



HMS Medium Voltage Air-Insulated Metal-Enclosed Switchgear

Internal Arc-Proof



HMS Switchgear
up to 36 kV,
Medium Voltage
Air-Insulated
Metal-Enclosed Switchgear
LSC 2B, Internal Arc-Proof

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HMS series, HYUNDAI Medium Voltage

Air-Insulated Metal-Enclosed Switchgear, provides various benefits with its safe, reliable features, and compact design.





HMS series, HYUNDAI Medium Voltage

Air-Insulated Metal-Enclosed Switchgear, manufactured and tested based on over 30years experience acquired throughout the world



Description

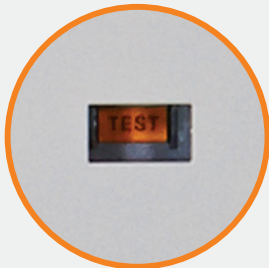
❖ Characteristics

HMS series, HYUNDAI Medium Voltage Air-Insulated Metal-Enclosed Switchgear, provides the highest level of performance and various advantages with their reliable features and compact design to meet all electrical requirements of the medium voltage distribution system up to 36 kV.

• Relays



• Breaker inspection window



• Breaker position indicator



HMS-N12C

• Small door for breaker withdrawal lever & Pad lock (Optional)



• Slot for earthing switch operating lever





Safe and Reliable Features

- Loss of service continuity category LSC 2B
- Partition class PM
- Internal arc classification IAC A FLR
- All operations with the front door closed
- Metallic enclosure, earthed metal shutter and partitions
- The power-on indicator situated on the front of the switchgear
- Interlock and padlocks prevent operator errors
- Type-tested for each switchgear type
- The design, manufacturing and testing according to ISO9001 quality standard.

Flexible Compact Design

- Modular structure, easily built
- Wide range of functional units available for all installation solutions
- Minimum space requirements thanks to compact design and flexible connection options

Easy Installation and Maintenance

- Maintenance free vacuum circuit-breakers and vacuum contactors
- Minimum interruption under operation by logical interlocking system
- Simple maintenance activities
- Easy and fast installation

Description

Application

Ratings		
Voltage		≤ 36 kV
Normal current		≤ 17.5 kV: Up to 4,000 A > 24 kV: Up to 3,150 A
Short-circuit withstand current		≤ 12 kV: Up to 50 kA (3 sec) = 17.5 kV: Up to 50 kA (3 sec) > 24 kV: Up to 31.5 kA (3 sec)
Loss of service continuity category and partition class		
Loss of service continuity category		LSC2B (metal-clad)
Partition class		PM (metallic partition)
Accessibility to compartments		
Busbar compartment		Tool-based
Switching device compartment		Interlock-controlled
Connection compartment		Interlock-controlled, procedure and/or tool-based
Internal arc classifications		
Internal arc classifications		IAC A FLR $I_{sc} \leq 50 \text{ kA}$, $t \leq 1 \text{ s}$
IAC		Internal arc classification
AFLR		Accessible to authorized personnel for front, lateral and rear side
Protection degree		
For internal partition	IP2X	Protection for fingers or objects with a diameter greater than 12 mm.
For standard enclosure	IP4X	Protection for a diameter or strips of a thickness greater than 1.0 mm.
For optional enclosure	IP41,2 IP51,2	Available on request

Utility and Power Plants

- Transforming stations
- Switching stations
- Power generation stations
- Main and auxiliary switchgear

Industry

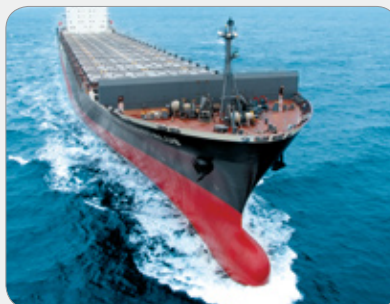
- Chemical industry
- Petroleum industry
- Iron and steel works
- Automobile industry
- Oil and gas pipelines
- Textile, paper and food industries
- Rolling mills

Marine

- Drilling rigs
- Offshore platforms and FPSO
- Container ships
- Passenger ships
- Tanker ships
- Bulk ships

Services and Transport

- Shopping malls
- Hospitals
- Large infrastructure and civil works
- Airports, ports



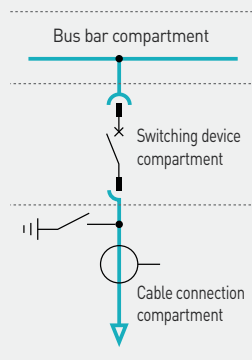
Complying with new definition of service continuity, partition class, maintainability and internal arc classification of IEC 62271-200

LSC2B (Metal Clad)

With the IEC, the Loss of Service Continuity category (LSC) newly defines the extent to which other high voltage compartments and/or functional units may remain energized when a main circuit compartment is opened.

The HMS switchgear has high voltage compartments of bus bar, withdrawable main switching device and cable connection compartments which are physically and electrically segregated with metal partition to achieve service continuity of the LSC2B described in IEC 62271-200 as follows;

- When main switching device compartment and/or cable connection compartment is opened, the busbar compartment can be energized.
- When switching device compartment and/or busbar compartment is opened, the cable connection compartment can be energized.



Partition Class, PM

HMS switchgear complies with the requirement for partition class, PM of IEC 62271-200.

The switchgear provides continuous metallic partitions. All high-voltage compartments are surrounded by metallic partitions, and metal shutters which are connected to the earthing point of the functional unit are used to cover fixed contacts when the switching device is withdrawn to the test/disconnected position or removed position.

Accessibility to Compartments

Control of the opening of the switching device compartment of HMS switchgear is by interlocks, the connection compartment is by interlocks, procedures and/or tool based to ensure that all live parts inside are dead and earthed before opening, the switching device is in the disconnected position with corresponding shutters closed, and for the accessible to busbar compartment need tools to be opened.

Operating Condition

[Normal Operating Conditions]

The rated characteristic of the switchgear is based on the normal operating conditions for indoor switchgear according to the IEC 62271-1 and IEC 62271-200 listed below.

- Minimum ambient temperature: -5°C
- Maximum ambient temperature: $+40^{\circ}\text{C}$
- Maximum of 24 hour mean: $+35^{\circ}\text{C}$
- Maximum relative humidity of 24 hour mean: 95 %
- Maximum relative humidity of 1 month mean: 90 %
- Maximum altitude: 1,000 m above sea level
- Presence of normal, non-corrosive and uncontaminated atmosphere

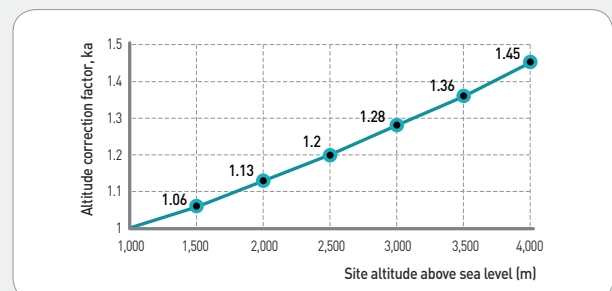


Fig.1 Specific operating conditions

HMS switchgear is designed to meet the following specific conditions:

• Temperature Rise

The rated normal current of the switchgears depends on the ambient air temperature outside the enclosure (please contact us for details).

• Site Altitude

The dielectric strength of air insulation decreases with increasing altitude due to lower air density. This reduction is permitted up to a site altitude of 1,000 m according to IEC. For site altitudes above 1,000 m, a higher insulation level must be selected, and the altitude correction factor K_a is recommended, depending on the site altitude above sea level (Fig.1).

• Corrosive Atmospheres, Vibrations

Must be agreed depending on the conditions (please contact us for possible adaptation).

Arc Classification

Protection Degree

Protection against entry hazardous parts and water of the HMS switchgear according to the IEC 62271-200 and IEC 60529 following degree of protection.

Degree		Description of protection
For standard internal partition	IP2X	For fingers or any other objects with a diameter greater than 12 mm.
For standard switchgear enclosure	IP4X	For wires of a diameter or strips of a thickness greater than 1.0 mm.
For optional switchgear enclosure	IP41	IP4X, and protection for vertically dropping water
	IP42	IP4X, and protection for dropping water tilted up to 15 °C
	IP51, 52	IP41 or IP42, and dust protection (In case of ventilation type enclosure, the intake of dust is not completely eliminated, but dust shall not penetrate in a quantity sufficient to interfere with satisfactory operation.)

Arc Classification

HMS Switchgear is designed to withstand and protect personnel in the case of failure due to internal arcing, and classified as IAC AFLR, up to 50 kA.

- Metal pressure relief positioned above the enclosure, which in the case of internal fault, limits overpressure in the compartments.
- Nonflammable materials used for the cubicle.
- The switchgear complies with all criteria specified in the IEC 62271-200 as follows:
 - Correctly secured doors and covers do not open.
 - No ejection of fragments or of other parts of the switchgear of an individual mass of 60 g or more.
 - Arcing does not cause holes by burning through in the classified sides up to a height of 2,000 mm.
 - Indicators arranged on front, lateral, and rear side do not ignite due to the effect of hot gases or burning liquids.
 - The enclosure remains connected to its earthing point.

In the case where classification IAC is proven by the tests, the switchgear will be designated as follows:

- General: classification IAC (Internal Arc Classified)
- Accessibility: A, B or C
 - A** Switchgear accessible to authorized personnel only
 - B** Switchgear accessible to all
 - C** Not accessible

- Protection sides: F, L and R
 - F** Front / **L** Lateral / **R** Rear
- Test current (kA)
- Duration in seconds (s)

When installing the switchgear, some fundamental points must be taken into consideration:

- Escape routes for the hot and toxic gases given off.
- Dimensions of the room, with special attention to the height.

When installation in a room with limited ceiling height, we recommend to install arc duct above the switchgear to prevent reflection of hot gases on the ceiling.



Fig.2 Arc test without arc duct (HMS -N12)



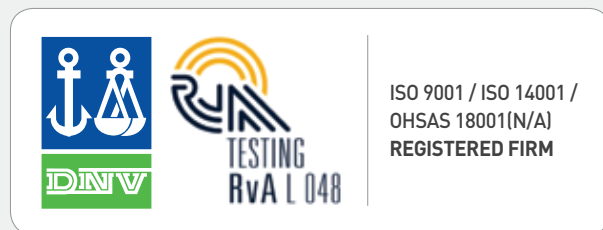
Fig.3 Arc test with arc duct (HMS-N12C)

Designed, type tested, and manufactured according to the certified assurance program, IEC 62271-200 and the related standards.

Certified Quality System: ISO 9001 & ISO 14001

The quality system for the design and manufacture of HMS switchgear is certified to be in conformity with the requirements of ISO 9001 quality assurance standard from DNV certification B.V., The Netherlands.

The environmental management system is assessed and recognized as conforming to the requirements of the ISO 14001 standard.



Routine Test

The HMS was designed for unsurpassed structural strength, to be arc proof, and to offer trouble-free installation and operation providing complete customer satisfaction. To ensure the quality and conformity of each functional unit, systematic routine testing is performed after manufacturing as follows:

- Visual inspections and checks
- Power-frequency voltage tests on the main circuit
- Power-frequency voltage tests on the auxiliary and control circuits
- Mechanical operations tests
- Electrical sequence operations
- Verification of correct wiring

Type Test

The HMS switchgear are fully type tested according to international (IEC) standards and also tested in accordance with rules required by the major shipping registers (LR, DNV, RINA, BV, and GL) for use of the switchgear in marine installations. As described in the IEC, the tests were made on representative functional units considered most sensitive to the effect of the tests.

Standard

Switchgear	HMS	IEC 62271-1 IEC 62271-200
Device	Circuit-breaker	IEC 62271-100
	Vacuum contactors	IEC 60470
	Disconnecter and earthing switch	IEC 62271-102
	Switch and disconnectors	IEC 60265-1
	HV HRC fuse	IEC 60282
Degree of protection		IEC 60529
Insulation		IEC 60071
Insulation transformer	Current transformer	IEC 60044-1
	Voltage transformer	IEC 60044-2



Power Management System (SCADA)

HiPAS, HYUNDAI Intelligent Power Automation System is a power management system which consists of independent function modules in a network. It can be divided into 3 system levels; "Master", "PCM", and "Device".

Master Level

Its main constituents are Engineering Station Module (hereafter, ESM) and Operator Station Module (hereafter, OSM). ESM takes part in configuring I/O points and control algorithm, while OSM monitors and controls the electric facilities.

ESM and OSM can be installed on an integrated type or each module can be used as a standalone type on a different system.

For an integrated type, an authorized user can change the system's mode, either ESM or OSM. There are 4 kinds of user authority level in HiPAS.

PCM (Process Control Module)

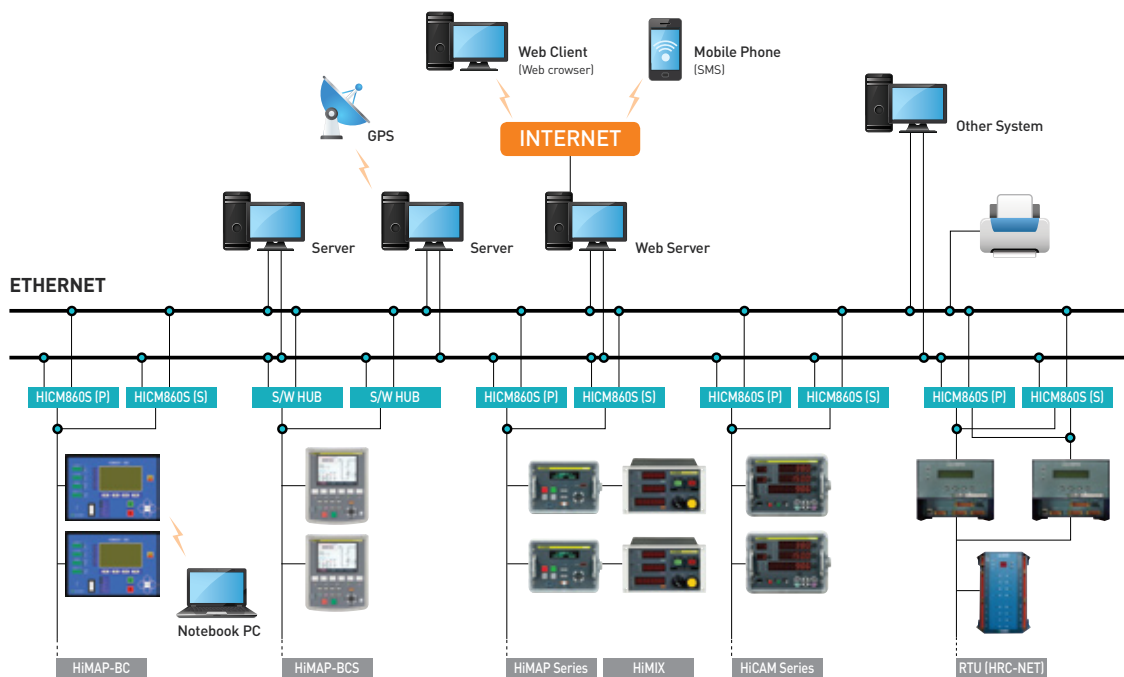
It is a kind of FEP. PCM executes the various algorithm on the basis of real time value gathered from "Field". HYUNDAI product name at PCM level is "HICM-860S".

Device Level

It can consist of HRC-Net, HiMAP and HiCAM. HRC-Net (HYUNDAI Remote Control - Network), it is a kind of RTU which gets field data from sensors.

HiMAP is a IED which gives the function of measuring the data and protecting an electric power system with various protection relays. HiCAM meters the data without relays, but it has a more convenient user interface than HiMAP.

- Mimic diagram of the plant configuration
- Remote setting of the communicating IEDs (HiMAP)
- Alarm management
- Fault recorder analysis for HiMAP
- Trend management
- Monitoring of system network status
- Report management
- Security access within the login/logoff procedure



Monitoring and Diagnostic System

HiPDS-D, HYUNDAI Intelligent Preventive Diagnostic System is advanced monitoring and diagnostic system for distribution switch gear and mold transformer.

- UHF PD (Partial Discharge) detection sensor
- TEV PD (Partial Discharge) detection sensor
- Infrared temperature sensor
- 3D phase resolved partial discharge pattern analysis



Fig.4 3D PRPD (Phase Resolved Partial Discharger) Analyze

The HMS switchgear was designed for unsurpassed structural strength, to be arc proof, and to offer trouble-free installation and operation providing complete customer satisfaction. Influence due to internal arc faults is minimized by pressure relief (E) which is located on each functional compartment.

Internal arc fault test was performed with the classification IAC A FLR, arc duration of 1 s for up to 50 kA according to individual type of switchgear.

Vacuum circuit breakers and vacuum contactors which are used for main switching device have been proven to be desirable by their improved reliability, longer maintenance free life cycle, eco-friendly design and compact size. The operations of main switching device is possible with high-voltage door closed. Cable connection compartment can be accessible from front in case front accessible type (Fig.5) or from rear side in case rear accessible type (Fig.6).

Assembly

Each panel consists of three power compartments: main switching device compartment (A), busbar compartment (B) and cable connection compartment (C). Each panel is fitted with a low voltage compartment (D), where all the instruments and cabling are housed. The compartments are segregated from each other by metallic partitions. Arc-proof switchgear is normally provided with a pressure relief (E) and/or arc duct (F) for the relieving of pressure and evacuation of the gases which may be induced by arc.

Finish

The switchgear enclosure is cleaned and rust-proofed which is made of zinc galvanized steel sheet. The doors and end cover plates are painted through HYUNDAI standard electrostatic powder coating procedure. RAL7035 is normally used for the finishing color if customer does not specify other colours.

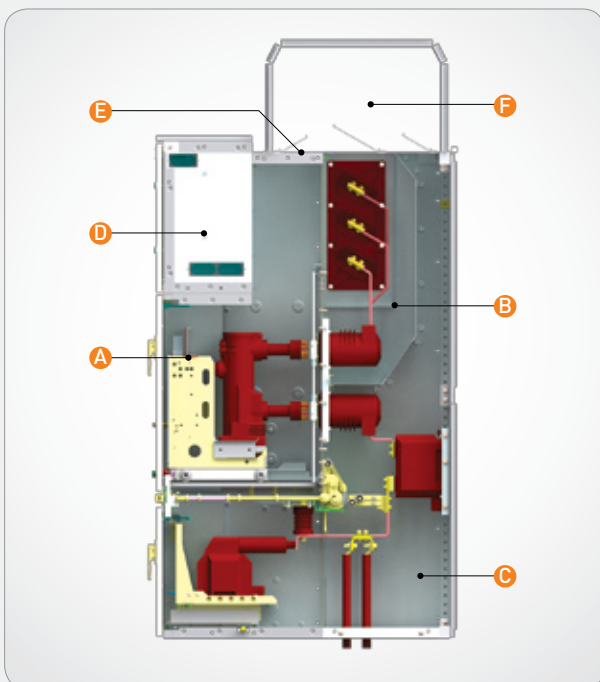


Fig.5 Section view for front accessible type (HMS-N12C)

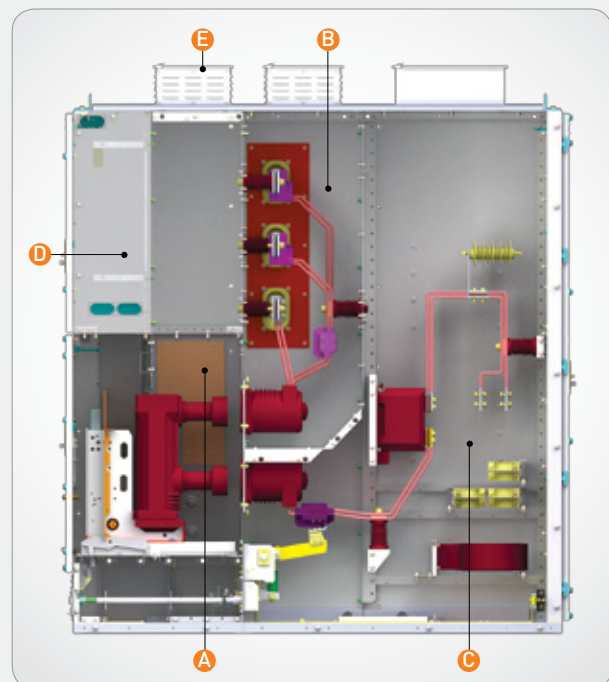


Fig.6 Section view for rear accessible type (HMS-N12)

Low-Voltage (LV) Compartment

- The LV compartment with a hinged door accommodates instruments, meters, and relays, and is easily customized to the specification requirements.
- All control wirings include flame retardant grades.
- The opening on both sides allows for interconnection among line-up panels. The opening holes are shrouded with grommet to protect the wiring from tracking.
- All wirings are identified with wiring numbers inscribed on the white vinyl tubes.

Main Switching Device Compartment

- HYUNDAI HVF type vacuum circuit breakers which are used for main switching device have been proven to be desirable by their improved reliability, longer maintenance free life cycle, and compact size.
- The fixed contacts of the primary part are encapsulated by the primary bushing.
- The metal shutters which are earthed, automatically cover the fixed contacts of both line and load side when the switching device is moving to the test/disconnected position.



Fig.7 Main switching device & LV compartment

- The pressure relief reduces the inner pressure in the event of internal arcs in the panel, and the high-voltage door can withstand the pressure safely.
- Position of circuit breaker, earthing switch and low-voltage plug connector for connection of control cables are interlocked according to the requirements of IEC 62271-200 and customer's specification.



Fig.8 Main switching device compartment with circuit breaker



Fig.9 Main switching device compartment without circuit breaker

Busbar Compartment

- The main busbars are completely surrounded by metallic partitions, and all components are fully insulated.
- The main busbars are vertically connected to the upper fixed contacts of the primary parts through the primary bushings.
- The busbars are made of electrolytic copper (cu).
- All bus joints are torque tightened with the standard torque value, and covered with removable boots for easy inspection.
- The buses are supported and braced to withstand a related short circuit current for three full seconds.



Fig.10 Bus bar compartment

Cable-Connection Compartment

- Single or three-core cables up to a maximum of 6 cores per phase can be connected depending upon the panel type.
- Voltage transformers can be fitted in a dedicated section of the cubicle, mounted on a removable or withdrawable truck depending upon the panel type.
- 6 current transformers and one balancing current transformers can be installed depending upon the panel type.
- Voltage detectors and surge arresters can be installed.
- Top or bottom entry for both bus ducts and power cables can be provided depending upon the panel type.
- The earthing busbars located in the bottom run the entire length of the assembly.



Fig.11 Removal voltage transformer in cable compartment

Interlocks

- The withdrawal or engagement of switching device is prevented unless it is in the open position.
- The operation of switching device is mechanically prevented unless it is in the service or test/disconnected position.
- Engagement of switching device to the service position is prevented unless earthing switch is in the open position.
- Earthing switch can only be operated with switching device in the test/disconnected position.
- The secondary umbilical cord and plug of the breaker are mechanically interlocked to prevent disengagement while the circuit breaker is in the service position.
- Options:
 - Closed door racking mechanism
 - Electromagnetic interlocks
 - Mechanical key interlocking systems
 - Padlocks.

Earthing Switch

Earthing switch having making capability, short circuit current carrying capability for 3 seconds and is interlocked with main switching device. It can be fitted usually in the cable connection compartment of the feeder panel for the cable earthing, or in the busbar compartment of bus riser panel for the busbar earthing.

The snap-action closing mechanism is independent of the operation and operated by manual.



Fig.12 HES type earthing switch

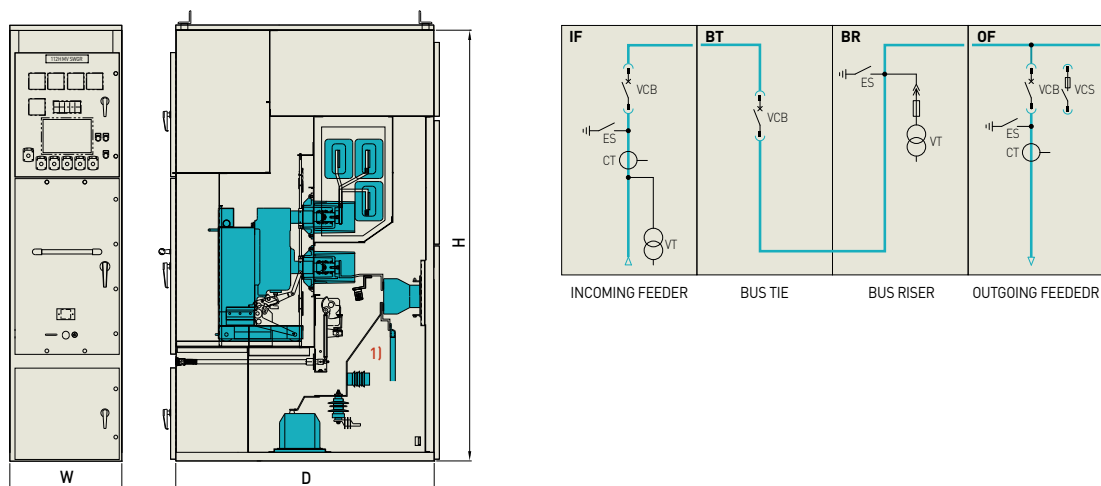
7.2/12 kV Switchgear

HMS-112



Rated voltage (kV)			7.2
Normal current (A)		Main-bus	≤1,500
		Feeder	1,250
Frequency			60
Power frequency withstand voltage (kV)			20
Lightning impulse withstand voltage (kV)			60
Short circuit breaking current (kA)			..25
Short time withstand current, 3 s (kA)			..25
Peak withstand current (kA, peak)			..65
Partition class			PM
Loss of service continuity category			LSC2B
Arc classification, AFLR			..25kA
Normal feeder current for contactor panel (A) ²⁾			..400
Size (mm) ³⁾	Width (W)	IF,OF,BR	650
		BT	800
		Contactor panel	650
	Depth (D)		1,500
	Height (H)		2,500 [2,600] ⁴⁾

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.

2) Current values and short circuit breaking current of contactor panel dependent on HV HRC fuses.

3) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

4) When using base frame of height, 100 mm for the application of marine use, total height including the frame will be 2,600 mm.

* This switchgear is certified for marine use by GL, LRS, BV, and DNV.

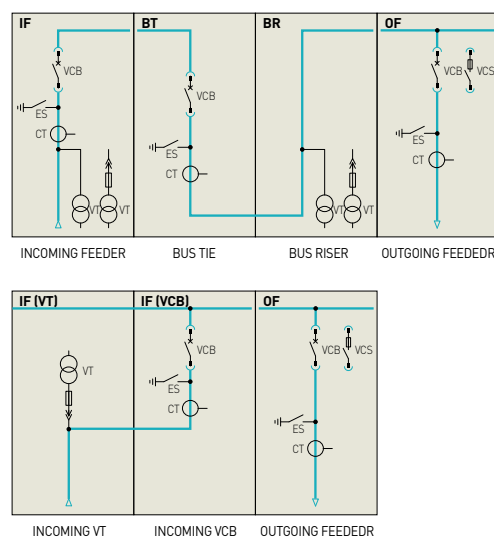
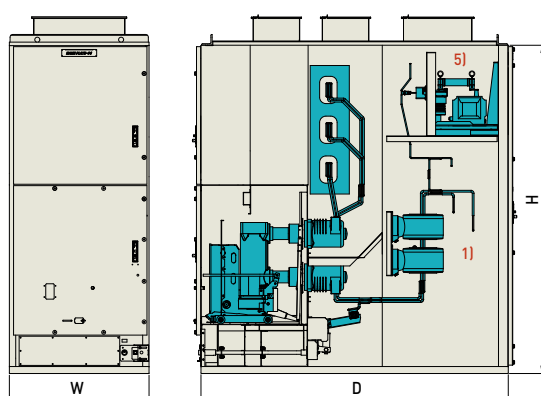
7.2/12 kV Switchgear

HMS-N7.2



Rated voltage (kV)		7.2
Normal current (A)	Main-bus	≤4,000
	Feeder	1,250/2,000/2,500/4,000
Frequency		50/60
Power frequency withstand voltage (kV)		20
Lightning impulse withstand voltage (kV)		60
Short circuit breaking current (kA)		..50
Short time withstand current, 3 s (kA)		..50
Peak withstand current (kA, peak)		..130
Partition class		PM
Loss of service continuity category		LSC2B
Arc classification, AFLR		..50kA
Normal feeder current for contactor panel (A) ²⁾		..400
Size (mm) ³⁾	Width (W)	1,250 A
		≥2,500 A
		Contactor panel
	Depth (D)	2,000
Height (H)		2,350 [2,450] ⁴⁾

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.

2) Current values and short circuit breaking current of contactor panel dependent on HV HRC fuses.

3) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

4) When using base frame of height, 100 mm for the application of marine use, total height including the frame will be 2,450 mm.

5) Withdrawable voltage transformer can be installed in the rear upper side of the panel on request.

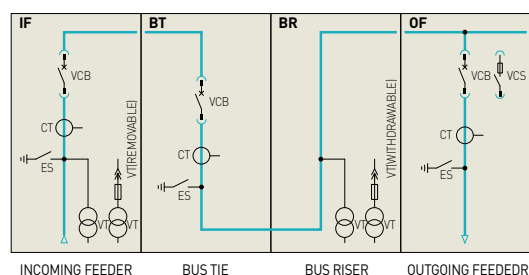
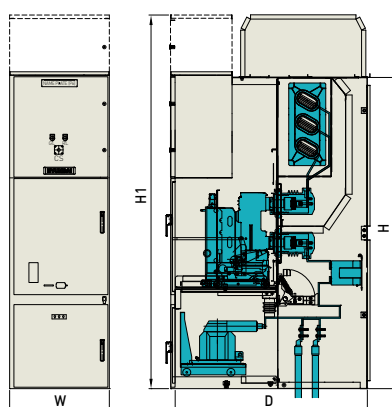
* This switchgear is certified for the marine use by DNV, LRS, and BV.

HMS-N12C



Rated voltage (kV)		7.2/12				
Normal current (A)	Main-bus	≤4,000			5,000	
	Feeder	630/1,250	1,250/2,000/2,500/3,150/4,000		5,000	
Frequency		50/60				
Power frequency withstand voltage (kV)		28				
Lightning impulse withstand voltage (kV)		75				
Short circuit breaking current (kA)		..25	..40	..50	..50	
Short time withstand current, 3 s (kA)		..25	..40	..50	..50	
Peak withstand current (kA, peak)		..65	..104	..130	..130	
Partition class		PM	PM	PM	PM	
Loss of service continuity category		LSC2B	LSC2B	LSC2B	LSC2B	
Arc classification, AFLR		..25 kA	..40 kA	..50 kA	..50 kA	
Normal feeder current for contactor panel (A) ²⁾		..400				
Size (mm) ³⁾	Width (W)	≤1,250 A	650	700	800	800
		2,000 A		800	800	800
		≥2,500 A (IF,OF,BT)		1,000	1,000	1,000
		≥2,500 A (BR)	650	800	800	800
		5,000 A				1,400
		Contactor panel	700	700	700	
	Depth (D)	≤2,000 A	1,290	1,290	1,290	1,800
		2,500/ 3,150 A		1,290	1,340	1,800
		4,000 A		1,340	1,340	1,800
		5,000 A				2,400
		Extend panel	4)			
	Height (H)	2,200	2,200	2,200	2,400	
	With extend LV Compartment (H1) ⁵⁾		2,600	2,600	2,600	2,800

Section View (IF/OF) and Single Line Diagram of Typical Unit



- ※ 1) Connection compartment can be accessed from the front, but rear side accessible panel available on request.
 2) Current values and short circuit breaking current of contactor panel dependent on HV HRC fuses.
 3) The size of actual panel can be different according to the rating, quantity, and arrangement of components.
 4) Extend panel is available for installing a ZCT in the switchgear, more than one CT per phase or some more equipment than our standard on request.
 5) Extend LV compartment is available according to the kind and quantity of components in the LV compartments.

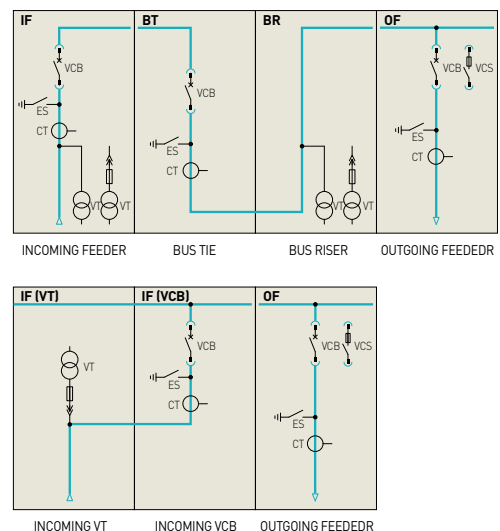
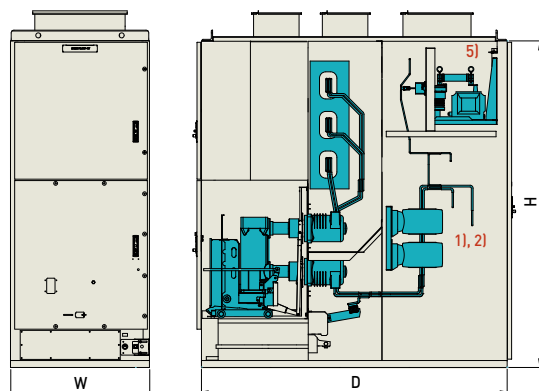
7.2/12 kV Switchgear

HMS-N12



Rated voltage [kV]			7.2/12	
Normal current (A)	Main-bus		≤4,000	
	Feeder		1,250/2,000/2,500/3,150/4,000	
Frequency			50/60	
Power frequency withstand voltage (kV)			28	
Lightning impulse withstand voltage (kV)			75	
Short circuit breaking current (kA)			..40	..50
Short time withstand current, 3 s (kA)			..40	..50
Peak withstand current (kA, peak)			..104	..130
Partition class			PM	PM
Loss of service continuity category			LSC2B	LSC2B
Arc classification, AFLR			..40 kA	..50 kA
Normal feeder current for contactor panel (A) ³⁾			..400	
Size (mm) ⁴⁾	Width (W)	1,250 A	750 (800) ⁶⁾	800
		2,000 A	800	800
		≥2,500 A	1,000	1,000
		Contactor panel	750	750
	Depth (D)		2,200	2,200
	Height(H)		2,350	2,350

Section View (IF/OF) and Single Line Diagram of Typical Unit

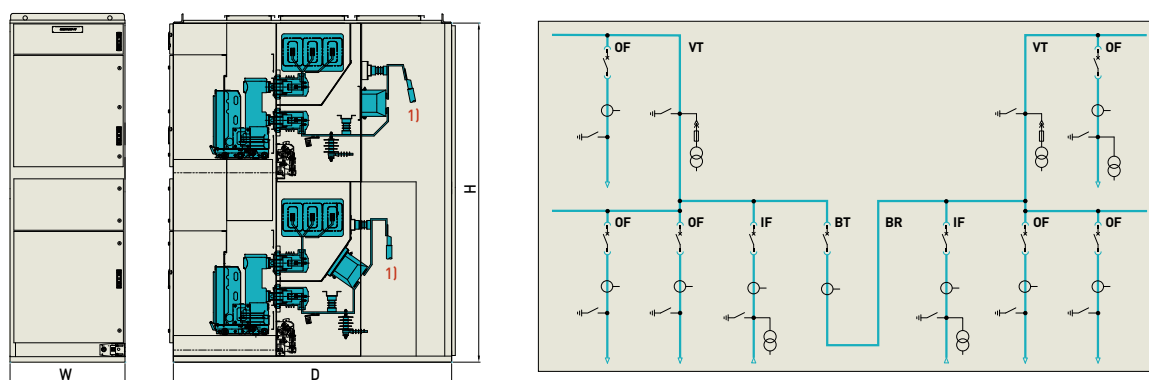


- ※ 1) Connection compartment can be accessed from the rear.
 2) 1 ZCT and 2 CT's per phase can be installed in cable connection compartment with the panel of standard size.
 3) Current values and short circuit breaking current of contactor panel dependent on HV HRC fuses.
 4) The size of actual panel can be different according to the rating, quantity, and arrangement of components.
 5) Width of 40 kA 1,250 A panel is 800 mm when withdrawal voltage transformer is installed in the rear upper side.
 6) Withdrawable voltage transformer can be installed in the rear upper side of the panel on request.

HMS-N7.2D

Rated voltage (kV)		7.2
Normal current (A)	Main-bus	≤2,500
	Feeder	1,250/2,500
Frequency		50/60
Power frequency withstand voltage (kV)		20
Lightning impulse withstand voltage (kV)		60
Short circuit breaking current (kA)		..40
Short time withstand current, 3 s (kA)		..40
Peak withstand current (kA, peak)		..104
Partition class		PM
Loss of service continuity category		LSC2B
Arc classification, AFLR		..40 kA
Size (mm) ²⁾	Width (W)	1,250 A
		2,000 A
	Depth (D)	2,300
	Height (H)	2,800

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.

2) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

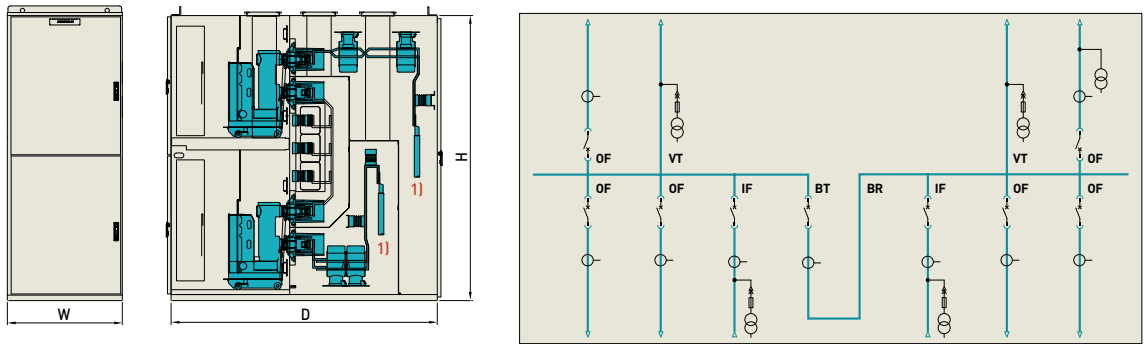
7.2/12 kV Switchgear

HMS-N12D



Rated voltage (kV)		7.2/12
Normal current (A)	Main-bus	≤2,000
	Feeder	1,250/2,000
Frequency		60
Power frequency withstand voltage (kV)		28
Lightning impulse withstand voltage (kV)		75
Short circuit breaking current (kA)		..40
Short time withstand current, 3 s (kA)		..40
Peak withstand current (kA, peak)		..104
Partition class		PM
Loss of service continuity category		LSC2
Arc classification, AFLR		-
Size (mm) 2)	Width (W)	1,250 A
		2,000 A
	Depth (D)	2,300
	Height (H)	2,350

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.
2) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

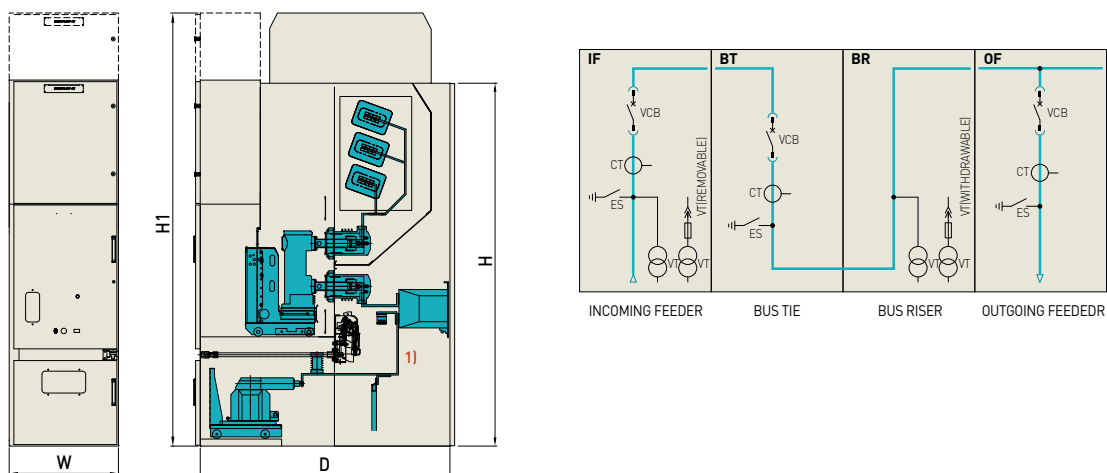
17.5 kV Switchgear

HMS-N17.5C



Rated voltage (kV)		17.5
Normal current (A)	Main-bus	≤3,150
	Feeder	1,250/2,000/3,150
Frequency		60
Power frequency withstand voltage (kV)		38
Lightning impulse withstand voltage (kV)		95
Short circuit breaking current (kA)		..50
Short time withstand current, 3 s (kA)		..50
Peak withstand current (kA, peak)		..130
Partition class		PM
Loss of service continuity category		LSC2B
Arc classification, AFLR		..50 kA
Size (mm) ²⁾	Width (W)	1,250 A
		2,000 A
		≥3,150 A
	Depth (D)	Extend panel
	Height (H)	2,350
With extend LV Compartment (H1) ⁴⁾		2,600

Section View (IF/OF) and Single Line Diagram of Typical Unit



- ※ 1) Connection compartment can be accessed from the front, but rear side accessible panel available on request.
 2) The size of actual panel can be different according to the rating, quantity and arrangement of components.
 3) Extend panel is available for installing a ZCT in the switchgear, more than one CT per phase or some more equipment on request.
 4) Extend LV compartment is available according to the kind and quantity of components in the LV compartments.

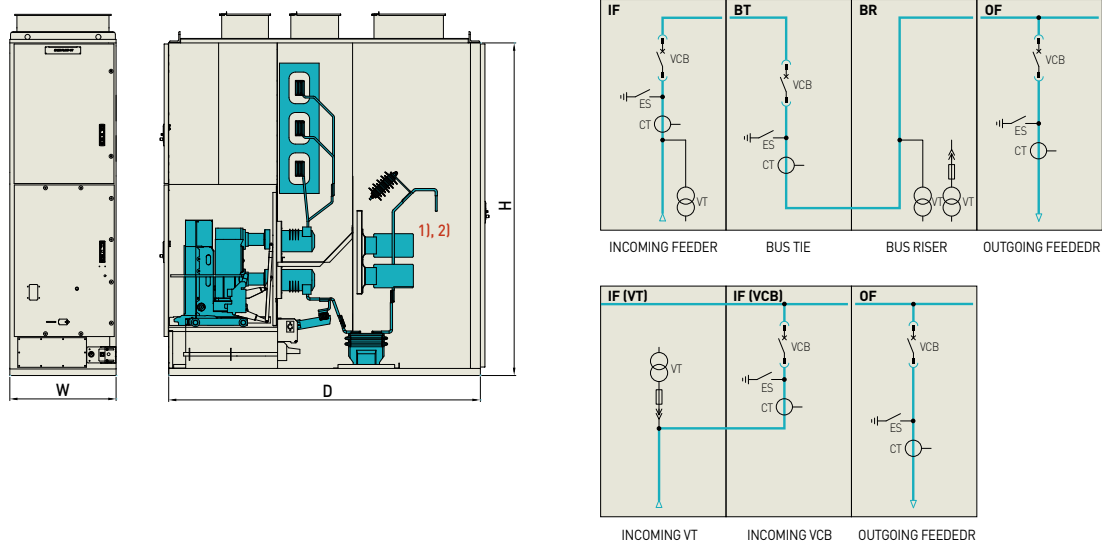
17.5 kV Switchgear

HMS-N17.5



Rated voltage (kV)		17.5	
Normal current (A)	Main-bus	≤4,000	
	Feeder	1,250/2,000/2,500/3,150/4,000	
Frequency		50/60	
Power frequency withstand voltage (kV)		38	
Lightning impulse withstand voltage (kV)		95	
Short circuit breaking current (kA)		..40	
Short time withstand current, 3 s (kA)		..40	
Peak withstand current (kA, peak)		..104	
Partition class		PM	
Loss of service continuity category		LSC2B	
Arc classification, AFLR		..40 kA	
Size (mm) ³⁾	Width (W)	1,250 A	800
		2,000 A	900
		≥2,500 A	1,000
	Depth (D)		2,200
	Height (H)		2,350

Section View (IF/OF) and Single Line Diagram of Typical Unit



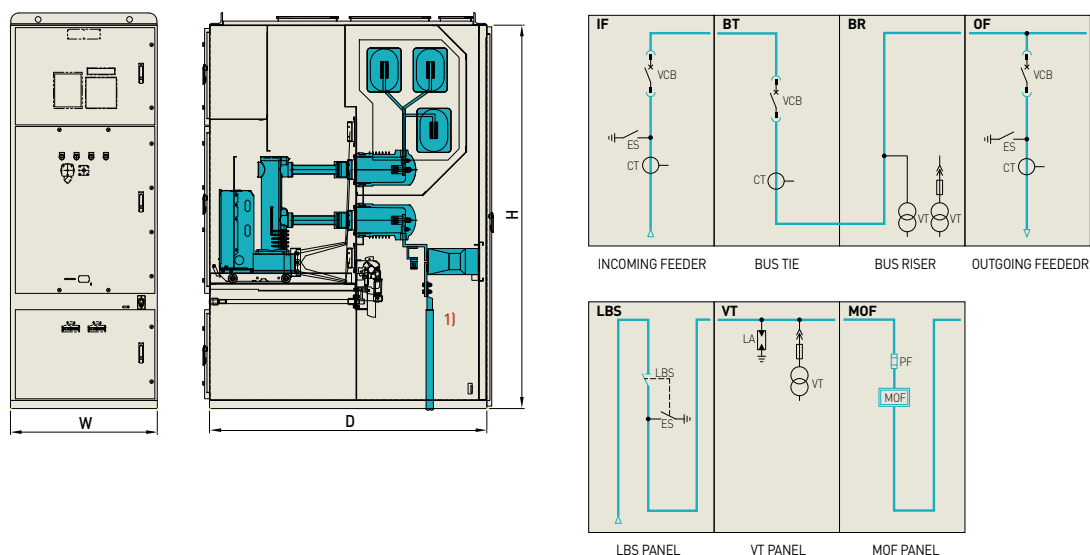
※ 1) Connection compartment can be accessed from the rear.
2) 1 ZCT and 2 CT's per phase can be installed in cable connection compartment with the panel of standard size.
3) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

HMS-N24



Rated voltage (kV)			24
Normal current (A)		Main-bus	≤3,150
		Feeder	1,250/2,000/2,500/3,150
Frequency			50/60
Power frequency withstand voltage (kV)			50
Lightning impulse withstand voltage (kV)			125
Short circuit breaking current (kA)			..25
Short time withstand current, 3 s (kA)			..25
Peak withstand current (kA, peak)			..65
Partition class			PM
Loss of service continuity category			LSC2B
Arc classification, AFLR			..25 kA
Size (mm) ²⁾	Width (W)	1,250 A	800
		≥2,000 A Width	1,000
		LBS, VT, MOF panel	1,200
	Depth (D)	Standard panel	1,700
		Extend panel ³⁾	2,200
	Height (H)		2,350

Section View (IF/OF) and Single Line Diagram of Typical Unit



- ※ 1) Connection compartment can be accessed from the rear, but front side accessible panel available on request.
 2) The size of actual panel can be different according to the rating, type, quantity, and arrangement of components.
 3) Extend panel can be used when installing a ZCT in the switchgear or more equipment than our standard is required.

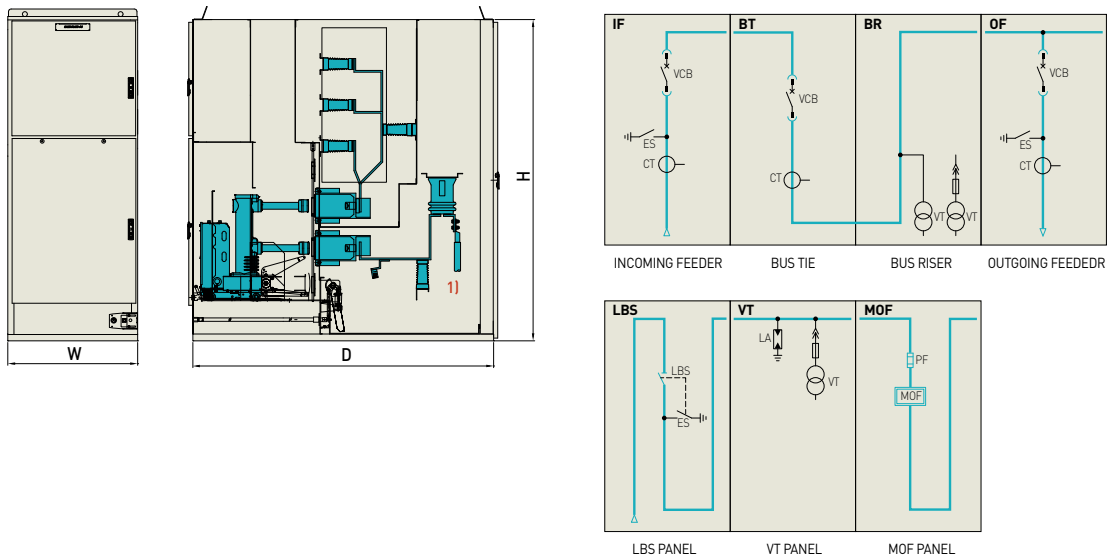
24 kV Switchgear

HMS-N108



Rated voltage (kV)		24	
Normal current (A)	Main-bus	≤2,000	
	Feeder	1,250/2,000	
Frequency		50/60	
Power frequency withstand voltage (kV)		50	
Lightning impulse withstand voltage (kV)		125	
Short circuit breaking current (kA)		..25	
Short time withstand current, 3 s (kA)		..25	
Peak withstand current (kA, peak)		..65	
Partition class		PM	
Loss of service continuity category		LSC2B	
Size (mm) ²⁾	Width (W)	1,250 A	800
		≥2,000 A	1,000
		LBS, VT, MOF panel	1,200
	Depth (D)	Standard panel	2,200
		Extend panel ³⁾	2,500
	Height (H)		2,350

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.
2) The size of actual panel can be different according to the rating, quantity, and arrangement of components.
3) Extend panel can be used when installing a ZCT in the switchgear or more equipment than our standard is required.

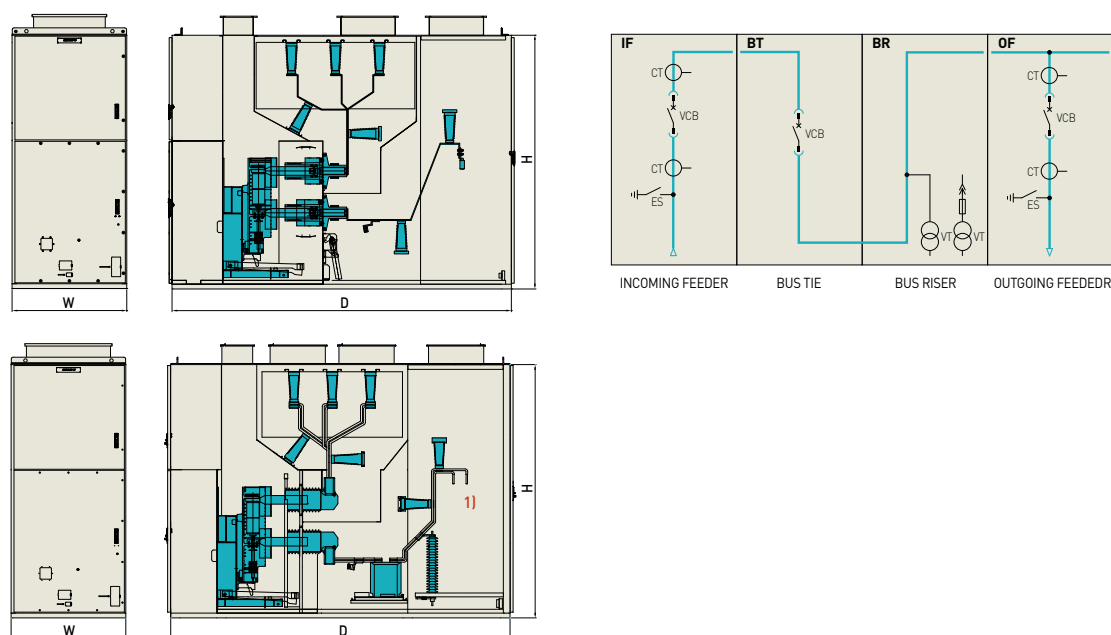
36 kV Switchgear

HMS-N36



Rated voltage (kV)		36
Normal current (A)	Main-bus	≤3,150
	Feeder	1,250/2,000/2,500/3,150
Frequency		50/60
Power frequency withstand voltage (kV)		70
Lightning impulse withstand voltage (kV)		170
Short circuit breaking current (kA)		..31.5
Short time withstand current, 3 s (kA)		..31.5
Peak withstand current (kA, peak)		..82
Partition class		PM
Loss of service continuity category		LSC2B
Arc classification, AFLR		..31.5 kA
Size (mm) ²⁾	Width (W)	1,200
	Depth (D)	3,550
	Height (H)	2,650

Section View (IF/OF) and Single Line Diagram of Typical Unit



※ 1) Connection compartment can be accessed from the rear.

2) The size of actual panel can be different according to the rating, quantity, and arrangement of components.

Switching Device

Vacuum Circuit Breaker

HYUNDAI HVF series vacuum circuit breakers are designed employing advanced vacuum principle for use in medium voltage indoor switch-gear. The breakers are fully tested according to IEC 62271-100, and have high dielectric strength with only a small contact gap, long maintenance-free life cycle, eco-friendly design, and compact size.

Ratings	
Rated voltage	7.2 kV...36 kV
Normal current	≤17.5 kV: Up to 4,000 A
	24/36 kV: Up to 3,150 A
Frequency	50/60 Hz
Short circuit breaking current	≤12 kV: Up to 50 kA
Short time withstand current, 3 s	>12 kV: Up to 40 kA
Classification	
Frequency of mechanical operation	M2
Restrike performance during capacitive current switching	E2
Electrical endurance without auto-recloser	C2
Operating and control voltage	
Operating sequence	0-0.3S-C0-3M-C0, C0-15S-C0



Vacuum Contactor

HYUNDAI HCA and UVC vacuum contactors are designed and manufactured for frequent switchings, especially taking into account safety and quality assurance. The contactor conforms with IEC 60470, and is suitable for switching and controlling squirrel cage and slipring motors, medium voltage loads and resistance furnances, and capacitors and transformers.

Ratings	
Rated operational voltage	6.6/11 kV
Normal current	Up to 400 A
Frequency	50/60 Hz
Short time withstand current, 1 s	6.3 kA
Breaking capacity	4 kA [0-3m-C0-3m-C0]
Utilization category	6.6 kV: AC3/11 kV: AC4
Operating method	Continuously energized/ Latched



Instrument Transformer

Current Transformer (CT)

The current transformers are fully cast in epoxy resin and designed to supply the measurement device and protection. These transformers can have a wound core or a bushing bar with one or more cores, with performances and accuracy classes according to IEC 60044-1 and installation requirements.

They cover the current range up to 3,150 A with the block type and up to 4,000 A with the ring type.

The switchgear can also receive a wide range of CTs of different brands.



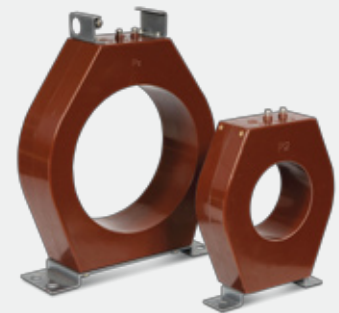
Block type CT- HDAB, HWS type



Ring type CT- HDCI, HCHR type

Zero Sequence Current Transformer (ZCT)

The zero sequence current transformers are cast in epoxy resin and used to measure earth fault current directly with ground relay for grounding system or with selective ground relay for ungrounded system.



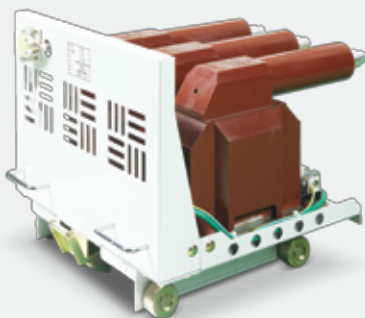
ZCT- HCZ, HCIH type

Voltage Transformers (VT)

The voltage transformers are cast in epoxy resin and designed to supply the measurement device and protection.

They conform with IEC 60044-2, and can be installed as fixed assembly or mounted on truck for removable or withdrawable type.

When they are mounted on a truck, they are mounted with medium voltage protection fuse.



VT truck with fuse



Single pole VT with fuse- HDPE type



VT without fuse- HDPE type

LV Component

Digital Protection Relay

HiMAP, HYUNDAI Intelligent Measuring And Protection device, is a multifunctional digital protection relay that has a protection function to protect incoming and feeder lines, the motor, and the transformer in one body. It also has various kinds of measuring, control, and communication functions which are based on IEC 61850 for the power management system.



HiMAP

HiMAP

HYUNDAI Intelligent Measuring And Protection device.
(HiMAP-F, F1, M, T, SC)

A multifunctional digital protection relay that has a protection function to protect incoming and feeder lines, motors, and transformers.
HiMAP-F1 for Incoming and Feeder protection, -M for Motor protection, -T for Transformer protection, -SC for Synchronization Check.



HiMAP-BCS

HiMAP-BCS

HiMAP-Bay Control for Substation.

Has a protection function to protect incoming and feeder lines, motors, and transformers.
It also has various measuring & control functions and can be linked to power management system with IEC 61850 communication protocol.



HiMAP-BC

HiMAP-BC/BCG

HiMAP-Bay Controller/Bay Control for Generator.

A bay control unit supplying power management system.
The HiMAP-BCG is on an extension series of HiMAP in generator level.



HiMAP-MC

HiMAP-MC

HiMAP-Motor Controller.

Developed to protect and control motors under 1 kV AC application.
Conventional complex buttons and switches can be integrated into the HiMAP-MC.

Digital Meter

HiCAM, HYUNDAI Intelligent Communication And Measuring device, is a multifunctional, intelligent digital meter for the AC or DC power distribution system that has a CB control and RS-486 communication system.

HiMIX, HYUNDAI Intelligent Measuring Information Box, displays measured data from HiMAP by connecting with RS-485 communication. It can also operate the circuit breaker remotely with ON/OFF and LOCAL/REMOTE & RESET switch.

HiCAM-II

Multifunctional digital meter.

A multifunctional digital meter that has integrated as many as 15 analog meters in one unit.



HiCAM-II

HiCAM-S

High performance intelligent digital measuring device.

A high performance intelligent digital measuring device for under 380 V AC.



HiCAM-S & HiCAM-S-DC

HiCAM-S-DC

Digital power meters for DC power distribution system.

Measures electricity of DC and harmonics, THD, etc...

HiMIX

HYUNDAI Intelligent Measuring Information Box.

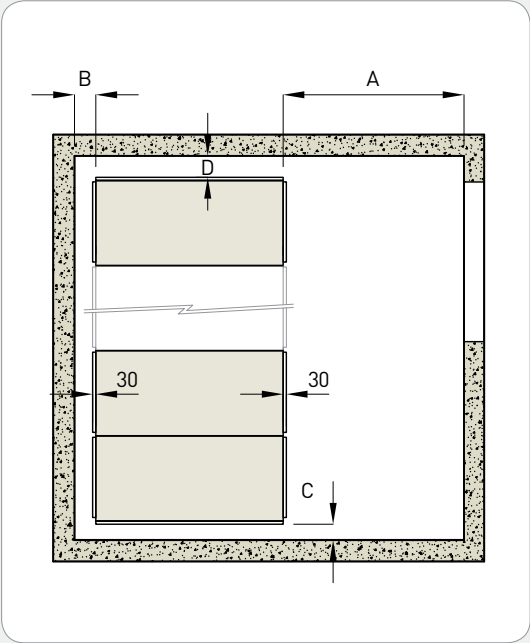
Displays measured data of HiMAP by connecting with RS-485 communication protocol and can operate circuit breaker remotely with ON/OFF & LOCAL/REMOTE & RESET switch.



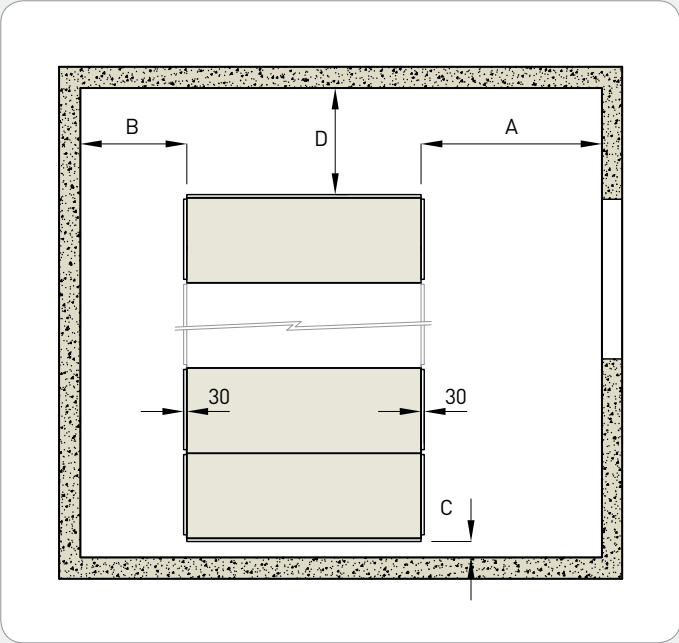
HiMIX

Room Planning

Plan View for Front Accessible Panel



Plan View for Rear Accessible Panel



Minimum Distance for the Room Planning

(Unit : mm)

Panel type		A	B	C	D
Front accessible panel	HMS-N12C	1,700	200	150	150
	HMS-N17.5C				
Rear accessible panel	HMS-112	1,700	800	150	1,000
	HMS-N12	1,700	1,000	150	1,000
	HMS-N17.5				
	HMS-N24 ¹⁾				
	HMS-N7.2D				
	HMS-N12D				
	HMS-N108	2,500	1,000	150	1,000
	HMS-N36	2,500	1,200	150	1,000

※ ¹⁾ In case of HMS-N24, front accessible panel is available on request.

HMS Medium Voltage Air-Insulated
Metal-Enclosed Switchgear


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