



# GIM

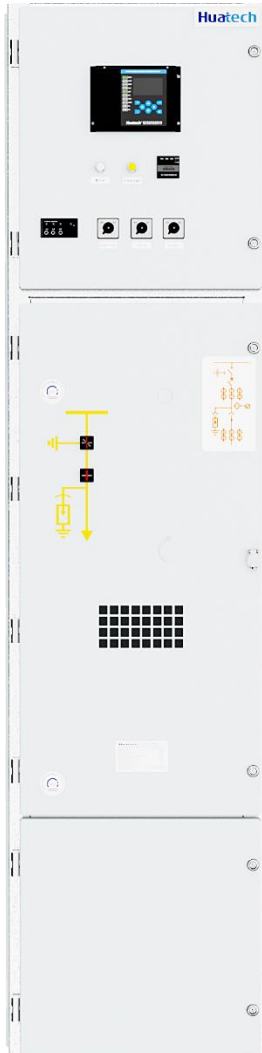
## GIM Gas Insulated Metal-enclosed Switchgear

40.5kV,...3150A,...40kA

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### Product outline

GIM gas insulated switchgear is a new generation of double gas tank gas-insulated switchgear designed and developed by Xiamen Huadian Switchgear Co., Ltd. It adopts advanced high-voltage composite insulation and gas sealing technology, combined with reliable production process, to meet the requirements of usage in various harsh environmental conditions, and provide the best solution to users.

### GIM gas insulated switchgear has complete specifications and excellent performance parameters:

- Rated voltage: 40.5kV
- Rated current: up to 3150A
- Rated short circuit breaking current: up to 40KA
- Rated peak withstand current: up to 100kA
- Annual leakage rate of SF<sub>6</sub> gas: ≤ 0.1%
- Gas box protection level: up to IP67
- Applicable altitude: ≤5000m

## Product Features



### Product features

The GIM gas insulated switchgear adopts SF6 gas, with excellent insulation performance, as the insulation medium, integrates high-voltage components such as bus, isolation / grounding switch, vacuum circuit breaker, measurement and protection transformer, cable connectors etc. as one body, completely enclosed in the metal shell filled with SF6 gas, so that it has the following functional characteristics to meet the needs of users for high performance and quality:

### High security

- The design is in full conformity with the requirements of GB, DL, IEC, DIN VDE and the standards of major industrialized countries in the world, and can operate safely all over the world
- The complete set of product type tests and severe environmental tests conducted by authoritative testing institutions have been passed to ensure the safe operation of the equipment under specific working conditions, including:
  - Conventional type test items
  - Leakage test
  - Gas status measurement
  - High altitude dielectric test (5000m)
- The primary live part is fully sealed and gas insulated to prevent contact with charged body to the maximum extent and ensure the safety of operation
- Its circuit breaker and three-position switch can realize effective interlock, to ensure that the operators are in a safe condition all time

## Product Features



High Sensitive Helium Mass Spectrometer  
Leak Detection Equipment

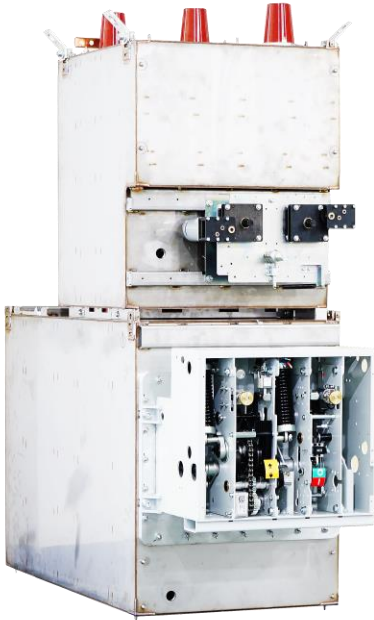


Voltage Withstand Test of Switchgear

### High reliability

- Efficient assembly lines and advanced production technology ensure the stability of product quality;
- The gas tank is welded by robot laser welding system imported from German, to ensure tightness of gas tank and maintenance-free
- Realize large-scale assembly line production and the standardization of products to ensure the consistent high quality
- Accurate inspection equipment and strict quality management system guarantee the reliability of products;
- High-precision fixture and high-sensitive helium mass spectrometry leak detection equipment will minimize the factors in affecting the quality
- ISO9001 quality management system to improve the lean production ability of the factory and ensure reliability and quality of products
- Imported aluminum zinc plate material, high strength stainless steel rivet riveting and double bending process ensure the quality and reliability
- Each gas tank is equipped with a pressure release device to effectively prevent the accidental rise of internal gas pressure
- Metal armored design, high voltage conductor completely sealed, gas tank protection grade up to IP67 to ensure equipment from being affected by the external environment
- The operating mechanism of circuit breaker and disconnecting switch is located outside the gas tank, which is convenient for maintenance and repair, and ensures reliable operation
- Comprehensive measures to prevent misoperation, which are fully meet the interlocking system requirements and protect the safety of personnel and equipment

## Product Features



Modular GasTank Design Structure



Gas Tank Pressure Release Device

### Wide adaptability

- Completely functional schemes and available for various combinations can meet different load requirements
- Modular design of structure make it convenient for equipment assembly, maintenance, expansion and flexible operation
- Wall or back-to-back installation can realize operation in front of cabinet
- Both traditional current / voltage transformer and electronic current / voltage transformer can be selected with various choices
- Top expansion connection mode is adopted for the main bus, which is convenient for installation and flexible expansion, and does not need to deal with the gas system

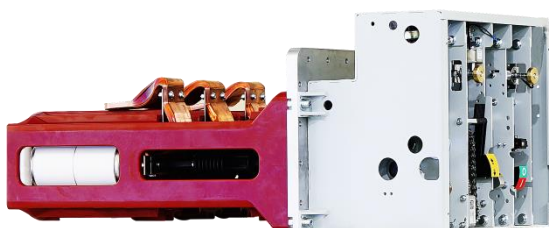
### Economy and environmental protection

- More compact cabinet reduces the occupation of valuable space and investment on infrastructure
- More convenient operation to reduce operating intensity
- Longer service life to save new investment
- Less maintenance requirements to reduce operating costs
- Lower average product life cycle cost

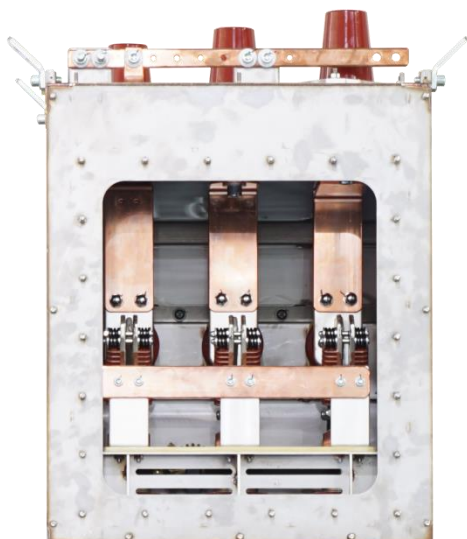
## Product Features



Solid Insulated Bus Bushing



Indoor Medium Voltage  
Vacuum Circuit Breaker



Three Position Rotary Disconnect

### Technical innovation

#### ■ Application of solid insulated bus bushing

- The main bus adopts solid insulation technology and new epoxy resin material to ensure the high insulation performance of the product
- Plug in design and there is no need to charge or deflate on site, so as to avoid the influence of installation environment and ensure the tightness of gas tank
- Simple cabinet assembly, low requirements for infrastructure accuracy, efficient and convenient installation can effectively save cost of actual operation and maintenance

#### ■ Special indoor medium voltage vacuum circuit breaker for inflatable cabinet

- Equipped with high performance vacuum interrupter with features of miniaturization, low resistance, high breaking and improved insulation reliability
- Modular operation mechanism layout and integrated design with polar pole to ensure high precision and stable transmission
- The circuit breaker has passed rigorous verification and is E2, M2, C2 and S2 products with excellent electrical performance and high reliability

#### ■ Three position rotary disconnect

- Three operation positions: connection, isolation and grounding. And watch band connection mechanism ensures stable performance
- Reliable drive and interlock system to realize mechanical and electrical interlocking with circuit breaker to prevent misoperation
- It can be operated manually or electrically and can support remote control to meet the requirements of unattended substation

## Major Parameters of GIM Switchgear

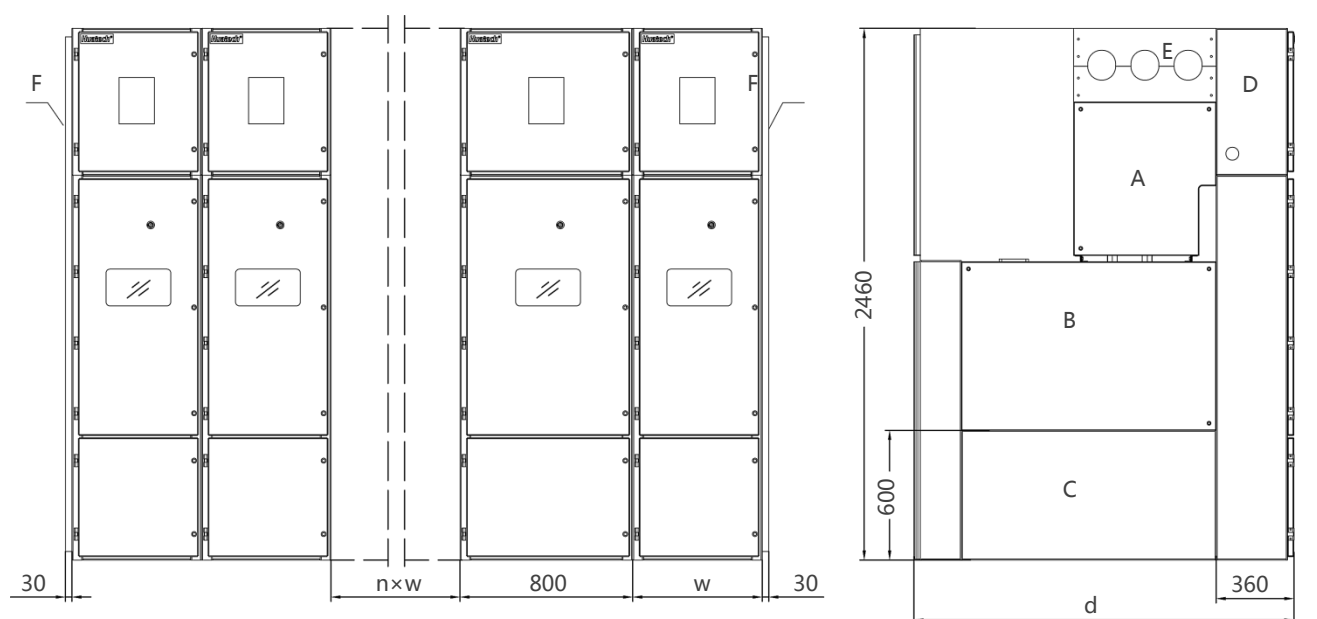
| No. | Technical Parameters                              |                                                                     |                                                                  | Unit | Data                     |
|-----|---------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------|------|--------------------------|
| 1   | Rated voltage                                     |                                                                     |                                                                  | kV   | 40.5                     |
| 2   | Rated frequency                                   |                                                                     |                                                                  | Hz   | 50/60                    |
| 3   | Rated current                                     |                                                                     |                                                                  | A    | 1250/1600/2000/2500/3150 |
| 4   | Insulation level                                  | 1min power frequency withstand voltage                              | Phase to earth, phase to phase, between open contacts of breaker | kV   | 95                       |
|     |                                                   |                                                                     | Between open contacts of disconnecting switch                    |      | 118                      |
|     |                                                   | Rated lightning impulse withstand voltage (peak)                    | Phase to earth, phase to phase, between open contacts of breaker |      | 185                      |
|     |                                                   |                                                                     | Between open contacts of disconnecting switch                    |      | 215                      |
|     |                                                   | Power frequency withstand voltage of auxiliary and control circuits |                                                                  |      | V                        |
| 5   | Rated short-circuit breaking current              |                                                                     |                                                                  | kA   | 20/25/31.5/40            |
| 6   | Rated short-circuit closing current               |                                                                     |                                                                  | kA   | 50/63/80/100             |
| 7   | Rated short-time withstand current                |                                                                     |                                                                  |      | 20/25/31.5/40            |
| 8   | Rated peak withstand current                      |                                                                     |                                                                  |      | 50/63/80/100             |
| 9   | Rated duration of short-circuit                   |                                                                     |                                                                  | s    | 4                        |
| 10  | Rated cable-charging breaking current             |                                                                     |                                                                  | A    | 50                       |
| 11  | Rated operation sequence                          |                                                                     |                                                                  | -    | O-0.3s-CO-180s-CO        |
| 12  | Rated supply voltage of auxiliary circuit         |                                                                     |                                                                  | V    | DC24,48,110,220/AC220    |
| 13  | Rated inflation pressure (gauge pressure at 20 ℃) |                                                                     |                                                                  | MPa  | 0.13                     |
| 14  | Min. working pressure (gauge pressure at 20℃)     |                                                                     |                                                                  |      | 0.12                     |
| 16  | Annual gas leakage rate                           |                                                                     |                                                                  | %    | ≤0.1%                    |
| 17  | Protection level                                  |                                                                     | Sealed gas box                                                   | -    | IP67                     |
| 18  |                                                   |                                                                     | Switchgear                                                       |      | IP4X                     |

### Note:

The insulation test was carried out under the minimum air pressure of 0.1Mpa or 1bar (abs, 20 °C)



## Outline Dimension of GIM Switchgear



#### D. Low voltage compartment

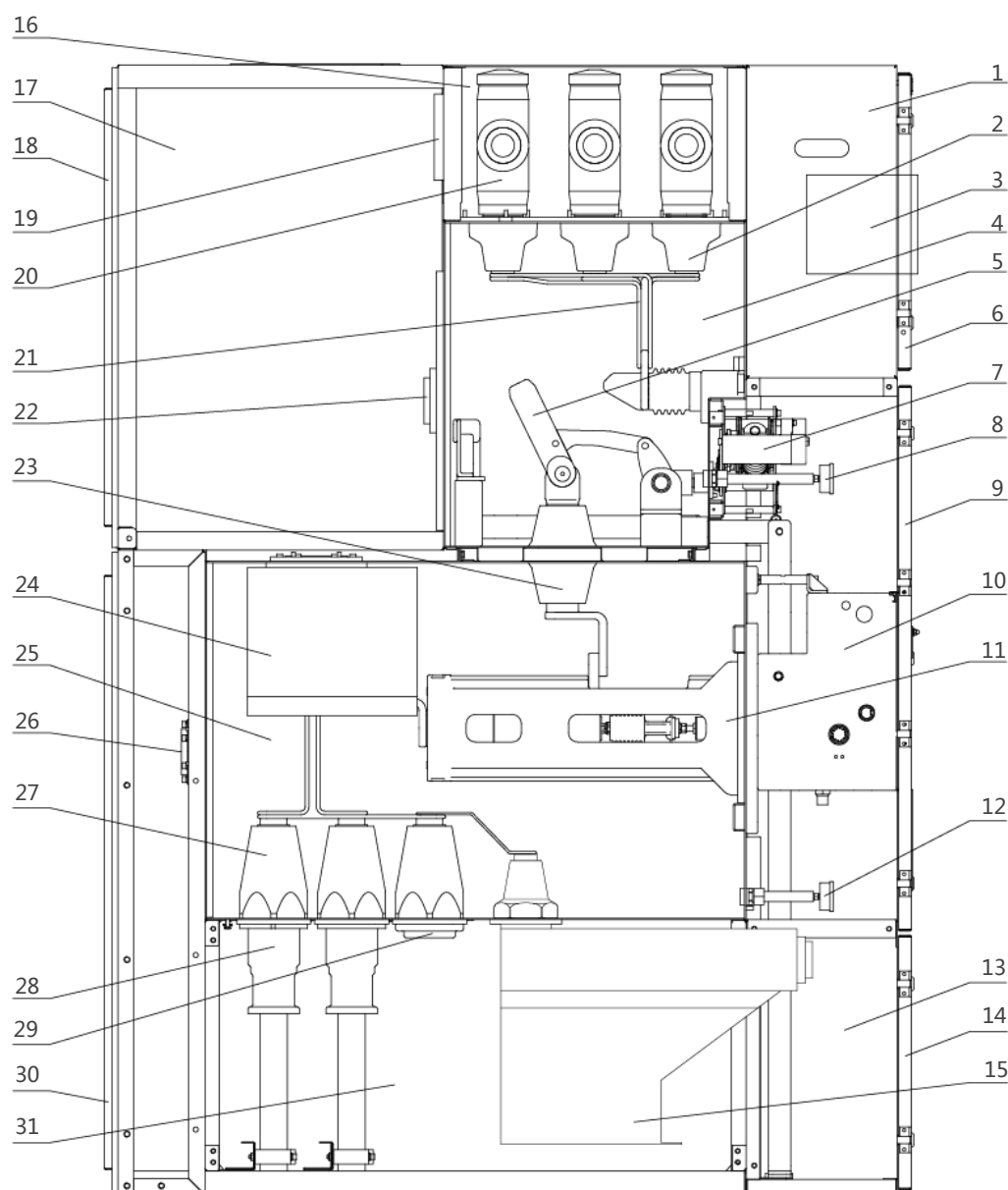
### E. Insulated bus compartment

F. end cover

| GIM Switchgear         | Single-bus Scheme |        | Double-bus Scheme |        |
|------------------------|-------------------|--------|-------------------|--------|
| Rated current ( A )    | ≤1250A            | ≥1600A | ≤1250A            | ≥1600A |
| Cabinet Width w ( mm ) | 600               | 800    | 600               | 800    |
| Cabinet depth d ( mm ) | 1760              |        | 1930              |        |
| Cabinet height ( mm )  | 2460              |        | 2460              |        |
| Weight approx. ( kg )  | 1200              | 1500   | 1400              | 1800   |

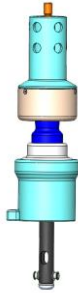
## Layout & Installation of GIM Switchgear

Structure diagram of GIM switchgear



- |                                                   |                                                 |                                                          |
|---------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|
| 1、Low voltage control room                        | 11、Vacuum circuit breaker                       | 21、Branch bus                                            |
| 2、bus bushing                                     | 12、Circuit breaker gas tank monitoring valve    | 22、Three position switch gas tank pressure release valve |
| 3、Protection and control unit                     | 13、Cabinet frame                                | 23、Gas box connecting Bushing                            |
| 4、Three position switch gas tank                  | 14、Cable room door                              | 24、Built-in current transformer (optional)               |
| 5、Three position switch                           | 15、Voltage transformer (plug in type)           | 25、Circuit breaker gas tank                              |
| 6、Control room door                               | 16、Insulated bus chamber                        | 26、Gas box pressure release valve of circuit breaker     |
| 7、Three position switch operating mechanism       | 17、Pressure release channel                     | 27、Inner cone socket                                     |
| 8、Three position switch gas tank monitoring valve | 18、Sealing plate of pressure release channel    | 28、Incoming and outgoing cables                          |
| 9、Circuit breaker chamber door                    | 19、Insulated bus chamber pressure release valve | 29、Insulation plug                                       |
| 10、Operating mechanism of vacuum circuit breaker  | 20、Insulated bus                                | 30、Lower sealing plate of pressure release channel       |
|                                                   |                                                 | 31、Cable chamber                                         |

## GIM switchgear program for switching capacitor/reactor banks



Self-energizing interrupters

### GIM switchgear SF<sub>6</sub> circuit breaker program

Aiming at petrochemical, iron and steel, chemical, metallurgy, new energy, power plant, distribution network and other industries Huadian Switchgear Co., Ltd. puts forward a solution that is different from the existing vacuum single-break or double-break solutions in the market. Ltd. proposes to use SF<sub>6</sub> gas to extinguish the arc, which is different from the existing vacuum single-break or double-break solutions in the market. Compared with vacuum arc extinguishing, SF<sub>6</sub> gas arc extinguishing can avoid the welding and heavy impact events that occur in vacuum arc extinguishing, with long service life and high reliability. wear events, long service life, high reliability



One-piece poles

### FEP type SF<sub>6</sub> circuit breaker performance parameters are excellent

- Rated voltage: 40.5kV
- Rated current: up to 1250A
- Rated short-circuit breaking current: up to 31.5kA
- Rated short-circuit closing current: up to 80kA
- Rated back-to-back capacitor bank opening and closing current: up to 1250A
- SF<sub>6</sub> gas rated pressure: 0.45MPa (20°C abs)
- SF<sub>6</sub> gas alarm pressure: 0.4MPa (20°C abs)
- SF<sub>6</sub> gas blocking pressure: 0.38MPa (20°C abs)
- Annual gas leakage rate : ≤0.1%

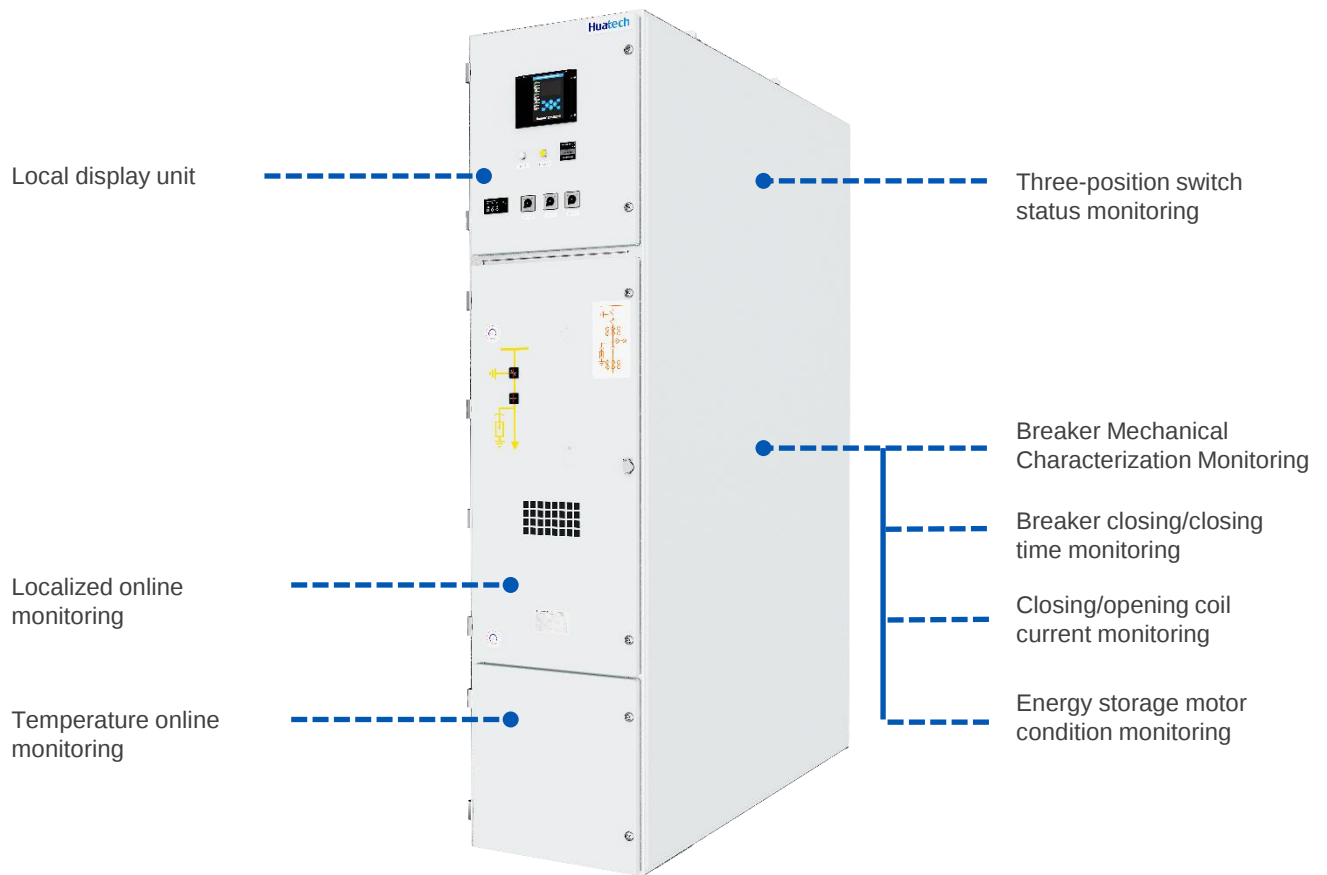


FEP Series SF<sub>6</sub> Circuit Breaker

### Features

The product solution adopts our FEP type SF<sub>6</sub> circuit breaker, its advanced self-energized arc extinguishing technology, combined with SF<sub>6</sub> gas as the arc extinguishing technology. This product solution adopts our FEP type SF<sub>6</sub> circuit breaker, whose advanced self-energized arc extinguishing technology, combined with the characteristics of SF<sub>6</sub> gas as the arc extinguishing medium, ensures excellent breaking performance and no overvoltage. operation over-voltage. It is especially suitable for the operation protection of capacitors and reactors. It has the following Features :

- The arc extinguishing chamber adopts self-energetic structure, utilizing the arc energy to realize compressed gas arc extinguishing, improving the Opening and closing reliability
- Based on the thermal expansion and negative electric characteristics of SF<sub>6</sub> gas, the arc extinguishing chamber has the characteristics of no cut-off current, no overvoltage and so on. Overvoltage and other characteristics of the arc extinguishing chamber
- Smooth breaking characteristics, fast self-recovery ability, so that it has excellent capacitive current breaking performance. Current breaking performance
- The pole is casted by imported epoxy resin material, forming a separate closed arc extinguishing chamber system with excellent insulation strength and mechanical properties. Excellent insulation strength and mechanical properties
- One-piece assembly of pole column, good electric field strength, high sealing performance, annual air leakage rate ≤ 0.1%.
- Modularized design, universal accessories, easy to operate, maintain and expand, and other programs Seamless splicing with other solutions
- Reliable interlocking, ensure that the operator is always in a safe state



- Real-time operating temperature, partial discharge status, switch mechanical characteristics and other parameters of each switchgear are displayed in situ.
- Video visualization real-time monitoring of the internal working status of three-position circuit breaker/isolated earthing switchgear to ensure reliable operation.
- Real-time monitoring of the mechanical characteristics of the circuit breaker, the status of the opening and closing coil and the status of the energy storage motor using intelligent sensors.
- Real-time monitoring of partial discharge status and trend of change of equipment, real-time monitoring of temperature status of switchgear cable overlap.

## Primary Wiring Diagram of GIM Switchgear

| Scheme No.             | 1                      | 2   | 3   | 4   | 5   | 6         | 7   |
|------------------------|------------------------|-----|-----|-----|-----|-----------|-----|
| Primary wiring scheme  |                        |     |     |     |     |           |     |
| Vacuum circuit breaker | 1                      | 1   | 1   | 1   | 1   |           |     |
| Three-position switch  | 1                      | 1   | 1   | 1   | 1   |           |     |
| Current transformer    | 3                      | 3   | 3   | 3   | 3   | 3         | 3   |
| Voltage transformer    |                        |     | 3   | 3   | 6   |           |     |
| High voltage fuse      |                        |     | 3   | 3   | 3   |           |     |
| Live displaying        | Yes                    | Yes | Yes | Yes | Yes | Yes       | Yes |
| Lightning arrester     |                        | 3   |     | 3   | 3   |           | 3   |
| Remark                 | Cable in & out cabinet |     |     |     |     | Bus Riser |     |

| Scheme No.             | 8         | 9   | 10  | 11        | 12  | 13  | 14  |
|------------------------|-----------|-----|-----|-----------|-----|-----|-----|
| Primary wiring scheme  |           |     |     |           |     |     |     |
| Vacuum circuit breaker |           |     |     |           |     |     |     |
| Three-position switch  |           |     |     | 1         | 1   | 1   | 1   |
| Current transformer    | 3         | 3   | 3   | 3         | 3   | 3   | 3   |
| Voltage transformer    | 3         | 3   | 6   |           |     | 3   | 3   |
| High voltage fuse      | 3         | 3   | 3   |           |     | 3   | 3   |
| Live displaying        | Yes       | Yes | Yes | Yes       | Yes | Yes | Yes |
| Lightning arrester     |           | 3   | 3   |           | 3   |     | 3   |
| Remark                 | Bus Riser |     |     | Bus Riser |     |     |     |

## Primary Wiring Diagram of GIM Switchgear

| Scheme No.             | 15                        | 16                            | 17  | 18* | 19*                          | 20  | 21  |
|------------------------|---------------------------|-------------------------------|-----|-----|------------------------------|-----|-----|
| Primary wiring scheme  |                           |                               |     |     |                              |     |     |
| Vacuum circuit breaker |                           | 1                             | 1   | 1   |                              |     |     |
| Three-position switch  | 1                         | 1                             | 1   | 1   |                              |     |     |
| Current transformer    | 3                         | 3                             | 3   | 3   | 3                            | 3   | 3   |
| Voltage transformer    | 6                         |                               |     | 3   |                              |     | 3   |
| High voltage fuse      | 3                         |                               |     | 3   |                              |     | 3   |
| Live displaying        | Yes                       | Yes                           | Yes | Yes | Yes                          | Yes | Yes |
| Lightning arrester     | 3                         |                               | 3   |     |                              | 3   |     |
| Remark                 | Isolation lifting cabinet | Aerial cable in & out cabinet |     |     | Aerial cable lifting cabinet |     |     |

| Scheme No.             | 22              | 23                        | 24  | 25  | 26  | 27                | 28                        |
|------------------------|-----------------|---------------------------|-----|-----|-----|-------------------|---------------------------|
| Primary wiring scheme  |                 |                           |     |     |     |                   |                           |
| Vacuum circuit breaker |                 |                           |     |     |     | 1                 |                           |
| Three-position switch  |                 | 1                         | 1   | 1   | 1   | 1                 | 1                         |
| Current transformer    | 3               | 3                         | 3   | 3   | 3   |                   | 3                         |
| Voltage transformer    | 3               |                           |     | 3   | 3   |                   |                           |
| High voltage fuse      | 3               |                           |     | 3   | 3   |                   |                           |
| Live displaying        | Yes             | Yes                       | Yes | Yes | Yes | Yes               | Yes                       |
| Lightning arrester     | 3               |                           | 3   |     | 3   |                   |                           |
| Remark                 | Top cable Riser | Top cable isolation Riser |     |     |     | Bus Section Panel | Section isolation cabinet |

## Primary Wiring Diagram of GIM Switchgear

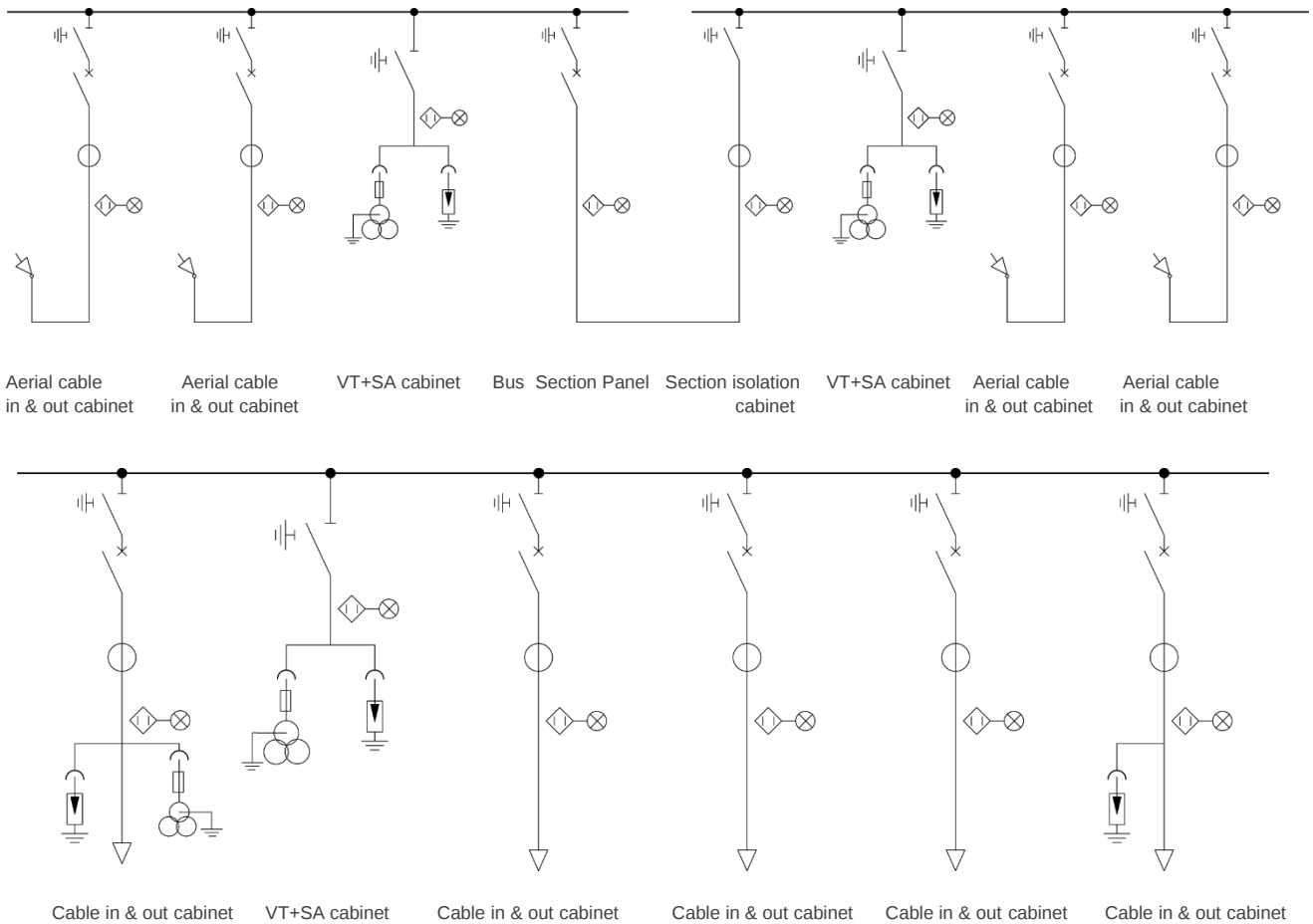
| Scheme No.             | 29                        | 30  | 31                | 32  | 33         | 34              |
|------------------------|---------------------------|-----|-------------------|-----|------------|-----------------|
| Primary wiring scheme  |                           |     |                   |     |            |                 |
| Vacuum circuit breaker |                           |     |                   |     |            |                 |
| Three-position switch  | 1                         | 1   |                   |     | 1          | 1               |
| Current transformer    | 3                         | 3   | 3                 | 3   |            |                 |
| Voltage transformer    | 3                         |     | 3                 | 3   | 3          | 3               |
| High voltage fuse      | 3                         |     | 3                 | 3   | 3          | 3               |
| Live displaying        | Yes                       | Yes | Yes               | Yes | Yes        | Yes             |
| Lightning arrester     |                           | 3   |                   | 3   |            | 3               |
| Remark                 | Section isolation cabinet |     | Bus Riser cabinet |     | VT cabinet | VT + SA cabinet |

### Note :

The models of all components in the diagram shall be subject to those used in the actual project.

## Primary Wiring Diagram of GIM Switchgear

### Project application example



Gim-40.5 Typical Primary Scheme Diagram

## Layout & Installation of GIM Switchgear

### Installation method

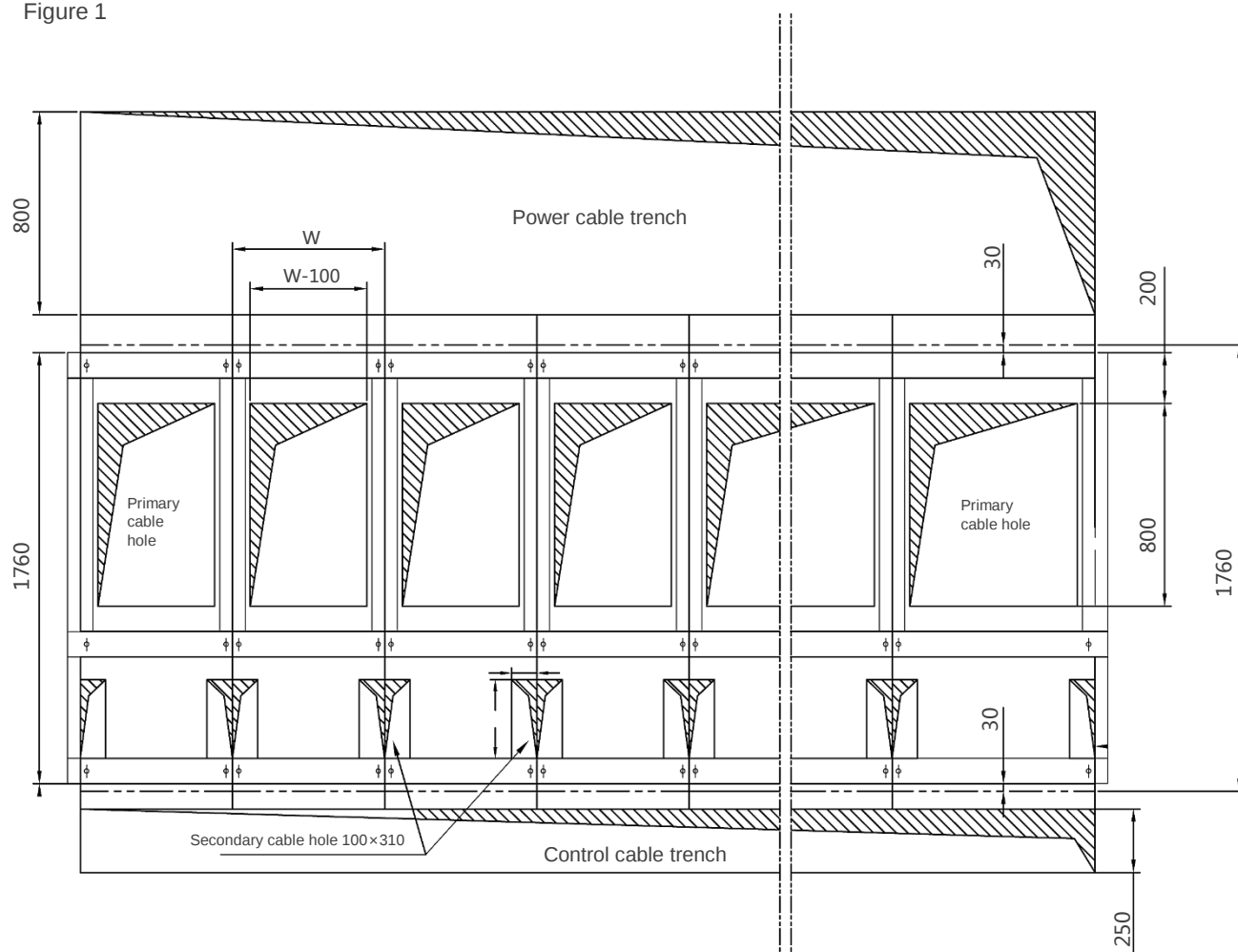
GIM-40.5 switchgear cabinet is recommended to be installed on suitable and permanent foundation frame or channel steel, and qualified professional personnel shall be employed for embedding;

For the installation hole size of GIM-40.5 switchgear on the foundation or channel steel, see the following figure:

When embedding the foundation frame, standard of IEC/ GB is recommended to follow , especially the tolerance of flatness and straightness, which should be taken as the prerequisite to ensure the high quality of the installation of switchgear;

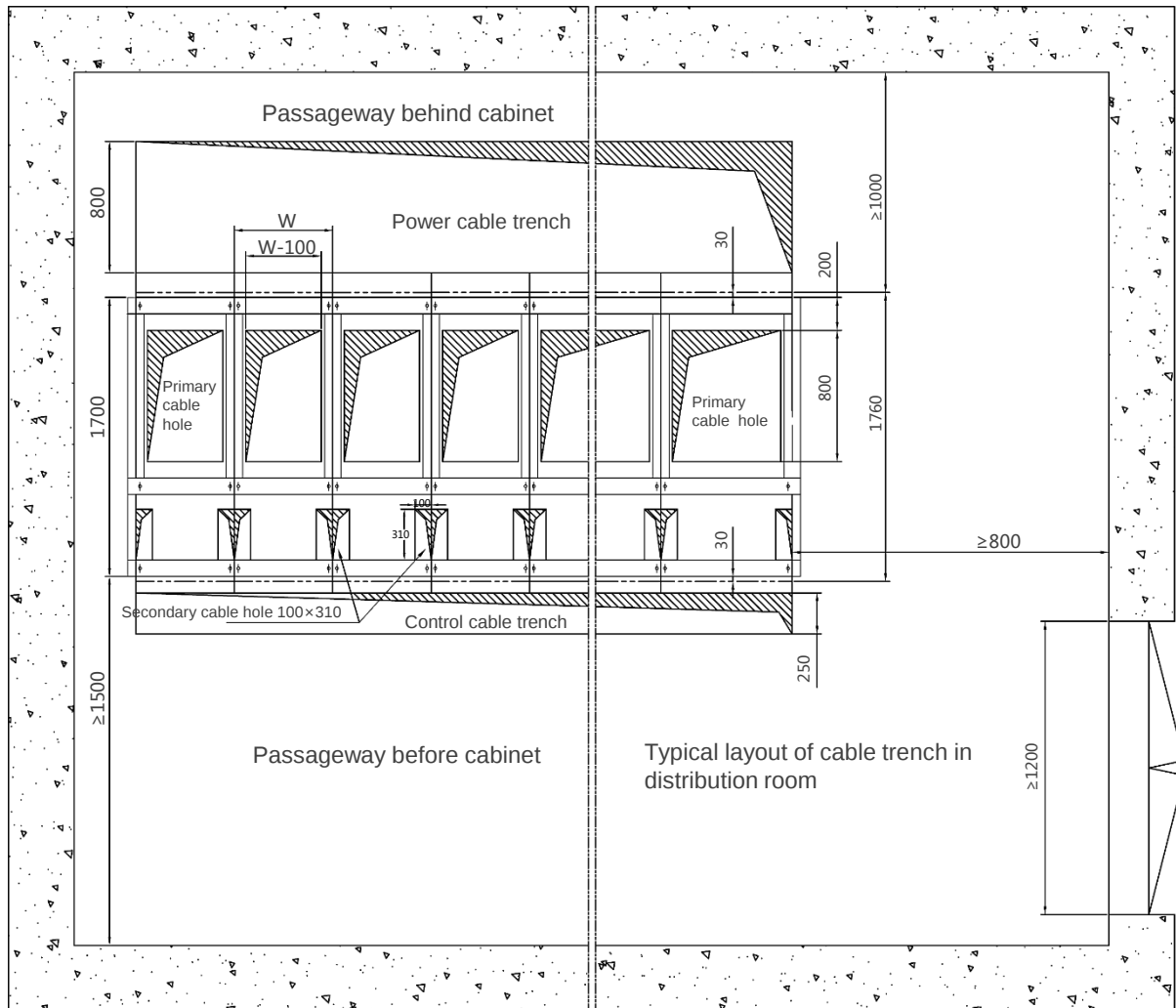
The allowable tolerance of flatness:  $\pm 1 \text{ mm / m}^2$ ; the allowable tolerance of straightness: maximum  $1 \text{ mm / m}$ , and the total length of the frame shall not exceed  $2 \text{ mm}$ .

Figure 1



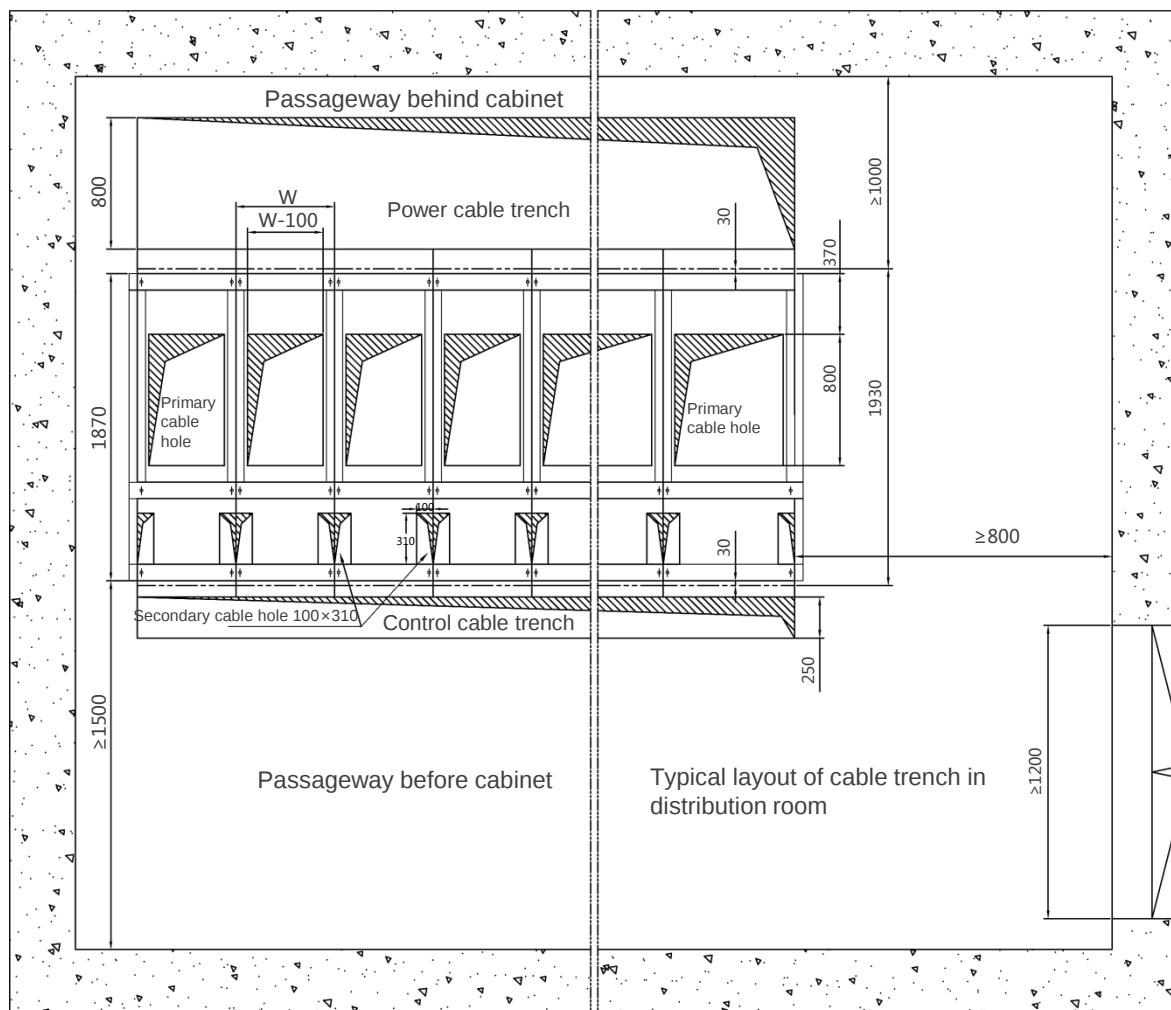
Typical Layout of Cable Trench in Distribution Room

Figure 2



Layout Plan of Switchgear GIM-40.5 (Single Bus Scheme)

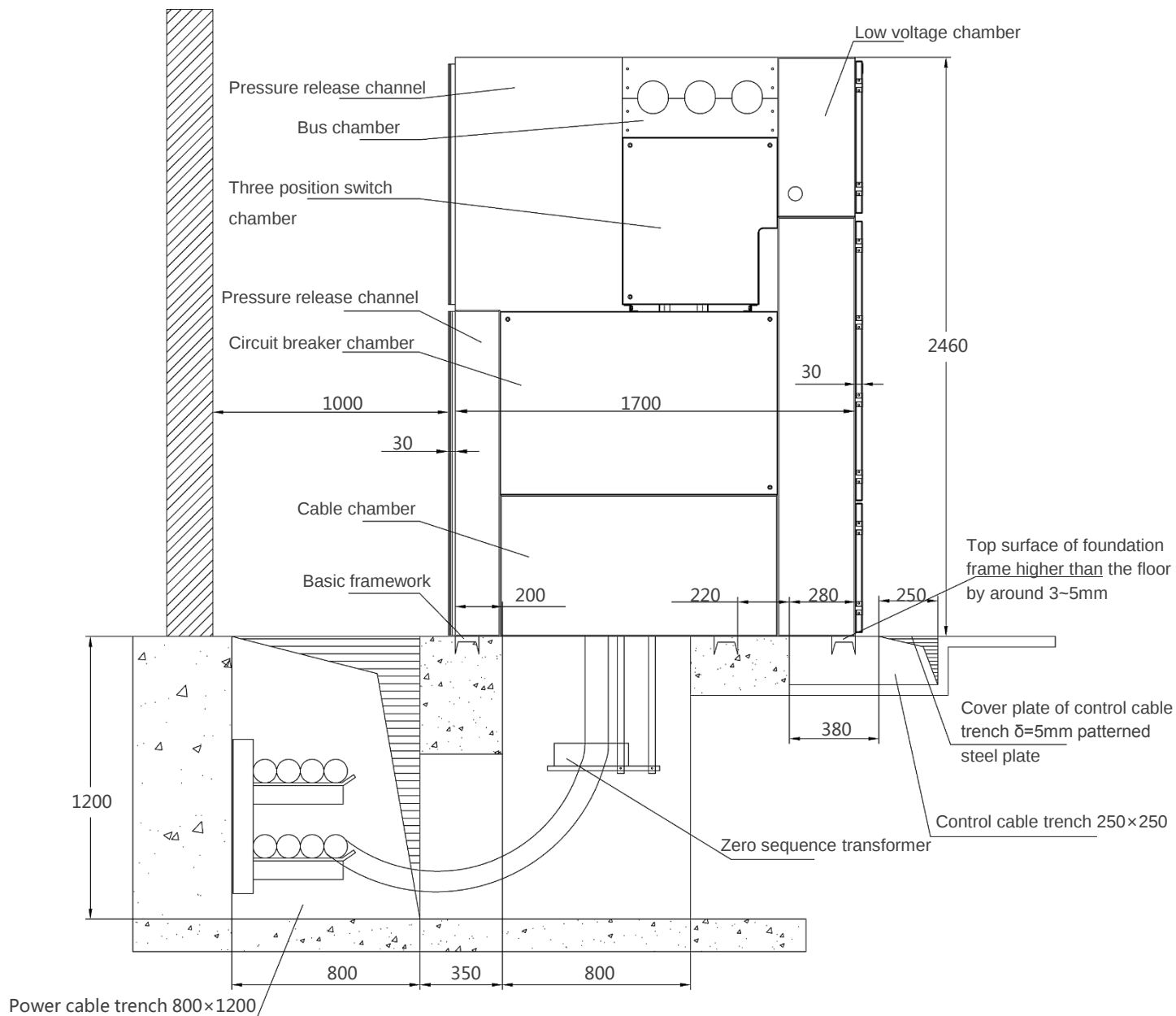
Figure3



Layout Plan of Switchgear GIM-40.5 (Double Bus Scheme)

## Layout & Installation of GIM Switchgear

Figure 4



Suitable Cable Trench for GIM-40.5 Switchgear

## Application Range



### Areas of application

- Power plant and power grid system in polluted and humid environment in coastal area
- Plateau substation in high altitude and cold environment of inland area
- Large industrial and mining enterprises such as petrochemical and metallurgical enterprises
- High rise buildings in densely populated areas and cities
- Urban infrastructure projects, such as subway, etc.

### Normal operation conditions

- Operating temperature:  $-15^{\circ}\text{C}$  (indoor)~ $+40^{\circ}\text{C}$
- Daily average temperature (maximum):  $35^{\circ}\text{C}$
- Altitude: Less than 1000m
- Max. seismic intensity: 8 degrees
- Surrounding air environment: the switchgear shall be installed in the place without fire, explosion, serious pollution, chemical corrosive gas and violent vibration

### Special operation conditions

- If the altitude is more than 1000m, it is necessary to negotiate with the manufacturer to take necessary measures to strengthen the insulation
- When the ambient temperature exceeds  $+40^{\circ}\text{C}$ , the current carrying capacity of the switchgear will be reduced by a certain coefficient, which must be confirmed by the manufacturer when ordering.

### Ordering instruction

Please provide following technical documents when ordering GIM switchgear :

- Main wiring scheme number, purpose and single line system diagram, rated voltage, rated current and rated short-circuit breaking current
- Layout plan of distribution room and arrangement diagram of switchgear cabinet, etc.
- Indicate the model, specification and quantity of main electrical components in the switchgear cabinet
- Requirements for control, measurement and protection functions of switchgear shall be indicated
- If the switchgear is used in special environment, it should be specified in the order list
- Other special requirements to be explained

### Delivery document, attachment & spare parts

- Delivery document include :
  - a. Product certificate and factory inspection report
  - b. Product manual
  - c. Primary, secondary wiring diagram and switchgear cabinet arrangement diagram
  - d. Packing List
- Attachment::
  - a. Manual energy storage rod of circuit breaker
  - b. Three position disconnecting switch operating handle

