Building a better future
Global Leader

ISO 9001 REGISTERED
DNV
MGMT.SYS.
RvA C024
DNV Certification B.V. The Netherlands

HMS Air-Insulated Medium-Voltage

Metal-Clad Switchgear

HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

METAL-CLAD SWITCHGEAR

Safe and Reliable

Flexible, Compact Design

Easy Installation and Maintenance

HMS

with Vacuum Circuit Breaker

HMS Air-Insulated Medium-Voltage
Metal-Clad Switchgear
Internal Arc Proof

Hyundai HMS medium-voltage metal-clad switchgears and control-gears, designed to reflect IEC standards, provide the highest level of performance and reliability. The design and manufacturing activities are backed by our quality assurance program based on ISO 9001, ISO 14001 and OHSAS 18001 accreditations.

HMS Air-Insulated
Metal-Clad Switchgear

36 kV Switchgear

C O N T E N T S

General

HMS is medium-voltage air-insulated metal-clad switchgears and control-gears, factory-assembled and type tested, employing unsurpassed vacuum switching technology, for rated voltages of up to 36 kV. Arc-proof switchgears and control-gears are in accordance with IEC 62271-200 standard appendix A accessibility “A” to Front, Lateral, and Rear (AFLR).
Features include: functional compartments separated by metal earthed partitions (PM); one high, drawable circuit breaker construction, metal-earthed safety shutter; and an integral racking mechanism with maximum safety interlocks.

Design Concepts

HMS switchgears have been designed, manufactured, and type tested in line with our quality assurance program and IEC standards, ensuring:

- Maximum safety and reliability
- A minimum of maintenance, with all parts easily accessible (LSC2B)
- A simple but flexible design
- Panels resistant to internal arc faults
- Switchgear modules with integrated interlocking and control boards.
- Circuit breakers, controls and switch-disconnector panels can be lined up.
- Easy installation

Applicable Standards

HMS switchgears fully comply with the following international standards:

- IEC 62271-100 for circuit breakers
- IEC 62271-200 for switchgears
- IEC 60470 for contactors
- IEC 60694 for general purposes
- IEC 62271-102 for earthing switches

Degrees of Protection

Degree	Description of Protection
IP2X	Protection against entry of hazardous parts, including fingers or any other objects with a diameter greater than 12mm. No protection against water.
IP4X	Protection against entry of hazardous parts for wires of a diameter or strips of a thickness greater than 1.0mm. No protection against water. Recommended for power plants, offshore plants, substations, and industrial plants.
IP41	Similar to IP4X, but vertical drop protection is added.
IP51	Similar to IP41, but dust protection is added. (The intake of dust is not completely eliminated, but dust shall not penetrate in a quantity sufficient to interfere with satisfactory operation.) Recommended for coal mine plants.

Degree of Protection

Degree of protection for standard switchgears, in accordance with IEC 60529, are as follows:

- Degree of protection for the switchgear enclosures: IP4X
- Degree of protection for the internal partitions: IP2X

Other degrees of protection (IP54, etc.) are available upon request.

Operating Conditions

Hyundai's switchgears are intended for use under normal indoor operating conditions and special operating conditions.

Normal indoor operating conditions

- Ambient temperatures: maximum 40℃
- The altitude is not to exceed 1000m above sea level.
- Relative humidity: maximum 95%

Special operating conditions

The following conditions are considered special operating conditions:

- Different values from those specified as normal indoor operating conditions
- Outdoor operation
- Heavy vibrations or shocks
- A hazardous area
- Seismic requirements for nuclear power plants

Finish

The switchgear enclosure is cleaned, rust-proofed, and painted through Hyundai's standard electrostatic powder coating procedure.

Standard finish colours are Munsell no. 7.5BG6/1.5, 5Y7/1, and RAL7032 (both are a light gray).

Assembly

The HMS was designed for unsurpassed structural strength, to be arc proof, and to offer trouble-free installation and operation providing complete customer satisfaction.
Internal arc faults are minimized due to compartment partitions.
Front connected 24 points (expandable to 48 points)
The umbilical cord and plug for the circuit breaker connection are mechanically interlocked to prevent disengagement while the circuit breaker is in the service position.
The cable connection compartment is designed to handle the top or bottom entry of either cables or bus ducts.
The inherent construction flexibility of the design allows for future expansion with the addition of vertical structures at either end.
A pressure relief vent is located on each functional compartment.

Name Plate

Material: Laminated plastic, 2.0t (white background)
Fixing Method: PVC locker (sealer)

Routine Testing

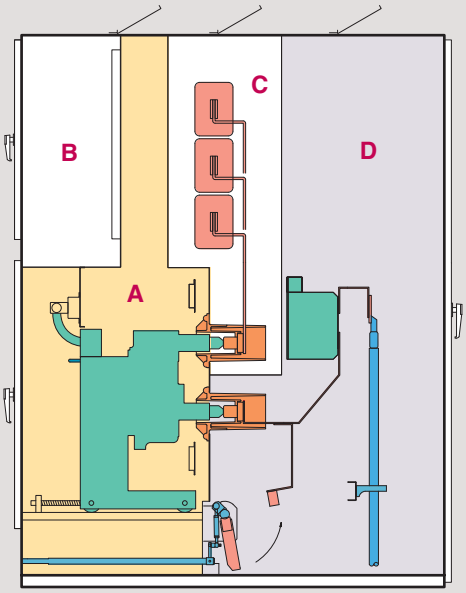
- Visual inspections and checks
- Power-frequency voltage tests on the main circuit
- Power-frequency voltage tests on the auxiliary and control circuits
- Resistance measurements for the main circuit
- Mechanical operations tests
- Electrical sequence operations
- Verification of correct wiring

Construction

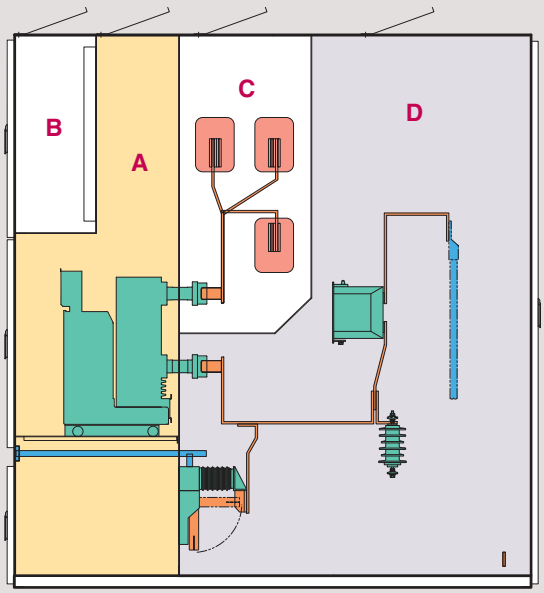
The HMS switchgear consists of the following compartments separated by earthed metal partitions.

- Circuit breaker compartment
- Low-voltage compartment
- Bus bar compartment
- Cable connection compartment

17.5kV SWGR



Typical Section View “A”



Typical Section View “B”

A Circuit Breaker Compartment

1. Withdrawable breaker truck with HVF circuit breaker
2. Plug and socket for auxiliary circuit
3. Screw for truck in and out
4. Guide for shutter operating mechanism
5. Metal shutter
6. Contact bushing

B Low-Voltage Compartment

7. Mounting plate for auxiliary devices

C Bus Bar Compartment

8. Main bus bar
9. Fixed disconnecting contact

D Cable Connection Compartment

10. Block-type current transformer
11. Earthing switch
12. Shaft for earthing switch
13. Branch bus bar
14. Epoxy insulator
15. Cable clamper

Circuit Breaker Compartment

Containing fixed contacts encapsulated by the form of insulating bushing, metal earthed shutter and integral racking mechanism & the related circuit breaker. Vacuum circuit breakers have proven to be desirable due to their improved reliability, longer maintenance free life cycle, eco-friendly design, and compact size.

Standard Features

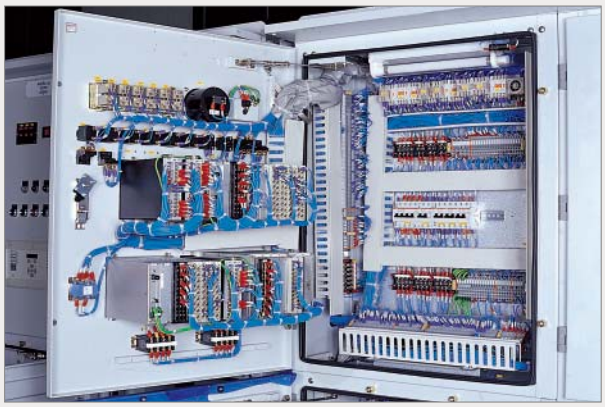
- Metal-earthed shutters automatically cover both line and load stabs when the breaker is moved to the test position.
- The breakers are interlocked to prevent sliding into the service position from the test position, and vice versa, while in the closed position.
- Closing and opening of breakers is mechanically prevented unless in the closed or open 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.
- When the breaker is interlocked in the test position, it allows the earthing switch to close.
- Each breaker cell assembly contains a closed door racking mechanism.

Circuit Breaker Removed

Circuit Breaker in the 'Service' Position

Low-Voltage (LV) Compartment

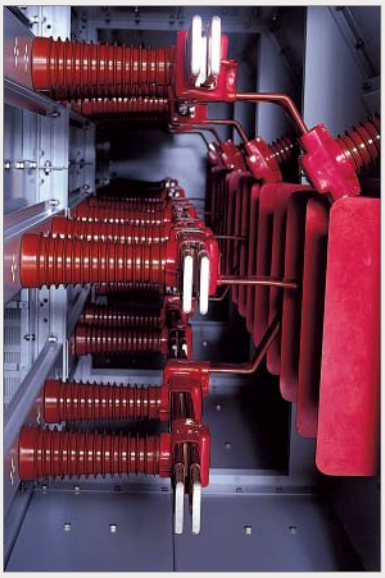
- The LV compartment with a hinged door accommodates instruments, meters, and relays, and is easily customized to the specification requirements
- All control wiring is flame retardant grade
- The opening on both sides allow for interconnection among line-up panels. The opening holes are shrouded with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


LV Compartment

Construction

Bus Bar Compartment

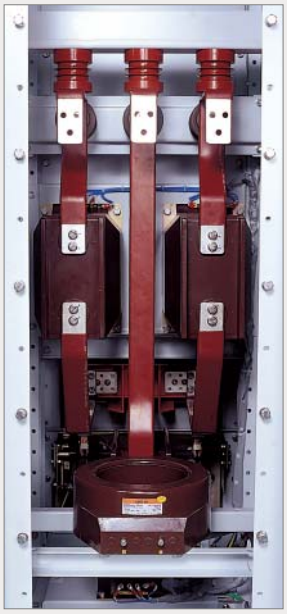
- The main bus bar system is housed in a completely isolated chamber within the cubicle assembly, and all components are fully insulated
- The main bus bars are vertically connected to the upper fixed contacts of the circuit breaker of each section
- All bus joints are torque tightened, marked in-line 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
- The bus bars are made of electrolytic copper
- Higher bus bracing minimizes bus movement from normal operation that may loosen bus joints



Bus Bar Compartment

Cable-Connection Compartment

- A liberal amount of entry area for both bus ducts or power cables is provided for top bottom entry
- Single or three-core cables up to a maximum of 6 cores per phase can be connected, depending upon the rated voltage
- Voltage transformers are fitted in a dedicated section of the cubicle, mounted on a withdrawable truck
- The earthing switch is mounted for cable earthing and the same device, normally located in the bus tier or a dedicated compartment, can also be used for the bus bar system
- The earthing bus located in the bottom runs the entire lenght of the assembly
- 6 current transformers, one balancing current transformers, voltage detectors (if requested), and surge arresters are located



Cable-Connection Compartment

Special Tools and Accessories

Special tools are supplied

- A withdrawable hand crank for breaker trucks
- A manual charging handle for C.B.s
- An operating handle for the earthing switch
- Trolley for breaker truck removal

Accessories

- Auxiliary contacts for breaker trucks in the 'service' position: 1NO + 1NC supplied on request.
- Auxiliary contact for breaker trucks in the 'test/disconnected' position: 1NO + 1NC supplied on request
- A heater (110V or 220V) by request will be supplied to the C.B. compartment
- A surge arrester
- Zero-phase current transformer

Electrical Characteristic for the HMS

Rated voltage (kV)	Rated 1 min. power-frequency withstand voltage (kV rms)	Impulse withstand voltage (kV peak)	Rated current (A)	Short-time withstand current for 3s		Internal ARC withstand current
				(kA rms)	(kA peak)	
7.2	20	60	1250, 2000 2500, 3150, 4000	~ 50	~ 130	40 kA/1s 50 kA/0.5s
12	28	75	1250, 2000 2500, 3150, 4000	~ 50	~ 104	40 kA/1s 50 kA/0.5s
17.5	38	95	1250, 2000 2500, 3150	~ 40	~ 104	40 kA/1s
24	50	125	1250, 2000	~ 31.5	~ 82	31.5 kA/1s
36	70	170	1250, 2000 2500, 3150	~ 31.5	~ 82	31.5 kA/1s

Dimensions

Cubicle Dimension for HMS

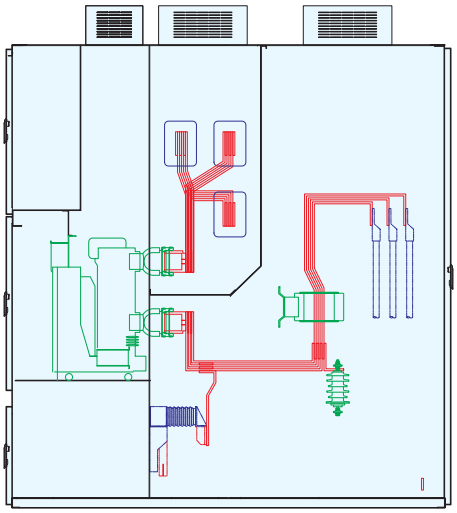
Rated voltage (kV)		Rated current (A)	Dimensions (mm)			Weight (kg) Approximately
			Width	Depth	Height	
7.2 kV (40 kA)	VCS	400	650	2200 (2000)*	2350	1600
	VCB	630, 1250	750			1700
		2000	800	2200		1800
		2500, 3150, 4000	1000			2200
7.2 kV (50 kA)	VCS	400	650	2200 (2000)*		1600
	VCB	630, 1250	800			1750
		2500, 3150, 4000	1000	2200		2200
12 kV	VCS	400	750	2200 (2000)*		1650
	VCB	630, 1250	750			1700
		2000	800	2200		1800
		2500, 3150, 4000	1000			2200
17.5 kV	VCB	630, 1250	800	2200		1800
		2000	900			1900
		3150	1000			2200
24 kV	VCB	630, 1250	800	2500(2000)*		1900
		2000, 2500	1000	2500(2200)*		2200
36 kV	VCB	1250	1200	3550(3100)*	2650	2800
		2500		3550		2900
		3150				3000

*: Cubicle dimensions can be changed in accordance with in/out power cable schedules or CT ratios.

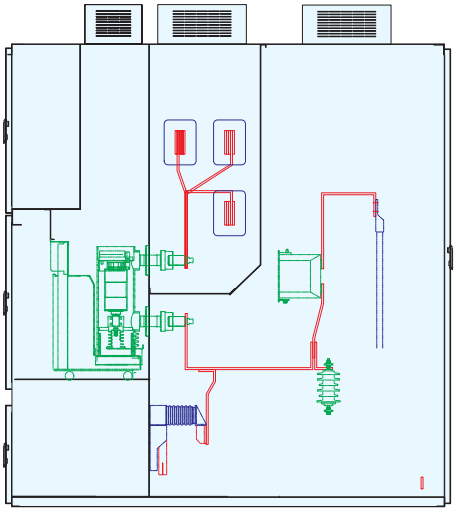
HMS Air-Insulated
Metal-Clad Switchgear

Typical Section Views (up to 7.2 kV)

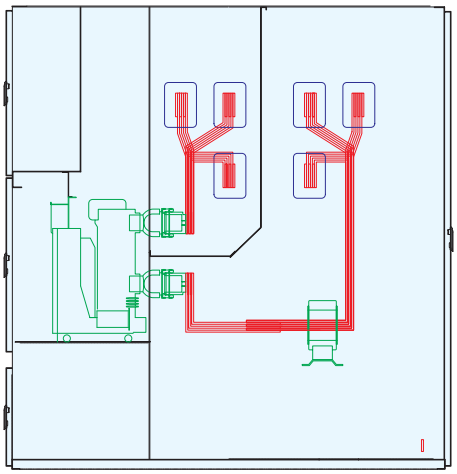
Incoming VCB Feeder Panel



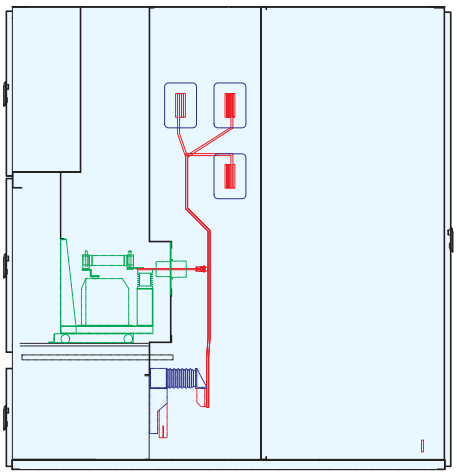
Outgoing VCB Feeder Panel



Bus Tie Panel



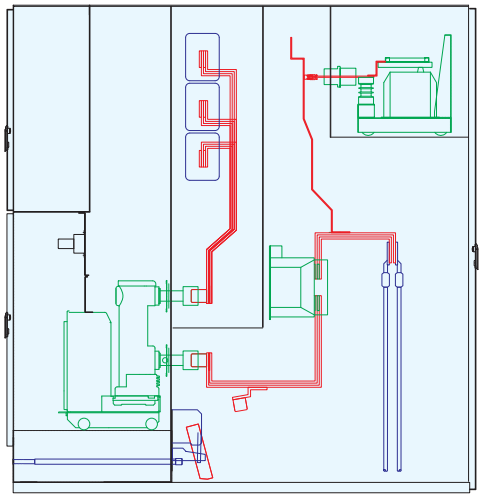
Bus PT Panel



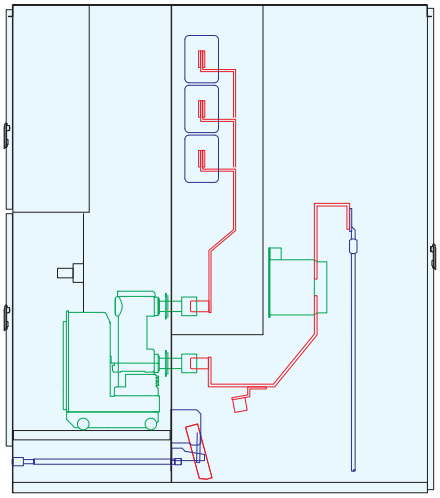
Dimensions

Typical Section Views (12 kV)

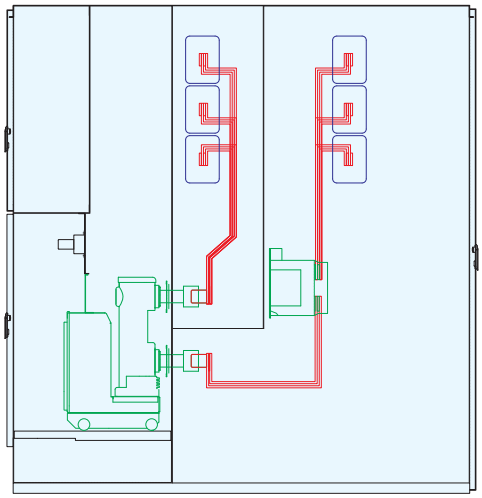
Incoming VCB Feeder Panel



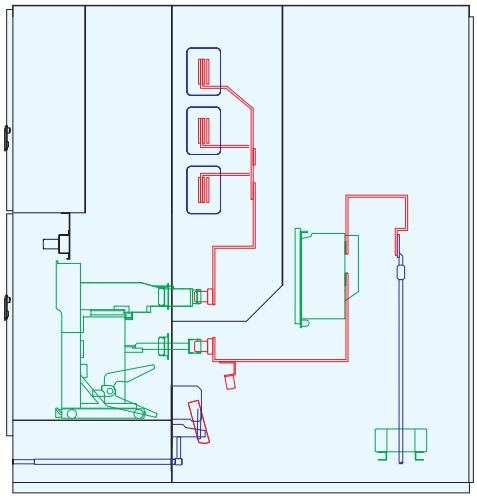
Outgoing VCB Feeder Panel



Bus Tie VCB Feeder Panel

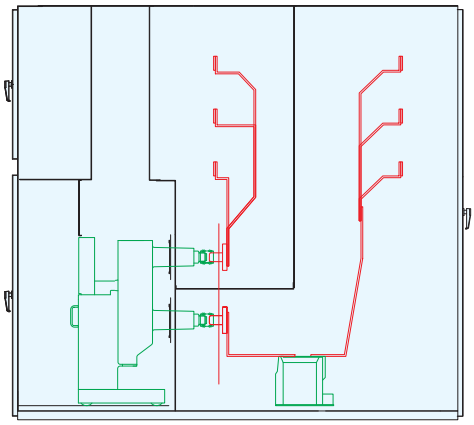


Outgoing VCS Panel

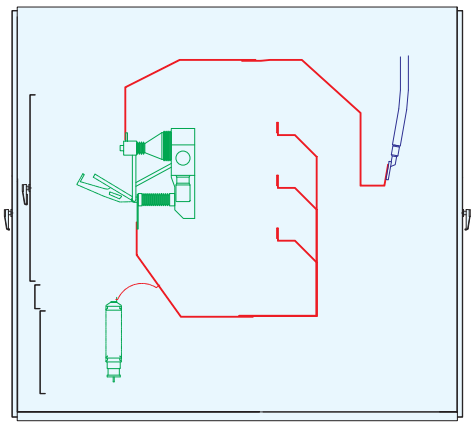


Typical Section Views (up to 24 kV)

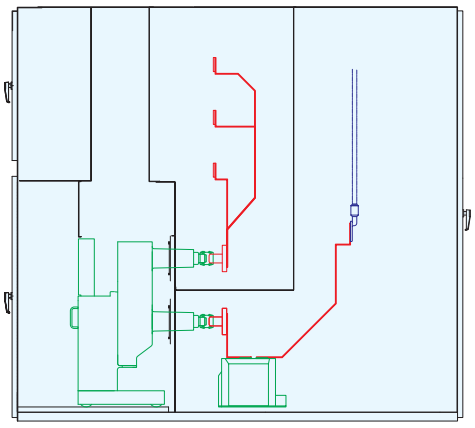
Bus Tie VCB Feeder Panel



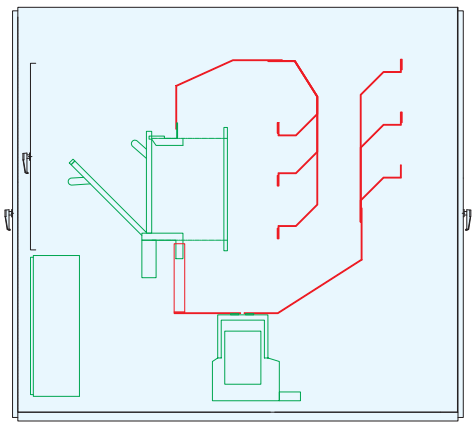
LBS Panel



Incoming & Outgoing VCB Feeder Panel



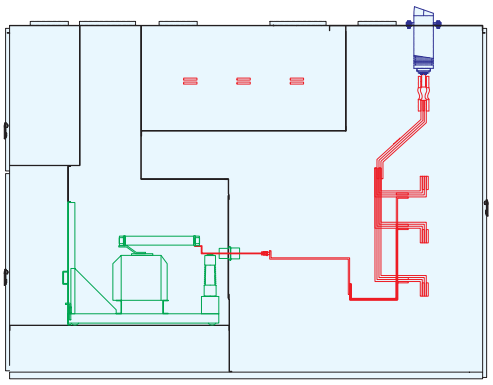
Power Fuse & MOF Panel



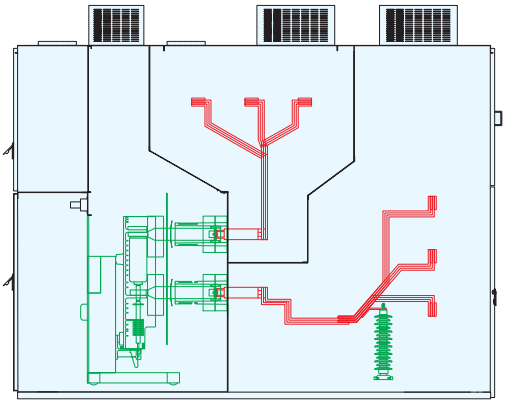
Dimensions

Typical Section Views (36 kV)

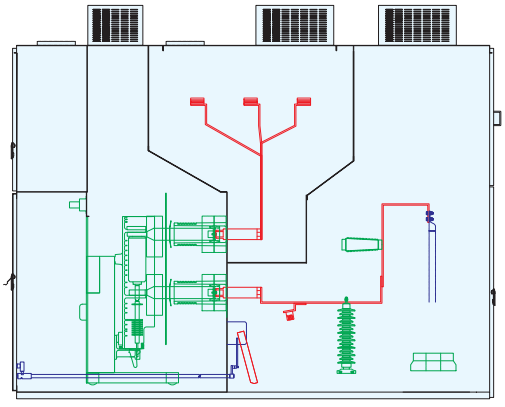
Incoming PT Panel



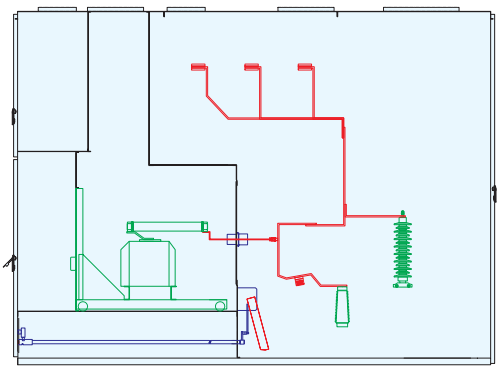
Incoming & Bus Tie VCB Panel



Outgoing VCB Panel



Bus PT Panel



Certifications

KERI-HV
CERTIFICATION SCHEME

KERI-CER Inspection · Certification service 07CECC00015

CERTIFICATE

Certificate of type conformity

Applicant	HYUNDAI HEAVY INDUSTRIES CO., LTD. 1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA
Product	AC metal-enclosed switchgear and controlgear
Type	HMS-N7.2
Ratings	3 Φ 7.2 kV 4 000/1 250 A 50 kA 50 Hz
Manufacturer	HYUNDAI HEAVY INDUSTRIES CO., LTD. 1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA
Receipt No and date	CCA07C00027(March 19, 2007)
Normative document	IEC 62271-200(2003)

The certificate indicates that the characteristics & ratings of the AC metal-enclosed switchgear and controlgear assigned by the manufacturer recorded in evaluation report were complied with the applied normative document.

The AC metal-enclosed switchgear and controlgear 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) Annexed document(Evaluation report : 07EVRC00015)

Date of issue November 05, 2007
Validation November 04, 2017

Prepared Lee, Jeong-Gee
Approved Jeong, Joo-Young

Korea Electrotechnology Research Institute

SINCERT

KERI-CER Inspection · Certification service 07CECC00018

CERTIFICATE

Certificate of type conformity

Applicant	HYUNDAI HEAVY INDUSTRIES CO., LTD. 1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA
Product	AC metal-enclosed switchgear and controlgear
Type	HMS-N12
Ratings	3 Φ 12 kV 2 000/1 250 A 40 kA 60 Hz
Manufacturer	HYUNDAI HEAVY INDUSTRIES CO., LTD. 1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA
Receipt No and date	CCA07C00006(January 19, 2007)
Normative document	IEC 62271-200 (2003)

The certificate indicates that the characteristics & ratings of the AC metal-enclosed switchgear and controlgear assigned by the manufacturer recorded in evaluation report were complied with the applied normative document.

The AC metal-enclosed switchgear and controlgear assemblies 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) Annexed document(Evaluation report : 07EVRC00018)

Date of issue November 09, 2007
Validation November 08, 2017

Prepared Park, Young-Chang
Approved Jeong, Joo-Young

Korea Electrotechnology Research Institute

SINCERT

07CECC00016

RTIFICATE

Certificate of type conformity

HYUNDAI HEAVY INDUSTRIES CO., LTD.
1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA

AC metal-enclosed switchgear and controlgear

HMS-N36

3 Φ 36 kV 2 500/1 250 A 31.5 kA 60 Hz

HYUNDAI HEAVY INDUSTRIES CO., LTD.
1, CHEONHA-DONG, DONG-GU, ULSAN, KOREA

CCA07C00002(January 19, 2007)
IEC 62271-200 (2003)

Date of issue November 05, 2007
Validation November 04, 2017

Prepared Park, Young-Chang
Approved Jeong, Joo-Young

Korea Electrotechnology Research Institute

SINCERT

HHI-WC-SE-B04-05, 2008.3 Designed by Design Korea

www.hyundai-elec.com

We build a better future

HYUNDAI HEAVY INDUSTRIES CO.,LTD. | ELECTRO ELECTRIC SYSTEMS

Head Office	1, Jeonha-dong, Dong-gu, Ulsan, Korea Tel. 82-52-202-8101~8 Fax. 82-52-202-8100
Seoul **(Sales & Marketing)**	140-2, Gye-dong, Jongno-gu, Seoul, Korea Tel. 82-2-746-7578, 7542, 7585 Fax. 82-2-746-7648 / **Domestic Sales** Tel. 82-2-746-7610, 7622 Fax. 82-2-746-7607
Orlando	3452 Lake Lynda Drive, Suite 170, Orlando, Florida 32817, U.S.A. Tel. 1-407-249-7350 Fax.1-407-275-4940
London	2nd Floor, The Triangle, 5-17 Hammersmith Grove London, W6 0LG, UK Tel. 44-20-8741-0501 Fax. 44-20-8741-5620
Tokyo	8th Fl., Yurakucho Denki Bldg. 1-7-1, Yuraku-cho, Chiyoda-gu, Tokyo, 100-0006, Japan Tel. 81-3-3212-2076, 3215-7159 Fax. 81-3-3211-2093
Dubai	Room 6206, Al Bustan Centre, Al Qusais P.O. Box 252458 Dubai, U.A.E. Tel. 971-4-263-9071 Fax. 971-4-263-9072
Sofia	1271, Sofia 41, Rojen Blvd., Bulgaria Tel. 359-2-803-3200 Fax. 359-2-803-3203
Yangzhong	Lianzhong Avenue, Xinba Scientific and Technologic Zone, Yangzhong City, Jiangsu 212212, China Tel. 86-511-842-0666, 0500 Fax. 86-511-842-0668, 0231