

ProGIS MV Gas Insulated Switchgear



Global Top Energy, Machinery & Plant Solution Provider



About HYOSUNG

Hyosung Power & Industrial Systems PG is a division under Hyosung which sension a seven performance groups (PGs). In addition to establishing itself as a world-place manufacturer of electrical equipments, green technology and industrial machineses. Hyosung is also the largest producer of tire cords and spandex in the global market and a the second largest supplier of ATMs in the USA.

01 Our Business

Brief introduction of Hyosung Power & Industrial Systems

Hyosung Power & Industrial Systems Performance Group

Hyosung Power & Industrial Systems Performance Group(PG), a comprehensive energy solution provider, boasts world-leading technology in the global power industry and has secured a competitive capability on par with that of top competitors in transformers, switchgears, motors, generators, gear units, industrial machineries, industrial pumps, and wind energy business.

With globalization as one of our top priorities, we have achieved outstanding increase in sales over the past few years thanks to the enhancement in Hyosung's quality, technology, and brand recognition among overseas clients, which include North America, Europe, the Middle East, and Asia. We expect such robust performance, marked by an increasing number of orders from the overseas market, to continue in the future.

At the heart of our capability to grow as a comprehensive energy solution provider is our global organization structure. Hyosung Power & Industrial Systems PG is divided into four business areas or performance units(PU), depending on the types of flagship products : Power Systems PU, Industrial Machinery PU, HYOSUNG GOODSPRINGS PU, and the Wind Energy Business Division.

Power Systems Performance Unit

Hyosung's Power Systems PU provides a full spectrum of power generation, transmission, and distribution services, from design and engineering to the maintenance of equipment. Power System PU has been building up on cutting-edge information technology resources and developing substation automation systems, such as power monitor and control systems, and early detection and prevention systems.

Such vast product assortment and technical know-how is based on our product development history. In 1992, Hyosung was the first in Korea, and the sixth in the world, to develop a 765kV ultra-high voltage (UHV) transformer, and, in 1999, was the first in the world to manufacture the 2-breaker 800kV gas insulated switchgear (GIS). Those technological achievements gave Hyosung world-wide recognition as one of the global major manufacturers.

The Power systems PU is continuously striving to secure competitiveness in every aspect of quality, technology, sales, services, and management, in order to satisfy customer needs globally and become a top-tier company in the world by providing customers with the best quality products and services in the power systems sector.



ProGIS (MV Gas Insulated Switchgear)

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02 Sustainability

Our sustainability principles are the backbone of the way we design and manufacture products



Quality Assurance

Hyosung strives for excellence. We believe excellence can only be achieved through absolute quality and value for customers. In order to create quality products, we believe that all of the actions of every single employee must be focused in the highest level of quality. In order to achieve such levels, we have implemented a quality assurance policy and programs that make our philosophy into a reality. Our Quality Assurance Policy was founded based on the management policy of the president and meets the demands of ISO 9001. As a globally active company, we are committed to comprehensive and quality management through three quality strategies: quality management system, customer-focused management system, and concentration on core competencies.

The comprehensive quality management system ensures that we completely comply with all compliances and applicable legislation, codes, and standards in addition to implementing efficient operation of our management resources to eliminate unnecessary waste. Our customer-focused management system clarifies and simplifies our first priority which is customer satisfaction. All of our work is

aimed to exceed customer needs and provide exceptional value through quality standards, flexibility, and innovation.

Finally, we concentrate on our core competencies for strict quality control and continual improvement which provides quality products and cost-saving to our clients via advancement in technical capacity and technological innovation.

We implement our policy via a Quality Management Team manages research laboratories, including the Measurement Standard Laboratory, the Chemical Analysis Laboratory and the Material Analysis Laboratory to maintain a strict control over quality.



Environment Protection Policy

Hyosung understands the impact of Hyosung's activities in the environment and works to protect the environment from pollution, manages the environmental impacts of Hyosung's products and technologies, and prevents future pollution and harmful effects in the environment by investing in environmentally-friendly products and solutions.

Based on this eco-philosophy of shared responsibility, Hyosung has implemented a comprehensive environmental protection program that aims to minimize our impact on the environment and conserve resources. Our environmental policy fulfils all requirements of the ISO 14001.

03 R&D

Inspiring innovation, creation and expertise

Hyosung R&D Center identifies innovation, creation, and expertise as core value, and concentrates on world class R&D activities in the 21st century with a philosophy aspiring after customer satisfaction, quality priority, and performance orientation. Hyosung pursues to be the world's best company in the field of heavy electrical machinery, industrial & electrical electronics engineering, and energy system. Ever since establishment in 1978, R&D Center had led the development of domestic technology. Along with the Anyang and Changwon labs, the group has endeavored to produce core technology and world-class products in the areas of heavy electrical machinery, energy system, electrical electronics engineering, and industrial automation system.

Research Areas

Hyosung R&D Center engages in the activities in the field of energy system, solution & service, applied electrical and electronic technology, basic core technology, technology of improved reliability, core components, and new materials.

Energy System

- Renewable energy
- (wind system, wind turbine, wind PCS, solar system, PV PCS, fuel cell, co-generation)
- Electric Vehicle (EV charger, EV motor)

Solution & Service

- Power facility diagnosis algorithm and system
- Power facility lifecycle evaluation system
- Service solution for remote diagnosis for prevention

Applied Electrical & Electronic Technology

- Power conversion system
- Flexible AC transmission system and high voltage direct current
- Power quality solution

Basic Core Technology

- Fortified technology in structural dynamics,
- electromagnetics, heat transfer analysis, etc.
- Skills for system simulation, analysis and evaluation
- Business support technology

Technology with Improved Reliability

- Test data analysis and testing facility
- Analysis of lifecycle and cause of error
- Reliability assessment (environment-friendliness, durability, long-term degradation, and more)

Core Components and New Materials

- Organic and inorganic insulation materials
- Silicon forming technology
- Intelligent sensor
- (facility diagnosis, CT, PT, VT, LA, and more)



Gas Insulated Switchgear

To meet various requirements for substations, Hyosung designs and manufactures a wide range of SF₆ GIS system.

It is Hyosung s strength to supply high-quality products at a competitive price. Hyosung GIS is used in various sites including building, factory, subway and other public facilities requiring high reliability, stability and minimum floor area.

Hyosung can design and manufacture the product that fulfills the requirements of the clients 100% in anywhere in the world. Hyosung designs and manufactures various types of SF₆ GIS of maximum rated breaking current of 63kA and the rated voltage ranging from 24kV to 800kV.

All the models comply with IEC, ANSI, IEEE and other international standards and are exported to the clients around the world.



KERI **KERI** Certification

TEST REP

KERI

KERI Certification

MANAGEMENT SYSTE

ISO14001

ISO9001

1 8 45

Hyosung GIS Series

Hyosung MV GIS

Spec.	Model Economy		iomy	General	Heavy duty	Export
Shape	External shape					
	SIZE (W×D×H)	650 × 1200 × 2050	550 × 1200 × 2350 600 × 1200 × 2350	600×2100×2600	$\begin{array}{c} 700 \times 2100 \times 2700 \\ 800 \times 2200 \times 2700 \end{array}$	$\begin{array}{c} 600 \times 1800 \times 2350 \\ 700 \times 2200 \times 2700 \end{array}$
	Rated voltage	24kV	25.8kV	25.8kV	25.8 / 36kV	36 / 38kV
Rating	Rated current	1250 / 2000A	630/1250/2000A	600 / 2000A	1250 / 2500 / 3150A 1250 / 2000 / 4000A	1250 / 3000A
	Instantaneous Current	25kA / 3sec	25kA / 3sec	25kA / 1sec	40kA/3sec	40kA / 3sec

Main Features

Hyosung GIS is designed for maximum safety of product and user



Compartmentalized structure

Gas compartment structure prevents expansion of accident to the whole area.

Bellows at the tank connector

Bellows absorbs temperature changes, tolerances in assembly, differential settlement of concrete base, and excessive displacement caused due to earthquake, maintaining mechanical safety of the system.



GIS model that passes the internal arc test

Hyosung GIS is C-GIS that passed the internal arc test and is recognized with its stability in operation.

Satisfy customer's needs by the world's first commercially available of 4000A, 3150A main bus

Offer bets solution considering the customer installed capacity.

Hyosung GIS adopts the best design technology available

Hyosung GIS adopts the latest design technologies such as 3-D electromagnetic analysis, structural analysis and heat distribution analysis, based on the know-how acquired through development of ultra high voltage GIS such as 362kV and 800kV.



Secure 4000A electric current-applying performance and target percentage of allowance above 15% by meets the temperature rise threshold by design improvements of VCB Heat dissipation structure.









HYOSUNG

Main Features

Hyosung GIS regards the convenience of users as the most importance



Modularized parts

Hyosung GIS has an ES/DS unit, a circuit breaker unit and a panel unit all in modular structure for quick disassembly and prompt recovery with minimum replacement.

Uninterrupted expansion

Double bus GIS supports uninterrupted expansion and maintenance of each feeder without need to power down the system.D

HYOSUNG GIS uses high-quality materials only for enhanced reliability.

Al₂O₃ insulation spacer

Typical epoxy fill contains Si, which reacts with oxygen and water in SF₆ gas, resulting in failure in maintaining the dielectric strength. Hyosung GIS adopts Al_2O_3 to avoid such problem.

Tulip contact connections

The tulip contactor which is typically used for GIS of 154kV or higher facilitates installation and disassembly, and guarantees firm contact.





06¹07 ProGIS

Tulip Contactor

Al₂O₃ insulation spacer

Specifications

Specifications of HYOSUNG MV GIS

Model		ProC2	ProC2XX25		ProG2XX25		ProG2XX40			ProG3XX31	
ltem		ProC21225S	ProC22025S	ProG20625	ProG22025	ProG21240	ProG22540	ProG23140	ProG31231	ProG32531	
Ra	ated voltage (kV)	25.8	25.8	25.8	25.8	25.8	25.8	25.8	36	36	
R	ated current (A)	1250	2000	600	2000	1250	2500	3150	1250	2500	
Rated	breaking current (kA)	25	25	25	25	40	40	40	31	31	
Rated	breaking time (Cycle)	5	5	5	5	5	5	5	5	5	
Power frequency withstanding voltage (kV/60sec)		70 (77)	70 (77)	70 (77)	70 (77)	70 (77)	70 (77)	70 (77)	70 (80)	70 (80)	
Basic Imp	ulse Insulation Level (kV)	150 (165)	150 (165)	150 (165)	150 (165)	15 0(165)	150 (165)	150 (165)	170 (195)	170 (195)	
I	Frequency (Hz)	50/60	50/60	60	60	60	60	60	50/60	50/60	
Op	perating method	Electric/ Manual									
Dimonsions	Width (mm)	550	550	600	600	700	700	700	600	600	
(mm)	Height (mm)	2350	2350	2600	2600	2350/2700	2350/2700	2350/2700	2350	2350	
(mm)	Depth (mm)	1200	1200	2000	2000	2100	2100	2100	1800	1800	
Rated gas pressure (kgf/cm2·G)		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Minimum	gas pressure (kgf/cm2·G)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	

External shape









	Model	ProG	3XX40		ProU2XX40			ProU3XX40	
ltem		ProG31240	ProG32540	proU21240	ProU22040	ProU24040	ProU31240	ProU32040	ProU34040
Ra	ated voltage (kV)	38	38	25.8	25.8	25.8	36	36	36
R	Rated current (A)	1250	3000	1250	2000	4000	1250	2000	4000
Rated	breaking current (kA)	40	40	40	40	40	40	40	40
Rated	breaking time (Cycle)	3	3	5	5	5	5	5	5
Power fr vo	requency withstanding oltage (kV/60sec)	95(105)	95(105)	70(80)	70(80)	70(80)	70(80)	70(80)	70(80)
Basic Imp	ulse Insulation Level (kV)	200(220)	200(220)	170(195)	170(195)	170(195)	170(195)	170(195)	170(195)
	Frequency (Hz)	50/60	50/60	60	60	60	60	60	60
Ol	perating method	Electric/ Manual							
D:	Width (mm)	700	700	700	700	800	700	700	800
Dimensions (mm)	Height (mm)	2350	2350	2700	2700	2700	2700	2700	2700
(11111)	Depth (mm)	1800	1800	2300	2300	2300	2300	2300	2300
Rated ga	as pressure (kgf/cm2·G)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum	gas pressure (kgf/cm2·G)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

External shape





* Note : The figures in brackets in the withstanding voltage fields are the values of disconneting switch(DS).





1 Professional

- 2 Gas insulated SWGR (Compact) / (Ultra)
- Rated voltage [Unit : 10,000]
- 4 Rated current [Unit : 100]
- 6 Rated breaking current



Economy

25.8kV 25kA 1250A(ProG21225) 25.8kV 25kA 2000A(ProG22025)



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
0	MAIN BUS	6	CABLE PLUG	9	ANN. LAMP
2	DS ASSEMBLY	6	СТ	0	GAS DENSITY MONITOR
8	VCB ASSEMBLY	7	PANEL ASSEMBLY	1	CONTROL SWITCH
4	MAIN TANK	8	DIGITAL RELAY	12	LPS (LINE POTENTIAL SIGNALLER)



SIDE VIEW



FRONT VIEW



ONE-LINE DIAGRAM

DS



SIDE VIEW

INCOMING



SIDE VIEW

PT

SIDE VIEW





ONE-LINE DIAGRAM

INCOMING

LPS

4

ONE-LINE DIAGRAM



FRONT VIEW



PT 25.8kV 25kA



Economy / Arc duct

24kV 25kA 1250A(ProG21225) 24kV 25kA 2000A(ProG22025)



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
0	MAIN BUS	6	VT	Û	CONTROL SWITCH
2	DS ASSEMBLY	0	CABLE PLUG	12	GAS DENSITY MONITOR
8	VCB ASSEMBLY	8	CT	ß	M/INDICATION (CB)
4	MAIN TANK	0	CABLE COMPARTMENT	(4)	DIGITAL RELAY
6	ARC DUCT	0	M/INDICATION (DS/ES)	(5	LPS (LINE POTENTIAL SIGNALLER)

Main with Line PT







ONE-LINE DIAGRAM

Main / Feeder



SIDE VIEW





ONE-LINE DIAGRAM

Bus Section



SIDE VIEW







General / Heavy duty

25.8kV 40kA 1250A(ProG21240) 25.8kV 40kA 2500A(ProG22540) 25.8kV 40kA 3150A(ProG23140)



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
0	MAIN BUS	6	CABLE PLUG	9	ANN. LAMP
2	DS ASSEMBLY	6	СТ	0	GAS DENSITY MONITOR
8	VCB ASSEMBLY	7	PANEL ASSEMBLY	1	CONTROL SWITCH
4	MAIN TANK	8	DIGITAL RELAY	12	LPS (LINE POTENTIAL SIGNALLER)







ONE-LINE DIAGRAM

DS







ONE-LINE DIAGRAM

PT









Heavy duty

25.8kV 40kA 1250A(ProU21240) 25.8kV 40kA 2000A(ProU22040) 25.8kV 40kA 4000A(ProU24040) 36kV 40kA 1250A(ProU31240) 36kV 40kA 2000A(ProU32040) 36kV 40kA 4000A(ProU34040)



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
0	MAIN BUS	6	CABLE PLUG	9	ANN. LAMP
2	DS ASSEMBLY	6	СТ	0	GAS DENSITY MONITOR
8	VCB ASSEMBLY	7	PANEL ASSEMBLY	1	CONTROL SWITCH
4	MAIN TANK	8	DIGITAL RELAY	12	LPS (LINE POTENTIAL SIGNALLER)



SIDE VIEW





ONE-LINE DIAGRAM

Bus Section



SIDE VIEW

ONE-LINE DIAGRAM

PT







PT 25.8kV 40kA 4000A 쑸



Export

36kV 31.5kA 1250A(ProG31231) 36kV 31.5kA 2500A(ProG32531) 38kV 40kA 1250A(ProG31240) 38kV 40kA 3000A(ProG33040)



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
0	MAIN BUS	6	CABLE PLUG	9	ANN. LAMP
2	DS ASSEMBLY	6	СТ	0	GAS DENSITY MONITOR
8	VCB ASSEMBLY	7	PANEL ASSEMBLY	1	CONTROL SWITCH
4	MAIN TANK	8	DIGITAL RELAY	12	LPS (LINE POTENTIAL SIGNALLER)



SIDE VIEW





ONE-LINE DIAGRAM

DS



SIDE VIEW





ONE-LINE DIAGRAM

PT









ONE-LINE DIAGRAM



FRONT VIEW

Double Bus (Optional)

All models can adopt double bus. Double bus model supports uninterrupted expansion.



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	1 MAIN BUS	6	MAIN TANK	0	ANN. LAMP
2	2 MAIN BUS	0	CABLE PLUG	12	GAS DENSITY MONITOR
8	1 DS ASSEMBLY	8	СТ	3	CONTROL SWITCH
4	2 DS ASSEMBLY	0	PANEL ASSEMBLY	0	LPS (LINE POTENTIAL SIGNALLER)
6	VCB ASSEMBLY	0	DIGITAL RELAY		



SIDE VIEW





ONE-LINE DIAGRAM

Bus Section



SIDE VIEW







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700

FRONT VIEW

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700



ONE-LINE DIAGRAM





Example of Standard Configuration

Single Bus



Double Bus



Characteristic of Hyosung GIS

GIS is the substation equipment containing switches such as circuit breakers, disconnectors and earthing switches, and auxiliary devices such as current transformers, voltage transformers and lightning arrestors in the metal enclosure filled with SF6 gas.

Hyosung GIS can be installed in minimum space, provides high reliability and safety of operation, and facilitates repair and maintenance. It is especially suitable for installation in highly-polluted area or seaside district.

Hyosung GIS ranging from 25.8kV to 800kV model has passed the CESI (Italy) and KEMA (The Netherlands) test as well as the Korea Electrotechnology Research Institute's test.

Highest technology

- · GIS technology for wide range of voltage and current
- Voltage : 24kV \sim 800kV
- Current : 630A \sim 8000A



Experience in supplying 25.8kV GIS to many projects

- Delivery 3,800 set up to date since GIS introduced in 1993 in KEPCO.
- Residential part : Delivery 2,300 set in Samsung electronics / Posco and so on



Reliable parts

- \cdot AL₂O₃ spacer with superior insulation
- Tulip contractor proven through application in high-voltage facilitiesn
- Highly reliable V.I.(Vacuum Interrupter)



Superior installation capability

- Experience in various projects
- Operating expert staffs (Switchgear team) Guarantees quality from commencement to A/S



Products of Panel Team in HYOSUNG

ProGIS (C-GIS)



Advanced MV GIS with maximum reliability and stability, and minimum installation surface has been developed based on abundant experiences and technical capabilities acquired through contracts with many domestic / overseas clients.

ProSWGR



ProSWGR is a metal-clad type standard high-voltage switchgear with inner spaces completely separated by partitions. The switchgear supports system operations, such as circuit breaking and monitoring, from the front panel while the door is closed.

Metal Clad Switchgear



Metal Clad Switchgear is selfdesigned and developed by HYOSUNG and have the high reliability & performance.

Low Voltage Metal Enclosed Switchgear



Low Voltage Switchgear will provide safe power distribution with handy operation, easy to installation & maintenance.

Motor Control Center



Motor Control Center is designed with operator's safety and easy to handling. It will provide the motor's status supervision.

Supervisory & Control Panel



Supervisory & Control Panel will provide the easy to operation protection and control of power system by humane facto application.

IPB (Isolated Phase Bus)



IPB is designed for high current, critical equipment or large capacity power plants. IPB is applied to the bus with the rated voltage of 36kV or lower and the rated current of 5,000~50,000A.

NSPB (Non Segregated Phase Bus)



Metal Enclosed Bus is a good method for main bus application in power plants, substations, buildings and factories.

25.8kV EGIS



25.8kV EGIS is an environmet-friendly product using dry-air insulation technology instead of SF_6 gas. The model adopts dual buses for uninterrupted expansion and maintenance.

Spot Network System



Spot Network System will eliminate the care about a power interruption and will provide the optimized installation area.

GIB (Gas Insulated Bus)



GIB(Gas Insulated Bus duct) is an enclosure that apply to the main bus equipment to connect the C-GIS and TR which composed of conductor, insulating material and filled with SF₆ gas which has excellent insulating properties.



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