

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

- \bullet 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

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
- \bullet 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

- 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
- $\bullet \ \, \text{Satisfies the quality standards of international accredited institutes (IEC, IEEE, CSA, NEMA, API \ \text{etc.})}$



Synchronous Generator

- 100 ~ 50,000 kVA
- 220 ~ 22,000 V, 50/60 Hz
- 220 ~ 22,000 • 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

Marine

Electrical Marine Equipment





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
- Invertor 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



Surge Protection Device

up to 200 kAAC, DC



Manual Motor Starter

- up to 100 kA, 80 A
- \bullet Wide range of breaking capacities and frames to meet all customer requirements
- Optimized design providing high performance
- \bullet Compact and reliable products type-tested by DEKRA and KERI



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



Residual Current Circuit Breaker

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



Installation Contactor

• up to 63 A



Fuse

• up to 1,250 A







Digital Motor Protection Relay

• up to 60 A



NEMA Premium Efficiency Motor

- 1-500 HP
- 2-6 pole

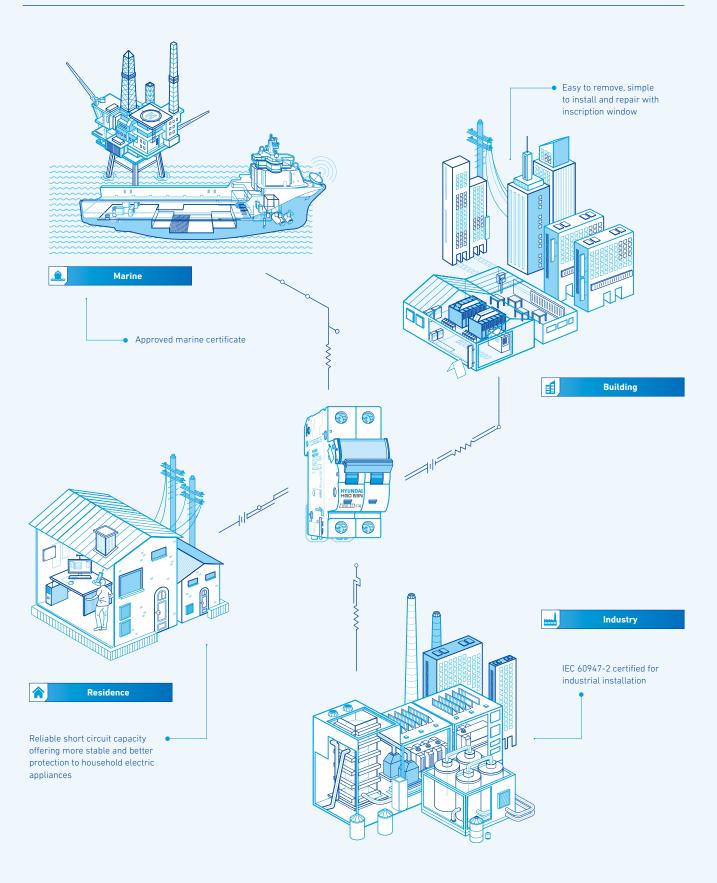


Explosion-Proof (Class 1 Div.1) Motor

- 1-500 H
- 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.







M

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



Product Overview

Miniature Circuit Breaker

Model	Deluxe	Standard		
Туре	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	1~100 A		
Tripping Curve	B, C, D	B, C, D		
Standard	IEC/EN 60898-1, 60947-2	IEC/EN 60898-1		



Miniature Switch Disconnector

Model	Deluxe	Standard
Туре	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
Туре	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	16~100 A	16~100 A
Standard	IEC/EN 61008-1	IEC/EN 61008-1



Residual current Circuit Breaker with Overcurrent protection

Model	2 N	2 Module Type		RCD Type			Compact Type					
Туре	HR063S	HR063A	HR063B	HR063M	HR063P	HR040L	HR040T	HR040HT	HR040M	HR040P	HR040ML	HR040PL
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	2	Р	1, 2(1+N), 3, 4(3+N)		1+N		N+1				
Rated Current	1~63 A	6~6	3 A	1~63 A			6~40 A 6~40 A					
Operating Characteristics	AC, A	AC	, A	AC	, A	AC, A AC, A			C, A			
Residual Current	Residual Current 10-500mA 30~300mA 10~500 mA		10~300 mA 10~300 mA									
Tripping Curve	B, C, D	В, (C, D	D B, C, D		B, C B, C						
Standard						IEC/EN	61009-1					



Electronic Circuit Breaker

Model	HEC
Туре	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	Plu	g-in	Lug-to-Lug		
Туре	HBD51D~53D	HBD51hD~53hD	HBD51~53	HBD51h~53h	
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 60	0947-2		





Installation Contactor

Model	HIC
Туре	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
Туре	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

Madal	Din-rail Type		Box Type				
Model			Star	ndard	Deluxe		
Туре	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	-	
limp (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)		





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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



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.

Standard Type

- 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 k		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 (lcs=100 % lcn)	10 kA (lcs=75 % lcn)	10 kA (lcs=75 % lcu)
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	0.150 kg
Dimensions (H x D x W)/Pole in mm	87.5 x 71.7 x 17.7 mm	87.5 x 71.7 x 17.7 mm	81 x 74.5 x 26.5 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material
Busbar Connections Top/Bottom Side	Pin/Fork type (Bottom)	Pin/Fork type (Bottom)	-
AUX/ALT/SHT/UVT/0VT	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 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 A
AC 240/415 V	AC 240/415 V					
50/60 Hz	50/60 Hz					
3 kA (lcs=100 % lcn)	4.5 kA (lcs=100 % lcn)	6 kA (lcs=100 % lcn)	6 kA (lcs=100 % lcn)	10 kA (lcs=75 % lcn)	15 kA (lcs=50 % lcn)	10 kA (lcs=75 % lcu)
(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					
4 kV	4 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					
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					
IP20	IP20	IP20	IP20	IP20	IP20	IP20
Red-ON, Green-OFF	Red-ON, Green-OFF					
0.090 kg	0.090 kg	0.109 kg	0.100 kg	0.115 kg	0.131 kg	0.150 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 m
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 mate					
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			
Utlization 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.

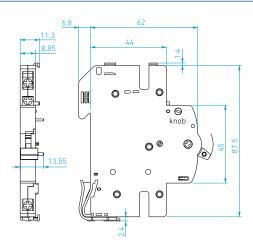
AXT Combination (Position = Pos)

	AX	T			М	СВ	
POS4	POS3	POS2	POS1	1P	2P	3P	4P
AUX4	AUX3	AUX2	AUX1	0	0	0	0
-	-	ALT2	ALT1	0	0	0	0
AUX2	AUX1	ALT2	ALT1	0	0	0	0

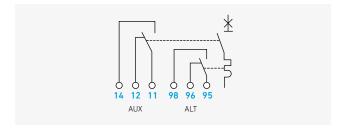
Ordering Information

AXT HGD63H	AUX/ALT
7011 11020011	710707121

Dimension

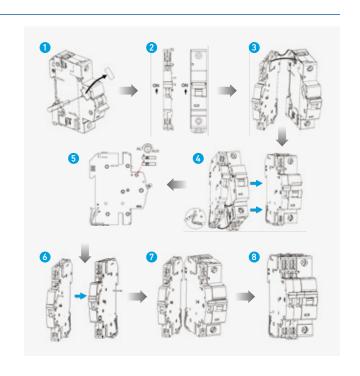


Circuit Diagram



Assembling with MCB (HGD Accessories)

- Remove the window sticker of the protection device with screw driver or by hand
- 2 Make sure the knob is in ON position Caution don't mount in OFF position
- 3 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.
- S 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
 - 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.
- 6 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.
- 3 Check for the working of the AXT by switching it ON & OFF. Set the working of secondary AXT as per step no.5.



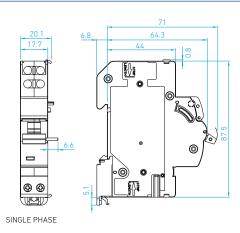
Shunt Trip (SHT)

Technical Specification			
Standard Conformity	IEC 60947-1		
	AC 110-415 V		
Rated Voltage (Ue)	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 mm²		
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)		

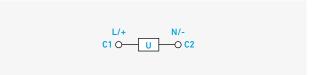
Ordering Information

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

Dimension



Circuit Diagram



Under Voltage Trip (UVT)

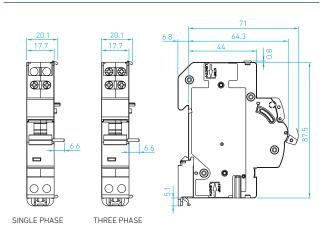
Technical Specification				
Phase	Single phase Three phase			
Standard Conformity	IEC 60947-1			
Rated Voltage	AC 240 V			
Frequency	50/60 Hz			
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue			
Terminal Size	6 mm²			
Protection Degree	IP20			
Mechanical Status Indicator	Front			
Tightening Torque	0.8 N·m			
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm			
Net Weight	78 g			
Electrical Endurance (no. of operations)	4,000			
Wiring Connection Type	Bottom	Тор		
Mounting	Left side of MCB (HGD63N/H)			

 $\ensuremath{\mathbb{X}}$ Causes the device with which it is associated to trip when input voltage decreases (between 70 % and 35 % of Un). 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





Accessories (Deluxe Type)

Under Voltage Trip + Time Delayed (UVT + t)

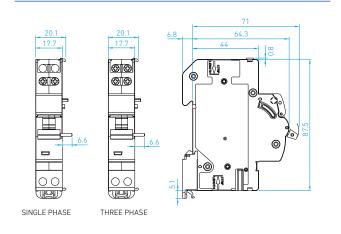
Technical Specification				
Phase	Single phase Three phase			
Standard Conformity	IEC 60947-1			
Rated Voltage	AC 240 V			
Frequency	50/60 Hz			
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue			
Trip Delay	0.2 sec			
Terminal Size	6 mm²			
Protection Degree	IP20			
Mechanical Status Indicator	Front			
Tightening torque	0.8 N·m			
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm			
Net Weight	78 g			
Electrical Endurance (no. of operations)	4,000			
Wiring Connection Type	Bottom	Тор		
Mounting	Left side of MCB (HGE	063N/H)		

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

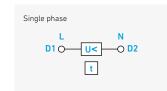
Ordering Information

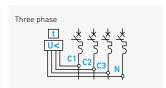
UVT HGD63H DUS2	Single phase
UVT HGD63H DUT2	Three phase

Dimension



Circuit Diagram





Over Voltage Trip (OVT)

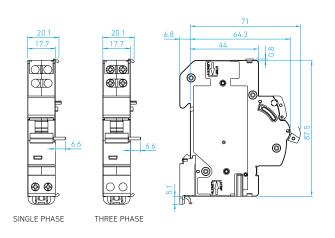
Technical Specification			
Phase	Single phase Three phase		
Standard Conformity	EN50550		
Rated Voltage	AC 240 V	AC 240 V (L-N)	
Frequency	50/60 Hz		
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)	
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)	
Max Duration of Impulse Command	10 ms		
Terminal Size	6 mm²		
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	Тор	
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





Under + Over Voltage Trip (UOVT)

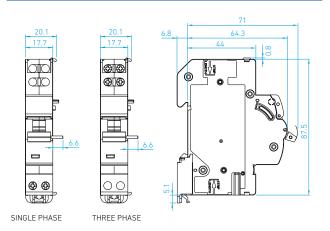
Technical Specification				
Phase	Single phase Three phase			
Standard Conformity	IEC 60947-1, EN 50550			
Rated Voltage	AC 240 V	AC 240 V (L-N)		
Frequency	50/60 Hz			
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)		
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)		
Under Voltage Trip Voltage	0.35 Ue ≥ V ≥ 0.7 Ue			
Max Duration of Impulse Command	10 ms			
Terminal Size	6 mm²			
Protection Degree	IP20			
Mechanical Status Indicator	Front			
Tightening Torque	0.8 N·m			
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm			
Net Weight	78 g			
Electrical Endurance (no. of operations)	4,000			
Wiring Connection Type	Bottom	Тор		
Mounting	Left side of MCB (HGD63N/H)			

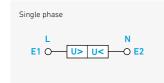
lpha Cuts the supply power by opening with which it is associated when the phase & neutral voltage is in not with in the limits.

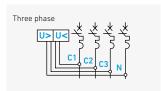
Ordering Information

UOVT HGD63H UOS2	Single phase
UOVT HGD63H UOT2	Three phase

Dimension

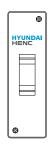






Accessories (Deluxe Type)

Enclosure for MCB-PLASTIC (ENC)





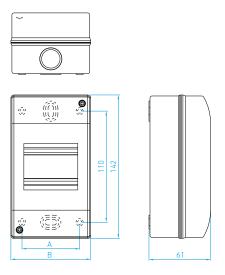
No. of Ways	Dimensions (In mm)		
NO. OI Ways	Α	В	
1P/2P	29.4	43.4	
3P/4P	57	79	

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

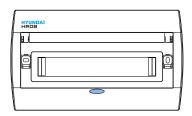
Ordering Information

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

Dimension



Distribution Board

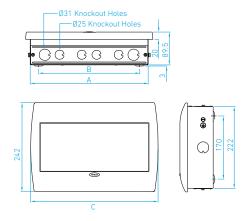


No. of Ways	Α.	В		To	op	Bot	tom	Side
No. of Ways	A	В	С	Ø25	Ø31	Ø25	Ø31	Side
8	247	195	272	2	2	2	2	1
12	319	267	344	4	2	4	2	1
16	391	339	416	4	2	4	2	1

Specification

- IEC61439-3
- These are most elegantly designed DBs, to suit the décor of homes
- Raised neutral link for easy wiring
- $\operatorname{\mathsf{Spring}}$ 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)

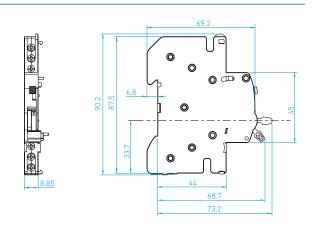
Auxiliary Contact + Alarm Trip (AXT-for 125 AF MCB)

Technical Specification			
Standard Conformity	IEC/EN 60947-5-4		
Current Carrying Capacity (max)	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		

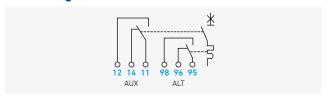
Ordering Information

AXT HGD125 AUX/ALT

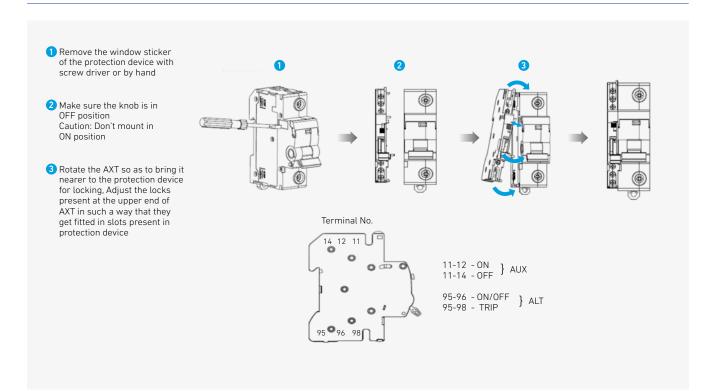
Dimension



Circuit Diagram



Assembling with MCB (HGD125)



Accessories (Standard Type)

Auxiliary Contact (AUX)

Technical Specification					
Standard Conformity		IEC/EN 60947-5-4			
Current Carrying Cap	pacity (max)	6 A	6 A		
Rated Voltage (Ue)		AC 240 V			
Contact Configuration	n	1NO + 1NC			
Rated Insulation Volt	age (Ui)	AC 500 V			
Rated Frequency (F)		50/60 Hz			
Utlization Category		AC 12			
Electrical Endurance	(no. of operations)	10,000			
Terminal Capacity (m	nax)	2.5 mm ²			
Protection Class		IP20			
Dimensions (H x D x	W)	81.5 x 74.5 x 8.8 mm			
Terminal Capacity (m	nax)	35 mm²			
Net Weight		32 g			
Mounting		Left side of MCB (HGD63M/P)/Max. 4 EA			
	Operating Power	Voltage	Current		
	AC.	415 V	3 A		
Operating	AC	240 V	6 A		
Current		130 V	1 A		
	DC	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

Alarm Trip (ALT)

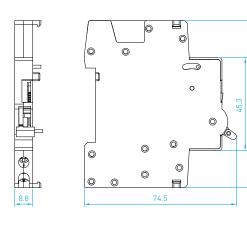
Technical Specification					
Standard Conformity		IEC/EN 60947-5-4			
Current Carrying	Capacity (max)	6 A	6 A		
Rated Voltage (Ue	e)	AC 240 V			
Contact Configura	ation	1NO + 1NC			
Rated Insulation	Voltage (Ui)	AC 500 V			
Rated Frequency	(F)	50/60 Hz			
Utlization Catego	ry	AC 12			
Electrical Endurance (no. of operations)		10,000			
Terminal Capacit	y (max)	2.5 mm ²			
Protection Class		IP20			
Dimensions (H x l	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	Voltage	Current		
	AC	415 V	3 A		
Operating	AC	240 V	6 A		
Current		130 V	1 A		
	DC	48 V	2 A		
		24 V	6 A		

- $\ensuremath{\mathbb{X}}$ 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.
- imes ALT Should be assembled with in 18 mm on the left side of MCB.

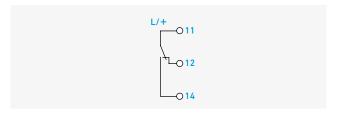
Ordering Information

ALI HGD63P ALI

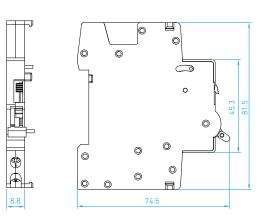
Dimension

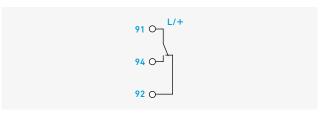


Circuit Diagram



Dimension





Shunt Trip (SHT) + Auxiliary Contact (AUX)

Technical Specification			
Standard Conformity	IEC/EN 60947-1, 60947-5-4		
Current Carrying Capacity (max)	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 mm²		
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)		

 \divideontimes 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)

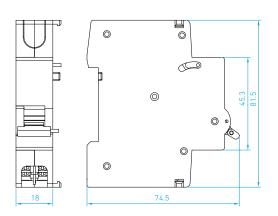
Technical Specification		
Standard Conformity	IEC 60947-1	
Current Carrying Capacity (max)	6 VA	
Rated Voltage (ac) (Ue)	AC 240 V	
Rated Insulation Voltage (Ui)	AC 500 V	
Rated Frequency (F)	50/60 Hz	
Operating Voltage Range	0.35 Ue ≥ V ≥ 0.7 Ue	
Electrical Endurance (no. of operations)	4,000	
Terminal Capacity (max)	6 mm²	
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 $\pm 5~\%$

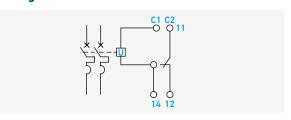
Ordering Information

IIVT HCD43D II3	40.0/0//
UV1 HGD63P U2	AC 240 V

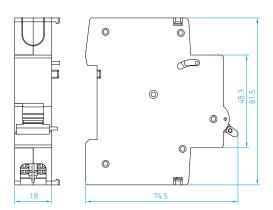
Dimension

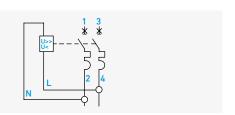


Circuit Diagram



Dimension





Accessories (Standard Type-100 AF)

Shunt Trip (SHT)

Technical Specification		
IEC/EN 60947-1		
6 VA		
AC110 - 415 V		
DC110 - 130 V		
AC500 V		
50/60 Hz		
85 % to 110 % of rated voltage		
4,000		
6 mm²		
IP20		
80.2 x 66.0 x 17.8		
60 g		
Right side of MCB (HGD100S)		

Ordering Information

SHT HGD100S S2	AC 240 V

Under Voltage Trip (UVT)

Technical Specification		
Standard Conformity	IEC/EN 60947-1	
Current Carrying Capacity (max)	6 VA	
Rated Voltage (Ue)	AC240 V	
Rated Insulation Voltage (Ui)	AC500 V	
Rated Frequency (F)	50/60 Hz	
Operating Voltage Range	0.35 Ue ≥ V ≥ 0.7 Ue	
Electrical Endurance (no. of operations)	4,000	
Terminal Capacity (max)	+ / - Cable type	
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)	

 $\ensuremath{\mathbb{X}}$ Attachment used for tripping when its input voltage decreases 170 V±5 %

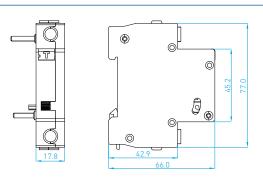
Ordering Information

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

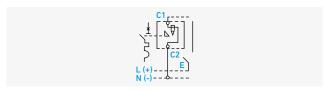
Handle Padlock Device (For 63 AF MCB)

Function	MCB handle can be locked either at "ON" position or at "OFF" position to prevent unwanted operation of the product
	Diameter of the padlock : 8mm max.
General	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	

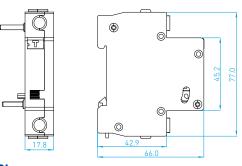
Dimension



Circuit Diagram



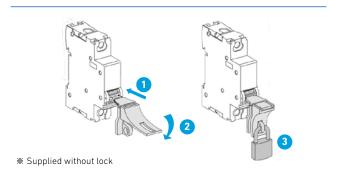
Dimension



Circuit Diagram



Installation



Accessories Ordering Information

Deluxe Type

Ту	ре	Code	Description
	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)
	OVI	UVT HGD63H UT2	Three phase (AC 415 V)
	UVT (Time Delayed Type)	UVT HGD63H DUS2	Single phase (AC 240 V)
HCD(3N/HCD(3H		UVT HGD63H DUT2	Three phase (AC 415 V)
HGD63N/HGD63H	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

Туј	pe	Code	Description
	AUX	AUX HGD63P	
	ALT	ALT HGD63P	
	63P/ CHT . AUV	SHT HGD63P S2	AC 240 V
HGD63M/HGD63P/		SHT HGD63P S5	DC 24 V
HGD32NS SHT + AUX	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 UVT	SHT HGD100S S2	AC 240 V	
	UVT	UVT HGD100S U2	Single phase (AC 240 V)

Technical Data

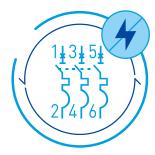
Description

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.

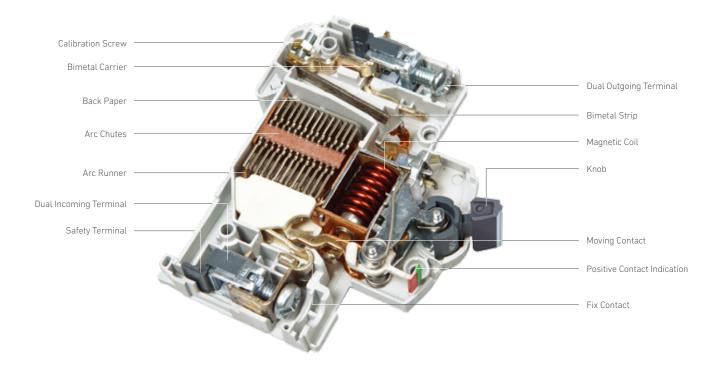
Under overload condition, a thermo-metallic element (bimetallic strip) deflects until it operates a latching mechanism allowing the main contacts to open.



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



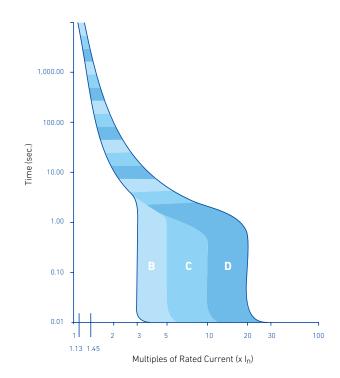
Characteristics Curves

A		Thermal Tripping		Magnetic Tripping					
As per	No Tripping	Tripping	Time	Hold	Trip	Time			
IEC/EN	Current	Current	Limits	Current	Current	Limits			
60898-1	I ₁	I ₂	t	I ₄	I ₅	t			
D.C.	1.13 x I _n		≥1 h	3 x I _n		≥0.1 s			
B Curve		1.45 x I _n	<1 h		5 x I _n	<0.1 s			
0.0	1.13 x I _n		≥1 h	5 x I _n		≥0.1 s			
C Curve		1.45 x I _n	<1 h		10 x I _n	<0.1 s			
D.C.	1.13 x I _n		≥1 h	10 x I _n		≥0.1 s			
D Curve		1.45 x I _n	<1 h		20 x I _n	<0.1 s			
l ₃ = 2.55xl _n			1 s < t < 60 s fo 1 s < t < 120 s f						

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) In
- '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) In
- '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) In



Technical Data

Temperature Derating Table

Rated						Α	mbient Tem	perature (°C)					
Current (A)	-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 electrodynamics forces set up by fault current, assist the extinction in less than half cycle.

The figure shows the current limiting effect of circuit breakers.

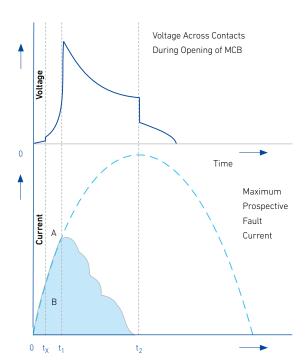
Fault traces for voltage & current

0 = Point of fault initiation

 t_{X} = Contact opening time (i.e., creation of arc)

t₁ = Current/Voltage peak (i.e., current limitation)

 t_2 = Time to total extinction of arc (i.e., complete shutdown of fault current)

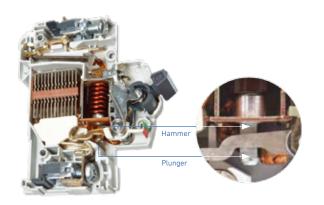


Standard Use Environment

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

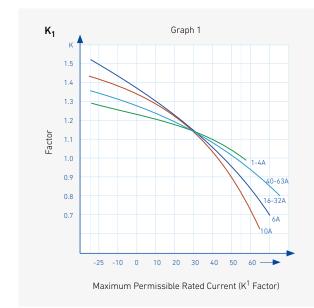
MCBs are designed to operate at AC frequency 50/60 Hz. However, MCBs specially suitable for DC applications and for frequencies upto 400 Hz can be supplied on request.

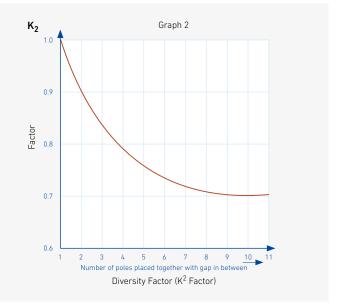
These can be used on different frequencies in supply from 50-60 Hz without any deration.

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

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

Ambient Temperature Compensation/Diversity Factor Chart



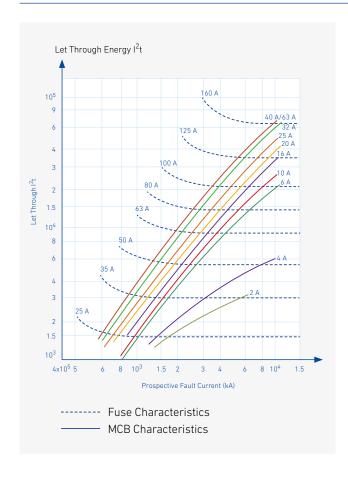


Calculation Example

 $I_n/MCB = K_1 \times K_2 \times I_n$ 4 MCBs with I_n = 10 A, and the amb. temp. is 50 °C kept with no gap in between

K1 = 0.89 (from graph 1) Solution K2 = 0.78 (from graph 2) $I_n/pole = 0.89 \times 0.78 \times 10 = 6.94 A$

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 _I (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 ±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)ln

for DC MCB, magnetic range = $1.4 (3-5)l_n = (4-7)l_n$

for 'C' curve AC MCB, magnetic range = $(5-10)l_n$

for DC MCB, magnetic range = $1.4 (5-10)l_n = (7-14)l_n$

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: $I_{SC} = Vb/Rb$

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 (In)	А	0.5-63
Rated Voltage (Ue)	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	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т
10 A		1,100	1,200	1,400	1,700	2,100	2,500	3,000	3,500	4,300	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т
16 A				1,300	1,600	1,900	2,100	2,400	2,700	3,200	8,300	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т
20 A					1,600	1,900	2,100	2,400	2,700	2,500	8,300	Т	Т	Т	Т	Т	Т	Т	Т	Т	Т
25 A						1,700	1,800	2,000	2,200	2,500	5,400	8,700	Т	Т	Т	Т	Т	Т	Т	Т	Т
32 A							1,800	2,000	2,200	2,500	5,400	8,700	Т	Т	Т	Т	Т	Т	Т	Т	Т
40 A								1,500	1,700	2,000	4,300	7,000	Т	Т	Т	Т	Т	Т	Т	Т	Т
50 A									1,300	1,500	3,600	5,900	9,000	Т	Т	Т	Т	Т	Т	Т	Т
63 A										1,100	2,800	5,200	8,200	Т	Т	Т	Т	Т	Т	Т	Т

 $[\]ensuremath{\,\times\,} \ensuremath{\,\text{Prospective fault levels to which selectivity)}} \\$

Discrimination With Fuses (HRC FUSE Upstream Type gG)

MCBs					HRC FUSE Li	ink Upstream				
Downstream	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
	1.0 ton	10 A ¹⁾	"C" series
Air Conditioner	1.5 ton	16 A ¹⁾	"C" series
	2.0 ton	20 A ¹⁾	"C" series
Refrigerator	165 litres	3 A ¹⁾	"C" series
Remigerator	350 litres	4 A ¹⁾	"C" series
Oven Cum Griller	4,500 W	32 A	"B" series
oven cum ormer	1,750 W	10 A	"B" series
	750 W	6 A	"B" series
Oven only Hot Plate only	2,000 W	10 A	"B" series
Room Heater	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
	1,000 W	6 A	"B" series
(Storage/Instant)	2,000 W	10 A	"B" series
(Storage/Instant/	3,000 W	16 A	"B" series
	6,000 W	32 A	"B" series
Electric Iron	750 W	6 A	"B" series
Electric iron	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

st 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
20 W	12	1.5
	2	0.5
40 W	10	2
	12	2.5
	1	0.5
/O.W	4	1.5
60 W	8	3
	12	4
	1	0.5
	2	1
80 W	5	2
	8	4
	12	5
	1	1
100 W	2	1.5
	4	2.5

 $[\]ensuremath{\mathbb{X}}$ "B" series MCB is used for all lighting applications

MCB Selection Chart for Motor Protection

S. No. k	kW	kW HP	1 Phase 230 V DOL Starting		3 Phase 400 V DOL Starting		3 Phase 400 V Assisted Starting Star Delta		
	KW	HP	Full Load Current	MCB Selection	Full Load Current	MCB Selection	Full Load Current	MCB Se	election
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

 $^{{\}it **}$ Calculation formulae:

- Incomer current rating, for single phase: <u>Total Load in Watts</u>

240 V

 \times 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.

- Incomer current rating, for single phase:

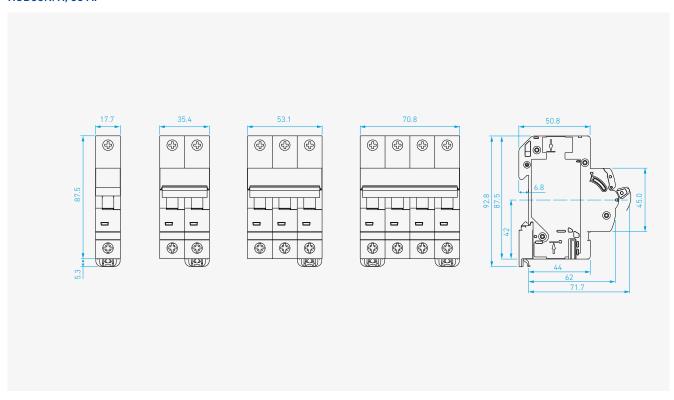
Total Load in Watts $\sqrt{3} \times 240 V$

[&]quot;C" series MCB is used for all motor applications

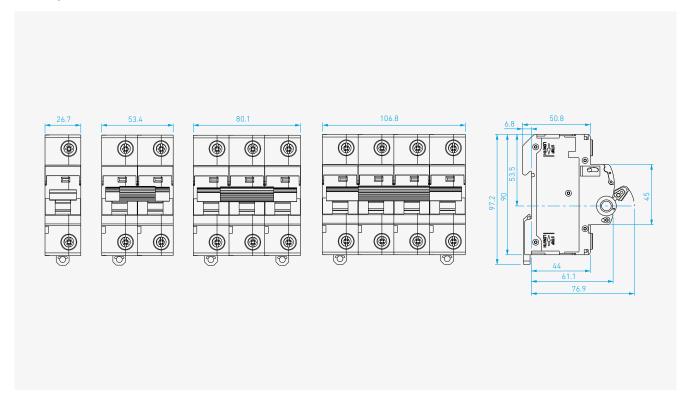
Dimensions

HGD (Deluxe Type)

HGD63N/H, 63 AF

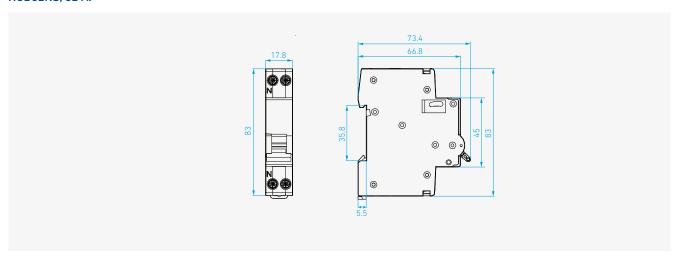


HGD125, 125 AF

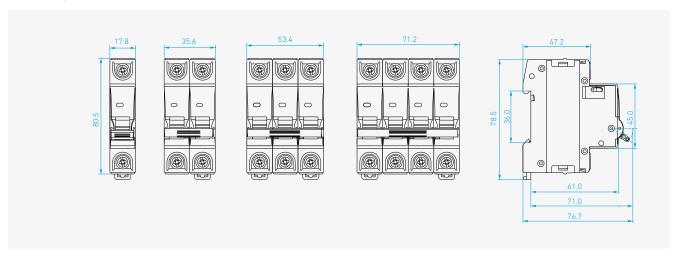


HGD (Standard Type)

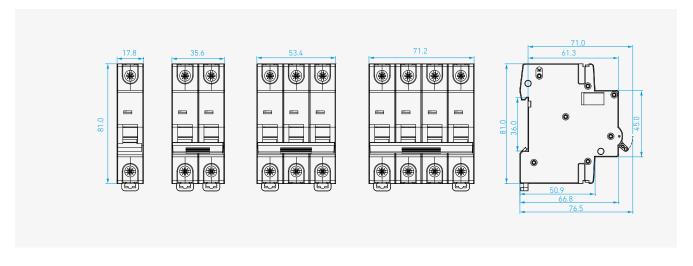
HGD32NS, 32 AF



HGD63E/S, 63 AF



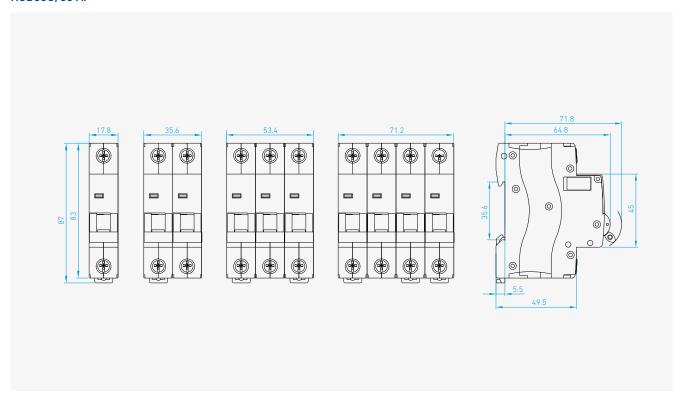
HGD63M/P, 63 AF



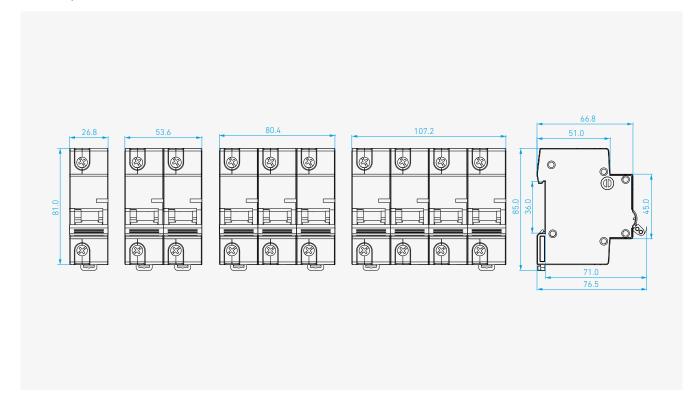
Dimensions

HGD (Standard Type)

HGD63U, 63 AF

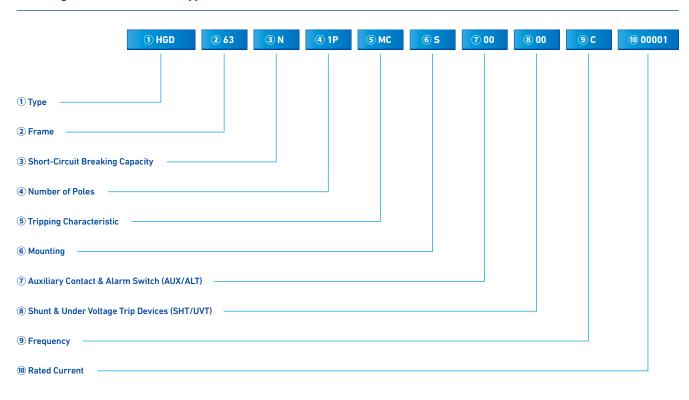


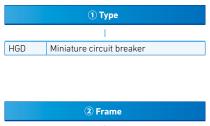
HGD100S, 100 AF



MCB Ordering Information

Ordering Guidelines (Deluxe Type)





63 AF (Deluxe type) 125 AF (Deluxe type)

	I		
МВ	B Curve		
MC	C Curve		
MD	D Curve		
	6 Mounting		
S Front connection			
(T) A	7 Auxiliary Contact & Alarm Switch		

5 Tripping Characteristic

	® 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				

9 Frequency

50/60 Hz

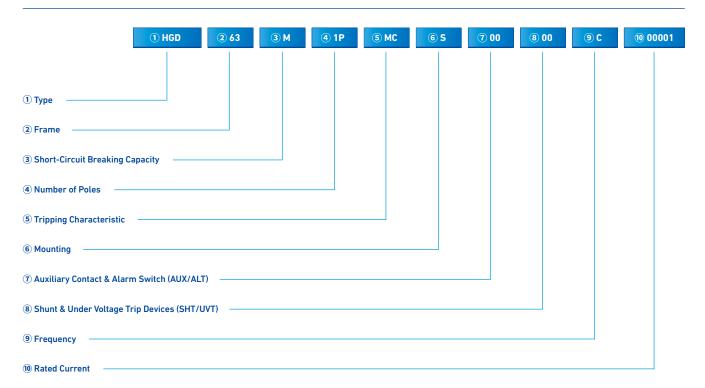
3	Short-Circuit Breaking Capacity
	1
N	6 kA (Deluxe type), 63 AF
Н	10 kA (Deluxe type), 63 AF
Н	10 kA (Deluxe type), 63 AF

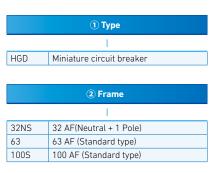
④ Number of Poles		
I		
1 Pole		
1 Pole + Neutral		
Neutral +1 Pole		
2 Pole		
3 Pole		
3 Pole + Neutral		
Neutral +3 Pole		
4 Pole		

MD	D Curve			
	6 Mounting			10 Rated Current
	T.			
S	Front connection	0	00P5	0.5 A
		0	0001	1 A
		0	0002	2 A
		0	0003	3 A
		0	0004	4 A
	7 Auxiliary Contact & Alarm Switch	0	0005	5 A
	T.	0	0006	6 A
00	Non-attachment	0	0010	10 A
		0	0016	16 A
		0	0020	20 A
		0	0025	25 A
(e)	Church & Harden Veltage Tria Devices	0	0032	32 A
•	Shunt & Under Voltage Trip Devices	0	0040	40 A
	I	0	0050	50 A
00	Non-attachment	0	0063	63 A
		0	0800	80 A
		0	0100	100 A
		0	0125	125 A

MCB Ordering Information

Ordering Guidelines (Standard Type)





3 Short-Circuit Breaking Capacity		
I		
3 kA (Standard type), 63 AF		
4.5 kA (Standard type), 63 AF		
6 kA (Standard type), 63 AF		
10 kA (Standard type), 63 AF		
15 kA (Standard type), 63 AF		

4 Number of Poles		
	I	
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
	I .
MB	B Curve
MC	C Curve
MD	D Curve

S	Front connection		
	7	uxiliary Contact & Alarm Switch	
		T.	
00		Non-attachment	

8	Shunt & Under Voltage Trip Devices
	I
00	Non-attachment
	9 Frequency
	I
С	50/60 Hz
	*

® Rated Current		
	I	
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	
08000	80 A	
00100	100 A	
00125	125 A	

HSD Miniature Switch Disconnector

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Selection Table	40
Dimensions	42
Order Information	44

Features

HSD Miniature Switch Disconnector

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 contruction
- Large cable terminals



Specification

- IEC/IEN 60947-3

- IEC/IEN 60947-3

Product Overview



Deluxe Type



Standard Type

Selection Table

HSD (Deluxe Type)

Model	HSD63, 63 AF	HSD125, 125 AF
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
Model	HSD1005, 100 AF

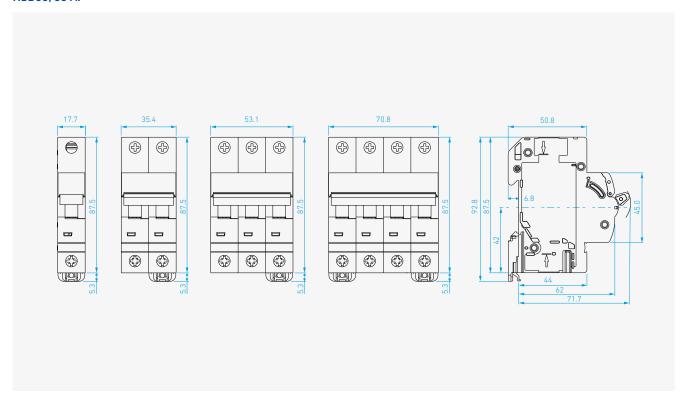


Reference Standard	IEC/EN 60947-3
No. of Poles	1P, 2P, 3P, 4P
Utilization Category	AC-22 A
Rated Current (In)	6, 10, 16, 20, 25, 32, 40, 50, 63, 70, 80, 100 A
Rated Voltage (Ue)	AC 240/415 V
Rated Frequency (F)	50/60 Hz
Rated Insulation Voltage (Ui)	690 V
Rated Impulse Voltage (Uimp)	6 kV
Dielectric 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

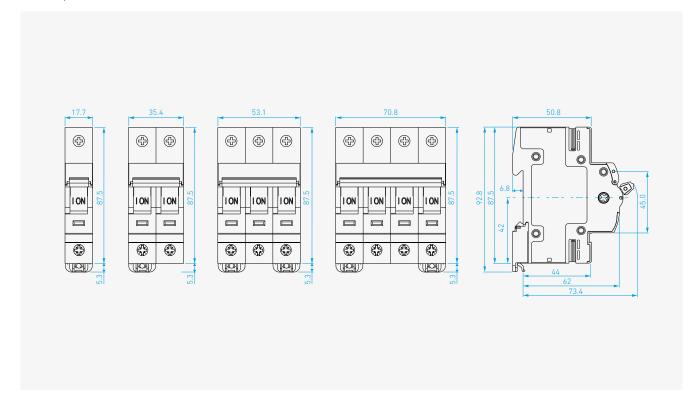
Dimensions

HSD (Deluxe Type)

HSD63, 63 AF

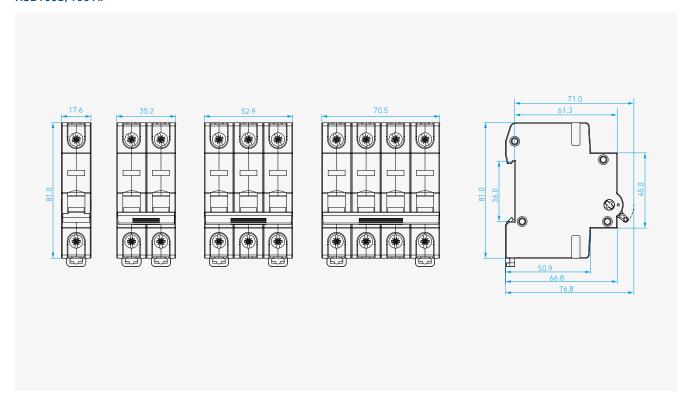


HSD125, 125 AF



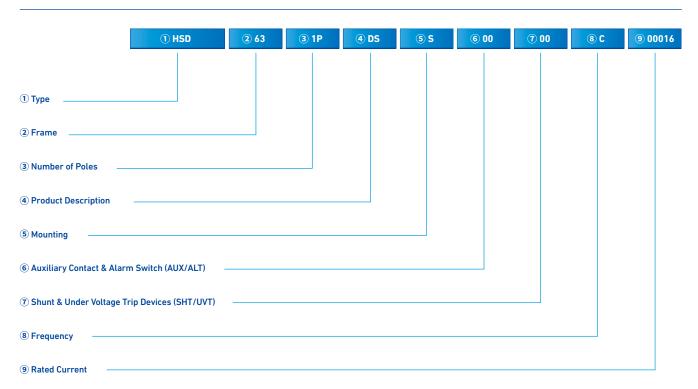
HSD (Standard Type)

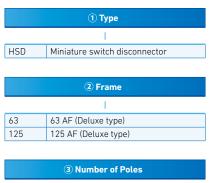
HSD100S, 100 AF



HSD Ordering Information

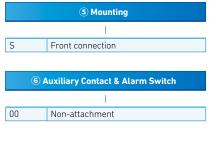
Ordering Guidelines (Deluxe Type)





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

4 Product Description	
	T.
DS	Disconnection switch

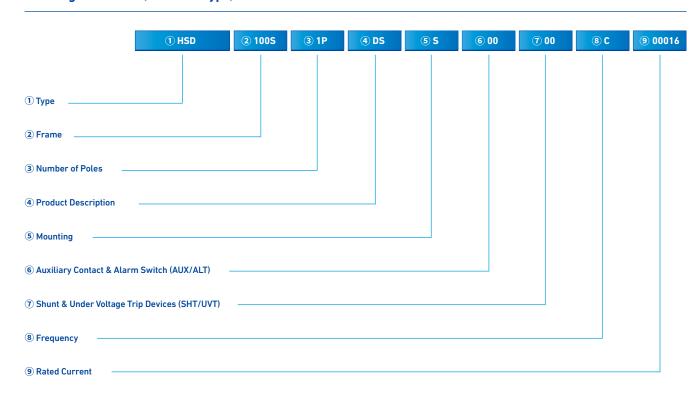


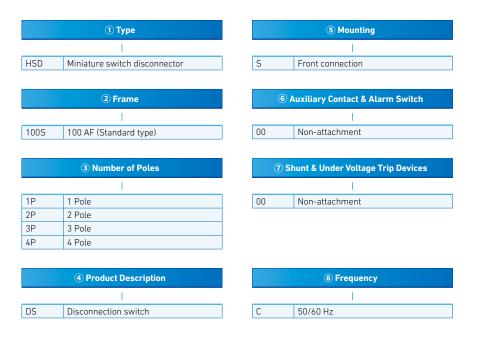
(7	Shunt & Under Voltage Trip Devices
	I
00	Non-attachment

8 Frequency	
	T.
С	50/60 Hz

Rated Current		
l l		
00016	16 A	
00025	25 A	
00032	32 A	
00040	40 A	
00063	63 A	
08000	80 A	
00100	100 A	
00125	125 A	

Ordering Guidelines (Standard Type)





Rated Current			
00016	16 A		
00025	25 A		
00032	32 A		
00040	40 A		
00063	63 A		
08000	80 A		
00100	100 A		
00125	125 A		



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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



Product Performance

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

Standard Type

- 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

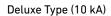
- IEC/EN 61008-1

- IEC/EN 61008-1

Product Overview









Standard Type (6 kA)

Selection Table

HRC (Deluxe Type)

Model	HRC63, 63 AF	HRC100, 100 AF





	6.6	6 6
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, 40, 50, 63 A	80, 100 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 (Inc)	10 kA	10 kA
Rated Residual Operating Current (I⊿n)	30, 100, 300	30, 100, 300
Rated Making Breaking Capacity (lm)	630 A or 10 ln 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 I∆n < 300 ms, 5 I∆n < 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





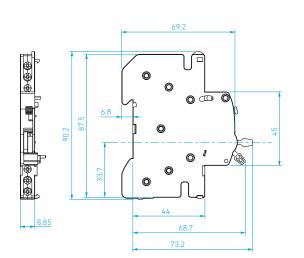
Reference Standard	IEC/EN 61008-1	IEC/EN 61008-1
No. of Poles	2P (N + 1P), 4P (N + 3P)	2P (N + 1P), 4P (N + 3P)
N Phase Position	Left	Left
Rated Current (In)	16, 25, 32, 40, 50, 63 A	80, 100 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz
Rated Conditional Short Circuit Current (Inc)	6 kA	6 kA
Rated Residual Operating Current (I⊿n)	10, 30, 100, 300, 500 mA (10 mA: up to 40 A)	30, 100, 300, 500 mA
Rated Making Breaking Capacity (lm)	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	
Utlization 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	

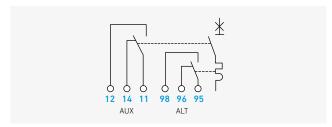
Dimension



Ordering Information

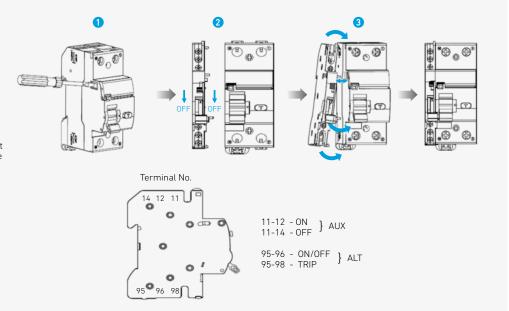
AVT HCD12E	ALIV/ALT
AXI HGD125	AUX/ALI

Circuit Diagram



Assembling with RCCB (HRC Accessories)

- 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



Accessories Ordering Information

Deluxe Type

Туре		Code	Description
HRC63 AX	Т	AXT HGD125	AUX/ALT

Technical Data

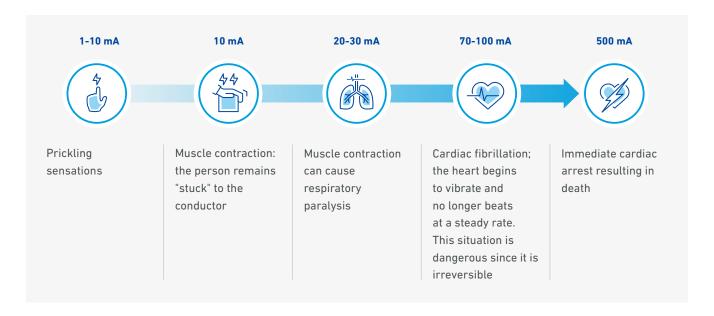
Standard Use Environment

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:

Zs (max) = 50/In = 50/0.03 = 1,666

Protection Against Fire

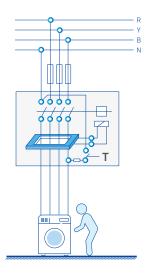
The majority of fires which occur as a result of faulty wiring are started by current flowing to earth. Fire can be started by fault current of less than 1 amp. The normal domestic overload protective device such as a fuse or MCB will not detect such a small current. A correctly chosen RCCB will detect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

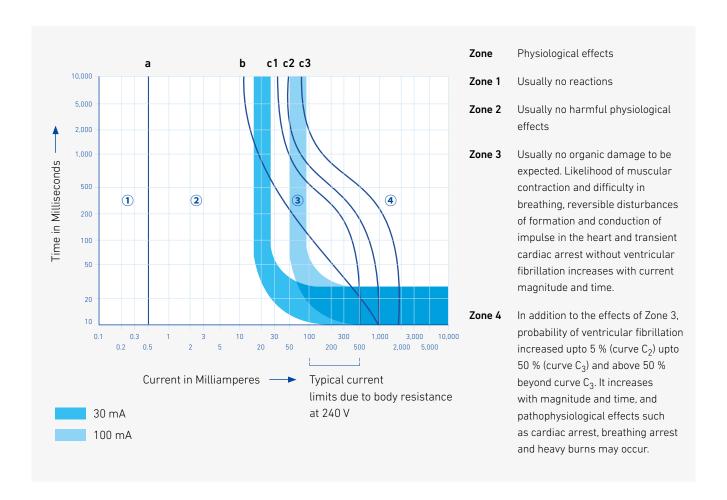
Rated Tripping Current of the RCCB	Maximum Permissible Earth Fault Loop Impedance in
10 mA	5,000
30 mA	1,666
100 mA	500
300 mA	166

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.





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

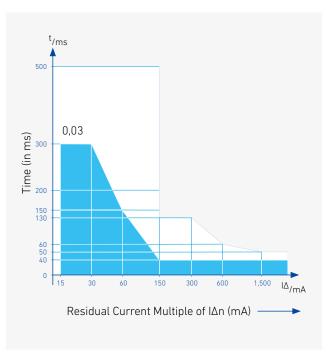
RCCB Type AC

AC type RCCB are used for residual sinusoidal alternating current.

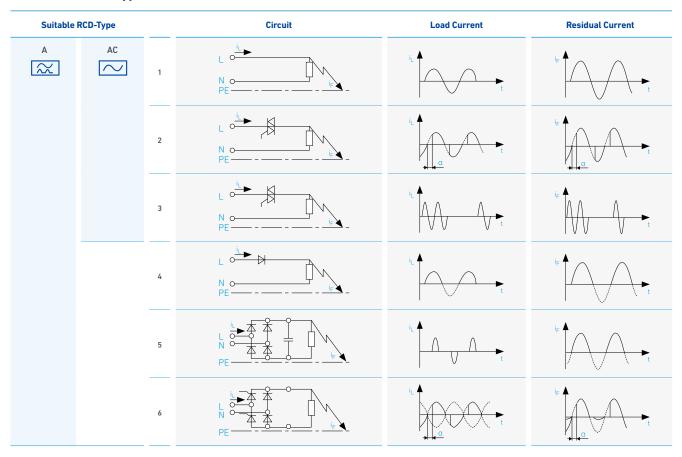
RCCB Type A

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

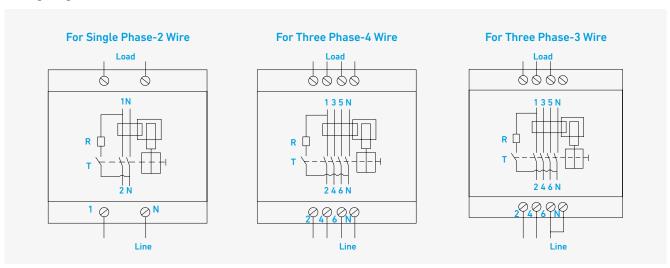


Selection of RCCB Type



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

Wiring Diagram

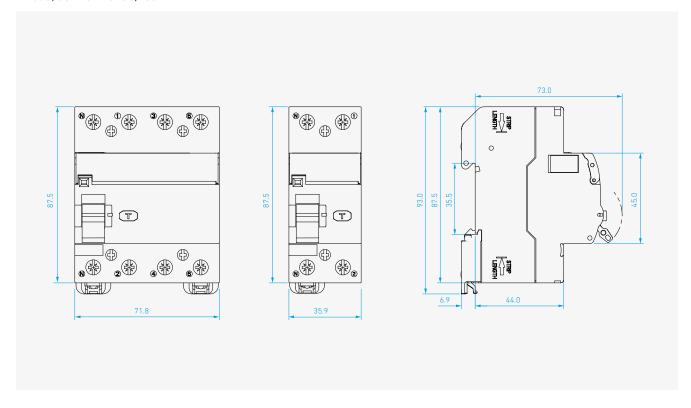


The Hyundai range of four pole RCCBs can be used to provide residual current protection in 3 phase. For 3 wire circuits (no neutral), a link from the neutral to an incoming should be made on the supply side of the RCCB, to enable the operation of the RCCB.

Dimensions

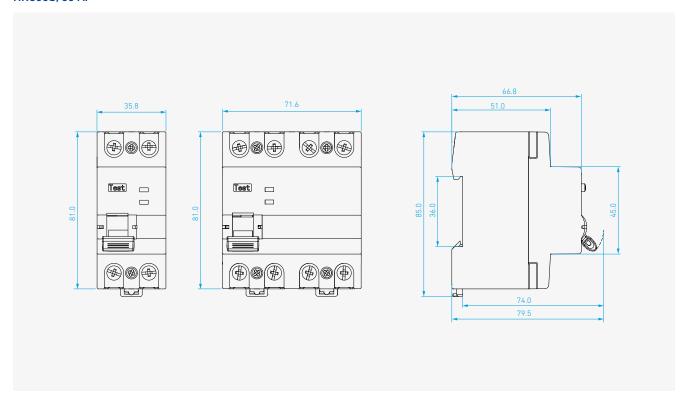
HRC (Deluxe Type)

HRC63, 63 AF/HRC100,100 AF

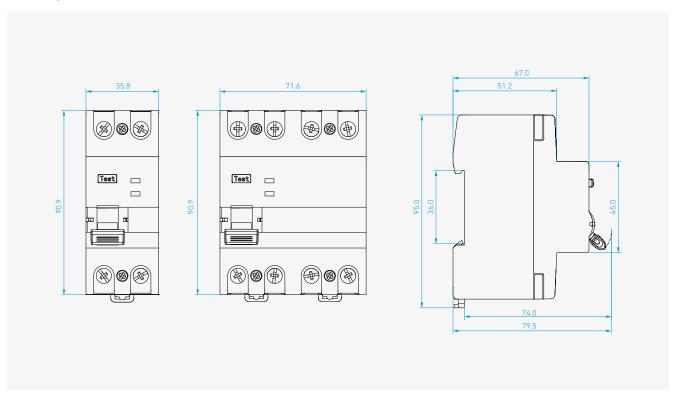


HRC (Standard Type)

HRC63S, 63 AF

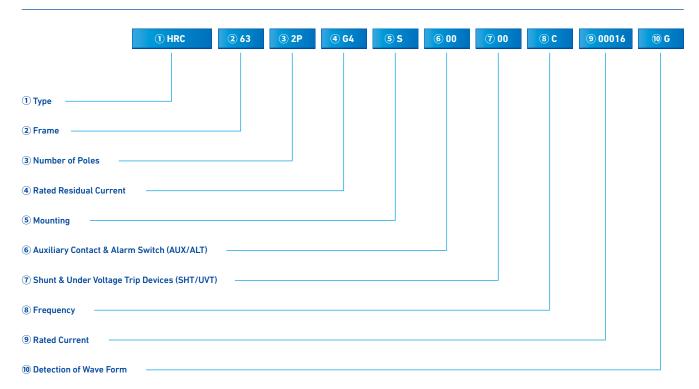


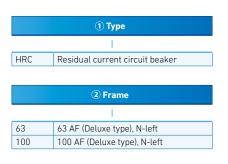
HRC100S, 100 AF



RCCB Ordering Information

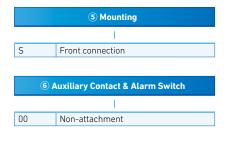
Ordering Guidelines (Deluxe Type)





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

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



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

® Frequency				
	I			
С	50/60 Hz			

Rated Current				
T.				
00016	16 A			
00025	25 A			
00032	32 A			
00040	40 A			
00063	63 A			
08000	80 A			
00100	100 A			

Detection of Wave Form				
	I			
G	AC type			
F	A type			

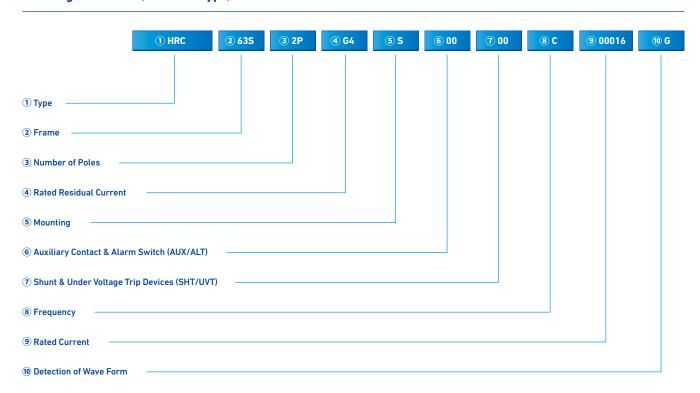
Ordering Guidelines (Standard Type)

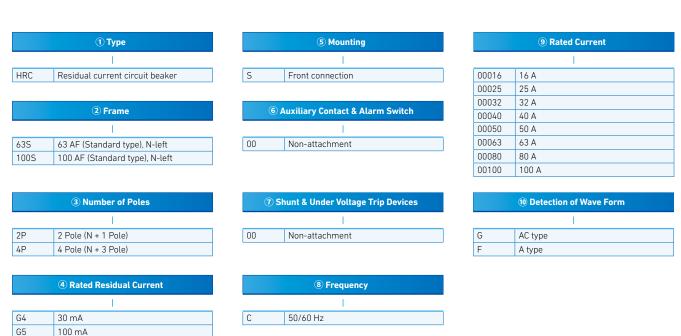
G7

G8

300 mA

500 mA





HRO

Residual Current Circuit Breaker with Overcurrent Protection

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Features



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











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

- conventional single pole MCB. - Dual termination for bus-bar as well as cable

- 1 Module 18 mm compact (Long type)/1 Module

- Compact size RCBO in same physical size as a

- Rated residual operating current 10~300 mA

- Short circuit, overcurrent and earth leakage protection

- Supply can be connected on either side
- IEC/EN 61009-1

Compact Type

- Breaking capacity up to 10 kA

- Tripping characteristics: B, C curve

18 mm compact (Short type)

- Rated current up to 40 AF

- Type AC and type A

- AS/N7S 61009-1
- DEKEA CB certification

- IEC/EN 61009-1

- DEKRA/INTERTEK CB certification

HYUNDAI ELECTRIC 65

Selection Table

HRO (Standard Type)

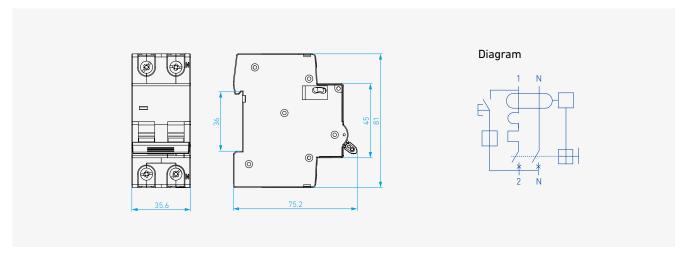
Madal	2 Module Type			RCD Type		Compact Type
Model 	HR063S, 63 AF, 4.5 kA	HR063A, 63 AF, 6 kA	HR063B, 63 AF, 10 kA	HR063M, 63 AF, 6 kA	HR063P, 63 AF, 10 kA	HR040L, 40 AF, 6 k/ (Cable Type)
	-	1		11	11	
Reference Standard	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 61009-1	IEC/EN 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 connecte
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	4.5 kA (lcs = 100 % lcn)	6 kA (lcs = 100 % lcn)	10 kA (lcs = 75 % lcn)	6 kA (lcs = 100 % lcn)	10 kA (lcs = 75 % lcn)	6 kA (lcs = 100 % lcn)
Rated Residual Operating Current (I∆n)	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			
Rated Residual Making Breaking Capacity (l∆m)	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			
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 I∆n < 300 ms, 5 I∆n < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 I∆n < 300 ms, 5 I∆n < 40 ms	1 I∆n < 300 ms, 5 I∆n < 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			
lumidity	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH
Energy Limit Class	3	3	3	3	3	3
erminal Capacity (max)	25 mm²	25 mm²	25 mm²	25 mm²	25 mm²	25 mm²
Fightening Torque	2 N·m	2 N·m	2 N·m	2 N·m	2 N·m	2 N·m
/ibration	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			
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)
nstallation 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			
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					
HR040T, 40 AF, 6 kA (Cable Type)	HR040HT, 40 AF, 10 kA (Cable Type)	HRO40M, 40 AF, 6 kA (Non-Cable Type)	HR040P, 40 AF, 10 kA (Non-Cable Type)	HR040ML, 40 AF, 6 kA (Cable Type)	HRO40PL, 10 kA (Cable Type)
	· 1000			in the second	The second
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)			
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 (lcs = 100 % lcn)	10 kA (lcs = 75 % lcn)	6 kA (lcs = 100 % lcn)	10 kA (lcs = 75 % lcn)	6 kA (lcs = 100 % lcn)	10 kA (lcs = 75 % lcn)
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 I∆n < 300 ms, 5 I∆n < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 I∆n < 300 ms, 5 I∆n < 40 ms	1 I∆n < 300 ms, 5 I∆n < 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 mm² (Top) 10 mm² (Bottom)	25 mm² (Top) 10 mm² (Bottom)	10 mm ²	10 mm ²	10 mm² (Top) 25 mm² (Bottom)	10 mm² (Top) 25 mm² (Botto
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	0138 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 mr
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				
NO	NO	NO	NO	NO	NO
DEKRA CB	DEKRA CB	INTERTEK CB	INTERTEK CB	INTERTEK CB	INTERTEK CB

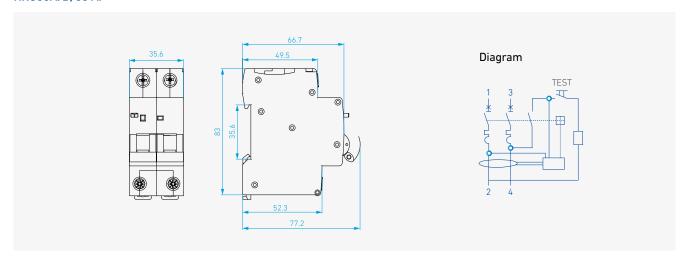
Dimensions

HRO (Standard Type)

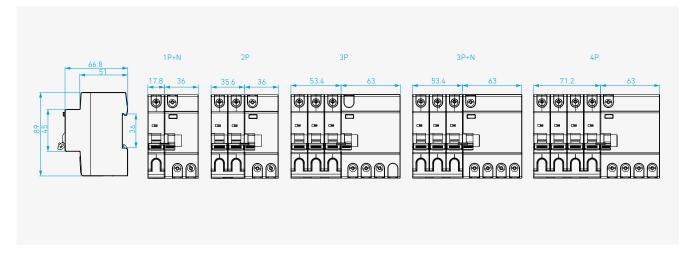
HR063S, 63 AF



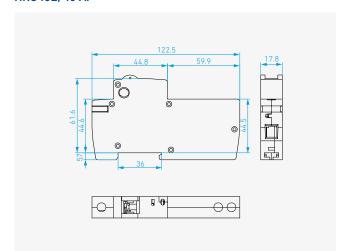
HR063A/B, 63 AF



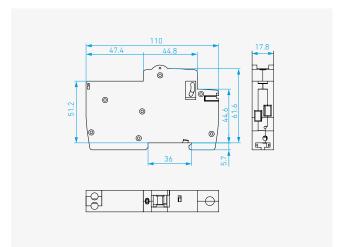
HR063M/P, 63AF



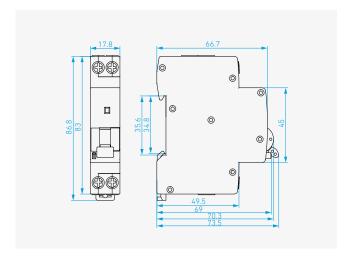
HR040L, 40 AF



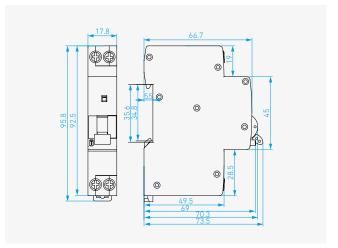
HR040T/HT, 40 AF



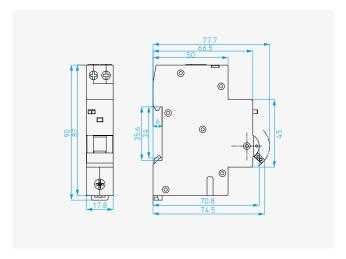
HR040M, 40 AF



HR040P, 40 AF

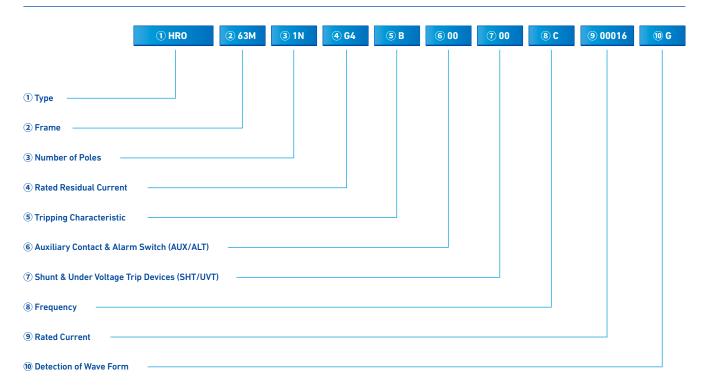


HR040ML/PL, 40 AF



RCBO Ordering Information

Ordering Guidelines (Standard Type)



① Туре		
	1	
HRO	Residual current circuit beaker with overcurrent protection	

② Frame		
	I	
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		
	1	
1N	1 Pole + Neutral (63 AF)	
N1	Neutral + 1Pole (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)	

	Rated Residual Current		
G2	10 mA		
G4	30 mA		
G5	100 mA		
G7	300 mA		
G8	500 mA		
	5 Tripping Characteristic		
В	B Curve		
С	C Curve		
D	D Curve		
Auxiliary Contact & Alarm Switch			
	1		
00	Non-attachment		

⑦ Shunt & Under Voltage Trip Devices		
	l l	
00	Non-attachment	
® Frequency		
	l l	

Rated Current		
	I	
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		



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Features



HEC Electronic Circuit Breaker

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





Product Features

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

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

HEC Type

- Product Performance
- Overloading protection
- Low power self consumption
- Automatic reset
- **Product Structure**
- Microcontroller based design
- Adjustable current setting
- LCD display of current consumption
- Pre-trip LED Indication
- Mounting: DIN-Rail mounting

Product Overview



Selection Table

HEC Type

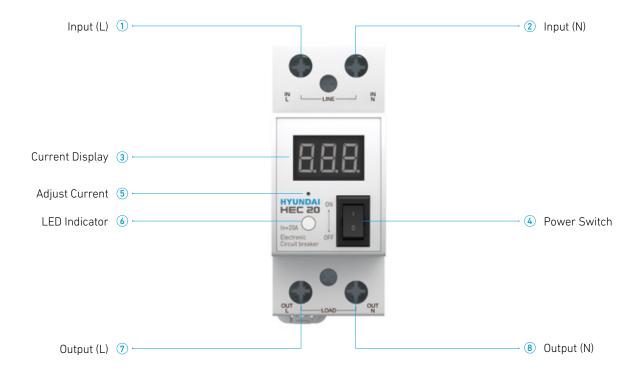
Weight

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

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 [In ← I flowing ← 2 In] 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 In] 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).

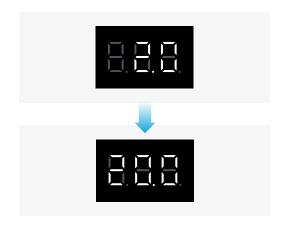
Technical Data

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 starts 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.



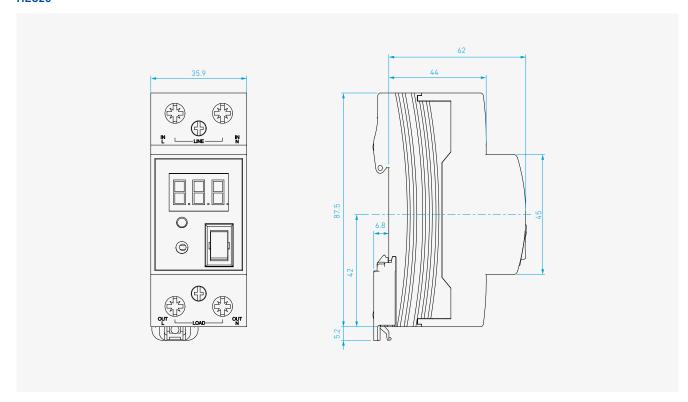
Automatic Reset Facility

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

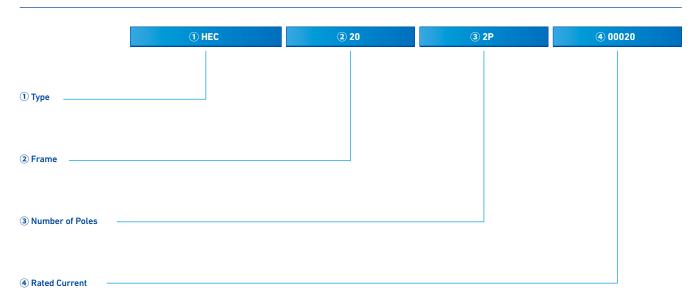
HEC

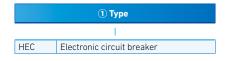
HEC20



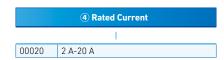
HEC Ordering Information

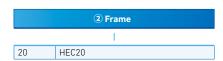
Ordering Guidelines













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Selection Table

HBD breaker

Standard	IEC 60947-2
Protection	Overload, short-circuit
	5, 10 kA at AC220/240 V
Continue	10, 15, 20, 30, 40, 50 A
Specification	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			IEC 60947-2			
Ampere Frame Size			50 AF	50 AF			50 AF			
Number of Poles (P)				1	2	3	1	2	3	
Degree of Protection				IP20			IP20	IP20		
Utilization Category				А	А			A		
Protection				Overload, sh	ort-circuit		Overload, sho	ort-circuit		
	Rated Current (A)			10, 15, 20, 30), 40, 50		10, 15, 20, 30	, 40, 50		
Della	Rated Insulation V	/oltage [Ui] (V)	AC460			AC460			
Rating	Rated Operationa	Rated Operational Voltage [Ue] (V)		AC240/460 ¹⁾	AC240/460 ¹⁾			AC240/460 ¹⁾		
	Rated Impulse withstand Voltage [Uimp] (kV)			6			6	6		
	Ultimate [Icu] (kA r.m.s.)	AC220/240 V, 50-60 Hz		5			10	10		
Rated Short-Circuit Breaking Capacity		DC125 V		5			10	10		
J	Service [Ics]	ee [lcs] % of (lcu)		50			50			
Trip Mechanism				Thermal magnetic			Thermal mag	Thermal magnetic		
Mounting	Plug-in			0			0			
Terminal	Line Side			Plug-in			Plug-in			
Connection	Load Side			Screw (Plug-in: for domestic order)			Screw (Plug-in: for domestic order)			
	d	а	Width	20	50	75	25	50	75	
		b	Height	74.5	74.5	74.5	74.5	74.5	74.5	
		С	Depth	60	60	60	60	60	60	
		d		77	79	79	77	79	79	
Weight (kg)			0.14	0.28	0.42	0.14	0.28	0.42		

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

Ratings

Model

Lug-to-lug type (Terminal: screw)

HiBC32S

			()		zicić Palala	-	EIC.	eicit 	Bo I
Standard			IEC 6094	7-2		IEC 6094	7-2		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			А			A		Α	
Protection			Overload, short-circuit		Overload, short-circuit		Overload, short-circuit		
	Rated Current (A)		10, 15, 20, 30, 40, 50		10, 15, 20, 30, 40, 50		10, 15, 20, 30		
	Rated Insulation Voltage [Ui] (V)		AC460		AC460		AC500		
Rating	Rated Operational Voltage [Ue] (V)		AC240/460 ¹⁾		AC240/460 ¹⁾		AC220		
	Rated Impulse withstand Voltage [Uimp] (kV)		6		6		6		
	Ultimate [Icu]	AC400/460 V, 50-60 Hz	2.5		5			-	
		AC380 V, 50-60 Hz	2.5			5	5		-
Rated Short-Circuit Breaking Capacity	(kA r.m.s.)	AC220/240 V, 50-60 Hz	5		10		1.5		
		DC125 V	5		10		-		
	Service [Ics]	% of (Icu)	50			50		50	
Trip Mechanism		Thermal	Thermal magnetic		Thermal magnetic		Thermal magnetic		
Mounting	ng Direct Mounting by Screw		0	0		0		0	
Terminal	Line Side		Clip & Sc	Clip & Screw		Clip & Screw		Screw	
Connection	Load Side		Clip & Sc	rew		Clip & Screw		Screw	
	d	a Width	25	50	75	25	50	75	33

Height

Depth

b

С

95

60

77

0.16

95

60

79

0.34

95

60

79

0.5

95

60

77

0.16

95

60

79

0.34

95

60

79

0.5

70

42

57

0.1

HBD51

HBD52

HBD53 HBD51h HBD52h HBD53h

Dimensions (mm)

Weight (kg)

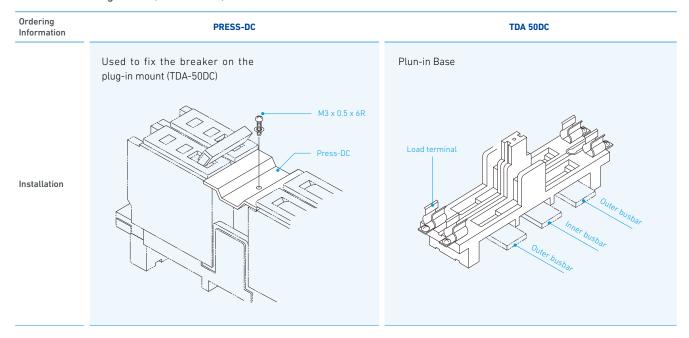
st 1) AC 460 V is not applicable for 1P breaker.

Accessories

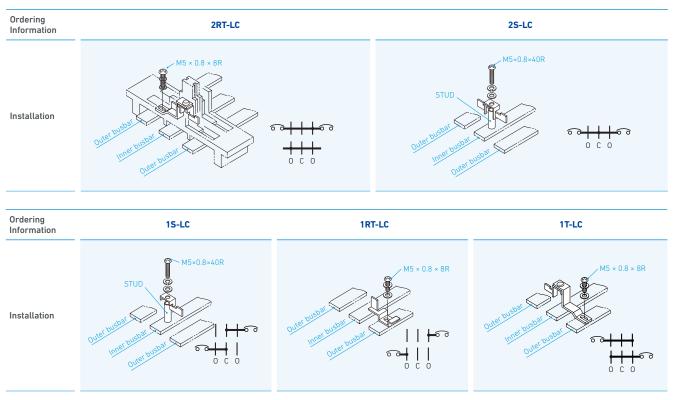
Purchased Parts when Using a HBD52D Plug-in Breaker

Plug-in Base

2 rows of mounting stands (for 4 circuits)



Branch conductor



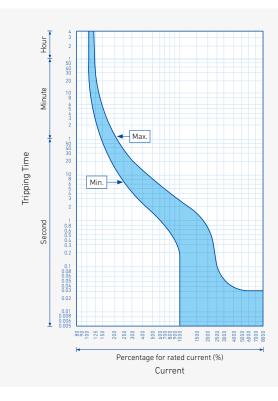
Technical Data

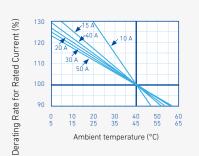
Tripping & Temperature Derating Curves

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



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

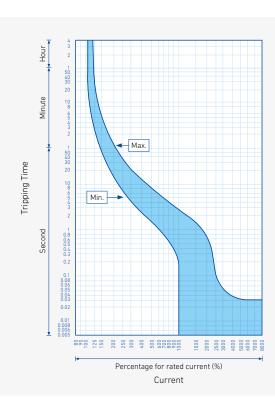


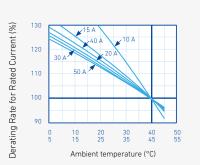


HBD breaker, 5-10 kA, 10-50 A



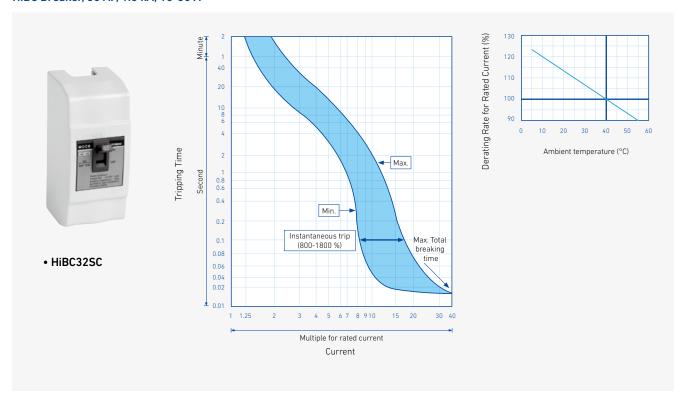
- HBD51
- HBD52
- HBD53
- HBD51h
- HBD52h
- HBD53h





Technical Data

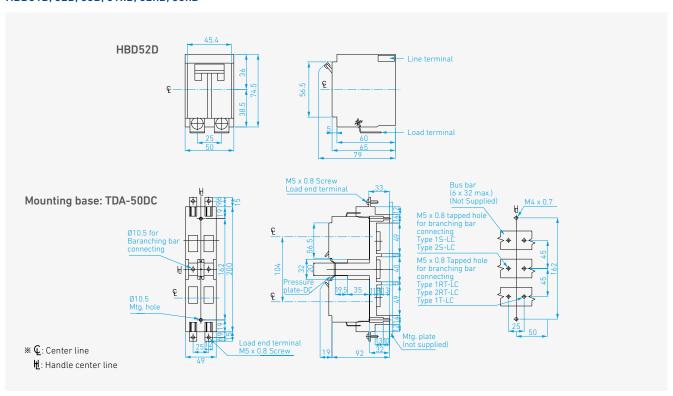
HiBC Breaker, 30 AF, 1.5 kA, 10-30 A



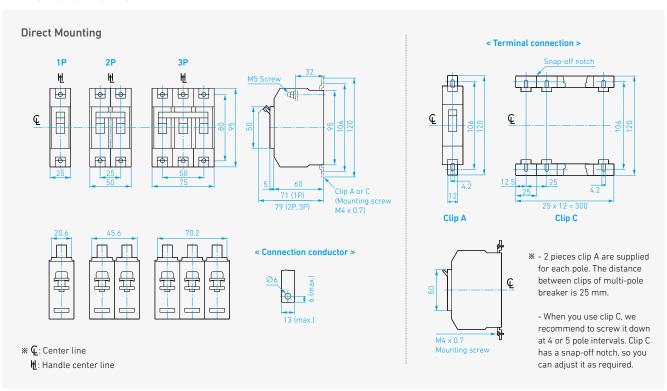
Dimensions

HBD (5-10 kA 10-50 A)

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



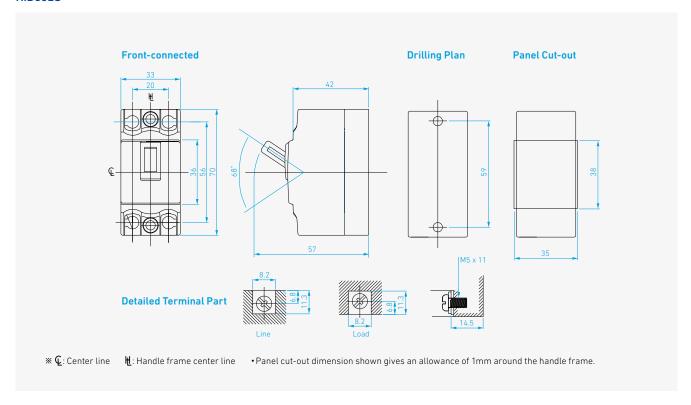
HBD51, 52, 53, 51h, 52h, 53h



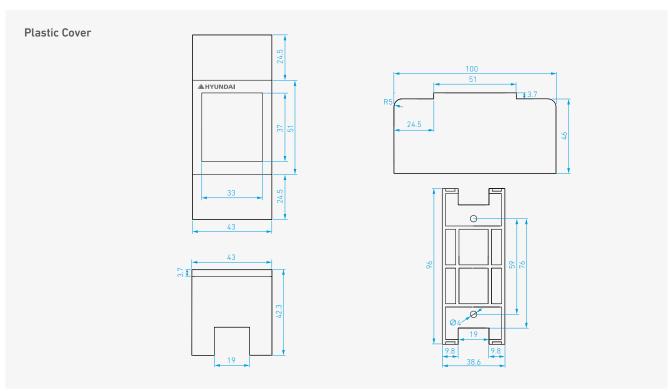
Dimensions

HiBC (30 AF 1.5 kA 10-30 A)

HiBC32S



HiBC32SC



HBD Ordering Information

HBD Breaker/5, 10 kA 10-50 A

		1 Pole	2 Pole	3 Pole	
Rating		Code	Code	Code	
	10 A	HBD51D 1PT4S0000C 00010 E	HBD52D 2PT4S0000C 00010 E	HBD53D 3PT4S0000C 00010 E	
	15 A	HBD51D 1PT4S0000C 00015 E	HBD52D 2PT4S0000C 00015 E	HBD53D 3PT4S0000C 00015 E	
	20 A	HBD51D 1PT4S0000C 00020 E	HBD52D 2PT4S0000C 00020 E	HBD53D 3PT4S0000C 00020 E	
	30 A	HBD51D 1PT4S0000C 00030 E	HBD52D 2PT4S0000C 00030 E	HBD53D 3PT4S0000C 00030 E	
50 AF, 5 kA	40 A	HBD51D 1PT4S0000C 00040 E	HBD52D 2PT4S0000C 00040 E	HBD53D 3PT4S0000C 00040 E	
Plug-in Type	50 A	HBD51D 1PT4S0000C 00050 E	HBD52D 2PT4S0000C 00050 E	HBD53D 3PT4S0000C 00050 E	
	10 A	HBD51HD 1PT4S0000C 00010 E	HBD52HD 2PT4S0000C 00010 E	HBD53HD 3PT4S0000C 00010 E	
	15 A	HBD51HD 1PT4S0000C 00015 E	HBD52HD 2PT4S0000C 00015 E	HBD53HD 3PT4S0000C 00015 E	
	20 A	HBD51HD 1PT4S0000C 00020 E	HBD52HD 2PT4S0000C 00020 E	HBD53HD 3PT4S0000C 00020 E	
	30 A	HBD51HD 1PT4S0000C 00030 E	HBD52HD 2PT4S0000C 00030 E	HBD53HD 3PT4S0000C 00030 E	
50 AF, 10 kA	40 A	HBD51HD 1PT4S0000C 00040 E	HBD52HD 2PT4S0000C 00040 E	HBD53HD 3PT4S0000C 00040 E	
Plug-in Type	50 A	HBD51HD 1PT4S0000C 00050 E	HBD52HD 2PT4S0000C 00050 E	HBD53HD 3PT4S0000C 00050 E	
	10 A	HBD51 1PT4S0000C 00010	HBD52 2PT4S0000C 00010	HBD53 3PT4S0000C 00010	
	15 A	HBD51 1PT4S0000C 00015	HBD52 2PT4S0000C 00015	HBD53 3PT4S0000C 00015	
1 -	20 A	HBD51 1PT4S0000C 00020	HBD52 2PT4S0000C 00020	HBD53 3PT4S0000C 00020	
8 -	30 A	HBD51 1PT4S0000C 00030	HBD52 2PT4S0000C 00030	HBD53 3PT4S0000C 00030	
50 AF. 5 kA	40 A	HBD51 1PT4S0000C 00040	HBD52 2PT4S0000C 00040	HBD53 3PT4S0000C 00040	
Lug-to-lug Type	50 A	HBD51 1PT4S0000C 00050	HBD52 2PT4S0000C 00050	HBD53 3PT4S0000C 00050	
	10 A	HBD51H 1PT4S0000C 00010	HBD52H 2PT4S0000C 00010	HBD53H 3PT4S0000C 00010	
C	15 A	HBD51H 1PT4S0000C 00015	HBD52H 2PT4S0000C 00015	HBD53H 3PT4S0000C 00015	
1 -	20 A	HBD51H 1PT4S0000C 00020	HBD52H 2PT4S0000C 00020	HBD53H 3PT4S0000C 00020	
Bi -	30 A	HBD51H 1PT4S0000C 00030	HBD52H 2PT4S0000C 00030	HBD53H 3PT4S0000C 00030	
50 AF, 10 kA	40 A	HBD51H 1PT4S0000C 00040	HBD52H 2PT4S0000C 00040	HBD53H 3PT4S0000C 00040	
Lug-to-lug Type	50 A	HBD51H 1PT4S0000C 00050	HBD52H 2PT4S0000C 00050	HBD53H 3PT4S0000C 00050	

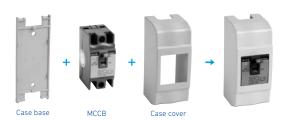
Mini Molded Case Circuit Breaker

Rating		Code	
	10 A	HIBC32S 2PT4S0000C 00010 E	
HiBC32S 1.5 kA, 2 P	15 A	HIBC32S 2PT4S0000C 00015 E	H 1.
(2P1E)	20 A	HIBC32S 2PT4S0000C 00020 E	w C
	30 A	HIBC32S 2PT4S0000C 00030 E	

Rating		Code
	10 A	HIBC32SC 2PT4S0000C 00010 E
HiBC32SC 1.5 kA, 2 P (2P1E)	15 A	HIBC32SC 2PT4S0000C 00015 E
with Plastic Case	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)





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





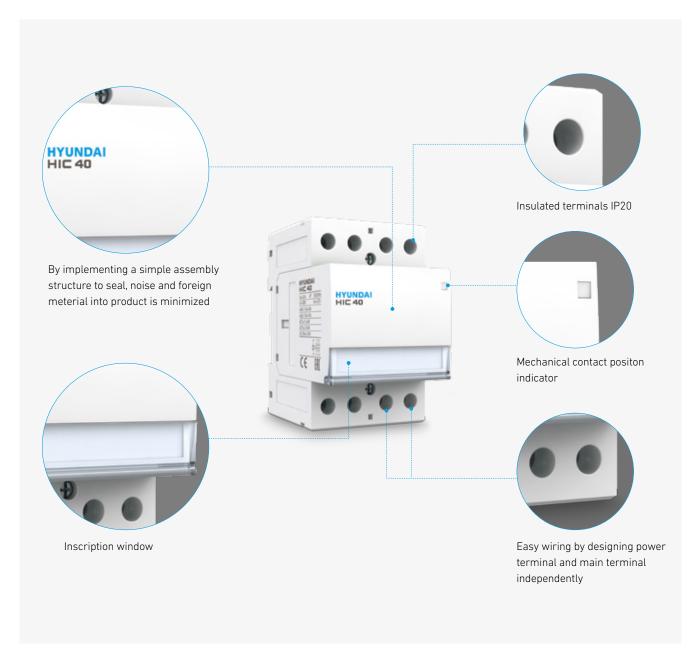


HIC25 HIC40 HIC63

Product Features

External Structure

- By implementing a simple assemply structure to seal, noise and foreign meterial 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 postion indicator
- Insulated terminals IP20



Selection Table

HIC Type

Busbar Connection Top/Bottom

Mounting

Side

Clip on DIN Rail (35 mm x 7.5 mm)

Pin 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 4N0/3N0 + 1NC/4NC: - 14 kW (AC-7a) - 4 kW (AC-7b) 2N0 + 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 (le)	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 mm²	25 mm²	25 mm²
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

Clip on DIN Rail (35 mm x 7.5 mm)

Pin type

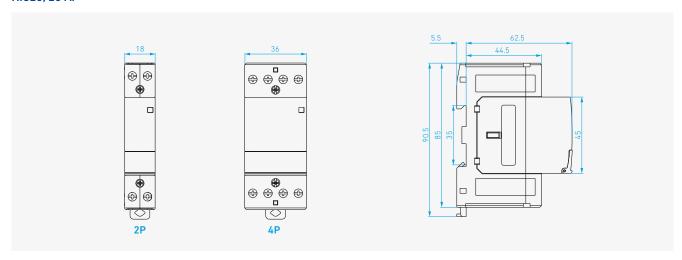
Clip on DIN Rail (35 mm x 7.5 mm)

Pin type

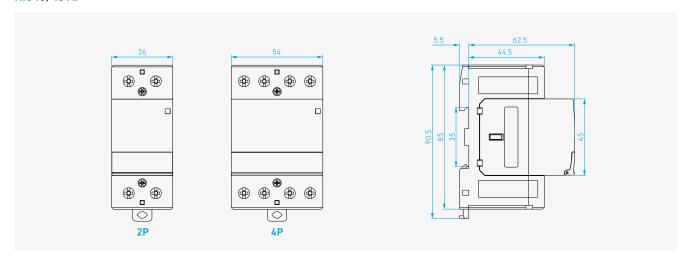
Dimensions

HIC

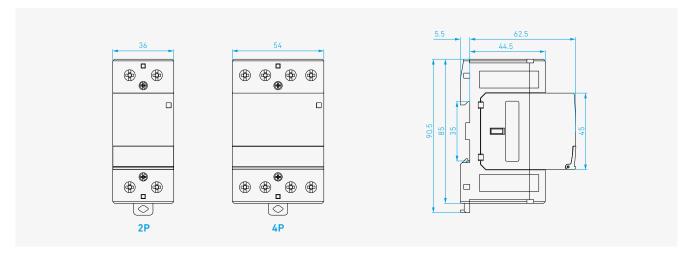
HIC25, 25 AF



HIC40, 40 AF



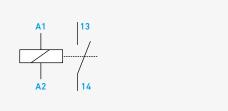
HIC63, 63 AF



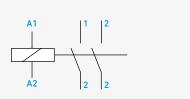
Circuit Diagram

HIC 2P

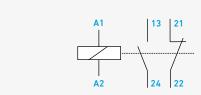
1NO



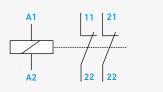
2NO



1NO + 1NC

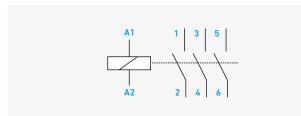


2NC

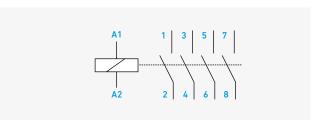


HIC 4P

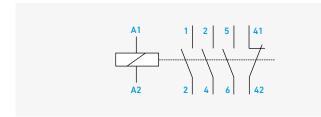
3N0



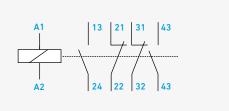
4N0



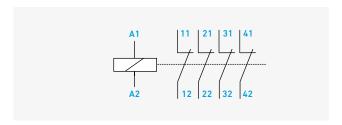
3NO + 1NC



2NO + 2NC

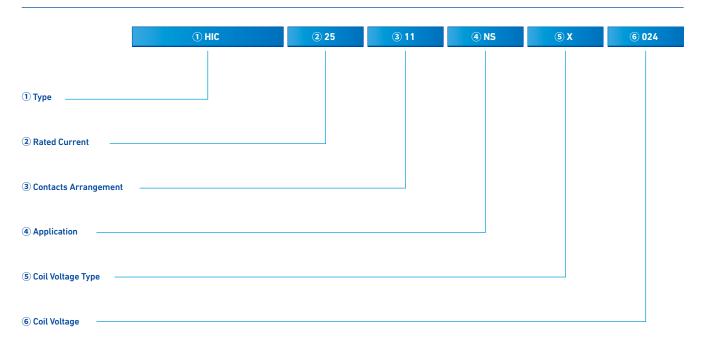


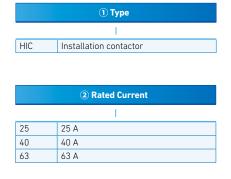
4NC



HIC Ordering Information

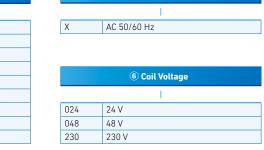
Ordering Guidelines





	3 Main Contact Arrangement
	I
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





5 Coil Voltage Type

	4 Application
	I
NS	Normal



Manual Motor Starter

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Features



HMMS Manual Motor Starter

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



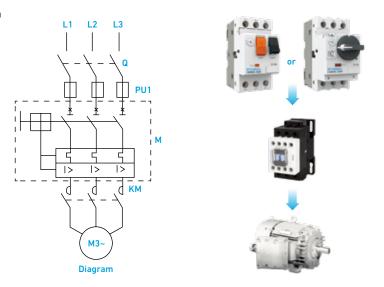


Product Features

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

Function

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



Features

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



 \times 44.5 mm width up to 32 AF, 61.2 mm width up to 80 AF.

Selection Table

HMMS Type

Model HMMS32K



							l p	0 0								
Operation Type				Push-button												
No. of Poles				3												
Rated Current (In)				A												
Rated Operational Vo	Up to 6	90 V														
Rated Frequency (F)	50/60 H															
Rated Insulation Volt	age (Ui)		690 V													
Rated Impulse Voltag			6 kV													
IEC 60947-2 (Breaker)				Cat. A												
Utilization Category IEC 60947-4 (Motor Starter)			AC 3													
Electrical/Mechanical Endurance (no. of Operations) Minimum				AC 3 100,000/100,000												
Max Operating Frequ																
Temperature Compe	25 -20~+60 °C															
Instantaneous Short	•		13 × le	-												
Humidity	Cil cuit Netease		95% RF													
Altitude (m)			2,000													
Terminal Capacity (m	av)		10 mm	2												
Tightening Torque	ua,		2.5 N·m													
rigintening forque	Overload Protection		_													
Function	Phase Failure Protect	0														
runction		0														
Waight (Ica)	Test Button		0													
Weight (kg) Dimensions (H x D x)	A/\		0.250													
	(V)		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 Operational Current (le)	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					
			lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs				
	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				
Rated Breaking	2.5	1.6-2.5	100	100	100	100	100	100	100	100	3	2.25				
Capacity (kA)	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





Rotary	,									Push-	button								
3							3												
0.1~32 A							25~80 A												
Up to 690 V							Up to												
50/60 Hz							50/60												
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~+6	50 °C									-20~+	60 °C								
13 × le	max.										e max.								
95% R										95% F									
2,000										2,000									
10 mm	η ²									25 mr	m²								
2.5 N·r										4.5 N·									
0								0											
0								0											
0										0									
0.277										0.682									
89.8 x	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/A	AUX/AXT/SHT/UVT/Handle					AUX													
AC230	AC220 V AC230 V AC240 V AC240 V AC415 V AC460 V AC500 V AC600 V AC690 V				AC230	V().3(1 \/			AC440										
lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs
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		Weight			
Accessories		Etectrical Diagram	Contact	Ui (AC/V)	Ue (V)	le (A)	VA	(g)
Auxiliary Switch Front Mounting	MMS32K AUX T11	21	1NO 1NC	250	240	2.5	120	16
W. W. W.	MMS32K AUX T20	23 - 24 13 - 14	2N0					
Auxiliary Switch Side Mounting	MMS32K AUX S11	(61) (73) 31 (63) 43 43 33	1NO 1NC	690	690	6	720	40
	MMS32K AUX S20		2NO	070	070	Ü		40
Auxiliary Switch Side Mounting	MMS80K AUX S11	(61) (73) (73) (63) 43 43 33 4	1NO 1NC	690	690	6	720	40
	MMS80K AUX S20		2NO					
Failure Alarm Side Mounting	MMS32K AXT 0110	96 67 57 53 55 55 55 55 55 55 55 55 55 55 55 55	Failure contact: NC Auxiliary contact: NO		240	2.5 (95-96 & 97-98) Failure contact	72	
	MMS32K AXT 0101	52 25 51 15	Failure contact: NC Auxiliary contact: NC	690				40
	MMS32K AXT 1010	₩ 98 87 87 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Failure contact: NO Auxiliary contact: NO		690	6 (51-52 & 53-54)	720	
=2).	MMS32K AXT 1001	7 98 98 97 52 51	Failure contact: NO Auxiliary contact: NC			Auxiliary contact		
Shunt Trip Relay	MMS32K SHT 110	C1 C2						
	MMS32K SHT 240		Uc = 220/240 V, 50/60 Hz					90
الب	MMS32K SHT 380							
Under Voltage Trip Relay	MMS32K UVT 110	D1 D2						
1.5	MMS32K UVT 240	U <			90			
71	MMS32K UVT 380		Uc = 380 V, 50/60 Hz					

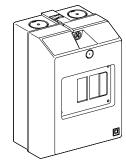
Enclosure

• MMS32K ENC

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

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

- Operating temp.: -20 \sim +60 $^{\circ}$ C
- Degree of protection: IP55
- Conforming to standards: IEC 60947-2, IRC 60947-4-1
- Operational voltage Ue: 690 V
- Material: Policarbonate



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.

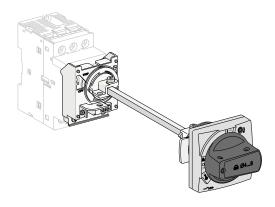
Motor starters under the situation of closing panel.

Application model: MMS32ROperating temp.: -20~+60 °C

- Degree of protection: IP65

- Locking device: Lockable in on/off position

- Material: PA66



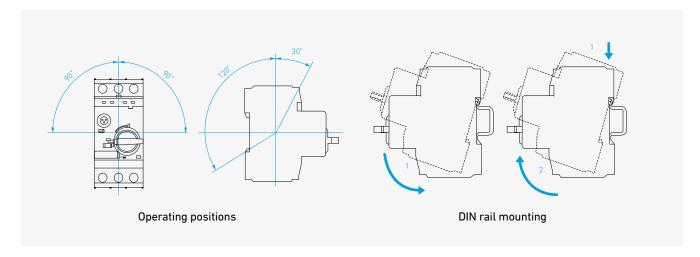
Mounting



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 $\sim + 40^{\circ}$ C) it needs to be calibrated by one point

Environment

Ambient air temperature storage: -50··· + 80 °C operation: -20··· + 60 °C

Ambient temperature compensation: –20 \cdots + 60 °C

Maximum operating altitude: 2,000 m

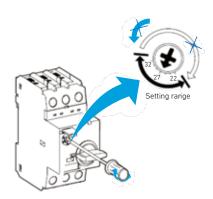
Protection degree: IP20 Shock resistance: 25 g Vibration resistance: 5~150 Hz

Product side by side

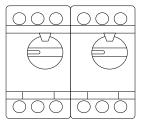
When several products MMS32K/MMS32R/MMS80K are mounted side by side, the thermal trip setting Ir maybe need to be adjusted up to 1.1 XIn.

Don't exceed the maximum thermal setting Ir.

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



Dial setting method



Terminals

reriiiiats				
Model	Terminal Screw	Applicable Wire Size (mm²)	Ring Tongue Terminal (mm²)	Screwing Torque (kgf.cm)
0.1-0.16 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
0.16-0.25 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
0.25-0.4 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
0.4-0.63 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
0.63-1 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
1-1.6 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
1.6-2.5 A	M4	1~10mm² (Hard cooper cable) 1~6mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
2.5-4 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
4-6.3 A	M4	1~10mm² (Hard cooper cable) 1~6mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
6-10 A	M4	1~10 mm² (Hard Cooper Cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
9-14 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
13-18 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
17-23 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
20-25 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
24-32 A	M4	1~10 mm² (Hard cooper cable) 1~6 mm² (Softcable)	Boreф3.5, Maximum outsideф 8.0	1.2 N.M
25-40 A	M8	2.5~25 mm² (Hard cooper cable) 2.5~16 mm² (Softcable)	-	3.5 N.M
40-63 A	M8	2.5~25 mm² (Hard cooper cable) 2.5~16 mm² (Softcable)	-	3.5 N.M
56-80 A	M8	2.5~25 mm² (Hard cooper cable) 2.5~16 mm² (Softcable)	-	3.5 N.M

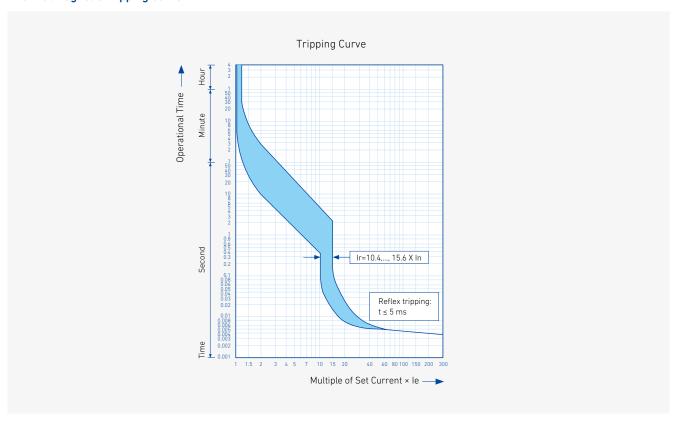
Technical Data

Application for-3Phase Motors, AC-3

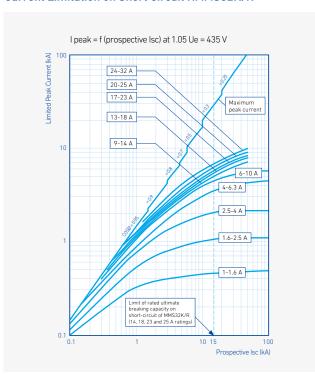
		3-Phase [kW] (50/60 Hz)					
Rated Current (A)	Setting Range (A)	AC230/240 V	400 V	415 V	440 V	500 V	690 V
0.16	0.1-0.16	-	-	-	-	-	-
0.25	0.16-0.25	-	0.06	0.06	-	-	-
0.4	0.25-0.4	-	0.09	0.09	-	-	-
0.63	0.4-0.63	-	0.12	0.12	0.2	0.25	0.37
1	0.63-1	-	0.25	0.25	0.5	0.5	0.55
1.6	1-1.6	-	0.37	0.37	0.55	0.75	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

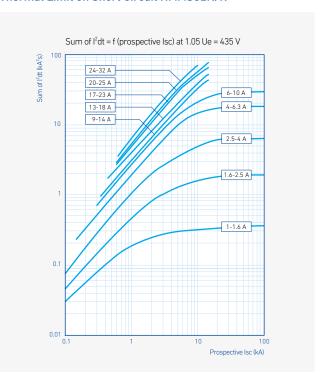
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit HMMS32K/R



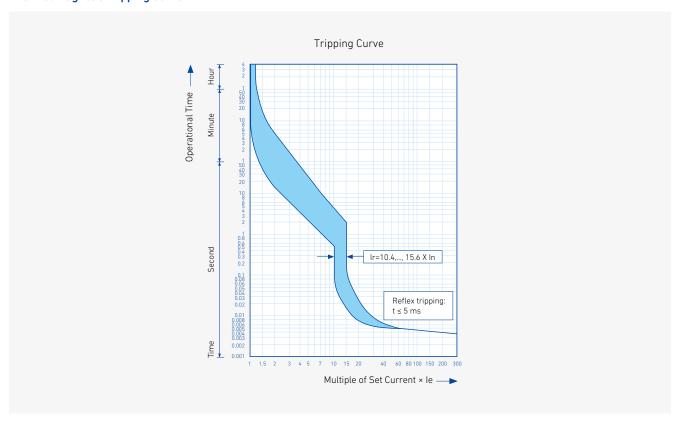
Thermal Limit on Short Circuit HMMS32K/R



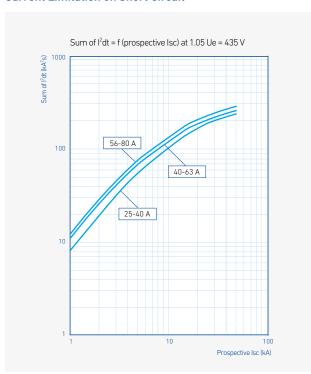
Technical Data

HMMS80K

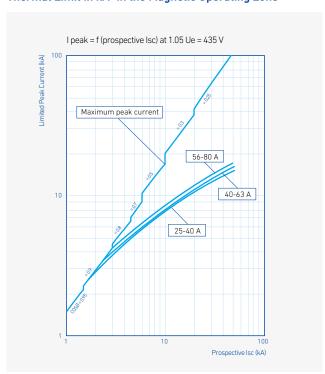
Thermal Magnetic Tripping Curve



Current Limitation on Short Circuit



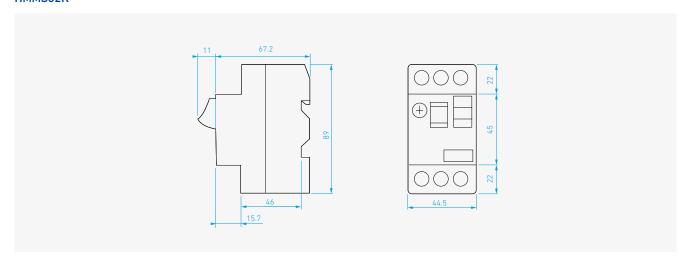
Thermal Limit in kA² in the Magnetic Operating Zone



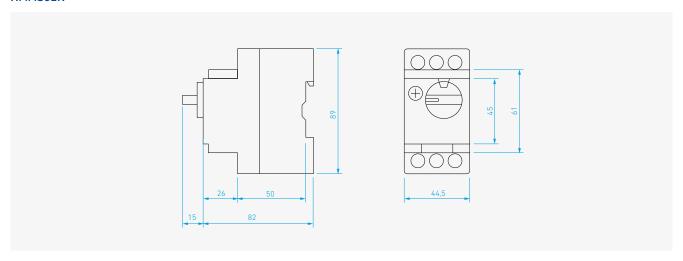
Dimensions

HMMS

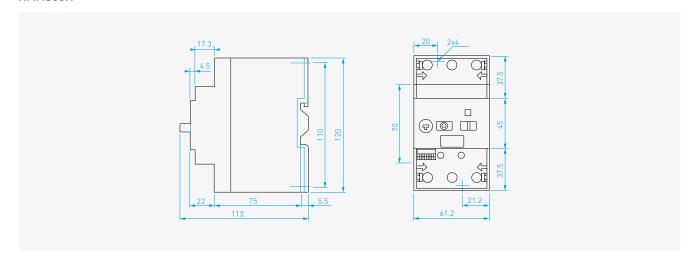
HMMS32K



HMMS32R



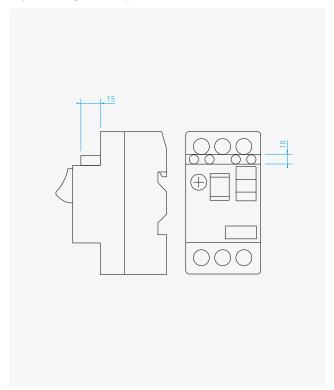
HMMS80K



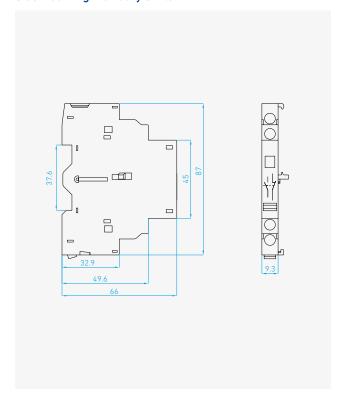
Dimensions

Accessories

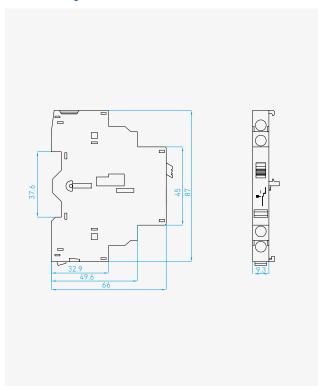
Top Mounting: Auxiliary Swich



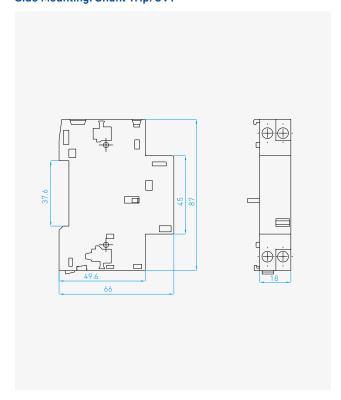
Side Mounting: Auxiliary Switch



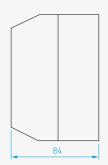
Side Mounting: Alarm Switch

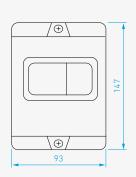


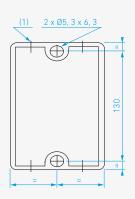
Side Mounting: Shunt Trip/UVT



Enclosure

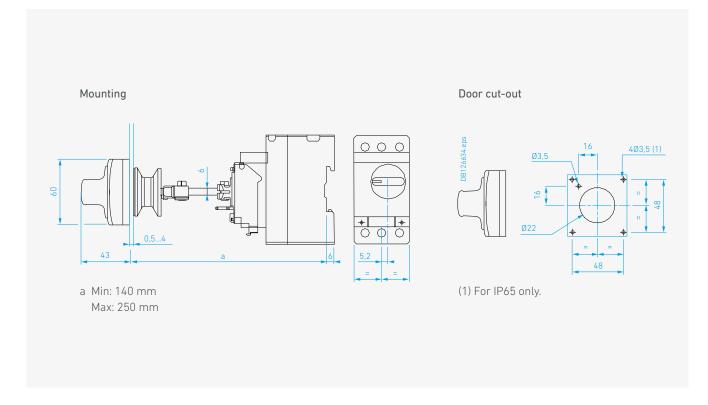






(1) Top face: 2 knock-outs for ISO20/25 cable glands or Pg16 or 16 mm conduits. Bottom face: 2 knock-outs for ISO20/25 cable glands or Pg16 or 16 mm conduits.

Extension Handle



HMMS Ordering Information

Ordering Guidelines

Code	Rated Current Setting Range (A)	Unit (EA)	Handle Type
MMS32K 0P16	0.1-0.16		
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	50	Push button
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		
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	50	Rotary
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		
MMS80K 0063	40-63	14	Push button
MMS80K 0080	56-80		

HSP Surge Protection Device

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Features

SPD Surge Protection Device

Over-voltage surges are a major cuase of electronic equipment failure and business disruption in our society. Over-voltage surge caused by lightning, lasting only some milionths 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
- Systematic SPD management with product monitoring and communication fuctions.
- 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 HSP20 2P	HSP20 3P	HSP20 4P
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Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II
No. of Poles	Pole	2P (1P2W)	3P (3P3W)	4P (3P4W)
Rated Frequency	Hz	50/60	50/60	50/60
Rated Voltage	Un	1P2 W ~275 V	~3P3W 480 V	3P4W 480/277 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	limp (10/350μs)	-	-	-
Maximum Discharge Current	lmax (8/20μs)	40 kA/Mode	40 kA/Mode	40 kA/Mode
Nominal Discharge Current	In (8/20μs)	20 kA/Mode	20 kA/Mode	20 kA/Mode
Short-circuit Current Rating	Isccr	5 kA	5 kA	5 kA
Voltage Protection Level	Up	1.5 kV	1.5 kV	1.5 kV
Response Time	tA	5 ns	5 ns	5 ns
Protection Mode		L-N, N-PE	L-PE	L-N, N-PE
Mounting		36 mm Din rail	36 mm Din rail	36 mm Din rail
Diagnostics Indicator (Green: protected Red: replace		Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-
Types of Earthing Syst	em	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP 20	IP 20	IP 20
Net Weight	kg	0.25	0.38	0.5
Dimenstions (WxHxD)/Pole in mm		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: 10 mm ² PE: 16 mm ²	L, N: 10 mm ² PE: 16 mm ²

Type HSP13 2P HSP13 3P HSP13 4P HSP25 2P HSP25 3P HSP25 4F	Туре	HSP13 2P	HSP13 3P	HSP13 4P	HSP25 2P	HSP25 3P	HSP25 4P
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Standard		IEC 61643-11					
Class		I	1	1	1	1	1
No. of Poles	Pole	2P (1P2W)	3P (3P3W)	4 (3P4W)	2P (1P2W)	3P (3P3W)	4 (3P4W)
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated Voltage	Un	1P2W ~275 V	~3P3W 480 V	3P4W 480/277 V	1P2W ~275 V	~3P3W 480 V	3P4W 480/277 V
Maximum Continuous Operating Voltage	Uc	320 Vac					
Impulse Discharge Current	limp (10/350μs)	L-N: 12.5 kA/Mode, N-PE: 50 kA/Mode	L-PE: 12.5 kA/Mode	L-N: 12.5 kA/Mode, N-PE: 50 kA/Mode	L-N: 25 kA/Mode, N-PE: 50 kA/Mode	L-PE: 25 kA/Mode	L-N: 25 kA/Mode, N-PE: 100 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	-	-	-	-	-	-
Nominal Discharge Current	In (8/20μs)	-	-	-	-	-	-
Short-circuit Current Rating	Isccr	25 kA	25 kA	25 kA	25 kA	50 kA	50 kA
Voltage Protection Level	Up	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	tA	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					
Diagnostics Indicator (LED lamp)	Green: protected Red: replace					
Surge Counter		-	-	-	-	-	-
Types of Earthing Syst	em	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
Net Weight	kg	0.45	0.68	0.9	0.45	0.68	0.9
Dimenstions (WxHxD)/	Pole in mm	72 x 90 x 68	108 x 90 x 68	144 x 90 x 68	72 x 90 x 68	108 x 90 x 68	144 x 90 x 68
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

Selection Table

Din-Rail Type (DC)

Type HSP20 2P HSP20 3P	
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Standard		IEC 61643-11	IEC 61643-11	
Class		II	II	
No. of Poles	Pole	2P	3P	
Maximum Continuous Operating Voltage	Uc	1,000 Vdc	1,000 Vdc	
Nominal Discharge In Current (8/20µs)		20 kA / Mode	20 kA / Mode	
Maximum Discharge Imax Current (8/20μs)		40 kA / Mode	40 kA / Mode	
Voltage Protection Level	Up	2.8 kV	3.8 kV	
Diagnostics Indicator (L	ED lamp)	Green : protected Red : replace	Green : protected Red : replace	
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	
IP Class		IP20	IP20	
Net Weight kg		0.25	0.38	
Dimenstions (WxHxD)/Pole in mm		36 x 90 x 67	54 x 90 x 67	
Wiring Size		≥ 4 mm²	≥ 4 mm ²	

Box Type/Standard

Type HSP40SS HSP40ST HSP40SY HSP80SS HSP80ST HSP80SY	Туре	H5P4U55		HSP4USY	HSP8USS	HSP80ST	HOPBUOT
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Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II	П	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	Un	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	Uc	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac
Impulse Discharge Current	limp (10/350μs)	-	-	-	-	-	-
Maximum Discharge Current	lmax (8/20μs)	40 kA/Mode	40 kA/Mode	40 kA/Mode	80 kA/Mode	80 kA/Mode	80 kA/Mode
Nominal Discharge Current	In (8/20μs)	20 kA/Mode	20 kA/Mode	20 kA/Mode	40 kA/Mode	40 kA/Mode	40 kA/Mode
Voltage Protection Level	Up	2.5 kV	2.5 kV	2.5 kV	3 kV	3 kV	3 kV
Response Time	tA	5 ns	5 ns	5 ns	5 ns	5 ns	5 ns
Protection Mode		L-N, N-PE	L-PE	L-N, N-PE	L-N, N-PE	L-PE	L-N, N-PE
Mounting		Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting	Parallel connection type wall mounting
Diagnostics Indicator (LED lamp)	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		-	-	-	-	-	-
Types of Earthing System		TN	TN	TN	TN	TN	TN
IP Class		IP 20	IP20	IP20	IP 20	IP20	IP20
Net Weight	kg	1.31	1.6	1.6	1.42	2.32	2.32
Dimenstions (WxHxD)/Pole in mm 68 x 110 x 8		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 HSP	P120ST HSP120SY	HSP200SS	HSP200ST	HSP200SY
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			- 9				
Standard		IEC 61643-11					
Class		1	I	I	1	I	1
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	Un	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	Uc	385 Vac					
Impulse Discharge Current	limp (10/350μs)	6.5 kA/Mode	6.5 kA/Mode	6.5 kA/Mode	12.5 kA/Mode	12.5 kA/Mode	12.5 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	120 kA/Mode	120 kA/Mode	120 kA/Mode	200 kA/Mode	200 kA/Mode	200 kA/Mode
Nominal Discharge Current	In (8/20µs)	-	-	-	-	-	-
Voltage Protection Level	Up	2 kV					
Response Time	tA	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					
Diagnostics Indicator (LED lamp)	Green: protected Red: replace					
Surge Counter		-	-	-	-	-	-
Types of Earthing Syst	em	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
Dimenstions (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

Туре	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	1	1	1
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	Un	220 V	380 V	380/220 V	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	Uc	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac	385 Vac
Impulse Discharge Current	limp (10/350µs)	-	-	-	12.5 kA/Mode	12.5 kA/Mode	12.5 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	40 kA/Mode	40 kA/Mode	40 kA/Mode	200 kA/Mode	200 kA/Mode	200 kA/Mode
Nominal Discharge Current	In (8/20μs)	20 kA/Mode	20 kA/Mode	20 kA/Mode	-	-	-
Voltage Protection Level	Up	2.5 kV	2.5 kV	2.5 kV	2 kV	2 kV	2 kV
Response Time	tA	5ns	5ns	5ns	5ns	5ns	5ns
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: protecte Red: replace
Surge Counter		0	0	0	0	0	0
Types of Earthing Syst	em	TN	TN	TN	TN	TN	TN
IP Class		IP20	IP20	IP20	IP20	IP20	IP20
Net Weight	kg	1.41	1.82	1.82	1.98	3.96	3.96
Dimenstions (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 PF: 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

Туре	HSP40HS	HSP40HT	HSP40HY	HSP160HS	HSP160HT
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Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		II	II	II	1	1
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	Un	220 V	380 V	380/220 V	~275 V	480 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	limp (10/350μs)	-	-	-	L-PE: 12.5 kA/Mode L-N: 12.5 kA/Mode N-PE: 50 kA/Mode	L-PE: 12.5 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	40 kA/Mode	40 kA/Mode	40 kA/Mode	-	-
Nominal Discharge Current	In (8/20μs)	20 kA/Mode	20 kA/Mode	20 kA/Mode	-	-
Short-circuit Current Rating	Isccr	5 kA	5 kA	5 kA	25 kA	25 kA
Voltage Protection Level	Up	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	tA	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			
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 Syst	em	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	1.26	1.25	1.25	2.28	2.28
Dimenstions (WxHxD)/	Pole in mm	74 x 116 x 80	125 x 165 x 79	125 x 165 x 79	127 x 165 x 79	162 x 250 x 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		HSP160HY	HSP320HS	HSP320HT	HSP320HY
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Standard		IEC 61643-11	IEC 61643-11	IEC 61643-11	IEC 61643-11
Class		I	1	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	Un	480/277 V	~275 V	480 V	480/277 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	limp (10/350μs)	L-PE: 12.5 kA/Mode L-N: 12.5 kA/Mode N-PE: 50 kA/Mode	L-PE: 25 kA/Mode L-N: 25 kA/Mode N-PE: 100 kA/Mode	L-PE: 25 kA/Mode	L-PE: 25 kA/Mode L-N: 25 kA/Mode N-PE: 100 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	-	-	-	-
Nominal Discharge Current	In (8/20μs)	-	-	-	-
Short-circuit Current Rating	Isccr	25 kA	25 kA	50 kA	50 kA
Voltage Protection Level	Up	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	tA	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 Syst	em	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
Dimenstions (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	
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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	Un	220 V	380 V	380/220 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	limp (10/350μs)	-	-	-
Maximum Discharge Current	lmax (8/20μs)	40 kA/Mode	40 kA/Mode	40 kA/Mode
Nominal Discharge Current	In (8/20μs)	20 kA/Mode	20 kA/Mode	20 kA/Mode
Short-circuit Current Rating	Isccr	5 kA	5 kA	5 kA
Voltage Protection Level	Up	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	tA	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 (I	_ED lamp)	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		0	0	0
Types of Earthing Syste	em	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20
Net Weight	kg	1.36	1.36	1.36
Dimenstions (WxHxD)/	Pole in mm	125 x 165 x 79	125 x 165 x 79	125 x 165 x 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

Туре	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	Un	~275 V	480 V	480/277 V
Maximum Continuous Operating Voltage	Uc	320 Vac	320 Vac	320 Vac
Impulse Discharge Current	limp (10/350μs)	L-PE: 12.5 kA/Mode L-N: 12.5 kA/Mode N-PE: 50 kA/Mode	L-PE: 12.5 kA/Mode	L-PE: 12.5 kA/Mode L-N: 12.5 kA/Mode N-PE: 50 kA/Mode
Maximum Discharge Current	lmax (8/20μs)	-	-	-
Nominal Discharge Current	In (8/20µs)	-	-	-
Short-circuit Current Rating	Isccr	25 kA	25 kA	25 kA
Voltage Protection Level	Up	L-PE: 1.5 kV L-N: 1.5 kV N-PE: 2.0 kV	L-PE: 1.5 kV	L-PE: 1.5 kV L-N: 1.5 kV N-PE: 2.0 kV
Response Time	tA	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 (L	ED lamp)	Green: protected Red: replace	Green: protected Red: replace	Green: protected Red: replace
Surge Counter		0	0	0
Types of Earthing Syste	m	TN/TT/IT	TN/TT/IT	TN/TT/IT
IP Class		IP20	IP20	IP20
Net Weight	kg	1.34	3.02	3.02
Dimenstions (WxHxD)/F	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





Class Table

	Model		Class I	Class II
		HSP20		•
Discoult Torre	AC	HSP13	•	
Din-rail Type		HSP25	•	
	DC	HSP20 (DC)		•
	Standard	HSP40S		•
		HSP80S		•
		HSP120S	•	
Box Type		HSP200S	•	
		HSP40H		•
	Deluxe	HSP160H	•	
		HSP320H	•	

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

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

Definition of SPD

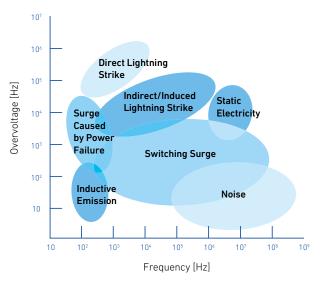


Fig 1. Various Electrical hazards
Lightning SURGE & Switching SURGE

Surge

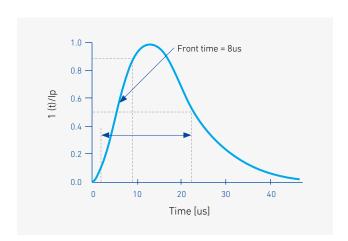
Transient Overvoltage due to Lightning, Utility grid switching, Switching external/internal inductive or capacitive loads and other sources travel on power line conductors throughout the electrical distribution system, causing system operating problems and equipment downtime.

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 $\mu \mathrm{S}$

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 (limp), $10/350 \mu \mathrm{S}$

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 | 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: Perfomance and test methods

Table 1. Type I, II, III Test

Test Type	Parameters	Test Waveforms	
Type I	I _{imp}	10/350 μs	
Type II	I _n	8/20 µs	
Type III	U _{oc}	1.2/50 μs, 8/20 μs	

Structure According to Different Points of Strike of Lightning

IEC 62305-4

S1

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



Lightning strike to the earth near the building or structure



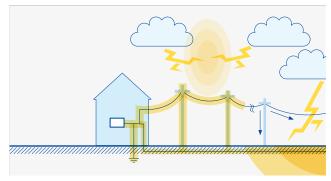
S3

Direct lightning strike to the entering



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)

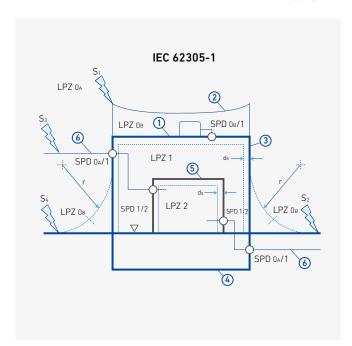
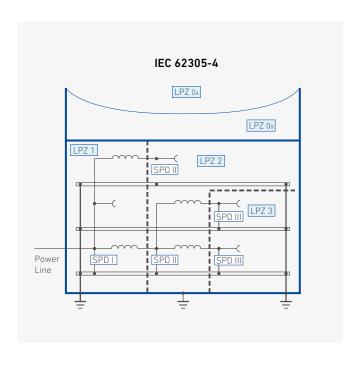


Table 1. Sources of Damage to a Structure According to the Point of Strike

S1	Flashes to the structure
S2	Flashes near the structure
53	Flashes to the lines connected the structure
54	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 | SPD $limp 10/350 \mu s$ 12.5 kA / 25 kA (L-N mode)

50 kA / 100 kA (N-PE mode)

In $8/20\mu s$ 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 || SPD $I_n 8/20 \mu s 20 kA / 40 kA / 80 kA /$

LPZ 2/LPZ 3

Type | | | SPD $U_{oc} 1.2/50 \mu s$ (8/20us)

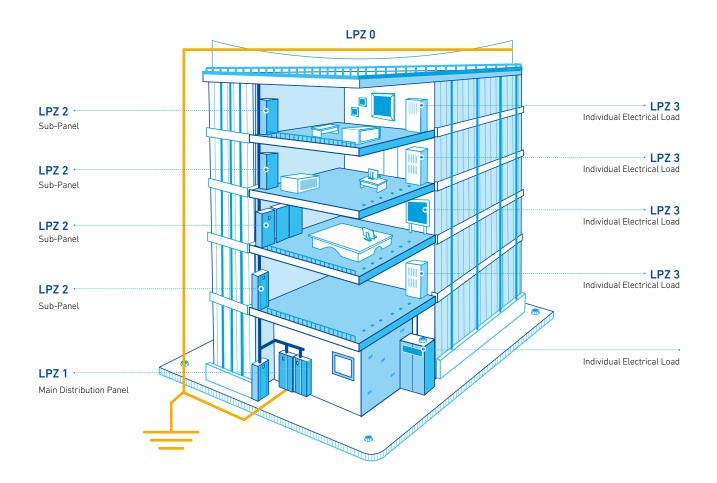
6~kV (3 kA) / 10 kV (5 kA) / 20 kV (10 kA)

The SPDs are installed in sequence.

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

Technical Data

Ligthning 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 μs	Type1 SPD current per mode (kA) 10/350 μs
ı	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

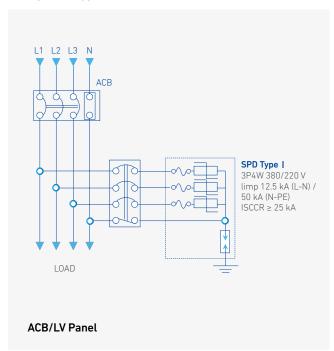
LPL (lightning protection level)

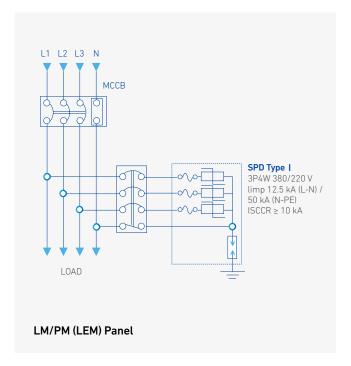
Number related to a set of lightning current parameter values relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning.

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

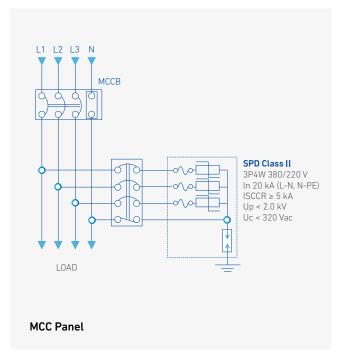
Example of SPD Installation

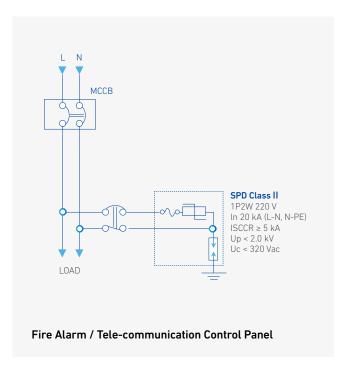
Examples of Type | SPD installations





Examples of Type II SPD installations

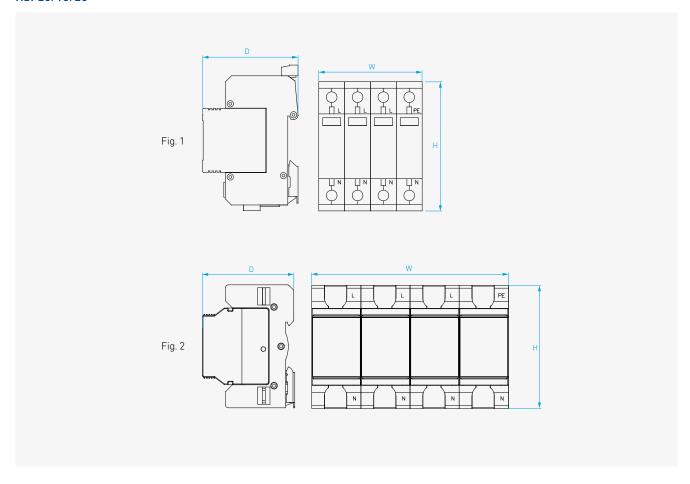




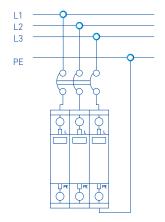
Dimension & Diagram

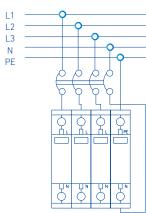
Din-Rail Type (AC)

HSP20/13/25



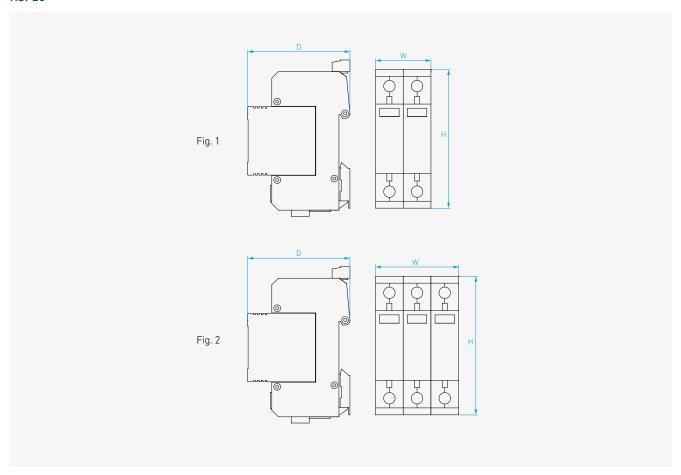
	HSP20 (Fig. 1)			HSP13/25 (Fig. 2)		
	W	Н	D	W	Н	D
2P	36	90	66.5	72	90	68
3P	54	90	66.5	108	90	68
4P	72	90	66.5	144	90	68



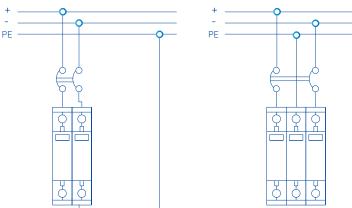


DIn-Rail Type (DC)

HSP20



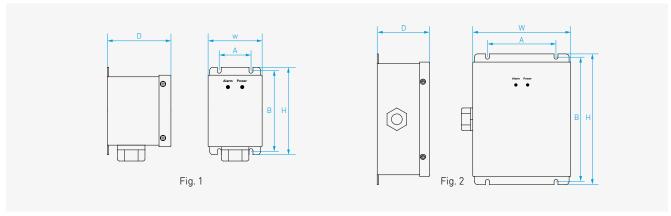
	HSP20 DC Type					
	W	Н	D	Note		
2P	36	90	66.5	Fig. 1		
3P	54	90	66.5	Fig. 2		



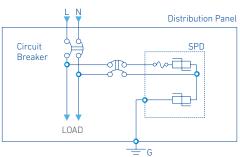
Dimension & Diagram

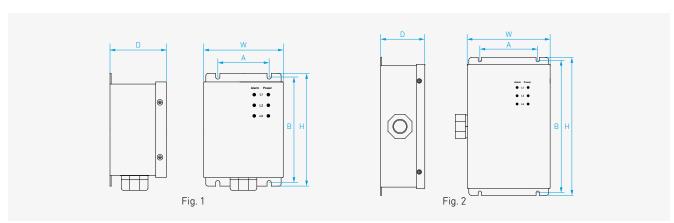
Standard Box Type

HSP40/80/120/200

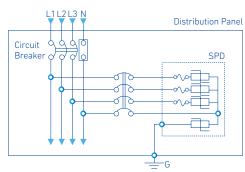


	S (2W + G)							
	W	Α	В	Н	D	Note		
HSP40	68	40	100	110	80	Pig. 1		
HSP80	95	70	127	137	80	Pig. 1		
HSP120	160	100	210	230	85	Pig. 1		
HSP200	168	105	190	200	80	Pig. 2		



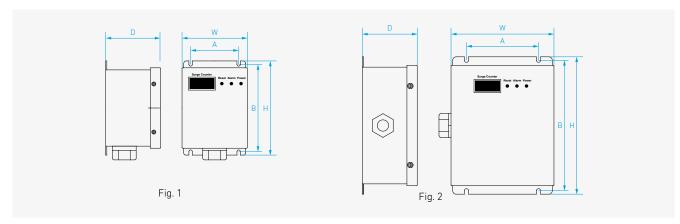


	T (3W + G), Y (4W + G)							
	W	Α	В	Н	D	Note		
HSP40	112	73	150	160	80	Pig. 1		
HSP80	130	90	180	190	80	Pig. 1		
HSP120	160	100	210	230	88	Pig. 1		
HSP200	172	105	240	250	80	Pig. 2		

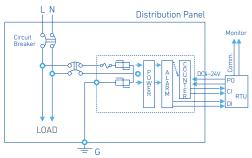


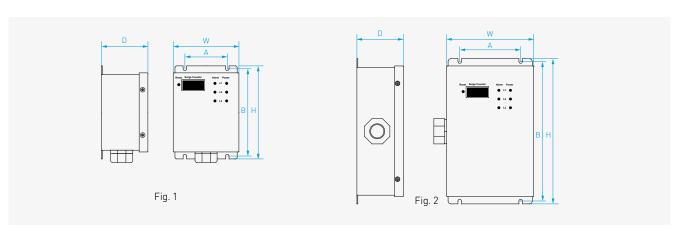
Standard Box Type + Counter

HSP40/200

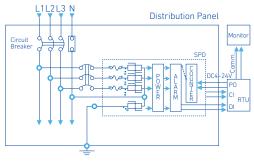


	S (2W + G)							
	W	Α	В	Н	D	Note		
HSP40	95	70	127	146	95	Pig. 1		
HSP200	167.4	105	190	200	95	Pig. 2		





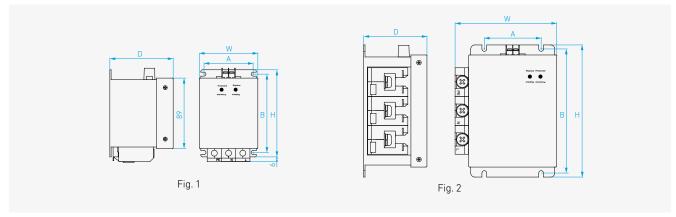
	T (3W + G), Y (4W + G)							
	W	Α	В	Н	D	Note		
HSP40	112	73	150	160	95	Pig. 1		
HSP200	172	105	240	250	95	Pig. 2		



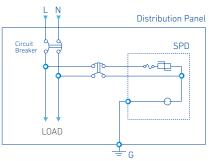
Dimension & Diagram

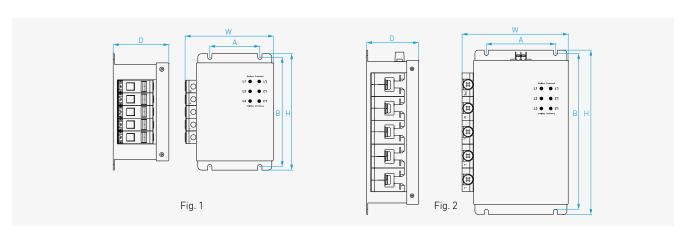
Deluxe Box Type

HSP40/160/320

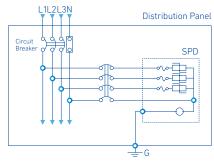


	S (2W+G)							
	W	Α	В	н	D	Note		
HSP40	74	62	99	110	80	Pig. 1		
HSP160	127	71	155	165	79	Pig. 2		
HSP320	127	71	155	165	79	Pig. 2		



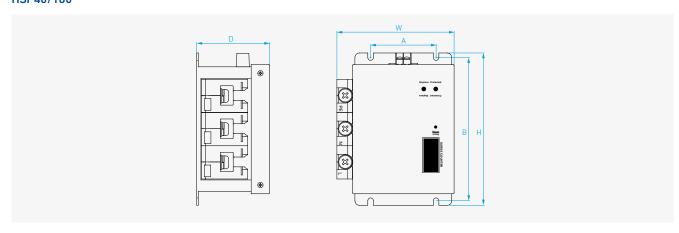


	T (3W+G), Y (4W+G)							
	W	Α	В	Н	D	Note		
HSP40	125	71	155	165	79	Pig. 1		
HSP160	161.5	105	240	250	79	Pig. 2		
HSP320	161.5	105	240	250	79	Pig. 2		

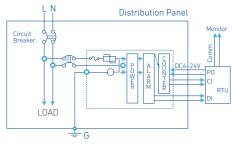


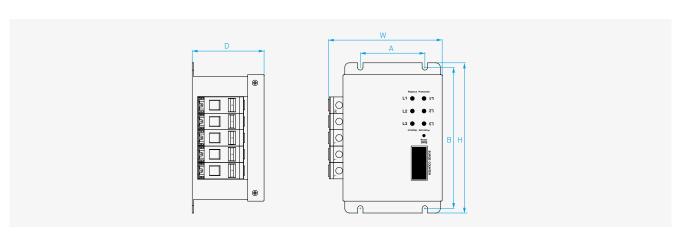
Deluxe Box Type + Counter

HSP40/160

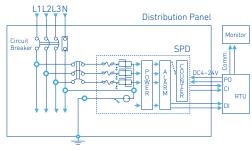


	S (2W + G)					
	W	Α	В	н	D	
HSP40	125	71	155	165	79	
HSP160	125	71	155	165	79	



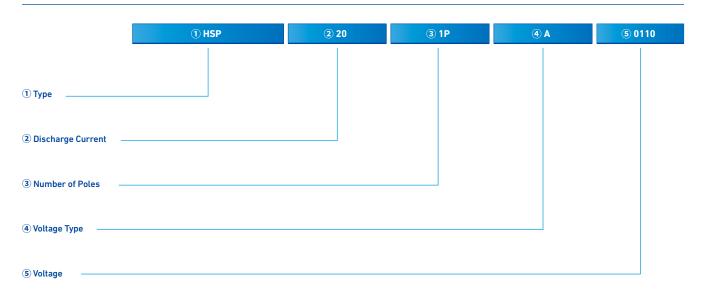


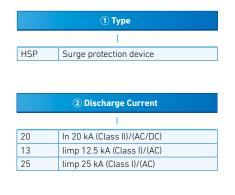
	T (3W + G), Y (4W + G)					
	W	A	В	Н	D	
HSP40	125	71	155	165	79	
HSP160	162	105	240	250	79	



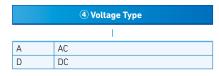
SPD Ordering Information

DIN Rail Type





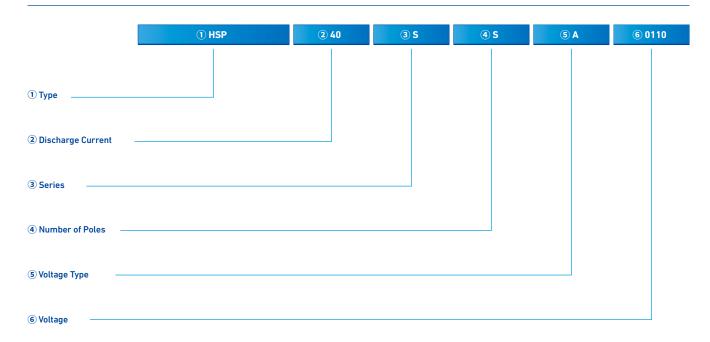
3 Number of Poles				
1P	1 Pole (AC)			
2P	2 Pole (AC/DC)			
3P	3 Pole (AC/DC)			
4P	3 Pole + N (AC)			



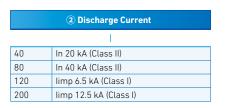
⑤ Voltage				
	I			
0110	110 VAC			
0220	220 VAC			
0380	380 VAC			
0440	440 VAC			
1000	1,000 VDC			

- voltage may be transferred between L-G.

Standard BOX Type









4 Number of Poles						
T.						
S	2 W + G					
T	3 W + G					
Υ	4 W + G					

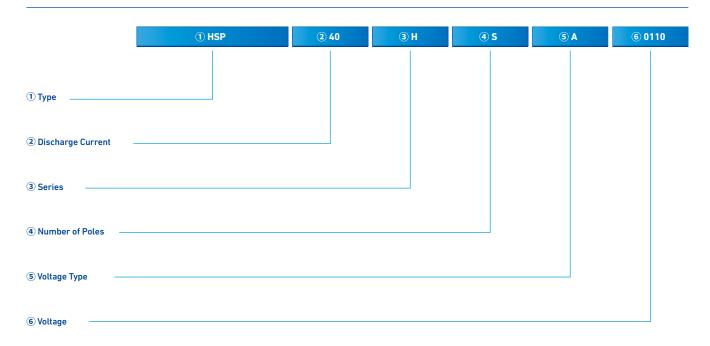
⑤ Voltage Type							
А	AC						

© Voltage						
T.						
0110	110 VAC					
0220	220 VAC					
0380	380 VAC					
0440	440 VAC					

※ Counter: HSP40, HSP200 only

SPD Ordering Information

Deluxe BOX Type





② Discharge Current						
I						
40	In 20 kA (Class II)					
160	limp 12.5 kA (Class I)					
320	limp 25 kA (Class I)					

3 Series					
	T.				
Н	Deluxe type				
CH	Counter + deluxe type				
СН	Counter + deluxe type				

• Number of Poles						
I						
S	2 W + G					
Т	3 W + G					
Υ	4 W + G					

⑤ Voltage Type						
		I				
Α	AC					

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 Order Information 158

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

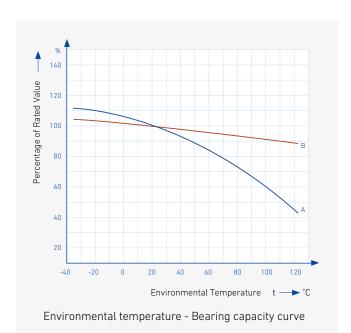
Height above sea level: not more than 2,000 m Atmospheric condition, humidity: the installation site's relative air humidity does not exceed 50 % while the maximum temperature is +40 °C, And it can allow to have higher relative humidity under lower temperature. The average temperature does not exceed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

In = 63 A / 0.78 = 80.77 A

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

Note: A: (qG) 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 anbient temperature around the fuse link.

Rated Breaking Capacity

Reted 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 form damages by electric power.

Fuse Supporter (Fuse Base)

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

Factors To Be Considered For Selection Of Fuses

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

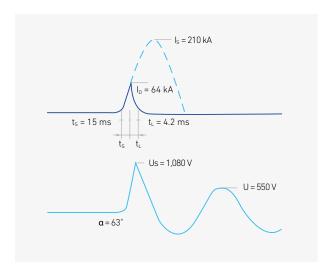
Threshold Value Of aM Fuses

Gate limit of "aM" type fuse links:

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

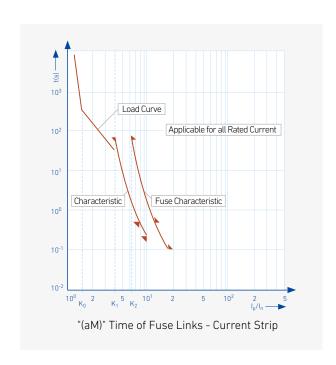
Note: Ip - Perspective current

In - Rate current of fuse link



Wave curve of current limiting characteristics of fuse link Where :

- I_s Peak value of maximum asymmetric current at 100 kA perspective current Ip (The impulse factor of a short circuit should be 1.5)
- ${\rm I}_{\rm D}$ The actual current at breaking (limiting current)
- U_s Arc voltage
- U Voltage
- t_s Melting time
- t_I Arcing time
- α Burning corner of arc after zero voltage



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 multiphase 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

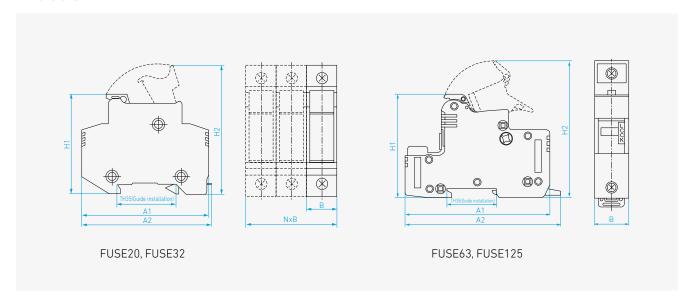
After the plastic-injected case is equipped with contacts and fuse links, the bases are formed by welding or riveting both capable of being multi-phase structured.

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	Туре	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 distrubuting 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

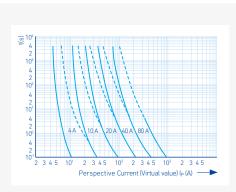
Design Features

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.

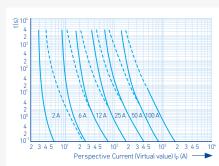
Specification

Figure	Dimension (mm)	Rated Voltage	Rated Current		L	ØD ±0.1	Weight (g)
	(11111)	(V)	(A)	mm			
an	8 x 32	500	0.5, 1, 2, 3, 4, 5, 6, 10, 12, 16, 20	31.	5±0.5	8.5	4.4
PATUNCAL PASIS TOTAL patintal members CE	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,	51	+0.6	14.3	20.5
			40, 50, 63		-1.0		
			10, 12, 16, 20, 25, 32,		+0.1		
	22 x 58	500/690	40, 50, 63, 80, 100, 125	58	-2.0	22.2	58

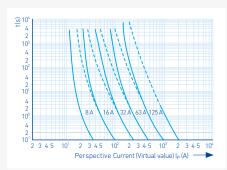
Characteristics Curve



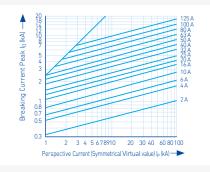
Time-current Range of "gG" Fuse Links



Time-current Range of "gG" Fuse Links



Time-current Range of "gG" Fuse Links



Breaking Current Characteristics Curve

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 qG), 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

Variable 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

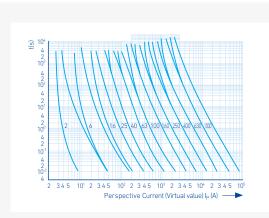
Design Features

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

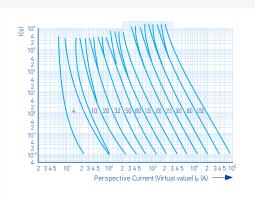
The product is featured with good heat sinking, hegh mechanic density, reliable connection and simple operation.

It is available for all NT(NH)00C-NT(NH)4 fuses.

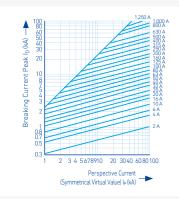
Characteristics Curve



Time-current Range of "gG" Fuse Links



Time-current Range of "gG" Fuse Links



Breaking Current Characteristics Curve of "gG" Fuse Links

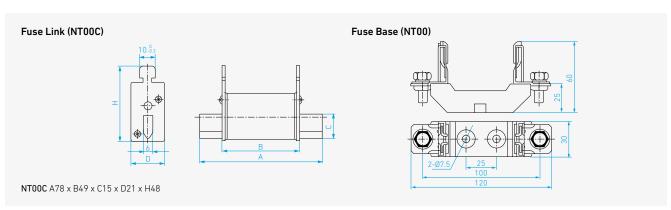
Specification

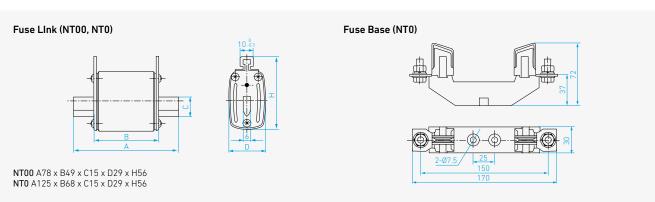
			Fuse Link	(Fuse Base		
Figure	Туре	Rated Current (A)	Rated Voltage(V)	Rated Power Loss (W)	Weight (kg)	Туре	Rated Current (A)	Weight (kg)
		2		0.41				
		4		0.62				
		6		0.81				
		10		1.08				
-		16		1.6				
A.P. A.		20		1.81				
W. Par	FL NT00C	25	500, 690	2.31	0.12	FB NT00 0160	160	0.19
30		32		3.07				
NT00C		40		4.05				
NTOOC		50		4.25				
		63		4.7				
		80		5.7				
		100		7				
		4		0.67		FB NT00 0160	160	0.19
		6		0.89				
	FL NT00	10	500, 690	1.14	0.17			
		16		1.65				
		20		1.94				
20.40		25		2.5				
23		32		3.32				
War Pay		36		3.56				
50 E		40		4.3				
NT00		50		4.5				
		63		4.6				
		80		6				
		100		7.3				
		125	500	7.6				
		160		9.6				
		6		1.03				
		10		1.42				
		16		2.45				
		20		2.36				
48		25		2.7				
W.		32	500, 690	3.74				
W. 8	FL NT0	40		4.7	0.25	FB NT0 0160	160	0.29
2		50		5.5				
NT0		63		6.9				
		80		7.6				
		100		8.9				
		125	500	10.1				
		160		15.2				

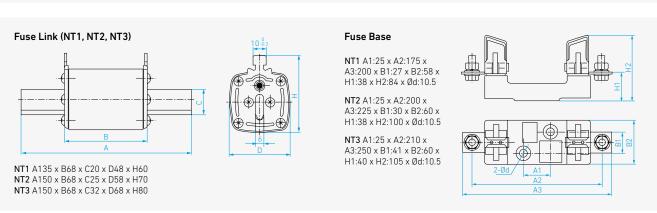
Specification

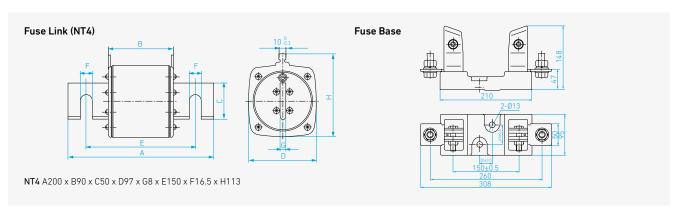
			Fuse Lini	k			Fuse Base	
Figure	Туре	Rated Current (A)	Rated voltage(V)	Rated Power Loss (W)	Weight (kg)	Туре	Rated Current (A)	Weight (kg)
		32		2.1				
		40		3.3				
		50		4.5				
A. C.		63		5.2				
120		80	500, 690	6.2				
10 - 1 E	FL NT1	100		7.5	0.45	FB NT1 0250	250	0.55
4		125		10.2				
NT1		160		13				
		200		15.2				
		224	500	16.8				
		250		18.3				
		80		6.1				
		100	500, 690	7.3	0.65			
		125		9				
1200	FL NT2	160		11.5				0.77
N. S.		200		15				
and the		224		16.6		FB NT2 0400	400	
12 X		250		18.4				
NT2		300		21				
		315		19.2				
		355		24.5				
		400		26				
		160		14.8				
		200		15.9			630	0.96
		224		17.2				
4		250		18.8				
- 23		300	500, 690	20.5				
(6) 3	FL NT3	315		21.7	0.88	FB NT3 0630		
		355		22.7				
NT3		400		26.8				
		425		28.9				
		500	500	32				
		630	500	40.3				
/		500		37				
		630		48				
A Topic	FL NT4	700	500	56	2.47	FB NT4 1250	1,250	3.4
1 To	I L IVI 4	800	500	62	2.47	1011141200	1,200	3.4
NT4		1000		68				
1114		1250		75				

Dimension









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

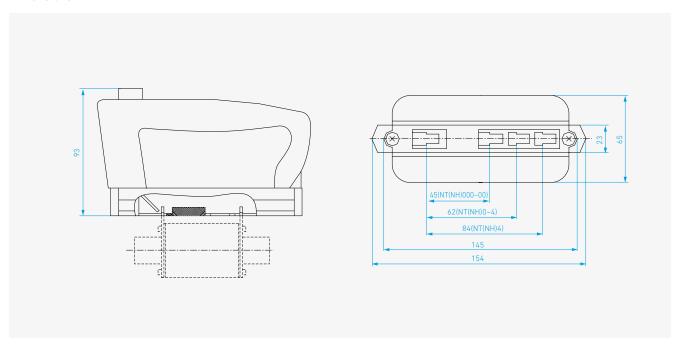
The fuse carrier is made up of catching holes, push button, guard board and handle.

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.



Туре	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 $690\,\mathrm{V}$
- 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.







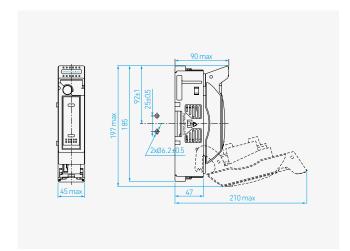
Specification

Туре	Assorted Fuse	Poles	Rated Current (A)
HA1P/160	NT00		4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HA1P/250	NT1	1P —	32, 40, 50, 63, 80, 100, 125, 160, 200, 224, 250
HA1P/400	NT2	IP	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	3F	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		4, 6, 10, 16, 20, 25, 32, 35, 40, 50, 63, 80, 100, 125, 160
HA4P/250	NT1	4P	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

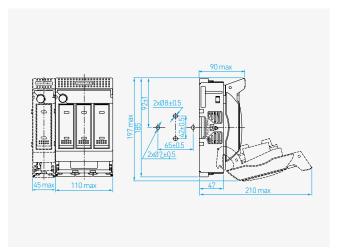
Dimension

Fuse Switch

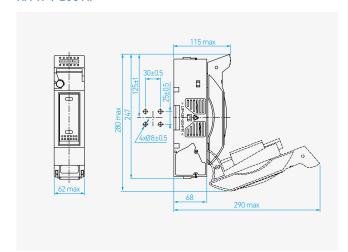
HA 1P / 160 AF



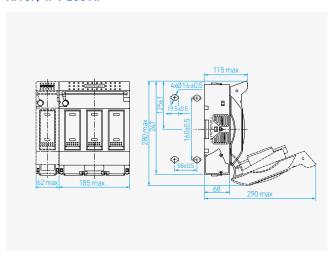
HA 3P, 4P / 160 AF



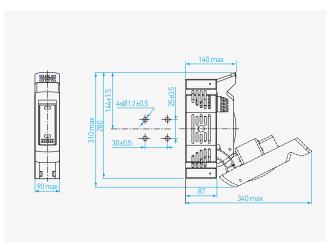
HA 1P / 250 AF



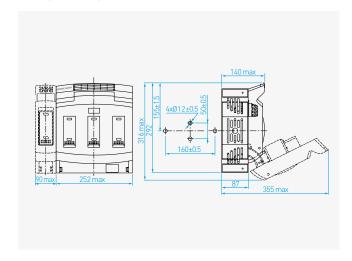
HA 3P, 4P / 250 AF



HA 1P / 400, 630 AF



HA 3P, 4P / 400, 630AF



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)
	690	100	AC21B	00, 00C	50
HA1P/160	500	125	AC22B	00	100
	400	160	AC23B	00	100
	690	100	AC21B	00, 00C	50
HA3P/160 HA4P/160	500	125	AC22B	00	100
	400	160	AC23B	00	100
	690	160	AC21B	1	50
HA1P/250	500	200	AC22B	1	100
	400	250	AC23B	1	100
	690	160	AC21B	1	50
HA3P/250	500	200	AC22B	1	100
	400	250	AC23B	1	100
	690	250	AC21B	2	50
HA1P/400	500	315	AC22B	2	100
	400	400	AC23B	2	100
	690	250	AC21B	2	50
HA3P/400	500	315	AC22B	2	100
	400	400	AC23B	2	100
	690	400	AC21B	3	50
HA1P/630	500	500	AC22B	3	100
	400	630	AC23B	3	100
	690	400	AC21B	3	50
HA3P/630	500	500	AC22B	3	100
	400	630	AC23B	3	100

Rated Open and Breaking Capacity of the Switch

			Rated Open and Breaking Capacity					
Rated Working Voltage (V)	Rated Working Current (A)	Applications	pplications Connecting		Breaking			
			I/Ie	U/Ue	cosø	lc/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
400	> 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

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
- Reted working current up to 630 A
- Rated limiting short-circuit is 100 kA at the voltage of 500 $\rm V$ and 50 kA at 690 V
- Rated short-time withstand current (Valid): 20 lth/1 s
- Compliant with IEC/EN 60947-3

Design Features

The switch is made up of two parts: the seat and the cover(meltloading 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





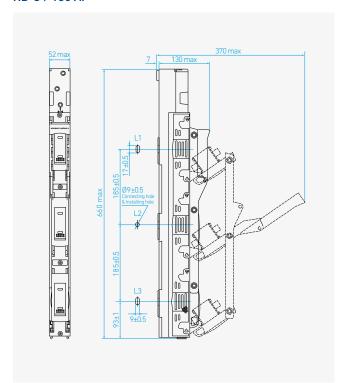
Specification

Туре	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

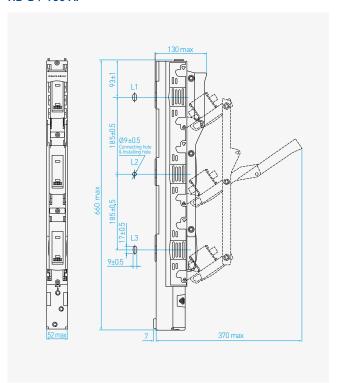
Dimension

Fuse Switch

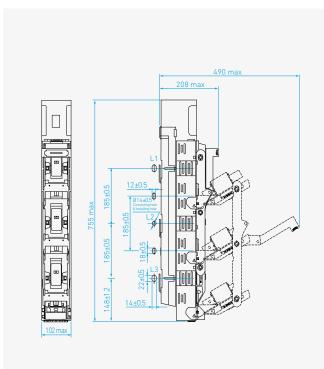
HB-U / 160 AF



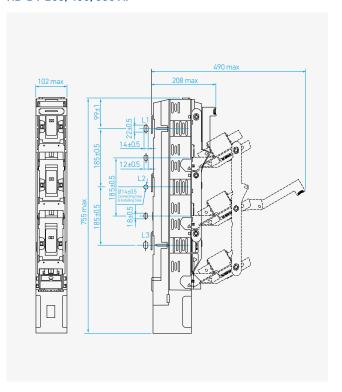
HB-D / 160 AF



HB-U / 250, 400, 630 AF



HB-D / 250, 400, 630 AF



5. FUSE Switch

HC Type





Specification

Туре	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)
	690	80	AC21B		50
	500	100	AC22B	00C	100
UD UC/1/0	400	100	AC23B		100
HB, HC/160	690	100	AC21B		50
	500	125	AC22B	00	100
	400	160	AC23B		100
	690	160	AC21B		50
	690	200	AC21B		50
HB, HC/400	690	250	AC21B	1, 2	50
	500	315	AC22B		100
	400	400	AC23B		100
	690	400	AC21B		50
HB, HC/630	500	500	AC22B	3	100
	400	630	AC23B		100

Rated Open and Breaking Capacity of the Switch

			Rated Open and Breaking Capacity					
Rated Working Voltage (V)	Rated Working Current (A)	Applications	Applications Connecting			Breaking		
rottage (r)	our one (A)		I/le	U/Ue	cosø	lc/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
/00	≤ 100	AC23B	10	1.05	0.45	8	1.05	0.45
400	> 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

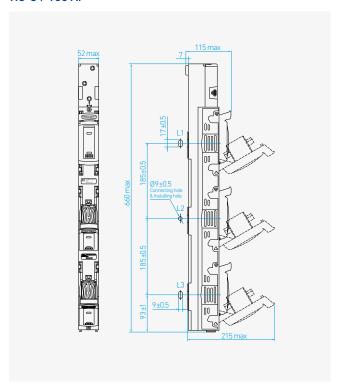
Ue - rated working voltage

Ur - recovery current

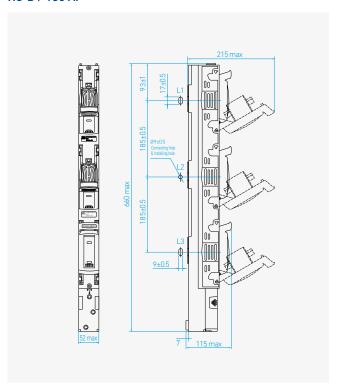
Dimension

Fuse Switch

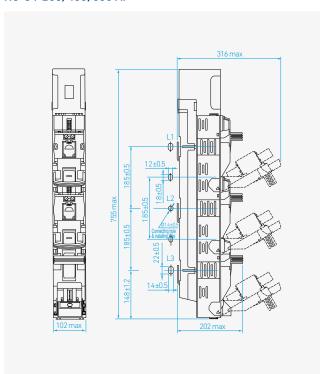
HC-U / 160 AF



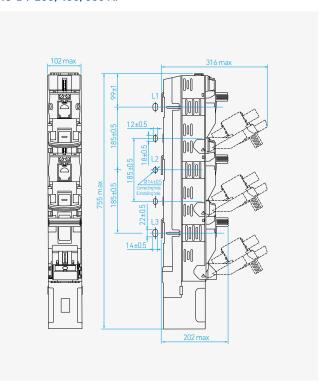
HC-D / 160 AF



HC-U / 250, 400, 630 AF



HC-D / 250, 400, 630 AF



FUSE Ordering Information

Fuse Link

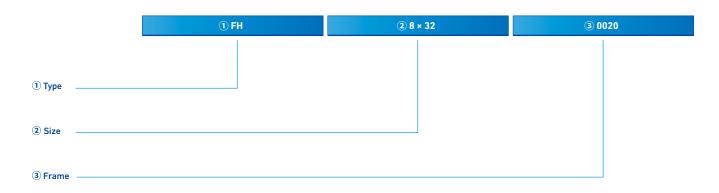




	② Size
	I
8 x 32	00P5 ~ 0016 range
10 x 38	00P5 ~ 0032 range
14 x 51	0002 ~ 0063 range
22 x 58	0010 ~ 0125 range
NT00C	0002 ~ 0100 range (NT type)
NT00	0004 ~ 0160 range (NT type)
NT0	0006 ~ 0160 range (NT type)
NT1	0032 ~ 0250 range (NT type)
NT2	0080 ~ 0400 range (NT type)
NT3	0160 ~ 0630 range (NT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

③ Rated Current				
	T.			
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			
0800	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	
		1	
FH	1 Pole		
FH2	2 Pole		
FH3	3 Pole		
FH4	4 Pole		

② Size			
	I		
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			
	I		
0020	20 AF		
0032	32 AF		
0063	63 AF		
0125	125 AF		

Fuse Base





② Size			
	1		
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			
I			
0160	160 AF		
0250	250 AF		
0400	400 AF		
0630	630 AF		
1250	1,250 AF		

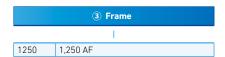
FUSE Ordering Information

Fuse Carrier



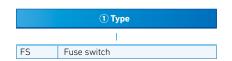


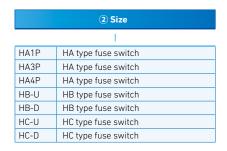




Fuse Switch







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

Handling and Maintenance Inspection

Storage and Transportation

Storage Precaution

| Ambient temperature | -20~60 °C

| Altitude | Below 1,000 m above sea level

| Relative humidity | Within 45 %~85 %

The surrounding environment may affect the insulation function and endurance of the molded case 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



. 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 -20 °C~+60 °C.

Transportation Precautions



- 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 45~85 %
- 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 MCCB. 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

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	Force (In Case of 3 Phase Short Circuit) N (kgf)		
() Power Factor	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
- \bullet When the insulation resistance is measured using a 500 V insulation-resistance tester, it must be above 5 M Ω

Withstand voltage

Mair	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)
Ui ≤ 300 V	2,000 V for 1 min	Uis ≤ 60 V	1,000 V for 1 min
300 < Ui ≤ 600 V	2,500 V for 1 min	60 V < Uis ≤ 600 V	2-Uis 1,000 V (min. 1,500 V) for 1 min

^{*} Based on the abovementioned table, do not conduct withstand voltage test above it.

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

¹⁾ Between terminal and grounding

Regular Inspection Item

Inspection Item	Procedure	Countermeasure	
Tightening of Terminal Screw	Inspect tightening of terminal screw, conductor connecting screw	Tighten according to the specified torque Ensure that it is not tightened excessively	
Dust and Foreign Substance	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	Remove dust, foreign substance and others using cloth with clean surface types (Do not use thinner or detergent)	
Damage in Mold Case	Check damage or crack on the circuit breaker's cover and base	Replace circuit breaker	
Arc Exhaust Hole	Check pollution in the arc exhaust hole	If there are burns or excessive pollution due to melted metal particles and others, replace the circuit breaker	
Switch Operation	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	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	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	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	Separate all conductors connected to the circuit breaker and measure the insulation resistance between the poles, terminals and groundings	• If the insulation resistance is not more than 5 M Ω , 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 $5~M\Omega$, 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	
	Heating at terminal part	Loose terminal screw, conductor connecting screw	Re-tighten according to the specified torque	
	ricating at terminat part	Increased resistance of contact	Replace circuit breaker	
	Damage in insulation	Loose terminal screw, conductor connecting screw		
bnormal eating	material at terminal part	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	Replace circuit breaker	
		Increased resistance of contact		
	Abnormal heating in the circuit breaker's external case	Loosening at the internal connection part	Replace circuit breaker	
		Increased current density due to disconnection		
		Big consumption at contact	Replace circuit breaker	
Defect in Current Flow	Abnormal voltage at load side	Foreign substance between contacts		
		Fusing at conductive part (excessive opening/closing and corrosion due to corrosive gas)		
	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	
Ooes not		Demagnetized state of under-voltage trip device	Apply specified voltage	
unction		Bimetal has not been cooled sufficiently	Reset after sufficient cooling	
	RESET does not	Corrosion or deformation of bimetal		
	function	Abnormality in mechanism	Dealers signiff baseling	
		Can't be used due to excessive opening/closing	Replace circuit breaker	
		Damage in mechanism due to excessive breaking current		

Type of Abnormality	Phenomenon	Assumed Cause	Action to be Taken	
		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	
	Trip under rated current	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	
Frequent Breaking		Trip in running inrush current		
		• Trip during switching at Y-∆ operation	Change the instantaneous trip current setting or replace with circuit breaker with bigger rated current	
	Trip in running current	Trip during switching in reversible operation	carrent	
	imp in running current	Trip in big running current	Replace with circuit breaker with bigger rated current	
		Trip in long running current		
		Short circuit between motor layer Wrong connection of SHT/UVT's operational circuit	Repair or replace motor Inspect wiring	
		When current limiting breaking of upper fuse or cooperation with upper circuit breaker is low	Review cooperation again	
Overcurrent does not Function	Does not function above specified operational current	When the ambient temperature is significantly low	Check the compensating curren	
		Inappropriate rated current	Check the rated current	
	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	
Abnormality in		Defect in mechanism	Replace accessory	
Accessory	Abnormal operation of under-voltage trip device (UVT)	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

Туре		Approvals		Certificate	
Certificate		Saftety Certification	IEC	IEC	
Mark			(€	DEKRA	
Testing Institute		ктс	CE	KEMA	
Certification Region		Korea	Europe	Netherlands	
	HGD63N/H (Deluxe type)		•	•	
	HGD125 (Deluxe type)		•	•	
	HGD32NS (Standard type)		•		
МСВ	HGD63E/S (Standard type)		•	•	
	HGD63M/P (Standard type)	•	•	•	
	HGD100S (Standard type)	•	•	•	
	HRC63/100 (Deluxe type)		•	•	
RCCB	HRC63S/100S (Standard type)	•	•	•	
	HR063S (Standard type)		•	•	
	HR063M/P (Standard type)		•	•	
RCBO	HR040L/T/HT (Standard type)		•	•	
	HR040M/ML/P/PL (Standard type)		•	•	
	HSD125 (Deluxe type)		•	•	
MSD	HSD100S (Standard type)		•	•	
HBD	HBD51h/51hD HBD52h/52hD HBD53h/53hD	•	•	•	
	HBD51/51D HBD52/52D HBD53/53D	•	•	•	



A HYUNDAI ELECTRIC

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Branch Offices			
Atlanta	6100 Atlantic Boulevard, 2nd FL., Norcross, GA30071, U.S.A	Tel: +1-678-823-7839	Fax: +1-678-823-7553
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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