

GreenPower

Indoor H.V. Switch Series

LIGHTS UP THE WAY
TO THE FUTURE



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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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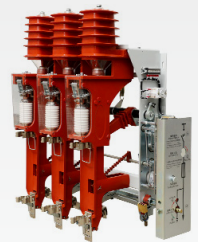
Load Switch - Fuse Combination Appliance



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Vacuum Isolated Load Switch



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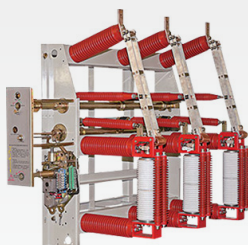
Vacuum Load Switch



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Vacuum Load Switch



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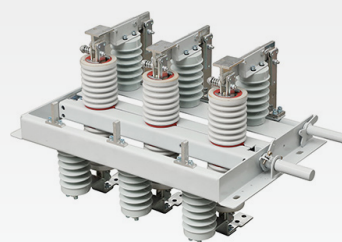
Vacuum Load Switch



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12kV/24kV Isolation Switch

1.1 Overview of FKN12 series load switch

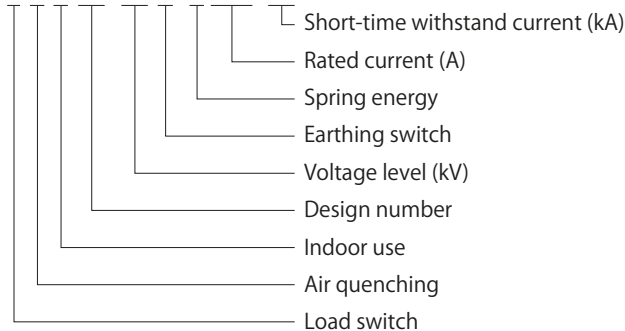
FKN12-12D/630-20 indoor AC high-voltage load switch (hereinafter referred to as FN-12D load switch) is a three-phase high-voltage switchgear with a rated voltage of 12kV and a rated frequency of 50Hz. It is used for switching load current, closed-loop current, No-load transformer and cable charging current, closing short-circuit current. The load switch equipped with earthing switch can withstand short-circuit current.

FKRN12-12D/125-31.5 AC high-voltage load switch fuse combination appliance (hereinafter referred to as FKRN12-12(D) combination appliance), is a combination of FKRN12-12D load switch and S □ LAJ-12(XRNT □ -10) high-voltage current-limiting type Indoor high-voltage switchgear with fuses combined. It can break any current up to the short-circuit current; the load switch breaks the working current, the fuse breaks the current, and jointly breaks any current between the working current and the full short-circuit current, and the fuse breaks the load switch through its impact.

1.2 Product model description

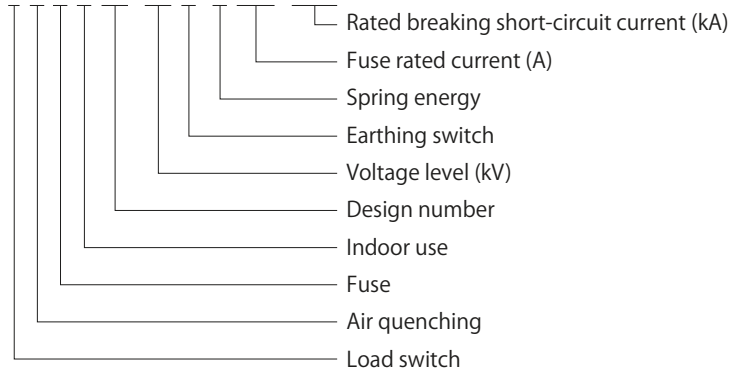
Compressed air load switch and its fuse combination appliance

F K N 12 - 12 D / T 630 - 20



Compressed air load switch - fuse combination appliance

F K R N 12 - 12 D / T 125 - 31.5



1.3 Main technical parameters

Compressed air load switch and its fuse combination appliance

No.	Item	Unit	Compressed air load switch FKN12-12(D)/T630-20	Compressed air load switch - fuse combination appliance FKRN12-12(D)/T125-31.5
1	Rated voltage	kV		12
2	Rated frequency	Hz		50
3	Rated current	A	630	125
4	Rated short-time withstand current	kA	20	20

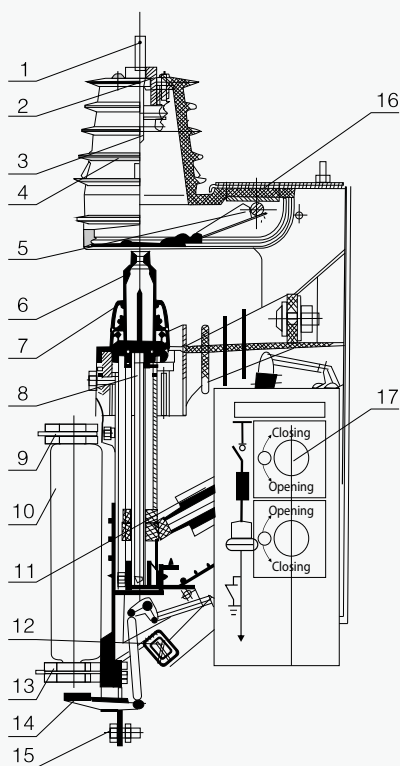
5	Rated peak withstand current	kA	50	80
6	Rated short-circuit closing current	kA	50	80
7	Rated active load breaking current	A	630	630
8	Rated closed loop breaking current	A	630	630
9	Disconnect the no-load transformer	kVA	1600	1600
10	Rated cable charging current	A	10	10
11	Rated short-circuit breaking current	kA		31.5
12	Rated transfer current	A		1200
13	Intrinsic opening time	ms	45	
14	Power frequency withstand voltage (1min)	kV	To earth/phase to phase: 42, Across isolating distance: 48	
15	Lightning impulse withstand voltage	kV	To earth/phase to phase: 75, Across isolating distance: 85	
16	Mechanical life	times	>2000	

1.4 Structural features

- The compressed air load switch is mainly equipped with a special self-produced air material built in the upper insulating cover, a unique arc extinguishing treatment process in the arc extinguishing chamber, and copper tungsten material arc ignition to ensure strong arc resistance.
- The load switch has a clearly visible isolation fracture, and is equipped with a uniquely designed visible transparent cover, which has the functions of dustproof and moistureproof.
- Single plug-in operation panel mechanism: an interlock device is added on the basis of the original "five-proof" interlock, that is, after the switch is closed, the operating rod cannot be inserted into the operating hole of the earthing switch, and the earthing switch can only be inserted after the switch is opened; After closing the earthing switch, the operating rod cannot be inserted into the operating hole of the main switch, which enhances the prevention of misoperation.

1.5 Structure schematic diagram

- The load switch is a high-performance high-voltage electrical product with a frame structure and a compact structure, integrating load switches, fuses, and earthing switches.
- Compared with similar products, it has an obvious isolation fracture. Compared with similar products, the inner diameter of the compressor cylinder is increased, the compressed air volume is increased, and the arc extinguishing ability is enhanced, so it has a strong breaking ability.
- There is a metal partition. When the earthing switch is closed, the metal partition associated with the earthing switch automatically closes the charged static contact (busbar room), and it is absolutely safe to repair or replace the fuse.
- The load switch can be equipped with an electric operating mechanism, which is dual-purpose for electric and manual, and can realize remote control.
- Auxiliary switch and release are optional.
- Optional transparent cover optional auxiliary switch, release. (also known as a dust cover) instead of a metal partition to close the charged static contact (busbar room).
- There is a mechanical interlock between the load switch and the earthing switch to prevent misoperation.
- The load switch is equipped with a door lock, which can easily interlock the switch cabinet door with the switch. When the cabinet door is opened or the cabinet door lock is not locked, the load switch cannot be operated. When the earthing switch is not closed, the cabinet door cannot be opened, maintenance work safety.
- The anti-mistake mechanism can meet the requirements of "five preventions" for complete sets of high-voltage equipment.



No.	Description
1	Upper outgoing wire
2	Upper contact holder
3	Arc suppression rod
4	Upper contact cover
5	Metal partition
6	Conductive tube
7	Lower contact holder
8	Piston rod
9	Upper fuse clip
10	Fuse
11	Crank arm
12	Earthing switch
13	Lower fuse clip
14	Striker plate
15	Lower outgoing wire
16	Metal frame
17	Operation panel

Schematic diagram of compressed air load switch - fuse combination appliance

1.6 Picture display of compressed air load switch



FKN12-12D
(Side installation series)



FKRN12-12
(Side installation series)



FKN12-12D
(Side inverted-installation series)

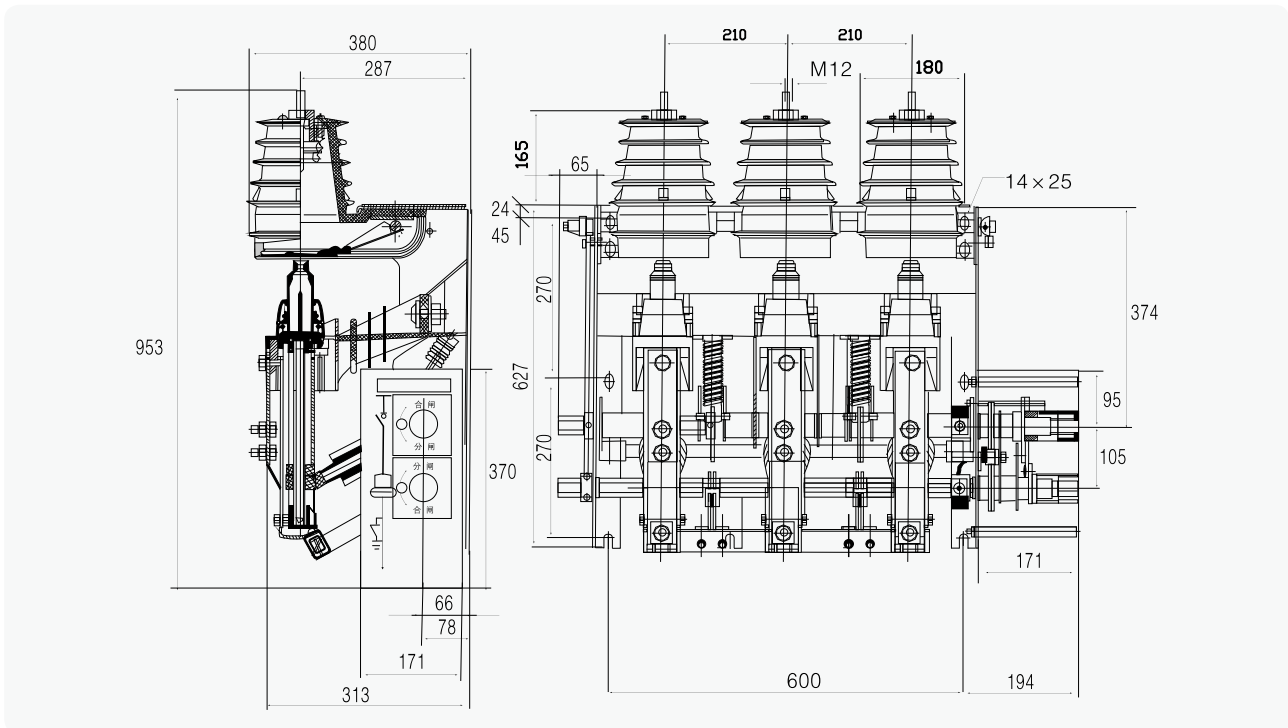


FKRN12-12
(Side inverted-installation series)

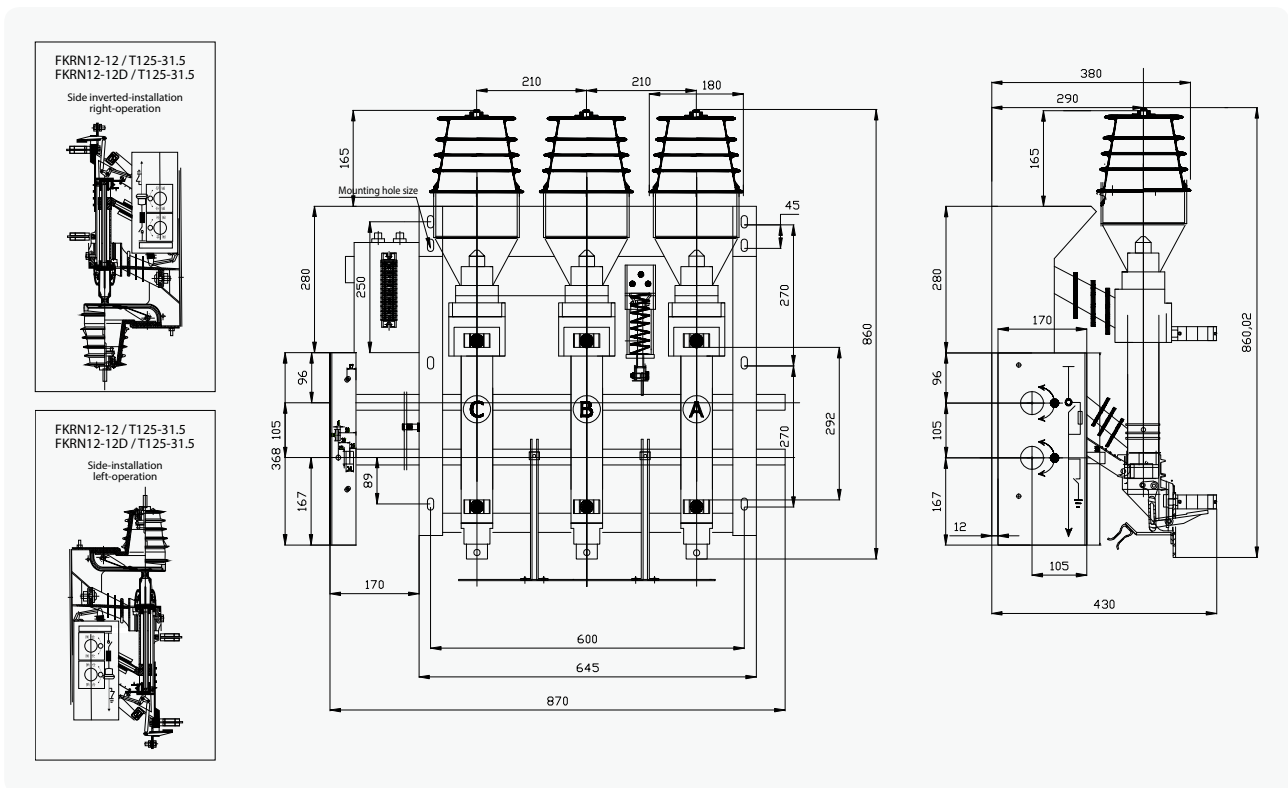
1.7 Working principle and opening and closing process

FKN12 high-pressure compressed air load switch uses compressed air flow to blow out the arc in a very short time. The compressed air is generated by the cylinder ① in the contact during the breaking process: the piston ② is fixed inside the cylinder ①, when the current is broken, the cylinder (moving contact) leaves the static contact ③ and moves downward, and the cylinder in the cylinder The air is compressed, and the compressed air is ejected from the specially designed nozzle ④, and the powerful airflow instantly blows out the arc. The cylinder (moving contact) continues to move downwards, and the current can be interrupted in a manufacturable manner. Since the compressed air is generated by the mechanical movement of the switch, it has nothing to do with the magnitude of the broken current. Within the rated breaking current range, regardless of high current or small current, 10 compressed air loads have the same arc extinguishing ability. Compressed air load switch is simple in structure and reliable in operation. It is mainly used for power feeding, protection, terminal control and ring network power supply of transformers below 1000kVA.

1.8 Outline dimension and installation diagram

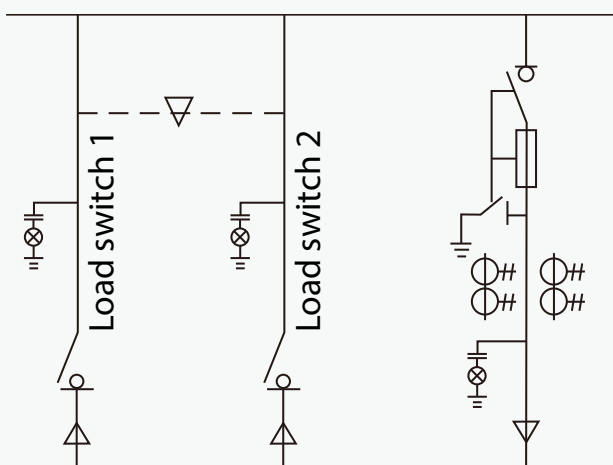


Outline dimension diagram of compressed air side-installation right-operated load switch



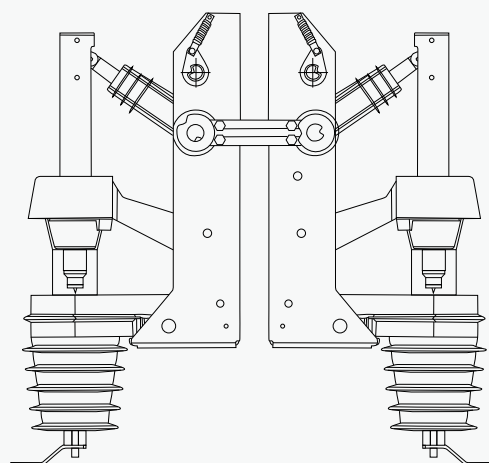
Outline dimension diagram of compressed air inverted-installation left-operated load switch

1.9 Dual power supply principle reference diagram



Interlocking of two load switches

Load switch 1	Load switch 2	Cabinet 1	Cabinet 2
Opening	Opening	Can open	Can open
Opening	Closing	Can't open	Can't open
Closing	Opening	Can't open	Can't open



Load switch 1

Load switch 2

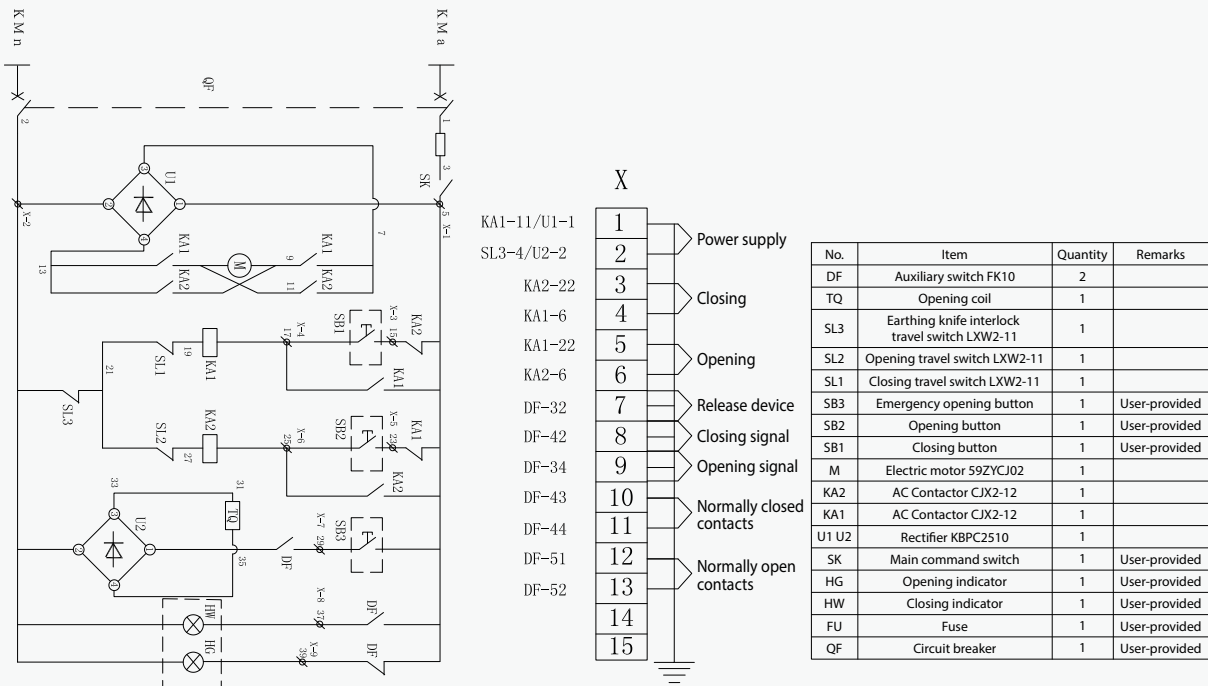
Push rod interlocking (back-to-back type), that is, two adjacent dual-power load switch cabinets, two in one, one must be left-handed, and the other right-handed.

Apply push rod interlocking between adjacent switch-disconnectors (back-to-back)

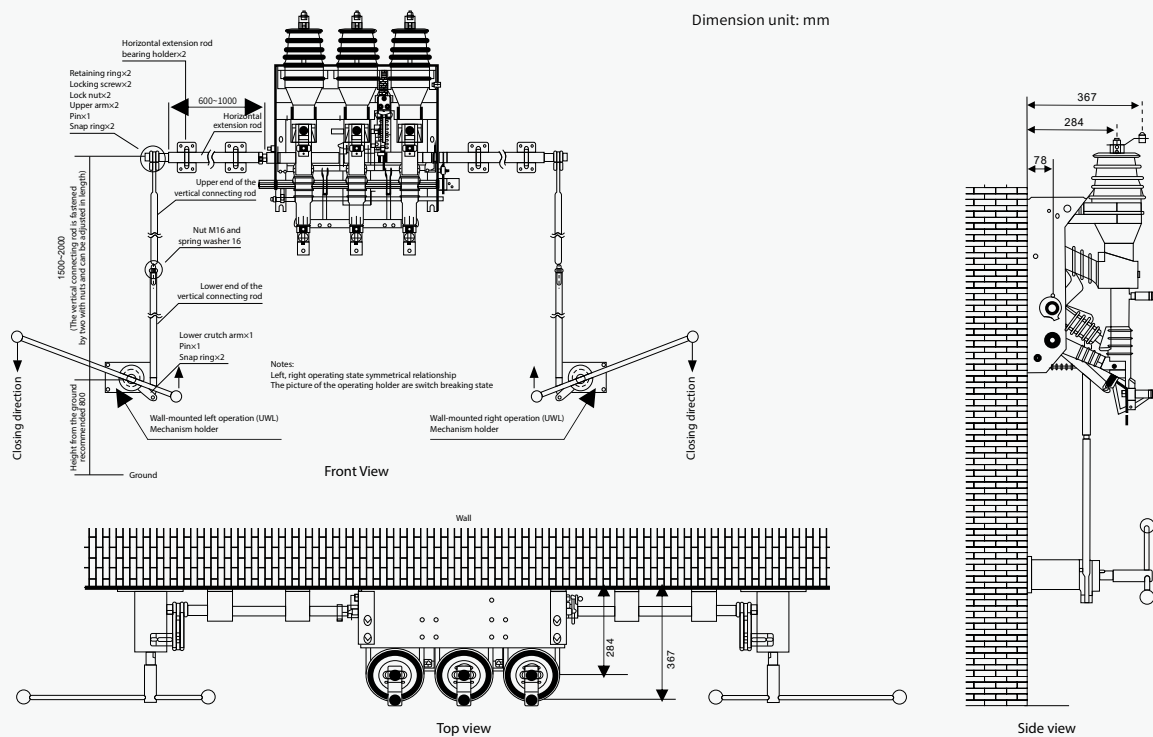
1.10 Accessories option table

Accessory name (optional by user)	Main performance name	Main performance parameters
Electric operating mechanism	Rated voltage	AC220V/110V, DC220V/110/24V
	Rated current	0.85A
	Rated power	70W
	Rated torque of output axis	140N.m
	Energy storage time	3s
	Working system	Short-time working system
Decoupling coil	Shunt tripping coil rated current	AC220V/110V or DC220V/110V, 50Hz
	Overcurrent release coil rated current	>5A, 50Hz
Mechanical interlocking devices	1. Key interlock device 2. Back-to-back type push rod interlocking	
Auxiliary switch	Maximum withstand voltage value	AC500V
	Maximum allowable current value	5A
	Standing auxiliary contact	2 open 2 closed, 3 open 3 closed, 4 open 4 closed

1.11 Dimension diagram of electric operating mechanism control principle



Dimension diagram of electric operating mechanism and electric division principle



Compressed air load switch and wall-mounted dimension diagram

1.12 Operation introduction

Compressed air load switch and its fuse combination appliance

Referring to the load switch operation instruction sign on the right, the instructions are as follows:

■ Operation of the load switch

- The clockwise direction is closing, and the closing position load switch indicates closing.
- The counterclockwise direction is the opening, and the minute-in-place load switch indicates the minute.
- If the fuse striker or the voltage or current release triggers tripping, the operating handle needs to be inserted into the operating hole of the load switch and turned counterclockwise to the dead point to reset the energy storage mechanism before reclosing operation (electric Operate the switch to reset automatically).
- Both the opening and closing operations are driven by the energy release of the spring over the dead point, and the opening and closing speeds are not affected by the operator's skill and operating force.

■ Operation of the earthing switch

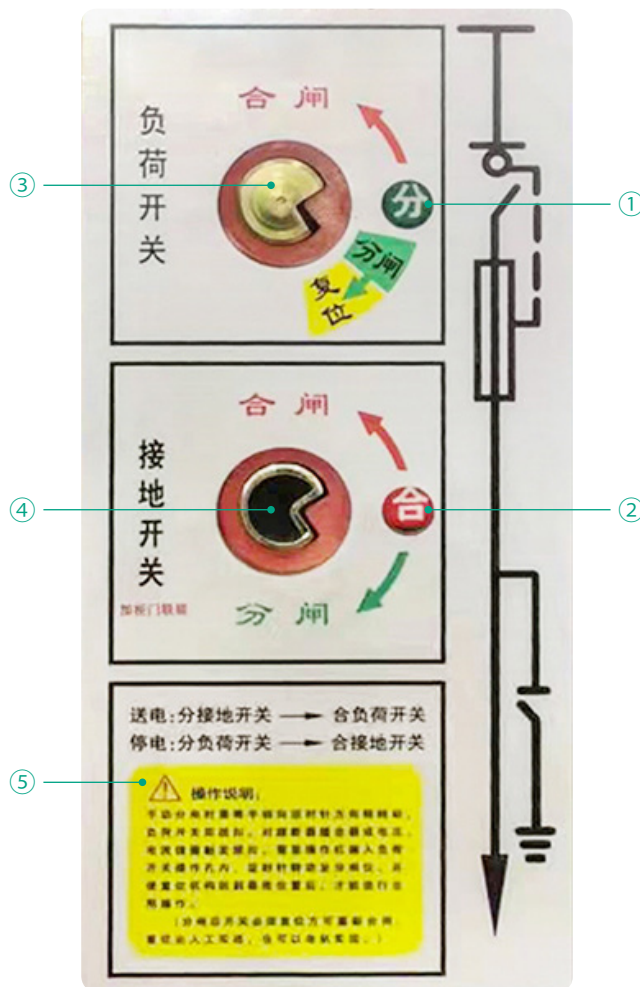
- The earthing switch can only be operated after the load switch is opened.
- The load switch can only be operated after the earthing switch is opened.
- After the earthing switch is closed, the cabinet door can be unlocked (open the cabinet door).
- After the cabinet door is closed and locked (the cabinet door is closed), the earthing switch can be opened.

■ Operation of B-type cabinet door lock

- Counterclockwise to close the cabinet door lock.
- Clockwise to open the cabinet door latch.

■ Interlocking of load switch and earthing switch

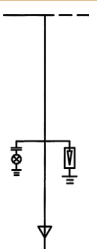
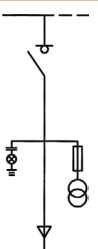
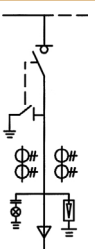
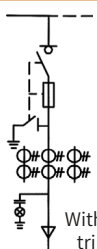
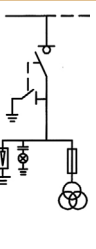
- The counterclockwise direction is closing, and the closing position earthing switch indicates closing.
- The clockwise direction is the opening, and the earthing switch in the minute position indicates the minute.



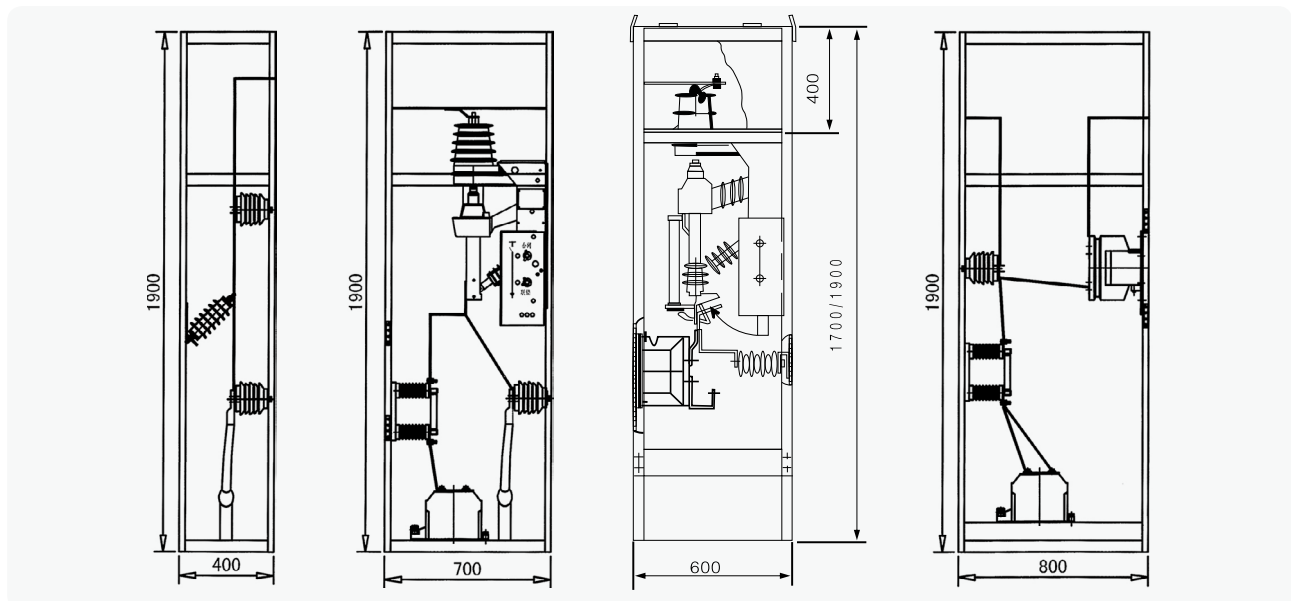
Note:

- ① Opening and closing indication of the load switch;
- ② Opening and closing indication of the earthing switch;
- ③ Opening and closing operation axis of the load switch;
- ④ Operation axis of the earthing switch;
- ⑤ Operation procedure description.

1.13 Primary scheme diagram

Scheme No.		01	02	03	04	05				
Main circuit diagram										
Switchgear model		HXGN15-12	HXGN15-12	HXGN15-12	HXGN15-12	HXGN15-12				
Application		Cable inlet cabinet	Ring network inlet cabinet	Ring network inlet (outlet) line cabinet	Transformer outlet cabinet	PT Cabinet				
Main equipment components	Load switch		KN12	1	KRN12	1	KRN12	1		
	Fuse		XRNP1-12/0.5A	3		SF(D)LAJ-12/XXA	3	XRNP1-12/0.5A	3	
	Current transformer				LZZBJ9-10 XX/5A	2	LZZBJ9-10 XX/5A	3		
	Voltage transformer		JDZ10-10 10/0.1	2				JDZX10-10	3	
	Alive indicator	DXN 10Q	1	DXN-10Q	1	DXN-10T	1	DXN-10Q	1	
	Condensation controller	SK(TH)	1	SK(TH)	1	SK(TH)	1	SK(TH)	1	
	Lightning arrester	HY5WS-17/50	3			HY5WS-17/50	3		HY5WS-17/50	3
	electromagnetic lock	DSN2-Z	1	DSN2-Z	1					
	Cabinet lighting	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A
Cabinet size (width×depth×height)		400 × 900 × 1900	700 × 900 × 1900	700 × 900 × 1900	700 × 900 × 1900	700 × 900 × 1900	700 × 900 × 1900			

1.14 Cabinet design reference diagram

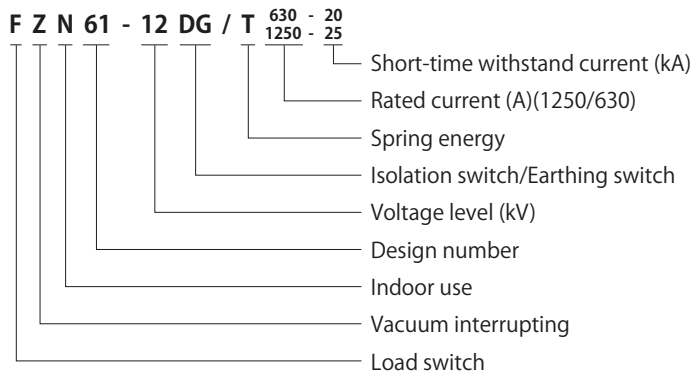


2.1 Overview of FZN61 series vacuum isolated load switch

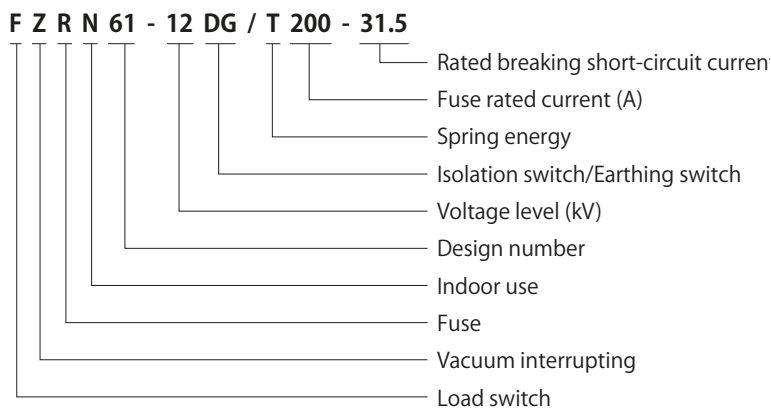
FZN61-12G indoor high-voltage vacuum isolating switch and fuse combination appliance is an indoor high-voltage vacuum isolating load switch with AC 50HZ and rated voltage of 12kV. It has obtained many national design patents. Its shape design is unique and novel, and the structure of power distribution equipment is used. It is simple, has good practical performance, and has a smaller cabinet width and volume. It can be used as power supply equipment for the ring network in power distribution systems such as industrial and mining enterprises, residential quarters, and schools.

2.2 Product model description

Vacuum isolation load switch



Vacuum isolation load switch - fuse combination appliance

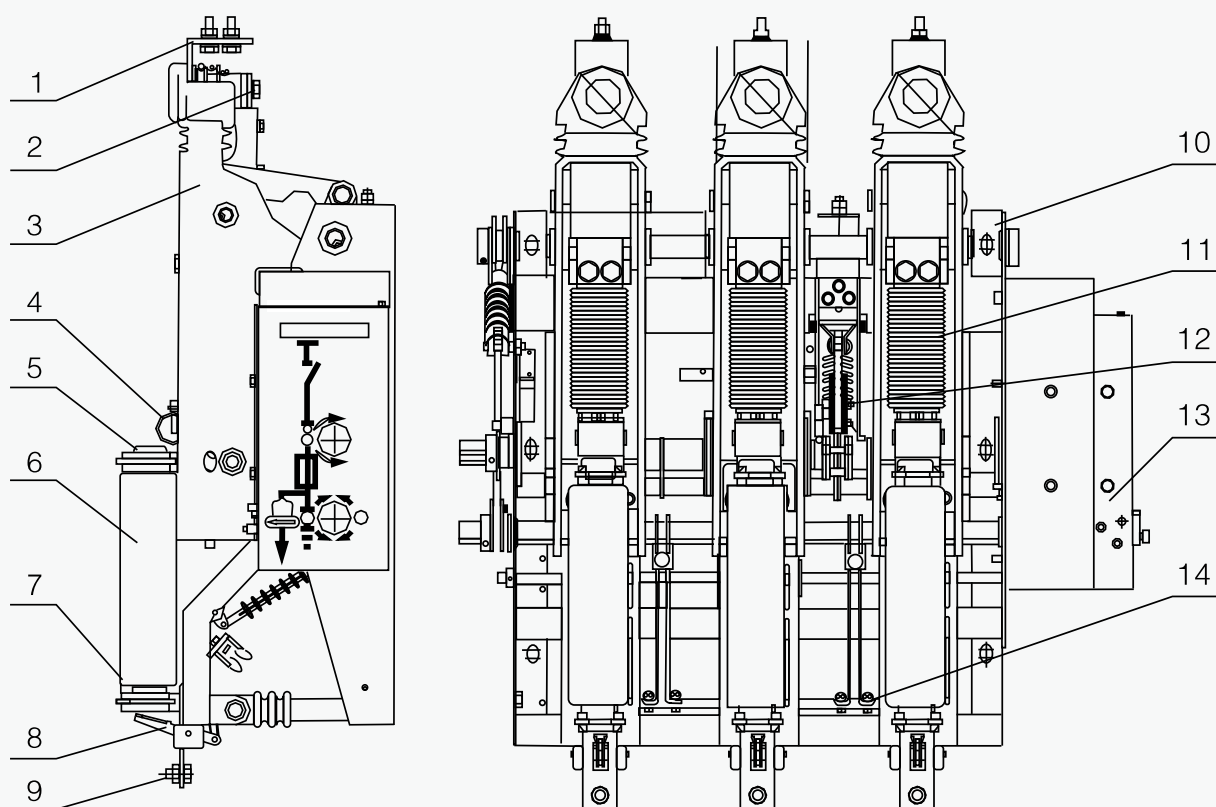


2.3 Main technical parameters

No.	Item	Unit	Vacuum isolation load switch		Vacuum isolation load switch - fuse combination appliance FZRN61-12(DG)/T200-31.5
			FZN61-12(DG) /T630 - 25	FZN61-12(DG) /T1250 - 25	
1	Rated voltage	kV	12		
2	Rated frequency	Hz	50		
3	Rated current	A	630	1250	200
4	Rated short-time withstand current	kA	25		
5	Rated peak withstand current	kA	63		
6	Rated short-circuit closing current	kA	63		80

7	Rated active load breaking current	A	1250
8	Rated closed loop breaking current	A	1250
9	Disconnect the no-load transformer	kVA	2000
10	Earth fault current	A	20
11	Line and cable charging current under earth fault conditions	A	20
12	Rated short-circuit breaking current	kA	31.5/50 (depending on the fuse)
13	Rated crossover current /transfer current	A	3150
14	Intrinsic opening time	ms	45
15	Power frequency withstand voltage (1min)	kV	To earth/phase to phase/vacuum distance: 42; Across isolating distance: 48
16	Lightning impulse withstand voltage	kV	To earth/phase to phase/vacuum distance: 75; Across isolating distance: 85
17	Mechanical life	times	>10000

2.4 Structure schematic diagram



- | | | | | |
|------------------------|--------------------|------------------------|------------------------|---------------------|
| 1. Upper outgoing wire | 4. Soft connection | 7. Lower fuse clip | 10. Metal frame | 13. Operation panel |
| 2. Isolation switch | 5. Upper fuse clip | 8. Trip plate | 11. Vacuum interrupter | 14. Earthing switch |
| 3. Insulation holder | 6. Fuse | 9. Lower outgoing wire | 12. Spring mechanism | |

- The vacuum isolation load switch is a modular product; the frame structure is compact, and it is a high-performance high-voltage electrical product that integrates isolation switches, vacuum load switches, fuses, and earthing switches.
- Small size: Width In the state of opening and closing: the width of the vacuum load switch is $\leq 299\text{mm}$.
- High parameters: the rated current of the vacuum load switch reaches 1250A; the rated current of the combined electrical appliance reaches 200A, which can protect a 2000 kVA transformer.
- The incoming line isolating switch is linked with the earthing switch. After the earthing switch is separated, the incoming line isolating switch will be closed in the same action.
- Rotary disconnecter with visible break after opening.
- There is a mechanical interlock between the vacuum isolation load switch and the isolation (earthing) switch to prevent misoperation. Make sure that the vacuum load switch can be closed only after the isolating switch is closed; the isolating switch can be opened only after the vacuum load switch is opened.
- The load switch can be equipped with an electric operating mechanism, which is dual-purpose for electric and manual, and can realize remote control.
- Auxiliary switch, shunt and overcurrent release are optional.
- The opening and closing speed of the vacuum load switch is not affected by the size of the manual operation.
- The anti-mistake mechanism meets the requirements of "five preventions" for complete sets of high-voltage equipment.

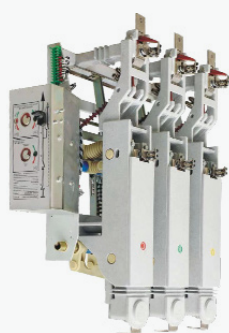
2.5 Picture display of FZN61 vacuum isolating switch



FZN61-12GD
(Side installation series)



FZRN61-12GD
(Side installation series)



FZN61-12GD
(Side inverted-installation series)



FZRN61-12GD
(Side inverted-installation series)

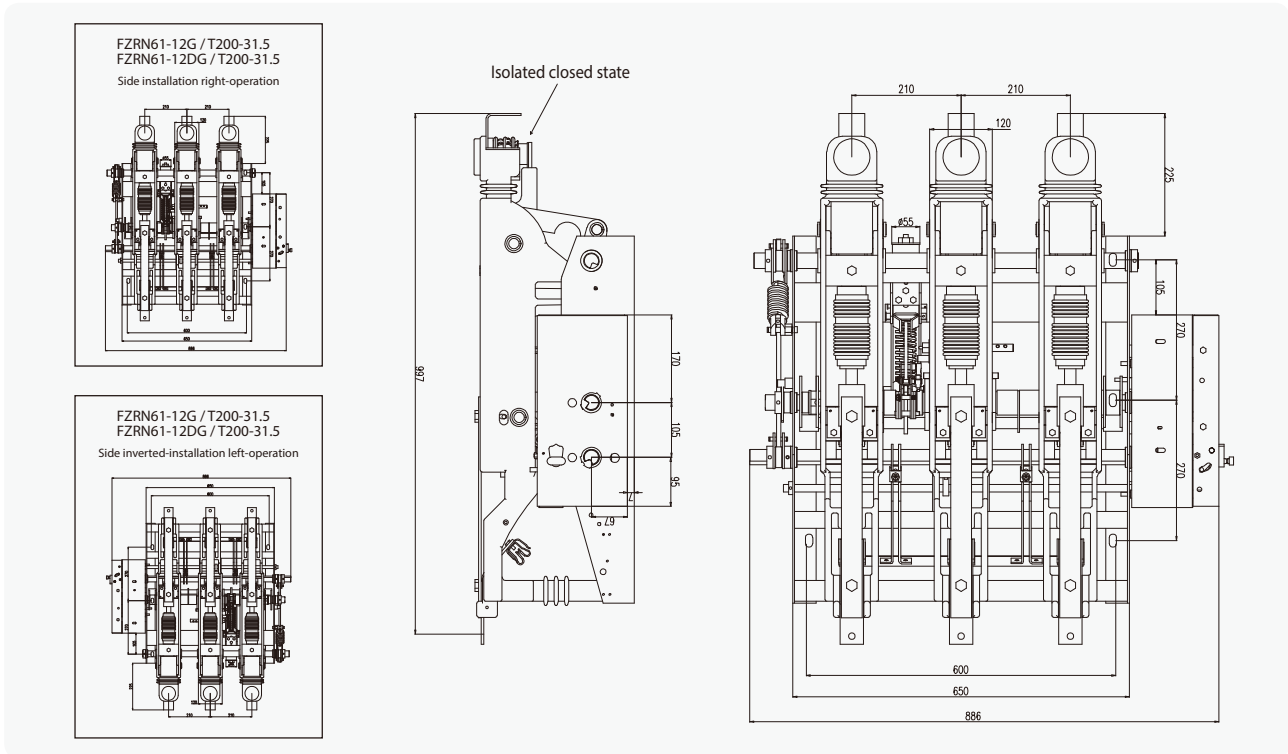
2.6 Switch structure features

FZN61 switch is a modular design product, it integrates vacuum switch, isolating switch, earthing switch, fuse holder, operation panel switch elements, and can choose electric operation and auxiliary contacts.

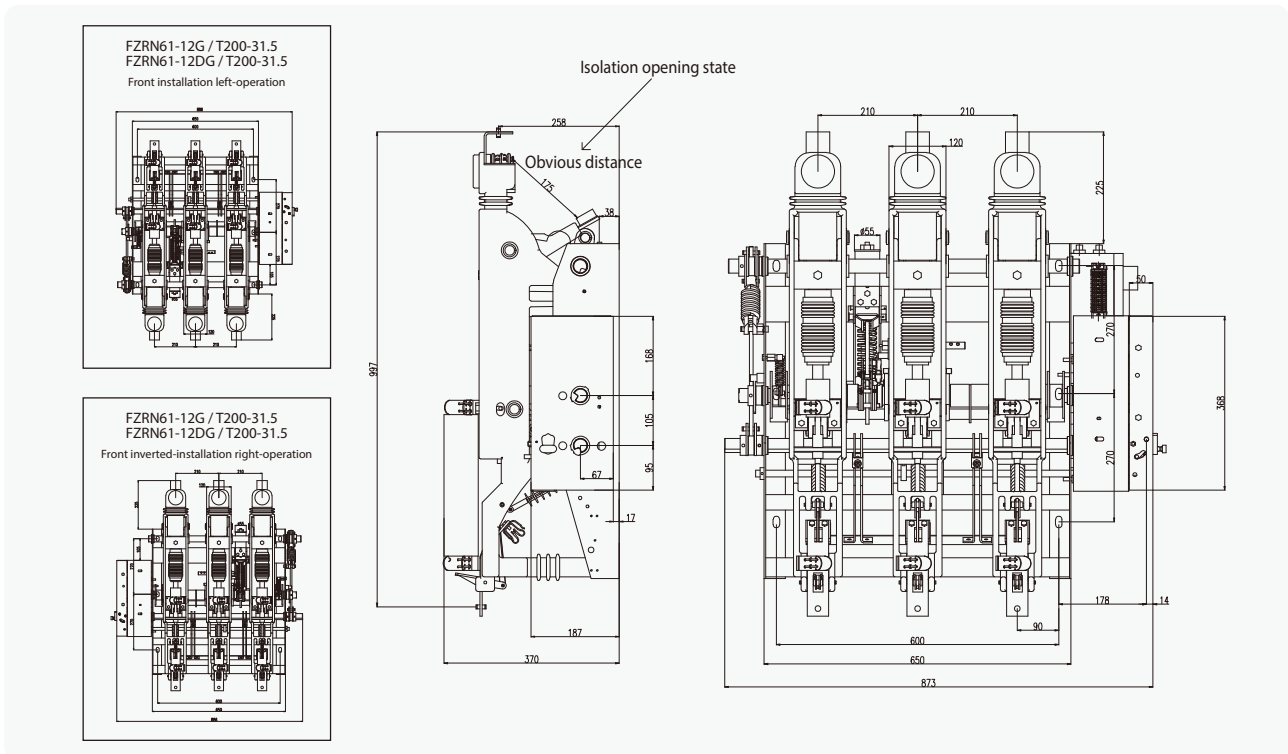
The rotary isolating switch has an obvious fracture after opening. The isolating switch and the earthing switch belong to the linkage operation. At the same time, the mechanical interlock with the vacuum switch and the cabinet door also meets the "five-proof" interlocking requirements of the complete set of high-voltage equipment. In particular, the "interlock" interlock function is also added to the panel operation hole, so that the entire switch has double "five-proof" interlock functions.

The switch is small in size, and the width of the vacuum load switch is $\leq 299\text{mm}$ in the opening and closing state. The parameters are based on the rated current of the vacuum load switch up to 1250A and the rated current of the combined electrical appliance up to 200A, which can protect a 200kVA transformer.

2.7 Outline dimension and installation diagram

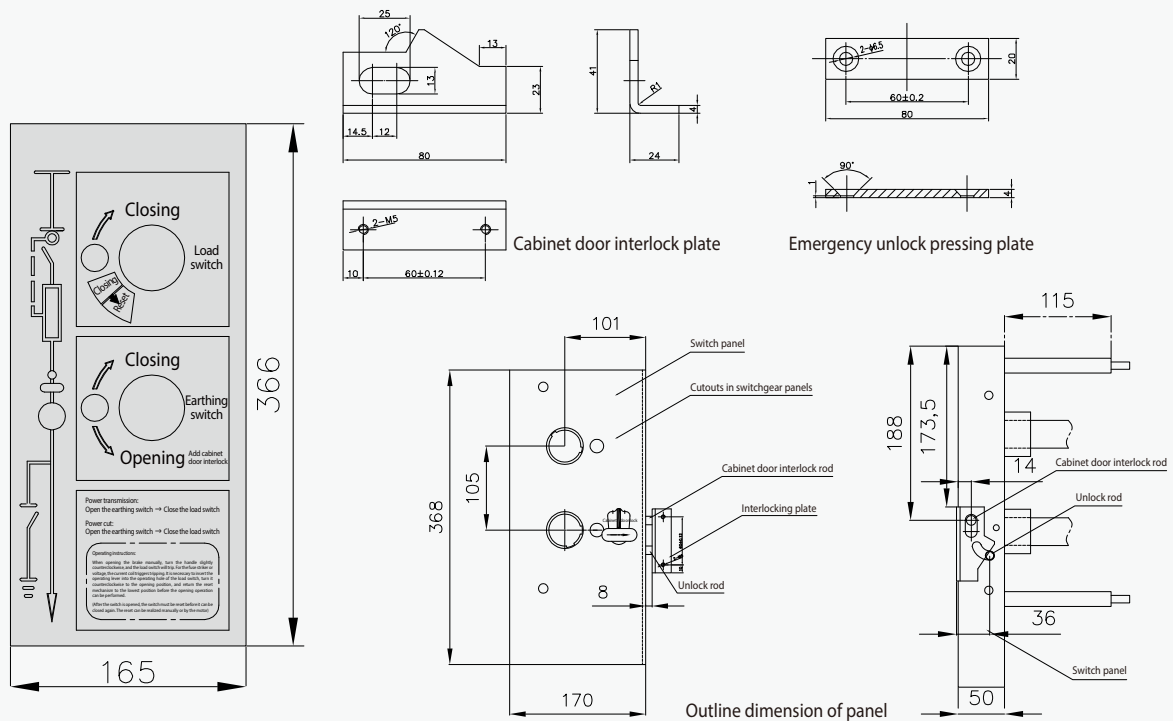


Outline dimension diagram of vacuum isolation load switch side installation (right operation)

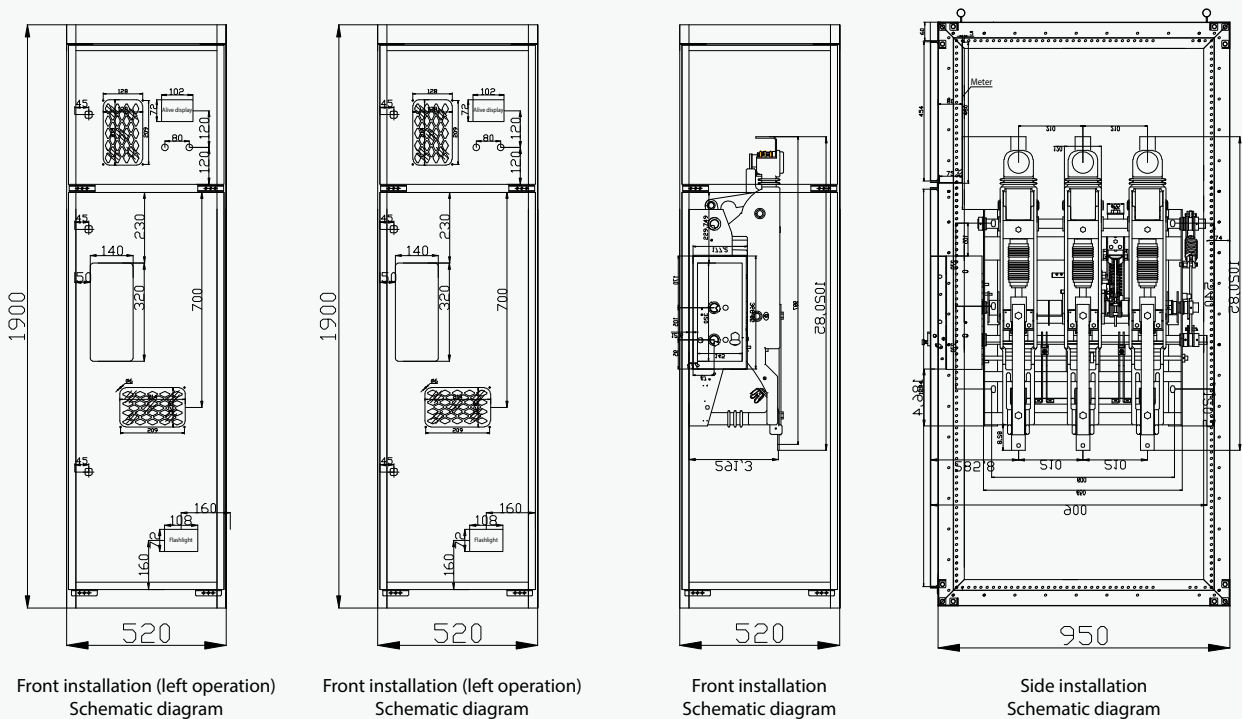


Outline dimension diagram of vacuum isolation load switch side installation (left operation)

2.8 Dimension diagram of cabinet door, panel, emergency unlock, and busbar divider



2.9 Schematic diagram of the internal configuration of the vacuum isolation load switch cabinet



2.10 Precautions for use (refer to the switch operation nameplate)

Refer to the load switch operation indicator on the left, the instructions are as follows:

- The isolating switch and the earthing switch are linked, the isolating switch is separated first and then the earthing switch is closed; the earthing switch is separated and then the isolating switch is closed.
- After the switch is opened and closed, please confirm its respective opening and closing status from the observation window.

Interlocking of load switch and earthing switch

- After the vacuum switch is opened, the isolation and earthing switches can be operated.
- The vacuum switch can only be operated after the isolating switch is closed (the earthing switch is opened).
- The cabinet door can be unlocked (open the cabinet door) only after the isolating switch is opened (the earthing switch is closed).
- After the cabinet door is closed and locked (the cabinet door is closed), the earthing switch can be opened.
- Counterclockwise to close the cabinet door lock.
- Clockwise to open the cabinet door latch.
- If the fuse striker or the voltage or current release triggers tripping, the operating handle needs to be inserted into the operating hole of the load switch and turned counterclockwise to the dead point to reset the energy storage mechanism before reclosing operation (electric operate the switch to reset automatically).
- The electric operating mechanism can complete the closing, opening and automatic reset of the energy storage mechanism after opening.
- The opening and closing operations of the vacuum switch are driven by the release of energy from the spring passing through the dead point, and the opening and closing speeds are not affected by the operator's skill and operating force.

Operation of the vacuum switch

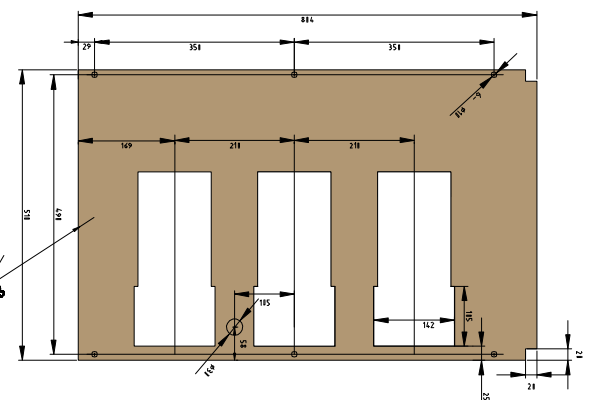
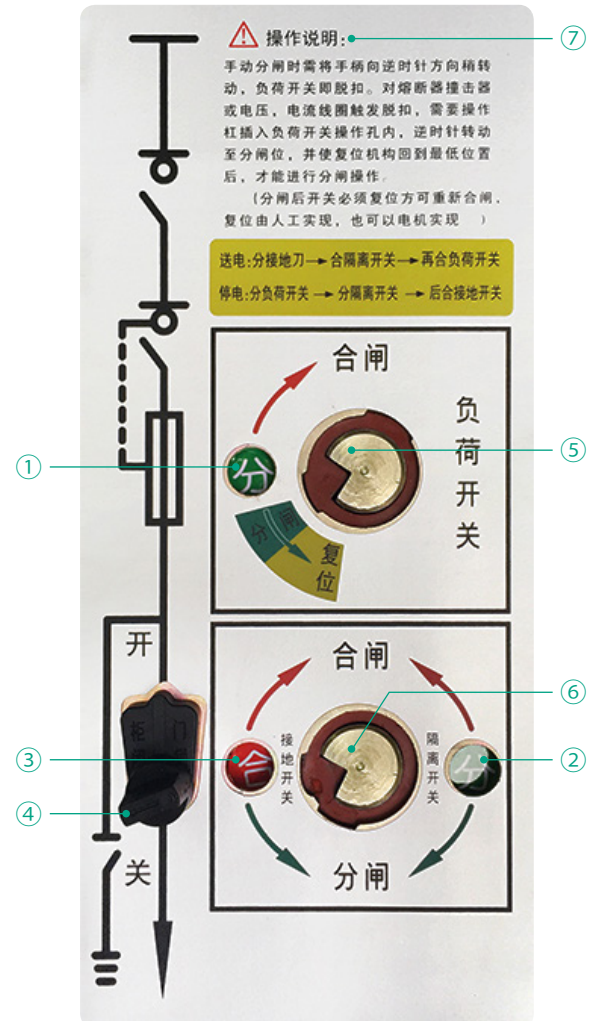
- The clockwise direction is closed, and the closed position vacuum switch indicates closed.
- The counterclockwise direction is the opening, and the vacuum switch indicates the opening when the minute is in place.
- The electric switch is electrically operated by closing and opening buttons.

Operation of isolation switch and earthing switch

- Clockwise is for the disconnecter to open (the earthing switch is closed).
- Counterclockwise is the closing of the isolating switch (opening of the earthing switch).

Note:

- ① Vacuum switch opening and closing indication;
- ② Isolation switch opening and closing indication;
- ③ Earthing switch opening and closing indication;
- ④ Cabinet door lock operation handle;
- ⑤ Vacuum switch opening and closing operation axis;
- ⑥ Isolation switch and earthing switch Operating axis;
- ⑦ Description of operating procedures.



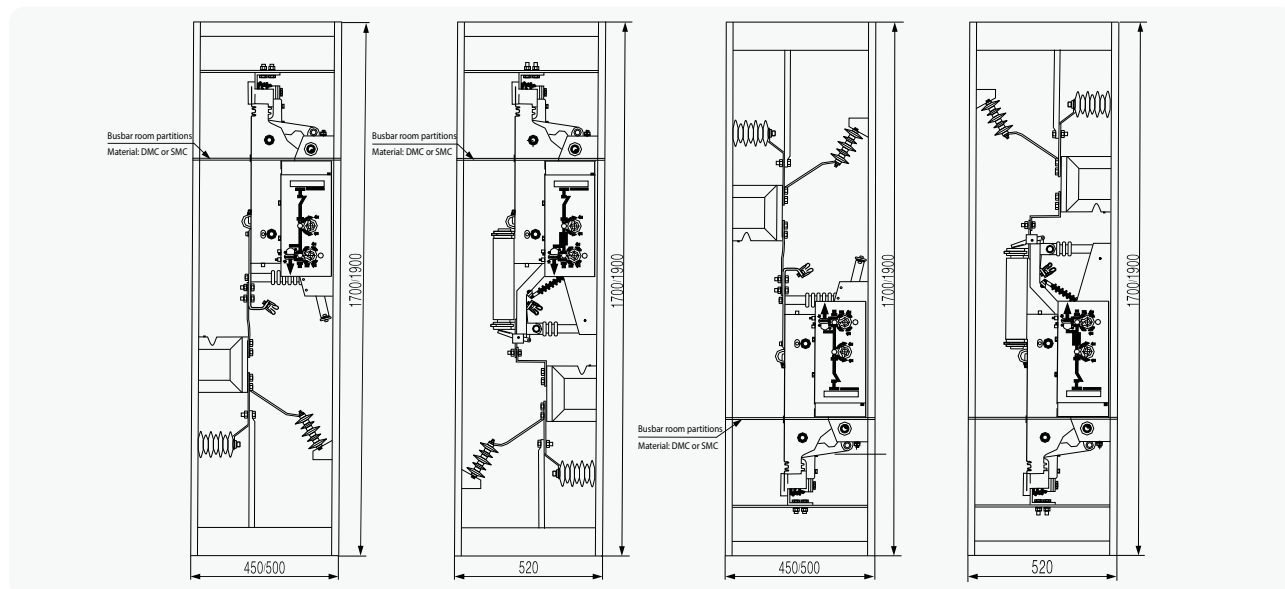
Busbar compartment partition size (switch: side installation right operation; cabinet width 520) for reference

Note: The material must be moisture-proof material XMC or DMC

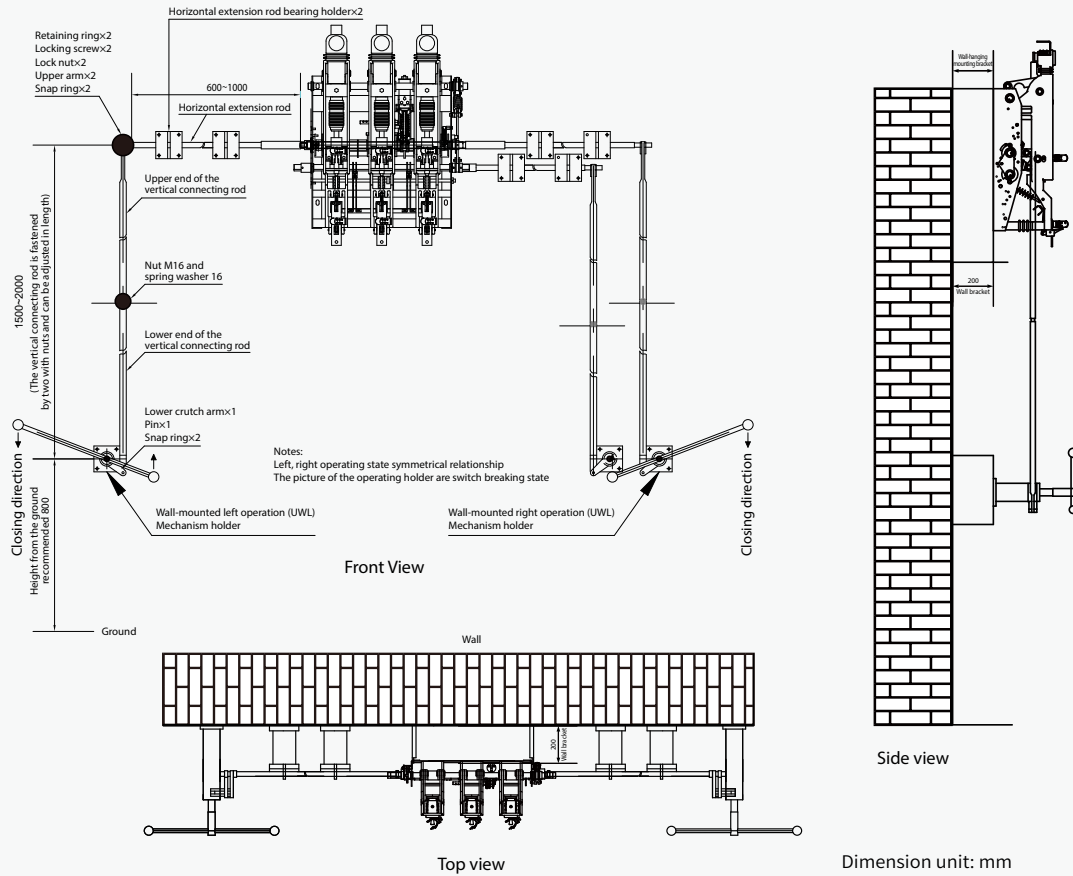
2.11 Primary scheme diagram

Scheme No.		01		02		03		04		05	
Main circuit diagram											
Switchgear model		HXGN-12		HXGN-12		HXGN-12		HXGN-12		HXGN-12	
Application		Cable inlet cabinet		Ring network inlet (outlet) line cabinet		Ring network inlet (outlet) line cabinet		Transformer outlet cabinet		Transformer outlet cabinet	
Main equipment components	Vacuum isolation load switch	ZN61-12G	1	ZN61-12G	1	ZN61-12G	1	ZRN61-12DG	1	ZRN61-12DG	1
	Fuse							SF(D)LAJ-12/XXA	3	SF(D)LAJ-12/XXA	3
	Current Transformer	ZBJ9-10 XX/5A	2			ZBJ9-10 XX/5A	2			ZBJ9-10 XX/5A	2
	Voltage transformer	JDZ10-10R 10/0.1	1								
	Alive display	DXN-10Q	1	DXN-10T	1	DXN-10T	1	DXN-10T	1	DXN-10T	1
	Condensation controller	SK(TH)	1	SK(TH)	1	SK(TH)	1	SK(TH)	1	SK(TH)	1
	Lightning arrester	HY5WS-17/50	3	HY5WS-17/50	3	HY5WS-17/50	3				
	Electromagnetic lock	DSN2-Z	1								
	Cabinet lighting	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A	1
Cabinet size (width×depth×height)		500 × 900 × 1900		500 × 900 × 1900		500 × 900 × 1900		500 × 900 × 1900		500 × 900 × 1900	

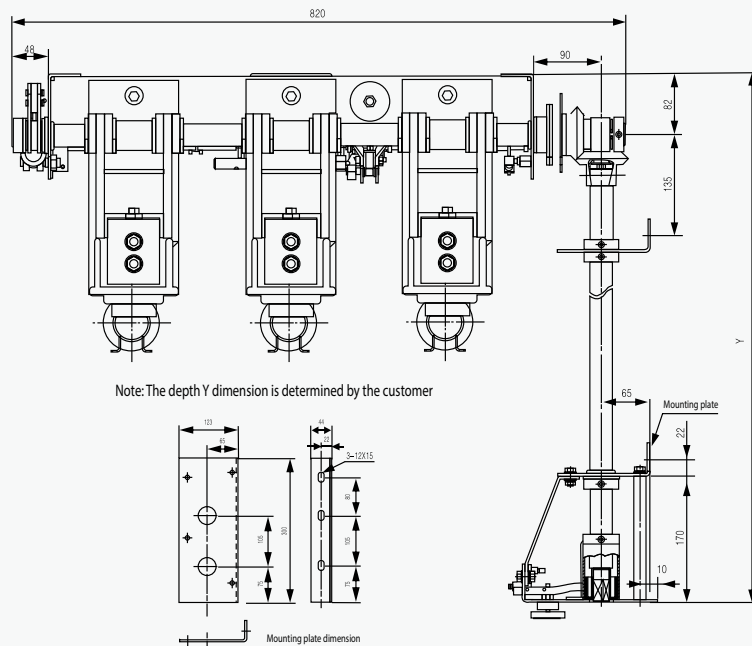
2.12 Vacuum isolation load switch and cabinet design reference diagram



2.13 Vacuum isolated load switch wall-mounted reference diagram



2.14 Vacuum isolated load switch reference diagram (front mounted right operation)



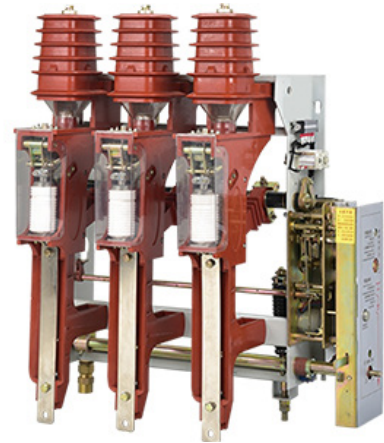
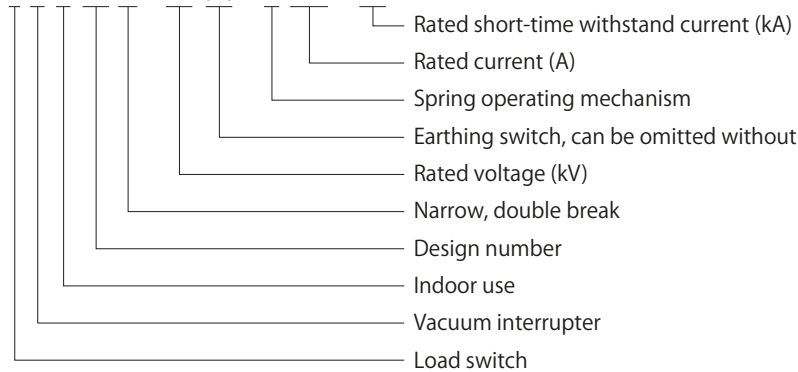
3.1 Overview of FZN25 series vacuum load switch

FZN25A-12(D)T630 indoor AC high-voltage vacuum load switch (hereinafter referred to as load switch) is suitable for three-phase AC 50Hz, 12kV power supply network, and is used for breaking load current and closing short-circuit current. This product can be equipped with manual and electric motor operating mechanism, especially suitable for places under harsh conditions, without long maintenance period and frequent operation requirements. Vacuum load switch-fuse combination appliance with fuse (hereinafter referred to as combination appliance) FZRN25A-12(D)/T200 can break short-circuit current for short-circuit protection. The product has a mechanism tripping mechanism, and the matched fuse is equipped with a striker. When the overload current or short-circuit current passes, the fuse is blown, and the striker strikes the tripping device to automatically open the load switch to avoid phase-open operation.

3.2 Product model description

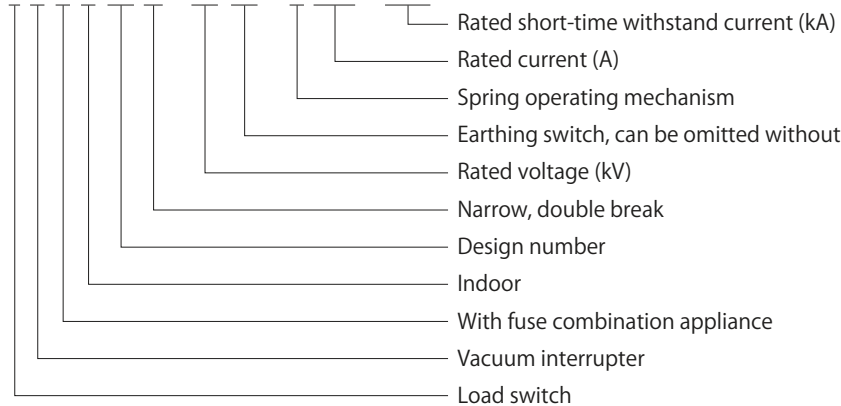
Vacuum load switch

F Z N 25 A - 12 (D) / T 630 - 20



Vacuum load switch - fuse combination appliance

F Z R N 25 A - 12 (D) / T 200 - 31.5



3.3 Environmental conditions of use

- Ambient air temperature: Maximum +40°C , Minimum -10°C ;
- Altitude: No more than 1000m;
- Relative humidity: The daily average value is not greater than 95%, and the monthly average value is not greater than 90%;
- Earthquake intensity: Less than 8 degrees;
- The surrounding air should not be polluted by corrosive or combustible gases, water vapor and other harmful gases.

3.4 Main technical parameters

Main electrical technical parameters

No.	Item	Unit	FZN25A-12D/T630	FZRN25A-12D/T200
1	Rated voltage	kV	12	12
2	Rated frequency	Hz	50	50
3	Rated current	A	630	200
4	Rated breaking current	Active load current	A	630
		Closed loop current	A	630
		No load transformer	kVA	1600
		Cable charging current	A	10
5	Rated transfer current	A		3150
6	Rated short-time withstand current (4s) ¹⁾	kA	20	
7	Rated peak withstand current	kA	50	
8	Rated short-circuit breaking current	kA		3.15 (expected value)
9	Rated short-circuit closing current	kA	50	
10	Rated short-time power frequency withstand voltage (1min)	kV	To earth/phase to phase: 42, Across isolating distance: 48	
11	Rated lightning impulse withstand voltage (peak value)	kV	To earth/phase to phase: 75, Across isolating distance: 85	

Note: 1) The rated short-circuit duration of the earthing switch is 2 seconds.

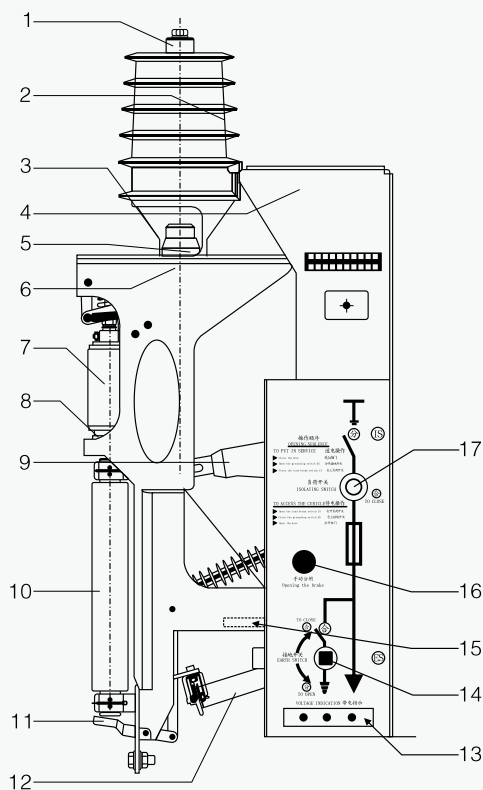
Main mechanical characteristic parameters

No.	Item	Unit	Data	Remark
1	Opening distance of vacuum interrupter	mm	$6+0$	Measuring contact spring compression stroke
2	Vacuum interrupter contact stroke	mm	$-2+0$	
3	Isolation fracture distance	mm	≥ 130	
4	Center distance between phases	mm	210 ± 1	
5	Unsynchronization of three-phase closing of vacuum interrupter	ms	≤ 3	
6	Vacuum interrupter allowable contact closing bounce time	ms	≤ 3	
7	Average closing speed of vacuum interrupter	m/s	0.6 ± 0.2	
8	Average opening speed of vacuum interrupter	m/s	0.9 ± 0.2	
9	Conducting loop resistance of each pole	$\mu\Omega$	≤ 300	
10	Maximum operating torque required for manual operation	Nm	≤ 160	
11	Mechanical life	times	10000	

3.5 Product specifications

- FZN25A-12/T630 vacuum load switch
- FZN25A-12D/T630 Vacuum load switch with earthing switch
- FZRN25A-12/T200 Vacuum load switch-fuse combination appliance
- FZRN25A-12D/T200 Vacuum load switch-fuse combination appliance with earthing switch

3.6 Structural diagram of FZRN25-12D vacuum load switch-fuse combination appliance



No.	Description
1	Isolation switch upper contact holder
2	Insulation support bracket
3	Transparent glass cover
4	Metal frame
5	Isolation switch conduction cylinder
6	Isolation switch lower contact holder
7	Vacuum interrupter room
8	Vacuum interrupter room lower outlet holder
9	Drive part of vacuum load switch
10	Fuse
11	Trip part
12	Earthing switch
13	Live indicator
14	Earthing switch operating hole
15	Cabinet door lock pin
16	Manual opening button
17	Energy storage and closing operation hole

Working principle

■ The load switch rotates through the main axis of the switch. When the clockwise rotation angle is less than 1300, the isolating switch is closed. At the same time, the spring energy of the mechanism is stored. The stored energy of the spring exceeding 1300 is released, which drives the driving part of the vacuum load switch to move, making the vacuum interrupter move. The contact moves upward and vertically to realize the closing operation of the switch. At this time, the opening spring stores energy. When the panel tripping device or tripping coil is pressed, the tripping half axis in the mechanism works, and the opening spring is released quickly.

■ The earthing switch completes the energy storage and release action of the earthing switch spring by rotating the earthing spindle, drives the earthing knife to rotate, and realizes the closing and opening of the earthing switch.

■ The work of the combined electrical appliance is that after any one-phase fuse is blown, its impactor hits the tripping device in the load switch, driving the load switch spring mechanism with pre-stored energy to work, and realizes the simultaneous opening of the load switch in three phases. When the fuse is not replaced, the load switch cannot be closed.

Arc extinguishing principle:

The vacuum interrupter used by FZN25A-12D vacuum load switch and FZRN25A-12D combined electrical appliance has a high degree of vacuum. A vacuum arc is generated. Since there are very few free electrons in the vacuum, it is not enough to maintain the arc. When the current naturally crosses zero, the arc is extinguished, and the dielectric strength between the contacts is quickly restored, achieving the purpose of breaking.

Action principle:

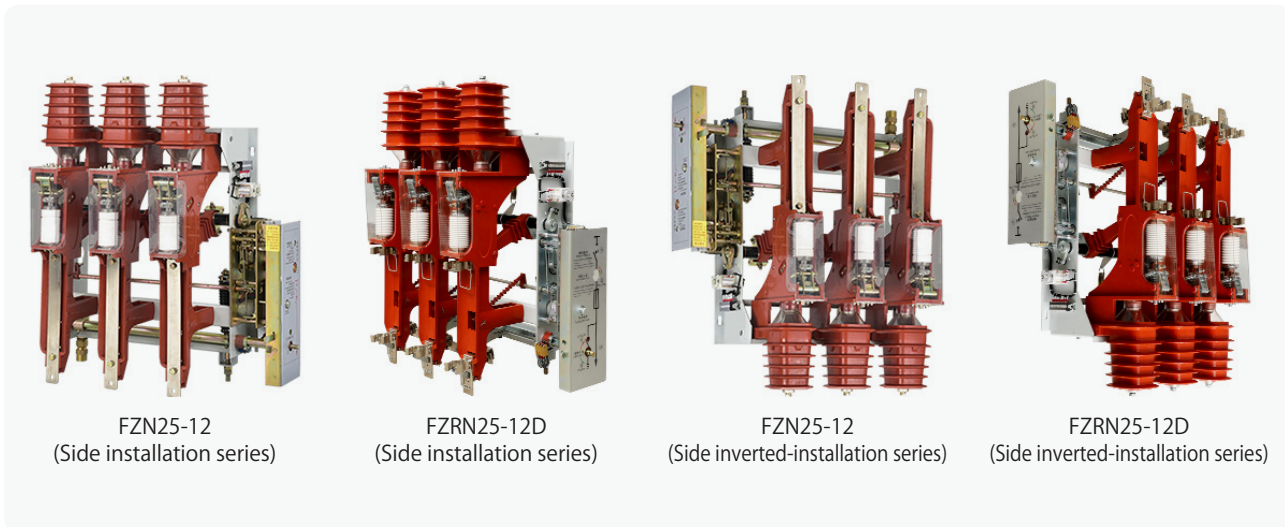
When closing, manually or electrically store energy in the closing spring, and when the spring is over-centered, it drives the cam to drive the main axis of the switch to rotate through the linkage mechanism to keep the switch in the closed state. When the main axis of the switch rotates, the conductive cylinder is closed by the operating rod in the first half, and the static contact and the middle contact seat are connected, that is, the isolation fracture is closed, and there is no current at this time; When the vacuum interrupter is closed, the pre-breakdown arc in the interrupter disappears with the closing of the moving and static contacts. When opening, manually or electrically disconnect the mechanism's closing (tripping half axis), and the switch spindle returns under the action of the opening spring. At this time, in the first half of the process, the moving and static contacts of the vacuum interrupter are separated by the operating rod, and the current is interrupted by the interrupter, while the conductive cylinder remains in the closing position.

■ Interlock:

The interlocking between load switch, earthing switch and cabinet door adopts mandatory mechanical locking method to ensure the "five defenses" function.

- A reliable mechanical interlock is installed between the load switch and the earthing switch.
- The secondary control loop is composed of a micro switch. When the earthing switch is closed, the electric closing power supply of the load switch is disconnected, and the load switch cannot be closed.
- The secondary control circuit composed of the micro switch linked by the trip axis, when the fuse causes the load switch to open, the fuse must be replaced to make the load switch close again. (configured according to user requirements)

3.7 Picture display of vacuum load switch

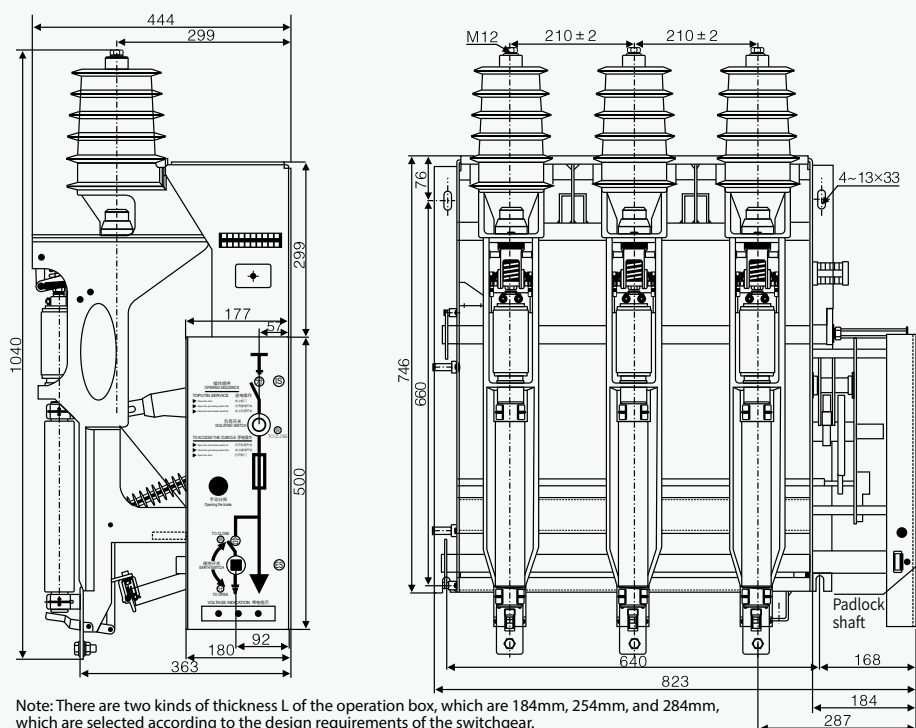


3.8 Product structure and working principle

The FZN25A-12 load switch adopts the overall frame assembly structure. The dynamic and static contacts in each phase circuit are closed in the vacuum tube to form a vacuum interrupter. It and related conductors are installed on the overall insulating support; the upper end of the vacuum interrupter passes through the conductor and The upper and lower direct-acting isolating switches at the rear are connected into a conductive circuit; the moving and static contacts and conductors of the isolating switch are also installed in the upper and lower integrated semi-closed insulating supports, and the entire organic integral insulating support is fastened on the metal frame. The spring energy storage operating mechanism effectively combines the characteristics of similar products in the country, and is installed on the side of the metal frame, which greatly improves the operating life of the spring operating mechanism. If the conductor at the lower end of the vacuum interrupter is installed with a detachable fuse device, fuse and its tripping device, it constitutes a load switch-fuse combination. A earthing knife arm, spring operating mechanism and interlock are installed on the metal frame; a high temperature resistant, flame retardant, transparent plexiglass cover is installed between the moving and static contacts of the isolating switch to effectively protect personal safety; the earthing is installed at the bottom of the load switch The static contacts constitute a load switch with a earthing switch and a combined electrical appliance with a earthing switch.

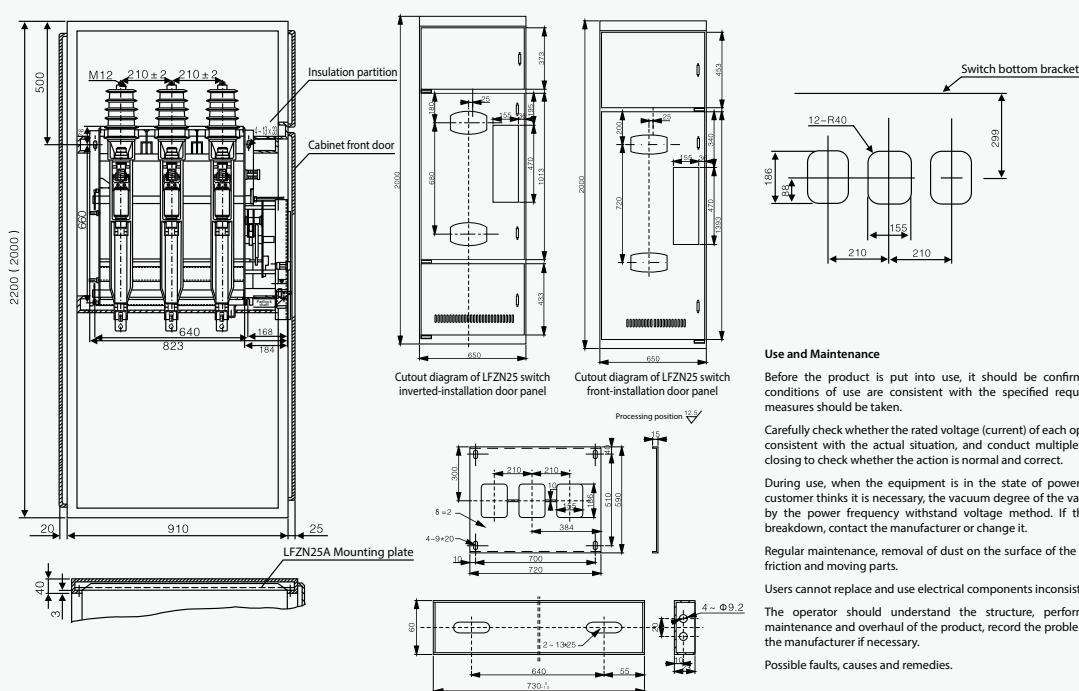
- Vacuum interrupter is adopted, which has strong arc extinguishing ability, reliable performance and safety.
- The vacuum load switch is integrated with the direct-acting isolating switch and the operating mechanism, which is easy to operate, completes breaking and isolation at one time, and has a clearly visible fracture. It can be equipped with a earthing knife and can be interlocked with the switch.
- Easy to operate, can be operated manually and electrically, each function has reliable interlock, which is convenient for the interlock design of the switch cabinet.
- The fully insulated design is adopted, and each live body is installed in the support frame of the SMC insulating part. The unique design of the tapered insulating seat and the transparent glass cover isolates the incoming busbar from the switch, which is convenient for the design of the armored switchgear.
- The installation method is flexible and the maintenance is convenient; it can be installed on the front or side, and the replacement of the fuse is more convenient.

3.9 Outline dimension and installation diagram



Note: There are two kinds of thickness L of the operation box, which are 184mm, 254mm, and 284mm, which are selected according to the design requirements of the switchgear.

3.10 Installation diagram of vacuum load switch - combination appliance and cabinet



Use and Maintenance

Before the product is put into use, it should be confirmed whether the environmental conditions of use are consistent with the specified requirements, otherwise appropriate measures should be taken.

Carefully check whether the rated voltage (current) of each operating element of the product is consistent with the actual situation, and conduct multiple test operations of opening and closing to check whether the action is normal and correct.

During use, when the equipment is in the state of power failure and maintenance, if the customer thinks it is necessary, the vacuum degree of the vacuum interrupter can be checked by the power frequency withstand voltage method. If there is discharge or continuous breakdown, contact the manufacturer or change it.

Regular maintenance, removal of dust on the surface of the product, regular lubrication of all friction and moving parts.

Users cannot replace and use electrical components inconsistent with the original model at will.

The operator should understand the structure, performance, installation, adjustment, maintenance and overhaul of the product, record the problems during operation, and contact the manufacturer if necessary.

Possible faults, causes and remedies.

4.1 Overview of FKN12 series vacuum load switch

Side installation:

- ① The side-mounted load switch will be attached with a connecting sleeve of about 30cm (it must be installed horizontally during assembly), so that the operation of the load switch can be extended to the switchboard panel for operation.
- ② Close → insert the operating rod into the panel opening installed on the panel (the triangular protrusion on the operating rod must be aligned with the groove of the panel opening before it can be inserted), and rotate the operating rod according to the direction indicated on the panel, to complete the input action, at this time the three-phase movable cylinder liner will be impacted to the upper contact position by the force of the energy released by the first spring that has stored energy, and the power will be turned on.
- ③ Opening → Insert the operating rod into the opening of the panel installed on the panel (the operation method is the same as before), and rotate the operating rod in the direction indicated on the panel (the direction is opposite to the input), and the tripping action is completed. When putting into action, the second spring is compressed by the energy release of the first spring and actively stores energy. At this time, the three-phase conduction tube will quickly separate from the upper contact due to the release force of the second spring, and the power supply interruption.
- ④ Repeat steps 2 and 3 above when closing and opening again, but pay attention to whether the operating mechanism of the opening has completely returned to the position of ready closing. If not, it means that the opening did not turn when it rotated in the opposite direction. Back to positioning.

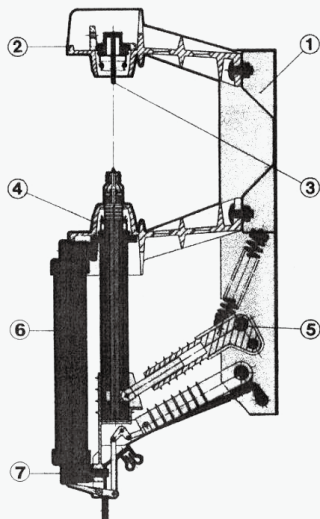
Front installation:

- ① The front-mounted load switch will be equipped with a set of steering gears, two gear fixing rings, and a 120CM extension rod (it must be installed horizontally during assembly), so that the operation of the load switch can be extended to the front of the switchboard. When the load switch is assembled, it must be level, and the angle between the extension rod and the steering gear must be 90°.
 - ② The rest of the operation methods are the same as step 2.3.4 of side operation.
- Three power fuses are installed in the three phases of the load switch for short-circuit current protection. If the short-circuit current exceeds the safe value, the fuse will blow and the load switch will be cut off; after the cause of the accident is eliminated, the power supply must be reinstalled Fuse, and re-use according to the above operation method.

Maintainance:

Because the three-phase active cylinder liner of the load switch is silver-plated and exposed, in consideration of environmental factors, power outage maintenance is required at least every six months, cleaning and cleaning are required, and it is necessary to prevent dust from falling into the outlet of the conduit to avoid blockage and unsmooth operation. ; And for the active parts, such as: gears, spring mechanisms, etc., apply an appropriate amount of neutral Vaseline to prolong the service life of the load switch.

4.2 Sectional view of GPKN12 high voltage load switch

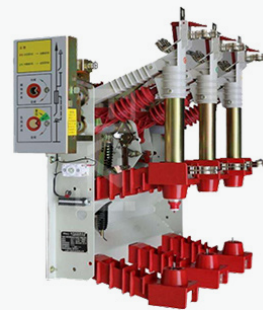


No.	Description
1	Main Frame
2	Upper insulator
3	Upper fixed arc extinguishing contact
4	Lower insulator
5	Main axis
6	Fuse
7	Fuse holder

4.3 Picture display of compressed air load switch - fuse combination appliance



GPKRN12-24D/125-31.5
(Side installation series)

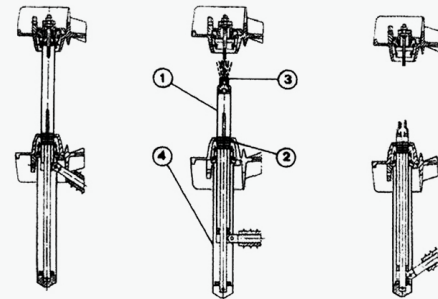


GPKRN12-24D/125-31.5
(Side inverted-installation series)

4.4 Product features

The GPKN12 high-voltage load switch is blown out of the arc caused by the breaking current caused by the impact, which is completed in a very short time. The compressed air required to blow out the arc is formed by operating the movable cylinder liner ① with a contact point to move downward, that is, through the piston ② fixed on the fixed cylinder ④ and the movable cylinder produced by the relative movement within the sleeve ①. Compressed air is blown out through a specially shaped nozzle ③, and the small but effective air flow is enough to blow off the arc generated by a current of several hundred amperes.

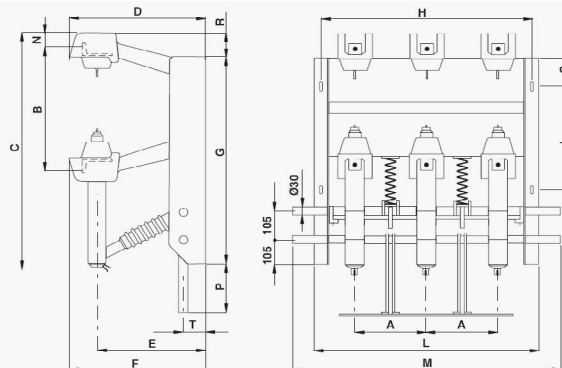
When the pressure is gradually increased, the induced current is interrupted without causing a dangerous situation of voltage overload, and the quick separation of the movable contact also facilitates the current to be cut off easily. Compared with other automatic air generating devices, GPKN12 high-voltage load circuit breaker has an advantage that the device itself will not produce obvious changes after each power failure.



1. Movable cylinder liner with contact points
2. Piston 3. Nozzle 4. Fixed cylinder

GPKN12 type arc suppression starting procedure

4.5 Product dimension



Mechanical properties

Model	A	B	C	D	E	F	G	H	I	L	M	N	P	R	S	T	Weight (kg)
GPN12-24R	300	455	900	403	375	439	770	800	400	840	1080	50	170	90	35	96	75
GPN12-24DR	300	455	1070	403	375	480	770	800	400	840	1080	50	200	90	35	96	80
GPKN12-35D	400	515	1025	495	449	555	890	1040	500	1080	1280	50	256	90	100	105	88

5.1 Overview of FZN21 series vacuum load switch

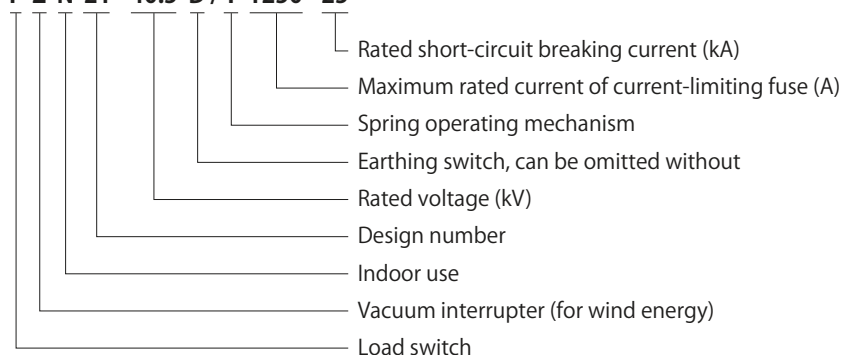
This type of high-voltage vacuum load switch and combined electrical equipment is suitable for three-phase AC 40.5kV, 50HZ power systems, or used in conjunction with power distribution equipment, ring network switch cabinets, and combined power stations. It is widely used in wind power generation, Chengwang construction and renovation projects, industrial and mining enterprises, high-rise buildings and public facilities, etc., can be used as a ring network power supply unit or terminal equipment, which plays the role of power distribution, control and protection. The technical performance of this product meets the requirements of GB16926-1997 "AC High Voltage Load Switch-Fuse Combined Appliance" and IEC420 "AC High Voltage Load Switch-Fuse Combined Appliance".

This product has the advantages of large breaking capacity, safety and reliability, long electrical life, frequent operation, compact structure, small size, light weight, and basically no maintenance. It has the ability to break the rated current, overload current, short-circuit current and prevent the equipment from running without phase. The switch has a clearly visible isolation fracture. It is equipped with a earthing switch and an electric spring mechanism with the ability to make and close. It has the ability of remote control.

5.2 Product model description

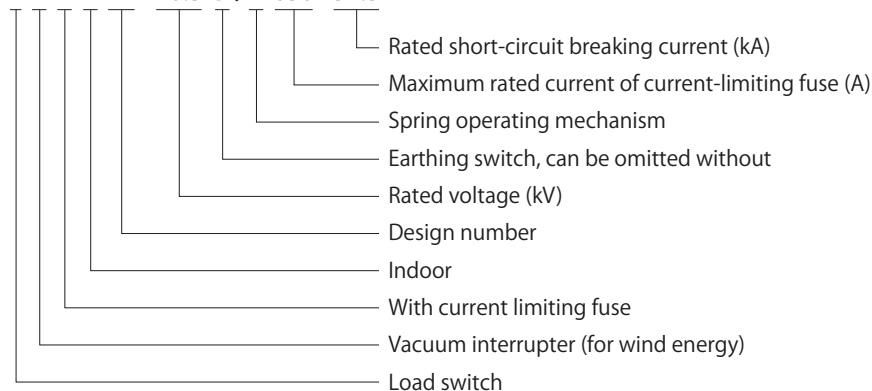
Vacuum load switch

F Z N 21 - 40.5 D / T 1250 - 25



Vacuum load switch - fuse combination appliance

F Z R N 21 - 40.5 D / T 630 - 31.5



5.3 Main technical parameters

The technical parameters of earthing switch for combination appliance after assembly adjustment

No.	Item	Unit	Data
1	Three-pole closing non-synchronization	ms	≤ 2
2	The amount of deflection of the just-closed position of each pole	mm	≤ 2
3	Static contact knife spring pressure	N	450 ± 40
4	Fracture opening distance	mm	≥ 350

The technical parameters of fuse for combination appliance

Model	Rated voltage (kV)	Fuse holder rated current (A)	Melt rated current (A)
XRNT3A	12	16	3.15, 63, 10, 16
		40	20, 25, 31.5, 40
		63	50, 56, 63

The main technical parameters of combination appliance

No.	Item		Unit	Data
1	Rated voltage		kV	40.5
2	Rated frequency		Hz	50
3	Maximum rated current of the fuse		A	63
4	Insulation level	Power frequency withstand voltage (1min)	kV	To earth/phase to phase/vacuum distance: 95; Across isolating distance: 110
		Lightning impulse withstand voltage	kV	To earth/phase to phase/vacuum distance: 185; Across isolating distance: 215
5	Rated peak withstand current		kA	50
6	Rated short-time withstand current (4s)		kA	20
7	Rated active load breaking current		A	1250
8	Rated closed loop breaking current		A	1250
9	Rated cable charging breaking current		kA	21
10	Rated short-circuit breaking current		kA	31.5
11	Rated transfer current		A	1200
12	Fuse model			XRNT3A-40.5/ □ -31.5
13	Fuse striker output energy		A	2~5
14	Rated short-circuit closing current		J	80 (expected peak value)
15	Earthing switch rated peak withstand current		kA	50
16	Earthing switch rated short-time withstand current (4s)		kA	20
17	Auxiliary circuit rated voltage (DC or AC)		V	220; 110
18	Mechanical life		times	10000

The technical parameters of vacuum load switch for combination appliance after assembly adjustment

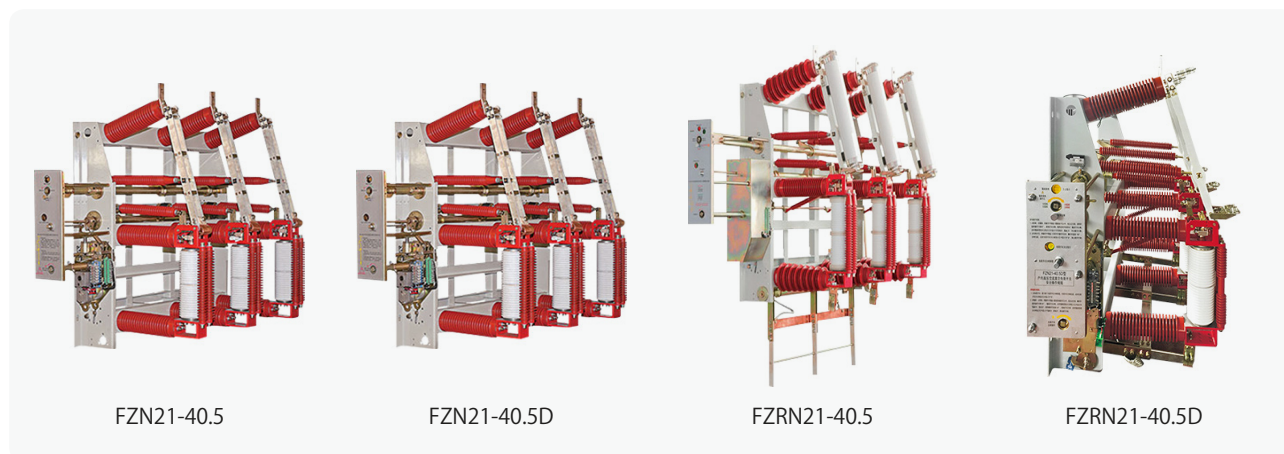
No.	Item	Unit	Data
1	Contact distance	mm	17 ± 1
2	Contact and spring compression	mm	4 ± 1
3	Average closing speed	m/s	0.8 ± 0.2
4	Average opening speed (when the opening distance reaches 6mm)	m/s	1.5 ± 0.2
5	Opening time	ms	≤ 60

6	The opening and closing of the three-phase contacts are not in the same period	ms	≤ 2
7	Contact closing bounce time	ms	≤ 3
8	Distance between charged bodies and relative ground	mm	≥ 300
9	Loop resistance between upper and lower brackets	$\mu\Omega$	≤ 80

The technical parameters of isolation switch for combination appliance after assembly adjustment

No.	Item	Unit	Data
1	Three-pole closing non-synchronization	ms	≤ 2
2	The amount of deflection of the just-closed position of each pole	mm	≤ 2
3	Positive contact pressure	N	260 ± 20
4	Fracture opening distance	mm	≥ 350
5	loop resistance	$\mu\Omega$	≤ 150

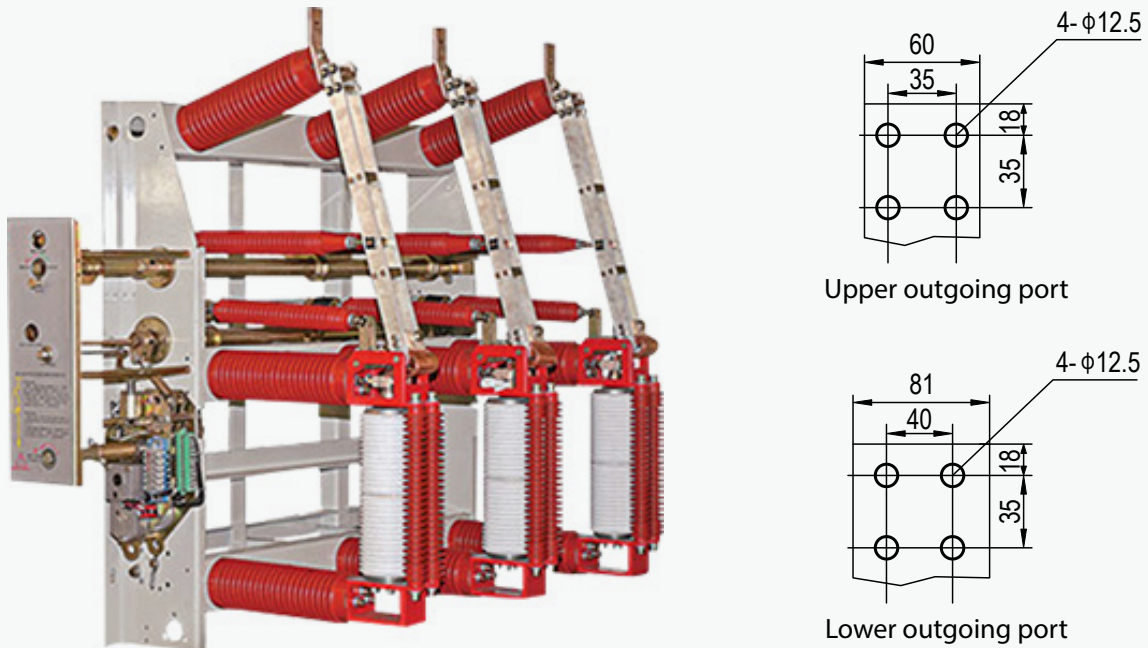
5.4 Picture display of FZRN21-40.5D vacuum load switch



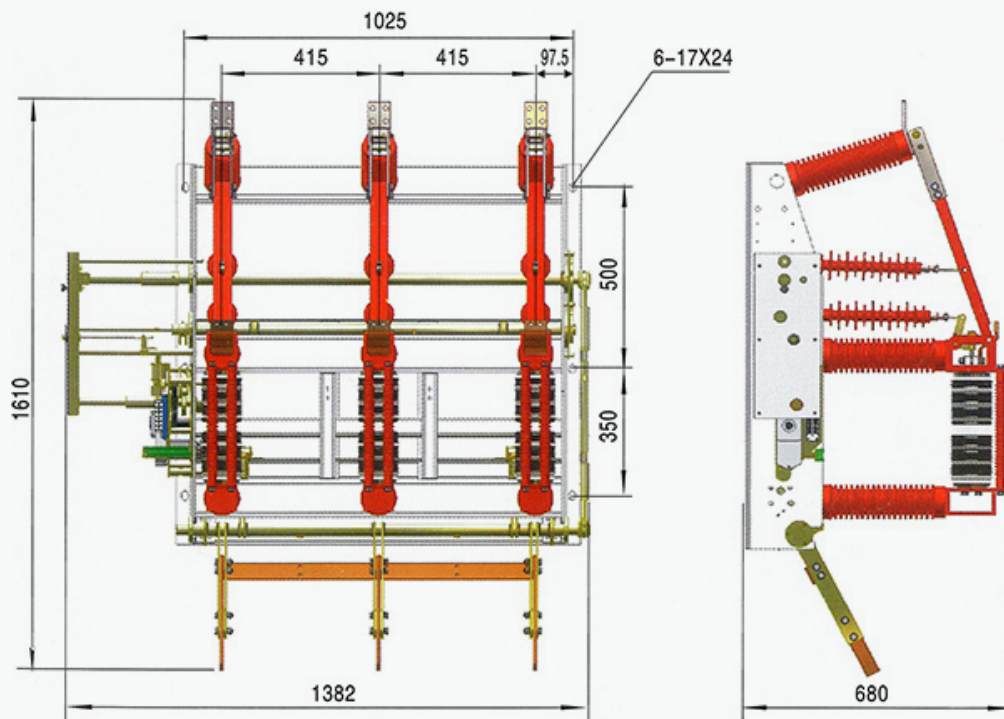
5.5 Environmental conditions of use

- The ambient air temperature does not exceed 40°C , and the average value measured within 24 hours does not exceed 35°C , and the minimum ambient air temperature is -25°C ;
- The influence of sunlight radiation can be ignored;
- The altitude does not exceed 1000m;
- The surrounding air is not obviously polluted by dust, smoke, corrosive, or flammable gases, steam or salt spray;
- The daily average relative humidity does not exceed 95%; the daily average water vapor pressure does not exceed 22kPa; the average relative humidity of the lunar phase does not exceed 90%; the average monthly water vapor pressure does not exceed 1.8kPa;
- Vibrations or ground motions from outside the switchgear and controlgear are negligible;
- The amplitude value of electromagnetic interference induced in the secondary system shall not exceed 1.6kV.
- The amplitude value of electromagnetic interference induced in the secondary system shall not exceed 1.6kV.

5.6 Outline and installation dimension diagram of load switch

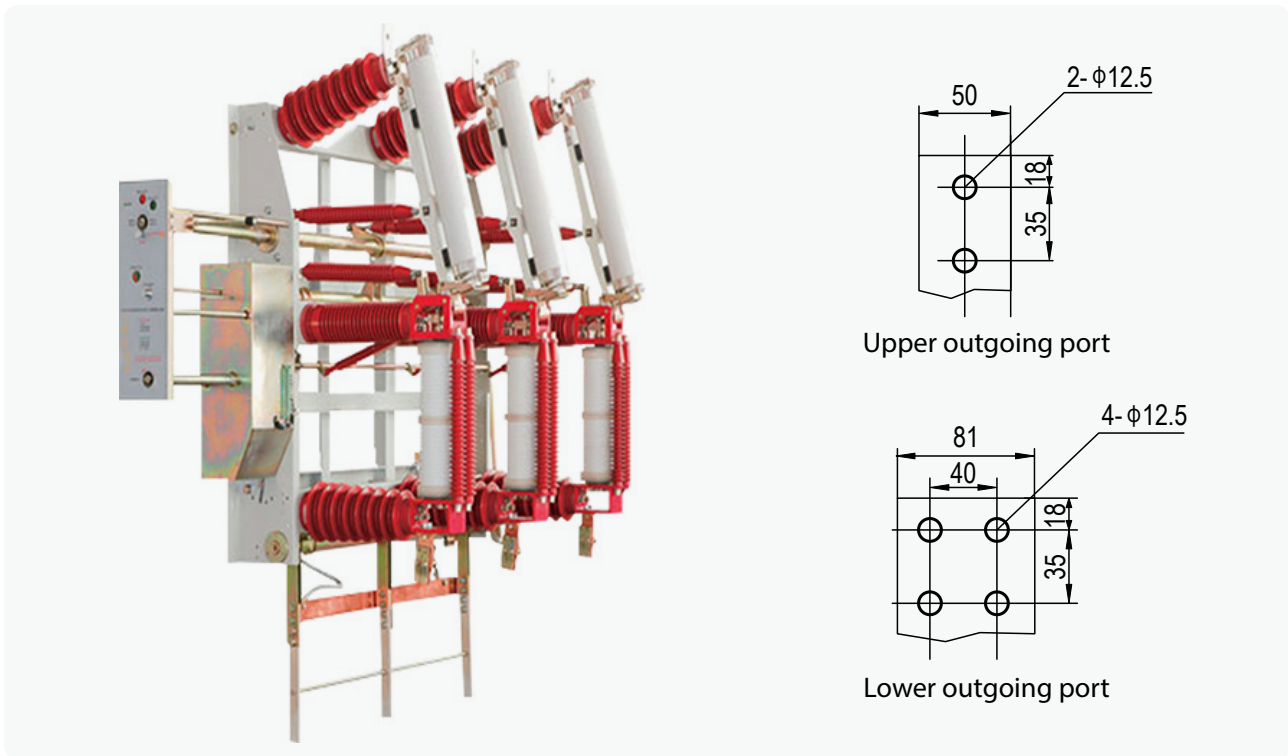


Outline and installation dimension diagram of load switch

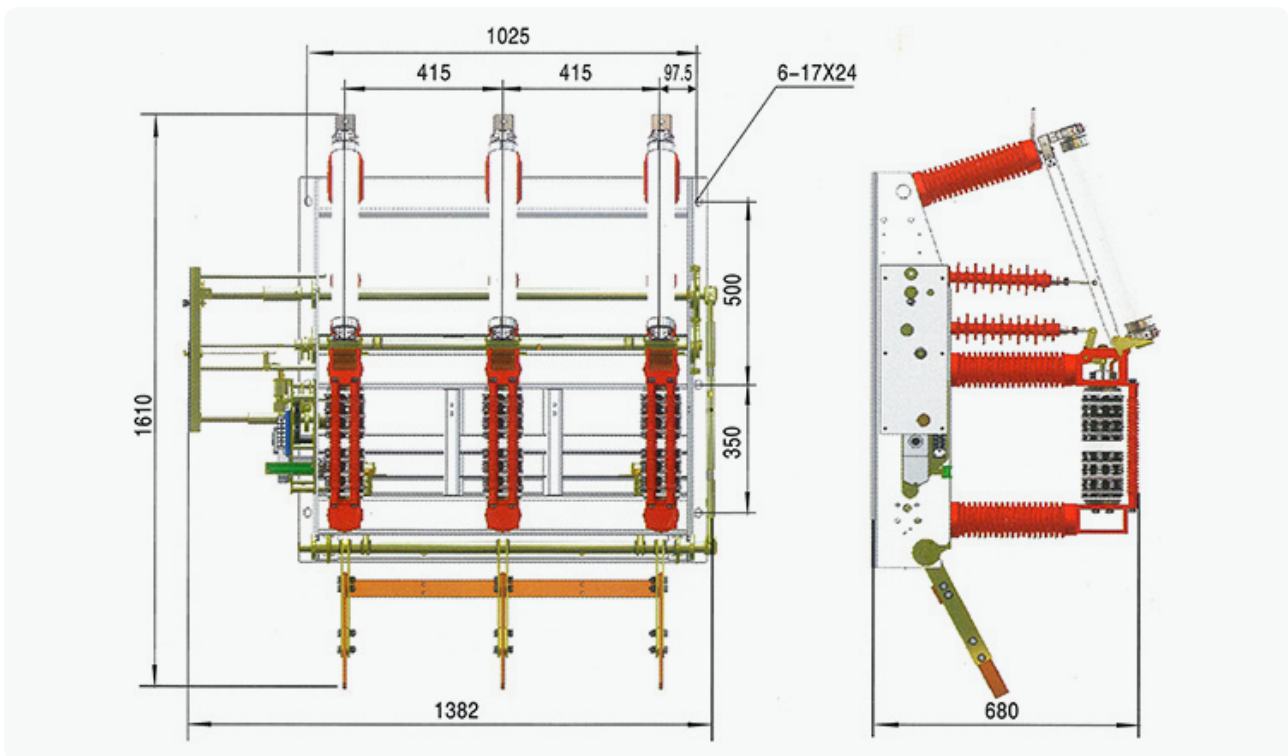


Outline and installation dimension diagram of FZN21-40.5D/1250-25

5.7 Outline and installation dimension diagram of combination appliance



Outline and installation dimension diagram of combination appliance



Outline and installation dimension diagram of FZRN21-40.5D/630-31.5

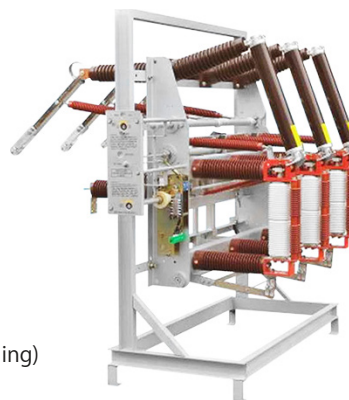
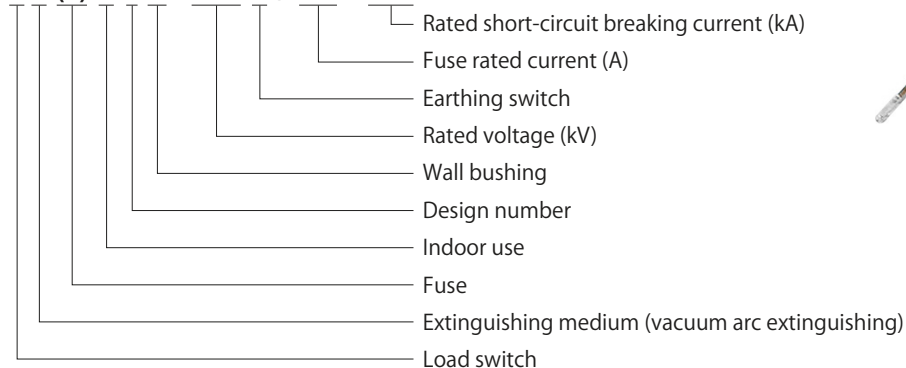
6.1 Overview of LZ(R)21C-40.5D series vacuum load switch

LZ(R)N1C-40.5D vacuum isolation load switch-fuse combination is specially designed for 35kV box-type substation, and can also be used as an independent electrical unit in the power system. This product is small in size, easy to install and easy to operate. Its structure is scientific and reasonable, and its movements are flexible and reliable. The load switch can be maintenance-free, and the combined electrical appliance can be equipped with a series of striker-type fuses, which are convenient and safe to replace.

LZ(R)N21C-40.5D vacuum isolation load switch-fuse combination is used in the network of AC 50Hz, rated voltage 40.5kV, for breaking load current, overload current and short circuit current. It is especially suitable for places that require oil-free, maintenance-free and frequent operation.

6.2 Product model description

L Z (R) N 1 C - 40.5 D / 100 - 31.5



6.3 Environmental conditions of use

- The altitude does not exceed 3000m;
- Ambient air temperature: The upper limit is 40°C , the lower limit is -40°C . The average daily temperature does not exceed 35°C ;
- Relative humidity: The daily average is not more than 95%, and the monthly average is not more than 90%;
Water vapor pressure: The daily average does not exceed 2.2kPa, and the monthly average does not exceed 1.8kPa;
- The surrounding air is not appreciably polluted by dust, smoke, corrosive and/or flammable gases, vapors or salt mist;
- The Pa value of electromagnetic interference induced in the secondary system shall not exceed 1.6kV.

6.4 Technical parameters

Electrical performance parameters

No.	Items	Unit	Combined switch	Load switch	Earthing switch
1	Rated voltage	kV	40.5	40.5	40.5
2	Rated current	A	100 A and under	1250	
3	Rated frequency	Hz	50	50	50
4	Rated short-circuit breaking current	kA	31.5A and under	-	-
5	Rated short-circuit making current	kA	-	80	80
6	Rated peak withstand current	kA	-	80	80
7	Rated short-time withstand current	kA	-	31.5	31.5
8	Rated transfer (handover) current	A	1700	-	-
9	Rated active load breaking current	A	-	1250	-
10	Rated closed-loop breaking current	A	-	1250	-
11	Rated cable charging current	A	-	21	-
12	Rated short circuit duration	s	-	4	4

13	Secondary circuit operating rated voltage		V	AC/DC220	AC/DC220	-
14	Rated short-time (1min) power frequency withstand voltage	Control and auxiliary circuits	kV	2	2	-
		Main circuit	kV	Interpole, earthing and common fractures 95		
			kV	Isolation fracture 115		
15	Rated lightning impulse withstand voltage (peak)		kV	Interpole, earthing and common fractures 185		
			kV	Isolation fracture 215		
16	Main circuit resistance		μΩ	≤ 400(Except fuses for combined electrical appliances)		

Mechanical performance parameters

No.	Items	Unit	Vacuum isolation chamber	Isolation knife	Earthing knife
1	Contact open distance	mm	17 ± 1	≥ 350	≥ 300
2	Contact overtravel	m/s	5 ± 1	-	-
3	Average opening speed	m/s	1.5 ± 0.2	-	-
4	Average closing speed	m/s	0.6 ± 0.2	-	-
5	Rated contact pressure	N	1000 ± 150	260 ± 30	390 ± 150
6	Three-pole opening and closing in different periods	ms	≤ 2	-	-
7	Contact closing bounce time	ms	≤ 3	-	-
8	Interpole center distance	mm	450 ± 3	450 ± 3	450 ± 3
9	Contact wear cumulative thickness	mm	3	-	-
10	The contact knife just-close position is skewed	mm	-	≤ 2	≤ 2
11	Mechanical life	Times	10000	2000	2000

The electrical parameters of the LN21 spring operating mechanism

Model	Rated voltage	Rated output power	Normal operating voltage range
GJ220-53	-220V	$\leq 30W$	85%~110% Rated voltage

Permanent magnet single-phase DC energy storage motor

Rated working voltage (V)	Rated working current (A)	Rated electrical power (W)	On 20°C coil resistance value(Ω)	Normal operating voltage range
-220	2.67	<587	30 ± 3	65%~120% of rated working voltage can be reliably opened; when it is less than 30% of rated working voltage, it will not be opened.
~110	2.93	<312	17 ± 1.7	
-220	2	400	110 ± 10	

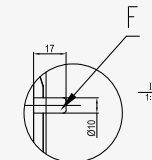
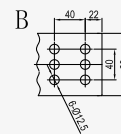
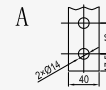
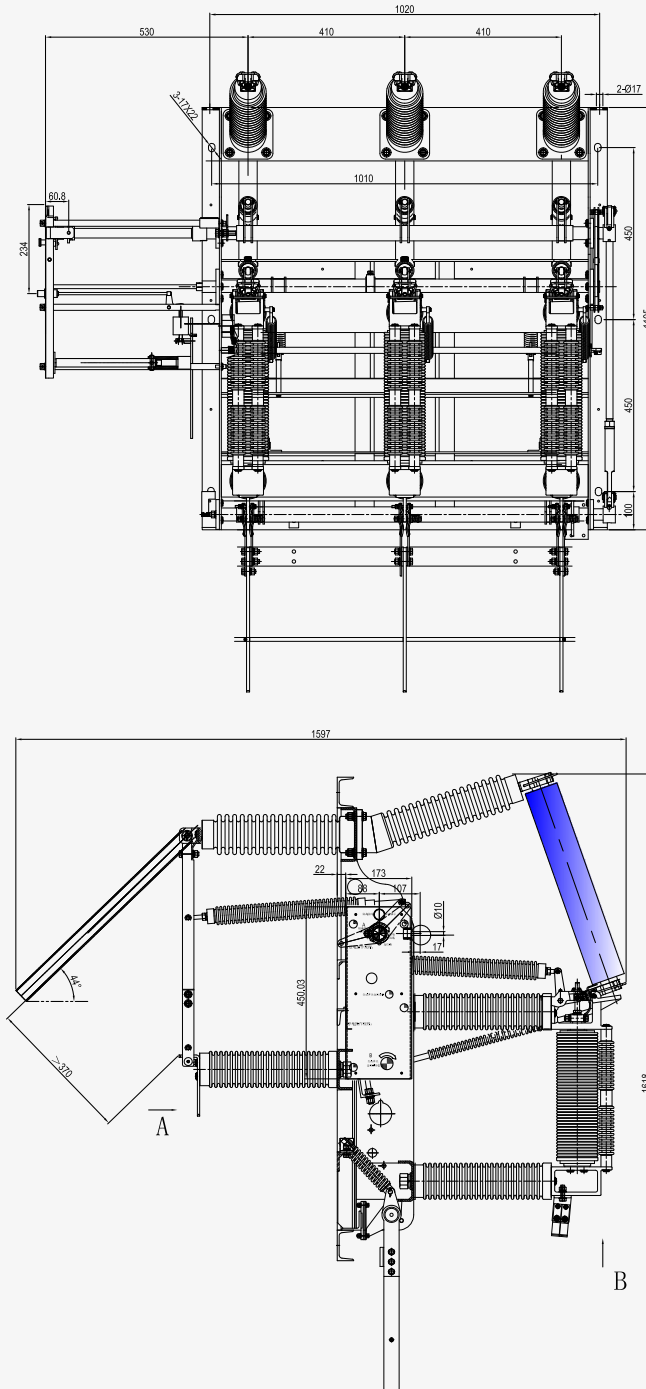
Opening electromagnet (independent power supply)

6.5 Structure and principle

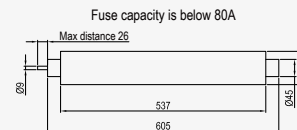
Basic structure

This combined electrical appliance is a three-pole linkage structure. It is mainly composed of frame, vacuum interrupter, isolation switch, fuse, earthing switch, tripping transmission device and spring operating mechanism. The isolation knife switch and the vacuum isolation chamber are fixed on the frame through the insulator, and the fuse and the isolation knife switch are installed on the front and back sides of the chassis respectively. The earthing knife switch spindle is directly mounted on the lower part of the frame. The spring operating mechanism is installed on the side plate of the frame, and the operation mode is side operation. The operating mechanism drives the main shaft of the switch, and the main shaft rotates and drives the vacuum interrupter or the isolation knife switch with the crank arm through the insulating operating rod to realize the operation of opening and closing. The earthing knife switch and the isolating knife switch are connected together through the transmission link, and the two are linked during operation.

Outline and installation dimensions of LZ(R)N1C-40.5D vacuum load switch - fuse combination appliance

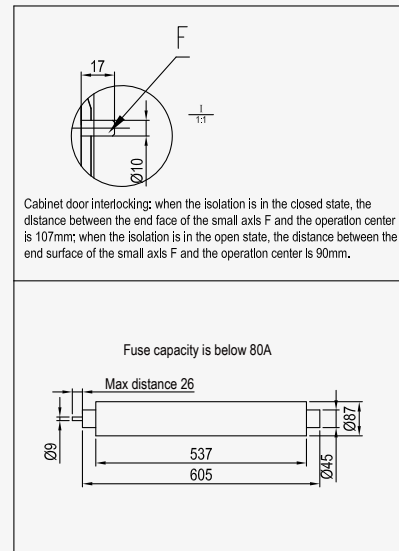
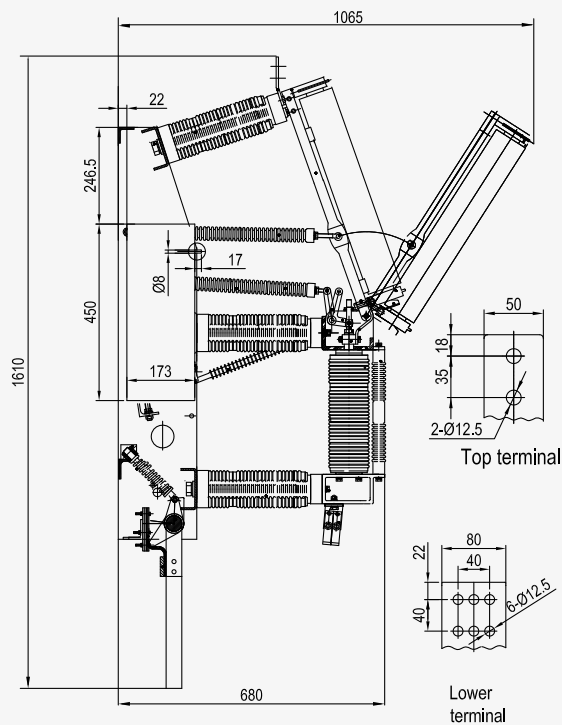
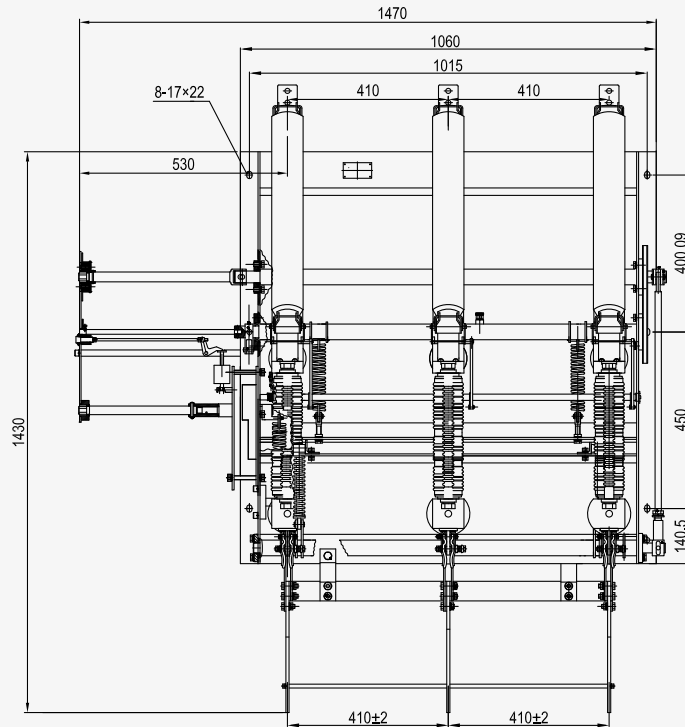


Cabinet door interlocking: when the isolation is in the closed state, the distance between the end face of the small axis F and the operation center is 107mm; when the isolation is in the open state, the distance between the end surface of the small axis F and the operation center is 90mm.



Note: This structure is a compact European transformer, and the high and low voltage chambers and transformers are the layout of the delta or straight in line.

■ Outline and installation dimensions of LZ(R)N1-40.5D/T50-20 vacuum load switch - fuse combination appliance



Note: This structure is a compact European transformer, and the high and low voltage chambers and transformers are the layout of the delta or straight in line.

7.1 Overview of VEF-12 series VCB - combination appliance

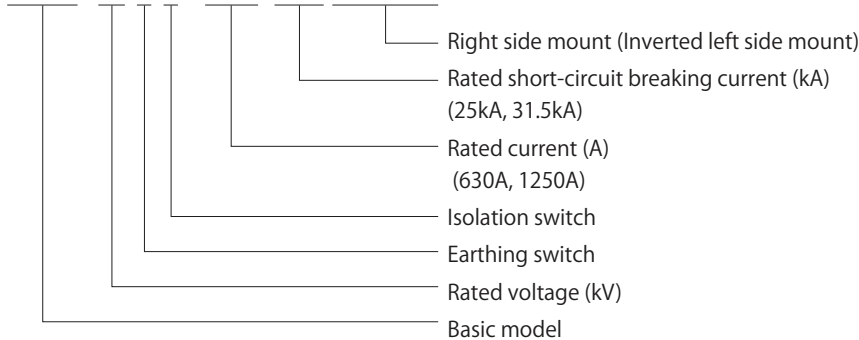
VEF-12 three-position vacuum circuit breaker-combined electrical appliance has excellent electrical and mechanical properties, reliable and stable mechanism, and long service life. The main circuit uses solid-sealed poles, which improves the environmental adaptability and insulation reliability of the circuit breaker; reliable mechanical and electronic performance, extended mechanical life and electronic life, make it possible for the circuit breaker to be maintenance-free. It can be used in 3.6-12kV power system, as power grid equipment, protection box control unit designed by industrial and mining enterprises, suitable for various loads of different natures and occasions of frequent operation and multiple breaking of short-circuit current. The product has a complete mechanical and electrical interlocking device, which has extremely high operational stability and reliability, ensuring the safety of operators and equipment, and ensuring the safety of electricity use.

- Using solid-sealed pole technology;
- The product adopts a modular design: a frame structure, which integrates a disconnecter, a solid-sealed vacuum circuit breaker, a earthing switch, an interlock mechanism, and an operating mechanism as one of the high-performance miniaturized high-voltage electrical products;
- Cabinet width 500mm;
- There is a non-contact live display sensor at the outlet end;
- Rotary isolating switch with visible fracture after opening;
- There is a mandatory mechanical interlock between the isolating switch, circuit breaker and earthing switch to prevent misoperation;
- The circuit breaker adopts a modular operating mechanism, which can be replaced or repaired independently, and has good interchangeability. It can be operated manually, or AC and DC energy storage operations can be used to realize remote control;
- The cabinet door and earthing switch are designed with a reliable interlocking structure to ensure the safety of operators.

7.2 Product model description

■ Vacuum load switch

VEF(C) - 12 D G / 630 - 25 YC(ZGDC)
1250 - 31.5



Note: If there is no earthing switch, the earthing operation shaft acts as an interlocking shaft, and the outline dimensions remain unchanged.

7.3 Environmental conditions of use

- Ambient temperature: -25°C + 40°C ;
- Altitude: Not higher than 1000m;
- Relative humidity: Daily average ≤ 95%, monthly average ≤ 90%;
- Earthquake intensity: No more than 8 degrees;
- Place of use: No explosion hazard, chemical and severe vibration and pollution; use above 1000 meters above sea level.
When the altitude exceeds 1000 meters, the air density will decrease relatively, which will affect the protection factor of electrical appliances.

Users must make relevant calculations when selecting switches.

The recommended calculation method is: Formula 1: $K\alpha = \frac{1}{1.1-H \times 10^{-4}}$

Find the height H of the designated location, calculate the relevant height coefficient $K\alpha$ according to the provisions of GB311.1 (Formula 1), multiply the lightning impulse withstand voltage and power frequency withstand voltage of the switch by $K\alpha$, and the obtained value is the value for the switch. At high altitude H, the withstand voltage parameters must be achieved in the environment below 1000 meters.

7.4 Applicable cabinet type

It can be installed in small fixed cabinets, ring main unit or box transformers.

VEF-12 three-station vacuum circuit breaker-combined electrical main circuit is arranged longitudinally, the upper part is the isolating switch, the middle part is the vacuum circuit breaker, and the lower part is the earthing switch. The operating mechanism, circuit breaker mechanism and interlocking mechanism are located at the front of the switch. The switch can be installed upside down.

7.5 Main technical parameters

No.	Item	Unit	Data
1	Rated voltage	kV	12
2	Rated short-duration power frequency withstand voltage (1min): phase-to-phase/fracture	kV	42/48
3	Rated lightning impulse withstand voltage (peak value): phase-to-phase/fracture	kV	75/85
4	Secondary circuit power frequency withstand voltage (1min)	V	2000
5	Rated frequency	Hz	50
6	Rated current	A	630、1250
7	Rated short-circuit breaking current	kA	20、25、31.5
8	Rated peak withstand current	kA	50、63、80
9	Rated short-circuit closing current	kA	50、63、80
10	Rated short-time withstand current (4s)	kA	20、25、31.5
11	Rated short-time withstand current duration	s	4
12	Rated single/back-to-back capacitor bank breaking current	A	630/400
13	Rated capacitor bank closing inrush current	kA	12.5 (frequency not greater than 1000Hz)
14	Rated short-circuit current breaking times	times	30
15	Mechanical life (isolating switch/circuit breaker/earth switch)	times	3000/1000/3000
16	The accumulative thickness of allowable wear of moving and static contacts	mm	3
17	Rated closing operating voltage	V	AC24/48/110/220、DC24/48/110/220
18	Rated opening operating voltage	V	AC24/48/110/220、DC24/48/110/220
19	Energy storage motor rated voltage	V	AC24/48/110/220、DC24/48/110/220
20	Energy storage motor rated power	W	70
21	Energy storage time	s	≤ 15
22	Contact distance	mm	9 ± 1
23	Overtravel	mm	3.5 ± 1
24	Contact closing bounce time	ms	≤ 2
25	Three-phase opening and closing asynchronous	ms	≤ 2
26	Opening time (rated voltage)	ms	≤ 40
27	Closing time (rated voltage)	ms	≤ 60
28	Average opening speed (contact just opened ~ 6mm)	m/s	0.9 ~ 1.3
29	Average closing speed (6mm ~ contact just closed)	m/s	0.5 ~ 1.1
30	Contact opening rebound amplitude	mm	≤ 2
31	Contact closing contact pressure	N	2400+200(20~25kA)、3100+200(31.5 kA)
32	Nominal operating sequence		0 - 0.3s - C0 - 180s - CO

7.6 Configuration of VEF-12 series VCB - combination appliance

Configuration	Parameter	Remark
Energy storage motor	120W	Standard
Closing coil	A(D)C24~220V	Standard
Opening coil	A(D)C24~220V	Standard
Isolation switch Auxiliary switch	1 open 1 close 5A	Standard
Earthing switch Auxiliary switch	1 open 1 close 5A	Standard
Energy storage mechanism auxiliary switch	2 open 1 close 5A	Standard
Circuit breaker auxiliary switch	8 open 8 close 5A	Standard
Anti-jump device	A(D)C24~220V	Standard
Live sensor (inductive)	Non-contact type	Standard
Locking device	A(D)C24~220V	Standard
Overcurrent release	3.5A、5A	Standard
Undervoltage device	A(D)C24~220V	Standard

Standard configuration: Wiring according to the standard wiring diagram, including anti-jumping device, no locking device, no over-current device, and no under-voltage device.

7.7 Operation introduction

Closing lock operation

■ **Locking:** Rotate the outer ring of the locking operation shaft 90° (to release positioning), push it to the limit position in the direction of locking, and then rotate the outer ring of the operating shaft 90° (positioning).

■ **Unlocking:** Rotate the outer ring of the locking operation shaft 90° (unlocating), push it to the limit position in the direction of unlocking the lock, and then rotate the outer ring of the operating shaft 90° (positioning).

Operation of the circuit breaker

Manual operation:

■ Open the energy storage cover and use a special energy storage rod to store energy.

■ Closing: Press the closing button. (If it is equipped with a closing lock or undervoltage device, it can only be closed after the secondary circuit is energized).

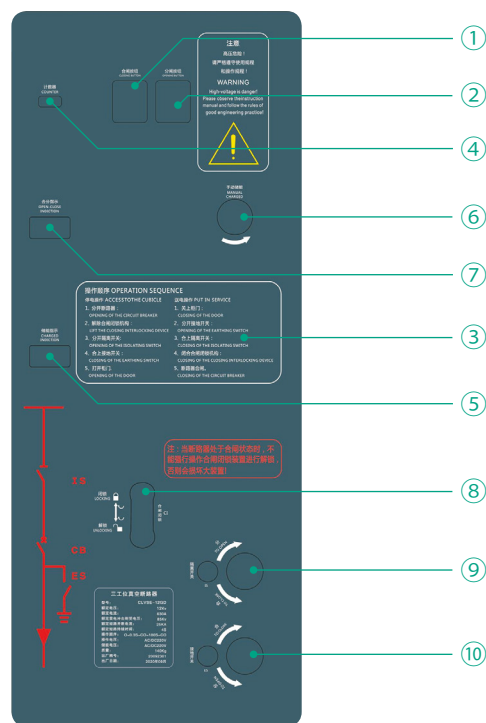
■ Opening: Press the opening button.

Electric operation:

■ After the secondary circuit is energized, the energy storage machine will automatically store energy.

■ Closing: Press the closing button in the control circuit.

■ Opening: Press the opening button in the control circuit.



① Closing button

④ Counter

⑦ Closing and opening indication of circuit breaker

⑨ Isolation switch operating shaft

② Open button

⑤ Energy storage indication

⑩ Earthing switch operating shaft

③ Operation sequence

⑥ Manual energy storage

⑧ Closing lockout

■ Operation of the isolating switch

- Clockwise to open the isolating switch. ■ Counterclockwise to close the isolating switch.

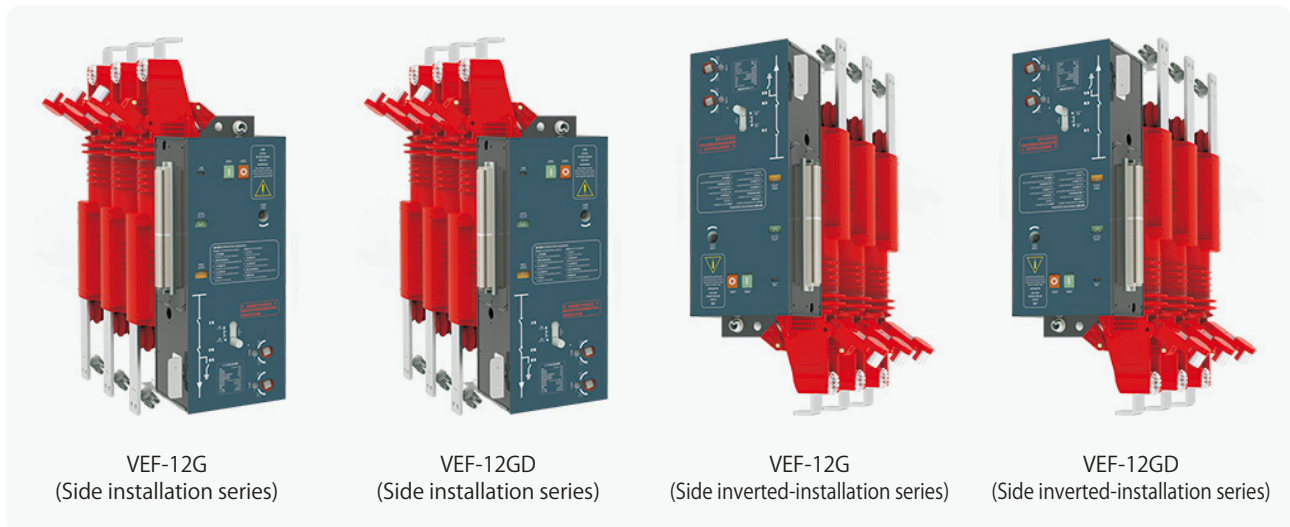
■ Operation of the earthing switch

- Clockwise to close the earthing switch. ■ Counterclockwise opens the earthing switch.

■ Operation of the cabinet door lock

- Closing the cabinet door automatically unlocks the lock between the cabinet door and the earthing switch.
- After the earthing switch is closed and the cabinet door is opened, the earthing switch is automatically locked and cannot be operated.

7.8 Picture display of VEF-12 VCB - combination appliance



7.9 Operation of VEF-12 VCB - combination appliance switch

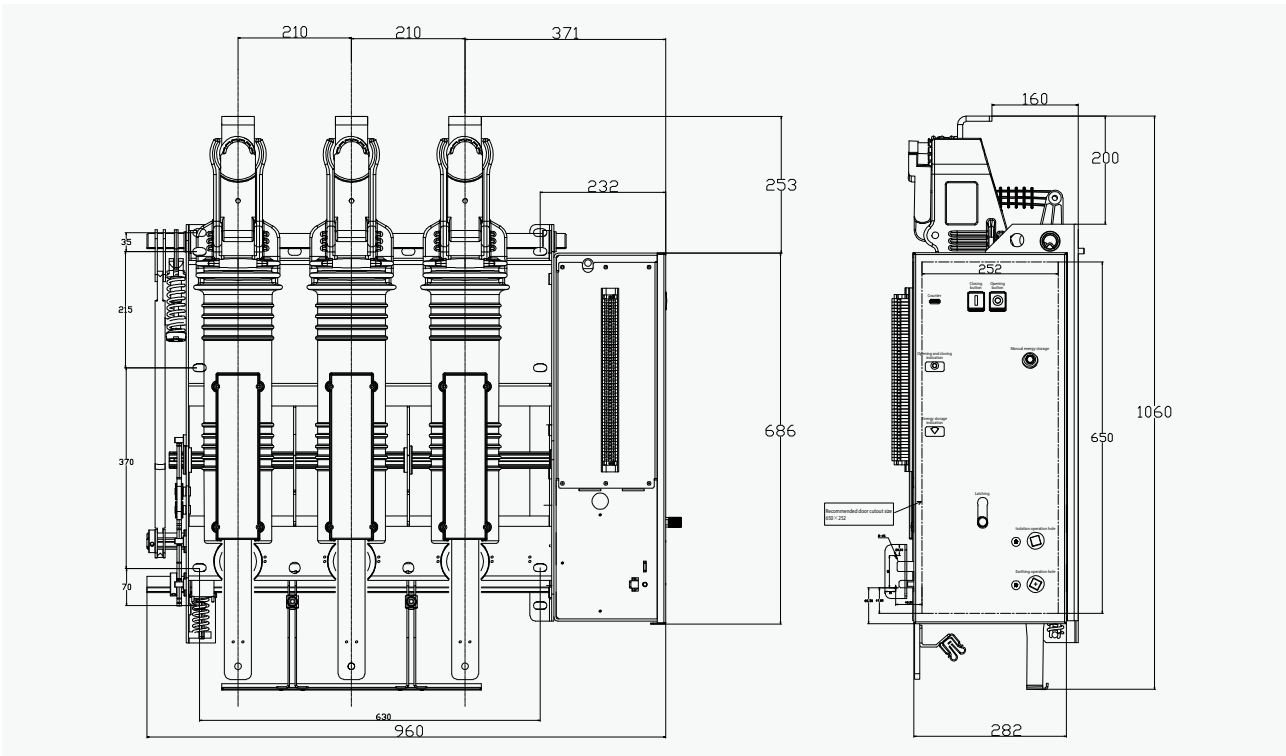
Refer to the switch operation indicator on the right, the instructions are as follows:

- Double interlocking: Circuit breaker, isolating switch, grounding switch set mandatory mechanical interlocking operation; the circuit breaker, isolating switch, and grounding switch are designed to prevent misoperation and lock the mouth of the device.
- The isolating switch and the grounding switch are operated step-by-step by an independent axis, and a mandatory mechanical interlock operation is set between the two operating axes.
- After the switch is opened and closed, please confirm its respective opening and closing status from the observation window.

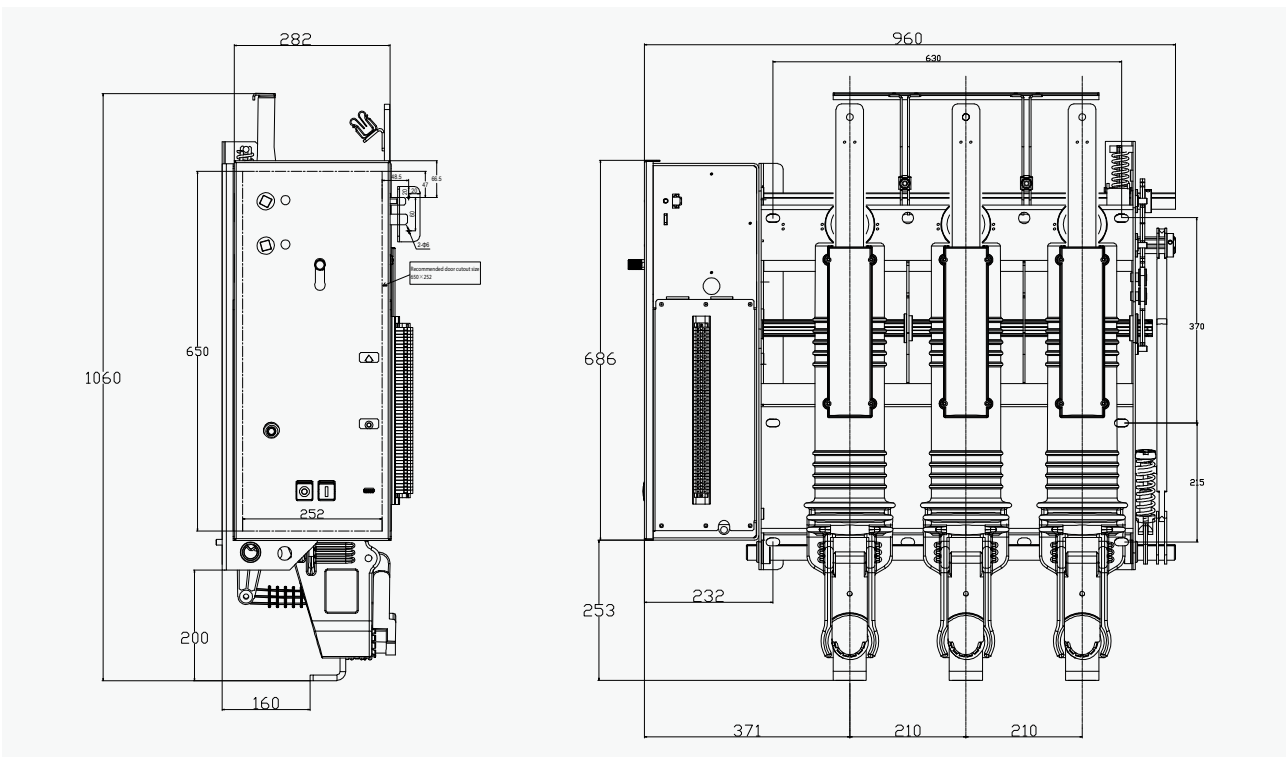
7.10 Circuit breakers, isolating switch, earthing switch, interlocking of cabinet doors

- The isolating switch and the earthing switch are mutually forced to be mechanically interlocked, and the two can only be combined into one, and cannot be closed at the same time; after the earthing switch is opened, the isolating switch can be closed; after the isolating switch is closed, the earthing switch cannot be closed.
- When the closing lock is in the locked position, the circuit breaker can be closed, and the isolating switch and the earthing switch cannot be operated.
- When the closing lock is in the unlocked position, the circuit breaker cannot be closed, and the isolating switch and the earthing switch can only be operated.
- After the circuit breaker is closed, the closing lock cannot be unlocked, and the isolating switch and the earthing switch cannot be operated.
- The cabinet door can only be opened after the earthing switch is closed.
- After the cabinet door is closed, the earthing switch can be opened.

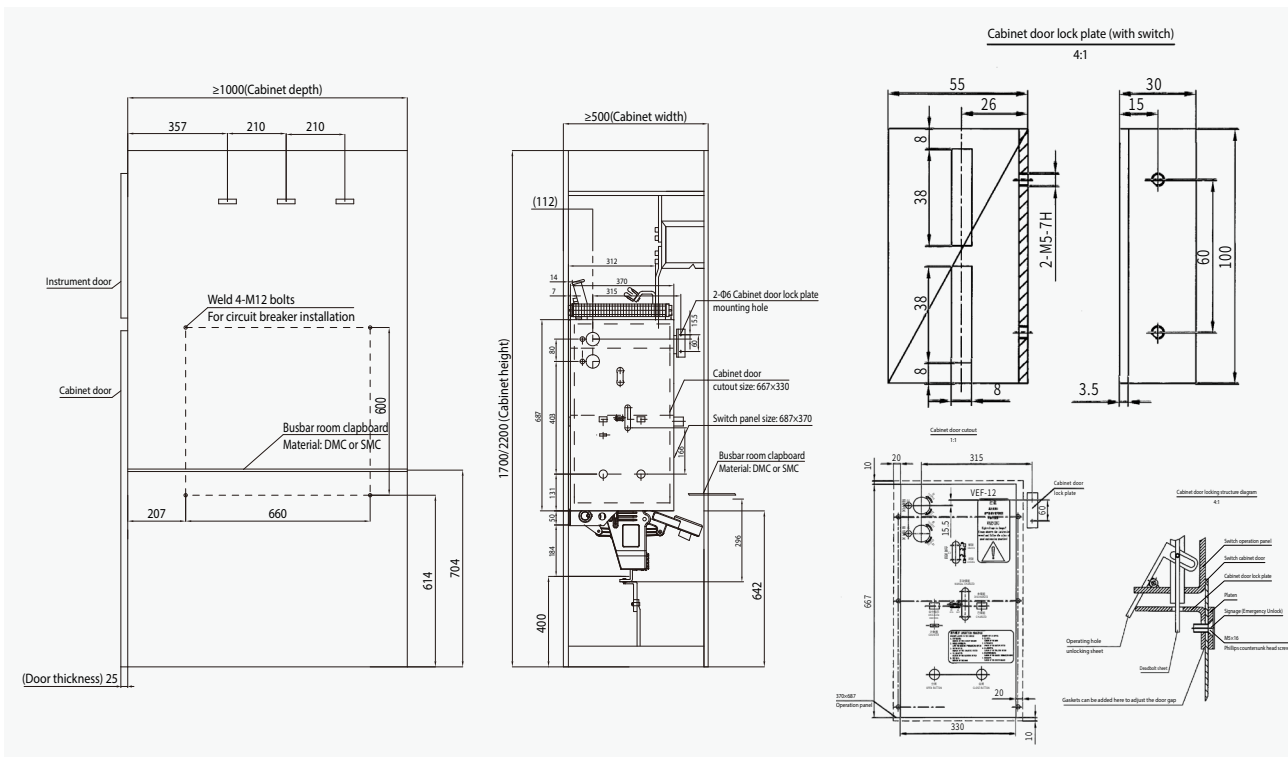
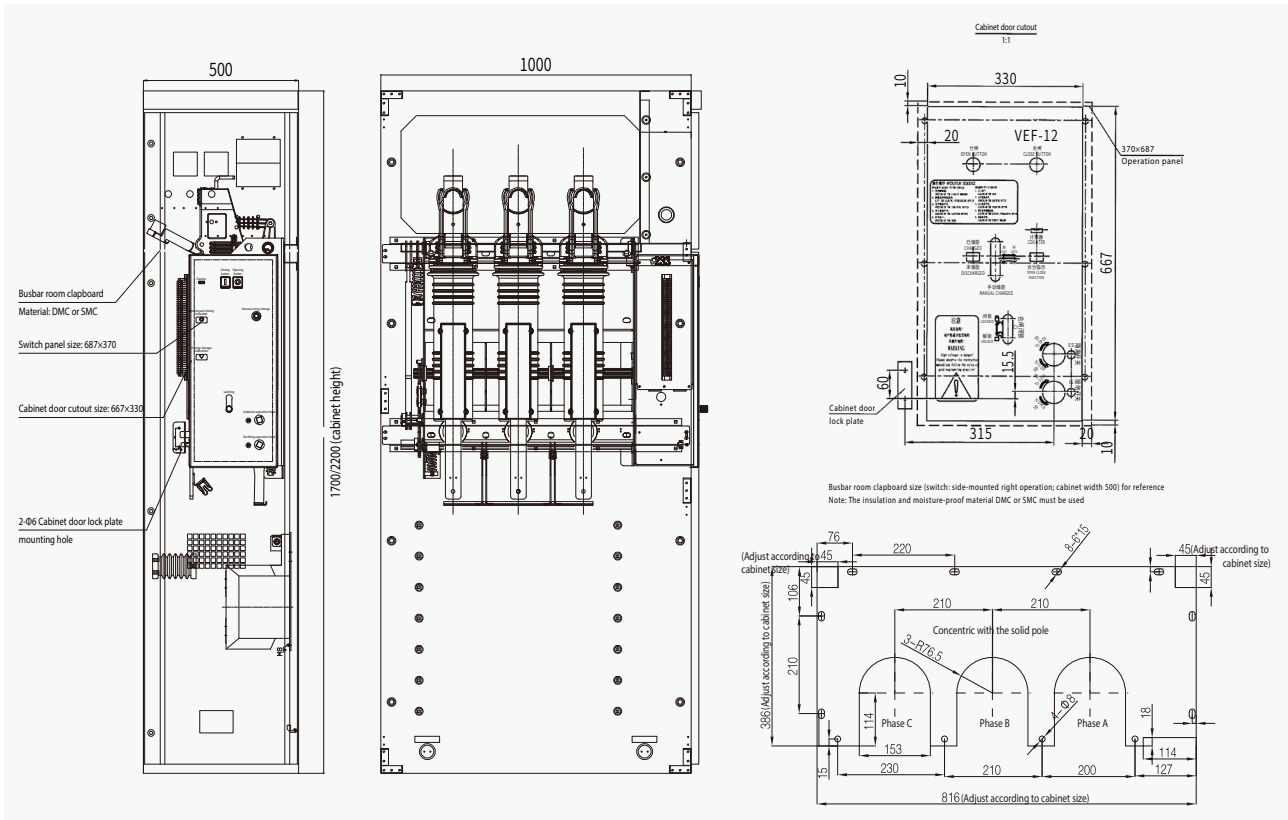
7.11 Installation dimension diagram of VEF-12 series VCB - combination application



Installation diagram on the right side of front-installation (YCZGD)



Installation diagram on the left side of inverted-installation (ZGDC)



8.1 Overview of GN30/GN19 series isolation switch

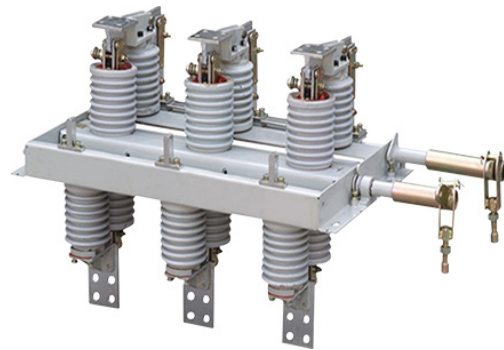
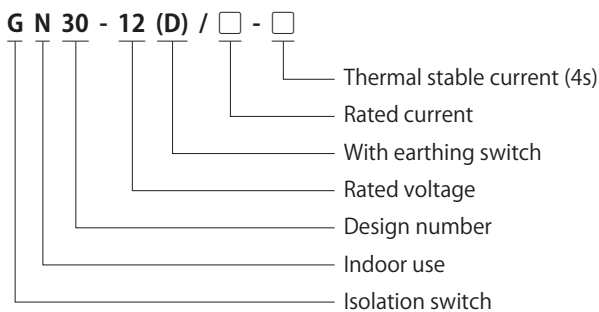
GN30-12 type rotary indoor high-voltage isolating switch is a new type of isolating switch with rotary knife contact. The main structure is to fix two sets of insulators and contacts on the upper and lower planes of the three-phase common chassis. Rotate the contact knife to realize the opening and closing of the switch.

The GN30-12D switch is based on the GN30-12 switch with a grounding knife, which can meet the needs of different power systems. This product is compact in design, small in space, strong in insulation capacity, easy to install and adjust, and its performance meets the requirements of GB198589 "AC High Voltage Isolating Switch and Grounding Switch". It is suitable for indoor systems with a rated voltage of 10 kV AC 50Hz and below. In the case of voltage and no load, it is used for opening and closing circuits. It can be used together with the high-voltage switchgear or alone.

GN19-12 series indoor high-voltage isolating switch is related to high-voltage switchgear, used in power systems with rated voltage 12kV, AC 50Hz and below, and equipped with GS6-1 human-operated mechanism, as a condition of voltage and no load. It is used for splitting and combining circuits, and there are also derivative products of anti-fouling type, plateau type, and the addition of live display devices.

8.2 Product model description

GN30-12(D) Indoor rotary high-voltage disconnecter



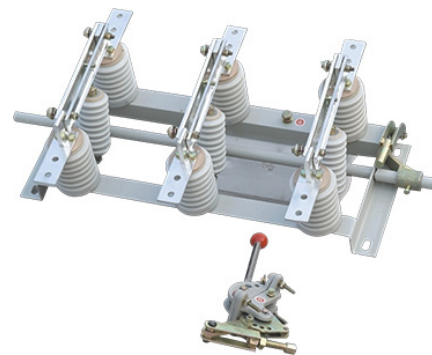
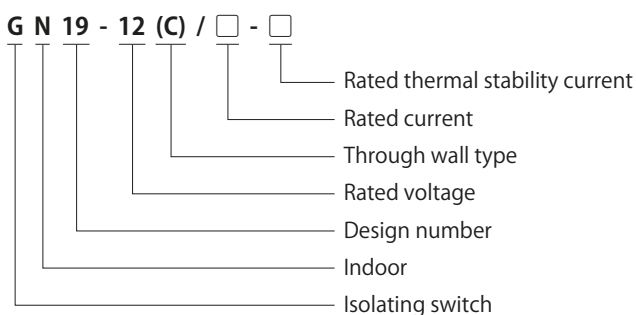
GN30-10 series indoor high-voltage disconnecters and GN30-10D type switches are added with earthing blades on the basis of GN30-10 type switches, which can meet the needs of different power systems.

Common models of disconnecting switches in general series are:

- | | | | | |
|-----------------|------------------|------------------|------------------|------------------|
| ■ GN30-10/630A | ■ GN30-10/1000A | ■ GN30-10/1250A | ■ GN30-10/2000A | ■ GN30-10/3150A |
| ■ GN30-10D/630A | ■ GN30-10D/1000A | ■ GN30-10D/1250A | ■ GN30-10D/2000A | ■ GN30-10D/3150A |

In addition, it can also be used as a switching device, as well as an anti pollution type, plateau type and a live display device.

GN19-12 Indoor rotary high-voltage disconnecter



It should be noted that the types of GN19-10 indoor high-voltage disconnecters are divided into GN19-10 flat type; GN19-10C is wall through type (with casing);

Wherein: C1—rotating at the casing side, C2—breaking at the casing side, and C3—both sides are casings. The GN19-10Y flat type is equipped with live display device.

Common models are as follows:

- | | | | |
|-----------------|-----------------|------------------|------------------|
| ■ GN19-10A400A | ■ GN19-10/630A | ■ GN19-10/1000A | ■ GN19-10/1250A |
| ■ GN19-10C/400A | ■ GN19-10C/630A | ■ GN19-10C/1000A | ■ GN19-10C/1250A |

8.3 Main technical parameters

■ GN30-12(D) Indoor rotary high-voltage disconnecter

Model	Rated voltage (kV)	Maximum operating voltage (kV)	Rated current (A)	Dynamic stability current (kA) (peak value)	4s Thermal stability current (kA) (Valid value)
GN30-10/630A	10	11.5	630	50	20
GN30-10/1000A	10	11.5	1000	80	31.5
GN30-10/1250A	10	11.5	1250	80	31.5
GN30-10/2000A	10	11.5	2000	100	40
GN30-10/2500A	10	11.5	2500	100	40
GN30-10/3150A	10	11.5	3150	100	40
GN30-10D/630A	10	11.5	630	50	20
GN30-10D/1000A	10	11.5	1000	80	31.5
GN30-10D/1250A	10	11.5	1250	80	31.5
GN30-10D/2000A	10	11.5	2000	100	40
GN30-10D/2500A	10	11.5	2500	100	40
GN30-10D/3150A	10	11.5	3150	100	40

■ GN19-12 Indoor rotary high-voltage disconnecter

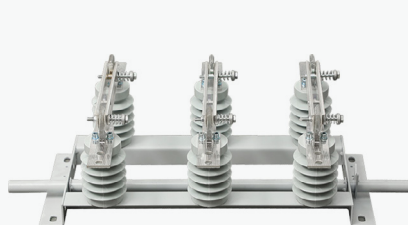
Model	Rated voltage (kV)	Maximum operating voltage (kV)	Rated current (A)	Dynamic stability current (kA) (peak value)	2s Thermal stability current (kA)
GN19-10/400A	10	11.5	400	31.5	12.5
GN19-10/630A	10	11.5	630	50	20
GN19-10/1000A	10	11.5	1000	80	31.5
GN19-10/1250A	10	11.5	1250	100	40
GN19-10C/400A	10	11.5	400	31.5	12.5
GN19-10C/630A	10	11.5	630	50	20
GN19-10C/1000A	10	11.5	1000	80	31.5
GN19-10C/1250A	10	11.5	1250	100	40

8.4 Environmental conditions

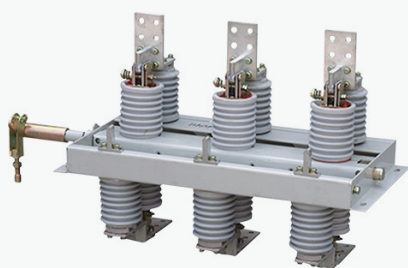
GN30-12(D) Indoor rotary high-voltage disconnecter

- The altitude shall not exceed 1000m;
- Ambient air temperature: upper limit +40 °C , lower limit - 10 °C in general areas; - 25 °C in alpine regions;
- Relative air humidity: The daily average value is not more than 95%, and the monthly average value is not more than 90%;
The daily average value of saturated steam pressure is not greater than 2.2×10^{-3} MPa, the monthly average value is not more than 1.8×10^{-3} MPa ;
- There is no place with fire, explosion, serious pollution, chemical corrosion and severe vibration.

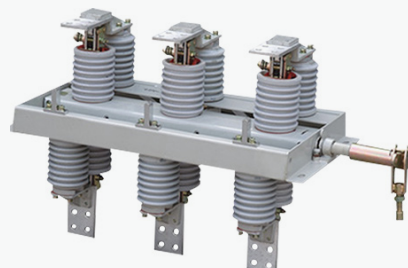
8.5 Photo display of indoor rotary high-voltage disconnecter



GN19-12
(Indoor isolating switch)



GN30-12(D)
(Indoor isolating switch)



GN30-12
(Indoor isolating switch)

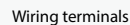
8.6 Product structure and working principle

The conductive parts of each phase of indoor high-voltage disconnectors GN19-10/400A, GN19-10/630A, GN19-10/1000A and GN19-10/1250A are fixed on the base through two post insulators. (For GN19-10C/400A, GN19-10C/630A, GN19-10C/1000A and GN19-10C/1250A, one is a post insulator and the other is a porcelain bushing insulator), three-phase parallel installation is adopted, and the conductive part is composed of contact knife, static contact, contact base (or conducting rod). The middle of each phase contact knife is connected with a pull rod insulator, which is connected with the main shaft installed on the base. The main shaft is connected with the connecting rod and CS6-1 hand mechanism through the handle. The contact knife is composed of two grooved copper plates. It not only increases the heat dissipation area of the contact knife, which is beneficial to reducing temperature, but also improves the mechanical strength of the contact knife, which improves the dynamic stability of the switch.

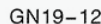
One end of the contact knife is installed on the contact base (or conductive rod) through bolts. In order to rotate the contact knife, the other end can be separately connected with the static contact knife system, and the contact pressure of the contact knife is maintained by the springs at both ends. A magnetic lock plate is arranged at the contact of the Richer indoor high-voltage disconnecter. The purpose of adding the magnetic lock plate is to strengthen the attraction between the two slot contacts when a large short-circuit current passes through, that is, increase the contact pressure, thus improving the dynamic and thermal stability of the switch. The pole current of GN19 - 10/400A and GN19-10/630 disconnectors is small. Therefore, the structure does not need magnetic lock plate.

Base assembly: it is composed of base, main shaft, stopper, stop ring, etc. The limiter is mainly used to ensure that the required end position can be obtained when the conductive contact knife is opened and closed.

8.7



GN30-12(D) Disconnecter installation dimension



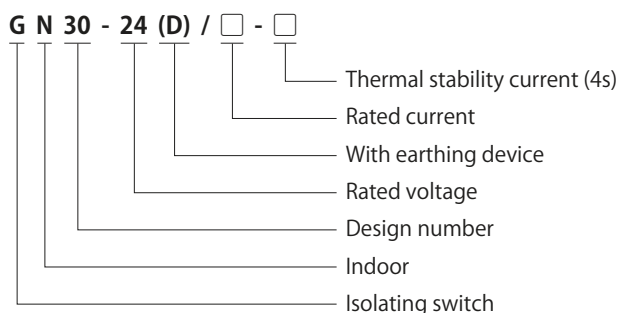
GN19-12 Disconnecter installation dimension

8.8 Overview of GN30-24(D) disconnectors

GN30-24 type rotary indoor high voltage disconnector is a new type of rotary contact switch. Its main structure is to fix two sets of insulators and contacts on the upper and lower two planes of the three-phase common base frame, through which the rotary contact is used. So as to realize the closing and opening of the switch.

GN30-24 switch is based on GN30-24 switch with earthing knife, which can meet the needs of different power systems. The product is compact in design, small in occupation space, strong in insulation capacity and easy to install and adjust. Its performance meets the requirements of GB1985-89 "AC high voltage disconnector and earthing switch". It is suitable for indoor power system with a rated voltage of 12kV/ AC50Hz and below, as the opening and closing circuit with or without voltage load. It can be used together with high-voltage switch cabinet or separately.

8.9 Product model description



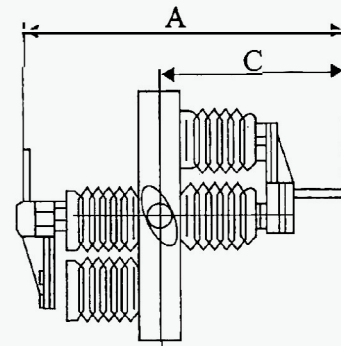
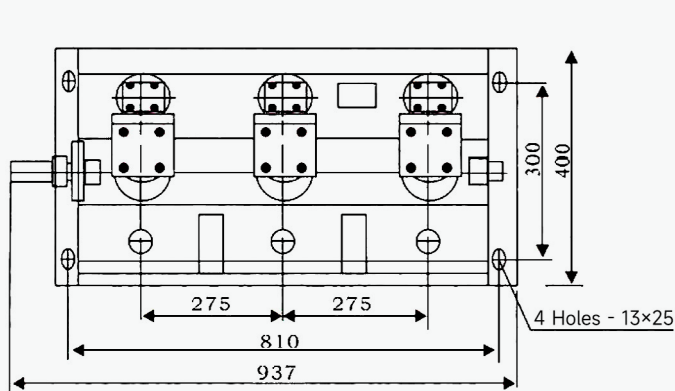
8.10 Use environment

- Altitude not more than 1000 meters;
- Ambient temperature not more than +40°C , no less than -10°C ;
- The average relative humidity is not more than 95% per day and 90% per month;
- The seismic intensity shall not exceed 8 degrees;
- Places without serious dust, chemical corrosive and explosive substances;
- Places without frequent and violent vibration.

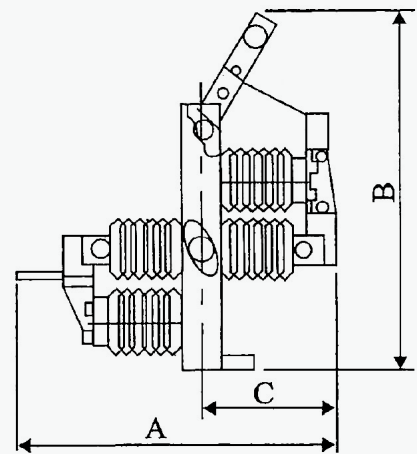
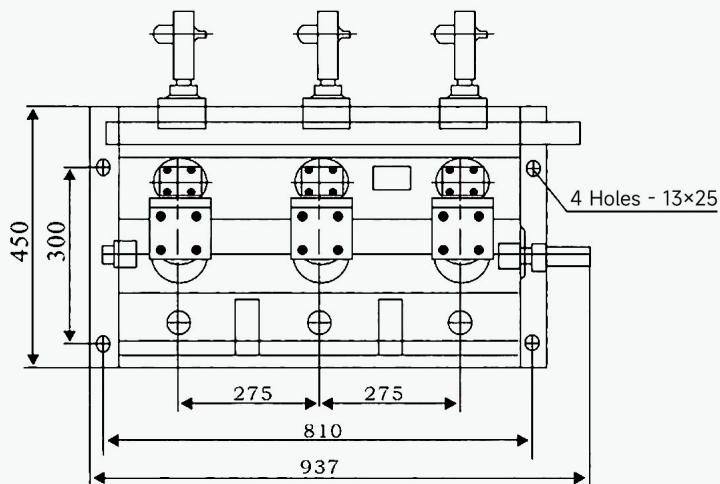
8.11 Technical parameter

Item		Unit	Model and specification			
			GN30-24(D)/400-24.5	GN30-24(D)/630-20	GN30-24(D)/1000-31.5	GN30-24(D)/1250-31.5
Rated voltage		kV	12			
Maximum voltage		kV	12.5			
Rated current		A	400	630	1000	1250
Thermally stable current		kA	12.5	20	31.5	
Thermal stability time		S	4			
Dynamic stable current		kA	31.5	50	80	
Rated insulation level	Rated impulse voltage	kV	75			
	1min power frequency withstand voltage	kV	42			

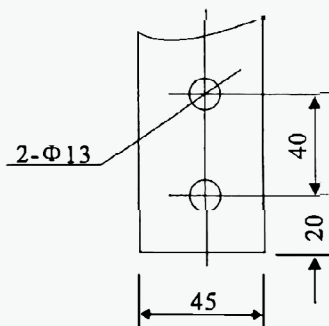
8.12 Outline and installation dimension



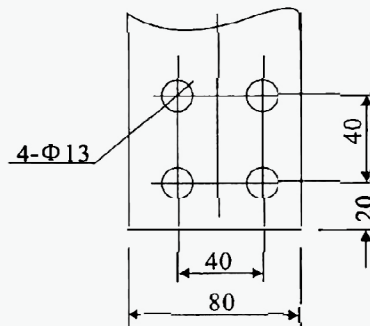
GN30-24/400(630, 1000) Outline and installation dimension



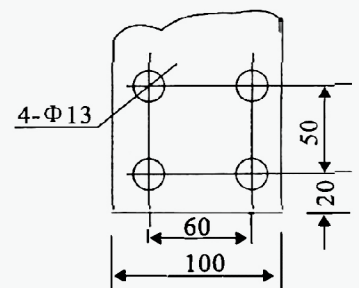
GN30-24D/400(630, 1000) Outline and installation dimension



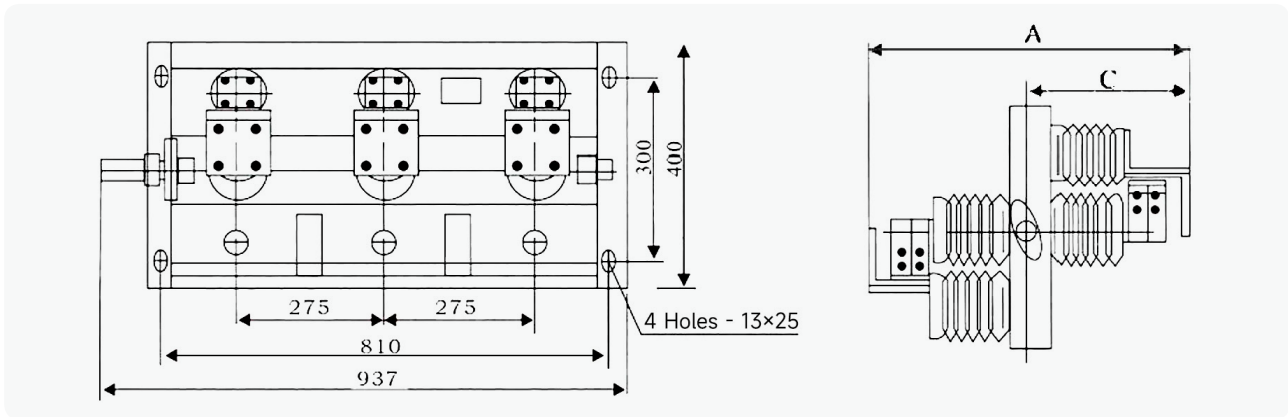
400A / 630A



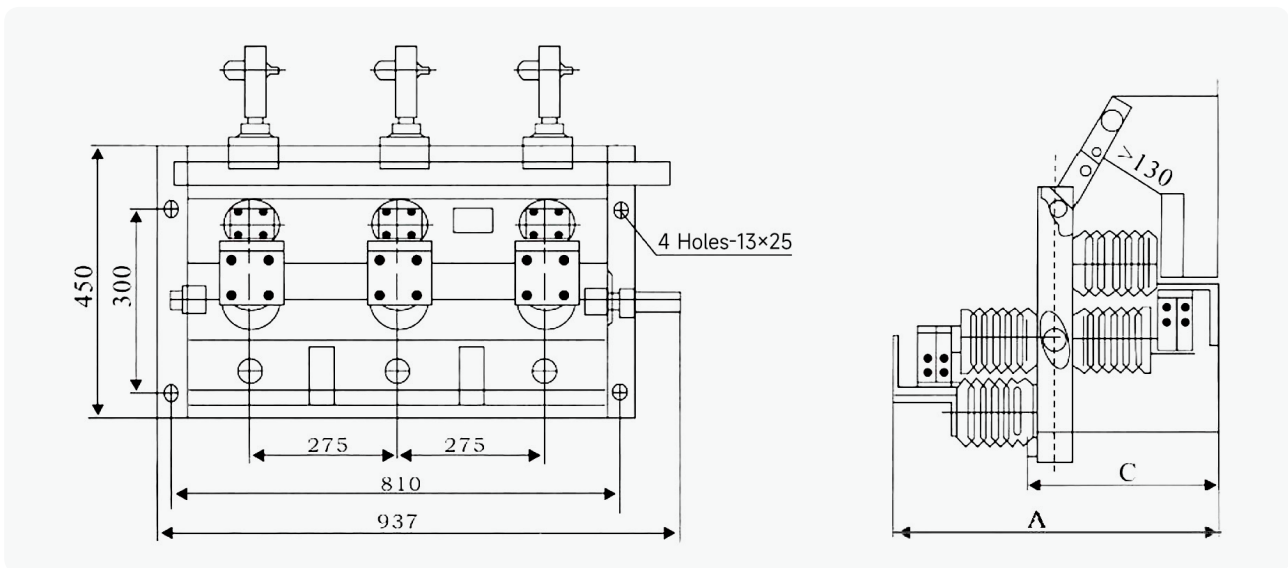
1000A



1250A



GN30-24/1250 Outline and installation dimension



GN30-24D/1250 Outline and installation dimension

GN30-24						GN30-24D								
400A / 630A		1000A		1250A		400A / 630A			1000A			1250A		
A	C	A	C	A	C	A	B	C	A	B	C	A	B	C
~560	~315	~580	~332	~580	~295	~550	~610	~240	~575	~615	~245	~580	~600	~295

8.13 Ordering instructions

- When ordering this switch, the technical data such as model, specification, rated voltage and rated current shall be indicated;
- If there are special requirements, they can be solved through consultation with the manufacturer.

E4-GP-202211

Indoor High Voltage Switch Series Selection Manual

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

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