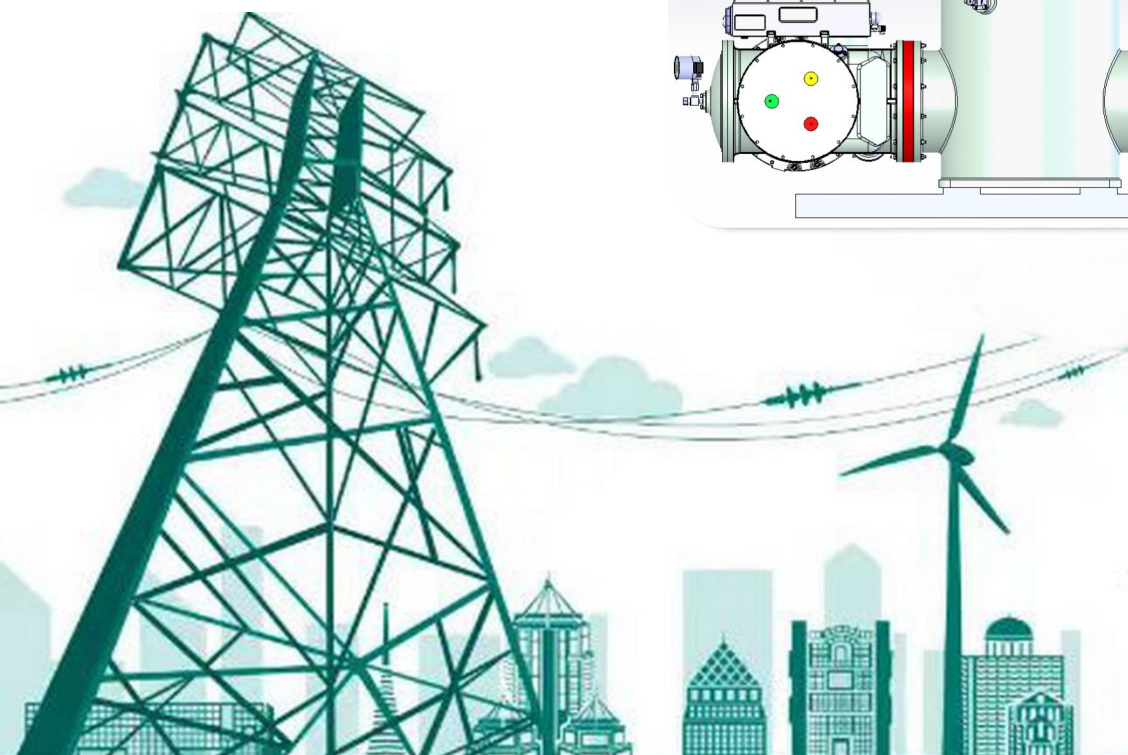
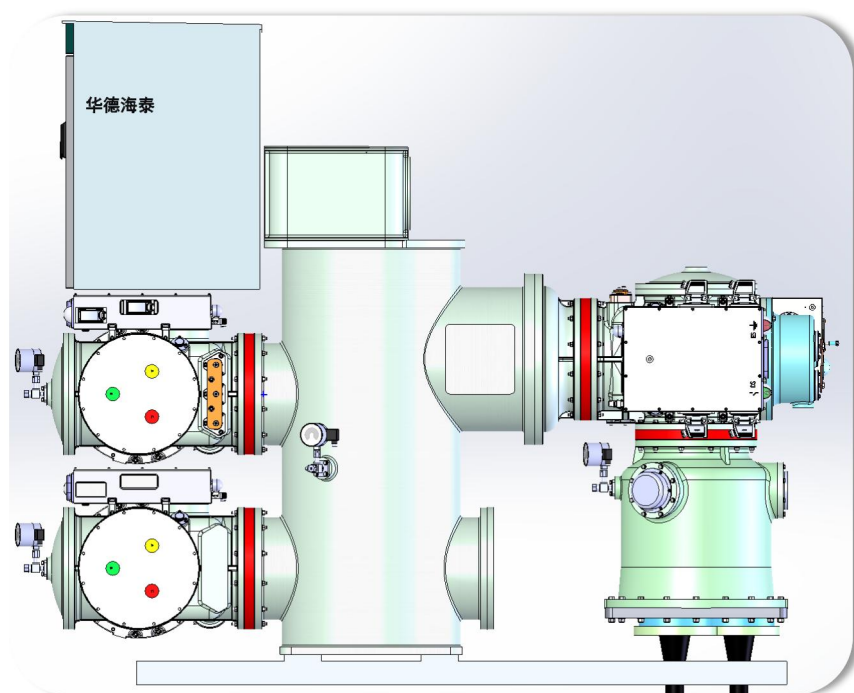


ZH3C-72.5 Green GIS

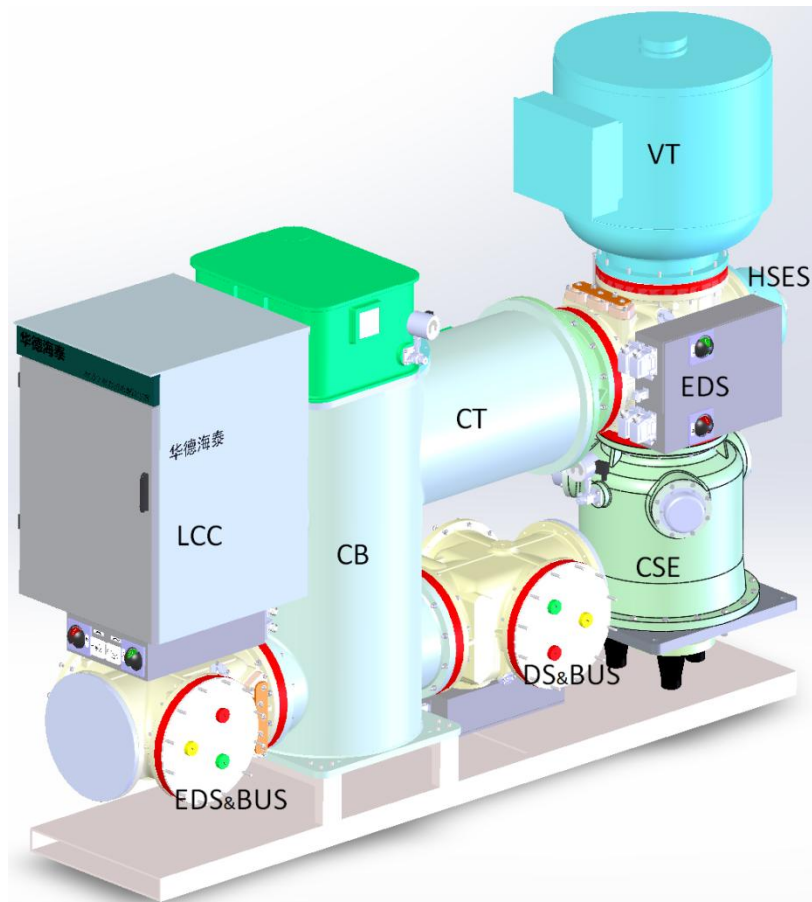
72.5kV, up to 3150A, 40kA



Shenyang Huade High Technology Electric Co., Ltd

As the electric power industry continues to evolve, power users are increasingly demanding more compact power transmission and transformation equipment. Miniaturized electrical equipment offers significant benefits, including land conservation and reduced construction costs. The new generation of SF6-free GIS addresses these needs by minimizing the use of the greenhouse gas SF6, thereby aligning with environmental protection standards.

Drawing on years of expertise in high-voltage electrical appliance design, Shenyang Huade High Technology Electric Co., Ltd. has developed the latest generation of the ZH3C-72.5 three-phase common tank GIS. This innovative product incorporates the most advanced global technology and design concepts. Utilizing a modular design and standardized component layout, it boasts a compact footprint with an interval width of just 0.8 meters, alongside advanced technology and high reliability.



ZH3C-72.5/T 3150-40 GIS

Standards

ZH3C-72.5 GIS fully meets IEC 62271-203, GB7674, DL617 and other standards with high technical parameters and stable and reliable quality.

Design concept

ZH3C-72.5 GIS improves product performance with smaller size, which greatly reduces civil costs and saves operating costs.

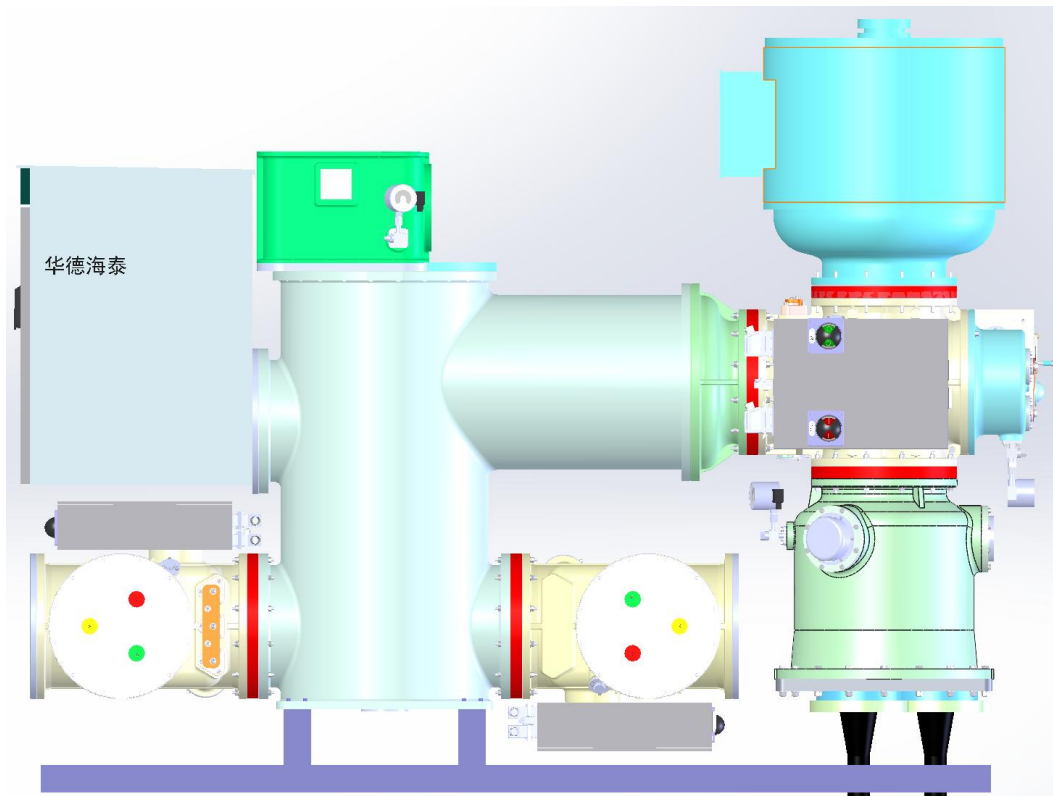
Solutions

ZH3C-72.5 GIS has maximum system reliability and minimum maintenance. Modular design adopted for easy expansion and reconstruction in the future.

Product Structure

The ZH3C-72.5 Green GIS product employs vacuum breaking technology and clean air insulation, achieving a Global Warming Potential (GWP) of zero. It is composed of several standard functional modules, including the circuit breaker (VCB), earthing disconnecting combination switch (EDS), voltage transformer (VT), current transformer (CT), bushing (BSG), busbar (BUS), and more. These modules share a uniform interface form and size, allowing for flexible combinations to meet the design and layout requirements of various substations.

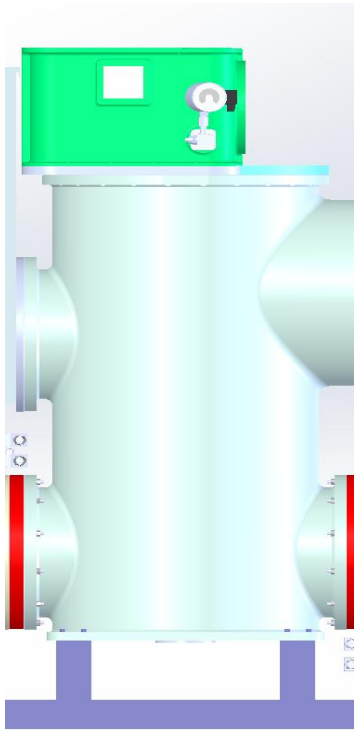
Each module is designed for easy assembly, facilitating future modifications and expansions. Gas-isolating insulators are used to minimize interaction between adjacent modules. The flexible modular design optimizes substation design and layout, considering various factors such as main wiring, incoming lines, cable routing, building dimensions, trafficability, reserved extensions, and rapid troubleshooting.



ZH3C-72.5/T 3150-40 GIS

The long-term safe and stable operation of all components and functions of the substation GIS is ensured through thoughtful design, error-proof system settings, meticulous inspections, and rigorous quality control.

Circuit breaker (VCB) module



The circuit breaker features a three-phase common tank structure, with the three phases sharing a spring operating mechanism equipped with mechanical interlocks. The circuit breaker modules have three or four coupling flanges as interfaces, allowing direct coupling with all other modules. This design enables a very compact arrangement through proper engineering. For instance, installing a large power station with a ring busbar or circuit breaker arrangement is as straightforward as constructing a small ring network.

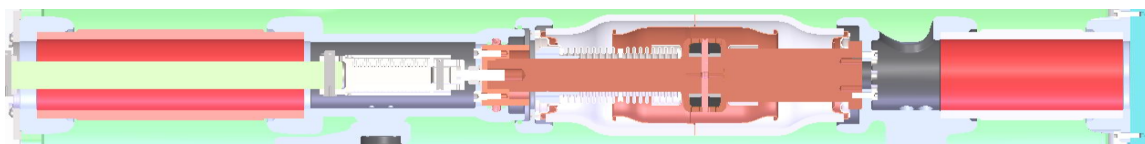
The circuit breaker utilizes a vacuum interrupter and a full-spring operating mechanism, resulting in minimal maintenance requirements. Through optimized electric field calculations, the double-bus scheme incorporates the internal line of the circuit breaker, simplifying the primary bus arrangement and reducing the occupied area.

Excellent breaking performance

The ZH3C-72.5 GIS employs vacuum interrupting technology, boasting over ten years of safe operation experience, advanced technology, reliable quality, and a long electrical lifespan, making it suitable for frequent operations. The circuit breaker's cable charging current switching level and extended electrical life level are rated at C2 and E2, respectively. Additionally, the gas tank is equipped with a gas density monitor to provide real-time insulation gas pressure monitoring.

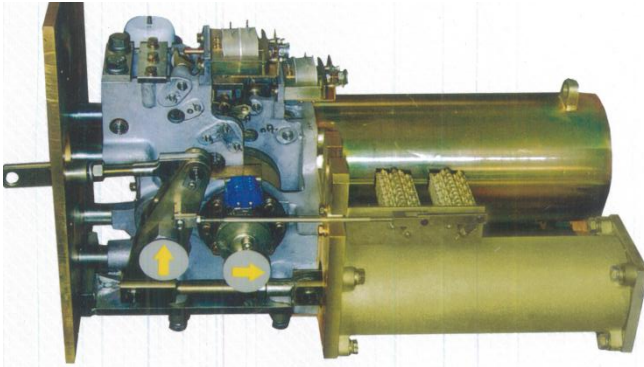
The use of a vacuum interrupter, as opposed to an SF6 interrupter, ensures that there are no arc decomposition byproducts during the breaking process. This allows for the installation of the current transformer within the circuit breaker's gas tank, thereby reducing the product's footprint and further lowering construction costs.

Furthermore, the adoption of vacuum breaking technology eliminates the need for heating cables in low-temperature areas, thereby enhancing the circuit breaker's reliability.



Vacuum interrupter

Spring operating mechanism of circuit breaker



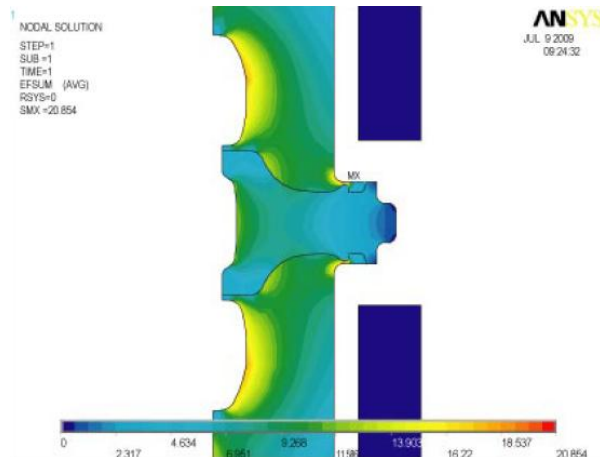
Spring operating mechanism, small volume and mechanical life up to 10,000 times, meets the oil-free, non-gasification environmental protection requirements.

- electrical or manual charging
- electrical or manual operation
- Slow opening and closing operation.

Basin-type insulator



Basin-type insulator



Analysis of electric field distribution of basin-type insulator

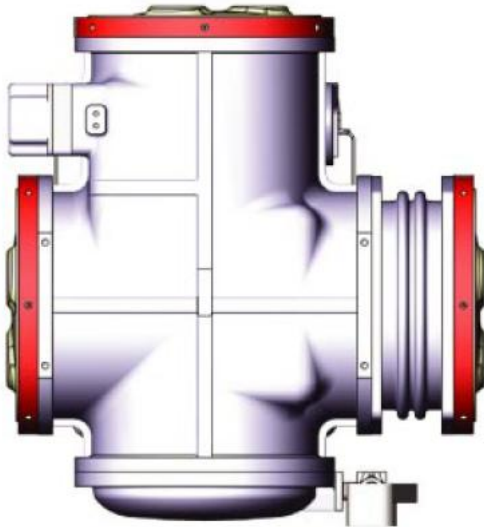
The optimal shape of the three-phase common tank insulator is determined through electric field modeling analysis using specialized software. The insulator is manufactured using epoxy resin and aluminum oxide filler, employing a vacuum casting process. Type test verification ensures that the pressure resistance level fully meets design requirements.

The basin-type insulator is strategically placed between adjacent compartments with different air pressures or between spaced bus-type EDS modules. It connects and supports the main loop conductor, maintains the necessary gas pressure differentials between compartments, and minimizes mutual influence between adjacent modules.

Earthing disconnecting combined switch module

The Earthing Disconnecting Combined Switch (EDS) integrates the disconnecting switch and the maintenance earthing switch into a single unit, sharing one moving contact. This design includes a natural mechanical locking mechanism, which structurally prevents the disconnecting switch and the earthing switch from being connected simultaneously, thereby completely eliminating the risk of mis-operation.

Bus EDS

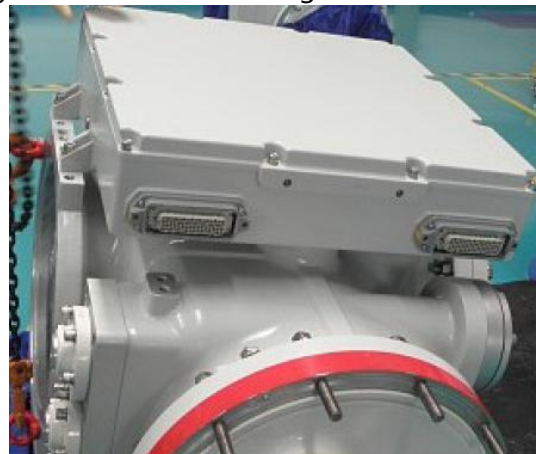
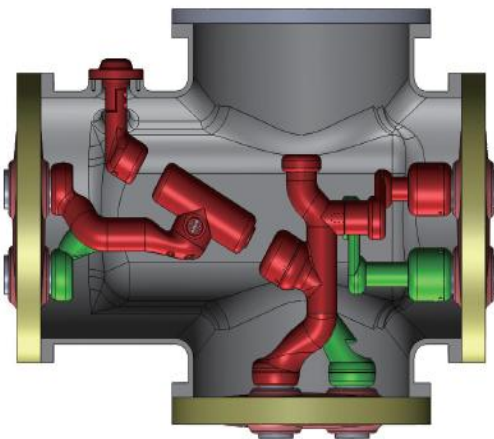


Bus EDS

- The bus EDS integrates the bus disconnecting switch and the maintenance earthing switch within the same module. This design allows for direct connection between compartments and interconnection through the branch bus and telescopic adjusting joint.
- The bus EDS is capable of opening and closing small capacitance and inductance currents, as well as switching the bus conversion current in double-bus transformer substations.
- The user-friendly structure design ensures that the working state of the opening and closing position indicator is visible from the inspection path.

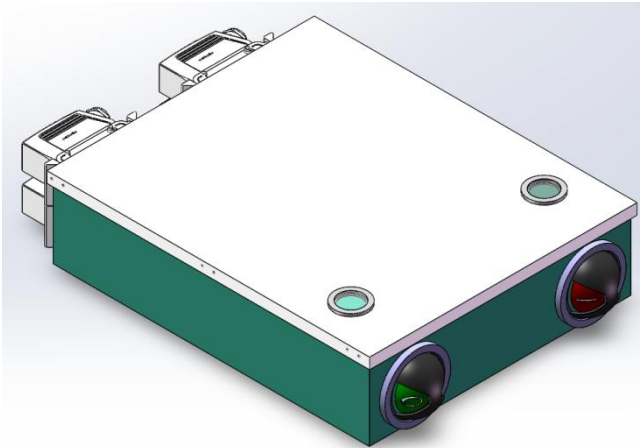
Line EDS

The line EDS includes the functions of outgoing line side disconnecting switch and outgoing line side maintenance earthing switch. It allows the compartment to be connected to various terminal modules (including cable terminations, overhead lines and transformer terminations) and to voltage transformers and surge arresters.

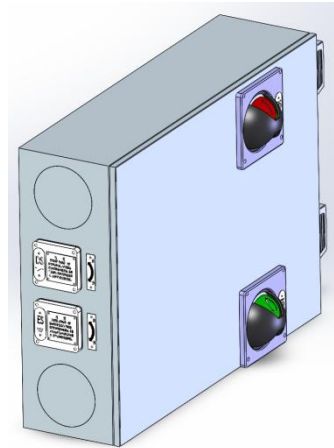


Line side EDS

EDS operating mechanism



Bus EDS operating mechanism



Line EDS operating mechanism

The disconnecting switch and earthing switch share a single operating mechanism, which also includes a manual operation option for emergency situations. The EDS operating mechanism is directly inserted onto the body, eliminating exposed connecting rods, ensuring high transmission efficiency, and offering good tolerance. It is driven by dual motors, featuring mechanical interlock and clutch functions to ensure motor safety.

Fast earthing switch (FES) module



Fast earthing switch FES module

The fast earthing switch features a motor spring operating mechanism, where the motor energizes the spring, and the spring releases energy upon reaching its inflection point. This mechanism enables quick opening and closing of the moving contact, making the fast earthing switch particularly suitable for feeder earthing applications.

The fast earthing switch can isolate and disconnect from the enclosure of the working earthing. This allows for easy adjustment and testing of relay protection, cable inspection, cable fault positioning, and other tasks. By electrically connecting the outside and the conductor of the GIS main circuit through the fast earthing switch, testing work is significantly facilitated.

Current transformer (CT) and Voltage transformer (VT) modules



Current transformer (CT)



Voltage transformer (VT)

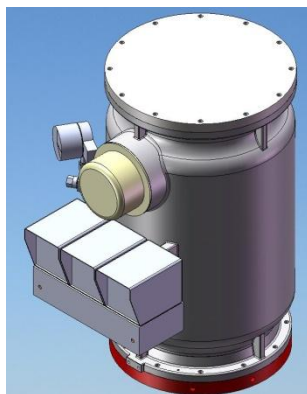
Inductive voltage and current transformers are utilized for measurement and protection purposes. These transformers employ gas as the primary insulation material (with the voltage transformer insulation consisting of gas and film), ensuring aging-resistant insulation and high reliability.

The current transformer is typically connected to the circuit breaker module and can accommodate multiple sets of secondary coils. Meanwhile, the secondary side of the voltage transformer may feature two measuring windings and an open delta winding for earth fault detection.

Electronic transformers can be incorporated as per user requirements. These transformers offer advantages such as compact size, lightweight construction, comprehensive self-check protection, and seamless integration with secondary comprehensive protection systems. With the digital evolution of electrical equipment, electronic current (voltage) transformers are expected to witness increasingly widespread adoption.

Lightning arrester (LA) module

ZH3C-72.5 GIS can be equipped with a lightning arrester module to limit the occurrence of overvoltage. The lightning arrester adopts valve plate type and gapless zinc oxide lightning arrester.



Lightning Arrester (LA) module



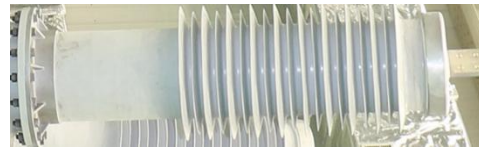
Zinc oxide valve

Air bushing BSG module

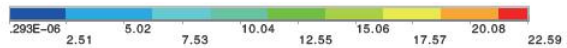
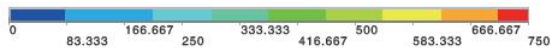
Outdoor bushings are utilized for connecting to overhead lines or transformers. Users have the option to choose between two types: high-strength porcelain and silicon rubber composite insulating bushings. It is recommended to opt for composite insulating bushings, comprised of a supporting pipe wall made of glass fiber-reinforced epoxy resin and a vulcanized umbrella group made of silicon rubber. These bushings offer numerous advantages, including explosion and crack resistance, high tensile strength, easy installation and transportation, resistance to fouling, and excellent hydrophobic properties. For transformer applications, the oil-gas bushing connection part can be customized based on project requirements.



Air bushing (BSG)/high strength porcelain



Compound insulating bushing

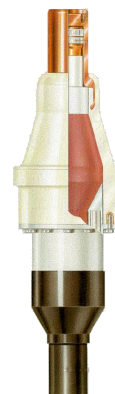
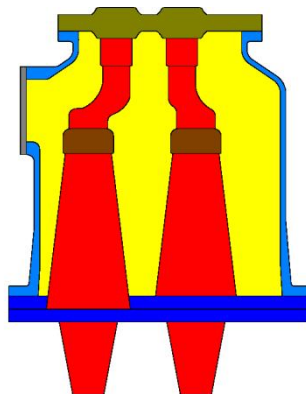


Bushing electric field distribution diagram

Bushing field intensity distribution diagram

Cable terminal

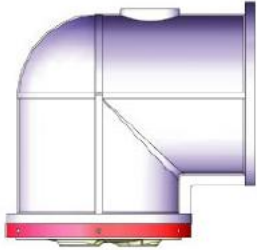
GIS can be connected with various types of high-voltage cables through three-phase common tank cable termination module. The coordination of cable termination box and cable termination comply with the requirements of IEC 60859.



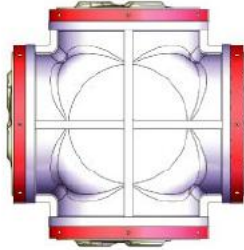
cable terminal

Transition module

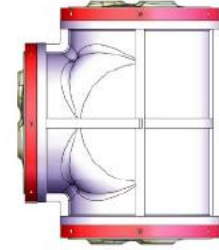
It is used for realizing interconnection inside the bays. The following transition modules are available according to the circuit design and the bay arrangement.



L-shaped bus module



Four-way bus module



Three-way bus module

Secondary control (LCP) module

The LCP control panel is equipped with all auxiliary electrical equipment for the purposes of command input, fault alarm, electrical interlocking and remote control, and collects the current and voltage signals required for control and protection equipment. The primary equipment is connected to the local control panel by multiple multi-core cables through plug connectors. All cables and plug connectors are prepared and passed the test before being delivered out from the factory.

The panel of the control panel is provided with components such as position indicator, control switch and fault alarm device. The user can release the interlock through the unlocking switch, and can also switch the control mode through the local/remote change-over switch.

According to the requirements of the digital substation, we design an intelligent digital control and protection module i-LCP, the output of which follows the IEC61850-9 standard format. It performs on-line detection on various functional data of the equipment and provides reference data for inspection and detection.



Control panel in operation

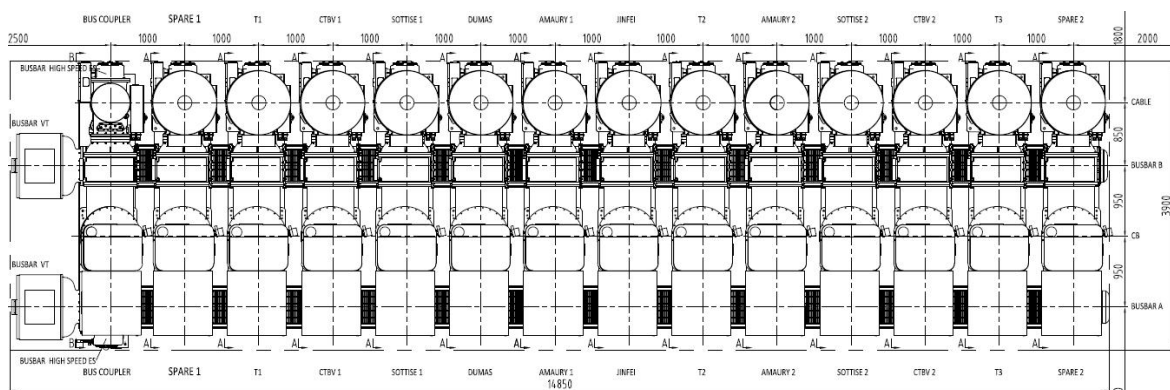
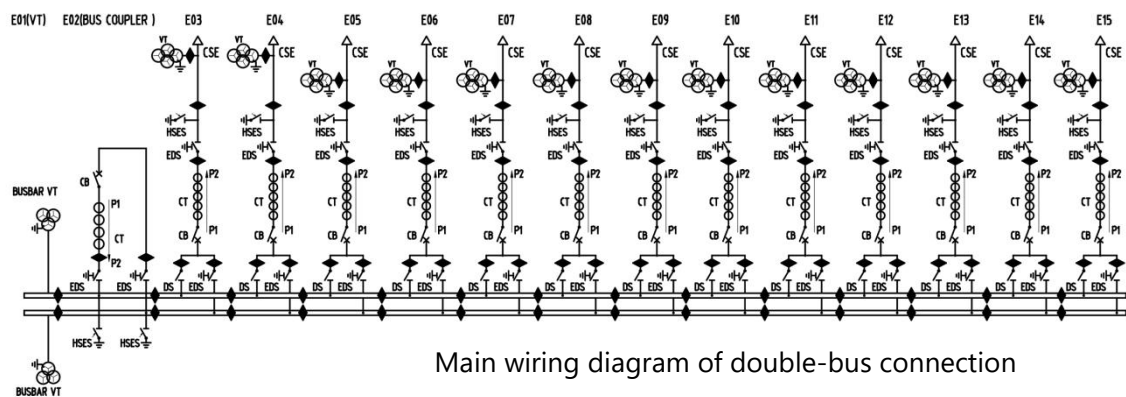
Applicable to various substation wirings

ZH3C-72.5 GIS can meet the design principle requirements of safe and reliable design, advanced technology, reasonable investment and efficient operation of modern substations. With flexible modular design, it can realize all wiring modes required by conventional substations, including single-bus, double-bus, single-bus section, double-bus section, bridge connection, ring-type bus connection, circuit breaker connection line transformer bank, etc., so that the substation can be conveniently optimized in design and layout. Conditions and factors of various substations, such as main connection, incoming line and cable direction, size of substation room, reserved expansion, rapid maintenance and troubleshooting, are fully and specifically considered.

The following are several main wiring modes commonly used in the application of ZH3C-72.5 GIS:

Double-bus connection mode:

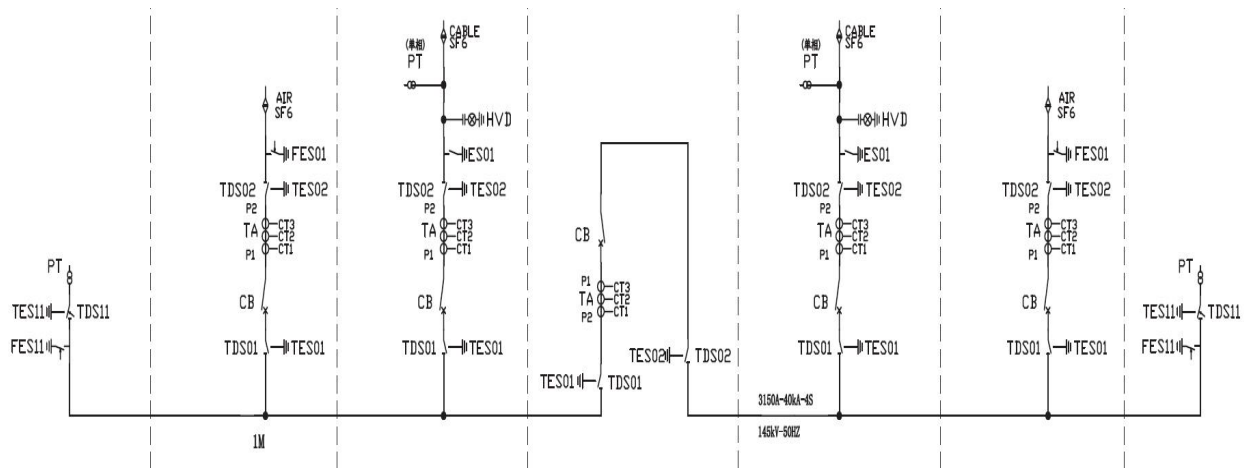
The power supply of the double-bus connection mode is reliable, no need to interrupt the power supply during busbar maintenance, the scheduling is flexible, the expansion is convenient, and the testing is convenient. It is suitable for users who have a large number of outgoing circuits or power supplies on the busbars and who require rapid restoration of power supply after a bus failure. It is now widely used in important power plants and substations with large capacity.



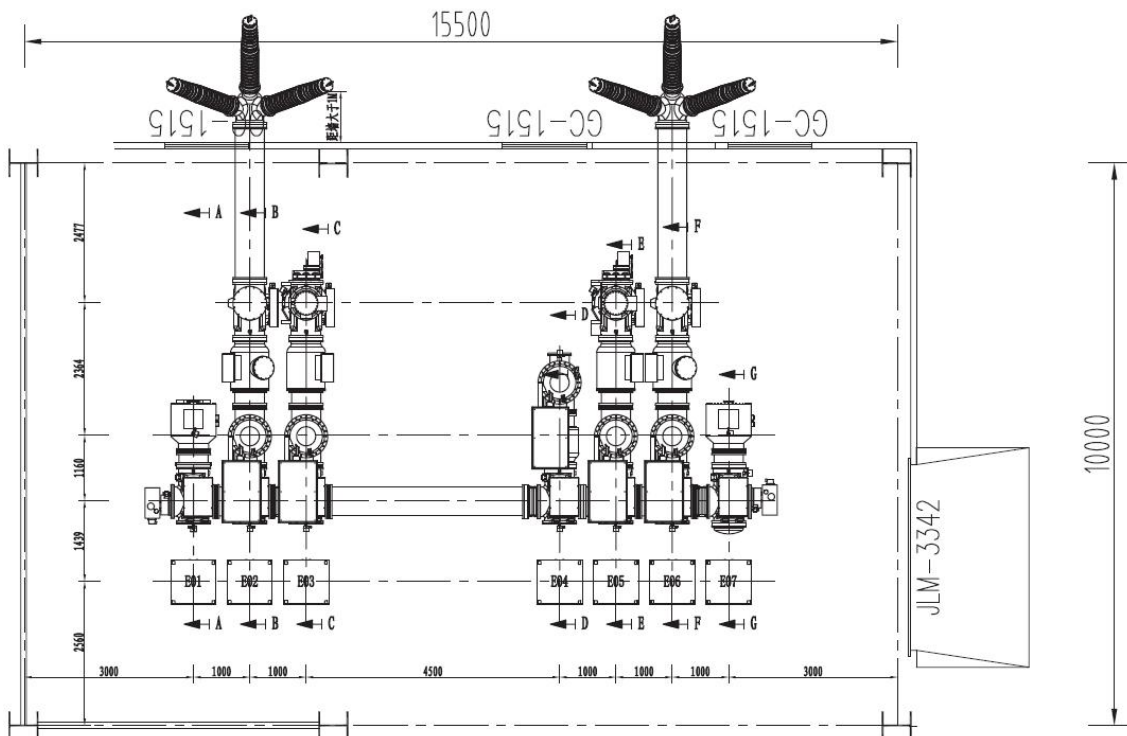
Layout plan of double-bus connection

Single-bus section connection mode:

Single bus section connection mode adopts dual power supply. The power distribution line can be overhauled by sections, and the power failure mode is small. When one section of bus fails, the section breaker will automatically cut off the faulty section to ensure uninterrupted power supply of normal section of bus and avoid power failure of important users. It is mainly used in small capacity power plants and substations and consumers with relatively high quality power supply.



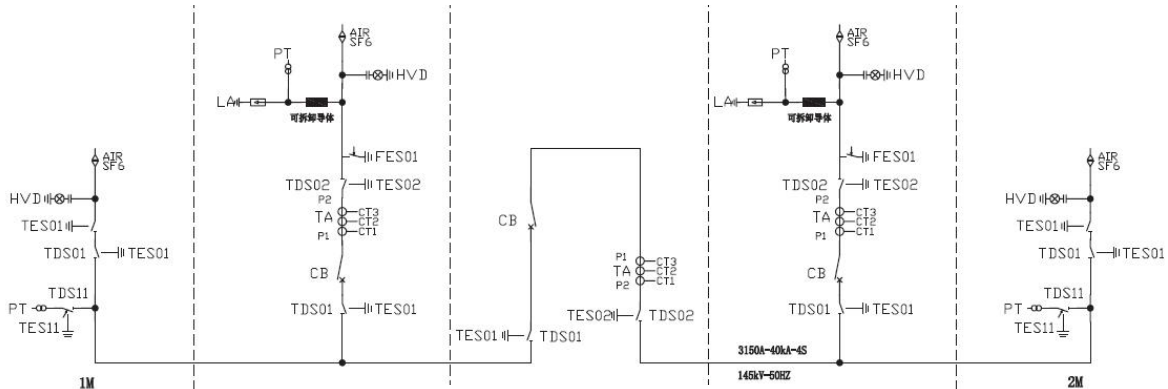
Main wiring diagram of single-bus section connection



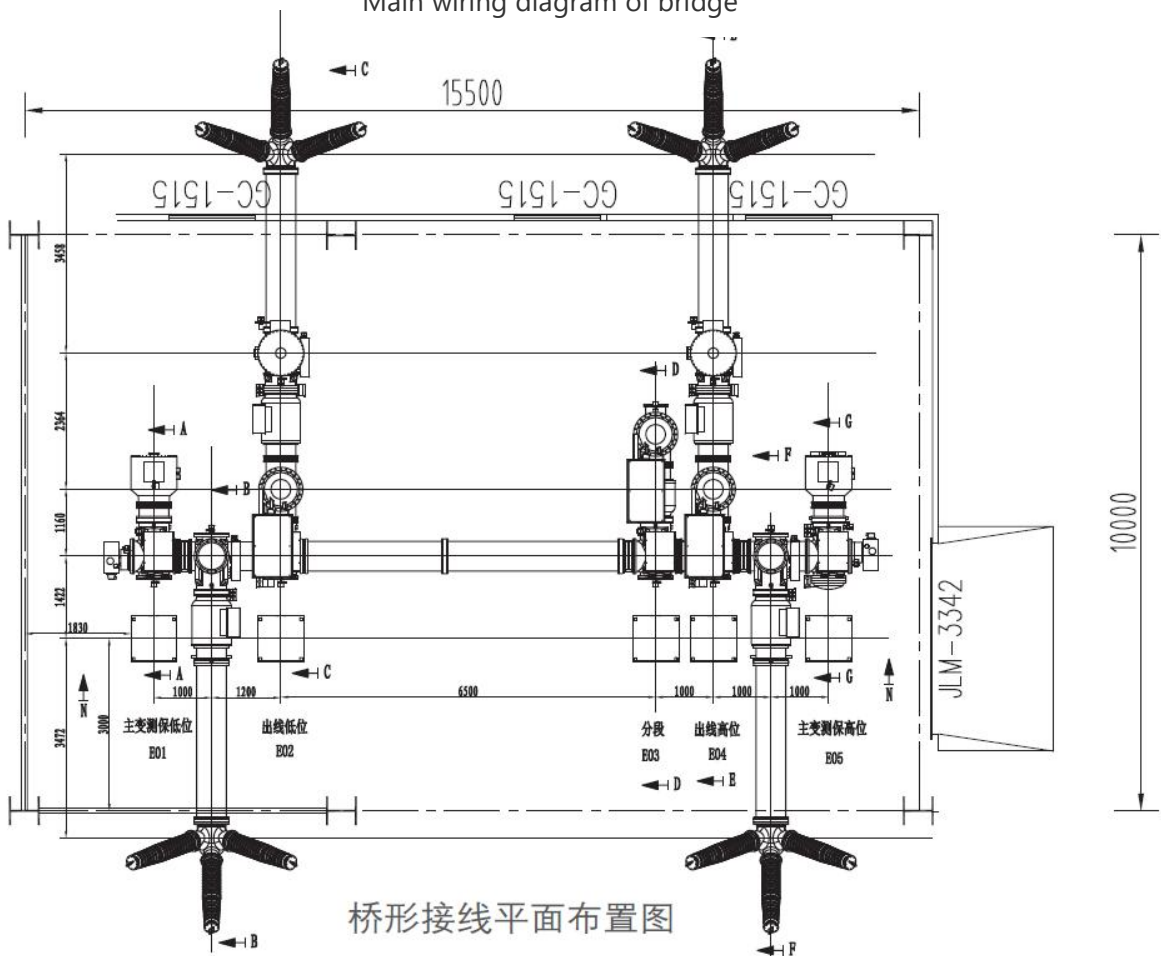
Layout plan of single-bus section connection

Bridge connection mode:

The bridge connection mode has the advantages of reliable and flexible operation, fewer electric appliances, simple and clear device, low construction cost and the like, so the bridge connection mode is widely used in the power supply system of an industrial user or a community, and is also widely adopted in a factory or enterprise substation with two-way power supply. If expansion is required in the future, it is suggested to consider in advance when designing the substation, and the bridge connection can be expanded into single bus section mode or expanded bridge mode.



Main wiring diagram of bridge



桥形接线平面布置图

Layout plan of bridge connection

Technical Parameters

No.	Item		Unit	Parameters
1	Rated voltage		kV	72.5
2	Rated frequency		Hz	50/60
3	Rated continuous current		A	1250~3 150
4	Rated short-circuit breaking current		kA	31.5/40
5	Rated short circuit making current		kA	80~108
6	Full breaking time		ms	≤ 60
7	Circuit breaker closing time		ms	≤100
8	Circuit breaker opening time		ms	≤40
9	Asynchronous circuit breaker	Opening	ms	≤2
		Closing	ms	≤2
10	Rated short-time withstand current (effective value)		kA	40
11	Rated short-circuit duration		s	3
12	Rated peak withstand current (effective value)		kA	80~108
13	Rated power-frequency short-duration withstand voltage (1min)	Phase to earth , Phase to Phase	kV	160
		Across the isolating distance	kV	160+42
14	Rated lighting impulse withstand voltage (Peak value)	Phase to earth , Phase to Phase	kV	380
		Across the isolating distance	kV	380+60
15	Clean air Gas pressure (20°C, gauge pressure)	Rated pressure	Mpa	0.6
		Alarm pressure	Mpa	0.56
16	Minimum functional pressure		Mpa	0.55
17	Circuit breaker electrical life			E2 level
18	Rated operating sequence			O-0.3s-CO-180s-CO
19	Partial discharge (Under 1.2 times rated voltage)	whole compartment	pC	5
		Insulation parts	pC	3
20	Compartment weight		T	1.5~4
21	Annual leakage rate			≤0.1%

Transportation, installation and Commissioning

As ZH3C-72.5 GIS is light in weight and extremely convenient for transportation and installation, we usually transport and install a complete, factory-manufactured and tested bay and its control panel as a transportation unit. Its outstanding advantages are:

1. Short on-site installation time and simple and convenient commissioning;
2. The whole bay is subject to routine dielectric test, partial discharge test, air tightness, micro-water and operation test in the factory, and the equipment delivered to the site will have no insulation damage;
3. As ZH3C-72.5 GIS is small in size and light in weight, there are almost no special requirements for packaging and transportation roads.
4. The working performance of ZH3C-72.5 GIS is not affected by external factors such as dust and moisture, so the maintenance workload of GIS is extremely small and almost maintenance-free.
5. For the usual inspection, operators do not need to enter the GIS enclosure, and the substation can be kept in operation. Periodic checks include checking of the correct operation of drives, auxiliary switches, density relays, etc.



Version No.: SHD ZHN3C-72.5 2024-5



Address: 10A-2, 5th Road, Tiexi District, Shenyang, China

Post code: 110027

Tel: 024-85818396

Fax: 024-88263464

Website: www.huade-electric.com

Email: export@syhuali.com