Ref. No. GIS123/145-S(P1)H-0

123/145 kV
SF_6 GAS INSULATED SWITCHGEAR

EQUIPPED WITH SPRING OPERATED GCB

Three-Phase Common Enclosure
Gas Insulated Switch Gear (Both Side CT Type)

Japan AE Power Systems Corporation

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Original technology, now further improved

AE Power developed the world's first three-phase common-enclosure GIS, which went in to commercial operation in 1975 at Kyushu Electric Power's Karatsu Substation, rating 84kV in Kyushu, Japan. This breakthrough made higher voltages possible and became the standard type of GIS throughout the world. Over the years, field data has proven that this design meets a wide range of technical requirements. Retaining the basic concept, we have refined the technology through intensive research and development based on feedback from customers around the world.

Outstanding features of AE Power GIS

Compact: One of AE Power's main objectives in GIS development has been compact design. The three-phase common-enclosure type has been improved to the point where it now requires only half the space of conventional types.

Reliable: AE Power GIS have proven their high reliability over more than 30years and in 6,000bays. Top-quality, long-life seals and pinhole-free steel enclosures keep the interior properly pressurized for ten years or more between refillings.
Even in the event of total pressure loss, the SF6 gas still effectively Insulates the switchgear at nominal system Voltage.

High Quality: All AE Power GIS are assembled in our own factories and undergo stringent mechanical and electrical testing.

Easy Maintenance: Hand holes provide ready access to circuit breaker contacts and other key GIS components for ease of inspection ,maintenance, and replacement.There is no need to disassemble the circuit breaker, nor to employ special tools or a mobile crane.

Environmental Adaptability: The switchgear's durable materials, heavy-duty construction and low profile design makes it suitable for installation almost anywhere.

Reduced Installation Time: AE Power GIS are assembled at the factory and shipped to the site intact, in as few pieces as possible. This approach minimizes the number of on-site connections required, thereby saving installation time.

Three-Phase Common-Enclosure Design Concept:
Three-phase common-enclosure designs offer two main advantages: less space and smaller parts count. This of course means fewer parts to fail and thus greater reliability.
By applying its years of experience with isolated-phase common-enclosure designs, AE Power has succeeded in placing three-phase types in over 3,000 bays worldwide.Offering a wide range of types with voltages as high as 300kV,our expertise enabled us to develop an ultra-compact 145kV model.
Developing three-phase common-enclosure switchgear involves three major considerations: interphase insulation coordination minimized interphase electromagnetic stress, and maximized current capacity.
Coordinating insulation between phases requires thorough EMTP surge analysis for a wide variety of faults scenarios, and we have learned that an insulation strength ratio of 1.5 phase-to-phase to phase-to-ground will provide the protection we require.
Minimizing electromagnetic stress between phases involves spacing conductor supports so as to suppress harmonics, then evaluating the optimal conductor layout in both computer-based simulations and real-time experiments.
Maximizing current capacity entails analyzing eddy current losses due to leakage flux. AE Power's high current capacity GIS reduce such losses through the use of internal magnetic shields.
Computer-based analysis plays an indispensable role in resolving these and other design issues. Three dimension analysis and a variety of simulation devices help boost reliability from the design stage on.

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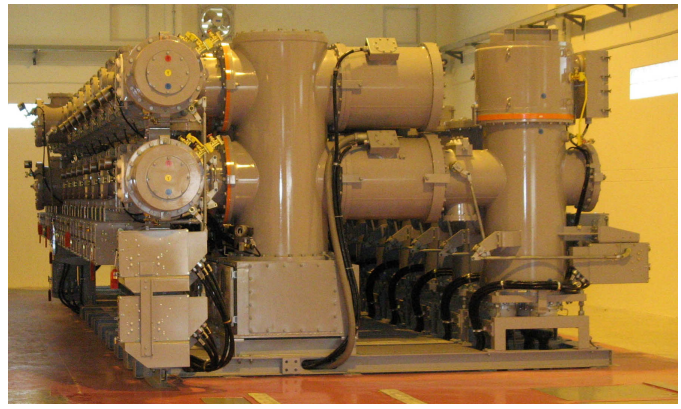
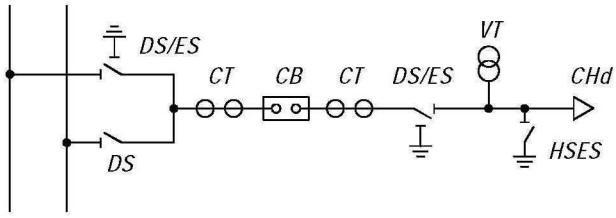
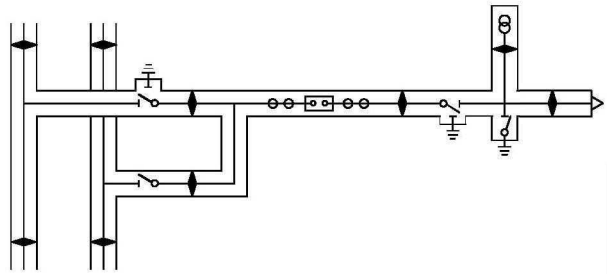
Gas Compartment

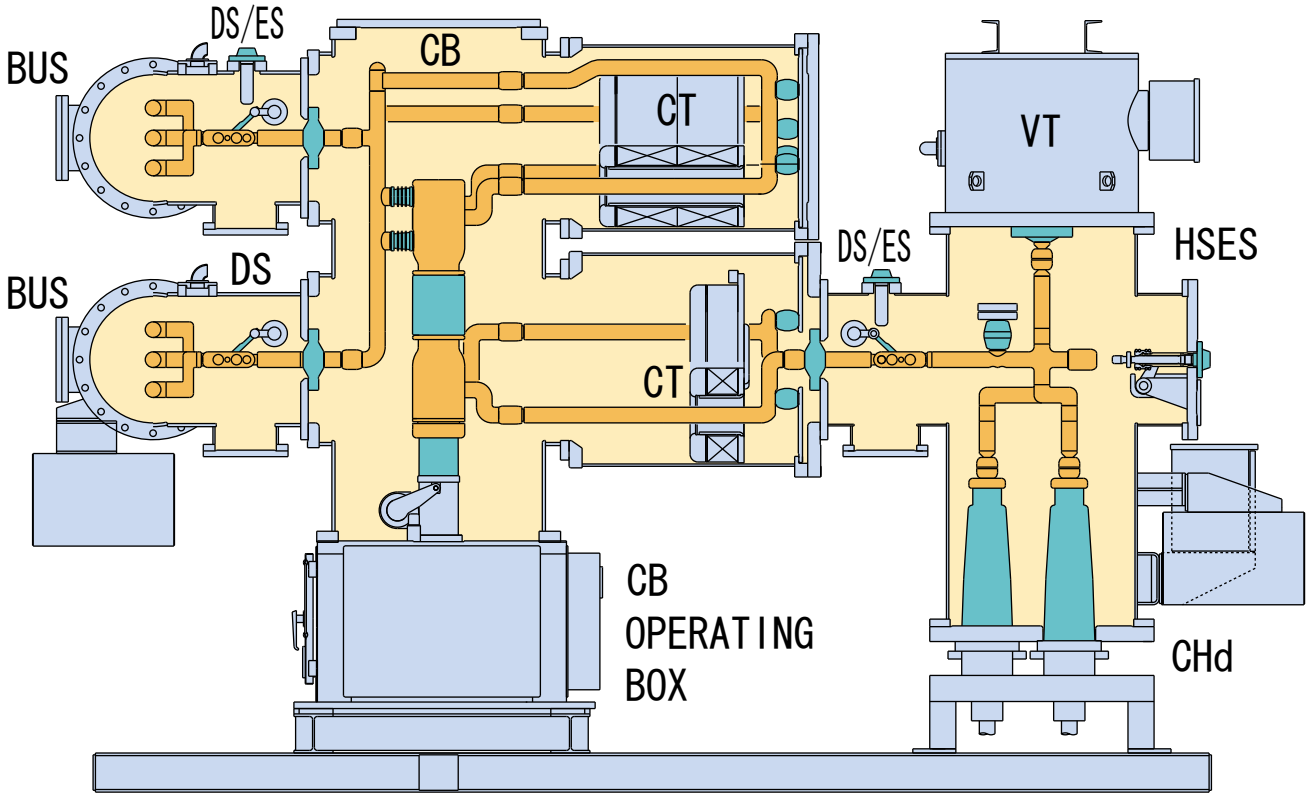


ONE LINE DIAGRAM



GAS SECTION





CB	: CIRCUIT BREAKER	CT	: CURRENT TRANSFORMER
DS	: DISCONNECTING SWITCH	VT	: VOLTAGE TRANSFORMER
ES	: EARTHING SWITCH	CHd	: CABLE SEALING END
HSES	: HIGH SPEED EARTHING SWITCH	BUS	: BUS BAR

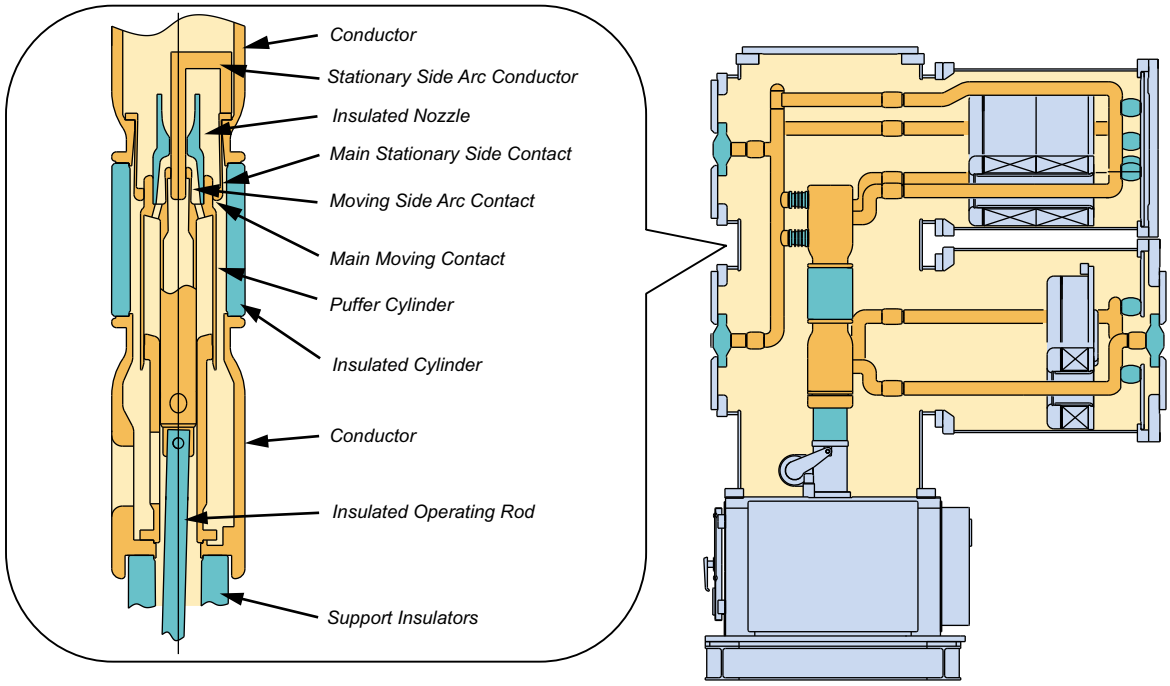
Circuit Breakers

Circuit breakers are the key modular component of GIS.

AE Power circuit breakers feature:

1. The synchronized axial blast method which significantly boosts circuit breaking performance.
2. Hand holes to provide ready access to the interrupter contacts for inspection and replacement.
3. Double trip coils to ensure reliable circuit breaking performance.
4. A high-reliability spring operating mechanism based on AE Power's long experience in the field.

Circuit Bresker Structure (Three-Phase Common Type)



Isolators (Disconnecting Switches)

The isolators are motor operated and feature three-phase gang operation. The basic design supports only no-load switching operation, but facilities for interrupting capacitive charging current, transformer Magnetization current, and loop current maybe added.

A mechanical indicator fixed to the operating shaft inside the operating mechanism box provides a visual means of checking isolator position.

Earthing Switches (Grounding Switches)

Earthing switches are operated by motor or motor Spring gand feature three-phase gang operation. They may be attached to the GIS at any position.

There are two different types of earthing switches, each with its own particular function : the maintenance earthing switch, and the high-speed earthing switch, for insertion into a circuit that has been accidentally energized. Both designs are fully capable of resisting short-circuit fault currents at their fully engaged positions.

The earthing switches can be used as primary injection terminals for checking voltages and currents. It is therefore possible to check the current transformer's ratio and contact resistance without draining the SF_6 gas.

A mechanical indicator fixed to the operating shaft inside the operating mechanism provides a visual means of checking isolator position.

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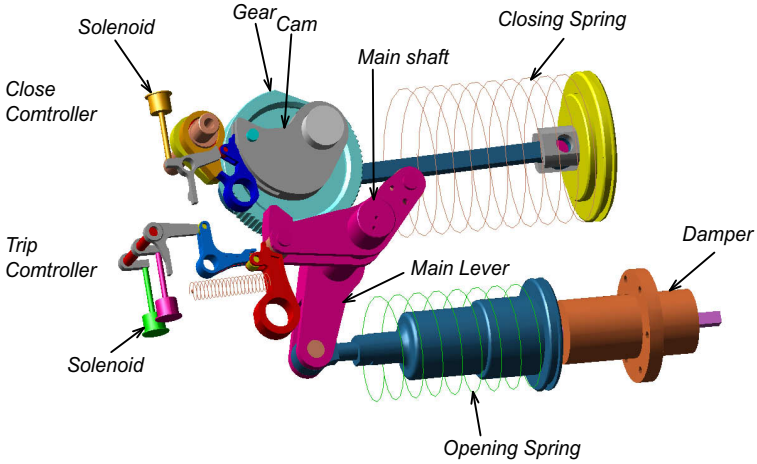
Spring Mechanism for Circuit Breaker

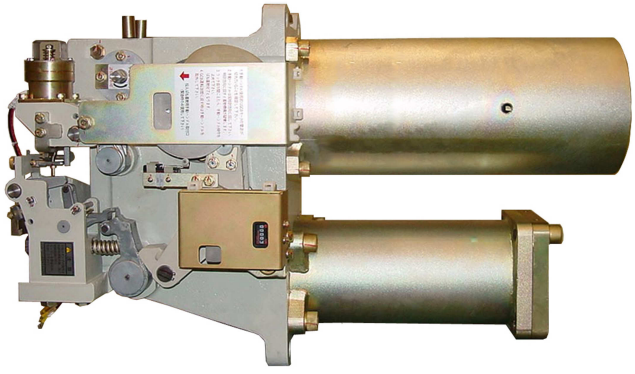
FEATURES

- Simplified driving mechanism and drastically reduced number of parts by adoption of solenoid, resulting in higher reliability.
- Easy maintenance thanks to use of cantilever construction for camshaft and main shaft.
- Locking device is provided to prevent manual closing operation with breaker closed.
- Very compact and lightweight.

OPERATING MECHANISM

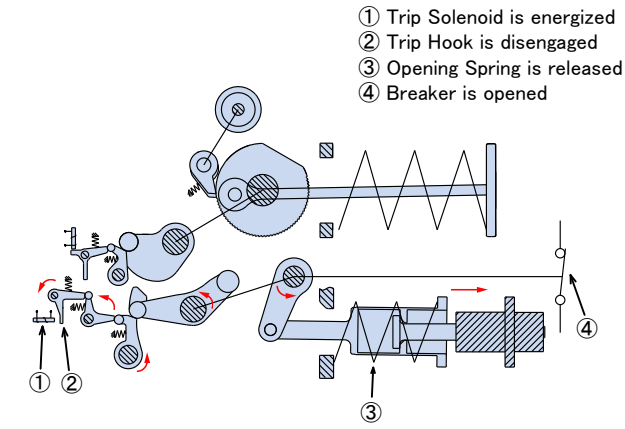


(3D-View)

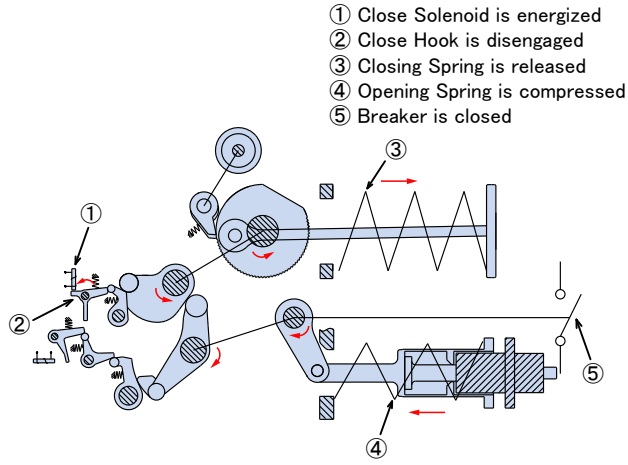


(Side-View)

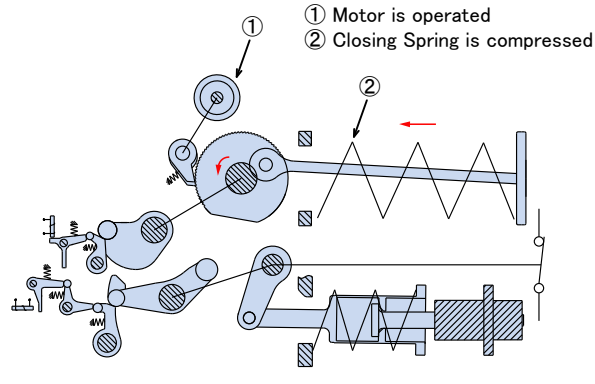
OPERATING PRINCIPLE



(a) OPENING OPERATION



(b) CLOSING OPERATION



(c) CLOSING SPRING OPERATION

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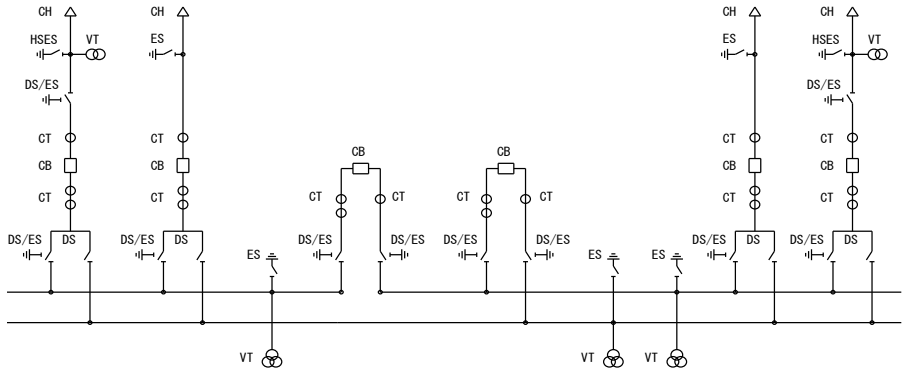
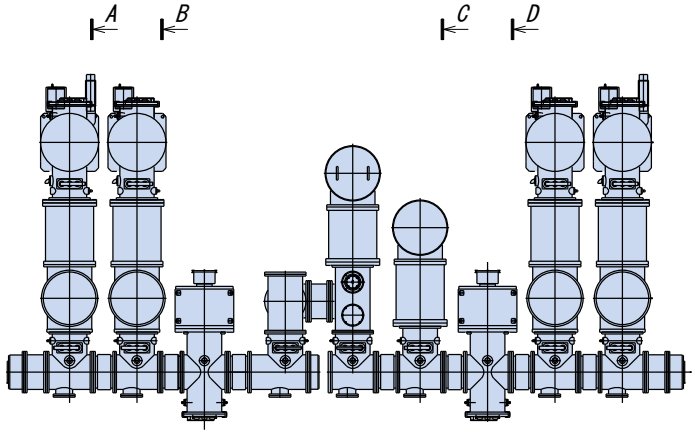
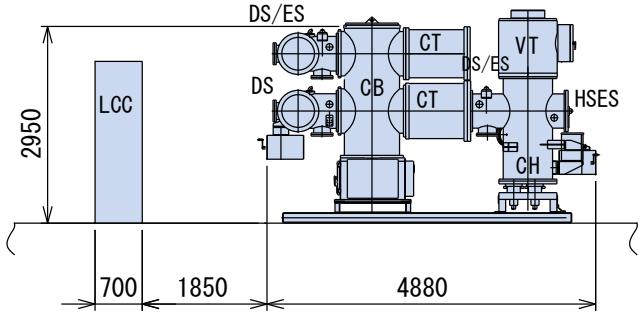
Rating & Bay Configuration

Equipment	Item	Rating／Specification
		123／145kV
CircuitBreaker (CB)	Type	Gas Circuit Breaker
	Rated Voltage	123／145kV
	Rated Current	1,250／2,000／3,150A
	Rated Breaking Current	31.5／40kA
	Rated Breaking Time	3cycles
	Lighting Impulse Withstand Voltage	550／650kV
	Rated Gas Pressure (Gage)	0.6MPa
	Method of Operation	Motor－Driven Spring & Manual
DisconnectingSwitch (DS)	Type	3－Phase Integrated
	Rated Voltage	123／145kV
	Rated Current	1,250／2,000／3,150A
	Rated Short－Time Current	31.5／40kA 3sec
	Method of Operation	Motor－Driven & Manual
Maintenance EarthingSwitch (ES)	Type	3－Phase Integrated
	Rated Voltage	123／145kV
	Rated Short－Time Current	31.5／40kA 3sec
	Method of Operation	Motor&Manual
High－Speed EarthingSwitch (HSES)	Type	3－Phase Integrated
	Rated Voltage	123／145kV
	Rated Short－Time Current	31.5／40kA 3sec
	Method of Operation	Motor－Driven Spring & Manual
Busbar (BUS)	Type	3－Phase Integrated
	Rated Voltage	123／145kV
	Rated Current	1,250／2,000／3,150A
	Rated Short－Time Current	31.5／40kA 3sec
	Rated Gas Pressure (Gage)	0.6MPa

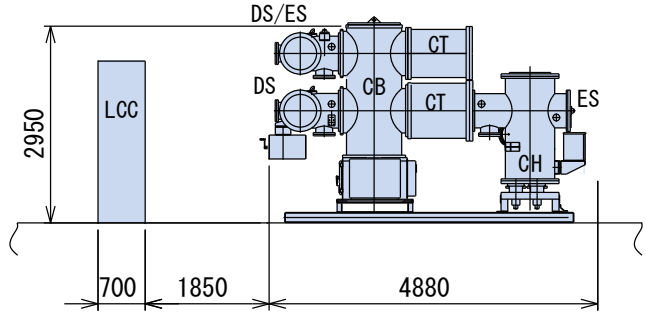




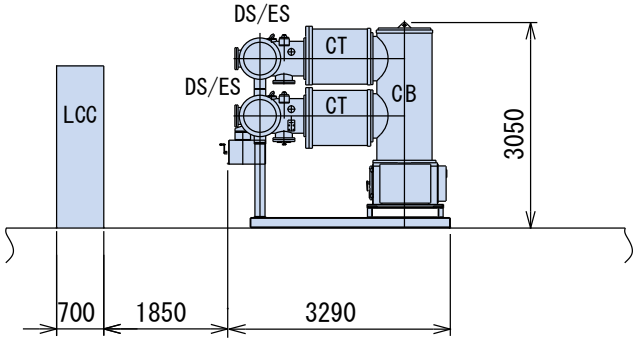
VIEW A-A



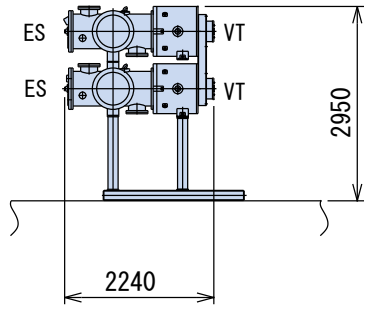
VIEW B-B



VIEW C-C



VIEW D-D



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The Right Solution in Power Transmission and Distribution

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