | Clip & Screw | | Clip & Screw | | Clip & Screw | | Screw | | | | | | | | | |
| | | Load Side | | Clip & Screw | | Clip & Screw | | Clip & Screw | | 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 | | 79 | | 77 | | 79 | | 79 | | 57 | |
| Weight (kg) | | | | 0.16 | | 0.34 | | 0.5 | | 0.16 | | 0.34 | | 0.5 | | 0.1 | | | | | | | |

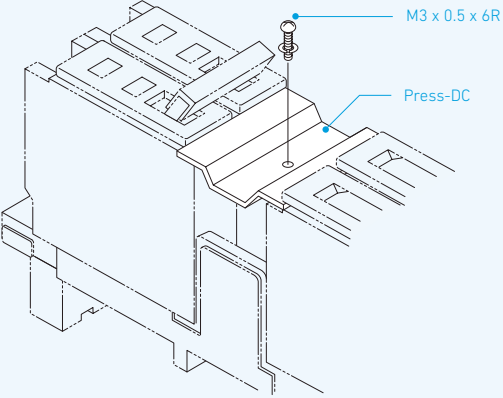
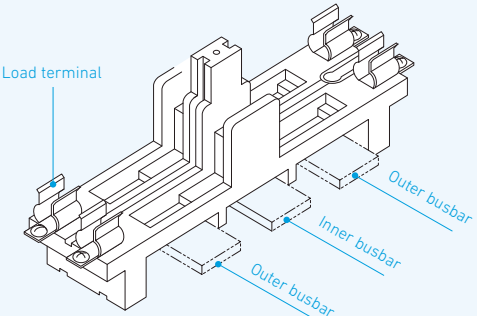
※ 1) AC 460 V is not applicable for 1P breaker.

Accessories

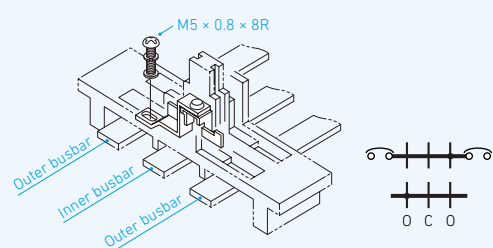
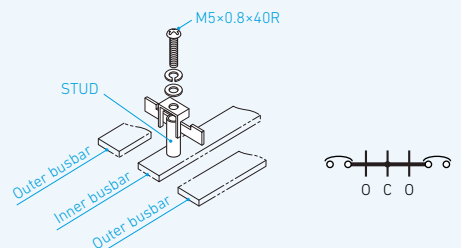
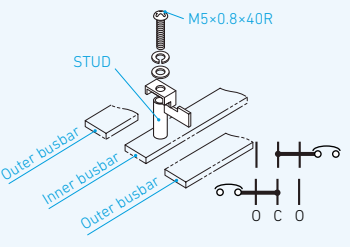
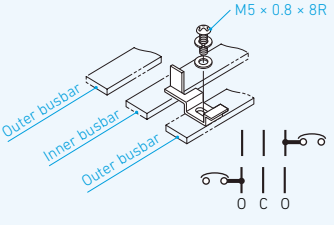
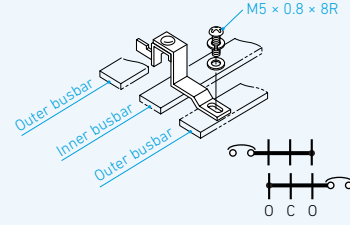
Purchased Parts when Using a HBD52D Plug-in Breaker

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>0 C 0</p> |  <p>M5 x 0.8 x 40R STUD Outer busbar Inner busbar Outer busbar</p> <p>0 C 0</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>0 C 0</p> |  <p>M5 x 0.8 x 8R Outer busbar Inner busbar Outer busbar</p> <p>0 C 0</p> |  <p>M5 x 0.8 x 8R Outer busbar Inner busbar Outer busbar</p> <p>0 C 0</p> |

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

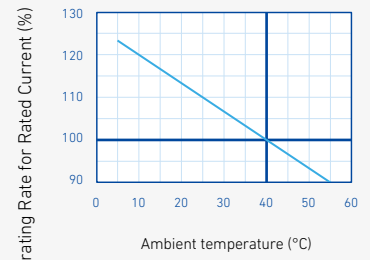
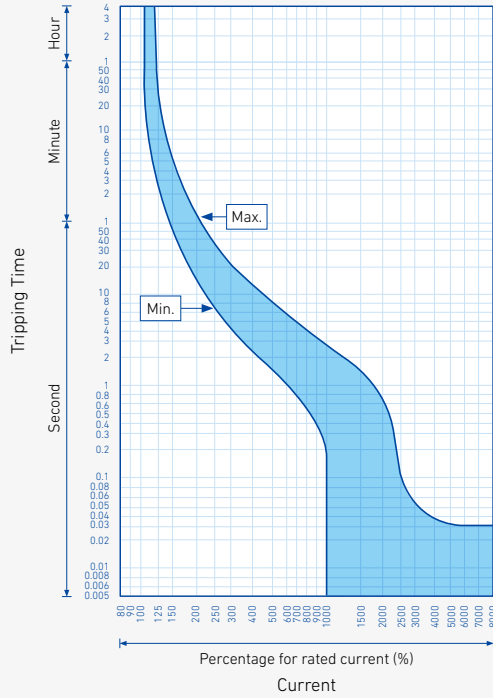
Technical Data

Tripping & Temperature Derating Curves

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



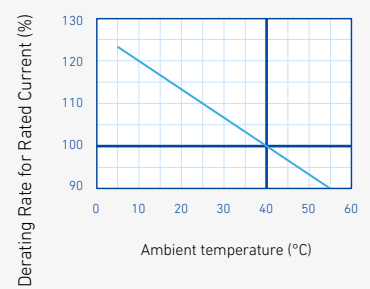
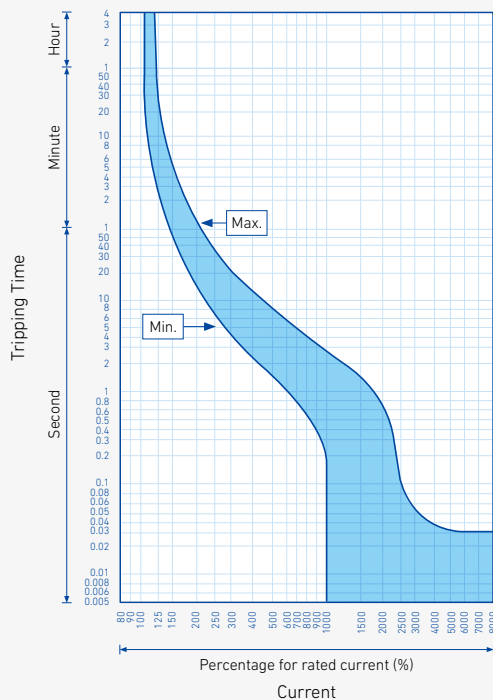
- HBD51D
- HBD52D
- HBD53D
- HBD51hD
- HBD52hD
- HBD53hD



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



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

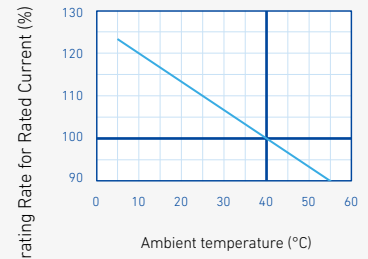
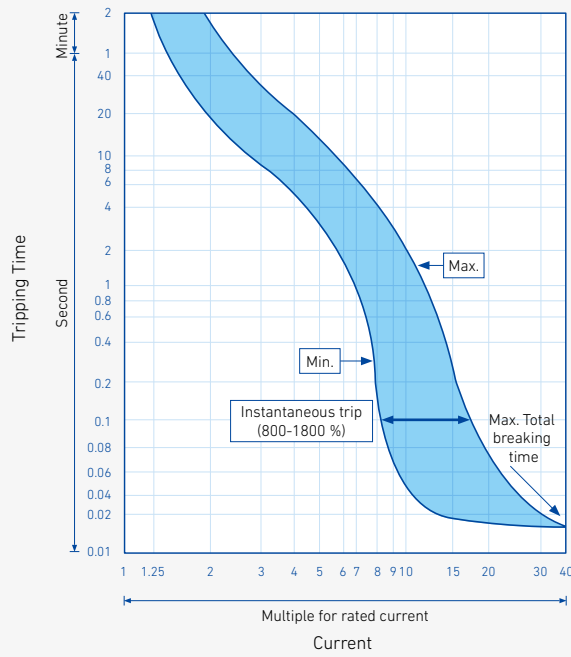


Technical Data

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



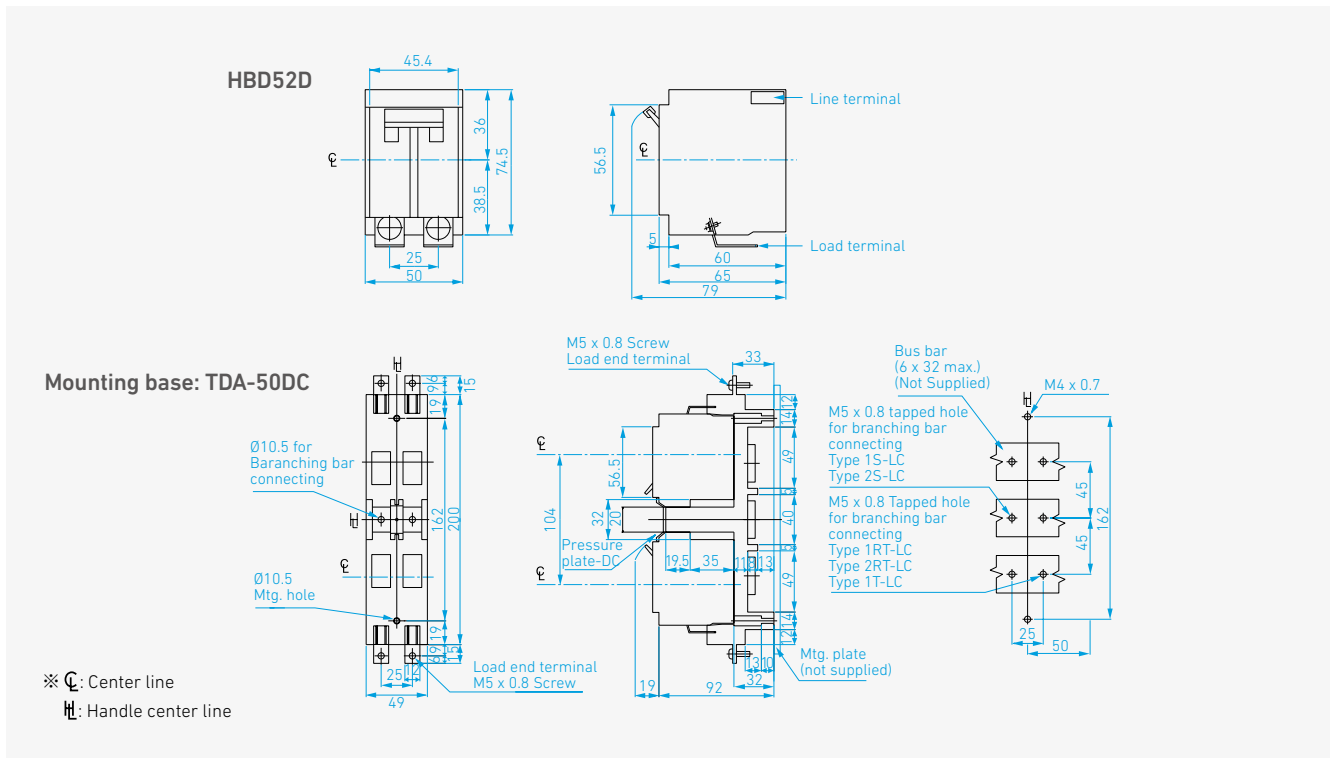
• HiBC32SC



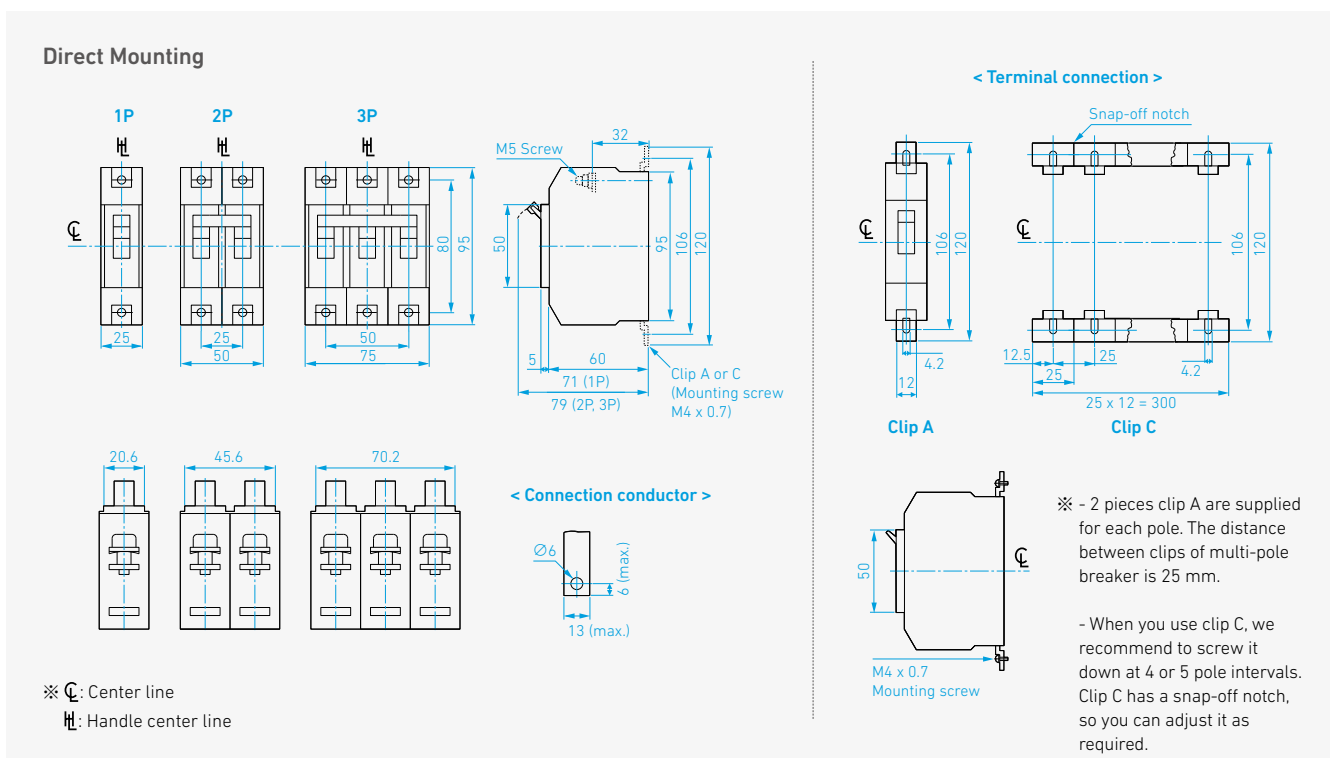
Dimensions

HBD (5-10 kA 10-50 A)

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



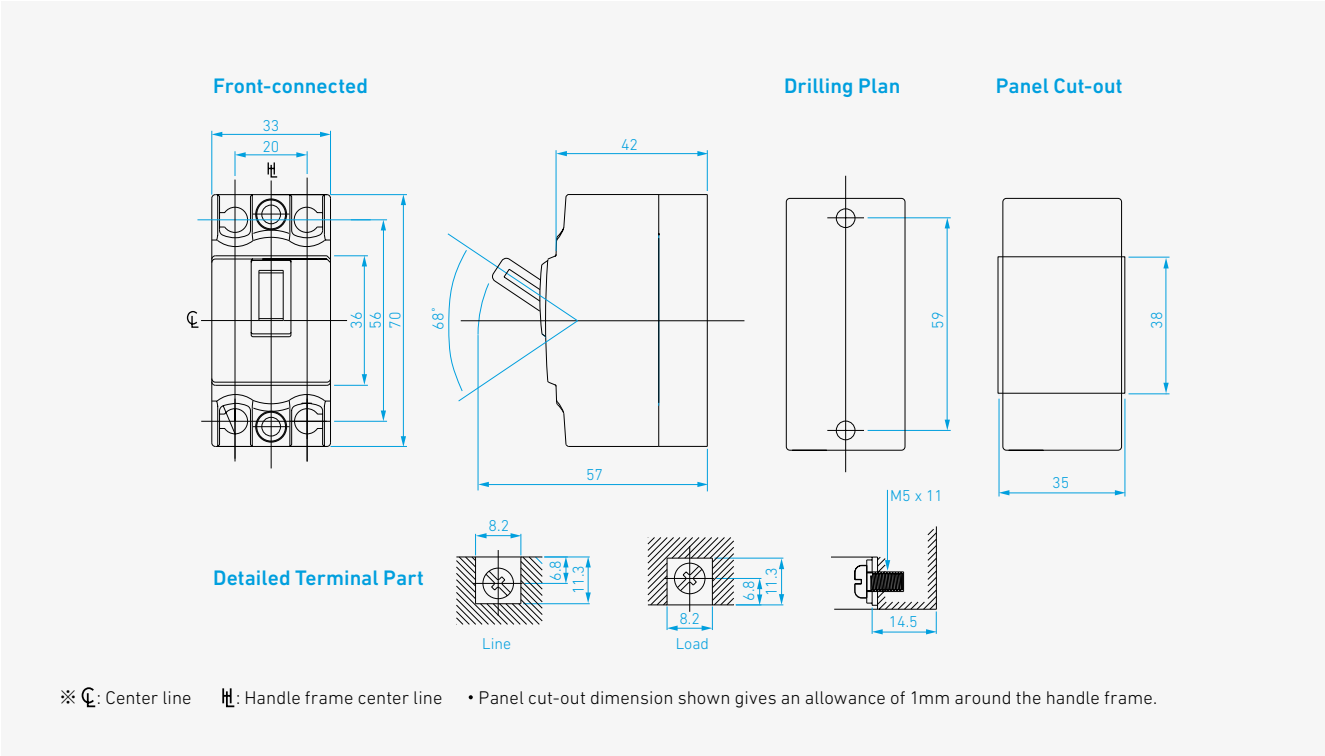
HBD51, 52, 53, 51h, 52h, 53h



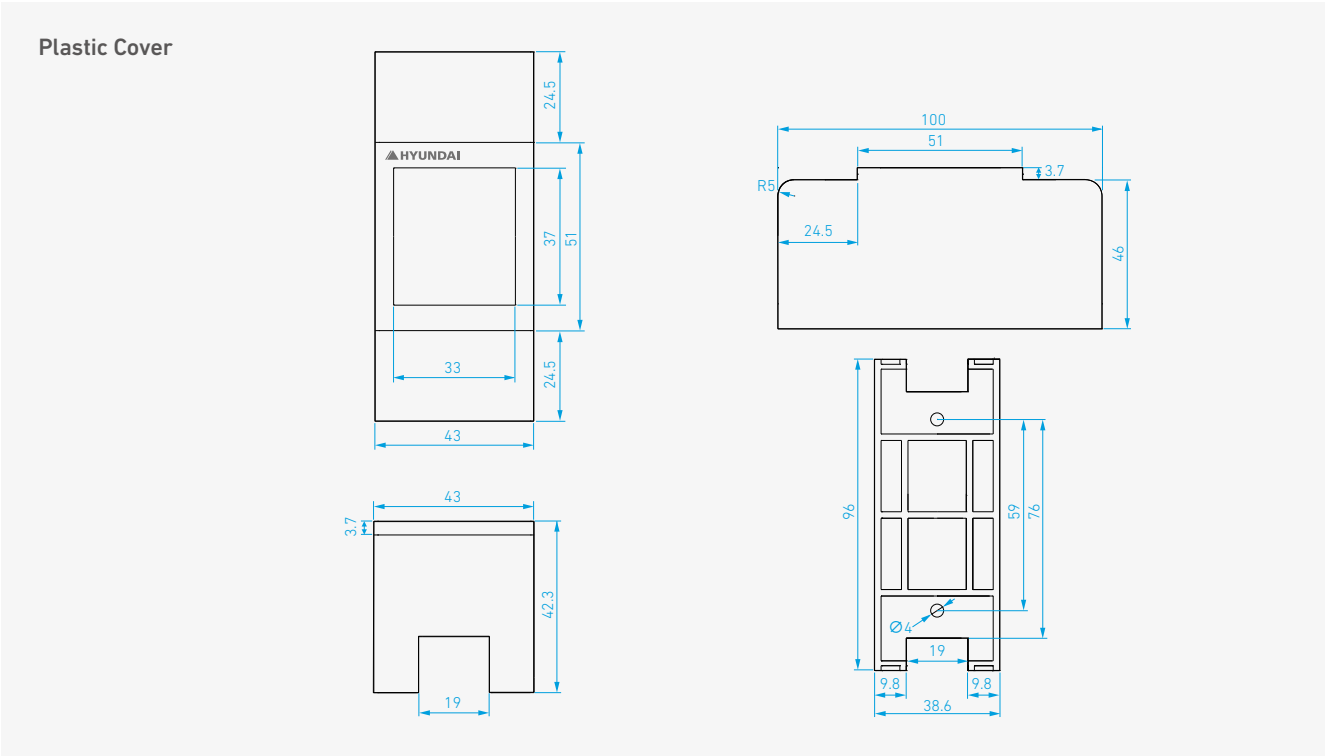
Dimensions

HiBC (30 AF 1.5 kA 10-30 A)

HiBC32S






HiBC32SC



HBD Ordering Information

HBD Breaker/5, 10 kA 10-50 A

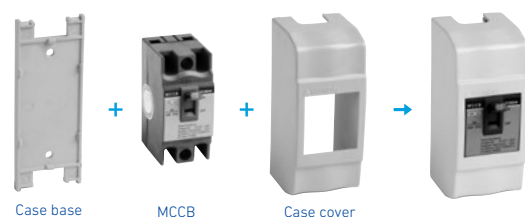
| Rating | 1 Pole | | 2 Pole | | 3 Pole | |
|--|--------|--------------------------|--------------------------|--------------------------|--------|------|
| | | Code | | Code | | Code |
|  50 AF, 5 kA Plug-in Type | 10 A | HBD51D 1PT4S0000C 00010 | HBD52D 2PT4S0000C 00010 | HBD53D 3PT4S0000C 00010 | | |
| | 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 |

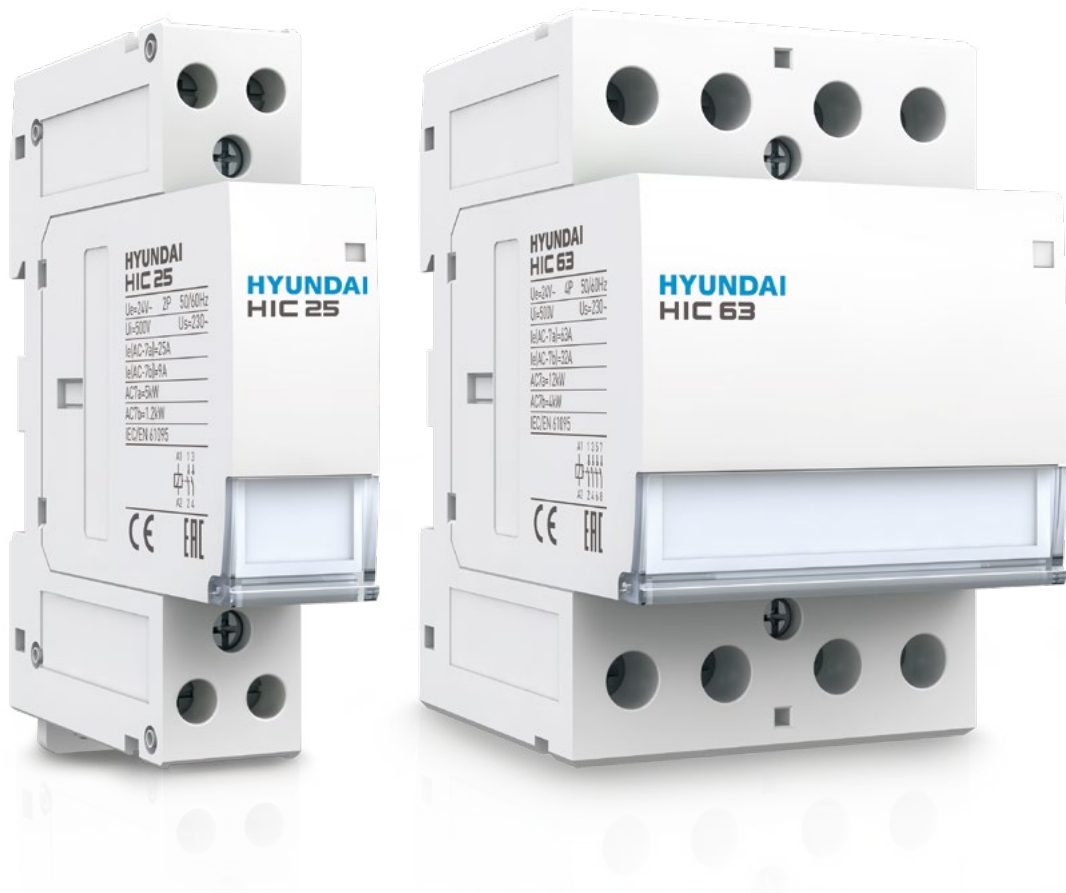
Features



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 be used 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: $-5 \sim +40$ °C, average not more than $+35$ °C within 24 hours
- Altitude (m): Not exceed 2,000 meters
- Atmospheric conditions: When the highest temperature is $+40$ °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 °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

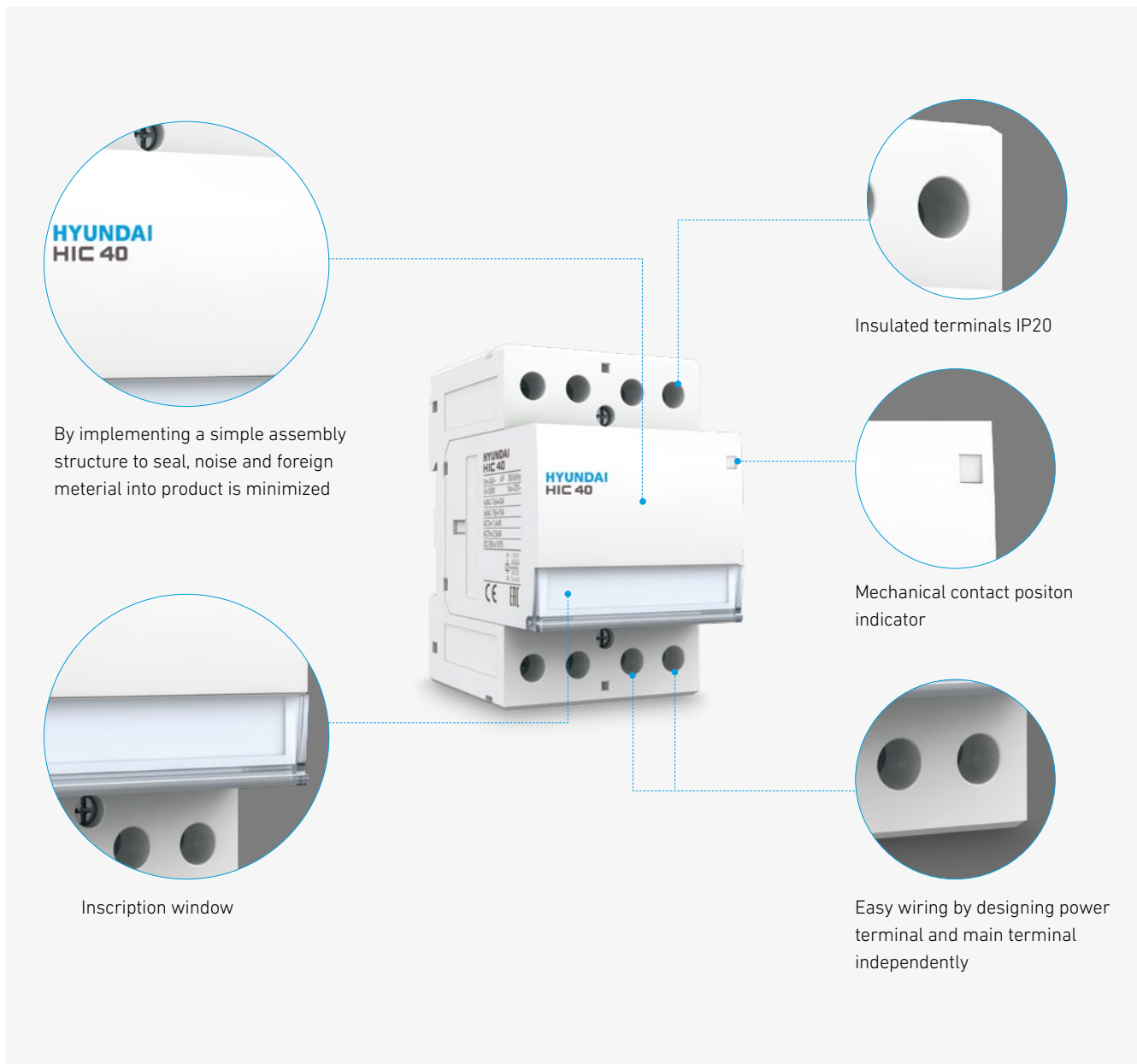


HIC63

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

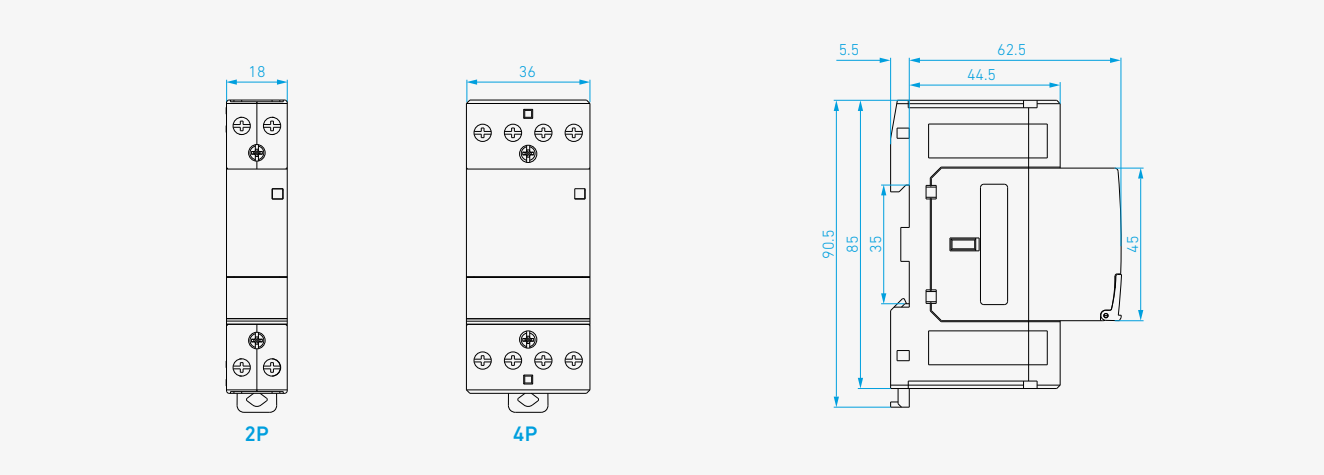
HIC Type

| 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 |

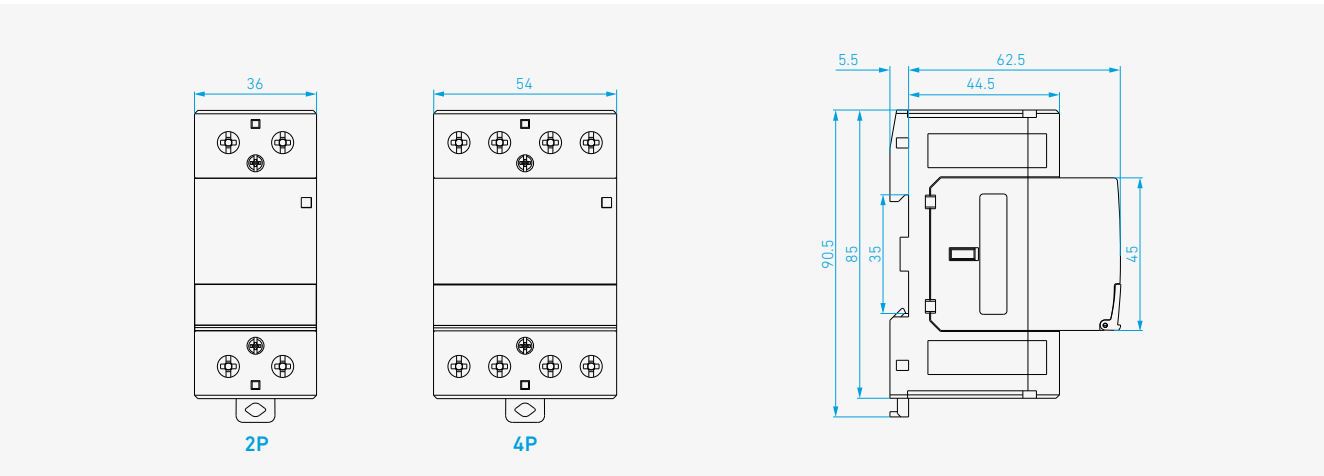
Dimensions

HIC

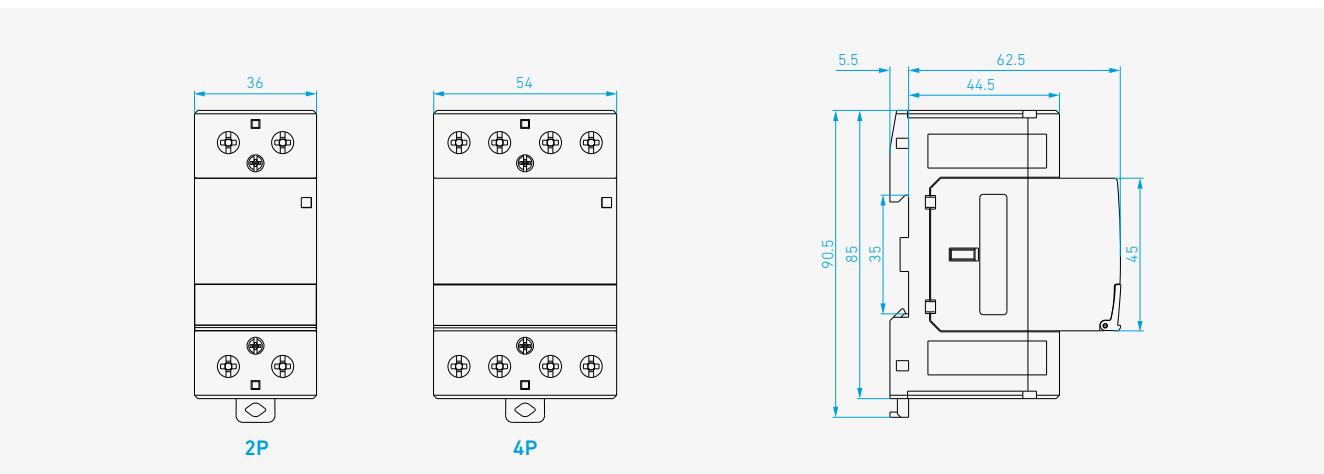
HIC25, 25 AF



HIC40, 40 AF



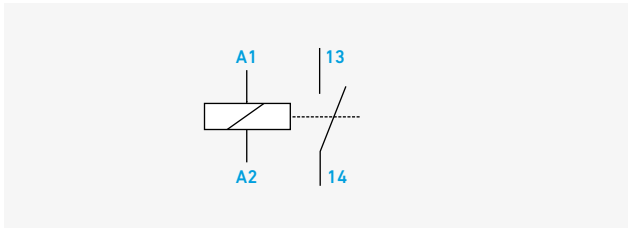
HIC63, 63 AF



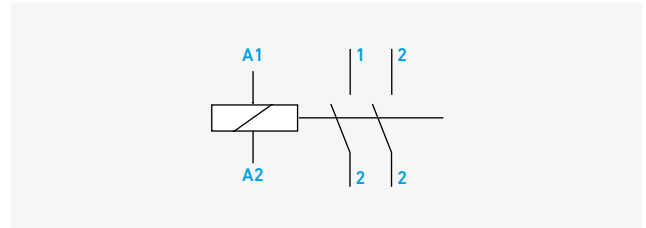
Circuit Diagram

HIC 2P

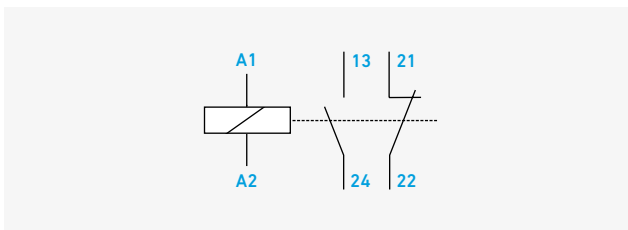
1NO



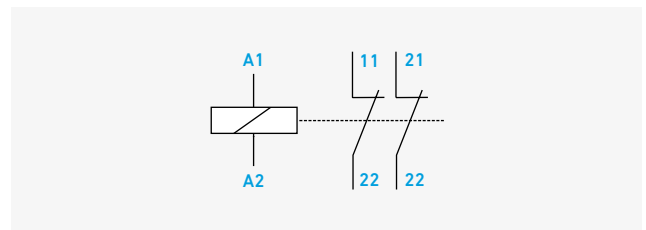
2NO



1NO + 1NC

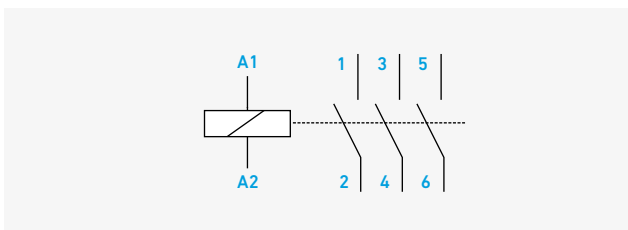


2NC

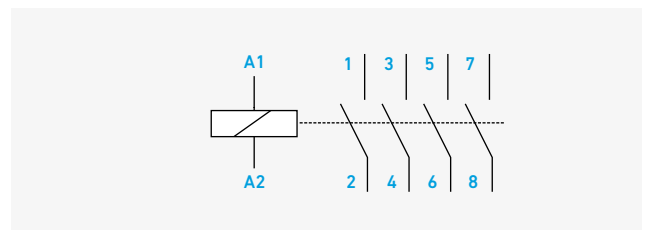


HIC 4P

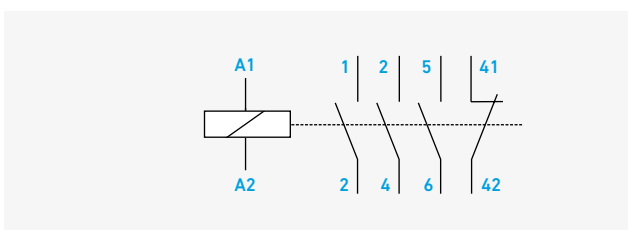
3NO



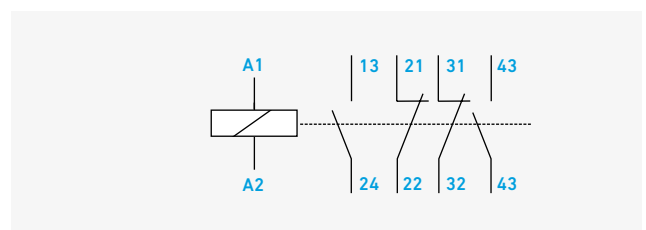
4NO



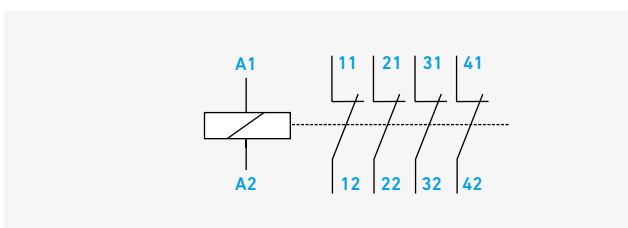
3NO + 1NC



2NO + 2NC

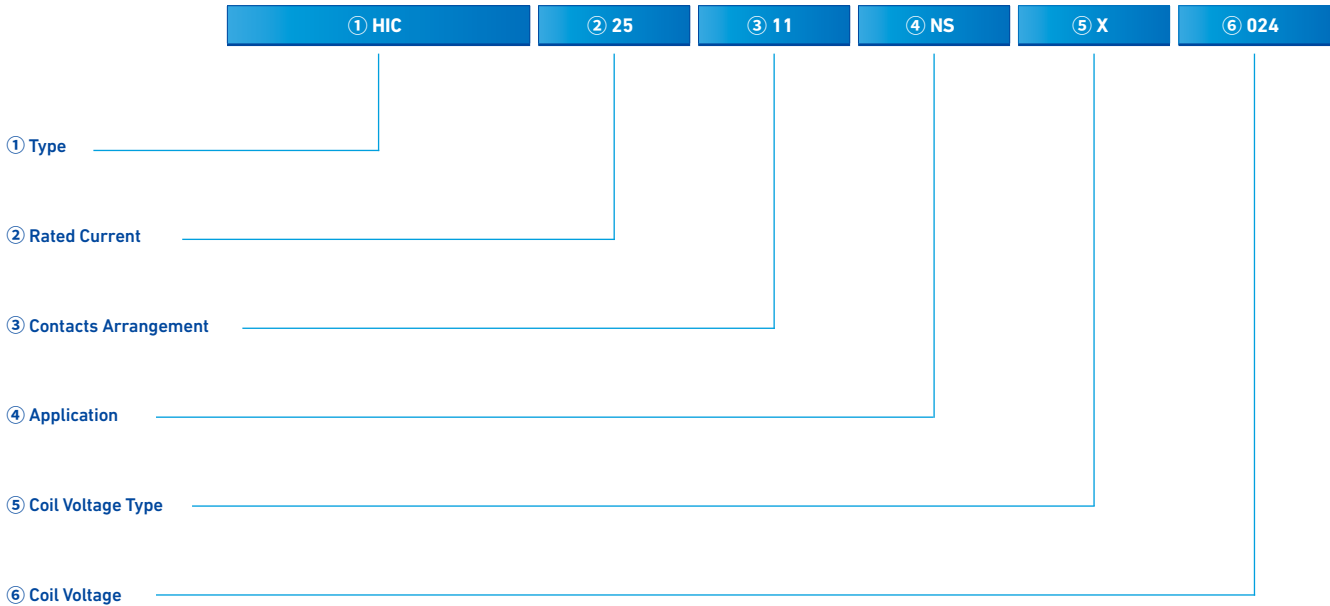


4NC



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

| | |
|-------------------|-----|
| Features | 98 |
| Selection Table | 100 |
| Accessories | 102 |
| Technical Data | 104 |
| Dimensions | 109 |
| Order Information | 112 |

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.



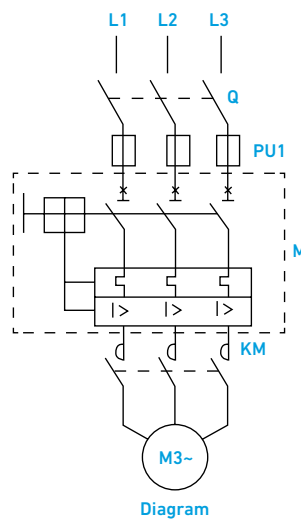


Product Features

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



※ 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 | - | - | - | - | - | - | - | - | - | - |

HMMS32R









HMMS80K



| HMMS32R | | | | | | | | | | HMMS80K | | | | | | | | | |
|-----------------------------------|-----|--------------------|-----|--------------------|-----|--------------------|-----|--------------------|------|-----------------------------------|-----|--------------------|-----|--------------------|-----|--------------------|-----|--------------------|-----|
| Rotary | | | | | | | | | | Push-button | | | | | | | | | |
| 3 | | | | | | | | | | 3 | | | | | | | | | |
| 0.1~32 A | | | | | | | | | | 25~80 A | | | | | | | | | |
| Up to 690 V | | | | | | | | | | Up to 690 V | | | | | | | | | |
| 50/60 Hz | | | | | | | | | | 50/60 Hz | | | | | | | | | |
| 690 V | | | | | | | | | | 690 V | | | | | | | | | |
| 6k V | | | | | | | | | | 6 kV | | | | | | | | | |
| Cat. A | | | | | | | | | | Cat. A | | | | | | | | | |
| AC 3 | | | | | | | | | | AC 3 | | | | | | | | | |
| 100,000/100,000 | | | | | | | | | | 30,000/50,000 | | | | | | | | | |
| 25 | | | | | | | | | | 25 | | | | | | | | | |
| -20~+60 °C | | | | | | | | | | -20~+60 °C | | | | | | | | | |
| 13 × Ie max. | | | | | | | | | | 13 × Ie max. | | | | | | | | | |
| 95% RH | | | | | | | | | | 95% RH | | | | | | | | | |
| 2,000 | | | | | | | | | | 2,000 | | | | | | | | | |
| 10 mm ² | | | | | | | | | | 25 mm ² | | | | | | | | | |
| 2.5 N·m | | | | | | | | | | 4.5 N·m | | | | | | | | | |
| ○ | | | | | | | | | | ○ | | | | | | | | | |
| ○ | | | | | | | | | | ○ | | | | | | | | | |
| ○ | | | | | | | | | | ○ | | | | | | | | | |
| 0.277 | | | | | | | | | | 0.682 | | | | | | | | | |
| 89.8 x 89.5 x 44.5 | | | | | | | | | | 120.0 x 113.0 x 61.2 | | | | | | | | | |
| Clip in DIN Rail (35 mm x 7.5 mm) | | | | | | | | | | Clip in DIN Rail (35 mm x 7.5 mm) | | | | | | | | | |
| Vertical/Horizontal | | | | | | | | | | Vertical/Horizontal | | | | | | | | | |
| AUX/AXT/SHT/UVT/Handle | | | | | | | | | | AUX | | | | | | | | | |
| AC220 V AC230 V AC240 V | | AC400 V AC415 V | | AC440 V AC460 V | | AC500 V AC525 V | | AC600 V AC690 V | | 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 | Icu | Ics | Icu | Ics | Icu | Ics | Icu | Ics | Icu | Ics |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 50 | 50 | 50 | 50 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 100 | 100 | 15 | 15 | 10 | 10 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 15 | 7.5 | 8 | 4 | 6 | 4.5 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 100 | 100 | 15 | 7.5 | 8 | 4 | 6 | 4.5 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 50 | 50 | 15 | 6 | 6 | 3 | 4 | 3 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 50 | 50 | 15 | 6 | 6 | 3 | 4 | 3 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| 50 | 50 | 10 | 5 | 6 | 3 | 4 | 3 | 3 | 2.25 | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | 100 | 100 | 50 | 25 | 50 | 25 | 10 | 5 | 5 | 3 |
| - | - | - | - | - | - | - | - | - | - | 100 | 100 | 50 | 25 | 50 | 25 | 10 | 5 | 5 | 3 |
| - | - | - | - | - | - | - | - | - | - | 100 | 100 | 15 | 7.5 | 10 | 6 | 4 | 4 | 2 | 2 |

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 | | | | | |

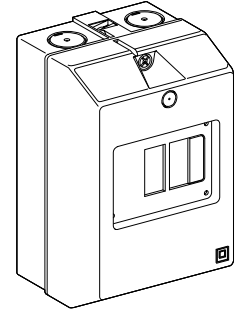
Enclosure

• 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



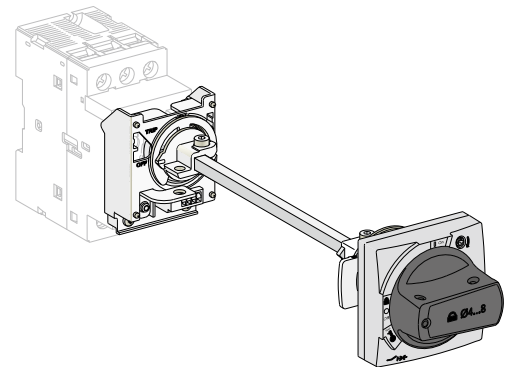
Extension Handle (TFH)

• 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



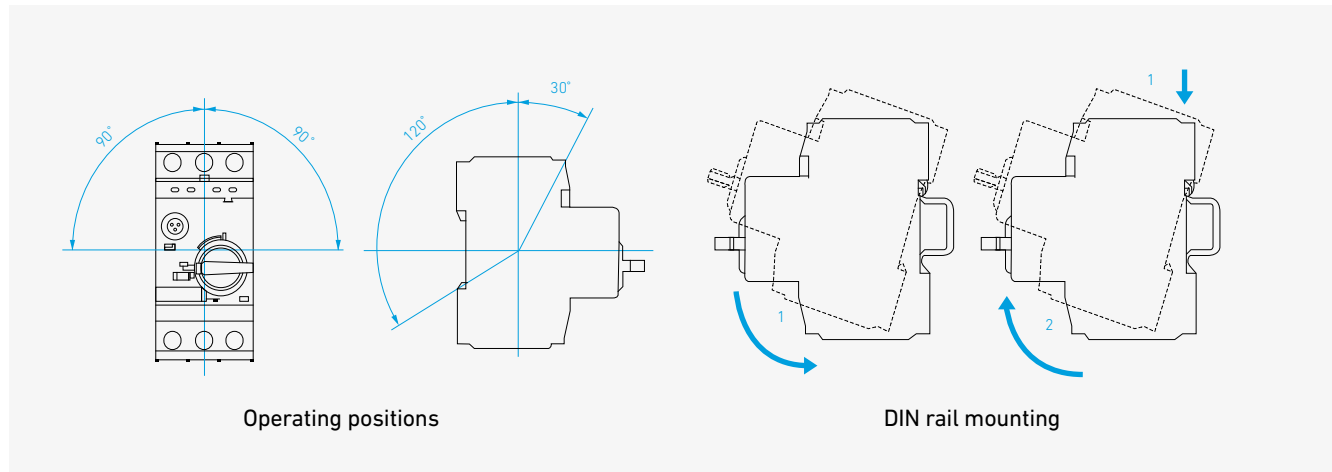
Mounting



Technical Data

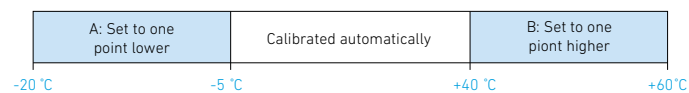
Mounting

35 mm Din-Rail for mounting

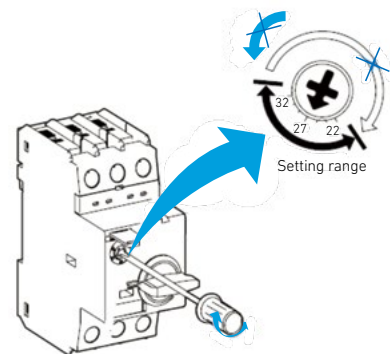


Caution for thermal adjustments

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

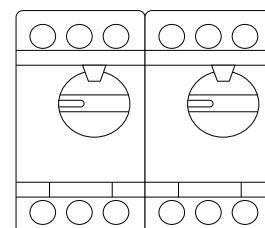
Vibration resistance: 5~150 Hz

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 |

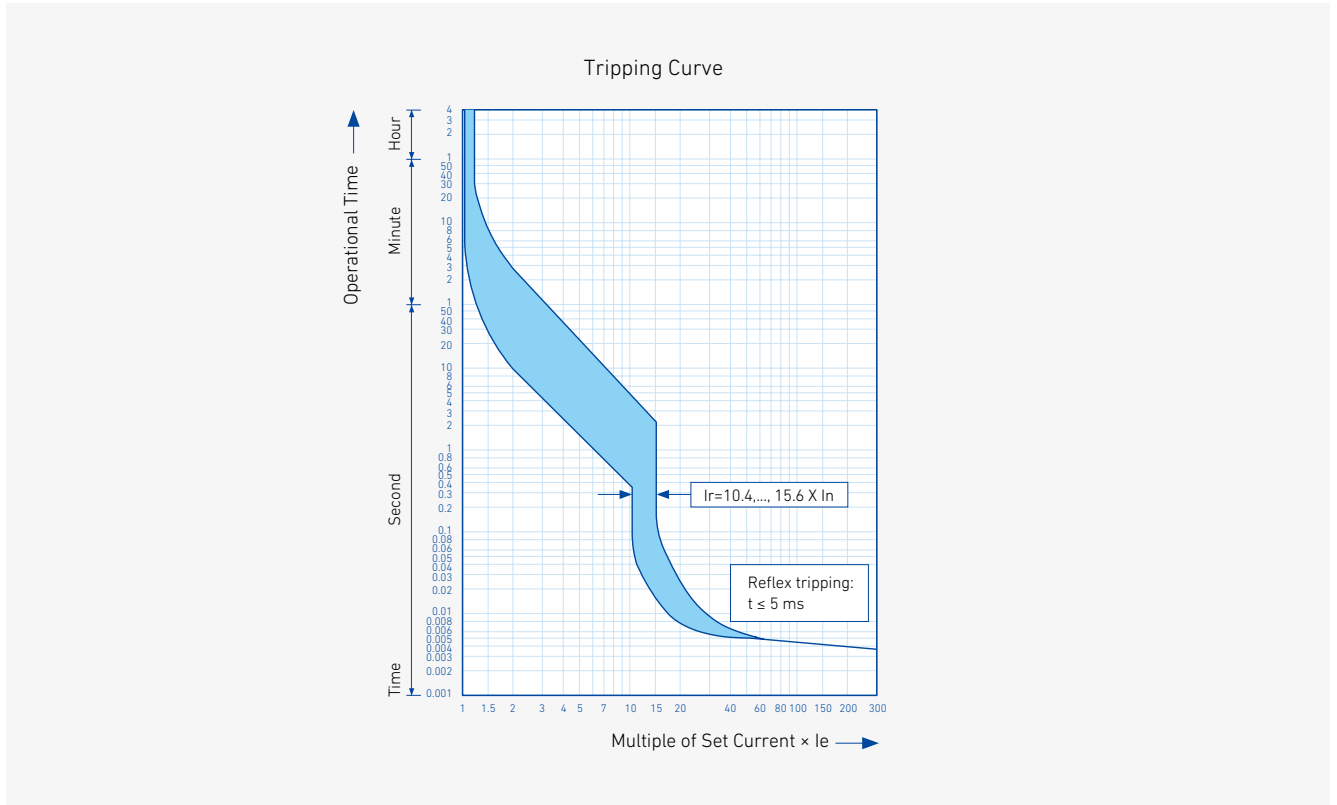
Technical Data

Application for-3Phase Motors, AC-3

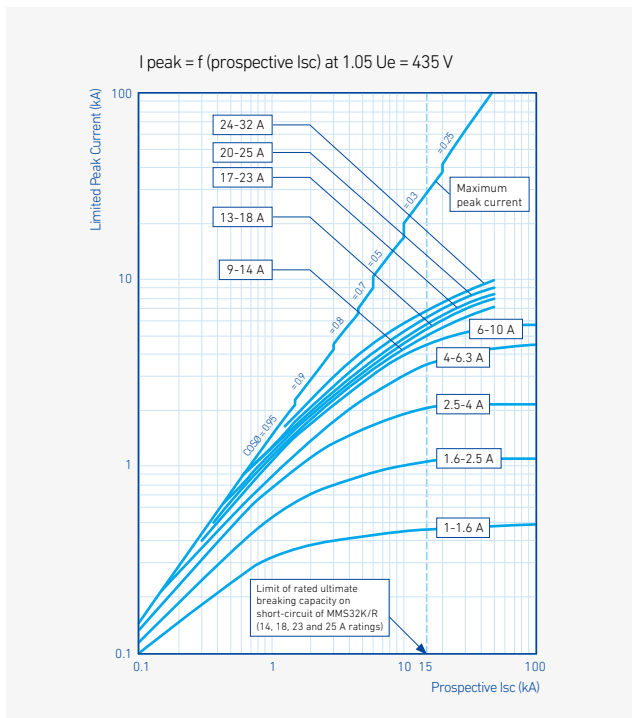
| Rated Current (A) | Setting Range (A) | 3-Phase [kW] (50/60 Hz) | | | | | |
|-------------------|-------------------|-------------------------|-------|-------|-------|-------|-------|
| | | AC230/240 V | 400 V | 415 V | 440 V | 500 V | 690 V |
| 0.16 | 0.1-0.16 | - | - | - | - | - | - |
| 0.25 | 0.16-0.25 | - | 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

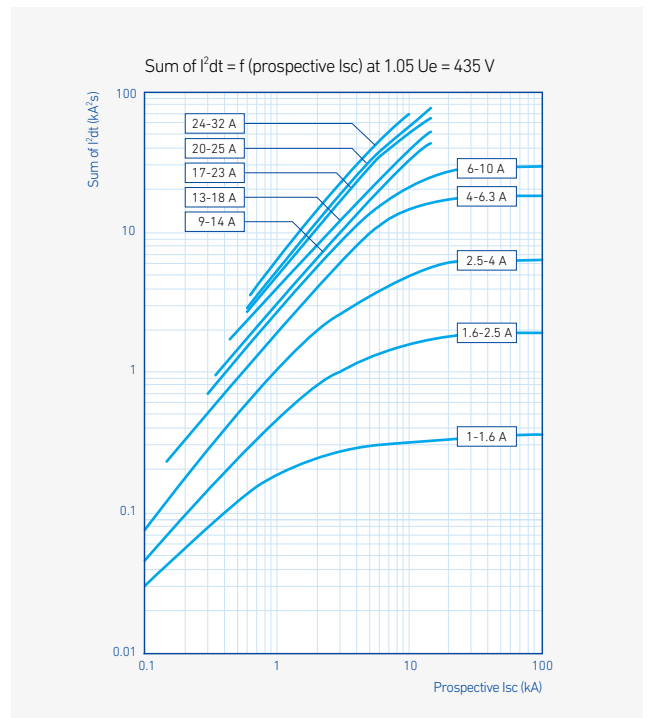
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit HMMS32K/R



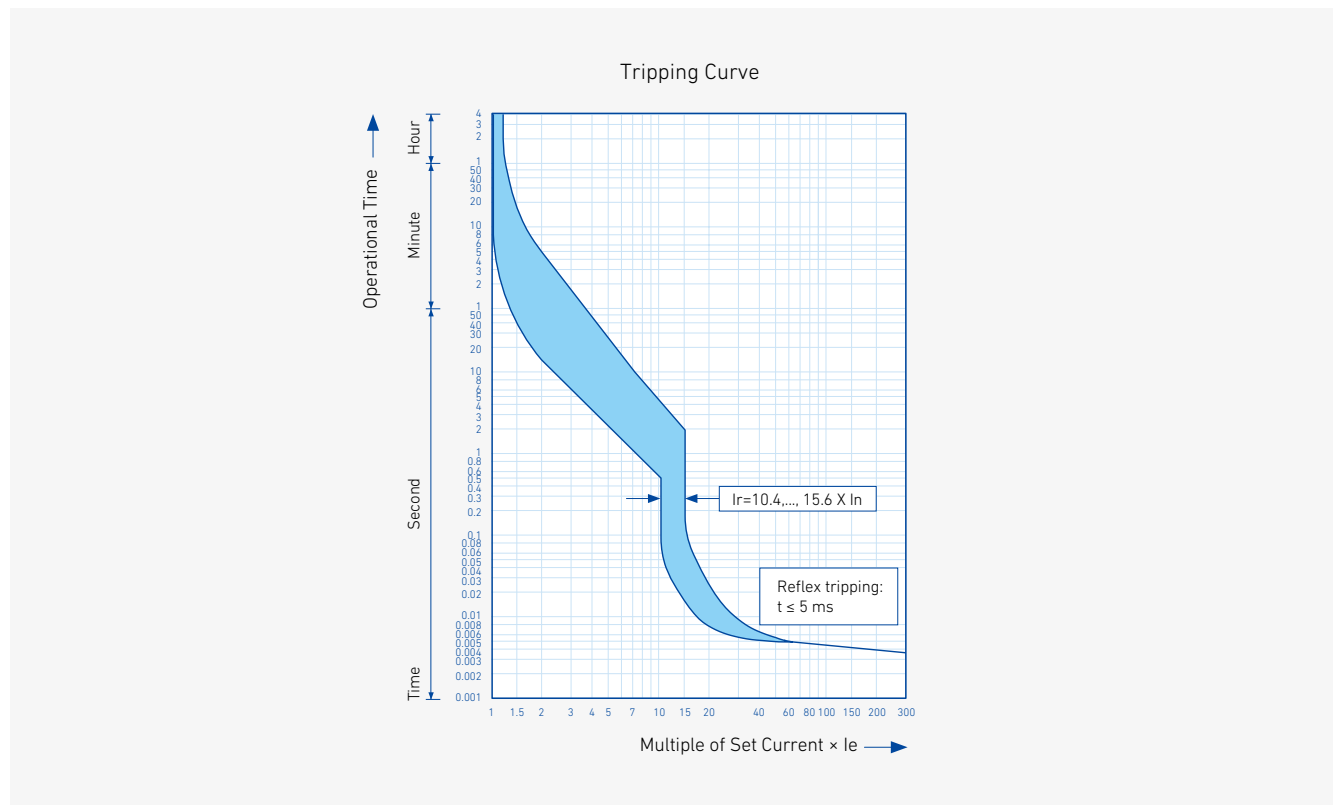
Thermal Limit on Short Circuit HMMS32K/R



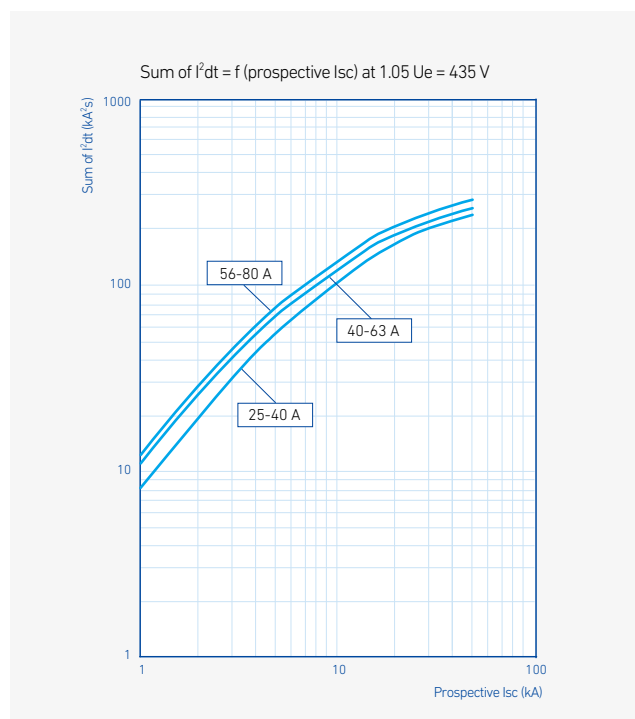
Technical Data

HMMS80K

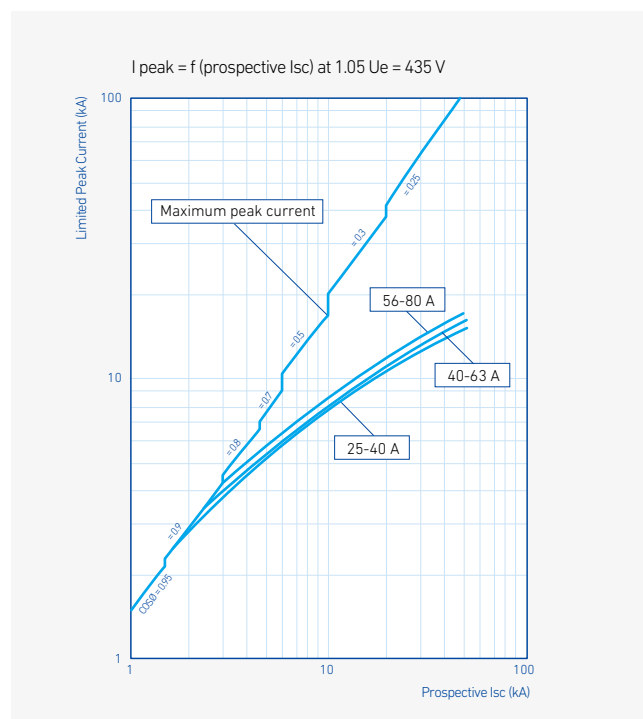
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit



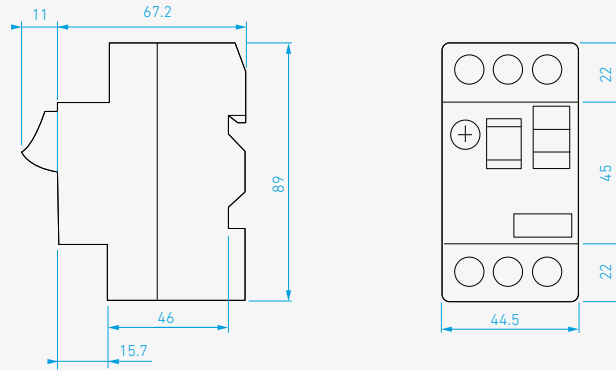
Thermal Limit in kA^2 in the Magnetic Operating Zone



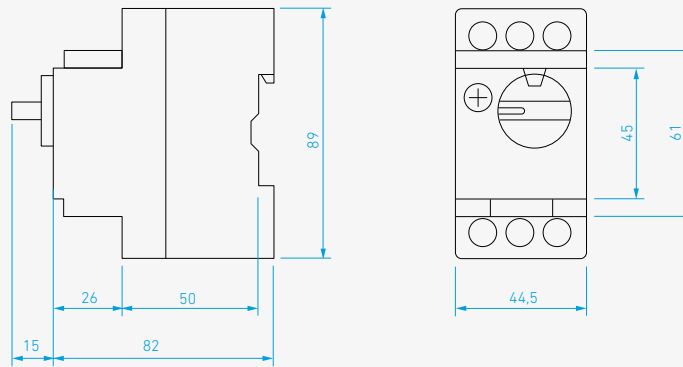
Dimensions

HMMS

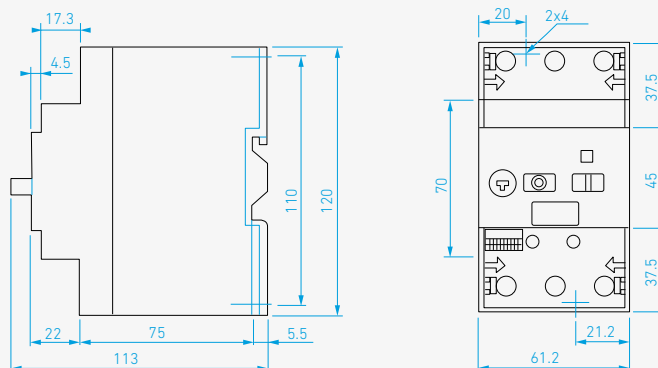
HMMS32K



HMMS32R



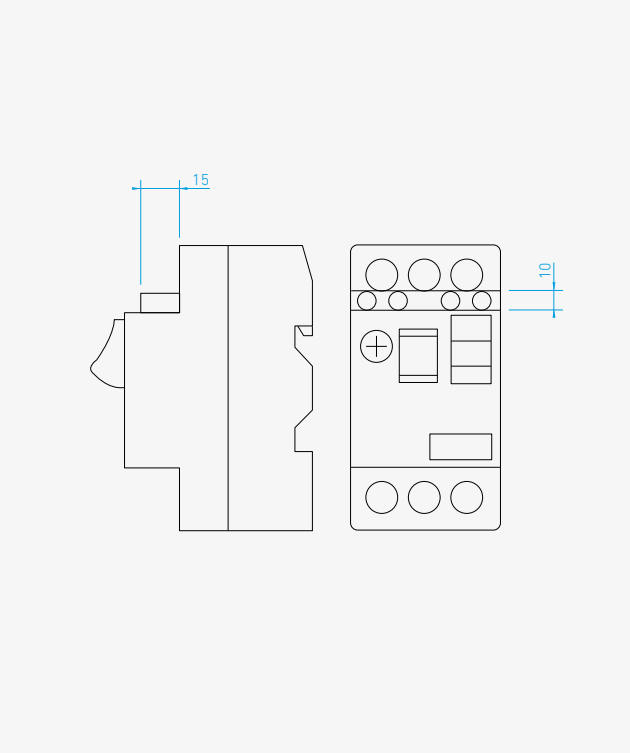
HMMS80K



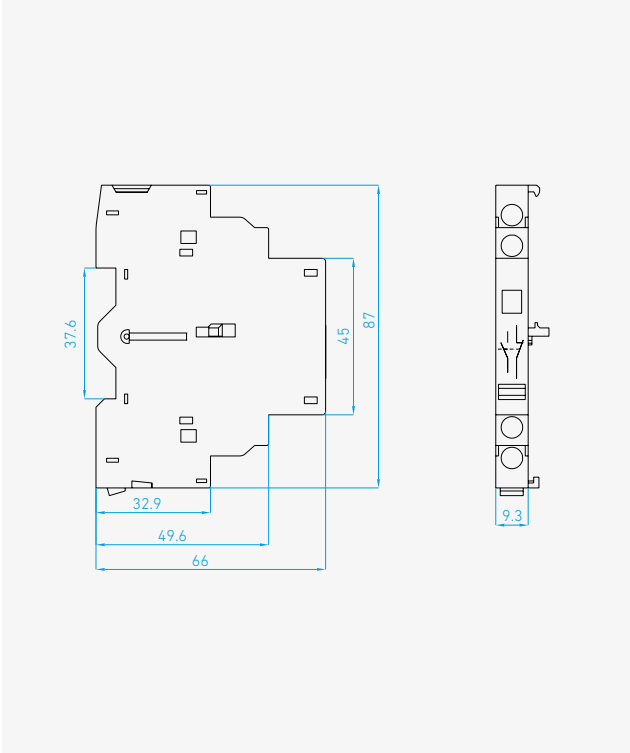
Dimensions

Accessories

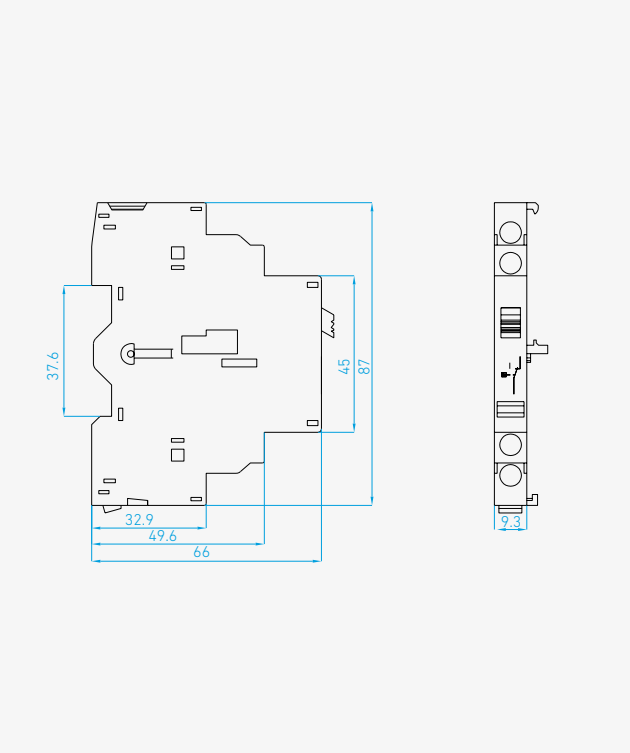
Top Mounting: Auxiliary Switch



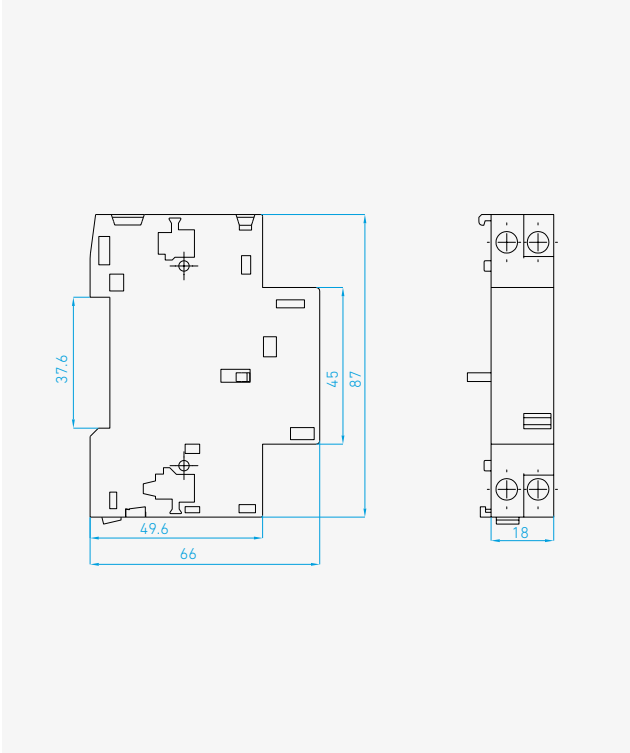
Side Mounting: Auxiliary Switch



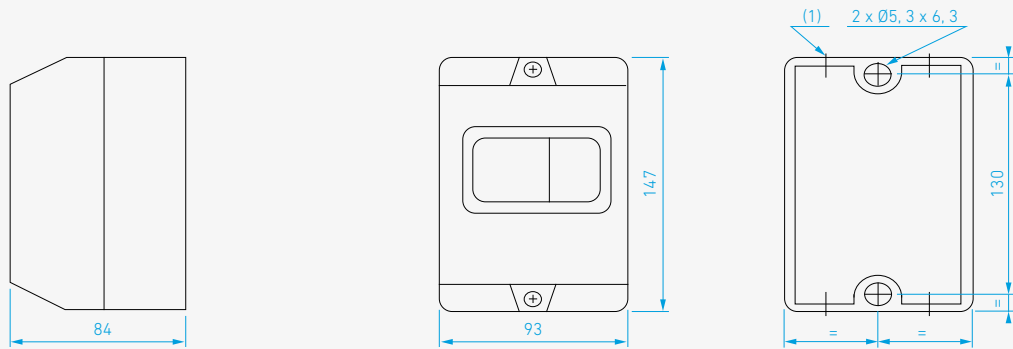
Side Mounting: Alarm Switch



Side Mounting: Shunt Trip/UVT

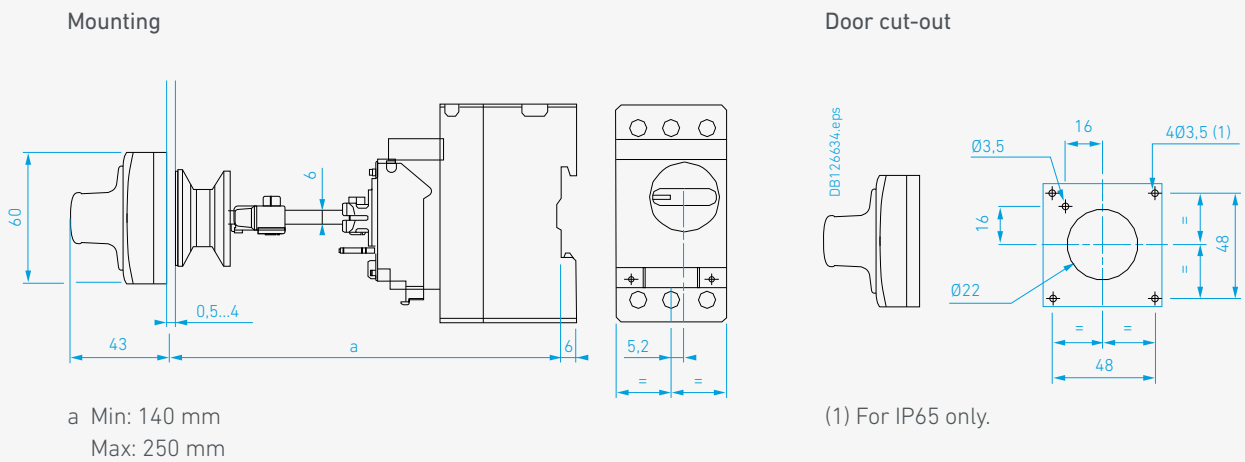


Enclosure



- (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

| | |
|-------------------|-----|
| Features | 114 |
| Selection Table | 116 |
| Technical Data | 126 |
| Dimension/Diagram | 132 |
| Order Information | 138 |

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 | | 18×90×66.5 | 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 | 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) | 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 | U _p | ≤ 2.0 kV | ≤ 2.0 kV | ≤ 2.0 kV | ≤ 2.0 kV | ≤ 2.0 kV | ≤ 2.0 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 | 1.65 | 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

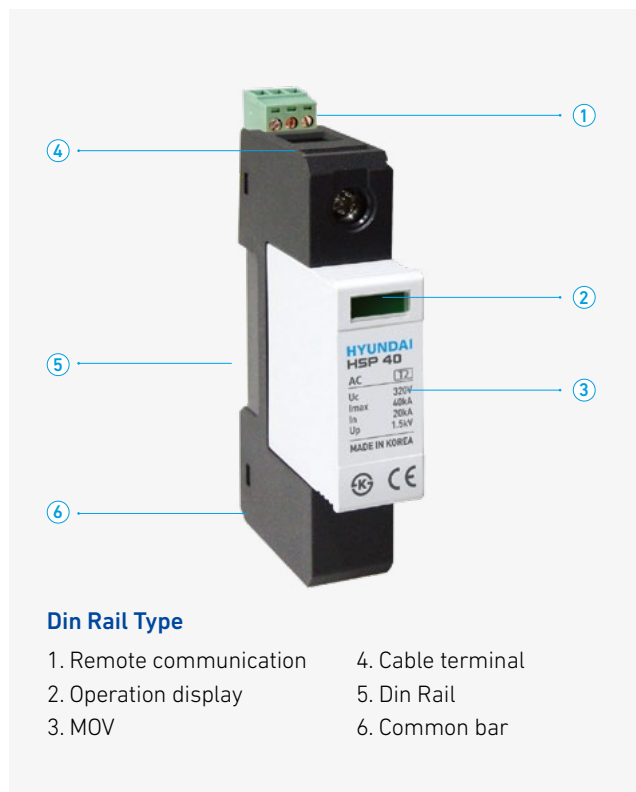
Box Type/Deluxe + Counter

| 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 | 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) | 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 _{scCR} | 25 kA | 25 kA | 25 kA |
| Voltage Protection Level | U _p | 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 | | ● | |
| | DC | HSP25 | | ● | |
| | | HSP40 | | | ● |
| Box Type | Standard | HSP40 UL | ● | | |
| | | HSP40S | | | ● |
| | | HSP80S | | | ● |
| | | HSP120S | | ● | |
| | Deluxe | HSP200S | | ● | |
| | | 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

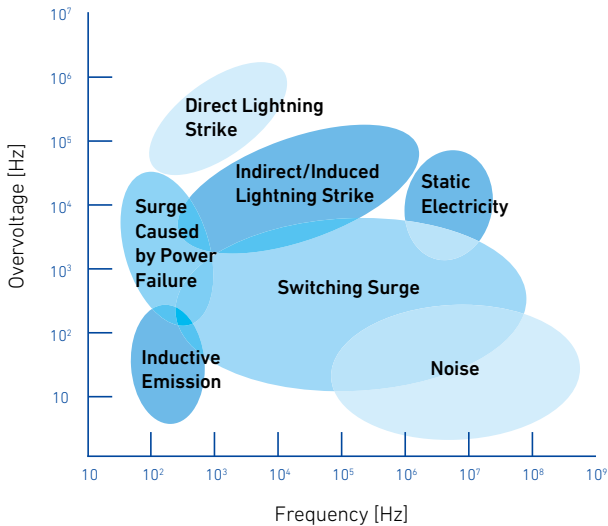


Fig 1. Various Electrical hazards
Lightning SURGE & Switching SURGE

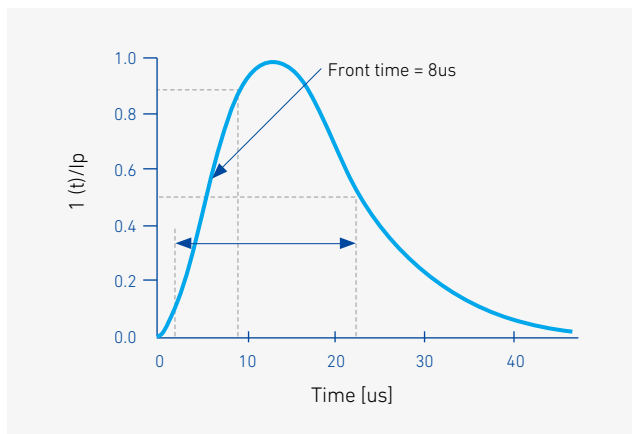
Surge

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.

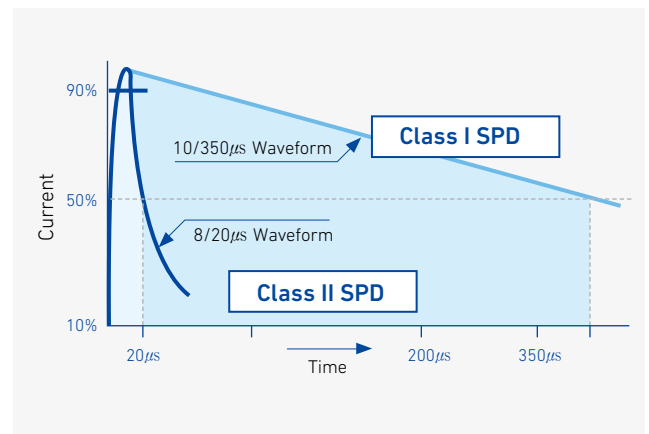
Waveforms of Surges



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

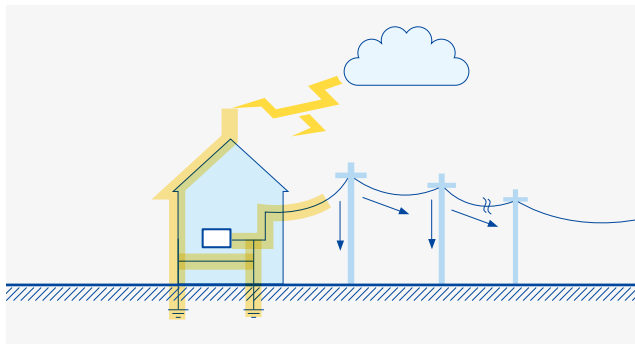
| Test Type | Parameters | Test Waveforms |
|-----------|------------|------------------------------|
| Type I | I_{imp} | 10/350 μ s |
| Type II | I_n | 8/20 μ s |
| Type III | U_{oc} | 1.2/50 μ s, 8/20 μ s |

Structure According to Different Points of Strike of Lightning

IEC 62305-4

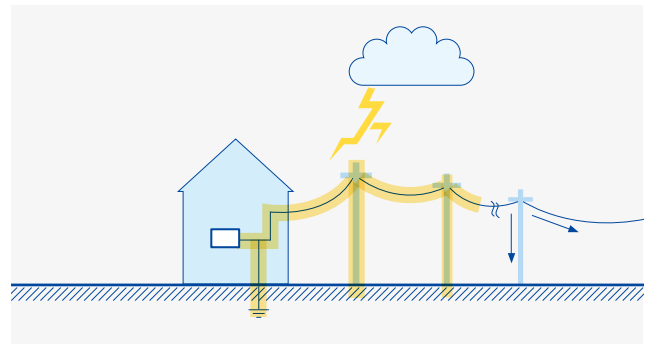
S1

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



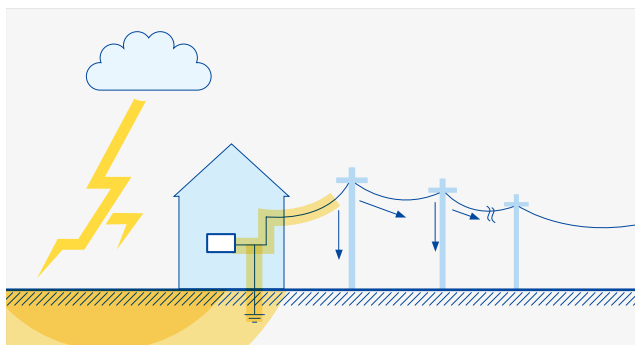
S3

Direct lightning strike to the entering



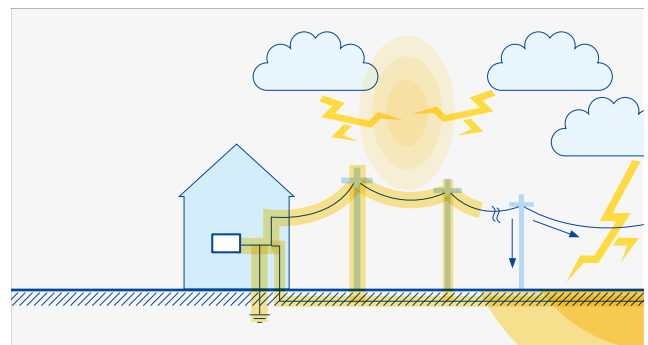
S2

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)

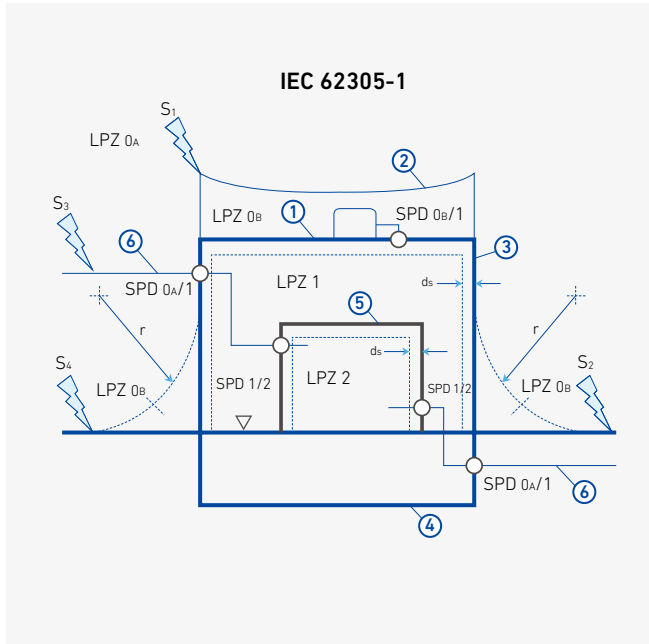
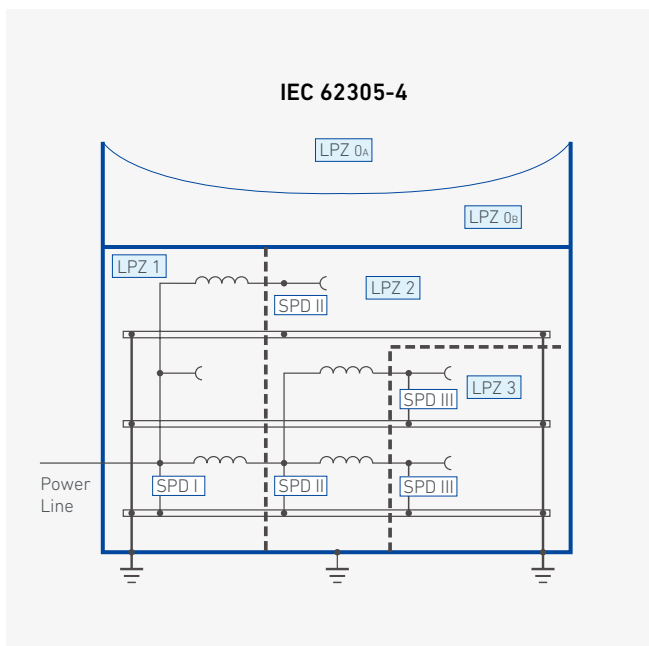


Table 1. Sources of Damage to a Structure According to the Point of Strike

| | |
|----|---|
| 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)

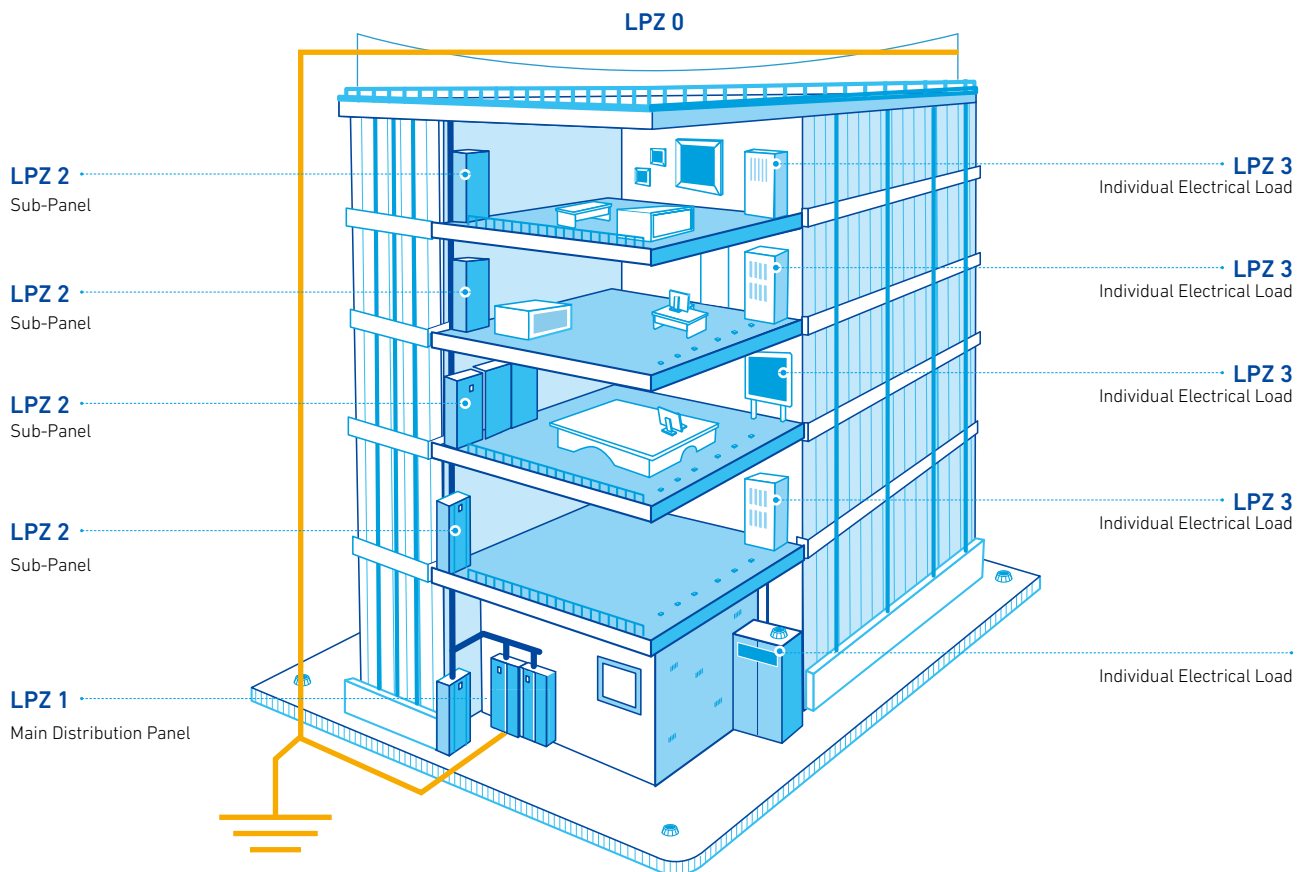
6 kV (3 kA) / 10 kV (5 kA) / 20 kV (10 kA)

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

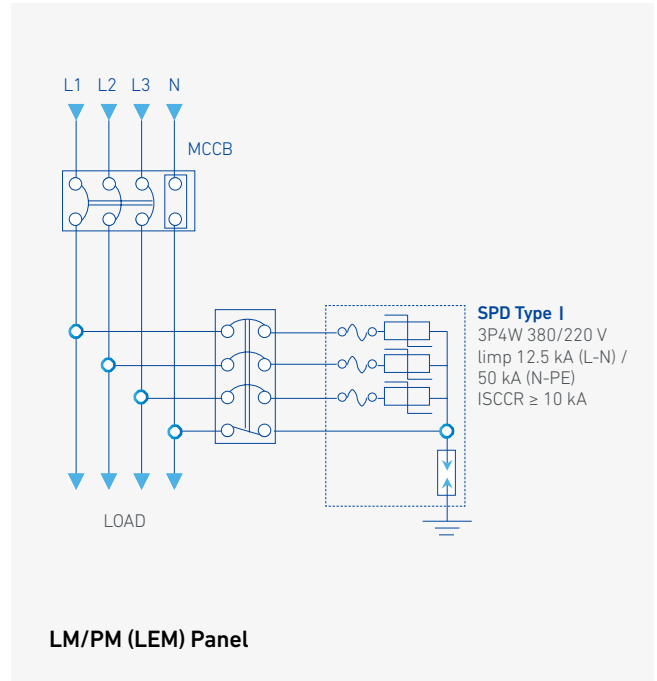
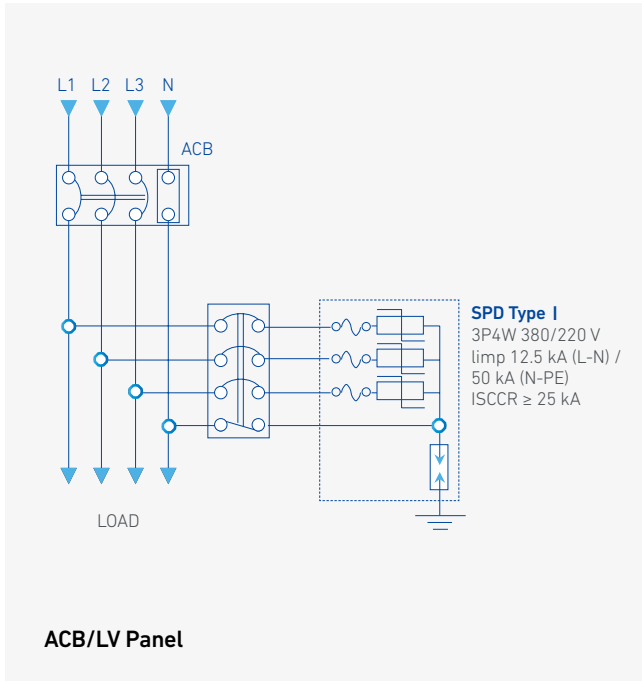
LPL (lightning protection level)

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.

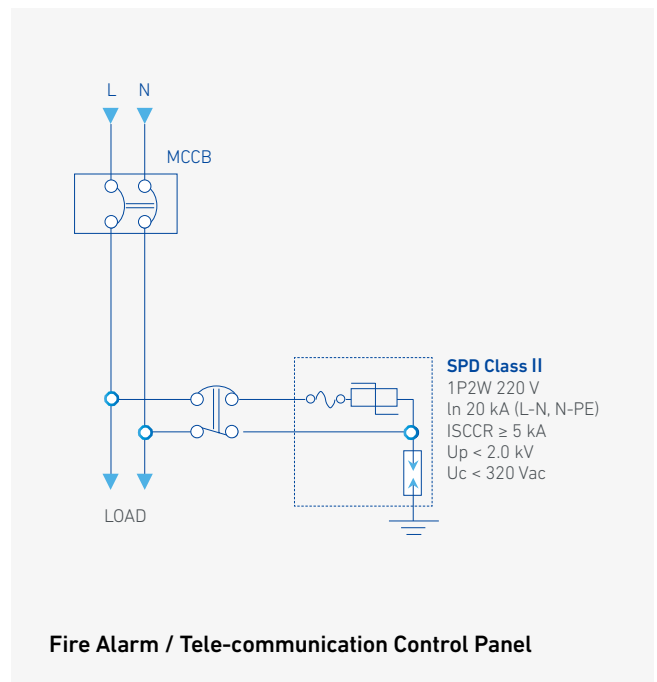
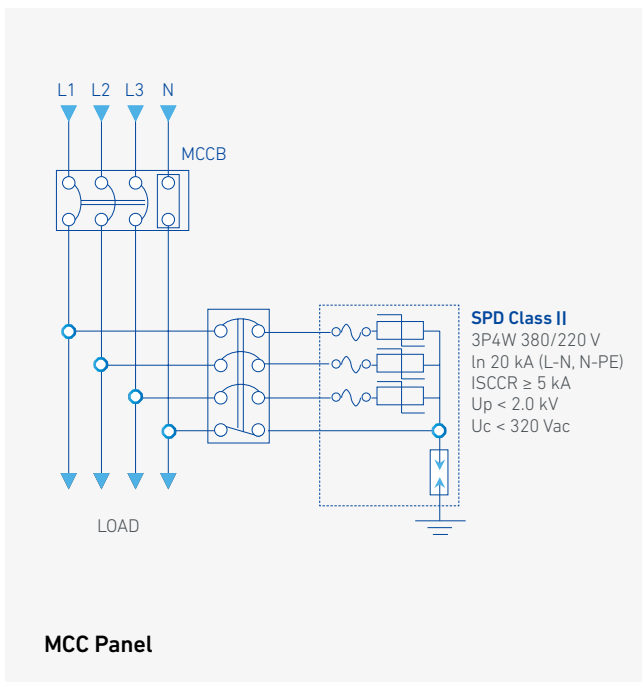
NOTE Lightning protection level is used to design protection measures according to the relevant set of lightning current parameters.

Example of SPD Installation

Examples of Type I SPD installations



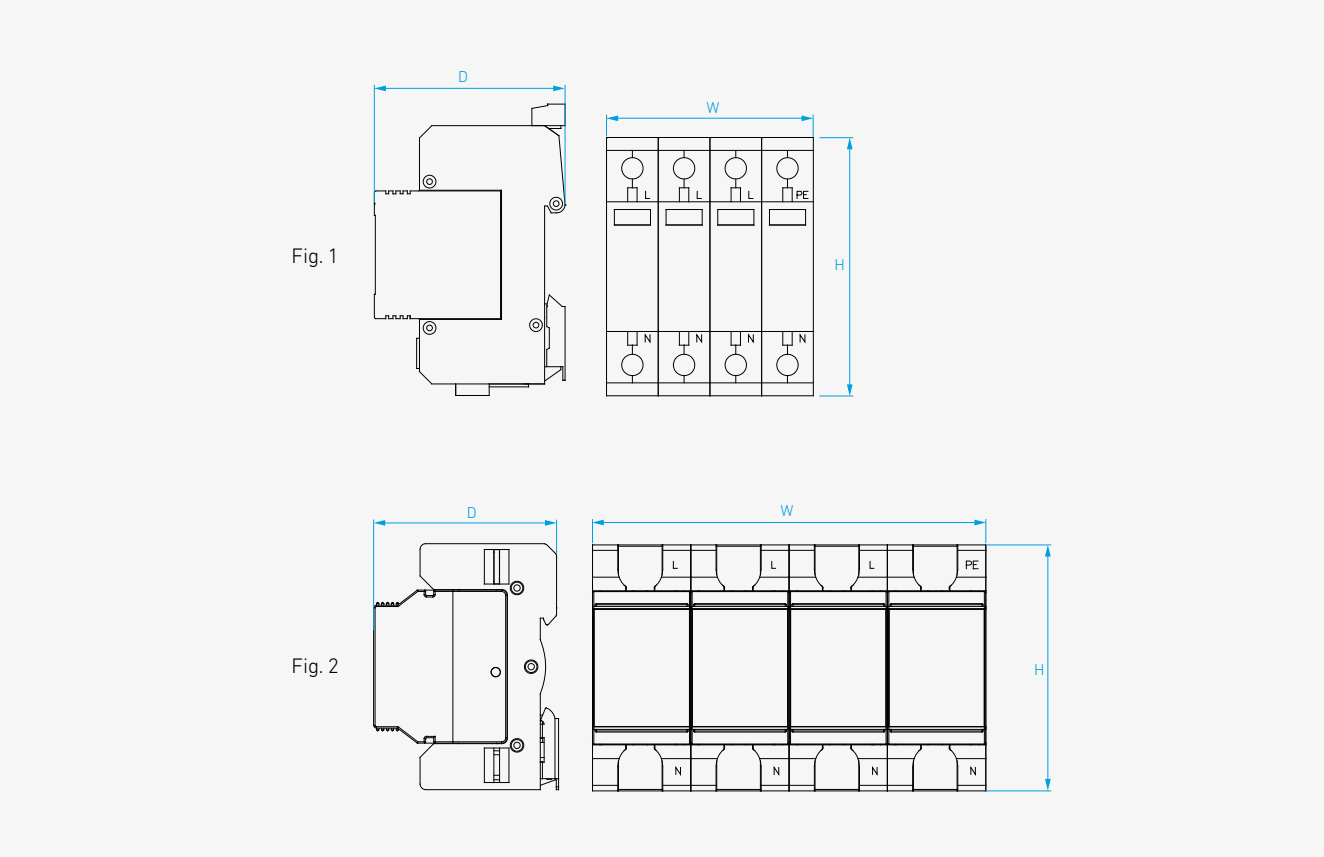
Examples of Type II SPD installations



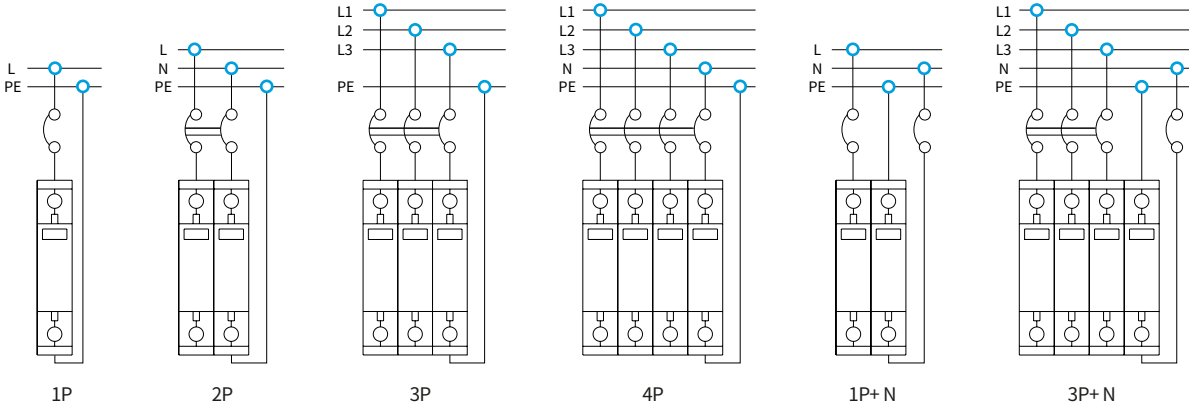
Dimension & Diagram

Din-Rail Type (AC)

HSP40/13/25

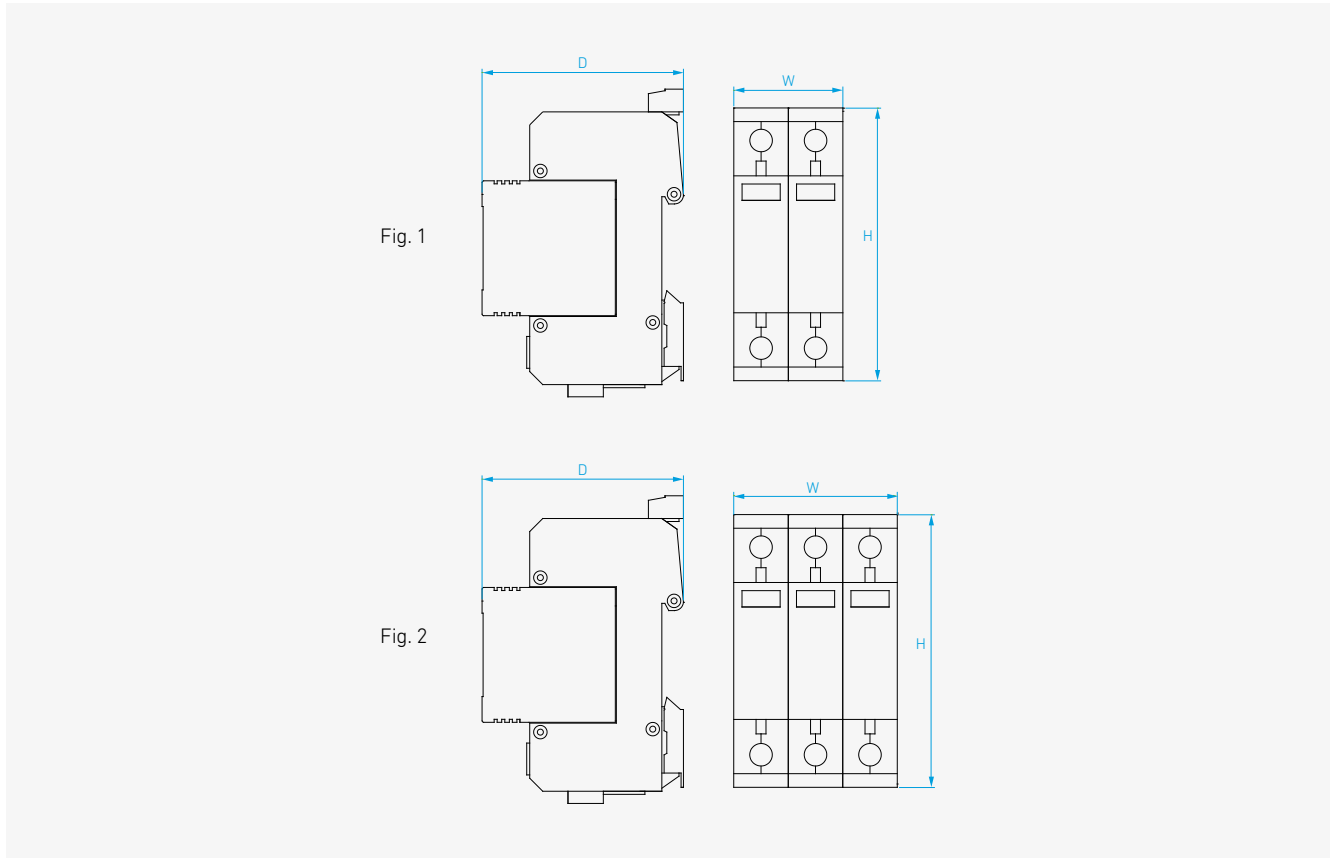


| | HSP40 (Fig. 1) | | | HSP13/25 (Fig. 2) | | |
|----|----------------|----|------|-------------------|----|----|
| | W | H | D | W | H | D |
| 1P | 18 | 90 | 66.5 | 36 | 90 | 68 |
| 2P | 36 | 90 | 66.5 | 72 | 90 | 68 |
| 3P | 54 | 90 | 66.5 | 108 | 90 | 68 |
| 4P | 72 | 90 | 66.5 | 144 | 90 | 68 |



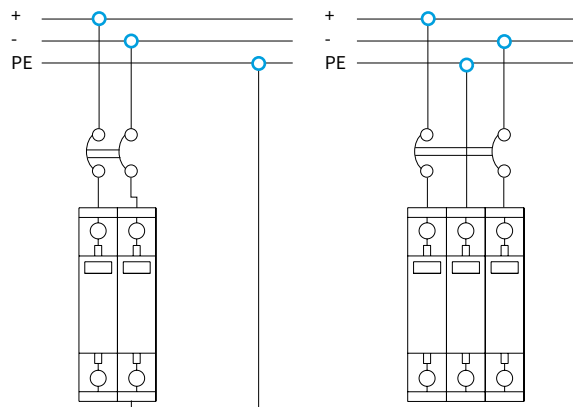
DIn-Rail Type (DC)

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

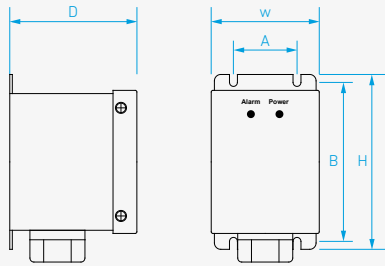


Fig. 1

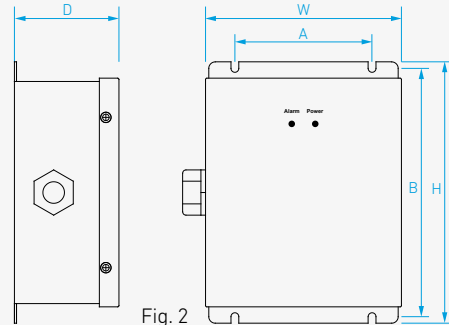


Fig. 2

| | 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 |

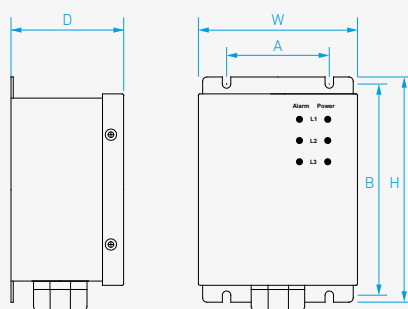
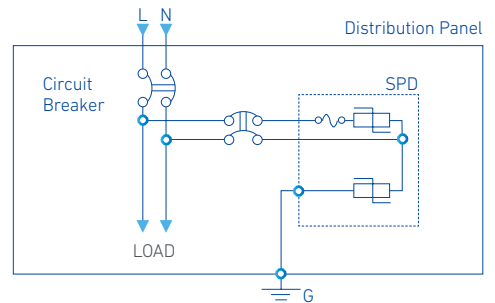


Fig. 1

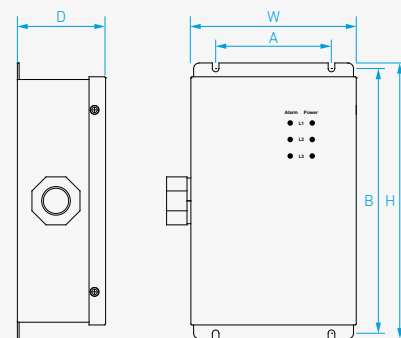
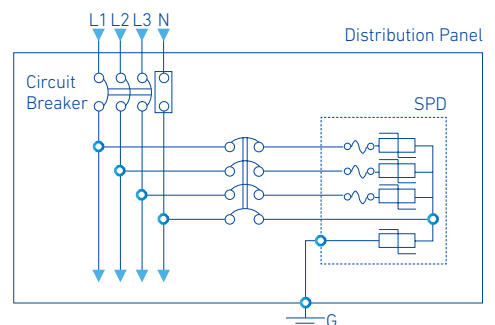


Fig. 2

| | 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

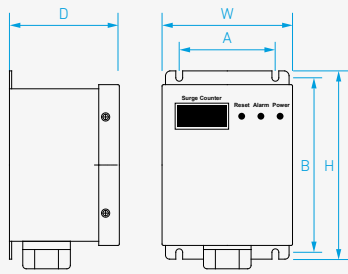


Fig. 1

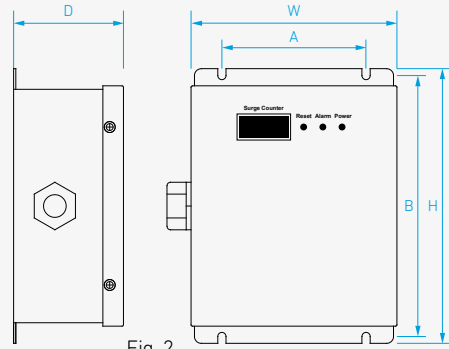


Fig. 2

| | 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 |

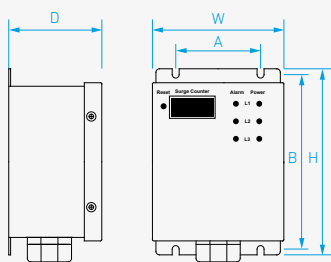
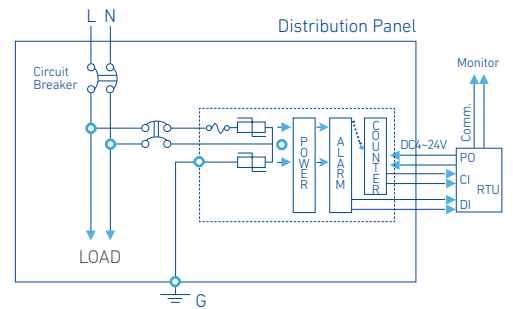


Fig. 1

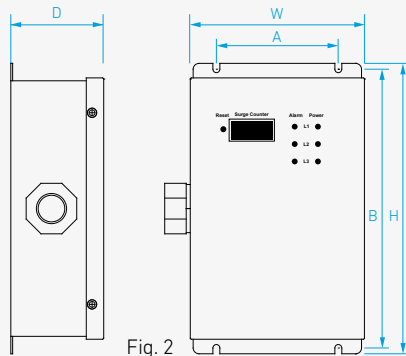
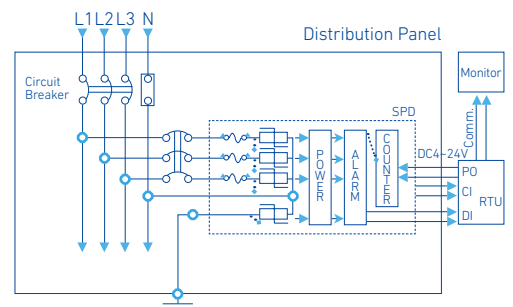


Fig. 2

| | 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

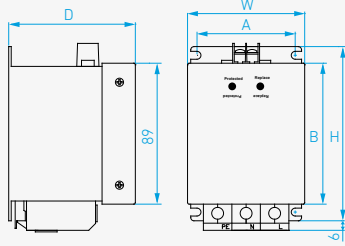


Fig. 1

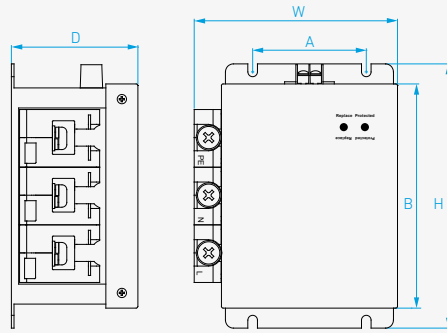


Fig. 2

| | 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 |

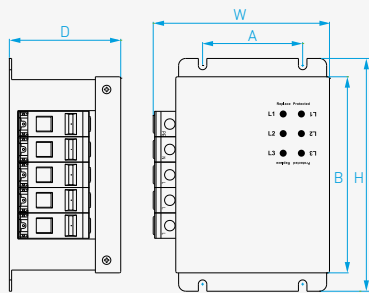
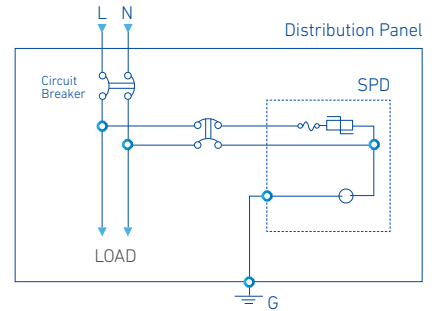


Fig. 1

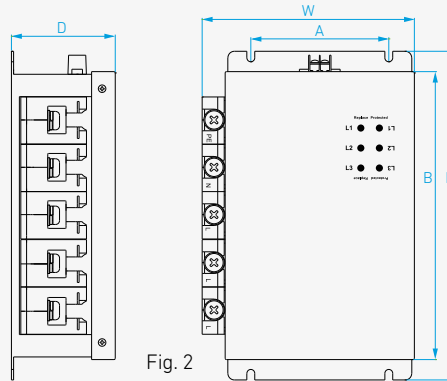
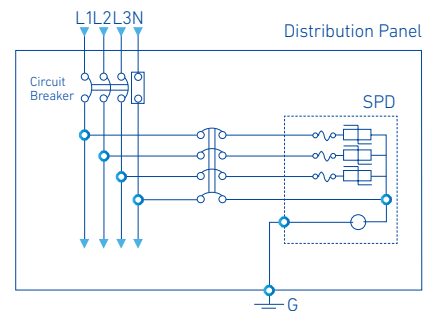


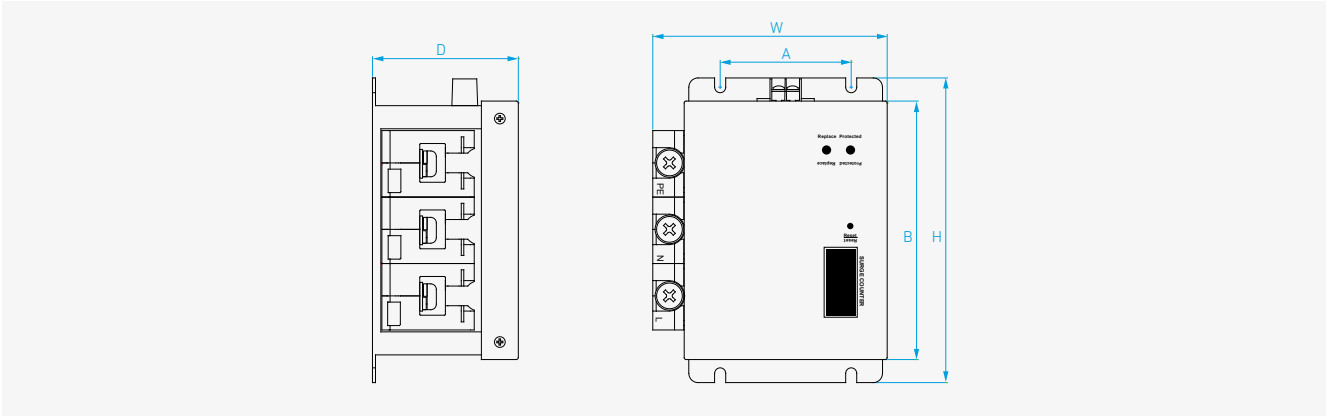
Fig. 2

| | 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 |

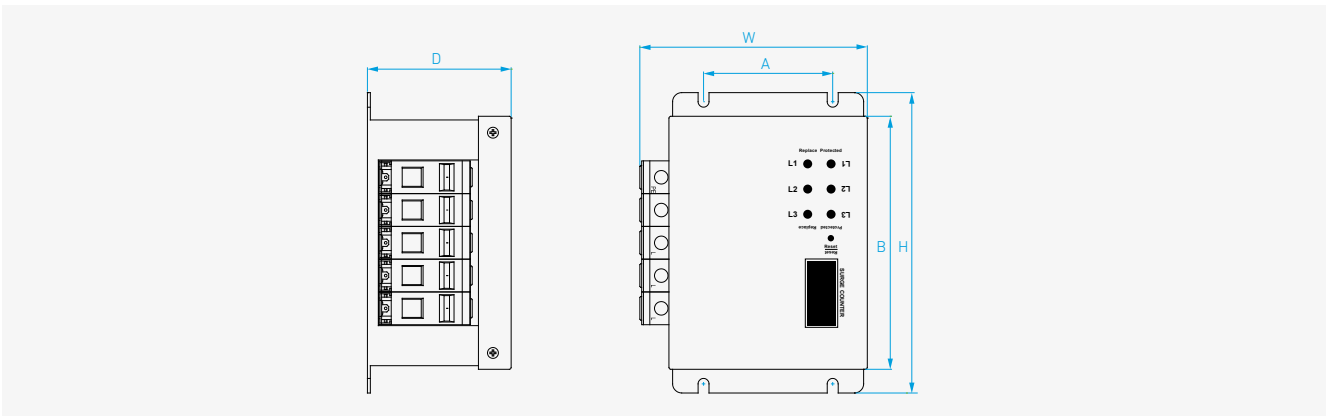
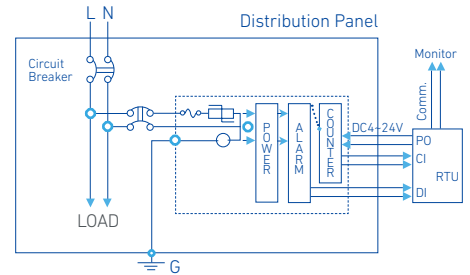


Deluxe Box Type + Counter

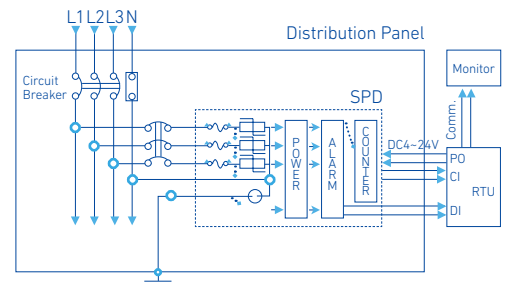
HSP40/160



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

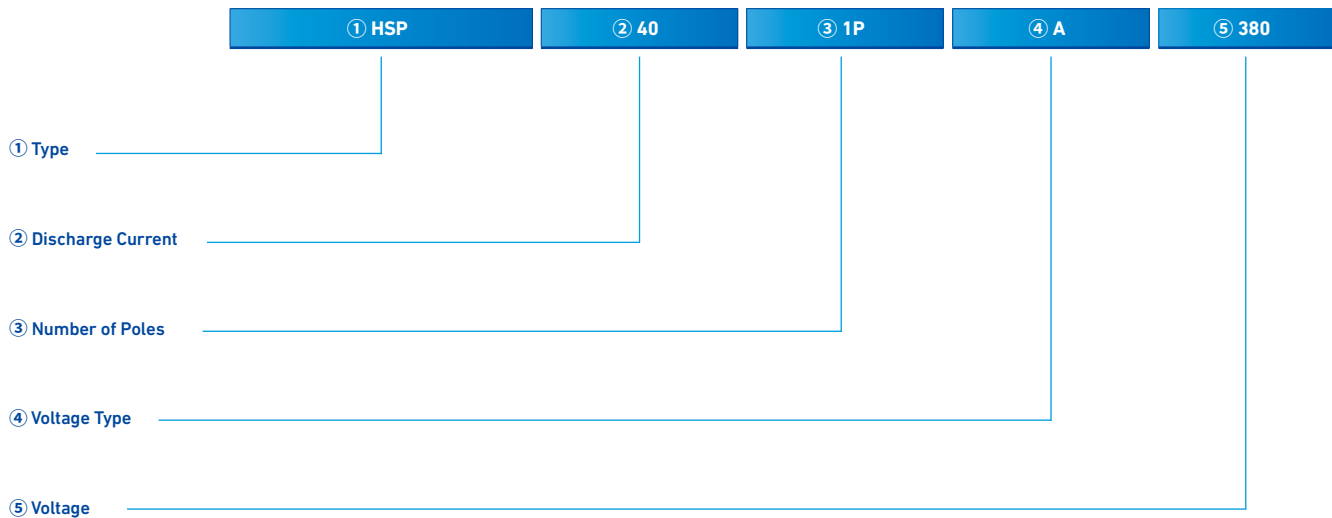


| | T (3W + G), Y (4W + G) | | | | |
|--------|------------------------|-----|-----|-----|----|
| | W | A | B | H | D |
| HSP40 | 125 | 71 | 155 | 165 | 79 |
| HSP160 | 162 | 105 | 240 | 250 | 79 |



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

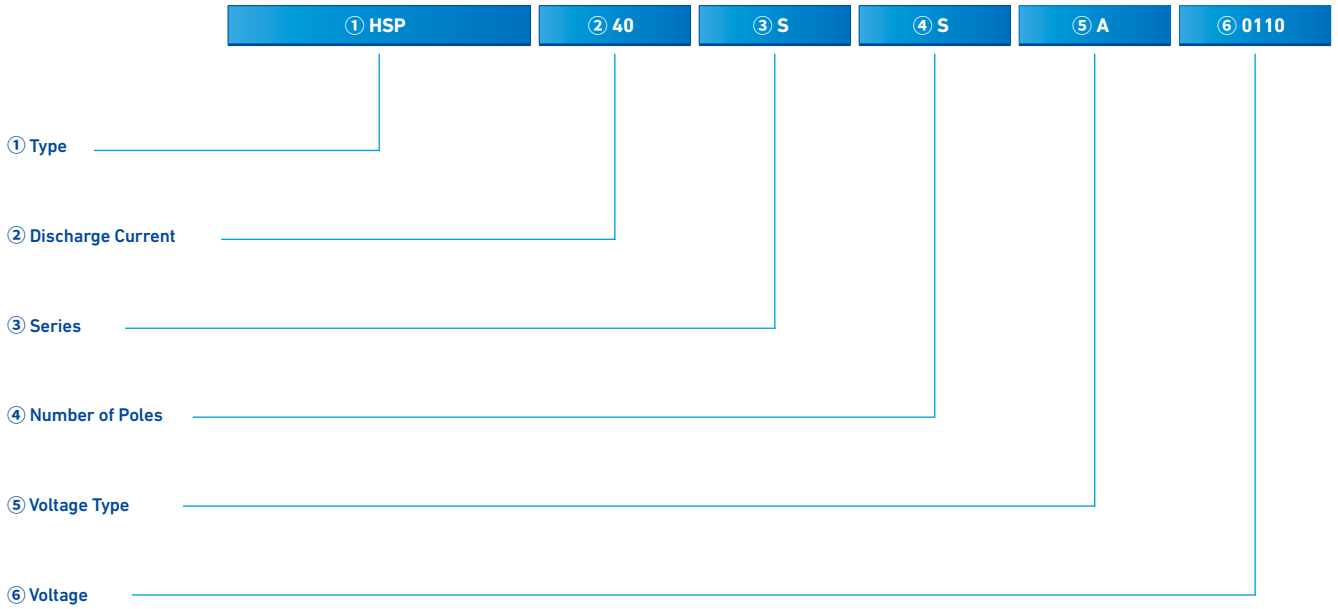
| ③ Number of Poles | |
|-------------------|-----------------|
| 1P | 1 Pole (AC) |
| 2P | 2 Pole (AC/DC) |
| 3P | 3 Pole (AC/DC) |
| 4P | 3 Pole + N (AC) |

| 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) |

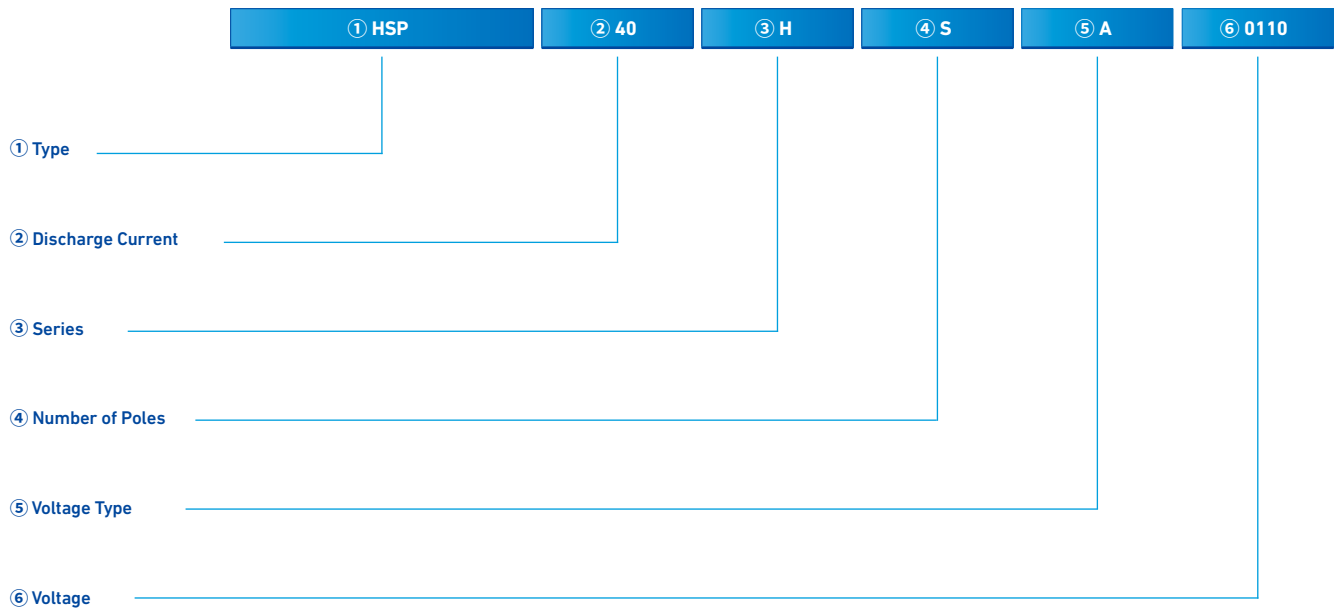
| ④ Number of Poles | |
|-------------------|---------|
| S | 2 W + G |
| T | 3 W + G |
| Y | 4 W + G |

| 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

| | |
|-------------------|-----|
| Technical Data | 142 |
| Fuse Holder | 144 |
| Fuse Link | 145 |
| Fuse Carrier | 150 |
| 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

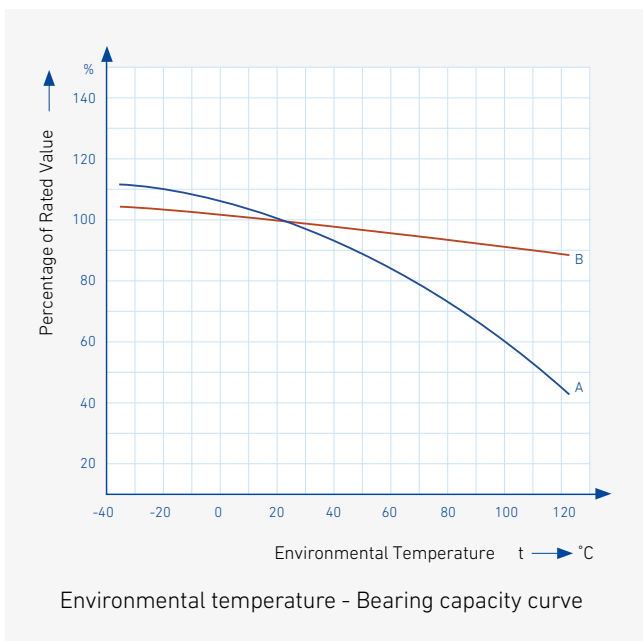
Height above sea level : not more than 2,000 m Atmospheric condition, humidity : the installation site's relative air humidity does not exceed 50 % while the maximum temperature is +40 °C, And it can allow to have higher relative humidity under lower temperature. The average temperature does not exceed +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

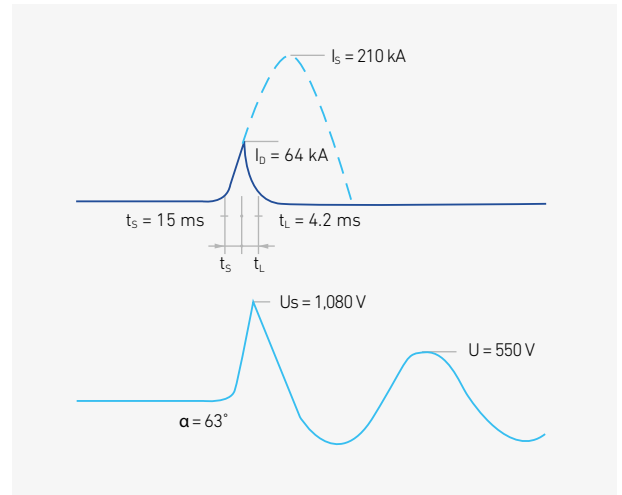
1. normal working current
2. working voltage
3. ambient temperature
4. overload current and cutout time
5. possible malfunction current
6. impulse current, surge current, starting current and transient value of the line
7. size and dimensions, connection methods, indicators, etc.

Threshold Value Of "aM" Fuses

Gate limit of "aM" type fuse links:

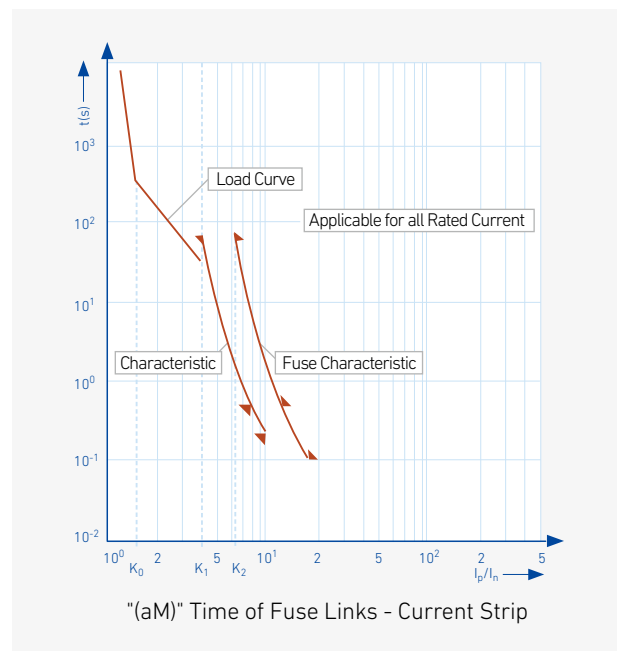
| | | | | | | |
|----------------|-----|-----|----|-----|------|-----|
| IP (In) | 4 | 6.3 | 8 | 10 | 12.5 | 19 |
| t Fuse < | (S) | - | 60 | - | - | 0.5 |
| t Before arc > | (S) | 60 | - | 0.5 | 0.2 | - |

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

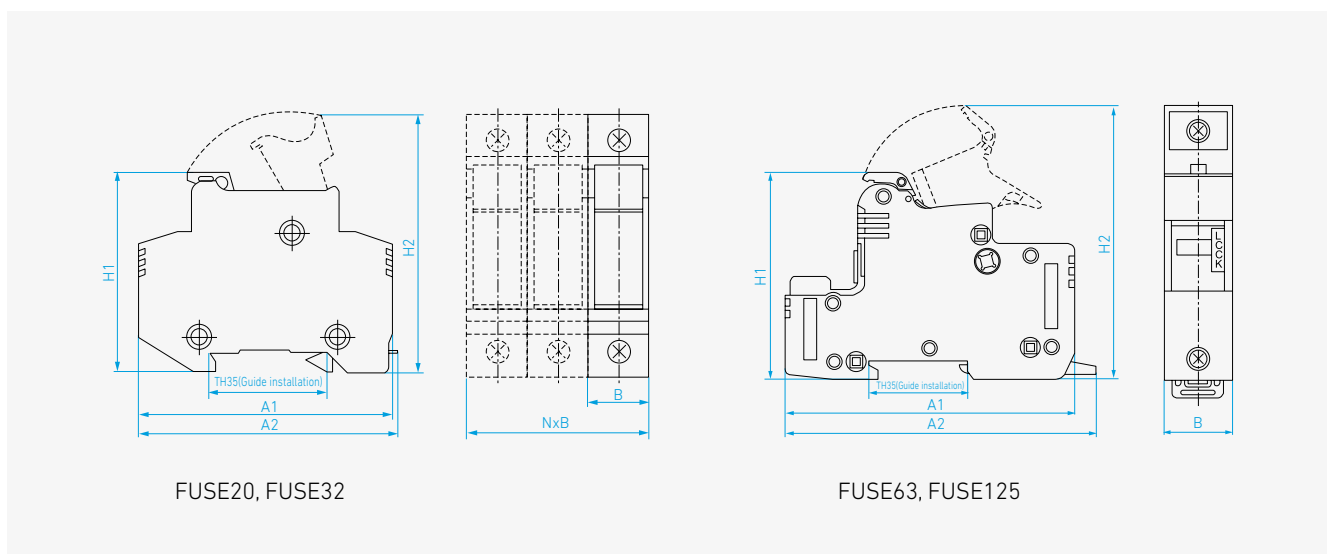
After the plastic-injected case is equipped with contacts and fuse links, the bases are formed by welding or riveting both capable of being multi-phase structured.

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

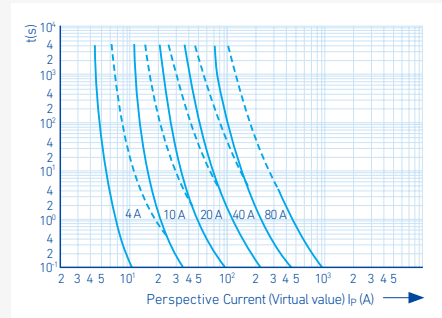
Design Features

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.

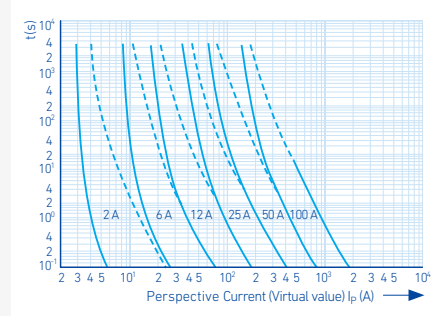
Specification

| 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 |

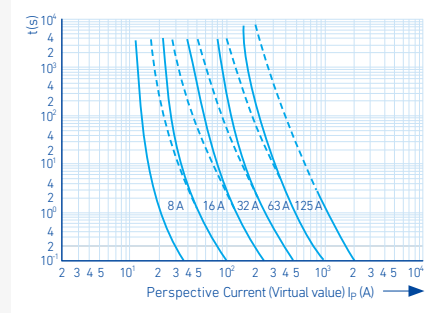
Characteristics Curve



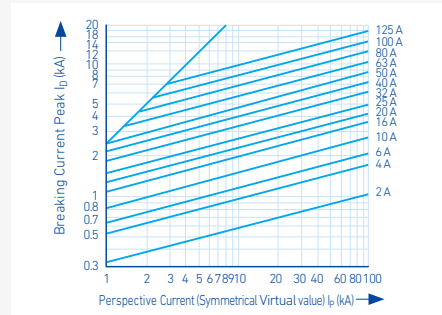
Time-current Range of "gG" Fuse Links



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.

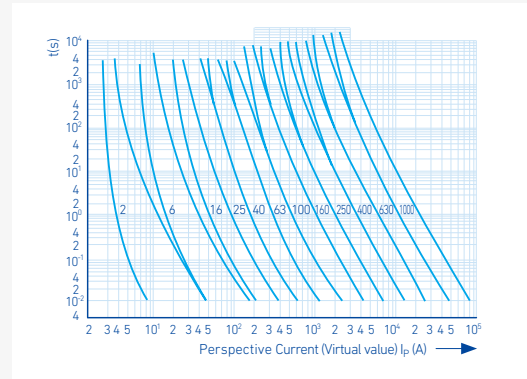
- Rated insulate voltage up to 660 V
- Rated current up to 1,000 A
- Working frequency 50 Hz AC
- Compliant with IEC 60269

Design Features

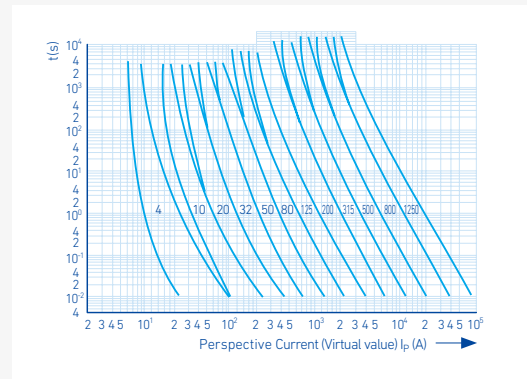
The bases are made up of high-density ceramic, heat-resistant resin board and wedge-shaped static contacts in a open structure.

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.

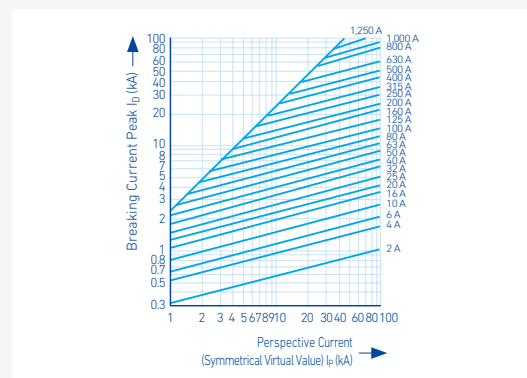
Characteristics Curve



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 | | | | | | |

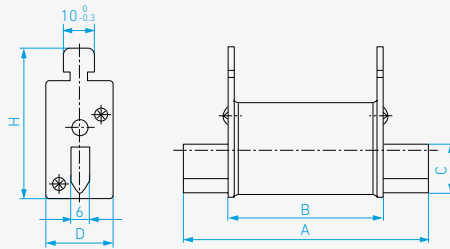
Technical Data

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 | | | | | | | |

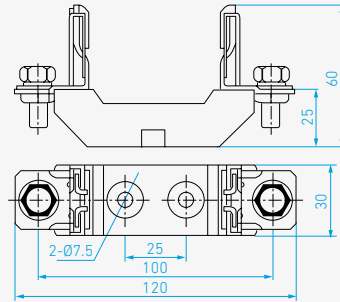
Dimension

Fuse Link (NT00C)

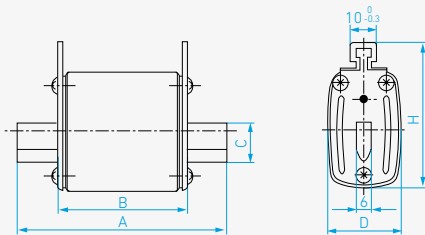


NT00C A78 x B49 x C15 x D21 x H48

Fuse Base (NT00)

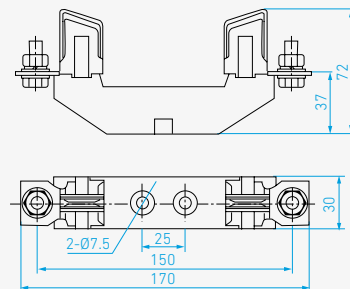


Fuse Link (NT00, NT0)

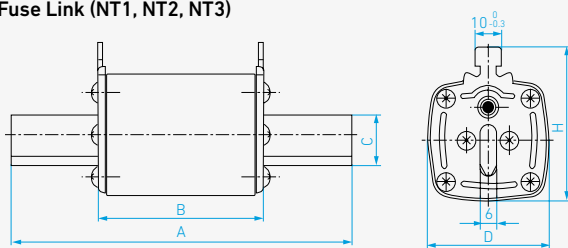


NT00 A78 x B49 x C15 x D29 x H56
NT0 A125 x B68 x C15 x D29 x H56

Fuse Base (NT0)



Fuse Link (NT1, NT2, NT3)



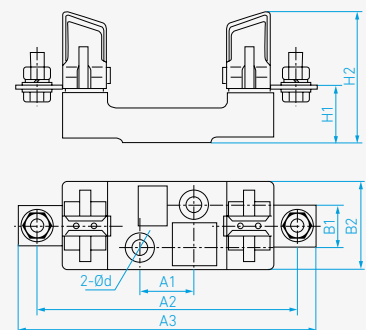
NT1 A135 x B68 x C20 x D48 x H60
NT2 A150 x B68 x C25 x D58 x H70
NT3 A150 x B68 x C32 x D68 x H80

Fuse Base

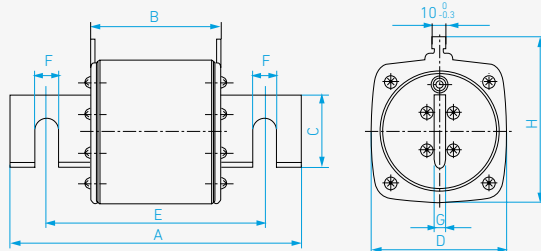
NT1 A1:25 x A2:175 x
A3:200 x B1:27 x B2:58 x
H1:38 x H2:84 x Ød:10.5

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

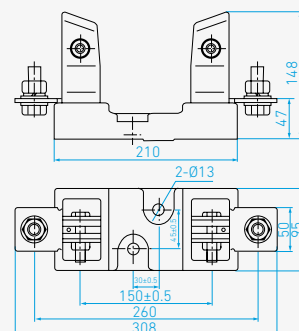


Fuse Link (NT4)



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

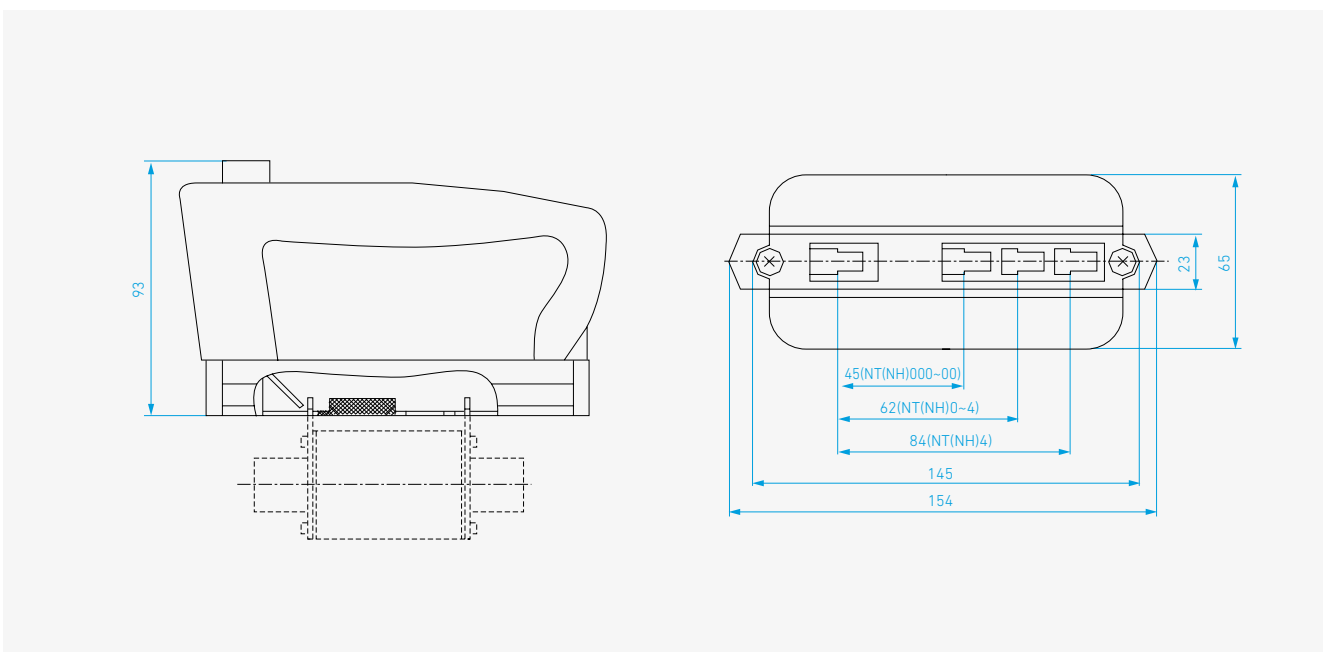
The fuse carrier is made up of catching holes, push button, guard board and handle.

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.



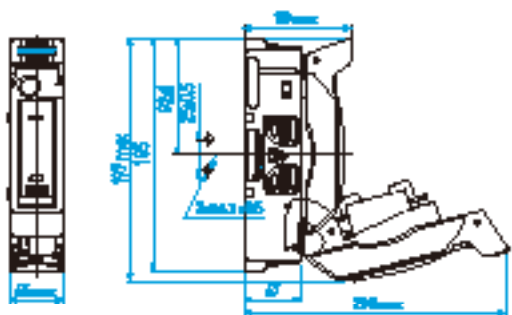
Specification

| 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 |

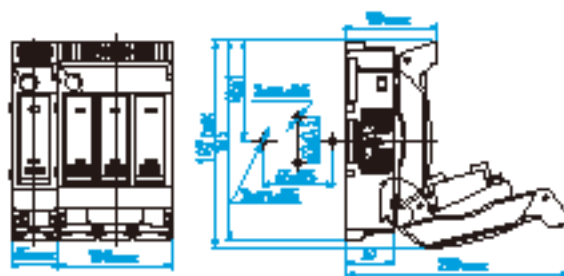
Dimension

Fuse Switch

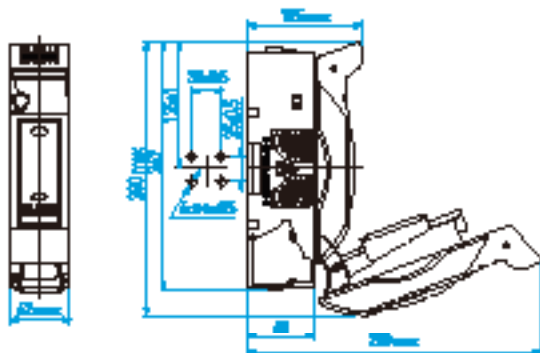
HA 1P / 160 AF



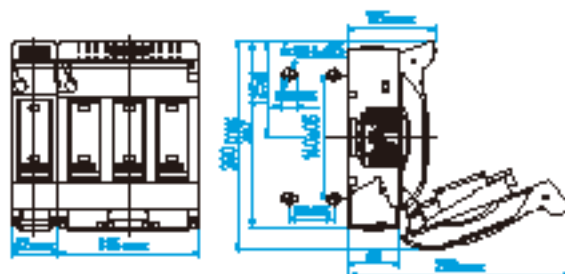
HA 3P, 4P / 160 AF



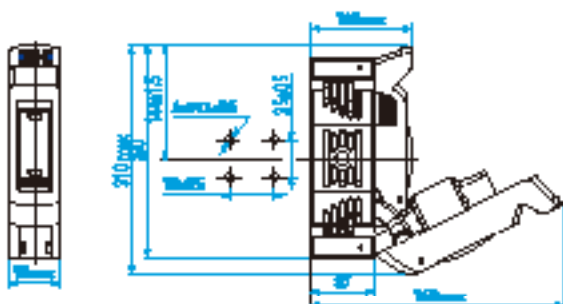
HA 1P / 250 AF



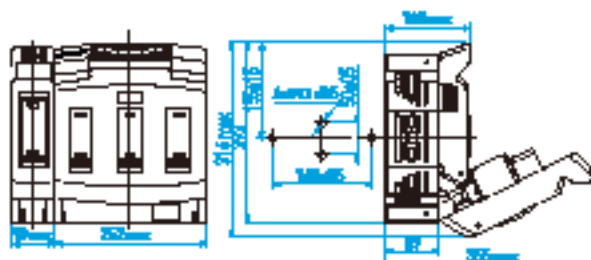
HA 3P, 4P / 250 AF



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



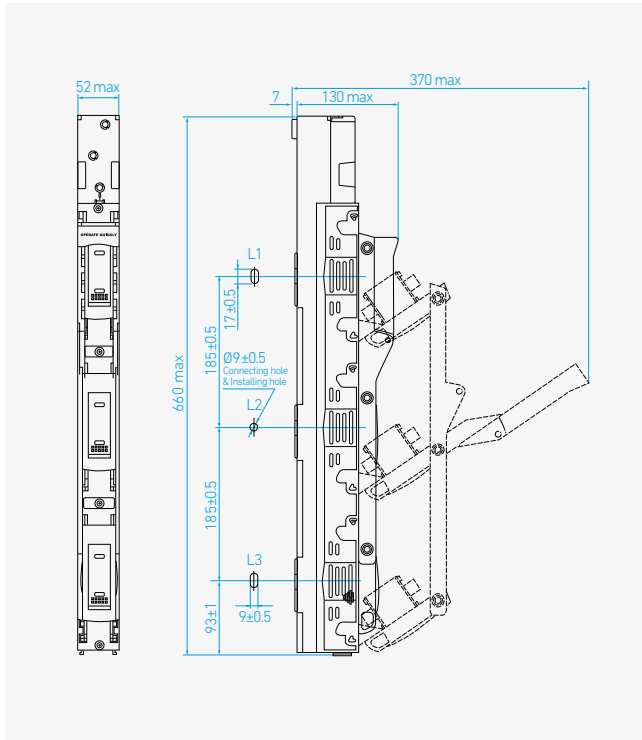
Specification

| 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 |

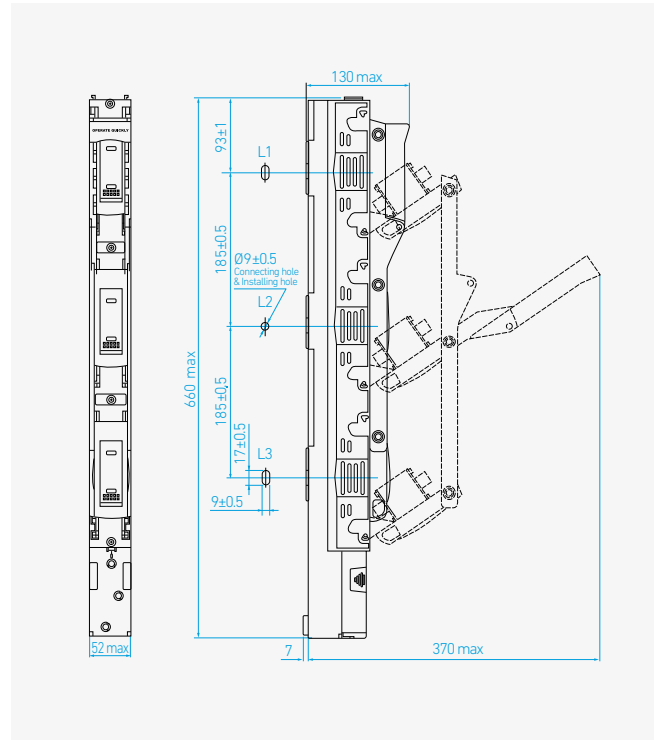
Dimension

Fuse Switch

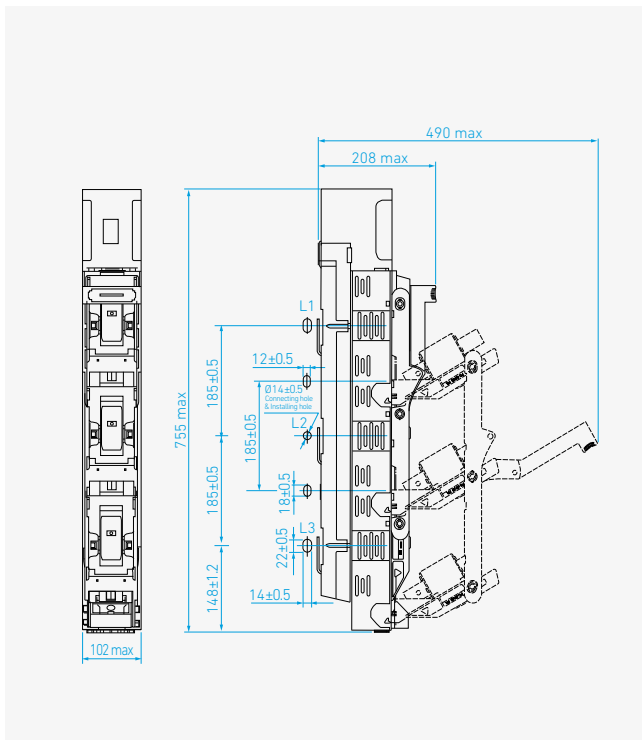
HB-U / 160 AF



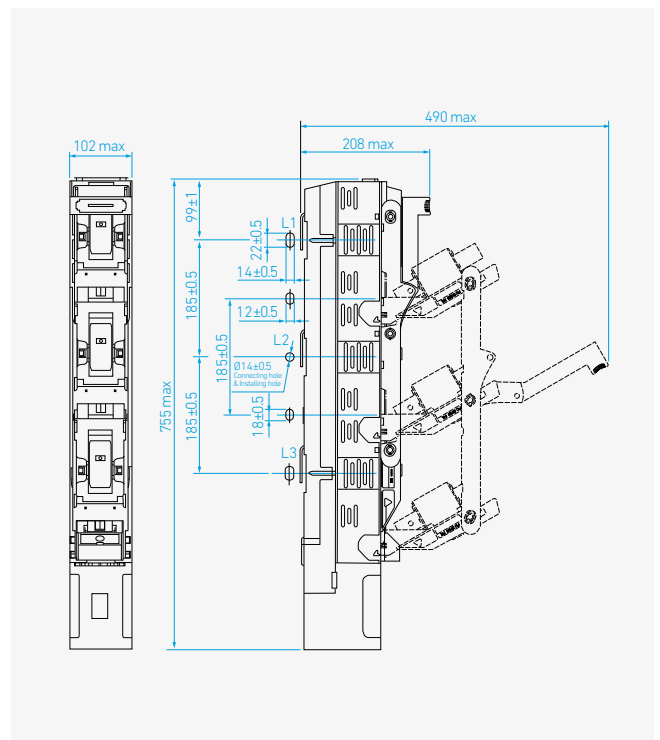
HB-D / 160 AF



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 |
| HB, HC/630 | 690 | 400 | AC21B | 3 | 50 |
| | 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/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 |

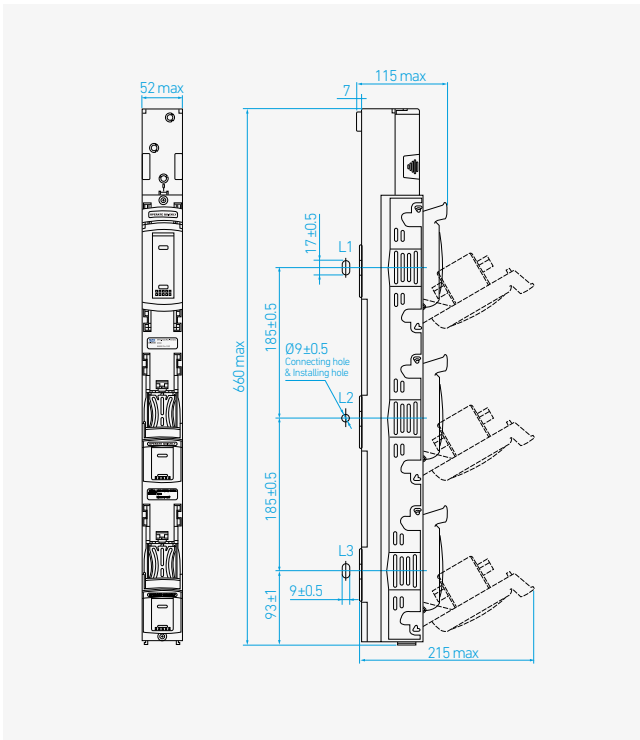
Note: I - connecting current
le - rated working current
Ir - breaking current

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

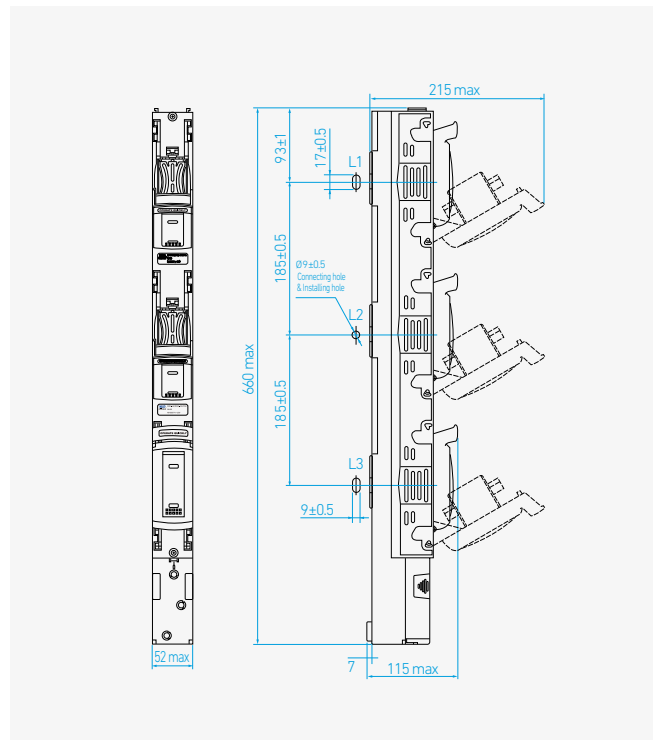
Dimension

Fuse Switch

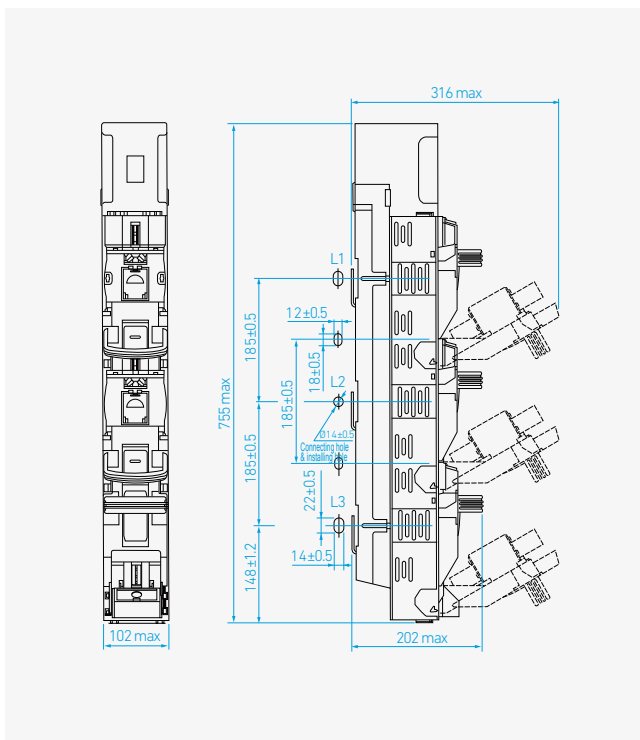
HC-U / 160 AF



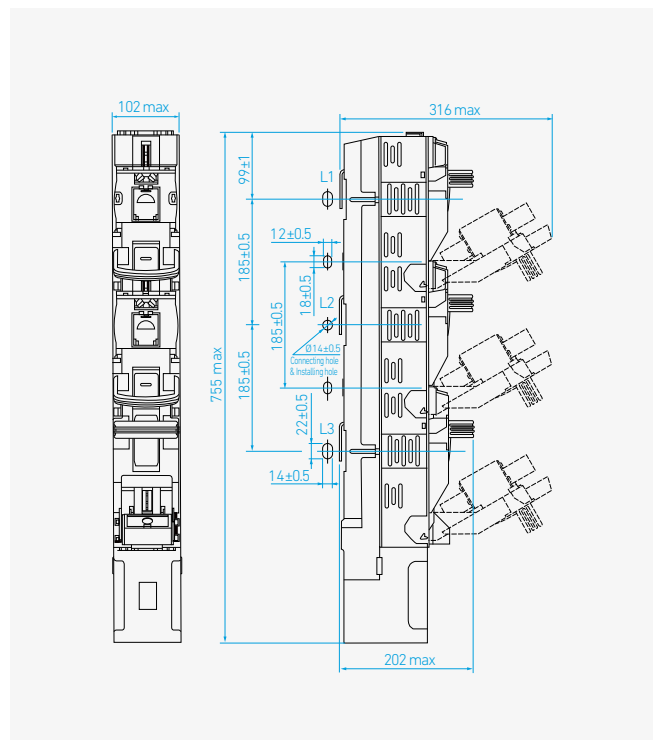
HC-D / 160 AF



HC-U / 250, 400, 630 AF

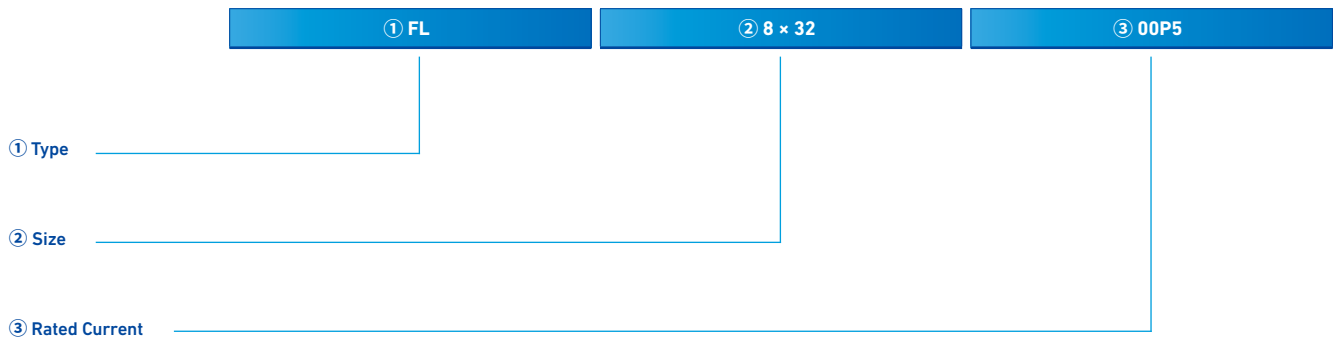


HC-D / 250, 400, 630 AF



FUSE Ordering Information

Fuse Link



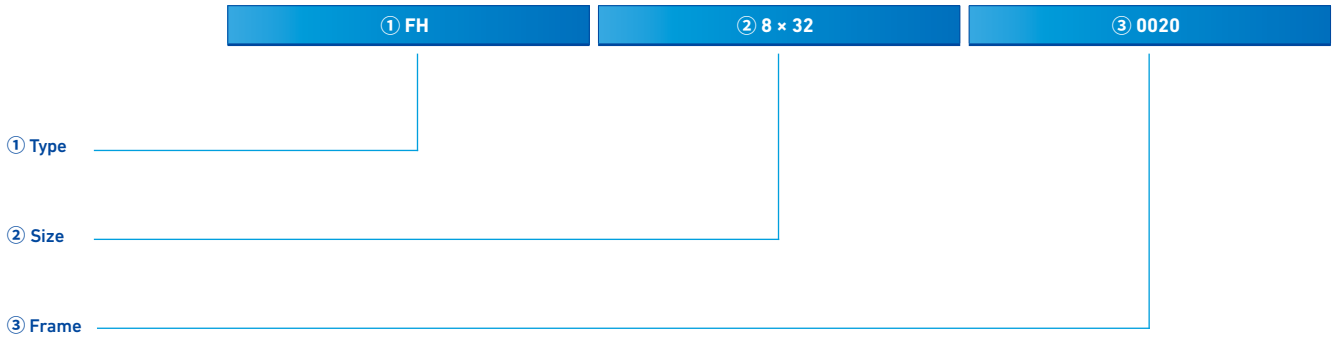
| ① Type | |
|--------|-----------|
| FL | Fuse link |

| 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 |

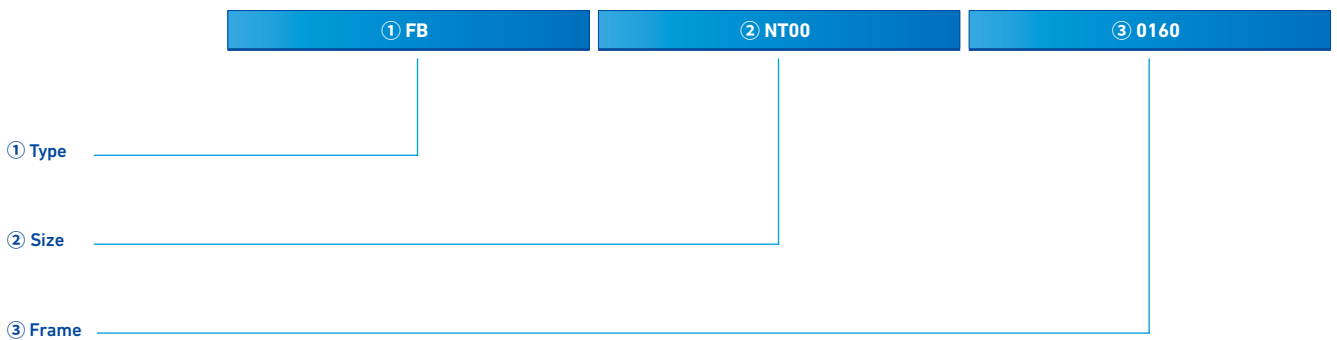
② Size

| | |
|---------|--------------------|
| 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 |
|----|-----------|

② Size

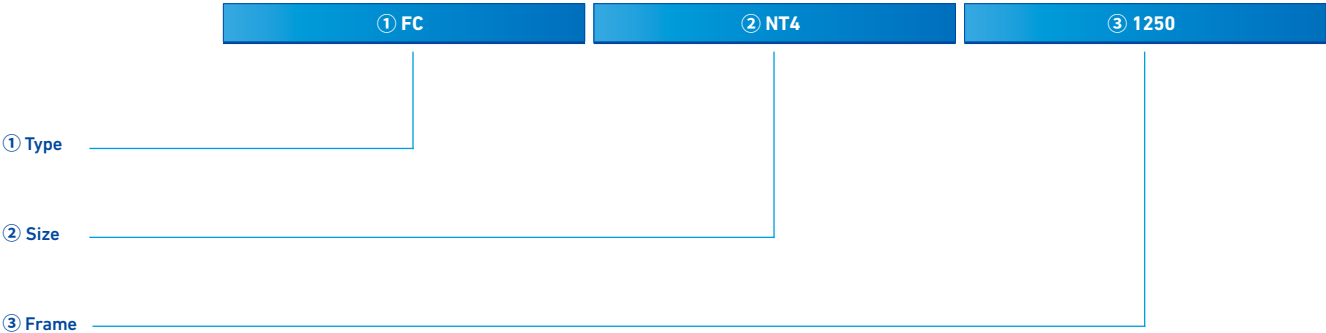
| | |
|------|---------------------|
| NT00 | Fuse base (160AF) |
| NT0 | Fuse base (160AF) |
| NT1 | Fuse base (250AF) |
| NT2 | Fuse base (400AF) |
| NT3 | Fuse base (630AF) |
| NT4 | Fuse base (1,250AF) |

③ Frame

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

FUSE Ordering Information

Fuse Carrier

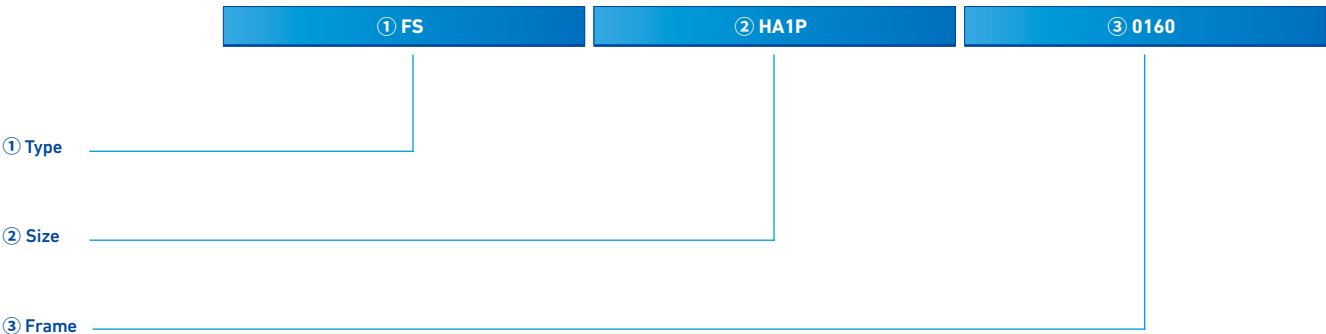


| ① Type | |
|--------|--------------|
| FC | Fuse carrier |

| 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

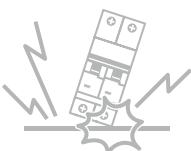
- Do not apply impact during transportation. Dropping or applying strong impact may cause defect.
- Do not handle while holding the circuit breaker's accessory or the external plug-in wire of the accessory. It may cause injury to the handler or a malfunction of the circuit breaker.



- **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**

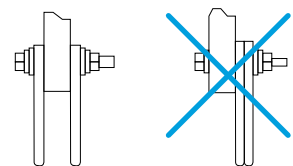
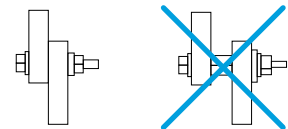
Dust and others must be removed from the contact surface to prevent increase in connection resistance at the contact surface.

- **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 | |
| 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 | ● | ● | ● |



HYUNDAI ELECTRIC

Korea

| | | | |
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| Sales Office | 5th Floor 55, Bundang-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea | Tel : +82-31-8006-6780, 6786 | Fax : +82-31-8006-6629 |
| Factories | 700, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea 223, Sapyong-ro, Nam-gu, Ulsan, Korea (Seonam) | | |
| R&D Center | 17-10, Mabuk-ro 240beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Korea | | |

Branch Offices

| | | | |
|------------------|--|-------------------------|-----------------------|
| Atlanta | 6100 Atlantic Boulevard, 2nd FL., Norcross, GA30071, U.S.A | Tel : +1-678-823-7839 | Fax : +1-678-823-7553 |
| Osaka | 5th Floor Nagahori Plaza Bldg. 2-4-8 Minami Senba, Chuo-ku, Osaka 542-0081, Japan | Tel : +81-6-6261-5766-7 | Fax : +81-6-6261-5818 |
| Moscow | World Trade Center, Ent.3, #703, Krasnopresnenskaya Nab.12, Moscow, 123610, Russia | Tel : +7-495-258-1381 | |
| Dubai | Unit 205, Emaar Square Building No.4 Sheikh Zayed Road, Dubai 252458, U.A.E | Tel : +971-4-425-7995 | Fax : +971-4-425-7996 |
| Frankfurt | Mendelssohn strabe 55-59 Frankfurt 60325, Germany | Tel : +49-69-4699-4988 | |
| Bangkok | 19th Floor, Unit 1908, Sathorn Square Office Tower, 98 North Sathorn Road, Silom, Bangrak, Bangkok 10500, Thailand | Tel : +66-02-115-7920 | Fax : +66-2-115-7898 |
