from 72.5 kV to 800 kV

Gas Insulated Switchgear

HYUNDAI
HEAVY INDUSTRIES CO., LTD.
Gas Insulated Switchgear
Gas Insulated Switchgear

from 72.5 kV to 800 kV

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Gas Insulated Switchgear to meet future power requirements with many excellent features

The SF₆ Gas Insulated Switchgear (GIS) contains major substation equipment, such as gas circuit breaker, disconnecting switch, earthing switch, voltage transformer, current transformer, and lightning arrester in the grounded metallic enclosure and is filled with SF₆ gas, which has the best insulation and arc-quenching capabilities.

Accordingly, GIS is the most developed switchgear with many excellent features including compactness, safety, high reliability, easy operation, long maintenance intervals and compatibility with its surroundings. Especially, the development of the 3-phase encapsulated GIS achieves a more economical and compact substation.
What are the outstanding characteristic features of HYUNDAI GIS?

**Small space requirements**
Availability and price of land play an important role in selecting the type of switchgear to be used. GIS substation requires only 5-10% installation space compared with conventional outdoor switchgear substations. Accordingly, HYUNDAI GIS makes it possible to install a substation in densely populated areas, mountainous terrains, etc. The GIS can be installed even in residential buildings and used effectively in limited space.

**Protection against contact with live parts**
The earthed enclosure which contains all live parts of the switchgear provides extra safety to operating personnel.

**Protection against pollution**
Since all live parts of GIS are contained in the metallic enclosure, they are fully protected against environmental effects, such as salt deposits in coastal regions, storms, ice, air pollution, and humidity. Thus, high reliability can be attained.

**Aesthetic compatibility with surroundings**
GIS meets recent requirements for aesthetic compatibility with its surroundings.

**Modular design**
The GIS comprises as many standardized modules as possible, resulting in high quality production and easy assembly.

**Gas tightness**
The seal-off system is adopted as our standard, resulting in a small number of pipes and valves. Thus, high reliability in gas tightness can be secured.

**Adoption of the puffer type gas circuit breaker**
HYUNDAI GIS uses the puffer type gas circuit breaker, resulting in simple construction, fewer components, elimination of gas heating components, and high reliability.

**Simple maintenance requirements**
Its design makes it possible to check and exchange contacts of the circuit breaker as it is installed without any disassembly.
Superior quality control system assures customer satisfaction

Our responsibility is to produce equipment of high reliability

Hyundai places great emphasis on quality assurance. A stringent quality control system covers the entire manufacturing process.

ISO 9001 Certificates

KEMA Certificates
Availability of various circuit arrangement

SF₆ Gas Insulated Switchgears of each rated voltage are essentially designed as standardized modules, so that all kinds of buses and feeders can be built up by the arrangement of these modules.
Gas Insulated Switchgear

- Single bus arrangement
- Double bus arrangement

- Single bus arrangement with by-pass bus
- Double bus arrangement with by-pass isolator

- 1½ circuit breaker arrangement
- Ring bus arrangement
- Main and transfer bus arrangement
## Technical Data

<table>
<thead>
<tr>
<th>Type of GIS</th>
<th>72.5 SP</th>
<th>72.5 SP-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>kV rms</td>
<td>72.5</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>kV rms</td>
<td>140</td>
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<tr>
<td>Rated switching impulse withstand voltage</td>
<td>kV peak</td>
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<tr>
<td>Rated lightning impulse withstand voltage</td>
<td>kV peak</td>
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<tr>
<td>Rated frequency</td>
<td>Hz</td>
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<tr>
<td>Rated normal current</td>
<td>A rms</td>
<td>2000</td>
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<tr>
<td>Rated short-circuit breaking current</td>
<td>kA rms</td>
<td>20</td>
</tr>
<tr>
<td>Rated making current</td>
<td>Circuit breaker kA peak</td>
<td>52</td>
</tr>
<tr>
<td>Line earthing switch</td>
<td>kA peak</td>
<td>52</td>
</tr>
<tr>
<td>Rated short-time current (1 sec/3 sec)</td>
<td>kA rms</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating method</th>
<th>Circuit breaker</th>
<th>Motor spring</th>
<th>Motor spring</th>
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<tbody>
<tr>
<td></td>
<td>Disconnecting switch</td>
<td>Motor/Manual</td>
<td>Motor/Manual</td>
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<table>
<thead>
<tr>
<th>Rated SF₆ gas pressure (at 20°C)</th>
<th>Circuit breaker kG</th>
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<th>6</th>
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<tr>
<td>Other equipment</td>
<td>kg/², G</td>
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<td>4</td>
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
<th>Enclosure</th>
<th>2 phase</th>
<th>2 phase</th>
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<tbody>
<tr>
<td>Circuit breaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disconnecting switch, Earthing switch</td>
<td>2 phase</td>
<td>3 phase</td>
</tr>
<tr>
<td>Feeder bus</td>
<td>2 phase</td>
<td>3 phase</td>
</tr>
<tr>
<td>Main bus</td>
<td>2 phase common</td>
<td>3 phase common</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation</th>
<th>Indoor, Outdoor</th>
<th>Indoor, Outdoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>145 SP/SP-1</td>
<td>170 SP</td>
<td>170 SR</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>123 / 145</td>
<td>170</td>
<td>170</td>
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<tr>
<td>275</td>
<td>325</td>
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<tr>
<td>650</td>
<td>750</td>
<td>750</td>
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<tr>
<td>50 / 60</td>
<td>50 / 60</td>
<td>50 / 60</td>
</tr>
<tr>
<td>3150</td>
<td>3150</td>
<td>4000</td>
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<td>40</td>
<td>31.5</td>
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<td>130</td>
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<tr>
<td>40</td>
<td>31.5</td>
<td>50</td>
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<td>Hydraulic, Motor spring</td>
<td>Hydraulic</td>
<td>Hydraulic</td>
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<td>6</td>
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<td>4</td>
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<td>3 phase common</td>
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<tr>
<td>Indoor, Outdoor</td>
<td>Indoor, Outdoor</td>
<td>Indoor, Outdoor</td>
</tr>
</tbody>
</table>
Type 72.5 SP/SP-1 Switchgear for 72.5 kV 20 kA/31.5 kA

Hyundai 72.5kV GIS is a quality product with integrated technology for more compact design and high availability.

- 2 phase type GIS suitable for Railway substation
- Reliable motor spring mechanism
- Ingenious modular system

72.5 SP
- 3 phase common enclosure type
- Combined disconnector and earthing switch
- Reliable motor spring mechanism

72.5 SP Switchgear

Product Range
- Gas to Air Bushing
- Disconnector for VT
- Voltage Transformer
- Earthing Switch Make-Proof Type
- Line Disconnector
- Earthing Switch for Maintenance
- Circuit Breaker
- Current Transformer
Type 145 SP/SP-1 Switchgear for 145 kV 40 kA

Type 145 SP & 145 SP-1 are arranged in module with utmost flexibility, which is designed with 3 phase common enclosure to reduce switchgear bay width and hysteresis loss.

145 SP
- Achieved all the advantages of metal clad design
- Hydraulic operating mechanism
- Single pressure puffer type

145 SP-1
- Space saving, Compact design
- Motor spring operation type
- Use of the thermal energy of the arc

### 145 SP Switchgear

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Bus</td>
</tr>
<tr>
<td>2</td>
<td>Bus Disconnector</td>
</tr>
<tr>
<td>3</td>
<td>Earthing Switch for Maintenance</td>
</tr>
<tr>
<td>4</td>
<td>Circuit Breaker</td>
</tr>
<tr>
<td>5</td>
<td>Current Transformer</td>
</tr>
<tr>
<td>6</td>
<td>Line Disconnector</td>
</tr>
<tr>
<td>7</td>
<td>Earthing Switch Make-proof Type</td>
</tr>
<tr>
<td>8</td>
<td>Cable Head Box</td>
</tr>
<tr>
<td>9</td>
<td>Insulation Spacer</td>
</tr>
<tr>
<td>10</td>
<td>Local Control Panel</td>
</tr>
</tbody>
</table>
145 SP-1 Switchgear

- Circuit Breaker
- Main Bus
- Lightning Arrester
- Cable Head
- Voltage Transformer
- 3-Position Switch
- Current Transformer
- Local Control Panel
Type 170 SP Switchgear for 170 kV 31.5 kA

Type 170 SP will give you various advantages in application, operation and maintenance with excellent features to meet future power requirements.

- Reliable opening and closing operation
- Operation mechanisms are well accessible
- A number of auto reclosing operations are available without recharging
- Extremely low maintenance
Gas Insulated Switchgear

**Typical Arrangements**

---

**Single Bus**
- Line Feeder
- Bus Sectionalizer
- Transformer Feeder (Gas to Oil Bushing)

**Double Bus**
- Line Feeder
- Bus Coupler
- Transformer Feeder (Gas to Air Bushing)

Bay width: 1700 mm
Type 170 SR Switchgear for 170 kV 50 kA

170 SR technology is based on many years of experience.

- **Condenserless type circuit breaker**
  It will minimize the ferro resonance phenomenon and have higher breaking capacity.

- **Tightness of enclosure**
  It is obtained with well-trained manufacturing.
Typical Arrangements

**Single bus**
- Line Feeder
- Bus Sectionalizer
- Transformer Feeder (Gas to Oil Bushing)

**Double bus**
- Line Feeder
- Bus Coupler
- Transformer Feeder (Gas to Air Bushing)

Bay width: 1800 mm
Type 300 SR Switchgear for 245 kV/300 kV 50 kA

To meet the wide range of different requirements from customers, this compact type 300 SR has been designed with the most reliable features such as single interrupter unit and hydraulic operation from which modular elements are simply selected to permit virtual layout as desired.

Section of 300 SR Switchgear

1. Main Bus
2. Bus Disconnector
3. Earthing Switch for Maintenance
4. Circuit Breaker
5. Current Transformer
6. Line Disconnector
7. Make-proof Earthing Switch
8. Cable Head Box
Type 362 SL/SR/SU Switchgear for 362 kV 40 kA/50kA/63kA

Main Bus
Earthing Switch for Maintenance
Bus Disconnector
Current Transformer
Circuit Breaker
Line Disconnector
Earthing Switch Make-proof Type
Voltage Transformer
Cable Head Box

Bay width : 5000 mm
Type 362 SL/SR/SU Switchgear for 362 kV 40 kA/50 kA/63 kA

Hyundai 362 kV GIS includes 3 models divided by the rated short time current of 40 kA, 50 kA and 63 kA.
Having pneumatic operating mechanism, 362 SL/SR model (covering up to 50 kA) can be easily arranged especially in the 1½ breaker system.
Our new 362 kV 63 kA GIS (Model: 362 SU) is developed to meet the soaring demands of the GIS with high breaking capacity. Hydraulic mechanism is adopted to operate circuit breaker for high fault current interrupting up to 63 kA.

High grade of corrosion resistant aluminium was selected for the enclosure. Due to the low weight, it is one of the lightest constructions of its kind. In addition, this model has the flexibility in the lay-out arrangements for various type of circuit configurations.
Type 550 SR Switchgear for 550 kV 50 kA

There has been continuous demands for economic efficiency, compactness, high reliability, low operating cost & long operating life from GIS users. All these requirements are fulfilled by our switchgear type 550 SR for rated voltages up to 550 kV.

The circuit breaker works on hydraulic mechanism with well-known puffer principle. One interrupter breaking system by dual motion and 2cycle-breaking time show the prominent technology of Hyundai.

By adopting vertical type arrangement, the space-saving and good accessibility are assured.
Type 800 SR Switchgear for 800 kV 50 kA

The 800 SR type GIS is a high-technology product, leading the future for the ultra-high voltage substation. Since the introduction of the 800 kV GIS in the year 2000, Hyundai has been one of the pioneers of this technology.

Section of 800 SR Switchgear

1. Main Bus
2. Lightning Arrester
3. Earthing Switch for Maintenance
4. Bus Disconnector
5. Current Transformer
6. Circuit Breaker
7. Line Disconnector
8. High Speed Grounding Switch
9. Line Earthing Switch
10. Gas to Air Bushing
Research & Development is an essential requirement for improvement and advance of modern technology.

HHI’s commitment to research and development has been a motivating factor of the company’s various technical achievements and will be vital in its advance into the 21st century.

HHI is operating three renowned in-house research institutes: HMRI (Hyundai Maritime Research Institute), HIRI (Hyundai Industrial Research Institute) and HEMRI (Hyundai Electro-Mechanical Institute) as well as an overseas institute (HUNELEC) in Budapest, Hungary.

In these institutes fully equipped with state-of-the-art R&D devices, HHI’s top-notch brains are exploring the future of high technology.

Hyundai Gas Insulated Switchgear have been supplied to most of the countries all over the world and their technology, quality and reliable performance have been widely acknowledged by the customers around the world.
1. General Requirements

- **Applied standard**: 
- **Rated voltage**:  
- **Rated frequency**: 50 Hz [ ] 60 Hz [ ]
- **Rated power frequency withstand voltage**: 
- **Rated switching impulse withstand voltage**:  
- **Rated lightning impulse withstand voltage**:  
- **Rated short-circuit breaking current**: kA 
- **Rated duration of short circuit**: 1 sec [ ] 3 sec [ ]
- **First-pole-to-clear factor**: 1.3 [ ] 1.5 [ ]
- **Duty cycle (of circuit breaker)**:
  - Operating time (of circuit breaker) : Break time Cycle
  - **Rated current**: Main bus A Feeder bus A
  - **Auxiliary voltage**:
    - Control voltage V Motor voltage V
    - Heater voltage V
  - **Ambient temperature** : Max °C Min °C

2. Instrument Transformers

- **Current transformer**: Primary current : A
  - Secondary current : A
  - Burden : VA
  - Accuracy class :
- **Voltage transformer**: Primary voltage : kV
  - Secondary voltage : V
  - Tertiary voltage : V
  - Accuracy class/Burden : / VA

3. Connections

- **Overhead line connection**:
  - Insulator creepage distance : mm/kV
- **Cable connection**:
  - Cable type :
  - Cable size :

Please enclose single-line diagram of required GIS with this sheet
- **Quantity of GIS**: bay(s)
- **Delivery** :
- **Site location (City, Town)** :
- **Service condition** :
  - Indoor ( )
  - Outdoor ( )