

# HG Modular Devices

HGD / HRC / HSD / HEC / HIC

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پیمان تابلو

صفر تا صد تابلو برق

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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.



بیمارین تابلو  
صفر تا صد تابلو برق

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.



Smart Ship Solution

Next-generation solution service that supports the vessel's total monitoring control, safety, efficient operation and management of energy by linking all systems and devices on board into one through a ICT platform.



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.



Marine

Automation System

- SCADA system engineering, establishment and commissioning in nationwide network unit
- Equipped with the technology for establishing Unix, Windows, Linus and various platform O.S.-based systems
- Seamless connection between the central control system, network and site devices and guaranteed performance with outstanding system
- Capable of meeting various customized demands based on the original technologies in possession

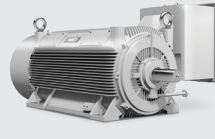


Electrical Marine Equipment

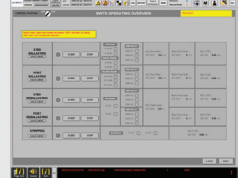
- Production of high quality marine devices satisfying the regulations and standards of key marine associations (LR5, ABS, DNV, GL, BV, NK etc.) and world's renowned institutes
- High quality safety secured through the latest equipment and stringent quality control system
- Realization of optimal high efficiency by converging SWGR, Generator, Motor, Telecom, Automation and others



Marine Switchgear



Marine Motor



ACONIS

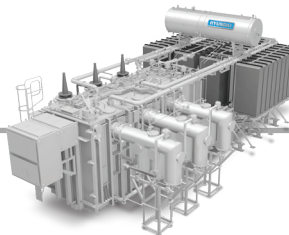
Generation

Power Plants

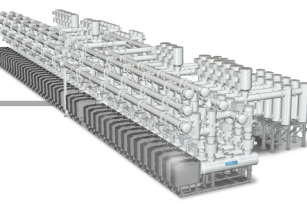
Utility

Primary Substation

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



Power Transformer



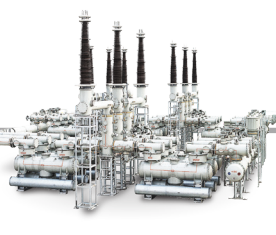
Gas Insulated Switchgear

Transmission

High Voltage (110~400 kV)

Secondary Substation

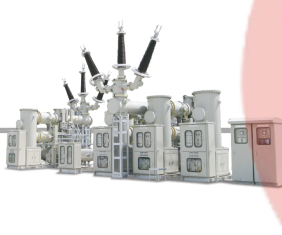
- Can be installed in spaces smaller than the open type of substation by using SF6 gas with outstanding insulation and arc extinguishing characteristics
- Secures advanced reliability by producing products that are resistant to external environment and climate effects through the sealing at the charge 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



Power Transformer



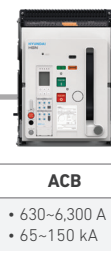
Gas Insulated Switchgear

Distribution

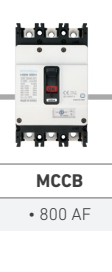
Below 1,000 V



VCB



ACB



MCCB



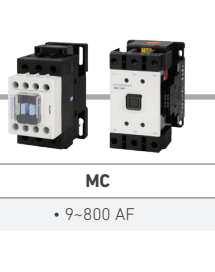
ELCB



MCCB



MCCB



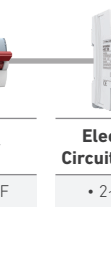
MC



MCB



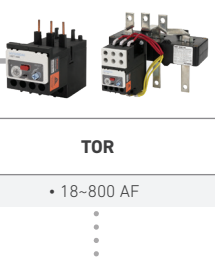
RCCB/RCSO



Isolator



Electronic Circuit Breaker



Installation Contactor



TOR



Fuse Links & Switches



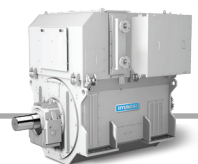
SPD



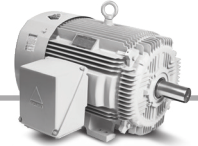
HGMAP



EOCR



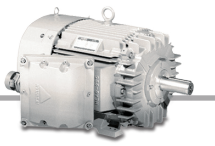
Medium & High Voltage Induction Motor



Inverter Shield Motor



NEMA Premium Efficiency Motor

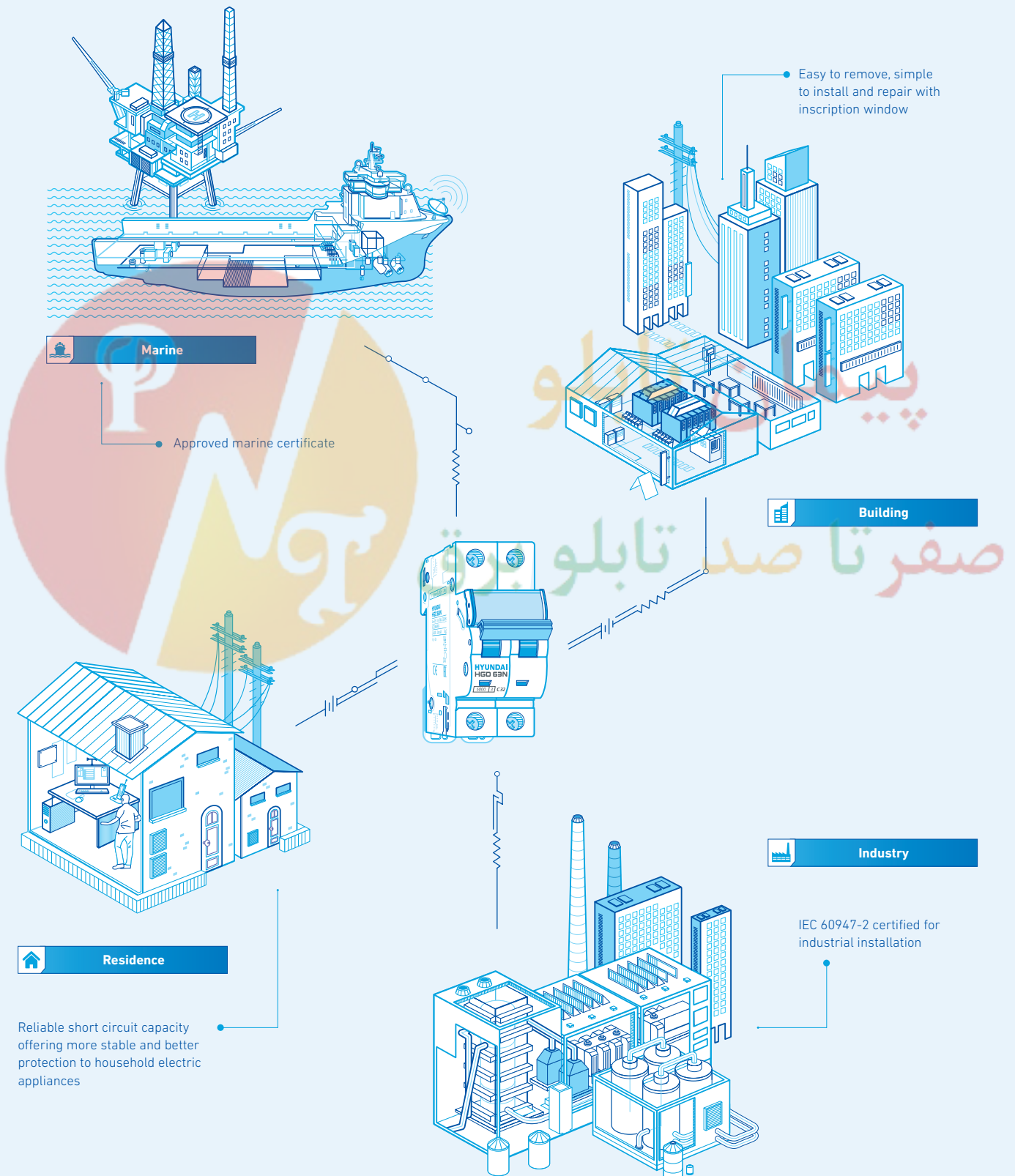


Explosion-Proof (Class 1 Div.1) Motor



# Features

## Applicable to Various Location



## Series Features

### HYUNDAI ELECTRIC Miniature Series

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



#### Inscription Window

Ensures circuit identification and hence reduces maintenance downtime



#### Safety Terminals

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



#### Dual Termination

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



#### Large Cable Terminals

The terminals are suitable for cables up to 50 mm<sup>2</sup> 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)

### RCCB

1. Mid trip
2. Advance neutral
3. Conditional short circuit capacity 10 kA

### MSD

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



New Miniature Series

Recognized with IF Design Award 2016

# Product Overview

## Miniature Circuit Breaker

Model	Deluxe	Standard
Type	HGD63N, 63H, 125	HGD63E, 63S, 63M, 63P, 100S
Breaking Capacity	6, 10 kA	3, 4.5, 6, 10 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



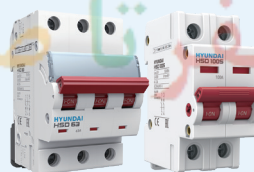
## Residual Current Circuit Breaker

Model	Deluxe	Standard
Type	HRC63, HRC100	HRC63S, HRC100S
Operating Characteristics	AC, A	AC, A
Pole	2, 4	2, 4
Residual Current	30~500 mA	30~500 mA
Rated Current	16~100 A	16~100 A
Standard	IEC/EN 61008-1	IEC/EN 61008-1



## Miniature Switch Disconnecter

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



## Electronic Circuit Breaker

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



## Installation Contactor

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



# HGD

## Miniature Circuit Breaker

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# Features

## HGD Miniature Circuit Breaker

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

HGD Deluxe Type

HGD63N

HGD63N





## 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 10 kA across entire range in accordance with IEC/EN 60898-1 and IEC/EN 60947-2. HGD also incorporates features like inscription window, safety terminal, large cable terminals, bi stable clip, positive contact indication and field fittable AUX, ALT, SHT, UVT, OVT.

### Deluxe Type

### Standard Type



#### Product Performance

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

- Compact structure and external design.
- Customers can choose between deluxe type and standard type depending on the need for inscription window
- Under the standard of IEC 60898-1, all ranges are available with a short circuit capacity of 3 kA~10 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

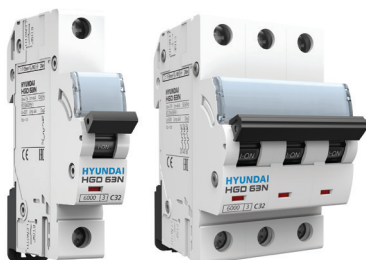


#### Specification

- 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)





# Selection Table

## HGD (Deluxe Type)

Model	HGD63N, 63 AF, 6 kA	HGD63H, 63 AF, 10 kA	HGD125, 125 AF, 10 kA
			
Reference Standard	IEC/EN 60898-1	IEC/EN 60898-1 ; IEC/EN 60947-2	IEC/EN 60947-2
No. of Poles	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P
Rated Current (In)	0.5, 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	0.5, 1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	80 A, 100 A, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz
Rated Short Circuit Current (Icn)	6 kA (Ics=100 % Icn)	10 kA (Ics=100 % Icn)	10 kA (Ics=75 % Icn)
Magnetic Release Setting	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve	(3-5) In - B Curve (5-10) In - C Curve (10-20) In - D Curve
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	-5 °C to + 55 °C	-5 °C to + 55 °C	-5 °C to + 55 °C
Humidity	95 % RH	95 % RH	95 % RH
Energy Limit Class	3	3	3
Terminal Capacity (max)	35 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>
Tightening Torque	2 N·m	2 N·m	2.5 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/OVT	Yes	Yes	No

※ HGD63N, 63H The appearance are the same.

## HGD (Standard Type)

Model	HGD63E, 63 AF, 3 kA <sup>1)</sup>	HGD63S, 63 AF, 4.5 kA <sup>1)</sup>	HGD63M, 63 AF, 6 kA <sup>2)</sup>	HGD63P, 63 AF, 10 kA <sup>2)</sup>	HGD100S, 100 AF, 10 kA
					
Reference Standard	IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60898-1	IEC/EN 60898-1	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	1P, 1P + N, 2P, 3P, 3P + N, 4P	1P, 1P + N, 2P, 3P, 3P + N, 4P
Rated Current (In)	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, 25, 32, 40, 50, 63 A	1, 2, 3, 4, 5, 6, 10, 16, 20, 25, 32, 40, 50, 63 A	80 A, 100 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated Short Circuit Current (Icn)	3 kA (Ics=100 % Icn)	4.5 kA (Ics=100 % Icn)	6 kA (Ics=100 % Icn)	10 kA (Ics=75 % Icn)	10 kA (Ics=75 % Icn)
Magnetic Release Setting	(3-5)In - B Curve (5-10)In - C Curve (10-20)In - D Curve	(3-5)In - B Curve (5-10)In - C Curve (10-20)In - D Curve	(3-5)In - B Curve (5-10)In - C Curve (10-20)In - D Curve	(3-5)In - B Curve (5-10)In - C Curve (10-20)In - D Curve	(3-5)In - B Curve (5-10)In - C Curve (10-20)In - D Curve
Rated Insulation Voltage (Ui)	500 V	500 V	500 V	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV	4 kV	4 kV	5 kV
Dielectric Strength	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
Operating Temperature	-5 °C to + 55 °C	-5 °C to + 55 °C	-5 °C to + 55 °C	-5 °C to + 55 °C	-5 °C to + 55 °C
Humidity	95 % RH	95 % RH	95 % RH	95 % RH	95 % RH
Energy Limit Class	1	1	3	3	1
Terminal Capacity (max)	25 mm <sup>2</sup>	25 mm <sup>2</sup>	25 mm <sup>2</sup>	25 mm <sup>2</sup>	35 mm <sup>2</sup>
Tightening Torque	2 N·m	2 N·m	2 N·m	2 N·m	2 N·m
Vibration	3 g	3 g	3 g	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20	IP20	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.090 kg	0.090 kg	0.100 kg	0.115 kg	0.150 kg
Dimensions (H x D x W)/Pole in mm	80.5 x 71.0 x 17.8 mm	80.5 x 71.0 x 17.8 mm	80.5 x 71.0 x 17.8 mm	80.5 x 71.0 x 17.8 mm	81.0 x 71.0 x 26.8 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)
Installation Position	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material	Molded, flame-retardant thermoplastic material
Busbar Connections Top/Bottom Side	-	-	Pin/Fork type	Pin/Fork type	-
AUX/ALT/SHT/UVT	No	No	Yes	Yes	No

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

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



# Accessories (Deluxe Type)

## Auxiliary Contact + Alarm Trip (AXT)

### Technical Specification

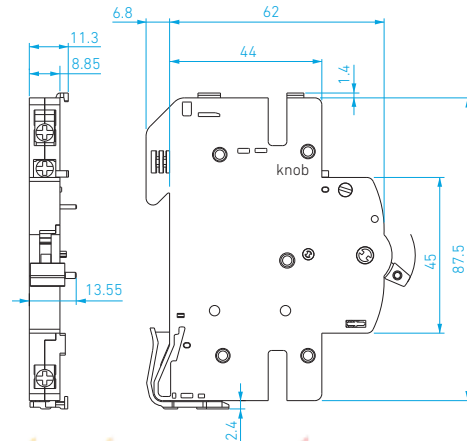
Standard Conformity	IEC/EN 60947-5-4
Current Carrying Capacity (max)	6 A
Rated Voltage (Ue)	AC 240 V
Contact Configuration	1NO + 1NC
Rated Insulation voltage	AC 500 V
Rated Frequency (F)	50/60 Hz
Utilization Category	AC 12
Electrical Endurance (no.of operations)	10,000
Terminal Capacity(max)	2.5 mm <sup>2</sup>
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.

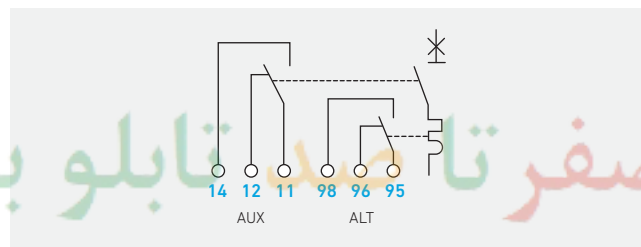
### Ordering Information

AXT HGD63H	AXT/ALT
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### Dimension

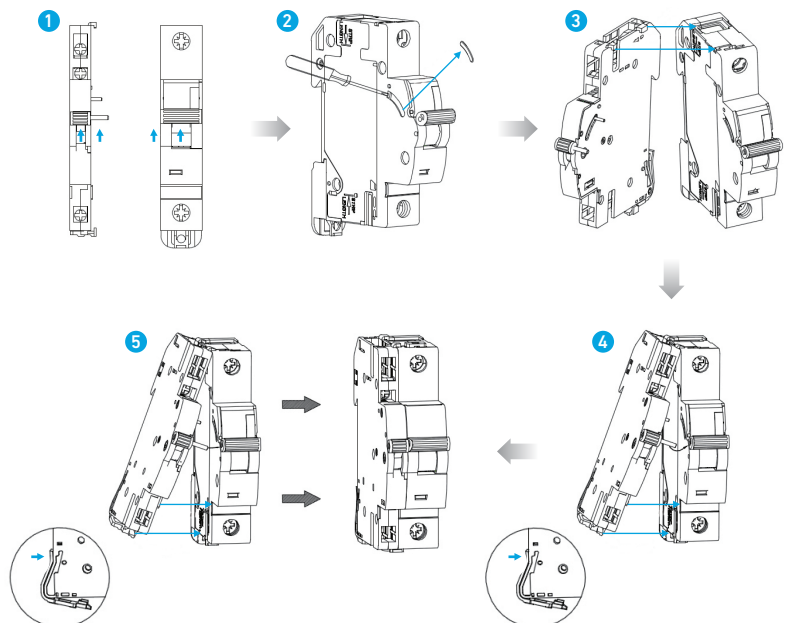


### Circuit Diagram



## Assembling with MCB (HGD Accessories)

- 1 Switch ON the auxiliary contact & MCB.
- 2 Remove the window cover of the protection device with screw driver or a suitable tool.
- 3 Adjust the U-shaped locks present at the upper end of the auxiliary in such a way that they get fitted into the slots present in the protection device.
- 4 Align knob pin of the auxiliary with the knob of the protection device.
- 5 Rotate the auxiliary so as to bring it nearer to the protection device for final locking. During this snap lock shall remain pressed until the U-Lock of the snap lock gets fitted into the slot provided in the protection.



※ AXT should be assembled with "ON" handle position

## Shunt Trip (SHT)

### Technical Specification

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

### Ordering Information

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

## Under Voltage Trip (UVT)

### Technical Specification

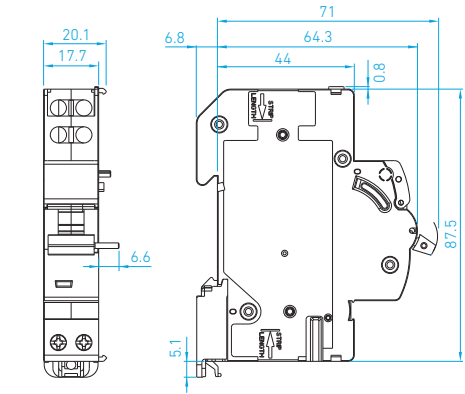
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1	
Rated Voltage	AC 240 V	
Frequency	50/60 Hz	
Under Voltage Trip Voltage	$0.35 U_e \geq V \geq 0.7 U_e$	
Terminal Size	6 mm <sup>2</sup>	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening Torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no.of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

※ Causes the device with which it is associated to trip when input voltage decrease (between 70 % and 35 % of  $U_n$ ). It will not trip the associated device on the power failure or voltage less than 35 % of  $U_n$ . Associated device can be manually reclosed when voltage reaches back to 85 %.

### Ordering Information

UVT HGD63H US2	Single phase
UVT HGD63H UT2	Three phase

## Dimension

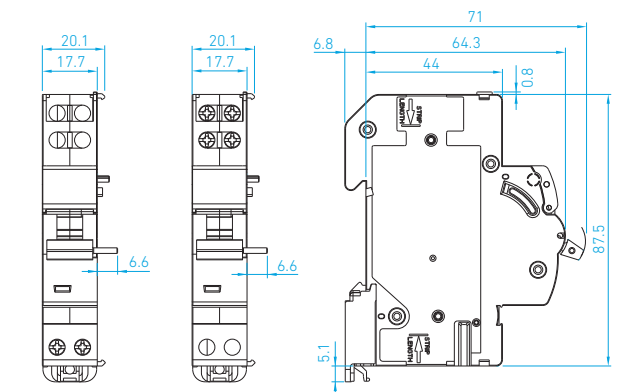


SINGLE PHASE

### Circuit Diagram



## Dimension



SINGLE PHASE

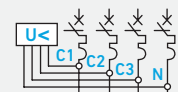
THREE PHASE

### Circuit Diagram

Single phase



Three phase



# Accessories (Deluxe Type)

## Under Voltage Trip + Time Delayed (UVT + t)

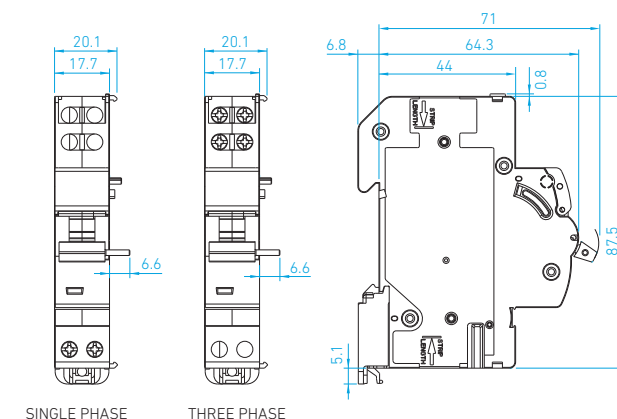
Technical Specification		
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1	
Rated Voltage	AC 240 V	
Frequency	50/60 Hz	
Under Voltage Trip Voltage	$0.35 U_n \geq V \geq 0.7 U_n$	
Trip Delay	0.2 sec	
Terminal Size	6 mm <sup>2</sup>	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no.of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

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

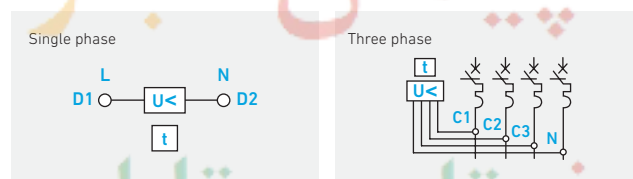
## Ordering Information

UVT HGD63H DUS2	Single phase
UVT HGD63H DUT2	Three phase

## Dimension



## Circuit Diagram



## Over Voltage Trip (OVT)

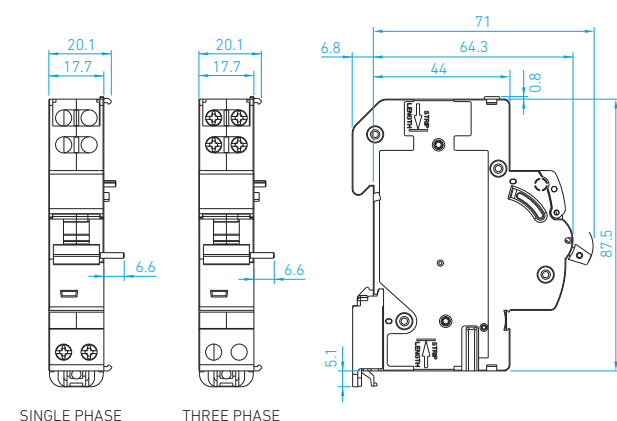
Technical Specification		
Phase	Single phase	Three phase
Standard Conformity	EN50550	
Rated Voltage	AC 240 V	AC 240 V (L-N)
Frequency	50/60 Hz	
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)
Max Duration of Impulse Command	10 ms	
Terminal Size	6 mm <sup>2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

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

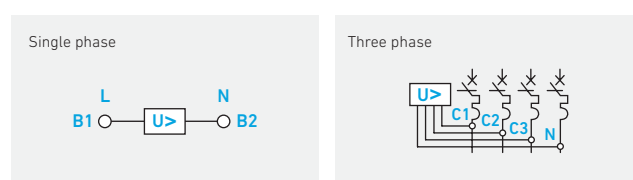
## Ordering Information

OVT HGD63H OS2	Single phase
OVT HGD63H OT2	Three phase

## Dimension



## Circuit Diagram



## Under + Over Voltage Trip (UOVT)

### Technical Specification

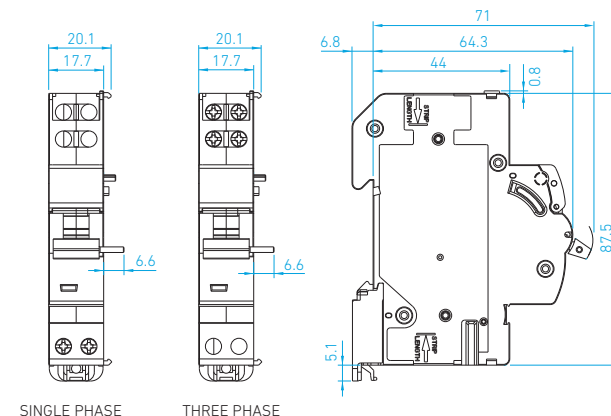
Phase	Single phase	Three phase
Standard Conformity	IEC 60947-1, EN 50550	
Rated Voltage	AC 240 V	AC 240 V (L-N)
Frequency	50/60 Hz	
Max Non-Tripping Voltage	AC 255 V	AC 255 V (L-N)
Max Tripping Voltage	AC 280 V	AC 280 V (L-N)
Under Voltage Trip Voltage	$0.35 U_e \geq V \geq 0.7 U_e$	
Max Duration of Impulse Command	10 ms	
Terminal Size	6 mm <sup>2</sup>	
Protection Degree	IP20	
Mechanical Status Indicator	Front	
Tightening Torque	0.8 N·m	
Dimensions (H x D x W)	88.3 x 71 x 17.7 mm	
Net Weight	78 g	
Electrical Endurance (no. of operations)	4,000	
Wiring Connection Type	Bottom	Top
Mounting	Left side of MCB (HGD63N/H)	

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

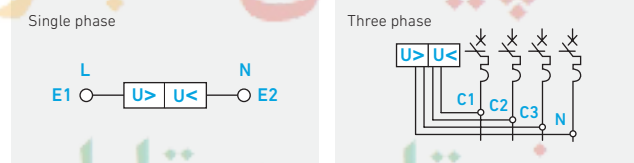
### Ordering Information

UOVT HGD63H U0S2	Single phase
UOVT HGD63H U0T2	Three phase

## Dimension



### Circuit Diagram



## Enclosure for MCB - PLASTIC (ENC)



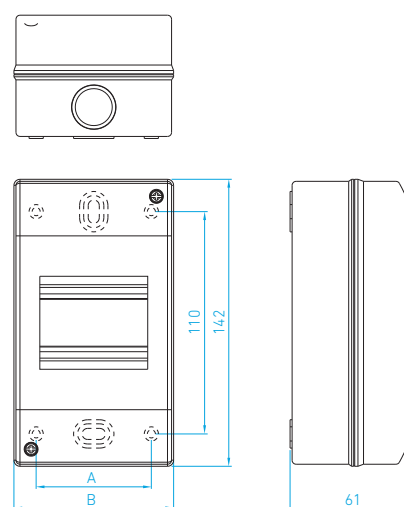
No. of Ways	Dimensions (In mm)	
	A	B
1P/2P	29.4	43.4
3P/4P	57	79

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

### Ordering Information

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

## Dimension





# Accessories (Standard Type)

## Auxiliary Contact (AUX)

### Technical Specification

Standard Conformity	IEC/EN 60947-5-4		
Current Carrying Capacity (max)	6 A		
Rated Voltage (Ue)	AC 240 V		
Contact Configuration	1NO + 1NC		
Rated Insulation Voltage	AC 500 V		
Rated Frequency (F)	50/60 Hz		
Utilization Category	AC 12		
Electrical Endurance (no.of operations)	10,000		
Terminal Capacity (max)	2.5 mm <sup>2</sup>		
Protection Class	IP20		
Dimensions (H x D x W)	81.5 x 74.5 x 8.8 mm		
Terminal Capacity (max)	35 mm <sup>2</sup>		
Net Weight	32 g		
Mounting	Left side of MCB (HGD63M/P)		
Operating Current	Operating Power	Voltage	Current
	AC	415 V	3 A
		240 V	6 A
		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

AUX HGD63P	AUX
------------	-----

## Alarm Trip (ALT)

### Technical Specification

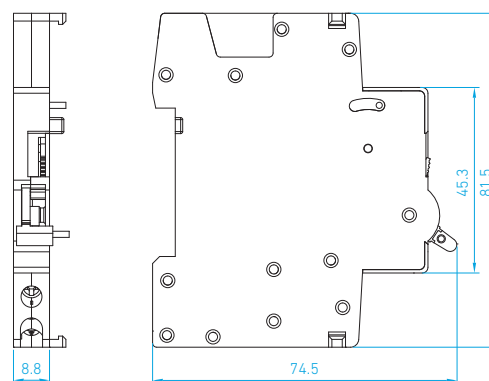
Standard Conformity	IEC/EN 60947-5-4		
Current Carrying Capacity (max)	6 A		
Rated Voltage (Ue)	AC 240 V		
Contact Configuration	1NO + 1NC		
Rated Insulation Voltage	AC 500 V		
Rated Frequency (F)	50/60 Hz		
Utilization Category	AC 12		
Electrical Endurance (no.of operations)	10,000		
Terminal Capacity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

※ Attachment used for signalling, indication and interlocking  
 ※ Point 91 and 92 are connected when circuit is closed.  
 Point 91 and 94 are connected when the breaker trips due to fault.  
 Point 91 and 92 are connected when the breaker trips by manual operation.  
 Meanwhile, point 91 and 94 are disconnected.

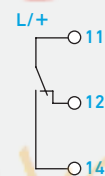
## Ordering Information

ALT HGD63P	ALT
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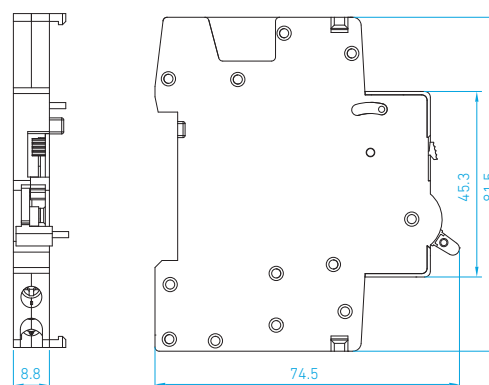
## Dimension



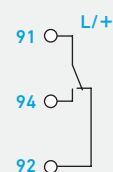
## Circuit Diagram



## Dimension



## Circuit Diagram



## Shunt Trip (SHT) + Auxiliary Contact (AUX)

### Technical Specification

Standard Conformity	IEC/EN 60947-1, 60947-5-4
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	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)	2.5 mm <sup>2</sup>
Protection Class	IP20
Dimensions (H x D x W)	81.5 x 74.5 x 18 mm
Net Weight	64 g
Mounting	Left side of MCB (HGD63M/P)

※ Attachment used for remote tripping and signaling, 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

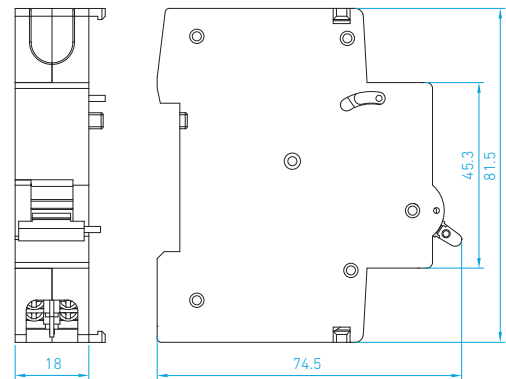
Standard Conformity	IEC 60947-1
Current Carrying Capacity (max)	6 VA
Rated Voltage (ac) (Ue)	AC 240 V
Rated Insulation Voltage	AC 500 V
Rated Frequency (F)	50/60 Hz
Operating Voltage Range	0.35 Ue ≥ V ≥ 0.7 Ue
Electrical Endurance (no.of operations)	4,000
Terminal Capacity (max)	2.5 mm <sup>2</sup>
Protection 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 ± 5 %

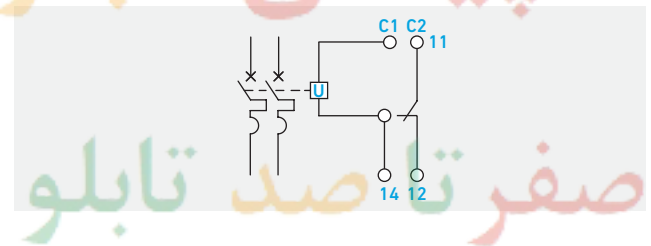
## Ordering Information

UVT HGD63P U2	AC 240 V
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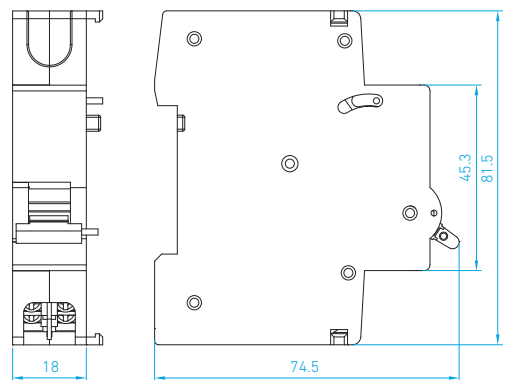
## Dimension



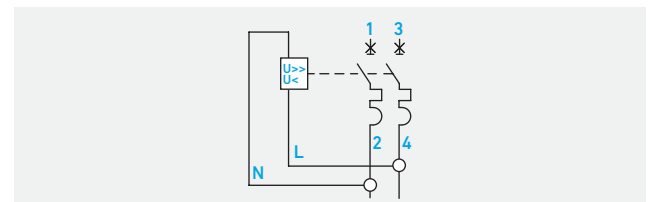
## Circuit Diagram



## Dimension



## Circuit Diagram



# Accessories Ordering Information

## Deluxe Type

Type	Code	Description
HGD63N/HGD63H	AXT HGD63H	AUX/ALT
	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 HGD63H US2	Single phase (AC 240 V)
	UVT HGD63H UT2	Three phase (AC 415 V)
	UVT HGD63H DUS2	Single phase (AC 240 V)
	UVT HGD63H DUT2	Three phase (AC 415 V)
	OVT HGD63H OS2	Single phase (AC 240 V)
	OVT HGD63H OT2	Three phase (AC 415 V)
	UOVT HGD63H UOS2	Single phase (AC 240 V)
	UOVT HGD63H UOT2	Three phase (AC 415 V)
	ENC HGD63H 2P	for 1P/2P MCB
	ENC HGD63H 4P	for 3P/4P MCB

## Standard Type

Type	Code	Description
HGD63M/HGD63P	AUX	AUX HGD63P
	ALT	ALT HGD63P
	SHT HGD63P S2	AC 240 V
	SHT HGD63P S5	DC 24 V
	SHT HGD63P S7	DC 48 V
	SHT HGD63P S9	DC 12 V
	UVT	UVT HGD63P U2
		Single phase (AC 240 V)

# Technical Data

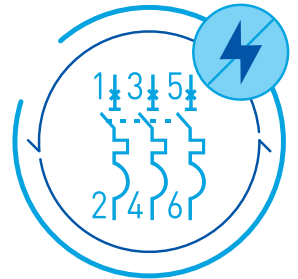
## Description

### 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.

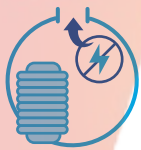
The contact mechanism comprises of fixed & moving contacts specially designed for reliability, long life and anti-weld properties. The arc extinguishing device comprises of 13 plates arc chute. The arc under the influence of the magnetic field and arc guide is moved into the arc chute where it is rapidly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

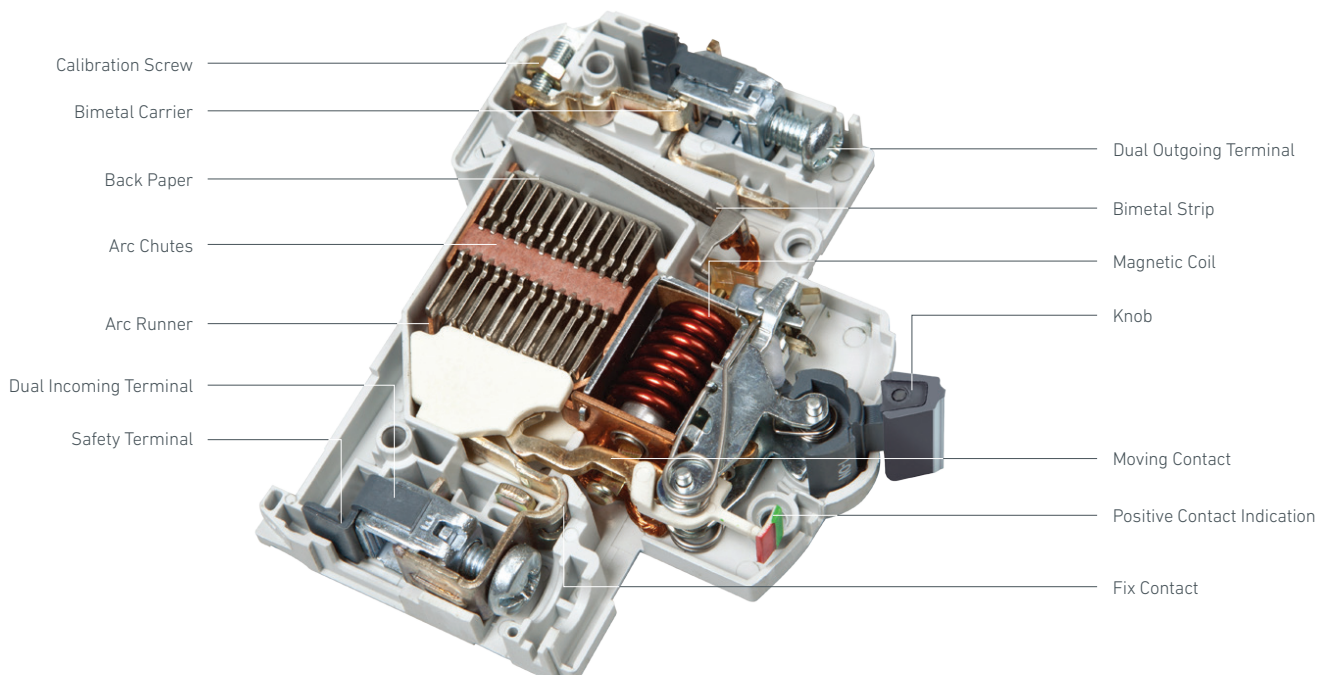


### Magnetic Operation

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





# Technical Data

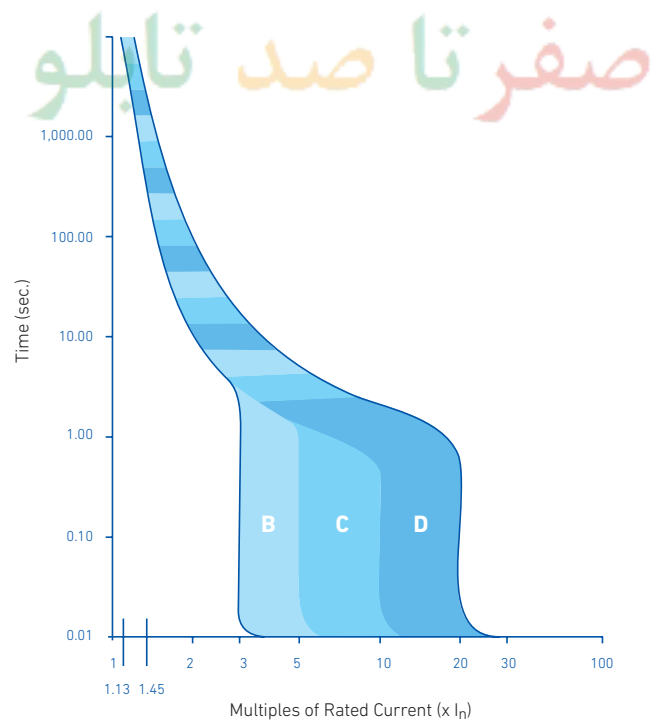
## Characteristics Curves

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

### Tripping Characteristics

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

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



**Temperature Derating Table**

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

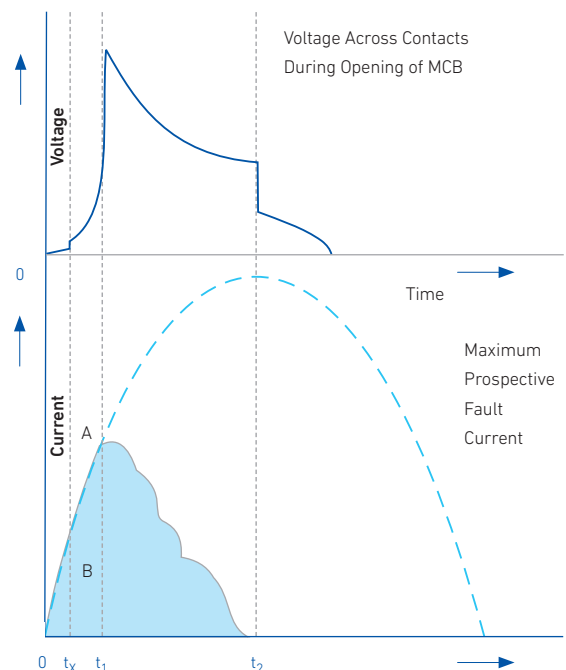
### Current Limiting Design

In a current limiting breaker, the tripping & arc control mechanism are designed that under short circuit conditions, the contacts are physically separated and the 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)
- $t_1$  = Current/Voltage peak (i.e., current limitation)
- $t_2$  = Time to total extinction of arc (i.e., complete shutdown of fault current)



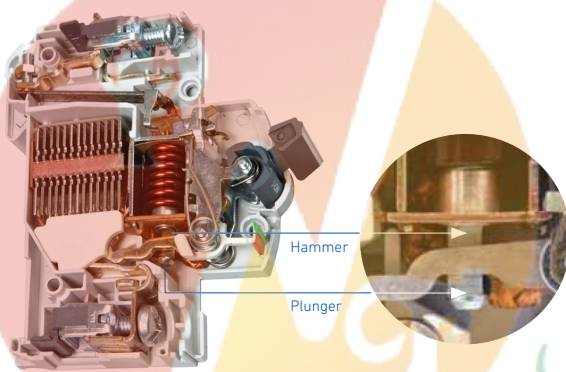
# Technical Data

## Standard Use Environment

### Hammer Trip Mechanism

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

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



### Effect of Frequency Variation

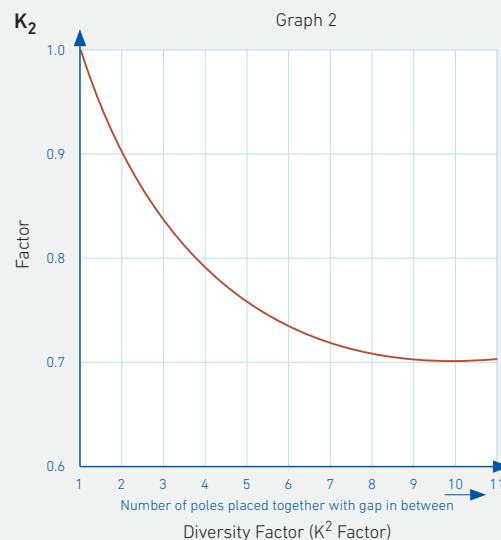
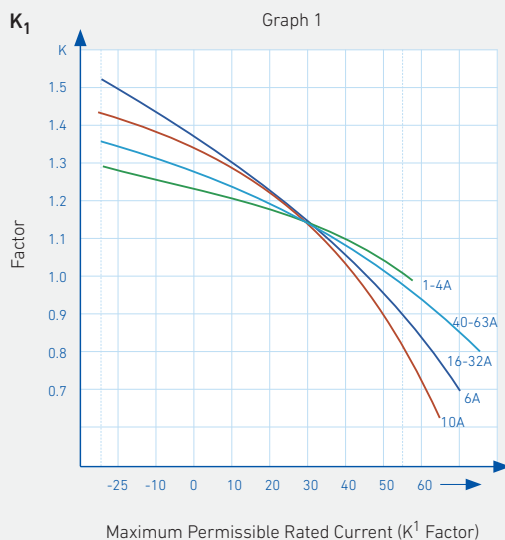
MCBs are designed to operate at AC frequency 50/60 Hz. However, MCBs specially suitable for DC applications and for frequencies upto 400 Hz can be supplied on request.

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

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

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

## Ambient Temperature Compensation/Diversity Factor Chart



Calculation

Example

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

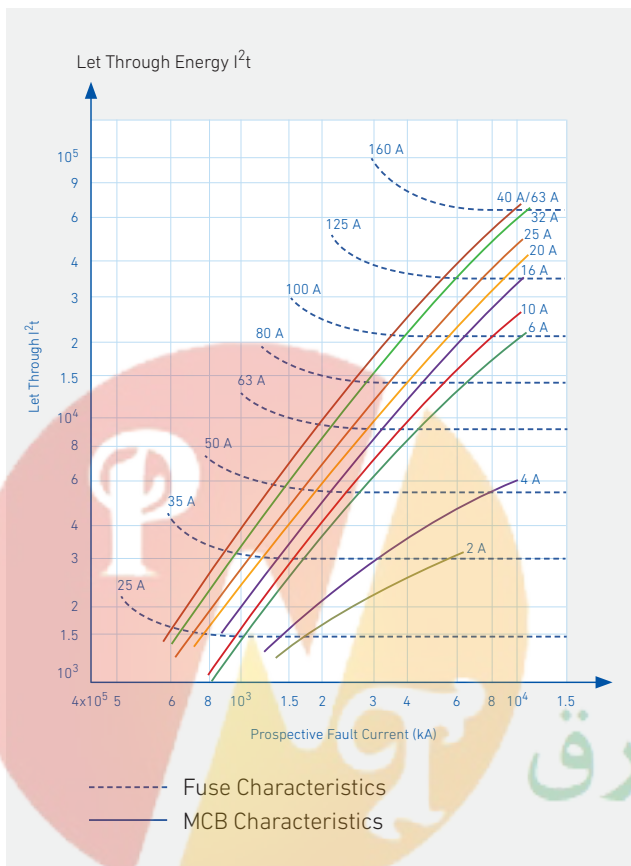
4 MCBs with  $I_n = 10$  A, and the amb. temp. is  $50^\circ\text{C}$  kept with no gap in between

Solution

$K_1 = 0.89$  (from graph 1)

$K_2 = 0.78$  (from graph 2)

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



### Energy Limiting Class 3

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

### Maximum Backup Protection

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

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

### Cold Resistance & Power Loss Details

The power loss value declared at rated current.

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

※ Remarks: - Tolerance  $\pm 5\%$

# Technical Data

## DC Application

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

### Normal Circuit Currents

The rating and normal running temperature of the MCB are unaffected by DC. The MCB can be selected using the thermal section of the standard time/current curves. Magnetic tripping on DC is different from the equivalent AC by a peak factor of 1.4

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

### Short Circuit Currents

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

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

Where,  $I_{SC}$  is the short circuit current

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

$R_b$  is the internal resistance of the battery cells

(this is usually stated by the manufacturer)

### Circuit Time Constant

The time constant is given by:  $L/R = 15 \text{ ms max}$  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.

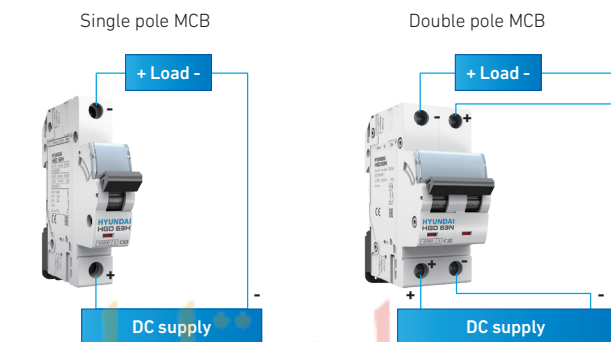
### Circuit Voltage

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



Standard Conformity		IEC/EN 60947-2
Rated Current ( $I_n$ )	A	0.5-63
Rated Voltage ( $U_e$ )	V=	220
No. of Poles (Execution)		1P, 2P
Rated Short Circuit Breaking Capacity	kA	3

※ Also available in DC 130 V

## Discrimination Table

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

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

MCB Downstream	MCCB Upstream																				
C Curve	16 A	20 A	25 A	32 A	40 A	50 A	63 A	80 A	100 A	125 A	160 A	200 A	250 A	320 A	400 A	500 A	630 A	800 A	1,000 A	1,250 A	1,600 A
0.5 to 6 A	1,100	1,200	1,400	1,700	2,000	2,500	3,400	4,800	5,800	6,700	T	T	T	T	T	T	T	T	T	T	T
10 A		1,100	1,200	1,400	1,700	2,100	2,500	3,000	3,500	4,300	T	T	T	T	T	T	T	T	T	T	T
16 A				1,300	1,600	1,900	2,100	2,400	2,700	3,200	8,300	T	T	T	T	T	T	T	T	T	T
20 A					1,600	1,900	2,100	2,400	2,700	2,500	8,300	T	T	T	T	T	T	T	T	T	T
25 A						1,700	1,800	2,000	2,200	2,500	5,400	8,700	T	T	T	T	T	T	T	T	T
32 A							1,800	2,000	2,200	2,500	5,400	8,700	T	T	T	T	T	T	T	T	T
40 A								1,500	1,700	2,000	4,300	7,000	T	T	T	T	T	T	T	T	T
50 A									1,300	1,500	3,600	5,900	9,000	T	T	T	T	T	T	T	T
63 A										1,100	2,800	5,200	8,200	T	T	T	T	T	T	T	T

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



# Technical Data

## Discrimination With Fuses (HRC FUSE Upstream Type gG)

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

## MCB Selection Chart For Household Applications

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

※ 1) The values vary depending on manufacturers.

# Technical Data

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

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

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

## MCB Selection Chart for Motor Protection

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

※ Calculation formulae:

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

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

"C" series MCB is used for all motor applications

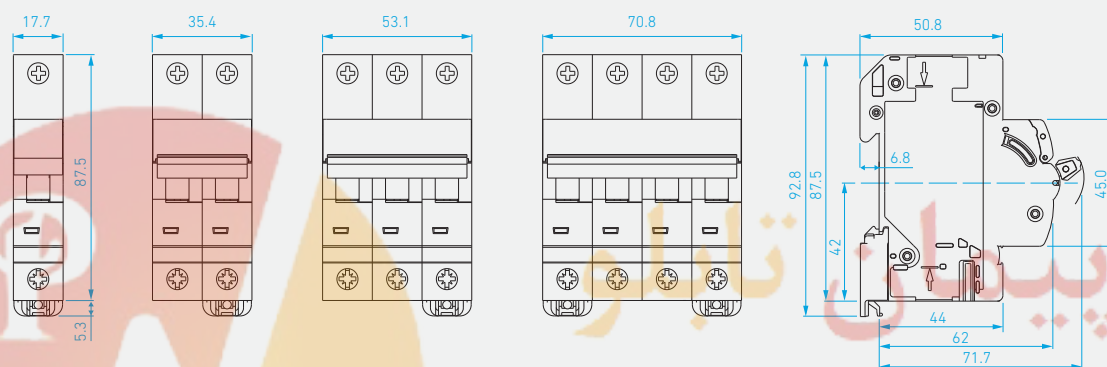
※ Note: One lighting circuit can have up to 800 W or up to 10 lighting points.

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

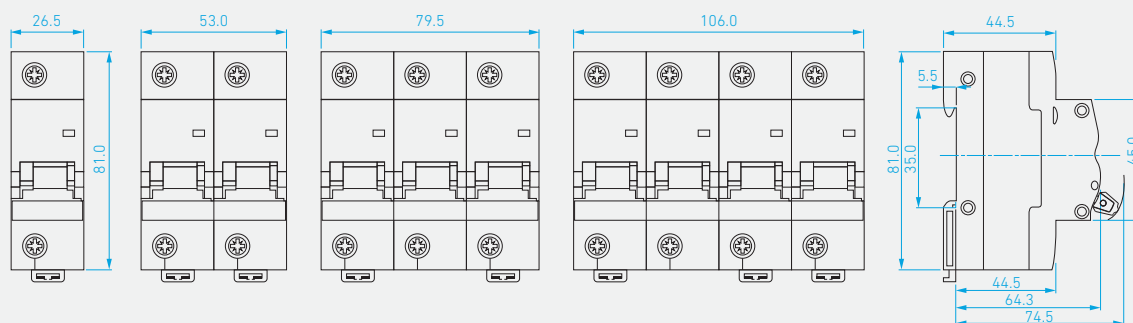
# Dimensions

## HGD (Deluxe Type)

### HGD63N/H, 63 AF



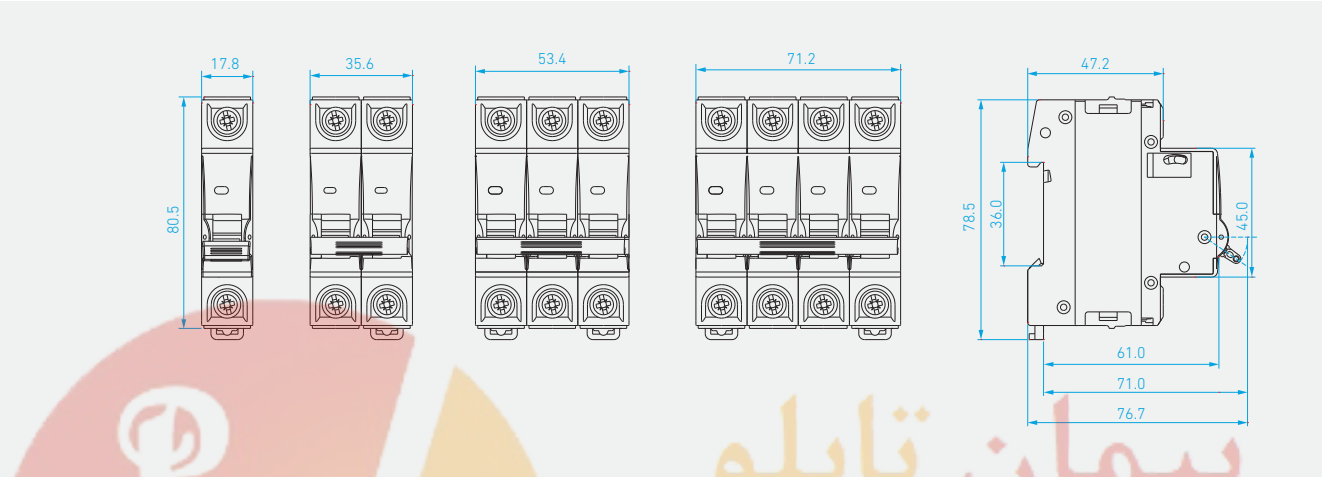
### HGD125, 125 AF



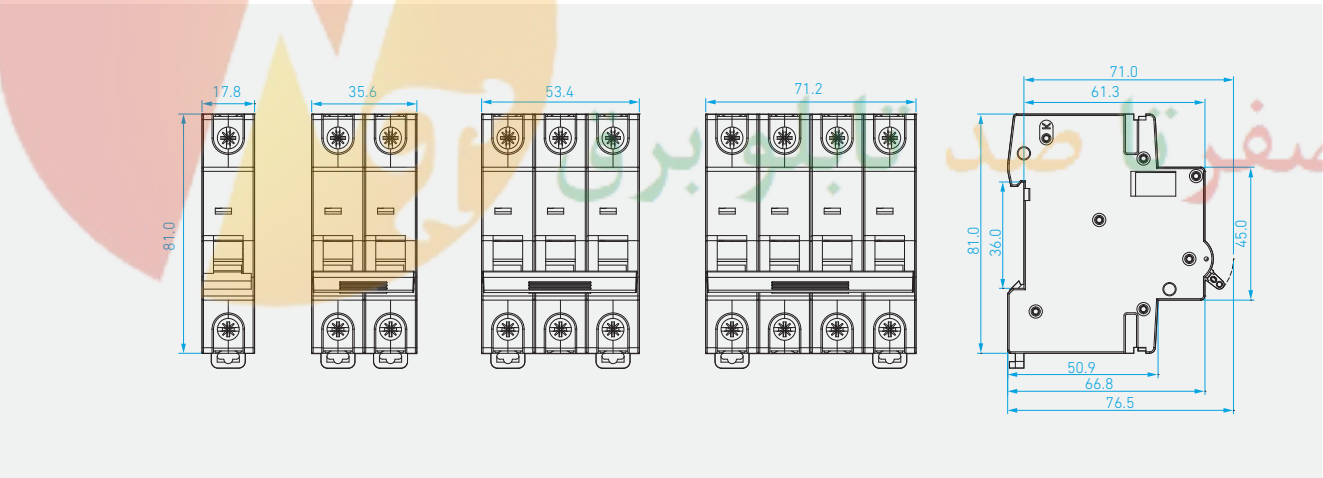
# Dimensions

## HGD (Standard Type)

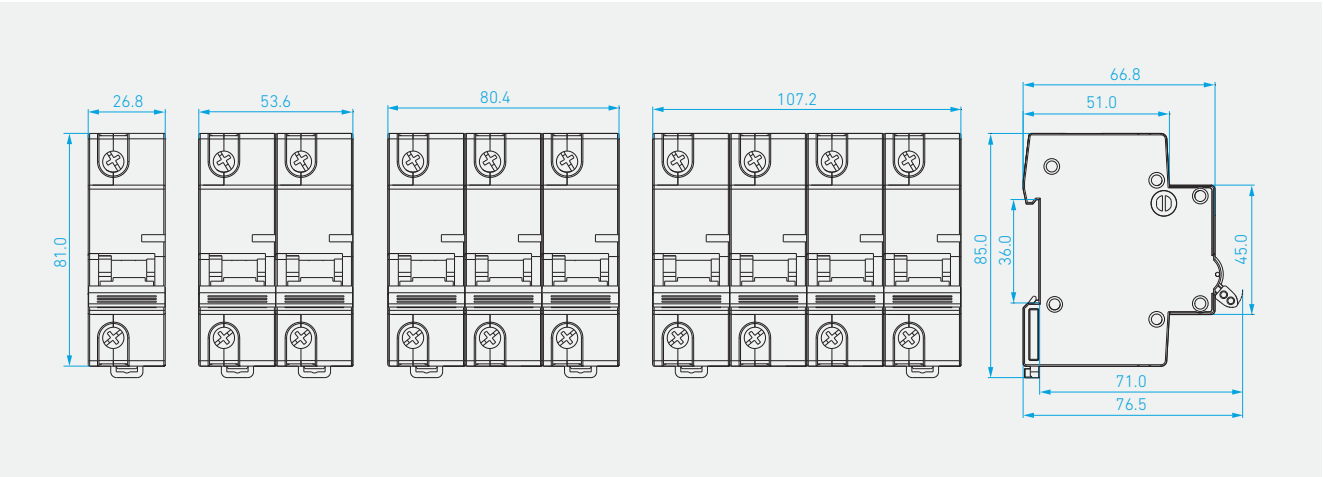
### HGD63E/S, 63 AF



### HGD63M/P, 63 AF

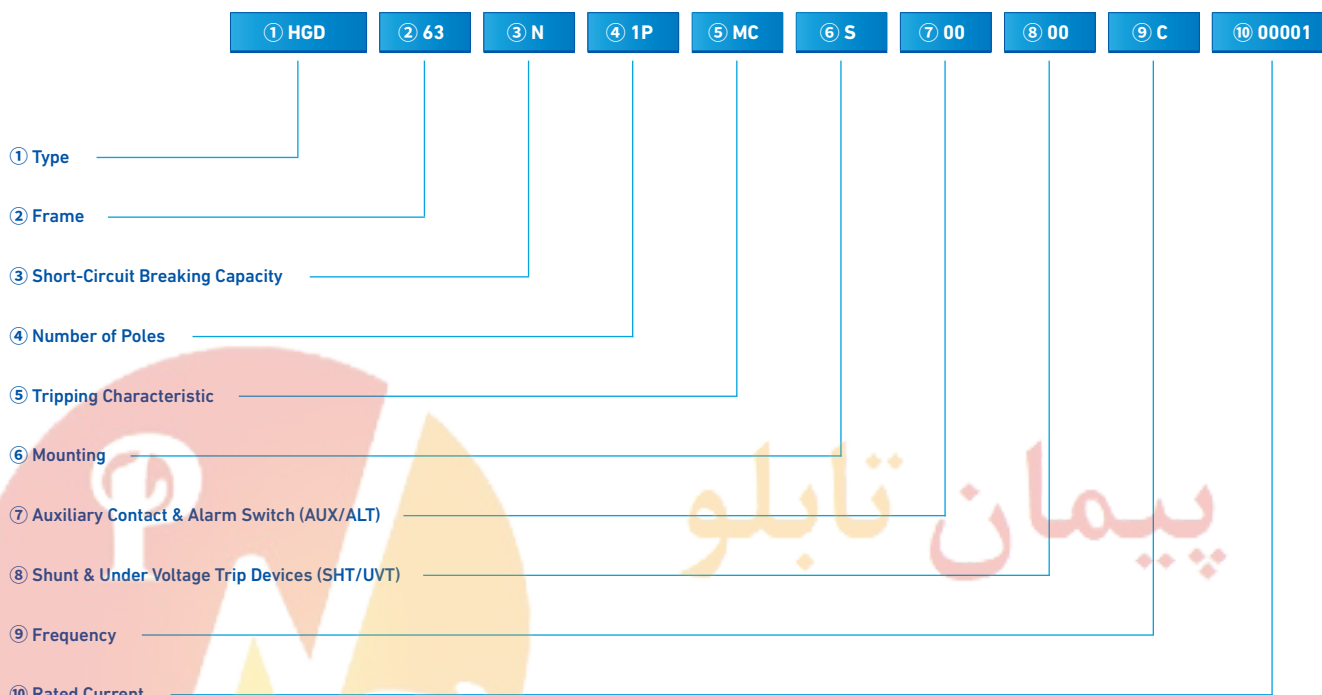


### HGD100S, 100 AF



# MCB Ordering Information

## Ordering Guidelines (Deluxe Type)



① Type	
HGD	Miniature circuit breaker

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

⑨ Frequency	
C	50/60 Hz

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

⑥ Mounting	
S	Front connection

⑩ Rated Current	
-----------------	--

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

⑦ Auxiliary Contact & Alarm Switch	
00	Non-attachment

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

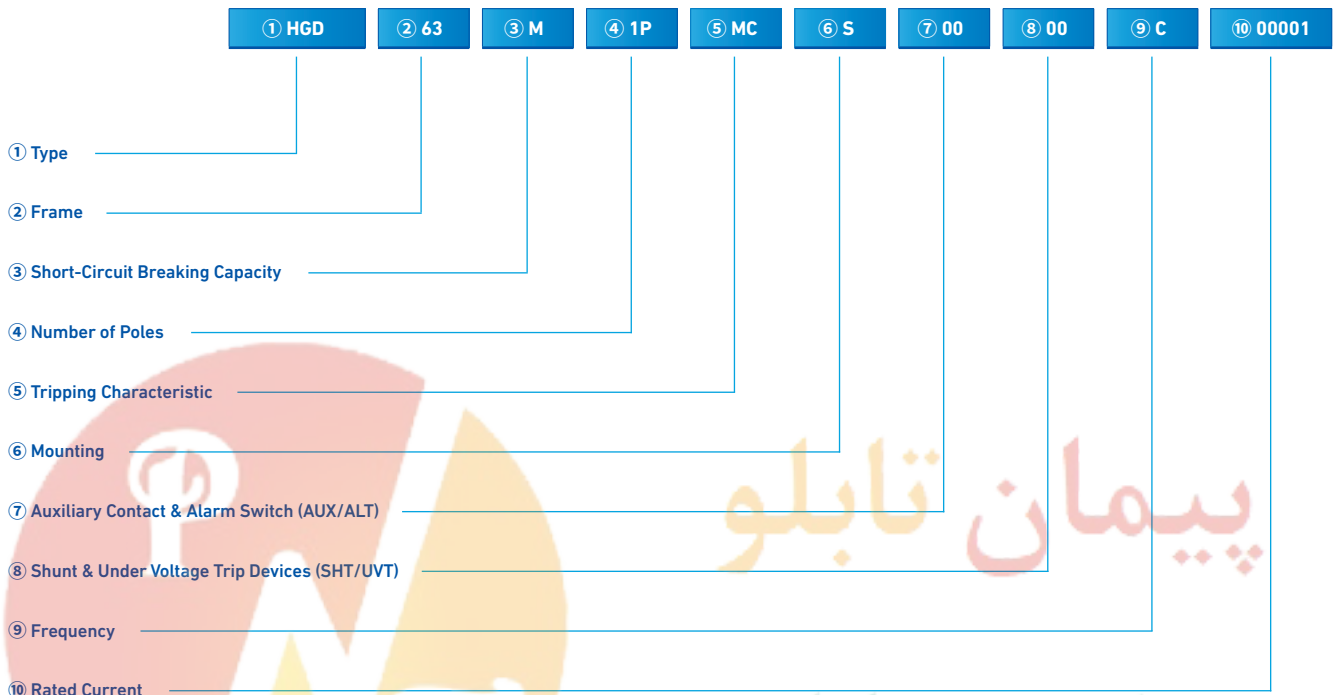
④ Number of Poles	
1P	1 Pole
1N	1 Pole + Neutral
2P	2 Pole
3P	3 Pole
3N	3 Pole + Neutral
4P	4 Pole

⑧ Shunt & Under Voltage Trip Devices	
00	Non-attachment



# MCB Ordering Information

## Ordering Guidelines (Standard Type)



① Type	
HGD	Miniature circuit breaker

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

⑨ Frequency	
C	50/60 Hz

② Frame	
63	63 AF (Standard type)
100S	100 AF (Standard type)

⑥ Mounting	
S	Front connection

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

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

⑦ Auxiliary Contact & Alarm Switch	
00	Non-attachment

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

⑧ Shunt & Under Voltage Trip Devices	
00	Non-attachment

# HRC

Residual Current  
Circuit Breaker

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# Features

## HRC Residual Current Circuit Breaker

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

HRC Deluxe Type





## 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 mid trip - different knob position to indicate whether the device is switched OFF manually, inscription window, safety terminal, dual termination, positive contact indication, field fittable auxiliary contacts, test button for regular inspection.

### Product Performance

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

### Product Structure

- Simple and robust operating mechanism
- Dual termination for bus-bar as well as cable connection
- N phase at the right pole
- Different knob position to indicate whether it is switched by a fault or manually switched OFF (Mid trip)
- Test button

### 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

### Accessories

- Selectable AUX/ALT with knob

### Specification

- IEC/EN 61008-1

- IEC/EN 61008-1

## Product Overview



Deluxe Type (10 kA)



Standard Type (6 kA)

# Selection Table

## HRC (Deluxe Type)

Model	HRC63, 63 AF	HRC100, 100 AF
		
Reference Standard	IEC/EN 61008-1	IEC/EN 61008-1
No. of Poles	2P (1P + N), 4P (3P + N)	2P (1P + N), 4P (3P + N)
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 (Isc)	10 kA	10 kA
Rated Residual Operating Current (IΔn)	30, 100, 300	30, 100, 300
Rated Making Breaking Capacity (Im)	630 A or 10 In whichever is greater	630 A or 10 In whichever is greater
Operating Characteristics in Presence of Residual Current with d.c Components	'A' type & 'AC' type	'A' type & 'AC' type
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
Rated Insulation Voltage (Ui)	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000
Operating Temperature	-25 °C to + 55 °C	-25 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	35 mm <sup>2</sup>	50 mm <sup>2</sup>
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 71.7 x 35.9 mm (for 2P) ; 87.5 x 71.7 x 72.0 mm (for 4P)	88.2 x 71.7 x 35.9 mm (for 2P) ; 88.2 x 71.7 x 72.0 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	No



## 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)
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 (Isc)	6 kA	6 kA
Rated Residual Operating Current (IΔn)	30, 100, 300, 500 mA	30, 100, 300, 500 mA
Rated Making Breaking Capacity (Im)	500 A or 10 In whichever is greater	500 A or 10 In whichever is greater
Operating Characteristics in Presence of Residual Current with d.c Components	'A' type & 'AC' type	'A' type & 'AC' type
Trip Time	1 IΔn < 300 ms, 5 IΔn < 40 ms	1 IΔn < 300 ms, 5 IΔn < 40 ms
Rated Insulation Voltage (Ui)	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	-25 °C to + 55 °C	-25 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	25 mm <sup>2</sup>	35 mm <sup>2</sup>
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	0.200 kg (for 2P) ; 0.310 kg (for 4P)	0.230 kg (for 2P) ; 0.370 kg (for 4P)
Dimensions (H x D x W)/Pole in mm	81.0 x 74.0 x 35.8 mm (for 2P) 81.0 x 74.0 x 71.6 mm (for 4P)	90.9 x 74.0 x 35.8 mm (for 2P) 90.9 x 74.0 x 71.6 mm (for 4P)
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type	Pin/Fork type
Auxiliary Contacts	No	No



# Accessories (Deluxe Type)

## Auxiliary Contact + Alarm Trip (AXT)

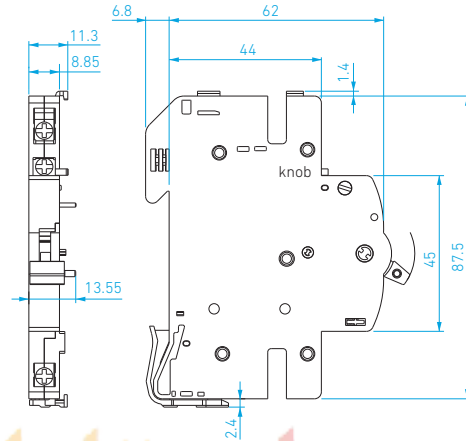
### Technical Specification

Standard Conformity	IEC/EN 60947-5-4
Current Carrying Capacity (max)	6 A
Rated Voltage (Ue)	AC 240 V
Contact Configuration	1NO + 1NC
Rated Insulation Voltage	AC 500 V
Rated Frequency (F)	50/60 Hz
Utilization Category	AC 12
Electrical Endurance (no. of operations)	10,000
Terminal Capacity (max)	2.5 mm <sup>2</sup>
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 RCCB (HRC63)

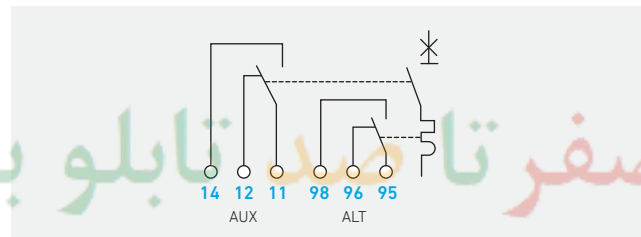
### Ordering Information

AXT HRC63	AUX/ALT
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### Dimension

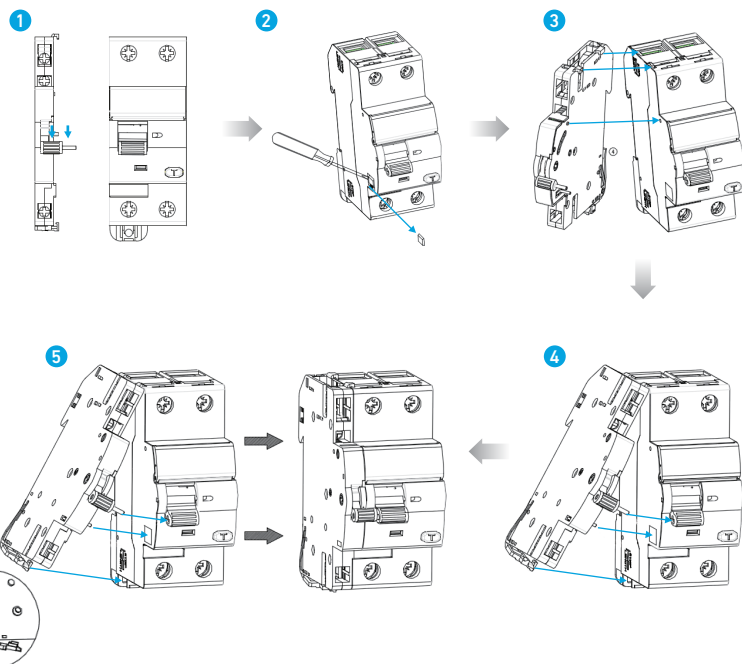


### Circuit Diagram



## Assembling with RCCB (HRC Accessories)

- 1 Make sure the knob is in OFF position.
- 2 Remove the window cover of the protection device with screw driver or a suitable tool.
- 3 Adjust the U-shaped locks present at the upper end of the auxiliary in such a way that they get fitted into the slots present in the protection device.
- 4 Align knob pin of the auxiliary with the knob of the protection device.
- 5 Rotate the auxiliary to bring it nearer to the protection device for final locking. During this, snap lock shall remain pressed until the U-Lock of the snap lock gets fitted into the slot provided in the protection.



※ AXT should be assembled with "OFF" handle position

# Accessories Ordering Information

## Deluxe Type

Type		Code	Description
HRC63	AXT	AXT HRC63	AUX/ALT



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# Technical Data

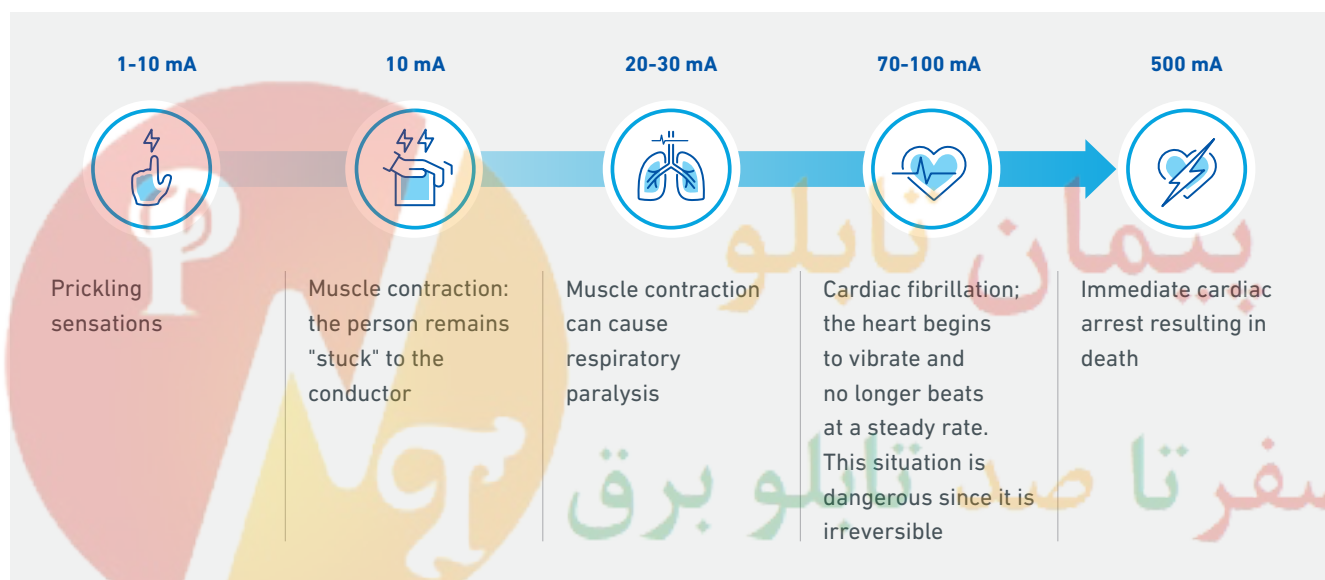
## Standard Use Environment

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

### Protection Against Electrocution

Electrocution is a passage of current through human body, which is dangerous. The flow of current through human body affects vital functions of breathing & heartbeat.

Effect of electric current through human body has been well researched and following chart summarizes the results:



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

The human body has known limits:

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

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

### Protection Against Indirect Contact

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

### Example

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

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

### Protection Against Fire

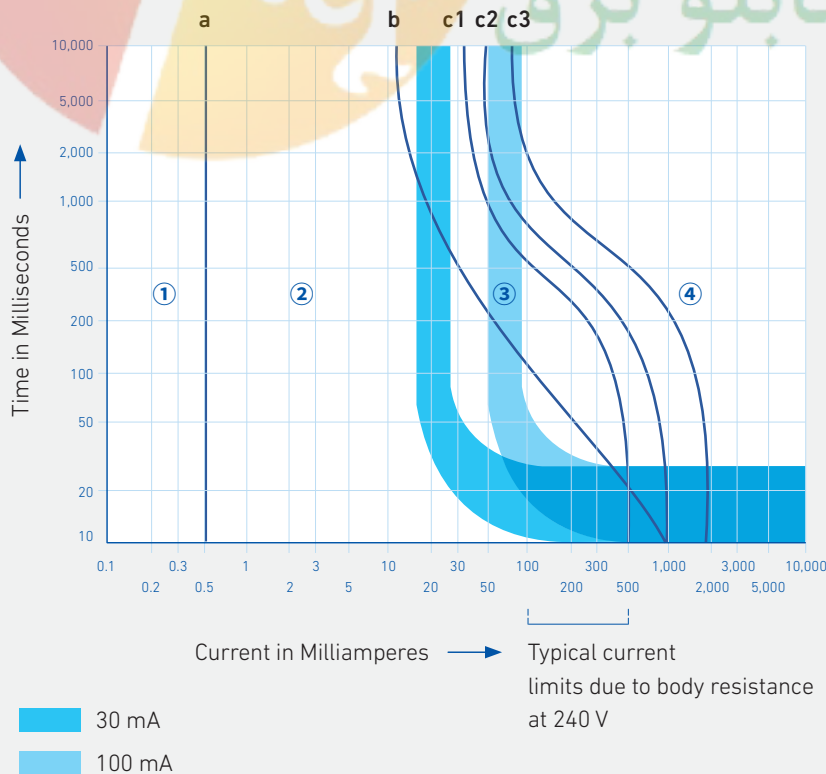
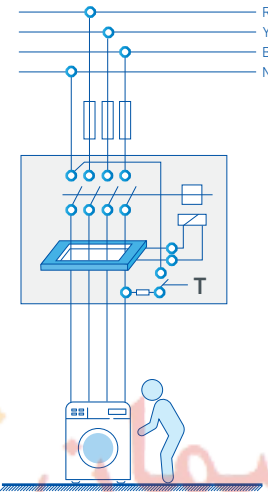
The majority of fires which occur as a result of faulty wiring are started by current flowing to earth. Fire can be started by fault current of less than 1 amp. The normal domestic overload protective device such as a fuse or MCB will not detect such a small current. A correctly chosen RCCB will detect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

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

### Working Principle

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

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



#### Zone Physiological effects

**Zone 1** Usually no reactions

**Zone 2** Usually no harmful physiological effects

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

**Zone 4** In addition to the effects of Zone 3, probability of ventricular fibrillation increased upto 5 % (curve  $C_2$ ) upto 50 % (curve  $C_3$ ) and above 50 % beyond curve  $C_3$ . It increases with magnitude and time, and pathophysiological effects such as cardiac arrest, breathing arrest and heavy burns may occur.

# Technical Data

## Residual Current Circuit Breaker 16 A-100 A

### Sensitivity Selection

#### • 30 mA

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

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

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

Both these conditions are satisfied by 30 mA RCCB.

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

#### • 100 mA

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

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

#### • 300/500 mA

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

### Selection of RCCB Type

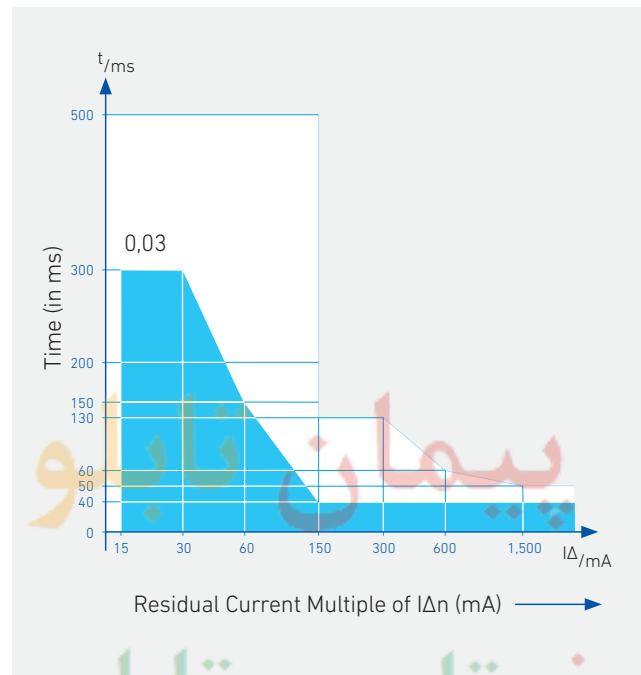
#### RCCB Type AC

AC type RCCB are used for residual sinusoidal alternating current.

#### RCCB Type A

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

### Actuation Time Characteristics



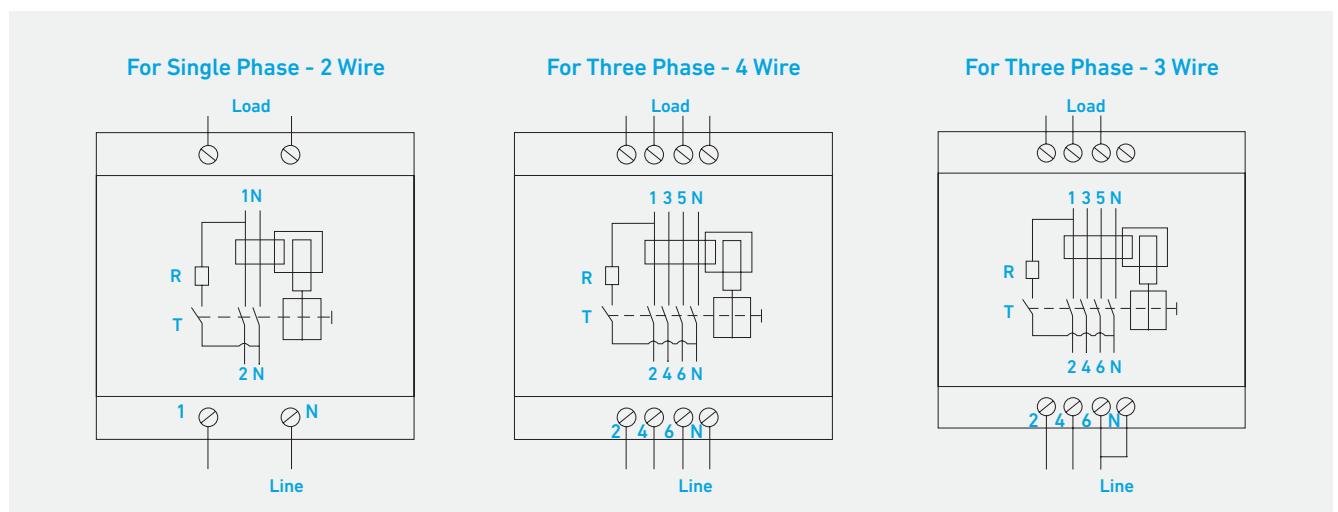


## Selection of RCCB Type

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

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

## Wiring Diagram

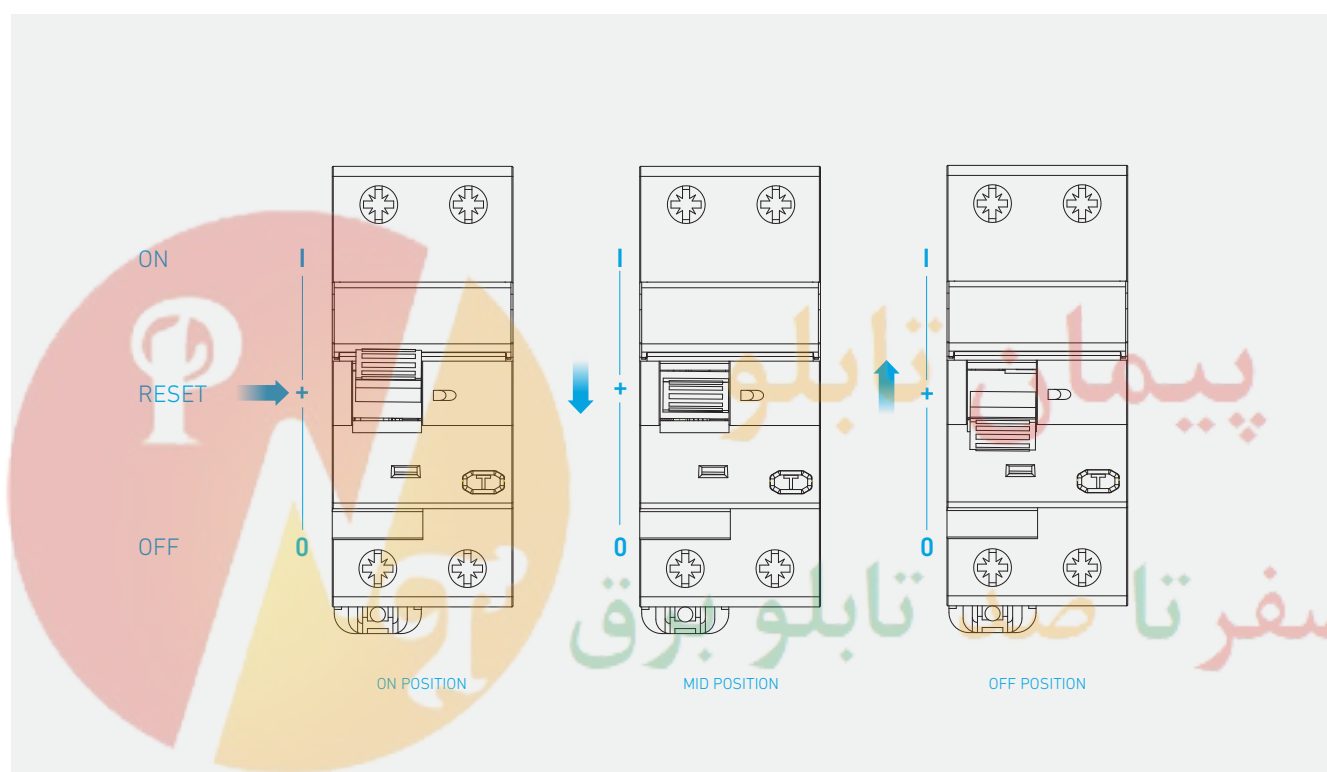


The Hyundai range of four pole RCCBs can be used to provide residual current protection in 3 phase. For 3 wire circuits (no neutral), a link from the neutral to an incoming should be made on the supply side of the RCCB, to enable the operation of the RCCB.

# Technical Data

## Reset Function

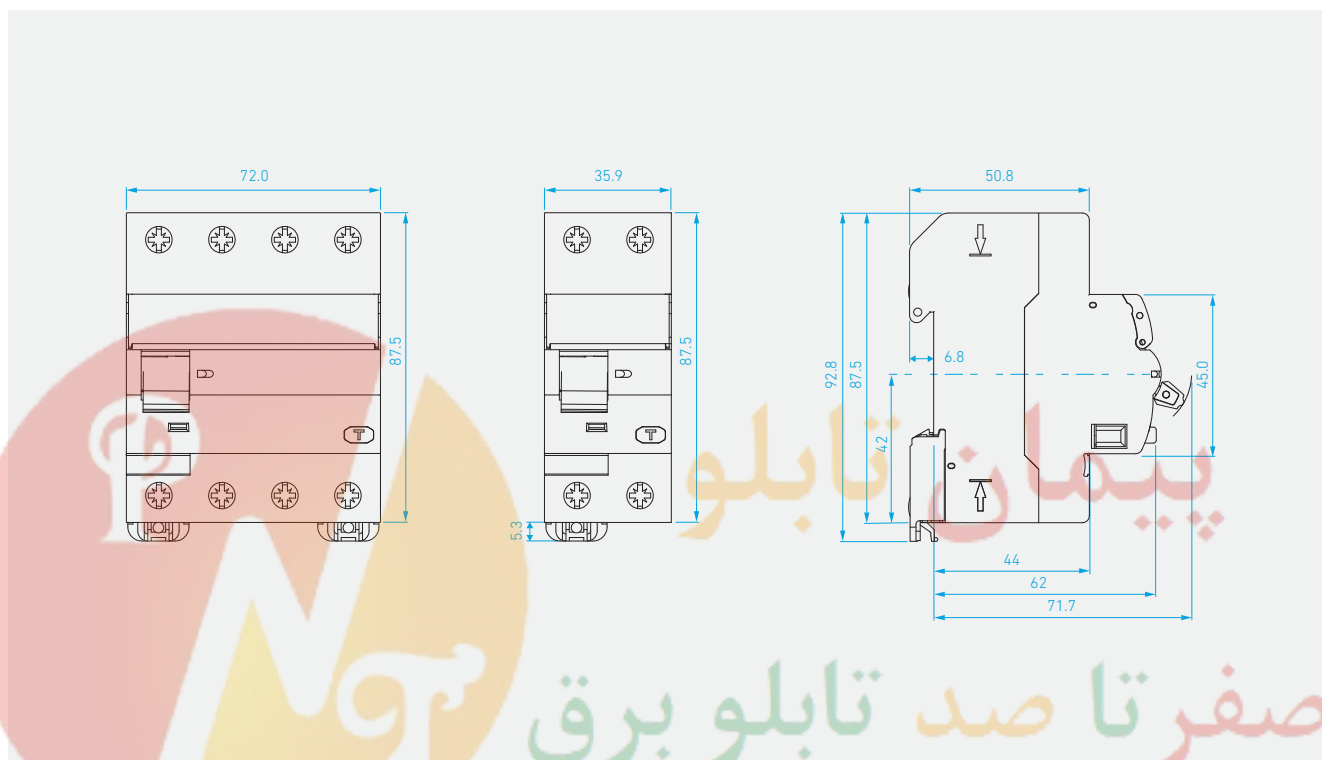
The switch mechanism of RCCBs provides a reset function. The position of the switch lever indicates whether the RCCB has been switched off manually (position 0) or as the result of a fault (central position). In order to cancel the central positioning, the switch need to be moved to position "0". Then, the RCCB can be switched on again.



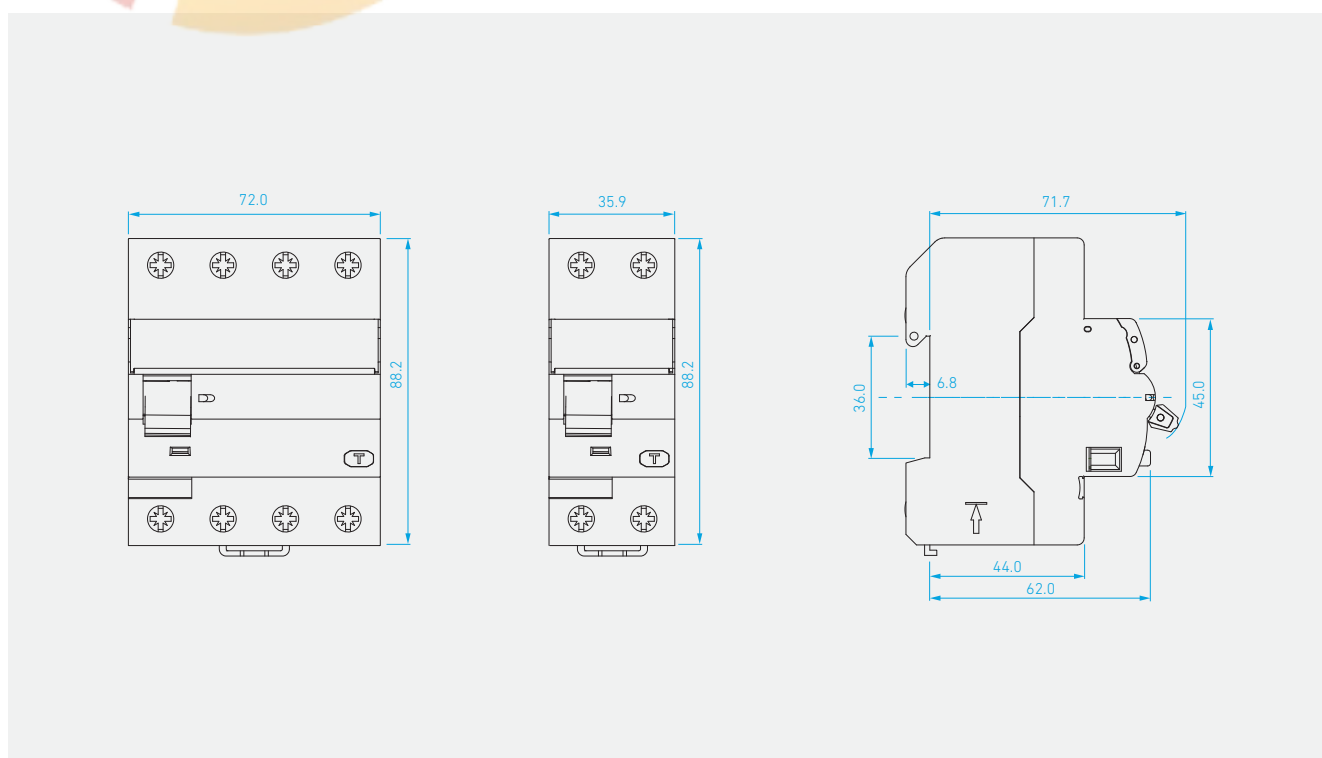
# Dimensions

## HRC (Deluxe Type)

### HRC63, 63 AF



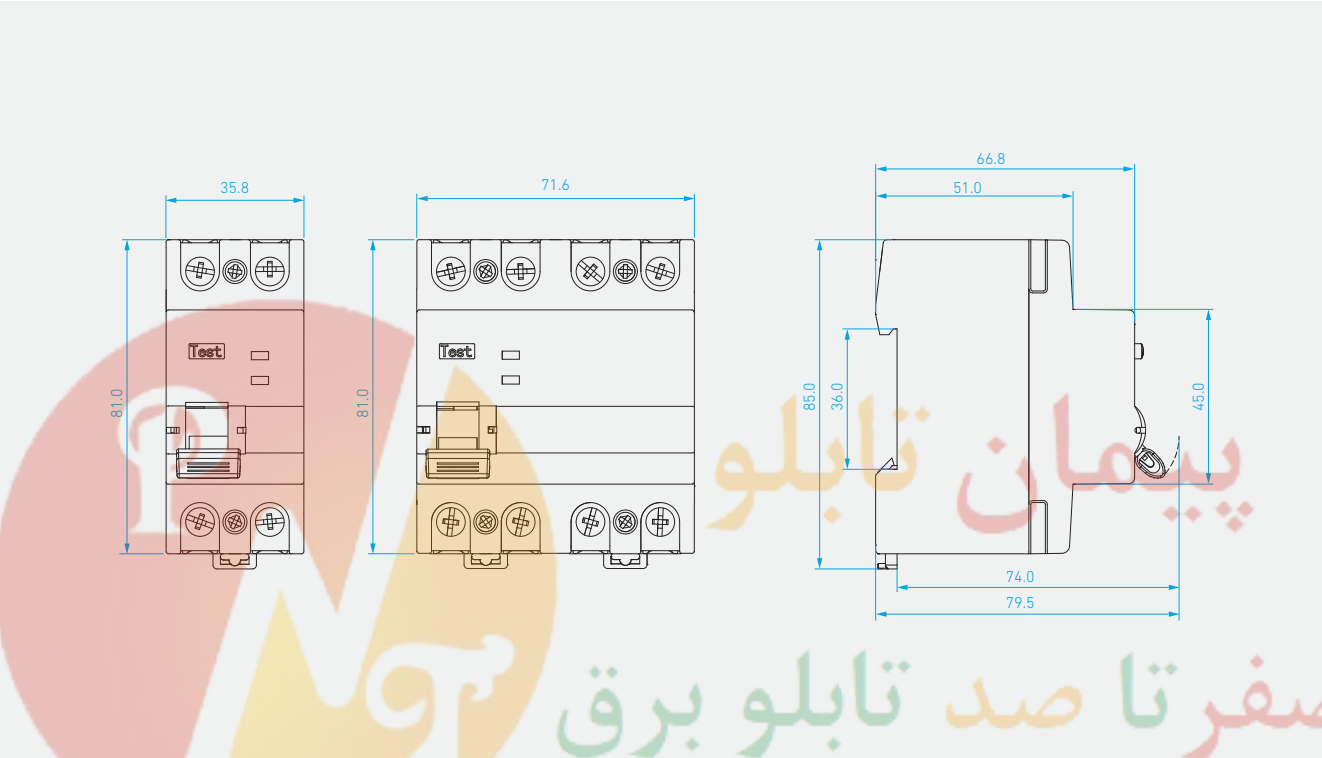
### HRC100, 100 AF



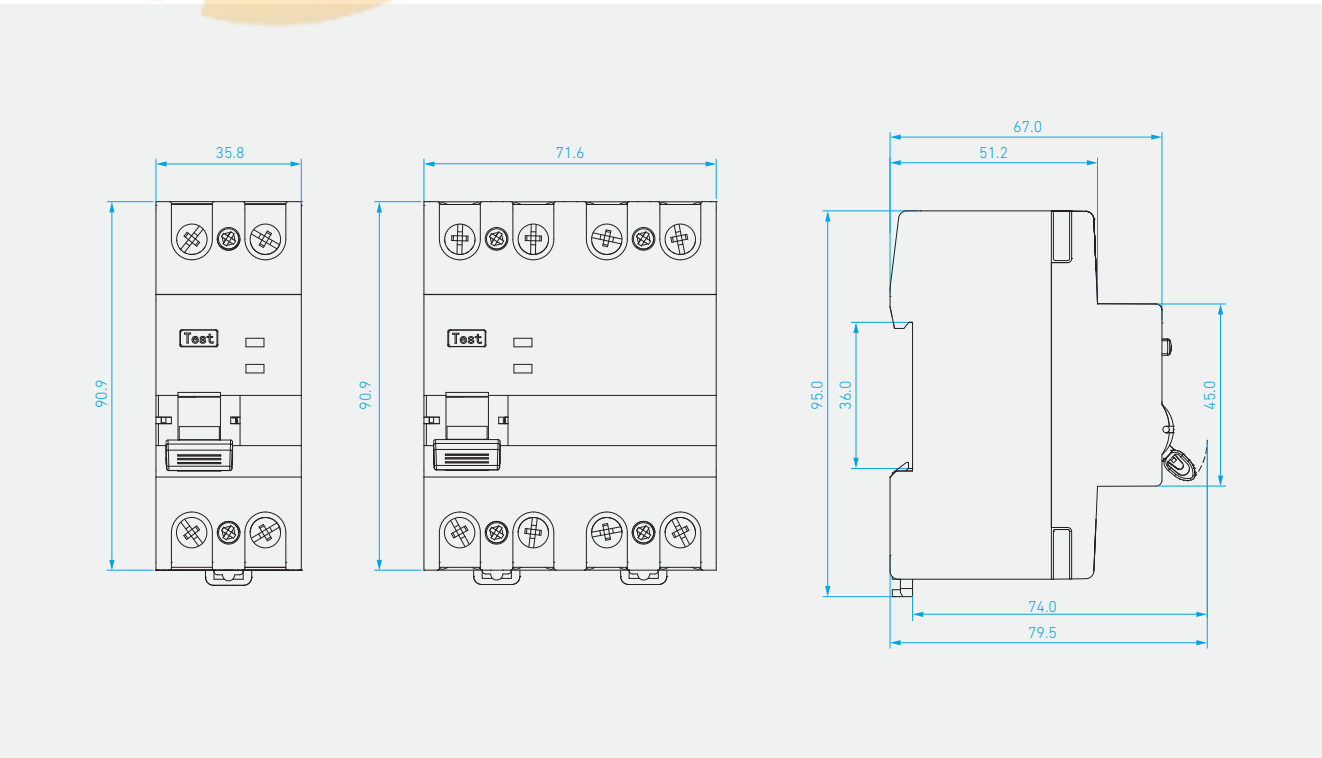
# Dimensions

## HRC (Standard Type)

### HRC63S, 63 AF

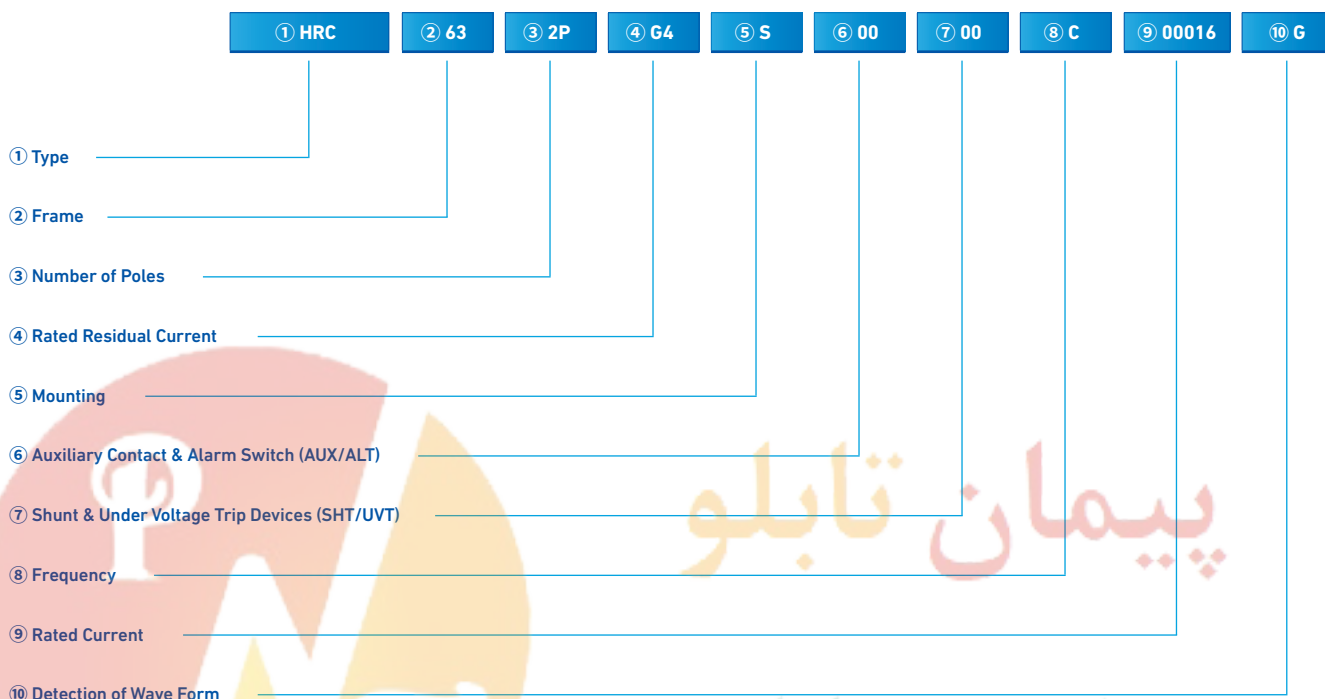


### HRC100S, 100 AF



# RCCB Ordering Information

## Ordering Guidelines (Deluxe Type)



① Type	
HRC	Residual current circuit breaker

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

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

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

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

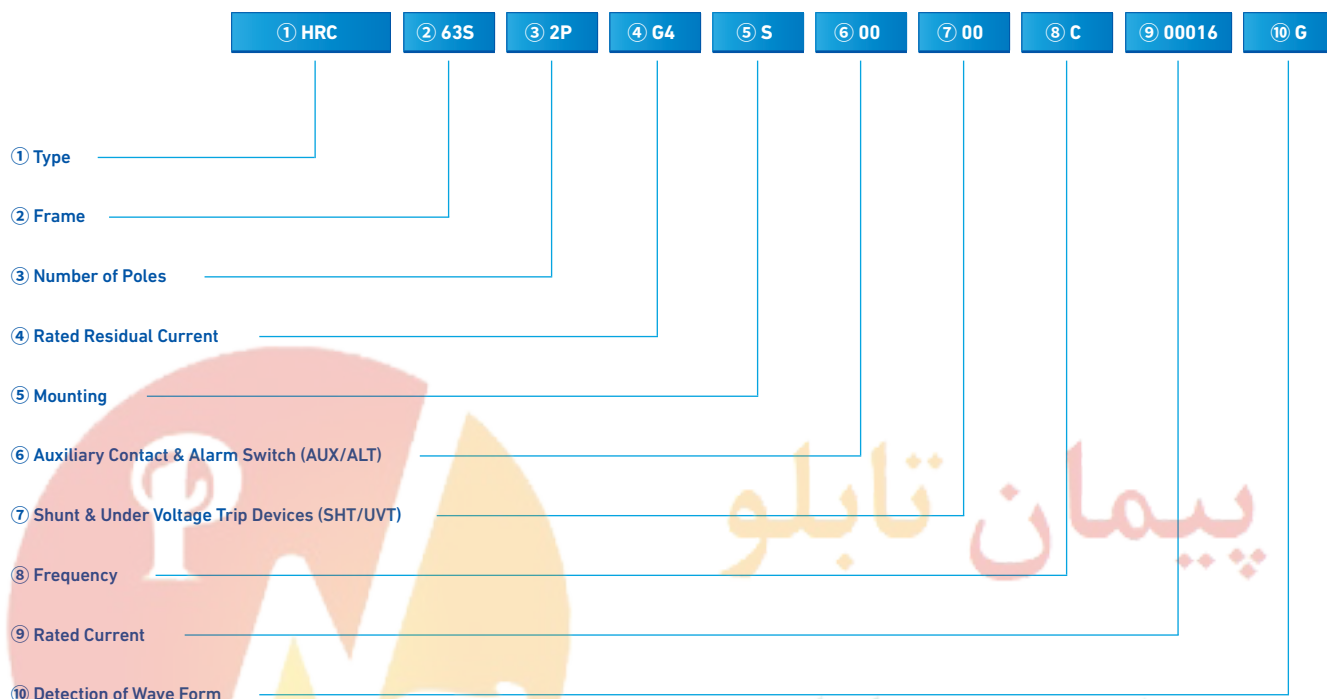
⑧ Frequency	
C	50/60 Hz

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

⑩ Detection of Wave Form	
G	AC type
F	A type

# RCCB Ordering Information

## Ordering Guidelines (Standard Type)



① Type	
HRC	Residual current circuit breaker

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

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

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

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

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

⑩ Detection of Wave Form	
G	AC type
F	A type



# HSD

Miniature Switch  
Disconnecter

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# Features

## HSD Miniature Switch Disconnecter

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

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

HSD Deluxe Type

HSD63





## 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.



### 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



### Product Structure

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

### Standard Type

- Low watt loss
- Wide range

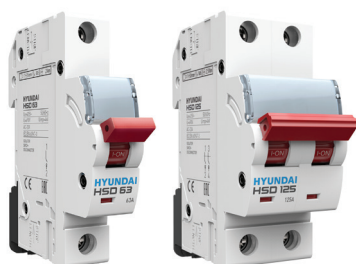


### Specification

- IEC/EN 60947-3

- IEC/EN 60947-3

## Product Overview



Deluxe Type



Standard Type

# Selection Table

## HSD (Deluxe Type)

Model	HSD63, 63 AF	HSD125, 125 AF
		
Reference Standard	IEC/EN 60947-3	IEC/EN 60947-3
No. of Poles	1P, 2P, 3P, 4P	1P, 2P, 3P, 4P
Utilization Category	AC-22 A	AC-22 A
Rated Current (In)	16, 25, 32, 40, 63 A	80, 100, 125 A
Rated Voltage (Ue)	AC 240/415 V	AC 240/415 V
Rated Frequency (F)	50/60 Hz	50/60 Hz
Rated Insulation Voltage (Ui)	500 V	500 V
Rated Impulse Voltage (Uimp)	4 kV	4 kV
Dielectric Strength	2.5 kV	2.5 kV
Electrical/Mechanical Endurance (no. of operations) Minimum	10,000/20,000	10,000/20,000
Operating Temperature	-5 °C to + 55 °C	-5 °C to + 55 °C
Humidity	95 % RH	95 % RH
Terminal Capacity (max)	35 mm <sup>2</sup>	50 mm <sup>2</sup>
Tightening Torque	2 N·m	2.5 N·m
Vibration	3 g	3 g
Shock Resistance	40 mm free fall	40 mm free fall
Protection Class	IP20	IP20
Positive Contact Indication	Red-ON, Green-OFF	Red-ON, Green-OFF
Net Weight/Pole in kg	0.090 kg	0.079 kg
Dimensions (H x D x W)/Pole in mm	87.5 x 71.7 x 17.7 mm	87.5 x 73.4 x 17.7 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type (Bottom)	Pin/Fork type (Bottom)

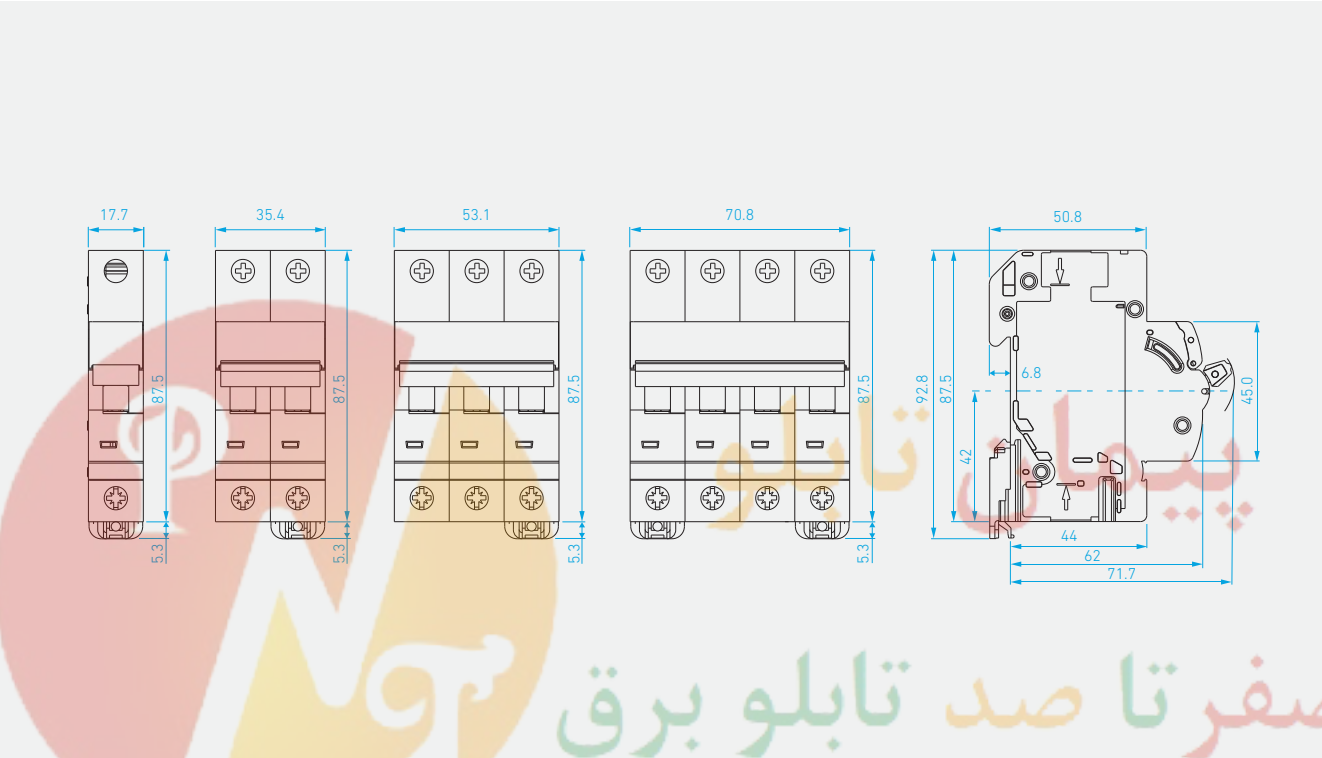
## HSD (Standard Type)

Model	HSD100S, 100 AF
	
Reference Standard	IEC/EN 60947-3
No. of Poles	1P, 2P, 3P, 4P
Utilization Category	AC-22 A
Rated Current (In)	6, 10, 16, 20, 25, 32, 40, 50, 63, 70, 80, 100 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	-25 °C to + 55 °C
Humidity	95 % RH
Terminal Capacity (max)	35 mm <sup>2</sup>
Tightening Torque	2.5 N·m
Vibration	3 g
Shock Resistance	40 mm free fall
Protection Class	IP20
Positive Contact Indication	Red-ON, Green-OFF
Net Weight/Pole in kg	0.080 kg
Dimensions (H x D x W)/Pole in mm	81.0 x 76.8 x 17.6 mm
Mounting	Clip on DIN Rail (35 mm x 7.5 mm)
Installation Position	Vertical/Horizontal
Case & Cover	Molded, flame retardant thermoplastic material
Busbar Connections	Pin/Fork type

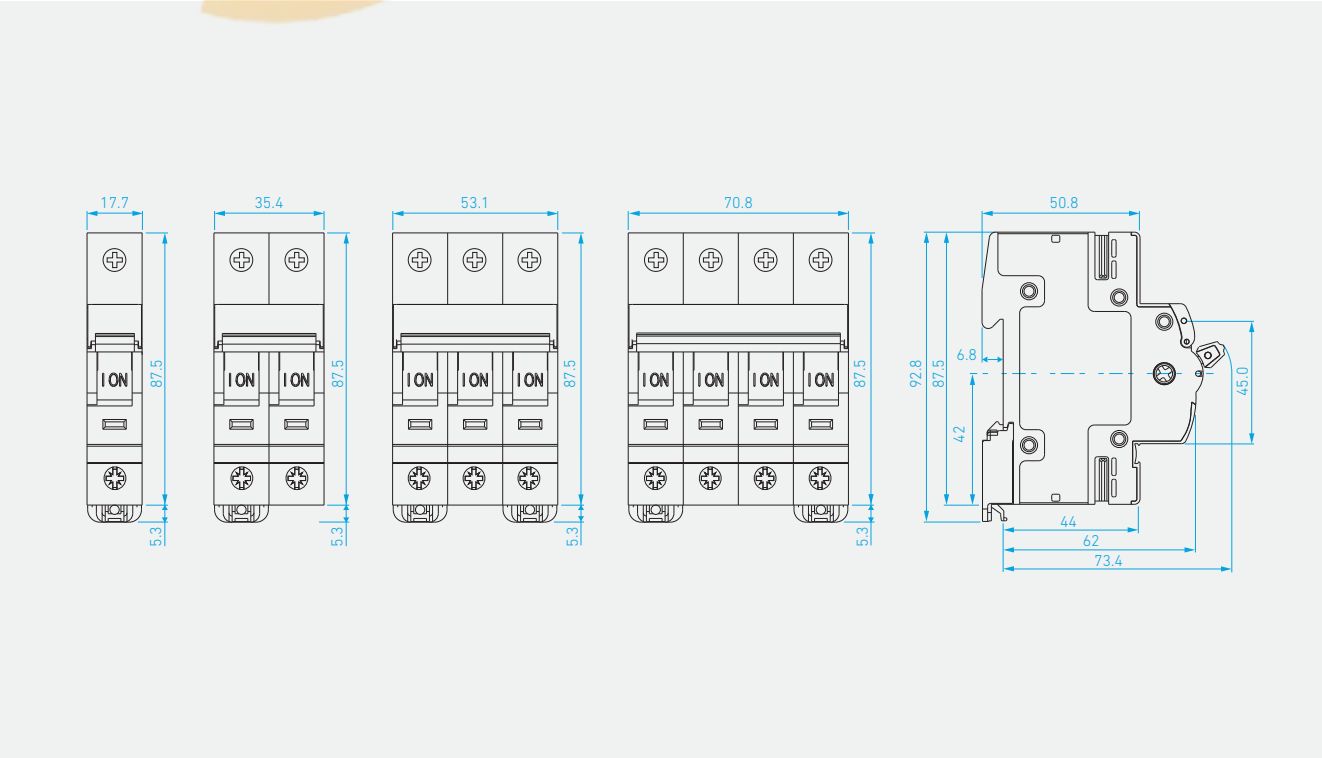
# Dimensions

## HSD (Deluxe Type)

### HSD63, 63 AF



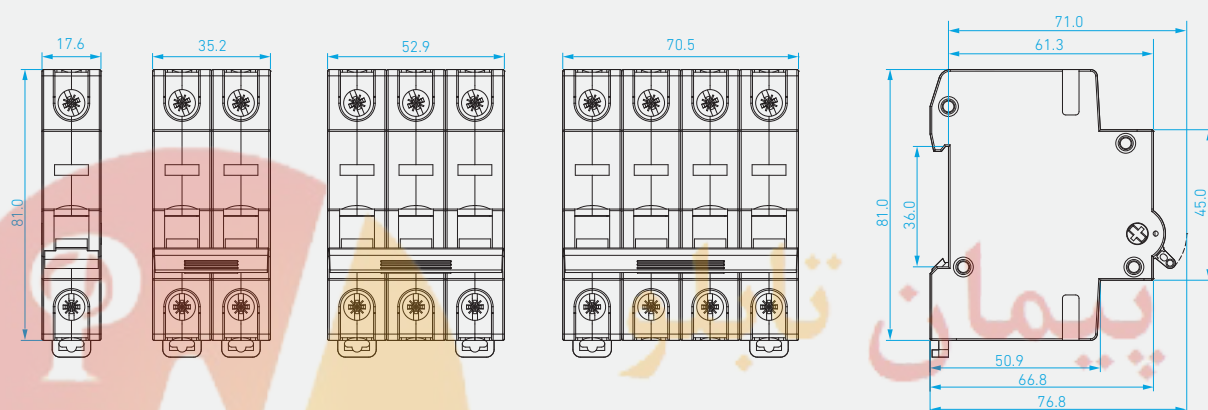
### HSD125, 125 AF





## HSD (Standard Type)

HSD100S, 100 AF



# HSD Ordering Information

## Ordering Guidelines (Deluxe Type)

	① HSD	② 63	③ 1P	④ DS	⑤ S	⑥ 00	⑦ 00	⑧ C	⑨ 00016
① Type									
② Frame									
③ Number of Poles									
④ Product Description									
⑤ Mounting									
⑥ Auxiliary Contact & Alarm Switch (AUX/ALT)									
⑦ Shunt & Under Voltage Trip Devices (SHT/UVT)									
⑧ Frequency									
⑨ Rated Current									

① Type	
HSD	Miniature switch disconnecter

⑤ Mounting	
S	Front connection

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

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

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

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

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

④ Product Description	
DS	Disconnection switch

⑧ Frequency	
C	50/60 Hz

## Ordering Guidelines (Standard Type)

	① HSD	② 100S	③ 1P	④ DS	⑤ S	⑥ 00	⑦ 00	⑧ C	⑨ 00016
① Type									
② Frame									
③ Number of Poles									
④ Product Description									
⑤ Mounting									
⑥ Auxiliary Contact & Alarm Switch (AUX/ALT)									
⑦ Shunt & Under Voltage Trip Devices (SHT/UVT)									
⑧ Frequency									
⑨ Rated Current									

① Type	
HSD	Miniature switch disconnecter

② Frame	
100S	100 AF (Standard type)

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

④ Product Description	
DS	Disconnection switch

⑤ Mounting	
S	Front connection

⑥ Auxiliary Contact & Alarm Switch	
00	Non-attachment

⑦ Shunt & Under Voltage Trip Devices	
00	Non-attachment

⑧ Frequency	
C	50/60 Hz

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



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# HEC

## Electronic Circuit Breaker

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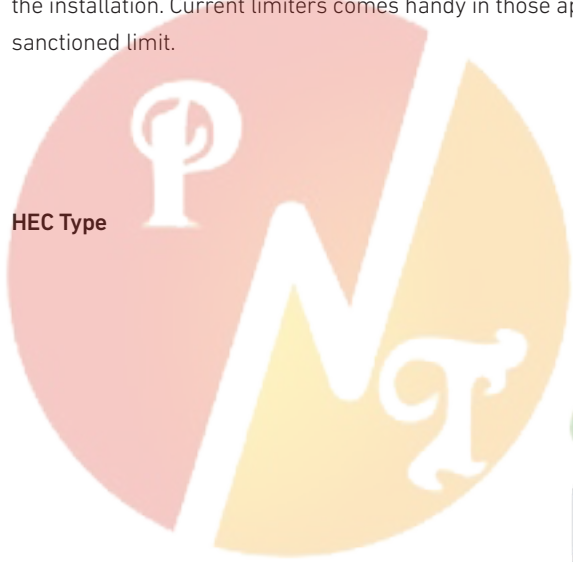
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# Features



## 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.



HEC Type

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HEC20



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## 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



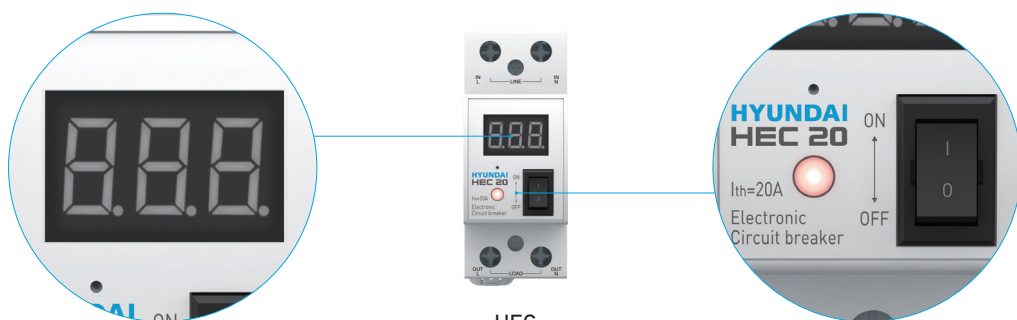
#### Product Structure

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

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## Product Overview



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

# Selection Table

## HEC Type

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

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# Operation

## Product Description



## Controls and Settings

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

# Technical Data

## Functions

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

### Current Sanctioning

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

### Pre-Trip Indication

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

### Overloading/Current Limiting

In the case user starts consuming current more than the sanctioned limit, the HEC will detect the fault situation and the pre-trip LED will 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

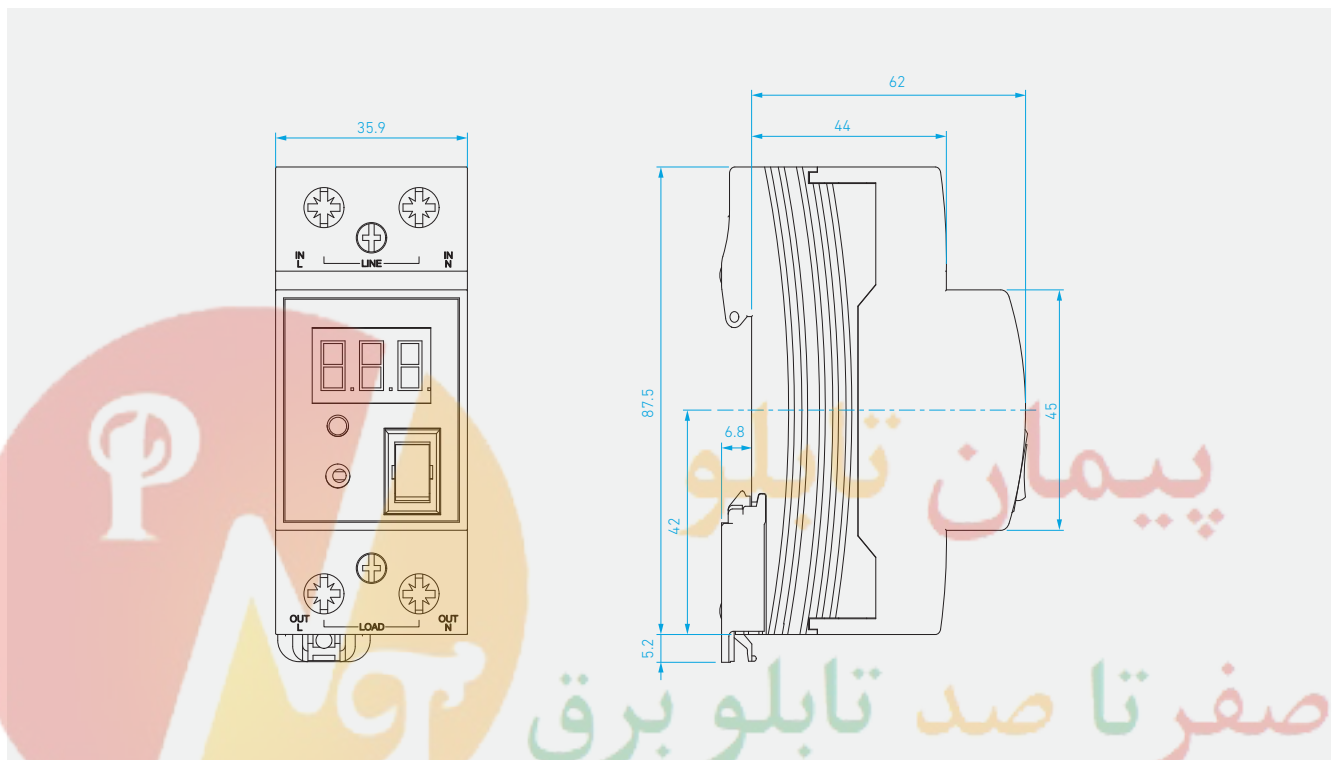
Once the HEC trips in the event of the fault, 10 seconds. If user has already switched off and brought load in sanctioned limits, it will run smoothly. Else, it will again disconnect the load.



# Dimensions

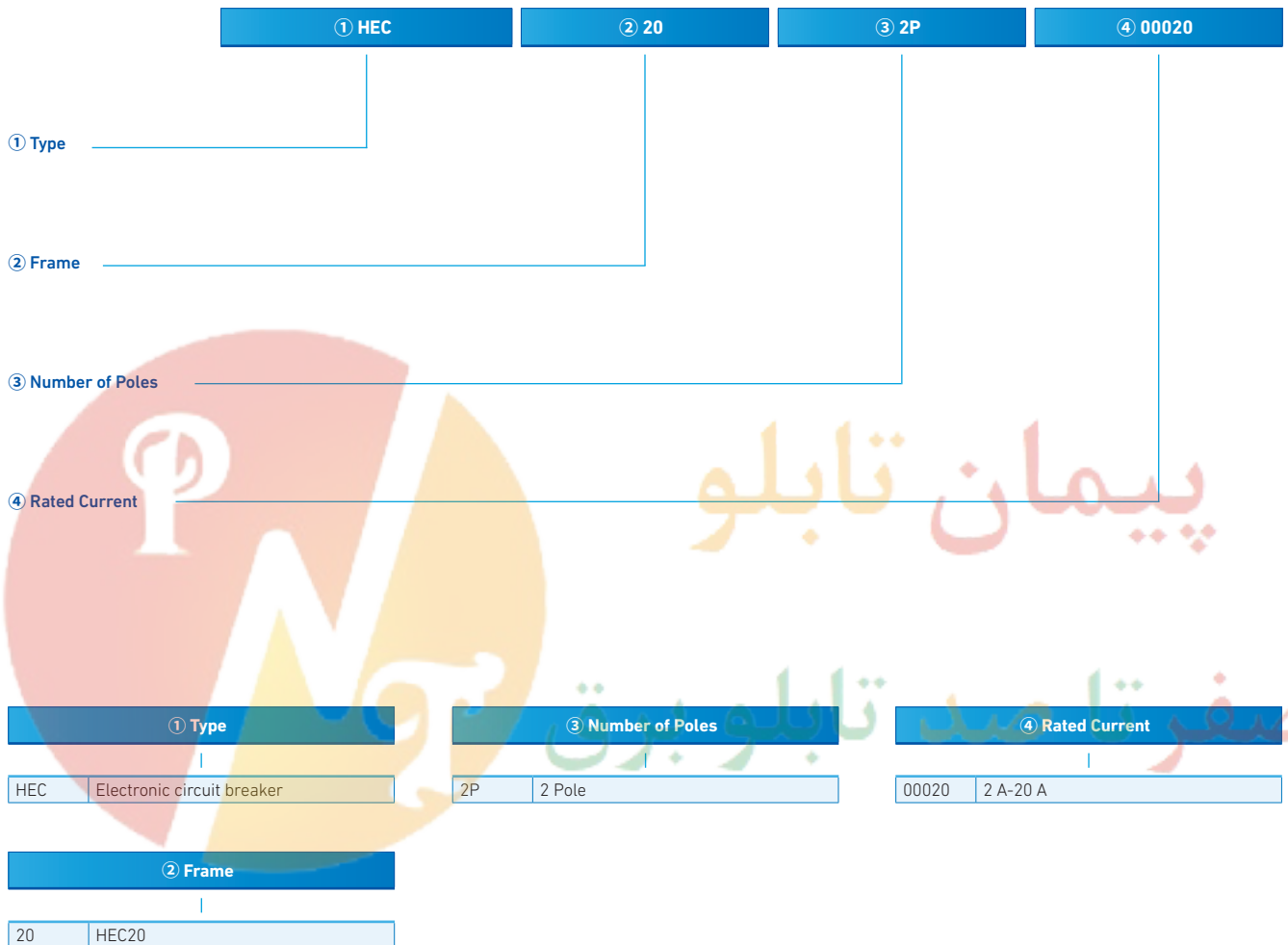
HEC

HEC20



# HEC Ordering Information

## Ordering Guidelines





# HIC

## Installation Contactor

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# Features

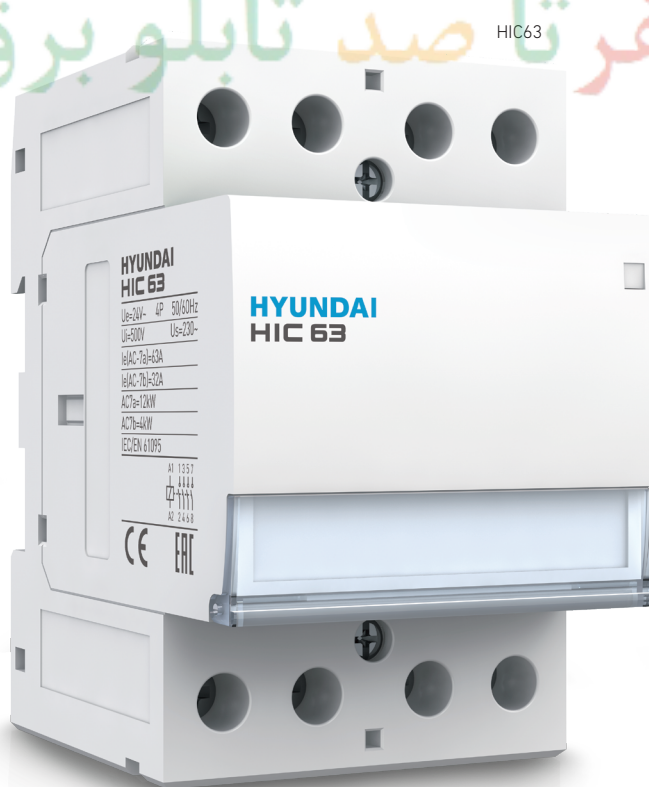


## HIC Installation Contactor

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

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

HIC Type





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



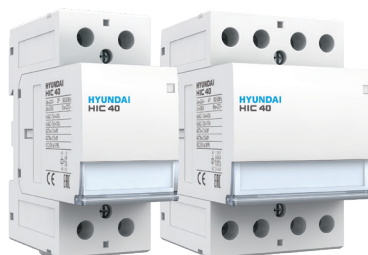
### Specification

- Standard: IEC/EN 61095

## Product Overview



HIC25



HIC40



HIC63

## Product Features




## External Structure

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



# Selection Table

## HIC Type

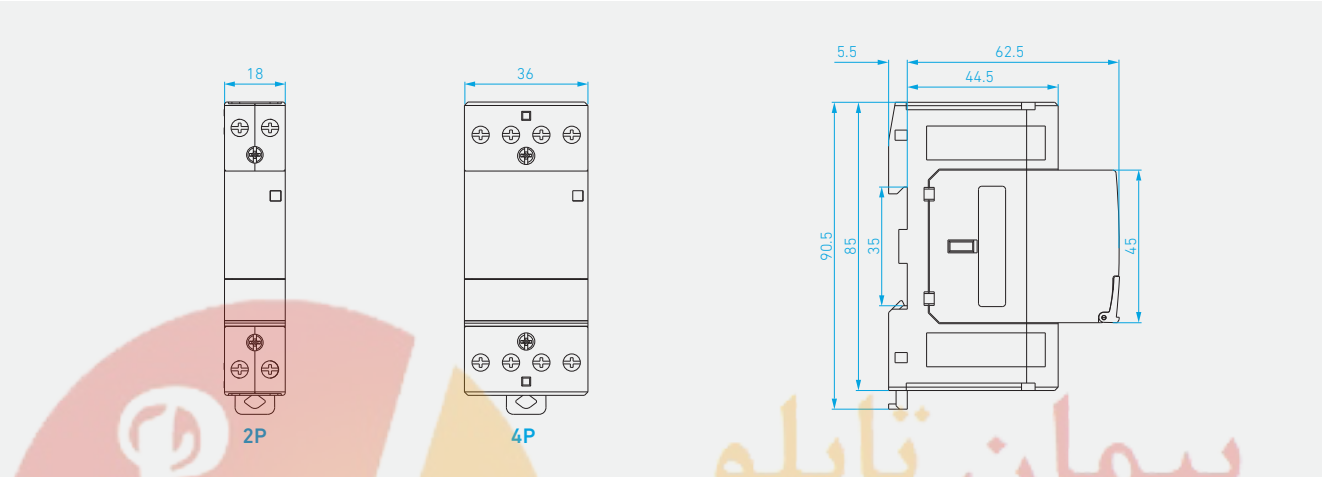
Model	HIC25	HIC40	HIC63
			
Reference Standard	IEC/EN 61095	IEC/EN 61095	IEC/EN 61095
No. of Poles	2P, 4P	2P, 4P	2P, 4P
Rated Current (In)	25 A	40 A	63 A
Rated Voltage (Ue)	2P: 230 V 4P: 400 V	2P: 230 V 4P: 400 V	2P: 230 V 4P: 400 V
Rated Voltage (Ui)	500 V	500 V	500 V
Rated Control Voltage (Uc)	24 V,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



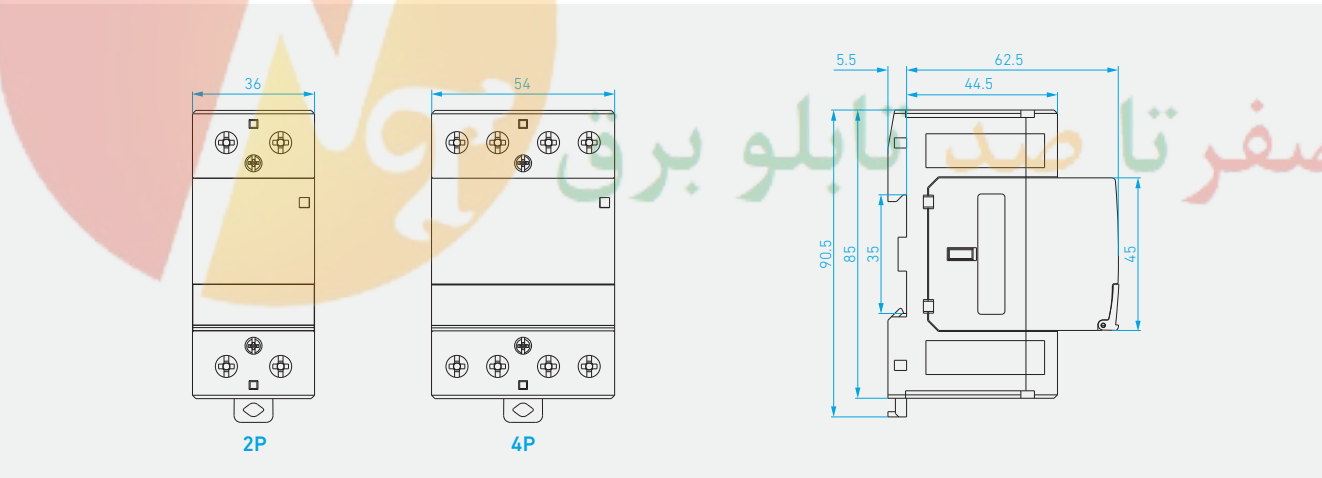
# Dimensions

## HIC

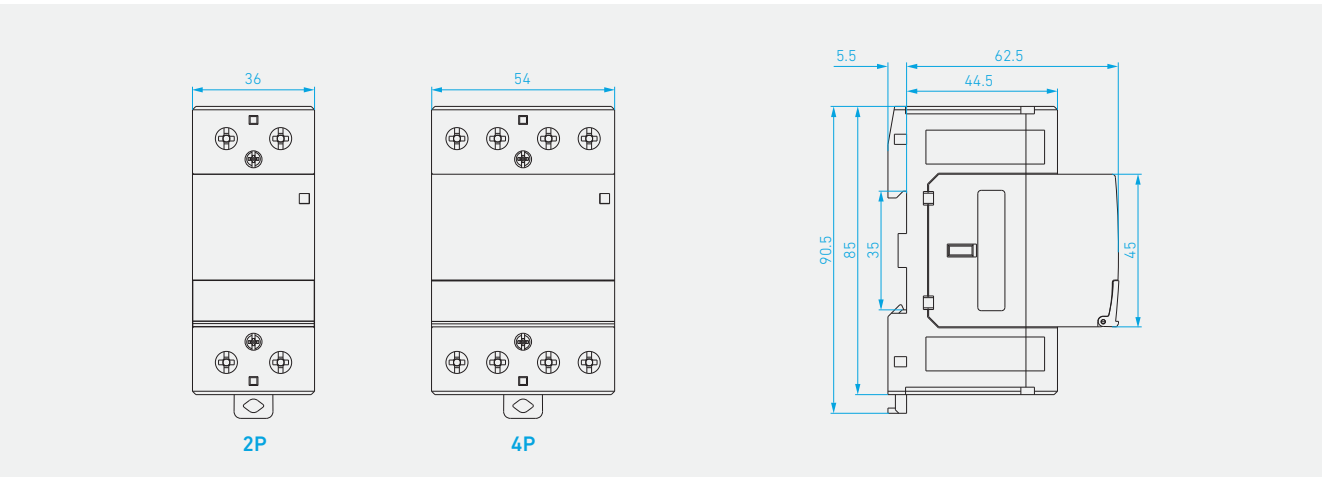
### HIC25, 25 AF



### HIC40, 40 AF



### HIC63, 63 AF

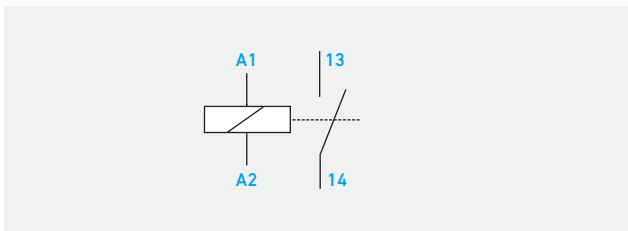




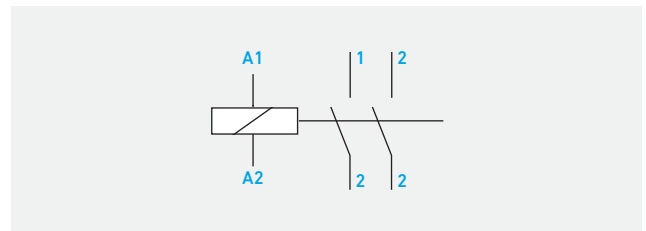
# Circuit Diagram

## HIC 2P

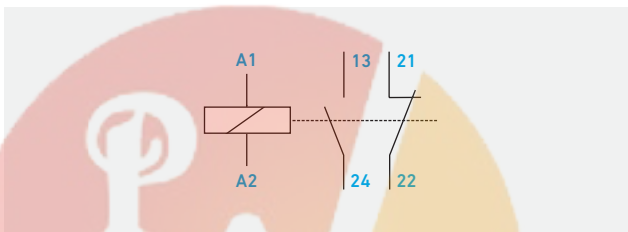
### 1NO



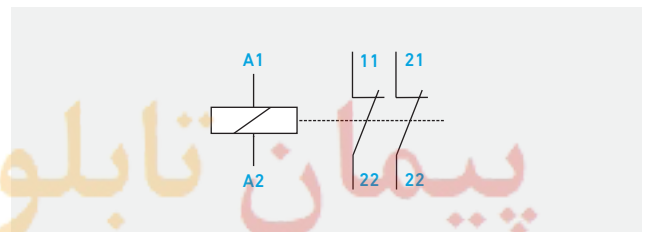
### 2NO



### 1NO + 1NC

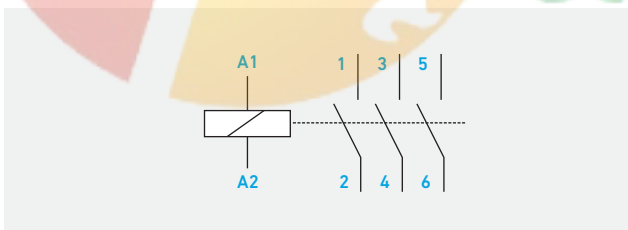


### 2NC

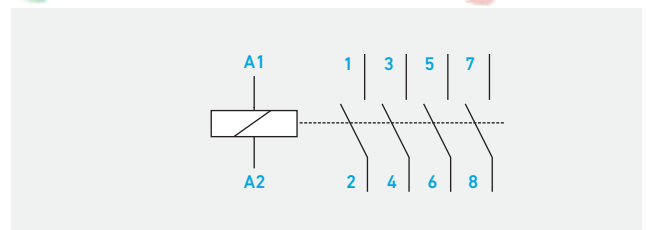


## HIC 4P

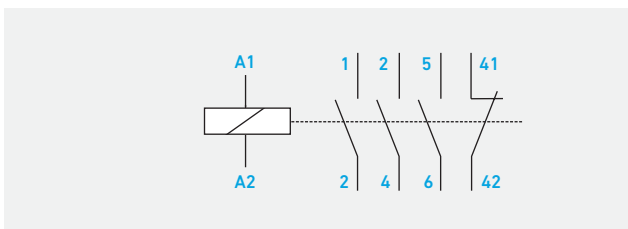
### 3NO



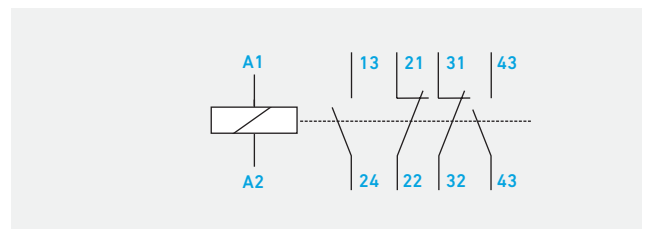
### 4NO



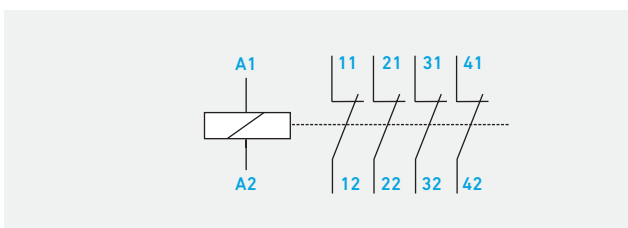
### 3NO + 1NC



### 2NO + 2NC



### 4NC



# HIC Ordering Information

## Ordering Guidelines

	① HIC	② 25	③ 11	④ NS	⑤ X	⑥ 024
① Type						
② Rated Current						
③ Contacts Arrangement						
④ Application						
⑤ Coil Voltage Type						
⑥ Coil Voltage						

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① Type	
HIC	Installation contactor

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

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

※ N/A: 1NO + 0NC (63 AF, 2P)

⑤ Coil Voltage Type	
X	AC 50/60 Hz

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

④ Application	
NS	Normal

# 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 and others.



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



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



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

- **Avoid storage in high or low temperature**  
Storage temperature must be maintained between -20 °C~+60 °C.

### Transportation Precautions



#### Caution

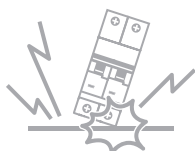
- Do not apply impact during transportation. Dropping or applying strong impact may cause defect.
- Do not handle while holding the circuit breaker's accessory or the external plug-in wire of the accessory. It may cause injury to the handler or a malfunction of the circuit breaker.



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



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



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



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

# Handling and Maintenance Inspection

## Installation

### Installation Precautions

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

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

- Ambient temperature of  $-5^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$   
(However, the 24-hour average temperature must not exceed  $35^{\circ}\text{C}$ .)
- 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 state.**  
As for the connecting conductor, electromagnetic force between conductors is generated by extremely big fault current so it must be fixed firmly.

## Connection Precautions

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

### Impact force per 1m conductor

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

- Contact surface must be clean**

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

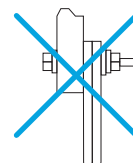
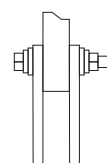
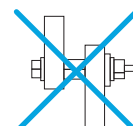
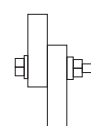
- Conductor must be connected so that it has direct contact with the contact surface**

Do not use bolt or nut between the contact surfaces of the conductor.

If there is no direct contact between conductors, it may cause increase in temperature and fire.

- Do not overlap the conductors**

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



# Handling and Maintenance Inspection

## Maintenance Inspection

### Initial Inspection

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

### Withstand voltage

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

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

1) Between terminal and grounding

## Installation

### Regular Inspection

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

### Standard inspection period

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

## Regular Inspection Item

Inspection Item	Procedure	Countermeasure
Tightening of Terminal Screw	<ul style="list-style-type: none"> <li>Inspect tightening of terminal screw, conductor connecting screw</li> </ul>	<ul style="list-style-type: none"> <li>Tighten according to the specified torque</li> <li>Ensure that it is not tightened excessively</li> </ul>
Dust and Foreign Substance	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Remove dust, foreign substance and others using cloth with clean surface types (Do not use thinner or detergent)</li> </ul>
Damage in Mold Case	<ul style="list-style-type: none"> <li>Check damage or crack on the circuit breaker's cover and base</li> </ul>	<ul style="list-style-type: none"> <li>Replace circuit breaker</li> </ul>
Arc Exhaust Hole	<ul style="list-style-type: none"> <li>Check pollution in the arc exhaust hole</li> </ul>	<ul style="list-style-type: none"> <li>If there are burns or excessive pollution due to melted metal particles and others, replace the circuit breaker</li> </ul>
Switch Operation	<ul style="list-style-type: none"> <li>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</li> <li>Press the trip button to trip the circuit breaker multiple times</li> </ul>	<ul style="list-style-type: none"> <li>If there is a problem in the switch operation of the circuit breaker, replace or contact the nearest store</li> <li>If the specified limit value of the switch operation has exceeded, replace it</li> </ul>
Discoloration of Terminal Part	<ul style="list-style-type: none"> <li>Check severe discoloration in the terminal part or conductor part</li> <li>If there is severe discoloration in the copper conductor or silver coated part, check the insulation performance caused by thermal damage</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>
Insulation Resistance	<ul style="list-style-type: none"> <li>Separate all conductors connected to the circuit breaker and measure the insulation resistance between the poles, terminals and groundings</li> </ul>	<ul style="list-style-type: none"> <li>If the insulation resistance is not more than 5 MΩ, replace it</li> </ul>

## Inspection and Processing After Blocking Fault Current

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

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



# Handling and Maintenance Inspection

## Installation

### Countermeasures with Regards to Abnormal Phenomenon

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

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

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

# Current Status of Acquired Standards

## Approvals & Certificates

Type	Approvals	Certificate
Certificate	IEC	IEC
Mark	CE	DEKRA
Testing Institute	CE	KEMA
Certification Region	Europe	Netherlands
MCB	HGD63N/H (Deluxe type)	•
	HGD125 (Deluxe type)	•
	HGD63E/S (Standard type)	•
	HGD63M/P (Standard type)	•
RCCB	HGD100 (Standard type)	•
	HRC63/100 (Deluxe type)	•
	HRC63S/100S (Standard type)	•
RCBO	HRO63M/P (Standard type)	•
MSD	HSD125 (Deluxe type)	•
	HSD100S (Standard type)	•



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