

ALPS

ALPS US5.0 Clean-Gas Insulated Switchgear





ALPS US5.0 Clean-Gas Insulated Switchgear

Among urban medium voltage distribution methods, the ring main distribution is the most widely used one. After being transformed to 12-24kV by a high-voltage primary substation, a large number of regional secondary substations are needed to distribute the power to user terminals. The safety and reliability of power distribution equipment directly affect the stability of distribution networks.

ALPS series gas insulated switchgear is suitable for a power distribution system with rated voltages at 12-24kV. With its diversified insulation forms (full insulation, semi-insulation) and flexible functional combinations, this series can provide systematic solutions for industrial zones, rural townships and other areas with large power supply load and high density.

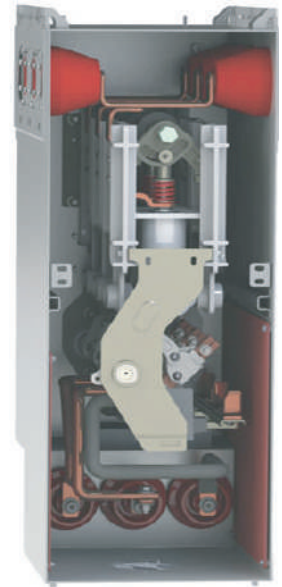


In order to realize the goal of carbon peaking and carbon neutrality, it is urgently needed to build a novel new energy-based power system. The goals of the new power system, such as “clean and low-carbon, safe and reliable”, require that the distribution network switchgear focuses on digitalization and environmental protection. By reducing non-carbon greenhouse gas emissions through the use of environmentally friendly gas insulation and combining it with advanced digitization technology, the new distribution network switchgear is able to reduce its carbon footprint, create end-of-line equipment condition awareness, and participate in the regulation and control of the distribution networks.

Through years of technology accumulation and R&D, GEIS has launched the next generation of green switchgear-US5.0 Clean-Gas insulated switchgear. The switchgear adopts dry air as insulating gas, which is perfectly combined with vacuum breaking technology. Strict production process and rich operation experience solidify the stability and reliability of the product. The switchgear is characterized by being environment-friendly, strong adaptability, compact structure, and maintenance-free. DTU can be configured to realize integration, and monitoring, temperature measurement and other devices are equipped to realize intelligent management.

ALPS US5.0 Clean-Gas Insulated Switchgear

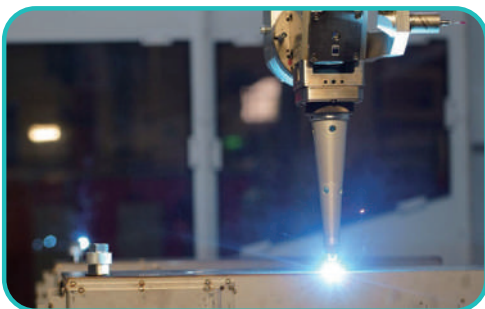
ALPS series US5.0 Clean-Gas insulated switchgear has excellent environmental performance, with high reliability and safety, compact structure, small size, and complete solutions, including circuit breaker, load switch, manometer, voltage transformer, ATS dual power supply, switching station, primary and secondary integration and other design solutions to meet various occasions of application. Each inlet and outlet unit can share a common gas tank or have an independent gas tank, and all functional units can be flexibly configured.



- Fully sealed and insulated design, all high-voltage components are sealed in the gas tank, adapting to various harsh environments and realizing maintenance-free



- Zero Global Warming Potential (GWP)
- Non-toxic and non-hazardous dried air, no maintenance or recycling by the customer required



- 3mm thick stainless steel gas tank, laser welding process, protection level IP67

- Integrated with the distribution terminal DTU to monitor, analyze and judge the key data of the switchgear online, with various features such as intelligent protection, self-management, and visualization



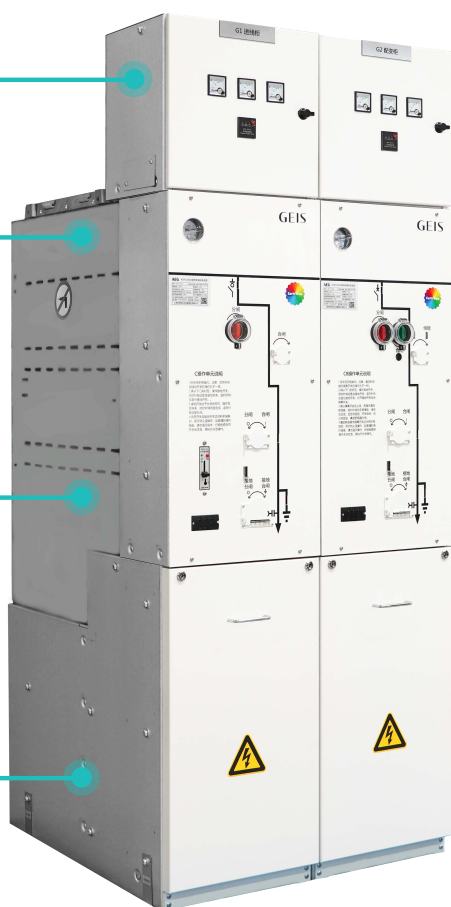
Quality Assurance

GEIS is fully integrated with a manufacturing execution system (MES) through SAP system, and equipped with the most complete inspection and testing equipment to ensure high-quality production and full traceability of products. From the design and development stage, the products are designed and evaluated according to standards higher than GB/IEC to provide customers with stable, reliable and high-quality products and services.

ALPS series switchgear inherits GEIS's first-class design and manufacturing technology, modular, maintenance-free design. full laser automatic welding equipment to ensure the welding quality of the gas tank, to ensure the airtightness and homogeneity, the integrated inflatable leakage detection equipment to ensure that the annual leakage rate of the gas tank is less than 0.01%, and the security of the operation of the 40-year guarantee.

Executive Standard of the Product

- GB/T 11022-2011 Common specifications for high-voltage switchgear and controlgear standards
- GB/T 3906-2020 Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV
- GB/T 3804-2017 High-voltage alternating current switches for rated voltage above 3.6 kV and less than 40.5 kV
- GB/T 1985-2014 High-voltage alternating-current disconnectors and earthing switches
- GB/T 1984-2014 High-voltage alternating-current circuit-breakers
- IEC 60694-2002 Common specifications for high-voltage switchgear and controlgear standards
- IEC 62271-200 High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
- IEC 62271-100 High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers
- IEC 62271-102 High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches



Type tests

- Insulation
- Auxiliary circuit insulation
- Temperature rise
- Circuit resistance measurement
- Partial discharge
- Short-time and peak withstand current
- Ingress Protection (IP) Testing
- Electromagnetic compatibility
- Making and breaking
- Electrical endurance
- Short-circuit making capacity
- Seal

.....

Catalogue

ALPS US5.0 Clean-Gas Insulated Switchgear

01 Model Selection

02 Technical Data

04 Features & Configurations

08 ATS

10 Foundation

11 3AE Protective relay

Model Description

Model Selection

US 5.0	-12	C	/630	-20	L
Product series	Rated voltage 12-12kV	Type of switchgear C: Load switch F: Combined fuse-switch CB: Vacuum circuit breaker AM: Metering D: Cable connection CPT: Voltage transformer ATS: Auto transfer switch	Rated current 630-630A	Rated breaking current 20-20kA	Type of extension L: Left-extensible R: Right-extensible LR: Extensible on both side Blank: Non-extensible

Product Overview

The ALPS US5.0 Clean-Gas insulated switchgear is a new generation GEIS environmental-friendly switchgear that breaks current based on the dry air gas insulation and vacuum arc extinguishing technology. All HV live parts of the switchgear are enclosed in a stainless steel gas tank without affection by the environment and with an excellent safety performance.

The ALPS US5.0 Clean-Gas insulated switchgear is also provided with those outstanding characteristics from ALPS US3.0, such as compact structure and maintenance-free, and composed of main functional units including load switch module, circuit breaker module and related extension scheme. It can be extended in any direction through bus connectors, and the incoming and outgoing lines are plug-in cables arranged freely according to different design schemes for different power distribution tasks.

The ALPS US5.0 Clean-Gas insulated switchgear can be integrated with the distribution terminal DTU, and meet the needs of intelligent grid feeder automation and load management through functions such as remote signaling, telemetry, and remote control, achieving digitized measurement, networked control, status visualization and information interaction, and satisfying the construction requirement of a distributed "zero-power-outage" self-healing system.

Usage environment

Temperature

- -40°C ~+55°C

Humidity

- Maximum daily relative humidity ≤ 95%
- Maximum monthly relative humidity ≤ 90%

Anti-seismic grade

- Not more than grade 8

Altitude

- ≤ 1000m
- Above 1000m, please contact us

Technical Data

Overall Parameters

Item			Unit	Value
Rated voltage			kV	12
Rated frequency			Hz	50
Rated insulation level	Power frequency withstand voltage(1min)	Between phase , to earth	kV	42
		Across contact		48
	Lightning impulse withstand voltage (peak)	Between phase , to earth		75
		Across contact		85
Dielectric of the auxiliary and control circuits			kV	2
IP degree	Gas compartment			IP67
	Enclosure			IP4X
Rated filling level of dry air (20 °C, gauge pressure)	Rated gas filled pressure		Mpa	0.04
	Minimum gas filled pressure			0.02
Annual leakage rate			% / year	≤ 0.01

Load Switch

Item		Unit	Value
Rated short time withstand current	Main circuit / Earthing switch	kA/s	20/4
	Earth circuit connector		17.4/2
Rated peak withstand current	Main circuit / Earthing switch	kA	50
	Earth circuit connector		43.5
Rated short-circuit making current		kA	50
Rated active load breaking current		A	630
Rated active load breaking times		Time	200
Rated active load breaking current (5%)		A	31.5
Rated closed loop breaking current		A	630
Rated cable-charging breaking current		A	40
Short-circuit making capacity	Load switch	Time	5
	Earthing switch		5
Mechanical life	Load switch	Time	5000
	Earthing switch		3000

Technical Data

Combined fuse-switch

Item		Unit	Value
Rated current		A	Depends on the fuse
Rated short-circuit breaking current		kA	31.5
Rated short-circuit making current		kA	80
Rated transfer current		A	1600
Mechanical life	Combined switch	Time	5000
	Earthing switch		3000

Circuit breaker

Item		Unit	Value
Rated short time withstand current	Main circuit / Earthing switch	kA/s	20/4
	Earth connection circuit		17.4/2
Rated peak withstand current	Main circuit / Earthing switch	kA	50
	Earth connection circuit		43.5
Rated short-circuit breaking current		kA	20
Rated short-circuit making current		kA	50
Rated cable-charging breaking current		A	31.5
Rated short-circuit breaking times		Time	50
Rated operating sequence			O-0.3s-CO-180s-CO
Earthing switch short-circuit making capacity		Time	5
Mechanical life	Vacuum circuit breaker	Time	20000
	Isolation switch		3000
	Earthing switch		5000

Functions and Configurations

Key Components



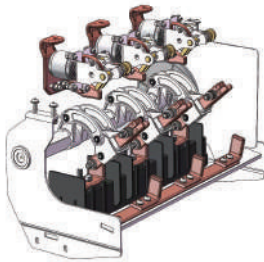
Gas tank

- 3mm thick stainless steel gas tank, fully automatic laser welding process, 40 years of safe operation without maintenance
- Special sealing design, annual leakage rate of gas tank is $\leq 0.01\%$
- Left and right sides can be extended at will, up to 5 modules can be in a common-gas tank



Vacuum interrupter

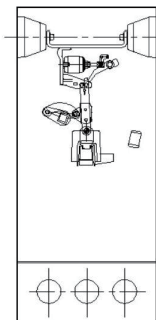
- One sealing process, greatly simplified manufacturing process, and improved reliability, stability and consistency
- High vacuum up to 10^{-5} Pa at 800°C
- Longitudinal magnetic field arc quenching technology with increased number of breakings and strong arc quenching capacity
- Longer life with high-quality bellows, enhanced air tightness and reliability



Three-position load switch

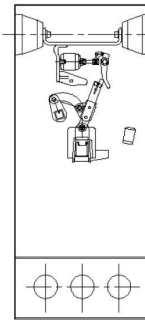
- Innovative application of transfer breaking current technology, with the combination of isolating switch and transfer breaking current vacuum interrupter, easy to realize the load current breaking
- Integrated opening, closing and grounding as three positions, which continues the original three-position operation habit and ensures the convenience of operation
- The contact can only be in one position at the same time, preventing the live busbar from grounding, safe and reliable

Initiation of opening



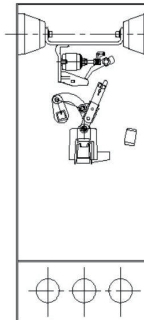
Main circuit current approaches vacuum interrupter through an isolating switch gate

During opening



The isolating switch gate is disconnected, and the main circuit current is transferred to the vacuum interrupter

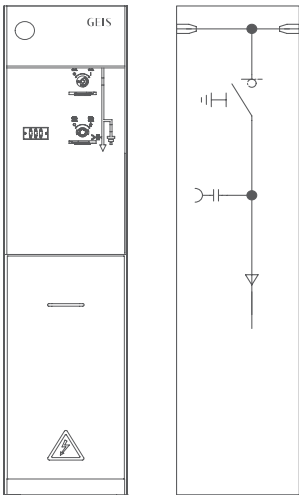
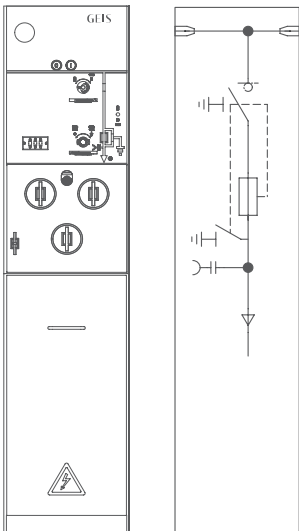
End of opening



Vacuum interrupter is successfully breaking, and opening is completed

Functions and Configurations

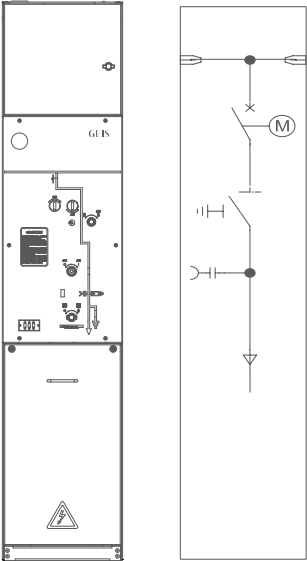
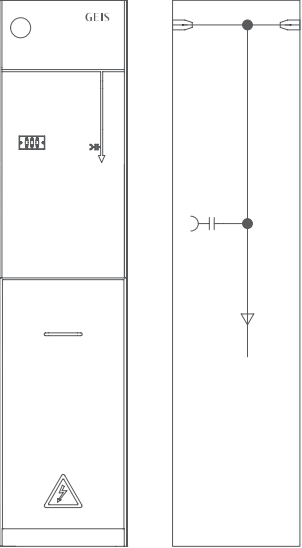
Functions and Configurations

Solution	Description of functions	Primary standard configuration	Secondary accessory configuration
 US5.0-12 (C) load switch cabinet Size: 420*885*2050mm	Equipped with three-position loadswitch, connecting and disconnecting the incoming and outgoing cables from the busbar, enabling the incoming and outgoing cables to be grounded in three phases at the same time, and with short-circuit making capability. Used for the control of inlet and outlet cables	1. Three-position load switch 2. Voltage indicator 3. Dry Air pressure indicator 4. Load switch spring-operated 5. Five defenses 6. 630A Busbar, grounding 7. Operating handle	1. Load switch motorised mechanism 2. Short and Grounded Fault Indicator 3. Lightning arrester or double cable head 4. Cable Tee Connector busbar 5. Expandable left and right 6. Terminal cover (for end cabinet) 7. Current transformer 8. key lock 9. Load switch auxiliary contact 10. Ground switch auxiliary contact
 US5.0-12 (F) combined fuse-switch cabinet Size: 420*885*2050mm	Equipped with the same load switch as the load switchgear and with high breaking capacity connecting and disconnecting capacity of the fuse in series to form a combination of electrical appliances. Used for transformer control and protection.	1. Three-position load switch 2. Voltage indicator 3. Dry Air pressure indicator 4. Load switch spring operating mechanism 5. Five defenses 6. 630A Busbar, grounding busbar 7. Operating handle	1. Load switch motorised mechanism 2. Short and Grounded Fault Indicator 3. Lightning arrester or double cable head 4. Cable Tee Connector busbar 5. Expandable left and right 6. Terminal cover (for end cabinet) 7. Current transformer 8. key lock 9. Load switch auxiliary contact 10. Ground switch auxiliary contact

Note: Including 400mm LV compartment and 35mm cabinet door. For other sizes of switchgears, please feel free to contact us

Functions and Configurations

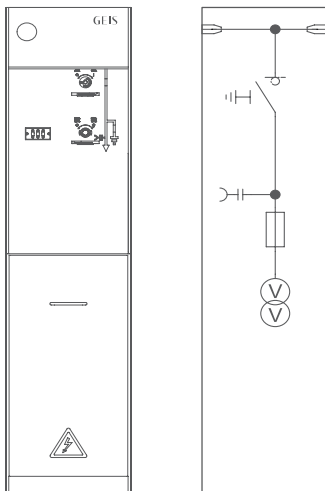
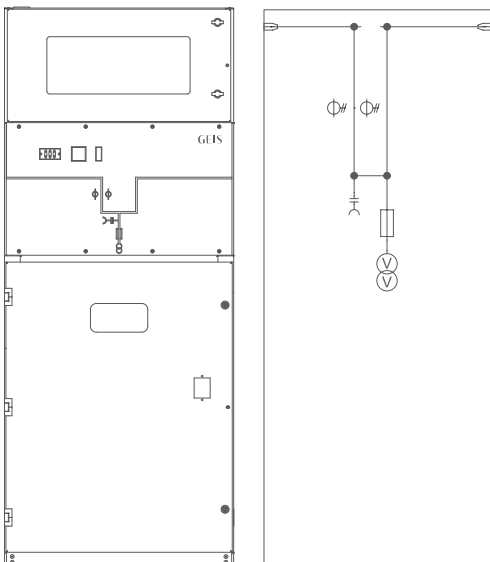
Functions and Configurations

Solution	Description of functions	Primary standard configuration	Secondary accessory configuration
 US5.0-12(CB)circuit breaker cabinet Size: 420*885*2050mm	Equipped with a vacuum circuit breaker and a three-position disconnecting switch in series, the circuit breaker is placed on the busbar side of the inlet and outlet lines, and the disconnecting switch is on the cable side, and it can be assembled with multi-curve over current relay protection device and conventional relay protection device. Used for line and transformer control and protection.	1.Circuit breaker 2.Three-position disconnect switches 3. Dry Air pressure indicator Mechanical 4.Interlocking and position indication of circuit breakers and disconnecting switches 5. Voltage indicator 6. 630A Busbar, grounding 7. Operating handle	1.Fault indicator 2.Arrester 3.Cable Tee Connector 4.Expandable left and right 5.Terminal cover (for end cabinet) 6.Current transformer 7.Key lock 8.Circuit breaker status contact 9.Disconnecting switch closing and grounding auxiliary contacts 10.Protective relay
 US5.0-12(D)cable connection cabinet Size: 420*885*2050mm	The inlet and outlet cable is directly connected with the bus bar, and has a metal stainless steel protective housing and a voltage display. It is used to connect incoming and outgoing cables.	1. 630A Busbar 2. Voltage indicator	1.Arrester 2.Cable Tee Connector 3. Expandable left and right 4.Terminal cover (for end cabinet)

Note: Including 400mm LV compartment and 35mm cabinet door. For other sizes of switchgears, please feel free to contact us

Functions and Configurations

Functions and Configurations

Solution	Description of functions	Primary standard configuration	Secondary accessory configuration
 US5.0-12 (Cpt) voltage transformer cabinet Size: 420*885*2050mm	Equipped with three-position load switch, which can connect or disconnect the voltage transformer and grounding with load. Used to monitor system voltage and provide operating power.	1. 630A Busbar grounding busbar 2. Three-position load switch 3. Load switch spring-operated mechanism 4. Dry Air pressure indicator 5. Voltage transformer 6. Operating handle	1. Load switch motorised mechanism 2. Key lock 3. Cable Tee Connector 4. Expandable left and right 5. Terminal cover (for end cabinet) 6. Arrester 7. Load switch auxiliary contact
 US5.0-12 (AM) metering cabinet Size: 800*885*2050mm	Equipped with conventional current transformer and voltage transformer to facilitate calibration by the power department, it can be conveniently combined with any other kind of cabinet. Used for electrical energy calculation (this cabinet is air insulated).	1. Current transformer 2. Voltage transformer 3. PT fuse	1. Meter 2. Arrester

Note: Including 400mm LV compartment and 35mm cabinet door. For other sizes of switchgears, please feel free to contact us

ATS Switch Cabinet (dual power supply)

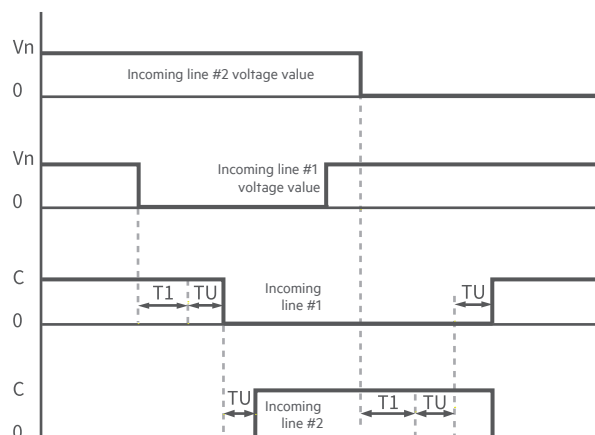
Description of Solution

- For various action logic modes of the ATS Switch Cabinet, the device automatically recognizes external access signals, and the device software automatically completes all action logic processes according to the status of the received signal, without operator intervention.
- If the action logic fails to operate normally during automatic charge and automatic recovery operation due to external reasons (e.g., jamming of the mechanism, poor contact of the switching auxiliary contact, etc.), the device will automatically report an automatic charge (or automatic recovery) failure signal after a delay of 10s.
- The operating power supply of the device is DC220V, which is provided by the power module. Under normal conditions, the power supply is supplied to the power module by the external AC power, and when the AC power is cut off, the power supply is supplied to the power module by the battery as backup power.
- The two incoming lines are electrically blocked, and only one of the two incoming lines can be combined.
- When incoming line #1 fails, it will be automatically switched to incoming line #2 through the automatic switch device.

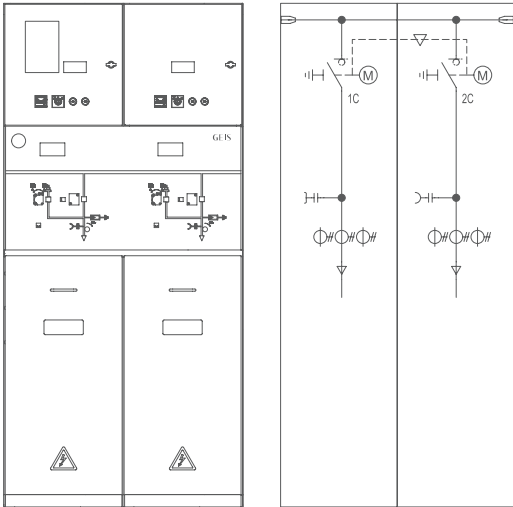
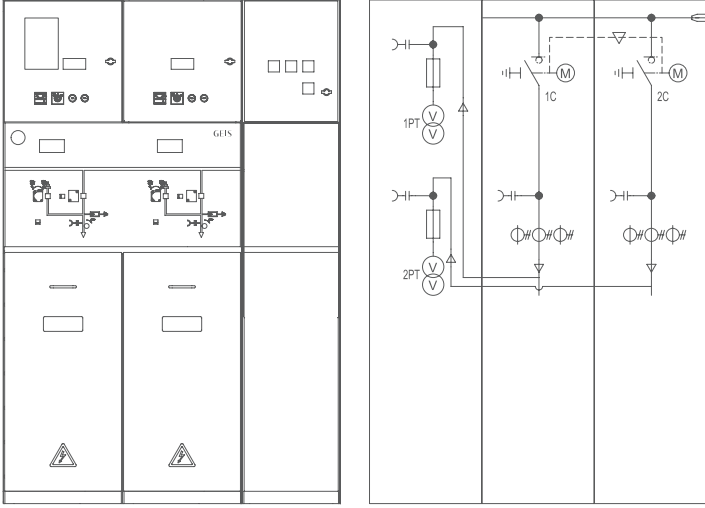
Operation modes for switching between the two medium voltage network power supplies:

- Automatic incoming line #1 or automatic incoming line #2 mode
 If there is a loss of voltage on the operating distribution line (incoming line #2), the ATS delays switching to the backup line (incoming line #1).
 [Open 2C, close 1C]
 The ATS returns to the mains (incoming line #2) as soon as voltage is restored to the mains.
 [No external spare power supply automatic charging blocking contact]
- Semi-automatic incoming line #1 $\leftrightarrow$ incoming line #2
 If there is a loss of voltage on the line (incoming line #2), the ATS will delay switching to the backup line (incoming line #1).
 The ATS will not return to the mains unless there is a loss of voltage on the backup line.
 For all the above-mentioned action logic methods, the device automatically recognizes the external access signal, and the device software automatically completes all the action logic processes according to the state of the signal without the intervention of the operator.
 If the action logic fails to operate normally during automatic charge and automatic recovery operation due to external reasons (e.g., jamming of the mechanism, poor contact of the switching auxiliary contact, etc.), the device will automatically report an automatic charge (or automatic recovery) failure signal after a delay of 10s.

ATS action profile



ATS Switch Cabinet (dual power supply)**Description of Solution**

Solution	Description of functions	Primary standard configuration	Secondary accessory configuration
 US 5.0-12 (ATS-V) automatic switching cabinet (dual power supply) Size: 840×885×2050mm	Two power supplies of one main and one standby. (no voltage transformer) The presence or absence of voltage is judged through the live indicator, and automatic transferring to standby power.	1. Current transformer 2. ATS device	1. Expandable left and right side 2. Terminal cover
 US 5.0-12 (ATS-P) automatic switching cabinet (dual power supply) Size: 1332×885×2050mm	Two power supplies of one main and one standby. (with voltage transformer) The presence or absence of voltage is judged through the live indicator, and automatic transferring to standby power.	1. Current transformer 2. Voltage transformer 3. ATS device	1. Expandable left and right side 2. Terminal cover

Note: Including 400mm LV compartment and 35mm cabinet door. For other sizes of switchgears, please feel free to contact us

Basic Installation Diagram

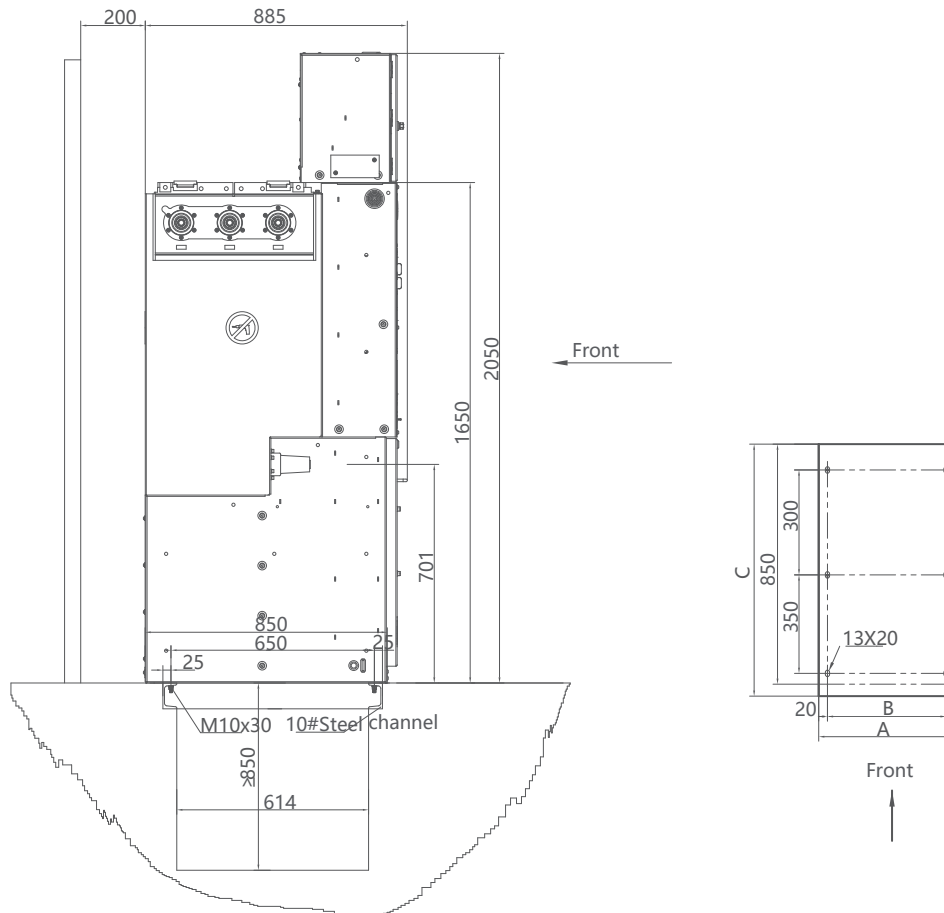
The ground foundation construction of the installation of the switch cabinet shall comply with the provisions of the connection between the cabinet and the channel steel in the "Technical Specification for the Construction and Acceptance of Electric Power Construction" to ensure the installation quality.

The technical requirements for the installation of the basic channel steel frame are that the allowable error is not more than 1mm/m, and the total length deviation is ± 3 mm.

For the basic frame structure, see the against-wall installation foundation detailed drawing and off-wall installation plan diagram.

The installation foundation of the switch cabinet is generally divided into secondary pouring concrete. The first is the installation base of the switch cabinet, and the second is the ground supplementary layer. The general thickness is 60mm, and the height of the supplementary layer should be 1~3mm lower than the basic channel steel.

US5.0-12 (CB)



Type	C	CB	CPT	AM	D	F
Dimension mm						
A	420	420	420	800	420	420
B	380	380	380	660	380	380
C	885	885	885	885	885	885

3AE Protective Relay



GALAXY 3AE series protection and management device is the next generation of microcomputer measurement and control integrated protection device launched to meet the requirements of the development of substation automation technology. The device adopts dual CPU structure and are able to complete the operations of protection, measurement, control and remote communication of the circuit. The device is simple and practical in structure, safe and reliable in operation.

Product Features

- Adopting anti-vibration, wide-temperature, dust-proof sealing and “one-to-one” design principle, it can be installed in the switchgear unit in a decentralized manner or be configured through combined screen in a centralized manner
- Adaptable to harsh on-site operating environments, EMC up to level 4
- A wide range of power supply, 100-250VDC or 85-276VAC, 50Hz (DC48V optional)
- Equipped with large white screen and Chinese language interface, and intuitively presenting dynamic single line diagrams and histograms
- Multifunction buttons provided for convenient panel operations by the users
- Two sets of settings that can be switched manually or automatically
- Capable of measuring various parameters such as current, voltage, power, power factor and energy.
- One RS485 communication interface that can transmit information, and one RS232 communication interface on the front panel for testing, with communication protocol MODBUS-RTU
- Eight passive switch inputs, four electrical pulse inputs (can be defined as switch inputs), and six switch outputs. Most of which can be customized and programmed
- One analog output, applied to DCS system
- Capable of recording 100 power outagw events in 1ms resolution

Note:



GEIS