

GPR1-40.5kV

Box Type Gas Insulated Metal Enclosed Switchgear





About Us»

GreenPower promotes environmental awareness, and aims to create unprecedented happiness and wealth for our investors, employees, clients and partners. By focusing in the mid-to-high voltage and low voltage eld, and professionally working on R&D, manufacturing, marketing and service of high-end green intelligent switchgears, equipments and products.GreenPower sets to become a well-respected global company in the power industry.

GreenPower, is jointly established by a number of state-owned excellent industrial electrical professional manufacturers, we committed to meet the procurement needs of clients. It is a professional procurement service provider with entity of industrial electrical.

GreenPower provides ONE-STOP solutions service for all customers in the International area. It is located in the time-honored electrical industrial city, a collection of worldclass brand of industrial electrical products,excellent brand of domestic electrical products as the basis.

Innovative business philosophy, strong professional supply team, expert technical guidance, advanced Information network management platform, fast logistics, which makes GreenPower as your procurement expert by your side.

GreenPower adheres to its own brand and multi-brand integration, marketing dierentiated development strategy. The products involving low voltage, medium voltage and high voltage transmission and distribution products and industrial automation products.

It covering all aspects of distribution, logistics, warehousing, professional and technical engineering services, systems integration and complete sets of manufacturing. Stable business foundation for cooperation with customers and suppliers, and has established a good reputation to maintain its leading position in the market competition.

Human quests for transcendence, with transcendence we make progress, when the pursuit of unlimited become a belief, our dream began to realize.

Hard-working, dedicated GreenPower people, will be adhering to its past glory, beginners mind, let go sailing, to face the fierce competition in the future, and always help customers make the best choice, and strive to become the best and most reliable procurement service provider in the eld of industrial electrical.



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1.1 Product application

The product is applied to the ring network power supply or dual radiation power supply of 40.5kV power supply wire, which can change the original single radiation power supply mode. When the wire fails, the ring main unit can restore the transformer circuit feed in time, greatly improving the reliability and utilization of power supply. It is applicable to industrial areas, commercial areas or rural towns with large power supply load density and cable feed network, especially suitable for the power collection and transmission of wind power generation equipment.

At the same time, the ring main unit is safe to use, free from the influence of climate, convenient to install, maintenance free, land saving, and suitable for installation in box type substations.

The load switch cabinet, load switch - fuse combination electrical cabinet and vacuum circuit breaker cabinet in the ring main unit can also be used independently. Users can select different unit combinations according to their own requirements to form different distribution systems.

1.2 Conditions of use

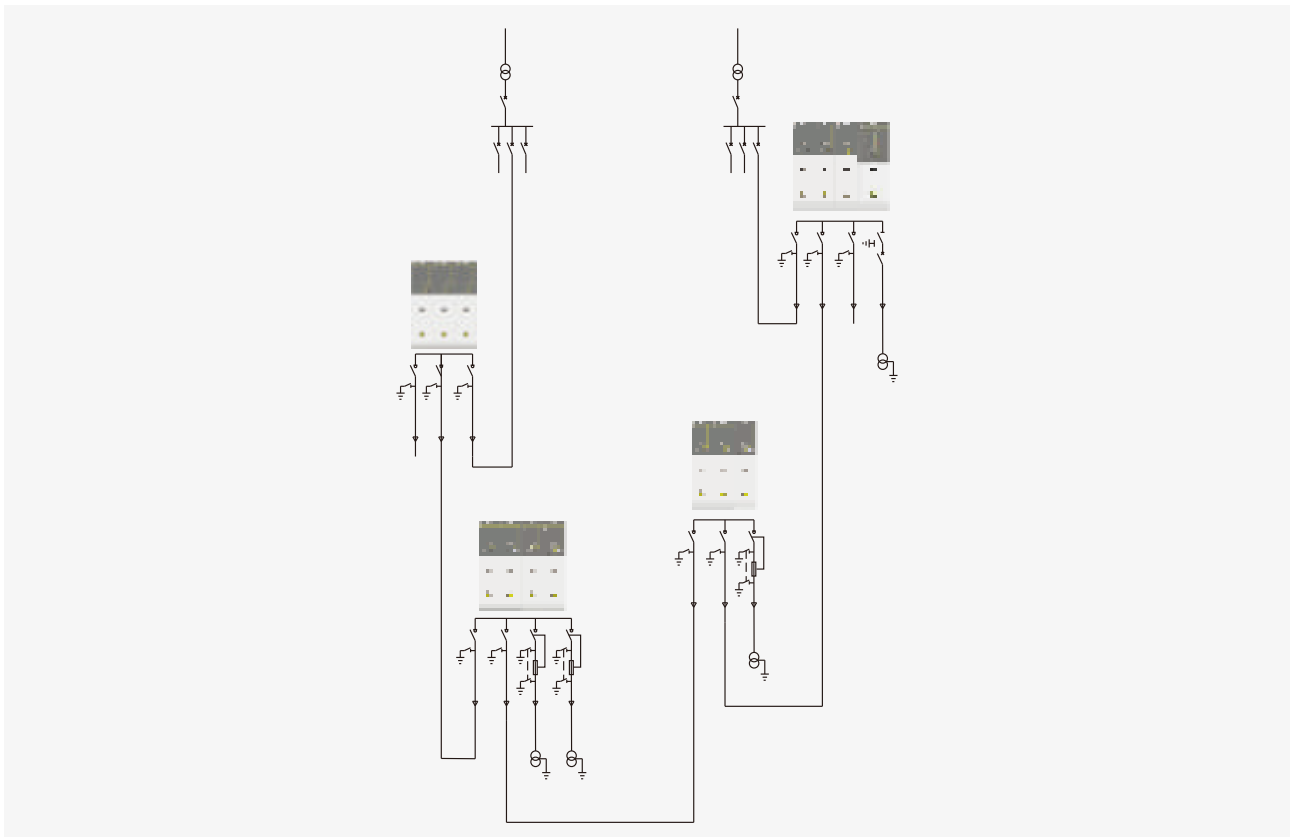
Conditions for normal use

The product application shall comply with the requirements of GB3906, DL/T404 and IEC62,271-200:

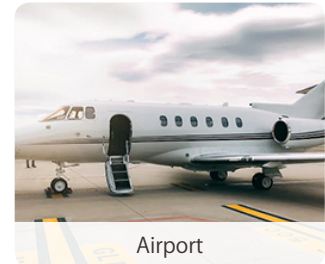
1. Ambient air temperature:
Maximum temperature+40°C ; The minimum temperature is - 25°C ; Daily average maximum temperature+35 °C
2. Humidity: Daily average relative humidity $\leq 95\%$; Monthly average relative humidity $\leq 90\%$;
Daily average saturated steam pressure $\leq 2.2 \times 10^{-3}$ MPa; Monthly average saturated steam pressure $\leq 1.8 \times 10^{-3}$ MPa
3. Altitude: ≤ 1000 m
4. The surrounding air is not obviously polluted by dust, smoke, corrosive gas or combustible gas, steam or salt mist.

Conditions for special use

According to GB11022 and IEC62271-1 standards, special requirements beyond the above normal service conditions shall be consulted with the manufacturer in advance and agreed through consultation. For example, the altitude exceeds 1000m; Higher ambient temperature; Lower ambient temperature; Other special climatic conditions, etc.



1.3 Wide range of applications



1.4 High performance professional solutions

Comprehensive, flexible and compact

1. Save land occupation and land acquisition cost;
2. It is convenient to install in the area with narrow space.

Modular design, expandable and arbitrary combination

1. Provide any combination and expansion of various modules such as C cabinet, F cabinet, V cabinet and compact CCV cabinet;
2. Plug in bus connector is designed to realize gapless splicing without being affected by outer environment;
3. The factory gas tank is assembled without on-site gas treatment.

Safe and reliable

1. High pressure fully enclosed structure, suitable for various environments, such as high altitude, high humidity, high dust and other harsh areas;
2. High insulation level, applicable to requirements of various standards, such as GB/DL/IEC, etc;
3. The inflation pressure of the gas tank is as low as 0.12MPa (absolute value), the leakage rate is small, and the rated insulation level and breaking capacity are guaranteed under zero gauge pressure;
4. Excellent corrosion resistance, neutral salt spray test for 1000 hours and above, suitable for operation in high salt spray environment.

Low operation and maintenance cost

1. The switch cabinet has small volume, low circuit resistance and low energy consumption;
2. Maintenance free for 30 years, low operation and maintenance cost in the whole life cycle, and stable return on investment for users.

High quality core components

1. All laser welding high quality stainless steel gas tank, with annual gas leakage rate less than 0.1%;
2. The world's advanced production and test technology, combined with advanced quality management system;
3. The high voltage protection grade is IP67, which effectively ensures the personal safety of operators;
4. High voltage interface insulation technology is applied to design, and all high voltage components and accessories are fully insulated plug in structure;
5. The vacuum circuit breaker has excellent breaking performance and can frequently break 1250A rated current and 25kA short circuit current.

1.5 Design concept

■ Safe and reliable

GPR1-40.5 uses SF₆ gas with excellent performance, which has strong negative electricity and excellent dielectric insulation performance. In a uniform electric field, the insulation strength is about 2-3 times that of air. It is non-toxic and tasteless, and has non combustibility, excellent arc extinguishing performance and cooling performance, so that the load switch can quickly and reliably extinguish the arc when breaking the current.

■ Small and compact

With SF₆ gas with excellent insulation performance and optimized electric field design, GPR1-40.5 switchgear is smaller in size, lighter in weight and more compact in structure on the premise of excellent performance, safety and reliability, which saves space and land for users.

■ Full module design/fully enclosed structure/all round expansion

GPR1-40.5 series ring main unit is a new generation of compact modular switchgear. The gas tank is made of high quality 3mm stainless steel plate by laser welding. All high voltage live parts such as circuit breaker, load switch and bus are sealed in the box filled with SF₆ gas.

The whole series of products have module structures such as single compartment unit type and common box type compact type. Each module has its own function and independent metal shell, and can be expanded freely from left to right. The splicing and bus connection between GPR1-40.5 series ring main unit are convenient and reliable, ensuring the safe connection of cabinet columns in each different scheme. The cable connection of incoming and outgoing wire units is also simple, fast and reliable.

■ All weather adaptation

GPR1-40.5 series ring main unit adopts airtight structure, and the primary conductive system is completely independent in the operating environment with SF₆ as the medium, so it is not affected by the outer environment (such as condensation, pollution, salt fog, small animals and chemical substances, etc.). It is truly maintenance free, suitable for various harsh places, and has a strong anti immersion ability. Both the gas tank and fuse compartment have reached the protection level of IP67, providing our users with reliable electrical equipment and economic operation and maintenance costs.

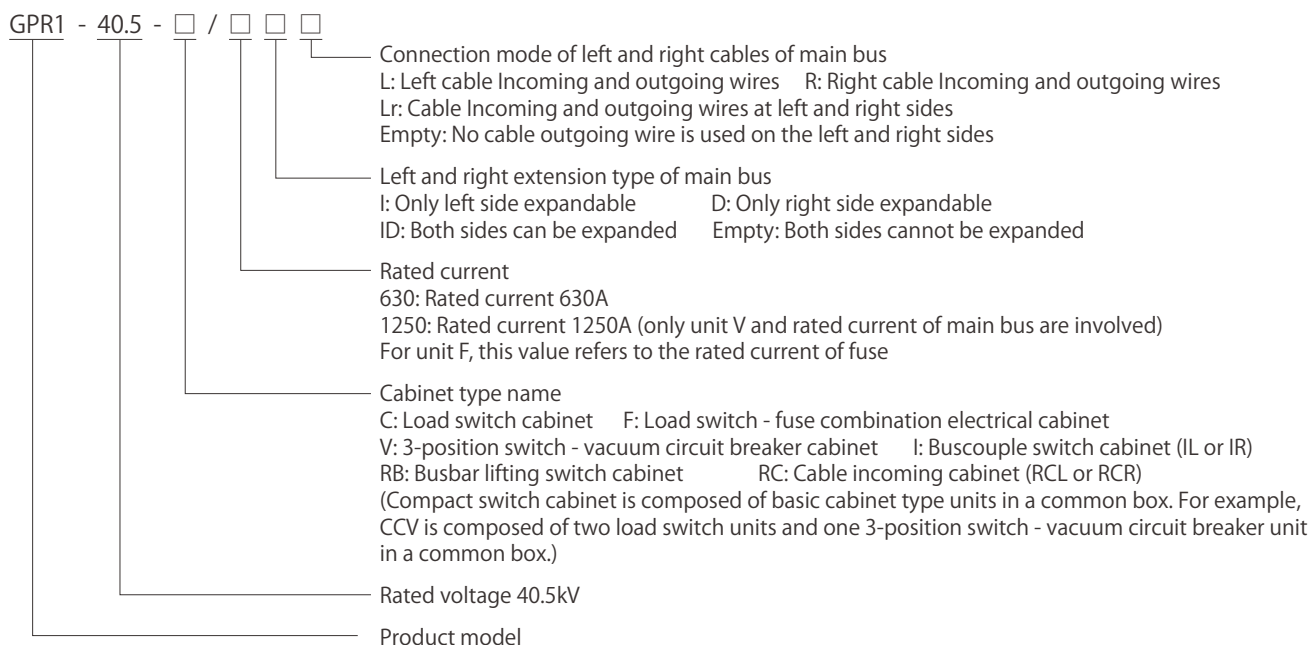
■ Advanced and flexible

GPR1-40.5 series ring main unit adopts international advanced design concept, production and detection means, which makes the whole series of products simple in structure, flexible in operation and reliable in interlocking. In addition, it adopts advanced sensing technology and the latest microcomputer protection device, which can provide various technical solutions to meet different user requirements.

1.6 Standards for design

GB/T11022-2011 (IEC62271-1)	"Common Technical Requirements for High Voltage Switchgear and Control Equipment Standards"
GB3906-2006 (IEC62271-200)	"3.6kV~40.5kV AC Metal Enclosed Switchgear and Control Equipment"
GB3804-2004 (IEC62271-103)	"3.6 kV~40.5 kV High Voltage AC Load Switch"
GB16926-2009 (IEC62271-105)	"High voltage AC Load Switch - Fuse Combination Apparatus"
GB1985-2004 (IEC62271-102)	"High Voltage AC Isolation Switches and Earthing Switches"
GB1984-2014 (IEC62271-100)	"AC High Voltage Circuit Breaker"
GB/T8905-2012 (IEC60480)	"Guide for Gas Management and Detection in Sulfur Hexafluoride Electrical Equipment"
GB11023-1989	"Test Method for Sulfur Hexafluoride Gas Sealing of High Voltage Switchgear"
GB/T12022-2006	"Sulfur Hexafluoride for Industrial Use"
GB/T12706.4-2008 (IEC60502-4)	"Extruded Insulated Power Cables and Accessories with Rated Voltages from 1kV (Um=1.2kV) to 35kV (Um=40.5kV) Part 4: Test Requirements for Accessories of Power Cables with Rated Voltages from 6kV (Um=7.2kV) to 35kV (Um=40.5kV)"
DL/T593-2006	"Common Technical Requirements for High Voltage Switchgear and Control Equipment Standards"
DL/T404-2007	"3.6kV~40.5kV AC Metal Enclosed Switchgear and Control Equipment"

1.7 Product model and meaning



Exemplify

- GPR1-40.5-V/630ID represents vacuum circuit breaker cabinet, with rated voltage of 40.5kV, rated current of 630A and expansion on both sides.
- GPR1-40.5-CCTV/1250 refers to a three unit cabinet, which is composed of two load switch units and one vacuum circuit breaker. The rated voltage is 40.5kV, the rated current of the main bus and V unit is 1250A, and the rated current of C unit is still 630A, without expansion.

1.8 Main technical parameters

Item		Unit	Load switch cabinet	Load switch - Fuse combination electrical cabinet	3-position switch - Vacuum circuit breaker cabinet	
Rated voltage U_r		kV	40.5	40.5	40.5	
Rated current I_r		A	630	*(1)	630	1250
Rated frequency f_r		Hz	50	50	50	
Rated power frequency withstand voltage (Valid value) U_d	To earth/ phase to phase	kV	95	95	95	
	Across isolating distance	kV	118	118	118	
Rated lightning impulse withstand voltage (Peak) U_p	To earth/ phase to phase	kV	200	200	200	
	Across isolating distance	kV	220	220	220	
Rated short circuit breaking current I_{sc}		kA	—	31.5	25	
Rated short time withstand current I_k		kA	20	—	25	
Rated short circuit duration t_k		s	3	—	4	
Rated peak withstand current I_p		kA	50	—	63	
Rated short circuit closing current I_{ma}		kA	50	—	63	
Rated active load breaking current I_l		A	630	630	—	
Rated closed loop breaking current I_{2a}		A	630	—	—	
Rated cable charging breaking current I_{4a}		A	50	—	50	
Mechanical life	Load switch/earthing switch	times	5000/2000	3000/2000	—	
	Vacuum circuit breaker/3-position switch	times	—	—	10000/2000	
IP Grade	Low voltage room			IP3X		
	Gas tank			IP67		
	Fuse room			IP67		
SF_6 gas rated pressure (20 °C)		Mpa		0.02(rel.)		
SF_6 gas leakage rate				≤ 0.1%		

*(1) Note: The rated current and rated short circuit closing current (peak value) of the load switch - fuse combination electrical cabinet are limited by the fuse. Please refer to the fuse specification option table on page P15.

1.9 First class production equipment and manufacturing process



■ CNC laser cutting processing center

Germany TRUMPF CNC laser cutting processing center.



■ High voltage partial discharge test room

Fully shielded partial discharge test room, the whole machine and incoming components are subject to comprehensive and strict local discharge testing and control to ensure the electrical life and insulation reliability of the equipment under long term operation.



■ Fully automatic sheet metal flexible processing production line

Adopting the international first class Finnish fully automatic sheet metal flexible manufacturing system - Midnight Express System (FMS), the three traditional processes (shearing, punching and folding) of the modern switchgear industry are organically combined into one, from the feeding, transferring, stacking and unloading of metal materials are all automated, ensuring the accuracy, material utilization and production efficiency of sheet metal processing, and fully saving human resources.



■ Fully automatic helium leak detection

The German fully automatic helium leak detection process is used to simultaneously evacuate the inside and outside of the gas tank and fill the box with helium gas at a certain pressure to avoid deformation and accelerate helium leakage to achieve the purpose of accurately detecting the leak rate of the gas tank. Unlike the helium spray method and the buttoned hood method, this method is a positive pressure helium leak detection and inert helium mass spectrometry with the smallest molecular diameter, which is comprehensive, accurate and sensitive, especially suitable for leak detection of thin plate gas tanks. Pumping, filling and leak detection are carried out automatically, and each leak detection takes only 15 minutes, which is suitable for mass production in assembly line. The average annual leakage rate of the gas tank is less than 0.1%, ensuring an effective working life of 30 years.

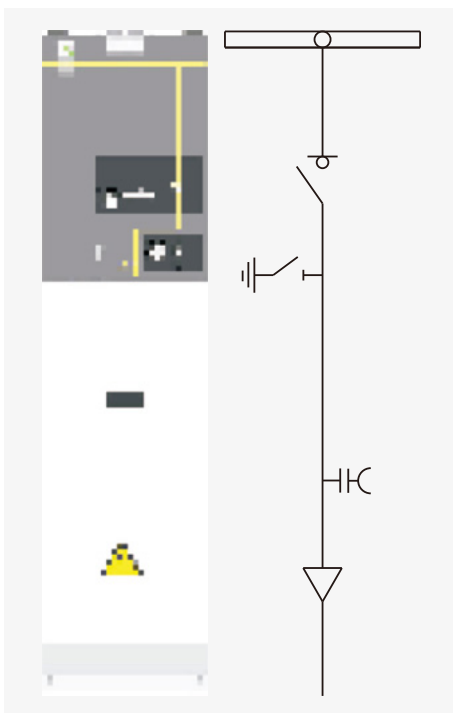


■ CNC 3D five axis laser helium shielded automatic welding system

Adopting the most advanced international laser welding process, using the laser's high precision and high energy, the stainless steel plate is welded into one, without flux and solder, avoiding the traditional argon arc welding process of large welding scars, uneven thermal stress in the weld, false welding, leakage, sand eyes, large deformation of the welded surface and other defects, to ensure that the gas tank to withstand long term thermal expansion and contraction changes in gas tightness, so that the annual leakage rate of the gas tank is less than 0.1%.

2.1 Basic cabinet type unit

C-type load switch cabinet



GPR1-40.5-C

Width: 430mm Depth: 1000mm Height: 1700mm Weight: 300kg

Function

Connecting or disconnecting the incoming and outgoing cables to the busbar can make the incoming and outgoing cables earthed in three phases at the same time and have short-circuit closing capability for incoming and outgoing cable control.

Standard configuration

FN □ -L-40.5 type load switch
JN □ -40.5 type earthing switch (can be canceled)
Manual spring-operated mechanism for load/earth switch
Electrified display
SF₆ gas density meter
Five prevention interlocks
Main busbar/branch busbar/earthing busbar
Incoming and outgoing cable sleeves
Operation handle
Main busbar left and right extendable

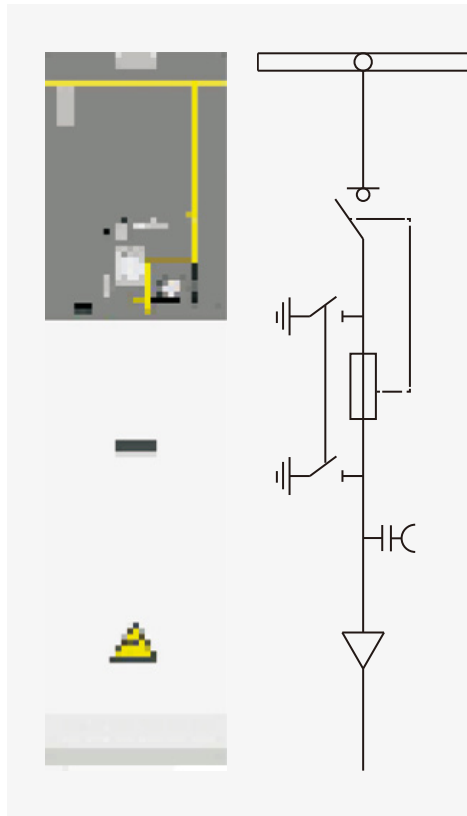
Optional configuration

Load switch electric operating unit
Core piercing current transformers
Gas density monitor or gas density relay
Low voltage control room
T-type cable terminations
Inner-cone type cable terminal
T-type back-connected lightning arrester
Inner-cone plug-in lightning arrester
Short circuit and earth fault indicator
Load switch position auxiliary contact 3NO+3NC
Earthing switch position auxiliary contact 2NO+2NC
Main busbar single side extension
Main busbar left and right side or single side cable entry and exit
Key lock

Load switch		FN □ -L-40.5
Rated voltage Ur		40.5kV
Rated short time power frequency 1min withstand voltage Ud	To earth/ phase to phase	95kV
	Across isolating distance	118kV
Rated lightning impulse withstand voltage Up	To earth/ phase to phase	200kV
	Across isolating distance	220kV
Rated current Ir		630A
Rated active load breaking current I1		630A
Rated distribution circuit closed-loop current breaking and closing I2a		630A
Rated cable charge breaking current I4a		50A
Rated earth fault breaking current I6a		63A
Earth fault cable charge breaking current I6b		86A
Rated short-circuit closing current (peak value) Ima		50kA
Rated short time withstand current/time Ik/tk		20kA/3s
Electric life grade		E2
Mechanical life		5000 times

Earthing switch		JN □ -40.5
Rated voltage Ur		40.5kV
Rated short time frequency withstand voltage Ud		95kV
Rated lightning impulse withstand voltage Up		200kV
Rated short circuit closing current Ima		50kA
Rated short time withstand current/time Ik/tk		20kA/3s
Mechanical life		2000 times

F-type load switch - fuse combination electrical cabinet



GPR1-40.5-F

Width: 430mm Depth: 1000mm Height: 1700mm Weight: 375kg

Function

Control and protection of transformers of 2000kVA and below.

Standard configuration

FNR □ -L-40.5 type load switch
JN □ -40.5 type earthing switch
Fuse outgoing side earthing switch
Fuse compartment assembly (without fuse)
Manual spring operating mechanism for load/earth switches
Energized display
SF₆ gas density meter
Five prevention interlock
Main Busbar/Branch Busbar/Earthing Busbar
Incoming and outgoing cable sleeves
Operating handle
Main busbar left and right extendable
Fuses

(see fuse specification options table on page 15)

Optional configuration

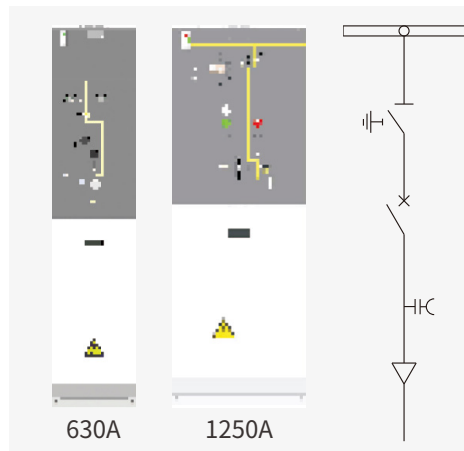
Load switch electric operating unit
Opening coil
Core piercing current transformers
Gas density monitor or gas density relay
Low voltage control room
T-type cable terminations
Inner tapered cable terminations
T-type back-connected lightning arrester
Inner-cone plug-in lightning arrester
Short circuit and earth fault indicator
Load switch position auxiliary contact 3NO+3NC
Earthing switch position auxiliary contact 2NO+2NC
Fuse fusing auxiliary contact 1NO
Key lock
Main busbar single side extension
Main busbar left and right side or single side cable incoming and outgoing wires
Active or passive relay protection device

Load switch - fuse combination apparatus		FN □ -L-40.5
Rated voltage Ur		40.5kV
Rated short time power frequency 1min withstand voltage Ud	To earth/ phase to phase	95kV
	Across isolating distance	118kV
Rated lightning impulse withstand voltage Up	To earth/ phase to phase	200kV
	Across isolating distance	220kV
Rated current Ir		
Main busbar		630A
Load switch - fuse combination apparatus*		*
Rated short-circuit breaking current Isc		31.5kA
Rated active load breaking current I1		630A
Transfer current Itransfer		750A
Mechanical life		3000 times

*Detailed parameters of combination apparatus, please contact us.

Earthing switch		JN □ -40.5
Rated voltage Ur		40.5kV
Rated short time frequency withstand voltage Ud		95kV
Rated lightning impulse withstand voltage Up		200kV
Rated short circuit closing current Ima		50kA
Rated short time withstand current/time Ik/tk		20kA/3s
Mechanical life		2000 times

V-type 3-position switch - vacuum circuit breaker cabinet



Function

For control and protection of wires, motors and transformers.

Standard configuration

Vacuum circuit breaker
3-position switch (or only isolating switch)
Electric spring operating mechanism of vacuum circuit breaker
3-position switch electric operating mechanism (or electric operating mechanism for isolation switches only)
Five prevention mechanical interlock
Energized displays
SF₆ gas density meter
Main busbar/branch busbar/earthing busbar
Incoming and outgoing cable sleeve
Energy storage handle of vacuum circuit breaker
3-position switch operating handle
The main bus can be expanded from left to right

Optional configuration

Through core current transformers
Gas density monitor or gas density relay
Low voltage control room
Active or passive relay protection devices
T-type cable terminations
Inner tapered cable terminations
T-type back connected lightning arrester
Inner-cone plug in lightning arrester
Short circuit and earth fault indicator
Vacuum breaker position auxiliary contact 5NO+6NC
Isolation switch position auxiliary contact 5NO+3NC
Earthing switch position auxiliary contact 5NO+3NC
Key lock
Main busbar single side extension
Main busbar left and right side or single side cable incoming and outgoing wires

GPR1-40.5-V/630

Width: 430mm
Depth: 1000mm
Height: 1700mm
Weight: 375kg

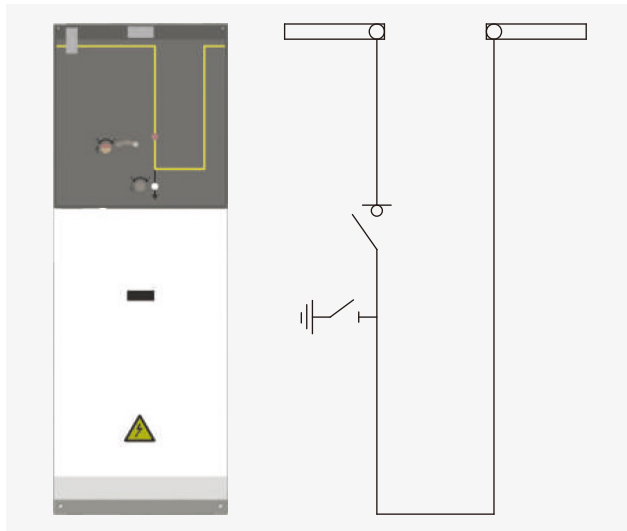
GPR1-40.5-V/1250

Width: 600mm
Depth: 1000mm
Height: 1700mm
Weight: 500kg

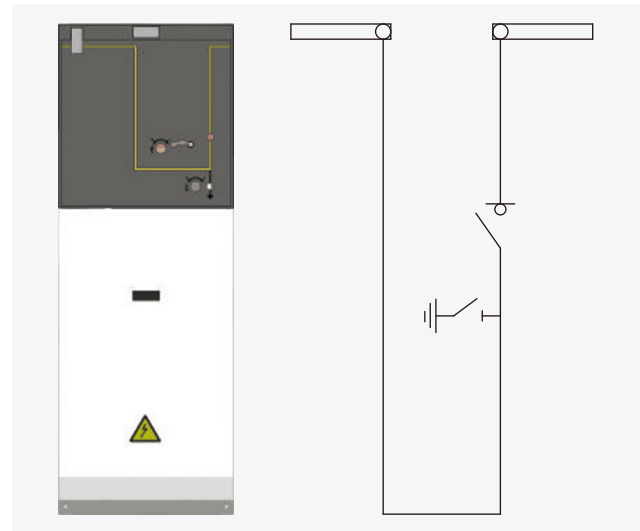
Vacuum breaker module		VEQ-40.5(1250A) VEG-L-40.5(630A)
Rated voltage Ur		40.5kV
Rated short time power frequency 1min withstand voltage Ud	To earth/ phase to phase	95kV
	Across isolating distance	118kV
Rated lightning impulse withstand voltage Up	To earth/ phase to phase	200kV
	Across isolating distance	220kV
Rated current Ir		1250A
Rated short-circuit breaking current Isc		25kA
Rated short-circuit closing current Ima		63kA
Rated short time withstand current/time Ik/tk		25kA/4s
Rated cable charging and breaking current Ic		50A
Electric life grade		E2
Mechanical life		10000 times
Rated operating sequence		O-0.3s-CO-3min-CO

3-position switch		IST-40.5(1250A) GN □ -L-40.5(630A)
Rated voltage Ur		40.5kV
Rated short time frequency withstand voltage Ud		95kV
Rated lightning impulse withstand voltage Up		200kV
Rated current		1250A
Rated short time withstand current/time Ik/tk		25kA/4s
Mechanical life		2000 times

IL-type busbar switchgear



IR-type busbar switchgear



GPR1-40.5-IL GPR1-40.5-IR

Width: 600mm
Depth: 1000mm
Height: 1700mm
Weight: 400kg

Function

Connects or disconnects two sections of the main busbar to achieve segmentation and contact between the two sections. It can make the single side main busbar earthed for easy maintenance.

Standard configuration

FN □ -L-40.5 type load switch
JN □ -40.5 type earthing switch (can be canceled)
Manual spring operating mechanism for load/earthing switch
SF₆ gas density meter
Five prevention interlock
Main busbar/branch busbar/earthing busbar
Operating handle
Main busbar left and right extendable

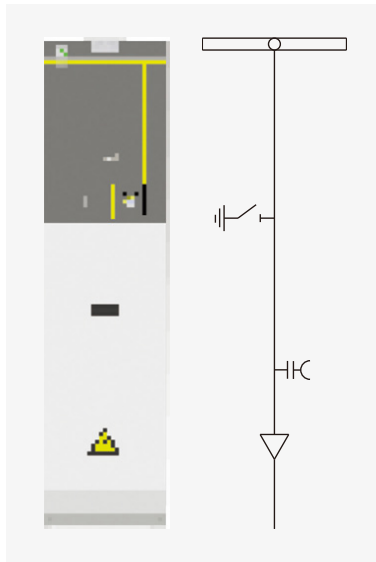
Optional configuration

Load switch motorized operating unit
Gas density monitor or gas density relay (optional)
Low voltage control room
Inner-cone plug in lightning arrester
Load switch position auxiliary contact 3NO+3NC
Earthing switch position auxiliary contact 2NO+2NC

Load switch		FN □ -L-40.5
Rated voltage Ur		40.5kV
Rated short time power frequency 1min withstand voltage Ud	To earth/ phase to phase	95kV
	Across isolating distance	118kV
Rated lightning impulse withstand voltage Up	To earth/ phase to phase	200kV
	Across isolating distance	220kV
Rated current Ir		630A
Rated active load breaking current I1		630A
Rated distribution line closed loop current opening and closing I2a		630A
Rated cable charging and breaking current I4a		50A
Rated earth fault breaking current I6a		63A
Earth fault cable charge breaking current I6b		86A
Rated short circuit closing current (peak value) Ima		50kA
Rated short time withstand current/time Ik/tk		20kA/3s
Electric life grade		E2
Mechanical life		5000 times

Earthing switch		JN □ -40.5
Rated voltage Ur		40.5kV
Rated short time power frequency withstand voltage Ud		95kV
Rated lightning impulse withstand voltage Up		200kV
Rated short circuit closing current Ima		50kA
Rated short time withstand current/time Ik/tk		20kA/3s
Mechanical life		2000 times

RB-type busbar elevated switchgear



GPR1-40.5-RB

Width: 430mm Depth: 1000mm

Height: 1700mm Weight: 250kg

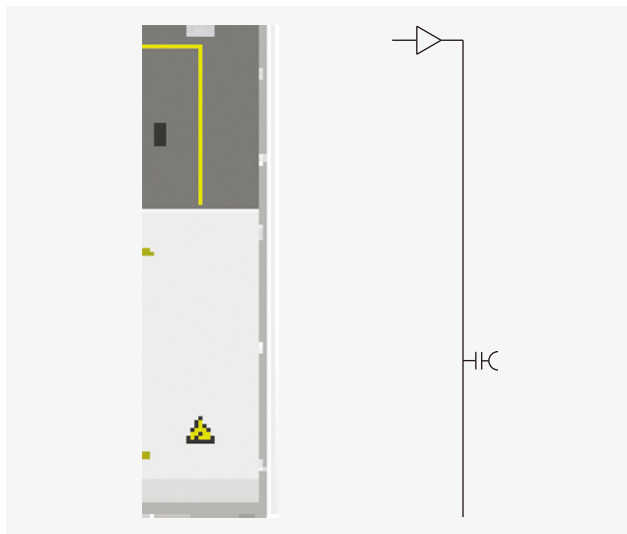
Standard configuration

JN □ -40.5 type earthing switch (can be cancelled)
Manual spring operating mechanism for earthing switch
Energized display
SF₆ gas density meter
Five prevention interlock
Main busbar/branch busbar/earthing busbar
Incoming and outgoing cable sleeves
Operating handle
Main busbar left and right extendable

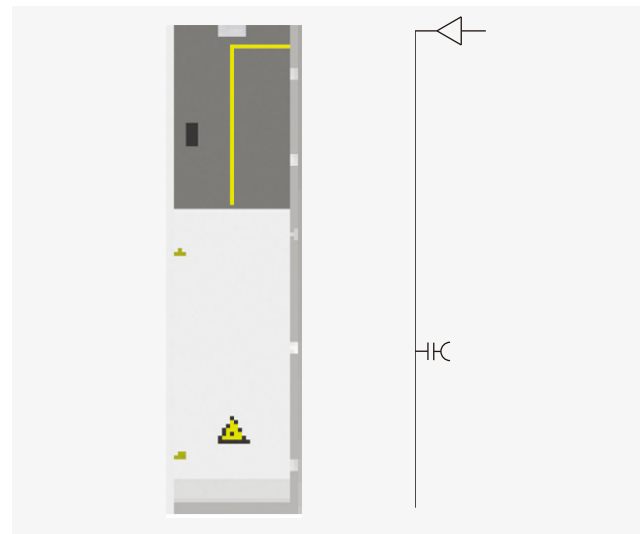
Optional configuration

Through core current transformers
Gas density monitor or gas density relay
Low voltage control room
T-Type Cable Termination
Inner Cone Cable Termination
T-type back connected lightning arrester
Metal clad plug in lightning arrester
Short circuit and earthing fault indicator
Earthing switch position auxiliary contact 2NO+2NC
Main busbar single side extension

RCL-type cable incoming cabinet



RCR-type cable incoming cabinet



GPR1-40.5-RCL GPR1-40.5-RCR

Width: 430mm Depth: 1000mm

Height: 1700mm Weight: 150kg

Standard configuration

Energized display
Five prevention interlock
Single side expandable

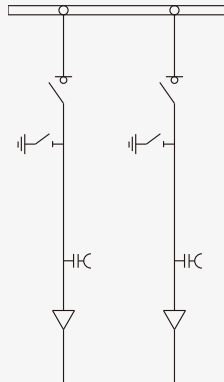
Optional configuration

Through core current transformer
T-type cable termination
T-type back connected lightning arrester

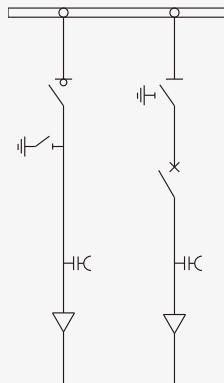
Earthing switch	JN □ -40.5
Rated voltage Ur	40.5kV
Rated short time power frequency withstand voltage Ud	95kV
Rated lightning impulse withstand voltage Up	200kV
Rated short circuit closing current Ima	50kA
Rated short time withstand current/time Ik/tk	20kA/3s
Mechanical life	2000 times

2.2 GPR1-40.5 Compact switchgear

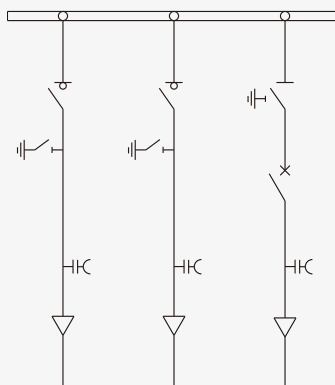
GPR1-40.5 switchgear is available as a compact solution with multiple units in a common box. The functions of the compact switchgear are exactly the same as those of the corresponding modular switchgear. The outline dimensions of the compact switchgear are added to the outline dimensions of the corresponding modular switchgear. Compact solutions are described below. The rest of the solutions are subject to consultation with the manufacturer.



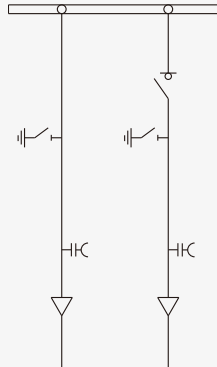
CC Dimension	
Width	860mm
Depth	1000mm
Height	1700mm
Weight	600kg



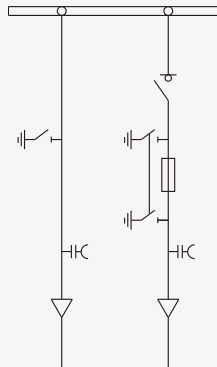
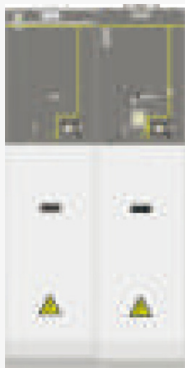
CV Dimension	
Width	1030mm
Depth	1000mm
Height	1700mm
Weight	800kg



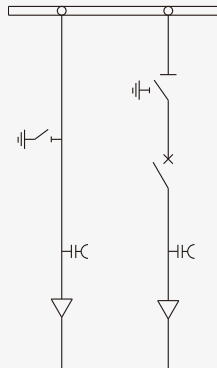
CCV Dimension	
Width	1460mm
Depth	1000mm
Height	1700mm
Weight	1100kg



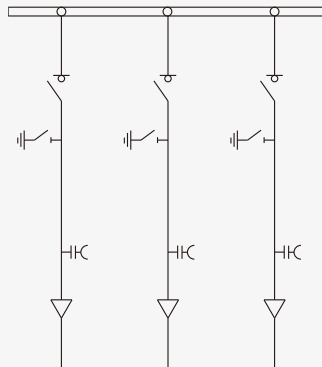
RBC Dimension	
Width	860mm
Depth	1000mm
Height	1700mm
Weight	550kg



RBF Dimension	
Width	860mm
Depth	1000mm
Height	1700mm
Weight	625kg



RBV Dimension	
Width	1030mm
Depth	1000mm
Height	1700mm
Weight	750kg



CCC or CCF Dimension	
Width	1290mm
Depth	1000mm
Height	1700mm
Weight	900kg

3.1 C-type load switch cabinet



- The load switch is installed in a sealed gas tank filled with SF₆ gas, with two positions of closing and opening, and adopts a direct acting pneumatic structure with strong arc extinguishing capacity.
- When the load switch is in the opening position, it meets the corresponding requirements of the isolation switch.
- Mechanical five prevention interlock device between the load switch and the earthing switch.
- Independent earthing switch operation with the ability to close the rated short circuit closing current.

3.2 F-type load switch - fuse combination electrical cabinet



- A combination of load switch and fuse with high breaking capacity in series for control and protection of transformers of 2000kVA and below.
- The earthing switch adopts the form of double earthing, which can be earthed on both sides of the fuse at the same time to ensure the safe replacement of the fuse. The main earthing switch on the bus side of the fuse has a rated short circuit closing capacity. The dual side earthing switches are mechanically interlocked with each other, and during earthing and closing operation, the main earthing switch is earthed first and the outgoing side earthing switch is earthed later.

3.3 V-type 3-position switch - vacuum circuit breaker cabinet



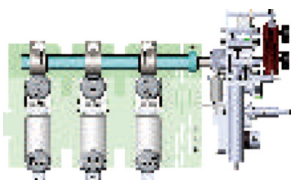
630A



1250A

- Equipped with a vacuum circuit breaker and connected in series with a 3-position switch, the circuit breaker is placed on the incoming and outgoing cable side, the 3-position switch is on the busbar side, and can be equipped with active or passive relay protection devices for the control and protection of wires and transformers
- Operation between the vacuum circuit breaker and the isolation switch, and between the isolation switch and the earthing switch is interlocked in a mechanical way.
- The earthing switch does not have the ability to close the short circuit current, and the vacuum circuit breaker is closed to complete the fast earthing function on the cable side.

3.4 Vacuum circuit breaker



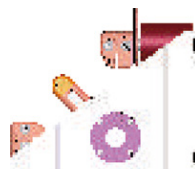
Compact VEG-L type (630A)



High performance VEQ type (1250A)

- The 1250A vacuum circuit breaker is a solid sealed pole and post type with advanced APG process; 630A is a compact arrangement structure. the use of vacuum opening and closing technology avoids the adverse effects caused by insulation gas degradation.
- The vacuum circuit breaker adopts a planar arrangement spring mechanism with manual and electric energy storage functions.
- The vacuum circuit breaker arranges the pole with interrupter chamber and the operating mechanism front and rear into one, which greatly simplifies the transmission link, and the output characteristics of the mechanism are more in wire with the breaking and closing characteristics required by the circuit breaker, reducing energy consumption and improving mechanical reliability
- Breaking capacity of 25kA, mechanical life of 10000 times.

3.5 3-position switch



Compact GN □ -L type (630A)



High performance IST type (1250A)

- The 3-position structure has the following 3-positions:
 - Closing position: Isolation switch closing position
 - Isolation position: Isolation switch opening, earthing switch opening position
 - Earthing position: Earthing switch closing position
- 1250A 3-position switch with unique direct action design, 630A with compact rotary design; manual or electric operation
- Uniform electric field and high current carrying capacity
- With natural mechanical locking function to prevent misoperation
- Complete mechanical and electrical operation interlock with the circuit breaker
- Vacuum circuit breaker earthing closing, compared with conventional earthing switch, closing capacity is stronger, longer electrical life

3.6 Anti misoperation and interlocking

Overview of interlocks for V-type cabinets

To prevent dangerous misoperation, the GPR1-40.5 circuit breaker cabinet has adopted a series of electrical and mechanical interlocks to protect the operating personnel and the equipment itself.

Anti misoperation can be achieved by the following devices:

- Intelligent protection and control units Intelligent control units with separated protective relays
- Conventional relay circuits
- Mechanical interlocks between the circuit breaker and the 3-position switch
- Mechanical interlocking device between circuit breaker and cable room cover

The circuit breakers and 3-position switches can be controlled either locally directly in front of the cabinet or remotely from the control room via local/remote changeover switches. Local operation can be accomplished by selecting the intelligent control unit, or by pushbuttons in the conventional way and by single wire indicators via analog diagrams.

- Mechanical and electrical interlocks between the 3-position switch and the vacuum breaker
- Mechanical interlocking between vacuum circuit breaker and cable room cover
- Electrical interlocking between cabinets (if any) can be achieved by means of small busbars between cabinets



Interlocking function of circuit breaker and 3-position switch

a) Electrical interlocking

- The integrated protection and control unit implements the electrical interlocking of the 3-position switch with the circuit breaker.
- Or the electrical control line realizes the electrical interlocking of the 3-position switch and the circuit breaker.

b) Mechanical interlocking

- When the circuit breaker is in the closed state, the operating handle for operating the 3-position switch cannot be inserted, i.e., the 3-position switch cannot be operated.
- Only after the circuit breaker is opened, the shutter of the latching operation hole can be opened and the operating handle can be inserted for isolation switch or earthing switch operation.
- When the shutter of the latching operation hole is opened, the circuit breaker cannot be operated both electrically and mechanically.

Mechanical interlocking function of circuit breaker and cable room cover

- Only when the 3-position switch is in the earth position and the circuit breaker is in the closed position, the cable room cover can be opened by the lifting door handle on the cover of the mechanism room.
- When the cable room cover is opened, the circuit breaker opening button is latched and the circuit breaker cannot be opened, ensuring the safety of maintenance in the grounded condition.
- Only when the cable room cover is closed, the lifting door handle drops to the lowest position, at which time the circuit breaker opening button can be pressed to open the circuit breaker.

■ C-type, F-type cabinet mechanical interlock function cabinet mechanical interlock function

The load switch and earthing switch can be both controlled locally in front of the cabinet, while the load switch can also be remotely controlled in the control room through local and remote changeover switches.

- Mechanical and electrical interlocking between load switch and earthing switch
- Mechanical interlock between earthing switch and cable room cover

The mechanical interlocking function of the load switch cabinet and load switch - fuse combination electrical cabinet is as follows:

- Only when the load switch is in the opening position, the operating hole of the earthing switch is opened, and only then can the operating handle be inserted for the closing operation of the earthing switch.
- Only when the earthing switch is in the opening position, the operating hole of the load switch is opened, and the operating handle can be inserted for the closing operation of the load switch.
- Only when the earthing switch is in the earthed position can the cable room cover be opened by lifting the door handle on the cover of the mechanism room.
- When the cable room cover is open, the earthing switch operation hole latch cannot be inserted into the operation handle to ensure the safety of maintenance and repair in the earthed state.
- Only when the cable room cover is closed and the lifting door handle is dropped to the lowest position, the earthing operation hole is opened and the operation handle can be inserted for the earthing switch opening operation.

■ Padlocks

- C-type, F-type cabinet can be padlocked through the padlock hole on the cover of the mechanism room or padlock the load switch operation hole and earthing switch operation hole respectively or simultaneously.
- The V-type cabinet can be accessed through the padlock hole in the mechanism room cover
 - Padlock 3-position switch operation hole
 - Separate or simultaneous padlocking of circuit breaker opening and closing buttons

3.7 Gas tank pressure relief device



Each gas tank is equipped with independent pressure release device, in the case of inner arc fault in the gas tank, the pressure relief port opens, the pressure airflow is safely directed to the top of the cabinet or behind the cabinet to protect the safety of personnel and equipment in front of the cabinet.

3.8 Low voltage control room



When vacuum circuit breaker is used for transformer and wire protection, active or passive relay protection device can be assembled according to customer's requirements, and the relay protection device should be installed in the low voltage control room on top of the ring main unit. When electric operation is required, the low voltage control components are also installed in the low voltage control room on the top of the ring main unit.

3.9 Extension of GPR1-40.5



The GPR1-40.5 is an expandable switchgear for secondary distribution networks. It not only provides a complete single circuit solution, but also can be extended left and right between any circuits to provide various fixed standard combinations to meet the requirements of most 40.5kV distribution network applications.

The plug in busbar connector design enables gapless splicing, independent of outer environment and high reliability, providing more flexibility and rich solutions for distribution networks. No need to handle SF6 gas on site when splicing, no special requirements for installation site, more convenient and safe operation and installation.

3.10 GPR1-40.5 Protection function

Transformer/circuit protection

GPR1-40.5 series ring main unit provides two transformer protection modes

Adopt load switch - fuse combination electrical apparatus

The high voltage backup protection current limiting fuse with high breaking capacity is installed in the epoxy cast insulating sleeve, which is sealed in the SF₆ stainless steel gas tank. In case of short circuit fault, the fuse will blow, and the ejected striker will trigger the spring energy storage tripping mechanism of the load switch, and the load switch will trip immediately, so that the fault wire/transformer can be quickly removed.

The fuse can be equipped with a temperature limiter. When the fuse and fuse barrel are overheated due to overcurrent fault, the temperature limiter will trigger the striker to open the switch. The fuse impactor shall be medium spring impactor.

Fuse dimension:



$6.3A \leq I_n \leq 25A$, Outer diameter $d=53mm$
 $31.5A \leq I_n \leq 40A$, Outer diameter $d=67mm$
 $50A \leq I_n \leq 63A$, Outer diameter $d=85mm$



Fuse dimension:

Rated capacity of transformer (kVA) (Primary voltage of transformer 35kV) 100% load	Fuse rated current (A)	Rated capacity of transformer (kVA) (Primary voltage of transformer 35kV) 100% load	Fuse rated current (A)
100	6.3	500	20
125	6.3	630	20
160	10	800	25
200	10	1000	31.5
250	10	1250	40
315	16	1600	50
400	16	2000	63

*Please contact us to protect transformers with capacity above 2000kVA.

3.11 Relay protection systems used in conjunction with circuit breaker units



WIC1



CT (Current Transformer)

When vacuum circuit breakers are used for transformer and wire protection, WIC1 self powered relay units (passive relays) or other brands can be used to provide short circuit, overcurrent and earth fault protection.

The WIC1 is a CT-supplied digital protection relay with a small, compact structure, safe and simple wiring, and high immunity to electromagnetic interference.

Protection functions that can be achieved by WIC1

- Three phase fixed time overcurrent and short circuit fault protection (ANSI 50/51)
- Three phase time limited overcurrent protection and time limited short circuit fault protection (ANSI 50/51)
- Time limited earth overcurrent protection by inner calculation (ANSI 50N/51N)

CT for WIC1 relay protection unit

Depending on the primary rated current, CT of different variable ratios are selected. The earthing current is calculated by the WIC1 relay protection unit, and there is no need to install zero sequence current transformers.

DIP1-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	CT variable ratio
DIP1-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	
DIP1-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	
DIP-4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	
HEX-Schalter Is	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	25:1
WIC1-W1	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	50:1
WIC1-W2	16	18	20	22	24	26	28	30	32	34	36	40	44	48	52	56	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	100:1
WIC1-W3	32	36	40	44	48	52	56	60	64	68	72	80	88	96	104	112	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	200:1
WIC1-W4	64	72	80	88	96	104	112	120	128	136	144	160	176	192	208	224	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	400:1
WIC1-W5	128	144	160	176	192	208	224	240	256	272	288	320	352	384	416	448	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	800:1
WIC1-W6	256	288	320	352	384	416	448	480	512	544	573	640	704	768	832	896	
Teststrom CD	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.80	0.88	0.96	1.04	1.12	

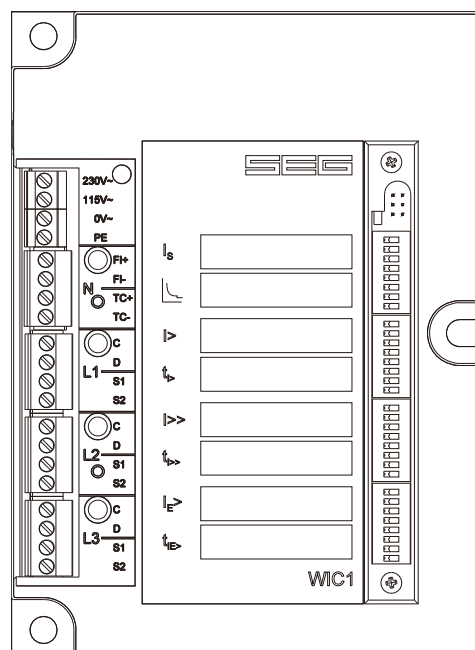
User Interface

For the WIC1-2 relays, the adjustment of the protection functions can be done via DIP switches. Each protection parameter is set by four DIP switches in binary code, for a total of 16 combinations. the WIC1-2 relay can read out the stored fault values and set values.

The interface for this relay can be found on the left side of the relay and on the upper part of the DIP switch assembly.

For other brands, please refer to the corresponding operating instructions.

Switch assembly; switch number	Parameter Setting
1; 1-4	IS: CT rated current depending on the primary operating current
1; 5-8	Selection of overcurrent protection characteristics
2; 1-4	I>: The current start value of the component with fixed time or inverse time characteristics
2; 5-8	tl>: The adjustment time of the constant time overcurrent characteristic or the factor "a" of the inverse time characteristic
3; 1-4	I>>: Current start value for short circuit fault protection
3; 5-8	tl>>: The rectification time of short circuit fault protection
4; 1-4	le>: Current start value for fixed time earthing fault protection
4; 5-8	tle>: The adjustment time of fixed time earth fault protection



3.12 GPR1-40.5 Accessories



T-type cable termination

High voltage cables can be connected to the outer tapered bushing of the GPR1-40.5 switchgear by means of T-type cable terminations. T-type cable terminations, outer tapered bushings according to EN50181, DIN47637.



Density table

The front of each gas tank is equipped with a density meter to facilitate the observation of the normal air pressure inside the tank to ensure the reliability of equipment insulation and operational safety.



Insulation plug

The terminals on both sides of the cabinet column can be sealed with special insulating plugs.



Inner-cone socket

The inner-cone socket is a gas tight casing element that is mounted on the gas tank to realize the electrical connection between the electrical components inside the tank and the outside of the tank. In addition to the busbar connection, the inner-cone socket can also be connected to a voltage adapter for high voltage testing and a current adapter for current and circuit resistance testing.



Outer-cone bushing

The standard scheme of GPR1-40.5 switchgear cable outgoing wire is connected to the T-type cable terminal by the outer-cone bushing. When more than one cable outgoing or cable incoming or required by the user, the inner-cone socket can be connected to the inline type cable terminal head.



Plug in busbar connector

The plug in busbar connector can be used to connect the inner tapered sockets for busbar connection on each GPR1-40.5 switchgear to achieve seamless connection of the cabinet, no gas handling is required for on site installation, easy splicing, safe and reliable, preventing operators from touching the live body and ensuring personal safety. The busbar connector with silicone rubber insulation is designed in accordance with DIN47637 standard.

4.1 Outdoor switch station



The outdoor ring main unit station adopts all metal pre-assembled structure with good mechanical strength, protection grade up to IP33, rainproof and impermeable to small animals.

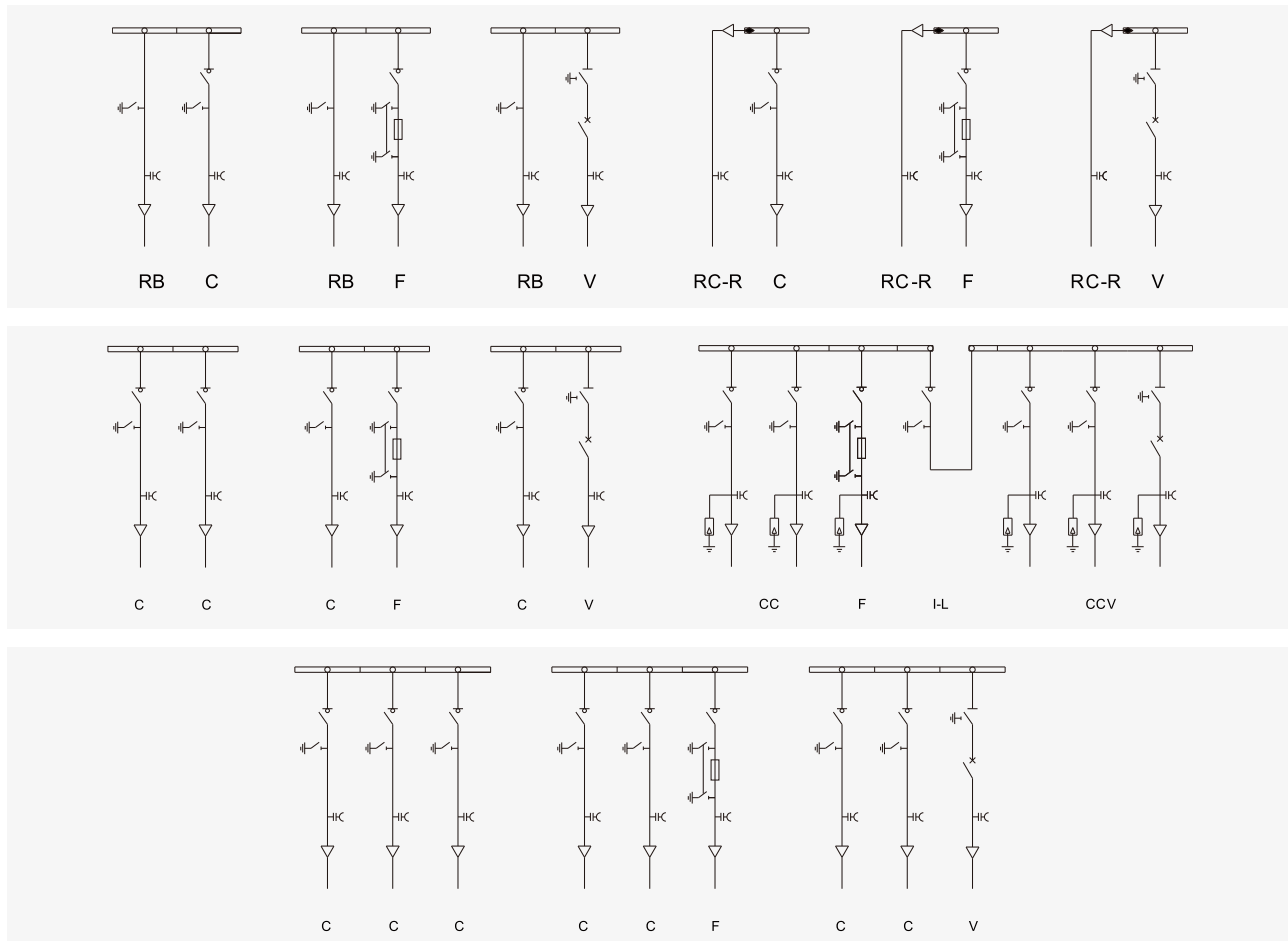
- Good ventilation:
Front and rear, left and right symmetrical opening louvers, window holes lined with removable high quality thin mesh partitions.
- Good thermal insulation:
The top cover is lined with double layer of high quality insulation cotton.
- Anti-condensation:
The roof is designed with a slope of more than 3°, and the eaves extend along the entire box station, which, together with good ventilation, eliminates the generation of condensation inside the box.

Number of switchgear units	Dimension (W × D × H)mm
Two units	1470 × 1400 × 2250 (2600)
Three units	1900 × 1400 × 2250 (2600)
Four units	2330 × 1400 × 2250 (2600)
Five units	2760 × 1400 × 2250 (2600)

Notes:

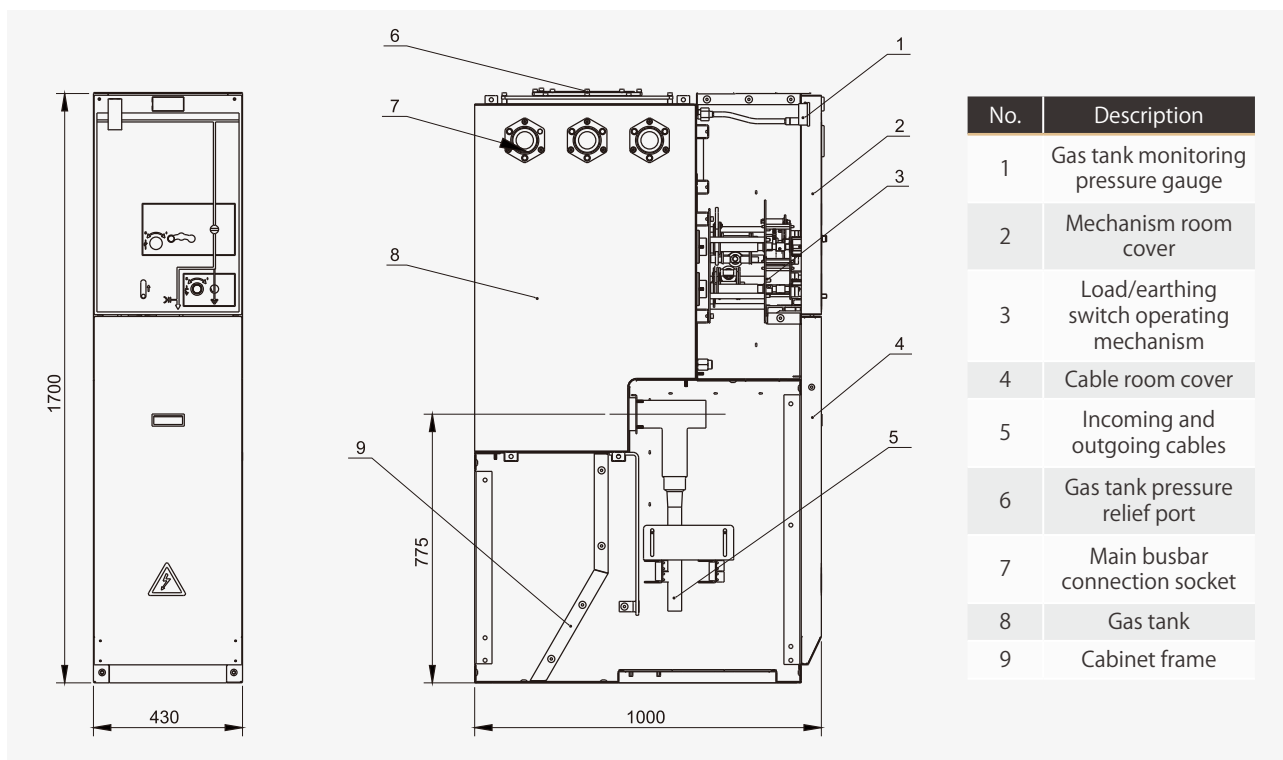
- The switchgear needs to be moved into the outdoor room after being combined with the cabinet outside the outdoor room.
- If the switchgear has a low voltage control room, the height of the outdoor room should be the dimension in brackets.
- If users have other specific dimension requirements, please contact us.

4.2 Typical design scheme of GPR1-40.5 series ring main unit

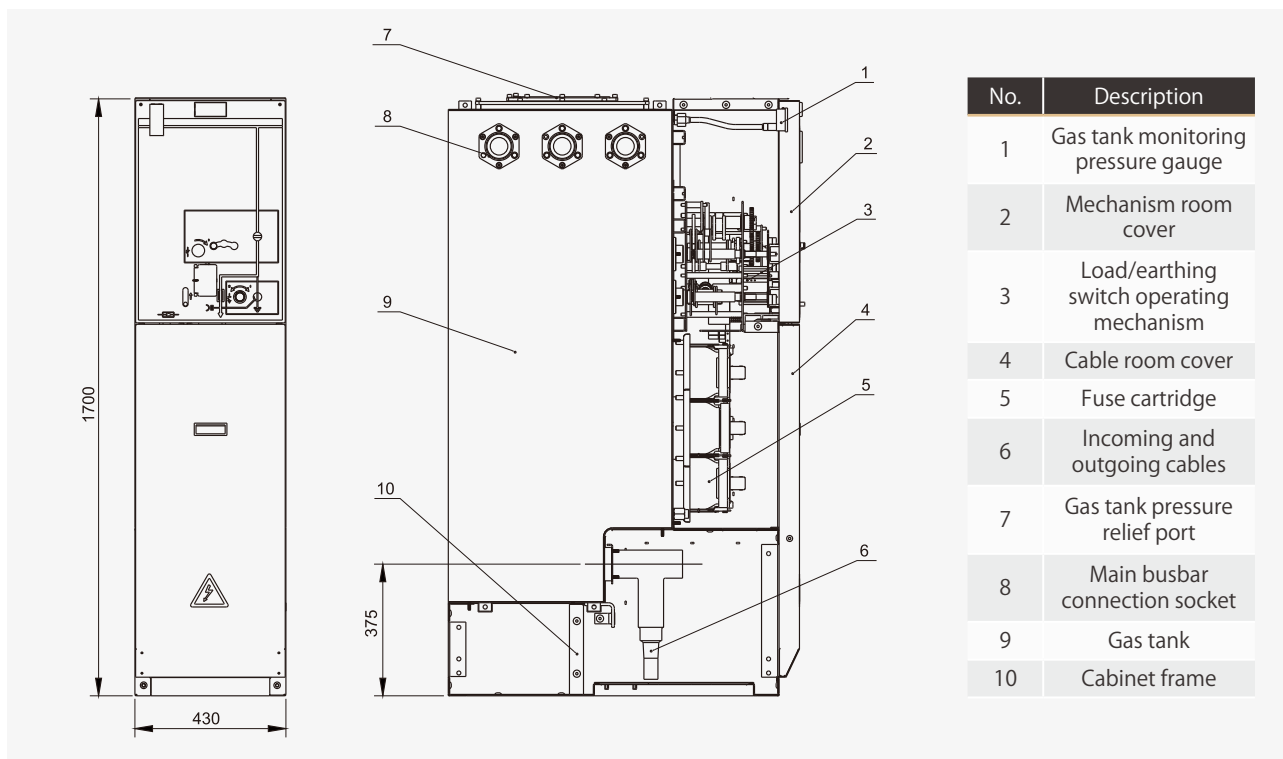


4.3 Outline dimensions of GPR1-40.5 series ring main unit

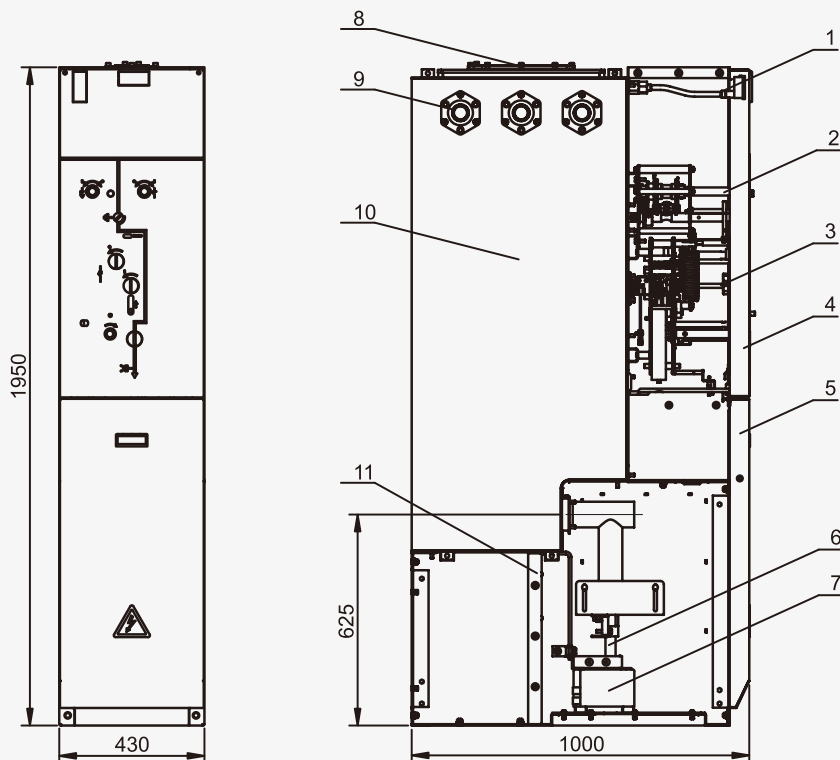
C-type load switch cabinet



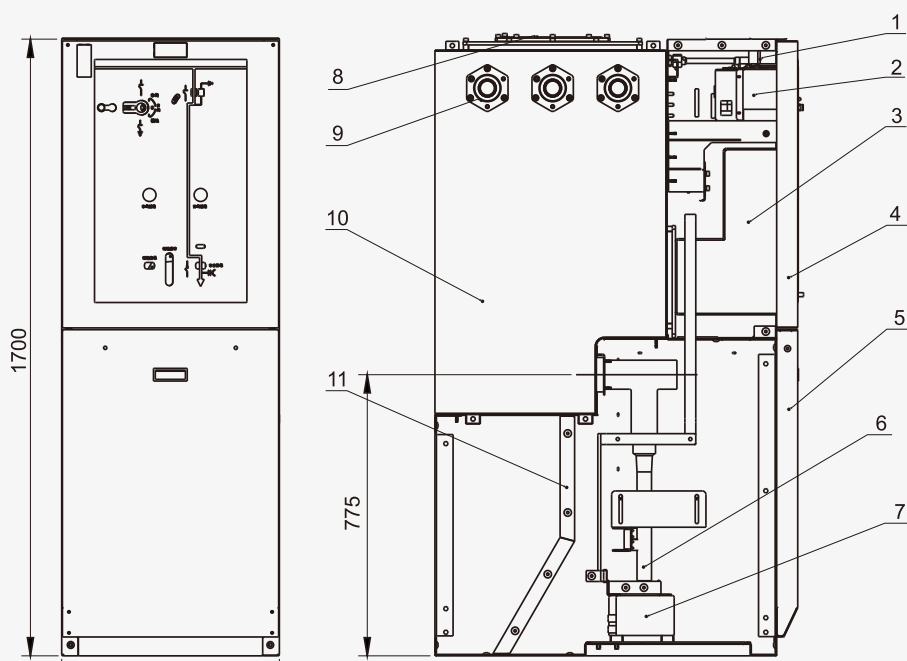
F-type load switch - fuse combination electrical cabinet



V-type 3-position switch - vacuum circuit breaker cabinet



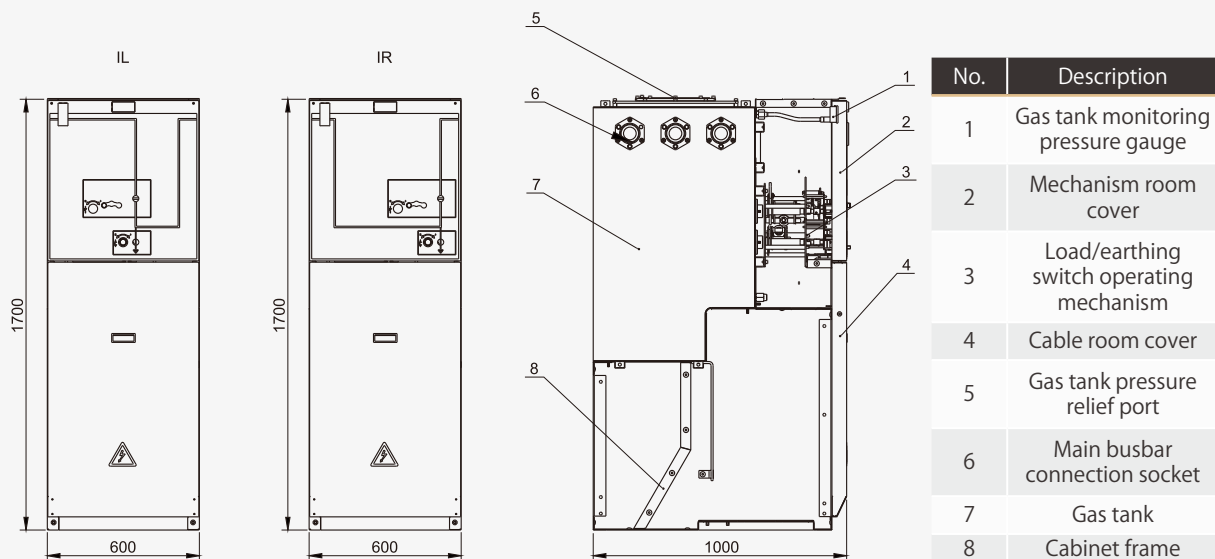
630A



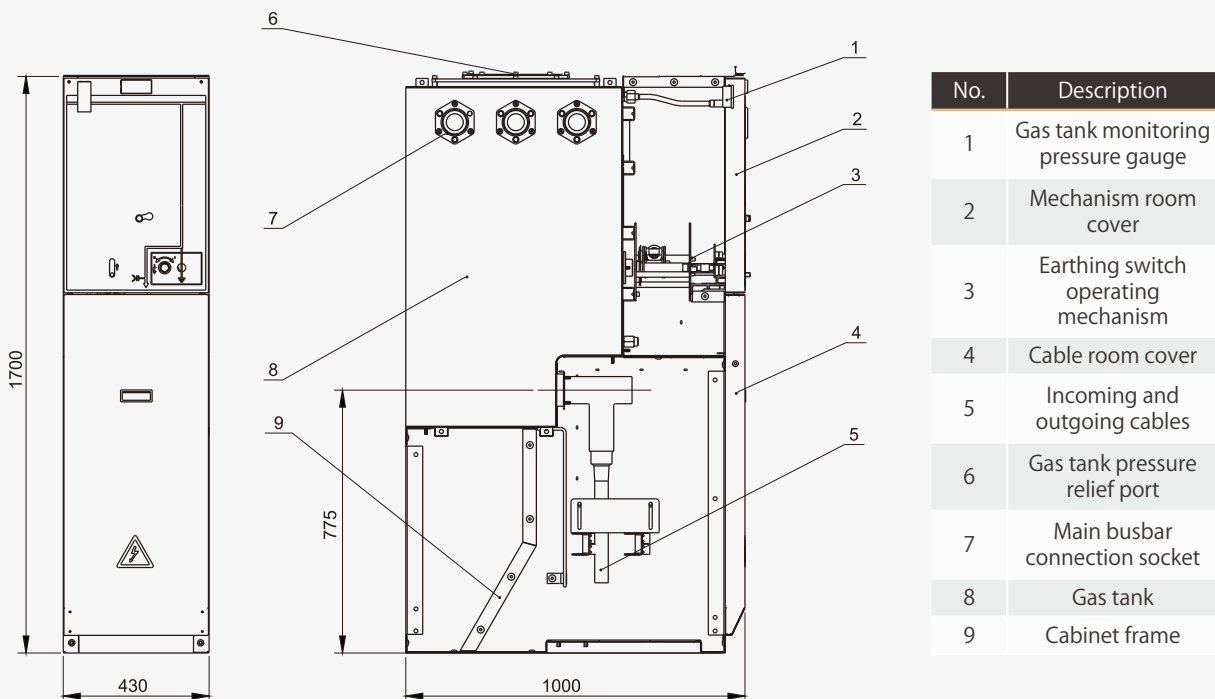
1250A

No.	Description
1	Gas tank monitoring pressure gauge
2	3-position switch operating mechanism
3	VCB operating mechanism
4	Mechanism room cover
5	Cable room cover
6	Incoming and outgoing cables
7	Current transformer
8	Gas tank pressure relief port
9	Main busbar connection socket
10	Gas tank
11	Cabinet frame

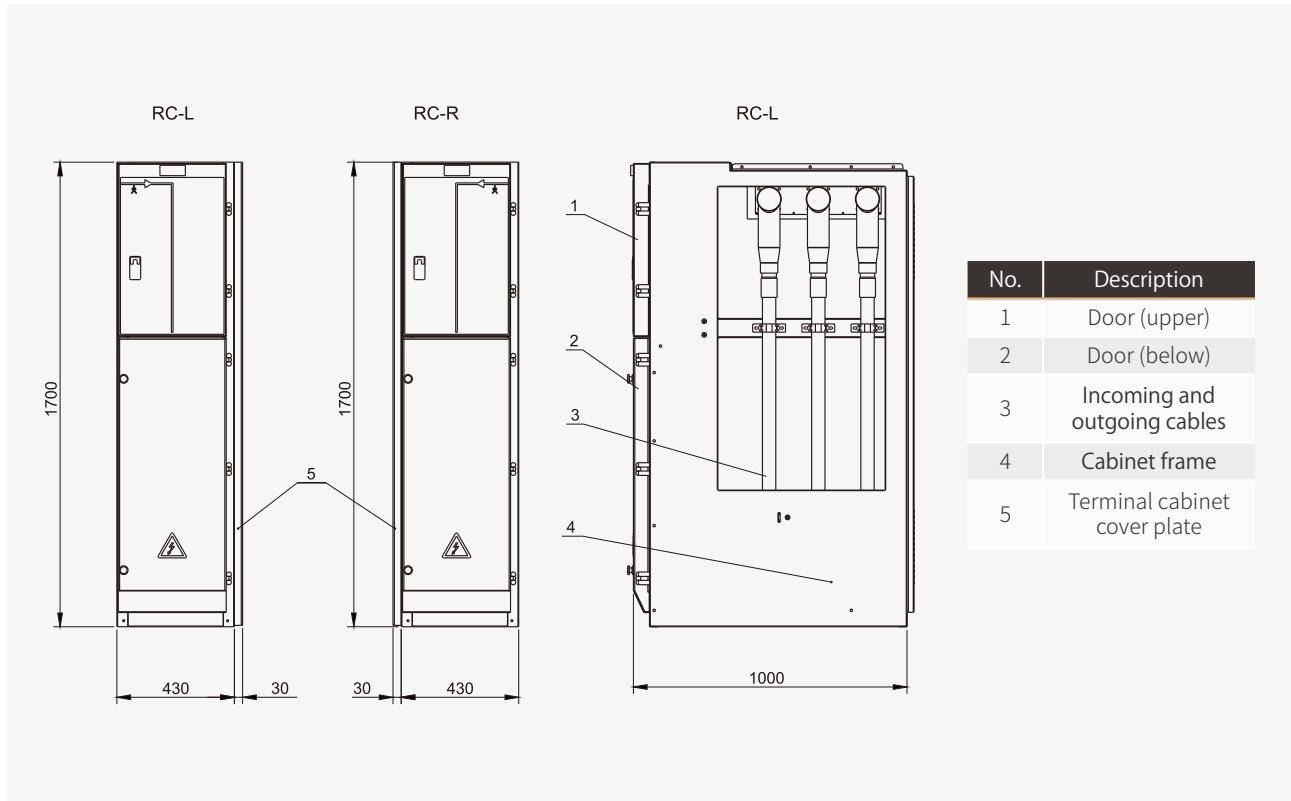
I-type busbar switchgear



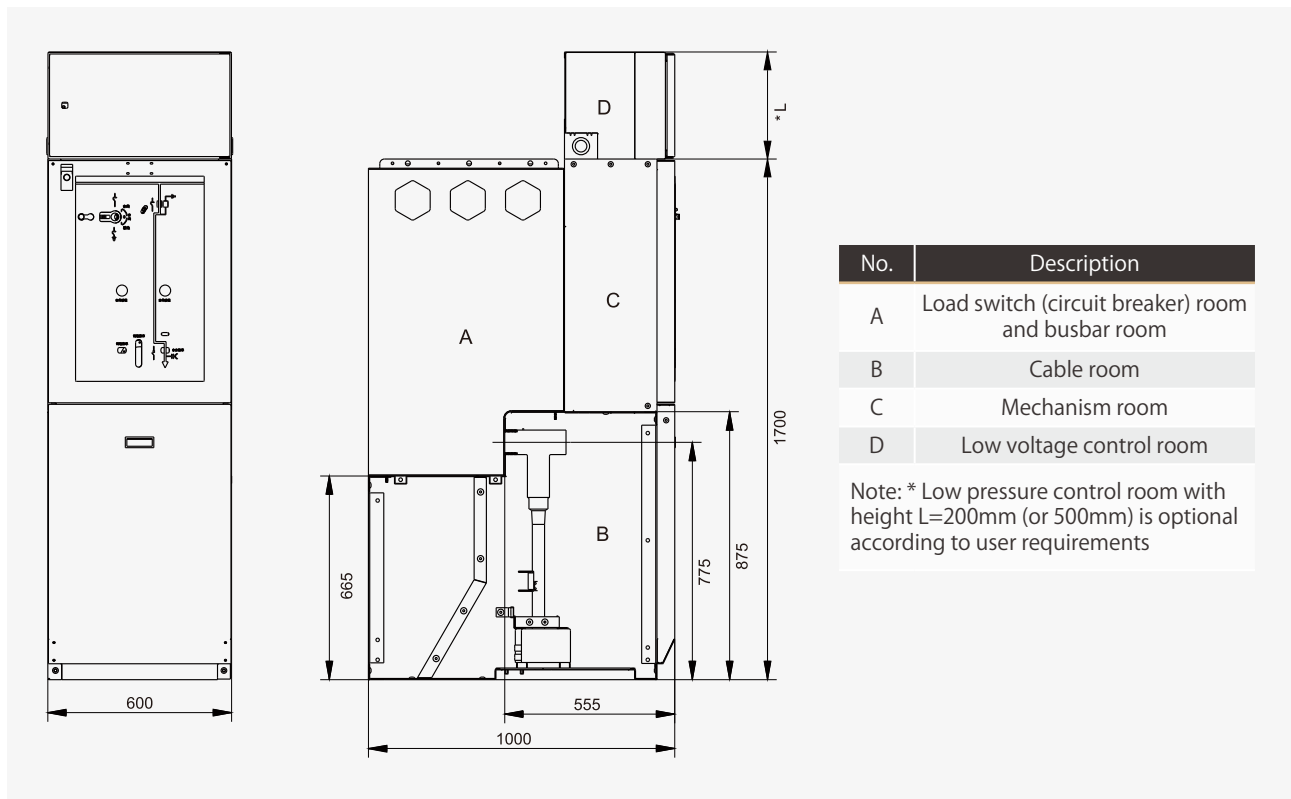
RB-type busbar elevated switchgear



■ RC-type cable incoming cabinet

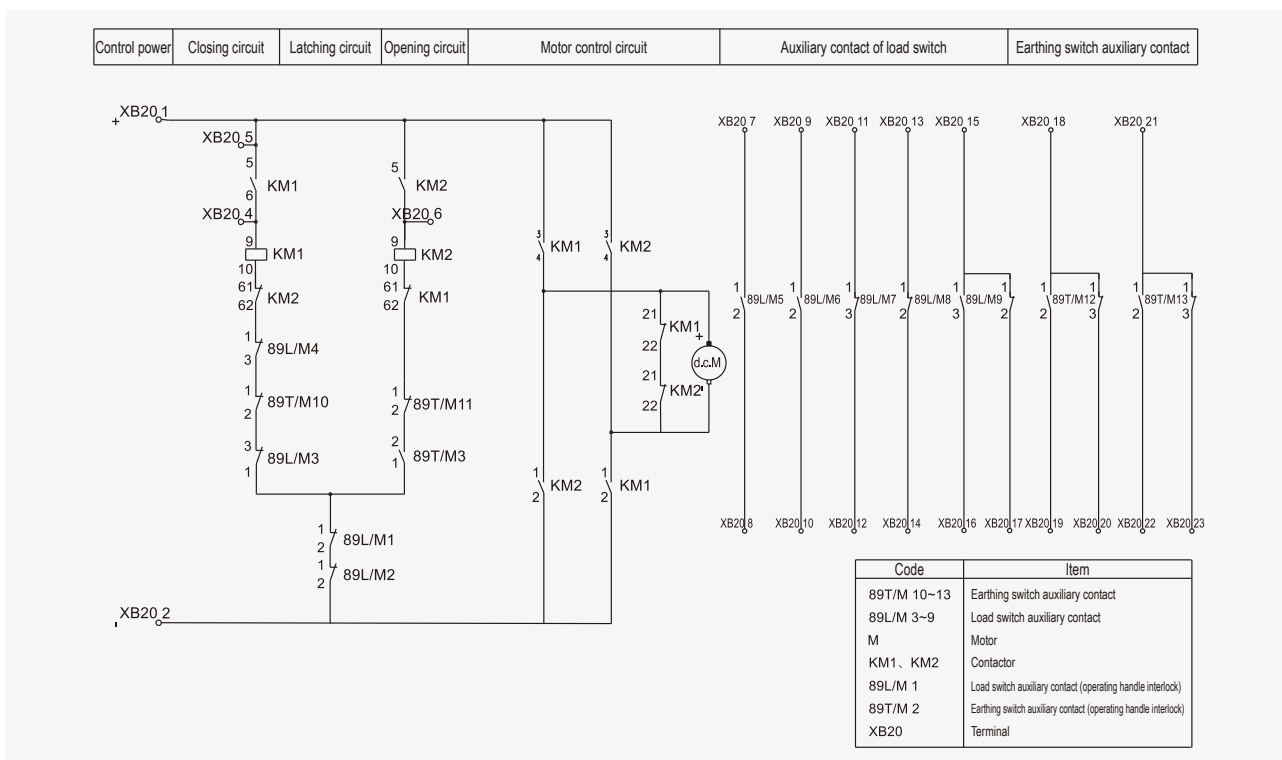


■ Cabinet top plus low voltage control room

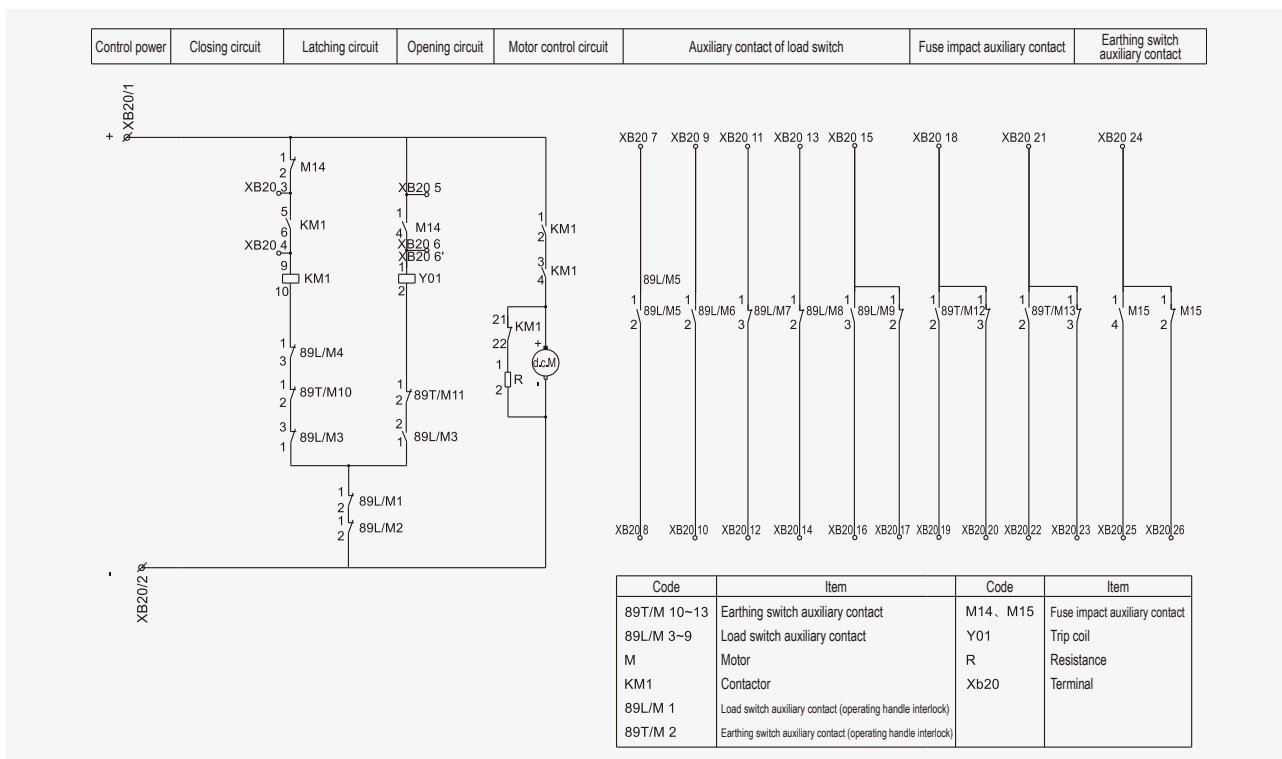


4.4 GPR1-40.5 Inner electrical control schematic diagram

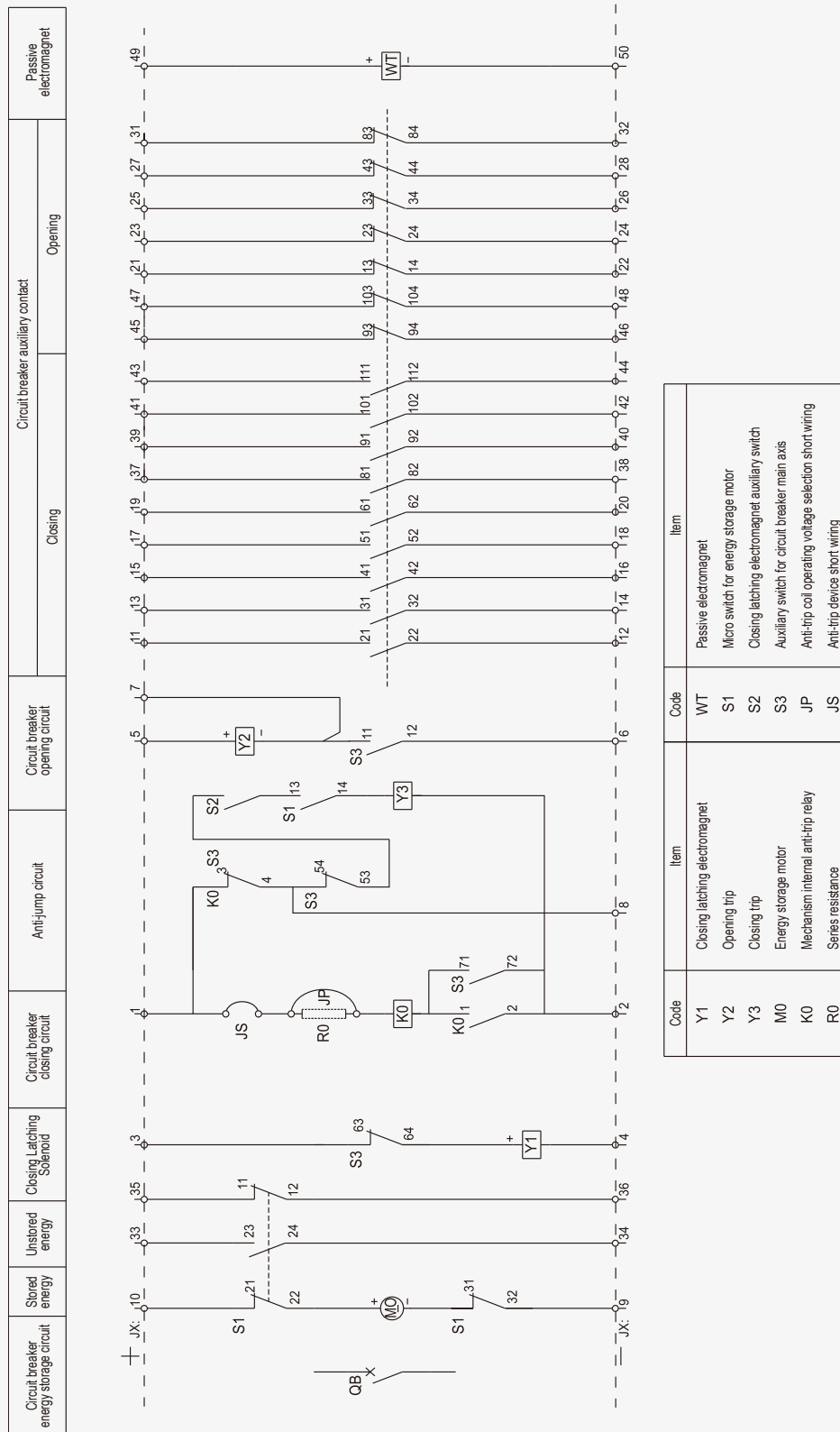
C-type cabinet mechanism inner electrical control schematic diagram



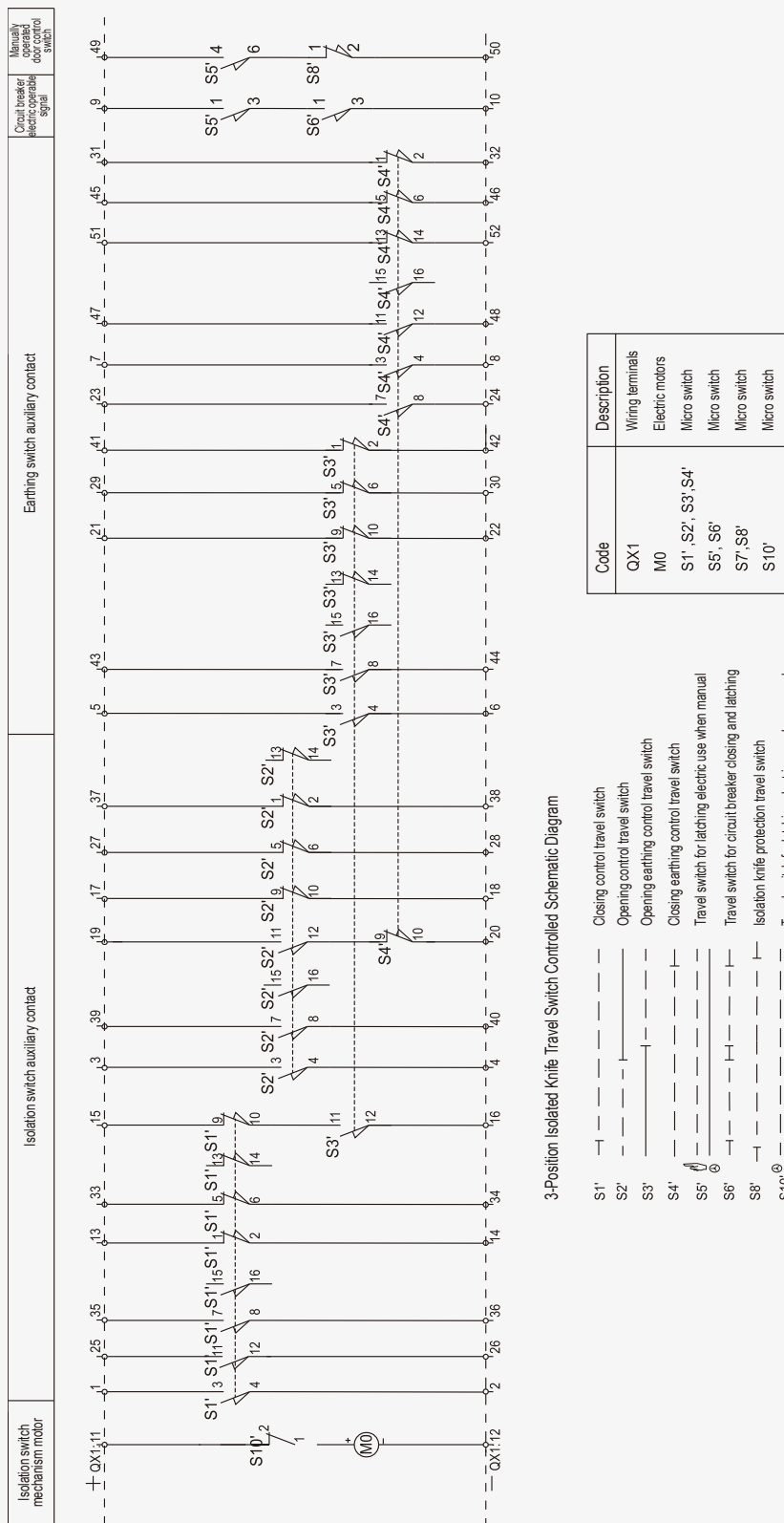
F-type cabinet mechanism inner electrical control schematic diagram



V-type cabinet circuit breaker inner electrical control schematic diagram

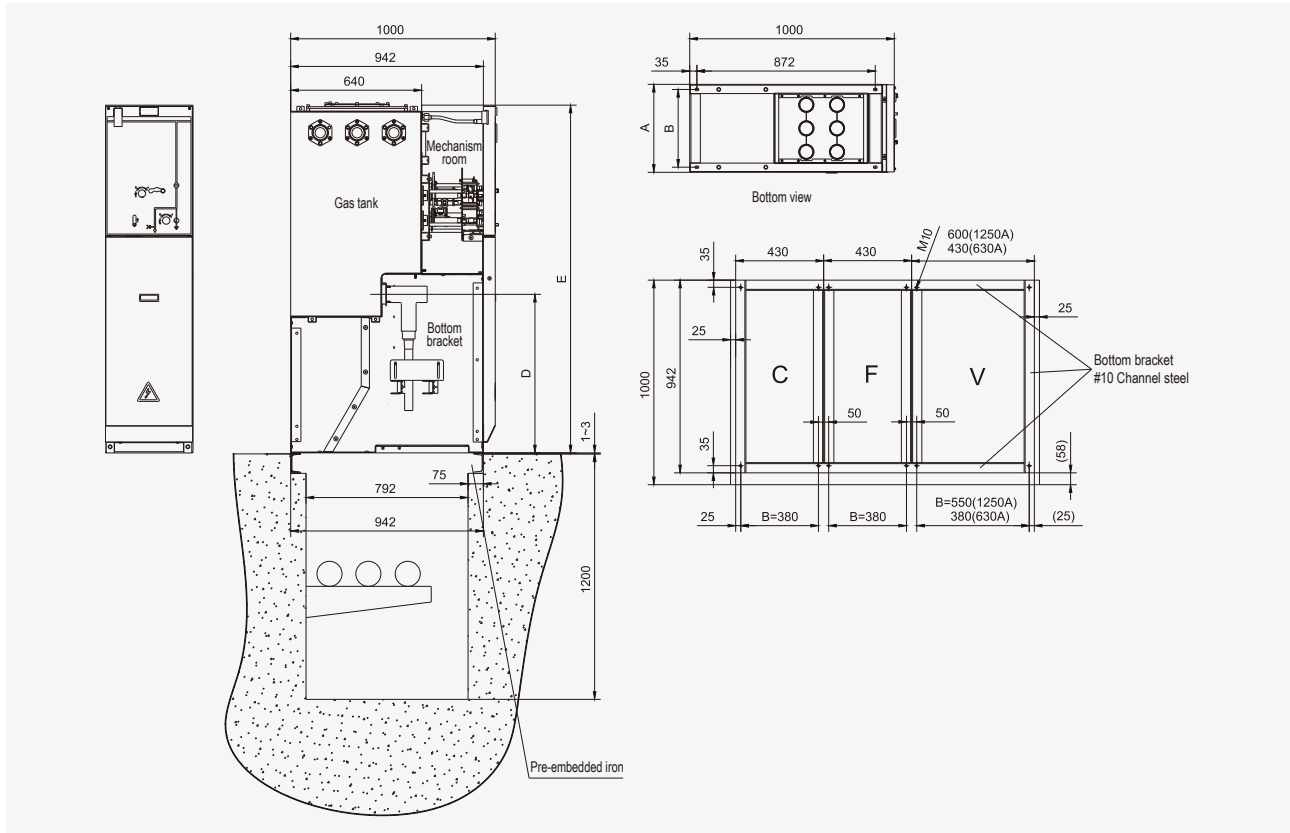


V-type cabinet 3-position switch inner electrical control schematic diagram

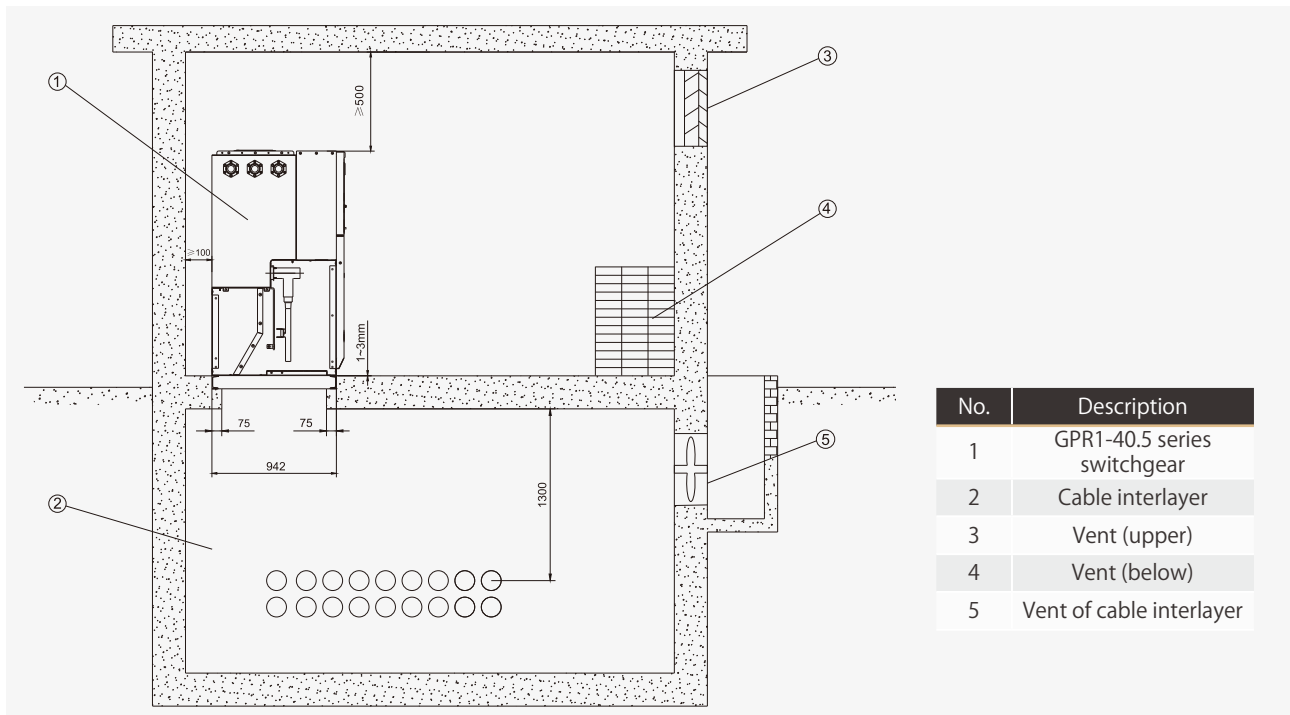


4.5 GPR1-40.5 series ring main unit outline dimensions and installation base

Single gas tank cabinet dimensions and installation base diagram



Form of cable interlayer for GPR1-40.5 switchgear installation



No.	Description
1	GPR1-40.5 series switchgear
2	Cable interlayer
3	Vent (upper)
4	Vent (below)
5	Vent of cable interlayer

E2.1202E-202211

Zhejiang Greenpower Electric Co., Ltd
Zhejiang GreenPower I&E Co., Ltd
Professional Power Equipment provider

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