

Top 100  
Global  
Innovator  
for 10 years

# Gas Insulated Switchgear

Up to 145kV



**LS** *ELECTRIC*

# Gas Insulated Switchgear Up to 145kV

## LS's GIS satisfying your various needs

LS offers the range of GIS(gas-insulated switchgear) from 25.8kV to 420kV for many types of power plants and substations to satisfy customers various needs.

LS's GIS meets the electric systems requirements of increasing capacity according to expansion of consumers and large plants.

By opening and closing the circuit breaker under normal and fault condition, customer can prevent & protect the implemented facilities over the whole system.

LS's compact size GIS is comparable with other manufactures within the same rating while

the design and constitution of our GIS offers high reliability, safety and convenience.

We also provide economical & feasible solutions for limited space.

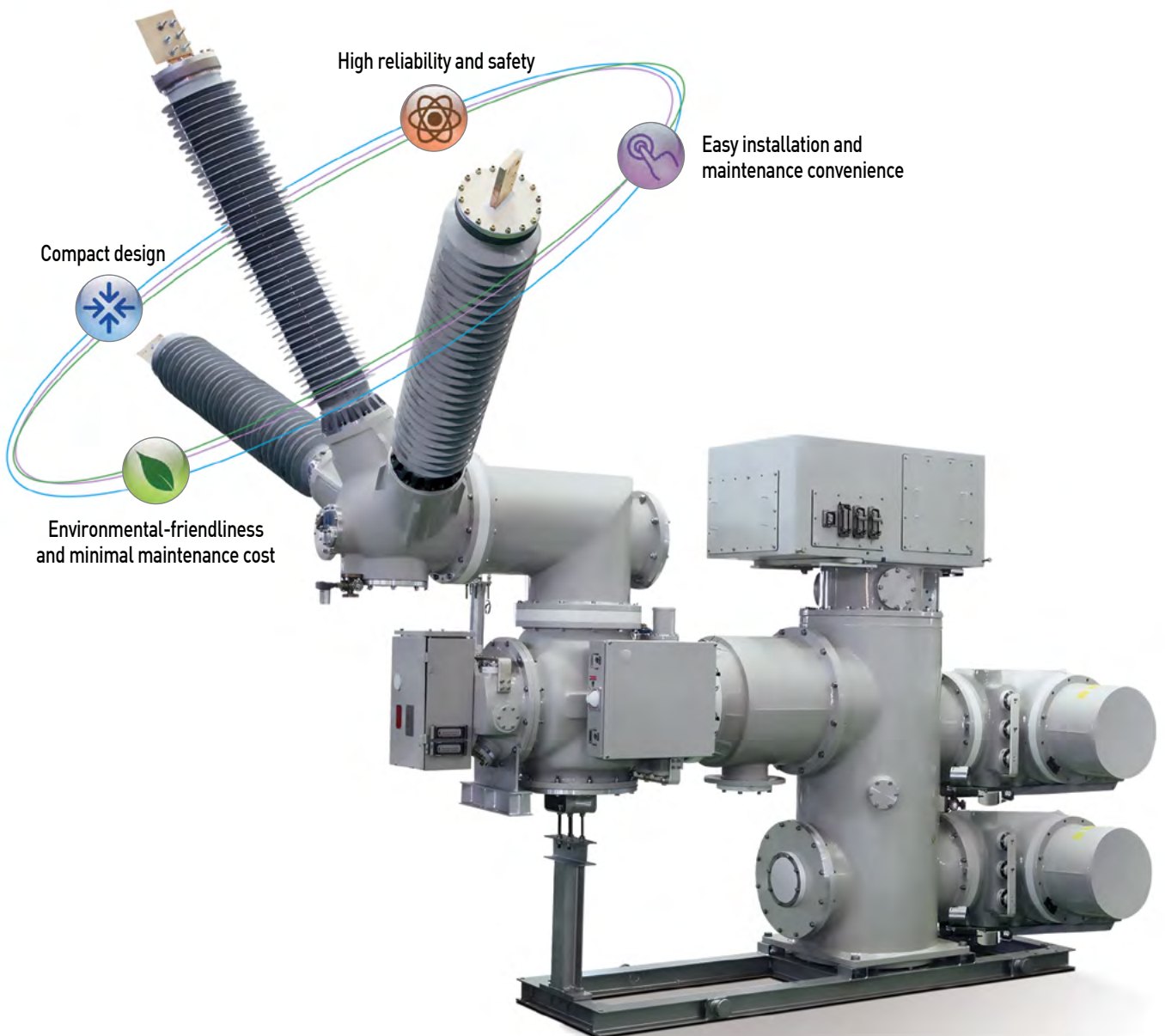
Our products are designed and tested according to the latest international standards to give our customers the highest quality product.

LS also adopts procedures for production, delivery and technical service which are fully environment-friendly under control of ISO 14001 for our future generation, which include minimizing the use of SF<sub>6</sub> gas.



## Contents

- 4 Line-up
- 6 Modular design
- 8 Circuit breaker module
- 10 3 position switch & HSES
- 12 Termination
- 13 PDPS
- 14 Layout
- 17 Technical data
- 18 Research & development
- 19 Quality assurance



# Leading the future with world class products

25.8/36kV

72.5kV

145kV



Rated voltage (kV)	25.8/36	72.5	145
Rated current (A)	~3150	2000	~3150
Rated breaking current (kA)	~40	20/31.5	40
Power frequency withstand voltage (kV)	70	140	275
Lightning impulse withstand voltage (kV)	~170	325	650

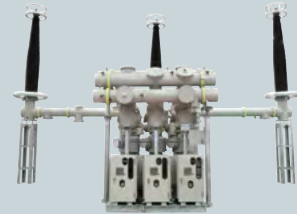
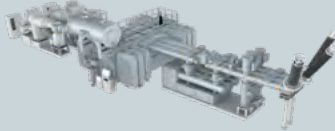
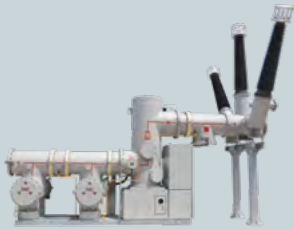


170kV

245kV

362kV

420kV



170	245	362	420
1250~4000	~3150	4000~6300	4000
50	40/50	50/63	50
325	460	520	650
750	1050	1175	1425



# GIS Modular design



## Economical efficiency

Compact design can reduce space requirement and operating costs. Modular system cuts construction time and saves costs.



## Environmental-friendliness

Modules are designed to fit in optimal space for installation, while protecting the environment thanks to minimal use of SF<sub>6</sub> gas.



## High appliance

Modular system can satisfy customers' various needs and layout requests.



## Convenience

Modular system makes our GIS easier to operate.



## Reliability

Maximize system security with a minimum of maintenance.

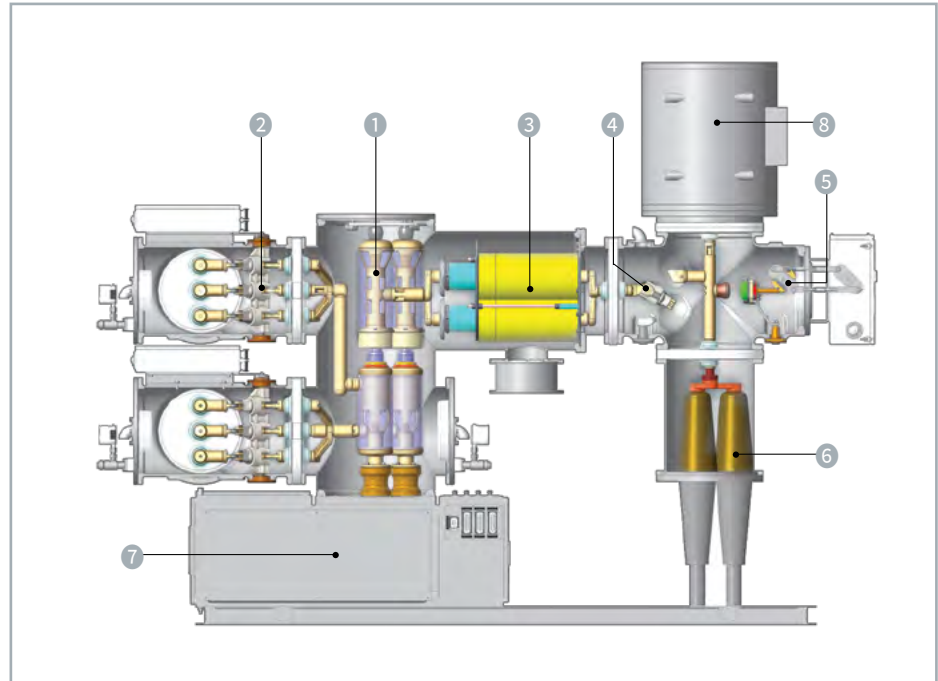


**All typical configuration can be realized with only a few modules**

## 72.5kV & 145kV GIS construction

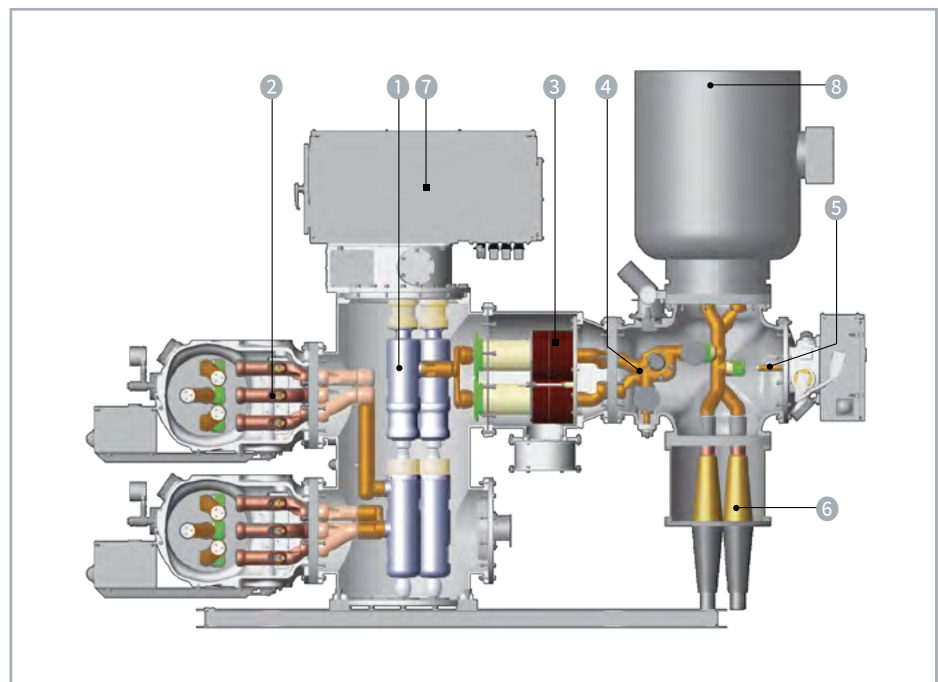
### 72.5kV GIS

- ① Circuit breaker
- ② Bus disconnector with maintenance earthing switch
- ③ Current transformer
- ④ Line DS/ES
- ⑤ High speed earthing switch (HSES)
- ⑥ Cable head
- ⑦ Operating mechanism for CB
- ⑧ Potential transformer



### 145kV GIS

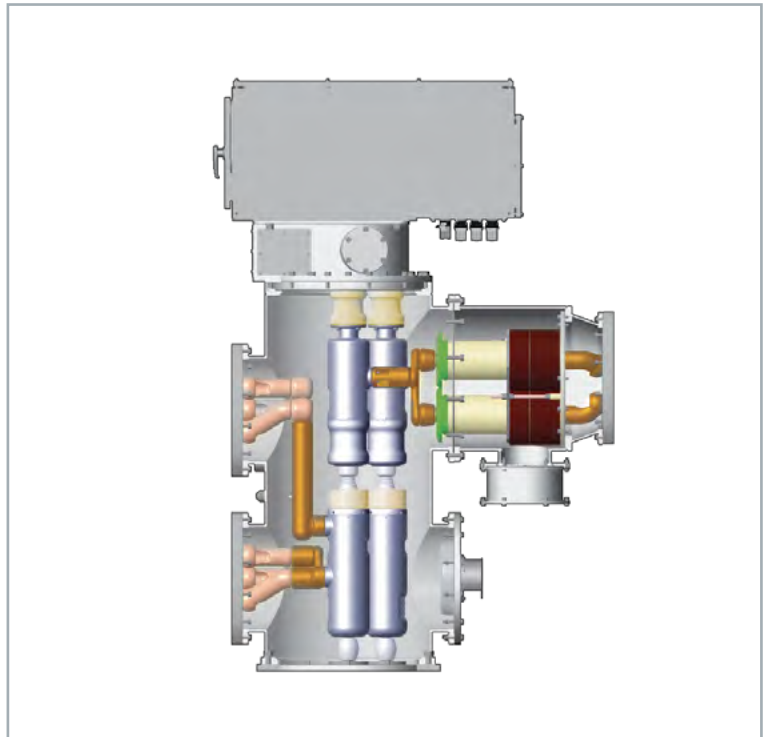
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## Circuit breaker module

### CB & CT module

The 3-phase common circuit breaker (CB), a core equipment of the GIS, is composed with current transformer (CT) in one module, the 3-phase interrupter is simultaneously run by a motor operation or hydraulic operation. The motor mechanism is disposed at the bottom part of the interrupter. The CT can be installed to incoming or outgoing side, and also can be composed of several units by number of CTs.



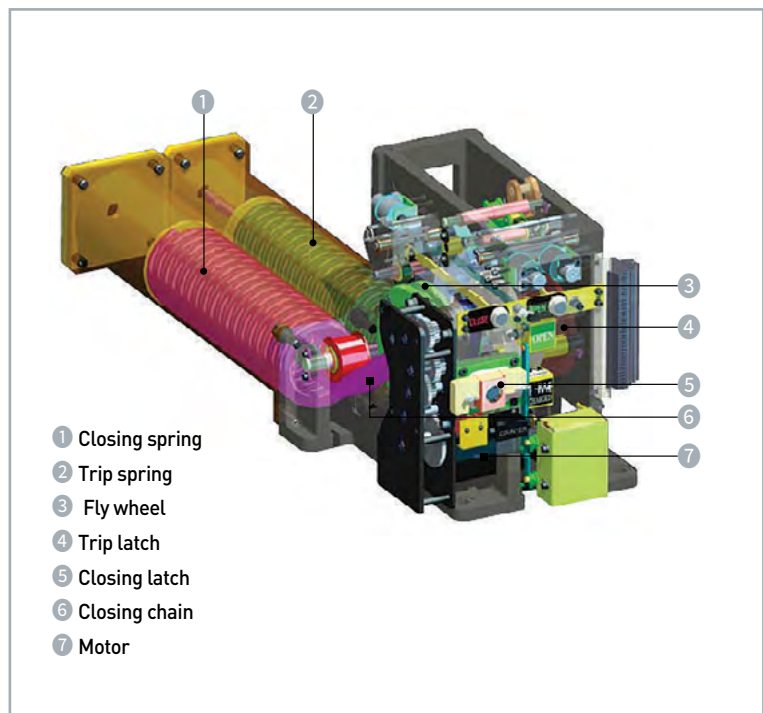
### Operating mechanism for CB

The operating mechanism for circuit breaker is spring stored-energy type that is installed at the bottom of the circuit breaker in parallel, for manual operation and easy to check close-open status for convenient maintenance.

The circuit breaker mechanism is composed of separate module which make it a simple design, highly reliable apparatus made from the latest technology.

The circuit breaker has a mechanical endurance capability over 10,000 operations with minimal use of each part.

Also, the circuit breaker mechanism minimizes the influence of temperature.



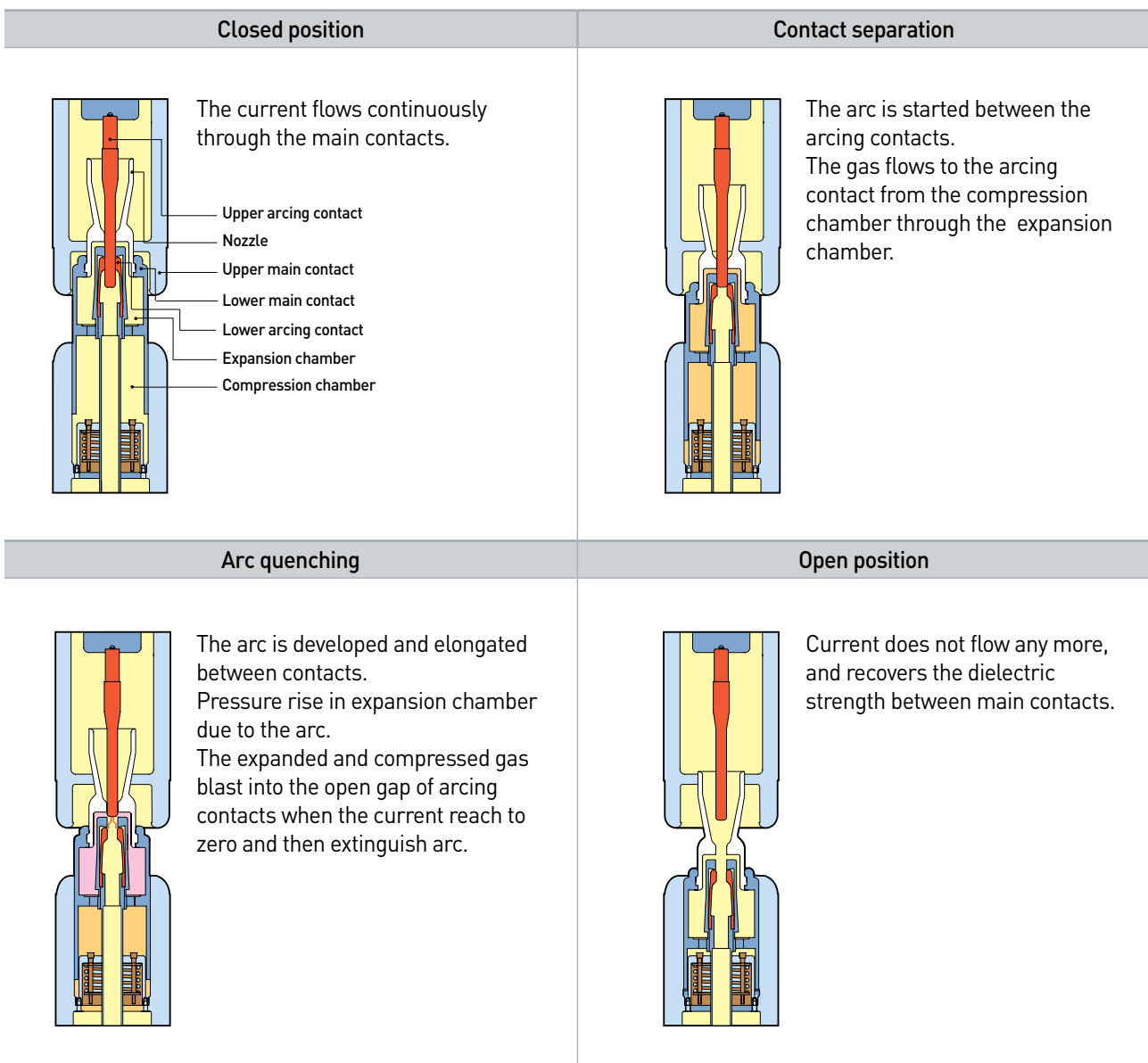


## Interrupter unit

The interrupter unit is applied thermal expansion double flow puffer (self-expansion) type, the most effective arc quenching method. This ensures high reliability to terminate accidental electric current, and minimal mechanical movement from at low operation energy to minimize stress delivered to the enclosure.

Also, the 3-phase common enclosure is used to minimize the width of bay through interrupt principle and electric field analysis.

## Arc quenching principle



## 3 position switch & HSES

### 3 position switch

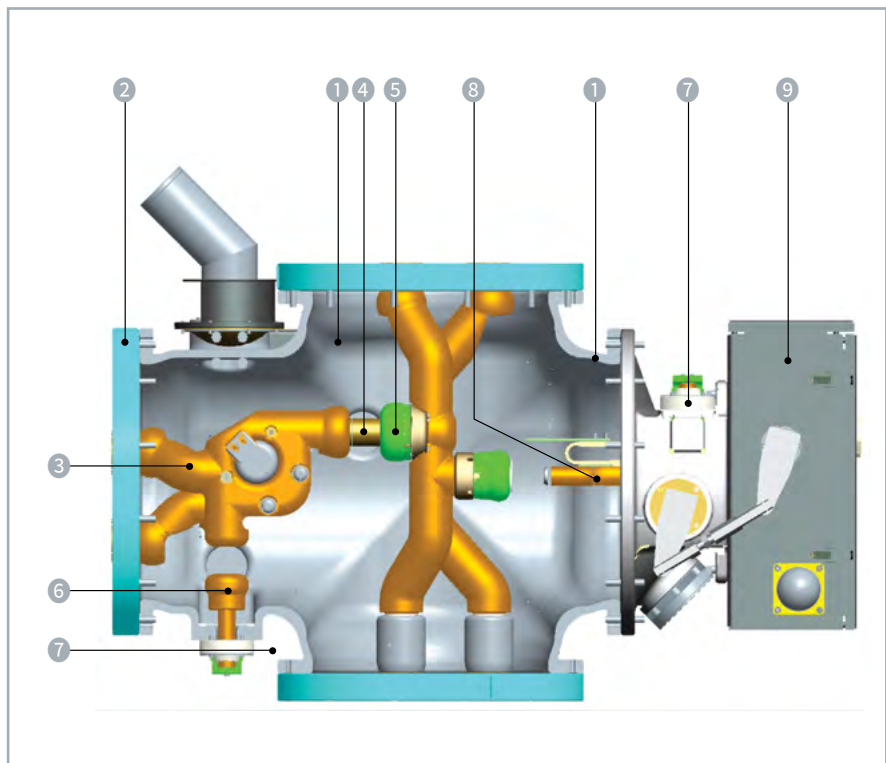
The 3 position switch is combination of disconnecter and earthing switch put together, and is composed of finger and tulip type contact design.

This eliminates the need for an additional mechanical interlock between the disconnecter and earthing switch, and also electric interlock.

The 3 position switch is installed inside the 3-phase common type enclosure which operates simultaneously by motor operation, and can be manually operated in case of emergency.

### Line DS/ES & HSES module

- ① Enclosure
- ② Gas barrier
- ③ Conductor
- ④ Moving Contact
- ⑤ Fixed contact (DS)
- ⑥ Fixed contact (ES)
- ⑦ Earthing Terminal
- ⑧ High Speed earthing switch
- ⑨ Operating mechanism for HSES

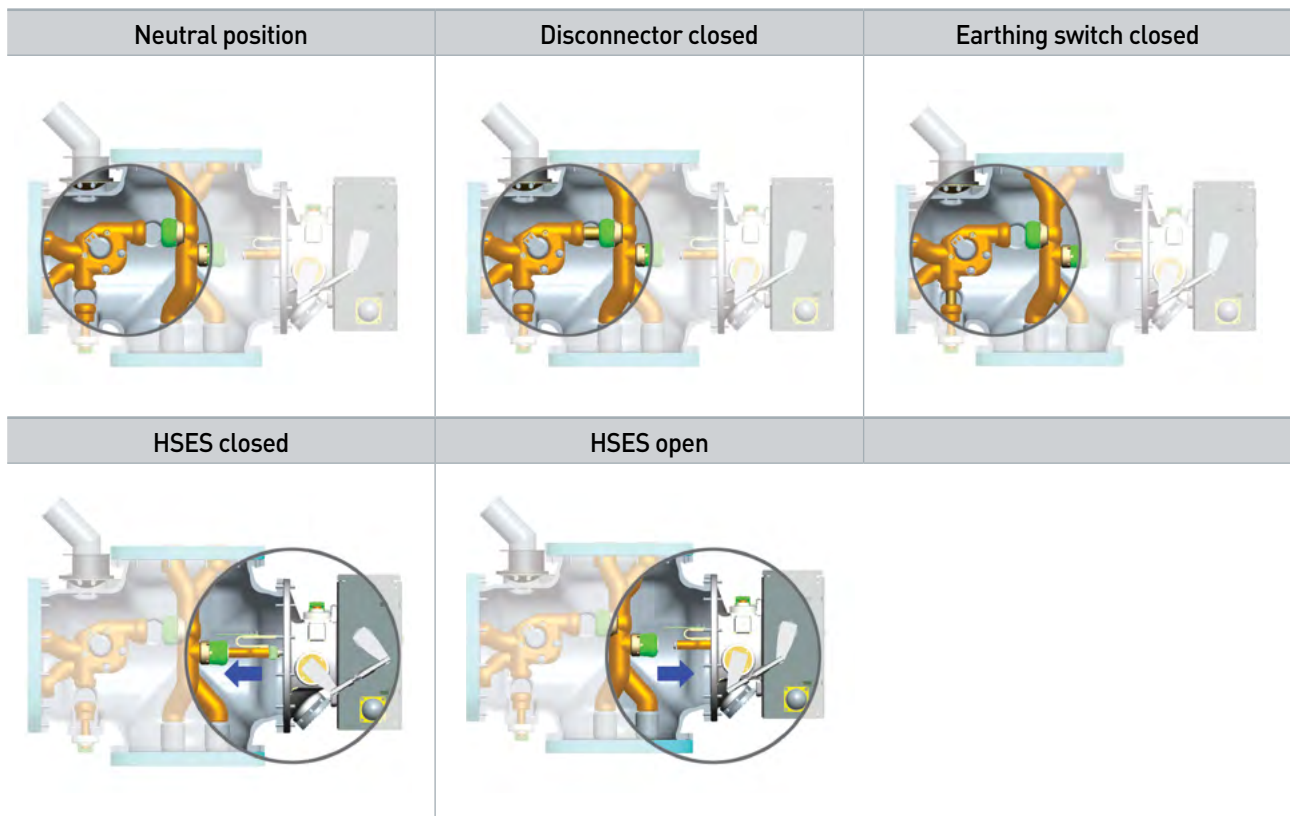


**High speed earthing switch (HSES)**

High speed earthing switch has finger type construction. It is operated by motor spring mechanism and its moving part is inserted in the finger type contact parts with high speed when it is operated.

**Operating principle**

The 3 position switch operates with conductor rotating twice. The conductor operates clockwise and closes DS when DS and ES is in open, neutral state. In order to close the ES, the conductor rotates counter-clockwise in first stage and in second stage the DS is open to a neutral state and closes the ES.



# GIS

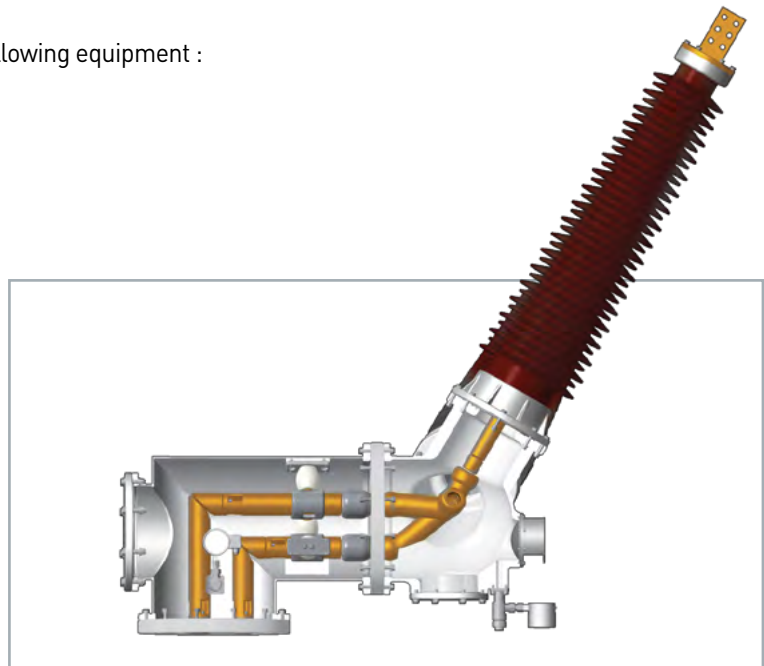
## Termination

The termination units of the GIS connect to the following equipment :

- Overhead line
- Underground cable
- Transformer

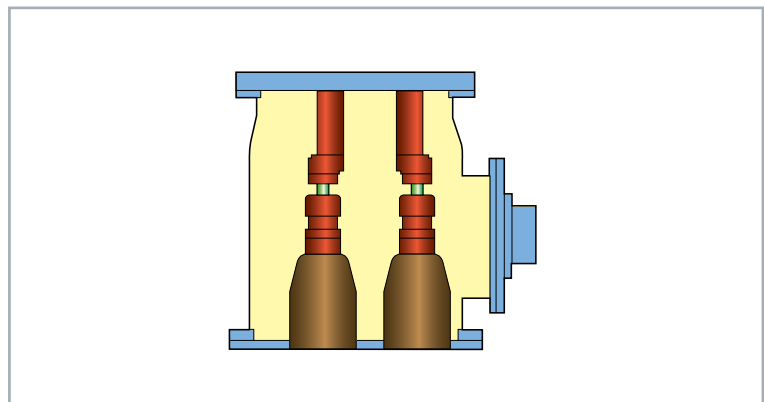
### Gas to air bushing unit

SF<sub>6</sub> gas- to-air bushing is a method that is generally used to connect overhead line with GIS or GIS and transformer connection. The bushing can be made of porcelain or composite material to satisfy customer requirement.



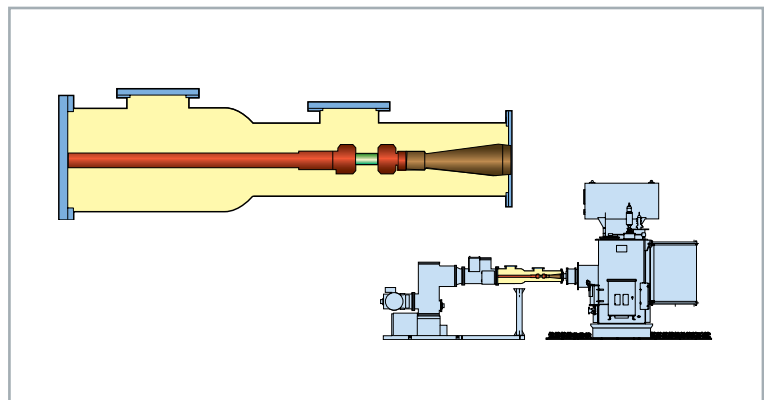
### Cable connection unit

The 3-phase encapsulated type cable termination is used to connect high voltage cable to GIS. This connecting method is applied with conventional type cable sealing end and plug-in type, and with no special request given by the user the IEC regulation is applied.



### TR termination

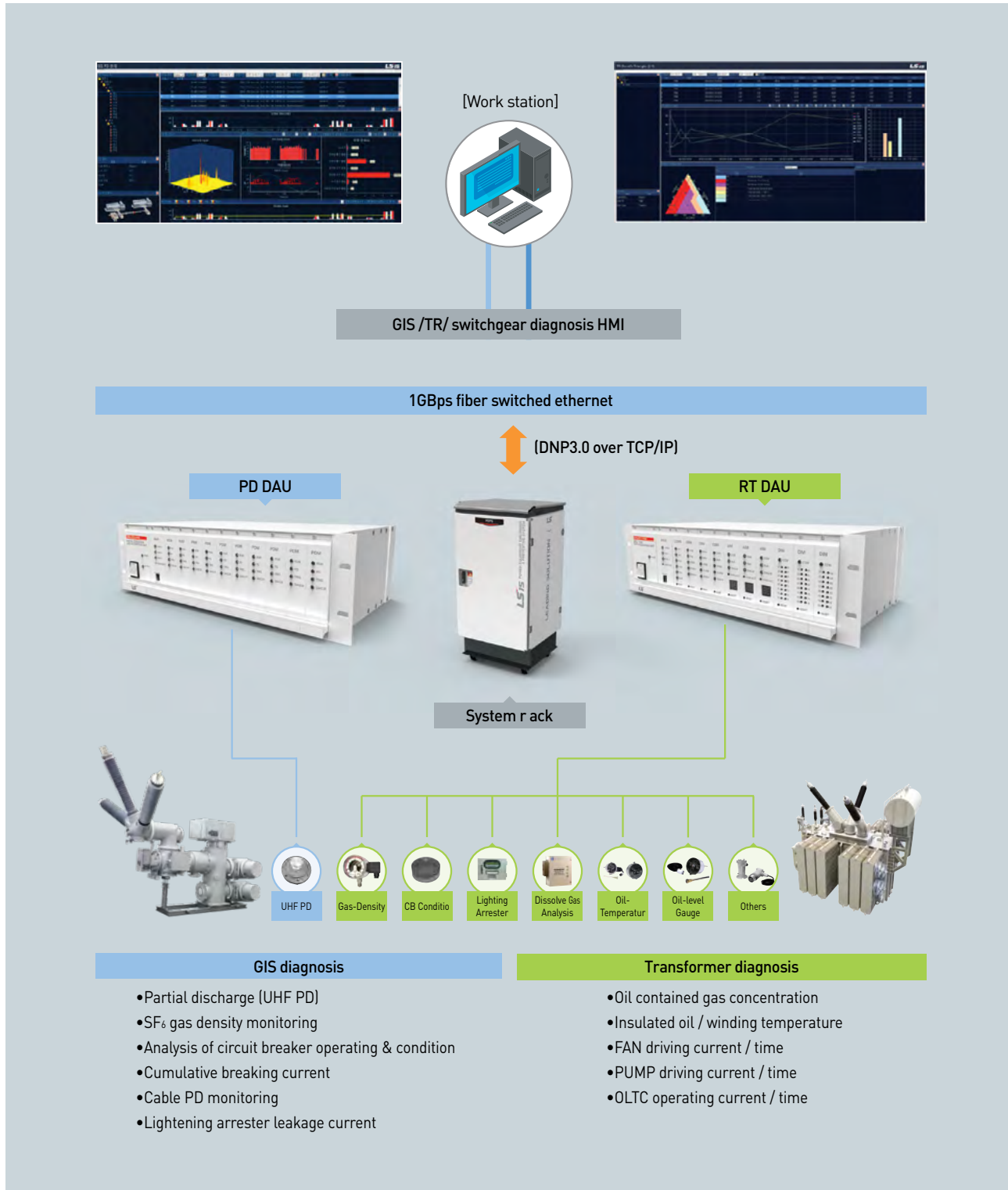
This method is used when connecting directly to the GIS and transformer. The 3 phase segregated unit of the GIS is used to connect to gas-to-oil bushing of the transformer, and expansion joint is provided to absorb vibration and temperature change caused by transformer.

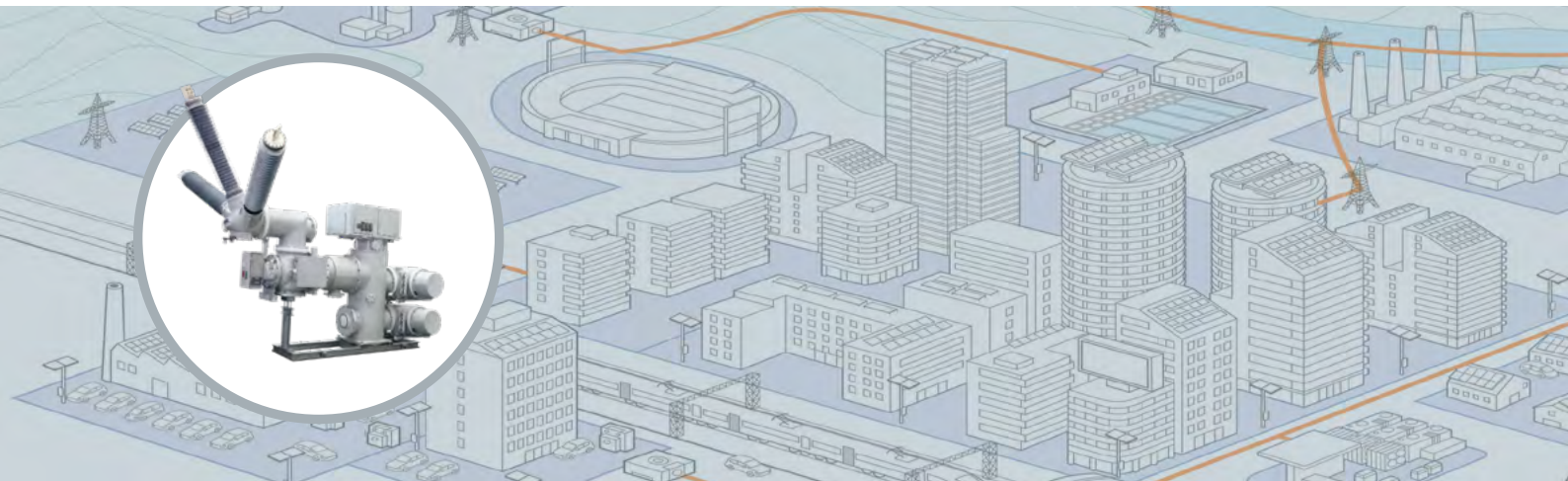


# PDPS (Power Equipment Diagnosis & Preventive System)

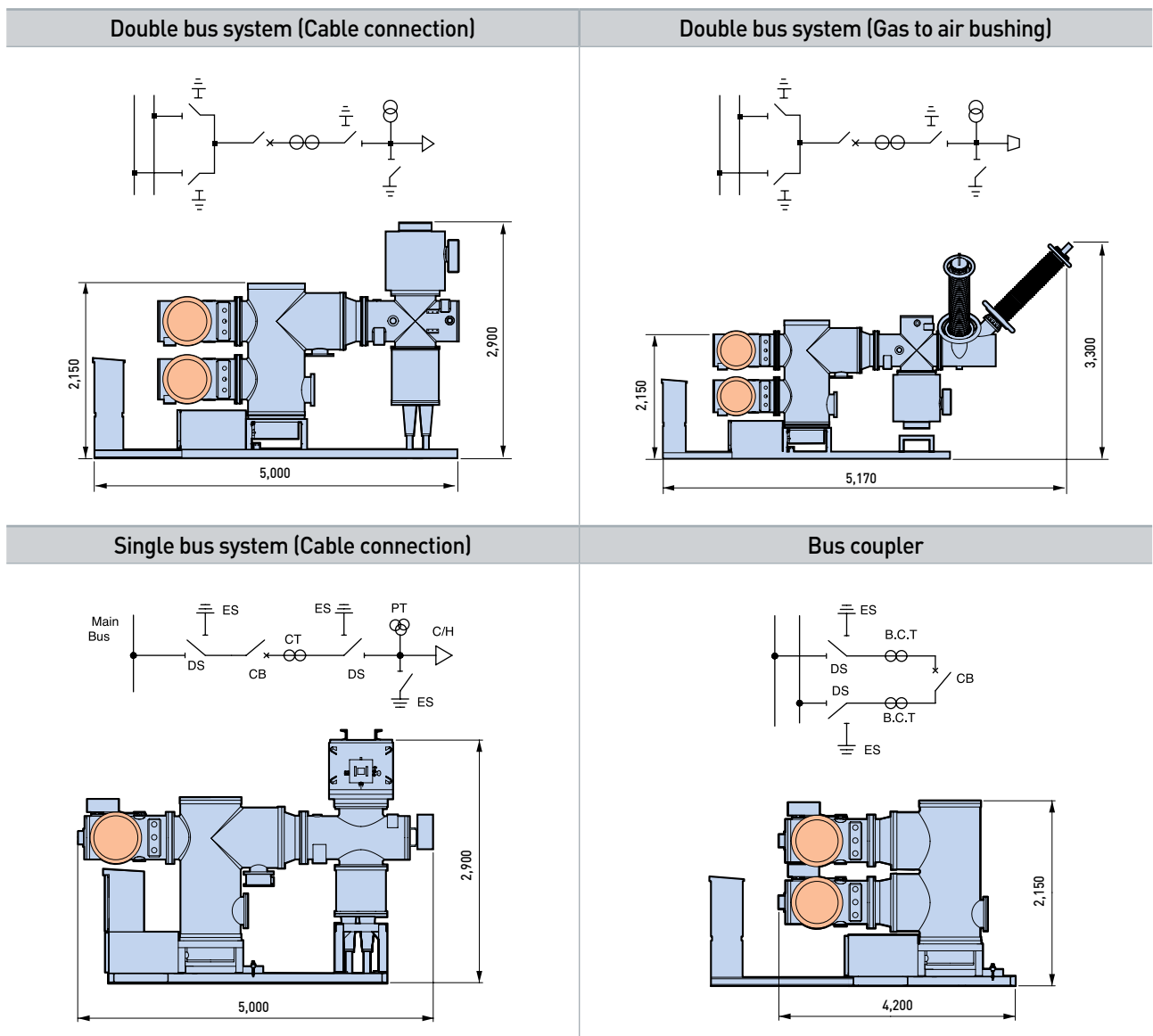
Gas Insulated Switchgear 145kV

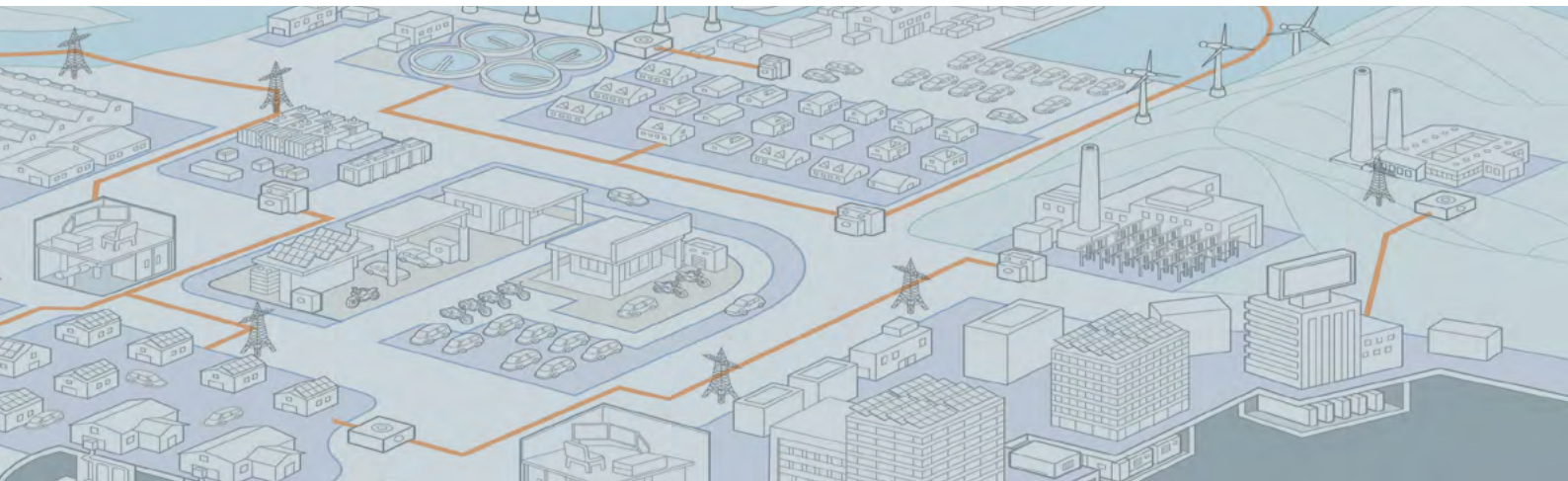
Through regular monitoring of major power equipment, accidents can be prevented.  
Also database management system supports efficient management of events and history for each unit.





72.5kV typical bay arrangements





### 145kV typical bay arrangements

Double bus system (Cable connection)	Double bus system (Gas to air bushing)
Single bus system (Cable connection)	Bus coupler

# GIS Layout

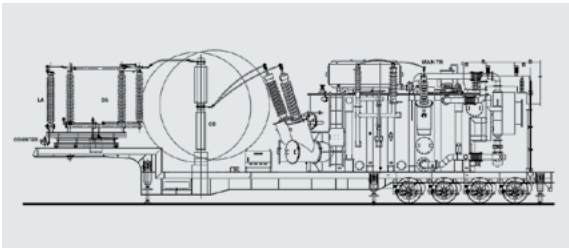
## Mobile type

- Service for mobility and flexibility
- Standby or temporary power supply
- Service for over-load area
- Replacement in case of equipment failure
- Power supply for isolated areas
- Reduced works and maintenance costs
- Connectivity with the renewable energy

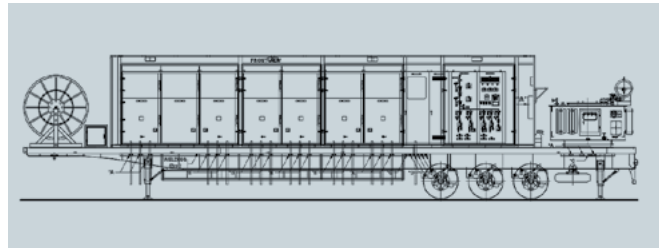


	GIS	AIS	Power transformer	Switchgear
Voltage level, Capacity	Up to 245kV	Up to 145kV	31.5MVA	Up to 36kV

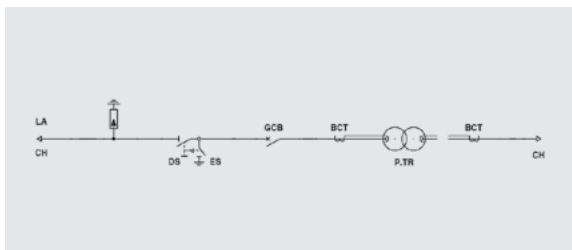
## HV trailer



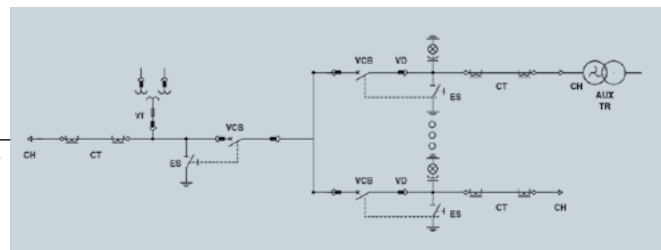
## MV/LV trailer



## Single line diagram



Cable







Rated voltage (kV, rms)	72.5	145
Rated frequency (Hz)	50 / 60	50 / 60
Rated normal current (A, rms)	2000	Up to 3,150
Rated short-duration power-frequency withstand voltage		
- Common (kV, peak)	140	275
- Across the isolating distance (kV, peak)	160	315
Rated lightning impulse withstand voltage		
- Common (kV, rms)	325	650
- Across the isolating distance (kV, rms)	375	750
Rated short-circuit breaking current (kA, rms)	31.5	40
Rated break time (Cycle)	3	3
Rated short-time withstand current (kA, rms)	31.5	40
Rated peak withstand current (kA, peak)	79	100
Rated duration of short-circuit (sec)	3	3
Phase arrangements	3 phase common encapsulated	
Applicable standards	IEC 62271-203, IEC 62271-100, IEC 62271-102	

## Research & development

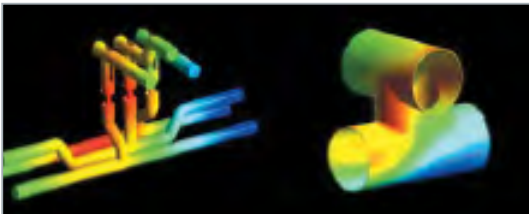
LS obtained certification about major research and development tasks in some leading countries and continues to invest in developing the best GIS product for our customers worldwide.

To produce highest quality GIS, optimized design is conducted through 3D electric field analysis, arc diagnosis and structure & temperature analysis.

### Electro technology R&D center

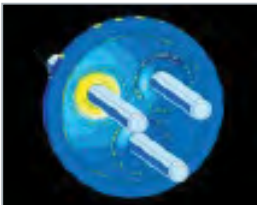


#### Multi-physics technology



DS/ES unit temperature prediction using electro-Magnetic field and temperature flow analysis.

#### Optimized electric field control



3D electric field analysis is used for effective space design and optimization

#### Interruption performance analysis



Arc movement prediction to evaluated breaker capability



### Power testing & technology institute



PT&T is a KOLAS-qualified (Korea Laboratory Accreditation Scheme) accredited testing laboratory and provides worldwide testing service with its 1,600MVA-capacity high power laboratory, high voltage laboratory and reliability testing laboratory.



High Voltage Test | Impulse Test

# Quality assurance

Providing high quality products and services to lead customer satisfaction is the motto of LS, and it is what motivates the company to perfecting zero-defect product.

The quality assurance program by LS provides strict quality control from promotion, manufacture and delivery in compliance to ISO 9001.

LS's GIS fully comply with the latest international standards, and acquired type test certificates for efficient design and excellent quality.

It is our goal to provide world-best product to our customers, only to be done by maintaining the latest quality system and service.

## Certificates



ISO 9001



ISO 14001



OHSAS 18001



KERI



CESI



KEMA



### Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance. Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.



- According to The WEEE Directive, please do not discard the device with your household waste.



[www.ls-electric.com](http://www.ls-electric.com)

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#### Technical Question or After-sales Service

Customer Center-Quick Responsive Service, Excellent technical support

**82-1644-5481**