

GVG-12 Solid Insulated Ring Network Switchgear



Overview

GVG-12 series solid insulated ring network switchgear is a fully insulated, fully sealed, maintenance-free solid insulated vacuum switchgear. All high-voltage live parts are molded with epoxy resin material with excellent insulation performance, and the vacuum interrupter, main conductive circuit, insulating support, etc. are organically combined into a whole, and the functional units are connected by a fully insulated solid busbar. Therefore, the entire switchgear is not affected by the external environment, and the reliability of the operation of the device and the safety of the operator can be ensured.

The ring network switchgear has the characteristics of simple structure, flexible operation, reliable interlocking, convenient installation, etc. It is suitable for 50Hz, 12kV power system, and is widely used in industrial and civil cable ring networks and distribution network terminal projects, as the reception and distribution of electric energy, it is especially suitable for power distribution in urban residential areas, small substations, switching stations, cable branch boxes, box-type substations, industrial and mining enterprises, shopping malls, airports, subways, wind power generation, hospitals, stadiums, railways, tunnels, etc. use. Because the product has the advantages of fully insulate, fully sealed, and fully shielded, it is especially suitable for use in areas with high altitude, high temperature, damp heat, severe cold, and serious pollution.

Product Structure

- GVG-12 switchgear mainly has three types of functional units, namely V unit (circuit breaker unit), C unit (load break switch unit), and F unit (combined electrical unit). When the system requires multiple units to be configured, they can be arbitrarily expanded on the left and right sides and arranged according to different design schemes to achieve different configuration requirements.
- Each unit is divided into three parts: instrument room, operating mechanism, and primary circuit. The instrument room can be equipped with microcomputer protection (intelligent controller) and other meters. The operating mechanism is a dedicated spring operating mechanism, or an electric operating mechanism; the primary circuit adopts APG automatic gel process, completely embed the bus bar, disconnecter and vacuum interrupter in epoxy resin, and use dedicated connectors and bus bars to connect.
- GVG-12 solid-insulated switchgear has the advantages of compact structure, fully insulated, long life, maintenance-free, small space occupation, safety and reliability, and is not affected by the working environment. It is widely used in industrial and civil ring networks and terminal power supplies. Especially suitable for small secondary power distribution stations, opening and closing stations, industrial and mining enterprises, airports, railways, commercial districts, high-rise buildings, highways, subways, tunnels and other fields.

Features

Excellent performance epoxy resin

- GVG-12 solid insulated fully enclosed switchgear is produced by using special epoxy resin as insulation material. This epoxy resin has excellent properties:
 - Has excellent electrical insulation properties. Dielectric strength 20-30kV/mm, volume resistivity (pv) 1×10^{13} - $15 \Omega \cdot m$;
 - The heat resistance can reach more than 200°C, and it has good insulation performance at high temperature;
 - Stable chemical properties, excellent alkali resistance, acid resistance and solvent resistance, and good resistance to temperature aging and radiation aging;
 - The thermal conductivity is 80×10^{-2} ~ $100 \times 10^{-2} W/mk$, easy to dissipate heat;
 - It has high adhesion to various substances, close molecular structure, high mechanical strength, and good protection for switchgear;
 - The curing shrinkage rate is small, generally 1%-2%; the linear expansion coefficient is also very small, generally $6 \times 10^{-6} / ^\circ C$. Therefore, the size of the switch is stable, the internal stress is small, and it will not crack.

Truly environmentally friendly green switchgear

- GVG-12 epoxy resin solid insulated fully enclosed switchgear is a truly environmentally friendly green switchgear.
 - The epoxy resin itself has stable chemical properties, and there is no volatilization and diffusion of any toxic substances;
 - There is no volatile matter during automatic pressure gel (APG technology), no dripping after the gel is handled, and no exhaust gas emission during the curing process;
 - The switchgear has no SF6 greenhouse gas emissions, no oil pollution, and no toxic gases and harmful substances during operation;
 - After the end of the service life, the epoxy resin can be quickly decomposed through two treatment methods: heat treatment cycle and chemical treatment cycle, and can be recycled and reused by extraction technology.
 - All materials used in epoxy resin solid insulated fully enclosed switchgear are recyclable materials, and will not emit any polluted liquid, let alone any toxic gas. It is a truly environmentally friendly green switchgear.

A new generation of high-tech products

- Environmental protection:
 - Completely cancel the SF6 gas insulation, without any pollution or harm to the environment and people.
- Compactness:
 - Using fully insulation technology, the switchgear is small in size and compact in structure, (width×depth×height) only 420mm×730mm×1400mm.
- Insulation:
 - The solid insulation adopts automatic pressure gel technology, and all live parts are fully insulated, with excellent insulation performance to ensure the safety of personnel and equipment.
- Tightness:
 - The sealed structure of the switch makes the product moisture-proof, ready to be put into operation, dirt-resistant, maintenance-free, and can operate normally even when immersed in water.
- Maintenance-free:
 - The use of high-performance and low-wear vacuum interrupter and a reliable spring operating mechanism ensure that the equipment is completely maintenance-free within 20 years.
- Corrosion resistance:
 - The modular assembly of the cabinet adopts the electrostatic spraying process of aluminum-zinc plate and steel plate to ensure the anti-corrosion performance of the equipment.
- Security:
 - The protection level of the solid insulated switchgear enclosure reaches IP3X, the primary circuit and the fuse cartridge reach IP67, and the internal fuse, vacuum switch, disconnecter and earth switch have a complete mechanical interlocking device to ensure operators and operation security.
- Scalability:
 - The solid-insulated switchgear adopts modular structure design, which makes it easy for users to combine and expand according to their power supply schemes.
- Quick installation:
 - It is convenient and quick to install European-style cable connector with plug-in method.
- Easy to replace the fuse:
 - After unlocking the corresponding mechanical interlock through the operating mechanism, you can manually pull out the fuse for quick and easy replacement.
- Flexible operation control:
 - In addition to the normal manual operation of the main switch, disconnecter and earth switch, electric operation is optional. Strongly support the automation and intelligence of the distribution network.
- High degree of intelligence:

- The intelligent controller developed by our company can be selected to carry out remote control, remote measurement and remote communication of switchgear and substation sites, which can be used for distributed control and can also facilitate centralized control.
- Measurement function:
 - It can measure circuit current, voltage, power, transformer operating temperature and ambient temperature, etc.
- Protection function:
 - It can realize a variety of protection functions, such as overcurrent protection, quick-break protection, zero sequence protection, directional grounding protection, etc.
- Event recording function:
 - With power-down memory function, record the time and type of events.
- Interlock function:
 - When the vacuum switch is in the closed state, the disconnecter cannot be operated: when the cabinet door is opened, the earth switch cannot be operated, and the disconnecter cannot be closed; when the disconnecter is opened, the earth switch can be closed; when the earth switch is opened, the disconnecter can be closed.

Wide range of applications

- Applied to areas requiring high environmental protection: SF6 gas insulation is completely eliminated, and there is no pollution or harm to the environment and humans.
- Applied to places with frequent operations: The mechanical life of solid-insulated switchgear exceeds 10,000 times.
- Application in low temperature and cold areas: no SF6 gas application, no need to consider the problem of SF6 gas low temperature operation. It can also operate normally at -45°C .
- Application in plateau areas: There is no need to consider the influence of plateau atmospheric pressure on insulation performance.
- Applied to areas with strong wind and sand: The safety protection level of the solid insulated switchgear body is IP67, and the control circuit room adopts special treatment to ensure long-term operation in areas with strong wind and sand.
- Applied to safe and explosion-proof places: use a vacuum interrupter with explosion-proof performance; solid insulation further protects the switch: strengthen the phase isolation to avoid short circuit between phases or multiple circuits;
- Applied to low-lying basements: there is no leakage of SF6 gas and other harmful gas accumulation problems, and it will not cause any harm to the basement staff.
- Applied to wet coastal areas: epoxy resin sealing, moisture resistance, salt spray corrosion resistance, to ensure long-term use in coastal areas.

Unique switch structure

- Not only the main switch can be equipped with electric operation, but also the disconnecter and earth switch can be equipped with electric operation, which strongly supports the automation and intelligence of the distribution network;
- All live parts adopt a sealed design, complete a fully insulated and fully sealed structure, with a protection level of IP67, and can work normally even when immersed in water for a short time;
- Can clearly observe the switch's opening and closing position from the observation window;
- Modular design and split-phase design make it more convenient for unit combination and circuit expansion, and with better insulation performance:
- No SF6 gas insulation, no pollution, completely environmental protection structure;
- Ingenious mechanical interlocking and electrical interlocking to meet the five-prevention requirements to ensure the safety of personal equipment;
- The exquisite appearance and soft and coordinated colors give users the enjoyment of beauty.

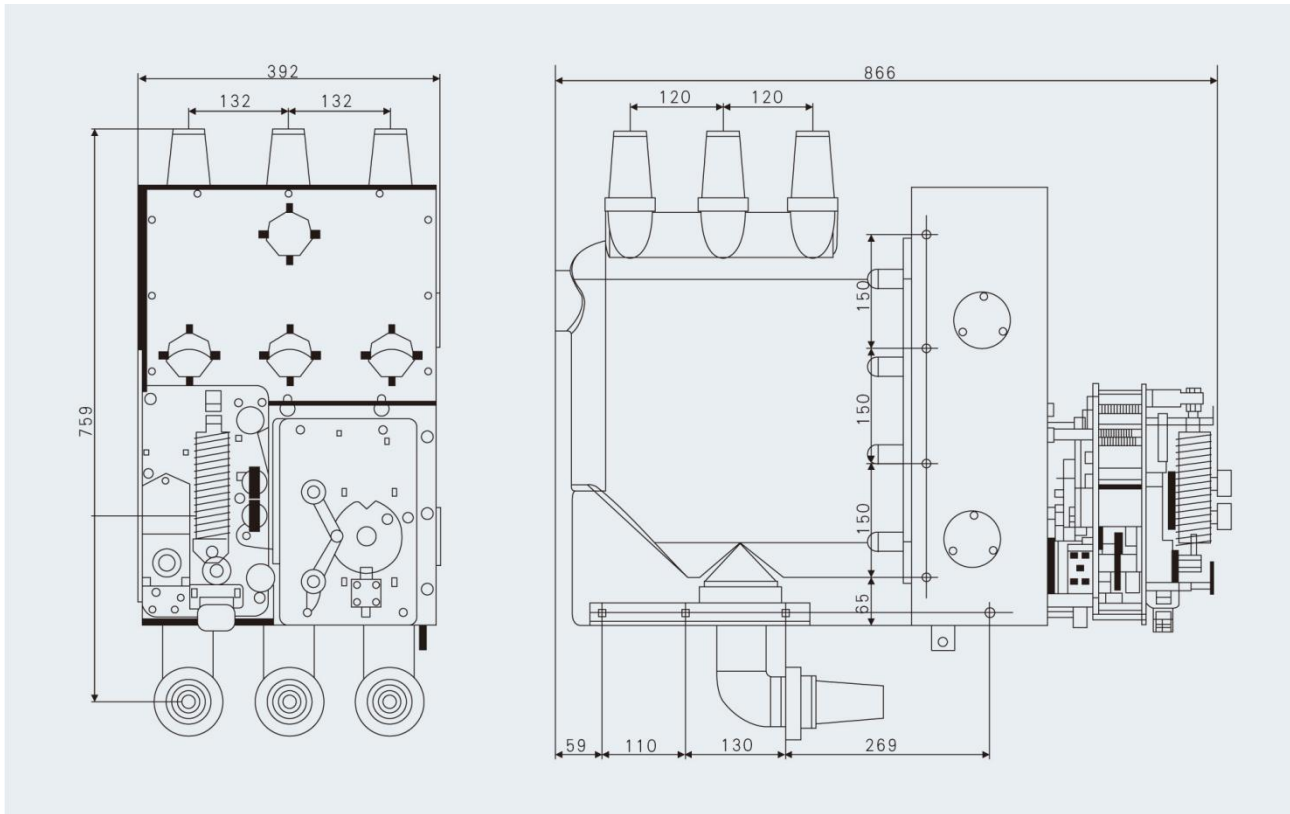
Perfect safety performance

- The solid insulated switchgear completely cancels the SF6 application, avoiding the explosion accident caused by the insulation performance and arc extinguishing ability of the SF6 ring network cabinet due to insufficient gas pressure.
- Use a vacuum interrupter with explosion-proof performance, and the solid insulation layer has an improved protective effect on the switch, ensuring the safety of equipment and personnel.
- The modular isolation structure between phases completely avoids accidents caused by short circuits between phases or multi-circuit short circuits.
- The "five-prevention interlock" between the main circuit breaker, disconnecter, earth switch and the cabinet door ensures the safety of maintenance personnel.
- The opening and closing positions of each phase of the switch can be clearly seen through the observation window, which enhances the safety of operation and maintenance.
- The high glass transition temperature of epoxy resin ensures that the insulation capacity of epoxy resin and silicone rubber will not decrease at high temperatures.
- Flexible filler is used between the epoxy resin insulation layer and the switch secondary conductor to eliminate the stress caused by thermal expansion and contraction, and avoid cracks.
- Full gear transmission is adopted in the operating mechanism to improve the reliability of the operating mechanism.
- The protection level of the solid insulation switch reaches IP67, and it can operate normally even when immersed in water.
- The switch position indication is installed on the operating spindle, which enhances the accuracy of the indication.

Main Technical Parameters

Item		V unit		C unit		F unit		
Rated voltage (kV)		12	24	12	24	12	24	
Rated frequency (Hz)		50		50		50		
Rated current (A)		800	630	630		630		
Rated short circuit breaking current (kA)		25	20	/		31.5		
Rated cable charging breaking current (A)		/		10		/		
Rated short time withstand current (kA)		25	20	20		/		
Rated short time withstand duration (s)		4		4		/		
Rated peak withstand current (kA)		63	50	50		/		
Rated short circuit making current (kA)		63	50	50		/		
Rated breaking transfer current (A)		/		/		3150		
Rated insulation level	Rated lightning impulse withstand voltage (kV)	Phase-to-phase, phase-to-earth	75	125	75	125	75	125
		Across open contacts	85	145	85	145	85	145
	Rated power frequency withstand voltage (kV 1min)	Phase-to-phase, phase-to-earth	42	65	42	65	42	65
		Across open contacts	48	79	48	79	48	79
Auxiliary control circuit		2		2		2		
Mechanical life (times)		10000		10000		10000		
Main circuit resistance ($\mu\Omega$)		≤ 140		≤ 140		≤ 700		

Movement Structure Drawing



Security and protection

- Visible open contacts of disconnector

There is an obvious visible window for the disconnector in the front of the cabinet, which can view three working positions: disconnector closing position, disconnector opening position, and grounding closing position, which are convenient for on-site staff to check and determine the position of the disconnector, which is very safe.



- Internal internal arcing design

Internal arcing pressure valve: When an arc occurs inside the product, the pressure will be released from the pressure release valve and the arc will be discharged to the cable trench to avoid accidental injury to the operator.

- Excellent environmental protection

It adopts environmental protection material design, does not use SF6 gas as the arc extinguishing medium and insulation, and does not pollute the environment. The primary circuit adopts the minimum contact design to ensure low energy consumption during operation.



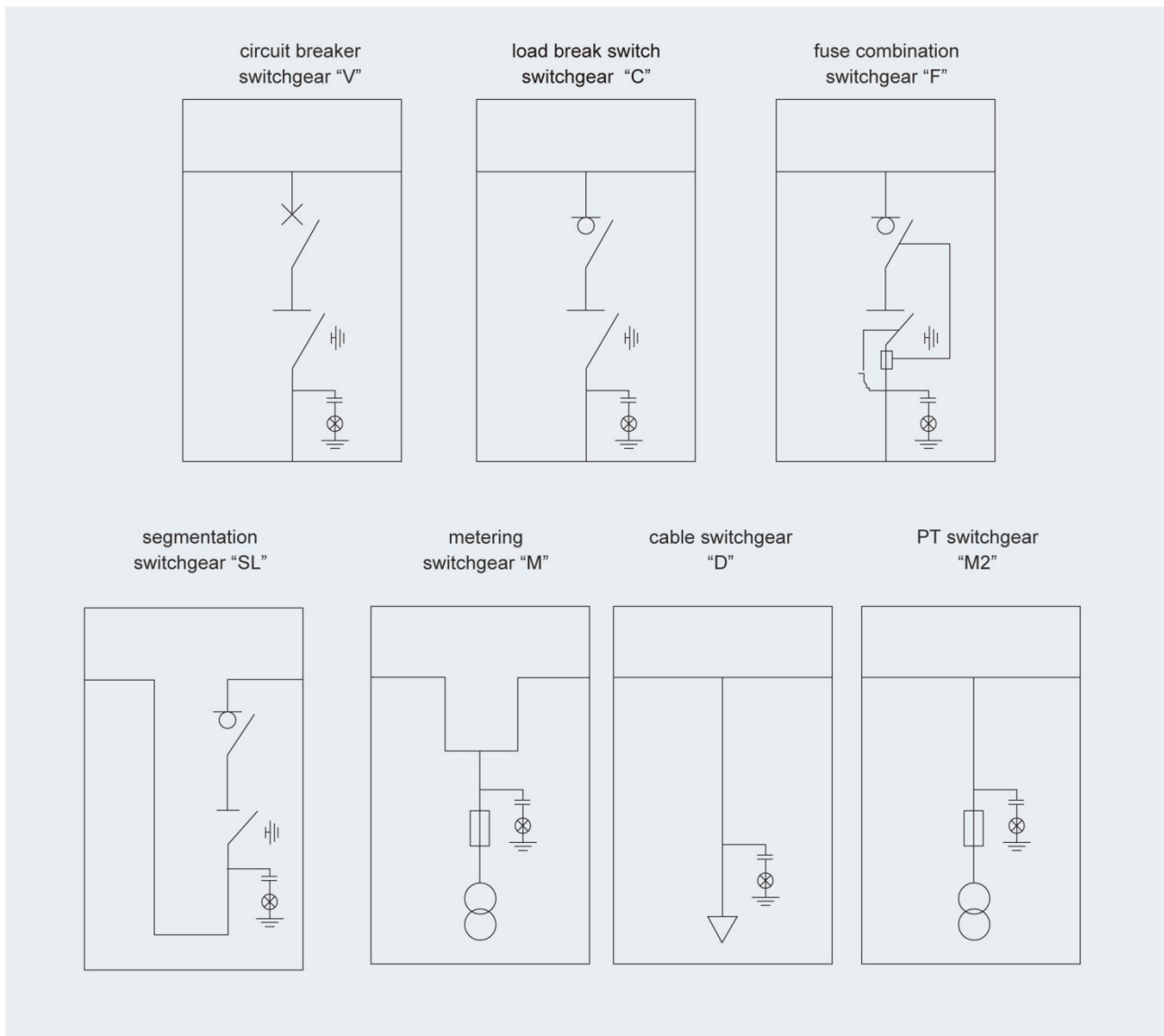
Application field

- Low temperature and cold area: no SF6 gas application, no need to consider the low temperature operation of SF6 gas, and it can operate normally at -45°C .
- Plateau area: There is no need to consider the influence of plateau atmospheric pressure on insulation performance.
- Strong sandy areas: The solid insulation ring main unit has a safety protection level of IP67, and the control circuit room adopts special treatment to ensure long-term operation in strong sandy areas.
- Coastal wet areas: environmental resin sealing, moisture resistance, salt spray corrosion resistance, to ensure

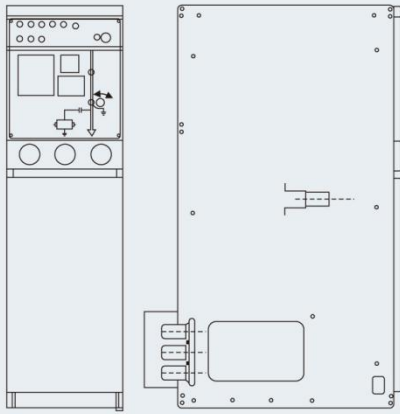
long-term use in coastal areas.

- Areas with high environmental protection requirements: The impact of SF6 gas on atmospheric warming has been paid attention to. The solid ring network cabinet has canceled SF6 gas, and there is no pollution and harm to the environment and people.
- In the smart grid: Since the main switch and the disconnecter can be electric, the intelligent controller developed by our company can be selected to remotely control, remotely measure, and remotely communicate the switchgear and substation site, which can carry out distributed control and convenient Centralized control.

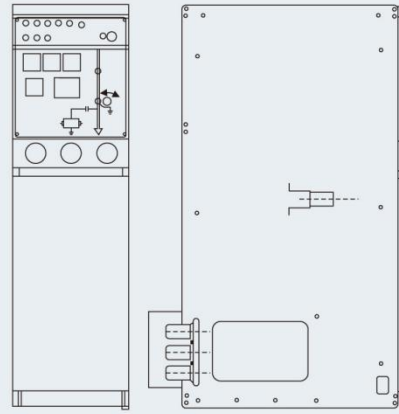
Design Scheme



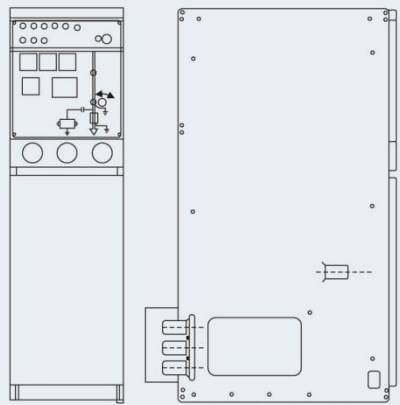
Overall Dimensions



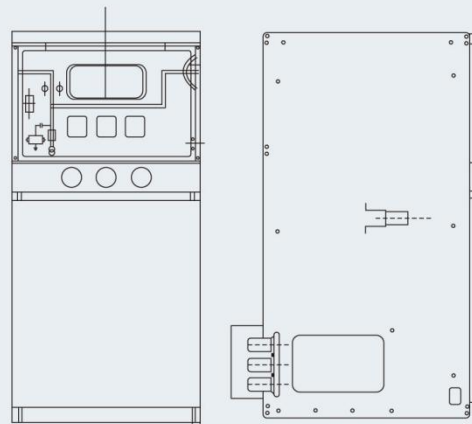
442×845×1550
circuit breaker



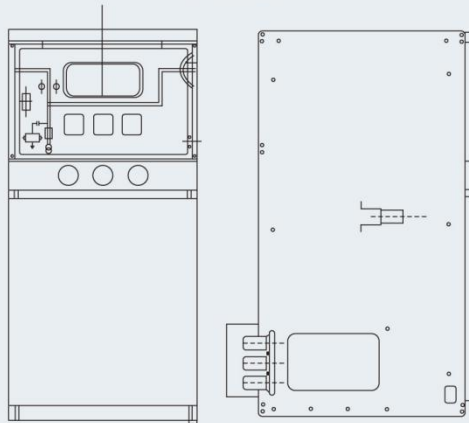
442×845×1550
load break switch switchgear



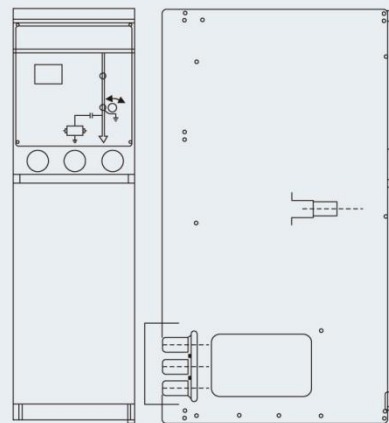
442×845×1550
load break switch-fuse combination
switchgear



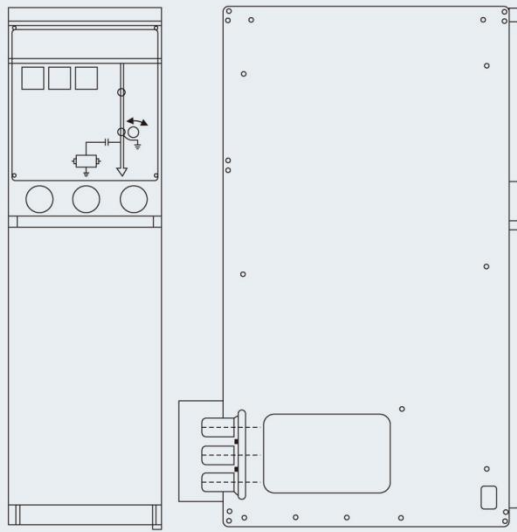
750×845×1550
x metering switchgear
(solid insulated type)



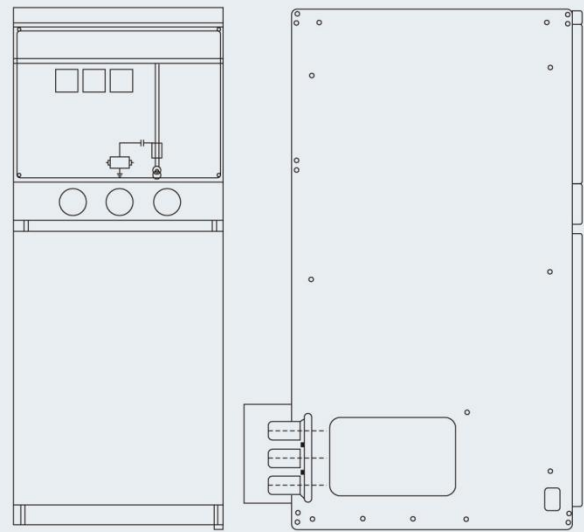
750×845×1550
metering switchgear
(normal type)



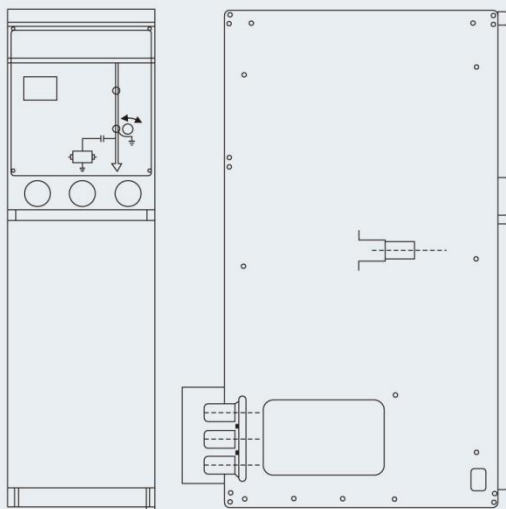
442×845×1550
lifting switchgear



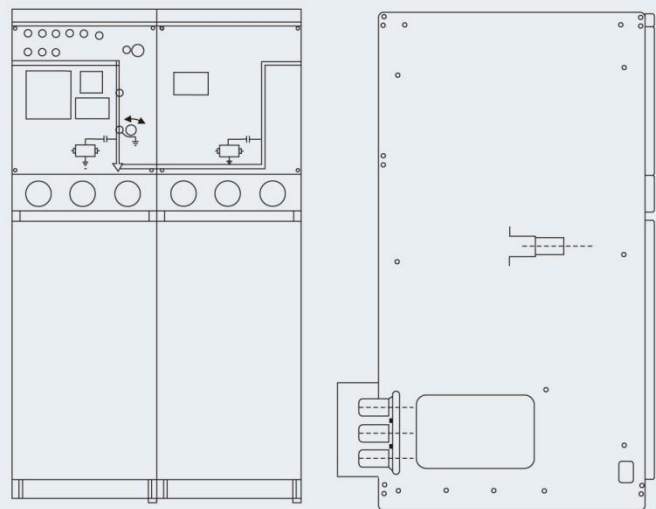
442×845×1550
PT switchgear with disconnector
(solid insulated type)



600×845×1550
PT switchgear without disconnector
(normal type)



442×845×1550 disconnector
switchgear



884×845×1550
lifting switchgear