

up to 24 kV | Medium Voltage **HMGS-G10**

SF₆ Gas Insulated Metal-clad Switchgear




HYUNDAI Medium Voltage

Gas Insulated Metal-clad Switchgear, HMGS!

SF₆ Gas Insulated Metal-clad Switchgear is an integrated assembly of vacuum circuit breaker, 3-position switch, disconnecter, bus connecting system and control devices coordinated electrically and mechanically for medium voltage circuit protection.

SF₆ Gas Insulated Metal-clad Switchgear

- Compactness
- Automation
- High Reliability and Safety
- Easy Expansion
- Simple Installation
- Economy

We build a better future! 



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General

Description and Application

HMGS-G10 is an integrated assembly of vacuum circuit breaker, 3-position switch, disconnecter, bus connecting system and control devices coordinated electrically and mechanically for medium voltage circuit protection.

The Metal-clad design provides high reliability, economical benefit, user friendly operation and safety.

The switchgear is isolated by grounded metal plates so that any live part is not exposed to the operator when the door is opened.

Compact design with three-phase enclosure allows very systematic construction.

In addition, the switching section can be dismantled or added in a very short time without the busbar being disconnected.

The switchgear is applicable at voltage ratings up to 24 kV(25.8 kV) for indoor installation.

The switchgear and all components are designed, manufactured and tested in accordance with the latest standards including :

- IEC 60298 (1998)
- IEC 62271-101 (2002)
- IEC 62271-102 (2001)
- IEC 60694 (2001)

Definition

The switchgear is an optimum assembly by the following features :

- All live parts are hermetically sealed.
- The circuit breaker compartment and busbar compartment are completely enclosed by welded stainless steel switchgear container which has separated compartments.
- CB poles are horizontally installed in the circuit breaker compartment.
- The three position switch in the bus compartment prepares 3 conditions
 - Current interrupted condition("OPEN")
 - Current alive condition("CLOSED")
 - Earthing condition("EARTH")
- All operating mechanisms are fitted outside of the gas compartment.
- Mechanical interlocks ensure safe operating sequence.



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Environmental Qualification

The switchgear equipments is evaluated by optimum analysis and test for easy maintenance and long lifetime.

Hermetically sealed primary enclosure for protection against environmental conditions (dirt, moisture, vermins and insects etc.).

Quality Assurance

Advanced Quality Assurance Program is applied.

The program comply with the requirement of ISO fully.

HMGs-G10

SF₆ Gas Insulated Metal-clad Switchgear



Features

Compactness

The switchgear provides dimensional compactness.

Unified standard frame saves and simplifies the layout.
It also permits complete allocation of space for future extension.

The switchgear enables optimum access and easy installation.

SF₆ Gas Insulated Metal-clad Switchgear





Medium Voltage >> SF₆ Gas Insulated Metal-clad Switchgear

Economy and Convenience

- Compact and systematical design
- Optimum engineering
- Modular design
- Intelligent digital control and protection system
- High reliable vacuum interrupters
- Panels coupled by plug-in connecting system
- Extension capability of existing systems to the both sides
- Factory-assembled panels with insulating gas at operating pressure

Automation

Bay control and protection unit HIMAP-BC provides the benefits of the following.

- Economic advantage
- State-of-the-art technology
- Reliability and availability
- International standard
- Flexibility
- Experience sharing
- Easy operation and mounting
- Simple interface and application

Safety and Maintenance

- High reliability and safety
- Safe operation
- Interlock system and monitoring
- Three-position switch mechanically interlocked with circuit breaker
- Circuit breaker function accompanied by earthing function in combination with a three position switch
- Operating mechanism to be accessed from outside of enclosure.
- Independent compartments
- Duct for pressure relief
- Inert SF₆ insulating gas prevents fire in the system and contact to oxidation.
- Safe manual closing of energy storage circuit breaker with spring charge mechanism.

Safe Compartment

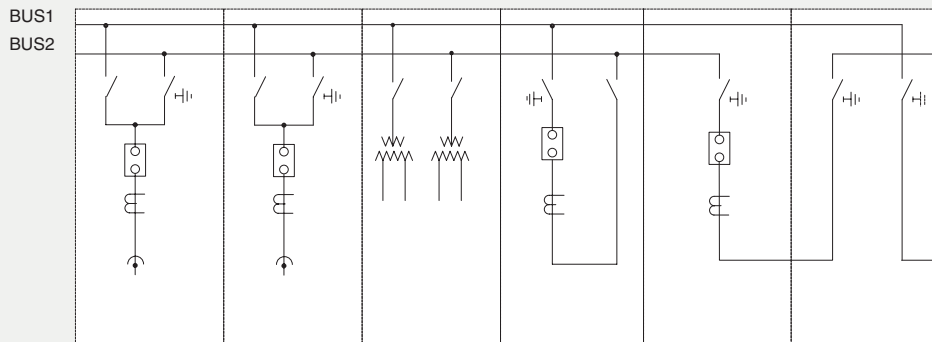
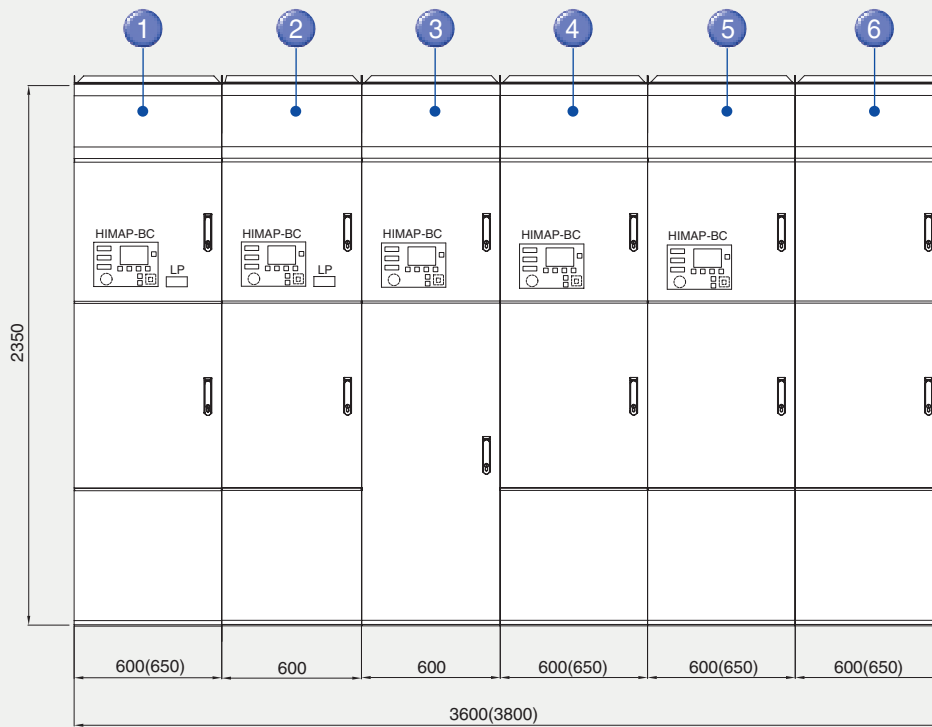
This unit is divided into five completely separate areas each with its own front doors.

- Bus compartment
- Circuit breaker compartment
- Cable compartment
- Low voltage compartment
- Gas duct

HMGS-G10

Application Data

Front View & Diagram



- ❶ Incoming Panel
- ❷ Outgoing Panel
- ❸ Voltage Transformer Panel
- ❹ Bus-tie Panel
- ❺ Bus sectionalize Panel
- ❻ Bus connection Panel

Applicable Industry

IEC (International Electrotechnical Commission)

IEC 60298

A.C.metal enclosed switchgear and control gear for rated voltage from 1 kV and up to 52 kV

IEC 62271-100

High voltage alternating current circuit breakers

IEC 62271-102

High voltage alternating current disconnectors and earthing switches

IEC 60694

Common specifications for high voltage switchgear and control gear standards

Production Tests

- Ensuring the quality and uniformity of workmanship.
- Meet design specification of customer and standards.



SF₆ Gas Insulated Metal-clad Switchgear

Design / Proof Tests

HMGS-G10 meets applicable IEC standards.

The design criteria dictate that all performance tests meet the requirements of the standards.

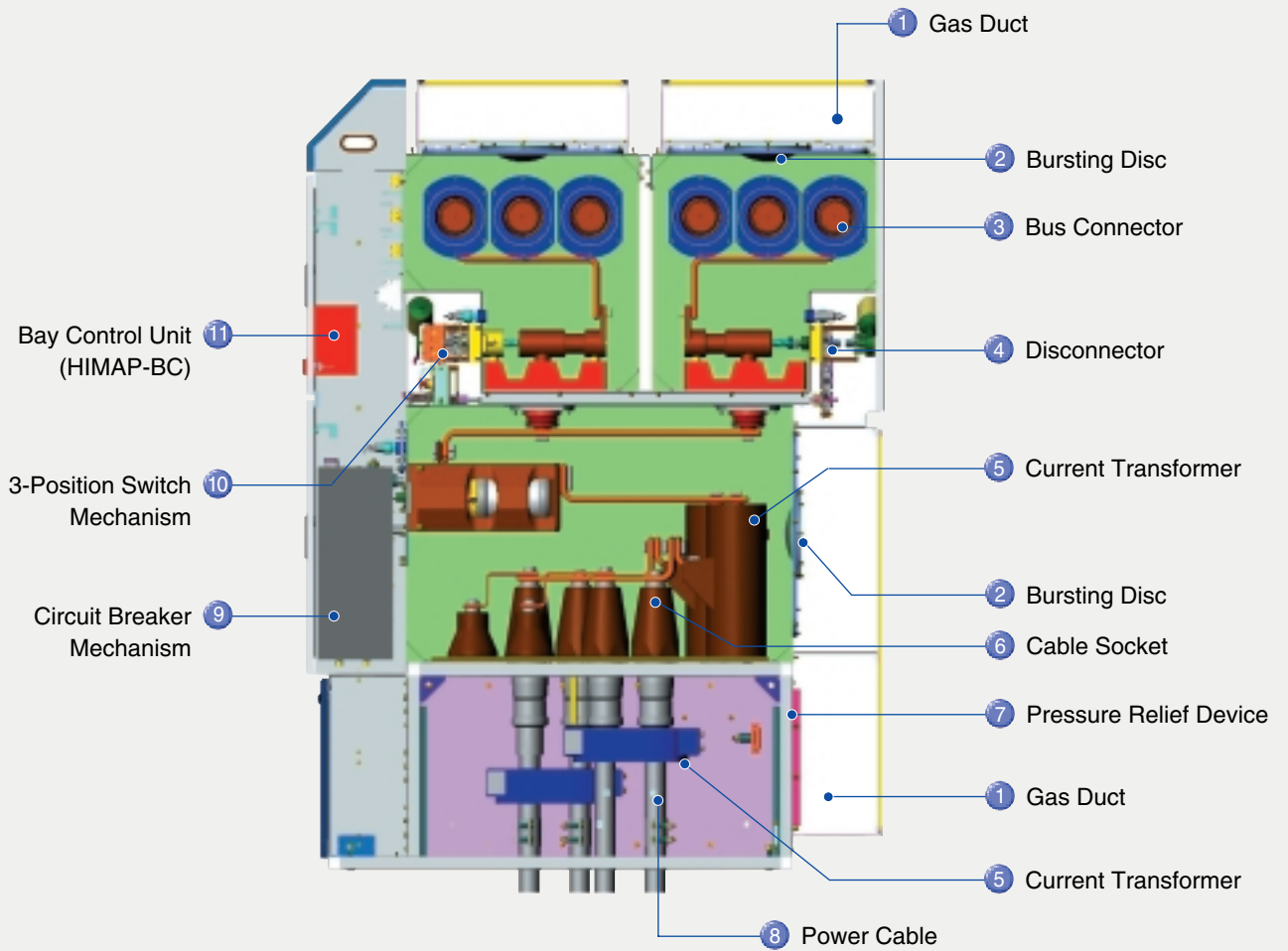
The basic IEC test series include short circuit, BIL, dielectric continuous current, mechanical life, thermal and environmental conditions.

HMGS-G10 is certified by Korea Electrotechnology Research Institute(KERI).

HMGS-G10

Technical Data

Type HMGS-G10 Switchgear Section View



HMGS-G10 Technical Data

IEC Standard ratings

Rated voltage	kV	12	24(25.8)
Maximum operating voltage	kV	12	24(25.8)
Rated power frequency withstand voltage	kV	28 ¹⁾	50 ¹⁾
Rated lightning impulse withstand voltage	kV	75	125
All voltage values apply for an insulating gas pressure, absolute, 20°C	bar	1.0	1.0
Rated frequency	Hz	50 / 60	50 / 60
Rated busbar current	A	up to 2000	up to 2000
Rated feeder current	A	630 / 1250 / 2000	630 / 1250 / 2000
Rated peak withstand current	kA	65	65
Rated short time current, 3 seconds	kA	25	25
Rated short circuit breaking current of circuit breaker	kA	25	25
Rated short circuit making current of circuit breaker	kA	65	65
Rated operating sequence		O - 0.3s - CO - 3min - CO ²⁾	
Closing time	ms	75	75
Opening time	ms	60	60
Break time		5cycle	
Insulating gas		SF ₆ ³⁾	SF ₆ ³⁾
Design pressure, absolute, 20°C	bar	1.5	1.5
Rated filling pressure, absolute, 20°C	bar	1.2	1.2
Minimum operating pressure, absolute, 20°C	bar	1.1	1.1
Rated data: Auxiliary voltage	V	110 / 125DC ⁴⁾	
Degree of protection (IEC 60529, DIN VDE 0470) :			
High voltage live parts		IP 65	IP 65
Low voltage compartment		IP 4X ⁵⁾	IP 4X ⁵⁾
Ambient temperature : ⁸⁾			
Maximum value	°C	+40	+40
Minimum value	°C	-5	-5
Altitude for erection above sea level ⁶⁾	m	...1000	...1000
Dimensions :			
Height	mm	2300	2300
Depth	mm	1720	1720
Width	mm	600 / 650 ⁷⁾	600 / 650 ⁷⁾

1) Higher values as per international standards on request

2) Other sequences on request

3) Insulating gas : sulphur hexafluoride

4) Other auxiliary voltages on request

5) Higher values on request

6) Adaption required at greater altitude

7) 650 mm for rated current 2000 A

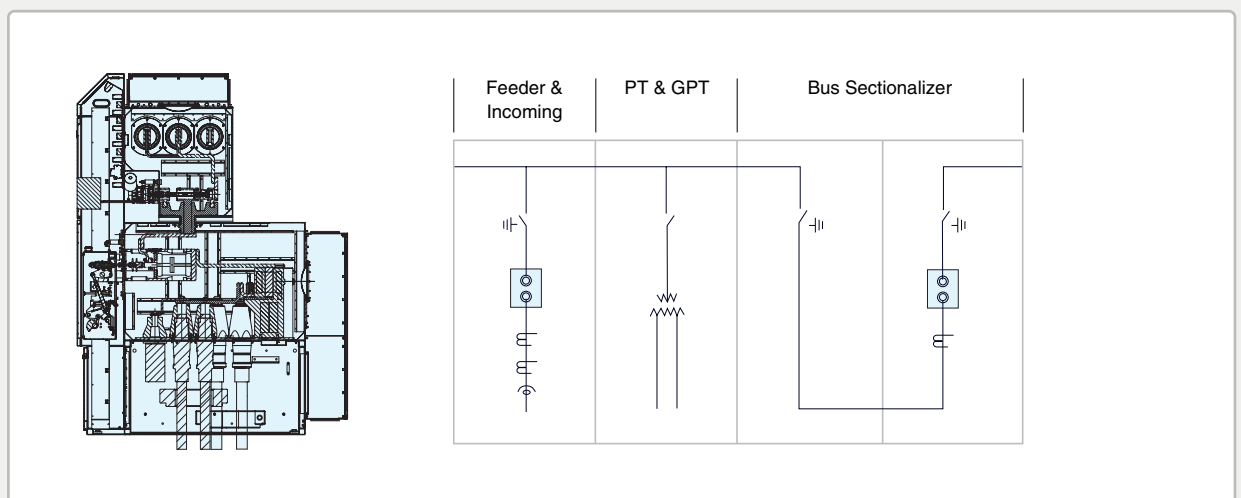
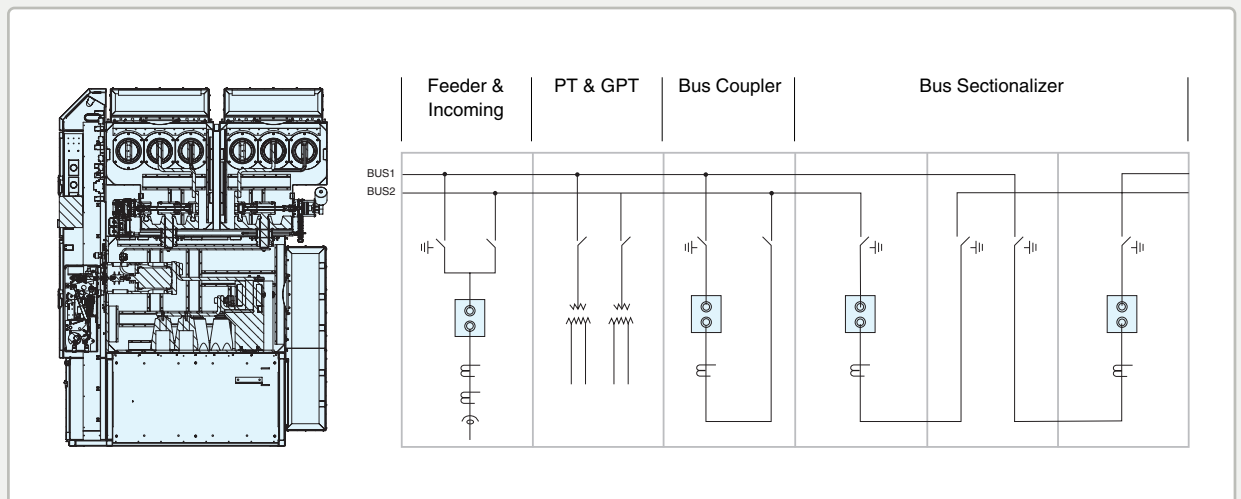
8) Special service conditions on request

※ The above technical data may change without prior notice for the quality improvement.

HMGS-G10

Unit Type and Versions

Optimum user-friendly control for digital type bay control unit, HIMAP-BC.
HMGS-G10 is suitable for both single and double bus systems.



Specification Guide

General

SF₆ Gas Insulated Metal-clad switchgear, HMGS-G10 designed up to 24,000 volts 3-phase 3 wire 50/60 Hz system.

The switchgear shall be rated up to 24,000 volts and has horizontally installed vacuum circuit breakers.

The switchgear includes vacuum circuit breakers, meters, relays, etc.

The switchgear is certified by Korea Electrotechnology Research Institute.

Specification Guide

Note : Color denoted information to be provided to the purchaser regarding :

1. Choice of alternates
2. Addition of optional features
3. Specific information

Stationary Structure

The switchgear consists of bus compartments and circuit breaker compartment that are hermetically pressure sealed with SF₆ gas.

- Welded stainless steel enclosure
- Modular design
- Duct for pressure relief
- Panels coupled by plug in bus connectors
- Cable connection inner cone plug in system

Circuit Breaker Compartment

Circuit breaker(CB) compartment contains feeder busbars(tie off conductors), Vacuum Interrupter(VI), Current Transformer(CT) and cable sockets.

CB compartment is filled with SF₆ gas and equipped with a safety device (bursting disc) activated by overpressure.

SF₆ Gas Insulated Metal-clad Switchgear

Specification Guide

Bus Compartment

Bus(BB) compartments contain main busbar, feeder busbar (tie off conductors) including the 3-position switch(3PS) or disconnector(DS) and filled with SF₆ gas with safety devices (bursting disc) activated by overpressure.

Low Voltage Compartment

Low voltage compartment contains CB operating mechanism, 3PS and DS operating mechanisms, bay control unit and mounting plate.

Bay Control Unit, HIMAP-BC



HIMAP-BC is a bay control unit, based on the micro processors and integrated with the new electrical, electronic and mechanical technologies.

HIMAP-BC provides the multi protection, measuring, bay control, transducer, fault recording, programmable outputs, event recording, human machine interface, self-supervision, programmable logic control and communication.

Gas Duct

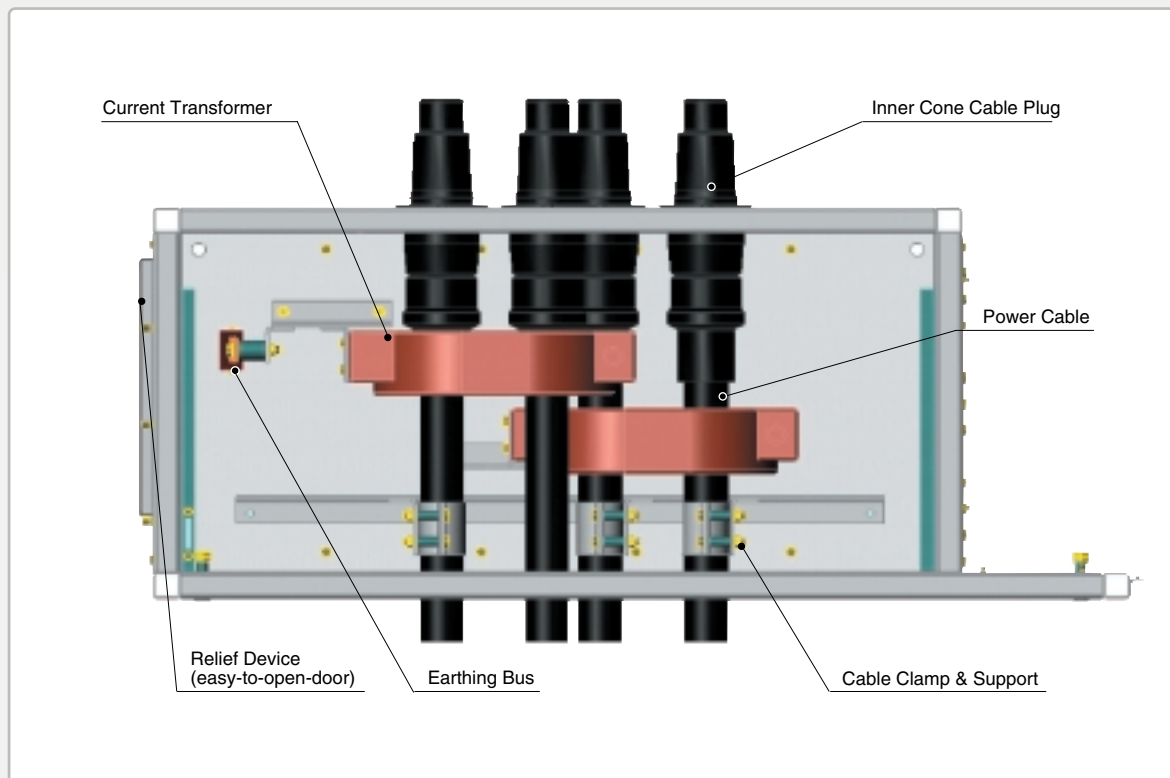
Gas duct on the top/rear is to guide the exhausted hot gas flow from the gas filled compartments(CB, BB compartments) when the internal arc fault occur.

Cable Compartment

Cable compartment contains the incoming or outgoing cable supports, earthing busbars and fixing facilities.

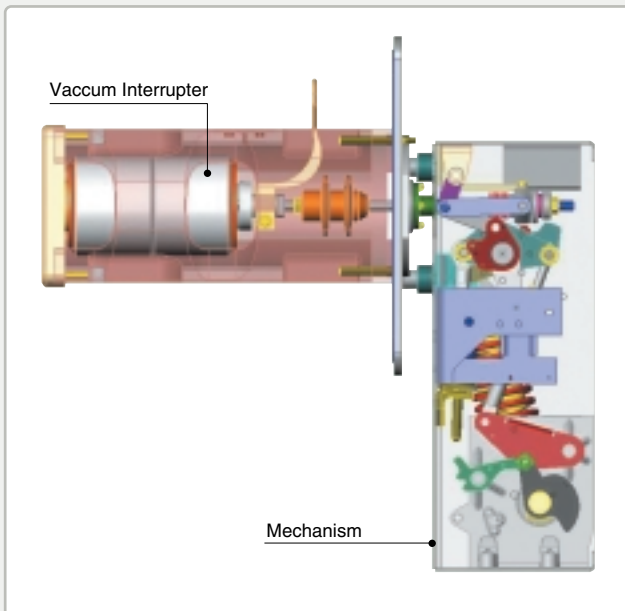
The cable compartment is closed by metal walls.

The relief device, easy-to-open door to the rear gas duct, exhausts, hot gas flow can be opened when internal arc fault occur.



Specification Guide

Circuit Breaker, HHF1



The circuit breaker rated up to 24,000 volts, 50/60 Hz, up to 2,000 Amps.

The circuit breaker consists of Vacuum Interrupters(VI), insulator frame and operating mechanism.

The circuit breaker poles are installed horizontally in this compartment.

The vacuum interrupter is supported by the insulator frame located in this compartment.

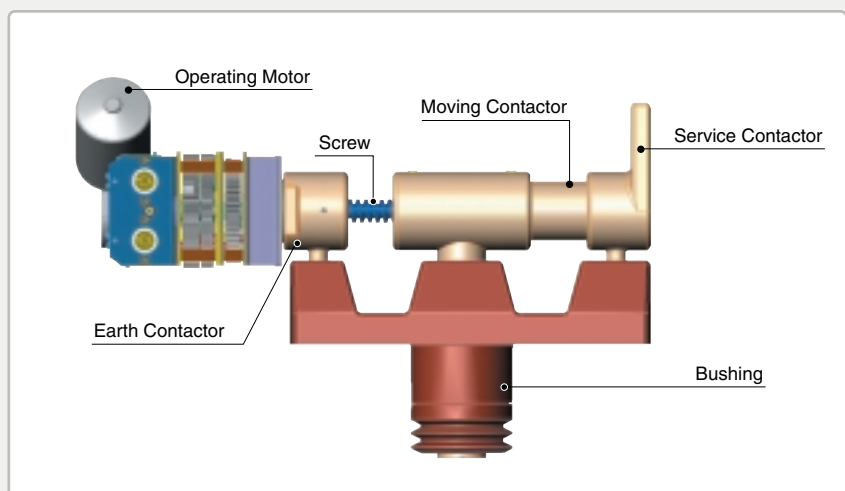
The circuit breaker operated by energy storage mechanism is normally charged by a small universal motor. But it can be also charged by a manual handle for emergency manual closing and testing.

The circuit breaker has three independent vacuum interrupters.

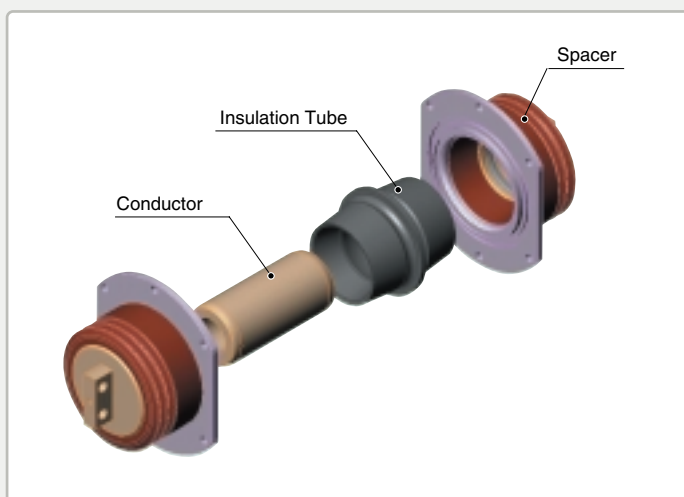
3-position Switch and Disconnecter

The 3-position switch has disconnecting and earthing functions and disconnecter rated up to 24,000 volts and up to 2,000 Amps and it is a motor operating rod-type switch.

Live switch components(busbar, insulated spindle with moving contact) are located inside the gas compartment while operating mechanism(drive motor, position indicator and emergency manual operation) is located outside.



Bus Connector



Panels are connected electrically by the connecting set patented by HHI since 2001, via conductor covered space.

Each sealed flange has multiple contact points for easy-link on the sides of the panels to be linked.

Delivery

The switchgear 'HMGS-G10' is delivered in panels filled with SF₆ gas at operating pressure.

Each panel of the switchgear is suitable for handling by a crane or forklift truck.

Inspection and Maintenance

The switchgear 'HMGS-G10' is maintenance free inside of the gas compartment under normal service conditions.

The inspection shall be carried out by visual inspection and predominant functional tests.

SF₆ Gas Insulated Metal-clad Switchgear



Certificate

KERI KERI-CER 2001-CA001-2 2002-05000 - 01

Certificate of type conformity

Certification scheme: KERI-HV Certification scheme
 Normative document: EC 60090:1998
 Product: SF₆ gas insulated metal-clad switchgear
 Type: H800-G10-000001 no. 01
 Ratings: 24, 25.2kV, 2000A, 25 kA, 60Hz
 Applicant: HYUNDAI HEAVY INDUSTRIES CO., LTD.
 1 Cheongju Dong, Song-ku, Ulsan, Korea
 Manufacturer: HYUNDAI HEAVY INDUSTRIES CO., LTD.
 1 Cheongju Dong, Song-ku, Ulsan, Korea

The certificate indicates that the characteristics & ratings of the SF₆ gas insulated metal-clad switchgear assigned by the manufacturer recorded in evaluation report were complied with the applied normative document.

The SF₆ gas insulated metal-clad switchgear manufactured according to the relevant drawings & technical documents were tested in accordance with the applied normative document.

The certificate is limited only to the sample verified & tested and the responsibility for declaring the conformity of other products, having the same design as those certified by KERI, rests with the manufacturer.

The parts of the certificate shall not be reproduced except in full, without the written approval of KERI.

No. of pages: 1 Attached document/Evaluation report : 2002-05000

Date of issue: December 10, 2002

Prepared: Jeong, Joo-Young
Jeong, Joo-Young

Verified: Kim, In-Deo
Kim, In-Deo

Approved: Park, Hyeon-Hak
Park, Hyeon-Hak

Testing & Evaluation Division

한국전기연구원, KEET Korea Electrotechnology Research Institute
 441-030, 공평남도 행정시 공평동 29-1, Songpyeong-dong 29-1 Cheongju, Korea, 441-030
 Tel : +82-030-280-1500, Fax : +82-030-280-1505, E-mail : ke133@keri.re.kr, www.keri.ac.kr

DI-C-1501

KERI KERI-CER 2001-CA001-1 2002-05000 - 01

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 441-030, 공평남도 행정시 공평동 29-1, Songpyeong-dong 29-1 Cheongju, Korea, 441-030
 Tel : +82-030-280-1500, Fax : +82-030-280-1505, E-mail : ke133@keri.re.kr, www.keri.ac.kr

SF₆ Gas Insulated Metal-clad Switchgear



Memo

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