VACUUM CIRCUIT BREAKERS

AIR CIRCUIT BREAKERS

MOLDED CASE CIRCUIT BREAKERS

EARTH LEAKAGE CIRCUIT BREAKERS

MAGNETIC CONTACTORS AND OVERLOAD RELAYS

Comprehensive Product Brochure of Power Distribution Devices

HD HYUNDAI ELECTRIC

Essential for Today, Potential for Tomorrow

HD 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.

Contents

VCB Vacuum Circuit Breakers

ACB Air Circuit Breakers

MCCB Molded Case Circuit Breakers &
Earth Leakage Circuit Breakers

MS Magnetic Contactors & Overload Relays

RELAY Digital Motor Protection Relays

Power System Monitoring and
Protection Relays

Solution

Utility

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.

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.

Generation(step-up)

Power Plants

- Supplied to more than 70 countries around the world for the past 45 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
· up to 800 kV, 1,500 MVA



Gas Insulated Switchgear
· up to 800 kV

- Can be installed in spaces smaller than the open type of substation by using SF_6 gas with outstanding insulation and arc extinguishing characteristics
- Manufacturing advanced 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

Transmission

Primary Substation/Secondary Substation



Gas Insulated Switchgear
· up to 800 kV



Power Transformer
· up to 800 kV, 1,500 MVA



Shunt Reactor
· up to 765 kV, 300 Mvar

GREENTRIC



ECO Transformer
· up to 500 kV, 1,000 MVA

- Eco-friendly oil (Natural/Synthetic)
- Dynamic Pressure Resistant System(DPRS)
- Guarantees excellence in safety

GREENTRIC



SF_6 Free Gas Insulated Switchgear
· GIS for 170 kV 50 kA 60 Hz
· ECO GIS for 72.5 kV, 145 kV

- Korea's first solely developed technology
- Eco-friendly Novec mixture gas instead of SF_6 gas

Distribution



Cubicle GIS
· up to 40.5 kV
· IEC, ANSI, GOST, UL

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

Motor & Generator



Synchronous Generator
· Rated Output: < 50 MVA
· Rated Voltage: < 15 kV
· Ploes: > 2P

Marine

Marine Solution

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



Marine Switchgear



Marine Motor



Generator



Shaft Generator



Metal Clad Switchgear
· up to 38 kV
· IEC, ANSI, UL



Low Voltage Switchgear & Motor Control Center
· H8PU : 480 V, 3,200 A, 65 kA
· H5600 : 480 V, 1,200 A, 65 kA
· HiMCC : 480 V, 5,000 A, 100 kA



Distribution Transformer
· up to 36 kV, 50 MVA



Cast Resin Transformer
· up to 36 kV, 20 MVA



Synchronous Motor
· Rated Output: < 40 MW
· Rated Voltage: < 15 kV
· Ploes: > 2P



MV&HV Induction Motor
· Rated Output: < 35 MW
· Rated Voltage: < 15 kV
· Poles: 2P-30P



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



ACB
· AC : up to 150 kA, 6,300 A
· DC : up to 60 kA, 4,000 A



VC
· up to 12 kV, 400 A



Switch-Disconnector
· DC : up to 100 kA/1 s, 4,000 A



HGMAP
· HGMAP Series



HGCAM
· HGCAM Series



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



ELCB
· up to 85 kA, 800 A, 1,000 mA



MCCB / ELCB
· up to 10 kA, 100 A, 100 mA



MS / MC
· up to 800 A



Distribution Box
· Up to 36 ways
· Surface/Flush type



MCB
· up to 15 kA, 125 A



RCCB / RCBO
· up to 100 A, 500 mA



Isolator
· up to 125 A



Electronic Circuit Breaker
· up to 20 A



MMS
· up to 100 kA, 80 A



Fuse Links & Switches
· up to 1,250 A

- Can be applied to various places of demand due to various domestic and international certifications and marine certifications
- Full HG-Series line-up established
- High standard of breaking capacity and various product line offers production in any load environments
- Increased reliability with reinforced breaking performance of high-breaking MCCB
- Reinforced usage stability through internal reliability verification



Installation Contactor
· up to 63 A



SPD
· up to 200 kA
· AC, DC



HGDM



EOCR
· up to 60 A

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



LV Motor
· Rated Output: < 750 kW
· Rated Voltage: < 690 V
· Poles: 2P-12P

HG
Vacuum Circuit Breakers

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VCB

HG Series

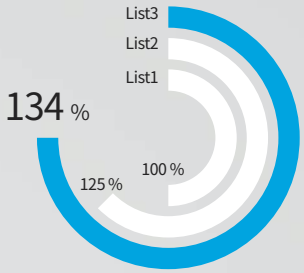
Vacuum Circuit Breakers

New system solution with better selection and user convenience!

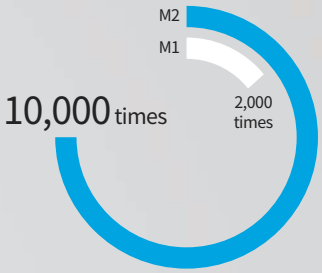


Standards and Certification

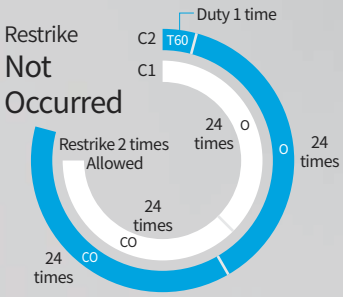
E2 (List3) Arc Energy



M2 Mechanical Durability



C2 Restrike did not occur during T60 : Duty 1 time, O : 24 times, CO : 24 times



Draw-Out Type Breaker & ES/FS-Type Cradle

FS is an ES cradle with a safty shutter.

Draw-Out Type Breaker & GS-Type Cradle

GS-type is a high-end cradle for MCSG, to which mold bushing and metal shutter are applied.
GE is equipped with earthing switch.

Draw-Out Type Breaker & MS-Type Cradle

MS-type is a cell-type cradle and complete implementation of circuit breaker board of panel.
It includes every application of GS-type and can be equipped with various options based on door requirements.



Draw-Out Type Breaker & ES/FS-Type Cradle



Draw-Out Type Breaker & Gs-Type Cradle



Draw-Out Type Breaker & MS-Type Cradle

Overview and Characteristics (HGV)

Features

- Hyundai Electric vacuum circuit breaker is composed of vacuum interrupter which is manufactured independently based on our 30 years of manufacturing experience ensuring the lowest leak rate and high reliability for long-lasting lifetime.
- HG-Series vacuum circuit breaker is for installation under high pressure and very high pressure switchboard (7.2 ~ 25.8 kV) as a circuit breaker for entrance or branching. It is used for control, line protection, transformer protection and motor protection. In addition, it has a fully open architecture unlike existing closed or half-closed ones, and is free of the insulating method relying on closed or half-closed-type insulating material but employed an ideal insulation method based on insulation by air/surface distance expansion to endure withstanding voltage which is 1.3 times greater than rated voltage even in the event of destruction of auxiliary insulating material.
  In particular, with its optimized flow path of the conductive part which naturally suppresses temperature rise, it enables stable operation of the system.

Vacuum Circuit Breaker (VCB)



Vacuum Interrupters (VI)



Standards and Certification

HG-Series vacuum circuit breakers were tested and certified by a recognized testing agency which is a member of STL in accordance with IEC 62271-100 (2012) and can be installed and applied to the environment and conditions allowed by the standard.

Applied Standards

IEC 62271-1 (2008)
High-Voltage Switchgear and Controlgear
- Part 1 : Common Specifications

IEC 62271-100 (2012)
High-Voltage Switchgear and Controlgear
- Part 2 : Alternating-Current Circuit Breaker

Certification

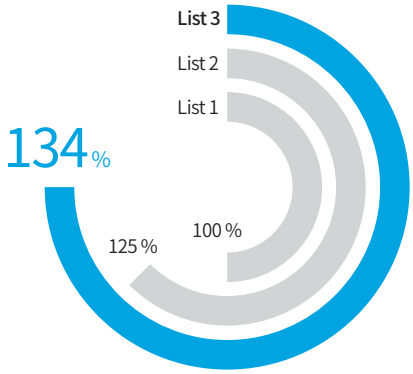
ACCREDIA
Product certification issued by the Italian accreditation body for base models and derived models

STL
Test certificate issued only if tested and evaluated based on STL Guide by STL member test agency

Electrical Endurance Rating : E2 (List3)

E2 grade is the highest among electrical endurance grades specified in IEC 62271-100. There are three test operation obligations of List1, List2 and List3, out of which one has to be picked.
For specifications, List 1 is recommended ; however, List3 which emerged for the first time in the 2008 revision has lower cases of breaking of T10 and T30 when compared with Lists 1 and 2. However, greatly increased breaking testing times of T60 resulted in the same test equality but the arc energy on the breaker is like follows : when list 1 is 100 %, list 2 is 125 % and list 3 134 %, making the test environment harsh.
To HG-Series VCB, E2 grade List3 is applied.

E2 (List3) | Arc Energy



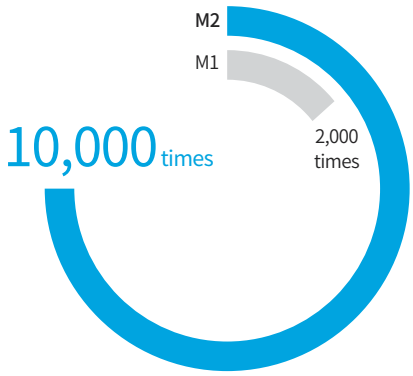
Mechanical Endurance Rating : M2

The IEC standard specifies mechanical endurance ratings so that customers can select and use product performance and quality levels. Out of the M1 and M2 mechanical endurance, the M2 level is applied to HG-Series vacuum circuit breaker.

M1
- Pre-test (Characteristic, Insulation and Resistance)
- Confirmation test after 2,000 times are completed (Characteristic, Insulation and Resistance)

M2
- Pre-test (Characteristic, Insulation and Resistance)
- Confirmation test after every 2,000 times of test are completed (Characteristic, Insulation and Resistance)
- Confirmation test after 10,000 times are completed (Characteristic, Insulation and Resistance)

M2 | Mechanical Durability



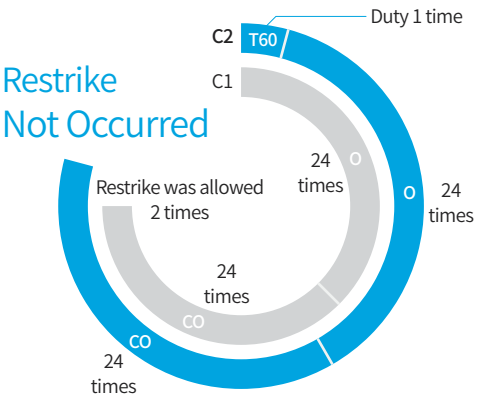
Make and Break Rating of Cable Charging Current : C2

The over-voltage higher than usual is applied to contacts when charging current is interrupted, which increases the chance of restrike. In the event of restrike, there is a possibility of breaking insulation due to high surge voltages.
Therefore, cable charging current make and break tests are divided into C1 and C2 in order to separate stability level. Also, C2 level has been applied to HG-Series vacuum circuit breaker.

C1
Restrike were allowed two times among “O” 24 times, “CO” 24 times

C2
Restrike did not occur among “T60” Duty 1 time, “O” 24 times, “CO” 24 times

C2 | T60 : Duty 1 time, O : 24 times, CO : Restrike did not occur during 24 times



Overview and Characteristics (HGV)

Convenience of Panel Configuration

It offers the convenience of panel production ensuring stability and prevention of spreading accidents by isolated metal structure and breaker boundary compartment of M-type cradle

- Completely isolated structure by metal : Prevention of spreading accidents and securing stability
- Improved ease of operation by access truck
  - Panel doors (door) is implemented to allow pushing/drawing only when panel doors are closed
  - Location indicator during pushing/drawing
- Equipped with safety devices and accessory devices
  - Control power connecting interlock
  - Grounding switch and interlock
- Panel manufacturing convenience : Units were assembled based on breaker boundary compartment

VCB in the Cradle



Cradle Empty



MS Type Cradle

Cradle Front



Cradle Back



Overview and Characteristics (HVF)

Features

- With the technology and know-how which manufactured the largest number of VCB models and based on the newer and more stabilized machine unit and breaker units, high reliability and quality tested by new standard of IEC 62271-100
- By adopting electro motion spring mechanism with faster and more reliable mechanical features, 3 cycles of breaker time is implemented for all models
- Implementation of full moldization which inserts breaker unit to insulating material container to minimize the human and material damage in the event of an accident
- Reduced the size of vacuum interrupters using the optimal arc control technology to ensure higher rated breaking current

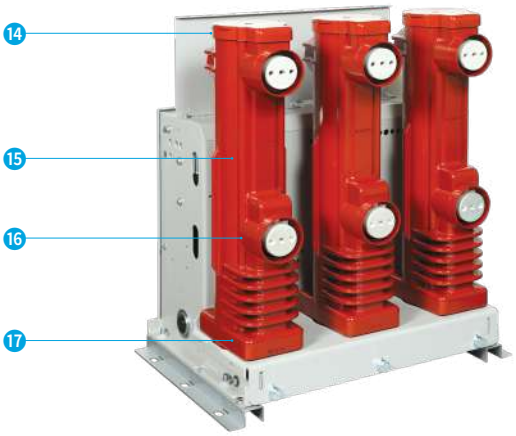
Structure and Operation

HVF-type VCB is of the structure in which electric motion spring-type operation and control machine unit is installed inside operation control box and vacuum interrupting unit. Also electric current unit are installed inside insulation frame which is on the rear side of operation control box.
Insulation Frame of epoxy material is designed to be a closed-type in order to have sufficient mechanical strength and dielectric strength and to minimize the impact of dust and dirt during use.

In addition, it helps solidly fixing vacuum circuit breaker unit, upper and the lower terminal unit and flexible terminal installed inside insulation frame to well withstand various electrical and mechanical shock and to adapt to temperature rise during the conducting of rated current.
Contacts of VI unit were designed to be a special shape using special materials sintered with Cu and Cr in an appropriate ratio, thus they have a superior performance in the short-circuit current and various load current cut-off, and are completely sealed in a vacuum state to be safely used for a long time.



HVF Type VCB Front



HVF Type VCB Rear

HVF Type VCB

1. Control Circuit Connecting Unit
2. Manual Charging Hole
3. Closing Spring Condition Indicator
4. Breaker Operating State Indicator
5. Counter
6. Draw-Out Mechanism Unit
7. Shutter
8. Electric Current Unit
9. Cradle (G Grade)
10. Manual Feed Button
11. Housing Box
12. Manual Trip Button
13. Nameplate
14. Upper Insulating Cap
15. Vaccum Interrupter
16. Lower Terminal
17. Insulating Frame

Overview and Characteristics (Compact HGV)

Features

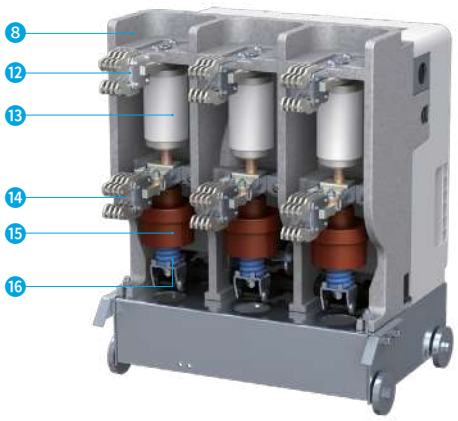
- Compact HGV has a compact size minimizing installation footprint
- Simple structure and ease operation. Test completed by the new standard of IEC 62271-100 with 3-cycle breaker
- Easy inspection and maintenance for current conducting. Mechanism unit can be easily maintained by opening the front cover

Structure and Operation

Electric motion spring system was adopted for operation of breaker, with main components of motor, closing spring, trip spring, contact pressure spring, closing solenoid, solenoid trip, auxiliary switch, reclosing-preventing contactor, vacuum breaker unit and the like.
Operation control machine unit consists of the mechanism of electric motion spring operating method and should make breaker maintain stable switching features during long hours of usage.
Current breaker and conducting units consist of vacuum circuit breaker unit and upper and the lower insulation units installed within insulation frame. In addition, breaker and conducting units are securely fixed to withstand various electrical and mechanical shock within insulation frame. Insulation frame of unsaturated polyester material (BMC) has a sufficient insulating dialectric strength.
When the control circuit of the circuit breaker are connected and voltage is applied to the control circuit, the closing spring is tensioned making the breaker always ready for closing. Once the breaker closes, the closing spring immediately gets recharged and the contacting spring is to provide appropriate pressure to the vacuum circuit breaker unit. At this time, the trip spring has been accumulating energy for the trip. Closing and trip solenoid control in operation control machine unit is commanded to perform electrical open/close in order to operate operation control machine unit ; breaker can be manually operated by manual operation handle, manual ON button and manual trip button.



Compact HGV Type VCB Front



Compact HGV Type VCB Rear

Compact HGV Type VCB

1. Manual Charging Hole
2. Closing Spring Condition Indicator
3. Breaker Operating State Indicator
4. Counter
5. Interlock Lever
6. Conducting Unit
7. Control Circuit Connecting Unit
8. Housing Box
9. Manual Closing Button
10. Manual Opening Button
11. Draw-Out Mechanism Unit
12. Upper Terminal
13. Vacuum Interrupter
14. Lower Terminal
15. Insulation Rod
16. Contact Pressure Spring

Overview and Characteristics (HVF)

Application of VCB

Applied Standards

Designed and tested in compliance with all the requirements of the International Standard IEC 62271-100 and can be applied to ANSI C37 standard based on breaker rating.

High-Speed Load Switchover and Operation Responsibilities

As closing and opening time of the circuit breaker is short, thus it is suitable for high-speed load transfer which requires input power switchover without stopping operation of load and can be used as a circuit breaker for high reclosing applied to avoid transient deviation such as lightning, temporary earth fault, etc. Operating responsibilities of the breaker are classified and verified as follows in accordance with related standards such as IEC 62271-100, making it available for various-type of operating conditions :

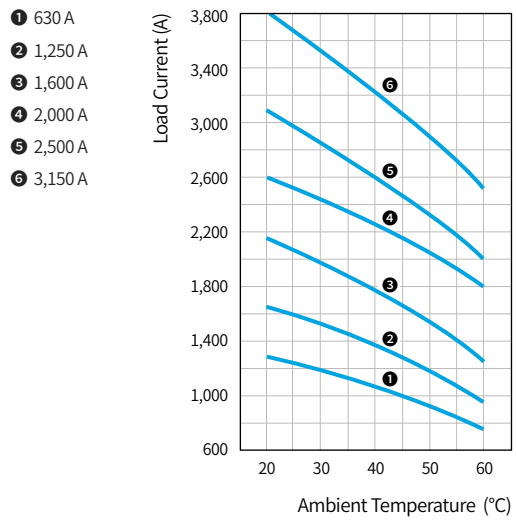
- O-0.3 sec-CO-3 min-CO (For High Speed Reclosing)
- CO-15 sec-CO (Standard)

(O : Opening, C : Closing, CO : Closing soon after opening)

Capacity of Conducting Current

Can be operated at - 5 °C ~ + 40 °C. Rating current of circuit breaker is determined at an ambient temperature of + 40 °C based on IEC standard. When the breaker is used at a different temperature it should be calibrated for the load current.
The figure below displays load current at various temperatures. However, this figure should only apply to open switchgear and load current is reduced when applied to closed switchboard.

Vacuum Circuit Breaker Load Characteristic Curve



Machining Line and Cable Opening/Closing

Cutting off cable current and machining line during no load poses no over-loading and restriking risks due to line charging current.

Cutting off Short-Circuit Current with High Recovery Voltage Rising Rate

In case of short-circuit current occurs at the back end of current limiting chalk, transformer or generator, recovery voltage rising rate exceeds the value regulated by IEC 62271-100, and can have a value higher than 10 kV/μs, but Hyundai Electric vacuum circuit breaker can be in such adverse conditions.

Opening and Closing Electrically

Frequent opening/closing and relatively less opening/closing surge makes it suitable for electric usage. However, for safer usage, special consideration is necessary for the maintenance and opening/closing surge of the breaker, thus make sure to contact us for application.

No-Load Transformer Opening/Closing

Chopping current ranges 4 ~ 5 A when cutting off inductive low current using contacts of special materials and no hazardous overvoltage when cutting off no-load transformer current.
Some dry-type transformer models may have lower dialectric strength compared to general transforms. Thus make sure to check dialectric strength of transformer to use and protect it using surge absorber when needed.

Capacitive Load Opening/Closing

Designed to be suitable for use for capacitive circuit no hazardous over-voltage and restriking at the time of capacitive load opening/closing such as condenser bank, etc. It can be used to capacitive load currents of up to 400 A (Except for VCB below 7.2 kV 20 kA) and for further details, make sure to contact us.

Motor Opening/Closing

Frequent electrical opening/closing and relatively less opening/closing surge in rate current makes it especially advantageous for opening/closing of high capacity motors with frequent opening/closing. For low-dose motor with low dialectric strength of 600 A or less starting current, installation of appropriate surge absorber is recommended to more reliably protect the system and load facilities.

Overview and Characteristics (HVF)

Operation and Control Voltage

Electric Motion Spring Charging Method

Motor is used for charging the closing spring in the vacuum circuit breaker of the electric motion spring system. For current consumption during motor operation, refer to <Table 1>.
<Table 1> shows the maximum current consumption of the motor, the starting current which is generated during the initial operation can be ignored as they lasts very short amount of time.

Rated Specifications of Auxiliary Contacts

- Opening/Closing Capacity : 200 W (Inductive Load at 220 V DC), 200 W (Resistive Load in DC)
- Closing Current : 30 A
- Continuous Current : 10 A
- Opening/Closing Current : 2 A (DC 220 V at T = 20 ms)
- Operating Voltage : 250 V AC/DC

Solenoid

Solenoids detect electrical control signal and enable operating mechanism inside the breaker to operate according to a control signal.
For current consumption of closing and trip-controlling solenoid, refer to <Table 1> whose values are based on the peak current.

Auxiliary contacts and wiring

Wiring of control jack for operation and control can be configured with 'fixed jack' method whose jack is installed and fixed on the breaker body and 'draw-out jack' method whose jack is installed on the end of lead cable connected to the body.
Specifications and wiring of auxiliary contacts are as follows :

HVF Type

- 4NO + 4NC & Fixed Jack : Fixed Standard (2.2 m) - A-Type
- 4NO + 4NC & Draw-Outs Jack (Lead Cable : 0.8 m) : Draw-Out-Type Standard - C-Type
- 7NO + 7NC & Fixed Jack (2.2 m) - B-Type
- 10NO + 10NC & Draw-Outs Jack (Lead Cable : 0.8 m) - D-Type



Photo when Fixed Jack was Applied



Photo when Draw-Out Jack was Applied

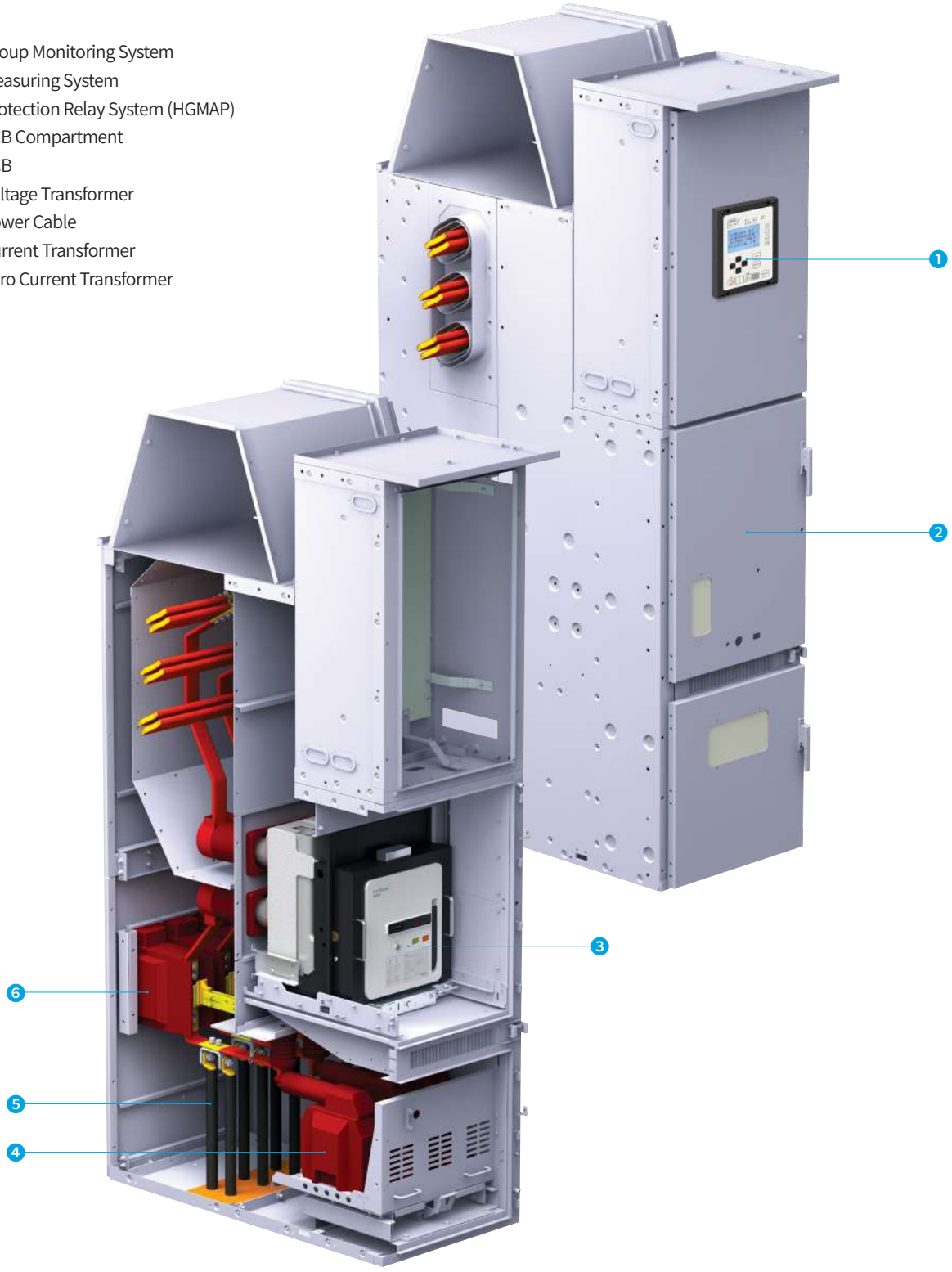
<Table 1> Fluctuation of Operation and Control Voltage & Current Consumption

Rated Voltage	Current Consumption (A)			Voltage Range (Based on IEC)
	Motor/Condenser	Closing	Trip (Open)	
	HVF Type	HVF Type	HVF Type	
48 V DC	20	2.7	6.2	Motor : 85 ~ 110 % Closing Control : 85 ~ 110 % Trip Control : 70 ~ 110 % (85 ~ 110 % for AC Control Voltage) ※ Voltage range of ESB standard applied breaker complies with the ESB specification.
110 V DC	8	1.3	2.7	
125 V DC	8	1.5	2.4	
220 V DC	4	0.7	1.4	
110 V AC	10	1.3	2.7	
220 V AC	6	0.7	1.4	

Overview and Characteristics

Application of VCB Compartment

1. Group Monitoring System
   Measuring System
   Protection Relay System (HGMAP)
2. VCB Compartment
3. VCB
4. Voltage Transformer
5. Power Cable
6. Current Transformer
   Zero Current Transformer



Overview and Characteristics (UVC)

Operation Overview

Operation Time and Current

Item		Closing Current (A)		Holding Current (A)		Trip Current (A)		Closing Time (ms)	Trip Time (ms)
		3.6/7.2kV	12kV	3.6/7.2kV	12kV	3.6/7.2kV	12kV		
Continuous-Type	AC/DC 100 ~ 125 V	3.0	13.0	0.5	0.9	-	-	Less than 110	Less than 40
	AC/DC 200 ~ 230 V								
Latch-Type	AC/DC 100 ~ 125 V	3.0	13.0	-	-	4.0	4.0	Less than 110	Less than 25
	AC/DC 200 ~ 230 V								

※ For latch-type, closing current flows only for 170 ms.

Operating Voltage

Item	Contents
Closing Voltage	85 ~ 110 % of Rated Voltage
Trip Voltage	70 ~ 110 % of Rated Voltage
Drop Out Voltage	AC/DC 25 V

Rating of Auxiliary Contacts

Item	Contents	
Voltage	AC 110 V	AC 220 V
Operating Current	5 A	2 A

Fuse Selection

Hyundai Electric does not produce fuse. Thus refer to fuse catalog to select and purchase one to attach it to our high-voltage vacuum contactor. Following diagram is fuse selecting methods for customers' convenience based on some fuse makers. Make sure to refer to fuse maker catalogs.

Fuse Attaching-Type

- Fuse only cuts off short-circuit current exceeding cut-off current of vacuum circuit breakers and uses protective relay for over-current.
- Fuse melting detector is an option and supplied at the request of user. However, for systems without protector against single-phase earth fault, single-phase short-circuit, use fuse melting detector to configure circuit to trip in the event of vacuum contactor incident.

Fuse Non-Attaching-Type

- For draw-out-type, the part to be connected with fuse is replaced with bus bar, thus it can change into fuse-attached draw-out-type.
- Fuse non-attached-type is limited in circuit breaking, thus breaker should be installed on the front end.

Rated Current Selection

Compare operating conditions and time-current characteristics of fuse to select rated current values meeting each item below by referring to fuse maker catalog.

- Rated current value shall be higher than full load current.
- Must be a fuse with sufficient rated current whose fuse element does not deteriorate due to allowed overload.
- Select fuse rated current value whose starting current (Magnetizing inrush current)-time characteristics fall within current-allowed time characteristics of fuse so that magnetizing inrush current or starting current may not deteriorate fuse elements.

Rated Breaking Current Selection

Figure out short-circuit current of the circuit and select fuse with higher rated breaking current.

Item		Contents			
Rated Insulation Voltage (kV)		3.6		7.2	
Rated Operating Voltage (kV)		3.3		6.6	
Rated Current (A)		200	400	200	400
Maximum Load Capacity	Motor (kW)	750	1500	1500	3000
	Transformer (kVA)	1,000	2,000	2,000	4,000
	Condenser (kVAR)	750	1,200	1,500	2,000

※ Select the rated current value for each rated voltage from the table above, depending on the secondary axle load and capacity.

Fuse Selection Table based on Load Conditions

This table is based on the condition when operation was carried out for less than 15 seconds and about 2 times per hour for 3-phase motor load of SIBA company product. For other loading conditions, refer to the fuse maker catalog.

Load		3Ø Motor (kW)				3Ø Transformer (kVA)				3Ø Condenser (kVAR)			
		3.3 kV		6.6 kV		3.3 kV		6.6 kV		3.3 kV		6.6 kV	
Fuse Maker		SIBA	LS	SIBA	LS	SIBA	LS	SIBA	LS	SIBA	LS	SIBA	LS
Fuse Rated Current (A)	6.3 (5)	-	-	-	-	-	-	-	15	-	-	-	-
	10	-	-	-	-	-	15	-	30	-	10	-	25
	16	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	37 ~ 75	-	75 ~ 160	50	30	100	75	30	30	60	50
	25	-	-	-	-	-	-	-	-	-	-	-	-
	31.5 (30)	-	-	-	-	80	75	160	150	50	50	100	100
	40	-	-	-	-	100	100	200	200	75	75	150	150
	50	90	90 ~ 200	160	185 ~ 400	125	150	250	300	100	100	200	200
	63	100	-	200	-	160	-	315	-	125	-	250	-
	80 (75)	125	-	250	-	200	200	400	500	150	150	300	400
	100	160	220 ~ 400	330	450 ~ 800	250	375	500	750	200	300	400	600
	125	200	-	400	-	315	-	630	-	250	-	500	-
	160 (150)	275	450 ~ 630	550	900 ~ 1,250	400	500	800	1,000	300	400	650	800
	200	315	710 ~ 800	650	1,500	500	750	1,000	1,500	375	600	750	1,000
	250	400	-	830	-	630	-	1,250	-	500	-	1,000	-
	315 (300)	500	-	1,000	-	750	1000	1,500	2,000	600	-	1,200	-
	355	600	-	1,200	-	900	-	1,800	-	700	-	1,400	-
	2X125	-	-	-	-	-	-	-	-	-	-	-	-
	2X160	500	-	1,000	-	800	-	1,600	-	600	-	1,200	-
	2X200	650	-	1,300	-	1,000	-	2,000	-	750	-	1,500	-
	2X250	750	-	1,500	-	1,250	-	2,500	-	1,000	-	2,000	-

※ If you are using SIBA fuse under condenser load, it is recommended to select fuse rated voltage one level higher than current voltage under load.
E.g. : If you use the SIBA fuse under 3.3 kV 200 kW motor load, select 125 A.
E.g. : If you are using the SIBA fuse under 6.6 kV 200 kVAR condensor load, it becomes 6.6 kV 50 A but as it is condesor load, select 12 kV 50 A which is one rated voltage higher.

Precautions per Load

Motor

- For selection of fuse, make sure to refer to 'Fuse selection table based on load conditions' to avoid damaging fuse by allowed overload and motor starting voltage.
- When using a transformer for control power, controlled power should not drop by 20 % or more by motor starting voltage.

Transformer

- For selection of fuse, make sure to refer to 'Fuse selection table based on load conditions' to avoid damaging fuse by no-load inrush current.

Capacitor

- For selection of fuse, make sure to refer to 'Fuse selection table based on load conditions' to avoid damaging fuse by inrush current.
- If you are using capacitor load back-to-back, contact us as adverse effect is expected due to high inrush current.

Overview and Characteristics (UVC)

Anti Pumping Function

Anti pumping circuit which triggers closing and trip occur once only when the closing command and tripping command occur at the same time is embedded inside the controller.



Realizing Free Voltage of Operating Power

- Common operating voltage of AC/DC 100 ~ 125 V, AC/DC 200 ~ 230 V.
- Controller used in 2 one voltage ranges is compatible as they are identical parts.

Noise Removed

- By adopting the solenoid magnetizing method as standard using PWM control, noise is removed.

Reducing Current Consumption

- By removing current in the PWM method, power consumption is reduced by 40 % in comparison with other products

Certification

- Products were developed in compliance with IEC, NEMA standards.
- Acquired the KAS (Korea Electrical Safety Corporation) certified V checkmark, thus KAS recognizes independent test reports, making other acceptance testing not necessary.
- Acquired UL and cUL certification according to UL347, proving reliability for use in the US and Canada.

Overview and Characteristics (VI)

Vacuum interrupters is a product that places conducting contacts in a sealed vacuum container for stable cutting off and opening/closing in the high-voltage large current.

High Performance

- High insulation performance in vacuum - able to cut off large current even in short-distance
- Less arc and low contact consumption
- Optimized design - compact and lightweight

Minimized Maintenance

- Very low leak rate over long period of usage - high reliability
- Special material with very low gas content - long-lasting high-vacuum state

Eco-Friendly

- Sealed and welded under highly vacuum state not effecting or is affected by surrounding environment

Compliant with International Standards

- Manufactured in accordance with IEC standard - can be used by various products



Overview and Characteristics (VI)

Technical Advantages of Vacuum Interrupters

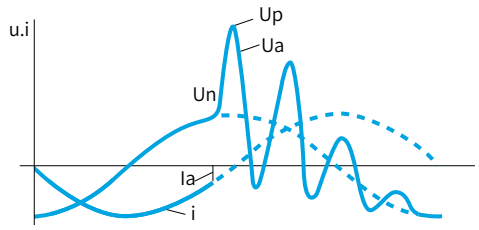
High Cutting off Performance

Short circuit performance with a compact size through transverse and axial magnetic field contacts.

Low Current Chopping

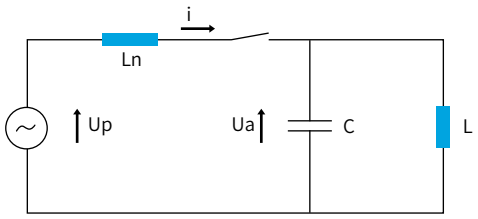
In clearly low current, as shown in Fig.1, the metal vapor arc is interrupted before reaching to a current zero point. The current chopping which is generated at the point creates over-voltage and may affect surrounding equipment. Current chopping relies on vacuum interrupter and should be as low as possible. HG-Series vacuum interrupter uses CuCr contact materials to maintain the current chopping under 5 A.

<Fig.1> Over-Voltage by Current Chopping when Cutting off Induced Current



Un : Commercial Frequency Counter Ground Voltage
Ua : Load Breaker Terminal Voltage
Up : Maximum Over-Voltage at The Loading Unit
i : Commercial Frequency Current
Ia : Current Chopping

<Fig.2> Single-Phase Equivalent Circuit for Cutting off Induced Current



Un : Commercial Frequency Counter Ground Voltage
Ua : Load Breaker Terminal Voltage
i : Load Current
Ln : Inductance of Power System
L : Inductance of Load
C : Load Capacity

High Dielectric Strength

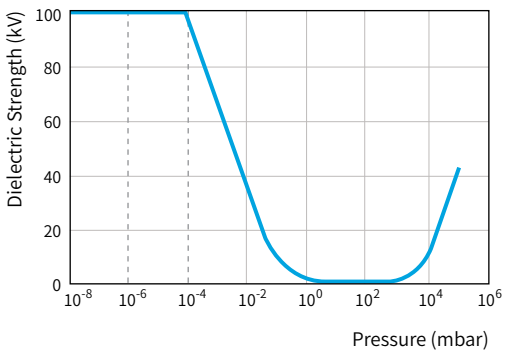
After opening, interrupted current is discharged and exists in a plasma state due to metal vapor between the contacts. Arc is extinguished at a current zero point, the metal vapor loses conductivity in microseconds. When interrupted, dielectric strength in vacuum is recovered in a short time. At a normal state, high vacuum is maintained under 1×10-7 mbar. At an opening state, distance between contacts are shorter but is with high dielectric strength.

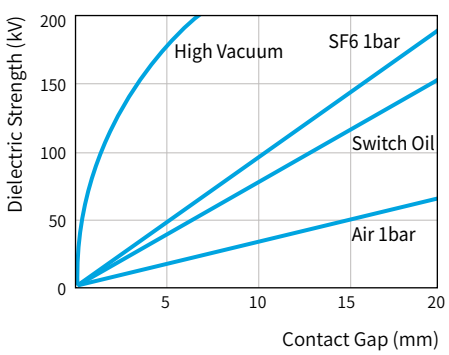
Minimized Contact Consumption

With low arc voltage and short arcing time, contact consumption was minimized to enhance electrical life of vacuum interrupters.

<Fig.3> Vacuum Insulation Strength

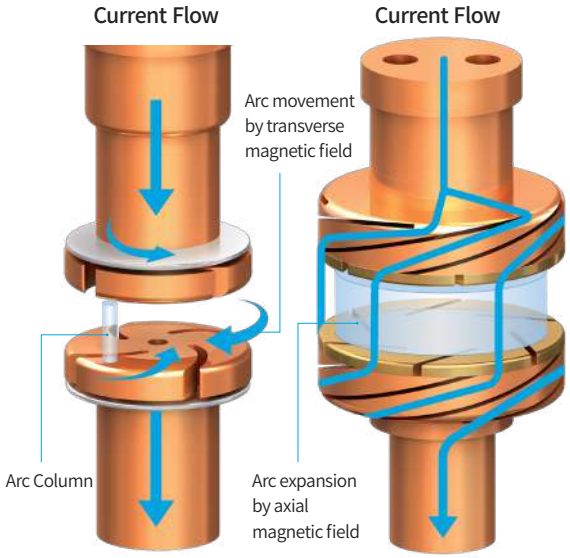
Data
Contact Gap
: 0.8 mm
Contact Diameter
: 10 mm





Interrupting Behavior

As for untreated flat contact, when the contact is opened, the hot arc is focused and fixed on the contact center, which is called Pinch Effect. To prevent this from happening, transverse or axial magnetic field methods are applied to rotate or spread the arc so that the focused arc is staying in the gaps.
This makes arc energy to be evenly distributed on the contact surface to minimize contact damage.

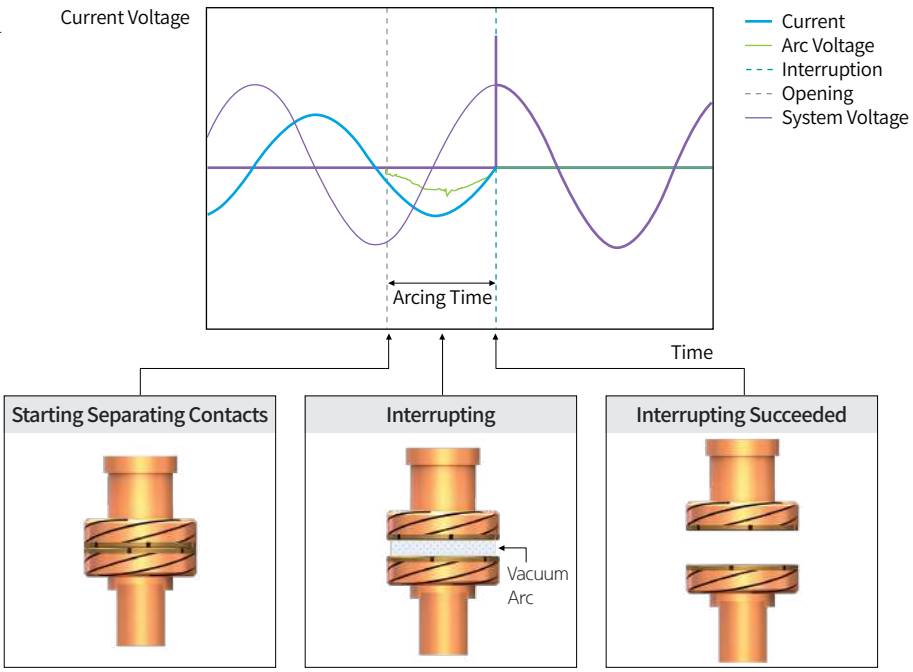


Current Interrupting Properties

When the contact is opened, arc is generated between the contacts, the arc is then maintained until it reaches the current zero point. At this time, arc melts the contacts generating metal vapor. If the arc is locally focused, a greater amount of metal vapor is generated overheating contacts and will eventually degrade the interrupting performance.
Therefore, in order to enhance the interrupting performance, it is important to prevent local overheating of the contacts. As an arc extinguishing chamber technology to prevent localized overheating of these contact, we applied the transverse and axial magnetic field approaches.

Transverse magnetic field approach generates a magnetic force in the horizontal direction between the contact point rotating arc to prevent local overheating of the contacts, axial magnetic field method is a technique for preventing local overheating through the spread of the arc to generate a magnetic force in the axial direction.
Using the contact to which above technologies are applied enables producing more compact and higher-performance vacuum interrupters.

Interruption Graph



HGV Structure

External Structure

- All components are modular.
- Operation of energy of mechanism is delivered to the VI. Closing spring cannot be electrically or manually charged. Once charging is complete, it automatically hangs on the latch waiting for closing. The breaker performs basic operations with the energy stored in the closing spring.
- Breaker closing operates with the resilience of the spring compressed by a manual button or an electrical signal. By release of closing latch, VI contact is pressurized with an appropriate pressure and at the same time, the trip spring is tensioned to prepare trip. In addition, the discharged closing spring is charged again by motor waiting for the next command. HG-Series Vacuum Circuit Breaker is not only quick in synchronization and load delivery but implements high-speed auto-reclosing function.



Slide-in Module

1. Connection Unit
2. Bushing Cover
3. Shutter
4. Bushing
5. Cradle
6. Conducting Unit
7. Control Jack
8. Breaker (VCB)
9. Truck (Pushing/Drawing Device)





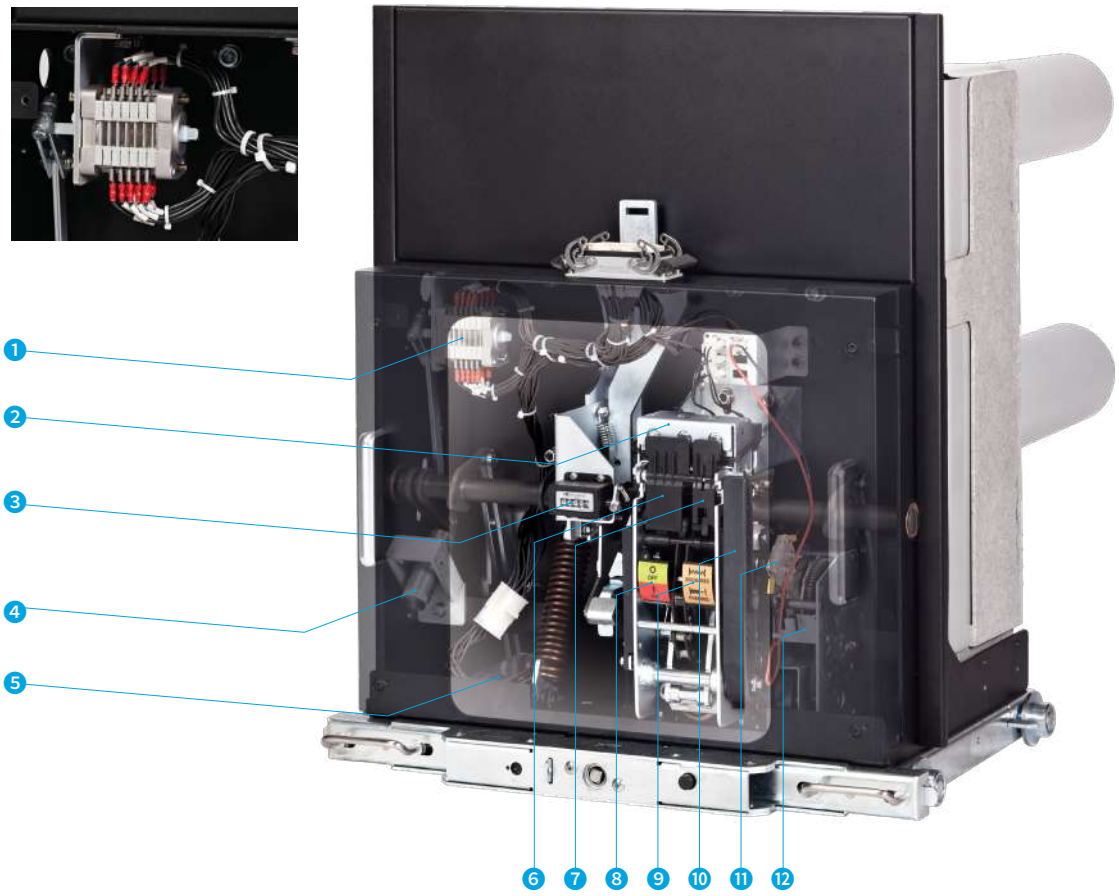
Internal Structure

Trip Free Mechanism

- As for closing command given during trip operation, driving force is not delivered to pole unit but offset by driving mechanism Therefore, VCB remains a trip state without a VI movement.
- This feature is included in the mechanism.

Anti-Pumping Mechanism

- HG-Series Vacuum Circuit Breaker is out of the conventional electrical anti-pumping, but implemented more reliable and mechanical anti-pumping as well.
- This feature is included in the mechanism.

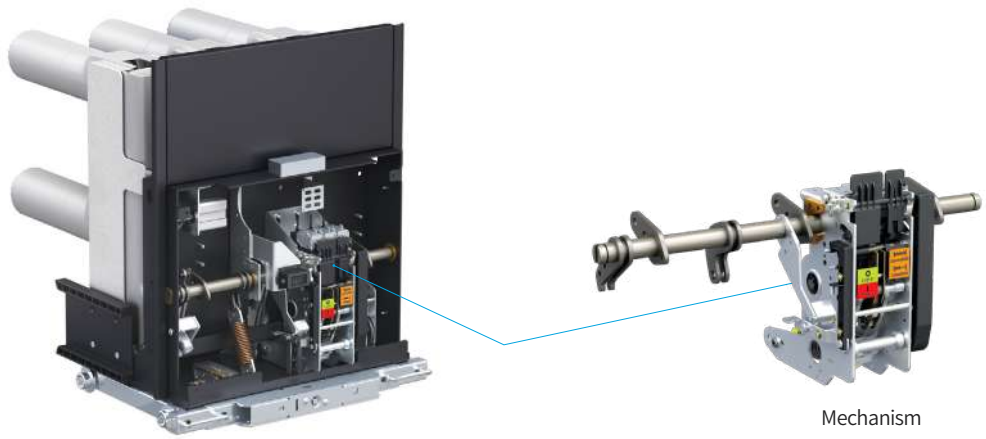


Circuit Breaker Operating Mechanism

1. Auxiliary Switch
2. Closing Coil, Trip Coil
3. Operation Count Indicator
4. Oil Dash Pot
5. Location Dis Playing Switch
6. Manual Trip Button
7. Manual Closing Button
8. ON/OFF Status Indicator
9. Closing Spring Charged Indicator
10. Manual Charging Handle
11. Spring Charged Limit Switch
12. Electric Motor

HGV Operation Structure

ON/OFF Operation Structure and Features



Mechanism

Charging

Once manual handle or motor completes compression of the closing spring, it is fixed onto the latch waiting for closing.



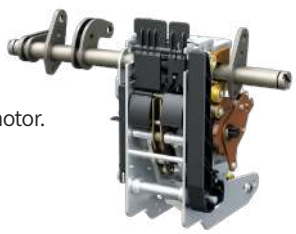
Closing

Once closing signal comes in, compression of the closing spring is release, by the force, VI contacts are pressed until it gets enough pressure.
Further, trip spring gets tension at the same time waiting for the next operation.



Recharging

After closing operation completed, closing spring can be recharged by manual handle or motor. At this time, if the control power is connected, motor recharges automatically. This is to prepare a high-speed reclosing.

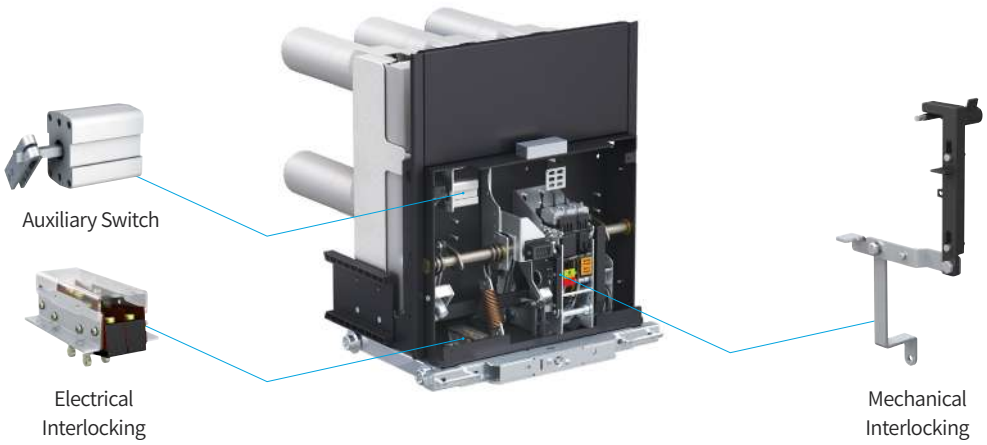


Tripping

If trip signal comes in, VI pressurizing force and trip spring is released returning the VI contacts to the trip position.



Interlocking



Mechanical Interlocking

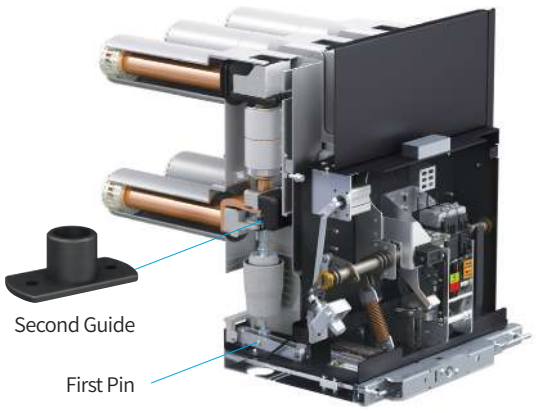
Pushing/drawing vacuum circuit breakers are interlocked to allow inserting of pushing/drawing handle only in an open state.
In addition, when the vacuum circuit breaker is in a position apart from service or test position, operation is unavailable (Switching ON/OFF is unavailable).

Electrical Interlocking

The auxiliary switch of the vacuum circuit breaker is linked to the ON/OFF state and the pushing/drawing location information of the breaker to facilitate the interlocking configuration of the panel. Panel interlock monitors the ON/OFF state of the breaker being able to prevent closing of disconnectors when the vacuum circuit breaker is closing.
The system also prevents closing of the vacuum circuit breakers when disconnectors are in an abnormal position.

Reliability of Mechanical Behavior of VI

During ON/OFF operation, insulating rod connection adds, in addition to the pin first, guide to upper part secondly minimizing changes in eccentricity and straightness of VI contacts for mechanism rotation. Also, by avoiding vibration frequency overlap and energy balance between closing spring and VI pressing spring.



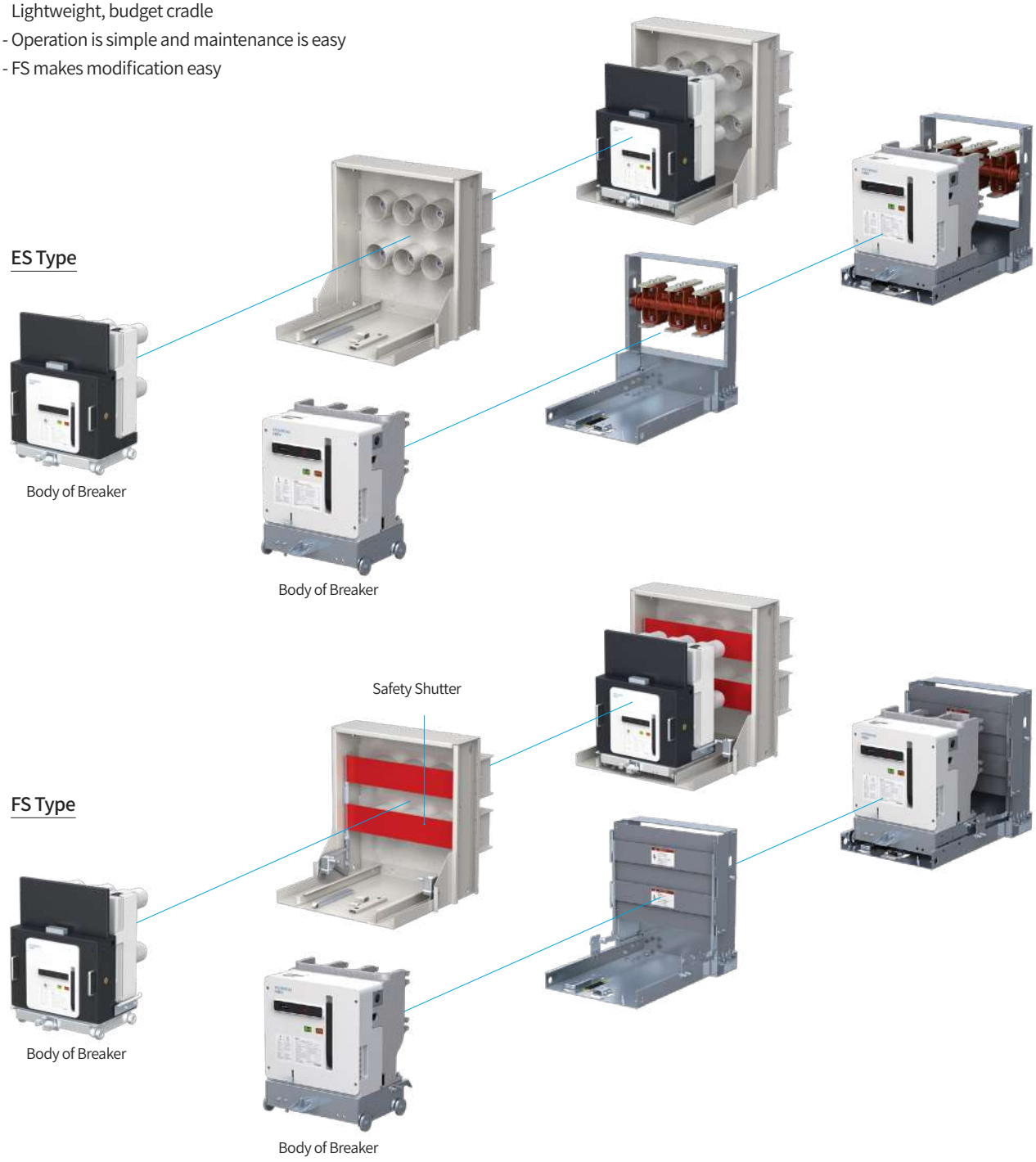
HGV Cradle Structure

ES-Type Cradle

- Structure : Basic cradle made of steel structure
- Main Terminal Mounting:
  Fixing busbar of mold bushing shape into insulator
- Pushing/Drawing-Type : Latch (Lever)
- Safty Shutter: Unapplied
- Applying Switchboard : Cubicle-Type MESG
- Features
  - No direct impact from arc in the event of accident Acropolis.
    Lightweight, budget cradle
  - Operation is simple and maintenance is easy
  - FS makes modification easy

FS-Type Cradle

- Structure : ES-Type Cradle + Safty Shutter
- Safty Shutter : Applied (Insulating Shutter)
- All application of ES-type are applied
- Features
  - Insulating shutter fully isolates the bus unit and breaker unit
    resulting in higher protection rate

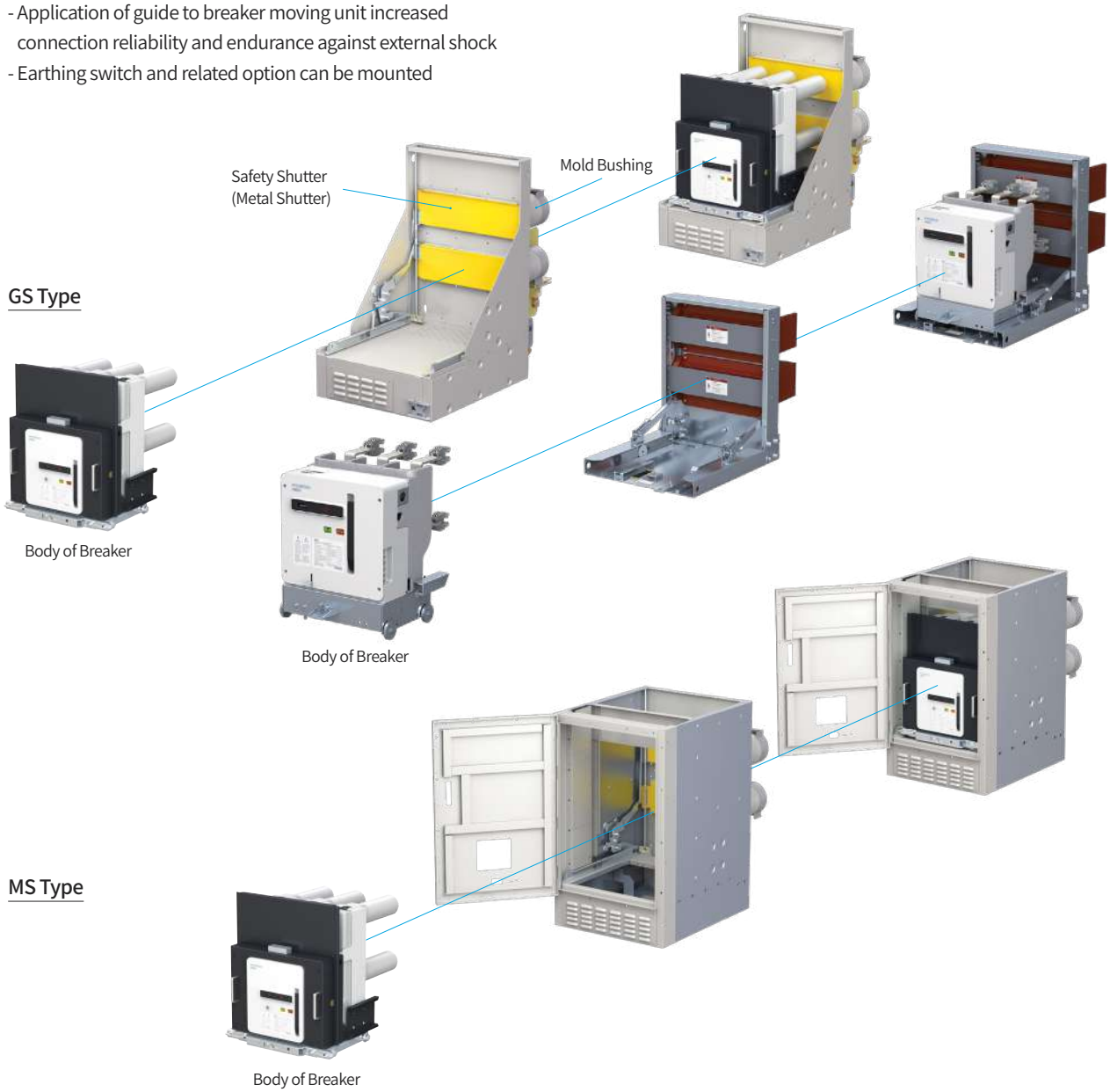


GS-Type Cradle

- Structure : High-end cradle consisted of an optimized steel structure
- Main Terminal Mounting : Fixing busbar with mold bushing
- Pushing/Drawing-Type : Screw (Breaker location inspection is possible)
- Safety Shutter : Applied (Metal Shutter)
- Applied Switchboard : Closed Switchboard (MCSG)
- Features
  - Bus unit and breaker unit is fully isolated with a steel structure preventing spreading of accident and securing stability
  - When connecting bus, insulating cover is applied to secure clearance between phases and minimize insulation processing cost
  - Application of guide to breaker moving unit increased connection reliability and endurance against external shock
  - Earthing switch and related option can be mounted

MS-Type Cradle

- Structure : Top-notch cell-type cradle with an attached door
- All application of GS-Type are applied
- Features
  - Full implementation of panel breaker to reduce costs and maximize convenience
  - Breaker operation available with door closed maximizing safety
  - Earthing switch and related option can be mounted



HVF Cradle Structure

VCB is divided into fixed and draw-out type breaker depending on the mounting method. Draw-out type breaker has main circuit connection terminal, pushing/drawing device to connect or disconnect body unit of breaker to bus unit. It also has interlocking device to prevent pushing/drawing of breaker when closing breaker. And it is provided with drawing unit to suitable mounting and convenient use in accordance with various switchgear-type ; there are following-types of drawing units based on the configuration form of bus unit in main circuit :

X-Type Cradle

- Fixed-Type

E-Type Cradle

- Shutter Unattached (For Cubicle-Type Switchboard)

X / ES / FS / SF
Type Cradle



X-Type



E-Type

Lever-Type - ES Type



F-Type

Lever-Type - FS Type



F-Type

Screw-Type - SF Type

F-Type Cradle

- Shutter Mounted (For a Compartment-Type Switchgear)

G-Type Cradle

- Bushing Terminal is used/Shutter Mounted (For a Metal-Clad Switchgear)

IG / GS
Type Cradle



G-Type

Earthing Switch Mounting-Type - GS Type



G-Type

Metal Shutter Mounting-Type - GS Type



G-Type

Safty Shutter Mounting-Type - IG Type

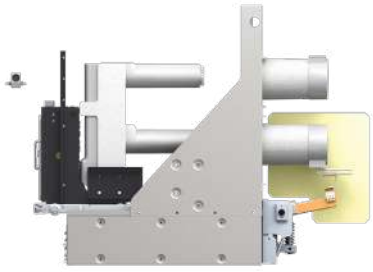
※ However, special breakers for KEPCO hydro and thermal power, MCSG (IEC or ANSI-type) and replacing obsolete breaker are manufactured upon a special order.

For Hyundai Electric's vacuum circuit breakers, various draw-out type VCBs and cradles are designed and manufactured to meet customers' requirements.

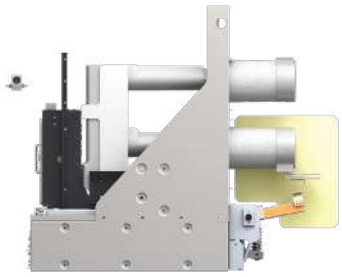
HGV Pushing/Drawing

The table below shows operation status and function of each position of the vacuum circuit breaker. See what safety functions are available for each status.

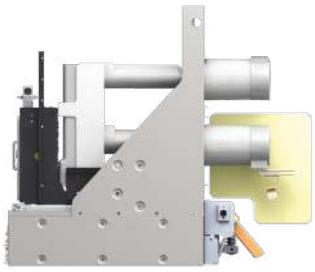
Remove



Test Position



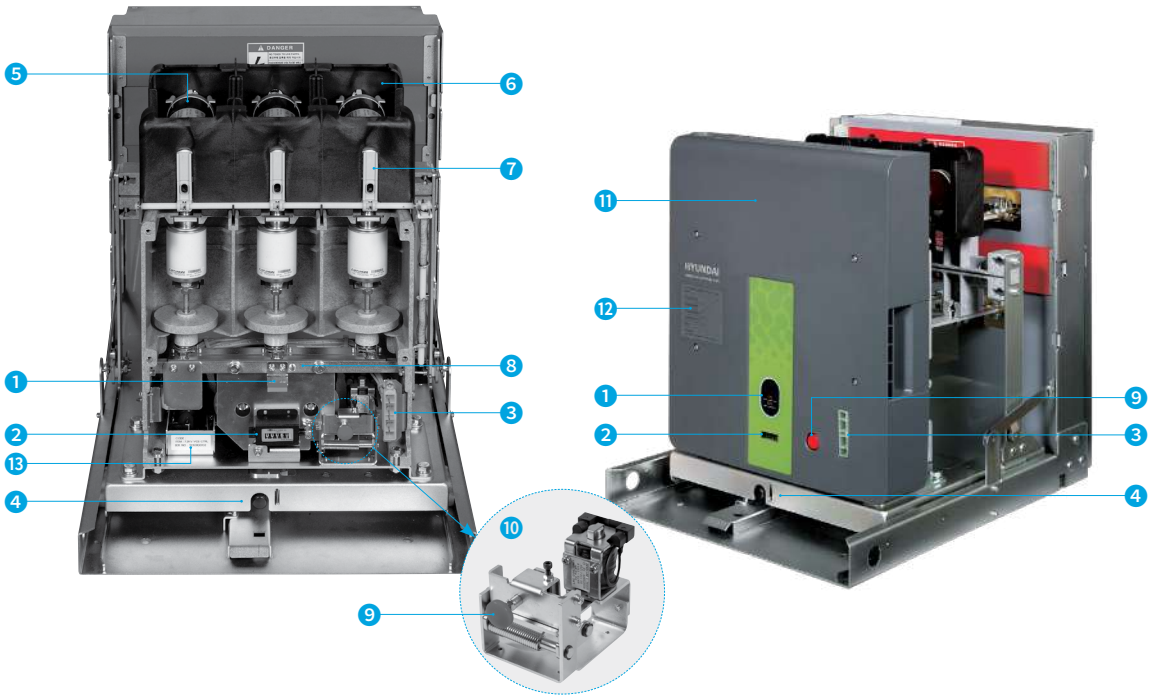
Service Position



Breaker (VCB) Position	Position: Removed	Test	→→→ Incoming Drawing Out ←←←	Service	Condition	Application Type
Cradle Shutter					Shutter Padlock Unavailable	HGV, HVF
					Shutter Padlock Available	
Cradle Door					Door cannot Open	HGV, HVF
					Door can Open	
Control Jack					Control Circuit Connector Inseparable	HGV
					Control Circuit Connector Jack can be Separated	
Breaker					Closing, Tripping Unavailable	HGV, HVF, HVG
					Closing, Tripping Available	
Earthing Switch					ES Closing Unavailable	HGV, HVF
					ES Closing Available	

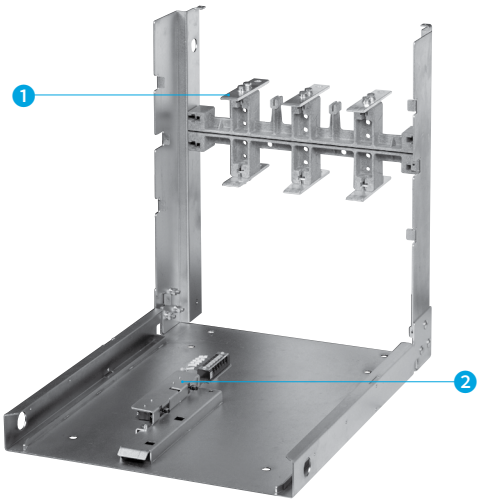
UVC Structure

Internal and External Structure

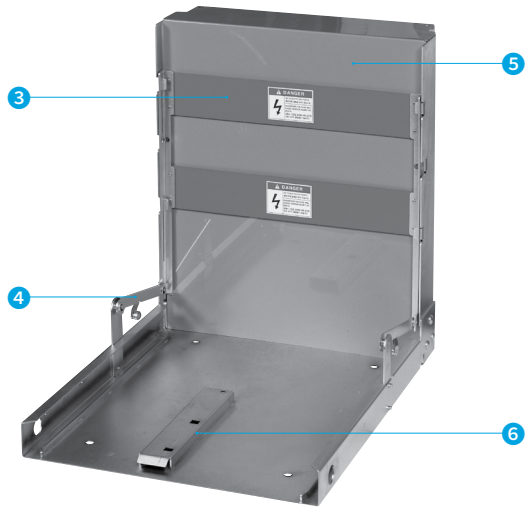


1. Switching Status Indicator
2. Switching Count Indicator
3. Control Plug
4. Pushing/Drawing Button
5. Fuse
6. Fuse Holder
7. Fuse Blow Detector (Optional)
8. Manual Inspection Opening
9. Emergency Trip Button (For Latch-Type)
10. Latch Device (For Latch-Type)
11. Front Cover
12. Nameplate
13. Controllers

Cradle Structure



E-Class Cradle



F-Class Cradle

1. Cradle Terminal
2. Position Detecting Switch
3. Shutter
4. Shutter Lifter
5. Rear Barrier
6. Interlock Supporter

UVC Technical Data

Behavior Method Selection

Continuous Type, Latch Type

Continuous Type

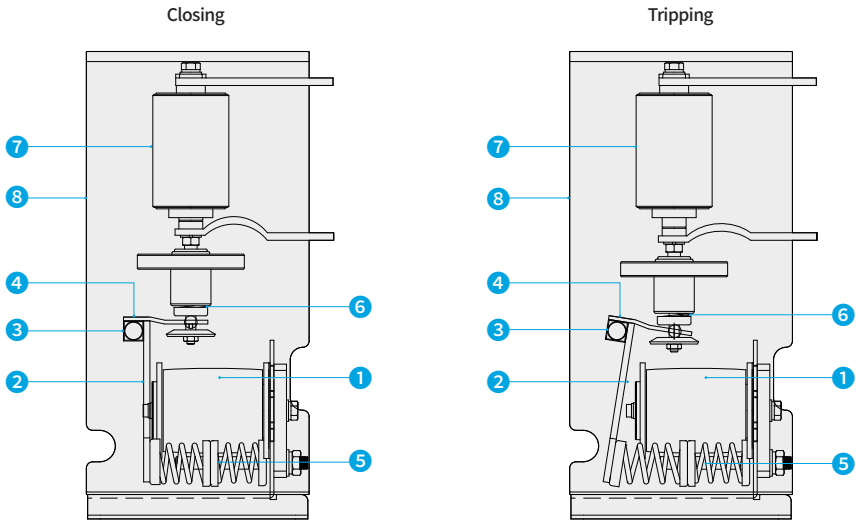
- Long mechanical switching life - suitable for frequent opening and closing.
- If you are using a transformer for control power, it is automatically tripped to protect the load when control power fails to supply.

Latch Type

- Shorter switching life compared with the continuous-type.
- It maintains closing status in case of no control power - suitable for systems without continuous control power supply,
- Or loads which needs automatic closing once power is restored.
- As there is a separate trip circuit, use DC power for stable power supply. If you need to use AC power, it is recommended to purchase CTD (Condensor Trip Device) separately for use (See the circuit diagram for connection method)

Closing and Tripping

1. Closing Coil
2. Front Drive Plate
3. Shaft
4. Drive Plate
5. Trip Spring
6. Compression Spring
7. Vacuum Interrupters
8. Insulating Frame



Closing

- When closing coil (1) is magnetized, it pulls the front drive plate (2) and at the same time trip spring is compressed (5). Further, with the shaft (3) on the center, top drive plate (4) pushes driving unit of compression spring (6) and vacuum interrupters (7) making it closing status.
- In a continuous-type, once closing completes, controller automatically reduces the current supplied to closing coil.
- In a latch-type, at the time when closing is completes, the latch device installed on bottom of the product mechanically fixes the front drive plate to maintain closing. At this time, control power is automatically disconnected from the controller.

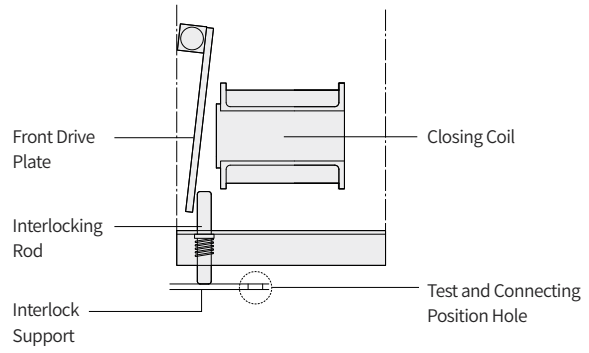
Tripping

- For continuous-type, interrupting closing coil (1) control power releases magnetization of the coil, compressed trip spring (5) is recovered and tripped.
- For latch-type, providing power to trip coil releases latch that fixed front drive plate and at the same time, compressed trip spring is recovered and tripped.
- For latch-type, trip can be done by condenser trip device installed separately or by manual trip button even in the event of a power failure.
- With the main power applied, draw-out by interlocking device is unavailable for user's safety, make sure to trip before application.

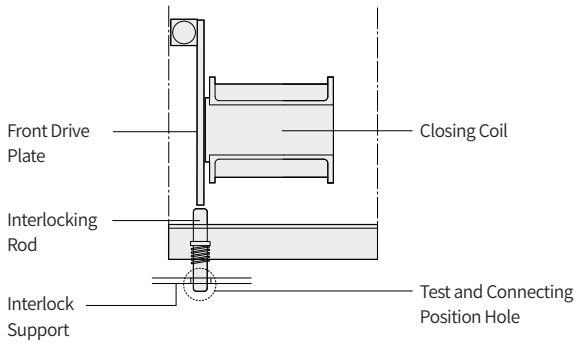
Interlocking Device

Interlock Condition	Interlock Information	Interlock Release	Remarks
With high-pressure vacuum contactor closing, pushing to connecting position is unavailable	The interlock bar built in the body mechanically interrupts pushing	Turn off high-pressure vacuum contactor	Standard Specifications
With high-pressure vacuum contactor closing, pushing from connecting position to testing position is unavailable	The interlock bar built in the body is fixed in the cradle interrupting pushing	Turn off high-pressure vacuum contactor	Standard Specifications
In incorrect segments of each intermediate position, closing is unavailable	If the interlock bar built in the body is not in the right position, it does not mechanically operates	Move high-pressure vacuum contactor to testing and contacting positions and close them.	Standard Specifications
	Electronically control in order not to supply control power if not in the right position		Optional (Electrical Interlock)
High-pressure vacuum contactor stops in the test position	The interlock bar built in the body is fixed in the test position	Press pushing/drawing button	Standard Specifications

If not at the Test or Contacting Position



Test and Connecting Positions



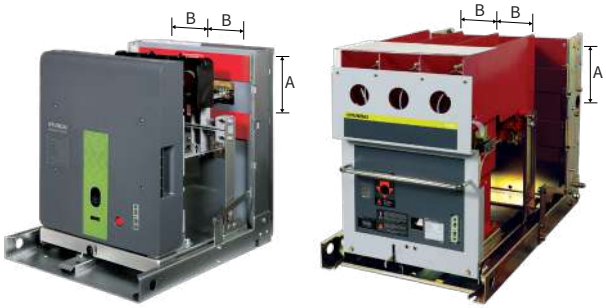
Easily Removable Fuse

Fuse clip of spring pressure shape which does not require bolting is adopted making removal easy at the time of using DIN-type fuse.



Compatible with Older Products

The dimensions of main bus connecting parts are same as older products enabling replacement of them. In this case, the terminal number of control circuit lead cable needs a change.



A : Distance between Poles
B : Distance between Phases

UVC Technical Data

Cradle Selection

- High-pressure vacuum contactor is divided into a fixed and draw-out types based on installation method.
- Draw-out has main circuit connection terminal, pushing/drawing device to contact or separate body of the breaker to bus unit, and interlocking device that makes pushing/drawing unavailable at the time of closing. It is provided with a draw-out unit to suitably mount and conveniently use based on various switchgear type ; types of draw-out unit cradles are as follows based on configuration type of main circuit bus unit.



X-Type
Fixed-Type



E-Type
Shutter Unattached
(For Cubicle-Type Switchgear)



F-Type
Shutter Attached
(For Compartment-Type Switchgear)

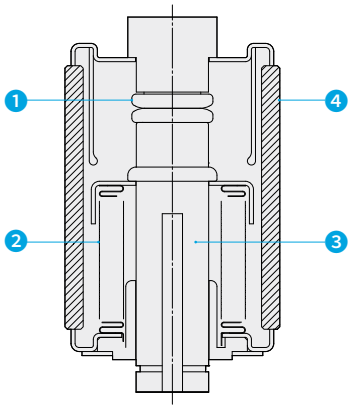


E-Type
Metal Shutter Attached
& Bushing

※ Cradle design and production can be customized depending on customer requirements even when they are not in the catalog.

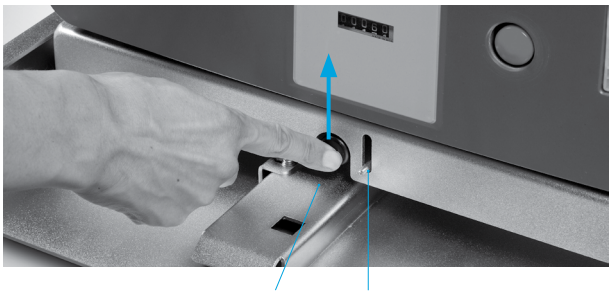
Vacuum Interrupter

Vacuum interrupter of high-pressure vacuum contactor has the upper and lower stem ❸ and contacts ❶ of conducting unit as well as bellows ❷ and ceramic insulating material ❹ that form a support.
Special contact material enables approximately 1 million operations ; current chopping of 1 A or lower inhibits excessive recovery voltage. Inside of vacuum interrupters is a high degree of vacuum degree of less than 10-6 [mbar] and has a long life.



How to Push/Draw (E & F Cradle)

High-pressure vacuum contactor must be placed precisely on the cradle rail at this time. Make sure to use lift to lift contactor for the sake of safety. Sliding the contactor horizontally blocks interlock rod connected to the pushing/drawing button in the test position, making additional pushing unavailable.
In this position, connecting the control power allows testing the internal circuitry as required. In order to insert it into the connection position, push again the pushing/drawing button and slide it inside. When pulling is completed, main circuit connection terminal is fully inserted inside the cradle terminal and the interlock rod is inserted into the connection position hole and gets bound.



Model Selection Table

7.2 kV(Compact HGV)

Type			HGV1199	HGV1111	HGV114□ [1]	
Rated Voltage		kV	7.2	7.2	7.2	
Rated Breaking Current		kA	8	12.5	25	
Breaking Capacity		MVA	100	160	310	
Rated Conducting Current		A	400	630	630	1,250
Inter-Phase X Inter-Pole Distance		mm				
130×155			◆	◆		
140×155					◉	◉
130×220			▼	▼		
140×223					▣	▣
Installaition Method [2]						
Fixed	XA		◆	◆	◉	◉
Draw-Out	ES		◆	◆	◉	◉
	FS		◆	◆	◉	◉
	GS		▼	▼	▣	▣

7.2 kV

Type			HGV114□ [1]			HGV115□					HGV116□					HGV117□				
Rated Voltage		kV	7.2			7.2					7.2					7.2				
Rated Breaking Current		kA	25			31.5					40					50				
Breaking Capacity		MVA	312			393					499					624				
Rated Conducting Current		A	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000
Inter-Phase × Inter-Pole Distance																				
150×205			●	●																
150×210			■	■																
165×310		mm				★					★									
210×310			△	△	△	△	△				△	△				△	△			
275×310								◈	◈	◈			◈	◈	◈			◈	◈	◈
Installation Method [2]																				
Fixed	XA		●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
Draw-Out	ES		■	■																
	FS		■	■																
	GS, GE		●△	●△	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
	MS, ME		●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈

12 kV

Type			HGV214□ [1]			HGV215□					HGV216□					HGV217□				
Rated Voltage		kV	12			12					12					12				
Rated Breaking Current		kA	25			31.5					40					50				
Breaking Capacity		MVA	520			655					831					1,039				
Rated Conducting Current		A	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000
Inter-Phase × Inter-Pole Distance																				
150×205			●	●																
150×210			■	■																
165×310		mm				★					★									
210×310			△	△	△	△	△				△	△				△	△			
275×310								◈	◈	◈			◈	◈	◈			◈	◈	◈
Installation Method [2]																				
Fixed	XA		●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
Draw-Out	ES		■	■																
	FS		■	■																
	GS, GE		●△	●△	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
	MS, ME		●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)

2) E.g. : If inter-phase × inter-pole distance for HGV1141 is 150×210 (mm), ES or FS type can be selected for installation method.
(◆ : 130×155, ◉ : 140×155, ▼ : 140X220, ▣ : 140X223, ● : 150×205, ■ : 150×210, ★ : 165×310, △ : 210×310, ◈ : 275×310, ☆ : 275×403, ◎ : 275×438)

17.5 kV

Type			HGV314□ [1]			HGV315□				HGV316□					HGV317□				
Rated Voltage		kV	17.5			17.5				17.5					17.5				
Rated Breaking Current		kA	25			31.5				40					50				
Breaking Capacity		MVA	758			955				1,212					1,516				
Rated Conducting Current		A	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000	1,250	2,000	2,500	3,150	4,000
Inter-Phase × Inter-Pole Distance																				
150×205		mm	●	●																
150×210			■	■																
210×310			△	△	△	△	△				△	△				△	△			
275×310								◆	◆	◆			◆	◆	◆			◆	◆	◆
Installation Method [2]																				
Fixed	XA		●	●	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆
Draw-Out	ES		■	■																
	FS		■	■																
	GS, GE		●△	●△	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆
	MS, ME		●	●	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆

24/25.8 kV

Type			HGV611□ [1]			HGV614□		
Rated Voltage		kV	24/25.8			24/25.8		
Rated Breaking Current		kA	12.5			25		
Breaking Capacity		MVA	520			1,039		
Rated Conducting Current		A	630	1,250	2,000	630	1,250	2,000
Inter-Phase × Inter-Pole Distance								
210×310		mm	△	△	△	△	△	△
Installation Method [2]								
Fixed	XA		△	△		△	△	△
Draw-Out	ES		△	△		△	△	△
	FS		△	△		△	△	△
	GS, GE		△	△	△	△	△	△
	MS, ME		△	△	△	△	△	△

24/25.8 kV, 36/38 kV

Type			HVF614□ [1]		HVF616□		HVF714□		HVF705□			
Rated Voltage		kV	24/25.8		24/25.8		36		38			
Rated Breaking Current		kA	25		40		25		31.5			
Breaking Capacity		MVA	1,040/1,120		1,662/1,787		1,600		2,000			
Rated Conducting Current		A	2,500	3,150	2,500	3,150	1,250	2,000	1,200/1,250	2,000	2,500	3,000/3,150
Inter-Phase × Inter-Pole Distance												
275×310		mm	◆	◆	◆	◆						
275×403							☆	☆				
275×438									◎	◎		◎
Installation Method [2]												
Fixed	XA		◆	◆	◆	◆	☆	☆	◎	◎	◎	◎
Draw-Out	GS, GE		◆	◆	◆	◆	☆	☆	◎	◎	◎	◎

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)

2) E.g. : If inter-phase × inter-pole distance for HGV1141 is 150×210 (mm), ES or FS type can be selected for installation method.
(◆ : 130×155, ◉ : 140×155, ● : 150×205, ■ : 150×210, ★ : 165×310, △ : 210×310, ◈ : 275×310, ☆ : 275×403, ◎ : 275×438)

Ratings and Specifications

Rating 7.2 kV(Compact HGV)

Type			HGV1199	HGV1111	HGV114□ [1]	
Apllied Standards			IEC 62271-100			
Rated Current Ur		kV	7.2			
Rated Short-Time Current		kA/s	8/3	12.5/3	25/1	
Rated Breaking Current Isc		kA	8	12.5	25	
Rated Closing Current Ip		kA	20	32.5	65	
Rated Current		A	400	630	630	1,250
Rated Frequency		Hz	50/60			
Breaking Capacity		MVA	100	160	312	
Standard Operating Duty			O - 0.3s - CO - 15s - CO			
Withstand Voltage						
Commercial Frequency Withstand Voltage(1 min) Ud		kV	20			
Impulse Withstand Voltage (1.2X50 μs) Up		kV	60			
Opening/Closing Test Ratings						
Mechanical			M2 (10,000 operations)			
Electrical			E2 (List3)			
Leading Current Opening/Closing			C2			
Rated Circuit Opening Time		ms	≤40			
Rated Breaking Time		Cycle	3			
Rated Closing Time		ms	≤65			
Closing Operation Method			Electirc Motion Spring System			
Auxiliary Contacts			4NO + 4NC (Up to 10NO + 10NC)			
Control Power						
Closing Coil			DC 24V, AC/DC 48 ~ 60V, AC/DC 100 ~ 130V, AC/DC 200 ~ 250V			
Trip Coil			DC 24V, AC/DC 48 ~ 60V, AC/DC 100 ~ 130V, AC/DC 200 ~ 250V			
Opening/Closing Life						
Mechanical			See Page 39(Table 2)			
Electrical			(30,000 operations)[2]			
Inter-Phase X Inter-Pole Distance [3]		mm				
130×155			◆	◆		
140×155					◉	◉
150×205						
130×220			▼	▼		
140×223					▣	▣
Installation Method						
Fixed	XA		◆	◆	◉	◉
Draw-Out	ES		◆	◆	◉	◉
	FS		◆	◆	◉	◉
	GS		▼	▼	▣	▣
Weight		kg				
Vacuum Circuit Breakers	Fixed		35	36	45	45
	Draw-Out		38	40	50	52
Cradle	ES					
	FS					
	GS					

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)
2) 10,000 operations are free of charge but subsequent target life can be realized with maintenance. For maintenance specifications, refer to the instruction manual.
3) ◆ : 130×155, ◉ : 140×155, ▼ : 140×220, ▣ : 140×223

Rating 7.2 kV

Type		HGV114 □ [1]			HGV115 □ [1]					HGV116 □ [1]					HGV117 □ [1]				
Applied Standards		IEC 62271-100 (2012)																	
Rated Current Ur	kV	7.2																	
Rated Short-Time Current	kA/s	25/4			31.5/4					40/4					50/3				
Rated Breaking Current Isc	kA	25			31.5					40					50				
Rated Closing Current Ip	kA	65			82					104					130				
Rated Current	A	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]
Rated Frequency	Hz	50/60																	
Breaking Capacity	MVA	312			393					499					624				
Standard Operating Duty		O-0.3 s-CO-15 s-CO																	
Withstand Voltage																			
Commercial Frequency Withstand Voltage (1 min) Ud	kV	20																	
Impulse Withstand Voltage (1.2×50 μs) Up	kV	60																	
Opening/Closing Test Ratings																			
Mechanical		M2 (10,000 operations)																	
Electrical		E2 (List3)																	
Leading Current Opening/Closing		C2																	
Rated Circuit Opening Time	ms	≤ 40																	
Rated Breaking Time	Cycle	3																	
Rated Closing Time	ms	≤ 65																	
Closing Operation Method		Electric Motion Spring System																	
Auxiliary Contacts		4NO + 4NC (Up to 10NO + 10NC)																	
Control Power																			
Closing Coil		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																	
Trip Coil		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																	
Opening/Closing Life																			
Electrical		See page 39 (Table 2)																	
Mechanical		30,000 operations [2]																	
Inter-Phase×Inter-Pole Distance [4]																			
150×205	mm	●	●																
150×210		■	■																
165×310					★					★									
210×310		△	△	△	△	△				△	△				△	△			
275×310							◈	◈	◈			◈	◈	◈			◈	◈	◈
Installation Method																			
Fixed	XA	●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
Draw-Out	ES	■	■																
	FS	■	■																
	GS, GE	●△	●△	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
	MS, ME	●	●	△	★△	△	◈	◈	◈	★△	△	◈	◈	◈	△	△	◈	◈	◈
Weight	kg																		
Vacuum Circuit Breakers	Fixed	70	70	110	90	130	170	170	170	90	130	170	170	170	135	135	175	175	175
	Draw-Out	100	105	130	125	160	200	200	200	125	160	200	200	200	165	165	205	205	205
Cradle	ES	55	55																
	FS	60	60																
	GS	70	70	90	85	90	120	120	120	85	90	120	120	120	90	90	120	120	120
	GE	135	135	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190
	MS	140	140	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190
	ME	210	210	235	230	235	265	265	265	230	235	265	265	265	235	235	265	265	265

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)

2) 10,000 operations are free of charge but subsequent target life can be realized with maintenance. For maintenance specifications, refer to the instruction manual.

3) 4,000 A is met by applying forced circulation method using fan. The fan is driven by a "Thermostat (Temperature Sensors)" and starters except for the fan are not separately provided/sold.

4) ◆ : 130×155, ◉ : 140×155, ● : 150×205, ■ : 150×210, ★ : 165×310, △ : 210×310, ◈ : 275×310, ☆ : 275×403, ◎ : 275×438

Ratings and Specifications

Rating — 12 kV

Type		HGV214 □ [1]			HGV215 □ [1]					HGV216 □ [1]					HGV217 □ [1]				
Applied Standards		IEC 62271-100 (2012)																	
Rated Current Ur	kV	12																	
Rated Short-Time Current	kA/s	25/4			31.5/4					40/4					50/3				
Rated Breaking Current Isc	kA	25			31.5					40					50				
Rated Closing Current Ip	kA	65			82					104					130				
Rated Current	A	630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]
Rated Frequency	Hz	50/60																	
Breaking Capacity	MVA	520			655					831					1,039				
Standard Operating Duty		O-0.3 s-CO-15 s-CO																	
Withstand Voltage																			
Commercial Frequency Withstand Voltage (1 min) Ud	kV	28 (42) [4]																	
Impulse Withstand Voltage (1.2×50 μs) Up	kV	75 (82) [4]																	
Opening/Closing Test Ratings																			
Mechanical		M2 (10,000 operations)																	
Electrical		E2 (List3)																	
Leading Current Opening/Closing		C2																	
Rated Circuit Opening Time	ms	≤ 40																	
Rated Breaking Time	Cycle	3																	
Rated Closing Time	ms	≤ 65																	
Closing Operation Method		Electric Motion Spring System																	
Auxiliary Contacts		4NO + 4NC (Up to 10NO + 10NC)																	
Control Power																			
Closing Coil		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																	
Trip Coil		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																	
Opening/Closing Life																			
Electrical		See page 39 (Table 2)																	
Mechanical		30,000 operations [2]																	
Inter-Phase×Inter-Pole Distance [5]																			
150×205	mm	●	●																
150×210		■	■																
165×310					★					★									
210×310		△	△	△	△	△				△	△				△	△			
275×310							◆	◆	◆			◆	◆	◆			◆	◆	◆
Installation Method																			
Fixed	XA	●	●	△	★△	△	◆	◆	◆	★△	△	◆	◆	◆	△	△	◆	◆	◆
Draw-Out	ES	■	■																
	FS	■	■																
	GS, GE	●△	●△	△	★△	△	◆	◆	◆	★△	△	◆	◆	◆	△	△	◆	◆	◆
	MS, ME	●	●	△	★△	△	◆	◆	◆	★△	△	◆	◆	◆	△	△	◆	◆	◆
Weight	kg																		
Vacuum Circuit Breakers	Fixed	70	70	110	90	130	170	170	170	90	130	170	170	170	135	135	175	175	175
	Draw-Out	100	105	130	125	160	200	200	200	125	160	200	200	200	165	165	205	205	205
Cradle	ES	60	60																
	FS	65	65																
	GS	70	70	90	85	90	120	120	120	85	90	120	120	120	90	90	120	120	120
	GE	135	135	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190
	MS	140	140	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190
	ME	210	210	235	230	235	265	265	265	230	235	265	265	265	235	235	265	265	265

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)

2) 10,000 operations of operation is free of charge but subsequent target life can be realized with maintenance. For maintenance specifications, refer to the instruction manual.

3) 4,000 A is met by applying forced circulation method using fan. The fan is driven by a "Thermostat (Temperature Sensors)" and starters except for the fan are not separately provided/sold.

4) Select B□ option for order to apply it. □ : 1 (Inter-phase 150 mm), 2 (Inter-phase 210 mm, 25 kA), 3 (Inter-phase 275 mm), 4 (Inter-phase 210 mm, 31.5/40/50 kA)

5) ◆ : 130×155, ◉ : 140×155, ● : 150×205, ■ : 150×210, ★ : 165×310, △ : 210×310, ◈ : 275×310, ☆ : 275×403, ◎ : 275×438

17.5 kV

24/25.8 kV

HGV314□ [1]			HGV315 □ [1]					HGV316 □ [1]					HGV317 □ [1]					HGV611 □ [1]			HGV614 □ [1]		
IEC 62271-100 (2012)																		IEC 62271-100 (2012)					
17.5																		24 (25.8)					
25/4			31.5/4					40/4					50/3					12.5/4			25/4		
25			31.5					40					50					12.5			25		
65			82					104					130					32.5			65		
630	1,250	2,000	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]	1,250	2,000	2,500	3,150	4,000 [3]	630	1,250	2,000	630	1,250	2,000
50/60																		50/60					
758			955					1,212					1,516					520			1,039		
O-0.3 s-CO-15 s-CO																		O-0.3 s-CO-15 s-CO					
38																		60					
95																		125					
M2 (10,000 operations)																		M2 (10,000 operations)					
E2 (List3)																		E2 (List3)					
C2																		C2					
≤ 40																		≤ 40					
3																		3					
≤ 65																		≤ 65					
Electric Motion Spring System																		Electric Motion Spring System					
4NO + 4NC (Up to 10NO + 10NC)																		4NO + 4NC (Up to 10NO + 10NC)					
DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V					
DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V																		DC 24 V, AC/DC 48 ~ 60 V, AC/DC 100 ~ 130 V, AC/DC 200 ~ 250 V					
See page 39 (Table 2)																		See page 39 (Table 2)					
30,000 operations [2]																		30,000 operations [2]					
●	●																						
■	■																						
△	△	△	△	△				△	△				△	△				△	△	△	△	△	△
					◆	◆	◆			◆	◆	◆			◆	◆	◆							
●	●	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△		△	△	△
■	■																	△	△		△	△	△
■	■																	△	△		△	△	△
●△	●△	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	△	△	△	△
●	●	△	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	◆	◆	◆	△	△	△	△	△	△
70	70	110	90	130	170	170	170	90	130	170	170	170	135	135	175	175	175	115	115		115	115	130
100	105	140	125	160	200	200	200	125	160	200	200	200	165	165	205	205	205	145	145	160	145	145	160
70	70																	95	95		95	95	125
75	75																	105	105		105	105	130
70	70	90	85	90	120	120	120	85	90	120	120	120	90	90	120	120	120	95	95	100	95	95	100
135	135	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190	175	175	180	175	175	180
140	140	160	155	160	190	190	190	155	160	190	190	190	160	160	190	190	190	180	180	190	180	180	190
210	210	235	230	235	265	265	265	230	235	265	265	265	235	235	265	265	265	265	265	275	265	265	275

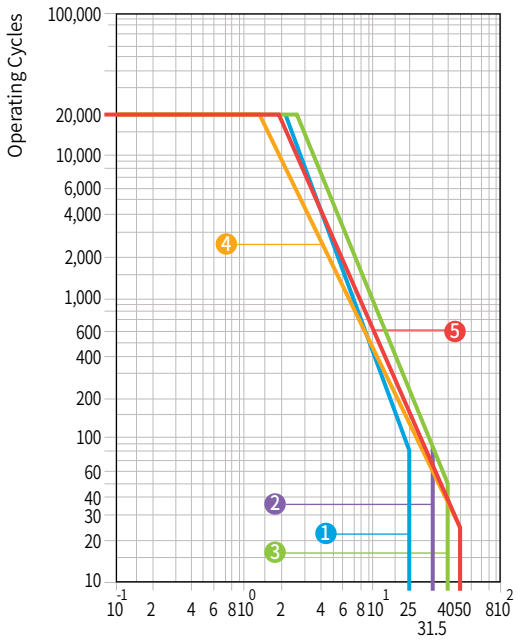
Ratings and Specifications

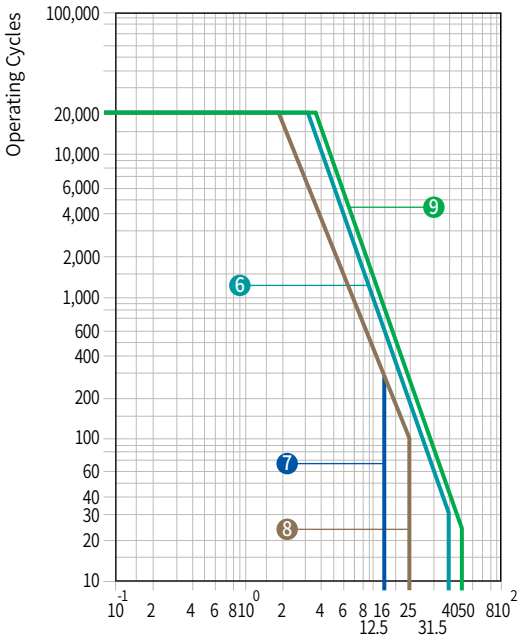
Rating — 36 kV

Type		HVF614□ [1]		HVF616□ [1]		HVF714□ [1]			HVF705□ [1]		
Applied Standards		IEC 62271-100									
Rated Current Ur	kV	24/25.8				36			36/38		
Rated Short-Time Current	kA/s	25/3		40/3		25/3			31.5/3		
Rated Breaking Current Isc	kA	25		40		25			31.5		
Rated Closing Current Ip	kA	65		104		65			82		
Rated Current	A	2,500	3,150	2,500	3,150	1,200	2,500	1,200/1,250	2,000	2,500	3,000/3,150
Rated Frequency	Hz	50/60									
Breaking Capacity	MVA	1,040/1,120		1,662/1,787		1,600			2,000		
Standard Operating Duty		O-0.3 sec-CO-3 min-CO / CO-15 sec-CO				O-0.3 sec-CO-3 min-CO					
Withstand Voltage											
Commercial Frequency Withstand Voltage (1 min) Ud	kV	50				70					
Impulse Withstand Voltage (1.2×50 μs) Up	kV	125				170					
Opening/Closing Test Ratings											
Mechanical		M2									
Electrical		E2									
Leading Current Opening/Closing		C2									
Rated Circuit Opening Time	ms	≤ 40		≤ 40		≤ 50			≤ 50		
Rated Breaking Time	Cycle	3		3		5			5		
Rated Closing Time	ms	≤ 75		≤ 75		≤ 85			≤ 70		
Closing Operation Method		Electric Motion Spring System									
Auxiliary Contacts		4NO + 4NC, 7NO + 7NC (Up to 10NO + 10NC + 1W Possible)									
Control Power											
Closing Coil		AC 110, 220 / DC 48, 110, 125, 220									
Trip Coil		AC 110, 220 / DC 48, 110, 125, 220									
Opening/Closing Life											
Electrical		See page 41 (Table 3)									
Mechanical		30,000 operations		20,000 operations		20,000 operations			20,000 operations		
Inter-Phase×Inter-Pole Distance [3]											
275×310	mm	◈	◈	◈	◈						
275×403	mm					☆	☆				
275×438	mm							◎	◎	◎	◎
Installation Method											
Fixed	XA					☆	☆	◎	◎	◎	◎
Draw-Out	GS, GE	◈	◈	◈	◈	☆	☆	◎ [2]	◎ [2]	◎ [2]	◎ [2]
	MS, ME										
Weight	kg										
Vacuum Circuit Breakers	Fixed	200	200	280	280	300	300	340	365	400	400
	Draw-Out	200	200	280	280	300	300	340	365	400	400
Cradle	GS										
	GE										
	MS										
	ME										

※ 1) □ : Rated Current (1 : 630 A / 2 : 1,250 A / 4 : 2,000 A / 6 : 2,500 A / 7 : 3,150 A / 8 : 4,000 A)
2) In case of HVF 70 type, GE is unavailable
3) ◆ : 130×155, ◉ : 140×155, ● : 150×205, ■ : 150×210, ★ : 165×310, △ : 210×310, ◈ : 275×310, ☆ : 275×403, ◎ : 275×438
VCB pole unit body inter-phase distance selection table A : 130, B : 140, C : 150, D : 165, E : 178, F : 210, G : 250, H : 254, I : 275, J : 300, K : 350
In □ of model name, relevant rated current number is filled.
For order of special VCB, contact us in advance.
Report and plate name of 24 kV VCB are issued based on 25.8 kV.
Mechanical opening/closing life is subject to operating environment. Refer to our instruction manual. (Capable of compliance with maintenance)

HGV Characteristics Curve





<Table 2> Electrical Opening/Closing Life Curve Number

Rated Voltage (kV)	Breaking Current (kA)	Characteristic Curve Number by Rated Current						
		400A	630A	1,250A	2,000A	2,500A	3,150A	4,000A
7.2	8	7						
	12.5		7					
	25		1	1				
	31.5			2	2			
	40			3	3	3	3	3
	50			4	5	9	9	9
12	25		1	1				
	31.5			2	2			6
	40			6	6	6	6	
	50			4	5	9	9	9
17.5	25		1	1				
	31.5			2	2			
	40			6	6	6	6	
	50			4	5	9	9	9
24 / 25.8	12.5		7	7				
	25		8	8	8			

Operating Duty

Operating durability and reliability rating is determined under the condition that the breaker repeatedly uses operation once or twice or more for a regulated interval.

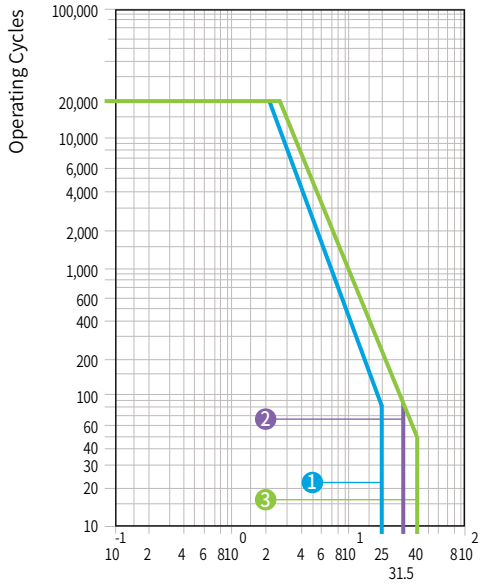
Division	Operation Duty	Remarks
Standard Edition	O - 15 s - CO - 3 min - CO	O : Opening C : Closing CO : Closing and Repeatedly Opening
	CO - 15 s - CO	
For High-Speed Reclosing	O - 0.3 s - CO - 3 min - CO	
	O - 0.3 s - CO - 15 s - CO	

Ratings and Specifications

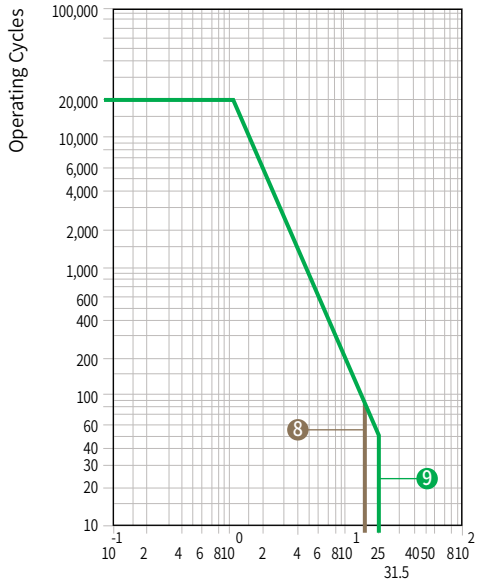
HVF characteristic curve

With long opening/closing life and easy maintenance, it can be used safely during its lifetime. For details on maintenance, refer to our instruction manual. Electrical opening/closing life is as follows based the rated and breaking current.

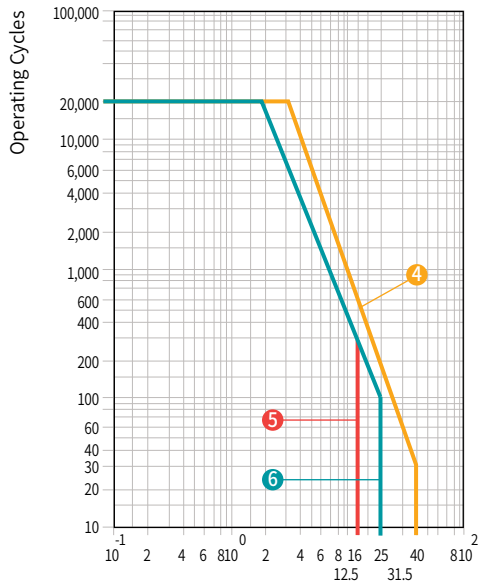
<Fig.4>



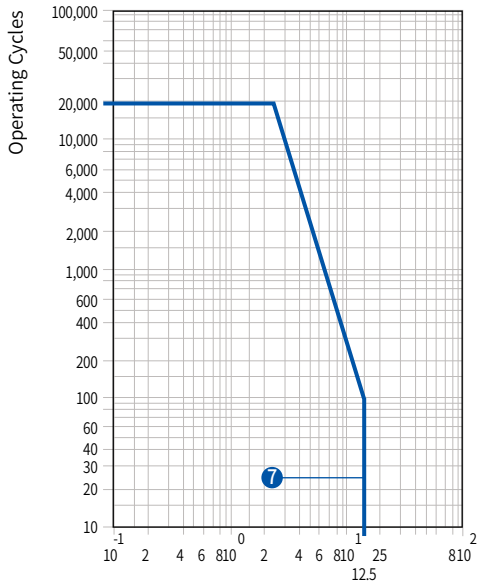
<Fig.5>



<Fig.6>



<Fig.7>



<Table 3> HVF Type Vacuum Circuit Breaker's Electrical Opening/Closing Life Curve Number and Decision

Model Name		HVF														
Rated Voltage	kV	7.2			12			15/17.5			24		36		38	
Rated Breaking Current	kA	25	31.5	40	25	31.5	40	25	31.5	40	12.5	25	25	31.5	31.5	40
Characteristics Curve Number at Each Rated Current	400A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	630A	1	-	-	1	-	-	1	-	-	5	6	6	-	-	-
	1,250A	1	2	3	1	2	4	1	2	4	5	6	6	2	2	4
	2,000A	-	2	3	-	2	4	-	2	4	-	6	6	-	2	4
	2,500A	-	-	3	-	-	4	-	-	4	-	-	-	2	-	-
	3,150A	-	-	3	-	-	4	-	-	4	-	-	-	-	2	4
	4,000A	-	-	3	-	4	-	-	-	-	-	-	-	-	-	-

Ratings and Specifications (UVC)

Standards Acquisition

- UL347
- NEMA ICS 3
- IEC62271-106

Certification Acquisition

- UL
- cUL
- KAS Certified V Checkmark



Item \ Division		Fixed-Type						Draw-Out					
		X1 Fuse Unattached A1 A2 A3 Fuse Attached						B1 B2 Fuse Unattached D1 D2 D3 D4 D5 D6 H1 S1 S4 S5 Fuse Attached					
Type													
Continuous-Type		UVC 32C□	UVC 34C□	UVC 62C□	UVC 64C□	UVC 82C□	UVC 84C□	UVC 32C□	UVC 34C□	UVC 62C□	UVC 64C□	UVC 82C□	UVC 84C□
Latch-Type		UVC 32L□	UVC 34L□	UVC 62L□	UVC 64L□	UVC 82L□	UVC 84L□	UVC 32L□	UVC 34L□	UVC 62L□	UVC 64L□	UVC 82L□	UVC 84L□
Rated Breaking Voltage	kV	3.6		7.2		12		3.6		7.2		12	
Rated Operating Voltage	kV	3.3		6.6		11		3.3		6.6		11	
Rated Frequency	Hz	60				50/60		60				50/60	
Rated Current	A	200	400	200	400	200	400	200	400	200	400	200	400
Impact Withstand Voltage	kV	60				75		60				75	
Commercial Frequency Withstand Voltage	for 1 min, kV	20				28		20				28	
Control Circuit Withstand Voltage	for 1 min, kV	2											
Opening/Closing Capacity Category		AC 4											
Breaking Capacity (O–3 min–CO–3 min–CO)	kA	4											
Short-Time Current	kA												
1 sec		6.3											
30 sec		2.4											
Durability	10,000 operations												
Mechanical		100											
Electrical		30											
Control Voltage	V	AC/DC 100 ~ 125 V, AC/DC 200 ~ 230 V											
Aux Contacts		3a2b						Max. 5a5b					
Maximum Load Capacity													
Electric Motor	kW	750	1,500	1,500	3,000	3,000	6,000	750	1,500	1,500	3,000	3,000	6,000
Transformer	kVA	1,000	2,000	2,000	4,000	4,000	8,000	1,000	2,000	2,000	4,000	4,000	8,000
Condenser	kVAR	750	1,200	1,500	2,000	3,000	4,000	750	1,200	1,500	2,000	3,000	4,000
Weight	kg	X1 19				X1 40		B1 B2 35				-	
		A1 A2 28				-		D1 D2 D3 D5 38				-	
		A3 33				-		D4 D6 H1 43				-	
		-				-		S1 S4 S5 48				S1 S5 60	

※ For VCS of rated voltage 12 kV, contact our sales team.

Ratings and Specifications (VI)

VI Vacuum Interrupter

High Reliability

High reliability based on 25 years' experience in manufacturing technology

Comprehensive Ratings and Application

- 7.2 kV ~ 24/25.8 kV voltage 25 kA breaking performance
- 7.2 kV ~ 17.5 kV voltage 40 kA breaking performance
- Each rating is in compliance with various international standards

Compact and Lightweight

Compact and lightweight thanks to the advanced contact and isolation technology

Minimized Maintenance

- High reliability and long-lasting lifetime with a very low leakage rate
- Used special material with very low gas content to maintain very vacuum status for a long time



HCV 3D/3E/3F/3G

HCV 6A/6B

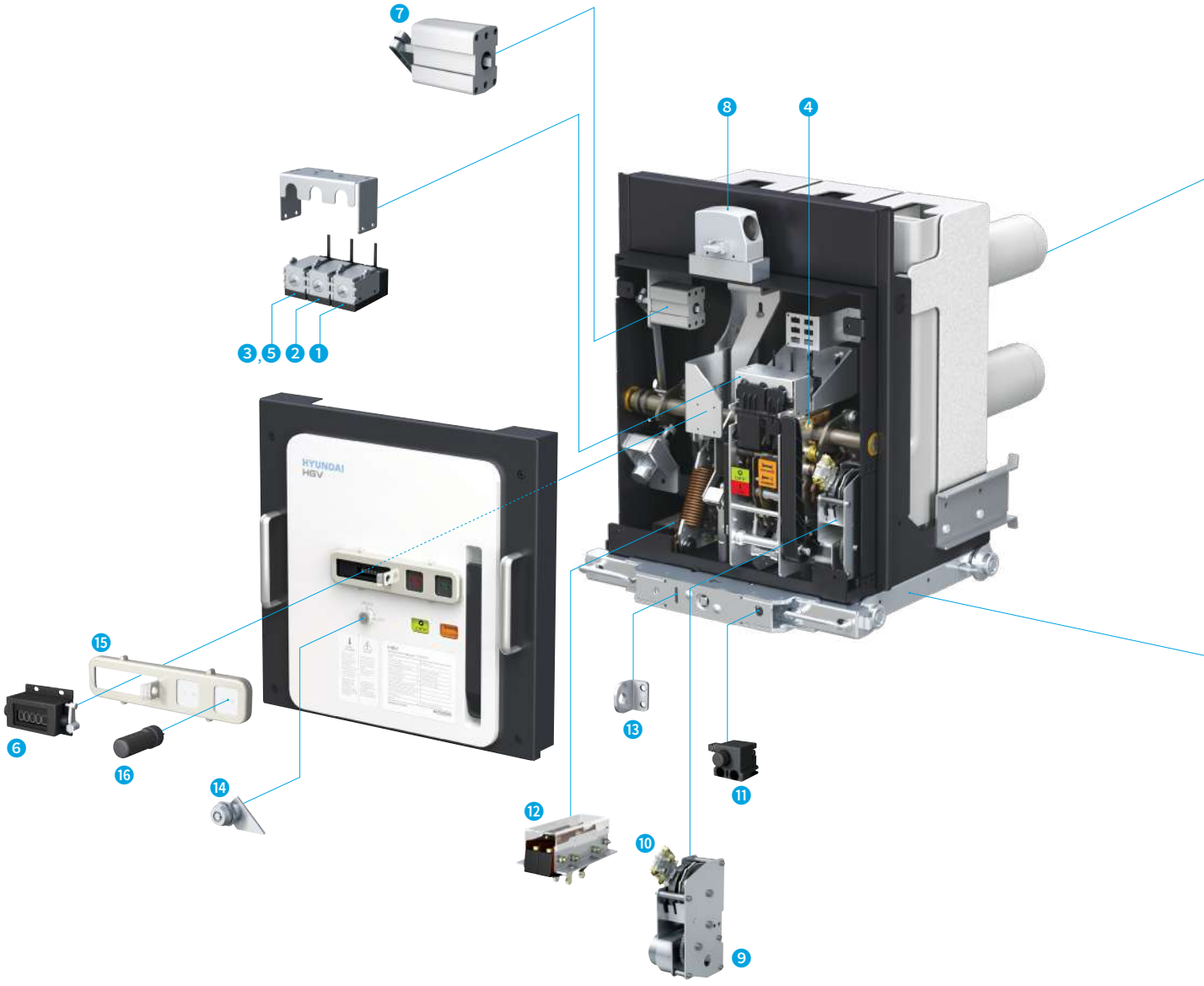
HCV 3B

Rating

Type		HCV 3B	HCV 3D	HCV 3E	HCV 3F	HCV 3G	HCV 6A	HCV 6B
Rated Voltage	kV	7.2, 12, 17.5	7.2, 12, 17.5	7.2, 12, 17.5	7.2, 12, 17.5	7.2, 12, 17.5	24, 25.8	24, 25.8
Rated Current	A	630, 1,250, 2,000	1,250, 2,000	2,500, 3,150, 4,000	1,250, 2,000	2,500, 3,150, 4,000	630	630, 1,250, 2,000
Rated Breaking Current. symm	kA	25	31.5/40	31.5/40	50	50	12.5	12.5/25
Electrical Performance								
Rated Closing Current, peak	kA	65	104	104	130	130	32.5	65
Rated Short-Time Current	kA/s	25/4 s	31.5, 40/4 s	31.5, 40/4 s	50/3 s	50/3 s	12.5/4 s	12.5, 25/4 s
Rated Frequency	Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Commercial Frequency Withstand Voltage	kV/min	38 (42)	38 (42)	38 (42)	38 (42)	38 (42)	60	60
Shockwave Withstand Voltage	kV	95	95	95	95	95	125	125
Mechanical Performance								
Contacts Opening Distance	mm	10 ± 1	10 ± 1	10 ± 1	10 ± 1	10 ± 1	12 ± 1	12 ± 1
Max Over Travel	mm	2	2	2	2	2	2	2
Maximum Rebound	mm	2	2	2	2	2	2	2
Average Opening Speed	m/s	1.0 ~ 1.2	1.0 ~ 1.2	1.0 ~ 1.2	1.0 ~ 1.2	1.0 ~ 1.2	1.0 ~ 1.2	1.0 ~ 1.2
Average Closing Speed	m/s	0.9 ~ 1.1	0.9 ~ 1.1	0.9 ~ 1.1	0.9 ~ 1.1	0.9 ~ 1.1	0.9 ~ 1.1	0.9 ~ 1.1
Self-Closing Ability (at full stroke)	kgf	15	25	35	25	35	10	15
Contacts Wear Limits	mm	3	3	3	3	3	3	3
Contacts Bounding	ms	2	2	2	2	2	2	2
No-Load Opening/Closing Live	operations	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Welding Force	kgf	250 ± 10 %	380 ± 10 %	380 ± 10 %	380 ± 10 %	380 ± 10 %	150 ± 10 %	250 ± 10 %

Attachments (HGV)

Circuit Breaker

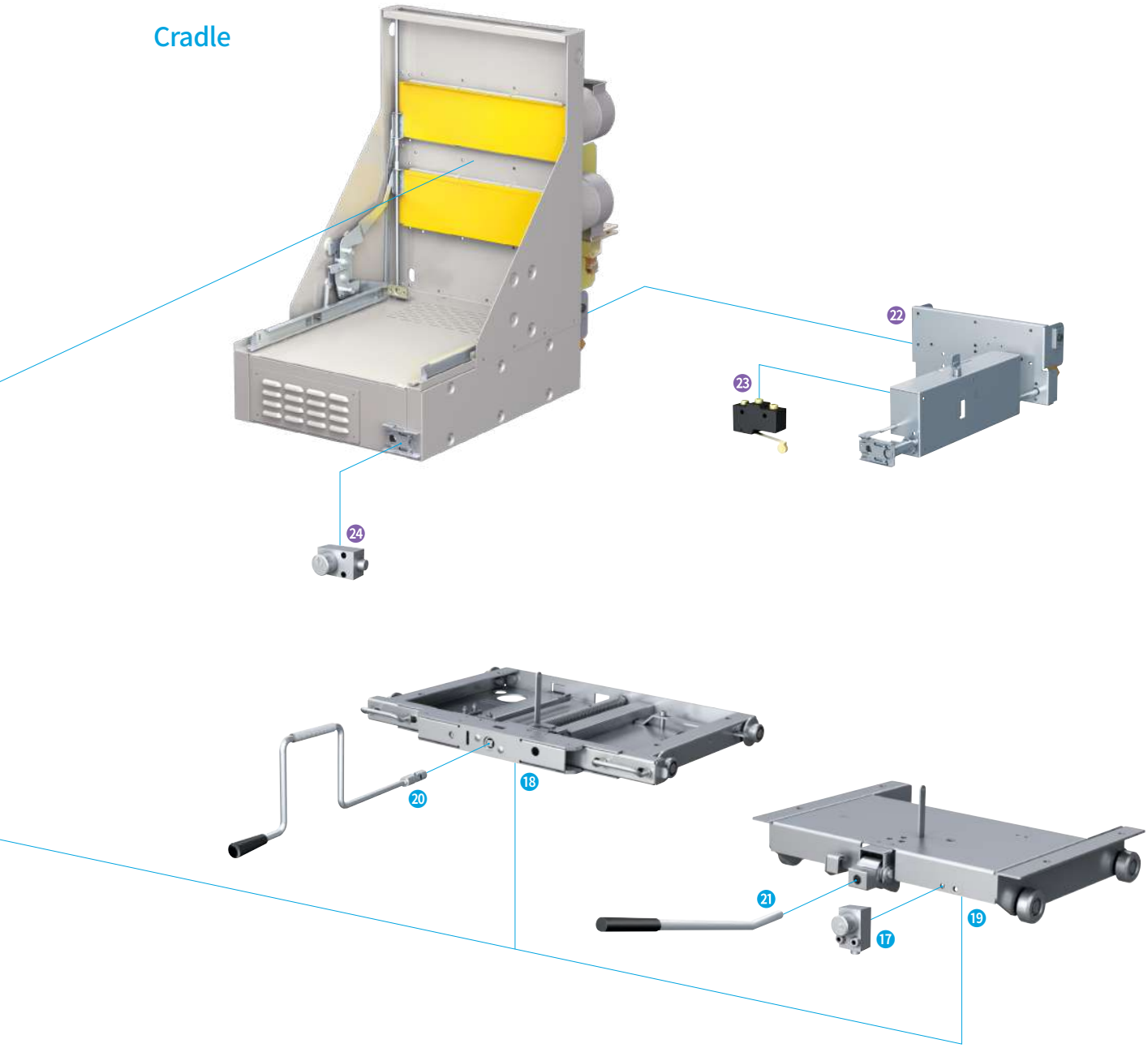


Attachments for Circuit

1. Close Coil
2. Trip Coil
3. Secondary Trip Coil
4. UVR (Under Voltage Release)
5. C.T Operated Release
6. Counter
7. Auxiliary Switch
8. Jack Interlock
9. Electric Motor
10. Spring Charged Limit Switch
11. Door Interlock
12. Position Switch

※ 3 , 5 cannot be applied simultaneous

Cradle



Attachments for Crable

- ⑬ Position Padlock (For G/M Type)
- ⑭ Key Lock
- ⑮ Button Cover
- ⑯ Manual Bar
- ⑰ Position Padlock Kirk Key (For E/F Type)
- ⑱ Pushing/Drawing Device (For G/M Type)
- ⑲ Pushing/Drawing Device (For E/F Type)
- ⑳ Pushing/Drawing Handle (For G/M Type)
- ㉑ Pushing/Drawing Handle (For E/F Type)
- ㉒ Earthing Switch
- ㉓ Earthing Switch Monitor Contact
- ㉔ Earthing Switch Locking Kirk Key

Attachments (HGV)

Basic Attachments

Pushing/Drawing Handle

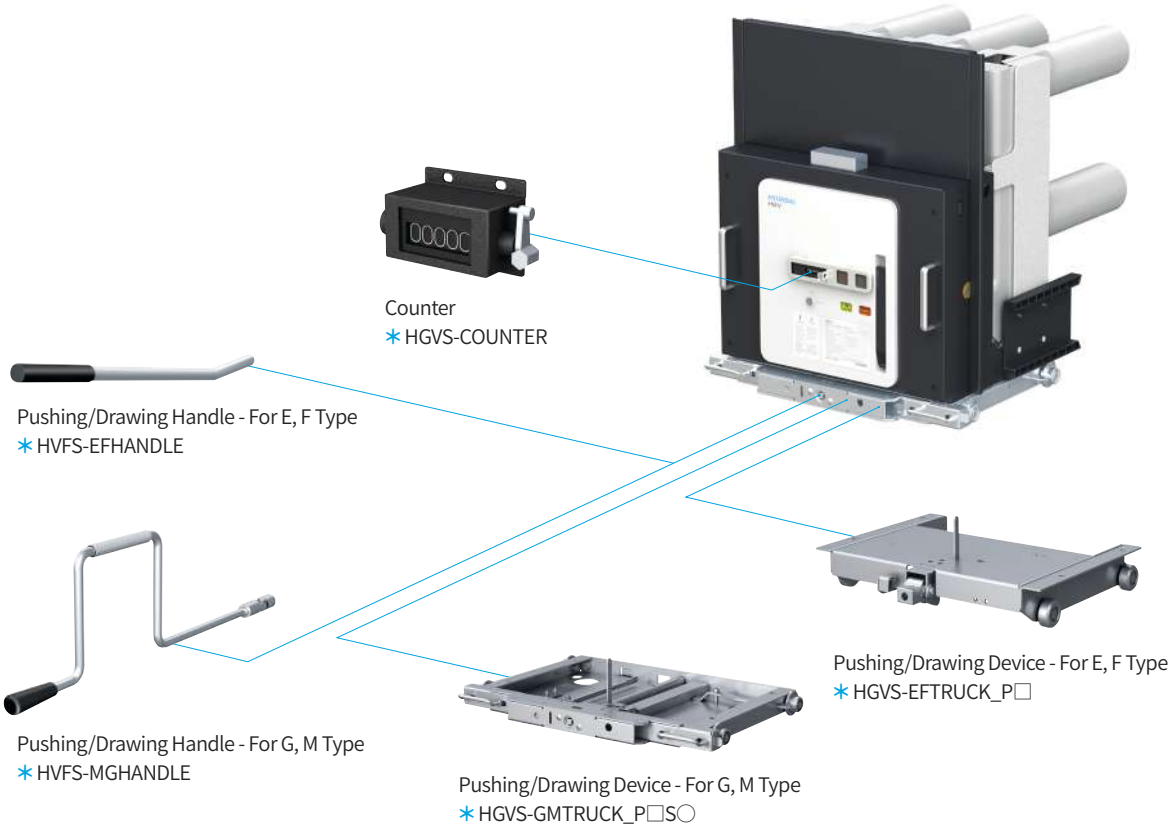
- Used for pushing/drawing of circuit breaker.
- Only one is provided based on the circuit breaker.
- Standard part supplied according to shipment standard at the time of product shipment.

Counter

- Displays breaker trip count.
- Displays up to 5 digits by default

Pushing/Drawing Device

- Device that moves the breaker into test or service position.
- Default specification is position 2 and only applied to pushing type.
- Relevant pushing/drawing device is attached based on E, F, G and M type of the breaker.



※ ∗ : Order Number for Separate Purchase
□ : Phase-to-Phase Distance (1 : 150 mm, 2 : 165 mm, 3 : 210 mm, 4 : 275 mm)
○ : Pushing/Drawing Distance (1 : 200 mm, 2 : 300 mm)

Trip Coil

- Controlling device that trips breaker by input of below external controlling voltage.
- Attached to breaker by default.

Rating

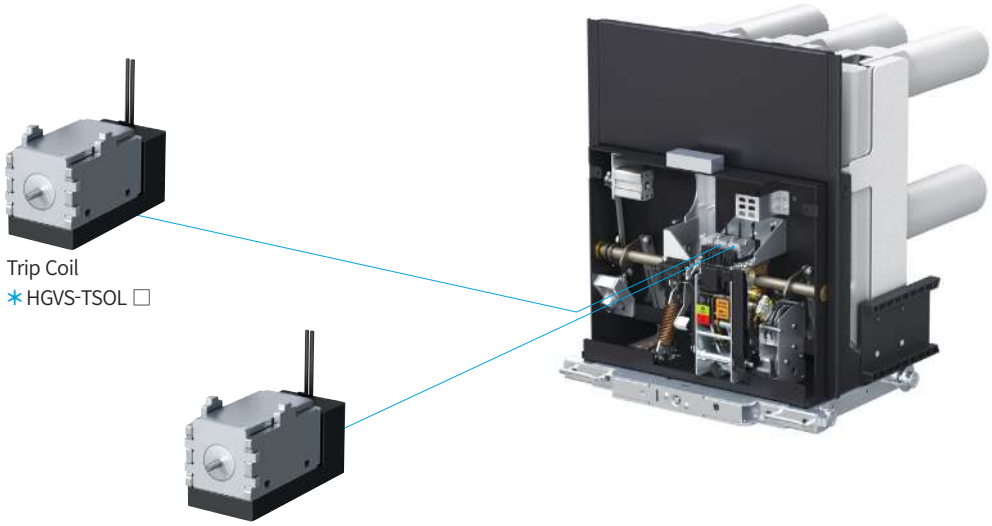
Item		Contents	
Operating Power		Rated Voltage (Un)	Load Current (A)
	DC	24 V	9.5 A
	AC/DC	48 ~ 60 V	5 A
		100 ~ 130 V	2.5 A
		200 ~ 250 V	1.5 A
Range of Motion		65 ~ 120 %	
Starting Power		DC = 200 W, AC = 200 VA	
Starting Time		approx. 120 ms	
Maintaining Power		DC = 4 W, AC = 4 VA	
Dielectric Strength		2,000 V 50/60 Hz (1 min)	

Close Coil

- Controlling device that closes breaker by input of below external controlling voltage.
- Attached to breaker by default.

Rating

Item		Contents	
Operating Power		Rated Voltage (Un)	Load Current (A)
	DC	24 V	9.5 A
	AC/DC	48 ~ 60 V	5 A
		100 ~ 130 V	2.5 A
		200 ~ 250 V	1.5 A
Range of Motion		80 ~ 120 %	
Starting Power		DC = 200 W, AC = 200 VA	
Starting Time		approx. 120 ms	
Maintaining Power		DC = 4 W, AC = 4 VA	
Dielectric Strength		2,000 V 50/60 Hz (1 min)	



※ ∗ : Order Number for Separate Purchase
□ : Operating Power (1 : DC 24 V, 2 : AC/DC 48 ~ 60 V, 4 : AC/DC 100 ~ 130 V, 6 : AC/DC 200 ~ 250 V)

Attachments (HGV)

Basic Attachments

Auxiliary Switch

- Contact switch used to check on/off status of breaker.
- Electrical signal of breaker on/off is configured with standard contacts of 4NO + 4NC.
- Available up to 10NO + 10NC upon request.

Item	Contents
Name	Control Circuit Connector
Standard	4a + 4b
Selection	10a + 10b

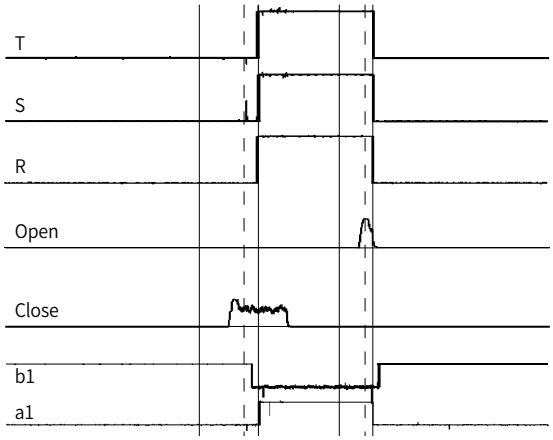
Rating

Item	Contents
Rated Voltage (Un)	AC/DC 24 ~ 250 V
Rated Current (A)	Ith2 = 10 A
Dielectric Strength	2,000 V 50/60 Hz (1 min)
Resistance	3 MΩ

Rated Current and Breaking Capacity in AC and DC Ranges

Voltage	T	In	Icu
AC 220 V	15 ms	2.5 A	25 A
DC 24 V	15 ms	10 A	12 A
DC 60 V	15 ms	6 A	8 A
DC 110 V	15 ms	4 A	5 A
DC 220 V	15 ms	1 A	1.5 A

Time Chart





Aux Switch
∗HGVS-ASW□

※ ∗ : Order Number for Separate Purchase
□ : Contacts Configuration (4 : 4NO + 4NC, 10 : 10NO + 10NC)

Electric Motor

- Electric motor that charges close spring.
- Once charging completes, the built-in switch interrupts input control power.
- When control power is connected, it recharges right away once breaker closes.

Spring Charged Limit Switch

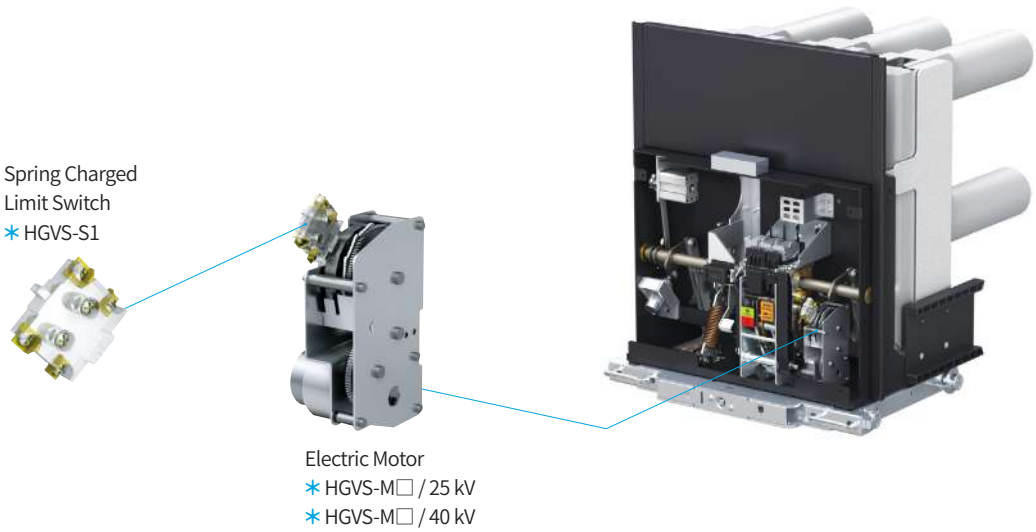
- Provides micro-switch contacts for charges/discharged status of close spring (1NO Provided).

Rating

Item		Contents	
Operating Power		Rated Voltage (Un)	Load Current (A)
	DC	24 V	12 A
	AC/DC	48 ~ 60 V	6 A
		100 ~ 130 V	3 A
		200 ~ 250 V	1.5 A
Range of Motion		80 ~ 110 % Un	
25 kA or Less	Starting Power	DC = 500 W, AC = 500 VA	
	Power Consumption	DC = 200 W, AC = 200 VA	
	Starting Time	approx. 0.2 sec	
	Maintaining Power	DC = 5 W, AC = 5 VA	
	Charging Time	3 ~ 5 sec	
	Dielectric Strength	2,000 V 50/60 Hz (1 min)	
31.5 kA or Higher	Starting Power	DC = 900 W, AC = 900 VA	
	Power Consumption	DC = 350 W, AC = 350 VA	
	Starting Time	approx. 0.2 sec	
	Maintaining Power	DC = 5 W, AC = 5 VA	
	Charging Time	3 ~ 5 sec	
	Dielectric Strength	2,000 V 50/60 Hz (1 min)	

Rated Current and Breaking Capacity within AC and DC Ranged

Voltage	T	In	Icu
AC 220 V	15 ms	2.5 A	25 A
DC 24 V	15 ms	10 A	12 A
DC 60 V	15 ms	6 A	8 A
DC 110 V	15 ms	4 A	5 A
DC 220 V	15 ms	1 A	1.5 A



※ ∗ : Order Number for Separate Purchase
☐ : Operating Power (1 : DC 24 V, 2 : AC/DC 48 ~ 60 V, 4 : AC/DC 100 ~ 130 V, 6 : AC/DC 200 ~ 250 V)
As motors vary depending on VCB capacity, check it prior to placing an order.

Attachments (HGV)

Basic Attachments

Auxiliary Contacts and Control Cables

- A, B : Provides counter controlling connector and pin to connect to breaker (Lead cable is not supplied).
- C, D : Standard length of lead cable of control circuit is 2.0 m and 0.8 SQ or higher is applied.
- Only either of two above is provided by default. Choose between 4NO + 4NC and 10NO + 10NC.

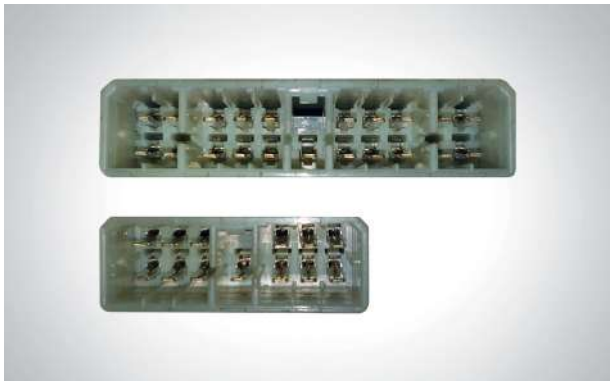


Control Circuit Connector
∗ HGVS-JACK □



Control Circuit Cable
∗ HGVS-LC □

Compact HGV Control Cable



Control Circuit Connector
∗ HGVS-□□JACK COM



Control Circuit Cable
∗ HGVS-LC□ COM

※ ∗ : Order Number for Separate Purchase
□ : Number of Auxiliary Contact (4 : 4NO + 4NC, 10 : 10NO + 10NC)
Cable installation direction is left by default at the time of product shipment. For Compact HGV, Control Ciruit Lead Cable(1.5m, 0.8SQ or more) is provided.

Optional Attachments

Secondary Trip Coil

- Double control device that can trip breaker even in the event of problem to trip coil.
- It trips breaker by below external controlling voltage.
- It is placed next to trip coil and cannot be applied at the same time with C.T operated release.

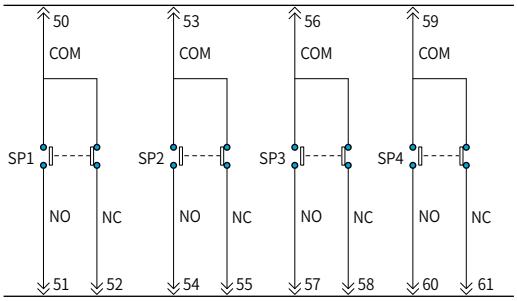
Position Switch

- Contact switch that shows pushing/drawing position of test and service of breaker. It is inside of the breaker.
- For G and M types, default specification is 2NO + 2NC per position.
- For E and F types, default specification is 1NO + 1NC per position.

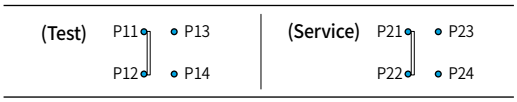
Rating

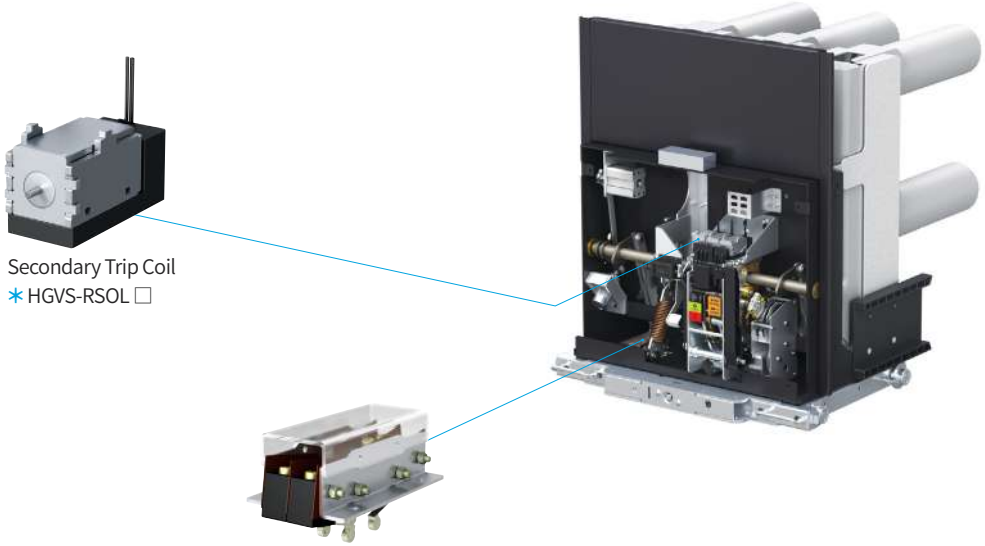
Item		Contents	
Operating Power		Rated Voltage (Un)	Load Current (A)
	DC	24 V	9.5 A
	AC/DC	48 ~ 60 V	5 A
		100 ~ 130 V	2.5 A
		200 ~ 250 V	1.5 A
Range of Motion		65 ~ 120 %	
Starting Power		DC = 200 W, AC = 200 VA	
Starting Time		approx. 120 ms	
Maintaining Power		DC = 4 W, AC = 4 VA	
Dielectric Strength		2,000 V 50/60 Hz (1 min)	

For G/M Type



For E/F Type





Secondary Trip Coil
✳ HGVS-RSOL □

Position Switch
✳ HGVS-P4 (For G/M)

※ ✳ : Order Number for Separate Purchase
□ : Operating Power (1 : DC 24 V, 2 : AC/DC 48 ~ 60 V, 4 : AC/DC 100 ~ 130 V, 6 : AC/DC 200 ~ 250 V)

Attachments (HGV)

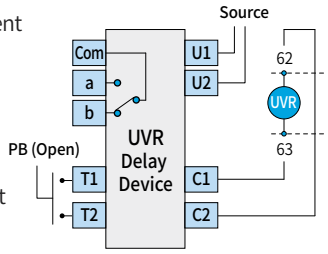
Optional Attachments

UVR (Under Voltage Release)

- Controlling device that automatically trips breaker when external controlling voltage supplied to breaker drops below a certain value.
- By default, instantaneous type is supplied but in order to delay for certain time, integrate it with UVR delay device for use.
- When input control voltage does not reach the range in the below table, breaker cannot close electrically and mechanically.

UVR Time Delay Device

- It is used to delay trip time of breaker for a set time and attached to exterior of breaker to be mounted in panel or cradle.
- Controlling device used in connection with UVR to prevent breaker trip when power network is released due to voltage drop or breaking over a short time.
- Operating voltage must be set as same as UVR.



Rating

Item		Contents	
Operating Power		Rated Voltage (Un)	Load Current (A)
	DC	24 V	10.5 A
	AC/DC	48 ~ 60 V	4.3 A
		100 ~ 130 V	2 A
		200 ~ 250 V	1 A
Range of Motion		Drop Out : 4.5 ~ 65 %	
		Pick Up : 65 ~ 80 %	
Starting Power		DC = 200 W, AC = 200 VA	
Starting Time		approx. 120 ms	
Maintaining Power		DC = 4 W, AC = 4 VA	
Dielectric Strength		2,000 V 50/60 Hz (1 min)	

Rating

Item		Contents		
Operating Power		Rated Voltage (Un)	Load Current (A)	
			Inrush State	Normal State
	DC	24 V	10.5 A (200 VA)	1.05 A (4 VA or lower)
	AC/DC	48 ~ 60 V	4.3 A (200 VA)	0.43 A (4 VA or lower)
		100 ~ 130 V	2 A (200 VA)	0.2 A (4 VA or lower)
		200 ~ 250 V	1 A (200 VA)	0.1 A (4 VA or lower)
Range of Motion		Drop Out : 4.5 ~ 65 %		
		Pick Up : 65 ~ 80 %		
Delay Time Setting		0.5, 1.0, 1.5, 3.0 sec		
Dielectric Strength		2,000 V 50/60 Hz (1 min)		



UVR Delay Device
∗ HGVS-UD□



UVR
∗ HGVS-UV□



※ ∗ : Order Number for Separate Purchase
□ : Operating Power (1 : DC 24 V, 2 : AC/DC 48 ~ 60 V, 4 : AC/DC 100 ~ 130 V, 6 : AC/DC 200 ~ 250 V)

Button Cover

- Device to prevent manual on/off of breaker due to erroneous operation of operator.
- When it is applied, manual on/off is unavailable and padlock function can be performed at the same time.
- Lock is not provided by default (Ø10 hole provided).

Key Lock

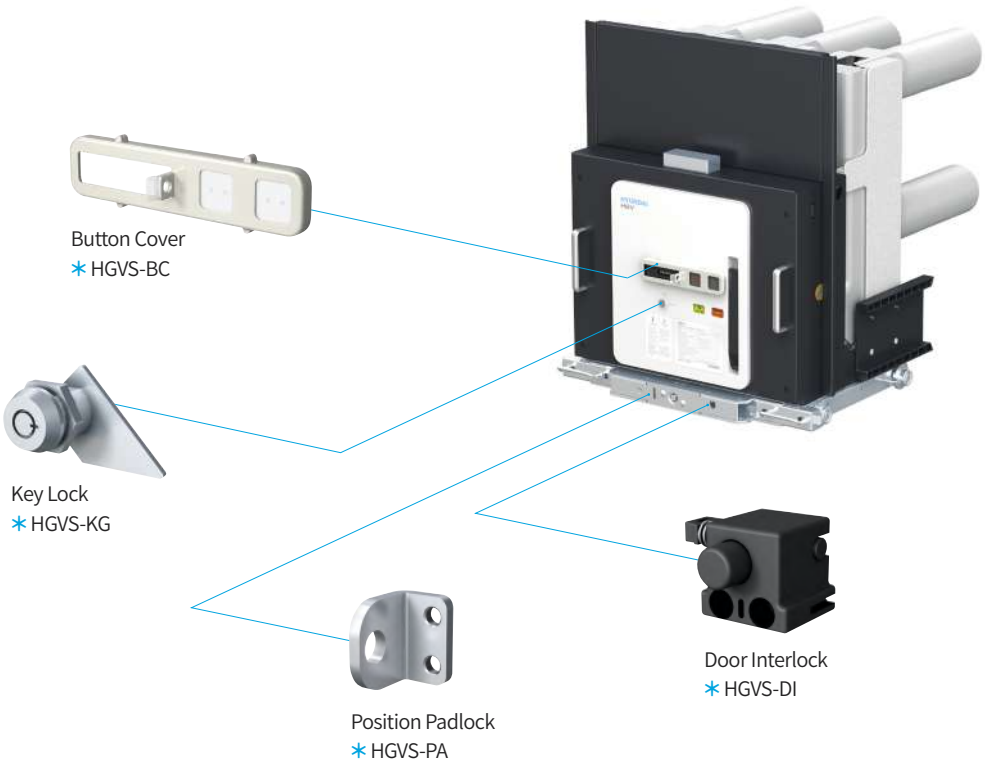
- Device to lock and release breaker status depending on purpose of operator.
- When locked, electrical and mechanical input is unavailable.
- It can only lock when breaker is tripped.

Position Padlock

- Device to prevent pushing/drawing of breaker during maintenance and operation of operator.
- Lock is not provided by default (Ø8 hole provided).

Door Interlock

- Device that makes pushing/drawing unavailable when panel door is open
- Option only available for MS and ME type cradle.



※ ∗ : Order Number for Separate Purchase

Attachments (HGV)

Optional Attachments

C.T Operated Release

- Device that automatically trips breaker with current release that can operate by C. T. secondary current when overcurrent and short circuit occurs.
- It is placed next to trip coil and cannot be applied at the same time with second trip coil.

Rating

Item	Contents
Rated Current	1.0 A
Operating Current	0.85 A

Position Padlock Kirk Key

- Device that locks or releases breaker in the given position.
- It can be mounted when cradle is E or F type.

Manual Bar

- Device that can manually operate breaker with lock hanging on a button cover.
- Only operator should carry it and use it as required.
- This device length is set to be used for breaker only in test positions.

Jack Interlock

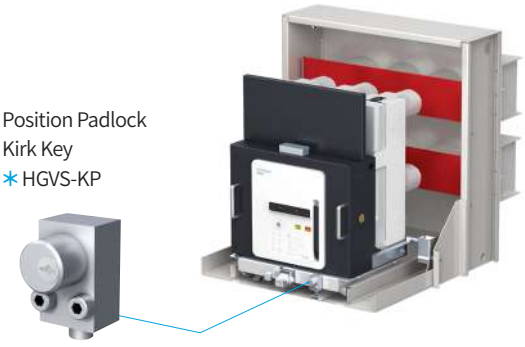
- Device that allows pushing/drawing only when control circuit connector on the input side mounted on cradle is normally connected to control circuit connector of breaker
- Control circuit connect cannot be separated when breaker is in service position or being pushed/drawn. Connection and separation is only available in test positions.
- It can be mounted when cradle is G or M type.



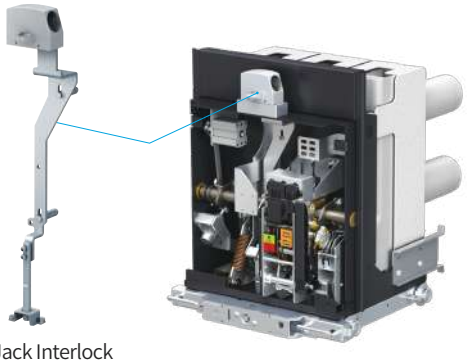
C.T Operated Release
∗ HGVS-CT2



Manual Bar
∗ HGVS-OB



Position Padlock
Kirk Key
∗ HGVS-KP



Jack Interlock
∗ HGVS-JI

※ ∗ : Order Number for Separate Purchase

Earthing Switch

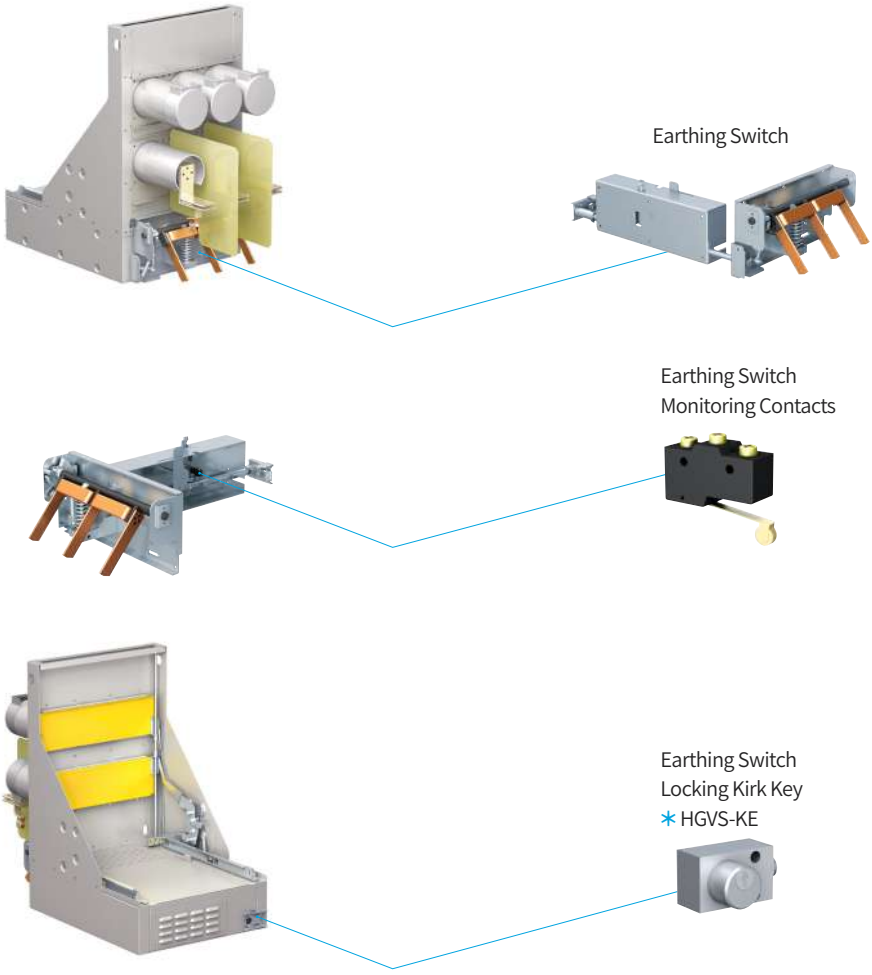
- Device that discharges charging current on the load side during panel maintenance or abnormality check in a test position or when breaker is fully drawn out.
- Operation is unavailable when breaker is drawing in. Applicable to G and M types.

Earthing Switch Locking Kirk Key

- Device to prevent operation for safety after maintenance or abnormality check or for other purpose after earthing switch check.

Earthing Switch Monitoring Contacts

- Contacts that display on/off status of grounding when applying earthing switch.
- It is installed to prevent potential accident by arbitrary operation.
- It should be installed with earthing switch and provides 1NO + 1NC contacts.
- It should be selected when mounting earthing switch.



※ ∗ : Order Number for Separate Purchase

Attachments (HGV)

Optional Attachments

Vacuum Checker

Breaking in vacuum circuit breaker is carried out in a vacuum interrupters fully sealed to a very vacuum status. Vacuum interrupters are manufactured in a special process, thus can be used without inspection except for appearance check. However, for more stable operation, customer may use below mobile vacuum checker to inspect vacuum interrupters.



Item	Contents
Order No.	HAFS-VC9
Input Voltage	AC 200 ~ 220 V
Output Voltage	AC 11 kV / AC 22 kV
Weight	22 kg
Shape	Portable

Condensor Trip Device

Attachment with a function to manually or automatically trip breaker using power charged to condenser when control power is not supplied due to a short circuit accidents, etc. when using alternating current power for controlling breaker trip. It has advantages as follows：

- Can automatically trip breaker using No. 3 and 4 contacts of built-in relay and switch operation for setting delay is as follows：
  - ON：Delay (Operation after less than 1.5 sec of delay)
  - OFF：By-Pass (Operation without delay)
- CTD function and rectifying function are combined and as the device is designed to use constant load current within 2 A, no separate rectifying is required.

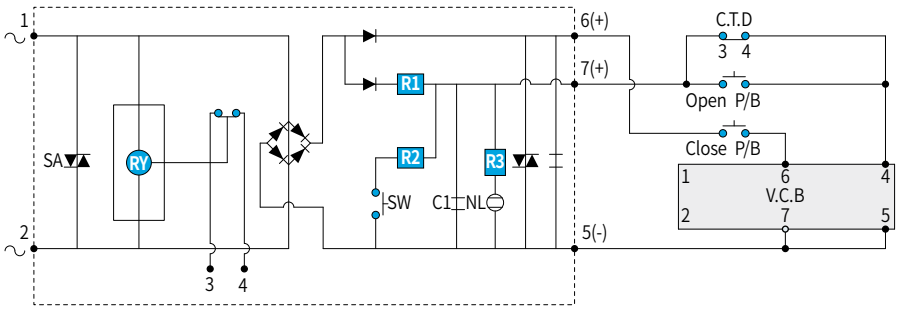


Item	Contents			
Order No.	HVFS-T7	HVFS-T9	HVFS-T4	HVFS-T6
Rated Input Voltage	AC 110 V	AC 220 V	DC 110 V	DC 220 V
Constant Charging Voltage	DC 145 V	DC 290 V	DC 110 V	DC 220 V
Constant Current Capacity	DC 2 A			
Delayed Current Time	0, 1.5 sec or less [1)]			
Rated Frequency	50/60 Hz		-	

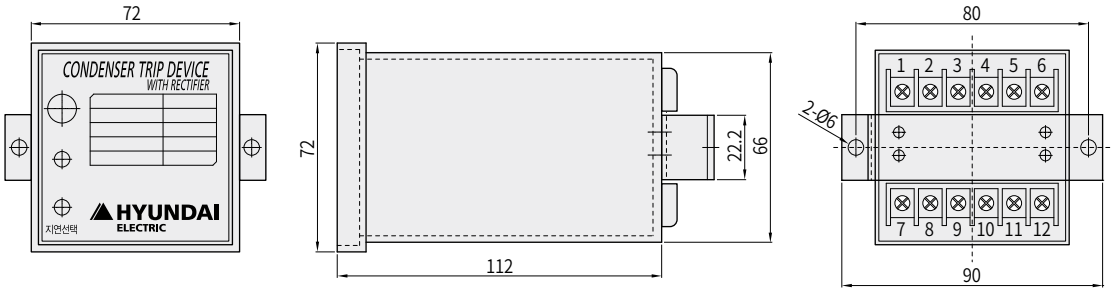
※ 1) For use in combination with VCB, controlling power of trip circuit should be DC.

For AC

Unit：mm



Alternating Current Input Power
NO. 1, 2
Condenser Trip Power
NO. 7 (+), 5 (-)
Direct Current Constant Power
NO. 6 (+), 5 (-)
Delay Contact
(For automatic trip as well)
NO. 3, 4



Attachments (HGV)

Order Code for Spare HGV Attachments

Code	Name	Spec
HVFS-MGHANDLE	Pushing/Drawing Handle	G, M Types
HVFS-EFHANDLE		E, F Types
HGVS-GMTRUCK_P□S○	Pushing/Drawing Device	G, M Types
HVFS-EFHANDLE		E, F Types
HGVS-COUNTER	Opening/Closing Counter	
HGVS-CSOL□	Closing Coil	
HGVS-TSOL□	Trip Coil	
HGVS-RSOL□	Secondary Trip Coil	
HGVS-UV□	UVR	
HGVS-UD□	UVR Delay Device	
HGVS-M□	Electric Motor	
HGVS-CT2	C.T Operaterd Release	1.0 A
HGVS-ASW4	Aux Switch	4NO + 4NC
HGVS-ASW10		10NO + 10NC
HGVS-S1	Spring Charged Limit Switch	1NO
HGVS-P2	Position Switch	1NO + 1NC applied for E and F
HGVS-P4		2NO + 2NC applied for G and M
HGVS-BC	Button Cover	
HGVS-OB	Manual Bar	
HGVS-KG	Key Lock	
HGVS-PA	Position Padlock	
HGVS-DI	Door Interlock	
HGVS-KE	Earthing Switch Locking Kirk Key	
HGVS-KP	Position Padlock Kirk key	
HGVS-JACK4	Control Circuit Connector (Single Supply)	4NO + 4NC
HGVS-JACK10		10NO + 10NC
HGVS-LC4	Control Circuit Cable	4NO + 4NC
HGVS-LC10		10NO + 10NC
HAFS-VC9	Vacuum Checker	
HVFS-T4	Condenser Trip Device	Input DC 110 V
HVFS-T6		Input DC 220 V
HVFS-T7		Input AC 110 V
HVFS-T9		Input AC 220 V
HGVS-DHANDLE COM	Draw-Out Handle(Only For Compact HGV)	E,F,G Types
HGVS-TSOL□ COM	Trip Coil(Only For Compact HGV)	HGV1099A/1011A
HGVS-RSOL□ COM	Secondary Trip Coil(Only For Compact HGV)	HGV1099A/1011A
HGVS-ASW4 COM	Auxiliary Switch(Only For Compact HGV)	4NO + 4NC, Fixed Type, Plug and Socket Only For A Type
HGVS-ASW7 COM		7NO + 7NC, Fixed Type, Plug and Socket Only For B Type
HGVS-ASW10 COM		10NO + 10NC, Fixed Type, Plug and Socket Only For D Type
HGV-P/S1 COM	Position Switch (Only For Compact HGV)	1NO + 1NC applied for E and F
HGV-CAM1 COM	Cam for Position Switch (Only For Compact HGV)	HGV1099A/1011A
HGV-CAM2 COM		HGV1141B/1142B
HGVS-LC4 COM	Control Circuit Cable (Only For Compact HGV)	4NO + 4NC
HGVS-LC7 COM		7NO + 7NC
HGVS-LC10 COM		10NO + 10NC
HVGS-22JACK	Control Jack	4NO + 4NC Plug and Socket Only For A Type
HVGS-36JACK	Control Jack	7NO + 7NC Plug and Socket Only For B Type
HVGS-PL1099	Plug-in Contact (Only For Compact HGV)	8kA 400A
HVGS-PL1141		25kA 630A
HVGS-PL1011		12.5kA 630A
HVGS-PL1142		25kA 1250A

※ Product codes vary depending on control voltage and draw-out type, see contents herein.

Attachments (HVF)

Basic Attachments (HVF)

Code	Name	Spec
HVFS-HANDLE	Charging Handle	HVF, HAF
HVFS-MGHANDLE	Pushing/Drawing Handle	SF Type, M Type, G Type
HVFS-EFHANDLE		E Type, F Type
HAFS-24JACK	Control Circuit Connector	HVF, HAF
HVFS-LEADCABLE (A-Type)	Control Circuit Lead Cable	A-Type
HVFS-LEADCABLE (B-Type)		B-Type

※ Handle (HVF Type) : HVF pushing/drawing breaker is used for pushing and drawing of breaker body.
Pushing/Drawing Handle (Pushing/Drawing Breaker) : Used for pushing/drawing of pushing/drawing breaker.
Charging Handle (HVF/HAF/HVG Type) : Used for manual closing spring charging. Also HAF pushing/drawing VCB is used for pushing/drawing of breaker body.
Control Circuit Lead Cable : Standard length is 2.2 m and applies 1.5 SQ or higher. (Applied to A and B types)
Fixed Plate (Fixed Breaker) : Fixed plate for fixed breaker.
Control Circuit Connector : Applied to pushing/drawing jack. (Applied to C and D types)
( ) What is given is parentheses is spare order code.

Attachments (HVF)

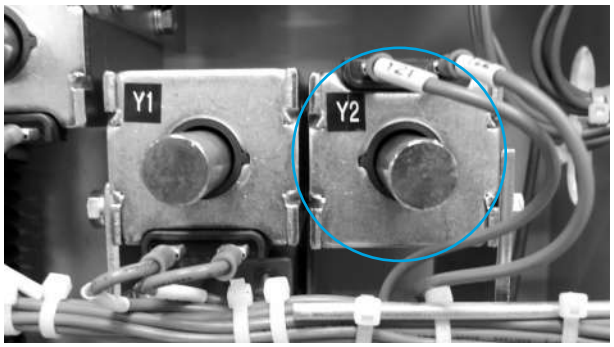
Optional Attachments

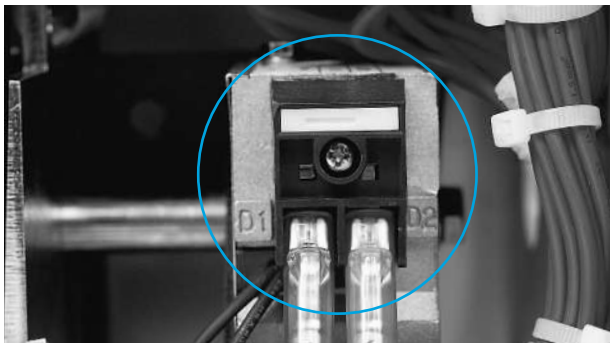
Secondary Trip Solenoid (Y2)

Additionally attaches and protects the second shunt release in addition to the first shunt release (Trip Solenoid) or can automatically trip breaker by electrical or mechanical operation.

Undervoltage Release (Y7)

Undervoltage release (UVR) can be used to automatically trip breaker when control voltage drops below a certain value. It can be connected to potential transformer but DC operation is available as well. UVR automatically trips breaker when control voltage is less than 35 % of rated value and can close breaker when control voltage is recovered to 85 % or higher. Also, when using UVR, attach electric lockout also to prevent closing of unnecessary breaker when control voltage gets under a certain value.





C.T Operated Release (Y4)

Provides automatic trip of breaker with current release that can operate by C.T secondary current when overcurrent and short-circuit occur. Its appearance is same as undervoltage release (Y7).

Item	Contents	
Order No.	HAFS-CT1	HAFS-CT2
Rated Current	0.5 A	1.0 A
Operating Current	0.45 A or higher	0.8 A or higher
Coil Resistance	20 Ω	11 Ω

※ If multiple options are built-in, make sure to discuss with us.
Second trip solenoid (Y2) and Undervoltage Release (Y7) do not apply at the same time.

Electrical Lockout (F1)

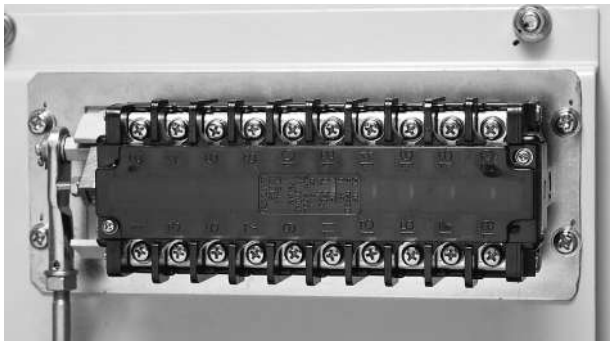
Device that makes closing of breaker unavailable when control voltage drops under a certain value and can close of breaker when control voltage recovers to above a certain value.

- Pick-Up :
  85 % or higher of rated voltage
- Drop-Out :
  60 % or less of rated voltage



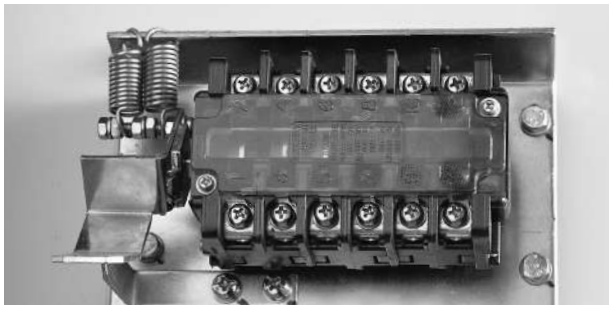
MOC (M5) : Mechanism Operated Cell Switches

This switch is a mechanical operation switch which operates directly by mechanical structure of breaker when breaker is in operation mode. It can be individually operated and default contact is made up of 5NO + 5NC.
However, installed by default for ANSI draw-out type VCB.



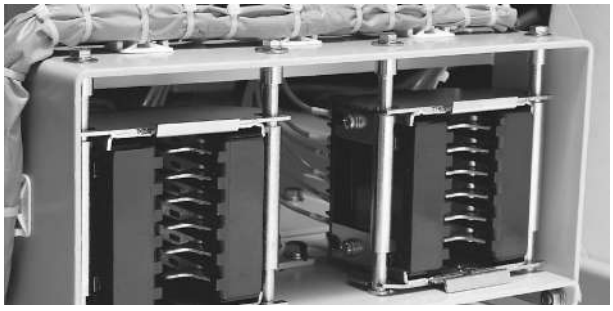
TOC (T3) : Truck Operated Cell Switches

The truck operated cell switch operates when breaker is drawn in from driving position and should not transform if moving unit is not completely connected to driving position. Default contact is made up of 3NO + 3NC. However, it is installed by default for ANSI draw-out type VCB.



Auto Secondary Jack

This Control Jack is a method that applies to Position 3 that does not breaker to connect on a disconnecting position and automatically connects on test and connection positions.
It is mounted on ANSI VCB by default.



Earthing Switch

Device installed for safety of operator by discharging charging current to the load side for maintenance of switchgear after drawing out breaker or moving it to disconnected position.
It can only be mounted on G type cradle. For detailed mountable models, contact us.



Contacts for Earthing Switch Operation (EE)

Contacts that show operating status (on/off) of earthing switch when using earthing switch. It is installed to prevent potential accidents caused by arbitrary operations and provides 1NO + 1NC contacts.



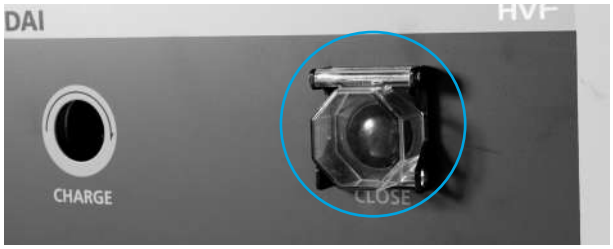
Spring Charged Signal (S41) Draw-Out

It refers to the electrical function to externally check the status of VCB waiting for closing. It additionally attaches limit switch of charge unit within VCB for application. If without further discussion, draw-out standard is control jack No. 3 and 8.

Button Padlock (Lock Button for Closing and Trip Buttons)

Locking device can be installed on button to prevent potential accident.

- BB : Button Padlock (Close & Open)
- BC : Button Padlock (Close)
- BO : Button Padlock (Open)

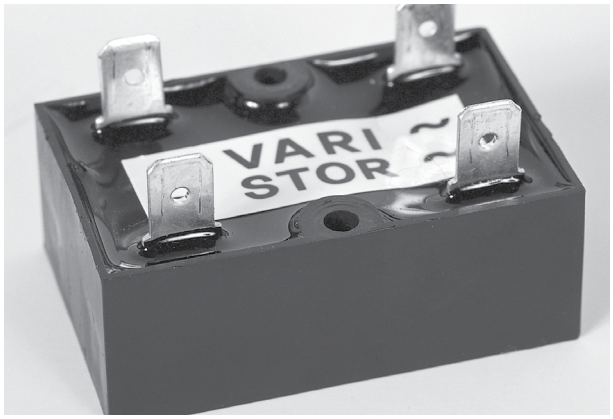


Attachments (HVF)

Optional Attachments

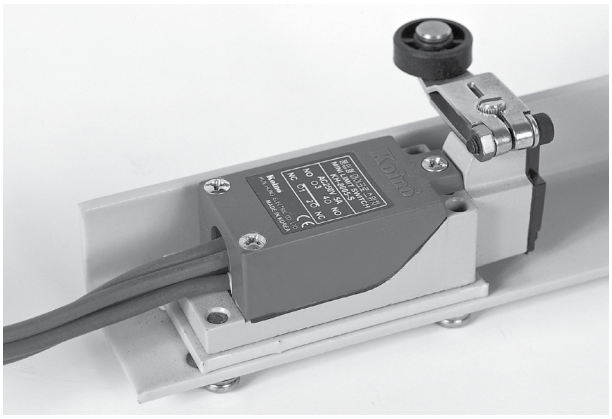
Varistor Module (V□)

In case the surge that is generated when opening/closing shunt release, soleid, motor of DC control circuit may affect solid-state control device of other control circuit, varistor module can be additionally attached to both sides of motor and solenoid.



Position Switch (P2)

It has functions to electrically display status of test and connection positions of breaker. Default contact draw-out provides 1NO + 1NC per position. However, at a customer request, extension up to 4NO + 4NC per position is available for HVF type VCB only with cable 1.5 SQ or higher and 2.5 MR draw-out as standard.



Flame-Retardant Cable (NA, NB)

Auxiliary and control circuit cable. It uses flame-retardant cable for cable distribution based on following methods :

- NA : Auxiliary Contact 4NO + 4NC Application (A and C Type Jack)
- NB : Auxiliary Contact 7NO + 7NC, 10NO + 10NC Application (B and D Type Jack)

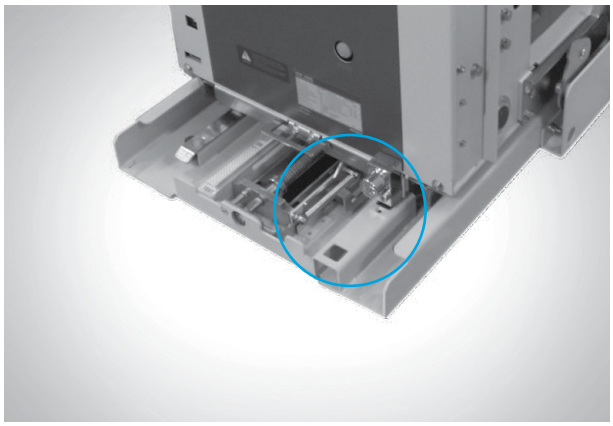
Vacuum Checker

Breaking at vacuum circuit breaker is carried out in a completely vacuum tube in a highly vacuum state ; vacuum tube is manufactured in a special process and can be use without a separate inspection except for exterior check for 20 years. However, for more stable operation, customer may use below mobile vacuum checker to inspect vacuum tube.

Item	Contents
Order No.	HAFS-VC9
Input Voltage	AC 200 ~ 220 V
Output Voltage	AC 11 kV / AC 22 kV
Weight	22 kg
Shape	Portable

Key Lock (KL)

Part that enables locking and releasing of breaker position in a given position.





Condensor Trip Device

Attachment with a function to manually or automatically trip breaker using power charged to condenser when control power is not supplied due to a short circuit accidents, etc. when using alternating current power for controlling breaker trip. It has advantages as follows：

- Can automatically trip breaker using No. 3 and 4 contacts of built-in relay and switch operation for setting delay is as follows：
  - ON：Delay (Operation after less than 1.5 sec of delay)
  - OFF：By-Pass (Operation without delay)
- CTD function and rectifying function are combined and as the device is designed to use constant load current within 2 A, no separate rectifying is required.

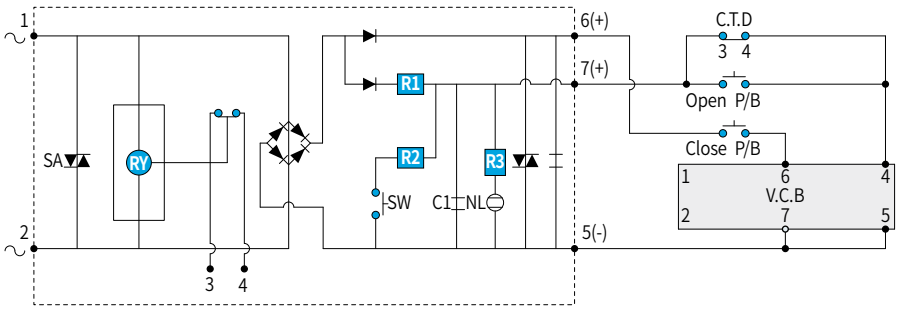


Item	Contents			
Order No.	HVFS-T7	HVFS-T9	HVFS-T4	HVFS-T6
Rated Input Voltage	AC 110 V	AC 220 V	DC 110 V	DC 220 V
Constant Charging Voltage	DC 145 V	DC 290 V	DC 110 V	DC 220 V
Constant Current Capacity	DC 2 A			
Delayed Current Time	0, 1.5 sec or less [1)]			
Rated Frequency	50/60 Hz		-	

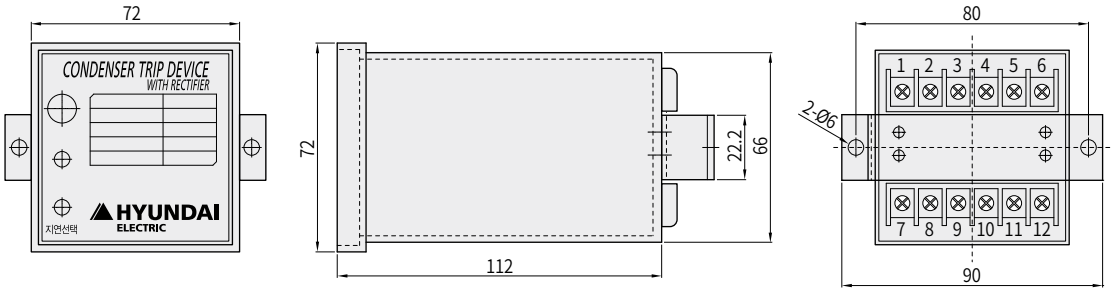
※ 1) For use in combination with VCB, controlling power of trip circuit should be DC.

For AC

Unit：mm



Alternating Current Input Power
NO. 1, 2
Condenser Trip Power
NO. 7 (+), 5 (-)
Direct Current Constant Power
NO. 6 (+), 5 (-)
Delay Contact
(For automatic trip as well)
NO. 3, 4

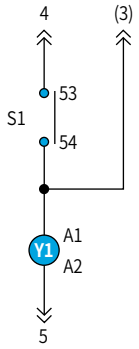


Attachments (HVF)

Optional Attachments

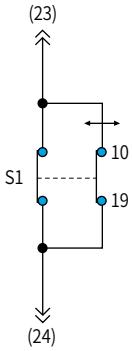
Trip Circuit Supervision Signal (Tc) Draw-Out

- It is applied to the relay with a function of monitoring abnormality of trip coil among electrical protective relay.
- Without further discussion, draw-out is made with (3).



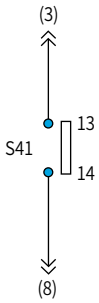
Wiping Contact (WC)

- Aux. Early “B” contact configuration is available when connected parallel with “B” contact in the switch.
- Without further discussion, draw-out is made with (23) and (24) of control Jack.



Spring Charged Signal (SI)

- Electrical function to externally check the status of VCB waiting for closing.
- Without further discussion, draw-out is made with (3) and (8) of control Jack.



Electro Locking Device (LC)

- Earthing switch operation can be automatically locked using electricity by linking with earthing switch. For operating power, DC is used and DC 100, 125, 220, are 240 V applied.



Order Code for Spare HVF Attachments

HAFS-48Jack / Control Jack / (10NO + 10 NC Cable Type D Type)
HVFS-Controller (DC 48_N) / UVR Controller / DC 48 V
HVFS-Controller (AC/DC 110_N) / UVR Controller / AC/DC 110 V, DC 125 V
HVFS-Controller (AC/DC 220_N) / UVR Controller / AC/DC 220 V

To purchase spare products for vacuum circuit breakers, orders as follows can be placed：

Code	Name	Spec
HAFS-K1□	Anti-Pumping Relay	2：DC 48 V, 4：DC 110 V, 5：DC 125 V, 6：DC 220 V, 7：AC 110 V, 9：AC 220 V
HAFS-M □	Charging Motor	
HAFS-L04 (NEW)	Lockout Relay	AC/DC 110 V, DC 125 V
HAFS-L06 (NEW)	Lockout Relay	AC/DC 220 V
HAFS-SOL□ 1)	Closing Solenoid	2：DC 48 V, 4：DC 110 V, 5：DC 125 V, 6：DC 220 V, 7：AC 110 V, 9：AC 220 V
HVFS-SOL□ 2)	Tripping Solenoid	
HAFS-UV4 (NEW)	Under Voltage Release	AC/DC 110 V, DC 125 V, AC/DC 220 V
HVFS-T4	Condensor Trip Device	DC 110 V
HVFS-T6	Condensor Trip Device	DC 220 V
HVFS-T7	Condensor Trip Device	AC 110 V
HVFS-T9	Condensor Trip Device	AC 220 V
HVFS-T/Jumper	Test Jumper	-
HAFS-ASW4	Auxiliary Switch	4NO + 4NC
HAFS-ASW7	Auxiliary Switch	7NO + 7NC
HAFS-ASW10	Auxiliary Switch	10NO + 10NC
HAFS-L/S	Limit Switch (S1)	1NO + 1NC
HVFS-P/S (NEW)	Position Switch	1NO + 1NC
HAFS-C/ME	Closing Mechanism	-
HAFS-T/ME	Tripping Mechanism	-
HAFS-CT1	CT Operated Release	0.5 A
HAFS-CT2	CT Operated Release	1 A
HAFS-22JACK	Control Jack	4NO + 4NC, Plug and Socket Only (A Type)
HAFS-24JACK	Control Jack	4NO + 4NC, Plug and Socket Only (C Type) 3)
HAFS-44JACK	Control Jack	7NO + 7NC, Plug and Socket Only (B Type)
HAFS-HANDLE	Charging Handle	-
HVFS-EFHANDLE	Draw-Out Handle	ES, FS Cradle
HVFS-MGHANDLE	Draw-Out Handle	GS, CS, MS, SF Cradle
HAFS-VC9 (22 kV)	Vacuum Checker	AC 220 / AC 22 kV
HAFS-VC9 (28 kV)	Vacuum Checker	AC 220 / AC 28 kV
HVFS-LEADCABLE (A-Type)	Lead Cable	4NO + 4NC, Fixed Type
HVFS-LEADCABLE (B-Type)	Lead Cable	7NO + 7NC, Fixed Type

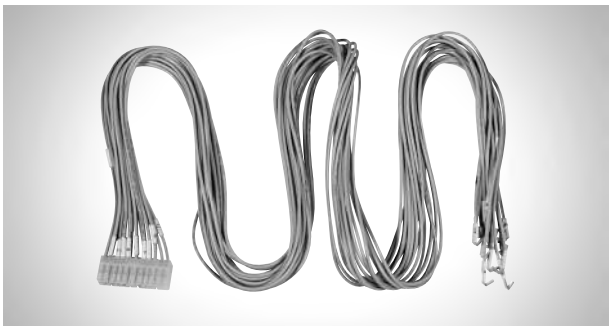
※ 1) For HAF type, use 1) code for both closing and trip.
2) For HVF type, use 1) code for closing, 2) code for trip.
3) For D type, order 2 sets of C type.
For additional UVR option installation, contact us.
For replacement of UVR Controller prior to Oct 2016, UVR requires replacement simultaneously as well. (Not compatible with older UVR)

Attachments (UVC)

Basic Attachments

Control Circuit Lead Cable

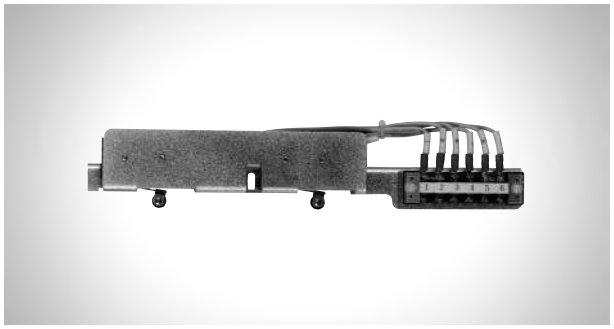
Standard length is 1.5 m and cable is 17AWG (Gray Color).



Optional Devices

Position Switch

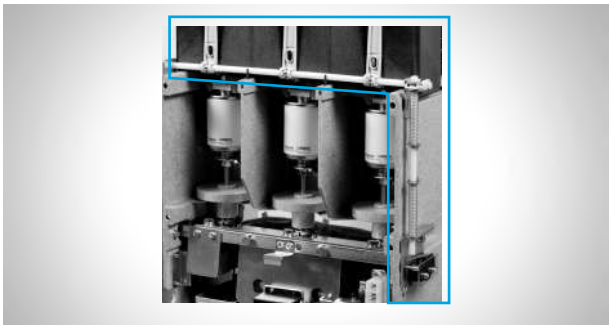
Device to electrically display the status of test and contact positions of high-pressure vacuum contactor. It provides one c contact in each position.



※ Order Code : CP / For P4, offer 2 Com at each position.

Fuse Melting Indicator

Device that informs melting statue of fuse and it is made up with one c contact.



Potential Transformer (P.T)

It lowers the voltage of main busbar on the primary side to 110 V or 220 V to be used as a power of high-pressure vacuum contactor or distribution line devices.



Manual Inspection Handle

It is used for manual inspection of the product with front cover removed.



Electrical Position Interlock

Device that allows supply of high-pressure vacuum contactor power at a correct (Test and connect) positions only. Mechanical interlock that is mechanically provided allows power supply at an incorrect position as well but it makes closing unavailable mechanically.

Optional Attachments

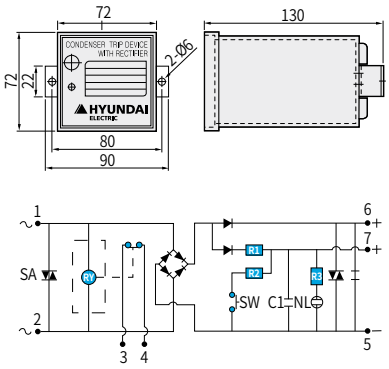
Condenser Tripping Device (CTD)

Device that can manually or automatically trip breaker using power charged to condenser when control power is not supplied due to a short circuit accidents, etc. when using alternating current power for controlling trip. CTD can be purchased as a spare part only.

Item	Contents	
Order No.	UVCS0013	UVCS0014
Rated Input Voltage	AC 110 V	AC 220 V
Constant Voltage Charging	DC 145 V	DC 290 V
Constant Current Capacity	DC 2 A	
Rated Frequency	50 / 60 Hz	
Time Delay Circuit [1)]	Less than 1.5 sec	
Applied Standards	IEC 60694 / KSC 4611	

※ 1) Customer can choose one without delay as a option.

AC Input Power :
No. 1, 2
DC Continuous Power :
No. 6 (+), 5 (-)
Condenser Trip Power :
No. 7 (+), 5 (-)
Delay Contact :
No. 3, 4



Vacuum Checker

Breaking in vacuum contactor is carried out in a vacuum interrupter fully sealed to a highly vacuum status. Vacuum interrupters are manufactured in a special process, thus can be used without inspection except for appearance check. However, in order to inspect vacuum interrupters for more stable operation, customer can use below mobile vacuum checker.

Item	Contents
Order No.	HAFS-VC9
Input Voltage	AC 200 / 220 V
Output Voltage	AC 11 kV / AC 22 kV
Weight	22 kg
Shape	Portable



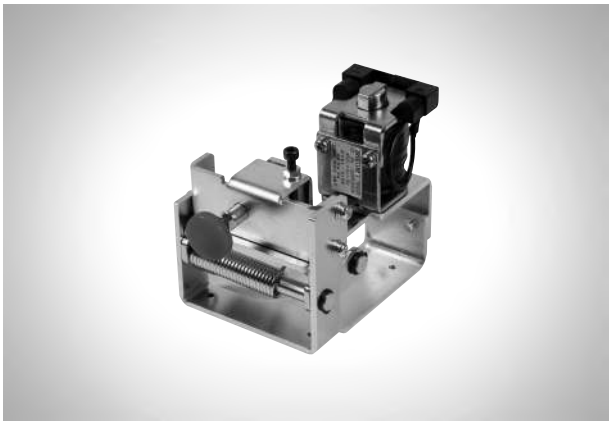
Controllers

Electronic controller that provides closing coil current. It has latch and instantaneous type selection switches and for control power AC/DC.



Latch Device

It consists of a trip coil and a latch mechanism unit.
Trip coil can be purchased separately (UVCS0023, UVCS0024) and applies to instantaneous type only.



Attachments (UVC)

Order Code for Spare UVC Attachments

Code	Spec	Code	Spec
UVCS0001	Open/Close Collector	UVCS6250	Fuse-7.2 kV/250 A/50 kA, 192 mm (SIBA)
UVCS0002	Manual Inspection Handle	UVCS6315	Fuse-7.2 kV/315 A/50 kA, 292 mm (SIBA)
UVCS0003	Latch Device (DC 110 V)	UVCS6355	Fuse-7.2 kV/355 A/50 kA, 292 mm (SIBA)
UVCS0004	Latch Device (DC 220 V)	UVCS7006	Fuse-12 kV/6.3 A/63 kA, 292 mm (SIBA)
UVCS0006	Position Switch	UVCS7010	Fuse-12 kV/10 A/63 kA, 292 mm (SIBA)
UVCS0007	Closing Coil (Continuous-Type) 1)	UVCS7016	Fuse-12 kV/16 A/63 kA, 292 mm (SIBA)
UVCS0008	Closing Coil (Latch-Type) 1)	UVCS7020	Fuse-12 kV/20 A/63 kA, 292 mm (SIBA)
UVCS0009	Potential Transformer (3.3 kV/110 V, 200 VA)	UVCS7025	Fuse-12 kV/25 A/63 kA, 292 mm (SIBA)
UVCS0010	Potential Transformer (3.3 kV/220 V, 200 VA)	UVCS7032	Fuse-12 kV/32 A/63 kA, 292 mm (SIBA)
UVCS0011	Potential Transformer (6.6 kV/110 V, 200 VA)	UVCS7040	Fuse-12 kV/40 A/63 kA, 292 mm (SIBA)
UVCS0012	Potential Transformer (6.6 kV/220 V, 200 VA)	UVCS7050	Fuse-12 kV/50 A/63 kA, 292 mm (SIBA)
UVCS0013	CTD (AC 110 V)	UVCS7063	Fuse-12 kV/63 A/63 kA, 292 mm (SIBA)
UVCS0014	CTD (AC 220 V)	UVCS7080	Fuse-12 kV/80 A/63 kA, 292 mm (SIBA)
UVCS0015	Shutter Set (E Class→F Class)	UVCS7100	Fuse-12 kV/100 A/63 kA, 292 mm (SIBA)
UVCS0016	Control Circuit Lead Cable (1.5 m)	UVCS7125	Fuse-12 kV/125 A/63 kA, 292 mm (SIBA)
UVCS0017	Fuse Holder (For DIN Fuse, Plate Spring Included) 2)	UVCS7160	Fuse-12 kV/160 A/63 kA, 292 mm (SIBA)
UVCS0018	Isolating Contact (Main Circuit Connecting Terminal) 2)	UVCS7200	Fuse-12 kV/200 A/50 kA, 292 mm (SIBA)
UVCS0019	Controller (AC/DC 100 ~ 125 V, AC/DC 200 ~ 230 V)	UVCS2005	Fuse-3.6 kV/5 A/40 kA/G Type (LS)
UVCS0021	E Class Cradle (200/400 A)	UVCS2010	Fuse-3.6 kV/10 A/40 kA/G Type (LS)
UVCS0022	F Class Cradle (200/400 A)	UVCS2020	Fuse-3.6 kV/20 A/40 kA/G Type (LS)
UVCS0023	Trip Coil (DC 110 V)	UVCS2030	Fuse-3.6 kV/30 A/40 kA/G Type (LS)
UVCS0024	Trip Coil (DC 220 V)	UVCS2040	Fuse-3.6 kV/40 A/40 kA/G Type (LS)
HVC00703	Vacuum Interrupters for Vacuum Contactor (7.2 kV 400 A) 3)	UVCS2050	Fuse-3.6 kV/50 A/40 kA/G Type (LS)
UVCS6006	Fuse-7.2 kV/6.3 A/63 kA, 192 mm (SIBA)	UVCS2060	Fuse-3.6 kV/60 A/40 kA/G Type (LS)
UVCS6010	Fuse-7.2 kV/10 A/63 kA, 192 mm (SIBA)	UVCS2075	Fuse-3.6 kV/75 A/40 kA/G Type (LS)
UVCS6020	Fuse-7.2 kV/20 A/63 kA, 192 mm (SIBA)	UVCS2100	Fuse-3.6 kV/100 A/40 kA/G Type (LS)
UVCS6025	Fuse-7.2 kV/25 A/63 kA, 192 mm (SIBA)	UVCS2150	Fuse-3.6 kV/150 A/40 kA/G Type (LS)
UVCS6032	Fuse-7.2 kV/31.5 A/63 kA, 192 mm (SIBA)	UVCS2200	Fuse-3.6 kV/200 A/40 kA/G Type (LS)
UVCS6040	Fuse-7.2 kV/40 A/63 kA, 192 mm (SIBA)	UVCS2300	Fuse-3.6 kV/300 A/40 kA/G Type (LS)
UVCS6050	Fuse-7.2 kV/50 A/63 kA, 192 mm (SIBA)	UVCS2400	Fuse-3.6 kV/400 A/40 kA/G Type (LS)
UVCS6063	Fuse-7.2 kV/63 A/63 kA, 192 mm (SIBA)	UVCS3020	Fuse-3.6 kV/20 A/40 kA/M Type (LS)
UVCS6080	Fuse-7.2 kV/80 A/63 kA, 192 mm (SIBA)	UVCS3050	Fuse-3.6 kV/50 A/40 kA/M Type (LS)
UVCS6100	Fuse-7.2 kV/100 A/63 kA, 192 mm (SIBA)	UVCS3100	Fuse-3.6 kV/100 A/40 kA/M Type (LS)
UVCS6125	Fuse-7.2 kV/125 A/63 kA, 192 mm (SIBA)	UVCS3150	Fuse-3.6 kV/150 A/40 kA/M Type (LS)
UVCS6160	Fuse-7.2 kV/160 A/63 kA, 192 mm (SIBA)	UVCS3200	Fuse-3.6 kV/200 A/40 kA/M Type (LS)
UVCS6200	Fuse-7.2 kV/200 A/50 kA, 192 mm (SIBA)	UVCS3300	Fuse-3.6 kV/300 A/40 kA/M Type (LS)

※ 1) Order 2 units for one set.
2) Order 6 units for one set.
3) Order 3 units for one set.
Order 3 fuses for one set.

Order Code for Spare UVC Attachments

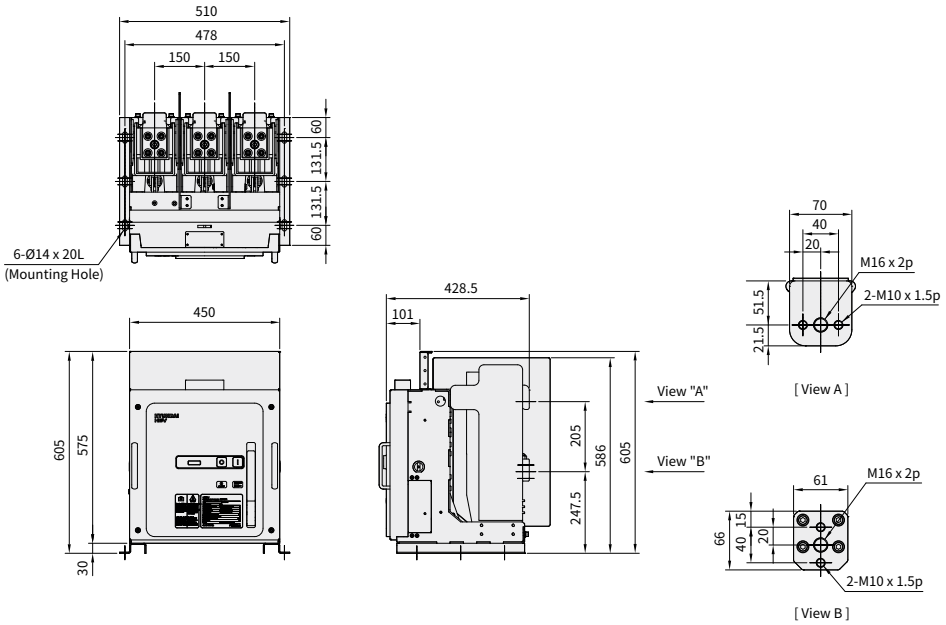
Code	Spec	Code	Spec
UVCS3400	Fuse-3.6 kV/400 A/40 kA/M Type (LS)	UVCS8030	Fuse-3.6 kV/30 A/40 kA/DIN Type (LS)
UVCS4005	Fuse-7.2 kV/5 A/40 kA/G Type (LS)	UVCS8040	Fuse-3.6 kV/40 A/40 kA/DIN Type (LS)
UVCS4010	Fuse-7.2 kV/10 A/40 kA/G Type (LS)	UVCS8050	Fuse-3.6 kV/50 A/40 kA/DIN Type (LS)
UVCS4020	Fuse-7.2 kV/20 A/40 kA/G Type (LS)	UVCS8063	Fuse-3.6 kV/63 A/40 kA/DIN Type (LS)
UVCS4030	Fuse-7.2 kV/30 A/40 kA/G Type (LS)	UVCS8075	Fuse-3.6 kV/75 A/40 kA/DIN Type (LS)
UVCS4040	Fuse-7.2 kV/40 A/40 kA/G Type (LS)	UVCS8100	Fuse-3.6 kV/100 A/40 kA/DIN Type (LS)
UVCS4050	Fuse-7.2 kV/50 A/40 kA/G Type (LS)	UVCS8125	Fuse-3.6 kV/125 A/40 kA/DIN Type (LS)
UVCS4060	Fuse-7.2 kV/60 A/40 kA/G Type (LS)	UVCS8160	Fuse-3.6 kV/160 A/40 kA/DIN Type (LS)
UVCS4075	Fuse-7.2 kV/75 A/40 kA/G Type (LS)	UVCS8200	Fuse-3.6 kV/200 A/40 kA/DIN Type (LS)
UVCS4100	Fuse-7.2 kV/100 A/40 kA/G Type (LS)	UVCS9005	Fuse-7.2 kV/5 A/40 kA/DIN Type (LS)
UVCS4150	Fuse-7.2 kV/150 A/40 kA/G Type (LS)	UVCS9010	Fuse-7.2 kV/10 A/40 kA/DIN Type (LS)
UVCS4200	Fuse-7.2 kV/200 A/40 kA/G Type (LS)	UVCS9020	Fuse-7.2 kV/20 A/40 kA/DIN Type (LS)
UVCS5020	Fuse-7.2 kV/20 A/40 kA/M Type (LS)	UVCS9030	Fuse-7.2 kV/30 A/40 kA/DIN Type (LS)
UVCS5050	Fuse-7.2 kV/50 A/40 kA/M Type (LS)	UVCS9040	Fuse-7.2 kV/40 A/40 kA/DIN Type (LS)
UVCS5100	Fuse-7.2 kV/100 A/40 kA/M Type (LS)	UVCS9050	Fuse-7.2 kV/50 A/40 kA/DIN Type (LS)
UVCS5150	Fuse-7.2 kV/150 A/40 kA/M Type (LS)	UVCS9063	Fuse-7.2 kV/63 A/40 kA/DIN Type (LS)
UVCS5200	Fuse-7.2 kV/200 A/40 kA/M Type (LS)	UVCS9075	Fuse-7.2 kV/75 A/40 kA/DIN Type (LS)
UVCS5300	Fuse-7.2 kV/300 A/40 kA/M Type (LS)	UVCS9100	Fuse-7.2 kV/100 A/40 kA/DIN Type (LS)
UVCS5400	Fuse-7.2 kV/400 A/40 kA/M Type (LS)	UVCS9125	Fuse-7.2 kV/125 A/40 kA/DIN Type (LS)
UVCS8005	Fuse-3.6 kV/5 A/40 kA/DIN Type (LS)	UVCS9160	Fuse-7.2 kV/160 A/40 kA/DIN Type (LS)
UVCS8010	Fuse-3.6 kV/10 A/40 kA/DIN Type (LS)	UVCS9200	Fuse-7.2 kV/200 A/40 kA/DIN Type (LS)
UVCS8020	Fuse-3.6 kV/20 A/40 kA/DIN Type (LS)	-	-

Dimensions

XA-Type Vacuum Circuit Breakers (7.2/12 kV) Fixed-Type, Phase-to-Phase Distance 150 mm

HGV 1141C
HGV 1142C
HGV 2141C
HGV 2142C

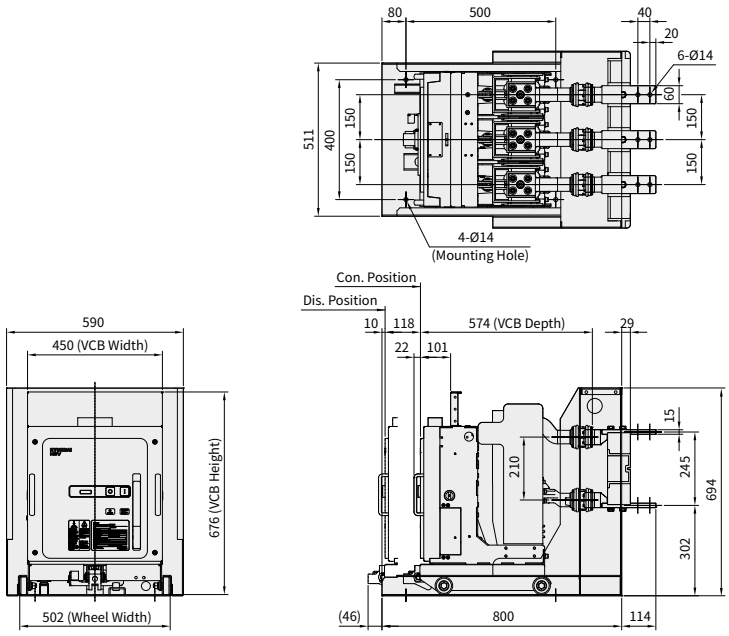
Unit : mm



ES-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

HGV 1141C
HGV 1142

Unit : mm

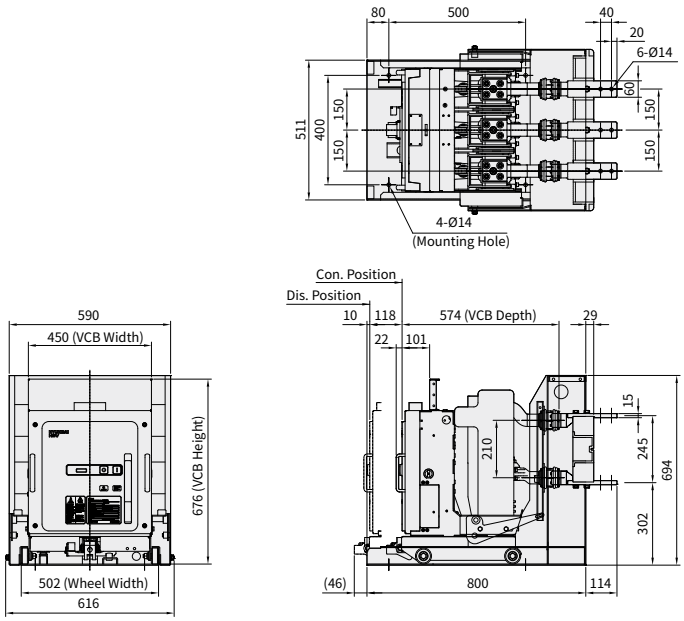


※ Dimension on this page are subject to change without notice.

FS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

Unit : mm

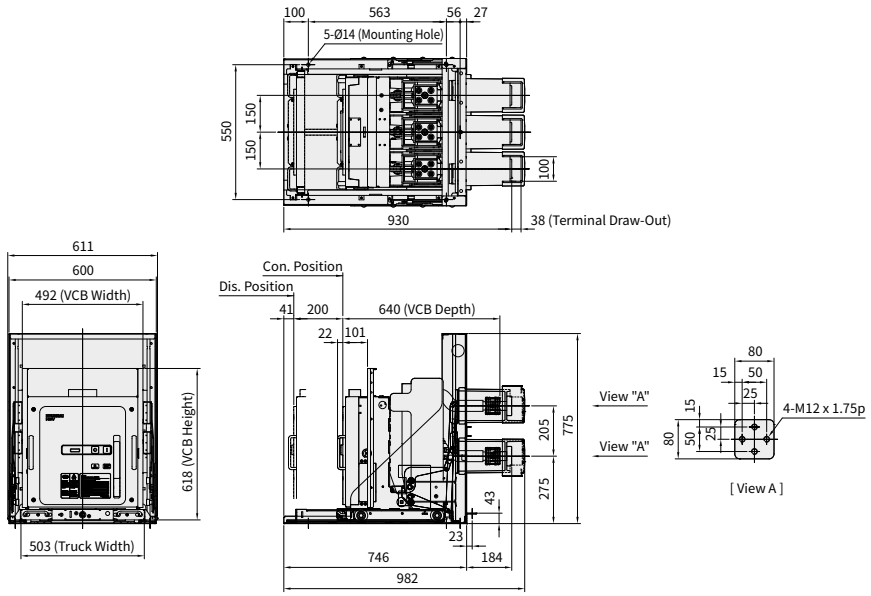
HGV 1141C
HGV 1142



GS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

Unit : mm

HGV 1141C
HGV 1142



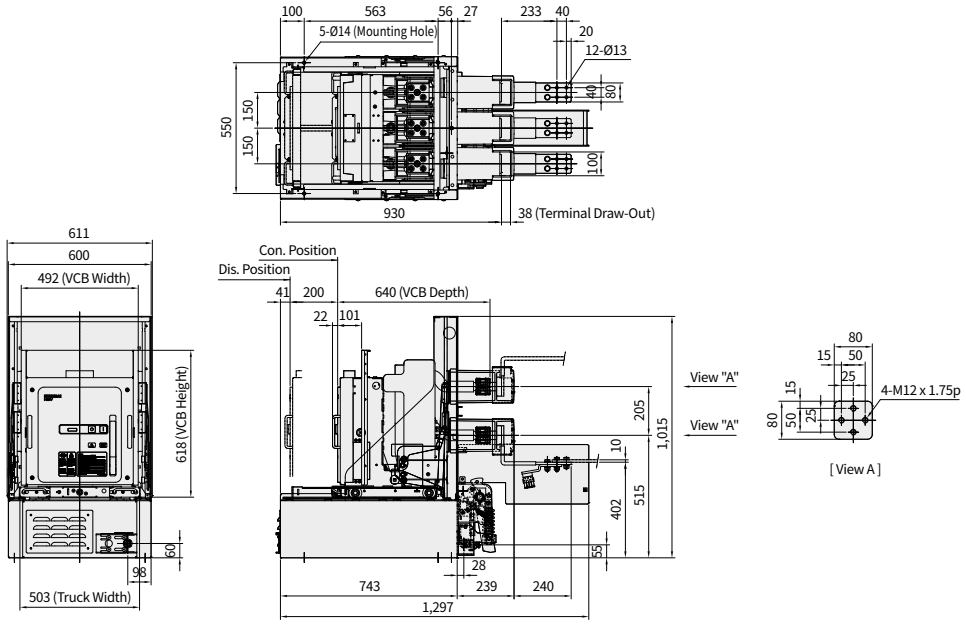
※ Dimension on this page are subject to change without notice.

Dimensions

GE-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 1141C
HGV 1142

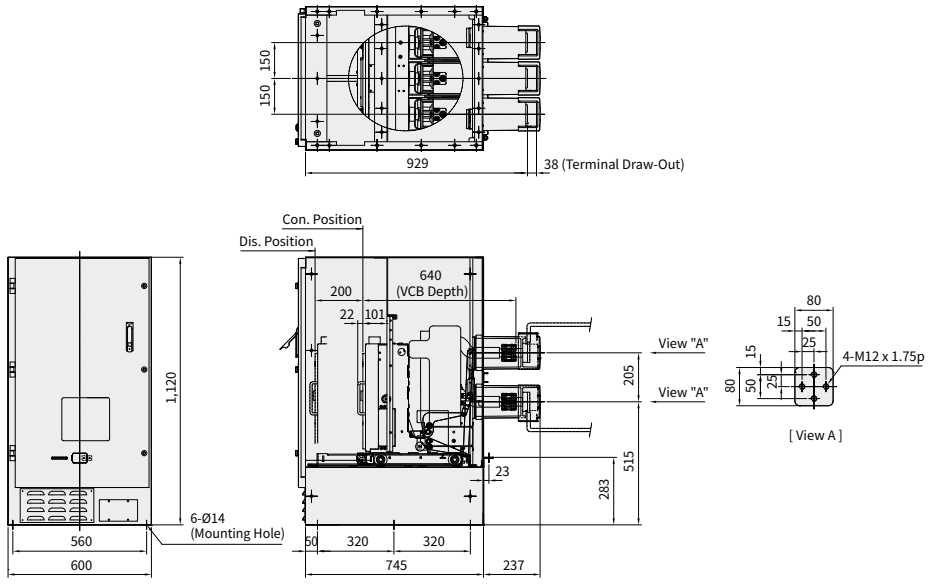
Unit : mm



MS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 1141C
HGV 1142

Unit : mm

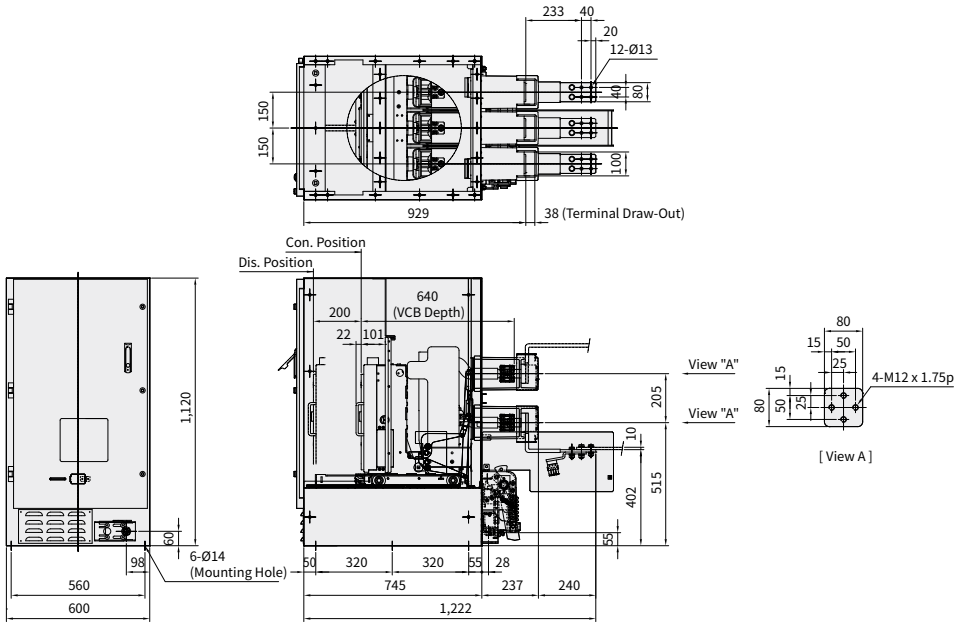


※ Dimension on this page are subject to change without notice.

ME-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

Unit : mm

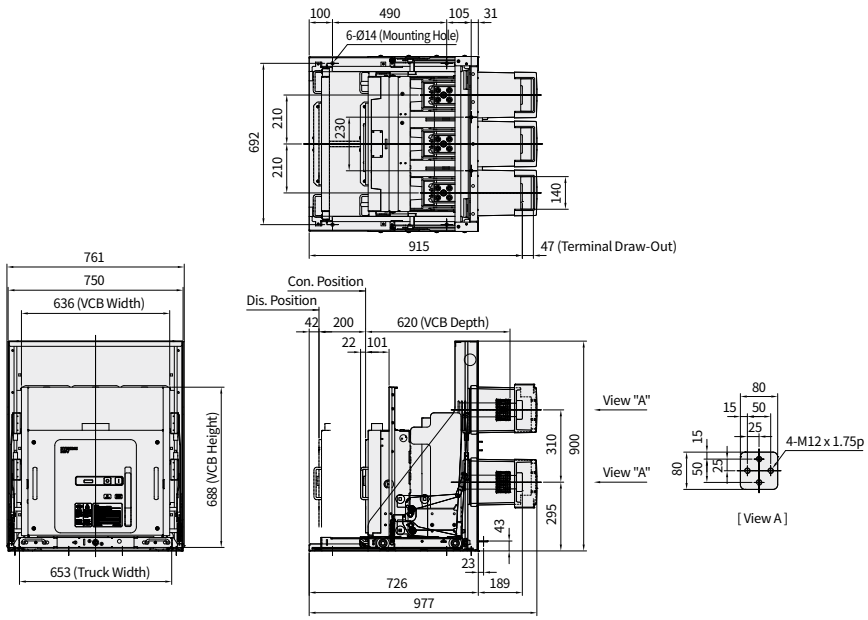
HGV 1141C
HGV 1142



GS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 1141F
HGV 1142
HGV 1144



※ Dimension on this page are subject to change without notice.

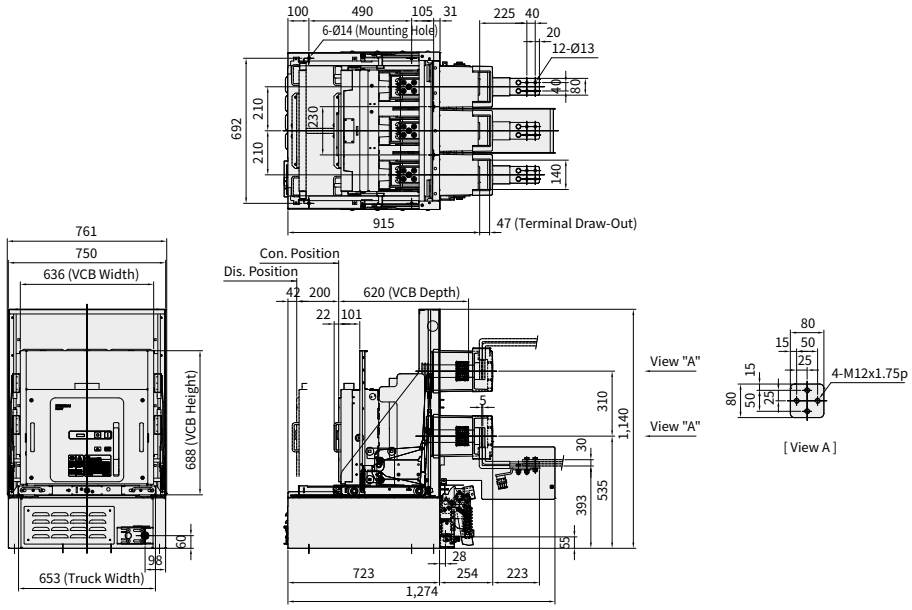
Dimensions

GE-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 1141F
HGV 1142
HGV 1144

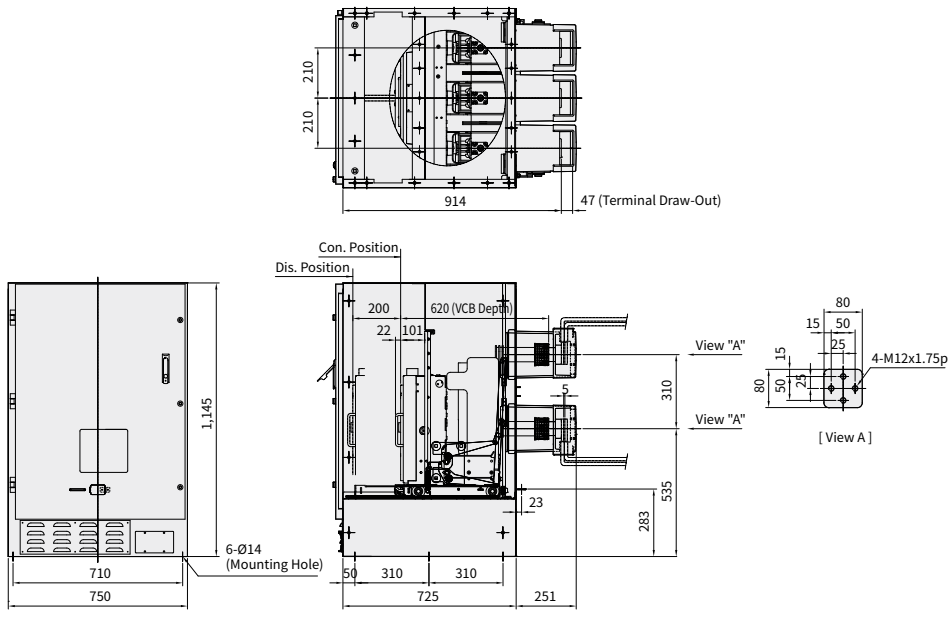
・630/1,250 A : Terminal Busbar 1 ea
・2,000 A : Terminal Busbar 2 ea



MS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 1141F
HGV 1142
HGV 1144



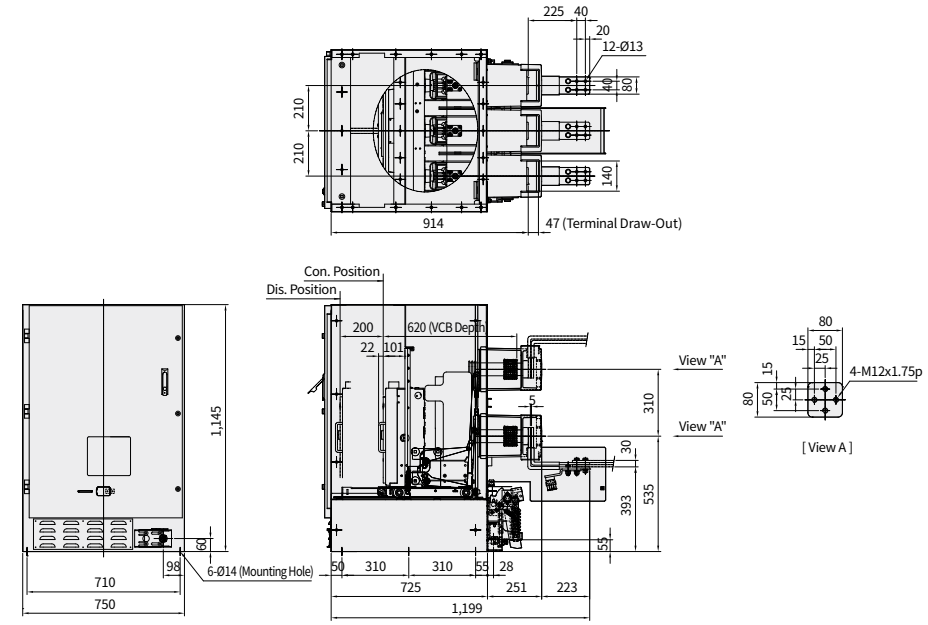
※ Dimension on this page are subject to change without notice.

ME-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 1141F
HGV 1142
HGV 1144

Unit : mm

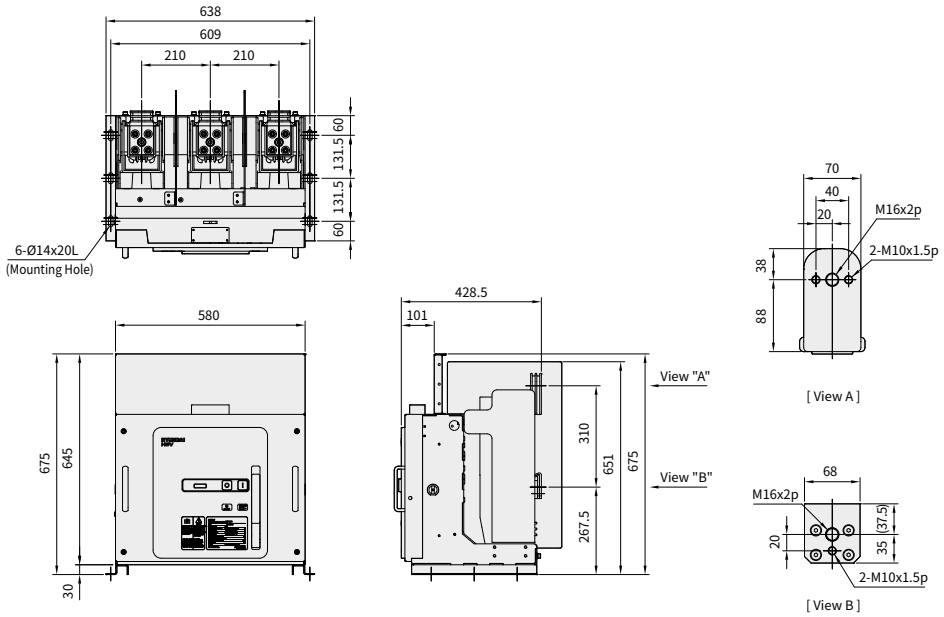
- 630/1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



XA-Type Vacuum Circuit Breakers (7.2/12 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

HGV 1144F
HGV 2144

Unit : mm



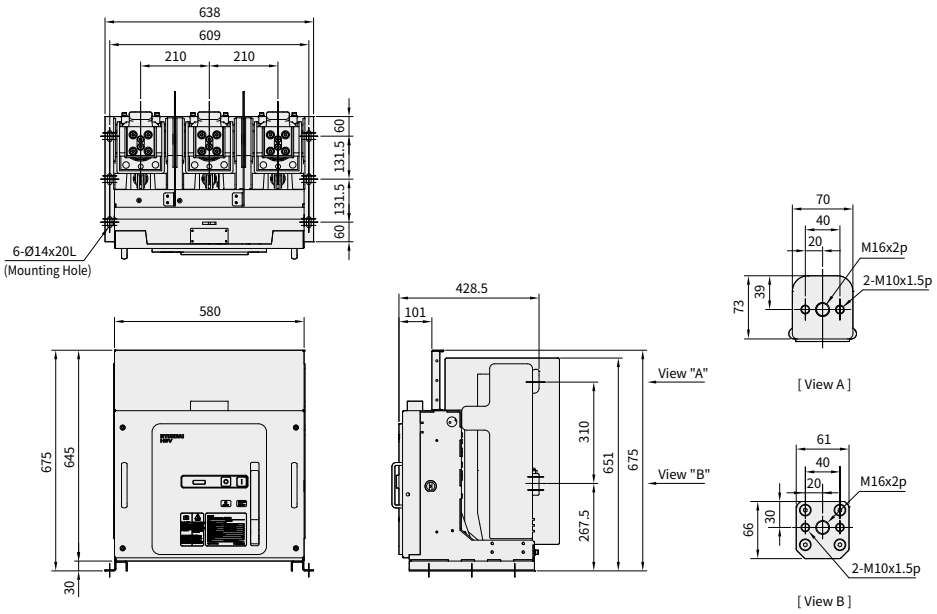
※ Dimension on this page are subject to change without notice.

Dimensions

XA-Type Vacuum Circuit Breakers (7.2/12 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

HGV 1152F
HGV 1162
HGV 2152
HGV 2162

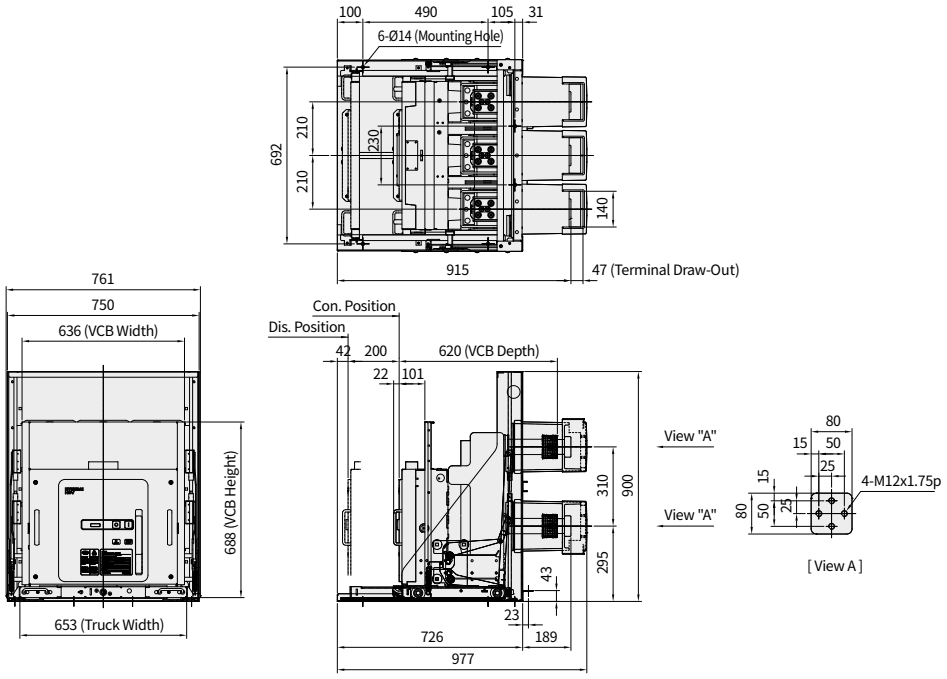
Unit : mm



GS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 1152F
HGV 1154
HGV 1162
HGV 1164
HGV 1172
HGV 1174

Unit : mm



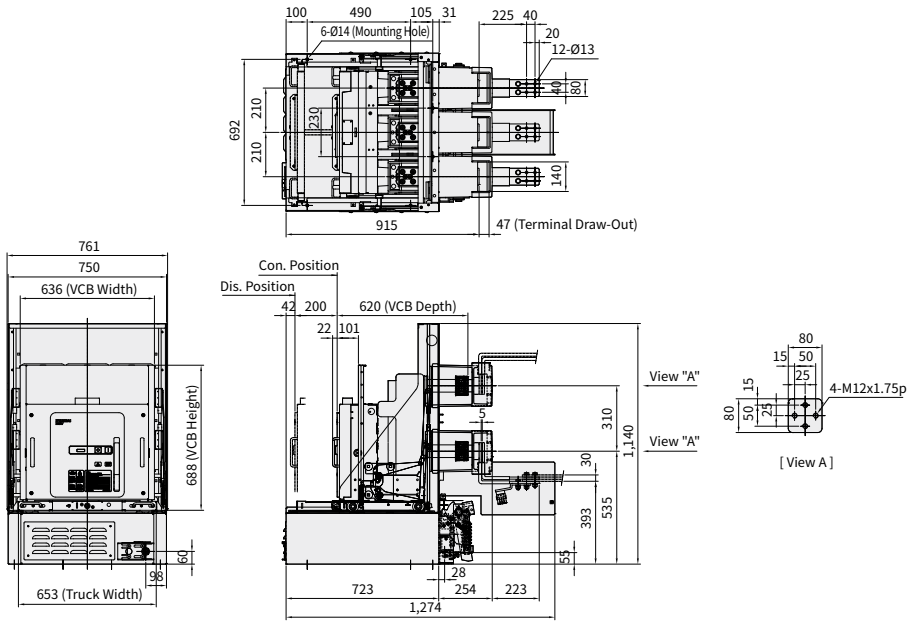
※ Dimension on this page are subject to change without notice.

GE-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 1152F
HGV 1154
HGV 1162
HGV 1164
HGV 1172
HGV 1174

Unit : mm

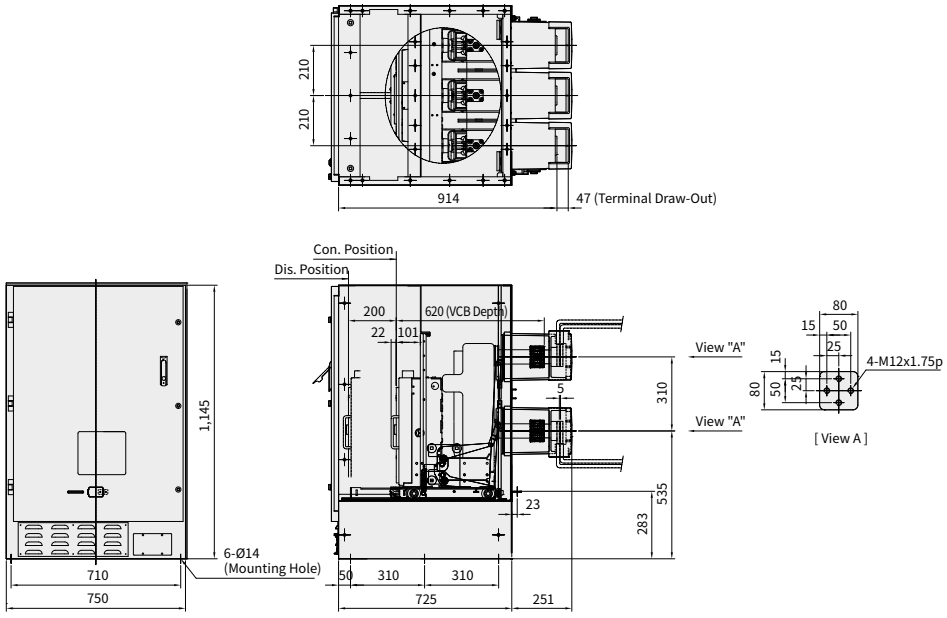
- 1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



MS-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 1152F
HGV 1154
HGV 1162
HGV 1164
HGV 1172
HGV 1174

Unit : mm



※ Dimension on this page are subject to change without notice.

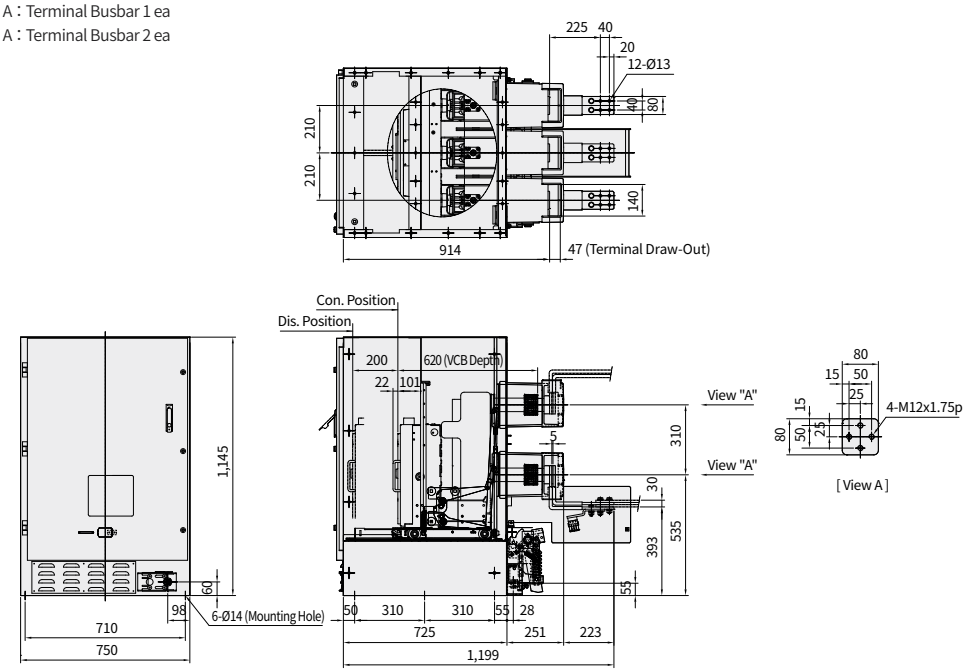
Dimensions

ME-Type Vacuum Circuit Breakers (7.2 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 1152F
HGV 1154
HGV 1162
HGV 1164
HGV 1172
HGV 1174

Unit : mm

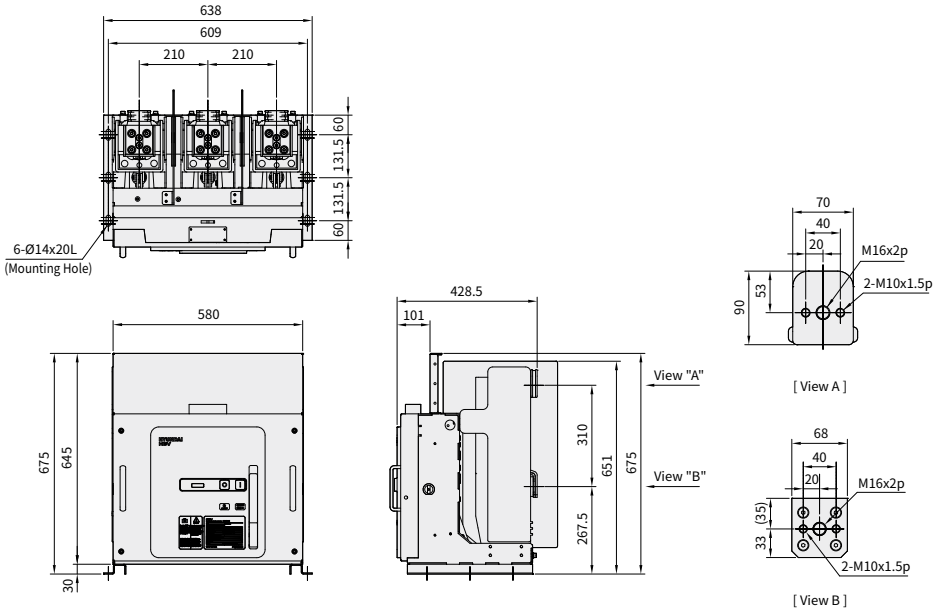
- 1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



XA-Type Vacuum Circuit Breakers (7.2/12 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

HGV 1154F
HGV 1164
HGV 1172
HGV 1174
HGV 2154
HGV 2164
HGV 2172
HGV 2174

Unit : mm

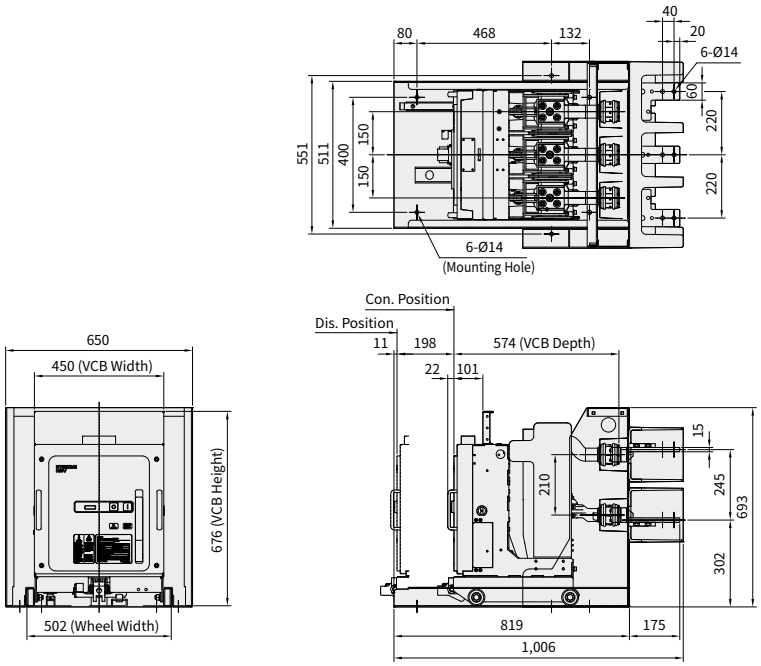


※ Dimension on this page are subject to change without notice.

ES-Type Vacuum Circuit Breakers (12 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

Unit : mm

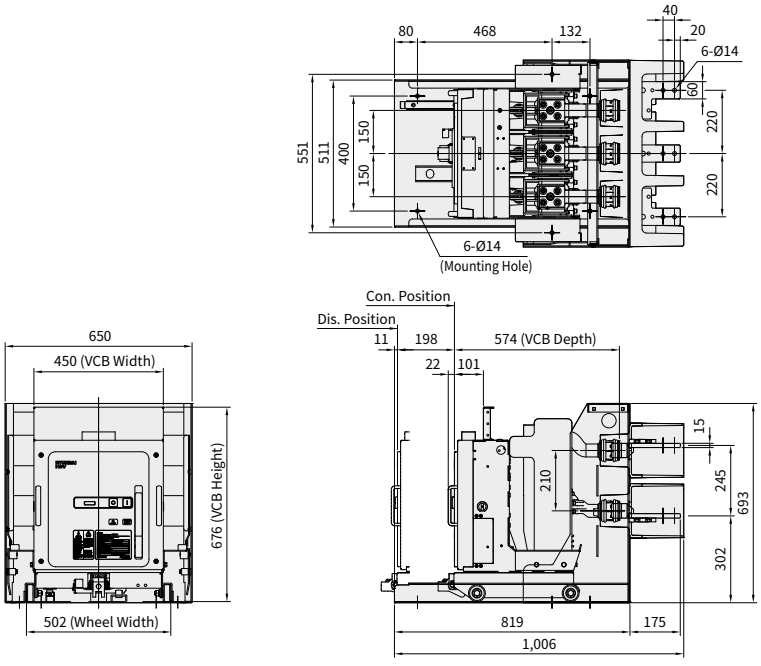
HGV 2141C
HGV 2142



FS-Type Vacuum Circuit Breakers (12 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

Unit : mm

HGV 2141C
HGV 2142



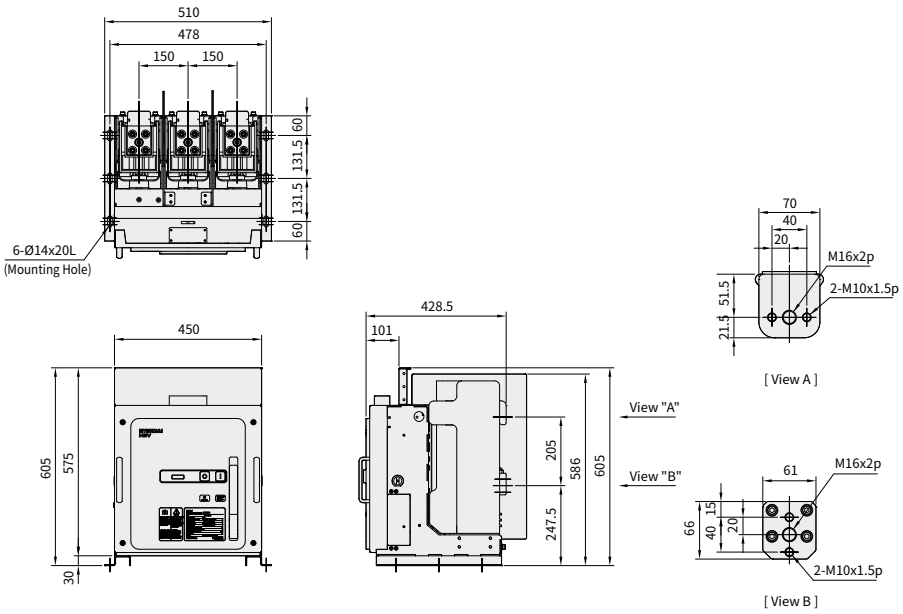
※ Dimension on this page are subject to change without notice.

Dimensions

XA-Type Vacuum Circuit Breakers (17.5 kV) Fixed-Type, Phase-to-Phase Distance 150 mm

Unit : mm

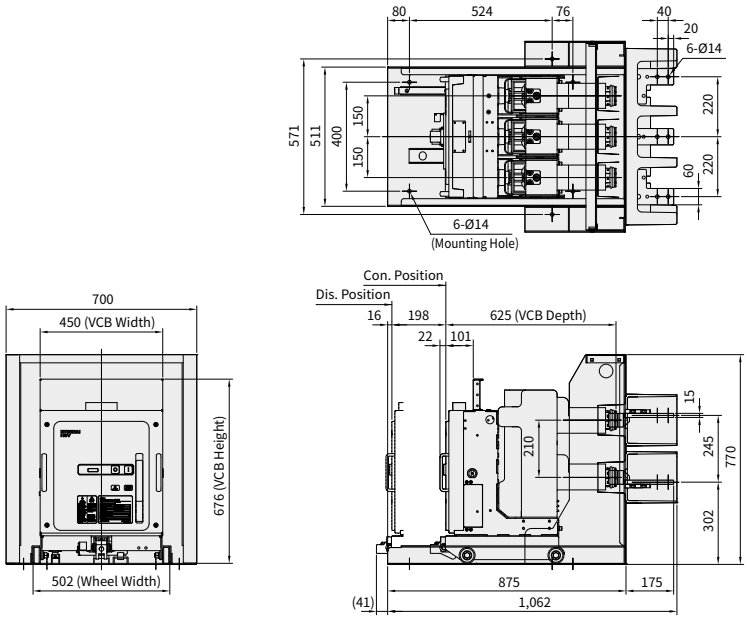
HGV 3141C
HGV 3142



ES-Type Vacuum Circuit Breakers (17.5 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

Unit : mm

HGV 3141C
HGV 3142

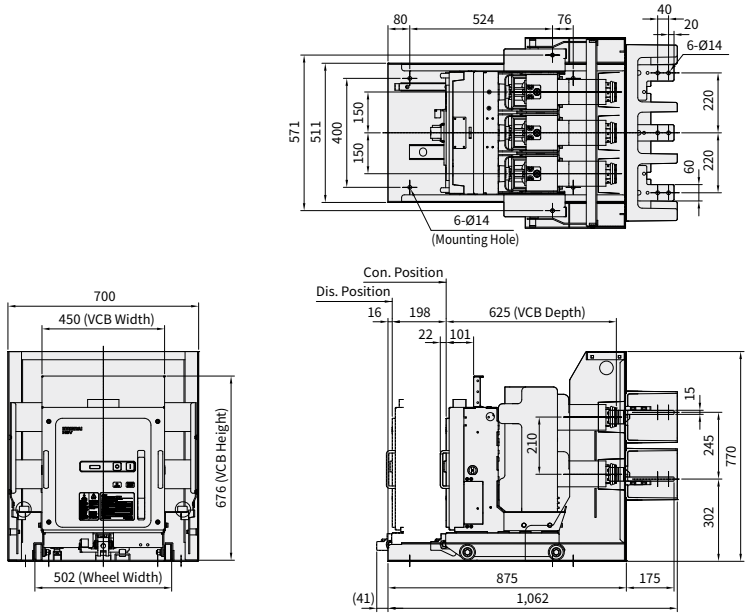


※ Dimension on this page are subject to change without notice.

FS-Type Vacuum Circuit Breakers (17.5 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 150 mm

HGV 3141C
HGV 3142

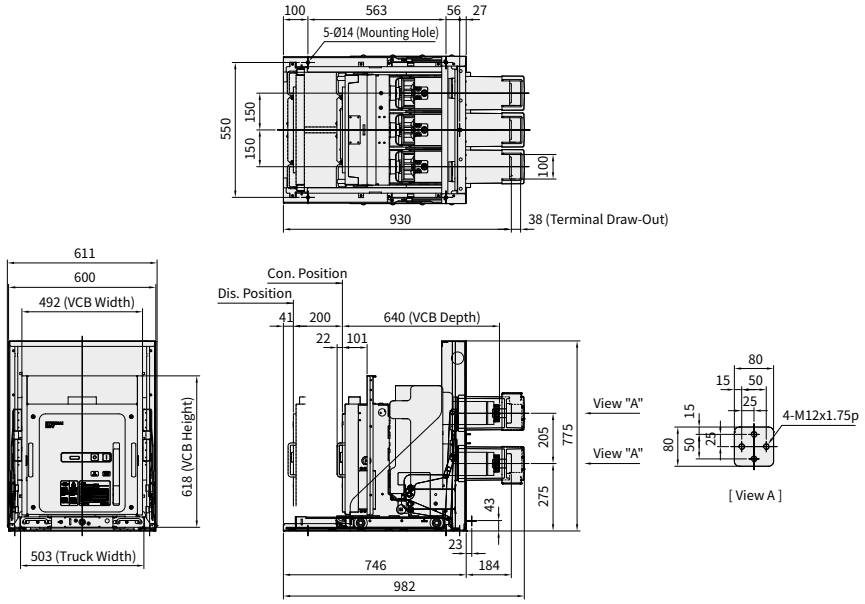
Unit : mm



GS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 2141C
HGV 2142
HGV 3141
HGV 3142

Unit : mm



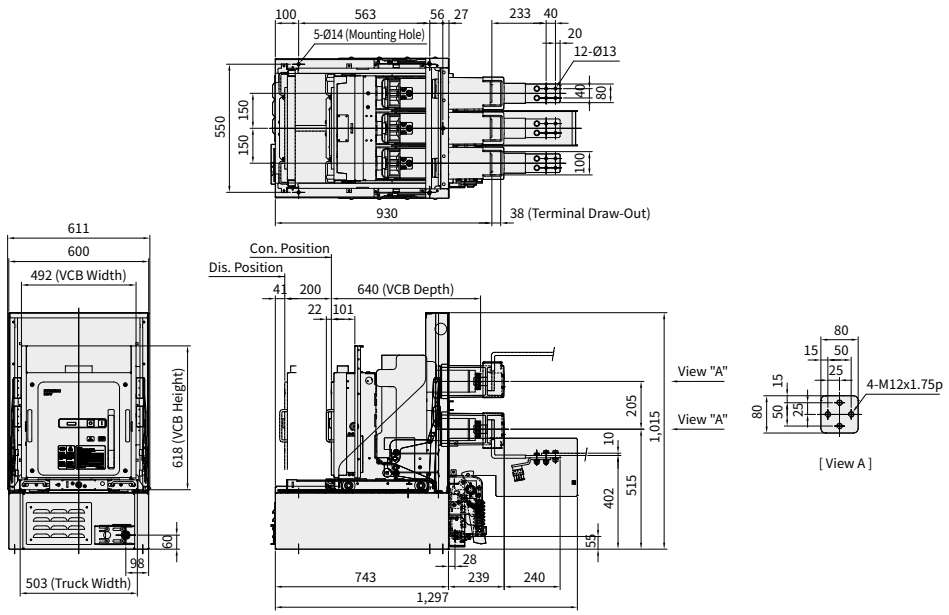
※ Dimension on this page are subject to change without notice.

Dimensions

GE-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 2141C
HGV 2142
HGV 3141
HGV 3142

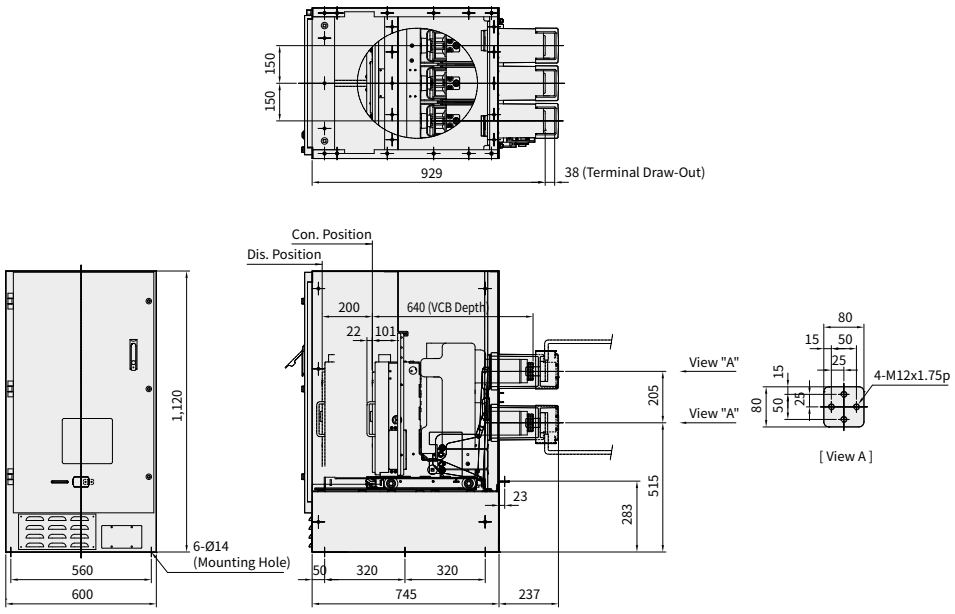
Unit : mm



MS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 2141C
HGV 2142
HGV 3141
HGV 3142

Unit : mm

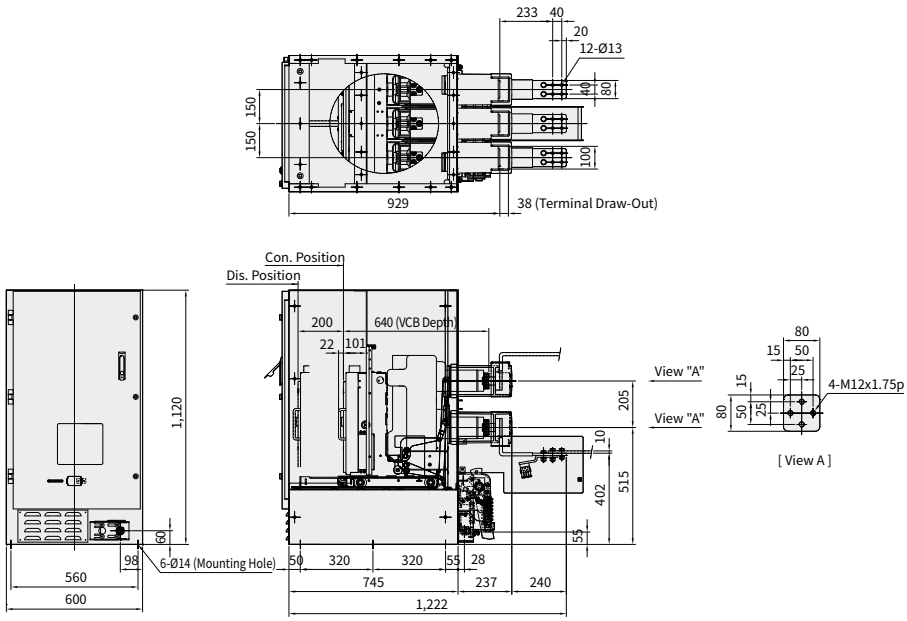


※ Dimension on this page are subject to change without notice.

ME-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 150 mm

HGV 2141C
HGV 2142
HGV 3141
HGV 3142

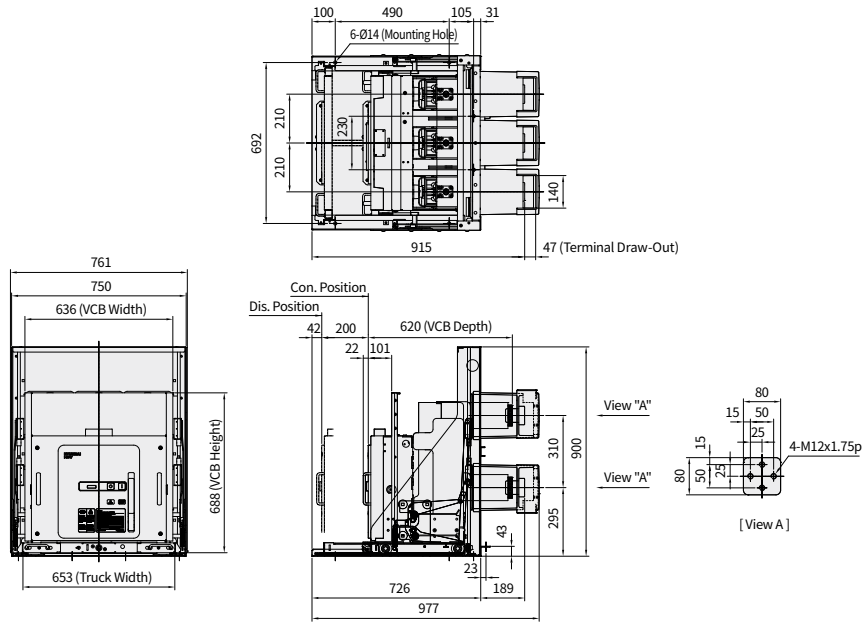
Unit : mm



GS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 2141F
HGV 2142
HGV 2144
HGV 3141
HGV 3142
HGV 3144

Unit : mm



※ Dimension on this page are subject to change without notice.

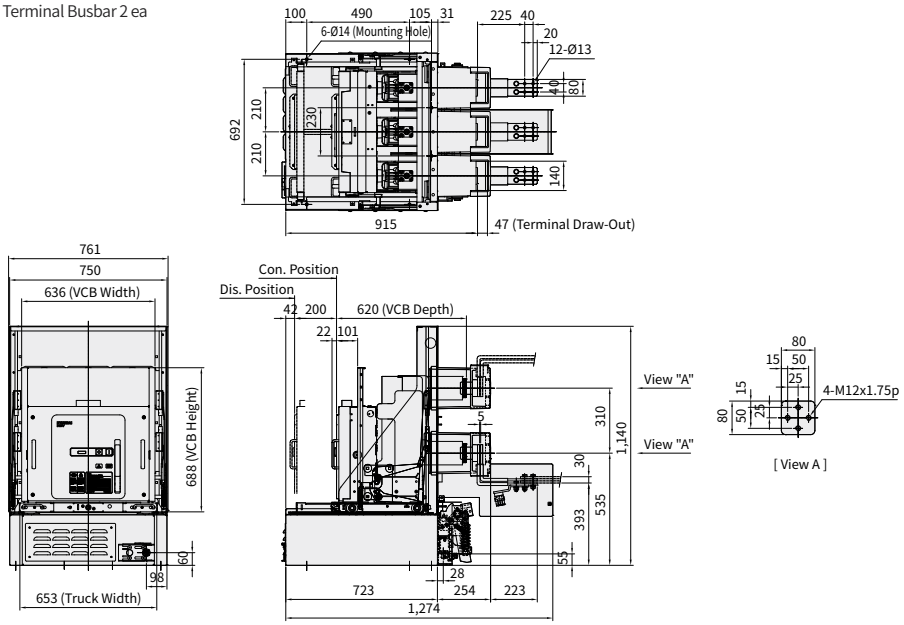
Dimensions

GE-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 2141F
HGV 2142
HGV 2144
HGV 3141
HGV 3142
HGV 3144

Unit : mm

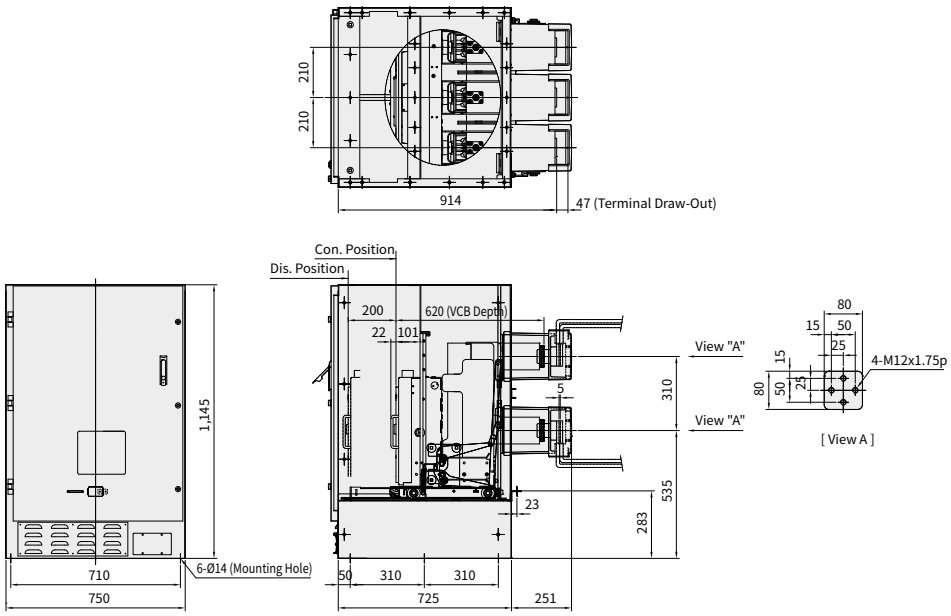
- 630/1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



MS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 2141F
HGV 2142
HGV 2144
HGV 3141
HGV 3142
HGV 3144

Unit : mm



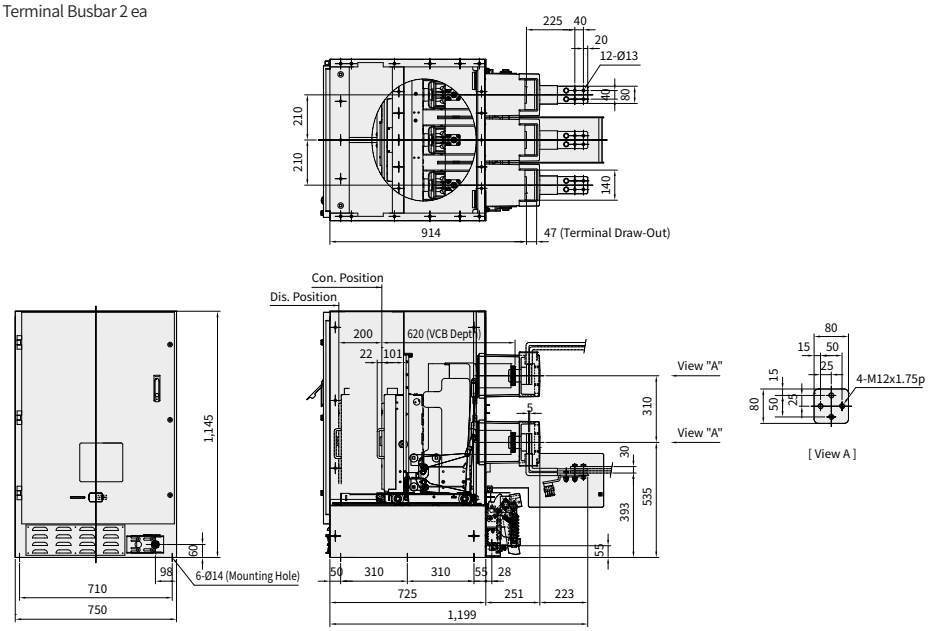
※ Dimension on this page are subject to change without notice.

ME-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 2141F
HGV 2142
HGV 2144
HGV 3141
HGV 3142
HGV 3144

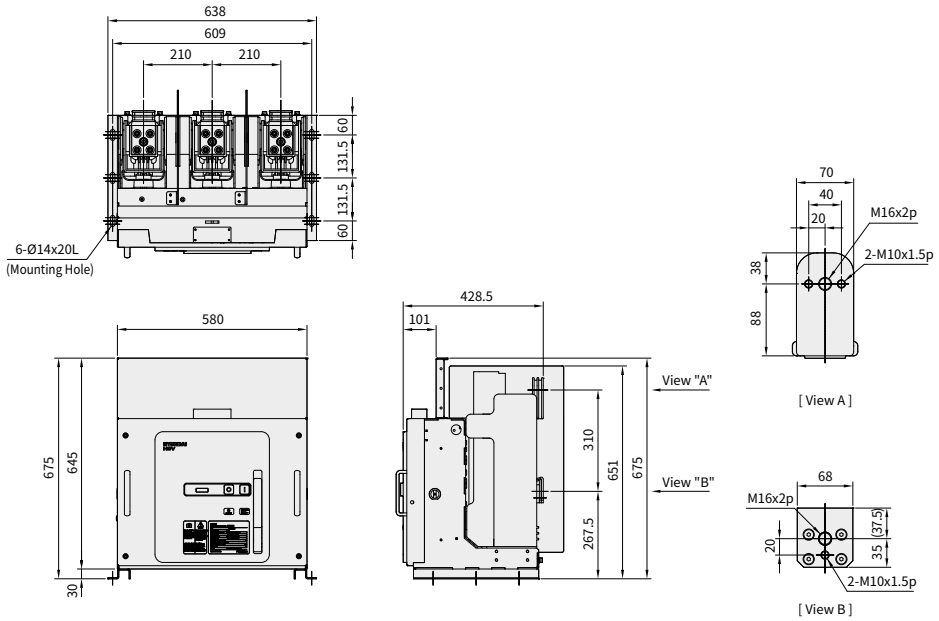
- 630/1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



XA-Type Vacuum Circuit Breakers (17.5 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 3144F



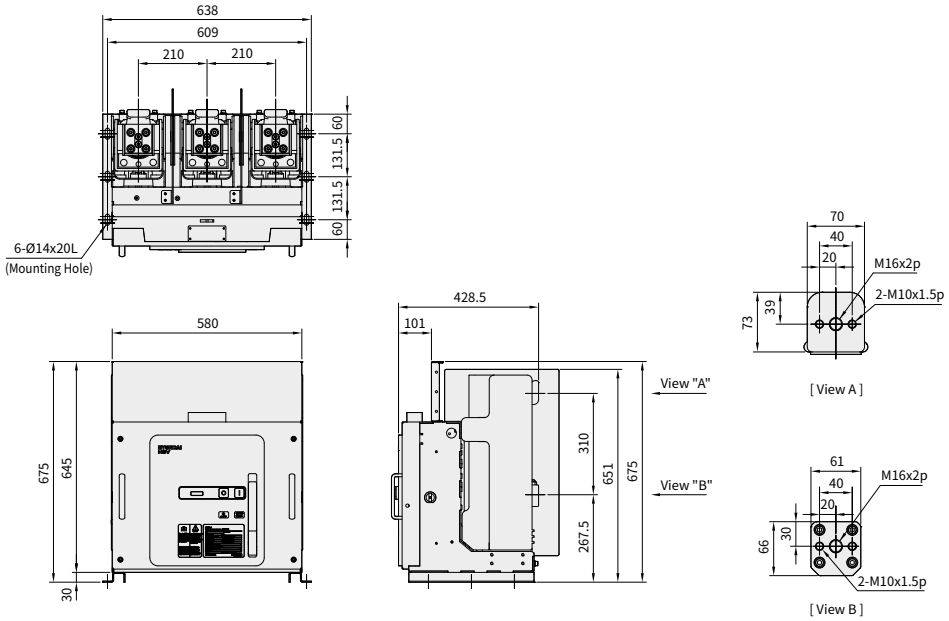
※ Dimension on this page are subject to change without notice.

Dimensions

XA-Type Vacuum Circuit Breakers (17.5 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

Unit : mm

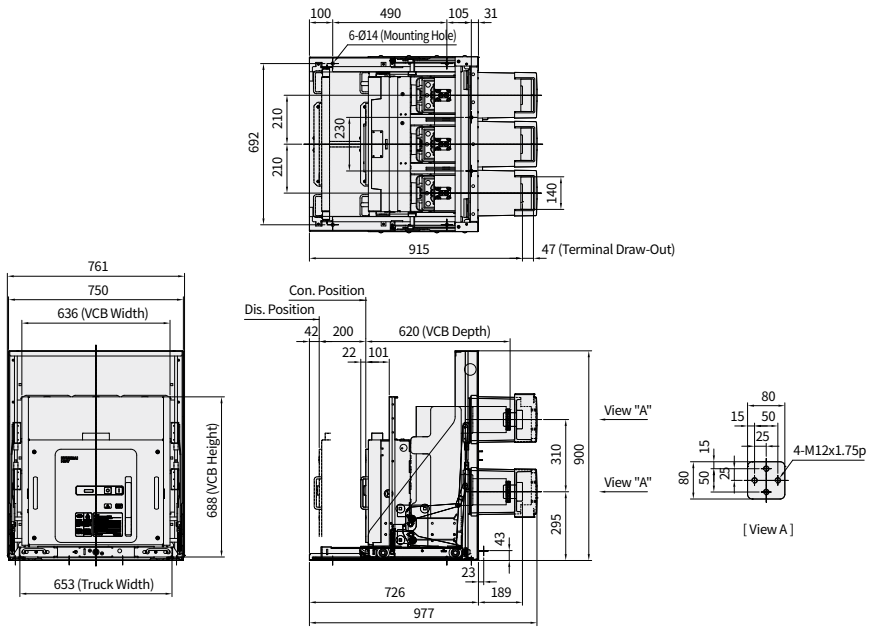
HGV 3152F
HGV 3162



GS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 2152F
HGV 2154
HGV 2162
HGV 2164
HGV 2172
HGV 2174
HGV 3152
HGV 3154
HGV 3162
HGV 3164
HGV 3172
HGV 3174



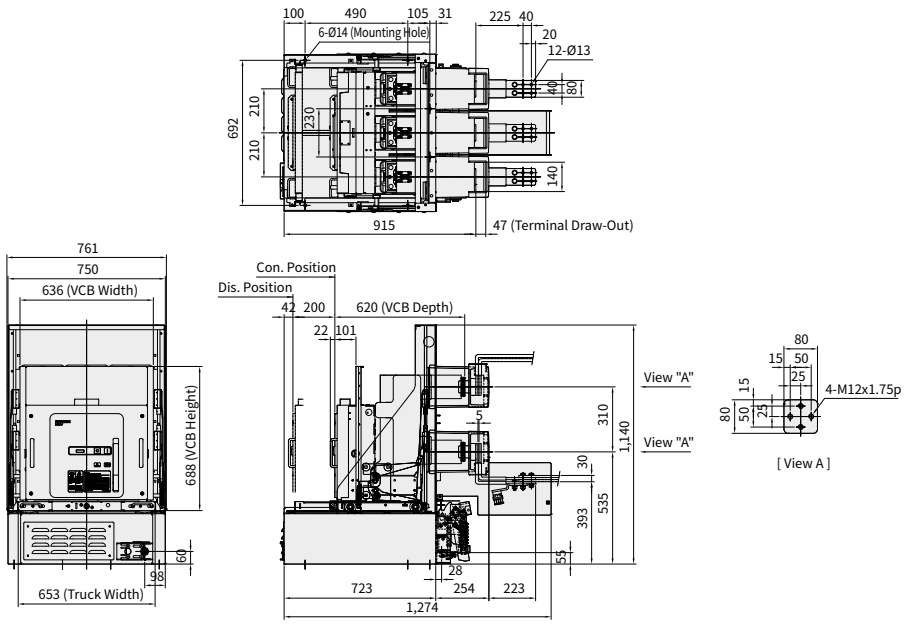
※ Dimension on this page are subject to change without notice.

GE-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 2152F
HGV 2154
HGV 2162
HGV 2164
HGV 2172
HGV 2174
HGV 3152
HGV 3154
HGV 3162
HGV 3164
HGV 3172
HGV 3174

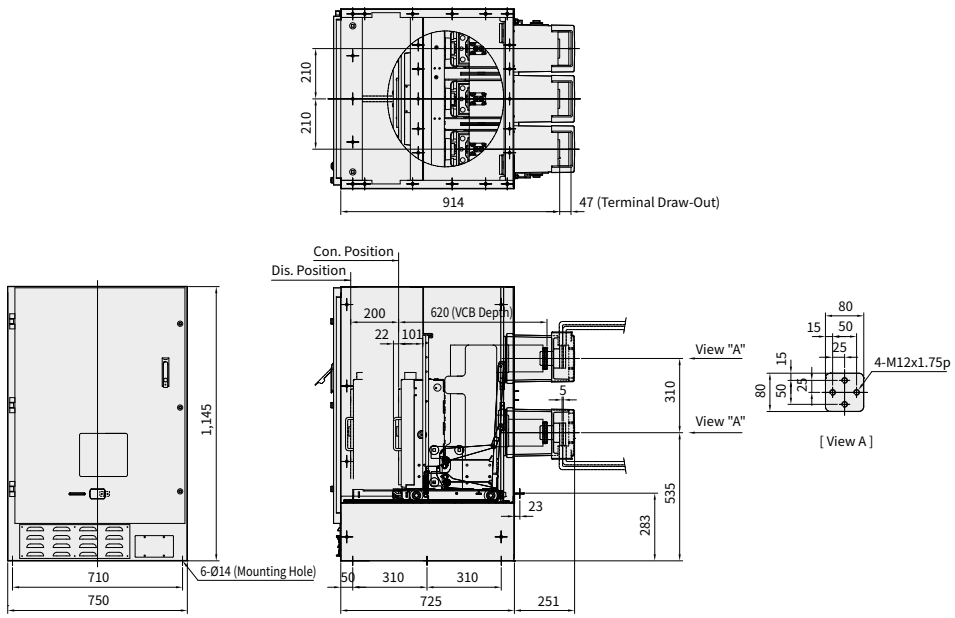
・1,250 A : Terminal Busbar 1 ea
・2,000 A : Terminal Busbar 2 ea



MS-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 2152F
HGV 2154
HGV 2162
HGV 2164
HGV 2172
HGV 2174
HGV 3152
HGV 3154
HGV 3162
HGV 3164
HGV 3172
HGV 3174



※ Dimension on this page are subject to change without notice.

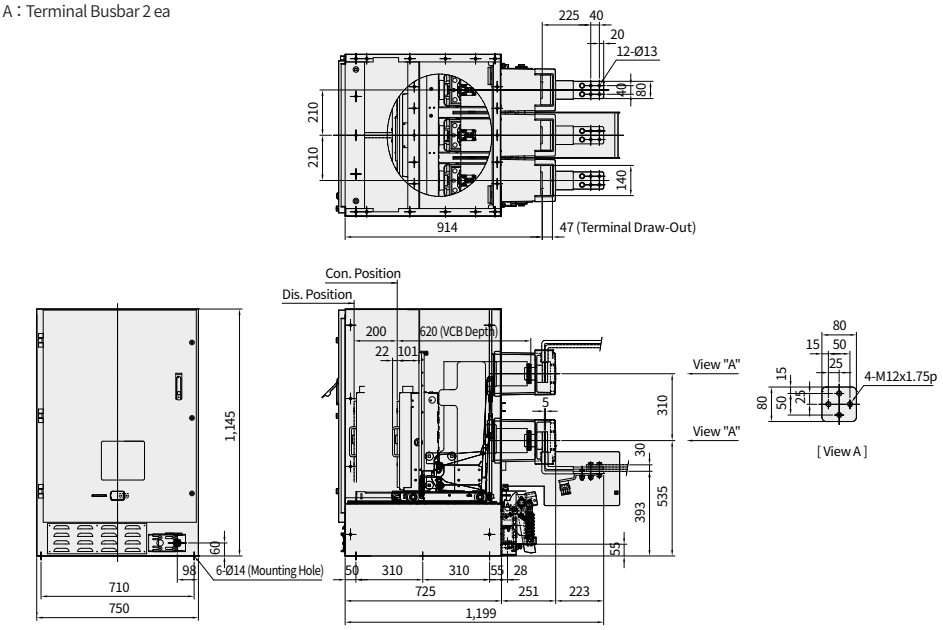
Dimensions

ME-Type Vacuum Circuit Breakers (12/17.5 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 2152F
HGV 2154
HGV 2162
HGV 2164
HGV 2172
HGV 2174
HGV 3152
HGV 3154
HGV 3162
HGV 3164
HGV 3172
HGV 3174

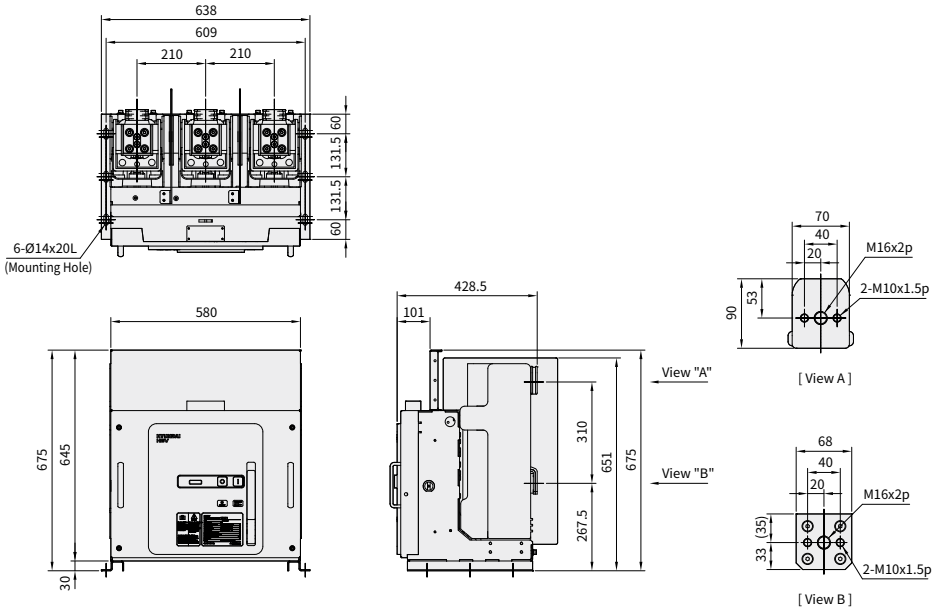
・1,250 A : Terminal Busbar 1 ea
・2,000 A : Terminal Busbar 2 ea



XA-Type Vacuum Circuit Breakers (17.5 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 3154F
HGV 3164
HGV 3172
HGV 3174

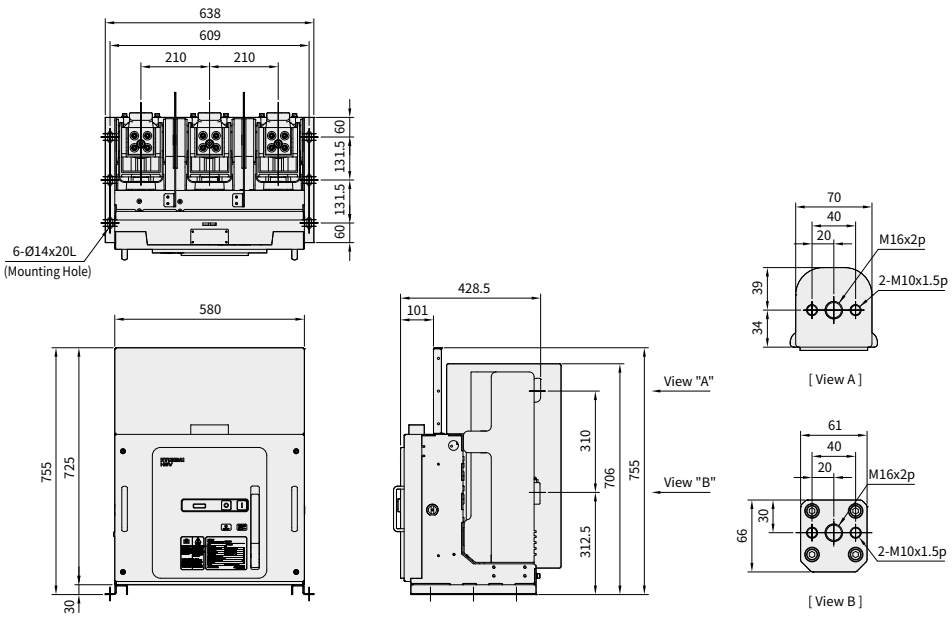


※ Dimension on this page are subject to change without notice.

XA-Type Vacuum Circuit Breakers (24/25.8 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6141
HGV 6142

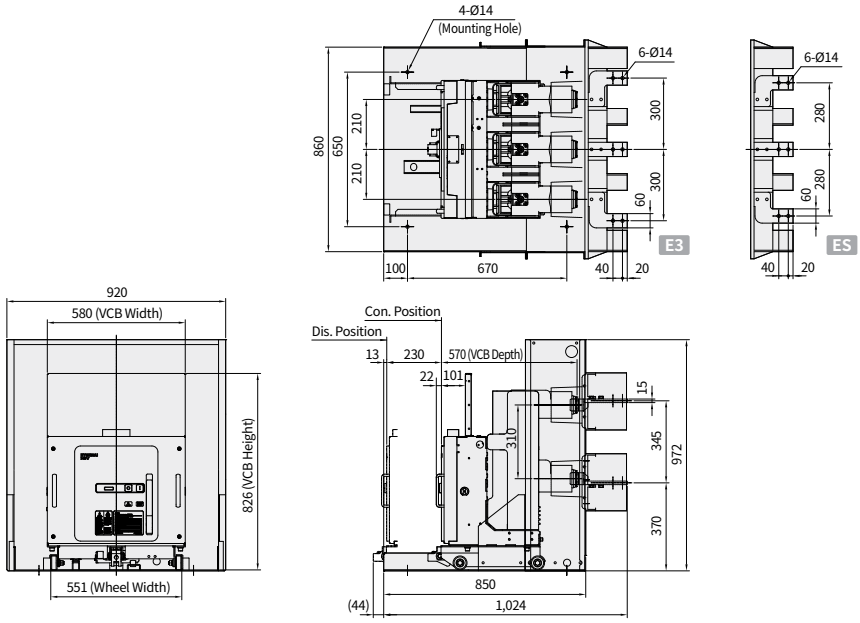
Unit : mm



ES/E3-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6141
HGV 6142

Unit : mm



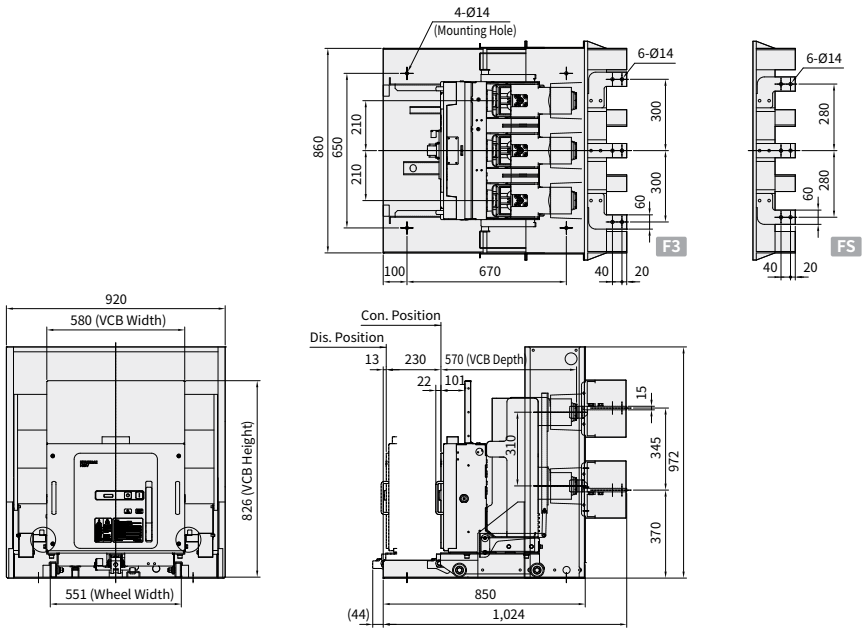
※ Dimension on this page are subject to change without notice.

Dimensions

FS/F3-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6141
HGV 6142

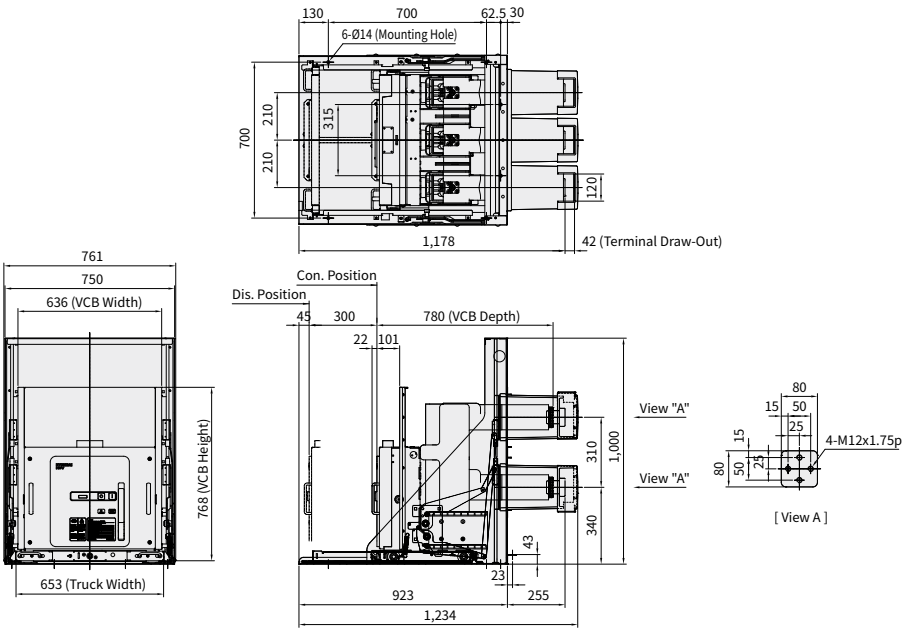
Unit : mm



GS-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6114
HGV 6141
HGV 6142
HGV 6144

Unit : mm



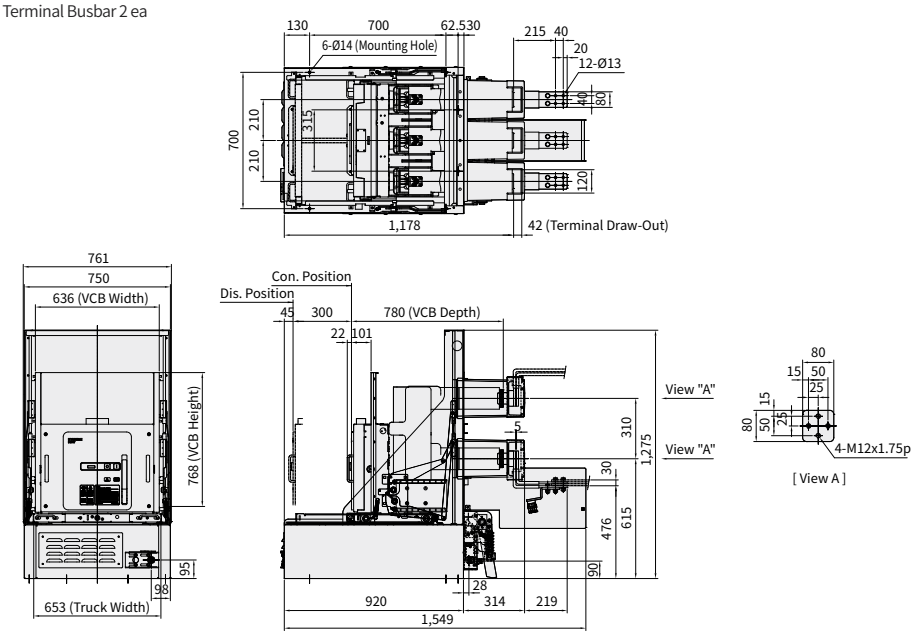
※ Dimension on this page are subject to change without notice.

GE-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6114
HGV 6141
HGV 6142
HGV 6144

Unit : mm

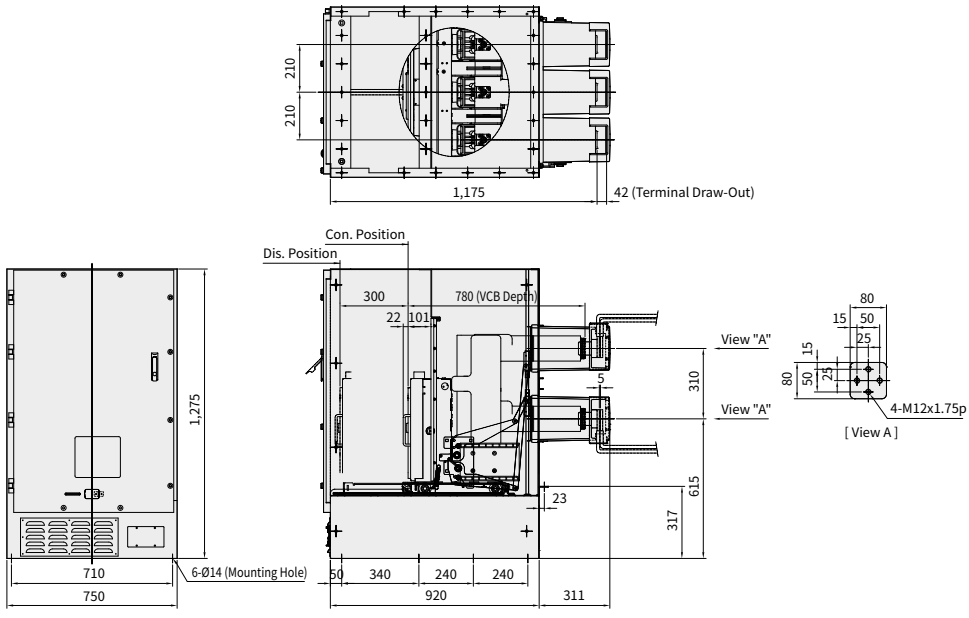
- 630/1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea



MS-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

HGV 6111F
HGV 6112
HGV 6114
HGV 6141
HGV 6142
HGV 6144

Unit : mm



※ Dimension on this page are subject to change without notice.

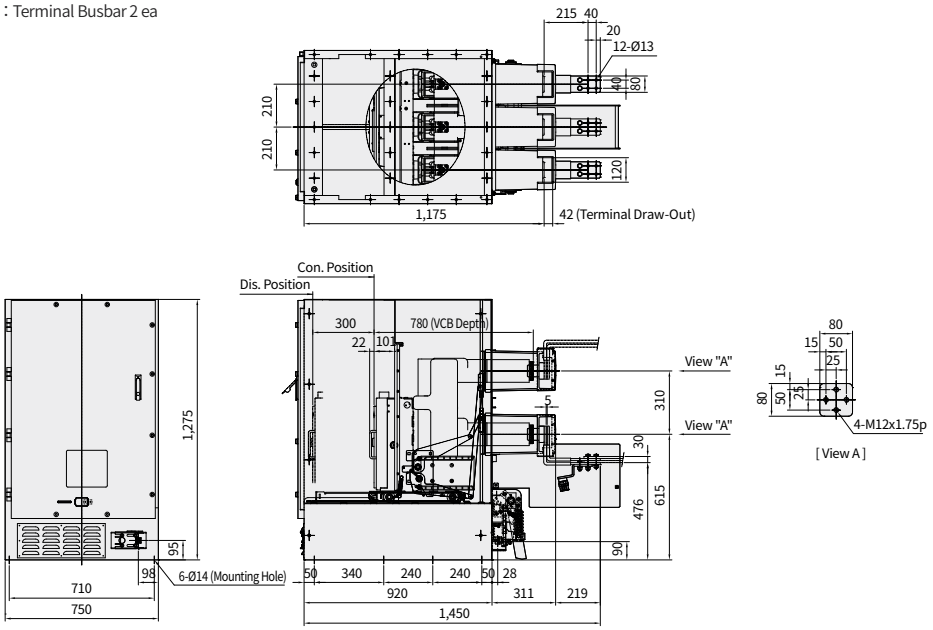
Dimensions

ME-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Screw-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 6111F
HGV 6112
HGV 6114
HGV 6141
HGV 6142
HGV 6144

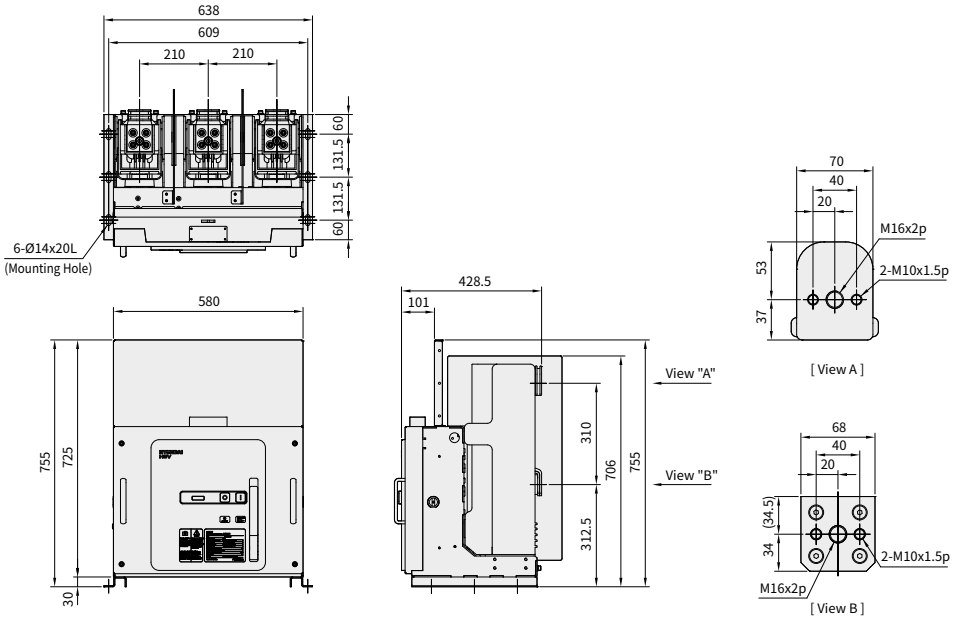
・630/1,250 A : Terminal Busbar 1 ea
・2,000 A : Terminal Busbar 2 ea



XA-Type Vacuum Circuit Breakers (24/25.8 kV) Fixed-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 6144F

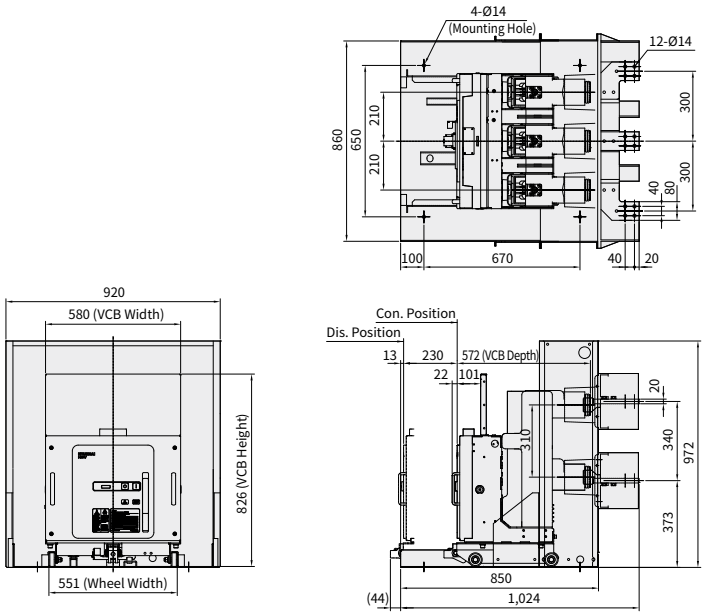


※ Dimension on this page are subject to change without notice.

ES-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 210 mm

Unit : mm

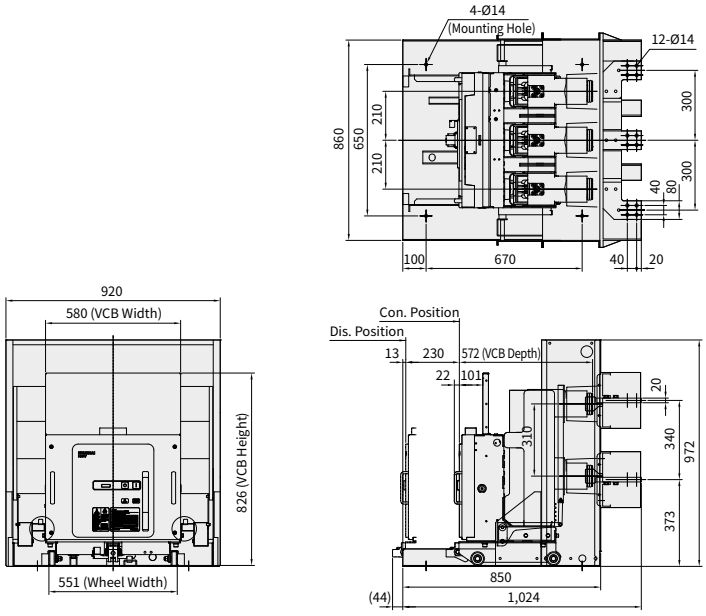
HGV 6144F



FS-Type Vacuum Circuit Breakers (24/25.8 kV) Draw-Out Type, Lever-Type, Phase-to-Phase Distance 210 mm

Unit : mm

HGV 6144F



※ Dimension on this page are subject to change without notice.

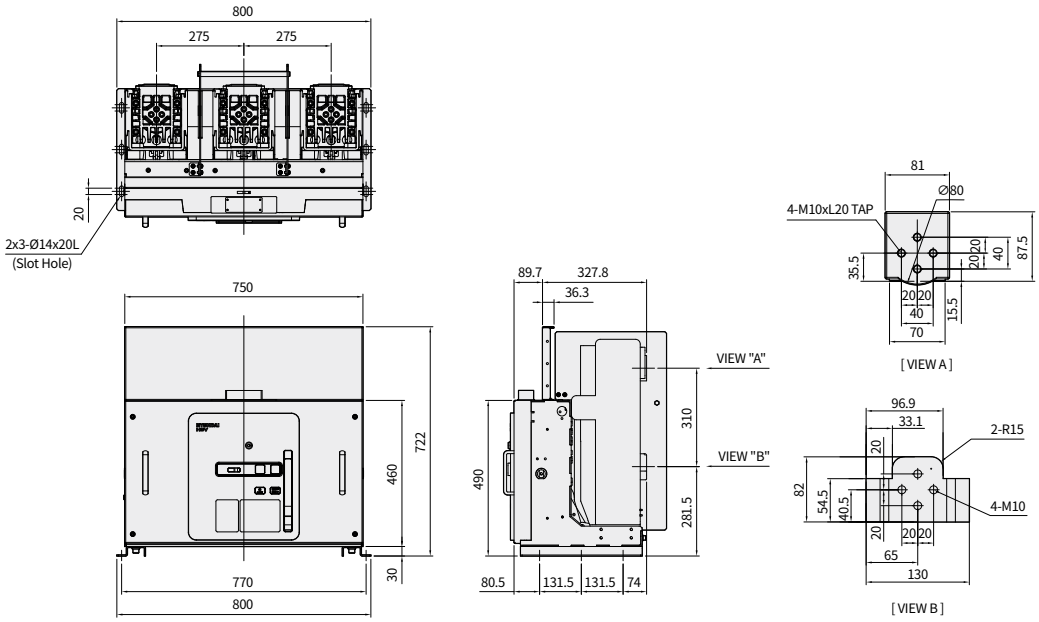
Dimensions

IXA-Type Vacuum Circuit Breakers (7.2/12 kV) Fixed-Type, Phase-to-Phase Distance 275 mm

Unit : mm

HGV 1156I
HGV 1157
HGV 1158
HGV 1166
HGV 1167
HGV 1168
HGV 1176
HGV 1177
HGV 1178
HGV 2156
HGV 2157
HGV 2158
HGV 2166
HGV 2167
HGV 2168
HGV 2176
HGV 2177
HGV 2178
HGV 3156
HGV 3157
HGV 3158
HGV 3166
HGV 3167
HGV 3168
HGV 3176
HGV 3177
HGV 3178

- 2,500 A/3,150 A does not have fan
- 4,000 A requires fan (For fan capacity and ventilation path, contact us)

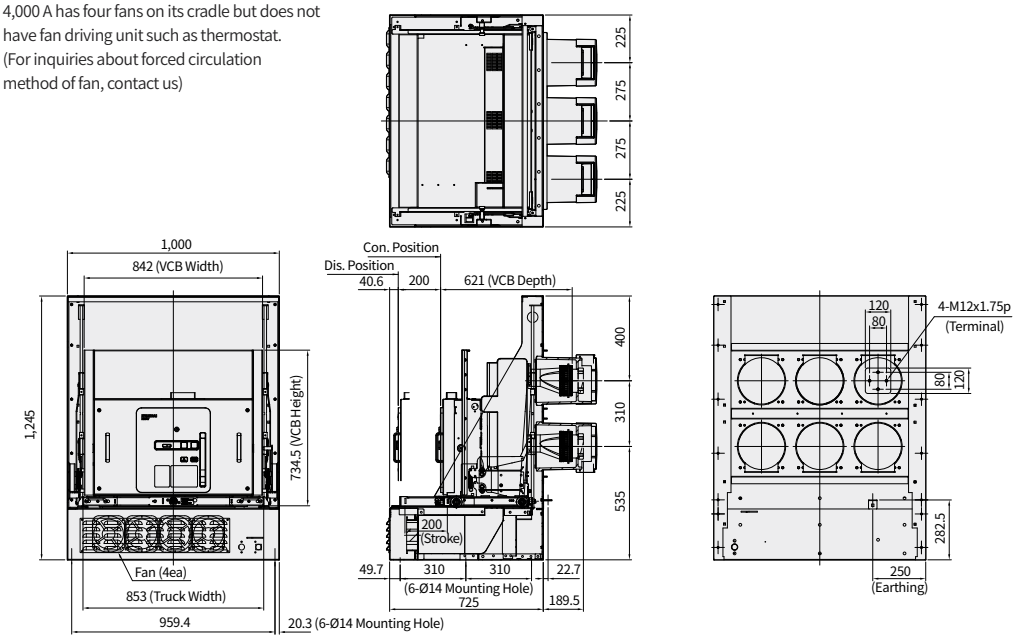


IGS-Type Vacuum Circuit Breakers (7.2/12/17.5 kV) Draw-Out Type, Phase-to-Phase Distance 275 mm

Unit : mm

HGV 1156I
HGV 1157
HGV 1158
HGV 1166
HGV 1167
HGV 1168
HGV 1176
HGV 1177
HGV 1178
HGV 2156
HGV 2157
HGV 2158
HGV 2166
HGV 2167
HGV 2168
HGV 2176
HGV 2177
HGV 2178
HGV 3156
HGV 3157
HGV 3158
HGV 3166
HGV 3167
HGV 3168
HGV 3176
HGV 3177
HGV 3178

- Pushing-Drawing Distance : 200 mm
- 2,500 A/3,150 A does not have fan
- 4,000 A has four fans on its cradle but does not have fan driving unit such as thermostat. (For inquiries about forced circulation method of fan, contact us)



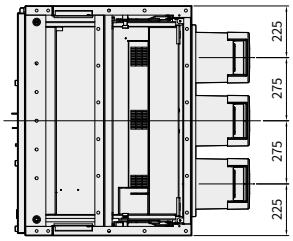
※ Dimension on this page are subject to change without notice.

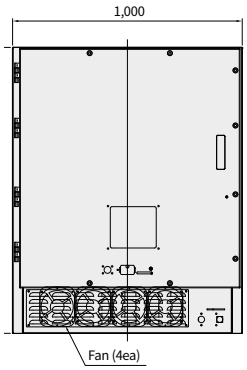
IMS-Type Vacuum Circuit Breakers (7.2/12/17.5 kV) Draw-Out Type, Phase-to-Phase Distance 275 mm

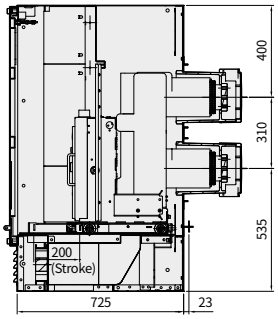
Unit : mm

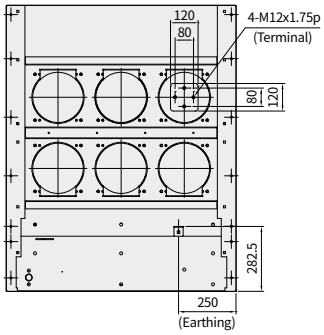
HGV 1156I
HGV 1157
HGV 1158
HGV 1166
HGV 1167
HGV 1168
HGV 1176
HGV 1177
HGV 1178
HGV 2156
HGV 2157
HGV 2158
HGV 2166
HGV 2167
HGV 2168
HGV 2176
HGV 2177
HGV 2178
HGV 3156
HGV 3157
HGV 3158
HGV 3166
HGV 3167
HGV 3168
HGV 3176
HGV 3177
HGV 3178

- Pushing-Drawing Distance : 200 mm
- 2,500 A/3,150 A does not have fan
- 4,000 A has four fans on its cradle but does not have fan driving unit such as thermostat. (For inquiries about forced circulation method of fan, contact us)







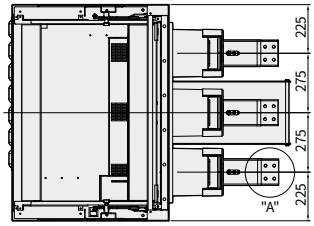


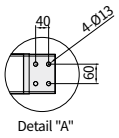
IGE-Type Vacuum Circuit Breakers (7.2/12/17.5 kV) Draw-Out Type, Phase-to-Phase Distance 275 mm

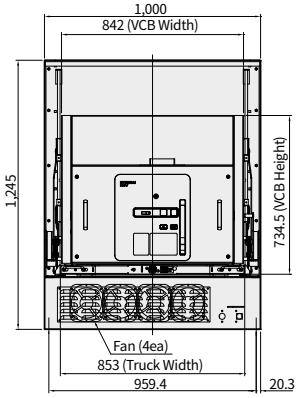
Unit : mm

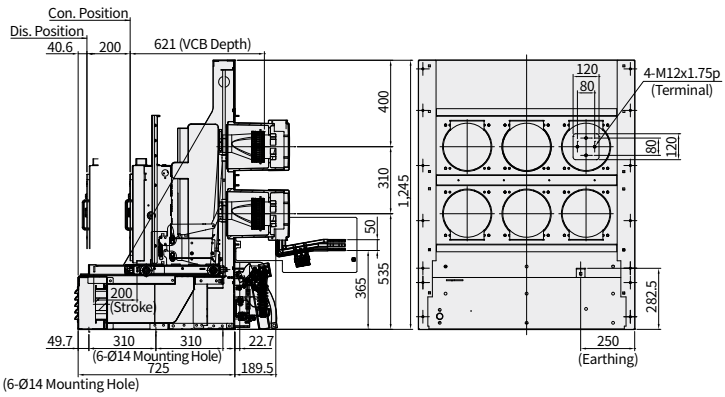
HGV 1156I
HGV 1157
HGV 1158
HGV 1166
HGV 1167
HGV 1168
HGV 2156
HGV 2157
HGV 2158
HGV 2166
HGV 2167
HGV 2168
HGV 2176
HGV 2177
HGV 2178
HGV 3156
HGV 3157
HGV 3158
HGV 3166
HGV 3167
HGV 3168
HGV 3176
HGV 3177
HGV 3178

- Pushing-Drawing Distance : 200 mm
- 2,500 A/3,150 A does not have fan
- 4,000 A has four fans on its cradle but does not have fan driving unit such as thermostat. (For inquiries about forced circulation method of fan, contact us)
- 2,500/3,150/4,000 A : Terminal Busbar 3 ea









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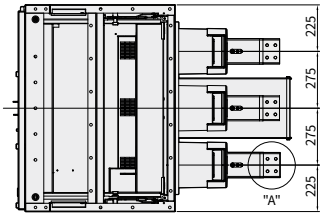
Dimensions

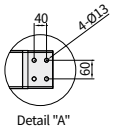
IME-Type Vacuum Circuit Breakers (7.2/12/17.5 kV) Draw-Out Type, Phase-to-Phase Distance 275 mm

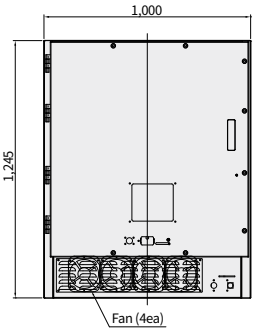
HGV 1156I
HGV 1157
HGV 1158
HGV 1166
HGV 1167
HGV 1168
HGV 2156
HGV 2157
HGV 2158
HGV 2166
HGV 2167
HGV 2168
HGV 2176
HGV 2177
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HGV 3168
HGV 3176
HGV 3177
HGV 3178

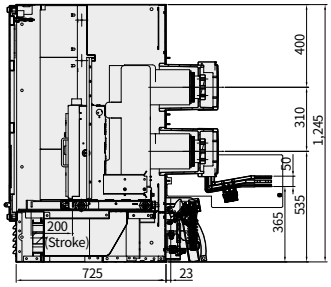
Unit : mm

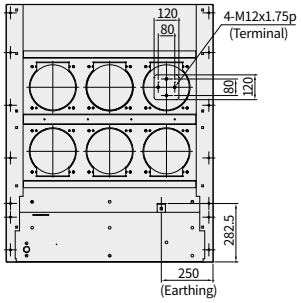
- Pushing-Drawing Distance : 200 mm
- 2,500 A/3,150 A does not have fan
- 4,000 A has four fans on its cradle but does not have fan driving unit such as thermostat. (For inquiries about forced circulation method of fan, contact us)
- 2,500/3,150/4,000 A : Terminal Busbar 3 ea











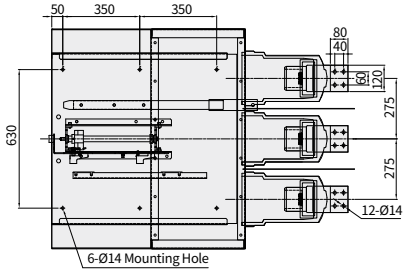
※ Dimension on this page are subject to change without notice.

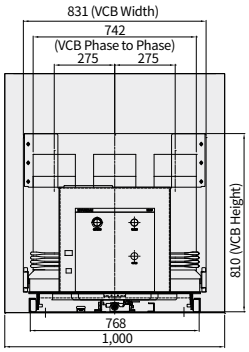
GS-Type Vacuum Circuit Breakers (24 kV) Draw-Out Type, Screw-Type

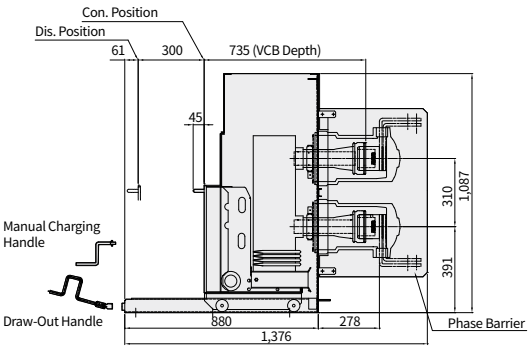
Unit : mm

HVF 6146
HVF 6147

- Metal Shutter Type.
- Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm





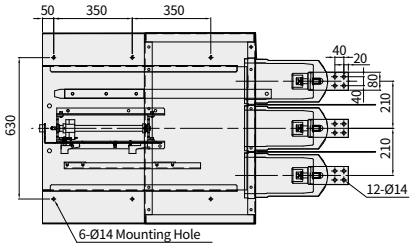


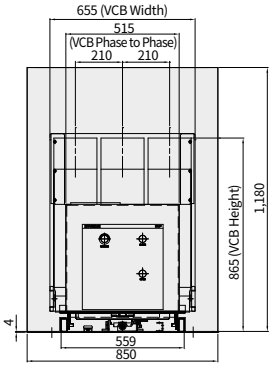
GS-Type Vacuum Circuit Breakers (24 kV) Draw-Out Type, Screw-Type

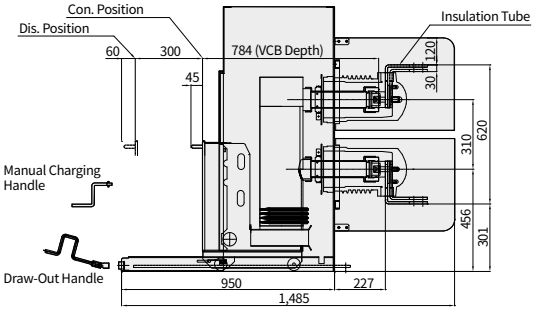
Unit : mm

HVF 6162
HVF 6164

- Metal Shutter Type.
- Phase-to-Phase Distance : Body - 210 mm, Cradle - 210 mm
- 1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea







※ Dimension on this page are subject to change without notice.

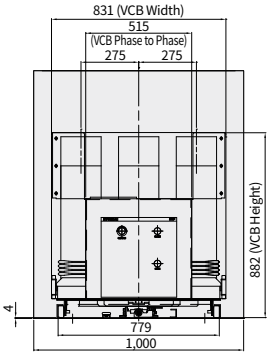
Dimensions

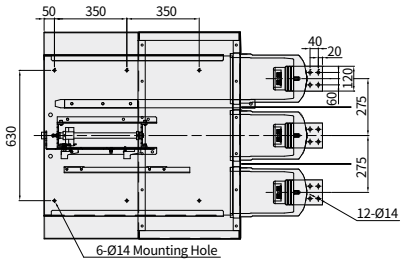
GS-Type Vacuum Circuit Breakers (24 kV) Draw-Out Type, Screw-Type

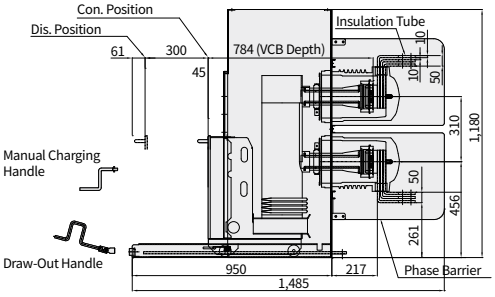
HVF 6166
HVF 6167

Unit : mm

・Metal Shutter Type.
・Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm





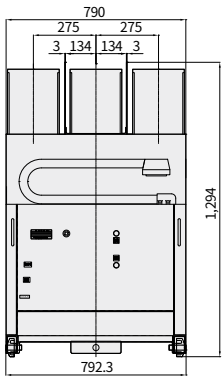


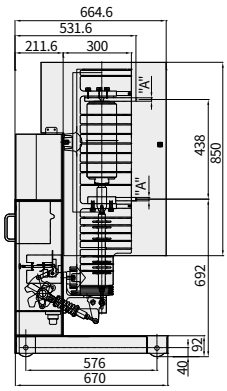
XA-Type Vacuum Circuit Breakers (36/38 kV) Fixed Type

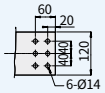
HVF 7052
HVF 7054
HVF 7056
HVF 7057
HVF 7062
HVF 7064
HVF 7067

Unit : mm

・Phase-to-Phase Distance : Body - 275 mm





Model	Rated Current	Size "A"	Terminal Type	Main Terminal A Type	Main Terminal B Type
HVF7052/7062	1,250 A (1,200 A)	15	A		
HVF7054/7064	2,500 A (2,000 A)	20			
HVF7056/7057/7067	3,150 A (3,000 A)	30	B		

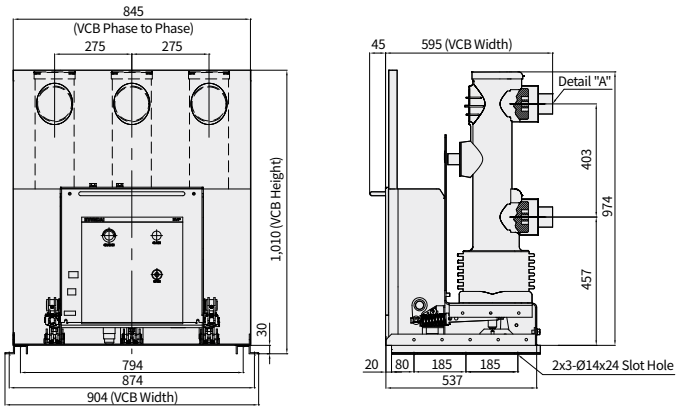
※ Dimension on this page are subject to change without notice.

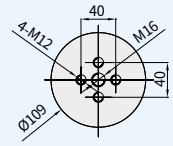
XA-Type Vacuum Circuit Breakers (36 kV) Fixed Type

HVF 7142
HVF 7144

Unit : mm

・Phase-to-Phase Distance : Body - 275 mm



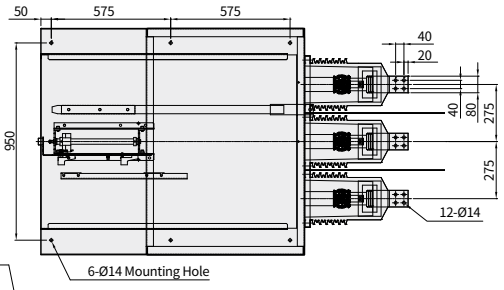
Item	1,250/2,000 A
Detail “A”	

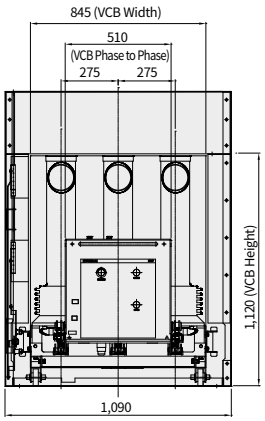
GS-Type Vacuum Circuit Breakers (36 kV) Draw-Out Type

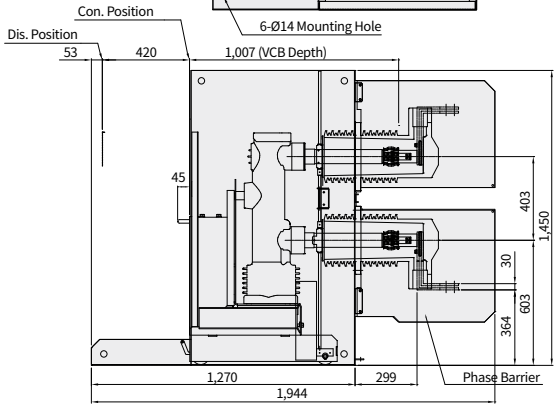
HVF 7142
HVF 7144

Unit : mm

・Metal Shutter Type.
・Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm
・1,250 A : Terminal Busbar 1 ea
・2,000 A : Terminal Busbar 2 ea







※ Dimension on this page are subject to change without notice.

Dimensions

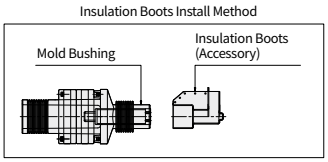
GS-Type Vacuum Circuit Breakers (36/38 kV) Draw-Out Type, Screw-Type

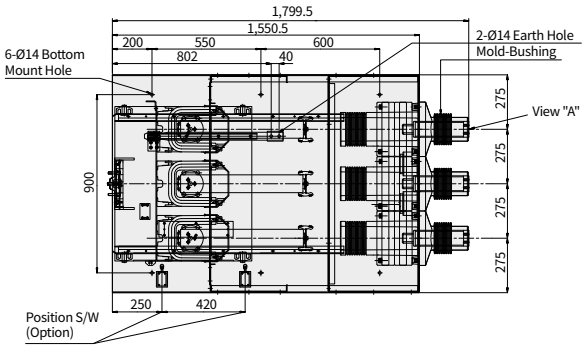
Standard : IEC

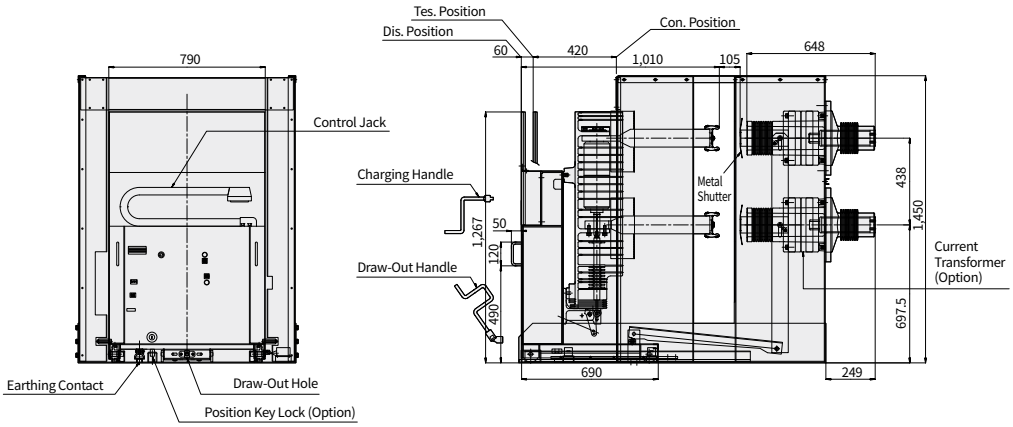
HVF 7052
HVF 7054
HVF 7056
HVF 7062
HVF 7064
HVF 7066

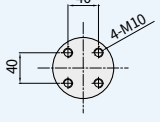
Unit : mm

・Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm







Model	Rated Current	Main Circuit Terminal View (View "A")
HVF7052/HVF7062	1,250 A	
HVF7054/HVF7064	2,000 A	
HVF7056/HVF7066	2,500 A	

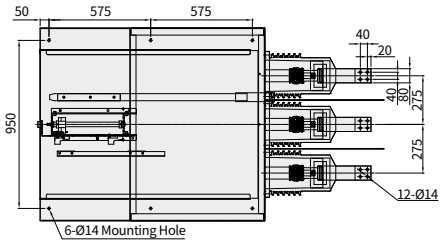
※ Dimension on this page are subject to change without notice.

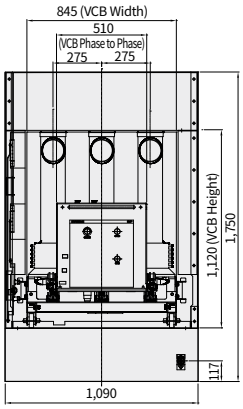
GE-Type Vacuum Circuit Breakers (36 kV) Draw-Out Type, Screw-Type

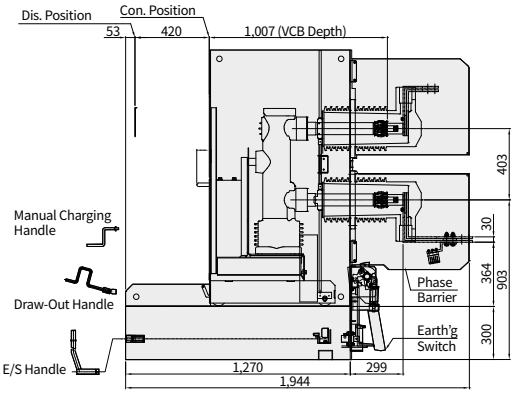
Unit : mm

HVF 7142
HVF 7144

- Metal Shutter Type.
- Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm
- 1,250 A : Terminal Busbar 1 ea
- 2,000 A : Terminal Busbar 2 ea







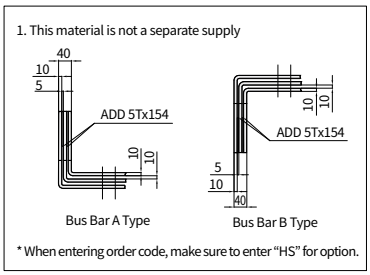
GS-Type Vacuum Circuit Breakers (36 kV) Draw-Out Type (Door), MCSG Type

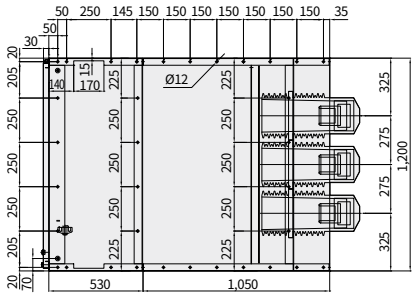
Standard : IEC

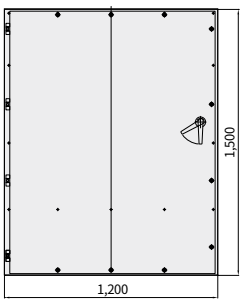
Unit : mm

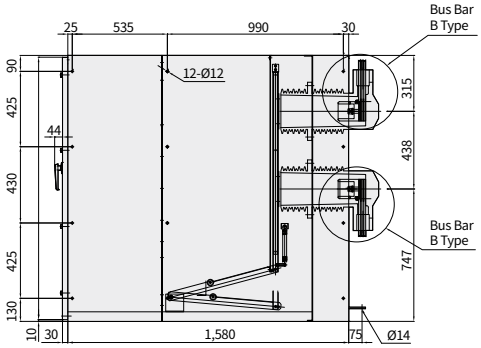
HVF 7057

- Insulation Shutter Type.
- GS-Class.
- VCB Phase-to-Phase Distance : 275 mm









※ Dimension on this page are subject to change without notice.

Dimensions

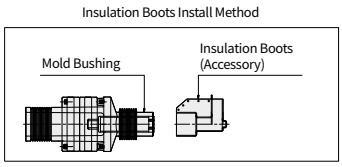
GS-Type Vacuum Circuit Breakers (36/38 kV) GS Draw-Out Type, Screw-Type

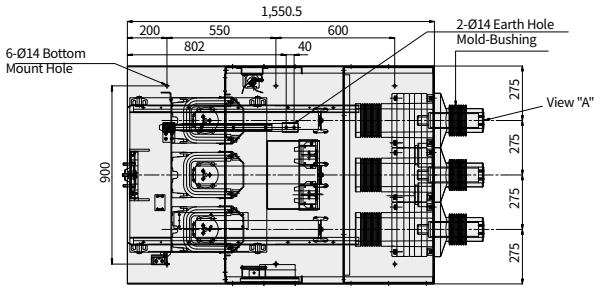
Standard : ANSI

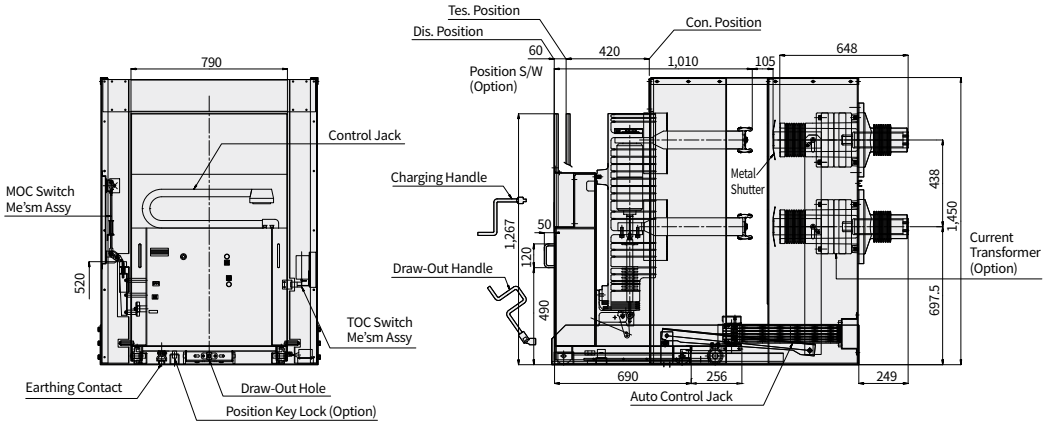
HVF 7052
HVF 7054
HVF 7056
HVF 7057
HVF 7062
HVF 7064
HVF 7067

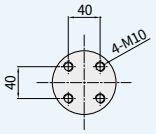
Unit : mm

・Phase-to-Phase Distance : Body - 275 mm, Cradle - 275 mm







Model	Rated Current	Main Circuit Terminal View (View "A")
HVF7052/7062	1,250 A (1,200 A)	
HVF7054/7064	2,000 A	
HVF7056/7057/7067	2,500/3,000 A	

※ Dimension on this page are subject to change without notice.

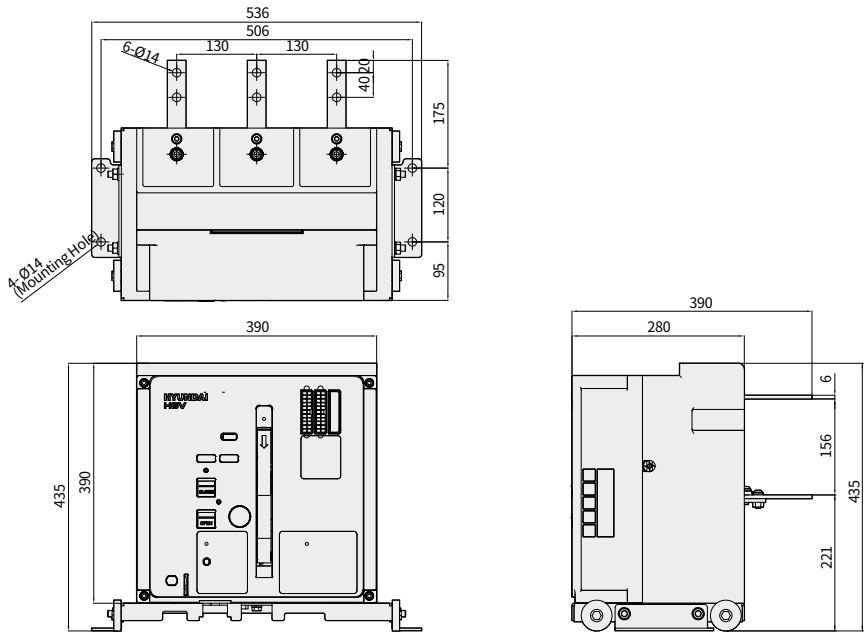
Dimensions(Compact HGV)

X-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Fixed Type

IEC 62271-100

Unit : mm

HGV1199A
HGV1111A

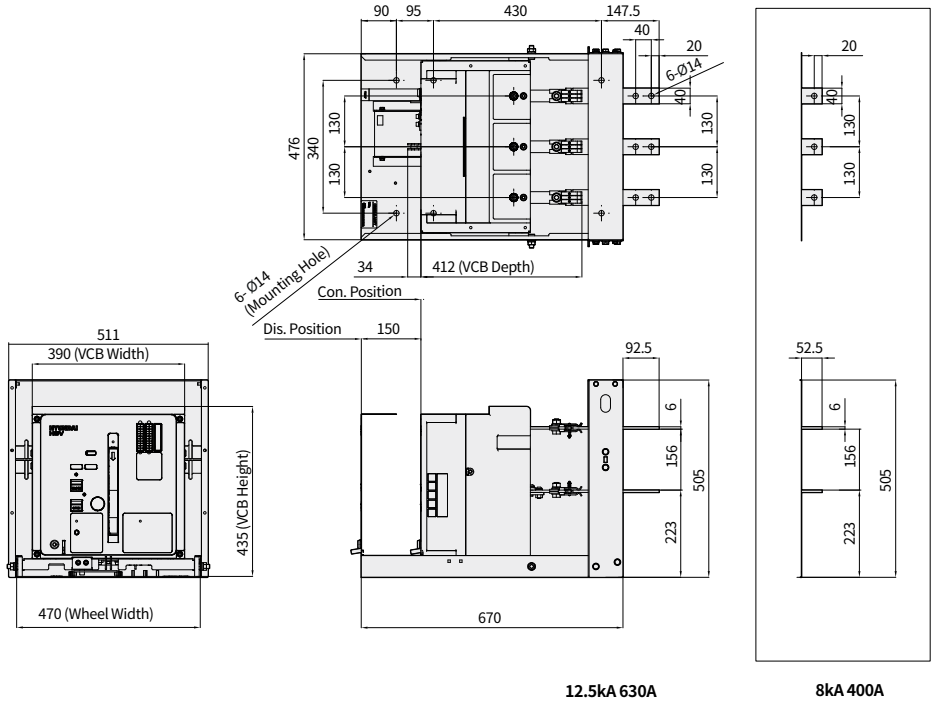


E-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Draw-Out Type

IEC 62271-100

Unit : mm

HGV1199A
HGV1111A



12.5kA 630A **8kA 400A**

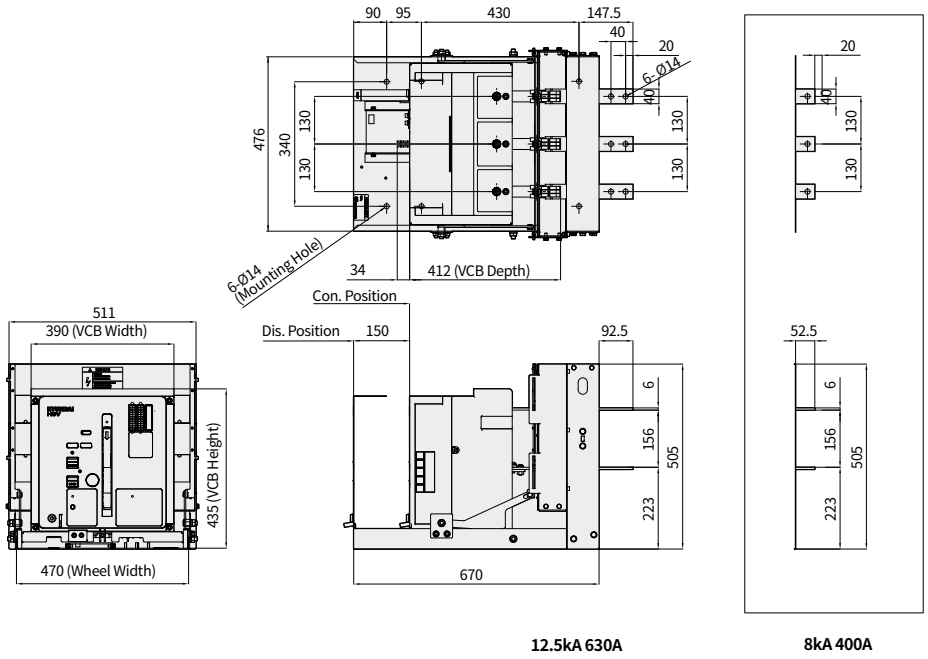
※ Dimension on this page are subject to change without notice.

Dimensions(Compact HGV)

F-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Draw-Out Type

HGV1199A
HGV1111A

Unit : mm



12.5kA 630A **8kA 400A**

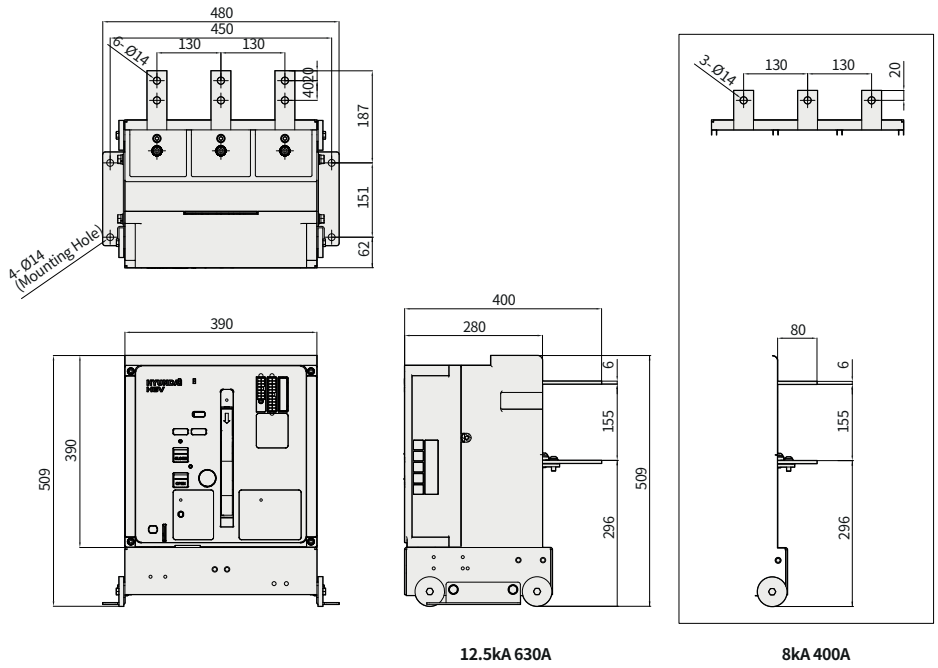
※ Dimension on this page are subject to change without notice.

Dimensions(Compact HGV Retrofit)

X-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Fixed Type

Unit : mm

HGV 1199A RV
HGV 1111A RV



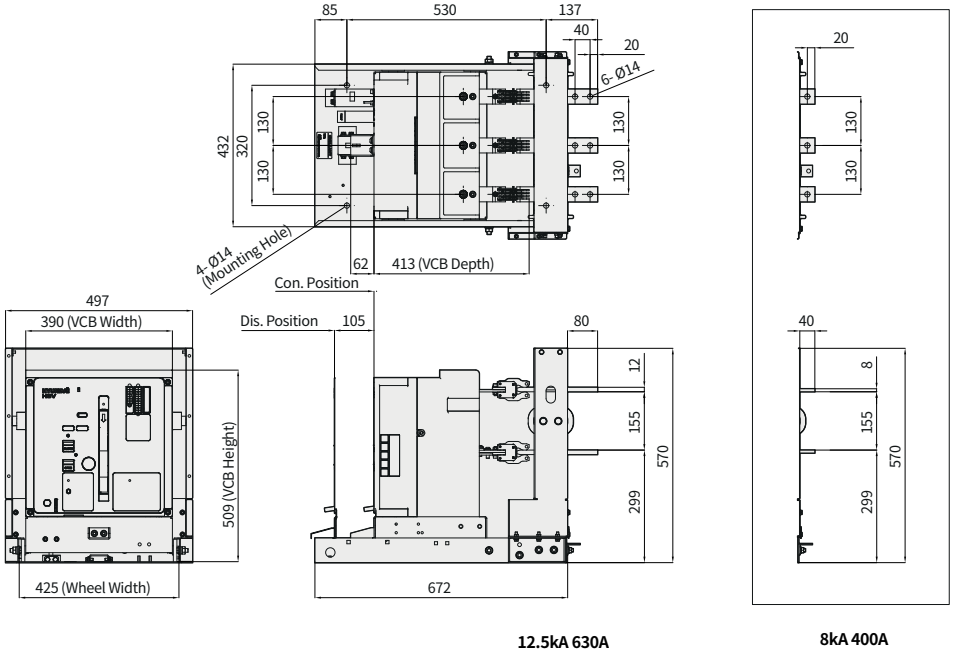
12.5kA 630A

8kA 400A

E-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Draw-Out Type

Unit : mm

HGV 1199A RV
HGV 1111A RV



12.5kA 630A

8kA 400A

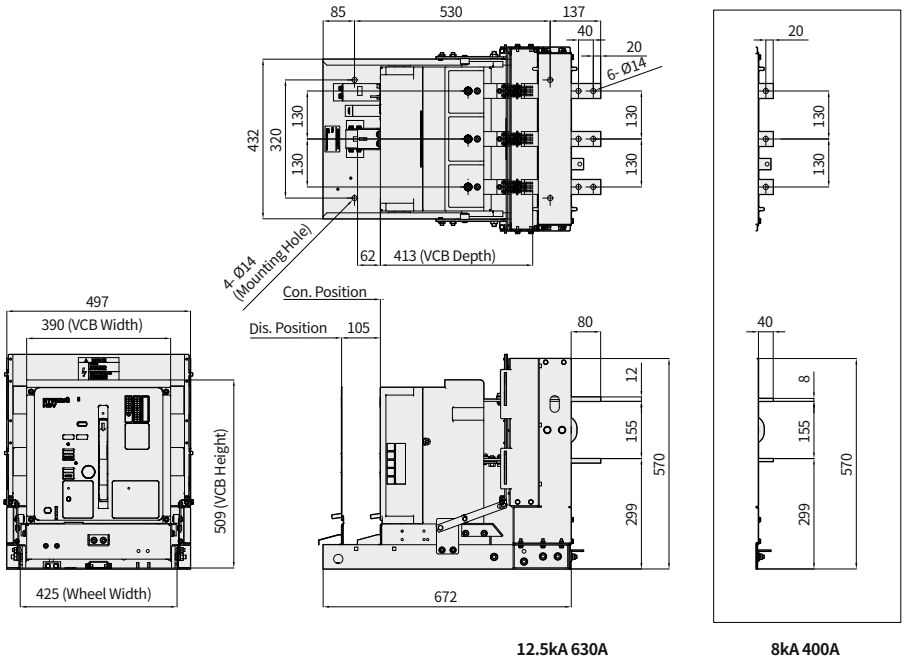
※ Dimension on this page are subject to change without notice.

Dimensions

F-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Draw-Out Type

Unit : mm

HGV 1199A RV
HGV 1111A RV

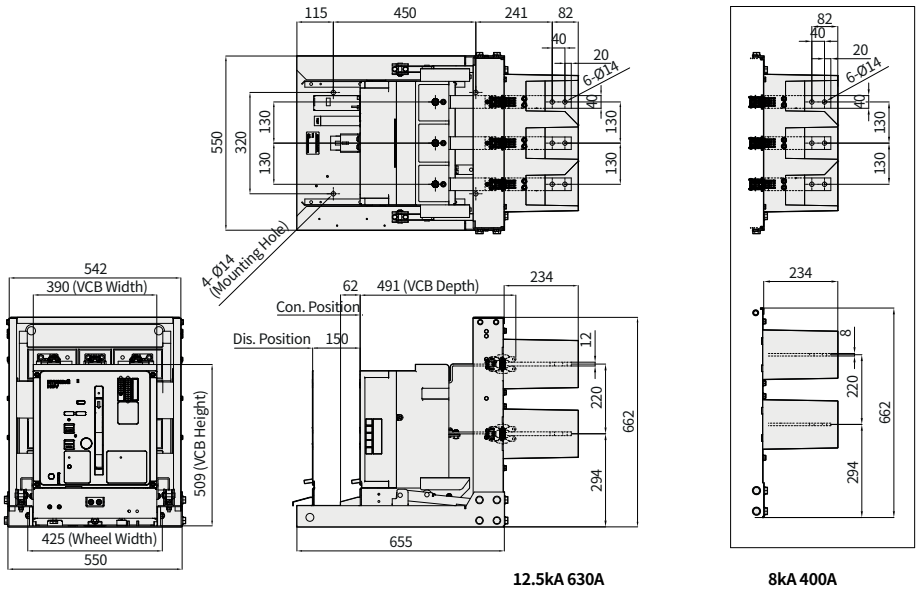


12.5kA 630A **8kA 400A**

G-Type Vacuum Circuit Breakers (7.2 kV, 8/12.5kA) Draw-Out Type

Unit : mm

HGV 1199A RV
HGV 1111A RV



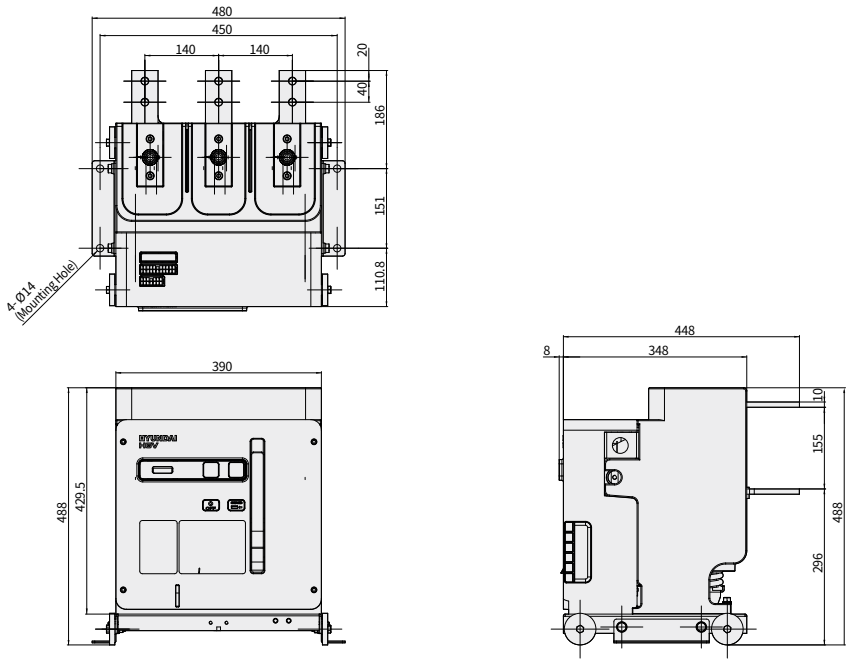
12.5kA 630A **8kA 400A**

※ Dimension on this page are subject to change without notice.

X-Type Vacuum Circuit Breakers (7.2 kV, 25kA) Fixed Type

Unit : mm

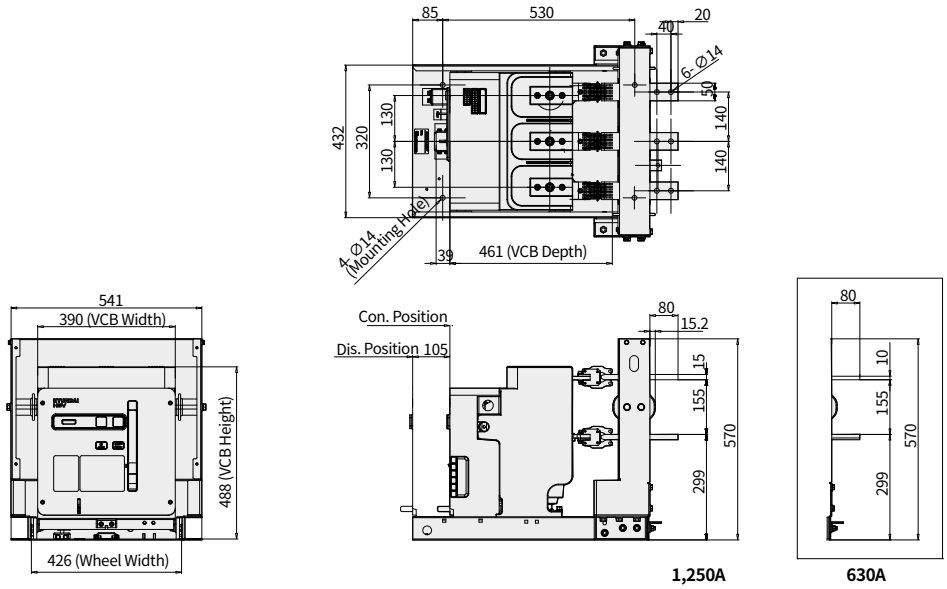
HGV 1141B
HGV 1142B



E-Type Vacuum Circuit Breakers (7.2 kV, 25kA) Draw-Out Type

Unit : mm

HGV 1141B
HGV 1142B



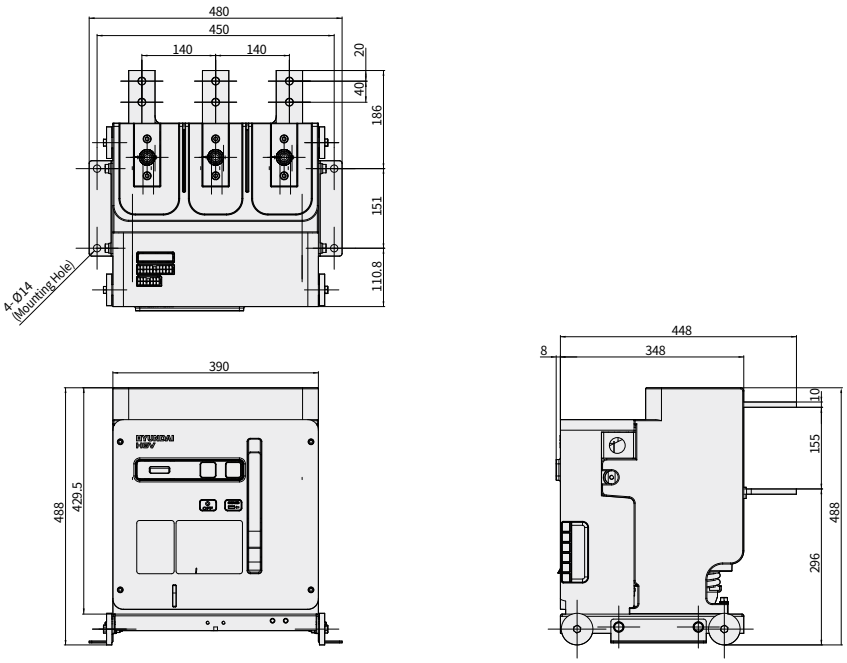
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Dimensions

X-Type Vacuum Circuit Breakers (7.2 kV, 25kA) Fixed Type

Unit : mm

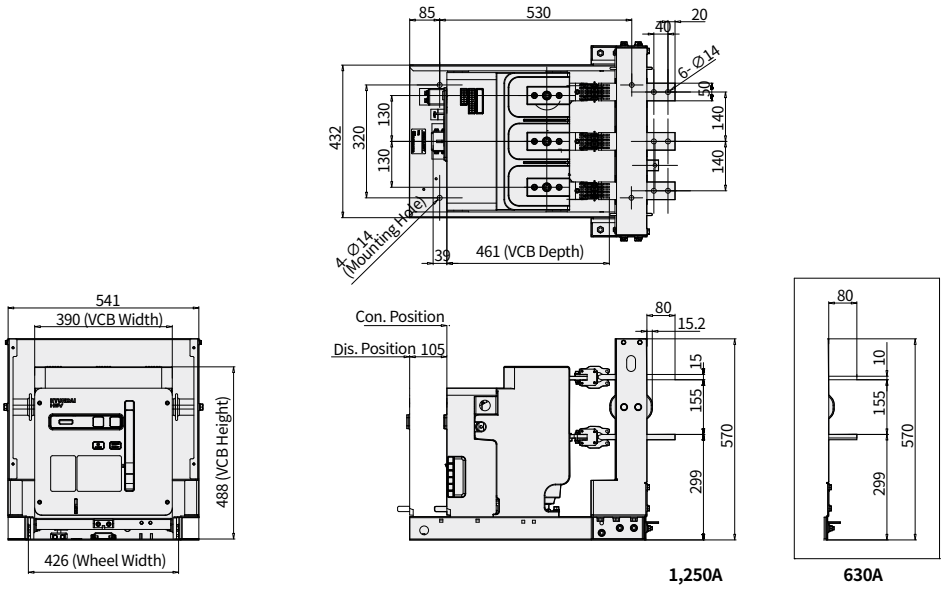
HGV 1141B
HGV 1142B



E-Type Vacuum Circuit Breakers (7.2 kV, 25kA) Draw-Out Type

Unit : mm

HGV 1141B
HGV 1142B



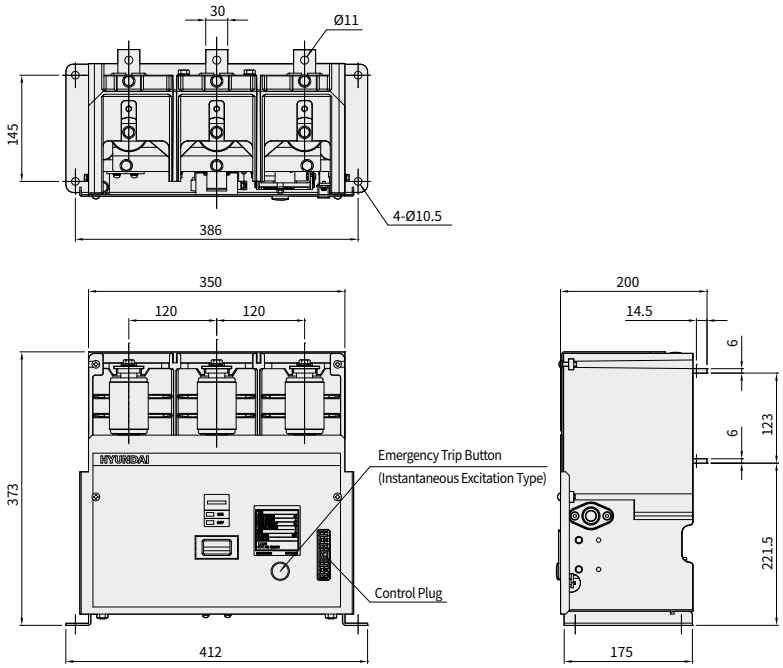
※ Dimension on this page are subject to change without notice.

Dimensions

Vacuum Contactor (3.6/7.2 kV) Fixed Type

X1 and fuse not attached ; 21 pin front draw-out control plug

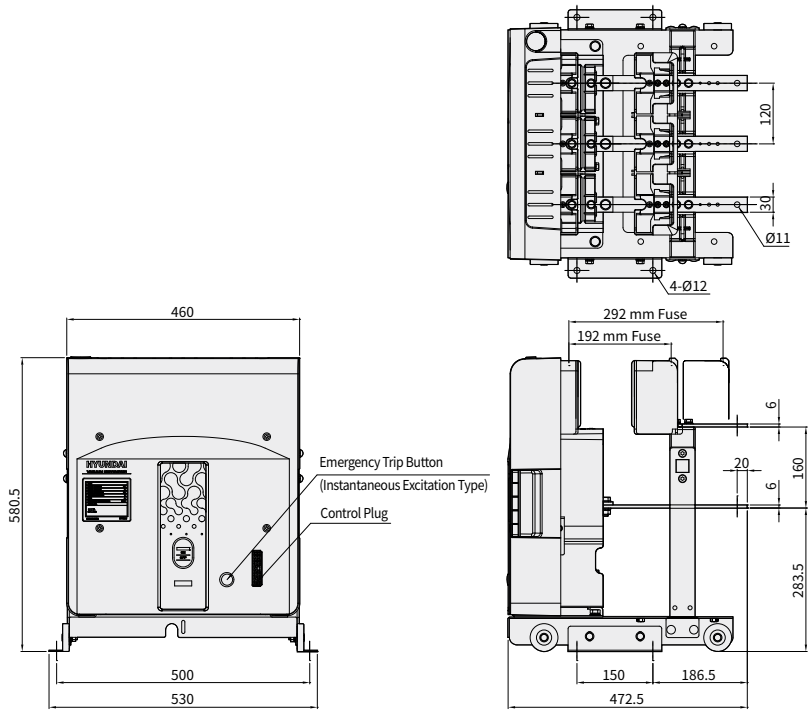
Unit : mm



Vacuum Contactor (3.6/7.2 kV) Fixed Type

A1 and DIN fuse attached ; 21 pin front draw-out control plug

Unit : mm

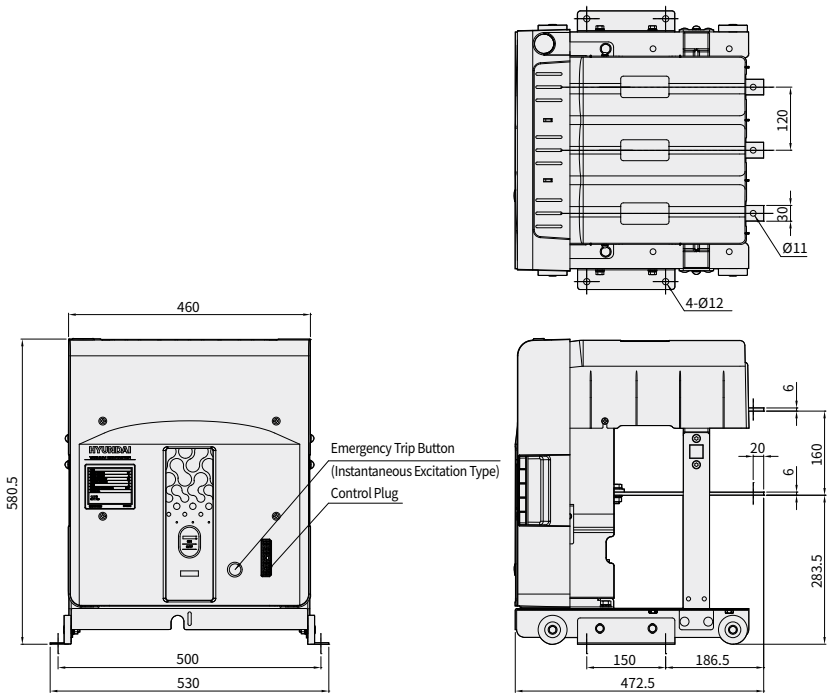


※ Dimension on this page are subject to change without notice.

Vacuum Contactor (3.6/7.2 kV) Fixed Type

A2 and KS fuse not attached ; 21 pin front draw-out control plug

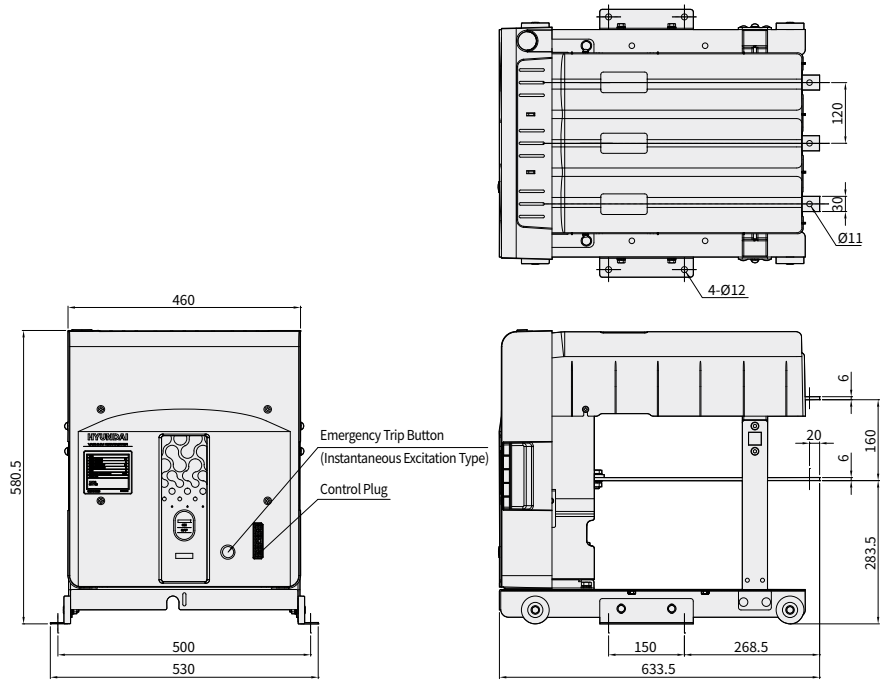
Unit : mm



Vacuum Contactor (7.2 kV) Fixed Type

A3 and KS fuse not attached (300, 400 A for 7.2 kV motor) ; 21 pin front draw-out control plug

Unit : mm



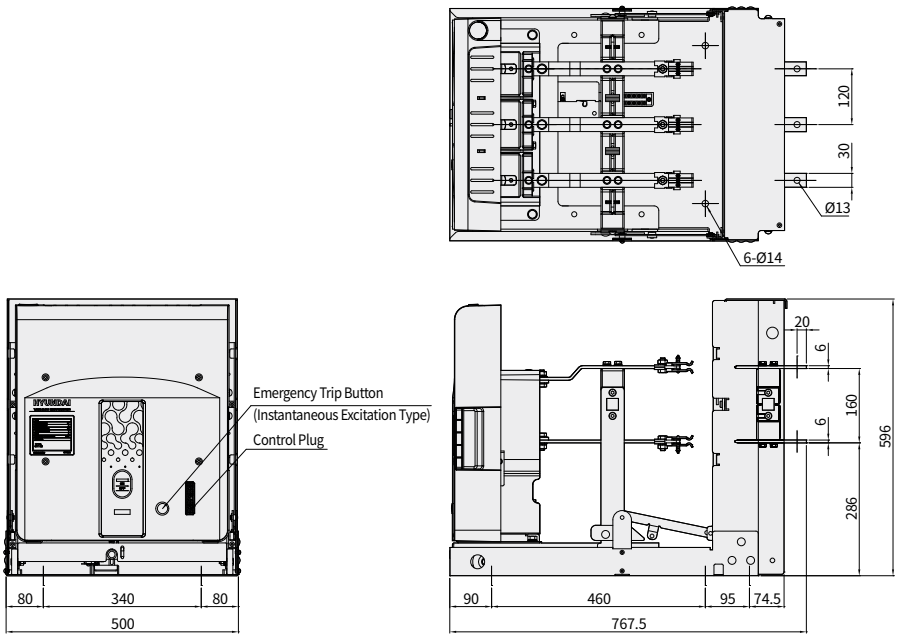
※ Dimension on this page are subject to change without notice.

Dimensions

E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

B1 and fuse not attached ; 21 pin front draw-out control plug

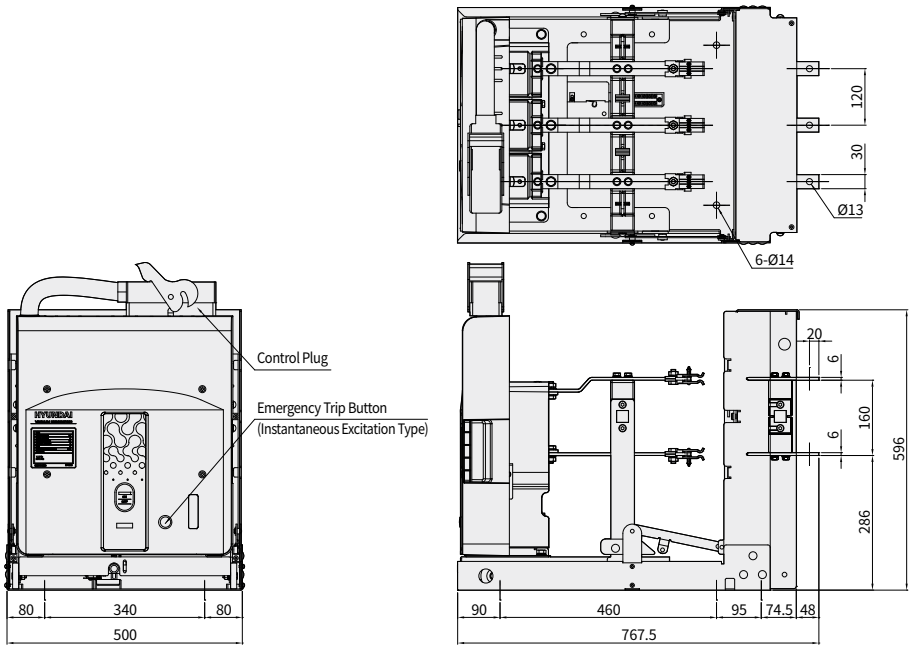
Unit : mm



E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

B2 and fuse not attached ; 52 pin upper part draw-out control plug

Unit : mm

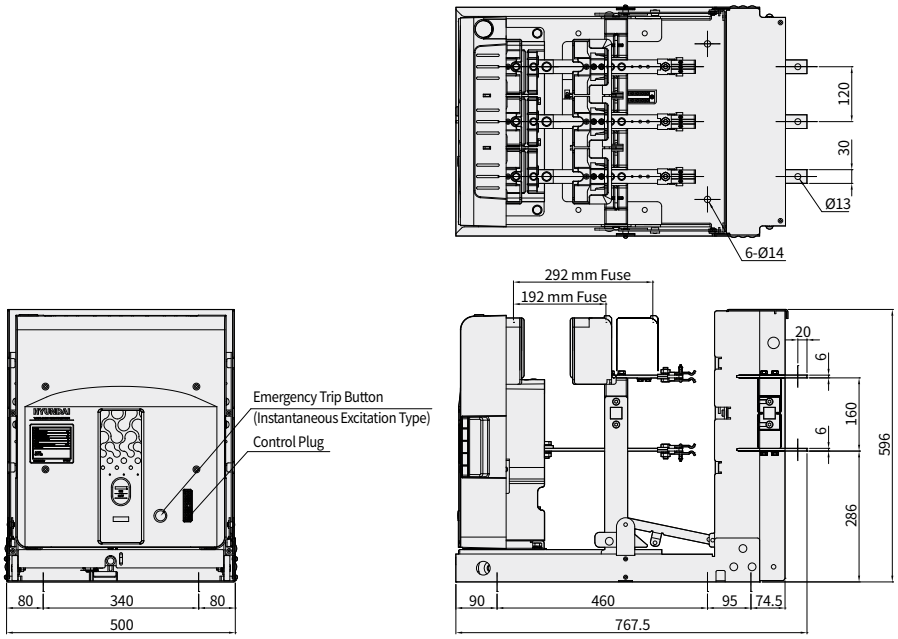


※ Dimension on this page are subject to change without notice.

E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

D1 and DIN fuse attached ; 21 pin front draw-out control plug

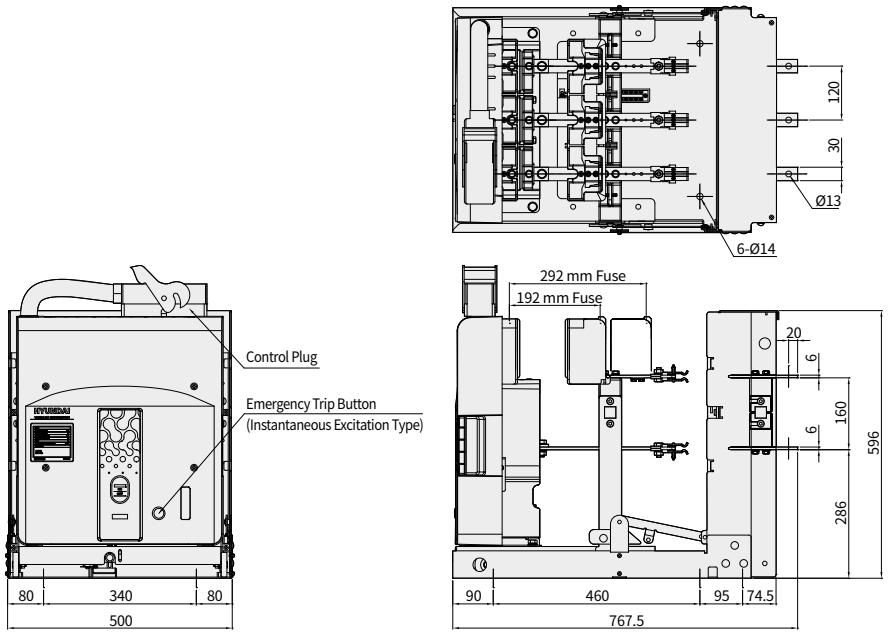
Unit : mm



E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

D2 and DIN fuse attached ; 52 pin upper part draw-out control plug

Unit : mm



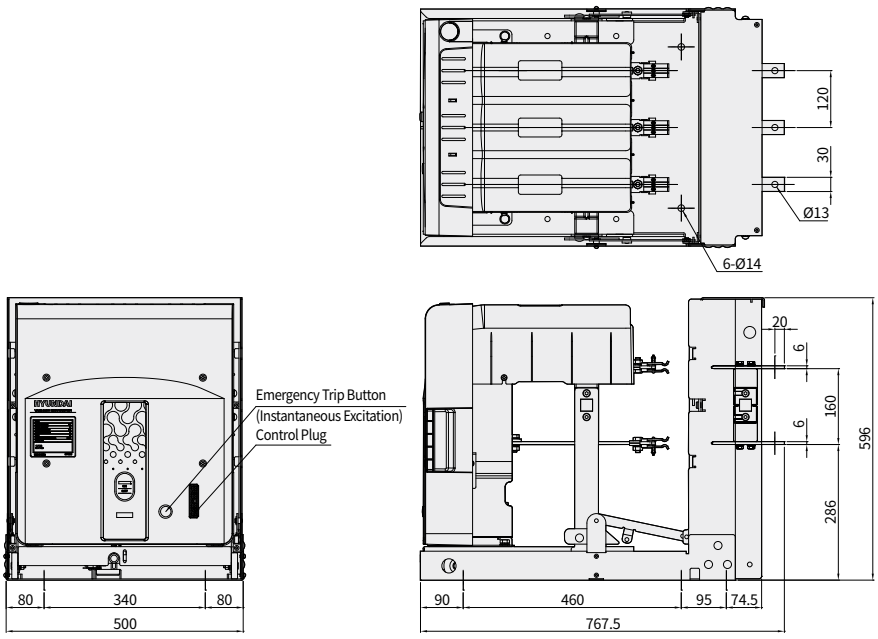
※ Dimension on this page are subject to change without notice.

Dimensions

E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

D3 and KS fuse not attached ; 21 pin front draw-out control plug

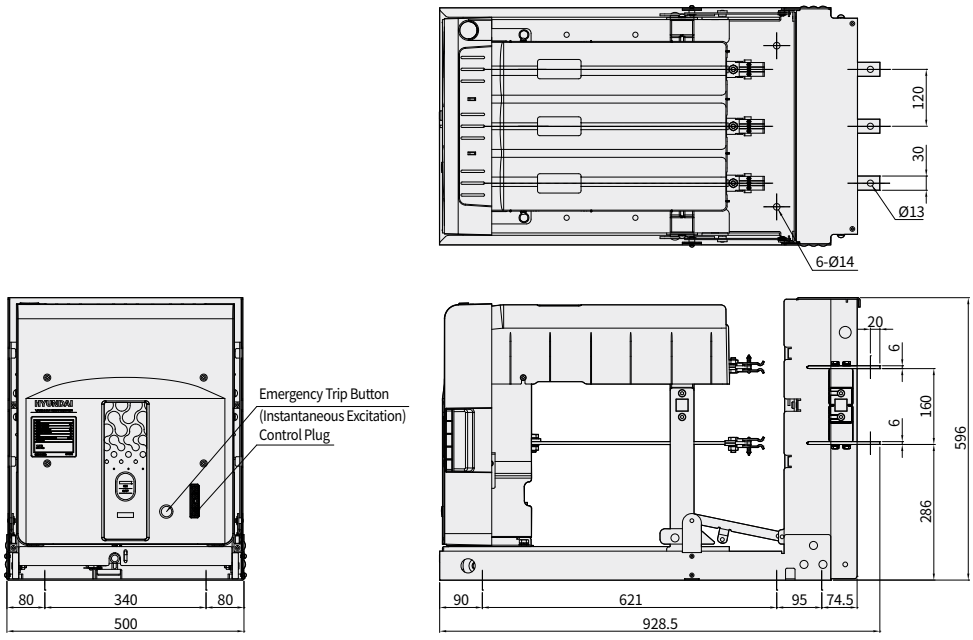
Unit : mm



E/F-Class Vacuum Contactor (7.2 kV) Draw-Out Type

D4 and KS fuse not attached (300, 400 A for 7.2 kV motor) ;
21 pin front draw-out control plug

Unit : mm

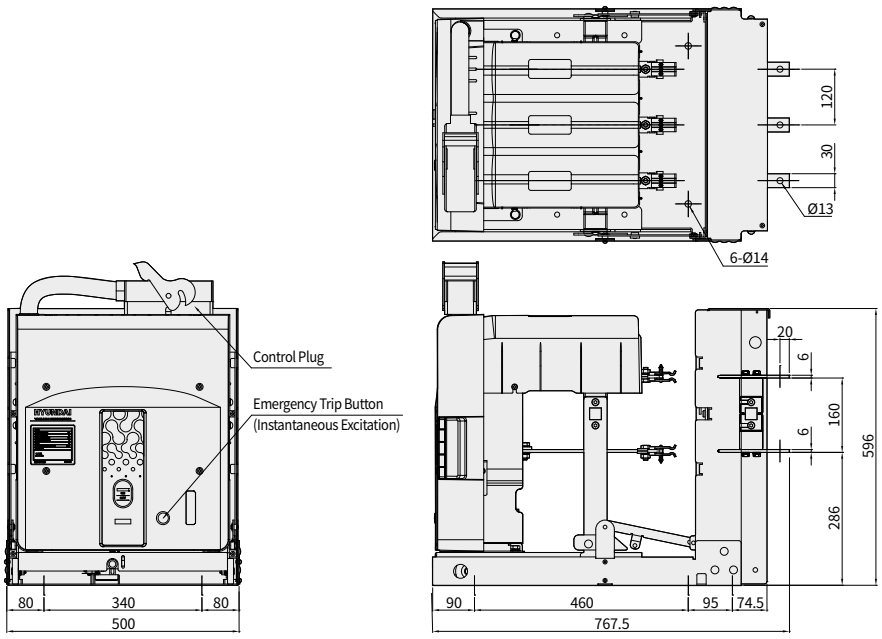


※ Dimension on this page are subject to change without notice.

E/F-Class Vacuum Contactor (3.6/7.2 kV) Draw-Out Type

D5 and KS fuse attached ; 52 pin upper part draw-out control plug

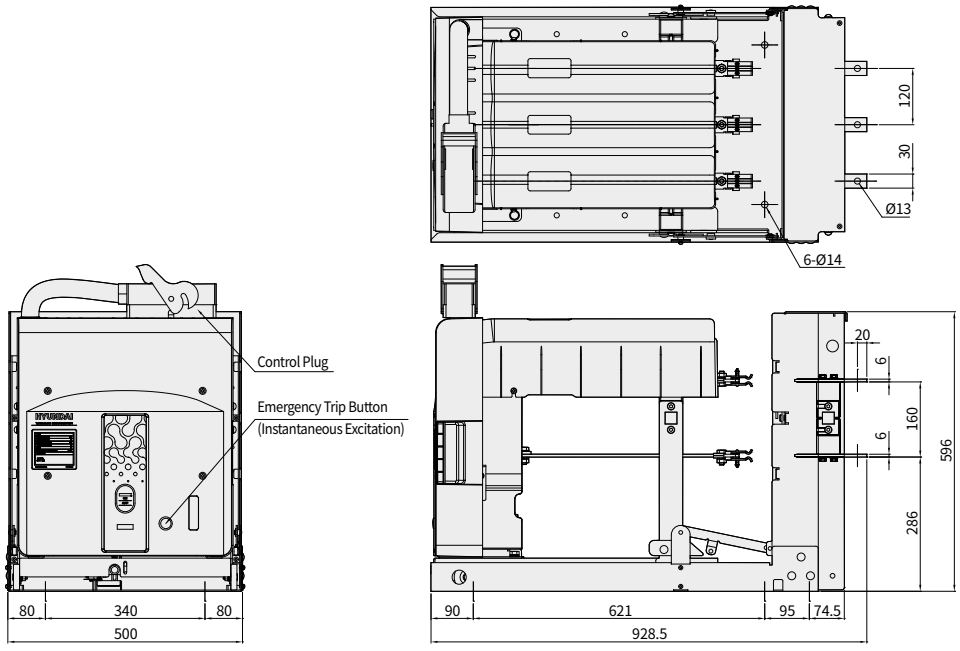
Unit : mm



E/F-Class Vacuum Contactor (7.2 kV) Draw-Out Type

D6 and KS fuse not attached (300, 400 A for 7.2 kV motor) ;
52 pin upper part draw-out control plug

Unit : mm



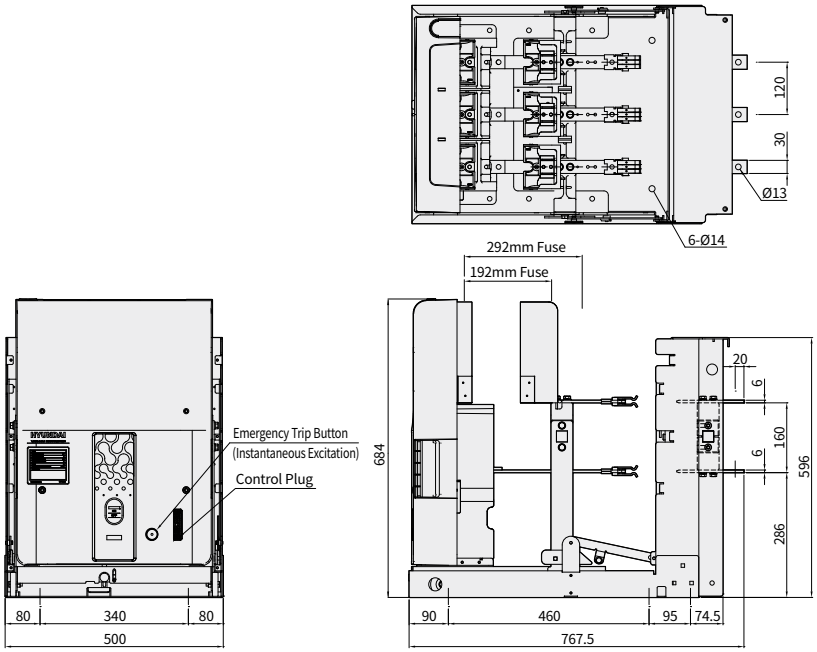
※ Dimension on this page are subject to change without notice.

Dimensions

E/F-Class UVC (3.6/7.2kV) Draw-Out Type

H1, DIN fuse double attached ; 21pin front draw-out control plug

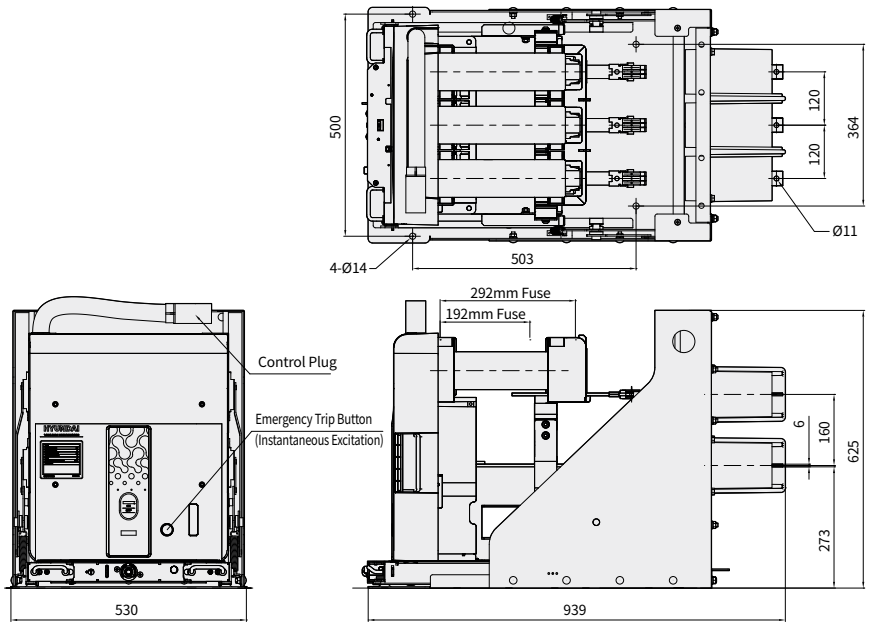
Unit : mm



M-Class UVC (3.6/7.2kV) Screw Draw-Out Type

S1, DIN fuse attached ; 72pin upper part draw-outcontrol plug

Unit: mm

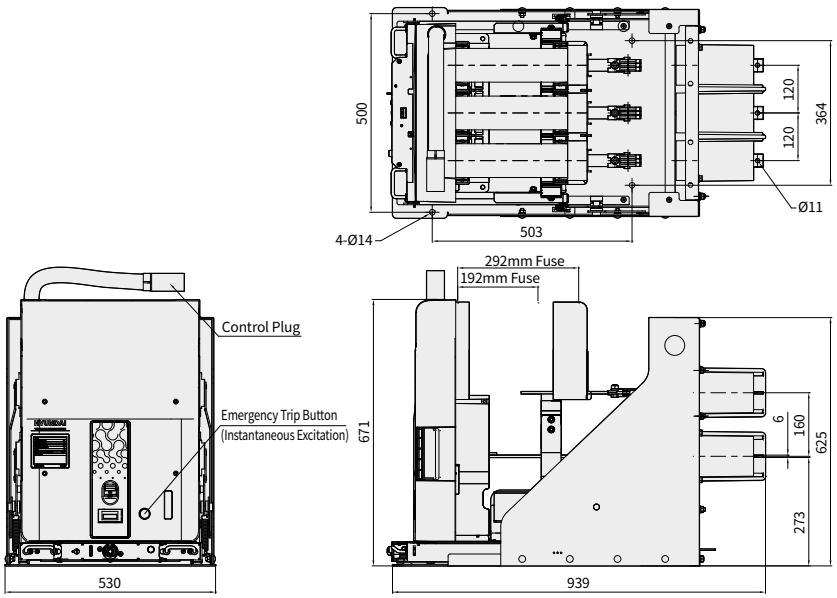


※ Dimension on this page are subject to change without notice.

M-Class UVC (3.6/7.2kV) Screw Draw-Out Type

S4, DIN fuse double attached ; 72pin upper part draw-outcontrol plug

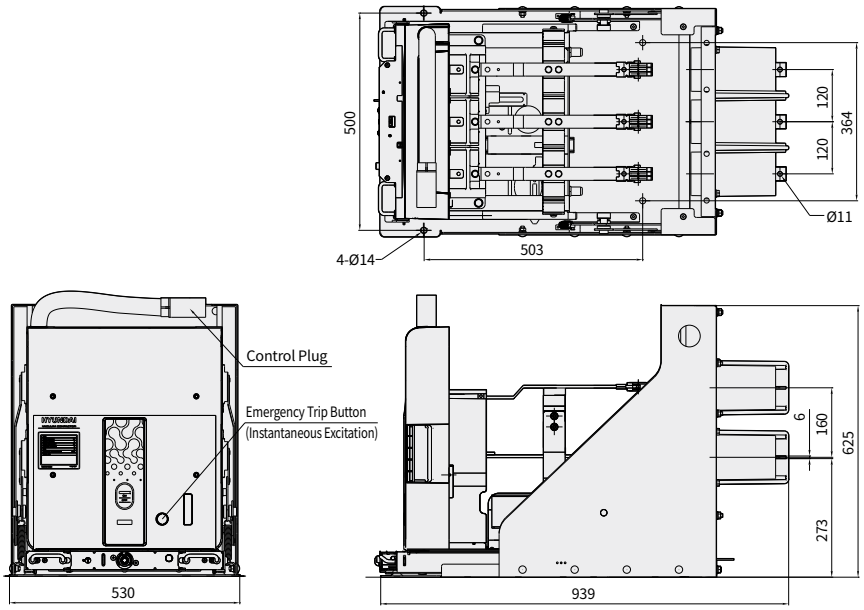
Unit : mm



M-Class UVC (3.6/7.2kV) Screw Draw-Out Type

S5, fuse not attached ; 72pin upper part draw-outcontrol plug

Unit : mm



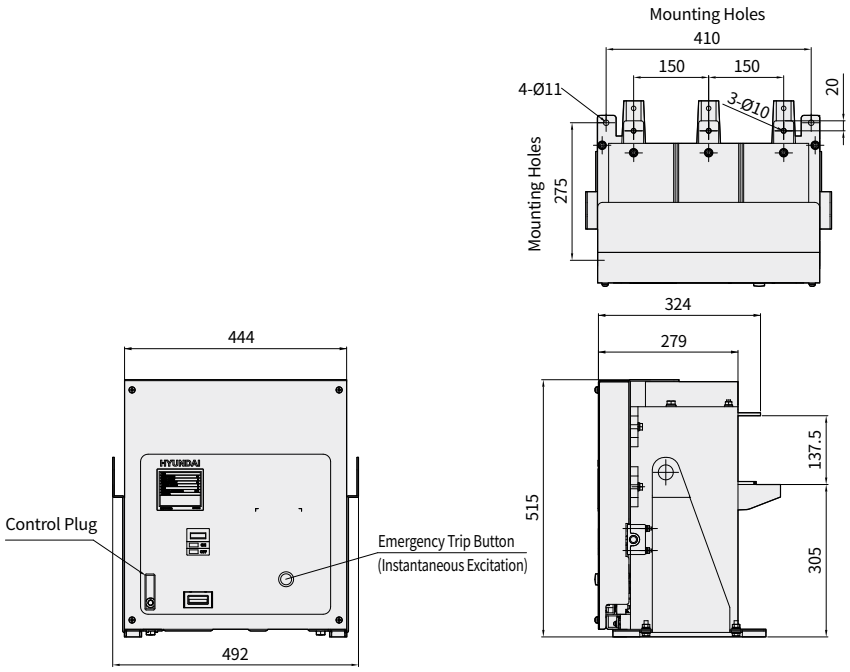
※ Dimension on this page are subject to change without notice.

Dimensions

UVC (12kV) Fixed Type

X1, fuse not attached ; 21pin front draw-out control plug

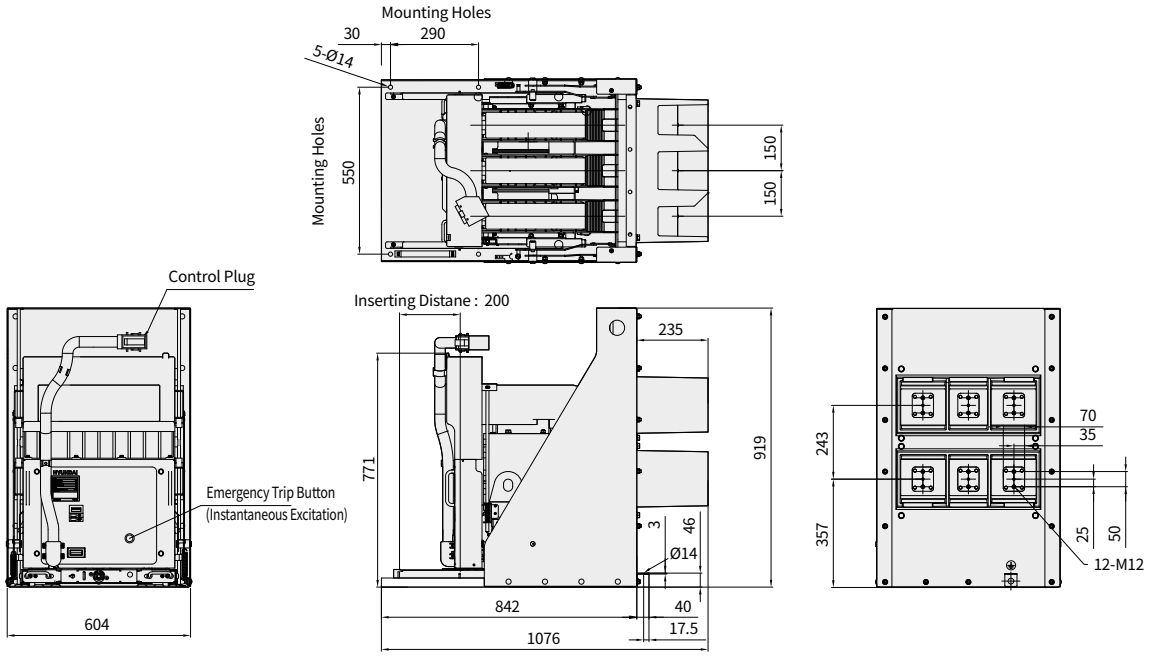
Unit : mm



M-Class UVC(12kV) Screw Draw-Out Type

S1, DIN fuse attached/S5, fuse not attached ;
72pin upper part draw-out control plug

Unit : mm

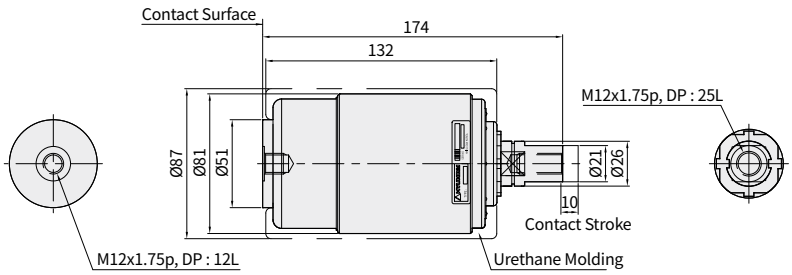


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Dimensions (Vacuum Interrupters)

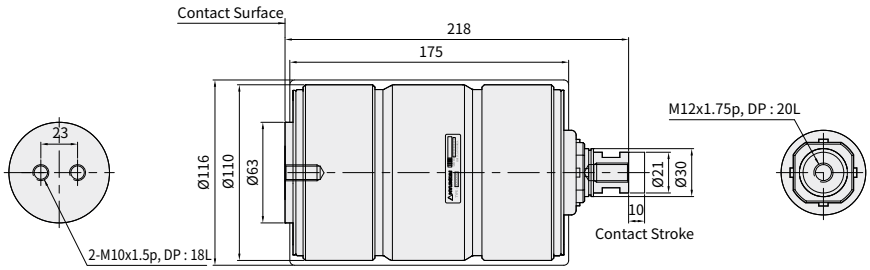
HCV-3B

Unit : mm



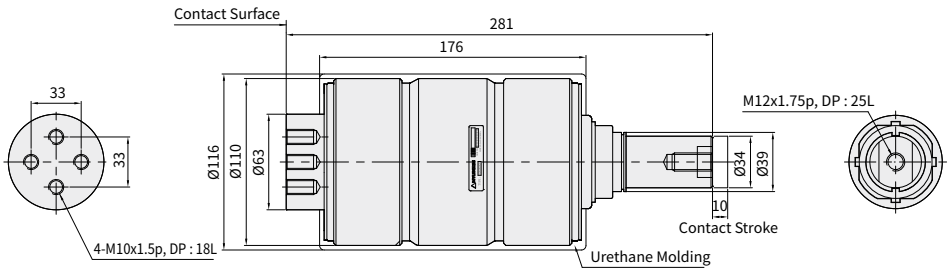
HCV-3D

Unit : mm



HCV-3E

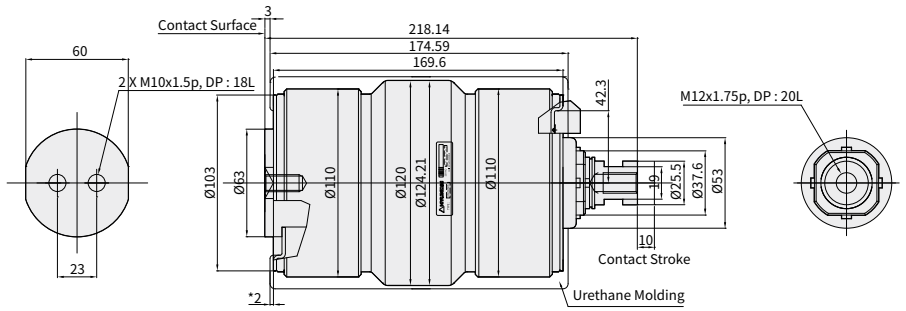
Unit : mm



※ Dimension on this page are subject to change without notice.

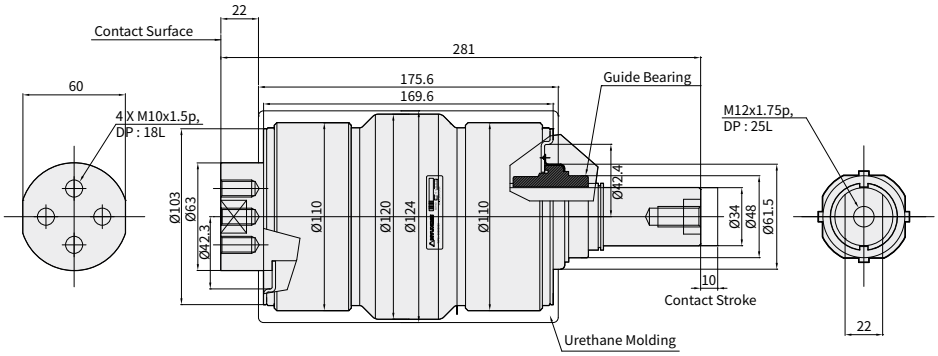
HCV-3F

Unit : mm



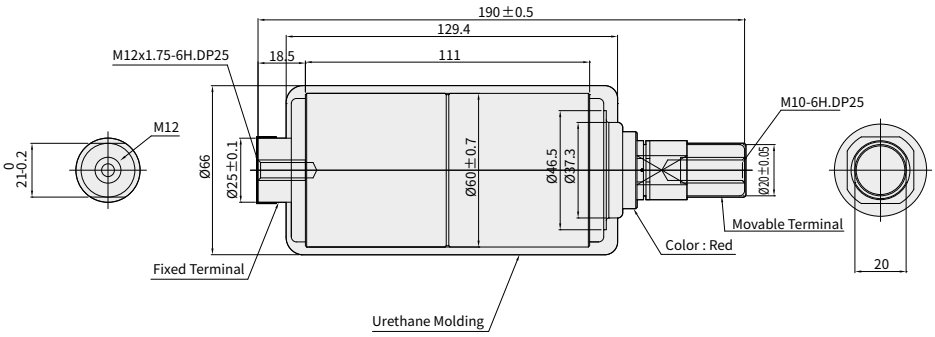
HCV-3G

Unit : mm



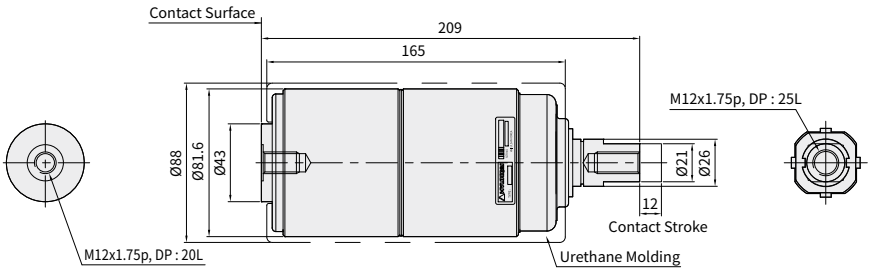
HCV-6A

Unit : mm



HCV-6B

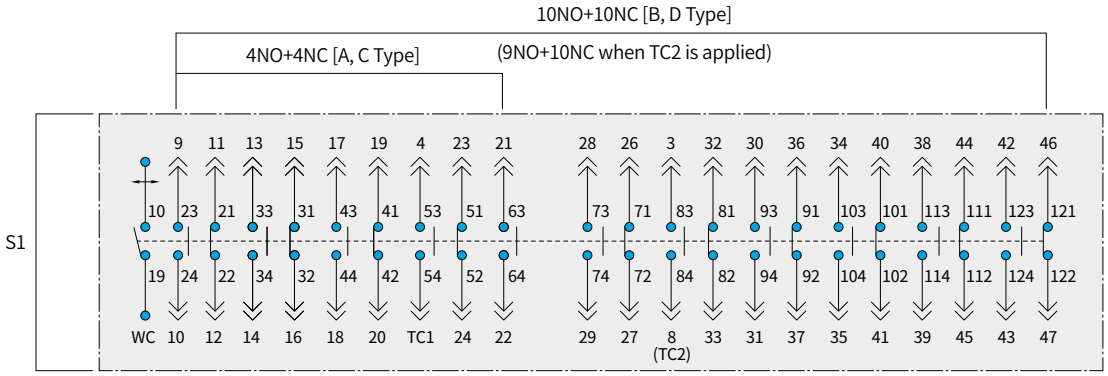
Unit : mm



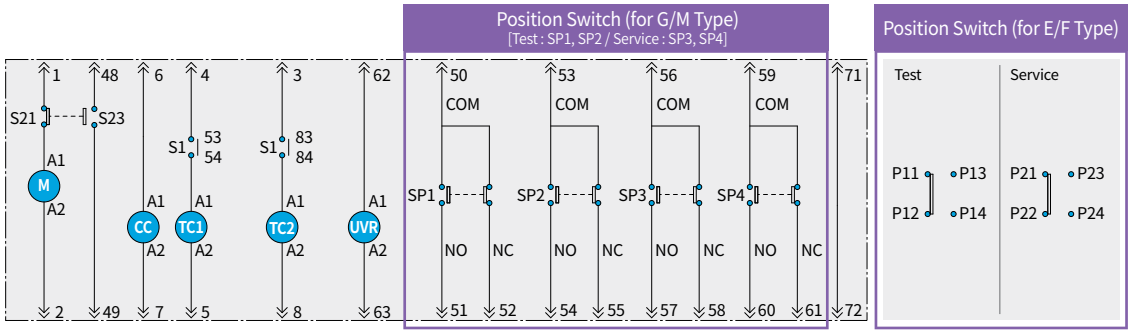
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Circuit Diagram

HGV

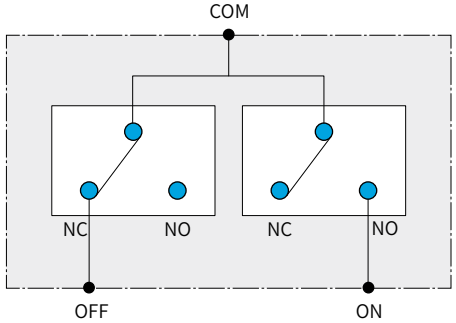


Auxiliary Switch

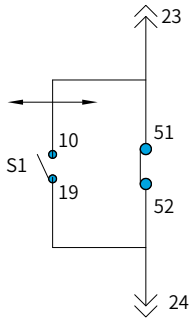


Legend			
M	Motor	S21	Motor Control Switch
CC	Closing Coil (Close)	S23	Spring Charged Limit Switch
TC1	Trip Coil (Open)	S1	Auxiliary Switch
TC2	Secondary Trip Coil	SP1 ~ 4	Position Switch (Test : 2C, Service : 2C)
UVR	Under Voltage Release		

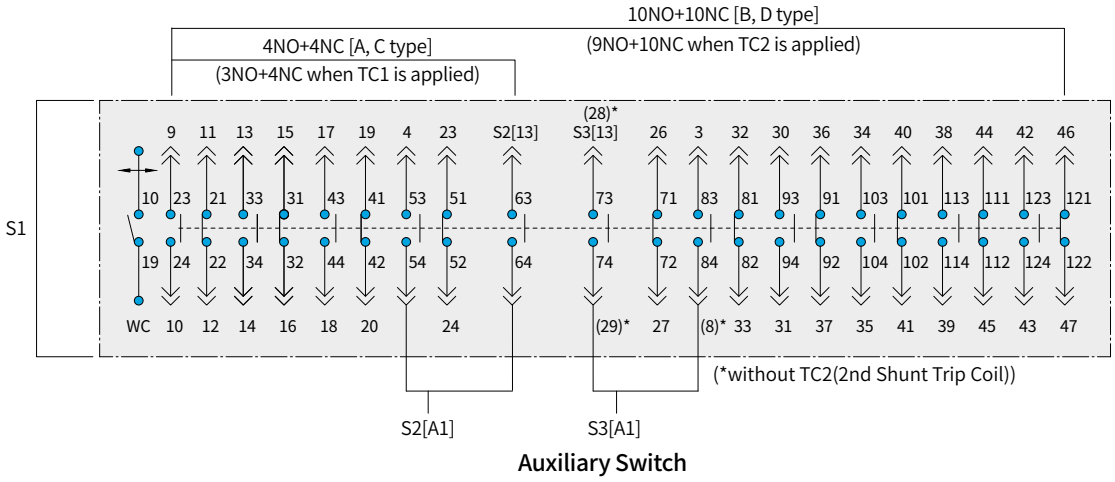
Earthing Switch Behavior Monitoring Contact Circuit Diagram

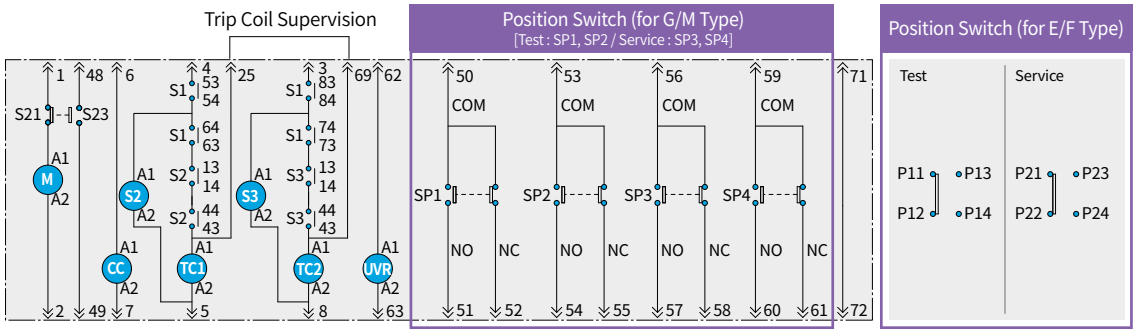


Early B Contact(WC) Circuit Diagram



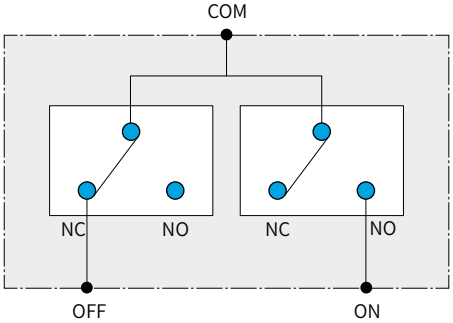
HGV (with Trip Supervision)



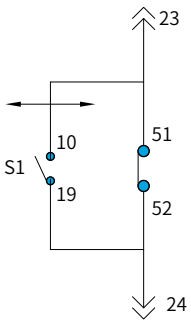


Legend			
M	Motor	S21	Motor Control Switch
CC	Closing Coil (Close)	S23	Spring Charged Limit Switch
TC1	Trip Coil (Open)	S1	Auxiliary Switch
TC2	Secondary Trip Coil	S2, S3	HGR Relay
UVR	Under Voltage Release	SP1 ~ 4	Position Switch (Test : 2C, Service : 2C)

Earthing Switch Behavior Monitoring Contact Circuit Diagram



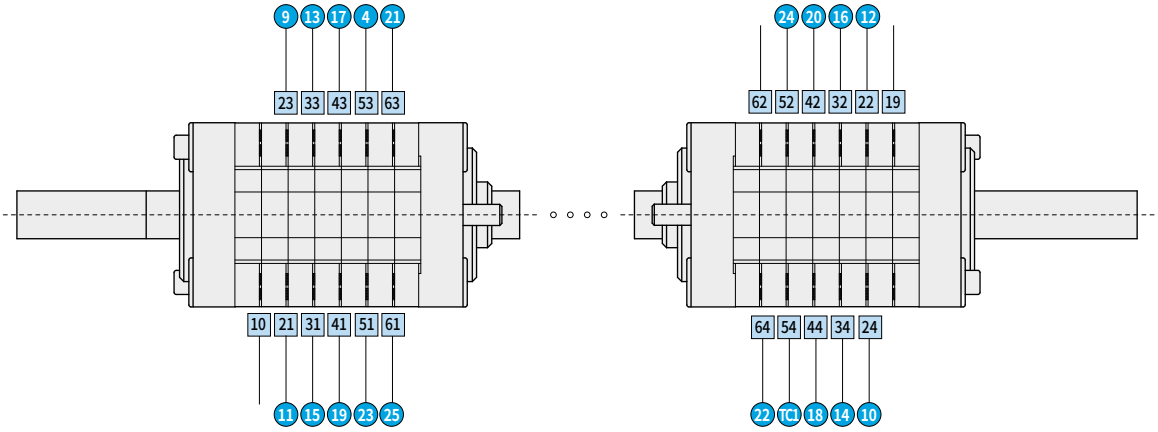
Early B Contact(WC) Circuit Diagram



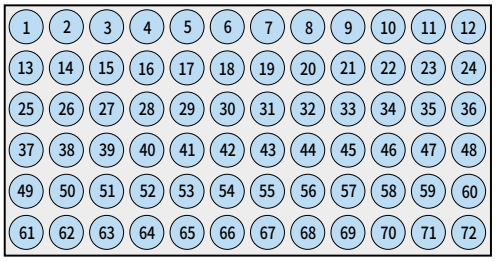
Circuit Diagram

HGV

Auxiliary Switch

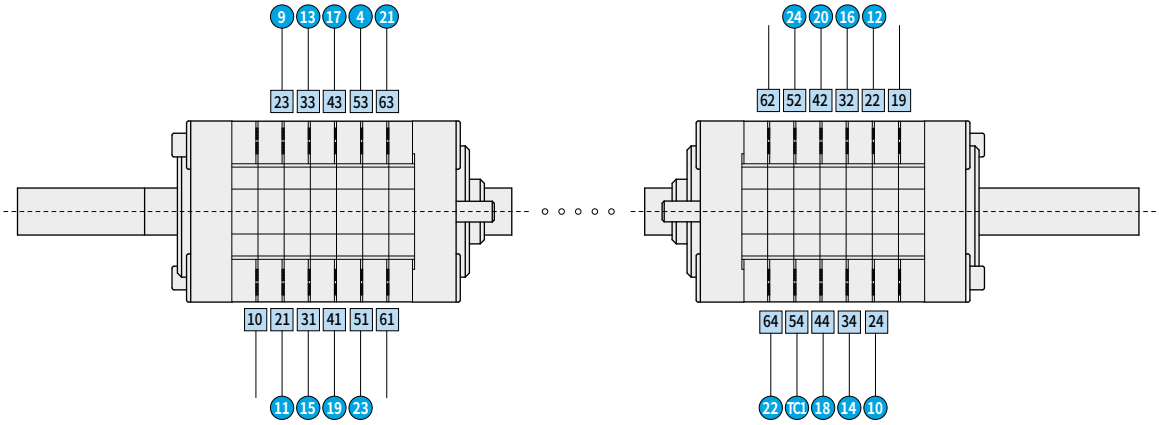


Terminal No.



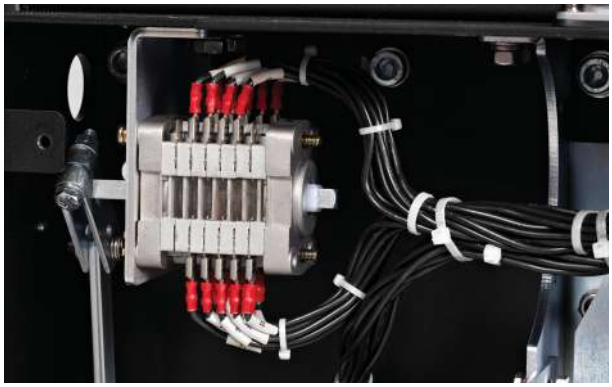
Control Jack Panel Side

Auxiliary Switch



Control Jack Terminal No.





Auxiliary Switch

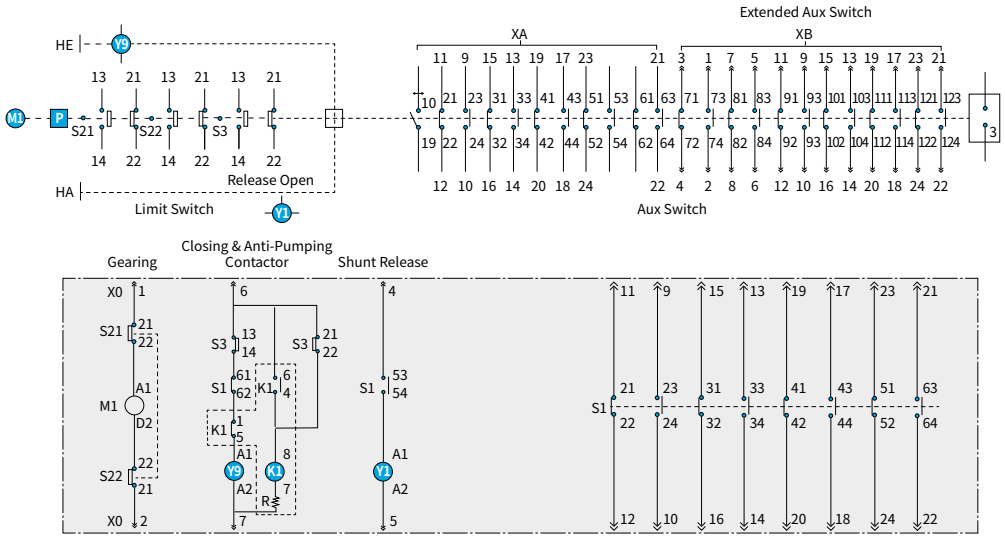


Control Jack Terminal

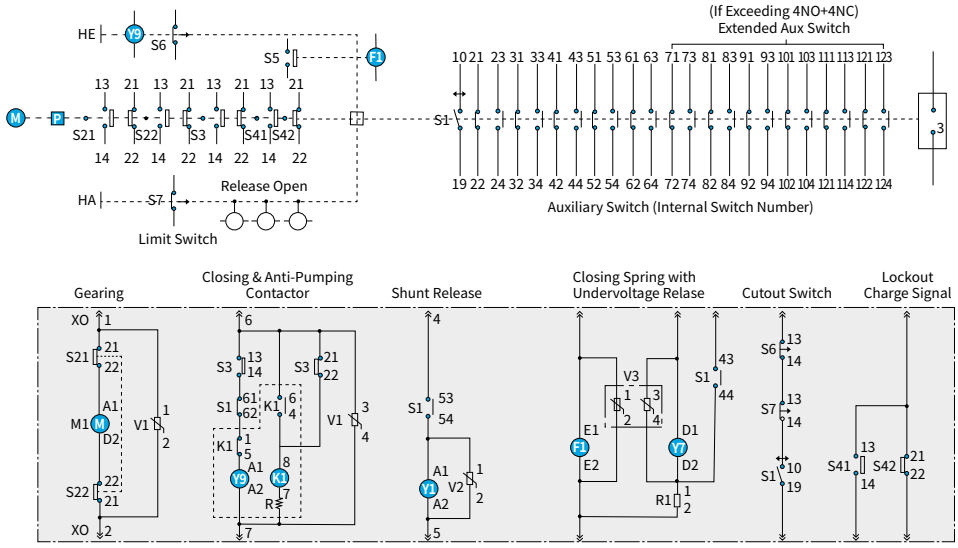
Circuit Diagram

HVF

Standard Circuit Diagram



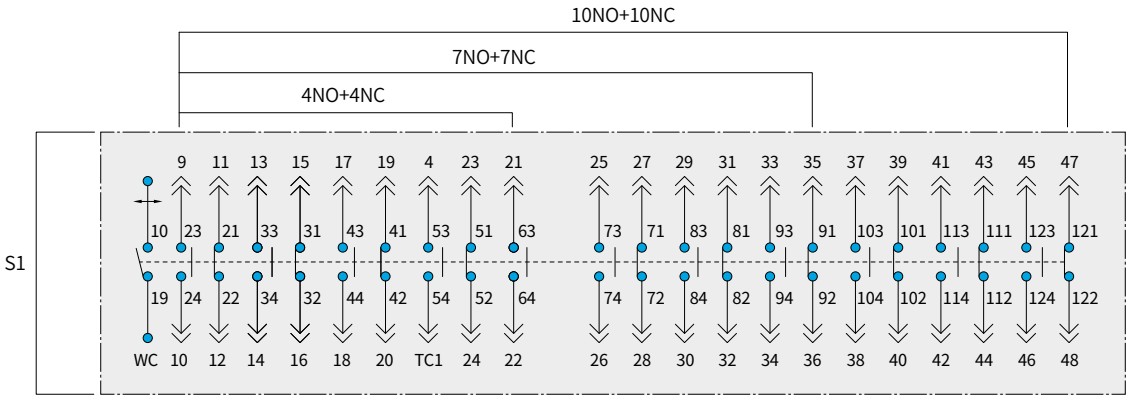
Varist and Attached Release Detached Circuit



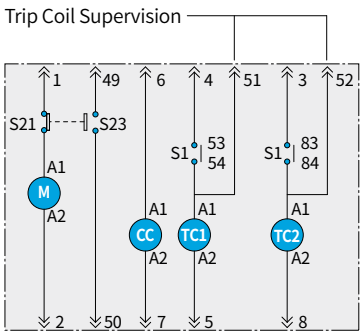
F1 : Lockout
HA : Manual Tripping
HE : Manual Closing
K1 : Anti-Pumping Relay
M1 : Motor
P : Stored Energy Mechanism
Y1 : Tripping Solenoid
Y7 : Under Voltage Release
Y9 : Closing Solenoid
R1 : Resistance
S1 : Aux Switch
S21, S22 : Limit Switch (Charge spring and then interrupt motor circuit)
S3 : Limit Switch (K1 Control)
S41, S42 : Limit Switch (Spring charging status signal)
S6, S7 : Cutout Switch
V1, V2, V3 : Varistor Module
X0 : Plug/Socket

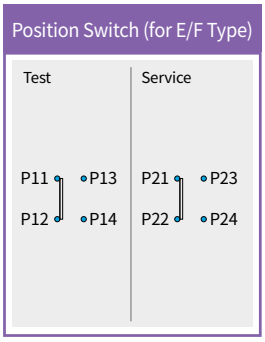
※ For request for B type jack, circuit diagram has the same draw-out number of additional aux contact circuit diagram of HVG VCB on page 115.
For request for draw-out type option, No. 3 and 8 are drawn-out by default. For request for fixed type option, No. 21 and 22 are drawn out by default.
For request for two or more options, refer to Vacuum Circuit Breakers (Technical Data) on our website.
No 10 and 19 of S1 is a wiping contact ; connecting it in parallel with 'b' contact enables early 'b' contact configuration. (Option : WC)
M1 (Charging Motor) can be used both for AC and DC.

Compact HGV



Auxiliary Switch



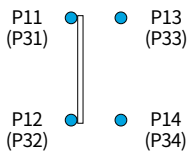


Legend			
M	Motor	S21	Motor Control Switch
CC	Closing Coil (Close)	S23	Spring Charged Limit Switch
TC1	Trip Coil (Open)	S1	Auxiliary Switch
TC2	Secondary Trip Coil		

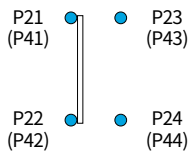
※ For request for 2nd Trip Coil(R□) / Spring Charged Signal(S1) / Trip Supervision(TS), 4NO+3NC, 7NO+6NC, 10NO+9NC is applied.
(S1,TS,R□ simultaneous apllication not allowed)
※ For request for R□, 23→3, 24→8 / S1, 23→49,24→50 / TS, 23→51,24→52(Applied to 2nd Trip Coil)

Position Switch Diagram

Test Position



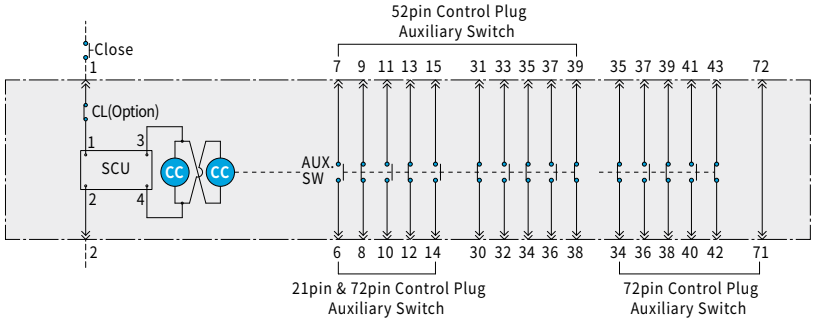
Service Position



※ When VCB is in the Test Position, P13,P14 are connected.
When VCB is In the Service Position, P23,P24 are connected.

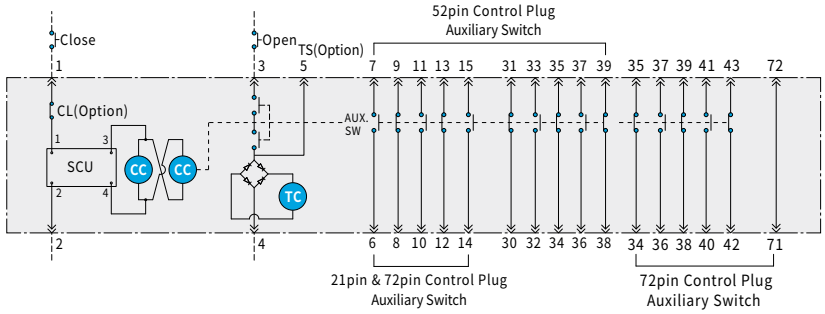
UVC Circuit Diagram

Continuous Excitation Type (3.6/7.2 kV)

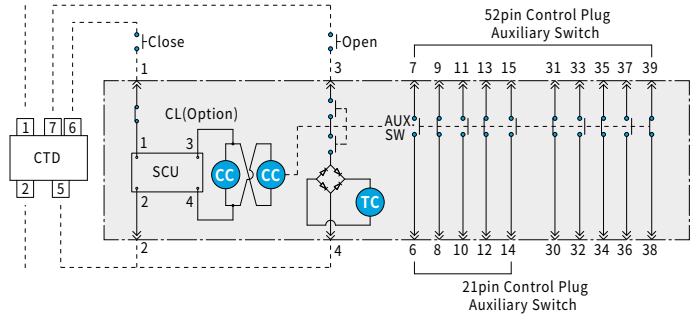


CL : Electrical Position Interlock (Attachment)
CC : Closing Coil
AUX, Switch : Aux Contact
TC : Trip Coil
CTD : Condenser Trip Device
SCU : Controller
TS : Trip Coil Supervision Contact

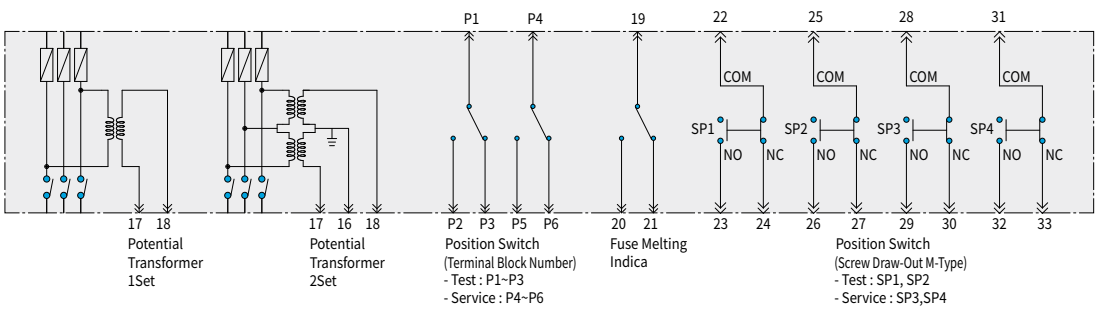
Instantaneous Excitation Type (3.6/7.2 kV)



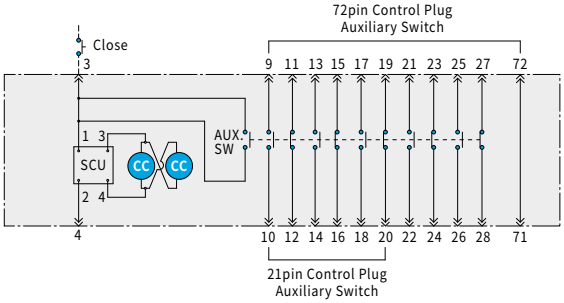
Instantaneous Excitation Type (CTD Attached) (3.6/7.2 kV)



Attachment (3.6/7.2 kV)

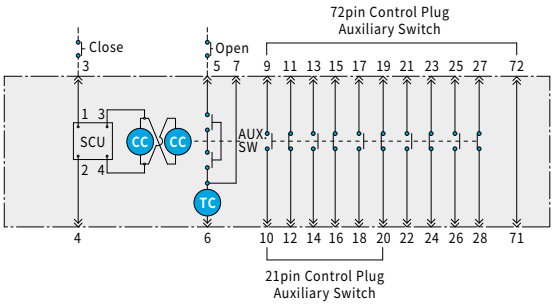


Continuous Excitation Type (12 kV)

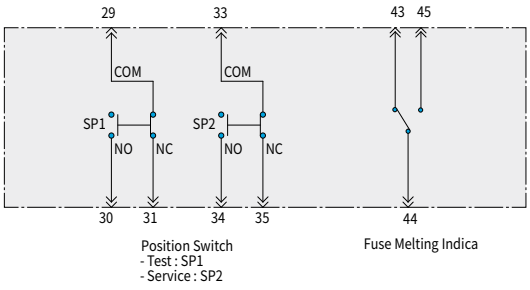


CL : Electrical Position Interlock (Attachment)
CC : Closing Coil
AUX, Switch : Aux Contact
TC : Trip Coil
CTD : Condenser Trip Device
SCU : Controller

Instantaneous Excitation Type (12 kV)



Instantaneous Excitation Type (CTD Attached) (12 kV)



Order Code

HGV Type (For Body + Cradle Order)

HGV	61	4	4	F	GS
Model	Rated Voltage	Rated Breaking	Rated Current	Inter-Phase Distance	Installation Method

Model	
HGV	HG Vacuum Circuit Breakers

Rated Voltage	
10	7.2 kV [13]
11	7.2kV
21	12 kV
31	17.5 kV
61	24/25.8 kV

Rated Breaking	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA
7	50 kA
9	8 kA

Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A
9	400 A

Inter-Phase Distance	
A	130 [14]
B	140 [14]
C	150
D	165
F	210
I	275

Installation Method	
XA	Fixed-Type
EA	Draw-Out (E-Type Body)
ES	Draw-Out (Shutter Unattached Cradle)
E3	Draw-Out (ES-Type 24 kV, Inter-Phase 300 mm, 630/1,250 A)
FA	Draw-Out (F-Type Body)
FS	Draw-Out (Insulating Shutter Attached Cradle)
F3	Draw-Out (FS-Type 24 kV, Inter-Phase 300 mm, 630/1,250 A)
GA	Draw-Out (GS-Type Body)
GS [15]	Draw-Out (Bushing and Metal Shutter Attached Cradle)
GE [1]	Draw-Out (GS-Type + Earthing Switch)
MS	Draw-Out (Cell Type Cradle)
ME [1]	Draw-Out (MS-Type + Earthing Switch)

HGV Type (For Separate Order for Cradle)

GVL	61	4	4	F	ME
Model	Rated Voltage	Rated Breaking	Rated Current	Inter-Phase Distance	Installation Method

Model	
GVL	HG Vacuum Circuit Breakers Cradle

Rated Voltage	
10	7.2 kV [13]
11	7.2kV
21	12 kV
31	17.5 kV
61	24/25.8 kV

Rated Breaking	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA
7	50 kA
9	8 kA

Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A
9	400 A

Inter-Phase Distance	
A	130 [14]
B	140 [14]
C	150
D	165
F	210
I	275

Installation Method	
ES, E3	Draw-Out
FS, F3	Draw-Out
GS	Draw-Out
GE [1]	Draw-Out
MS	Draw-Out
ME [1]	Draw-Out

※ 1) Earthing switch attaching type should contain attachment "EE" in its order code.
2) R□ and C2 cannot be applied simultaneously.
3) Only available with UVR.
4) Apply both close button and trip button.
5) Only MS and ME types can be applied.
6) Applicable only to GA, GS, GE, MS, and ME types.
7) □ : A (4NO + 4NC applied), B (10NO + 10NC applied)
8) □ : 2 (1NO + 1NC applied per position), 4 (2NO + 2NC applied per position)
9) Applicable only to GE and ME.
10) Lead cable is not provided. (See 56 page)
11) Order for breaker only should contain "EI".
12) Applicable to 12 kV products. (See 36 page rating and specifications)
□ : 1 (Inter-phase 150 mm), 2 (Inter-phase 210 mm, 25 kA),
3 (Inter-phase 275 mm), 4 (Inter-phase 210 mm, 31.5/40/50 kA)
13) Only Compact HGV 7.2kV 8/12.5kA can be applied.
14) Only Compact HGV can be applied.
15) Incase of Compact HGV, Insulation Shutter applied.

4	4	4	C	P2
Closing Operation (Motor) Voltage	Closing Control Voltage	Trip Control Voltage	Auxiliary Contacts and Control Circuit Connector	Attachments

1	DC 24 V
2	AC/DC 48 ~ 60 V
4	AC/DC 100 ~ 130 V
6	AC/DC 200 ~ 250 V

A [10]	Connector and Pin (4NO + 4NC)
B [10]	Connector and Pin (10NO + 10NC)
C	Lead Cable (4NO + 4NC)
D	Lead Cable (10NO + 10NC)
A [14]	4NO + 4NC & Fixed Control Jack
B [14]	7NO + 7NC & Fixed Control Jack
D [14]	10NO + 10NC & Fixed Control Jack
X [14]	Control Jack not Applied

EE [1]	Earthing Switch Monitoring Contacts (1NO + 1NC Provided)
U□ [2]	Under Voltage Release (□: Order Number of the Control Voltage)
R□ [2]	Second Trip Coil (□: Order Number of the Control Voltage)
KG	Electrical, Mechanical Key Lock
BC [4]	Button Cover (Padlock Available, Key not Supplied)
PA	Position Padlock (Key not Supplied)
DI [5]	Door Interlock
JI [6]	Jack Interlock
N□ [7]	Flame Retardant Cable
P□ [8]	Position Switch
TS	Trip Supervision (Monitoring Circuit)
KP	Position Padlock Kirk Key
KE [9]	Earthing Switch Lock Kirk Key
EI [6] [11]	Plate to Prevent Earthing Switch after Pulling
B□ [12]	Special-Purpose Breaker
ZZ	Special Features or Attachment

0	0	0	0	KL
Closing Operation (Motor) Voltage	Closing Control Voltage	Trip Control Voltage	Auxiliary Contacts and Line	Attachments

0	None

0	None

KE	Earthing Switch Lock Kirk Key
EE [1]	Earthing Switch Monitoring Contacts (1NO + 1NC)
DM [5]	Door Interlock
ZZ	Special Features or Accessories

Order Code

HVF Type (For Body + Cradle Order)

HVF	11	4	1	C	ES
Model	Rated Voltage	Rated Breaking	Rated Current	Inter-Phase Distance [1]	Installation Method

Model	
HVF	Vacuum Circuit Breakers

Rated Voltage	
11	7.2 kV
21	12 kV
31	17.5 kV
61	24/25.8 kV
70	36/38 kV
71	36 kV

Rated Breaking	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA
7	50 kA

Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A

Inter-Phase Distance [1]	
A	130
B	140
C	150
D	165
E	178
F	210
G	250
H	254
I	275
J	300
K	350

Installation Method	
XA	Fixed-Type
EA	Draw-Out (E-Type Body)
ES	Draw-Out (Shutter Unattached Cradle)
FA	Draw-Out (F-Type Body)
FS	Draw-Out (Shutter Attached Cradle)
IA	Draw-Out (IG-Type Body)
IG	Draw-Out (Bushing and Insulation Shutter Attached Cradle)
IE [2]	Draw-Out (IG-Type + Earthing Switch)
GA	Draw-Out (GS-Type Body)
GS	Draw-Out (Bushing and Metal Shutter Attached Cradle)
GE [2]	Draw-Out (GS-Type + Earthing Switch)
CS	Draw-Out (G-Level VCB for HVF 7.2/12 kV Vessel)
E3	Draw-Out (24 kV Shutter Unattached, Phase-to-Phase Distance 300 mm Cradle 630/1,250 A)
F3	Draw-Out (24 kV Shutter Attached, Phase-to-Phase Distance 300 mm Cradle 630/1,250 A)
SA	Draw-Out (Screw Operation Type Body)
SF	Draw-Out (Screw Operation Type, FS-Type VCB)
KD	Draw-Out (630/1,250 A for E-Type 24 kV for Cradle Depth 850 mm)
MS	Draw-Out (ANSI 38 kV Draw-Out Type VCB and G-Type Cradle)
WA	Draw-Out (ANSI 4.76 kV Draw-Out Type VCB)
MA	Draw-Out (HEES Standard Switchgear Models)
GK	Draw-Out (KEPCO Hydro and Thermal Models)

HVF Type (With Separate Cradle Order)

DVF	11	4	1	C	ES
Model	Rated Voltage	Rated Breaking	Rated Current	Inter-Phase Distance [1]	Installation Method

Model	
DVF	Vacuum Circuit Breakers Cradle

Rated Voltage	
11	7.2 kV
21	12 kV
31	17.5 kV
61	24/25.8 kV
70	38 kV
71	36 kV

Rated Breaking	
1	12.5 kA
4	25 kA
5	31.5 kA
6	40 kA
7	50 kA

Rated Current	
1	630 A
2	1,250 A
4	2,000 A
6	2,500 A
7	3,150 A
8	4,000 A

Inter-Phase Distance [1]	
A	130
B	140
C	150
D	165
E	178
F	210
G	250
H	254
I	275
J	300
K	350

Installation Method	
ES	Draw-Out
FS	Draw-Out
GS	Draw-Out
MS	Draw-Out
GK	Draw-Out
IG	Draw-Out
GE	Draw-Out
SF	Draw-Out
IG	Draw-Out
E3	Draw-Out
F3	Draw-Out

※ 1) Body phase-to-phase distance.
Refer to 34 ~ 38 pages for selecting phase-to-phase distance.
2) Earthing Switch attaching type must have attachment EE
(Earthing Switch operation marking point) in its order code.

4	4	4	A	P2
Closing Operation (Motor) Voltage	Closing Control Voltage	Trip Control Voltage	Auxiliary Contacts and Line	Attachments

	Closing Operation (Motor) Voltage
2	DC 48 V
4	DC 110 V
5	DC 125 V
6	DC 220 V
7	AC 110 V
9	AC 220 V
L	DC 250 V
A	DC 24 V (Special)
B	DC 48 V (Special)
D	DC 110 V (Special)
E	DC 125 V (Special)
F	DC 220 V (Special)
G	AC 110 V (Special)
I	AC 220 V (Special)

	Auxiliary Contacts and Line
A	Standard Contacts and Fixed Control Jack
B	7NO + 7NC & Fixed Control Jack
C	4NO + 4NC & Draw-Out Control Jack
D	10NO + 10NC & Draw-Out Control Jack
X	Control Jack Unattached
W	When Applied Auto Jack

	Attachments
P2	Position Switch (GS Type can order P2 and P4)
U□	Under Voltage Release (□ : Order Number of the Control Voltage)
R□	Second Shunt Release (□ : Order Number of the Control Voltage)
L□	Lockout Relay (□ : Order Number of the Control Voltage)
V□	Varistor Module (□ : Number of Varistor)
PO	CAM for Position Switch
KL	Position Padlock Key
EL	Electrical Local Closing
CO	Cut-Out Switch
S1	Spring Charged Signal (S41)
C1	C.T Operated Release 0.5 A
C2	C.T Operated Release 1.0 A
EE	Earthing Switch Operation Marking Contacts
NA	Flame Retardant Cable (for 4NO + 4NC)
NB	Flame Retardant Cable (for 7NO + 7NC, 10NO + 10NC)
TC	Trip Monitoring Circuit
S2	Line System Applied Breaker
WC	Wiping Contact Auxiliary Contact
ZZ	Special Features or Attachment
BB	Button Padlock (Close & Open)
BC	Button Padlock (Close)
BO	Button Padlock (Open)
LC	Electro Locking Device

0	0	0	0	P2
Closing Operation (Motor) Voltage	Closing Control Voltage	Trip Control Voltage	Auxiliary Contacts and Line	Attachments

	Closing Operation (Motor) Voltage
0	None

	Auxiliary Contacts and Line
0	None

	Attachments
P2	Position Switch (GS Type can order P2 and P4)
KL	Position Padlock Key
ZZ	Special Features or Attachment
EE	Earthing Switch (2 Position) Operation Marking Contacts
LC	Electro Locking Device (See H-21)

Order Code

UVC Type (For Body + Cradle Order)

UVC	6	4	C	D1			F1		
Model	Rated Voltage	Rated Current	Operation Method	Connection Method		Fuse	Division		Cradle
UVC	Vacuum Contactor								
	3	3.6 kV							
	6	7.2 kV							
		2	200 A						
		4	400 A						
			C	Continuous-Type					
			L	Latch-Type					
				X1	Fixed-Type	Fuse Unattached 21 Pin Control Plug (Front Draw-Out)			
				A1	Fixed-Type	Din Fuse Attached 21 Pin Control Plug (Front Draw-Out)			
				A2	Fixed-Type	KS Fuse Attached 21 Pin Control Plug (Front Draw-Out)			
				A3	Fixed-Type	KS Fuse Attached 300 A, 400 A for 7.2 kV Motor 21 Pin Control Plug (Front Draw-Out)			
				B1	Draw-Out	Fuse Unattached 21 Pin Control Plug (Front Draw-Out)			
				B2	Draw-Out	Fuse Unattached 52 Pin Control Plug (Top Draw-Out)			
				D1	Draw-Out	DIN Fuse Attached 21 Pin Control Plug (Front Draw-Out)			
				D2	Draw-Out	DIN Fuse Attached 52 Pin Control Plug (Top Draw-Out)			
				D3	Draw-Out	KS Fuse Attached 21 Pin Control Plug (Front Draw-Out)			
				D4	Draw-Out	KS Fuse Attached 300 A, 400 A for 7.2 kV Motor 21 Pin Control Plug (Front Draw-Out)			
				D5	Draw-Out	KS Fuse Attached 52 Pin Control Plug (Top Draw-Out)			
				D6	Draw-Out	KS Fuse Attached 300 A, 400 A for 7.2 kV Motor 52 Pin Control Plug (Top Draw-Out)			
				H1	Draw-Out	DIN Double Fuse Attached 21 Pin Control Plug (Front Draw-Out)			
				S1	Screw Draw-Out	DIN Fuse Attached 72 Pin Control Plug (Top Draw-Out)			
				S4	Screw Draw-Out	DIN Double Fuse Attached 72 Pin Control Plug (Top Draw-Out)			
				S5	Screw Draw-Out	DIN Fuse Unattached 72 Pin Control Plug (Top Draw-Out)			
							00	Fixed-Type	-
							E0	E-Class (Shutter Unattached)	Not Used (Body Only)
							E1		Used
							F0	F-Class (Shutter Attached)	Not Used (Body Only)
							F1		Used
							M0	M-Class (Metal Shutter attached & Bushing)	Not Used (Body Only)
							M1		Used

6000

Fuse Specifications

0000	Fuse Holder Unattached		
200A	Fuse Holder Only Attached	For LS Company KS/G-Type Fuse	3.6 kV 50 A or below
200B			3.6 kV 75 ~ 200 A
200C			3.6 kV 300 A, 400 A
300B		For LS Company KS/M-Type Fuse	3.6 kV 100 A or below
300C			3.6 kV 150 ~ 200 A
300D			3.6 kV 300 A, 400 A
400A		For LS company KS/G-Type Fuse	7.2 kV 60 A or below
400B			7.2 kV 75 ~ 100 A
400C			7.2 kV 150 ~ 200 A
500B		For LS company KS/M-Type Fuse	7.2 kV 50 A or below
500C			7.2 kV 100 ~ 200 A
500D			7.2 kV 300 A, 400 A
6000		DIN-Type	Length 192 mm, SIBA Company or LS Company
600A			Length 292 mm, SIBA Company 315 A, 355 A
600B		DIN-Type Double	Length 192mm
□□□□ 4 Digits Excluding UVCS from Spare Part Fuse Order Code	Fuse Attached	6□□□	SIBA Company Fuse (7.2 kV)
		7□□□	SIBA Company Fuse (12 kV)
		2□□□	LS Company KS/G-Type Fuse
		3□□□	LS Company KS/M-Type Fuse
		4□□□	LS Company KS/G-Type Fuse
		5□□□	LS Company KS/M-Type Fuse
		8□□□	LS Company DIN-Type Fuse
		9□□□	LS Company DIN-Type Fuse

L

Operating Voltage

L	AC/DC 100 ~ 125 V
H	AC/DC 200 ~ 230 V

CM

Attachments

CL	Electrical Position Interlock	
CM	Fuse Melting Indicator	DIN Standard
CD	Fuse Melting Indicator	KS Standard
CP	Position Detecting Switch	
P4	Position Detecting Indicator	Screw Draw-Out M Type
T1	1 Potential Transformer	3.3 kV/110 V
T2	1 Potential Transformer	3.3 kV/220 V
T3	1 Potential Transformer	6.6 kV/110 V
T5	1 Potential Transformer	6.6 kV/220 V
T4	2 Potential Transformer	3.3 kV/110 V
T7	2 Potential Transformer	3.3 kV/220 V
T6	2 Potential Transformer	6.6 kV/110 V
T8	2 Potential Transformer	6.6 kV/220 V
T5	Trip Coil Supervision Contact	Screw Draw-Out M Type

Order Code

UVC Type 12kV (For Body + Cradle Order)

UVC	8	4	C	S1			M1		
Model	Rated Voltage	Rated Current	Operation Method	Connection Method		FUSE	Division		Cradle
UVC	Vacuum contactor	8	12kV	C	Continuous-Type	X1	Fixed-Type	Fuse Unattached 21pin Control Plug (Front Draw-Out)	00	Fixed-Type	-
		2	200A	L	Latch-Type	S1	Screw Draw-Out	DIN Fuse Attached 72pin Control Plug (Top Draw-Out)	M0	M-Class (Metal Shutter attached & Bushing)	Not Used (Body Only)
		4	400A			S5	Screw Draw-Out	DIN Fuse Unattached 72pin Control Plug (Top Draw-Out)	M1		Used

7000

FUSE Specifications

0000	Fuse Holder Unattached		
6000	Fuse Holder Only Attached	DIN-Type	Length 192mm
7000			Length 292mm
700A			Length 442mm
6□□□	Fuse Attached		SIBA Company Fuse (7.2kV)
7□□□			SIBA Company Fuse (12kV)

L

Operating Voltage

L	AC/DC 100 ~ 125V
H	AC/DC 200 ~ 230V

DM

Accessories

DM	Fuse Melting Indicator
DP	Position Detecting Indicator

Order Code

VI Order Code

HCV		6B	
Model		Rating	
VI	Vacuum Interrupters	3B	7.2/12/17.5 kV 25 kA 630/1,250/2,000 A
		3D	7.2/12/17.5 kV 31.5/40 kA 1,250/2,000 A
		3E	7.2/12/17.5 kV 31.5/40 kA 2,500/3,150/4,000 A
		3F	7.2/12/17.5 kV 50 kA 1,250/2,000 A
		3G	7.2/12/17.5 kV 50 kA 2,500/3,150/4,000 A
		6A	24/25.8 kV 12.5 kA 630 A
		6B	24/25.8 kV 12.5/25 kA 630/1,250/2,000 A

Operating Environment

Standard Operating Environment

Defining values below have been set in accordance with IEC 62271-100 (IEC 62271-1).

| Ambient Temperature | - 5 ~ + 40 °C
(Average day temperature below 35 °C)
| Operating Altitude | Less than 1,000 m above sea level
| Relative Humidity | Less than 95 % (Daily average less than 95 %)

The environment may affect insulation performance and the durability of the vacuum circuit breaker thus, make sure to check the operation environmental conditions before application.



For operation in a high temperature exceeding 40 °C, follow the derating in accordance with the ambient temperature in the catalog.



Operation in a humid place with frequent heavy rain may deteriorate dielectric strength and electrical performance.



For saving and using in a dusty and humid place, it is recommended to use anti-dust cover and moisture preventer. Excessive shock and vibration can cause damage to the operating mechanism.



For a long-term ON or OFF, it is recommended to regularly open/close load current to maintain the interrupting performance.



When there is much corrosive gas, it should be kept in a closed protective structure to minimize damage due to corrosion.



In high altitude mountains, the dielectric strength is degraded, thus check the insulation performance correction factor and apply higher rated products.

Special Operation Environments

HG-Series vacuum circuit breakers are designed/manufactured to operate at a standard operating environment specified in the IEC standard. In order to operate the breaker in a special environment as follows, contact us.

- In case altitude and ambient temperature does not fall in the standard operating environment
- Places with much sea breeze or salt
- Places with heavy snow
- Places with frequent shock and vibration
- In case relative humidity does not fall in the standard operating environment
- In case humidity is high and rainfall is frequent
- Places with much dust, vapor, corrosive and flammable gases and wet steam
- Other special environment that does not fall in the standard environment category

Operating Environment

Compensation of Insulation Performance where Altitude above Sea Level Exceeds 1,000 m

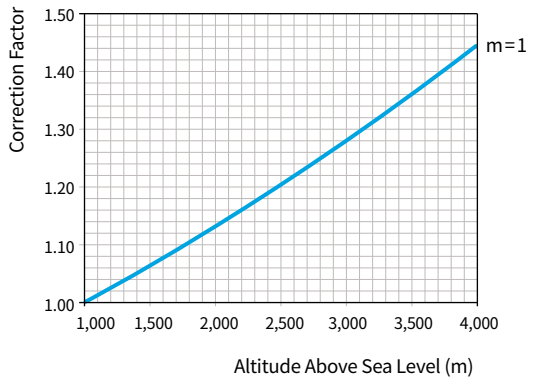
Since the higher the elevation the more insulation performance degradation, refer to below correction factor to select the product to operate.

※ Product Selection ≥ Commercial Frequency Withstand Voltage and Brain Shock Withstand Voltage × Correction Factor

For example, to select a product to operate in a place where rated voltage is 7.2 kV and sea level altitude is 2,000 m,

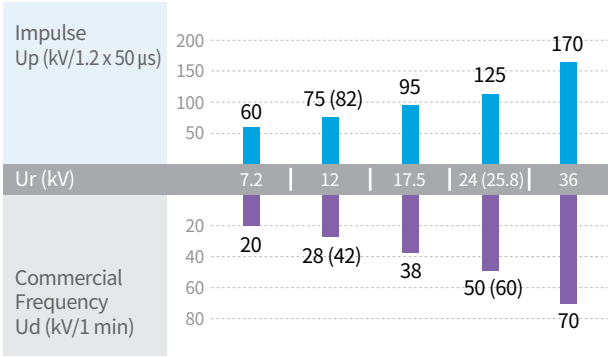
- Correction factor for 2,000 m is 1.13
- Withstand voltage required for rated voltage :
  Commercial frequency withstand voltage = 20 kV/min, Brain shock withstand voltage = 60 kV
- Standard of required withstand voltage :
  Commercial frequency withstand voltage = 20 × 1.13 = 22.6 kV/min,
  Brain shock withstand voltage = 60 × 1.13 = 67.8 kV.
  Thus make sure to select product with rated voltage of 12 kV that meets the required insulation performance.

1,000 m
When Altitude Above Sea Level



Item	Description				
Applied Altitude	1,000 m	1,500 m	2,000 m	2,500 m	3,000 m
Correction Factor	1.0	1.06	1.13	1.2	1.28

Standard of Withstand Voltage per Rated Voltage Specified in IEC 62271-1



Correcting Rated Current According to Ambient Temperature

If ambient temperature exceeds the temperature of the standard operating environment, use below formula to correct operating current value and apply to operation.

40 °C
When Ambient Temperature

$$I_s = I_r \sqrt{\left\{ \frac{\theta_{max} - \theta_\alpha}{\theta_\gamma} \right\}}$$

I_s : Corrected rated continuous conducting current (A)
I_r : Rated continuous conducting current in a normal state (- 5 ~ + 40 °C) (A)
θ_{max} : All temperature in the highest permissible temperature area (°C)
θ_α : Actual ambient temperature (if less than - 5 °C or higher than + 40 °C)
θ_γ : Highest permissible temp in the highest temperature area during rated current (°C)

E.g.) If ambient temperature is 50 °C, corrected continued conducting current of breaker of 2,000 A rated current : $2{,}000 \times \sqrt{\frac{105 - 50}{65}} = 1{,}840$ A

Table for Rated Current based on Ambient Temperature

Rated Current (A)	Ambient Temp (°C)				
	-5 ~ 40	45	50	55	60
4,000	4,000	3,843	3,679	3,508	3,328
3,150	3,150	3,026	2,898	2,763	2,621
2,500	2,500	2,402	2,300	2,193	2,080
2,000	2,000	1,922	1,840	1,754	1,664
1,250	1,250	1,201	1,150	1,096	1,040
630	630	605	580	553	524

Maintenance Inspection List

Breaker Anomaly and Action Plan

Symptom	Cause	Action Plan
Closing Spring is not Charged	Electrical spring is not charged ・Control cable is missing or short ・Motor/limit switch is faulty	・Check if control cable is missing ・Replace motor/limit switch
	Manual spring is not charged	・Check operating mechanism unit status
Breaker is not Closing	Electrical closing or manual closing is not available ・Control cable is missing or short ・Motor charging failure ・Interlock operation failure ・Voltage application status failure ・During UVR or secondary trip coil operation	・Check if control cable is missing ・Check motor connection status ・Check interlock operation status ・Check voltage status (Minimum Voltage : Rated×85 %) ・Check UVR or secondary trip coil control voltage status
	Tripped after half-closing status or right after closing	Check operating status of operating
Breaker is not Tripped	Electrical trip and manual trip is not available ・Control cable is missing or short ・Bad auxiliary switch ・Voltage application status failure	・Check if control cable is missing ・Replace auxiliary switch ・Check voltage status (Minimum Voltage : Rated×70 %)
Breaker does not Push/ Draw	Pushing/drawing handle insertion failure	・Check pushing/drawing handle insertion status ・Check assembly status of shutter mechanism and shutter mechanism unit ・Check interlock operation status
	Interference occurs to shutter and interruption period	
	Interlock malfunction	
	Pushing/drawing device interlock failure	
Breaker Position Switch is not Working	Control cable is missing or short	・Check if control cable is missing ・Replace position switch
	Position switch failure	

Periodic Inspection List

Inspection Item	Items to Check	Inspection Intervals
Basics	1. Wipe off dirt or moisture on the insulator/insulator surface with a dry cloth	Twice a year
	2. Check external damage	
	3. Check the status of bolt and nut tightness in and out of operation mechanism unit	
	4. Check any damage to snap-retainer and C-ring	
	5. Check connection status between the terminal and the conductor (Modified by corrosion and temperature)	
Operation Test	1. Check electrical/mechanical operation of operation mechanism unit (At least 10 continued operation)	Every 2,000 operation, or interrupting each short-circuit 10 times
	2. Check if ON/OFF indicator or behavior count indicator is working properly	
Insulation Resistance	Measure insulation resistance between phases and between counter grounds at 1,000 V Megger (For measurement 500 MΩ or below, analysis is required)	Twice a year
Withstand Voltage Test	Conduct commercial frequency withstand voltage in compliance with regulated application value	Twice a year
Apply Grease	1. Apply grease to each rotating and rubbing areas (Grease Specification : CHEMAX HHI 5000 # 1)	Every two years or every 2,000 operation
	2. Wipe the terminal conductor with a dry cloth and apply very small amount of conductive grease (Grease Specifications : FLOIL G-5002)	
Vacuum Interrupters (VI)	1. Check status of contacts wear with naked eyes (Replacement is required when white mark of VI stem is confirmed to be 1/2 or less with breaker closing)	Every two years or every 2,000 operation
	2. Check vacuum degree using vacuum checker with breaker tripped	

Current Status of Acquired Standards

Approvals & Certificates

Hi-Series VCB (Vacuum Circuit Breaker)

Type of Certification	Approvals	Certificate		
Type of Standard	KS	KAS Certified V Checkmark	IEC	GB
Mark				
Testing Institute	KS	Korea Electrical Safety Corporation KAS-P-008	KERI	GB 1984
Certification Country	Korea	Korea	Korea	China
HAF1072-3				●
HAF1074-3				●
HAF1077-3				●
HVG1011	●	●	●	
HVG1031			●	
HVG1041			●	
HVG1099	●	●	●	
HVG1131		●	●	
HVG1132		●	●	
HVG1141		●	●	
HVG1142		●	●	
HVF1141		●	●	
HVF1142		●	●	
HVF1151		●	●	
HVF1152		●	●	
HVF1154		●	●	
HVF1162		●	●	
HVF1164		●	●	
HVF1166		●	●	
HVF1167		●	●	
HVF1168		●	●	
HVF1172		●	●	
HVF1174		●	●	
HVF1176		●	●	
HVF1177		●	●	
HVF1178		●	●	
HVF1378				●
HVF1442			●	
HVF1444			●	
HVF1462			●	
HVF1464			●	
HVF1542			●	
HVF1544			●	
HVF2141		●	●	
HVF2142		●	●	
HVF2151		●	●	
HVF2152		●	●	
HVF2154		●	●	
HVF2161			●	
HVF2162		●	●	
HVF2164		●	●	
HVF2166		●	●	
HVF2167		●	●	

Type of Certification	Approvals	Certificate		
Type of Standard	KS	KAS Certified V Checkmark	IEC	GB
Mark				
Testing Institute	KS	Korea Electrical Safety Corporation KAS-P-008	KERI	GB 1984
Certification Country	Korea	Korea	Korea	China
HVF2168		●	●	
HVF2172		●	●	
HVF2174		●	●	
HVF2176		●	●	
HVF2177		●	●	
HVF2178		●	●	
HVF3141		●	●	
HVF3142		●	●	
HVF3151		●	●	
HVF3152		●	●	
HVF3154		●	●	
HVF3161			●	
HVF3162		●	●	
HVF3164		●	●	
HVF3166		●	●	
HVF3167		●	●	
HVF3362				●
HVF3364			●	●
HVF3442			●	
HVF3444			●	
HVF3462			●	
HVF3464			●	
HVF3467			●	
HVF3542			●	
HVF3544			●	
HVF6111		●	●	
HVF6112		●	●	
HVF6114			●	
HVF6141		●	●	
HVF6142		●	●	
HVF6144		●	●	
HVF6146		●	●	
HVF6147		●	●	
HVF6162			●	
HVF6164			●	
HVF6166			●	
HVF6167			●	
HVF7052		●	●	●
HVF7056		●	●	
HVF7057		●	●	
HVF7062				●
HVF7142		●	●	
HVF7144		●	●	

Current Status of Acquired Standards

Approvals & Certificates

Hi-Series VCS (High-Pressure Vacuum Contactor)

Type of Certification	Approvals	Certificate	
Type of Standard	UL	IEC	ANSI
Mark			
Testing Institute	UL	KERI	KERI
Certification Country	USA	Korea	Korea
HCA34CD	●		
HCA62CD		●	
HCA62LD		●	
HCA64CD	●	●	●
HCA64LD		●	●

U-Series VCS (High-Pressure Vacuum Contactor)

Type of Certification	Approvals	Certificate	
Type of Standard	UL	KAS Certified V Checkmark	IEC
Mark			
Testing Institute	UL	Korea Electrical Safety Corporation KAS-P-008	KERI
Certification Country	USA	Korea	Korea
UVC32C	●	●	
UVC32L	●	●	
UVC34C	●		
UVC34L	●		
UVC62C	●	●	●
UVC62L	●	●	●
UVC64C	●		●
UVC64L	●		●

Approvals & Marine Certificates

Hi-Series VCB (Vacuum Circuit Breaker)

Type of Certification	Vessel		
Type of Standard	Korean Register	Bureau Veritas	Germanischer Lloyd
Mark	KR KOREAN REGISTER	BUREAU VERITAS	GL OPERATING 24/7
Testing Institute	KR	BV	GL
Certification Country	Korea	France	Germany
HVF1164		●	
HVF1166		●	
HVF1167		●	
HVF1168		●	
HVF1172		●	
HVF1174		●	
HVF1176		●	
HVF1177		●	
HVF1178		●	
HVF2041	●		●
HVF2042	●	●	●
HVF2164		●	
HVF2166		●	
HVF2167		●	
HVF2168		●	
HVF2172		●	
HVF2174		●	
HVF2176		●	
HVF2177		●	
HVF2178		●	
HGV1142C	●	●	●
HGV2142C	●	●	●

Hi-Series VCS (High-Pressure Vacuum Contactor)

Type of Certification	Vessel		
Type of Standard	Korean Register	Bureau Veritas	Germanischer Lloyd
Mark	KR KOREAN REGISTER	BUREAU VERITAS	GL OPERATING 24/7
Testing Institute	KR	BV	GL
Certification Country	Korea	France	Germany
HCA32C	●	●	
HCA34C	●	●	
HCA62C	●	●	
HCA64CD	●	●	●
HCA64LD		●	●
UVC64			●

HG
Air Circuit Breakers

Model Selection Table		2
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ACB

Model Selection Table

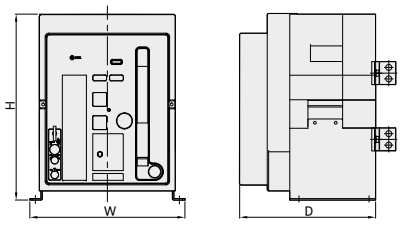
Air Circuit Breakers (HGN/HGS)

Model Name				HGN				HGS	
Item				**A Frame**	**B Frame**	**C Frame**	**D Frame**	**A Frame**	**B Frame**
Rated Current [In max]	Based on 40 ℃		A	06 : 630	06 : 630	32 : 3,200	40 : 4,000	06 : 630	20 : 2,000
				08 : 800	08 : 800	40 : 4,000	50 : 5,000	08 : 800	25 : 2,500
				10 : 1,000	10 : 1,000	50 : 5,000	63 : 6,300	10 : 1,000	32 : 3,200
				12 : 1,250	12 : 1,250			12 : 1,250	
				16 : 1,600	16 : 1,600			16 : 1,600	
				20 : 2,000	20 : 2,000				
					25 : 2,500				
					32 : 3,200				
					40 : 4,000				
Rated Operational Voltage [Ue]			V	690				690	
Rated Insulation Voltage [Ui]			V	1,000				1,000	
Frequency			Hz	50/60				50/60	
No. of Poles			P	3, 4				3, 4	
Current Setting Range (…× In max)			A	0.4 ~ 1.0				0.4 ~ 1.0	
Rated Current of Neutral Pole (N) (… %×In)			A	100%	100%	100%	100%	100%	100%
Rated Breaking Capacity [Icu] [Sym]									
IEC 60947-2 Category "B" KS C 4620	AC	690/600/550 V	kA	65	85	85	100	50	70 [1] (KS : 65)
		500/480/460 V		85	100	100	150	65	85
		415/380/230/220V		85	100	100	150	65	85
Rated Service Short-Circuit Breaking Capacity [Ics] …%×Icu			kA	100%	100%	100%	100%	100%	100%
Rated Closing Current [Icm] [Peak]									
IEC 60947-2 Category "B" KS C 4620	AC	690/600/550V	kA	143	187	187	220	105	154
		500/480/460V		187	220	220	330	143	187
		415/380/230/220V		187	220	220	330	143	187
Rated Short-Time withstand Voltage [Icw] (Without Inst)									
1 Second			kA	65	85	85	100	50	70
2 Seconds				42	75	75	85	35	65
3 Seconds				35	65	65	75	28	50
Rated Impulse withstand Voltage [Uimp]			kV	12				12	
Break time between tripping order and arc extinction			ms	35				35	
Closing Operational Time									
Motor Charging Time (sec) max.				10				10	
Closing Time (ms) max.				80				80	
Lifecycle (Cycles)									
Mechanical				20,000	15,000	10,000	10,000	20,000	15,000
Electrical				5,000	5,000	2,000	2,000	5,000	5,000
Weight									
3 Pole	Draw-Out Type		kg	63	87 (107) [2]	145	169	63	87
	Fixed Type			34	44 (61) [2]	76	108	34	44
4 Pole	Draw-Out Type			74	103 (140) [2]	173	214	74	103
	Fixed Type			44	55 (80) [2]	81	137	44	55
External dimensions (W×H×D)									
3 Pole	Draw-Out Type		mm	328×460×368.4	399×460×368.4	624×460×368.4	766×460×368.4	328×460×368.4	399×460×368.4
	Fixed Type			337.4×404.4×295.8	408.4×404.4×295.8	633.4×404.4×295.8	775.4×404.4×295.8	337.4×404.4×295.8	408.4×404.4×295.8
4 Pole	Draw-Out Type			413×460×368.4	514×460×368.4	794×460×368.4	996×460×368.4	413×460×368.4	514×460×368.4
	Fixed Type			422.4×404.4×295.8	523.4×404.4×295.8	803.4×404.4×295.8	1,005×404.4×295.8	422.4×404.4×295.8	523.4×404.4×295.8

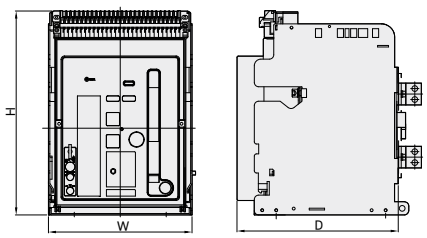
※ 1) 70 kA is DEKRA certified
2) 4,000 AF

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

Fixed Type



Draw-Out Type



Air Circuit Breakers (HGN1150V)

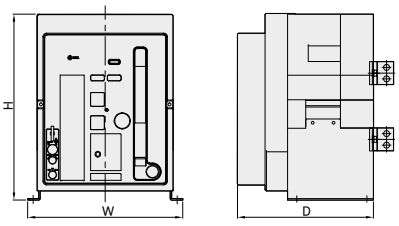
Model Name HGN

Item				P Frame	Q Frame
Rated Current [In max]	Based on 40 ℃		A	06:630	06:630
				08:800	08:800
				10:1,000	10:1,000
				12:1,250	12:1,250
				16:1,600	16:1,600
				20:2,000	20:2,000
					25:2,500
					32:3,200
					40:4,000
Rated Operational Voltage [Ue]			V	1,150	
Rated Insulation Voltage [Ui]			V	1,250	
Frequency			Hz	50/60	
No. of Poles			P	3, 4	
Current Setting Range (…× In max)			A	0.4 ~ 1.0	
Rated Current of Neutral Pole (N) (… %×In)			A	100%	100%
Rated Breaking Capacity [Icu] [Sym]					
IEC 60947-2 Category "B"	AC	1,150/1,000/900V	kA	30	50
		800V		30	75
Rated Service Short-Circuit Breaking Capacity [Ics] …%×Icu			kA	100%	100%
Rated Closing Current [Icm] [Peak]					
IEC 60947-2 Category "B"	AC	1,150/1,000/900V	kA	66	110
		800V		66	165
Rated Short-Time withstand Voltage [Icw] (Without Inst)					
1 Second			kA	30	50
Rated Impulse withstand Voltage [Uimp]			kV	12	12
Break time between tripping order and arc extinction			ms	35	35
Closing Operational Time					
Motor Charging Time (sec) max.				10	10
Closing Time (ms) max.				80	80
Lifecycle (Cycles)					
Mechanical				10,000	10,000
Electrical				5,000	5,000
Weight					
3 Pole	Draw-Out Type		kg	68	92 (112) 1)
	Fixed Type			36	46 (61) 1)
4 Pole	Draw-Out Type			79	108 (145) 1)
	Fixed Type			46	57 (80) 1)
External dimensions (W×H×D)					
3 Pole	Draw-Out Type		mm	328×483.3×368.4	399×483.3×368.4
	Fixed Type			337.4×404.4×295.8	408.4×404.4×295.8
4 Pole	Draw-Out Type			413×483.3×368.4	514×483.3×368.4
	Fixed Type			422.4×404.4×295.8	523.4×404.4×295.8

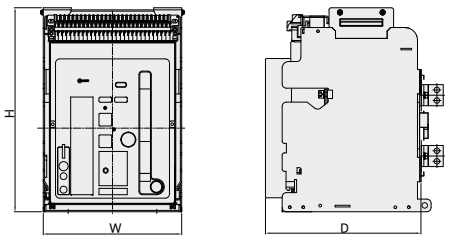
※ 1) 4,000AF

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

Fixed Type



Draw-Out Type



Model Selection Table

Accessories - Protective Relay (OCR)

Function	General Feeder					Generator (Marine Type)		
Model Name	N Type	A Type		P Type	H Type	N Type	A Type	P Type
	GPR-LN	GPR-LA	GPR-LAG	GPR-LP	GPR-LH	GPR-SN	GPR-SA	GPR-SP
Frequency								
50 Hz	50	51	52	54	55	57	58	59
60 Hz	60	61	62	64	65	67	68	69
Control Power								
External Power	-	●	●	●	●	-	●	●
Self-Power	●	●	●	●	●	●	●	●
Protection Function								
LTD (Long Time)	●	●	●	●	●	●	●	●
STD (Short Time)	●	●	●	●	●	●	●	●
INST (Instantaneous)	●	●	●	●	●	●	●	●
Pre-Trip Alarm	-	●	●	●	●	-	●	●
Ground Fault Trip	●	●	-	●	●	-	-	-
ELT Function	-	-	● Outer CT Ground [2] (Ground fault at more than 30 A)	-	-	-	-	-
Thermal Function	●	●	●	●	●	●	●	●
Field Test	-	●	●	●	●	-	●	●
Fail Safe	●	●	●	●	●	●	●	●
Indication								
True RMS Detection Method	●	●	●	●	●	●	●	●
LED Indication per Trip Type	-	●	●	●	●	-	●	●
Fault LED	L [1]	PTA, L, S/I, G	PTA, L, S/I, leakage	PTA, L, S/I, G	PTA, L, S/I, G	L [1]	PTA, L, S/I	PTA, L, S/I
Real-Time LCD Indication of Load Rate per Phase	-	●	●	●	●	-	●	●
Measurement LCD	-	●	●	●	●	-	●	●
Output Contact								
Integrated Instantaneous Contact (1a)	-	-	-	-	-		-	-
Individual Continuous Contact (4a)	-	●	●	●	●	-	● [4]	● [4]
Operation								
MCR	-	○	○	○	○	-	○	○
Communication	NFC	Modbus-RTU	Modbus-RTU	Modbus-RTU	Modbus-RTU	NFC	Modbus-RTU	Modbus-RTU
Event/Fault Recording	●	●	●	●	●	●	●	●

※ ● : Standard, ○ : Option

1) Indicates reserve before operation during long time delay.

2) ZCT designated by the customer is used.

3) ZCT designated by our company is used.

4) As for marine type, individual continuous contact is 3a.

Air Circuit Breakers (HGN/HGS)

Selective Breaking Method of Protection Coordination



- Upstream : ACB HGN/HGS
- Downstream : MCB HGD, MCCB HGM/HGP

Upstream →

Downstream ↓

Item	Model Name	Rated Current (A)	Rated Breaking Current [Icu] (kA rms)	ACB														
				HGN/HGS A Frame						HGN/HGS B Frame				HGN C Frame		HGN D Frame		
				630	800	1,000	1,250	1,600	2,000	2,000	2,500	3,200	4,000	4,000	5,000	4,000	5,000	6,300
				85	85	85	85	85	85	100	100	100	100	100	100	100	150	150
MCB	HGD63E B, C, D Curve	1	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		2	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		3	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		4	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		5	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		13	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		15	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		16	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		32	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	3	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	HGD63S B, C, D Curve	1	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		2	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		3	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		4	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		5	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		13	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		15	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		16	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		32	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	4.5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	HGD63N/M B, C, D Curve	1	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		2	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		3	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		4	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		5	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		13	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		15	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		16	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

※ T Selective breaking is possible in all sectors, Selective breaking is impossible in this sector.

Model Selection Table

Air Circuit Breakers (HGN/HGS)

Selective Breaking Method of Protection Coordination



- Upstream : ACB HGN/HGS
- Downstream : MCB HGD, MCCB HGM/HGP

Upstream →

Downstream ↓

Item	Model Name	Rated Current (A)	Rated Breaking Current [Icu] (kA rms)	ACB														
				HGN/HGS A Frame						HGN/HGS B Frame				HGN C Frame		HGN D Frame		
				630	800	1,000	1,250	1,600	2,000	2,000	2,500	3,200	4,000	4,000	5,000	4,000	5,000	6,300
				85	85	85	85	85	85	100	100	100	100	100	100	100	150	150
MCB	HGD63N/MB, C, D Curve	32	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	6	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	HGD63H B, C, D Curve	1	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		2	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		3	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		4	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		5	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		13	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		15	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		16	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		32	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	HGD125 B, C, D Curve	80	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		100	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		125	10	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
MCCB	HGM100	16	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		32	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		75	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		80	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		100	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	HGM125	16	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		20	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		25	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		32	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		40	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		50	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		63	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		75	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		80	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		100	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		125	55	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

※ T Selective breaking is possible in all sectors, ☐ Selective breaking is impossible in this sector.
MCCB Rated Breaking Current : Based on AC 440/460 V, HGM L-Type, HGP X-Type



- Upstream : ACB HGN/HGS
- Downstream : MCB HGD, MCCB HGM/HGP

Upstream →

Downstream ↓

Item	Model Name	Rated Current (A)	Rated Breaking Current [Icu] (kA rms)	ACB											
				HGN/HGS A Frame						HGN/HGS B Frame				HGN C Frame	
				630	800	1,000	1,250	1,600	2,000	2,000	2,500	3,200	4,000	4,000	5,000
				85	85	85	85	85	85	100	100	100	100	100	100
MCCB	HGM160 E/S/H/L HGM250 E/S/H/L	100	55	T	T	T	T	T	T	T	T	T	T	T	T
		125	55	T	T	T	T	T	T	T	T	T	T	T	T
		150	55	T	T	T	T	T	T	T	T	T	T	T	T
		160	55	T	T	T	T	T	T	T	T	T	T	T	T
		175	55	T	T	T	T	T	T	T	T	T	T	T	T
		200	55	T	T	T	T	T	T	T	T	T	T	T	T
		225	55	T	T	T	T	T	T	T	T	T	T	T	T
		250	55	T	T	T	T	T	T	T	T	T	T	T	T
	HGM400 E/S/H/L	250	85	T	T	T	T	T	T	T	T	T	T	T	T
		300	85	T	T	T	T	T	T	T	T	T	T	T	T
		350	85	T	T	T	T	T	T	T	T	T	T	T	T
		400	85	T	T	T	T	T	T	T	T	T	T	T	T
	HGM630	500	85		T	T	T	T	T	T	T	T	T	T	T
		630	85		T	T	T	T	T	T	T	T	T	T	T
	HGM800	700	85			T	T	T	T	T	T	T	T	T	T
		800	85			T	T	T	T	T	T	T	T	T	T
	HGP125D	16	150	T	T	T	T	T	T	T	T	T	T	T	T
		20	150	T	T	T	T	T	T	T	T	T	T	T	T
		25	150	T	T	T	T	T	T	T	T	T	T	T	T
		32	150	T	T	T	T	T	T	T	T	T	T	T	T
		40	150	T	T	T	T	T	T	T	T	T	T	T	T
		50	150	T	T	T	T	T	T	T	T	T	T	T	T
		63	150	T	T	T	T	T	T	T	T	T	T	T	T
		80	150	T	T	T	T	T	T	T	T	T	T	T	T
		100	150	T	T	T	T	T	T	T	T	T	T	T	T
		125	150	T	T	T	T	T	T	T	T	T	T	T	T
	HGP250	100	150	T	T	T	T	T	T	T	T	T	T	T	T
		125	150	T	T	T	T	T	T	T	T	T	T	T	T
		150	150	T	T	T	T	T	T	T	T	T	T	T	T
		160	150	T	T	T	T	T	T	T	T	T	T	T	T
		175	150	T	T	T	T	T	T	T	T	T	T	T	T
		200	150	T	T	T	T	T	T	T	T	T	T	T	T
		225	150	T	T	T	T	T	T	T	T	T	T	T	T
		250	150	T	T	T	T	T	T	T	T	T	T	T	T
	HGP400	300	150	T	T	T	T	T	T	T	T	T	T	T	T
		350	150	T	T	T	T	T	T	T	T	T	T	T	T
		400	150	T	T	T	T	T	T	T	T	T	T	T	T
	HGP630	500	150		T	T	T	T	T	T	T	T	T	T	T
		630	150		T	T	T	T	T	T	T	T	T	T	T
	HGP800	700	150			T	T	T	T	T	T	T	T	T	T
		800	150			T	T	T	T	T	T	T	T	T	T

※ T Selective breaking is possible in all sectors, Selective breaking is impossible in this sector.
MCCB Rated Breaking Current : Based on AC 440/460 V, HGM L-Type, HGP X-Type

HG Series

Air Circuit Breakers

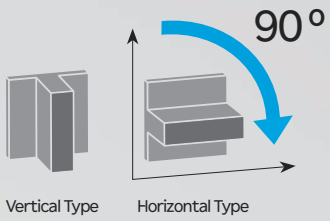
Maximized customer's range of selection and level of satisfaction with model dualization and compact size.



Characteristics

Multi

Bus bar terminal can be changed to horizontal/vertical



Retrofit



Customized Retrofit ACB can be Provided

New products can be developed to be compatible/installed according to the distance of cradle phase/pole/land and terminal size of the ACB that has been installed previously

Certifications

Maximum Breaking Capacity

150 kA (At 500 V, HGN D Frame)

Type per Rating

6 Frames, HGN 2,000/4,000/5,000/6,300 A

2 Frames, HGS 1,600/3,200 A

Rated Impulse Withstand Voltage (Uimp) : 12kV



A Frame [85 kA]

630 ~ 2,000A (HGN) / 630 ~ 1,600A (HGS)

100 % N Phase Current Flow Capacity for all Types



B Frame [100 kA]

630 ~ 4,000A (HGN) / 2,000 ~ 3,200A (HGS)



C Frame [100 kA]

3,200 ~ 5,000A (HGN)



D Frame [150 kA]

4,000 ~ 6,300A (HGN)



P Frame [30kA]

HGN 630 ~ 2,000 A



Q Frame [50kA]

HGN 630 ~ 4,000 A

Overview and Characteristics

Air Circuit Breaker (ACB)

Capable of Responding to Various Customer Applications

HG Series air circuit breaker is equipped with high breaking capacity and highly functional OCR, making various customer applications on industrial building, computer center, device industries and others possible. With all models designed with 100 % n phase current flow capacity, the equipment is safely protected against abnormal phenomenon such as harmonics and others.

Bus Bar Terminal can be Changed to Horizontal/Vertical

Connection method can be changed flexibly according to the customer's panel structure

- HGS/HGN A, P frame 630 ~ 1,600 A
- HGS/HGN B, Q frame 630 ~ 3,200 A

Equipped with Various Accessories and Highly Functional Protection Trip Relay (OCR)

Over Current Relay (Trip Relay)

Apart from the basic protection functions, OCR has reinforced power monitoring functions such as temperature monitoring, fault recording and storage etc., enabling stable power supply.

Convenient Maintenance by Attaching Draw-In/Out Device to the Body

N Type

- Overcurrent Protection (L/S/I/G)
- World's First NFC Function Applied
- Fault Recording (10) and Waveform (4 Cycles, Check Via Communication) can be Transmitted to Mobile Phone App

A Type

- Overcurrent Protection (L/S/I/G)
- Self Power
- Individual Continuous Power Contact
- Fault Recording (256) and Waveform (4 Cycles, Check Via Communication)
- Communication (MODBUS), External Grounding CT/Earth Leakage ZCT can be used

P Type

- Overcurrent Protection (L/S/I/G)
- External Power
- Individual Continuous Power Contact
- Fault Recording (256) and Waveform (4 Cycles, Check Via Communication)
- Over-Voltage/Under-Voltage, Power, Power Factor, Energy Display

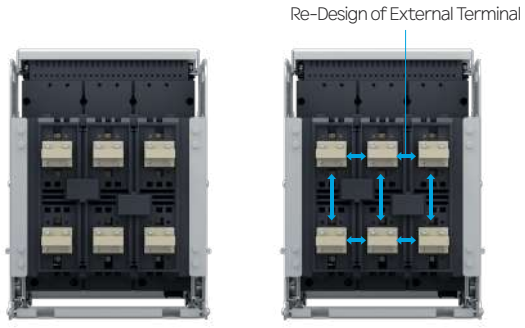
H Type

- L/S/I/G Functions
- External Power
- Individual Continuous Power Contact
- Fault Recording (256) and Waveform (4 Cycles, Check Via Communication)
- L/S/I/G Minute Current Adjustment
- Voltage/Current Harmonics (1 st ~ 63 th) Analysis
- View 3 Phase Waveform

Customized Retrofit ACB

New products can be developed to be compatible/installed according to the distance of cradle phase/pole/land and terminal size of the ACB that has been installed previously

- Economic : No need for busbar and external box replacement, minimum construction period, uninterruptable replacement in case of body retrofit
- Stability : Lifespan can be extended through the latest relay performance and by providing breaking performance of high breaking product
- Compatibility : Stable usage through control terminal bar, bus bar structure and plug-in compatible devices
- Technical Support : Customer satisfaction through inspection of various accessories of old panels

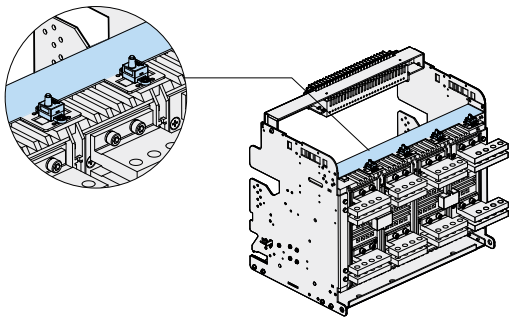


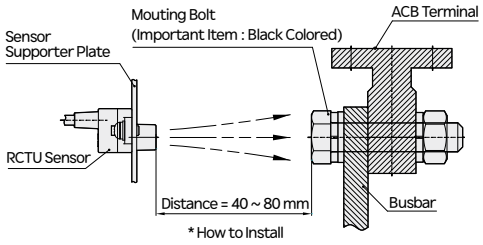
Standard Cradle　　Cradle Retrofit

Equipped with Temperature Sensor

Reliable high temperature measurement is possible following the sensor measurement of the heat source (Range of measurement : -5 ~ 250 degrees)

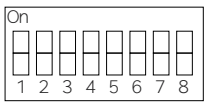
Example of IR Sensor Application





* How to Install

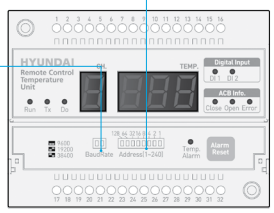
Address Setting : 1 ~ 240



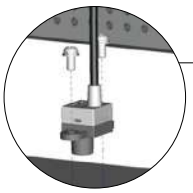
Baud Rate Setting



Set		Description
Off	Off	9,600
Off	On	19,200
On	Off	38,400

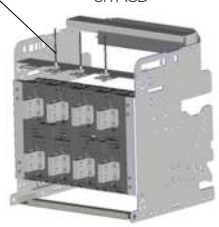


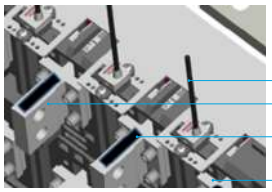
Installation of IR Sensor



Screw PH(+) PS/W M4 L8

When Installed Directly on ACB





- IR temperature sensor has to be installed with sufficient insulation distance from the point to be measured
- The recommended distance between the measurement point and temperature sensor is 50 ~ 80 mm.
- The measurement point has to be a surface without reflection due to the characteristics of the IR sensor and matte black painting is recommended for the measurement point.

⚠ Caution

1. The measurement value of the IR sensor differs depending on the reflection rate of the metal surface. Surfaces coated with matte black or surface with varnish excluding metallic varnish must be measured.
2. The size of measurement point differs depending on the D : S Ratio for the surface to be measured and the IR distance. This sensor has a ratio of 8 : 1.

Applied Standards and Certifications

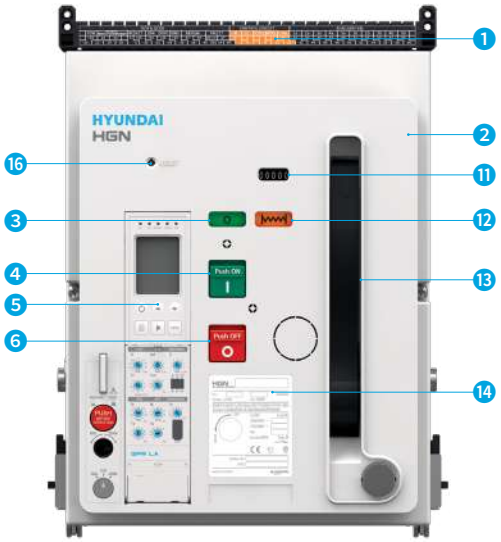
HG Series air circuit breaker has acquired testing/certifications from IEC 60947-1, 2 certified testing institute and can be installed and applied according to the usage environment and conditions permitted by the standards.

Acquired Standards and Certifications

- KS Certification : KS C 4620
- CB Certification (DEKRA, KERI) : IEC 60947-1, 2
- CE Mark
- CCC Certification
- Vessel Certification : LR, ABS, KR, BV, GL, NK, RINA, DNV, RS
- 9 Major Vessel Certifications : KR, GL, LR, ABS, BV, NK, RINA, DNV, RS

External·Internal Structure

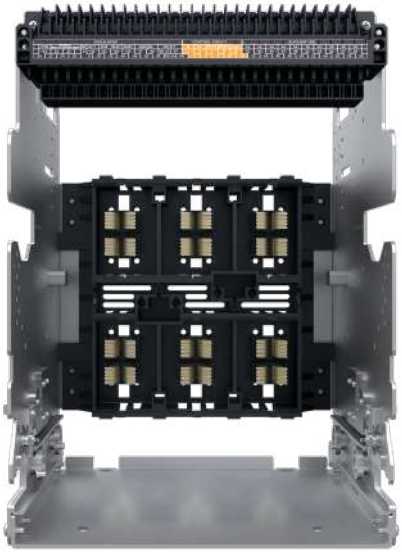
Air Circuit Breakers (HGN/HGS)



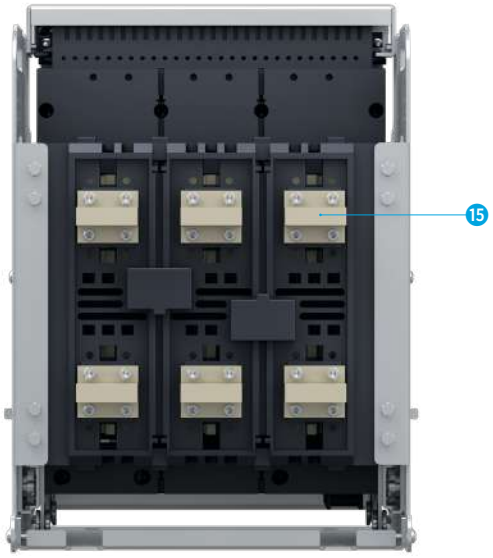
Draw-In/Out Type (ACB Body)



Draw-In/Out Type (Including Cradle)



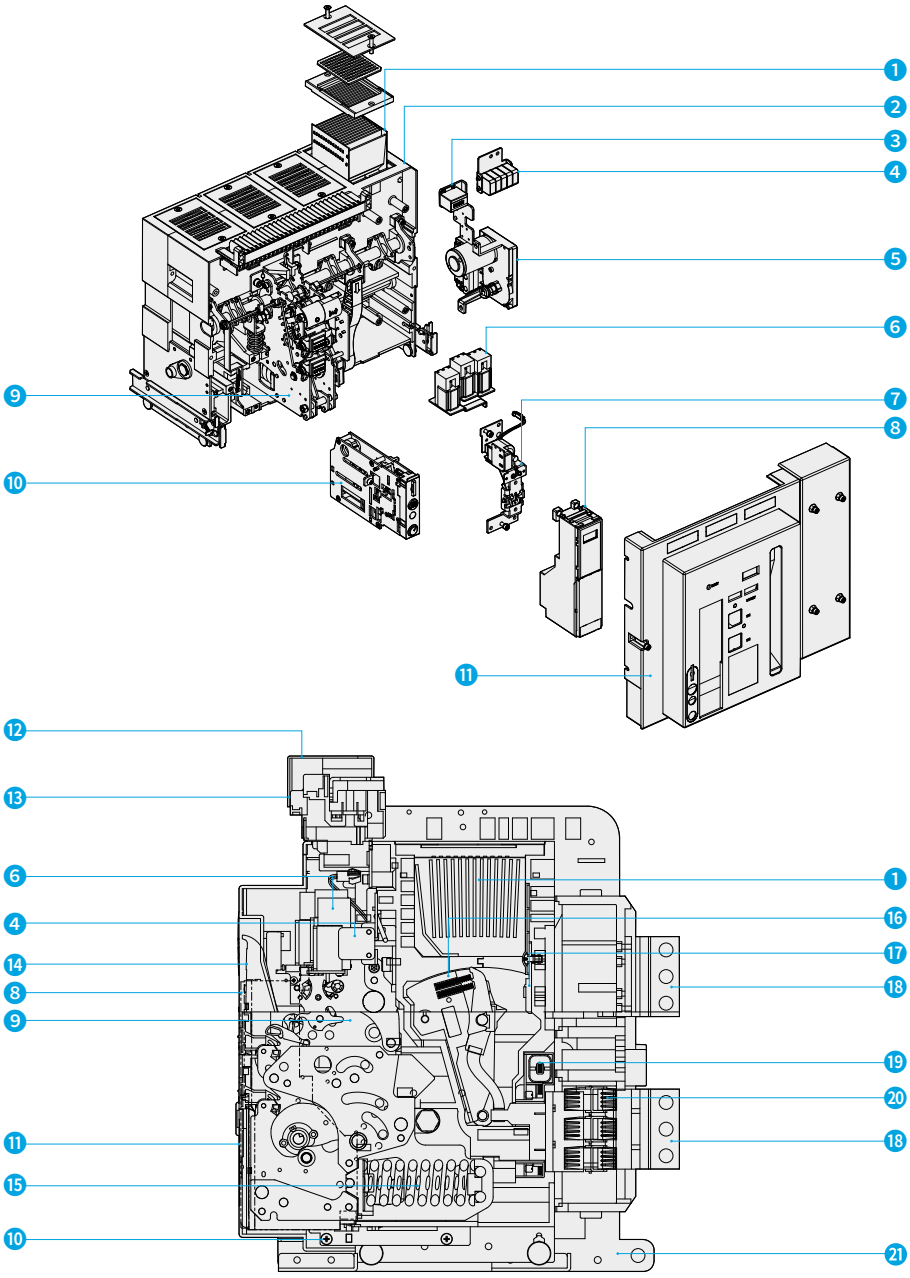
Cradle Front



Cradle Rear

Air Circuit Breakers (HGN/HGS)

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



Air Circuit Breakers (HGN/HGS)

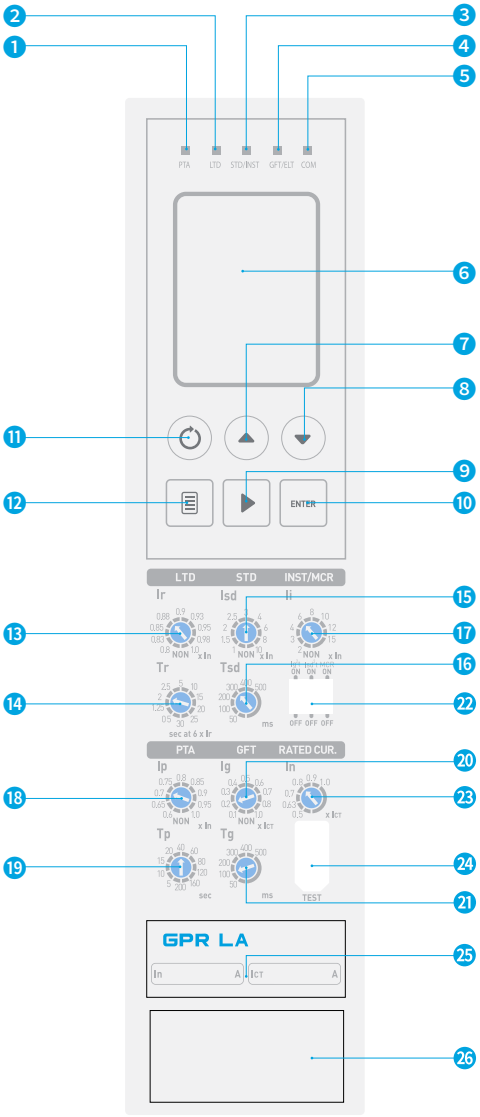
1. DI Grid
2. CO Unit
3. Counter
4. AUX Switch
5. Motor
6. Closing/Trip/UVT Coil
7. MHT Device
8. OCR
9. Mechanism
10. DR Device
11. Cover
12. Control Terminal Protection Cover
13. Control Terminal
14. Manual Charging Handle
15. Closing Spring
16. Moving Contact
17. Fixed Contact
18. Terminal
19. Current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

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

Accessories

Over Current Relay (OCR)

External



Protective Relay (OCR) Accessories

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

※ Self-power functions normally in the case of 10 % for 3 phases and 30 % for a single phase. However, when 200A, 320A, 400A CT is used, it functions normally in case of 50 % for 3 phase and more than 100 % for single phase.
When using MCR function, mark B8 in the name of order type. Auxiliary contact point is 4a5b.
The lifespan of the battery is usually 10 years so in case it is time for replacement, contact our customer support division and services can be received at a cost.
High/low test function is automatically disabled when a load current is applied.

Enhancement of Over Current Relay (OCR) Functions

Over current relay (OCR) built in the HG Series air circuit breaker has reinforced power monitoring functions such as temperature monitoring, fault recording other than the basic protection function, ultimately enabling stable power supply.

Item	General Feeder				
Model Name	N Type	A Type		P Type	H Type
	GPR-LN	GPR-LA	GPR-LAG (Outer CT Ground)	GPR-LP	GPR-LH
Externals					
Frequency 50 Hz	50	51	52	54	55
Frequency 60 Hz	60	61	62	64	65
Main Functions	• L/S/I/G • Thermal • Self-Power • Fail Safe • Integrated Instantaneous Contact • 10 ea Fault Recording (Check Via Communication) • Last Fault's Waveform Recording (4 Cycles, Check Via Communication)	• L/S/I/G • Thermal • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, GFT, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording (Check Via Communication)	• L/S/I Uses Dedicated Outer CT Ground if Outer CT Ground (More than 30 A) > 5 A at Secondary) • Thermal • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, GFT, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording (Check Via Communication)	• L/S/I/G • Thermal • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, GFT, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording (Check Via Communication) • Over-Voltage/ Under-Voltage • Imbalance Type (Voltage/ Current) • Reverse Power • 3 Phase Voltage/Current RMS/Vector • Power (P, Q, S), Power Factor (3 Phase) • Energy (Normal/Reverse Direction) • Demand	• L/S/I/G • Thermal • IDMTL • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, GFT, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording • Over-Voltage/Under-Voltage • Imbalance Type (Voltage/Current) • Reverse Power • 3 Phase Voltage/Current RMS/ Vector • Power (P, Q, S), Power Factor (3 Phase) • Energy (Normal/Reverse Direction) • Frequency, Demand • Minute Current Adjustment at Long Time, Short Time, Instantaneous, Ground Setting • Voltage/Current Harmonics (1 st ~ 63 th) • View 3 Phase Waveform • THD, TDD

Accessories

Over Current Relay (OCR)

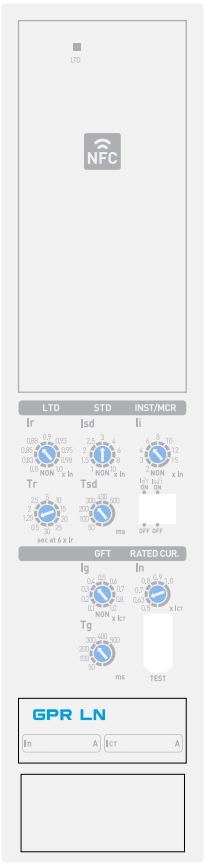
Enhancement of Over Current Relay (OCR) Functions

Over current relay (OCR) built in the HG Series air circuit breaker has reinforced power monitoring functions such as temperature monitoring, fault recording other than the basic protection function, ultimately enabling stable power supply.

Item		Generator (Marine Type)		
Model Name		N Type	A Type	P Type
		GPR-SN	GPR-SA	GPR-SP
Externals				
Frequency	50Hz	57	58	59
	60Hz	67	68	69
Main Functions		• L/S/I • Minute Current Adjustment • Thermal • Self-Power • Fail Safe • Integrated Instantaneous Contact • 10 ea Fault Recording (Check Via Communication) • Last Fault's Waveform Recording (4 Cycles, Check Via Communication)	• L/S/I • Minute Current Adjustment • Thermal • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording (Check Via Communication)	• L/S/I • Thermal • Self-Power • Fail Safe • Communication (Modbus) • External Power • ZSI • Remote Reset Function • Individual Continuous Contact : LTD, STD/INST, PTA • 256 ea Fault Recording • Last Fault's Waveform Recording (4 Cycles, Check Via Communication) • 200 ea Event Recording (Check Via Communication) • Over-Voltage/Under-Voltage • Imbalance Type (Voltage/Current) • Reverse Power/Over-Power • 3 Phase Voltage/Current RMS/Vector • Power (P, Q, S), Power Factor (3 Phase) • Energy (Normal/Reverse Direction) • Demand • Minute Current Adjustment at Long Time, Short time, Instantaneous, Ground Setting

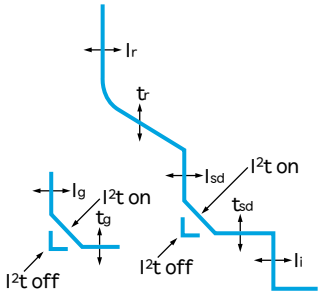
Appearance and Setting Value

GPR-LN (50, 60)



- Overload Protection
  - Long time delay
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Ground Fault Protection
  - I^2t On/Off optional
- Neutral Wire Protection
  - 3P : No protection for neutral wire
  - 4P : 100 % × In
  - LTD, STD, INST protection
- Self-Power
- Equipped with NFC Functions
  - Incident information can be received to the mobile phone
  - Introduction of function and app installation method : Refer to Page 34

- Protection Features



Protection Functions

LTD Protection	Current Setting (A)	In = Ict×···		0.5	0.63	0.7	0.8	0.9	1				
		Ir = In×···		0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.5×Ir)		10.4	26.1	41.7	52	104	208	312	417	521	626
		tr @ (6.0×Ir)		0.5	1.25	2	2.5	5	10	15	20	25	30
		tr @ (7.2×Ir)		0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
STD Protection	Current Setting (A)	Isd = In×···		1	1.5	2	2.5	3	4	6	8	10	Non
	Time Delay (sec) @10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···		2	3	4	6	8	10	12	15	Non	
	Tripping Time			Below 50 ms									
Grounding Protection	Grounding Pick-Up Setting (A) Accuracy : ± 15 % (Ig > 0.4 In) ± 20 % (Ig≤0.4 In)	Ig = Ict×···		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	Time Delay (sec) @ 1×Ict Accuracy : ±20%	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				

Accessories

Over Current Relay (OCR)

Appearance and Setting Value

GPR-LA (51, 61)

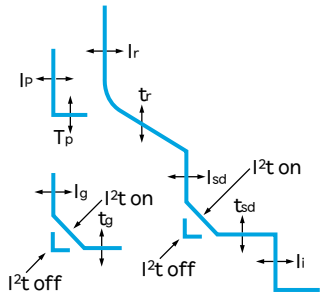


- Overload Protection
  - Long time delay
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Ground Fault Protection
  - I^2t On/Off optional
- Neutral Wire Protection
  - 3 Pole : No protection
  - 4 Pole : Non, 50 %, 100 % (×Ir, Isd, Ii)
- Measurement and Display
  - 3 Phase current
- Realization of Protective Coordination by ZSI (Zone Selective Interlocking)
- Fault Recording
  - Records up to 256 fault information on fault type, fault phase, fault value, occurrence time of fault
- Event Recording
  - Records up to 200 events of devices, records changes in protection trip relay information
- Pre-Trip Alarm
  - Prevent unnecessary overload trip by setting according to rated current (In)
- Field Test
  - Simulation of long time, short time, instantaneous

- RS-485 Communication/Modbus-RTU
- 4a DO (Digital Output)
  - Contact specification

Rating	Nominal Switching Capacity (Resistive Load)	5 A 277 VAC
	Max. Switching Power (Resistive Load)	1,385 VA
	Max. Switching Voltage	277 VAC
	Max. Switching Current	5 A
	Max. Switching Capacity (Reference Value)	100 mA 5 VDC

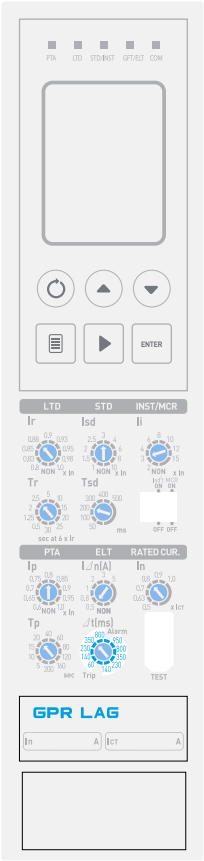
- Protection Features



Protection Functions

LTD Protection	Current Setting (A)	In = Ict×···		0.5	0.63	0.7	0.8	0.9	1				
		Ir = In×···		0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.5×Ir)		10.4	26.1	41.7	52	104	208	312	417	521	626
		tr @ (6.0×Ir)		0.5	1.25	2	2.5	5	10	15	20	25	30
		tr @ (7.2×Ir)		0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
STD Protection	Current Setting (A)	Isd = In×···		1	1.5	2	2.5	3	4	6	8	10	Non
	Time Delay (sec) @10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···		2	3	4	6	8	10	12	15	Non	
	Tripping Time			Below 50 ms									
Grounding Protection	Grounding Pick-Up Setting (A) Accuracy : ±15% (Ig > 0.4In) ±20% (Ig≤0.4In)	Ig = Ict×···		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	Time Delay (sec) @ 1×Ict Accuracy : ±20%	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Pre-Alarm	전류설정 (A)	Ip = In×···		0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	Time Delay (sec) Accuracy : ±15%	tp		5	10	15	20	40	60	80	120	160	

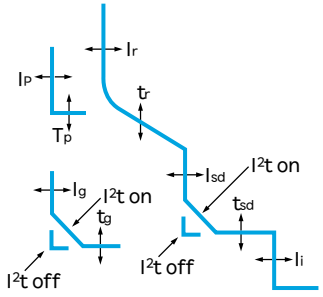
GPR-LAG (52, 62)



- Overload Protection
  - Long time delay
  - Thermal operation
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Earth Leakage Protection
  - Uses ZCT for 5 A output at secondary (used within 3 %)
  - GPR setting is calculated based on 5 A at secondary
    Ex) When using 100 : 5 A, in order for primary to function at 30 A, 30×5/100 = 1.5 A, GPR is set to 2 A
- Neutral Wire Protection
  - 3 Pole : No protection
  - 4 Pole : Non, 50 %, 100 % (×Ir, Isd, Ii)
- Measurement and Display
  - 3 Phase current
- Realization of Protective Coordination by ZSI (Zone Selective Interlocking)
- Fault Recording
  - Records up to 256 fault information on fault type, fault phase, fault value, occurrence time of fault
- Event Recording
  - Records up to 200 events of devices, records changes in protection trip relay information
- Pre-Trip Alarm
  - Prevent unnecessary overload trip by setting according to rated current (In)
- Field Test
  - Simulation of long time, short time, instantaneous
- RS-485 Communication/Modbus-RTU
- 4a DO (Digital Output)
  - Contact specification

Rating	Nominal Switching Capacity (Resistive Load)	5 A 277 VAC
	Max. Switching Power (Resistive Load)	1,385 VA
	Max. Switching Voltage	277 VAC
	Max. Switching Current	5 A
	Max. Switching Capacity (Reference Value)	100 mA 5 VDC

- Protection Features



Protection Functions

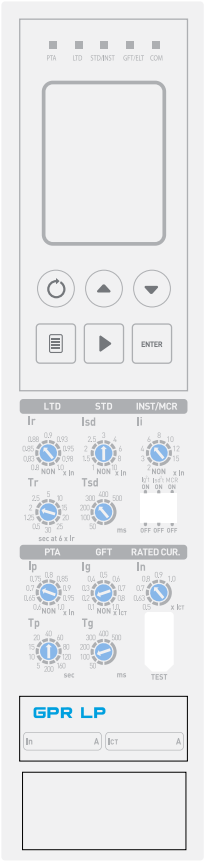
LTD Protection	Current Setting (A)	In = Ict×⋯		0.5	0.63	0.7	0.8	0.9	1			
		Ir = In×⋯		0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.5×Ir)		10.4	26.1	41.7	52	104	208	312	417	521	626
		tr @ (6.0×Ir)		0.5	1.25	2	2.5	5	10	15	20	25	30
		tr @ (7.2×Ir)		0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
STD Protection	Current Setting (A)	Isd = In×⋯		1	1.5	2	2.5	3	4	6	8	10	Non
	Time Delay (sec) @ 10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×⋯		2	3	4	6	8	10	12	15	Non	
	Tripping Time			Below 50 ms									
Pre-Alarm	Current Setting (A)	Ip = In×⋯		0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	Time Delay (sec) Accuracy : ±15%	tp		5	10	15	20	40	60	80	120	160	200
Leakage Protection	Current Setting (A)	IΔn		0.5	0.8	1	2	3	5	Non			
	Time Delay (ms) Accuracy : ± 15 % or Above 40 ms	Δt	Alarm Time (ms)	140	230	350	800	950					
			Trip Time (ms)	60	140	230	350	800					

Accessories

Over Current Relay (OCR)

Appearance and Setting Value

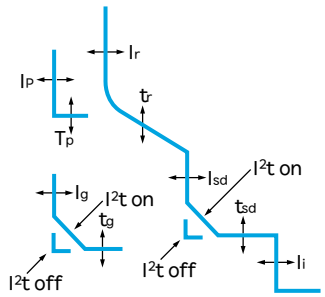
GPR-LP (54, 64) / GPR-LH (55, 65)



- Overload Protection
  - Long time delay
  - Thermal operation
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Ground Fault Protection
  - I^2t On/Off optional
- Neutral Wire Protection
  - 3 Pole : No protection
  - 4 Pole : Non, 50 %, 100 % (×Ir, Isd, Ii)
- Over-Voltage/Under-Voltage/Imbalance Protection
- Measurement and Display
  - 3 Phase current/voltage/power/power factor/power quantity/phase/demand
- Realization of Protective Coordination by ZSI (Zone Selective Interlocking)
- Fault Recording
  - Records up to 256 fault information on fault type, fault phase, fault value, occurrence time of fault
- Event Recording
  - Records up to 256 events of devices, records changes in protection trip relay information
- Pre-Trip Alarm
  - Prevent unnecessary overload trip by setting according to rated current (In)
- Field Test
  - Simulation of long time, short time, instantaneous
- RS-485 Communication/Modbus-RTU
- Need to Connect Voltage Module for Voltage Measurement
- Additional Function in LH Type
- Voltage/Current Harmonics (1 st ~ 63 th)
  - 3 phase waveform
  - TDH, TDD
- 4a DO (Digital Output)
  - Contact specification

Rating	Nominal Switching Capacity (Resistive Load)	5 A 277 VAC
	Max. Switching Power (Resistive Load)	1,385 VA
	Max. Switching Voltage	277 VAC
	Max. Switching Current	5 A
	Max. Switching Capacity (Reference Value)	100 mA 5 VDC

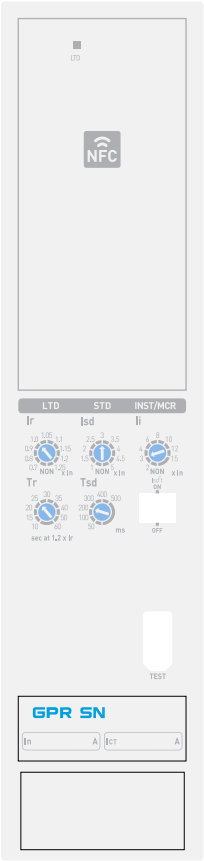
- Protection Features



Protection Functions

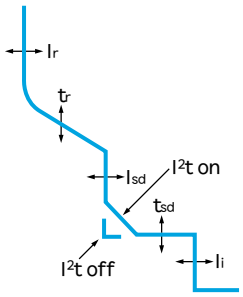
LTD Protection	Current Setting (A)	In = Ict×···		0.5	0.63	0.7	0.8	0.9	1			
		Ir = In×···		0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.5×Ir)		10.4	26.1	41.7	52	104	208	312	417	521	626
		tr @ (6.0×Ir)		0.5	1.25	2	2.5	5	10	15	20	25	30
		tr @ (7.2×Ir)		0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
STD Protection	Current Setting (A)	Isd = In×···		1	1.5	2	2.5	3	4	6	8	10	Non
	Time Delay (sec) @ 10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···		2	3	4	6	8	10	12	15	Non	
	Tripping Time			Below 50 ms									
Grounding Protection	Ground Pick-Up Setting (A) Accuracy : ± 15 % (Ig> 0.4 In) ± 20 % (Ig≤0.4 In)	Ig = Ict×···		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Non
	Time Delay (sec) @ 1×Ict Accuracy : ±20%	tg	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Pre-Alarm	Current Setting (A)	Ip = In×···		0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	Time Delay (sec) Accuracy : ±15%	tp		5	10	15	20	40	60	80	120	160	200

GPR-SN (57, 67)



- Overload Protection
  - Long time delay
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Self-Power
- Equipped with NFC Functions
  - Incident information can be received to the mobile phone
  - Introduction of function and app installation method : Refer to P age 34

- Protection Features



Protection Functions

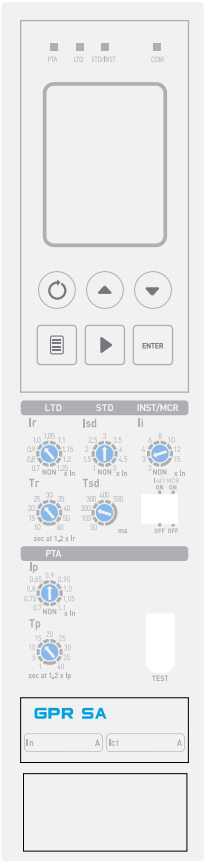
LTD Protection	Current Setting (A)	In = Ict×···	(0.5 ~ 1.0) ✻1 % Unit or 1 A Unit								
		Ir = In×···	0.7	0.8	0.9	1	1.05	1.1	1.15	1.2	1.25	Non
	Time Delay (sec) Accuracy : ±15% 또는 100ms이하	tr @ (1.05×Ir)	20	30	40	50	60	70	80	100	120	
		tr @ (1.2×Ir)	10	15	20	25	30	35	40	50	60	
		tr @ (3×Ir)	0.99	1.49	1.99	2.48	2.98	3.48	3.97	4.97	5.96	
STD Protection	Current Setting (A)	Isd = In×···	1	1.5	2	2.5	3	3.5	4	4.5	5	Non
	Time Delay (sec) @10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···	2	3	4	6	8	10	12	15	Non	
	Tripping Time		Below 50 ms									

Accessories

Over Current Relay (OCR)

Appearance and Setting Value

GPR-SA (58, 68)

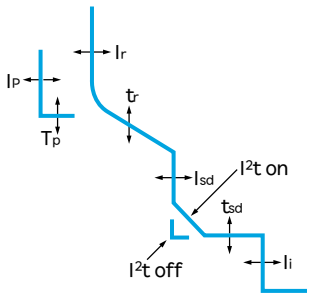


- Overload Protection
  - Long time delay
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- In Setting with Minute Adjustment
  - Adjusts in 1 A unit within the range of 0.5 ~ 1 Ict
  - Adjusted using button in the LCD setting screen
- Realization of Protective Coordination by ZSI (Zone Selective Interlocking)
- Fault Recording
  - Records up to 256 fault information on fault type, fault phase, fault value, occurrence time of fault
- Event Recording
  - Records up to 200 events of devices, records changes in protection trip relay information
- Pre-Trip Alarm
  - Prevent unnecessary overload trip by setting according to rated current (In)
- Field Test
  - Simulation of long time, short time, instantaneous
- RS-485 Communication/Modbus-RTU

- 3a DO (Digital Output)
  - Contact specification

Rating	Nominal Switching Capacity (Resistive Load)	5 A 277 VAC
	Max. Switching Power (Resistive Load)	1,385 VA
	Max. Switching Voltage	277 VAC
	Max. Switching Current	5 A
	Max. Switching Capacity (Reference Value)	100 mA 5 VDC

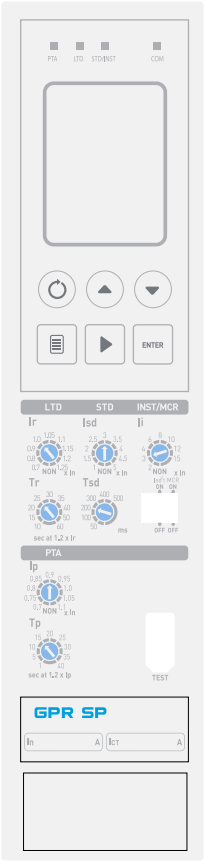
- Protection Features



Protection Functions

LTD Protection	Current Setting (A)	In = Ict×···	(0.5 ~ 1.0) ✻1 % Unit or 1 Unit									
		Ir = In×···	0.7	0.8	0.9	1	1.05	1.1	1.15	1.2	1.25	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.05×Ir)	20	30	40	50	60	70	80	100	120	
		tr @ (1.2×Ir)	10	15	20	25	30	35	40	50	60	
		tr @ (3×Ir)	0.99	1.49	1.99	2.48	2.98	3.48	3.97	4.97	5.96	
STD Protection	Current Setting (A)	Isd = In×···	1	1.5	2	2.5	3	3.5	4	4.5	5	Non
	Time Delay (sec) @10×In Accuracy : ±15%	tsd I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
		tsd I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off) Min. Trip Time (ms)	20	80	160	260	360	460				
		(I^2t Off) Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···	2	3	4	6	8	10	12	15	Non	
	Tripping Time		Below 50 ms									
Pre-Alarm	Current Setting (A)	Ip = In×···	0.7	0.75	0.8	0.85	0.9	0.95	1	1.05	1.1	Non
	Time Delay (sec) Accuracy : ±15%	tp @ (Ip×1.2)	1	5	10	15	20	25	30	35	40	

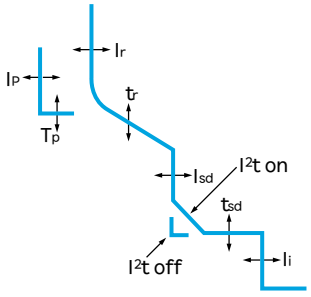
GPR-SP (59, 69)



- Overload Protection
  - Long time delay
- Short Circuit Protection
  - Short time delay, instantaneous trip
  - I^2t On/Off optional (for STD)
- Neutral Wire Protection
  - 3 Pole : No protection
  - 4 Pole : Non, 50 %, 100 % (× Ir, Isd, Ii)
- Over-Voltage/Under-Voltage/Imbalance Protection
- Measurement and Display
  - 3 Phase current/voltage/power/power factor/power quantity/phase/demand
- Realization of Protective Coordination by ZSI (Zone Selective Interlocking)
- Fault Recording
  - Records up to 256 fault information on fault type, fault phase, fault value, occurrence time of fault
- Event Recording
  - Records up to 200 events of devices, records changes in protection trip relay information
- Pre-Trip Alarm
  - Prevent unnecessary overload trip by setting according to rated current (In)
- Field Test
  - Simulation of long time, short time, instantaneous
- RS-485 Communication/Modbus-RTU
- Need to Connect Voltage Module for Voltage Measurement
- 3a DO (Digital Output)
  - Contact specification

Rating	Nominal Switching Capacity (Resistive Load)	5 A 277 VAC
	Max. Switching Power (Resistive Load)	1,385 VA
	Max. Switching Voltage	277 VAC
	Max. Switching Current	5 A
	Max. Switching Capacity (Reference Value)	100 mA 5 VDC

- Protection Features



Protection Functions

STD Protection	Current Setting (A)	In = Ict×···		0.5	0.63	0.7	0.8	0.9	1			
		Ir = In×···		0.8	0.83	0.85	0.88	0.9	0.93	0.95	0.98	1	Non
	Time Delay (sec) Accuracy : ± 15 % or Below 100 ms	tr @ (1.05×Ir)		10.4	26.1	41.7	52	104	208	312	417	521	626
		tr @ (1.2×Ir)		0.5	1.25	2	2.5	5	10	15	20	25	30
		tr @ (3×Ir)		0.35	0.86	1.38	1.73	3.45	6.9	10.4	13.8	17.3	20.7
STD Protection	Current Setting (A)	Isd = In×···		1	1.5	2	2.5	3	4	6	8	10	Non
	Time Delay (sec) @10×In Accuracy : ±15%	tsd	I^2t Off	0.05	0.1	0.2	0.3	0.4	0.5				
			I^2t On	0.05	0.1	0.2	0.3	0.4	0.5				
		(I^2t Off)	Min. Trip Time (ms)	20	80	160	260	360	460				
			Max. Trip Time (ms)	80	140	240	340	440	540				
Instantaneous Protection	Current Setting (A)	Ii = In×···		2	3	4	6	8	10	12	15	Non	
	Tripping Time			Below 50 ms									
Pre-Alarm	Current Setting (A)	Ip = In×···		0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1	Non
	Time Delay (sec) Accuracy : ±15%	tp @ (Ip×1.2)		5	10	15	20	40	60	80	120	160	

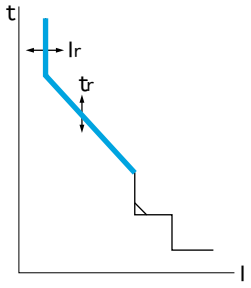
Accessories

Over Current Relay (OCR)

Operation Characteristics

Long Time Delay (LTD)





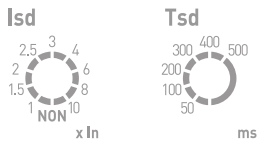
Standard Current Setting

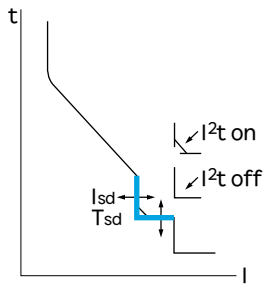
- **L Type**
  - The scale marks the magnification of [In].
  - The setting range of current is a 10-step method of Non, 0.8, 0.83, 0.85, 0.88, 0.9, 0.93, 0.95, 0.98 and 1.0×[In].
  - No protection in case the [Ir] is set as [Non].
  - The breaker does not trip below 105 % of [Ir] and trips at 120 % of [Ir] and above.
- **S Type**
  - The setting range of current is a 10-step method of Non, 0.7, 0.8, 0.9, 1.0, 1.05, 1.1, 1.15, 1.2, 1.25×[In].
  - The breaker trips at 100 % of [Ir] setting value and above.

Time Delay Setting

- **L Type**
  - The scale is the second of operating time based on 600 %×[Ir] with inverse time operation.
  - The setting range of current is a 10-step method of 0.5, 1.25, 2, 2.5, 5, 10, 15, 20, 25, 30 sec.
  - The breaker trips at ±15 % of setting time.
- **S Type**
  - The setting range is a 9-step method of 10, 15, 20, 25, 30, 35, 40, 50, 60 sec.
  - The scale is the second of operating time based on 120 %×[Ir] with inverse time operation.

Short Time Delay (STD)





Standard Current Setting

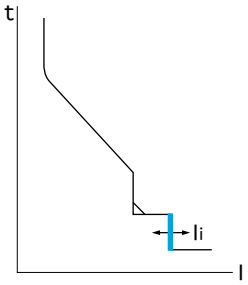
- **L Type**
  - The scale marks the magnification of [In].
  - The setting range of current is a 10-step method of Non, 1, 1.5, 2, 2.5, 3, 4, 6, 8, 10×[In].
- **S Type**
  - The scale marks the magnification of [In].
  - The setting range of current is a 10-step method of Non, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5×[In].

Time delay setting

- **L Type**
  - The marking indicates the relay operation based on the time of 110 % of [Isd] in msec with definite time operation.
  - The setting range is a 6-step method of 50, 100, 200, 300, 400, 500 msec.
  - 1,000 % of inverse time curve is applied in case of I^2t on setting.
- **S Type**
  - The marking indicates the relay operation based on the time of 110 % of [Isd] in msec with definite time operation.
  - The setting range is a 6-step method of 50, 100, 200, 300, 400, 500 msec.
  - 500 % of inverse time curve is applied in case of I^2t on setting.

Instantaneous (INST)





Standard Current Setting

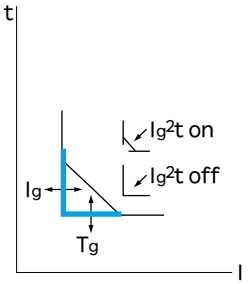
- The scale marks the magnification of [In].
- The setting range of current is a 9-step method of Non, 2, 3, 4, 6, 8, 10, 12, 15×[In].
- No protection in case [Ii] is set as [Non], the protection does not function.

Time Delay Setting

- Total breaking time is below 50 ms.

Ground Fault Trip (GFT)





Standard Current Setting

• L Type

- The numbers indicate scale for the 1 st currnet of OCR [Ict].
- The setting range of current is a 10-step method of Non, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0×[Ict].

Time Delay Setting

• L Type

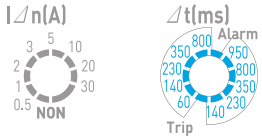
- The marking indicates the relay operation based on the time of 120 % of [Ig] in msec with definite time operation.
- The setting range is a 6-step method of 50, 100, 200, 300, 400, 500 msec.
- It functions in case of 100 % Ict of inverse time in case of I^2t on setting.

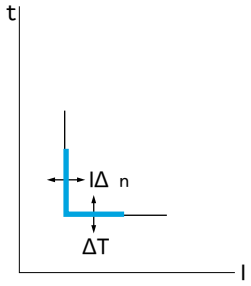
Accessories

Over Current Relay (OCR)

Operation Characteristics

Earth Leakege Trip (ELT)





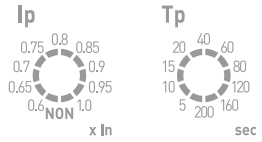
Standard Current Setting

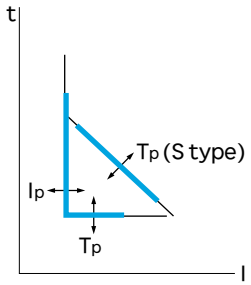
- **GPR LAZ**
  - The scale marks the magnification of UPR rated primary current [ZCT].
  - The setting range of current is a 9-step method of Non, 0.5, 1, 2, 3, 5, 10, 20, 30×[A].
- **GPR LAG**
  - The scale is based on 5 A ZCT at secondary.
  - The setting range of current is a 7-step method of Non, 0.5, 0.8, 1, 2, 3, 5.

Time Delay Setting

- **L Type**
  - Once the primary value that has been set flows as much as the delayed time, it is set as both alarm and trip mode.
  - The setting range of alarm is a 5-step method of 140, 230, 350, 800, 950 msec.
  - The setting range of trip is a 5-step method of 60, 140, 230, 350, 800 msec.

Pre-Trip Alram (PTA)





Standard Current Setting

- **L Type**
  - The scale marks the magnification of [In] with inverse time operation.
  - The setting range of current is a 10-step method of Non, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0 of [In].
- **S Type**
  - The scale marks the magnification with regards to [Io] with inverse time operation.
  - The setting range of current is a 10-step method of Non, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1×[Io].

Time Delay Setting

- **L Type**
  - The marking indicates the relay operation based on the time of 100 % of [Ip] in sec.
  - The setting range of current is a 10-step method of 5, 10, 15, 20, 40, 60, 80, 120, 160, 200 sec.
- **S Type**
  - 9-step of 1, 5, 10, 15, 20, 25, 30, 35, 40 sec can be selected in 120 % of [Ip] and has operation characteristics at inverse time operation.

Characteristic Curve

General Feeder

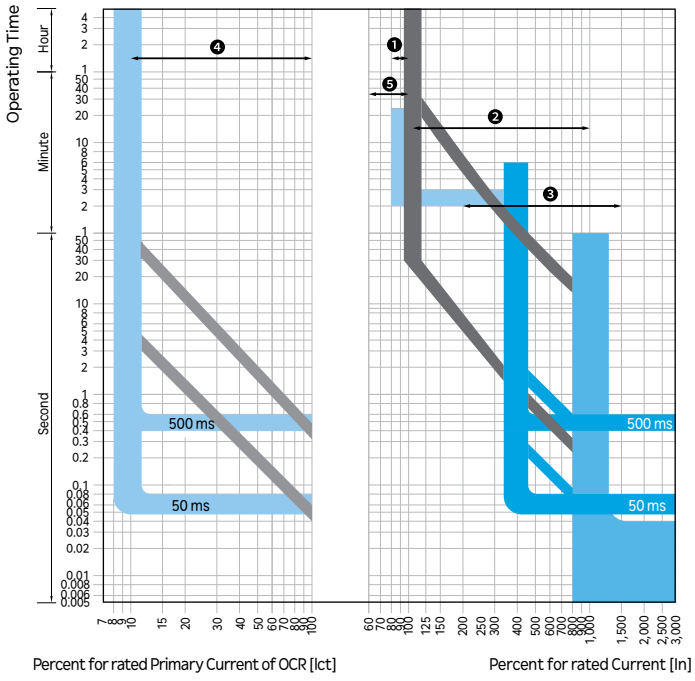
❶ Long Time Delay Current Setting Range

❷ Short Time Delay Current Setting Range

❸ Instantaneous Tripping Current Setting Range

❹ Ground Fault Trip Current Setting Range

❺ Pre-Trip Alarm Current Setting Range



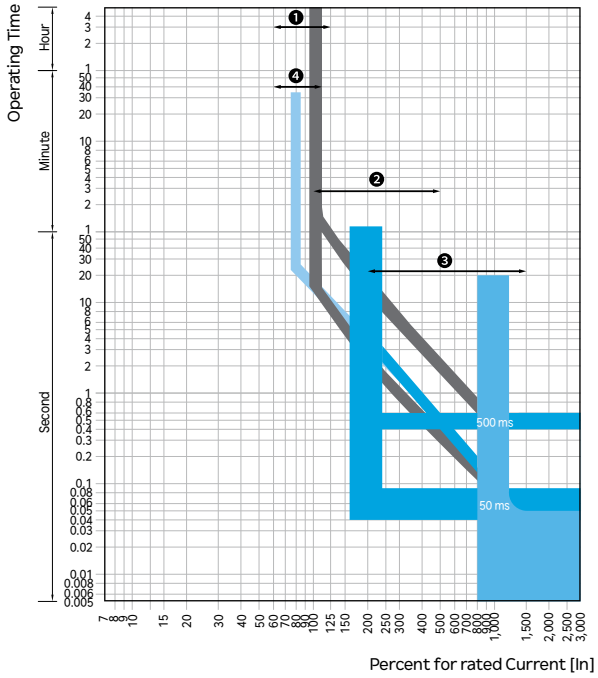
Generator

❶ Long Time Delay Current Setting Range

❷ Short Time Delay Current Setting Range

❸ Instantaneous Tripping Current Setting Range

❹ Pre-Trip Alarm Current Setting Range



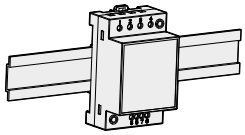
Accessories

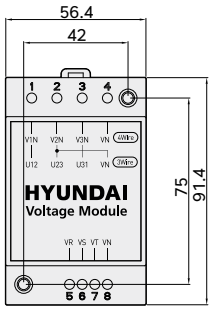
Over Current Relay (OCR)

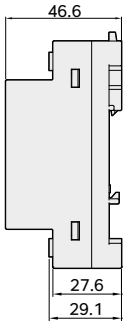
Measurable

Dimension

Unit : mm







Voltage Module

GPR-LP/LH/SP Trip Relay has to be installed with a voltage module to measure the voltage.

Voltage Input Range : AC 69 ~ 690 V

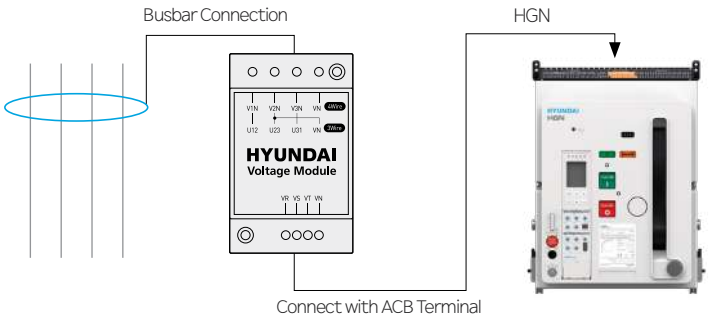
※ **INSTALLATION PRECAUTION**

- When installing on a panel, do not install in a place exposed to external shock or vibration.
- Do not install it on the ACB Cradle as it may be damaged by shock from opening and closing.

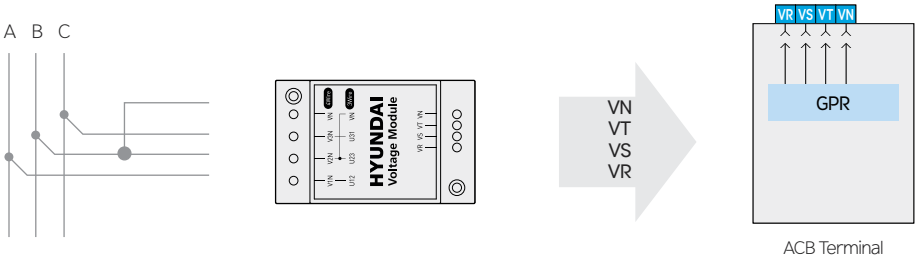
Voltage Connection

Voltage Input Range : 69 ~ 690 V

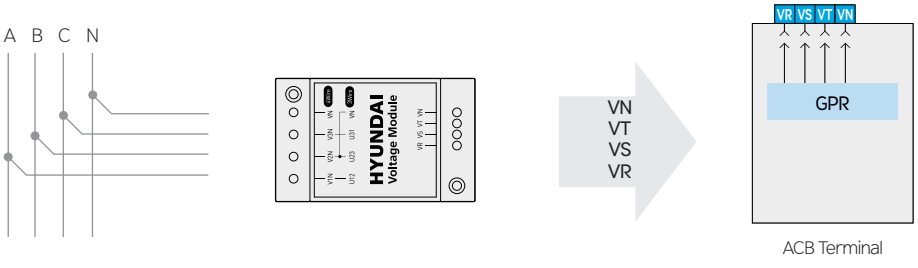
※ The length of connecting cable of the voltage module and ACB's VR, VS, VT shall be installed within 150 mm.



3P 3Wire



4P 4Wire / 3P 4Wire



Zone Selective Interlocking System

Zone selective interlocking function involves the breaker in the fault sector detecting malfunction for selective protection coordination. The circuit breaker in the fault sector sends a lock signal to the back-up protection circuit breaker by force to delay the operation and the circuit breaker in the fault sector operates instantaneously to enable selective protection coordination of the system.

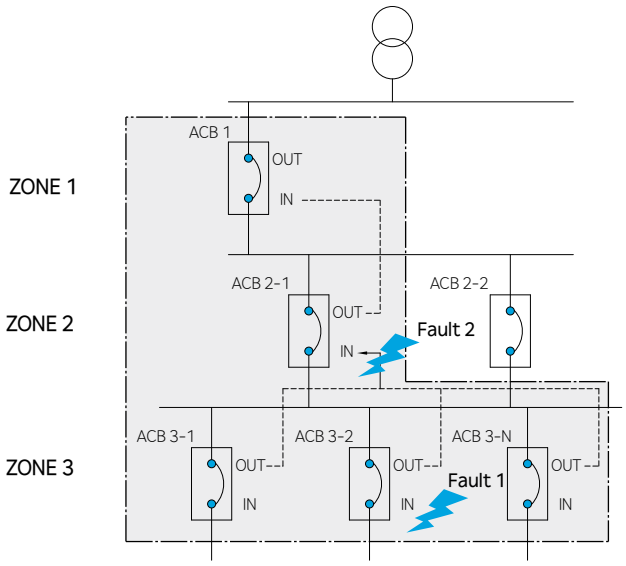
Examples

• First Fault Occurrence

In case fault 1 occurs in selective zone (Zone 3), ACB 3-2 functions immediately and ACB 3-2 relay triggers a ZSI signal in ACB 2-1 relay to maintain a delay so that the circuit breaker does not function, preventing the expansion of fault region.

• Fault 2 Occurrence

In case a fault occurs at the lower end of ACB 2-1, the circuit breaker in zone 3 region is unable to detect. Therefore, the relay of ACB 2-1 is unable to receive any signal from the lower end so, immediately, ACB 2-1 functions, triggering a ZSI signal to ACB 1 to prevent the expansion of fault range.



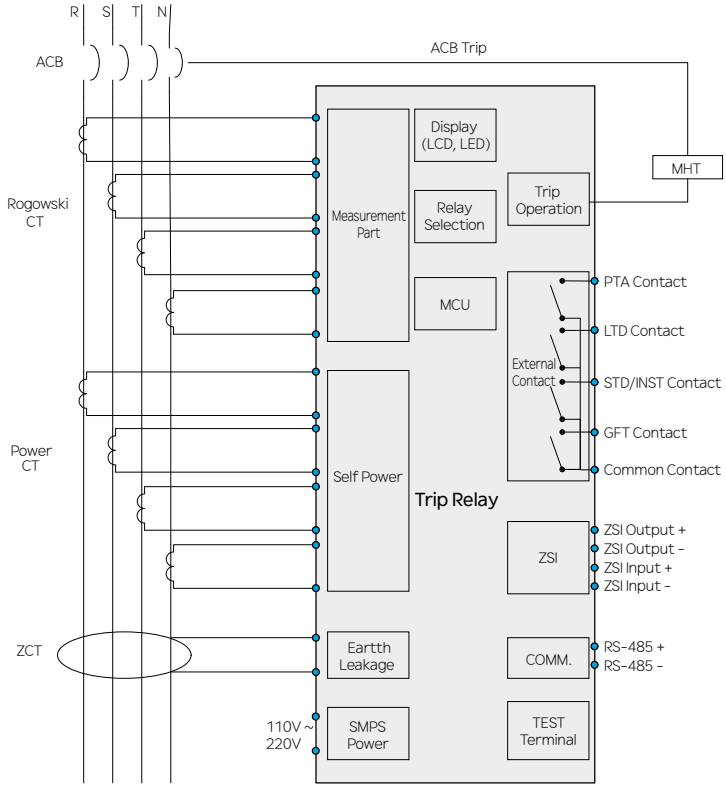
------- ZSI Connection

※ZSI connection wire's maximum distance has to be constituted within 3 m.
ZSI function cannot be operated during self-power.
Upon the release of the product, ZSI function is not activated and the 2 terminals (31, 32) at the control power input area are short so please cut the wire before connection when using ZSI.

Accessories

Over Current Relay (OCR)

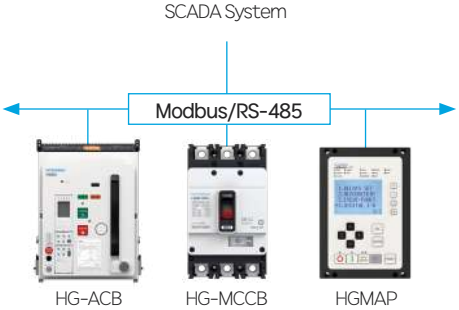
System Diagram



Communication Function

Modbus-RTU/RS-485

- Operation Mode : Differential
- Distance : Max. 1.2 km
- Cable : RS-485 Shielded Twist 2-Pair Cable
- Baud Rate : 9,600, 19,200, 38,400 bps
- Transmission Method : Half-Duplex
- Termination : 110 Ω



NFC Communication (Near Field Communication) * for Android™

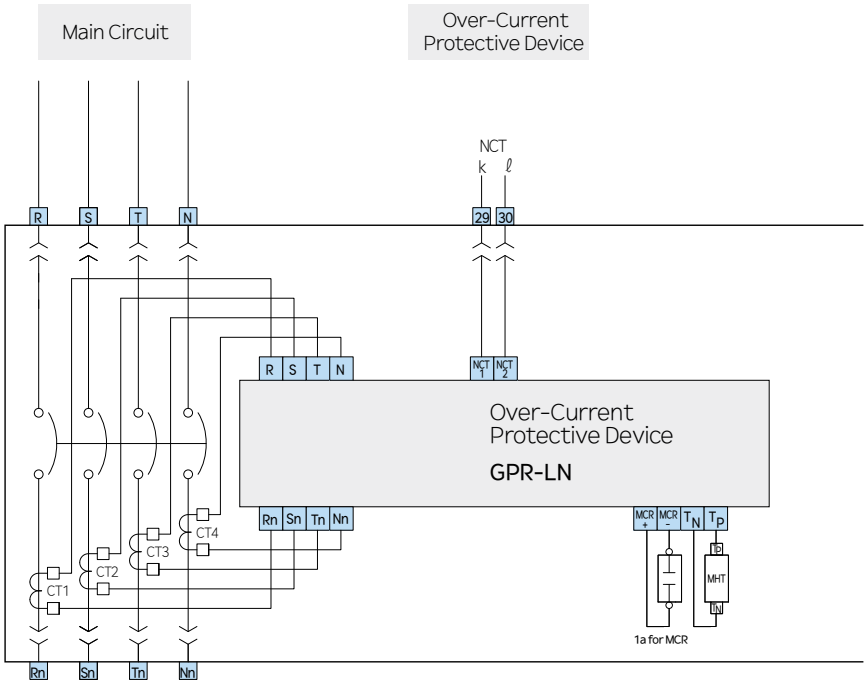
- Various information related to the breaker's faults (cause of fault, current waveform at fault etc.) can be received conveniently through smart phones by using NFC wireless communication technology's Android application.
- Execute the application and receive the fault information by placing the smart phone's NFC antenna at the contact position indicated in the OCR.
- You can search the HG CB Link in Google Play™ for the application or download it for free by connecting to the QR code on the right.
- Up to 10 past faults worth of information is saved. (However, as for current's waveform information, only the recent fault is saved.)
- The information received can be sent to the e-mail through the application.

※ Android and Google Play are registered trademarks of Google Inc.

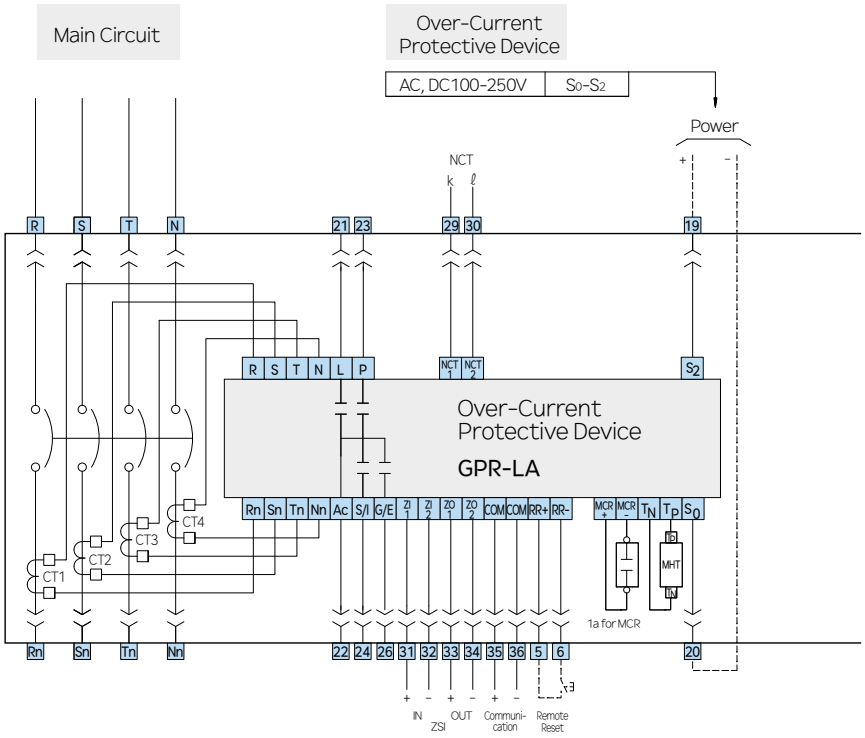
NFC

Circuit Diagrams

GPR-LN



GPR-LA

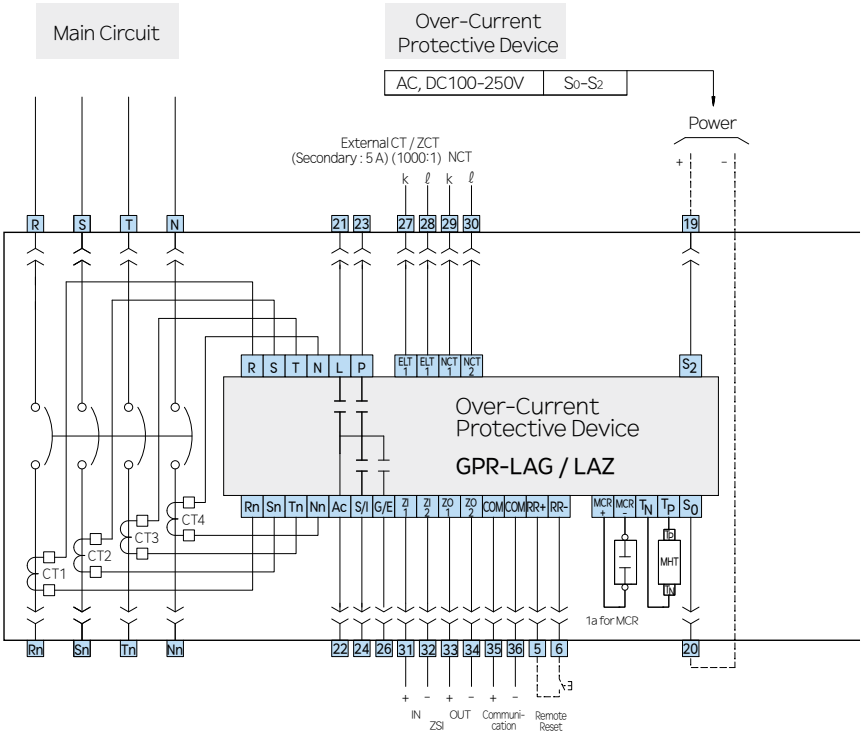


Accessories

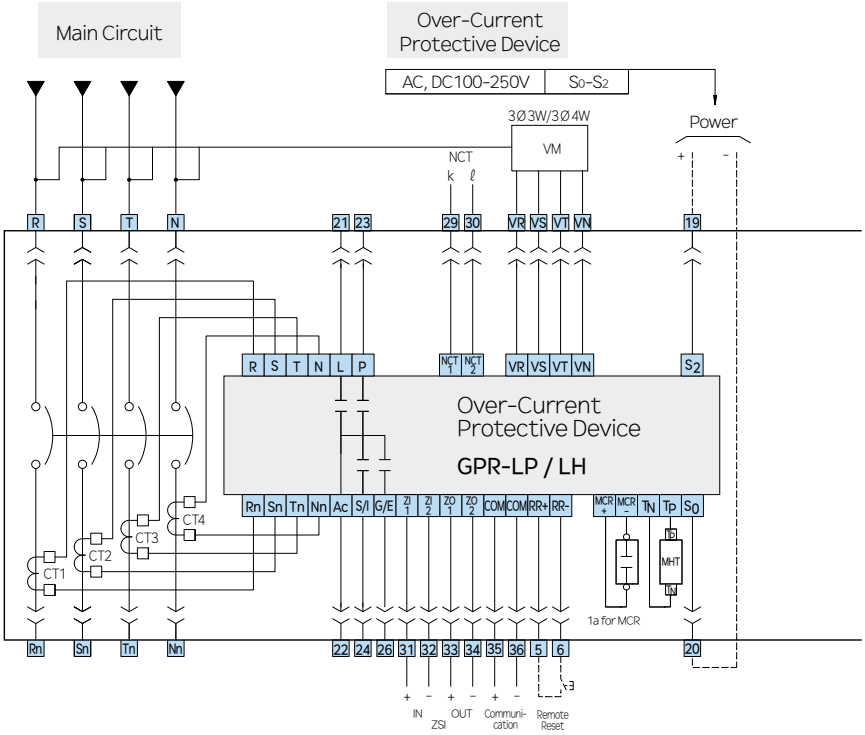
Over Current Relay (OCR)

Circuit Diagrams

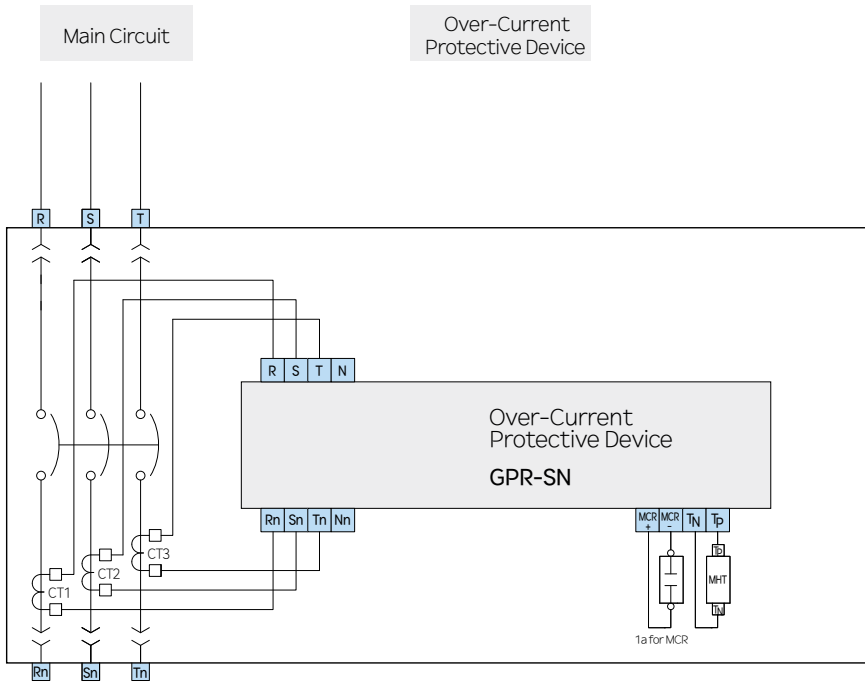
GPR-LAG/LAZ



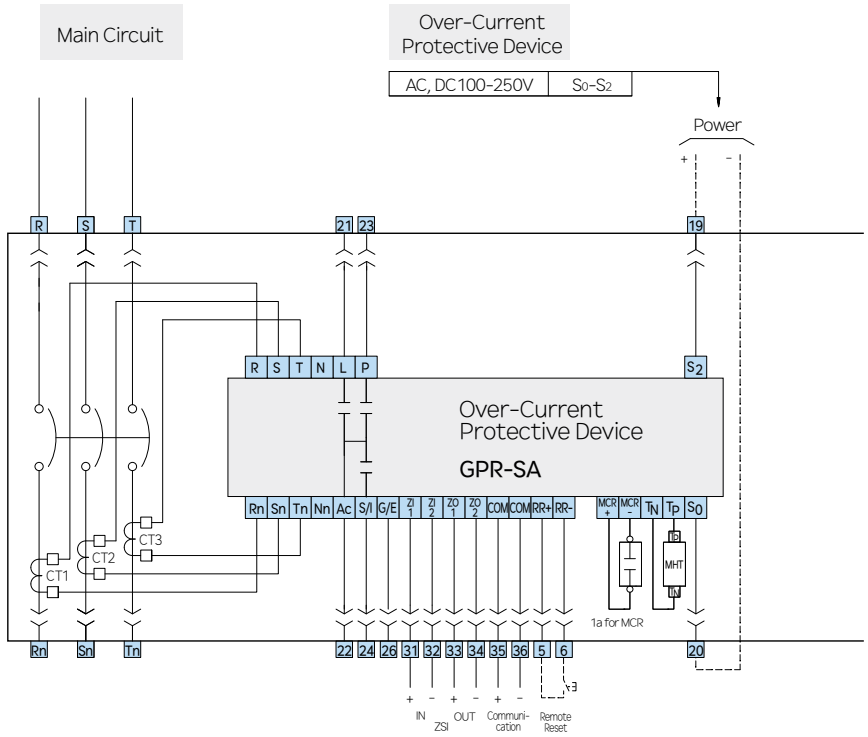
GPR-LP/LH



GPR-SN


Main Circuit
Over-Current Protective Device
R S T
R S T N
Over-Current Protective Device
GPR-SN
Rn Sn Tn Nn
MCR + MCR - TN TP
CT1 CT2 CT3
MHT
1a for MCR
Rn Sn Tn

GPR-SA

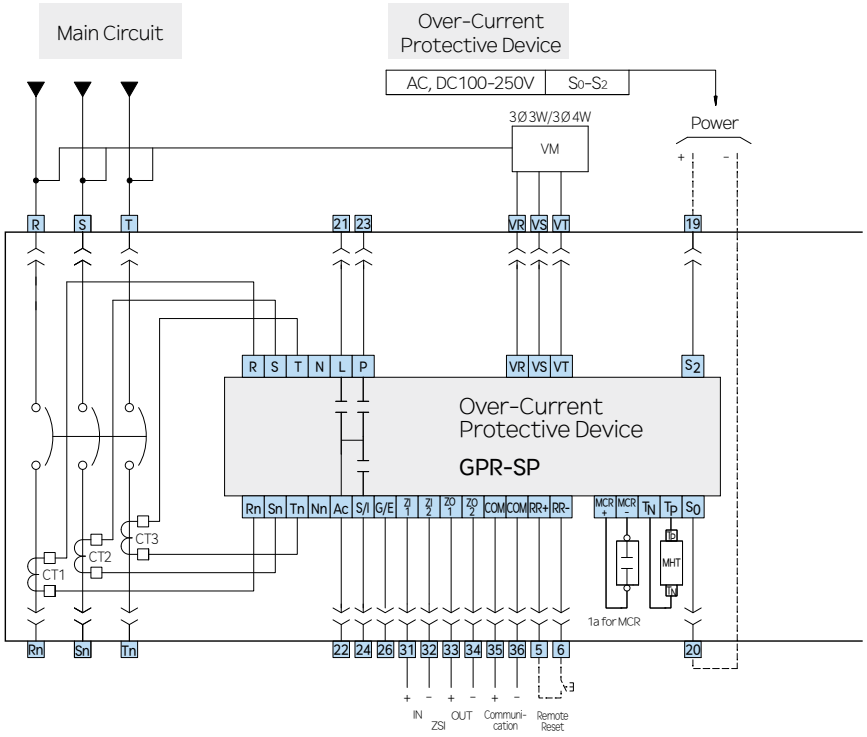

Main Circuit
Over-Current Protective Device
AC, DC100-250V
S0-S2
Power
R S T
21 23
19
R S T N L P
S2
Over-Current Protective Device
GPR-SA
Rn Sn Tn Nn Ac S/I G/E ZI 1 ZI 2 ZO 1 ZO 2 COM COM RR+ RR-
MCR + MCR - TN TP S0
CT1 CT2 CT3
MHT
1a for MCR
Rn Sn Tn
22 24 26 31 32 33 34 35 36 5 6
20
IN ZSI OUT Communi-cation Remote Reset

Accessories

Over Current Relay (OCR)

Circuit Diagrams

GPR-SP



※ 52번 62 (GPR-LAG) 53-63 (GPR-LAZ)인 경우 CT연결선 27, 28 은 5m이내로 구성하십시오.
Remote Reset (RR) 5번 6번 회로의 연결선은 5m이내로 구성하십시오.

Time Chart for LTD Inverse Time (General Feeder)

Item	x Ir \ Tr	LTD Time Setting (sec)									
		0.5	1.25	2	2.5	5	10	15	20	25	30
Overload Rate (%)	115	25.05	62.62	100.19	125.23	250.47	500.93	751.40	1,001.87	1,252.34	1,502.80
	120	21.04	52.61	84.17	105.22	210.43	420.87	631.30	841.74	1,052.17	1,262.61
	125	18.13	45.33	72.53	90.67	181.33	362.66	543.99	725.32	906.66	1,087.99
	130	15.90	39.75	63.60	79.50	158.99	317.99	476.98	635.97	794.96	953.96
	135	14.12	35.30	56.48	70.61	141.21	282.42	423.64	564.85	706.06	847.27
	140	12.67	31.67	50.67	63.34	126.69	253.37	380.06	506.74	633.43	760.11
	145	11.46	28.64	45.83	57.29	114.58	229.15	343.73	458.31	572.88	687.46
	150	10.43	26.08	41.73	52.16	104.33	208.65	312.98	417.30	521.63	625.95
	155	9.55	23.88	38.21	47.77	95.53	191.07	286.60	382.13	477.67	573.20
	160	8.79	21.98	35.17	43.96	87.91	175.83	263.74	351.65	439.57	527.48
	165	8.12	20.31	32.50	40.62	81.25	162.50	243.75	325.00	406.25	487.50
	170	7.54	18.84	30.15	37.69	75.38	150.75	226.13	301.50	376.88	452.25
	175	7.02	17.54	28.07	35.08	70.16	140.33	210.49	280.65	350.82	420.98
	180	6.55	16.38	26.20	32.76	65.51	131.02	196.53	262.04	327.55	393.06
	185	6.13	15.33	24.53	30.67	61.33	122.67	184.00	245.34	306.67	368.01
	190	5.76	14.39	23.03	28.78	57.57	115.14	172.71	230.28	287.85	345.42
	195	5.42	13.54	21.66	27.08	54.16	108.32	162.48	216.64	270.80	324.96
	200	5.11	12.77	20.42	25.53	51.06	102.12	153.18	204.24	255.30	306.36
	205	4.82	12.06	19.29	24.12	48.23	96.46	144.70	192.93	241.16	289.39
	210	4.56	11.41	18.26	22.82	45.64	91.29	136.93	182.57	228.22	273.86
	215	4.33	10.82	17.31	21.63	43.27	86.53	129.80	173.07	216.33	259.60
	220	4.11	10.27	16.43	20.54	41.08	82.16	123.23	164.31	205.39	246.47
	225	3.91	9.76	15.62	19.53	39.06	78.12	117.18	156.23	195.29	234.35
	230	3.72	9.30	14.88	18.59	37.19	74.38	111.57	148.76	185.95	223.14
	235	3.55	8.86	14.18	17.73	35.46	70.91	106.37	141.82	177.28	212.74
	240	3.38	8.46	13.54	16.92	33.85	67.69	101.54	135.38	169.23	203.07
	245	3.23	8.09	12.94	16.17	32.35	64.69	97.04	129.38	161.73	194.07
	250	3.09	7.74	12.38	15.47	30.95	61.89	92.84	123.78	154.73	185.67
	255	2.96	7.41	11.86	14.82	29.64	59.28	88.91	118.55	148.19	177.83
	260	2.84	7.10	11.37	14.21	28.41	56.83	85.24	113.65	142.07	170.48
	265	2.73	6.82	10.91	13.63	27.27	54.53	81.80	109.06	136.33	163.59
	270	2.62	6.55	10.47	13.09	26.19	52.37	78.56	104.75	130.94	157.12
	275	2.52	6.29	10.07	12.59	25.17	50.35	75.52	100.69	125.87	151.04
	280	2.42	6.05	9.69	12.11	24.22	48.44	72.66	96.87	121.09	145.31
	285	2.33	5.83	9.33	11.66	23.32	46.64	69.95	93.27	116.59	139.91
	290	2.25	5.62	8.99	11.23	22.47	44.94	67.41	89.87	112.34	134.81
	295	2.17	5.42	8.67	10.83	21.67	43.33	65.00	86.66	108.33	129.99
	300	2.09	5.23	8.36	10.45	20.91	41.81	62.72	83.62	104.53	125.43
	305	2.02	5.05	8.07	10.09	20.19	40.37	60.56	80.74	100.93	121.11
	310	1.95	4.88	7.80	9.75	19.50	39.00	58.51	78.01	97.51	117.01
	315	1.89	4.71	7.54	9.43	18.85	37.71	56.56	75.42	94.27	113.13
	320	1.82	4.56	7.30	9.12	18.24	36.48	54.72	72.95	91.19	109.43
	325	1.77	4.41	7.06	8.83	17.65	35.31	52.96	70.61	88.27	105.92
	330	1.71	4.27	6.84	8.55	17.10	34.19	51.29	68.38	85.48	102.57
	335	1.66	4.14	6.63	8.28	16.56	33.13	49.69	66.26	82.82	99.39
	340	1.61	4.01	6.42	8.03	16.06	32.12	48.18	64.23	80.29	96.35
	345	1.56	3.89	6.23	7.79	15.58	31.15	46.73	62.30	77.88	93.45
	350	1.51	3.78	6.05	7.56	15.11	30.23	45.34	60.46	75.57	90.69
	355	1.47	3.67	5.87	7.34	14.67	29.35	44.02	58.70	73.37	88.04
	360	1.43	3.56	5.70	7.13	14.25	28.50	42.76	57.01	71.26	85.51
	365	1.38	3.46	5.54	6.92	13.85	27.70	41.55	55.40	69.24	83.09
	370	1.35	3.37	5.39	6.73	13.46	26.93	40.39	53.85	67.31	80.78
	375	1.31	3.27	5.24	6.55	13.09	26.19	39.28	52.37	65.46	78.56

Accessories

Over Current Relay (OCR)

Time Chart for LTD Inverse Time (General Feeder)

Item	Tr / x Ir	LTD Time Setting (sec)									
		0.5	1.25	2	2.5	5	10	15	20	25	30
Overload Rate (%)	380	1.27	3.18	5.10	6.37	12.74	25.48	38.21	50.95	63.69	76.43
	385	1.24	3.10	4.96	6.20	12.40	24.79	37.19	49.59	61.99	74.38
	390	1.21	3.02	4.83	6.04	12.07	24.14	36.21	48.28	60.35	72.42
	395	1.18	2.94	4.70	5.88	11.76	23.51	35.27	47.03	58.78	70.54
	400	1.15	2.86	4.58	5.73	11.45	22.91	34.36	45.82	57.27	68.73
	405	1.12	2.79	4.47	5.58	11.16	22.33	33.49	44.66	55.82	66.99
	410	1.09	2.72	4.35	5.44	10.89	21.77	32.66	43.54	54.43	65.31
	415	1.06	2.65	4.25	5.31	10.62	21.23	31.85	42.47	53.08	63.70
	420	1.04	2.59	4.14	5.18	10.36	20.72	31.07	41.43	51.79	62.15
	425	1.01	2.53	4.04	5.05	10.11	20.22	30.33	40.44	50.54	60.65
	430	0.99	2.47	3.95	4.93	9.87	19.74	29.61	39.47	49.34	59.21
	435	0.96	2.41	3.85	4.82	9.64	19.27	28.91	38.55	48.18	57.82
	440	0.94	2.35	3.77	4.71	9.41	18.83	28.24	37.65	47.07	56.48
	445	0.92	2.30	3.68	4.60	9.20	18.39	27.59	36.79	45.99	55.18
	450	0.90	2.25	3.60	4.49	8.99	17.98	26.97	35.95	44.94	53.93
	455	0.88	2.20	3.51	4.39	8.79	17.57	26.36	35.15	43.94	52.72
	460	0.86	2.15	3.44	4.30	8.59	17.19	25.78	34.37	42.96	51.56
	465	0.84	2.10	3.36	4.20	8.40	16.81	25.21	33.62	42.02	50.43
	470	0.82	2.06	3.29	4.11	8.22	16.44	24.67	32.89	41.11	49.33
	475	0.80	2.01	3.22	4.02	8.05	16.09	24.14	32.18	40.23	48.28
	480	0.79	1.97	3.15	3.94	7.88	15.75	23.63	31.50	39.38	47.25
	485	0.77	1.93	3.08	3.86	7.71	15.42	23.13	30.84	38.55	46.26
	490	0.76	1.89	3.02	3.78	7.55	15.10	22.65	30.20	37.75	45.30
	495	0.74	1.85	2.96	3.70	7.40	14.79	22.19	29.58	36.98	44.37
	500	0.72	1.81	2.90	3.62	7.25	14.49	21.74	28.98	36.23	43.47
	505	0.71	1.77	2.84	3.55	7.10	14.20	21.30	28.40	35.50	42.60
	510	0.70	1.74	2.78	3.48	6.96	13.92	20.88	27.83	34.79	41.75
	515	0.68	1.71	2.73	3.41	6.82	13.64	20.46	27.29	34.11	40.93
	520	0.67	1.67	2.68	3.34	6.69	13.38	20.07	26.75	33.44	40.13
	525	0.66	1.64	2.62	3.28	6.56	13.12	19.68	26.24	32.80	39.36
	530	0.64	1.61	2.57	3.22	6.43	12.87	19.30	25.74	32.17	38.60
	535	0.63	1.58	2.52	3.16	6.31	12.62	18.94	25.25	31.56	37.87
	540	0.62	1.55	2.48	3.10	6.19	12.39	18.58	24.77	30.97	37.16
	545	0.61	1.52	2.43	3.04	6.08	12.16	18.24	24.31	30.39	36.47
	550	0.60	1.49	2.39	2.98	5.97	11.93	17.90	23.87	29.83	35.80
	555	0.59	1.46	2.34	2.93	5.86	11.72	17.57	23.43	29.29	35.15
	560	0.58	1.44	2.30	2.88	5.75	11.50	17.26	23.01	28.76	34.51
	565	0.56	1.41	2.26	2.82	5.65	11.30	16.95	22.60	28.24	33.89
	570	0.55	1.39	2.22	2.77	5.55	11.10	16.65	22.19	27.74	33.29
	575	0.55	1.36	2.18	2.73	5.45	10.90	16.35	21.80	27.26	32.71
	580	0.54	1.34	2.14	2.68	5.36	10.71	16.07	21.42	26.78	32.14
	585	0.53	1.32	2.11	2.63	5.26	10.53	15.79	21.05	26.32	31.58
	590	0.52	1.29	2.07	2.59	5.17	10.35	15.52	20.69	25.87	31.04
	595	0.51	1.27	2.03	2.54	5.09	10.17	15.26	20.34	25.43	30.51
	600	0.50	1.25	2.00	2.50	5.00	10.00	15.00	20.00	25.00	30.00
	605	0.49	1.23	1.97	2.46	4.92	9.83	14.75	19.67	24.58	29.50
	610	0.48	1.21	1.93	2.42	4.84	9.67	14.51	19.34	24.18	29.01
	615	0.48	1.19	1.90	2.38	4.76	9.51	14.27	19.02	23.78	28.53
	620	0.47	1.17	1.87	2.34	4.68	9.36	14.04	18.71	23.39	28.07
	625	0.46	1.15	1.84	2.30	4.60	9.21	13.81	18.41	23.01	27.62
	630	0.45	1.13	1.81	2.26	4.53	9.06	13.59	18.12	22.65	27.17
	635	0.45	1.11	1.78	2.23	4.46	8.91	13.37	17.83	22.29	26.74
	640	0.44	1.10	1.75	2.19	4.39	8.77	13.16	17.55	21.93	26.32

Item	x Ir \ Tr	LTD Time Setting (sec)									
		0.5	1.25	2	2.5	5	10	15	20	25	30
Overload Rate (%)	645	0.43	1.08	1.73	2.16	4.32	8.64	12.96	17.27	21.59	25.91
	650	0.43	1.06	1.70	2.13	4.25	8.50	12.75	17.01	21.26	25.51
	655	0.42	1.05	1.67	2.09	4.19	8.37	12.56	16.74	20.93	25.12
	660	0.41	1.03	1.65	2.06	4.12	8.24	12.37	16.49	20.61	24.73
	665	0.41	1.01	1.62	2.03	4.06	8.12	12.18	16.24	20.30	24.36
	670	0.40	1.00	1.60	2.00	4.00	8.00	12.00	15.99	19.99	23.99
	675	0.39	0.98	1.58	1.97	3.94	7.88	11.82	15.76	19.69	23.63
	680	0.39	0.97	1.55	1.94	3.88	7.76	11.64	15.52	19.40	23.28
	685	0.38	0.96	1.53	1.91	3.82	7.65	11.47	15.29	19.12	22.94
	690	0.38	0.94	1.51	1.88	3.77	7.54	11.30	15.07	18.84	22.61
	695	0.37	0.93	1.49	1.86	3.71	7.43	11.14	14.85	18.57	22.28
	700	0.37	0.91	1.46	1.83	3.66	7.32	10.98	14.64	18.30	21.96
	705	0.36	0.90	1.44	1.80	3.61	7.21	10.82	14.43	18.04	21.64
	710	0.36	0.89	1.42	1.78	3.56	7.11	10.67	14.23	17.78	21.34
	715	0.35	0.88	1.40	1.75	3.51	7.01	10.52	14.02	17.53	21.04
	720	0.35	0.86	1.38	1.73	3.46	6.91	10.37	13.83	17.29	20.74
	725	0.34	0.85	1.36	1.70	3.41	6.82	10.23	13.64	17.05	20.46
	730	0.34	0.84	1.34	1.68	3.36	6.72	10.09	13.45	16.81	20.17
	735	0.33	0.83	1.33	1.66	3.32	6.63	9.95	13.26	16.58	19.90
	740	0.33	0.82	1.31	1.64	3.27	6.54	9.81	13.08	16.36	19.63
	745	0.32	0.81	1.29	1.61	3.23	6.45	9.68	12.91	16.14	19.36
	750	0.32	0.80	1.27	1.59	3.18	6.37	9.55	12.73	15.92	19.10
	755	0.31	0.79	1.26	1.57	3.14	6.28	9.42	12.57	15.71	18.85
	760	0.31	0.77	1.24	1.55	3.10	6.20	9.30	12.40	15.50	18.60
	765	0.31	0.76	1.22	1.53	3.06	6.12	9.18	12.24	15.30	18.35
	770	0.30	0.75	1.21	1.51	3.02	6.04	9.06	12.08	15.10	18.11
	775	0.30	0.74	1.19	1.49	2.98	5.96	8.94	11.92	14.90	17.88
	780	0.29	0.74	1.18	1.47	2.94	5.88	8.82	11.77	14.71	17.65
	785	0.29	0.73	1.16	1.45	2.90	5.81	8.71	11.62	14.52	17.42
	790	0.29	0.72	1.15	1.43	2.87	5.73	8.60	11.47	14.33	17.20
	795	0.28	0.71	1.13	1.42	2.83	5.66	8.49	11.32	14.15	16.98
	800	0.28	0.70	1.12	1.40	2.80	5.59	8.39	11.18	13.98	16.77
	805	0.28	0.69	1.10	1.38	2.76	5.52	8.28	11.04	13.80	16.56
	810	0.27	0.68	1.09	1.36	2.73	5.45	8.18	10.90	13.63	16.36
	815	0.27	0.67	1.08	1.35	2.69	5.38	8.08	10.77	13.46	16.15
	820	0.27	0.66	1.06	1.33	2.66	5.32	7.98	10.64	13.30	15.96
	825	0.26	0.66	1.05	1.31	2.63	5.25	7.88	10.51	13.14	15.76
	830	0.26	0.65	1.04	1.30	2.60	5.19	7.79	10.38	12.98	15.57
	835	0.26	0.64	1.03	1.28	2.56	5.13	7.69	10.26	12.82	15.38
	840	0.25	0.63	1.01	1.27	2.53	5.07	7.60	10.13	12.67	15.20
	845	0.25	0.63	1.00	1.25	2.50	5.01	7.51	10.01	12.52	15.02
	850	0.25	0.62	0.99	1.24	2.47	4.95	7.42	9.89	12.37	14.84
	855	0.24	0.61	0.98	1.22	2.44	4.89	7.33	9.78	12.22	14.67
	860	0.24	0.60	0.97	1.21	2.42	4.83	7.25	9.66	12.08	14.50
	865	0.24	0.60	0.96	1.19	2.39	4.78	7.16	9.55	11.94	14.33
	870	0.24	0.59	0.94	1.18	2.36	4.72	7.08	9.44	11.80	14.16
	875	0.23	0.58	0.93	1.17	2.33	4.67	7.00	9.33	11.67	14.00
	880	0.23	0.58	0.92	1.15	2.31	4.61	6.92	9.23	11.53	13.84
	885	0.23	0.57	0.91	1.14	2.28	4.56	6.84	9.12	11.40	13.68
	890	0.23	0.56	0.90	1.13	2.25	4.51	6.76	9.02	11.27	13.53
	895	0.22	0.56	0.89	1.11	2.23	4.46	6.69	8.92	11.15	13.38
	900	0.22	0.55	0.88	1.10	2.20	4.41	6.61	8.82	11.02	13.23
	905	0.22	0.55	0.87	1.09	2.18	4.36	6.54	8.72	10.90	13.08

Accessories

Over Current Relay (OCR)

Time Chart for LTD Inverse Time (General Feeder)

Item	x Ir \ Tr	LTD Time Setting (sec)									
		0.5	1.25	2	2.5	5	10	15	20	25	30
Overload Rate (%)	910	0.22	0.54	0.86	1.08	2.16	4.31	6.47	8.63	10.78	12.94
	915	0.21	0.53	0.85	1.07	2.13	4.27	6.40	8.53	10.66	12.80
	920	0.21	0.53	0.84	1.05	2.11	4.22	6.33	8.44	10.55	12.66
	925	0.21	0.52	0.83	1.04	2.09	4.17	6.26	8.35	10.43	12.52
	930	0.21	0.52	0.83	1.03	2.06	4.13	6.19	8.26	10.32	12.38
	935	0.20	0.51	0.82	1.02	2.04	4.08	6.13	8.17	10.21	12.25
	940	0.20	0.51	0.81	1.01	2.02	4.04	6.06	8.08	10.10	12.12
	945	0.20	0.50	0.80	1.00	2.00	4.00	6.00	7.99	9.99	11.99
	950	0.20	0.49	0.79	0.99	1.98	3.96	5.93	7.91	9.89	11.87
	955	0.20	0.49	0.78	0.98	1.96	3.91	5.87	7.83	9.78	11.74
	960	0.19	0.48	0.77	0.97	1.94	3.87	5.81	7.75	9.68	11.62
	965	0.19	0.48	0.77	0.96	1.92	3.83	5.75	7.67	9.58	11.50
	970	0.19	0.47	0.76	0.95	1.90	3.79	5.69	7.59	9.48	11.38
	975	0.19	0.47	0.75	0.94	1.88	3.75	5.63	7.51	9.38	11.26
	980	0.19	0.46	0.74	0.93	1.86	3.72	5.57	7.43	9.29	11.15
	985	0.18	0.46	0.74	0.92	1.84	3.68	5.52	7.36	9.19	11.03
	990	0.18	0.46	0.73	0.91	1.82	3.64	5.46	7.28	9.10	10.92
	995	0.18	0.45	0.72	0.90	1.80	3.60	5.41	7.21	9.01	10.81
	1,000	0.18	0.45	0.71	0.89	1.78	3.57	5.35	7.14	8.92	10.70

Time Chart for LTD Inverse Time (Generator)

Item	x Ir \ Tr	LTD Time Setting (sec)								
		10	15	20	25	30	35	40	50	60
Overload Rate (%)	101	33.12	49.68	66.24	82.80	99.36	115.92	132.49	165.61	198.73
	105	20.04	30.05	40.07	50.09	60.11	70.12	80.14	100.18	120.21
	110	14.77	22.16	29.54	36.93	44.31	51.70	59.08	73.85	88.63
	115	11.90	17.85	23.80	29.76	35.71	41.66	47.61	59.51	71.41
	120	10.00	15.00	20.00	25.00	30.00	35.00	40.00	50.00	60.00
	125	8.62	12.93	17.23	21.54	25.85	30.16	34.47	43.08	51.70
	130	7.56	11.33	15.11	18.89	22.67	26.44	30.22	37.78	45.33
	135	6.71	10.07	13.42	16.78	20.13	23.49	26.84	33.55	40.26
	140	6.02	9.03	12.04	15.05	18.06	21.07	24.08	30.10	36.12
	145	5.44	8.17	10.89	13.61	16.33	19.06	21.78	27.22	32.67
	150	4.96	7.44	9.92	12.39	14.87	17.35	19.83	24.79	29.75
	155	4.54	6.81	9.08	11.35	13.62	15.89	18.16	22.70	27.24
	160	4.18	6.27	8.36	10.44	12.53	14.62	16.71	20.89	25.07
	165	3.86	5.79	7.72	9.65	11.58	13.51	15.44	19.31	23.17
	170	3.58	5.37	7.16	8.95	10.75	12.54	14.33	17.91	21.49
	175	3.33	5.00	6.67	8.34	10.00	11.67	13.34	16.67	20.01
	180	3.11	4.67	6.23	7.78	9.34	10.90	12.45	15.57	18.68
	185	2.91	4.37	5.83	7.29	8.74	10.20	11.66	14.57	17.49
	190	2.74	4.10	5.47	6.84	8.21	9.58	10.94	13.68	16.41
	195	2.57	3.86	5.15	6.43	7.72	9.01	10.29	12.87	15.44
	200	2.43	3.64	4.85	6.07	7.28	8.49	9.71	12.13	14.56
	205	2.29	3.44	4.58	5.73	6.88	8.02	9.17	11.46	13.75
	210	2.17	3.25	4.34	5.42	6.51	7.59	8.68	10.85	13.01
	215	2.06	3.08	4.11	5.14	6.17	7.20	8.22	10.28	12.34
	220	1.95	2.93	3.90	4.88	5.86	6.83	7.81	9.76	11.71
	225	1.86	2.78	3.71	4.64	5.57	6.50	7.42	9.28	11.14
	230	1.77	2.65	3.53	4.42	5.30	6.19	7.07	8.84	10.60
	235	1.68	2.53	3.37	4.21	5.05	5.90	6.74	8.42	10.11
	240	1.61	2.41	3.22	4.02	4.83	5.63	6.43	8.04	9.65
	245	1.54	2.31	3.07	3.84	4.61	5.38	6.15	7.69	9.22
	250	1.47	2.21	2.94	3.68	4.41	5.15	5.88	7.35	8.82
	255	1.41	2.11	2.82	3.52	4.23	4.93	5.63	7.04	8.45
	260	1.35	2.03	2.70	3.38	4.05	4.73	5.40	6.75	8.10
	265	1.30	1.94	2.59	3.24	3.89	4.53	5.18	6.48	7.77
	270	1.24	1.87	2.49	3.11	3.73	4.36	4.98	6.22	7.47
	275	1.20	1.79	2.39	2.99	3.59	4.19	4.78	5.98	7.18
	280	1.15	1.73	2.30	2.88	3.45	4.03	4.60	5.75	6.91
	285	1.11	1.66	2.22	2.77	3.32	3.88	4.43	5.54	6.65
	290	1.07	1.60	2.14	2.67	3.20	3.74	4.27	5.34	6.41
	295	1.03	1.54	2.06	2.57	3.09	3.60	4.12	5.15	6.18
	300	0.99	1.49	1.99	2.48	2.98	3.48	3.97	4.97	5.96
	305	0.96	1.44	1.92	2.40	2.88	3.36	3.84	4.80	5.76
	310	0.93	1.39	1.85	2.32	2.78	3.24	3.71	4.63	5.56
	315	0.90	1.34	1.79	2.24	2.69	3.14	3.58	4.48	5.38
	320	0.87	1.30	1.73	2.17	2.60	3.03	3.47	4.33	5.20
	325	0.84	1.26	1.68	2.10	2.52	2.94	3.36	4.19	5.03
	330	0.81	1.22	1.62	2.03	2.44	2.84	3.25	4.06	4.87
	335	0.79	1.18	1.57	1.97	2.36	2.76	3.15	3.94	4.72
	340	0.76	1.14	1.53	1.91	2.29	2.67	3.05	3.82	4.58
	345	0.74	1.11	1.48	1.85	2.22	2.59	2.96	3.70	4.44
	350	0.72	1.08	1.44	1.80	2.15	2.51	2.87	3.59	4.31
	355	0.70	1.05	1.39	1.74	2.09	2.44	2.79	3.49	4.18
	360	0.68	1.02	1.35	1.69	2.03	2.37	2.71	3.39	4.06

Accessories

Over Current Relay (OCR)

Time Chart for LTD Inverse Time (Generator)

Item	Tr / x Ir	LTD Time Setting (sec)								
		10	15	20	25	30	35	40	50	60
Overload Rate (%)	365	0.66	0.99	1.32	1.65	1.97	2.30	2.63	3.29	3.95
	370	0.64	0.96	1.28	1.60	1.92	2.24	2.56	3.20	3.84
	375	0.62	0.93	1.24	1.56	1.87	2.18	2.49	3.11	3.73
	380	0.61	0.91	1.21	1.51	1.82	2.12	2.42	3.03	3.63
	385	0.59	0.88	1.18	1.47	1.77	2.06	2.36	2.95	3.53
	390	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.87	3.44
	395	0.56	0.84	1.12	1.40	1.68	1.96	2.23	2.79	3.35
	400	0.54	0.82	1.09	1.36	1.63	1.91	2.18	2.72	3.27
	405	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.65	3.18
	410	0.52	0.78	1.03	1.29	1.55	1.81	2.07	2.59	3.10
	415	0.50	0.76	1.01	1.26	1.51	1.77	2.02	2.52	3.03
	420	0.49	0.74	0.98	1.23	1.48	1.72	1.97	2.46	2.95
	425	0.48	0.72	0.96	1.20	1.44	1.68	1.92	2.40	2.88
	430	0.47	0.70	0.94	1.17	1.41	1.64	1.88	2.34	2.81
	435	0.46	0.69	0.92	1.14	1.37	1.60	1.83	2.29	2.75
	440	0.45	0.67	0.89	1.12	1.34	1.57	1.79	2.24	2.68
	445	0.44	0.66	0.87	1.09	1.31	1.53	1.75	2.19	2.62
	450	0.43	0.64	0.85	1.07	1.28	1.50	1.71	2.14	2.56
	455	0.42	0.63	0.84	1.04	1.25	1.46	1.67	2.09	2.51
	460	0.41	0.61	0.82	1.02	1.22	1.43	1.63	2.04	2.45
	465	0.40	0.60	0.80	1.00	1.20	1.40	1.60	2.00	2.40
	470	0.39	0.59	0.78	0.98	1.17	1.37	1.56	1.95	2.34
	475	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.91	2.29
	480	0.37	0.56	0.75	0.94	1.12	1.31	1.50	1.87	2.25
	485	0.37	0.55	0.73	0.92	1.10	1.28	1.47	1.83	2.20
	490	0.36	0.54	0.72	0.90	1.08	1.26	1.44	1.79	2.15
	495	0.35	0.53	0.70	0.88	1.05	1.23	1.41	1.76	2.11
	500	0.34	0.52	0.69	0.86	1.03	1.21	1.38	1.72	2.07
	505	0.34	0.51	0.67	0.84	1.01	1.18	1.35	1.69	2.02
	510	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.65	1.98
	515	0.32	0.49	0.65	0.81	0.97	1.13	1.30	1.62	1.94
	520	0.32	0.48	0.64	0.79	0.95	1.11	1.27	1.59	1.91
	525	0.31	0.47	0.62	0.78	0.94	1.09	1.25	1.56	1.87
	530	0.31	0.46	0.61	0.76	0.92	1.07	1.22	1.53	1.83
	535	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.50	1.80
	540	0.29	0.44	0.59	0.74	0.88	1.03	1.18	1.47	1.77
	545	0.29	0.43	0.58	0.72	0.87	1.01	1.16	1.44	1.73
	550	0.28	0.43	0.57	0.71	0.85	0.99	1.13	1.42	1.70
	555	0.28	0.42	0.56	0.70	0.84	0.97	1.11	1.39	1.67
	560	0.27	0.41	0.55	0.68	0.82	0.96	1.09	1.37	1.64
	565	0.27	0.40	0.54	0.67	0.81	0.94	1.07	1.34	1.61
	570	0.26	0.40	0.53	0.66	0.79	0.92	1.05	1.32	1.58
	575	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.30	1.55
	580	0.25	0.38	0.51	0.64	0.76	0.89	1.02	1.27	1.53
	585	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.25	1.50
	590	0.25	0.37	0.49	0.61	0.74	0.86	0.98	1.23	1.48
	595	0.24	0.36	0.48	0.60	0.73	0.85	0.97	1.21	1.45
	600	0.24	0.36	0.48	0.59	0.71	0.83	0.95	1.19	1.43
	605	0.23	0.35	0.47	0.58	0.70	0.82	0.93	1.17	1.40
	610	0.23	0.34	0.46	0.57	0.69	0.80	0.92	1.15	1.38
	615	0.23	0.34	0.45	0.56	0.68	0.79	0.90	1.13	1.36
	620	0.22	0.33	0.44	0.56	0.67	0.78	0.89	1.11	1.33
	625	0.22	0.33	0.44	0.55	0.66	0.77	0.87	1.09	1.31

Item	x Ir \ Tr	LTD Time Setting (sec)								
		10	15	20	25	30	35	40	50	60
Overload Rate (%)	630	0.22	0.32	0.43	0.54	0.65	0.75	0.86	1.08	1.29
	635	0.21	0.32	0.42	0.53	0.64	0.74	0.85	1.06	1.27
	640	0.21	0.31	0.42	0.52	0.63	0.73	0.83	1.04	1.25
	645	0.21	0.31	0.41	0.51	0.62	0.72	0.82	1.03	1.23
	650	0.20	0.30	0.40	0.51	0.61	0.71	0.81	1.01	1.21
	655	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.99	1.19
	660	0.20	0.29	0.39	0.49	0.59	0.69	0.78	0.98	1.18
	665	0.19	0.29	0.39	0.48	0.58	0.68	0.77	0.96	1.16
	670	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.95	1.14
	675	0.19	0.28	0.37	0.47	0.56	0.66	0.75	0.94	1.12
	680	0.18	0.28	0.37	0.46	0.55	0.65	0.74	0.92	1.11
	685	0.18	0.27	0.36	0.45	0.55	0.64	0.73	0.91	1.09
	690	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.90	1.07
	695	0.18	0.26	0.35	0.44	0.53	0.62	0.71	0.88	1.06
	700	0.17	0.26	0.35	0.43	0.52	0.61	0.70	0.87	1.04
	705	0.17	0.26	0.34	0.43	0.51	0.60	0.69	0.86	1.03
	710	0.17	0.25	0.34	0.42	0.51	0.59	0.68	0.84	1.01
	715	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.83	1.00
	720	0.16	0.25	0.33	0.41	0.49	0.58	0.66	0.82	0.99
	725	0.16	0.24	0.32	0.41	0.49	0.57	0.65	0.81	0.97
	730	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.80	0.96
	735	0.16	0.24	0.32	0.39	0.47	0.55	0.63	0.79	0.95
	740	0.16	0.23	0.31	0.39	0.47	0.54	0.62	0.78	0.93
	745	0.15	0.23	0.31	0.38	0.46	0.54	0.61	0.77	0.92
	750	0.15	0.23	0.30	0.38	0.45	0.53	0.61	0.76	0.91
	755	0.15	0.22	0.30	0.37	0.45	0.52	0.60	0.75	0.90
	760	0.15	0.22	0.29	0.37	0.44	0.52	0.59	0.74	0.88
	765	0.15	0.22	0.29	0.36	0.44	0.51	0.58	0.73	0.87
	770	0.14	0.22	0.29	0.36	0.43	0.50	0.57	0.72	0.86
	775	0.14	0.21	0.28	0.35	0.42	0.50	0.57	0.71	0.85
	780	0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.70	0.84
	785	0.14	0.21	0.28	0.34	0.41	0.48	0.55	0.69	0.83
	790	0.14	0.20	0.27	0.34	0.41	0.48	0.54	0.68	0.82
	795	0.13	0.20	0.27	0.34	0.40	0.47	0.54	0.67	0.81
	800	0.13	0.20	0.27	0.33	0.40	0.46	0.53	0.66	0.80
	805	0.13	0.20	0.26	0.33	0.39	0.46	0.52	0.66	0.79
	810	0.13	0.19	0.26	0.32	0.39	0.45	0.52	0.65	0.78
	815	0.13	0.19	0.26	0.32	0.38	0.45	0.51	0.64	0.77
	820	0.13	0.19	0.25	0.32	0.38	0.44	0.51	0.63	0.76
	825	0.12	0.19	0.25	0.31	0.37	0.44	0.50	0.62	0.75
	830	0.12	0.18	0.25	0.31	0.37	0.43	0.49	0.62	0.74
	835	0.12	0.18	0.24	0.30	0.37	0.43	0.49	0.61	0.73
	840	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.60	0.72
	845	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.59	0.71
	850	0.12	0.18	0.24	0.29	0.35	0.41	0.47	0.59	0.71
	855	0.12	0.17	0.23	0.29	0.35	0.41	0.46	0.58	0.70
	860	0.11	0.17	0.23	0.29	0.34	0.40	0.46	0.57	0.69
	865	0.11	0.17	0.23	0.28	0.34	0.40	0.45	0.57	0.68
	870	0.11	0.17	0.22	0.28	0.34	0.39	0.45	0.56	0.67
	875	0.11	0.17	0.22	0.28	0.33	0.39	0.44	0.55	0.67
	880	0.11	0.16	0.22	0.27	0.33	0.38	0.44	0.55	0.66
	885	0.11	0.16	0.22	0.27	0.33	0.38	0.43	0.54	0.65
	890	0.11	0.16	0.21	0.27	0.32	0.38	0.43	0.54	0.64

Accessories

Over Current Relay (OCR)

Time Chart for LTD Inverse Time (Generator)

Item	x Ir \ Tr	LTD Time Setting (sec)								
		10	15	20	25	30	35	40	50	60
Overload Rate (%)	895	0.11	0.16	0.21	0.26	0.32	0.37	0.42	0.52	0.64
	900	0.10	0.16	0.21	0.26	0.31	0.37	0.42	0.52	0.63
	905	0.10	0.16	0.21	0.26	0.31	0.36	0.41	0.52	0.62
	910	0.10	0.15	0.20	0.26	0.31	0.36	0.41	0.51	0.61
	915	0.10	0.15	0.20	0.25	0.30	0.35	0.41	0.51	0.61
	920	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.50	0.60
	925	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.50	0.59
	930	0.10	0.15	0.20	0.25	0.29	0.34	0.39	0.49	0.59
	935	0.10	0.15	0.19	0.24	0.29	0.34	0.39	0.49	0.58
	940	0.10	0.14	0.19	0.24	0.29	0.34	0.38	0.48	0.58
	945	0.09	0.14	0.19	0.24	0.28	0.33	0.38	0.47	0.57
	950	0.09	0.14	0.19	0.23	0.28	0.33	0.38	0.47	0.56
	955	0.09	0.14	0.19	0.23	0.28	0.33	0.37	0.46	0.56
	960	0.09	0.14	0.18	0.23	0.28	0.32	0.37	0.46	0.55
	965	0.09	0.14	0.18	0.23	0.27	0.32	0.36	0.46	0.55
	970	0.09	0.14	0.18	0.23	0.27	0.32	0.36	0.45	0.54
	975	0.09	0.13	0.18	0.22	0.27	0.31	0.36	0.45	0.54
	980	0.09	0.13	0.18	0.22	0.26	0.31	0.35	0.44	0.53
	985	0.09	0.13	0.17	0.22	0.26	0.31	0.35	0.44	0.52

Time Chart for STD Inverse Time (General Feeder)

Item	Tsd / x In	STD Time Setting (ms) Inland Type					
		50	100	200	300	400	500
Overload Rate (%)	100	5,000	10,000	20,000	30,000	40,000	50,000
	110	4,132	8,264	16,529	24,793	33,058	41,322
	120	3,472	6,944	13,889	20,833	27,778	34,722
	130	2,959	5,917	11,834	17,751	23,669	29,586
	140	2,551	5,102	10,204	15,306	20,408	25,510
	150	2,222	4,444	8,889	13,333	17,778	22,222
	160	1,953	3,906	7,813	11,719	15,625	19,531
	170	1,730	3,460	6,920	10,381	13,841	17,301
	180	1,543	3,086	6,173	9,259	12,346	15,432
	190	1,385	2,770	5,540	8,310	11,080	13,850
	200	1,250	2,500	5,000	7,500	10,000	12,500
	210	1,134	2,268	4,535	6,803	9,070	11,338
	220	1,033	2,066	4,132	6,198	8,264	10,331
	230	945	1,890	3,781	5,671	7,561	9,452
	240	868	1,736	3,472	5,208	6,944	8,681
	250	800	1,600	3,200	4,800	6,400	8,000
	260	740	1,479	2,959	4,438	5,917	7,396
	270	686	1,372	2,743	4,115	5,487	6,859
	280	638	1,276	2,551	3,827	5,102	6,378
	290	595	1,189	2,378	3,567	4,756	5,945
	300	556	1,111	2,222	3,333	4,444	5,556
	310	520	1,041	2,081	3,122	4,162	5,203
	320	488	977	1,953	2,930	3,906	4,883
	330	459	918	1,837	2,755	3,673	4,591
	340	433	865	1,730	2,595	3,460	4,325
	350	408	816	1,633	2,449	3,265	4,082
	360	386	772	1,543	2,315	3,086	3,858
	370	365	730	1,461	2,191	2,922	3,652
	380	346	693	1,385	2,078	2,770	3,463
	390	329	657	1,315	1,972	2,630	3,287
	400	313	625	1,250	1,875	2,500	3,125
	410	297	595	1,190	1,785	2,380	2,974
	420	283	567	1,134	1,701	2,268	2,834
	430	270	541	1,082	1,622	21,63	2,704
	440	258	517	1,033	1,550	2,066	2,583
	450	247	494	988	1,481	1,975	2,469
	460	236	473	945	1,418	1,890	2,363
	470	226	453	905	13,58	1,811	2,263
	480	217	434	868	1,302	1,736	2,170
	490	208	416	833	1,249	1,666	2,082
	500	200	400	800	1,200	1,600	2,000
	510	192	384	769	1,153	1,538	1,922
	520	185	370	740	1,109	1,479	1,849
	530	178	356	712	1,068	1,424	1,780
	540	171	343	686	1,029	1,372	1,715
	550	165	331	661	992	1,322	1,653
	560	159	319	638	957	1,276	1,594
	570	154	308	616	923	1,231	1,539
	580	149	297	595	892	1,189	1,486
	590	144	287	575	862	1149	1,436
	600	139	278	556	833	11,11	1,389
	610	134	269	537	806	1,075	1,344
	620	130	260	520	780	1,041	1,301

Item	Tsd / x In	STD Time Setting (ms) Inland Type					
		50	100	200	300	400	500
Overload Rate (%)	630	126	252	504	756	1,008	12,60
	640	122	244	488	732	977	1,221
	650	118	237	473	710	947	1,183
	660	115	230	459	689	918	1,148
	670	111	223	446	668	891	1,114
	680	108	216	433	649	865	1,081
	690	105	210	420	630	840	1,050
	700	102	204	408	612	816	1,020
	710	99	198	397	595	793	992
	720	96	193	386	579	772	965
	730	94	188	375	563	751	938
	740	91	183	365	548	730	913
	750	89	178	356	533	711	889
	760	87	173	346	519	693	866
	770	84	169	337	506	675	843
	780	82	164	329	493	657	822
	790	80	160	320	481	641	801
	800	78	156	313	469	625	781
	810	76	152	305	457	610	762
	820	74	149	297	446	595	744
	830	73	145	290	435	581	726
	840	71	142	283	425	567	709
	850	69	138	277	415	554	692
	860	68	135	270	406	541	676
	870	66	132	264	396	528	661
	880	65	129	258	387	517	646
	890	63	126	252	379	505	631
	900	62	123	247	370	494	617
	910	60	121	242	362	483	604
	920	59	118	236	354	473	591
	930	58	116	231	347	462	578
	940	57	113	226	340	453	566
	950	55	111	222	332	443	554
	960	54	109	217	326	434	543
	970	53	106	213	319	425	531
	980	52	104	208	312	416	521
	990	51	102	204	306	408	510
	1,000	50	100	200	300	400	500

Accessories

Over Current Relay (OCR)

Time Chart for STD Inverse Time (Generator)

Item	Tsd / x In	STD Time Setting (ms) Marine Type					
		50	100	200	300	400	500
Overload Rate (%)	100	1,250	2,500	5,000	7,500	1,0000	12,500
	110	1,033	2,066	4,132	6,198	8,264	10,331
	120	868	1,736	3,472	5,208	6,944	8,681
	130	740	1,479	2,959	4,438	5,917	7,396
	140	638	1,276	2,551	3,827	5,102	6,378
	150	556	1,111	2,222	3,333	4,444	5,556
	160	488	977	1,953	2,930	3,906	4,883
	170	433	865	1,730	2,595	3,460	4,325
	180	386	772	1,543	2,315	3,086	3,858
	190	346	693	1,385	2,078	2,770	3,463
	200	313	625	1,250	1,875	2,500	3,125
	210	283	567	1,134	1,701	2,268	2,834
	220	258	517	1,033	1,550	2,066	2,583
	230	236	473	945	1,418	1,890	2,363
	240	217	434	868	1,302	1,736	2,170
	250	200	400	800	1,200	1,600	2,000
	260	185	370	740	1,109	1,479	1,849
	270	171	343	686	1,029	1,372	1,715
	280	159	319	638	957	1,276	1,594
	290	149	297	595	892	1,189	1,486
	300	139	278	556	833	1,111	1,389
	310	130	260	520	780	1,041	1,301
	320	122	244	488	732	977	1,221
	330	115	230	459	689	918	1,148
	340	108	216	433	649	865	1,081
	350	102	204	408	612	816	1,020
	360	96	193	386	579	772	965
	370	91	183	365	548	730	913
	380	87	173	346	519	693	866
	390	82	164	329	493	657	822
	400	78	156	313	469	625	781
	410	74	149	297	446	595	744
	420	71	142	283	425	567	709
	430	68	135	270	406	541	676
	440	65	129	258	387	517	646
	450	62	123	247	370	494	617
	460	59	118	236	354	473	591
	470	57	113	226	340	453	566
	480	54	109	217	326	434	543
	490	52	104	208	312	416	521
	500	50	100	200	300	400	500

Time Chart for GFT Inverse Time (General Feeder)

Item	Tg / x Ict	GFT Time Setting (ms)					
		50	100	200	300	400	500
Detection Setting Current (%)	10	5,000	10,000	20,000	30,000	40,000	50,000
	11	4,132	8,264	16,529	24,793	33,058	41,322
	12	3,472	6,944	13,889	20,833	27,778	34,722
	13	2,959	5,917	11,834	17,751	23,669	29,586
	14	2,551	5,102	10,204	15,306	20,408	25,510
	15	2,222	4,444	8,889	13,333	17,778	22,222
	16	1,953	3,906	7,813	11,719	15,625	19,531
	17	1,730	3,460	6,920	10,381	13,841	17,301
	18	1,543	3,086	6,173	9,259	12,346	15,432
	19	1,385	2,770	5,540	8,310	11,080	13,850
	20	1,250	2,500	5,000	7,500	10,000	12,500
	21	1,134	2,268	4,535	6,803	9,070	11,338
	22	1,033	2,066	4,132	6,198	8,264	10,331
	23	945	1,890	3,781	5,671	7,561	9,452
	24	868	1,736	3,472	5,208	6,944	8,681
	25	800	1,600	3,200	4,800	6,400	8,000
	26	740	1,479	2,959	4,438	5,917	7,396
	27	686	1,372	2,743	4,115	5,487	6,859
	28	638	1,276	2,551	3,827	5,102	6,378
	29	595	1,189	2,378	3,567	4,756	5,945
	30	556	1,111	2,222	3,333	4,444	5,556
	31	520	1,041	2,081	3,122	4,162	5,203
	32	488	977	1,953	2,930	3,906	4,883
	33	459	918	1,837	2,755	3,673	4,591
	34	433	865	1,730	2,595	3,460	4,325
	35	408	816	1,633	2,449	3,265	4,082
	36	386	772	1,543	2,315	3,086	3,858
	37	365	730	1,461	2,191	2,922	3,652
	38	346	693	1,385	2,078	2,770	3,463
	39	329	657	1,315	1,972	2,630	3,287
	40	313	625	1,250	1,875	2,500	3,125
	41	297	595	1,190	1,785	2,380	2,974
	42	283	567	1,134	1,701	2,268	2,834
	43	270	541	1,082	1,622	2,163	2,704
	44	258	517	1,033	1,550	2,066	2,583
	45	247	494	988	1,481	1,975	2,469
	46	236	473	945	1,418	1,890	2,363
	47	226	453	905	1,358	1,811	2,263
	48	217	434	868	1,302	1,736	2,170
	49	208	416	833	1,249	1,666	2,082
	50	200	400	800	1,200	1,600	2,000
	51	192	384	769	1,153	1,538	1,922
	52	185	370	740	1,109	1,479	1,849
	53	178	356	712	1,068	1,424	1,780
	54	171	343	686	1,029	1,372	1715
	55	165	331	661	992	1,322	1,653
	56	159	319	638	957	1,276	1,594
	57	154	308	616	923	1,231	1,539
	58	149	297	595	892	1,189	1,486
	59	144	287	575	862	1,149	1,436
	60	139	278	556	833	1,111	1,389
	61	134	269	537	806	1,075	1,344
	62	130	260	520	780	1,041	1,301

Item	Tg / x Ict	GFT Time Setting (ms)					
		50	100	200	300	400	500
Detection Setting Current (%)	63	126	252	504	756	1,008	1,260
	64	122	244	488	732	977	1,221
	65	118	237	473	710	947	1,183
	66	115	230	459	689	918	1,148
	67	111	223	446	668	891	1,114
	68	108	216	433	649	865	1,081
	69	105	210	420	630	840	1,050
	70	102	204	408	612	816	1,020
	71	99	198	397	595	793	992
	72	96	193	386	579	772	965
	73	94	188	375	563	751	938
	74	91	183	365	548	730	913
	75	89	178	356	533	711	889
	76	87	173	346	519	693	866
	77	84	169	337	506	675	843
	78	82	164	329	493	657	822
	79	80	160	320	481	641	801
	80	78	156	313	469	625	781
	81	76	152	305	457	610	762
	82	74	149	297	446	595	744
	83	73	145	290	435	581	726
	84	71	142	283	425	567	709
	85	69	138	277	415	554	692
	86	68	135	270	406	541	676
	87	66	132	264	396	528	661
	88	65	129	258	387	517	646
	89	63	126	252	379	505	631
	90	62	123	247	370	494	617
	91	60	121	242	362	483	604
	92	59	118	236	354	473	591
	93	58	116	231	347	462	578
	94	57	113	226	340	453	566
	95	55	111	222	332	443	554
	96	54	109	217	326	434	543
	97	53	106	213	319	425	531
	98	52	104	208	312	416	521
	99	51	102	204	306	408	510
	100	50	100	200	300	400	500

Accessories

Over Current Relay (OCR)

Time Chart for PTA Inverse Time (Generator)

Item	Tp / x Ip	PTA Time Setting (sec)								
		1	5	10	15	20	25	30	35	40
Detection Setting Current (%)	49	6.00	29.99	59.98	89.96	119.95	149.94	179.93	209.91	239.90
	50	5.76	28.80	57.60	86.40	115.20	144.00	172.80	201.60	230.40
	51	5.54	27.68	55.36	83.04	110.73	138.41	166.09	193.77	221.45
	52	5.33	26.63	53.25	79.88	106.51	133.14	159.76	186.39	213.02
	53	5.13	25.63	51.26	76.90	102.53	128.16	153.79	179.42	205.06
	54	4.94	24.69	49.38	74.07	98.77	123.46	148.15	172.84	197.53
	55	4.76	23.80	47.60	71.40	95.21	119.01	142.81	166.61	190.41
	56	4.59	22.96	45.92	68.88	91.84	114.80	137.76	160.71	183.67
	57	4.43	22.16	44.32	66.48	88.64	110.80	132.96	155.12	177.29
	58	4.28	21.40	42.81	64.21	85.61	107.02	128.42	149.82	171.22
	59	4.14	20.68	41.37	62.05	82.73	103.42	124.10	144.79	165.47
	60	4.00	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00
	61	3.87	19.35	38.70	58.05	77.40	96.75	116.10	135.45	154.80
	62	3.75	18.73	37.46	56.19	74.92	93.65	112.38	131.11	149.84
	63	3.63	18.14	36.28	54.42	72.56	90.70	108.84	126.98	145.12
	64	3.52	17.58	35.16	52.73	70.31	87.89	105.47	123.05	140.63
	65	3.41	17.04	34.08	51.12	68.17	85.21	102.25	119.29	136.33
	66	3.31	16.53	33.06	49.59	66.12	82.64	99.17	115.70	132.23
	67	3.21	16.04	32.08	48.12	64.16	80.20	96.24	112.27	128.31
	68	3.11	15.57	31.14	46.71	62.28	77.85	93.43	109.00	124.57
	69	3.02	15.12	30.25	45.37	60.49	75.61	90.74	105.86	120.98
	70	2.94	14.69	29.39	44.08	58.78	73.47	88.16	102.86	117.55
	71	2.86	14.28	28.57	42.85	57.13	71.41	85.70	99.98	114.26
	72	2.78	13.89	27.78	41.67	55.56	69.44	83.33	97.22	111.11
	73	2.70	13.51	27.02	40.53	54.04	67.55	81.07	94.58	108.09
	74	2.63	13.15	26.30	39.44	52.59	65.74	78.89	92.04	105.19
	75	2.56	12.80	25.60	38.40	51.20	64.00	76.80	89.60	102.40
	76	2.49	12.47	24.93	37.40	49.86	62.33	74.79	87.26	99.72
	77	2.43	12.14	24.29	36.43	48.57	60.72	72.86	85.01	97.15
	78	2.37	11.83	23.67	35.50	47.34	59.17	71.01	82.84	94.67
	79	2.31	11.54	23.07	34.61	46.15	57.68	69.22	80.76	92.29
	80	2.25	11.25	22.50	33.75	45.00	56.25	67.50	78.75	90.00
	81	2.19	10.97	21.95	32.92	43.90	54.87	65.84	76.82	87.79
	82	2.14	10.71	21.42	32.12	42.83	53.54	64.25	74.96	85.66
	83	2.09	10.45	20.90	31.35	41.81	52.26	62.71	73.16	83.61
	84	2.04	10.20	20.41	30.61	40.82	51.02	61.22	71.43	81.63
	85	1.99	9.97	19.93	29.90	39.86	49.83	59.79	69.76	79.72
	86	1.95	9.73	19.47	29.20	38.94	48.67	58.41	68.14	77.88
	87	1.90	9.51	19.02	28.54	38.05	47.56	57.07	66.59	76.10
	88	1.86	9.30	18.60	27.89	37.19	46.49	55.79	65.08	74.38
	89	1.82	9.09	18.18	27.27	36.36	45.45	54.54	63.63	72.72
	90	1.78	8.89	17.78	26.67	35.56	44.44	53.33	62.22	71.11
	91	1.74	8.69	17.39	26.08	34.78	43.47	52.17	60.86	69.56
	92	1.70	8.51	17.01	25.52	34.03	42.53	51.04	59.55	68.05
	93	1.66	8.32	16.65	24.97	33.30	41.62	49.95	58.27	66.60
	94	1.63	8.15	16.30	24.45	32.59	40.74	48.89	57.04	65.19
	95	1.60	7.98	15.96	23.93	31.91	39.89	47.87	55.84	63.82
	96	1.56	7.81	15.63	23.44	31.25	39.06	46.88	54.69	62.50
	97	1.53	7.65	15.30	22.96	30.61	38.26	45.91	53.57	61.22
	98	1.50	7.50	14.99	22.49	29.99	37.48	44.98	52.48	59.98
	99	1.47	7.35	14.69	22.04	29.38	36.73	44.08	51.42	58.77
	100	1.44	7.20	14.40	21.60	28.80	36.00	43.20	50.40	57.60
	101	1.41	7.06	14.12	21.17	28.23	35.29	42.35	49.41	56.47

Item	Tp / x Ip	PTA Time Setting (sec)								
		1	5	10	15	20	25	30	35	40
Detection Setting Current (%)	102	1.38	6.92	13.84	20.76	27.68	34.60	41.52	48.44	55.36
	103	1.36	6.79	13.57	20.36	27.15	33.93	40.72	47.51	54.29
	104	1.33	6.66	13.31	19.97	26.63	33.28	39.94	46.60	53.25
	105	1.31	6.53	13.06	19.59	26.12	32.65	39.18	45.71	52.24
	106	1.28	6.41	12.82	19.22	25.63	32.04	38.45	44.86	51.26
	107	1.26	6.29	12.58	18.87	25.16	31.44	37.73	44.02	50.31
	108	1.23	6.17	12.35	18.52	24.69	30.86	37.04	43.21	49.38
	109	1.21	6.06	12.12	18.18	24.24	30.30	36.36	42.42	48.48
	110	1.19	5.95	11.90	17.85	23.80	29.75	35.70	41.65	47.60
	111	1.17	5.84	11.69	17.53	23.37	29.22	35.06	40.91	46.75
	112	1.15	5.74	11.48	17.22	22.96	28.70	34.44	40.18	45.92
	113	1.13	5.64	11.28	16.92	22.55	28.19	33.83	39.47	45.11
	114	1.11	5.54	11.08	16.62	22.16	27.70	33.24	38.78	44.32
	115	1.09	5.44	10.89	16.33	21.78	27.22	32.67	38.11	43.55
	116	1.07	5.35	10.70	16.05	21.40	26.75	32.10	37.46	42.81
	117	1.05	5.26	10.52	15.78	21.04	26.30	31.56	36.82	42.08
	118	1.03	5.17	10.34	15.51	20.68	25.85	31.03	36.20	41.37
	119	1.02	5.08	10.17	15.25	20.34	25.42	30.51	35.59	40.68
	120	1.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00
	121	0.98	4.92	9.84	14.75	19.67	24.59	29.51	34.42	39.34
	122	0.97	4.84	9.67	14.51	19.35	24.19	29.02	33.86	38.70
	123	0.95	4.76	9.52	14.28	19.04	23.80	28.55	33.31	38.07
	124	0.94	4.68	9.37	14.05	18.73	23.41	28.10	32.78	37.46
	125	0.92	4.61	9.22	13.82	18.43	23.04	27.65	32.26	36.86
	126	0.91	4.54	9.07	13.61	18.14	22.68	27.21	31.75	36.28
	127	0.89	4.46	8.93	13.39	17.86	22.32	26.78	31.25	35.71
	128	0.88	4.39	8.79	13.18	17.58	21.97	26.37	30.76	35.16
	129	0.87	4.33	8.65	12.98	17.31	21.63	25.96	30.29	34.61
	130	0.85	4.26	8.52	12.78	17.04	21.30	25.56	29.82	34.08
	131	0.84	4.20	8.39	12.59	16.78	20.98	25.17	29.37	33.56
	132	0.83	4.13	8.26	12.40	16.53	20.66	24.79	28.93	33.06
	133	0.81	4.07	8.14	12.21	16.28	20.35	24.42	28.49	32.56
	134	0.80	4.01	8.02	12.03	16.04	20.05	24.06	28.07	32.08
	135	0.79	3.95	7.90	11.85	15.80	19.75	23.70	27.65	31.60
	136	0.78	3.89	7.79	11.68	15.57	19.46	23.36	27.25	31.14
	137	0.77	3.84	7.67	11.51	15.34	19.18	23.02	26.85	30.69
	138	0.76	3.78	7.56	11.34	15.12	18.90	22.68	26.47	30.25
	139	0.75	3.73	7.45	11.18	14.91	18.63	22.36	26.09	29.81
	140	0.73	3.67	7.35	11.02	14.69	18.37	22.04	25.71	29.39
	141	0.72	3.62	7.24	10.86	14.49	18.11	21.73	25.35	28.97
	142	0.71	3.57	7.14	10.71	14.28	17.85	21.42	25.00	28.57
	143	0.70	3.52	7.04	10.56	14.08	17.60	21.13	24.65	28.17
	144	0.69	3.47	6.94	10.42	13.89	17.36	20.83	24.31	27.78
	145	0.68	3.42	6.85	10.27	13.70	17.12	20.55	23.97	27.40
	146	0.68	3.38	6.76	10.13	13.51	16.89	20.27	23.64	27.02
	147	0.67	3.33	6.66	10.00	13.33	16.66	19.99	23.32	26.66
	148	0.66	3.29	6.57	9.86	13.15	16.44	19.72	23.01	26.30
	149	0.65	3.24	6.49	9.73	12.97	16.22	19.46	22.70	25.94
	150	0.64	3.20	6.40	9.60	12.80	16.00	19.20	22.40	25.60
	151	0.63	3.16	6.32	9.47	12.63	15.79	18.95	22.10	25.26
	152	0.62	3.12	6.23	9.35	12.47	15.58	18.70	21.81	24.93
	153	0.62	3.08	6.15	9.23	12.30	15.38	18.45	21.53	24.61
	154	0.61	3.04	6.07	9.11	12.14	15.18	18.22	21.25	24.29

Accessories

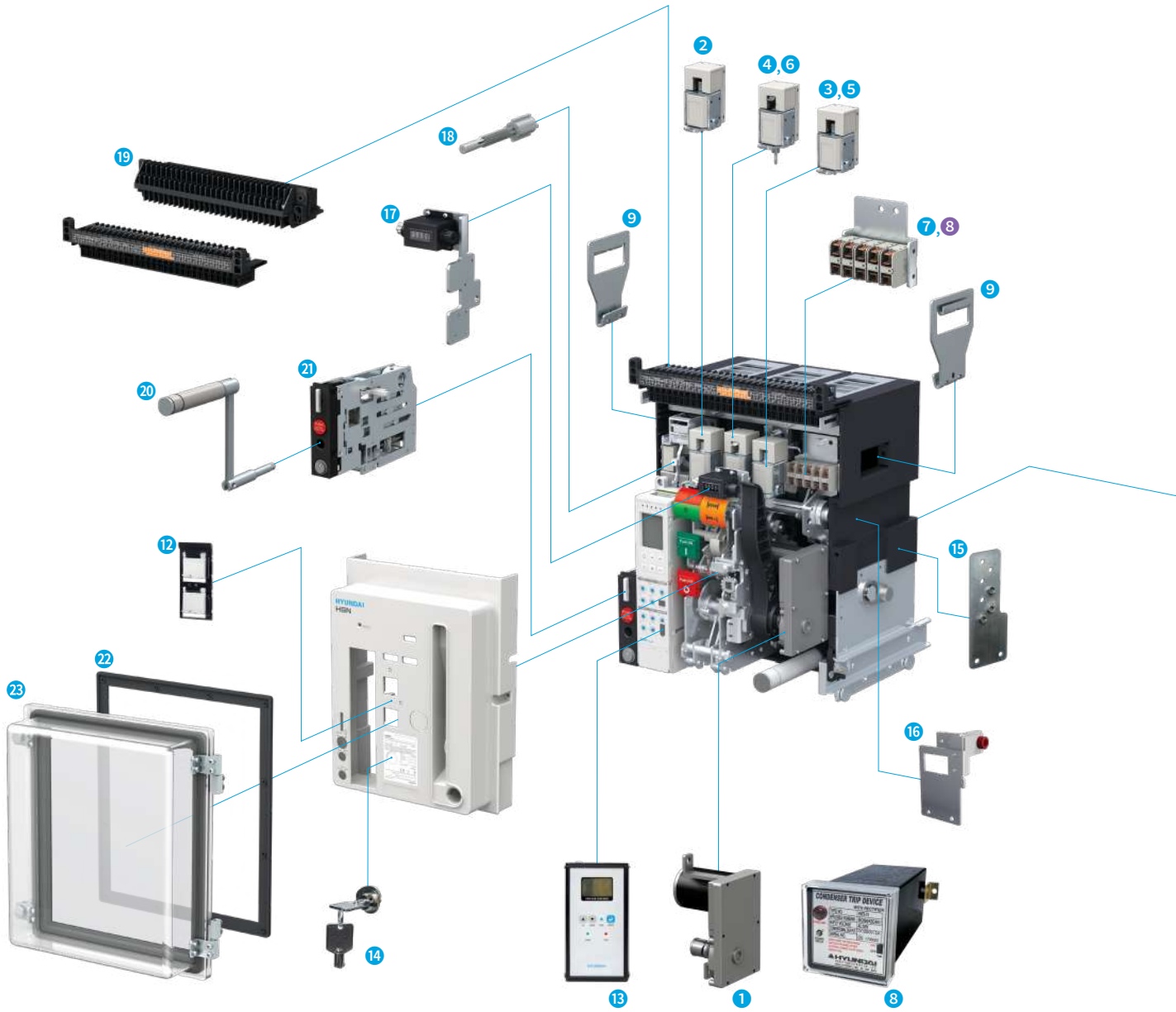
Over Current Relay (OCR)

Time Chart for PTA Inverse Time (Generator)

Item	Tp / x Ip	PTA Time Setting (sec)								
		1	5	10	15	20	25	30	35	40
Detection Setting Current (%)	155	0.60	3.00	5.99	8.99	11.99	14.98	17.98	20.98	23.98
	156	0.59	2.96	5.92	8.88	11.83	14.79	17.75	20.71	23.67
	157	0.58	2.92	5.84	8.76	11.68	14.61	17.53	20.45	23.37
	158	0.58	2.88	5.77	8.65	11.54	14.42	17.30	20.19	23.07
	159	0.57	2.85	5.70	8.54	11.39	14.24	17.09	19.94	22.78
	160	0.56	2.81	5.63	8.44	11.25	14.06	16.88	19.69	22.50
	161	0.56	2.78	5.56	8.33	11.11	13.89	16.67	19.44	22.22
	162	0.55	2.74	5.49	8.23	10.97	13.72	16.46	19.20	21.95
	163	0.54	2.71	5.42	8.13	10.84	13.55	16.26	18.97	21.68
	164	0.54	2.68	5.35	8.03	10.71	13.38	16.06	18.74	21.42
	165	0.53	2.64	5.29	7.93	10.58	13.22	15.87	18.51	21.16
	166	0.52	2.61	5.23	7.84	10.45	13.06	15.68	18.29	20.90
	167	0.52	2.58	5.16	7.74	10.33	12.91	15.49	18.07	20.65
	168	0.51	2.55	5.10	7.65	10.20	12.76	15.31	17.86	20.41
	169	0.50	2.52	5.04	7.56	10.08	12.60	15.13	17.65	20.17
	170	0.50	2.49	4.98	7.47	9.97	12.46	14.95	17.44	19.93
	171	0.49	2.46	4.92	7.39	9.85	12.31	14.77	17.24	19.70
	172	0.49	2.43	4.87	7.30	9.73	12.17	14.60	17.04	19.47
	173	0.48	2.41	4.81	7.22	9.62	12.03	14.43	16.84	19.25
	174	0.48	2.38	4.76	7.13	9.51	11.89	14.27	16.65	19.02
	175	0.47	2.35	4.70	7.05	9.40	11.76	14.11	16.46	18.81
	176	0.46	2.32	4.65	6.97	9.30	11.62	13.95	16.27	18.60
	177	0.46	2.30	4.60	6.89	9.19	11.49	13.79	16.09	18.39
	178	0.45	2.27	4.54	6.82	9.09	11.36	13.63	15.91	18.18
	179	0.45	2.25	4.49	6.74	8.99	11.24	13.48	15.73	17.98
	180	0.44	2.22	4.44	6.67	8.89	11.11	13.33	15.56	17.78
	181	0.44	2.20	4.40	6.59	8.79	10.99	13.19	15.38	17.58
	182	0.43	2.17	4.35	6.52	8.69	10.87	13.04	15.22	17.39
	183	0.43	2.15	4.30	6.45	8.60	10.75	12.90	15.05	17.20
	184	0.43	2.13	4.25	6.38	8.51	10.63	12.76	14.89	17.01
	185	0.42	2.10	4.21	6.31	8.41	10.52	12.62	14.73	16.83
	186	0.42	2.08	4.16	6.24	8.32	10.41	12.49	14.57	16.65
	187	0.41	2.06	4.12	6.18	8.24	10.29	12.35	14.41	16.47
	188	0.41	2.04	4.07	6.11	8.15	10.19	12.22	14.26	16.30
	189	0.40	2.02	4.03	6.05	8.06	10.08	12.09	14.11	16.12
	190	0.40	1.99	3.99	5.98	7.98	9.97	11.97	13.96	15.96
	191	0.39	1.97	3.95	5.92	7.89	9.87	11.84	13.82	15.79
	192	0.39	1.95	3.91	5.86	7.81	9.77	11.72	13.67	15.63
	193	0.39	1.93	3.87	5.80	7.73	9.66	11.60	13.53	15.46
	194	0.38	1.91	3.83	5.74	7.65	9.57	11.48	13.39	15.30
	195	0.38	1.89	3.79	5.68	7.57	9.47	11.36	13.25	15.15
	196	0.37	1.87	3.75	5.62	7.50	9.37	11.25	13.12	14.99
	197	0.37	1.86	3.71	5.57	7.42	9.28	11.13	12.99	14.84
	198	0.37	1.84	3.67	5.51	7.35	9.18	11.02	12.86	14.69
	198	0.36	1.82	3.64	5.45	7.27	9.09	10.91	12.73	14.55
	198	0.36	1.80	3.60	5.40	7.20	9.00	10.80	12.60	14.40
	200	0.36	1.80	3.60	5.40	7.20	9.00	10.80	12.60	14.40

Accessories

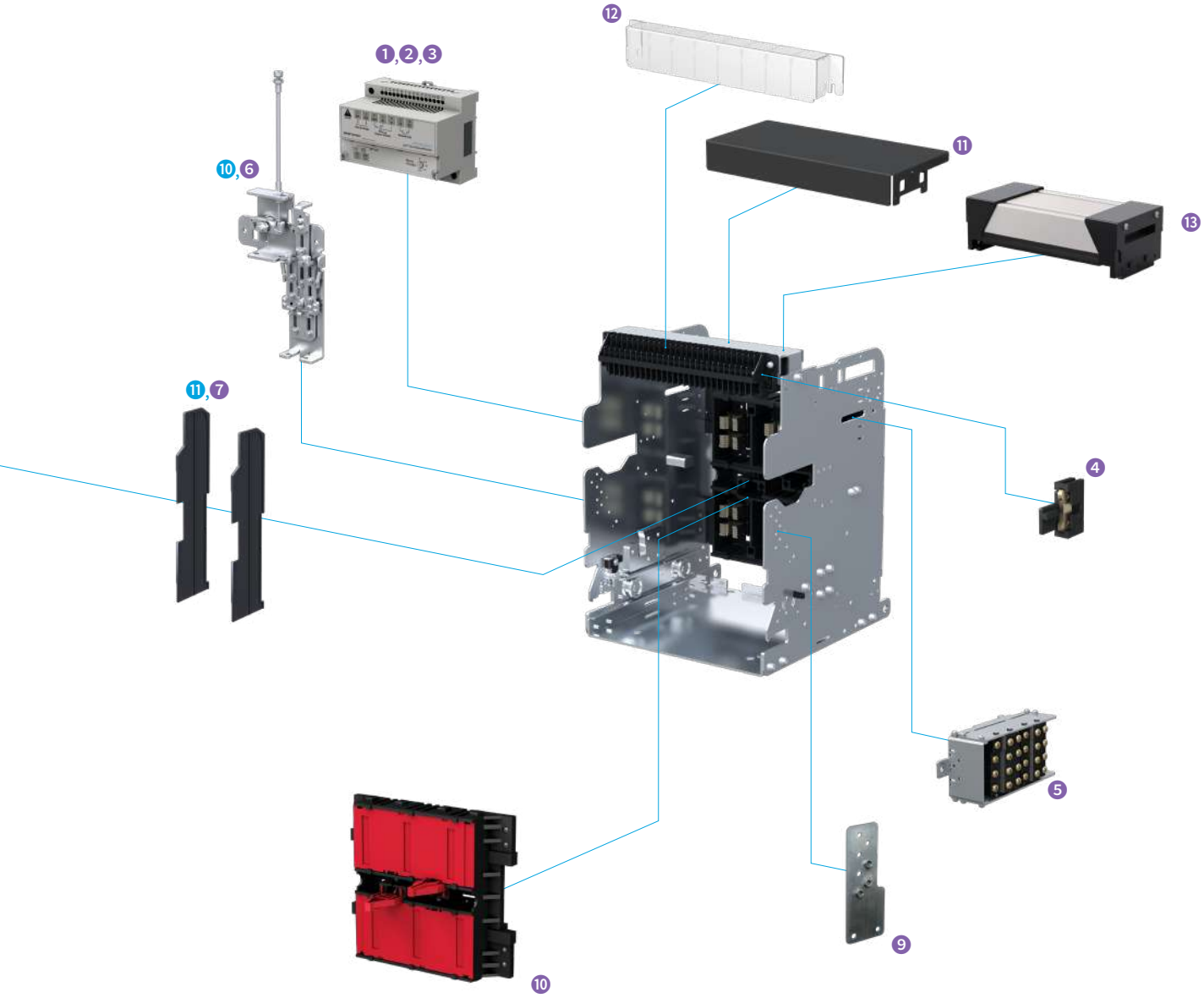
Main Unit



Accessories for Circuit Breaker

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

Cradle



Accessories for Cradle

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

* Standard supply for HGN1150V model

Accessories

Spring Charging Geared Motor

- Manual charging method and geared motor charging method using external power source for charging the spring in the circuit breaker.
- As for the geared motor charging method, if power is applied to the control power terminal number (1), (2), spring charge is possible at 85 ~ 110 % power of the operating voltage range.
- Add M1 ~ M9 in the order form.
- It can be purchased separately.

Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
Spring Charging Geared Motor	M1	AC/DC 110 V
	M2	AC/DC 220 V
	M7	DC 24 V
	M8	DC 48 V
	M9	DC 125 V

Ratings

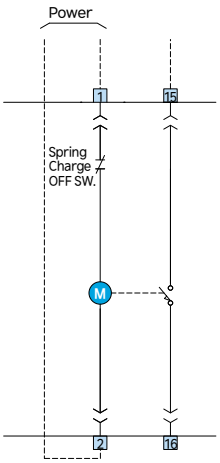
Item	DC 110	DC 220
Rated Current (A)	1.2	0.5
Starting Pick-Up (A)	5 ~ 6 times the rated current	
Final Rated rpm	16 ± 3	
Charging Time (sec)	Within 5 seconds [1)]	
Rated Torque (kgf)	300 kgf×cm	
Rated Watt (W)	100	100
Dielectric Strength (V/min)	2,000	
Insulation Resistance (MΩ)	100	
Workable Temperature (℃)	-15 ~ 60	

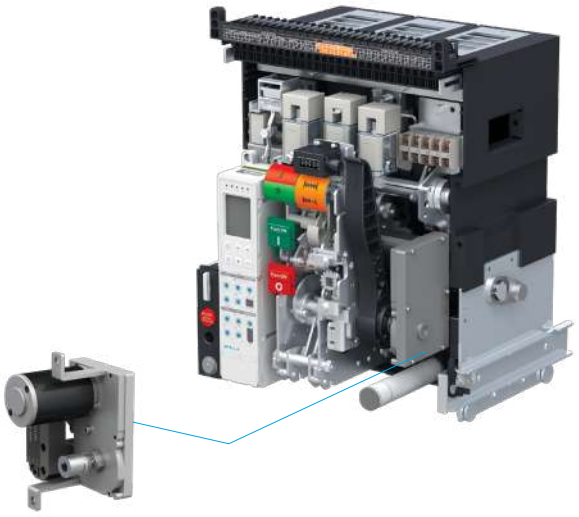
※ 1) Charging time is within 10 sec of rated, in case of DC 24/48 V.

Wire Ratings

Rated Voltage	DC 24, 48		DC 110, 220	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	18	600	18	600

Connection Diagram





Spring Charging Geared Motor

Spring Charging Switch or Ready to Close Switch

- Spring charging switch delivers (15, 16) the charged status when mechanism spring charge is complete.
- Read to close switch delivers (15, 16) only when the circuit breaker is open and simultaneously only when the mechanism spring charge is complete.
- Order name of spring charging switch : B6, Order name of ready to close switch : BT
- Two accessories cannot be ordered simultaneously.

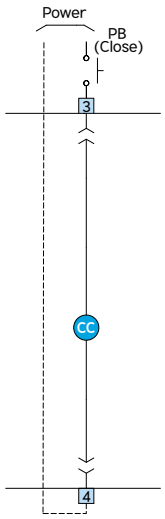
Closing Coil (CC)

- A control device which closes a circuit breaker remotely from outside.
- The circuit breaker is closed by applying power of at least more than 150 ms within the range of 85 ~ 110 % of the rated control voltage to the control power terminal number (3) and (4).
- Add C1 ~ C9 in the order form when ordering the main unit.
- It can be purchased separately.
- Use a separate switch externally to apply power to the closing coil.

Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
Closing Coil	C1	AC/DC 110 V
	C2	AC/DC 220 V
	C3	AC 380 V
	C4	AC 440 V
	C7	DC 24 V
	C8	DC 48 V
	C9	DC 125 V

Connection Diagram



Ratings

Item	DC (V)	AC (V)
Rated Voltage (Vn)	24~48	-
	100 ~ 130	100 ~ 130
	200 ~ 250	200 ~ 250
Operating Limits (Vn)	0.85 ~ 1.1	
Power Consumption (VA)	Inrush (300), Steady-State (10)	
Trip Time (ms)	80	
Pick up current	24 ~ 48V : 3.0A(±10%)	-
	100 ~ 130V : 2.0A(±10%)	100 ~ 130V : 2.0A(±10%)
	200 ~ 250V : 1.4A(±10%)	200 ~ 250V : 1.4A(±10%)
Holing current	24 ~ 48V : 330mA(±10%)	-
	100 ~ 130V : 150mA(±10%)	100 ~ 130V : 150mA(±10%)
	200 ~ 250V : 120mA(±10%)	200 ~ 250V : 120mA(±10%)

Wire Ratings

Rated Voltage	DC 24		AC/DC 110, 220	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	20	600	20	600



Closing Coil

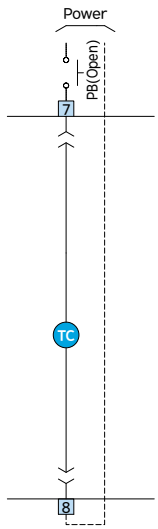


Accessories

Trip Coil (TC)

- A control device which trips a circuit breaker remotely.
- The circuit breaker is tripped by applying power of at least more than 150 ms within the range of 70 ~ 110 % of the rated control voltage to the control power terminal number (7) and (8).
- Add S1 ~ S9 in the order form when ordering the main unit.
- It can be purchased separately.
- Use a separate switch externally to apply power to the closing coil.

Connection Diagram



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
Trip Coil	S1	AC/DC 110 V
	S2	AC/DC 220 V
	S3	AC 380 V
	S4	AC 440 V
	S7	DC 24 V
	S8	DC 48 V
	S9	DC 125 V

Ratings

Item	DC (V)	AC (V)
Rated Voltage (Vn)	24~48	-
	100 ~ 130	100 ~ 130
	200 ~ 250	200 ~ 250
Operating Limits (Vn)	0.7 ~ 1.1	
Power Consumption (VA)	Inrush (300), Steady-State (10)	
Trip Time (ms)	40	
Pick up current	24 ~ 48V : 2.0A(±10%)	-
	100 ~ 130V : 2.0A(±10%)	100 ~ 130V : 2.0A(±10%)
	200 ~ 250V : 1.4A(±10%)	200 ~ 250V : 1.4A(±10%)
Holing current	24 ~ 48V : 330mA(±10%)	-
	100 ~ 130V : 120mA(±10%)	100 ~ 130V : 120mA(±10%)
	200 ~ 250V : 100mA(±10%)	200 ~ 250V : 100mA(±10%)

Wire Ratings

Rated Voltage	DC 24		AC/DC 110, 220	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	20	600	20	600



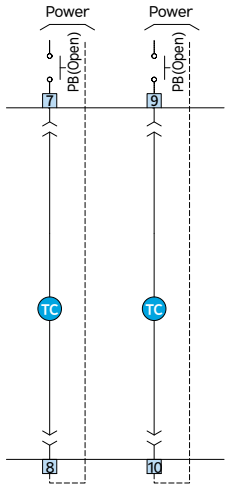
Trip Coil



Secondary Trip Coil

- It is a control device which trips a circuit breaker remotely from outside and dual remote trip is possible with an additional installation of trip coil.
- The circuit breaker is tripped by applying power of at least more than 150 ms within the range of 70 ~ 110 % of the rated control voltage by applying power to the control power terminal number (9) and (10).
- When dual trip coil is used, it cannot be used together with UVT coil.
- Add S1 ~ S9 in the order form when ordering the main unit and under the option, add S1 ~ S9 once again.
- It can be purchased separately.
- Use a separate switch externally to apply power to the dual trip coil.

Connection Diagram



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
Secondary Trip Coil	S1	AC/DC 110 V
	S2	AC/DC 220 V
	S3	AC 380 V
	S4	AC 440 V
	S7	DC 24 V
	S8	DC 48 V
	S9	DC 125 V

Wire Ratings

Rated Voltage	DC 24		AC/DC 110, 220	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	20	600	20	600

Ratings

Item	DC (V)	AC (V)
Rated Voltage (Vn)	24~48	-
	100 ~ 130	100 ~ 130
	200 ~ 250	200 ~ 250
Operating Limits (Vn)	0.7 ~ 1.1	
Power Consumption (VA)	Inrush (300), Steady-State (10)	
Trip Time (ms)	40	
Pick up current	24 ~ 48V : 2.0A(±10%)	-
	100 ~ 130V : 2.0A(±10%)	100 ~ 130V : 2.0A(±10%)
	200 ~ 250V : 1.4A(±10%)	200 ~ 250V : 1.4A(±10%)
Holing current	24 ~ 48V : 330mA(±10%)	-
	100 ~ 130V : 120mA(±10%)	100 ~ 130V : 120mA(±10%)
	200 ~ 250V : 100mA(±10%)	200 ~ 250V : 100mA(±10%)



Secondary Trip Coil

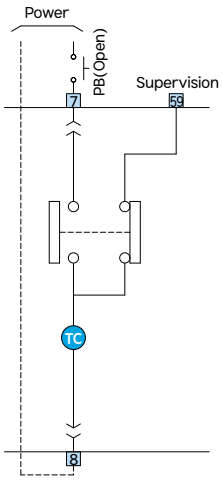


Accessories

Trip Coil Supervision

- A control device which trips a circuit breaker remotely from outside.
- The circuit breaker is tripped by applying power of at least more than 150 ms within the range of 70 ~ 110 % of the rated control voltage by applying power to the control power terminal number (7) and (8).
- When using trip coil supervision, auxiliary contact is 4a3b and when 1a1b is added, it becomes 5a4b. (AUX S/W 43/44, 53/54 cannot be used.)
- In order to monitor the permanent normal status when TCS is closed and tripped, the circuit sequence cannot be created by using the additional 1a1b (Order code AA). (Possibility of contact damage) However, if it is compulsory, select 1a contact within 4a3b for use.
- The trip coil's monitoring output contact No. 59.
- Coil supervision checks not only the circuit's mechanical contact but also the condition of the coil.
- Add T1 ~ T9 in the order form when ordering the main unit.
- It can be purchased separately.

Connection Diagram



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
Trip Coil Supervision	T1	AC/DC 110 V
	T2	AC/DC 220 V
	T3	AC 380 V
	T4	AC 440 V
	T7	DC 24 V
	T8	DC 48 V
	T9	DC 125 V

Ratings

Item	DC (V)	AC (V)
Rated Voltage (Vn)	24	-
	100 ~ 130	100 ~ 130
	200 ~ 250	200 ~ 250
Operating Limits (Vn)	0.7 ~ 1.1	
Power Consumption (VA)	Inrush (300), Steady-State (10)	
Trip Time (ms)	40	

Wire Ratings

Rated Voltage	DC 24		AC/DC 110, 220	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	20	600	20	600



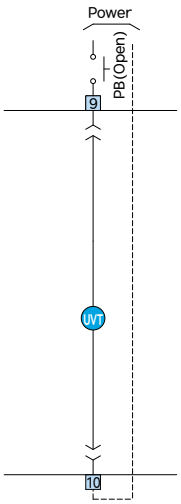
Trip Coil Supervision



UVT Coil

- Under-voltage trip device is a device that automatically trips the circuit breaker if the load voltage drops to below the standard or to prevent accidents at the load part during a black out.
- Under-voltage trip device is classified into instantaneous and time delay type for use. As for instantaneous type, directly connect to control power terminal number (9), (10) for use and as for time delay type, the Time Delay Controller can be used.
- When instantaneous type of UVT is used, dual trip coil cannot be used.
- When instantaneous type of UVT is used, add U1 ~ U9 in the order form when ordering the main unit.
- It can be purchased separately.

Connection Diagram



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
UVT Coil	U1	AC/DC 110 V
	U2	AC/DC 220 V
	U3	AC 380 V
	U4	AC 440 V
	U7	DC 24 V
	U8	DC 48 V
	U9	DC 125 V

Ratings

Item	DC (V)	AC (V)
Rated Voltage (Vn)	24	-
	110 (100 ~ 130)	110 (100 ~ 130)
	220 (200 ~ 250)	220 (200 ~ 250)
	-	380
	-	440
Pickup	Above 0.85 Vn	
Drop	Below 0.35 Vn	
Power Consumption (VA)	Inrush (300), Steady-State (10)	
Trip Time (ms)	50	

Wire Ratings

Rated Voltage	DC 24		AC/DC 110, 220		AC 380, 440	
	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)	AWG (mm^2)	Insulation Level (V)
Specification	20	600	20	600	20	600



UVT Coil

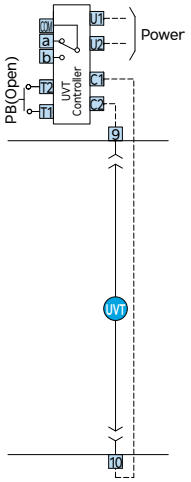


Accessories

UVT Time Delay Controller

- Under-voltage trip device is a device that automatically trips the circuit breaker if the load voltage drops to below operating voltage or to prevent accidents at the load part during a black out.
- This device is capable of delaying (0.5, 1.0, 1.5, 3 sec).
- UVT Time Delay Controller can be mounted at the left side of the cradle and the external rail and it can also be mounted at the position desired by the customer.
- Add V1 ~ V9 in the order form when ordering the main unit. Time Delay Controller will be included in the package.
- When purchasing the UVT time delay controller only, place the order for the separate product, HGNS UT1 ~ UT9.
- DC 24 V and DC 48 V are only available in instantaneous type.
- In the event the UVT Time Delay Controller and RCTU are purchased simultaneously, the front mounting can be installed in the front for 1 option designated by the customer. The remaining 1 shall be installed by designating a position in the DIN RAIL inside the panel.

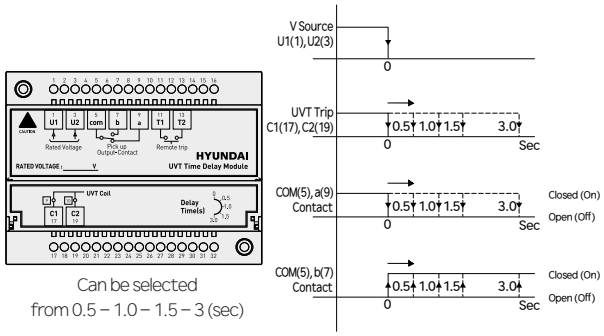
Connection Diagram



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Order Name for Separate Sales (HGNS-)	Detailed Specification
UVT Time Delay Controller	-	HGNS UT1	AC/DC 110 V
	-	HGNS UT2	AC/DC 220 V
	-	HGNS UT3	AC 380 V
	-	HGNS UT4	AC 440 V
	-	HGNS UT9	DC 125 V
UVT Time Delay Controller + UVT Coil	V1	HGNS V1	AC/DC 110 V
	V2	HGNS V2	AC/DC 220 V
	V3	HGNS V3	AC 380 V
	V4	HGNS V4	AC 440 V
	V9	HGNS V9	DC 125 V

Wiring and Operating Time



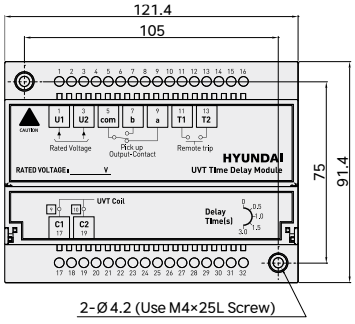
Can be selected from 0.5 – 1.0 – 1.5 – 3 (sec)

UVT Time Delay Controller



Dimension

Unit : mm

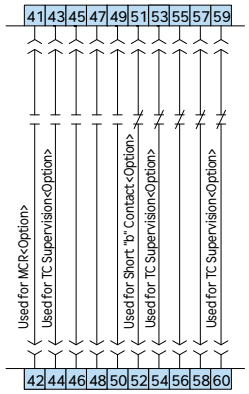


※ 5, 7, 9 switch status is the status when UVT is functioning.

AUX Switch

- It is an output contact to remotely monitor the On/Off state of the ACB.
- As for HGS Type, 3a3b is provided and as for HGN Type, 5a5b is provided as standard without separate indication in the order form.
- AUX switch can be expanded up to 6a6b maximum.
  - How to order HGS 5a5b : Add A5 in the order form.
  - How to order HGS/HGN 6a6b : Add AA in the order form.
- When using the monitoring contact for trip coil, 3a3b can be used for the AUX switch and when using the MCR function of OCR, it can be used as 4a3b.
- When short "b" is added, it will be attached to 'b' contacts 51, 52 for outgoing and upon additional mounting, the short "b" sealed and released can be mounted additionally depending on the number of b contacts.
- 5a5b can be purchased separately. Place an order separately as HGNS A5.

Connection



AUX Switch Ratings

Applicable Load	Resistance	Lamp	Inductor	Motor
AC 125 V	5 A	0.7 A	4 A	1.3 A
AC 250 V	5 A	0.5 A	4 A	0.8 A
DC 125V	≤ 2 A	-	≤ 1.0 A	-
DC 250V	≤ 1 A	-	≤ 0.5 A	-

Wire Specification

Wire Specification	AWG	Insulation Level (V)
Specification	20	300



AUX Switch



Accessories

Counter

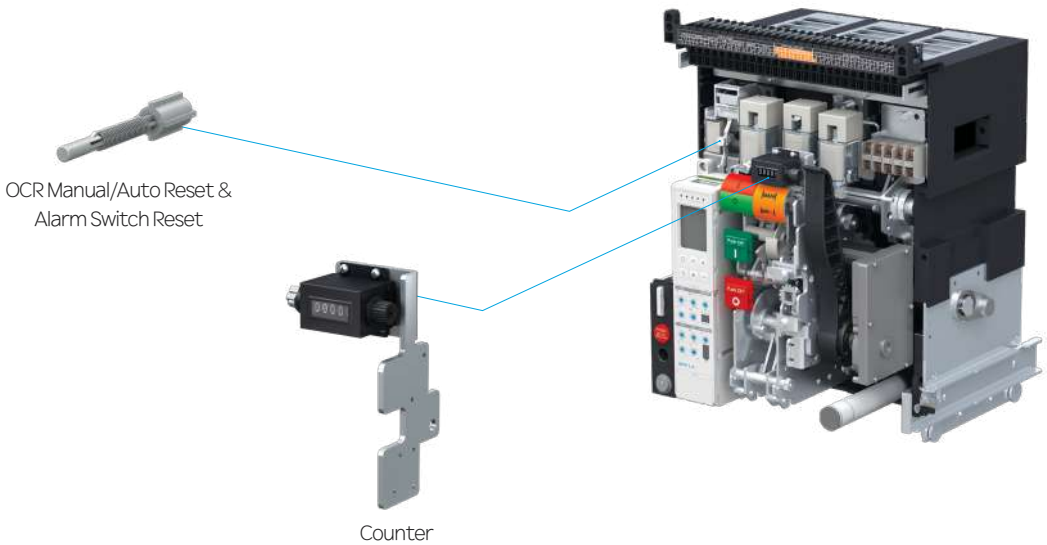
- It is a device that displays the number of operations, indicating On/Off operation of the circuit breaker in 1 cycle.
- It is a primary component so separate order is unnecessary.

OCR Manual/Auto Reset & Alarm Switch Reset

- It is a device that interlocks the closing of the circuit breaker until the electric line is restored after the user has completely removed the fault factor when a circuit breaker tripped by OCR due to overload or fault current in the electric line. (BR)
- BR : When the circuit breaker functions due to OCR, it interlocks to prevent closing of circuit breaker and is reset manually.
- BA : When the circuit breaker functions due to OCR, the circuit breaker's status is indicated as output contact 1a1b other than the interlock feature and this output contact is reset manually.
- BH : When the circuit breaker functions due to OCR, the circuit breaker's status is indicated as output contact high capacity switch other than the interlock feature and this output contact is reset manually.
- As a product mounted in the main unit, add BR/BA/BH in the order form when ordering the main unit.

Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Detailed Specification
OCR Manual Reset	BR	Interlock Manual Reset
OCR Manual Reset + Alarm S/W Reset	BA	Interlock Manual Reset + Alarm S/W Reset
OCR Manual Reset + High Capacity Alarm S/W Reset (1C)	BH	Interlock Manual Reset + Alarm S/W Reset (High Capacity DC 3 A)



Position Switch

- This switch, mounted at the side of the cradle, displays the position of ACB during draw-out.
- The position of Inserted/Isolated/Test/Connected can be displayed.
- Only one switch is applicable and it can only be mounted at the right side of the cradle.
- It can be purchased separately.

Position Switch



AUX Switch Ratings

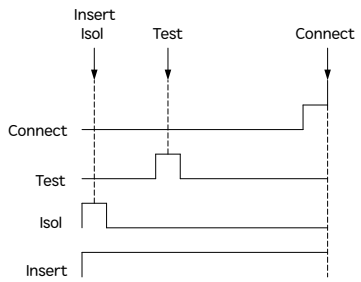
Applicable Load	Resistance	Lamp	Inductor	Motor
AC 125 V	10 A	1.5 A	6 A	2 A
DC 30 V	6 A	3 A	6 A	3 A
DC 125 V	0.6 A	0.1 A	0.6 A	0.1 A
DC 250 V	0.3 A	0.05 A	0.3 A	0.05 A

Ordering Method

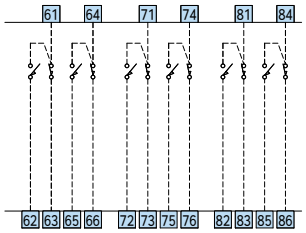
Order Name		Specification of Switch Output					Mounting Position
		Composition	Insert	Isol	Test	Connect	
AQ	HGNS AQ	Test 1C/Connect 1C	×	×	● (1C)	● (1C)	Right Side of Cradle
AR	HGNS AR	Connect 2C	×	×	×	● (2C)	
AS	HGNS AS	Test 2C	×	×	● (2C)	×	
AT	HGNS AT	Isol 1C/Insert 1C	● (1C)	● (1C)	×	×	
AU	HGNS AU	Insert 2C	● (2C)	×	×	×	
AV	HGNS AV	Isol 2C	×	● (2C)	×	×	
PQ	HGNS PQ	Isol 1C/Insert 1C/Test 1C/Connect 1C	● (1C)	● (1C)	● (1C)	● (1C)	
PS	HGNS PS	Isol 1C/Test 1C/Connect 2C	×	● (1C)	● (1C)	● (2C)	
P4	HGNS P4	Test 2C/Connect 2C	×	×	● (2C)	● (2C)	
PT	HGNS PT	Test 4C	×	×	● (4C)	×	
PR	HGNS PR	Insert 1C/Isol 1C/Test 3C/Connect 3C	● (1C)	● (1C)	● (3C)	● (3C)	
P8	HGNS P8	Insert 2C/Isol 2C/Test 2C/Connect 2C	● (2C)	● (2C)	● (2C)	● (2C)	
PU	HGNS PU	Test 4C/Connect 4C	×	×	● (4C)	● (4C)	

※For position switches, because they are common parts with the U-Series product, the position switch may be marked "UANS".

Operating Sequence of Position Switch Operation Circuit



Connection Diagram



Test Position	Connection Position	Isolation Postion
61-62 a 61-63 b	71-72 a 71-73 b	81-82 a 81-83 b
64-65 a 64-66 b	74-75 a 74-76 b	INSERT POSITION
67-68 a 67-69 b	77-78 a 77-79 b	91-92 a 91-93 b

Dimension

Unit : mm



Accessories

Lifting Lug

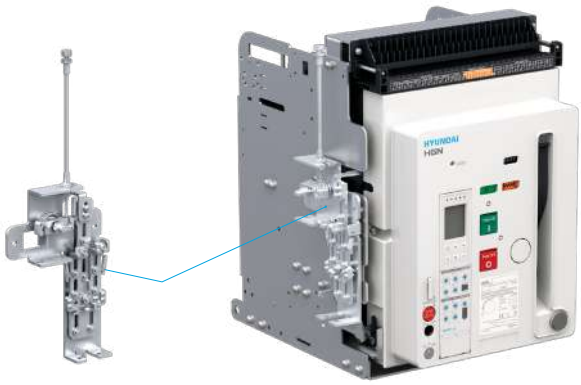
- It is a component that is used for transporting the circuit breaker.
- It can be hung to the handle at the side of the cradle, side of the arc shield and the main unit and the product can be moved by a crane or a person.
- When handling all the products, use the crane and in case of transporting independently using only the crane in case of products below 3,200 A, the products must be transported in accordance with the safety regulations.
- As a product sold separately, place an order for HGNS AL.

Lifting Lug



Mechanical Interlock

- MI is a device that mechanically interlocks the closing and tripping of each circuit breaker by connecting 2 or 3 circuit breakers.
- The MI is operated by a combination of the MI unit and the components of the interlock that is installed inside the main unit.
- The MI unit is a separate product and it is a device that is mounted additionally after the ACB has to be installed in the panel.
- When placing the order for the main unit, add B0 in the order from and only the component inside the interlock is mounted inside the main unit for release and as for the external mounting kit, place an additional order as a separate product.
- MI wire should be connected under 2 m between ACBs.
- In order to install, a square hole of 100×200 (mm) is required.



Mechanical Interlock

Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Accessory Spec.
Mechanical Interlock	HGNS DWB1	A & B & C & D & P & Q Frame Draw-Out (Fixed) Type 2 Way MI (External Mounting Kit Only)
	HGNS DWB2	A & B & C & D & P & Q Frame Draw-Out (Fixed) Type 3 Way MI (External Mounting Kit Only)
	HGNS FWB1	A & B & C & D & P & Q Frame Fixed Type 2 Way MI (External Mounting Kit Only)
	HGNS FWB2	A & B & C & D & P & Q Frame Fixed Type 3 Way MI (External Mounting Kit Only)
	HGNS B0DA	A, P Frame Interlock Part (B0)
	HGNS B0DB	B, Q Frame Interlock Part (B0)
	HGNS B0DC3	C Frame 3P Interlock Part (B0)
	HGNS B0DC4	C Frame 4P Interlock Part (B0)
	HGNS B0DD3	D Frame 3P Interlock Part (B0)
	HGNS B0DD4	D Frame 4P Interlock Part (B0)
	HGNS B0FA	A, P Frame Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS B0FB	B, Q Frame Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS B0FC3	C Frame 3P Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS B0FC4	C Frame 4P Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS B0FD3	D Frame 3P Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS B0FD4	D Frame 4P Interlock Part (B0) + Fixed Type of Installation Bracket
	HGNS DWB1A	A, P Frame Draw-Out Type 2 Way MI + Interlock Part (B0)
	HGNS DWB2A	A, P Frame Draw-Out Type 3 Way MI + Interlock Part (B0)
	HGNS DWB1B	B, Q Frame Draw-Out Type 2 Way MI + Interlock Part (B0)
	HGNS DWB2B	B, Q Frame Draw-Out Type 3 Way MI + Interlock Part (B0)
	HGNS DWB1C3	C Frame 3P Draw-Out 2 Way MI + Interlock Part (B0)
	HGNS DWB1C4	C Frame 4P Draw-Out 2 Way MI + Interlock Part (B0)

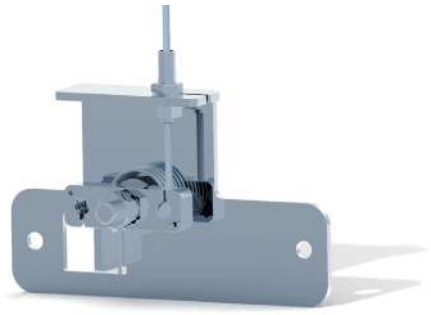
Name of Accessory	Order Name for Separate Sales (HGNS-)	Accessory Spec.
Mechanical Interlock	HGNS DWB2C3	C Frame 3P Draw-Out 3 Way MI + Interlock Part (B0)
	HGNS DWB2C4	C Frame 4P Draw-Out 3 Way MI + Interlock Part (B0)
	HGNS DWB1D3	D Frame 3P Draw-Out 2 Way MI + Interlock Part (B0)
	HGNS DWB1D4	D Frame 4P Draw-Out 2 Way MI + Interlock Part (B0)
	HGNS DWB2D3	D Frame 3P Draw-Out 3 Way MI + Interlock Part (B0)
	HGNS DWB2D4	D Frame 4P Draw-Out 3 Way MI + Interlock Part (B0)
	HGNS FWB1A	A, P Frame Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB2A	A, P Frame Fixed Type 3 Way MI + Interlock Part (B0)
	HGNS FWB1B	B, Q Frame Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB2B	B, Q Frame Fixed Type 3 Way MI + Interlock Part (B0)
	HGNS FWB1C3	C Frame 3P Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB1C4	C Frame 4P Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB2C3	C Frame 3P Fixed Type 3 Way MI + Interlock Part (B0)
	HGNS FWB2C4	C Frame 4P Fixed Type 3 Way MI + Interlock Part (B0)
	HGNS FWB1D3	D Frame 3P Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB1D4	D Frame 4P Fixed Type 2 Way MI + Interlock Part (B0)
	HGNS FWB2D3	D Frame 3P Fixed Type 3 Way MI + Interlock Part (B0)
	HGNS FWB2D4	D Frame 4P Fixed Type 3 Way MI + Interlock Part (B0)

Accessories

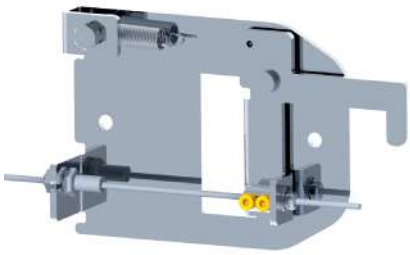
Door Interlock [DI]

- The device that prevents the switchboard door from opening when the ACB is in the "ON" state at the "Connection" position.
- The DI operates through a combination of the DI Unit and interlock components inside the main body.
- When ordering the main unit with DO, only the interlock internal components will be attached. The external attachment kit must be ordered separately.
- For installation and maintenance, please refer to the installation manual.





Installation on the left side of the ACB cradle



Installation on the right side of the switchboard.

Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Detailed Specification
Door Interlock	HGNS DDI	Draw-out type Door Interlock external attachment Kit only.
	HGNS FDI	Fixed type Door Interlock external attachment Kit only.
	HGNS DDIAC	Draw-out type external attachment Kit + A, C, P Frame internal interlock components(DO)
	HGNS DDIBD	Draw-out type external attachment Kit + B, D, Q Frame internal interlock components(DO)
	HGNS FDIAC	Fixed type external attachment Kit + A, C, P Frame internal interlock components(DO)
	HGNS FDIBD	Fixed type external attachment Kit + B, D, Q Frame internal interlock components(DO)

Key Lock

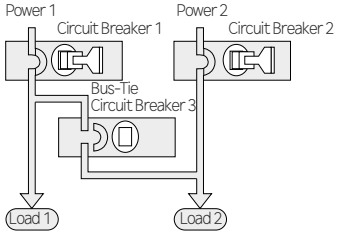
- It is a device that maintains the interlock condition to prevent electric/manual closing when the circuit breaker is open.
- When the key has been used to unlock, the electric/manual On/Off operation is possible. When the key has been removed from the circuit breaker, it becomes interlocked. When the key has been used to lock, the Off button has to be pressed to turn the key to the lock position.
- As a product mounted on the main unit, add AB in the order form when placing an order for the main unit.



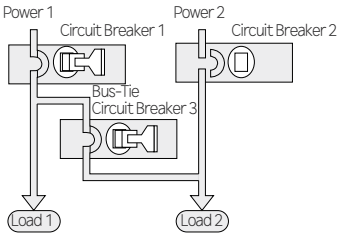
Key Lock & Key Interlock

- 3 circuit breakers mounted with the key lock device for preventing On can be used to make up the system. Only 2 circuit breakers can be allowed to close using 2 keys and the remaining 1 unit can be interlocked to provide stable load.

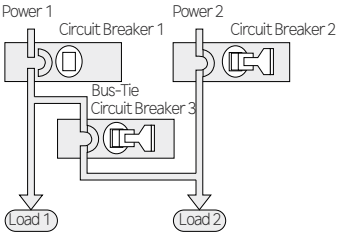
Circuit Breaker 3 cannot be closed



Circuit Breaker 2 cannot be closed



Circuit Breaker 1 cannot be closed



※ Example : Parallel feed at 2 power is prevented in case bus-tie circuit breaker is used

Accessories

On/Off Button Lock

- It is a safety device that prevents manual On/Off operation caused by the user's mistaken. The buttons are covered with a plastic cover to prevent arbitrary operation of manual close/trip button and padlock is used.
- As a product mounted on the main unit, add AM in the order form when placing an order for the main unit.
- Padlock is not provided by our company. (Ø5 ~ Ø8)

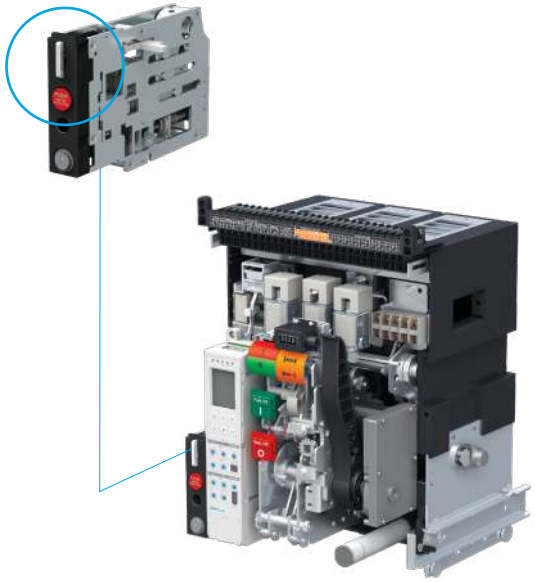
DR Device Unit & Position Pad Lock

- As for the draw-out type of circuit breaker, DR device is mounted on the main unit.
- DR device is comprised of a groove for inserting draw-out handle, draw-out push button, position indicator and a padlock device.
- As for the padlock device, it is provided as a standard safety device that prevents arbitrary draw-out by using a padlock in the connection/test/isolated position but the padlock is not provided by our company. (Ø5 ~ Ø8)
- It can be purchased separately.

On/Off Button Lock



DR Device Unit &
Position Pad Lock



Auto Connection Type & Manual Control Plug Type

- As for the method of connecting the control power, auto connection type in which the control power is automatically connected/isolated when the main unit is drawn out and manual connection type in which the user directly inserts the connector with the control power connected to the main unit are available.
- Fixed type is provided with manual control plug type as standard so that type of connection terminal of the main power can be designated without separate indication.
- When completely removing the manual connection type of product from the cradle, the main unit has to be separated after removing the connector.
- As a product mounted on the cradle, select A for automatic connection type and J for manual connection type.

Manual Control Plug Type



Auto Control Plug Type

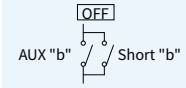
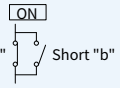
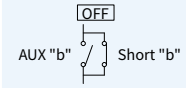
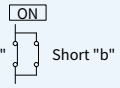




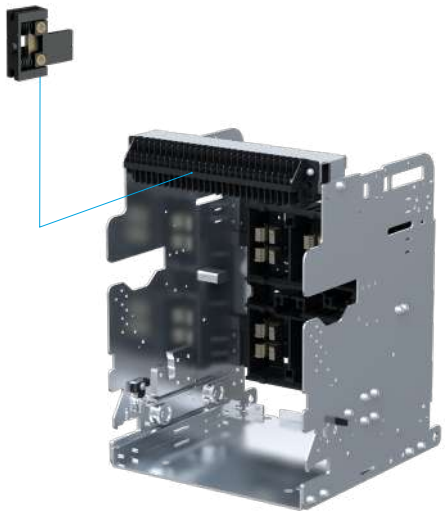
Short “b” Contact

- When the circuit breaker is moved from the Connected position to the Test position, the auxiliary contact AUX “b” is disconnected to maintain the external control circuit in normal, ultimately maintaining an accurate sequence operation.
  As for the number of shorting “b” contact, it corresponds to the number of AUX “b” (5b).
- Upon outgoing, only 1b (51, 52) is mounted and as for the remaining 4b, it is sealed together with the manual pack so it can be mounted as much as needed for use.
- As a product mounted on the main unit, add AK in the order form when placing an order for the main unit.

Indication of Contact Status
(When AUX “b” and Short “b” are Connected)

ACB Operating / ACB Position	ACB Close (AUX “b” Off)	ACB Open (AUX “b” On)
Connected Position (Short “b” Off)		
Test Position (Short “b” On)		

Short “b” Contact



Accessories

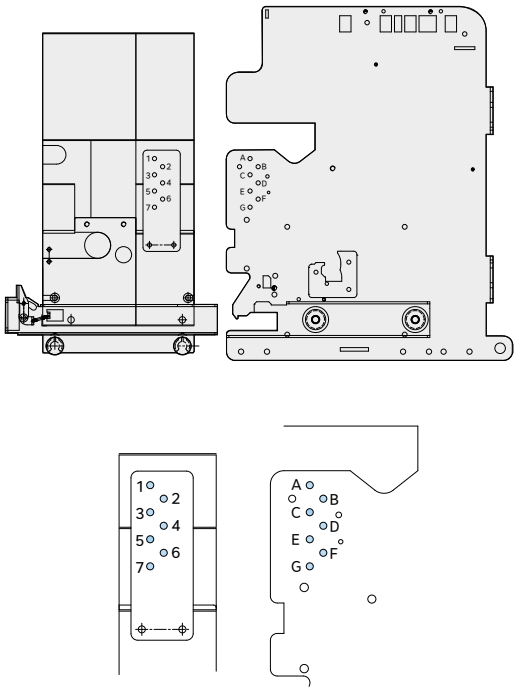
Miss-Insertion Preventor

- Although the external size is equivalent, in case the rating does not conform when the main unit of the circuit breaker (ACB) is inserted in the cradle in the composition of another circuit breaker, this device prevents it from being inserted.
- It is comprised based on the CT rated current.
- Each component is mounted on the main unit and cradle respectively. Add AW in the main unit and cradle's order form respectively when placing the order.

Ordering Method

CT Rating	Cradle	ACB
0 = OCR Non Mounting	ADEG	236
O = 200A	ADEF	237
V = 320A	ABEF	347
E = 400A	ABDG	356
T = 630A	ABDF	357
H = 800A	ABDE	367
J = 1,000A	ABCG	456
K = 1,250A	ABCF	457
L = 1,600A	ABCE	467
M = 2,000A	ABCD	567
N = 2,500A	BCDE	167
P = 3,200A	BCDF	157
Q = 4,000A	BCDG	156
S = 5,000A	BCEF	147
X = 6,300A	ABEG	346

Part's Mounting Position per Rated Current



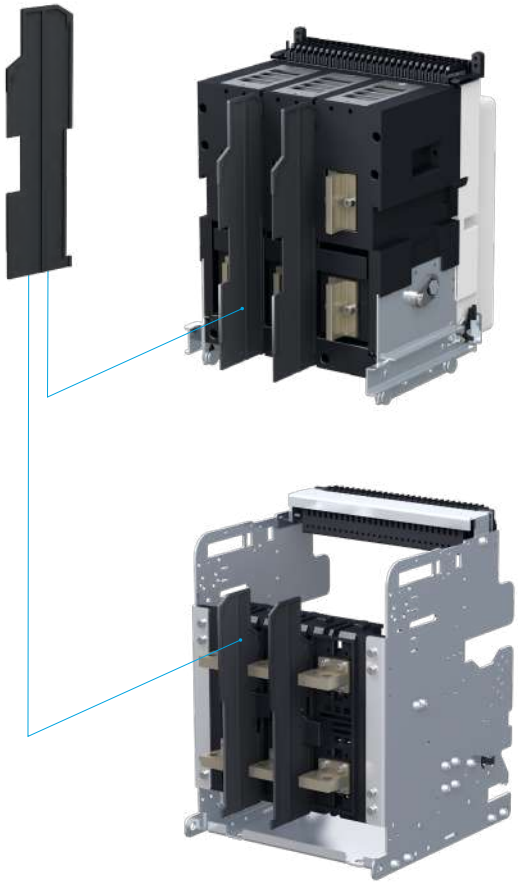


Miss-Insertion Preventer

Phase Insulation Barrier

- Phase insulation barrier is a part installed between phases that prevents short circuit between phases in advance by closing the arc which may occur between phases.
- 2 ea are mounted for 3P Type and 3 ea are mounted for 4P Type and as they are sold individually, select the required quantity when placing the order.
- As a product sold separately, place an order in HGNS P BAR.

Phase Insulation Barrier



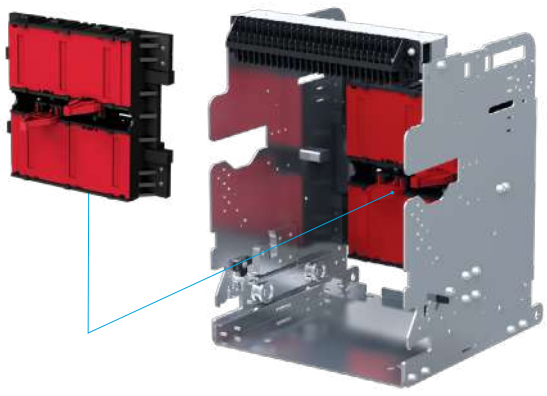
Safety Shutter & Shutter Lock

- It is a safety device that prevents the contact between the conductor part and the front part when the main unit of the circuit breaker mounted on the cradle is drawn out.
- The structure automatically opens and closes when the circuit breaker is drawn out and it comes with a shutter lock device that prevents it from opening when the shutter is closed in the event the main unit is drawn out. The padlock is not provided by our company. (Ø5 ~ Ø8)
- As for the shutter, the power side and load side operates separately, each equipped with an operation device and they can be locked individually.
- As a product mounted on the cradle, add AE in the order form when placing the order for the cradle.

Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Order Name for Separate Sales (HGNS-)	Detailed Specification
Safety Shutter	AE	HGNS AEA3	A, P Frame, 630 ~ 2,000 A, 3P
		HGNS AEA4	A, P Frame, 630 ~ 2,000 A, 4P
		HGNS AEB3	B, Q Frame, 2,000 ~ 4,000 A, 3P
		HGNS AEB4	B, Q Frame, 2,000 ~ 4,000 A, 4P
		HGNS AEC3	C Frame, 3,200 ~ 5,000 A, 3P
		HGNS AEC4	C Frame, 3,200 ~ 5,000 A, 4P
		HGNS AED3	D Frame, 4,000 ~ 6,300 A, 3P
		HGNS AED4	D Frame, 4,000 ~ 6,300 A, 4P

Safety Shutter & Shutter Lock



Accessories

Fixing Block

- It is a safety device for reinforcement in order to prevent abnormal operation caused by vibration.
- It is capable of simultaneously fixing the main unit and the cradle and reinforcing the cradles and panel supporters.
- Each component is mounted on the main unit and the cradle. Add AF in the respective order form of the main unit and cradle when placing the order.

Control Terminal Protection Cover

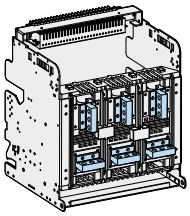
- It is a safety cover that is placed on the connection terminal to prevent contact with external foreign substances or physical contact after the control power has been connected to the automatic connection type of terminal.
- It cannot be applied to fixed type ACB and draw-out type ACB with manual connection terminal.
- As a product mounted on the cradle, add BC when placing an order for the draw-out type with automatic connection type.



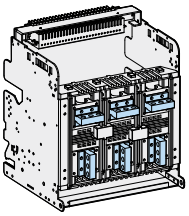
Terminal Bus Bar (Draw-Out Type)

- HG-Series ACB is compatible with various type of terminal bus bar such as vertical, horizontal, front and others depending on the type of bus bar of the customer's equipment and the terminal can be changed to A, P frame (630 ~ 1,600 A) and B, Q frame (630 ~ 3,200 A).
- The front type of terminal bus bar is released separately from the main unit and cradle so it needs to be installed at site. In addition, the front type of terminal bus bar requires separate order so refer to the following table when placing the order.
- As for the front type of terminal bus bar that is provided separately for the B, Q frame 2,000/2,500 A, 3,200 A terminal is provided.
- Front type of terminal bus bar is sold separately.

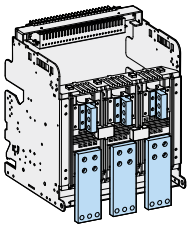
Mixed Type



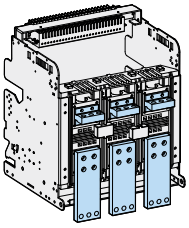
(Upper) Vertical Type
+
(Lower) Horizontal Type



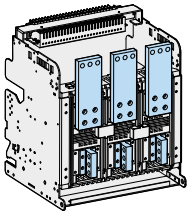
(Upper) Horizontal Type
+
(Lower) Vertical Type



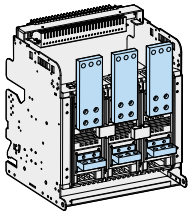
(Upper) Vertical Type
+
(Lower) Front Type



(Upper) Horizontal Type
+
(Lower) Front Type

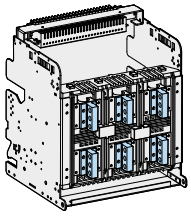


(Upper) Front Type
+
(Lower) Vertical Type

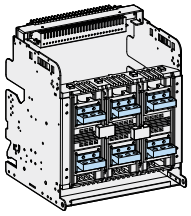


(Upper) Front Type
+
(Lower) Horizontal Type

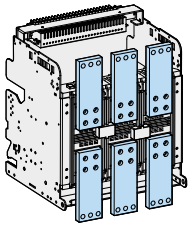
Standard Type



Vertical Type



Horizontal Type



Front Type

Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Detailed Specification
Connection Terminal (Draw-Out Type)	HGNS HVA3	Up-Down Horizontal Type/Up-Down Vertical Type 6 ea (A, P Frame, 630 ~ 1,600 A, 3P)
	HGNS HVA4	Up-Down Horizontal Type/Up-Down Vertical Type 8 ea (A, P Frame, 630 ~ 1,600 A, 4P)
	HGNS HVB3	Up-Down Horizontal Type/Up-Down Vertical Type 6 ea (B, Q Frame, 2,000 ~ 3,200 A, 3P)
	HGNS HVB4	Up-Down Horizontal Type/Up-Down Vertical Type 8 ea (B, Q Frame, 2,000 ~ 3,200 A, 4P)
	HGNS FRA3	Up-Down Front Type 6 ea (A, P Frame, 630 ~ 1,600 A, 3P)
	HGNS FRA4	Up-Down Front Type 8 ea (A, P Frame, 630 ~ 1,600 A, 4P)
	HGNS FRB3	Up-Down Front Type 6 ea (B, Q Frame, 2,000 ~ 3,200 A, 3P)
	HGNS FRB4	Up-Down Front Type 8 ea (B, Q Frame, 2,000 ~ 3,200 A, 4P)
	HGNS FHVA3	Up-Down Front Type 3 ea + Horizontal Type/Vertical Type 3 ea (A, P Frame, 630 ~ 1,600 A, 3P)
	HGNS FHVA4	Up-Down Front Type 4 ea + Horizontal Type/Vertical Type 4 ea (A, P Frame, 630 ~ 1,600 A, 4P)
	HGNS FHVB3	Up-Down Front Type 3 ea + Horizontal Type/Vertical Type 3 ea (B, Q Frame, 2,000 ~ 3,200 A, 3P)
	HGNS FHVB4	Up-Down Front Type 4 ea + Horizontal Type/Vertical Type 4 ea (B, Q Frame, 2,000 ~ 3,200 A, 4P)

※ The customer-selected type can be purchased separately after the customer modifies the horizontal, vertical, and flat type.

Accessories

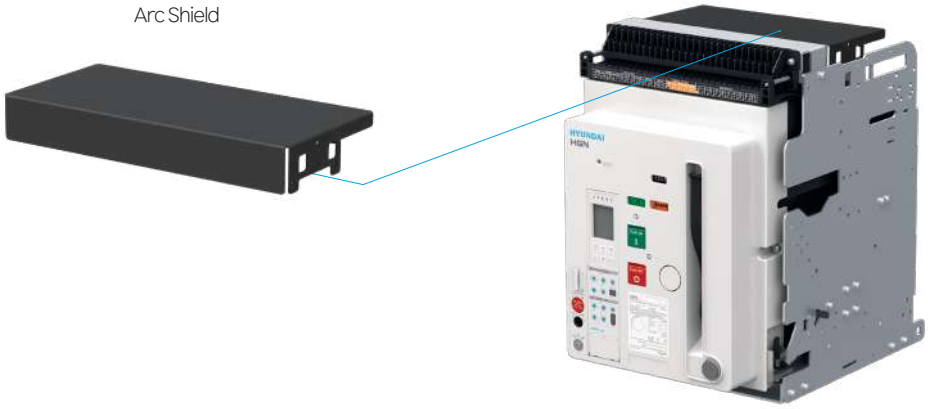
Arc Shield

- Arc which occurs while breaking the circuit breaker is extinguished through the arc chamber within the main unit or as the residual arc is discharged to the external upper part, the basic distance required for insulation has to be maintained.
- When mounting the arc shield, the insulation distance can be minimized to "0" due to the residual arc discharged to the upper part.
- When mounting the arc shield, it can be piled in 4 stories.
- As a product mounted on the cradle, add AX in the order form when placing the order for the cradle.

Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Order Name for Separate Sales (HGNS-)	Detailed Specification
Arc Shield	AX	HGNS AXA3	A Frame, 630 ~ 2,000 A, 3P
		HGNS AXA4	A Frame, 630 ~ 2,000 A, 4P
		HGNS AXB3	B Frame, 2,000 ~ 4,000 A, 3P
		HGNS AXB4	B Frame, 2,000 ~ 4,000 A, 4P
		HGNS AXC3	C Frame, 4,000 ~ 5,000 A, 3P
		HGNS AXC4	C Frame, 4,000 ~ 5,000 A, 4P
		HGNS AXD3	D Frame, 4,000 ~ 6,300 A, 3P
		HGNS AXD4	D Frame, 4,000 ~ 6,300 A, 4P

Arc Shield



HGN1150V Arc Shield

Applicable Model
2000AF 3P
2000AF 4P
4000AF 3P
4000AF 4P

* P, Q Frame Standard Supply

Arc Shield



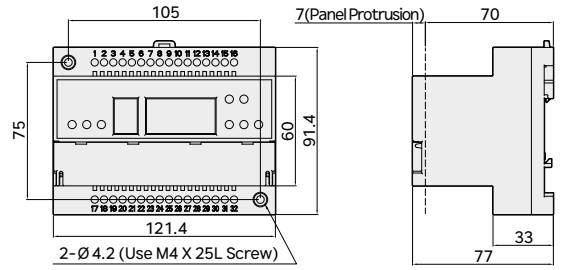
RCTU

- This product is a module that closes and prevents the ACB remotely by using communication.
- This product uses Modbus/RS-485 communication.
- Close/Open control of ACB assures its reliability through SBO (Select Before Operation) function.
- It can be used together with the temperature monitoring device module.

Contact Specification

For ACB Control	Applicable Range
Contact Ratings	10 A 240 VAC, 30 VDC
Max Switching Power	10 A 240 VAC, 30 VDC

Dimension



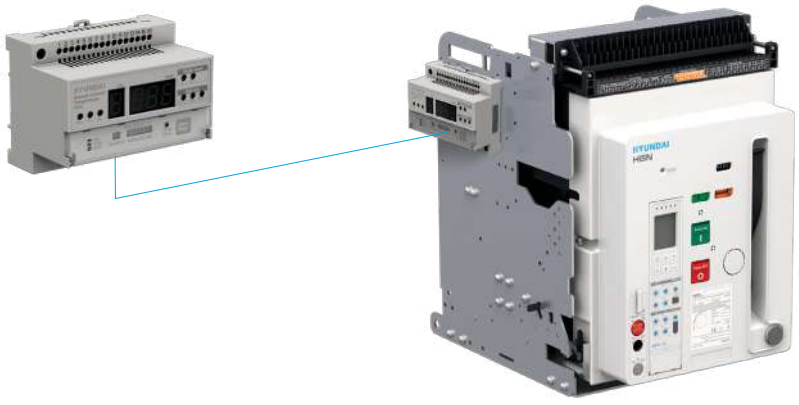
Temperature Monitoring Device Module

- This product detects the bus bar temperature of the ACB through the temperature sensor installed on the temporary location of ACB and displays it.
- Up to 3 temperature sensor can be installed and it can trigger the designated temperature alarm through a separate temperature contact.
- It supports Modbus/RS-485 communication and the each channel's temperature value and the maximum temperature value out of the channel are transmitted through communication.
- The alarm for operating temperature value can be set through communication.
- The temperature value of each channel can be checked through the Segment LED mounted at the front and once it reaches the temperature alarm set by the user, the temperature value of the relevant channel is displayed.
- As a product sold separately, it can be installed in the ACB and the internal panel. It can also be used together with the remote breaking module.
- This product is an optional product of remote breaking module and it is only sold as a combination type with the remote breaking module.

Contact Specification

Temperature Alarm	Applicable Range
Contact Ratings	10 A 120 VAC/5 A 240 VAC, 5 A 30 VDC
Max Switching Power	1,200 VA, 150 W

Remote Control Trip Unit (RCU) /
Temperature Monitoring Device Module



Accessories

Temperature Sensor Unit

• Detailed specification of Remote Control Temperature Unit (RCTU)
- RCTU is equipped with a contact that enables remote insertion/disconnection of ACB using communication. Through the 4 temperature channels, the temperature of ACB is measured.
- RCTU supports RS-485/Modbus-RTU communication.
- Insertion/disconnection control of ACB assures its reliability through SBO (Select Before Operation) function.
- If the temperature rises over the value set by the user through communication, it can be checked through the alarm contacting point (Additional connection required).
- The temperature of ACB can be checked through the Segment LED at the front.
- RCTU can be installed in the ACB's cradle or panel.
- RCU module is equipped with the same function other than the temperature monitoring function in the RCTU module.

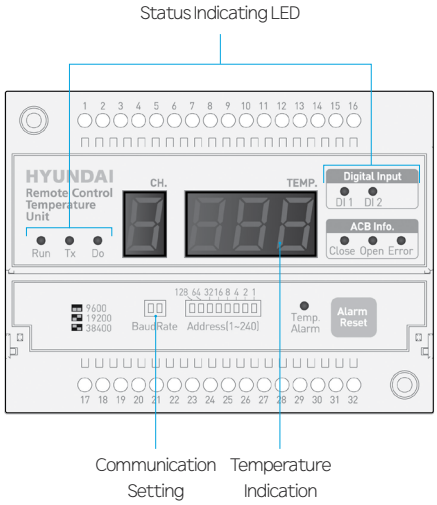
Status Indicating LED		Details
RCTU Status	Run LED	RCTU Operation Status LED
	Com LED	Communication LED
	Temp. Alarm LED	Temperature Alarm LED
	Alarm DO LED	Temperature Alarm Output Contact LED
Universal Digital Input	DI1	Dry Contact (5 V)
	DI2	Dry Contact (5 V)
Temperature Alarm	CB Close	ACB Close Status LED
	CB Open	ACB Open Status LED
	CB Error	ACB Close/Open Terminal Non Contacted and Control Error Status

Terminal Block

No.	Definition	No.	Definition
1	DI1 +	17	NTC IR Sensor
2	DI1 -	18	NTC IR Sensor
3	DI2 +	19	IR Sensor 3 AOR (Black)
4	DI2 -	20	IR Sensor 3 GND (Green)
5	DI Close +	21	IR Sensor 3 AOT (Yellow)
6	DI Close -	22	IR Sensor 3 Power (Red)
7	DI Open +	23	IR Sensor 2 AOR (Black)
8	DI Open -	25	IR Sensor 2 GND (Green)
9	DO Temp. Alarm	25	IR Sensor 2 AOT (Yellow)
10	DO Temp. Alarm	26	IR Sensor 2 Power (Red)
11	DO Close	27	IR Sensor 1 AOR (Black)
12	DO Close	28	IR Sensor 1 GND (Green)
13	DO Open	29	IR Sensor 1 AOT (Yellow)
14	DO Open	30	IR Sensor 1 Power (Red)
15	AC Power	31	RS485 (-)
16	AC Power	32	RS485 (+)

Contact Specification

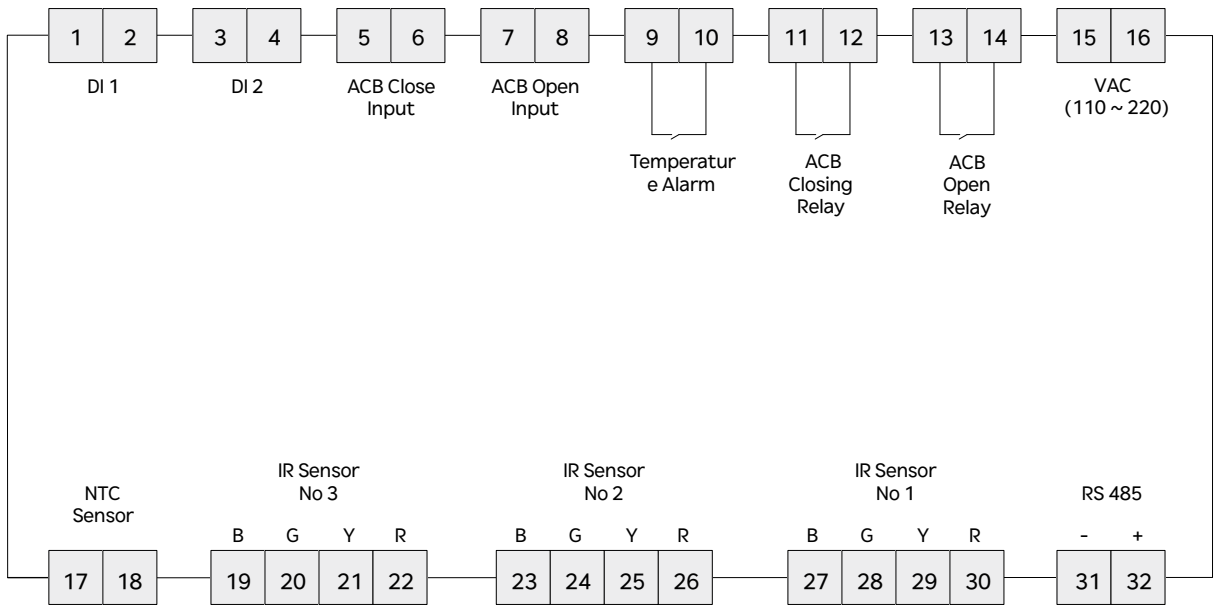
Item		Applicable Range
ACB Control	Contact Ratings	10 A 240 VAC, 30 VDC
	Max Switching Power	2,400 VA, 300 W
Temperature Alarm	Contact Ratings	10 A 120 VAC/5 A 240 VAC 5 A 30 VDC
	Max Switching Power	1,200 VA, 150 W



⚠ Caution

1. IR sensor differs in value by the reflectivity of metal surface. Measuring point should be varnished or painted with matt black paint depending on material.
2. Measuring point and IR distance differ measuring spot size by D : S ratio. This sensor has 8 : 1 scale.
3. IR sensor should be indicated at the point where there is no gloss surface.
4. IR sensor distance : The ratio of measurement locations is 8 : 1. The diameter measured by the IR sensor is 1 cm when it is 8 cm away from the measurement position.

Block Diagram



Accessories

Temperature Sensor

- The temperature sensor is mounted on the designated position as standard but another location can be designated by the user.
- It is sold separately.

Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Detailed Specification
Temp Sensor	HGNS TSN	Temperature Sensor
Remote Control Trip Module	HGNS RCU	Remote Control Trip Module
	HGNS RCTU	Remote Control Trip Module + Temperature Monitoring Device Module
	HGNS RCTUN	Remote Control Trip Module + Temperature Monitoring Device Module + Temperature Sensor

Physical Medium

- Shielded Twister Pair cable used

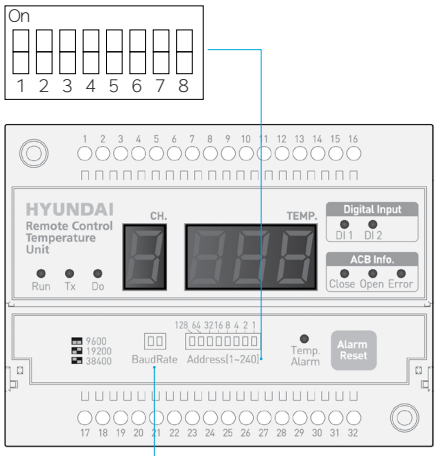
⚠ Caution

1. The use of Shielded Twisted Pair cable is recommended.
2. The maximum length for connection can be 1 km but the communication length may become shorter depending on the installation environment and the number of device connected to the communication line.
3. The communication length may differ depending on the communication speed.

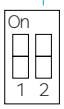
Communication Specification

- RS-485 (Modbus-RTU)
- Baud Rate : 9,600, 19,200, 38,400 bps (Default : 9,600)
- Data Bits : 8 bits
- Parity : None
- Stop Bits : 1 bits

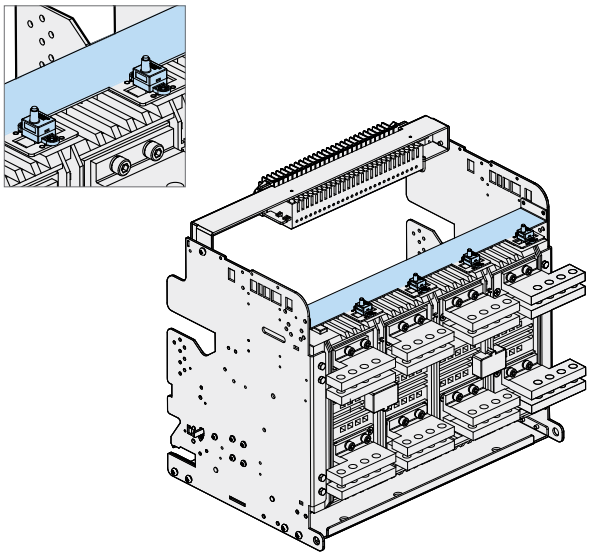
Address Setting : 1 ~ 240



Baud Rate Setting

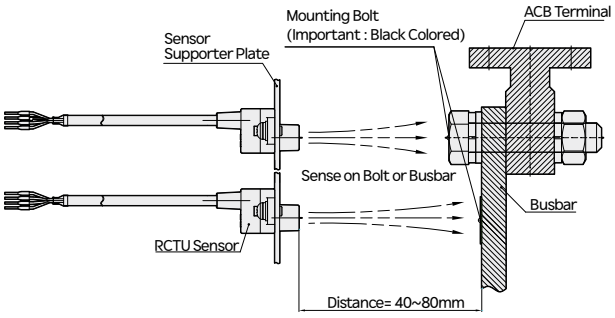


Set		Description
Off	Off	9,600
Off	On	19,200
On	Off	38,400

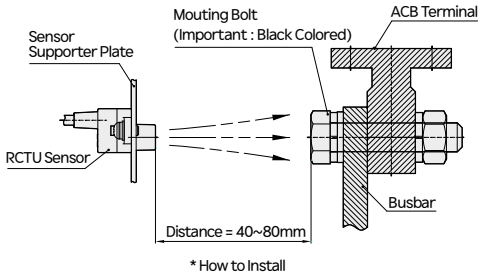


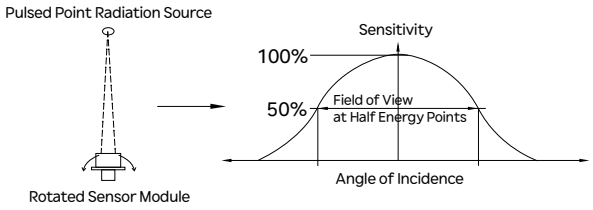
IR (Infrared Sensor) Specification (Option)

IR Sensor



Example of IR Sensor Application





Parameter	Limits			Unit	Conditions
	Min	Typ	Max		
Cable Length		3		m	
Optical Axis	- 3.5	0	+ 3.5	Degree	Sensor View Direction
Field of View		6	11	Degree	50 % Energy Points
D:S Ratio		8:1			Distance (mm) to Spot Size

IR Sensor Measurement

- IR temperature sensor has to be installed with sufficient insulation distance from the measuring point.
- The recommended distance between the measuring point and the temperature sensor is 50 ~ 80 mm.
- The measuring point must be a surface without reflection due to the characteristics of the IR sensor and black matte painting is recommended at the measuring point.

⚠ Caution

1. As for the IR sensor, the measurement value differs depending on the reflection rate of the metal surface. Measuring point with surfaced painted with matte black or varnish other than metallic varnishing must be measured.
2. As for the surface to be measured and the IR distance, the size of measurement area differs depending on the D : S Ratio. This sensor has a ratio of 8 : 1.

Accessories

Temperature Sensor

Connection Diagram

ACB Information Pin

a Contact	b Contact	Test	Connection
45, 47, 49	55, 57	61	71
46, 48, 50	56, 58	62	72

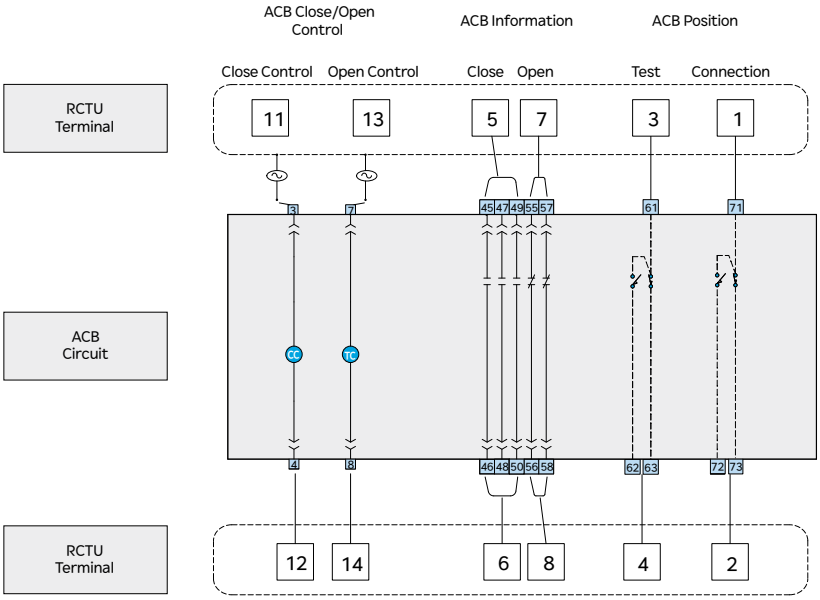
ACB Open/Close Control Pin

CC	TC
3	7
4	8

HGN



Example : When DI input is used as ACB position



INTC Thermistor Specification (Option)

- The electrical resistance value changes depending on the ambient temperature and by measuring the change in value, the temperature is displayed.
- The length of the cable is 1,000 mm and it measures the value of ambient temperature where in the RCTU has been installed.
- The range that can be measured is -50 ~ 250 °C.

Parameter	Content	Conditions
Length of Cable	1,000 mm	
Resistance Value	10 kΩ ± 1 %	Ambient Temperature of 25 ℃

OCR Portable Checker

- OCR Portable Checker (Hereinafter referred to as the Checker) executes the relay test operation of the OCR (Hereinafter referred to as the OCR) (Long time/short time delay/ instantaneous/ground fault).
- It is possible to set the current size and phases using button for the OCR test.
- The relay test factors can be set through the front LCD and the operating time can be checked.
- It is equipped with a battery so it can be used without a separate external power.
- As for the cable connector of the checker, connect when the control power of OCR is off when inserting the OCR.
- As a product sold separately, place an order for HGNS OCC.
- HGNS OCC is a product with a calibration certificate issued by a specializing institute.



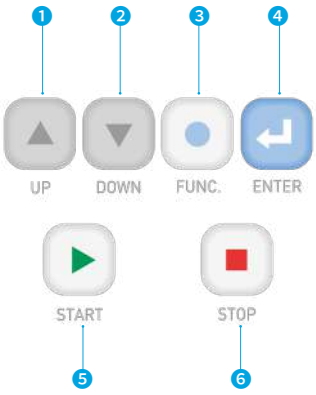
Ratings

Item	Detailed Specification
External Power (Adaptor)	Input : AC/DC 100 ~ 220 V, 50/60 Hz Output : DC 24 V, 2.5 A
Battery	Alkaline 9 V : 3 ea
Trip Time Measurement	0 ~ 999.999 sec
Test Output	0.3 Ict ~ 17 Ict
Output Precision	± 20 % (1 Ict ~ 17 Ict)
Size (mm)	193.40 (H) × 110.60 (W) × 44.60 (D)

Ordering Method

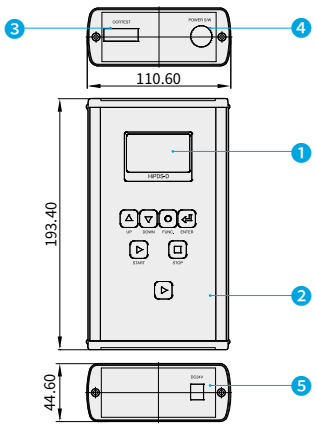
Name of Accessory	Order Name for Separate Sales	accessory Spec.
OCR Checker	HGNS OC	PORTABLE OCR CHECKER

Key Pad



No.	Button	Application
❶	UP	Move Menu and Increase Setting Value
❷	DOWN	Move Menu and Decrease Setting Value
❸	FUNC	Move to the Previous Menu and Return to the Setup Screen
❹	ENTER	Save the Setting and Move the Number of Digits of Setting Current
❺	START	Generate Waveform
❻	STOP	Stop Waveform

Externals



No.	Content	Function
❶	LCD	Indicates Menu, Setting Current, Trip Time
❷	Key Pad	Move Menu and Setting
❸	Signal Output Terminal	OCR Connection Terminal
❹	Power Switch	Power On/Off
❺	Adapter Terminal	Control Terminal of Checker

Accessories

OCR Checker

Multi-functional OCR checker is test equipment that can inspect the OCR operation in unloaded status and the OCR status can be inspected through communication.

- Control Power : AC/DC 85 ~ 270 V (50/60 Hz)
- Specification
  - Dimension : 411 (L) × 321 (W) × 165 (H)
  - Weight : 8 kg
- Key Functions
  - Inspection of LTD, STD, INST, GFT operation and operating time
  - Inspection of PTA operation (Pre Trip Alarm)
  - Touch LCD

Rating	Specification
Control Power	AC/DC 85 ~ 270 V (50/60 Hz)
Output	Output Channel : 4 (R, S, T, N) Test Output : 0.4 ~ 17 Ict Precision : ± 3 %
Input	Communication : RS 485 Touch-Screen of HMI
Size	411×321×165 mm, 8 kg

Ordering Method

Name of Accessory	Order Name for Separate Sales	accessory Spec.
OCR Checker	HGNS HROC	HIGHER OCR CHECKER



NCT (Neutral CT)

- It is a separate mounting type of current transform installed in the N phase in case of protecting the earth fault by using 3-pole air circuit breaker with earth fault protection features in a 3 phase 4 line circuit. It clarifies the GFT operation caused by earth fault by detecting currents flowing in the N phase.
- The phase is important for inserting the relay so connect properly to the designated terminal.
- As a product sold separately, place the order using the following form name per rated current.
- Switch the OCR's switch from 3P to 4P after connecting the NCT power (k), 30 (ℓ) to the 3-pole circuit breaker.

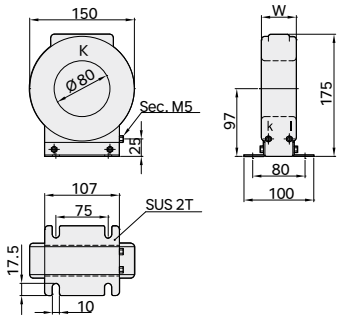
Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Detailed Specification
Neutral CT	HGNS NCT_T	NCT T = 630 A/Inner Diameter 80
	HGNS NCT_H	NCT H = 800 A/Inner Diameter 80
	HGNS NCT_J	NCT J = 1,000 A/Inner Diameter 80
	HGNS NCT_K	NCT K = 1,250 A/Inner Diameter 80
	HGNS NCT_L	NCT L = 1,600 A/Inner Diameter 80
	HGNS NCT_M	NCT M = 2,000 A/Inner Diameter 135
	HGNS NCT_N	NCT N = 2,500 A/Inner Diameter 135
	HGNS NCT_P	NCT P = 3,200 A/Inner Diameter 135
	HGNS NCT_Q	NCT Q = 4,000 A/Inner Diameter 200
	HGNS NCT_S	NCT S = 5,000 A/Inner Diameter 200
	HGNS NCT_X	NCT X= 6,300 A/Inner Diameter 200

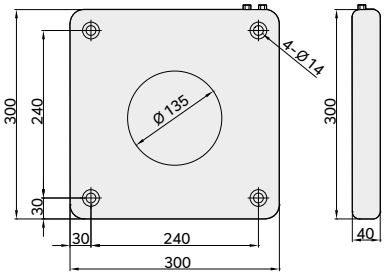
Externals

Unit : mm

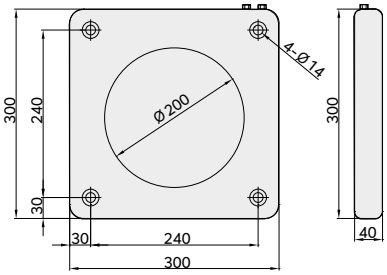
630 ~ 1,600A



2,000 ~ 3,200A



4,000 ~ 6,300A





Accessories

CTD-Condenser Trip Device

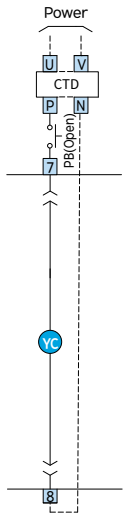
- In case of using AC/DC power for trip control of the circuit breaker, it is a device that can electrically trip the circuit breaker once by using the power charged in the CTD when the supply of control voltage has been stopped due to black-out and others.
- It is a product sold separately.



Ordering Method

Name of Accessory	Order Name for Separate Sales (HGNS-)	Detailed Specification
CTD	HGNS CTD1	AC 110 V
	HGNS CTD2	AC 220 V

Connection Diagram

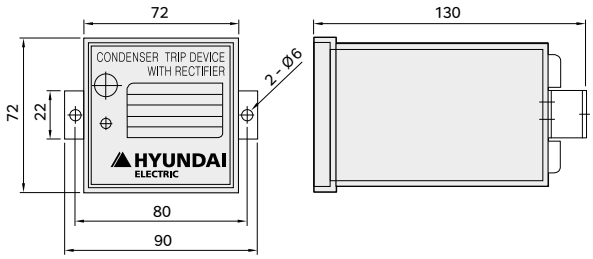


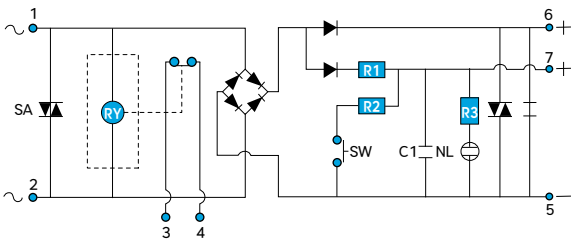
Ratings

Item	Details	
Rated Input Voltage	AC 110 V	AC 220 V
Normal Charging Voltage	DC 145 V	DC 290 V
Normal Current Capacity	DC 2 A	
Rated Frequency	50/60 Hz	
Delay Circuit Time	Within 1.5 sec	
Applicable Standard	IEC 60694/KSC 4611	

Operating Sequence of CTD External Operation Circuit

Unit : mm





- AC Input Power NO. 1, 2
- CTD Trip Power NO. 7 (+), 5 (-)
- DC Normal Power NO. 6 (+), 5 (-)
- Delay Contact NO. 3, 4

Test Jumper

- It is a device that enables the main unit to be operated independently by separating the automatic connection type of main unit from the cradle.
- As a product sold separately, place an order for HGNS AJ when ordering.



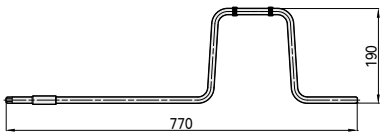
Draw-In/Out Handle

- The draw-in/out handle for drawing the draw-in type of circuit breaker is provided basically.
- In case the standard handle is uncomfortable when drawing the circuit breaker in and out, Long Type Handle and Universal Joint Handle which are sold separately can be used.
- As a product sold separately, place an order of HGNS LHANDLE or HGNS UHANDLE.

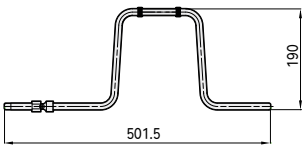


Type

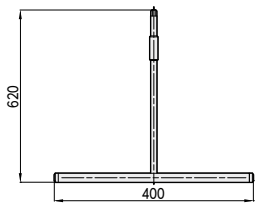
Long Type Handle



Universial Joint Handle



T-Type Handle



Ordering Method

Name of Accessory	Order Name Placed upon Outgoing	Order Name for Separate Sales (HGNS-)	Detailed Specification
Draw-In/Out Handle	-	HGNS HANDLE	Standard Handle (Provided as Standard)
		HGNS LHANDLE	Long Type of Draw-In/Out Handle (For ACB)
		HGNS UHANDLE	Universal Joint Type of Draw-In/Out Handle
		HGNS THANDLE	T-Type, Long Type Handle

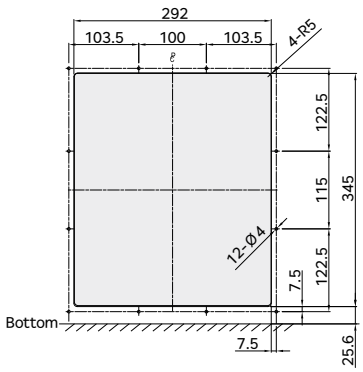
Accessories

Door Flange

- It is an auxiliary device mounted on the cutting part of the panel door at the front protrusion mounting type of ACB.
- The door flange of our company is IP30.
- As for the cutting dimension of the panel, refer to the external drawing.
- As for the panel cutting dimension, it is equivalent for both the draw-out and fixed type and it is the same even if the dust cover is installed.
- As a product sold separately, place an order for HGNS AG.

Panel Door Cutting Dimension

Unit : mm

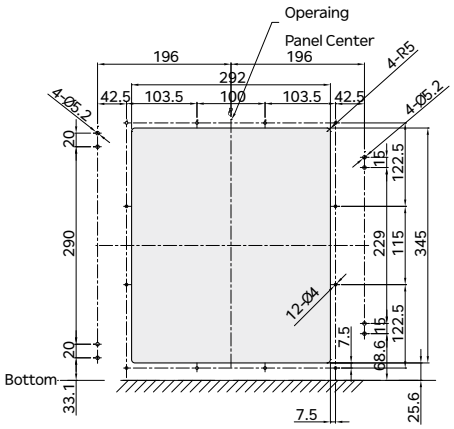


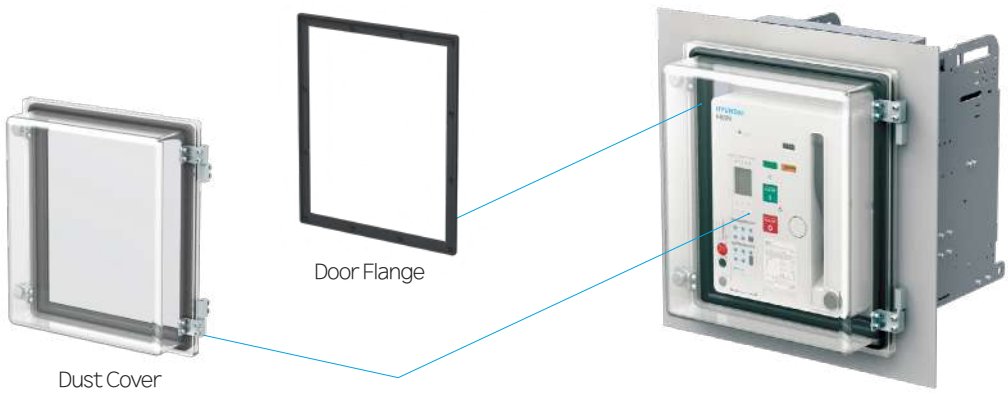
Dust Cover

- It is a device installed to protect against dust and moisture mounted on the cutting part of the panel door at the front protrusion mounting type of ACB.
- The dust cover of our company is IP52.
- The cover can be locked in the test and connected position.
- The cutting dimension of the panel must be referred to.
- As a product sold separately, place an order for HGNS DC.

Panel Door Cutting Dimension

Unit : mm



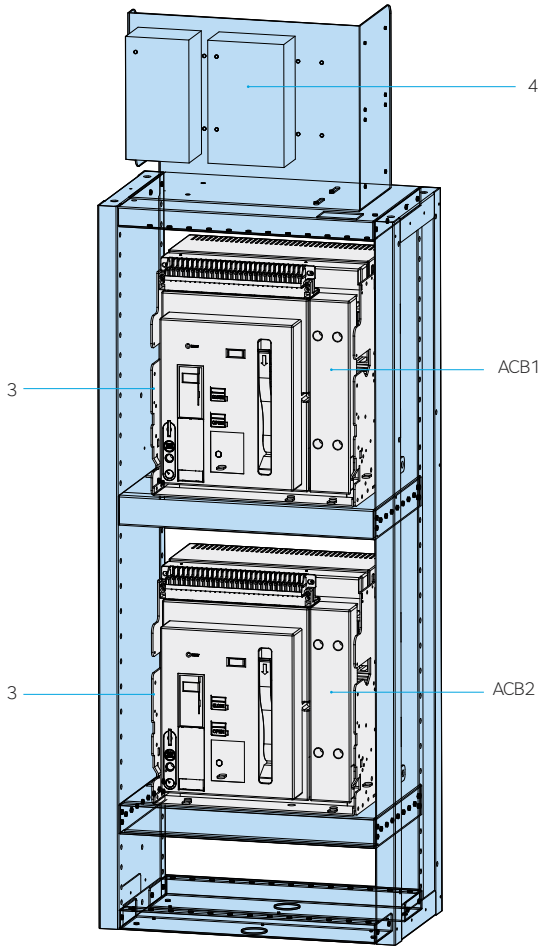


ATS & Controller

Features

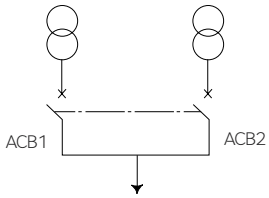
- **Stable Transfer System**
  By applying Hyundai air circuit breaker equipped with the highest rated breaking capacity in Korea, it has outstanding protective features with regards to electric power system, making it optimal for places in which stable power supply is compulsory (Communication base station, computer center, hospital, plant equipment and other important facilities).
- **Unmanned Working System**
  Unmanned power transfer is possible by applying automatic power control device in the ACB equipped with mechanical interlock device.
- **Various Modes**
  Various modes is possible as it is equipped with 4 selection models for user convenience.
- **Multi Protection Device**
  The multi protection device installed in ACB has self-monitoring, simple set up and various protecting functions. Unlike the existing ATS, short circuit and overload protection are possible for stable use.
- **Compact Size, Lightweight**
  ACB is more compact and lightweight so it can easily be installed in the ATS switchgear and occupies less space.
- **ATS Configuration and Interlock**
  - ACB1 : "Normal" power (Power company side)
  - ACB2 : "Stand-by" power (Power generator side)
  - 3 : Mechanical interlock device unit
  - 4 : ATS unit

  Each ACB should meet the following specifications.
  - Geared charge type of mechanism (Control power of AC 220 V)
  - TC (Control power of AC 220 V)
  - CC (Control power of AC 220 V)
  - Trip device for overload or short protection (2a contact)



Transfer System's Interlock Conditions

ACB1	ACB2
Open	Open
Close	Open
Open	Close



※ As a product sold separately, place an order for HGNS ATS when placing an order. However, M1 has to be ordered separately and B0, BA must be added when placing an order for the product.

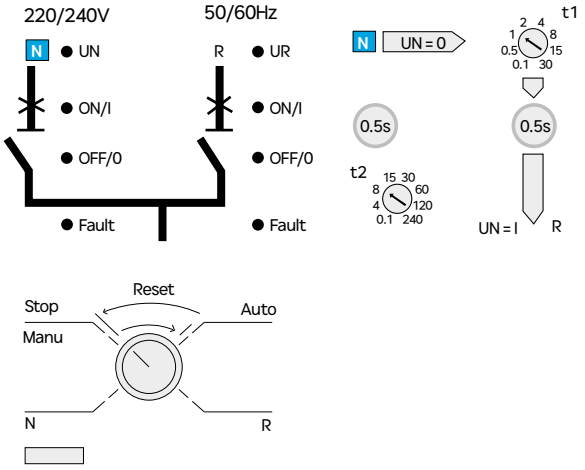
Accessories

ATS & Controller

Characteristics per Mode

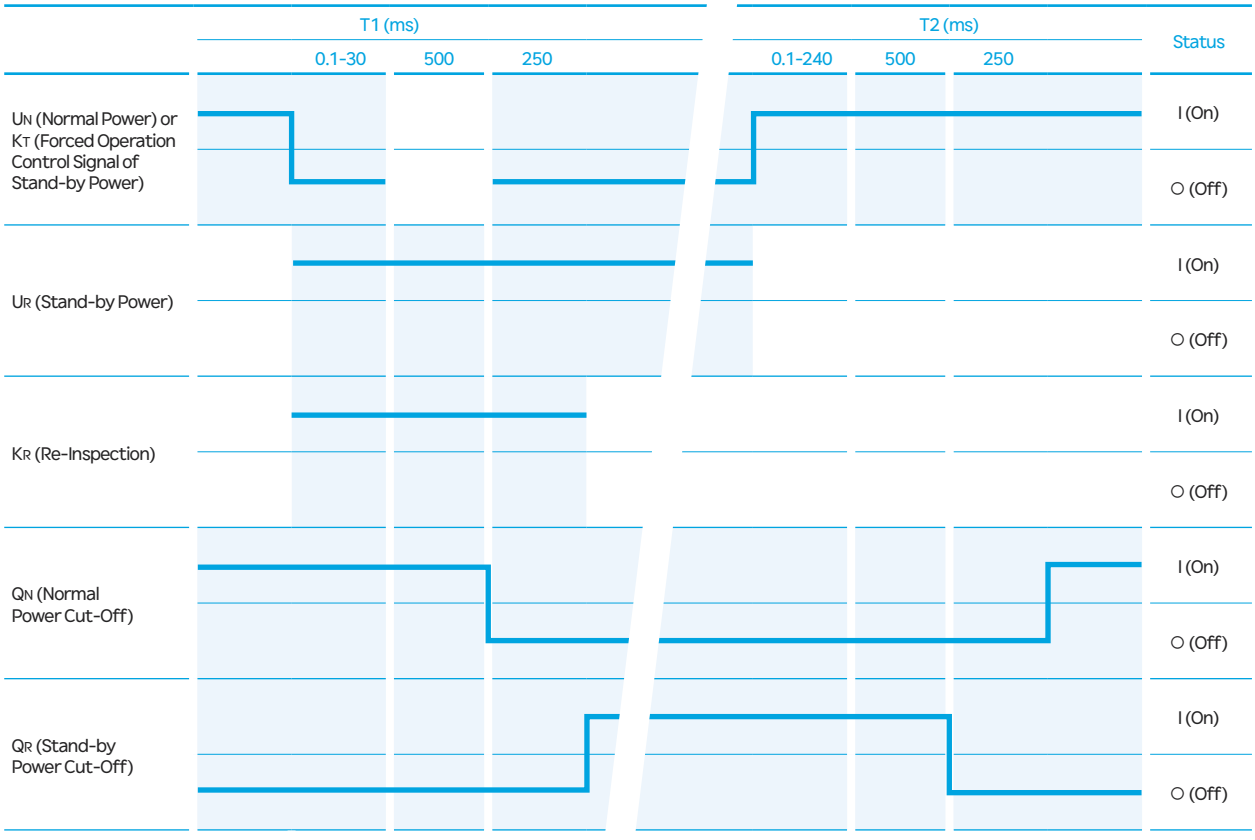
There are 4 selection modes.

- Stop/Manu Mode
  This mode offers On/Off functions using ACB Manual from the power company side and generator side.
- Auto Mode
  This mode is for automatically controlling the ACB depending on the sequence of system operation flow chart in the controller.
- N Mode (Forced Operation of Power Company Power)
  This mode turns off the ACB at the generator side and turns on the ACB at the power company side by force.
- R Mode (Forced Operation of Generator Power)
  This mode turns off the ACB at the power company side and turns on the ACB at the generator side by force.



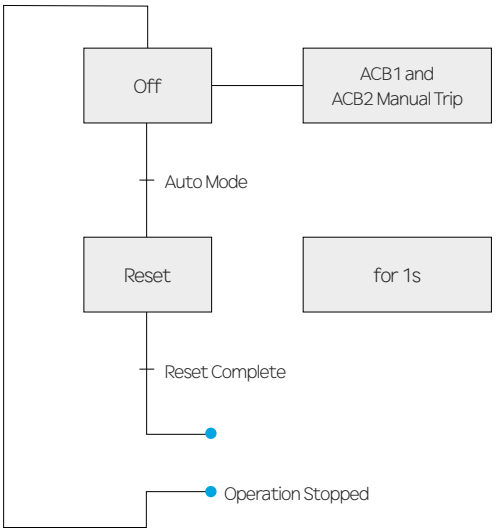
Time Delay Adjustment	Indication of the Controller's Status
t1 : 0.1 ~ 30 sec	On, Off, Fault Indication
t2 : 0.1 ~ 240 sec	(Power Company Side, Generator Side)

Operation Characteristics

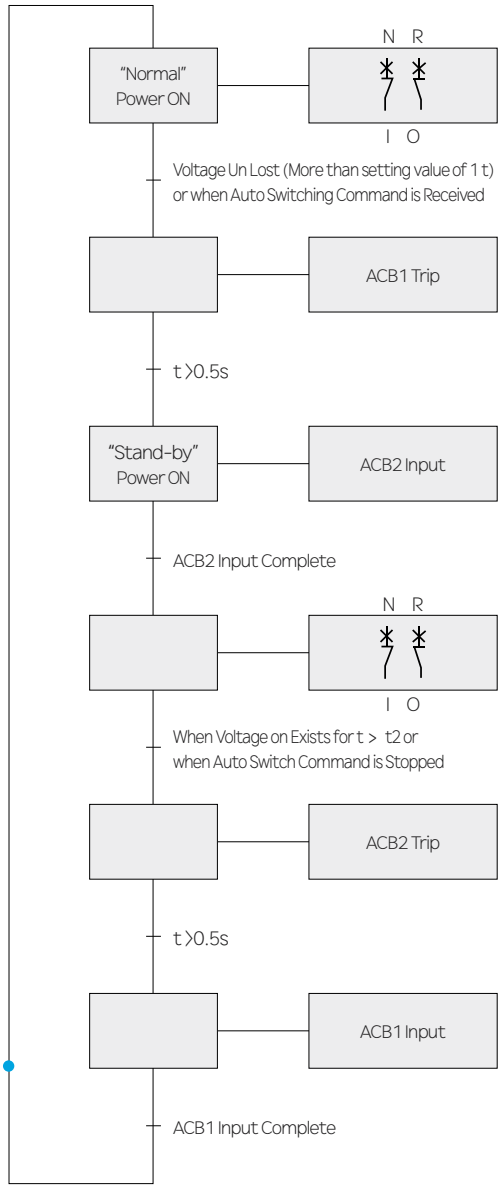


System Operation

Stop Mode



Auto Mode



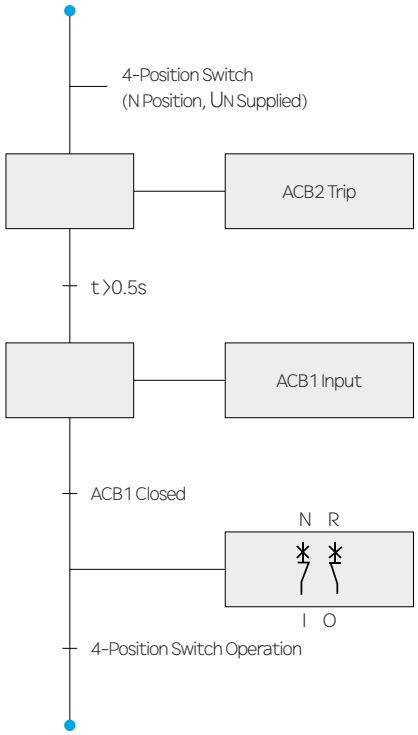
- ACB1 : HGN (S) ACB1 "Normal" Power (Power Company Side)
- ACB2 : HGN (S) ACB2 "Stand-by" Power (Generator Side)
- U_N : "Normal" Power Voltage
- U_R : "Stand-by" Power Voltage

Accessories

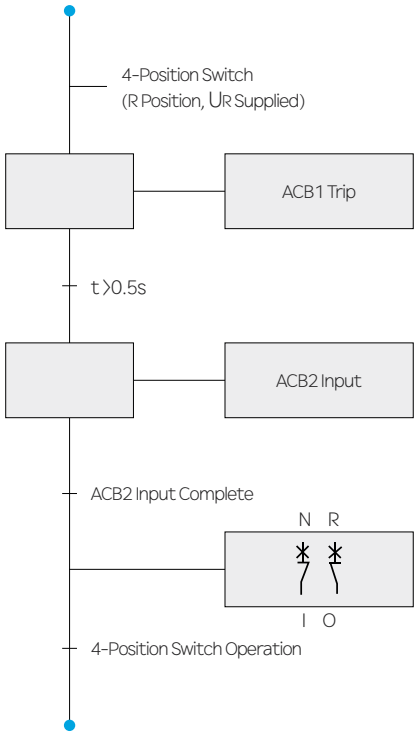
ATS & Controller

System Operation

N Mode ("Normal Mode" Forced ON)

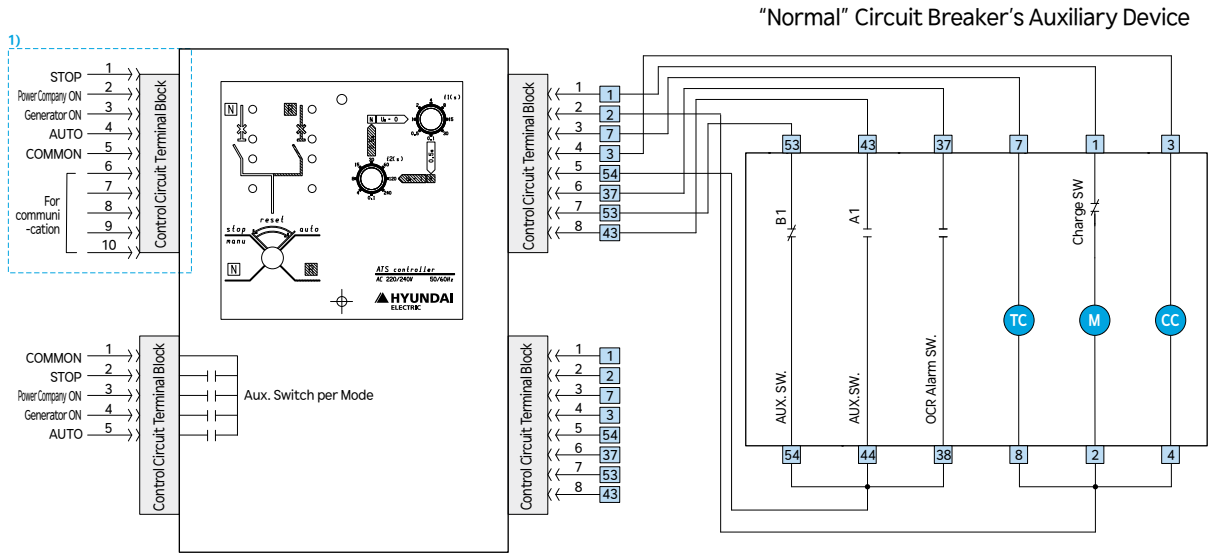


R Mode ("Stand-by" Power Forced ON)



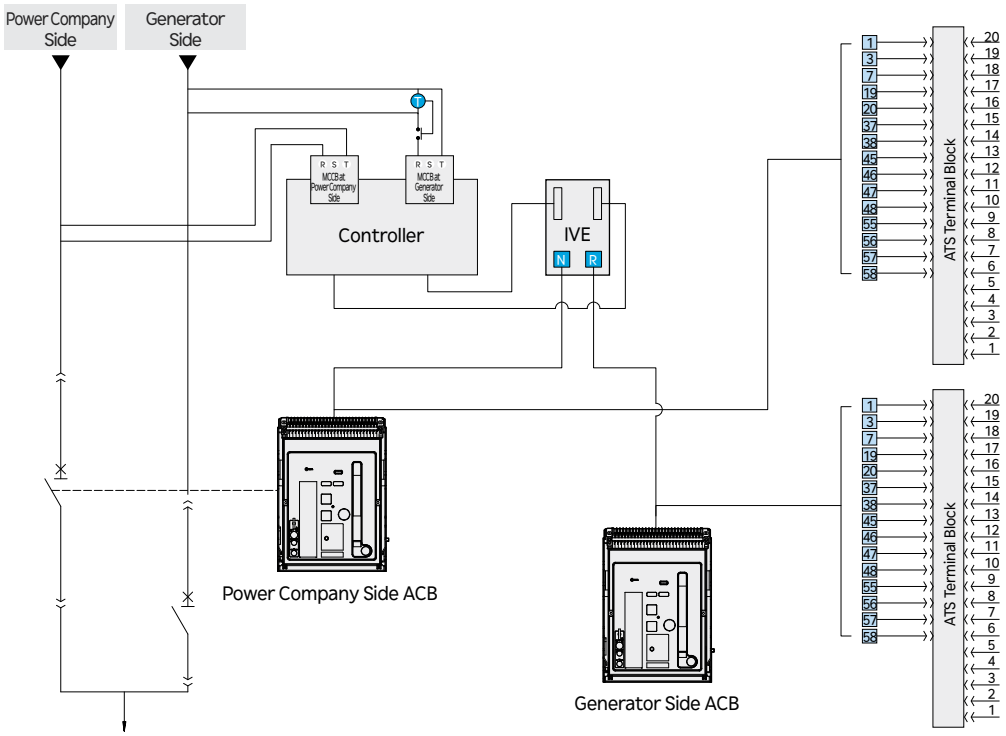
Circuit Diagram of the System [HGS/HGN Type]

Auto Switch System's Auxiliary Device Circuit Diagram



※ 1) The standard model is a SW mounting type on controller. (Control terminal type is not a standard model)

Auto Power Switch System's Auxiliary Device Circuit Diagram applied with 2 ACBs

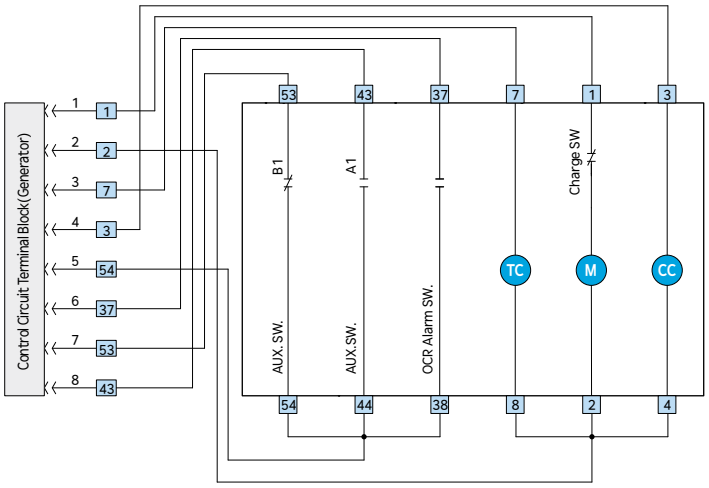


Accessories

ATS & Controller

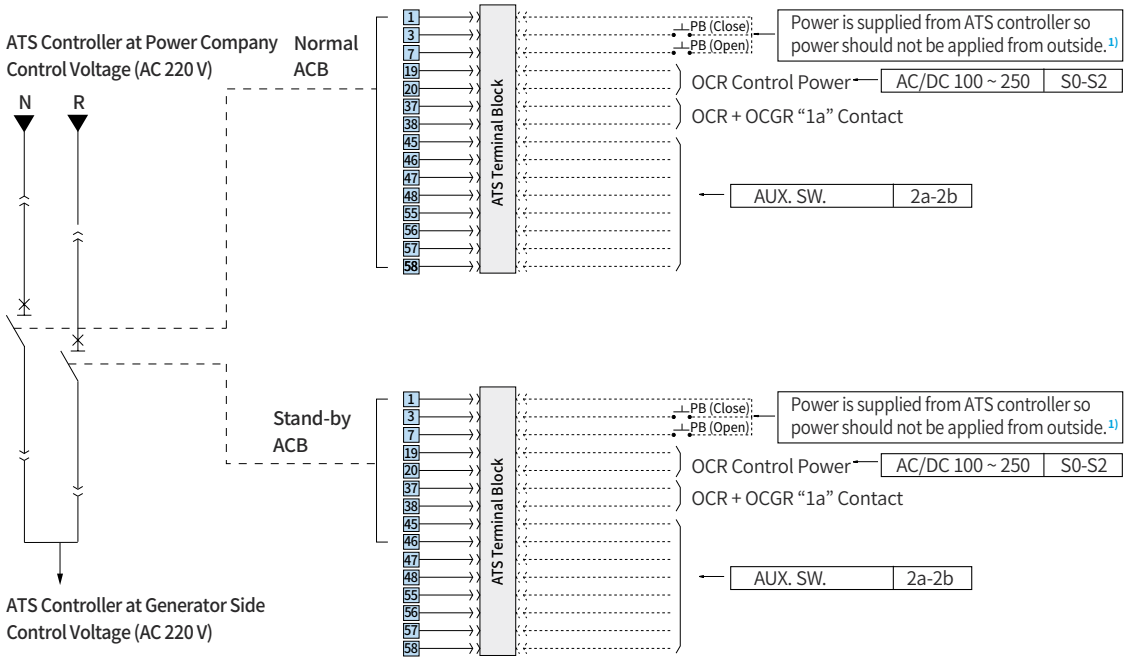
Circuit Diagram of the System [HGS/HGN Type]

"Stand-by" Circuit Breaker's Auxiliary Device



37 38 OCR DO
43 44 Auxiliary a Switch Terminal
53 54 Auxiliary b Switch Terminal
TC Voltage Trip
7 8 Voltage Trip Power Terminal
1 2 Geared Charge Power Terminal
3 4 Power Terminal for Close
M Charging Motor
CC Latch Release (Close)

ATS Panel Remote Circuit Diagram



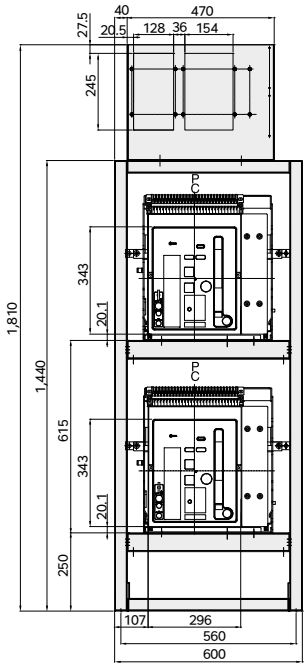
※ 1) Upon remote operation, as for the Open/Close power, the power is supplied from the ATS control device so do not input a separate control power supply. (Terminal number "1", "7", "16")

Dimensions [ATS HGN A Frame]

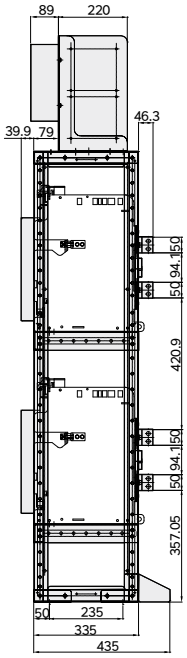
HGN06 ~ 16 A

Unit : mm

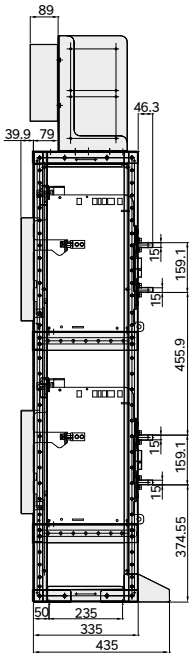
[Front]



[Vertical Type]



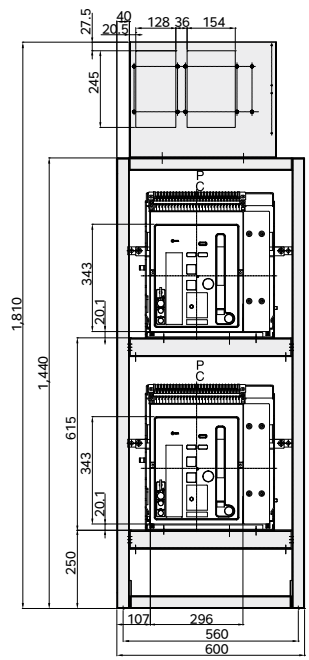
[Horizontal Type]



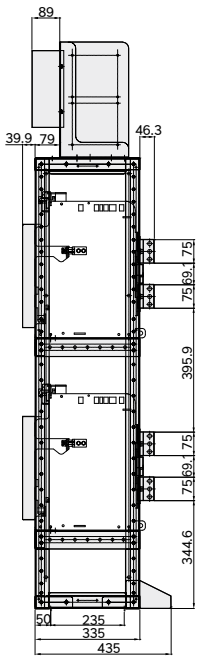
HGN20 A

Unit : mm

[Front]



[Vertical Type]



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

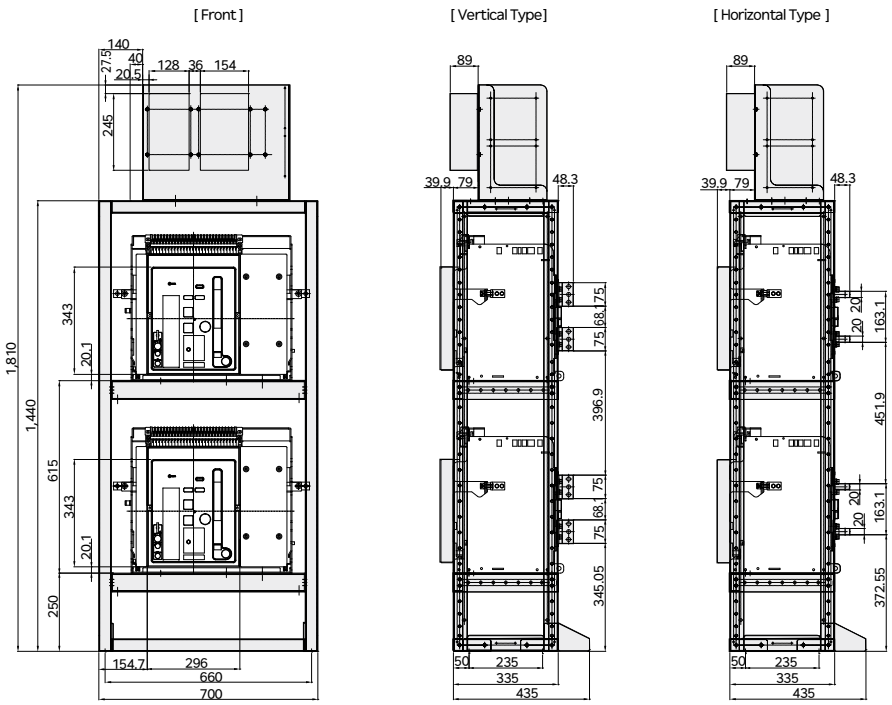
Accessories

ATS & Controller

Dimensions [ATS HGN B Frame]

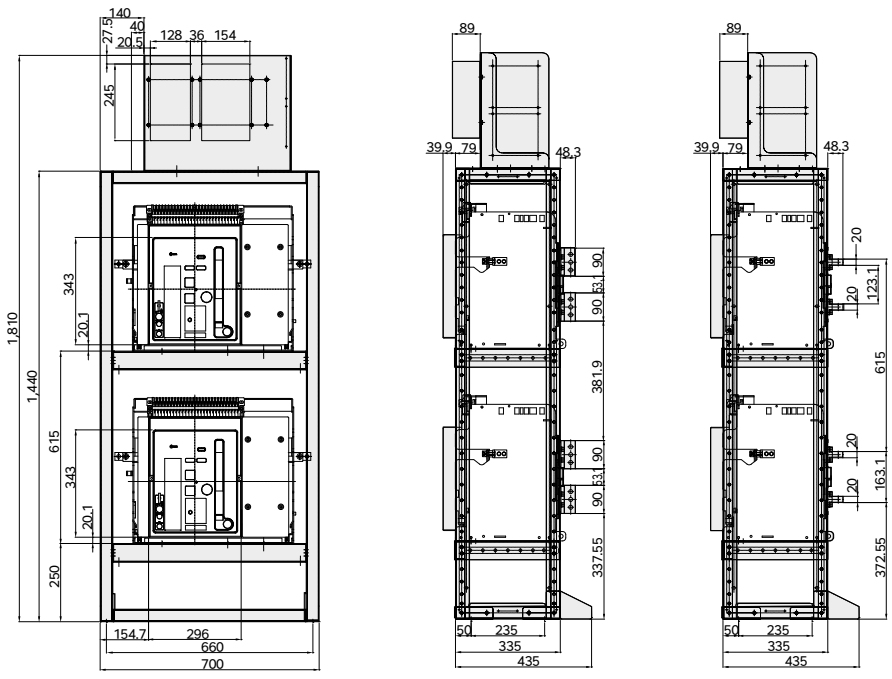
Unit : mm

HGN20 ~ 25 B



Unit : mm

HGN32 B

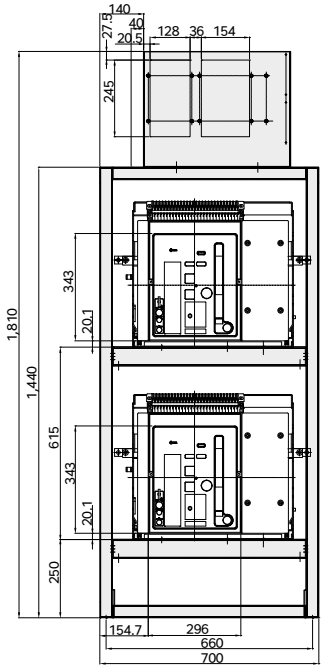


※ The drawing dimension of this page may be subject to change without prior notice.

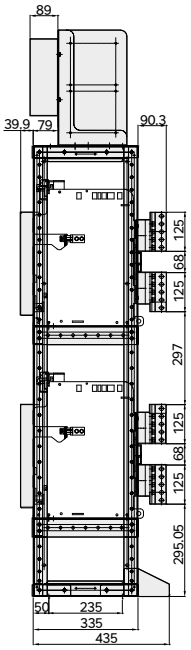
HGN40 B

Unit : mm

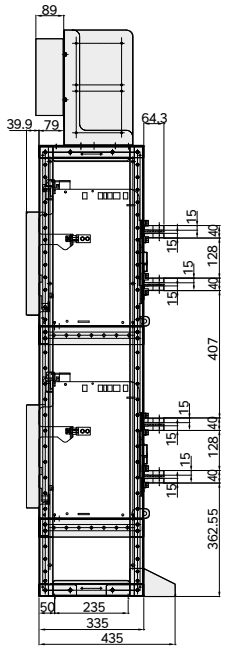
[Front]



[Vertical Type]



[Horizontal Type]



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

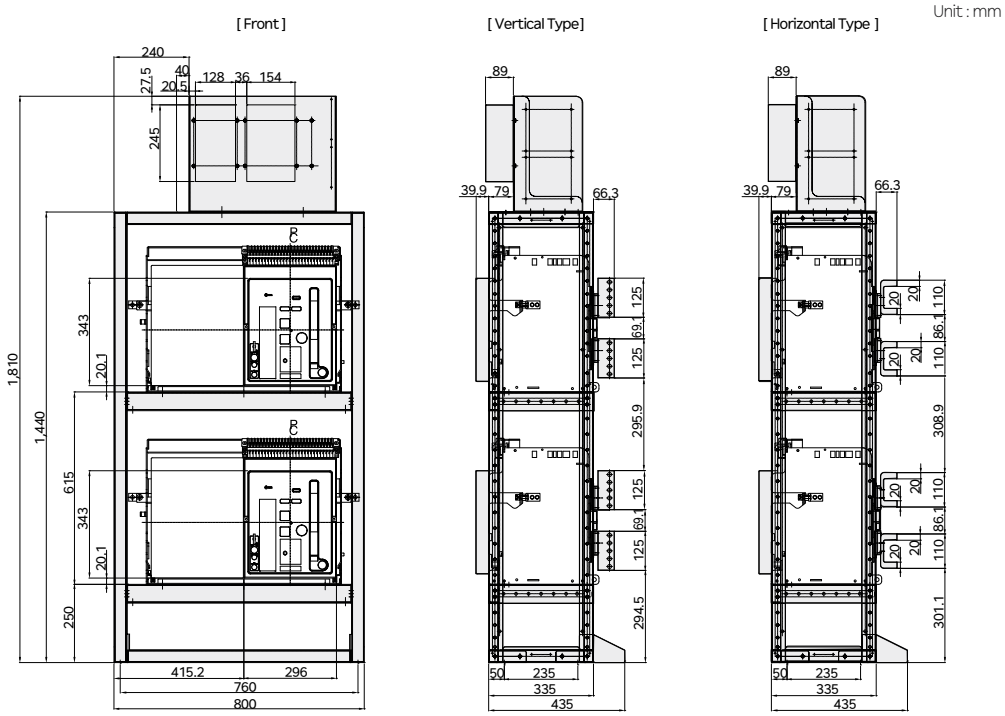
Accessories

ATS & Controller

Dimensions [ATS HGN C Frame]

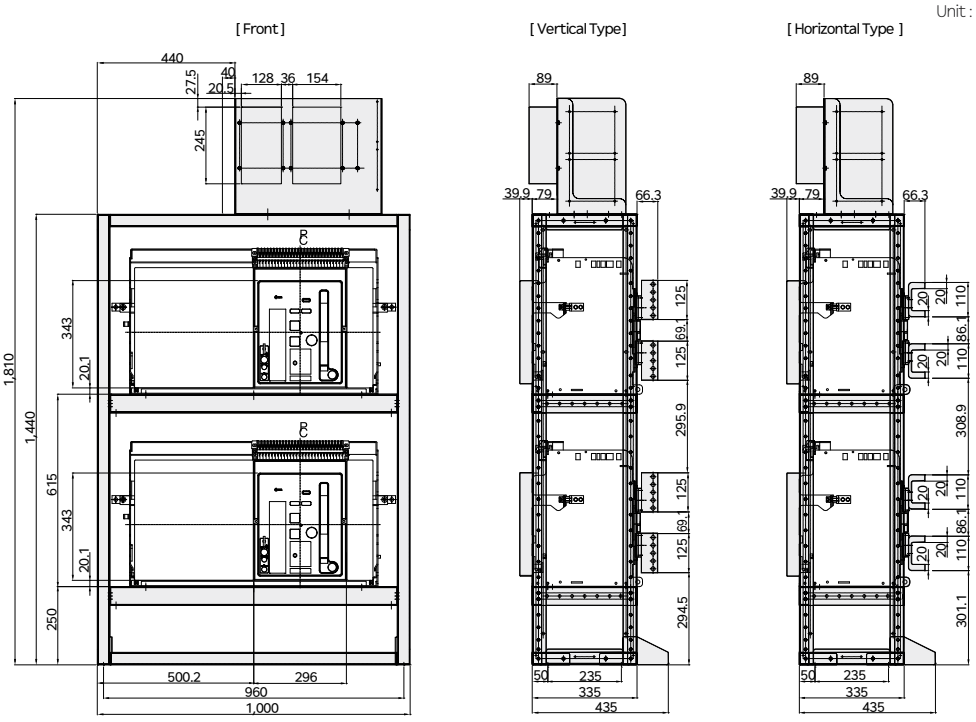
HGN40 ~ 50 C, 3P

Unit : mm



HGN40 ~ 50 C, 4P

Unit : mm

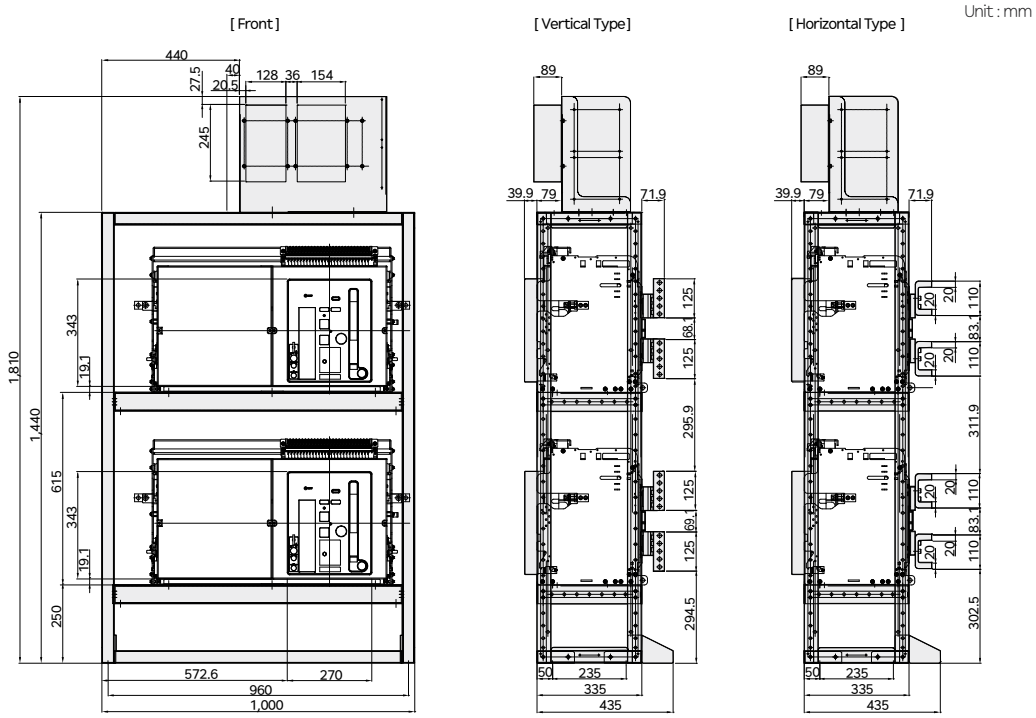


※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions [ATS HGN D Frame]

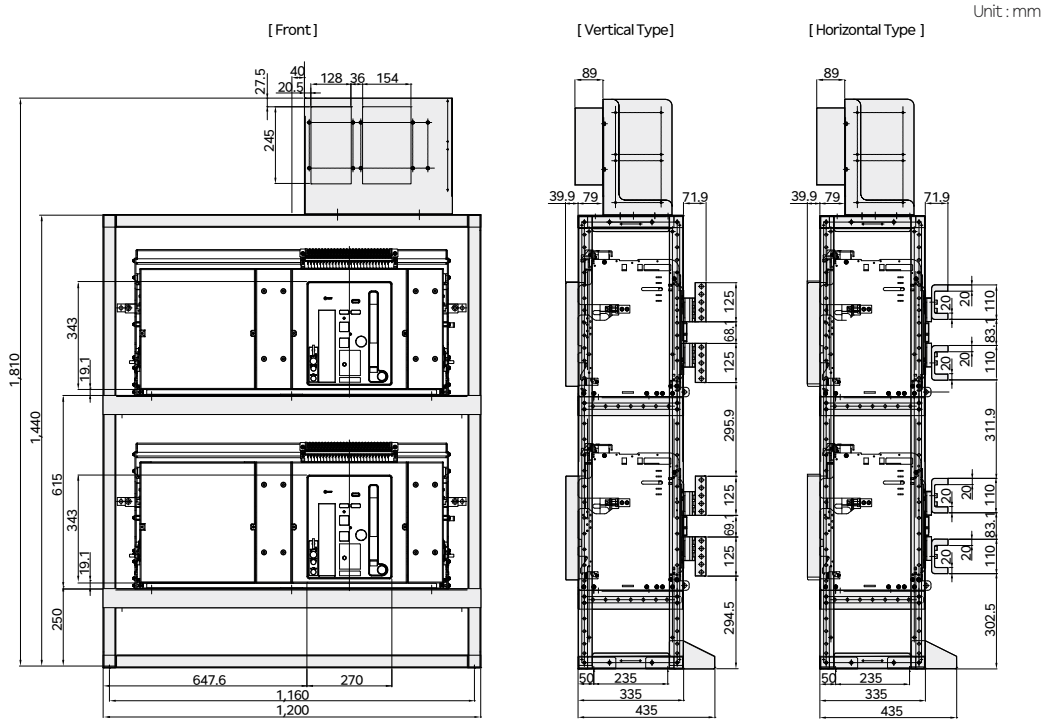
HGN40 D, 3P

Unit : mm



HGN40 D, 4P

Unit : mm



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

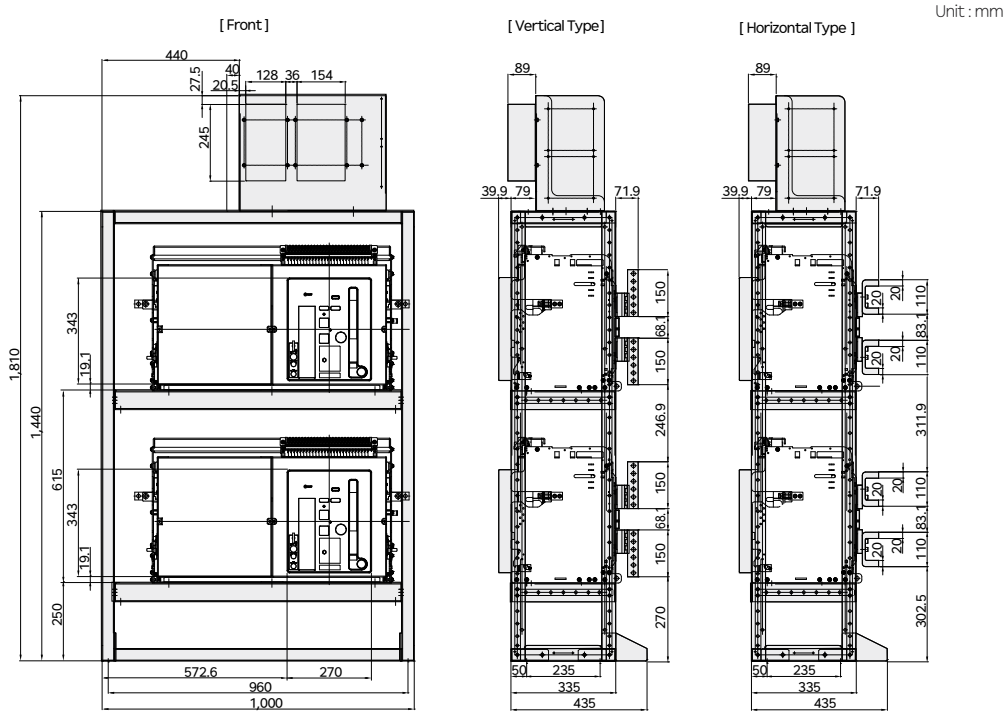
Accessories

ATS & Controller

Dimensions [ATS HGN D Frame]

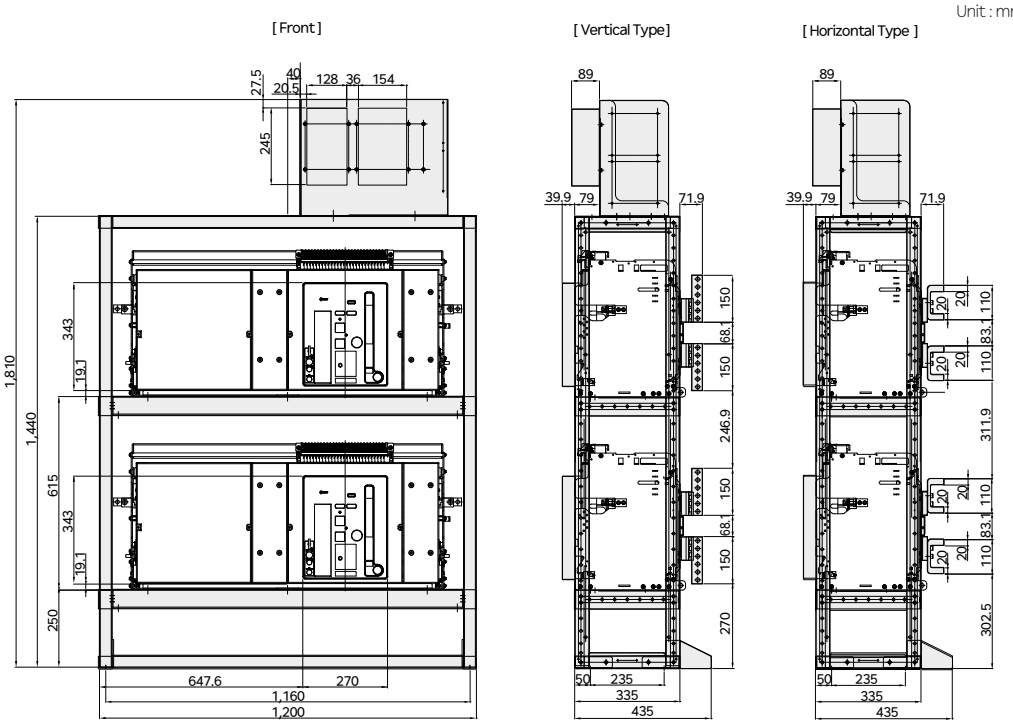
HGN50 ~ 63 D, 3P

Unit : mm



HGN50 ~ 63 D, 4P

Unit : mm



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

Technical Data

Standard Operating Conditions

Load Rate (I/In)

- ACB cannot be used in outdoor panel in principle. In case of inevitable installation, the ambient temperature must be below 40 °C and the load rate must be below 50 % of the rated current. In case it is not complied with, it may cause heating and burning in the ACB.
- As for the total harmonic distortion (THD) rate, it must be managed below 5 % in the distribution system phase. In case it is not complied with, it may cause heating in the product.

Load Rate	Hours of Use	Effect	Installation
I/In ≤ 80 %	24/24 Hours	-	Normal Condition (Recommended)
80 < I/In ≤ 90 %	24/24 Hours	-	Periodic Inspection
I/In = 100 %	24/24 Hours	Change in Plastic Insulation Material Color	Additional Exhaust

Altitude

- Below 2,000 m

Item	Altitude		
	2,000 m (6,600 ft)	2,600 m (8,500 ft)	3,900 m (13,000 ft)
Isolation Voltage (V)	1,000 (1,250)	950 (1,200)	800 (1,050)
Operating Voltage (V)	690 (1,150)	655.5 (1,115.5)	552 (1,012)
Allowed Current (V)	In	0.99×In	0.96×In

※ ( ) indicates P, Q frame application

Protection Degree Provided by Enclosures (IP Code)

- Standard : IP30 (When the ACB front cover part of the switchboard door is cut out)
- With Dust Cover : IP52

Classification of Protection Degree Provided by Enclosures (IP code) IEC 60529

Indication : I P □ □

- Second Characteristic Numeral : Level of preventing liquid from permeating into the external box (0 ~ 8)
- First Characteristic Numeral : Level of preventing particulate materials from permeating into the external box (0 ~ 6)

※ In the event indicating the characteristic number is not required, mark the said area with 'X'.

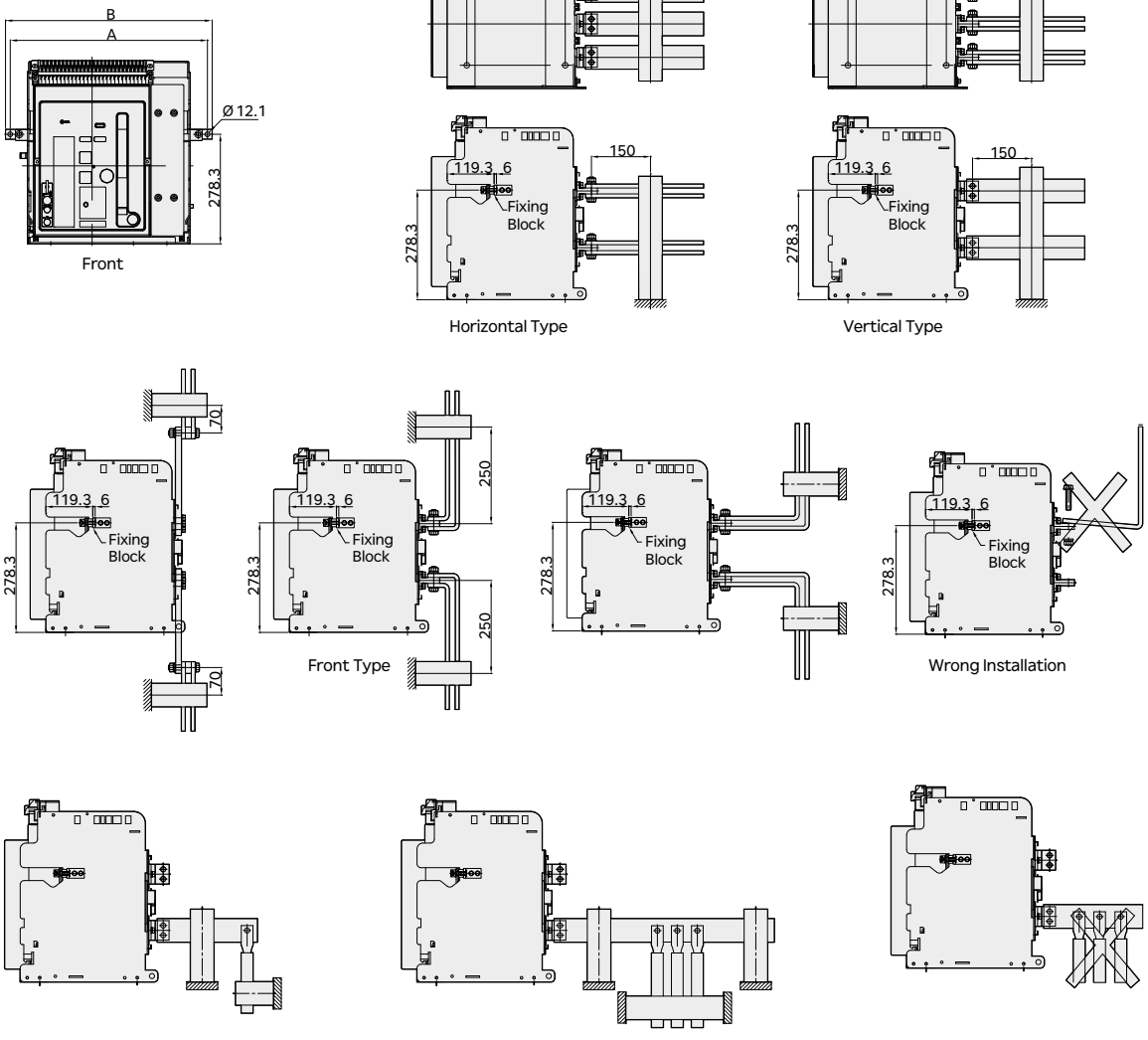
Classification Table Following the Degree

Numeral	Protection Degree	
	First Characteristic Numeral (Particulate)	Second Characteristic Numeral (Liquid)
0	No protection (Open)	No protection (Open)
1	Protected against external objects with a diameter of 50 mm and above	Protected against vertical fall
2	Protected against external objects with a diameter of 12.5 mm and above	Protected against falling with a gradient of 15 °
3	Protected against external objects with a diameter of 2.5 mm and above	Protected against falling with a gradient of 60 °
4	Protected against external objects with a diameter of 1.0 mm and above	Protected against spraying water from up, down, left, right (Splash proof)
5	Protected against deposition risk of dust and others	Protected against spraying water from up, down, left, right (Hose proof)
6	Complete protection without deposition of dust and others	Protected against heavy rainfall and tsunami (Deckwater proof)
7	-	Protected against submersion under certain pressure and certain time (Immersible)
8	-	Protected against complete submersion (Submersible)

Product Installation Condition

- In order to prevent burning of products caused by electrical fault and to enhance structural safety of the panel when installing the product in areas with concerns of vibration, mount the fixing block and install the terminal supporting position like the figure.
- In particular, when executing short-time/short-circuit panel testing, it must be installed for structural safety.
- For the support dimension of the product, refer to the drawing.
- In the event of switchboard (Panel) development test (Short-time, short-circuit), the bus bar inside the panel must be supported firmly according to the following conditions.

Unit : mm



Model Name	A	B
HGN 06 ~ 20A 3P, HGS 06 ~ 16A 3P, HGN 06 ~ 20P 3P	416	440
HGN 06 ~ 20A 4P, HGS 06 ~ 16A 4P, HGN 06 ~ 20P 4P	501	525
HGN 20 ~ 40B 3P, HGS 20 ~ 32A 3P, HGN 20 ~ 40Q 3P	487	511
HGN 20 ~ 40B 4P, HGS 20 ~ 32A 4P, HGN 20 ~ 40Q 4P	602	626
HGN 40 ~ 50C 3P	712	736
HGN 40 ~ 50C 4P	906	982
HGN 40 ~ 63D 3P	854	878
HGN 40 ~ 63D 4P	1,084	1,108

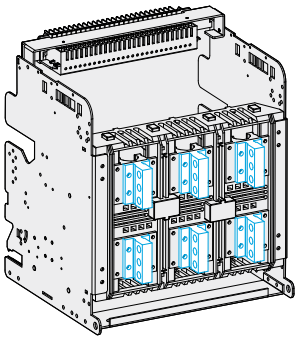
Technical Data

Connection Method

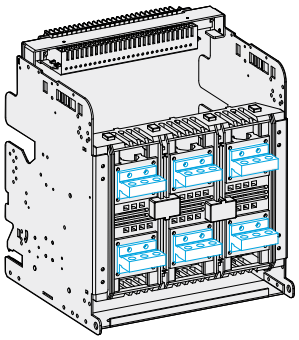
User convenience has been reinforced by allowing each terminal to be rotated 90 degrees directly on site depending on the busbar type of low voltage switchgear.

Standard Type

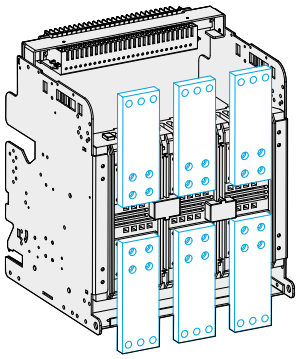
Vertical Type



Horizontal Type

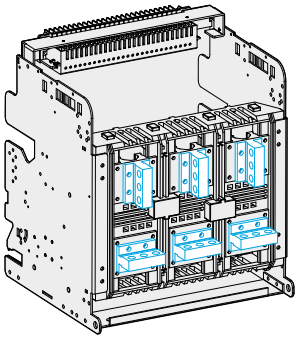


Front Type

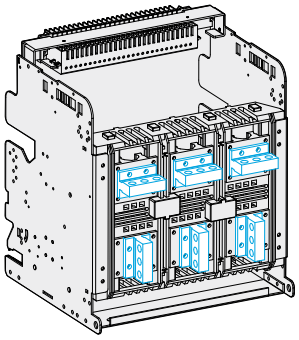


Combined Type

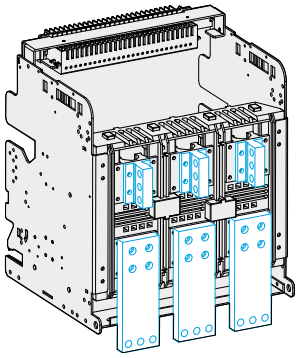
(Upper) Vertical Type +
(Lower) Horizontal Type



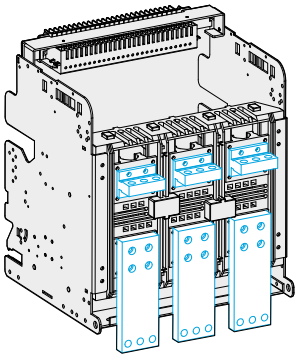
(Upper) Horizontal Type +
(Lower) Vertical Type



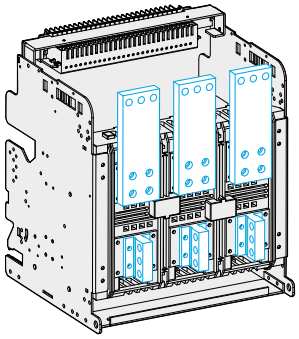
(Upper) Vertical Type +
(Lower) Front Type



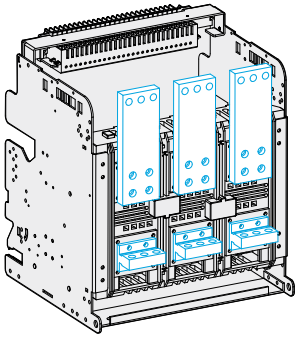
(Upper) Horizontal Type +
(Lower) Front Type



(Upper) Front Type +
(Lower) Vertical Type



(Upper) Front Type +
(Lower) Horizontal Type



※ Terminal change is only possible for HGS/HGN A, P frame 630 ~ 1,600 A, B, Q frame 2,000 ~ 3,200 A.
Front type is a terminal form that is suitable for switchgear with spatial restrictions.
Horizontal/vertical change above 4,000 A requires separate parts so please contact our company.
In case of B, Q frame, 3,200 A terminal is provided as for the front type provided separately for 2,000/2,500 A.
Front type terminal has to be purchased separately.

Convenient Connection Method

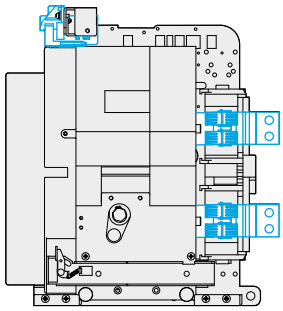
As for HG Series air circuit breaker, 4 types of mounting (Connected, test, isolated, removed) are possible and offer easy maintenance.



Sliding Body Type (In Case of Draw-In/Out Type)

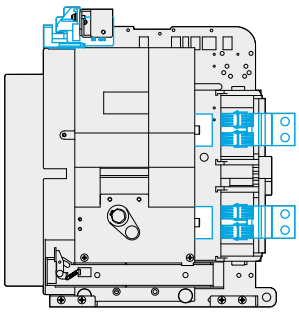
Connected Position

As a commonly used status, the main circuit and control circuit are both connected.



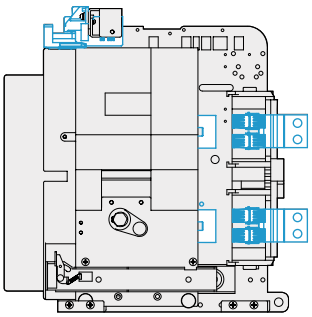
Test Position

As a status in which the main circuit is isolated and the control circuit is connected, the circuit breaker can be turned On/Off with the switchgear door closed.



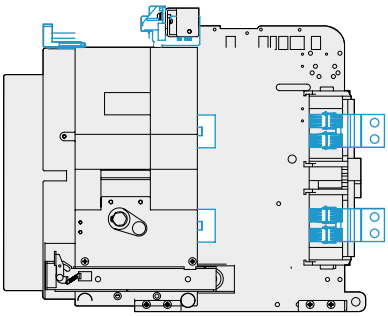
Isolated Position

With the main circuit and control circuit both isolated, the air circuit cannot be turned On/Off.



Removed Position

The air circuit has completely been removed from the cradle.



Technical Data

Internal Resistance and Power Consumption

Model Name	Rated Current (A)	Fixed Type		Draw-Out Type	
		Internal Resistance (μΩ)	Power Consumption (W/3Phase)	Internal Resistance (μΩ)	Power Consumption (W/3Phase)
A Frame HGS/HGN 06 ~ 16 P Frame HGN 06 ~ 16	630	20	24	40	48
	800	20	38	40	77
	1,000	20	60	40	120
	1,250	20	94	40	188
	1,600	20	154	40	307
A Frame HGN 20 P Frame HGN 20	630	15	18	30	36
	800	15	29	30	58
	1,000	15	45	30	90
	1,250	15	70	30	141
	1,600	15	115	30	230
	2,000	13	156	27	324

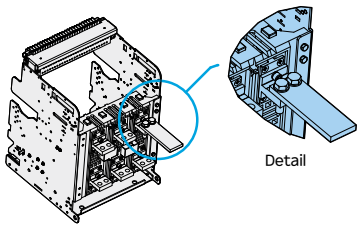
Model Name	Rated Current (A)	Fixed Type		Draw-Out Type	
		Internal Resistance (μΩ)	Power Consumption (W/3Phase)	Internal Resistance (μΩ)	Power Consumption (W/3Phase)
B Frame HGS/HGN 20 ~ 32 Q Frame HGN 20 ~ 32	2,000	10	120	20	240
	2,500	10	188	20	375
	3,200	10	307	20	614
B Frame HGN 40 Q Frame HGN 40	2,000	10	120	20	240
	2,500	10	188	20	375
	3,200	10	307	20	614
	4,000	8	384	11	528
C Frame HGN 40 ~ 50	4,000	8	384	11	528
	5,000	8	600	11	825
D Frame HGN 40 ~ 63	4,000	6	288	9	432
	5,000	6	450	9	675
	6,300	5	595	7	833

※ The abovementioned power consumption is the total power consumption of the circuit breaker based on 50/60 Hz, 3/4 pole.
The inner resistance value is the resistance value per pole. Power Factor = 1.0

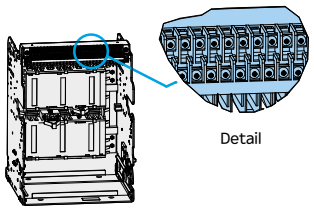
※ The internal resistance mentioned above is the factory default value. It may slightly increase depending on the operating environment (load conditions, short circuits, load switching, and other ambient conditions) and the duration of use.
Regular inspections and maintenance are recommended.

※ Contact resistance may increase after 1-2 years. Wiping the contact surface with an alcohol-dampened towel can reduce contact resistance.

Tightening Torque



Main Circuit
Tightening Torque
M10 : 270 ± 32kgf-cm
M12 : 480 ± 57kgf-cm



Control Circuit
Tightening Torque
M3.5 : 8.8 ± 1.1kgf-cm

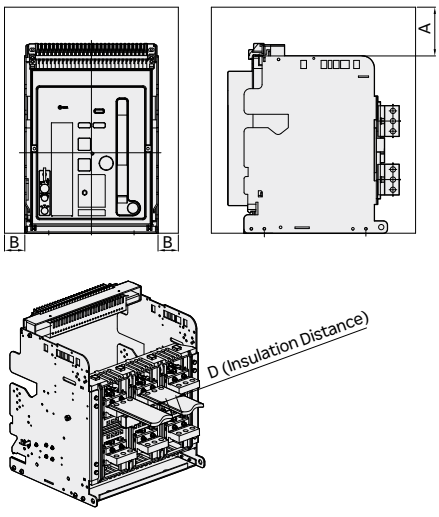
Insulation Voltage

When designing the switchboard, maintain the insulation distance in accordance with the table below.

Insulation Distance from ARC

Unit : mm

Item	A	B
Fixed Type	150	50
Draw-Out Type without Arc Shield	150	50
Draw-Out Type with Arc Shield	0	50



Minimum Insulation Distance at Charging Side

Insulating Voltage	Minimum Insulation Distance(mm)
Below 600 V	8
Above 600 V, below 1,250 V	14

Calibration of Rating Current

Calibration of Rating Current Following Ambient Temperature and Motion Specification





Model Name	Rating Current	ACB Terminal	Applicable Motion Standard	Horizontal Type					Vertical Type				
				40 ℃	45 ℃	50 ℃	55 ℃	60 ℃	40 ℃	45 ℃	50 ℃	55 ℃	60 ℃
A Frame HGN/HGS 06 ~ 16	200 A	15 t×50×1 ea	5 t×50×1 ea	200 A	200 A	200 A	200 A	200 A	200 A	200 A	200 A	200 A	200 A
	400 A			400 A	400 A	400 A	400 A	400 A	400 A	400 A	400 A	400 A	400 A
	630 A		5 t×50×2 ea	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A
			10 t×60×1 ea										
	800 A		6 t×50×2 ea	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A
			10 t×60×1 ea										
	1,000 A		8 t×50×2 ea	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A
P Frame HGN 06 ~ 16	1,250 A		6 t×75×2 ea	-	-	-	-	-	1,250 A	1,250 A	1,250 A	1,250 A	1,250 A
			8 t×60×2 ea	1,250 A	1,250 A	1,250 A	1,250 A	1,250 A					
			10 t×50×2 ea										
	1,600 A		6 t×75×3 ea	-	-	-	-	-	1,600 A	1,600 A	1,580 A	1,550 A	1,500 A
			10 t×60×2 ea	1,600 A	1,600 A	1,520 A	1,480 A	1,420 A					
			8 t×60×3 ea										
A Frame HGN20 P Frame HGN20	2,000 A	15 t×75×1 ea	8 t×75×3 ea	-	-	-	-	-	2,000 A	2,000 A	1,940 A	1,860 A	1,780 A
			10 t×100×2 ea										
B Frame HGS/HGN 06 ~ 25 Q Frame HGN 06 ~ 25	630 A	20 t×75×1 ea	5 t×50×2 ea	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A	630 A
			10 t×60×1 ea										
	800 A		6 t×50×2 ea	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A	800 A
			10 t×60×1 ea										
	1,000 A		8 t×50×2 ea	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A	1,000 A
	1,250 A		6 t×75×2 ea	-	-	-	-	-	1,250 A	1,250 A	1,250 A	1,250 A	1,250 A
			8 t×60×2 ea	1,250 A	1,250 A	1,250 A	1,250 A	1,250 A					
			10 t×50×2 ea										
	1,600 A		6 t×75×3 ea	-	-	-	-	-	1,600 A	1,600 A	1,600 A	1,600 A	1,600 A
			10 t×60×2 ea	1,600 A	1,600 A	1,600 A	1,600 A	1,600 A					
			8 t×60×3 ea										
	2,000 A		8 t×75×3 ea	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A	2,000 A
			10 t×100×2 ea	-	-	-	-	-					
	2,500 A		10 t×75×3 ea	2,500 A	2,500 A	2,500 A	2,400 A	2,300 A	2,500 A	2,500 A	2,500 A	2,500 A	2,500 A
			8 t×75×4 ea										
B Frame HGN32 Q Frame HGN32	3,200 A	20 t×90×1 ea	10 t×100×3 ea	-	-	-	-	-	3,200 A	3,200 A	3,120 A	3,050 A	2,950 A
			10 t×75×4 ea	3,200 A	3,200 A	3,100 A	3,000 A	2,900 A					
B Frame HGN40 Q Frame HGN40	4,000 A Horizontal	15 t×100×2 ea	10 t×100×4 ea	4,000 A	4,000 A	3,900 A	3,800 A	3,640 A	-	-	-	-	-
			10 t×125×3 ea										
	4,000 A Vertical	15 t×125×2 ea	10 t×100×4 ea	-	-	-	-	-	4,000 A	4,000 A	3,950 A	3,800 A	3,680 A
			10 t×125×3 ea										
C Frame HGN32 ~ 50	3,200 A	20 t×125×2 ea	10 t×100×3 ea	3,200 A	3,200 A	3,100 A	3,000 A	2,900 A	3,200 A	3,200 A	3,100 A	3,000 A	2,900 A
	4,000 A		10 t×100×4 ea	4,000 A	4,000 A	3,920 A	3,860 A	3,800 A	4,000 A	4,000 A	3,960 A	3,900 A	3,880 A
	5,000 A		10 t×125×4 ea	5,000 A	5,000 A	4,900 A	4,800 A	4,700 A	5,000 A	5,000 A	4,950 A	4,900 A	4,850 A
D Frame HGN40 ~ 63	4,000 A	20 t×125×2 ea	10 t×100×4 ea	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A	4,000 A
	5,000 A		10 t×125×4 ea	5,000 A	5,000 A	4,900 A	4,820 A	4,750 A	5,000 A	5,000 A	4,950 A	4,870 A	4,850 A
	6,300 A		10 t×150×4 ea	6,300 A	6,300 A	6,170 A	6,040 A	5,900 A	6,300 A	6,300 A	6,220 A	6,160 A	6,100 A

※ The ambient temperature is based on the external temperature of the circuit breaker and the motion that can be applicable to the circuit breaker is applied.
The motion is based on copper material with no separate painting.
The maximum allowable temperature of the motion is below 100 ℃.

※ The above table represents the correction values for individual applications.
※ When installing inside a panel, please apply the Derating Table.

Calibration of Rating Current Following Altitude

ACB is designed to be used at altitudes below 2,000 m.
When used at above 2,000 m, change the ratings depending on the surrounding environment condition for use.

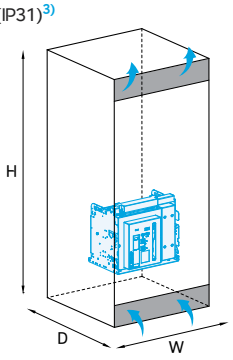
Item \ Altitude	2,000m	3,000m	4,000m	5,000m
Withstand Voltage (V)	3,500	3,150	2,500	2,100
Average Insulating Voltage (V)	1,000 (1,250)	900 (1,125)	700 (1,000)	600 (875)
Max. Operation Voltage (V)	690 (1,150)	590 (1,035)	520 (920)	460 (805)
Current Calibration Coefficient	1×In	0.99×In	0.96×In	0.94×In

※ ( ) indicates P, Q frame application

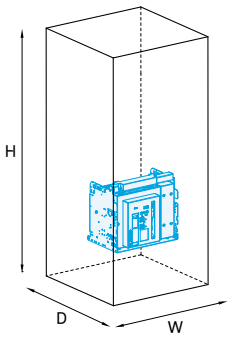
Technical Data

Derating Table (HGN)

Switchboard Composition / Connection Type			4 3 2 1								
Model Name			HGN 06 ~ 08					HGN 10			
Rated Current [2]			~ 800A					1,000A			
Busbar Dimensions (mm)			6t×50×2ea					8t×50×2ea			
Ventilation distribution board (IP31)[3]	Ta [1] = 30 ~ 40℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000
	Ta = 40 ~ 50℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000
	Ta = 50 ~ 60℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000
Enclosed distribution board (IP41/54) [5]	Ta [1] = 30 ~ 40℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000
	Ta = 40 ~ 50℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000
	Ta = 50 ~ 60℃	4					800↓				
		3				800↓	800↓				1,000
		2			800↓	800↓	800↓			1,000	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1000
Panel dimensions (mm) : W×H×D			800×2,300×900								
Area of outlet vents (IP31)			350cm²								
Area of inlet vents (IP31)			350cm²								



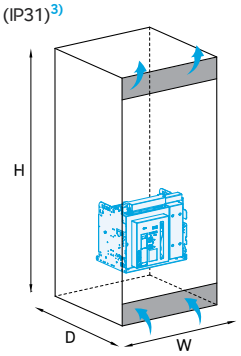
Area of intake ventilation : 350cm²
Area of exhaust ventilation : 350cm²



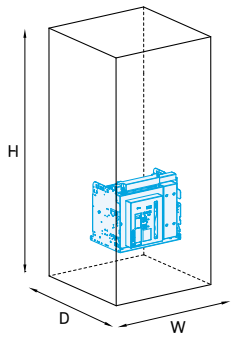
※ 1) Ambient temperature Ta refers to the temperature outside the panel (per IEC 60947-1).
2) The rated current should meet the performance satisfying the temperature requirements of IEC 60947-1 and 2 when installed inside the panel, using additional current derating and recommended conductor sizes.
3) Ventilation structure should be designed to allow temperature reduction for products installed inside the panel.
4) The above Derating Table represents the maximum current for the selected circuit breaker under panel conditions.
5) To reduce the temperature inside the sealed panel, forced ventilation devices must be added.
6) For ACB product ratings, the specifications of the panel busbars, vertical/horizontal arrangement, air circulation, presence of vents, fans, and IEC temperature rise test conditions create variables in the operating environment. Therefore, the ratings of circuit breakers and panels may differ. Thus, when selecting the circuit breaker rating, consider the actual safe load of the panel (up to 30%) to ensure the safety of the panel's actual load.
Ex) Actual load 2,850A × 1.3 = 3,705A → Select 4,000AF.

Under the conditions of the Derating table above, the load factor should be less than 70% of the rated current. If the designated busbar size is smaller, it can cause temperature rise due to reduced busbar cross-section. To protect the load, the current load factor must be reduced to a safe range.

Switchboard Composition Connection Type		4 3 2 1									
Model Name			HGN 12A				HGN 16A			HGN 20A	
Rated Current [2]			1,250A				1,600A			2,000A	
Busbar Dimensions (mm)			8t×75×2ea				8t×75×3ea			10t×100×2ea	
Ventilation distribution board (IP31) [3]	Ta [1] = 30 ~ 40℃	4									
		3				1,250					2,000
		2			1,250	1,250			1,600	2,000	2,000
		1	1,250	1,250	1,250	1,250	1,600	1,600	1,600		
	Ta = 40 ~ 50℃	4									
		3				1,250					1,900
		2			1,250	1,250			1,600	2,000	2,000
		1	1,250	1,250	1,250	1,250	1,600	1,600	1,600		
	Ta = 50 ~ 60℃	4									
		3				1,250					1,800
		2			1,250	1,250			1,470	1,900	1,900
		1	1,250	1,250	1,250	1,250	1,520	1,600	1,600		
Enclosed distribution board (IP41/54) [5]	Ta [1] = 30 ~ 40℃	4									
		3				1,250					1,750
		2			1,250	1,250			1,600	1,850	1,850
		1	1,250	1,250	1,250	1,250	1,600	1,600	1,600		
	Ta = 40 ~ 50℃	4									
		3				1,250					1,650
		2			1,250	1,250			1,500	1,750	1,750
		1	1,250	1,250	1,250	1,250	1,500	1,600	1,600		
	Ta = 50 ~ 60℃	4									
		3				1,250					1,550
		2			1,250	1,250			1,400	1,650	1,650
		1	1,250	1,250	1,250	1,250	1,400	1,520	1,520		
Panel dimensions (mm) : W×H×D			800×2,300×900								
Area of outlet vents (IP31)			350cm^2								
Area of inlet vents (IP31)			350cm^2								

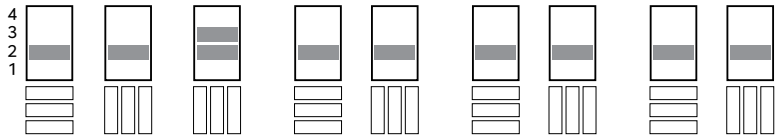


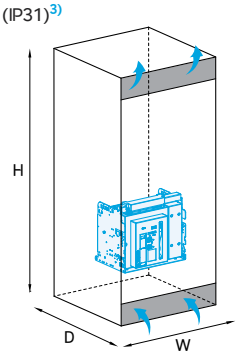
Area of intake ventilation : 350cm^2
Area of exhaust ventilation : 350cm^2



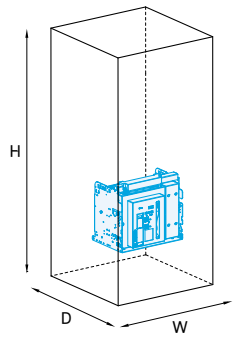
Technical Data

Derating Table (HGN)

Switchboard Composition / Connection Type												
Model Name			HGN 06 ~ 20B			HGN 25B		HGN 32B		HGN 40B	
Rated Current [2]			2,000A			2,500A		3,200A		4,000A	
Busbar Dimensions (mm)			10t×100×2ea			10t×100×3ea		10t×125×3ea		10t×125×4ea	
Ventilation distribution board (IP31)[3]	Ta [1] = 30 ~ 40℃	4									
		3			2,000↓						
		2	2,000↓	2,000↓	2,000↓	2,375	2,500	3,040	3,200	3,320	3,700
		1									
	Ta = 40 ~ 50℃	4									
		3			2,000↓						
		2	2,000↓	2,000↓	2,000↓	2,250	2,380	2,880	3,100	3,160	3,500
		1									
	Ta = 50 ~ 60℃	4									
		3			2,000↓						
		2	2,000↓	2,000↓	2,000↓	2,100	2,250	2,690	2,900	2,960	3,280
		1									
Enclosed distribution board (IP41/54) [5]	Ta [1] = 30 ~ 40℃	4									
		3			2,000↓						
		2	2,000↓	2,000↓	2,000↓	2,125	2,275	2,650	2,850	3,040	3,320
		1									
	Ta = 40 ~ 50℃	4									
		3			1,900↓						
		2	1,900↓	1,960↓	1,960↓	2,000	2,150	2,550	2,700	2,880	3,120
		1									
	Ta = 50 ~ 60℃	4									
		3			1,780↓						
		2	1,800↓	1,920↓	1,920↓	1,900	2,020	2,370	2,530	2,720	2,960
		1									
Panel dimensions (mm) : W×H×D			800×2,300×900								
Area of outlet vents (IP31)			350cm²								
Area of inlet vents (IP31)			350cm²								

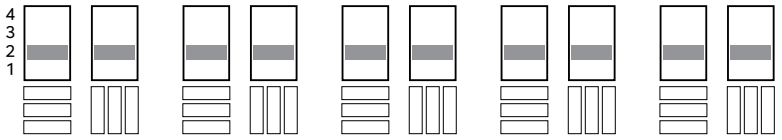


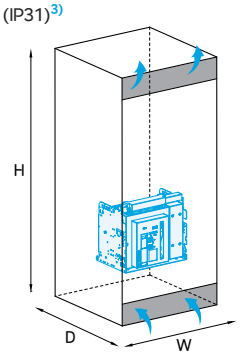
Area of intake ventilation : 350cm²
Area of exhaust ventilation : 350cm²



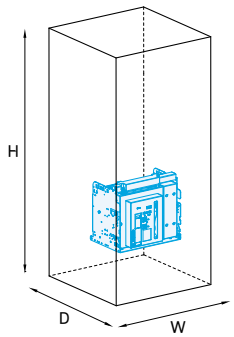
※ 1) Ambient temperature Ta refers to the temperature outside the panel (per IEC 60947-1).
2) The rated current should meet the performance satisfying the temperature requirements of IEC 60947-1 and 2 when installed inside the panel, using additional current derating and recommended conductor sizes.
3) Ventilation structure should be designed to allow temperature reduction for products installed inside the panel.
4) The above Derating Table represents the maximum current for the selected circuit breaker under panel conditions.
5) To reduce the temperature inside the sealed panel, forced ventilation devices must be added.
6) For ACB product ratings, the specifications of the panel busbars, vertical/horizontal arrangement, air circulation, presence of vents, fans, and IEC temperature rise test conditions create variables in the operating environment. Therefore, the ratings of circuit breakers and panels may differ. Thus, when selecting the circuit breaker rating, consider the actual safe load of the panel (up to 30%) to ensure the safety of the panel's actual load.
Ex) Actual load 2,850A × 1.3 = 3,705A → Select 4,000AF.

Under the conditions of the Derating table above, the load factor should be less than 70% of the rated current. If the designated busbar size is smaller, it can cause temperature rise due to reduced busbar cross-section. To protect the load, the current load factor must be reduced to a safe range.

Switchboard Composition Connection Type												
Model Name			HGN 40C		HGN 50C		HGN 40D		HGN 50D		HGN 63D	
Rated Current [2]			4,000A		5,000A		4,000A		5,000A		6,300A	
Busbar Dimensions (mm)			10t×125×4ea		10t×140×5ea		10t×125×4ea		10t×140×5ea		10t×160×5ea	
Ventilation distribution board (IP31) [3]	Ta [1] = 30 ~ 40℃	4										
		3										
		2	3,900	4,000	4,550	4,850	4,000	4,000	4,700	5,000	5,550	5,850
		1										
	Ta = 40 ~ 50℃	4										
		3										
		2	3,850	3,900	4,350	4,650	4,000	4,000	4,450	4,850	5,380	5,670
		1										
	Ta = 50 ~ 60℃	4										
		3										
		2	3,800	3,850	4,100	4,400	4,000	4,000	4,200	4,600	5,080	5,350
		1										
Enclosed distribution board (IP41/54) [5]	Ta [1] = 30 ~ 40℃	4										
		3										
		2	3,800	3,900	4,200	4,500	4,000	4,000	4,350	4,650	5,050	5,290
		1										
	Ta = 40 ~ 50℃	4										
		3										
		2	3,650	3,800	3,950	4,250	4,000	4,000	4,100	4,400	4,780	5,040
		1										
	Ta = 50 ~ 60℃	4										
		3										
		2	3,550	3,650	3,750	4,050	3,840	3,950	3,850	4,150	4,490	4,730
		1										
Panel dimensions (mm) : W×H×D			1,000×2,300×900				1,400×2,300×1,500					
Area of outlet vents (IP31)			500cm^2				500cm^2					
Area of inlet vents (IP31)			500cm^2				500cm^2					

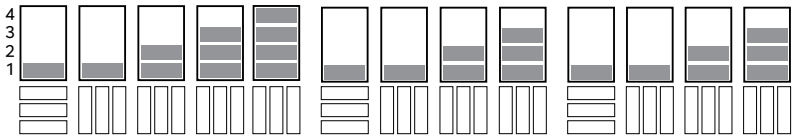


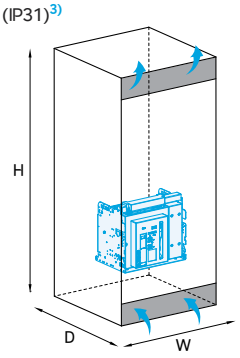
Area of intake ventilation : 350cm^2
Area of exhaust ventilation : 350cm^2



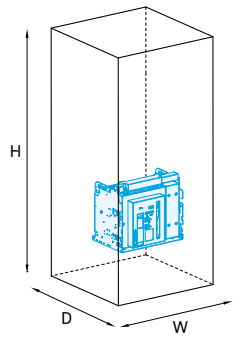
Technical Data

Derating Table (HGS)

Switchboard Composition / Connection Type															
Model Name			HGS 06 ~ 08A					HGS 10A				HGS 12A			
Rated Current [2]			~ 800A					1,000A				1,250A			
Busbar Dimensions (mm)			6t×50×2ea					8t×50×2ea				8t×75×2ea			
Ventilation distribution board (IP31)[3]	Ta [1] = 30 ~ 40℃	4					800↓								
		3				800↓	800↓				1,000				1,250
		2			800↓	800↓	800↓			1,000	1,000			1,250	1,250
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000	1,250	1,250	1,250	1,250
	Ta = 40 ~ 50℃	4					800↓								
		3				800↓	800↓				1,000				1,250
		2			800↓	800↓	800↓			1,000	1,000			1,250	1,250
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000	1,250	1,250	1,250	1,250
	Ta = 50 ~ 60℃	4					800↓								
		3				800↓	800↓				1,000				1,050
		2			800↓	800↓	800↓			1,000	1,000			1,200	1,150
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000	1,250	1,250	1,250	1,250
Enclosed distribution board (IP41/54) [5]	Ta [1] = 30 ~ 40℃	4					800↓								
		3				800↓	800↓				1,000				1,050
		2			800↓	800↓	800↓			1,000	1,000			1,200	1,150
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000	1,250	1,250	1,250	1,250
	Ta = 40 ~ 50℃	4					800↓								
		3				800↓	800↓				900				1,000
		2			800↓	800↓	800↓			975	950			1,100	1,050
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	1,000	1,000	1,250	1,250	1,150	1,150
	Ta = 50 ~ 60℃	4					800↓								
		3				800↓	800↓				850				975
		2			800↓	800↓	800↓			950	900			1,050	1,000
		1	800↓	800↓	800↓	800↓	800↓	1,000	1,000	975	950	1,250	1,250	1,150	1,050
Panel dimensions (mm) : W×H×D			800×2,300×900												
Area of outlet vents (IP31)			350cm²												
Area of inlet vents (IP31)			350cm²												

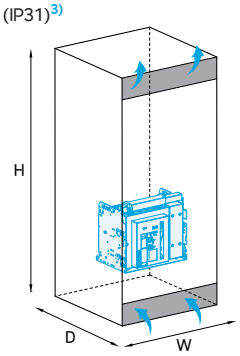
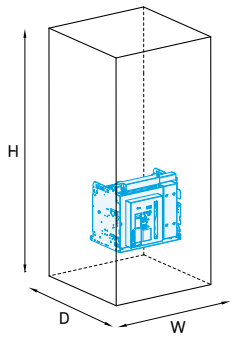


Area of intake ventilation : 350cm²
Area of exhaust ventilation : 350cm²



※ 1) Ambient temperature Ta refers to the temperature outside the panel (per IEC 60947-1).
2) The rated current should meet the performance satisfying the temperature requirements of IEC 60947-1 and 2 when installed inside the panel, using additional current derating and recommended conductor sizes.
3) Ventilation structure should be designed to allow temperature reduction for products installed inside the panel.
4) The above Derating Table represents the maximum current for the selected circuit breaker under panel conditions.
5) To reduce the temperature inside the sealed panel, forced ventilation devices must be added.
6) For ACB product ratings, the specifications of the panel busbars, vertical/horizontal arrangement, air circulation, presence of vents, fans, and IEC temperature rise test conditions create variables in the operating environment. Therefore, the ratings of circuit breakers and panels may differ. Thus, when selecting the circuit breaker rating, consider the actual safe load of the panel (up to 30%) to ensure the safety of the panel's actual load.
Ex) Actual load 2,850A × 1.3 = 3,705A → Select 4,000AF.

Under the conditions of the Derating table above, the load factor should be less than 70% of the rated current. If the designated busbar size is smaller, it can cause temperature rise due to reduced busbar cross-section. To protect the load, the current load factor must be reduced to a safe range.

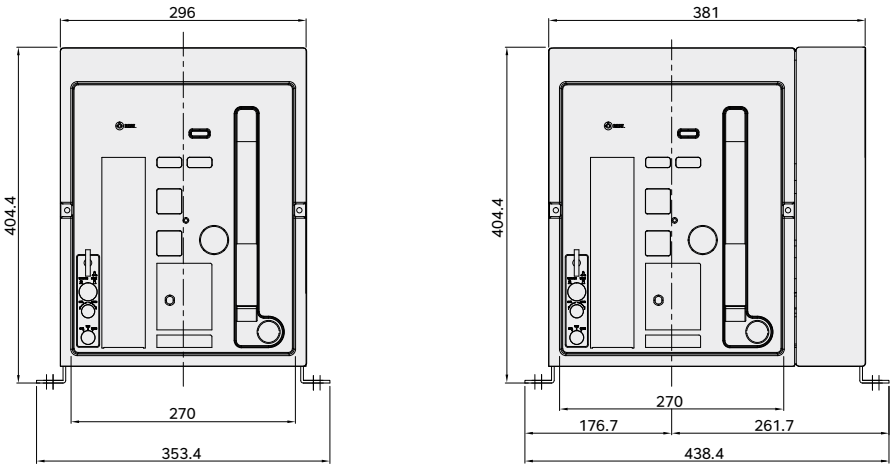
Switchboard Composition / Connection Type													
Model Name		HGS 16A			HGS 20B			HGS 25B		HGS 32B	
Rated Current [2]		1,600A			2,000A			2,500A		3,200A	
Busbar Dimensions (mm)		8t×75×3ea			10t×100×2ea			10t×100×3ea		10t×25×3ea	
Ventilation distribution board (IP31)[3]											
	Ta [1] = 30 ~ 40℃	4											
		3						2,000					
		2			1,600	2,000	2,000	2,000	2,375	2,500	2,880	3,100
		1	1,600	1,600	1,600							
	Ta = 40 ~ 50℃	4											
		3						1,900					
		2			1,520	1,900	2,000	2,000	2,250	2,380	2,690	2,900
		1	1,600	1,600	1,600							
	Ta = 50 ~ 60℃	4											
		3						1,800					
		2			1,450	1,800	1,950	1,900	2,100	2,250	2,500	2,700
		1	1,520	1,600	1,520							
Area of intake ventilation : 350cm^2													
Area of exhaust ventilation : 350cm^2													
Enclosed distribution board (IP41/54) [5]													
	Ta [1] = 30 ~ 40℃	4											
		3						1,750					
		2			1,520	1,750	1,850	1,850	2,125	2,275	2,550	2,700
		1	1,600	1,600	1,600							
	Ta = 40 ~ 50℃	4											
		3						1,650					
		2			1,450	1,650	1,750	1,750	2,000	2,150	2,370	2,530
		1	1,520	1,600	1,520							
	Ta = 50 ~ 60℃	4											
		3						1,550					
		2			1,370	1,550	1,650	1,650	1,900	2,020	2,200	2,370
		1	1,370	1,450	1,450							
Panel dimensions (mm) : W×H×D		800×2,300×900			800×2,300×900								
Area of outlet vents (IP31)		350cm^2			350cm^2								
Area of inlet vents (IP31)		350cm^2			350cm^2								

Dimensions

HGS/HGN Fixed Type 630 ~ 2,000 A (HGS06 ~ 16/HGN06 ~ 20 A Frame)

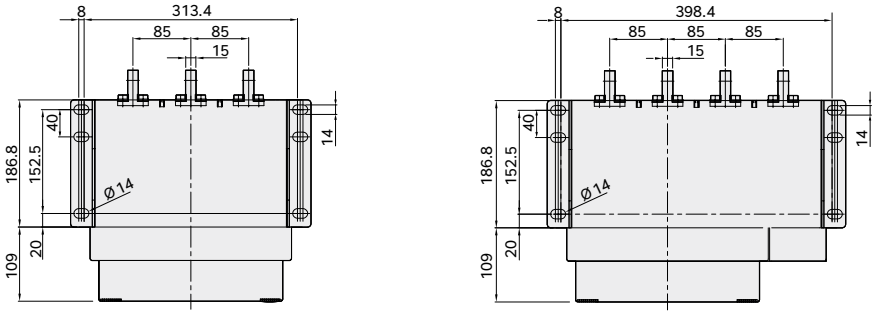
Unit : mm

Front

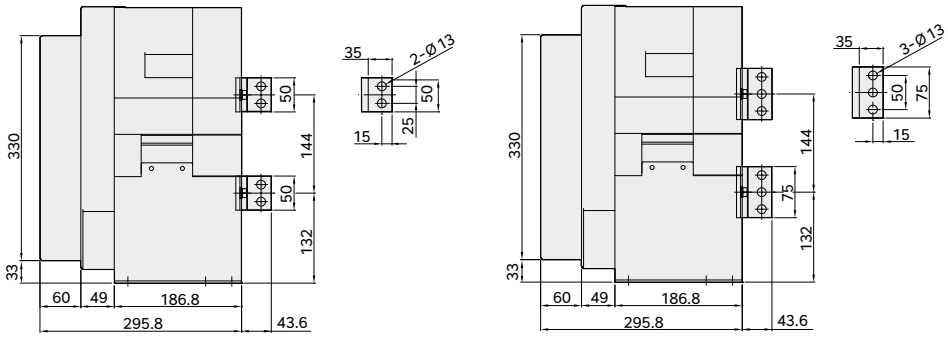


3P 4P

Vertical Type



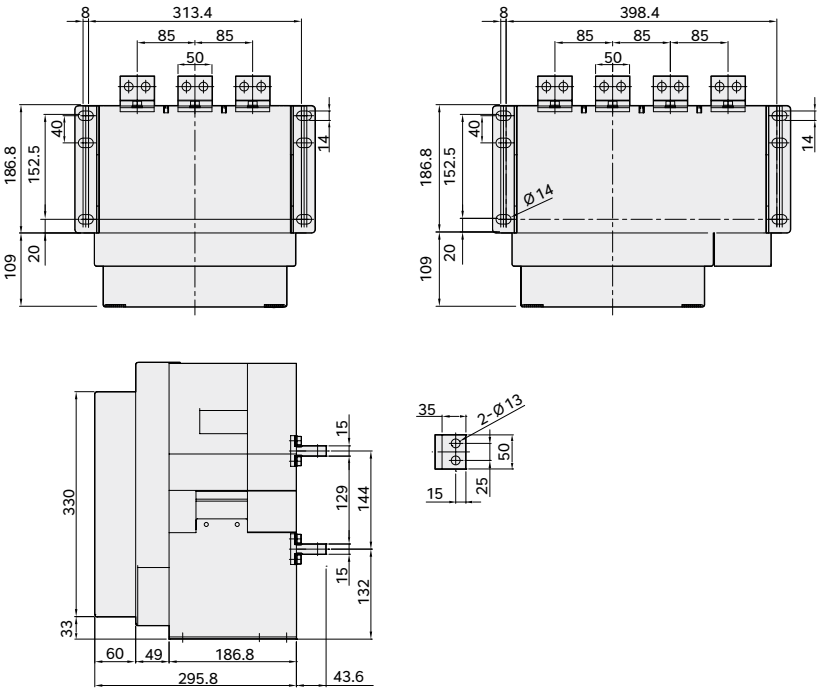
[HGN/HGS 630 ~ 1,600A] [HGN 2,000A]



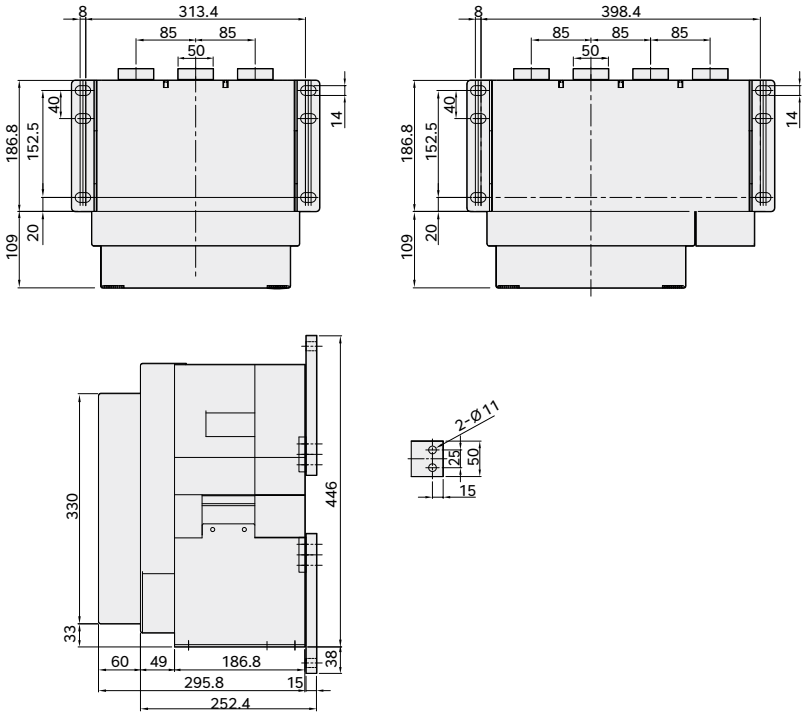
※ The drawing dimension of this page may be subject to change without prior notice.
As for the HGN fixed type A type 2,000 A, only the vertical terminal can be applicable.

Unit : mm

Horizontal Type (630 ~ 1,600A)



Flat Type (630 ~ 1,600A)



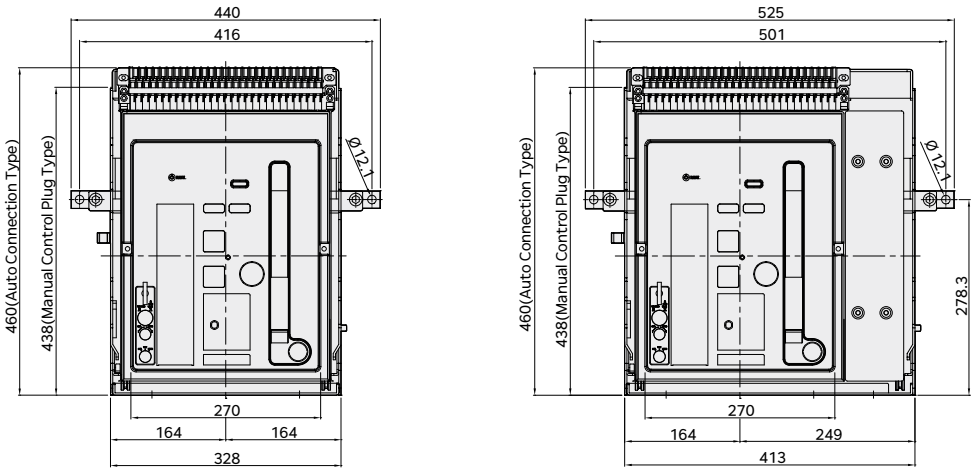
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

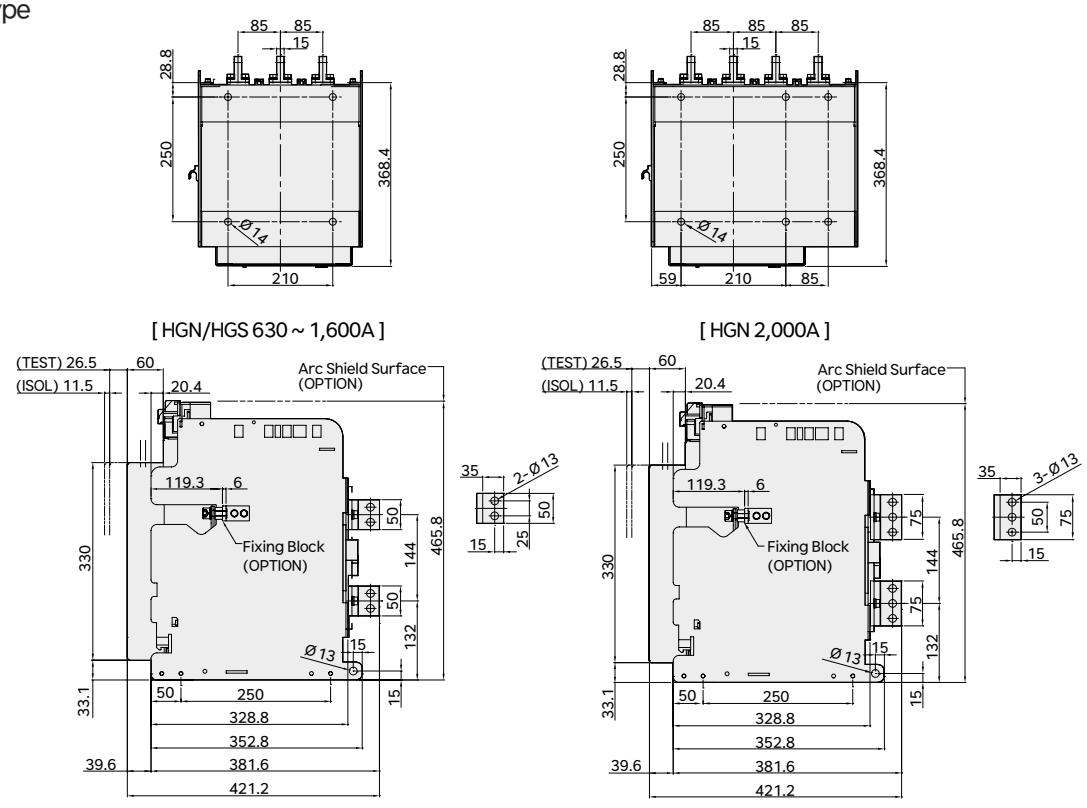
HGS/HGN Draw-Out Type 630 ~ 2,000 A (HGS06 ~ 16/HGN06 ~ 20 A Frame)

Unit : mm

Front



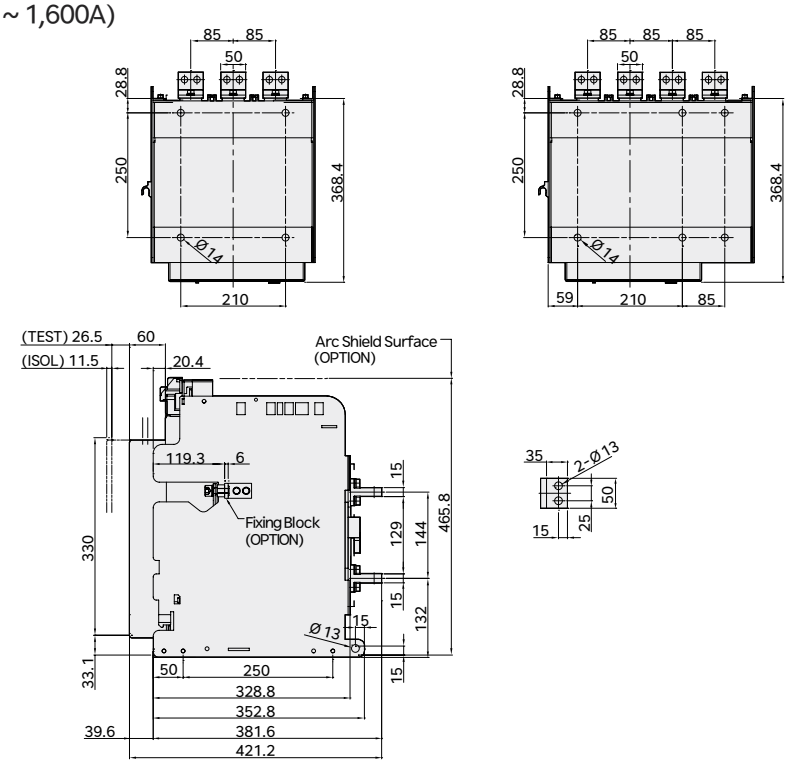
Vertical Type



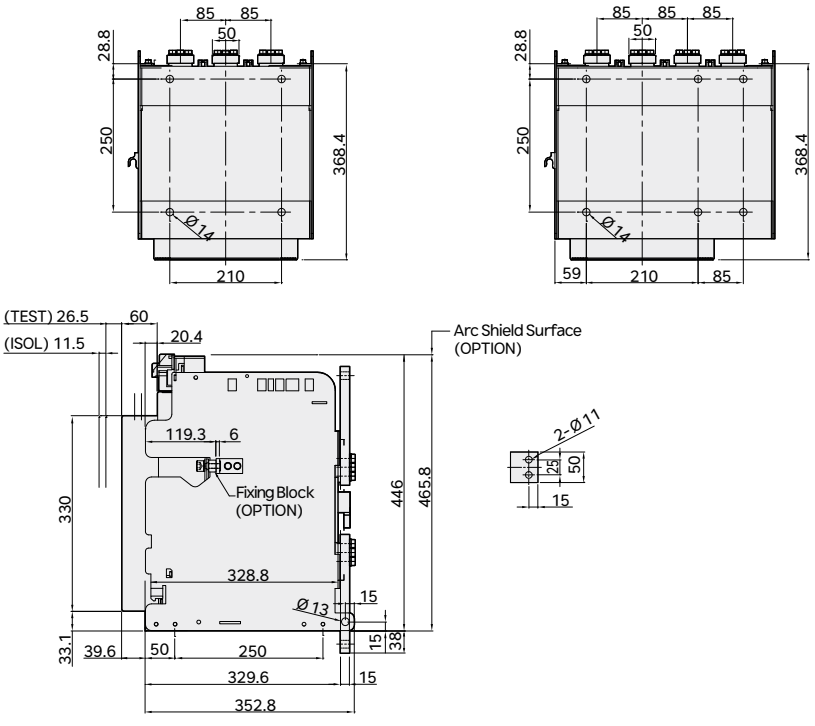
※ The drawing dimension of this page may be subject to change without prior notice.
As for the HGN draw-out type A type 2,000 A, only the vertical terminal can be applicable.

Unit : mm

Horizontal Type (630 ~ 1,600A)



Flat Type (630 ~ 1,600A)



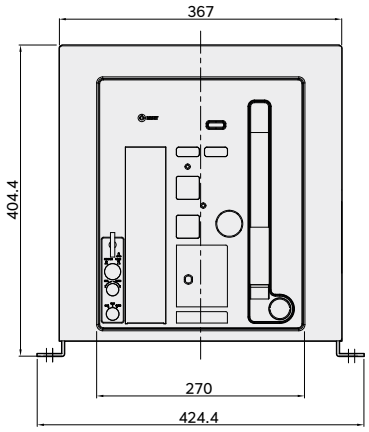
※ The drawing dimension of this page may be subject to change without prior notice.

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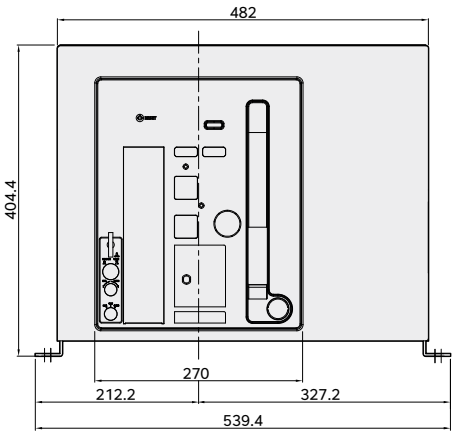
HGS/HGN Fixed Type 2,000 (630) ~ 3,200 A (HGS/HGN20 (06) ~ 32 B Frame)

Unit : mm

Front

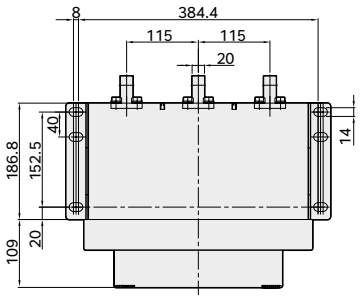


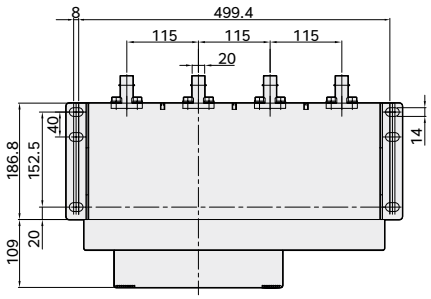
3P



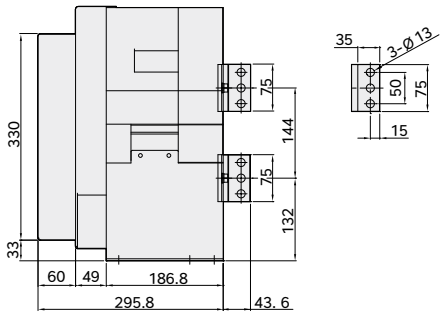
4P

Vertical Type

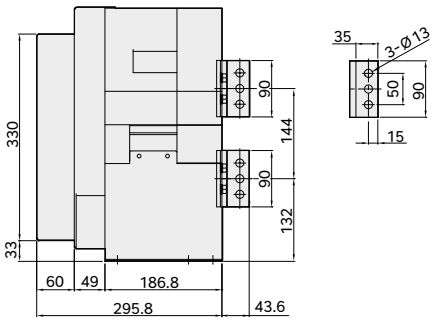




[630 ~ 2,500A]



[3,200A]

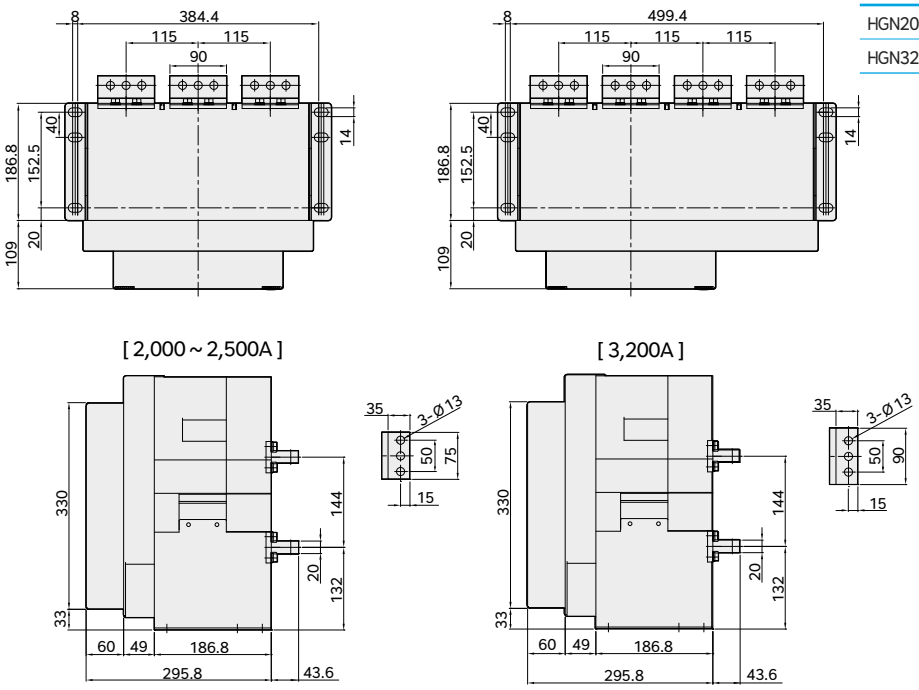


※ The drawing dimension of this page may be subject to change without prior notice.

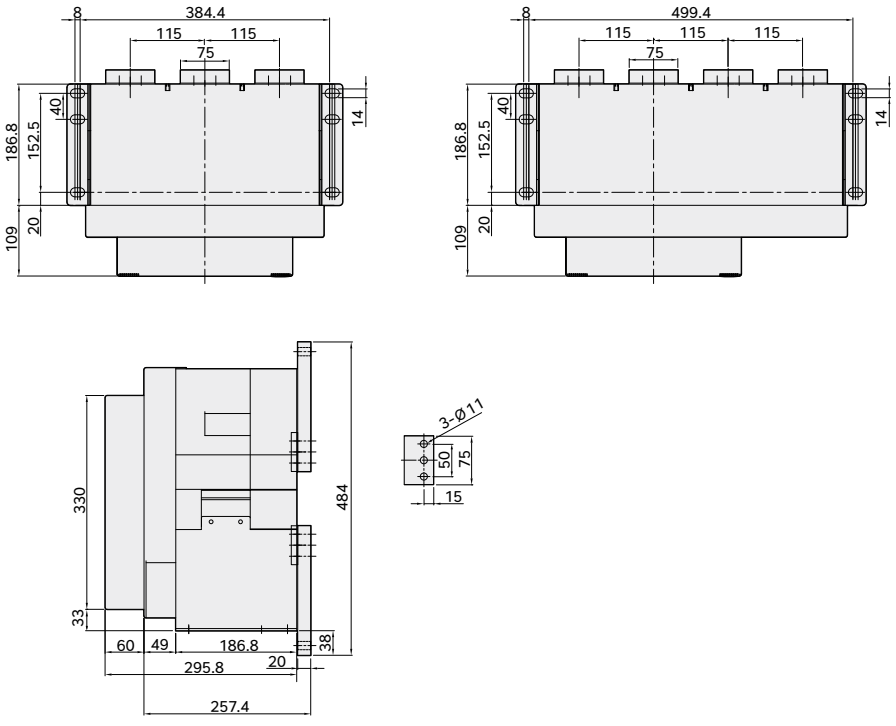
Unit : mm

Horizontal Type

Model Name	Detail "A"
HGN20 (06) ~ 25	75
HGN32	90



Flat Type



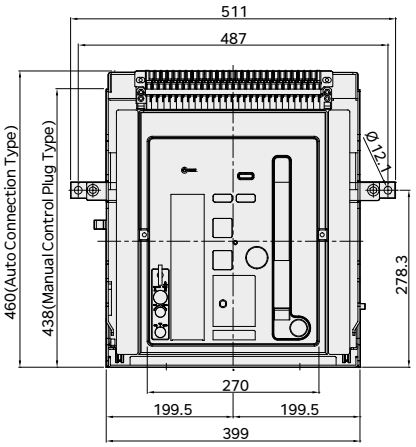
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

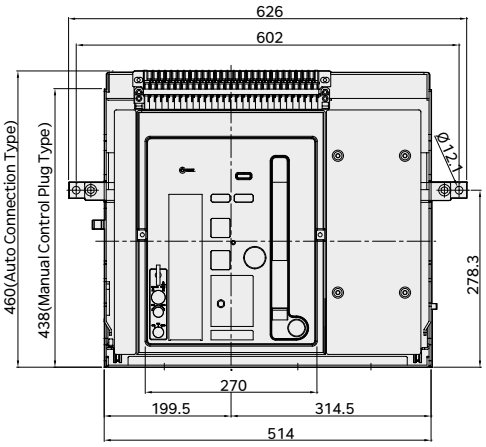
HGS/HGN Draw-Out Type 2,000 (630) ~ 3,200 A (HGS/HGN20 (06) ~ 32 B Frame)

Unit : mm

Front

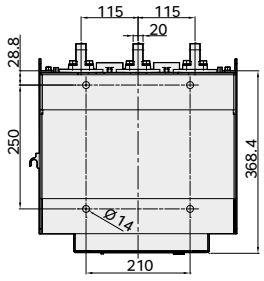


3P

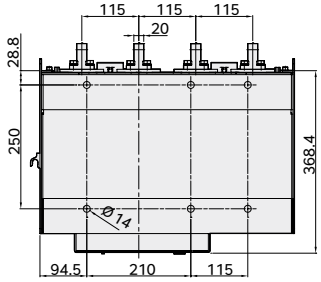


4P

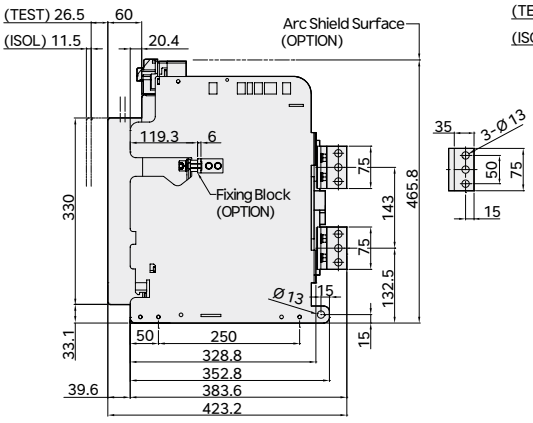
Vertical Type

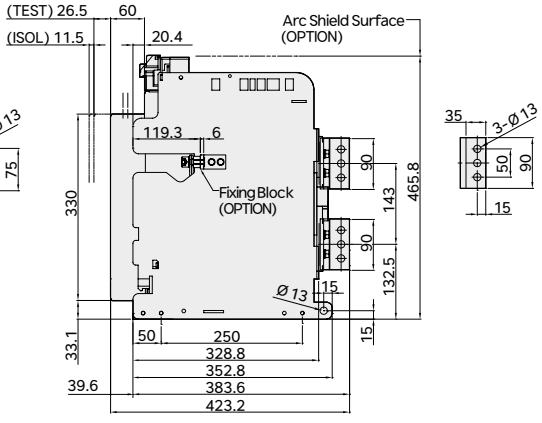


[630 ~ 2,500A]



[3,200A]

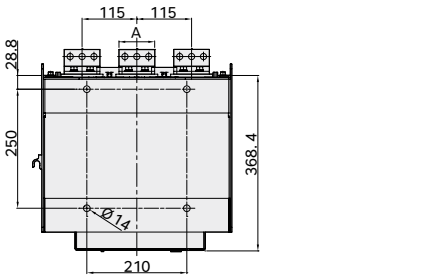


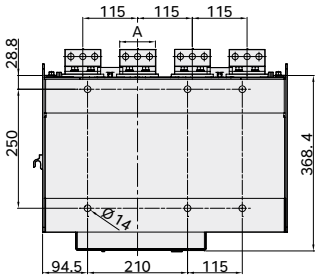


※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

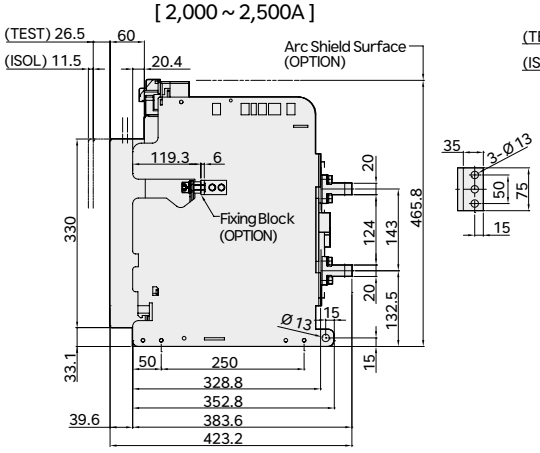
Horizontal Type



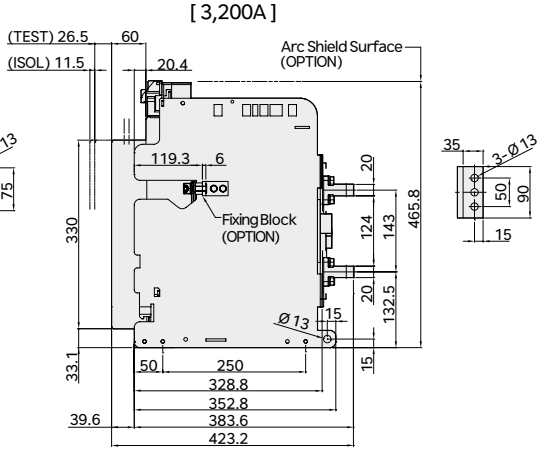


Model Name	Detail "A"
HGN20 (06) ~ 25	75
HGN32	90

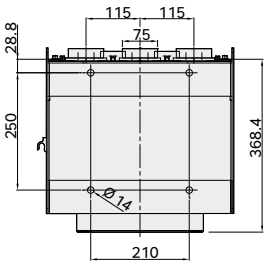
[2,000 ~ 2,500A]

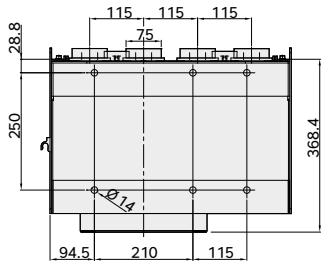


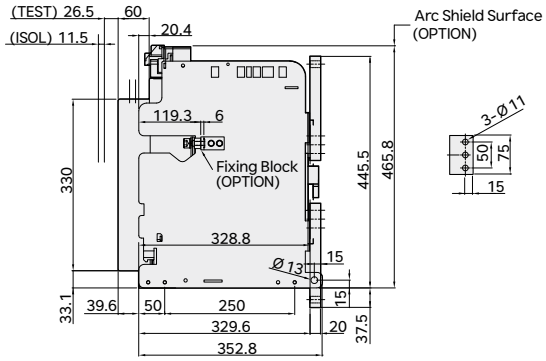
[3,200A]



Flat Type







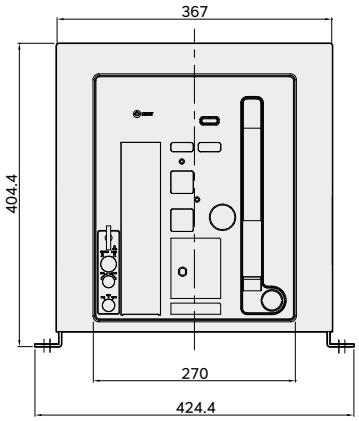
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

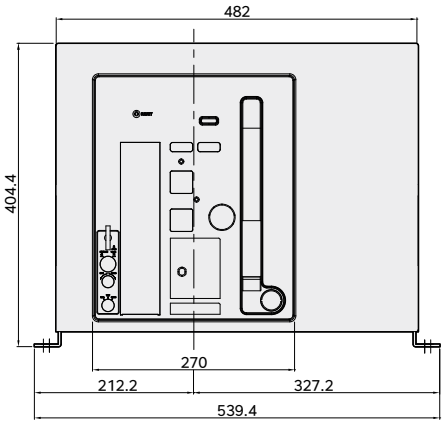
HGN Fixed Type 4,000 A (HGN40 B Frame)

Unit : mm

Front

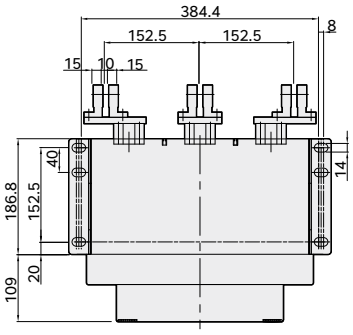


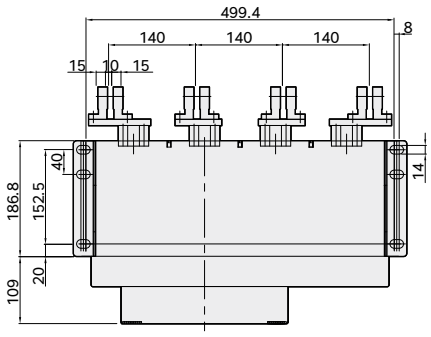
3P



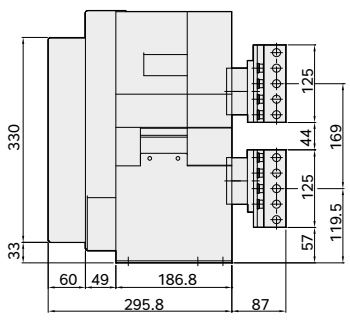
4P

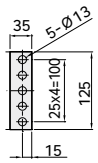
Vertical Type





[4,000A]

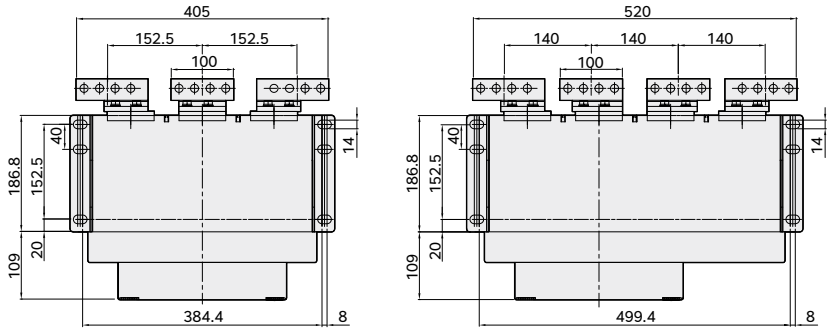




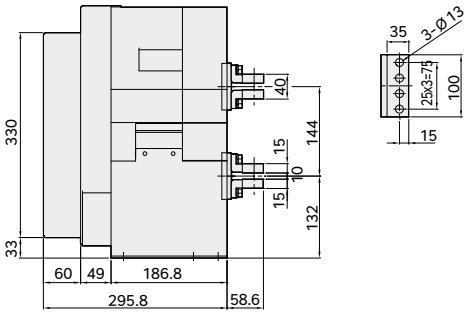
※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type



[4,000A]



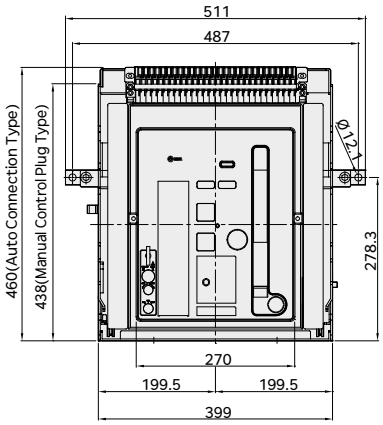
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Dimensions

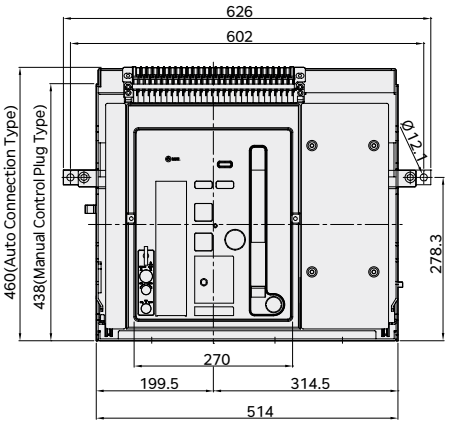
HGN Draw-Out Type 4,000 A (HGN40 B Frame)

Unit : mm

Front

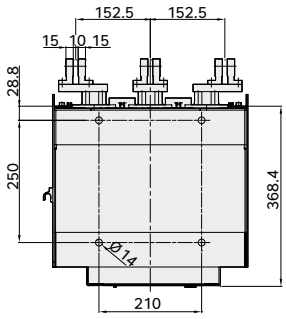


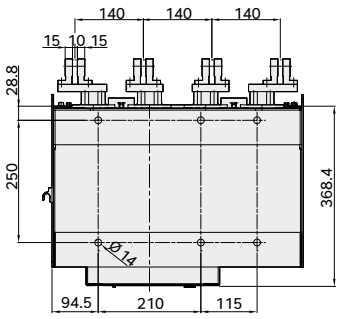
3P



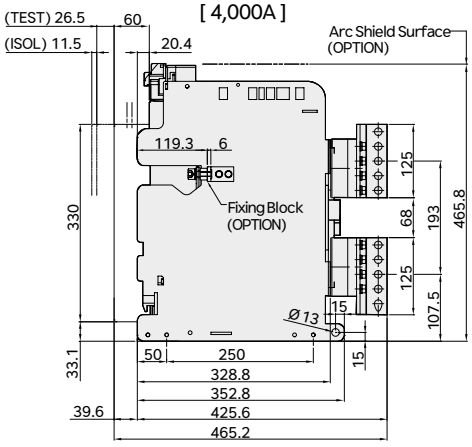
4P

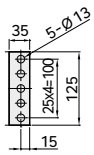
Vertical Type





[4,000A]

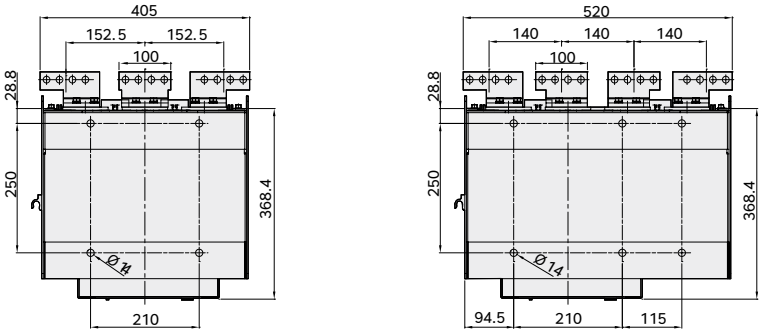




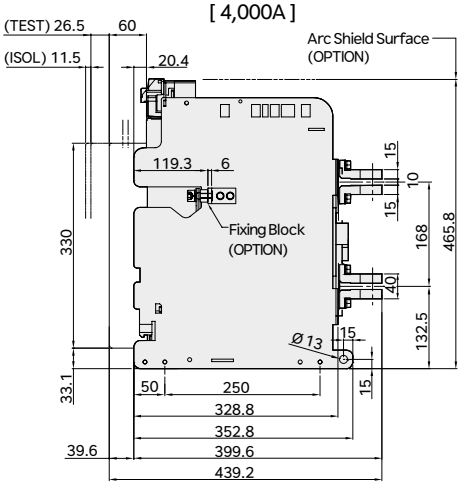
※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type



[4,000A]



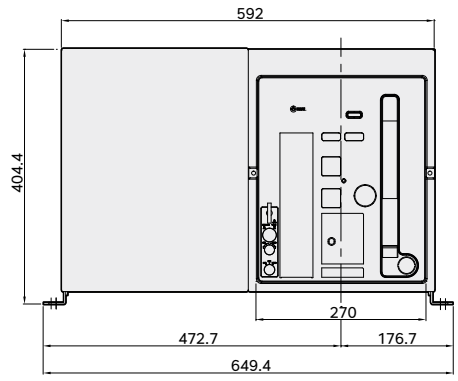
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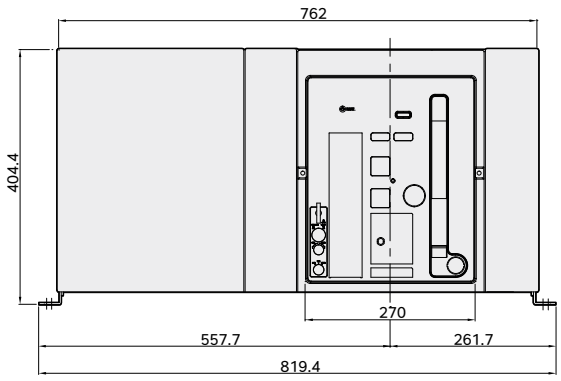
HGN Fixed Type 3,200 ~ 5,000 A (HGN32 ~ 50 C Frame)

Unit : mm

Front

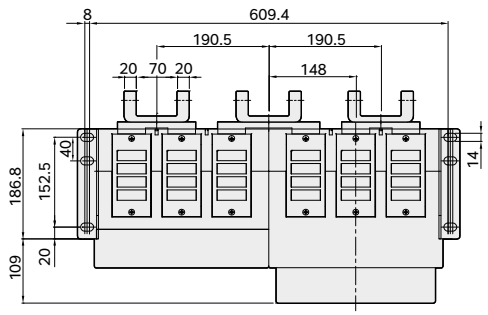


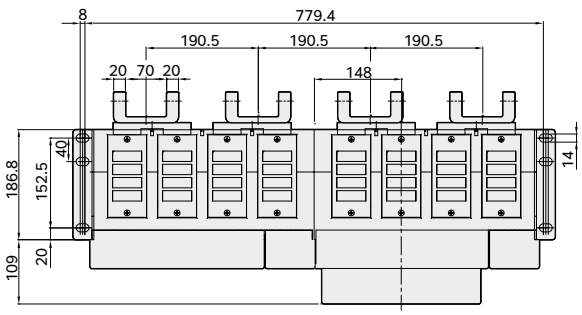
3P

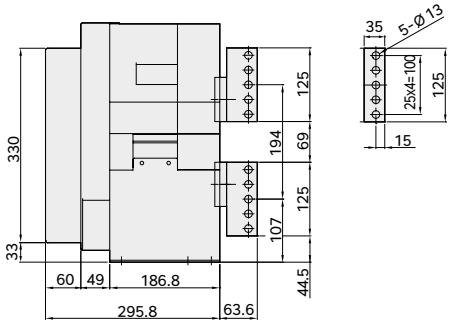


4P

Vertical Type



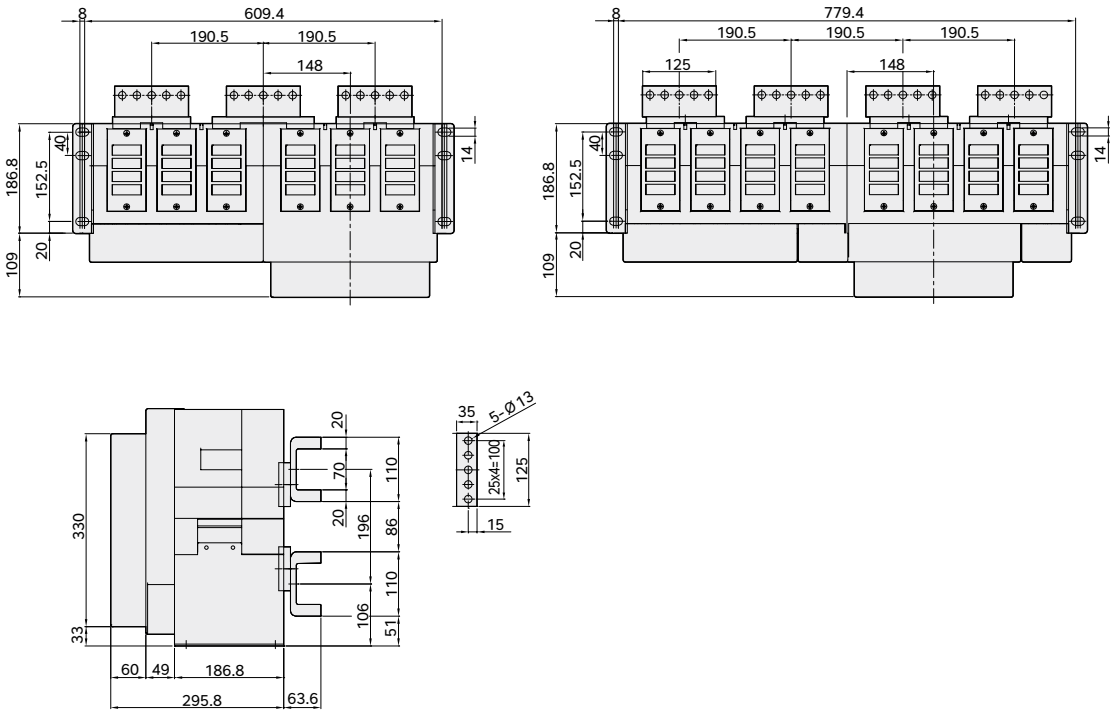




※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type



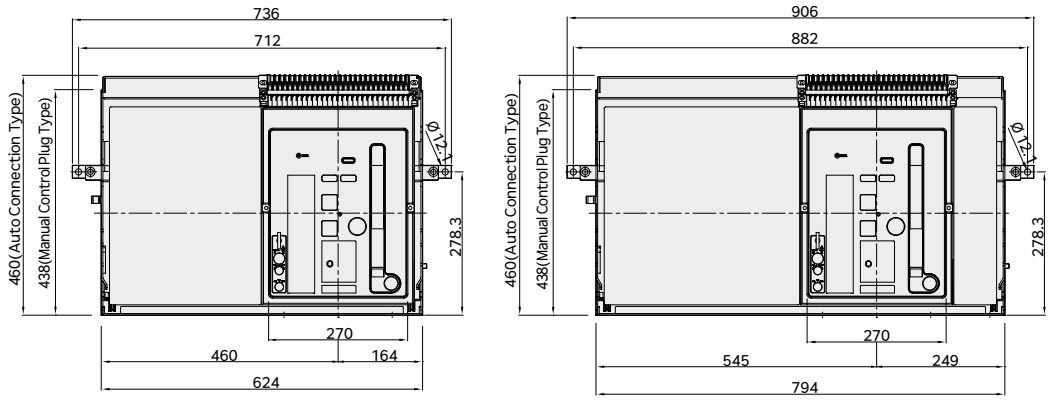
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Dimensions

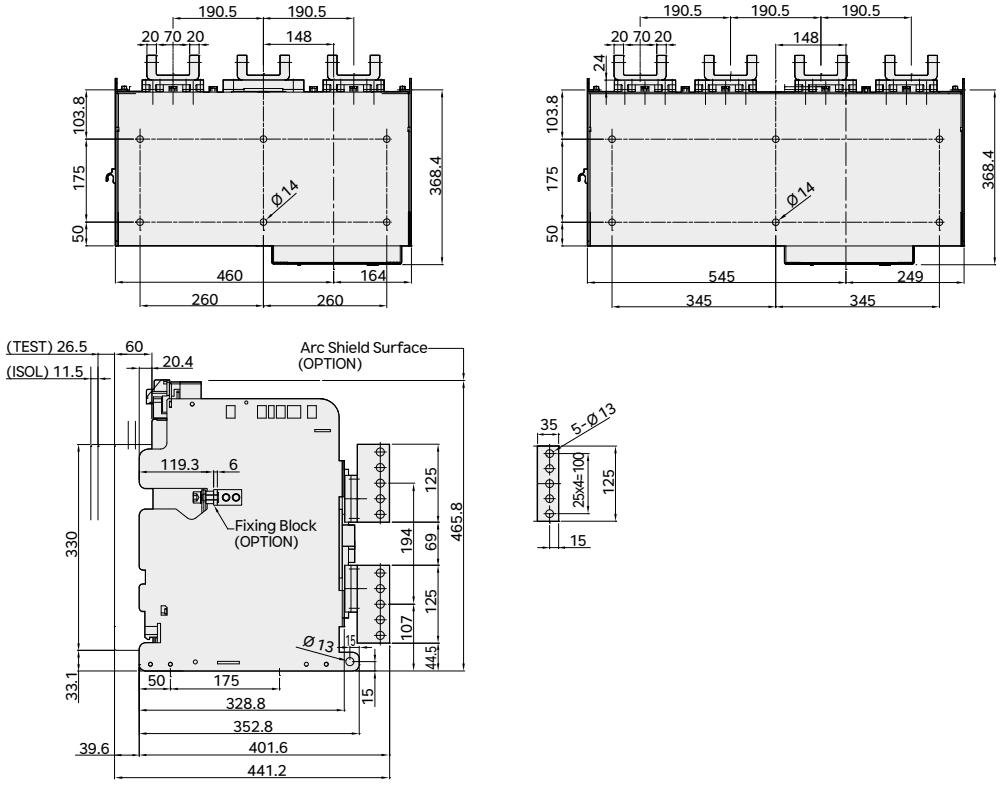
HGN Draw-Out Type 3,200 ~ 5,000A (HGN30 ~ 50 C Frame)

Unit : mm

Front



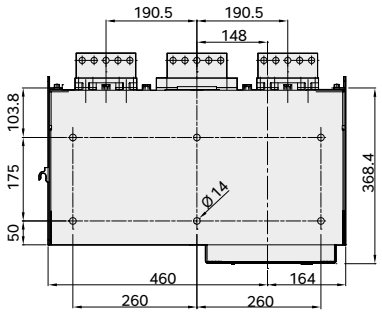
Vertical Type

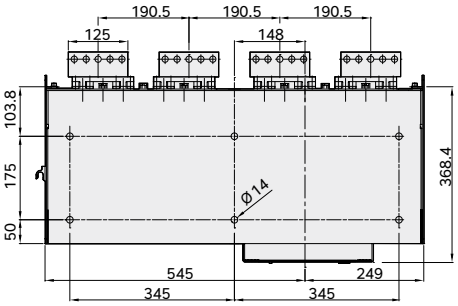


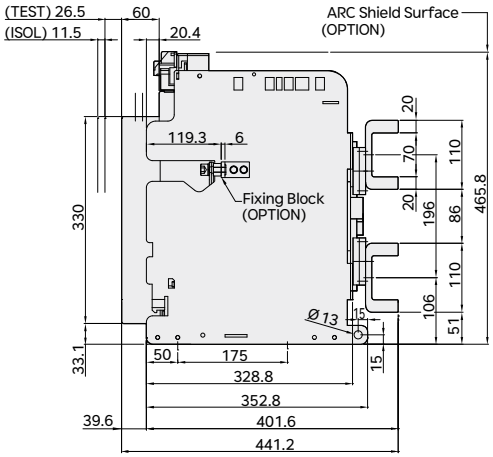
※ The drawing dimension of this page may be subject to change without prior notice.

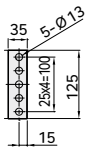
Unit : mm

Horizontal Type









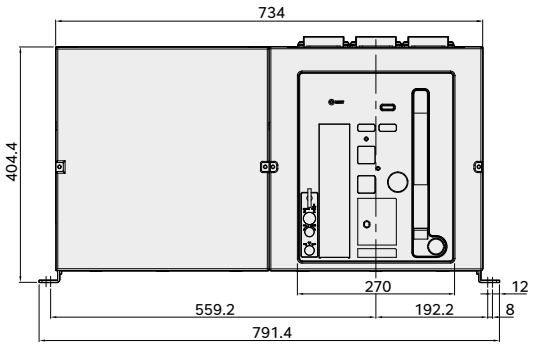
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

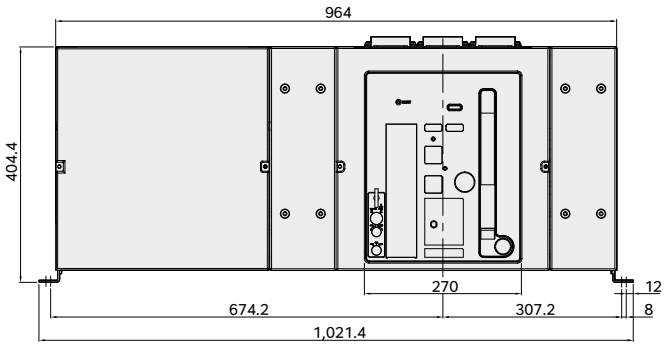
HGN Fixed Type 4,000 ~ 6,300 A (HGN40 ~ 63 D Frame)

Unit : mm

Front

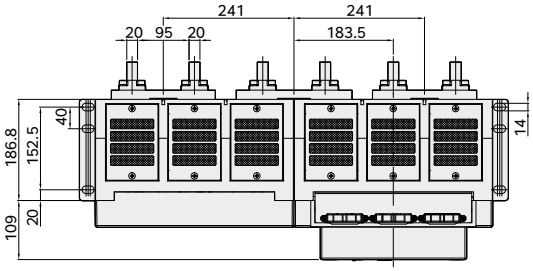


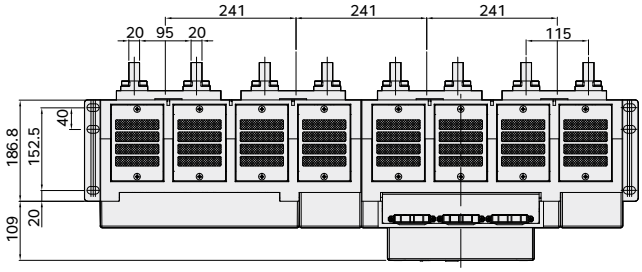
3P

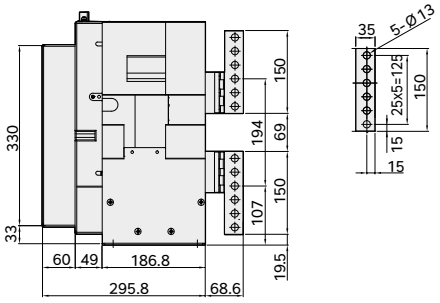


4P

Vertical Type



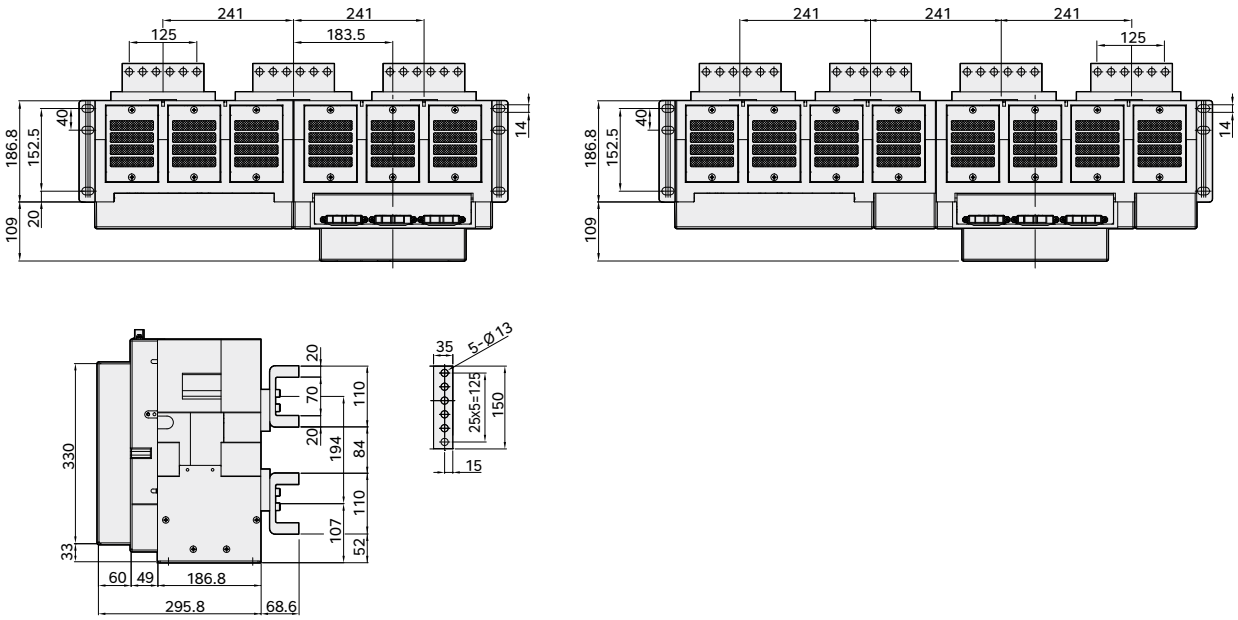




※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type



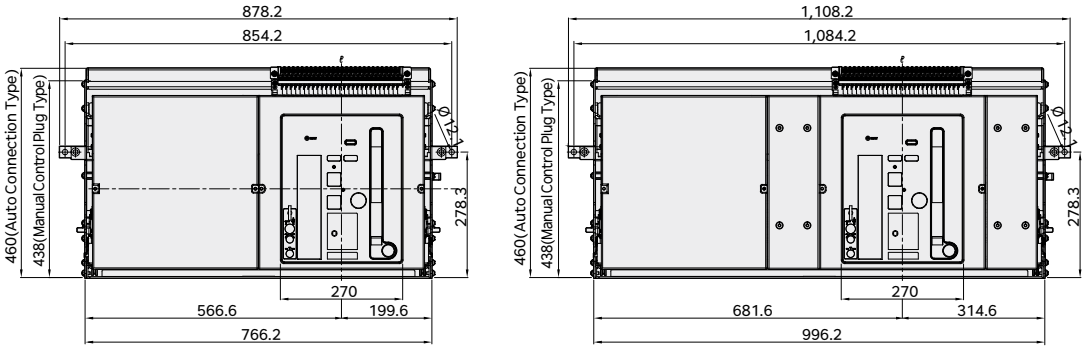
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Dimensions

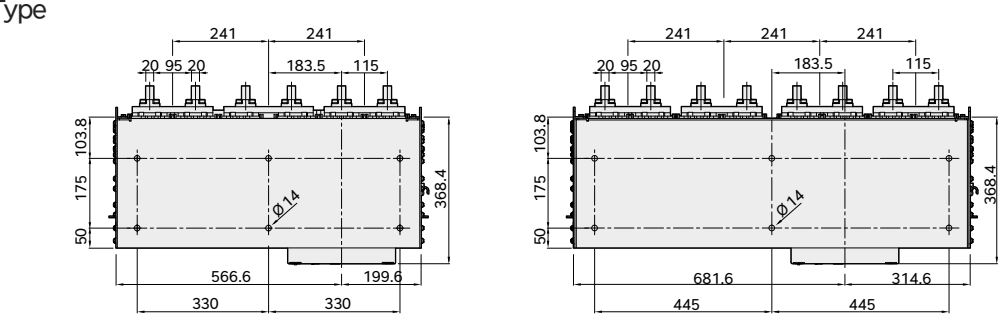
HGN Draw-Out Type 4,000 A (HGN40 D Frame)

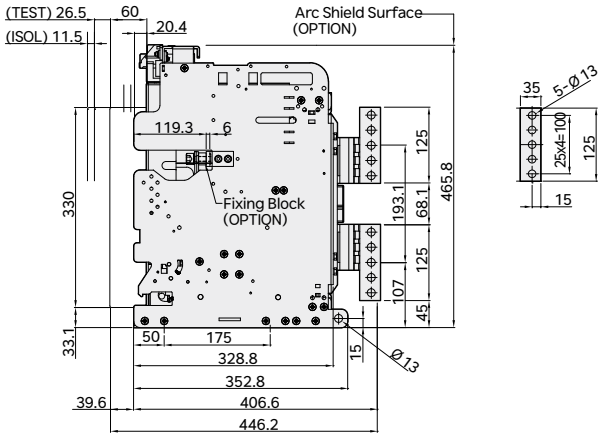
Unit : mm

Front



Vertical Type

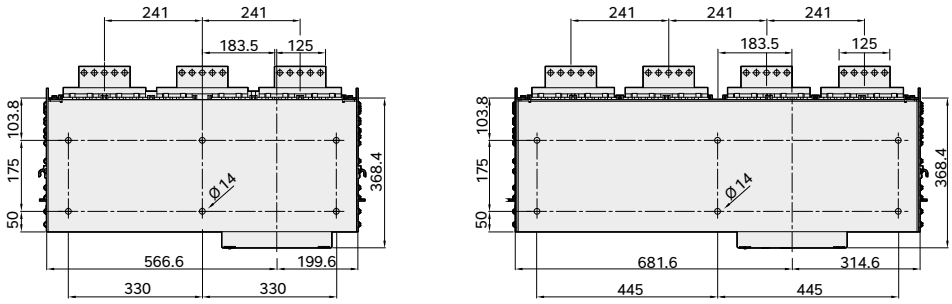


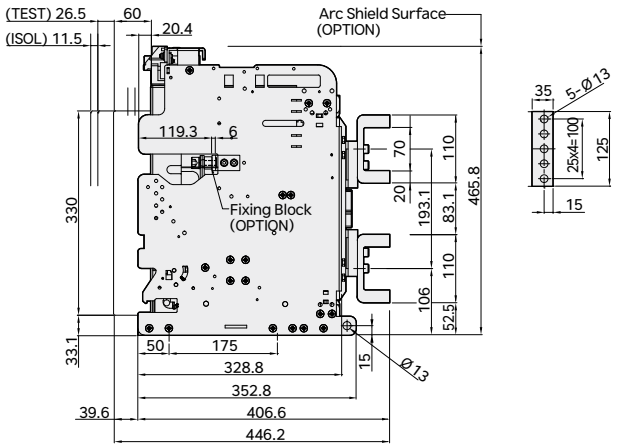


※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type





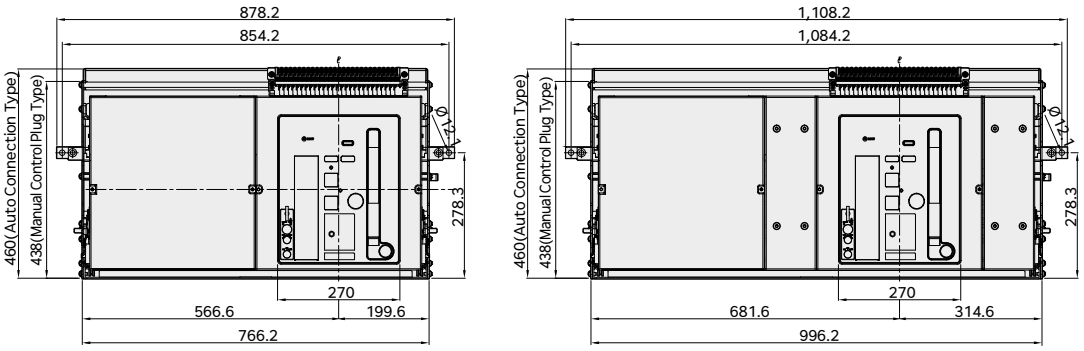
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Dimensions

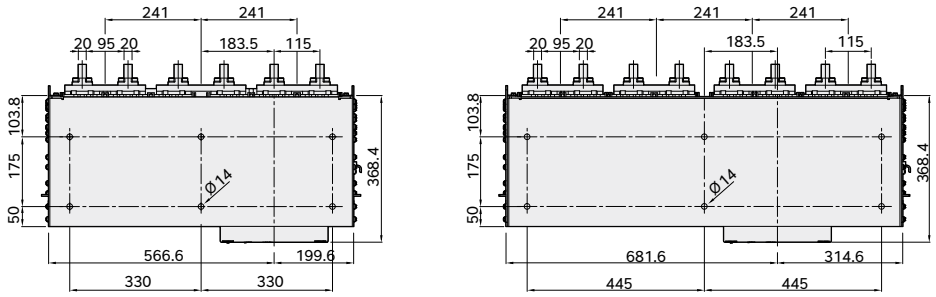
HGN Draw-Out Type 5,000 ~ 6,300 A (HGN50 ~ 63 D Frame)

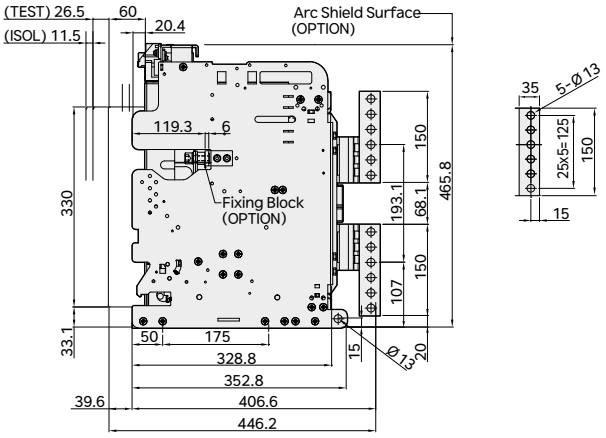
Unit : mm

Front



Vertical Type

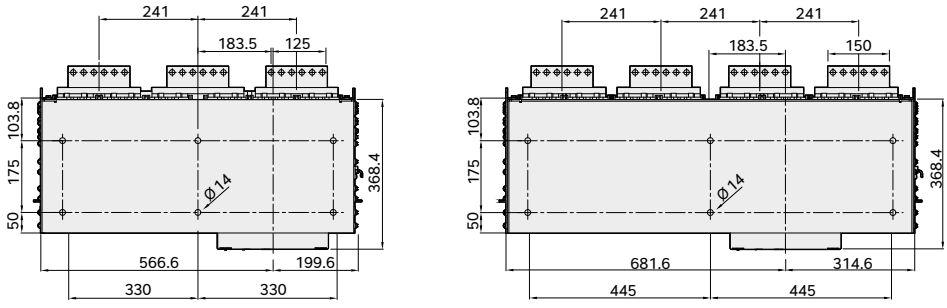


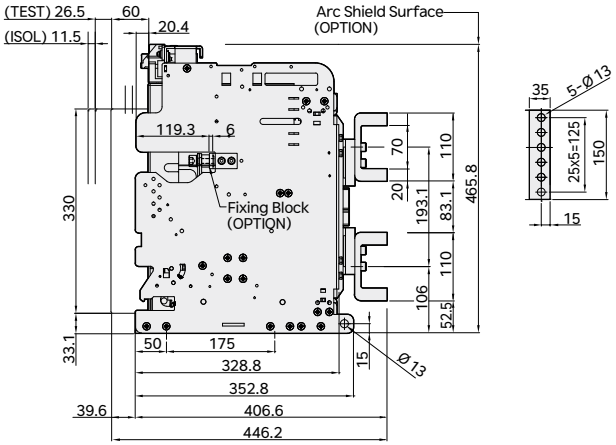


※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type





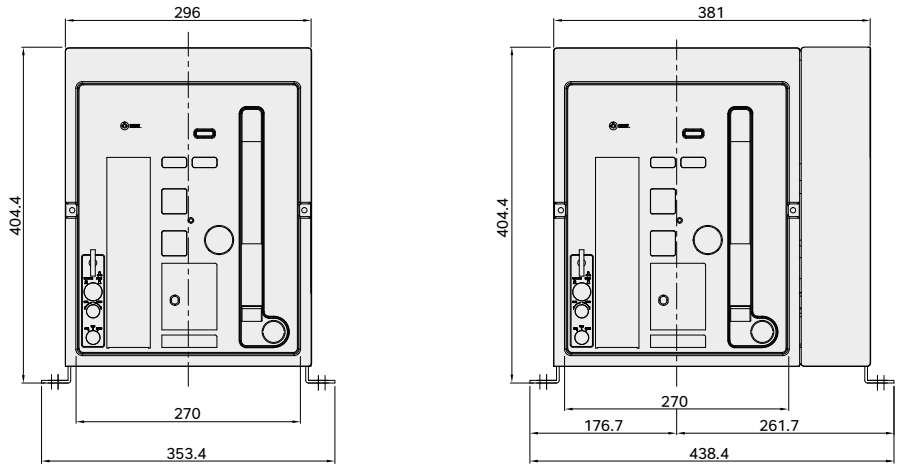
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Dimensions

HGN Fixed Type 630~2,000A (HGN06~20 P Frame)

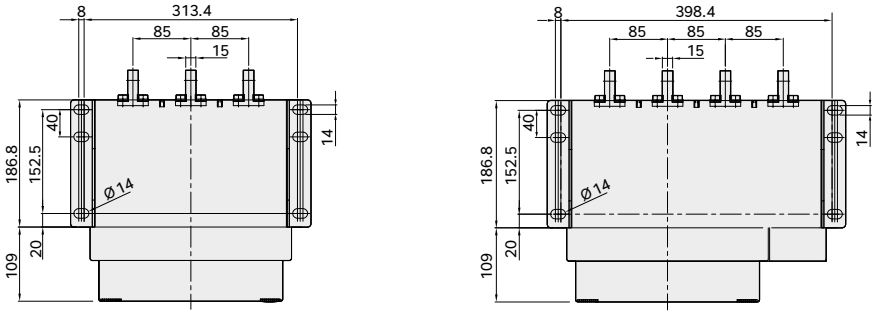
Unit : mm

Front

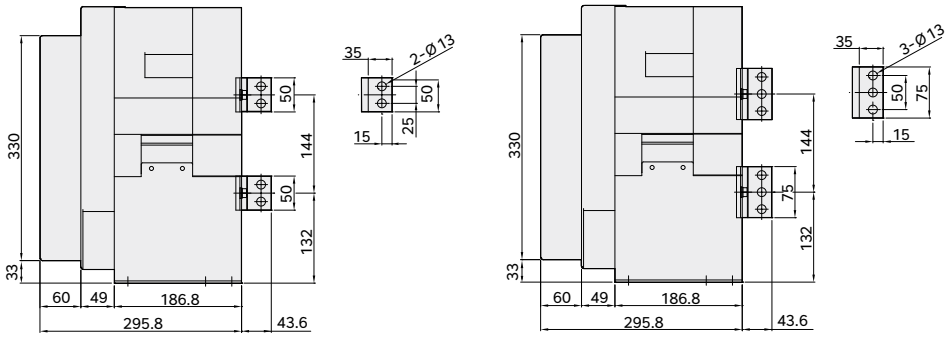


3P 4P

Vertical Type



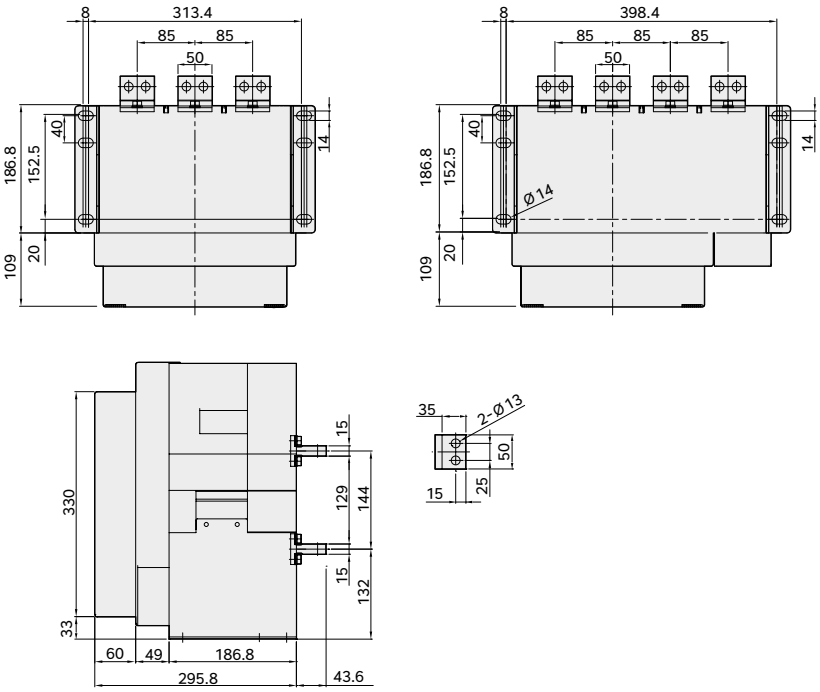
[HGN/HGS 630 ~ 1,600A] [HGN 2,000A]



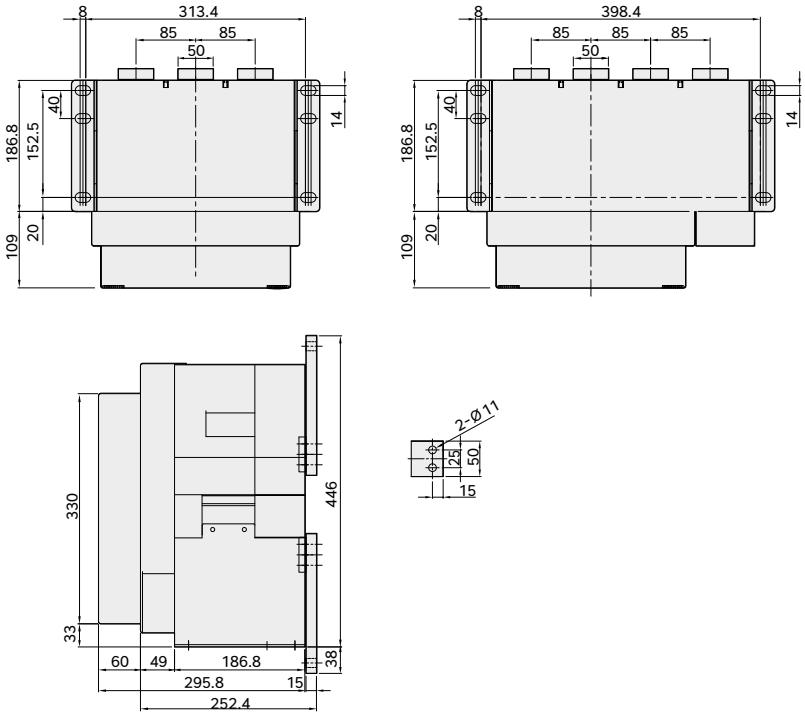
※ The drawing dimension of this page may be subject to change without prior notice.
As for the HGN fixed type P type 2,000 A, only the vertical terminal can be applicable.

Unit : mm

Horizontal Type (630 ~ 1,600A)



Flat Type (630 ~ 1,600A)



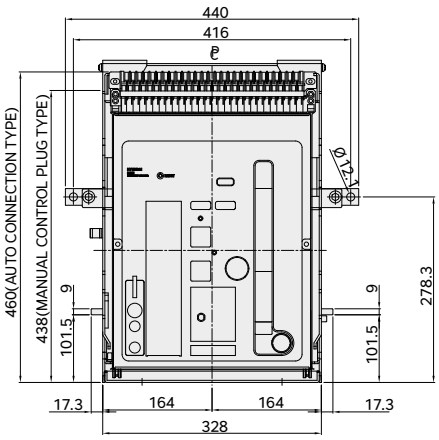
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Dimensions

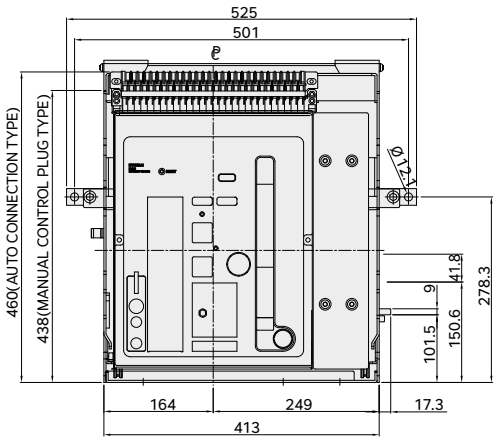
HGN Draw-Out Type 630~2,000A (HGN06~20 P Frame)

Unit : mm

Front

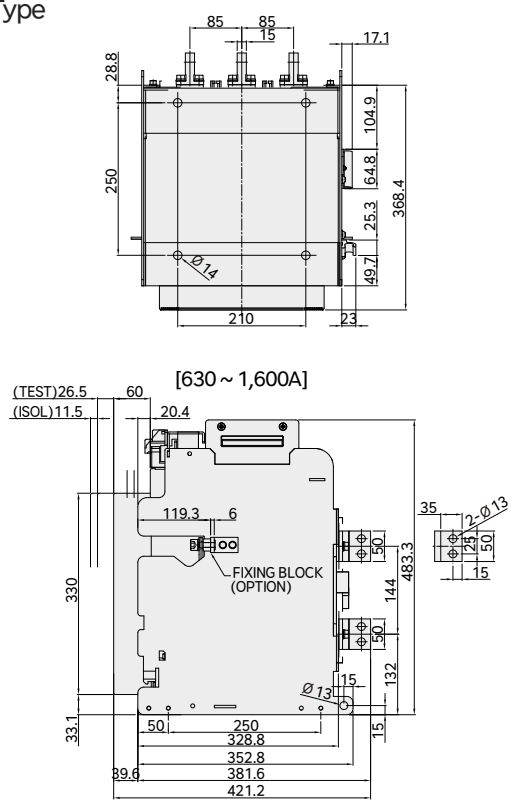


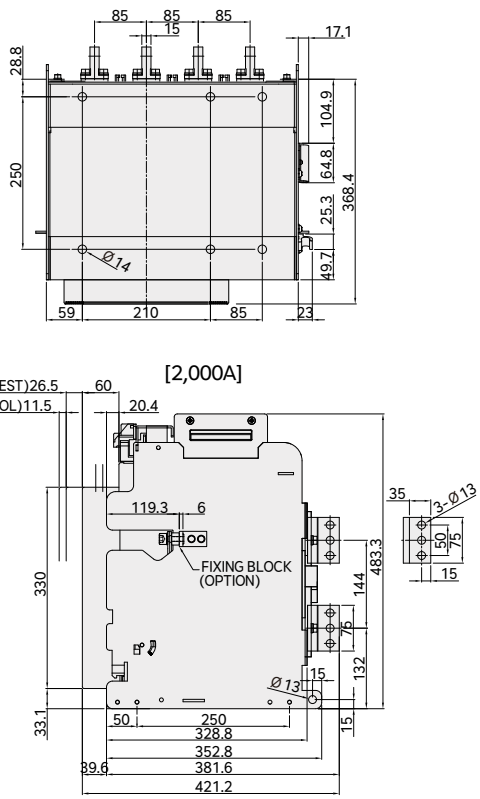
3P



4P

Vertical Type

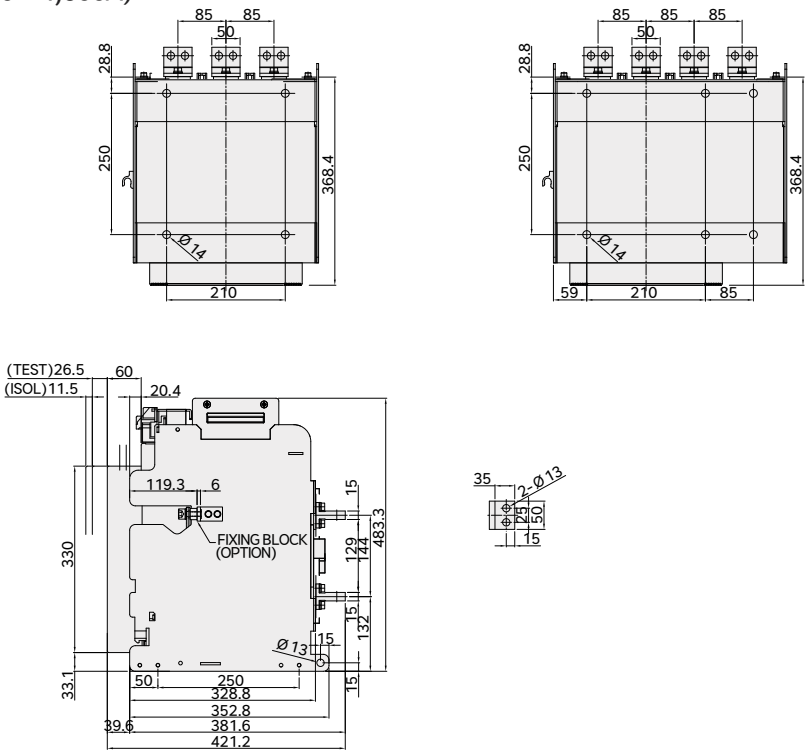




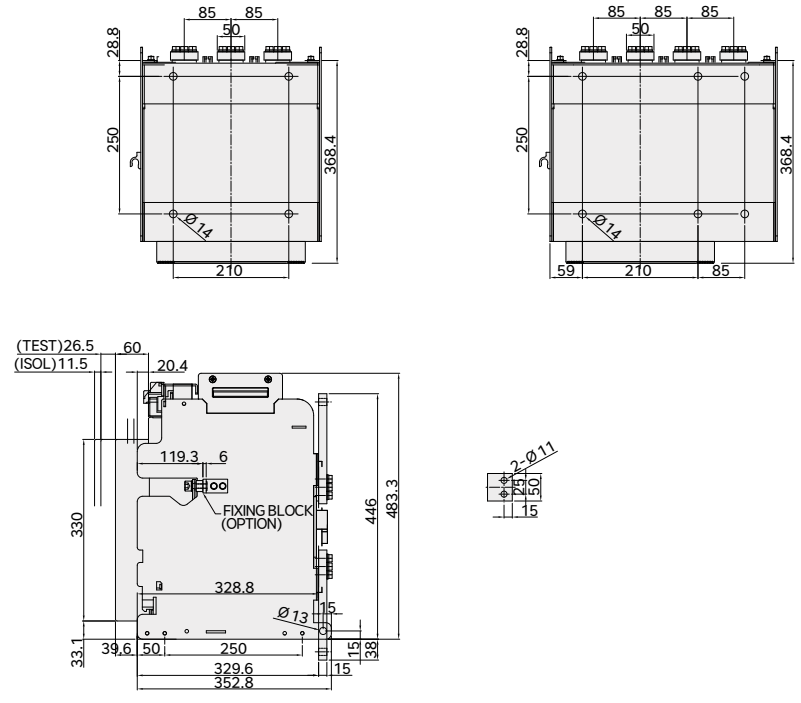
※ The drawing dimension of this page may be subject to change without prior notice.
As for the HGN draw-out type P type 2,000 A, only the vertical terminal can be applicable.

Unit : mm

Horizontal Type (630 ~ 1,600A)



Flat Type (630 ~ 1,600A)



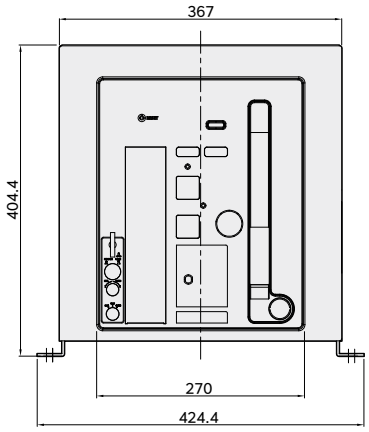
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

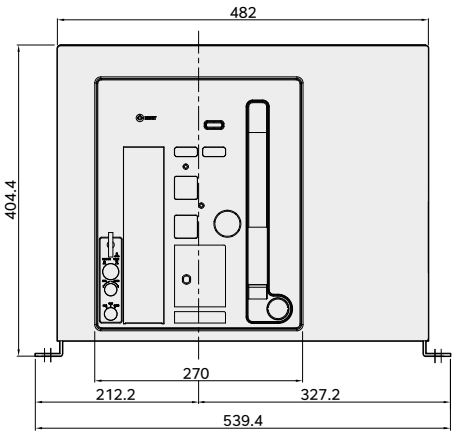
HGN Fixed Type 630~3,200A (HGN06~32 Q Frame)

Unit : mm

Front

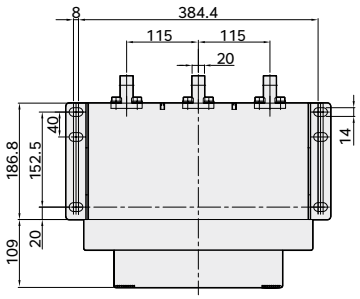


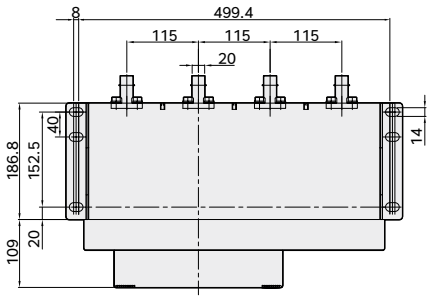
3P



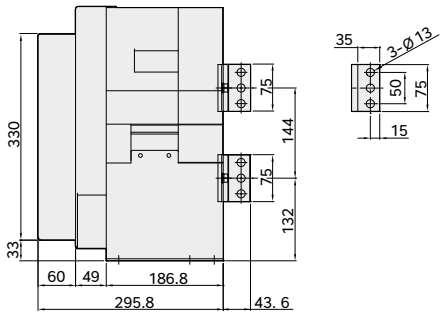
4P

Vertical Type

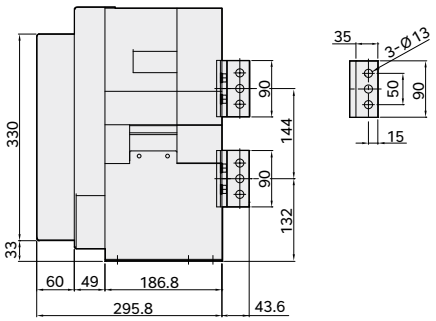




[630 ~ 2,500A]



[3,200A]

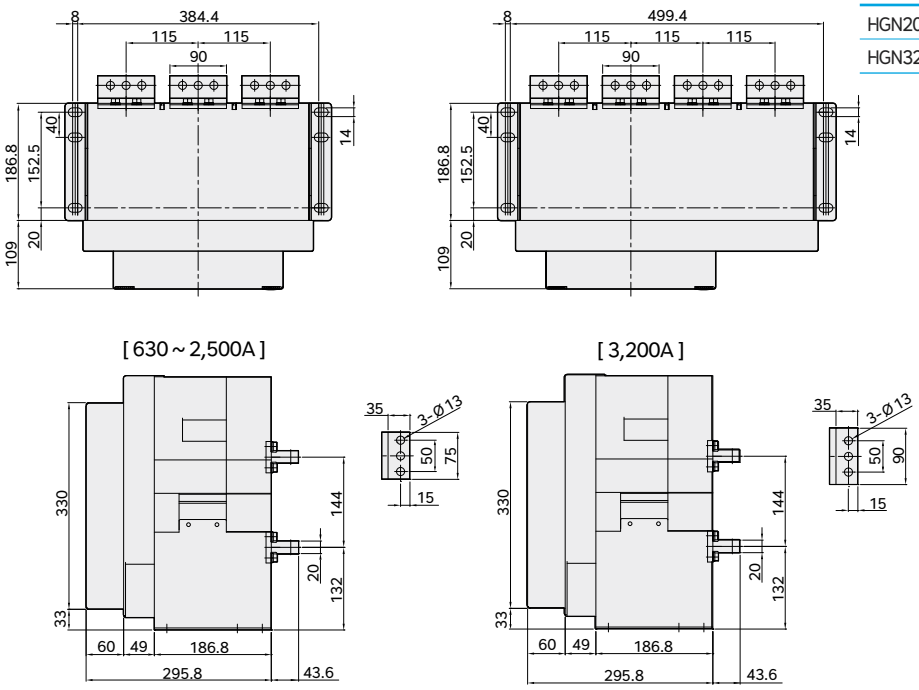


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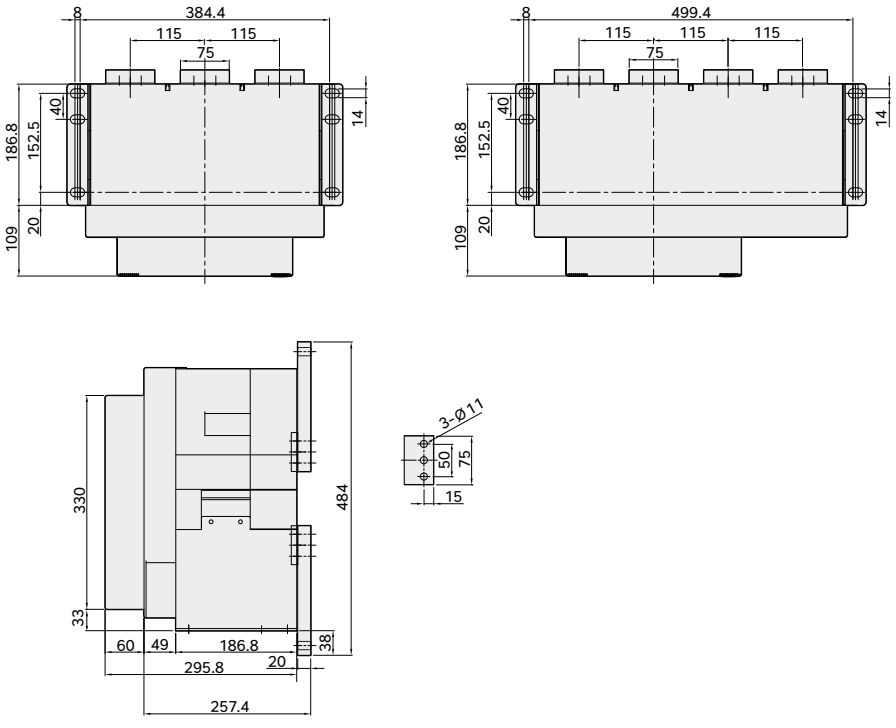
Unit : mm

Horizontal Type

Model Name	Detail "A"
HGN20 (06) ~ 25	75
HGN32	90



Flat Type



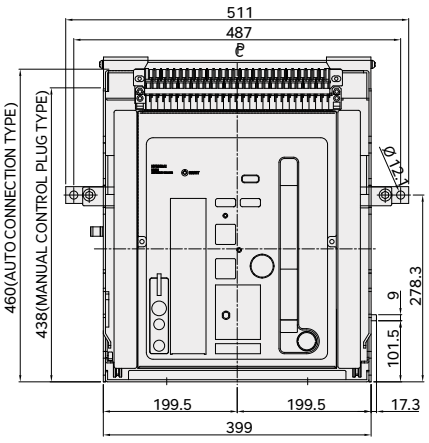
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Dimensions

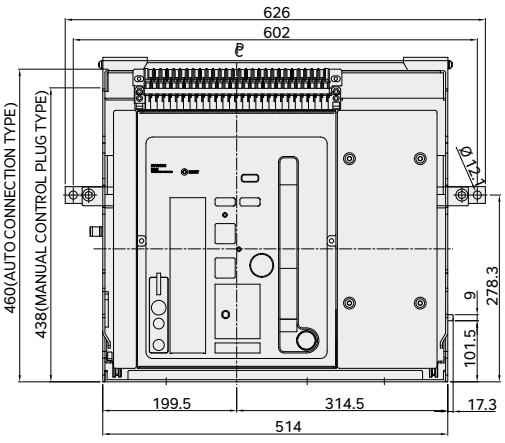
HGN Draw-Out Type 630~3,200A (HGN06~32 Q Frame)

Unit : mm

Front

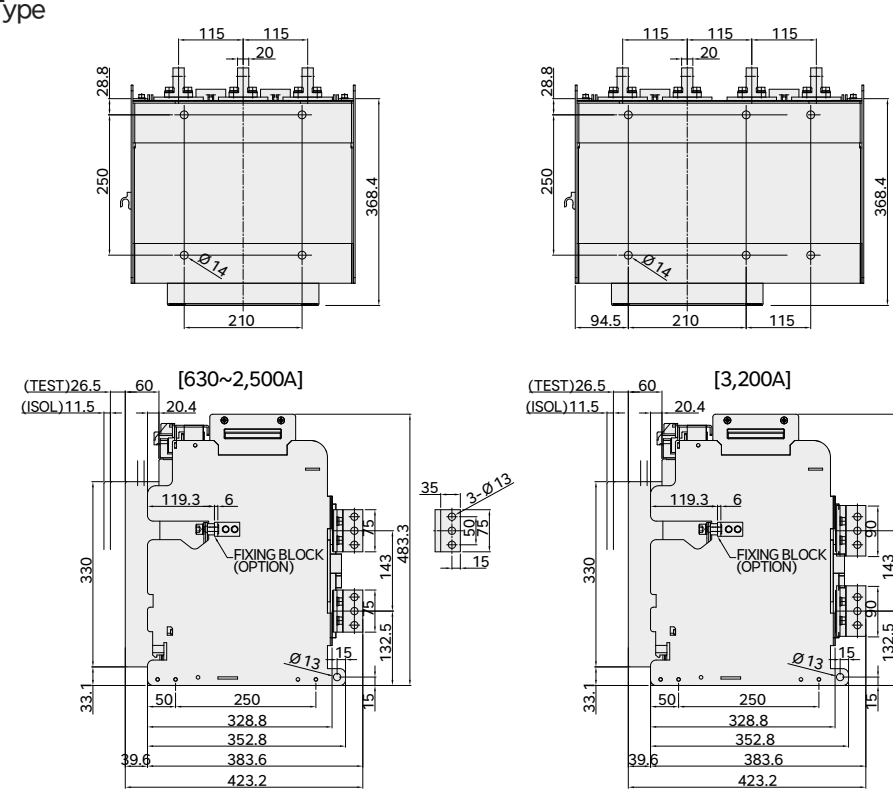


3P



4P

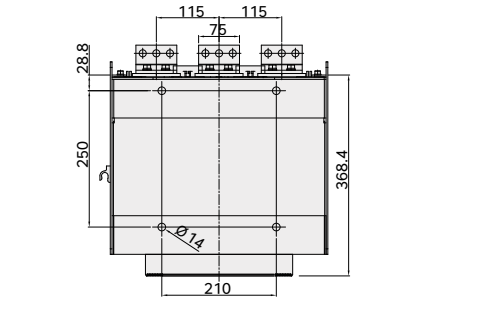
Vertical Type

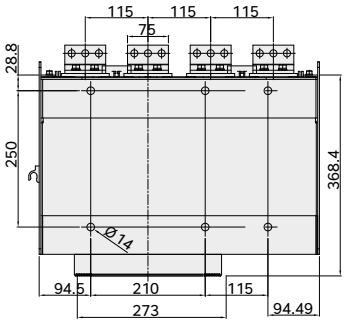


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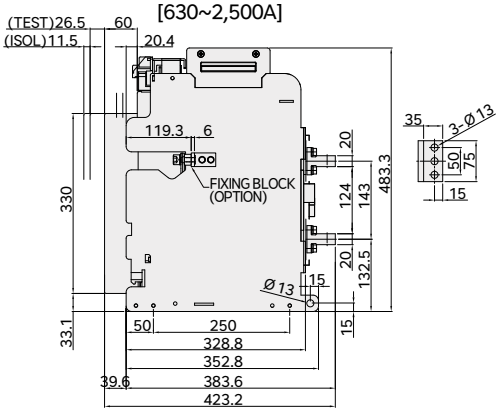
Unit : mm

Horizontal Type

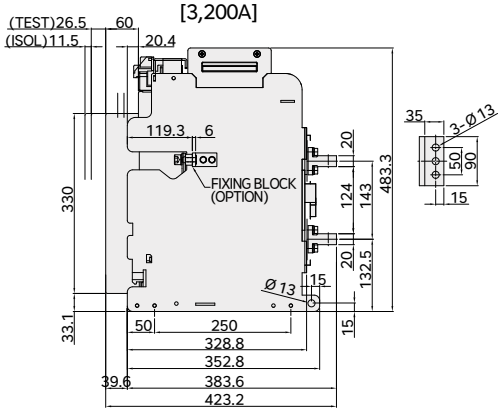




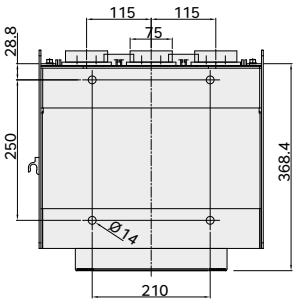
[630~2,500A]

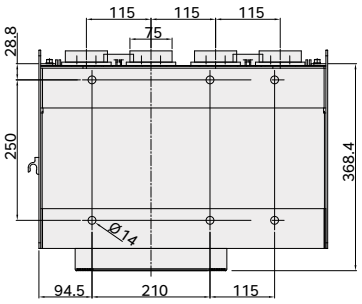


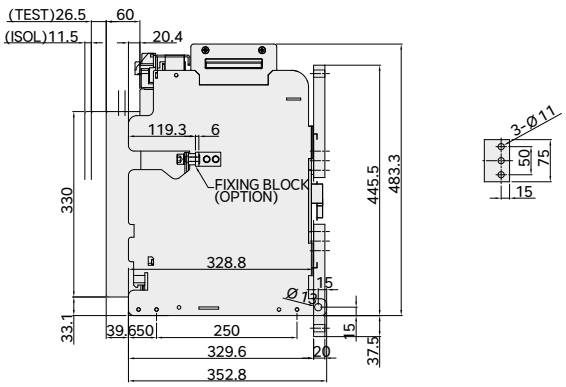
[3,200A]



Flat Type







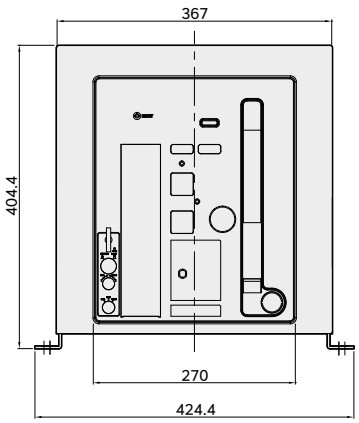
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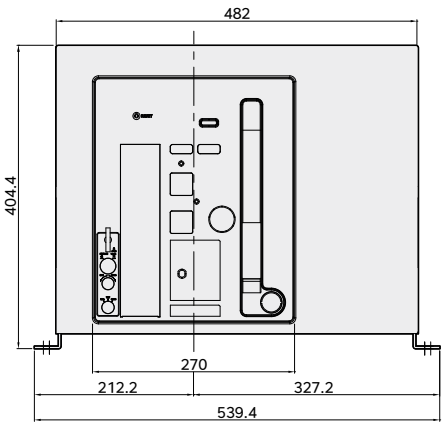
HGN Fixed Type 4,000A (HGN40 Q Frame)

Unit : mm

Front

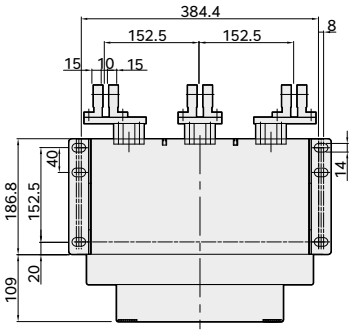


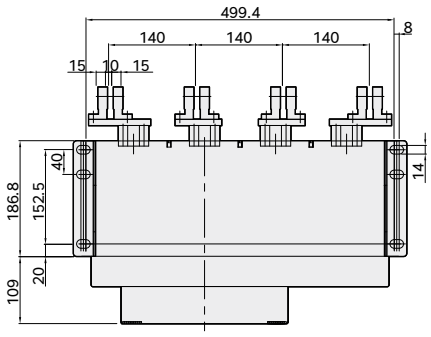
3P



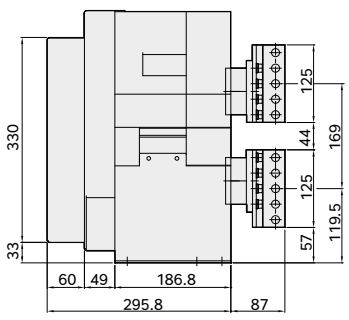
4P

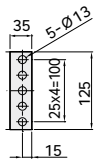
Vertical Type





[4,000A]

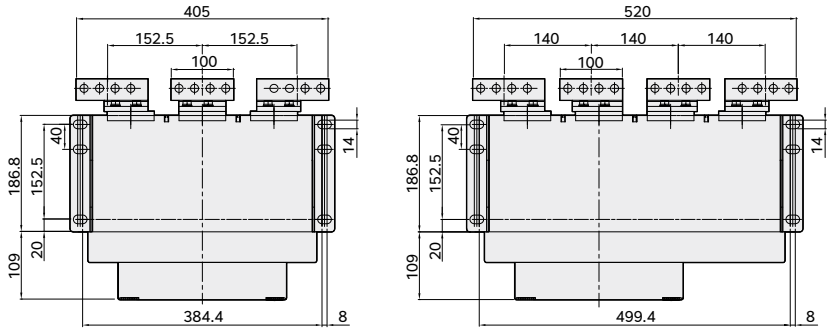




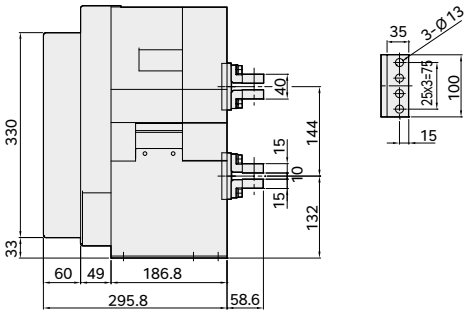
※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type



[4,000A]



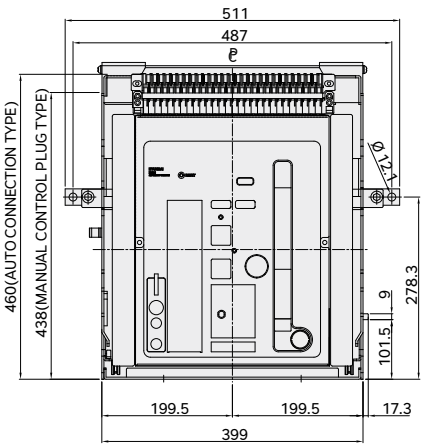
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

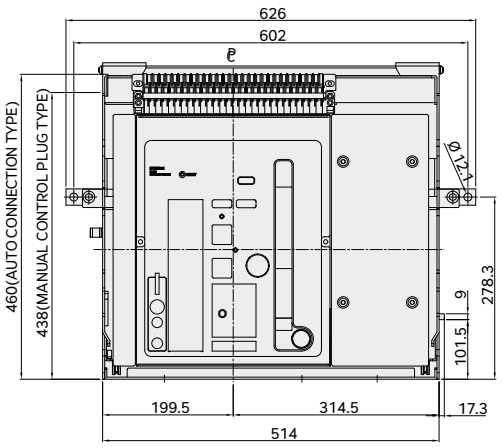
HGN Draw-Out Type 4,000A (HGN40 Q Frame)

Unit : mm

Front

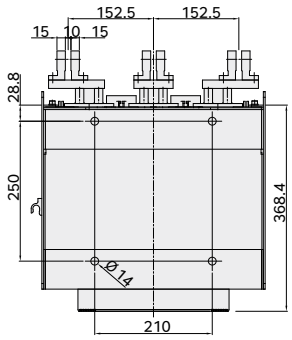


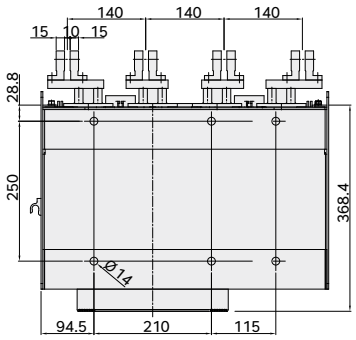
3P



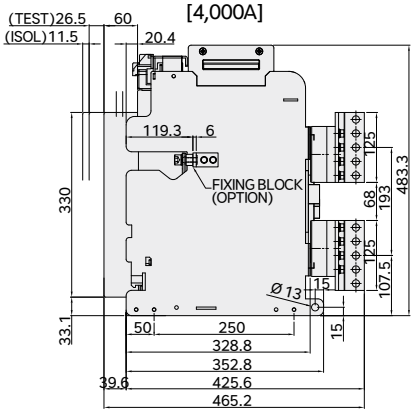
4P

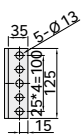
Vertical Type





[4,000A]

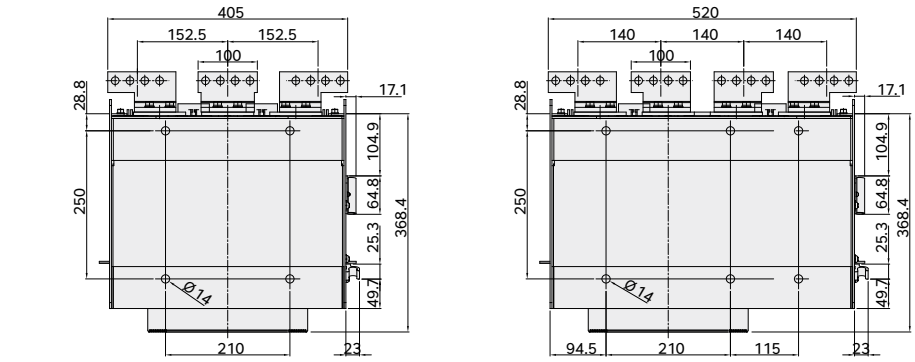


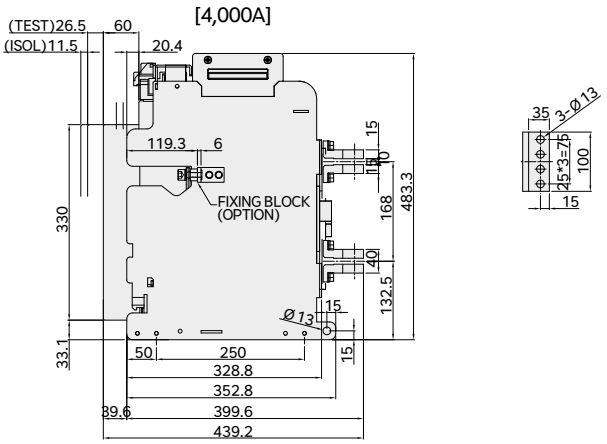


※ The drawing dimension of this page may be subject to change without prior notice.

Unit : mm

Horizontal Type





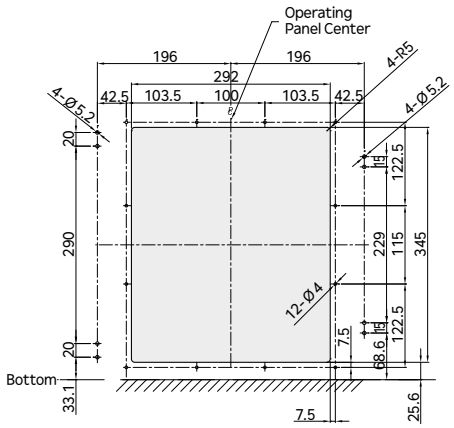
※ The drawing dimension of this page may be subject to change without prior notice.

Dimensions

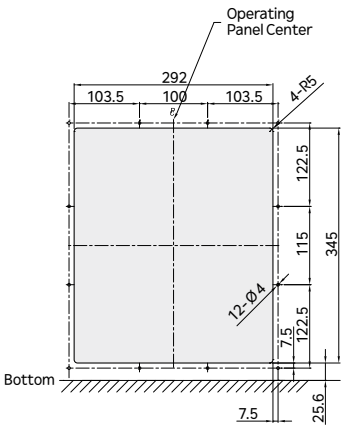
Panel Cutting Dimension of HGS/HGN Fixed Type

Unit : mm

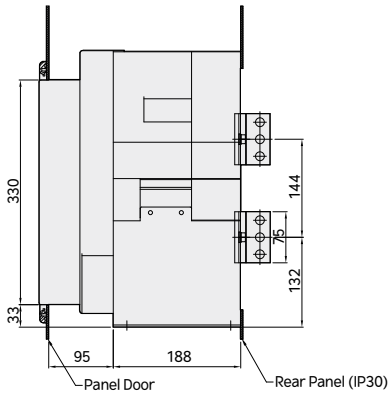
Panel Door Cut-Out (For Dust Cover)



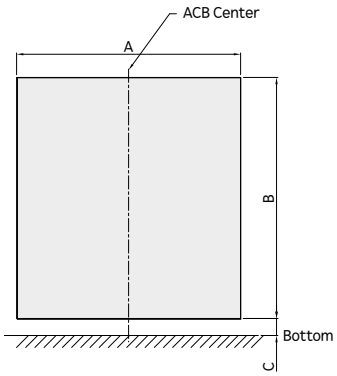
Panel Door Cut-Out (For Door Flange)



Side View



Rear Panel Cutting Size (For IP30)



Detailed Dimensions of Real Panel Cutting

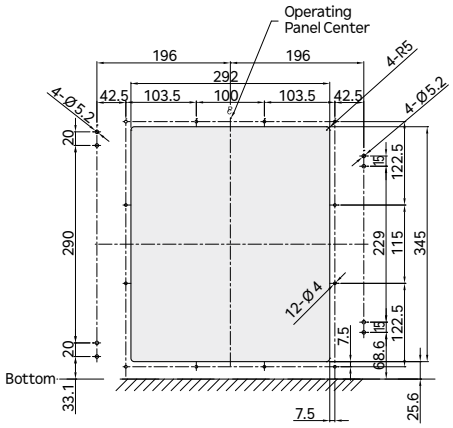
Model Name	A	B	C
HGN 06A3 ~ 20A3, HGS 06A3 ~ 16A3, HGN 06P3 ~ 20P3	283	355	25
HGN 06A4 ~ 20A4, HGS 06A4 ~ 16A4, HGN 06P4 ~ 20P4	368	355	25
HGN 06B3 ~ 40B3, HGS 20B3 ~ 32B3, HGN 06Q3 ~ 40Q3	354	355	25
HGN 06B4 ~ 40B4, HGS 20B4 ~ 32B4, HGN 06Q4 ~ 40Q4	469	355	25
HGN 32C3 ~ 50C3	579	355	25
HGN 32C4 ~ 50C4	749	355	25

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

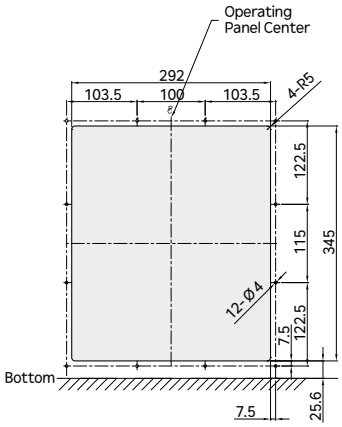
Panel Cutting Dimension of HGS/HGN Draw-Out Type

Unit : mm

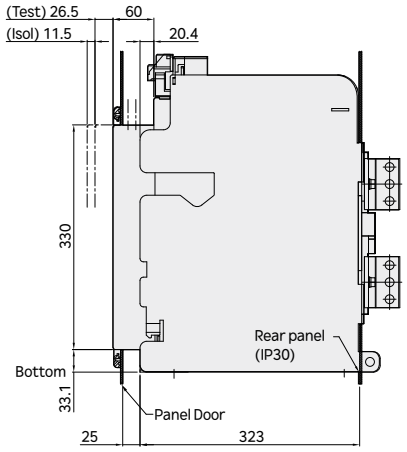
Panel Door Cut-Out (For Dust Cover)



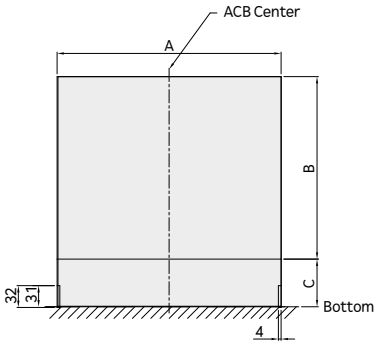
Panel Door Cut-Out (For Door Flange)



Side View



Rear Panel Cutting Size (For IP30)

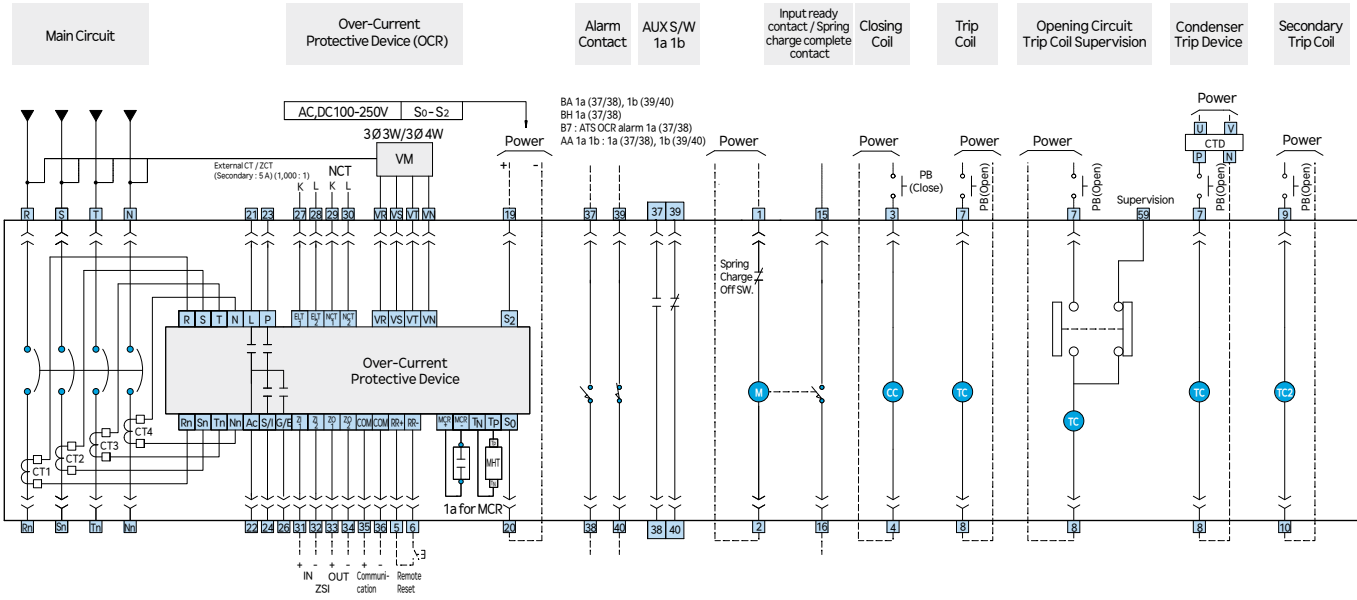


Detailed Dimensions of Real Panel Cutting

Model Name	A	B	C
HGN 06A3 ~ 20A3, HGS 06A3 ~ 16A3, HGN 06P3 ~ 20P3	329	268	70
HGN 06A4 ~ 20A4, HGS 06A4 ~ 16A4, HGN 06P4 ~ 20P4	414	268	70
HGN 06B3 ~ 40B3, HGS 20B3 ~ 32B3, HGN 06Q3 ~ 40Q3	400	298	55
HGN 06B4 ~ 40B4, HGS 20B4 ~ 32B4, HGN 06Q4 ~ 40Q4	515	298	55
HGN 32C3 ~ 50C3	625	338	35
HGN 32C4 ~ 50C4	795	338	35

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

Circuit Diagrams



Terminal symbol

CT	Transformer
L	Normally open contact
PT	Standby alarm
G	Fault contact
S / I	Instantaneous / Time-delay contact
Ac	Common contact
NCT	Neutral Current Transformer (NCT) input
ZI	Zone Selective Interlock Input
ZO	Zone Selective Interlock Output
MCR +,-	MCR input terminal
Tp / Tn	MCR output terminal
M	Charging motor
CC	Closing coil
TC	Trip coil
UVT	Under-voltage trip coil
MHT	Magnetic Hold Trigger
SO /S2	OCR power supply

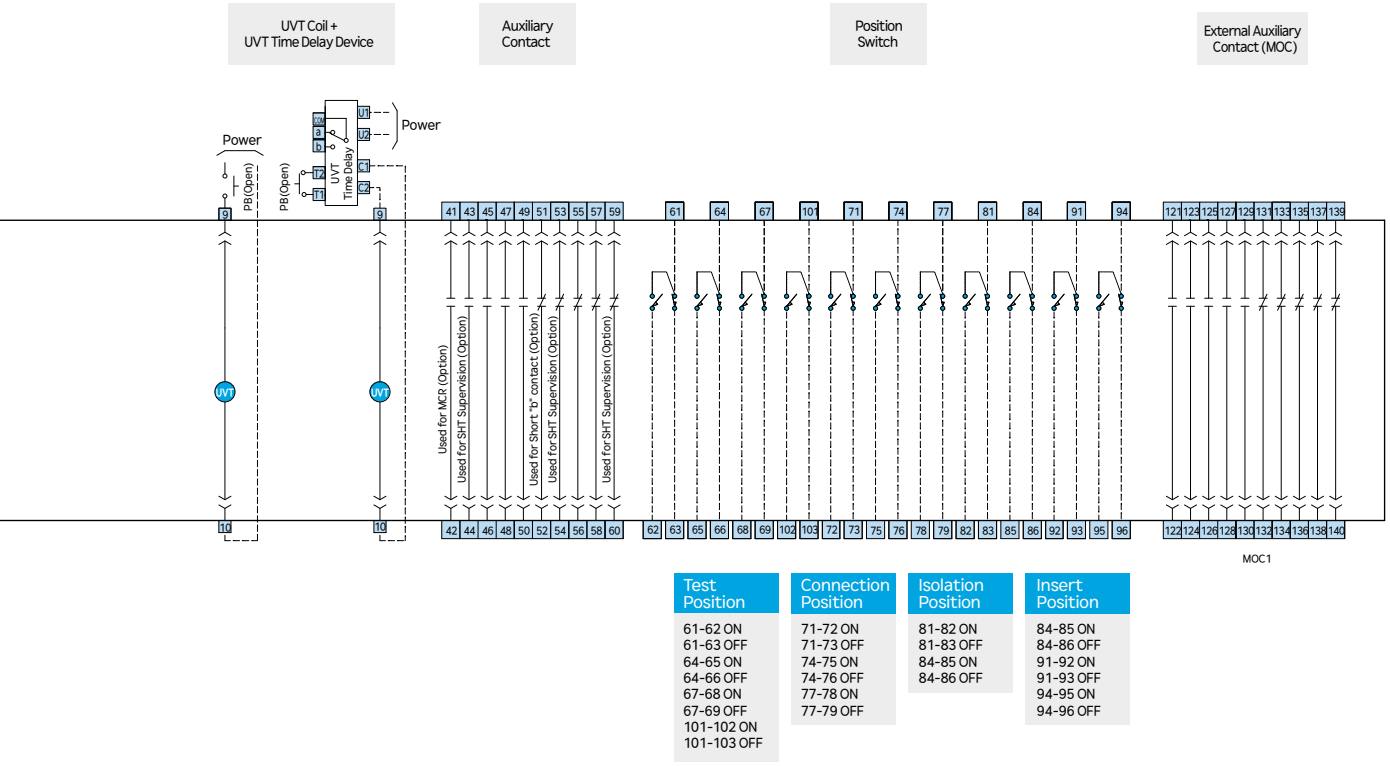
Terminal symbol

1 2	Charging motor power supply
3 4	Closing coil power supply
5 6	Remote Reset
7 8	Trip coil power supply
9 10	UVT Coil power supply
15 16	Spring charge switch
19 20	OCR control power supply
22 21	LTD contact
22 23	Standby/temperature alarm contact
22 24	Instantaneous/time-delay contact
22 26	Fault/leakage contact
27 28	ELT (CT/ZCT) input terminal
29 30	NCT (Neutral Current Transformer) input terminal
31 ~ 34	ZSI (Zone Selective Interlock)
35 36	Communication (RS485)
41 ~ 60	Auxiliary contact
61 ~ 93	Position switch

- RR : Remote Reset
- VM : Voltage Module
- VR ~ VN : Voltage phase input
- R ~ N : Current input
- Rn ~ Nn : Current input

Manufacturer's wiring ---- Customer's wiring Automatic connection (Draw-Out Type)

*Please refer to pages 31 to 34 for the circuit diagram according to the type of protective relay (OCR).

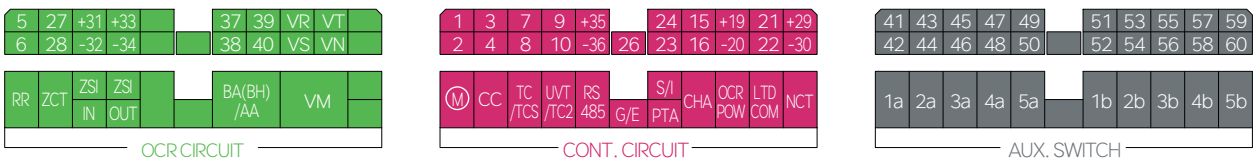


Test Position	Connection Position	Isolation Position	Insert Position
61-62 ON	71-72 ON	81-82 ON	84-85 ON
61-63 OFF	71-73 OFF	81-83 ON	84-86 OFF
64-65 ON	74-75 ON	84-85 ON	91-92 ON
64-66 OFF	74-76 OFF	84-86 OFF	91-93 OFF
67-68 ON	77-78 ON		94-95 ON
67-69 OFF	77-79 OFF		94-96 OFF
101-102 ON			
101-103 OFF			

Control Jack Lay-out (Auto Connection Type)

OCR													Operating					Auxiliary switch									
POW	OCR Contact					RR	N-CT	ZSI		COM	Temp		V Input		M	CC	TC	UVT	CHA	1a	2a	3a	4a	5a	1b	2b	3b	4b	5b
	COM	L	S/I	P/T	G/E																							
19	21		23		5	29	31		33	35	37		39	VR(27)	VT	1	3	7	9	15	41	43	45	47	49	51	53	55	57	59
20	22		24		26	6	30		32	34	36		38	40	VS(28)	VN	2	4	8	10	16	42	44	46	48	50	52	54	56	58	60
OCR Protection relay																Operating circuit					Auxiliary switch									

Control Jack Lay-out (Manual Connection Type)



Order Code

HGN Type

HGN	12	A	3	J	M2
Model Name	Rated Frame	Frame Category & Neutral Pole	No. of Poles	Mounting Method	Charging Motor Power

HGN	Air Circuit Breakers

6	630 A
8	800 A
10	1,000 A
12	1,250 A
16	1,600 A
20	2,000 A [1]

6	630 A
8	800 A
10	1,000 A
12	1,250 A
16	1,600 A
20	2,000 A
25	2,500 A
32	3,200 A
40	4,000 A

32	3,200 A
40	4,000 A
50	5,000 A

40	4,000 A
50	5,000 A
63	6,300 A

A	630 ~ 2,000 AF 3/4P Standard RST (N)
W	630 ~ 2,000 AF 4P Reverse Phase NRST
B	630 ~ 4,000 AF 3/4P Standard RST (N)
X	630 ~ 4,000 AF 4P Reverse Phase NRST
C	3,200 ~ 5,000 AF 3/4P Standard RST (N)
Y	3,200 ~ 5,000 AF 4P Reverse Phase NRST
D	4,000 ~ 6,300 AF 3/4P Standard RST (N)
Z	4,000 ~ 6,300 AF 4P Reverse Phase NRST

3	3 Pole
4	4 Pole

Independent Release of Draw-Out Type (Control Power) of Main Unit	
A	Auto Connection
J	Manual Connection
Fixed Type (Terminal Form)	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P [2]	Front Type and Mounting Type Selected by Customer
Draw-Out Type (Combined with Cradle)	
B	Auto Connection + Horizontal Type
C	Auto Connection + Vertical Type
D	Auto Connection + Upper Side : Horizontal / Lower Side : Vertical
E	Auto Connection + Upper Side : Vertical / Lower Side : Horizontal
G [2]	Auto Connection + Front Type/Mounting Type Selected by Customer
K	Manual Connection + Horizontal Type
M	Manual Connection + Vertical Type
N	Manual Connection + Upper : Horizontal/ Lower : Vertical
Q	Manual Connection + Upper Side : Vertical/ Lower Side : Horizontal
R [2]	Manual Connection + Front Type/Mounting Type Selected by Customer

M0	Manual Type
M1	AC/DC 110 V
M2	AC/DC 220 V
M7	DC 24 V
M8	DC 48 V
M9	DC 125 V

※ 1) A frame, 2,000 A is only available for vertical terminal bus bar arrangement.
2) P, G, R type of fixed terminal bus bar arrangement should be ordered per terminal and mounted personally. (Refer to the additional components). Applicable frames are A06 ~ 16, B06 ~ 32.
3) CT for Over-Current
- A/W Frame : 200 ~ 2,000 A
- B/X Frame : 400 ~ 4,000 A
- C/Y Frame : 3,200 ~ 5,000 A
- D/Z Frame : 4,000 ~ 6,300 A

4) When applying OCR high-end type P, H type, place an order for voltage module (HGNS VM) additionally for mounting.

C2

Closing Coil

C0	N/A
C1	AC/DC 110 V
C2	AC/DC 220 V
C3	AC 380 V
C4	AC 440 V
C7	DC 24 V
C8	DC 48 V
C9	DC 125 V

S2

Trip Coil

S0	N/A
S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V

Trip Supervision Coil

T1	AC/DC 110 V
T2	AC/DC 220 V
T3	AC 380 V
T4	AC 440 V
T7	DC 24 V
T8	DC 48 V
T9	DC 125 V

61

Over-Current Trip

	General Feeder
00	N/A
	50 Hz
50	GPR-LN
51	GPR-LA
52	GPR-LAG
54	GPR-LP [4]
55	GPR-LH [4]
	60 Hz
60	GPR-LN
61	GPR-LA
62	GPR-LAG
64	GPR-LP [4]
65	GPR-LH [4]
	Generator
	50 Hz
57	GPR-SN
58	GPR-SA
59	GPR-SP [4]
	60Hz
67	GPR-SN
68	GPR-SA
69	GPR-SP [4]

K

CT [3]

0	OCR N/A
O	200 A
V	320 A
E	400 A
T	630 A
H	800 A
J	1,000 A
K	1,250 A
L	1,600 A
M	2,000 A
N	2,500 A
P	3,200 A
Q	4,000 A
S	5,000 A
X	6,300 A

AB

Parts for Main Unit

	INST (UVT Coil)
U1	AC/DC 110 V
U2	AC/DC 220 V
U3	AC 380 V
U4	AC 440 V
U7	DC 24 V
U8	DC 48 V
U9	DC 125 V
	Secondary Trip Coil
S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V
AM	On/Off Button Lock Device
AA	Auxiliary Switch (Additional 1a 1b)
AB	Key Lock Device (Prevent ON)
B8	OCR MCR
BR	OCR Manual Reset Function
BA	OCR Manual Reset & Alarm S/W 1a1b
BH	CR Manual Reset + High Capacity Alarm S/W 1a
B0	Mechanical Interlock Device
B6	Spring Charge Switch
AG	Door Flange
BT	Closing Preparation Contact (B6 and CT cannot be Combined)
MR	Marine Switchgear
D0	Door Interlock

Parts Mounted on Cradle (Only Applicable when Placing an Order for Combination Type)

	Time Delay Type (UVT Coil + UVT Controller)
V1	AC/DC 110 V
V2	AC/DC 220 V
V3	AC 380 V
V4	AC 440 V
V9	DC 125 V
	Position S/W
AQ	Test 1C, Connected 1C
AR	Connected 2C
AS	Test 2C
AT	Isolated 1C, Inserted 1C
AU	Inserted 2C
AV	Isolated 2C
P4	Test 2C, Connected 2C
PT	Test 4C
PS	Isolated 1C, Test 1C, Connected 2C
PQ	Inserted 1C, Isolated 1C, Test 1C, Connected 1C
P8	Inserted 2C, Isolated 2C, Test 2C, Connected 2C
PR	Inserted 1C, Isolated 1C, Test 3C, Connected 3C
BC	Auto Connection Control Terminal's Safety Cover
MC	External Auxiliary Contact (MOC) 10a10b
AK	Short "b" Contact
AE	Safety Shutter
AX	Arc Shield
AF	Fixing Block
AW	Miss Insertion Preventer
TM	Temperature Sensor Bracket
	ATS Production
BAB7	Emergency Power Transfer
MR	Marine Switchgear

- U☐ is only applicable when instantaneous type and only the UVT coil is installed. When using time delay type, place a separate order for the time delay type of controller (HGNS ~) and install externally.
- V☐ is only applicable when time delay type is applied and the UVT coil is installed in the main unit while the time delay type of controller is installed at the side of the cradle. In case of dimension issues, place an order for HGNS V☐ for separate installation.
- B0 : The mechanical interlock device has to be ordered separately and when B0 is marked, only the components interlocked inside the main unit are assembled for release. (Refer to additional components).
- When S☐ Secondary trip is applied, UVT coil cannot be applied at the same time.
- When using T☐ trip coil monitoring contact, it becomes 4a3b and when using MCR function of B8 OCR, it can be used as 4a5b. When both functions are applied, 3a3b can be possible.
- In the order code for the main unit only (A/J/Fixed type), combination with cradle accessories is not possible and the cradle accessory arrangement is only possible when purchased with cradle arrangement. For the independent release of the main unit, place a separate order (HGNS ~) (refer to additional components).
- Position switch cannot be overlapped for use and can only be attached only at the right side of cradle. In case a combination other than the combination indicate is required, make an inquiry separately.
- Mechanical interlock device (B0), external auxiliary contact (MC), fixing block (AF) and Door Interlock (D0) cannot be used together.
- Mechanical interlock device (B0), external auxiliary contact (MC) and fixing block (AF) cannot be used together.
- BC : The control terminal's safety cover is only available for the auto connection.
- AK : Short "b" is only available for auto connection and is attached to 51, 52. It can be attached as much as the number of "B" contact so upon additional mounting, place a separate order (HGNS ~).
- AG : Originally, it is attached separately but upon release, the front cover is inserted when shipped.
- MR : AE, AG, AF, AM are attached as a standard option, so the relevant accessories are not marked separately.
- AA and BA (BH) cannot be attached at the same time.
- UVT and Secondary Trip Coil cannot be attached at the same time.

Order Code

HGN (When Placing an Order for the Cradle)

DHN	12	A	3	A	H	AE
Model Name	Rated Frame	Frame Category & Neutral Pole	No. of Poles	Control Terminal Connection	Terminal Bus Bar Arrangement	Accessories

Model Name	
DHN	Air Circuit Breakers Cradle

Rated Frame	
16	DHN06 ~ 16A (W)
20	DHN20A (W) 1)
25	DHN06 ~ 25B (X)
32	DHN32B (X)
40	DHN40B (X)
50	DHN32 ~ 50C (Y)
40	DHN40D (Z)
63	DHN50 ~ 63D (Z)

Frame Category & Neutral Pole	
A	630 ~ 1,600 A 3/4P Standard RSTN Reverse Phase NRST
B	630 ~ 4,000 A 3/4P Standard RSTN Reverse Phase NRST
C	3,200 ~ 5,000 A 3/4P Standard RSTN Reverse Phase NRST
D	4,000 ~ 6,300 A 3/4P Standard RSTN Reverse Phase NRST

No. of Poles	
3	3 Pole
4	4 Pole

Control Terminal Connection	
A	Auto Connection
J	Manual Connection

Terminal Bus Bar Arrangement	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P 2)	Front Type and Mounting Type Selected by Customer

Accessories	
AE	Safety Shutter

※ AE : Safety shutter lock is supplied with safety shutter.

※ Marking upon Shipping of Cradle
- DHN06/08/10/12/16A (W) > DHN06 ~ 16A (W)
- DHN20A (W) > DHN20A (W)
- DHN06/08/10/12/16/20/25B (X) > DHN06 ~ 25B (X)
- DHN32B (X) > DHN32B (X)
- DHN40B (X) > DHN40B (X)
- DHN32/40/50C (Y) > DHN32 ~ 50C (Y)
- DHN40/50D (Z) > DHN40 ~ 50D (Z)

※ 1) A frame, 2,000 A is only available for vertical terminal bus bar arrangement.
2) P type of fixed terminal bus bar arrangement should be ordered per terminal and mounted personally. (Refer to the additional components).
Applicable frames are A06 ~ 16, B06 ~ 32.

Order Code

HGS Type

HGS	12	A	3	J	M2
Model Name	Rated Frame	Frame Category & Neutral Pole	No. of Poles	Mounting Method	Charging Motor Power

HGS	Air Circuit Breakers

6	630 A
8	800 A
10	1,000 A
12	1,250 A
16	1,600 A
20	2,000 A
25	2,500 A
32	3,200 A

A	630 ~ 1,600 AF 3/4P Standard RST (N)
W	630 ~ 1,600 AF 4P Reverse Phase NRST
B	2,000 ~ 3,200 AF 3/4P Standard RST (N)
X	2,000 ~ 3,200 AF 4P Reverse Phase NRST

3	3 Pole
4	4 Pole

Independent Release of Draw-Out Type (Control Power) of Main Unit	
A	Auto Connection
J	Manual Connection
Fixed Type (Terminal Form)	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P [1)]	Front Type and Mounting Type Selected by Customer
Draw-Out Type (Combined with Cradle)	
B	Auto Connection + Horizontal Type
C	Auto Connection + Vertical Type
D	Auto Connection + Upper Side : Horizontal/ Lower Side : Vertical
E	Auto Connection + Upper Side : Vertical/ Lower Side : Horizontal
G [1)]	Auto Connection + Front Type/Mounting Type Selected by Customer
K	Manual Connection + Horizontal Type
M	Manual Connection + Vertical Type
N	Manual Connection + Upper Side : Horizontal/ Lower Side : Vertical
Q	Manual Connection + Upper Side : Vertical/ Lower Side : Horizontal
R [1)]	Manual Connection + Front Type/Mounting Type Selected by Customer

M0	Manual type
M1	AC/DC 110 V
M2	AC/DC 220 V
M5	DC 24 V
M6	DC 48 V
M9	DC 125 V

※ 1) P, G, R type of fixed terminal bus bar arrangement should be ordered per terminal and mounted personally. (Refer to the additional components).
2) O, V can only be applicable to frame A.
- B frame can be applied above 400 A of CT.
3) When applying LP type of OCR, place an order for the voltage module (HGNS VM) additional for mounting.

C2 — Closing Coil

C0	N/A
C1	AC/DC 110 V
C2	AC/DC 220 V
C3	AC 380 V
C4	AC 440 V
C7	DC 24 V
C8	DC 48 V
C9	DC 125 V

S2 — Trip Coil

S0	N/A
S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V

61 — Over-Current Trip

General Feeder	
00	N/A
50 Hz	
50	GPR-LN
51	GPR-LA
52	GPR-LAG
54	GPR-LP [3]
60 Hz	
60	GPR-LN
61	GPR-LA
62	GPR-LAG
64	GPR-LP [3]

K — CT [2]

0	OCR N/A
O	200 A
V	320 A
E	400 A
T	630 A
H	800 A
J	1,000 A
K	1,250 A
L	1,600 A
M	2,000 A
N	2,500 A
P	3,200 A

AB — Parts for Main Unit

INST (UVT Coil)	
U1	AC/DC 110 V
U2	AC/DC 220 V
U3	AC 380 V
U4	AC 440 V
U7	DC 24 V
U8	DC 48 V
U9	DC 125 V
Secondary Trip Coil	
S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V
AM	On/Off Button Lock Device
AA	Auxiliary Switch (Additional 1a 1b)
A5	Auxiliary Switch (Additional 5a 5b)
AB	Key Lock Device (Prevent ON)
B8	OCR MCR
BR	OCR Manual Reset Function
BA	OCR Manual Reset & Alarm S/W 1a1b
BH	CR Manual Reset + High Capacity Alarm S/W 1a
BT	Closing Preparation Contact (B6 and BT cannot be Applied Simultaneously (Overlapping Mounting)
B6	Spring Charge Switch
AG	Door Flange
A5	Auxiliary Switch (5 ~ 5b)

Parts Mounted on Cradle (Only Applicable when Placing an Order for Combination Type)

Time Delay Type (UVT Coil + UVT Controller)	
V1	AC/DC 110 V
V2	AC/DC 220 V
V3	AC 380 V
V4	AC 440 V
V9	DC 125 V
Position S/W	
AQ	Test 1C, Connected 1C
AR	Connected 2C
AS	Test 2C
AT	Isolated 1C, Inserted 1C
AU	Inserted 2C
AV	Isolated 2C
P4	Test 2C, Connected 2C
PT	Test 4C
PS	Isolated 1C, Test 1C, Connected 2C
PQ	Inserted 1C, Isolated 1C, Test 1C, Connected 1C
P8	Inserted 2C, Isolated 2C, Test 2C, Connected 2C
PR	Inserted 1C, Isolated 1C, Test 3C, Connected 3C
BC	Auto Connection Control Terminal's Safety Cover
AE	Safety Shutter
AX	Arc Shield
AF	Fixing Block

- U☐ is only applicable when instantaneous type and only the UVT coil is installed. When using time delay type, place a separate order for the time delay type of controller (HGNS ~) and install externally.
- V☐ is only applicable when time delay type is applied and the UVT coil is installed in the main unit while the time delay type of controller is installed at the side of the cradle. In case of dimension issues, place an order for HGNS V☐ for separate installation.
- When S☐ Secondary trip is applied, UVT coil cannot be applied at the same time.
- When using T☐ trip coil monitoring contact, it becomes 4a4b and when using MCR function of B8 OCR, it can be used as 4a5b. When both functions are applied, 3a4b can be possible.
- In the order code for the main unit only (A/J/Fixed type), combination with cradle accessories is not possible and the cradle accessory arrangement is only possible when purchased with cradle arrangement. For the independent release of the main unit, place a separate order (HGNS ~) (refer to additional components).
- Position switch cannot be overlapped for use and can only be attached only at the right side of cradle. In case a combination other than the combination indicate is required, make an inquiry separately.
- Mechanical interlock device (B0), external auxiliary contact (MC) and fixing block (AF) cannot be used together.
- BC : The control terminal's safety cover is only available for the auto connection.
- AK : Short "b" is only available for auto connection and is attached to 51, 52. It can be attached as much as the number of "B" contact so upon additional mounting, place a separate order (HGNS ~).
- AG : Originally, it is attached separately but upon release, the front cover is inserted when shipped.
- AA and BA (BH) cannot be attached at the same time.
- UVT and Secondary Trip Coil cannot be attached at the same time.

Order Code

HGN (When Placing an Order for the Cradle)

DHS	12	A	3	A	H	AE
Model Name	Rated Frame	Frame Category & Neutral Pole	No. of Poles	Control Terminal Connection	Terminal Bus Bar Arrangement	Accessories

Model Name	
DHS	Air Circuit Breakers Cradle

Rated Frame	
10	DHS06 ~ 10A (W)
16	DHS12 ~ 16A (W)
20	DHS20B (X)
25	DHS25B (X)
32	DHS32B (X)

Frame Category & Neutral Pole	
A	630 ~ 1,600 A 3/4P Standard RSTN Reverse Phase NRST
B	2,000 ~ 3,200 A 3/4P Standard RSTN Reverse Phase NRST

No. of Poles	
3	3 Pole
4	4 Pole

Control Terminal Connection	
A	Auto Connection
J	Manual Connection

Terminal Bus Bar Arrangement	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P [1)]	Front Type and Mounting Type Selected by Customer

Accessories	
AE	Safety Shutter

※ AE : Safety shutter lock is supplied with safety shutter.

※ Marking upon Shipping of Cradle
- DHS06/08/10A (W) > DHS06 ~ 16A (W)
- DHS12/16A (W) > DHS12 ~ 16A (W)
- DHS20B (X) > DHS20B (X)
- DHS25B (X) > DHS25B (X)
- DHS32B (X) > DHS32B (X)

※ 1) P type of fixed terminal bus bar arrangement should be ordered per terminal and mounted personally. (Refer to the additional components).
Applicable frames are A06 ~ 16, B06 ~ 32.

Order Code

HGN 1150V

HGN — Model Name

HGN	Air Circuit Breakers

12 — Rated Frame

6	630A
8	800A
10	1,000A
12	1,250A
16	1,600A
20	2,000A [1]
6	630A
8	800A
10	1,000A
12	1,250A
16	1,600A
20	2,000A
25	2,500A
32	3,200A
40	4,000A

A — Frame Category & Neutral Pole

P	630 ~ 2,000 AF 3/4P Standard RST (N)
S	630 ~ 2,000 AF 4P Reverse Phase NRST
Q	630 ~ 4,000 AF 3/4P Standard RST (N)
U	630 ~ 4,000 AF 4P Reverse Phase NRST

3 — No. of Poles

3	3 Pole
4	4 Pole

J — Mounting Method

Independent Release of Draw-Out Type (Control Power) of Main Unit	
A	Auto Connection
J	Manual Connection
Fixed Type (Terminal Form)	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P [2]	Front Type and Mounting Type Selected by Customer
Draw-Out Type (Combined with Cradle)	
B	Auto Connection + Horizontal Type
C	Auto Connection + Vertical Type
D	Auto Connection + Upper Side : Horizontal / Lower Side : Vertical
E	Auto Connection + Upper Side : Vertical / Lower Side : Horizontal
G [2]	Auto Connection + Front Type/Mounting Type Selected by Customer
K	Manual Connection + Horizontal Type
M	Manual Connection + Vertical Type
N	Manual Connection + Upper : Horizontal/ Lower : Vertical
Q	Manual Connection + Upper Side : Vertical/ Lower Side : Horizontal
R [2]	Manual Connection + Front Type/Mounting Type Selected by Customer

M2 — Charging Motor Power

M0	Manual Type
M1	AC/DC 110V
M2	AC/DC 220V
M7	DC 24V
M8	DC 48V
M9	DC 125V

※ 1) P frame, 2,000 A is only available for vertical terminal bus bar arrangement.
2) P, G, R type of fixed terminal bus bar arrangement should be ordered per terminal and mounted personally. (Refer to the additional components). Applicable frames are A06 ~ 16, B06 ~ 32.
3) CT for Over-Current
- P/S Frame : 200 ~ 2,000 A
- Q/U Frame : 400 ~ 4,000 A
4) When applying OCR high-end type P, H type, place an order for voltage module (HGNS VM) additionally for mounting.

C2 — Closing Coil

C0	N/A
C1	AC/DC 110 V
C2	AC/DC 220 V
C3	AC 380 V
C4	AC 440 V
C7	DC 24 V
C8	DC 48 V
C9	DC 125 V

S2 — Trip Coil

S0	N/A
S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V

Trip Supervision Coil

T1	AC/DC 110 V
T2	AC/DC 220 V
T3	AC 380 V
T4	AC 440 V
T7	DC 24 V
T8	DC 48 V
T9	DC 125 V

61 — Over-Current Trip

General Feeder	
00	N/A
50 Hz	
50	GPR-LN
51	GPR-LA
52	GPR-LAG
54	GPR-LP [4]
55	GPR-LH [4]
60 Hz	
60	GPR-LN
61	GPR-LA
62	GPR-LAG
64	GPR-LP [4]
65	GPR-LH [4]
Generator	
50 Hz	
57	GPR-SN
58	GPR-SA
59	GPR-SP [4]
60Hz	
67	GPR-SN
68	GPR-SA
69	GPR-SP [4]

K — CT [3]

0	OCR N/A
O	200 A
V	320 A
E	400 A
T	630 A
H	800 A
J	1,000 A
K	1,250 A
L	1,600 A
M	2,000 A
N	2,500 A
P	3,200 A
Q	4,000 A
S	5,000 A
X	6,300 A

AB — Parts for Main Unit

INST (UVT Coil)

U1	AC/DC 110 V
U2	AC/DC 220 V
U3	AC 380 V
U4	AC 440 V
U7	DC 24 V
U8	DC 48 V
U9	DC 125 V

Secondary Trip Coil

S1	AC/DC 110 V
S2	AC/DC 220 V
S3	AC 380 V
S4	AC 440 V
S7	DC 24 V
S8	DC 48 V
S9	DC 125 V

AM	On/Off Button Lock Device
AA	Auxiliary Switch (Additional 1a 1b)
AB	Key Lock Device (Prevent ON)
B8	OCR MCR
BR	OCR Manual Reset Function
BA	OCR Manual Reset & Alarm S/W 1a1b
BH	CR Manual Reset + High Capacity Alarm S/W 1a
B0	Mechanical Interlock Device
B6	Spring Charge Switch
AG	Door Flange
BT	Closing Preparation Contact (B6 and CT cannot be Combined)
MR	Marine Switchgear

AB — Parts Mounted on Cradle (Only Applicable when Placing an Order for Combination Type)

Time Delay Type (UVT Coil + UVT Controller)

V1	AC/DC 110 V
V2	AC/DC 220 V
V3	AC 380 V
V4	AC 440 V
V9	DC 125 V

Position S/W

AQ	Test 1C, Connected 1C
AR	Connected 2C
AS	Test 2C
AT	Isolated 1C, Inserted 1C
AU	Inserted 2C
AV	Isolated 2C
P4	Test 2C, Connected 2C
PT	Test 4C
PS	Isolated 1C, Test 1C, Connected 2C
PQ	Inserted 1C, Isolated 1C, Test 1C, Connected 1C
P8	Inserted 2C, Isolated 2C, Test 2C, Connected 2C
PR	Inserted 1C, Isolated 1C, Test 3C, Connected 3C
BC	Auto Connection Control Terminal's Safety Cover
MC	External Auxiliary Contact (MOC) 10a10b
AK	Short "b" Contact
AE	Safety Shutter
AX	Arc Shield
AF	Fixing Block
AW	Miss Insertion Preventer
TM	Temperature Sensor Bracket

ATS Production

BAB7	Emergency Power Transfer
MR	Marine Switchgear

- U☐ is only applicable when instantaneous type and only the UVT coil is installed. When using time delay type, place a separate order for the time delay type of controller (HGNS ~) and install externally.
- V☐ is only applicable when time delay type is applied and the UVT coil is installed in the main unit while the time delay type of controller is installed at the side of the cradle. In case of dimension issues, place an order for HGNS V☐ for separate installation.
- B0 : The mechanical interlock device has to be ordered separately and when B0 is marked, only the components interlocked inside the main unit are assembled for release. (Refer to additional components).
- When S☐ Secondary trip is applied, UVT coil cannot be applied at the same time.
- When using T☐ trip coil monitoring contact, it becomes 4a3b and when using MCR function of B8 OCR, it can be used as 4a5b. When both functions are applied, 3a3b can be possible.
- In the order code for the main unit only (A/J/Fixed type), combination with cradle accessories is not possible and the cradle accessory arrangement is only possible when purchased with cradle arrangement. For the independent release of the main unit, place a separate order (HGNS ~) (refer to additional components).
- Position switch cannot be overlapped for use and can only be attached only at the right side of cradle. In case a combination other than the combination indicate is required, make an inquiry separately.
- Mechanical interlock device (B0), external auxiliary contact (MC) and fixing block (AF) cannot be used together.
- BC : The control terminal's safety cover is only available for the auto connection.
- AK : Short "b" is only available for auto connection and is attached to 51, 52. It can be attached as much as the number of "B" contact so upon additional mounting, place a separate order (HGNS ~).
- AG : Originally, it is attached separately but upon release, the front cover is inserted when shipped.
- MR : AE, AG, AF, AM are attached as a standard option, so the relevant accessories are not marked separately.
- AA and BA (BH) cannot be attached at the same time.
- UVT and Secondary Trip Coil cannot be attached at the same time.

Order Code

HGN 1150V (When Placing an Order for the Cradle)

DHS	12	A	3	A	H	AE
Model Name	Rated Frame	Frame Category & Neutral Pole	No. of Poles	Control Terminal Connection	Terminal Bus Bar Arrangement	Accessories

Model Name	
DHS	Air Circuit Breakers Cradle

Rated Frame	
16	DHN06 ~ 16P (S)
20	DHN20P (S) [1]
25	DHN06 ~ 25Q (U)
32	DHN32Q (U)
40	DHN40Q (U)

Frame Category & Neutral Pole	
p	630 ~ 1,600 A 3/4P Standard RSTN Reverse Phase NRST
q	630 ~ 4,000 A 3/4P Standard RSTN Reverse Phase NRST

No. of Poles	
3	3 Pole
4	4 Pole

Control Terminal Connection	
A	Auto Connection
J	Manual Connection

Terminal Bus Bar Arrangement	
H	Horizontal Type
V	Vertical Type
T	Upper Side : Horizontal/ Lower Side : Vertical
L	Upper Side : Vertical/ Lower Side : Horizontal
P [1]	Front Type and Mounting Type Selected by Customer

Accessories	
AE	Safety Shutter

※ AE : Safety shutter lock is supplied with safety shutter.

※ Marking upon Shipping of Cradle
- ·DHS06/08/10A (W) > DHS06 ~ 16A (W)
- ·DHS12/16A (W) > DHS12 ~ 16A (W)
- ·DHS20B (X) > DHS20B (X)
- ·DHS25B (X) > DHS25B (X)
- ·DHS32B (X) > DHS32B (X)

※ 1) P frame 2,000A is only implementable for vertical terminals.
2) Fixed connection terminals P type are customer-installed after separate ordering. (Refer to separate shipping item)
Applicable frames are only applicable for P06 ~ 16, Q06 ~ 32.
3) Arc shield is provided as a complimentary for P, Q frames.

Order Code

Accessories

Name of Accessory	Order Form		Detailed Specification	Release Form	Page
	Mounted	Sold Separately			
Terminal Bus Bar [1] (Draw-Out Type)	-	HGNS HVA3	Up-Down Horizontal/Up-Down Vertical (A, P Frame, 06 ~ 16A 3P)	Sold Separately	-
	-	HGNS HVA4	Up-Down Horizontal/Up-Down Vertical (A, P Frame, 06 ~ 16A 4P)		
	-	HGNS HVB3	Up-Down Horizontal/Up-Down Vertical (B, Q Frame, 06 ~ 32B 3P)		
	-	HGNS HVB4	Up-Down Horizontal/Up-Down Vertical (B, Q Frame, 06 ~ 32B 4P)		
	-	HGNS FRA3	Up-Down Front 6 ea (A, P Frame, 06 ~ 16A 3P)		
	-	HGNS FRA4	Up-Down Front 8 ea (A, P Frame, 06 ~ 16A 4P)		
	-	HGNS FRB3	Up-Down Front 6 ea (B, Q Frame, 06 ~ 32B 3P)		
	-	HGNS FRB4	Up-Down Front 8 ea (B, Q Frame, 06 ~ 32B 4P)		
	-	HGNS FHVA3	Up-Down Front 3 ea + Horizontal/Vertical 3 ea 06 ~ 16A 3P		
	-	HGNS FHVA4	Up-Down Front 4 ea + Horizontal/Vertical 4 ea 06 ~ 16A 4P		
	-	HGNS FHVB3	Up-Down Front 3 ea + Horizontal/Vertical 3 ea 06 ~ 32B 3P		
	-	HGNS FHVB4	Up-Down Front 4 ea + Horizontal/Vertical 4 ea 06 ~ 32B 4P		
Terminal Bus Bar [2] (Fixed Type)	-	HGNS FRA3F	Up-Down Front 6 ea (A Frame, 06 ~ 16A 3P) + Additional Spacer 6	Sold Separately	-
	-	HGNS FRA4F	Up-Down Front 8 ea (A Frame, 06 ~ 16A 4P) + Additional Spacer 8		
	-	HGNS FRB3F	Up-Down Front 6 ea (B Frame, 06 ~ 32B 3P) + Additional Spacer 6		
	-	HGNS FRB4F	Up-Down Front 8 ea (B Frame, 06 ~ 32B 4P) + Additional Spacer 8		
	-	HGNS FHVA3F	Up-Down Front 3 ea + Horizontal/Vertical 3 ea 06 ~ 16A 3P + Additional Spacer 3		
	-	HGNS FHVA4F	Up-Down Front 4 ea + Horizontal/Vertical 4 ea 06 ~ 16A 4P + Additional Spacer 4		
	-	HGNS FHVB3F	Up-Down Front 3 ea + Horizontal/Vertical 3 ea 06 ~ 32B 3P + Additional Spacer 3		
	-	HGNS FHVB4F	Up-Down Front 4 ea + Horizontal/Vertical 4 ea 06 ~ 32B 4P + Additional Spacer 4		
Auxiliary Switch [3]	MC	HGNS MOC	External Auxiliary Contact 10a10b (Mechanical Opearting Cell Switch)	Mounted upon Release and Sold Separately	-
Automatic Connection Control Terminal Protection Cover	BC	HGNS BC	Automatic Connection Control Terminal Cover (Cannot be Mounted on Fixed Type, Manual Connection Type)	Mounted upon Release and Sold Separately	-
Manual Connector	J	HGNS MCJ	Manual Control Plug	Sold Separately	-
Manual Connector Lead Wire	J	HGNS MWIRE	Manual Connector Lead Wire	Mounted upon Release and Sold Separately	-
Condenser Trip Device	-	HGNS CTD1	AC 110 V	Sold Separately	-
	-	HGNS CTD2	AC 220 V		
UVT Time Delay Module [4]	-	HGNS UT1	AC/DC 110 V & DC 125 V	Sold Separately	-
	-	HGNS UT2	AC/DC 220 V		
	-	HGNS UT3	AC 380 V		
	-	HGNS UT4	AC 440 V		
	-	HGNS UT9	AC/DC 110 V & DC 125 V		
UVT Time Delay Module + UVT Coil	V1	HGNS V1	AC/DC 110 V	Mounted upon Release and Sold Separately	-
	V2	HGNS V2	AC/DC 220 V		
	V3	HGNS V3	AC 380 V		
	V4	HGNS V4	AC 440 V		
	V9	HGNS V9	DC 125 V		
OCR Acce	-	HGNS OC	OCR Portable Checker	Sold Separately	-
	-	HGNS HROC	Higher OCR Checker		
	-	HGNS VM	Voltage Module		

※ 1) Only the terminal bus bar (Draw-out type) A, P frame 630 ~ 1,600A/B, Q frame 2,000 ~ 3,200 A-draw-out type can be ordered.
2) Only the terminal bus bar (Fixed type) A, P frame 630 ~ 1,600A/B, Q frame 2,000 ~ 3,200 A-fixed type can be ordered.
3) Contact us when placing an order for set order required for installation.
4) UVT time delay type of controller is mounted outside the main unit or the cradle.

Name of Accessory	Order Form		Detailed Specification	Release Form	Page
	Mounted	Sold Separately			
Key Lock	AB	HGNS AB	Key Lock	Mounted upon Release and Sold Separately	-
Safety Shutter	AE	HGNS AEA3	06A3 ~ 20A3, 06P3 ~ 20P3	Mounted upon Release and Sold Separately	-
		HGNS AEA4	06A4 ~ 20A4, 06P4 ~ 20P4		
		HGNS AEB3	20B3 ~ 40B3, 20Q3 ~ 40Q3		
		HGNS AEB4	20B4 ~ 40B4, 20Q4 ~ 40Q4		
		HGNS AEC3	32C3 ~ 50C3		
		HGNS AEC4	32C4 ~ 50C4		
		HGNS AED3	40D3 ~ 63D3		
		HGNS AED4	40D4 ~ 63D4		
Fixing Block	AF	HGNS AF	For Main Unit + Cradle	Mounted upon Release and Sold Separately	-
		HGNS AFB	For Main Unit + Cradle	Sold Separately	-
		HGNS AFC	For Cradle		
Position Switch [5]	AQ	HGNS AQ	Test 1C, Connected 1C	Mounted upon Release and Sold Separately	-
	AR	HGNS AR	Connected 2C		
	AS	HGNS AS	Test 2C		
	AT	HGNS AT	Isolated 1C, Inserted 1C		
	AU	HGNS AU	Inserted 2C		
	AV	HGNS AV	Isolated 2C		
	P4	HGNS P4	Test 2C, Connected 2C		
	PS	HGNS PS	Isolated 1C, Test 1C, Connected 2C		
	PT	HGNS PT	Test 4C		
	PQ	HGNS PQ	Inserted 1C, Isolated 1C, Test 1C, Connected 1C		
	P8	HGNS P8	Inserted 2C, Isolated 2C, Test 2C, Connected 2C		
	PR	HGNS PR	Inserted 1C, Isolated 1C, Test 3C, Connected 3C		
	PU	HGNS PU	Test 4C, Connected 4C		
Miss Insertion Preventor	AW	HGNS AW	Add Order Form in the Main Unit + Cradle, Main Unit/Cradle Respectively	Mounted upon Release and Sold Separately	-
Arc Shield	AX	HGNS AXA3	06A3 ~ 20A3	Mounted upon Release and Sold Separately	-
		HGNS AXA4	06A4 ~ 20A4		
		HGNS AXB3	20B3 ~ 40B3		
		HGNS AXB4	20B4 ~ 40B4		
		HGNS AXC3	32C3 ~ 50C3		
		HGNS AXC4	32C4 ~ 50C4		
		HGNS AXD3	40D3 ~ 63D3		
		HGNS AXD4	40D4 ~ 63D4		
Mech Interlock [6]	-	HGNS DWB1	Drawout (Fixed)/Wire Type 2 Way MI	Sold Separately	-
	-	HGNS DWB2	Drawout (Fixed)/Wire Type 3 Way MI		
	-	HGNS FWB1	Fixed/Wire Type 2 Way MI		
	-	HGNS FWB2	Fixed/Wire Type 3 Way MI		
	-	HGNS DWB1A	A, P Frame, Draw-Out Type, Wire Type 2 Way MI + Interlock Parts (B0)		
	-	HGNS DWB2A	A, P Frame, Draw-Out Type, Wire Type 3 Way MI + Interlock Parts (B0)		
	-	HGNS DWB1B	B, Q Frame, Draw-Out Type, Wire Type 2 Way MI + Interlock Parts (B0)		
	-	HGNS DWB2B	B, Q Frame, Draw-Out Type, Wire Type 3 Way MI + Interlock Parts (B0)		

※ 5) Position switch cannot be used together and can only be mounted at the right side of the cradle.
For position switches, because they are common parts with the U-Series product, the position switch may be marked "UANS".
6) Mechanical interlock is a wire type. The MI unit is mounted outside the main unit or on the cradle and the interlock part is mounted inside the main unit.

Order Code

Accessories

Name of Accessory	Order Form		Specification	Release Form	Page
	Mounted	Sold Separately			
Mech Interlock [6)]	-	HGNS DWB1C3	C Frame 3P, Draw-Out Type, Wire Type 2way MI + Interlock Parts (B0)	Sold Separately	-
	-	HGNS DWB1C4	C Frame 4P, Draw-Out Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS DWB2C3	C Frame 3P, Draw-Out Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS DWB2C4	C Frame 4P, Draw-Out Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS DWB1D3	DFrame 3P, Draw-Out Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS DWB1D4	DFrame 4P, Draw-Out Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS DWB2D3	DFrame 3P, Draw-Out Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS DWB2D4	DFrame 4P, Draw-Out Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB1A	A, P Frame, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB2A	A, P Frame, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB1B	B, Q Frame, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB2B	B, Q Frame, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB1C3	C Frame 3P, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB1C4	C Frame 4P, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB2C3	C Frame 3P, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB2C4	C Frame 4P, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB1D3	DFrame 3P, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB1D4	DFrame 4P, Fixed Type, Wire Type 2way MI + Interlock Parts (B0)		
	-	HGNS FWB2D3	DFrame 3P, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	-	HGNS FWB2D4	DFrame 4P, Fixed Type, Wire Type 3way MI + Interlock Parts (B0)		
	BO	HGNS B0DA	A, P Frame Interlock Parts (B0)	Mounted upon Release and Sold Separately	-
		HGNS B0DB	B, Q Frame Interlock Parts (B0)		
		HGNS B0DC3	C Frame 3P Interlock Parts (B0)		
		HGNS B0DC4	C Frame 4P Interlock Parts (B0)		
		HGNS B0DD3	DFrame 3P Interlock Parts (B0)		
		HGNS B0DD4	DFrame 4P Interlock Parts (B0)		
		HGNS B0FA	A, P Frame Interlock Parts (B0) + Fixed Bracket		
		HGNS B0FB	B, Q Frame Interlock Parts (B0) + Fixed Bracket		
		HGNS B0FC3	C Frame 3P Interlock Parts (B0) + Fixed Bracket		
		HGNS B0FC4	C Frame 4P Interlock Parts (B0) + Fixed Bracket		
		HGNS B0FD3	DFrame 3P Interlock Parts (B0) + Fixed Bracket		
		HGNS B0FD4	DFrame 4P Interlock Parts (B0) + Fixed Bracket		
Temperature Sensor Bracket	-	HGNS TMSUPA3	A, P Frame 3P, Temperature Sensor Bracket	Mounted upon Release and Sold Separately	-
	-	HGNS TMSUPA4	A, P Frame 4P, Temperature Sensor Bracket		
	-	HGNS TMSUPB3	B, Q Frame 3P, Temperature Sensor Bracket		
	-	HGNS TMSUPB4	B, Q Frame 4P, Temperature Sensor Bracket		
	-	HGNS TMSUPC3	C Frame 3P, Temperature Sensor Bracket		
	-	HGNS TMSUPC4	C Frame 4P, Temperature Sensor Bracket		
	-	HGNS TMSUPD3	D Frame 3P, Temperature Sensor Bracket		
	-	HGNS TMSUPD4	D Frame 4P, Temperature Sensor Bracket		
Neutral CT	-	HGNS NCT_T	T = 630A/Inner Diameter 80	Sold Separately	-
	-	HGNS NCT_H	NCT H = 800A/Inner Diameter 80		
	-	HGNS NCT_J	NCT J = 1,000A/Inner Diameter 80		
	-	HGNS NCT_K	NCT K = 1,250A/Inner Diameter 80		
	-	HGNS NCT_L	NCT L = 1,600A/Inner Diameter 80		
	-	HGNS NCT_M	NCT M = 2,000A/Inner Diameter 135		
	-	HGNS NCT_N	NCT N = 2,500A/Inner Diameter 135		
	-	HGNS NCT_P	NCT P = 3,200A/Inner Diameter 135		
	-	HGNS NCT_Q	NCT Q = 4,000A/Inner Diameter 200		
	-	HGNS NCT_S	NCT S = 5,000A/Inner Diameter 200		
	-	HGNS NCT_X	NCT×= 6,300A/Inner Diameter 200		

※6) Mechanical interlock is a wire type. The MI unit is mounted outside the main unit or on the cradle and the interlock part is mounted inside the main unit.

Name of Accessory	Order Form		Detailed Specification	Release Form	Page
	Mounted	Sold Separately			
Door Flange	AG	HGNS AG	IP30	Mounted upon Release and Sold Separately	-
Dust Cover	-	HGNS DC	IP52	Sold Separately	-
Test Jumper	-	HGNS AJ	For Automatic Connection Type of Test	Sold Separately	-
Short "B" Contact	AK	HGNS AK	Short Circuit "B" Contact	Mounted upon Release and Sold Separately	-
Lifting LUG	-	HGNS AL	2 ea = 1 set, C Frame 5,000 A is Provided as Standard	Sold Separately	-
On/Off Button Lock	AM	HGNS AM	On/Off Button Cover Lock	Sold Separately	-
Insulation Barrier	-	HGNS PBAR	Insulation Barrier	Sold Separately	-
Draw In-Out Handle	-	HGNS LHANDLE	Long Head Type Draw In-Out Handle	Sold Separately	-
	-	HGNS UHANDLE	Universal Join Head Draw In-Out Handle		
	-	HGNS THANDLE	T Grip Long Type Draw In-Out Handle		
	-	HGNS HANDLE	Standard Draw In-Out Handle		
Door Interlock	-	HGNS DDI	Draw-out type Door Interlock external attachment Kit Only	Sold Separately	-
	-	HGNS FDI	Fixed type Door Interlock external attachment Kit Only	Sold Separately	-
	-	HGNS DDIAC	Draw-out type Door Interlock external attachment Kit + A, C, P Frame internal interlock components (D0)	Sold Separately	-
	-	HGNS DDIBD	Draw-out type Door Interlock external attachment Kit + B, D, Q Frame internal interlock components (D0)	Sold Separately	-
	-	HGNS FDIAC	Fixed type Door Interlock external attachment Kit + A, C, P Frame internal interlock components (D0)	Sold Separately	-
	-	HGNS FDIBD	Fixed type Door Interlock external attachment Kit + B, D, Q Frame internal interlock components (D0)	Sold Separately	-

Handling and maintenance inspection

Standard Operation Conditions

| Ambient Temperature | -5 ~ +40 °C
(Daily average temperature of below 35 °C)
| Altitude | Below 2,000 m above sea level
| Relative Humidity | Below 85 % (Below daily average of 85 %)

The surrounding environment may affect the insulation performance and durability of the circuit break so the operation conditions must be checked clearly before application.



In case of operating in high ambient temperature exceeding 40 °C, use according to the derating calibrated depending on the ambient temperature indicated in the catalogue.



In case of operating in places with high humidity and frequent rain, the insulation or electrical performance may drop.



In case of storing and using in places with a lot of dust and humidity, the use of a dust cover or dehumidifier is recommended. Excessive impact and vibration may cause damage in the operation mechanism.



When storing circuit breaker without electric circuit : -25 °C ~ 85 °C
When storing circuit breaker with electric circuit : -15 °C ~ 70 °C
After storing in low temperature, store for more than 8 hours in room temperature then store in an open location for the type with charging motor.



In case there is a lot of corrosive gas, it must be stored in an enclosed protective structure to minimize damage.



In case of highland with high altitude, the insulation performance drops so please apply the highest rating product after checking the insulation performance calibration coefficient.

Special Operating Conditions

The HG-Series air circuit breaker has been designed/manufactured to operate in a standard operating environment designated by the IEC standard and in case of operating the circuit breaker in the following special environment, contact our company.

- In case the altitude above sea level and the ambient temperature exceeds the standard operating environment
- In case of a region with a lot of sea wind or salinity
- In case of a region with snow and freezing
- In case of a region of frequent shock and vibration
- In case the relative humidity exceeds the standard operating environment
- In case of a region with a lot of humidity and frequent rainfall
- In case of a region with a lot of dust, vapor, corrosive and combustible gas, wet steam
- In other special environment that exceeds the standard environment

※ Special operating environment and condition may cause damage in the product (Increase in resistance at main circuit, rust, change in coating).

Maintenance inspection

Regular Inspection

Inspection Form	Inspection Item			Inspection Period
	Main Review Item	Details and Countermeasures		
General Regular Inspection	Foreign Substance	Visual examination must be executed and there must be no foreign substance inside. Blow away the foreign substance using compressed air.		Every 6 months
	Gap	Execute visual examination and there must be no cracks or gaps.		Replace, repair
	Operation	Circuit breaker must be closed manually to inspect the operation area during normal status.		Once a year
	Greasing	Apply an adequate amount of grease on each pin, axle and bearing. Excessive greasing may cause dust and stain from building up. Electrical grease : HITALWBE 28G Lubricant grease : Kamro Chemical/CHEMAX HHI 5000#1.		Every 6 months
	Spring Type	The status of the spring must be checked to inspect the damaged area.		Replace, repair
	Screw/Bolt Type	Tighten loose areas using screw or bolt.		Every 6 months
	Stain on the Fastening Bolt Area	There must be no dust or stain at the fastening area. Wipe the area well using clean cloth dipped in alcohol.		All the time
Mechanical Durability Warranty Lifespan Inspection (Based on IEC60947 standard)	Below 2,500 AF	Total operation frequency : 3,000 times	Non-current 2,500 time, current 500 time	Paid inspection is required (Precision inspection) Inspection period : At least 6 months after exceeding the opening/closing frequency Precision inspection once a year is recommended Contact our company to determine is replacement is required
		Open/closing frequency : 500 times	Open/close within the range of rated current	
		Open/closing frequency : 25 times	Open/close in over-load (Around 6 times the rated current) area	
		Immediately upon breaking	Prevent short-circuit/earth fault	
	Above 3,200 AF	Open/close frequency : 2,000 times	Non-current 1,500 time, current 500 time	
		Open/close cycle : 500 times	Open/close within the range of rated current	
		Open/close cycle : 25 times	Open/close in over-load (Around 6 times the rated current) area	
		Immediately upon breaking	Prevent short-circuit/earth fault	
Arc Chamber (Grid)	Contact with Foreign Substance	In case foreign substance has melted onto the grid's side plate, replace the ionized pieces inside the arc chamber and others.		Replace, contact our company
Arc Contact	Contact Tip Surface	Remove foreign substance, dust and oil.		Visual inspection, no problem Replace, contact our company
		Melting stains on the contact tip surface is caused by open/closing arc.		
		In case the extent of melting caused by arc reduces to 1/3, replace the entire operation and fixing moving contact unit.		
		However, in case there is foreign substance on the contact, precision diagnosis is required to determine if replacement is necessary through our company's paid service.		
Main Contact	Damage of Main Contact	In case the main contact has been worn off and is rough, the surface must be managed neatly.		At all times
		However, in case there is foreign substance on the contact, precision diagnosis is required to determine if replacement is necessary through our company's paid service.		

⚠ Caution

1. In the event the contact or part is replaced, turn the circuit breaker off and replace after drawing out the disconnected position to isolated.
2. Execute the inspection work after checking whether the remaining heat in the conduction part has been dissipated. It may cause burns.
3. When rubbing the contact tip, ensure that the sludge does not enter the circuit breaker's mechanical device. After rubbing, wipe the contact tip neatly.
4. Please refer to the instruction manual for detailed information when disassembling and assembling.

Approvals & Certificates Status

Approvals & Certificates

ACB

● : Acquired
◎ : In Progress (Expected)

Type of Certification	Approvals				
Type of Standard	KS	IEC	IEC	ANSI	ANSI
Mark					
Testing Institute	KS	CE	DEKRA	KEPIC	KERI
Certification Country	Korea	Europe	Netherlands	Korea	Korea
HGN06 A Frame	●	●	●		
HGN08 A Frame	●	●	●		
HGN10 A Frame	●	●	●		
HGN12 A Frame	●	●	●		
HGN16 A Frame	●	●	●		
HGN20 A Frame	●	●	●		
HGN06 B Frame	●	●	●		
HGN08 B Frame	●	●	●		
HGN10 B Frame	●	●	●		
HGN12 B Frame	●	●	●		
HGN16 B Frame	●	●	●		
HGN20 B Frame	●	●	●		
HGN25 B Frame	●	●	●		
HGN32 B Frame	●	●	●		
HGN40 B Frame	●	●	●		
HGN32 C Frame	●	●	●		
HGN40 C Frame	●	●	●		
HGN50 C Frame	●	●	●		
HGN40 D Frame		●	●		
HGN50 D Frame		●	●		
HGN63 D Frame		●	●		
HGN16 E Frame				●	
HGN20 F Frame				●	
HGN32 F Frame				●	
HGN40 G Frame				●	
HGN16 L Frame				●	
HGN25 M Frame				●	
HGN32 N Frame				●	
HGS06 A Frame	●	●	●		
HGS08 A Frame	●	●	●		
HGS10 A Frame	●	●	●		
HGS12 A Frame	●	●	●		
HGS16 A Frame	●	●	●		
HGS20 B Frame	●	●	●		
HGS25 B Frame	●	●	●		
HGS32 B Frame	●	●	●		

Approvals & Marine Certificates

ACB

● : Acquired
◎ : In Progress (Expected)

Type of Certification	Vessel								
Type of Standard	Korea	U.K	U.S.A	France	Japan	Germany	Germany	Italy	Russia
Mark	KR KOREAN REGISTER	Lloyd's Register	ABS	BUREAU VERITAS	ClassNK	GL OPERATING 24/7	DNV	RINA	RMRS
Testing Institute	KR	LR	ABS	BV	NK	GL	DNV	RINA	RMRS
Certification Country	Korea	U.K.	USA	France	Japan	Germany	Germany	Italy	Russia
HGN06 A Frame	●	●	●	●	●	●	●	●	●
HGN08 A Frame	●	●	●	●	●	●	●	●	●
HGN10 A Frame	●	●	●	●	●	●	●	●	●
HGN12 A Frame	●	●	●	●	●	●	●	●	●
HGN16 A Frame	●	●	●	●	●	●	●	●	●
HGN20 A Frame	●	●	●	●	●	●	●	●	●
HGN08 B Frame	●	●	●	●	●	●	●	●	●
HGN10 B Frame	●	●	●	●	●	●	●	●	●
HGN12 B Frame	●	●	●	●	●	●	●	●	●
HGN16 B Frame	●	●	●	●	●	●	●	●	●
HGN20 B Frame	●	●	●	●	●	●	●	●	●
HGN32 B Frame	●	●	●	●	●	●	●	●	●
HGN40 B Frame	●	●	●	●	●	●	●	●	●
HGN32 C Frame	●	●	●	●	●	●	●	●	●
HGN40 C Frame	●	●	●	●	●	●	●	●	●
HGN50 C Frame	●	●	●	●	●	●	●	●	●
HGN40 D Frame	●	●	●	●	●	●	●	●	●
HGN50 D Frame	●	●	●	●	●	●	●	●	●
HGN63 D Frame	●	●	●	●	●	●	●	●	●
HGS06 A Frame									
HGS08 A Frame									
HGS10 A Frame									
HGS12 A Frame									
HGS16 A Frame									
HGS20 B Frame									
HGS25 B Frame									
HGS32 B Frame									

HG

Molded Case Circuit Breakers & Earth Leakage Circuit Breakers

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MCCB

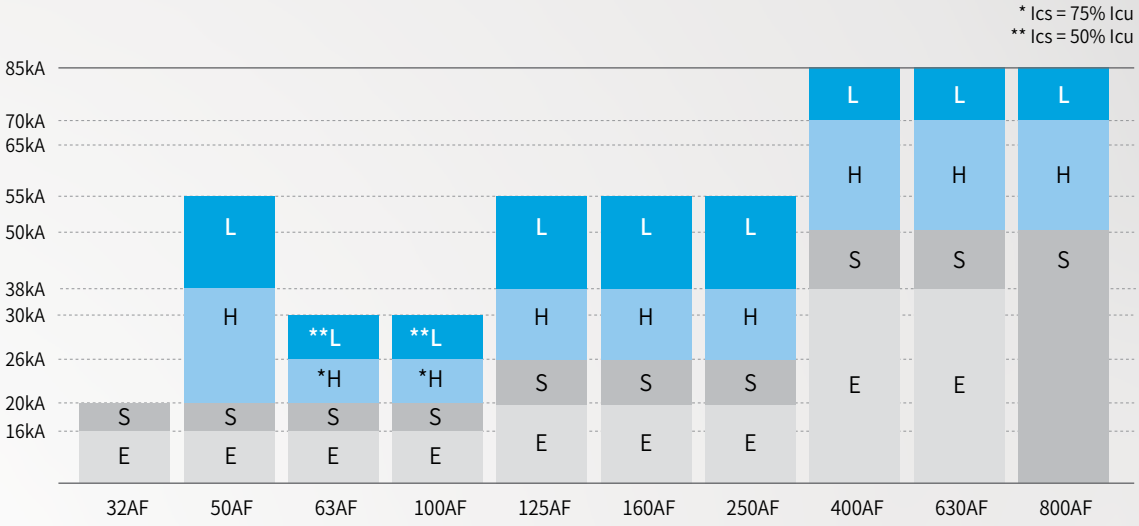
HG Series

Molded Case Circuit Breakers & Earth Leakage Circuit Breakers

Maximized selectivity and safety with wide product range and reinforced breaking performance!



Rated Short-Circuit Current by AF, (Ics = 100 % Icu at 440/460 V)



Wide Product Range

HGM/HGE 32 AF ~ 800 AF

High Breaking Capacity

16 kA ~ 85 kA (at 460 V), Ics = 100 % Icu

Rated Insulation Voltage of 1,000 V

Reinforcement of Protective Coordination

It enables selective breaking.

Adjustable Rated Current (Molded Case Circuit Breaker)

32 ~ 250 AF : 0.8 - 0.9 - 1 Times the Rated Current

400 ~ 800 AF : 0.63 - 0.8 - 1 Times the Rated Current

Adjustable Residual Current (Earth Leakage Circuit Breaker)

100 - 300 - 500 - 1,000 (mA)

Adjustable Residual Current's Non-Operation Hour (Earth Leakage Circuit Breaker)

0 - 200 - 500 - 1,000 (ms)



Molded Case Circuit Breakers



Earth Leakage Circuit Breakers

Characteristics

Enhanced Performance and Various Selectivity

Various Range of Products : 10 Frames, 32 ~ 800 AF

Compatible MCCB, ELCB Dimensions and Common Use of Accessories

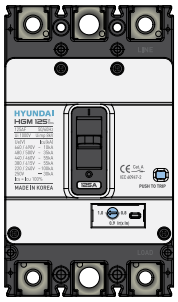
Standardization of Product Depth per Frame : 32 ~ 250 AF (68 mm), 400 ~ 800 AF (110 mm)



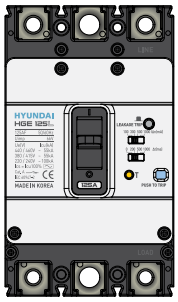




32, 50, 63, 100 AF	50, 125 AF	160, 250 AF



MCCB



ELCB



400 AF



630, 800 AF

Unit : mm

Characteristics

HGM Molded Case Circuit Breaker

Maximized Insulation Performance

The safety of the product has been maximized through enhanced insulation voltage

- Rated Insulation Voltage, Ui : 1,000 V
- Rated Impulse Withstand Voltage, Uimp : 8 kV

High Breaking Capacity

Maximum breaking capacity was realized with high breaking capacity in Korea.

- 16 ~ 30 kA at 460 V (32 ~ 100 AF)
- 20 ~ 55 kA at 460 V (125 ~ 250 AF)
- 38 ~ 85 kA at 460 V (400 ~ 800 AF)

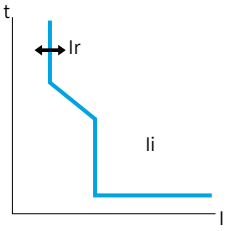
Cable Insulation Performance Suitability

In case there is a presence of abnormal condition such as welding of the main contact after tripping of the circuit breaker by realizing the cable insulation performance in accordance with IEC 60947-2, the handle does not move from ON to OFF position. This makes it safe by preventing the operation of circuit breaker caused by the operator's negligence.

Adjustable Rated Current in all Frames

The adjustable rated current of up to 800 AF provides optimal protection for load variations in customer's equipment.

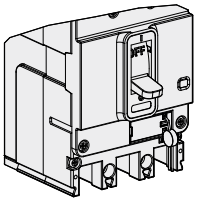
- Long Time (≤ 250 AF) :
  3-step adjusting, 80 % - 90 % - 100 % of rated current
- Long Time (400 AF, 800 AF) :
  3-step adjusting, 63 % - 80 % - 100 % of rated current



Characteristics Curve
(I - t Curve)

Sealing Structure (Option) Applied

Dial sealing structure is applied to prevent arbitrary change of the current set value using a protection cover (Prevent operation of thermal magnetic adjustment knob) (Option).

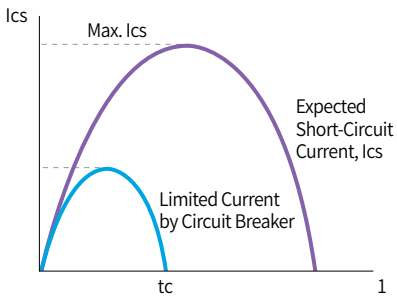




Service Breaking Capacity (Ics = 100 % × Icu)

100 % service breaking capacity has been realized by significantly improving the breaking capacity by restricting accidental current using an internal current limiting device in case of short-circuit accidents.

- 32 ~ 800 AF
- 16 ~ 55 kA @ 460 Vac (Below 250 AF)
- 38 ~ 85 kA @ 460 Vac (400 ~ 800 AF)
  (HGM60, 100 H Type Ics = 75 % Icu, HGM60,
  100 L Type Ics = 50 % Icu)



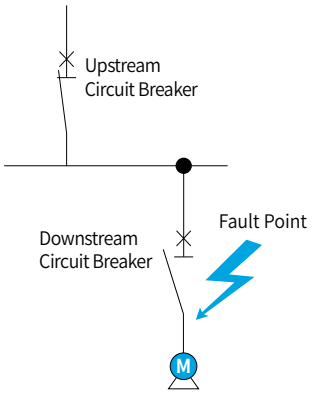
Current Limiting Characteristics

Various Low Voltage System Protections

HGM Type MCCB realizes current limiting characteristics and outstanding breaking performance and enables various low voltage system protections such as discrimination and cascading.

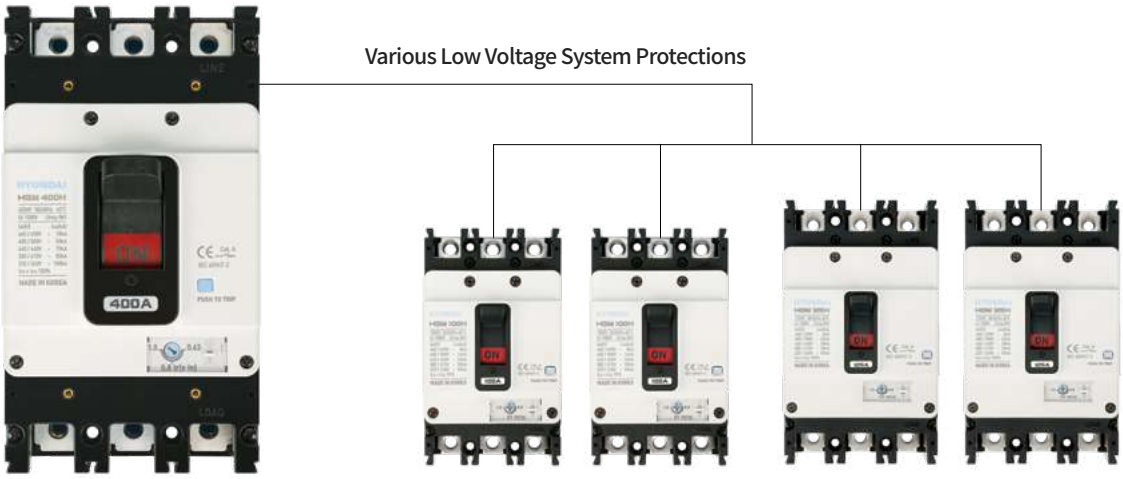
Discrimination

It is a protection method in which when an accident occurs during load, the downstream circuit breaker that is directly related to the accident circuit operates first so that the other sound branch circuit breaker and the upstream main circuit breaker can feed continuously. It is a low voltage system protection method that can minimize the fault point by selectively preventing faults.



Cascading

In case an accident occurs during load, the upstream main circuit breaker operates earlier than the downstream circuit breaker of the accident circuit for back-up protection. It is an economic protection method. Thus, a circuit breaker with lower breaking capacity than the estimated short-circuit current can be applied.



Characteristics

HGE Earth Leakage Circuit Breaker

Secures Equivalent Breaking Performance with MCCB, Maintains Compatibility with Dimensions and Accessories

- Service Breaking Current, Ics = 100 % Icu
- Rated Impulse Withstand Voltage, Uimp : 6 kV

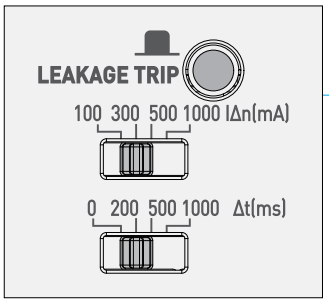
Characteristics of Earth Leakage Protection

- Prevention function of damage caused by reverse connection : A circuit capable of preventing damage in PCB and Trip Coil has been applied to prevent damage despite usage during reserve connection caused by the misuse of user.
- The device is safe as it is equipped with a function that prevents unnecessary malfunction of earth leakage circuit breaker caused by temporary drop of voltage and noise signal.
- With the 3-phase power supply method, it safely breaks even during abnormal system voltage caused by open phase.
- By deploying filter circuit in IC, it safely protects the inverter load from grounding.

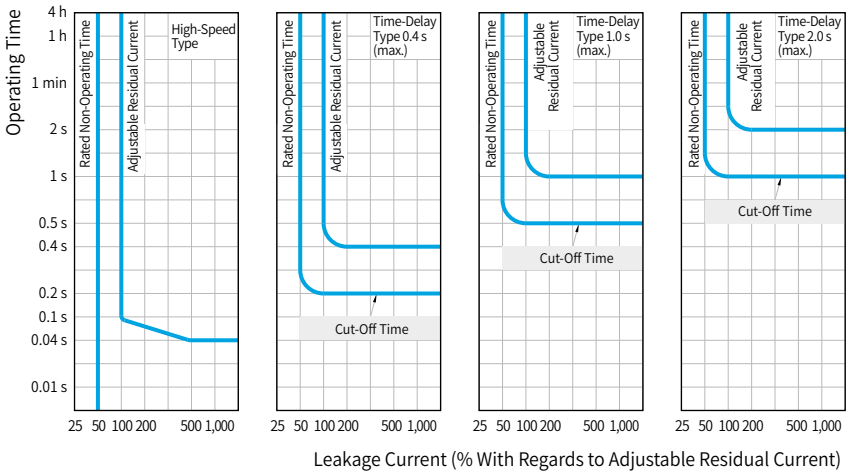
Adjustable Residual Current / Operating Time

Item	Adjustable Residual Current					Cut-Off Time			
	30 mA	100 mA	300 mA	500 mA	1,000 mA	0 ms	200 ms	500 ms	1,000 ms
Previous (U-ELCB)	Fixed	Adjustable (3 Steps)			-	Fixed	-	-	-
New Product (HG-ELCB)	Fixed	Adjustable (4 Steps)				Adjustable (4 Steps)			

- With adjustable leakage current sensitivity (4 stages), prompt action can be taken without replacing the product depending on the load status.
- Selective protection coordination between upstream circuit breaker and downstream circuit breaker is possible through adjustable residual current and operating time, protecting the circuit safely







Applicable standards and certifications

Applicable Standards

Korean Standards

KS C 8321 Molded Case Circuit Breaker for Industrial Uses
(Molded Case Circuit Breaker for Industrial Uses)

KS C 4613 Circuit Breaker Incorporating Residual Current Protection for Industrial Uses (CBR)
(Circuit Breaker Incorporating Residual Current Protection for Industrial Uses (CBR))



International Standards

IEC 60947-1
LLow Voltage Switchgear and Controlgear, Part 1 (General Rules)

IEC 60947-2
Low Voltage Switchgear and Controlgear, Part 2 (Circuit Breakers)

Approvals and Certifications

HG-Series MCCB has acquired the testing/certification from certified testing institutes registered in STL in accordance with the IEC standard and domestic safety certifications (K 60747-2) and can be installed and applied depending on the usage environment and condition permitted in the standard.

- CB Certification (Certifying Institute, DEKRA)
- Safety Certification
- KS Certification
- Marine Approvals (8 Classifications)

Vibration/Shock-Proof Test Certification Acquired

Our product has qualified the vibration/shock-proof test in accordance with the IEC 60068-2-6 which is a requirement of IACS, an international vessel inspection institute.

- 5 ~ 13.2 Hz : Displacement (1 mm)
- 13.2 ~ 100 Hz : Acceleration (0.7 g)

DEKRA

Our services
Testing, Inspections, Certification DEKRA provides certification of management systems as well as technical support, testing and certification of a wide range of products throughout the life cycle.

HG Series

Molded Case Circuit Breakers (HGP Type)

Realizes optimal protection performance regardless of changes in load situation with rated adjustment design!



Rated Short-Circuit Current by AF (Ics = 100 % Icu at 440/460 V)

	50 AF	125 AF	160 AF	100 AF	160 AF	250 AF	400 AF	630 AF	800 AF
150 kA	50DX	125DX	160DX	100X	160X	250X	400X	630X	800X
85 kA	50DH	125DH	160DH	100H	160H	250H	400H	630H	800H
70 kA									
65 kA	50DS	125DS	160DS	100S	160S	250S	400S	630S	800S
36 kA*	50DF	125DF	160DF	100F	160F	250F	400F	630F	800F

* F type is for overseas sales.

Wide Product Range

HGP 50 AF ~ 800 AF

Realizes Maximum Breaking Capacity in Korea

150 kA (at 460 V)

Reinforcement of Protective Coordination

It enables selective breaking.

Acquisition of Various Certifications

DEKRA, marine and KS certifications have been acquired.

Adjustable Operating Characteristics

Rated Current

3-Steps, 0.8 - 1 Times the Rated Current
(Thermal Magnetic Type)
9-Steps, 0.4 - 1 Times the Rated Current
(Electronic Type)

Instantaneous Current

6-Steps, 5 - 6 - 7 - 8 - 9 - 10 Times the Rated Current
(Thermal Magnetic Type)
9-Steps, 1.5 - 10 Times the Rated Current
(Electronic Type, Short Time Current)



Thermal Magnetic Type



Electronic Type

Characteristics (HGP)

Outstanding Protection Coordination and Maximized Breaking Capacity

Simplified Dimension with 4 Types from 50 ~ 800 AF

Adjustable Rated Currents in all Models

Owns the Outstanding Breaking Capacity in all Frames : 150 kA at 460 V

Various Breaking Coordination such as Selective Breaking and Others

Guaranteed Breaking Capacity in Reverse Connection



Trip Device : Thermal Magnetic Type

50D, 125D, 160D AF

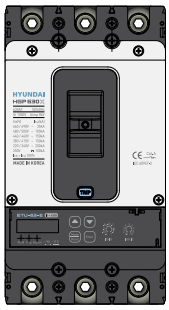


Trip Device : Thermal Magnetic Type, Electronic Type

100, 160, 250 AF



Thermal Magnetic Type



Electronic Type



Trip Device : Thermal Magnetic Type, Electronic Type

400, 630 AF



Trip Device : Thermal Magnetic Type, Electronic Type

800 AF

Unit : mm

Characteristics (HGP)

HGP MCCB Trip Device

- The device to monitor the system and send a breaking signal to protect load and a cable
- The external dimensions and accessories are for common use regardless of the type of a trip device.
- A trip unit is replaceable, which depends on load types and protection characteristics.
  (Common use for the circuit breaker body)
- It has various ratings and adjustable functions.

Thermal Magnetic Type



Electronic Type



Type	Rated Current (A)			
	2.5 ~ 12.5	16 ~ 80	100	125 ~ 800
Thermal Magnetic (Thermal Fixed / Instantaneous Fixed)		●	●	●
Thermal Magnetic (Thermal Adjustable / Instantaneous Fixed)		●	●	●
Thermal Magnetic (Thermal Adjustable / Instantaneous Adjustable)			●	●
Electronic (E, A, N, D Type)			●	●
For Motor Protection, Switch-Disconnector	●	●	●	●





For protecting a cable and a device (Thermal Magnetic)

- MTM-25-FF : Thermal Fixed / Instantaneous Fixed
- MTM-25-JF : Thermal Adjustable / Instantaneous Fixed
- MTM-25-JJ : Thermal Adjustable / Instantaneous Adjustable

For protecting a cable and a device (Electronic Trip Unit)

- ETU-25-N : Normal Type
- ETU-25-D : Display Type
- ETU-25-A : Ammeter Type
- ETU-25-E : Energy-meter Type

For motor protection (Instantaneous)

- MCP-25-OJ : Instantaneous Adjustable

Switch-Disconnector

- DSU-25 : No protection

HGP Type ETU (Electrical Trip Unit)

- Equipped with intelligent electronic function for a new era
- Maximizes a system energy efficiency the function of monitoring commutation and power

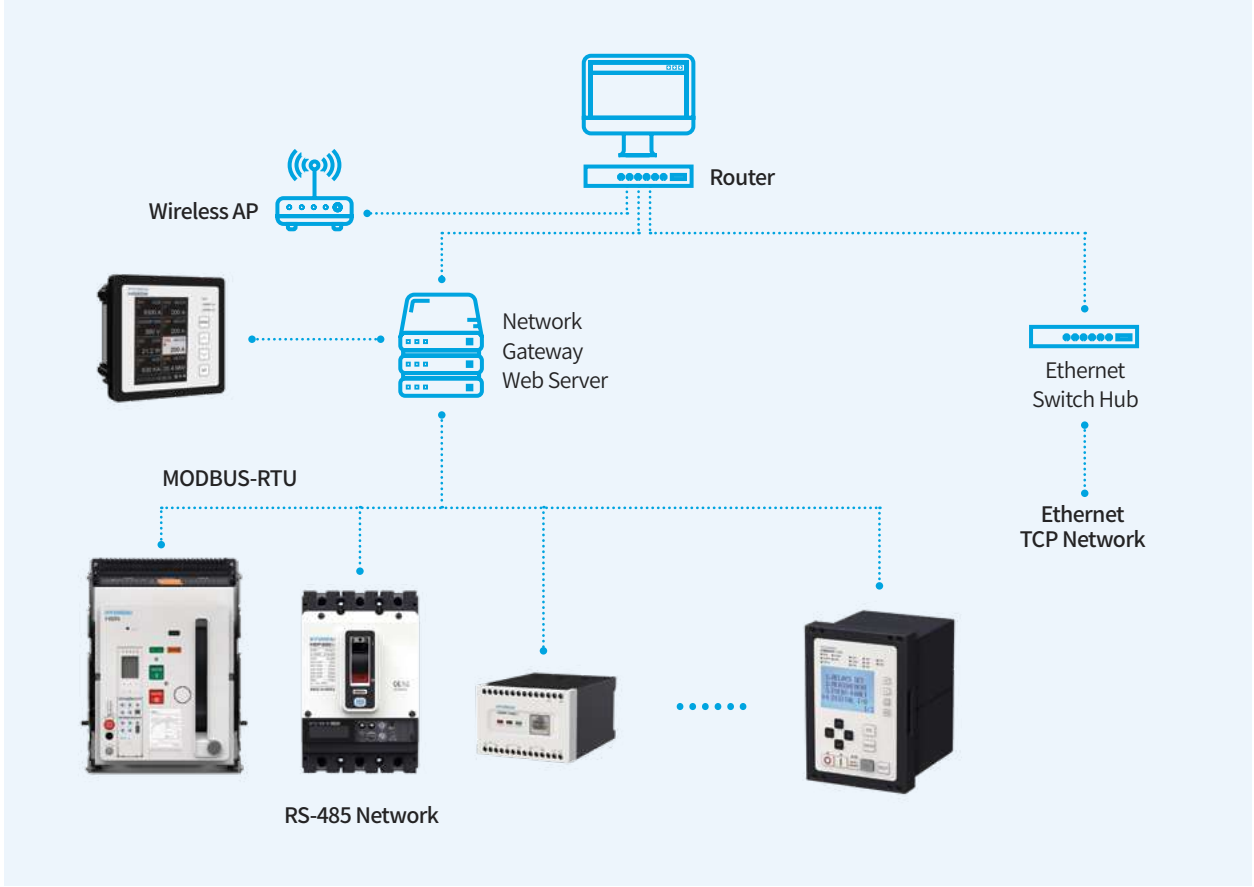
Protects the system (L / S / I / G / IN)

Measures and monitors power (current, voltage, energy, power, frequency, phase, power factor, etc.)

Communicates through RS485 MODBUS

Saves accident information and displays status on the LED window

Runs a test and monitors for maintenance





It checks current status on the front display and product status on the LED window. (Pre trip alarm)



It monitors the system with a maintenance tool.



It applies a transparent protection cover. (prevent pollution and operation)

Characteristics (HGP)

HGP Molded Case Circuit Breaker

Maximized Insulation Performance

The safety of the product has been maximized through improved insulation voltage

- Rated Insulation Voltage, Ui : 1,000 V
- Rated Impulse Withstand Voltage, Uimp : 8 kV

High Breaking Capacity

Maximum breaking capacity was realized with regards to all frames with high breaking capacity in Korea.

- 150 kA at 460 V (Same performance secured in all frames)

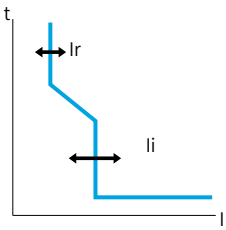
Cable Insulation Performance Suitability

In case there is presence of abnormal condition such as welding of the main contact after tripping the circuit breaker by realizing the cable insulation performance in accordance with IEC 60947-2, the handle does not move from ON to OFF position, making it safe by preventing the operation of circuit breaker caused by the operator's negligence.

Adjustable Rated Current in all Frames

The adjustable rated current of up to 800 AF provides optimal protection for load variations in customer's equipment.

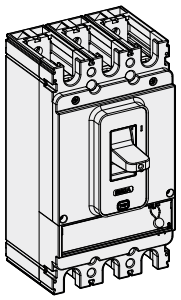
- Rated Current
  Thermal Magnetic Type : 0.8 - 1 times the rated current (3 Step)
  Electronic Type : 0.4 - 1 times the rated current (9 Step)
- Instantaneous Current
  Thermal Magnetic Type : 5 - 6 - 7 - 8 - 9 - 10 times the rated current (6 Step)
  Electronic Type : 1.5 - 10 times the rated current (9 Step, Short Time Adjusting)



Characteristics Curve
(I - t Curve)

Sealing Structure (Option) Applied

Dial sealing structure was applied to prevent arbitrary change of the current set value using a protection cover (Prevent operation of thermal magnetic adjustment knob) (Option).

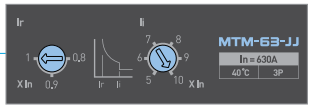


HYUNDAI
HGP 630S
630AF 50/60Hz
Ui 1000V Uimp 8kV

CE Cat. A
IEC 60947-2

Ue(V)	Icu(kA)
660 / 690V	~ 10kA
480 / 500V	~ 50kA
440 / 460V	~ 70kA
380 / 415V	~ 85kA
220 / 240V	~ 100kA
240V	65kA
Ics = Icu 100%	

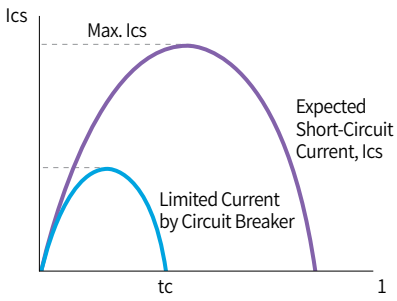




Service Breaking Capacity (Ics = 100 % × Icu)

100 % service breaking capacity has been realized by significantly enhancing the breaking capacity by restricting accidental current using an internal current limiting device in case of short-circuit accidents.

- 50 ~ 800 AF
- 36 ~ 150 kA @ 460 Vac



Current Limiting Characteristics

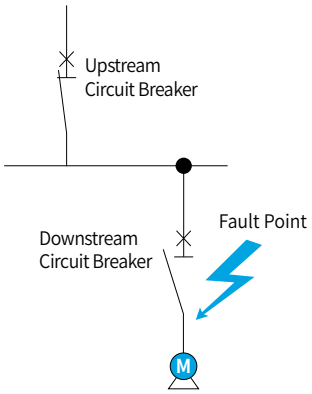
Guaranteed Breaking Capacity in Reverse Connection

The same breaking performance is guaranteed even if the device is used by mixing LINE (Line side)/LOAD (Load side).

- Realizes integrated barrier circuit breaker that reinforces phase to phase insulation
- Realizes fast breaking operating characteristics by applying instantaneous mechanism part

Various Low Voltage System Protections

HGP Type MCCB realizes current limiting characteristics and outstanding breaking performance and enables various low voltage system protections such as discrimination and cascading.



Discrimination

It is a protection method in which when an accident occurs during load, the downstream circuit breaker that is directly related to the accident circuit operates first so that the other sound branch circuit breaker and the upstream main circuit breaker can feed continuously. It is a low voltage system protection method that can minimize the fault point by selectively preventing faults.

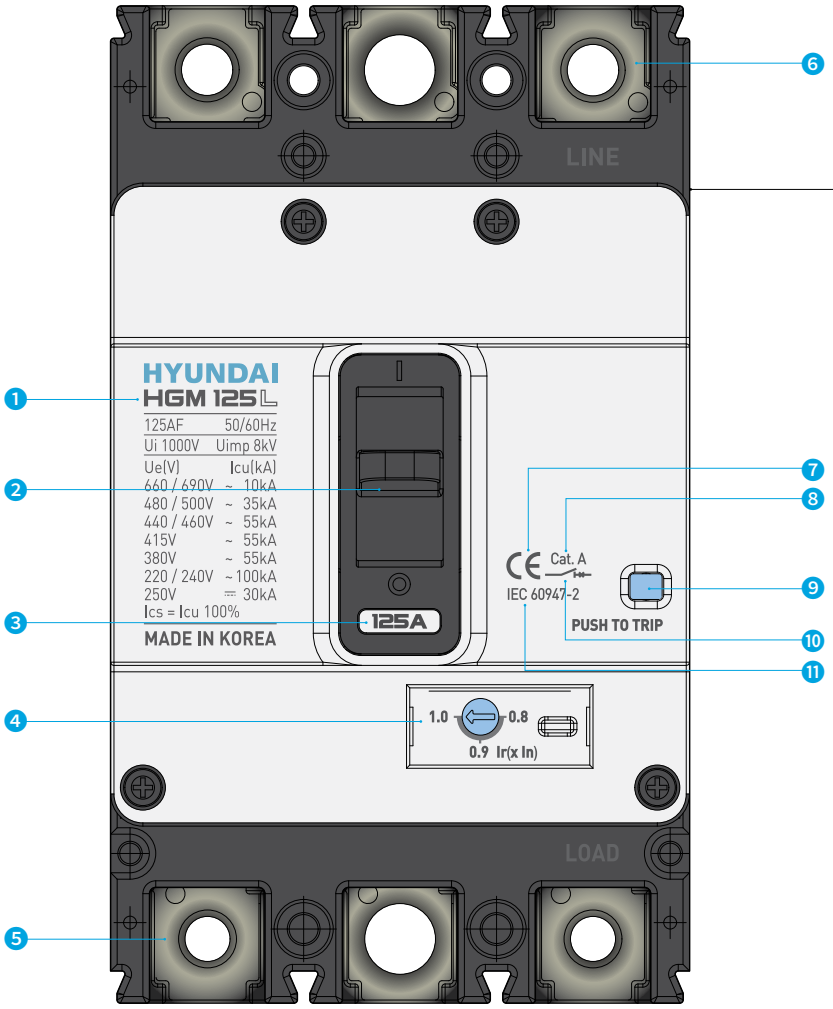
Cascading

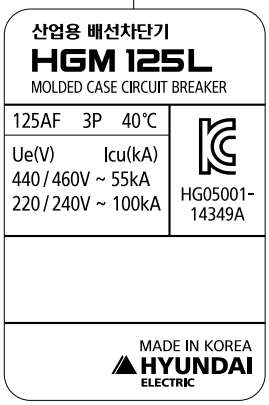
In case an accident occurs during load, the upstream main circuit breaker operates earlier than the downstream circuit breaker of the accident circuit for back-up protection. It is an economic protection method that enables circuit breaker with lower breaking capacity than the estimated short-circuit current to be applied.



External Structure and Indications

Molded Case Circuit Breaker (MCCB)





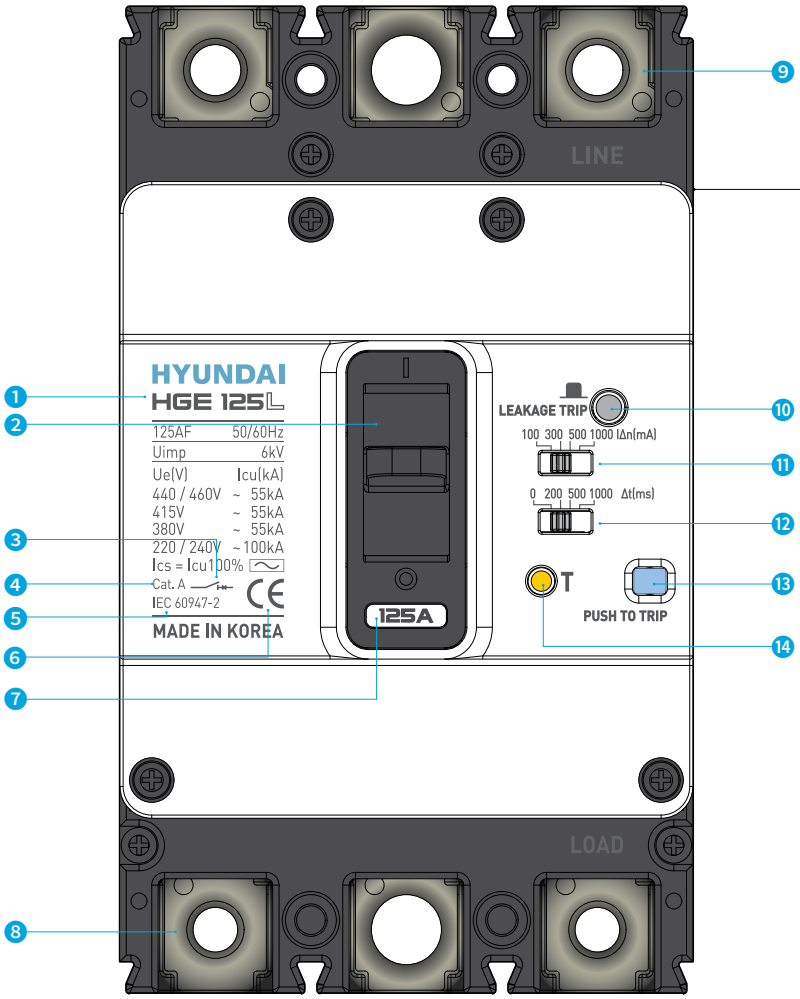
Description of Nameplate at the Side of Product

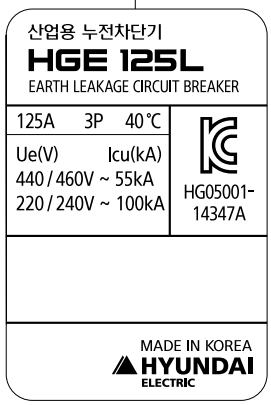
- Ui : Rated Insulation Voltage
- Uimp : Rated Impulse Withstand Voltage
- Ue : Rated Operational Voltage
- Icu : Rated Ultimate Short-Circuit Breaking Capacity (o-co)
- Ics : Rated Service Short-Circuit Breaking Capacity (o-co-co)

Molded Case Circuit Breaker (MCCB)

1. Manufacturer and Product Name
2. Operating Handle
3. Rated Current Nameplate
4. Rated Current Adjusting Dial
5. Load Side Terminal
6. Line Side Terminal
7. CE Marking
8. Utilization Category
9. Trip Button
10. Cable Insulation Performance Suitability
11. Reference Standard

Earth Leakage Circuit Breakers (ELCB)





Description of Nameplate at the Side of Product

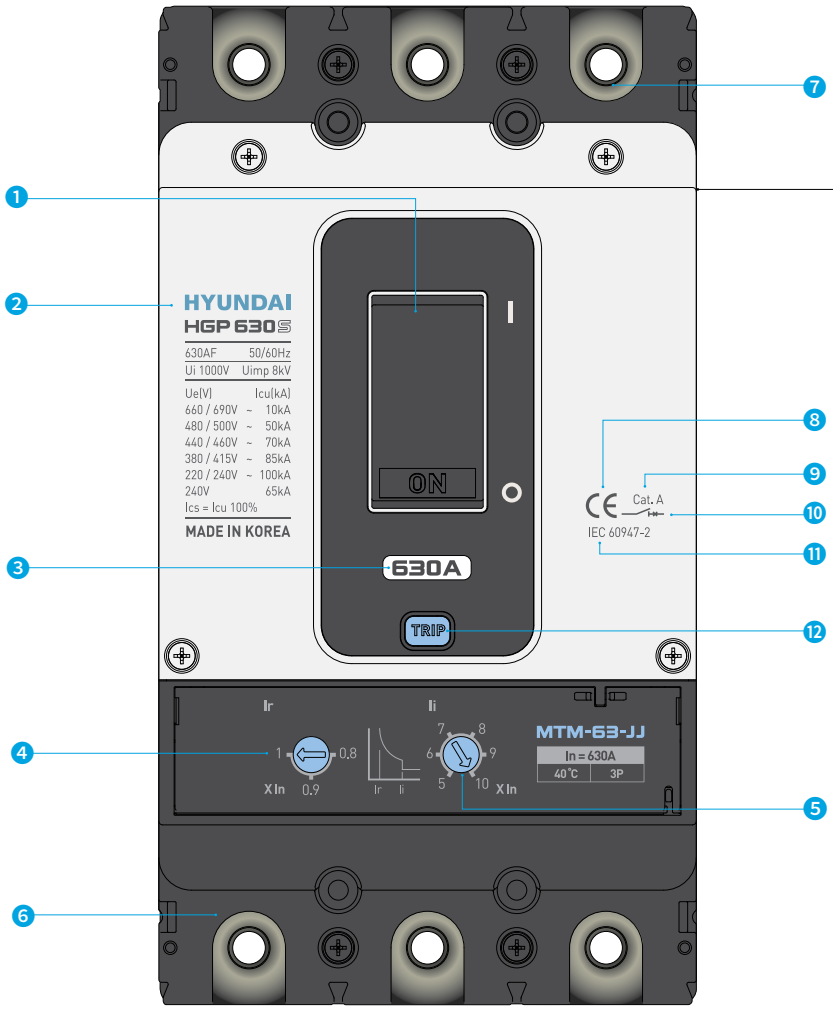
- Ui : Rated Insulation Voltage
- Uimp : Rated Impulse Withstand Voltage
- Ue : Rated Operational Voltage
- Icu : Rated Ultimate Short-Circuit Breaking Capacity (o-co)
- Ics : Rated Service Short-Circuit Breaking Capacity (o-co-co)

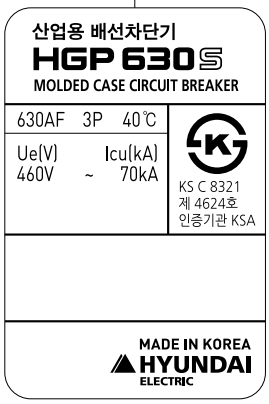
Earth Leakage Circuit Breakers (ELCB)

1. Manufacturer and Product Name
2. Operating Handle
3. Cable Insulation Performance Suitability
4. Utilization Category
5. Reference Standard
6. CE Marking
7. Rated Current Nameplate
8. Load Side Terminal
9. Line Side Terminal
10. Leakage Trip Indication Device
11. Adjustable Residual Current Setting Switch
12. Rated Non-Operating Time Setting Switch
13. Trip Button
14. Leakage Test Button

External Structure and Indications

Molded Case Circuit Breaker (HGP Type)





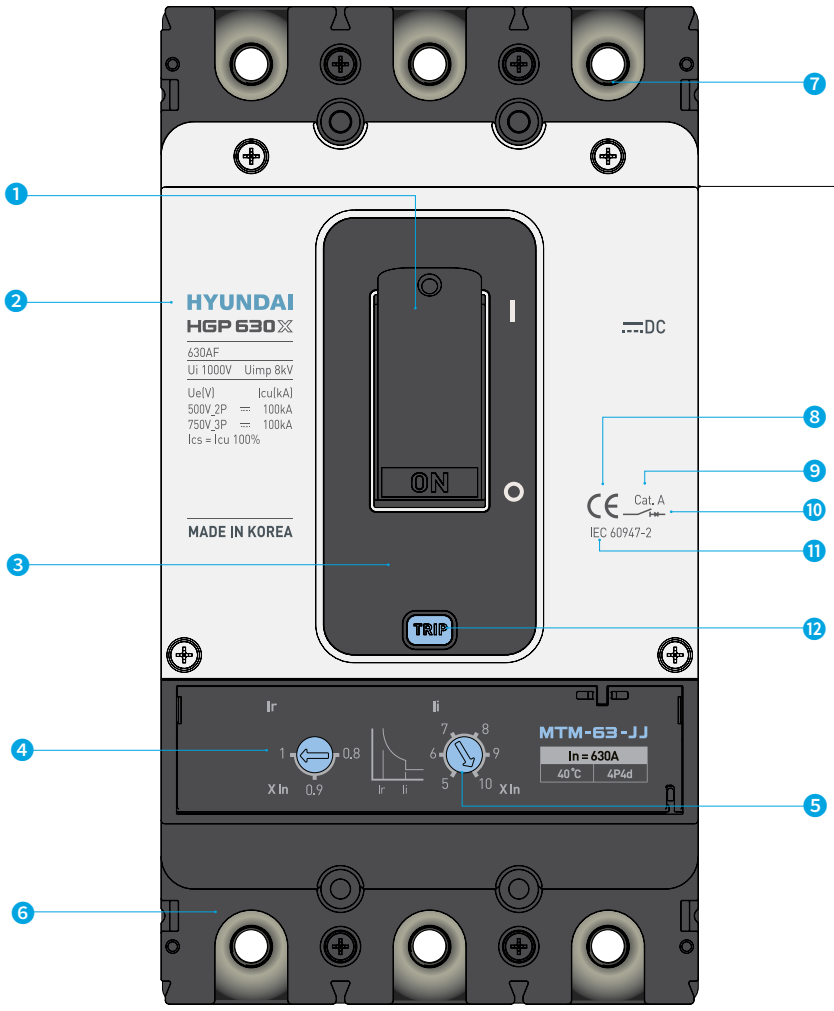
Description of Nameplate at the Side of Product

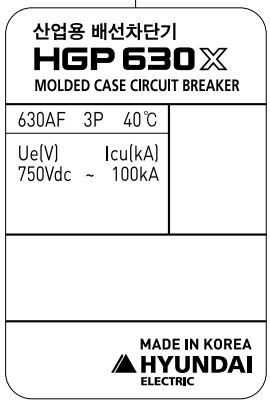
- Ui : Rated Insulation Voltage
- Uimp : Rated Impulse Withstand Voltage
- Ue : Rated Operational Voltage
- Icu : Rated Ultimate Short-Circuit Breaking Capacity (o-co)
- Ics : Rated Service Short-Circuit Breaking Capacity (o-co-co)

Molded Case Circuit Breaker (HGP Type)

1. Operating Handle
2. Manufacturer and Product Name
3. Rated Current Nameplate
4. Long Operating Current Adjusting Dial
5. Instantaneous Operating Current Adjusting Dial
6. Load Side Terminal
7. Line Side Terminal
8. CE Marking
9. Utilization Category
10. Cable Insulation Performance Suitability
11. Reference Standard
12. Trip Button

Molded Case Circuit Breaker (HGP DC Type)





Description of Nameplate at the Side of Product

- Ui : Rated Insulation Voltage
- Uimp : Rated Impulse Withstand Voltage
- Ue : Rated Operational Voltage
- Icu : Rated Ultimate Short-Circuit Breaking Capacity (o-co)
- Ics : Rated Service Short-Circuit Breaking Capacity (o-co-co)

Molded Case Circuit Breaker (HGP Type)

1. Operating Handle
2. Manufacturer and Product Name
3. Rated Current Nameplate
4. Long Operating Current Adjusting Dial
5. Instantaneous Operating Current Adjusting Dial
6. Load Side Terminal
7. Line Side Terminal
8. CE Marking
9. Utilization Category
10. Cable Insulation Performance Suitability
11. Reference Standard
12. Trip Button

Model Selection Table

Molded Case Circuit Breaker (HGM Type)：32 ~ 250 AF

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM30		HGM50				HGM60			
Frame			(AF)	32		50				63			
Number of Poles			(P)	2, 3, 4 [1]		2, 3, 4 [1]				2, 3, 4 [1]			
Rated Current, at 40 °C			(A)	16, 20, 25, 32		16, 20, 25, 32, 40, 50				16, 20, 25, 32, 40, 50, 63			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)													
Short-Circuit Breaking Category Code				E	S	E	S	H	L	E	S	H	L
AC 660/690 V				2.5	5	2.5	5	8	10	2.5	5	7.5	8
AC 480/500 V				7.5	10	7.5	10	26	35	7.5	10	14	26
AC 415/440/460 V				16	20	16	20	38	55	16	20	26	30
AC 380 V				18	22	18	22	42	55	18	22	30	31
AC 220/240 V				35	50	35	50	85	100	35	50	50	50
DC 250 V (2P)				5	10	5	10	20	30	5	10	15	15
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	75	50
Rated Short-Circuit Making Capacity [Icm] (kA peak)													
AC 660/690 V				4	8	4	8	14	17	4	8	13	14
AC 480/500 V				13	17	13	17	55	74	13	17	28	55
AC 415/440/460 V				32	40	32	40	80	121	32	40	55	63
AC 380 V				36	47	36	47	89	121	36	47	63	66
AC 220/240 V				74	105	74	105	187	220	74	105	105	105
DC 250 V (2P)				8	17	8	17	40	63	8	17	30	30
Endurance [times] (Durability)													
Mechanical				30,000		30,000				30,000			
Electrical (at 460 V)				10,000		10,000				10,000			
Trip Device													
Thermal Magnetic	Long Time [LTD]	Fixed		(1.0)×In		(1.0)×In				(1.0)×In			
		Adjustable		(0.8 - 0.9 - 1.0)×In		(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In			
	Instantaneous [INST]			400 A		16 ~ 32 A：400 A, 40 ~ 50 A：10×In				16 ~ 32 A：400 A, 40 ~ 63 A：10×In			
Accessory													
Internal	Auxiliary Switch		AUX	●		●				●			
	Alarm Switch		ALT	●		●				●			
	Shunt Trip		SHT	●		●				●			
	Under-Voltage Trip		UVT	●		●				●			
External	Rotary Handle	Front Contact	TFG	●		●				●			
		Extension	TFH	●		●				●			
	Mechanical Open/Close Device		MOT	●		●				●			
	Mechanical Interlock		MIF	●		●				●			
	Handle Locking Device		PLD	●		●				●			
	Plug-in	TDM (LINE/LOAD)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDM (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDF (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (1 row)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (2 rows)		● (2, 3P Only)		● (2, 3P Only)		● (3P Only)		● (2, 3P Only)			
	Cage Terminal Block		CTB	●		●				●			
	Terminal Cover		TCF	●		●				●			
	Insulation Barrier		TQQ	●		●				●			
	Terminal Bus Bar		TBB	-		-				-			
Installation and Dimensions													
Connection/ Installation		Front Connection		Terminal Screw									
		Rear Connection		Horizontal/Vertical									
		Plug-in		Switchgear (Line & Load, Line Only), Switchboard									
		DIN Rail Installation		Possible if DIN Rail adaptor is used				-		Possible if DIN Rail adaptor is used			
Dimension (mm) 		a (2/3/4P)		50/75/100		50/75/100		60/90/120		50/75/100			
		b		130		130		155		130			
		c		68		68		68		68			
Weight (kg)		2/3/4P		0.6/0.8/1.0		0.6/0.8/1.0		0.8/1.0/1.3		0.6/0.8/1.0			
Detailed Rating and Selection				232 Page		232 Page		232 Page		232 Page			
Characteristic Curve and Appearance				149 / 166 Page		149 / 166 Page		150 / 167 Page		149 / 166 Page			

※ 1) 4 Pole Arrangement：Basic specification of R-S-T-N (N-R-S-T is optional.)
2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.

HGM100				HGM125				HGM160				HGM250			
100				125				160				250			
2, 3, 4 [1]				2, 3, 4 [1]				2 [2], 3, 4 [1]				2 [2], 3, 4 [1]			
16, 20, 25, 32, 40, 50, 63, 75, 80, 100				16, 20, 25, 32, 40, 50, 63, 75, 80, 100, 125				100, 125, 150, 160				100, 125, 150, 160, 175, 200, 225, 250			
E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
2.5	5	7.5	8	5	7.5	8	10	7.5	8	8	10	7.5	8	8	10
7.5	10	14	26	10	14	26	35	14	20	26	35	14	20	26	35
16	20	26	30	20	26	38	55	20	26	38	55	20	26	38	55
18	22	30	31	22	30	42	55	22	30	42	55	22	30	42	55
35	50	50	50	50	65	85	100	50	65	85	100	50	65	85	100
5	10	15	15	10	15	20	30	10	15	20	30	10	15	20	30
100	100	75	50	100	100	100	100	100	100	100	100	100	100	100	100
4	8	13	14	8	13	14	17	8	13	14	17	8	13	14	17
13	17	28	55	17	28	55	74	17	28	55	74	17	28	55	74
32	40	55	63	40	55	80	121	40	55	80	121	40	55	80	121
36	47	63	66	47	63	89	121	47	63	89	121	47	63	89	121
74	105	105	105	105	143	187	220	105	143	187	220	105	143	187	220
8	17	30	30	17	30	40	63	17	30	40	63	17	30	40	63
30,000				30,000				25,000				25,000			
10,000				10,000				10,000				10,000			
(1.0)×In				(1.0)×In				(1.0)×In				(1.0)×In			
(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In			
16 ~ 32 A : 400 A, 40 ~ 100 A : 10×In				16 ~ 32 A : 400 A, 40 ~ 125 A : 10×In				10×In				10×In			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				-				-			
● (3P Only)				● (3P Only)				-				-			
● (2, 3P Only)				● (3P Only)				-				-			
●				●				●				●			
●				●				●				●			
●				●				●				●			
-				-				●				●			
Terminal Screw								Terminal Screw, Terminal Bus Bar							
Horizontal/Vertical								Horizontal/Vertical							
Switchgear (Line & Load, Line Only), Switchboard								Switchgear (Line & Load, Line Only)							
Possible if DIN Rail adaptor is used				-				-				-			
50/75/100				60/90/120				105/105/140				105/105/140			
130				155				165				165			
68				68				68				68			
0.6/0.8/1.0				0.8/1.0/1.3				1.1/1.3/1.7				1.1/1.3/1.7			
232 Page				232 Page				232 Page				232 Page			
149 / 166 Page				150 / 167 Page				151 / 168 Page				151 / 168 Page			

Model Selection Table

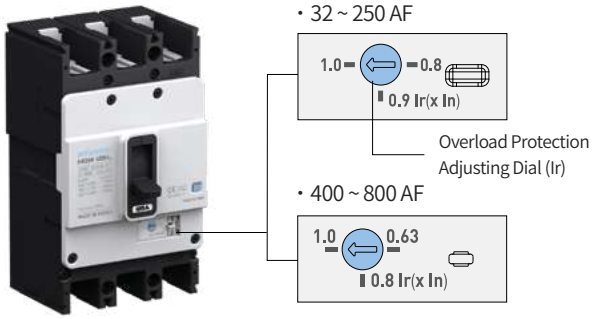
Molded Case Circuit Breaker (HGM Type) : 400 ~ 800 AF

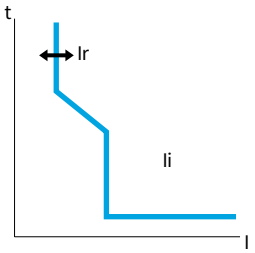
Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM400				HGM630				HGM800		
Frame			(AF)	400				630				800		
Number of Poles			(P)	2 [2], 3, 4 [1]				2 [2], 3, 4 [1]				2 [2], 3, 4 [1]		
Rated Current, at 40 °C			(A)	250, 300, 350, 400				500, 630				700, 800		
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)														
Short-Circuit Breaking Category Code				E	S	H	L	E	S	H	L	S	H	L
AC 660/690 V				5	8	10	14	5	8	10	14	8	10	14
AC 480/500 V				18	35	50	65	25	45	50	65	45	50	65
AC 440/460 V				38	50	70	85	38	50	70	85	50	70	85
AC 380/415 V				45	65	85	100	45	65	85	100	65	85	100
AC 220/240 V				50	75	100	125	50	75	100	125	75	100	125
DC 250 V (2P)				20	25	40	40	20	25	40	40	25	40	40
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)														
AC 660/690 V				8	14	17	28	8	14	17	28	14	17	28
AC 480/500 V				36	74	105	143	53	95	105	143	95	105	143
AC 440/460 V				80	105	154	187	80	105	154	187	105	154	187
AC 380/415 V				95	143	187	220	95	143	187	220	143	187	220
AC 220/240 V				105	165	220	275	105	165	220	275	165	220	275
DC 250 V (2P)				40	53	84	84	40	53	84	84	53	84	84
Endurance [times] (Durability)														
Mechanical				4,000				2,500				2,500		
Electrical (at 460 V)				1,000				500				500		
Trip Device														
Thermal Magnetic	Long Time [LTD]	Fixed		(1.0)×In				(1.0)×In				(1.0)×In		
		Adjustable		(0.63 - 0.8 - 1.0)×In [3]				(0.63 - 0.8 - 1.0)×In				(0.63 - 0.8 - 1.0)×In		
	Instantaneous [INST]			10×In				10×In				10×In		
Accessory														
Internal	Auxiliary Switch		AUX	●				●				●		
	Alarm Switch		ALT	●				●				●		
	Shunt Trip		SHT	●				●				●		
	Under-Voltage Trip		UVT	●				●				●		
External	Rotary Handle	Front Contact	TFG	●				●				●		
		Extension	TFH	●				●				●		
	Mechanical Open/Close Device		MOT	●				●				●		
	Mechanical Interlock		MIF	●				●				●		
	Handle Locking Device		PLD	●				●				●		
	Plug-in	TDM (LINE/LOAD)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDM (LINE Only)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDF (LINE Only)		-				-				-		
		TDA (1 row)		-				-				-		
		TDA (2 rows)		-				-				-		
	Cage Terminal Block		CTB	●				●				●		
	Terminal Cover		TCF	●				●				●		
	Insulation Barrier		TQQ	●				●				●		
	Terminal Bus Bar		TBB	●				●				●		
Installation and Dimensions														
Connection/ Installation		Front Connection		Terminal Screw				Terminal Screw, Terminal Bus Bar						
		Rear Connection		Horizontal/Vertical Cable				Horizontal/Vertical Cable						
		Plug-in		Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)						
Dimension (mm) 		a (2/3/4P)		140/140/184				210/210/280				210/210/280		
		b		257				280				280		
		c		110				110				110		
Weight (kg)		2/3/4P		4/4.5/5.4				8.7/9.5/12.5				8.7/9.5/12.5		
Detailed Rating and Selection				232 Page				232 Page				232 Page		
Characteristic Curve and Appearance				151 / 169 Page				152 / 170 Page				152 / 170 Page		

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N (N-R-S-T is optional.)
2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.
3) As for adjustable type, applicable to above 300 A.





Characteristics Curve
(I - t Curve)

Trip Unit Characteristics – Thermal Magnetic

Rated Current (A) In		16	20	25	32	40	50	63	75	80	100	125
MCCB	HGM30	●	●	●	●							
	HGM50	●	●	●	●	●	●					
	HGM60	●	●	●	●	●	●	●				
	HGM100	●	●	●	●	●	●	●	●	●	●	
	HGM125	●	●	●	●	●	●	●	●	●	●	●
Moment Characteristics Ir												
Setting Value (A)	Fixed	16	20	25	32	40	50	63	75	80	100	125
	0.8×In	12.8	16	20	25.6	32	40	50.4	60	64	80	100
	0.9×In	14.4	18	22.5	28.8	36	45	56.7	67.5	72	90	112.5
	1.0×In	16	20	25	32	40	50	63	75	80	100	125
Instantaneous Characteristics Ii												
Setting Value (A)	10×In (Min. 400 A)	400					500	630	750	800	1,000	1,250
	Max. Non-Tripping Current (A)	320					400	504	600	640	800	1,000
	Min. Tripping Current (A)	480					600	756	900	960	1,200	1,500
Neutral Pole Protection												
4P3D		Unprotected										
4P4D		-										

Rated Current (A) In		100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
MCCB	HGM160	●	●	●	●											
	HGM250	●	●	●	●	●	●	●	●							
	HGM400								●[1)]	●	●	●				
	HGM630												●	●		
	HGM800														●	●
Moment Characteristics Ir																
Setting Value (A)	Fixed	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
	0.63×In									189	221	252	315	397	441	504
	0.8×In	80	100	120	128	140	160	180	200	240	280	320	400	504	560	640
	0.9×In	90	112.5	135	144	157.5	180	202.5	225							
	1.0×In	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
Instantaneous Characteristics Ii																
Setting Value (A)	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Tripping Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600
Neutral Pole Protection																
4P3D		Unprotected														
4P4D		-														

※ 1) HGM400 250 A is fixed type only.

Model Selection Table

Switch - Disconnector (HGM NA Type)：50 ~ 800 AF

Switch - disconnector is a switch for disconnection without protective function and as the appearance is equivalent to the circuit breaker, all accessories of the circuit breaker can be shared.

Common Ratings

Rated Insulation Voltage, Ui	1,000 V
Rated Operational Voltage, Ue	690 V
Rated Impulse Withstand Voltage, Uimp	8 kV

Suitablilty for Isolation	Yes
Utilization Category	AC 22 A/AC 23 A - DC 22 A/DC 23 A
Pollution Degree	3
Reference Standard	IEC 60947-3

Model Name				HGM50NA	HGM100NA	HGM125NA	HGM160NA
Frame			(AF)	50	100	125	160
Number of Poles			(P)	3, 4 [1)]	3, 4 [1)]	3, 4 [1)]	3, 4 [1)]
Conventional Free Air Thermal Current, Ith at 60 °C			(A)	50	100	125	160
Rated Operational Current [Ie]							
AC 690 V (50/60 Hz)				50	100	125	160
DC 125 V (1 Pole Connection)				50	100	125	160
DC 250 V (2 Pole Connection)				50	100	125	160
Rated Short Circuit Making Current [Icm] (kA Peak @ AC 460)				0.8	1.7	2.1	2.7
Rated Short Time Withstand Current [Icw] (kA rms)				1	1	1	2
Endurance [times] (Durability)							
Mechanical				30,000	30,000	30,000	25,000
In @ 440 V				10,000	10,000	10,000	10,000
Accessory							
Internal	Auxiliary Switch		AUX	●	●	●	●
	Alarm Switch		ALT	●	●	●	●
	Shunt Trip		SHT	●	●	●	●
	Under-Voltage Trip		UVT	●	●	●	●
External	Rotary Handle	Front Contact	TFG	●	●	●	●
		Extension	TFH	●	●	●	●
	Mechanical Open/Close Device		MOT	●	●	●	●
	Mechanical Interlock		MIF	●	●	●	●
	Handle Locking Device		PLD	●	●	●	●
	Plug-in	TDM (LINE/LOAD)		● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
		TDM (LINE Only)		● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
		TDF (LINE Only)		● (3P Only)	● (3P Only)	● (3P Only)	-
		TDA (1 row)		● (3P Only)	● (3P Only)	● (3P Only)	-
		TDA (2 rows)		● (3P Only)	● (3P Only)	● (3P Only)	-
	Cage Terminal Block		CTB	●	●	●	●
	Terminal Cover		TCF	●	●	●	●
	Insulation Barrier		TQQ	●	●	●	●
	Terminal Bus Bar		TBB	-	-	-	●
Installation and Dimensions							
Connection/ Installation		Front Connection		Terminal Screw			Terminal Screw, Terminal Bus Bar
		Rear Connection		Horizontal/Vertical			Horizontal/Vertical
		Plug-in		Switchgear (Line & Load, Line Only), Distribution Panel			Switchgear (Line & Load, Line Only)
		DIN Rail Installation		Possible if DIN Rail adaptor is be used		-	-
Dimension (mm) 		a (3/4P)		75/100	75/100	90/120	105/140
		b		130	130	155	165
		c		68	68	68	68
Weight (kg)		3/4P		0.8/1.0	0.8/1.0	1.0/1.3	1.3/1.7
Detailed Rating and Selection				232 Page	232 Page	232 Page	232 Page
Characteristic Curve and Appearance				166 Page	166 Page	167 Page	168 Page

※ 1) 4 Pole Arrangement：Basic specification of R-S-T-N (N-R-S-T is optional.)

Applicable Field of Switch – Disconnectors

- Bus bar connection and disconnection
- Disconnection of switchgear and control panel
- Switch for emergency power switchover (ATS)

HGM250NA	HGM400NA	HGM630NA	HGM800NA
250	400	630	800
3, 4 [1)]	3, 4 [1)]	3, 4 [1)]	3, 4 [1)]
250	400	630	800
250	400	630	800
250	400	630	800
250	400	630	800
4.2	6.8	10.7	13.6
2	4	6.3	8
25,000	4,000	2,500	2,500
10,000	1,000	500	500
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
-	-	-	-
-	-	-	-
-	-	-	-
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
Terminal Screw, Terminal Bus Bar	Terminal Screw	Terminal Screw, Terminal Bus Bar	
Horizontal/Vertical	Horizontal/Vertical Cable	Horizontal/Vertical Cable	
Switchgear (Line & Load, Line Only)	Switchgear (Line & Load, Line Only)	Switchgear (Line & Load, Line Only)	
-	-	-	-
105/140	140/184	210/280	210/280
165	257	280	280
68	110	110	110
1.3/1.7	4.5/5.4	9.5/12.5	9.5/12.5
232 Page	232 Page	232 Page	232 Page
168 Page	169 Page	170 Page	170 Page

Model Selection Table

Motor Protection Circuit Breakers (HGM MO Type) : 50 ~ 250 AF

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM50				HGM60			
Frame			(AF)	50				63			
Number of Poles			(P)	3				3			
Rated Current, at 40 °C			(A)	40, 50				40, 50, 63			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)											
Short-Circuit Breaking Category Code				E	S	H	L	E	S	H	L
AC 660/690 V				2.5	5	8	10	2.5	5	7.5	8
AC 480/500 V				7.5	10	26	35	7.5	10	14	26
AC 415/440/460 V				16	20	38	55	16	20	26	30
AC 380 V				18	22	42	55	18	22	30	31
AC 220/240 V				35	50	85	100	35	50	50	50
DC 250 V (2P)				5	10	20	30	5	10	15	15
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	75	50
Rated Short-Circuit Making Capacity [Icm] (kA peak)											
AC 660/690 V				4	8	14	17	4	8	13	14
AC 480/500 V				13	17	55	74	13	17	28	55
AC 415/440/460 V				32	40	80	121	32	40	55	63
AC 380 V				36	47	89	121	36	47	63	66
AC 220/240 V				74	105	187	220	74	105	105	105
DC 250 V (2P)				8	17	40	63	8	17	30	30
Endurance [times] (Durability)											
Mechanical				30,000				30,000			
Electrical (at 460 V)				10,000				10,000			
Trip Device											
Magnetic	Instantaneous [INST]			10×In				10×In			
Accessory											
Internal	Auxiliary Switch		AUX	●				●			
	Alarm Switch		ALT	●				●			
	Shunt Trip		SHT	●				●			
	Under-Voltage Trip		UVT	●				●			
External	Rotary Handle	Front Contact	TFG	●				●			
		Extension	TFH	●				●			
	Mechanical Open/Close Device		MOT	●				●			
	Mechanical Interlock		MIF	●				●			
	Handle Locking Device		PLD	●				●			
	Plug-in	TDM (LINE/LOAD)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDM (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDF (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (1 row)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (2 rows)		● (2, 3P Only)		● (3P Only)		● (2, 3P Only)			
	Cage Terminal Block		CTB	●				●			
	Terminal Cover		TCF	●				●			
	Insulation Barrier		TQQ	●				●			
	Terminal Bus Bar		TBB	-				-			
Installation and Dimensions											
Connection/ Installation		Front Connection		Terminal Screw							
		Rear Connection		Horizontal/Vertical							
		Plug-in		Switchgear (Line & Load, Line Only), Distribution Panel							
		DIN Rail Installation		Possible if DIN Rail adaptor is be used		-		Possible if DIN Rail adaptor is be used			
Dimension (mm)		a		75		90		75			
		b		130		155		130			
		c		68		68		68			
Weight (kg)		3P		0.8		1.0		0.8			
Detailed Rating and Selection				232 Page		232 Page		232 Page			
Characteristic Curve and Appearance				149 / 166 Page		150 / 167 Page		149 / 166 Page			

HGM100				HGM125				HGM160				HGM250			
100				125				160				250			
3				3				3				3			
40, 50, 63, 75, 80, 100				40, 50, 63, 75, 80, 100, 125				100, 125, 150, 160				100, 125, 150, 160, 175, 200, 225, 250			
E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
2.5	5	7.5	8	5	7.5	8	10	7.5	8	8	10	7.5	8	8	10
7.5	10	14	26	10	14	26	35	14	20	26	35	14	20	26	35
16	20	26	30	20	26	38	55	20	26	38	55	20	26	38	55
18	22	30	31	22	30	42	55	22	30	42	55	22	30	42	55
35	50	50	50	50	65	85	100	50	65	85	100	50	65	85	100
5	10	15	15	10	15	20	30	10	15	20	30	10	15	20	30
100	100	75	50	100	100	100	100	100	100	100	100	100	100	100	100
4	8	13	14	8	13	14	17	8	13	14	17	8	13	14	17
13	17	28	55	17	28	55	74	17	28	55	74	17	28	55	74
32	40	55	63	40	55	80	121	40	55	80	121	40	55	80	121
36	47	63	66	47	63	89	121	47	63	89	121	47	63	89	121
74	105	105	105	105	143	187	220	105	143	187	220	105	143	187	220
8	17	30	30	17	30	40	63	17	30	40	63	17	30	40	63
30,000				30,000				25,000				25,000			
10,000				10,000				10,000				10,000			
10×In				10×In				10×In				10×In			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				-				-			
● (3P Only)				● (3P Only)				-				-			
● (2, 3P Only)				● (3P Only)				-				-			
●				●				●				●			
●				●				●				●			
●				●				●				●			
-				-				●				●			
Terminal Screw								Terminal Screw, Terminal Bus Bar							
Horizontal/Vertical								Horizontal/Vertical							
Switchgear (Line & Load, Line Only), Distribution Panel								Switchgear (Line & Load, Line Only)							
Possible if DIN Rail adaptor is be used				-				-				-			
75				90				105				105			
130				155				165				165			
68				68				68				68			
0.8				1.0				1.3				1.3			
232 Page				232 Page				232 Page				232 Page			
149 / 166 Page				150 / 167 Page				151 / 168 Page				151 / 168 Page			

Model Selection Table

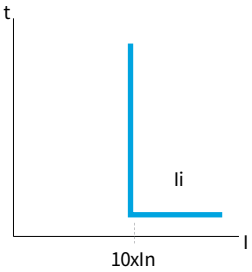
Motor Protection Circuit Breakers (HGM MO Type) : 400 ~ 800 AF

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM400				HGM630				HGM800		
Frame			(AF)	400				630				800		
Number of Poles			(P)	3				3				3		
Rated Current, at 40 °C			(A)	250, 300, 350, 400				500, 630				700, 800		
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)														
Short-Circuit Breaking Category Code				E	S	H	L	E	S	H	L	S	H	L
AC 660/690 V				5	8	10	14	5	8	10	14	8	10	14
AC 480/500 V				18	35	50	65	25	45	50	65	45	50	65
AC 440/460 V				38	50	70	85	38	50	70	85	50	70	85
AC 380/415 V				45	65	85	100	45	65	85	100	65	85	100
AC 220/240 V				50	75	100	125	50	75	100	125	75	100	125
DC 250 V (2P)				20	25	40	40	20	25	40	40	25	40	40
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)														
AC 660/690 V				8	14	17	28	8	14	17	28	14	17	28
AC 480/500 V				36	74	105	143	53	95	105	143	95	105	143
AC 440/460 V				80	105	154	187	80	105	154	187	105	154	187
AC 380/415 V				95	143	187	220	95	143	187	220	143	187	220
AC 220/240 V				105	165	220	275	105	165	220	275	165	220	275
DC 250 V (2P)				40	53	84	84	40	53	84	84	53	84	84
Endurance [times] (Durability)														
Mechanical				4,000				2,500				2,500		
Electrical (at 460 V)				1,000				500				500		
Trip Device														
Magnetic	Instantaneous [INST]			10×In				10×In				10×In		
Accessory														
Internal	Auxiliary Switch		AUX	●				●				●		
	Alarm Switch		ALT	●				●				●		
	Shunt Trip		SHT	●				●				●		
	Under-Voltage Trip		UVT	●				●				●		
External	Rotary Handle	Front Contact	TFG	●				●				●		
		Extension	TFH	●				●				●		
	Mechanical Open/Close Device		MOT	●				●				●		
	Mechanical Interlock		MIF	●				●				●		
	Handle Locking Device		PLD	●				●				●		
	Plug-in	TDM (LINE/LOAD)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDM (LINE Only)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDF (LINE Only)		-				-				-		
		TDA (1 row)		-				-				-		
		TDA (2 rows)		-				-				-		
	Cage Terminal Block		CTB	●				●				●		
	Terminal Cover		TCF	●				●				●		
	Insulation Barrier		TQQ	●				●				●		
	Terminal Bus Bar		TBB	●				●				●		
Installation and Dimensions														
Connection/ Installation		Front Connection		Terminal Screw				Terminal Screw, Terminal Bus Bar						
		Rear Connection		Horizontal/Vertical Cable				Horizontal/Vertical Cable						
		Plug-in		Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)						
Dimension (mm) 		a (3P)		140				210				210		
		b		257				280				280		
		c		110				110				110		
Weight (kg)		3P		4.5				9.5				9.5		
Detailed Rating and Selection				232 Page				232 Page				232 Page		
Characteristic Curve and Appearance				151 / 169 Page				152 / 170 Page				152 / 170 Page		





Characteristics Curve
(I - t Curve)

Trip Unit Characteristics - Thermal Magnetic

Rated Current (A) In		40	50	63	75	80	100	125
MCCB	HGM50	●	●					
	HGM60	●	●	●				
	HGM100	●	●	●	●	●	●	
	HGM125	●	●	●	●	●	●	●
Instantaneous Characteristics Ii								
Setting Value (A)	10×In	400	500	630	750	800	1,000	1,250
	Max. Non-Tripping Current (A)	320	400	504	600	640	800	1,000
	Min. Tripping Current (A)	480	600	756	900	960	1,200	1,500

Rated Current (A) In		100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
MCCB	HGM160	●	●	●	●											
	HGM250	●	●	●	●	●	●	●	●							
	HGM400								●	●	●	●				
	HGM630												●	●		
	HGM800														●	●
Instantaneous Characteristics Ii																
Setting Value (A)	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Tripping Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600

Model Selection Table

ZCT Embedded Molded Case Circuit Breaker (HGM Type) : 32 ~ 250 AF

As a model with a built-in ZCT in MCCB, it is a device that detects grounding when connected to an external ELR (Earth Leakage Relay) that can enhance reliability.

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM30		HGM50				HGM60			
Frame			(AF)	32		50				63			
Number of Poles			(P)	2 [2], 3, 4 [1]		2 [2], 3, 4 [1]				2 [2], 3, 4 [1]			
Rated Current, at 40°C			(A)	16, 20, 25, 32		16, 20, 25, 32, 40, 50				16, 20, 25, 32, 40, 50, 63			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)													
Short-Circuit Breaking Category Code				E	S	E	S	H	L	E	S	H	L
AC 660/690 V				2.5	5	2.5	5	8	10	2.5	5	7.5	8
AC 480/500 V				7.5	10	7.5	10	26	35	7.5	10	14	26
AC 415/440/460 V				16	20	16	20	38	55	16	20	26	30
AC 380 V				18	22	18	22	42	55	18	22	30	31
AC 220/240 V				35	50	35	50	85	100	35	50	50	50
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	75	50
Rated Short-Circuit Making Capacity [Icm] (kA peak)													
AC 660/690 V				4	8	4	8	14	17	4	8	13	14
AC 480/500 V				13	17	13	17	55	74	13	17	28	55
AC 415/440/460 V				32	40	32	40	80	121	32	40	55	63
AC 380 V				36	47	36	47	89	121	36	47	63	66
AC 220/240 V				74	105	74	105	187	220	74	105	105	105
DC 250 V (2P)				8	17	8	17	40	63	8	17	30	30
Endurance [times] (Durability)													
Mechanical				30,000		30,000				30,000			
Electrical (at 460 V)				10,000		10,000				10,000			
ZCT Output Characteristics				200 mA/100 mV		200 mA/100 mV				200 mA/100 mV			
Trip Device													
Thermal Magnetic	Long Time [LTD]			(1.0)×In		(1.0)×In				(1.0)×In			
	Instantaneous [INST]			400 A		16 ~ 32 A : 400 A, 40 ~ 50 A : 10×In				16 ~ 32 A : 400 A, 40 ~ 63 A : 10×In			
Accessory													
Internal	Auxiliary Switch		AUX	●		●				●			
	Alarm Switch		ALT	●		●				●			
	Shunt Trip		SHT	●		●				●			
	Under-Voltage Trip		UVT	●		●				●			
External	Rotary Handle	Front Contact	TFG	●		●				●			
		Extension	TFH	●		●				●			
	Mechanical Open/Close Device		MOT	●		●				●			
	Mechanical Interlock		MIF	●		●				●			
	Handle Locking Device		PLD	●		●				●			
	Plug-in	TDM (LINE/LOAD)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDM (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDF (LINE Only)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (1 row)		● (3P Only)		● (3P Only)		● (3P Only)		● (3P Only)			
		TDA (2 rows)		● (2, 3P Only)		● (2, 3P Only)		● (3P Only)		● (2, 3P Only)			
	Cage Terminal Block		CTB	●		●				●			
	Terminal Cover		TCF	●		●				●			
	Insulation Barrier		TQQ	●		●				●			
	Terminal Bus Bar		TBB	-		-				-			
Installation and Dimensions													
Connection/ Installation		Front Connection		Terminal Screw									
		Rear Connection		Horizontal/Vertical									
		Plug-in		Switchgear (Line & Load, Line Only), Distribution Panel									
		DIN Rail Installation		Possible if DIN Rail adaptor is used				-		Possible if DIN Rail adaptor is used			
Dimension (mm)		a (2/3/4P)		75/75/100		75/75/100		90/90/120		75/75/100			
		b		130		130		155		130			
		c		68		68		68		68			
Weight (kg)		2/3/4P		0.7/0.8/1.0		0.7/0.8/1.0		0.9/1.0/1.3		0.7/0.8/1.0			
Detailed Rating and Selection				232 Page		232 Page		232 Page		232 Page			
Characteristic Curve and Appearance				149 / 166 Page		149 / 166 Page		150 / 167 Page		149 / 166 Page			

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N

2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.

HGM100				HGM125				HGM160				HGM250			
100				125				160				250			
2 [2], 3, 4 [1]				2 [2], 3, 4 [1]				2 [2], 3, 4 [1]				2 [2], 3, 4 [1]			
16, 20, 25, 32, 40, 50, 63, 75, 80, 100				16, 20, 25, 32, 40, 50, 63, 75, 80, 100, 125				100, 125, 150, 160				100, 125, 150, 160, 175, 200, 225, 250			
E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
2.5	5	7.5	8	5	7.5	8	10	7.5	8	8	10	7.5	8	8	10
7.5	10	14	26	10	14	26	35	14	20	26	35	14	20	26	35
16	20	26	30	20	26	38	55	20	26	38	55	20	26	38	55
18	22	30	31	22	30	42	55	22	30	42	55	22	30	42	55
35	50	50	50	50	65	85	100	50	65	85	100	50	65	85	100
100	100	75	50	100	100	100	100	100	100	100	100	100	100	100	100
4	8	13	14	8	13	14	17	8	13	14	17	8	13	14	17
13	17	28	55	17	28	55	74	17	28	55	74	17	28	55	74
32	40	55	63	40	55	80	121	40	55	80	121	40	55	80	121
36	47	63	66	47	63	89	121	47	63	89	121	47	63	89	121
74	105	105	105	105	143	187	220	105	143	187	220	105	143	187	220
8	17	30	30	17	30	40	63	17	30	40	63	17	30	40	63
30,000				30,000				25,000				25,000			
10,000				10,000				10,000				10,000			
200 mA/100 mV				200 mA/100 mV				200 mA/100 mV				200 mA/100 mV			
(1.0)×In				(1.0)×In				(1.0)×In				(1.0)×In			
16 ~ 32 A : 400 A, 40 ~ 100 A : 10×In				16 ~ 32 A : 400 A, 40 ~ 125 A : 10×In				10×In				10×In			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				-				-			
● (3P Only)				● (3P Only)				-				-			
● (2, 3P Only)				● (3P Only)				-				-			
●				●				●				●			
●				●				●				●			
●				●				●				●			
-				-				●				●			
Terminal Screw								Terminal Screw, Terminal Bus Bar							
Horizontal/Vertical								Horizontal/Vertical							
Switchgear (Line & Load, Line Only), Distribution Panel								Switchgear (Line & Load, Line Only)							
Possible if DIN Rail adaptor is used				-				-				-			
75/75/100				90/90/120				105/105/140				105/105/140			
130				155				165				165			
68				68				68				68			
0.7/0.8/1.0				0.9/1.0/1.3				1.1/1.3/1.7				1.1/1.3/1.7			
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Model Selection Table

ZCT Embedded Molded Case Circuit Breaker (HGM Type)：400 ~ 800 AF

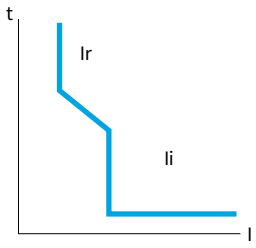
Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGM400				HGM630				HGM800		
Frame			(AF)	400				630				800		
Number of Poles			(P)	2 [2], 3, 4 [1]				2 [2], 3				2 [2], 3		
Rated Current, at 40 °C			(A)	250, 300, 350, 400				500, 630				700, 800		
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)														
Short-Circuit Breaking Category Code				E	S	H	L	E	S	H	L	S	H	L
AC 660/690 V				5	8	10	14	5	8	10	14	8	10	14
AC 480/500 V				18	35	50	65	25	45	50	65	45	50	65
AC 440/460 V				38	50	70	85	38	50	70	85	50	70	85
AC 380/415 V				45	65	85	100	45	65	85	100	65	85	100
AC 220/240 V				50	75	100	125	50	75	100	125	75	100	125
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)														
AC 660/690 V				8	14	17	28	8	14	17	28	14	17	28
AC 480/500 V				36	74	105	143	53	95	105	143	95	105	143
AC 440/460 V				80	105	154	187	80	105	154	187	105	154	187
AC 380/415 V				95	143	187	220	95	143	187	220	143	187	220
AC 220/240 V				105	165	220	275	105	165	220	275	165	220	275
DC 250 V (2P)				40	53	84	84	40	53	84	84	53	84	84
Endurance [times] (Durability)														
Mechanical				4,000				2,500				2,500		
Electrical (at 460 V)				1,000				500				500		
ZCT Output Characteristics				200 mA/100 mV				200 mA/100 mV				200 mA/100 mV		
Trip Device														
Thermal Magnetic	Long time [LTD]			(1.0)×In				(1.0)×In				(1.0)×In		
	Instantaneous [INST]			10×In				10×In				10×In		
Accessory														
Internal	Auxiliary Switch		AUX	●				●				●		
	Alarm Switch		ALT	●				●				●		
	Shunt Trip		SHT	●				●				●		
	Under-Voltage Trip		UVT	●				●				●		
External	Rotary Handle	Front Contact	TFG	●				●				●		
		Extension	TFH	●				●				●		
	Mechanical Open/Close Device		MOT	●				●				●		
	Mechanical Interlock		MIF	●				●				●		
	Handle Locking Device		PLD	●				●				●		
	Plug-in	TDM (LINE/LOAD)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDM (LINE Only)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDF (LINE Only)		-				-				-		
		TDA (1 row)		-				-				-		
		TDA (2 rows)		-				-				-		
	Cage Terminal Block		CTB	●				●				●		
	Terminal Cover		TCF	●				●				●		
	Insulation Barrier		TQQ	●				●				●		
	Terminal Bus Bar		TBB	●				●				●		
Installation and Dimensions														
Connection/ Installation		Front Connection		Terminal Screw				Terminal Screw, Terminal Bus Bar						
		Rear Connection		Horizontal/Vertical Cable				Horizontal/Vertical Cable						
		Plug-in		Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)						
Dimension (mm)		a (2/3/4P)		140/140/184				210/210				210/210		
		b		257				280				280		
		c		110				110				110		
Weight (kg)		2/3/4P		4/4.5/5.4				8.7/9.5				8.7/9.5		
Detailed Rating and Selection				232 Page				232 Page				232 Page		
Characteristic Curve and Appearance				151 / 169 Page				152 / 170 Page				152 / 170 Page		

※ 1) 4 Pole Arrangement：Basic specification of R-S-T-N
2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.





Characteristic Curve
(I - t Curve)

Trip Unit Characteristics - Thermal Magnetic

Rated Current (A) In		16	20	25	32	40	50	63	75	80	100	125
MCCB	HGM30	●	●	●	●							
	HGM50	●	●	●	●	●	●					
	HGM60	●	●	●	●	●	●	●				
	HGM100	●	●	●	●	●	●	●	●	●	●	
	HGM125	●	●	●	●	●	●	●	●	●	●	●
Moment Characteristics Ir												
Setting Value (A)	1.0×In	16	20	25	32	40	50	63	75	80	100	125
Instantaneous Characteristics Ii												
Setting Value (A)	10×In (Min. 400 A)	400					500	630	750	800	1,000	1,250
	Max. Non-Tripping Current (A)	320					400	504	600	640	800	1,000
	Min. Operational Current (A)	480					600	756	900	960	1,200	1,500
Neutral Pole Protection												
4P3D		Unprotected										
4P4D		-										

Rated Current (A) In		100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
MCCB	HGM160	●	●	●	●											
	HGM250	●	●	●	●	●	●	●	●							
	HGM400								●	●	●	●				
	HGM630												●	●		
	HGM800														●	●
Moment Characteristics Ir																
Setting Value (A)	1.0×In	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
Instantaneous Characteristics Ii																
Setting Value (A)	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Operational Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600
Neutral Pole Protection																
4P3D		Unprotected														
4P4D		-														

Model Selection Table

Earth Leakage Circuit Breaker (HGE Type) : 32 ~ 250 AF

Common Ratings

Rated Operational Voltage, Ue	AC 220/460 V
Usable Voltage Range	AC 187 ~ 506 V
Rated Impulse Withstand Voltage, Uimp	6 kV
Protection Function	Earth Leakage, Overload, Instantaneous, Short-Circuit Protection

Suitablilty for Isolation	Yes
Utilization Category	A
Pollution Degree	3
Reference Standard	IEC 60947-2

Model Name				HGE30	HGE50			HGE60			
Frame			(AF)	32	50			63			
Number of Poles			(P)	2 [2], 3, 4 [1]	2 [2], 3, 4 [1]			2 [2], 3, 4 [1]			
Rated Current, at 40 °C			(A)	16, 20, 25, 32	16, 20, 25, 32, 40, 50			16, 20, 25, 32, 40, 50, 63			
High Speed Type											
Adjustable Residual Current			(mA)	30	30			30			
Max. Operational Time			(s)	0.1	0.1			0.1			
Time Delay Type											
Adjustable Residual Current			(mA)	100 - 300 - 500 - 1,000 Adjustable	100 - 300 - 500 - 1,000 Adjustable			100 - 300 - 500 - 1,000 Adjustable			
Maximum Operational Time			(s)	0.1 - 0.4 - 1.0 - 2.0	0.1 - 0.4 - 1.0 - 2.0			0.1 - 0.4 - 1.0 - 2.0			
Inertial Delay Time			(ms)	0 - 200 - 500 - 1,000 Adjustable	0 - 200 - 500 - 1,000 Adjustable			0 - 200 - 500 - 1,000 Adjustable			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)											
Short-Circuit Breaking Category Code				E	S	E	S	H	L	E	S	H	L
AC 415/440/460 V				16	20	16	20	38	55	16	20	26	30
AC 380 V				16	22	18	22	42	55	18	22	30	31
AC 220/240V				35	50	35	50	85	100	35	50	50	50
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	75	50
Rated Short-Circuit Making Capacity [Icm] (kA peak)											
AC 415/440/460 V				32	40	32	40	80	121	32	40	55	63
AC 380 V				36	47	36	47	89	121	36	47	63	66
AC 220/240 V				74	105	74	105	187	220	74	105	105	105
Endurance [times] (Durability)											
Mechanical				30,000	30,000					30,000			
Electrical (at 460 V)				10,000	10,000					10,000			
Trip Device											
Thermal Magnetic	Long Time [LTD]			(1.0)×In	(1.0)×In					(1.0)×In			
	Instantaneous [INST]			400 A	16 ~ 32 A : 400 A, 40, 50 A : 10×In					16 ~ 32 A : 400 A, 40 ~ 63 A : 10×In			
Accessory											
Internal	Auxiliary Switch		AUX	●	●					●			
	Alarm Switch		ALT	●	●					●			
	Shunt Trip		SHT	-	-					-			
	Under-Voltage Trip		UVT	-	-					-			
External	Rotary Handle	Front Contact	TFG	●	●					●			
		Extension	TFH	●	●					●			
	Mechanical Open/Close Device		MOT	●	●					●			
	Mechanical Interlock		MIF	●	●					●			
	Handle Locking Device		PLD	●	●					●			
	Plug-in	TDM (LINE/LOAD)		● (3P Only)	● (3P Only)			● (3P Only)		● (3P Only)			
		TDM (LINE Only)		● (3P Only)	● (3P Only)			● (3P Only)		● (3P Only)			
		TDF (LINE Only)		● (3P Only)	● (3P Only)			● (3P Only)		● (3P Only)			
		TDA (1 row)		● (3P Only)	● (3P Only)			● (3P Only)		● (3P Only)			
		TDA (2 rows)		● (2, 3P Only)	● (2, 3P Only)			● (3P Only)		● (2, 3P Only)			
	Cage Terminal Block		CTB	●	●					●			
	Terminal Cover		TCF	●	●					●			
	Insulation Barrier		TQQ	●	●					●			
	Terminal Bus Bar		TBB	-	-					-			
Installation and Dimensions											
Connection/ Installation		Front Connection		Terminal Screw									
		Rear Connection		Horizontal/Vertical									
		Plug-in		Switchgear (Line & Load, Line Only), Distribution Panel									
		DIN Rail Installation		Possible if DIN Rail adaptor is used				-		Possible if DIN Rail adaptor is used			
Dimension (mm)		a (2/3/4P)		75/75/100	75/75/100			90/90/120		75/75/100			
		b		130	130			155		130			
		c		68	68			68		68			
Weight (kg)		2/3/4P		0.8/0.9/1.3	0.8/0.9/1.3			1.0/1.1/1.4		0.8/0.9/1.3			
Detailed Rating and Selection				232 Page	232 Page			232 Page		232 Page			
Characteristic Curve and Appearance				149 / 171 Page	149 / 171 Page			150 / 172 Page		149 / 171 Page			

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N

2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.

HGE100	HGE125	HGE160	HGE250
100	125	160	250
2[2], 3, 4[1]	2[2], 3, 4[1]	2[2], 3, 4[1]	2[2], 3, 4[1]
16, 20, 25, 32, 40, 50, 63, 75, 80, 100	16, 20, 25, 32, 40, 50, 63, 75, 80, 100, 125	100, 125, 150, 160	100, 125, 150, 160, 175, 200, 225, 250
30	30	30	30
0.1	0.1	0.1	0.1
100 - 300 - 500 - 1,000 Adjustable	100 - 300 - 500 - 1,000 Adjustable	100 - 300 - 500 - 1,000 Adjustable	100 - 300 - 500 - 1,000 Adjustable
0.1 - 0.4 - 1.0 - 2.0	0.1 - 0.4 - 1.0 - 2.0	0.1 - 0.4 - 1.0 - 2.0	0.1 - 0.4 - 1.0 - 2.0
0 - 200 - 500 - 1,000 Adjustable	0 - 200 - 500 - 1,000 Adjustable	0 - 200 - 500 - 1,000 Adjustable	0 - 200 - 500 - 1,000 Adjustable
E S H L	E S H L	E S H L	E S H L
16 20 26 30	20 26 38 55	20 26 38 55	20 26 38 55
18 22 30 31	22 30 42 55	22 30 42 55	22 30 42 55
30 50 50 50	50 65 85 100	50 65 85 100	50 65 85 100
100 100 75 50	100 100 100 100	100 100 100 100	100 100 100 100
32 40 55 63	40 55 80 121	40 55 80 121	40 55 80 121
36 47 63 66	47 63 89 121	47 63 89 121	47 63 89 121
74 105 105 105	105 143 187 220	105 143 187 220	105 143 187 220
30,000	30,000	25,000	25,000
10,000	10,000	10,000	10,000
(1.0)×In	(1.0)×In	(1.0)×In	(1.0)×In
16 ~ 32 A : 400 A, 40 ~ 100 A : 10×In	16 ~ 32 A : 400 A, 40 ~ 125 A : 10×In	10×In	10×In
●	●	●	●
●	●	●	●
-	-	-	-
-	-	-	-
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
● (3P Only)	● (3P Only)	-	-
● (3P Only)	● (3P Only)	-	-
● (2, 3P Only)	● (3P Only)	-	-
●	●	●	●
●	●	●	●
●	●	●	●
-	-	●	●
Terminal Screw		Terminal Screw, Terminal Bus Bar	
Horizontal/Vertical		Horizontal/Vertical	
Switchgear (Line & Load, Line Only), Distribution Panel		Switchgear (Line & Load, Line Only)	
Possible if DIN Rail adaptor is used	-	-	-
75/75/100	90/90/120	105/105/140	105/105/140
130	155	165	165
68	68	68	68
0.8/0.9/1.3	1.0/1.1/1.4	1.3/1.5/1.9	1.3/1.5/1.9
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Model Selection Table

Earth Leakage Circuit Breaker (HGE Type) : 400 ~ 800 AF

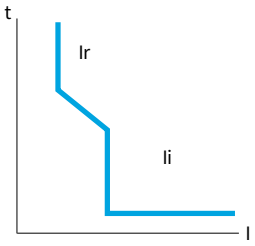
Common Ratings

Rated Operational Voltage, Ue	AC 220/460 V	Suitablilty for Isolation	Yes
Usable Voltage Range	AC 187 ~ 506 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	6 kV	Pollution Degree	3
Protection Function	Earth Leakage, Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

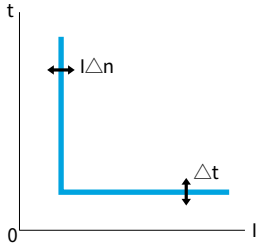
Model Name				HGE400				HGE630				HGE800		
Frame			(AF)	400				630				800		
Number of Poles			(P)	2 [2], 3, 4 [1]				2 [2], 3				2 [2], 3		
Rated Current, at 40 °C			(A)	250, 300, 350, 400				500, 630				700, 800		
High Speed Type														
Adjustable Residual Current			(mA)	30				30				30		
Max. Operational Time			(s)	0.1				0.1				0.1		
Time Delay Type														
Adjustable Residual Current			(mA)	100 - 300 - 500 - 1,000 Adjustable				100 - 300 - 500 - 1,000 Adjustable				100 - 300 - 500 - 1,000 Adjustable		
Max. Operational Time			(s)	0.1 - 0.4 - 1.0 - 2.0				0.1 - 0.4 - 1.0 - 2.0				0.1 - 0.4 - 1.0 - 2.0		
Inertial Delay Time			(ms)	0 - 200 - 500 - 1,000 Adjustable				0 - 200 - 500 - 1,000 Adjustable				0 - 200 - 500 - 1,000 Adjustable		
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)														
Short-Circuit Breaking Category Code				E	S	H	L	E	S	H	L	S	H	L
AC 440/460 V				38	50	70	85	38	50	70	85	50	70	85
AC 380/415 V				45	65	85	100	45	65	85	100	65	85	100
AC 220/240 V				50	75	100	125	50	75	100	125	75	100	125
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)														
AC 440/460 V				80	105	154	187	80	105	154	187	105	154	187
AC 380/415 V				95	143	187	220	95	143	187	220	143	187	220
AC 220/240 V				105	165	220	275	105	165	220	275	165	220	275
Endurance [times] (Durability)														
Mechanical				4,000				2,500				2,500		
Electrical (at 460 V)				1,000				500				500		
Trip Device														
Thermal Magnetic	Long Time [LTD]			(1.0)×In				(1.0)×In				(1.0)×In		
	Instantaneous [INST]			10×In				10×In				10×In		
Accessory														
Internal	Auxiliary Switch		AUX	●				●				●		
	Alarm Switch		ALT	●				●				●		
	Shunt Trip		SHT	●				●				●		
	Under-Voltage Trip		UVT	●				●				●		
External	Rotary Handle	Front Contact	TFG	●				●				●		
		Extension	TFH	●				●				●		
	Mechanical Open/Close Device		MOT	●				●				●		
	Mechanical Interlock		MIF	●				●				●		
	Handle Locking Device		PLD	●				●				●		
	Plug-in	TDM (LINE/LOAD)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDM (LINE Only)		● (3P Only)				● (3P Only)				● (3P Only)		
		TDF (LINE Only)		-				-						
		TDA (1 row)		-				-						
		TDA (2 rows)		-				-						
	Cage Terminal Block		CTB	●				●				●		
	Terminal Cover		TCF	●				●				●		
	Insulation Barrier		TQQ	●				●				●		
	Terminal Bus Bar		TBB	●				●				●		
Installation and Dimensions														
Connection/ Installation		Front Connection		Terminal Screw				Terminal Screw, Terminal Bus Bar						
		Rear Connection		Horizontal/Vertical Cable				Horizontal/Vertical Cable						
		Plug-in		Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)						
Dimension (mm) 		a (2/3/4P)		140/140/184				210/210				210/210		
		b		257				280				280		
		c		110				110				110		
Weight (kg)		3/4P		4/4.5/5.4				8.7/9.5				8.7/9.5		
Detailed Rating and Selection				232 Page				232 Page				232 Page		
Characteristic Curve and Appearance				151 / 174 Page				152 / 175 Page				152 / 175 Page		

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N
2) As for 2P products, only the neutral pole in the 3P product has been eliminated so the dimension is equivalent to the 3P product.

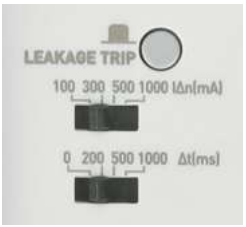




Over-Current Protection Characteristics



Earth Leakage Protection Characteristics (Time Delay Type)



Trip Unit Characteristics - Thermal Magnetic

Rated Current (A) In		16	20	25	32	40	50	63	75	80	100	125
ELCB	HGE30	●	●	●	●							
	HGE50	●	●	●	●	●	●					
	HGE60	●	●	●	●	●	●	●				
	HGE100	●	●	●	●	●	●	●	●	●	●	
	HGE125	●	●	●	●	●	●	●	●	●	●	●
Moment Characteristics Ir												
Setting Value (A)	1.0×In	16	20	25	32	40	50	63	75	80	100	125
Instantaneous Characteristics Ii												
Setting Value (A)	10×In (Min. 400 A)	400					500	630	750	800	1,000	1,250
	Max. Non-Tripping Current (A)	320					400	504	600	640	800	1,000
	Min. Operational Current (A)	480					600	756	900	960	1,200	1,500
Rated Non-Operational Time I△n												
High-Speed Type		Fixed : 30 mA										
Time Delay Type		Adjustable : 100 - 300 - 500 - 1,000 mA										
Inertial Propagation Time △t												
High-Speed Type		Fixed : 0 ms										
Time Delay Type		Adjustable : 0 - 200 - 500 - 1,000 ms										
Neutral Pole Protection												
4P3D		Unprotected										
4P4D		-										

Rated Current (A) In		100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
ELCB	HGE160	●	●	●	●											
	HGE250	●	●	●	●	●	●	●	●							
	HGE400								●	●	●	●				
	HGE630												●	●		
	HGE800														●	●
Moment Characteristics Ir																
Setting Value (A)	1.0×In	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
Instantaneous Characteristics Ii																
Setting Value (A)	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Operational Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600
Rated Non-Operational Time I△n																
High-Speed Type		Fixed : 30 mA														
Time Delay Type		Adjustable : 100 - 300 - 500 - 1,000 mA														
Inertial Propagation Time △t																
High-Speed Type		Fixed : 0 ms														
Time Delay Type		Adjustable : 100 - 200 - 500 - 1,000 mA														
Neutral Pole Protection																
4P3D		Unprotected														
4P4D		-														

Model Selection Table

High Breaking Capacity Type of Molded Case Circuit Breaker (HGP Type) : 50 ~ 800 AF

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Overload, Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGP50D				HGP125D				HGP160D				HGP100			
Frame			(AF)	50				125				160				100			
Number of Poles			(P)	3, 4 [1]				3, 4 [1]				3, 4 [1]				3, 4 [1]			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)																			
Short-Circuit Breaking Category Code				F*[2]	S	H	X	F*[2]	S	H	X	F*[2]	S	H	X	F*[2]	S	H	X
AC 660/690 V				6	8	8	10	6	8	8	10	6	8	8	10	6	8	8	10
AC 480/500 V				25	50	65	100	25	50	65	100	25	50	65	100	25	50	65	100
AC 440/460 V				36	65	85	150	36	65	85	150	36	65	85	150	36	65	85	150
AC 380/415 V				50	85	100	150	50	85	100	150	50	85	100	150	50	85	100	150
AC 220/240 V				65	100	130	200	65	100	130	200	65	100	130	200	65	100	130	200
DC 250 V [3]				36	65	85	100	36	65	85	100	36	65	85	100	36	65	85	100
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)																			
AC 660/690 V				9	14	14	17	9	14	14	17	9	14	14	17	9	14	14	17
AC 480/500 V				53	105	143	220	53	105	143	220	53	105	143	220	53	105	143	220
AC 440/460 V				76	143	187	330	76	143	187	330	76	143	187	330	76	143	187	330
AC 380/415 V				105	187	220	330	105	187	220	330	105	187	220	330	105	187	220	330
AC 220/240 V				143	220	286	440	143	220	286	440	143	220	286	440	143	220	286	440
Endurance [times] (Durability)																			
Mechanical				25,000				25,000				25,000				25,000			
In @ 440 V				10,000				10,000				10,000				10,000			
Trip Device																			
Thermal Magnetic				●				●				●				●			
	Rated Current, at 40 °C		(A)	16, 20, 25, 32, 40, 50				16, 20, 25, 32, 40, 50, 63, 75, 80, 100, 125				100, 125, 160				40, 50, 63, 80, 100			
	Long Time [LTD]			(0.8-0.9-1.0)×In				(0.8-0.9-1.0)×In				(0.8-0.9-1.0)×In				(0.7-0.8-0.9-1.0)×In			
	Instantaneous [INST]			16~32 A : 400 A, 40~50 A : 10×In				16~32 A : 400 A, 40~50 A : 10×In				10×In				10×In			
Electronic				-				-				-				●			
	Rated Current, at 40 °C		(A)	-				-				-				40, 100			
	Long Time [LTD]	Ir (A)	N, D, A, E	-				-				-				0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In			
		Tr (s)	N	-				-				-				16 @ 6Ir			
			D, A, E	-				-				-				0.5-1-2-4-6-8-16 @ 6×Ir			
	Short Time [STD]	Isd (A)	N, D, A, E	-				-				-				1.5-2-3-4-5-6-7-8-10×In			
		Tsd (s)	N	-				-				-				0.1			
			D, A, E	-				-				-				0.1-0.2-0.3-0.4			
	Instantaneous [INST]	Ii (A)	N	-				-				-				1,500			
			D, A, E	-				-				-				1.5-2-4-6-8-10-11-12-13-14-15×In			
		Break time (s)	N, D, A, E	-				-				-				0.05			
	Ground Fault Protection [GFT]	Ig (A)	N	-				-				-				NA			
			D, A, E	-				-				-				OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In			
		Tg (ms)	N	-				-				-				NA			
			D, A, E	-				-				-				0.1-0.2-0.3-0.4			
	N Pole Protection (L, S)	(A)	N, D, A, E	-				-				-				OFF-0.5-1-1.6 [4]×In			
Installation and Dimensions																			
Connection/ Installation	Front Connection			Terminal Screw				Terminal Screw				Terminal Screw				Terminal Screw, Terminal Bus Bar			
	Rear Connection			Horizontal/Vertical Cable				Horizontal/Vertical Cable				Horizontal/Vertical Cable				Horizontal/Vertical Cable			
	Plug-in			Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)			
Dimension (mm)	a (3/4P)			90/120				90/120				90/120				105/140			
	b			140				140				140				165			
	c			86				86				86				86.5			
Weight (kg)	3/4P			1.5/1.8				1.5/1.8				1.5/1.8				2/2.6			
Detailed Rating and Selection				234				234				234				234			
Characteristic Curve and Appearance				156 / 176				156 / 176				156 / 176				157 [5] / 177			

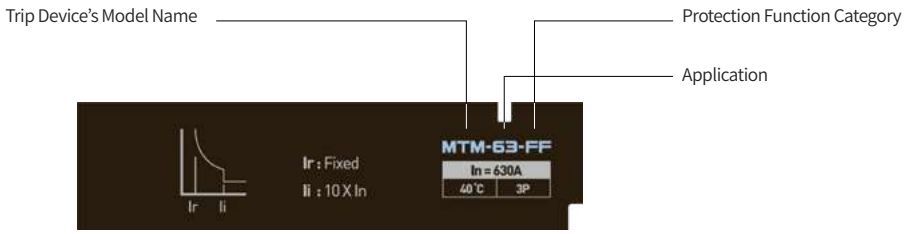
※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N
2) Only applicable to oversea products/ship products
3) DC is only applicable to thermal magnetic
4) Only applicable if Ir < 0.63 ("1" is applicable if Ir ≥ 0.63)
5) The characteristic curve of electronic MCCB : 161 ~ 163 page

Accessory	
Internal	Auxiliary switch (AUX), Alarm switch (ALT), Shunt trip (SHT), Undervoltage trip (UVT)
External	Rotary handle - Front Contact Type (TFG)/Extension Type (TFH), Motor operator (MOT), Mechanical interlock (MIF), Locking device (PLD), Cage terminal block (CTB), Insulation terminal cover (TCF), Insulation barrier (TQQ) ※ Plug-in TDM is only for 3 pole and can be selected by LINE/LODE(P3), LINE Only(F3).Terminal extensions (TBB) excludes HGP50D, 125D and 160D types.

HGP160				HGP250				HGP400				HGP630				HGP800			
160				250				400				630				800			
3, 4 [1]				3, 4 [1]				3, 4 [1]				3, 4 [1]				3, 4 [1]			
F*[2]	S	H	X	F*[2]	S	H	X	F*[2]	S	H	X	F*[2]	S	H	X	F*[2]	S	H	X
6	8	8	10	6	8	8	10	10	10	20	35	10	10	20	35	10	10	20	35
25	50	65	100	25	50	65	100	25	50	70	100	25	50	70	100	25	50	70	100
36	65	85	150	36	65	85	150	36	70	85	150	36	70	85	150	36	70	85	150
50	85	100	150	50	85	100	150	50	85	100	150	50	85	100	150	50	85	100	150
65	100	130	200	65	100	130	200	65	100	130	200	65	100	130	200	65	100	130	200
36	65	85	100	36	65	85	100	36	65	85	100	36	65	85	100	36	65	85	100
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
9	14	14	17	9	14	14	17	17	17	40	74	17	17	40	74	17	17	40	74
53	105	143	220	53	105	143	220	53	105	154	220	53	105	154	220	53	105	154	220
76	143	187	330	76	143	187	330	76	154	187	330	76	154	187	330	76	154	187	330
105	187	220	330	105	187	220	330	105	187	220	330	105	187	220	330	105	187	220	330
143	220	286	440	143	220	286	440	143	220	286	440	143	220	286	440	143	220	286	440
25,000				25,000				20,000				20,000				10,000			
10,000				10,000				6,000				4,000				3,000			
●				●				●				●				●			
100, 125, 150, 160				125, 150, 160, 175, 200, 225, 250				300, 350, 400				500, 630				700, 800			
(0.7-0.8-0.9-1.0)×In				(0.7-0.8-0.9-1.0)×In				(0.8-0.9-1.0)×In				(0.8-0.9-1.0)×In				(0.8-0.9-1.0)×In			
(5-6-7-8-9-10)×In				(5-6-7-8-9-10)×In				(5-6-7-8-9-10)×In				(5-6-7-8-9-10)×In				(5-6-7-8-9-10)×In			
●				●				●				●				●			
100, 160				160, 250				250, 400				630				800			
0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In				0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In				0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In				0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In				0.4-0.45-0.5-0.56-0.63-0.7-0.8-0.9-1×In			
16 @ 6Ir				16 @ 6Ir				16 @ 6Ir				16 @ 6Ir				16 @ 6Ir			
0.5-1-2-4-6-8-16 @ 6×Ir				0.5-1-2-4-6-8-16 @ 6×Ir				0.5-1-2-4-6-8-16 @ 6×Ir				0.5-1-2-4-6-8-16 @ 6×Ir				0.5-1-2-4-6-8-16 @ 6×Ir			
1.5-2-3-4-5-6-7-8-10×In				1.5-2-3-4-5-6-7-8-10×In				1.5-2-3-4-5-6-7-8-10×In				1.5-2-3-4-5-6-7-8-10×In				1.5-2-3-4-5-6-7-8-10×In			
0.1				0.1				0.1				0.1				0.1			
0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4			
1,500 @ 100 A, 2,400 @ 160 A				2,400 @ 160 A, 3,000 A @ 250 A				3,000 @ 250 A, 4,800 @ 400 A				6,900				8,800			
1.5-2-4-6-8-10-11-12-13-14-15×In				1.5-2-4-6-8-10-11×In				1.5-2-4-6-8-10-11×In				1.5-2-4-6-8-10-11×In				1.5-2-4-6-8-10-11×In			
0.05				0.05				0.05				0.05				0.05			
NA				NA				NA				NA				NA			
OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In				OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In				OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In				OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In				OFF-0.2-0.3-0.4-0.5-0.6-0.7-0.8-1×In			
NA				NA				NA				NA				NA			
0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4				0.1-0.2-0.3-0.4			
OFF-0.5-1-1.6 [4]×In				OFF-0.5-1-1.6 [4]×In				OFF-0.5-1-1.6 [4]×In				OFF-0.5-1-1.6 [4]×In				OFF-0.5-1-1.6 [4]×In			
Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar			
Horizontal/Vertical Cable				Horizontal/Vertical Cable				Horizontal/Vertical Cable				Horizontal/Vertical Cable				Horizontal/Vertical Cable			
Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)			
105/140				105/140				140/186.5				140/186.5				210/280			
165				165				260				260				320			
86.5				86.5				110				110				135			
2/2.6				2/2.6				5.4/7.2				5.4/7.2				15.1/19.6			
234				234				234				234				234			
157 [5] / 177				157 [5] / 177				158 [5] / 178				158 [5] / 178				158 [5] / 179			

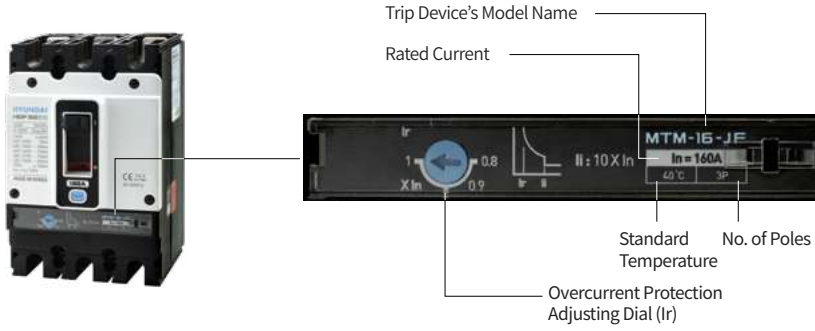
Model Selection Table

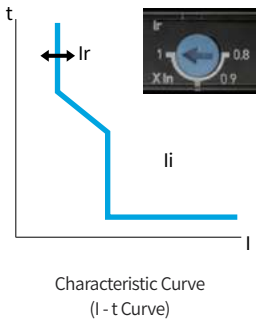
Trip Unit's Model Name and Function (Thermal Magnetic)



Overcurrent Protection	Instantaneous Current Protection	TRIP Unit Name								
		HGP50D	HGP125D	HGP160D	HGP100	HGP160	HGP250	HGP400	HGP630	HGP800
Fixed	Fixed	MTM - 16 - FF			MTM - 25 - FF			MTM - 63 - FF		MTM - 80 - FF
Adjustable	Fixed	MTM - 16 - JF			MTM - 25 - JF			MTM - 63 - JF		MTM - 80 - JF
Adjustable	Adjustable	-			MTM - 25 - JJ			MTM - 63 - JJ		MTM - 80 - JJ

Trip Unit Characteristics – Thermal Magnetic HGP50D, 125D, 160D



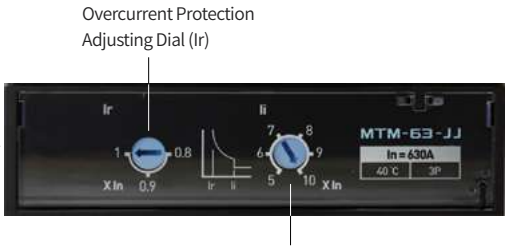


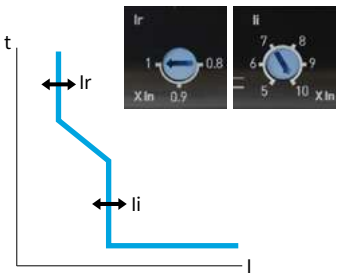
Rated Current (A) In		16	20	25	32	40	50	63	75	80	100	125	150	160
MCCB	HGP50D	●	●	●	●	●	●							
	HGP125D	●	●	●	●	●	●	●	●	●	●	●		
	HGP160D										●	●	●	●
	HGP100					●	●	●	●	●	●			
Moment Characteristics Ir														
Fixed (FF)	1.0×In	16	20	25	32	40	50	63	75	80	100	125	150	160
Adjustable (JF, JJ)	0.7×In [1)]					28 [1)]	35 [1)]	44 [1)]	53 [1)]	56 [1)]	70 [1)]			
	0.8×In	13	16	20	26	32	40	50	60	64	80	100	120	128
	0.9×In	14	18	23	29	36	45	57	68	72	90	113	135	144
	1.0×In	16	20	25	32	40	50	63	75	80	100	125	150	160
Instantaneous Characteristics Ii														
Fixed (FF, JF)	10×In (Min. 400 A)	400					500	630	750	800	1,000	1,250	1,500	1,600
	Max. Non-Tripping Current (A)	320					400	504	600	640	800	1,000	1,200	1,280
	Min. Tripping Current (A)	480					600	756	900	960	1,200	1,500	1,800	1,920
Neutral Pole Protection														
4P3D (Neutral Unprotected)		●	●	●	●	●	●	●	●	●	●	●	●	●
4P4D (Neutral Protected 100 % Ir)		●	●	●	●	●	●	●	●	●	●	●	●	●

※ 1) Only applicable to HGP100

Trip Unit Characteristics – Thermal Magnetic HGP250, 400, 630, 800







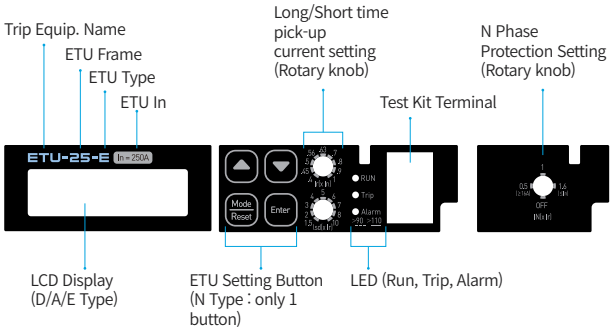
Rated Current (A) In		100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
MCCB	HGP100	● 1)														
	HGP160	●	●	●	●											
	HGP250		●	●	●	●	●	●	●							
	HGP400									●	●	●				
	HGP630												●	●		
	HGP800														●	●
Moment Characteristics Ir																
Fixed (FF)	1.0×In	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
Adjustable (JF, JJ)	0.7×In	70	88	105	112	123	140	158	175							
	0.8×In	80	100	120	128	140	160	180	200	240	280	320	400	504	560	640
	0.9×In	90	113	135	144	158	180	203	225	270	315	360	450	567	630	720
	1.0×In	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
Instantaneous Characteristics Ii																
Fixed (FF, JF)	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Tripping Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600
Adjustable (JJ)	5×In	500	625	750	800	875	1,000	1,125	1,250	1,500	1,750	2,000	2,500	3,150	3,500	4,000
	Max. Non-Tripping Current (A)	400	500	600	640	700	800	900	1,000	1,200	1,400	1,600	2,000	2,520	2,800	3,200
	Min. Tripping Current (A)	600	750	900	960	1,050	1,200	1,350	1,500	1,800	2,100	2,400	3,000	3,780	4,200	4,800
	6×In	600	750	900	960	1,050	1,200	1,350	1,500	1,800	2,100	2,400	3,000	3,780	4,200	4,800
	Max. Non-Tripping Current (A)	480	600	720	768	840	960	1,080	1,200	1,440	1,680	1,920	2,400	3,024	3,360	3,840
	Min. Tripping Current (A)	720	900	1,080	1,152	1,260	1,440	1,620	1,800	2,160	2,520	2,880	3,600	4,536	5,040	5,760
	7×In	700	875	1,050	1,120	1,225	1,400	1,575	1,750	2,100	2,450	2,800	3,500	4,410	4,900	5,600
	Max. Non-Tripping Current (A)	560	700	840	896	980	1,120	1,260	1,400	1,680	1,960	2,240	2,800	3,528	3,920	4,480
	Min. Tripping Current (A)	840	1,050	1,260	1,344	1,470	1,680	1,890	2,100	2,520	2,940	3,360	4,200	5,292	5,880	6,720
	8×In	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Max. Non-Tripping Current (A)	640	800	960	1,024	1,120	1,280	1,440	1,600	1,920	2,240	2,560	3,200	4,032	4,480	5,120
	Min. Tripping Current (A)	960	1,200	1,440	1,536	1,680	1,920	2,160	2,400	2,880	3,360	3,840	4,800	6,048	6,720	7,680
	9×In	900	1,125	1,350	1,440	1,575	1,800	2,025	2,250	2,700	3,150	3,600	4,500	5,670	6,300	7,200
	Max. Non-Tripping Current (A)	720	900	1,080	1,152	1,260	1,440	1,620	1,800	2,160	2,520	2,880	3,600	4,536	5,040	5,760
	Min. Tripping Current (A)	1,080	1,350	1,620	1,728	1,890	2,160	2,430	2,700	3,240	3,780	4,320	5,400	6,804	7,560	8,640
	10×In	1,000	1,250	1,500	1,600	1,750	2,000	2,250	2,500	3,000	3,500	4,000	5,000	6,300	7,000	8,000
	Max. Non-Tripping Current (A)	800	1,000	1,200	1,280	1,400	1,600	1,800	2,000	2,400	2,800	3,200	4,000	5,040	5,600	6,400
	Min. Tripping Current (A)	1,200	1,500	1,800	1,920	2,100	2,400	2,700	3,000	3,600	4,200	4,800	6,000	7,560	8,400	9,600
Neutral Pole Protection																
4P3D (Neutral Unprotected)		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
4P4D (Neutral Protected 100 % Ir)		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

※ 1) HGP100 100 A product is only applicable to Instantaneous fixed type.

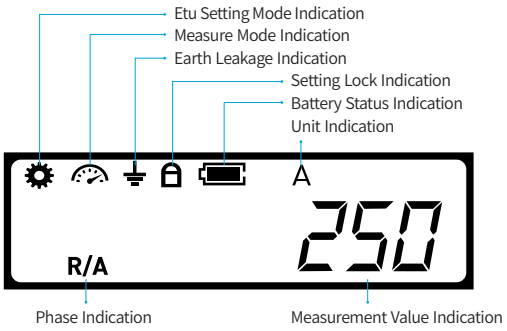
Model Selection Table

Trip Unit's Model Name and Function (ETU)

ETU Part Name



LCD Display / ICON (N Type is not applicable)



ETU Type / AF

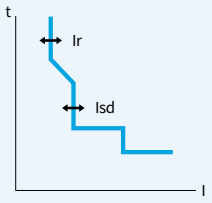
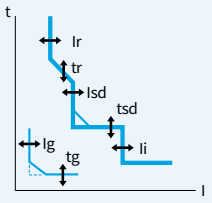
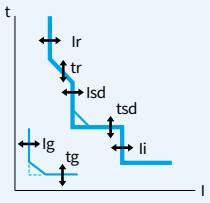
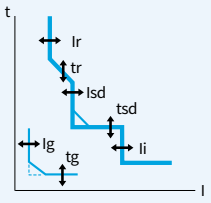
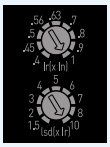
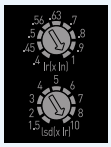
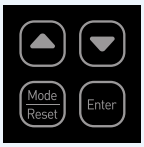
Type	Model (AF)	Trip Unit							
		HGP100, HGP160, HGP250				HGP400		HGP630	HGP800
	Rated Current (A)	40	100	160	250	250	400	630	800
Normal Type		ETU-25-N				ETU-63-N		ETU-63-N	ETU-80-N
Display Type		ETU-25-D				ETU-63-D		ETU-63-D	ETU-80-D
Ammeter Type		ETU-25-A				ETU-63-A		ETU-63-A	ETU-80-A
Energy-meter Type		ETU-25-E				ETU-63-E		ETU-63-E	ETU-80-E

Trip Unit Characteristics – Electronic Type

	N	D	A	E	Remark
HMI	Dial 2 EA	· Dial 2 EA, Key Button 4 EA · Segment LCD	· Dial 2 EA, Key Button 4 EA · Segment LCD	· Dial 2 EA, Key Button 4 EA · Segment LCD	Dial Setting (Ir, Isd)
Protection	· L (Dial) · S (Dial) · I (Fixed) · IN (Dial)	· L (Dial, Key Button) · S (Dial) · I (Key Button) · G (Key Button) · IN (Dial)	· L (Dial, Key Button) · S (Dial) · I (Key Button) · G (Key Button) · IN (Dial)	· L (Dial, Key Button) · S (Dial) · I (Key Button) · G (Key Button) · IN (Dial)	L, S time to be changed by key button
Measurement		· IR, IS, IT, IN, IG	· IR, IS, IT, IN, IG · Iavg, Imax, Imin	· IR, IS, IT, IN, IG, $I_{unbalance\ (per\ phase)}$ · Iavg, Imax, Imin · V, phase to neutral, phase to phase, · P, total/per phase, power factor · Q, total/per phase · S, total/per phase · Active(kW), Reactive(kVAR), Apparent(kVA) · F, THD (I, V, per phase, VLN, VLL) · Harmonic (15 th), Demand I, P	
History / Event	· 20 Trip information (damaged phase, type, time)	· 20 Trip information (damaged phase, type, time)	· 20 Trip information (damaged phase, type, time) · 32 System Event	· 20 Trip information (damaged phase, type, time) · 32 System Event	External power requried DC 24 V
Power	· Self-Power	· Self-Power	· Self-Power External power input (24 V DC)	· Self-Power [1)] External power input (24 V DC)	
Battery	●	●	●	●	
Add-on function	· Test terminal	· Test terminal	· Test terminal · ZSI OUT : 250 AF · ZSI IN/OUT : 630 AF, 800 AF · Trip / Alarm Counter · Operating time 50 % In Over - 24 h	· Test terminal · ZSI OUT : 250 AF · ZSI IN/OUT : 630 AF, 800 AF · Trip / Alarm Counter · Operating time 50 % In Over - 24 h	External power requried DC 24 V
Communication			· RS-485 MODBUS-RTU	· RS-485 MODBUS-RTU	External power requried DC 24 V
Indication	· LED 3 ea · Run LED / Trip LED Alarm LED (90 % off, 110 % on)	· LED 3 ea · Run LED / Trip LED Alarm LED (90 % off, 110 % on)	· LED 3 ea · Run LED / Trip LED Alarm LED (90 % off, 110 % on)	· LED 3 ea · Run LED / Trip LED Alarm LED (90 % off, 110 % on)	

※ 1) ETU self-power active current
Under 250A : over 30%In
Etc. : over 15%In

Trip Unit Overview

Type	ETU N	ETU D	ETU A	ETU E
Protection Elements				
	• For protecting the switchgear / general industry • L, S, I	• For protecting the switchgear / general industry • L, S, I, G	• For protecting the switchgear / general industry • L, S, I, G	• For protecting the switchgear / general industry • L, S, I, G
Trip Unit	 250 AF  630 AF  800 AF	 250 AF  630 AF  800 AF	 250 AF  630 AF  800 AF	 250 AF  630 AF  800 AF
Setting and Display	• Use the dial to set the pick-up for LT and ST. • The setting of time delay has been fixed for operation.  LT pick-up setting ST pick-up setting	• A user can set LT and ST puck-up with a dial. • A user can set the time delay for operation with a keypad. • A user can set a pick-up and time delay of Instantaneous and grounding operation with a keypad. • A user can move around information displayed on the LED window and set relaying with Menu, Up, Down, and Enter button.  LT pick-up setting ST pick-up setting 		
	• It displays load and trip status, which are in use, on the LED window. 	• It displays load and trip status, which are in use, on the LED window. 		
	• A user can check battery replacement time by pressing the keypad with the battery symbol. 	• A user can check battery replacement time on the LED window. 		

※ A battery is consumable. 6 years of use is guaranteed under normal working conditions.
※ Even if the battery is discharged, the trip function of the ETU operates.

Model Selection Table

Trip Unit – Basic (N Type)

Protection

Overload : Long Time Protection Fixed Time Delay (Ir)

It protects the system from overload through fixed operation time and adjustable setting range.

Short Circuit : Short time Protection Fixed Time Delay (Isd)

It protects the system from short-circuit accidents through fixed operation time and adjustable setting range.

Short Circuit : Instantaneous Protection (Ii)

It protects the system from short-circuit accidents with a fixed setting range.

Neutral Wire : Neutral Protection (Ii)

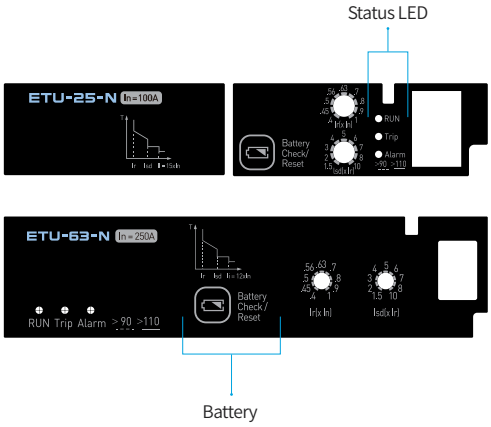
- A 3-phase circuit breaker does not protect a neutral wire.
- In a 4-phase circuit breaker, a setting range is set with a regulating device (dial) to protect the neutral wire.
  - OFF : It does not protect a neutral wire.
  - 0.5 1) : It protects a neutral wire at 0.5 Ir (x in).
  - 1 : It protects a neutral wire at 1 Ir (x in).
  - 1.6 : It protects a neutral wire at 1.6 Ir (x in).
    However, when it exceeds 0.63 A (rated current) in the setting range, a neutral wire is protected at 1 Ir (x in).

※ 1) It is set to 16 A or higher.

Display

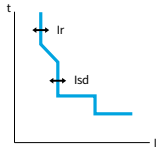
Status LED

- RUN LED : It informs the operation status of a circuit breaker.
- Trip LED : It turns on when a circuit breaker operates.
- Alarm LED : It turns off at I > 0.9 x Ir and turns on at I > 1.1 x Ir.
- Battery Check : It checks battery replacement time by pressing the N-Type Battery Check button.
  - Usable : 3 LED lamps turn on.
  - Replacement Time : One Alarm LED turns on.



Protection Setting Range

N Type



L	Long-Time Protection										
Pick-up [A]	Ir = In x	Dial Setting	0.4	0.45	0.5	0.56	0.63	0.7	0.8	0.9	1
Time Delay [s] Accuracy ±20 %	tr =	Fixed									
		1.5×Ir	378								
		6×Ir	16								
		7.2× Ir	11								
Thermal Memory			20 minutes								
S	Short-Time Protection										
Pick-up [A] Accuracy ±15 %	Isd = Ir x	dial setting	1.5	2	3	4	5	6	7	8	10
Time Delay [s]	tsd =	Fixed									
		Non Triping Time	0.08								
		Max Time	0.14								
I	Instantaneous Protection										
Pick-up [A] Accuracy ±15 %	Ii =	In = 40 A	600								
		In = 100 A	1,500								
		In = 160 A	2,400								
		In = 250 A	3,000								
		In = 400 A	4,800								
		In = 630 A	6,900								
		In = 800 A	8,800								
Time Delay [s]		Maximum Time	≤ 0.05								
IN	Neutral Protection										
Pick-up	IN = Ir x		OFF	0.5	1	1.6					

Trip Unit – D/A/E Type

Protection

Overload : Long time Protection (Ir)

It protects the system from overload through an adjustable setting range and an operational time range.

Short Circuit : Short time Protection (Isd)

It protects the system from short-circuit accidents through an adjustable setting range and an operational time range.

Short Circuit : Instantaneous Protection (Ii)

It protects the system from short-circuit accidents with an adjustable setting range.

Grounding : Ground Fault Protection (Ig)

It protects the system with an adjustable setting range and an operation time range. To find grounding, the residual current is detected in a circuit.

Neutral Wire : Neutral Protection (Ii)

- A 3-phase circuit breaker does not protect a neutral wire.
- In a 4-phase circuit breaker, a setting range is set with a regulating device (dial) to protect the neutral wire.
  - OFF : It does not protect a neutral wire.
  - 0.5 1) : It protects a neutral wire at 0.5 Ir (x in).
  - 1 : It protects a neutral wire at 1 Ir (x in).
  - 1.6 : It protects a neutral wire at 1.6 Ir (x in).
    However, when it exceeds 0.63 A (rated current) in the setting range, a neutral wire is protected at 1 Ir (x in).

※ 1) It is set to 16 A or higher.

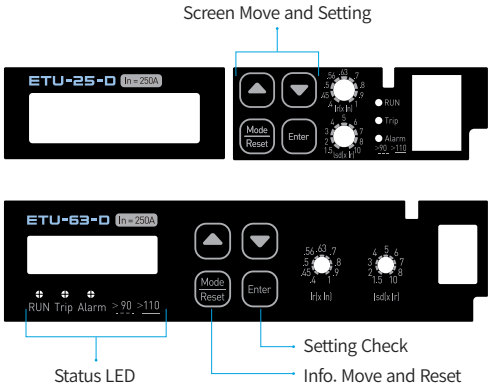
Display

Status LED

- RUN LED : It informs the operation status of a circuit breaker.
- Trip LED : It turns on when a circuit breaker operates.
- Alarm LED : It turns off at I > 0.9 x Ir and turns on at I > 1.1 x Ir.

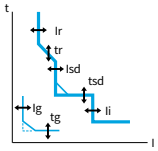
Button

- It moves around the screens on the display and sets the trip units.
- There are 4 buttons: Up, Down, Menu/Reset, and Enter



Protection Setting Range

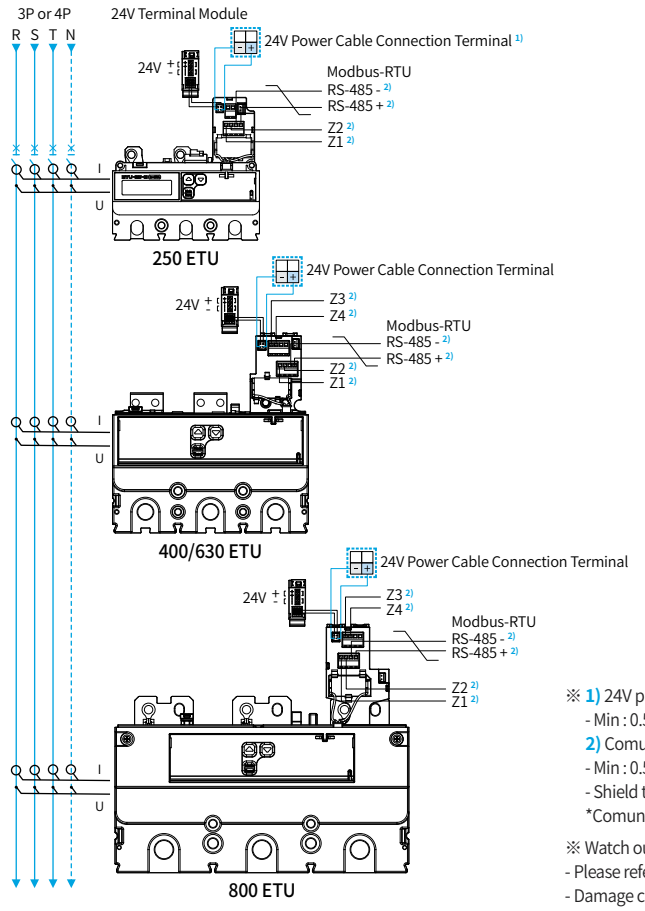
D/A/E Type



L	Long-Time Protection													
Pick-up [A]	Ir = In x	Dial Setting		0.4	0.45	0.5	0.56	0.63	0.7	0.8	0.9	1		
		Button Setting		Correction in 1 A increments. Max correction value = Dial Setting										
Time Delay [s] Accuracy ±20 %	tr =	Button Setting		0.5	1	2	4	6	8	16				
		1.5×Ir		11.8	23.7	47.3	94.7	142	189	378				
		6×Ir		0.5	1	2	4	6	8	16				
		7.2×Ir		345	690	1.38	2.76	4.2	5.5	11				
Thermal Memory				20 minutes										
S	Short-Time Protection													
Pick-up [A] Accuracy ±15%	Isd = Ir x	Dial Setting		1.5	2	3	4	5	6	7	8	10		
Time Delay [s]	tsd =	Butto Setting	I^2 OFF	0.1	0.2	0.3	0.4							
			I^2 ON	0.1	0.2	0.3	0.4							
		Non Triping Time		0.08	0.14	0.23	0.35							
		Max Time		0.14	0.2	0.32	0.5							
I	Instantaneous Protection													
Pick-up [A] Accuracy ±15%	Ii= In x	Button Setting	In = 40 A, 100 A, 160 A	1.5	2	4	6	8	10	11	12	13	14	15
			In ≥ 250 A	1.5	2	4	6	8	10	11				
Time Delay [s]		Maximum Time		≤0.05										
In	Neutral Protection													
Pick-up	IN = Ir x			OFF	0.5	1	1.6							
G	Ground-Fault Protection													
Pick-up [A] Accuracy ±15 %	Ig = In x	Button Setting		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	OFF	In > 40 A	
				0.4	0.5	0.6	0.7	0.8	1	OFF			In = 40 A	
Time Delay [s]	tsd =	Button Setting	I^2 OFF	0.1	0.2	0.3	0.4							
			I^2 ON	0.1	0.2	0.3	0.4							
		Non Triping Time		0.08	0.14	0.23	0.35							
		Max Time		0.14	0.20	0.32	0.5							

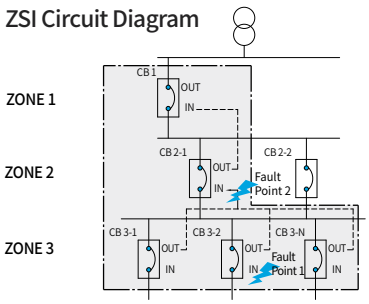
Technical Data (ETU)

Circuit Diagram



ETU A/E	
A/E	**Power** - (Black), + (Red) : 24V DC Power Supply **ZSI (Zone Selective Interlocking)** Z1 : ZSI OUT 0 Z2 : ZSI OUT 1 Z3 : ZSI IN 0 Z4 : ZSI IN 1 ※ Z1-Z3 and Z2-Z4 are connected. ※ Z3 and Z4 are usable for HGP400, 630, and 800. ※ ZSI signal line to connect should not be longer than 3 meters.
E	**Voltage Measurement**

ZSI Circuit Diagram



※ 1) 24V power cable spec.
- Min : 0.5mm^2, Max : 1.5mm^2

2) Comunication cable spec*
- Min : 0.5mm^2, Max : 1.5mm^2
- Shield twisted pair

*Comunication cable is not included.

※ Watch out cable direction(+,-) when customer connect 24V power cable.
- Please refer to ⬚ marked point on left diagram.
- Damage can be occured in case of reverse or wrong connection.

Internal Options Related to HGP Electronic Type

Type	Image	Features	Type	Image	Features
FAL 250 AF 630 AF 800 AF		Transmits a fault signal of ETU Indicator Fault Alarm LED	DC 24 V Terminal Block		ETU Trip Unit The options for the connection of “A” and “E” type to the external power source Easy to connect a power cable between the products ※ The same purpose as DC 24 V power cable
DC 24 V Power Cable		ETU Trip Unit The options for the connection of “A” and “E” type to the external power source (DC 24 V) - 1.5 m	DC 3.6 V Battery		A replaceable battery is necessary for the function of saving the ETU time and accidents. - 10 EA vinyl packing

External Options Related to HGP Electronic Type

Type	Image	Features
Test Kit		The external options used to test and set an electronic product.

Trip Unit – D/A/E Type

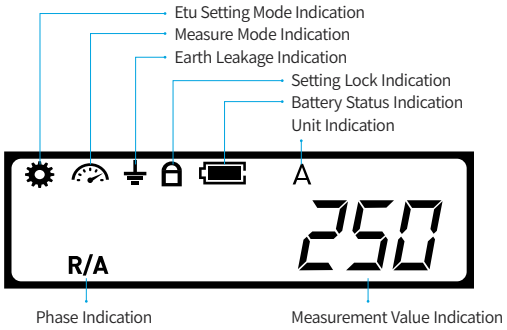
Display

It displays the setting info. of a trip unit and key measured values on the LCD window.

- D/A Type : Current
- E Type : Current, voltage, and energy

When it is connected with an external power source, it becomes possible to check a trip unit info. and set it even with the MCCB (molded case circuit breaker) open. The following functions activate when it is connected to an external power source.

- Connects with a communication system
- Displays trip info.



Metering

Metering

The trip unit types (D, A, and E) display each phase and current to a neutral wire in RMS. A user can check information in each phase displayed with the Up and Down button.
The A type measures current and the E type provides information of voltage, power, and energy through a display device and communication.

Power Quality

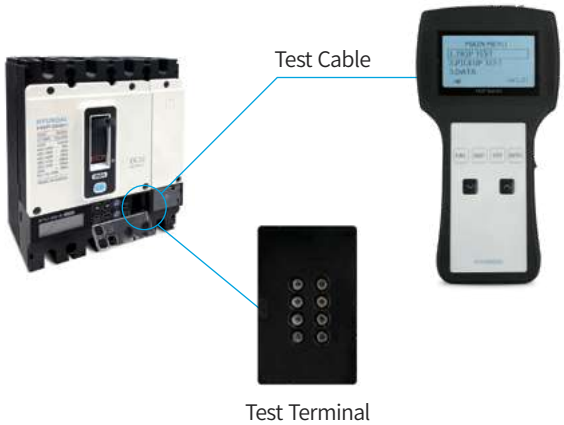
The E type displays total harmonic distortion (THD) of load current and voltage, and 15th order harmonic waves. The relevant information is sent to a PC or a monitor through MODBUS communication.

Test Terminal

For its maintenance, ETU has a test terminal at the front. When the test terminal is connected to the ETU test kit, it is possible to set the ETU and simulate a trip operation.

Test Kit Composition

- A dedicated adapter (AC 100 ~ 220 V 50/60 Hz)
- A dedicated cable to connect the ETU test terminal
- A user manual



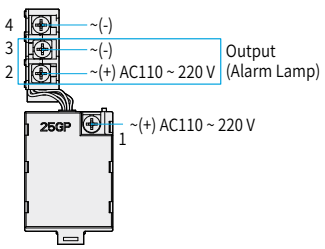
Alarm Contact (FAL)

As an additional option, an alarm switch can be constructed only for ETU operations not connected with the MCCB trip alarm switch.

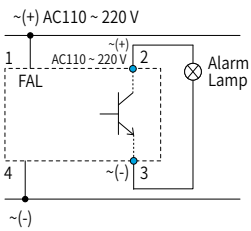
FAL Output Characteristics

Static Outputs : AC 100 ~ 220 V, 64 mA max

FAL Structure and Terminal



FAL Circuit Diagram

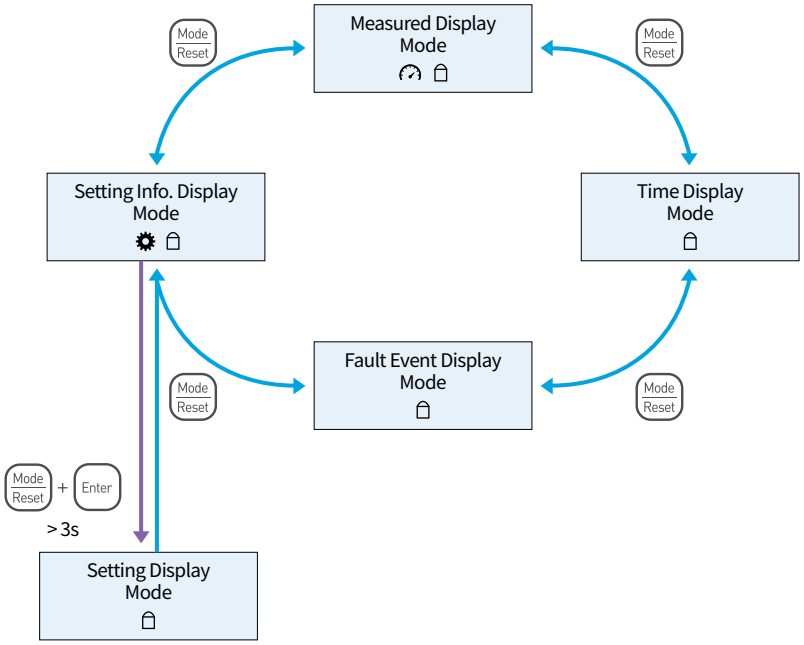


※ A lamp is not provided.

Technical Data (ETU)

Operation and Setting – ETU LCD

The ETU LCD provides a user with information of load status and relay settings.



It displays current metering on the default screen.
A user can move to the metering screen to display with the ▲ ▼ buttons.
In case there is information on phases in the metering screen, it turns sequentially (phase after phase) every 3 seconds.
With the Enter button, a user can move around the screens (Current, Voltage, Power, and Energy).

Metering Display

Model	Mode	Order	Description		Model	Mode	Order	Description	
D/A/E		1	Instantaneous Current I1	R/A 250 A	E		6	Phase to Phase Voltage U12	R/A S/B 380 V
		2	Instantaneous Current I2	S/B 250 A			7	Phase to Phase Voltage U23	S/B T/C 380 V
		3	Instantaneous Current I3	T/C 250 A			8	Phase to Phase Voltage U31	R/A T/C 380 V
		4	Instantaneous Neutral Current IN (4P or with ENCT)	N 0 A			9	Phase to Phase Voltage V1N	R/A 220 V
		5	Instantaneous Ground Current Ig	20 A			10	Phase to Phase Voltage V2N	S/B 220 V

Metering Display

Model	Mode	Order	Description	
E		11	Phase to Phase Voltage V3N	V 220 T/C
		12	Total Active Power Ptot	k W 605.7 R/A S/B T/C
		13	Total Reactive Power Qtot	kVAR 199.1 R/A S/B T/C
		14	Total Apparent Power Stot	kVA 637.5 R/A S/B T/C

Model	Mode	Order	Description	
E		15	Active Energy Ep (readout and reset)	k Wh 123.3 R/A S/B T/C
		16	Reactive Energy Eq (readout and reset)	kVARh 123.1 R/A S/B T/C
		17	Apparent Energy Es (readout and reset)	kVA h 233.1 R/A S/B T/C

Setting Information Display

A user can check the relay settings on the default display screen with the Mode/Reset button.
A user moves around the setting screens with the ▲ ▼ button.

Model	Mode	Order	Description	
D/A/E		1	Ir Long Time Protection Pickup Value	Ir= A 250 R/A S/B T/C
		2	Ir Long Time Protection Neutral Pickup Value (4P or with ENCT)	Ir= A 125 N
		3	tr Long Time Protection Time Delay @ 6 Ir	Tr= 2 s
		4	Isd Short Time Protection Pickup Value	Isd= A 500 R/A S/B T/C
		5	Isd Short Time Protection Neutral Pickup Value (4P or with ENCT)	Isd= A 500 N
		6	tsd Short Time Protection Time Delay - ON : I^2t Active - OFF : I^2t Reactive	Tsd= OFF.1 s Tsd= On.4 s

Model	Mode	Order	Description	
D/A/E		7	Ii Instantaneous Protection Pickup Value (N phase is display when it is 4P or with ENCT.)	Ii= A 1260 R/A S/B T/C Ii= A 1260 N R/A S/B T/C
		8	Ig Ground Fault Protection Pickup Value	Ig= A 50
		9	tg Ground Fault Protection Time Delay Value - ON : I^2t Active - OFF : I^2t Reactive	Tg= OFF.1 s Tg= On.4 s
		10	Communication Address : 1 ~ 250	a001
		11	Communication Baud Rate b 9.6 : 9600 bps b 19.2 : 19200 bps b 38.4 : 38400 bps	Ir= b 9.6

Technical Data (ETU)

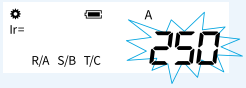
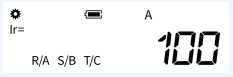
Operation and Setting – ETU LCD

Setting Information Display

Model	Mode	Order	Description	
D/A/E	⚙ 🔒	12	Thermal ON/OFF Enter ON/OFF Check	

Setting Change Screen

To change the ETU settings, keep pressing the two buttons Mode/Reset + Enter for more than 3 seconds and the Lock symbol disappears. Then a user can change the settings. When no entry has been made for 10 seconds or the Mode/Reset button is pressed, the Lock symbol is displayed automatically. A user moves around the setting screens with the ▲ ▼ buttons. (Mode : ⚙ 🔒)

1. Relay Setting				
1	Ir Setting Screen ⚙ 🔒	Mode/Reset + Enter	> 3 Seconds Hold The Lock Symbol Disappears.	
1.1	The Lock Symbol Not Seen ⚙	Enter	Flashing + The State of Changing The Settings	
1.2	Ir Setting ⚙	▲ ▼	Setting The Current Value a User Wants Step 1 A Fine Adjustment and Dial Adjustment (~ Max Dial Settings)	
1.3	Saving Ir Settings ⚙	Enter	Saving The Settings	
2	tr Setting Screen ⚙	▼ Enter	Move Flashing + The State of Changing The Settings	
2.1	tr Setting and Saving ⚙	▲ ▼ Enter	Setting the desired trip time. : 0.5 ~ 16 Saving The Settings	
3	Isd Setting Screen Move ⚙	▼	Move	

Setting Change Screen

1. Relay Setting				
3.1	Isd Setting Screen ⚙	4 5 6 3 7 2 8 1 5 10	Pickup Range Dial Setting : 1.5 ~ 10	Isd= R/A S/B T/C 2
4	tsd Setting Screen ⚙	Enter	Move Flashing + The State of Changing The Settings	Tsd= OFF.1 s
4.1	tsd Setting and Saving ⚙	▲ ▼ Enter	Time Delay Setting - OFF.1 : I^2t OFF 0.1 s - On.4 : I^2t ON 0.4 s Saving The Settings	Tsd= On.4 s
5	Ig Setting ⚙	▼ Enter	Move Flashing + The State of Changing The Settings	Ig= 0.2
5.1	Ig Setting and Saving ⚙	▲ ▼ Enter	Pickup Range : 0.2 ~ 1×In Saving The Settings	Ig= 0.2
6	tg Setting ⚙	▼ Enter	Move Flashing + The State of Changing The Settings	Tg= OFF.1 s
6.1	tg Setting and Saving ⚙	▲ ▼ Enter	Time Delay Setting : 0.1 ~ 0.4 - OFF.1 : I^2t OFF 0.1 s - On.4 : I^2t ON 0.4 s Saving The Settings	Tg= On.4 s
7	Ii Setting ⚙	▼ Enter	Move Flashing + The State of Changing The Settings	Ii= R/A S/B T/C 6
7.1	Ii Setting and Saving ⚙	▲ ▼ Enter	Pickup Range : 1.5 ~ 11×In N is displayed when it is 4P or with ENCT. Saving The Settings	Ii= R/A S/B T/C 6
8	IN Setting ⚙	▼	Move Setting with The Pickup Range Dial. OFF – 0.5 – 1 – 1.6	IN= OFF

Technical Data (ETU)

Operation and Setting – ETU LCD

Setting Change Screen

2. Communication Settings Address (A/E)				
9	Communication Address Setting Screen	Mode/Reset + Enter	> 3 Seconds Hold The Lock Symbol Disappears.	
9.1	The Lock Symbol Disappears.	Enter	Flashing + The State of Changing The Settings	
9.2	Setting	▲ ▼	Address Setting : 1 ~ 250	
9.3	Saving Settings	Enter	Save	
10	Communication Baud Rate Setting Screen	Mode/Reset + Enter	> 3 Seconds Hold The Lock Symbol Disappears.	
10.1	The Lock Symbol Disappears.	Enter	Flashing + The State of Changing The Settings	
10.2	Setting	▲ ▼	Setting The Desired Communication Speed. b 9.6 : 9600 bps b 19.2 : 19200 bps b 38.4 : 38400 bps	
10.3	Saving Settings	Enter	Save	

Setting Change Screen

Basically, the MCCB has thermal characteristics. The thermal functions are aimed to prevent a fire caused by heat and a device from it by simulating the thermal energy of a bus-bar, which runs at a regular phase.
When a user wants to deactivate the functions in a certain situation, he or she can do so by setting on the setting screen as follows.

3. Thermal On/Off (A/E)				
11	Thermal On/Off Screen ⚙	▼ Enter	Move Setting Display	Ir= R/A S/B T/C t hr
11.1	Thermal On/Off Setting ⚙	Enter ▲ ▼	Flashing + The State of Changing The Settings Setting Change - ON : Thermal ON - OFF : Thermal OFF I^2t Applying	Ir= R/A S/B T/C On
11.2	Thermal On/Off Saving ⚙	Enter	Save	Ir= R/A S/B T/C OFF
11.3	Thermal On/Off Screen ⚙	Mode/Reset	Move The Screen	Ir= R/A S/B T/C t hr

Reset

Energy Reset (Active, Reactive, Apparent) E Type				
1	Energy Metering Screen	Mode/Reset + Enter	> 3 Seconds Hold The Lock Symbol Disappears.	R/A S/B T/C k Wh 123.3
2	The Lock Symbol Disappears.		A Measured Value Flashes.	R/A S/B T/C k Wh 123.3
3	Energy Reset	Mode/Reset	Energy Values Reset.	R/A S/B T/C k Wh 0
6	Return to The Energy Metering Screen			R/A S/B T/C kVA h 0

Model Selection Table

Motor Protection Type of Molded Case Circuit Breaker (HGP Type) : 100 ~ 800 AF

The circuit breaker for motor protection is a circuit breaker for instantaneous trip (magnetic only) equipped with instantaneous and short circuit protection functions only, it is suitable for protecting the motor by assembling it together with the overcurrent relay/ electronic connector.

Common Ratings

Rated Insulation Voltage, Ui	1,000 V	Suitablilty for Isolation	Yes
Rated Operational Voltage, Ue	690 V	Utilization Category	A
Rated Impulse Withstand Voltage, Uimp	8 kV	Pollution Degree	3
Protection Function	Instantaneous, Short-Circuit Protection	Reference Standard	IEC 60947-2

Model Name				HGP100				HGP250			
Frame			(AF)	100				250			
Number of Poles			(P)	3				3			
Rated Current, at 40 °C			(A)	2.5, 3.2, 6.3, 12.5, 20, 32, 50, 63, 80, 100				125, 150, 175, 200, 225, 250			
Rated Short-Circuit Breaking Capacity [Icu] (kA rms)											
Short-Circuit Breaking Category Code				F* [1]	S	H	X	F* [1]	S	H	X
AC 660/690 V				6	8	8	10	6	8	8	10
AC 480/500 V				25	50	65	100	25	50	65	100
AC 440/460 V				36	65	85	150	36	65	85	150
AC 380/415 V				50	85	100	150	50	85	100	150
AC 220/240 V				65	100	130	200	65	100	130	200
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100
Rated Short-Circuit Making Capacity [Icm] (kA peak)											
AC 660/690 V				9	14	14	17	9	14	14	17
AC 480/500 V				53	105	143	220	53	105	143	220
AC 440/460 V				76	143	187	330	76	143	187	330
AC 380/415 V				105	187	220	330	105	187	220	330
AC 220/240 V				143	220	286	440	143	220	286	440
Endurance [times] (Durability)											
Mechanical				25,000				25,000			
In @ 440 V				10,000				10,000			
Trip Device											
Thermal Magnetic				●				●			
	Long Time [LTD]			-				-			
	Instantaneous [INST]			(6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14) × In				(5 - 6 - 7 - 8 - 9 - 10) × In			
Electronic				-				-			
	Long Time [LTD]			-				-			
	Short Time [STD]			-				-			
	Instantaneous [INST]			-				-			
Accessory											
Internal	Auxiliary Switch		AUX	●				●			
	Alarm Switch		ALT	●				●			
	Shunt Trip		SHT	●				●			
	Under-Voltage Trip		UVT	●				●			
External	Rotary Handle	Front Contact	TFG	●				●			
		Extension	TFH	●				●			
	Mechanical Open/Close Device		MOT	●				●			
	Mechanical Interlock		MIF	●				●			
	Handle Locking Device		PLD	●				●			
	Plug-in	TDM (LINE/LOAD)		● (3P Only)				● (3P Only)			
		TDM (LINE Only)		● (3P Only)				● (3P Only)			
	Cage Terminal Block		CTB	●				●			
	Terminal Cover		TCF	●				●			
	Insulation Barrier		TQQ	●				●			
	Terminal Bus Bar		TBB	●				●			
Installation and Dimensions											
Connection/ Installation		Front Connection		Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar			
		Rear Connection		Horizontal/Vertical Cable				Horizontal/Vertical Cable			
		Plug-in		Switchgear (Line & Load, Line Only)				Switchgear (Line & Load, Line Only)			
Dimension (mm)		a		105				105			
		b		165				165			
		c		86.5				86.5			
Weight (kg)		3/4P		2/2.6				2/2.6			
Detailed Rating and Selection				234 Page				234 Page			
Characteristic Curve and Appearance				157 / 177 Page				157 / 177 Page			

※ 1) F type is for overseas sales.

HGP400				HGP630				HGP800			
400				630				800			
3				3				3			
350, 400				500, 630				700, 800			
F* [1]	S	H	X	F* [1]	S	H	X	F* [1]	S	H	X
10	10	20	35	10	10	20	35	10	10	20	35
25	50	70	100	25	50	70	100	25	50	70	100
36	70	85	150	36	70	85	150	36	70	85	150
50	85	100	150	50	85	100	150	50	85	100	150
65	100	130	200	65	100	130	200	65	100	130	200
100	100	100	100	100	100	100	100	100	100	100	100
17	17	40	74	17	17	40	74	17	17	40	74
53	105	154	220	53	105	154	220	53	105	154	220
76	154	187	330	76	154	187	330	76	154	187	330
105	187	220	330	105	187	220	330	105	187	220	330
143	220	286	440	143	220	286	440	143	220	286	440
20,000				20,000				10,000			
6,000				4,000				3,000			
●				●				●			
-				-				-			
(5 - 6 - 7 - 8 - 9 - 10)×In				(5 - 6 - 7 - 8 - 9 - 10)×In				(5 - 6 - 7 - 8 - 9 - 10)×In			
-				-				-			
-				-				-			
-				-				-			
-				-				-			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
● (3P Only)				● (3P Only)				● (3P Only)			
● (3P Only)				● (3P Only)				● (3P Only)			
●				●				●			
●				●				●			
●				●				●			
●				●				●			
Terminal Screw, Terminal Bus Bar								Terminal Screw, Terminal Bus Bar			
Horizontal/Vertical Cable								Horizontal/Vertical Cable			
Switchgear (Line & Load, Line Only)								Switchgear (Line & Load, Line Only)			
140				140				210			
260				260				320			
110				110				135			
5.4/7.2				5.4/7.2				15.1/19.6			
234 Page				234 Page				234 Page			
158 / 178 Page				158 / 178 Page				158 / 179 Page			

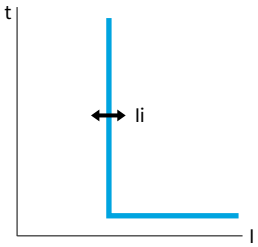
Model Selection Table

Trip Unit Characteristics









Characteristic Curve
(I - t Curve)



Rated Current (A) In		2.5	3.2	6.3	12.5	20	32	50	63	80	100
MCCB	HGP100	●	●	●	●	●	●	●	●	●	●
Instantaneous Setting Current (A)											
9 Step Adjustable	6×Ir	15	19.2	37.8	75	120	192	300	378	480	600
	7×Ir	17.5	22.4	44.1	87.5	140	224	350	441	560	700
	8×Ir	20	25.6	50.4	100	160	256	400	504	640	800
	9×Ir	22.5	28.8	56.7	112.5	180	288	450	567	720	900
	10×Ir	25	32	63	125	200	320	500	630	800	1,000
	11×Ir	27.5	35.2	69.3	137.5	220	352	550	693	880	1,100
	12×Ir	30	38.4	75.6	150	240	384	600	756	960	1,200
	13×Ir	32.5	41.6	81.9	162.5	260	416	650	819	1,040	1,300
	14×Ir	35	44.8	88.2	175	280	448	700	882	1,120	1,400
Accuracy		Within ± 20 %									

Rated Current (A) In		125	150	175	200	225	250	350	400	500	630	700	800
MCCB	HGP250	●	●	●	●	●	●						
	HGP400							●	●				
	HGP630									●	●		
	HGP800											●	●
Instantaneous Setting Current (A)													
6 Step Adjustable	5×Ir	625	750	875	1,000	1,125	1,250	1,750	2,000	2,500	3,150	3,500	4,000
	6×Ir	750	900	1,050	1,200	1,350	1,500	2,100	2,400	3,000	3,780	4,200	4,800
	7×Ir	875	1050	1,225	1,400	1,575	1,750	2,450	2,800	3,500	4,410	4,900	5,600
	8×Ir	1,000	1,200	1,400	1,600	1,800	2,000	2,800	3,200	4,000	5,040	5,600	6,400
	9×Ir	1,125	1,350	1,575	1,800	2,025	2,250	3,150	3,600	4,500	5,670	6,300	7,200
	10×Ir	1,250	1,500	1,750	2,000	2,250	2,500	3,500	4,000	5,000	6,300	7,000	8,000
Accuracy		Within ± 20 %											

Model Selection Table

Switch Disconnectors (HGP NA Type) : 50 ~ 800 AF

Switch disconnector is a short circuit switch without protection function and as the appearance is equivalent to the circuit breaker, all accessories can be shared with the circuit breaker.

Common Ratings

Rated Insulation Voltage, Ui	1,000 V
Rated Operational Voltage, Ue	690 V
Rated Impulse Withstand Voltage, Uimp	8 kV

Suitablilty for Isolation	Yes
Utilization Category	AC 22 A/AC 23 A - DC 22 A/DC 23 A
Pollution Degree	3
Reference Standard	IEC 60947-3

Model Name				HGP50DNA	HGP125DNA	HGP160DNA
Frame			(AF)	50	125	160
Number of Poles			(P)	3, 4 [1)]	3, 4 [1)]	3, 4 [1)]
Conventional Thermal Current, Ith at 60 °C			(A)	50	125	160
Rated Operational Current [Ie]						
AC 690V (50/60 Hz)				50	125	160
DC 250 V (1 Pole)				50	125	160
DC 250 V (2 Pole in Series)				50	125	160
Rated Short-Circuit Making Capacity [Icm] (kA Peak)				2.1	2.8	3.6
Rated Short-Time Withstand Current [Icw]						
1 s			(A rms)	1,800	2,200	2,200
3 s			(A rms)	1,800	2,200	2,200
20 s			(A rms)	690	960	960
Endurance [times] (Durability)						
Mechanical				25,000	25,000	25,000
In @ 440 V				10,000	10,000	10,000
Accessory						
Internal	Auxiliary Switch		AUX	●	●	●
	Alarm Switch		ALT	●	●	●
	Shunt Trip		SHT	●	●	●
	Under-Voltage Trip		UVT	●	●	●
External	Rotary Handle	Front Contact	TFG	●	●	●
		Extension	TFH	●	●	●
	Mechanical Open/Close Device		MOT	●	●	●
	Mechanical Interlock		MIF	●	●	●
	Handle Locking Device		PLD	●	●	●
	Plug-in	TDM (LINE/LOAD)		● (3P Only)	● (3P Only)	● (3P Only)
		TDM (LINE Only)		● (3P Only)	● (3P Only)	● (3P Only)
	Cage Terminal Block		CTB	●	●	●
	Terminal Cover		TCF	●	●	●
	Insulation Barrier		TQQ	●	●	●
	Terminal Bus Bar		TBB	-	-	-
Installation and Dimensions						
Connection/ Installation		Front Connection		Terminal Screw		
		Rear Connection		Horizontal/Vertical Cable		
		Plug-in		Switchgear (Line & Load, Line Only)		
Dimension (mm) 		a (3/4P)		90/120	90/120	90/120
		b		140	140	140
		c		86	86	86
Weight (kg)		3/4P		1.5/1.8	1.5/1.8	1.5/1.8
Detailed Rating and Selection				234 Page	234 Page	234 Page
Characteristic Curve and Appearance				176 Page	176 Page	176 Page

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N

Applicable Field of Switch – Disconnectors

- Bus bar connection and disconnection
- Disconnection of switchgear and control panel
- Switch for emergency power switchover (ATS)

HGP250NA	HGP400NA	HGP630NA	HGP800NA
250	400	630	800
3, 4 [1)]	3, 4 [1)]	3, 4 [1)]	3, 4 [1)]
250	400	630	800
250	400	630	800
250	400	630	800
250	400	630	800
4.9	7.1	8.5	12
3,500	5,000	6,300	8,000
3,500	5,000	6,300	8,000
1,350	1,920	2,320	2,560
25,000	20,000	20,000	10,000
10,000	6,000	4,000	3,000
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
● (3P Only)	● (3P Only)	● (3P Only)	● (3P Only)
●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●
Terminal Screw	Terminal Screw		Terminal Screw
Horizontal/Vertical Cable	Horizontal/Vertical Cable		Horizontal/Vertical Cable
Switchgear (Line & Load, Line Only)	Switchgear (Line & Load, Line Only)		Switchgear (Line & Load, Line Only)
105/140	140/186.5	140/186.5	210/280
165	260	260	320
86.5	110	110	135
2/2.6	5.4/7.2	5.4/7.2	15.1/19.6
234 Page	234 Page	234 Page	234 Page
177 Page	178 Page	178 Page	179 Page

Model Selection Table

Molded Case Circuit Breaker (HGP DC Type)

Common Ratings

Rated Insulation Voltage, Ui	1,000 V
Rated Impulse Withstand Voltage, Uimp	8 kV
Protection Function	Overload, Instantaneous, Short-Circuit Protection

Suitablilty for Isolation	Yes
Utilization Category	A
Pollution Degree	3
Reference Standard	IEC 60947-2

Model Name				HGP100				HGP160			
Frame			(AF)	100				160			
Number of Poles			(P)	3, 4 [1)]				3, 4 [1)]			
Rated Current, at 40 °C			(A)	40, 50, 63, 80, 100				100, 125, 150, 160			
Rated Ultimate Short-Circuit Breaking Capacity [Icu] (kA rms)											
Short-Circuit Breaking Category Code				F	S	H	X	F	S	H	X
DC 750 V for 3P				10	55	85	100	10	55	85	100
DC 1,000 V for 4P				10	55	85	100	10	55	85	100
Service Breaking Capacity [Ics = % Icu]				100	100	100	100	100	100	100	100
Trip Device											
Thermal Magnetic		Long Time [LTD]		(0.7 - 0.8 - 0.9 - 1.0)×In				(0.7 - 0.8 - 0.9 - 1.0)×In			
		Instantaneous [INST]		10×In				(5 - 6 - 7 - 8 - 9 - 10)×In			
Accessory											
Internal	Auxiliary Switch		AUX	●				●			
	Alarm Switch		ALT	●				●			
	Shunt Trip		SHT	●				●			
	Under-Voltage Trip		UVT	●				●			
External	Rotary Handle	Front Contact	TFG	●				●			
		Extension	TFH	●				●			
	Mechanical Open/Close Device		MOT	●				●			
	Mechanical Interlock		MIF	●				●			
	Handle Locking Device		PLD	●				●			
	Cage Terminal Block		CTB	●				●			
	Insulation Barrier		TQQ	●				●			
	Terminal Bus Bar		TBB	●				●			
	Series Busbar		SBB	●				●			
Installation and Dimensions											
Connection/Installation		Front Connection		Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar			
Dimension (mm)		a (3/4P)		105/140				105/140			
		b		165				165			
		c		86.5				86.5			
Weight (kg)		3/4P		2/2.6				2/2.6			
Detailed rating and Selection				234				234			
Characteristic Curve and Appearance				157 / 229				157 / 229			
Certification		CB-DEKRA		●				●			

※ 1) 4 Pole Arrangement : Basic specification of R-S-T-N

HGP250				HGP400				HGP630				HGP800			
250				400				630				800			
3, 4 [1)]				3, 4 [1)]				3, 4 [1)]				3, 4 [1)]			
125, 150, 160, 175, 200, 225, 250				300, 350, 400				500, 630				700, 800			
F	S	H	X	F	S	H	X	F	S	H	X	F	S	H	X
10	55	85	100	10	55	85	100	10	55	85	100	10	55	85	100
10	55	85	100	10	55	85	100	10	55	85	100	10	55	85	100
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
(0.7 - 0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In				(0.8 - 0.9 - 1.0)×In			
(5 - 6 - 7 - 8 - 9 - 10)×In				(5 - 6 - 7 - 8 - 9 - 10)×In				(5 - 6 - 7 - 8 - 9 - 10)×In				(5 - 6 - 7 - 8 - 9 - 10)×In			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
●				●				●				●			
Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar				Terminal Screw, Terminal Bus Bar			
105/140				140/186.5				140/186.5				210/280			
165				260				260				320			
86.5				110				110				135			
2/2.6				5.4/7.2				5.4/7.2				15.1/19.6			
234				234				234				234			
157 / 229				158 / 229				158 / 229				158 / 230			
●				●				●				●			

Technical Data (HGP DC Type)

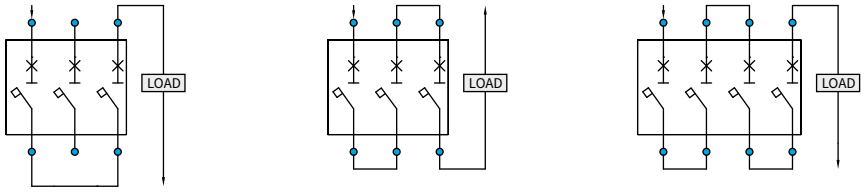
Installation

Precautions for Use

Please keep in mind the following installation conditions when applying the product to a solar power system.
Otherwise, it could lead to damage to the product and the system.

Circuit Diagram

Referring to the contact circuit diagram below, connect the adjacent poles in series.
In the case where a 3P product is used for a 2P product, connect it skipping the phase(s) in the middle.



2P 3P 4P

Connection

In wiring the circuit, a wire must be at least as long as 60 cm.
If it is shorter than that, it can produce excessive heat.

When using the busbar, operate it referring to the Rated Current Derating Table on the right.
When using a self-produced busbar, please keep it to the dimension on page 229 ~ 230. And it is recommended to plate it (busbar) with silver or tin. (A busbar and a heat sink are optional. You need to make an additional order if you want it.)(SBB 25/63/80 GP)

Insulation

Please insert a barrier between the phases after connecting a busbar or a cable if they do not use the same phase.

External Environment

In the case that the internal temperature of the panel is above 40 °C, derate the temperature, referring to the Rated Current Derating Table on the right.

Technical Data

Environmental Operating Conditions

Temperature Derating

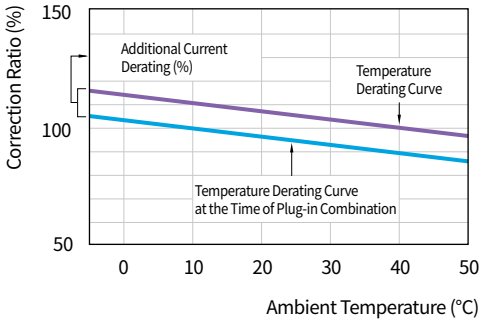
The overcurrent characteristic of MCCB has been set to the ambient temperature of 40 °C. If the ambient temperature is less or more than 40 °C, the overcurrent characteristics may differ.

If the Ambient Temperature is less than 40 °C

In order to ensure that the circuit breaker's overcurrent meet the derating curve at the given ambient temperature, the real current (Ir) has to be adjusted. The temperature correction ratio or each MCCB is shown in the circuit breaker's characteristics curve.

If the Ambient Temperature is more than 40 °C

As the internal temperature of MCCB is a sum of increased temperature due to current flow and the ambient temperature, if the ambient temperature exceeds 40 °C, thermal damage of internal insulation material of MCCB may occur causing the circuit breaker to trip at an early stage. When applying ambient temperature higher than 40 °C, the rated current must be adjusted as shown in the following rated current correction table.



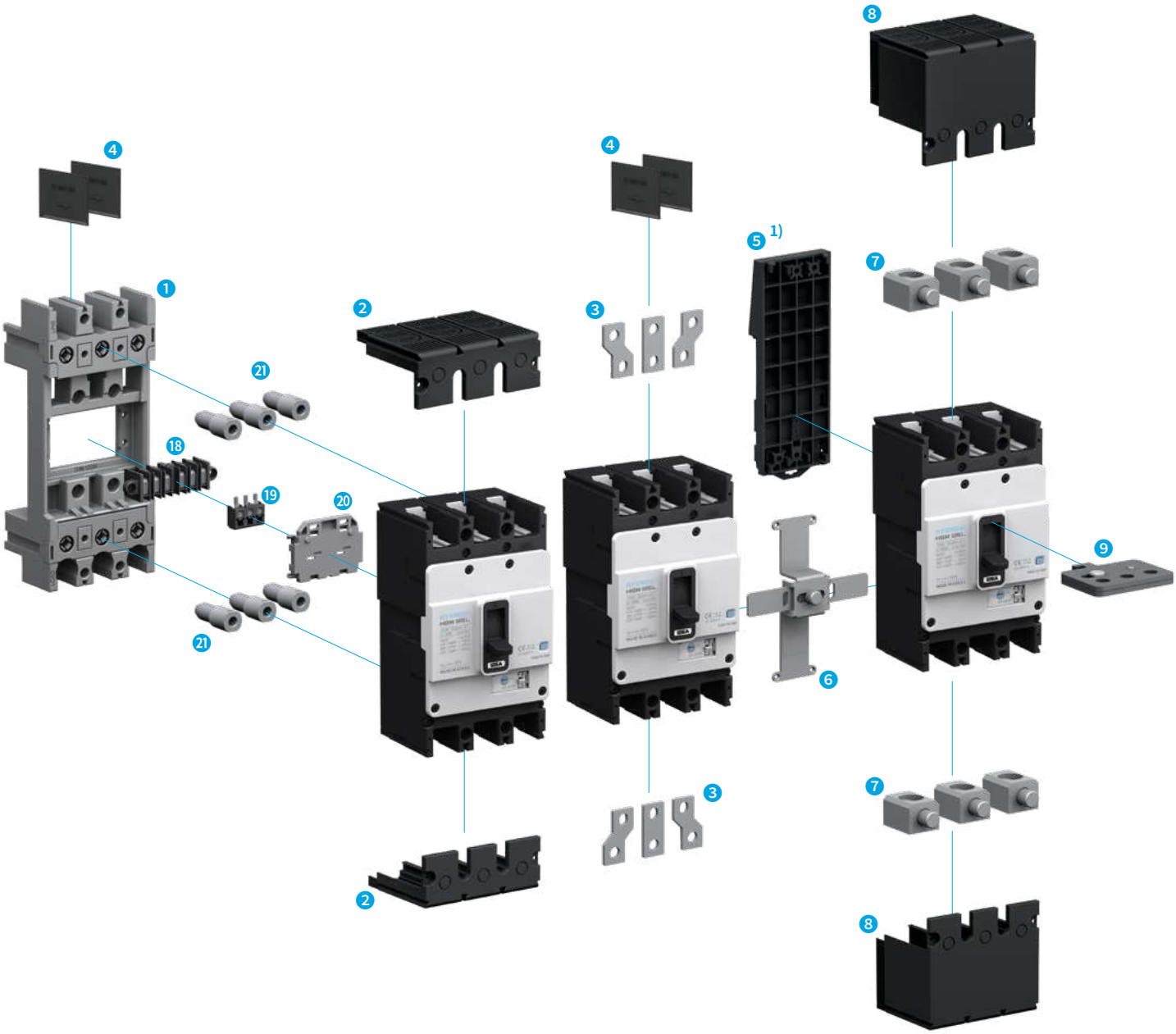
In (Rated Current) :
Circuit breaker's rating at ambient temperature of 40 °C
Ir (Real Current) :
Circuit breaker's rating at the given temperature
Ir = Correction Ratio (%) × In

Rated Current Derating Table : HGP DC Type/Standard Mounting (Fixed Type)

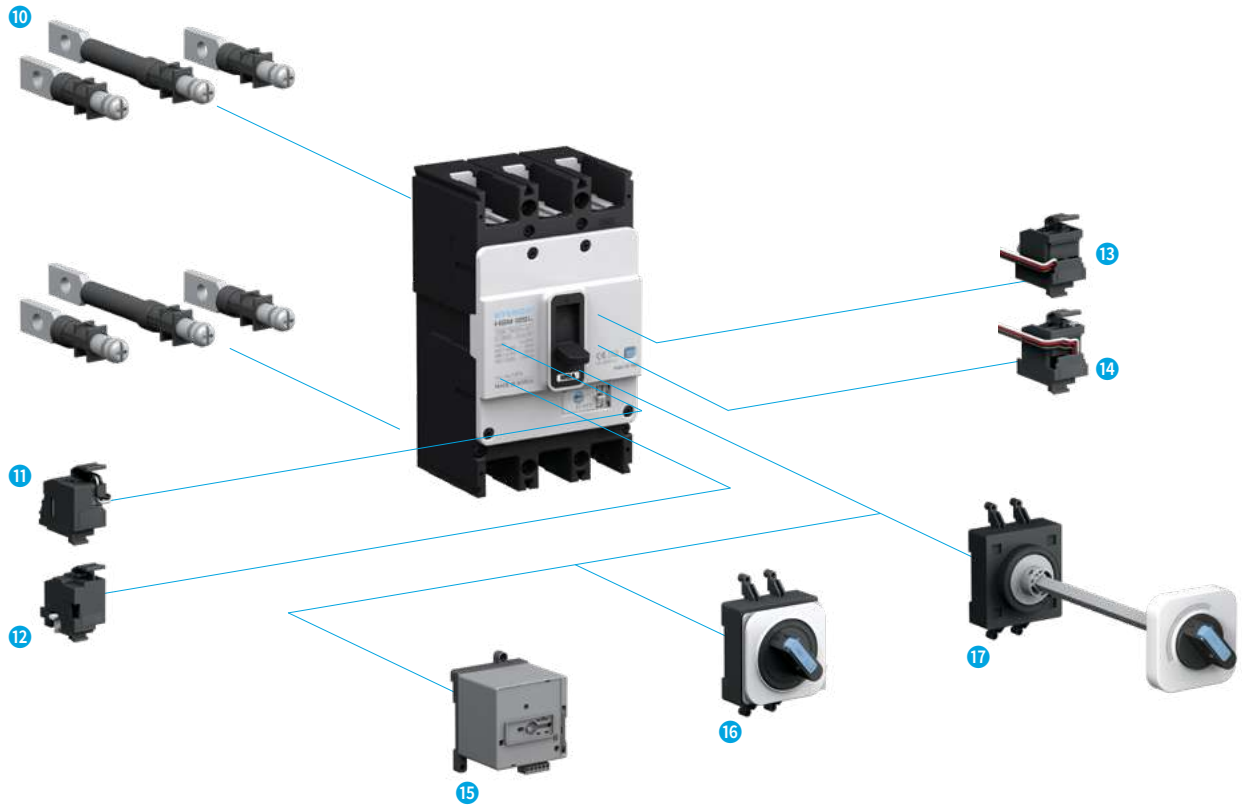
Model	Rated Current (Adc)	Ambient Temperature (°C)										Connection
		10	20	30	40	45	50	55	60	65	70	
HGP100 HGP160 HGP250	40	46	44	42	40	39	38	37	36	35	34	HGP250 Busbar
	50	58	55	53	50	49	48	46	45	44	43	
	63	72	69	66	63	61	60	58	57	55	54	
	80	92	88	84	80	78	76	74	72	70	68	
	100	115	110	105	100	98	95	93	90	88	85	
	125	144	138	131	125	122	119	116	113	109	106	HGP250 Busbar + Heat Sink
	150	173	165	158	150	146	143	139	135	131	128	
	160	184	176	168	160	156	152	148	144	140	136	
	175	201	193	184	175	171	166	162	158	153	149	
	200	230	220	210	200	195	190	185	180	175	170	
	225	259	248	236	225	219	214	208	203	197	191	
	250	288	275	263	250	244	238	231	225	219	213	
HGP400 HGP630	300	323	315	308	300	291	282	273	264	255	246	HGP630 Busbar + Heat Sink
	350	376	368	359	350	340	330	320	310	300	290	
	400	430	420	410	400	388	376	364	352	340	328	
	500	538	525	513	500	485	470	455	440	425	410	
	630	677	662	646	630	611	592	573	554	535	516	
HGP800	700	753	735	718	700	679	658	637	616	595	574	HGP800 Busbar + Heat Sink
	800	860	840	820	800	776	752	728	704	680	656	

Accessory

HGM General-Type



※ 1) DIN Rail Adaptor (DRA) : For HGM/HGE100

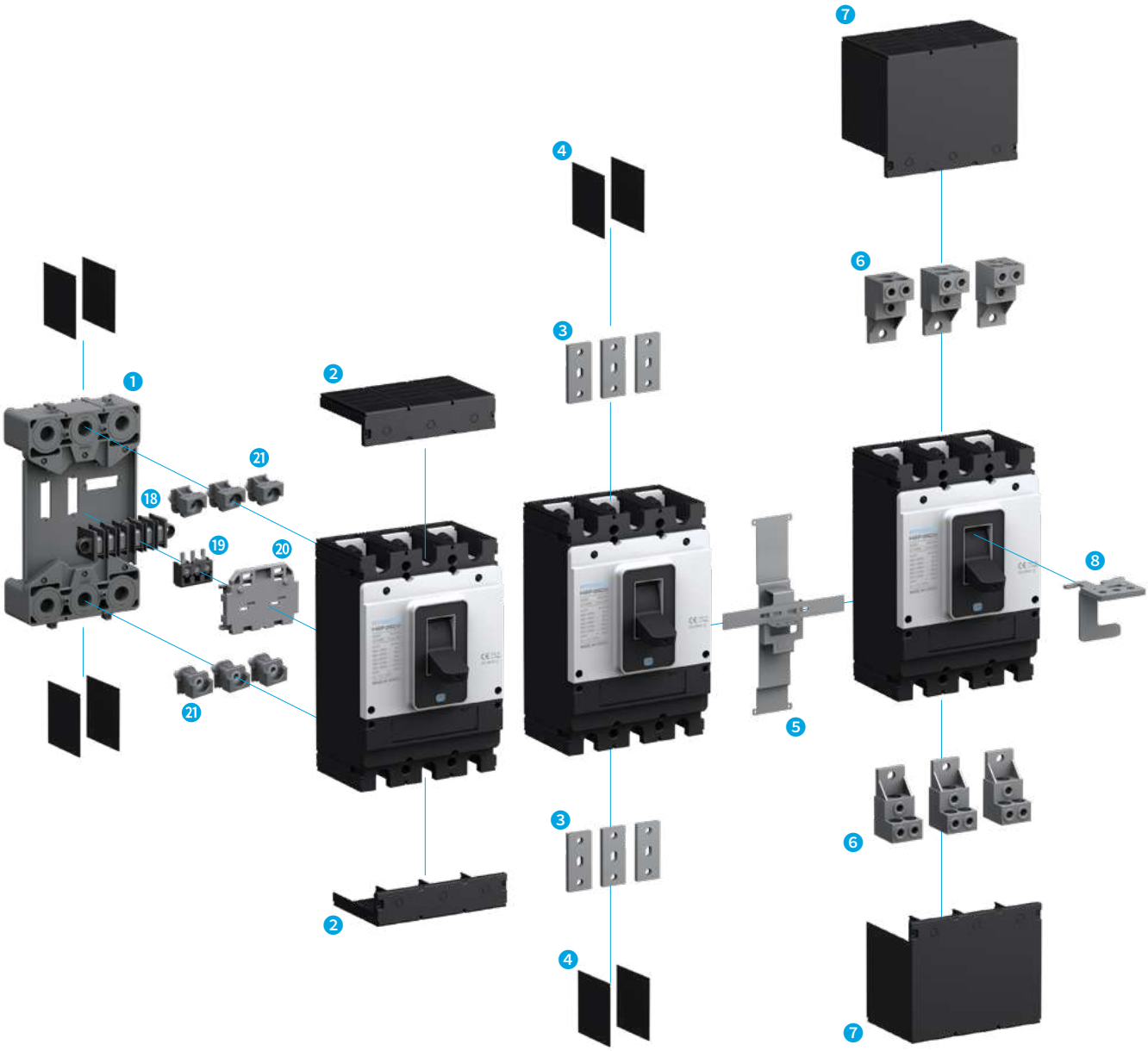


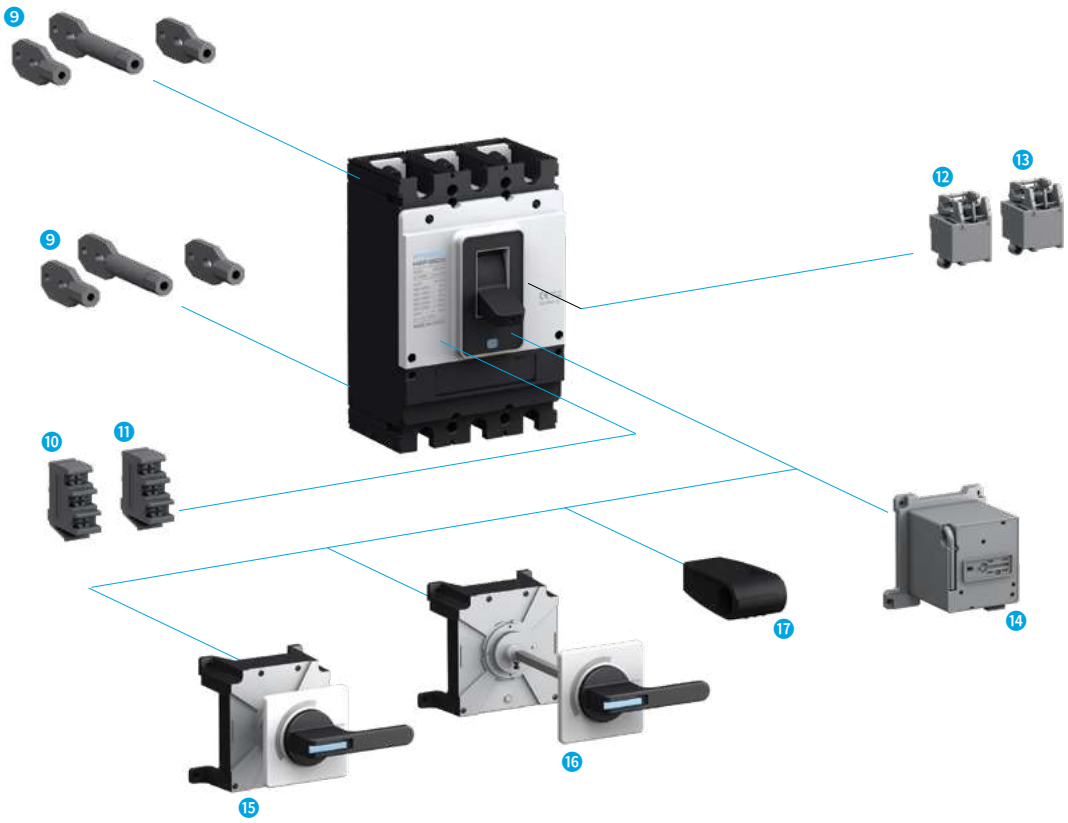
HGM Type MCCB

1. Plug-in Device (TDA, TDM, TDF)
2. Terminal Cover (For Plug-in) (TCF)
3. Bus Bar (TBB)
4. Insulation Barrier (TQQ)
5. DIN Rail Adaptor (DRA)
6. Mechanical Interlock (MIF)
7. Lug Terminal (CTB)
8. Terminal Cover (General-Type) (TCF)
9. Padlock (PLD)
10. Rear Connection Terminal (RCT)
11. Shunt Trip Switch (SHT)
12. Under-Voltage Trip Switch (UVT)
13. Auxiliary Switch (AUX)
14. Trip Alarm Switch (ALT)
15. Motor Operator (MOT)
16. Front Contact Rotary Handle (TFG)
17. Extension Rotary Handle (TFH)
18. Plug-in Terminal Block (CBM)
19. Plug-in Terminal Block (CBB BLOCK UNIT)
20. Plug-in Terminal Block (CBB PLATE)
21. Plug-in Terminal (PC MALE)

Accessory

HGP High Breaking Capacity

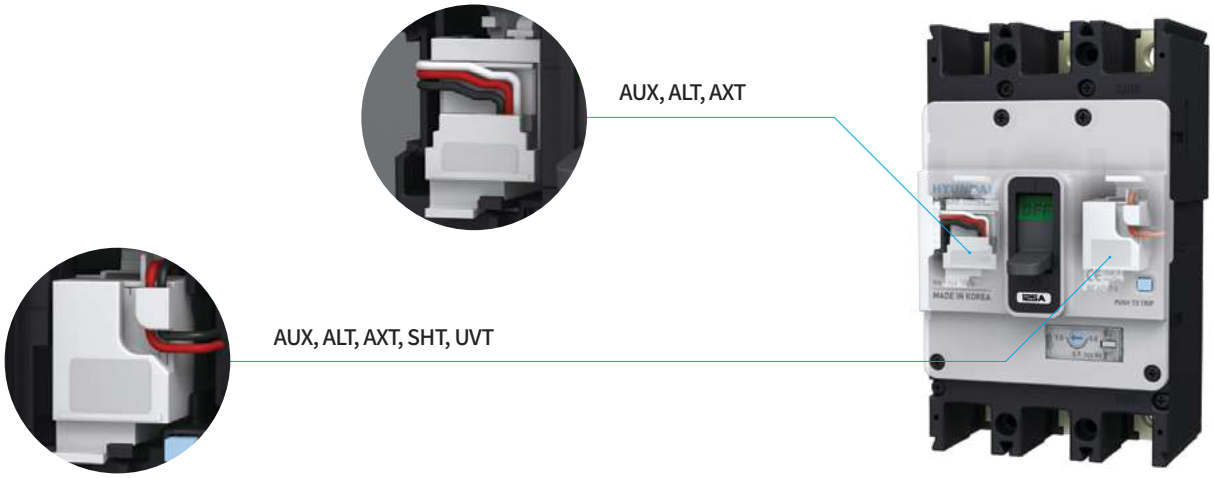




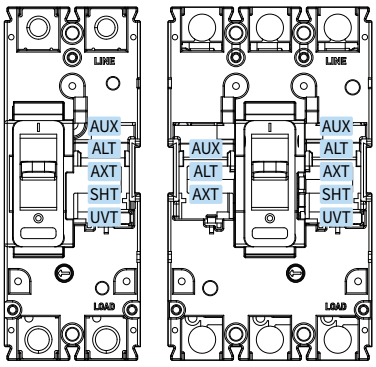
HGP Type MCCB

1. Plug-In Device (TDM)
2. Terminal Cover (For Plug-in) (TCF Short Type)
3. Bus Bar (TBB)
4. Insulation Barrier (TQQ)
5. Mechanical Interlock MIF)
6. Lug Terminal (CTB)
7. Terminal Cover (General-Type) (TCF Long Type)
8. Padlock (PLD)
9. Rear Connection Terminal (RCT)
10. Auxiliary Switch (AUX)
11. Trip alarm Switch (ALT)
12. Shunt trip Switch (SHT)
13. Under-Voltage Trip Switch (UVT)
14. Motor Operator (MOT)
15. Front Contact Rotary Handle (TFG)
16. Extension Rotary Handle (TFH)
17. Auxiliary Handle (THA)
18. Plug-in Terminal Block (CBM)
19. Plug-in Terminal Block (CBB BLOCK UNIT)
20. Plug-in Terminal Block (CBB PLATE)
21. Plug-in Terminal (PC MALE)

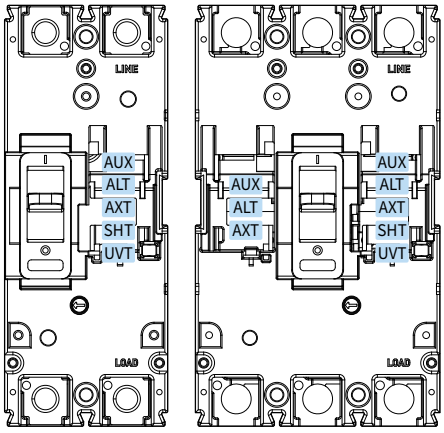
Internal Accessories (HGM)



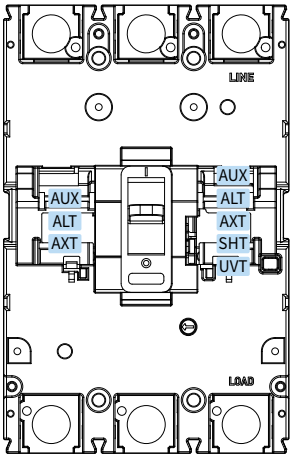
HGM30, 50E/S, 60, 100



HGM50H/L, 125



HGM160, 250



Possible Installation Combinations (Below 250 AF)

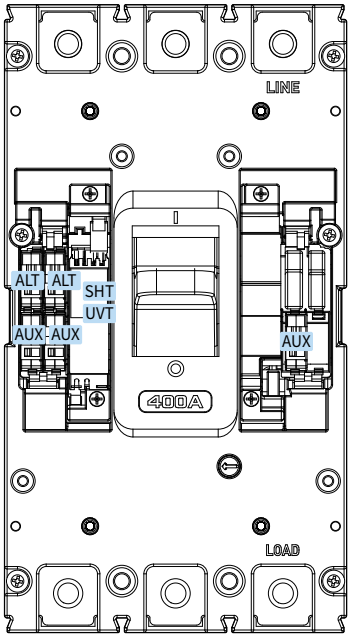
Type	Pole	AUX	ALT	SHT	UVT	AXT	AUX ALT	AUX ALT	SHT AUX	UVT AUX	SHT ALT	UVT ALT	SHT AXT	UVT AXT
HGM30 ~ HGM125	2	■	■	■	■	■								
HGM30 ~ HGM250	3/4	■	■	■	■	■	■	■	■	■	■	■	■	■
HGE30 ~ HGE250	2/3/4	■	■			■								

※ AUX : Auxiliary Switch □ / ALT : Alarm Switch ■ / SHT : Shunt Trip ▨ / UVT : Under-Voltage Trip ▩ / AXT : Auxiliary Alarm Switch □■ (AUX/ALT Integrated Type)

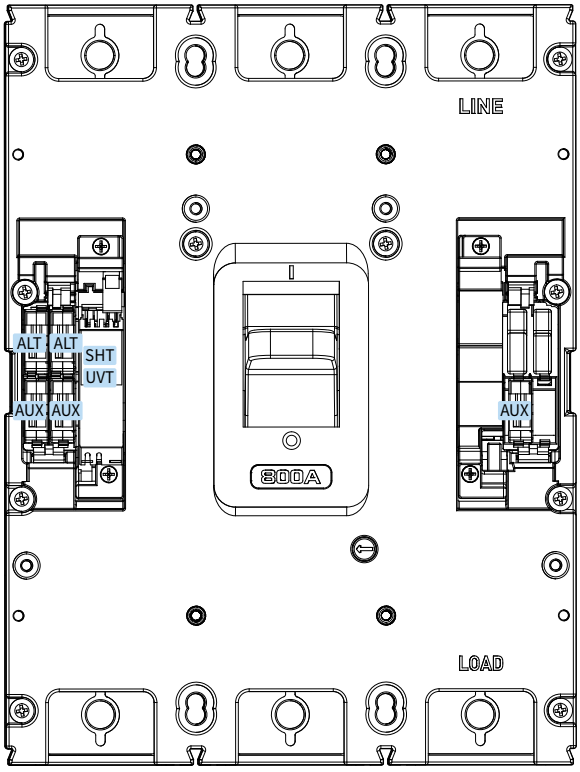
HGM Type's Internal Accessories and Possible Location for Installation

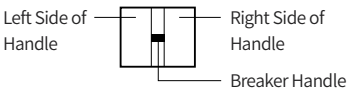
- Auxiliary Switch (AUX)
- Alarm Switch (ALT)
- Auxiliary + Trip Alarm Switch (AXT)
- Shunt Trip Coil (SHT)
- Under-Voltage Trip Coil (UVT)

HGM400



HGM630, 800





Possible Installation Combinations (400 ~ 800 AF)

Type	Pole	AUX	ALT	SHT	UVT	AUX ALT	SHT AUX	UVT AUX	SHT ALT	UVT ALT	SHT AUX ALT	UVT AUX ALT
HGM400	2/3/4											
HGM630 HGM800	2/3 4RSTN											
HGM630 HGM800	4NRST											
HGE400	2/3/4											
HGE630 HGE800	2/3											

※ AUX : Auxiliary Switch □ / ALT : Alarm Switch ■ / SHT : Shunt Trip ▨ / UVT : Under-Voltage Trip ▩
HGM Type's ZCT embedded type of product can be combined equally as HGE Type.

Internal Accessories (HGM)

Auxiliary Switch (AUX) / Trip Alarm Switch (ALT)

It is a contact for indicating the status of the circuit breaker in a remote position.
This contact can be used to realize not only the indication function but also electrical functions such as electrical lock and relay.

Auxiliary Switch (AUX)

- Indicates the ON/OFF status of the circuit breaker contact.
- Status is OFF during TRIP.
- It is comprised of C contact.

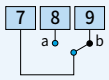
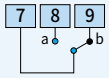
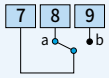
Trip Alarm Switch (ALT)

- It is only activated when the circuit breaker has tripped due to an overload, short circuit or operation of shunt trip switch and does not operate during general ON/OFF.
- Returns to original state when circuit breaker has been reset.
- It is comprised of C contact.

Auxiliary + Trip Alarm Switch (AXT)

- This switch is an integrated combination of auxiliary switch and trip alarm switch.

Contact Circuit Diagram

	Auxiliary Switch (AUX)	Trip Alarm Switch (ALT)
MCCB ON		
MCCB OFF		
MCCB TRIP		

Rating of Contact

Rated Conventional Thermal Current		5 A	
Minimum Load		160 mA, 5 VDC	
Rated Operation Current		Resistive Load	Inductive Load
	AC 125 V	5 A	3 A
	AC 250 V	3 A	2 A
	DC 30 V	4 A	3 A
	DC 125 V	0.4 A	0.4 A
	DC 250 V	0.2 A	0.2 A

Possible Location for Installation

Type	Pole	AUX	ALT	AXT
HGM30 ~ HGM125	2			
HGM30 ~ HGM250	3/4			
HGE30 ~ HGE250	2/3/4			
HGM400	2/3/4			
HGE400	2/3/4			
HGM630 HGM800	2/3/4			
HGE630 HGE800	2/3			

※ AUX : Auxiliary Switch □
ALT : Alarm Switch ■
AXT : Auxiliary Alarm Switch □■ (AUX/ALT Integrated Type)





AUX



ALT

Shunt Trip Device (SHT)

Shunt trip device (SHT) is a device that remotely trips the circuit breaker by applying voltage to both terminals of the coil.

Operating Condition

- U ≥ 0.7×Un (More than 70 % of rated voltage applied)
- As for impulse type voltage, more than 20 ms applied

Rated Voltage and Characteristics (100 ~ 250 AF)

Rated voltage (Un)		Power Consumption	
		VA (W)	A (A)
DC	24 V	50.2	2.1
	48 V	94.6	1.97
	60 V	91.2	1.52
	100 ~ 120 V	11.8	0.1
	125 V	58.1	0.47
AC (50/60 Hz)	100 ~ 120 V	75.2	0.63
	200 ~ 250 V	64.8	0.26
	380 ~ 480 V	131	0.27
Rated Operational Voltage		0.7 ~ 1.1×Un	
Operating Time		50 ms	

※ Controller output voltage : DC 45 V

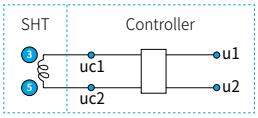
SHT Wiring

1. SHT Only



※ Not applicable to HGM400, 630, 800 AF DC 24 V

2. HGM400, 630, 800 AF DC 24 V (SHT + Controller)



Possible Location for Installation

Type	Pole	SHT	UVT
HGM30 ~ HGM125	2		
HGM30 ~ HGM250	3/4		
HGE30 ~ HGE250	2/3/4		
HGM400	2/3/4		
HGE400	2/3/4		
HGM630 HGM800	2/3/4		
HGE630 HGE800	2/3		

※ SHT : Shunt Trip ☑
UVT : Under-Voltage Trip ☒





SHT

Internal Accessories (HGM)

Under-Voltage Trip Device (UVT)

In case the circuit voltage drops to less than 35 % of the rated voltage (Un), UVT automatically initiates a trip in the circuit breaker to prevent damage to the load.

Opening Conditions

- Operating characteristics are guaranteed to conform to the IEC 60947-2 standard criteria.
- Trip Condition of Circuit Breaker : U ≤ 0.35×Un
- Fixed Type : 50 ms (400 ~ 800 AF)
- Time Delay Type : 500 ~ 1,000 ms (Below 250 AF)
- No Trip Condition of Circuit Breaker : U ≥ 0.7×Un
- In the U = 0.35 ~ 0.7×Un interval, the circuit breaker can be tripped but the operation is not guaranteed.

Closing Conditions

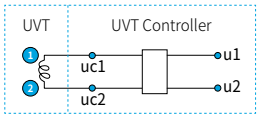
- In case of circuit breakers assembled with UVT, the circuit breaker cannot be ON (Closing) when voltage is not applied to the UVT.
- The reset operation after the circuit breaker's trip caused by UVT operation may differ depending on the circuit breaker's type and UVT structure.
- In order to close the circuit breaker, Voltage must be applied to UVT.
- Closing Condition : U ≥ 0.85×Un

Time Delay Function

Malfunction is prevented during a short momentary voltage drop of below 500 ms. (Below 250 AF)

UVT Wiring

1. HGM30 ~ 250 AF (UVT + Controller)



※ DC 24 V among HGM400 and above products require a controller.

2. HGM400, 630, 800 AF (UVT Only)



Rated Voltage and Characteristics (Below 250 AF)

Rated Voltage (Un)		Power Consumption	
		VA (W)	A (mA)
DC	24 V	0.96	40
	48 V	1.1	22.7
	100 ~ 110 V	2.2	20
AC (50/60 Hz)	100 ~ 120 V	5.1	42
	200 ~ 230 V	6	26
	380 ~ 415 V	9.6	23
	440 ~ 480 V	12.5	26
Starting Voltage	Opening	0.35 ~ 0.7×Un	
	Closing	0.85×Un	
Rated Operational Voltage		0.85 ~ 1.1×Un	
Operating Time		500 ~ 1,000 ms	

※ Do not use UVT for electrical interlocking system.
※ Controller output voltage : DC 45 V





UVT

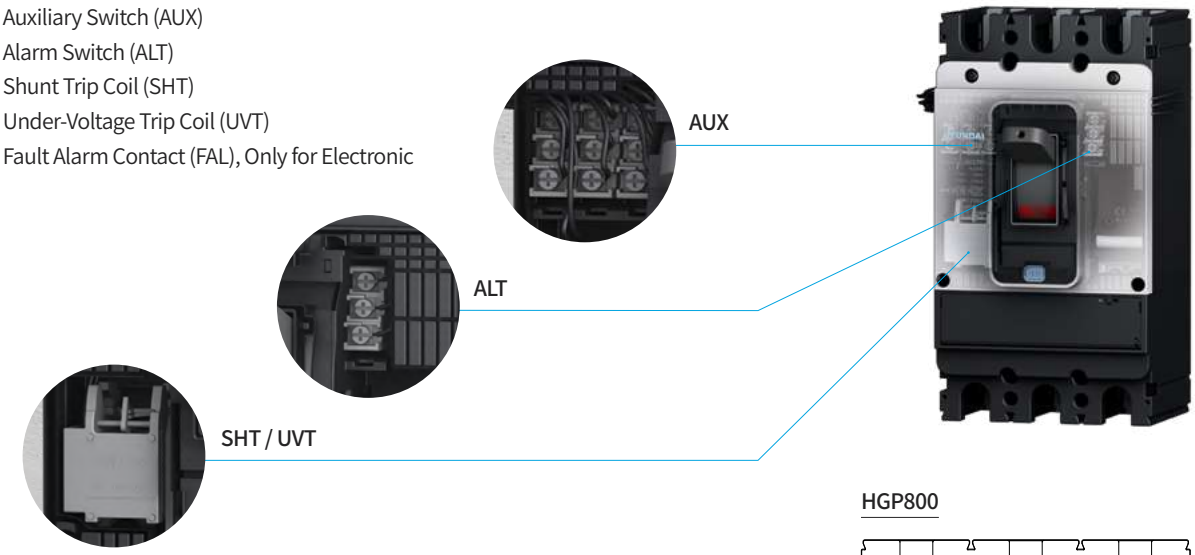


UVT Controller

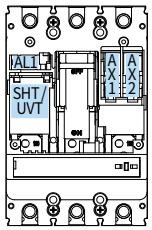
Internal Accessories (HGP)

HGP Type's Internal Accessories and Possible Location for Installation

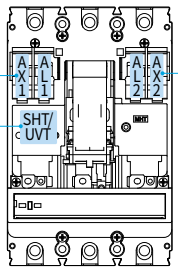
- Auxiliary Switch (AUX)
- Alarm Switch (ALT)
- Shunt Trip Coil (SHT)
- Under-Voltage Trip Coil (UVT)
- Fault Alarm Contact (FAL), Only for Electronic



HGP50D, 125D, 160D

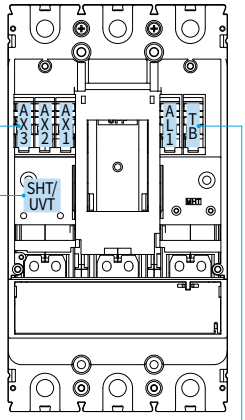


HGP250 (New Type)



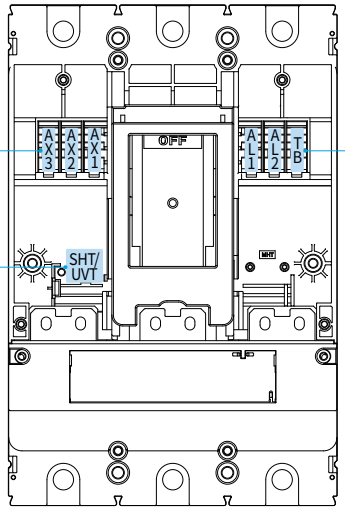
AX1 or FAL Terminal Block
SHT / UVT or FAL Body
AX2 or 24 V Terminal block

HGP400, 630



AX3 or FAL Terminal Block
SHT / UVT or FAL Body
24 V Terminal block

HGP800



AX3 or FAL Terminal Block
SHT / UVT or FAL Body
24 V Terminal block



Possible Location for Installation

Type	Pole	AUX	ALT	SHT	UVT	SHT AUX	SHT ALT	UVT AUX	UVT ALT	SHT AUX ALT	UVT AUX ALT
HGP50D HGP125D HGP160D	3/4										
HGP250	3/4										
HGP400 HGP630	3/4										
HGP800	3/4										

※ AUX : Auxiliary Switch □ / ALT : Alarm Switch ■ / SHT : Shunt Trip ▨ / UVT : Under-Voltage Trip ▩ / AXT : Auxiliary Alarm Switch □■ (AUX/ALT Integrated Type)

Internal Accessories (HGP)

Auxiliary Switch (AUX)/ Trip Alarm Switch (ALT)

It is a contact for indication to inform the status of the circuit breaker in a remote position.
This contact can be used to realize not only the indication function but also electrical functions such as electrical lock and relay.

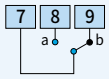
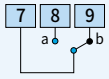
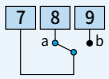
Auxiliary Switch (AUX)

- Indicates the ON/OFF status of the circuit breaker contact.
- Status is OFF during TRIP.
- It is comprised of C contact.

Trip Alarm Switch (ALT)

- It is only activated when the circuit breaker has tripped due to an overload, short circuit or operation of shunt trip switch and does not operate during general ON/OFF.
- Returns to original state when circuit breaker has been reset.
- It is comprised of C contact.

Contact Circuit Diagram

	Auxiliary Switch (AUX)	Trip Alarm Switch (ALT)
MCCB ON		
MCCB OFF		
MCCB TRIP		

Possible Location for Installation

Type	AUX	ALT
HGP50D HGP125D HGP160D		
HGP250		
HGP400 HGP630		
HGP800		

Rating of Contact

Rated Conventional Thermal Current		5 A	
Minimum Load		160 mA, 5 VDC	
Rated Operation Current		Resistive Load	Inductive Load
AC	125 V	5 A	3 A
	250 V	3 A	2 A
DC	30 V	4 A	3 A
	125 V	0.4 A	0.4 A
	250 V	0.2 A	0.2 A



HGP160D ALT



HGP250 ~ 800 ALT
HGP160D ~ 800 AUX

Shunt Trip Device (SHT) / Under-Voltage Device (UVT)

SHT/UVT is installed inside the circuit breaker and it offers the function of remote tripping the circuit breaker by controlling the voltage applied to both terminals of the coil.

Shunt Trip Device (SHT)

It is able to remotely trip the circuit breaker by applying voltage to the shunt trip device installed in the circuit breaker.

Operating Condition

- U ≥ 0.7×Un (More than 70 % of rated voltage applied)
- As for impulse type voltage, more than 20 ms applied

Rated Voltage and Characteristics

Rated Voltage (Un)		Power Consumption	
		W or VA	A (mA)
DC	24 V	1.2	49.7
	100 ~ 110 V	2.8	25
AC (50/60 Hz)	100 ~ 120 V	3.3	27.5
	200 ~ 230 V	5.2	22.6
	380 ~ 415 V	13.9	33.4
	440 ~ 480 V	10.9	22.8
Rated Operational Voltage		0.7 ~ 1.1×Un	
Operating Time		50 ms	

※ Controller output voltage : DC 45 V

Possible Location for Installation

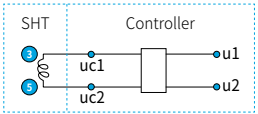
Type	SHT	UVT
HGP50D HGP125D HGP160D		
HGP250		
HGP400 HGP630		
HGP800		

SHT Wiring

1. SHT Only

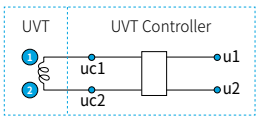


2. HGP160D DC SHT



※ 160D AF (50D, 125D, 160D) DC products include controller.

UVT Wiring



Under-Voltage Device (UVT)

If the under-voltage trip device is installed in the circuit breaker, the circuit breaker is tripped or is not closed in case the circuit voltage is below the reference value.
In case the circuit voltage drops to less than 35 % of the rated voltage (Un), UVT automatically initiates a trip in the circuit breaker to prevent damage to the load.

Opening Conditions

- Operating characteristics are guaranteed to conform to the IEC 60947-2 standard criteria.
- Trip Condition of Circuit Breaker : U ≤ 0.35×Un
- No Trip Condition of Circuit Breaker : U ≥ 0.7×Un
- In the U = 0.35 ~ 0.7×Un interval, the circuit breaker can be tripped but the operation is not guaranteed.

Closing Conditions

- In case of circuit breakers assembled with UVT, the circuit breaker can be OFF/RESET when voltage is not applied but the circuit breaker cannot be ON (Closing).
- In order to close the circuit breaker, Voltage must be applied to UVT.
- Closing Condition : U ≥ 0.85×Un

Rated Voltage and Characteristics

Rated Voltage (Un)		Power Consumption	
		Pick Up	
		W or VA	A (mA)
DC	24 V	2.6	110
	100 ~ 110 V	5	45
AC (50/60 Hz)	100 ~ 120 V	4.5	37.9
	200 ~ 230 V	5.6	24.3
	380 ~ 415 V	10.8	26
	440 ~ 480 V	12.5	26
Starting Voltage	Opening	0.35 ~ 0.7×Un	
	Closing	0.85×Un	
Rated Operational Voltage		0.85 ~ 1.1×Un	
Operating Time		50 ms	

※ Do not use UVT for electrical interlocking system.
※ Controller output voltage : DC 45 V



HGP50D ~ 160D SHT/ UVT



HGP250 SHT/UVT



HGP400 ~ 800 SHT/ UVT



UVT Controller

External Accessories (HGM)

Locking Device

Handle Locking Device Using Padlock (PLD)

This device is used for locking the handle of circuit breaker to the OFF position by using a padlock. Padlock is not provided separately and up to 3 can be used. The applicable specifications of padlocks are as below.

Type	Application	Padlock Diameter [1)]
PLD 10GM	HGM30 ~ HGM250	5 mm
	HGE30 ~ HGE250	
PLD 40GM	HGM400 ~ HGM800	6 mm
	HGE400 ~ HGE800	

Mechanical Interlock

This device interlocks two circuit breakers by using a mechanical interlock.

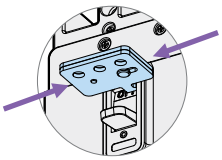
Key Features

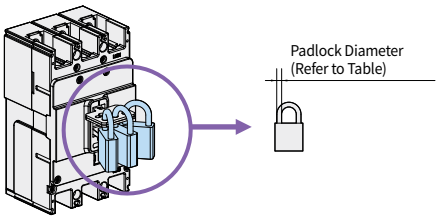
- It prevents two breakers from closing at the same time.
- All circuit breakers are turned OFF. The applicable specifications of padlocks are as below.

Type				Application	Padlock Diameter [1)]
2P	3P	4P (RSTN)	4P (NRST)		
MIF 10GM 2	MIF 10GM 3	MIF 10GM R4	MIF 10GM N4	HGM/HGE30, 50E/S, 60, 100	5 mm
MIF 12GM 2	MIF 12GM 3	MIF 12GM R4	MIF 12GM N4	HGM/HGE50H/L,125	
-	MIF 25GM 3	MIF 25GM R4	MIF 25GM N4	HGM/HGE160, 250	
-	MIF 40GM 3	MIF 40GM R4	MIF 40GM N4	HGM/HGE400	6 mm
-	MIF 80GM 3	MIF 80GM R4	MIF 80GM N4	HGM/HGE630, 800	



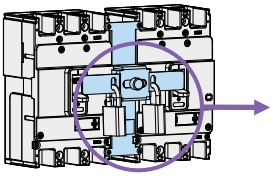
PLD

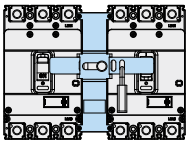




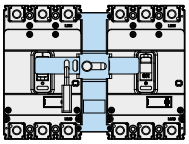


MIF

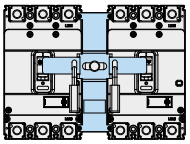




Right Off Lock



Left Off Lock



Double Off Lock

※ 1) Padlock not included

Terminal Cover

As a part that insulates the circuit breaker's live and load side of terminal area from the outside, it prevents electric shock and short-circuit accidents that may occur due to direct contact of people's hand or tools such as drivers with the live current part. When the terminal cover is used, the protection grade of IP40 is applied to the power part. Based on the connection method of the circuit breaker, it can be classified into long or short type for use and various handles and interlock devices can be combined for use.

Short Type

It is suitable for plug-in or rear connection.

Long Type

It is suitable for front connection by using wires, bus bar or lug terminals.

Type						Application	Pitch (mm)
2P		3P		4P			
Short	Long	Short	Long	Short	Long		
TCF 10GM S2	TCF 10GM L2	TCF 10GM S3	TCF 10GM L3	TCF 10GM S4	TCF 10GM L4	HGM30, 50E/S, 60, 100 HGE30, 50E/S, 60, 100	25
TCF 12GM S2	TCF 12GM L2	TCF 12GM S3	TCF 12GM L3	TCF 12GM S4	TCF 12GM L4	HGM50H/L, 125 HGE50H/L, 125	30
TCF 25GM S3	TCF 25GM L3	TCF 25GM S3	TCF 25GM L3	TCF 25GM S4	TCF 25GM L4	HGM160, 250 HGE160, 250	35
TCF 40GM S3	TCF 40GM L3	TCF 40GM S3	TCF 40GM L3	TCF 40GM S4	TCF 40GM L4	HGM400 HGE400	44
TCF 80GM S3	TCF 80GM L3	TCF 80GM S3	TCF 80GM L3	TCF 80GM S4	TCF 80GM L4	HGM630, 800 HGE630, 800	70
TCF 10HD S2	-	TCF 10HD S3	-	-	-	HDB30, 50, 100 HDG30, 50, 100	25

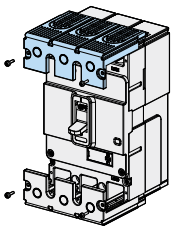
※ In case of using as front connection, please use it after removing the indicated part.



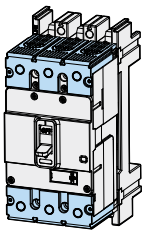
Short Type



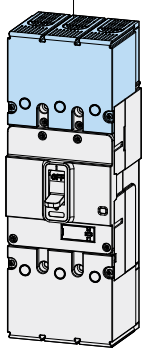
Long Type



Assembly Diagram



Short Type
(Plug-in Connection)



Long Type
(Front Connection)

External Accessories (HGM)

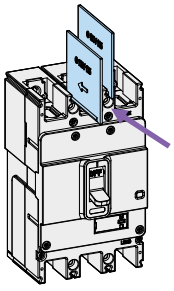
Insulation Barrier

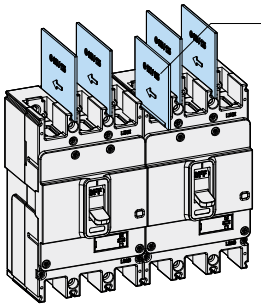
As a part used to prevent accidents with regards to insulation and conductive foreign substance between the circuit breaker terminals, it improves the performance of phase-to-phase insulation by installing it in the groove between the circuit breaker's terminals. It can easily be assembled even if the circuit breaker has already been installed and in case the two circuit breakers have been installed side by side, it can also be assembled in the gap between the two circuit breakers. In addition, it is used in the terminal cover and plug-in base.

※ In case insulation barrier is not mounted between the circuit breaker's terminal, it may cause secondary short-circuit accidents so it must be used.
Insulation barrier must be installed towards the direction of the circuit breaker's line indication part.

Type			Application	No. of Parts (EA/Set)		
2P	3P	4P		2P	3P	4P
TQQ 10GM 2	TQQ 10GM 3	TQQ 10GM 4	HGM30, 50E/S, 60, 100 HGE30, 50E/S, 60, 100	1	2	3
TQQ 10GM 2	TQQ 10GM 3	TQQ 10GM 4	HGM50H/L, 125 HGE50H/L, 125	1	2	3
TQQ 25GM 2	TQQ 25GM 3	TQQ 25GM 4	HGM160, 250 HGE160, 250	1	2	3
TQQ 40GM 2	TQQ 40GM 3	TQQ 40GM 4	HGM400 HGE400	1	2	3
TQQ 40GM 2	TQQ 40GM 3	TQQ 40GM 4	HGM630, 800 HGE630, 800	1	2	3
TQQ 10HD 2	TQQ 10HD 3	-	HDB30, 50, 100 HDG30, 50, 100	2	4	-







※ Additional barrier required for close mounting is provided as additional options. (It may cause secondary accidents so it must be installed.)

Rotary Handle

Rotary handle is a product that can check and operate MCCB's ON/OFF/TRIP even when the panel door is closed by installing the circuit breaker in enclosed switchgear or on MCCB panel and others. There are two types of rotary handle, front contact type and extension type and all the rotary handles offer panel door locking function and handle locking function. The rotary handle can be rotated clockwise to turn the circuit breaker "ON" and according to the mounting direction of MCCB, it is categorized into the upper line, the right line and the left line. The IP rating of the handle is IP40.

Front Contact Rotary Handle

- 32 ~ 250 AF : The handle is attached directly to the circuit breaker.
- 400 ~ 800 AF : The handle attached to the door of the panel.

Extension Rotary Handle

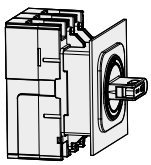
It is suitable in case the distance between the circuit breaker and the panel door is long. The handle is attached to the door of the panel and there is no trip-button function.

Type			Application
Upper Line	Right Line	Left Line	
TFG 10GM U	TFG 10GM R	TFG 10GM L	HGM/HGE30, 50E/S, 60, 100
TFG 12GM U	TFG 12GM R	TFG 12GM L	HGM/HGE50H/L, 125
TFG 25GM U	TFG 25GM R	TFG 25GM L	HGM/HGE160, 250
TFG 40GM U	TFG 40GM R	TFG 40GM L	HGM/HGE400
TFG 80GM U	TFG 80GM R	TFG 80GM L	HGM/HGE630, 800

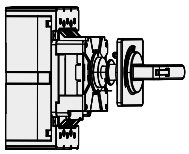
Type	Application
TFH 10GM	HGM/HGE30, 50E/S, 60, 100
TFH 12GM	HGM/HGE50H/L, 125
TFH 25GM	HGM/HGE160, 250
TFH 40GM	HGM/HGE400
TFH 80GM	HGM/HGE630, 800



Front Contact Rotary Handle
(TFG-HGM)



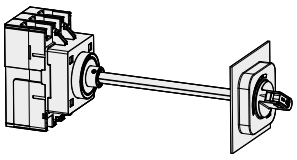
HGM30 ~ HGM250



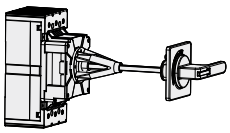
HGM400 ~ HGM800



Extension Rotary Handle
(TFH-HGM)



HGM30 ~ HGM250



HGM400 ~ HGM800

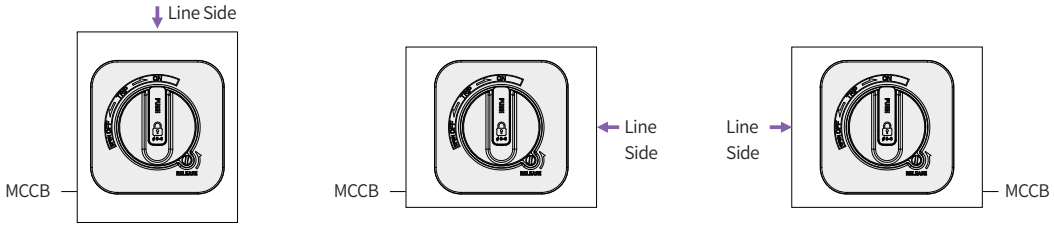
※ When installing an extension rotary handle, the eccentric tolerance of the handle drive shaft is 1.5 degrees.

External Accessories (HGM)

Rotary Handle

Types of Handle Depending on the Circuit Breaker's Installation Type

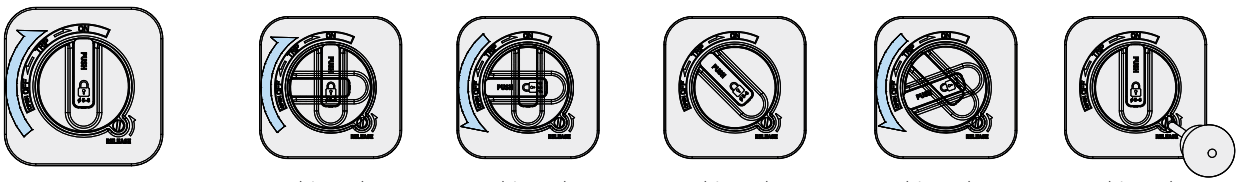
Rotary handle is divided into the following three types depending on the circuit breaker's direction of power supply.



How to Operate the Handle

Operating Direction : Turn the handle clockwise to turn the breaker ON.

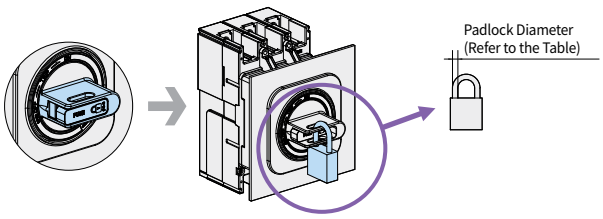
- Circuit Breaker ON : Rotate the handle to ON position. (Figure 1)
- Circuit Breaker OFF : Rotate the handle to OFF position. (Figure 2)
- Circuit Breaker TRIP : If the circuit breaker is tripped, the handle will automatically return to TRIP position. (Figure 3)
- After the circuit breaker is tripped, rotate the handle to the RESET position first (Figure 4) then rotate to the ON position and the circuit breaker will turn ON (Figure 1).
- If you need to open the door when the handle is in the ON state, rotate the RELEASE screw to the direction of the arrow then open the door (Figure 5).



(Figure 1) (Figure 2) (Figure 3) (Figure 4) (Figure 5)

Handle Locking Device

Lock Function	OFF State Door Lock	ON State Door Lock	Reverse Interlock	Handle Padlock
Details	• Impossible to open the panel door when the circuit breaker is in the OFF state. • Possible at RESET position • Possible to open the panel door after rotating the handle to RESET	• Impossible to open the panel door when the circuit breaker is in the ON state • Possible to open the panel door after rotating the RELEASE screw	• Impossible to close the circuit breaker (ON) in case the panel door is open	• Padlocking function which locks using a padlock to prevent handle operation. • Padlock is not provided separately and the number of padlocks depends on the padlock diameter. (Refer to the table below) • As for the specifications of the applicable padlocks, refer to the table below.
Front Contact Type (TFG)	●	●	● (100/125/250 AF Only)	●
Extension Type (TFH)	●	●	-	●



Application	Padlock Diameter 1)	No. of Padlocks that can be Used
HGM/HGE30 ~ 250	6 ~ 8 mm	Ø6,Ø7 : 2 EA Ø8 : 1 EA
HGM/HGE400 ~ 800	5 ~ 7 mm	3 EA

※ 1) Padlock not included

Front Connection of Fixed Devices

Straight/spreader bus bar or lug terminal can be selected for use depending on the size specification of the cable or bus bar to be connected to the circuit breaker.

Insulated Bar Connection

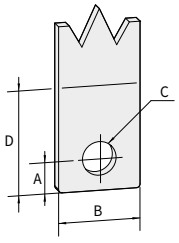
In case the bus bar pitch of the switchgear is equal to the circuit breaker, it can be connected directly to the circuit breaker by using an insulation tube. Refer to the following connection bus bar specification for connection. Interphase barrier and terminal cover must be used.

Application	Connection Bus Bar Dimensions (mm)				Applicable Bolt and Tightening Torque	
	A	B	C	D	Bolt Spec.	Max. Tightening Torque (kgf×cm)
HGM/HGE 30, 50E/S, 60, 100	< 7.5	< 17	Ø ≥ 5.5 (≤ 50 A)	A + 7.5	M5 Screw (≤ 50 A)	28.5
	< 7.5	< 17	Ø ≥ 9 (> 50 A)	A + 7.5	M8 Screw (> 50 A)	110
HGM/HGE50H/L, 125	< 7.5	< 20	Ø ≥ 9	A + 7.5	M8 Screw	110
HGM/HGE160, 250	< 10	< 27	Ø ≥ 9	A + 10	M8 Hex Socket	110
HGM/HGE400	< 12.5	< 30	Ø ≥ 11	A + 12.5	M10 Hex Socket	270
HGM/HGE630, 800	< 12.5	< 45	Ø ≥ 13	A + 12.5	M12 Hex Socket	470

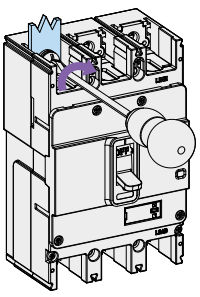
Crimp Terminal

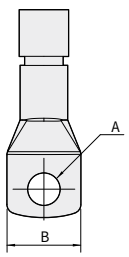
The terminal that conforms to the specification (crimped/copper tubing terminal) must be used and the interphase barrier and the terminal cover must be used. Select the terminal that meets the material and specification of the cable according to the circuit breaker's rating. The terminal is not provided separately. Refer to the table below for the wire specifications for the main ratings.

Application		Cu Cable Size (mm^2)	Applicable Terminal Dimensions (mm)	
Type	Rated Current		A	B
HGM/HGE 30, 50E/S, 60, 100	32	6	Ø ≥ 5.5	< 18
	50	10	Ø ≥ 5.5	
	63	16	Ø ≥ 9	
	100	35	Ø ≥ 9	
HGM/HGE50H/L, 125	50	10	Ø ≥ 9	< 21
	125	50		
HGM/HGE160, 250	160	70	Ø ≥ 9	< 28
	250	120		
HGM/HGE400	400	240	Ø ≥ 11	< 30
HGM/HGE630, 800	800	240×2	Ø ≥ 13	< 45



Connection Bus Bar





Crimped Terminal

External Accessories (HGM)

Front Connection of Fixed Devices

Busbar

Straight Busbar

It is used to meet the cable and standards of the switchgear. (Pitch between the poles maintained)

Spreader Busbar

It is used to extend the internal insulation distance of the switchgear. (Pitch between the poles extended)

Application		Straight		Spreader		Thickness
Type	Pole	Type	Pitch	Type	Pitch	
HGM/HGE 160, 250	2	TBB 25GP 2S	35 mm	-	45 mm	4 mm
	3	TBB 25GP 3S		TBB 25GP 3E45		
	4	TBB 25GP 4S		TBB 25GP 4E45		
HGM/HGE 400	2	TBB 40GM 2S	44 mm	-	59 mm	8 mm
	3	TBB 40GM 3S		TBB 40GM 3E59		
	4	TBB 40GM 4S		TBB 40GM 4E59		
HGM/HGE 630	2	TBB 63GM 2S	70 mm	-	-	8 mm
	3	TBB 63GM 3S		-		
	4	TBB 63GM 4S		-		
HGM/HGE 800	2	TBB 80GM 2S	70 mm	-	-	10 mm
	3	TBB 80GM 3S		-		
	4	TBB 80GM 4S		-		

LUG Terminal

As a part that connects the cable to the circuit breaker so that the cable can be used without crimp terminal, it must be selected according to the product's rating and size of cable.

Application		LUG Terminal		Applicable Cable				Tightening Torque (kgf×cm)
Type	Pole	Type	Material	EA	Material	S (mm^2)	L (mm)	
HGM/HGE 30, 50E/S, 60, 100 (≤ 50 A)	2	CTB 10GM 2S50	Al	1	Cu/Al	2.5 ~ 16	14	60
	3	CTB 10GM 3S50						
	4	CTB 10GM 4S50						
HGM/HGE 60, 100 (> 50 A)	2	CTB 10GM 2S100	Al	1	Cu/Al	16 ~ 50	14	60
	3	CTB 10GM 3S100						
	4	CTB 10GM 4S100						
HGM/HGE 50H/L, 125	2	CTB 12GM 2S	Al	1	Cu/Al	2.5 ~ 70	14	60
	3	CTB 12GM 3S						
	4	CTB 12GM 4S						
HGM/HGE 160, 250	2	CTB 25GM 2S	Al	1	Cu/Al	50 ~ 180	19	140
	3	CTB 25GM 3S						
	4	CTB 25GM 4S						
HGM/HGE 400	3	CTB 40GM 3S1H	Al	1	Cu/Al	60 ~ 240	30 ~ 60	353
	4	CTB 40GM 4S1H				60 ~ 125		
HGM/HGE 400	3	CTB 40GM 3S	Al	2	Cu/Al	60 ~ 240	30 ~ 60	353
	4	CTB 40GM 4S						
HGM/HGE 630, 800	3	CTB 80GM 3S	Al	3	Cu/Al	60 ~ 185	30 ~ 60	353
	4	CTB 80GM 4S						

※ Quantity per Set : 2P - 2 EA, 3P - 3 EA, 4P - 4 EA
This type is inch type. For HGM100~250, ISO type (mm) is also available.



Straight Busbar



Spreader Busbar

LUG Terminal



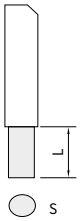
HGM/HGE30 ~ 250



HGM400



HGM/HGE630, 800

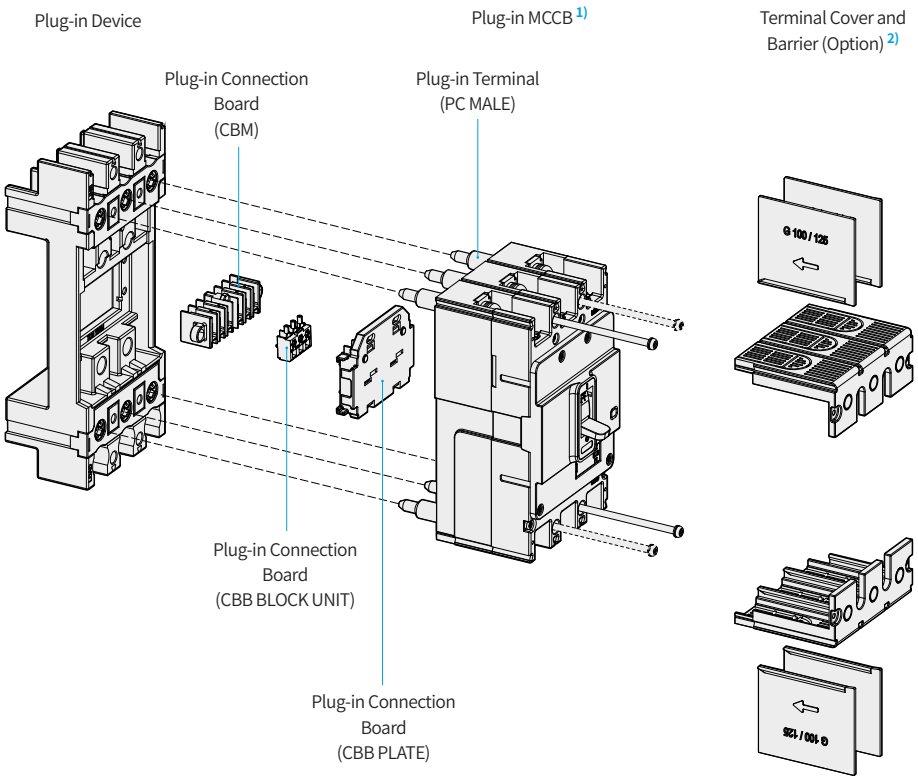


Wire

Plug-in Connection Devices

If the plug-in connection method is used, the circuit breaker can be replaced quickly and accurately without separating the power cable during a malfunction of a circuit breaker. Therefore, if plug-in type circuit breaker is installed in important electrical facilities such as shipping, broadcast station and others, the circuit breaker can be replaced and maintained quickly and conveniently without disconnecting the bus bar.

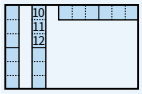
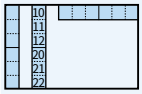
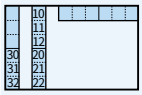
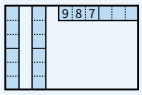
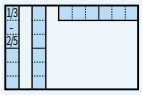
- Applicable to 32 ~ 800 AF.
- Offers convenient maintenance of switchgear.
- Convenient and relaxed installation after manufacture of the switchgear.
- Circuit breaker can be removed or replaced quickly without touching the terminal connection area.
- Connection block can be made by connecting the internal accessory to the circuit breaker.
- Type : For switchgear (TDM/TDF), for distribution board (TDA)
- Composition : Plug-in devices, plug-in MCCB, terminal cover or insulation barrier (Option).



※ 1) Plug-in MCCB must be used to apply plug-in connection method.
2) In case of not using the terminal cover, be sure to install a interphase barrier.

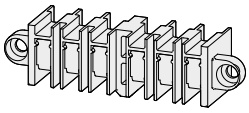
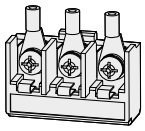
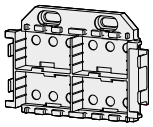
External Accessories (HGM)

HG-MCCB Plug-in CBM Wiring Position (TDM Front Side)

Option	HGM30, 50E/S, 60, 100 / 2P	HGM30, 50E/S, 60, 100	HGM50H/L, 125, 160, 250	HGM400, 630, 800	HGP50D, 125D, 160D	HGP250	HGP630	HGP800
AUX								
AUX2								
AUX3								
ALT								
SHT/UVT								
AUX+ALT								
AUX2+ALT								
AUX3+ALT								
AUX+ SHT/UVT								
AUX2+ SHT/UVT								
AUX3+ SHT/UVT								
ALT+ SHT/UVT								
AUX+ALT+ SHT/UVT								
AUX+ALT+ SHT/UVT Max. Mounting Combination								

Plug-in Connection Block

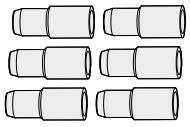
It is a connection block enables plug-in connection method, and it can be connected to the internal and external accessory of the circuit breaker.

Application			
HGM100 (≤ 50 A)	CBM 10GM 2PUNIT (2P) CBM 10GM UNIT (3P)	CBB BLOCK UNIT CBB BLOCK UNIT2C	CBBPLATE 10GM
HGM100 (> 50 A)			
HGM125			
HGM250			
HGM400			CBBPLATE 40GM
HGM800			CBBPLATE 80GM
Quantity per Set	1	1	1

※ Please refer to the bolt tightening torque of CBM/CBB.
CBM : 5~10kgf · cm
CBB : 15~20kgf · cm
Specifications for the wires : AWG20 to AWG22

Plug-in Terminal

It is a part that can implement the plug-in MCCB.

Application	
HGM100 (≤ 50 A)	PCMALE 10GM 50 A
HGM100 (> 50 A)	PCMALE 10GM 100 A
HGM125	PCMALE 12GM
HGM250	PCMALE 25GM
HGM400	PCMALE 40GM
HGM800	PCMALE 80GM
Quantity per Set	6

External Accessories (HGM)

Plug-in Devices

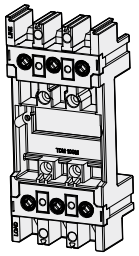
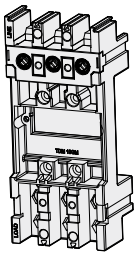
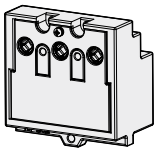
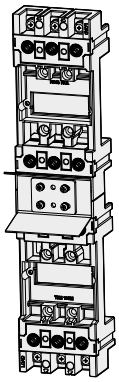
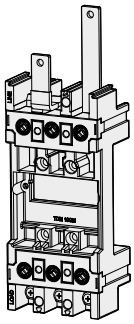
It is a connection block for plug-in MCCB installation and it is available according to the applicable panel and usage.

TDM Type

- TDM-P : It is comprised of plug-in terminal for both line/load for convenient use of connection block depending on the structure of the switchgear.
- TDM-F : Only plug-in parts of the line terminal are provided in TDM-P products.

TDF Type

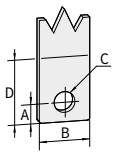
- Only the line terminal is comprised of plug-in terminal but the plug-in device can be fixed to the switchgear using the same method as TDM-P.

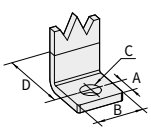
Applied Panel	Switchgear			Distribution Board	
Type	TDM-P	TDM-F	TDF	TDA (2 row)	TDA (1 row)
Composition					
Purpose	Line/Load Side	Line Side	Line Side	Duble Base	Single Base
HGM/HGE Type	32 ~ 800 AF	32 ~ 800 AF	32 ~ 125 AF	32 ~ 125 AF	32 ~ 125 AF
Pole	3P	3P	3P	2P (100 AF Only), 3P	3P

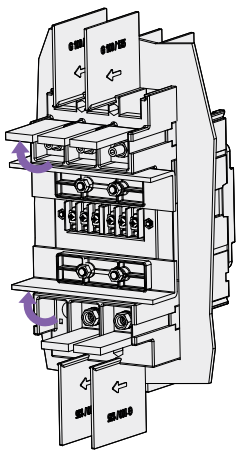
Specification of Connection Busbar

The bus bar of the switchgear can directly be connected to the plug-in device. The specifications of the applicable bus bar are as below and the insulation barrier or terminal cover must be used.

Unit : mm

Product	A	B	C	D	Remark
HGM/HGE30, 50E/S, 60, 100	< 10	< 21	Ø ≥ 6.5	< 17.5	
HGM/HGE50H/L, 125	< 10	< 21	Ø ≥ 6.5	< 19.5	
HGM/HGE160, 250	< 17.5	< 25	Ø ≥ 8.5	< 27.5	
HGM/HGE400	< 22	< 32	Ø ≥ 10.5	< 38	
HGM/HGE630, 800	< 30	< 40	Ø ≥ 17	< 48.5	

Product	A	B	C	D	Remark
HGM/HGE30, 50E/S, 60, 100	< 7.5	< 15	Ø ≥ 7	< 13	
HGM/HGE50H/L, 125	< 7.5	< 15	Ø ≥ 7	< 13	
HGM/HGE160, 250	-	-	-	-	
HGM/HGE400	-	-	-	-	
HGM/HGE630, 800	-	-	-	-	



Rear Connection Terminal

It is a part for rear connection instead of front connection requirement it applies the fixed type of circuit breaker to the switchgear. The bus bar of the switchgear can be wired vertically or horizontally depending on the assembly direction of the connection.

Flat Type

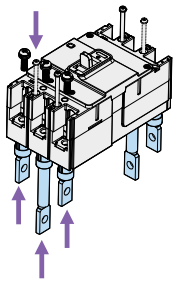
Application		Rear Terminal		Quantity per Set	
Type	Pole	Line Side	Load Side	Short Terminal	Long Terminal
HGM/HGE 30, 50E/S, 60, 100 (≤ 50 A)	2	RCT 05GM F2		1	1
	3	RCT 05GM F3		2	1
	4	RCT 05GM F4		2	2
HGM/HGE 60, 100 (> 50 A)	2	RCT 10GM F2		1	1
	3	RCT 10GM F3		2	1
	4	RCT 10GM F4		2	2
HGM/HGE 50H/L, 125	2	RCT 12GM F2		1	1
	3	RCT 12GM F3		2	1
	4	RCT 12GM F4		2	2
HGM/HGE 160, 250	2	RCT 25GM F2		2	0
	3	RCT 25GM F3		2	1
	4	RCT 25GM F4		2	2
HGM/HGE 400	3	RCT 40GM F3 LINE	RCT 40GM F3 LOAD	2	1
	4	RCT 40GM F4 LINE	RCT 40GM F4 LOAD	2	2
HGM/HGE 630, 800	3	RCT 80GM F3 LINE	RCT 80GM F3 LOAD	2	1
	4	RCT 80GM F4 LINE	RCT 80GM F4 LOAD	2	2

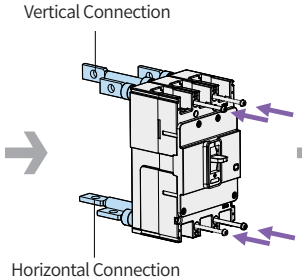


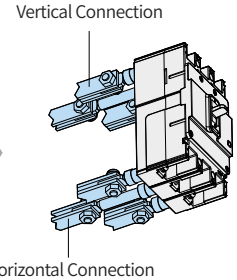
Short Terminal

Long Terminal

HGM30 ~ 250
HGE30 ~ 250





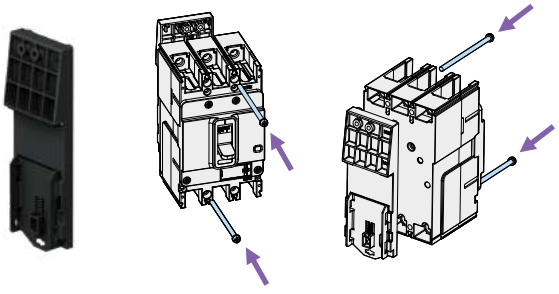


※When assembling the RCT, remove the back barrier in advance.

DIN Rail Adaptor

This is a part that enables a separate adaptor to be assembled and mounted for rear connection with the circuit breaker when the circuit breaker is mounted on the DIN Rail.
(HGM/HGE100 Only)

Application		Din Rail Adapter	Quantity
Type	Pole		
HGM/HGE 30, 50E/S, 60, 100	2	DRA 10GM	1
	3	DRA 10GM	1
	4	DRA 10GM	2



※ When assembling the DRA, remove the back barrier in advance.

External Accessories (HGM)

Motor Operator

This device is used for turning the circuit breaker ON/OFF in remote position.
It is convenient for establishing automation system for low-voltage system and for selecting load when operating under emergency power.

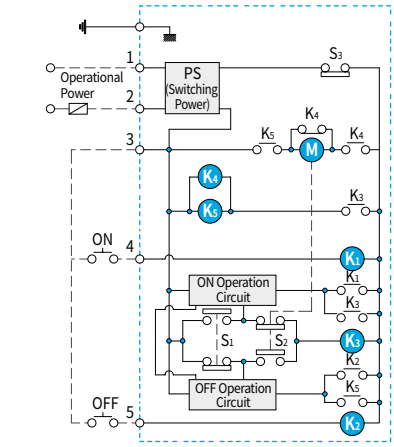
Application		MOT	Voltage
Type	Pole		
HGM30, 50E/S, 60, 100	3, 4	MOT 10GM	DC 24 V AC/DC 110 V AC/DC 240 V
HGM50H/L, 125	3, 4	MOT 12GM	
HGM160, 250	3, 4	MOT 25GM	
HGM400	3, 4	MOT 40GM	
HGM630, 800	3, 4	MOT 80GM	

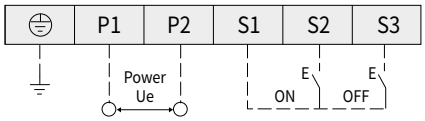
Rating and Characteristics

Format	Mechanical Lifespan	Operational Voltage	Operational Current (A)	Operating Time (ms)		Power Consumption (W)
				Closing	Opening	
MOT 10GM	10,000	DC 24 V	≤ 2.5	1,000	1,000	14
		AC/DC 110 V	≤ 0.5			
		AC/DC 240 V	≤ 0.5			
MOT 12GM	10,000	DC 24 V	≤ 2.5	1,000	1,000	14
		AC/DC 110 V	≤ 0.5			
		AC/DC 240 V	≤ 0.5			
MOT 25GM	8,000	DC 24 V	≤ 2.5	1,000	1,000	14
		AC/DC 110 V	≤ 0.5			
		AC/DC 240 V	≤ 0.5			
MOT 40GM	5,000	DC 24 V	≤ 6.0	1,200	1,200	14
		AC/DC 110 V	≤ 3.0			
		AC/DC 240 V	≤ 2.0			
MOT 80GM	5,000	DC 24 V	≤ 6.0	1,200	1,200	35
		AC/DC 110 V	≤ 3.0			
		AC/DC 240 V	≤ 2.0			

※ Operating Voltage Range : 85 ~ 110 % (DC 24 V : 95 ~ 110 %)

Circuit and Wiring Drawing

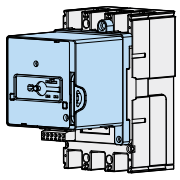




M : Motor
K4 : ON Relay
K2 : OFF Relay
K3, K4, K5 : Relay for Motor

S1 : ON Limit Switch
S2 : OFF Llimit Switch
S3 : Auto/Manual Limit Switch





※ Precaution for mounting
When mounting the motor operator on MCCB, it must be mounted when the MCCB's handle position is in OFF position.
Mounting the motor operator in other positions (ON, TRIP) may cause damage to the motor.
※ Operation caution
When device tripped in off position, it is tripped and handle position is located in trip position even if indicator turn off to green color.
In this case, device should be reset manually.

External Accessories (HGP)

Locking Device

Padlock Device (PLD)

This device is used for locking the handle of circuit breaker to the OFF position by using a padlock. Padlock is not provided separately and up to 3 can be used. The applicable specifications of padlocks are as below.

Type	Application	Padlock Diameter 1)
PLD 16GP	HGP50D, HGP125D, HGP160D	5 ~ 6 mm
PLD 25GP	HGP250 (HGP100/MCP)	
PLD 63GP	HGP400, HGP630	
PLD 80GP	HGP800	

Mechanical Interlock

This device interlocks two circuit breakers by using a mechanical interlock.

Key Features

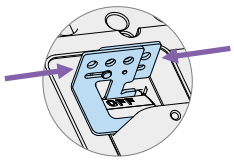
- It prevents two breakers from closing at the same time.
- All circuit breakers are open. The applicable specifications of padlocks are as below.

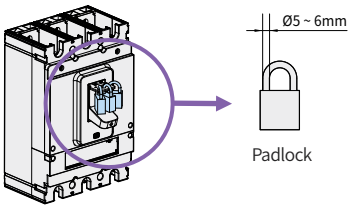
Type		Application	Padlock Diameter 1)
3P	4P		
MIF 16GP 3	MIF 16GP R4	HGP50D, HGP125D, HGP160D	5 ~ 7 mm
MIF 25GP 3	MIF 25GP R4	HGP250 (HGP100/MCP)	
MIF 63GP 3	MIF 63GP R4	HGP400, HGP630	
MIF 80GP 3	MIF 80GP R4	HGP800	

※ 1) Padlock not included



PLD

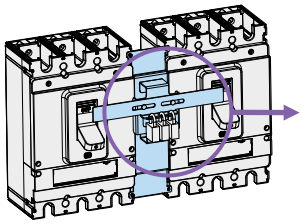


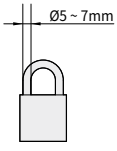


Padlock

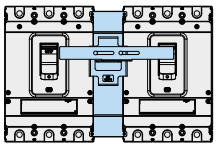


MIF

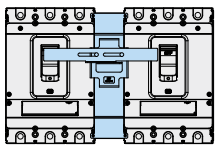




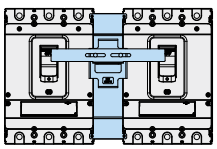
Padlock



Right Off Lock



Left Off Lock



Double Off Lock

External Accessories (HGP)

Terminal Cover / Insulation Barrier

Terminal Cover

It is our insulation part of circuit breaker for live and load side of terminal area from the outside and it prevents electric shock and short-circuit accidents that may occur due to direct contact of people's hand or tools with the live current part. When the terminal cover is used, the protection degree of IP40 is applied to the conductor part. Based on the connection method of the circuit breaker, it can be classified into long or short type for use and various handles and interlock devices can be combined for use.

Short Type

It is suitable for plug-in or rear connection.

Long Type

It is suitable for front connection using wires, bus bar or lug terminals.

Insulation Barrier

As a part used to prevent accidents with regards to insulation and conductive foreign substance between the circuit breaker terminals, it improves the performance of phase-to-phase insulation by installing it in the groove between the circuit breaker's terminals. It can easily be assembled even if the circuit breaker has already been installed and in case the two circuit breakers have been installed side by side, it can also be assembled in the gap between the two circuit breakers. In addition, it is used in the terminal cover and plug-in base.
In case insulation barrier is not mounted between the circuit breaker's terminal, it may cause secondary short-circuit accidents so it must be used.

Type			Application	Pitch (mm)	No. of Parts (EA/Set)
3P Short (Plug-in)	3P Long (3P)	4P Long (4P)			
TCF 16GP S3	TCF 16GP L3	TCF 16GP L4	HGP50D, HGP125D, HGP160D	30	1
TCF 25GP-G S3	TCF 25GP-G L3	TCF 25GP-G L4	HGP250 (HGP100/MCP)	35	1
TCF 63GP S3	TCF 63GP L3	TCF 63GF L4	HGP400, HGP630	46.5	1
TCF 80GP S3	TCF 80GP L3	TCF 80GF L4	HGP800	70	1

Type		Application	No. of Parts (EA/Set)	
3P	4P		3P	4P
TQQ 16GP 3	TQQ 16GP 4	HGP50D, HGP125D, HGP160D	4	6
TQQ 25GP-G 3	TQQ 25GP-G 4	HGP250 (HGP100/MCP)	4	6
TQQ 63GP 3	TQQ 63GP 4	HGP400, HGP630	4	6
TQQ 80GP 3	TQQ 80GP 4	HGP800	4	6



Terminal Cover
Short Type

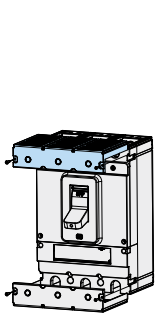


Terminal Cover
Long Type

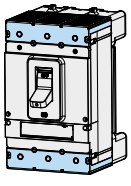


Insulation Barrier

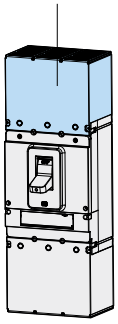
※ In case of using as front connection, please use it after removing the indicated part.



Assembly
Diagram

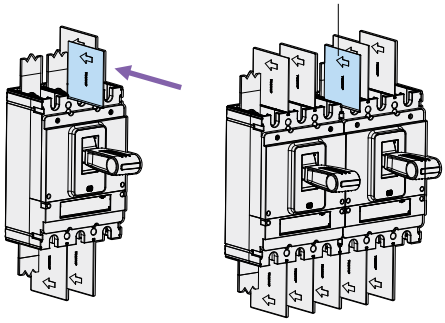


Short Type
(Plug-in Connection)



Long Type
(Front Connection)

※ Additional barrier required for close mounting is provided as additional options. (It may cause secondary accidents, so it must be installed.)



Rotary Handle

Rotary handle is a product that can check and operate MCCB's ON/OFF/TRIP even when the panel door is closed by installing the circuit breaker in enclosed switchgear or on MCCB panel and others. There are two types of rotary handle, front contact type and extension type and all the rotary handles offer panel door locking function and handle locking function. The rotary handle can be rotated clockwise to turn the circuit breaker "ON" and according to the mounting direction of MCCB, it is categorized into the upper line, the right line and the left line. The IP grade of the handle is IP40.

Front Contact Rotary Handle

- 160 ~ 250 AF : The handle is installed directly to the circuit breaker.
- 630 ~ 800 AF : The handle is installed to the door of the panel.

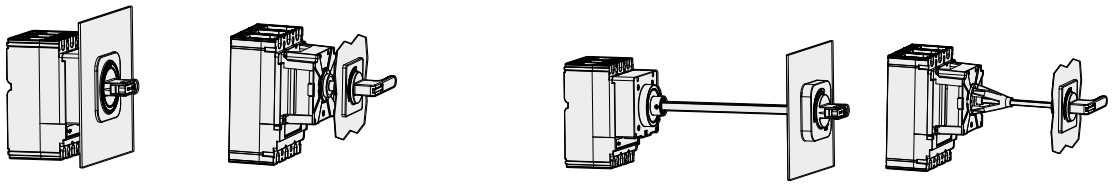
Type			Application
Upper Line	Right Line	Left Line	
TFG 16GP U	TFG 16GP R	TFG 16GP L	HGP50D, HGP125D, HGP160D
TFG 25GP U	TFG 25GP R	TFG 25GP L	HGP250 (HGP100/MCP)
TFG 63GP U	TFG 63GP R	TFG 63GP L	HGP400, HGP630
TFG 80GP U	TFG 80GP R	TFG 80GP L	HGP800

Extension Rotary Handle

It is suitable if the distance between the circuit breaker and the panel door is long. The handle is installed to the door of the panel and there is no trip-button function.

Type	Application
TFH 16GP	HGP50D, HGP125D, HGP160D
TFH 25GP	HGP250 (HGP100/MCP)
TFH 63GP	HGP400, HGP630
TFH 80GP	HGP800





HGP50D, HGP125D
HGP160D, HGP250

HGP400, HGP630
HGP800

HGP50D, HGP125D
HGP160D, HGP250

HGP400, HGP630
HGP800

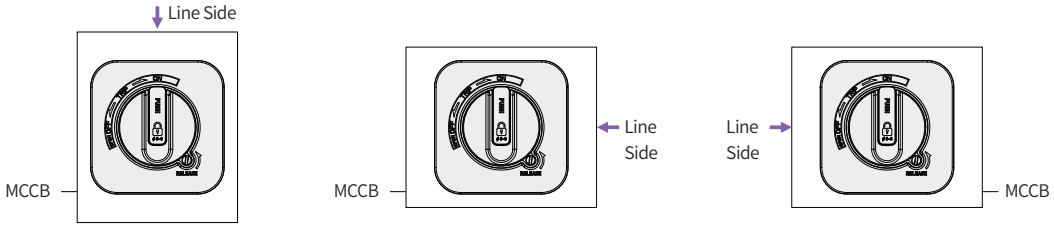
※ When installing an extension rotary handle, the eccentric tolerance of the handle drive shaft is 1.5 degrees.

External Accessories (HGP)

Rotary Handle

Types of Handle by the Circuit Breaker's Installation Type

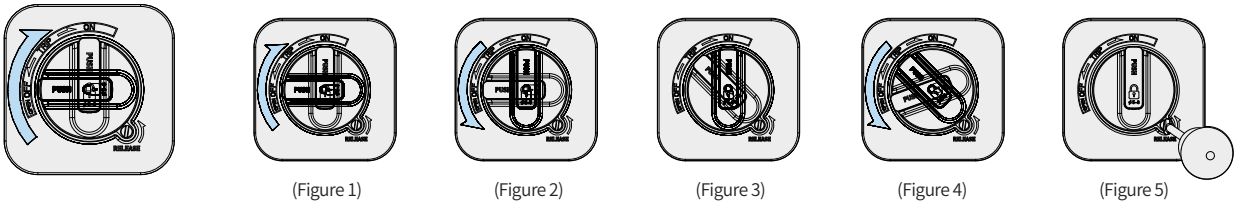
Rotary handle is divided into the following three types by the circuit breaker's direction of power supply.



How to Operate the Handle

Operating Direction : Turn the handle clockwise to turn the breaker ON.

- Circuit Breaker ON : Rotate the handle to ON position. (Figure 1)
- Circuit Breaker OFF : Rotate the handle to OFF position. (Figure 2)
- Circuit Breaker TRIP : If the circuit breaker is tripped, the handle will automatically return to TRIP position. (Figure 3)
- After the circuit breaker is tripped, rotate the handle to the RESET position first (Figure 4) then rotate to the ON position and the circuit breaker will turn ON (Figure 1).
- If you need to open the door when the handle is in the ON state, rotate the RELEASE screw to the direction of the arrow then open the door (Figure 5).

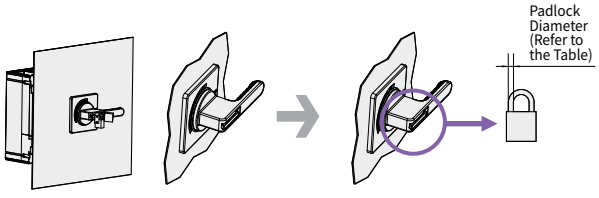


(Figure 1) (Figure 2) (Figure 3) (Figure 4) (Figure 5)

Handle Locking Device

Lock Function	OFF State Door Lock	ON State Door Lock	Reverse Interlock	Handle Padlock [1]
Details	· Impossible to open the panel door when the circuit breaker is in the OFF state. · Possible at RESET position · Possible to open the panel door after rotating the handle to RESET	· Impossible to open the panel door when the circuit breaker is in the ON state · Possible to open the panel door after rotating the RELEASE screw	· Impossible to close the circuit breaker (ON) in case the panel door is open	· Padlocking function which locks using a padlock to prevent handle operation. · Padlock is not provided separately and the number of padlocks depends on the padlock diameter. (Refer to the table below) · As for the specifications of the applicable padlocks, refer to the table below.
Front Contact Type (TFG)	●	●	● (160/250 AF Only)	●
Extension Type (TFH)	●	●	-	●

※ 1) For TFG 250 AF or less, The handle remains ON when the circuit breaker is tripped after padlocking in ON position.



Application	Padlock Diameter [1]
HGP50D, HGP125D, HGP160D, HGP250	6 ~ 8 mm
HGP400, HGP630, HGP800	5 ~ 7 mm

※ 1) Padlock not included

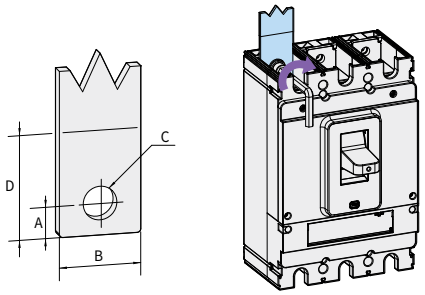
Front Connection of Fixed Devices

Straight/spreader bus bar or lug terminal can be selected according to the size and specification of the cable or bus bar to be connected to the circuit breaker.

Insulated Bar Connection

In case the bus bar pitch of the switchgear is equal to the circuit breaker, it can be connected directly to the circuit breaker by using an insulation tube. Refer to the following connection bus bar specification for connection and the insulation barrier between phases and terminal cover must be used.

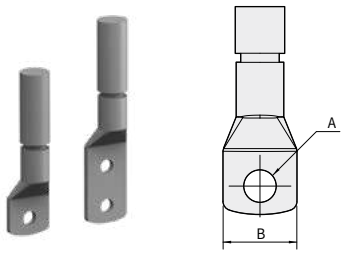
Application	Connection Bus Bar Dimensions (mm)				Applicable Bolt and Tightening Torque	
	A	B	C	D	Bolt Spec.	Max. Tightening Torque (kgf×cm)
50 ~ 160 AF	< 9	< 22	Ø9	A + 9	M8 Screw	136
250 AF	< 9	< 25	Ø9	A + 10	M8 Hex Socket	136
400 ~ 630 AF	< 15	< 32	Ø10.5	A + 15	M10 Hex Socket	270
800 AF	< 15.5	< 50	Ø13	A + 16.5	M12 Hex Socket	470



Crimped Terminal

Standard terminals (crimped/copper tubing terminal) must be used and the insulation barrier between phases and the terminal cover must be used. Standard terminals must be selected for use according to the rating of the circuit breaker and the terminal is not provided separately. As for the cable specifications with regards to important ratings, refer to the table below.

Application		Cu Cable Size (mm^2)	Applicable Terminal Dimensions (mm)		
AF	Rated Current		A	B	C
50 ~ 160 AF	100 A	35	Ø9	< 22	< 9
	160 A	70			
250 AF	160 A	70	Ø9	< 25	< 9
	250 A	120			
400 ~ 630 AF	400 A	240	Ø10.5	< 32	< 15
	630 A	185×2			
800 AF	800 A	240×2	Ø13	< 50	< 15.5



Busbar

Straight Busbar

It is used to meet the cable and standards of the switchgear.
(Pitch between the poles maintained)

Spreader Busbar

It is used to extend the internal insulation distance of the switchgear.
(Pitch between the poles extended)

Series Busbar

Used for serial connection of adjacent phases. (DC only)



Straight Busbar | Spreader Busbar | Series Busbar

Application		Straight		Spreader		Series
Type	Pole	Type	Pitch	Type	Pitch	Type
HGP250	3	TBB 25GP 3S	35 mm	TBB 25GP 3E45	45 mm	SBB 25GP
	4	TBB 25GP 4S		TBB 25GP 4E45		
HGP630	3	TBB 63GP 3S	46.5 mm	TBB 63GP 3E61.5	61.5 mm	SBB 63GP
	4	TBB 63GP 4S		TBB 63GP 4E61.5		
HGP800	3	TBB 80GP 3S	70 mm	-	-	SBB 80GP
	4	TBB 80GP 4S		-		

※ Quantity per Set : 3P - 3 EA, 4P - 4 EA, SBB - 1 EA

External Accessories (HGP)

LUG Terminals

As a cable connection to the circuit breaker the cable can be used without crimped terminal, it must be selected according to the product's rating and size of cable.

Application		LUG Terminal		Application				Tightening Torque (kgf×cm)
Type	Pole	Type	Material	EA	Material	S (mm^2)	L (mm)	
HGP50D HGP125D HGP160D	3	CTB 16GP 3	Steel	1	Cu/Al	1.5 ~ 95	19	140
	4	CTB 16GP 4						
HGP250 (HGP100/MCP)	3	CTB 25GP 3	Al	1	Cu/Al	14 ~ 185	19	140
	4	CTB 25GP 4						
HGP400 HGP630	3	CTB 63GP 3	Al	2	Cu/Al	60 ~ 240	30 ~ 60	353
	4	CTB 63GP 4						
HGP800	3	CTB 80GP 3	Al	3	Cu/Al	60 ~ 185	30 ~ 60	353
	4	CTB 80GP 4						

※ Packaging Quantity per Set : Provided in the composition quantity of line or load side (3P - 3 EA, 4P - 4 EA)



HGP50D
HGP125D
HGP160D



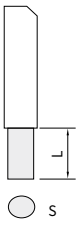
HGP250



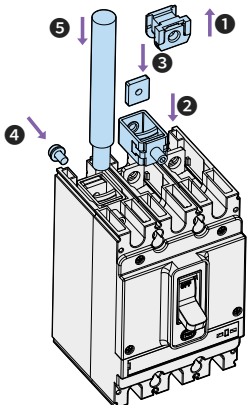
HGP400
HGP630

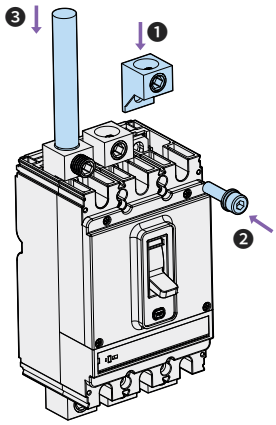


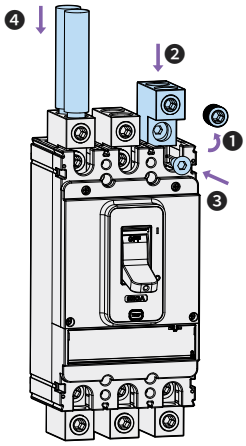
HGP800

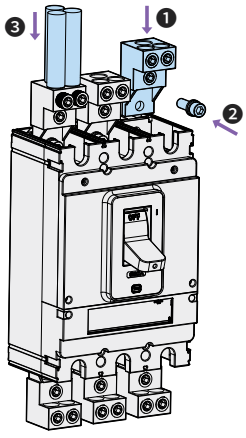


Wire





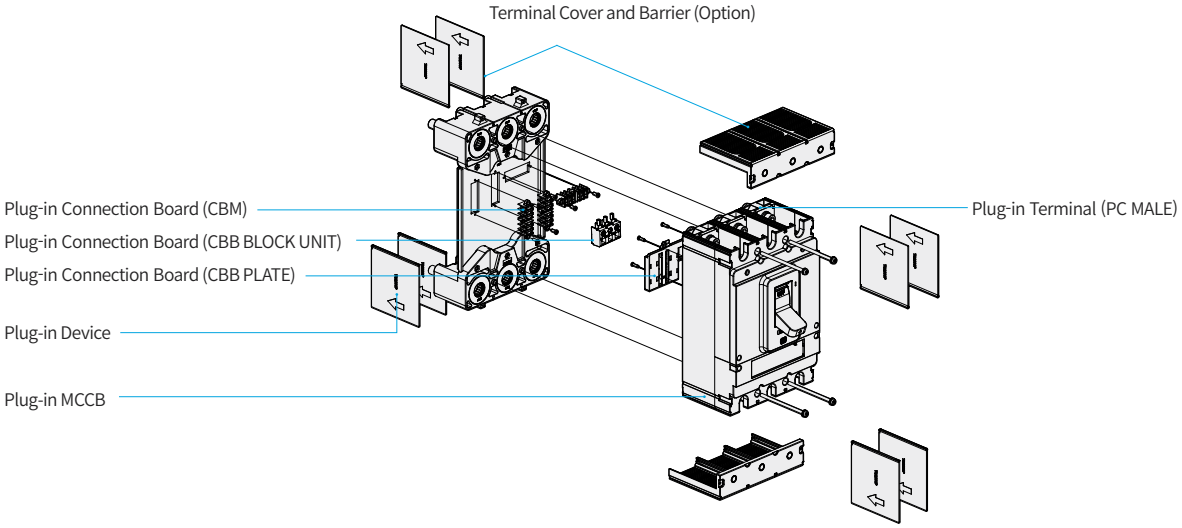




Plug-in Connection Devices

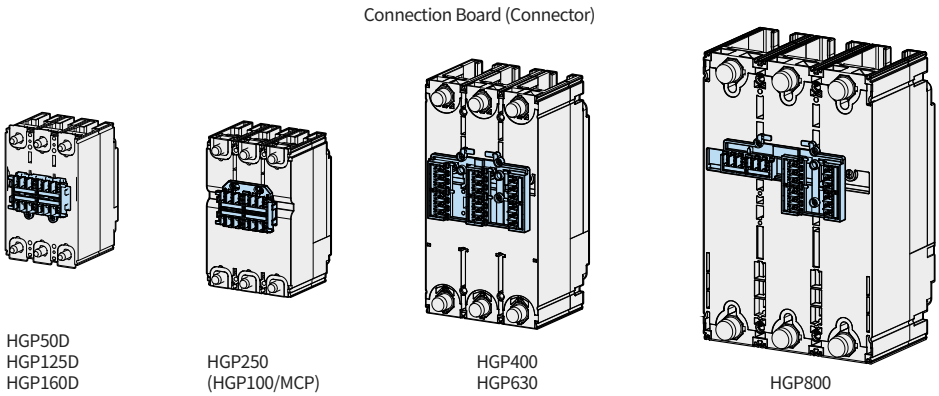
When the plug-in connection method is used, the circuit breaker can be replaced quickly and accurately without power off during a malfunction of a circuit breaker. Therefore, in case the plug-in method of circuit breaker is installed in important electrical facilities such as shipping, broadcast station and others, the circuit breaker can be replaced and maintained quickly and conveniently without disconnecting the bus bar.

- Applicable to 50 ~ 800 AF, up to 3P.
- Offers convenient maintenance of switchgear.
- Convenient and relaxed installation after manufacture of the switchgear.
- Circuit breaker can be removed or replaced quickly without touching the terminal connection area.
- Type : For switchboard (TDM/TDF)
- Composition : Plug-in devices, plug-in MCCB, terminal cover or insulation barrier (Option)



Plug-in MCCB (For HGP)

In order to apply the plug-in connection method, the plug-in MCCB must be used instead of the general type, even for the MCCB.
The product covers various breaking capacity up to the rated current of 800 A so this product conforms to the switchgear standard.
Connection board (Connector) can be added to connect internal accessories to the circuit breaker.



HGP50D
HGP125D
HGP160D

HGP250
(HGP100/MCP)

HGP400
HGP630

HGP800

External Accessories (HGP)

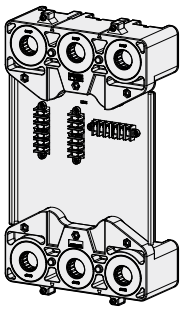
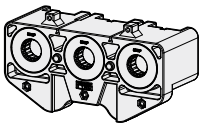
Plug-in Connection Devices

Plug-in Devices

As a connection block in which plug-in MCCB can be installed, it is available according to the applied panel and the purpose.

TDM Type

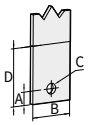
- TDM-P : It is comprised of plug-in terminal for both line/load for convenient use of connection block depending on the structure of the switchgear.
- TDM-F : Only plug-in parts of the line terminal are provided in TDM-P products.

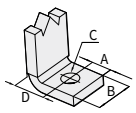
Applied Panel	For Switchgear	
Type	TDM-P	TDM-F
Composition		
Purpose	Line/Load Side	Line Side
Applicable MCCB	HGP50 ~ 800 AF 3P	

Specification of Connection Busbar

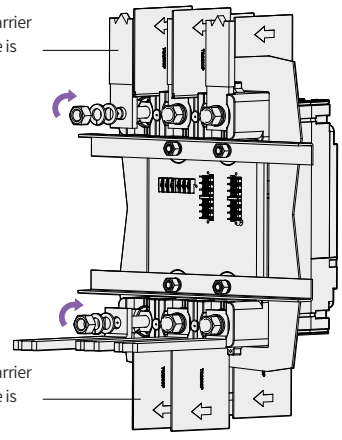
The bus bar of the switchgear can directly be connected to the plug-in device.
The specifications of the applicable bus bar are as below and the insulation barrier or terminal cover must be used.
There is no separate bus bar for connection.

Unit : mm

Product	A	B	C	D	Remark
50 ~ 160 AF	< 12	< 21	Ø ≥ 8.5	A + 18	
250 AF	< 18	< 25	Ø ≥ 8.5	A + 17	
400 ~ 630 AF	< 34	< 35	Ø ≥ 10.5	A + 26	
800 AF	< 30	< 40	Ø ≥ 16.5	A + 30	

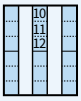
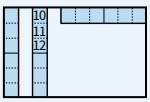
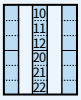
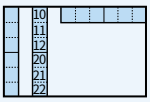
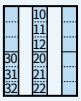
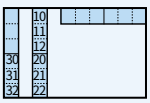
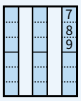
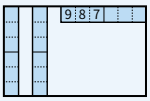
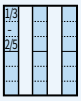
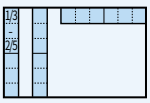
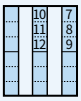
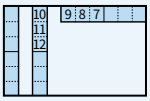
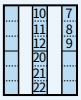
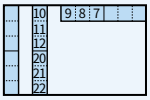
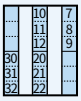
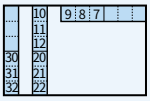
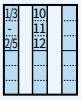
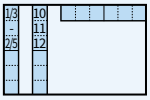
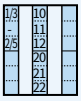
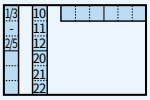
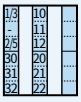
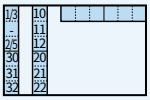
Product	A	B	C	D	Remark
50 ~ 160 AF	< 12	< 21	Ø ≥ 8.5	< 12	
250 AF	< 18	< 25	Ø ≥ 8.5	< 18	
400 ~ 630 AF	< 25	< 35	Ø ≥ 10.5	< 25	
800 AF	< 30	< 40	Ø ≥ 16.5	< 30	

※ The insulation barrier for plug-in device is an option



※ The insulation barrier for plug-in device is an option.

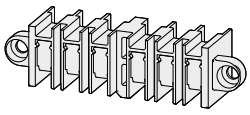
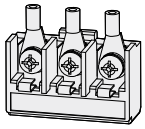
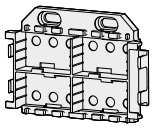
HG-MCCB Plug-in CBM Wiring Position (TDM Front Side)

Option	HGP50D, HGP125D, HGP160D	HGP250 (HGP100/MCP)	HGP400, HGP630	HGP800
AUX				
AUX2				
AUX3				
ALT				
SHT/UVT				
AUX+ALT				
AUX2+ALT				
AUX3+ALT				
AUX+ SHT/UVT				
AUX2+ SHT/UVT				
AUX3+ SHT/UVT				
ALT+ SHT/UVT				
AUX+ALT+ SHT/UVT				
AUX+ALT+ SHT/UVT Max. Mounting Combination				

External Accessories (HGP)

Plug-in Connection Block

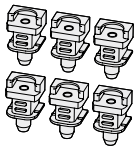
In order for the plug-in connection method, it can be connected to the internal and external accessory of the circuit breaker.

Application			
HGP160D	CBM 10GM UNIT (3P)	CBB BLOCK UNIT CBB BLOCK UNIT2C	CBBPLATE 16GP
HGP250			CBBPLATE 25GP
HGP630			CBBPLATE 63GP
HGP800			CBBPLATE 80GP
Quantity per Set	1	1	1

※ Please refer to the bolt tightening torque of CBM/CBB.
CBM : 5~10kgf · cm
CBB : 15~20kgf · cm
Specifications for the wires : AWG20 to AWG22

Plug-in Terminal

It is a part that can realize the plug-in MCCB.

Application	
HGP160D	PCMALE 16GP
HGP250	PCMALE 25GP-G
HGP630	PCMALE 63GP
HGP800	PCMALE 80GP
Quantity per Set	6

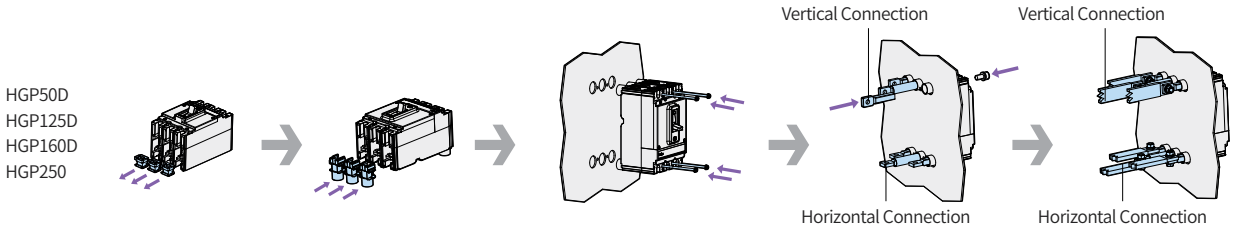
Rear Connection Terminal

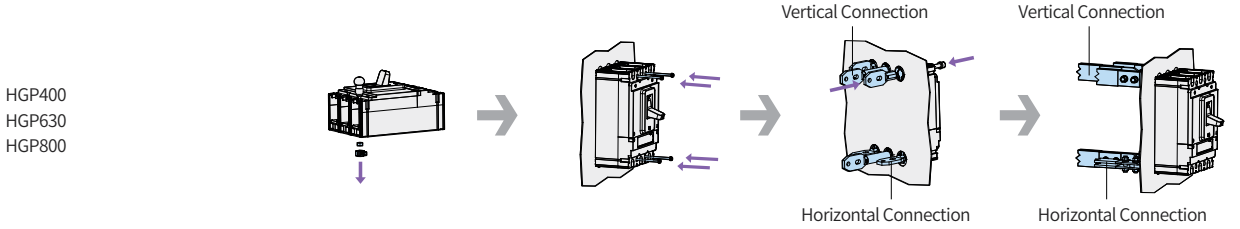
It is a part that is used in case there is a need for rear connection instead of front connection by applying the fixed type of circuit breaker to the switchgear. The bus bar of the switchgear can be wired vertically or horizontally depending on the assembly direction of the connection.

Flat Type

Application		Rear Terminal		Quantity per Set	
Type	Pole	Line Side	Load Side	Short Terminal	Long Terminal
HGP50D, HGP125D, HGP160D	3	RCT 16GP F3		2	1
	4	RCT 16GP F4		2	2
HGP250 (HGP100/MCP)	3	RCT 25GP-G F3		2	1
	4	RCT 25GP-G F4		2	2
HGP400 HGP630	3	RCT 63GP F3 LINE	RCT 63GP F3 LOAD	2	1
	4	RCT 63GP F4 LINE	RCT 63GP F4 LOAD	2	2
HGP800	3	RCT 80GP F3 LINE	RCT 80GP F3 LOAD	2	1
	4	RCT 80GP F4 LINE	RCT 80GP F4 LOAD	2	2

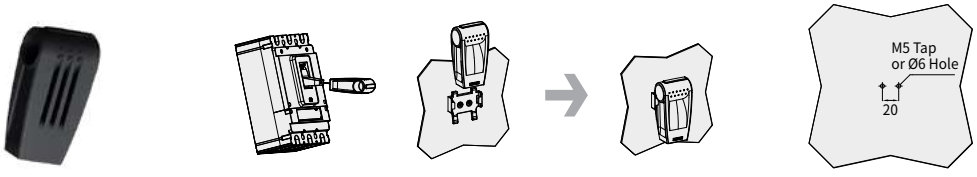






Auxiliary Handle (THA)

As an auxiliary handle used to reduce the operating force of ON, OFF, RESET in large capacity circuit breaker (400 ~ 800 AF), it is a standard product provided. It comes together with a holder for storing auxiliary handle that can be fixed to the switchboard panel.



External Accessories (HGP)

Motor Operator

This device is used for turning the circuit breaker ON/OFF from remote position. It is convenient for establishing automation system for low-voltage load system and for selecting load when operating under emergency power.

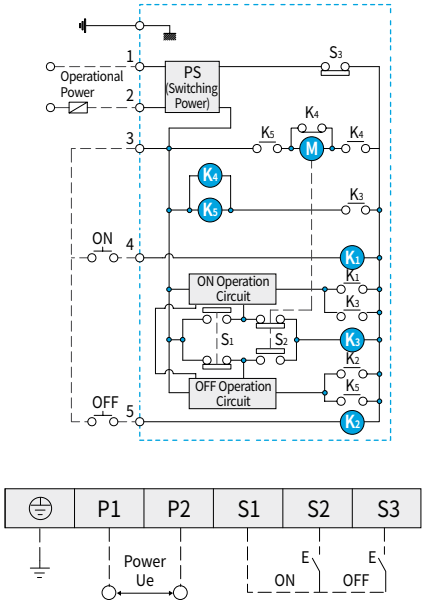
Application Type	Pole	MOT	Voltage
HGP50D, HGP125D, HGP160D	3, 4	MOT 16GP	DC 24 V AC/DC 110 V AC/DC 240 V
HGP250 (HGP100/MCP)	3, 4	MOT 25GP	
HGP400, HGP630	3, 4	MOT 63GP	
HGP800	3, 4	MOT 80GP	

Rating and Characteristics

Format	Operational voltage	Operational Current (A)	Operating Time (ms)		Power Consumption (W)	Endurance
			Closing	Opening		
MOT 16GP	DC 24 V	≤ 2.5	1,000	1,000	14	10,000
	AC/DC 110 V	≤ 0.5				
	AC/DC 240 V	≤ 0.5				
MOT 25GP	DC 24 V	≤ 2.5	1,000	1,000	14	10,000
	AC/DC 110 V	≤ 0.5				
	AC/DC 240 V	≤ 0.5				
MOT 63GP	DC 24 V	≤ 6.0	1,200	1,200	35	5,000
	AC/DC 110 V	≤ 3.0				
	AC/DC 240 V	≤ 2.0				
MOT 80GP	DC 24 V	≤ 6.0	1,200	1,200	35	5,000
	AC/DC 110 V	≤ 3.0				
	AC/DC 240 V	≤ 2.0				

※ Range of Operational Voltage : 85 ~ 110 % (DC 24 V : 95 ~ 110 %)

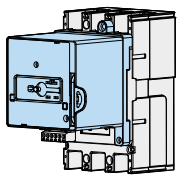
Circuit and Wiring Drawing



M : Motor
K1 : ON Relay
K2 : OFF Relay
K3 K4 K5 : Relay for Motor

S1 : ON Limit Switch
S2 : OFF Llimit Switch
S3 : Auto/Manual Limit Switch





※ Precaution for mounting
When mounting the motor operator on MCCB, it must be mounted when the MCCB's handle position is at in position.
Mounting the motor operator in other positions (ON, TRIP) may cause damage to the motor.
※ Operation caution
When device tripped in off position, it is tripped and handle position is located in trip position even if indicator turn off to green color.
In this case, device should be reset manually.

Technical Data (HGM/HGE)

Environmental Operating Conditions

Temperature Derating

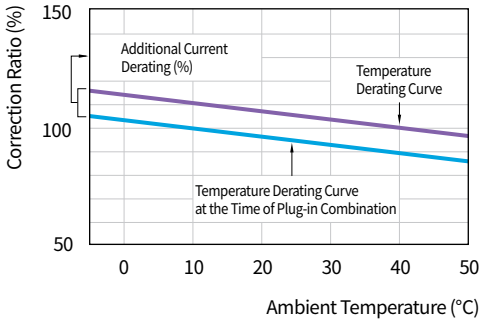
The overcurrent characteristic of MCCB has been set to the ambient temperature of 40 °C. If the ambient temperature is less or more than 40 °C, the overcurrent characteristics may differ.

If the Ambient Temperature is lower than 40 °C

In order to ensure that the circuit breaker's overcurrent meet the derating curve at the given ambient temperature, the real current (Ir) has to be adjusted. The temperature correction ratio or each MCCB is shown in the circuit breaker's characteristics curve.

If the Ambient Temperature is higher than 40 °C

As the internal temperature of MCCB is a sum of increased temperature due to current flow and the ambient temperature, if the ambient temperature exceeds 40 °C, thermal damage of internal insulation material of MCCB may occur causing the circuit breaker to trip at an early stage. When applying ambient temperature higher than 40 °C, the rated current must be adjusted as shown in the following rated current derating table.



In (Rated Current) :
Circuit breaker's rating at ambient temperature of 40 °C
Ir (Real Current) :
Circuit breaker's rating at the given temperature
Ir = Correction Ratio (%) × In

Rated Current Derating Table : HG Type/Standard Mounting

Model	Rated Current (A)	Ambient Temperature (°C)									
		10	20	30	40	45	50	55	60	65	70
HGM/HGE 30, 50E/S, 60, 100	16	18.9	18.6	17.8	16	15.2	14.6	14.1	13.6	13.2	12.8
	20	23.58	23.3	22.2	20	19.1	18.3	17.6	17.0	16.5	16.0
	25	26.8	26.2	25.6	25	24.7	24.4	24.1	23.8	23.5	23.2
	32	34.3	33.5	32.8	32	31.6	31.3	30.9	30.5	30.1	29.7
	40	42.9	41.9	41.0	40	39.5	39.0	38.6	38.1	37.6	37.1
	50	53.6	52.4	51.2	50	49.4	48.8	48.2	47.6	47.0	46.4
	63	67.5	66.0	64.5	63	62.2	61.5	60.7	60.0	59.2	58.5
	75	80.4	78.6	76.8	75	74.1	73.2	72.3	71.4	70.5	69.6
	80	85.8	83.8	81.9	80	79.0	78.1	77.1	76.2	75.2	74.2
	100	107.2	104.8	102.4	100	98.8	97.6	96.4	95.2	94.0	92.8
HGM/HGE 50H/L, 125	16	18.9	18.6	17.8	16	15.2	14.6	14.1	13.6	13.2	12.8
	20	23.6	23.3	22.2	20	19.1	18.3	17.6	17.0	16.5	16.0
	25	27.3	26.6	25.8	25	24.6	24.2	23.8	23.4	23.0	22.6
	32	35.0	34.0	33.0	32	31.5	31.0	30.5	30.0	29.5	29.0
	40	43.8	42.5	41.3	40	39.4	38.8	38.1	37.5	36.8	36.2
	50	54.7	53.1	51.6	50	49.2	48.4	47.7	46.9	46.1	45.3
	63	68.9	66.9	65.0	63	62.0	61.0	60.1	59.1	58.0	57.0
	75	82.0	79.7	77.3	75	73.8	72.7	71.5	70.3	69.1	67.9
	80	87.5	85.0	82.5	80	78.8	77.5	76.3	75.0	73.7	72.4
	100	109.4	106.3	103.1	100	98.4	96.9	95.3	93.8	92.1	90.5
	125	136.7	132.8	128.9	125	123.1	121.1	119.1	117.2	115.1	113.1
HGM/HGE 160, 250	100	107.8	105.2	102.6	100	96.0	94.0	92.0	88.0	85.5	83.0
	125	134.8	131.5	128.3	125	120.0	117.5	115.0	110.0	106.9	103.8
	150	161.7	157.8	153.9	150	144.0	141.0	138.0	132.0	128.3	124.5
	160	172.5	168.3	164.2	160	153.6	150.4	147.2	140.8	136.8	132.8
	175	188.7	184.1	179.6	175	168.0	164.5	161.0	154.0	149.6	145.3
	200	215.6	210.4	205.2	200	192.0	188.0	184.0	176.0	171.0	166.0
	225	242.6	236.7	230.9	225	216.0	211.5	207.0	198.0	192.4	186.8
	250	269.5	263.0	256.5	250	240.0	235.0	230.0	220.0	213.8	207.5

Rated Current Derating Table : HG Type/Standard Mounting

Model	Rated Current (A)	Ambient Temperature (°C)									
		10	20	30	40	45	50	55	60	65	70
HGM/HGE 400	250	269.5	263.0	256.5	250	246.8	243.5	240.2	237.0	233.6	230.3
	300	324	316.5	309	300	291	282	273	264	255	246
	350	378	369.25	360.5	350	340	330	320	310	300	290
	400	432	422	412	400	388	376	364	352	340	328
HGM/HGE 630, 800	500	540	527.5	515	500	485	470	455	440	425	410
	630	680.4	664.65	648.9	630	611	592	573	554	535	516
	700	756	738.5	721	700	679	658	637	616	595	574
	800	864	844	824	800	776	752	728	704	680	656

Rated Current Derating Table : HG Type/Plug-in Method

Model	Rated Current (A)	Ambient Temperature (°C)									
		10	20	30	40	45	50	55	60	65	70
HGM/HGE 30, 50E/S, 60, 100	16	18.5	18.3	17.4	16	14.9	14.3	13.8	13.3	12.9	12.5
	20	23.1	22.8	21.8	20	18.7	17.9	17.2	16.7	16.1	15.7
	25	26.3	25.7	25.1	25	24.2	23.9	23.6	23.3	23.0	22.7
	32	33.6	32.9	32.1	31	31.0	30.6	30.2	29.9	29.5	29.1
	40	42.0	41.1	40.1	39	38.7	38.3	37.8	37.3	36.8	36.4
	50	52.5	51.4	50.2	49	48.4	47.8	47.2	46.6	46.1	45.5
	63	66.2	64.7	63.2	62	61.0	60.3	59.5	58.8	58.0	57.3
	75	78.8	77.0	75.3	74	72.6	71.7	70.9	70.0	69.1	68.2
	80	84.0	82.2	80.3	78	77.5	76.5	75.6	74.6	73.7	72.8
	100	105.1	102.7	100.4	98	96.8	95.6	94.5	93.3	92.1	90.9
HGM/HGE 50H/L, 125	16	18.5	18.2	17.4	16	14.9	14.3	13.8	13.3	12.9	12.5
	20	23.1	22.8	21.8	20	18.7	17.9	17.2	16.7	16.1	15.7
	25	26.8	26.0	25.3	25	24.1	23.7	23.4	23.0	22.6	22.2
	32	34.3	33.3	32.3	31	30.9	30.4	29.9	29.4	28.9	28.4
	40	42.9	41.7	40.4	39	38.6	38.0	37.4	36.8	36.1	35.5
	50	53.6	52.0	50.5	49	48.2	47.5	46.7	45.9	45.1	44.4
	63	67.5	65.6	63.7	62	60.8	59.8	58.8	57.9	56.9	55.9
	75	80.4	78.1	75.8	74	72.4	71.2	70.1	68.9	67.7	66.5
	80	85.8	83.3	80.9	78	77.2	76.0	74.7	73.5	72.2	71.0
	100	107.2	104.1	101.1	98	96.5	94.9	93.4	91.9	90.2	88.7
	125	134.0	130.2	126.3	123	120.6	118.7	116.8	114.8	112.8	110.9
HGM/HGE 160, 250	100	103.5	101.0	98.5	96	92.2	90.2	88.3	84.5	82.1	79.7
	125	129.4	126.2	123.1	120	115.2	112.8	110.4	105.6	102.6	99.6
	150	155.3	151.5	147.8	144	138.2	135.4	132.5	126.7	123.1	119.5
	160	165.6	161.6	157.6	154	147.5	144.4	141.3	135.2	131.3	127.5
	175	181.1	176.7	172.4	168	161.3	157.9	154.6	147.8	143.6	139.4
	200	207.0	202.0	197.0	192	184.3	180.5	176.6	169.0	164.2	159.4
	225	232.9	227.3	221.6	216	207.4	203.0	198.7	190.1	184.7	179.3
	250	258.7	252.5	246.2	240	230.4	225.6	220.8	211.2	205.2	199.2
HGM/HGE 400	250	261.4	255.1	248.8	242.5	239.3	236.2	233.0	229.9	226.6	223.4
	300	314.3	307.0	299.7	291.0	282.3	273.5	264.8	256.1	247.4	238.6
	350	366.7	358.2	349.7	339.5	329.8	320.1	310.4	300.7	291.0	281.3
	400	405.2	395.8	387.6	378	373.7	367.9	363.2	357.9	352.6	347.3
HGM/HGE 630, 800	500	523.8	511.7	499.6	485.0	470.5	455.9	441.4	426.8	412.3	397.7
	630	660.0	644.7	629.4	611.1	592.7	574.2	555.8	537.4	519.0	500.5
	700	725.8	709.0	692.2	672.0	651.8	631.7	611.5	591.4	571.2	551.0
	800	777.8	759.7	744.1	726	717.4	706.3	697.3	687	676.9	666.7

Technical Data (HGM/HGE)

Environmental Operating Conditions

Altitude Derating

The characteristics of the circuit breaker is not affected at an altitude of less than 2,000 m Characteristics of insulation and air cooling of the circuit breaker are reduced at an altitude of more than 2,000 m and the rated current and rated voltage must be adjusted as shown in the table below. However, there is no change in the characteristics of breaking capacity.

Circuit Breaker	Altitude		2,000 m	3,000 m	4,000 m	5,000 m
HGM Type MCCB 32 ~ 800 AF	Withstand Voltage (V)		3,000	2,500	2,100	1,800
	Insulation Voltage (V)	Ui	1,000	850	750	600
	Maximum Operational Voltage (V)	Ue	690	590	520	460
	Average Through-Current (A), at 40 °C	In x	1	0.96	0.93	0.9
HGE Type ELCB 32 ~ 800 AF	Withstand Voltage (V)		3,000	2,500	2,100	1,800
	Maximum Operational Voltage (V)	Ue	460	390	345	275
	Average Through-Current (A), at 40 °C	In x	1	0.96	0.93	0.9

Vibrations

The excessive vibration may cause problems such as decrease of breaking capacity, lower dynamic, strength, reduction of electric current conductivity or compromising safety of operating characteristics. Therefore, proper consideration is required with regards to these environmental stresses when it comes to designating the circuit breakers. These stresses are generated by the vibration during transportation, magnetic impact during opening and closing operation and influence of adjacent devices. Our circuit breaker has been verified in accordance with the standards with regards to vibration resistance.

Vibration test

Vibration test is verified with the standard requested by the shipping certification institute in compliance with IEC 60068-2-6. Out of the vibration test items, resonance test and vibration Endurance test were verified based on the following standard.

Vibration Endurance test

A sinusoidal wave with frequency of 30 Hz is applied for 90 minutes to check for abnormalities.

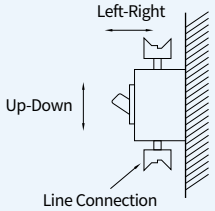
- 30 Hz : 0.7 g Acceleration

Resonance test

It confirms whether vibration is generated in the characteristics part of MCCB by slowly changing the frequency in the frequency sector of the following sinusoidal wave.

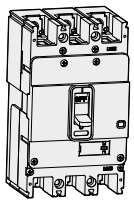
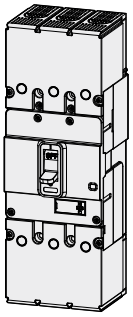
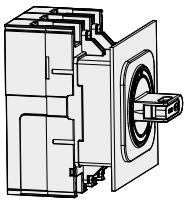
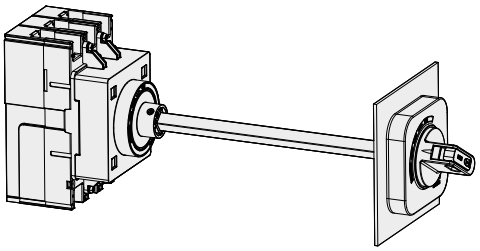
- 5 ~ 13.2 Hz : 1 mm Displacement
- 13.2 ~ 100 Hz : 0.7 g Acceleration

Seismic Performance and Shock Tolerance Table

Item		Seismic
Test Condition	Mounting Posture Direction of Vibration, Shock	• Vertical mounting • Up-down, left-right, front-back 
	Status of MCCB	• Non-conduction (ON of OFF status) • Status where rated current has been conducted on until the temperature of MCCB becomes constant and continuous
Test Result	Judgment Condition	• If it is ON, it should not turn OFF • If it is OFF, it should not turn ON • No abnormal status such as damage, deformation or loosened screw part • The characteristics of switch and trip after the test must be normal

Degree of Protection

The MCCB's IP rating is defined based on IEC 60529. The IP rating also depends on product conditions.

Condition	Circuit Breaker	Circuit Breaker + Terminal Cover	Circuit Breaker + Terminal Cover + Rotary Handle (Front Contact Type)	Circuit Breaker + Terminal Cover + Rotary Handle (Extension Type)
Appearance				
Protection Degree	IP20	IP40	IP40	IP54

Technical Data (HGM/HGE)

Power Loss / Resistance

HGM Type MCCB

Type	Rated Current (A)	HGM30, 50E/S, 60, 100		HGM50H/L, 125		HGM160, 250		HGM400		HGM630, 800	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Fixed / Adj 	16	16.0	4.10	17.0	4.35						
	20	16.0	6.40	17.0	6.80						
	25	4.0	2.50	4.3	2.69						
	32	4.0	4.10	3.0	3.07						
	40	2.9	4.64	1.9	3.06						
	50	2.3	5.75	1.6	3.90						
	63	1.2	4.88	0.9	3.37						
	75	0.7	4.11	0.6	3.38						
	80	0.9	5.76	0.6	3.84						
	100	0.7	7.30	0.6	5.60	0.6	5.60				
	125			0.5	7.97	0.4	6.72				
	150					0.4	8.55				
	160					0.3	8.70				
	175					0.3	9.80				
	200					0.3	10.80				
	225					0.3	13.67				
	250					0.2	13.75	0.2	14.38		
	300							0.2	18.90		
	350							0.2	23.28		
	400							0.2	27.20		
	500									0.1	30.00
	630									0.1	39.60
	700									0.1	53.90
	800									0.1	64.00
Plug-in 	16	16.1	4.12	17.1	4.37						
	20	16.1	6.43	17.1	6.83						
	25	4.1	2.55	4.4	2.74						
	32	4.1	4.18	3.1	3.15						
	40	3.0	4.77	2.0	3.18						
	50	2.4	5.95	1.6	4.10						
	63	1.3	5.20	0.9	3.69						
	75	0.8	4.56	0.7	3.83						
	80	1.0	6.27	0.7	4.35						
	100	0.8	8.10	0.6	6.40	0.6	6.40				
	125			0.6	9.22	0.5	7.97				
	150					0.5	10.35				
	160					0.4	10.75				
	175					0.4	12.25				
	200					0.4	14.00				
	225					0.4	17.72				
	250					0.3	18.75	0.3	19.38		
	300							0.3	26.10		
	350							0.3	33.08		
	400							0.3	40.00		
	500									0.2	50.00
	630									0.2	68.40
	700									0.2	93.10
	800									0.2	115.20

HGE Type ELCB

Type	Rated Current (A)	HGE30, 50E/S, 60, 100		HGE50H/L, 125		HGE160, 250		HGE400		HGE630, 800	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Fixed 	16	14.3	3.66	12.9	3.30						
	20	14.3	5.72	12.9	5.16						
	25	4.9	3.04	4.2	2.63						
	32	4.9	4.98	3.9	4.00						
	40	2.9	4.64	2.3	3.75						
	50	2.4	6.03	1.7	4.14						
	63	1.7	6.62	1.2	4.80						
	75	0.8	4.49	0.7	4.15						
	80	1.0	6.65	0.7	4.72						
	100	0.8	8.07	0.8	7.52	0.5	5.44				
	125			0.7	10.16	0.5	7.32				
	150					0.4	8.10				
	160					0.3	8.67				
	175					0.3	10.06				
	200					0.3	11.37				
	225					0.3	14.65				
	250					0.2	15.13	0.3	16.25		
	300							0.2	21.60		
	350							0.2	26.95		
	400							0.2	32.00		
	500									0.2	40.00
	630									0.2	54.00
	700									0.1	68.60
	800									0.1	83.20
Plug-in 	16	14.3	3.66	12.9	3.30						
	20	14.3	5.72	12.9	5.16						
	25	4.9	3.04	4.4	2.75						
	32	4.9	4.98	3.9	4.00						
	40	2.9	4.64	3.0	4.85						
	50	2.4	6.03	1.8	4.49						
	63	2.1	8.49	1.7	6.59						
	75	1.3	7.14	1.1	6.40						
	80	1.0	6.65	1.1	7.28						
	100	1.0	9.77	0.8	8.42	0.5	5.44				
	125			0.7	11.56	0.5	7.32				
	150					0.4	8.10				
	160					0.3	8.67				
	175					0.3	10.06				
	200					0.3	11.37				
	225					0.3	14.65				
	250					0.2	15.13	0.3	21.25		
	300							0.3	28.80		
	350							0.3	36.75		
	400							0.3	44.80		
	500									0.2	60.00
	630									0.2	82.80
	700									0.2	107.80
	800									0.2	134.40

Technical Data (HGM/HGE)

Cascading Table

AC 220/240 V

Upstream Circuit Breaker：HGM30, HGM50, HGM60, HGM100, HGM125, HGM160, HGM250, HGM400
Downstream Circuit Breaker：HGD32, HGD63, HGD125, HGM30, HGM50, HGM60, HGM100

Upstream Circuit Breaker		HGM30		HGM50				HGM60				HGM100			
		E	S	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		35	50	35	50	85	100	35	50	50	50	35	50	50	50
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity													
HGD63E	10	15	15	15	15	15	15	15	15	15	15	15	15	15	15
HGD63S	15	20	20	20	20	20	20	20	20	20	20	20	20	20	20
HGD32NS, HGD63N/M	20			35	40	40	40	35	40	40	40	35	40	40	40
HGD63H/P	25			35	50	50	50	35	40	40	40	35	40	40	40

Upstream Circuit Breaker		HGM125				HGM160				HGM250			
		E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		50	65	85	100	50	65	85	100	50	65	85	100
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E	10	15	15	15	15	15	15	15	15	15	15	15	15
HGD63S	15	20	20	20	20	20	20	20	20	20	20	20	20
HGD32NS, HGD63N/M	20	40	40	40	40	40	40	40	40	40	40	40	40
HGD63H/P	25	40	50	50	50	40	50	50	50	40	50	50	50
HGD100S/125	25	40	40	40	40	40	40	40	40	40	40	40	40

Upstream Circuit Breaker		HGM30		HGM50				HGM60				HGM100			
		E	S	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		35	50	35	50	85	100	35	50	50	50	35	50	50	50
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity													
HGM30E	35		50		50	65	65		50	50	50		50	50	50
HGM50E	35				50	65	70		50	50	50		50	50	50
HGM50S	50					70	85								
HGM50H	85						100								
HGM60E	35								50	50	50		50	50	50
HGM100E	35												50	50	50

Upstream Circuit Breaker		HGM125				HGM160				HGM250				HGM400			
		E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		50	65	85	100	50	65	85	100	50	65	85	100	50	75	100	125
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM30E	35	50	65	65	65	50	65	65	65	50	65	65	65	50	65	65	65
HGM30S	50		65	65	65		65	65	65		65	65	65		65	65	65
HGM50E	35	50	65	65	70	50	65	65	70	50	65	65	70	50	65	65	70
HGM50S	50		65	70	85		65	70	85		65	70	85		65	70	85
HGM50H	85				100				100				100				100
HGM60E	35	50	65	70	70	50	65	70	70	50	65	70	70	50	65	70	70
HGM60S	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM60H	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM60L	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM100E	35	50	65	70	70	50	65	70	70	50	65	70	70	50	65	70	70

Upstream Circuit Breaker : HGM125, HGM160, HGM250, HGM400, HGM630, HGM800
Downstream Circuit Breaker : HGM100, HGM160, HGM250, HGM400, HGM630, HGM800

Upstream Circuit Breaker		HGM125				HGM160				HGM250				HGM400			
		E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		50	65	85	100	50	65	85	100	50	65	85	100	50	75	100	125
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM100S	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM100H	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM100L	50		65	70	70		65	70	70		65	70	70		65	70	70
HGM125E	50		65	85	100		65	85	100		65	85	100		65	85	100
HGM125S	65			85	100			85	100			85	100			85	100
HGM125H	85				100				100				100				100

Upstream Circuit Breaker		HGM160				HGM250				HGM400			
		E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		50	65	85	100	50	65	85	100	50	75	100	125
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM160E	50		65	85	100		65	85	100		75	85	100
HGM160S	65			85	100			85	100			85	100
HGM160H	85				100				100			100	125
HGM160L	100												125
HGM250E	50						65	85	100		75	85	100
HGM250S	65							85	100			85	100
HGM250H	85								100			100	125
HGM250L	100												125

Upstream Circuit Breaker		HGM630				HGM800		
		E	S	H	L	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		50	75	100	125	75	100	125
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity						
HGM250E	50		75	85	100	75	85	100
HGM250S	65			85	100		85	100
HGM250H	85			100	125		100	125
HGM250L	100				125			125
HGM400E	50		75	85	100	75	85	100
HGM400S	75			85	100		85	100
HGM400H	100				125			125
HGM630E	50		75	85	100	75	85	100
HGM630S	75			85	100		85	100
HGM630H	100				125			125
HGM800S	75						70	85
HGM800H	100							85

Technical Data (HGM/HGE)

Cascading Table

AC 440/460 V

Upstream Circuit Breaker：HGM30, HGM50, HGM60, HGM100, HGM125, HGM160, HGM250, HGM400
Downstream Circuit Breaker：HGD32, HGD63, HGD125, HGM30, HGM50, HGM60, HGM100

Upstream Circuit Breaker		HGM30		HGM50				HGM60				HGM100			
		E	S	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		16	20	16	20	38	55	16	20	26	30	16	20	26	30
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity													
HGD63E	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10
HGD63S	4.5	14	14	14	14	14	14	14	14	14	14	14	14	14	14
HGD32NS, HGD63N/M	6			16	20	20	20	16	20	20	20	16	20	20	20
HGD63H/P	10			16	20	26	26	16	20	20	20	16	20	20	20

Upstream Circuit Breaker		HGM125				HGM160				HGM250			
		E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		20	26	38	55	20	26	38	55	20	26	38	55
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E	3	10	10	10	10	10	10	10	10	10	10	10	10
HGD63S	4.5	14	14	14	14	14	14	14	14	14	14	14	14
HGD32NS, HGD63N/M	6	16	20	20	20	16	20	20	20	16	20	20	20
HGD63H/P	10	16	20	26	26	16	20	26	26	16	20	26	26
HGD100S/125	10	16	20	26	26	16	20	26	26	16	20	26	26

Upstream Circuit Breaker		HGM30		HGM50				HGM60				HGM100			
		E	S	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		16	20	16	20	38	55	16	20	26	30	16	20	26	30
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity													
HGM30E	16		20		20	26	30		20	20	20		20	20	20
HGM30S	20					30	30			26	26			26	26
HGM50E	16				20	26	30		20	20	20		20	20	20
HGM50S	20					30	38			26	26			26	26
HGM50H	38						55								
HGM60E	16								20	20	20		20	20	20
HGM60S	20									26	26			26	26
HGM60H	26										30				30
HGM100E	16												20	20	20
HGM100S	20													26	26
HGM100H	26														30

Upstream Circuit Breaker		HGM125				HGM160				HGM250				HGM400			
		E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		20	26	38	55	20	26	38	55	20	26	38	55	38	50	70	85
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM30E	16	20	26	26	30	20	26	26	30	20	26	26	30	26	26	30	30
HGM30S	20		26	30	30		26	30	30		26	30	30		30	30	30
HGM50E	16	20	26	26	30	20	26	30	30	20	26	30	30	20	26	30	30
HGM50S	20		26	30	38		26	30	38		26	30	38	20	30	38	38
HGM50H	38				55				55				55		50	70	70
HGM50L	55															70	70
HGM60E	16	20	26	26	30	20	26	26	30	20	26	26	30	26	26	30	30
HGM60S	20		26	30	30		26	30	30		26	30	30	26	30	30	30
HGM60H	26			30	38			30	38			30	38	30	38	38	38
HGM60L	30				38				38				38		38	38	38
HGM100E	16	20	26	26	30	20	26	26	30	20	26	26	30	26	26	30	30
HGM100S	20		26	30	30		26	30	30		26	30	30	26	30	30	30
HGM100H	26			30	38			30	38			30	38	30	38	38	38
HGM100L	26				38				38				38		38	38	38

Upstream Circuit Breaker : HGM125, HGM160, HGM250, HGM400, HGM630, HGM800
Downstream Circuit Breaker : HGM100, HGM160, HGM250, HGM400, HGM630, HGM800

Upstream Circuit Breaker		HGM125				HGM160				HGM250				HGM400			
		E	S	H	L	E	S	H	L	E	S	H	L	E	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		20	26	38	55	20	26	38	55	20	26	38	55	38	50	70	85
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM125E	20		26	30	38		26	30	38		26	30	38	26	30	38	38
HGM125S	26			38	38			38	38			38	38		38	50	50
HGM125H	38				55				55				55		50	70	70
HGM125L	55															70	70
HGM160E	20						26	30	38		26	30	38	26	30	38	38
HGM160S	26							38	50			38	50	30	38	50	50
HGM160H	38								55				55		50	70	70
HGM160L	55															70	70

Upstream Circuit Breaker		HGM250				HGM400				HGM630				HGM800		
		E	S	H	L	E	S	H	L	E	S	H	L	S	H	L
Breaking Capacity [Icu] (kA r.m.s.)		20	26	38	55	38	50	70	85	38	50	70	85	50	70	85
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity														
HGM250E	20		26	30	38	26	30	38	38	26	30	38	38	30	38	38
HGM250S	26			38	50	30	38	50	50	30	38	50	50	38	50	50
HGM250H	38				55		50	70	70		50	70	70	50	70	70
HGM250L	55							70	70			70	70		70	70
HGM400E	38						50	70	70		50	70	70	50	70	70
HGM400S	50							70	85			70	85		70	85
HGM400H	70								85				85			85
HGM630E	38										50	70	70	50	70	70
HGM630S	50											70	85		70	85
HGM630H	70												85			85
HGM800S	50														70	85
HGM800H	70															85

Technical Data (HGM/HGE)

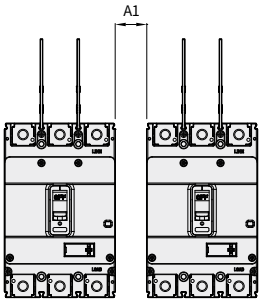
Installation

Insulation Distance (Safety Clearance)

For safety, insulation distance must be secured at installation. In case of installing a circuit breaker, safety clearances must be secured between breakers or between the circuit breaker and panel, bus bar and other adjacent devices. When the circuit breaker interrupts a short circuit, high temperature ionized gas is generated and the gas is discharged through the discharge outlet from the circuit breaker. As this gas can cause short-circuit accidents and grounding accidents, sufficient insulation distance is required between the circuit breaker and the panel.

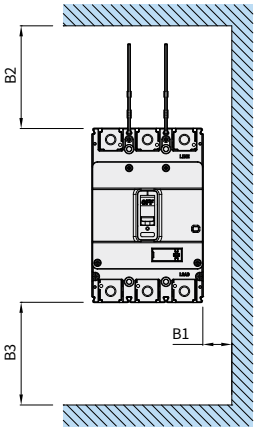
※ In case insulation barrier is not installed between the circuit breaker terminals, secondary short-circuit accident may occur so it must be used.
The insulation barrier must be installed towards the direction of the circuit breaker's line indication part.

Separation distance in case the circuit breaker is installed side by side

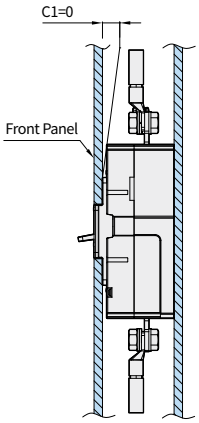


※ In case of using the minimum separation distance(A1 = 0), terminal cover and phase to phase barrier must be assembled between the product. And pay attention to the tolerances of the enclosure dimensions.

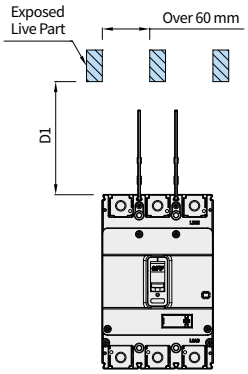
Up/down/left/right distance in case of metallic panel



Front/back distance in case of metallic panel



Distance with circuit breaker in case the live part is exposed



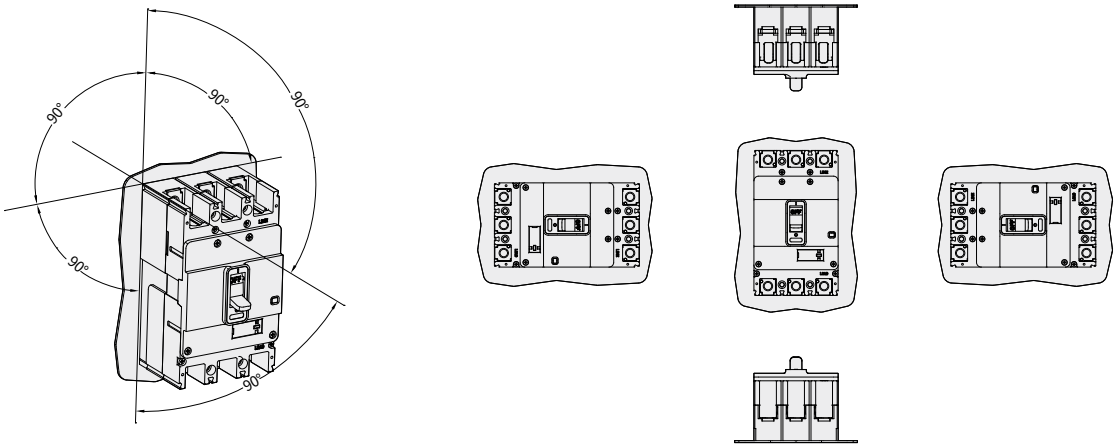
※ If the distance between the live parts is less than 60 mm, the exposed part must be insulated.

HGM/HGE Type's Minimum Insulation Distance

Type	Minimum Clearance (mm)											
	460 V						240 V					
	A1	B1	B2	B3	C1	D1	A1	B1	B2	B3	C1	D1
HGM30 E/S	0	25	50	25	0	85	0	15	50	25	0	70
HGM50 E/S	0	25	50	25	0	85	0	15	50	25	0	70
HGM100 E/S/H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGM50 H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGM125 E/S/H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGM160 E/S	0	25	80	40	0	140	0	15	80	40	0	110
HGM160 H/L	0	40	80	40	0	140	0	20	80	40	0	110
HGM250 E/S	0	25	80	40	0	140	0	15	80	40	0	110
HGM250 H/L	0	40	80	40	0	140	0	20	80	40	0	110
HGE30 E/S	0	25	50	25	0	85	0	15	50	25	0	70
HGE50 E/S	0	25	50	25	0	85	0	15	50	25	0	70
HGE100 E/S/H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGE50 H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGE125 E/S/H/L	0	25	50	25	0	85	0	15	50	25	0	70
HGE160 E/S	0	25	80	40	0	140	0	15	80	40	0	110
HGE160 H/L	0	40	80	40	0	140	0	20	80	40	0	110
HGE250 E/S	0	25	80	40	0	140	0	15	80	40	0	110
HGE250 H/L	0	40	80	40	0	140	0	20	80	40	0	110
HGM400 E/S	0	60	120	60	0	200	0	30	120	60	0	160
HGM400 H/L	0	80	120	60	0	200	0	40	120	60	0	160
HGM630, 800 E/S	0	60	120	60	0	200	0	30	120	60	0	160
HGM630, 800 H/L	0	80	120	60	0	200	0	40	120	60	0	160
HGE400 E/S	0	60	120	60	0	200	0	30	120	60	0	160
HGE400 H/L	0	80	120	60	0	200	0	40	120	60	0	160
HGE630, 800 E/S	0	60	120	60	0	200	0	30	120	60	0	160
HGE630, 800 H/L	0	80	120	60	0	200	0	40	120	60	0	160

Installation Angle

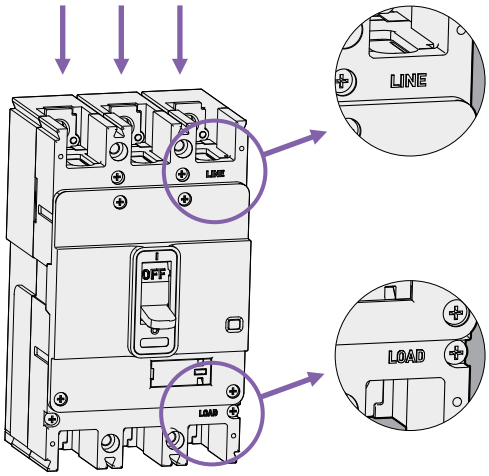
It can be installed vertically or horizontally without changing any characteristics of the HGM/HGE Type of circuit breakers and as for the detailed installation direction, please refer to the figure below.



Direction of Power Supply

HGM/HGE Type

When wiring the terminal between breakers, the LINE, LOAD mark in front of the product's cover must be checked.

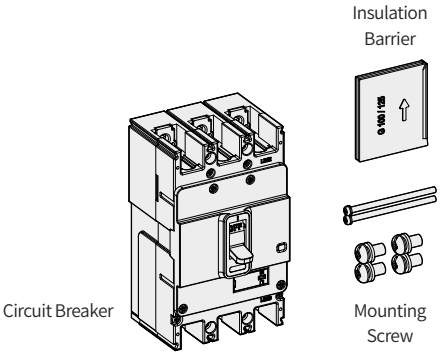


Technical Data (HGM/HGE)

Standard Configuration

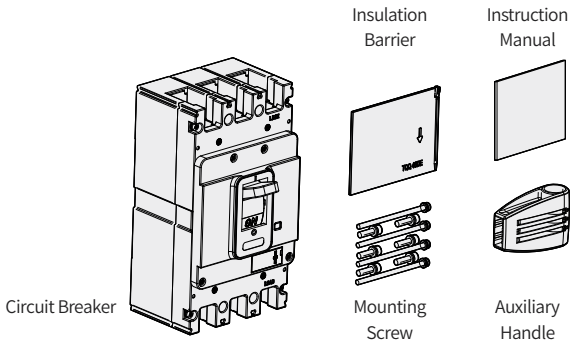
HGM/HGE Type

HGM/HGE30 ~ 250



Type	Part					
HGM/HGE 30, 50E/S, 60, 100	2P	2 EA (M4×L70)	4 EA	(M5×L15) (15 ~ 50 A)	(M8×L15) (60 ~ 100 A)	1 EA
	3P	2 EA (M4×L70)	6 EA			2 EA
	4P	4 EA (M4×L70)	8 EA			3 EA
HGM/HGE 50H/L, 125	2P	2 EA (M4×L70)	4 EA (M8×L15)			1 EA
	3P	2 EA (M4×L70)	6 EA (M8×L15)			2 EA
	4P	4 EA (M4×L70)	8 EA (M8×L15)			3 EA
HGM/HGE 160, 250	2P	2 EA (M4×L70)	4 EA (Hex Socket M8×L18)			1 EA
	3P	2 EA (M4×L70)	6 EA (Hex Socket M8×L18)			2 EA
	4P	4 EA (M4×L70)	8 EA (Hex Socket M8×L18)			3 EA

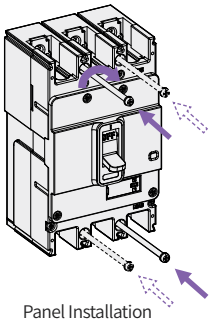
HGM/HGE400 ~ 800



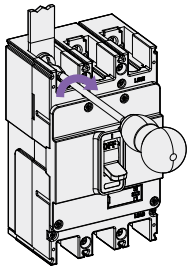
Type	Part				
HGM/HGE 400	2P	4 EA (M6×L103)	4 EA (M10×L30)	1 EA	1 EA
	3P	4 EA (M6×L103)	6 EA (M10×L30)	2 EA	1 EA
	4P	6 EA (M6×L103)	8 EA (M10×L30)	3 EA	1 EA
HGM/HGE 630, 800	2P	4 EA (M6×L103)	4 EA (M12×L30)	1 EA	1 EA
	3P	4 EA (M6×L103)	6 EA (M12×L30)	2 EA	1 EA
	4P	6 EA (M6×L103)	8 EA (M12×L30)	3 EA	1 EA

MCCB/ELCB Assembly and Terminal Mounting Specification

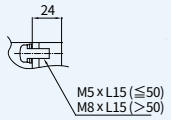
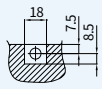
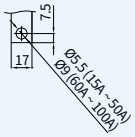
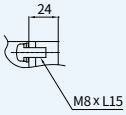
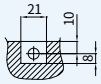
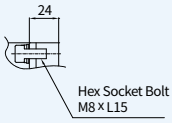
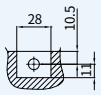
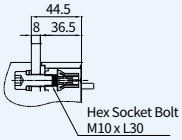
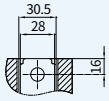
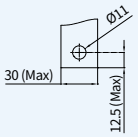
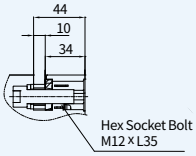
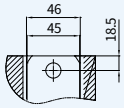
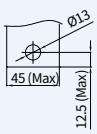
HGM/HGE Type



Panel Installation



Terminal Connection

No	Type	Panel Mounting	Connection Terminal			
		Screw Specification	Termianl Connection Method and Dimensions (mm])		Conductor Processing	Tightening Torque
1	HGM/HGE 30, 50E/S, 60, 100	M4 : 13 kgf.cm				M5 : 28.5 kgf.cm M8 : 110 kgf.cm
2	HGM/HGE 50H/L,125	M4 : 13 kgf.cm				M8 : 110 kgf.cm
3	HGM/HGE 160, 250	M4 : 13 kgf.cm				Hex M8 : 110 kgf.cm
4	HGM/HGE 400	M6 : 45 kgf.cm				Hex M10 : 270 kgf.cm
5	HGM/HGE 630, 800	M6 : 45 kgf.cm				Hex M12 : 470 kgf.cm

Technical Data (HGP)

Environmental Operating Conditions

Temperature Derating

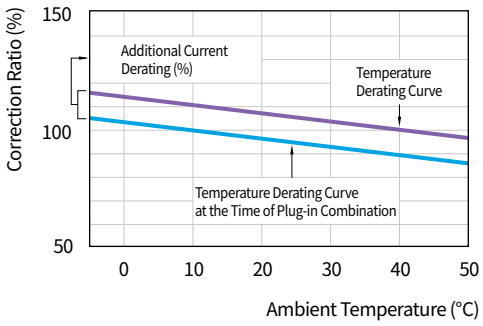
The overcurrent characteristic of MCCB has been set to the ambient temperature of 40°C. If the ambient temperature is less or more than 40°C, the overcurrent characteristics may differ.

If the Ambient Temperature is less than 40 °C

In order to ensure that the circuit breaker's overcurrent meet the derating curve at the given ambient temperature, the real current (Ir) has to be adjusted. The temperature correction ratio or each MCCB is shown in the circuit breaker's characteristics curve.

If the Ambient Temperature is more than 40 °C

As the internal temperature of MCCB is a sum of increased temperature due to current flow and the ambient temperature, if the ambient temperature exceeds 40 °C, thermal damage of internal insulation material of MCCB may occur causing the circuit breaker to trip at an early stage. When applying ambient temperature higher than 40 °C, the rated current must be adjusted as shown in the following rated current derating table.



In (Rated Current) :
Circuit breaker's rating at ambient temperature of 40 °C
Ir (Real Current) :
Circuit breaker's rating at the given temperature
Ir = Correction Ratio (%) × In

Rated Current Derating Table : HGP Type/Standard Mounting (Fixed Type)

Model	Rated Current (A)	Ambient Temperature (°C)									
		10	20	30	40	45	50	55	60	65	70
HGP160D	16	18	17	17	16	16	15	15	14	14	13
	20	22	22	21	20	19	19	18	18	17	16
	25	28	27	26	25	24	24	23	22	22	21
	32	36	35	33	32	31	30	29	28	27	26
	40	45	43	42	40	39	38	36	35	34	33
	50	56	54	52	50	49	47	46	44	43	41
	63	71	68	66	63	61	59	57	55	53	51
	80	90	87	83	80	78	75	73	70	68	65
	100	112	108	104	100	97	94	91	88	85	82
	125	141	135	130	125	121	117	113	109	105	101
	150	169	162	156	150	145	140	135	130	125	120
	160	180	173	166	160	155	150	145	140	135	130
HGP250	40	46	44	42	40	39	38	37	36	35	34
	50	58	55	53	50	49	48	46	45	44	43
	63	72	69	66	63	61	60	58	57	55	54
	80	92	88	84	80	78	76	74	72	70	68
	100	115	110	105	100	98	95	93	90	88	85
	125	144	138	131	125	122	119	116	113	109	106
	150	173	165	158	150	146	143	139	135	131	128
	160	184	176	168	160	156	152	148	144	140	136
	175	201	193	184	175	171	166	162	158	153	149
	200	230	220	210	200	195	190	185	180	175	170
	225	259	248	236	225	219	214	208	203	197	191
	250	288	275	263	250	244	238	231	225	219	213
HGP400 HGP630	300	323	315	308	300	291	282	273	264	255	246
	350	376	368	359	350	340	330	320	310	300	290
	400	430	420	410	400	388	376	364	352	340	328
	500	538	525	513	500	485	470	455	440	425	410
	630	677	662	646	630	611	592	573	554	535	516
HGP800	700	753	735	718	700	679	658	637	616	595	574
	800	860	840	820	800	776	752	728	704	680	656

Rated Current Derating Table：HGP Type/Plug-in Method

Model	Rated Current(A)	Ambient Temperature (°C)									
		10	20	30	40	45	50	55	60	65	70
HGP 160D	16	16	16	15	14	14	14	13	13	12	12
	20	20	19	19	18	17	17	16	16	15	15
	25	25	24	23	23	22	21	21	20	19	19
	32	32	31	30	29	28	27	26	25	24	23
	40	40	39	37	36	35	34	33	32	31	30
	50	51	49	47	45	44	42	41	40	38	37
	63	64	61	59	57	55	53	51	50	48	46
	80	81	78	75	72	70	68	65	63	61	59
	100	101	97	94	90	87	85	82	79	77	74
	125	126	122	117	113	109	105	102	98	95	91
	150	152	146	140	135	131	126	122	117	113	108
	160	162	156	150	144	140	135	131	126	122	117
HGP250	40	40	38	36	34	33	32	31	30	29	28
	50	50	48	45	43	41	40	39	38	36	35
	63	63	60	57	54	52	50	49	47	46	44
	80	80	76	72	68	66	64	62	60	58	56
	100	105	100	95	90	88	85	83	80	78	75
	125	131	125	119	113	109	106	103	100	97	94
	150	158	150	143	135	131	128	124	120	116	113
	160	168	160	152	144	140	136	132	128	124	120
	175	184	175	166	158	153	149	144	140	136	131
	200	210	200	190	180	175	170	165	160	155	150
	225	236	225	214	203	197	191	186	180	174	169
	250	263	250	238	225	219	213	206	200	194	188
HGP400 HGP630	300	284	277	271	264	256	248	240	232	224	216
	350	331	323	316	308	299	290	282	273	264	255
	400	378	370	361	352	341	331	320	310	299	289
	500	473	462	451	440	427	414	400	387	374	361
	630	596	582	568	554	538	521	504	488	471	454
HGP800	700	696	680	664	648	628	609	589	570	550	531
	800	796	777	759	740	718	696	673	651	629	607

Technical Data (HGP)

Environmental Operating Conditions

Altitude Derating

The characteristics of the circuit breaker is not affected at an altitude of less than 2,000 m Characteristics of insulation and air cooling of the circuit breaker are reduced at an altitude of more than 2,000 m and the rated current and rated voltage must be adjusted as shown in the table below. However, there is no change in the characteristics of breaking capacity.

Circuit breaker	Altitude		2,000 m	3,000 m	4,000 m	5,000 m
HGP Type MCCB HGP160D HGP250 ~ 800	Withstand Voltage (V)		3,000	2,500	2,100	1,800
	Insulation Voltage (V)	Ui	1,000	850	750	650
	Maximum Operational Voltage (V)	Ue	690	590	520	460
	Average Through-Current (A), at 40 °C	In x	1	0.96	0.93	0.9

Vibrations

The excessive vibration may cause problems such as decrease of breaking capacity, lower dynamic, strength, reduction of electric current conductivity or compromising safety of operating characteristics. Therefore, proper consideration is required with regards to these environmental stresses when it comes to designating the circuit breakers. These stresses are generated by the vibration during transportation, magnetic impact during opening and closing operation and influence of adjacent devices. Our circuit breaker has been verified in accordance with the standards with regards to vibration resistance.

Vibration Test

Vibration test is verified with the standard requested by the shipping certification institute in compliance with IEC 60068-2-6. Out of the vibration test items, resonance test and vibration Endurance test were verified based on the following standard.

Vibration Endurance Test

A sinusoidal wave with frequency of 30 Hz is applied for 90 minutes to check for abnormalities.

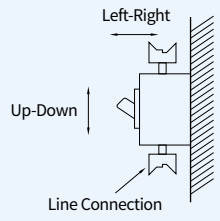
- 30 Hz : 0.7 g Acceleration

Resonance Test

It confirms whether vibration is generated in the characteristics part of MCCB by slowly changing the frequency in the frequency sector of the following sinusoidal wave.

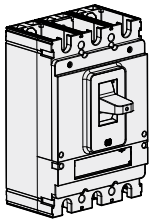
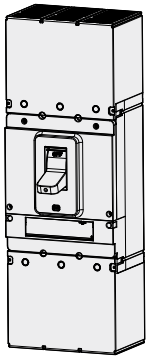
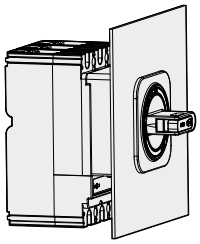
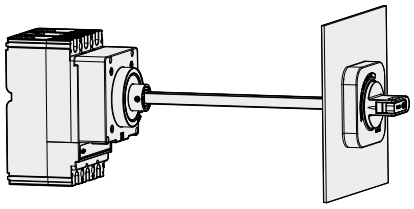
- 5 ~ 13.2 Hz : 1 mm Displacement
- 13.2 ~ 100 Hz : 0.7 g Acceleration

Seismic Performance and Shock Tolerance Table

Item		Seismic
Test Condition	Mounting Posture Direction of Vibration, Shock	• Vertical mounting • Up-down, left-right, front-back 
	Status of MCCB	• Non-conduction (ON of OFF status) • Status where rated current has been conducted on until the temperature of MCCB becomes constant and continuous
Test Result	Judgment Condition	• If it is ON, it should not turn OFF • If it is OFF, it should not turn ON • No abnormal status such as damage, deformation or loosened screw part • The characteristics of switch and trip after the test must be normal

Degree of Protection

The MCCB's IP rating is defined based on IEC 60529. The IP rating also depends on product conditions.

Condition	Circuit Breaker	Circuit Breaker + Terminal Cover	Circuit Breaker + Terminal Cover + Rotary Handle (Front Contact Type)	Circuit Breaker + Terminal Cover + Rotary Handle (Extension Type)
Appearance				
Protection Degree	IP20	IP40	IP40	IP54

Technical Data (HGP)

Power Loss / Resistance

HGP Type MCCB

Type	Rated Current (A)	HGP50D		HGP125D		HGP160D		HGP100		HGP160		HGP250	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Fixed 	16	14.4	3.69	14.4	3.69	14.4	3.69						
	20	14.4	5.76	14.4	5.76	14.4	5.76						
	25	6.372	3.98	6.372	3.98	6.372	3.98						
	32	4.056	4.15	4.056	4.15	4.056	4.15						
	40	2.544	4.07	2.544	4.07	2.544	4.07	2.40	3.84				
	50	2.544	6.36	2.544	6.36	2.544	6.36	1.80	4.50				
	63			1.488	5.91	1.488	5.91	1.30	5.16				
	80			1.188	7.60	1.188	7.60	0.84	5.37				
	100			1.044	10.44	1.044	10.44	0.88	8.80	0.88	8.80		
	125			0.924	14.44	0.924	14.44			0.61	9.53	0.61	9.53
	150					0.792	17.82			0.46	10.35	0.46	10.35
	160					0.792	20.28			0.46	11.78	0.46	11.78
	175											0.39	11.94
	200											0.39	15.60
	225											0.3	15.19
	250											0.3	18.75

Type	Rated Current (A)	HGP400		HGP630		HGP800	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Fixed 	300	0.215	19.35				
	350	0.215	26.34				
	400	0.185	29.60				
	500			0.155	38.75		
	630			0.125	49.61		
	700					0.11	53.90
	800					0.08	51.20

Type	Rated Current (A)	HGP100 MP	
		R/Pole (mΩ)	P/Pole (W)
Fixed 	2.5	160.7	1
	3.2	67.20	0.69
	6.3	14.85	0.59
	12.5	4.29	0.67
	20	2.53	1.01
	32	0.96	0.98
	50	0.59	1.49
	63	0.59	2.35
	80	0.52	3.34
	100	0.48	4.78

Type	Rated Current (A)	HGP100 ETU		HGP160 ETU		HGP250 ETU		HGP400 ETU		HGP630 ETU		HGP800 ETU	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Fixed 	40	0.6	0.96										
	100	0.3	3.00	0.3	3.00								
	160			0.3	7.68	0.3	7.68						
	250					0.3	18.75	0.125	7.81				
	400							0.125	20.00				
	630									0.125	49.61		
	800											0.08	51.20

Type	Rated Current (A)	HGP50D		HGP125D		HGP160D		HGP100		HGP160		HGP250	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Plug-in 	16	14.48	3.71	14.48	3.71	14.48	3.71						
	20	14.48	5.79	14.48	5.79	14.48	5.79						
	25	6.452	4.03	6.452	4.03	6.452	4.03						
	32	4.136	4.24	4.136	4.24	4.136	4.24						
	40	2.624	4.20	2.624	4.20	2.624	4.20	2.46	3.94				
	50	2.624	6.56	2.624	6.56	2.624	6.56	1.86	4.65				
	63			1.568	6.22	1.568	6.22	1.36	5.40				
	80			1.268	8.12	1.268	8.12	0.899	5.75				
	100			1.124	11.24	1.124	11.24	0.94	9.40	0.94	9.40		
	125			1.004	15.69	1.004	15.69			0.67	10.47	0.67	10.47
	150					0.872	19.62			0.52	11.70	0.52	11.70
	160					0.872	22.32			0.52	13.31	0.52	13.31
	175											0.45	13.78
	200											0.45	18.00
	225											0.36	18.23
	250											0.36	22.50

Type	Rated Current (A)	HGP400		HGP630		HGP800	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Plug-in 	300	0.255	22.95				
	350	0.255	31.24				
	400	0.225	36.00				
	500			0.195	48.75		
	630			0.165	65.49		
	700					0.13	63.70
	800					0.1	64.00

Type	Rated Current (A)	HGP100 MP	
		R/Pole (mΩ)	P/Pole (W)
Plug-in 	2.5	160.76	1
	3.2	67.26	0.69
	6.3	14.91	0.59
	12.5	4.35	0.68
	20	2.59	1.04
	32	1.015	1.04
	50	0.654	1.64
	63	0.651	2.58
	80	0.582	3.72
	100	0.538	5.38

Type	Rated Current (A)	HGP100 ETU		HGP160 ETU		HGP250 ETU		HGP400 ETU		HGP630 ETU		HGP800 ETU	
		R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)	R/Pole (mΩ)	P/Pole (W)
Plug-in 	40	0.66	1.06										
	100	0.36	3.60	0.36	3.60								
	160			0.36	9.22	0.36	9.22						
	250					0.36	22.50	0.165	10.31				
	400							0.165	26.40				
	630									0.165	65.49		
	800											0.1	64.00

Technical Data (HGP)

Cascading Table

AC 220/240 V

Upstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630
Downstream : HGD32*, HGD63*, HGD125*, HGM30, HGM50

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E*	10	20	20	20	20	20	20	20	20	20	20	20	20
HGD63S*	15	30	30	30	30	30	30	30	30	30	30	30	30
HGD32NS*, HGD63N/M*	20	40	60	60	60	40	60	60	60	40	60	60	60
HGD63H/P*	25	40	60	60	60	40	60	60	60	40	60	60	60
HGD100S/125*	25	40	60	60	60	40	60	60	60	40	60	60	60

Upstream Circuit Breaker		HGP100				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E*	10	20	20	20	20	20	20	20	20	20	20	20	20
HGD63S*	15	30	30	30	30	30	30	30	30	30	30	30	30
HGD32NS*, HGD63N/M*	20	40	60	60	60	40	60	60	60	40	60	60	60
HGD63H/P*	25	40	60	60	60	40	60	60	60	40	60	60	60
HGD100S/125*	25					40	60	60	60	40	60	60	60

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM30E	35	65	70	70	70	65	70	70	70	65	70	70	70
HGM30S	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM50E	35	65	85	100	100	65	85	100	100	65	85	100	100
HGM50S	50	65	100	130	130	65	100	130	130	65	100	130	130
HGM50H	85		100	130	150		100	130	150		100	130	150
HGM50L	100			130	150			130	150			130	150

Upstream Circuit Breaker		HGP100				HGP160			
		F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity							
HGM30E	35	65	70	70	70	65	70	70	70
HGM30S	50	65	70	70	70	65	70	70	70
HGM50E	35	65	85	100	100	65	85	100	100
HGM50S	50	65	100	130	130	65	100	130	130
HGM50H	85		100	130	150		100	130	150
HGM50L	100			130	150			130	150

Upstream Circuit Breaker		HGP250				HGP400				HGP630			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM30E	35	65	70	70	70	65	70	70	70	65	70	70	70
HGM30S	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM50E	35	65	85	100	100	65	85	100	100	65	85	100	100
HGM50S	50	65	100	130	130	65	100	130	130	65	100	130	130
HGM50H	85		100	130	150		100	130	150		100	130	150
HGM50L	100			130	150			130	150			130	150

※ * F type is for overseas sales.

Upstream : HGP125D, HGP160D, HGP250, HGP400, HGP630
Downstream : HGM60, HGM100, HGM125, HGM160, HGM250

Upstream Circuit Breaker		HGP125D				HGP160D				HGP100			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM60E	35	65	70	70	70	65	70	70	70	65	70	70	70
HGM60S	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM60H	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM60L	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM100E	35	65	70	70	70	65	70	70	70	65	70	70	70
HGM100S	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM100H	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM100L	50	65	70	70	70	65	70	70	70	65	70	70	70
HGM125E	50	65	85	100	100	65	85	100	100				
HGM125S	65		100	130	130		100	130	130				
HGM125H	85		100	130	150		100	130	150				
HGM125L	100			130	150			130	150				

Upstream Circuit Breaker		HGP160				HGP250				HGP400				HGP630			
		F*	S	H	X	F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM60E	35	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM60S	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM60H	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM60L	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM100E	35	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM100S	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM100H	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM100L	50	65	70	70	70	65	70	70	70	65	70	70	70	65	70	70	70
HGM125E	50	65	85	100	100	65	85	100	100	65	85	100	100	65	85	100	100
HGM125S	65		100	130	130		100	130	130		100	130	130		100	130	130
HGM125H	85		100	130	150		100	130	150		100	130	150		100	130	150
HGM125L	100			130	150			130	150			130	150			130	150

Upstream Circuit Breaker		HGP160D				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM160E	50	65	85	100	100	65	85	100	100	65	85	100	100
HGM160S	65		100	130	130		100	130	130		100	130	130
HGM160H	85		100	130	150		100	130	150		100	130	150
HGM160L	100			130	150			130	150			130	150
HGM250E	50									65	85	100	100
HGM250S	65										100	130	130
HGM250H	85										100	130	150
HGM250L	100											130	150

※ * F type is for overseas sales.

Technical Data (HGP)

Cascading Table

AC 220/240 V

Upstream : HGP400, HGP630, HGP800
Downstream : HGM160, HGM250, HGM400, HGM600, HGM800

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM160E	50	65	85	100	100	65	85	100	100				
HGM160S	65		100	130	130		100	130	130				
HGM160H	85		100	130	150		100	130	150				
HGM160L	100			130	150			130	150				
HGM250E	50	65	85	100	100	65	85	100	100	65	85	100	100
HGM250S	65		100	130	130		100	130	130		100	130	130
HGM250H	85		100	130	150		100	130	150		100	130	150
HGM250L	100			130	150			130	150			130	150

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM400E	50	65	100	130	150	65	100	130	150	65	100	130	150
HGM400S	75		100	130	150		100	130	150		100	130	150
HGM400H	100			130	200			130	200			130	200
HGM400L	125			130	200			130	200			130	200
HGM600E	50					65	100	130	150	65	100	130	150
HGM600S	75						100	130	150		100	130	150
HGM600H	100							130	200			130	200
HGM600L	125							130	200			130	200
HGM800S	75										100	130	150
HGM800H	100											130	200
HGM800L	125											130	200

※ * F type is for overseas sales.

Upstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630, HGP800
Downstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630, HGP800

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D/125D/160D F*	65		100	130	150		100	130	150		100	130	150
HGP50D/125D/160D S	100			130	200			130	200			130	200
HGP50D/125D/160D H	130				200				200				200

Upstream Circuit Breaker		HGP100				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D F*	65		100	130	150		100	130	150		100	130	150
HGP50D S	100			130	200			130	200			130	200
HGP50D H	130				200				200				200
HGP125D F*	65		100	130	150		100	130	150		100	130	150
HGP125D S	100			130	200			130	200			130	200
HGP125D H	130				200				200				200
HGP160D F*	65		100	130	150		100	130	150		100	130	150
HGP160D S	100			130	200			130	200			130	200
HGP160D H	130				200				200				200
HGP100 F*	65		100	130	150		100	130	150		100	130	150
HGP100 S	100			130	200			130	200			130	200
HGP100 H	130				200				200				200
HGP160 F*	65						100	130	150		100	130	150
HGP160 S	100							130	200			130	200
HGP160 H	130								200				200
HGP250 F*	65										100	130	150
HGP250 S	100											130	200
HGP250 H	130												200

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		65	100	130	200	65	100	130	200	65	100	130	200
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D/125D/160DF*	65		100	130	150		100	130	150		100	130	150
HGP50D/125D/160DS	100			130	200			130	200			130	200
HGP50D/125D/160DH	130				200				200				200
HGP100 F*	65		100	130	150		100	130	150		100	130	150
HGP100 S	100			130	200			130	200			130	200
HGP100 H	130				200				200				200
HGP160 F*	65		100	130	150		100	130	150		100	130	150
HGP160 S	100			130	200			130	200			130	200
HGP160 H	130				200				200				200
HGP250 F*	65		100	130	150		100	130	150		100	130	150
HGP250 S	100			130	200			130	200			130	200
HGP250 H	130				200				200				200
HGP400/630 F*	65		100	130	150		100	130	150		100	130	150
HGP400/630 S	100			130	200			130	200			130	200
HGP400/630 H	130				200				200				200
HGP800 F*	65										100	130	150
HGP800 S	100											130	200
HGP800 H	130												200

※ * F type is for overseas sales.

Technical Data (HGP)

Cascading Table

AC 440/460 V

Upstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630
Downstream : HGD32 *, HGD63 *, HGD125 *, HGM30, HGM50

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E *	3	10	15	15	15	10	15	15	15	10	15	15	15
HGD63S *	4.5	14	15	20	20	15	20	20	20	15	20	20	20
HGD32NS *, HGD63N/M *	6	20	26	26	26	20	26	26	26	20	26	26	26
HGD63H/P *	10	20	30	30	30	20	30	30	30	20	30	30	30
HGD100S/125 *	10	20	30	30	30	20	30	30	30	20	30	30	30

Upstream Circuit Breaker		HGP100				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGD63E *	3	10	15	15	15	10	15	15	15	10	15	15	15
HGD63S *	4.5	15	20	20	20	15	20	20	20	15	20	20	20
HGD32NS *, HGD63N/M *	6	20	26	26	26	20	26	26	26	20	26	26	26
HGD63H/P *	10	20	30	30	30	20	30	30	30	20	30	30	30
HGD100S/125 *	10					20	30	30	30	20	30	30	30

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM30 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM30 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM50 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM50 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM50 H	38		50	70	85		50	70	85		50	70	85
HGM50 L	55		65	70	85		65	70	85		65	70	85

Upstream Circuit Breaker		HGP100				HGP160			
		F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity							
HGM30 E	16	26	38	38	38	26	38	38	38
HGM30 S	20	30	38	38	38	30	38	38	38
HGM50 E	16	26	38	38	38	26	38	38	38
HGM50 S	20	30	38	38	38	30	38	38	38
HGM50 H	38		50	70	85		50	70	85
HGM50 L	55		65	70	85		65	70	85

Upstream Circuit Breaker		HGP250				HGP400				HGP630			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	70	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM30 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM30 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM50 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM50 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM50 H	38		50	70	85		50	70	85		50	70	85
HGM50 L	55		65	70	85		65	70	85		65	70	85

※ * F type is for overseas sales.

Upstream : HGP125D, HGP160D, HGP250, HGP400, HGP630
Downstream : HGM60, HGM100, HGM125, HGM160, HGM250

Upstream Circuit Breaker		HGP125D				HGP160D				HGP100			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM60 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM60 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM60 H	26	36	50	50	55	36	50	50	55	36	50	50	55
HGM60 L	30	36	50	50	55	36	50	50	55	36	50	50	55
HGM100 E	16	26	38	38	38	26	38	38	38	26	38	38	38
HGM100 S	20	30	38	38	38	30	38	38	38	30	38	38	38
HGM100 H	26	36	50	50	55	36	50	50	55	36	50	50	55
HGM100 L	30	36	50	50	55	36	50	50	55	36	50	50	55
HGM125 E	20	36	50	50	50	36	50	50	50				
HGM125 S	26	36	50	50	50	36	50	50	50				
HGM125 H	38		50	70	85		50	70	85				
HGM125 L	55		65	70	85		65	70	85				

Upstream Circuit Breaker		HGP160				HGP250				HGP400				HGP630			
		F*	S	H	X	F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	70	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM60 E	16	26	38	38	38	26	38	38	38	26	38	38	38	26	38	38	38
HGM60 S	20	30	38	38	38	30	38	38	38	30	38	38	38	30	38	38	38
HGM60 H	26	36	50	50	55	36	50	50	55	36	50	50	55	36	50	50	55
HGM60 L	30	36	50	50	55	36	50	50	55	36	50	50	55	36	50	50	55
HGM100 E	16	26	38	38	38	26	38	38	38	26	38	38	38	26	38	38	38
HGM100 S	20	30	38	38	38	30	38	38	38	30	38	38	38	30	38	38	38
HGM100 H	26	36	50	50	55	36	50	50	55	36	50	50	55	36	50	50	55
HGM100 L	30	36	50	50	55	36	50	50	55	36	50	50	55	36	50	50	55
HGM125 E	20	36	50	50	50	36	50	50	50	36	50	50	50	36	50	50	50
HGM125 S	26	36	50	50	50	36	50	50	50	36	50	50	50	36	50	50	50
HGM125 H	38		50	70	85		50	70	85		50	70	85		50	70	85
HGM125 L	55		65	70	85		65	70	85		65	70	85		65	70	85

Upstream Circuit Breaker		HGP160D				HGP100				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity															
HGM160 E	20	36	50	50	50					36	50	50	50	36	50	50	50
HGM160 S	26	36	50	50	50					36	50	50	50	36	50	50	50
HGM160 H	38		50	70	85						50	70	85		50	70	85
HGM160 L	55		65	70	85						65	70	85		65	70	85
HGM250 E	20													36	50	50	50
HGM250 S	26													36	50	50	50
HGM250 H	38														50	70	85
HGM250 L	55														65	70	85

※ * F type is for overseas sales.

Technical Data (HGP)

Cascading Table

AC 440/460 V

Upstream : HGP400, HGP630, HGP800
Downstream : HGM160, HGM250, HGM400, HGM600, HGM800

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	70	85	150	36	70	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM160 E	20	36	50	50	50	36	50	50	50				
HGM160 S	26	36	50	50	50	36	50	50	50				
HGM160 H	38		50	70	85		50	70	85				
HGM160 L	55		65	70	85		65	70	85				
HGM250 E	20	36	50	50	50	36	50	50	50	36	50	50	50
HGM250 S	26	36	50	50	50	36	50	50	50	36	50	50	50
HGM250 H	38		50	70	85		50	70	85		50	70	85
HGM250 L	55		65	70	85		65	70	85		65	70	85

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	70	85	150	36	70	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGM400 E	38		70	85	100		70	85	100		70	85	85
HGM400 S	50		70	85	100		70	85	100		70	85	85
HGM400 H	70			85	100			85	100			85	100
HGM400 L	85				100				100				100
HGM600 E	38						70	85	100		70	85	85
HGM600 S	50						70	85	100		70	85	85
HGM600 H	70							85	100			85	100
HGM600 L	85								100				100
HGM800 S	50										70	85	85
HGM800 H	70											85	100
HGM800 L	85												100

※ * F type is for overseas sales.

Upstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630, HGP800
Downstream : HGP50D, HGP125D, HGP160D, HGP250, HGP400, HGP630, HGP800

Upstream Circuit Breaker		HGP50D				HGP125D				HGP160D			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D/125D/160D F*	38		65	85	100		65	85	100		65	85	100
HGP50D/125D/160D S	70			85	150			85	150			85	150
HGP50D/125D/160D H	85				150				150				150

Upstream Circuit Breaker		HGP100				HGP160				HGP250			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	65	85	150	36	65	85	150	36	65	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D F*	36		65	85	100		65	85	100		65	85	100
HGP50D S	65			85	150			85	150			85	150
HGP50D H	85				150				150				150
HGP125D F*	36						65	85	100		65	85	100
HGP125D S	65							85	150			85	150
HGP125D H	85								150				150
HGP160D F*	36						65	85	100		65	85	100
HGP160D S	65							85	150			85	150
HGP160D H	85								150				150
HGP100 F*	36		65	85	100		65	85	100		65	85	100
HGP100 S	65			85	150			85	150			85	150
HGP100 H	85				150				150				150
HGP160 F*	36						65	85	100		65	85	100
HGP160 S	65							85	150			85	150
HGP160 H	85								150				150
HGP250 F*	36										65	85	100
HGP250 S	65											85	150
HGP250 H	85												150

Upstream Circuit Breaker		HGP400				HGP630				HGP800			
		F*	S	H	X	F*	S	H	X	F*	S	H	X
Breaking Capacity [Icu] (kA r.m.s.)		36	70	85	150	36	70	85	150	36	70	85	150
Downstream Breaking Capacity [Icu] (kA r.m.s.)		Enhanced Breaking Capacity											
HGP50D/125D/160D F*	36		65	85	100		65	85	100		65	85	100
HGP50D/125D/160D S	65			85	150			85	150			85	150
HGP50D/125D/160D H	85				150				150				150
HGP100 F*	36		65	85	100		65	85	100		65	85	100
HGP100 S	65			85	150			85	150			85	150
HGP100 H	85				150				150				150
HGP160 F*	36		65	85	100		65	85	100		65	85	100
HGP160 S	65			85	150			85	150			85	150
HGP160 H	85				150				150				150
HGP250 F*	36		65	85	100		65	85	100		65	85	100
HGP250 S	65			85	150			85	150			85	150
HGP250 H	85				150				150				150
HGP400/630 F*	36		65	85	100		65	85	100		65	85	100
HGP400/630 S	70			85	150			85	150			85	150
HGP400/630 H	85				150				150				150
HGP800 F*	36										65	85	100
HGP800 S	70											85	150
HGP800 H	85												150

※ * F type is for overseas sales.

Technical Data (HGP)

Discrimination Table

Ue < AC 460 V

Upstream : HGP50D ~ HGP800
Downstream : HGD32, HGD63, HGD125

Model	Trip Unit	HGP160D F*/S/H/X												
		Thermal Magnetic												
	Rated Current (A)	16	20	25	32	40	50	63	75	80	100	125	150	160
HGD32 - B, C, D Curve	1	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	3	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	5	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	6	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	10	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	16		0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	20			0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	25				0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	32					0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	40						0.4	0.5	0.6	0.64	0.8	1	T	T
HGD63 - B, C, D Curve	1	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	2	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	3	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	4	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	5	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	6	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	10	0.19	0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	13		0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	15		0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	16		0.32	0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	20			0.32	0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	25				0.32	0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	32					0.32	0.4	0.5	0.6	0.64	0.8	1	T	T
	40						0.4	0.5	0.6	0.64	0.8	1	T	T
	50							0.5	0.6	0.64	0.8	1	T	T
	63								0.6	0.64	0.8	1	T	T
HGD125 B, C, D Curve	63									0.64	0.8	2.4	2.4	2.4
	80										0.8	2.4	2.4	2.4
	100											2.4	2.4	2.4
	125												2.4	2.4

T	Total Discrimination, Up to the Breaking Capacity of the Downstream Circuit Breaker
4	Discrimination Limit = 4 kA
	No Discrimination

※ * F type is for overseas sales.

Upstream : HGP50D ~ HGP800
Downstream : HGD32, HGD63, HGD125

Model	Trip Unit	HGP250 F*/S/H/X													HGP400 F*/S/H/X			HGP630 F*/S/H/X		HGP800 F*/S/H/X	
		Thermal Magnetic & Electronic																			
	Rated Current (A)	40	50	63	75	80	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
HGD32 - B, C, D Curve	1	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	3	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	5	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	6	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	10	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	16	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	20	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	25	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	32	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	40		0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
HGD63 - B, C, D Curve	1	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	2	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	3	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	4	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	5	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	6	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	10	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	13	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	15	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	16	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	20	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	25	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	32	0.32	0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	40		0.4	0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	50			0.5	0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	63				0.6	0.64	0.8	T	T	T	T	T	T	T	T	T	T	T	T	T	T
HGD125 B, C, D Curve	63					0.64	0.8	2.4	2.4	2.4	T	T	T	T	T	T	T	T	T	T	T
	80						0.8	2.4	2.4	2.4	T	T	T	T	T	T	T	T	T	T	T
	100							2.4	2.4	2.4	T	T	T	T	T	T	T	T	T	T	T
	125							2.4	2.4	2.4	T	T	T	T	T	T	T	T	T	T	T

T	Total Discrimination, Up to the Breaking Capacity of the Downstream Circuit Breaker
4	Discrimination Limit = 4 kA
	No Discrimination

※ * F type is for overseas sales.

Technical Data (HGP)

Discrimination Table

Ue < AC 460 V

Upstream : HGP50D ~ HGP800
Downstream : HGM30 ~ HGM800

Model	Trip Unit	HGP160D F*/S/H/X												
		Thermal Magnetic												
	Rated Current (A)	16	20	25	32	40	50	63	75	80	100	125	150	160
HGM30 E/S HGM50 E/S HGM60 E/S/H/L HGM100 E/S/H/L	16							0.5	0.6	0.64	0.8	1	1.25	1.25
	20							0.5	0.6	0.64	0.8	1	1.25	1.25
	25							0.5	0.6	0.64	0.8	1	1.25	1.25
	32							0.5	0.6	0.64	0.8	1	1.25	1.25
	40									0.64	0.8	1	1.25	1.25
	50									0.64	0.8	1	1.25	1.25
	63										0.8	1	1.25	1.25
	75											1	1.25	1.25
	80											1	1.25	1.25
	100													1.25
HGM125 E/S/H/L	16							0.5	0.6	0.64	0.8	1	1.25	1.25
	20							0.5	0.6	0.64	0.8	1	1.25	1.25
	25							0.5	0.6	0.64	0.8	1	1.25	1.25
	32							0.5	0.6	0.64	0.8	1	1.25	1.25
	40									0.64	0.8	1	1.25	1.25
	50									0.64	0.8	1	1.25	1.25
	63										0.8	1	1.25	1.25
	75											1	1.25	1.25
	80											1	1.25	1.25
	100													1.25
	125													
HGM160 E/S/H/L HGM250 E/S/H/L	100													
	125													
	150													
	160													
	175													
	200													
	225													
	250													
HGM400 E/S/H/L	250													
	300													
	350													
	400													
HGM630 E/S/H/L HGM800 S/H/L	500													
	630													
	700													
	800													

T	Total Discrimination, Up to the Breaking Capacity of the Downstream Circuit Breaker
4	Discrimination Limit = 4 kA
	No Discrimination

※ * F type is for overseas sales.

Upstream : HGP50D ~ HGP800
Downstream : HGM30 ~ HGM800

Model	Trip Unit	HGP250 F*/S/H/X													HGP400 F*/S/H/X			HGP630 F*/S/H/X		HGP800 F*/S/H/X	
		Thermal Magnetic & Electronic																			
	Rated Current (A)	40	50	63	75	80	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
HGM30 E/S HGM50 E/S HGM60 E/S/H/L HGM100 E/S/H/L	16			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	20			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	25			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	32			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	40				0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	50					0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	63						0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	75							1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	80							1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	100									1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
HGM125 E/S/H/L	16			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	20			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	25			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	32			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	40				0.6	0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	50					0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	63						0.8	1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	75							1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	80							1	1.25	1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	100									1.25	1.4	1.6	1.8	2	T	T	T	T	T	T	T
	125										1.4	1.6	1.8	2	T	T	T	T	T	T	T
HGM160 E/S/H/L HGM250 E/S/H/L	100									1.25	1.4	1.6	1.8	2	2.4	2.8	3.8	4	5	T	T
	125											1.6	1.8	2	2.4	2.8	3.8	4	5	T	T
	150													2	2.4	2.8	3.8	4	5	T	T
	160													2	2.4	2.8	3.8	4	5	T	T
	175														2.4	2.8	3.8	4	5	T	T
	200														2.4	2.8	3.8	4	5	T	T
	225															2.8	3.8	4	5	T	T
	250																3.8	4	5	T	T
HGM400 E/S/H/L	250																	4	5	5.6	6.4
	300																	4	5	5.6	6.4
	350																		5	5.6	6.4
	400																		5	5.6	6.4
HGM630 E/S/H/L HGM800 S/H/L	500																			5.6	6.4
	630																				6.4
	700																				
	800																				

※ * F type is for overseas sales.

Technical Data (HGP)

Discrimination Table

Ue < AC 460 V

Upstream : HGP50D ~ HGP800
Downstream : HGP50D ~ HGP800

Model	Trip Unit	HGP160D F*/S/H/X												
		Thermal Magnetic												
	Rated Current (A)	16	20	25	32	40	50	63	75	80	100	125	150	160
HGP50D F*/S/H/X HGP125D F*/S/H/X HGP160D F*/S/H/X	16							0.5	0.6	0.64	0.8	1	1.25	1.25
	20							0.5	0.6	0.64	0.8	1	1.25	1.25
	25							0.5	0.6	0.64	0.8	1	1.25	1.25
	32							0.5	0.6	0.64	0.8	1	1.25	1.25
	40									0.64	0.8	1	1.25	1.25
	50									0.64	0.8	1	1.25	1.25
	63										0.8	1	1.25	1.25
	75											1	1.25	1.25
	80											1	1.25	1.25
	100													1.25
	125													
	150													
	160													
HGP250 F*/S/H/X	100													
	125													
	150													
	160													
	175													
	200													
	225													
	250													
HGP400 F*/S/H/X HGP630 F*/S/H/X	300													
	350													
	400													
	500													
	630													
HGP800 F*/S/H/X	700													
	800													

T	Total Discrimination, Up to the Breaking Capacity of the Downstream Circuit Breaker
4	Discrimination Limit = 4 kA
	No Discrimination

※ * F type is for overseas sales.

Upstream : HGP50D ~ HGP800
Downstream : HGP50D ~ HGP800

Model	Trip Unit	HGP250 F*/S/H/X													HGP400 F*/S/H/X			HGP630 F*/S/H/X		HGP800 F*/S/H/X	
		Thermal Magnetic & Electronic																			
	Rated Current (A)	40	50	63	75	80	100	125	150	160	175	200	225	250	300	350	400	500	630	700	800
HGP50D F*/S/H/X HGP125D F*/S/H/X HGP160D F*/S/H/X	16			0.5	0.6	0.64	0.8	1	1.25	36	36	36	36	36	T	T	T	T	T	T	T
	20			0.5	0.6	0.64	0.8	1	1.25	1.25	36	36	36	36	T	T	T	T	T	T	T
	25			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	32			0.5	0.6	0.64	0.8	1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	40					0.64	0.8	1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	50					0.64	0.8	1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	63						0.8	1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	75							1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	80							1	1.25	1.25	1.4	36	36	36	T	T	T	T	T	T	T
	100									1.25	1.4	1.6	36	36	T	T	T	T	T	T	T
	125											1.6	1.8	36	T	T	T	T	T	T	T
	150												1.8	2	T	T	T	T	T	T	T
	160													2	T	T	T	T	T	T	T
HGP250 F*/S/H/X	40					0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	50					0.64	0.8	1	1.25	1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	63						0.8	1	1.25	1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	75							1	1.25	1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	80							1	1.25	1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	100									1.25	1.4	1.6	1.8	2	36	36	36	T	T	T	T
	125											1.6	1.8	2	36	36	36	T	T	T	T
	150													2	36	36	36	T	T	T	T
	160													2	2.4	36	36	T	T	T	T
	175														2.4	2.8	36	36	36	T	T
	200														2.4	2.8	3.8	36	36	T	T
	225															2.8	3.8	36	36	T	T
	250																3.8	4	36	T	T
HGP400 F*/S/H/X HGP630 F*/S/H/X	300																	4	5	36	36
	350																		5	36	36
	400																		5	5.6	36
	500																			5.6	6.4
	630																				6.4
HGP800 F*/S/H/X	700																				
	800																				

T	Total Discrimination, Up to the Breaking Capacity of the Downstream Circuit Breaker
4	Discrimination Limit = 4 kA
	No Discrimination

※ * F type is for overseas sales.

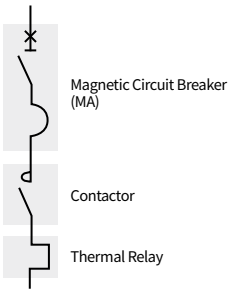
Technical Data (HGP)

Type 2 Coordination (IEC 60947-4-1)

AC 440 V

Performance : Ue = 440 V

Circuit breakers	F*	S	H
HGP100/250	36	65	85
HGP400/630	36	65	85
HGP800	36	65	85



Motor			Circuit Breakers			Contactors	Thermal o/l relays	
P (kW)	I (A) 440V	Ie Max (A)	Type	Rating (A)	Ii (A)	Type	Type	Irth (A)
0.37	1.1	1.6	HGP100	2.5	32.5	HGC18	HGT18 1)	0.8 ~ 1.2
0.55	1.4	1.6	HGP100	2.5	32.5	HGC18	HGT18 1)	1.1 ~ 1.6
0.75	1.7	2.5 2)	HGP100	2.5	32.5	HGC18	HGT18 1)	1.5 ~ 2.1 2)
1.1	2.4	2.5	HGP100	3.2	41.6	HGC18	HGT18 1)	2 ~ 3
1.5	3.1	4	HGP100	6.3	81.9	HGC40	HGT18 1), 4)	2.8 ~ 4.2
2.2	4.5	6	HGP100	6.3	81.9	HGC40	HGT18 1), 4)	4 ~ 6
3	5.8	6	HGP100	6.3	81.9	HGC40	HGT18 1), 4)	5.6 ~ 8
4	8	8	HGP100	12.5	163	HGC65	HGT65 1), 4)	6 ~ 9
5.5	10.5	12.5 3)	HGP100	12.5	163	HGC65	HGT65 1), 4)	8 ~ 12 3)
7.5	13.7	18	HGP100	32	416	HGC65	HGT65 1)	12 ~ 18
10	19	25	HGP100	32	416	HGC65	HGT100 1)	17 ~ 25
11	20	25	HGP100	32	320	HGC100	HGT100 1)	17 ~ 25
15	26.5	32	HGP100	50	650	HGC100	HGT100	22 ~ 32
18.5	33	40	HGP100	50	650	HGC100	HGT100	28 ~ 40
22	39	40	HGP100	50	650	HGC100	HGT100	34 ~ 50
30	52	63	HGP100	100	1300	HGC115	HGT150	48 ~ 80
37	63	63	HGP100	100	1300	HGC130	HGT150	48 ~ 80
45	76	80	HGP250	125	1250	HGC150	HGT150	48 ~ 80
55	90	100	HGP250	160	1600	HGC150	HGT150	69 ~ 115
75	125	150	HGP250	200	2000	HGC150	HGT150	90 ~ 150
90	140	150	HGP250	200	2000	HGC150	HGT150	111 ~ 185
110	178	185	HGP250	250	2500	HGC185	HGT265	135 ~ 225
132	210	265	HGP400	350	3500	HGC265	HGT265	180 ~ 300
160	256	265	HGP400	350	3500	HGC265	HGT265	180 ~ 300
200	310	320	HGP630	400	4000	HGC400	HGT500	240 ~ 400
220	353	400	HGP630	630	6300	HGC400	HGT500	300 ~ 500
250	400	500	HGP630	700	7000	HGC500	HGT500	300 ~ 500
300	460	500	HGP800	700	7000	HGC500	HGT800	378 ~ 630
		630	HGP800	800	8000	HGC630	HGT800	378 ~ 630
335	540	630	HGP800	800	8000	HGC800	HGT800	378 ~ 630
375	575	630	HGP800	800	8000	HGC800	HGT800	378 ~ 630

※ 1) Iq < 50 kA
2) TOR Thermal Maximum Rating 2.1 A
3) TOR Thermal Maximum Rating 12 A
4) Type 1 Only for Thermal Relay
* F type is for overseas sales.

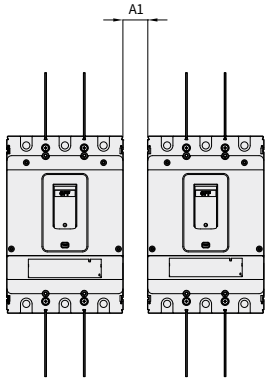
Installation

Insulation Distance (Safety Clearance)

For safety, insulation distance must be secured at installation. In case of installing a circuit breaker, safety clearances must be secured between breakers or between the circuit breaker and panel, bus bar and other adjacent devices. When the circuit breaker interrupts a short circuit, high temperature ionized gas is generated and the gas is discharged through the discharge outlet from the circuit breaker. As this gas can cause short-circuit accidents and grounding accidents, sufficient insulation distance is required between the circuit breaker and the panel.

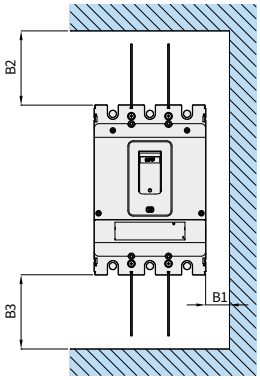
※ In case insulation barrier is not installed between the circuit breaker terminals, secondary short-circuit accident may occur so it must be used. The insulation barrier must be installed towards the both directions of the circuit breaker's line / load indication part.

Separation distance in case the circuit breaker is installed side by side

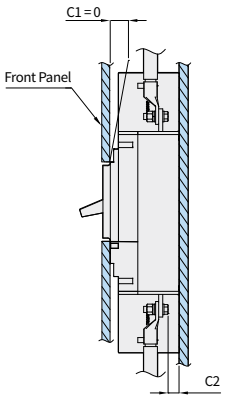


※ In case of using the minimum separation distance(A1 = 0), terminal cover and phase to phase barrier must be assembled between the product. And pay attention to the tolerances of the enclosure dimensions.

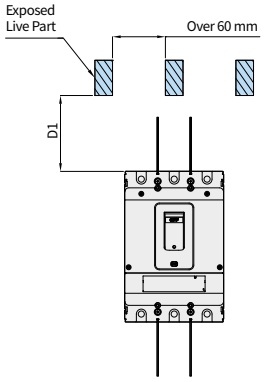
Up/down/left/right distance in case of metallic panel



Front/back distance in case of metallic panel



Distance with circuit breaker in case the live part is exposed



※ If the distance between the live parts is less than 60 mm, the exposed part must be insulated.

HGP Type's Minimum Insulation Distance

Type	Minimum Clearance (mm)													
	460 V							240 V						
	A1	B1	B2	B3	C1	C2	D1	A1	B1	B2	B3	C1	C2	D1
HGP50D F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP50D H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP125D F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP125D H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP160D F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP160D H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP100 F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP100 H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP160 F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP160 H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP250 F*/S	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP250 H/X	0	10	50	50	0	8	350	0/50	10	50	50	0	8	350
HGP400 F*/S	0	40	116	116	0	8	350	0/50	15	116	116	0	8	350
HGP400 H/X	0	40	116	116	0	8	350	0/50	15	116	116	0	8	350
HGP630 F*/S	0	40	116	116	0	8	350	0/50	15	116	116	0	8	350
HGP630 H/X	0	40	116	116	0	8	350	0/50	15	116	116	0	8	350
HGP800 F*/S	0	45	115	115	0	8	350	0/50	20	115	115	0	8	350
HGP800 H/X	0	45	115	115	0	8	350	0/50	20	115	115	0	8	350

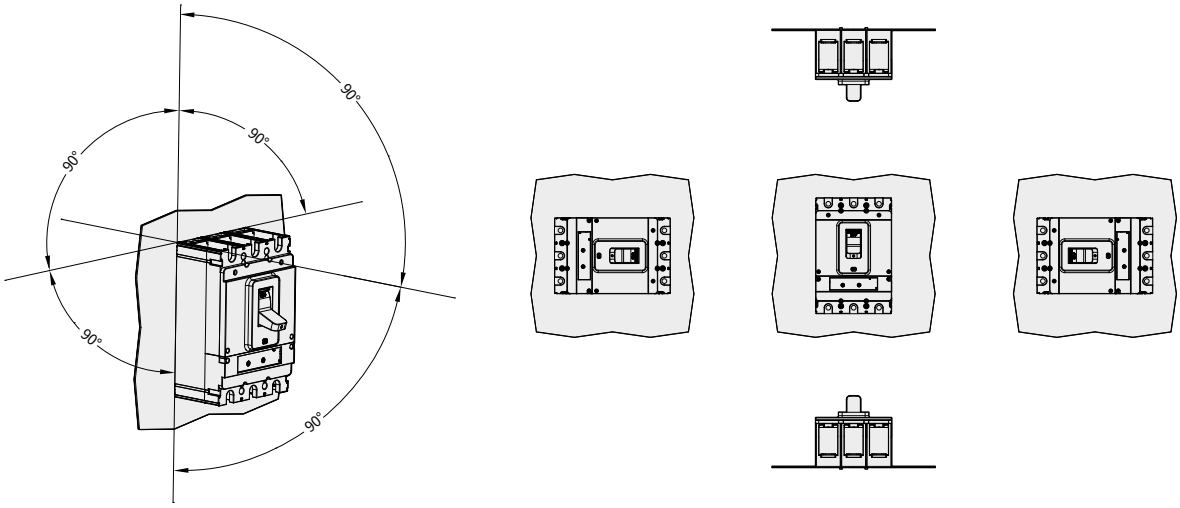
※ * F type is for overseas sales.

Technical Data (HGP)

Installation

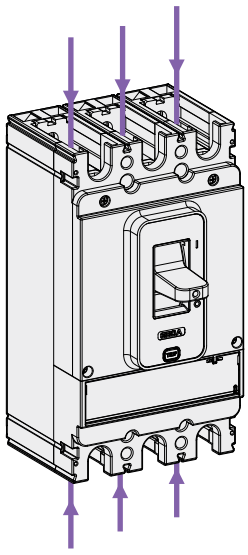
Installation Angle

The HGP Type of circuit breakers can be installed vertically or horizontally without changing any characteristics and as for the detailed installation direction, please refer to the figure below.



Direction of Power Supply

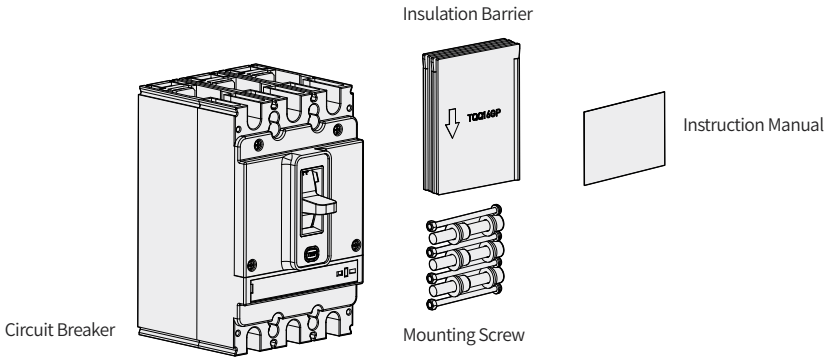
As for the HGP Type circuit breaker, the breaking power of circuit breaker does not drop even if power is supplied to the load side. So, power can be supplied to any direction regardless of the line side/load side for use. With regards to the use in reverse connection, HGP got DEKRA Certificate under IEC 60947-2.



Standard Configuration

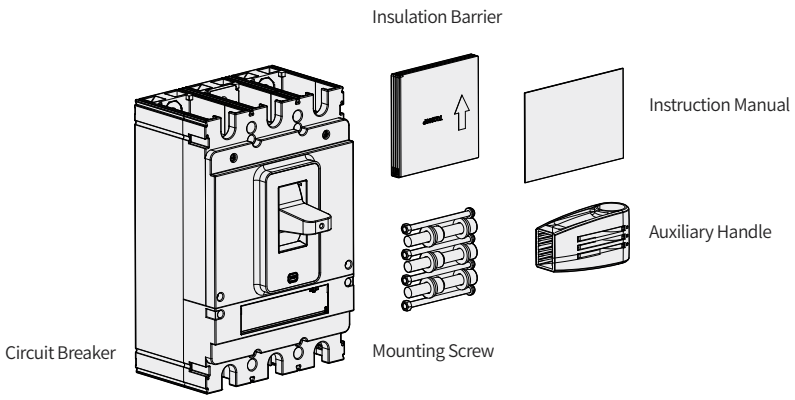
HGP Type

HGP50D, HGP125D, HGP160D, HGP100, HGP160, HGP250



MCCB \ Part				
HGP50D, HGP125D, HGP160D	3P	4 EA (M4×L85)	6 EA (PH Screw P·S/W M8×L18)	4 EA
	4P	5 EA (M4×L85)	8 EA (PH Screw P·S/W M8×L18)	6 EA
HGP100, HGP160, HGP250	3P	4 EA (M4×L85)	6 EA (Hex Socket P·S/W M8×L20)	4 EA
	4P	6 EA (M4×L85)	8 EA (Hex Socket P·S/W M8×L20)	6 EA

HGP400, HGP630, HGP800



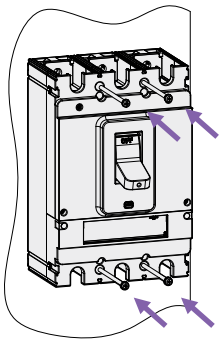
MCCB \ Part					
HGP400, HGP630	3P	4 EA (M5×L98)	6 EA (Hex Socket P·S/W M10×L30)	4 EA	1 EA
	4P	5 EA (M5×L98)	8 EA (Hex Socket P·S/W M10×L30)	6 EA	1 EA
HGP800	3P	4 EA (M6×L110)	6 EA (Hex Socket P·S/W M12×L35)	4 EA	1 EA
	4P	6 EA (M6×L110)	8 EA (Hex Socket P·S/W M12×L35)	6 EA	1 EA

Technical Data (HGP)

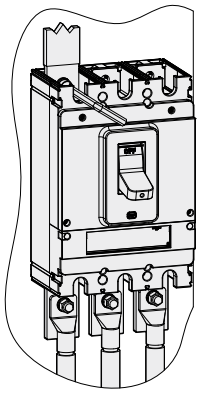
MCCB Assembly and Terminal Mounting Specification

HGP Type

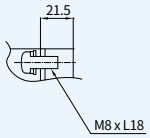
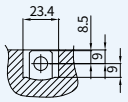
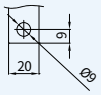
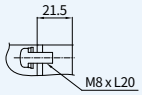
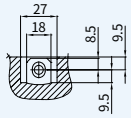
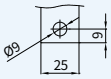
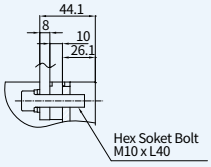
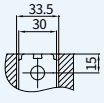
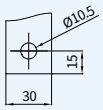
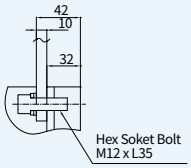
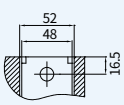
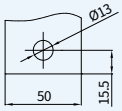
HGP Type circuit breaker can be mounted directly on the panel by using a screw. In case there is a bus bar or terminal at the back of the panel, insulation distance requires your attention. The wire and bus bar have to be wired according to the terminal part's specification for power supply of circuit breaker and fastened according to the specified tightening torque.



Panel Installation



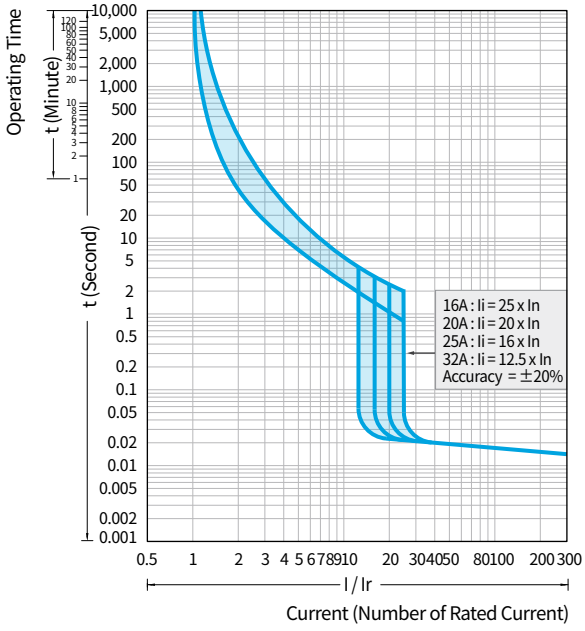
Terminal Connection

No	Type	Panel Mounting	Connection Terminal			
		Screw Specification	Termianl Connection Method and Dimensions (mm])		Conductor Processing	Tightening Torque
1	HGP50D HGP125D HGP160D	M4 : 13 kgf.cm				M8 : 50 ~ 70 kgf·cm
2	HGP100 HGP160 HGP250	M4 : 13 kgf.cm				M8 : 80 ~ 130 kgf·cm
3	HGP400 HGP630	M5 : 28.5 kgf·cm				M10 : 140 ~ 270 kgf.cm
4	HGP800	M6 : 45 kgf.cm				M12 : 350 ~ 470 kgf.cm

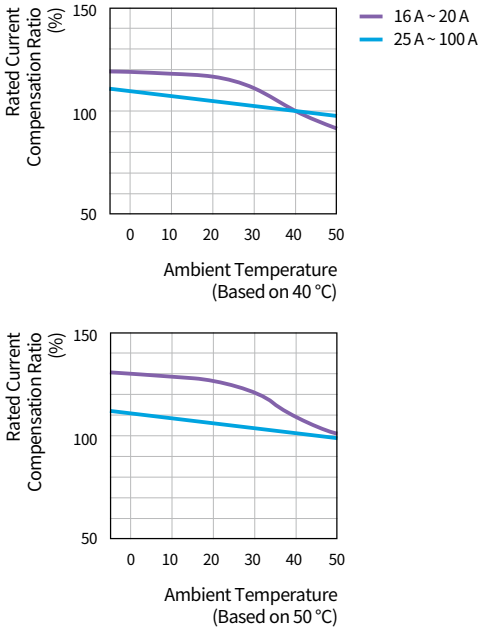
Operation Characteristic Curve

HGM/HGE100 (16 ~ 32 A)

· HGM/HGE30, 50E/S, 60, 100

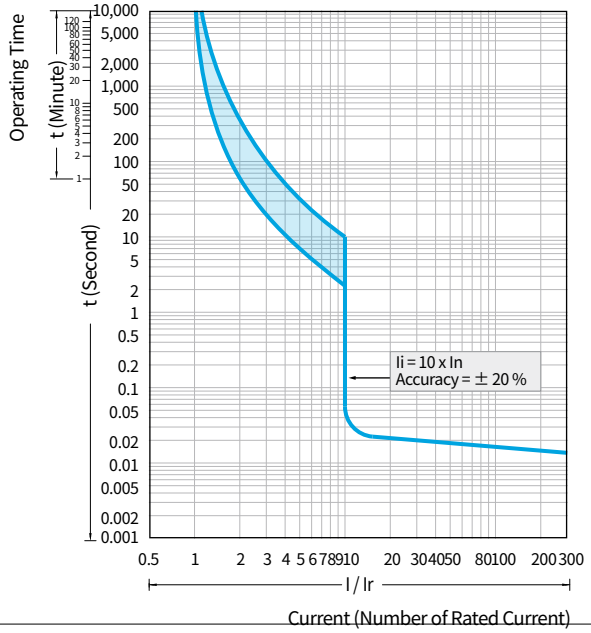


Ambient Temperature Derating Curve

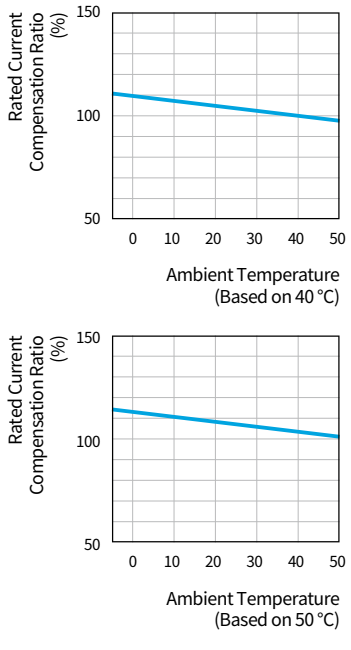


HGM/HGE100 (40 ~ 100 A)

· HGM/HGE50E/S, 60, 100



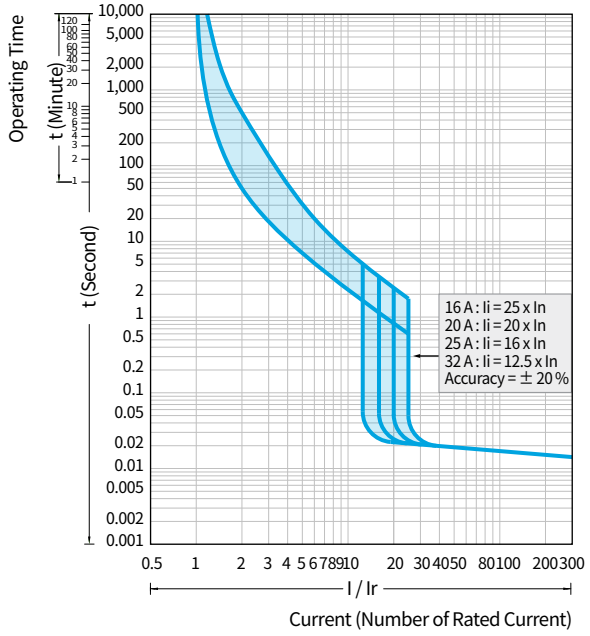
Ambient Temperature Derating Curve



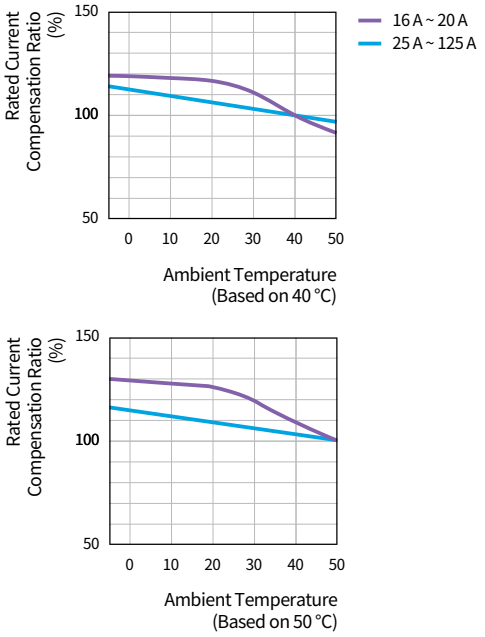
Operation Characteristic Curve

HGM/HGE125 (16 ~ 32 A)

· HGM/HGE50H/L, 125

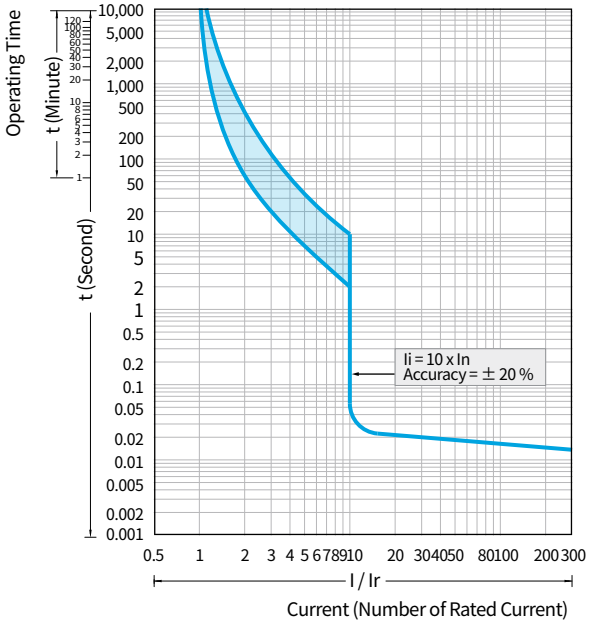


Ambient Temperature Derating Curve

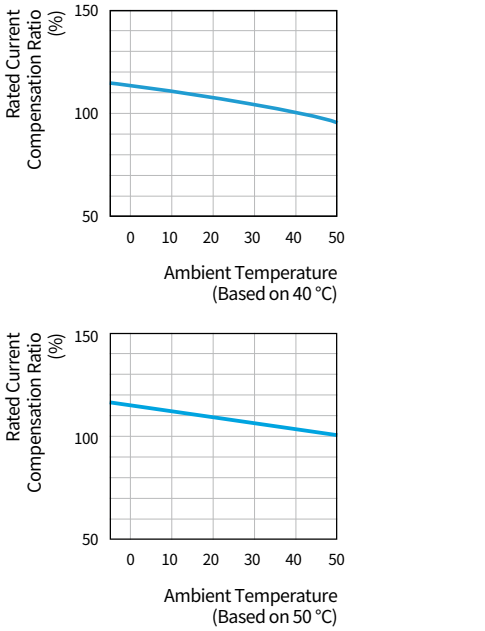


HGM/HGE125 (40 ~ 125 A)

· HGM/HGE50H/L, 125

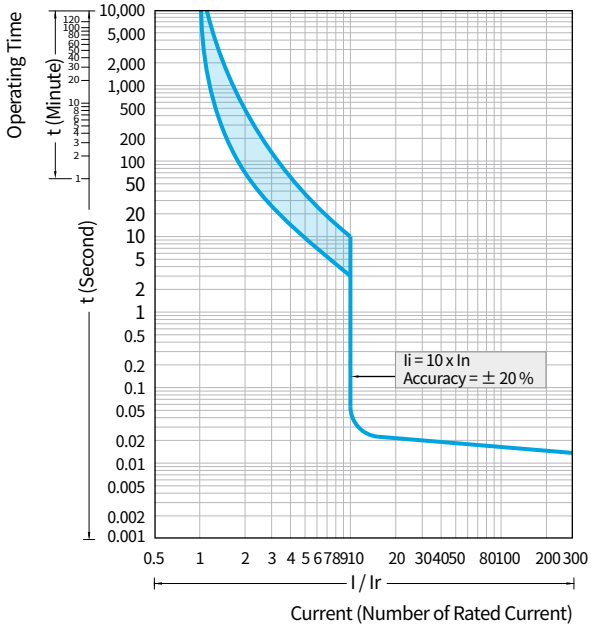


Ambient Temperature Derating Curve

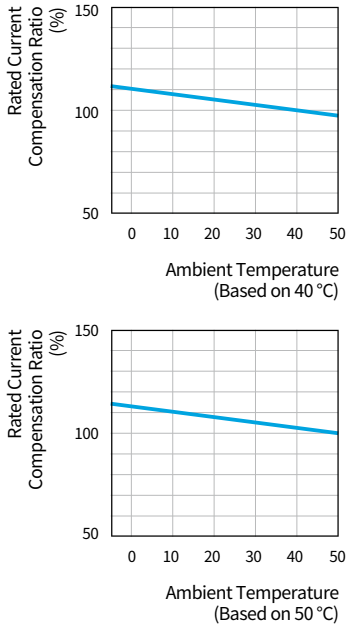


HGM/HGE250 (100 ~ 250 A)

• HGM/HGE160, 250

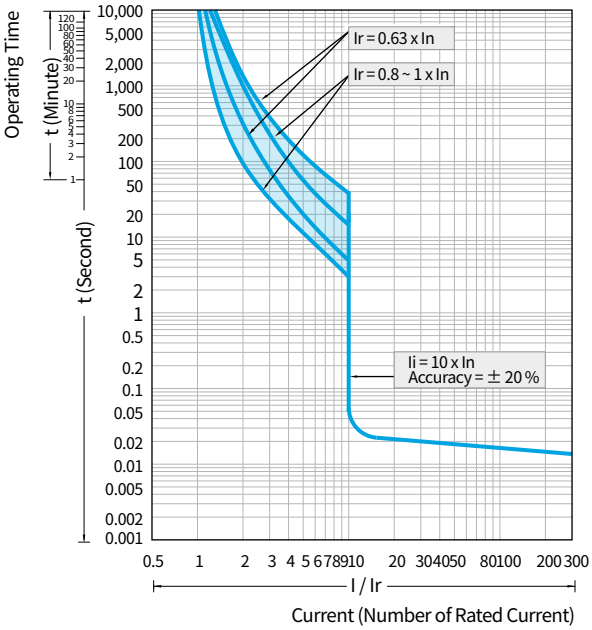


Ambient Temperature Derating Curve

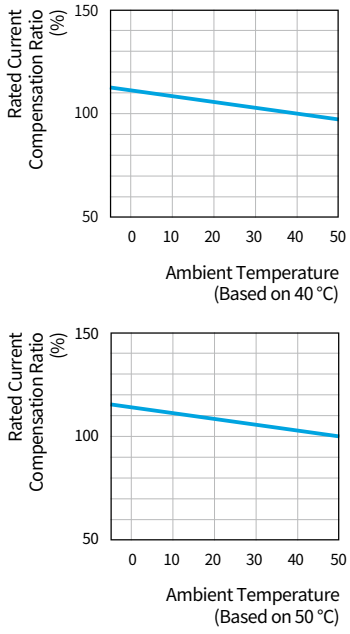


HGM400

• HGM400



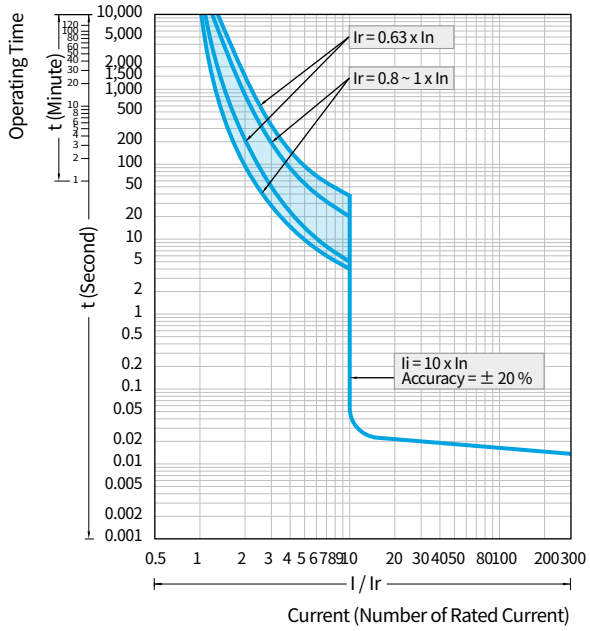
Ambient Temperature Derating Curve



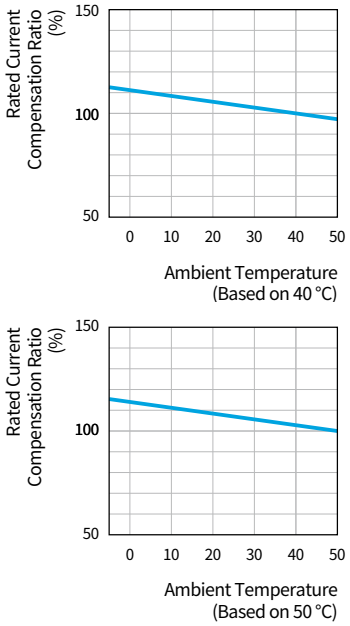
Operation Characteristic Curve

HGM800 (500 ~ 800 A)

· HGM630, 800

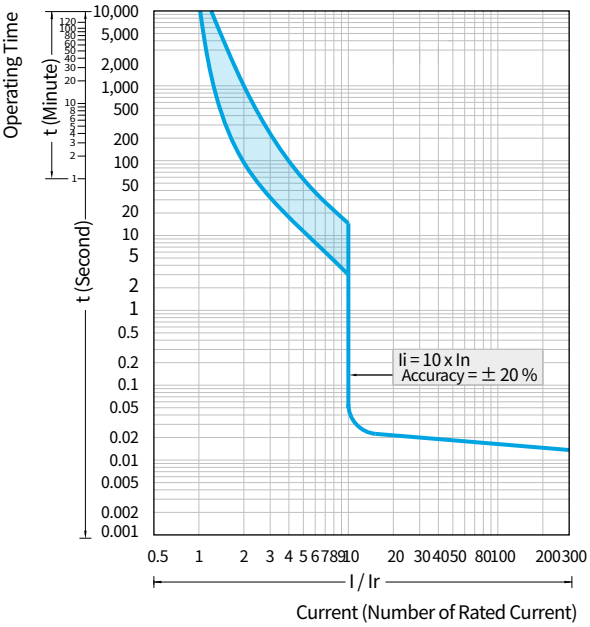


Ambient Temperature Derating Curve

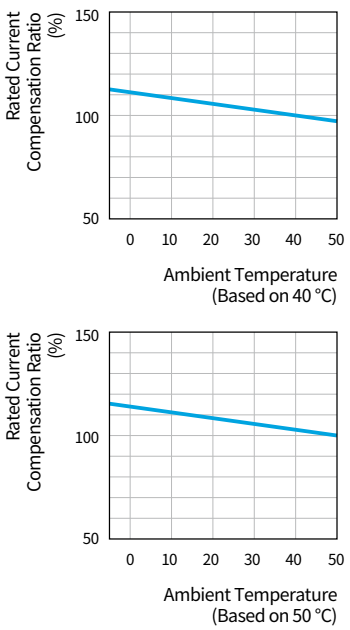


HGE400

· HGE400

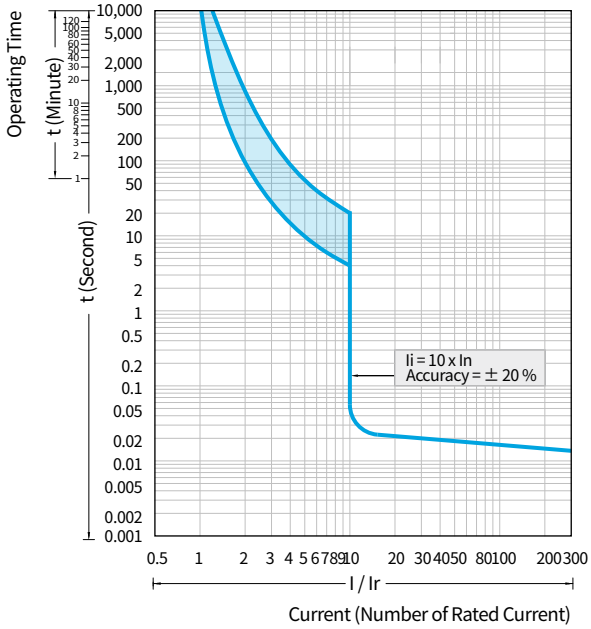


Ambient Temperature Derating Curve

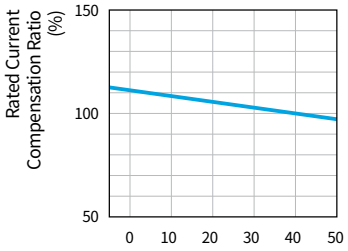


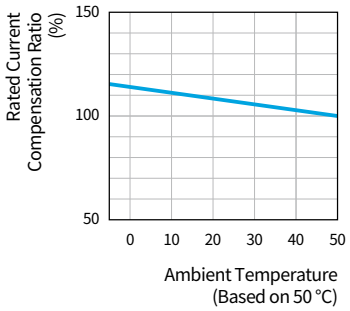
HGE800 (500 ~ 800 A)

• HGE630, 800



Ambient Temperature Derating Curve

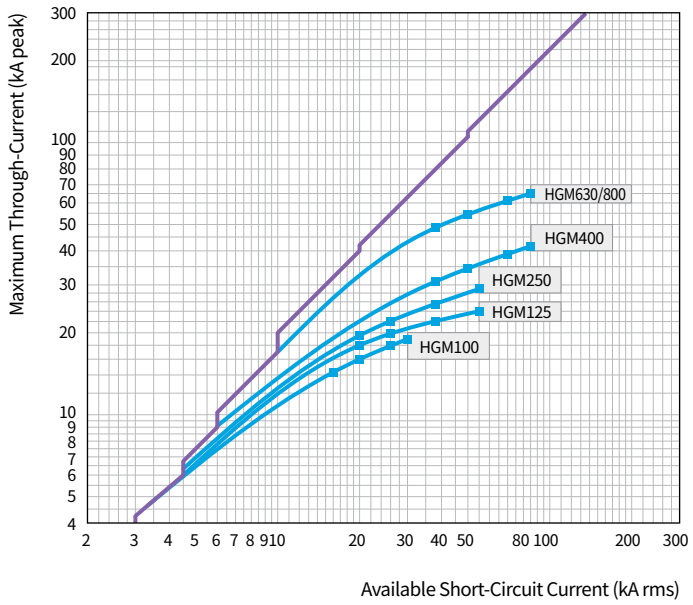




Current & Energy-Limiting Characteristic Curve

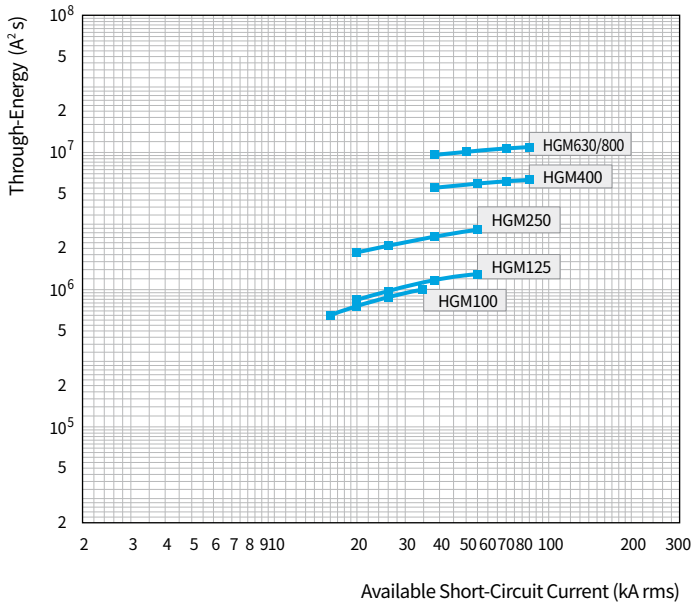
Current-Limiting Characteristic Curve

· Based on 400/460 V



Energy-Limiting Characteristic Curve

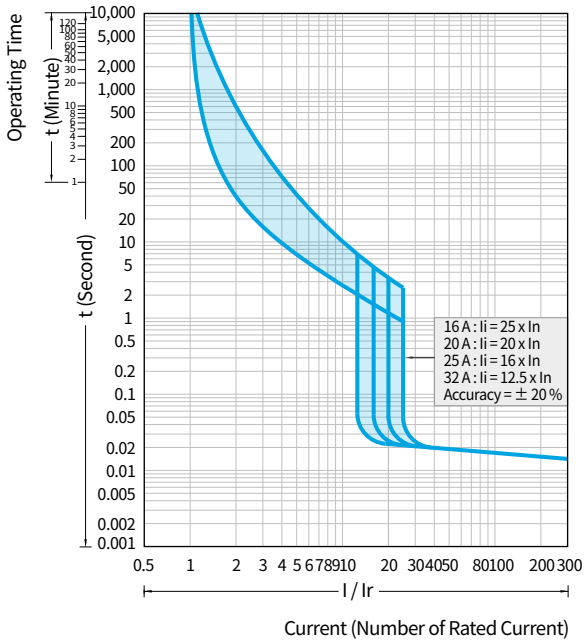
· Based on 400/460 V



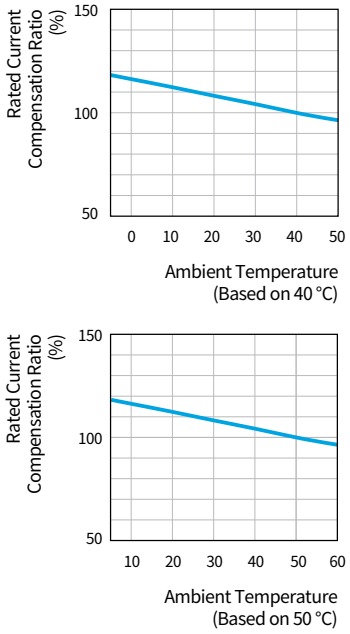
Operation Characteristic Curve (HGP Thermal Magnetic Type)

HGP160D (16 ~ 32 A)

· HGP50D, 125D

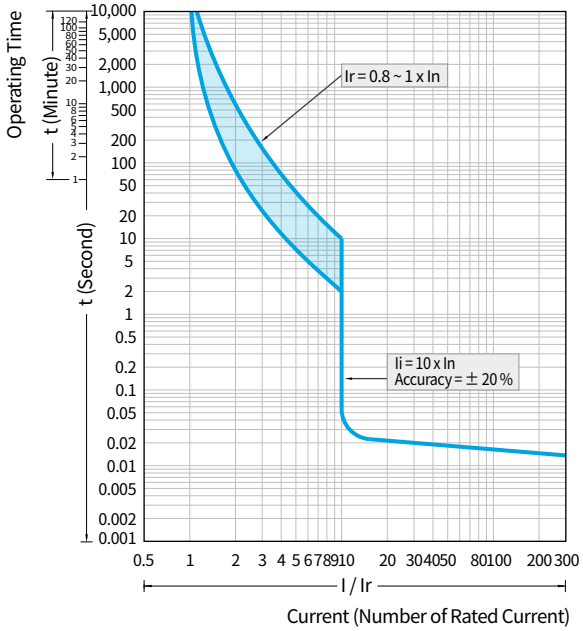


Ambient Temperature Derating Curve

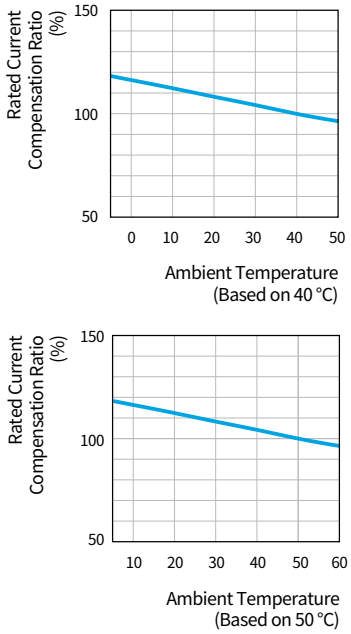


HGP160D (40 ~ 160 A)

· HGP50D, 125D, 160D

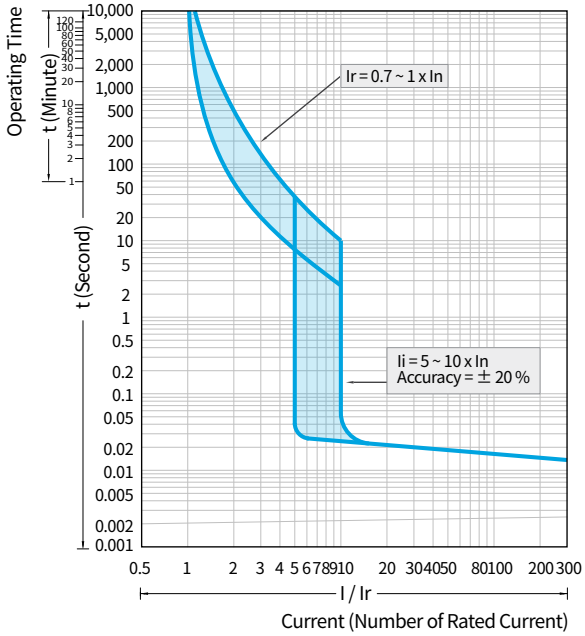


Ambient Temperature Derating Curve

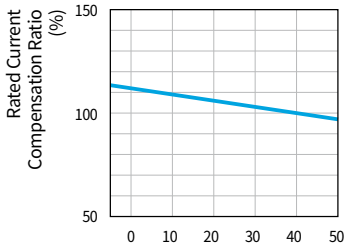


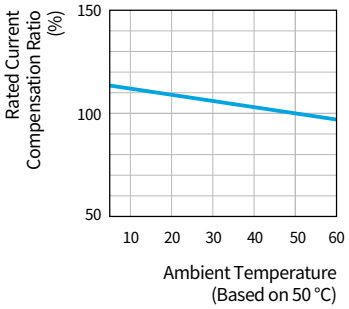
HGP250

• HGP100, 160, 250



Ambient Temperature Derating Curve

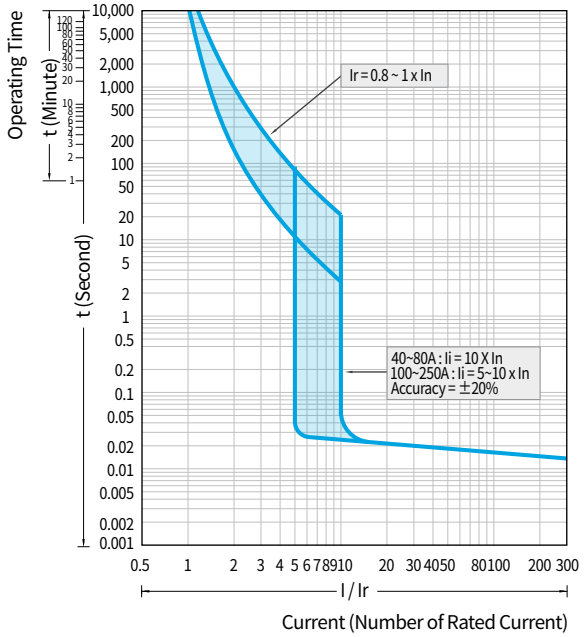




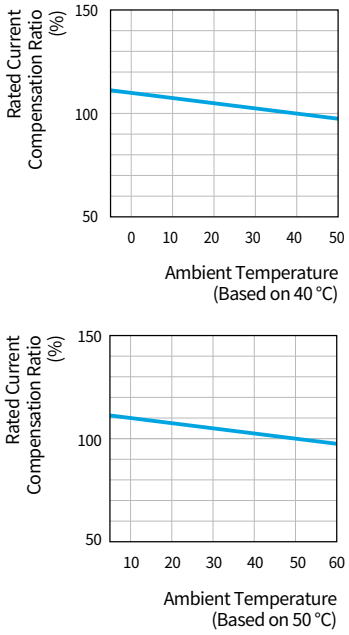
Operation Characteristic Curve (HGP Thermal Magnetic Type)

HGP630 (300 ~ 630 A)

· HGP400, 630

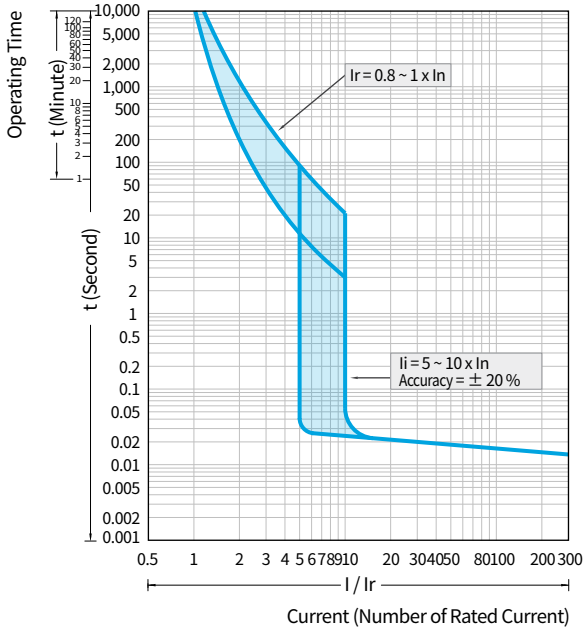


Ambient Temperature Derating Curve

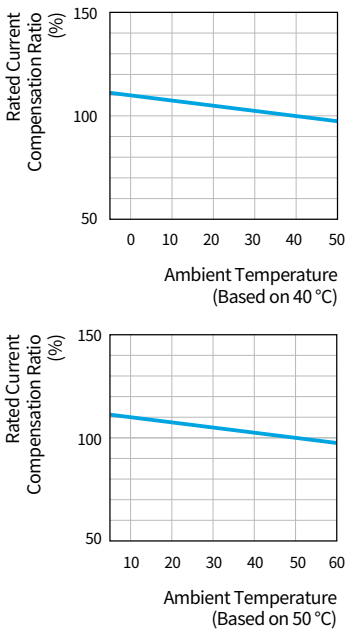


HGP800 (700 ~ 800 A)

· HGP800



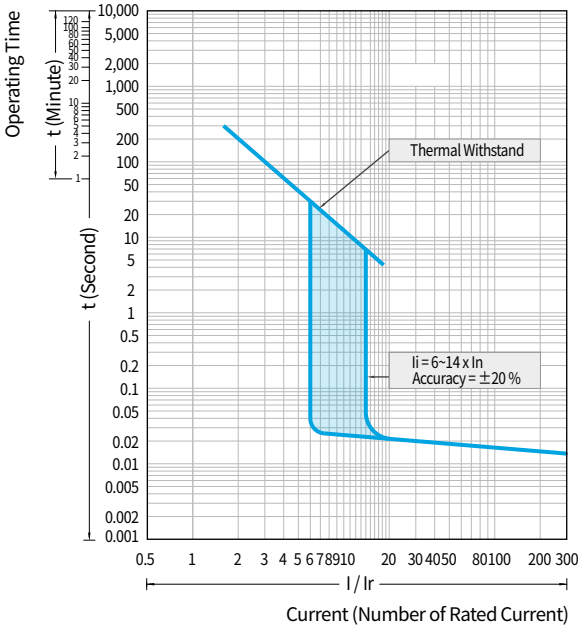
Ambient Temperature Derating Curve



Operation Characteristic Curve (HGP for Motor Protection)

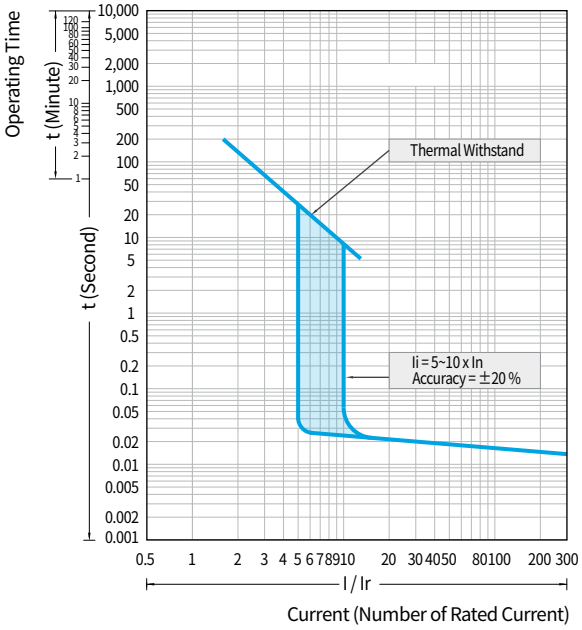
HGP100 (2.5 ~ 100 A)

· HGP100



HGP250 (125 ~ 250 A)

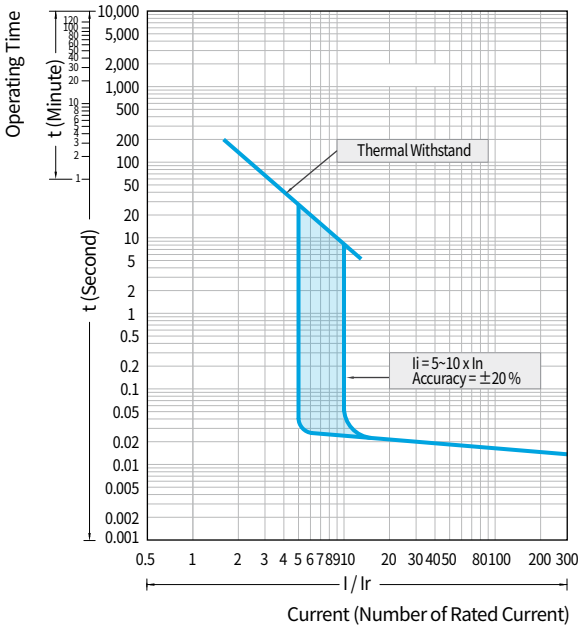
· HGP250



Operation Characteristic Curve (HGP for Motor Protection)

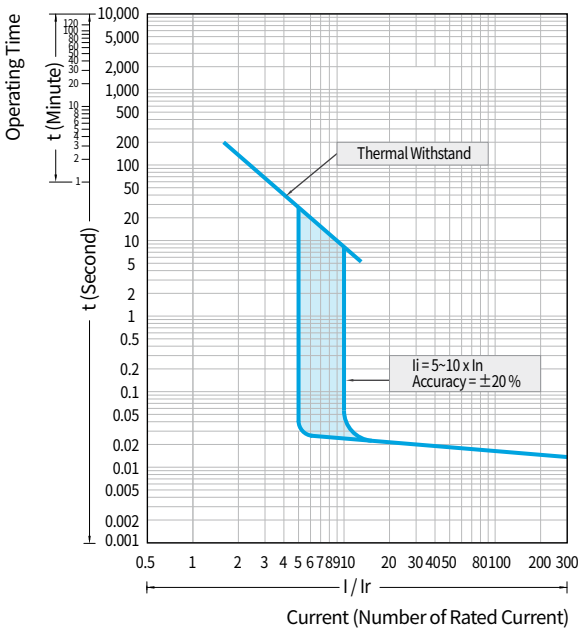
HGP630 (300 ~ 630 A)

· HGP400, 630



HGP800 (700 ~ 800 A)

· HGP800

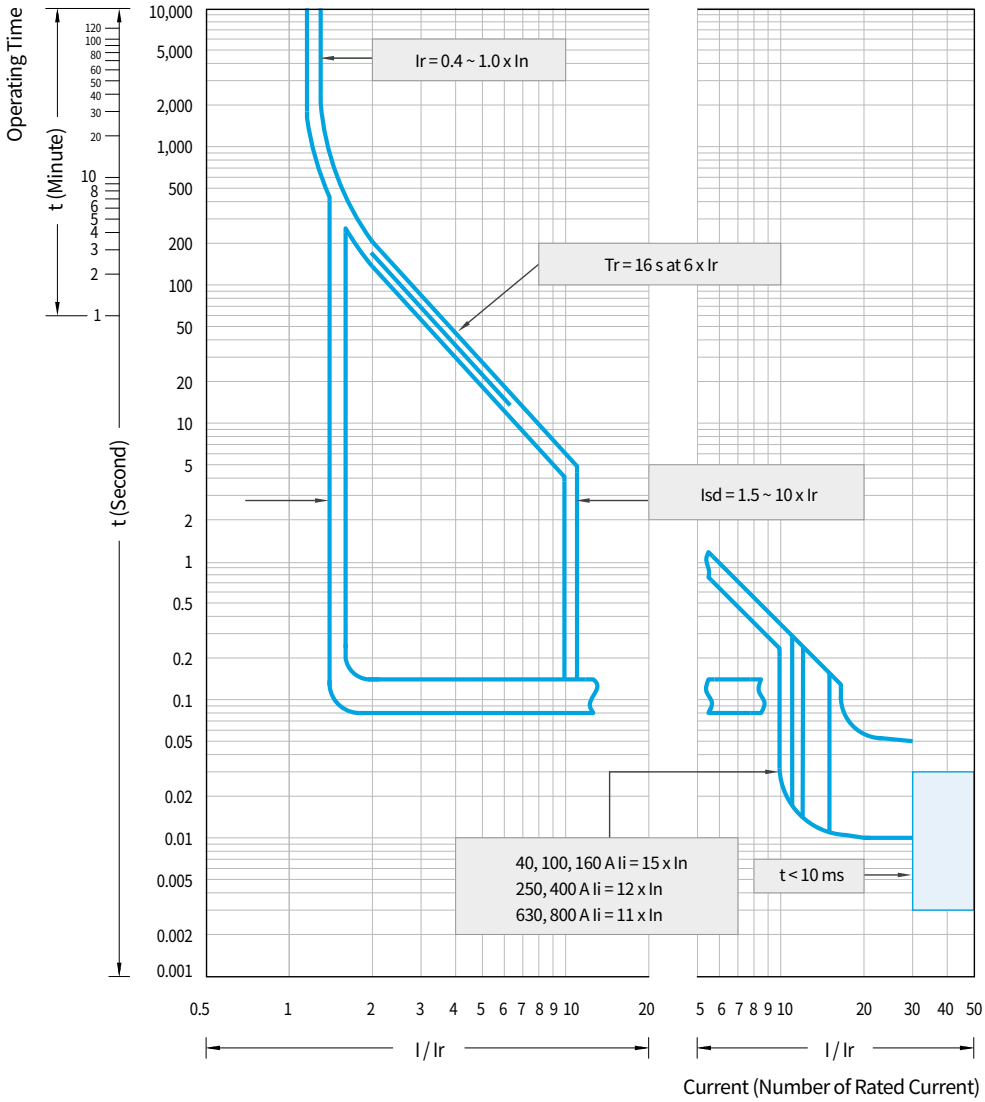


Operation Characteristic Curve (HGP for Electronic)

ETU-N Type

· HGP100, 160, 250, 400, 630, 800

- Long-Time Protection [L]
- Short-Time Protection [S]
- Instantaneous Protection [I]

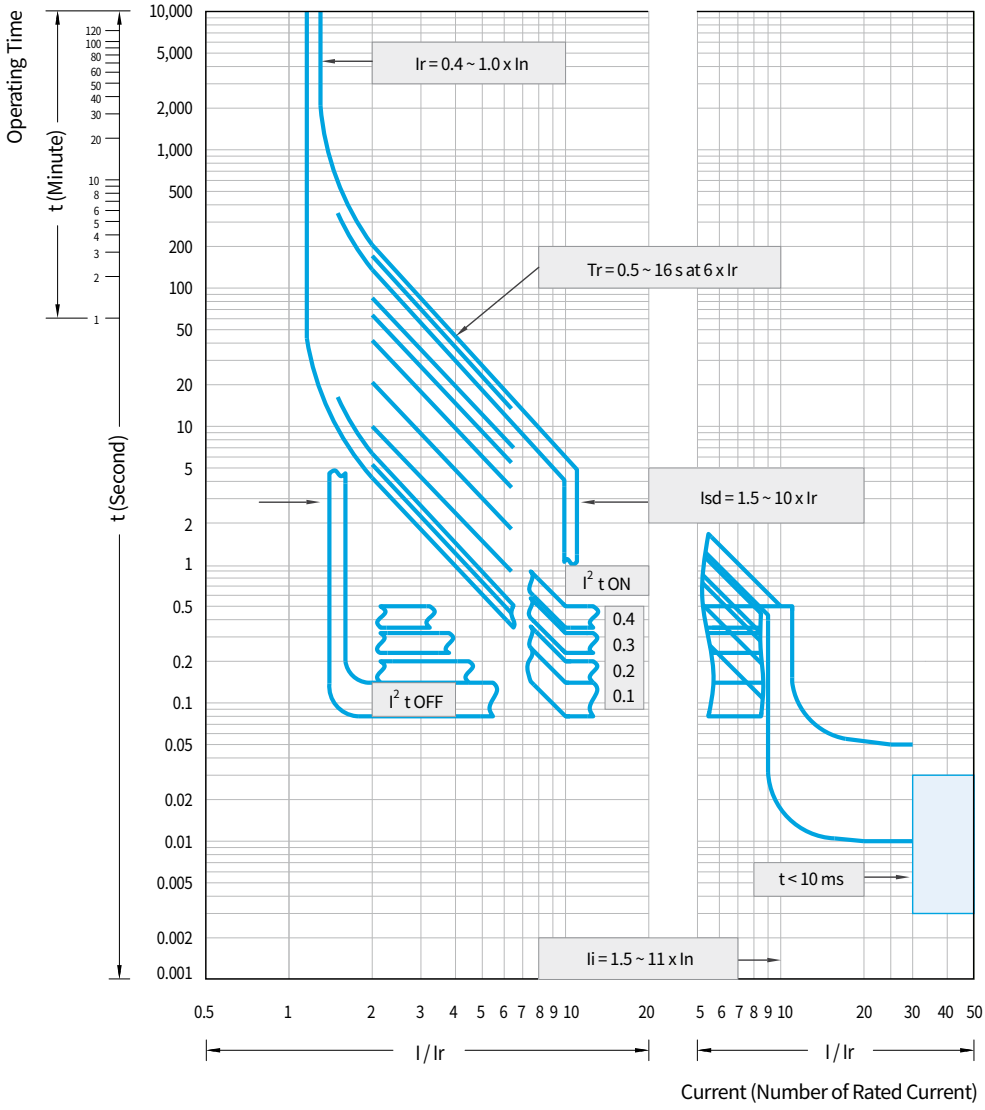


Operation Characteristic Curve (HGP for Electronic)

ETU-D/A/E Type (L,S,I)

・HGP100, 160, 250, 400, 630, 800

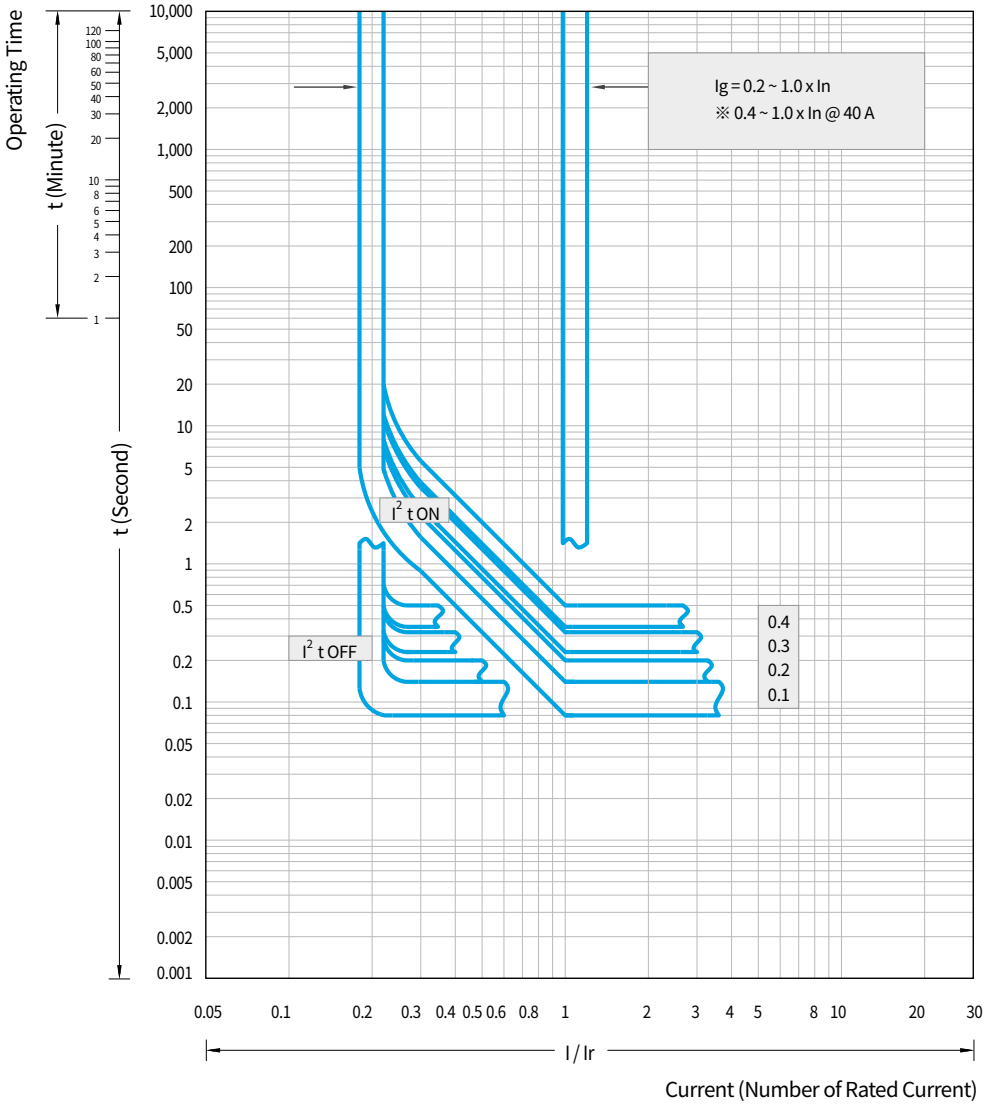
・Long-Time Protection [L]
・Short-Time Protection [S]
・Instantaneous Protection [I]



ETU-D/A/E Type (G)

・HGP100, 160, 250, 400, 630, 800

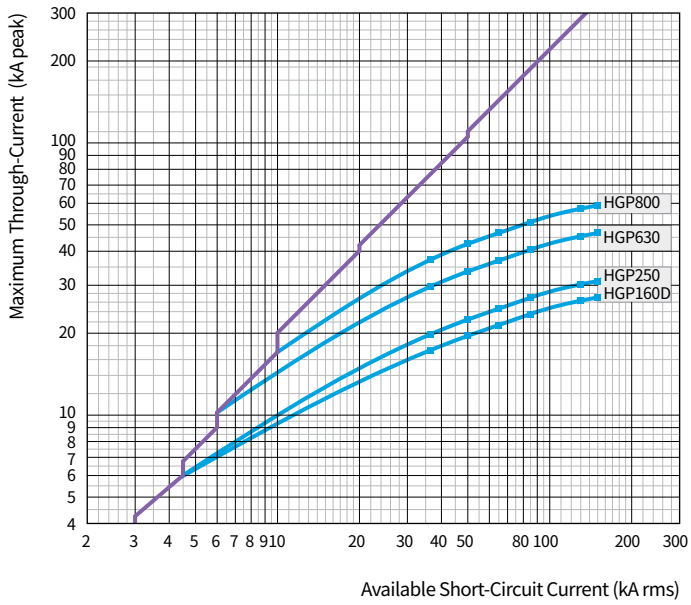
・Ground-Fault Protection [G]



Current & Energy-Limiting Characteristic Curve (HGP)

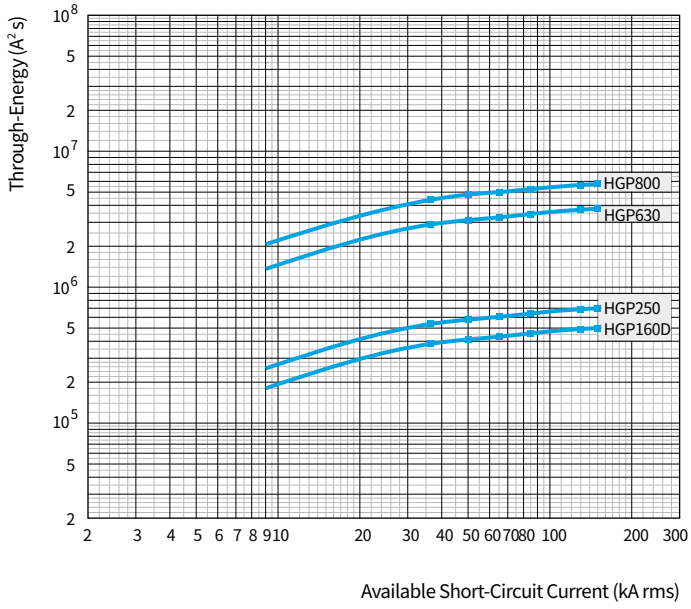
Current-Limiting Characteristic Curve

· Based on 400/460 V



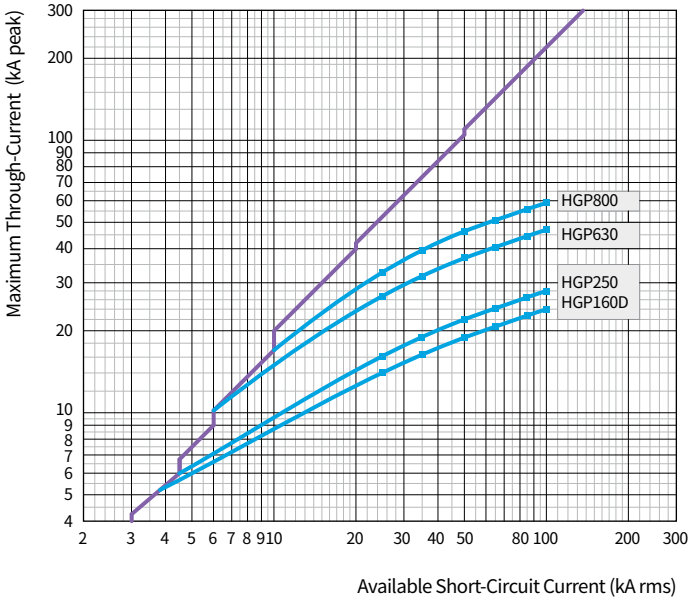
Energy-Limiting Characteristic Curve

· Based on 400/460 V



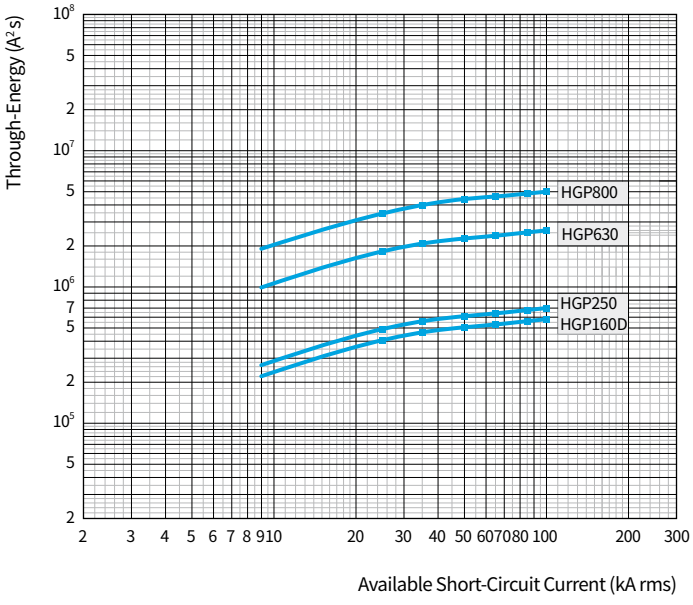
Current-Limiting Characteristic Curve

Based on 480/500 V



Energy-Limiting Characteristic Curve

Based on 480/500 V



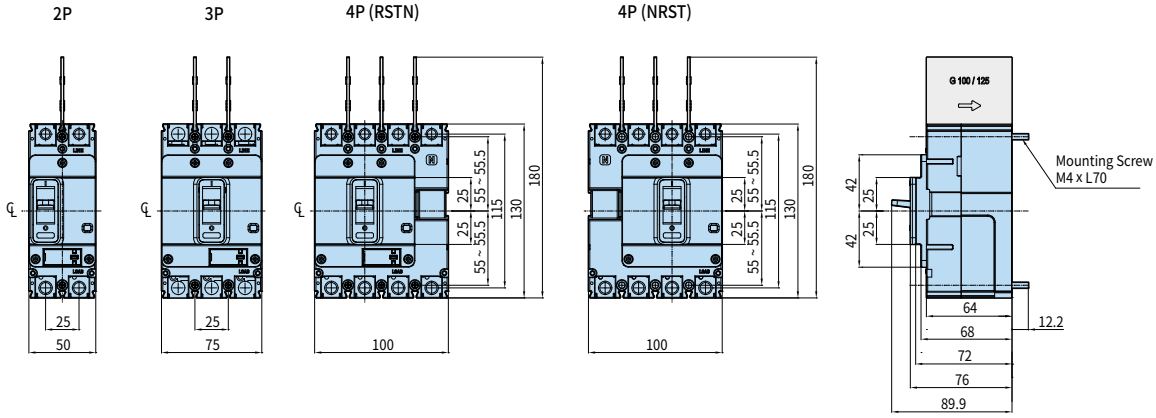
Dimensions

Front Connection HGM100

· HGM30, 50E/S, 60, 100

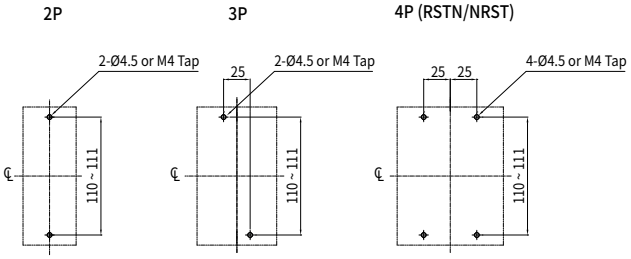
External Dimension

Unit : mm

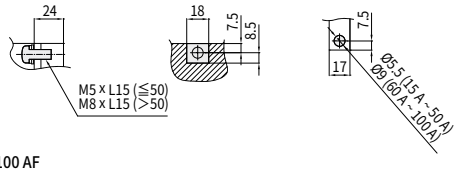


※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension



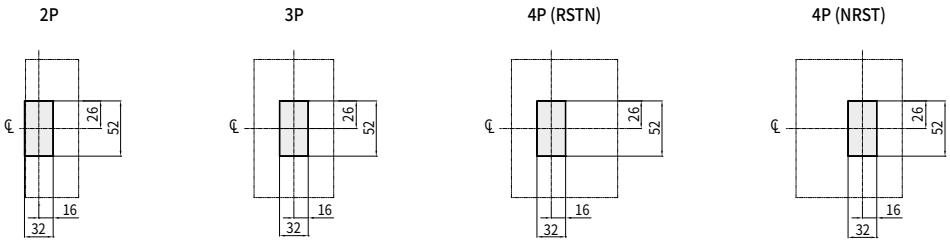
Detail Drawing of Terminal Part/ Connecting Conductor



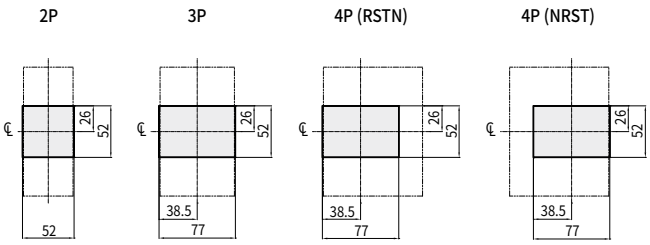
100 AF

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

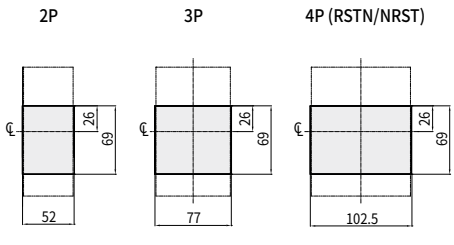
Dimension of Panel Cover Cutting - Handle Exposure



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



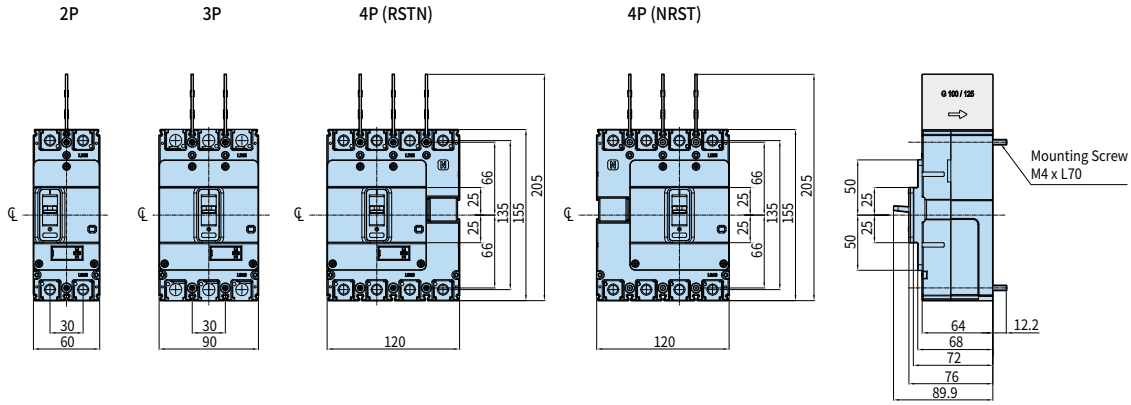
※ When installing the product in close contact, please consider tolerances for external dimensions.

Front Connection HGM125

· HGM50H/L, 125

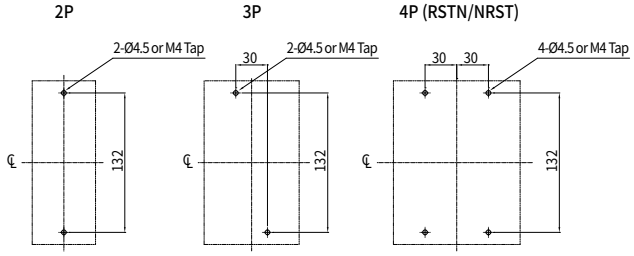
External Dimension

Unit : mm

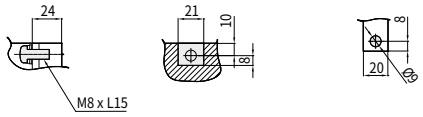


※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension



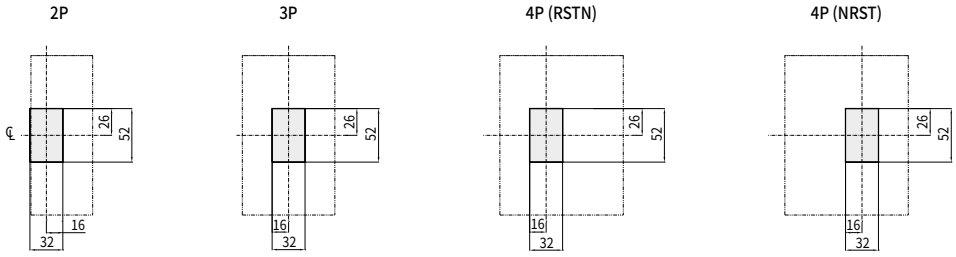
Detail Drawing of Terminal Part/ Connecting Conductor



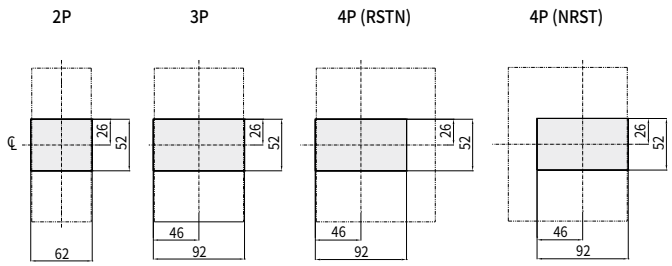
125 AF

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

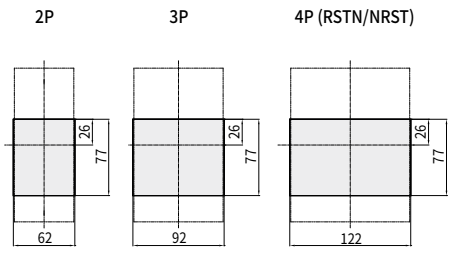
Dimension of Panel Cover Cutting - Handle Exposure



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

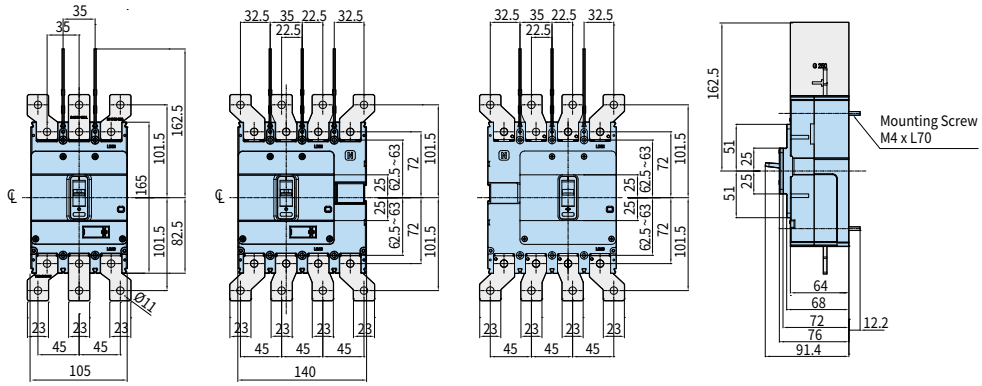
Front Connection HGM250

· HGM160, 250

External Dimension

Unit : mm

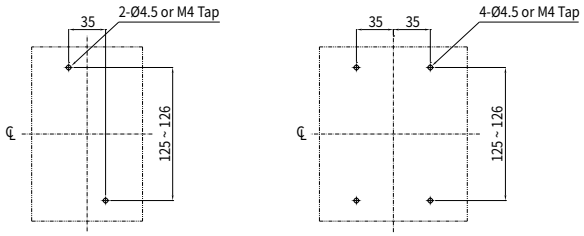
2/3P 4P (RSTN) 4P (NRST)



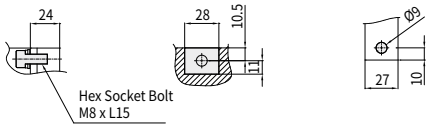
※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension

2/3P 4P (RSTN/NRST)



Detail Drawing of Terminal Part/ Connecting Conductor

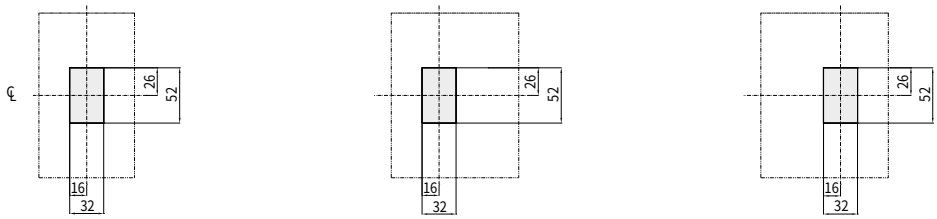


250 AF

Specification of Mounting Screw : M4 x L70 P/W
Specification of Terminal Mounting Screw : Hex Socket Bolt M8 x L18 W/W

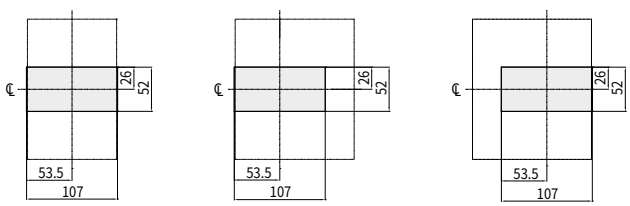
Dimension of Panel Cover Cutting - Handle Exposure

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



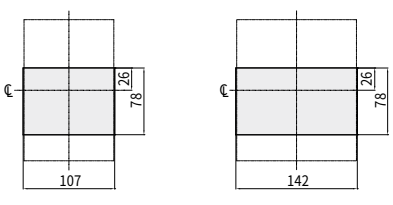
Dimension of Panel Cover Cutting - Handle/Test Button Exposure

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



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure

2/3P 4P (RSTN/NRST)



※ When installing the product in close contact, please consider tolerances for external dimensions.

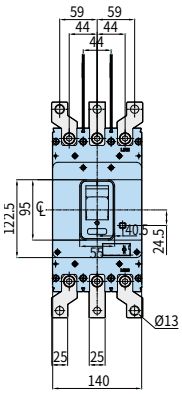
Front Connection HGM400

• HGM400

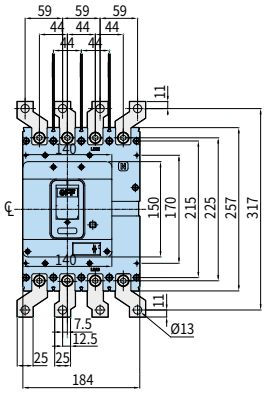
External Dimension

Unit : mm

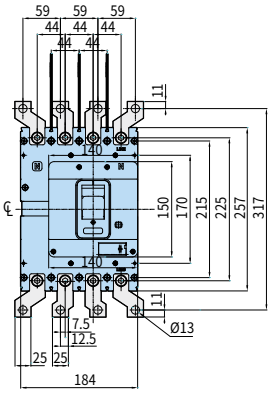
2/3P

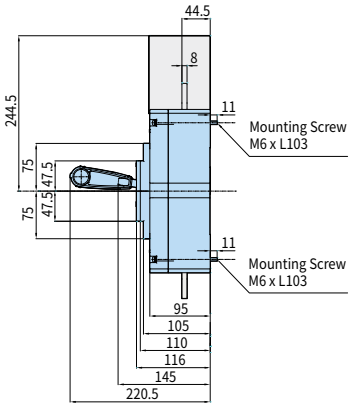


4P (RSTN)



4P (NRST)

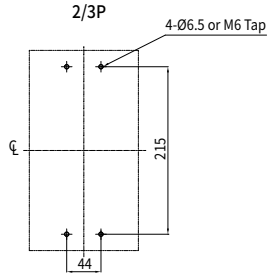




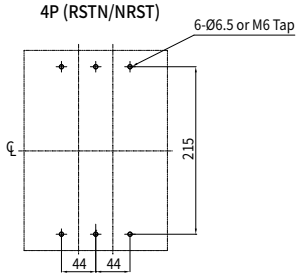
※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension

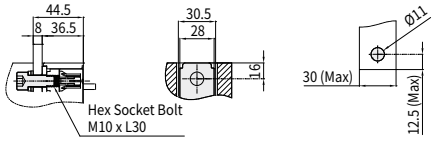
2/3P



4P (RSTN/NRST)

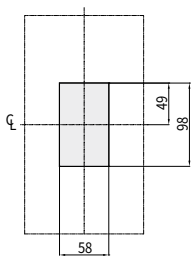


Detail Drawing of Terminal Part/Connecting Conductor

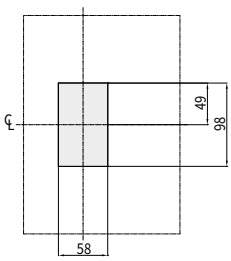


Dimension of Panel Cover Cutting - Handle Exposure

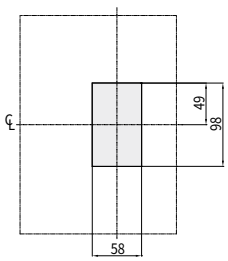
2/3P



4P (RSTN)

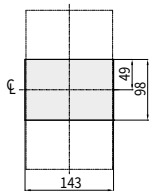


4P (NRST)

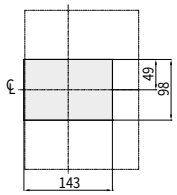


Dimension of Panel Cover Cutting - Handle/Test Button Exposure

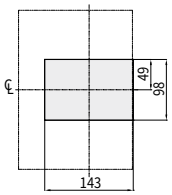
2/3P



4P (RSTN)

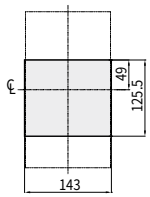


4P (NRST)

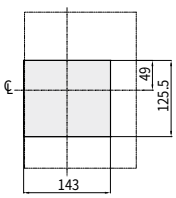


Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure

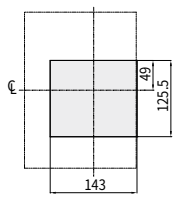
2/3P



4P (RSTN)



4P (NRST)



※ When installing the product in close contact, please consider tolerances for external dimensions.

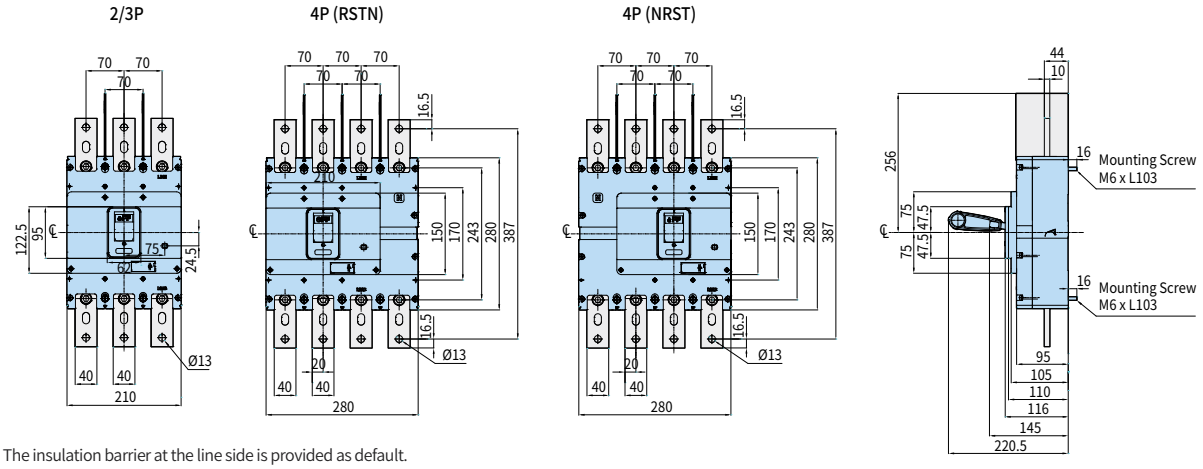
Dimensions

Front Connection HGM800

· HGM630, 800

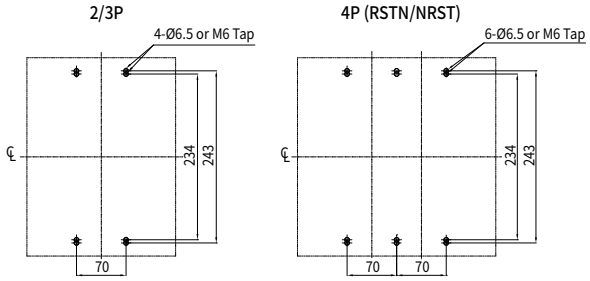
External Dimension

Unit : mm

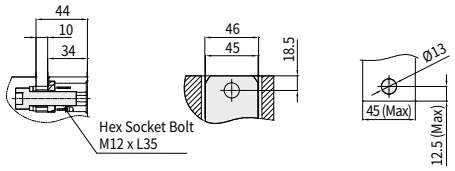


※ The insulation barrier at the line side is provided as default.

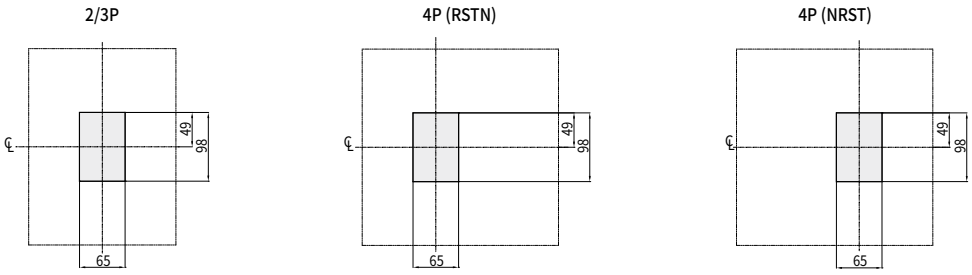
Panel Installation Dimension



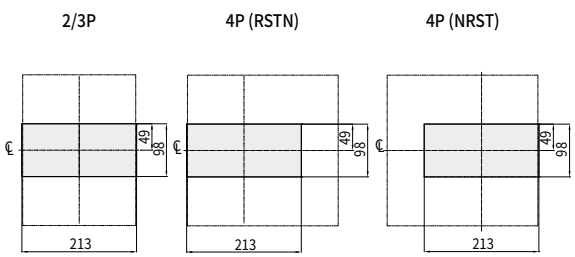
Detail Drawing of Terminal Part/Connecting Conductor



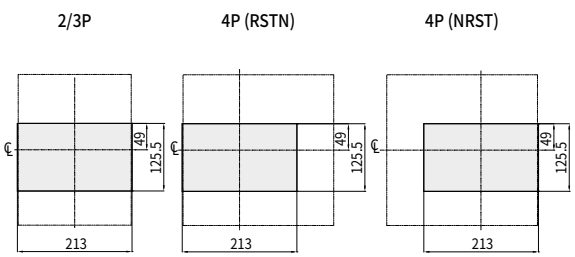
Dimension of Panel Cover Cutting - Handle Exposure



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



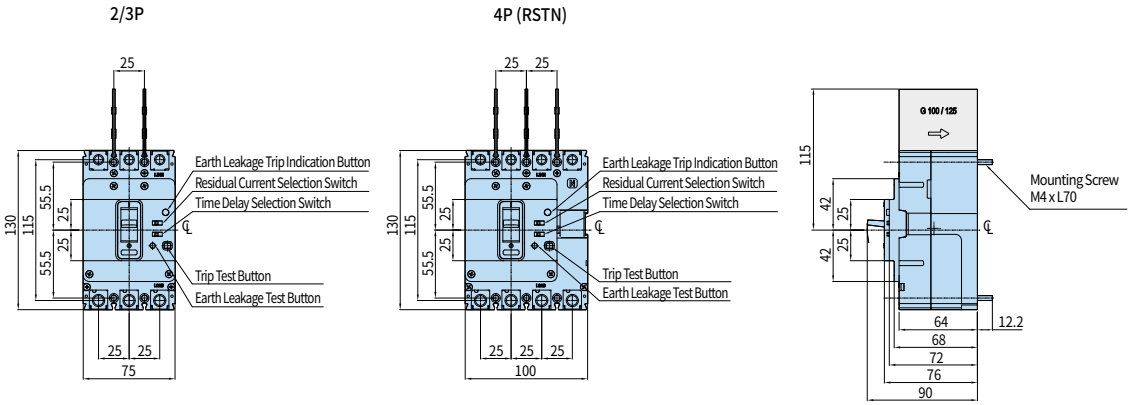
※ When installing the product in close contact, please consider tolerances for external dimensions.

Front Connection HGE100

· HGE30, 50E/S, 60, 100

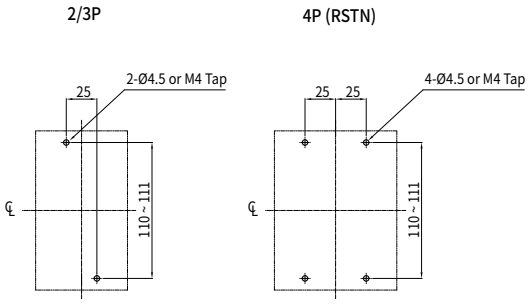
External Dimension

Unit : mm

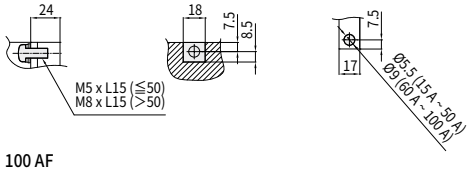


※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension



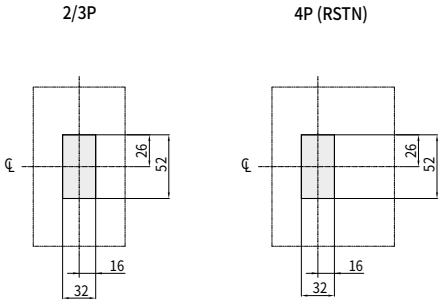
Detail Drawing of Terminal Part/Connecting Conductor



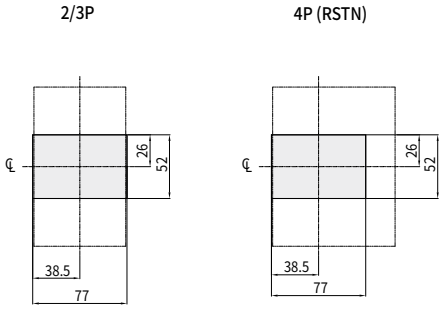
100 AF

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

Dimension of Panel Cover Cutting - Handle Exposure



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



※ When installing the product in close contact, please consider tolerances for external dimensions.

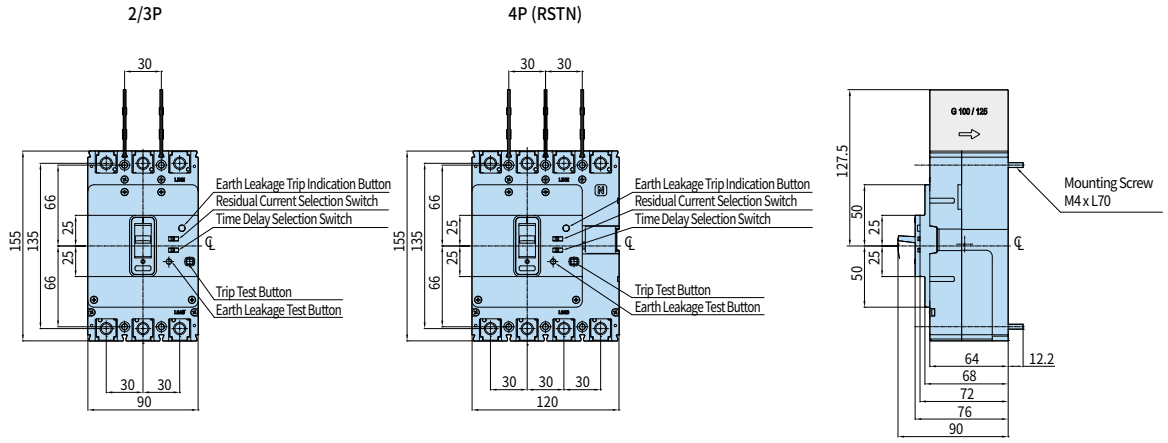
Dimensions

Front Connection HGE125

· HGE50H/L, 125

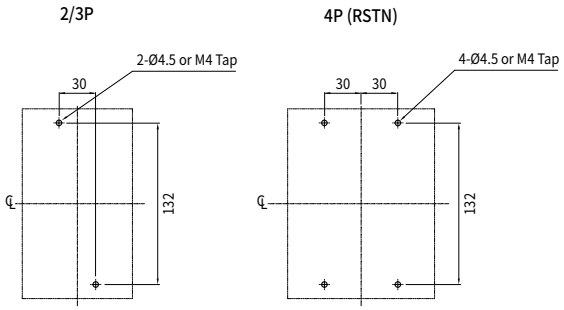
External Dimension

Unit : mm

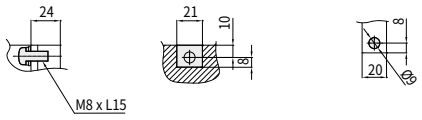


※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension



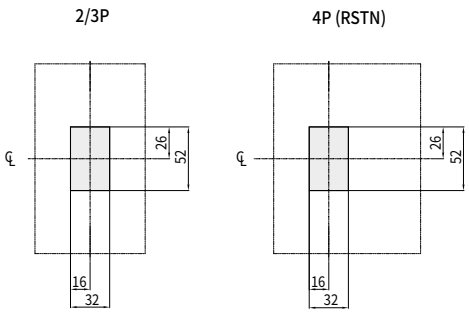
Detail Drawing of Terminal Part/Connecting Conductor



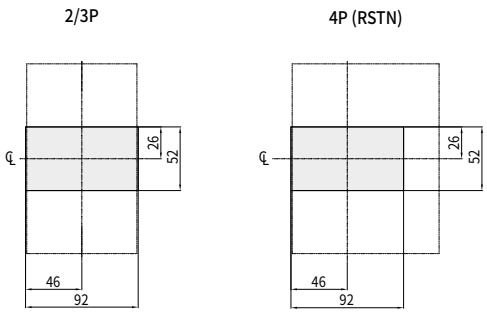
125 AF

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

Dimension of Panel Cover Cutting - Handle Exposure



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



※ When installing the product in close contact, please consider tolerances for external dimensions.

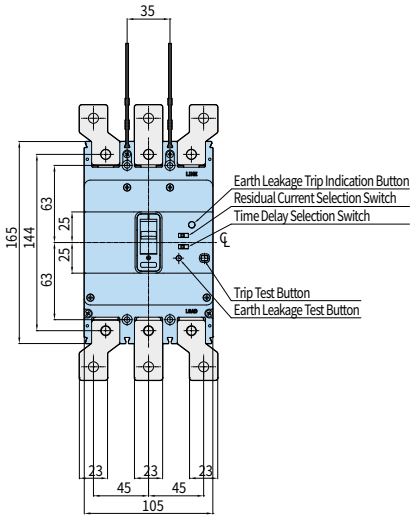
Front Connection HGE250

· HGE160, 250

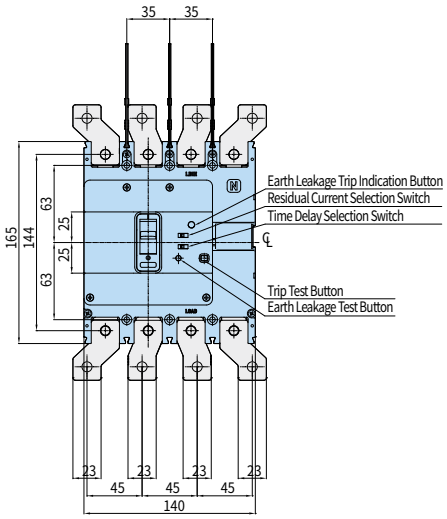
External Dimension

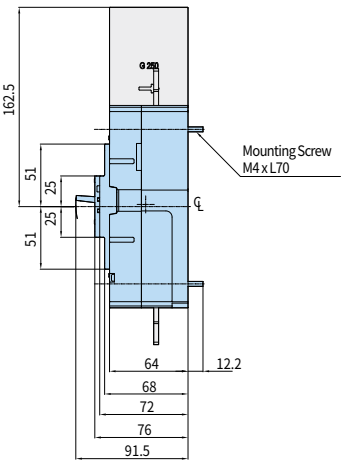
Unit : mm

2/3P



4P (RSTN)

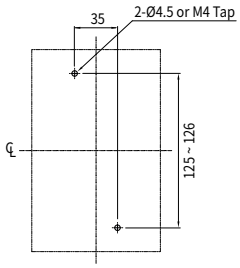




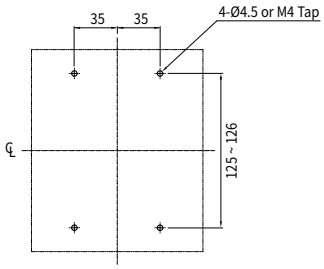
※ The insulation barrier at the line side is provided as default.

Panel Installation Dimension

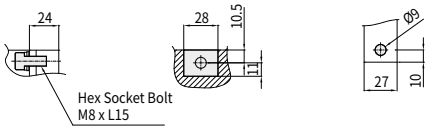
2/3P



4P (RSTN)



Detail Drawing of Terminal Part/Connecting Conductor

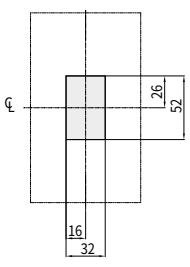


250 AF

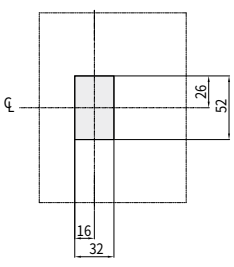
Specification of Mounting Screw : M4 x L70 P/W
Specification of Terminal Mounting Screw : Hex Socket Bolt M8 x L18 W/W

Dimension of Panel Cover Cutting - Handle Exposure

2/3P

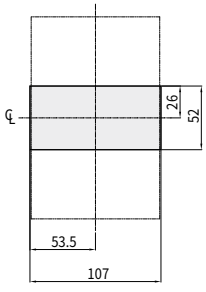


4P (RSTN)

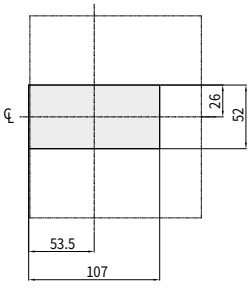


Dimension of Panel Cover Cutting - Handle/Test Button Exposure

2/3P



4P (RSTN)



※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

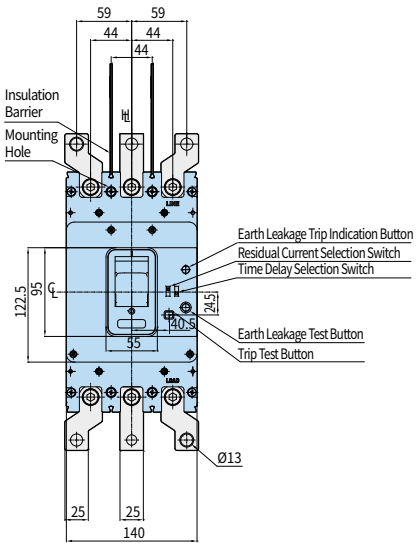
Front Connection HGE400

· HGE400

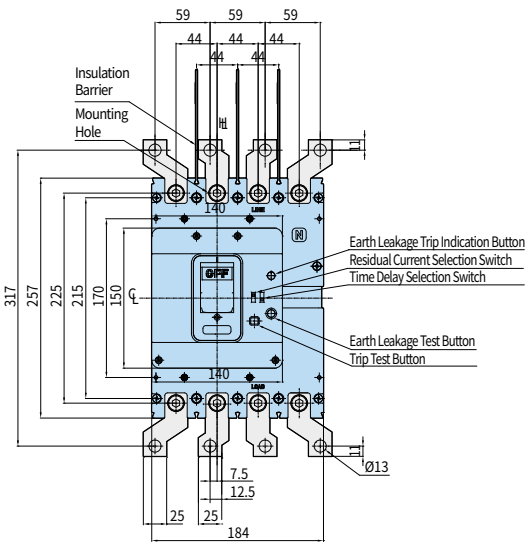
External Dimension

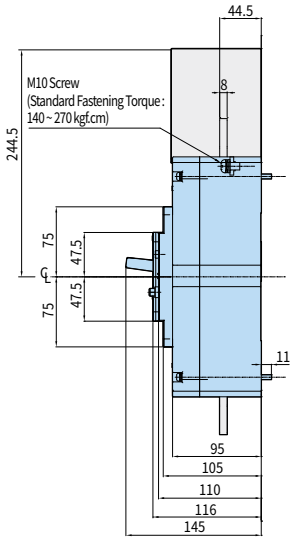
Unit : mm

2/3P



4P (RSTN)

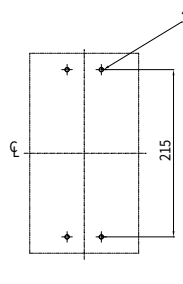




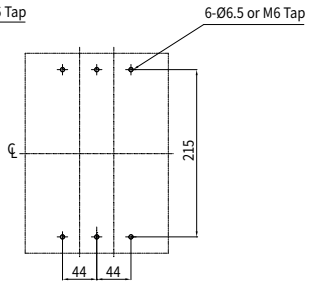
※ The insulation barrier at the line side is provided as standard product.

Panel Installation Dimension

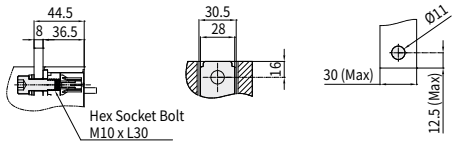
2/3P



4P (RSTN)

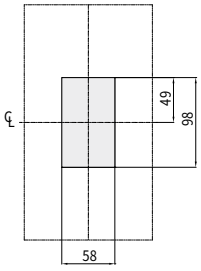


Detail Drawing of Terminal Part/Connecting Conductor

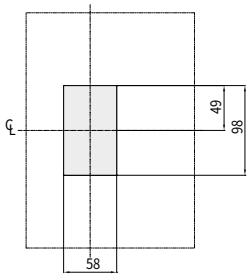


Dimension of Panel Cover Cutting

2/3P



4P (RSTN)



※ When installing the product in close contact, please consider tolerances for external dimensions.

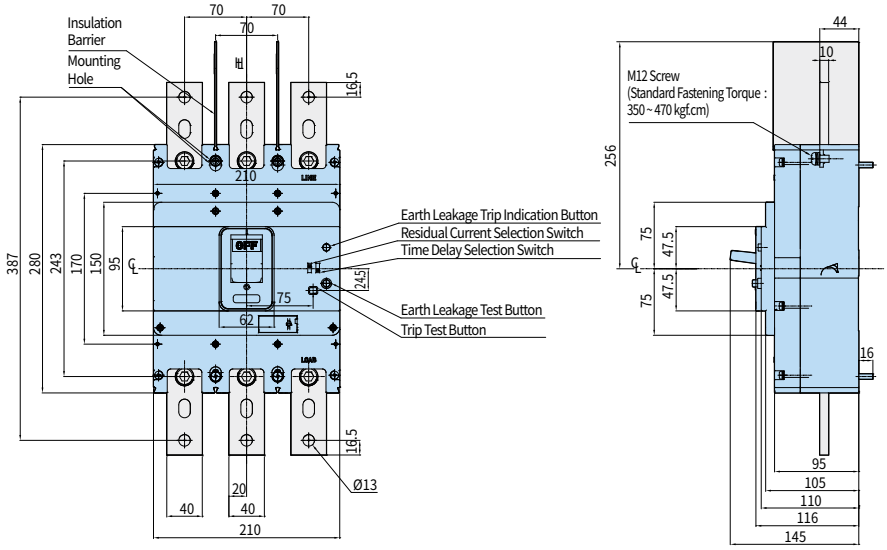
Front Connection HGE800

· HGE630, 800

External Dimension

Unit : mm

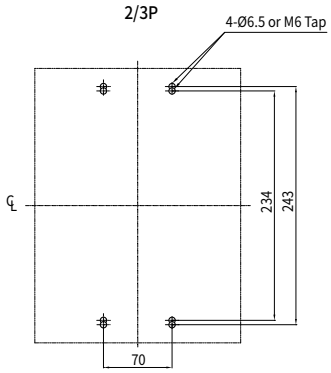
2/3P



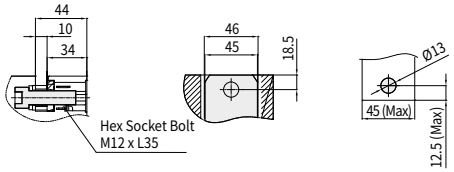
※ The insulation barrier at the line side is provided as standard product.

Panel Installation Dimension

2/3P

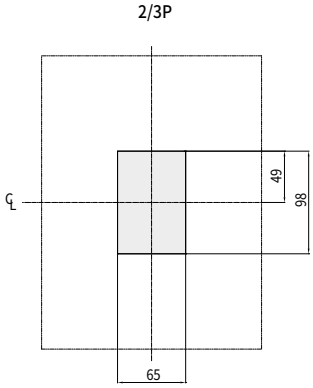


Detail Drawing of Terminal Part/Connecting Conductor



Dimension of Panel Cover Cutting

2/3P



※ When installing the product in close contact, please consider tolerances for external dimensions.

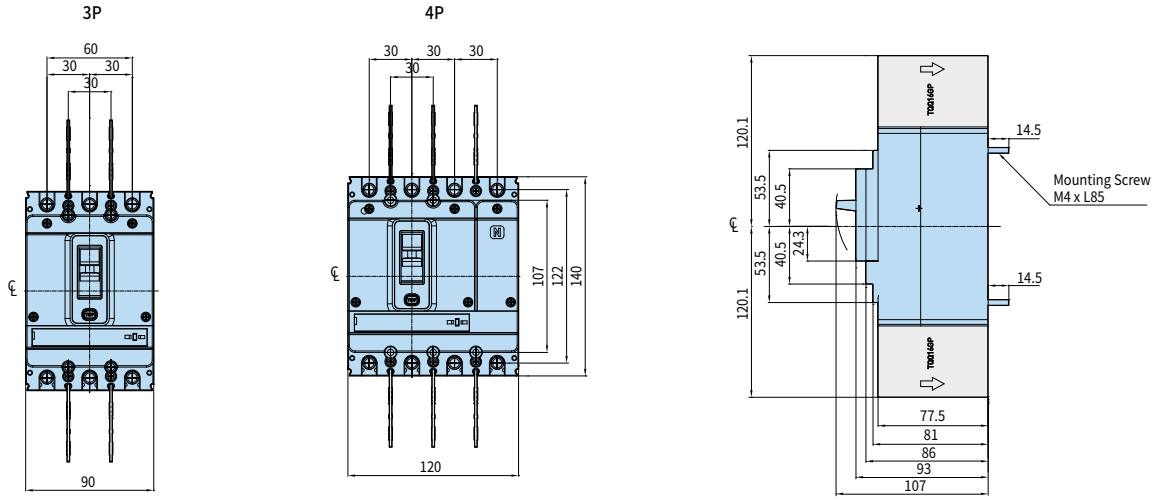
Dimensions

Front Connection HGP160D

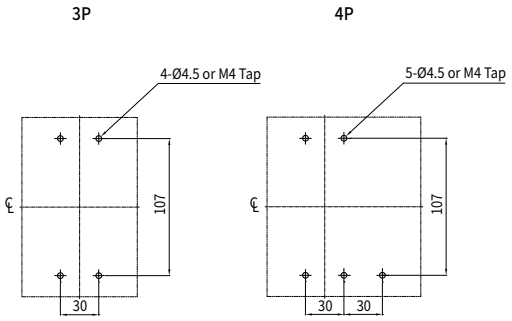
· HGP50D, 125D, 160D

External Dimension

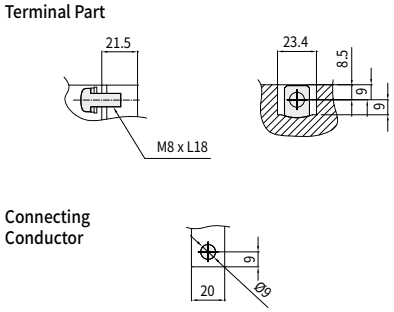
Unit : mm



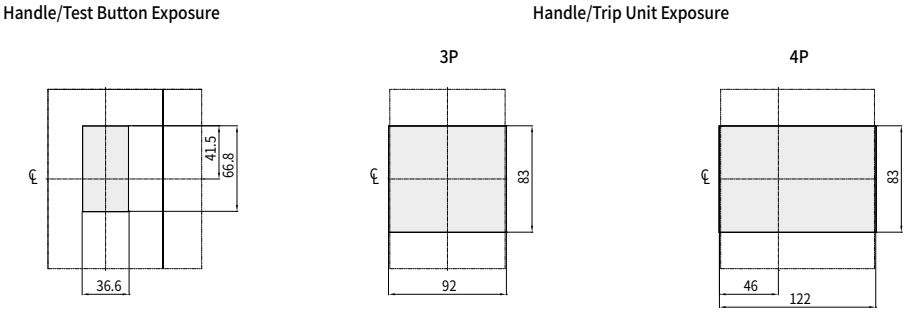
Panel Installation Dimension



Detail Drawing of Terminal Part/Connecting Conductor



Dimension of Panel Cover Cutting



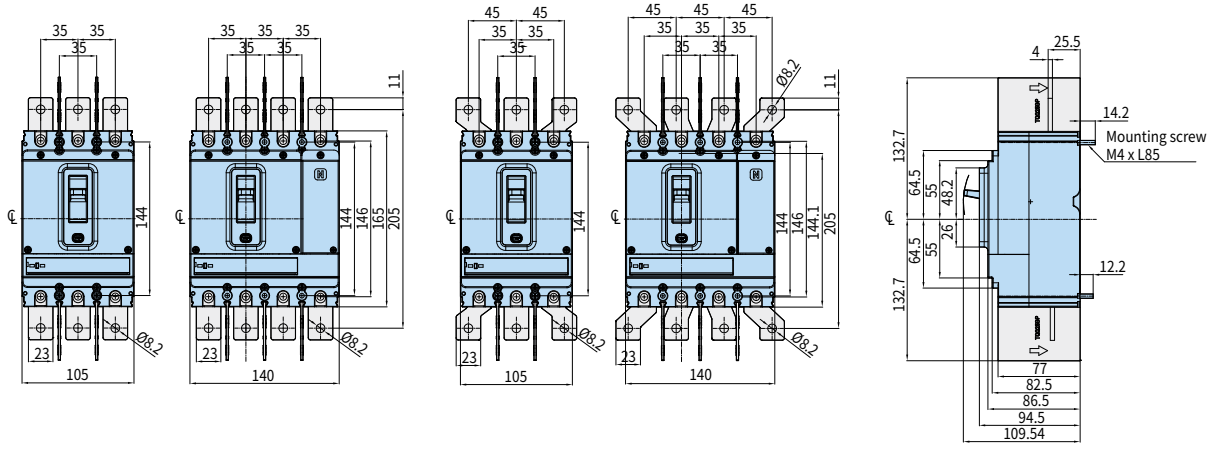
※ When installing the product in close contact, please consider tolerances for external dimensions.

Front Connection HGP250

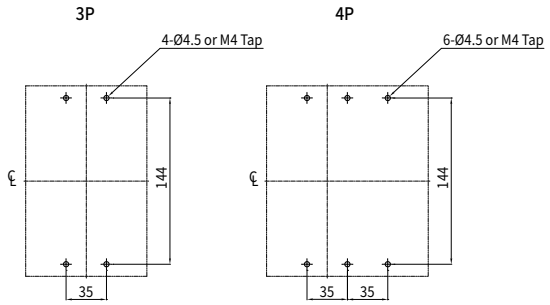
· HGP100, 160, 250

External Dimension

Unit : mm

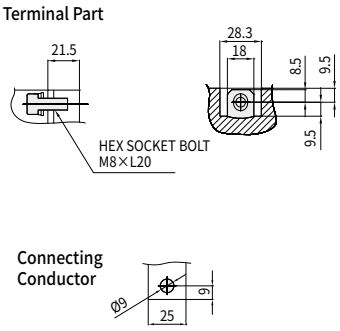


Panel Installation Dimension

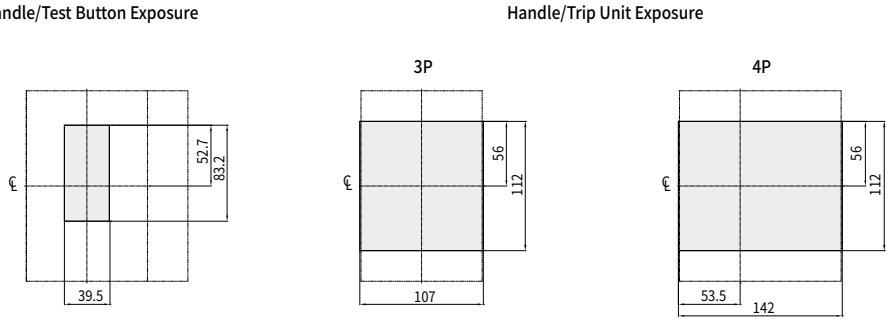


※ Screw Applied : M4×L85 S/W (For Circuit Breaker Mounting),
M8×L18 S/W P/W (For Terminal Mounting)

Detail Drawing of Terminal Part/Connecting Conductor



Dimension of Panel Cover Cutting



※ When installing the product in close contact, please consider tolerances for external dimensions.

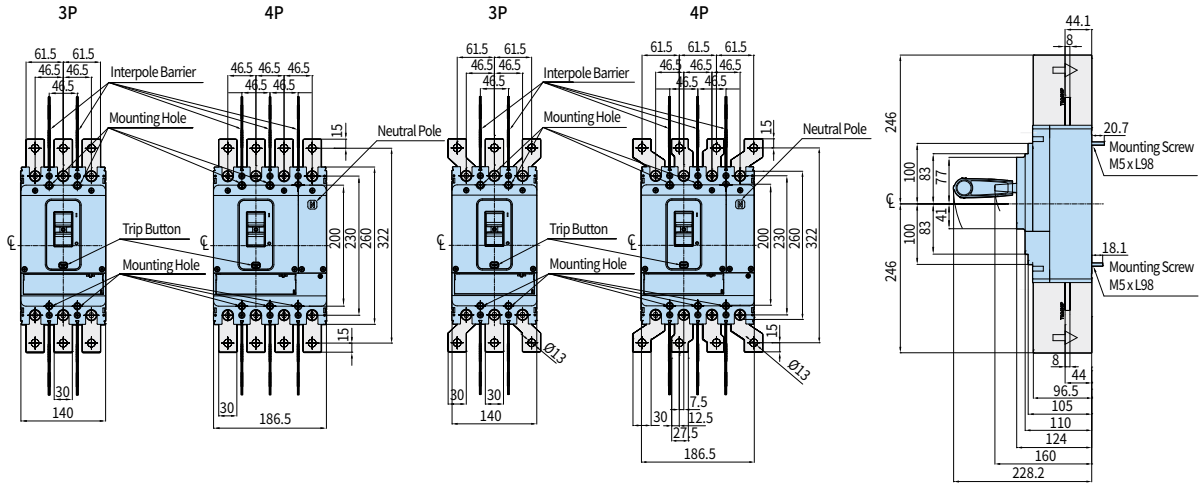
Dimensions

Front Connection HGP630

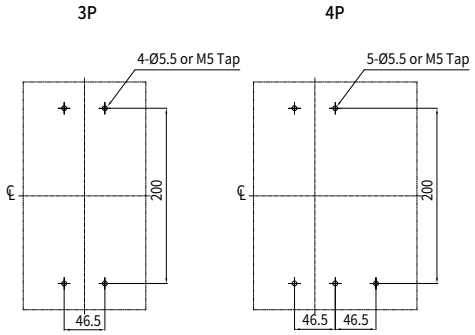
· HGP400, 630

External Dimension

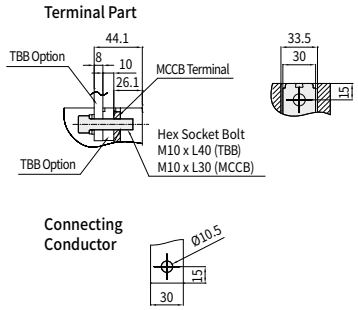
Unit : mm



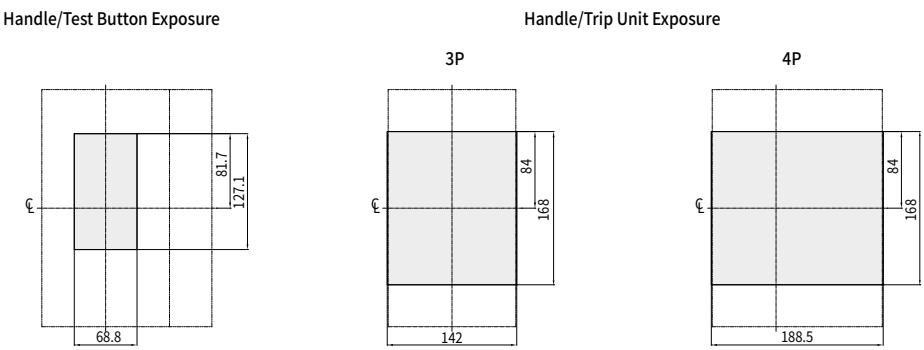
Panel Installation Dimension



Detail Drawing of Terminal Part/Connecting Conductor



Dimension of Panel Cover Cutting



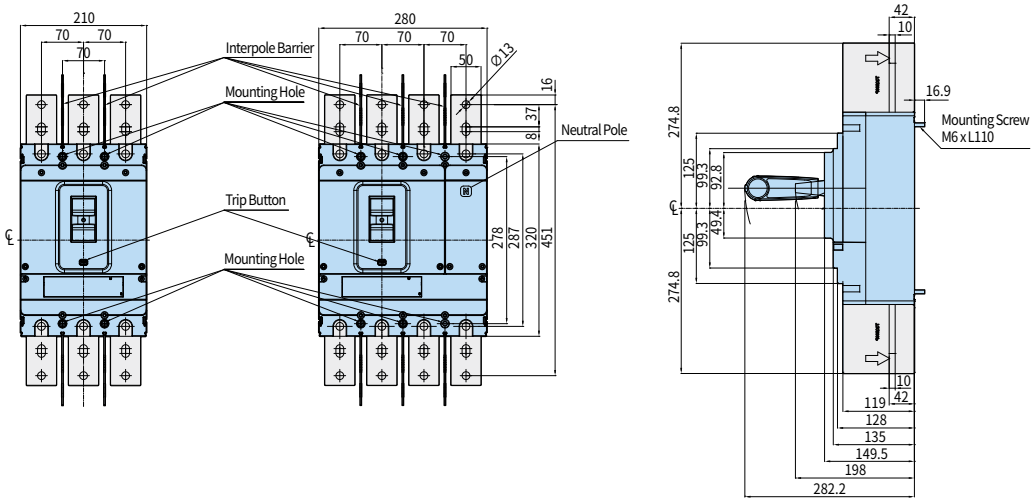
※ When installing the product in close contact, please consider tolerances for external dimensions.

Front Connection HGP800

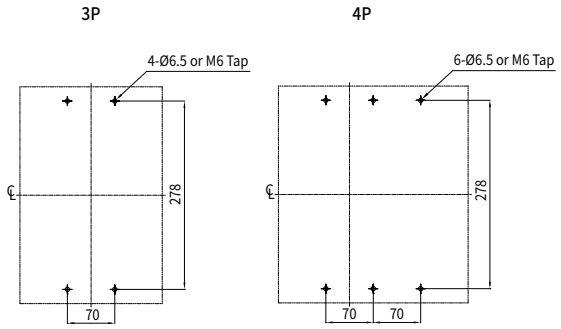
· HGP800

External Dimension

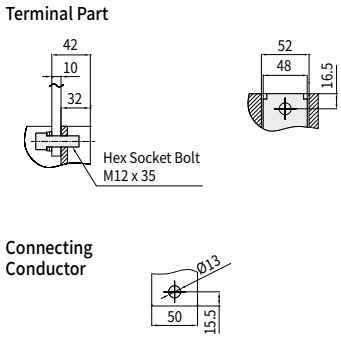
Unit : mm



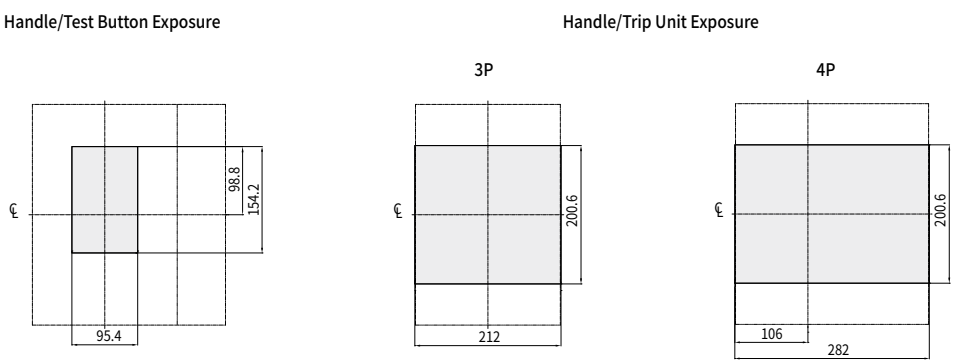
Panel Installation Dimension



Detail Drawing of Terminal Part/Connecting Conductor



Dimension of Panel Cover Cutting



※ When installing the product in close contact, please consider tolerances for external dimensions.

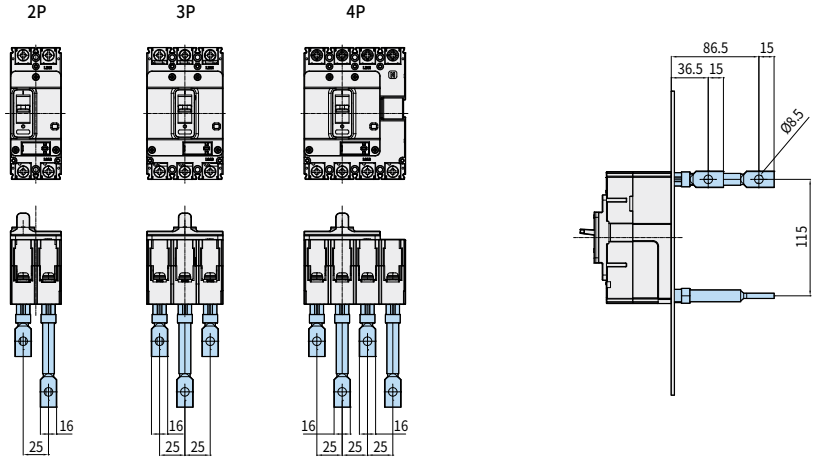
Dimensions

Rear Connection (Flat Type) HGM100

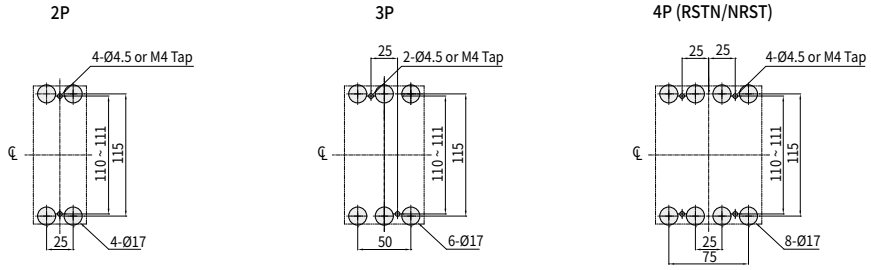
· HGM30, 50E/S, 60, 100

External Dimension

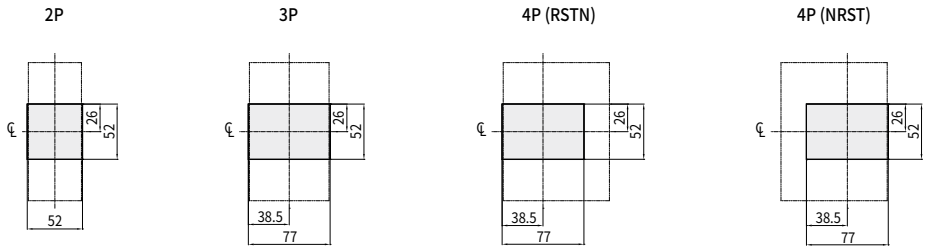
Unit : mm



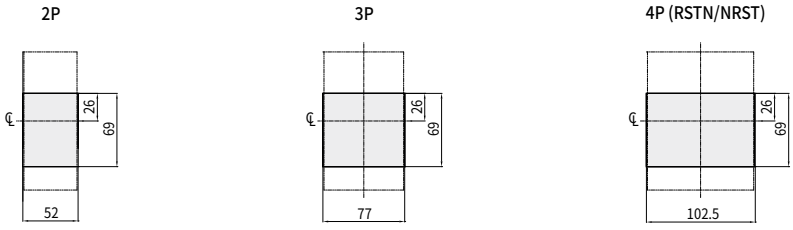
Panel Installation Dimension



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



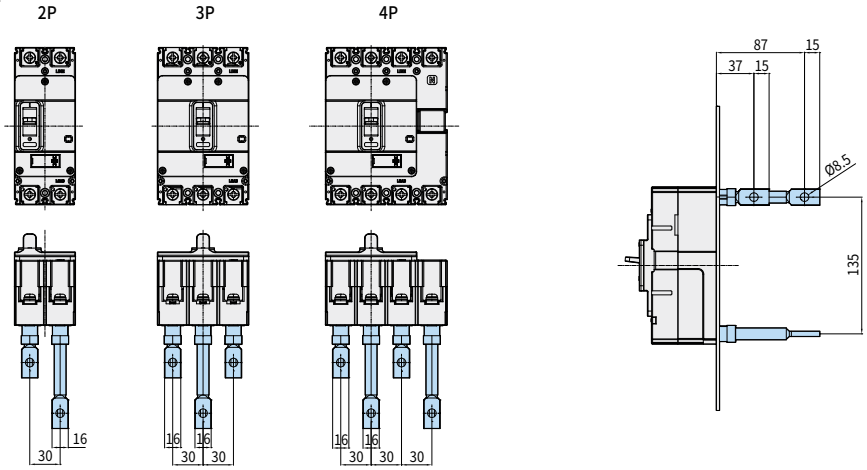
※ When assembling the RCT, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

Rear Connection (Flat Type) HGM125

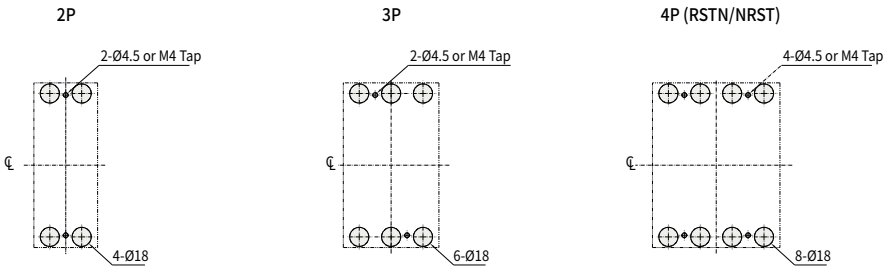
· HGM50H/L, 125

External Dimension

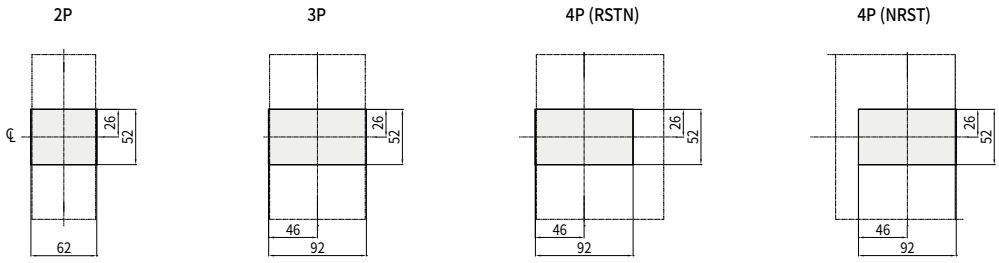
Unit : mm



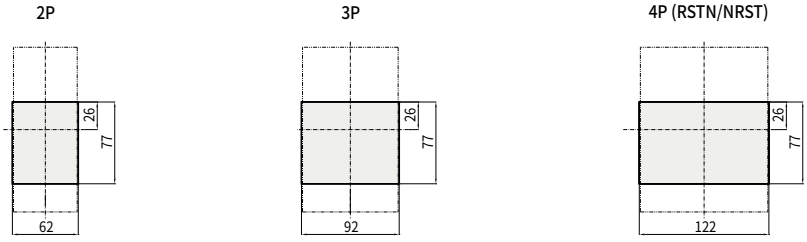
Panel Installation Dimension



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



※ When assembling the RCT, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

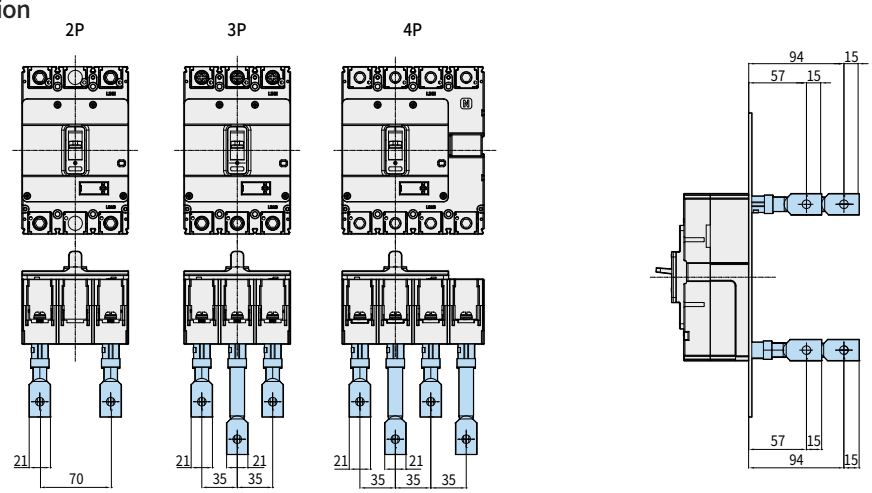
Dimensions

Rear Connection (Flat Type) HGM250

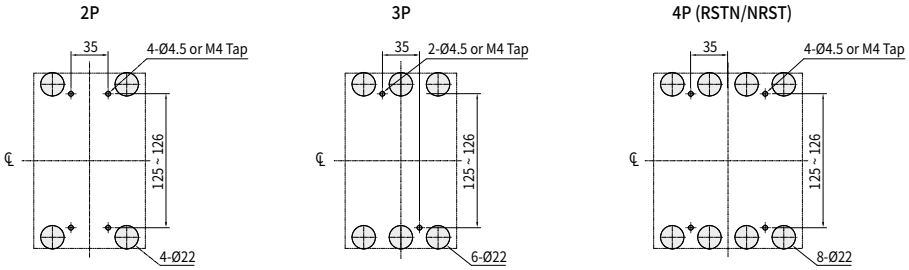
· HGM160, 250

External Dimension

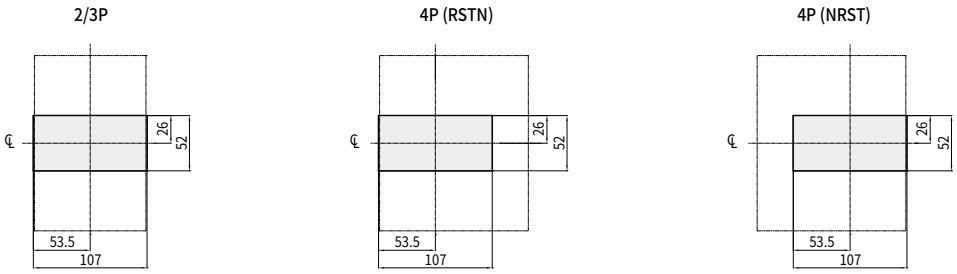
Unit : mm



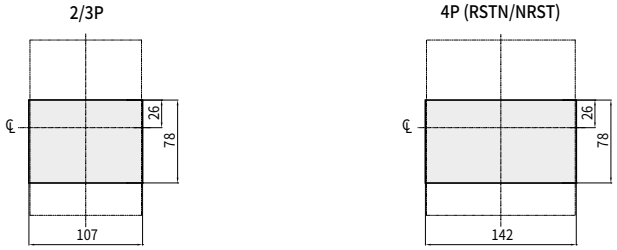
Panel Installation Dimension



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



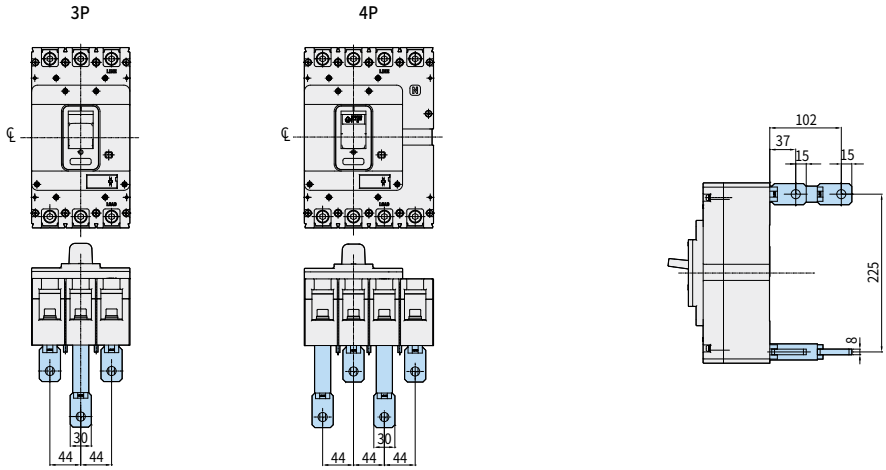
※ When assembling the RCT, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

Rear Connection (Flat Type) HGM400

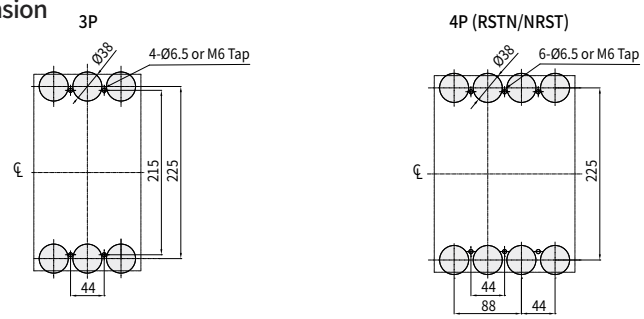
• HGM400

External Dimension

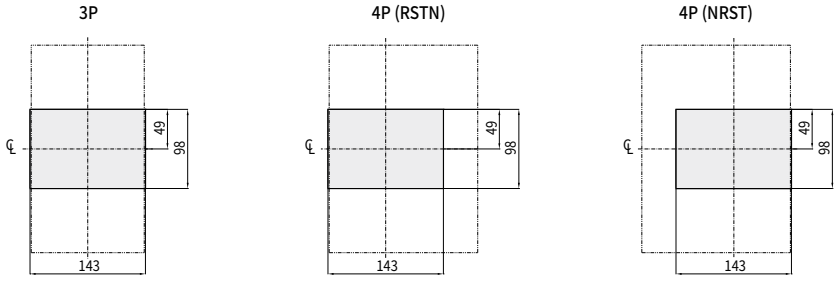
Unit : mm



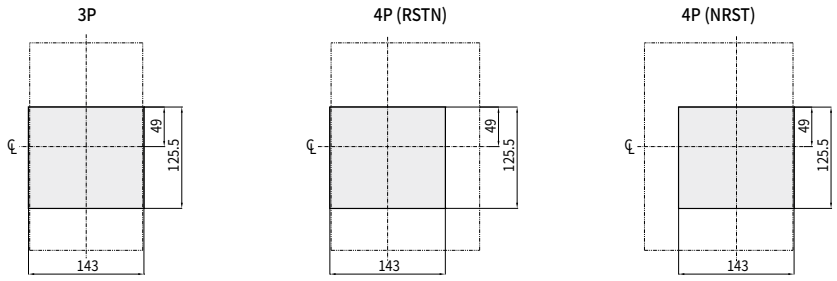
Panel Installation Dimension



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



※ When assembling the RCT, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

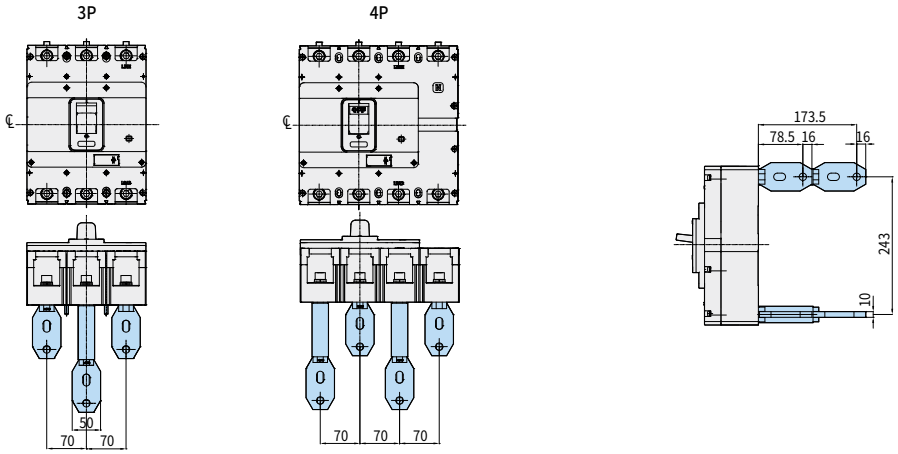
Dimensions

Rear Connection (Flat Type) HGM800

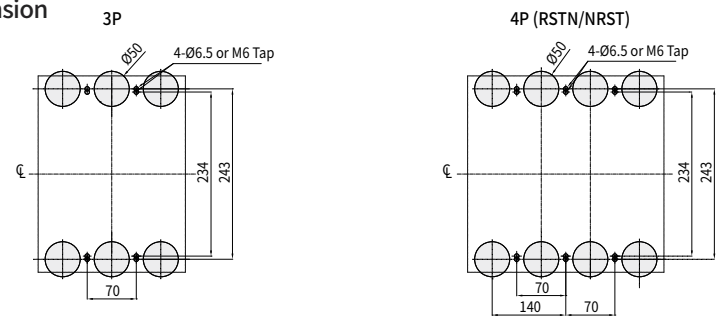
· HGM630, 800

External Dimension

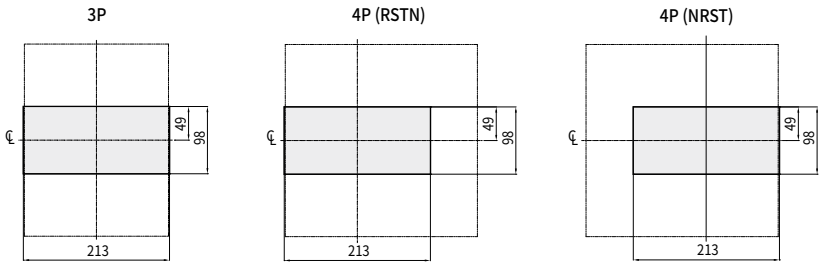
Unit : mm



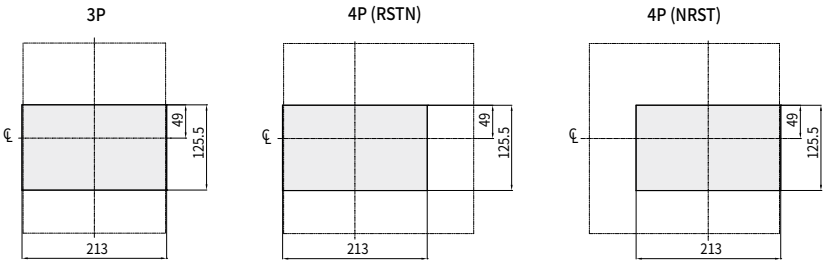
Panel Installation Dimension



Dimension of Panel Cover Cutting - Handle/Test Button Exposure



Dimension of Panel Cover Cutting - Handle/Trip Unit Exposure



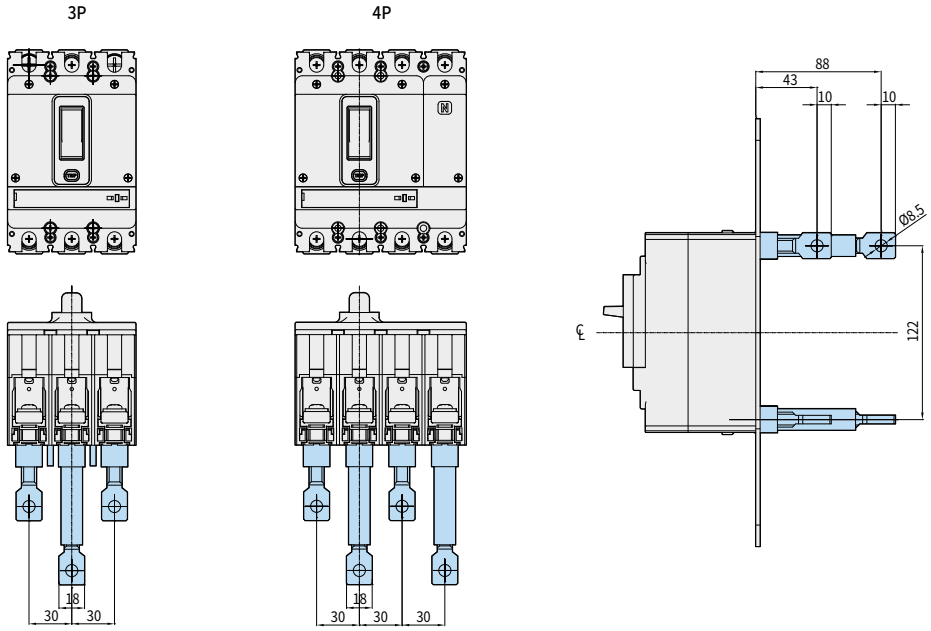
※ When assembling the RCT, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

Rear Connection (Rear Type) HGP160D

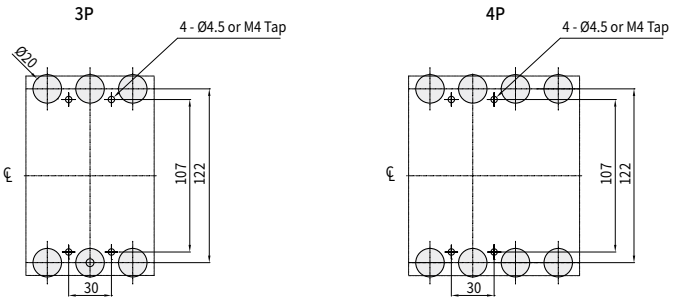
· HGP50D, 125D, 160D

External Dimension

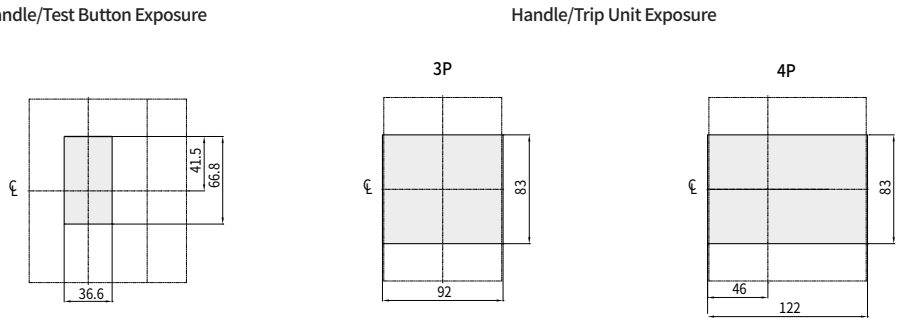
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



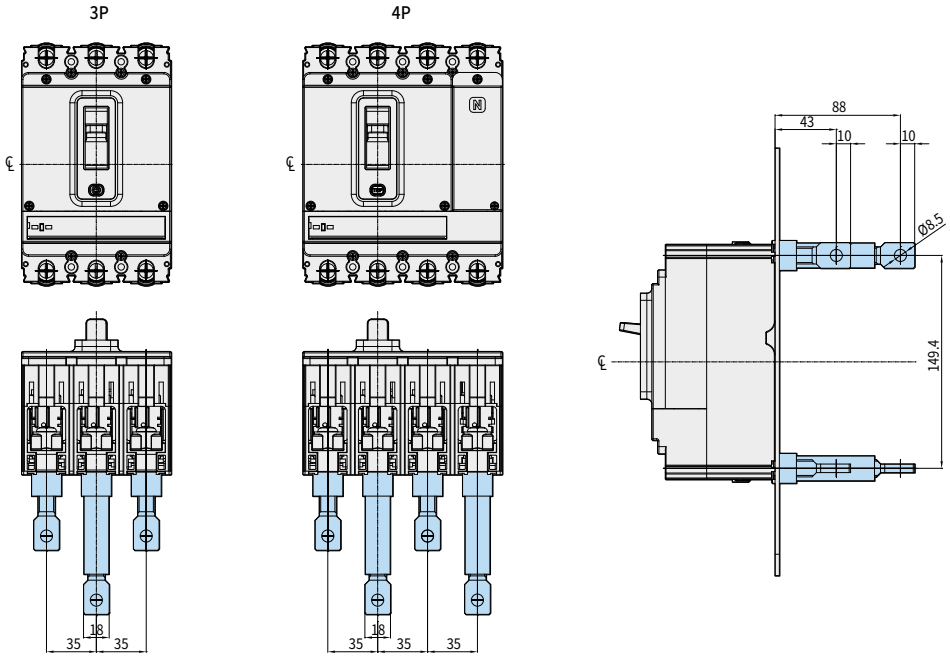
Dimensions

Rear Connection (Rear Type) HGP250

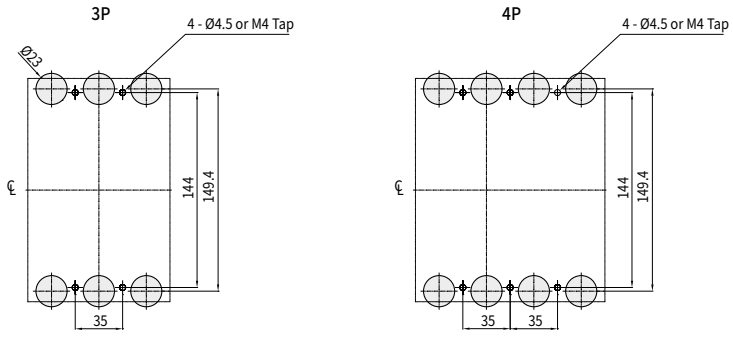
• HGP250

External Dimension

Unit : mm



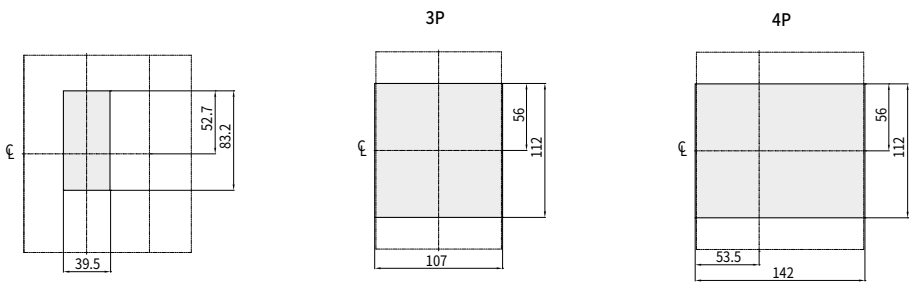
Panel Installation Dimension



Dimension of Panel Cover Cutting

Handle/Test Button Exposure

Handle/Trip Unit Exposure

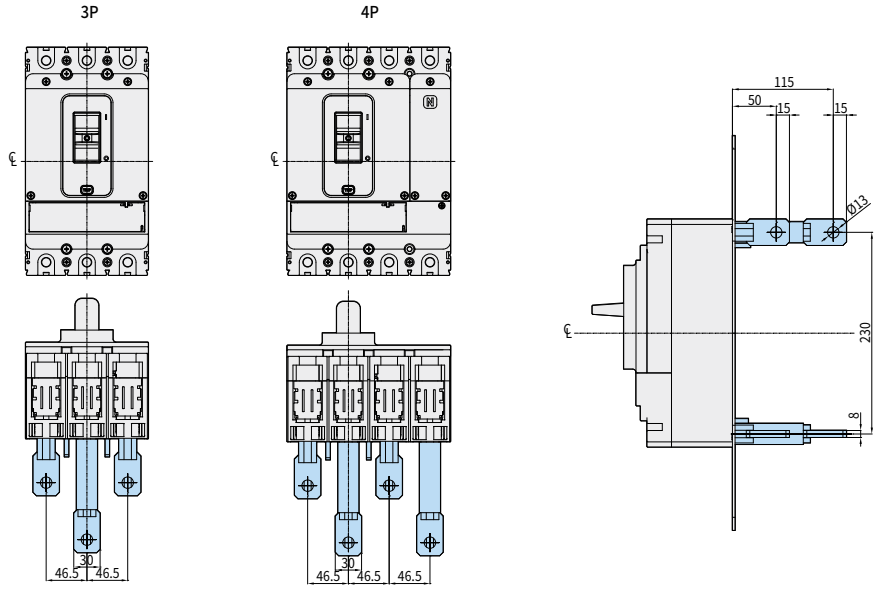


Rear Connection (Rear Type) HGP630

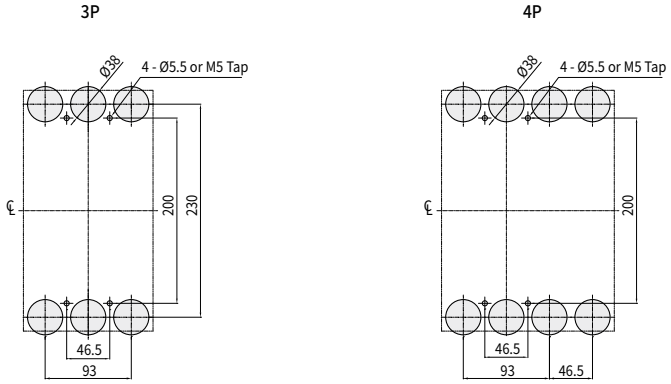
· HGP400, 630

External Dimension

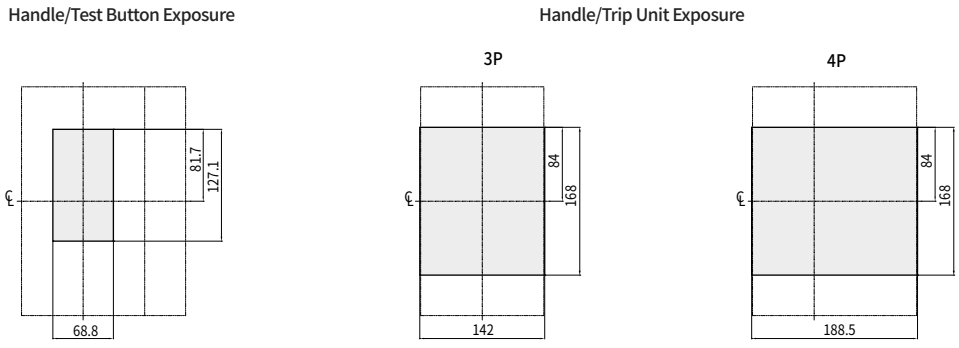
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



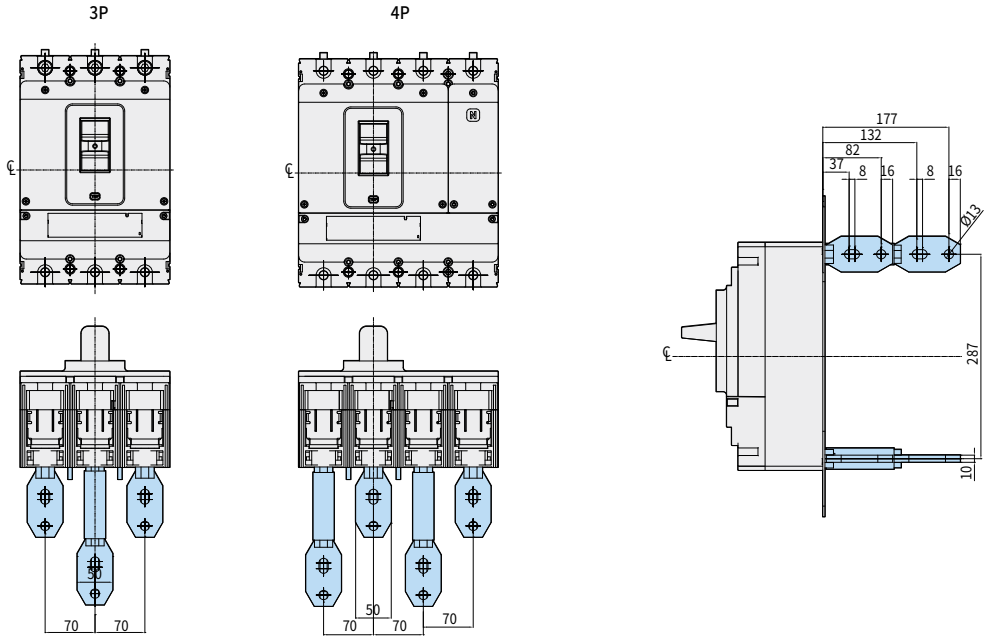
Dimensions

Rear Connection (Rear Type) HGP800

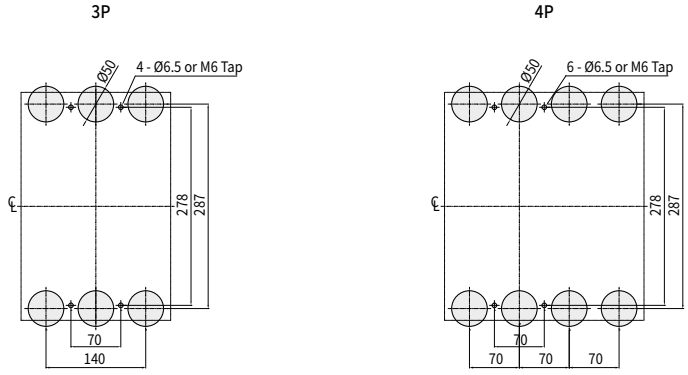
· HGP800

External Dimension

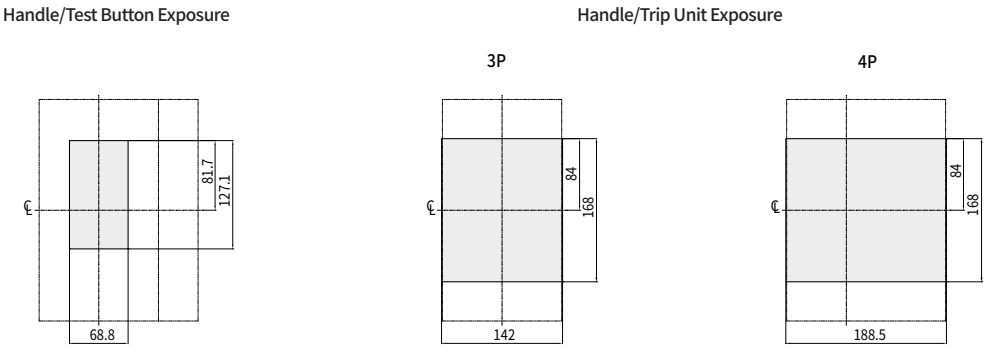
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting

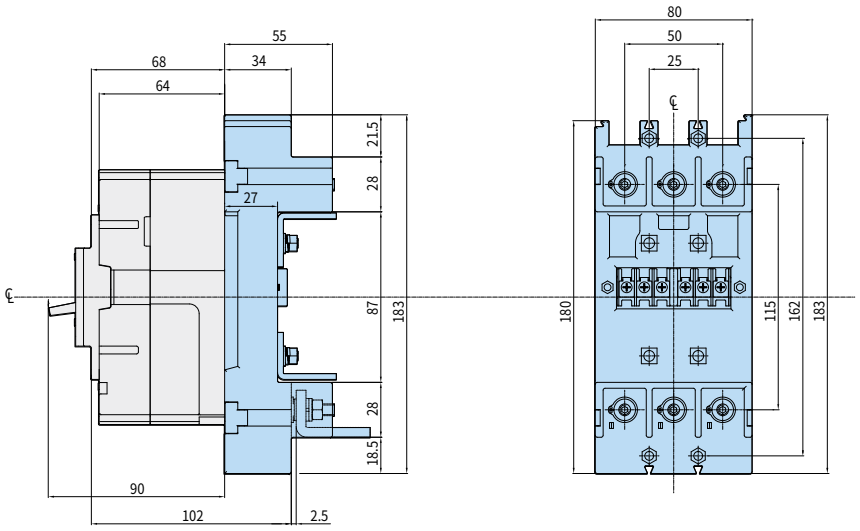


Plug-in Type HGM100

· HGM30, 50E/S, 60, 100

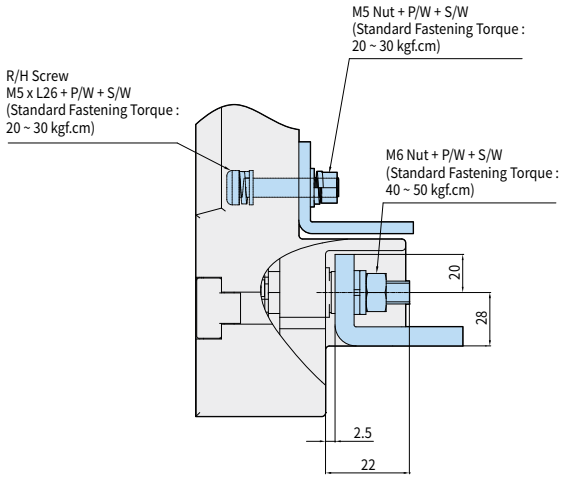
External Dimension (TDM Type)

Unit : mm

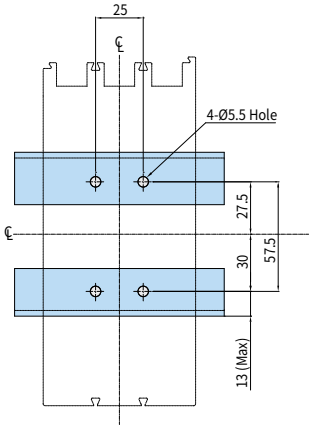


Panel Installation Dimension and Cover Cutting Dimension

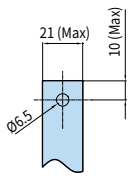
Detailed Drawing of Connection



Mounting Drawing



Process Criterion of Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

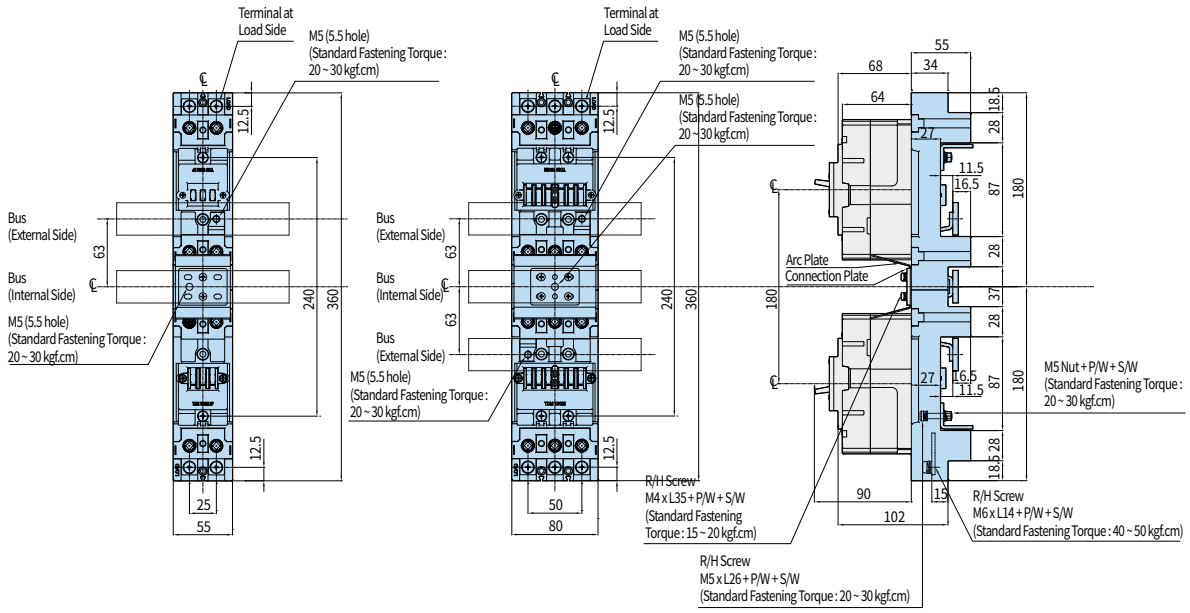
Dimensions

Plug-in Type HGM100

· HGM30, 50E/S, 60, 100

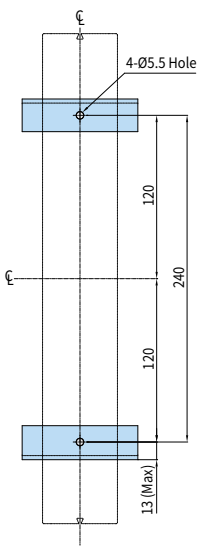
External Dimension (TDA D Type)

Unit : mm

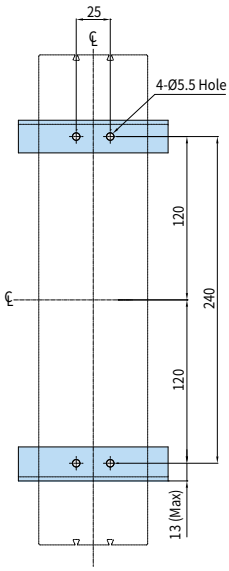


Panel Installation Dimension and Cover Cutting Dimension

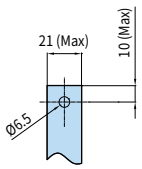
Mounting Drawing



Mounting Drawing



Process Criterion of Connecting Conductor



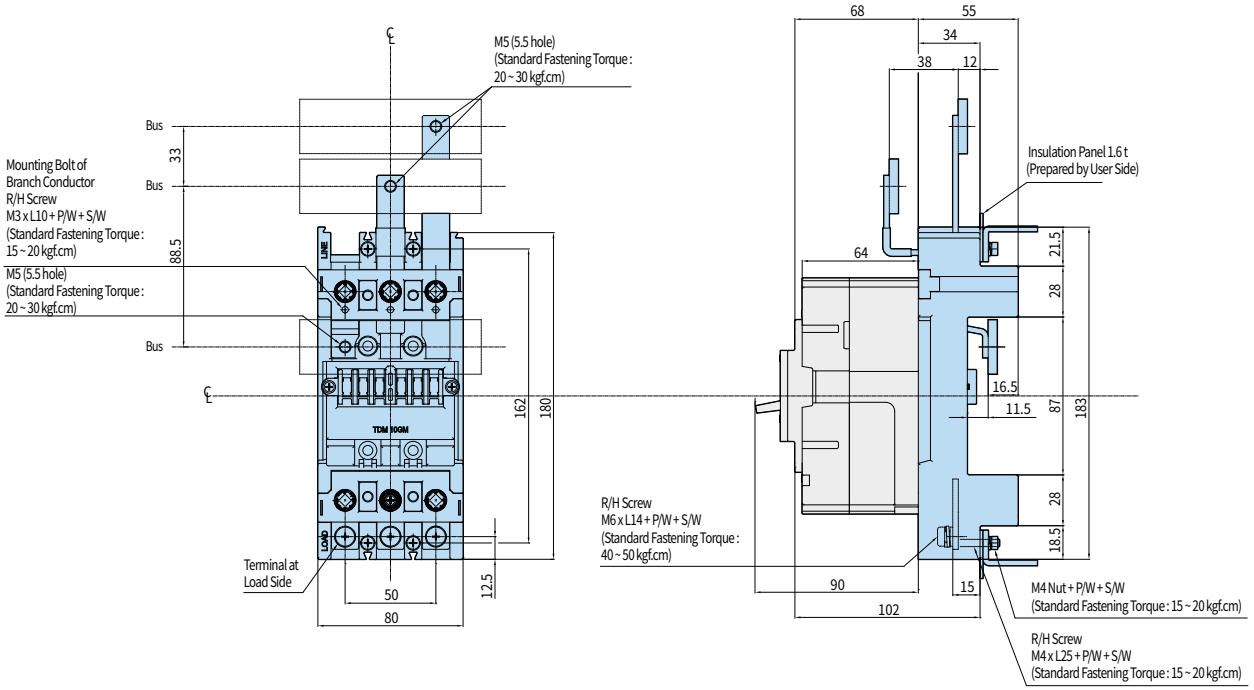
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGM100

· HGM30, 50E/S, 60, 100

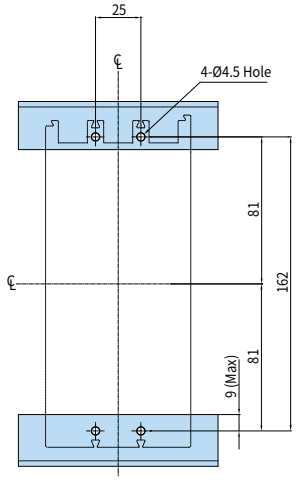
External Dimension (TDA S Type)

Unit : mm

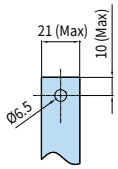


Panel Installation Dimension and Cover Cutting Dimension

Mounting Drawing



Process Criterion of Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

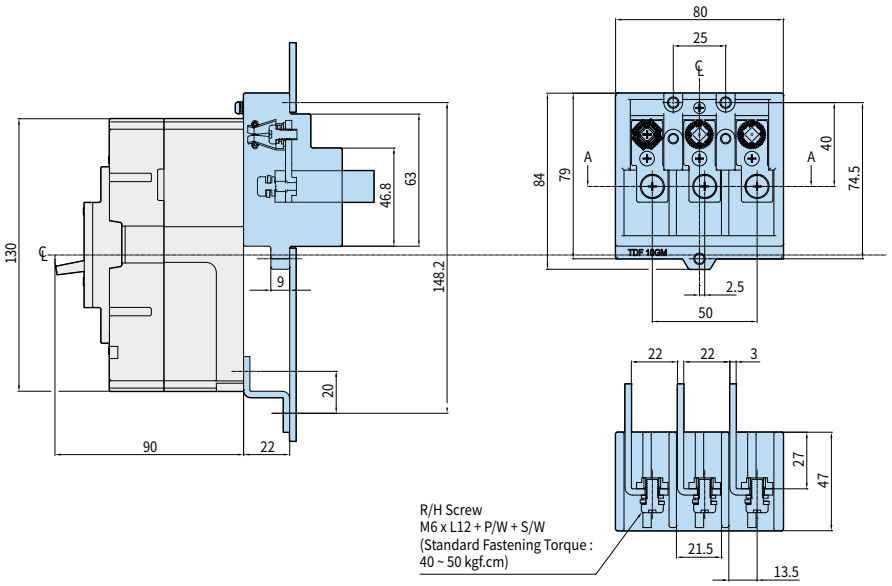
Dimensions

Plug-in Type HGM100

· HGM30, 50E/S, 60, 100

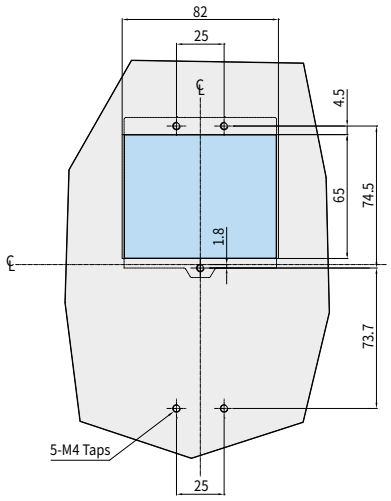
External Dimension (TDF Type)

Unit : mm

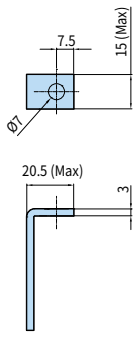


Panel Installation Dimension and Cover Cutting Dimension

Mounting Drawing



Process Criterion of Connecting Conductor



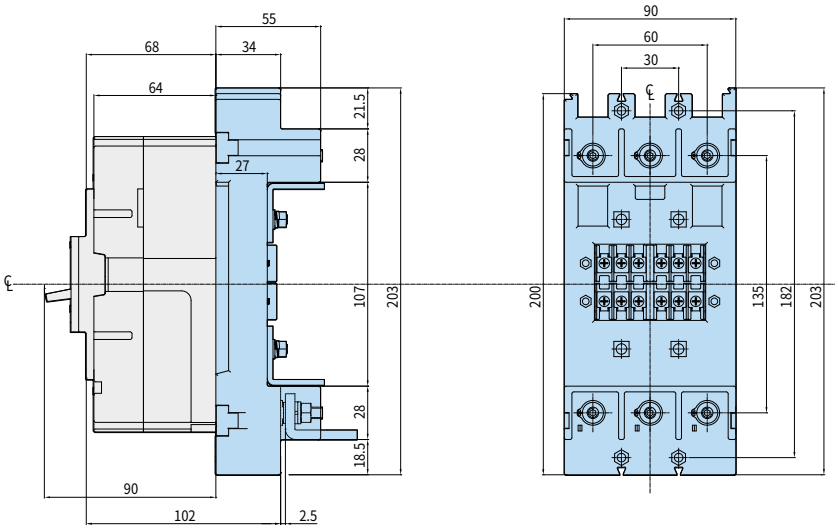
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGM125

· HGM50H/L, 125

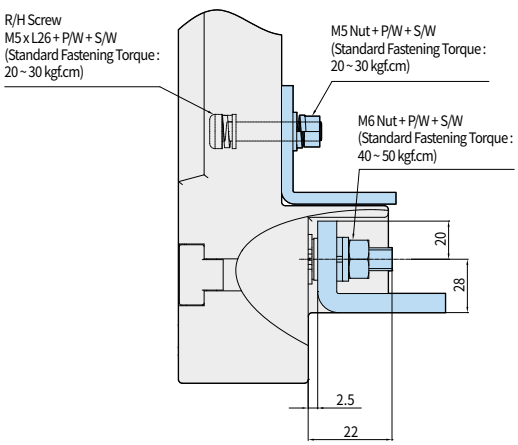
External Dimension (TDM Type)

Unit : mm

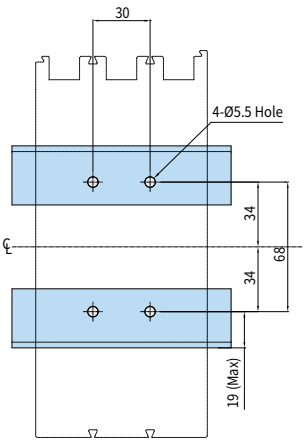


Panel Installation Dimension and Cover Cutting Dimension

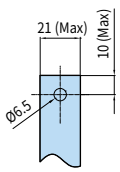
Detailed Drawing of Connection



Mounting Drawing



Process Criterion of
Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

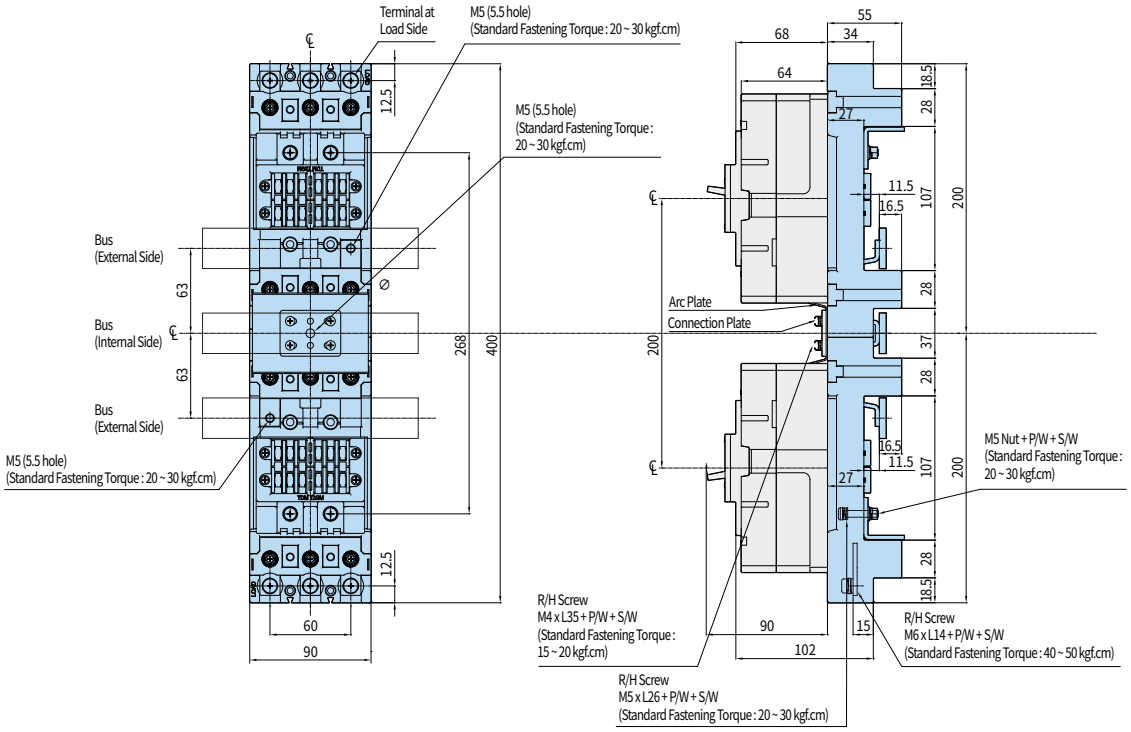
Dimensions

Plug-in Type HGM125

· HGM50H/L, 125

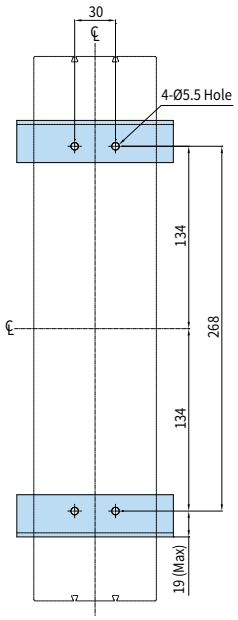
External Dimension (TDA D Type)

Unit : mm

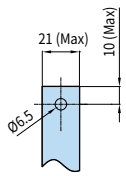


Panel Installation Dimension and Cover Cutting Dimension

Mounting Drawing



Process Criterion of Connecting Conductor



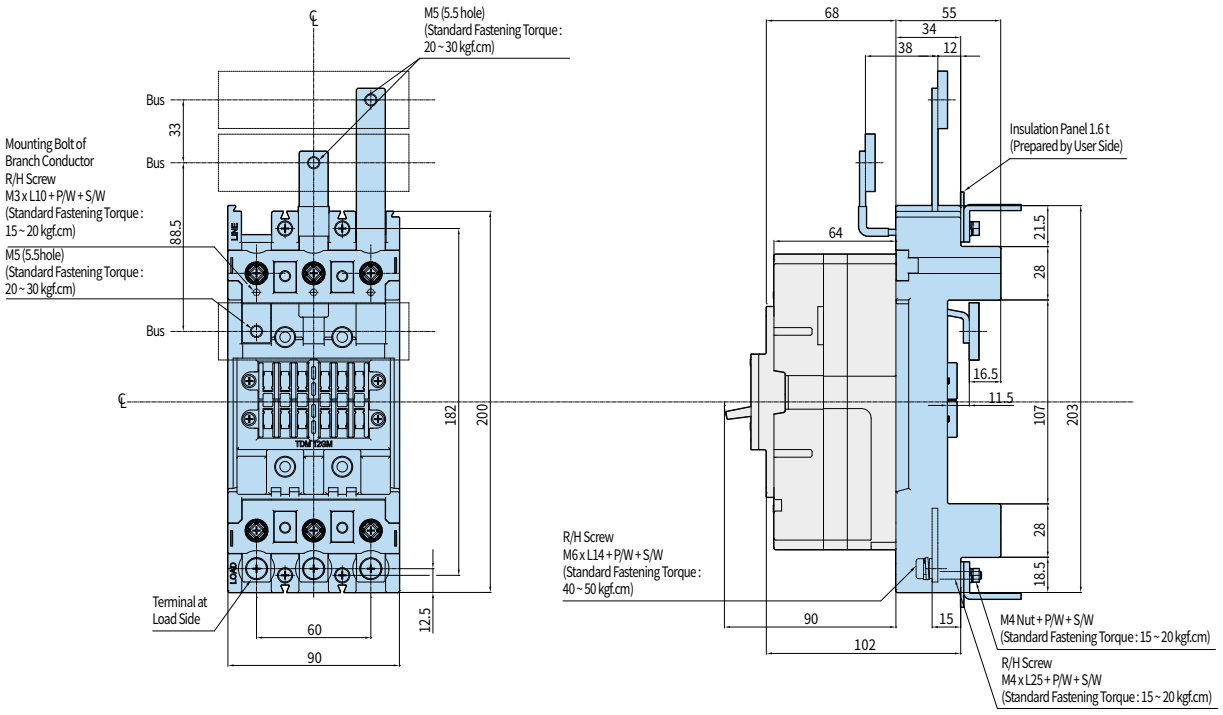
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGM125

· HGM50H/L, 125

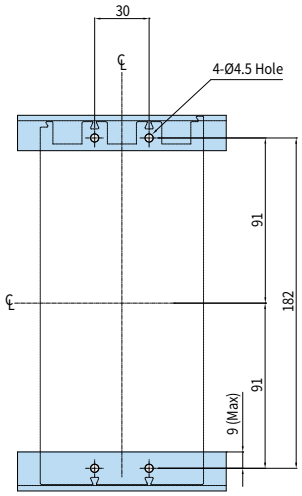
External Dimension (TDA S Type)

Unit : mm

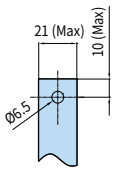


Panel Installation Dimension and Cover Cutting Dimension

Mounting Drawing



Process Criterion of Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

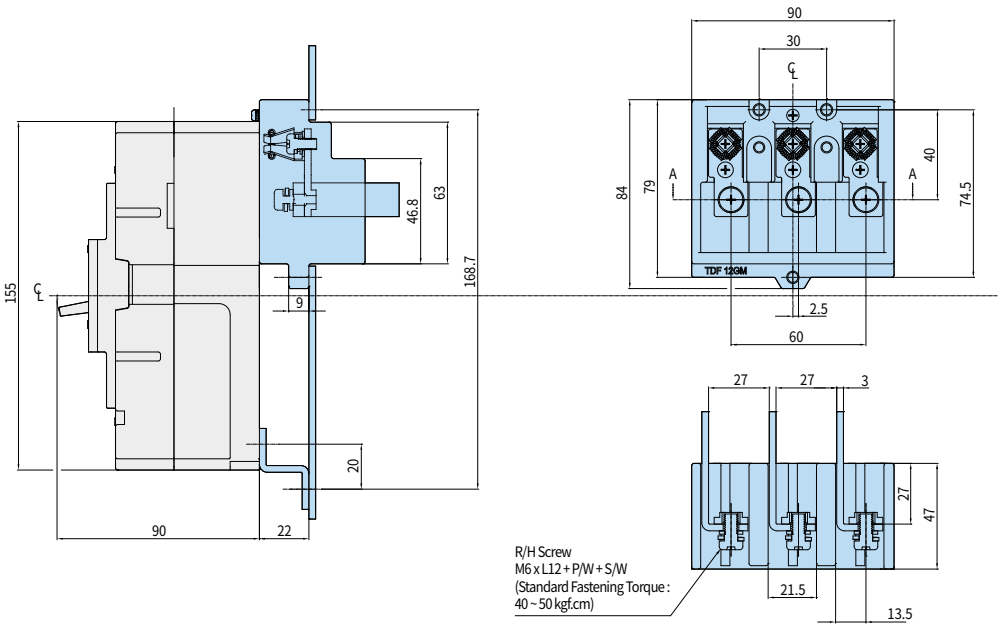
Dimensions

Plug-in Type HGM125

· HGM50H/L, 125

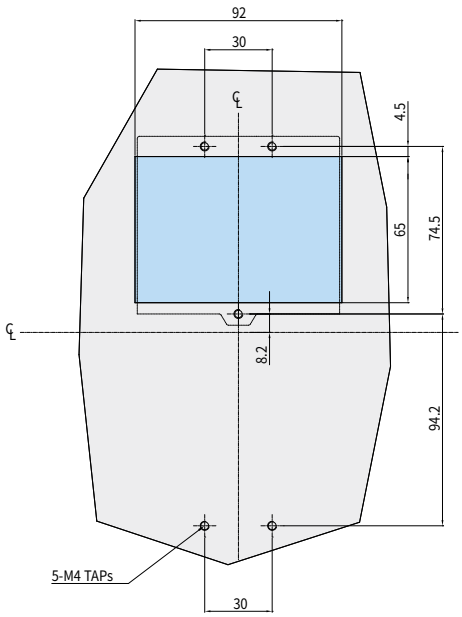
External Dimension (TDF Type)

Unit : mm

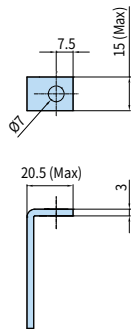


Panel Installation Dimension and Cover Cutting Dimension

Mounting Drawing



Process Criterion of Connecting Conductor



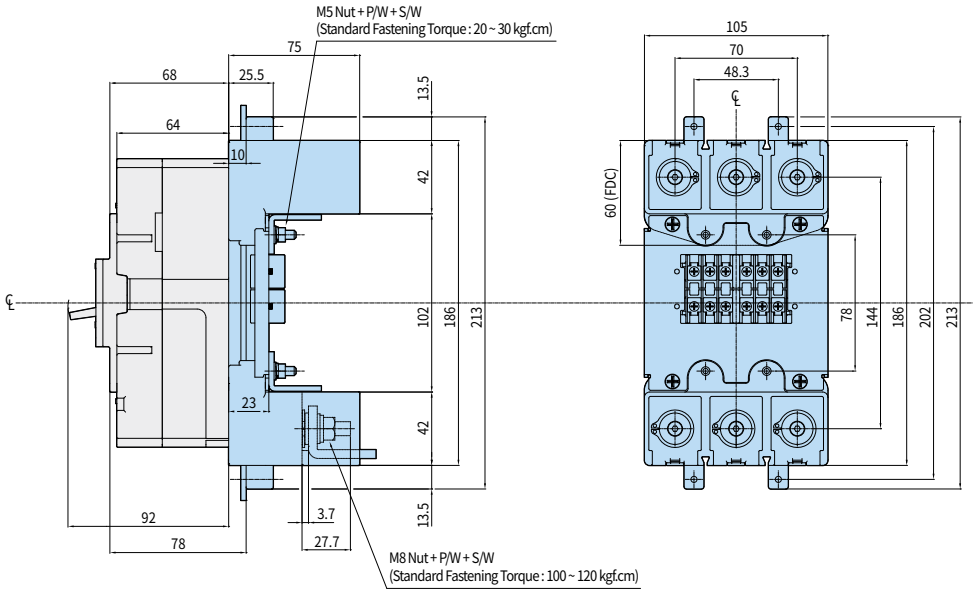
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGM250

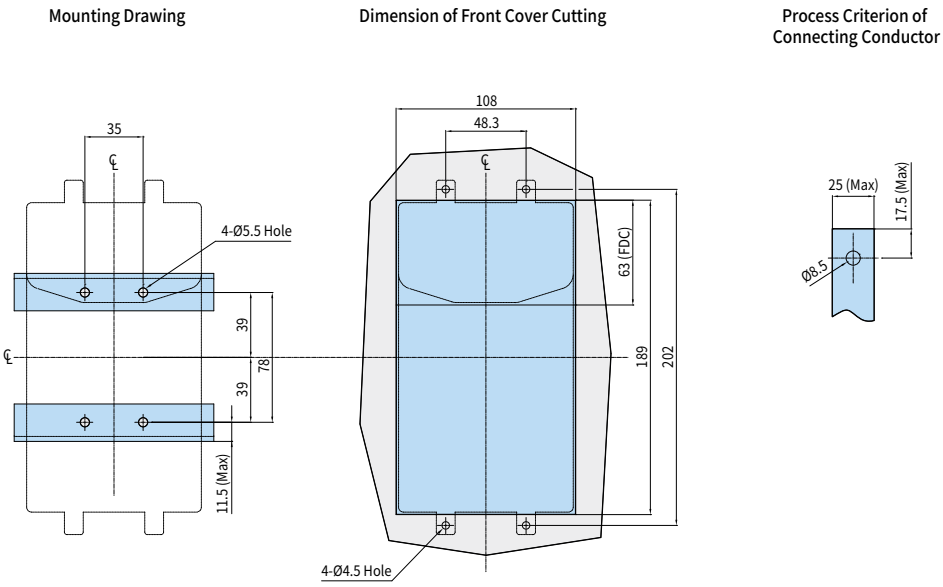
· HGM160, 250

External Dimension (TDM Type)

Unit : mm



Panel Installation Dimension and Cover Cutting Dimension



※ When installing the product in close contact, please consider tolerances for external dimensions.

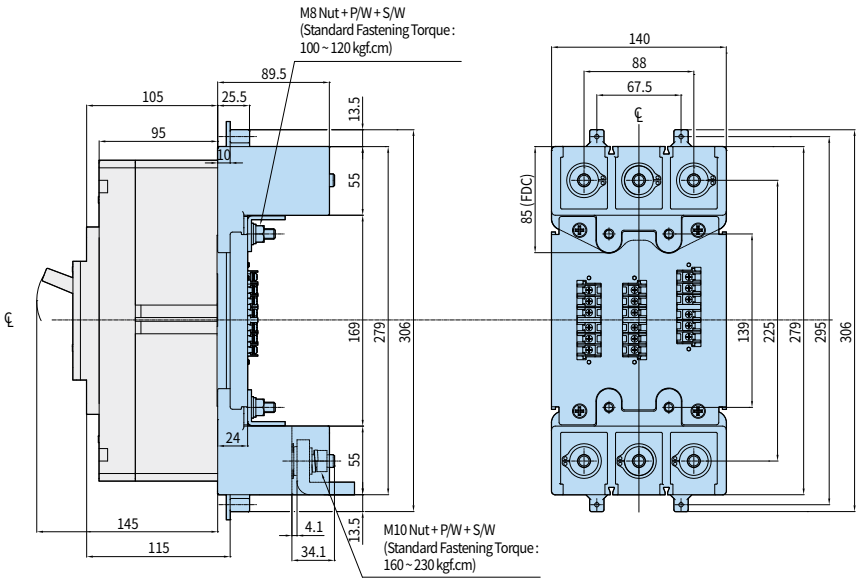
Dimensions

Plug-in Type HGM400

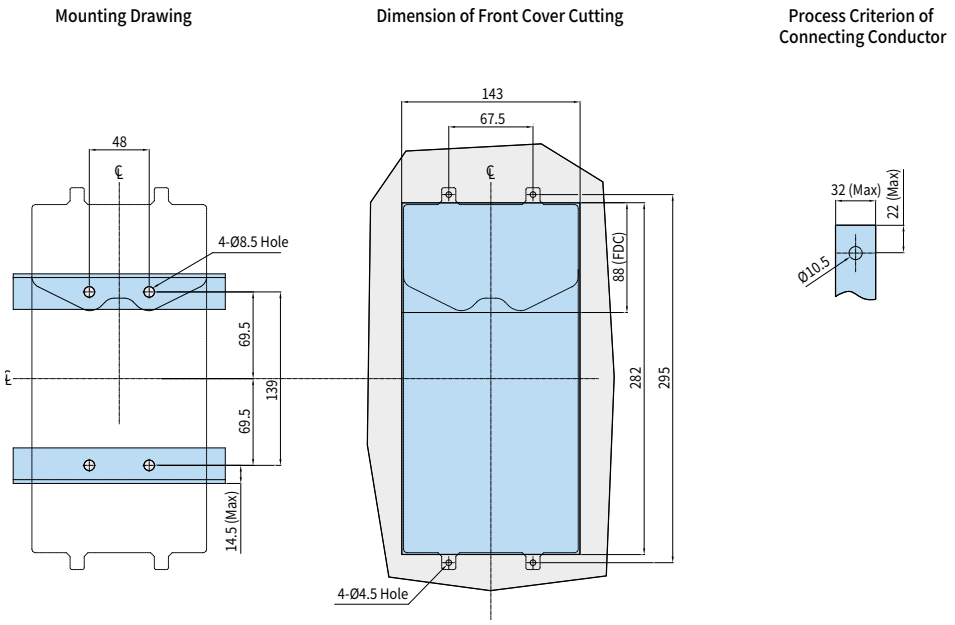
· HGM400

External Dimension (TDM Type)

Unit : mm



Panel Installation Dimension and Cover Cutting Dimension



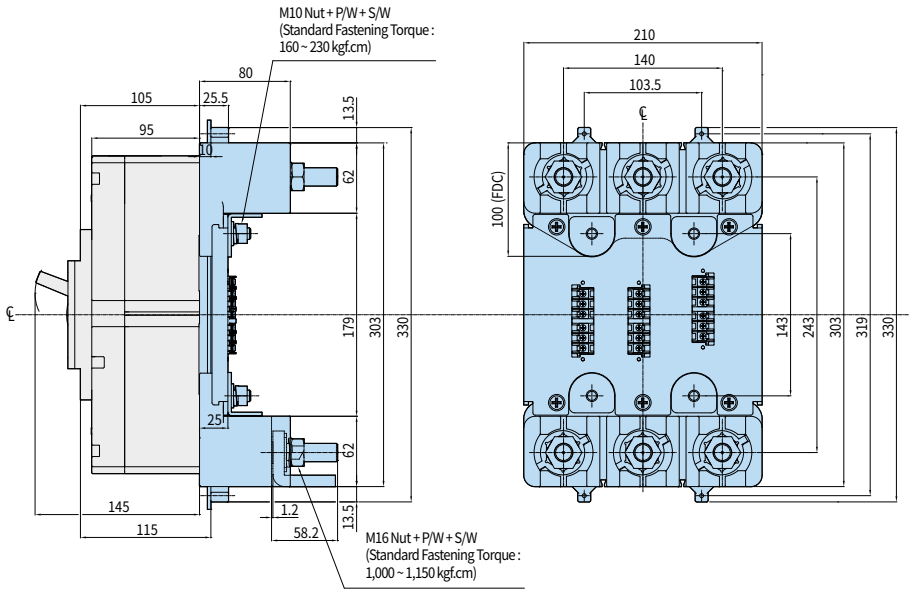
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGM800

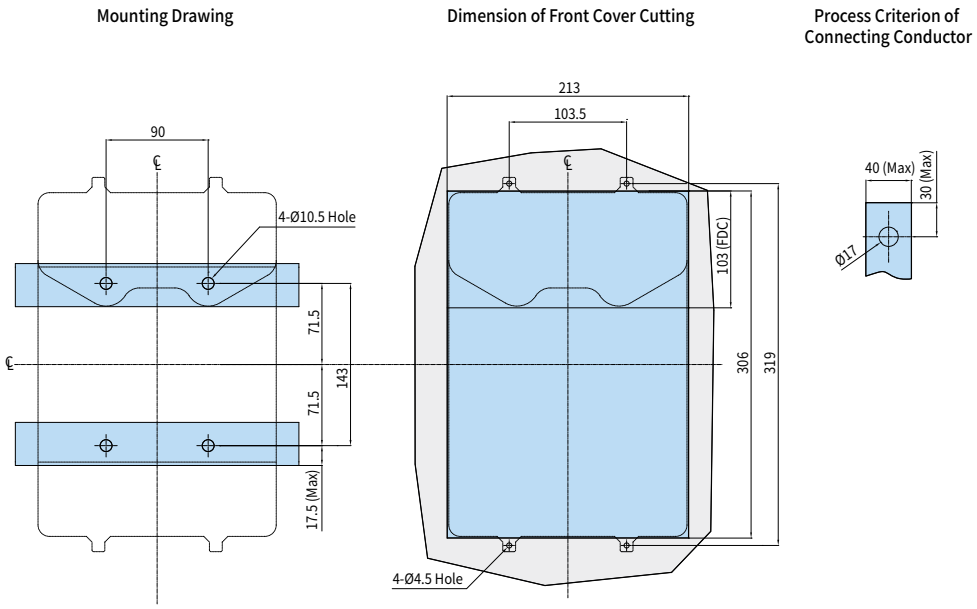
· HGM630, 800

External Dimension (TDM Type)

Unit : mm



Panel Installation Dimension and Cover Cutting Dimension



※ When installing the product in close contact, please consider tolerances for external dimensions.

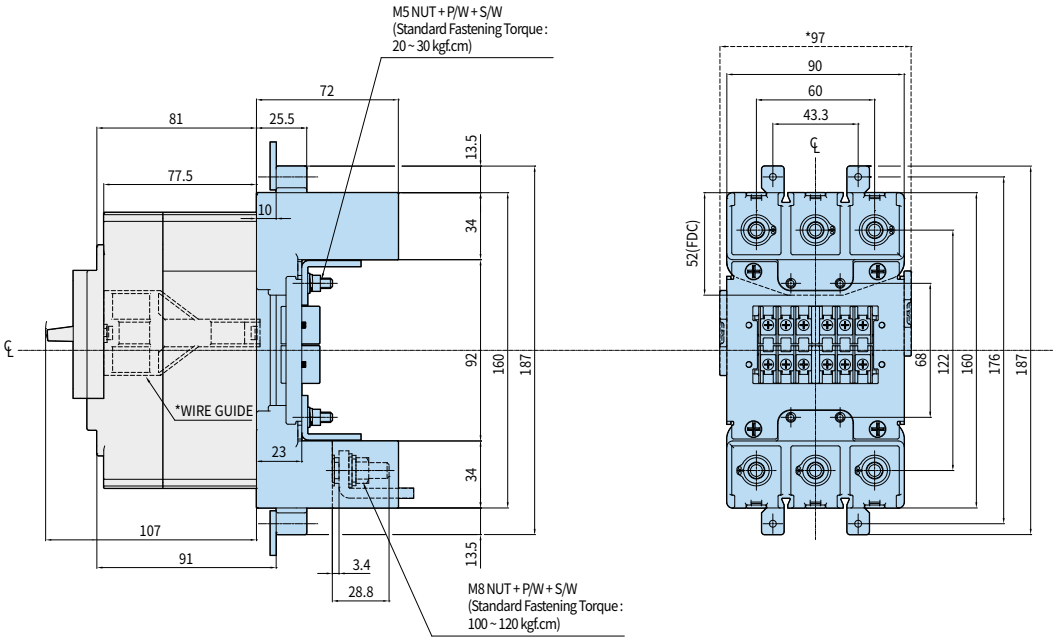
Dimensions

Plug-in Type HGP160D

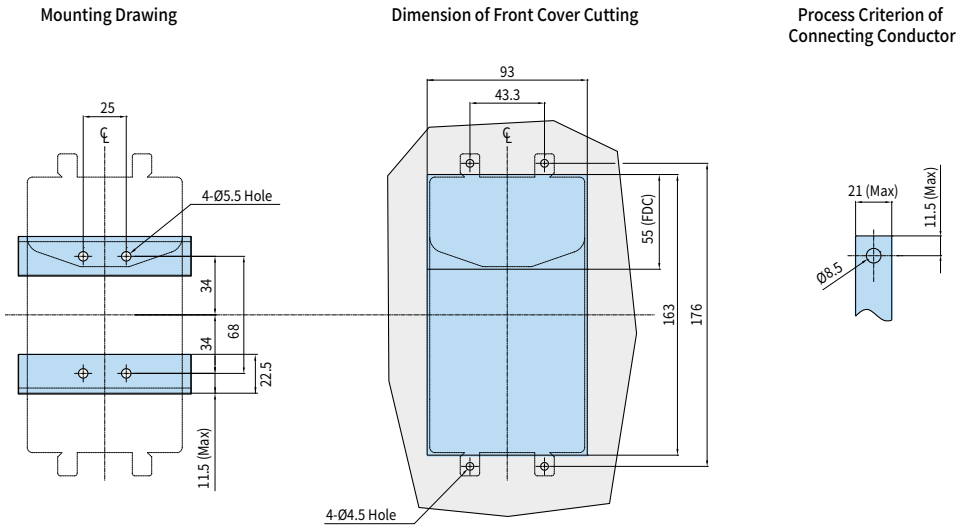
· HGP50D, 125D, 160D

External Dimension

Unit : mm



Panel Installation Dimension and TDM Cover Cutting Dimension



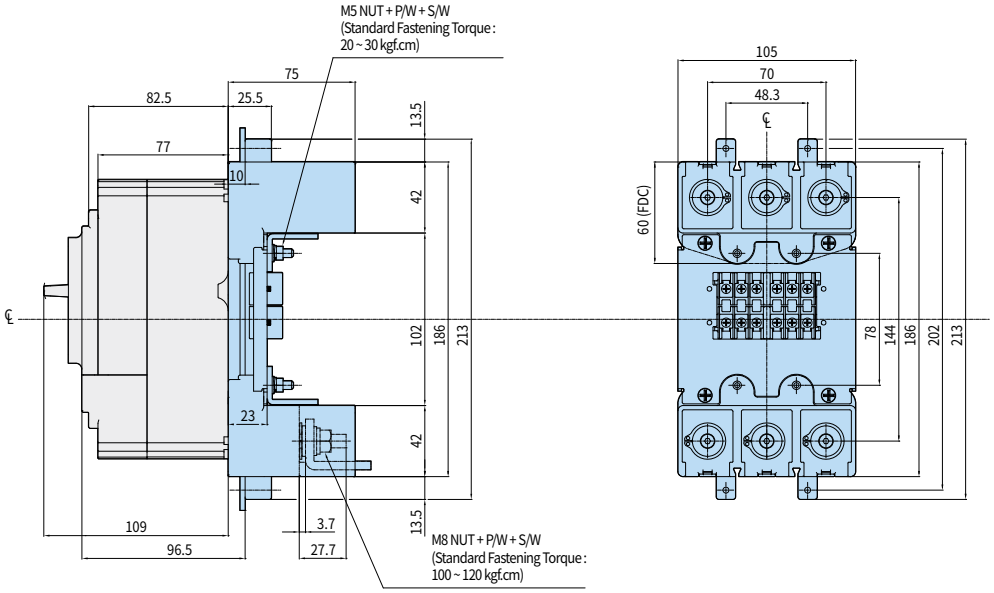
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGP250

· HGP100, 160, 250

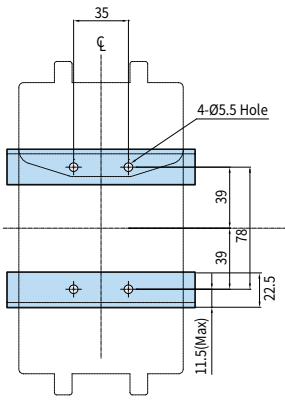
External Dimension

Unit : mm

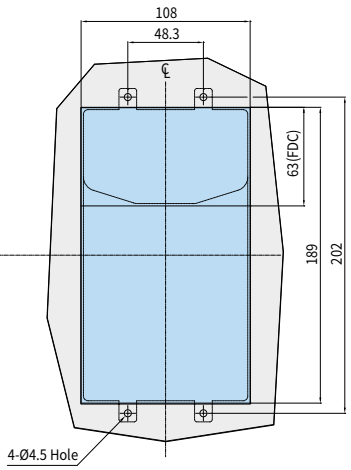


Panel Installation Dimension and TDM Cover Cutting Dimension

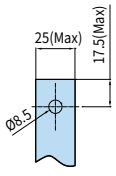
Mounting Drawing



Dimension of Front Cover Cutting



Process Criterion of Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

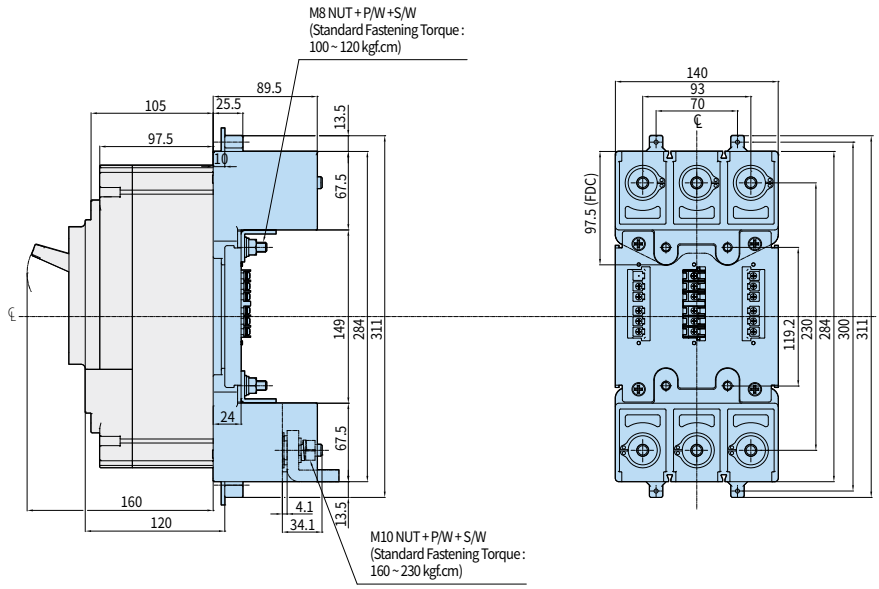
Dimensions

Plug-in Type HGP630

· HGP400, 630

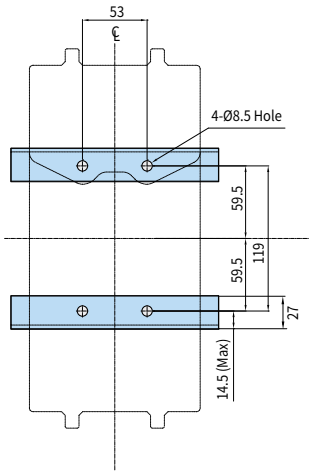
External Dimension

Unit : mm

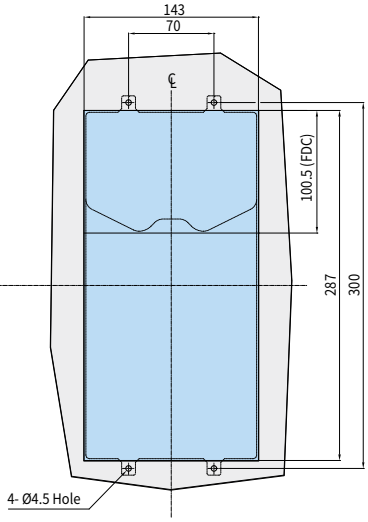


Panel Installation Dimension and TDM Cover Cutting Dimension

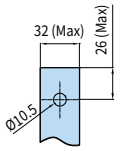
Mounting Drawing



Dimension of Front Cover Cutting



Process Criterion of Connecting Conductor



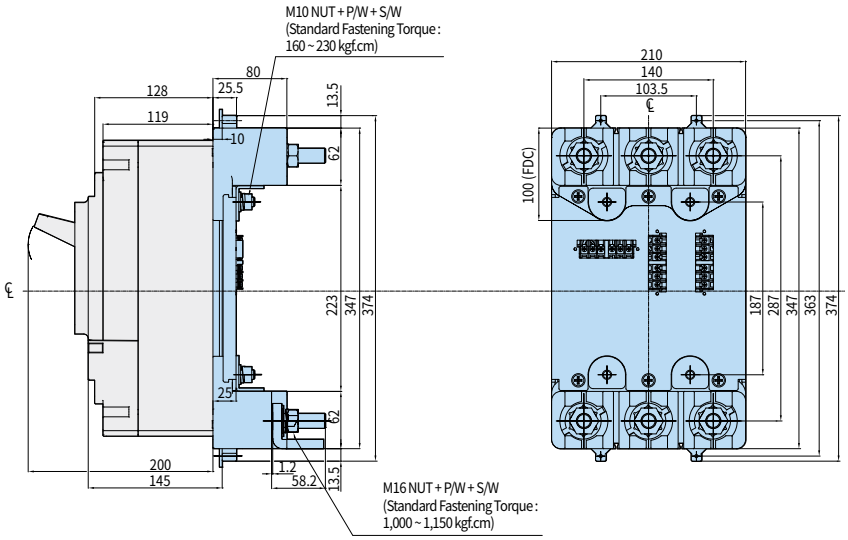
※ When installing the product in close contact, please consider tolerances for external dimensions.

Plug-in Type HGP800

· HGP800

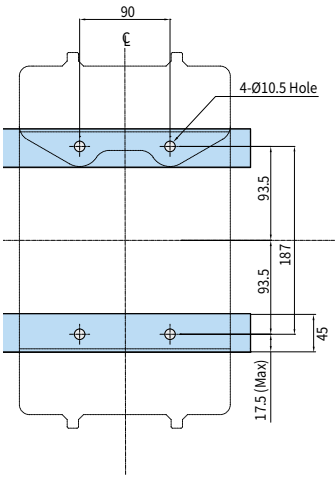
External Dimension

Unit : mm

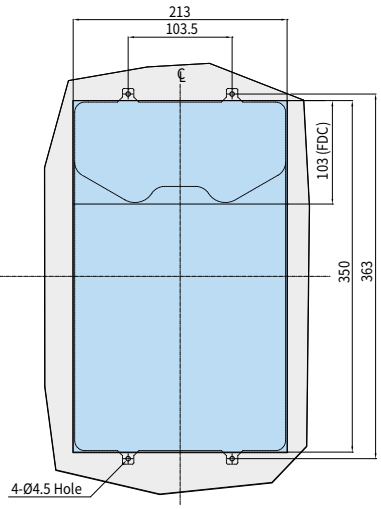


Panel Installation Dimension and TDM Cover Cutting Dimension

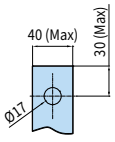
Mounting Drawing



Dimension of Front Cover Cutting



Process Criterion of Connecting Conductor



※ When installing the product in close contact, please consider tolerances for external dimensions.

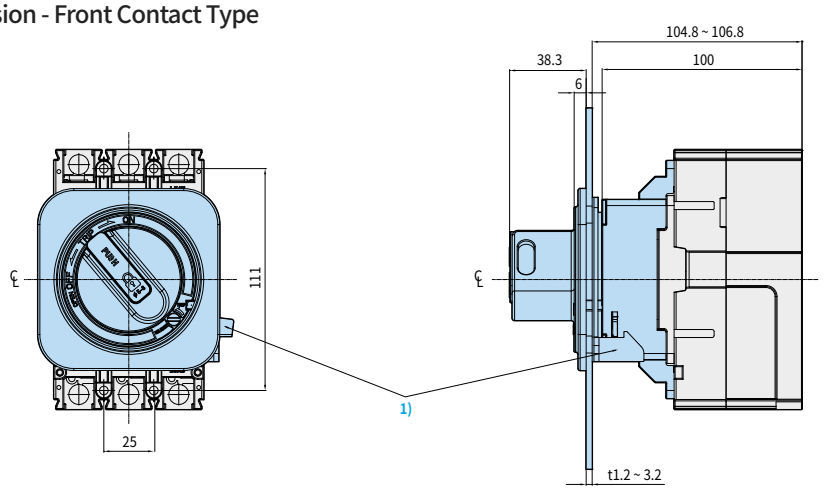
Dimensions

External Rotary Handle HGM100

· HGM30, 50E/S, 60, 100

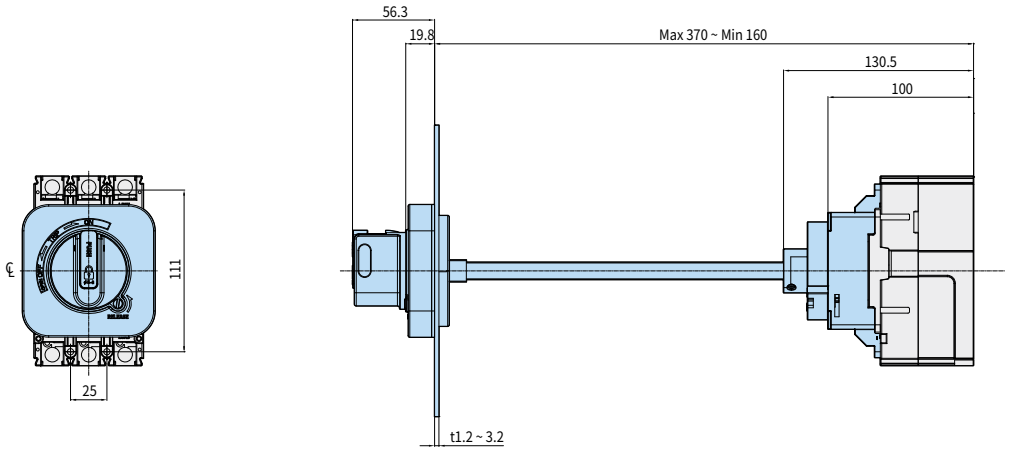
External Dimension - Front Contact Type

Unit : mm



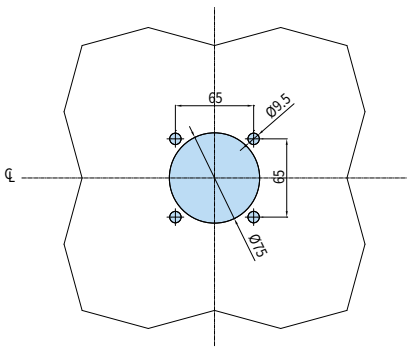
※ 1) Note that the LOCK PLATE may need to be positioned for combined operation with the handle.

External Dimension – Extension Type

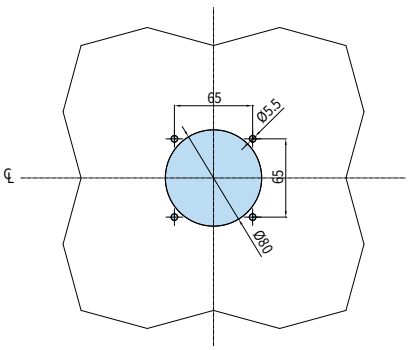


Panel Installation Dimension

Front Contact Type



Extension Type



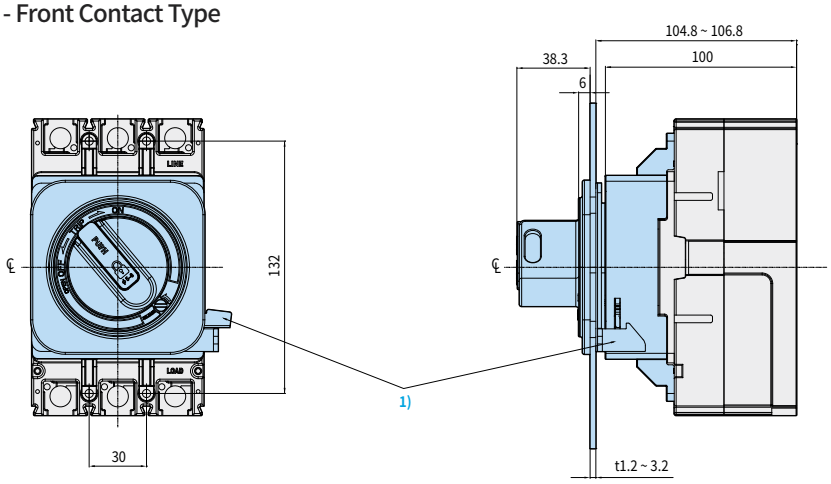
※ When installing the product in close contact, please consider tolerances for external dimensions.

External Rotary Handle HGM125

· HGM50H/L, 125

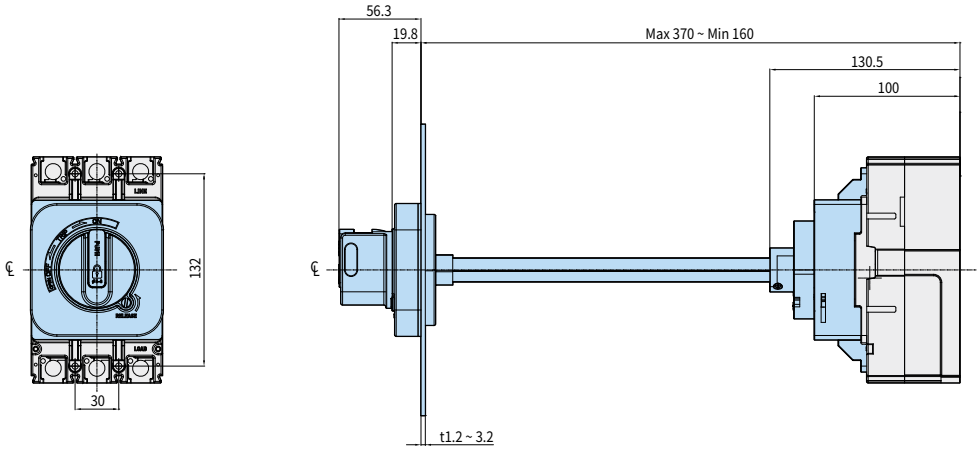
External Dimension - Front Contact Type

Unit : mm

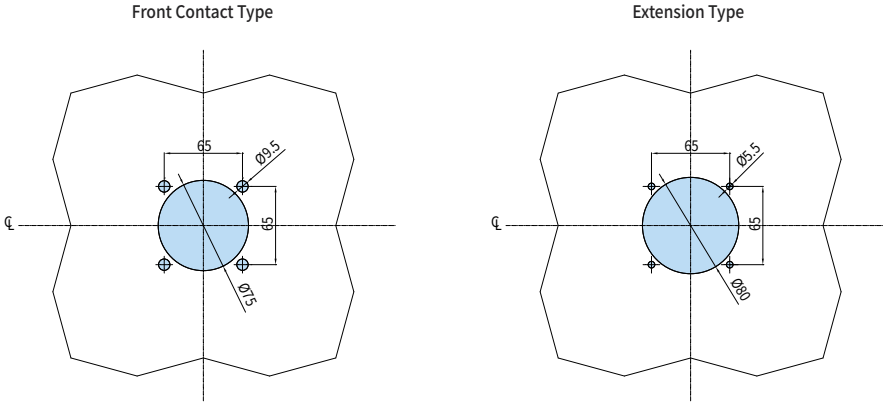


※ 1) Note that the LOCK PLATE may need to be positioned for combined operation with the handle.

External Dimension – Extension Type



Panel Installation Dimension



※ When installing the product in close contact, please consider tolerances for external dimensions.

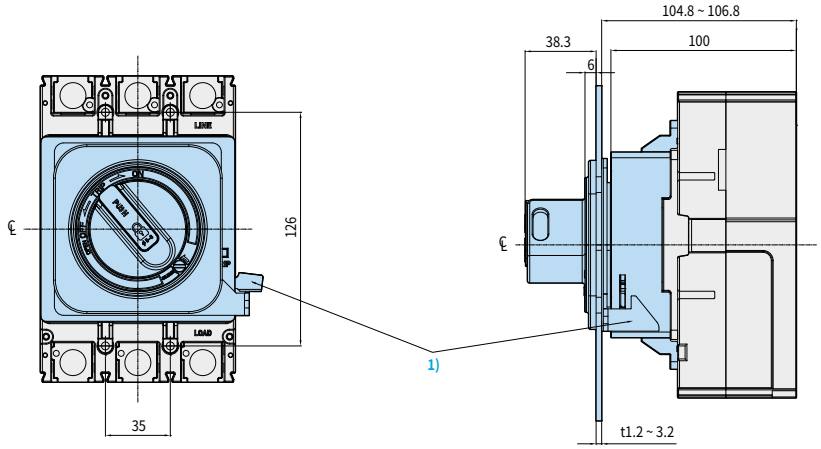
Dimensions

External Rotary Handle HGM250

· HGM160, 250

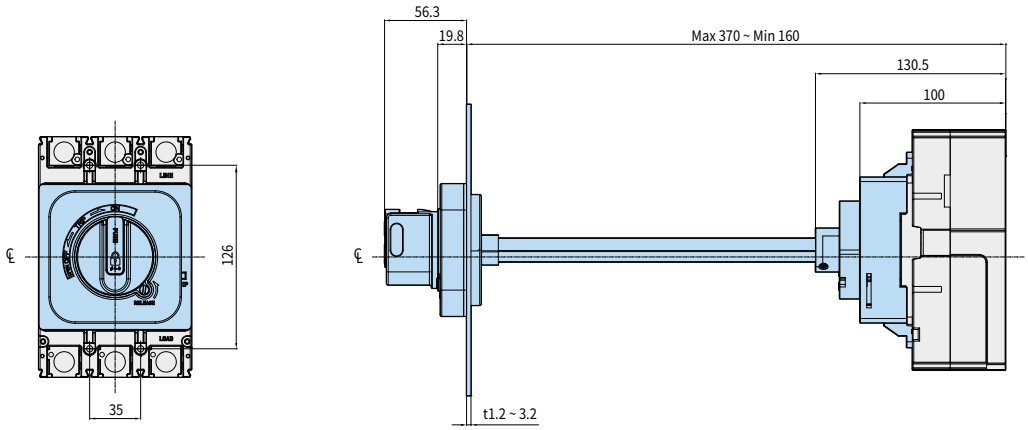
External Dimension - Front Contact Type

Unit : mm

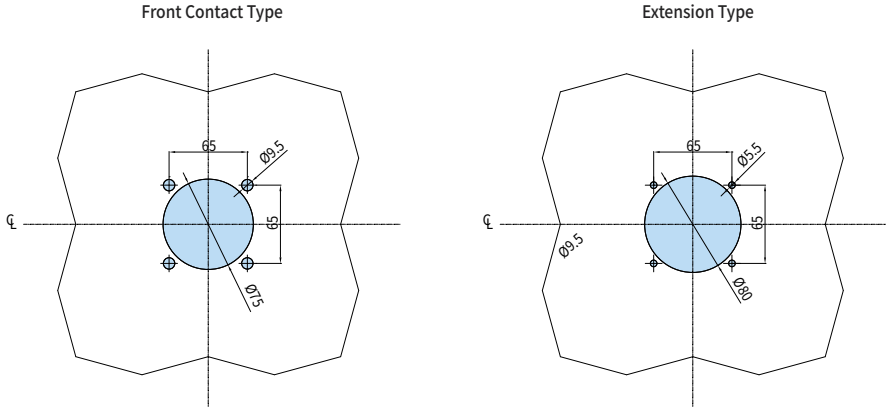


※ 1) Note that the LOCK PLATE may need to be positioned for combined operation with the handle.

External Dimension – Extension Type



Panel Installation Dimension



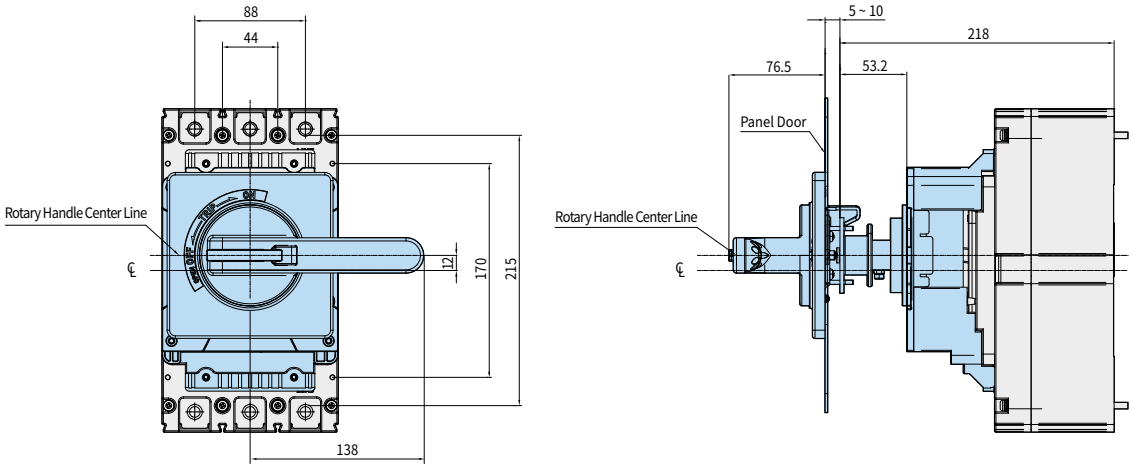
※ When installing the product in close contact, please consider tolerances for external dimensions.

External Rotary Handle HGM400

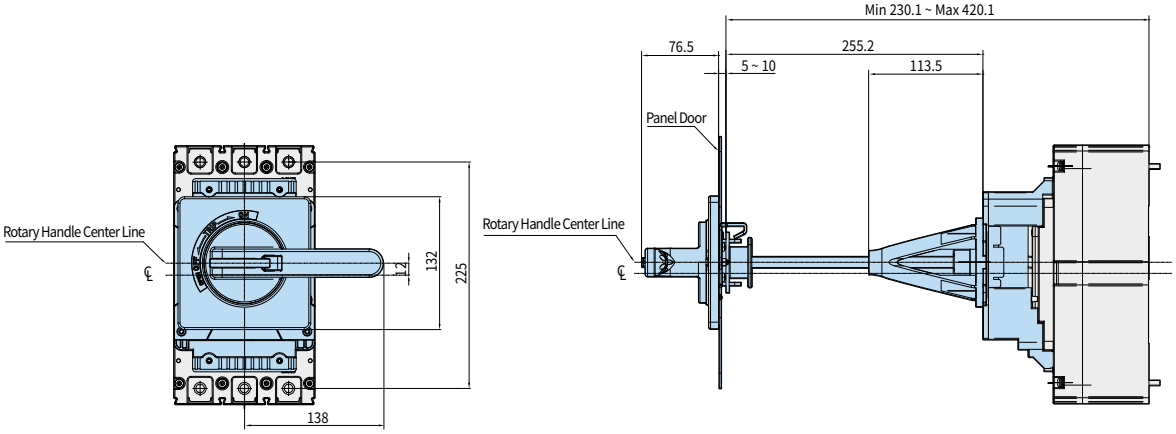
• HGM400

External Dimension - Front Contact Type

Unit : mm



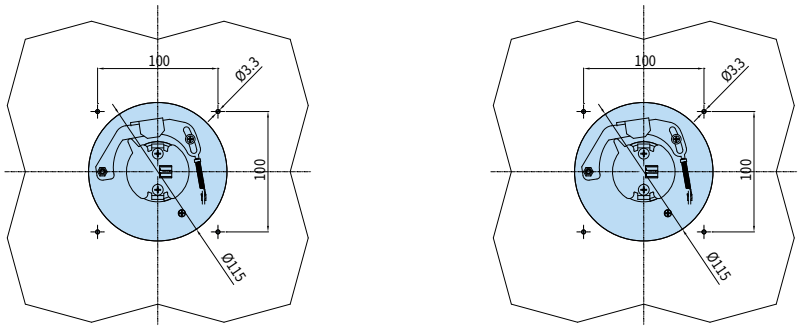
External Dimension – Extension Type



Panel Installation Dimension

Front Contact Type

Extension Type



※ When installing the product in close contact, please consider tolerances for external dimensions.

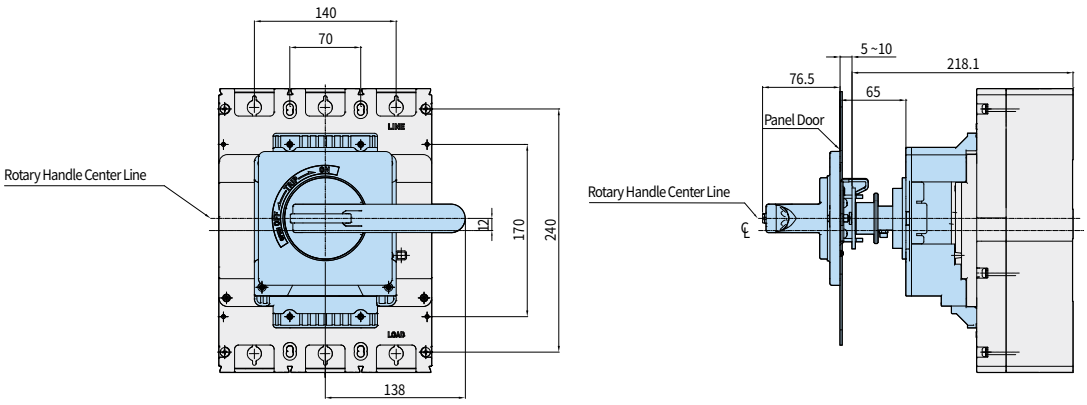
Dimensions

External Rotary Handle HGM800

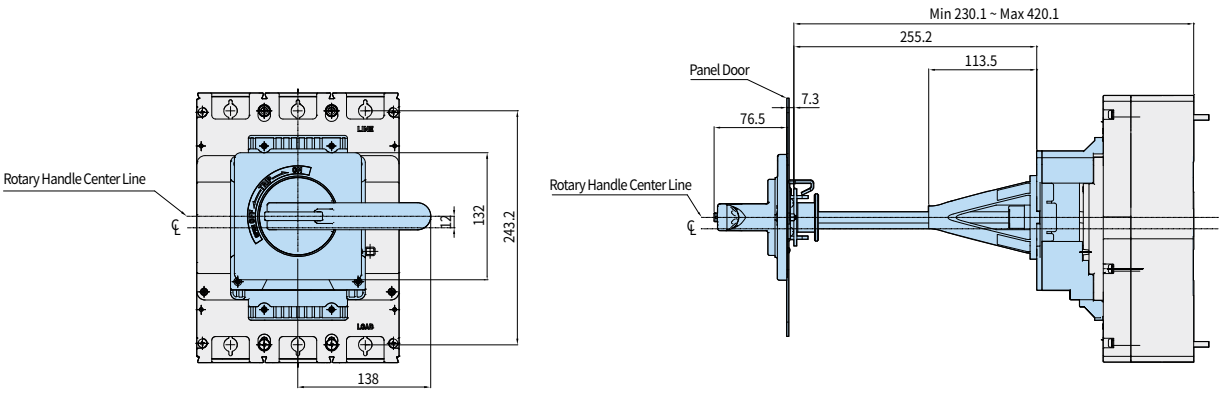
· HGM630, 800

External Dimension - Front Contact Type

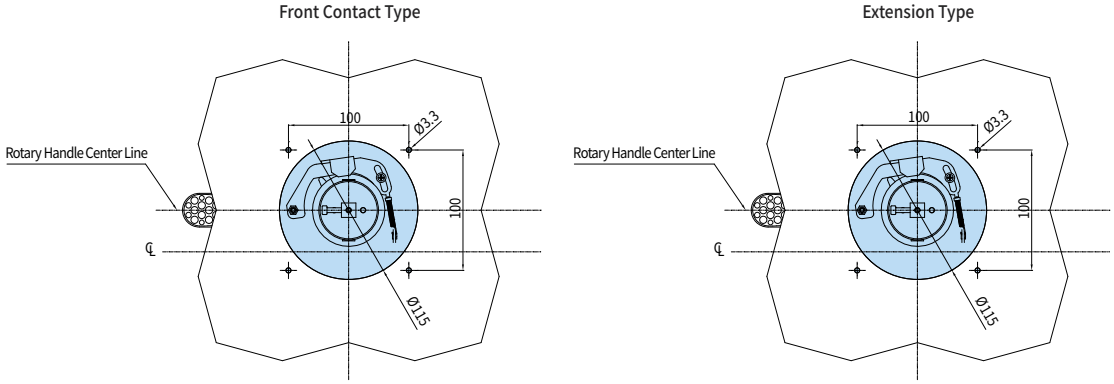
Unit : mm



External Dimension – Extension Type



Panel Installation Dimension



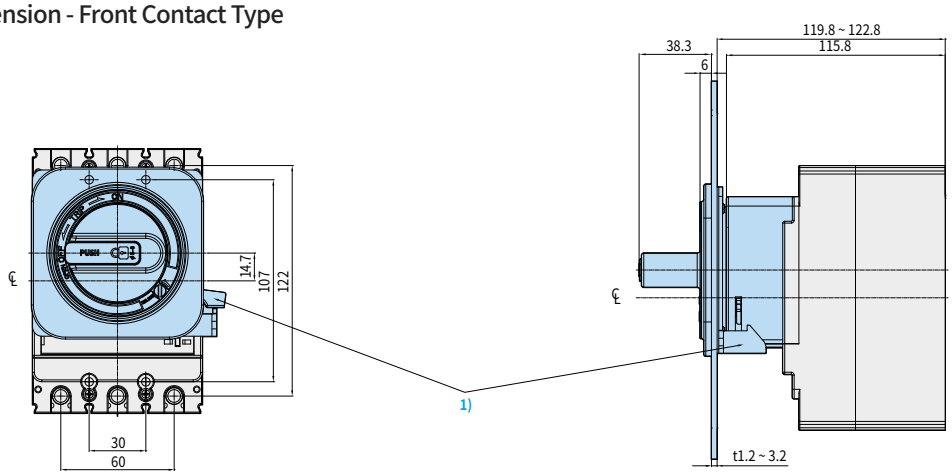
※ When installing the product in close contact, please consider tolerances for external dimensions.

External Rotary Handle HGP160D

· HGP50D, 125D, 160D

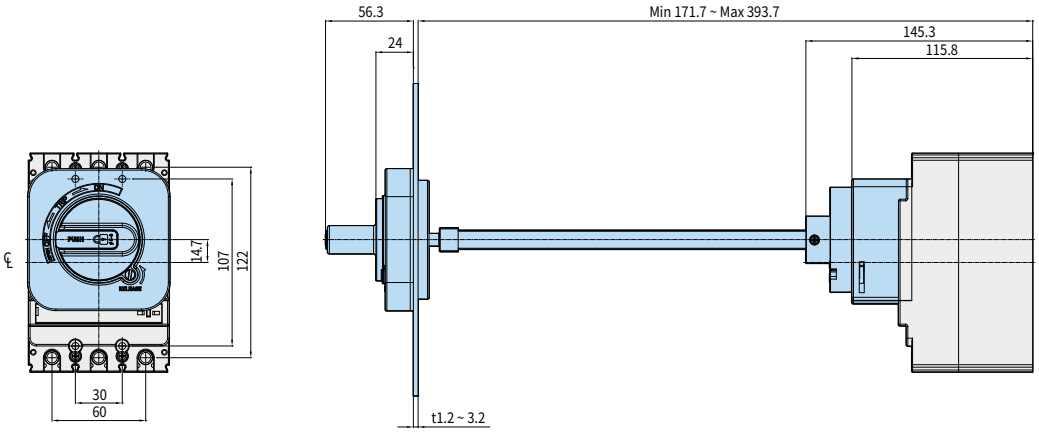
External Dimension - Front Contact Type

Unit : mm

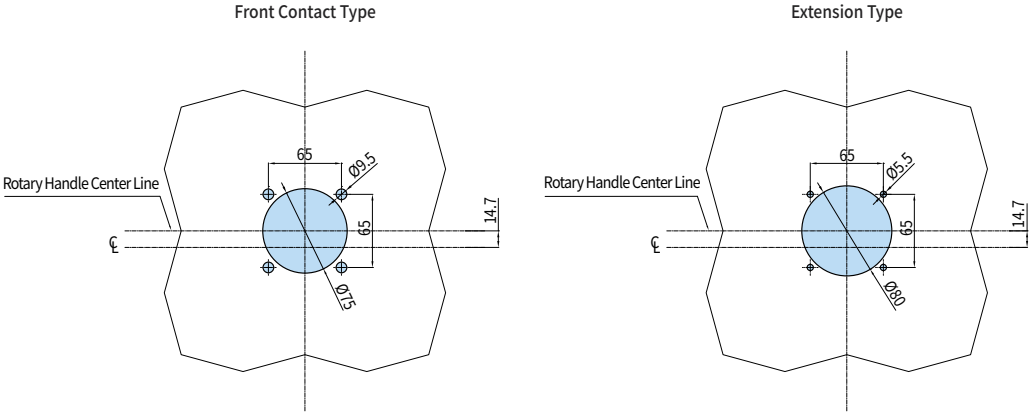


※ 1) Note that the LOCK PLATE may need to be positioned for combined operation with the handle.

External Dimension – Extension Type



Panel Installation Dimension



※ When installing the product in close contact, please consider tolerances for external dimensions.

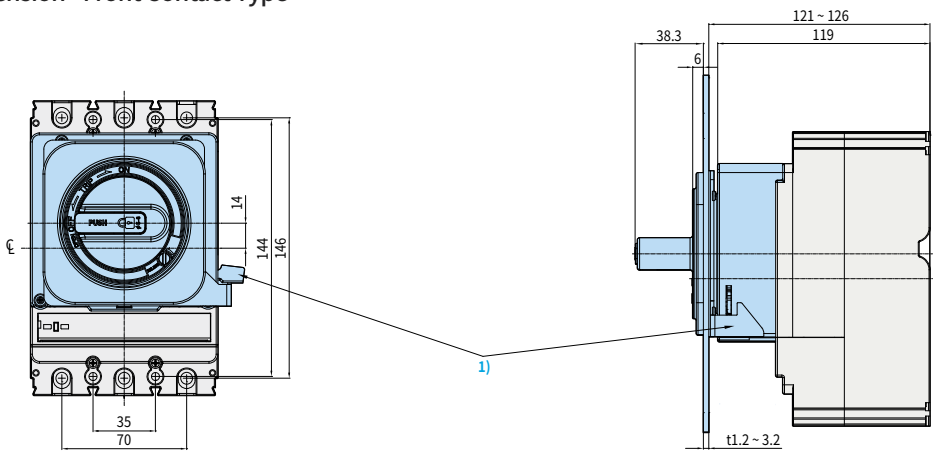
Dimensions

External Rotary Handle HGP250

· HGP100, 160, 250

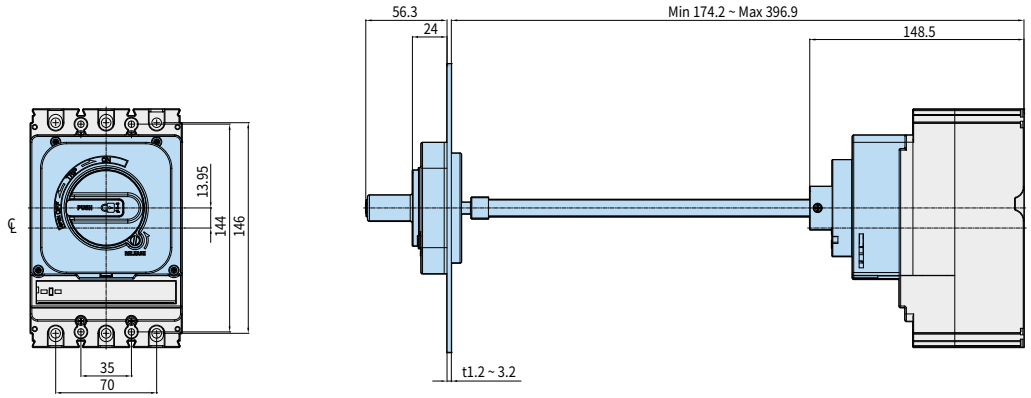
External Dimension - Front Contact Type

Unit : mm

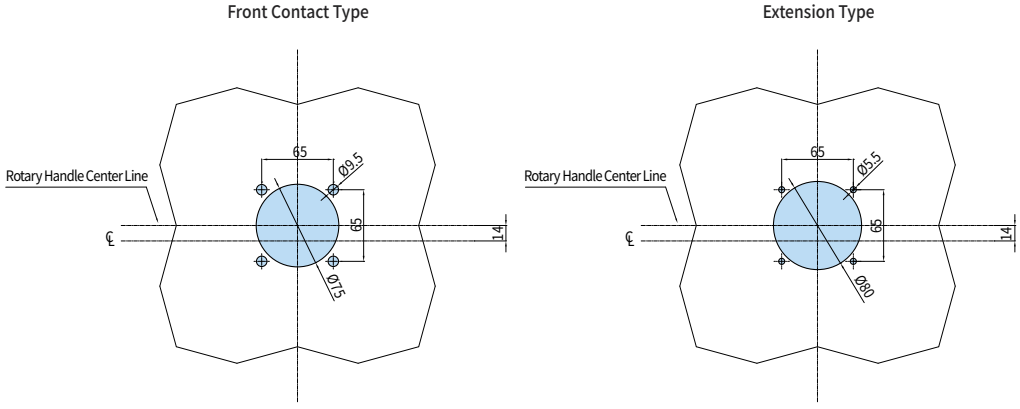


※ 1) Note that the LOCK PLATE may need to be positioned for combined operation with the handle.

External Dimension – Extension Type



Panel Installation Dimension



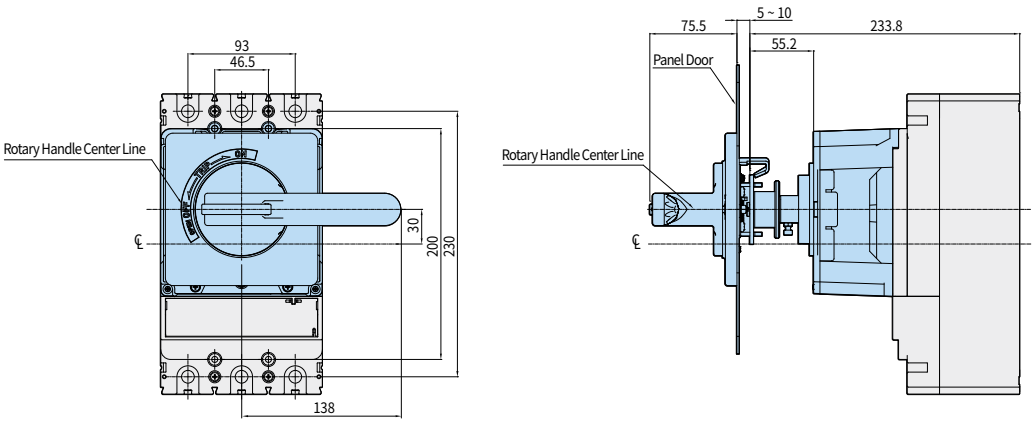
※ When installing the product in close contact, please consider tolerances for external dimensions.

External Rotary Handle HGP630

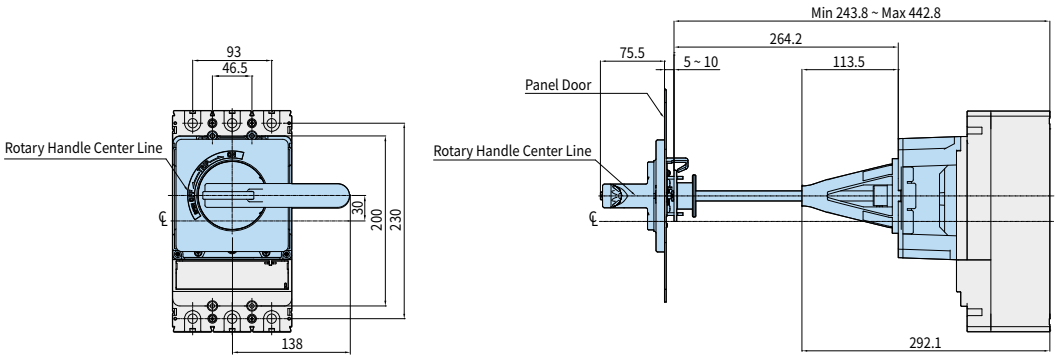
· HGP400, 630

External Dimension - Front Contact Type

Unit : mm

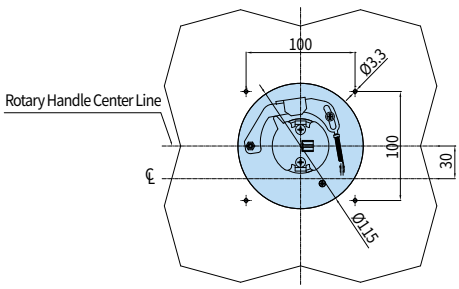


External Dimension – Extension Type

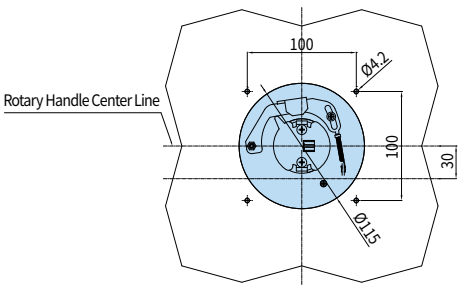


Panel Installation Dimension

Front Contact Type



Extension Type



※ When installing the product in close contact, please consider tolerances for external dimensions.

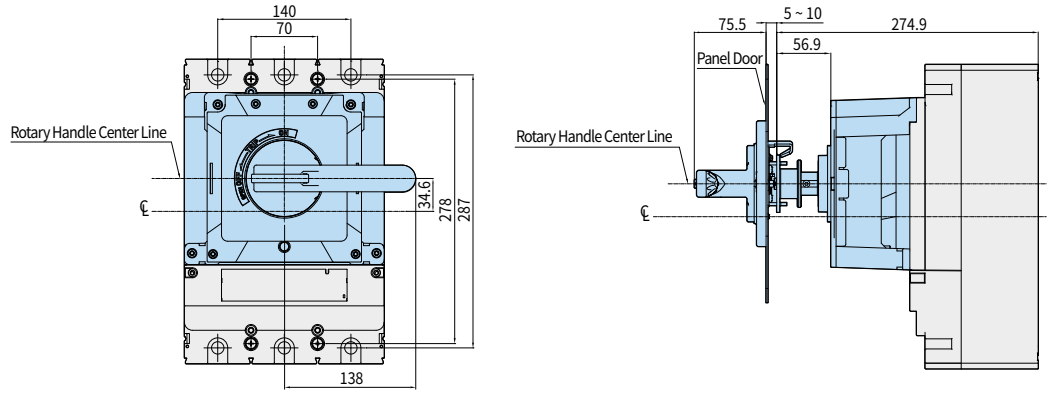
Dimensions

External Rotary Handle HGP800

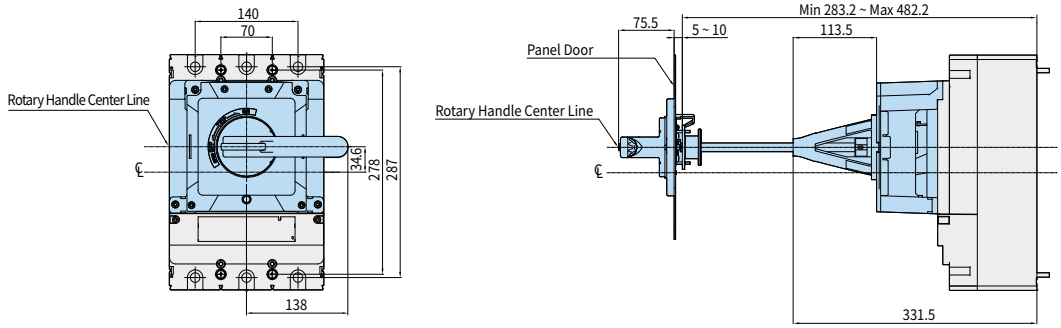
• HGP800

External Dimension - Front Contact Type

Unit : mm



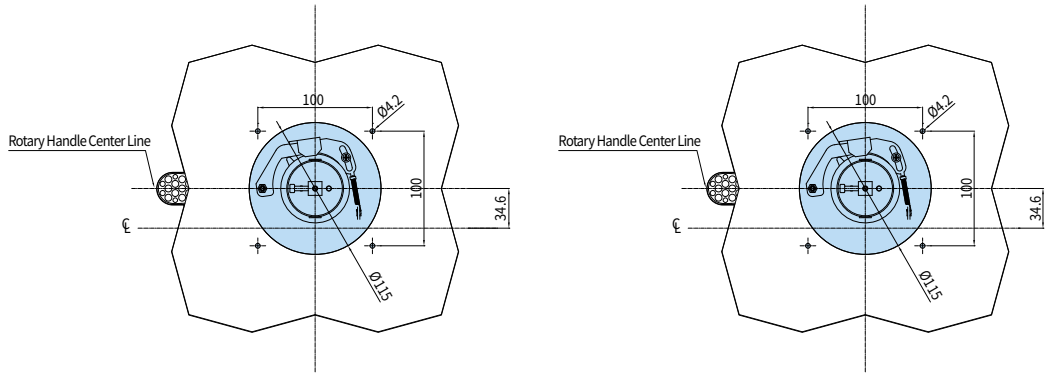
External Dimension – Extension Type



Panel Installation Dimension

Front Contact Type

Extension Type



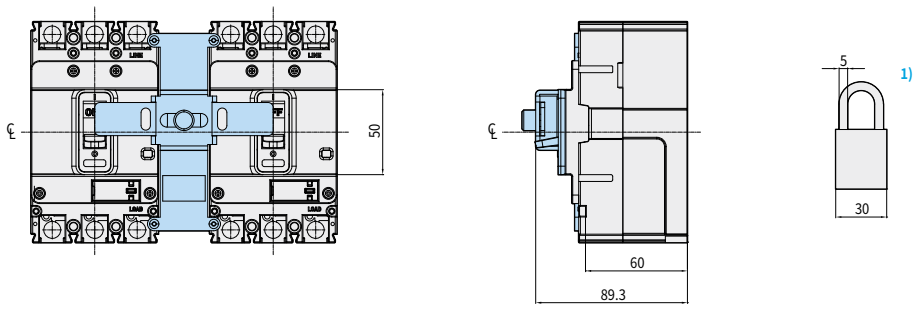
※ When installing the product in close contact, please consider tolerances for external dimensions.

Mechanical Interlock HGM100

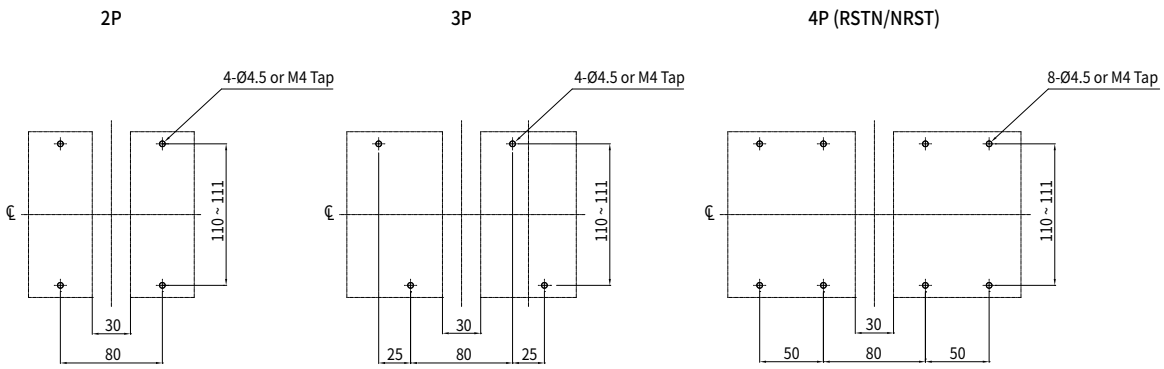
· HGM30, 50E/S, 60, 100

External Dimension

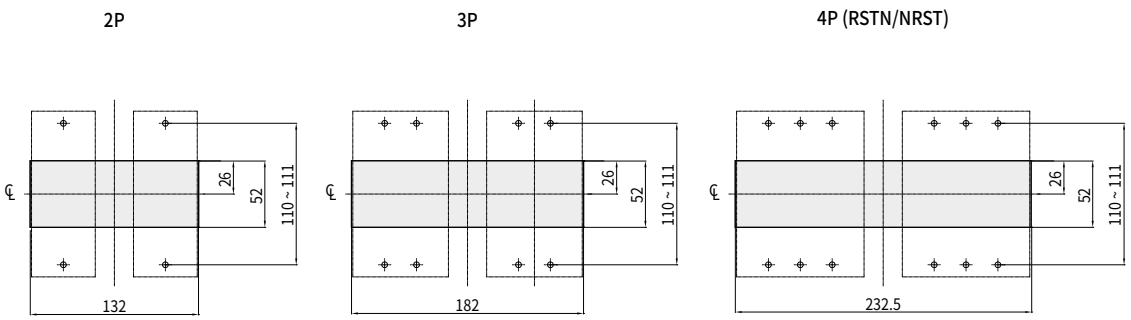
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



※ 1) Padlock not included.
※ When installing the product in close contact, please consider tolerances for external dimensions.

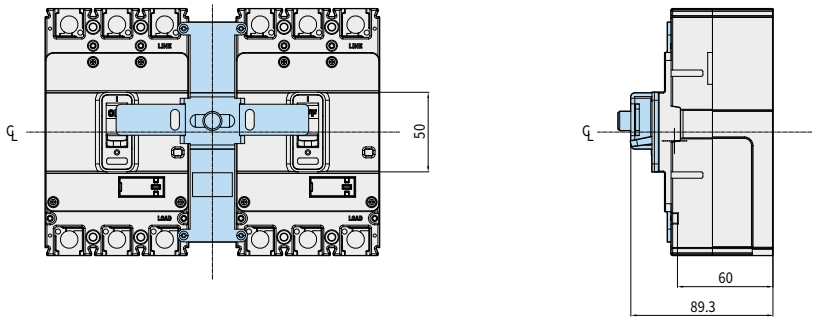
Dimensions

Mechanical Interlock HGM125

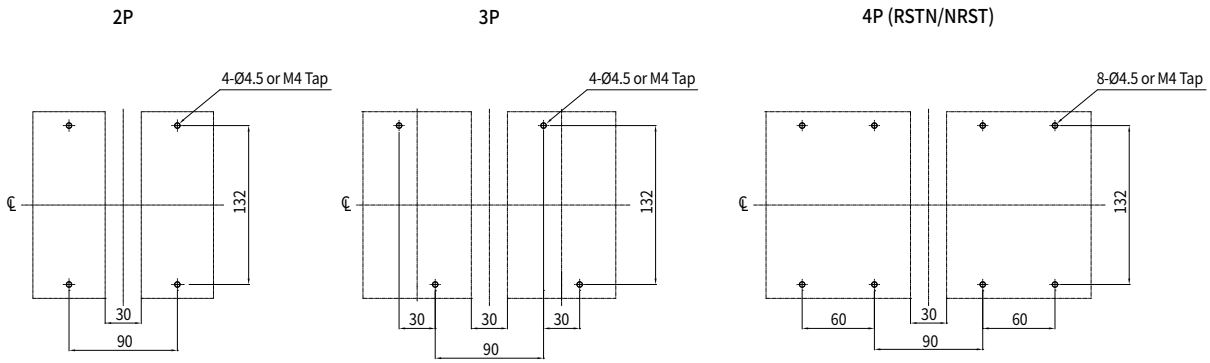
· HGM50H/L, 125

External Dimension

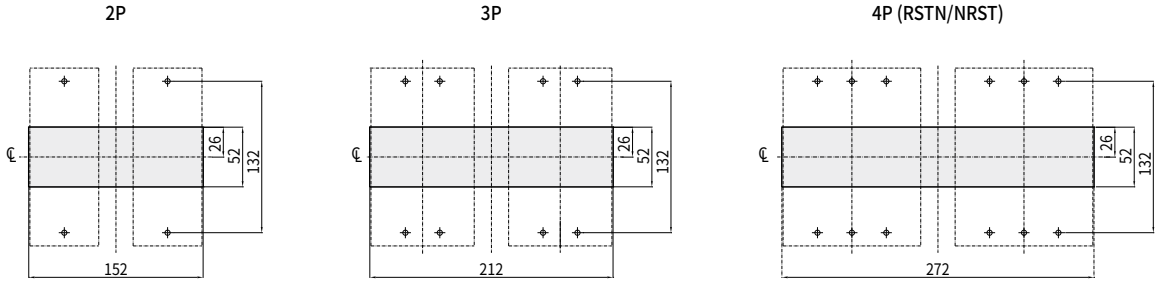
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



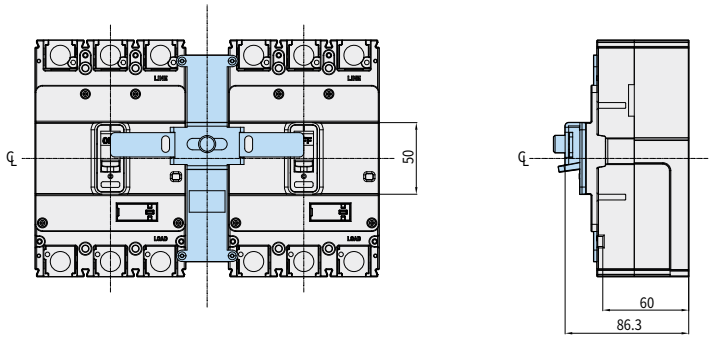
※ When installing the product in close contact, please consider tolerances for external dimensions.

Mechanical Interlock HGM250

• HGM160, 250

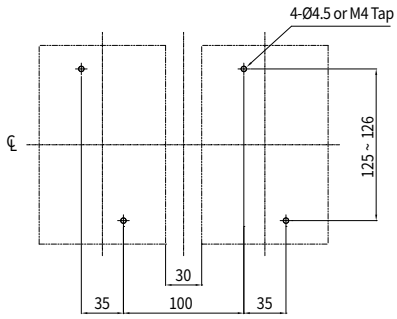
External Dimension

Unit : mm

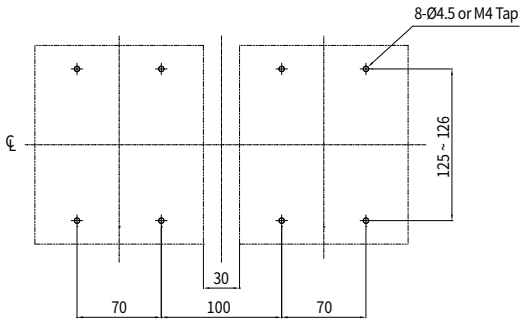


Panel Installation Dimension

2/3P

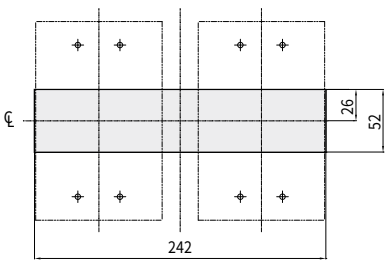


4P (RSTN/NRST)

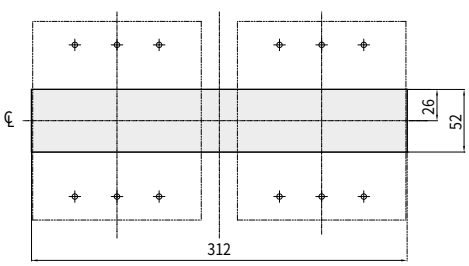


Dimension of Panel Cover Cutting

2/3P



4P (RSTN/NRST)



※ When installing the product in close contact, please consider tolerances for external dimensions.

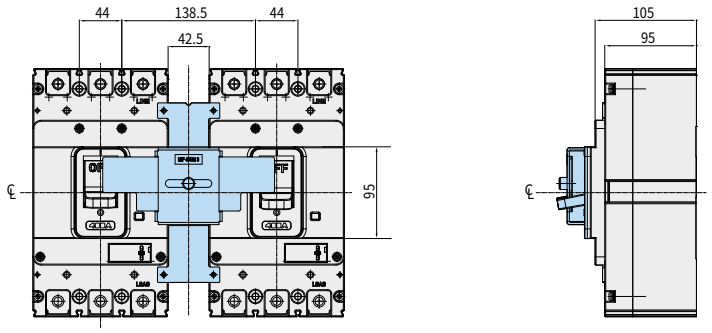
Dimensions

Mechanical Interlock HGM400

· HGM400

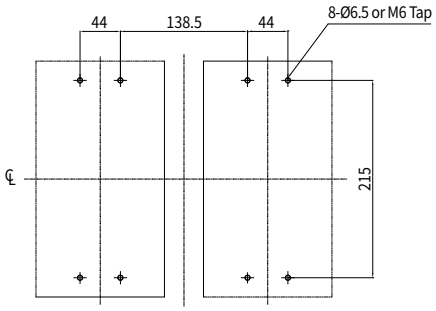
External Dimension

Unit : mm

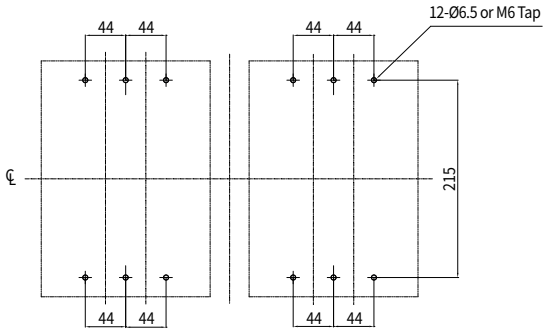


Panel Installation Dimension

2/3P

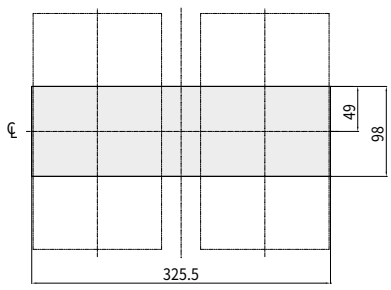


4P (RSTN/NRST)

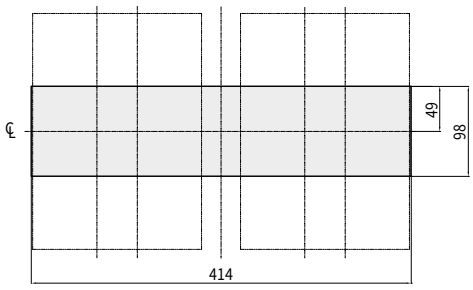


Dimension of Panel Cover Cutting

2/3P



4P (RSTN/NRST)



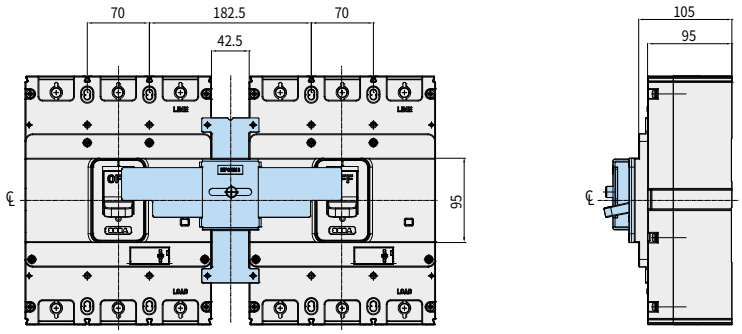
※ When installing the product in close contact, please consider tolerances for external dimensions.

Mechanical Interlock HGM800

· HGM630, 800

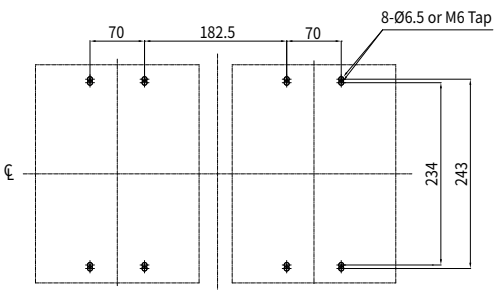
External Dimension

Unit : mm

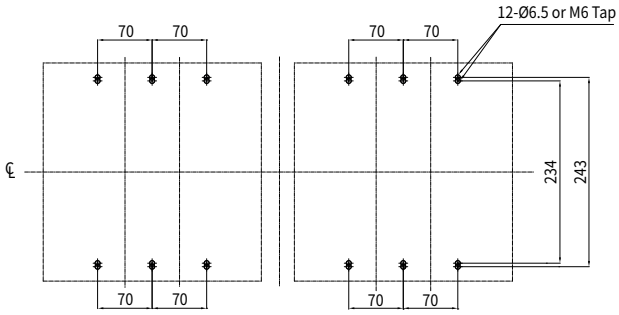


Panel Installation Dimension

2/3P

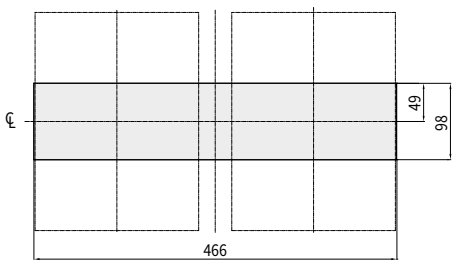


4P (RSTN/NRST)

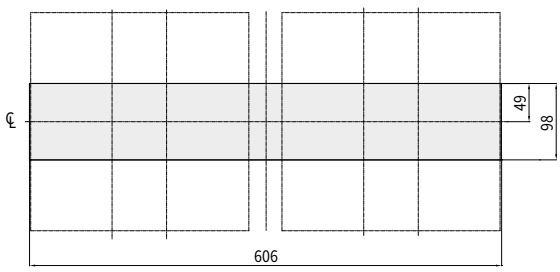


Dimension of Panel Cover Cutting

2/3P



4P (RSTN/NRST)



※ When installing the product in close contact, please consider tolerances for external dimensions.

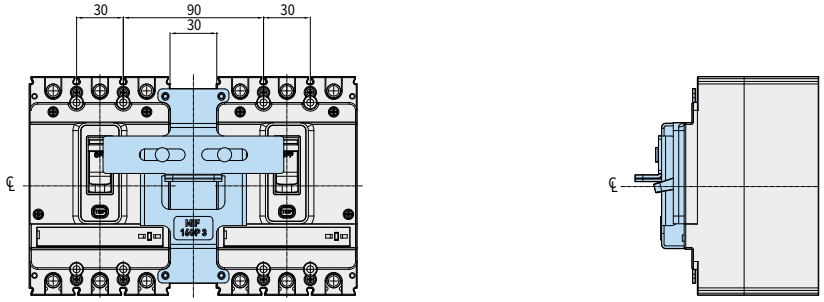
Dimensions

Mechanical Interlock HGP160D

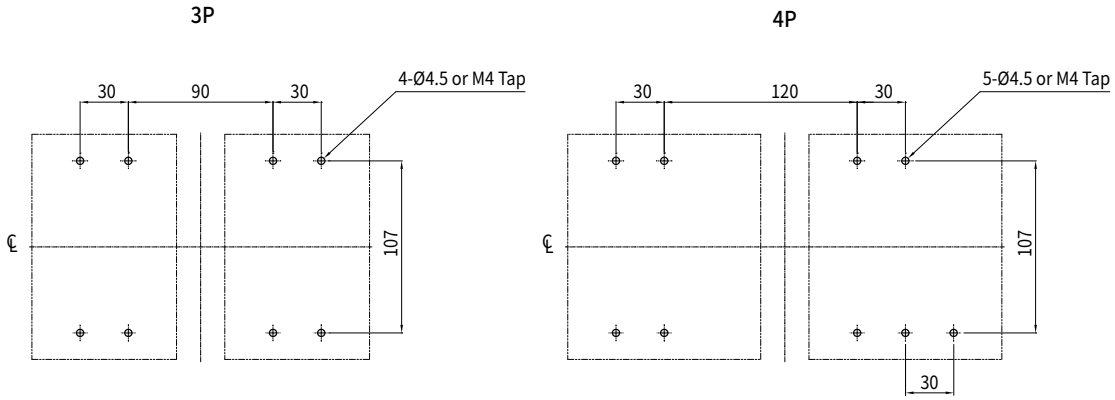
· HGP50D, 125D, 160D

External Dimension

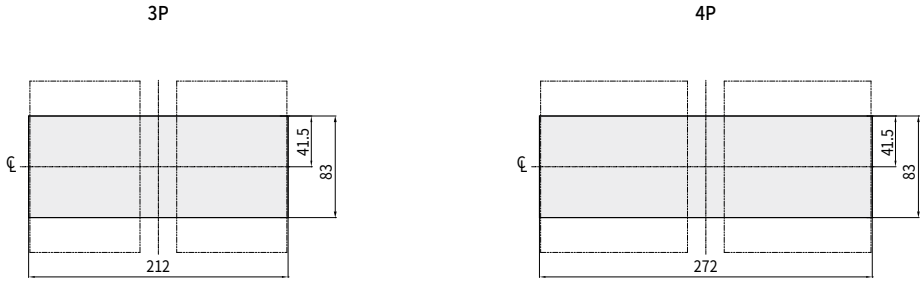
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



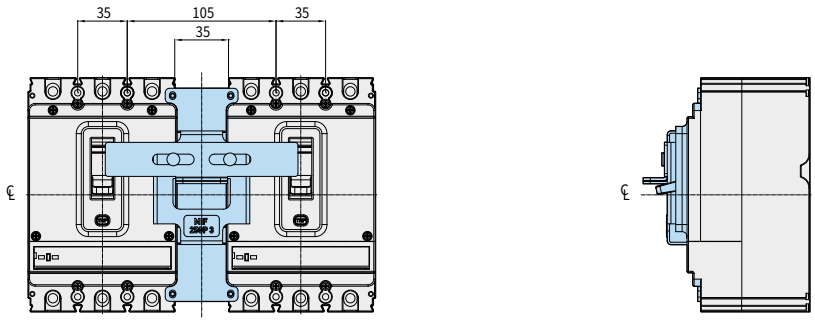
※ When installing the product in close contact, please consider tolerances for external dimensions.

Mechanical Interlock HGP250

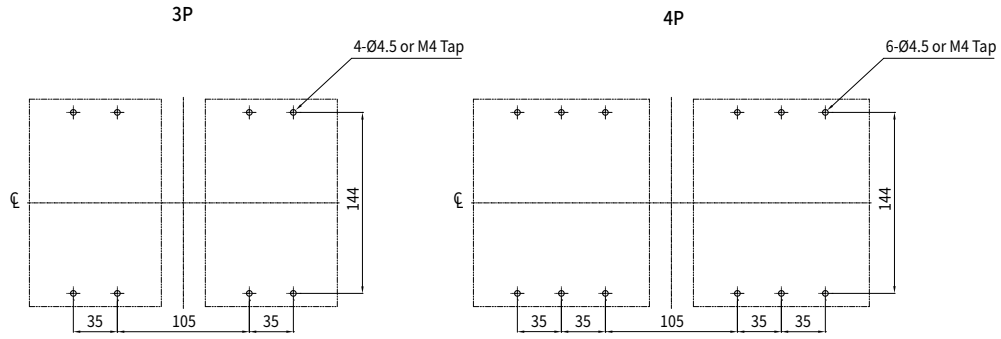
· HGP100, 160, 250

External Dimension

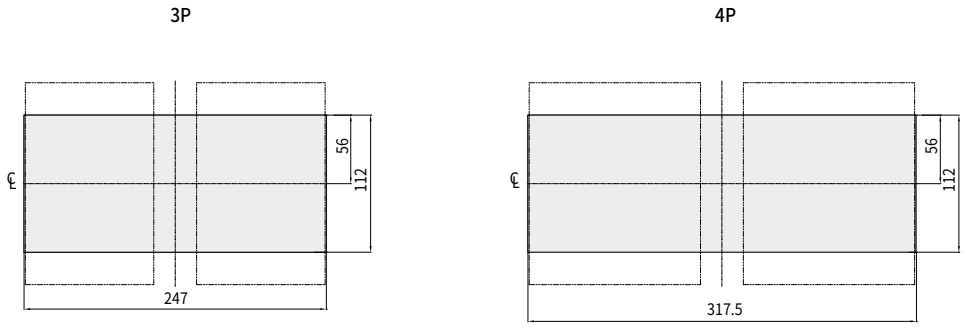
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



※ When installing the product in close contact, please consider tolerances for external dimensions.

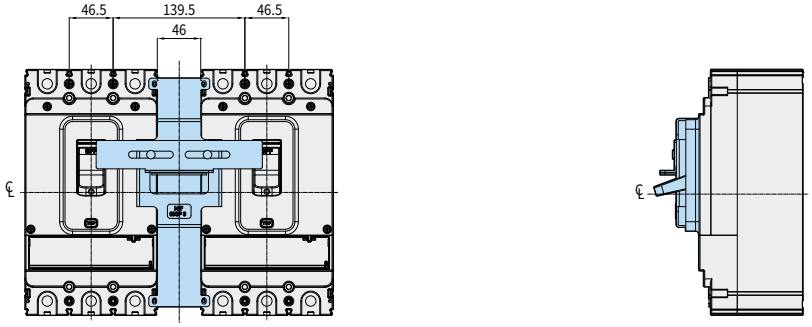
Dimensions

Mechanical Interlock HGP630

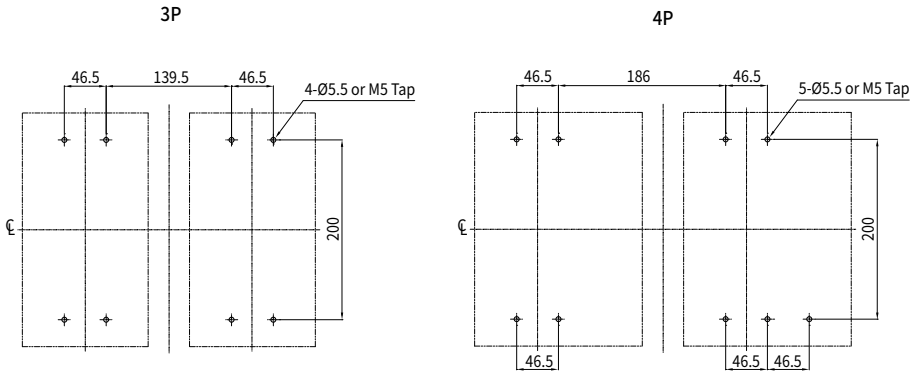
· HGP400, 630

External Dimension

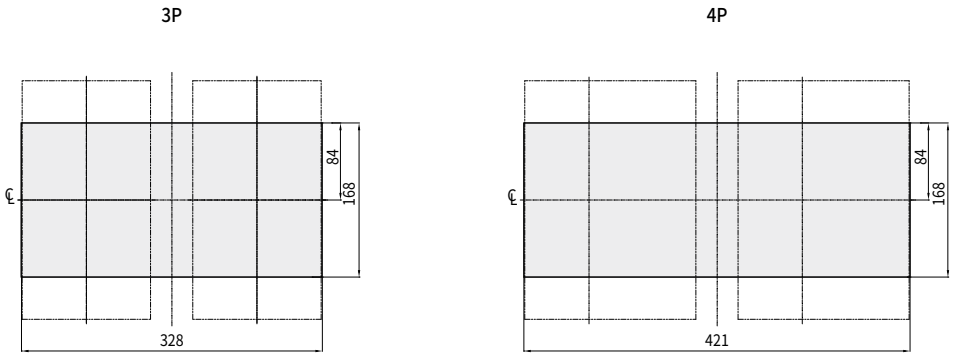
Unit : mm



Panel Installation Dimension



Dimension of Panel Cover Cutting



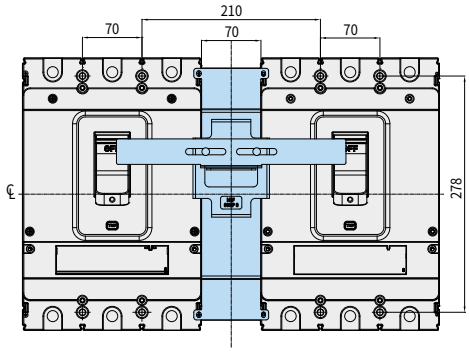
※ When installing the product in close contact, please consider tolerances for external dimensions.

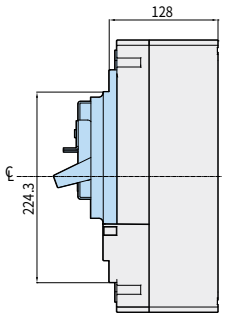
Mechanical Interlock HGP800

· HGP800

External Dimension

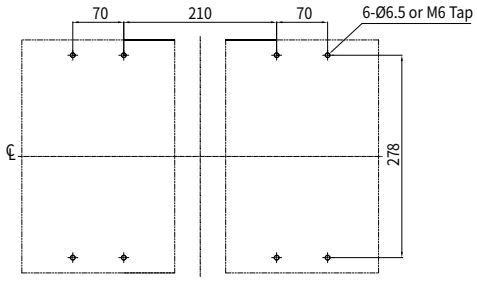
Unit : mm



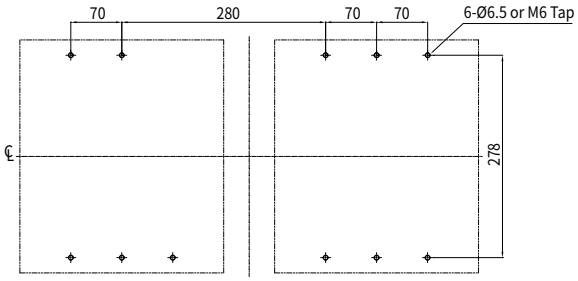


Panel Installation Dimension

3P

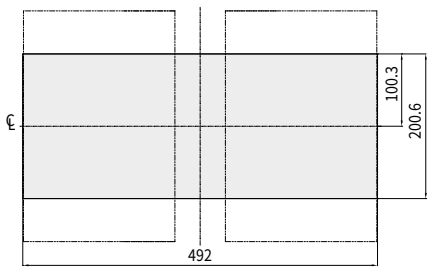


4P

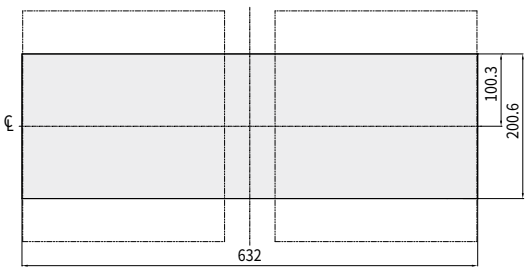


Dimension of Panel Cover Cutting

3P



4P



※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

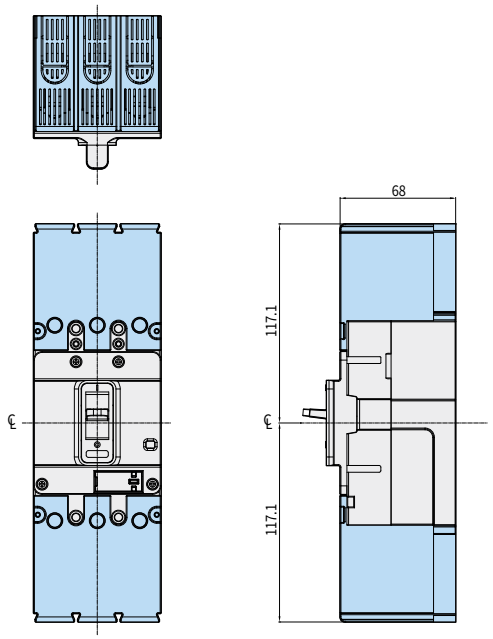
Terminal Cover HGM100

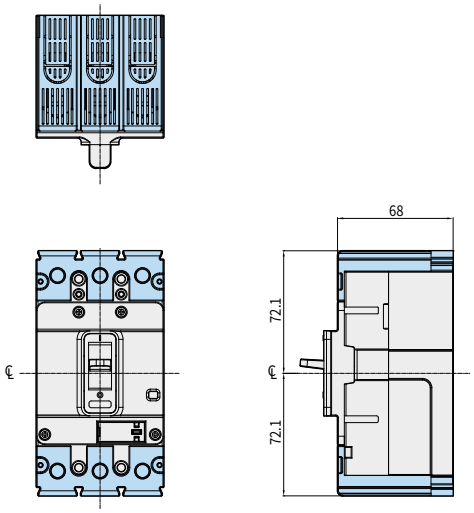
· HGM30, 50E/S, 60, 100

Long Type

Short Type

Unit : mm





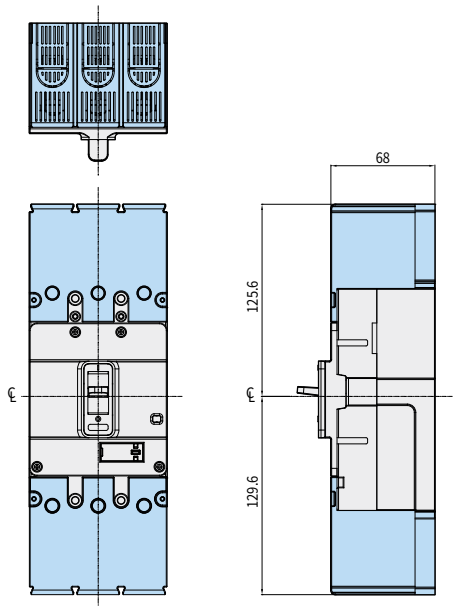
Terminal Cover HGM125

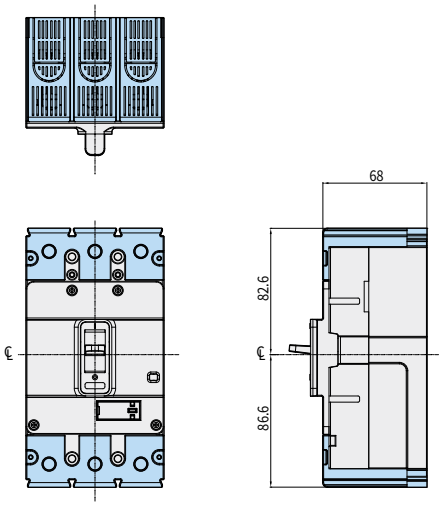
· HGM50H/L, 125

Long Type

Short Type

Unit : mm



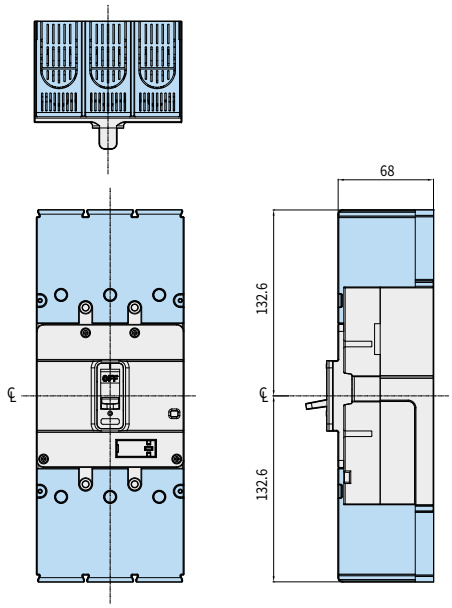


※ When installing the product in close contact, please consider tolerances for external dimensions.

Terminal Cover HGM250

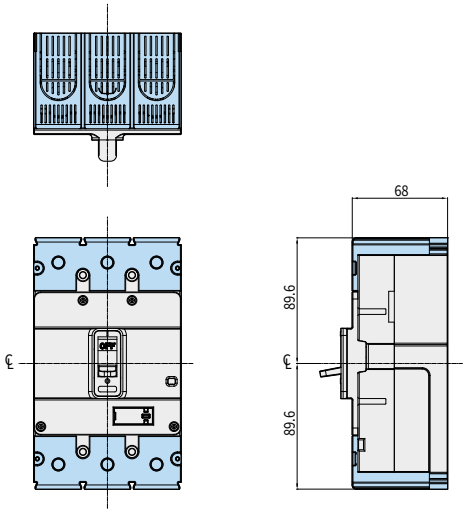
· HGM160, 250

Long Type



Short Type

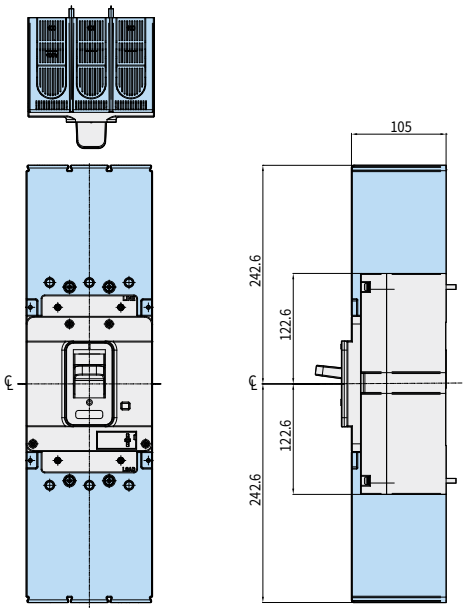
Unit : mm



Terminal Cover HGM400

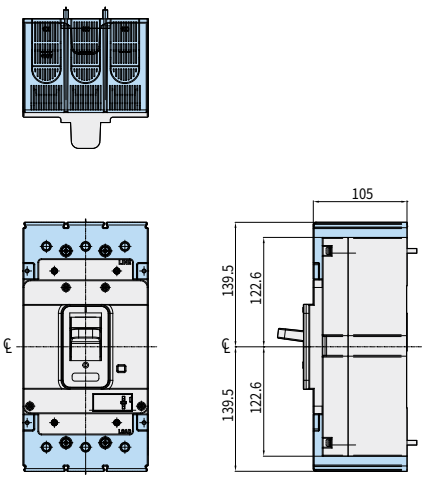
· HGM400

Long Type



Short Type

Unit : mm



※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

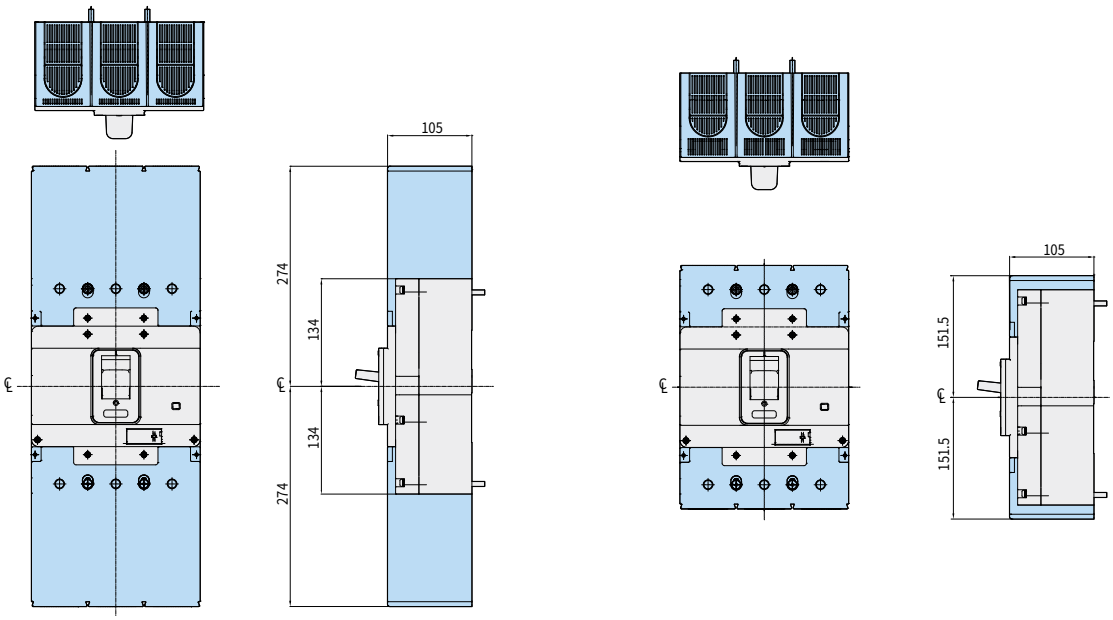
Terminal Cover HGM800

・HGM630, 800

Long Type

Short Type

Unit : mm



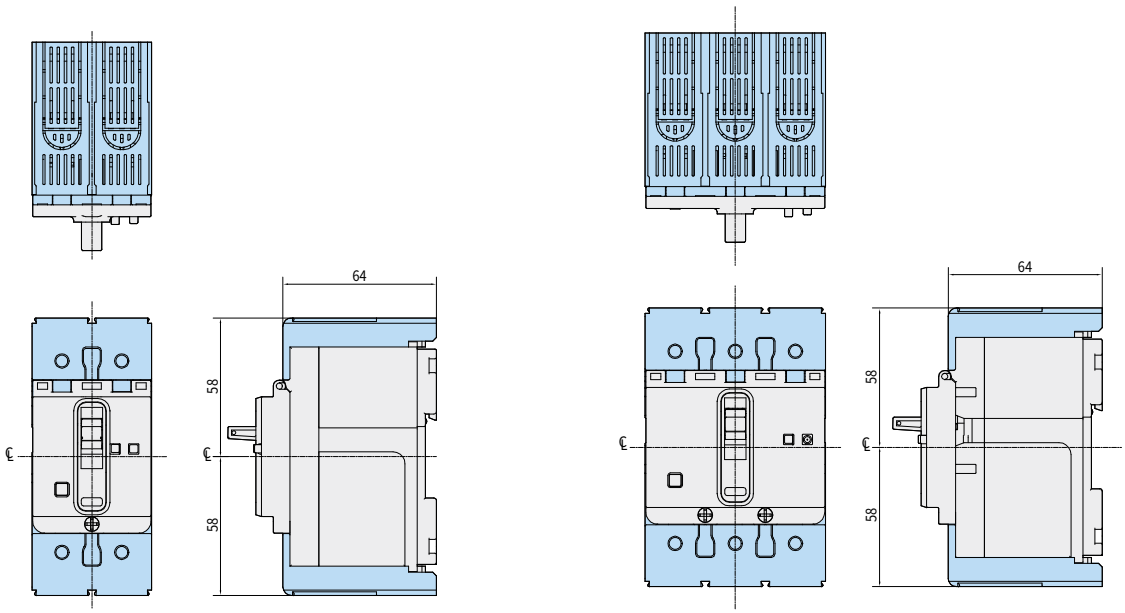
Terminal Cover HDB100 (for Distribution Panel)

・HDB/HDG30, 50, 100 (for Distribution Panel)

Short Type 2P

Short Type 3P

단위 : mm



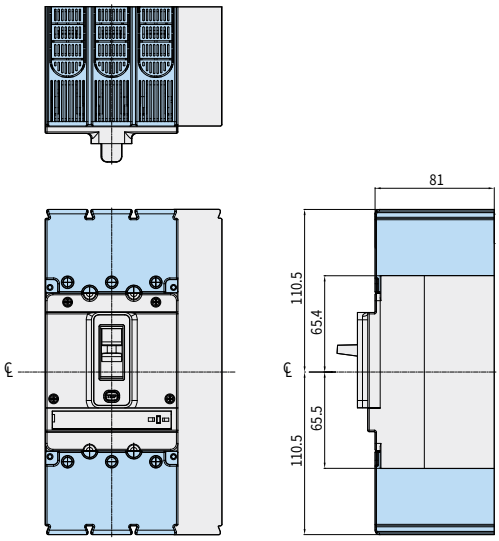
※ When installing the product in close contact, please consider tolerances for external dimensions.

Terminal Cover HGP50D, 125D, 160D

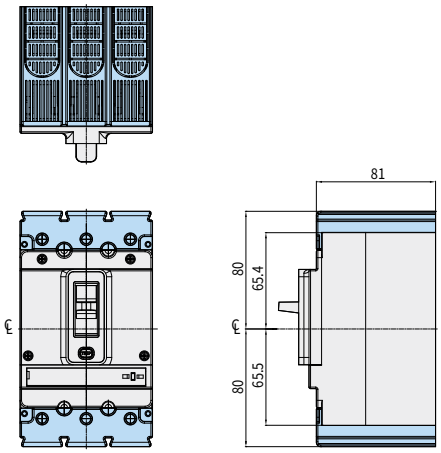
· HGP50D, 125D, 160D

Long Type 3P/4P

Unit : mm



Short Type 3P

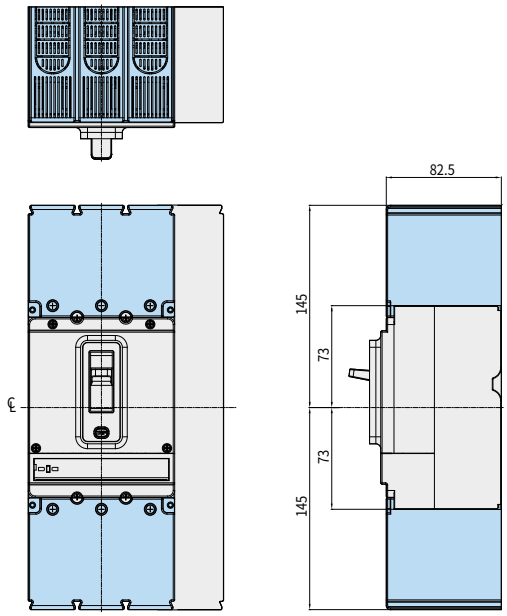


Terminal Cover HGP250

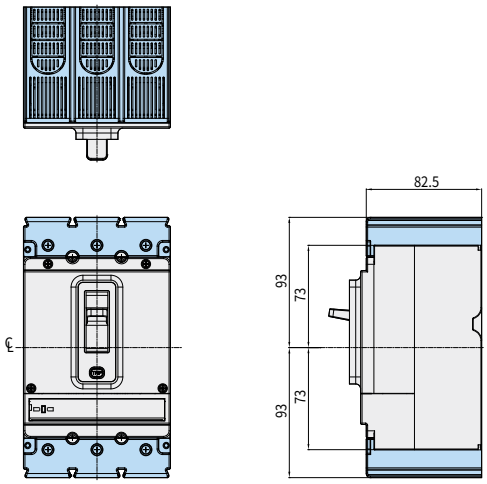
· HGP100, 160, 250

Long Type 3P/4P

Unit : mm



Short Type 3P



※ When installing the product in close contact, please consider tolerances for external dimensions.

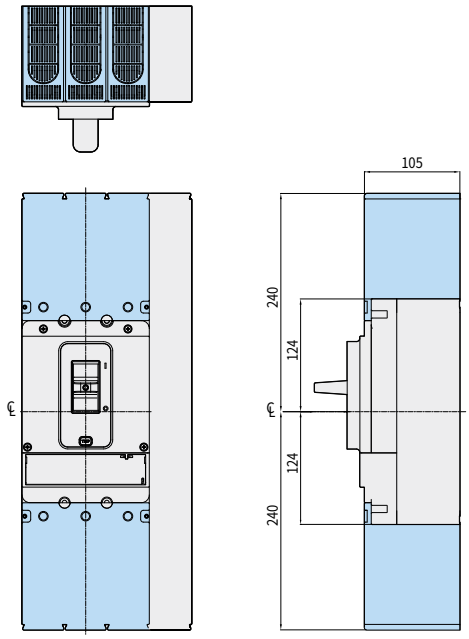
Dimensions

Terminal Cover HGP400, 630

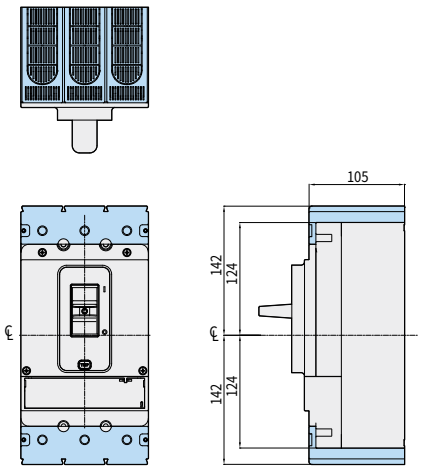
· HGP400, 630

Long Type 3P/4P

Unit : mm



Short Type 3P

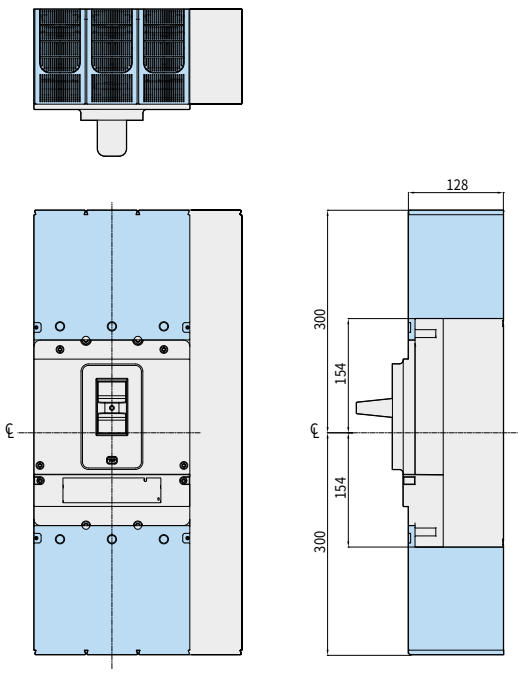


Terminal Cover HGP800

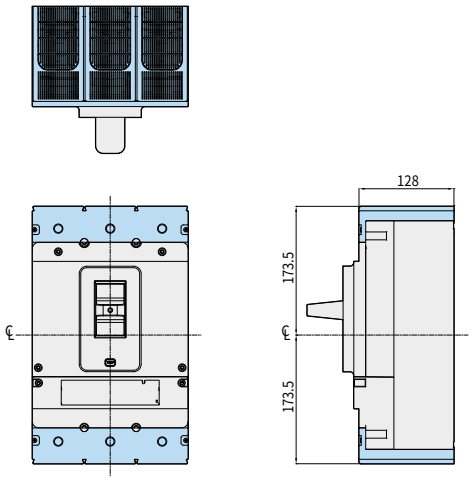
· HGP800

Long Type 3P/4P

Unit : mm



Short Type 3P

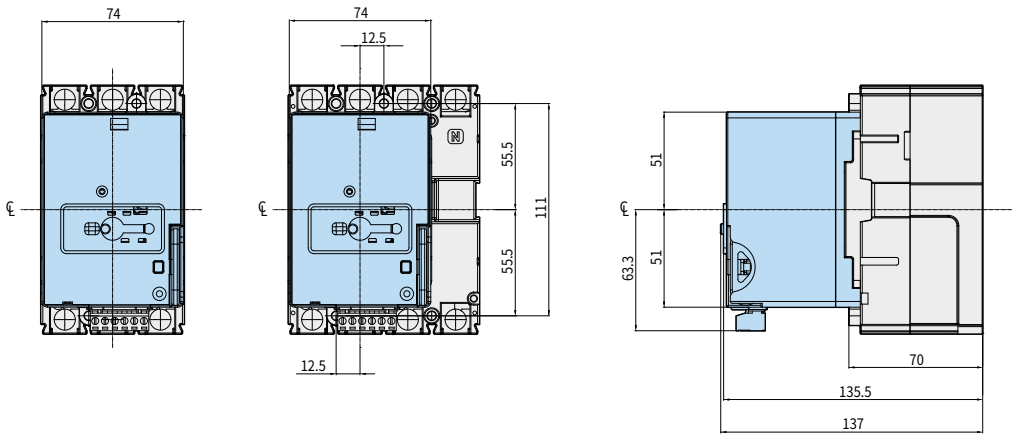


※ When installing the product in close contact, please consider tolerances for external dimensions.

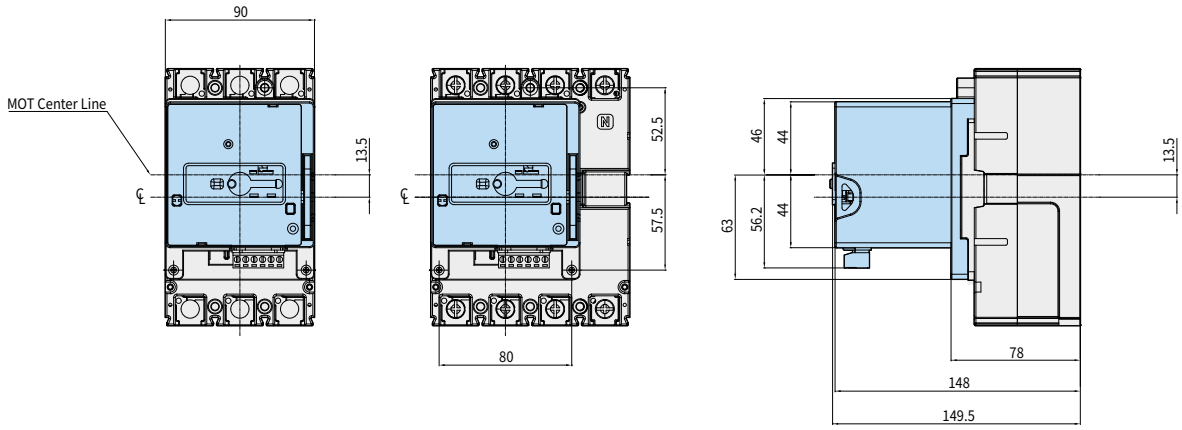
Motor Operator

HGM30, 50E/S, 60, 100

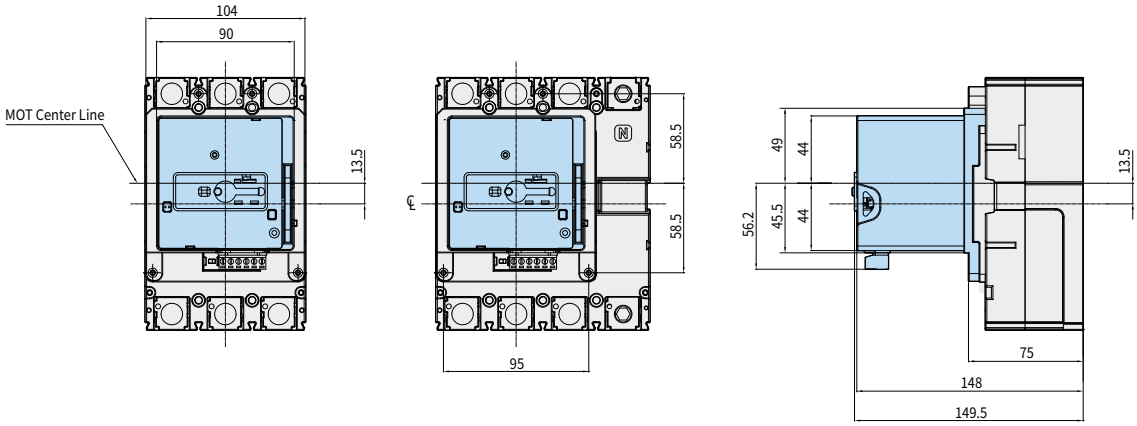
Unit : mm



HGM50H/L, 125



HGM160, 250



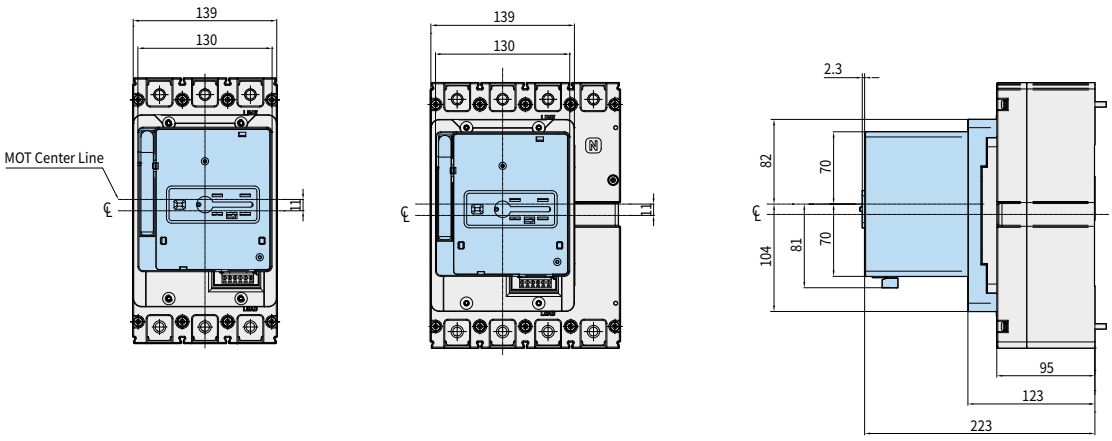
※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

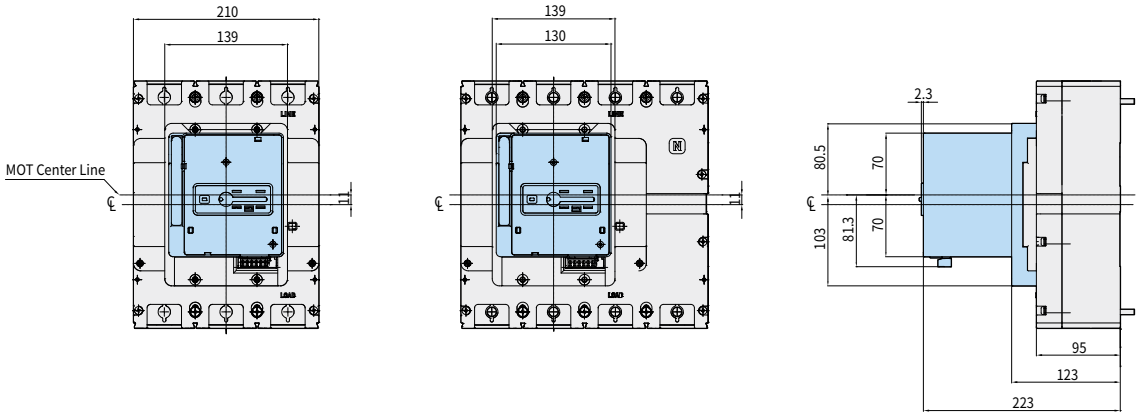
Motor Operator

HGM400

Unit : mm



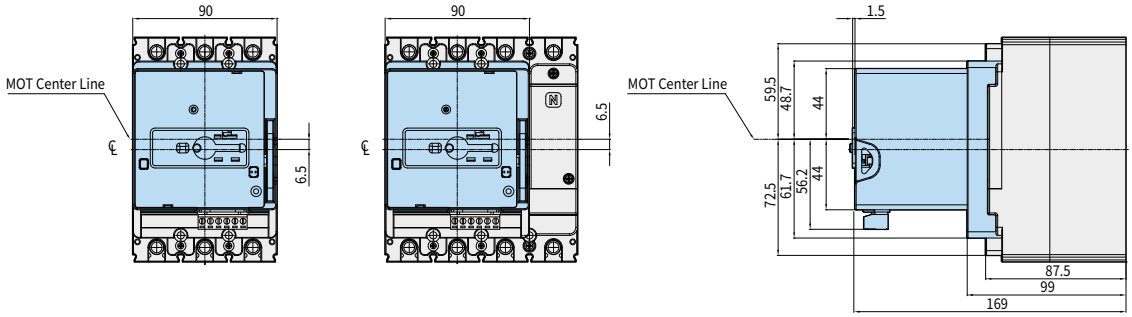
HGM630, 800



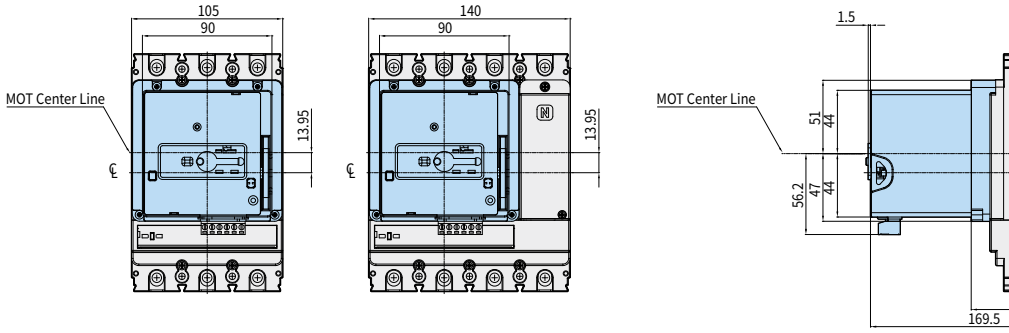
※ When installing the product in close contact, please consider tolerances for external dimensions.

HGP50D, 125D, 160D

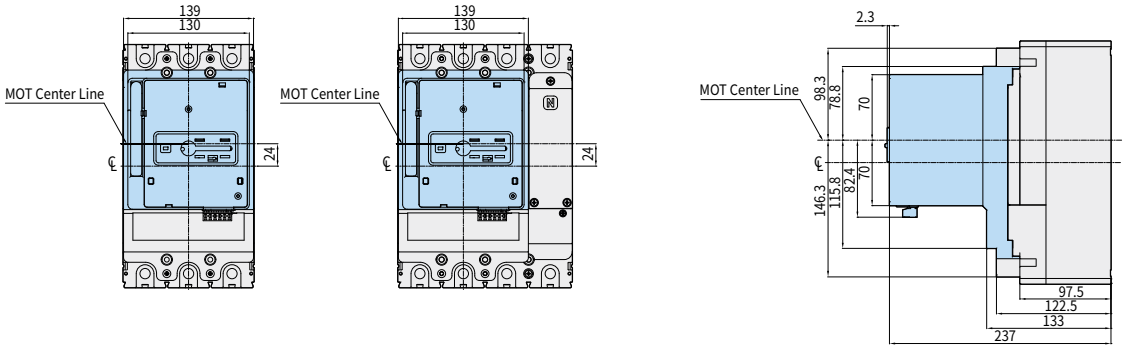
Unit : mm



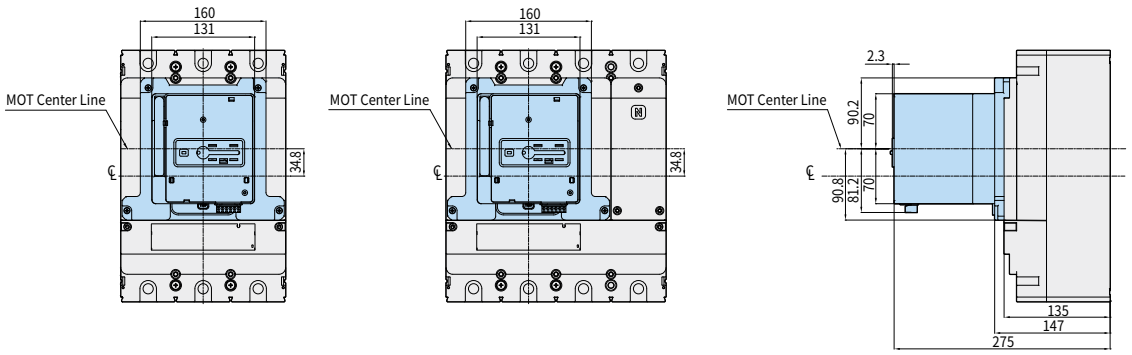
HGP100, 160, 250



HGP400, 630



HGP800



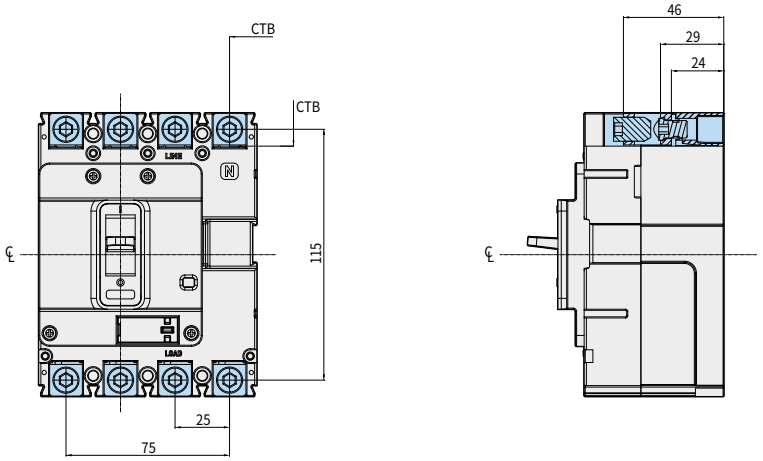
※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

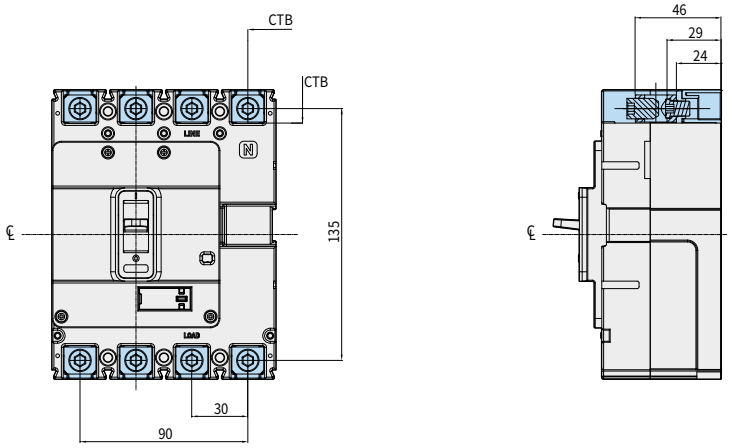
LUG Terminal

HGM30, 50E/S, 60, 100

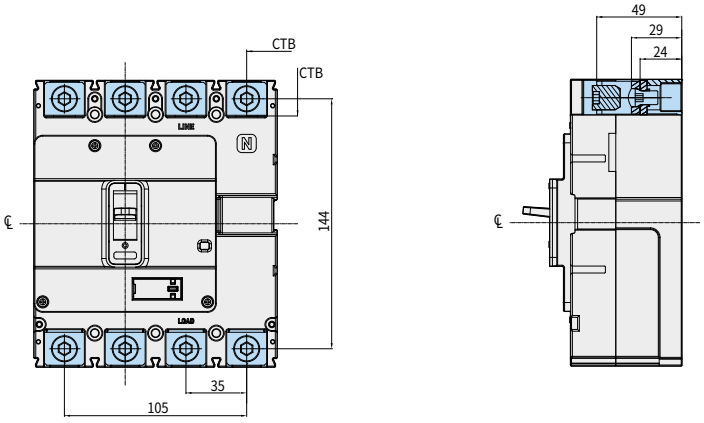
Unit : mm



HGM50H/L, 125



HGM160, 250

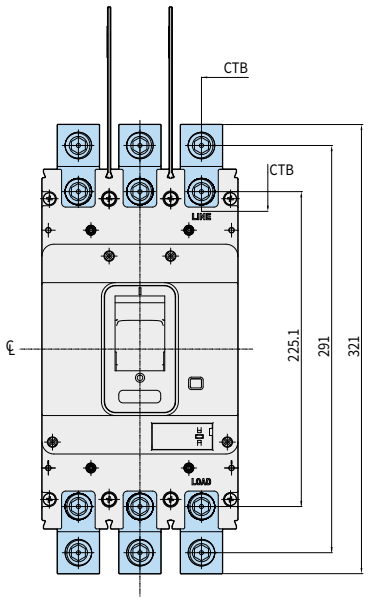


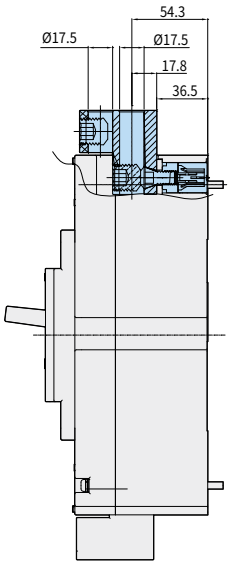
※ When using CTB, in case the Line/Load Insulation Barrier is not mounted, insulation tube or insulation tape does not provide complete insulation between bare conductors which may cause secondary short-circuit accidents so it must be used.

※ When installing the product in close contact, please consider tolerances for external dimensions.

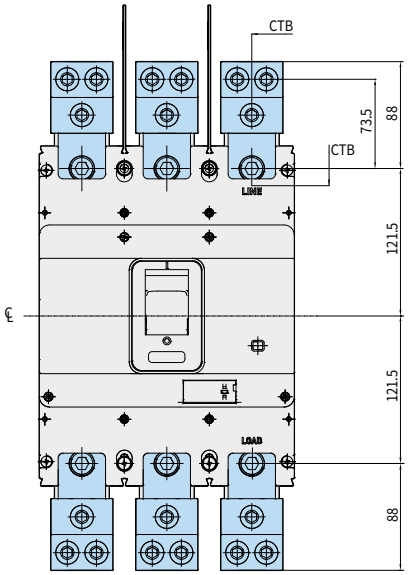
HGM400

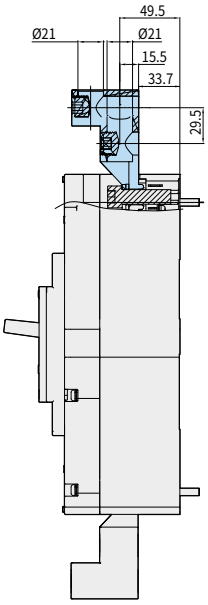
Unit : mm





HGM630, 800





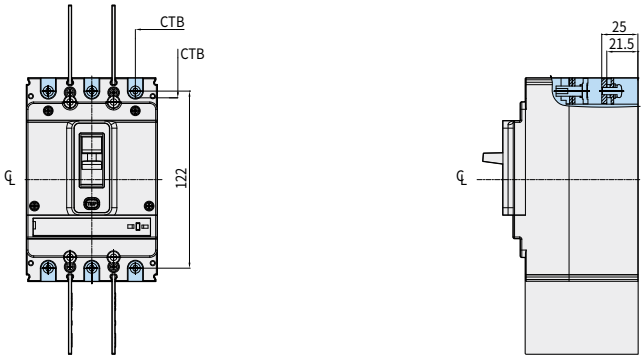
※ When using CTB, in case the Line/Load Insulation Barrier is not mounted, insulation tube or insulation tape does not provide complete insulation between bare conductors which may cause secondary short-circuit accidents so it must be used.
※ When installing the product in close contact, please consider tolerances for external dimensions.

Dimensions

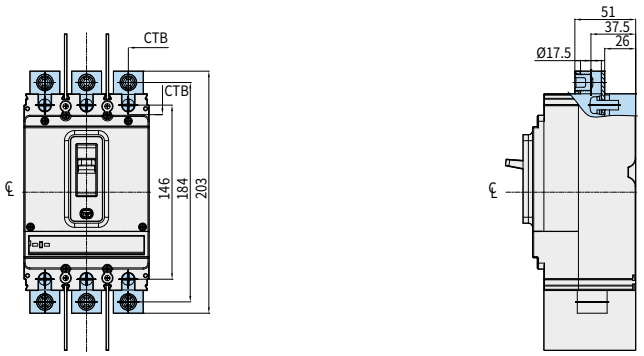
LUG Terminal

HGP50D, 125D, 160D

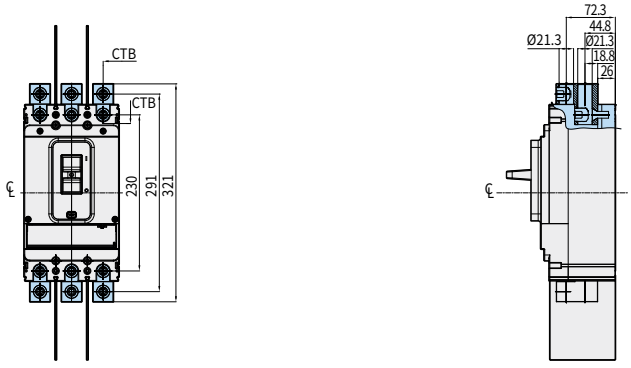
Unit : mm



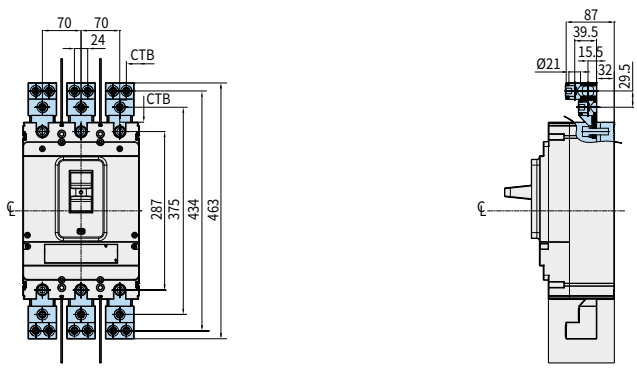
HGP100, 160, 250



HGP400, 630



HGP800



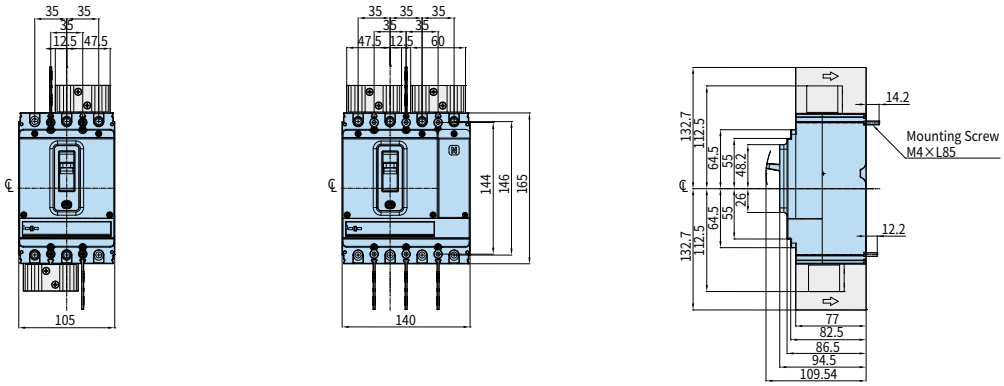
※ When installing the product in close contact, please consider tolerances for external dimensions.

Series Busbar(SBB) HGP250

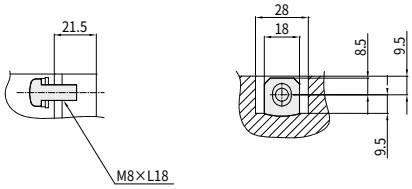
· HGP100, 160, 250

External Dimension

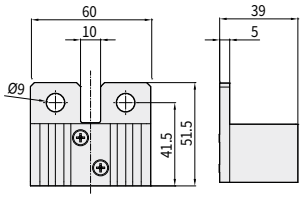
Unit : mm



Detail Drawing of Terminal Part



Detail Drawing of SBB

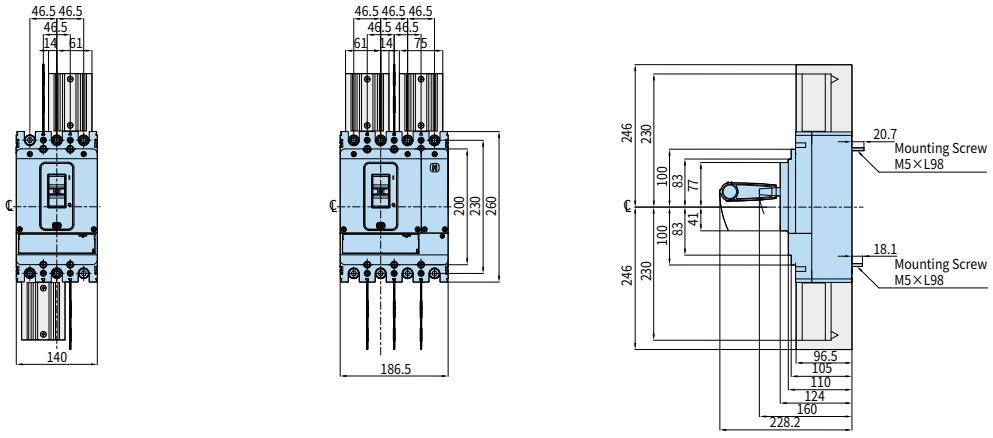


Series Busbar(SBB) HGP630

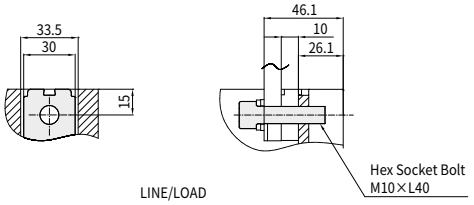
· HGP400, 630

External Dimension

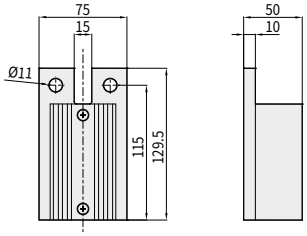
Unit : mm



Detail Drawing of Terminal Part



Detail Drawing of SBB



※ When installing the product in close contact, please consider tolerances for external dimensions.

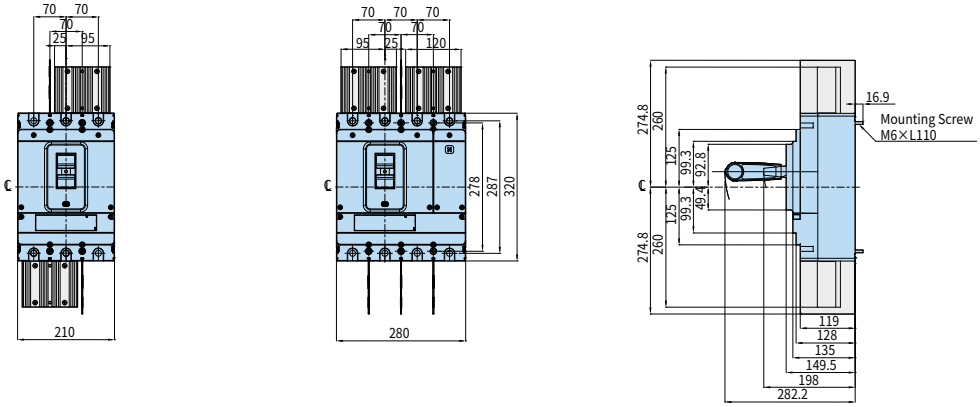
Dimensions

Series Busbar(SBB) HGP800

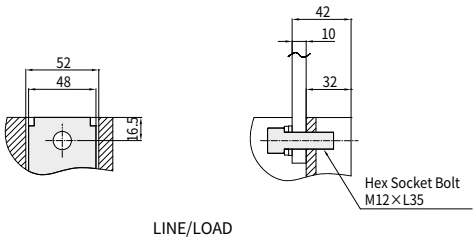
· HGP800

External Dimension

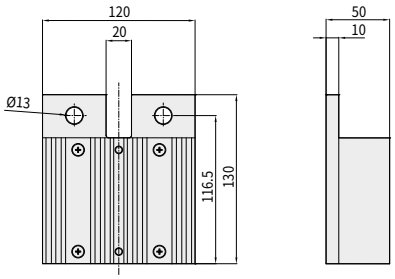
Unit : mm



Detail Drawing of Terminal Part



Detail Drawing of SBB



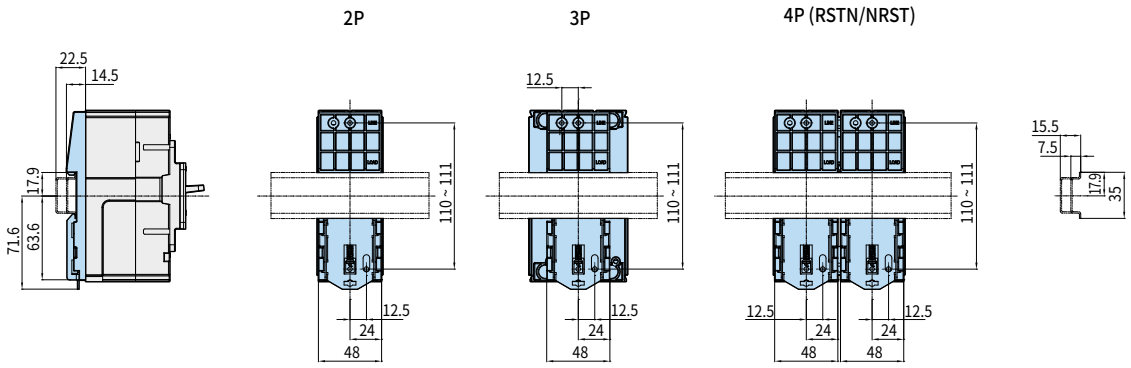
※ When installing the product in close contact, please consider tolerances for external dimensions.

DIN Rail Adaptor

· HGM100

Dimension of DIN Rail Mounting Hole

Unit : mm



※ When assembling the DRA, remove the back barrier beforehand.
※ When installing the product in close contact, please consider tolerances for external dimensions.

Order Code

HGM Type of Molded Case Circuit Breaker, Earth Leakage Circuit Breaker

HGM	50	E	3P	T4	S
Model Name	Frame Size	Short-Circuit Breaking Category Code	No. of Poles (Category per Circuit Breaker)	Product Category	Connection Method

HGM	Molded Case Circuit Breaker
HGE	Earth Leakage Circuit Breaker

30	32 AF
50	50 AF
60	63 AF
100	100 AF
125	125 AF
160	160 AF
250	250 AF
400	400 AF
630	630 AF
800	800 AF

E	E Type
S	S Type
H	H Type
L	L Type
NA	Switch-Disconnector

General Type of MCCB/ELCB	
2P	2 Pole
3P	3 Pole
4P	4 Pole (RSTN)
4PN	4 Pole (NRST)
ZCT Embedded Type of MCCB	
2Z	2 Pole
3Z	3 Pole
4Z	4 Pole

MCCB : Ambient Temperature	
T4	40/45 °C
T5	50 °C
ELCB : Adjustable Residual Current	
G4	30 mA
G5 [1]	100 mA
Instantaneous Circuit Breaker	
MO [2]	Instantaneous
Switch-Disconnector	
DS	Switch-Disconnector

S	Front Connection
BS [3]	Terminal Bus Bar (Straight Type)
BE [4]	Terminal Bus Bar (Spreader Type)
P	Plug-in
F	Line Side : Plug-in Load Side : Front Connection
X	PC/CBM Not Attached

※ 1) In case of 100/300/500/1,000 mA adjustable and time delay type, place order as 100 mA.
2) As for instantaneous products, only 3P can be ordered.
3) Only for 400 ~ 800 AF.
4) Only for 400 AF.
5) Rated current of instantaneous products : Above 40 A

00

Signal Device (AUX/ALT)

00	Not Attached
10	AUX 1C
20	AUX 2C
01	ALT 1C
11	AUX 1C + ALT 1C
21	AUX 2C + ALT 1C

00

Trip Device (SHT/UVT)

HGM/HGE 30 ~ 250 AF	
00	Not Attached
S1	SHT AC 100 - 120 V
S2	SHT AC 200 - 250 V
S3	-
S4	SHT AC 380 - 480 V
S5	SHT DC 24 V
S6	SHT DC 100 - 120 V
S7	SHT DC 48 V
S8	SHT DC 60 V
S9	SHT DC 125 V
U1	UVT AC 100 - 120 V
U2	UVT AC 200 - 230 V
U3	UVT AC 380 - 415 V
U4	UVT AC 440 - 480 V
U5	UVT DC 24 V
U6	UVT DC 100 - 110 V
U7	UVT DC 48 V
HGM/HGE 400 ~ 800 AF	
00	Not Attached
S1	SHT AC 100 - 120 V
S2	SHT AC 200 - 230 V
S3	SHT AC 380 - 415 V
S4	SHT AC 440 - 480 V
S5	SHT DC 24 V
S6	SHT DC 100 - 110 V
U1	UVT AC 100 - 120 V
U2	UVT AC 200 - 230 V
U3	UVT AC 380 - 415 V
U4	UVT AC 440 - 480 V
U5	UVT DC 24 V
U6	UVT DC 100 - 110 V

C

Frequency

C	50/60 Hz

00016

Rated Current [5)]

00016	16 A
00020	20 A
⋮	⋮
00800	800 A

F

Trip Device Characteristics (Applicable To MCCB Only)

For Protecting Overload Short-Circuit	
-	Thermal Fixed/ Instantaneous Fixed
F	Thermal Adjustable/ Instantaneous Fixed
Instantaneous	
B	Instantaneous Fixed (10×In)
Switch-Disconnector	
-	No Protection Function

Order Code

HGP Type of Molded Case Circuit Breaker / Switch Disconnector

HGP	250	X	-G	3P	T4	S
Model Name	Frame Size	Short-Circuit Breaking Category Code [1]	Classification-250 AF	No. of Poles & Voltage	Product Category	Connection Method

Model Name	
HGP	Molded Case Circuit Breaker / Earth Leakage Circuit Breaker

Frame Size	
50D	50 AF
125D	125 AF
160D	160 AF
100	100 AF
160	160 AF
250	250 AF
400	400 AF
630	630 AF
800	800 AF

Short-Circuit Breaking Category Code [1]	
AC	
F [8]	36 kA
S	65 [6]/70 [7] kA
H	85 kA
X	150 kA
NA	Switch-Disconnector
DC	
F	10 kA
S	55 kA
H	85 kA
X	100 kA

Classification-250 AF	
-	Terminal Height (24-26 mm) [10]
-G [2]	New Type Terminal Height (21.5 mm)

No. of Poles & Voltage	
3P	AC 3 pole
4P	AC 4 pole
D3	DC 3 pole
D4	DC 4 pole

Product Category	
Molded Case Circuit Breaker	
T4 [9]	Ambient Temperature of 40 °C
T5	Ambient Temperature of 50 °C
Electronic [3]	
EN	Normal
ED	Display
EA	Ammeter
EE	Energy Meter
Motor Protection	
MP	For Motor Protection
Switch-Disconnector	
DS	Switch-Disconnector

Connection Method	
S	Front Connection
BS [4]	Straight Type of Bus Bar Packaging
BE [11]	Spreader Type of Bus Bar Packaging
P	Plug-in PC/CBM Attached
F	Line Side: Plug-in Load Side: Front Connection
X	Plug-in PC/CBM Not Attached

※ 1) Based on AC 440/460 V
2) Applicable to HGP100,160,250
3) 50D, 125D, 160D : Electronic type N/A
4) Applicable to both Line part / Load part, HGP400~800
5) Applicable to HGP400 ~ 800
6) HGP50D, 125D, 160D, 100, 160, 250 AF
7) HGP400, 630, 800 AF
8) F type is for overseas and ship.
9) For DC products, only T4 is applicable.
10) Discontinued March 2020
11) Applicable to both Line part / Load part, HGP400
12) For DC products

00

Signal Device (AUX/ALT)

00	Not Attached
10	AUX 1C
20	AUX 2C
01	ALT 1C
11	AUX 1C + ALT 1C
21	AUX 2C + ALT 1C
31 [5)]	AUX 3C + ALT 1C
32 [5)]	AUX 3C + ALT 2C

00

Trip Device (SHT/UVT)

00	Not Attached
S1	SHT AC 100 - 120 V
S2	SHT AC 200 - 230 V
S3	SHT AC 380 - 415 V
S4	SHT AC 440 - 480 V
S5	SHT DC 24 V
S6	SHT DC 100 - 110 V
U1	UVT AC 100 - 120 V
U2	UVT AC 200 - 230 V
U3	UVT AC 380 - 415 V
U4	UVT AC 440 - 480 V
U5	UVT DC 24 V
U6	UVT DC 100 - 110 V

C

Frequency

C	AC(50/60 Hz)
Z [12)]	DC

00016

Rated Current

002.5	2.5 A
006.3	6.3 A
	⋮
00800	800 A

F

Trip Device Characteristics

For Protecting Overload Short-Circuit	
-	Thermal Fixed/Instantaneous Fixed (MTM - FF)
F	Thermal Adjustable/Instantaneous Fixed (MTM - JF)
H	Thermal Adjustable/Instantaneous Adjustable (MTM - JJ)
N	Thermal Fixed/Instantaneous Fixed (MTM - FF) + 4P N Phase Protection
FN	Thermal Adjustable/Instantaneous Fixed (MTM - JF) + 4P N Phase Protection
HN	Thermal Adjustable/Instantaneous Adjustable (MTM - JJ) + 4P N Phase Protection
Electronic	
-	Not Applicable (ETU)
Motor Protection	
-	No Thermal/Instantaneous Adjustable (MCP - OJ)
Switch-Disconnector	
-	No Protection Function (DSU)

Order Code of Accessories

HGM/HGE Type of Accessory Unit

HGM/HGE30, 50E/S, 60, 100

Connection Method

		2 Pole	3 Pole	4 Pole
Plug-in	TDM (LINE/LOAD)	-	TDM 10GM P3	-
	TDM (LINE Only)	-	TDM 10GM F3	-
	TDF (LINE Only)	-	TDF 10GM 3	-
	TDA (1 row)	-	TDA 10GM S3	-
	TDA (2 rows)	TDA 10GM D2	TDA 10GM D3	-
Conn. Block (CBM)		CBM 10GM 2P UNIT	CBM 10GM UNIT	-
CBB BLOCK UNIT		-	CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		-	CBBPLATE 10GM	-
PC MALE		-	PCMALE 10GM 50 A (≤ 50 A) PCMALE 10GM 100 A (> 50 A)	-
Terminal Busbar (TBB)	Straight Busbar	-	-	-
	Spreader Busbar	-	-	-
Rear Connection Terminal (RCT)	LINE/LOAD (≤ 50 A)	RCT 05GM F2	RCT 05GM F3	RCT 05GM F4
	LINE/LOAD (> 50 A)	RCT 10GM F2	RCT 10GM F3	RCT 10GM F4
Cage Terminal (CTB)	(≤ 50 A) inch	CTB 10GM 2S50	CTB 10GM 3S50	CTB 10GM 4S50
	(> 50 A) inch	CTB 10GM 2S100	CTB 10GM 3S100	CTB 10GM 4S100
	(≤ 50 A) mm	CTB 10GM 2S50-MM	CTB 10GM 3S50-MM	CTB 10GM 4S50-MM
	(> 50 A) mm	CTB 10GM 2S100-MM	CTB 10GM 3S100-MM	CTB 10GM 4S100-MM
Din Rail Adaptor (DRA)		DRA 10GM	DRA 10GM	DRA 10GM

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)	Auxiliary/Alarm (AXT)
Indication Contacts	AUX 10GM C1	ALT 10GM L1	AXT 10GM L1
	AUX 10GM C2	ALT 10GM R1	AXT 10GM R1
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)	
Remote Tripping	SHT 10GM DC 24 V	UVT 10GM DC 24 V	
	SHT 10GM DC 100 - 120 V	UVT 10GM DC 100 - 110 V	
	SHT 10GM DC 48 V	UVT 10GM DC 48 V	
	SHT 10GM DC 60 V	UVT 10GM AC 100 - 120 V	
	SHT 10GM DC 125 V	UVT 10GM AC 200 - 230 V	
	SHT 10GM AC 100 - 120 V	UVT 10GM AC 380 - 415 V	
	SHT 10GM AC 200 - 250 V	UVT 10GM AC 440 - 480 V	
	SHT 10GM AC 380 - 480 V	-	

External Accessory

		Front Contact (TFG)	Extension (TFH)	
Rotary Handle	Upper Line	TFG 10GM U	TFH 10GM	
	Right Line	TFG 10GM R	TFH 10GM	
	Left Line	TFG 10GM L	TFH 10GM	
		2 Pole	3 Pole	4 Pole
Motor Operator [1)]		-	MOT 10GM DC 24 V	
		-	MOT 10GM AC/DC 110 V	
		-	MOT 10GM AC/DC 240 V	
Terminal Cover	Short	TCF 10GM S2	TCF 10GM S3	TCF 10GM S4
	Long	TCF 10GM L2	TCF 10GM L3	TCF 10GM L4
		2 Pole	3 Pole	4 Pole RSTN / NRST
Locking Device	Padlock	PLD 10GM	PLD 10GM	PLD 10GM
	Mechanical Interlock	MIF 10GM 2	MIF 10GM 3	MIF 10GM R4 / MIF 10GM N4
		2 Pole	3 Pole	4 Pole
Interpole Barrier		TQQ 10GM 2	TQQ 10GM 3	TQQ 10GM 4
Auxiliary Handle		-		

※ 1) For HGM only.

HGM/HGE50H/L, 125

Connection Method

		2 Pole	3 Pole	4 Pole
Plug-in	TDM (LINE/LOAD)	-	TDM 12GM P3	-
	TDM (LINE Only)	-	TDM 12GM F3	-
	TDF (LINE Only)	-	TDF 12GM 3	-
	TDA (1 row)	-	TDA 12GM S3	-
	TDA (2 rows)	-	TDA 12GM D3	-
Conn. Block (CBM)		-	CBM 10GM UNIT	-
CBB BLOCK UNIT		-	CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		-	CBBPLATE 10GM	-
PC MALE		-	PCMALE 12GM	-
Terminal Busbar (TBB)	Straight Busbar	-	-	-
	Spreader Busbar	-	-	-
Rear Connection Terminal (RCT)	LINE/LOAD	RCT 12GM F2	RCT 12GM F3	RCT 12GM F4
Cage Terminal (CTB)	inch	CTB 12GM 2S	CTB 12GM 3S	CTB 12GM 4S
	mm	CTB 12GM 2S-MM	CTB 12GM 3S-MM	CTB 12GM 4S-MM
Din Rail Adaptor (DRA)		-	-	-

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)	Auxiliary/Alarm (AXT)
Indication Contacts	AUX 10GM C1	ALT 10GM L1	AXT 10GM L1
	AUX 10GM C2	ALT 10GM R1	AXT 10GM R1
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)	
Remote Tripping	SHT 10GM DC 24 V	UVT 10GM DC 24 V	
	SHT 10GM DC 100 - 120 V	UVT 10GM DC 100 - 110 V	
	SHT 10GM DC 48 V	UVT 10GM DC 48 V	
	SHT 10GM DC 60 V	UVT 10GM AC 100 - 120 V	
	SHT 10GM DC 125 V	UVT 10GM AC 200 - 230 V	
	SHT 10GM AC 100 - 120 V	UVT 10GM AC 380 - 415 V	
	SHT 10GM AC 200 - 250 V	UVT 10GM AC 440 - 480 V	
	SHT 10GM AC 380 - 480 V	-	

External Accessory

		Front Contact (TFG)	Extension (TFH)	
Rotary Handle	Upper Line	TFG 12GM U	TFH 12GM	
	Right Line	TFG 12GM R	TFH 12GM	
	Left Line	TFG 12GM L	TFH 12GM	
		2 Pole	3 Pole	4 Pole
Motor Operator [1)]		-	MOT 12GM DC 24 V	
		-	MOT 12GM AC/DC 110 V	
		-	MOT 12GM AC/DC 240 V	
Terminal Cover	Short	TCF 12GM S2	TCF 12GM S3	TCF 12GM S4
	Long	TCF 12GM L2	TCF 12GM L3	TCF 12GM L4
Locking Device	Padlock	PLD 10GM	PLD 10GM	PLD 10GM
	Mechanical Interlock	MIF 12GM 2	MIF 12GM 3	MIF 12GM R4 / MIF 12GM N4
Interpole Barrier		TQQ 10GM 2	TQQ 10GM 3	TQQ 10GM 4
Auxiliary Handle		-		

※ 1) For HGM only.

Order Code of Accessories

HGM/HGE Type of Accessory Unit

HGM/HGE160, 250

Connection Method

		2 Pole	3 Pole	4 Pole
Plug-in	TDM (LINE/LOAD)	-	TDM 25GM P3	-
	TDM (LINE Only)	-	TDM 25GM F3	-
	TDF (LINE Only)	-	-	-
	TDA (1 row)	-	-	-
	TDA (2 rows)	-	-	-
Conn. Block (CBM)		-	CBM 10GM UNIT	-
CBB BLOCK UNIT		-	CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		-	CBBPLATE 10GM	-
PC MALE		-	PCMALE 25GM	-
Terminal Busbar (TBB)	Straight Busbar	TBB 25GP 2S	TBB 25GP 3S	TBB 25GP 4S
	Spreader Busbar	-	TBB 25GP 3E45	TBB 25GP 4E45
Rear Connection Terminal (RCT)	LINE/LOAD	RCT 25GM F2	RCT 25GM F3	RCT 25GM F4
Cage Terminal (CTB)	inch	CTB 25GM 2S	CTB 25GM 3S	CTB 25GM 4S
	mm	CTB 25GM 2S-MM	CTB 25GM 3S-MM	CTB 25GM 4S-MM
Din Rail Adaptor (DRA)		-	-	-

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)	Auxiliary/Alarm (AXT)
Indication Contacts	AUX 10GM C1	ALT 10GM L1	AXT 10GM L1
	AUX 10GM C2	ALT 10GM R1	AXT 10GM R1
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)	
Remote Tripping	SHT 10GM DC 24 V	UVT 10GM DC 24 V	
	SHT 10GM DC 100 - 120 V	UVT 10GM DC 100 - 110 V	
	SHT 10GM DC 48 V	UVT 10GM DC 48 V	
	SHT 10GM DC 60 V	UVT 10GM AC 100 - 120 V	
	SHT 10GM DC 125 V	UVT 10GM AC 200 - 230 V	
	SHT 10GM AC 100 - 120 V	UVT 10GM AC 380 - 415 V	
	SHT 10GM AC 200 - 250 V	UVT 10GM AC 440 - 480 V	
	SHT 10GM AC 380 - 480 V	-	

External Accessory

		Front Contact (TFG)	Extension (TFH)	
Rotary Handle	Upper Line	TFG 25GM U	TFH 25GM	
	Right Line	TFG 25GM R	TFH 25GM	
	Left Line	TFG 25GM L	TFH 25GM	
		2 Pole	3 Pole	4 Pole
Motor Operator [1)]		-	MOT 25GM DC 24 V	
		-	MOT 25GM AC/DC 110 V	
		-	MOT 25GM AC/DC 240 V	
Terminal Cover	Short	TCF 25GM S3		TCF 25GM S4
	Long	TCF 25GM L3		TCF 25GM L4
		2 Pole	3 Pole	4 Pole RSTN / NRST
Locking Device	Padlock	PLD 10GM	PLD 10GM	PLD 10GM
	Mechanical Interlock	MIF 25GM 3		MIF 25GM R4 / MIF 25GM N4
		2 Pole	3 Pole	4 Pole
Interpole Barrier		TQQ 25GM 2	TQQ 25GM 3	TQQ 25GM 4
Auxiliary Handle		-		

※ 1) For HGM only.

HGM/HGE400

Connection Method

		2 Pole	3 Pole	4 Pole
Plug-in	TDM (LINE/LOAD)	-	TDM 40GM P3	-
	TDM (LINE Only)	-	TDM 40GM F3	-
Conn. Block (CBM)		-	CBM 10GM UNIT	-
CBB BLOCK UNIT		-	CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		-	CBBPLATE 40GM	-
PC MALE		-	PCMALE 40GM	-
Terminal Busbar (TBB)	Straight Busbar	TBB 40GM 2S	TBB 40GM 3S	TBB 40GM 4S
	Spreader Busbar	-	TBB 40GM 3E59	TBB 40GM 4E59
Rear Connection Terminal (RCT)	LINE	-	RCT 40GM F3 LINE	RCT 40GM F4 LINE
	LOAD	-	RCT 40GM F3 LOAD	RCT 40GM F4 LOAD
Cage Terminal (CTB)	1 Hole	-	CTB 40GM 3S1H	CTB 40GM 4S1H
	2 Hole	-	CTB 40GM 3S	CTB 40GM 4S

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts	AUX 40GM C1	ALT 40GM L1
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping	SHT 40GM DC 24 V	UVT 40GM DC 24 V
	SHT 40GM DC 100 - 110 V	UVT 40GM DC 100 - 110 V
	SHT 40GM AC 100 - 120 V	UVT 40GM AC 100 - 120 V
	SHT 40GM AC 200 - 230 V	UVT 40GM AC 200 - 230 V
	SHT 40GM AC 380 - 415 V	UVT 40GM AC 380 - 415 V
	SHT 40GM AC 440 - 480 V	UVT 40GM AC 440 - 480 V

External Accessory

		Front Contact (TFG)	Extension (TFH)	
Rotary Handle	Upper Line	TFG 40GM U	TFH 40GM	
	Right Line	TFG 40GM R	TFH 40GM	
	Left Line	TFG 40GM L	TFH 40GM	
		2 Pole	3 Pole	4 Pole
Motor Operator [1)]		-	MOT 40GM DC 24 V	
		-	MOT 40GM AC/DC 110 V	
		-	MOT 40GM AC/DC 240 V	
Terminal Cover	Short	TCF 40GM S3		TCF 40GM S4
	Long	TCF 40GM L3		TCF 40GM L4
Locking Device	Padlock	PLD 40GM	PLD 40GM	PLD 40GM
	Mechanical Interlock	MIF 40GM 3		MIF 40GM R4 / MIF 40GM N4
Interpole Barrier		TQQ 40GM 2	TQQ 40GM 3	TQQ 40GM 4
Auxiliary Handle		THA 48GM		

※ 1) For HGM only.

Order Code of Accessories

HGM/HGE Type of Accessory Unit

HGM/HGE630, 800

Connection Method

		2 Pole	3 Pole	4 Pole
Plug-in	TDM (LINE/LOAD)	-	TDM 80GM P3	-
	TDM (LINE Only)	-	TDM 80GP F3	-
Conn. Block (CBM)		-	CBM 10GM UNIT	-
CBB BLOCK UNIT		-	CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		-	CBBPLATE 80GM	-
PC MALE		-	PCMALE 80GM	-
Terminal Busbar (TBB)	Straight Busbar	TBB 63GM 2S (HGM/HGE630) TBB 80GM 2S (HGM/HGE800)	TBB 63GM 3S (HGM/HGE630) TBB 80GM 3S (HGM/HGE800)	TBB 63GM 4S (HGM/HGE630) TBB 80GM 4S (HGM/HGE800)
	Spreader Busbar	-	-	-
Rear Connection Terminal (RCT)	LINE	-	RCT 80GM F3 LINE	RCT 80GM F4 LINE
	LOAD	-	RCT 80GM F3 LOAD	RCT 80GM F4 LOAD
Cage Terminal (CTB)		-	CTB 80GM 3S	CTB 80GM 4S

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts	AUX 40GM C1	ALT 40GM L1
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping	SHT 40GM DC 24 V	UVT 40GM DC 24 V
	SHT 40GM DC 100 - 110 V	UVT 40GM DC 100 - 110 V
	SHT 40GM AC 100 - 120 V	UVT 40GM AC 100 - 120 V
	SHT 40GM AC 200 - 230 V	UVT 40GM AC 200 - 230 V
	SHT 40GM AC 380 - 415 V	UVT 40GM AC 380 - 415 V
	SHT 40GM AC 440 - 480 V	UVT 40GM AC 440 - 480 V

External Accessory

		Front Contact (TFG)	Extension (TFH)	
Rotary Handle	Upper Line	TFG 80GM U	TFH 80GM	
	Right Line	TFG 80GM R	TFH 80GM	
	Left Line	TFG 80GM L	TFH 80GM	
		2 Pole	3 Pole	4 Pole
Motor Operator [1)]		-	MOT 80GM DC 24 V	
		-	MOT 80GM AC/DC 110 V	
		-	MOT 80GM AC/DC 240 V	
Terminal Cover	Short	TCF 80GM S3		TCF 80GM S4
	Long	TCF 80GM L3		TCF 80GM L4
Locking Device	Padlock	PLD 40GM	PLD 40GM	PLD 40GM
	Mechanical Interlock	MIF 80GM 3		MIF 80GM R4 / MIF 80GM N4
Interpole Barrier		TQQ 40GM 2	TQQ 40GM 3	TQQ 40GM 4
Auxiliary Handle		THA 48GM		

※ 1) For HGM only.

Order Code of Accessories

HGP Type of Accessory Unit

HGP50/125/160D

Connection Method

Plug-in		3 Pole	4 Pole
TDM (LINE/LOAD)		TDM 16GP P3	-
TDM (LINE Only)		TDM 16GP F3	-
Conn. Block (CBM)		CBM 10GM UNIT	-
CBB BLOCK UNIT		CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		CBBPLATE 16GP	-
PC MALE		PCMALE 16GP	-
Terminal Busbar (TBB)	Straight Busbar	-	-
	Spreader Busbar	-	-
Rear Connection Terminal (RCT)	LINE/LOAD	RCT 16GP F3	RCT 16GP F4
Cage Terminal (CTB)		CTB 16GP 3	CTB 16GP 4

Internal Accessory

	Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts	AUX 16GP R1	ALT 16GP L1
	AUX 16GP R2	-
	Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping	SHT 16GP DC 24 V	UVT 16GP DC 24 V
	SHT 16GP DC 100 - 110 V	UVT 16GP DC 100 - 110 V
	SHT 16GP AC 100 - 120 V	UVT 16GP AC 100 - 120 V
	SHT 16GP AC 200 - 230 V	UVT 16GP AC 200 - 230 V
	SHT 16GP AC 380 - 415 V	UVT 16GP AC 380 - 415 V
	SHT 16GP AC 440 - 480 V	UVT 16GP AC 440 - 480 V

External Accessory

	Extended (TFH)	Front Contact (TFG)	Extension (TFH)
Rotary Handle	Upper Line	TFG 16GP U	TFH 16GP
	Right Line	TFG 16GP R	TFH 16GP
	Left Line	TFG 16GP L	TFH 16GP
		3 Pole / 4 Pole	
Motor Operator		MOT 16GP DC 24 V	
		MOT 16GP AC/DC 110 V	
		MOT 16GP AC/DC 240 V	
		3 Pole	4 Pole
Terminal Cover	Short	TCF 16GP S3	-
	Long	TCF 16GP L3	TCF 16GP L4
Locking Device	Padlock	PLD 16GP	PLD 16GP
	Mechanical Interlock	MIF 16GP 3	MIF 16GP R4
Interpole Barrier		TQQ 16GP 3	TQQ 16GP 4
Auxiliary Handle		-	

HGP100/160/250

Connection Method

Plug-in		3 Pole	4 Pole
TDM (LINE/LOAD)		TDM 25GM P3	-
TDM (LINE Only)		TDM 25GM F3	-
Conn. Block (CBM)		CBM 10GM UNIT	-
CBB BLOCK UNIT		CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		CBBPLATE 10GM	-
PC MALE		PCMALE 25GP-G	-
Terminal Busbar (TBB)	Straight Busbar	TBB 25GP 3S	TBB 25GP 4S
	Spreader Busbar	TBB 25GP 3E45	TBB 25GP 4E45
Rear Connection Terminal (RCT)	LINE/LOAD	RCT 25GP-G F3	RCT 25GP-G F4
Cage Terminal (CTB)		CTB 25GP 3	CTB 25GP 4
Series Busbar (SBB)		SBB 25 GP	SBB 25 GP
Terminal Height Compensation Terminal (STP) [6]		STP 25GP-G 3T2.5 STP 25GP-G 3T4.5	STP 25GP-G 4T2.5 STP 25GP-G 4T4.5

Internal Accessory

		Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts		AUX 25GP L1	ALT 25GP L1
		AUX 25GP R2	ALT 25GP R2
		Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping		SHT 25GP-G DC 24 V	UVT 25GP-G DC 24 V
		SHT 25GP-G DC 100 - 110 V	UVT 25GP-G DC 100 - 110 V
		SHT 25GP-G AC 100 - 120 V	UVT 25GP-G AC 100 - 120 V
		SHT 25GP-G AC 200 - 230 V	UVT 25GP-G AC 200 - 230 V
		SHT 25GP-G AC 380 - 415 V	UVT 25GP-G AC 380 - 415 V
		SHT 25GP-G AC 440 - 480 V	UVT 25GP-G AC 440 - 480 V
Electronic Internal Option	Indicator fault alarm LED	FAL 25GP [1]	
	DC 24 V POWER CABLE [2]	PWC 25GP DC 24 V	
	DC 24 V TERMINAL BLOCK [3]	TB 25GP DC 24 V	
	DC 3.6 V BATTERY	BAT 25GP 10 EA [4]	
		BAT 25GP 1 EA [5]	

External Accessory

		Front Contact (TFG)	Extension (TFH)
Rotary Handle	Upper Line	TFG 25GP U	TFH 25GP
	Right Line	TFG 25GP R	TFH 25GP
	Left Line	TFG 25GP L	TFH 25GP
		3 Pole / 4 Pole	
Motor Operator		MOT 25GP DC 24 V	
		MOT 25GP AC/DC 110 V	
		MOT 25GP AC/DC 240 V	
		3 Pole	4 Pole
Terminal Cover	Short	TCF 25GP-G S3	-
	Long	TCF 25GP-G L3	TCF 25GP-G L4
Locking Device	Padlock	PLD 25GP	PLD 25GP
	Mechanical Interlock	MIF 25GP 3	MIF 25GP R4
Interpole Barrier		TQQ 25GP-G 3	TQQ 25GP-G 4
Auxiliary Handle		-	-
Electronic External Option	TEST KIT	TESTKIT 25GP	
	NFC MODULE	NFCMD 25GP	

※ 1) FAL option for Electronic MCCB replace installation space of SHT/UVT 1 + AUX1 in MCCB internal accessory diagram of 81 page.
2) Applicable to ETU "A", "E" type only, length : 1.5 m
3) Applicable to ETU "A", "E" type only
4) 10 EA plastic wrapped
5) 1 EA plastic wrapped
6) Match of terminal height between old and new model (T2.5 : height 2.5 mm / T4.5 : height 4.5 mm, 3 Pole 3 EA / 4 Pole 4 EA)
7) 1 EA

Order Code of Accessories

HGP Type of Accessory Unit

HGP400/630

Connection Method

Plug-in		3 Pole	4 Pole
TDM (LINE/LOAD)		TDM 63GP P3	-
TDM (LINE Only)		TDM 63GP F3	-
Conn. Block (CBM)		CBM 10GM UNIT	-
CBB BLOCK UNIT		CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		CBBPLATE 63GP	-
PC MALE		PCMALE 63GP	-
Terminal Busbar (TBB)	Straight Busbar	TBB 63GP 3S	TBB 63GP 4S
	Spreader Busbar	TBB 63GP 3E61.5	TBB 63GP 4E61.5
Rear Connection Terminal (RCT)	LINE	RCT 63GP F3 LINE	RCT 63GP F4 LINE
	LOAD	RCT 63GP F3 LOAD	RCT 63GP F4 LOAD
Cage Terminal (CTB)		CTB 63GP 3	CTB 63GP 4
Series Busbar (SBB)		SBB 63 GP	SBB 63 GP

Internal Accessory

		Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts		AUX 63GP L1	ALT 63GP R1
		AUX 63GP L2	-
		AUX 63GP L3	-
		Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping		SHT 63GP DC 24 V	UVT 63GP DC 24 V
		SHT 63GP DC 100 - 110 V	UVT 63GP DC 100 - 110 V
		SHT 63GP AC 100 - 120 V	UVT 63GP AC 100 - 120 V
		SHT 63GP AC 200 - 230 V	UVT 63GP AC 200 - 230 V
		SHT 63GP AC 380 - 415 V	UVT 63GP AC 380 - 415 V
		SHT 63GP AC 440 - 480 V	UVT 63GP AC 440 - 480 V
Electronic Internal Option	Indicator fault alarm LED	FAL 25GP [1]	
	DC 24 V POWER CABLE [2]	PWC 25GP DC 24 V	
	DC 24 V TERMINAL BLOCK [3]	TB 25GP DC 24 V	
	DC 3.6 V BATTERY	BAT 25GP 10 EA [4]	
		BAT 25GP 1 EA [5]	

External Accessory

		Front Contact (TFG)	Extension (TFH)
Rotary Handle	Upper Line	TFG 63GP U	TFH 63GP
	Right Line	TFG 63GP R	TFH 63GP
	Left Line	TFG 63GP L	TFH 63GP
		3 Pole/ 4 Pole	
Motor Operator		MOT 63GP DC 24 V	
		MOT 63GP AC/DC 110 V	
		MOT 63GP AC/DC 240 V	
		3 Pole	4 Pole
Terminal Cover	Short	TCF 63GP S3	-
	Long	TCF 63GP L3	TCF 63GP L4
Locking Device	Padlock	PLD 63GP	PLD 63GP
	Mechanical Interlock	MIF 63GP 3	MIF 63GP R4
Interpole Barrier		TQQ 63GP 3	TQQ 63GP 4
Auxiliary Handle		THA 63GP	THA 63GP
Electronic External Option	TEST KIT	TESTKIT 25GP	
	NFC MODULE	NFCMD 25GP	

※ 1) FAL option for Electronic MCCB replace installation space of SHT/UVT 1 + AUX1 in MCCB internal accessory diagram of 81 page.
2) Applicable to ETU "A", "E" type only, length : 1.5 m
3) Applicable to ETU "A", "E" type only
4) 10 Ea plastic wrapped
5) 1 Ea plastic wrapped

HGP800

Connection Method

Plug-in		3극	4극
TDM (LINE/LOAD)		TDM 80GP P3	-
TDM (LINE Only)		TDM 80GP F3	-
Conn. Block (CBM)		CBM 10GM UNIT	-
CBB BLOCK UNIT		CBB BLOCK UNIT CBB BLOCK UNIT2C	-
CBB PLATE		CBBPLATE 80GP	-
PC MALE		PCMALE 80GP	-
Terminal Busbar (TBB)	Straight Busbar	TBB 80GP 3S	TBB 80GP 4S
	Spreader Busbar	-	-
Rear Connection Terminal (RCT)	LINE	RCT 80GP F3 LINE	RCT 80GP F4 LINE
	LOAD	RCT 80GP F3 LOAD	RCT 80GP F4 LOAD
Cage Terminal (CTB)		CTB 80GP 3	CTB 80GP 4
Series Busbar (SBB)		SBB 80 GP	SBB 80 GP

Internal Accessory

		Auxiliary Switch (AUX)	Alarm Switch (ALT)
Indication Contacts		AUX 63GP L1	ALT 63GP R1
		AUX 63GP L2	-
		AUX 63GP L3	-
		Shunt Trip (SHT)	Under-Voltage Trip (UVT)
Remote Tripping		SHT 63GP DC 24 V	UVT 63GP DC 24 V
		SHT 63GP DC 100 - 110 V	UVT 63GP DC 100 - 110 V
		SHT 63GP AC 100 - 120 V	UVT 63GP AC 100 - 120 V
		SHT 63GP AC 200 - 230 V	UVT 63GP AC 200 - 230 V
		SHT 63GP AC 380 - 415 V	UVT 63GP AC 380 - 415 V
		SHT 63GP AC 440 - 480 V	UVT 63GP AC 440 - 480 V
Electronic Internal Option	Indicator fault alarm LED	FAL 25GP [1]	
	DC 24 V POWER CABLE [2]	PWC 25GP DC 24 V	
	DC 24 V TERMINAL BLOCK [3]	TB 25GP DC 24 V	
	DC 3.6 V BATTERY	BAT 25GP 10 EA [4]	
		BAT 25GP 1 EA [5]	

External Accessory

		Front Contact (TFG)	Extension (TFH)
Rotary Handle	Upper Line	TFG 80GP U	TFH 80GP
	Right Line	TFG 80GP R	TFH 80GP
	Left Line	TFG 80GP L	TFH 80GP
		3 Pole / 4 Pole	
Motor Operator		MOT 80GP DC 24 V	
		MOT 80GP AC/DC 110 V	
		MOT 80GP AC/DC 240 V	
		3 Pole	4 Pole
Terminal Cover	Short	TCF 80GP S3	-
	Long	TCF 80GP L3	TCF 80GP L4
Locking Device	Padlock	PLD 80GP	PLD 80GP
	Mechanical Interlock	MIF 80GP 3	MIF 80GP R4
Interpole Barrier		TQQ 80GP 3	TQQ 80GP 4
Auxiliary Handle		THA 80GP	THA 80GP
Electronic External Option	TEST KIT	TESTKIT 25GP	
	NFC MODULE	NFCMD 25GP	

※ 1) FAL option for Electronic MCCB replace installation space of SHT/UVT 1 + AUX1 in MCCB internal accessory diagram of 81 page.
2) Applicable to ETU "A", "E" type only, length : 1.5 m
3) Applicable to ETU "A", "E" type only
4) 10 EA plastic wrapped
5) 1 EA plastic wrapped

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 environment condition for usage must accurately be 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 exposed places and use cover or packing 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.
  (Exceptionally, the HGM/HGP-MCCB in the original packing can be stored up to - 40 °C.)

Transportation Precautions

⚠ Caution

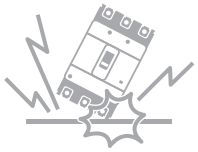
- Do not apply impact during transportation. Dropping or applying strong impact may cause defect.
- Do not handle while holding the circuit breaker's accessory or the external plug-in wire of the accessory. It may cause injury in the handler or a malfunction of the circuit breaker.



- **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 accessory may cause injury.



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



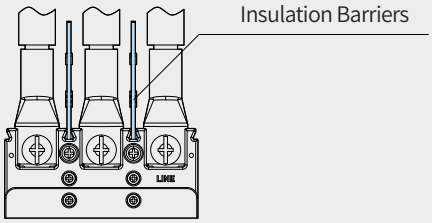
- **Pay attention to the packaging of the circuit breaker before transportation**
  Inappropriate packaging may cause damage in the circuit breaker during transportation.

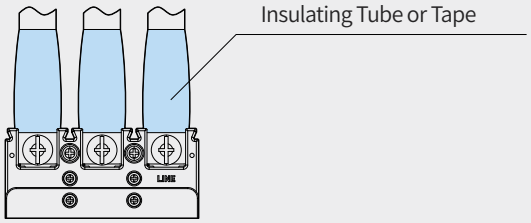
Installation

As for the detailed dimension of each part required for installation, refer to the external structure.

⚠ Caution

- Electrical works shall only be conducted by a person qualified for electrical works.
- For wiring works, the upper circuit breaker must be cut off (OFF) and execute the work after checking that it is not charged.
- In case of disconnecting cable or terminal bar, tighten the terminal screw firmly at the standard tightening torque.
  In case the terminal screw is tightened loosely, it may cause damage and fire due to overheating.
- Strictly insulate up to the circuit breaker's portion with terminal barrier, insulating tube, insulating tape and others between bare conductors with regards to the front connection of the circuit breaker.
  In case it is not insulated, it may cause short circuit.





- Secure sufficient arc space (Insulation distance) so that the arc gas discharge outlet is not blocked.
  In case this discharge outlet is blocked, the current may not be blocked.
- Do not install the circuit breaker in abnormal environment such as high temperature, high humidity, dust, corrosive gas, vibration, impact and others. It may cause fire or abnormal trip.
- Install so that foreign substances (Metal powder, concrete powder etc.), rainwater and others do not enter the circuit breaker.
  Such foreign substances in the circuit breaker may cause fire or malfunction.
- In case of 4 pole circuit breaker, the neutral wire of 3 phase 4 wire must be connected to the N phase (Right end part of the circuit breaker.
- When mounting the product, the live part (LINE) signal must be connected to the live part and the load part (LOAD) signal must be connected to the load part. Wrong connection may cause damage in product and electric shock.
- In case the insulation barrier is not mounted between the circuit breaker terminals, it may cause secondary short-circuit accidents so it must be used.

Handling and Maintenance Inspection

Installation

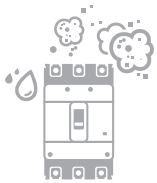
Installation Precautions

- **Install the circuit breaker in a place that satisfies the following environment conditions**
  Installing the circuit breaker in places and environment other than the following may cause malfunction of circuit breaker, fire and others.

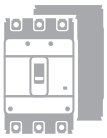
  - Ambient temperature should be within -5 °C to +50 °C degrees. (The default MCCB based on 40 °C ambient temperture. 50 °C products have a separate code and temperature correction table. If the ambient temperature is - 40 °C to - 5 °C, the HGM/HGP MCCB can be used under limited conditions.)
  - Relative humidity to be within 45 ~ 85 %
  - Excessive vibration or impact to be avoided
  - True height 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

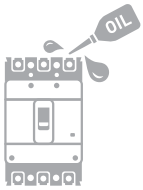


- **The insulation plate attached to the bottom of the circuit breaker must not be separated**
  It may destroy insulation and drop the insulation performance.

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.



- **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.



- **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.



- **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.



- **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.



- **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.

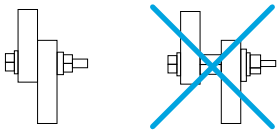
Connection Precautions

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

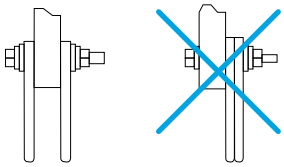
Impact Electromagnetic Force per 1 m Conductor

Regulated Short-Circuit Current kA (Power Factor)	Electromagnetic 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 (5,220)	25,595 (2,510)
100 (0.2)	70,804 (7,220)	35,402 (3,610)
125 (0.2)	110,815 (11,300)	55,408 (5,650)

- **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.

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 must be made if the rated voltage and breaking capacity of the circuit breaker are correct
- When the insulation resistance is measured using a 500 V insulation-resistance tester, it must be above 5 MΩ

Withstand Voltage

Main Circuit		Auxiliary Circuit or Control Circuit [1]	
Rated Insulation Voltage	Test Voltage (Effective Value of Interchange)	Rated Insulation Voltage of Operational Circuit	Test Voltage (Effective Value of Interchange)
Ui ≤ 300 V	2,000 V for 1 min	Uis ≤ 60 V	1,000 V for 1 min
300 < Ui ≤ 600 V	2,500 V for 1 min	60 V < Uis ≤ 600 V	2·Uis 1,000 V (최소 1,500 V) for 1 min

※ Based on the above mentioned table, do not conduct withstand voltage test above it.
1) Between terminal and grounding

Handling and Maintenance Inspection

Maintenance Inspection

Regular Inspection

Inspection shall be conducted once in 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 of 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	・Inspect tightening of terminal screw, conductor connecting screw	・Tighten according to the specified torque Ensure that it is not tightened excessively
Dust and Foreign Substance	・Check for foreign substance such as dust on the circuit breaker's surface, especially the top of the live part. There must be no dust or foreign substance to secure insulation distance	・Remove dust, foreign substance and others using cloth with clean surface types (Do not use thinner or detergent)
Damage in Mold Case	・Check for damage or crack on the circuit breaker's cover and base	・Replace circuit breaker
Arc Exhaust Hole	・Check for pollution in the arc exhaust hole	・If there are burns or excessive pollution due to melted metal particles and others, replace the circuit breaker
Switch Operation	・If the circuit breaker was maintained at closed state at normal times, operate the switch multiple times. Friction caused by hardened grease and others will be reduced and the contact resistance can be stabilized ・Press the trip button to trip the circuit breaker multiple times	・If there is a problem in the switch operation of the circuit breaker, replace or contact the nearest store ・If the specified limit value of the switch operation has exceeded, replace
	・If internal options were installed in mccb, the options should be checked when mccb is in switch operation	・If there is a internal option problem in the swtich operation, replace
Discoloration of Terminal Part	・Check for severe discoloration in the terminal part or conductor part ・If there is severe discoloration in the copper conductor or silver coated part, check the insulation performance caused by thermal damage	・Slight discoloration in the silver coated part is not a problem. If there is a problem in insulation due to thermal damage, replace the circuit breaker
Insulation Resistance	・Separate all conductors connected to the circuit breaker and measure the insulation resistance between the poles, terminals and groundings	・If the insulation resistance is not more than 5 MΩ, replace

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.

Detailed inspection and management of items when installed and used on a ship

- Special : A situation where fault current is cut off or abnormal trip occurs
- Usually : Within 2 years of installation
- Thorough : More than 3 years after installation

Inspection Part	Inspection Items	Inspection Cycle			Inspection Details	Note
		Special	Usually	Thorough		
Terminal and mold of MCCB	Inspection of appearance	After the fault current cut off	1 month		1) Procedures : Check for damage and dust of mold cover near the terminal of MCCB 2) Judgement : There must be no crack and damage ⚠ **CAUTION** If the part of the terminal is contaminated with object(debris, concrete powder, iron powder, etc.), it may occur accident(short-circuit, fire, etc.). so it needs to be replaced. ⚠ **CAUTION** Install Insulation barriers between terminals of the circuit breaker. Otherwise, short-circuit may be occurred.	Inspect under power outage
ETU	Measuring test	After the fault current cut off	1 month		1) Procedures : Compare the measured value of the phase current with the measured value of ETU using the phase current meter 2) Judgement : Within a 5% margin of measurement error ⚠ **CAUTION** If there is a large margin of error, it can cause a malfunction or trip. So it needs to be replaced.	Inspect while energized
AUX/ALT	Inspection of operating		1 month		1) Procedures : When the mechanism is in ON/OFF/Trip status, check for normal operation under each condition 2) Judgement : Normal operations under each condition	Inspect under power outage
SHT			1 year		1) Procedures : When applying the SHT voltage of 70%, check for trip of MCCB 2) Judgement : MCCB must be tripped normally ⚠ **CAUTION** If the SHT does not operate within the standard, it may cause a malfunction in an emergency. In this case, it needs to be replaced.	Inspect under power outage
UVT			1 year		1) Procedures : - When applying the UVT voltage of 35%, check for a trip - When applying the UVT voltage of 85%, check for a operation of the RESET/ON/OFF function 2) Judgement : Normal operations under each condition	Inspect under power outage
ETU		After the fault current cut off	1 year		1) Procedures : Please use the ETU TEST KIT and check for trip of MCCB 2) Judgement : MCCB must be tripped normally ⚠ **CAUTION** If the ETU does not trip, it needs to be replaced.	Inspect under power outage
Mechanism		After the fault current cut off	1 year		1) Procedures : - ON/OFF operation test, correct positioning when OFF, and test of energization status - Check the operation of the trip button and ensure it is in the correct position 2) Judgement : Normal operations under each condition	Inspect under power outage
Terminal of MCCB	Tightening torque	After the fault current cut off	1 year		1) Procedures : Check and mark the engagement using the torque gauge 2) Judgement : It shall conform to the torque criteria - Round-headed cross-groove screw M5 : 28.5kg·cm - InHex M8 : 60kg·cm - Hex M8 : 110kg·cm - Hex M10 : 200kg·cm - Hex M12 : 400kg·cm ⚠ **CAUTION** Tighten the terminal screw in proper torque regularly to prevent overheating.	Inspect under power outage
Terminal of MCCB	Temperature	After the fault current cut off		3 years	1) Procedures : Please use a contact thermometer (Type K) to measure the exposed part of the line/load terminal 2) Judgement : A rise in temperature : 80K, Maximum temperature within. 120°C ⚠ **CAUTION** If the terminal temperature exceeds the product specification, it may occur due to plastic deterioration. It is necessary to replace the product.	Inspect while energized
Terminal and mold of MCCB	Insulation characteristics	After the fault current cut off		3 years	1) Procedures : Please use a insulation resistance measuring device (DC 1000V) to test the insulation resistance between the poles, terminals, and groundings 2) Judgement : Insulation resistance ≥ 5 MΩ ⚠ **CAUTION** If the insulation resistance of the circuit breaker is not sufficient, an accident may occur. And it is necessary to replace the product.	Inspect under power outage
Contacts and arc extinguishing part		After the fault current cut off		3 years	1) Procedures : Please use the impulse voltage measuring device to measure the leakage current of each phase after switching off the circuit breaker 2) Judgement : Leakage current ≤ 1mA ⚠ **CAUTION** If the insulation resistance of the circuit breaker is not sufficient, an accident may occur. And it is necessary to replace the product.	Remove the panel and inspect it under power outage

Handling and Maintenance Inspection

Maintenance Inspection

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

Current Status of Acquired Standards

Approvals & Certificates

MCCB

Type of Certification		Approvals				Certificates
Type of Standard		Safety Certificate	KS	IEC	GB	DEKRA
Mark						
Testing Institute		KETI	KS	CE	GB 1984	DEKRA
Certification Country		Korea	Korea	Europe	China	Netherlands
HGM30	E	●	●	●	●	●
	S	●	●	●	●	●
HGM50	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM60	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM100	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM125	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM160	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM250	E	●	●	●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	L	●	●	●	●	●
HGM400	E	●	●	●		●
	S	●	●	●	●	●
	H	●	●	●		●
	L	●	●	●	●	●
HGM630	E		●	●		●
	S		●	●	●	●
	H		●	●		●
	L		●	●	●	●
HGM800	S		●	●	●	●
	H		●	●		●
	L		●	●	●	●

Current Status of Acquired Standards

Approvals & Marine Certificates

MCCB

Type of Certification		Vessel							
Type of Standard		Korea	U.K	France	U.S.A	Germany	Russia	Italy	Japan
Mark		KR KOREAN REGISTER	Lloyd's Register	BUREAU VERITAS	ABS	DNV·GL	RMRS	RINA	ClassNK
Testing Institute		KR	LR	BV	ABS	DNV·GL	RMRS	RINA	NK
Certification Country		Korea	U.K	France	USA	Germany	Russia	Italy	Japan
HGM30	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
HGM50	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM60	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM100	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM125	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM160	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM250	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM400	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM630	E	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●
HGM800	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	L	●	●	●	●	●	●	●	●

Approvals & Certificates

ELCB

Type of Certification		Approvals			Certificates
Type of Standard		Safety Certificate	KS	IEC	IEC
Mark					
Testing Institute		KETI	KS	CE	DEKRA
Certification Country		Korea	Korea	Europe	Netherlands
HGE30	E	●	●	●	●
	S	●	●	●	●
HGE50	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE60	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE100	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE125	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE160	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE250	E	●	●	●	●
	S	●	●	●	●
	H	●	●	●	●
	L	●	●	●	●
HGE400	E	●	●	●	
	S	●	●	●	
	H	●	●	●	
	L	●	●	●	
HGE630	E		●	●	
	S		●	●	
	H		●	●	
	L		●	●	
HGE800	S		●	●	
	H		●	●	
	L		●	●	

Current Status of Acquired Standards

Approvals & Certificates

MCCB

Type of Certification		Approvals				Certificates
Type of Standard		Safety Certificate	KS	IEC	GB	IEC
Mark						
Testing Institute		KETI	KS	CE	GB	DEKRA
Certification Country		Korea	Korea	Europe	China	Netherlands
HGP50D	F*			●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	X	●	●	●		●
HGP125D	F*			●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	X	●	●	●	●	●
HGP160D	F*			●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	X	●	●	●		●
HGP100	F*	●		●	●	●
	S	●		●	●	●
	H	●		●	●	●
	X	●		●		●
HGP160	F*	●		●	●	●
	S	●		●	●	●
	H	●		●	●	●
	X	●		●		●
HGP250	F*			●	●	●
	S	●		●	●	●
	H	●		●	●	●
	X	●		●		●
HGP400	F*			●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	X	●	●	●		●
HGP630	F*			●	●	●
	S	●	●	●	●	●
	H	●	●	●	●	●
	X	●	●	●		●
HGP800	F*			●	●	●
	S		●	●	●	●
	H		●	●	●	●
	X		●	●		●

※ * F type is for overseas sales.
※ Please refer to the certificate for specifications of certified products.

Approvals & Marine Certificates

MCCB

Type of Certification		Vessel							
Type of Standard		Korea	U.K	France	U.S.A	Germany	Italy	Japan	Russia
Mark		KR KOREAN REGISTER	Lloyd's Register	BUREAU VERITAS	ABS	DNV·GL	RINA	ClassNK	
Testing Institute		KR	LR	BV	ABS	DNV·GL	RINA	NK	RMRS
Certification Country		Korea	U.K	France	USA	Germany	Italy	Japan	Russia
HGP50D	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP125D	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP160D	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP100	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP160	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP250	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP400	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP630	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●
HGP800	F*	●	●	●	●	●	●	●	●
	S	●	●	●	●	●	●	●	●
	H	●	●	●	●	●	●	●	●
	X	●	●	●	●	●	●	●	●

※ * F type is for overseas sales.

HG
MAGNETIC CONTACTORS & OVERLOAD RELAYS

Overview and Characteristics		4
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Model Selection Table	Model Selection Table	32
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MS

HG Series

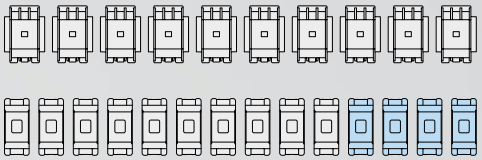
Magnetic Contactors & Overload Relays

Motor protection control solution that can be applied to various industrial equipment with strong durability and enhanced insulation performance!



Reduced Installation Area with upper Auxiliary Contact Structure

In the installation area for 10 units previously, 4 additional units can be installed with HG MC!



Various Product Ranges

18 AF ~ 800 AF (8 Frames)

Rated Insulation Voltage (Ui)

HGC 50 A ~ 800 A

Direct Connection with Overload Relay

HGT 18 AF ~ 800 AF

Auxiliary Relay – Power Consumption Power Saving Type

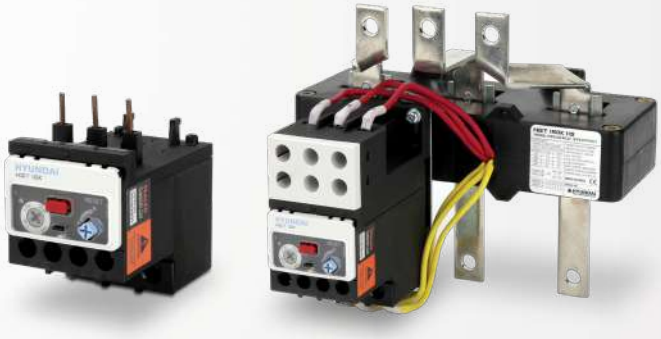
HGC DC : Permanent Magnet Applied

TOR Safety Protection Cover and Separated Test, Reset Buttons

Removable cover has been applied for safety.

AC/DC Free Voltage

HGC 115 A ~ 800 A







Overview and Characteristics

Product Characteristics

- Magnetic contactor is usually used for motor and equipment operation control and is applied to MCC and Thermal and Hydro power Panel.
- Hyundai provides a wide range of 9 A ~ 800 A of magnetic contactors and thermal/magnetic overload relays.

User Convenience
- User-Centered Design
- Compact Product and Convenient Wiring/ Compatibility

Product Design
- Modular, Compact Design
- 30 % Compact Compared to the Previous Model



Technical Characteristics
- Optimized Structure
- IEC Standard

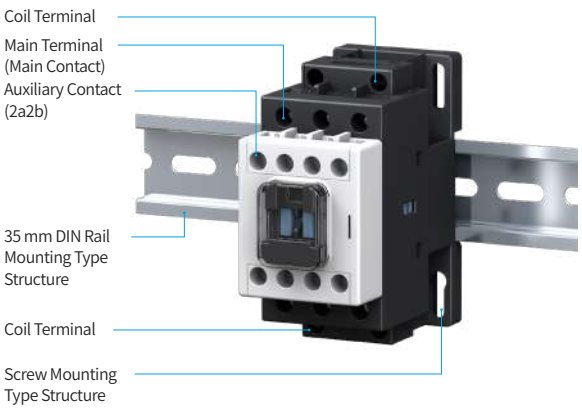
Product Reliability
- Quality Stabilization
- Specialized Design and Product Structure

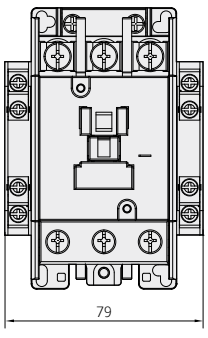
User Convenience

- Up/down allocation of coil terminal
- Built-in auxiliary contact
  - HGC9 ~ HGC40 : 1a1b or 2a2b
  - HGC50 ~ HGC100 : 2a2b

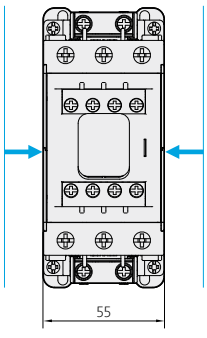
Product Design

- Reduced installation area with upper auxiliary contact structure
  - Space for 10 units of UMC65 (Based on 2a2b)
    → 14 units of HGC65 can be mounted





UMC65AF



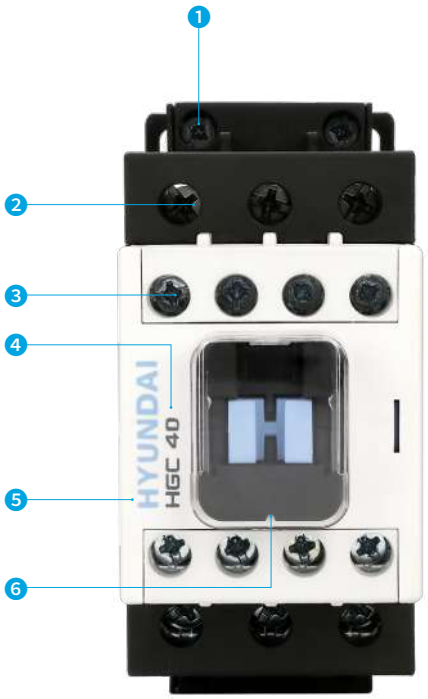
HGC65AF

Technical Characteristics

- IEC60947-4-1 (2012) applied
- CB/CCC/Classification Certificate (7) acquired

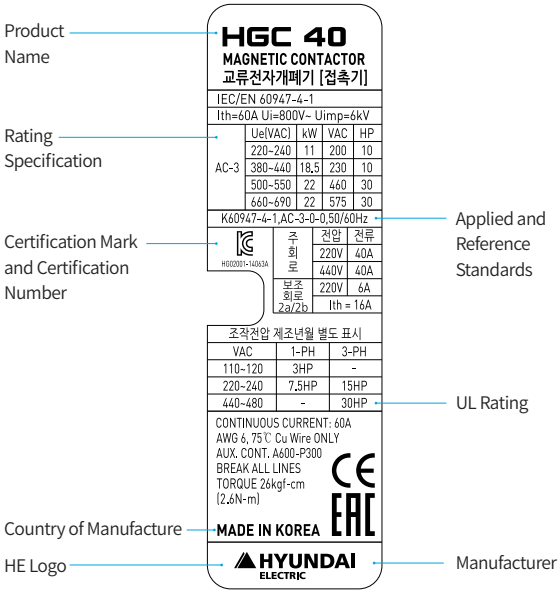
Technical Data

External Structure (Magnetic Contactor)





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



External Structure (Thermal Overload Relay)

Protection Cover

- The front of the operating mechanism is protected by a transparent cover so that the set current value and the reset operation method cannot be manipulated by object.
- To change the setting, lift the transparent cover.

Test Button

- Pressing the test button during emergency stop during motor operation will open the contact with the magnetic contactor and stop the motor.
- When testing the contact operation of the thermal overload relay, if the test button is pulled up, the contact switching is made so that rapid test is possible.

Current Setting Knob

The rated current setting can be set in 3 stages by using the +/-screw driver.

Reset Button

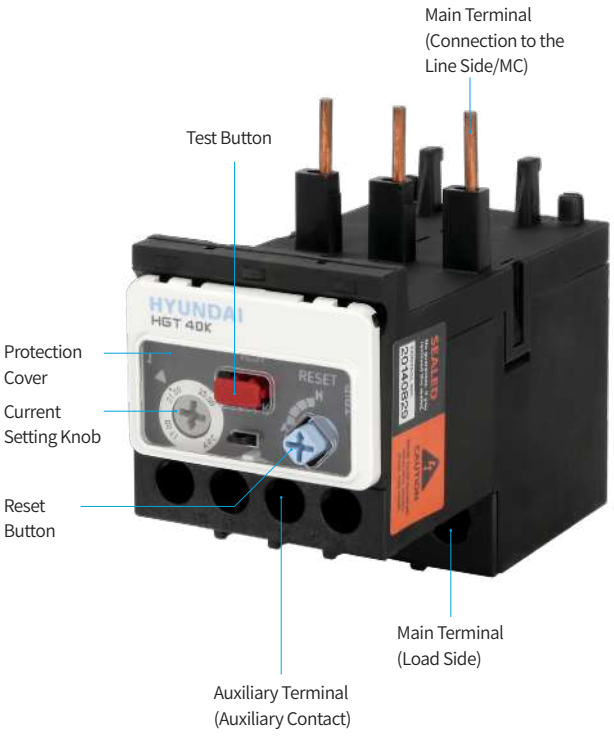
- A (Auto) Mode : Auto Reset
- H (Manual) Mode : Manual Reset

Main Circuit Terminal

Screw type of terminal is the standard model.

Safety Reinforcement of TOR

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





MC

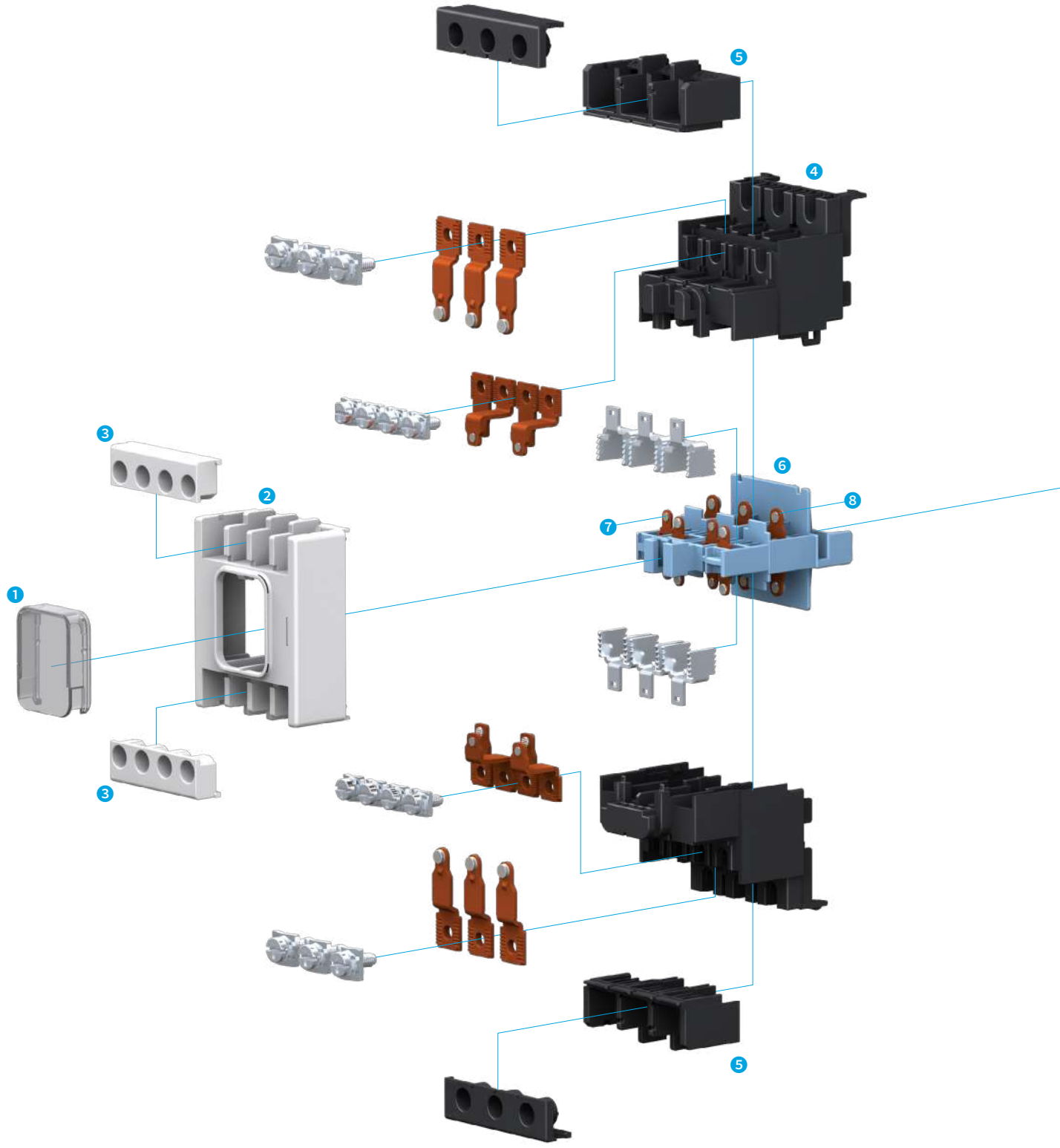


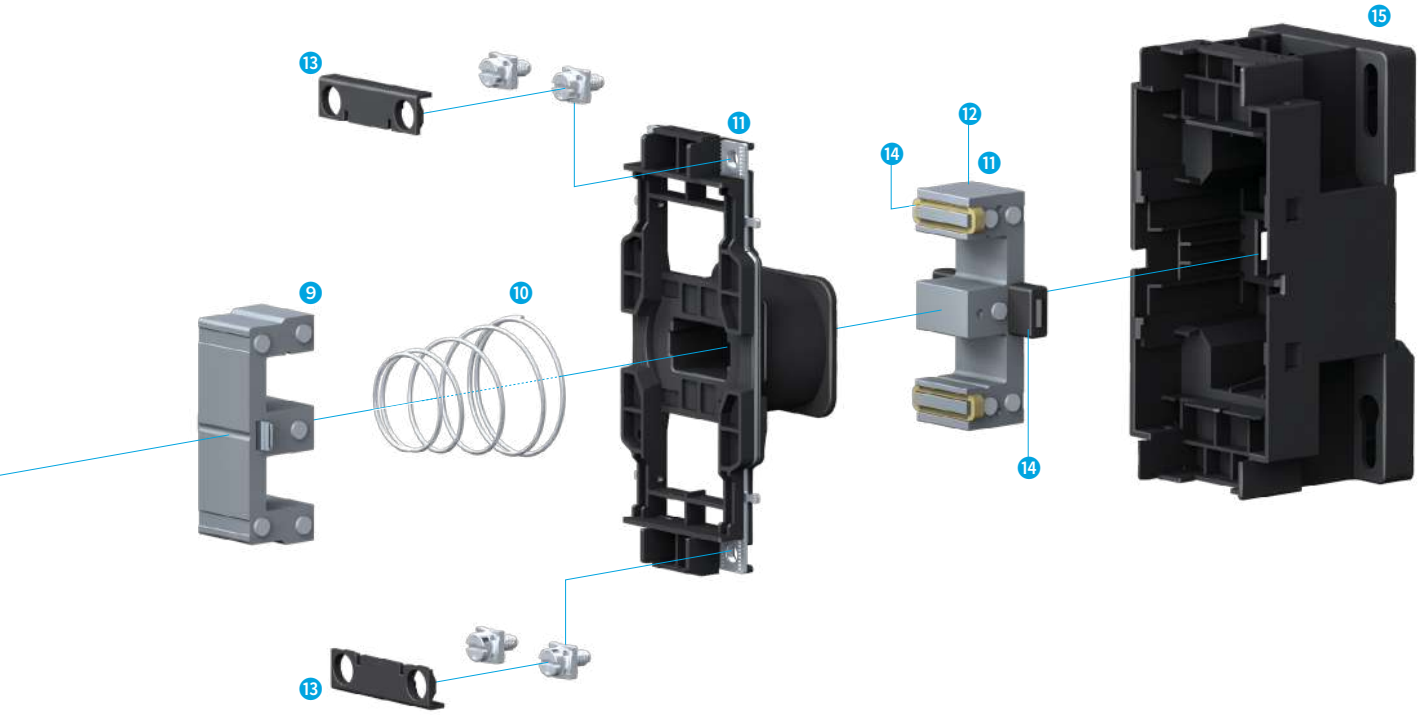
TOR

Technical Data

Internal Structure

Magnetic Contactor [9 ~ 100 AF]





1. Safety Cover : Safety cover that prevents the contact bridge from being pressed arbitrarily
2. Top Cover : Assembles arc chamber, auxiliary contact part is built in
3. Aux. Protection Cover : Safety cover to protect the user from auxiliary contact parts
4. Arc Chamber : Arc extinguishing device to prevent On/Off Arc
5. Screw Terminal : Device for mounting terminals
6. Contact Bridge : Assembled to a moving core and moving contact, it engages in on/off operation and the accessory mounting hole is built in
7. Aux. Contact : Operational part of the auxiliary contact terminal
8. Moving Contact : Operational part of the main contact terminal
9. Moving Core : When power is supplied to the coil, the moving core slides into the fixed core and the magnetic contact is closed
10. Return Spring : When the coil is de-energized, it separates the moving core from the fixed core
11. Coil Ass'y : The current flowing part to make the fixed core magnetized by supplying power
12. Fixed Core : The component that becomes magnetized when the power is supplied to the coil
13. Coil Protection Cover : Safety cover to protect the user from the current flowing part of the coil terminal
14. Rubber Damper : Device that absorbs the On/Off impact of the magnetic contact
15. Frame : Lower part of the magnetic contact built with the coil and fixed core

Technical Data

Magnetic Contactor [9 ~ 100 AF]

Enhanced Safety

Front Protection Cover

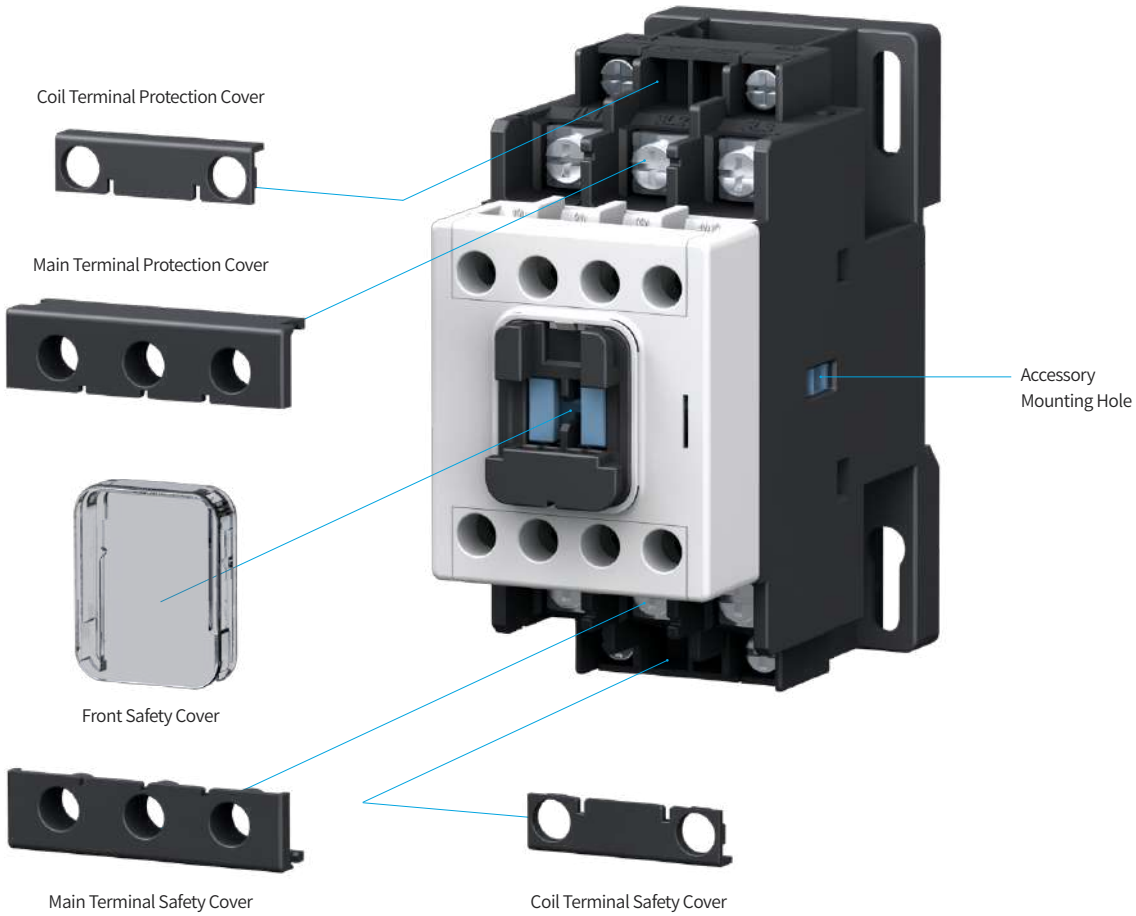
- Minimize the input of foreign substance
- Prevent malfunction caused by user's mistake

Enclosed Structure of Mounting Hole for Accessories

- Contact bridge creates sealed structure when MC is on/off

Removable Protection Cover

- For main terminal, auxiliary terminal, coil terminal
- Protection degree, IP20



Improved Customer Convenience

Built-In Upper Arrayed Auxiliary Contact

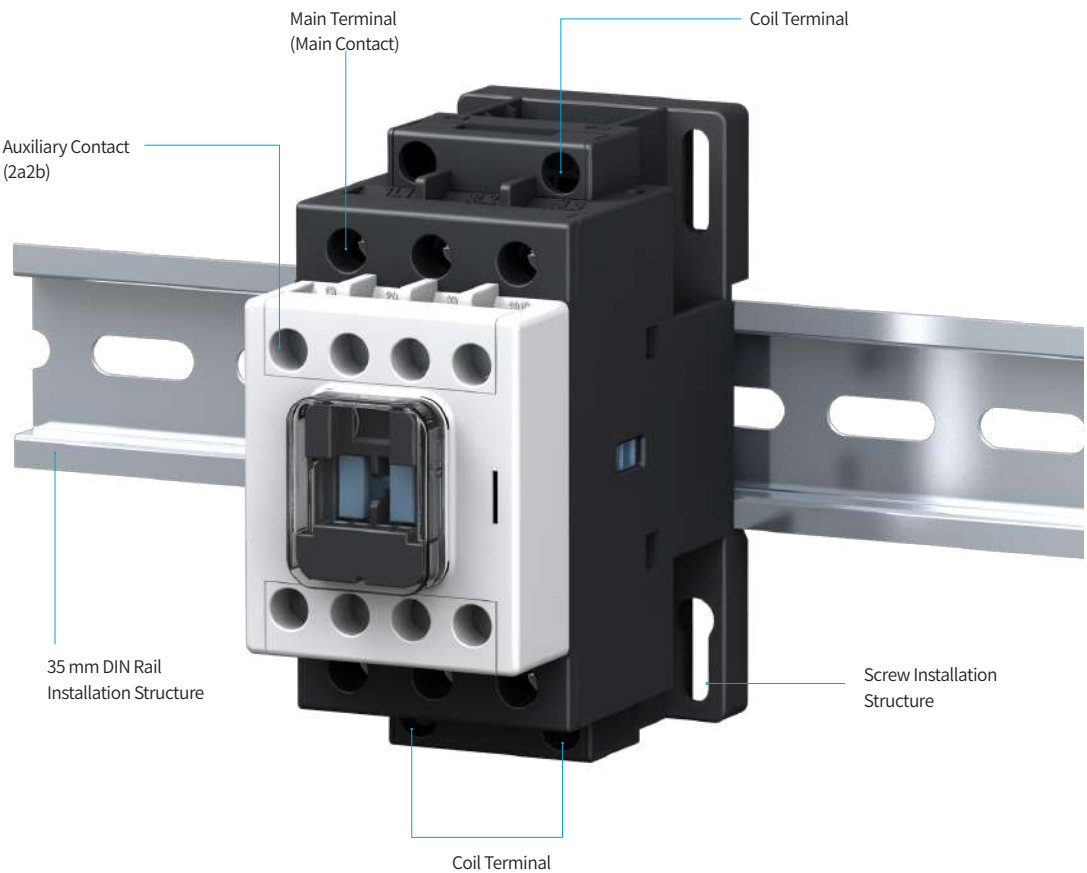
・2a2b standard built-in type easy wiring control circuit

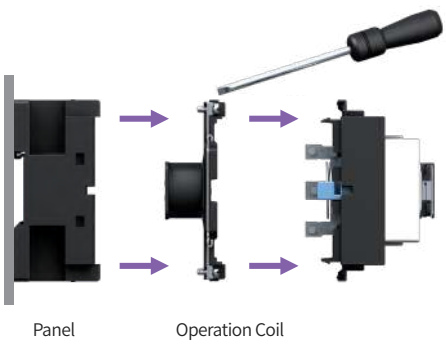
Easy Coil Replacement Structure

・Easy separation and replacement when it is attached to the panel

Various Mounting Methods

・Can be installed in Din Rail and Screw





Technical Data

Magnetic Contactor [115 ~ 800 AF]

Convenient Replacement of Operational Coil

- Easy separation and replacement of operational coil when it is attached to the panel
- The method of fixing the coil unit using a plastic case
  - Minimize the movement of the coil unit

Designed to Reduce Noise

- DC excitation method using magnetic circuit

Free Voltage of Coil Operation Power

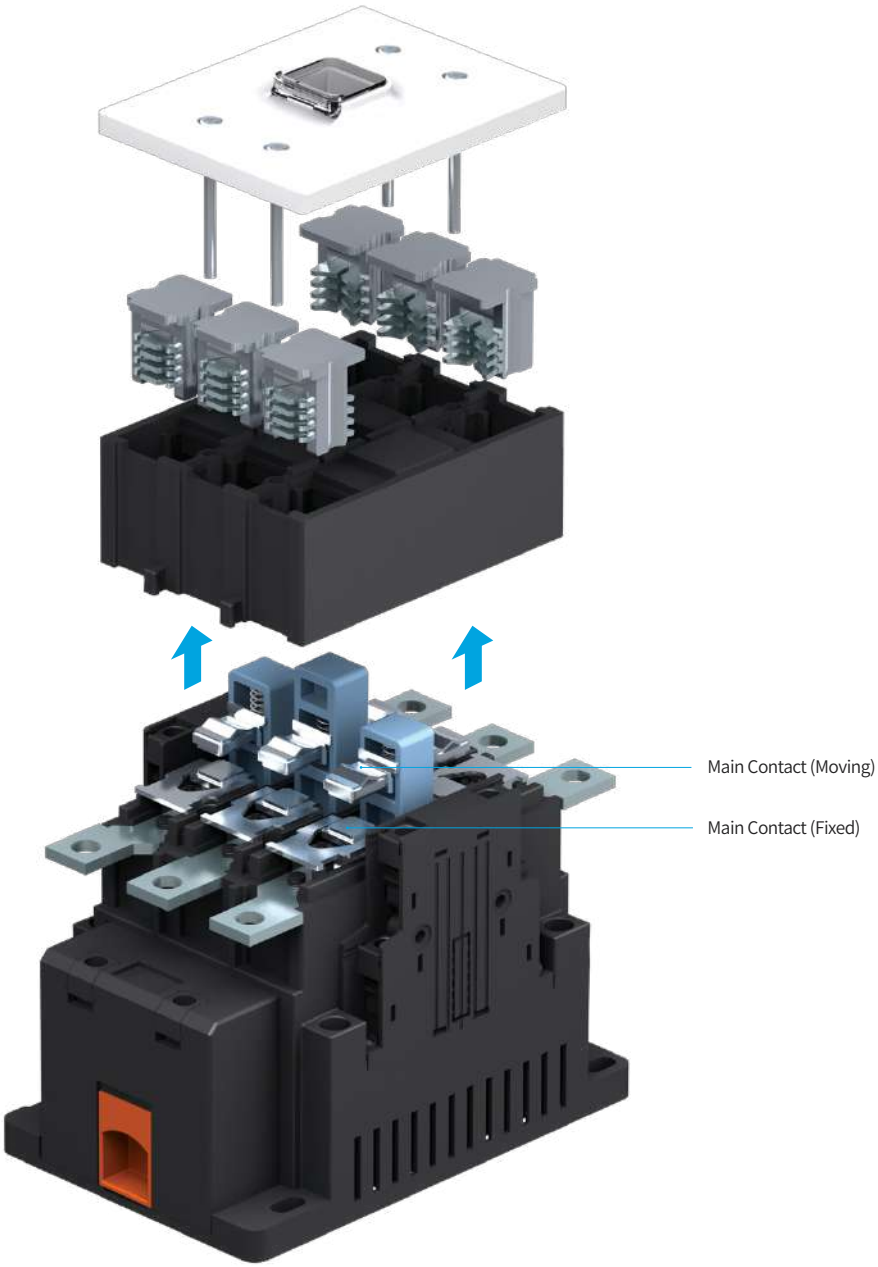
Nominal Voltage	Rated Voltage (AC/DC)
24 V	AC : 24 ~ 26 V, DC : 24 V
48 V	AC : 44 ~ 52 V, DC : 48 V
220 V	AC : 100 ~ 240 V, DC : 110 ~ 220 V
440 V	AC : 380 ~ 450 V

※ Based on HGC115 ~ 265



Easy Maintenance and Replacement for Main Contacts

- When the upper cover is removed, the main contact parts are revealed, enabling easy inspection and replacement of them from outside.



Technical Data

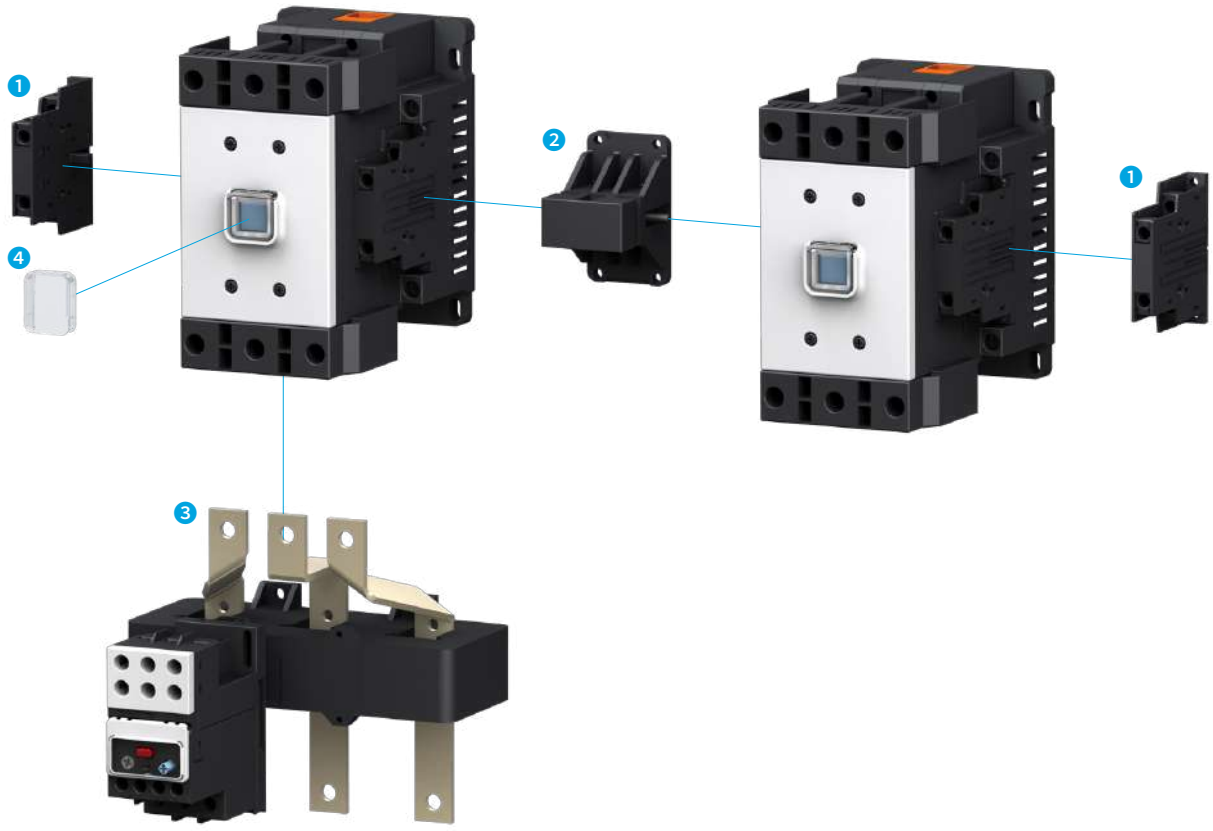
Accessories of Magnetic Contactor [9 ~ 100 AF]



9 ~ 100 AF Accessories

1. Auxiliary Contact Block (Front) HGC TB
2. Auxiliary Contact Block (Side) HGC SB
3. Mechanical Latching Block HGC LB 100
4. Timer HGC ET
5. Interlock Unit HGC IU
6. Surge Absorber HGC RC/CD
7. Thermal Overload Relay HGT
8. Installation Unit HGTMB
9. Front Protection Cover HGCFC 100

Accessories of Magnetic Contactor [115 ~ 800 AF]



115 ~ 800 AF Accessories

1. Auxiliary Contact Block HGC SB
2. Interlock Unit HGC IU
3. Thermal Overload Relay HGT
4. Front Protection Cover HGCFC

Technical Data

Operational Coil Ratings

HGC

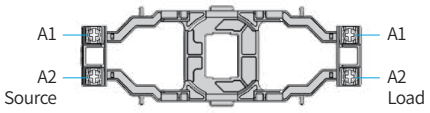
Magnetic Contactor Model Name				HGC9	HGC12	HGC18	HGC25	HGC32	HGC40	HGC50	HGC65	HGC75	HGC85	HGC100
Power Consumption														
AC, DC	AC Operation (220 V/60 Hz)	Closed	VA	80	80	80	80	80	80	200	200	300	300	300
		Maintained	VA/W	11/2.75	11/2.75	11/2.75	11/2.75	11/2.75	11/2.75	16/5.3	16/5.3	25/10	25/10	25/10
	DC Operation	Closed	W	10	10	10	10	10	10	200	200	350	350	350
		Maintained	W	10	10	10	10	10	10	5	5	8	8	8
Both AC·DC	AC Operation (220 V/60 Hz)	Closed	VA	-	-	-	-	-	-	-	-	-	-	-
		Maintained	VA/W	-	-	-	-	-	-	-	-	-	-	-
	AC Operation (110 V/60 Hz)	Closed	VA	-	-	-	-	-	-	-	-	-	-	-
		Maintained	VA/W	-	-	-	-	-	-	-	-	-	-	-
	DC Operation	Closed	W	-	-	-	-	-	-	-	-	-	-	-
		Maintained	W	-	-	-	-	-	-	-	-	-	-	-
Operating Time														
AC, DC	When Closed, Coil On → Main Contact On	AC	msec	12 ~ 30	12 ~ 30	12 ~ 30	12 ~ 30	12 ~ 30	12 ~ 30	9 ~ 18	9 ~ 18	15 ~ 30	15 ~ 30	15 ~ 30
		DC		45 ~ 55	45 ~ 55	45 ~ 55	45 ~ 55	45 ~ 55	45 ~ 55	10 ~ 18	10 ~ 18	15 ~ 30	15 ~ 30	15 ~ 30
Both DC·AC		AC		-	-	-	-	-	-	-	-	-	-	-
		DC		-	-	-	-	-	-	-	-	-	-	-
AC, DC	When Blocked, Coil Off → Main Contact Off	AC		8 ~ 15	8 ~ 15	8 ~ 15	8 ~ 15	8 ~ 15	8 ~ 15	13 ~ 20	13 ~ 20	13 ~ 20	13 ~ 20	13 ~ 20
		DC		6 ~ 18	6 ~ 18	6 ~ 18	6 ~ 18	6 ~ 18	6 ~ 18	13 ~ 20	13 ~ 20	13 ~ 20	13 ~ 20	13 ~ 20
Both DC·AC		AC		-	-	-	-	-	-	-	-	-	-	-
		DC		-	-	-	-	-	-	-	-	-	-	-
Operation TR														
AC, DC		Min. Capacity	VA	60	60	60	60	60	60	150	150	200	200	200
Both DC·AC				-	-	-	-	-	-	-	-	-	-	-

Type of Operation Coil Voltage

1. Voltage : 85 ~ 110 %
   (Drop-out Voltage : 20 ~ 60%)
2. Exceeding the rated voltage causes damage in coil and electronic parts, ultimately reducing the product performance.
3. If operational voltage other than the rated voltage is required, it can be customized. Contact our company upon order.

Item	Operational Voltage
AC 50 Hz	24, 48, 110, 120, 220, 240, 380, 440 V
AC 60 Hz	24, 48, 110, 120, 220, 240, 380, 440 V
DC	24, 48, 110, 125, 220 V

※ The operating time of the product for both DC/AC is the average data based on AC 220 V 60 Hz, DC 110 V. As for HGC9-100, the A1 and A2 terminal at the live and load side is not separately respectively and as it is common (connected), ensure that short-circuit does not occur during wiring.



Auxiliary Contact Ratings

IEC 60947

Rated Insulation Voltage (Ui)	AC 750 V							
Rated Operational Current (Ith)	16 A							
Minimum load	10 mA at 24 V DC							
Rated Current	AC12 (Resistive Load)		AC15 (Coil Load)		DC12 (Resistive Load)		DC13 (Coil Load)	
	110 V	10 A	110 V	6 A	24 V	4 A	24 V	4 A
	220 V	8 A	220 V	4 A	48 V	2.5 A	48 V	2.5 A
	440 V	6 A	440 V	3 A	125 V	1.1 A	125 V	1.1 A
	690 V	2 A	690 V	2 A	220 V	0.3 A	250 V	0.3 A

HGC115	HGC130	HGC150	HGC185	HGC225	HGC265	HGC300	HGC400	HGC500	HGC630	HGC800
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
530	530	530	360	360	360	390	390	390	1,700	1,700
14/7.2	14/7.2	14/7.2	15/9.4	15/9.4	15/9.4	18/11.2	18/11.2	18/11.2	54/33.5	54/33.5
240	240	240	250	250	250	250	250	250	850	850
3.3/2.1	3.3/2.1	3.3/2.1	6.4/4.4	6.4/4.4	6.4/4.4	6.4/4.4	6.4/4.4	6.4/4.4	10.5/8	10.5/8
193	193	193	420	420	420	420	420	420	850	850
2.6	2.6	2.6	3.4	3.4	3.4	3.4	3.4	3.4	9.5	9.5
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	40 ~ 80	45 ~ 150	45 ~ 150
70 ~ 80	70 ~ 80	70 ~ 80	35 ~ 45	35 ~ 70	35 ~ 70	35 ~ 70	35 ~ 70	35 ~ 70	45 ~ 150	45 ~ 150
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
18 ~ 25	18 ~ 25	18 ~ 25	40 ~ 50	40 ~ 50	40 ~ 50	35 ~ 50	35 ~ 50	35 ~ 50	45 ~ 150	45 ~ 150
15 ~ 20	15 ~ 20	15 ~ 20	35 ~ 45	35 ~ 45	35 ~ 45	35 ~ 45	35 ~ 45	35 ~ 45	45 ~ 150	45 ~ 150
-	-	-	-	-	-	-	-	-	-	-
200	200	200	200	200	200	200	200	200	1,000	1,000

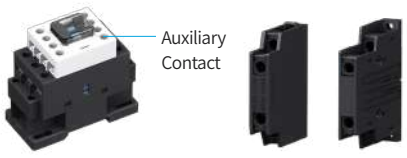
AC/DC

Nominal Voltage	AC	DC
220 V	100 ~ 240 V	110 ~ 220 V
440 V	380 ~ 450 V	-

AC/DC

Nominal Voltage	AC	DC
110 V	100 ~ 127 V	100 ~ 110 V
220 V	200 ~ 240 V	200 ~ 220 V
440 V	380 ~ 450 V	-

UL and CSA

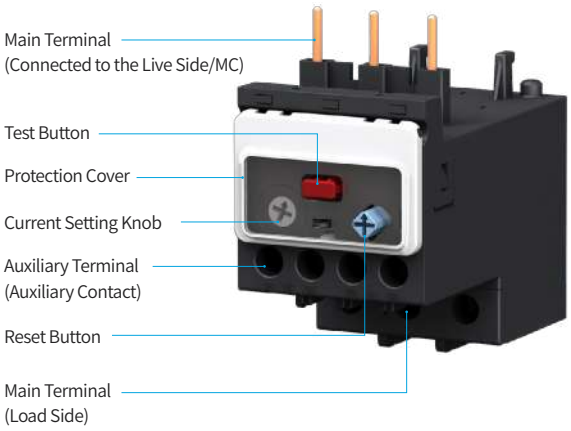


Current	16 A			
Minimum load	10 mA at 24 V DC			
	AC		DC	
Rated Current	120 V	6 A	125 V	1.1 A
	240 V	3 A	250 V	0.3 A
	480 V	1.5 A	440 V	0.2 A
	600 V	1.2 A	600 V	0.2 A

※ Contact Rating Code : A600 ~ P150

Technical Data

Structure and Characteristics of Thermal Overload Relay





Test Button

- Pressing the test button for emergency stop during motor operation will open the magnetic contact and stop operation.
- To test the contact operation of the thermal overload relay, the test button can be pulled up to change the contact status for prompt testing. The voltage supplied for the power consumption of the coil, capacitance of control circuit and others need to be reviewed to apply an appropriate conductor length within the limit.

Reset Button

- A (Auto) Mode : Auto Reset
- H (Manual) Mode : Manual Reset



Protection Cover

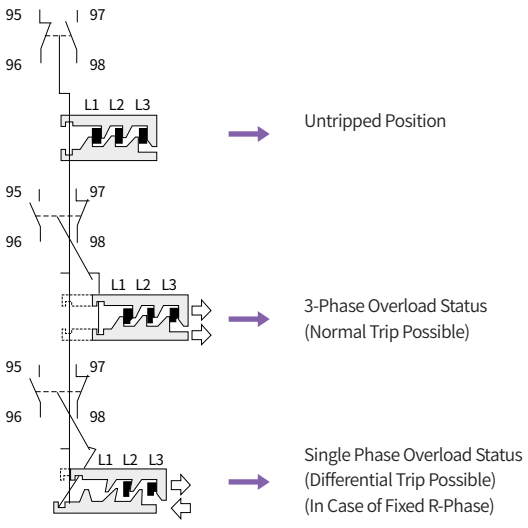
- The front of the operating side is covered with a transparent protection cover so that the current value setting and reset operating method cannot be changed arbitrarily.
- To change the setting, lift the transparent cover up.

Current Setting Knob

The rated current setting can be set in 3 stages by using the +/-screw driver.

Wiring Protection : Differential Trip Device

As seen in the figure, if only the S, T-phase bimetal are curved because R phase is in open position, the lower slide is moved by the S, T phase bimetal. As for the trip lever, only the end part moves as much as the transfer ratio of upper and lower slide and it can be contacted with trip device. This is tripped at shorter period compared with the 3-phase overload state. This is equivalent for the wiring of S, T-phase.



Selection

In Case the Starting Time is Short

- In case of squirrel-cage type of motor with starting time within a few seconds, the selection of overload relay can be selected by referring to the selection table and ratings of the overload relay. I such a case, the rated current of the motor must be selected within the current scale scope of the overload relay. The starting time of the rotating device with big inertia is an important factor in selecting the nominal rating of the overload relay.
- In case the starting time of the motor is 6~7 times the rated current, the trip time of the overload relay can be realized in the characteristic curve and this trip time must be selected as approximately 125 % of the start-up time.

In Case the Starting Time is Long

- In case the starting time is longer than the trip time of the HGT18, the HGT Type with the current converter (C.T) must be used.
- The current converter is included in the arrangement of the rated current flowing to the first converter so the overload relay is not tripped during the starting time of the motor and in the lower rated current range, the live wire at the primary current converter has to be wired several times to obtain the time delay characteristics.

Current Setting Ratio Following the Number of Wirings (Ex.：130 A)

No. of Wirings	Current Range	1st, 2nd Current Ratio
1	78 ~ 130	130/5
2	39 ~ 65	65/5
3	26 ~ 26.7	26.7/5
4	19.5 ~ 43.3	43.3/5
5	15.6 ~ 26	26/5
6	13 ~ 21.7	21.7/5
7	11.14 ~ 18.5	18.5/5
8	9.75 ~ 16.25	16.25/5

$$\text{Setting Current (A)} = \frac{\text{Motor's Rated Current}}{\text{Current Converter's Current}}$$

The secondary rated current of the current converter is 5 A and as for the overload relay, it can be adjusted up to 3 ~ 5 A.
The setting current value of this range can be calculated as below.

Auxiliary Contact's Closed Circuit and Short-Circuit Current

Item per Category	AC15 1)	
Voltage (V)	Auxiliary Contact 95 ~ 96	Auxiliary Contact 97 ~ 98
	Ie (A)	Ie (A)
110	2	1.2
220	1.5	1
500	1	0.5
660	0.5	0.3

Item per Category	DC13 2)	
Voltage (V)	Auxiliary Contact 95 ~ 96	Auxiliary Contact 97 ~ 98
	Ie (A)	Ie (A)
24	1	1
110	0.4	0.4
220	0.15	0.15
440	0.07	0.07

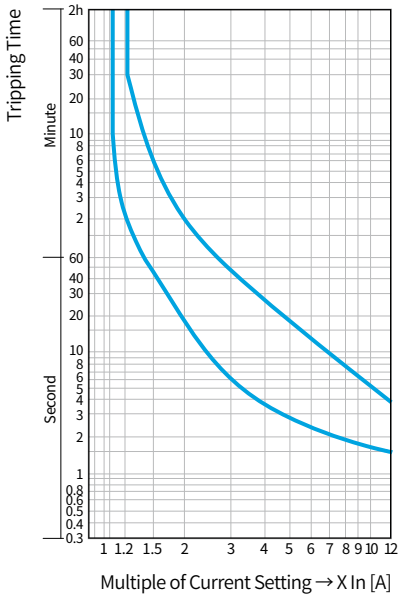
※ 1) AC15 : Closed circuit and short-circuit current = Ie × 10
2) DC13 : Closed circuit and short-circuit current = Ie × 1.1

Technical Data

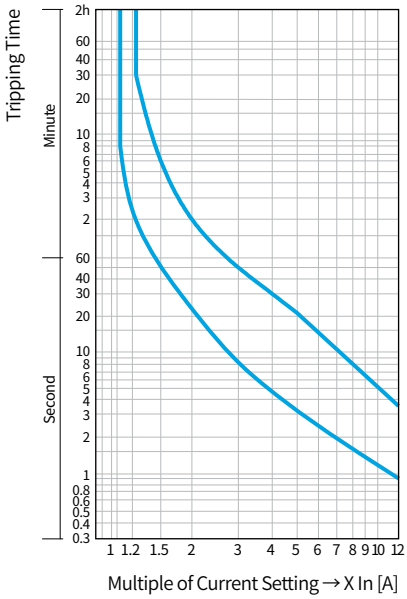
Characteristic Curve of Thermal Overload Relay

- The trip curve at 3-phase overload indicates the average trip time based on the ambient temperature of 20 °C Cold Start. (Hot Start : 20 ~ 40 % of Cold Start).
- The trip curve at wiring overload has the trip time of about 40 ~ 60 % of the 3-phase overload trip time.

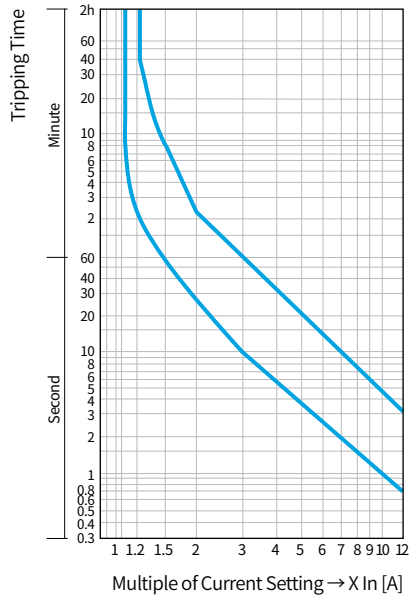
HGT18K



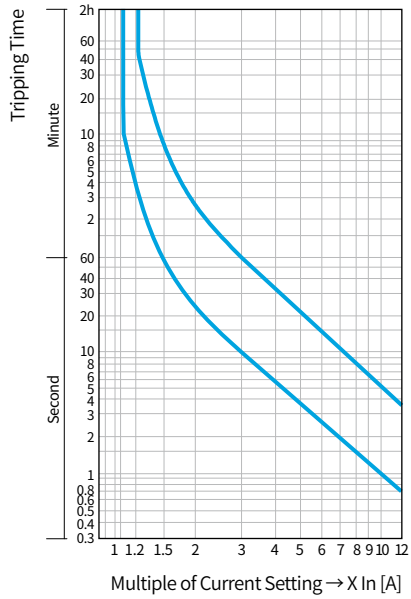
HGT40K



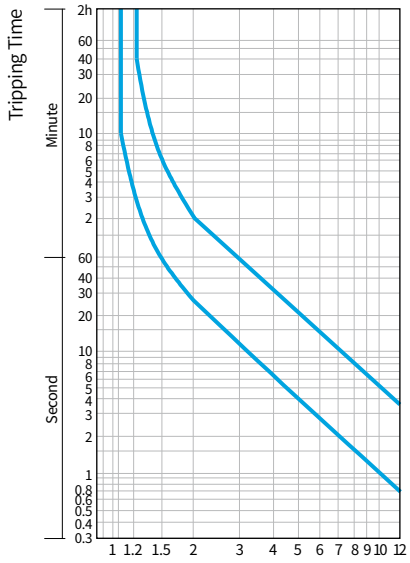
HGT65K



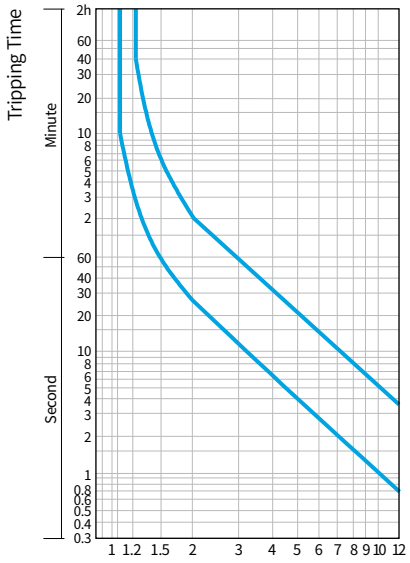
HGT100K



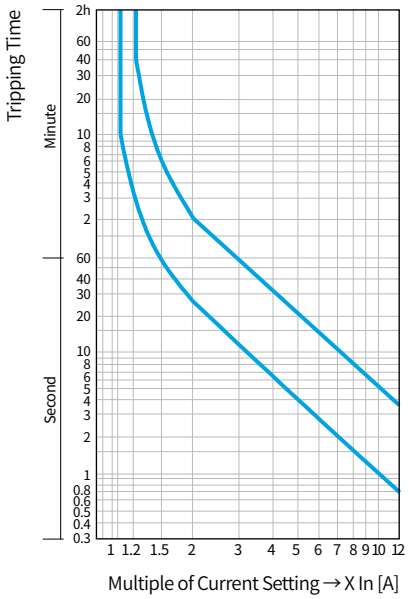
HGT150K



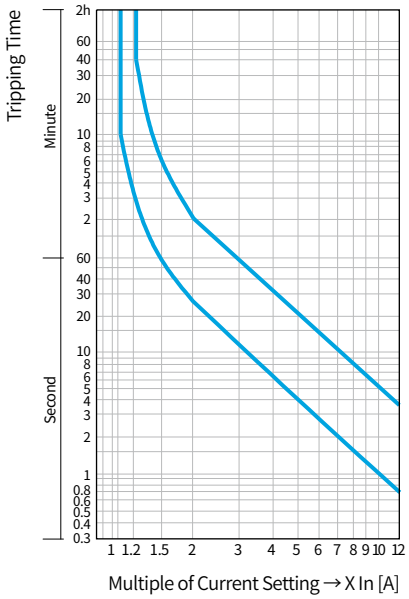
HGT265K



HGT400K



HGT800K



Technical Data

Connectable Wire and Fastening Torque

Main Circuit

Type	Size of Main Terminal	Stranded + Pin Terminal (mm^2)		Single Wire (mm^2)	Stranded Wire (mm^2)	Max. Terminal Width (mm)	Fastening Torque [kgf.cm]
HGC9/12/18	M4	1…10	1…6	1…10	1…10	10	15
HGC25/32/40	M5	1…10	1…6	2.5…16	2.5…16	12	26
HGC50/65	M6	N/A		6…25	6…25	13	40
HGC75/85/100	M8	N/A		10…50	10…50	17	60
HGC115/130/150		N/A		35…95	35…95	25	
HGC185/225/265	M10	N/A		50…185	50…185	25	100
HGC300	M12	N/A		95…240	95…240	30	140
HGC400		N/A		185 ~ 185×2	185 ~ 185×2	30	
HGC500		N/A		185 ~ 240×2	185 ~ 240×2	30	
HGC630		N/A		240 ~ 240×2	N/A	40	
HGC800		N/A		2×busbar (60×5)	N/A	40	
HGC9 ~ 800Aux/Coil	M3.5	0.5…5.5		0.75…5.5	0.75…5.5	7.5	12





Characteristics and Applications

The ratings of magnetic contactor is determined by the rated thermal current (Ith), rated operating (Ie), rated making and breaking capacity, electrical and mechanical lifespan and application category.

IEC 60947	AC1	Non-inductive or slightly inductive loads, resistance furnaces
	AC2	Slip-ring motor : starting, switching off
	AC3	Squirrel cage motor : Starting, switching
	AC4	Squirrel cage motor : Starting, reverse-phase plugging and inching
	AC12	Control of resistive load
	AC15	Control of coil load
	DC1	Non-inductive or slightly inductive load, resistance furnaces
	DC3	Shunt motor : Starting, reverse-phase plugging and inching
	DC5	Series motor : Starting, reverse-phase plugging and inching
	DC12	Control of resistive load
	DC13	Control of coil load

Rating Classification per Category based on Closing and Short-Circuit Current

Category	Closing				Closing and Short-Circuit			
	Current	Voltage	Power Factor	Cycle	Current	Voltage	Power Factor	Cycle
AC1	-	-	-	-	1.5 Ie	1.05 Ue	0.8	50
AC2	-	-	-	-	4.0 Ie	1.05 Ue	0.65	50
AC3	10.0 Ie	Ue	0.45 (≤100 A)	50	8.0 Ie	1.05 Ue	0.45 (≤100 A)	50
AC4	12.0 Ie	Ue	0.35 (>100 A)	50	10.0 Ie	1.05 Ue	0.35 (>100 A)	50
AC15	-	-	-	-	10.0 Ie	1.10 Ue	0.3	10
DC1	-	-	-	-	1.5 Ie	1.05 Ue	1	50
DC3	-	-	-	-	4.0 Ie	1.05 Ue	2.5	50
DC5	-	-	-	-	4.0 Ie	1.05 Ue	15	50
DC13	-	-	-	-	1.1 Ie	1.10 Ue	6P	10

Rating Classification per Category based on Operating Test

Category	Closing and Short-Circuit				
	Current	Voltage	Power Factor	On-Time	Cycle
AC1	1.0 Ie	1.05 Ue	0.8	0.05 secs	6,000
AC2	2.0 Ie	1.05 Ue	0.65	0.05 secs	6,000
AC3	2.0 Ie	1.05 Ue	0.45 (Ie≤100 A)	0.05 secs	6,000
AC4	6.0 Ie	1.05 Ue	0.35 (Ie>100 A)	0.05 secs	6,000
AC15	10.0 Ie	1.10 Ue	0.3	0.05 secs	6,000
DC1	1.0 Ie	1.05 Ue	1	0.05 secs	6,000
DC3	2.5 Ie	1.05 Ue	2	0.05 secs	6,000
DC5	2.5 Ie	1.05 Ue	7.5	0.05 secs	6,000
DC13	1.1 Ie	1.10 Ue	6P	0.05 secs	6,000

Rating Classification per Category based on Electrical Lifespan

Category	Closing			Breaking		
	Current	Voltage	Power Factor	Current	Voltage	Power Factor
AC1	1.0 Ie	1 Ue	0.95	1 Ie	1 Ue	0.95
AC2	2.5 Ie	1 Ue	0.65	2.5 Ie	1 Ue	0.65
AC3	6.0 Ie	1 Ue	0.65 (Ie≤17 A)	6 Ie	0.17 Ue	0.65 (Ie≤17 A)
AC4	6.0 Ie	1 Ue	0.35 (Ie>17 A)	6 Ie	1 Ue	0.35 (Ie>17 A)
DC1	1.0 Ie	1 Ue	1	1 Ie	1 Ue	1
DC3	2.5 Ie	1 Ue	2	2.5 Ie	1 Ue	2
DC5	2.5 Ie	1 Ue	7.5	2.5 Ie	1 Ue	7.5

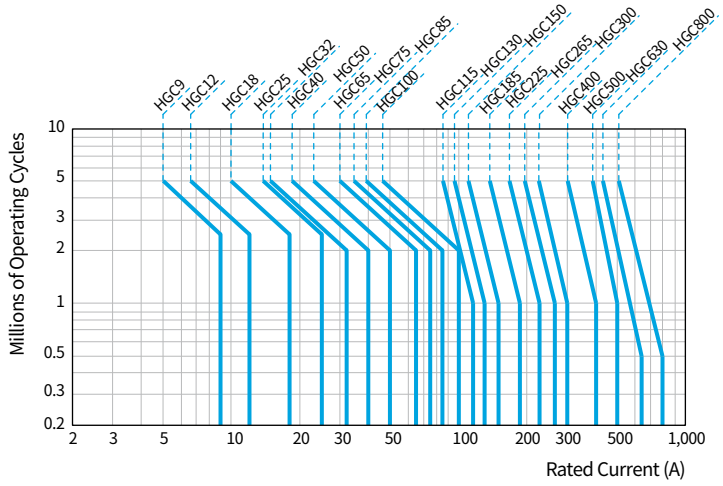
※ Ie : Rated current, Ue : Rated voltage

Technical Data

Selections of AC3 and AC4 Grade Magnetic Contactor for Load

- In case of load operation with low switching frequency, the rated capacity of the magnetic contactor applied may increase and the increased rated capacity should not exceed the closing and short-circuit capacity of the magnetic contactor. In case a thermal overload relay is used, the short-circuit protection should carefully be considered within the range that does not exceed the maximum capacity of the fuse
- The magnetic contactor must be selected by considering the electrical lifespan curve.

Life Curve of AC3 Category (380 ~ 440 VAC)

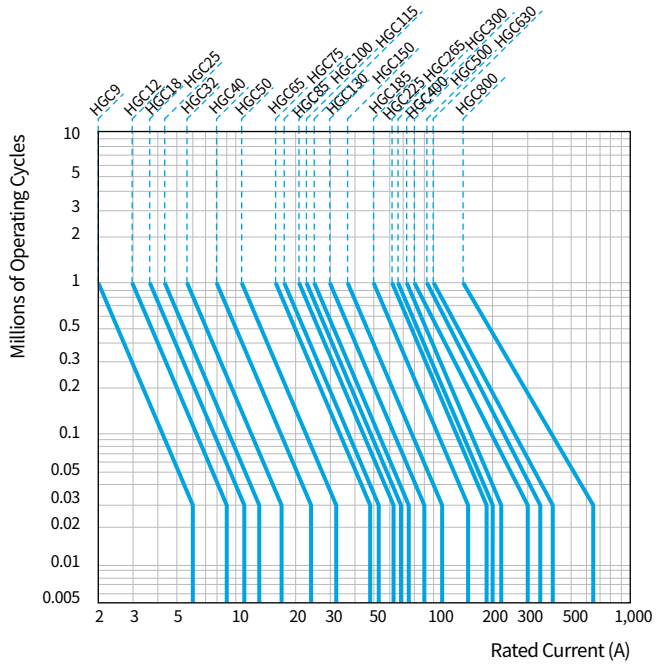


In case of load comprised of AC3 and AC4 category, the electrical lifespan of the magnetic contactor can be calculated using the following formula

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

- L : Electrical Lifespan of Contactor
- L 1 : Electrical Lifespan of AC3 Category
- L 2 : Electrical Lifespan of AC4 Category
- P1 : Coefficient Rate in AC3 Category
- P2 : Coefficient Rate in AC4 Category
- P1 + P2 + … + Pn = 1

Life Curve of AC4 Category (380 ~ 440 VAC)



※ Example)
80 A/440 VAC. What is the electrical lifespan when UMC100 is applied in case of a motor with 480 A operational current of 95 % coefficient rate, operational current of 70 A in AC3 category, 5 % coefficient rate and operational current of 400 A in AC4 category?

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

- Lifespan of UMC100 in AC3 category life curve is 2.0×10^6 (In case the operational current is 70 A)
- Lifespan of UMC100 in AC4 category is 0.03×10^6 (In case the operational current is 400 A)

Rated Operational Current with DC Load

Connection	Application	Operational Voltage	HGC9	HGC12	HGC18	HGC25	HGC32	HGC40	HGC50	HGC65	HGC75	HGC85	HGC100
2 Poles in Series	DC1 Resistive Load (L/R≤1 ms)	24 V	10	12	18	20	25	35	50	65	65	75	80
		48 V	10	12	18	20	25	35	40	65	65	65	65
		110 V	6	10	13	15	25	25	35	45	45	50	50
		220 V	3	7	8	10	12	12	15	15	15	20	20
	DC3, 5 DC Motor Load (L/R≤15 ms)	24 V	8	12	12	20	25	35	45	45	45	65	65
		48 V	4	6	6	15	20	20	25	25	25	40	40
		110 V	2.5	4	4	8	10	10	15	15	15	20	20
		220 V	0.8	1.2	1.2	2	3	3	3.5	3.5	3.5	5	5
	DC13 Coil Load (L/R≤40 ms)	24 V	8	12	12	20	25	35	-	-	-	-	-
		48 V	4	6	6	12	15	15	-	-	-	-	-
		110 V	2	3	3	3	4	4	-	-	-	-	-
		220 V	0.3	0.5	0.5	1.2	1.2	1.2	-	-	-	-	-
3 Poles in Series	DC1 Resistive Load (L/R≤1 ms)	24 V	10	12	18	20	25	35	50	65	65	75	80
		48 V	10	12	18	20	25	35	50	65	65	75	80
		110 V	8	12	18	20	25	35	50	65	65	75	80
		220 V	8	12	18	20	25	30	40	50	50	55	60
	DC3, 5 DC Motor Load (L/R≤15 ms)	24 V	8	12	12	20	25	35	50	50	50	80	80
		48 V	6	10	10	20	25	30	35	35	35	60	60
		110 V	4	8	8	15	20	20	30	30	30	50	50
		220 V	2	4	4	8	10	10	12	12	12	20	20
	DC13 Coil Load (L/R≤40 ms)	24 V	8	12	12	20	25	35	-	-	-	-	-
		48 V	6	10	10	15	25	35	-	-	-	-	-
		110 V	3	5	5	10	12	12	-	-	-	-	-
		220 V	0.8	2	2	4	4	4	-	-	-	-	-

Connection	Application	Operational Voltage	HGC115	HGC130	HGC150	HGC185	HGC225	HGC265	HGC300	HGC400	HGC500	HGC630	HGC800
2 Poles in Series	DC1 Resistive Load (L/R≤1 ms)	24 V	100	120	150	180	220	260	300	400	500	630	800
		48 V	100	100	120	180	180	220	240	240	300	630	800
		110 V	80	80	100	150	150	180	200	200	220	630	630
		220 V	50	50	100	150	150	180	200	200	220	630	630
	DC3, 5 DC Motor Load (L/R≤15 ms)	24 V	100	120	150	180	220	260	300	400	500	630	800
		48 V	60	60	100	150	150	180	200	200	260	630	800
		110 V	40	40	80	120	120	130	150	150	180	630	630
		220 V	30	30	60	80	80	80	90	90	130	210	210
	DC13 Coil Load (L/R≤40 ms)	24 V	-	-	-	-	-	-	-	-	-	-	-
		48 V	-	-	-	-	-	-	-	-	-	-	-
		110 V	-	-	-	-	-	-	-	-	-	-	-
		220 V	-	-	-	-	-	-	-	-	-	-	-
3 Poles in Series	DC1 Resistive Load (L/R≤1 ms)	24 V	100	120	150	180	220	260	300	400	500	630	800
		48 V	100	120	150	180	220	260	300	400	500	630	800
		110 V	100	100	150	180	220	260	300	400	500	630	630
		220 V	80	80	150	180	220	260	300	300	400	630	630
	DC3, 5 DC Motor Load (L/R≤15 ms)	24 V	100	120	150	180	220	260	300	400	500	630	800
		48 V	90	90	130	180	220	260	280	280	400	630	800
		110 V	80	80	120	150	150	180	200	200	260	630	630
		220 V	50	50	80	100	100	130	150	150	180	310	310
	DC13 Coil Load (L/R≤40 ms)	24 V	-	-	-	-	-	-	-	-	-	-	-
		48 V	-	-	-	-	-	-	-	-	-	-	-
		110 V	-	-	-	-	-	-	-	-	-	-	-
		220 V	-	-	-	-	-	-	-	-	-	-	-

Technical Data

Ratings for Transformer and Condenser Load

Connection	Operational Voltage		HGC9	HGC12	HGC18	HGC25	HGC32	HGC40	HGC50	HGC65	HGC75	HGC85	HGC100
Transformer (kVA)	Single Phase	AC 220 V	1	1.5	2	2.5	3	4	5	7	8	9	10
		AC 440 V	1.5	2	3	4	5	7.5	10	15	17	18	20
	3 Phase	AC 220 V	2	3	3.5	4	5	6.5	10	12	13	15	18
		AC 440 V	2.5	4	5	7.5	10	12	18	25	27	30	35
Condenser (kVAR)	3 Phase	AC 220 V	2	3	4	5	9	11	13	17	20	22	24
		AC 440 V	3	4	6	10	16	20	24	34	40	45	48

Connection	Operational Voltage		HGC115	HGC130	HGC150	HGC185	HGC225	HGC265	HGC300	HGC400	HGC500	HGC630	HGC800
Transformer (kVA)	Single Phase	AC 220 V	-	15	17	20	25	30	33	44	55	65	90
		AC 440 V	-	25	33	40	50	57	66	90	110	130	175
	3 Phase	AC 220 V	-	25	30	35	42	48	57	75	90	110	150
		AC 440 V	-	42	60	70	85	95	100	150	180	220	300
Condenser (kVAR)	3 Phase	AC 220 V	-	29	35	42	58	63	69	92	115	145	185
		AC 440 V	-	58	70	84	115	125	139	185	230	291	369

※ The abovementioned table is applicable in case the inrush current of the transformer is less than 30 times the rated current (RMS).
Electrical lifespan : 100,000 times (Based on IEC 60947-4-1, AC6a, 6b)

Light Load – Number of Incandescent Lamp that can be Switched

Application of Lighting Load

Other than special cases, the lighting load has relatively low electrical lifespan or switching frequency. In case of selecting magnetic contactor, the total input current of the load cannot exceed the rated current and the inrush current caused by lighting cannot exceed the breaking current capacity of the magnetic contactor.

Incandescent Lamp

The filament of the incandescent lamp has lower resistance in ordinary temperature so when the voltage is applied, the current that is 13~16 times the rated current flows but in room temperature, the impedance of the circuit causes the excessive current to be suppressed to about 7~10 times the rated current due to self-heating. Magnetic contact with incandescent lamp has to consider this excessive current and the rating current of the incandescent lamp shall be selected within the rated operational current of AC3 category.

Power Voltage		110 V							
Power Consumption		100 W	150 W	200 W	250 W	300 W	500 W	1,000 W	1,500 W
Magnetic Contactor	HGC9	11	7	5	4	2	2	1	-
	HGC12	14	8	6	5	4	2	1	-
	HGC18	19	13	10	7	6	3	1	1
	HGC25	20	13	10	8	6	3	1	1
	HGC32	28	18	14	11	9	5	2	1
	HGC40	38	25	19	15	12	7	3	2
	HGC50	55	35	27	22	16	10	5	3

Power Voltage		220 V							
Power Consumption		100 W	150 W	200 W	250 W	300 W	500 W	1,000 W	1,500 W
Magnetic Contactor	HGC9	22	14	11	8	7	4	2	1
	HGC12	26	18	14	10	8	5	2	1
	HGC18	38	25	20	15	13	7	3	2
	HGC25	40	27	20	16	13	8	3	2
	HGC32	55	36	28	22	18	11	5	3
	HGC40	75	50	38	30	25	15	7	4
	HGC50	105	70	54	43	35	22	10	6

Application of Star-Delta Starting

Voltage, Current, Torque for Start-Delta Starting

Starting (Start Type Magnetic Contactor / C3)					Operating (Delta Type Magnetic Contactor / C2)		
Starting Method	Starting Current	Torque	Full Load Current	Contact Voltage	Full Load Current	Contact Current	Contact Voltage
Direct	6 Im	1.5 T	6 Im	Em/√3	Im	Im	Em/√3
Star - Delta	2 Im	0.5 T	2 Im	Em/√3	Im	Im/√3	Em

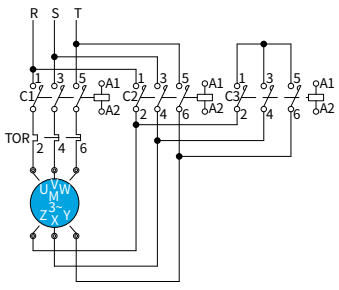
※ Im : Load current in case the motor is connected to delta Em : Line voltage T : Rated torque (Estimated torque fluctuation)

Application of Magnetic Contactor for Star – Delta Starting

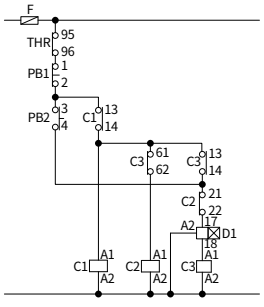
200 ~ 240 V AC, 3 Ø, 60 Hz							380 ~ 440 V AC, 3 Ø, 60 Hz						
Motor Capacity			Main Circuit	Δ Circuit	Y Circuit	TOR	Motor Capacity			Main Circuit	Δ Circuit	Y Circuit	TOR
kW	Hp	FLC	(C1)	(C2)	(C3)		kW	Hp	FLC	(C1)	(C2)	(C3)	
5.5	7.5	22	HGC25	HGC25	HGC18	HGT40K	5.5	7.5	12	HGC25	HGC25	HGC25	HGT40K
7.5	10	32	HGC32	HGC32	HGC25	HGT40K	7.5	10	18	HGC25	HGC25	HGC25	HGT40K
11	15	40	HGC40	HGC40	HGC32	HGT40K	11	15	22	HGC25	HGC25	HGC25	HGT40K
15	20	50	HGC50	HGC50	HGC32	HGT65K	15	20	32	HGC32	HGC32	HGC25	HGT40K
18.5	25	70	HGC50	HGC50	HGC40	HGT65K	18.5	25	40	HGC40	HGC40	HGC25	HGT40K
22	30	80	HGC75	HGC75	HGC40	HGT100K	22	30	50	HGC40	HGC40	HGC32	HGT40K
30	40	110	HGC100	HGC100	HGC50	HGT100K	30	40	65	HGC50	HGC50	HGC40	HGT65K
37	50	130	HGC115	HGC115	HGC65	HGT150K	37	50	80	HGC75	HGC75	HGC40	HGT100K
45	60	150	HGC130	HGC130	HGC65	HGT150K	45	60	90	HGC75	HGC75	HGC40	HGT100K
55	75	180	HGC150	HGC150	HGC100	HGT150K	55	75	110	HGC100	HGC100	HGC50	HGT100K
75	100	260	HGC185	HGC185	HGC115	HGT265K	75	100	150	HGC115	HGC115	HGC65	HGT150K
90	125	300	HGC225	HGC225	HGC130	HGT265K	90	125	180	HGC130	HGC130	HGC100	HGT150K
110	150	367	HGC300	HGC300	HGC150	HGT500K	110	150	220	HGC150	HGC150	HGC115	HGT150K
132	180	434	HGC400	HGC400	HGC225	HGT500K	132	180	260	HGC185	HGC185	HGC115	HGT265K
160	220	519	HGC400	HGC400	HGC225	HGT500K	160	220	300	HGC225	HGC225	HGC130	HGT265K
250	350	810	HGC630	HGC630	HGC400	HGT800K	250	350	500	HGC400	HGC400	HGC225	HGT500K
300	-	-	-	-	-		300	402	560	HGC400	HGC400	HGC300	HGT500K

※ The data of this table is subject to change depending on the grade and manufacturer of the motor and is a reference for using AC3 category squirrel cage motor or AC2 category slip-ring motor. The starting time of the motor is based on less than 10 seconds. Select separately in case the starting time has a long load (Ex : Fan. Blower. Compressor).
As for the load applied with phase advance condenser, consider the inrush current for selection. As for the transfer time of the timer contact for transfer, 30 ~ 80 ms is appropriate.
As for the current setting of the overload relay (UTH), set the current of motor full load at 58 %.

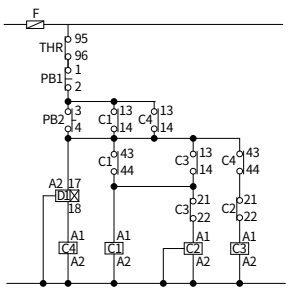
Main Circuit



Control Circuit



Connection Diagram 1 (HGC9 ~ 100)



Connection Diagram 2 (HGC115 ~ 800)

C1 : Main MC C2 : Delta MC C3 : Star MC D1 : Timer C4 : Auxiliary relay

Technical Data

Ratings of Inching and Plugging

• AC rating category (Rated capacity in case of inching and plugging)

Category	Voltage	Ratio	Electrical Lifespan		HGC9	HGC12	HGC18	HGC25	HGC32	HGC40	HGC50	HGC65	HGC75	HGC85	HGC100
Inching	220 V	10 %	100,000	kW	2.2	2.7	3.7	4	5.5	7.5	11	15	18.5	19	25
			500,000		1	1.5	2.7	3.7	4.5	5.5	7.5	11	15	15	15
		50 %	100,000		1	1.5	2.7	3.7	4.5	5.5	7.5	11	15	15	19
			500,000		0.5	0.75	1.1	1.5	2.2	3.7	3.7	5.5	7.5	7.5	9
		100 %	100,000		0.75	1.1	1.5	2.5	4.5	4.5	5.5	7.5	9	11	11
			500,000		0.3	0.5	0.75	1.1	1.8	2.7	3.7	4	4	5.5	5.5
	440 V	10 %	100,000		2.7	4	4	7.5	11	15	22	30	37	37	50
			500,000		1.5	2.2	3.7	7.5	9	11	15	22	30	30	37
		50 %	100,000		1.5	3.7	4	7.5	9	11	15	22	30	30	37
			500,000		0.75	1.5	2.2	3.7	4.5	5.5	7.5	11	15	15	18.5
		100 %	100,000		1.1	2.2	3.7	5.5	7.5	11	15	15	15	22	25
			500,000		0.5	1.1	1.5	2.2	3.7	3.7	5.5	7.5	7.5	11	13
Plugging	220 V	Plugging Brake 100 %	100,000	kW	0.75	0.75	1.5	2.2	2.5	3.7	5.5	7.5	9	9	11
			500,000		0.2	0.4	0.5	0.75	1.1	1.5	22	3	3.7	3.7	4.5
	440 V		100,000		0.75	1	2.2	3.7	4.5	4.5	7.5	11	18.5	18.5	22
			500,000		0.2	0.4	0.75	1.5	2.2	2.2	3.7	5.5	7.5	7.5	11

Category	Voltage	Ratio	Electrical Lifespan		HGC115	HGC130	HGC150	HGC185	HGC225	HGC265	HGC300	HGC400	HGC500	HGC630	HGC800
Inching	220 V	10 %	100,000	kW	30	30	37	45	55	65	75	110	132	160	200
			500,000		15	22	25	30	37	45	50	65	70	75	132
		50 %	100,000		22	22	30	37	45	50	55	75	80	90	150
			500,000		9	9	11	15	19	22	25	30	32	37	45
		100 %	100,000		11	15	19	25	30	32	37	45	50	55	75
			500,000		5.5	7.5	9	11	15	17	22	25	30	37	45
	440 V	10 %	100,000		50	60	75	90	110	132	150	200	250	300	400
			500,000		37	45	55	75	90	110	125	132	140	150	190
		50 %	100,000		37	45	55	75	90	110	132	150	167	190	220
			500,000		18.5	22	30	37	37	42	50	75	80	90	110
		100 %	100,000		25	30	45	55	60	65	75	110	120	132	160
			500,000		13	15	22	25	30	32	37	55	63	75	90
Plugging	220 V	Plugging Brake 100 %	100,000	kW	11	15	19	22	25	30	37	45	50	55	75
			500,000		4.5	5.5	7.5	11	13	15	18.5	22	25	30	37
	440 V		100,000		22	30	37	45	45	49	55	75	90	110	150
			500,000		11	15	19	22	25	26	30	37	40	45	75

※ The inching limit of switching frequency is below 10 continuous operations

$$\text{Inching (\%)} = \frac{\text{No. of Inching Operations}}{\text{No. of Standard Operations + No. of Inching Operations}} \times 100$$

Effect on Magnetic Contactor Depending on the Cable Length of Control Circuit

Input Defect caused by Voltage Drop Following Inrush Current and Resistive (AC/DC)

Voltage drop occurs on the control circuit cable due to inrush current that is generated when the operational coil power of the contact is supplied. Due to such, the input into the magnetic contactor may fail. Therefore, the length of the conductor has to be reviewed within the appropriate limit by reviewing the input power consumption, supply voltage and the cross sectional area of the circuit conductor and others.

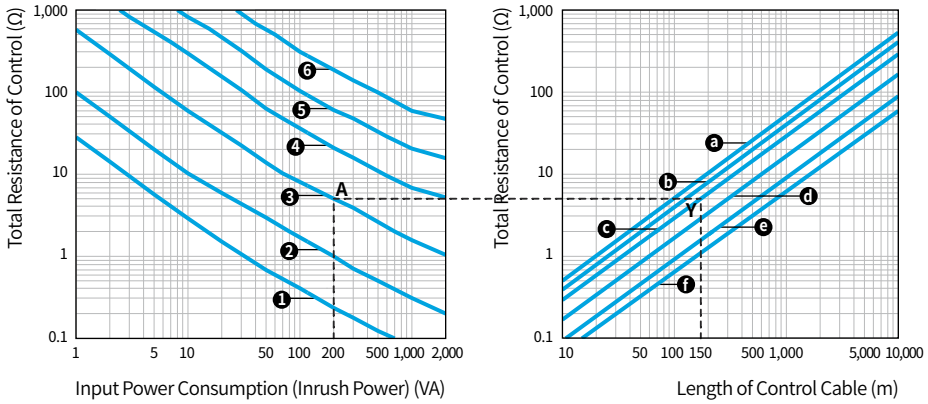
Calculation of the Allowable Conductor Length Following Inrush Power

This graph indicates the maximum 5 % line voltage drop.

AC Circuit

Supply Voltage
- ❶ AC 24 V
- ❷ AC 48 V
- ❸ AC 115 V
- ❹ AC 230 V
- ❺ AC 400 V
- ❻ AC 690 V

C.S.A of Cu Cable
- ⓐ 0.75 mm^2
- ⓑ 1 mm^2
- ⓒ 1.5 mm^2
- ⓓ 2.5 mm^2
- ⓔ 4 mm^2
- ⓕ 6 mm^2

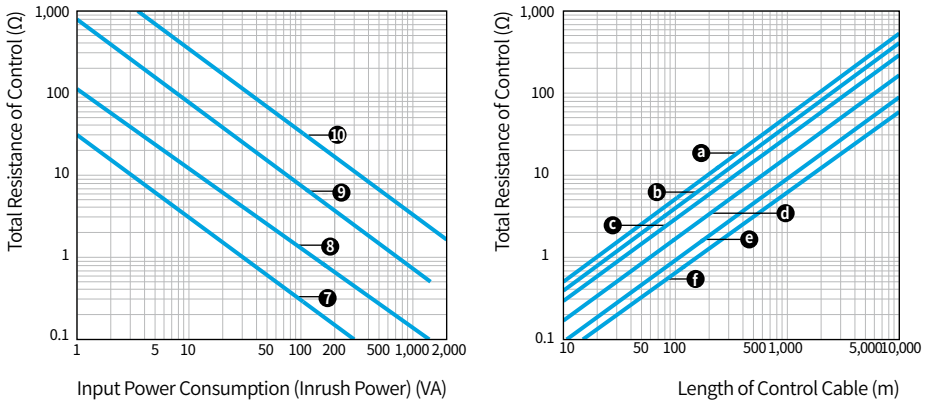


※ Ex.) The maximum length of conductor when using HGC50 magnetic contactor in a 1.5 mm^2 Cu cable at supply voltage of AC 115 V and input power consumption of 200 VA is 150 m.

DC Circuit

Supply Voltage
- ❼ DC 24 V
- ❽ DC 48 V
- ❾ DC 125 V
- ❿ DC 250 V

C.S.A of Cu Cable
- ⓐ 0.75 mm^2
- ⓑ 1 mm^2
- ⓒ 1.5 mm^2
- ⓓ 2.5 mm^2
- ⓔ 4 mm^2
- ⓕ 6 mm^2



Technical Data

Calculation of the Maximum Cable Distance Following Voltage

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

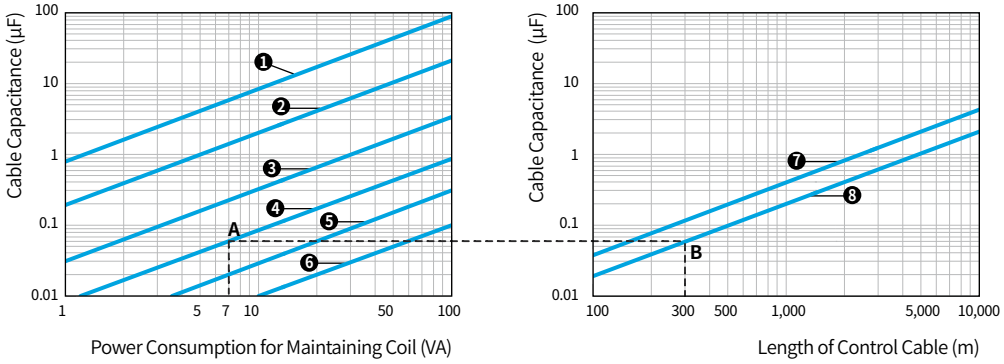
L : Distance between the conductor and control device, m (Length of cable)
U : Supply voltage, V
SA : Input power consumption (Inrush power), VA
s : C.S.A of conductor, mm^2
K : Factors in the following table

AC Supply	SA (VA)	20	40	100	150	200
	K	1.38	1.5	1.8	2	2.15
DC Supply	Consistent, regardless of the inrush power's SA value (W)					
	k = 1.38					

Trip Failure caused by Cable Capacitance (AC)

When the connection with the contact is opened, trip failure may occur due to the capacitance between the control device and the magnetic contactor coil.
This phenomenon may get worsened by the length of cable between the control device and the contactor, high control circuit voltage, low coil power consumption, low drop-out value and others. So, an appropriate conductor length within the limit is required by reviewing the supply voltage of power consumption for maintaining coil, capacitance of control circuit and others.

❶ AC 24 V
❷ AC 48 V
❸ AC 115 V
❹ AC 230 V
❺ AC 400 V
❻ AC 690 V
❼ 3-Wire Control
❽ 2-Wire Control



※ Ex.) The maximum length of conductor for stable trip when supply voltage of AC 230 V, power consumption for maintaining coil of 7 VA, w-wire control method are applied to HGC12 magnetic contactor is 300 m.

Calculation of Maximum Cable Distance Following Cable Capacitance

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

L : Distance between contact and control device, m (Length of cable)
S : Power consumption for maintaining coil, VA
U : Supply voltage, V
Co : Line capacity of cable

Model Selection Table

Magnetic Contactor：9 ~ 800 AF

9 ~ 18 AF

Model Name			HGC9B	HGC12B	HGC18B	HGC22B	HGC9	HGC12	HGC18
UL60947-4-1									
Pole			3				3		
Rated frequency			50/60Hz				50/60Hz		
Continuous Current (Ambient Temperature 40 °C)		A	25	25	40	40	25	25	40
Single Phase	1P/110~120V	HP	0.5	1	2	2	0.5	1	2
	1P/220~240V		1.5	2	3	3	1.5	2	3
Three Phase	3P/200~208V		2	3	7.5	7.5	2	3	7.5
	3P/220~240V		3	5	7.5	10	3	5	7.5
	3P/440~480V		5	7.5	10	15	5	7.5	10
	3P/600V		7.5	10	15	20	7.5	10	15
NEMA Size			0	0	0	0	0	0	0
Mounting Method			Screw & Rail Mounting				Screw & Rail Mounting		
Terminals			Screw clamp terminals				Screw clamp terminals		
Auxiliary Contacts									
Standard (*B type : side)	AC		1NO				1NO 1NC 2NO 2NC		
	DC		-						
Additional (front or side mount)	AC		2NO 2NC				2NO 2NC		
	DC		-						
Dimensions									
AC	W×H×D	mm	45×75×86				45×94.2×91.1		
DC			-				45×94.2×124		
AC	Weight	kg	0.4				0.4		
DC			-				0.6		

25 ~ 65 AF

Model Name			HGC25	HGC32	HGC40	HGC50/50B	HGC65/65B
UL60947-4-1							
Pole			3			3	
Rated frequency			50/60Hz			50/60Hz	
Continuous Current (Ambient Temperature 40 °C)		A	45	55	60	70	85
Single Phase	1P/110~120V	HP	2	3	3	3	5
	1P/220~240V		5	5	7.5	10	15
Three Phase	3P/200~208V		7.5	7.5	15	20	25
	3P/220~240V		10	10	15	25	30
	3P/440~480V		15	20	30	40	50
	3P/600V		20	25	30	50	60
NEMA Size			0	1	1	2	2
Mounting Method			Screw & Rail Mounting			Screw & Rail Mounting	
Terminals			Screw clamp terminals			Screw clamp terminals or Lug clamp terminals	
Auxiliary Contacts							
Standard (*B type : side)	AC		1NO 1NC 2NO 2NC			2NO 2NC	
	DC					2NO 1NC	
Additional (front or side mount)	AC		2NO 2NC			2NO 2NC	
	DC					1NO 1NC	
Dimensions							
AC	W×H×D	mm	45×99.6×96.6			55×123.6×126 B type : 80×123.6×107	
DC			45×99.6×129.5				
AC	Weight	kg	0.5			0.8	
DC			0.65			0.8	

75 ~ 150 AF

Model Name			HGC75/75B	HGC85/85B	HGC100/100B	HGC115	HGC130	HGC150
UL60947-4-1								
Pole			3			3		
Rated frequency			50/60Hz			50/60Hz		
Continuous Current (Ambient Temperature 40 °C)		A	115	125	145	160	180	210
Single Phase	1P/110~120V	HP	7.5	7.5	10	10	10	15
	1P/220~240V		15	15	20	20	20	25
Three Phase	3P/200~208V		25	30	30	30	40	40
	3P/220~240V		30	40	40	40	40	50
	3P/440~480V		50	60	75	75	75	100
	3P/600V		60	75	75	75	75	100
NEMA Size			2	3	3	3	3	4
Mounting Method			Screw & Rail Mounting			Screw Mounting		
Terminals			Screw clamp terminals or Lug clamp terminals			Screw clamp terminals		
Auxiliary Contacts								
Standard (*B type : side)	AC		2NO 2NC			2NO 2NC		
	DC		2NO 1NC					
Additional (front or side mount)	AC		2NO 2NC			2NO 2NC		
	DC		1NO 1NC					
Dimensions								
AC	W×H×D	mm	70×146×153 B type : 95×146×130.6			103×155×145.1		
DC								
AC	Weight	kg	1.3			2.7		
DC			1.3					

185 ~ 800 AF

Model Name			HGC185	HGC225	HGC265	HGC300	HGC400	HGC500	HGC630	HGC800
UL60947-4-1										
Pole			3			3			3	
Rated frequency			50/60Hz			50/60Hz			50/60Hz	
Continuous Current (Ambient Temperature 40 °C)		A	275	315	350	400	500	550	750	900
Single Phase	1P/110~120V	HP	15	15	-	-	-	-	-	-
	1P/220~240V		30	40	-	-	-	-	-	-
Three Phase	3P/200~208V		60	60	75	100	125	150	200	300
	3P/220~240V		60	75	100	100	150	200	250	350
	3P/440~480V		125	150	200	250	300	400	500	600
	3P/600V		125	150	200	200	300	400	500	600
NEMA Size			4	4	4	5	5	5	6	7
Mounting Method			Screw Mounting			Screw Mounting			Screw Mounting	
Terminals			Screw clamp terminals			Screw clamp terminals			Screw clamp terminals	
Auxiliary Contacts										
Standard	AC & DC		2NO 2NC			2NO 2NC			2NO 2NC	
Additional (side mount)	AC & DC		2NO 2NC			2NO 2NC			2NO 2NC	
Dimensions										
AC & DC	W×H×D	mm	138×204×174.2			163×243×203			276×314×255.3	
	Weight	kg	4.8			9.2			25	

Model Selection Table

Magnetic Contactor : 9 ~ 800 AF

9 ~ 40 AF

Model Name				HGC9	HGC12	HGC18	HGC25	HGC32	HGC40
IEC 60947-4-1									
Rated Insulation Voltage [Ui]			V	800	800	800	800	800	800
Rated Operational Voltage [Ue]			V	690	690	690	690	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	6	6	6	6	6	6
Rated Thermal Current [Ith] (AC1)			A	25	25	40	45	55	60
Rated frequency			Hz	50/60	50/60	50/60	50/60	50/60	50/60
AC3	200 ~ 240 V		kW/A	2.5/9	3.5/12	4.5/18	5.5/25	7.5/32	11/40
	380 ~ 440 V			4/9	5.5/12	7.5/18	11/25	15/32	18.5/40
	500 ~ 550 V			4/7	7.5/12	8.5/13	15/22	18.5/28	22/32
	660 ~ 690 V			4/6	7.5/9	7.5/9	15/17	18.5/20	22/23
	1,000 V			-	-	-	-	-	-
	Lifespan	Electrical	10,000 times	250	250	250	250	200	200
		Mechanical		1,500	1,500	1,500	1,500	1,500	1,500
AC4	200 ~ 240 V		kW/A	1.5/8	2.2/11	3.7/16	3.7/18	4.5/22	5.5/25
	380 ~ 440 V			2.2/6	4/9	4/11	5.5/13	7.5/17	11/24
	Electrical Lifespan		10,000 times	3	3	3	3	3	3
Mounting Method				Screw & Rail Mounting			Screw & Rail Mounting		
Auxiliary Contact									
Standard	AC			1NO1NC or 2NO2NC			1NO1NC or 2NO2NC		
	DC			1NO1NC or 2NO2NC			1NO1NC or 2NO2NC		
Additional	AC			2NO2NC			2NO2NC		
	DC			2NO2NC			2NO2NC		
Dimensions									
AC	W×H×D		mm	45×94.2×91.1			45×99.6×96.6		
DC				45×94.2×124			45×99.6×129.5		

50 ~ 100 AF

Model Name				HGC50	HGC65	HGC75	HGC85	HGC100
IEC 60947-4-1								
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	690	690	690	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8	8	8
Rated Thermal Current [Ith] (AC1)			A	70	85	115	125	145
Rated frequency			Hz	50/60	50/60	50/60	50/60	50/60
AC3	200 ~ 240 V		kW/A	15/50	18.5/65	22/75	25/85	30/100
	380 ~ 440 V			22/50	30/65	37/75	45/85	55/100
	500 ~ 550 V			30/43	33/60	37/64	50/75	55/85
	660 ~ 690 V			30/28	33/35	37/42	45/45	50/65
	1,000 V			-	-	-	-	-
	Lifespan	Electrical	10,000 times	200	200	200	200	200
		Mechanical		1,500	1,500	1,000	1,000	1,000
AC4	200 ~ 240 V		kW/A	7.5/35	11/50	13/55	15/65	17/72
	380 ~ 440 V			15/32	22/47	25/52	30/62	33/68
	Electrical Lifespan		10,000 times	3	3	3	3	3
Mounting Method				Screw & Rail Mounting		Screw & Rail Mounting		
Auxiliary Contact								
Standard	AC			2NO2NC		2NO2NC		
	DC			2NO1NC		2NO1NC		
Additional	AC			2NO2NC		2NO2NC		
	DC			1NO1NC		1NO1NC		
Dimensions								
AC	W×H×D		mm	55×123.6×129		70×146×153		
DC				55×123.6×129		70×146×153		

115 ~ 265 AF

Model Name				HGC115	HGC130	HGC150	HGC185	HGC225	HGC265
IEC 60947-4-1									
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000	1,000	1,000	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8	8	8	8
Rated Thermal Current [Ith] (AC1)			A	160	180	210	275	315	350
Rated frequency			Hz	50/60	50/60	50/60	50/60	50/60	50/60
AC3	200 ~ 240 V		kW/A	37/115	40/130	45/150	55/185	75/225	80/265
	380 ~ 440 V			60/115	65/130	75/150	90/185	132/225	147/265
	500 ~ 550 V			59/100	70/120	90/140	110/180	132/200	150/225
	660 ~ 690 V			55/65	75/82	90/120	110/120	132/150	160/173
	1,000 V			65/50	75/54	90/66	110/78	132/96	160/113
	Lifespan	Electrical	10,000 times	100	100	100	100	100	100
		Mechanical		500	500	500	500	500	500
AC4	200 ~ 240 V		kW/A	19/80	22/93	30/125	37/150	45/185	50/200
	380 ~ 440 V			37/75	45/90	55/110	75/150	90/185	102/200
	Electrical Lifespan		10,000 times	3	3	3	3	3	3
Mounting Method				Screw Mounting			Screw Mounting		
Auxiliary Contact									
Standard				2NO2NC			2NO2NC		
Additional				2NO2NC			2NO2NC		
Dimensions	W×H×D		mm	103×155×145.1			138×204×174.2		

300 ~ 800 AF

Model Name				HGC300	HGC400	HGC500	HGC630	HGC800
IEC 60947-4-1								
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000	1,000	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8	8	8
Rated Thermal Current [Ith] (AC1)			A	400	500	550	750	900
Rated frequency			Hz	50/60	50/60	50/60	50/60	50/60
AC3	200 ~ 240 V		kW/A	90/300	125/400	140/500	190/630	220/800
	380 ~ 440 V			160/300	220/400	250/500	330/630	440/800
	500 ~ 550 V			200/273	250/300	300/426	330/500	500/720
	660 ~ 690 V			200/220	250/300	335/360	400/412	500/630
	1,000 V			200/141	250/178	275/192	300/213	400/284
	Lifespan	Electrical	10,000 times	100	100	50	50	50
		Mechanical		500	500	500	500	500
AC4	200 ~ 240 V		kW/A	55/220	75/300	90/350	110/400	160/630
	380 ~ 440 V			110/220	150/300	175/350	200/400	300/630
	Electrical Lifespan		10,000 times	3	3	3	3	3
Mounting Method				Screw Mounting			Screw Mounting	
Auxiliary Contact								
Standard				2NO2NC			2NO2NC	
Additional				2NO2NC			2NO2NC	
Dimensions	W×H×D		mm	163×243×203			276×314×255.3	

Model Selection Table

Thermal Overload Relay : 18 ~ 800 AF

18 ~ 100 AF

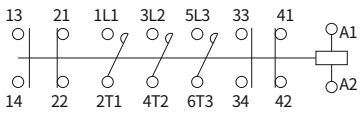
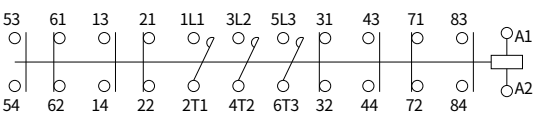
Model Name (Basic)			HGT18		HGT40		HGT65		HGT100	
3- Pole, 2 Element			HGT18H		HGT40H		HGT65H		HGT100H	
3- Pole, 3 Element (Loss Phase Protection)			HGT18K		HGT40K		HGT65K		HGT100K	
Current		A	Nominal Rating	0.12 ~ 18	Nominal Rating	7 ~ 40	Nominal Rating	7 ~ 65	Nominal Rating	17 ~ 100
Setting Current (Min. ~ Max.)		A	0.18	0.12 ~ 0.18	10	7 ~ 10	10	7 ~ 10	25	17 ~ 25
			0.26	0.18 ~ 0.26	12	8 ~ 12	12	8 ~ 12	32	22 ~ 32
			0.35	0.25 ~ 0.35	18	12 ~ 18	18	12 ~ 18	40	28 ~ 40
			0.5	0.34 ~ 0.5	22	15 ~ 22	22	15 ~ 22	50	34 ~ 50
			0.7	0.5 ~ 0.7	25	17 ~ 25	25	17 ~ 25	65	45 ~ 65
			0.9	0.6 ~ 0.9	32	22 ~ 32	32	22 ~ 32	75	52 ~ 75
			1.2	0.8 ~ 1.2	40	28 ~ 40	40	28 ~ 40	85	59 ~ 85
			1.6	1.1 ~ 1.6			50	34 ~ 50	100	70 ~ 100
			2.1	1.5 ~ 2.1			65	45 ~ 65		
			3	2 ~ 3						
			4.2	2.8 ~ 4.2						
			5	3 ~ 5						
			6	4 ~ 6						
			8	5.6 ~ 8						
			9	6 ~ 9						
			12	8 ~ 12						
Auxiliary Contact			1NO1NC		1NO1NC		1NO1NC		1NO1NC	
Reset Method			Manual/Auto		Manual/Auto		Manual/Auto		Manual/Auto	
Dimensions	W×H×D	mm	45×78.2×82.7		45×80.7×95.5		55×89.3×110.7		70×105×128.1	

150 ~ 800 AF

Model Name (Basic)			HGT150		HGT265		HGT500		HGT800	
3- Pole, 2 Element			HGT150H		HGT265H		HGT500H		HGT800H	
3- Pole, 3 Element (Loss Phase Protection)			HGT150K		HGT265K		HGT500K		HGT800K	
Current		A	Nominal Rating	48 ~ 150	Nominal Rating	48 ~ 265	Nominal Rating	90 ~ 500	Nominal Rating	378 ~ 800
Setting Current (Min. ~ Max.)		A	80	48 ~ 80	80	48 ~ 80	150	90 ~ 150	630	378 ~ 630
			115	69 ~ 115	115	69 ~ 115	185	111 ~ 185	800	480 ~ 800
			130	78 ~ 130	130	78 ~ 130	225	135 ~ 225		
			150	90 ~ 150	150	90 ~ 150	265	159 ~ 265		
					185	111 ~ 185	300	180 ~ 300		
					225	135 ~ 225	400	240 ~ 400		
					265	159 ~ 265	500	300 ~ 500		
Auxiliary Contact			1NO1NC		1NO1NC		1NO1NC		1NO1NC	
Reset Method			Manual/Auto		Manual/Auto		Manual/Auto		Manual/Auto	
Dimensions	W×H×D	mm	180×159×179.3		180×185×179.3		180×205.2×179.3		245×197×209.9	

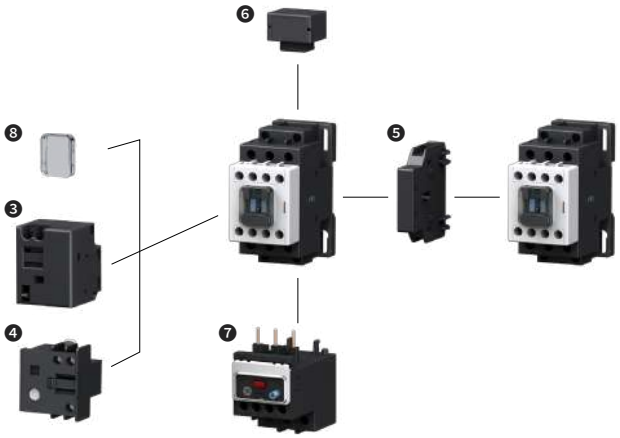
Ratings and Order Code

Magnetic Contactor : HGC 9 ~ 18 A

Rating				HGC		
Model Name				**HGC9**	**HGC12**	**HGC18**
IEC 60947-4						
Rated Insulation Voltage [Ui]			V	800	800	800
Rated Operational Voltage [Ue]			V	690	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	6	6	6
Rated Thermal Current Ith (AC1)			A	25	25	40
AC3	200 ~ 240 V		kW/A	2.5/9	3.5/12	4.5/18
	380 ~ 440 V			4/9	5.5/12	7.5/18
	500 ~ 550 V			4/7	7.5/12	8.5/13
	660 ~ 690 V			4/6	7.5/9	7.5/9
	1,000 V			-	-	-
	Lifespan	Electrical	10,000 times	250	250	250
		Mechanical		1,500	1,500	1,500
AC4	200 ~ 240 V		kW/A	1.5/8	2.2/11	3.7/16
	380 ~ 440 V			2.2/6	4/9	4/11
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	1,000	1,000	1,000
	50 % Load (DC)			2,000	2,000	2,000
	20 % Load (DC)			3,600	3,600	3,600
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	300	300	300
	50 % Load			600	600	600
Making Capacity	220 V		A	110	130	180
	440 V			90	120	180
Breaking Capacity	220 V		A	88	104	144
	440 V			72	96	144
Mounting Method				Screw & Rail Mounting		
Auxiliary Contact						
Standard	AC			1NO1NC or 2NO2NC		
	DC			1NO1NC or 2NO2NC		
	AC/DC			-		
Additional	AC			2NO2NC		
	DC			2NO2NC		
	AC/DC			-		
Dimensions						
AC	W×H×D		mm	45×94.2×91.1		
DC				45×94.2×124		
AC/DC				-		
Weight						
AC			kg	0.4		
DC				0.6		
AC/DC				-		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

※ For auxiliary contact usage, refer to Page 62 ~ 63.
When using auxiliary contact, Up to 6a can be made for A contact and up to 4b for B contact.
When using 4a4b condition by using side auxiliary block, upper auxiliary block cannot be used.
In the main 2a2b, upper auxiliary block can be used.

Accessories

Auxiliary Contacts	Other Accessories
	

❶ Auxiliary Contact Block (Front Mounting)
HGC TB - 62 page
❷ Auxiliary Contact Block (Side Mounting)
HGC SB 40 - 62 page

❸ Mechanical Latching Block
HGC LB 100 - 65 page
❹ Timer
HGC ET - 67 page
❺ Interlock Unit
HGC IU 40 - 64 page
❻ Surge Absorber
HGC RC/CD 40 - 66 page
❼ Thermal Overload Relay
HGT 18 - 52 page
❽ Front Safety Cover
HGCFC 100 - 69 page

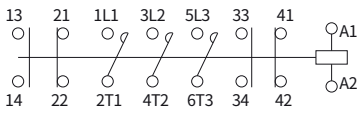
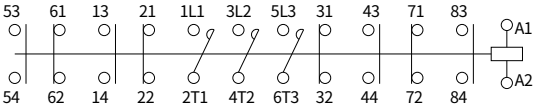
Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：Based on 2NO2NC

Operational Voltage (V)		HGC9	HGC12	HGC18
AC (60 Hz)	24	HGC9 22NS A024	HGC12 22NS A024	HGC18 22NS A024
	48	HGC9 22NS A048	HGC12 22NS A048	HGC18 22NS A048
	110	HGC9 22NS A110	HGC12 22NS A110	HGC18 22NS A110
	120	HGC9 22NS A120	HGC12 22NS A120	HGC18 22NS A120
	220	HGC9 22NS A220	HGC12 22NS A220	HGC18 22NS A220
	240	HGC9 22NS A240	HGC12 22NS A240	HGC18 22NS A240
	380	HGC9 22NS A380	HGC12 22NS A380	HGC18 22NS A380
	440	HGC9 22NS A440	HGC12 22NS A440	HGC18 22NS A440
AC (50 Hz)	24	HGC9 22NS X024	HGC12 22NS X024	HGC18 22NS X024
	48	HGC9 22NS X048	HGC12 22NS X048	HGC18 22NS X048
	110	HGC9 22NS X110	HGC12 22NS X110	HGC18 22NS X110
	120	HGC9 22NS X120	HGC12 22NS X120	HGC18 22NS X120
	220	HGC9 22NS X220	HGC12 22NS X220	HGC18 22NS X220
	240	HGC9 22NS X240	HGC12 22NS X240	HGC18 22NS X240
	380	HGC9 22NS X380	HGC12 22NS X380	HGC18 22NS X380
	440	HGC9 22NS X440	HGC12 22NS X440	HGC18 22NS X440
DC	24	HGC9 22NS D024	HGC12 22NS D024	HGC18 22NS D024
	48	HGC9 22NS D048	HGC12 22NS D048	HGC18 22NS D048
	110	HGC9 22NS D110	HGC12 22NS D110	HGC18 22NS D110
	125	HGC9 22NS D125	HGC12 22NS D125	HGC18 22NS D125
	220	HGC9 22NS D220	HGC12 22NS D220	HGC18 22NS D220

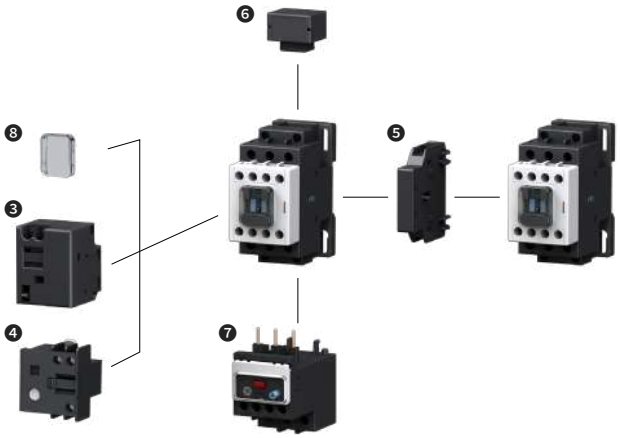
Ratings and Order Code

Magnetic Contactor : HGC 25 ~ 40 A

Rating				HGC		
Model Name				**HGC25**	**HGC32**	**HGC40**
IEC 60947						
Rated Insulation Voltage [Ui]			V	800	800	800
Rated Operational Voltage [Ue]			V	690	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	6	6	6
Rated Thermal Current Ith (AC1)			A	45	55	60
AC3	200 ~ 240 V		kW/A	5.5/25	7.5/32	11/40
	380 ~ 440 V			11/25	15/32	18.5/40
	500 ~ 550 V			15/22	18.5/28	22/32
	660 ~ 690 V			15/17	18.5/20	22/23
	1,000 V			-	-	-
	Lifespan	Electrical	10,000 times	250	200	200
		Mechanical		1,500	1,500	1,500
AC4	200 ~ 240 V		kW/A	3.7/18	4.5/22	5.5/25
	380 ~ 440 V			5.5/13	7.5/17	11/24
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	1,000	1,000	1,000
	50 % Load (DC)			2,000	2,000	2,000
	20 % Load (DC)			3,600	3,600	3,600
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	300	300	250
	50 % Load			600	600	500
Making Capacity	220 V		A	250	320	400
	440 V			250	320	400
Breaking Capacity	220 V		A	200	256	320
	440 V			200	256	320
Mounting Method				Screw & Rail Mounting		
Auxiliary Contact						
Standard	AC			1NO1NC or 2NO2NC		
	DC			1NO1NC or 2NO2NC		
	AC/DC			-		
Additional	AC			2NO2NC		
	DC			2NO2NC		
	AC/DC			-		
Dimensions						
AC	W×H×D		mm	45×99.6×96.6		
DC				45×99.6×129.5		
AC/DC				-		
Weight						
AC			kg	0.5		
DC				0.65		
AC/DC				-		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

※ For auxiliary contact usage, refer to Page 62 ~ 63.
When using auxiliary contact, Up to 6a can be made for A contact and up to 4b for B contact.
When using 4a4b condition by using side auxiliary block, upper auxiliary block cannot be used.
In the main 2a2b, upper auxiliary block can be used.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Front Mounting) HGC TB - 62 page ❷ Auxiliary Contact Block (Side Mounting) HGC SB 40 - 62 page	❸ Mechanical Latching Block HGC LB 100 - 65 page ❹ Timer HGC ET - 67 page ❺ Interlock Unit HGC IU 40 - 64 page ❻ Surge Absorber HGC RC/CD 40 - 66 page ❼ Thermal Overload Relay HGT 40 - 54 page ❽ Front Safety Cover HGCFC 100 - 69 page

Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：Based on 2NO2NC

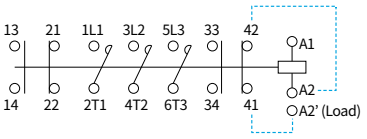
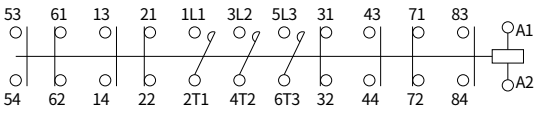
Operational Voltage (V)		HGC25	HGC32	HGC40
AC (60 Hz)	24	HGC25 22NS A024	HGC32 22NS A024	HGC40 22NS A024
	48	HGC25 22NS A048	HGC32 22NS A048	HGC40 22NS A048
	110	HGC25 22NS A110	HGC32 22NS A110	HGC40 22NS A110
	120	HGC25 22NS A120	HGC32 22NS A120	HGC40 22NS A120
	220	HGC25 22NS A220	HGC32 22NS A220	HGC40 22NS A220
	240	HGC25 22NS A240	HGC32 22NS A240	HGC40 22NS A240
	380	HGC25 22NS A380	HGC32 22NS A380	HGC40 22NS A380
	440	HGC25 22NS A440	HGC32 22NS A440	HGC40 22NS A440
AC (50 Hz)	24	HGC25 22NS X024	HGC32 22NS X024	HGC40 22NS X024
	48	HGC25 22NS X048	HGC32 22NS X048	HGC40 22NS X048
	110	HGC25 22NS X110	HGC32 22NS X110	HGC40 22NS X110
	120	HGC25 22NS X120	HGC32 22NS X120	HGC40 22NS X120
	220	HGC25 22NS X220	HGC32 22NS X220	HGC40 22NS X220
	240	HGC25 22NS X240	HGC32 22NS X240	HGC40 22NS X240
	380	HGC25 22NS X380	HGC32 22NS X380	HGC40 22NS X380
	440	HGC25 22NS X440	HGC32 22NS X440	HGC40 22NS X440
DC	24	HGC25 22NS D024	HGC32 22NS D024	HGC40 22NS D024
	48	HGC25 22NS D048	HGC32 22NS D048	HGC40 22NS D048
	110	HGC25 22NS D110	HGC32 22NS D110	HGC40 22NS D110
	125	HGC25 22NS D125	HGC32 22NS D125	HGC40 22NS D125
	220	HGC25 22NS D220	HGC32 22NS D220	HGC40 22NS D220

Ratings and Order Code

Magnetic Contactor : HGC 50 ~ 65 A

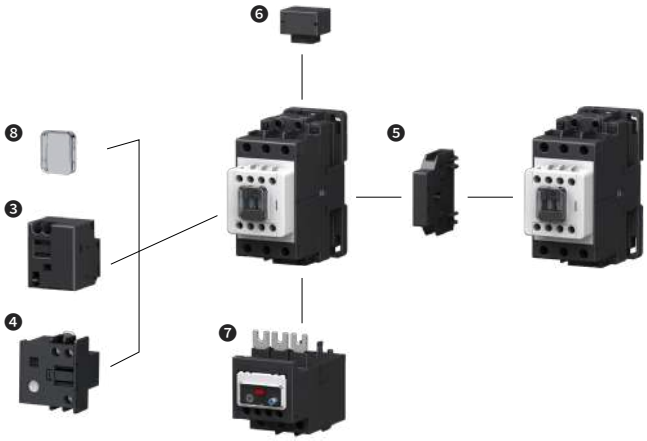
Rating

HGC

Model Name				HGC50	HGC65
IEC 60947					
Rated Insulation Voltage [Ui]			V	1,000	1,000
Rated Operational Voltage [Ue]			V	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	8	8
Rated Thermal Current Ith (AC1)			A	70	85
AC3	200 ~ 240 V		kW/A	15/50	18.5/65
	380 ~ 440 V			22/50	30/65
	500 ~ 550 V			30/43	33/60
	660 ~ 690 V			30/28	33/35
	1,000 V			-	-
	Lifespan	Electrical	10,000 times	200	200
		Mechanical		1,500	1,500
AC4	200 ~ 240 V		kW/A	7.5/35	11/50
	380 ~ 440 V			15/32	22/47
	Electrical Lifespan		10,000 times	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	750	750
	50 % Load (DC)			1,500 (900)	1,500 (900)
	20 % Load (DC)			3,000 (1,200)	3,000 (1,200)
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	250	250
	50 % Load			500	500
Making Capacity	220 V		A	500	650
	440 V			500	650
Breaking Capacity	220 V		A	400	520
	440 V			400	520
Mounting Method				Screw & Rail Mounting	
Auxiliary Contact					
Standard	AC			2NO2NC	
	DC			2NO1NC	
	AC/DC			-	
Additional	AC			2NO2NC	
	DC			1NO1NC	
	AC/DC			-	
Dimensions					
AC	W×H×D		mm	55×127.6×129.1	
DC				55×127.6×129.1	
AC/DC				-	
Weight					
AC			kg	0.8	
DC				0.8	
AC/DC				-	
Contact Arrangement					
Main	Main Contact		3a		
	Auxiliary Contact		2a2b		
Main + Auxiliary Block Added (2a2b)	Main Contact		3a		
	Auxiliary Contact		4a4b		

※ For auxiliary contact usage, refer to Page 62 ~ 63.
When using auxiliary contact, Up to 6a can be made for A contact and up to 4b for B contact.
When using 4a4b condition by using side auxiliary block, upper auxiliary block cannot be used.
In the main 2a2b, upper auxiliary block can be used.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Front Mounting) HGC TB - 62 page ❷ Auxiliary Contact Block (Side Mounting) HGC SB 100 - 62 page	❸ Mechanical Latching Block HGC LB 100 - 65 page ❹ Timer HGC ET - 67 page ❺ Interlock Unit HGC IU 100 - 64 page ❻ Surge Absorber HGC RC/CD100 - 66 page ❼ Thermal Overload Relay HGT 65 - 54 page ❽ Front Safety Cover HGCFC 100 - 69 page

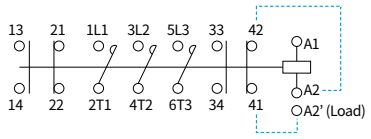
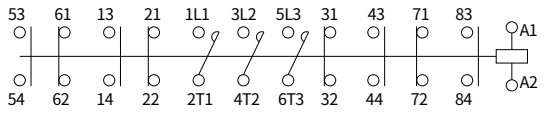
Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：AC based on 2NO2NC, DC based on 2NO1NC

Operational Voltage (V)		HGC50	HGC65
AC (60 Hz)	24	HGC50 22NS A024	HGC65 22NS A024
	48	HGC50 22NS A048	HGC65 22NS A048
	110	HGC50 22NS A110	HGC65 22NS A110
	120	HGC50 22NS A120	HGC65 22NS A120
	220	HGC50 22NS A220	HGC65 22NS A220
	240	HGC50 22NS A240	HGC65 22NS A240
	380	HGC50 22NS A380	HGC65 22NS A380
	440	HGC50 22NS A440	HGC65 22NS A440
AC (50 Hz)	24	HGC50 22NS X024	HGC65 22NS X024
	48	HGC50 22NS X048	HGC65 22NS X048
	110	HGC50 22NS X110	HGC65 22NS X110
	120	HGC50 22NS X120	HGC65 22NS X120
	220	HGC50 22NS X220	HGC65 22NS X220
	240	HGC50 22NS X240	HGC65 22NS X240
	380	HGC50 22NS X380	HGC65 22NS X380
	440	HGC50 22NS X440	HGC65 22NS X440
DC	24	HGC50 21NS D024	HGC65 21NS D024
	48	HGC50 21NS D048	HGC65 21NS D048
	110	HGC50 21NS D110	HGC65 21NS D110
	125	HGC50 21NS D125	HGC65 21NS D125
	220	HGC50 21NS D220	HGC65 21NS D220

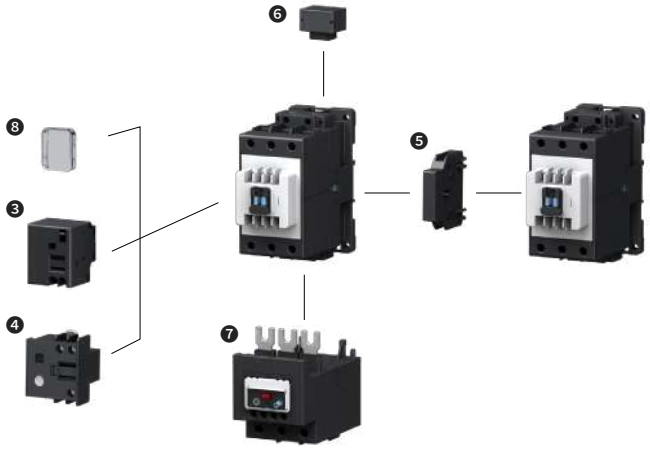
Ratings and Order Code

Magnetic Contactor : HGC 75 ~ 100 A

Rating				HGC		
Model Name				**HGC75**	**HGC85**	**HGC100**
IEC 60947						
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	690	690	690
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8
Rated Thermal Current Ith (AC1)			A	115	125	145
AC3	200 ~ 240 V		kW/A	22/75	25/85	30/100
	380 ~ 440 V			37/75	45/85	55/100
	500 ~ 550 V			37/64	50/75	55/85
	660 ~ 690 V			37/42	45/45	50/65
	1,000 V			-	-	-
	Lifespan	Electrical	10,000 times	200	200	200
		Mechanical		1,000	1,000	1,000
AC4	200 ~ 240 V		kW/A	13/55	15/65	17/72
	380 ~ 440 V			25/52	30/62	33/68
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	450	450	450
	50 % Load (DC)			900	900	900
	20 % Load (DC)			1,800	1,800	1,800
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	200	200	200
	50 % Load			400	400	400
Making Capacity	220 V		A	750	850	1,000
	440 V			750	850	1,000
Breaking Capacity	220 V		A	600	680	800
	440 V			600	680	800
Mounting Method				Screw & Rail Mounting		
Auxiliary Contact						
Standard	AC			2NO2NC		
	DC			2NO1NC		
	AC/DC			-		
Additional	AC			2NO2NC		
	DC			1NO1NC		
	AC/DC			-		
Dimensions						
AC	W×H×D		mm	70×146×153		
DC				70×146×153		
AC/DC				-		
Weight						
AC			kg	1.3		
DC				1.3		
AC/DC				-		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

※ For auxiliary contact usage, refer to Page 62 ~ 63.
When using auxiliary contact, Up to 6a can be made for A contact and up to 4b for B contact.
When using 4a4b condition by using side auxiliary block, upper auxiliary block cannot be used.
In the main 2a2b, upper auxiliary block can be used.

Accessories

Auxiliary Contacts	Other Accessories
	

❶ Auxiliary Contact Block (Front Mounting)
HGC TB - 62 page
❷ Auxiliary Contact Block (Side Mounting)
HGC SB 100 - 62 page

❸ Mechanical Latching Block
HGC LB 100 - 65 page
❹ Timer
HGC ET - 67 page
❺ Interlock Unit
HGC IU 100 - 64 page
❻ Surge Absorber
HGC RC/CD100 - 66 page
❼ Thermal Overload Relay
HGT 65 - 54 page
❽ Front Safety Cover
HGCFC 100 - 69 page

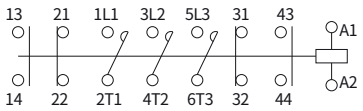
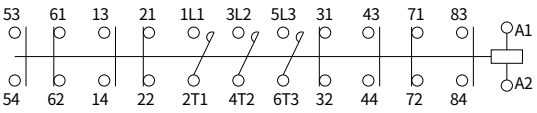
Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：AC based on 2NO2NC, DC based on 2NO1NC

Operational Voltage(V)		HGC75	HGC85	HG100
AC (60 Hz)	24	HGC75 22NS A024	HGC85 22NS A024	HGC100 22NS A024
	48	HGC75 22NS A048	HGC85 22NS A048	HGC100 22NS A048
	110	HGC75 22NS A110	HGC85 22NS A110	HGC100 22NS A110
	120	HGC75 22NS A120	HGC85 22NS A120	HGC100 22NS A120
	220	HGC75 22NS A220	HGC85 22NS A220	HGC100 22NS A220
	240	HGC75 22NS A240	HGC85 22NS A240	HGC100 22NS A240
	380	HGC75 22NS A380	HGC85 22NS A380	HGC100 22NS A380
	440	HGC75 22NS A440	HGC85 22NS A440	HGC100 22NS A440
AC (50 Hz)	24	HGC75 22NS X024	HGC85 22NS X024	HGC100 22NS X024
	48	HGC75 22NS X048	HGC85 22NS X048	HGC100 22NS X048
	110	HGC75 22NS X110	HGC85 22NS X110	HGC100 22NS X110
	120	HGC75 22NS X120	HGC85 22NS X120	HGC100 22NS X120
	220	HGC75 22NS X220	HGC85 22NS X220	HGC100 22NS X220
	240	HGC75 22NS X240	HGC85 22NS X240	HGC100 22NS X240
	380	HGC75 22NS X380	HGC85 22NS X380	HGC100 22NS X380
	440	HGC75 22NS X440	HGC85 22NS X440	HGC100 22NS X440
DC	24	HGC75 21NS D024	HGC85 21NS D024	HGC100 21NS D024
	48	HGC75 21NS D048	HGC85 21NS D048	HGC100 21NS D048
	110	HGC75 21NS D110	HGC85 21NS D110	HGC100 21NS D110
	125	HGC75 21NS D125	HGC85 21NS D125	HGC100 21NS D125
	220	HGC75 21NS D220	HGC85 21NS D220	HGC100 21NS D220

Ratings and Order Code

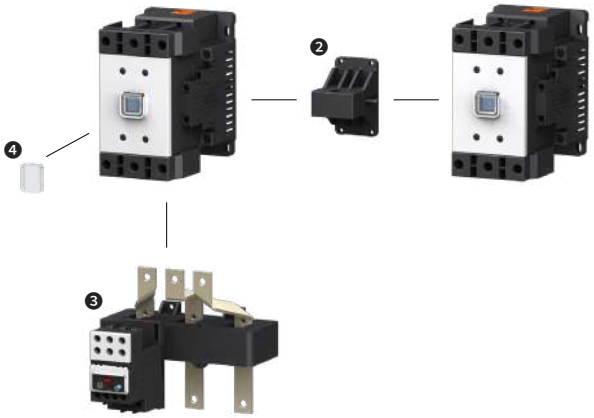
Magnetic Contactor : HGC 115 ~ 150 A

Rating				HGC		
Model Name				**HGC115**	**HGC130**	**HGC150**
IEC 60947-4						
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8
Rated Thermal Current Ith (AC1)			A	160	180	210
AC3	200 ~ 240 V		kW/A	37/115	40/130	45/150
	380 ~ 440 V			60/115	65/130	75/150
	500 ~ 550 V			59/100	70/120	90/140
	660 ~ 690 V			55/65	75/82	90/120
	1,000 V			65/50	75/54	90/66
	Lifespan	Electrical	10,000 times	100	100	100
		Mechanical		500	500	500
AC4	200 ~ 240 V		kW/A	19/80	22/93	30/125
	380 ~ 440 V			37/75	45/90	55/110
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	450	450	450
	50 % Load (DC)			900	900	900
	20 % Load (DC)			1,800	1,800	1,800
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	200	200	200
	50 % Load			400	400	400
Making Capacity	220 V		A	1,150	1,300	1,500
	440 V			1,150	1,300	1,500
Breaking Capacity	220 V		A	920	1,040	1,200
	440 V			920	1,040	1,200
Mounting Method				Screw Mounting		
Auxiliary Contact						
Standard	AC/DC			2NO2NC		
Additional [1]	AC/DC			2NO2NC		
Dimensions	AC/DC	W×H×D	mm	103×155×145.1		
Weight	AC/DC		kg	2.7		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

1) Maximum number of auxiliary contact that can be mounted horizontally on the side.

※ For auxiliary contact usage, refer to Page 62 ~ 63.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Side Mounting) HGC SB 800 - 62 page	❷ Interlock Unit HGC IU 265 - 64 page ❸ Thermal Overload Relay HGT 150 - 56 page ❹ Front Safety Cover HGCFC 150 - 69 page

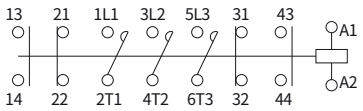
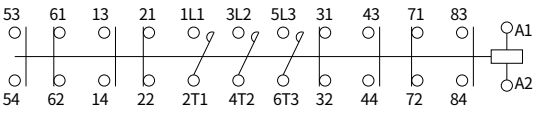
Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：Based on 2NO2NC

Nominal Voltage (V)	Operational Voltage (V)	HGC115	HGC130	HGC150
220	AC 100 ~ 240 DC 110 ~ 220	HGC115 22NS F220	HGC130 22NS F220	HGC150 22NS F220
440	AC 380 ~ 450	HGC115 22NS F440	HGC130 22NS F440	HGC150 22NS F440

Ratings and Order Code

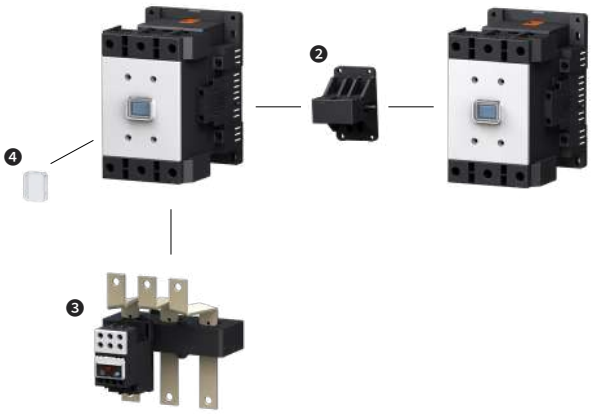
Magnetic Contactor : HGC 185 ~ 265 A

Rating				HGC		
Model Name				**HGC185**	**HGC225**	**HGC265**
IEC 60947						
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8
Rated Thermal Current Ith (AC1)			A	275	315	350
AC3	200 ~ 240 V		kW/A	55/185	75/225	80/265
	380 ~ 440 V			90/185	132/225	147/265
	500 ~ 550 V			110/180	132/200	150/225
	660 ~ 690 V			110/120	132/150	160/173
	1,000 V			110/78	132/96	160/113
	Lifespan	Electrical	10,000 times	100	100	100
		Mechanical		500	500	500
AC4	200 ~ 240 V		kW/A	37/150	45/185	50/200
	380 ~ 440 V			75/150	90/185	102/200
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	300	300	300
	50 % Load (DC)			600	600	600
	20 % Load (DC)			1,200	1,200	1,200
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	200	200	200
	50 % Load			400	400	400
Making Capacity	220 V		A	1,850	2,250	2,650
	440 V			1,850	2,250	2,650
Breaking Capacity	220 V		A	1,480	1,800	2,120
	440 V			1,480	1,800	2,120
Mounting Method				Screw Mounting		
Auxiliary Contact						
Standard	AC/DC			2NO2NC		
Additional [1]	AC/DC			2NO2NC		
Dimensions	AC/DC	W×H×D	mm	138×204×174.2		
Weight	AC/DC		kg	4.8		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

1) Maximum number of auxiliary contact that can be mounted horizontally on the side.

※ For auxiliary contact usage, refer to Page 62 ~ 63.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Side Mounting) HGC SB 800 - 62 page	❷ Interlock Unit HGC IU 265 - 64 page ❸ Thermal Overload Relay HGT 265 - 56 page ❹ Front Safety Cover HGCFC 265 - 69 page

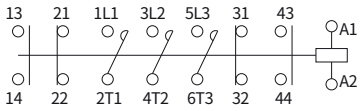
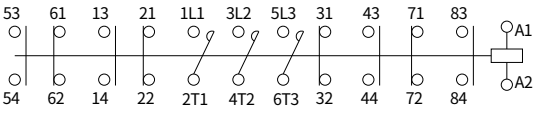
Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：Based on 2NO2NC

Nominal Voltage (V)	Operational Voltage (V)	HGC185	HGC225	HGC265
220	AC 100 ~ 240 DC 110 ~ 220	HGC185 22NS F220	HGC225 22NS F220	HGC265 22NS F220
440	AC 380 ~ 450	HGC185 22NS F440	HGC225 22NS F440	HGC265 22NS F440

Ratings and Order Code

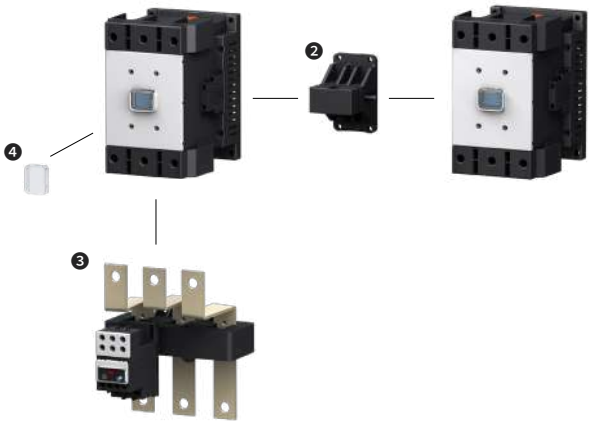
Magnetic Contactor : HGC 300 ~ 500 A

Rating				HGC		
Model Name				**HGC300**	**HGC400**	**HGC500**
IEC 60947-4						
Rated Insulation Voltage [Ui]			V	1,000	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8	8
Rated Thermal Current Ith (AC1)			A	400	500	550
AC3	200 ~ 240 V		kW/A	90/300	125/400	140/500
	380 ~ 440 V			160/300	220/400	250/500
	500 ~ 550 V			200/273	250/300	300/426
	660 ~ 690 V			200/220	250/300	335/360
	1,000 V			200/141	250/178	275/192
	Lifespan	Electrical	10,000 times	100	100	50
		Mechanical		500	500	500
AC4	200 ~ 240 V		kW/A	55/220	75/300	90/350
	380 ~ 440 V			110/220	150/300	175/350
	Electrical Lifespan		10,000 times	3	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	300	300	300
	50 % Load (DC)			600	600	600
	20 % Load (DC)			1,200	1,200	1,200
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	150	150	150
	50 % Load			300	300	300
Making Capacity	220 V		A	3,000	4,000	5,000
	440 V			3,000	4,000	5,000
Breaking Capacity	220 V		A	2,400	3,200	4,000
	440 V			2,400	3,200	4,000
Mounting Method				Screw Mounting		
Auxiliary Contact						
Standard	AC/DC			2NO2NC		
Additional [1]	AC/DC			2NO2NC		
Dimensions	AC/DC	W×H×D	mm	163×243×203		
Weight	AC/DC		kg	9.2		
Contact Arrangement						
Main	Main Contact		3a			
	Auxiliary Contact		2a2b			
Main + Auxiliary Block Added (2a2b)	Main Contact		3a			
	Auxiliary Contact		4a4b			

1) Maximum number of auxiliary contact that can be mounted horizontally on the side.

※ For auxiliary contact usage, refer to Page 62 ~ 63.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Side Mounting) HGC SB 800 - 62 page	❷ Interlock Unit HGC IU 800 - 64 page ❸ Thermal Overload Relay HGT 500 - 56 page ❹ Front Safety Cover HGCFC 500 - 69 page

Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact : Based on 2NO2NC

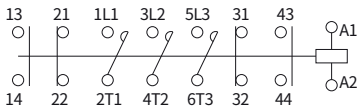
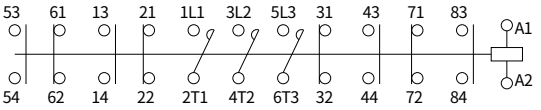
Nominal Voltage (V)	Operational Voltage (V)	HGC300	HGC400	HGC500
220	AC 100 ~ 240 DC 110 ~ 220	HGC300 22NS F220	HGC400 22NS F220	HGC500 22NS F220
440	AC 380 ~ 450	HGC300 22NS F440	HGC400 22NS F440	HGC500 22NS F440

Ratings and Order Code

Magnetic Contactor : HGC 630 ~ 800 A

Rating

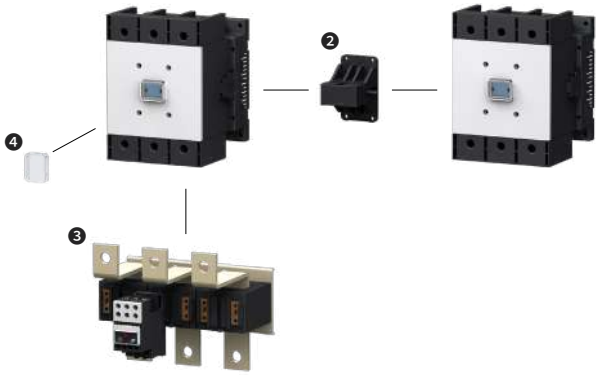
HGC

Model Name				HGC630	HGC800
IEC 60947-4					
Rated Insulation Voltage [Ui]			V	1,000	1,000
Rated Operational Voltage [Ue]			V	1,000	1,000
Rated Impulse Withstand Voltage [Uimp]			kV	8	8
Rated Thermal Current Ith (AC1)			A	750	900
AC3	200 ~ 240 V		kW/A	190/630	220/800
	380 ~ 440 V			330/630	440/800
	500 ~ 550 V			330/500	500/720
	660 ~ 690 V			400/412	500/630
	1,000 V			300/213	400/284
	Lifespan	Electrical	10,000 times	50	50
		Mechanical		500	500
AC4	200 ~ 240 V		kW/A	110/400	160/630
	380 ~ 440 V			200/400	300/630
	Electrical Lifespan		10,000 times	3	3
AC1, 2, 3 Load Permitted Operating Frequency/Time	100 % Load		Frequency	300	300
	50 % Load (DC)			600	600
	20 % Load (DC)			1,200	1,200
AC4 Load Permitted Operating Frequency/Time	100 % Load		Frequency	150	150
	50 % Load			300	300
Making Capacity	220 V		A	6,300	8,000
	440 V			6,300	8,000
Breaking Capacity	220 V		A	5,040	6,400
	440 V			5,040	6,400
Mounting Method				Screw Mounting	
Auxiliary Contact					
Standard	AC/DC			2NO2NC	
Additional [1]	AC/DC			2NO2NC	
Dimensions	AC/DC	W×H×D	mm	276×314×255.3	
Weight	AC/DC		kg	25	
Contact Arrangement					
Main	Main Contact		3a		
	Auxiliary Contact		2a2b		
Main + Auxiliary Block Added (2a2b)	Main Contact		3a		
	Auxiliary Contact		4a4b		

1) Maximum number of auxiliary contact that can be mounted horizontally on the side.

※ For auxiliary contact usage, refer to Page 62 ~ 63.

Accessories

Auxiliary Contacts	Other Accessories
	
❶ Auxiliary Contact Block (Side Mounting) HGC SB 800 - 62 page	❷ Interlock Unit HGC IU 800 - 64 page ❸ Thermal Overload Relay HGT 800 - 56 page ❹ Front Safety Cover HGCFC 800 - 69 page

Order Code

・Based on standard order (General type, with terminal cover), without accessories/
Auxiliary contact：Based on 2NO2NC

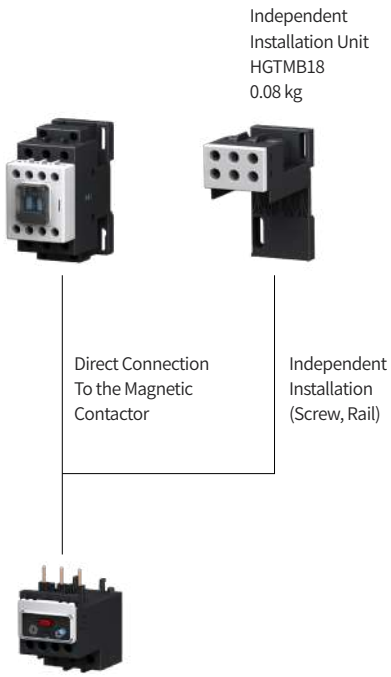
Nominal Voltage (V)	Operational Voltage (V)	HGC630	HGC800
110	AC 100 ~ 127 DC 100 ~ 110	HGC630 22NS F110	HGC800 22NS F110
220	AC 200 ~ 240 DC 200 ~ 220	HGC630 22NS F220	HGC800 22NS F220
440	AC 380 ~ 450	HGC630 22NS F440	HGC800 22NS F440

Ratings and Order Code

Thermal Overload Relay (TOR)

Exterior and Name of Basic Model		Ratings							
Exterior	Model Name	Current (A)				Applicable Cable (mm^2)		Aux. Contact	Applicable Magnetic Contactor
		Nominal Current	Setting Current			Main Circuit	Aux. Circuit		
			Min.	Mid.	Max.				
 Dimensions (mm) : 45 (W)×82.7 (H)×78.2 (D) Weight (kg) : 0.12	HGT18	0.18	0.12	0.15	0.18	1 ~ 2.5	1 ~ 2.5	1NO1NC	HGC9 HGC12 HGC18
		0.26	0.18	0.22	0.26				
		0.35	0.25	0.3	0.35				
		0.5	0.34	0.42	0.5				
		0.7	0.5	0.6	0.7				
		0.9	0.6	0.75	0.9				
		1.2	0.8	1	1.2				
		1.6	1.1	1.35	1.6				
		2.1	1.5	1.8	2.1				
		3	2	2.5	3				
		4.2	2.8	3.5	4.2				
		5	3	4	5				
		6	4	5	6				
		8	5.6	6.8	8				
		9	6	7.5	9				
		12	8	10	12				
		18	12	15	18				

Order Code			Remark
Thermal Overload Relay (Protection Grade 10 A)		Accessory Independent Installation Unit	Installation Method
Screw Type Terminal (With Terminal Cover)			Connect directly to the magnetic contactor or use separate installation panel for independent installation.
K-Type (3-Pole, 3 Elements)	H-Type (3-Pole, 2 Elements)		
HGT18K A0P18S	HGT18H A0P18S		
HGT18K A0P26S	HGT18H A0P26S		
HGT18K A0P35S	HGT18H A0P35S		
HGT18K A0P50S	HGT18H A0P50S		
HGT18K A0P70S	HGT18H A0P70S		
HGT18K A0P90S	HGT18H A0P90S		
HGT18K A1P20S	HGT18H A1P20S		
HGT18K A1P60S	HGT18H A1P60S		
HGT18K A2P10S	HGT18H A2P10S	HGTMB18	
HGT18K A0003S	HGT18H A0003S		
HGT18K A4P20S	HGT18H A4P20S		
HGT18K A0005S	HGT18H A0005S		
HGT18K A0006S	HGT18H A0006S		
HGT18K A0008S	HGT18H A0008S		
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HGT18K A0018S	HGT18H A0018S		

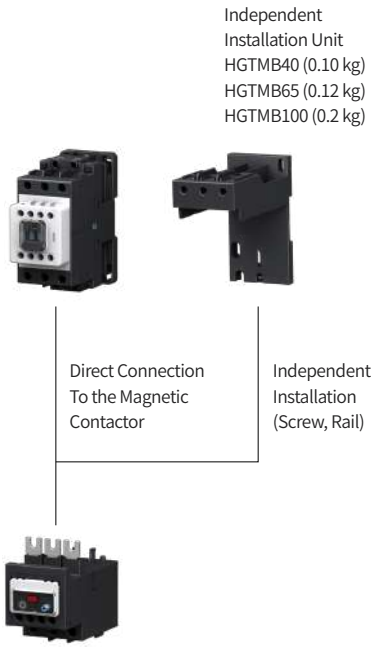


Ratings and Order Code

Thermal Overload Relay (TOR)

Exterior and Name of Basic Model		Ratings							
Exterior	Model Name	Current (A)				Applicable Cable (mm^2)		Aux. Contact	Applicable Magnetic Contactor
		Nominal Current	Setting Current			Main Circuit	Aux. Circuit		
			Min.	Mid.	Max.				
 Dimensions (mm) : 45 (W)×95.5 (H)×69.4 (D) Weight (kg) : 0.16	HGT40	10	7	8.5	10	2 ~ 10	1 ~ 2.5	1NO1NC	HGC25 HGC32 HGC40
		12	8	10	12				
		18	12	15	18				
		22	15	18.5	22				
		25	17	21	25				
		32	22	27	32				
		40	28	34	40				
 Dimensions (mm) : 55 (W)×110.7 (H)×89.3 (D) Weight (kg) : 0.29	HGT65	10	7	8.5	10	2 ~ 25	1 ~ 2.5	1NO1NC	HGC50 HGC65
		12	8	10	12				
		18	12	15	18				
		22	15	18.5	22				
		25	17	21	25				
		32	22	27	32				
		40	28	34	40				
		50	34	42	50				
		65	45	55	65				
 Dimensions (mm) : 70 (W)×128.1 (H)×105 (D) Weight (kg) : 0.47	HGT100	25	17	21	25	6 ~ 38	1 ~ 2.5	1NO1NC	HGC75 HGC85 HGC100
		32	22	27	32				
		40	28	34	40				
		50	34	42	50				
		65	45	55	65				
		75	52	63	75				
		85	59	72	85				
		100	70	85	100				

Order Code		Accessory Independent Installation Unit	Remark
Thermal Overload Relay (Protection Grade 10 A)			Installation Method
Screw Type Terminal (With Terminal Cover)			Connect directly to the magnetic contactor or use separate installation panel for independent installation.
K-Type (3-Pole, 3 Elements)	H-Type (3-Pole, 2 Elements)		
HGT40K A0010S	HGT40H A0010S	HGTMB40	
HGT40K A0012S	HGT40H A0012S		
HGT40K A0018S	HGT40H A0018S		
HGT40K A0022S	HGT40H A0022S		
HGT40K A0025S	HGT40H A0025S		
HGT40K A0032S	HGT40H A0032S		
HGT40K A0040S	HGT40H A0040S		
HGT65K A0010S	HGT65H A0010S	HGTMB65	
HGT65K A0012S	HGT65H A0012S		
HGT65K A0018S	HGT65H A0018S		
HGT65K A0022S	HGT65H A0022S		
HGT65K A0025S	HGT65H A0025S		
HGT65K A0032S	HGT65H A0032S		
HGT65K A0040S	HGT65H A0040S		
HGT65K A0050S	HGT65H A0050S		
HGT65K A0065S	HGT65H A0065S		
HGT100K A0025S	HGT100H A0025S	HGTMB100	
HGT100K A0032S	HGT100H A0032S		
HGT100K A0040S	HGT100H A0040S		
HGT100K A0050S	HGT100H A0050S		
HGT100K A0065S	HGT100H A0065S		
HGT100K A0075S	HGT100H A0075S		
HGT100K A0085S	HGT100H A0085S		
HGT100K A00100S	HGT100H A00100S		



Ratings and Order Code

Thermal Overload Relay (TOR)

Exterior and Name of Basic Model		Ratings							
Exterior	Model Name	Current (A)					Applicable Cable (mm^2)	Aux. Contact	Applicable Magnetic Contactor
		Nominal Current	Setting Current			CT Ratio	Aux. Circuit		
			Min.	Mid.	Max.				
 Dimensions (mm) : 180 (W)×179.3 (H)×159 (D) Weight (kg) : 2.0	HGT150	80	48	64	80	80 : 5	1 ~ 2.5	1NO1NC	HGC115 HGC130 HGC150
		115	69	92	115	115 : 5			
		130	78	104	130	130 : 5			
		150	90	120	150	150 : 5			
 Dimensions (mm) : 180 (W)×179.3 (H)×185 (D) Weight (kg) : 2.2	HGT265	80	48	64	80	80 : 5	1 ~ 2.5	1NO1NC	HGC185 HGC225 HGC265
		115	69	92	115	115 : 5			
		130	78	104	130	130 : 5			
		150	90	120	150	150 : 5			
		185	111	148	185	185 : 5			
		225	135	180	225	225 : 5			
		265	159	212	265	265 : 5			
 Dimensions (mm) : 180 (W)×179.3 (H)×205.2 (D) Weight (kg) : 2.4	HGT500	150	90	120	150	150 : 5	1 ~ 2.5	1NO1NC	HGC300 HGC400 HGC500
		185	111	148	185	185 : 5			
		225	135	180	225	225 : 5			
		265	159	212	265	265 : 5			
		300	180	240	300	300 : 5			
		400	240	320	400	400 : 5			
		500	300	400	500	500 : 5			
 Dimensions (mm) : 245 (W)×209.9 (H)×197 (D) Weight (kg) : 6.2	HGT800	630	378	504	630	630 : 5	1 ~ 2.5	1NO1NC	HGC630 HGC800
		800	480	640	800	800 : 5			

Order Code		Remark
Thermal Overload Relay (Protection Grade 10 A)		Installation Method
Screw Type Terminal (With Terminal Cover)		Direct connection to the magnetic contactor
K-Type (3-Pole, 3 Elements)	H-Type (3-Pole, 2 Elements)	
HGT150K A0080S	HGT150H A0080S	
HGT150K A0115S	HGT150H A0115S	
HGT150K A0130S	HGT150H A0130S	
HGT150K A0150S	HGT150H A0150S	
HGT265K A0080S	HGT265H A0080S	
HGT265K A0115S	HGT265H A0115S	
HGT265K A0130S	HGT265H A0130S	
HGT265K A0150S	HGT265H A0150S	
HGT265K A0185S	HGT265H A0185S	
HGT265K A0225S	HGT265H A0225S	
HGT265K A0265S	HGT265H A0265S	
HGT500K A0150S	HGT500H A0150S	
HGT500K A0185S	HGT500H A0185S	
HGT500K A0225S	HGT500H A0225S	
HGT500K A0265S	HGT500H A0265S	
HGT500K A0300S	HGT500H A0300S	
HGT500K A0400S	HGT500H A0400S	
HGT500K A0500S	HGT500H A0500S	
HGT800K A0630S	HGT800H A0630S	
HGT800K A0800S	HGT800H A0800S	

HGC115
HGC130
HGC150



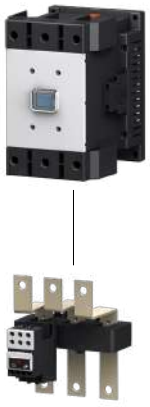
HGT150

HGC185
HGC225
HGC265



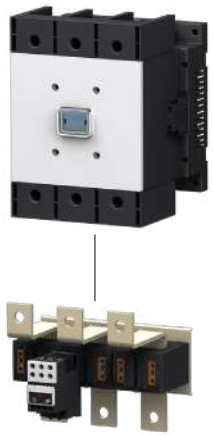
HGT265

HGC300
HGC400
HGC500



HGT500

HGC630
HGC800



HGT800

Ratings and Order Code

Control Relay (HGR)

Rating

HGR

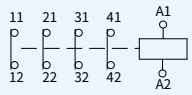
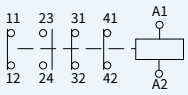
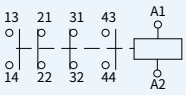
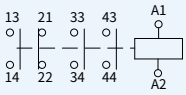
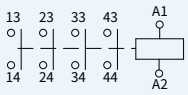
Model Name			HGR-N (AC)	HGR-P (DC) Permanent Magnetic
Rated Insulation Voltage [Ui]				
IEC 60947-5-1		V	AC 750	
VDE0660		V	AC 1,000	
Rated Thermal Current Ith (AC1)		A	16	
Minimum load		mA	10 (24 V DC)	
Rating				
AC15	220 V	A	4	
	380 V		3	
	440 V		3	
	500 V		2	
	690 V		2	
DC12 (Resistive Load)	24 V		4	
	48 V		2.5	
	125 V		1.1	
	250 V		0.3	
DC13 (Coil Load)	24 V		4	
	48 V		2.5	
	125 V		1.1	
	250 V		0.3	
UL/CSA [1)]	AC 120 V		6	
	AC 240 V		3	
	DC 125 V		1.1	
	DC 250 V		0.3	
Mechanical Lifespan		10,000 times	1,500	1,000
Applicable Cable Size for Connection		mm^2	2×0.75-2.5	
Operating Frequency		times/hr	3,000	1,800
Maximum Fuse Rating				
Plug-Fuse (Fast/Slow)		A	35/25	
MCB-C Characteristics			16	
HRC Fuse (DIN/BS88)			25	
Mounting Method			Screw & Rail Mounting	
Contact			4NC	
			1NO + 3NC	
			2NO + 2NC	
			3NO +1NC	
			4NO	
Coil Power Consumption				
AC (60 Hz)	Inrush	VA/W	80/64	-
	Normal		8/2.5	-
DC	Inrush/Normal	W	-	5
Dimensions				
A/C	W×H×D	mm	44×75×80	-
D/C			-	44×75×98.3
Weight				
AC		kg	0.3	-
DC			-	0.45

※ 1) Contact Rating Code : A300 ~ P150
As for permanent magnetic type of HGC-P products, attention is required with regards to +, - polarity during the wiring of the coil terminal part.

Operation Features

Model Name		HGR-N (220 Vac, 60 Hz)				HGR-P (110 Vdc)			
		22	40	44	80	22	40	44	80
Operational Voltage (V)	Intake	120 ~ 170	120 ~ 170	120 ~ 170	120 ~ 170	65 ~ 70	70 ~ 75	65 ~ 70	75 ~ 80
	Release	70 ~ 110	70 ~ 110	70 ~ 110	70 ~ 110	12 ~ 15	15 ~ 18	12 ~ 15	15 ~ 20
Operation Time (ms)	Coil On → NO Contact On	15 ~ 25	15 ~ 25	15 ~ 25	15 ~ 25	45 ~ 55	65 ~ 75	50 ~ 60	65 ~ 75
	Coil On → NC Contact Off	10 ~ 25		10 ~ 25		40 ~ 50		40 ~ 50	
	Coil Off → NO Contact Off	5 ~ 25	5 ~ 25	5 ~ 25	5 ~ 25	20 ~ 30	10 ~ 20	20 ~ 30	10 ~ 20
	Coil Off → NC Contact On	10 ~ 25		10 ~ 25		25 ~ 35		25 ~ 35	

Order Code

Model Name		Contact Arrangement				
		4NC	1NO + 3NC	2NO + 2NC	3NO + 1NC	4NO
AC 60 Hz	24	HGR 04NS A024	HGR 13NS A024	HGR 22NS A024	HGR 31NS A024	HGR 40NS A024
	48	HGR 04NS A048	HGR 13NS A048	HGR 22NS A048	HGR 31NS A048	HGR 40NS A048
	110	HGR 04NS A110	HGR 13NS A110	HGR 22NS A110	HGR 31NS A110	HGR 40NS A110
	120	HGR 04NS A120	HGR 13NS A120	HGR 22NS A120	HGR 31NS A120	HGR 40NS A120
	220	HGR 04NS A220	HGR 13NS A220	HGR 22NS A220	HGR 31NS A220	HGR 40NS A220
	240	HGR 04NS A240	HGR 13NS A240	HGR 22NS A240	HGR 31NS A240	HGR 40NS A240
	380	HGR 04NS A380	HGR 13NS A380	HGR 22NS A380	HGR 31NS A380	HGR 40NS A380
	440	HGR 04NS A440	HGR 13NS A440	HGR 22NS A440	HGR 31NS A440	HGR 40NS A440
	480	HGR 04NS A480	HGR 13NS A480	HGR 22NS A480	HGR 31NS A480	HGR 40NS A480
AC 50 Hz	24	HGR 04NS X024	HGR 13NS X024	HGR 22NS X024	HGR 31NS X024	HGR 40NS X024
	48	HGR 04NS X048	HGR 13NS X048	HGR 22NS X048	HGR 31NS X048	HGR 40NS X048
	110	HGR 04NS X110	HGR 13NS X110	HGR 22NS X110	HGR 31NS X110	HGR 40NS X110
	220	HGR 04NS X220	HGR 13NS X220	HGR 22NS X220	HGR 31NS X220	HGR 40NS X220
	240	HGR 04NS X240	HGR 13NS X240	HGR 22NS X240	HGR 31NS X240	HGR 40NS X240
	380	HGR 04NS X380	HGR 13NS X380	HGR 22NS X380	HGR 31NS X380	HGR 40NS X380
	400	HGR 04NS X400	HGR 13NS X400	HGR 22NS X400	HGR 31NS X400	HGR 40NS X400
	440	HGR 04NS X440	HGR 13NS X440	HGR 22NS X440	HGR 31NS X440	HGR 40NS X440
DC Permanent Magnetic	24	HGR 04PS D024	HGR 13PS D024	HGR 22PS D024	HGR 31PS D024	HGR 40PS D024
	48	HGR 04PS D048	HGR 13PS D048	HGR 22PS D048	HGR 31PS D048	HGR 40PS D048
	110	HGR 04PS D110	HGR 13PS D110	HGR 22PS D110	HGR 31PS D110	HGR 40PS D110
	125	HGR 04PS D125	HGR 13PS D125	HGR 22PS D125	HGR 31PS D125	HGR 40PS D125
	220	HGR 04PS D220	HGR 13PS D220	HGR 22PS D220	HGR 31PS D220	HGR 40PS D220
Contact Arrangement						

Accessories and Others

- It is categorized into AC and DC type with 5 types of contact configurations.
- It has been designed to comply with the IEC 60947 and the protection grade of the product is IP 20
- Permitted range of usable temperature : -25 ~ 40 °C
- It is optimal for control circuit with fast response speed or plant automation.
- Applicable standard and specification :
  IEC 60947-5-1, VDE0660, CENELEC-EN50011

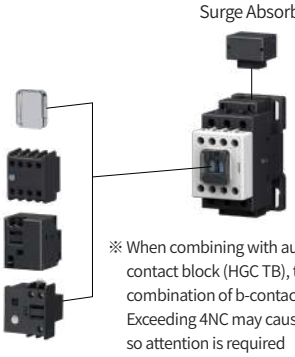
Accessories

Front Safety Cover

Auxiliary Contact Block (Front Mounting)

Mechanical Latching Block

Timer



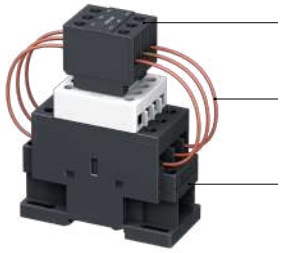
※ When combining with auxiliary contact block (HGC TB), the maximum combination of b-contact is 4NC. Exceeding 4NC may cause malfunction so attention is required

Ratings and Order Code

Magnetic Contactor for Capacitor

Product		Rating						Components	
Exterior	Model Name	KVAR (Ambient Temperature of 55 °C, 50/60 Hz)						Magnetic Contactors	
		220 V	230/240 V	400/415 V	440 V	500/550 V	690 V	Model Name	Auxiliary Contact
	HGC9C	5	5	9.7	9.7	14	14	HGC9	2NO + 2NC
	HGC12C	6.7	6.7	12	12	15	15	HGC12	2NO + 2NC
	HGC18C	8.5	8.5	16.7	16.7	24	24	HGC18	2NO + 2NC
	HGC25C	10	10	20	20	26	26	HGC25	2NO + 2NC
	HGC32C	13	13	25	25	30	30	HGC32	2NO + 2NC
	HGC40C	15	15	29	29	35	35	HGC40	2NO + 2NC
	HGC50C	19	19	40	40	45	45	HGC50	2NO + 2NC
	HGC65C	23.5	23.5	43.5	43.5	54	54	HGC65	2NO + 2NC
	HGC75C	28	28	52	52	60	60	HGC75	2NO + 2NC
	HGC85C	32	32	56	56	70	70	HGC85	2NO + 2NC
	HGC100C	35	35	62	62	80	80	HGC100	2NO + 2NC

Components		Order Code		Remark
Capacitor Unit		AC [1]		Composition of Capacitor Switching Contactor
Model Name	Auxiliary Contact	220 V, 60 Hz	220 V, 50 Hz	
HGC CU40	NONE	HGC9C 22NS A220	HGC9C 22NS X220	
		HGC9C 22NS A220	HGC9C 22NS X220	
HGC CU40		HGC12C 22NS A220	HGC12C 22NS X220	
		HGC12C 22NS A220	HGC12C 22NS X220	
HGC CU40		HGC18C 22NS A220	HGC18C 22NS X220	
		HGC18C 22NS A220	HGC18C 22NS X220	
HGC CU40		HGC25C 22NS A220	HGC25C 22NS X220	
		HGC25C 22NS A220	HGC25C 22NS X220	
HGC CU40		HGC32C 22NS A220	HGC32C 22NS X220	
		HGC32C 22NS A220	HGC32C 22NS X220	
HGC CU40		HGC40C 22NS A220	HGC40C 22NS X220	
		HGC40C 22NS A220	HGC40C 22NS X220	
HGC CU65		HGC50C 22NS A220	HGC50C 22NS X220	
		HGC50C 22NS A220	HGC50C 22NS X220	
HGC CU65		HGC65C 22NS A220	HGC65C 22NS X220	
		HGC65C 22NS A220	HGC65C 22NS X220	
HGC CU100		HGC75C 22NS A220	HGC75C 22NS X220	
		HGC75C 22NS A220	HGC75C 22NS X220	
HGC CU100		HGC85C 22NS A220	HGC85C 22NS X220	
		HGC85C 22NS A220	HGC85C 22NS X220	
HGC CU100		HGC100C 22NS A220	HGC100C 22NS X220	
		HGC100C 22NS A220	HGC100C 22NS X220	



- Capacitor switching unit is used together with the general magnetic contactor.
- When the capacitor is switched on, the contact of the capacity switching unit attached to the magnetic contactor is closed first so after the capacitor load is pre-charged through the resistance cable, the main contact of the magnetic contactor is closed.
  This prevents the main contact of the magnetic contactor from being fused by restricting the inrush current of the capacitor.
- The capacitor creates a oscillation frequency of 1 to 15 kHz when supplying into the power source. It generates high transient current (Over 180 In).
  The capacitor switching unit plays the role of protecting the main contact of the magnetic contactor by restricting such transient current.
- When voltage is applied to the general magnetic contactor, the maximum current is reduced in the following cases.
  - In case the inductance of the main power is extremely high
  - In case the rating of the line transformer is low
  - In case the short circuit voltage of the transformer is high

Switching Frequency and Lifespan

Permitted Switching Frequency		240 times/h
Electrical Lifespan (AC-6b)	Ue ≤ 440 Vac	100,000 times
	500 Vac ≤ Ue ≤ 690 Vac	100,000 times

When Only the Capacitor Unit is Ordered

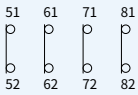
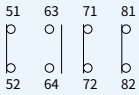
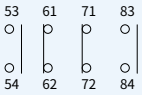
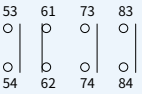
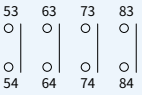
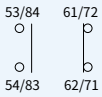
Model Name	Aux. Contact	Order Code	Remark
HGC CU40	NONE	HGC CU40 00NS	Quantity of Resistance Cable : 6
HGC CU65		HGC CU65 00NS	
HGC CU100		HGC CU100 00NS	

※ 1) Operational Voltage
50 Hz : 24, 48, 110, 120, 220, 240, 380, 440 V
60 Hz : 24, 48, 110, 120, 220, 240, 380, 440 V

Accessories

Auxiliary Contact Block

<table>
<tr><th colspan="2">Exterior and Name</th><th colspan="4">Rating</th></tr>
<tr><th>Exterior</th><th>Model Name</th><th colspan="4">Rating of Contact</th></tr>
<tr><td rowspan="15">Front Mounting
  </td><td rowspan="15">HGC TB</td><td rowspan="2">Rated Insulation Current (Ui)</td><td>IEC</td><td colspan="2">AC 690 V</td></tr>
<tr><td>UL</td><td colspan="2">AC 600 V</td></tr>
<tr><td colspan="2">Rated Thermal Current (Ith)</td><td colspan="2">16 A</td></tr>
<tr><td colspan="2">Minimum load</td><td colspan="2">10 mA at 24 V DC</td></tr>
<tr><td rowspan="6">Rated Operational Current AC15 (Coil Load)</td><td>120 V</td><td colspan="2">6 A</td></tr>
<tr><td>240 V</td><td colspan="2">4 A</td></tr>
<tr><td>380 V</td><td colspan="2">3 A</td></tr>
<tr><td>440 V</td><td colspan="2">3 A</td></tr>
<tr><td>500 V</td><td colspan="2">2 A</td></tr>
<tr><td>690 V</td><td colspan="2">2 A</td></tr>
<tr><td rowspan="6">Rated Operational Current DC13 (Coil Load)</td><td>24 V</td><td colspan="2">4 A</td></tr>
<tr><td>48 V</td><td colspan="2">2.5 A</td></tr>
<tr><td>125 V</td><td colspan="2">1.1 A</td></tr>
<tr><td>250 V</td><td colspan="2">0.3 A</td></tr>
<tr><td>480 V</td><td colspan="2">0.2 A</td></tr>
<tr><td>600 V</td><td colspan="2">0.2 A</td></tr>
<tr><td rowspan="20">Side Mounting
  </td><td rowspan="20">HGC SB</td><td colspan="2">Based on ZEC60947-4</td><td colspan="2">Based on UL and CSA</td></tr>
<tr><td colspan="2">Rated Insulation Voltage (Ui)</td><td>AC 750 V</td><td>Thermal Current</td><td>16 A</td></tr>
<tr><td colspan="2">Rated Thermal Current (Ith)</td><td>16 A</td><td rowspan="4">Rated Operational Current (AC)</td><td>120 V</td><td>6 A</td></tr>
<tr><td colspan="2">Minimum load</td><td>10 mA at 24 V DC</td><td>240 V</td><td>3 A</td></tr>
<tr><td rowspan="4">Rated Operational Current AC12 (Resistive Load)</td><td>110 V</td><td>10 A</td><td>480 V</td><td>1.5 A</td></tr>
<tr><td>220 V</td><td>8 A</td><td>600 V</td><td>1.2 A</td></tr>
<tr><td>440 V</td><td>6 A</td><td rowspan="4">Rated Operational Current (DC)</td><td>125 V</td><td>1.1 A</td></tr>
<tr><td>690 V</td><td>2 A</td><td>250 V</td><td>0.55 A</td></tr>
<tr><td rowspan="4">Rated Operational Current AC15 (Coil Load)</td><td>110 V</td><td>6 A</td><td>440 V</td><td>0.2 A</td></tr>
<tr><td>220 V</td><td>4 A</td><td>600 V</td><td>0.2 A</td></tr>
<tr><td>440 V</td><td>3 A</td><td colspan="2" rowspan="12">※ Contact Rating Code : A600 ~ P300</td></tr>
<tr><td>690 V</td><td>2 A</td></tr>
<tr><td rowspan="4">Rated Operational Current DC12 (Resistive Load)</td><td>24 V</td><td>4 A</td></tr>
<tr><td>48 V</td><td>2.5 A</td></tr>
<tr><td>125 V</td><td>1.1 A</td></tr>
<tr><td>250 V</td><td>0.3 A</td></tr>
<tr><td rowspan="4">Rated Operational Current DC13 (Coil Load)</td><td>24 V</td><td>4 A</td></tr>
<tr><td>48 V</td><td>2.5 A</td></tr>
<tr><td>125 V</td><td>1.1 A</td></tr>
<tr><td>250 V</td><td>0.3 A</td></tr>
</table>

Contact Arrangement		Order Code	Others		
Combination	Arrangement	With Terminal Cover	Weight	Applicable Magnetic Contactor	Installation Method
2NC		HGC TB02NS	0.031	HGC9 ~ 100 HGR	Front Mounting  ※ Maximum number of b contacts that can be combined is 4NC.
1NO + 1NC		HGC TB11NS			
2NO		HGC TB20NS			
4NC		HGC TB04NS			
1NO + 3NC		HGC TB13NS	0.053		
2NO + 2NC		HGC TB22NS			
3NO + 1NC		HGC TB31NS			
4NO		HGC TB40NS			
1NO + 1NC		HGC SB40 11NS	0.028	HGC9 ~ 40	Side Installation   ※ Maximum number of b contacts that can be combined is 4NC.
		HGC SB100 11NS	0.053	HGC50 ~ 100	
		HGC SB800 11NS	0.042	HGC115 ~ 800	

Accessories

Interlock Unit

The interlock unit is an accessory that provides interlock function for reversion operation of the magnetic contactors. Also, the mechanical interlock function can be configured. The reverse operation type of magnetic contactors configured with mechanical interlocks is not closed simultaneously so it is more reliable than the electrical interlocks.

Selection and Order

Order Code	Applicable Magnetic Contactor	Weight (kg)
HGC IU40	HGC9 ~ 40	0.03
HGC IU100	HGC50 ~ 100	0.03
HGC IU265	HGC115 ~ 265	0.081
HGC IU800	HGC300 ~ 800	0.101

Wire kit

Set of cable for connecting the main circuit of the reverse operation type of magnetic contactor.

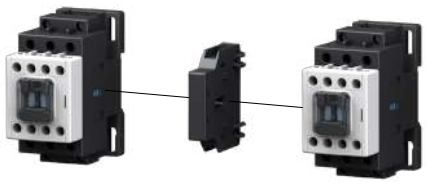
Selection and Order

Order Code	Applicable Magnetic Contactor	Weight (kg)
HGC RB18	HGC9 ~ 18	0.2
HGC RB40	HGC25 ~ 32	0.2
HGC RB65	HGC40 ~ 65	0.3
HGC RB100	HGC75 ~ 100	0.5

Handling

- Electrical interlock must be used together by using the NC contact of the magnetic contactor.
- When mounting the product, do not install vertically.
- In case of HGC115 ~ 800, the auxiliary contact block installed between the reverse operation type of magnetic contactor must be removed before installation.
- Do not apply excessive force when checking the simultaneously input by moving it left and right manually. It may cause damage.
- It is not applicable to DC type of HGC40 ~ 100.

HGC9 ~ 100



HGC115 ~ 800



Install after removing the auxiliary contact block installed between the magnetic contactor.



Interlock Unit



Wire Kit

Mechanical Latching Block

The mechanical latching block maintains the mechanical closed state even if the excitation state of the coil has become loosen due to a drop in operational voltage below the rated voltage that is supplied to the coil of the magnetic contactor and the control relay. The mechanical latching block manufactured in a module method can be installed using a One-Touch method at the magnetic contactor and the control relay.

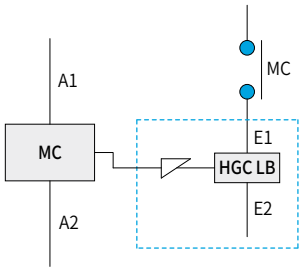
Selection and Order

Model Name	Order Code	Current	Operational Voltage	Applicable Magnetic Contactor
HGC LB100	HGC LB100 F024	AC/DC	24 V	HGC9 ~ 100 HGR
	HGC LB100 F048		48 V	
	HGC LB100 F110		100 ~ 125 V	
	HGC LB100 F220		200 ~ 240 V	
	HGC LB100 A440	AC	440 V	

Ratings and Characteristics

Coil Power Consumption	VA	25
	W	20
Voltage	V	(0.85 ~ 1.1) × Uc
Operation Frequency	Cycle/h	1,200
Operational Voltage	AC	24, 48, 100 ~ 125, 200 ~ 240 V 440 V
	DC	24, 48, 100 ~ 125, 200 ~ 240 V
Mechanical Lifespan	10,000 times	50
Weight	kg	0.1

Circuit Diagram



※ A1/A2 : Coil terminal, E1/E2 : Latching block terminal

Handling

- The latching block functions after receiving the mechanical closing signal from the magnetic contactor or the control relay and the closing state of the main contact is maintained even if the excitation state of the magnetic contactor or the control relay's coil has become loose due to momentary black-out of the cable.
- How to turn the magnetic contactor or the control relay off
  - Manual : Set the button on the latching block to "O" position.
  - Electrical : Apply de-energized voltage to the coil in the latching block. The power of the magnetic contactor (Control relay) assembled must be Off before supplying power to the coil of the latching block.
- How to open the magnetic contactor or the control relay
  - If the button located at the "I" part of the latching block is pressed, it can be opened without exciting the coil of the magnetic contactor or the control relay.
- Caution
  - Do not excite the magnetic contactor or the control relay with the latching block simultaneously.
  - The latching block functions instantaneously so do not apply power of more than 1 sec at the power part (E1, E2).
  - As for the circuit diagram of the latching block, please refer to the diagram on the right.





Accessories

Surge Absorber

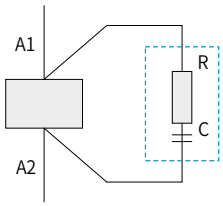
Surge Absorber (RC-Unit)

- The surge voltage occurs during the operation of the magnetic contactor or the control relay and the surge voltage is normally 10 ~ 20 times higher than the rated voltage so the surge absorber drops the surge voltage to approximately 3 times less.
- It is optimal for the switching circuit that uses PLC.
- It prevents damage in the electronic parts caused by high surge voltage.
- It is applicable to both 50/60 Hz. (In case of RC-Unit)
- If noise components exceeding 400Hz or more than 5% noise, internal device degradation may occur.

Selection and Order

Product	Order Code	Operational Voltage	Magnetic Contactor	Weight (kg)
RC-Unit	HGC RC40 Y048	AC 24 ~ 48 V	HGC9 ~ 40, HGR	0.029
	HGC RC40 Y220	AC 110 ~ 220 V		
	HGC RC40 Y380	AC 240 ~ 380 V		
	HGC RC100 Y048	AC 24 ~ 48 V	HGC50 ~ 100, HGC50B ~ 100B	
	HGC RC100 Y220	AC 110 ~ 220 V		
	HGC RC100 Y380	AC 240 ~ 380 V		
	HGC RC800 Y220	AC 110~220V	HGC115~ HGC800	





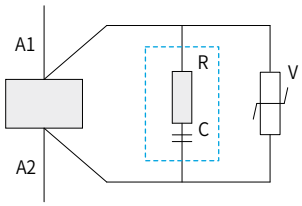
Surge Absorber (Varistor + RC-Unit)

- HGC RC100 F110/F220 products are available for AC/DC using varistors.
- When surge voltage comes in, it discharges the voltage through the varister to prevent sudden high voltage from entering.

Selection and Order

Product	Order Code	Operational Voltage	Magnetic Contactor	Weight (kg)
RC-Unit with Varistor	HGC RC100 F110	AC 48 ~ 110 V	HGC9 ~ 100, HGR	0.029
		DC 48 ~ 110 V		
	HGC RC100 F220	AC 110 ~ 220 V		
		DC 110 ~ 220 V		





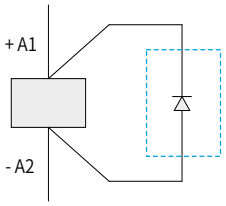
Clamping Diode

- It is used for the purpose of preventing counter electromotive force on the DC power supply.
- It must be installed when the coil is connected in parallel.
- It prevents damage in the electronic parts by preventing counter electromotive power.

Selection and Order

Product	Order Code	Operational Voltage	Magnetic Contactor	Weight (kg)
Clamping Diode	HGC CD100	DC 24 ~ 220 V	HGC9 ~ 100, HGR	0.029







Electronic Timer Block

- As it has been manufactured in a module method, it enables One-Touch mounting on the electronic contactor and control relay, saving space.
- It has been designed for AC/DC with comprehensive operational voltage.
- On-Delay and Interval timer functions can be realized using one timer and it is optimal as a Y-△ starter.

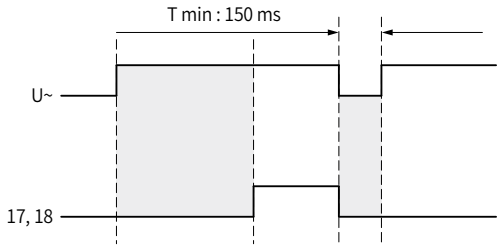
Selection and Order

Order Code	Magnetic Contactor	Operational Voltage
HGC ET1	HGC9 ~ 100, HGR	AC/DC 90 ~ 240 V
HGC ET2		AC/DC 24 ~ 60 V

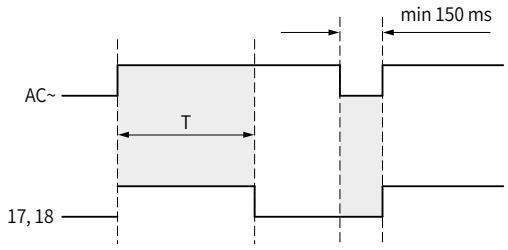
Ratings and Selection

Model Name	Order Code	HGC ET1	HGC ET2
Rated Voltage	AC/DC V	90 ~ 240	24 ~ 60
Permitted Voltage	V	(0.8 ~ 1.1)×Rated Voltage	
Breaking Capacity	VA	90	
Maximum Load	VA	15	
Delay Time	Position A	10 ~ 220	
	Position B	0.15 ~ 15	
Precision	%	±5	
Repetition Margin of Error	%	0.1	
	secs	50 ms	
Weight	kg	0.053	

Operation Concept Map



・Position 1 : On-Delay / t : Control time 0.15....220 sec

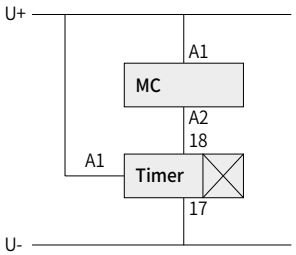


・Position 2 : Interval Timer

※ After the power has been turned off, resting time of 150 ms is required for re-operation.







※ A1/A2 : Coil terminal, 17/18 : Timer terminal

Accessories

Control Coil

Product	Operational Voltage		Order Code			
			Applicable Magnetic Contactor			
	Frequency	V	HGC9 ~ 18	HGC25 ~ 40	HGC50 ~ 65	HGC75 ~ 100
 	AC 60 Hz	24	HGCOLPKG18 A24	HGCOLPKG40 A24	HGCOLPKG65 A24	HGCOLPKG100 A24
		48	HGCOLPKG18 A48	HGCOLPKG40 A48	HGCOLPKG65 A48	HGCOLPKG100 A48
		110	HGCOLPKG18 A110	HGCOLPKG40 A110	HGCOLPKG65 A110	HGCOLPKG100 A110
		120	HGCOLPKG18 A120	HGCOLPKG40 A120	HGCOLPKG65 A120	HGCOLPKG100 A120
		220	HGCOLPKG18 A220	HGCOLPKG40 A220	HGCOLPKG65 A220	HGCOLPKG100 A220
		240	HGCOLPKG18 A240	HGCOLPKG40 A240	HGCOLPKG65 A240	HGCOLPKG100 A240
		380	HGCOLPKG18 A380	HGCOLPKG40 A380	HGCOLPKG65 A380	HGCOLPKG100 A380
		440	HGCOLPKG18 A440	HGCOLPKG40 A440	HGCOLPKG65 A440	HGCOLPKG100 A440
	AC 50 Hz	24	HGCOLPKG18 X24	HGCOLPKG40 X24	HGCOLPKG65 X24	HGCOLPKG100 X24
		48	HGCOLPKG18 X48	HGCOLPKG40 X48	HGCOLPKG65 X48	HGCOLPKG100 X48
		110	HGCOLPKG18 X110	HGCOLPKG40 X110	HGCOLPKG65 X110	HGCOLPKG100 X110
		120	HGCOLPKG18 X120	HGCOLPKG40 X120	HGCOLPKG65 X120	HGCOLPKG100 X120
		220	HGCOLPKG18 X220	HGCOLPKG40 X220	HGCOLPKG65 X220	HGCOLPKG100 X220
		240	HGCOLPKG18 X240	HGCOLPKG40 X240	HGCOLPKG65 X240	HGCOLPKG100 X240
		380	HGCOLPKG18 X380	HGCOLPKG40 X380	HGCOLPKG65 X380	HGCOLPKG100 X380
		440	HGCOLPKG18 X440	HGCOLPKG40 X440	HGCOLPKG65 X440	HGCOLPKG100 X440
	DC	24	HGCOLPKG18 D24	HGCOLPKG40 D24	HGCOLPKG65 D24	HGCOLPKG100 D24
		48	HGCOLPKG18 D48	HGCOLPKG40 D48	HGCOLPKG65 D48	HGCOLPKG100 D48
		110	HGCOLPKG18 D110	HGCOLPKG40 D110	HGCOLPKG65 D110	HGCOLPKG100D110
		125	HGCOLPKG18 D125	HGCOLPKG40 D125	HGCOLPKG65 D125	HGCOLPKG100D125
		220	HGCOLPKG18 D220	HGCOLPKG40 D220	HGCOLPKG65 D220	HGCOLPKG100D220
	Nominal Voltage	V	Applicable Magnetic Contactor			
			HGC115 ~ 150	HGC185 ~ 265	HGC300 ~ 500	HGC630 ~ 800
 ※ When ordering HGC115 ~ 800, it is provided in Ass'y including the AD converter is provided	24	AC 24 ~ 26 DC 24	It will be Available after 2025.		-	-
	110	AC 100 ~ 127 DC 100 ~ 110	-	-	-	HGCOL800 F110
	220	AC 100 ~ 240 DC 100 ~ 220	HGCOL150 F220	HGCOL265 F220	HGCOL500 F220	-
	220	AC 200 ~ 240 DC 200 ~ 220	-	-	-	HGCOL800 F220
	440	AC 380 ~ 450	HGCOL150 F440	HGCOL265 F440	HGCOL500 F440	HGCOL800 F440

※ Relay coils are marked as HGRCOL A220, D110 and others and P type is not sold separately.

Contacts and Covers

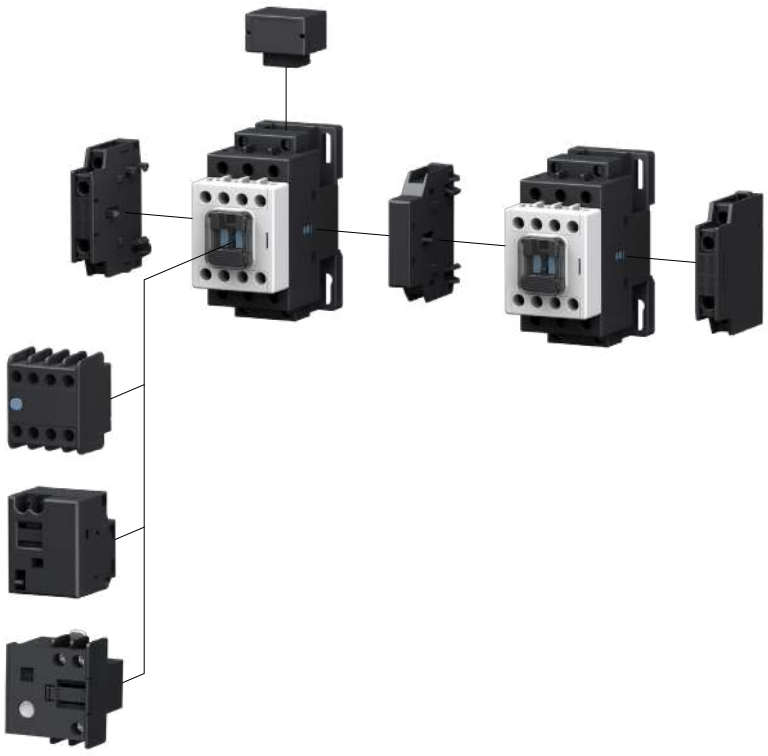
Product	Model Name	Applicable Product	Order Code	Components	
Main Contact		Magnetic contactor for use		1 SET	1 Order standard(set)
 Moving Contact  Fixed Contact	HGCTIP	HGC9	HGCTIP9	Moving Contact : 3 EA Fixed contact : 6 EA	1
		HGC12	HGCTIP12		
		HGC18	HGCTIP18		
		HGC25	HGCTIP25		
		HGC32	HGCTIP32		
		HGC40	HGCTIP40		
		HGC50	HGCTIP50		
		HGC65	HGCTIP65		
		HGC75	HGCTIP75		
		HGC85	HGCTIP85		
		HGC100	HGCTIP100		
		HGC115	HGCTIP115		
		HGC130	HGCTIP130		
		HGC150	HGCTIP150		
		HGC185	HGCTIP185		
		HGC225	HGCTIP225		
		HGC265	HGCTIP265		
		HGC300	HGCTIP300		
		HGC400	HGCTIP400		
		HGC500	HGCTIP500		
		HGC630	HGCTIP630		
		HGC800	HGCTIP800		
Protection Cover		Magnetic contactor for use		1 SET	1 Order standard(set)
 Main Terminal Cover  Coil Terminal Cover	HGCPC	HGC9 ~ 18	HGCPC1811NS	Main Terminal Cover : 2 EA Coil Terminal Cover : 2 EA Auxiliary Terminal Cover : 2 EA	5
			HGCPC1822NS		
		HGC25 ~ 40	HGCPC4011NS		
			HGCPC4022NS		
		HGC50 ~ 65	HGCPC65		
		HGC75 ~ 100	HGCPC100		
		HGC115 ~ 150	HGCPC150	Main Terminal Cover : 2 EA Coil Terminal Cover : 2 EA Auxiliary Terminal Cover : 8 EA	2
		HGC185 ~ 265	HGCPC265		3
		HGC300 ~ 500	HGCPC500		2
		HGC630 ~ 800	HGCPC800		2
		HGR	HGRPC	Main Terminal Cover : 2 EA Coil Terminal Cover : 2 EA	5
Front Cover		Magnetic contactor for use		1 SET	1 Order standard(set)
	HGCFC	HGC9 ~ 100	HGCFC100	Front Cover : 1 EA	4
		HGC115 ~ 150	HGCFC150		
		HGC185 ~ 265	HGCFC265		
		HGC300 ~ 500	HGCFC400		
		HGC630 ~ 800	HGCFC800		

※ The order code of HGC18 and 40 varies depending on the number of auxiliary contacts, so please pay attention to the order.

Accessories

Order Code

HGC	TB		22NS		N	
Model Name	Accessories		Detailed Ratings		Purpose	
HGC	**TB**	Auxiliary Contact (Front Mounting)	Refer to the Relevant Page per Accessory		**N**	Non 1E Class
	SB	Auxiliary Contact (Side Mounting)				
	IU	Interlock Unit	Nuclear			
	LB	Mechanical Latching Block	**04Q**	0NO + 4NC		
	RC	Surge Absorber	**13Q**	1NO + 3NC		
	CD	Clamping Diode	**22Q**	2NO + 2NC		
	ET	Electronic Timer	**31Q**	3NO + 1NC		
	CU	Capacitor Switching Unit	**40Q**	4NO + 0NC		



※ The order format above is to explain the order code. For detailed specification per type, refer to the relevant page upon placing the order.

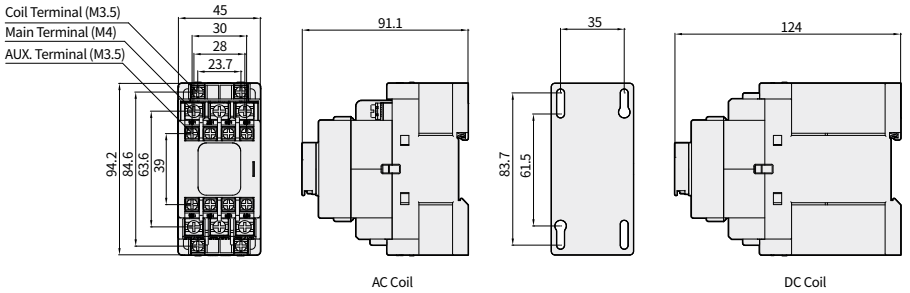
Dimensions

Magnetic Contactor

Unit : mm

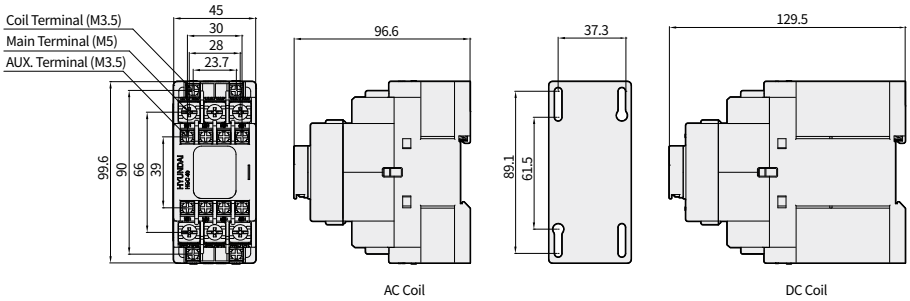
HGC9
HGC12
HGC18

Accessories	A (mm)
Auxiliary Contact HGCTB	35
Latching Block HGCLB	42.5
Timer HGCET	39



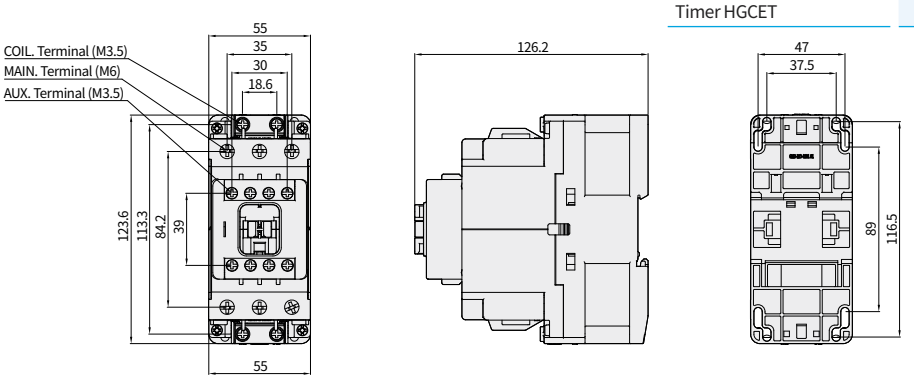
HGC25
HGC32
HGC40

Accessories	A (mm)
Auxiliary Contact HGCTB	35
Latching Block HGCLB	42.5
Timer HGCET	39



HGC50
HGC65
(AC/DC)

Accessories	A (mm)
Auxiliary Contact HGCTB	35
Latching Block HGCLB	42.5
Timer HGCET	39



※ The dimensions of the drawing on this page may be subject to change without notice.
( ) Refers to the DC type.

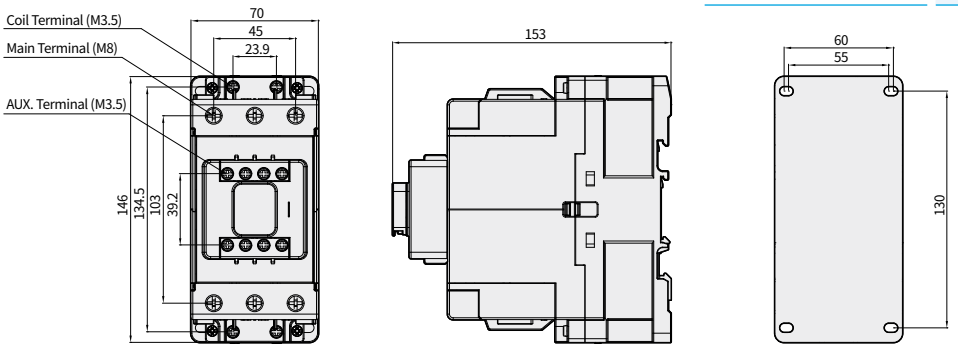
Dimensions

Electronic Contactor

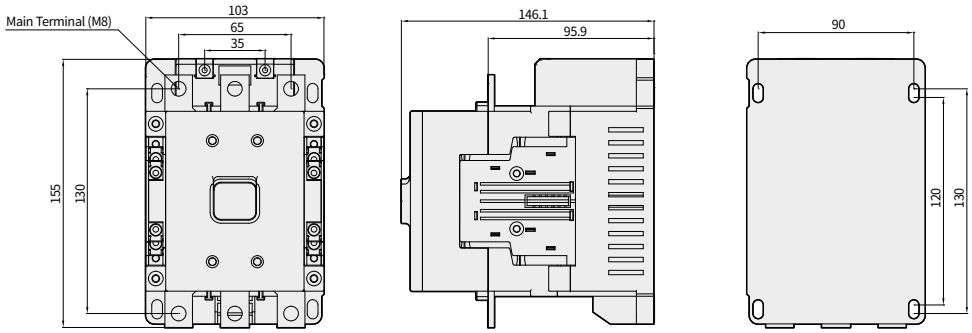
Unit : mm

HGC75
HGC85
HGC100
(AC/DC)

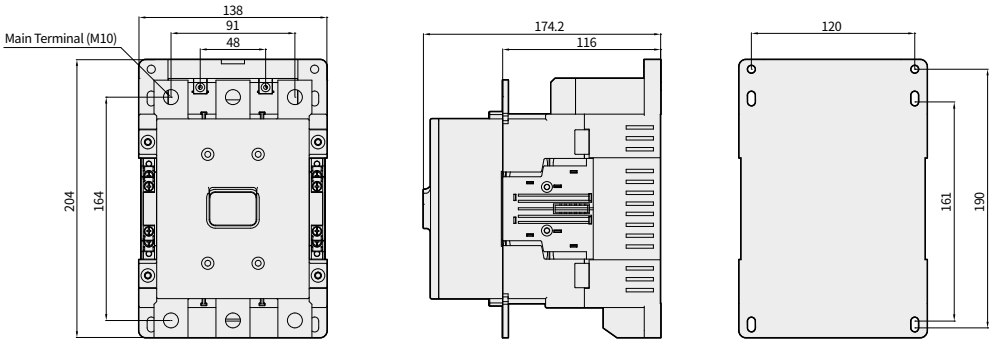
Accessories	A (mm)
Auxiliary Contact HGCTB	35
Latching Block HGCLB	42.5
Timer HGCET	39



HGC115
HGC130
HGC150



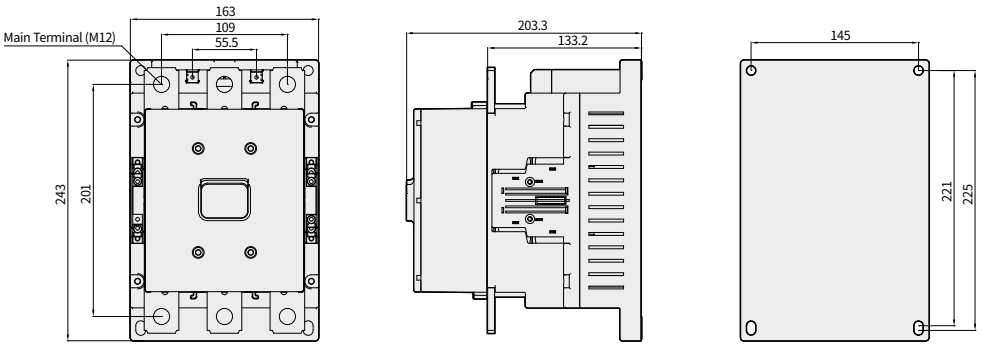
HGC185
HGC225
HGC265



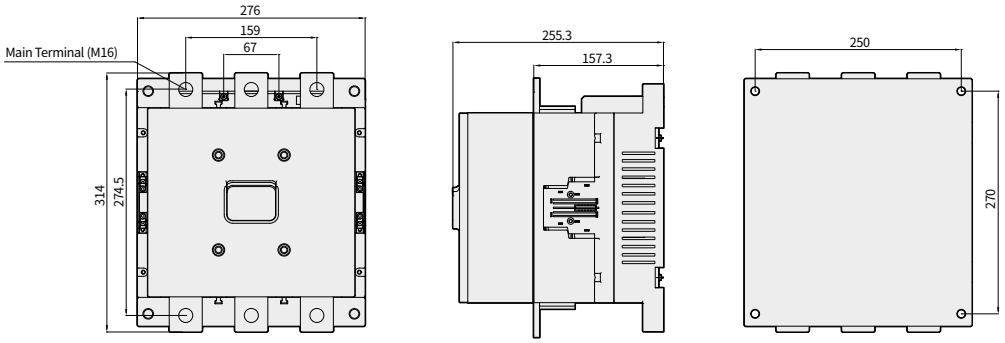
※ The dimensions of the drawing on this page may be subject to change without notice.
( ) Refers to the DC type.

Unit : mm

HGC300
HGC400
HGC500



HGC630
HGC800



※ The dimensions of the drawing on this page may be subject to change without notice.
( ) Refers to the DC type.

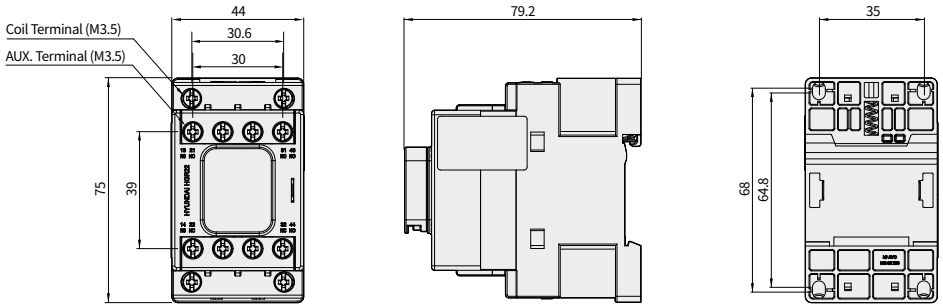
Dimensions

Control Relay

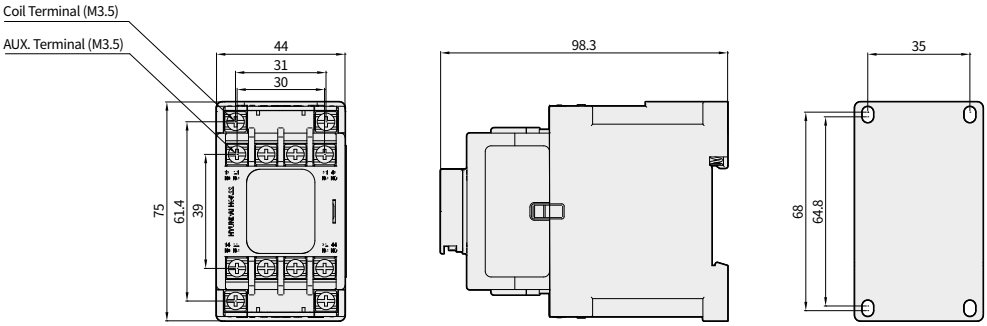
Unit : mm

HGR (AC)

Accessories	A (mm)
Auxiliary Contact HGCTB	35
Latching Block HGCLB	42.5
Timer HGCET	39



HGR-P (Magnetic Type) (DC)

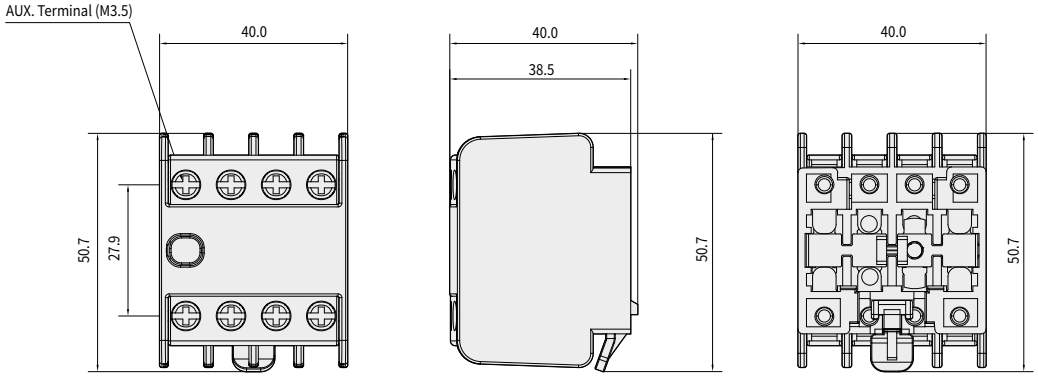


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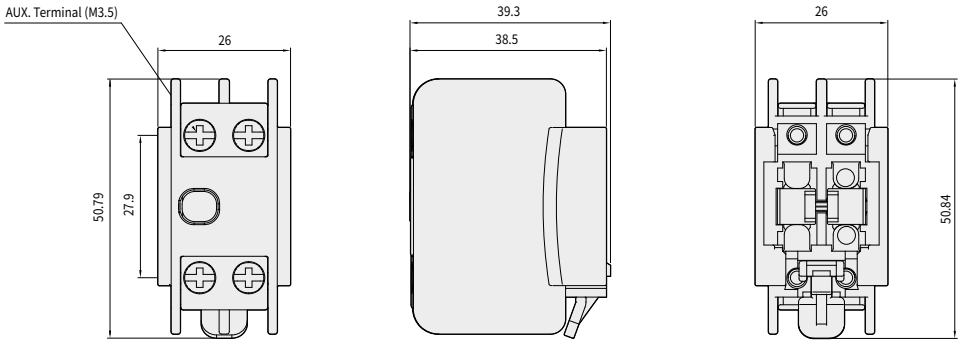
Auxiliary Contact Block (Front Mounting)

Unit : mm

HGCTB4P



HGCTB2P



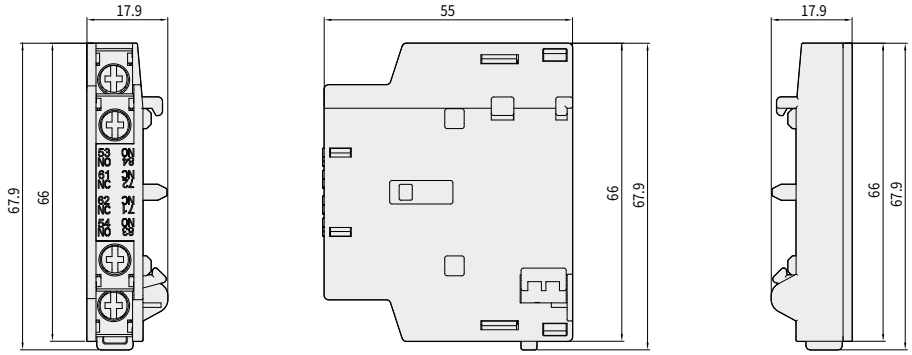
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Dimensions

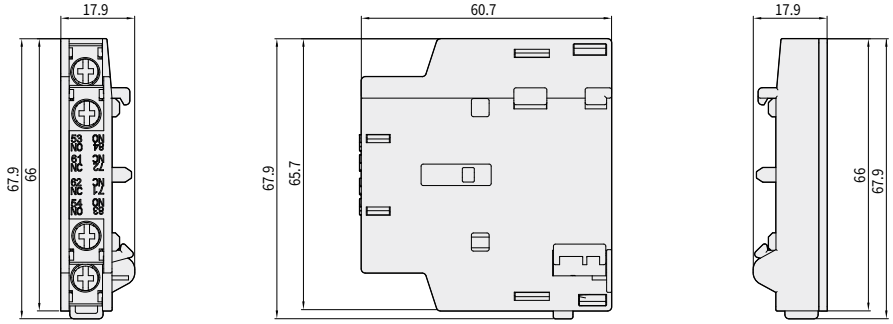
Auxiliary Control Block (Side Mounting)

Unit : mm

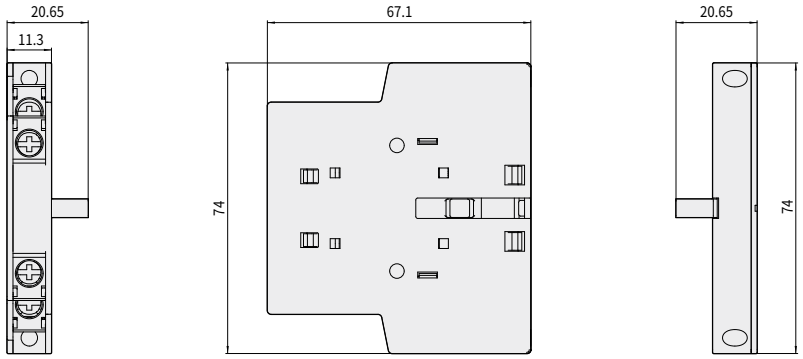
HGCSB40



HGCSB100



HGCSB800

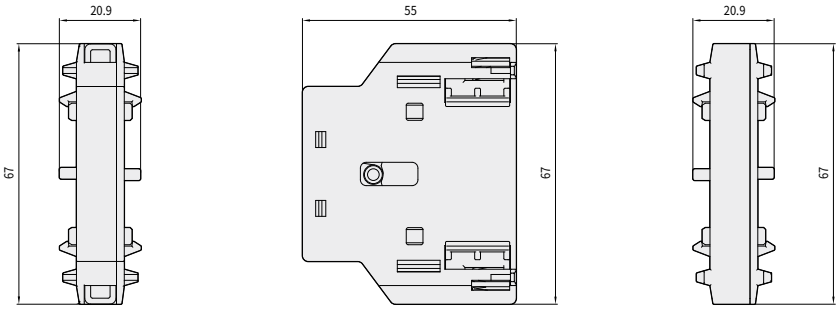


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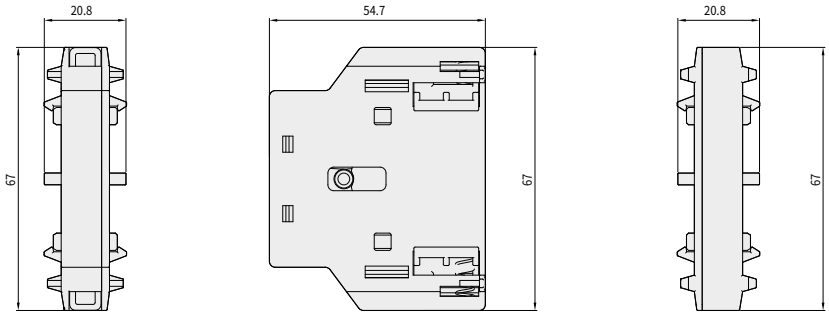
Interlock Unit

Unit : mm

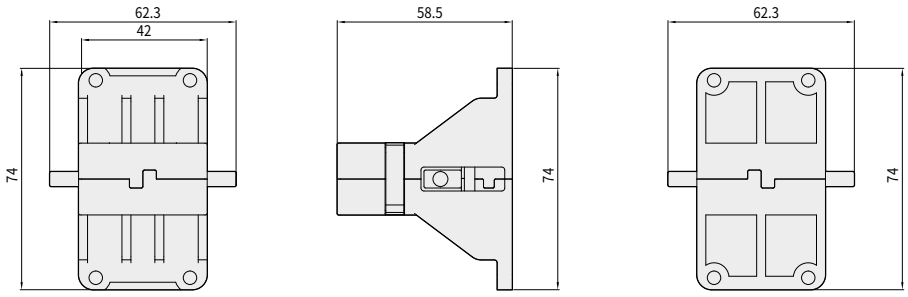
HGCIU40



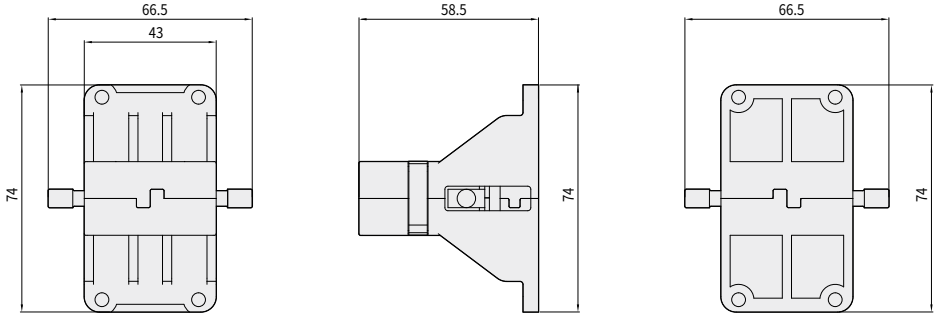
HGCIU100



HGCIU265



HGCIU800



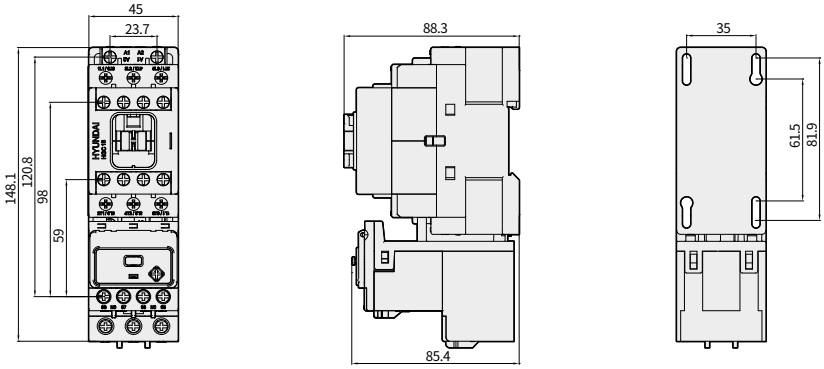
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Dimensions

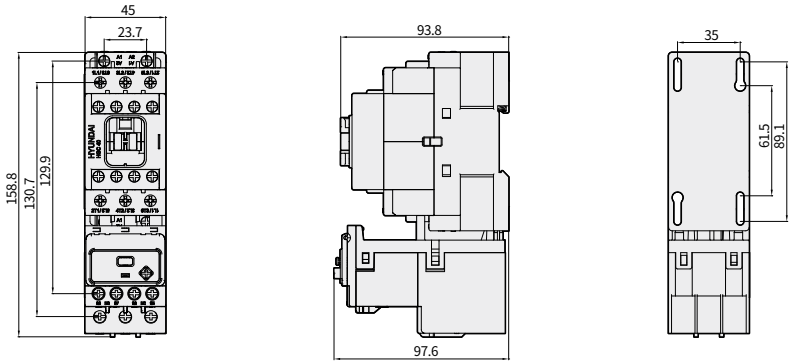
Magnetic Contactor + Thermal Overload Relay

Unit : mm

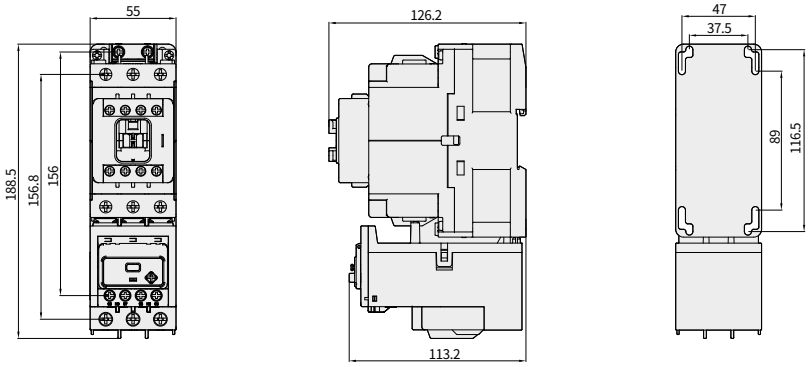
HGC9
HGC12
HGC18 +
HGT18



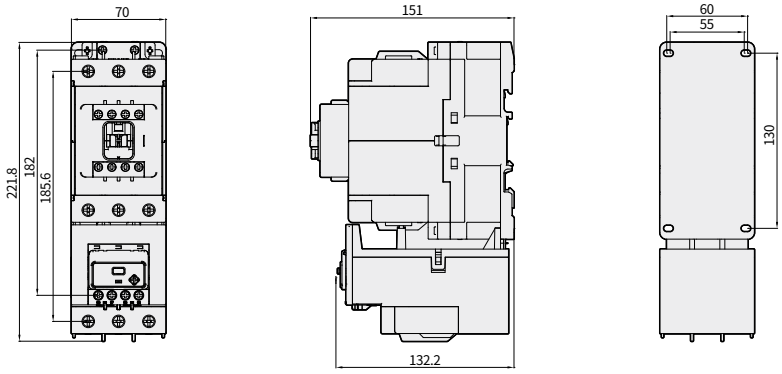
HGC25
HGC32
HGC40 +
HGT40



HGC50
HGC65 +
HGT65



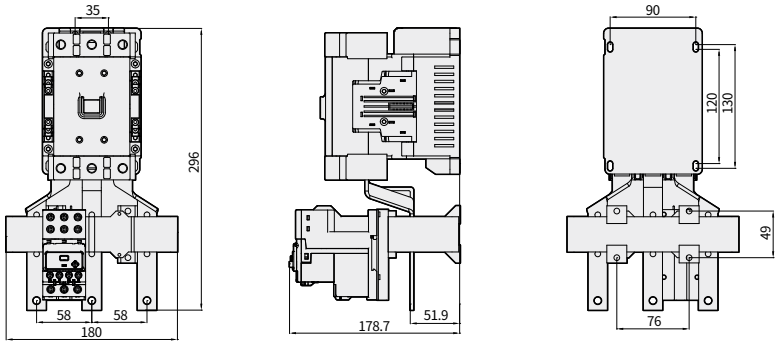
HGC75
HGC85
HGC100 +
HGT100



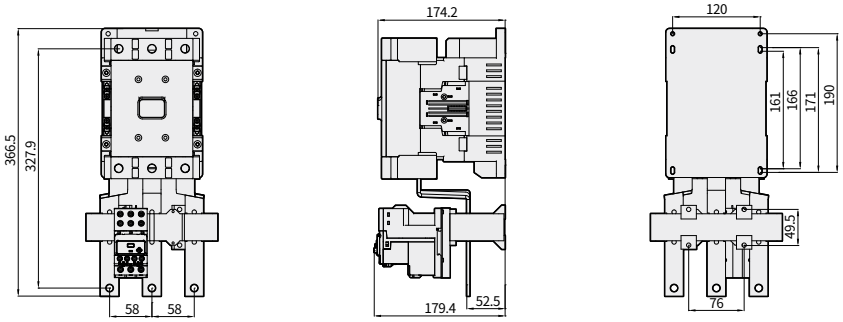
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Unit : mm

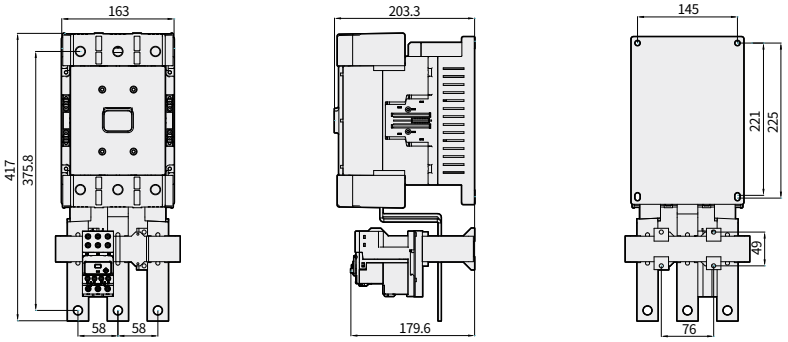
HGC115
HGC130
HGC150 +
HGT150



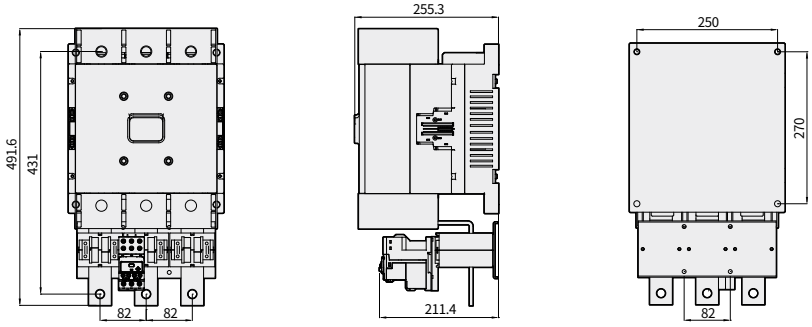
HGC185
HGC225
HGC265 +
HGT265



HGC300
HGC400
HGC500 +
HGT500



HGC630
HGC800 +
HGT800
(630, 800A)



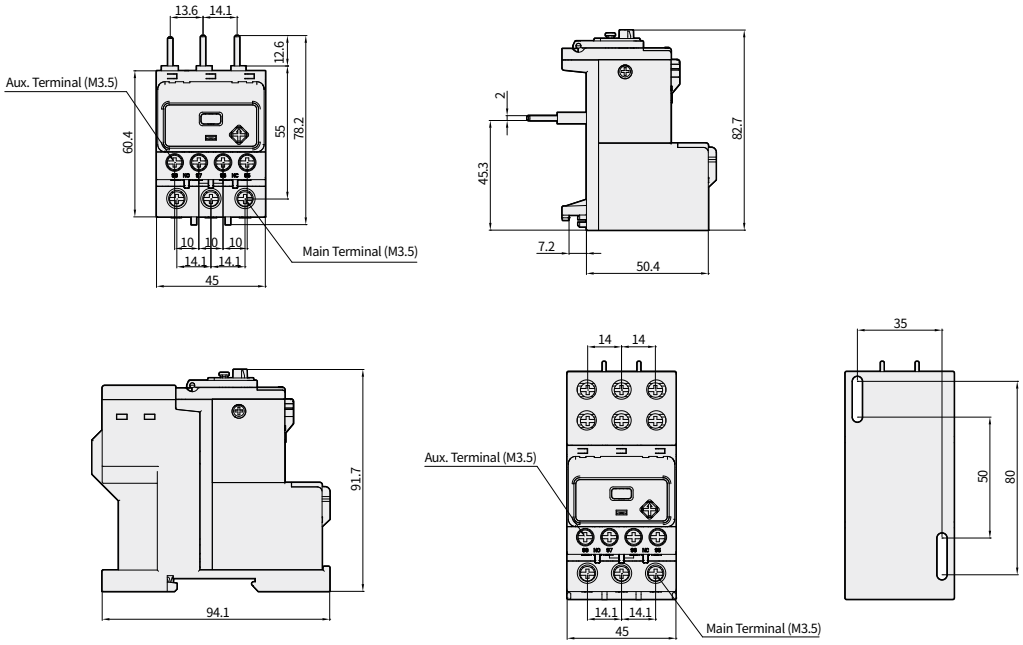
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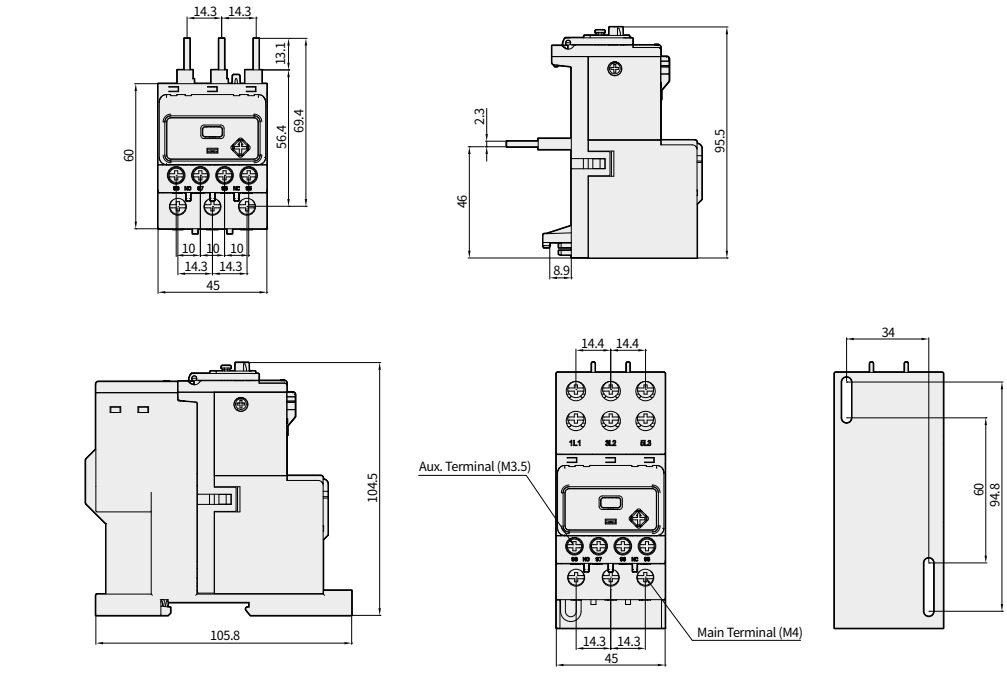
Thermal Overload Relay

Unit : mm

HGT18



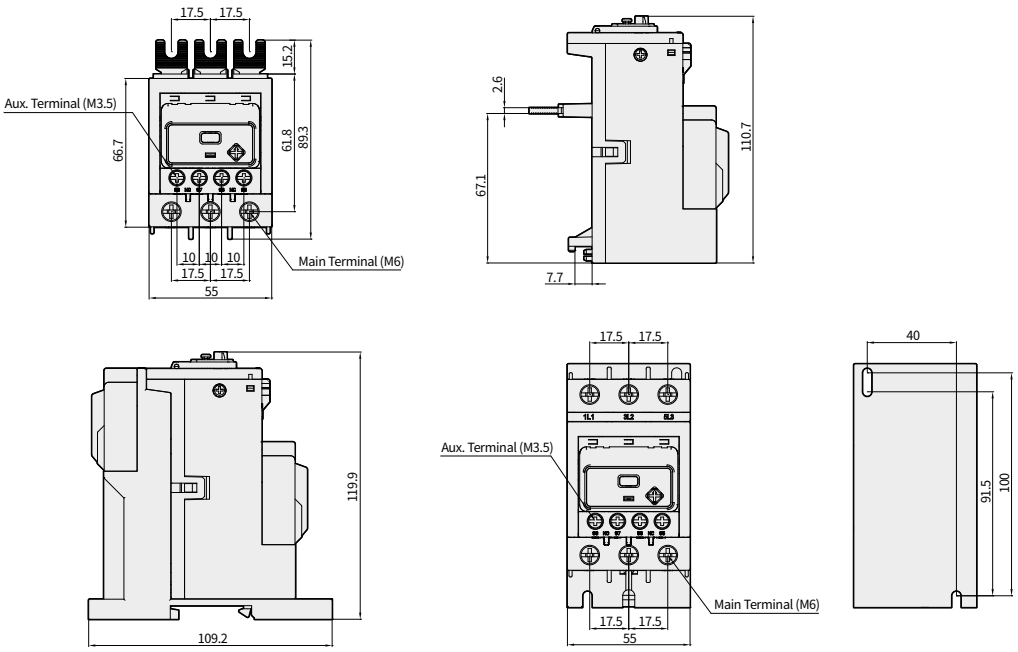
HGT40



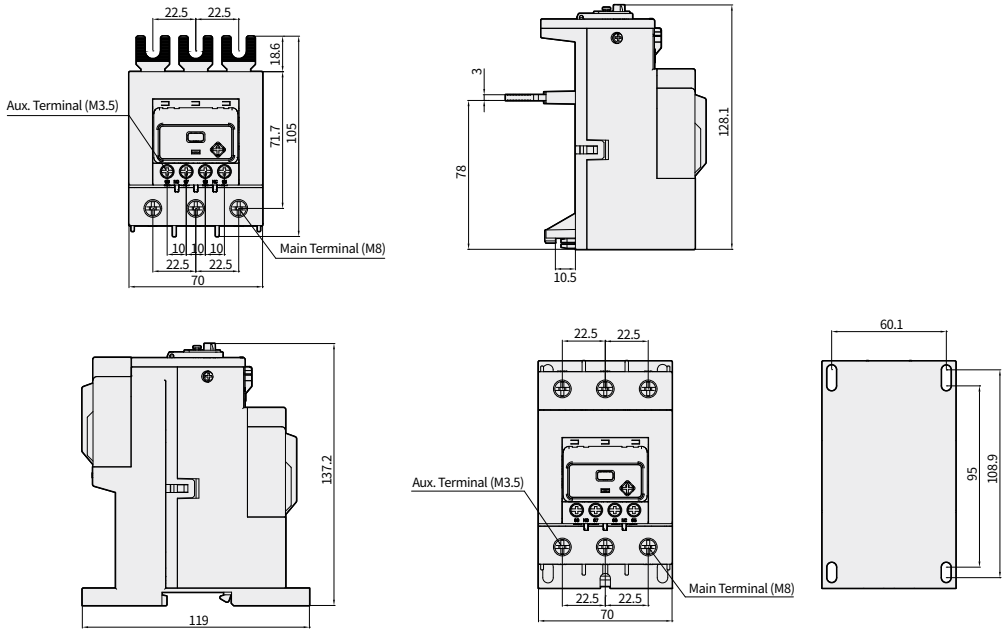
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Unit : mm

HGT65



HGT100



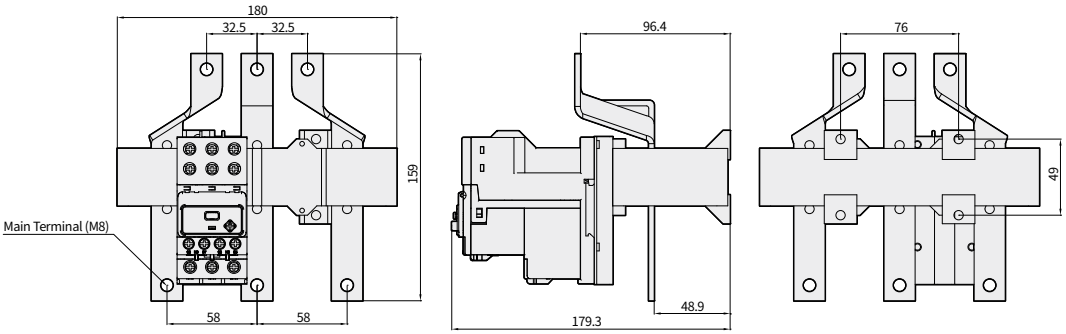
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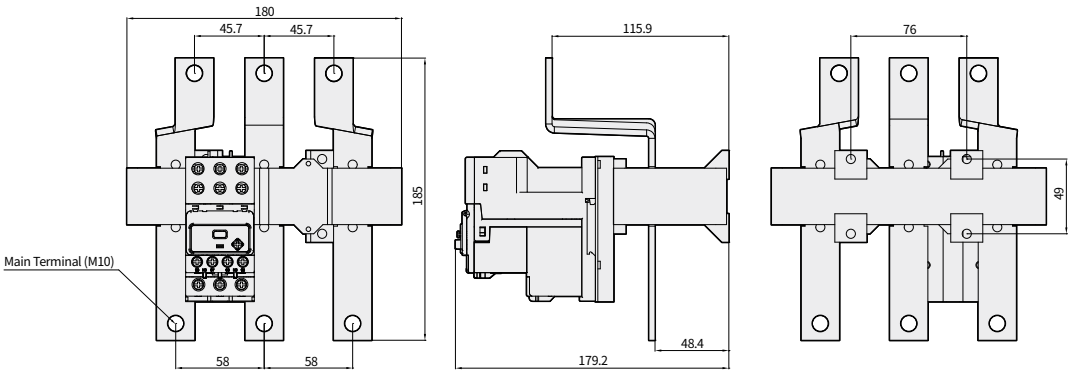
Thermal Overload Relay

Unit : mm

HGT150



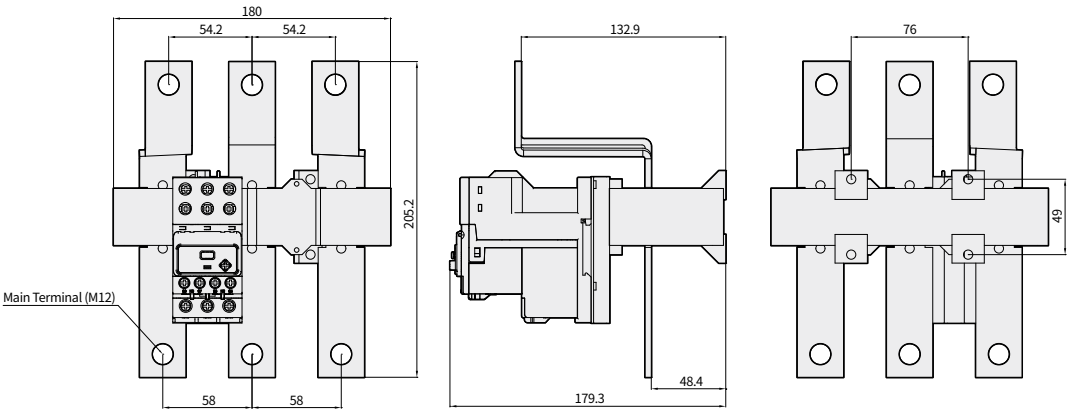
HGT265



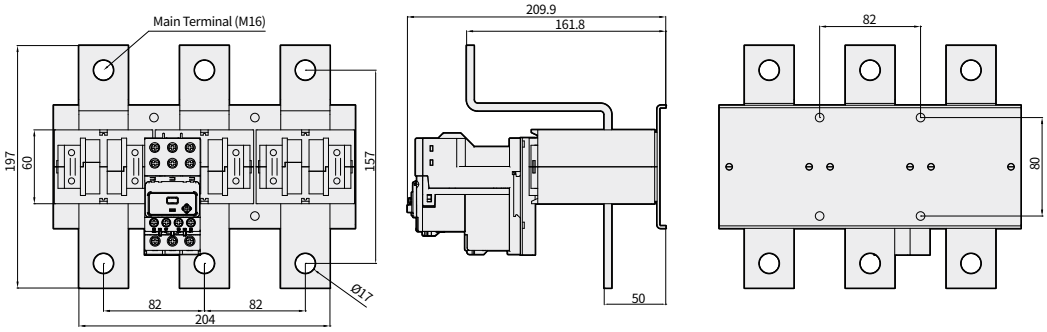
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Unit : mm

HGT500



HGT800



※ The dimensions of the drawing on this page may be subject to change without notice.

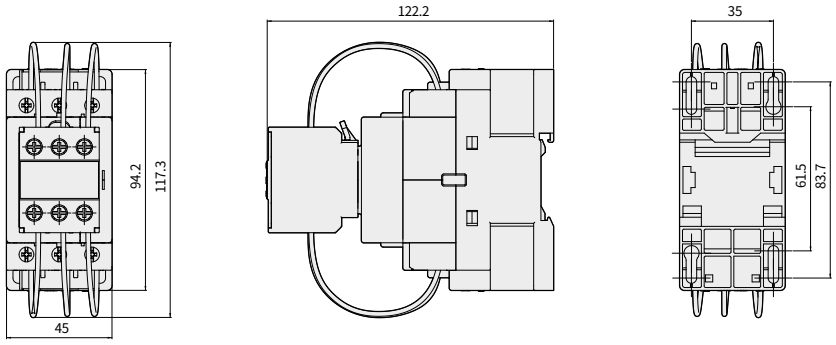
Dimensions

Magnetic Contactor + Capacitor Switching Unit

Unit : mm

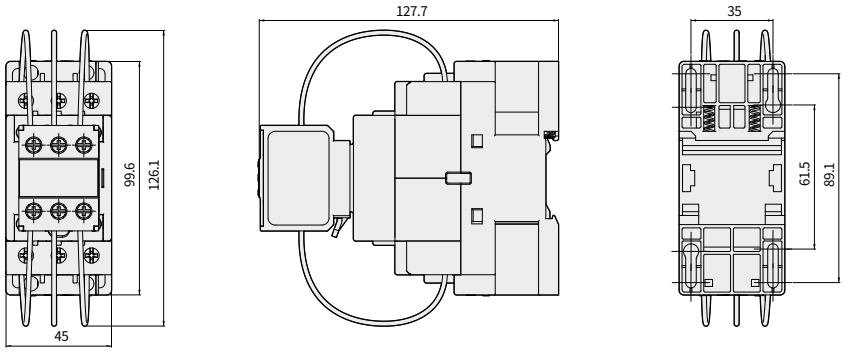
HGC18C

When connecting the resistance cable, 1.5 times the 94.2 space is required



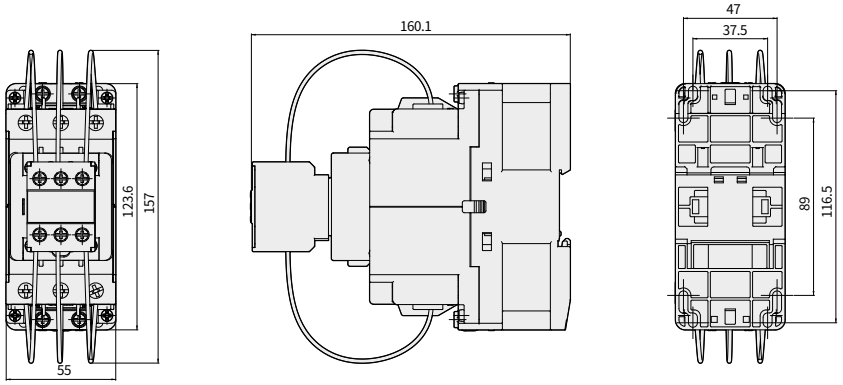
HGC40C

When connecting the resistance cable, 1.5 times the 99.6 space is required



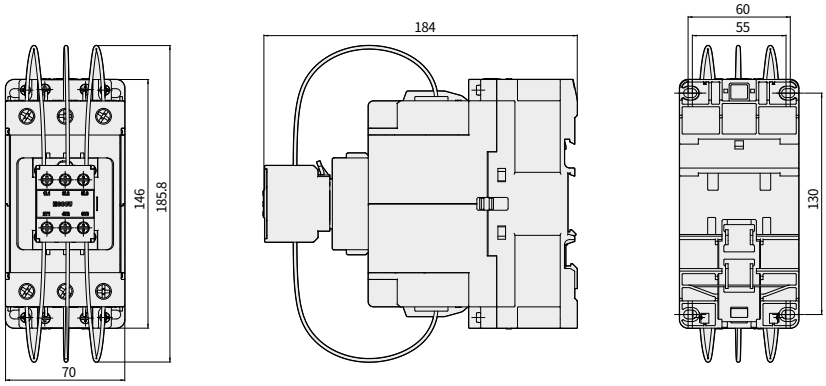
HGC65C

When connecting the resistance cable, 1.5 times the 123.6 space is required



HGC100C

When connecting the resistance cable, 1.5 times the 146 space is required

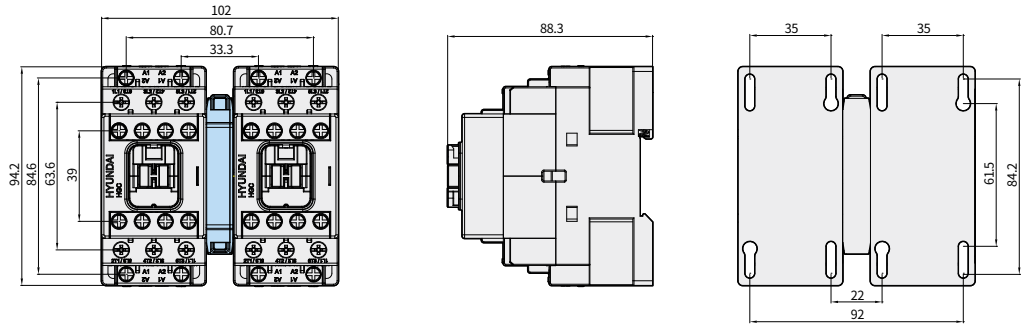


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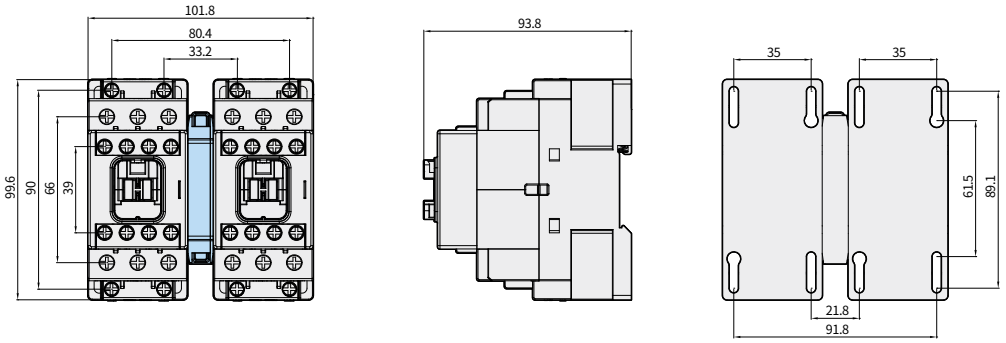
Reverse Operation Magnetic Contactor (With Interlock Unit)

Unit : mm

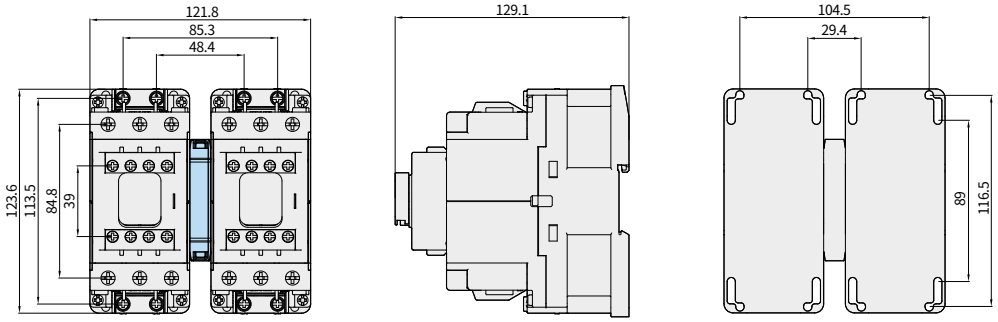
HGC18R



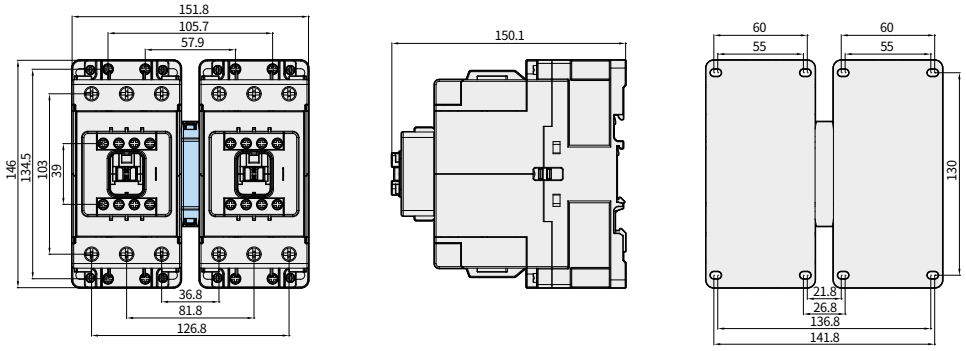
HGC40R



HGC65R



HGC100R



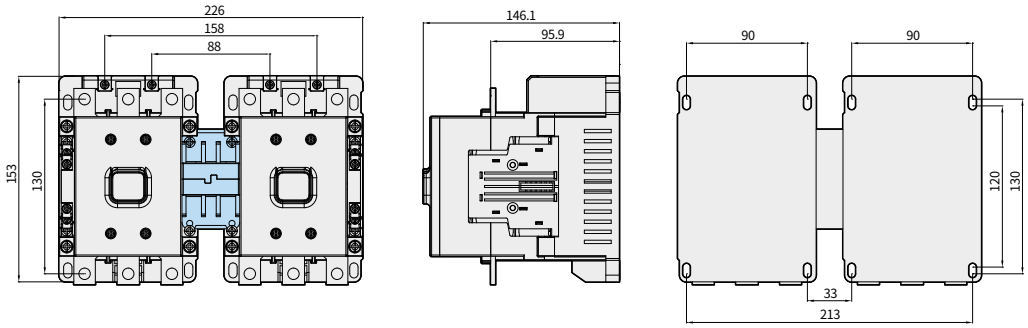
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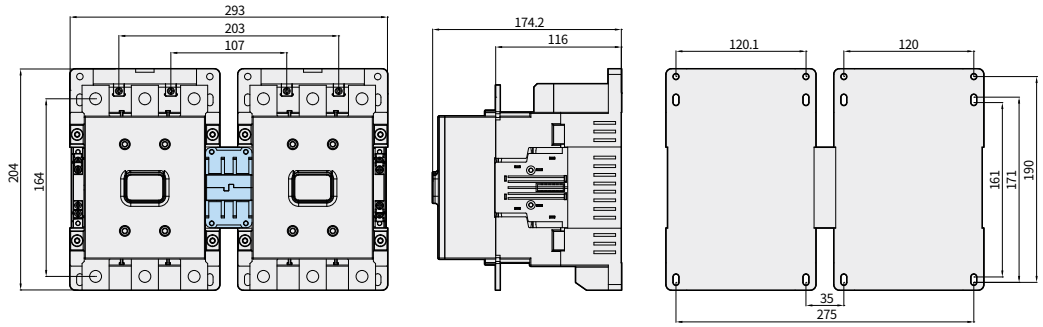
Reverse Operation Magnetic Contactor (With Interlock Unit)

Unit : mm

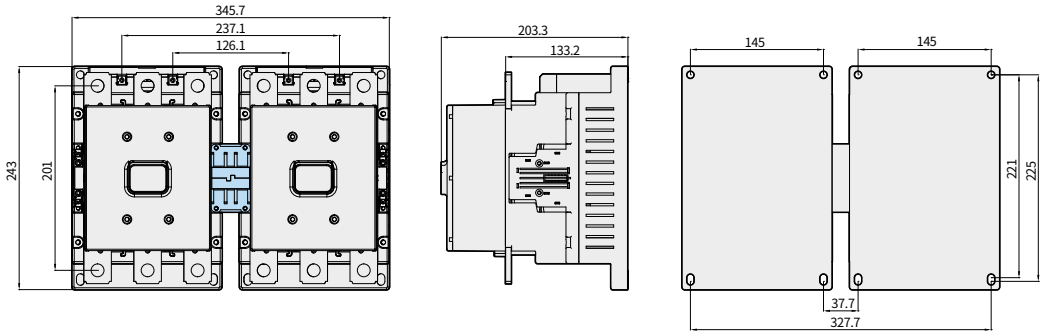
HGC150R



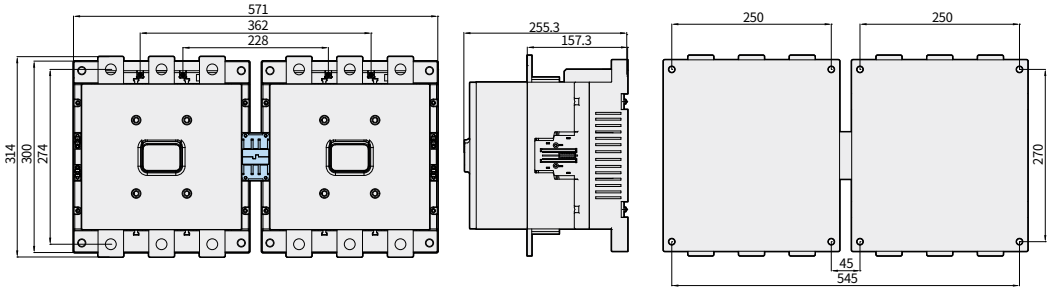
HGC265R



HGC500R



HGC800R

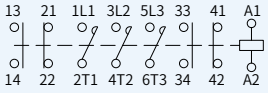
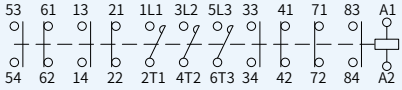
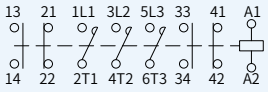
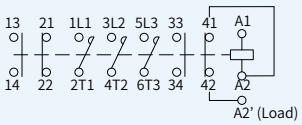
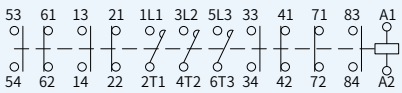
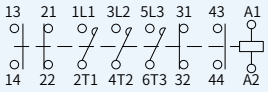
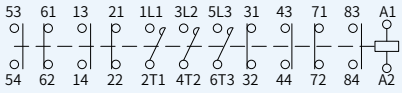


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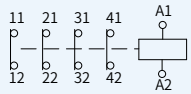
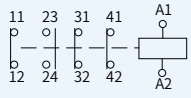
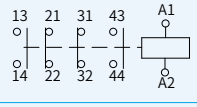
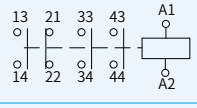
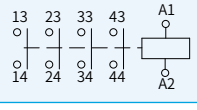
Circuit Diagram

Contact Arrangement

Magnetic Contactor

Model Name	Auxiliary Contact		Contact Arrangement Diagram	
	Standard	Additional	AC	DC
HGC9 HGC12 HGC18 HGC25 HGC32 HGC40	2NO + 2NC	-		Same as left
	2NO + 2NC	2NO + 2NC		Same as left
HGC50 HGC65 HGC75 HGC85 HGC100	2NO + 2NC	-		
	2NO + 2NC (AC) 2NO + 1NC (DC)	2NO + 2NC		
HGC115 HGC130 HGC150 HGC185 HGC225 HGC265 HGC300 HGC400 HGC500 HGC630 HGC800	2NO + 2NC	-		Same as left
	2NO + 2NC	2NO + 2NC		Same as left

Control Relay

Model Name	Inspection Arrangement	Inspection Arrangement Drawing
HGR04	4NC	
HGR13	1NO + 3NC	
HGR22	2NO + 2NC	
HGR31	3NO + 1NC	
HGR40	4NO	

Order Code

Magnetic Contactor

HGC | **12** | **22**

Model Name

HGC	Magnetic Contactor

Type and Capacity

Standard Magnetic Contactor

Code	Rated Current	Rated Capacity
	AC3/AC 400 V	
9	9 A	4 kW
12	12 A	5.5 kW
18	18 A	7.5 kW
25	25 A	11 kW
32	32 A	15 kW
40	40 A	18.5 kW
50	50 A	22 kW
65	65 A	30 kW
75	75 A	37 kW
85	85 A	45 kW
100	100 A	55 kW
115	115 A	60 kW
130	130 A	65 kW
150	150 A	75 kW
185	185 A	90 kW
225	225 A	132 kW
265	265 A	147 kW
300	300 A	160 kW
400	400 A	220 kW
500	500 A	250 kW
630	630 A	330 kW
800	800 A	440 kW
	For Nuclear	
32Q	32 A	
65Q	65 A	
100Q	100 A	
150Q	150 A	
300Q	300 A	

Type and Capacity

Magnetic Contactor for Capacitor

Code	Rated Current	Capacitor (AC 440 V)
9C	9 A	9.7 kVAR
12C	12 A	12 kVAR
18C	18 A	16.7 kVAR
25C	25 A	20 kVAR
32C	32 A	25 kVAR
40C	40 A	29 kVAR
50C	50 A	40 kVAR
65C	65 A	43.5 kVAR
75C	75 A	52 kVAR
85C	85 A	56 kVAR
100C	100 A	62 kVAR

Auxiliary Contact

Standard Magnetic Contactor		Applicable Type
11	1NO + 1NC	HGC9A ~ 40A, AC or DC
21	2NO + 1NC	HGC50A ~ 100A, DC
22	2NO + 2NC	HGC9A ~ 40A, AC or DC HGC50A ~ 100A, AC HGC115A ~ 800A

※ The order format above is to explain the order code. For detailed specification per type, refer to the relevant page upon placing the order.

N
Purpose
N General

S	
Terminal Type	
Standard Magnetic Contactor	
S	With Terminal Cover (9 ~ 100A)
Magnetic Contactor for Capacitor	
S	With Terminal Cover

A	
Category of Operational Coil Voltage	
Standard Magnetic Contactor	
X	AC 50 Hz (9 ~ 100 A)
A	AC 60 Hz (9 ~ 100 A)
D	DC (9 ~ 100 A)
F	AC/DC (115 ~ 500 A)
F	AC/DC (630 ~ 800 A)
Magnetic Contactor for Capacitor	
X	AC 50 Hz
A	AC 60 Hz

220	
Operational Coil Voltage	
24	X, A AC 50/60 Hz
48	
110	
120	
220	
240	
380	
440	
24	D DC
48	
110	
125	
220	
220	AC 100 ~ 240 DC 110 ~ 220
440	AC 380 ~ 450
110	AC 100 ~ 127 DC 100 ~ 110
220	AC 200 ~ 240 DC 200 ~ 220
440	AC 380 ~ 450

N	
Purpose	
N	Non 1E Class

Order Code

Thermal Overload Relay

HGT	18	K	A	18	S	N
Model Name	Capacity of Contactor	No. of Terminal	Protection Grade (Characteristics Curve)	Setting Current	Terminal Type	Purpose

Model Name	
HGT	Thermal Overload Relay

Capacity of Contactor	
18	HGC9 ~ 18
40	HGC25 ~ 40
65	HGC50, 65
100	HGC75 ~ 100
150	HGC115 ~ 150
265	HGC185 ~ 265
500	HGC300 ~ 500
800	HGC630 ~ 800
For Nuclear	
40KQ	HGC18Q ~ 40Q
65KQ	HGC50Q ~ 65Q
100KQ	HGC75Q ~ 100Q
150KQ	HGC115Q ~ 150Q
500KQ	HGC300Q ~ 500Q

No. of Terminal	
K	3
H	2

Protection Grade (Characteristics Curve)	
A	10 A

Setting Current	
0P18	0.12 ~ 0.18 A
0P26	0.18 ~ 0.26 A
0P35	0.25 ~ 0.35 A
0P50	0.34 ~ 0.5 A
0P70	0.5 ~ 0.7 A
0P90	0.6 ~ 0.9 A
1P20	0.8 ~ 1.2 A
1P60	1.1 ~ 1.6 A
2P10	1.5 ~ 2.1 A
3	2 ~ 3 A
4P20	2.8 ~ 4.2 A
5	3 ~ 5 A
6	4 ~ 6 A
8	5.6 ~ 8 A
9	6 ~ 9 A
10	7 ~ 10 A
12	8 ~ 12 A
18	12 ~ 18 A
22	15 ~ 22 A
25	17 ~ 25 A
32	22 ~ 32 A
40	28 ~ 40 A
50	34 ~ 50 A
65	45 ~ 65 A
75	52 ~ 75 A
80	48 ~ 80 A
85	59 ~ 85 A
100	70 ~ 100 A
115	69 ~ 115 A
130	78 ~ 130 A
150	90 ~ 150 A
185	111 ~ 185 A
225	135 ~ 225 A
265	159 ~ 265 A
300	180 ~ 300 A
400	240 ~ 400 A
500	300 ~ 500 A
630	378 ~ 630 A
800	480 ~ 800 A

Terminal Type	
S	With Terminal Cover

Purpose	
N	Non 1E Class

※ The order format above is to explain the order code. For detailed specification per type, refer to the relevant page upon placing the order.

Control Relay

HGR	22	N	S	A	220	N
Model Name	Auxiliary Contact	Operation Method	Terminal Type	Category of Operational Coil Voltage	Operational Coil Voltage	Purpose

Model Name	
HGR	Control Relay

Auxiliary Contact	
04	4NC
13	1NO + 3NC
22	2NO + 2NC
31	3NO + 1NC
40	4NO
	Nuclear
04Q	0NO + 4NC
13Q	1NO + 3NC
22Q	2NO + 2NC
31Q	3NO + 1NC
40Q	4NO + 0NC

Operation Method	
N	AC
P	DC (Permanent magnetic)

Terminal Type	
S	With Terminal Cover

Category of Operational Coil Voltage	
X	AC 50 Hz
A	AC 60 Hz
D	DC

Operational Coil Voltage
24 ~ 440 V

Purpose	
N	Non 1E Class

※ The order format above is to explain the order code. For detailed specification per type, refer to the relevant page upon placing the order.

Handling and Maintenance Inspection

Storage and Transportation

Storage Precaution

| Altitude | Below 2,000 m above sea level
| Relative Humidity | Within 45 % ~ 85 %

The surrounding environment may affect the insulation performance and durability of the magnetic contactor so the environment condition for usage must accurately be checked before application.



- **Relative humidity to be within the range of 45% ~ 85%**
  Do not store in places with high humidity for a long period of time.
- **Avoid places with a lot of dust**
  Do not store in exposed places and use cover or packing material to prevent dust from piling up on the circuit breaker.



- **Store in packaged state**
  During storage, store in packaged state. Store in a state using shelf or equivalent devices and do not leave it neglected on the floor. Do not transport heavy products manually. It may cause injury.



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



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



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

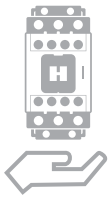


In case of mountainous region with high altitude, it may drop the insulation durability so check the adjustment coefficient of the insulation performance and use the appropriate ratings of the product.

Transportation Precautions

⚠ Caution

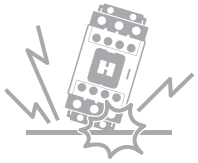
- Do not apply impact during transportation. Dropping or applying strong impact may cause defect.
- Do not handle while holding the circuit breaker's accessory or external plug-in wire of the accessory. It may cause injury in the handler or a malfunction of the circuit breaker.



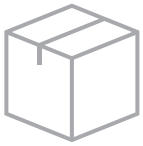
- **Hold the main unit of the circuit breaker during transportation**
  Do not handle while holding the external guide line of the accessory or the terminal bar.



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



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



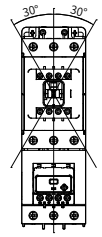
- **Pay attention to the packaging of the circuit breaker before transportation**
  Inappropriate packaging may cause damage in the circuit breaker during transportation.

Installation

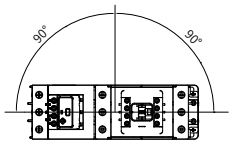
- Mount in dry places with less vibration.
- As for the installation direction, vertical installation is recommended but it can be used in each direction as seen in the figure.
- In case of cross installation and horizontal installation, it may drop the lifespan and various characteristics when compared to the normal installation.
- When using in a space below the insulation distance below, damage may be caused by the switching arc.
- Ambient Temperature : - 5°C ~ + 40°C (HGT, HGC DC Type), - 40°C ~ + 55°C (HGC only)

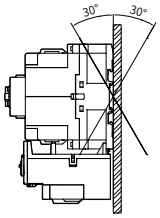
Installation

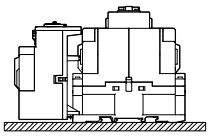
Normal Installation



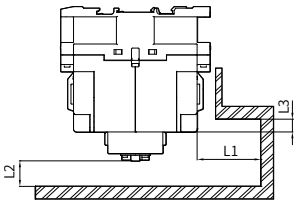
Cross Installation and Horizontal Installation







Insulation Distance



Unit : mm

Product / Distance	Above HGC75				
	HGC75 ~ 100	HGC115 ~ 150	HGC185 ~ 265	HGC300 ~ 500	HGC630 ~ 800
L1	30	30	80	80	80
L2	5	15	15	15	20
L3	6	11	32	32	40

Handling Precautions

Caution

- Do not store and use in abnormal environment such as high temperature, high humidity, dust, corrosive gas, vibration, impact and others It may cause electric shock, fire and malfunction.
- Ensure that rubbish, foreign substances such as concrete powder, metal powder, rainwater and others do not flow in.
- When handling the product, do not use lubricants. It may cause electric shock and fire.
- Electrical works must be conducted by qualified technicians with certifications related to electrical works. It may cause electric shock and fire.

Inspection Items Before Use

- Ensure that calibration work is not skipped. It may cause malfunction.

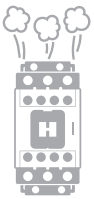
Installation, Usage and Maintenance Precautions

- Frequently check the fastening state, assembly and combination status of the bolt. It may cause electric shock, fire and malfunction.
- Check whether the rated current, voltage and frequency conform to the intended specification. It may cause electric shock, fire and malfunction.
- As for the wiring work, check whether the upper circuit breaker has been turned off so that electricity does not flow. It may cause electric shock.
- Connect the power that conforms to the ratings of the switch/contactor's main unit. It may cause fire and malfunction.
- As for the wiring and terminal, use the standard product and as for the terminal screw, fasten using the torque indicated in the user manual. It may cause fire.
- Frequently check the wiring state and shape. It may cause electric shock, fire and malfunction.
- Check whether parts have been omitted and replace damaged products and parts. It may cause electric shock, fire and malfunction.
- In case of abnormality in the contact, replace immediately and do not arbitrarily process such as trimming the contact using string or use lubricant. It may cause electric shock, fire and malfunction
- Use the specified tool. It may cause damage and malfunction.

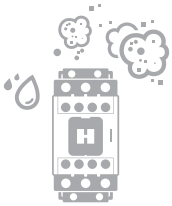
Handling and Maintenance Inspection

Storage and Transportation

Installation Precautions



- **Do not block the arc gas exhaust hole**
  It may drop the breaking capacity.



- **Pay attention to dust, metal scraps and others**
  After installation, cover the protection cover while working with the machine



- **Do not remove the insulation plate attached at the bottom of the circuit breaker.**
  It may destroy the insulation and the insulation performance.

Connection Precautions



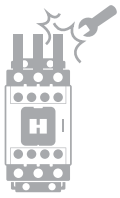
- **When fastening the terminal screw, it should be fastened according to the specified torque.**
  Incomplete fastening of the terminal screw may cause overheating so each terminal screw must be fastened completely according to the specified torque.
  In addition, excessive fastening torque may cause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



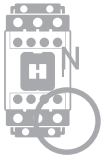
- **Use of lubricant at the terminal screw part is prohibited**
  Lubricant reduces the friction of the screw, causing the screw to loosen, ultimately leading to an increase in temperature.



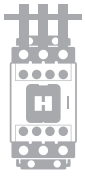
- **Exposed conductor must be insulated**
  Insulating tube or insulating tape must be used to complete insulation between the bare conductors of the MC. In case the terminals are not insulated, it may cause secondary shot-circuit during short-circuit accidents.



- **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.



- **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.



- **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.

Periodic Inspection

Detailed inspection and management of items when installed and used on a ship

Magnetic Contactor & Relay

- Special : In case of energization or operation problems
- Usually : Within 2 years of installation
- Precision : More than 3 years after installation

Inspection part	Inspection Items	Inspection Cycle			Inspection details	Note
		Special	Usually	Thorough		
External appearance	Visual inspection		1 month		1) Procedure : Check for cracks, damage, deformation, and contamination on the exterior of the product 2) Judgment : No cracks, damage, deformation and contanination on the exterior of the product	Non Power-shutdown inspection
Cable			1 month		1) Procedure : Check damage and overheating in Cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Terminal			1 month		1) Procedure : Check for signs of corrosion and overheating on the terminal part of the product and cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Moving unit			1 year		1) Procedure : Check for fully closing when operating 5 times on state 2) Judgment : Fully closing at 5 times. ⚠ **CAUTION** **Heat may occur due to incomplete closing, so replacement is required.**	Power-shutdown inspection
			1 year		1) Procedure : Check for fully turning off when operating 5 times off 2) Judgment : Fully Off at 5 times.	Power-shutdown inspection
Moving unit	Noise check		1 month		1) Procedure : Check for noise while operating 2) Judgment : No abnormal noise	Non Power-shutdown inspection
			1 year		1) Procedure : Check for abnormal noise during 10 ON/OFF operations. 2) Judgment : No abnormal noise	Power-shutdown inspection
Moving unit	Operation test		1 year		1) Procedure : Check chattering for 5 ON/OFF operations) 2) Judgment : No chattering ⚠ **CAUTION** **Heat may occur due to incomplete closing, so replacement is required.**	Power-shutdown inspection
Fastening screw	Tightening torque test		1 year		1) Procedure : Check torque with torque gauge and mark 2) Judgment : Over the torque reference value (M3.5 : 12kg·cm, M4 : 15kg·cm, M5 : 26kg·cm, M6 : 40kg·cm, M8 :60kg·cm, M10 : 100kg·cm, M12 : 140kg·cm)	Power-shutdown inspection
Main contact	Measuring check	Frequent opening/ closing loads		3 year	1) Procedure : Measure contact resistance at closing after 5 ON/OFF operations. 2) Judgment : less than 1Ω ⚠ **CAUTION** **High contact resistance may cause poor conduction, so replacement is required.**	Power-shutdown inspection
				3 year	1) Procedure : Measure contact resistance at OFF after 5 ON/OFF operations 2) Judgment : Infinity Ω	Power-shutdown inspection
Aux. contact		Always On Load		3 year	1) Procedure : Measure contact resistance at closing after 5 ON/OFF operations 2) Judgment : less than 1Ω ⚠ **CAUTION** **High contact resistance may cause poor conduction, so replacement is required.**	Power-shutdown inspection
Coil	Visual inspection			3 year	1) Procedure : Check coil wire's discoloration due to overheating 2) Judgment : No discoloration	Power-shutdown inspection (product disassemble inspection)
Moving unit	Operation test			3 year	1) Procedure : Check for fully closing when operating 5 times on at 85% of the coil rated voltage 2) Judgment : Fully closing	Power-shutdown inspection
				3 year	1) Procedure : Check for fully off when operating 5 times off at 10 to 70% of the coil rated voltage 2) Judgment : Fully off	Power-shutdown inspection
Terminal	Megger test			3 year	1) Procedure : Measure insulation resistance between phase and phase to earth (Equipment: DC1000V insulation resistance meter) 2) Judgment : More than 5MΩ	Power-shutdown inspection

Handling and Maintenance Inspection

Periodic Inspection

Detailed inspection and management of items when installed and used on a ship

Thermal Overload Relay

- Special : When trip/non-trip operation problems occur
- Usually : Within 2 years of installation
- Precision : More than 3 years after installation

Inspection part	Inspection Items	Inspection cycle			Inspection details	Note
		Special	Usually	Thorough		
External appearance	Visual inspection		1 month		1) Procedure : Check for cracks, damage, deformation, and contamination on the exterior of the product 2) Judgment : No cracks, damage, deformation and contanination on the exterior of the product	Non Power-shutdown inspection
Cable			1 month		1) Procedure : Check damage and overheating in Cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Terminal			1 month		1) Procedure : Check for signs of corrosion and overheating on the terminal part of the product and cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Fastening screw	Tightening torque test		1 year		1) Procedure : Check torque with torque gauge and mark 2) Judgment : Over the torque reference value (M3.5 : 12kg·cm, M4 : 15kg·cm, M5 : 26kg·cm, M6 : 40kg·cm, M8 :60kg·cm, M10 : 100kg·cm, M12 : 140kg·cm)	Power-shutdown inspection
Aux. contact	Measuring test	Always On Load		3 years	1) Procedure : Pull and push the test button and measure contact resistance after 5 operations 2) Judgment : Less than 1Ω ⚠ **CAUTION** **High contact resistance may cause poor conduction, so replacement is required.**	Power-shutdown inspection
Aux. contact	Operation test	Always On Load		3 years	1) Procedure : Using the Test button, verify the normal operation of the 98-97 / 96-95 auxiliary contacts) 2) Judgment: 98-97 (conducting) and 96-95 (non-conducting)	Power-shutdown inspection

Aux.contact block

- Special : In case of energization or operation problems
- Usually : Within 2 years of installation
- Precision : More than 3 years after installation

Inspection part	Inspection Items	Inspection cycle			Inspection details	Note
		Special	Usually	Thorough		
External appearance	Visual inspection		1 month		1) Procedure : Check for cracks, damage, deformation, and contamination on the exterior of the product 2) Judgment : No cracks, damage, deformation and contanination on the exterior of the product	Non Power-shutdown inspection
Cable			1 month		1) Procedure : Check damage and overheating in Cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Terminal			1 month		1) Procedure : Check for signs of corrosion and overheating on the terminal part of the product and cable 2) Judgment : Nothing wrong	Non Power-shutdown inspection
Fastening screw	Tightening torque test		1 year		1) Procedure : Check torque with torque gauge and mark 2) Judgment : Over the torque reference value (M3.5 : 12kg·cm, M4 : 15kg·cm, M5 : 26kg·cm, M6 : 40kg·cm, M8 :60kg·cm, M10 : 100kg·cm, M12 : 140kg·cm)	Power-shutdown inspection
Aux. contact	Measuring test	Always On Load		3 years	1) Procedure : Measure contact resistance at closing after 5 ON/OFF operations 2) Judgment : Less than 1Ω ⚠ **CAUTION** **High contact resistance may cause poor conduction, so replacement is required.**	Power-shutdown inspection

Current Status of Acquired Standards

Approvals & Certificates

MS

● : Acquired
◎ : In Progress (Expected)

Type of Certification	Approvals		Certificate		
Type of Standard	Safety Certificate	IEC	IEC		GB
Mark					
Testing Institute	KETI	CE	KTC	Nuclear	GB 1984
Certification Country	Korea	Europe	Korea	Korea	China
HGC9	●	●	●		●
HGC12	●	●	●		●
HGC18	●	●	●		●
HGC25	●	●	●		●
HGC32	●	●	●	◎	●
HGC40	●	●	●		●
HGC50	●	●	●		●
HGC65	●	●	●	◎	●
HGC75	●	●	●		●
HGC85	●	●	●		●
HGC100	●	●	●	◎	●
HGC115	●	●	●		●
HGC130	●	●	●		●
HGC150	●	●	●	◎	●
HGC185	●	●	●		●
HGC225	●	●	●		●
HGC265	●	●	●		●
HGC300	●	●	●	◎	●
HGC400		●	●		●
HGC500		●	●		●
HGC630		●	●		●
HGC800		●	●		●
HGR		●		◎	●
HGCTB		●		◎	●
HGT18		●	●		●
HGT40		●	●	◎	●
HGT65		●	●	◎	●
HGT100		●	●	◎	●
HGT150		●	●	◎	●
HGT265		●	●		●
HGT500		●	●	◎	●
HGT800		●	●		●

Current Status of Acquired Standards

Approvals & Marine Certificates

MS

● : Acquired
◎ : In Progress (Expected)

Type of Certification	Marine			
Type of Standard	Korea	U.K.	USA	France
Mark	KR KOREAN REGISTER	Lloyd's Register	ABS	BUREAU VERITAS
Testing Institute	KR	LR	ABS	BV
Certification Country	Korea	U.K.	USA	France
HGC9	●	●	●	●
HGC12	●	●	●	●
HGC18	●	●	●	●
HGC25	●	●	●	●
HGC32	●	●	●	●
HGC40	●	●	●	●
HGC50	●	●	●	●
HGC65	●	●	●	●
HGC75	●	●	●	●
HGC85	●	●	●	●
HGC100	●	●	●	●
HGC115	●	●	●	●
HGC130	●	●	●	●
HGC150	●	●	●	●
HGC185	●	●	●	●
HGC225	●	●	●	●
HGC265	●	●	●	●
HGC300	●	●	●	●
HGC400	●	●	●	●
HGC500	●	●	●	●
HGC630	●	●	●	●
HGC800	●	●	●	●
HGR	●	●	●	●
HGCTB	●	●	●	●
HGT18	●	●	●	●
HGT40	●	●	●	●
HGT65	●	●	●	●
HGT100	●	●	●	●
HGT150	●	●	●	●
HGT265	●	●	●	●
HGT500	●	●	●	●
HGT800	●	●	●	●

● : Acquired
◎ : In Progress (Expected)

Type of Certification	Marine		
Type of Standard	Japan	Germany	Italy
Mark	ClassNK	GL OPERATING 24/7	RINA
Testing Institute	NK	GL	RINA
Certification Country	Japan	Germany	Italy
HGC9	●	●	●
HGC12	●	●	●
HGC18	●	●	●
HGC25	●	●	●
HGC32	●	●	●
HGC40	●	●	●
HGC50	●	●	●
HGC65	●	●	●
HGC75	●	●	●
HGC85	●	●	●
HGC100	●	●	●
HGC115	●	●	●
HGC130	●	●	●
HGC150	●	●	●
HGC185	●	●	●
HGC225	●	●	●
HGC265	●	●	●
HGC300	●	●	●
HGC400	●	●	●
HGC500	●	●	●
HGC630	●	●	●
HGC800	●	●	●
HGR		●	
HGCTB		●	
HGT18		●	●
HGT40		●	●
HGT65		●	●
HGT100		●	●
HGT150		●	●
HGT265		●	●
HGT500		●	●
HGT800		●	●

HG
Digital Motor Protection Relays

Overview and Characteristics		4
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RELAY

HG Series

Digital Motor Protection Relays

Optimal motor protection solution for today's "smart" devices



The HGMP electronic motor protection relay provides protection for the motor system from unstable condition of power system and maximizes utilization rate with user-friendly advanced motor protection functions.

Features by Model Type

Normal Type	Advanced Type
Provides core motor protection functions to enable economical and practical motor control. Earth leakage or instantaneous protection functions can be selected as options.	All normal type features are offered, in addition protection function delay can be set in detail to implement more optimized motor protection system. Optional RS-485/Modbus communication feature enables relay integration into the user's system management network.

Rated Current

0.5 ~ 60 A

Control Power Range

100 ~ 240 VAC (50/60 Hz), 100 ~ 240 VDC

Operational Reliability

Real-time data processing based on
32-bit ARM Core MCU
Rogowski CT provides highprecision measurement.

Multiple Protection Functions

Multiple motor protection relay functions
Overload warning
Real-time load rate display

User Convenience

Trip history log and display
Cumulative operating time counter



Earth Leakage HGMP N60 Z



Instantaneous HGMP N60 I



HGMP A60

Overview and Characteristics

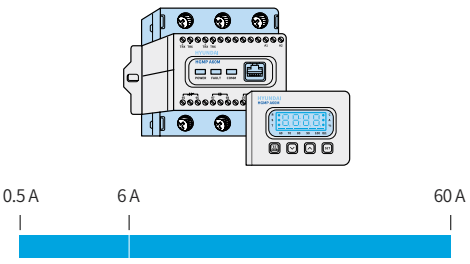
Microprocessor-Based Control

Advanced 32-bit ARM Core MCU provides precise measurements and calculations, maximizing relay stability and reliability.

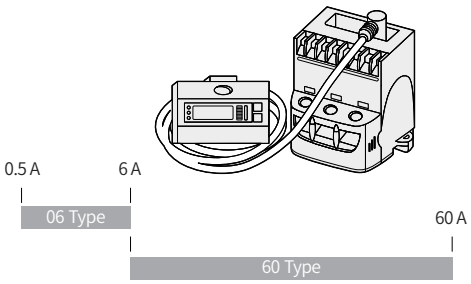
Wide Current Setting Range

- Current settings can be set from 0.5 A to 60.0 A in a single device without additional setting; current settings of 0.125 A and 0.25 A are possible by changing the CT number of turns, with a rated current setting of up to 2,000 A possible with the external CT.

HGMP



Conventional



Multiple Protection Functions

Key protection function provide a full suite of basic motor protection.

- Over-current protection provides stable motor protection according to the load characteristics for definite time, inverse time and thermal inverse time.
- A double layer of ground fault protection is provided by measuring zero current and residual current (Ground Fault Detection Current 100 mA to 60.0 A) (Earth Leakage Model of Normal Type, Advanced Type)
- Up to 1,500 % True-RMS instantaneous protection function (Instantaneous Model of Normal Type, Advanced Type)



Superior Noise Characteristics

Features superior harmonic noise characteristics and can be used for a wide frequency range (30 to 200 Hz), allowing application in the secondary coil of the inverter control circuit.
(For instantaneous, 50/60 Hz only).

Run-Time Alert Function

Total cumulative motor run time is displayed for convenient scheduling of maintenance and repair.

Overload Warning Feature

- A warning alert is activated during overload to prevent a system failure due to a sudden over-current trip.
- A bar graph on the display monitor during operation enables constant monitoring of load status, allowing easy maintenance.

Three-Phase Ammeter Function

Real-time current for each phase of the three-phase current is displayed continuously in sequence to allow constant monitoring of current values.

- Up to ten of the most recent failure events, up to 50 system events are stored (Advanced Type - Comm. Type)
- Up to the five latest events of failure and three-phase current values at the time can be checked on the indicator.
- A fault current waveform of the latest trip is stored to assist in diagnosis of the cause of the event. (Advanced Type - Comm. Type)
- Current waveform of the motor in operation can be easily viewed without the need of separate Current measuring equipment (Advanced Type - Comm. Type)



R-Phase



S-Phase



T-Phase

Trip History Recording Feature

When a trip occurs, the cause as well as the fault current is immediately displayed to assist in diagnosing the system failure.



Overcurrent



Undercurrent



Phase Failure

Technical Data

External Structure

Integrated type

- Main Unit : Control and display monitoring can be performed directly on the main unit of the relay. Tunnel type or screw type can be selected to suit the panel environment.

Separated type

- Main Unit : Tunnel type or screw type can be selected to suit the panel environment.
- Display Unit : Separate display unit installed on the front of the panel can enable easy monitoring of current values and error diagnostics via the 4-digit 7-segment FND display.
- Connecting Cable : L-shaped terminals on each cable end allow efficient use of panel space.





Front Side of Display Unit (Separated Type)

No.	Type	Main Functions
1	4-Digit 7-Segment FND Display	Indicates Current, Trip Information, Parameter Settings
2	TEST/RESET Button	Select Test Mode, Reset Trip, Move to the Higher Settings Menu
3	∨ Button	Move Between Menus, Change Set Value
4	∧ Button	Move Between Menus, Change Set Value
5	SET Button	Store Set Values, Move to the Lower Menu

※ Refer to the additional instructions for more detailed button functions



Phase Indicator

Indicates which phase (R, S, T) the current displayed value corresponds to. All three indicators are lit in case of earth leakage and ground failure.

Information Display

The current value or set value are indicated based on operational status.

Communication and Unit Display

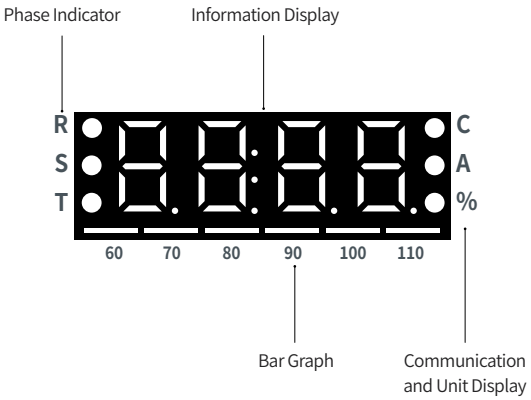
C - Indicates normal data transfer status between main unit and master network

A - Indicates that the current value represents amperage (A)

% - Indicates that the unit of the current value is a percentage (%)

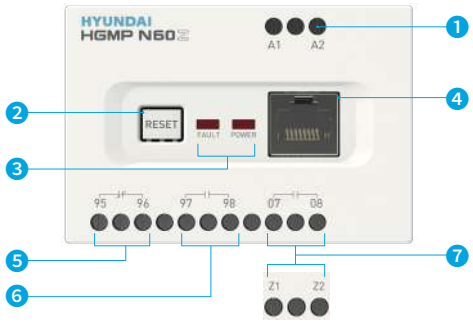
Bar Graph

Current actual load ratio to rated current is indicated in a percentage (60 to 110 %) to enable quick recognizing of current motor load conditions. The bar graph flashes when load ratio exceeds 100 %.



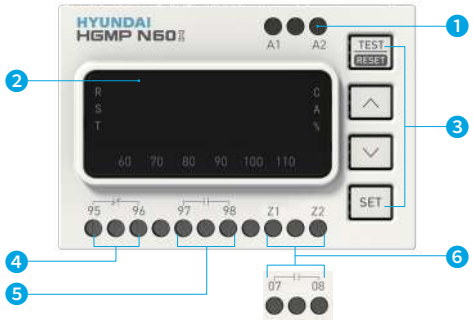
Front Side of Main Unit (Normal Type/Separated Type)

No.	Type	Main Functions
1	Power Connection Terminal	Relay Power Cable Connection Terminal
2	RESET Button	Manual Trip Reset
3	Status Indicator LED	POWER : Relay Power Status FAULT : Trip Activation Indicator
4	Connector Cable Port	Port For Cable Connection to the Display Unit (RJ45)
5	95-96 Main Contact [1)]	Functions as b contact for Default 1a1b Setting
6	97-98 Main Contact [1)]	Functions as a contact for Default 1a1b Setting
7	07-08 Auxiliary Contact [1)]	Instantaneous Type : Serves as Instantaneous and Overcurrent Alert Terminal (07-08) Ground Fault Type : External ZCT Connection Terminal (Z1-Z2)



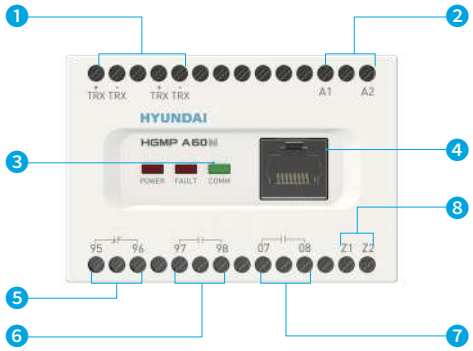
Front Side of Main Unit (Normal Type/Integrated Type)

No.	Type	Main Functions
1	Power Connection Terminal	Relay Power Cable Connection Terminal
2	4-Digit 7-Segment FND Display	Indicates Current, Trip Information and Parameter Settings
3	Control Buttons	TEST/RESET: Select Test Mode, Reset Trip and move to the Higher Settings Menu ∧: Move Between Menus, Change Set Value ∨: Move Between Menus, Change Set Value SET: Store Set Values and move to the Lower Menu (Refer to the Additional Instructions for more Detailed Button Functions)
4	95-96 Main Contact [1)]	Functions as b contact for Default 1a1b Setting
5	97-98 Main Contact [1)]	Functions as a contact for Default 1a1b Setting
6	External ZCT	Ground Fault Type : External ZCT Connection Terminal (Z1-Z2) Instantaneous Type : Serves as Instantaneous and Overcurrent Alert Terminal (07-08)



Front Side of Main Unit (Advanced Type)

No.	Type	Main Functions
1	RS-485 Modbus-RTU Communications Terminal	Connector Terminal for Modbus Network
2	Power Connection Terminal	Relay Power Cable Connection Terminal
3	Status Indicator LED	POWER : Relay Power Status FAULT : Trip Activation Indicator COMM : Data Transfer Status Between Unit and Master Network
4	Connector Cable Port	Port For Cable Connection to the Display Unit (RJ45)
5	95-96 Main Contact [1)]	Functions as b contact for Default 1a1b Setting
6	97-98 Main Contact [1)]	Functions as a contact for Default 1a1b Setting
7	07-08 Auxiliary Contact [1)]	Can be set for Overcurrent Alert, Ground Fault, Instantaneous
8	External ZCT	External ZCT Connection Terminal



※ 1) Main and auxiliary terminal output can be various based on user settings. Check the settings instructions for proper use of the relay device.

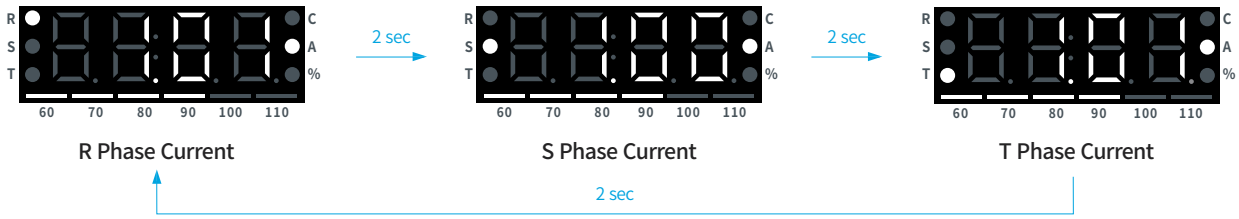
Technical Data

Functions

Display Unit Button Functions

Button	Picture	Main Functions and Key Information
TEST/RESET	TEST RESET	Switch between normal and test modes. Can only be switched when the motor is stopped. Clears the trip if a trip has occurred. Ensure that the cause of the failure has been removed before resetting. In the menu screen, press to move to the higher settings menu.
DOWN	∨	Move setting menus, or decrease set value. Manually switch phases sequence when the current values by phases are shown. (R → S → T → R sequence)
UP	∧	Move setting menus, or increase set value. Manually switch phases sequence when the current values by phases are shown. (R → S → T → R sequence)
SET	SET	Press to apply the indicated setting when adjusting settings and parameters. In the menu screen, press to move to the lower menu.

Three Phase Digital Ammeter Function



The display cycles by default every 2 seconds between R, S and T phases to show the real-time RMS current value and load ratio for each phase current. The indicator LEDs on the left show which phase is being displayed.
Use the directional buttons to quickly cycle between each phase to check the values. When no further key presses occur for a while, the display reverts to the automatic cycle mode.

Relay Circuit Test Procedure

Check the relay and circuit with the TEST/RESET button.

1. Check the circuit connection before testing.
2. Pressing the TEST/RESET button on the relay will display TEST until the trip is initiated, and the terminal output changes to simulate an overcurrent trip.
3. Test the circuit and motor based on the pre-set maintenance schedule.
4. After the test is complete, press the TEST/RESET button on the relay again to restore to normal operation mode.

Trip Reset Procedure

Three methods for clearing a trip are available.

1. Manual reset : Press the TEST/RESET button on the display unit to reset after a trip.
2. Electrical reset : When the electrical reset function is active, reset occurs when the relay's power is turned back on after being turned off. When the function is deactivated, the trip status is left unchanged even when power is reestablished.
3. Automatic reset : The relay resets after a pre-set period of time after the occurrence of a trip. The timer resumes after the power is turned off and on before the reset takes place. The "Automatic Reset" function becomes inactive after being activated five times in succession. This function becomes active again after being manually or electrically reset. Manual reset is always available by default, with the user able to activate or deactivate electrical or automatic reset.

Adjusting Settings

1. Enter Test Mode

- Stop the motor and verify that the amperage displayed on the ammeter is 0.00 A.
- Press the TEST/RESET button to switch to test mode. Verify that "TEST" is indicated on the display as shown.



2. Enter Password

- Press the "Set" button in test mode. Check if the four-digit password input window appears on the indicator.
- Move to the next digit by pressing the "Set" button. Use the ∧ and ∨ buttons to find the number of your choice.
- After entering all four digits, press the "Set" button. Make sure to enter the right password to move on to the next menu item.



3. Enter Settings Menu

- Press the SET button while in test mode. Verify that the first settings item is indicated on the display as shown.



4-1. Moving Between Settings Menus (Using the SET Button)

※ This feature is useful for resetting all parameters on first use after installation.

- Press the SET button when the first settings item is displayed. Verify that the current settings are shown and flashing.
- Flashing indicates that the value can be changed.
- Use the ∧,∨ directional buttons to change the value. Check the reference table for details on each settings value. Pressing and holding the ∧,∨ buttons will accelerate the counter for certain functions.
- Pressing the SET button while the desired value is flashing on the display to confirm the relay's new settings.
- After setting the first item, verify that the second settings item is displayed as shown.





Repeat the above process to adjust the settings as needed.

Technical Data

Adjusting Settings

4-2. Moving between the Settings Menus (∧,∨ Buttons)

※ This feature is useful for adjusting certain settings while the relay is in operation.

- Pressing the ∧,∨ at the first settings menu enables cycling through the settings menus. Refer to the table below for the sequence of the menus displayed.
- Additional settings menus will not display when some parameters are set to OFF to enhance user convenience.
- When overcurrent characteristic is set to inverse time, the activation delay time setting item is indicated as cLs, instead of oc-t.

5. Return to Test Mode

- Press the TEST/RESET button while in the settings screen will return to the test mode.
- When the current settings value is being displayed (settings flashing), pressing the TEST/RESET button twice will return to the test mode.
- The relay will automatically revert to the test mode if no key inputs are made for a certain period of time while in the settings menu or while current value is flashing.

6. Checking Settings During Operation

- Repeatedly pressing the SET button during operational mode will scroll through the current settings (regardless of operational status).

7. To Change the Set Value in Operation Mode

- The set value for rated current can be changed in operation mode.
- Just press the “Reset” button in operation mode and enter the password.
- To ensure safety, it is not allowed to set the value beyond the maximum rating of 60 A and the minimum rating of 0.5 A directly.

Settings Sequence and Menus

Order Shown	Settings Item	Indicator Code	Code Displayed	Description	Settings Range	Initial Value	Unit
1	Rated Current	rc	rc	Set the rated current for the protection characteristics.	0.5, 0.6, ⋯ 60.0	60	A
2	CT Ratios [2]	ctr	ctr	Enter the CT ratio for external CT.	0.25, 0.5, 1, 2, ⋯ 200	1	
3	Operating Time Characteristics	chA	chA	Select current Operating time characteristics between definite time/inverse time/ thermal inverse time - dEF (definite time), thr (thermal inverse time), nthr(non-thermal inverse time).	dEF, thr, nthr	dEF	
4-1	Activation Delay [3]	oc-t	oc-t	Set the activation delay (operation time) for the overcurrent characteristics.	oFF, 0.2, 0.5, 1, 2, ⋯ 60	60	sec
4-2	Time Profile for Inverse Time [3]	cLS	cLS	Select the overcurrent time class for inverse time.	oFF, 1, 2, ⋯ 60	60	
5	Startup Delay [10]	oc-d	oc-d	Set the motor expected startup time (delay time)	0, 1, 2, ⋯ 200	200	sec
6	Lock Protection	Loc	Loc	Set the lock current value under operation to a percentage of rated current (200 to 1,000 %). Only applicable under definite time (dEF).	oFF, 200, 300, ⋯ 1,000	oFF	%
7	Lock Activation Delay [4]	Lc-t	Lc-t	Set the activation delay for the lock protection feature. The oc-d takes priority before Lc-t is applied.	0.1, 0.2, ⋯ 10.0	10	sec
8	Stall Protection	StL	StL	Set the stall current value under operation as a percentage of the rated current (150 to 700 %). Only applicable under definite time (dEF).	oFF, 150, 200, 300, ⋯ 700	oFF	%
9	Stall Activation Delay [4]	St-t	St-t	Set the activation delay for the stall protection feature. The oc-d takes priority before St-t is applied.	0.5, 1, 2, ⋯ 10.0	10	sec
10	Phase Failure	PF	PF	Activate the phase failure protection function.	oFF, on	oFF	
11	Phase Failure Activation Delay [4]	PF-t	PF-t	Set the activation delay for the phase failure protection function.	0.5, 1, 2, ⋯ 10.0	10	sec
12	Phase Unbalance	Ub	Ub	Activate the phase unbalance protection feature, set current value.	oFF, 10, 20 ⋯ 70	oFF	%
13	Phase Unbalance Activation Delay [4]	Ub-t	Ub-t	Set the activation delay for the phase unbalance protection feature.	0.5, 1, 2, ⋯ 10.0	10	sec
14	Reverse Phase	rP	rP	Activate reverse phase protection function.	oFF, on	oFF	
15	Undercurrent	Uc	Uc	Activate the undercurrent protection function, set current value to percentage of rated current (30 to 90 %)	oFF, 30, 40, ⋯ 90	oFF	%
16	Undercurrent Activation Delay	Uc-t	Uc-t	Set the activation delay for the undercurrent protection function.	0.5, 1, 2, ⋯ 30.0	30	sec
17	Earth Leakage (ZCT) [5] [7]	EL	EL	Set the activation current value for the earth leakage (ZCT) protection function.	oFF, 0.1, 0.2, ⋯ 2.5 [8] [11]	oFF	A
18	Ground Fault (NCT)	gF	gF	Set the activation current value for the ground fault (NCT) protection function.	oFF, 0.5, 0.6, ⋯ 60	60	A
19	Ground Fault (NCT) [7] Activation Delay	gF-t	gF-t	Set the activation delay for the earth leakage(ZCT) and ground fault(NCT) protection function.	0.1, 0.2, ⋯ 10.0 [9]	10	sec
20	Ground Fault Delay During Startup	gF-d	gF-d	Set the application of oc-d for the ground fault (NCT) protection function. The oc-d takes priority before gF-t when set to ON;	oFF, on	on	
21	Instantaneous [6]	Sc	Sc	Set the activation current value for the instantaneous protection function to percentage of rated current (600 to 1,500 %).	oFF, 600, 700, ⋯ 1,500	oFF	%
22	Instantaneous Delay During Startup [6]	Sc-d	Sc-d	Set the application of oc-d for instantaneous protection. The oc-d is applied with set to ON, and not applied when set to OFF.	oFF, on	on	
23	Overcurrent Warning	AL	AL	SET the activation current value for the overcurrent warning function to percentage of rated current (60 to 110 %).	oFF, 60, 70, … 110	oFF	%
24	Electrical Reset	ErSt	ErSt	Activate electrical reset feature.	oFF, on	on	
25	Automatic Reset	ArSt	ArSt	Set the activation parameters for the automatic reset feature between 0.5 seconds to 20 minutes.	oFF, 0.5, 1, 2, ⋯ 1,200	oFF	sec
26	Motor Runtime Warning	rhS	rhS	Set motor runtime alert function. If motor runs under load for more than the set duration, “orh” will be displayed on the screen.	oFF, 1, 2, ⋯ 9,999	oFF	hour
27	Motor Runtime	rh	rh	Total cumulative runtime after relay is energized; reset to zero when power is turned OFF and ON.	-	-	hour
28	Total Runtime	t-rh	t-rh	Total cumulative runtime after relay installation; cannot be reset.	-	-	hour
29	Comm. Address [4]	Addr	Addr	Set Modbus communication address for the relay.	1, 2, ⋯ 247	1	
30	Comm. Speed [4]	bPS	bPS	Set Modbus communication speed baudrate -0.96: 9,600 bps, 1.92: 19,200 bps, 3.84: 38,400 bps	0.96, 1.92, 3.84	0.96	
31	Comm. Data SWAP [4]	SAP	SAP	Activate Modbus communication data swap feature.	oFF, on	oFF	
32	Clock Setting - year [4]	2016	2016	Set relay internal clock – year. Clock resets when the relay is powered OFF/ON.	2016, 2017, ⋯ 2099	2016	
33	Clock Setting – month/day [4]	1228	1228	Set relay internal clock – month/day. Clock resets when the relay is powered OFF/ON.	0101, 0102, ⋯ 1231	0101	
34	Clock Setting – hour/minute [4]	1038	1038	Set relay internal clock – hour/minute. Clock resets when the relay is powered OFF/ON.	0000, 0001, ⋯ 2359	0000	
35	Main Terminal Settings	cont	cont	Select terminal output for main terminals (95-96, 97-98).	1a1b, 2a, 2b	1a1b	
36	Auxiliary Terminal Settings	Au-c	Au-c	Set terminal output for auxiliary terminals (07-08). - AL-c: overcurrent warning (Alert), gF-c: for ground fault, Sc-c: for instantaneous	AL-c, gF-c, Sc-c	AL-c	
37	Password Settings	PASS	PASS	Set security password 4 digits	0000 ⋯ 9999	9999	

※ 1) To enhance user convenience, time settings for certain features will not be displayed when certain protection features are deactivated.

2) CT ratio setting (ctr) can be set to less than 2,000 A in conjunction with the rc setting.

3) The menu indicates oc-t when overcurrent settings are set at definite time (dEF), and cLS when set to inverse time. (thr, nthr)

4) This feature is only available on the advanced type.

5) Feature not offered for the instantaneous model.

6) Feature not offered for the ground fault model.

7) In the motor stationary state, it does not work regardless of ZCT input.

8) ZCT built-in models support 0.03, 0.05A and up to 10A.

9) ZCT built -in models support 0.05 sec.

10) It is used in oc-d, gf-d, and sc-d at designated time. However, it cannot be set directly at inverse time, so it is necessary to set it under designated time conditions.

11) N60Z, N60B model support 10A from 3Q of 2024

Technical Data

Functions

Function Inventory

Functions		Details	Notes
Protection Function	Overcurrent	Protection from overload damage based on motor's thermal characteristics Trip initiated when current exceeds 112.5 % of set rated current, based on operating time characteristics (inverse/definite time)	Basic function refer to cold/hot curve function
	Undercurrent	Protection from unloaded operation due to motor load breakdown Trip initiated according to set undercurrent multiple and runtime	Refer to cold/hot curve function
	Phase Failure	Protection from phase failure due to short or contact failure Trip initiated at set time if phase difference exceeds 70 %	Selectable function
	Phase Unbalance	Protection from phase unbalance due to insulation failure or incorrect wiring Trip initiated at set time if phase different exceeds pre-set parameters	Selectable function
	Stall	Protection from motor slowdown or lock due to increased load under operation If overcurrent occurs in definite time, trip initiates when current exceeds a set multiple after the delay period	Selectable function Only usable under definite time setting
	Lock	Protection from motor damage due to sudden increase in load or a lock If overcurrent occurs in definite time, trip initiates when current exceeds set multiple factor after the delay period	Selectable function Only usable under definite time setting
	Reverse Phase	Protection from motor reversal due to Incorrect wiring Detects reversal during startup and trips within 100 msec	Selectable function
	Earth Eakage/ Ground Fault	Protection from current leakage due to insulation failure or damage Trip initiated when current leakage exceeds set parameters	Selectable function
	Instantaneous	Protection from shorts of more than two phases due to motor insulation failure or Incorrect wiring Trips within 50 msec for current in excess of set multiple factor	Selectable function Dedicated terminal 1)
Overload Warning		Alert activated to prevent a trip from a sudden overcurrent event Alert switch activates until trip when current exceeds the set activation multiple	Selectable function Alert terminal removed under instant-time setting
Cumulative Runtime		Cumulative runtime under minimum of 70 % rated current during relay lifetime Unit : hours	RESET disabled
Runtime Alert		Runtime management for maintenance, i.e. motor oil replacement Indicator activates after pre-set runtime is reached	Selectable function
CT Ratio		Increases the number of CT turns for low current; external CT is used for high current. Actual motor current and current indicated on relay converted to correlate CT ratio is set to convert rated current parameters and indicated value (Ex.) For 100: 5 CT, CT ratio set at 20	0.25, 0.5, 1 ~ 200
Delay		Delay time for protection function based on motor startup characteristic	Selectable function
Test		Check relay and sequence status without energizing circuit	Off during operation under
Contact		Output contact activation method selectable 95-96, 97-98: 1a1b, 2a, 2b Auxiliary contact activation method selectable 07-08 : Dedicated for overcurrent alert, ground fault or instantaneous	
RESET		Select RESET method after trip Manual (non) / Electrical (Pr) / Automatic (0 ~ 20 min) RESET can be selected : - Manual reset by pressing the RESET button - Electrical reset by switching the power off - Automatic reset by timer (Timer resumes if power is turned off/on before reset)	Manual reset available for electrical and automatic settings
Cold/Hot Curve		Overcurrent protection curve based on motor thermal conditions - Cold : initial period of operation after period of inactivity - Hot : sufficient heat applied after motor has been in sustained operation	Applicable only for inverse time overcurrent protection characteristics

※ 1) Under instantaneous setting, auxiliary terminal 07-08 is automatically set to instantaneous terminal. Refer to information on operational characteristics for details

Controls and Settings

Trip Cause Indicator

Cause of Event	Indicator Code	Code Displayed	Details
Overcurrent (Definite time)	oc		Under definite time characteristics, trip occurs when current exceeds 112.5 % of set rated current.
Overcurrent (Inverse time)	oc		Under inverse time characteristics, trip occurs when current exceeds set rated current. Reset cannot be carried out when the motor has tripped under thermal inverse time in order to protect the motor; and reset is possible after a certain span of time has elapsed after the trip. Forcing a reset may cause damage to the motor.
Lock	Loc		Current in excess of the rated current protection factor (200 to 1,000 % of rated current) parameters (limited to overcurrent definite time characteristics)
Stall	StL		Current in excess of the rated current protection factor (150 to 700 % of rated current) parameters (limited to overcurrent definite time characteristics)
Phase Failure	PF		Difference between minimum and maximum current between three phases in excess of 70 %
Phase Unbalance	Ub		Difference between minimum and maximum current between three phases exceeds parameters (10 to 70 %)
Reverse Phase	rP		Detection of phase reversal during motor startup
Undercurrent	Uc		Current flow under rated current factor (30 to 70 % of rated current) parameters
Earth Leakage (ZCT)	gF		Current in excess of earth leakage current parameters
Ground Fault (NCT)	gF		Current in excess of ground fault current parameters
Instantaneous	Sc		Current in excess of the rated current protection factor (600 to 1,500 % of rated current) parameters

※ The current value at the time of the trip can be identified by pressing the ∧, ∨ directional buttons while the trip cause indicator is displayed.

Checking the Recent Event History

A maximum of five trip information and corresponding current value can be verified.

1. Press and hold the ∧ button while the current value is shown on the display (both while motor is operating or offline) to check the immediately preceding trip item and current information at time of trip.
2. The previous trip information will flash on the display.
3. Pressing the ∧, ∨ buttons at this time will indicate the current value at moment of event for all R, S and T phases. Respective current values are displayed for earth leakage or ground failure.
4. Press the “Set” button to check the past events of failure in reverse chronological order. The closer to the left of the load factor graph, the more recent the events are.

   ▶ The events are marked on the first through fifth bars of the graph from the latest to the earliest.

5. Pressing the TEST/RESET button in the previous event information screen will restore the display to the normal operational mode.

Technical Data

Operational Characteristics

Contact Characteristics

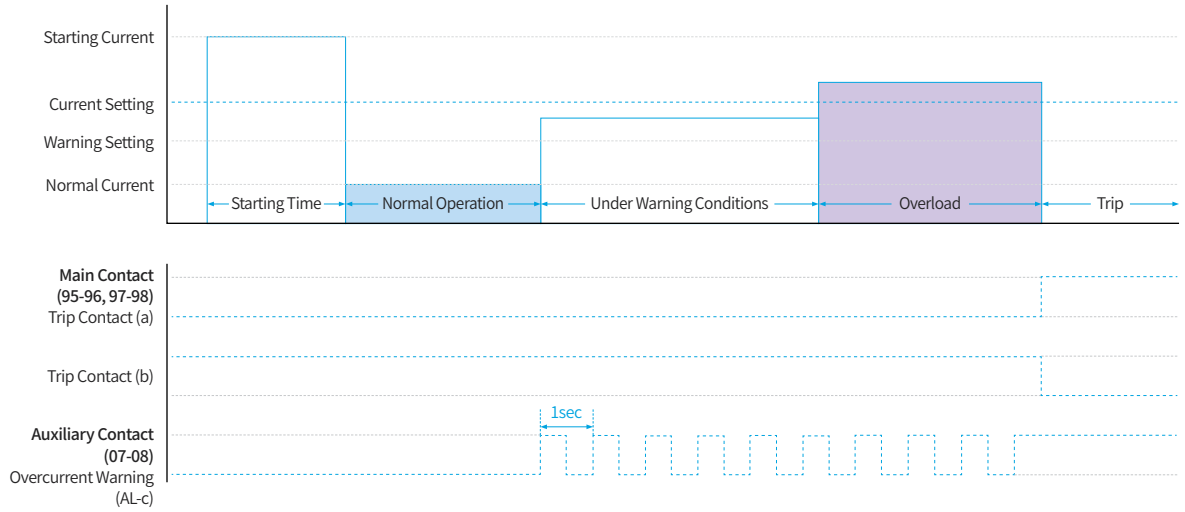
The operational characteristics for the relay's main contacts (95-96, 97-98) and auxiliary contact (07-08) can be various based on the Cont settings and the Au-c settings. The inverse of normal mode is applied during test mode

Model	Status	Menu Setting		Trip Cause	Contact Output			Notes
		Cont	Au-c		95-96	97-98	07-08	
HGMP A60 Advanced Type/ HGMP N60 I Instantaneous Type	Normal	1a1b	Sc-c, gF-c, AL-c	–	●	–	–	
		2a			–	–	–	
		2b			●	●	–	
	Test	1a1b	Sc-c, gF-c, AL-c	–	–	●	●	
		2a			●	●	●	
		2b			–	–	●	
	Trip	1a1b	Sc-c	Instantaneous	●	–	●	
			gF-c	Ground fault	●	–	●	
			AL-c	Overcurrent	–	●	●	
			Sc-c, gF-c, AL-c	Others [1)]	–	●	–	
		2a	Sc-c	Instantaneous	–	–	●	
			gF-c	Ground fault	–	–	●	
			AL-c	Overcurrent	●	●	●	
			Sc-c, gF-c, AL-c	Others [1)]	●	●	–	
		2b	Sc-c	Instantaneous	●	●	●	
			gF-c	Ground fault	●	●	●	
			AL-c	Overcurrent	–	–	●	
			Sc-c, gF-c, AL-c	Others [1)]	–	–	–	
	OFF	–	–	–	●	–	–	
HGMP N60 Z Leakage Type/ HGMP N60 B ZCT Built-in Type	Normal	1a1b	–	–	●	–	–	
		2a			–	–	–	
		2b			●	●	–	
	Test	1a1b	–	–	–	●	–	
		2a			●	●	–	
		2b			–	–	–	
	Trip	1a1b	–	All	–	●	–	
		2a			●	●	–	
		2b			–	–	–	
	OFF	–	–	–	●	–	–	

※ 1) Indicates trip causes except earth leakage and ground fault.

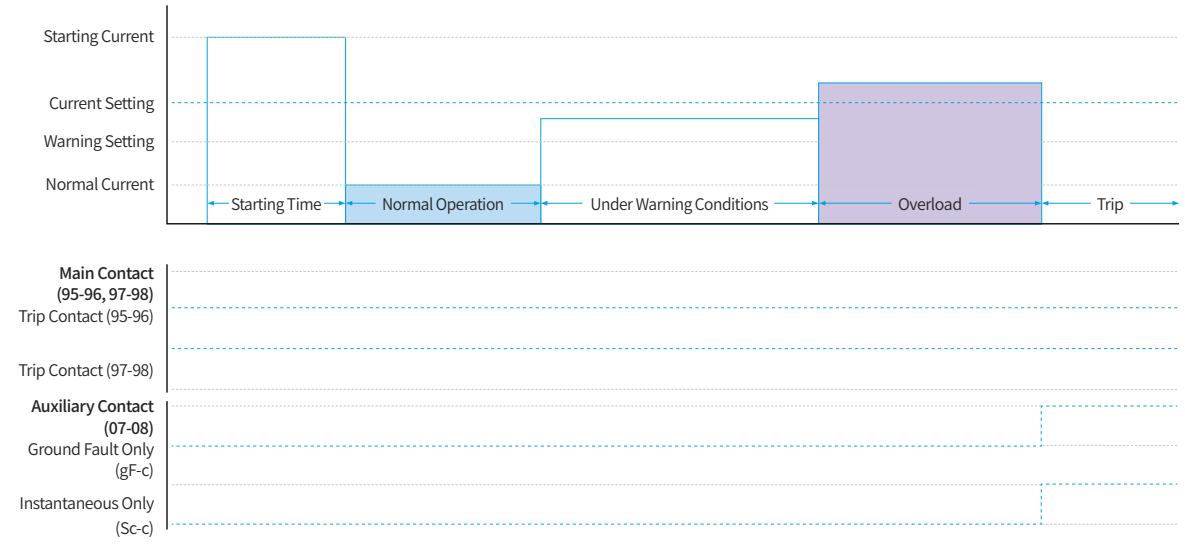
Contact Output Example for Overcurrent Warning

The 07-08 auxiliary contact can be used for overcurrent warning, dedicated ground fault or dedicated instantaneous according to settings. Activating the instantaneous function (Sc) forces the contact to be set for instantaneous. When current flow exceeds overcurrent warning threshold parameters, the warning terminal opens and closes repeatedly every second. When the trip occurs, the alert contact output would be identical to the trip contact (a).



Example when using the Dedicated Ground Fault/Instantaneous Contact

When using the dedicated ground fault/instantaneous contact, the main contacts (95-96, 97-98) will not activate under ground fault/instantaneous conditions. When the dedicated ground fault contact function is not used, the main terminals (95-96, 97-98) activate identically to normal trip conditions when a ground fault/instantaneous occurs. When the instantaneous setting is activated, the auxiliary terminal (07-08) is automatically set to instantaneous contact, and can no longer be used as overcurrent warning or ground fault contact.



Technical Data

Operational Characteristics

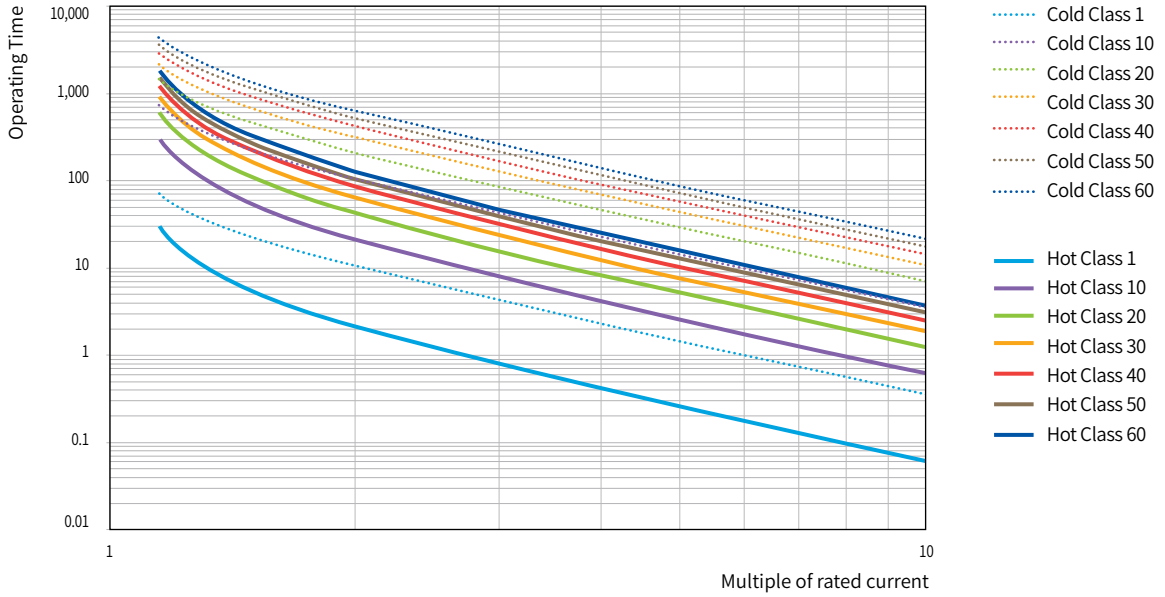
Thermal Curve

In accordance with IEC 60255-8 Thermal Electrical Relays specifications, protection functions activate based on hot curves and cold curves depending on the thermal characteristics of the load current before an overload can occur. The operating characteristic curves are as shown on the graph, represented as functions of current and time from class 1 to 60.

The relay takes real-time measurement of motor heating accumulation, and in the event of an overload activates the protection function that is optimized to the motor's operational conditions based on the cumulative heat data.

The formula for each operating characteristic curve can be represented as follows:

Cold curve indicates that the load current before the overload, I_P is zero in the hot curve formula.



Hot Curve $t = \tau ln \frac{I^2 - I_p^2}{I^2 - (kI_B)^2} [sec]$

Cold Curve $t = \tau ln \frac{I^2}{I^2 - (kI_B)^2} [sec]$

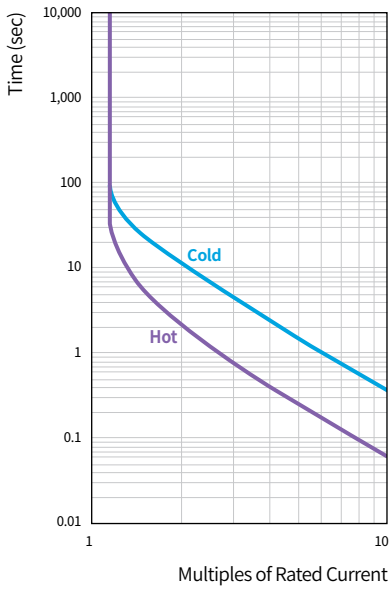
Item		Details
t	Operating Time	Duration of the operation of the relay.
τ	Time Constant	According to the above OC formula, the values for time constant τ for time T under 600 % of rated current and k = 1.1 are as follows.

T	1	10	20	30	40	50	60
τ	29.25	292.49	584.98	877.48	1,169.97	1,462.46	1,754.95

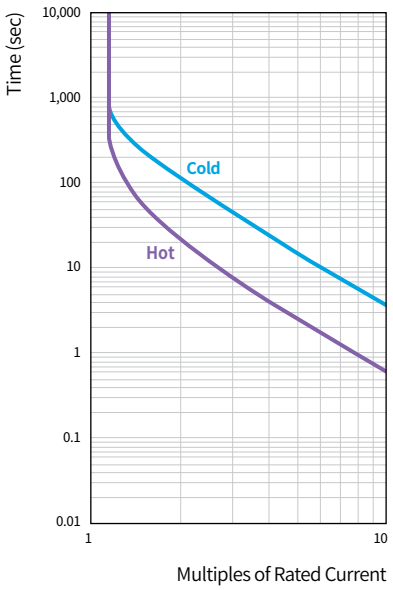
I_B	Rated Load Current	Rated current set value
I	Fault Current (Input Current)	Fault current value where a trip occurs. The reference value is six times (600 %) the rated current.
I_P	Load Current Before Overload	Load current recorded by the relay prior to the overload.
k	Overload Factor	Represents the motor's service factor value. K = 1.1

Overcurrent Time Characteristics Curves

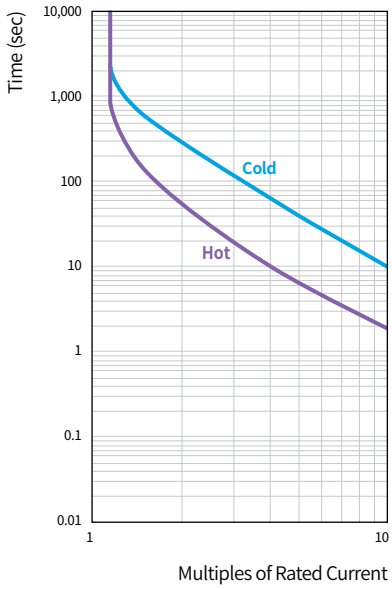
Inverse Time Class 1



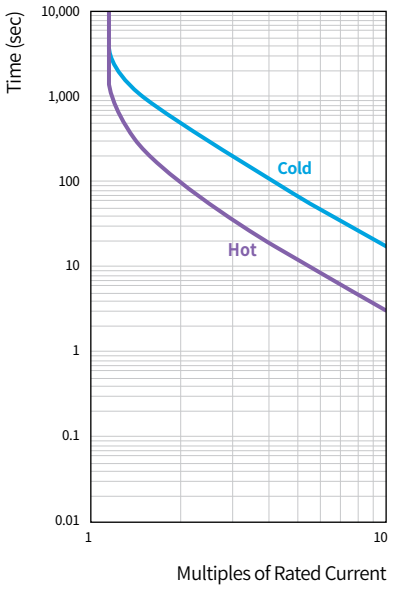
Inverse Time Class 10



Inverse Time Class 30



Inverse Time Class 50

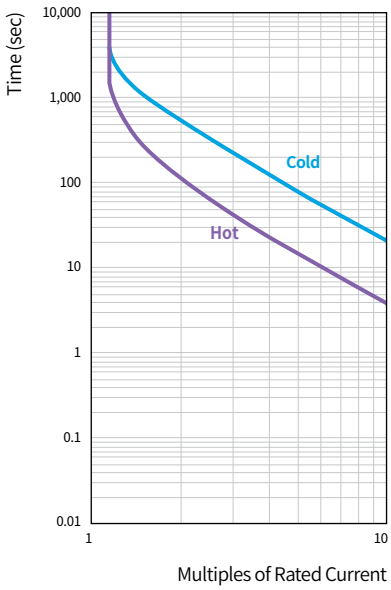


Technical Data

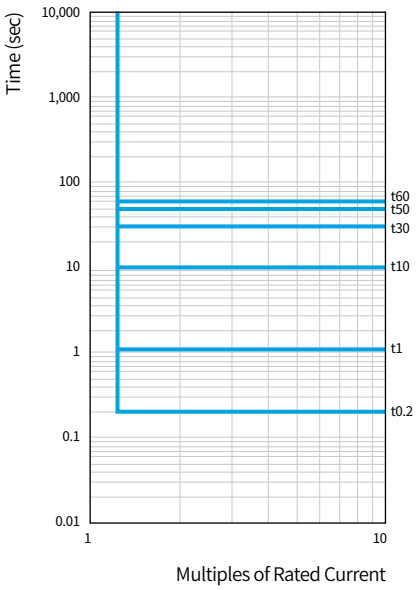
Operational Characteristics

Overcurrent Time Characteristics Curves

Inverse Time Class 60

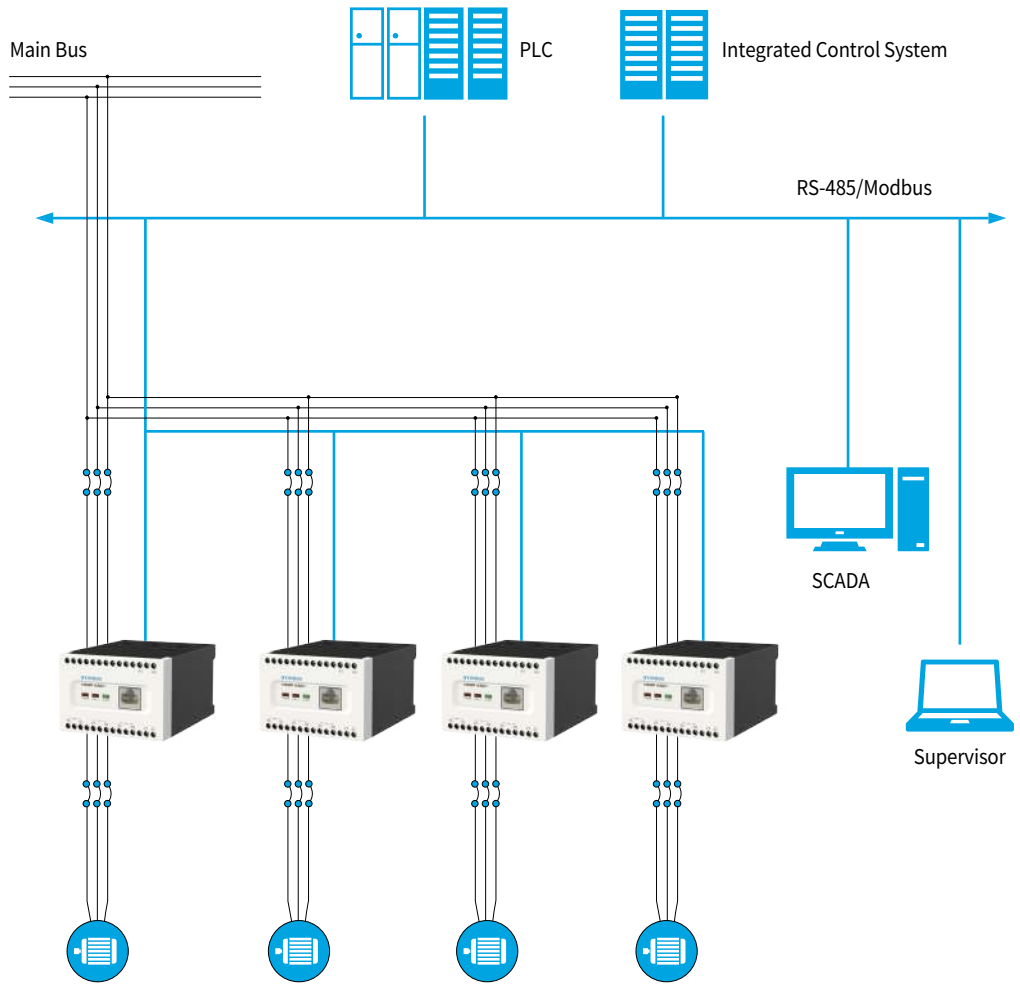


Definite Time



Communication Function (Advanced Type)

Supports the universal industrial communication protocol RS-485/Modbus to enable easy interfacing into the user's integrated control network.



Installation Compatibility

- Can be easily connected to the main circuit terminal block, with both tunnel and screw type connection available to suit the installation environment.
- Can be installed with screws or on DIN rails (for screw mounting, additional mounting block is supplied with relay).

Model Selection Table

Specifications Comparison by Model

Spec Classification		Electronic Motor Protection Relay			
		Normal – Earth Leakage HGMP N60 Z	Normal - Instantaneous HGMP N60 I	Normal – ZCT Built-in HGMP N60 B	Advanced – Communication HGMP A60 Z
Protection Functions					
Overcurrent		●	●	●	●
Undercurrent		●	●	●	●
Phase Failure		●	●	●	●
Phase Unbalance		●	●	●	●
Rotor	Stall	●	●	●	●
	Lock	●	●	●	●
Reverse Phase		●	●	●	●
Earth Leakage		●	–	●	●
Ground Fault		●	●	●	●
Instantaneous		–	●	–	●
Display Information					
Real-Time Load Current		●	●	●	●
Real-Time Load Rate		●	●	●	●
Check Parameters During Operation		●	●	●	●
Check Total Running Hours		●	●	●	●
Comm. Protocol					
RS-485/Modbus		–	–	–	●
Contact Configuration					
Main Contact (1a1b, 2a, 2b)		95-96, 97-98	95-96, 97-98, 07-08	95-96, 97-98, 07-08	95-96, 97-98, 07-08
Auxiliary Contact (1a-Ground Fault/Warning/Instantaneous)					

Electronic Motor Protection Relays

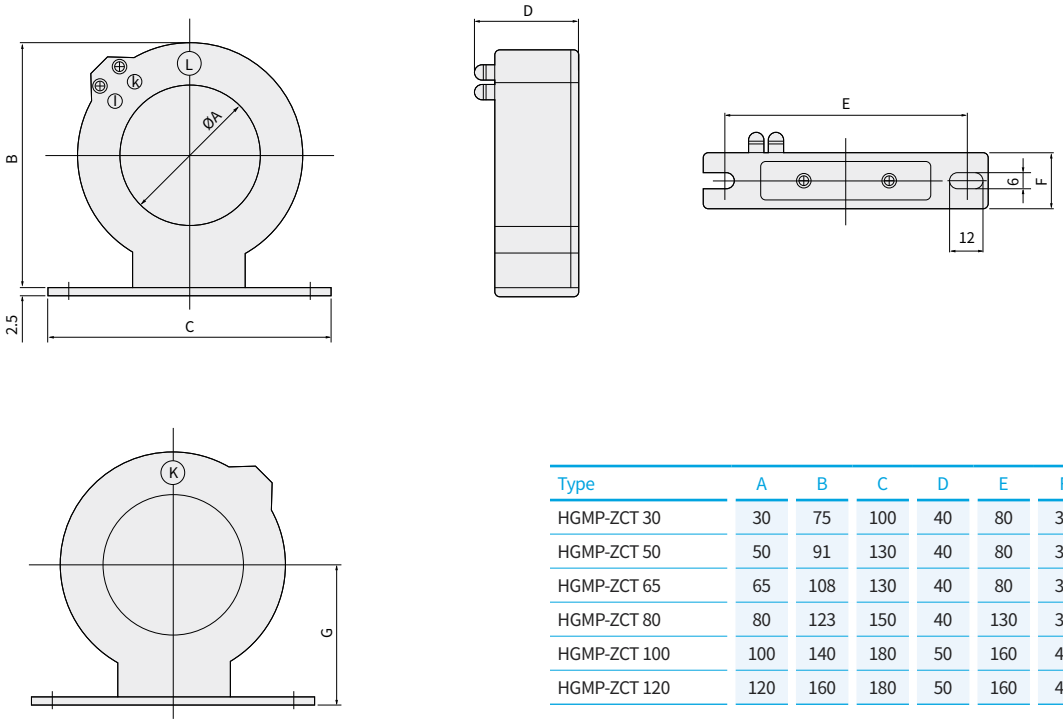
Classification		Normal Type – ZCT Built-in HGMP N60 B	Normal Type – Earth Leakage HGMP N60 Z	Normal Type - Instantaneous HGMP N60 I	Advanced Type HGMP A60
Panel Installation Type		Separated/Integrated			Separated
Connection Type		Screw type/Tunnel type			
Rated Current		60 : 0.5 ~ 60 A [1]			
Current Configuration Range		Minimum rated current ~ maximum rated current			
Control Voltage (50/60 Hz)		A/DC 100 ~ 240 V			
Function					
Overcurrent		Over 112.5 % ± 5 % – Definite time, inverse time (thermal, non-thermal)			
Undercurrent		User set (30 to 90 % of rated current) [1]			
Phase Failure		Over 70 ± 10 % of phase current deviation			
Phase Unbalance		Over user set ± 10 % of phase current deviation			
Rotor	Stall	User set after startup (Over 150 ~ 700 % of rated current) – Definite time only			
	Lock	User set after startup (Over 200 ~ 1,000 % of rated current) – Definite time only			
Reverse Phase		Detection during startup			
Earth Leakage		User set (30mA ~ 10A)	User set (100mA ~ 10A)	–	User set (100 ~ 2,500 mA)
Ground Fault		0.5 ~ 60 A			
Instantaneous		–		User set (600 ~ 1,500 % of rated current)	
Time Settings					
Overcurrent	Inverse	Operation time: 1 ~ 60 class (for 600 %)			
	Definite	Delay time : 0, 1 ~ 200 sec, operation time : 0.2 ~ 60 sec			
Undercurrent		User set (0.5 ~ 30 sec)			
Phase Failure		1.5 sec			User set (0.5 ~ 10 sec)
Phase Unbalance		4.5 sec			User set (0.5 ~ 10 sec)
Rotor	Stall	4.5 sec			User set (0.5 ~ 10 sec)
	Lock	500 msec			User set (0.5 ~ 10 sec)
Reverse Phase		Less than 100 msec			
Earth Leakage		User set (0.05 ~ 10 sec)	User set (0.1 ~ 10 sec) [3]	–	User set (0.1 ~ 10 sec) [3]
Ground Fault		User set (0.05 ~ 10 sec)	User set (0.1 ~ 10 sec) [3]		
Instantaneous		–		Less than 50 msec – Operation delay during startup can be set	
Overload Warning Function Setting		60 ~ 110 % of rated current [1]			
Runtime Alert Function		OFF/1 ~ 9,999 Hour			
Accuracy					
Current		±3% (or 100mA) [2]	±5 % (or 100 mA) [2]		
Time		±10 % (or 0.5 sec)			
Contact					
No. of Contacts		Main contact : 2SPST		Main contact : 2SPST, Auxiliary contact : 1SPST	
Capacity		3 A/250 VAC (Resistive load)			
Environment					
Operation		-20 ~ 60 °C			
Storage		-30 ~ 85 °C			
Relative Humidity		35 ~ 85 % RH (No freezing)			
Withstand Voltage					
Between Main Circuit And Enclosure		2,000 VAC/1 min			
Between Main Circuits		2,000 VAC/1 min			
Between Contacts		1,000 VAC/1 min			
The Others					
Insulation Resistance		over 100 MΩ at 500 VDC			
Standard		IEC 60947-4-1			
ZCT input (For our company only)		200 mA/100 mV			
Cable Spec.		1.5 m, 2 m, 3 m			
Power Consumption		under 2 W			

※ 1) Minimum operational current is over 70 % of minimum rated current
2) 50 % for earth leakage
3) Operation delay during startup can be set. (For HGMP N60 Z, earth leakage and ground fault share the operation time configuration)

Optional Component

ZCT

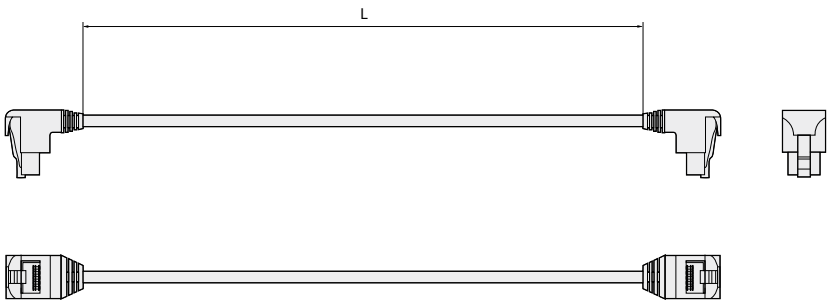
Unit : mm



Type	A	B	C	D	E	F	G
HGMP-ZCT 30	30	75	100	40	80	30	40
HGMP-ZCT 50	50	91	130	40	80	30	48
HGMP-ZCT 65	65	108	130	40	80	30	56.5
HGMP-ZCT 80	80	123	150	40	130	30	64
HGMP-ZCT 100	100	140	180	50	160	40	72.5
HGMP-ZCT 120	120	160	180	50	160	40	82.5

※ During the ZCT operation test, it operates only when Main current is flowing.

Connection Cable

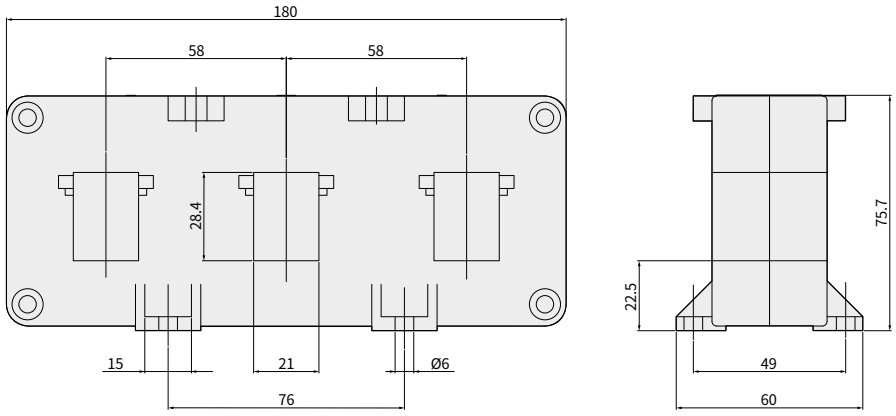


Type	L
HGMPCBL1.5	1.5 M
HGMPCBL2	2 M
HGMPCBL3	3 M

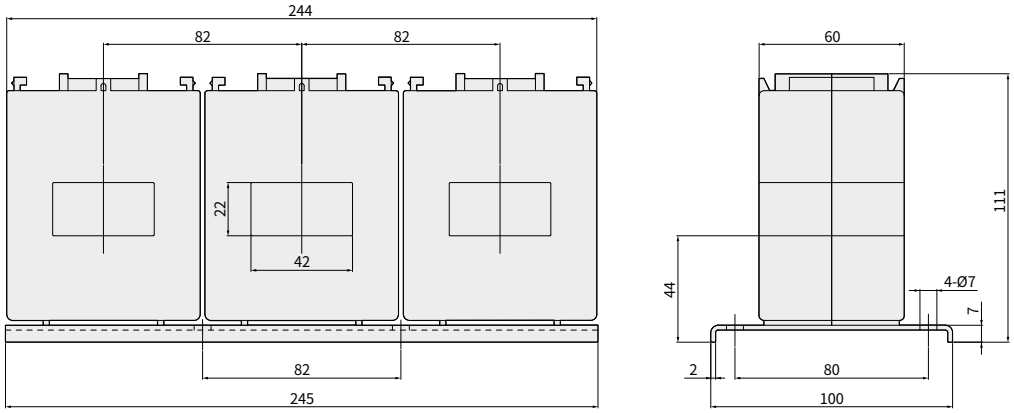
External CT

Unit : mm

iMP-CT80 ~ CT500



iMP-CT630 ~ CT800

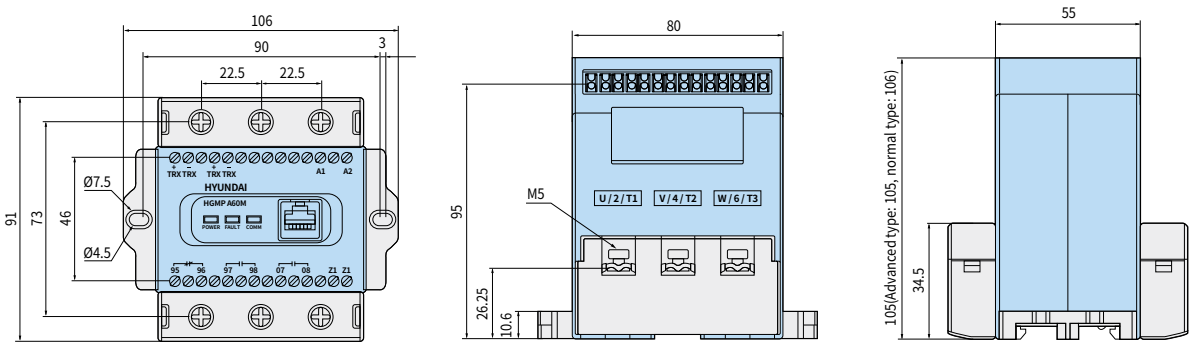


※ It is not supplied with mounting plate for assembling on the external CT.

Dimensions

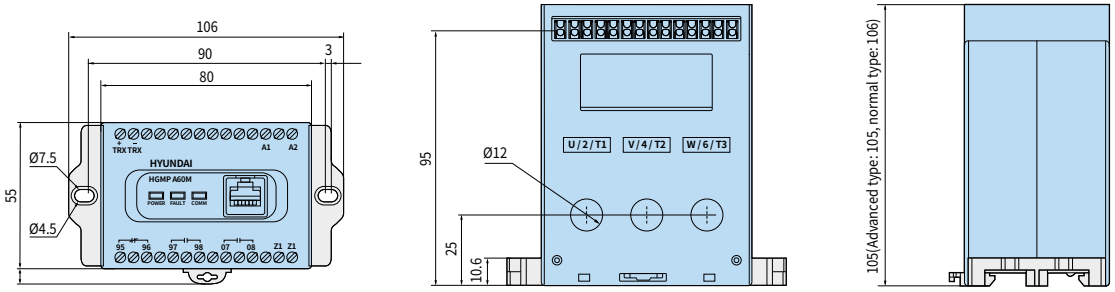
Main Unit and Screw Type

Unit : mm



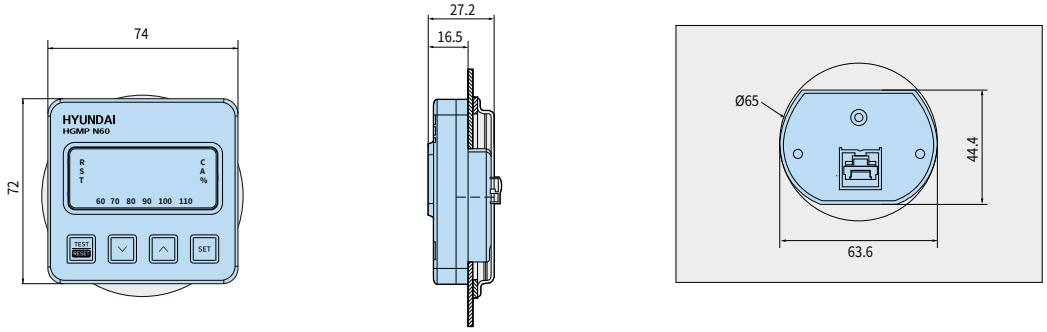
Main Unit and Tunnel Type

Unit : mm



Panel Installation of the Display Unit

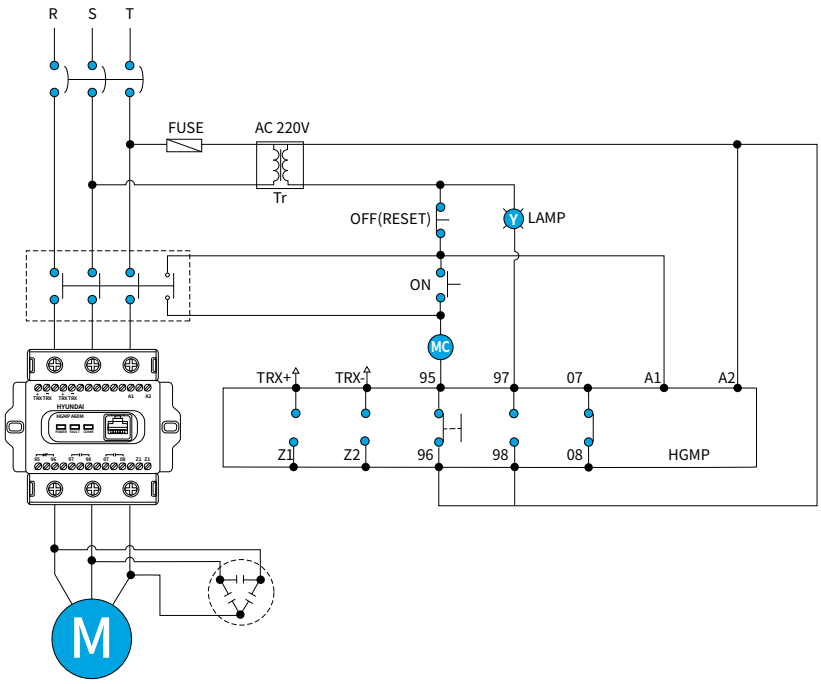
Unit : mm



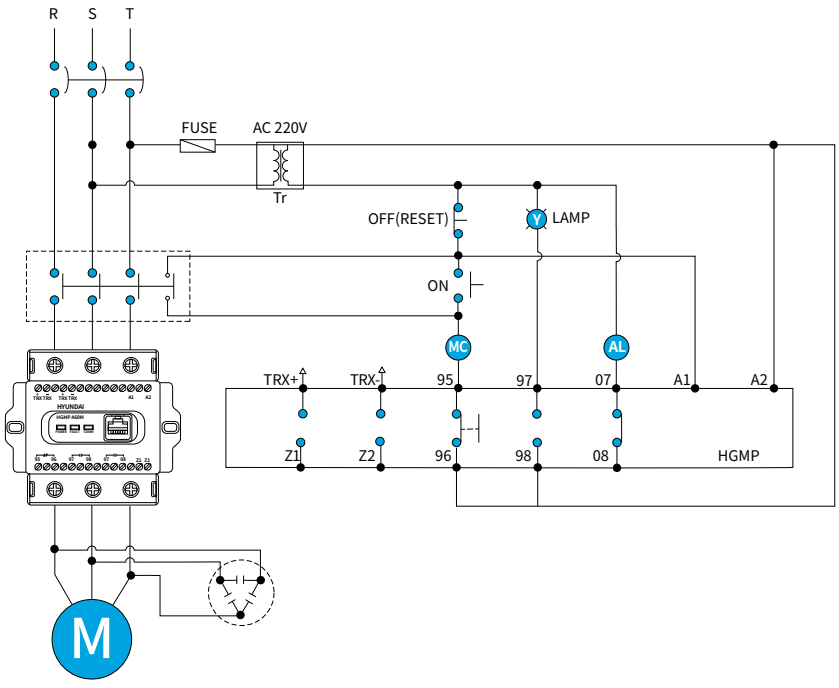
※ The sizes of the normal type and advanced type are same excluding the height of the product.
※ N60Z DISPLAY will change to N60B DISPLAY size from the third quarter of 2024.

Circuit Diagram

3 Phase Circuit

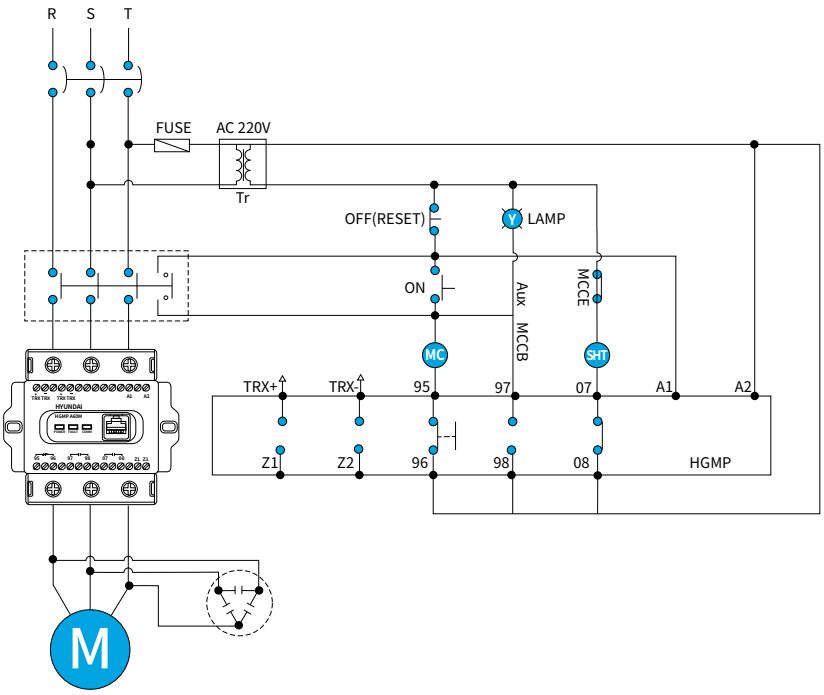


3 Phase Circuit (Aux. Terminal：Overcurrent Warning)

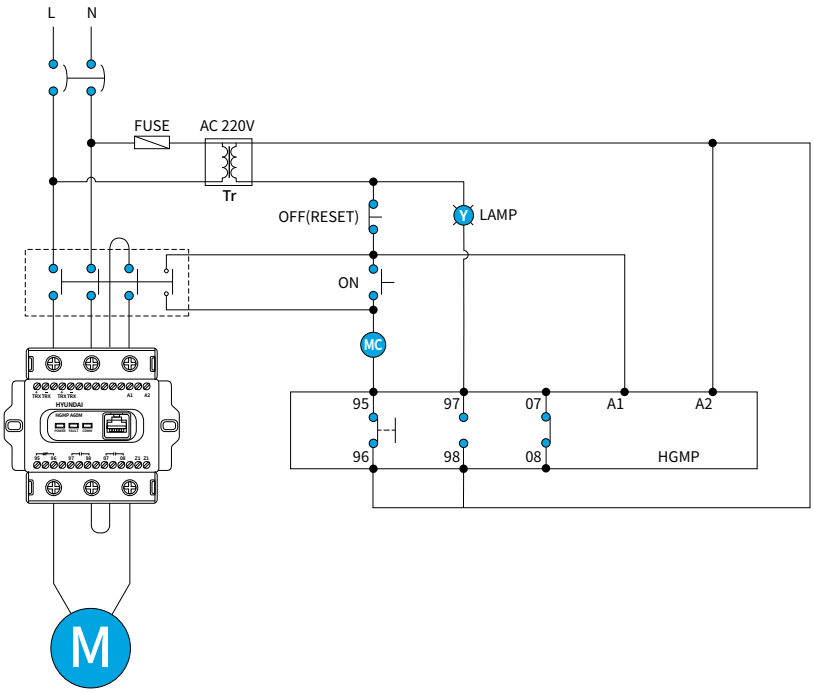


Circuit Diagram

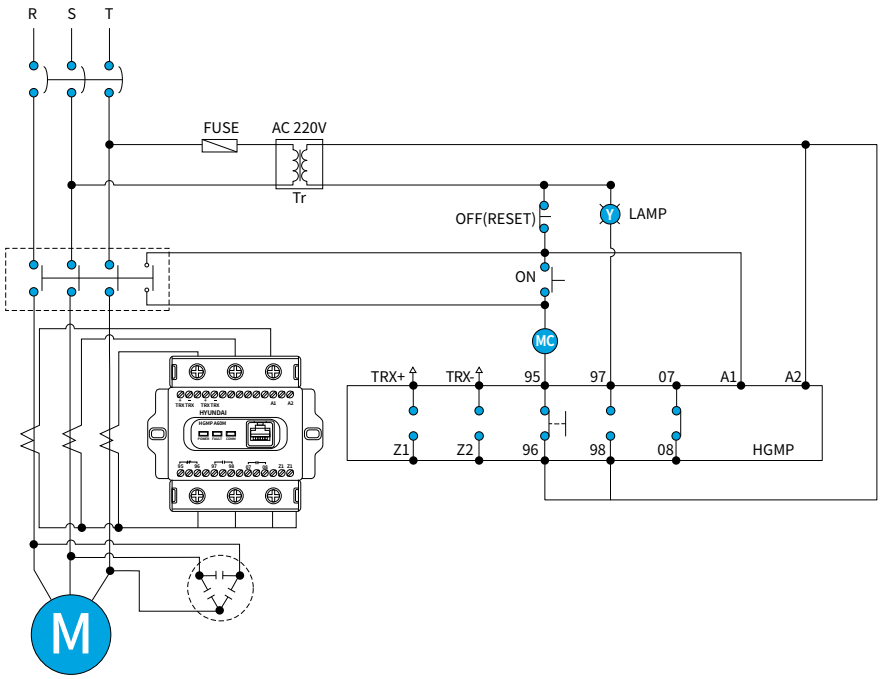
3 Phase Circuit (Aux. Terminal：Instantaneous)



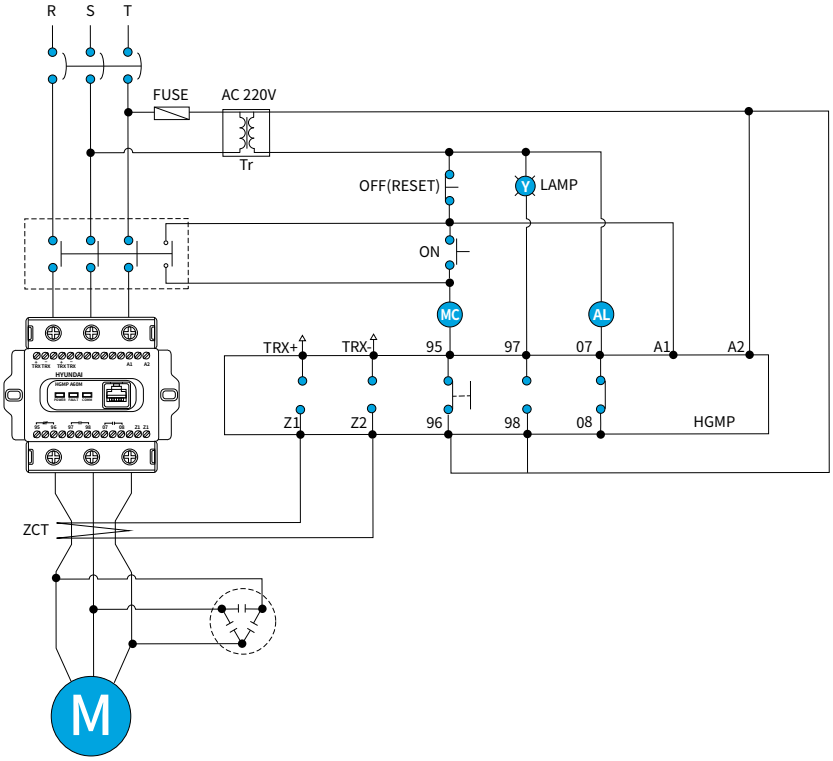
Single Phase Circuit



With External CT

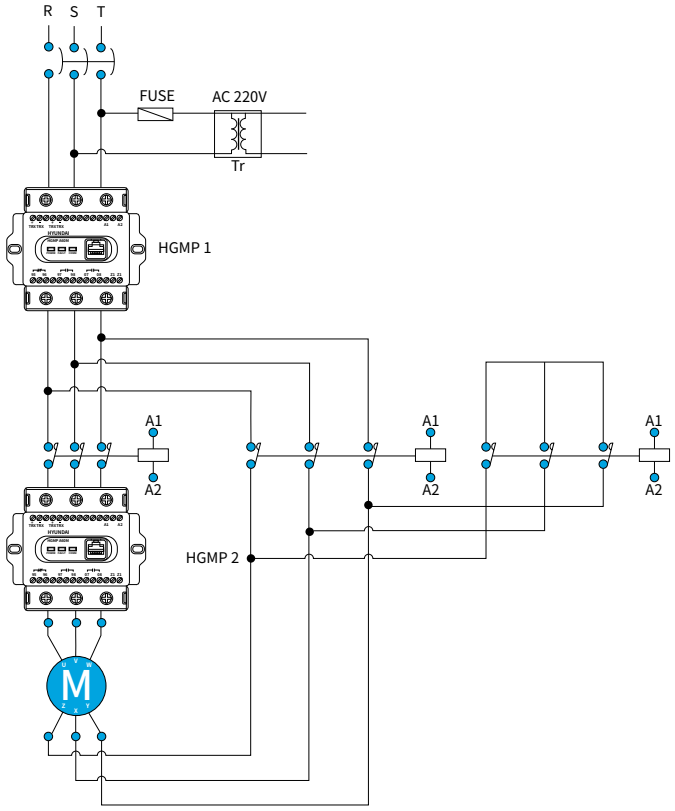


With Earth Leakage Protection ZCT



Circuit Diagram

Y-Δ with HGMP



Detects full load current when wired as HGMP 1, and $1/\sqrt{3}$ of full load current (58 %) when wired as HGMP 2.
Motor protection functions can be utilized for both HGMP 1 and 2 circuit placements.

Order Code

HGMP

HGMP	N60	Z	S	T	F220
Model Name	Type and A/F	Normal Type Protection Features [1]	Panel Installation Type	Contact Type	Control Voltage

N60	Normal Type
A60	Advanced Type

Z	Earth Leakage Type
I	Instantaneous Type
B	ZCT Built-in Type

Comm. Protocol [2]

RS-485/Modbus

S	Separated Unit
I	Integrated Unit [3]

T	Tunnel Type
S	Screw Type

F220	AC/DC 100 ~ 240 V

HGMP	BASEFRAME

IMP compatible KIT (Option)

External ZCT

HGMP	ZCT	100
Model Name	Current Transformer	CT Ratio

30	30 : 5
50	50 : 5
65	65 : 5
80	80 : 5
100	100 : 5
120	120 : 5

External CT

iMP	CT	300	H
Model Name	Current Transformer	CT Ratio	CT Elements

80	80 : 5
115	115 : 5
130	130 : 5
180	180 : 5
220	220 : 5
300	300 : 5
400	400 : 5
500	500 : 5
630	630 : 5
800	800 : 5

	Normal Type
H	2CT
K	3CT

※ 1) Indicates the optional protection function for the normal type model
2) Indicates the availability of the communication feature for the advanced type model
3) Only the separated unit type is available for the A60 advanced type

Handling and Maintenance Inspection

Storage and Transportation

Storage Precaution

| Ambient Temperature | -5 ~ +40 °C
(Below the average daily temperature of 35 °C)
| Altitude | Below 1,000 m above sea level
| Relative Humidity | Within 45 % ~ 85 %

The surrounding environment may affect the insulation performance and durability of the Electronic Motor Protection Relay so the environment condition for usage must accurately be checked before application.



- **Relative humidity to be within the range of 45% ~ 85%**
  Do not store in places with high humidity for a long period of time.
- **Avoid places with a lot of dust**
  Do not store in exposed places and use cover or packing material to prevent dust from piling up on the protection relay.



- **Store in packaged state**
  During storage, store in packaged state. Store in a state using shelf or equivalent devices and do not leave it neglected on the floor. Do not transport heavy products manually. It may cause injury.



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



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



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

Transportation Precautions

⚠ Caution

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



- **Hold the main unit during transportation.**
  Holding relay by connection cable of display unit may cause defect.



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



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



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

Handling Precautions

Caution

- Do not store and use in abnormal environment such as high temperature, high humidity, dust, corrosive gas, vibration, impact and others It may cause electric shock, fire and malfunction.
- Ensure that rubbish, foreign substances such as concrete powder, metal powder, rainwater and others do not flow in.
- When handling the product, do not use lubricants. It may cause electric shock and fire.
- Electrical works must be conducted by qualified technicians with certifications related to electrical works. It may cause electric shock and fire.

Inspection items before use

- Ensure that calibration work is not skipped. It may cause malfunction.

Installation, usage and maintenance precautions

- Frequently check the fastening state, assembly and combination status of the bolt. It may cause electric shock, fire and malfunction.
- Check whether the rated current, voltage and frequency conform to the intended specification. It may cause electric shock, fire and malfunction.
- As for the wiring work, check whether the upper protection relay has been turned off so that electricity does not flow. It may cause electric shock.
- Connect the power that conforms to the ratings of the switch/contactor's main unit. It may cause fire and malfunction.
- As for the wiring and terminal, use the standard product and as for the terminal screw, fasten using the torque indicated in the user manual. It may cause fire.
- Frequently check the wiring state and shape. It may cause electric shock, fire and malfunction.
- Check whether parts have been omitted and replace damaged products and parts. It may cause electric shock, fire and malfunction.
- In case of abnormality in the contact, replace immediately and do not arbitrarily process such as trimming the contact using string or use lubricant. It may cause electric shock, fire and malfunction
- Use the specified tool. It may cause damage and malfunction.

HG

Power System Monitoring and Protection Relays

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RELAY

HG Series

Power System Monitoring and Protection Relays

The Best Solution for Protecting Feeder/Incoming Panels.
Optimal Power Monitoring and Protecting Solution with Compact and Convenience.



The HGMAP digital power system monitoring and protection relay series is designed to provide optimized feeder/incoming protection for feeder/incoming loads and medium-small voltage motors, with advanced protective features and graphic based UI.

Compact size

- Easy Installation and Maintenance
- Compact form Factor and Lightweight Unit
- Better Performance in EMC Shielding and Heat Dissipation

Intuitive UI

- Voltage/Current Vector Diagrams
- Shortcut Keys for Measurement Screen
- Status & Alarm LED

Protection and Measurement Functions

- Feeder/Incoming Protection Relay
- Motor Protection Relay
- Measurement of Voltage/Current Negative Sequence, Zero Sequence and Power Factor
- Real-Time Self-Diagnostics Feature



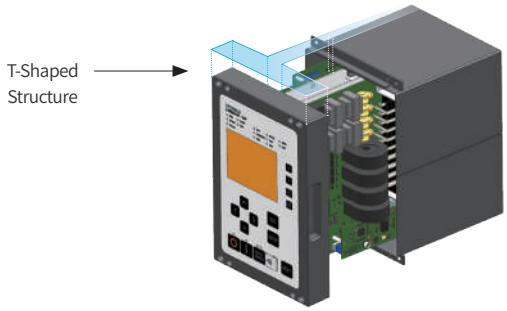
Overview and Characteristics

MCU-Based Controller

- Advanced 32-bit ARM core MCU provides precise measurements and calculations, maximizing relay stability and reliability.

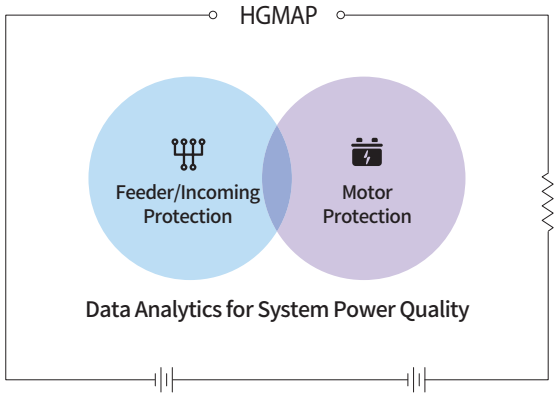
User-Friendly form Factor and Size

- Optimal size and weight for providing system monitoring and protection ensures easy installation and maintenance.
- Internal T-bone structure makes easy replacement of relay unit and components; sturdy modular construction provides greater protection against external shock or noise.



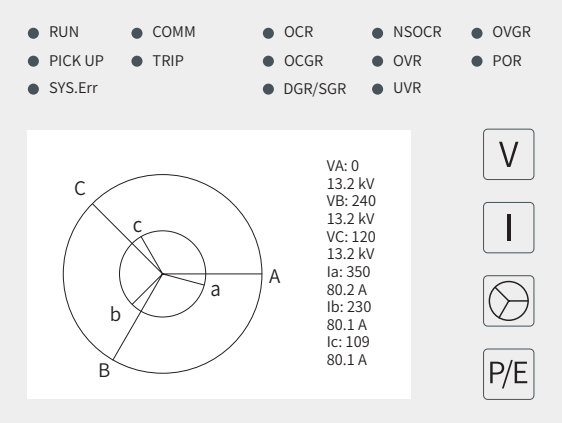
Diverse Protection Features

- Both a feeder/incoming protection model and a motor protection model are offered for a diverse range of protection features suitable for different small and medium systems.
- The feeder/incoming protection relay is designed to provide optimal feeder protection including overcurrent, ground fault, overvoltage, undervoltage, and reverse phase and unbalance protection.
- The motor protection relay includes additional features for protecting small- and medium-sized motors in addition to default feeder/incoming protection features, including thermal overload, short, undercurrent and phase reverse protection.



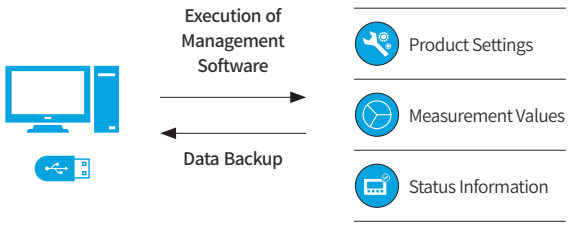
Intuitive HMI

- 128×96 graphic LCD provides three-phase current/voltage measurement checking at a glance, with vector diagram function for easy phase difference analysis.
- Measurement shortcut key allows single-button verification of measurement readings without entering into separate menu screens.
- Separate status LEDs and alarm LEDs provide extra layer of convenience for checking operating status and fault information.



System Management Software

- Connecting the relay and the operator's desktop system via USB link and running the system management software allows relay settings, measurements and status information to be downloaded to the PC, which can be saved into files as backup data.
- Fault waveform information can be converted to IEEE-specification comtrade file for use in any analysis tool to study the fault's waveforms.



Select Before Operation (SBO), Confirm Before Operation (CBO)

- Mandatory select & confirm action before executing relay settings and control commands provides increased relay control reliability and security.

Technical Data

External Structure

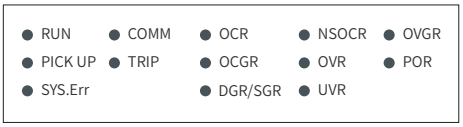
Front View

No.	Classification	Description
1	Status LED	Display relay status and trip/pick-up status
2	TRIP Alarm LED	Display the trip alarm for each protection element
3	Pixel Graphic LCD	Display measurements, settings and records
4	Measurement Shortcut Buttons	Shortcuts for each measurement (voltage, current, vector diagram, power)
5	Arrow Keys	Move between screens, change settings values
6	ESC Button	Return to previous screen, cancel save
7	ENTER Button	Enter menu screen, confirm save
8	Breaker Control Button	Control breaker and switch gear
9	Local/Remote Button	Local/Remote control permission toggle
10	USB Connector Port	Mini-B USB port for connection to PC with manager software
11	RESET Button	Cancel trip alarm, LED and DO reset control

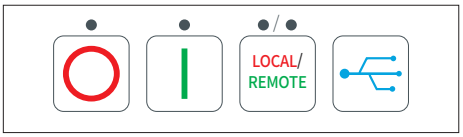


LED Status Guide

Classification		LED Status	Description	Notes
Status LED	RUN	●	Normal operation	
	PICKUP	✳ Blinking	Pick-up for protection element	
		●	Trip after pick-up	
	SYS.Err	●	System error	
	COMM	✳ Blinking	Communication to monitor or remote station underway	
	TRIP	●	Protection element trip	
Alarm LED	OCR	●	OCR trip	User settable
	OCGR	●	OCGR trip	User settable
	DGR/SGR	●	DGR/SGR trip	User settable
	NSOCR	●	NSOCR trip	User settable
	OVR	●	OVR trip	User settable
	UVR	●	UVR trip	User settable
	OVGR	●	OVGR trip	User settable
	POR	●	POR trip	User settable

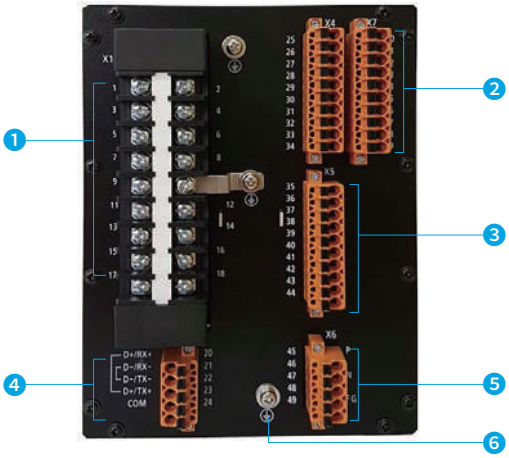


Classification		LED Status	Description
Status LED	O	●	Breaker OPEN
	I	●	Breaker CLOSED
	LOCAL/ REMOTE	●	LOCAL control established
		●	REMOTE control established



Rear View

No.	Classification	Description
1	PT and CT Input Terminals	X1: 1 ~ 8 - PT Terminals (PT1 ~ PT4)
		X1: 11 ~ 18 - CT Terminals (CT1 ~ CT4)
2	DO Output Terminals	X4: 25 ~ 28 - CB Close, Open
		X4: 30 ~ 34 - DO01 ~ DO03
		X7: 52 ~ 59 - DO04 ~ DO08
3	DI Input Terminals	X5: 35 ~ 37 - DI_52a, DI_52b
		X5: 38 ~ 43 - DI01 ~ DI04
4	Communication Terminal	RS-485/Modbus Communication Terminal
5	Power Cable Terminal	Relay Power Input Connector
6	Grounding Terminal	Grounding (X1: 9 ~ 10, X5: 44, X6: 49)



Detailed Terminal Locations

X1			
1	PT1	2	PT1
3	PT2	4	PT2
5	PT3	6	PT3
7	PT4	8	PT4
9	N.C	10	F.G
11	CT1	12	CT1
13	CT2	14	CT2
15	CT3	16	CT3
17	CT4	18	CT4

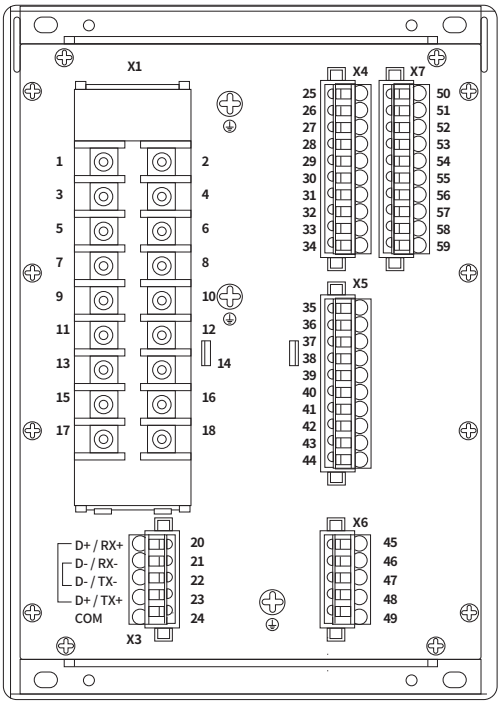
X4	
25	CB CLS+
26	CB CLS-
27	CB OPN+
28	CB OPN-
29	N.C
30	DO 01
31	DO 02
32	DO COM1
33	DO 03
34	DO COM2

X7	
50	N.C
51	N.C
52	DO 04
53	DO COM3
54	DO 05
55	DO 06
56	DO COM4
57	DO 07
58	DO 08
59	DO COM5

X5	
35	DI 52a
36	DI 52b
37	DI COM1
38	DI 01
39	DI 02
40	DI COM2
41	DI 03
42	DI 04
43	DI COM3
44	F.G

X3	
20	D+/RX+
21	D-/RX-
22	D-/TX-
23	D+/TX+
24	COM

X6	
45	P
46	N.C
47	N
48	N.C
49	F.G

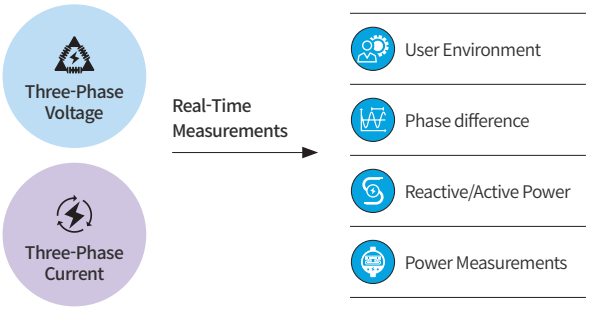


Technical Data

Features

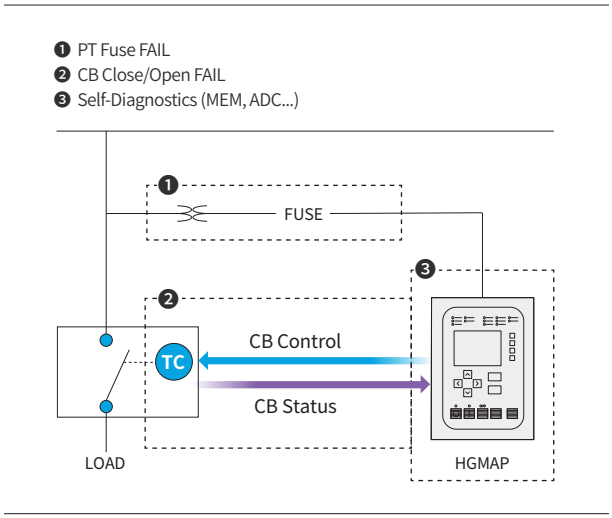
Current Status Monitoring

- Real-time measurement of three-phase voltage and current provides each phase and phase difference and measurement of active power/reactive power and wattage.
- DFT calculations of three-phase voltage and current provides measurements for positive, negative and zero phase sequence as well as power factor and frequency to enable an accurate analysis of power quality.



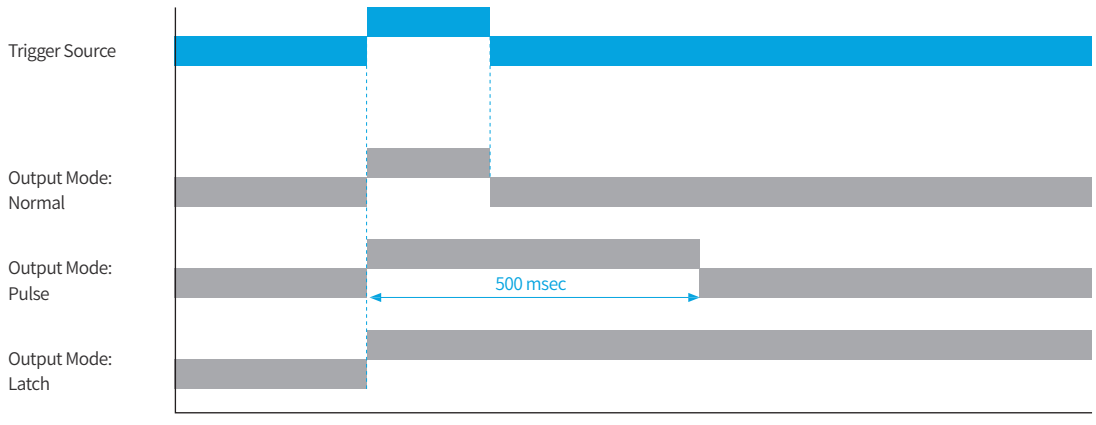
PT Fuse Monitoring and Breaker Monitoring

- Monitors for shorts in the fuse wired to the power system's PT secondary winding.
- When the relay controls (Close, Trip) the breaker, breaker control status is monitored using the breaker status information inputted into the system.



Customized DO Output

- DO output mode can be customized by the user to normal, latch and pulse.
- Additional DO output trigger source settings such as each phase pickup trip, TO input and other alarm functions can be selected in addition to the default trip signal for each protection element.

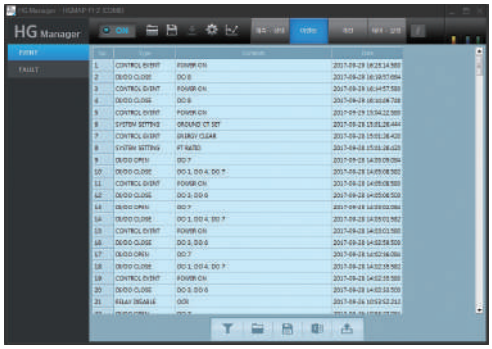


Self-Diagnostics

- Extensive self-diagnostics feature ensures reliability and prevents errors.
- Diagnostics feature enables error detection of internal memory, control power, analogue circuits and communication components, and monitoring of external power input.

Extensive Record-Keeping

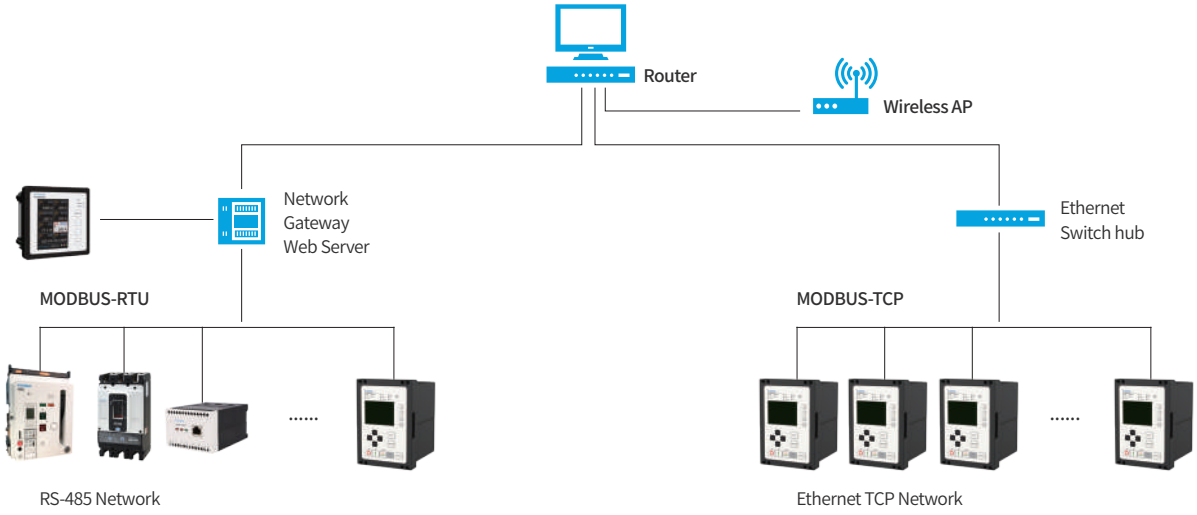
- Internal non-volatile memory provides a recording feature for each element.
- A maximum number of 256 records can be saved for relay status, settings change, and operation of monitoring and protective functions.
- In the event of a breaker being tripped due to a protection element, the fault information and relevant measurements are recorded for up to 64 faults.
- To ensure accurate event diagnostics, a breaker trip triggers the storage of event information and waveforms, storing up to ten waveforms.





Communication Function

- Supports universal industrial communication protocol RS-485/Modbus to enable easy integration into the user's management network.
- Optional Ethernet TCP communication module provides RJ45 and fiberoptic communication for use in conjunction with a high-speed network. 1)



※ 1) To be issued

Technical Data

Main Functions

Overcurrent Relay, OCR : 50/51

Overcurrent relay detects a load current that is greater than the setting value, and is classified into an instantaneous element (50) without a time delay and a time overcurrent element (51) that operate after a delay.
The instantaneous element is set to operate in less than 40 msec in the event of a massive current such as a load side short circuit, designed to minimize the damages caused by a fault.
Time delay is further classified into definite time and indefinite time characters; the definite time element fires the relay within a designated period of time after an overcurrent event regardless of the size of the current, with a delay ranging from 50 msec to 60 seconds. Inverse time characteristics is inversely proportional to the size of the current—smaller the ratio of the overcurrent to the pickup current, longer the delay, and vice versa.
The inverse time relay curves are categorized as standard inverse (SI), very inverse (VI), extremely inverse (EI) and long inverse (LI) as defined by IEC specifications.

Directional Ground Overcurrent Relay, DGR : 67N [1)]

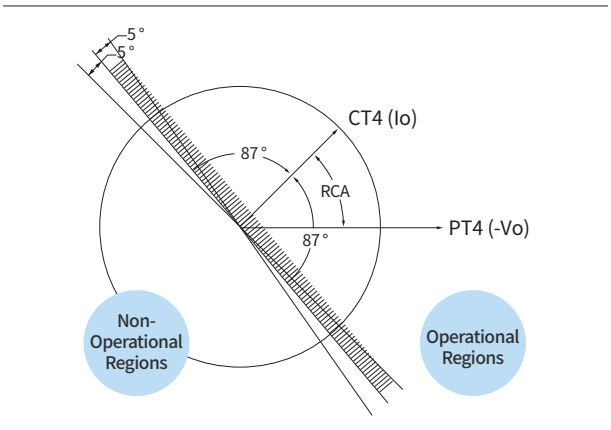
The DGR determines the operation of the relay by selecting the faulted circuit in the grounded system (bus event, load event) based on the size or phase of the zero sequence voltage and current. Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.

Overcurrent Ground Relay, OCGR : 50/51N [1)]

The ground overcurrent relay detects a zero sequence current larger than the setting value caused by a ground fault event in the grounding system, and is classified into the instantaneous element without a delay (50N) and time overcurrent relay with a time delay (51N).
The relay timing is identical to the overcurrent relay; however, while the OCR recognizes a fault by the size of the phase current, the OCGR receives input from the current transformer that measures the zero sequence current and measures the latter current to determine if a fault has occurred.
The OCGR Block function can be used to prevent a malfunction caused by irregular current, such as the operation current from a circuit breaker insertion.
The inverse time relay curves are categorized as standard inverse (SI), very inverse (VI), extremely inverse (EI) and long inverse (LI) as defined by IEC specifications.

Selective Ground Overcurrent Relay, SGR : 67G [2)]

The SDR determines the operation of the relay by selecting the faulted circuit in the ungrounded system (Bus Event, Load Event) based on the based on the size or phase of the zero sequence voltage and current.
Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.



※ 1) SF-N and SM-N can use either OCGR or DGR as a ground current protection element.
2) SF-N and SM-N can use only SGR as a ground current protection element.

Negative Sequence Overcurrent Relay, NSOCR : 46

The NSOCR calculates the negative sequence current passing through the system's CT circuit to detect a negative sequence short, phase loss or phase unbalance in the system under load, and is operated on a time delay.
Time delay is further classified into definite time and indefinite time characters; the definite time element fires the relay within a designated period of time after an overcurrent event regardless of the size of the current, with a delay ranging from 50 msec to 60 seconds. Inverse time characteristics is inversely proportional to the size of the current—smaller the ratio of the overcurrent to the pickup current, longer the delay, and vice versa.
The inverse time relay curves are categorized as standard inverse (SI), very inverse (VI), extremely inverse (EI) and long inverse (LI) as defined by IEC specifications.

Overvoltage Relay, OVR : 59

The OVR detects a voltage higher than the setting value in the PT secondary circuitry in the system, and is operated on a time delay. An overvoltage occurs in the event of an unbalance fault in the system, failure to control the generation voltage, max load dropoff from the generator for low load, or in the transformer circuits.
Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.

Undervoltage Relay, UVR : 27

The UVR detects a voltage lower than the setting value in the PT secondary circuitry in the system, and is operated on a time delay. Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec. The UVR is employed to detect a bus outage, protect from low voltage, load switching, condenser protection, and interlock other system elements.
In order to prevent malfunction due to momentary low voltage detection during system startup, the UV Block function can be set to activate the low voltage relay after normal voltage application.
The UVR should be linked with the PT fuse failure (PTF) feature in order to prevent an error caused by a short in the PT secondary side fuse.

Technical Data

Main Functions

Overvoltage Ground Relay, OVGR : 64

The OVGR measures zero sequence voltage in the event of a ground fault by detecting an overvoltage in the tertiary circuitry of the GPT, and is operated on a time delay.
As the OVGR by itself cannot make a completely accurate determination of a ground fault event, the OVGR is generally used to signal an alert while the DGR and SGR elements are used to trip the circuit after detecting a ground fault.
Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.

Phase Open Relay, POR : 47P

The POR detects a disparity between the phase and line voltage in the three-phase system or between the phase angle and the condition of balance, or in the event of a single phase voltage loss from the system.
The voltage unbalance is detected by receiving the three-phase voltage input from the system's PT and using the formula below to determine if the percentage value is larger than the setting value. Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.
The voltage unbalance rate formula of HGMAP-S is as follows.

$$V_{unbal}\ (\%) = \left(\frac{V_{max} - V_{min}}{V_{avg}} \right) \times 100$$

Vunbal : Unbalance Rate
Vmax : Highest of Three-Phase Voltage
Vmin : Lowest of Three-Phase Voltage
Vavg : Average of Three-Phase Voltage

Thermal Relay, THR : 49

The THR provides protection against motor overload and measures the heat buildup in the current inflowing via the system's CT circuit to check if the thermal load is larger than the setting value.
Relay operation is by inverse time characteristics with time delay characteristics of the cold and hot curves as outlined by IEC60255-8.
The cold curve is based on the thermal state and the time constant, and the hot curve operate based on the cold curve plus prior thermal accumulation.

Undercurrent Relay, UCR : 37

The UCR determines whether the current from the CT circuit is lower than the setting value, and is operated on a time delay.
Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.

Negative Sequence Overvoltage Relay, NSOVR : 47N

The NSOVR calculates the negative sequence voltage inflow via the system's PT circuit to detect the motor's reverse phase, open phase or phase unbalance, and is operated on a time delay.
Relay operation is by definite time characteristics, with a delay from 100 msec up to 60 sec.

Stall/Lock Relay : 48/51LR

Stall refers to a state when the torque load on a running motor exceeds the motor's maximum torque, reducing the rotational speed or stopping the motor altogether; a lock is caused by excessive torque on the motor before it operate, preventing startup.
The Stall/Lock Relay protects the motor from these events, detecting a similar set of conditions on the motor albeit during motor operation for stall and before motor startup for lock.
Both the stall and lock relay are operated on a time delay, with the stall relay operation on definite time characteristics and lock relay operation on inverse time (VI, EI) characteristics.

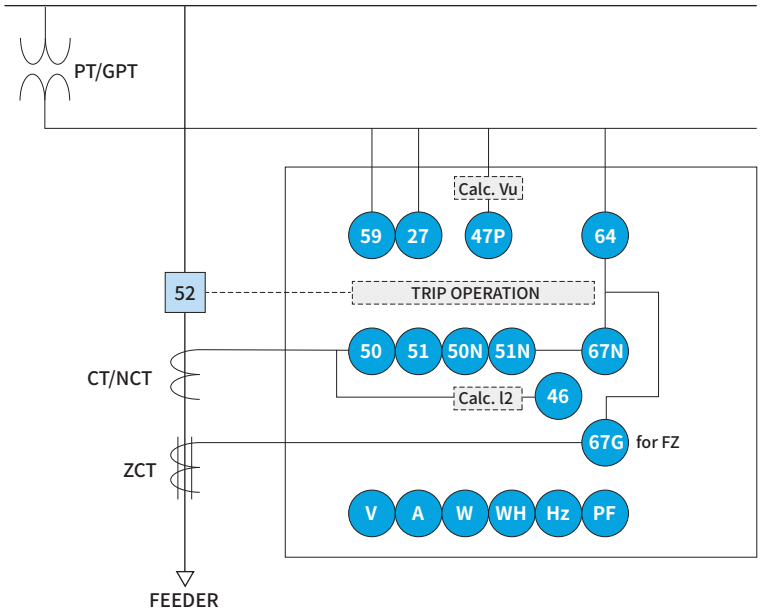
Notching Relay, NCH : 66

The NCH protects the motor from the large startup current occurring at initial motor operation which can put thermal and mechanical stress on the motor.
The NCH limits the number of operations during a set period of time, setting the interval between operations to prevent the motor from being started up immediately after powering down.
The relay can be linked with the THR element to limit operation when the residual heat is greater than the heat level setting.

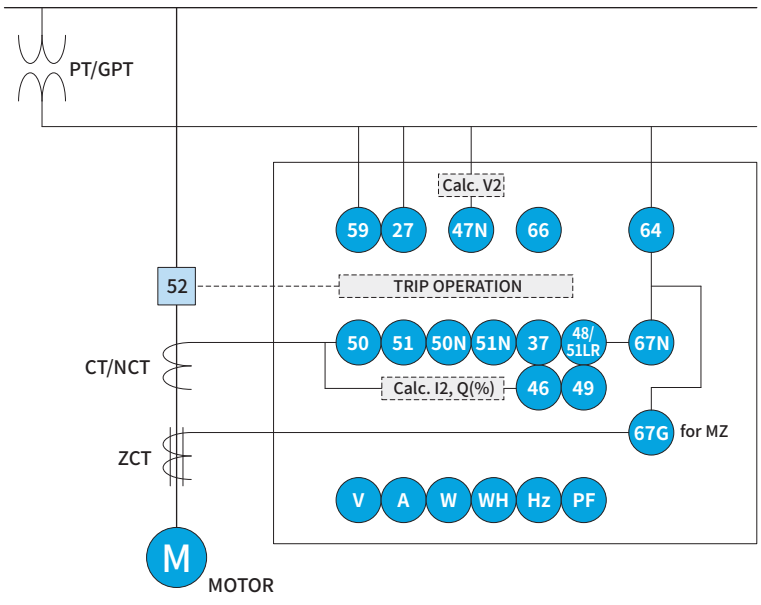
Technical Data

Function Block Diagram

HGMAP-SF

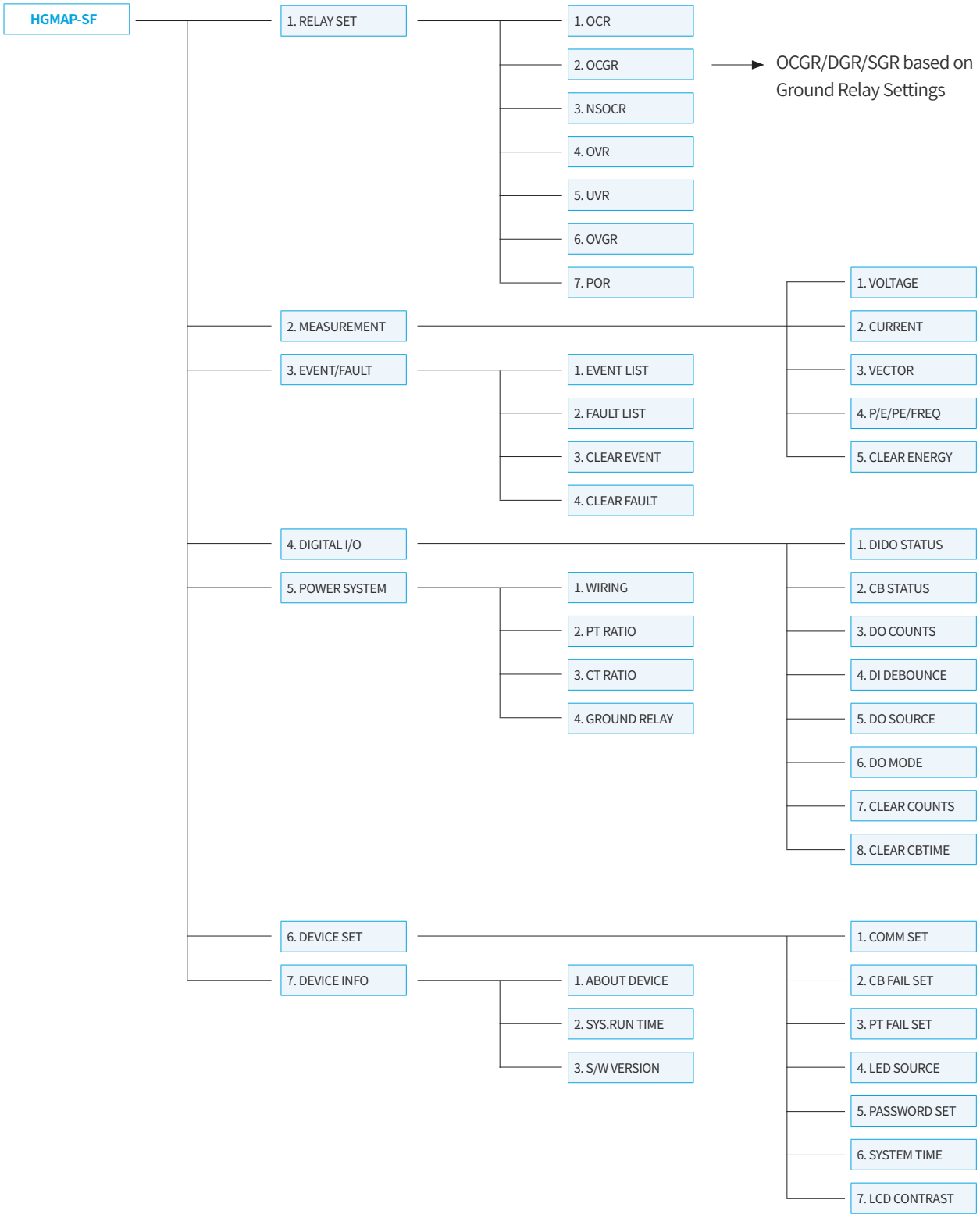


HGMAP-SM



Controls and Settings

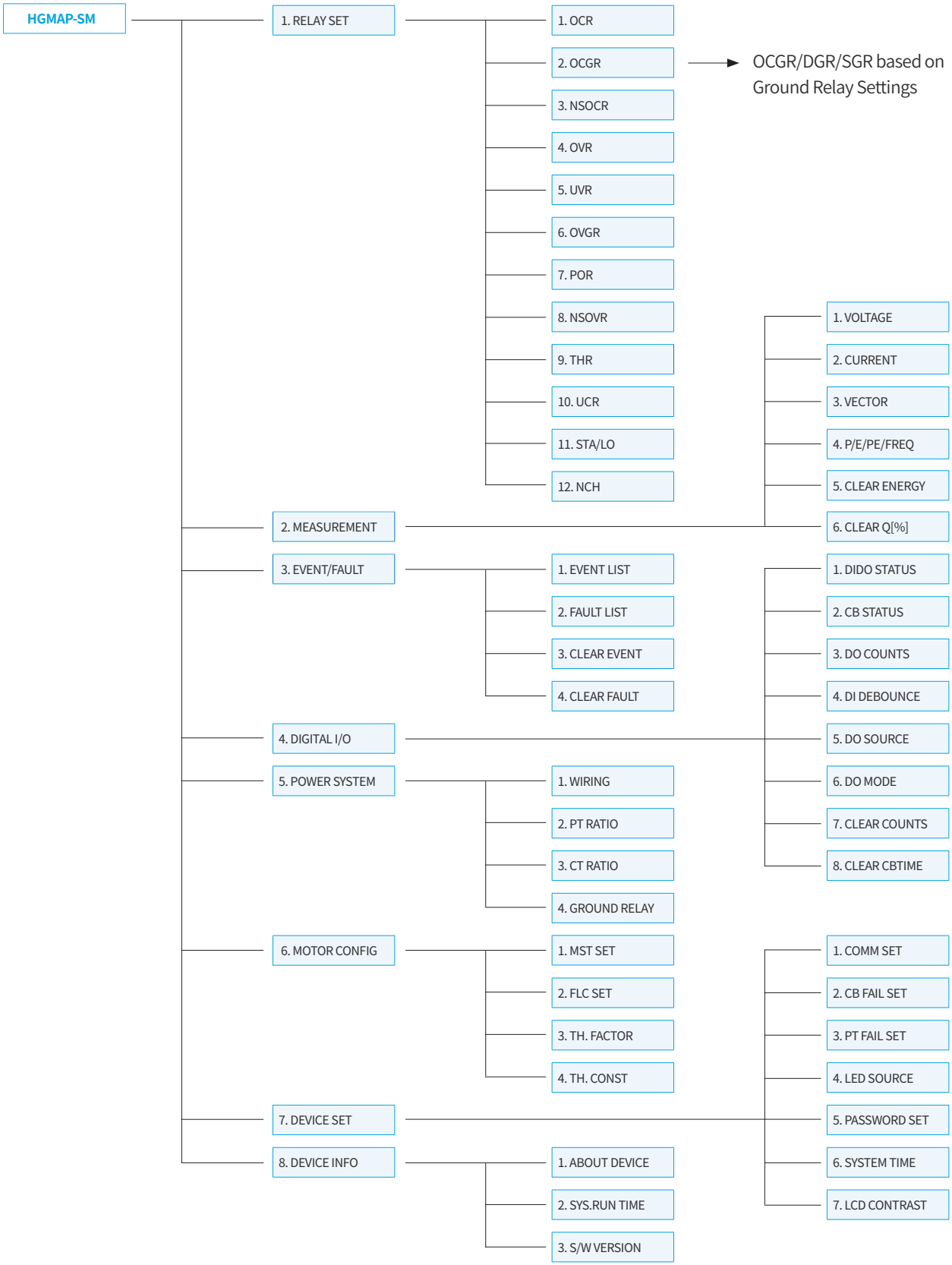
HGMAP-SF Menu Tree



Technical Data

Controls and Settings

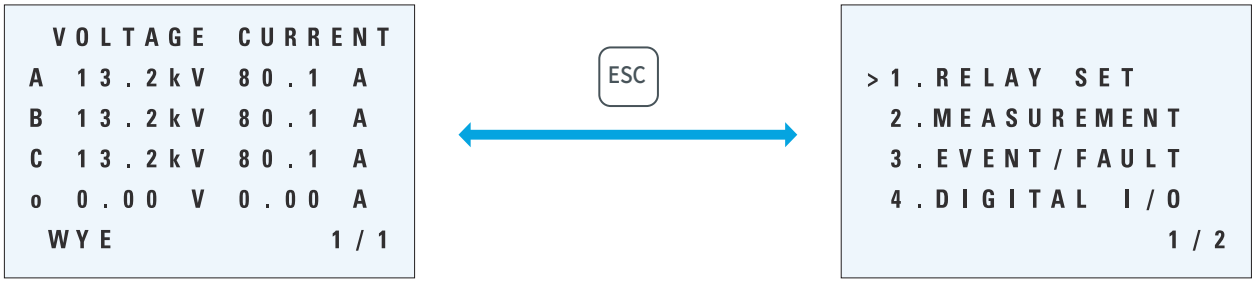
HGMAP-SM Menu Tree



HMI Basic Controls

1. Switching to Settings Menu

Pressing the ESC button from the default measurement screen switches to the settings menu.
Pressing the ESC button again returns to the Measurement screen.



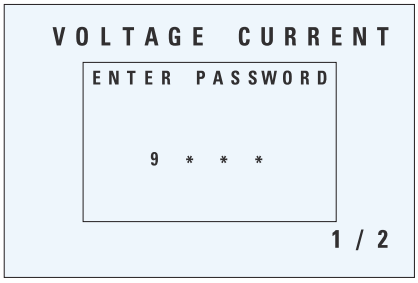
2. Password Input

The password must be entered for changing the relay's settings values or controlling the breaker.
The popup window shown below will appear for actions that require a password.

< > Buttons can be pressed to move the cursor.

∨ ∧ Buttons can be pressed to increase/decrease each value.

Press the ENTER key after entering the four-digit password. Unlocked state will be maintained for 2 minutes when entering password.



The default password is 9999. Change the password to a unique password to ensure safe and secure electrical panel control.
The password can be changed in **6. DEVICE SET** ▷ **5. PASSWORD** SET in the settings menu.

Technical Data

Controls and Settings

HMI Basic Controls

3. Protective Relay Settings

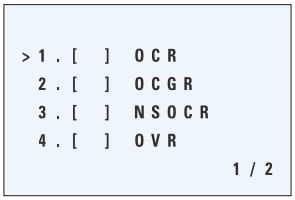
The protection element settings include settings for activating or deactivating a protective relay and entering the index setting value for each relay.

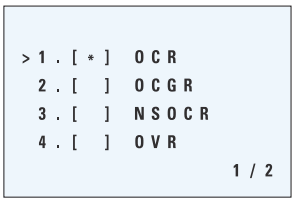
Activating a Protection Element

This is the basic settings menu screen.
1. Select the RELAY SET and press ENTER button to enter into the protective relay setting display.

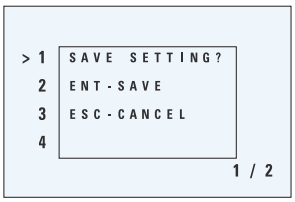


The unit's main protection elements are displayed.
Select the relay to activate.
Press the ∨ ∧ buttons to move the cursor to the intended relay.
Press the < > buttons to select or deselect a relay for operation.
[*]: Activate
[ ]: Deactivate
After selecting the intended relay, press ENTER.

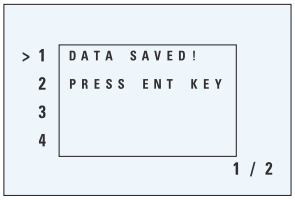




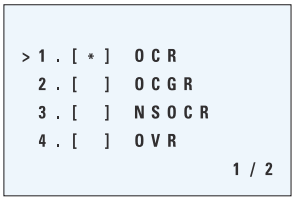
A popup will ask to confirm the new settings.
Press ENTER to save the new settings.



Protection element settings have been changed.
Press the ENTER or ESC button to close the pop-up window.

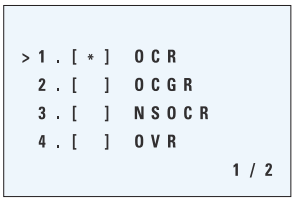


Pressing the ESC button will return to the menu screen.



Checking Measurement Values

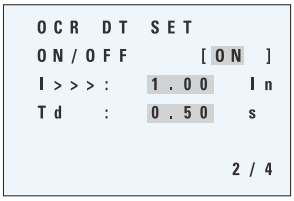
Press the ENTER button with the protection element highlighted and Operated.
1. [*] OCR is illustrated below.

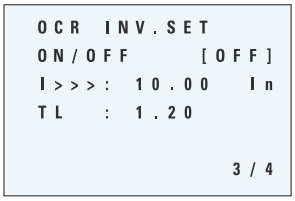


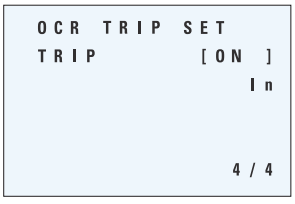
The page for the protection elements consists of how to activate/deactivate functions, how to change the setting, and how to trip on/off.
Press the V Λ buttons to toggle between parameters.



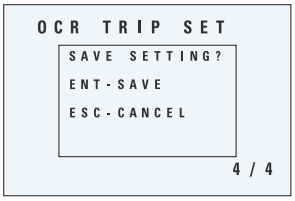
Current stored settings are displayed.
Press the < > buttons to increase/decrease each value.
Repeat the process for any parameters that need to be changed.
Once all entries for relay values are complete, press the ENTER button.



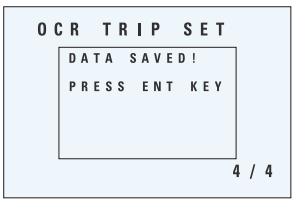




A popup will ask to confirm the new settings.
Press ENTER to save the new settings.



The setting of the protection elements has been changed.
Press the ENTER or ESC button to close the pop-up window.
Press the ESC button after the pop-up window is closed to move to the menu at the top.



※ Please refer to the separate list of items for setting the protection elements for the range and unit for setting each protection element in detail.

Technical Data

Controls and Settings

HMI Basic Controls

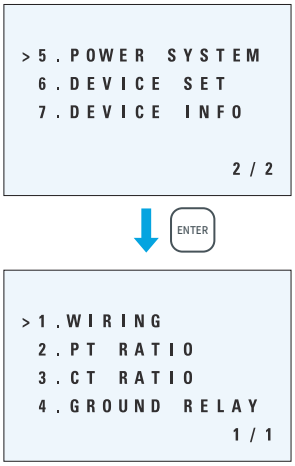
4. System Settings

System settings can be classified into POWER SYSTEM settings for the electrical panel environment and the DEVICE SET settings for the relay's own operational conditions.

POWER SYSTEM Settings

No.	Classification	Description	Setting Values
1	WIRING	PT Secondary Wiring Type	WYE, DELTA
2	PT RATIO	PT Primary Rating	110 ~ 345,000 V
		PT Secondary Rating	110 V, 110/√3 V
		GPT Tertiary Rating	110 V, 190 V
3	CT RATIO	CT/NCT Primary Rating	5 ~ 6,000 A (5 step)
4	GROUND RELAY	Ground Fault Current Detection Element	OCGR, DGR (SF-N, SM-N) SGR (SF-Z, SM-Z)

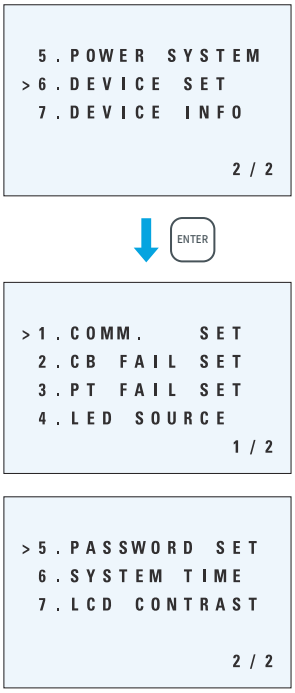
※ PT Primary Raiting is based on Line-to-Line voltage, and PT Secondary Rating is based on Phase Voltage.



DEVICE SET Settings

No.	Classification	Description	Setting Values
1	COMM. SET	RS-485 communication	
		- ADDR : comm. Address	1 ~ 247
		- BAUD : comm. Speed (bps)	9600, 19200, 38400
		- SWAP : Float Data Swap Feature [1)]	ON, OFF
2	CB FAIL SET	Breaker Control Status Monitoring	
		- CB CLOSE [ON/OFF] TIME	100 ~ 200 ms (5 step)
		- CB OPEN [ON/OFF] TIME	100 ~ 200 ms (5 step)
3	PT FAIL SET	PT Secondary Fuse Fail Monitoring	
		- PT FAIL [ON/OFF] TIME	100 ~ 200 ms (5 step)
4	LED SOURCE	User set LED 01 ~ 08 Source	Select among the pickup, operation, and DI status of protection elements.
5	PASSWORD SET	User Password Setting	-
6	SYSTEM TIME	System Clock Setting	-
7	LCD CONTRAST	LCD Display Contrast Setting	-

※ 1) The SWAP function applies only to the float data and operates with SWAP WORD.
Example) Float value 1234.57 is converted to hex value as follows:
- 3D 52 9A 44 (without SWAP)
- 9A 44 3D 52 (with SWAP)

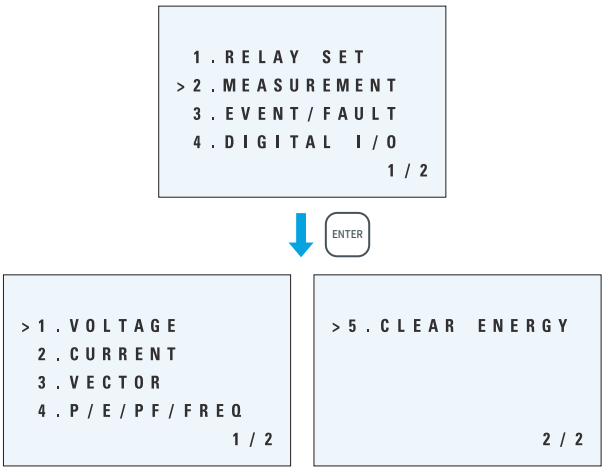


5. Measuring And Monitoring Screens

Checking Measurement Values

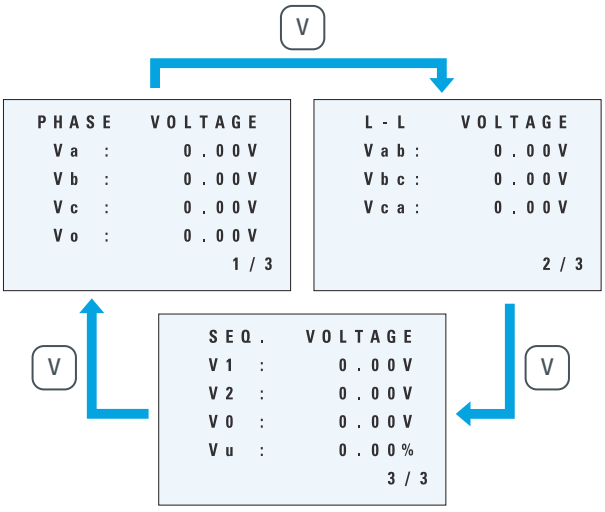
Measurement values including voltage, current, vector, power and energy, power factor and frequency can be verified in the **2. MEASUREMENT** menu item in the main menu screen.

Pressing the shortcut buttons at the right of the LCD screen immediately displays the relevant measurement value in any situation.



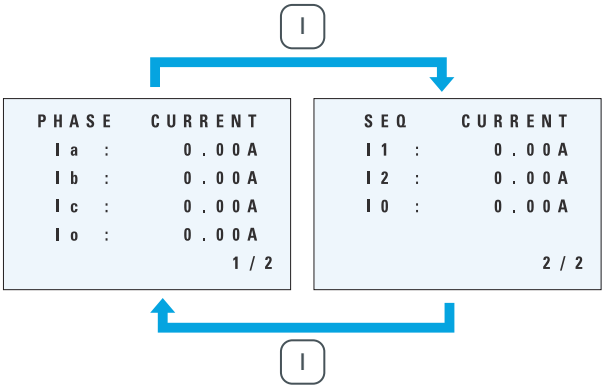
① VOLTAGE

- Displays the phase sequence voltage, line voltage, positive sequence voltage, negative voltage, and zero sequence voltage.
- Pressing the V shortcut button immediately displays the voltage measurement screen, with each press of the button toggling through the voltage category displays.



② CURRENT

- Displays the phase current, positive current, negative sequence current and zero sequence current.
- Pressing the I shortcut button immediately displays the current measurement screen, with each press of the button toggling through the current category displays.

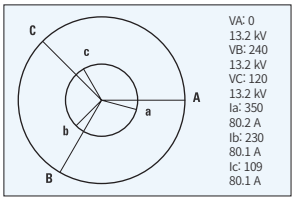


Technical Data

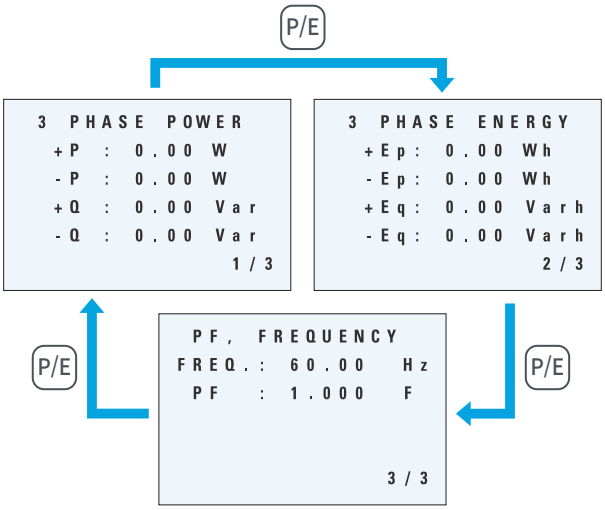
Controls and Settings

HMI Basic Controls

③ VECTOR
- Displays the magnitude, phase angle and vector diagram of voltage and current in each phase.
- Pressing the shortcut button immediately displays the vector measurement screen.



④ P/E/PF/FREQ
- Displays the active/reactive power, energy, power factor and frequency.
- Pressing the P/E shortcut button immediately displays the power measurement screen, with each press of the button toggling through the power category displays.



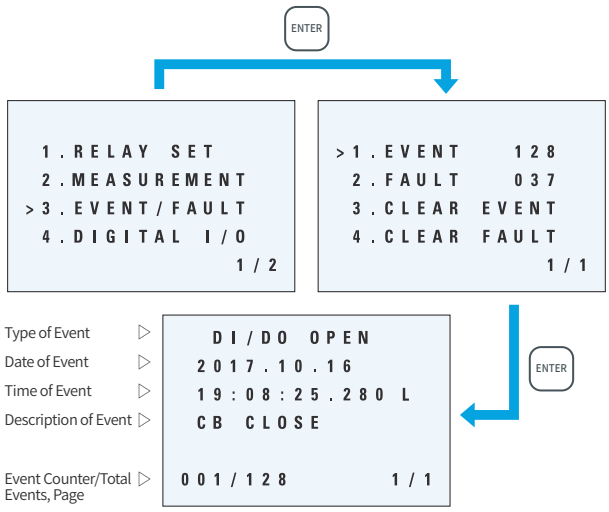
⑤ CLEAR ENERGY
- The CLEAR ENERGY menu can be selected to reset the relay's accumulated energy value.

6. Viewing Event and Fault History

The relay's event records and fault records can be viewed by accessing **3. EVENT/FAULT** in the main menu screen.

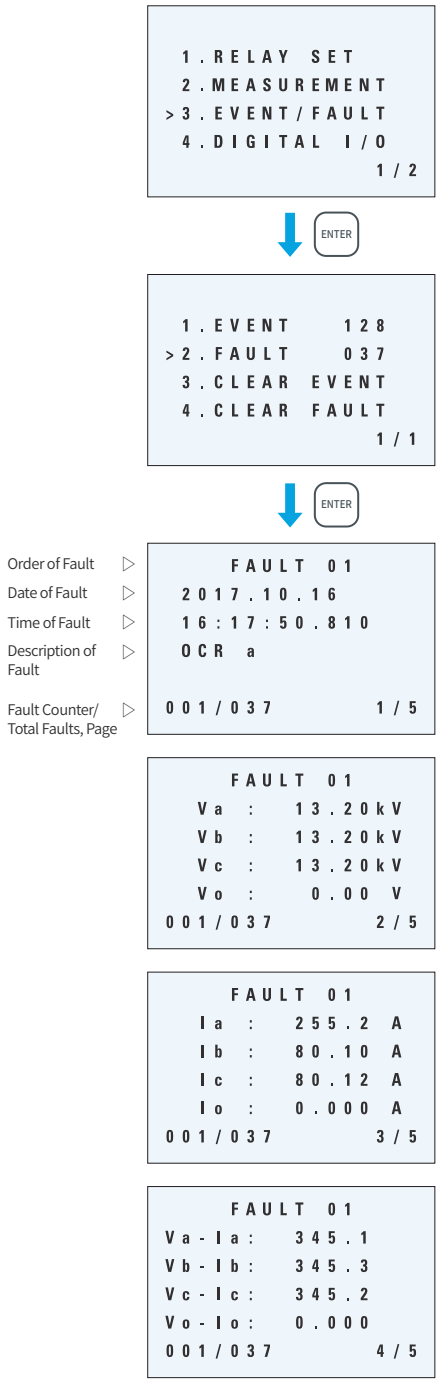
View Events

- The relay unit's various status changes, settings and event history of protection/monitoring operations can be viewed in the **1. EVENT** option in the **3. EVENT/FAULT** menu.
- Each event's details and time of occurrence can be verified.
- Up to 256 event records are stored, after which the oldest record is erased to store new event data.
- **3. CLEAR EVENT** can be selected to erase event history.



Fault History

- The relay's protective trip history can be viewed in the **2. FAULT** option from the **3. EVENT/FAULT** menu.
- The protection element responsible for triggering the trip as well as the current, voltage, phase, negative sequence voltage and current and phase unbalance rate at the moment of the fault can be viewed to facilitate analysis.
- Waveforms recorded at the time of the fault can be viewed and analyzed using the **HG Manager** software.
- Up to 64 fault records are stored, after which the oldest record is erased to store new fault data.
- **4. CLEAR FAULT** can be selected to erase event history.



Technical Data

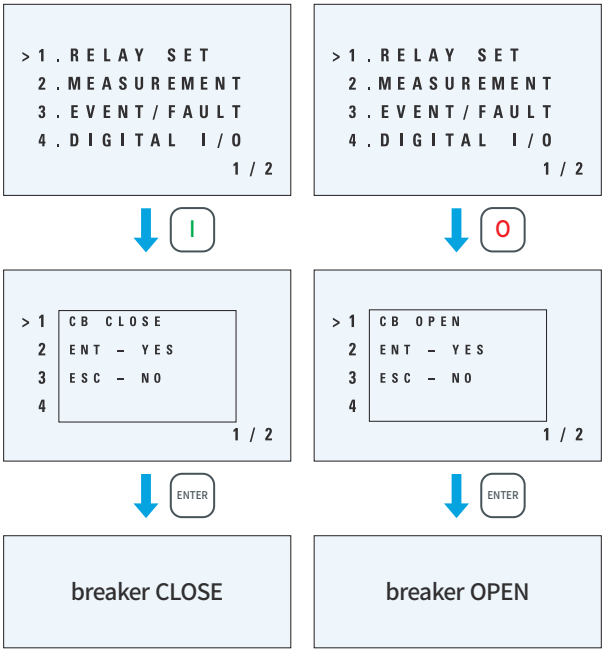
Controls and Settings

HMI Basic Controls

7. Circuit Breaker Control

The **1. RELAY SET** option can be used to directly open or close the circuit breaker.

To enable this action, the control command permission should be set to LOCAL (LED indicator of the LOCAL/ REMOTE button must be red).

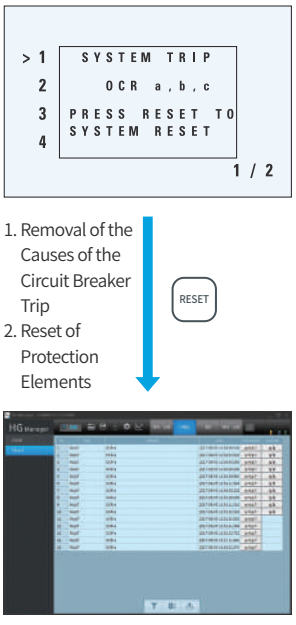


8. Fault Reset

Press the RESET button to initialize the DO status (when DO mode is latched) and LED status of the relay after the relay is operated due to fault in power system and the circuit breaker is tripped. The protection elements are operated, the TRIP LED is turned on, and the pop-up window indicating the operated elements appears.

Remove the causes of the circuit breaker trip or close the pop-up window and deactivate the operated protection elements first, and then press the RESET button to return the relay to the normal operating mode.

※ If any of the protection elements is deactivated without removing the causes, the causes can have a lasting impact and ultimately damage the system.
※ The RESET function does not operate if any of the activated protection elements falls into the causes of the circuit breaker trip.

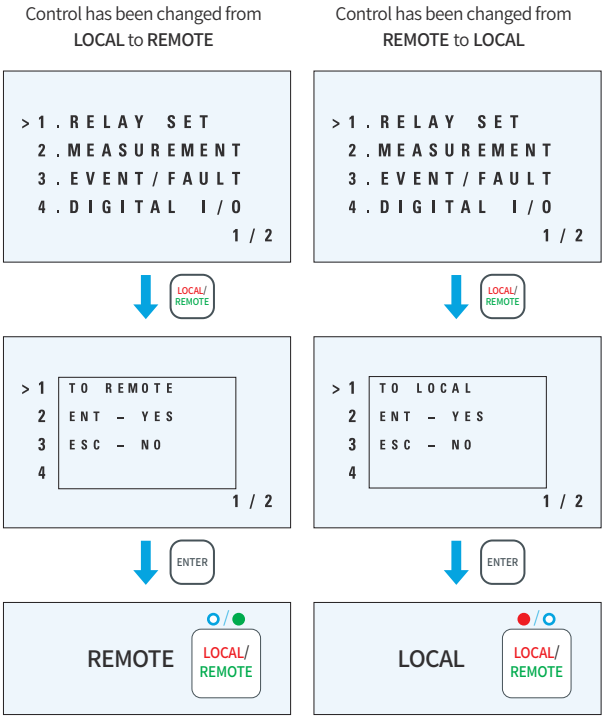


9. Control Setting

Control can be converted to LOCAL or REMOTE using the LOCAL/REMOTE button on the optional menu display.
In order to control the relay remotely, the product's control must be converted to REMOTE.

Changing the setting of the protection elements and product and controlling the circuit breaker using buttons are restricted when control is set at REMOTE.

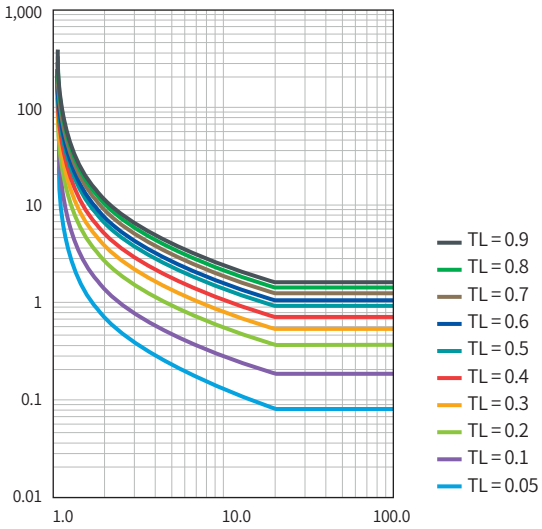
If control remains LOCAL, the red LED above LOCAL/REMOTE is turned on. If it remains REMOTE, the green LED above LOCAL/REMOTE is turned on.



Technical Data

Time Characteristic Curves

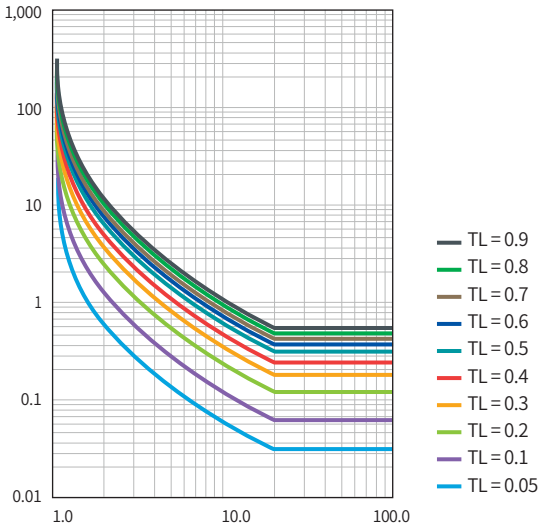
Inverse Curve : IEC_SI



$$T_{SI} = \left(\frac{0.14}{\left(\frac{I}{Is}\right)^{0.02} - 1} \right) \times T_L$$

Unit : sec
I : Fault Current
Is : Setting Current
T_L : Time Lever

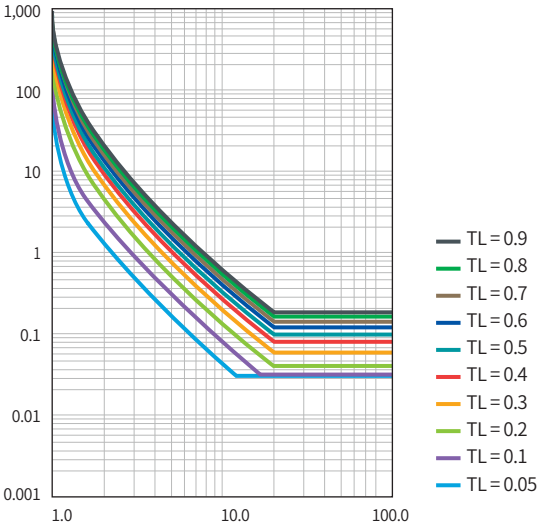
Inverse Curve : IEC_VI



$$T_{VI} = \left(\frac{13.5}{\left(\frac{I}{Is}\right) - 1} \right) \times T_L$$

Unit : sec
I : Fault Current
Is : Setting Current
T_L : Time Lever

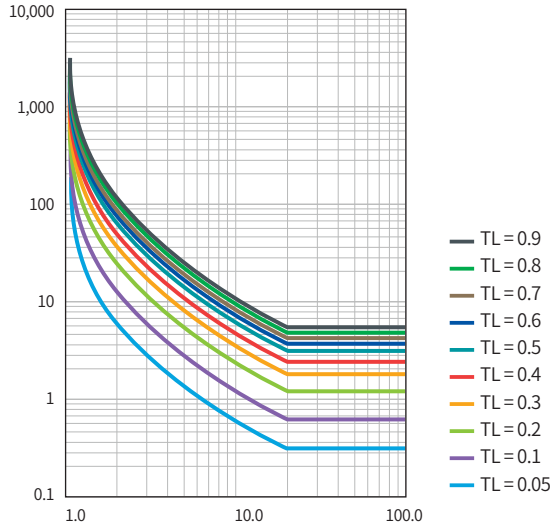
Inverse Curve : IEC_EI



$$T_{EI} = \left(\frac{80}{\left(\frac{I}{Is}\right)^{2} - 1} \right) \times T_L$$

Unit : sec
I : Fault Current
Is : Setting Current
T_L : Time Lever

Inverse Curve : IEC_LI

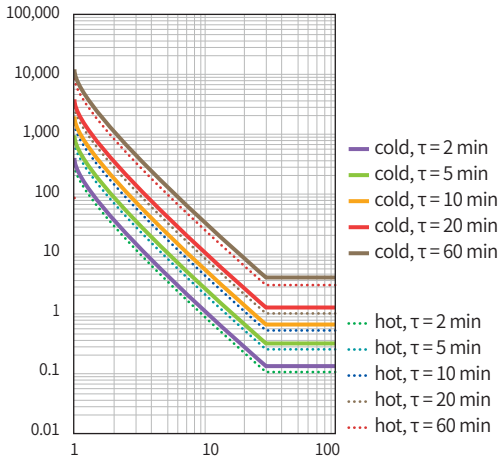


$$T_{LI} = \left(\frac{120}{\left(\frac{I}{Is}\right) - 1} \right) \times T_L$$

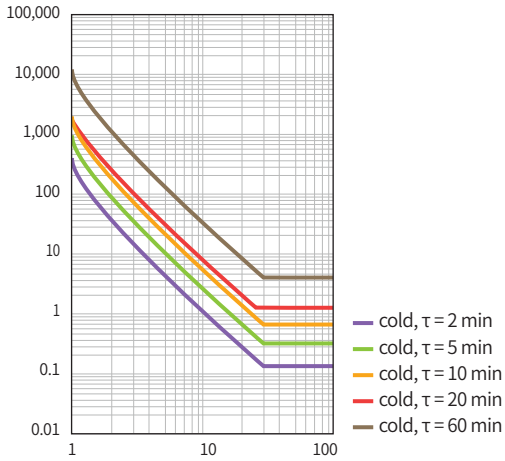
Unit: sec
I : Fault Current
Is : Setting Current
T_L : Time Lever

Thermal Curve Cold vs Hot

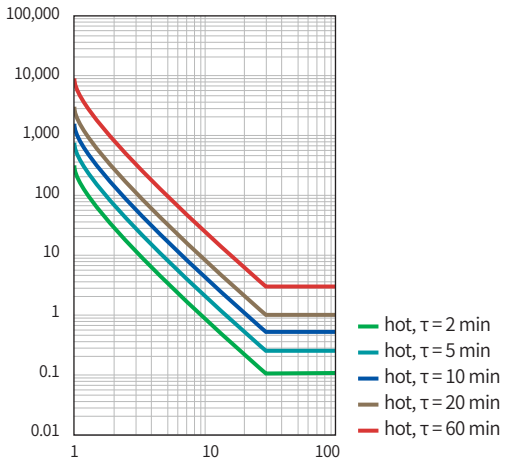
Cold vs Hot



Cold (FLC 0 %)



Hot (FLC 50 %)



$$t = \tau \times ln \frac{I^2 - I_p^2}{I^2 - (k \times I_B)^2}$$

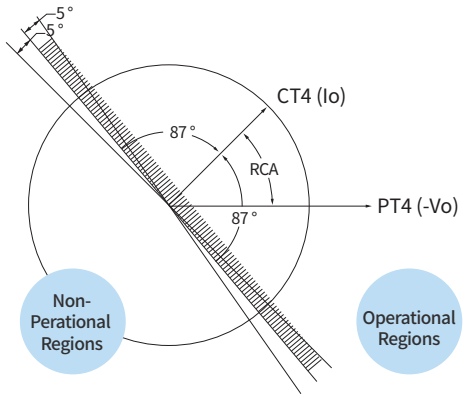
t : Trip Time (sec)
τ : Time Constant
I_P : Load Current Prior to Fault
I_B : Rated Load Current
k : Overload Constant (FLC×SVC×O/C)
I : Fault Current

- X axis : I/I_B (%)
- Y axis : Trip Time (sec)
- I_P=0 When Cold

DGR/SGR Operational Regions

- The DGR and SGR operational regions are within ± 87 ° of the pre-set RCA
- Wiring should be connected to “-Vo” when connecting PT4 terminal to GPT tertiary
- Phase deviation is within ± 5 ° of the index angle

Example) RCA : when set to 45 °
Operational angle (-Vo) : - 42 ° ~ 87 °
Phase deviation : 82 ° ~ 92 °, - 47 ° ~ -37 °



Technical Data

HG Manager

HG Manager Software

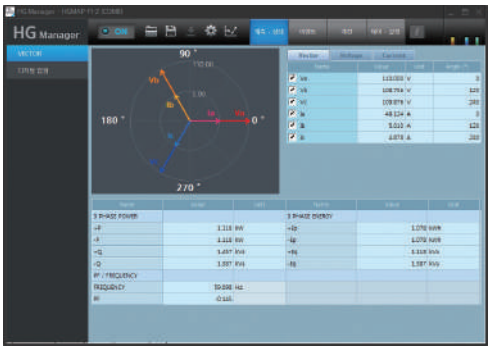
HG Manager is HGMAP dedicated management software.
The HGMAP relay includes the HG Manager software that provides additional convenience for initial settings for the relay's protection features. The software also provides a GUI for easy status monitoring, verification of events and comtrade analysis.

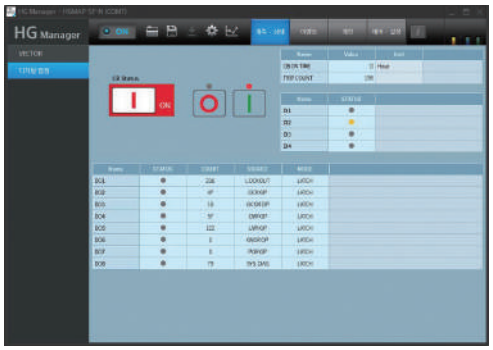
System Requirement

- OS : Microsoft Windows® 7/8/8.1/10
- RAM : 2 GB or higher
- Monitor : 1,366×768 resolution and color mode of 16 bits or higher
- Supports USB 2.0 or higher

1. Check Measured Values and Contact Status

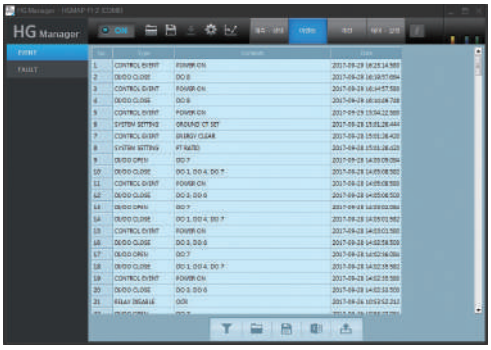
- Verify voltage, current vector diagram, power and wattage, power factor and frequency values at a glance.
- Check breaker open/close status and the various digital I/O contact values.

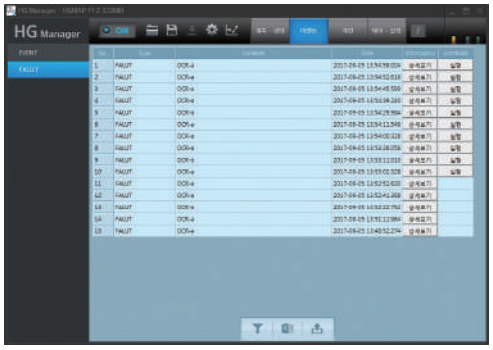




2. View Event and Fault History

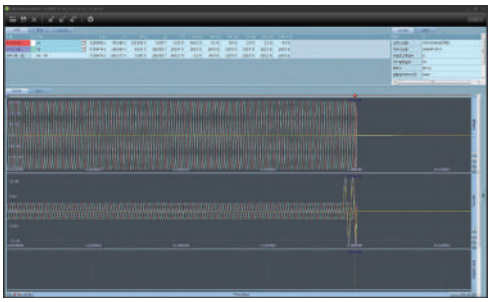
- Verify relay event logs.
- Various measured values as well as the protective relay that caused the trip can be examined closely, with the comtrade event waveform available for immediate analysis if necessary.

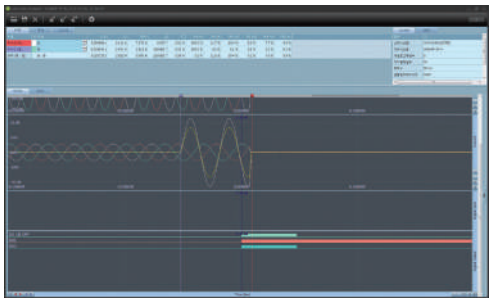




3. Comtrade Analysis

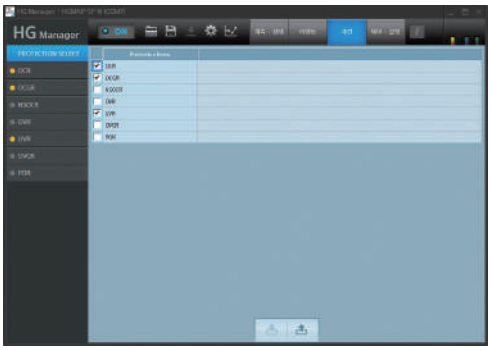
- Current, voltage, and contact status recorded in wave form at the time of an incident are converted into the form of comtrade. Wave form can be checked by setting Comtrade Viewer or other types of viewer software.
- Harmonics, difference between two times can also be analyzed.

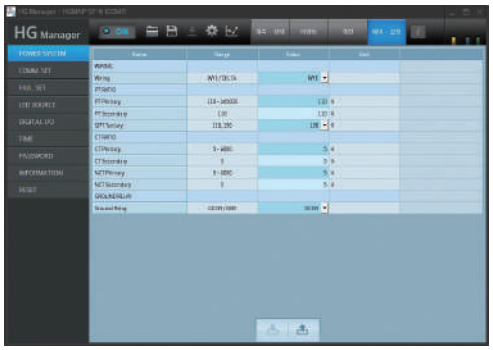




4. Protection Element Setting

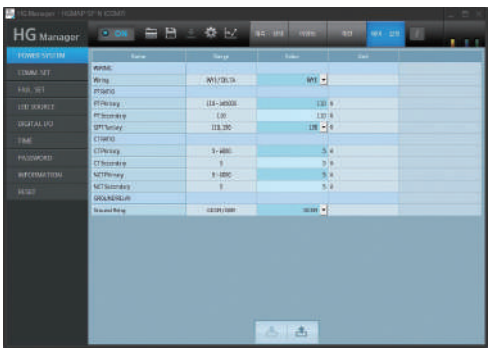
- The activation/deactivation of the protection elements can be set, as well as detailed operational characteristics.
- For elements with an inverse time characteristic, the inverse time characteristic curve can be checked.
- The current setting status can be saved to apply it to other devices (Saved as the system setting).

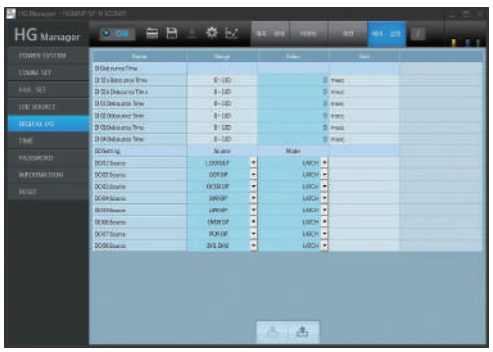




5. System Setting

- The Protection functions of PTF and CBF for HGMAP can be set, as well as predetermined values regarding communication, DO sources and operational characteristics, and LED sources.
- The system time information of HGMAP and time information on the user's desktop computer are synchronized.
- The product counter and accumulated records can be initialized and the product's current operational status can be reset.





Model Selection Table

Ratings and Specifications

Classification		Specifications
General Specifications		
Main Feature		Protects distribution panel feeder/incoming loads and motors, metering a variety of electrical information and monitoring and controlling input and output contacts.
		Supports remote control via communication link with monitoring station and provides real-time system protection status information
Operational Environment	Ambient Temperature Rating	25 [°C]
	Operating Temperature	-10 ~ 55 [°C]
	Storage Temperature	-20 ~ 75 [°C]
	Humidity	Below 80 [%] (Must be Free of Condensation)
	Installation Environment	Below 2,000 m Elevation
		No exposure to Snow, Rain, Direct Sunlight, Wind
		No exposure to Dust, Corrosion, Explosive Gases
General Features		
Input	Control Power	DC 110 V
	Analogue Input	PT 4 Channels, CT 4 Channels
Protection Relays	Feeder, Grounded (SF-N)	OCR (50/51), OCGR (50/51N), DGR (67N), NSOCR (46)
		OVR (59), UVR (27), OVGR (64), POR (47P)
	Feeder, Ungrounded (SF-Z)	OCR (50/51), SGR (67G), NSOCR (46)
		OVR (59), UVR (27), OVGR (64), POR (47P)
	Motor, Grounded (SM-N)	OCR (50/51), OCGR (50/51N), DGR (67N), NSOCR (46), THR (49), UCR (37), POR (47P)
		OVR (59), UVR (27), OVGR (64), NSOVR (47N), Stall/Lock (48/51L), NCH (66)
	Motor, Ungrounded (SM-Z)	OCR (50/51), SGR (67G), NSOCR (46), THR (49), UCR (37), POR (47P)
		OVR (59), UVR (27), OVGR (64), NSOVR (47N), Stall/Lock (48/51L), NCH (66)
Measurement		Voltage, Current, Power, Electrical Energy, Phase, Power Factor, Frequency
Display		128×96 Graphic LCD
		Status & Alarm LEDs×17
Data Records		Event Record×256
		Fault Record×64
		Fault Wave Record (64 cycles, 32 samples/cycle)×10 (IEEE C37.111 Comtrade Format)
External Specifications	Dimension	148×208×188 mm (W×H×D)
	Total Weight	3.5 kg (Including Box and Accessories)

Classification			Specifications
Rated Input/Output			
Control Power	Rated Input		110 Vdc
	Input Voltage Range		88 ~ 132 Vdc
	Instantaneous Power Failure Duration		100 msec (at 110 Vdc)
	Power Consumption		Standby : less than 10 W, Active : less than 15 W
CT Input	CT Primary Rating Range		5 ~ 6,000 A
	CT Secondary Rating		5 A (= 1 In)
	Maximum Burden		1.0 VA at 1 In
	Input Range		0 ~ 40 In
	Overload Capacity		2 In (continue), 20 In (for 2 sec), 40 In (for 50 msec)
ZCT Input	ZCT Primary Rating		200 mA
	ZCT Secondary Rating		1.5 mA (= 1 Ion)
	Maximum Burden		1.0 VA at 1 In
	Input Range		0 ~ 40 In
	Overload Capacity		2 In (continue), 20In (for 2 sec), 40 In (for 50 msec)
PT Input	PT Primary Rating Range		110 ~ 345,000 V
	PT Secondary Rating		110 V, 110/$\sqrt{3}$ V (= 1 Vn)
	Maximum Burden		0.5 VA at 1 Vn
	Input Range		0 ~ 2.0 Vn
	Overload Capacity		1.2 Vn (continue), 2 Vn (for 1 hour)
Digital Input (DI)	Rated Input		110 Vdc
	Threshold Voltage		Turn-On : 80 Vdc, Turn-off : 70 Vdc
	Input Delay		Less than 10 msec
	Maximum Burden		2 mA at 110 V
Digital Output (DO) (Control)	Contact Type		Dry Contact
	Contact Rating		Resistive Load : 10 A at 250 Vac/30 Vdc
			Inductive Load : 5 A at 250 Vac/30 Vdc
	Operation Speed		Less than 10 msec
Digital Output (DO) (Signal)	Contact Type		Dry Contact
	Contact Rating		Resistive Load : 5 A at 250 Vac/30 Vdc
			Inductive Load : 2 A at 250 Vac/30 Vdc
	Operation Speed		Less than 10 msec
Communication	RS-485	Wiring Types	2 Wire (D+, D-), 4 Wire (Rx+, Rx-, Tx-, Tx+)
		Communication Speed	9600, 19200, 38400 bps
		Protocol	Modbus/RTU
	Ethernet (Option)	Wiring Types	UTP (RJ45), Fiber Optic (SFP-MM)
		Communication Speed	10/100 Mbps
		Protocol	Modbus/TCP
	PC	Connection	USB Mini-B Port
		Protocol	Dedicated Protocol
Type Test			
CoC	Korea		KEMC1120-0579 ; 2008-06-26
EMC	RF Immunity		IEC61000-4-3/IEC60255-26
	Conducted RF		IEC61000-4-6/IEC60255-26
	ESD		IEC61000-4-2/IEC60255-26
	Fast Transient		IEC61000-4-4/IEC60255-26
	Surge Immunity		IEC61000-4-5/IEC60255-26
	Power Magnetic		IEC61000-4-8/IEC60255-26
	Voltage Dips, Interruptions		IEC61000-4-11/IEC60255-26, IEC61000-4-29/IEC60255-26
	RF Emission		CISPR 11,22/IEC60255-26
Mechanical	Vibration		IEC60255-21-1/IEC60255-27
	Shock/Bump		IEC60255-21-2/IEC60255-27
	Seismic		IEC60255-21-3/IEC60255-27
Environment	Dry heat		IEC60068-2-2/IEC60255-27
	Cold		IEC60068-2-1/IEC60255-27
	Damp-heat		IEC60068-2-78/IEC60255-27
	Cyclic Temperature		IEC60068-2-30/IEC60255-27
Withstand	Insulation Resistance		IEC60255-5/IEC60255-27
	Dielectric		
	Impulse Voltage		

Operational Characteristics

Relay Protection Characteristics

Relay	Input Signal	Classification	Setting Range	Time Characteristics	Time Delay	Notes
OCR (50/51)	CT1 ~ CT3	I >>>	OFF, 1.0 ~ 20.0 In (0.1 step)	Instantaneous	Less than 40 msec	
		I >>	OFF, 0.20 ~ 20.00 In (0.01 step)	Definite	0.05 ~ 60.00 sec (0.01 step)	
		I >	OFF, 0.20 ~ 10.00 In (0.01 step)	Inverse	0.05 ~ 1.20 (0.01 step)	SI, LI, VI, EI
OCGR (50/51N) N Type Only	CT4	I >>>	OFF, 0.50 ~ 8.00 In (0.01 step)	Instantaneous	Less than 40 msec	
		(50/51N)	OFF, 0.10 ~ 8.00 In (0.01 step)	Definite	0.05 ~ 60.00 sec (0.01 step)	
		I >	OFF, 0.10 ~ 2.00 In (0.01 step)	Inverse	0.05 ~ 1.20 (0.01 step)	SI, LI, VI, EI
		OCGR Block time: Delaying relay operation within block time additionally to prevent immediate trip after closing the breaker, or set-up the system.			0.05 ~ 60.00 sec (0.0 1 step)	
DGR (67N) N Type Only	PT4, CT4	Io >>	0.02 ~ 2.00 In (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	Limit Angle: RCA ± 87
		Vo >>	0.10 ~ 0.40 Von (0.01 step)			
		RCA	- 90 ~ 90 ° (1 step)			
SGR (67G) Z Type Only	PT4, CT4	Io >>	0.6 ~ 3.6 Ion (0.2 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	Limit Angle: RCA ± 87
		Vo >>	0.10 ~ 0.40 Von (0.01 step)			
		RCA	0 ~ 90 ° (1 step)			
NSOCR (46)	Calc. I2	I2 >>	OFF, 0.10 ~ 1.00 In (0.01 step)	Definite	0.05 ~ 60.00 sec (0.01 step)	
		I2 >	OFF, 0.10 ~ 1.00 In (0.01 step)	Inverse	0.05 ~ 1.20 (0.01 step)	SI, LI, VI, EI
OVR (59)	PT1 ~ PT3	DT1 V >>	OFF, 0.80 ~ 1.60 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		DT2 V >>	OFF, 0.80 ~ 1.60 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
UVR (27)	PT1 ~ PT3	DT1 V >>	OFF, 0.20 ~ 0.90 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		DT2 V >>	OFF, 0.20 ~ 0.90 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		UV Block : Blocking relay operation when the voltage on the secondary PT is below 15 V in all three-phase.				
OVGR (64)	PT4	DT1 Vo >>	OFF, 0.10 ~ 0.40 Von (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		DT2 Vo >>	OFF, 0.10 ~ 0.40 Von (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
POR (47P)	Calc. Vu (%)	DT1 Vu >>	OFF, 5 ~ 100 % (1 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	V_{unbal} (%) = $(V_{max} - V_{min})/V_{avg}$
		DT2 Vu >>	OFF, 5 ~ 100 % (1 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
NSOVR (47P) (M-Type)	Calc. V2	DT1 V2 >>	OFF, 0.10 ~ 1.00 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		DT2 V2 >>	OFF, 0.10 ~ 1.00 Vn (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
THR (49) (M-Type)	Calc. Q	INV1 >	OFF, 50 ~ 100 % (1 step)	Inverse		
		INV2 >	OFF, 50 ~ 100 % (1 step)	Inverse		
UCR (37) (M-Type)	CT1 ~ CT3	DT1 I >>	OFF, 0.10 ~ 0.90 In (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
		DT2 I >>	OFF, 0.10 ~ 0.90 In (0.01 step)	Definite	0.10 ~ 60.00 sec (0.01 step)	
STALL/LOCK (48/51LR) (M-Type)	CT1 ~ CT3	STALL>>	OFF, 0.50 ~ 10.00 FLC (0.01 step)	Definite	0.50 ~ 60.00 sec (0.01 step)	
		LOCK >>	OFF, 0.50 ~ 10.00 FLC (0.01 step)	Definite	0.50 ~ 60.00 sec (0.01 step)	
		LOCK >	OFF, 0.50 ~ 10.00 FLC (0.01 step)	Inverse	0.05 ~ 1.20 (0.01 step)	VI, EI
NCH (66) (M-Type)	Number of Starts	Ns	OFF, 1 ~ 16 (1 step)			
		Tbase	1 ~ 60 min (1 step)			
	Start and Stop Interval	Tss	1 ~ 60 min (1 step)			
	Residual Heat	Qr	10 ~ 80 % (1 step)			

※ Vn : PT secondary-circuit rated voltage (110 V)
Von: GPT tertiary-circuit rated voltage (110 V or 190 V)

In: CT secondary-circuit rated current (5 A)
Ion: ZCT secondary-circuit rated current (1.5 mA)

MOTOR Characteristics Settings

Classification		Setting Range
Motor Start Time	MST	1.00 ~ 60.00 sec (0.01 step)
Full Load Current	FLC	0.20 ~ 2.00 In (0.01 step)
(S/F: Service Factor, O/C: Overload Constant)	S/F	1.00 ~ 1.20 (0.05 step)
	O/C	0.80 ~ 1.20 (0.05 step)
Thermal Time Constant	Th	2 ~ 60 min (1 step)
	Tc	2 ~ 60 min (1 step)

Product Features

Key Measurement and Communication Functions

Item	Classification	Display Range	Accuracy	Notes
Voltage	Phase	0.000 ~ 999.99 [kV]	± 0.5 %	Va (PT1), Vb (PT2), Vc (PT3)
	Zero Phase	0.000 ~ 999.99 [kV]	± 0.5 %	Vo (PT4)
	Line [1)]	0.000 ~ 999.99 [kV]	± 0.5 %	Vab, Vbc, Vca
	Positive Sequence	0.000 ~ 999.99 [kV]	± 1 %	V1
	Negative Phase	0.000 ~ 999.99 [kV]	± 1%	V2
	Zero Sequence	0.000 ~ 999.99 [kV]	± 1 %	V0
	Voltage Unbalance Rate	0.00 ~ 100.0 [%]	± 1 %	Vu
Current	Phase	0.000 ~ 999.99 [kA]	± 0.5 %	Ia (CT1), Ib (CT2), Ic (CT3)
	Zero Phase	0.000 ~ 999.99 [kA]	± 0.5 %	Io (CT4)
	Positive Sequence	0.000 ~ 999.99 [kA]	± 1 %	I1
	Negative Phase	0.000 ~ 999.99 [kA]	± 1 %	I2
	Zero Sequence	0.000 ~ 999.99 [kA]	± 1 %	I0
Phase	Phase	0.0 ~ 360.0 °	± 2 °	Marked in three-phase voltage based on phase-A voltage Refer to "Vector" menu
Power	Forward Active Power	0.000 ~ 999.99 [MW]	± 1 %	+P
	Reverse Active Power	0.000 ~ 999.99 [MW]	± 1 %	-P
	Forward Reactive Power	0.000 ~ 999.99 [MVar]	± 1 %	+Q, Inductive load (L-Load)
	Reverse Reactive Power	0.000 ~ 999.99 [MVar]	± 1 %	-Q, Capacitive load (C-Load)
	Forward Active Energy	0.000 ~ 9999.99 [MWh]	± 1 %	+Ep
	Reverse Active Energy	0.000 ~ 9999.99 [MWh]	± 1 %	-Ep
	Forward Reactive Energy	0.000 ~ 9999.99 [MVarh]	± 1 %	+Eq
	Reverse Reactive Energy	0.000 ~ 9999.99 [MVarh]	± 1 %	-Eq
	Power Factor	-1.00 ~ 1.00 [F/R]	± 1 %	+: LEAD, - : LAG F: Forward direction, R: Reverse direction
	Frequency	45.000 ~ 65.000 [Hz]	± 0.005 Hz	Frequency for A phase

※ 1) As for delta wiring, voltage approved for PT is marked in line voltage.

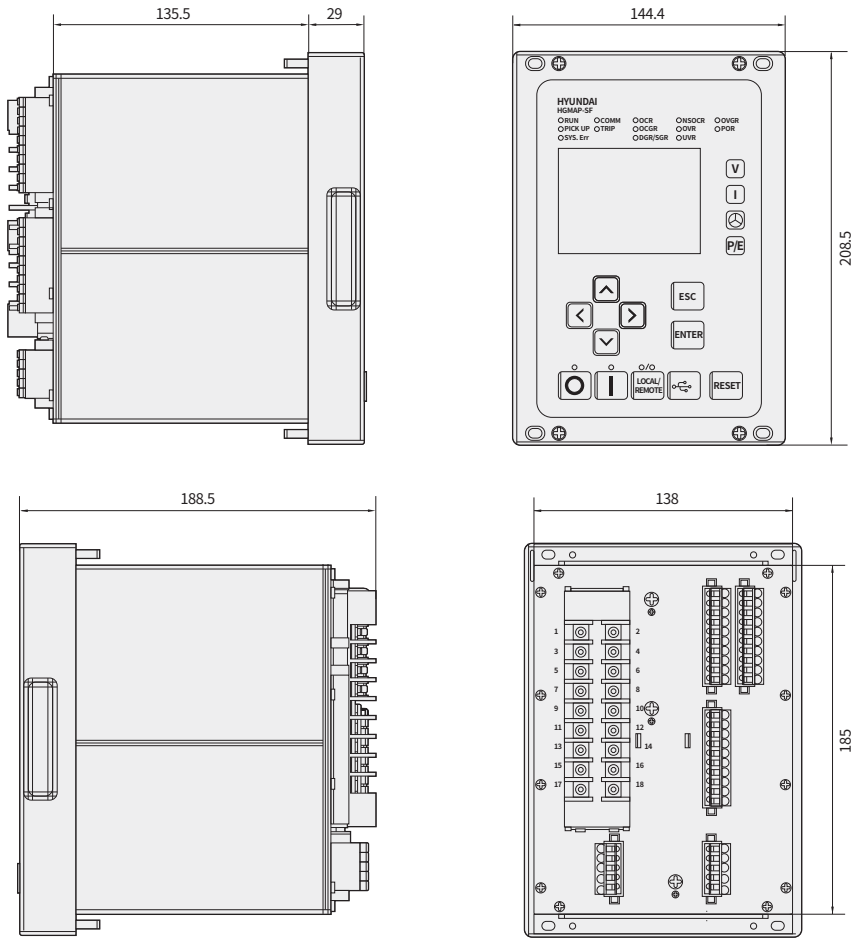
Monitoring Functions

Item	Classification	Parameters	Description
CB Failure (CBF)	Time Delay	100 ~ 200 msec	Measures time after breaker control (on/off) to receiving breaker status input signal, operating when the duration is greater than the preset parameters.
	Output Method	User Set LED, DO	
PT Fuse Failure (PTF)	Time Delay	100 ~ 200 msec	Feature for checking a PT circuit fuse short, operated when the three phase current is greater than 10% and less than 100% of rated current and voltage is 0.
	Output Method	User Set LED, DO	
Power Fail	Operating Voltage	Control Power below 75 Vdc	A system error occurs when external power voltage is less than default voltage, limiting protective relay and DO output from the unit.
	Recovery Voltage	Control Power above 88 Vdc	
	Output Method	Sys.Err LED Flash, User Set LED, DO	
Counter	Trip Counter	0 ~ 65,535 Events	Cumulative counter of CB open and DO close events.
	DO Counter	0 ~ 65,535 Events	Cumulative counter for DO1 to DO8 close events.
	CB On Time	0 ~ 4,294,697,295 hrs	Cumulative time after CB ON
	Sys. Run Time	0 ~ 4,294,697,295 hrs	Cumulative normal system run time

Dimensions

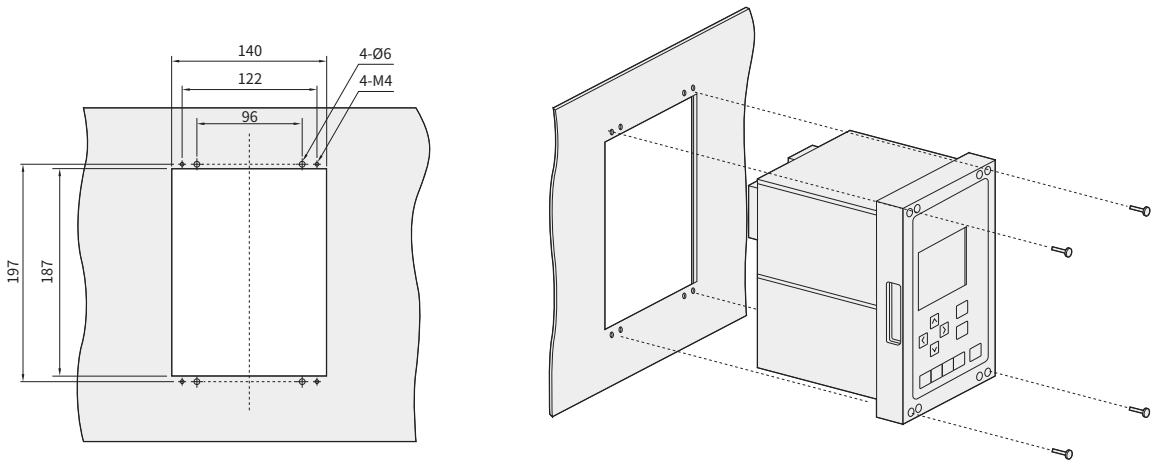
External Dimensions

Unit : mm



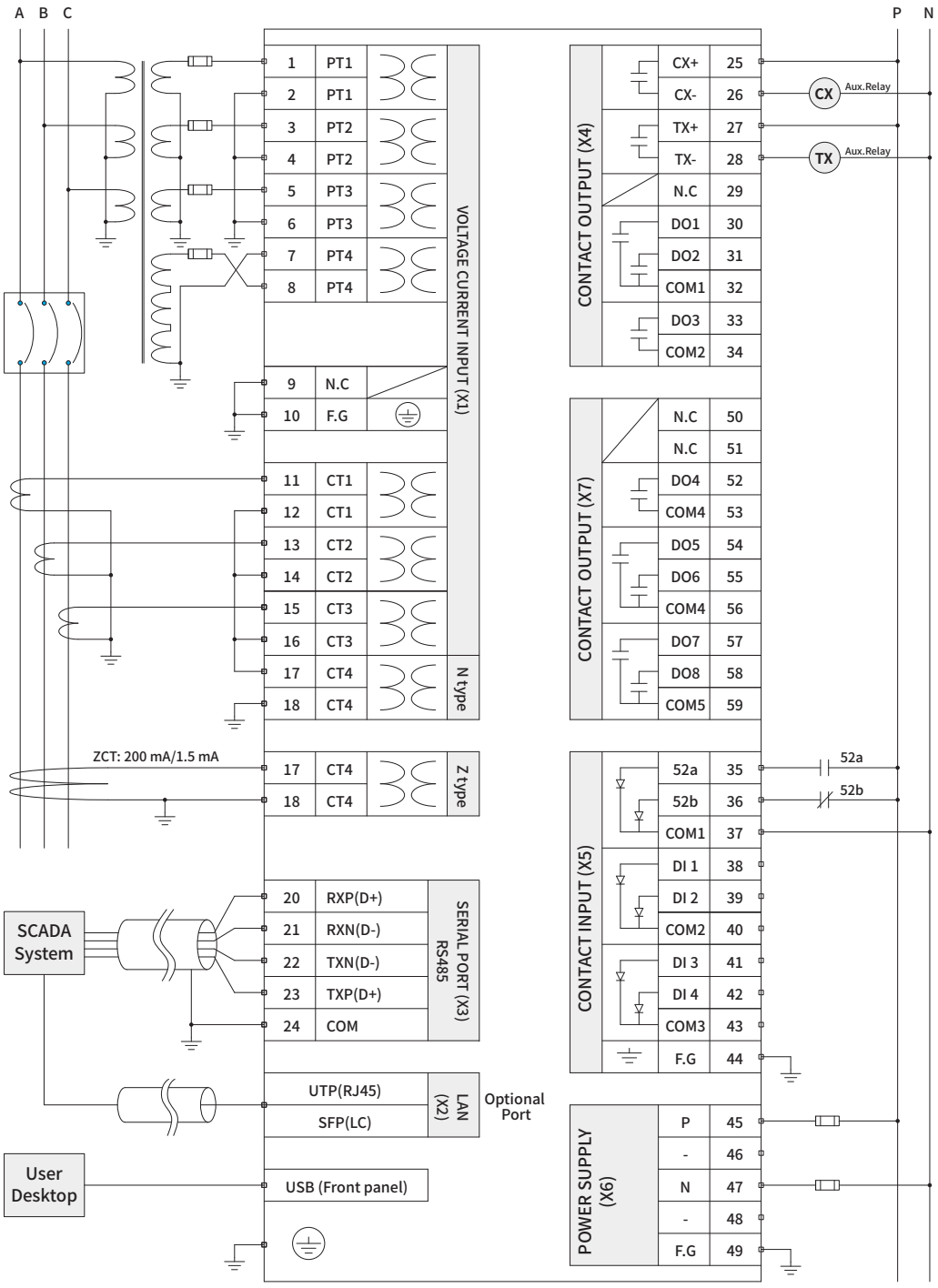
Panel Cutout Dimensions and Installation

Unit : mm



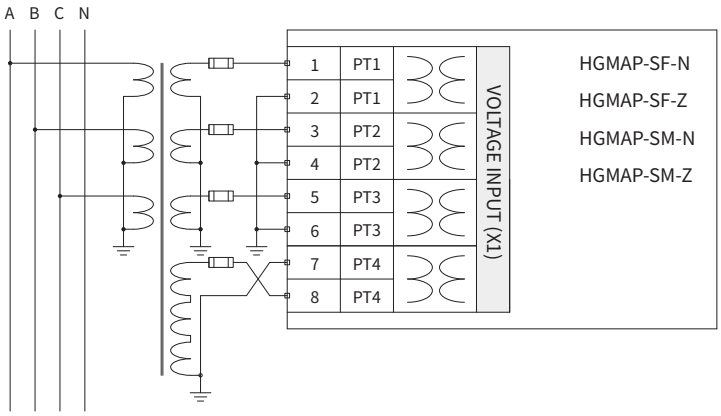
Wiring Diagram

Three Phase Wiring

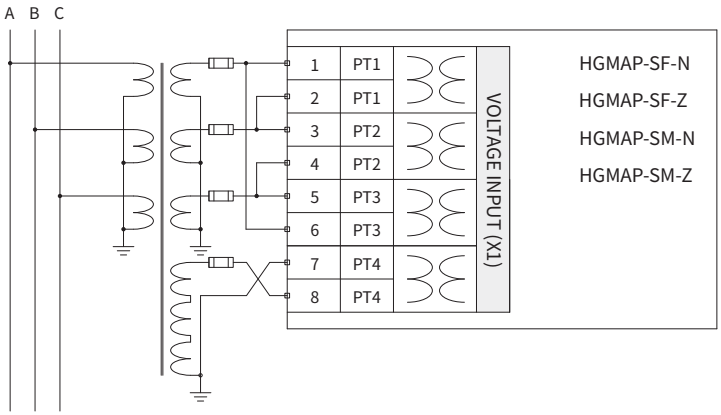


PT Wiring

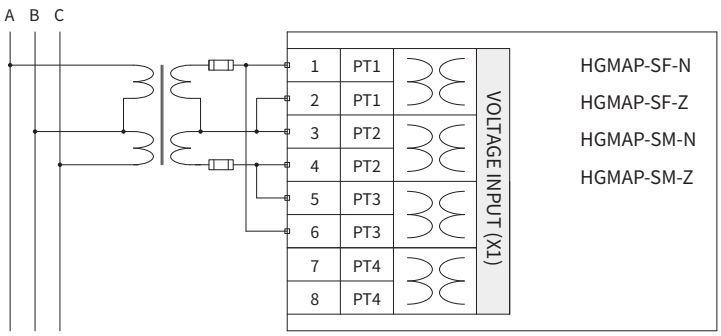
3P4W Wiring



3P3W 3PT Wiring

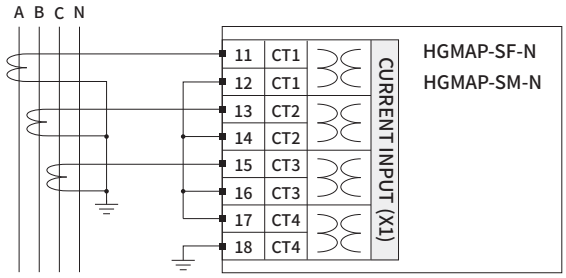


3P3W 2PT Wiring

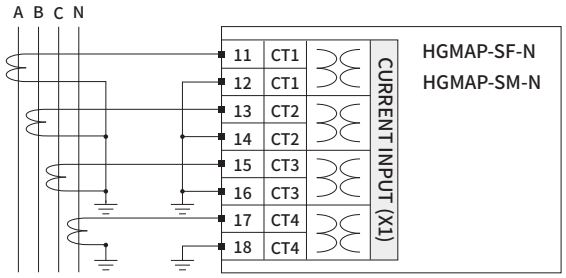


CT Wiring

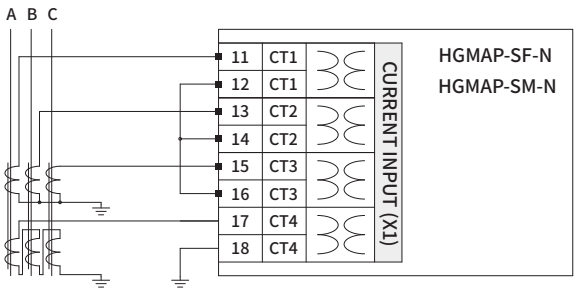
3P4W Residual Circuit Wiring



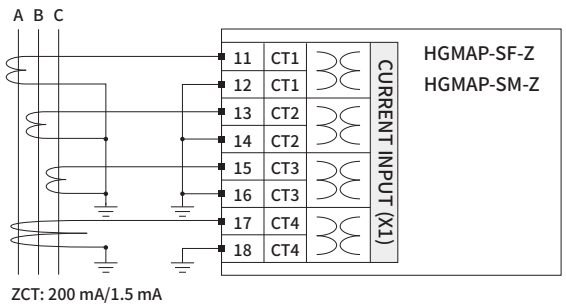
3P4W NCT Wiring



3P3W Tertiary Coil CT Wiring



3P3W ZCT Wiring



ZCT: 200 mA/1.5 mA

Order Code

Order Process

MAP	S	F	N	V	C1
Product Type	Model	Protection Purpose	Current Transformer Type	Mounting Type	Communication Options

MAP	HGMAP Digital Protection Relay	S	Standard Type	F	Feeder / Incoming	N	NCT
				M	Motor	Z	ZCT

V	Vertical Type	C1	MODBUS/RTU, RS485

※ NCT : OCFR, DFR Transformer [Grounded System]
ZCT : SGR Transformer [Ungrounded System]
Standard Type : Applied to mid- and low-voltage systems and power distribution for buildings and industries

D1	F6	A1	A5	NO
Control Power	Frequency	PT Secondary Rating	CT Secondary Rating	Optional Modules
D1 DC 110V	**F6** 60Hz	**A1** AC 110V	**A5** AC 5A	**NO** No Option

Essential for Today
Potential for Tomorrow

HD HYUNDAI ELECTRIC

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