Building a better future
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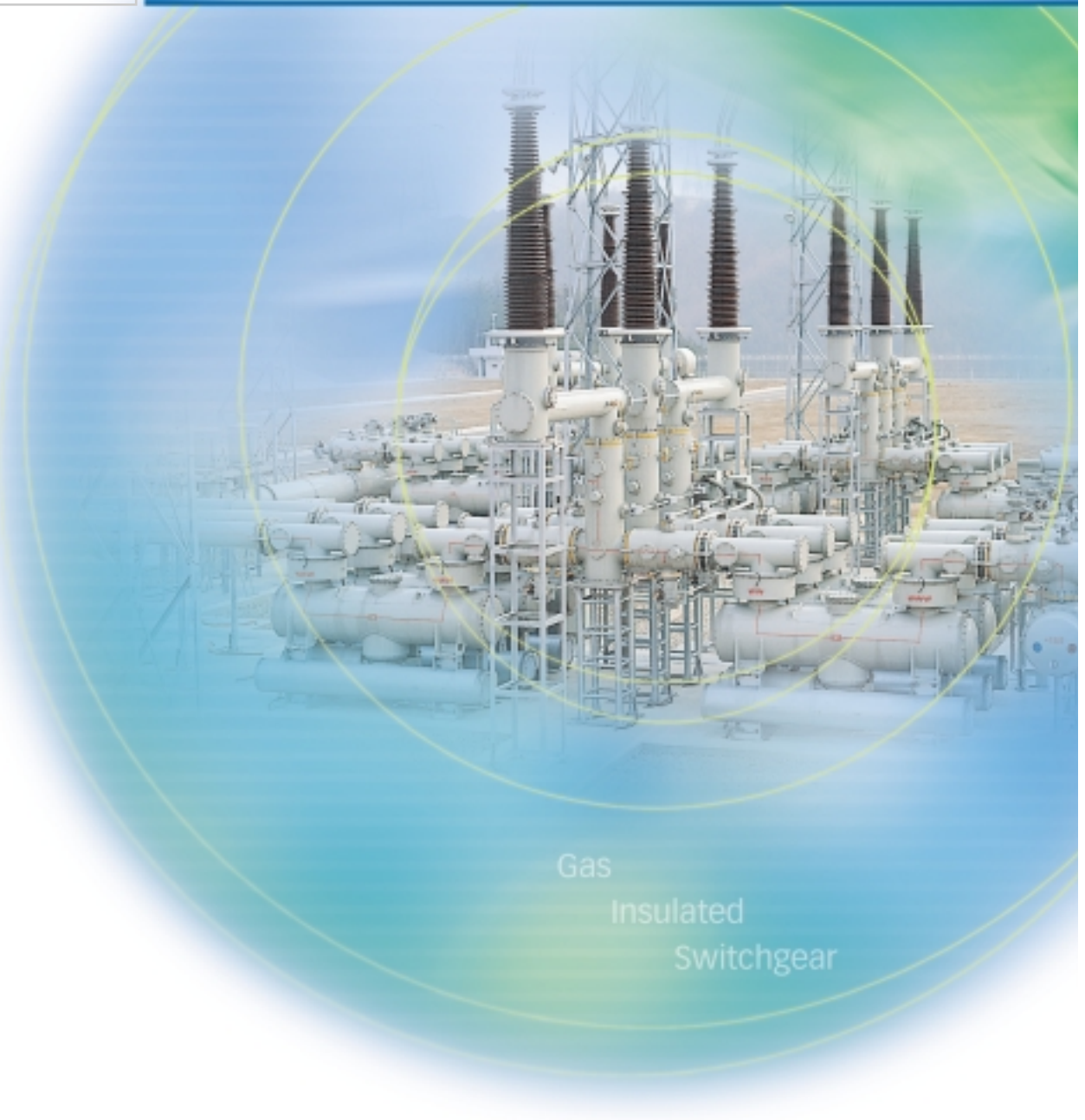
RvA C024
DNV Certification B.V., The Netherlands

from 72.5 kV to 800 kV

Gas Insulated Switchgear



HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

We Build a Better Future!




Gas Insulated Switchgear




from 72.5 kV to 800 kV

Gas Insulated Switchgear

CONTENTS

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

The SF_6 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 SF_6 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.

145 kV 40 kA GIS

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.

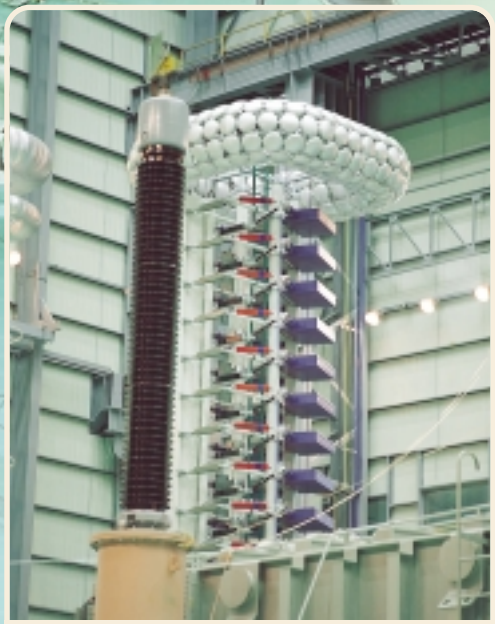
Adoption of the puffer type gas circuit breaker

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

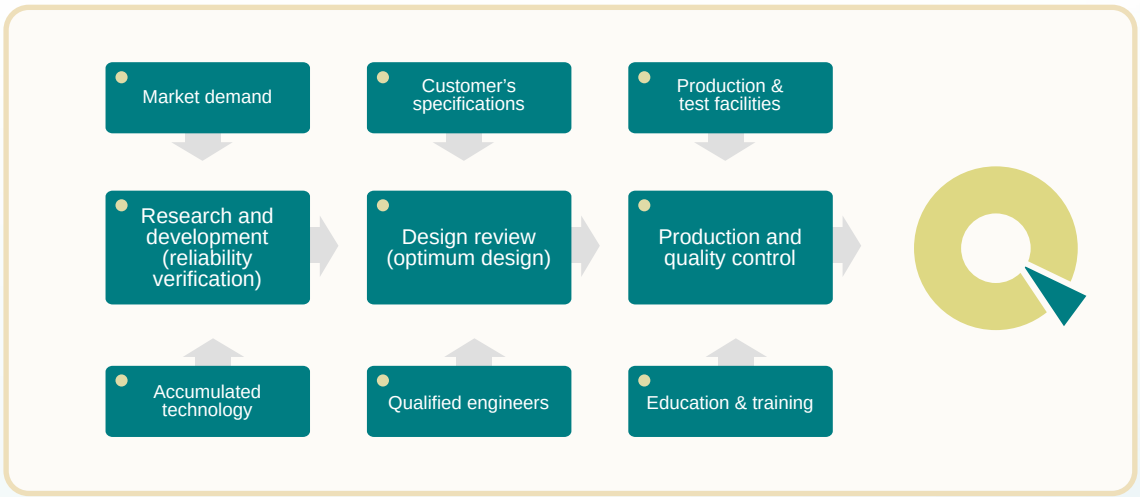
Simple maintenance requirements

Its design makes it possible to check and exchange contacts of the circuit breaker as it is installed without any disassembly.

AC high voltage test set



4000 kV impulse voltage generator



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.

145 kV 40 kA GIS under factory test

Under factory test

ISO 9001 Certificates

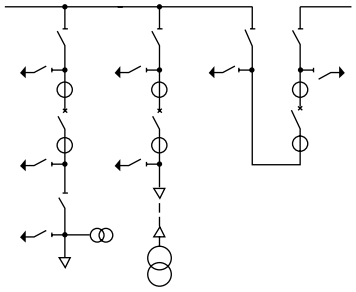
KEMA Certificates

Availability of various circuit arrangement

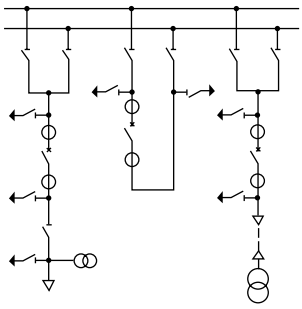
SF_6 Gas Insulated Switchgears of each rated voltage are essentially designed as standardized modules, so that all kinds of buses and feeders can be built up by the arrangement of these modules.

800 kV 50 kA GIS

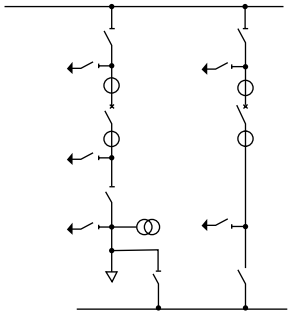
Single bus arrangement



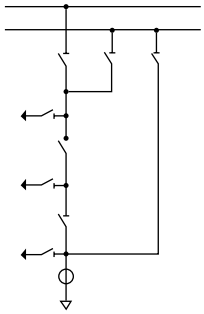
Double bus arrangement



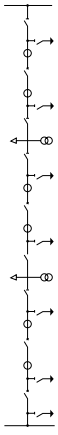
Single bus arrangement with by-pass bus



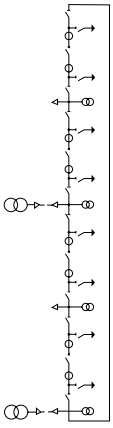
Double bus arrangement with by-pass isolator



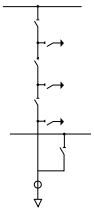
1½ circuit breaker arrangement



Ring bus arrangement



Main and transfer bus arrangement



Technical Data

Type of GIS			72.5 SP	72.5 SP-1
Rated voltage		kV rms	72.5	72.5
Rated power frequency withstand voltage		kV rms	140	140
Rated switching impulse withstand voltage		kV peak	-	-
Rated lightning impulse withstand voltage		kV peak	325	325
Rated frequency		Hz	50 / 60	50 / 60
Rated normal current		A rms	2000	2000
Rated short-circuit breaking current		kA rms	20	31.5
Rated making current	Circuit breaker	kA peak	52	81.9
	Line earthing switch	kA peak	52	81.9
Rated short-time current (1 sec/3 sec)		kA rms	20	31.5
Operating method	Circuit breaker		Motor spring	Motor spring
	Disconnecting switch		Motor/Manual	Motor/Manual
	Earthing switch		Motor/Manual	Motor/Manual
Rated SF_6 gas pressure (at 20°C)	Circuit breaker	kg/㎠,G	5	6
	Other equipment	kg/㎠,G	3	4
Number of breakers			1	1
Enclosure	Circuit breaker		2 phase	3 phase
	Disconnecting switch, Earthing switch		2 phase	3 phase
	Feeder bus		2 phase	3 phase
	Main bus		2 phase common	3 phase common
Installation			Indoor, Outdoor	Indoor, Outdoor

362 kV 40 kA GIS S/S

145 SP/SP-1	170 SP	170 SR	300 SR	362 SL	362 SR	362 SU	550 SR	800 SR
123 / 145	170	170	245 / 300	362	362	362	550	765
275	325	325	460	450	450	450	710	830
-	-	-	850	950	950	950	1175	1425
650	750	750	1050	1175	1175	1175	1550	2250
50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
3150	3150	4000	4000	4000	4000	8000	4000	8000
40	31.5	50	50	40	50	63	50	50
100	80	130	125	100	130	158	130	125
100	80	130	125	100	130	158	130	125
40	31.5	50	50	40	50	63	50	50
Hydraulic, Motor spring	Hydraulic	Hydraulic	Hydraulic	Pneumatic	Pneumatic	Hydraulic	Hydraulic	Hydraulic
Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor	Motor/Manual
Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual	Motor/Manual
6	6	6	6	6	6	7	7	7
4	4	4	5	5	5	4 / 5	4.5	4
1	1	1	1	2	2	2	1	2
3 phase common	3 phase common	3 phase common	Single phase	Single phase	Single phase	Single phase	Single phase	Single phase
3 phase common	3 phase common	3 phase common	Single phase	Single phase	Single phase	Single phase	Single phase	Single phase
3 phase common	3 phase common	3 phase common	Single phase	Single phase	Single phase	Single phase	Single phase	Single phase
3 phase common	3 phase common	3 phase common	Single, 3 phase	3 phase common	3 phase common	Single, 3 phase	Single phasee	Single phase
Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor	Indoor, Outdoor

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.

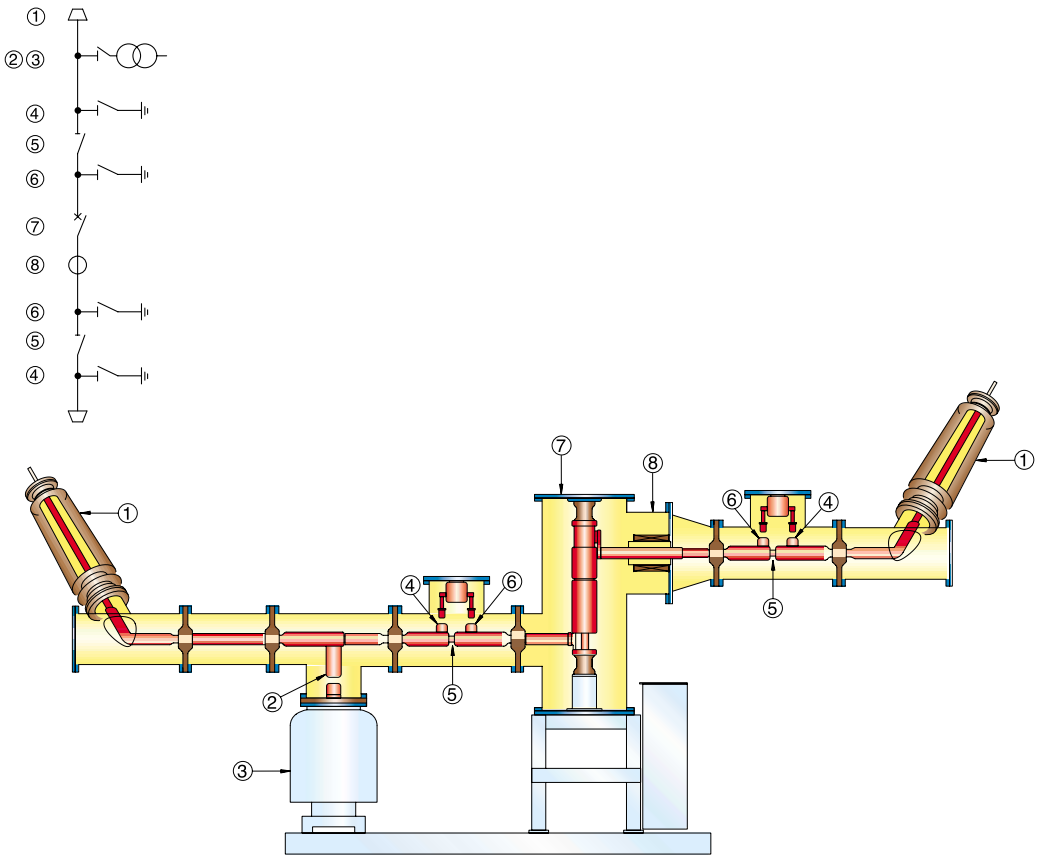
72.5 SP

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

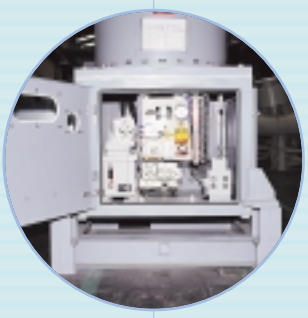
72.5 SP-1

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

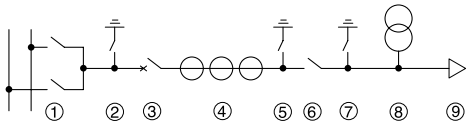
72.5 SP Switchgear

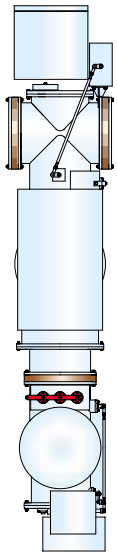


① Gas to Air Bushing
② Disconnector for VT
③ Voltage Transformer
④ Earthing Switch Make-Proof Type
⑤ Line Disconnector
⑥ Earthing Switch for Maintenance
⑦ Circuit Breaker
⑧ Current Transformer

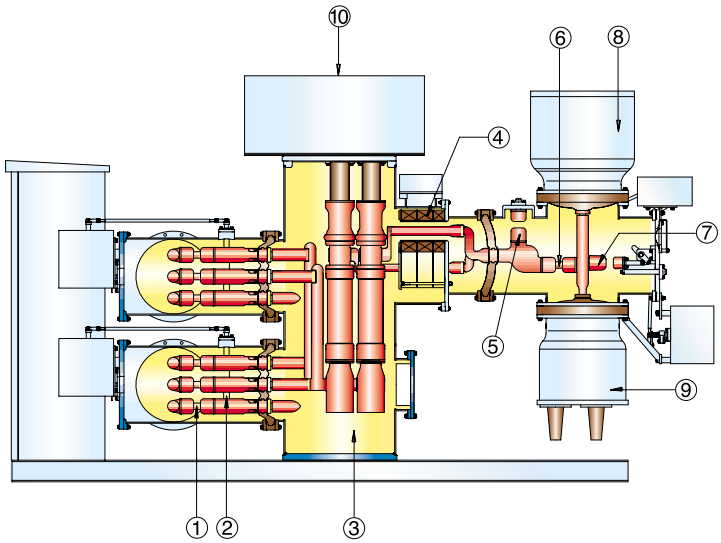


72.5 SP-1 Switchgear





Top View



① Disconnecting Switch
② Earthing Switch(Maintenance)
③ Circuit Breaker
④ CT
⑤ Earthing Switch(Maintenance)
⑥ Line Disconnecting Switch
⑦ Line Earthing Switch
⑧ Voltage Transformer
⑨ Cable Head Box
⑩ Operating Mechanism

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 hysterisis loss.

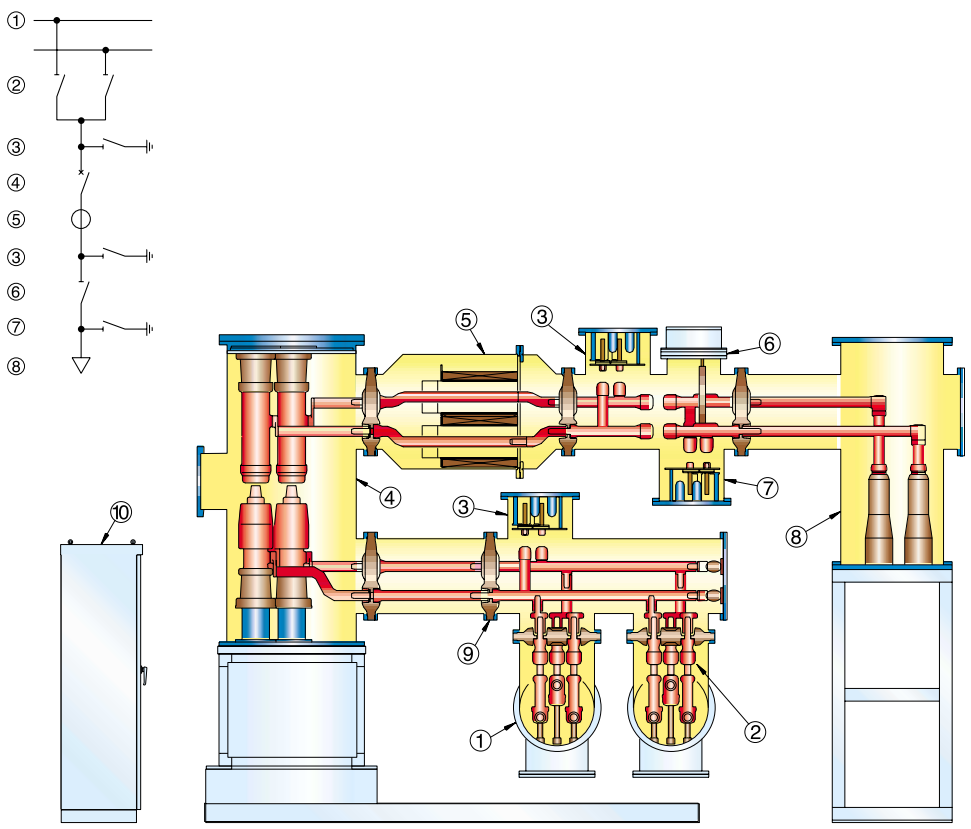
145 SP

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

145 SP-1

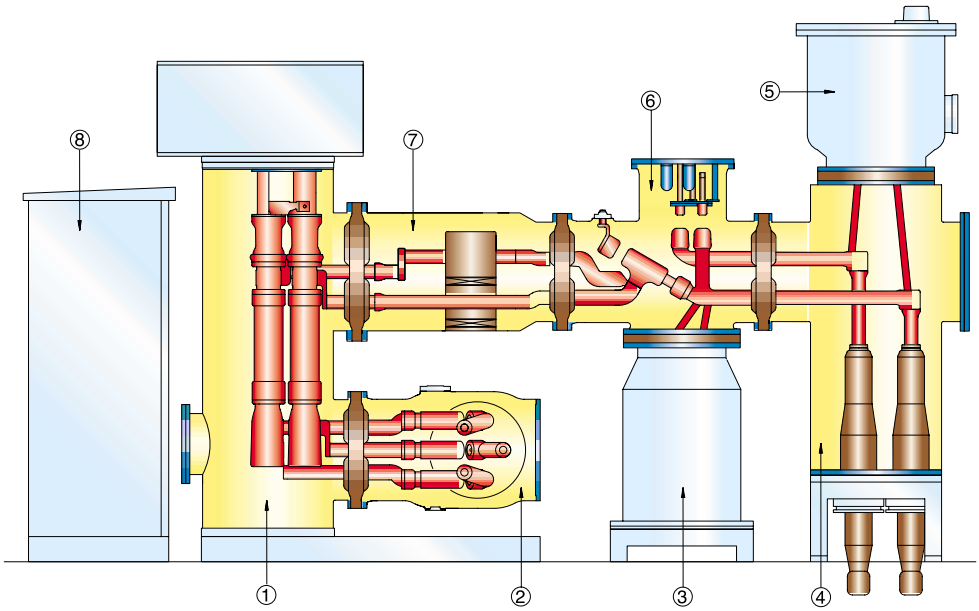
- Space saving, Compact design
- Motor spring operation type
- Use of the thermal energy of the arc

145 SP Switchgear



① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Circuit Breaker
⑤ Current Transformer
⑥ Line Disconnector
⑦ Earthing Switch Make-proof Type
⑧ Cable Head Box
⑨ Insulation Spacer
⑩ Local Control Panel

145 SP-1 Switchgear



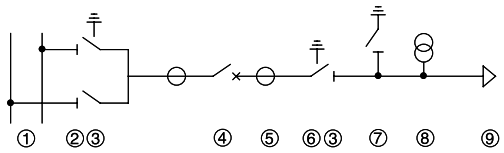
① Circuit Breaker
② Main Bus
③ Lightning Arrestor
④ Cable Head
⑤ Voltage Transformer
⑥ 3-Position Switch
⑦ Current Transformer
⑧ Local Control Panel

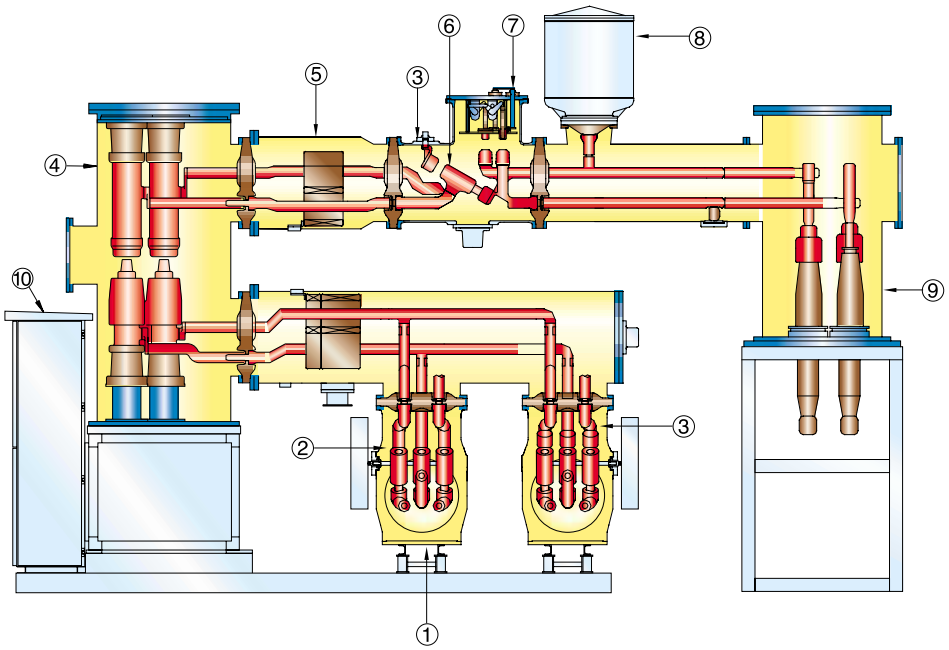
Type 170 SP Switchgear for 170 kV 31.5 kA

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

Section of 170 SP Switchgear



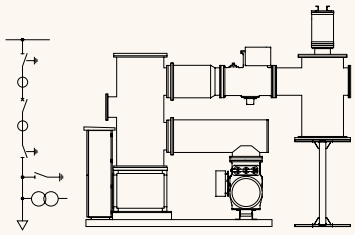


① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Circuit Breaker
⑤ Current Transformer
⑥ Line Disconnector
⑦ Make-proof Earthing Switch
⑧ Voltage Transformer
⑨ Cable Head Box
⑩ Local Control Panel

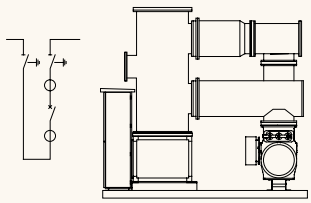
Typical Arrangements

<< Single Bus

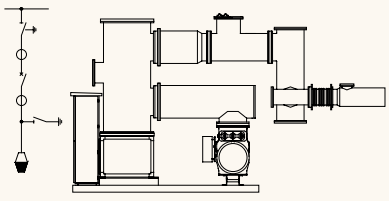
● Line Feeder



● Bus Sectionalizer

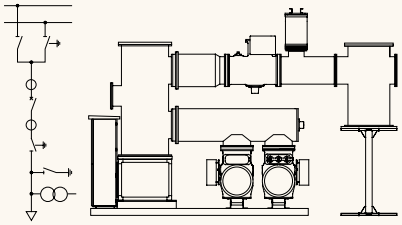


● Transformer Feeder (Gas to Oil Bushing)

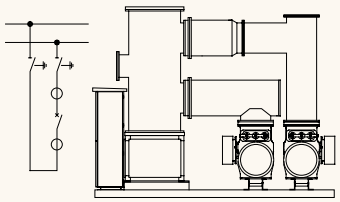


<< Double Bus

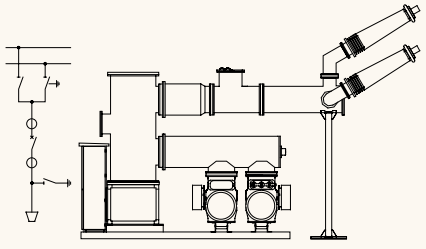
● Line Feeder



● 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.

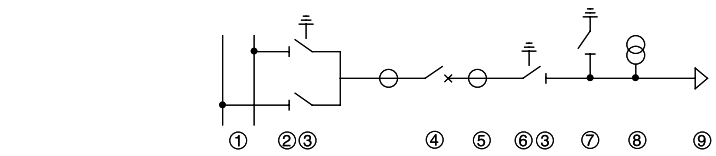
- **Condenserless type circuit breaker**

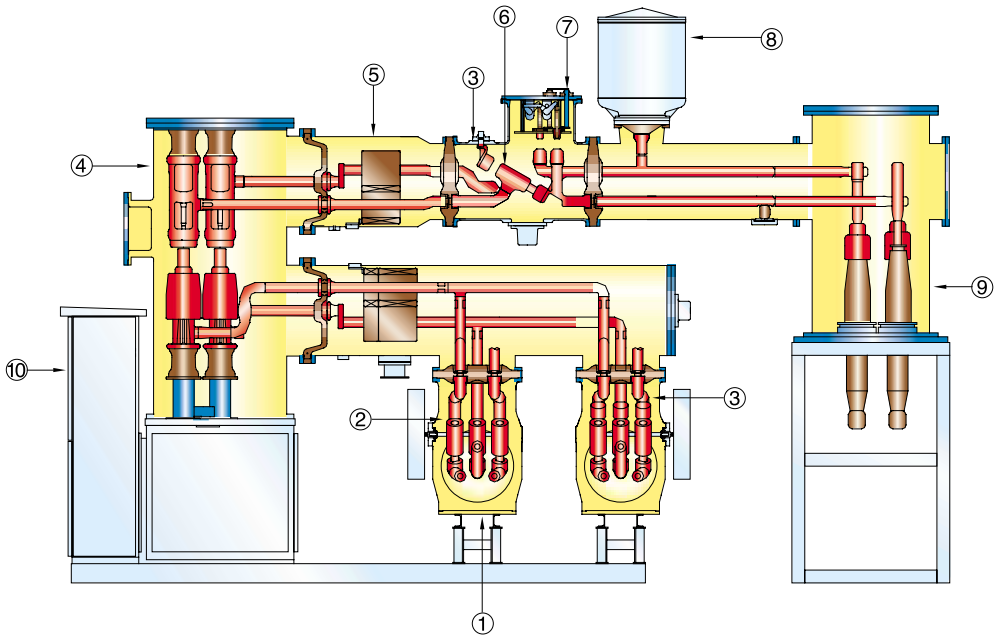
  It will minimize the ferro resonance phenomenon and have higher breaking capacity.

- **Tightness of enclosure**

  It is obtained with well-trained manufacturing.

Section of 170 SR Switchgear



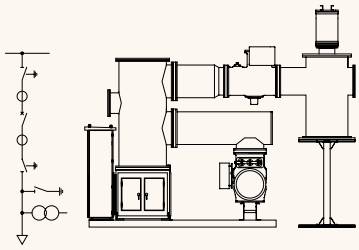


① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Circuit Breaker
⑤ Current Transformer
⑥ Line Disconnector
⑦ Make-proof Earthing Switch
⑧ Voltage Transformer
⑨ Cable Head Box
⑩ Local Control Panel

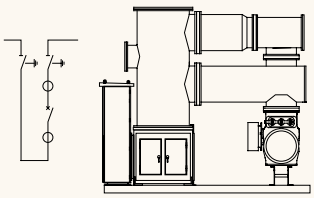
Typical Arrangements

<< Single bus

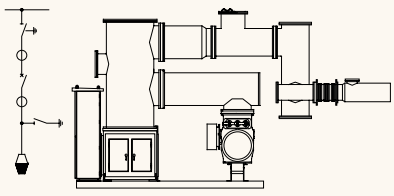
● Line Feeder



● Bus Sectionalizer

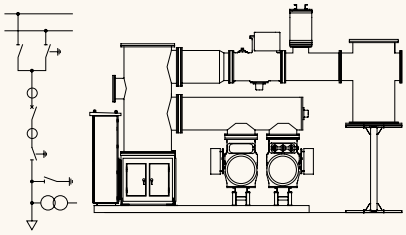


● Transformer Feeder (Gas to Oil Bushing)

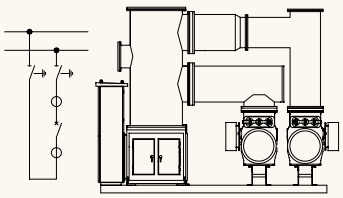


<< Double bus

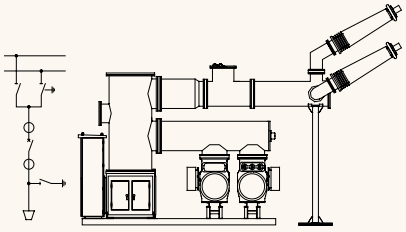
● Line Feeder



● Bus Coupler



● Transformer Feeder (Gas to Air Bushing)

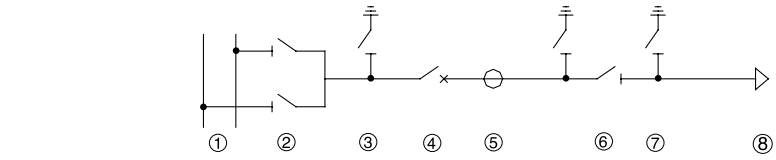


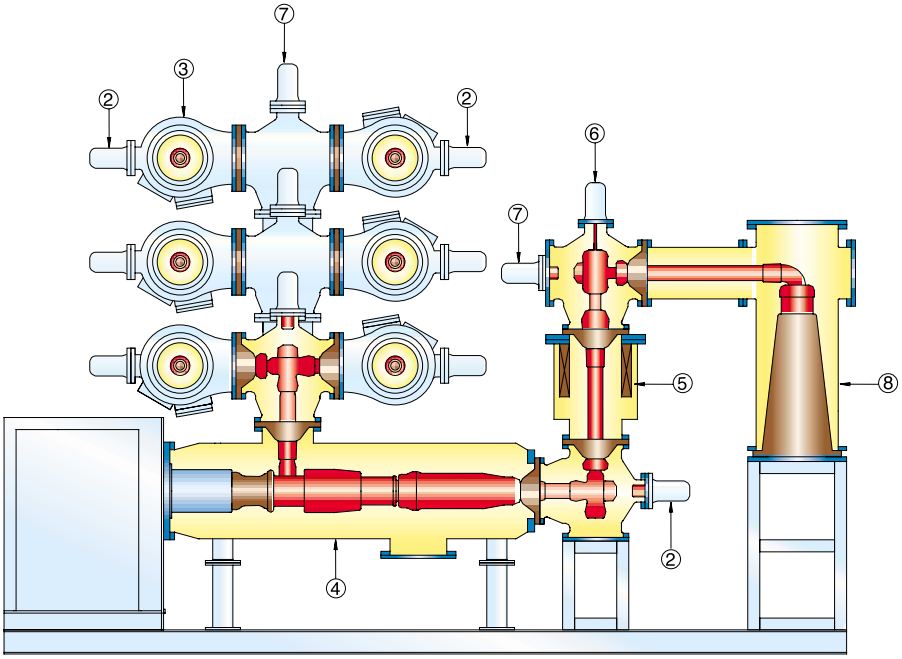
Bay width : 1800 mm

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

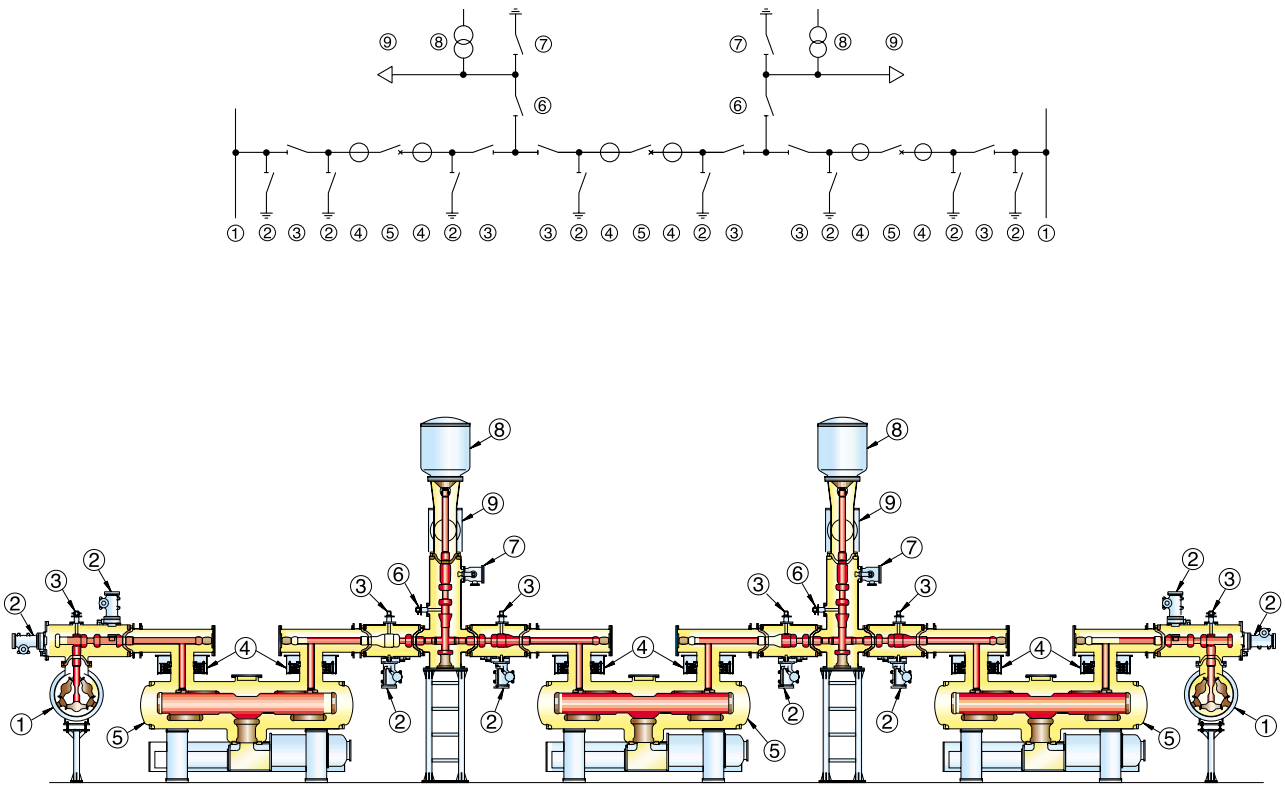




① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Circuit Breaker
⑤ Current Transformer
⑥ Line Disconnector
⑦ Make-proof Earthing Switch
⑧ Cable Head Box

Type 362 SL/SR/SU Switchgear for 362 kV 40 kA/50kA/63kA

Section of 362 SL Switchgear



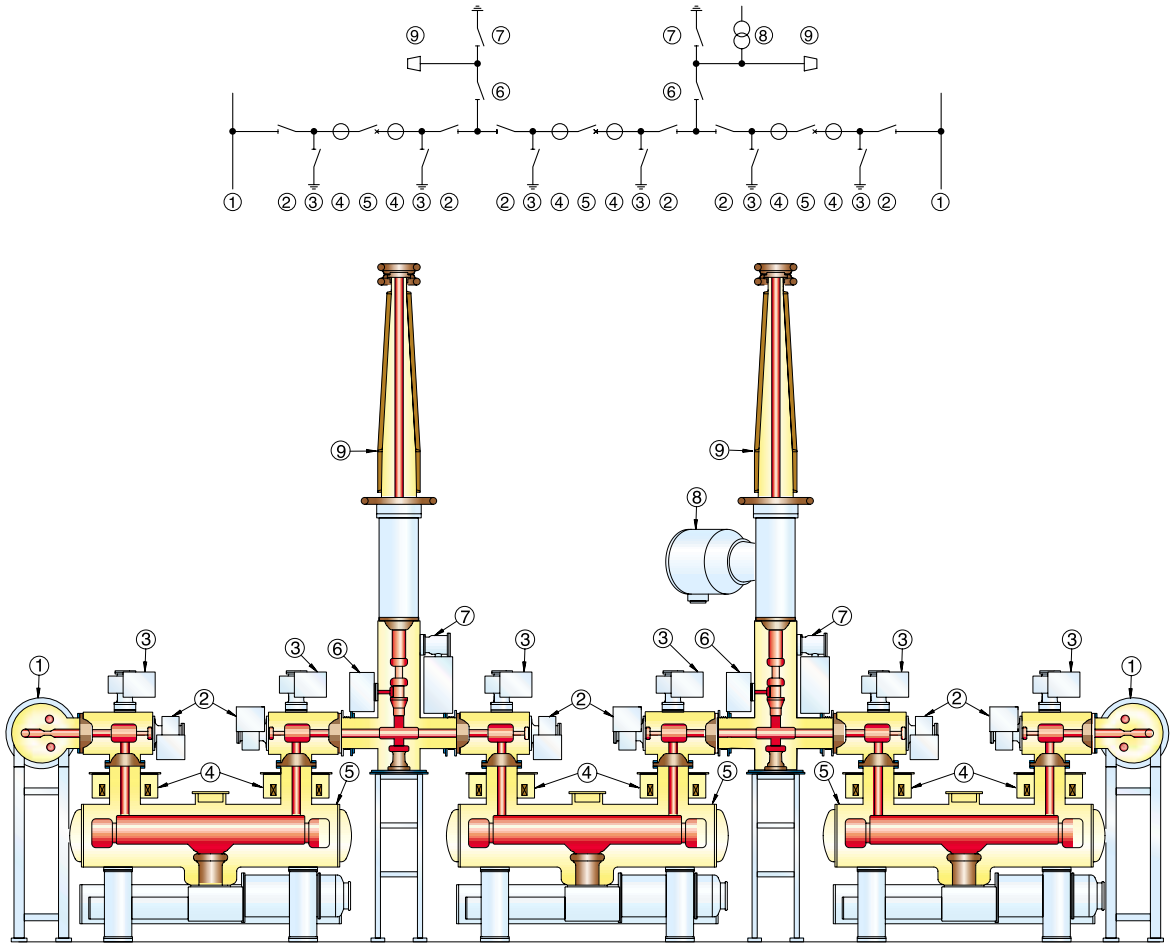
① Main Bus
② Earthing Switch for Maintenance
③ Bus Disconnector
④ Current Transformer
⑤ Circuit Breaker
⑥ Line Disconnector
⑦ Earthing Switch Make-proof Type
⑧ Voltage Transformer
⑨ Cable Head Box

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.

Section of 362 SR Switchgear

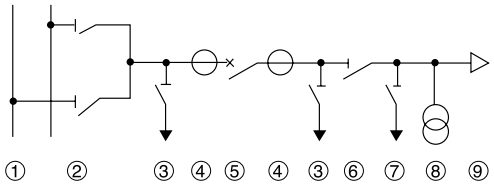


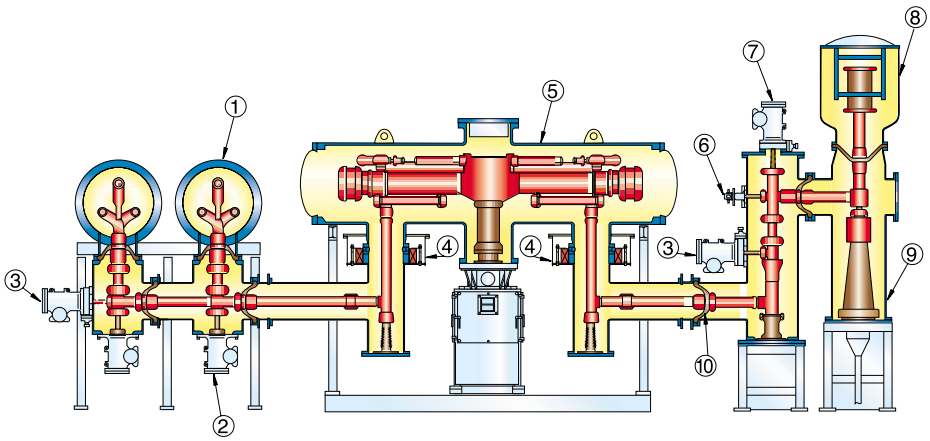
① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Current Transformer
⑤ Circuit Breaker
⑥ Line Disconnector
⑦ Earthing Switch Make-proof Type
⑧ Voltage Transformer
⑨ Gas to Air Bushing

Bay width : 5000 mm

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.

Section of 362 SU Switchgear





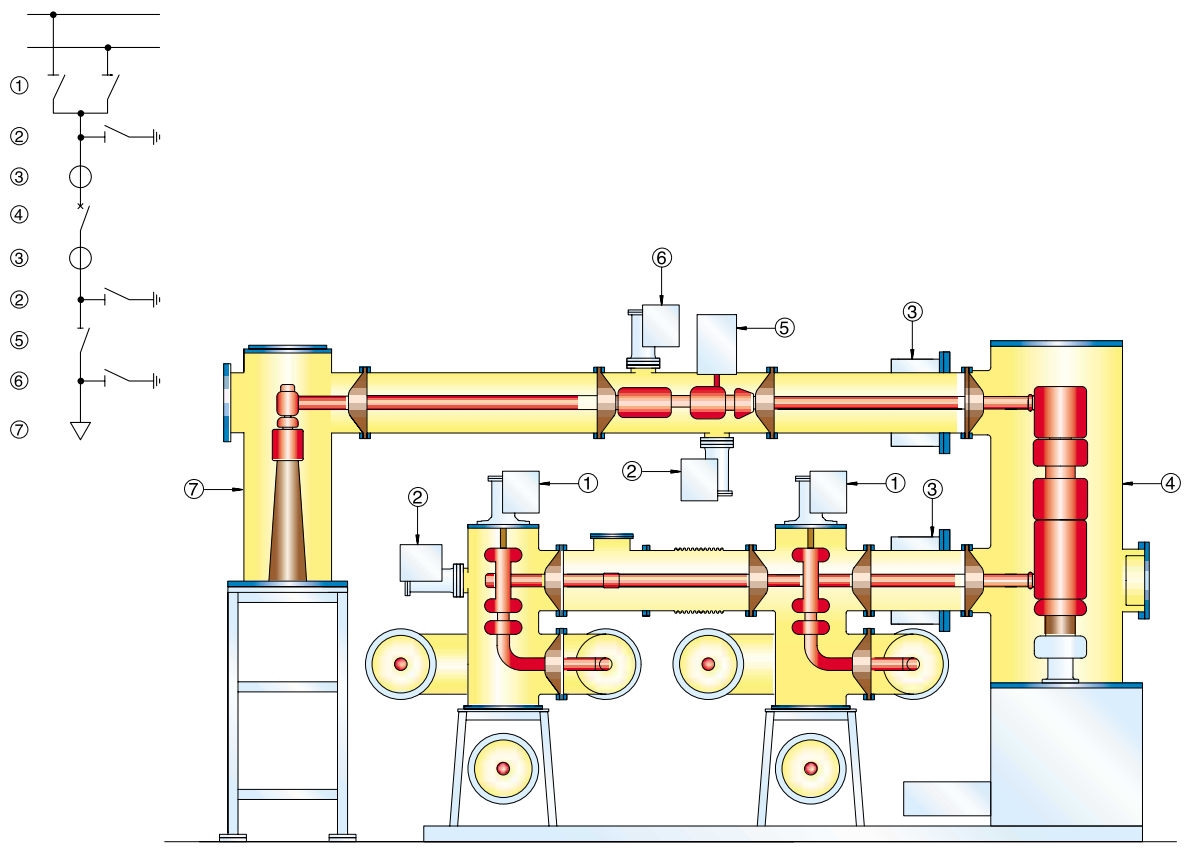
① Main Bus
② Bus Disconnector
③ Earthing Switch for Maintenance
④ Current Transformer
⑤ Circuit Breaker
⑥ Line Disconnector
⑦ Earthing Switch Make-proof Type
⑧ Voltage Transformer
⑨ Cable Head Box
⑩ Insulation Spacer

Bay width : 7000 mm

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.

Section of 550 SR Switchgear

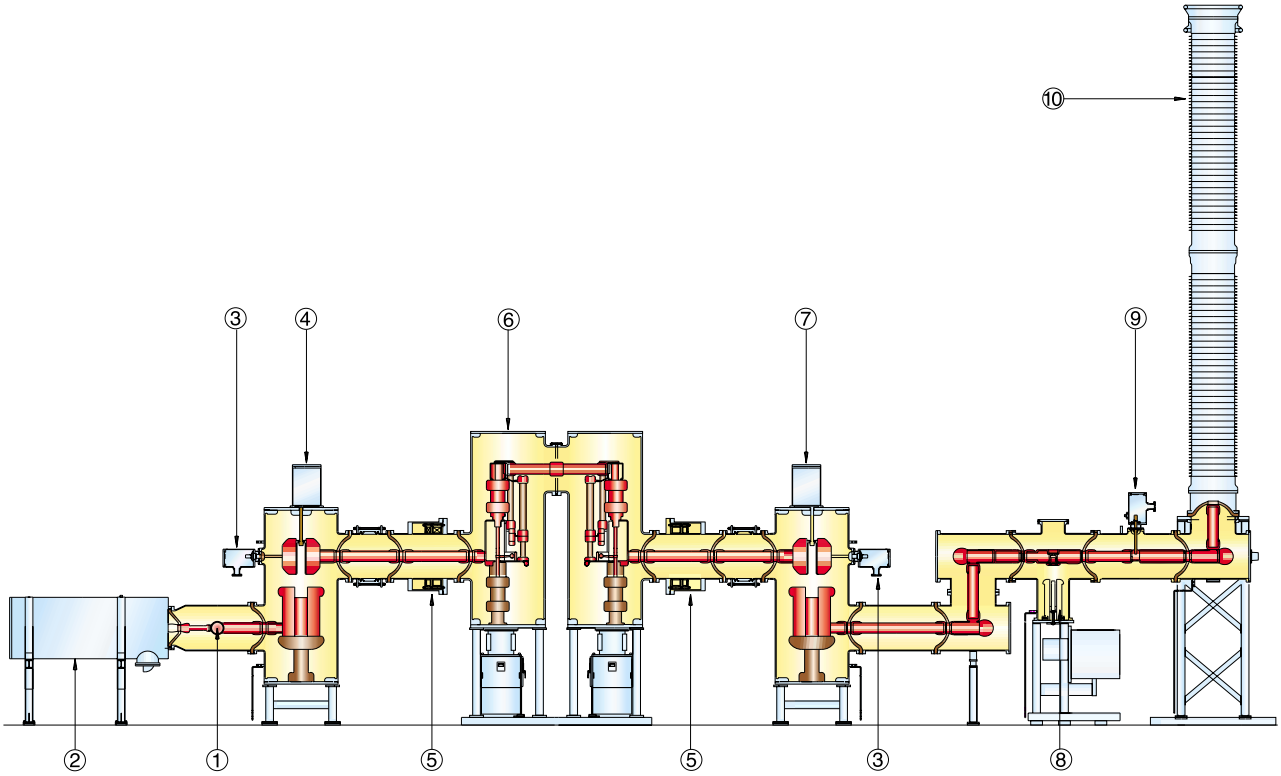


① Bus Disconnector
② Earthing Switch for Maintenance
③ Current Transformer
④ Circuit Breaker
⑤ Line Disconnector
⑥ Earthing Switch Make-proof Type
⑦ Cable Head Box

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

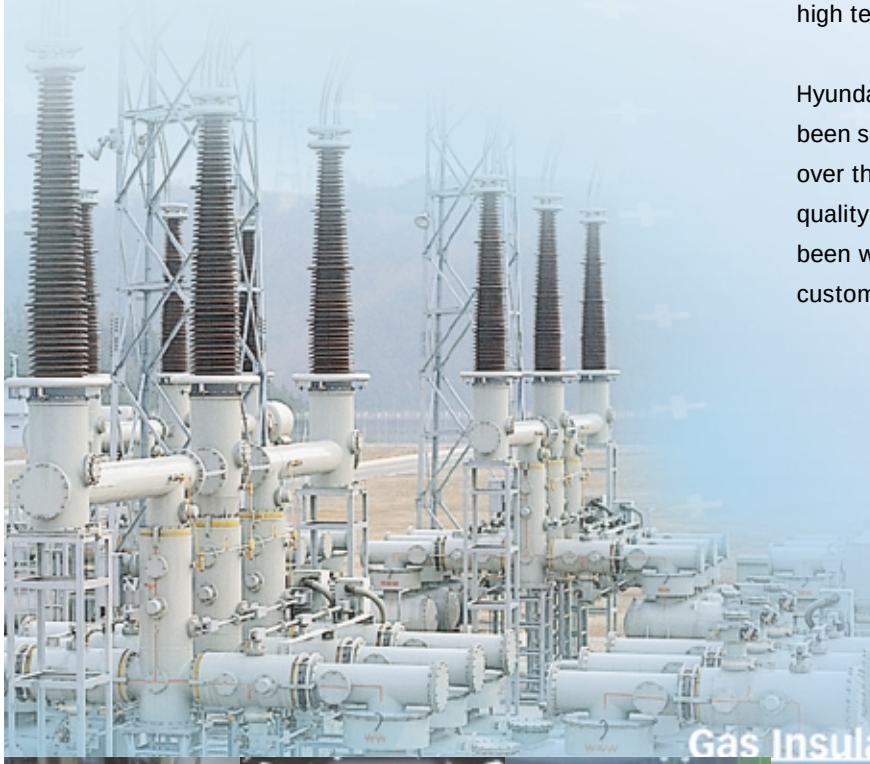
Research & Development is an essential requirement for improvement and advance of modern technology.

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.



Information to be given with inquiry

1. General Requirements

Applied standard : _____

Rated voltage : _____ kV

Rated frequency : 50 Hz 锛 60 Hz 锛

Rated power frequency withstand voltage : _____ kV

Rated switching impulse withstand voltage : _____ kV

Rated lightning impulse withstand voltage : _____ kV

Rated short-circuit breaking current : _____ kA

Rated duration of short circuit : 1 sec 锛 3 sec 锛

First-pole-to-clear factor : 1.3 锛 1.5 锛

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 _____ ℃ Min _____ ℃

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 ( ) _____