阿埃凯
AAIKAI

FZN61-12GD/630-20
FZRN61-12GD/200-31.5

Vacuum load switch-fuse combination unit

Product Instruction Manual

Zhejiang Aikai Electric Co., Ltd.

catalog

I. Product Overview

1.1.1 The FZRN61-12G indoor vacuum disconnect load switch boasts excellent electrical and mechanical performance, a reliable and stable mechanism, long service life, and is a maintenance-free product. This product is widely used in three-phase AC power distribution systems (3.6-12kV, rated frequency 50Hz) in factories, schools, residential communities, and high-rise buildings for receiving and distributing electrical energy. It can be used in ring network switchgear, prefabricated substations, and switching stations.

1.1.2 The product's excellent insulation and mechanical properties ensure reliable operation even in severely polluted environments. It features comprehensive mechanical and electrical interlocking devices, providing extremely high operational stability and reliability, ensuring the safety of operators and equipment, and ensuring electrical safety.

• This product is a modular switch; its frame structure is compact, integrating a disconnect switch, vacuum load switch, fuse, and grounding switch into a high-performance high-voltage electrical product.

• Small size: In the open/closed state, the width of the vacuum disconnect load switch is ≤299mm. High parameters: Vacuum disconnect load switches have a rated current of up to 1250A; combined electrical appliances have a rated current of up to 200A, capable of protecting 2000kVA transformers

• The incoming line disconnect switch is linked to the grounding switch; when the grounding switch is opened, the incoming line disconnect switch closes within the same operation.

Rotary disconnect switch with a visible break after opening.

Mechanical interlock between the vacuum load switch and the disconnect (grounding) switch prevents misoperation. Ensure the disconnect switch is closed before closing the vacuum load switch; the vacuum load switch is opened before opening the disconnect switch.

• The load switch can be equipped with an electric operating mechanism, allowing for both electric and manual operation and remote control.

Optional auxiliary switches, shunt trips, and overcurrent trip devices are available.

• The opening and closing speed of the vacuum disconnect load switch is unaffected by the degree of manual operation.

The anti-misoperation mechanism meets the "five protections" requirements of complete high-voltage equipment.

1.2 Environmental Conditions

1.2.1 Ambient Temperature: -25°C to +40°C;

1.2.2 Relative Humidity: Daily average ≤95%, Monthly average ≤90%;

1.2.3 Poster Height: Not exceeding 1000m;

1.2.4 Seismic Intensity: Not exceeding 8 degrees;

1.2.5 Location of Use: Free from explosion hazards, chemicals, severe vibrations, and pollution.

1.2.6 Usage Conditions Above 1000m Altitude: At altitudes above 1000m, air density decreases, affecting the protection factor of electrical appliances.

• Users must perform relevant calculations when selecting switches.

• Recommended Calculation Method: Determine the altitude H of the specified location. Calculate the relevant altitude coefficient Ka according to GB311.1 (Formula 1). Multiply the switch's lightning impulse withstand voltage and power frequency withstand voltage by Ka. The resulting value represents the withstand voltage parameter that the switch must meet when used at high altitudes H and in environments below 1000m.The following pressure resistance parameters must be met in the specified environment. Formula 1: $K\alpha = \frac{1}{1.1-Hx10^{-4}}$

II. Product Overview

Highly safe arc-extinguishing chamber

High reliability, stable insulation performance, more robust structure, miniaturization, maintenance-free, more environmentally friendly, and high mechanical resistance.

Built-in arc-extinguishing chamber optional

Visual isolation break

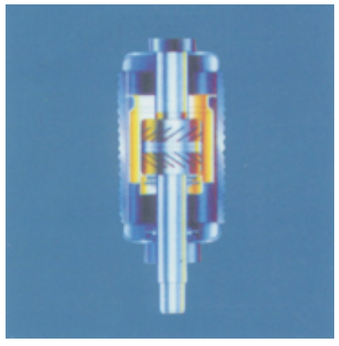
Rotary disconnect switch with a visible break after opening.

45° fuse clip

It is more convenient and easier to replace fuses than 90° fuse clips.

Reliable arc extinguishing performance

A vacuum interrupter is used, which employs contacts that generate a transverse magnetic field. In the transverse magnetic field contacts, when the instantaneous current reaches 10kA, the arc is diffused, while higher currents will form a concentrated arc.

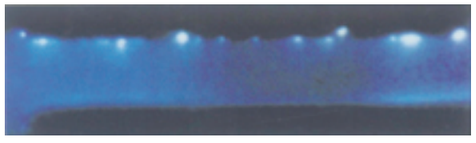


Vacuum interrupter structure principle

Small interception value

When the current drops below a certain minimum, the metal vapor arc will be cut off before the normal current reaches zero, resulting in overvoltage. Therefore, in an inductive circuit, this cutoff value should be reduced as much as possible to prevent the generation of high overvoltage.

The current-cutting value mainly depends on the contact material. By optimizing the copper anode material , the average current-cutting value can be 3A.



When interrupted, a concentrated electric arc (I=40kA, transverse magnetic field contact) is generated.

Minimal contact burn

Because the metal vapor plasma in the vacuum interrupter has good conductivity, the arc voltage is low (20-200V), the arc energy is low, and the arc time is short during the interruption process. It has the advantages of low contact burn-out and long service life.

A diffused arc before the current crosses zero during interruption (I=2kA, transverse magnetic field contact).

Low contact resistance

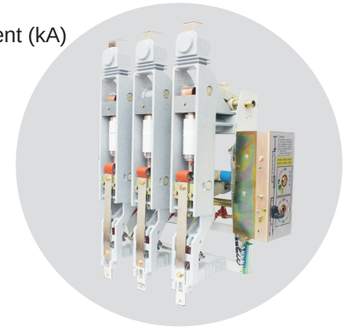
In a vacuum, the contact surface is free of impurities and contaminants. Using contact materials with good conductivity ensures minimal contact resistance, resulting in a correspondingly lower temperature rise.

III. Model Number and Meaning

3.1 Vacuum Load Switch

F Z N 61 – 12 G D / T 630 – 25

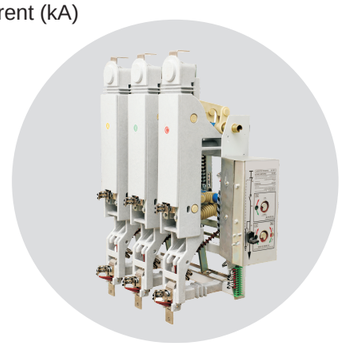
- Short-time withstand current (kA)
- Rated current (A)
- Spring mechanism
- Grounding switch
- Disconnecting switch
- Rated voltage (kV)
- Design serial number
- Indoor
- Vacuum arc extinguishing
- Load switch



3.2 Vacuum load switch-fuse combination appliance

F Z R N 61 – 12 G D / T 200 – 31.5

- Short-time withstand current (kA)
- Rated current (A)
- Spring mechanism
- Grounding switch
- Disconnecting switch
- Rated voltage (kV)
- Design serial number
- Indoor
- Fuse
- Vacuum arc extinguishing
- Load switch



3.3 Model Specifications Table

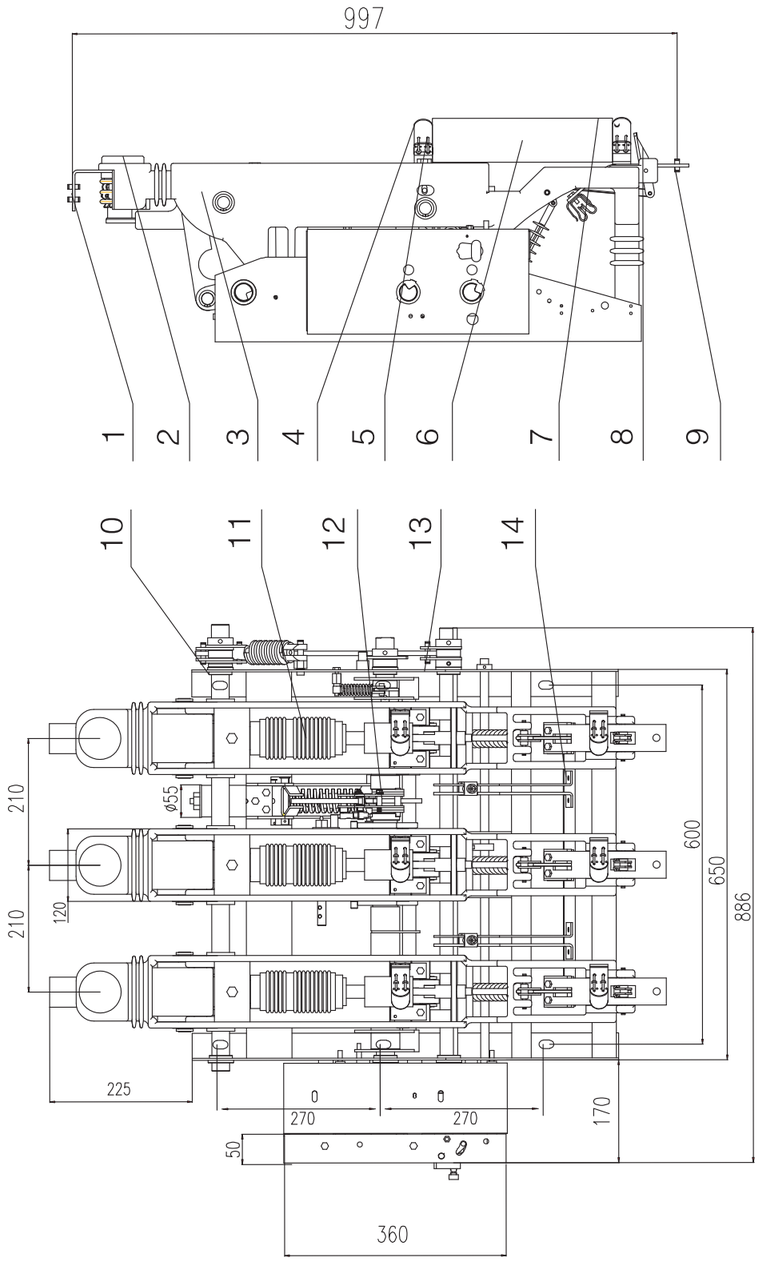
NO	Model	Name
1	FZN61-12G/T630-20	Vacuum disconnect load switch
2	FZN61-12GD/T630-20	Vacuum disconnect load switch (grounding switch)
3	FZRN61-12G/T200-31.5	Vacuum disconnect load switch - (fuse combination appliance)
4	FZRN61-12GD/T200-31.5	Vacuum disconnect load switch - (fuse combination switch) (grounding switch)

IV. Technical Parameters and Performance

4.1 Main Electrical Technical Parameters Table

NO	Parameter name	unit	Vacuum load switch		Vacuum load switch-fuse combination appliance
			FZN61-12 GD/T630-20	FZN61-12 GD/T1250-25	FZRN61-12GD/T200-31.5
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 making current	kA	63		80
7	Rated active load starting current	A	1250		
8	Rated closed-loop breaking current	A	1250		
9	Disconnecting unloaded transformers	KVA	2000		
10	Ground fault current	A	20		
11	Line and cable charging current under ground fault conditions	A	20		
12	Rated short-circuit breaking current	kA	-		31.5/50(Depending on the fuse)
13	Rated AC current / Transfer current	A	3150		
14	Fixed time	ms	45		
15	Power frequency withstand voltage (1 min)	kV	Phase-to-phase, phase-to-ground, vacuum fracture: 42; isolation fracture: 48		
16	Lightning impulse withstand voltage	kV	Phase-to-phase, phase-to-ground, vacuum fracture: 75; between isolated fractures: 85		
17	Mechanical life	number	> 10000		

V. Structural Diagram

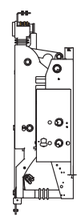


1. Appeared above
2. Disconnecting switch
3. Insulating base
4. Flexible connection
5. Install fuse clips
6. Fuse
7. Lower fuse clip
8. Tripping plate
9. Out of bounds
10. Metal frame
11. Vacuum interrupter
12. Spring mechanism
13. Control Panel
14. Grounding switch

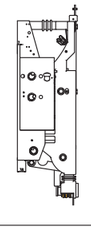
Structural diagram

VI. External Dimensions Drawing

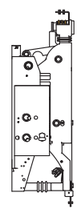
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted right-hand operation



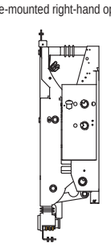
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted inverted left operation

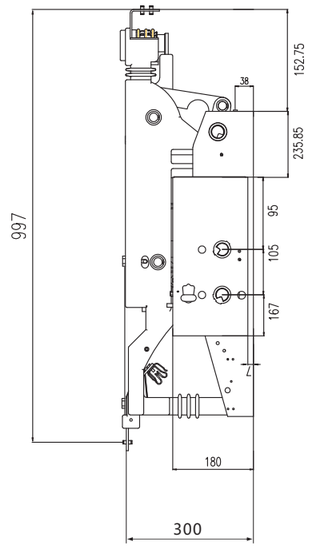


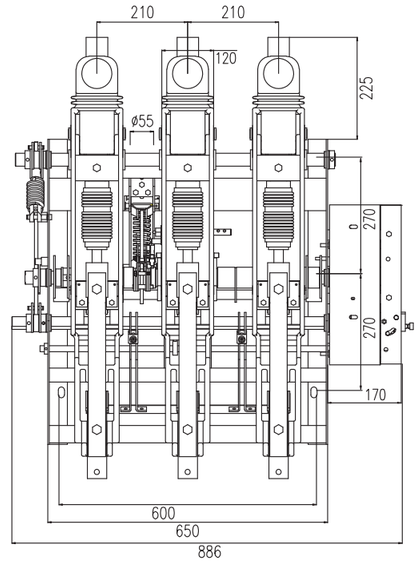
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted inverted left operation

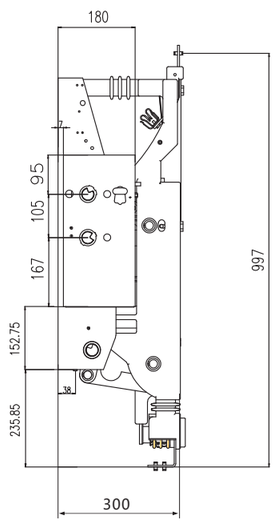


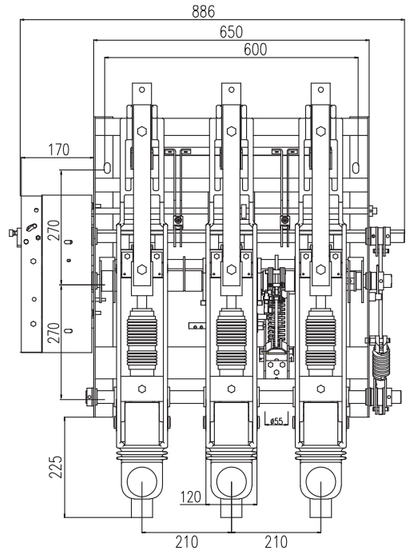
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted right-hand operation





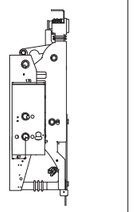




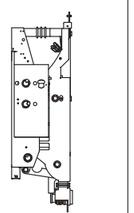


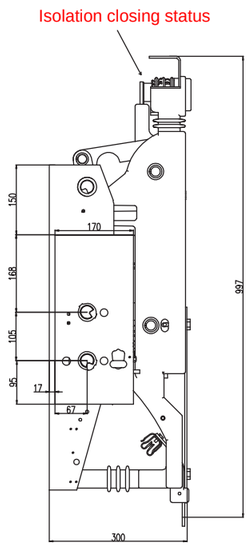
VI. External Dimensions Drawing

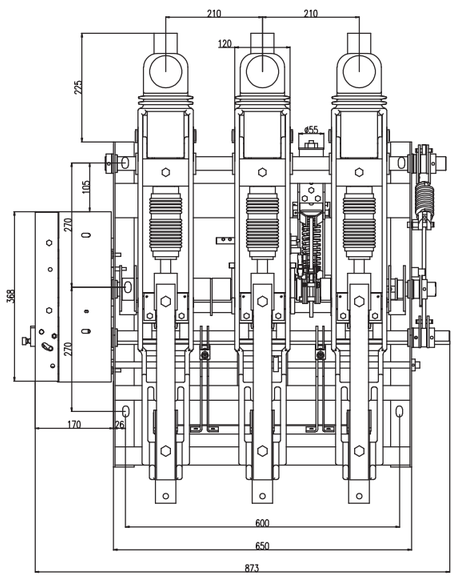
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted left-hand operation



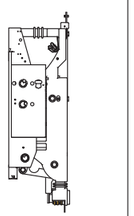
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted inverted right operation



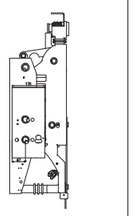


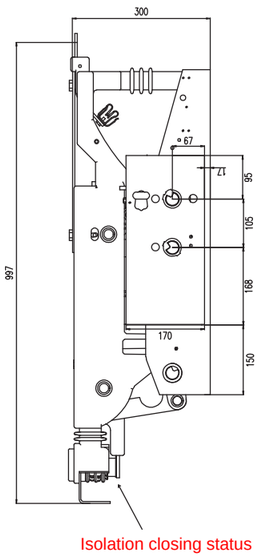


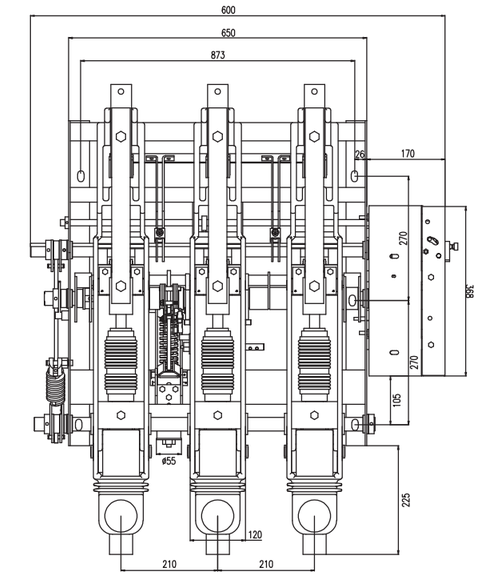
FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted inverted right operation



FZN61-12G/T630-25
FZN61-12GD/T1250-25
Side-mounted left-hand operation

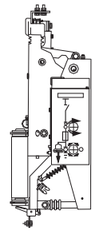




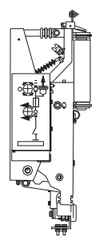


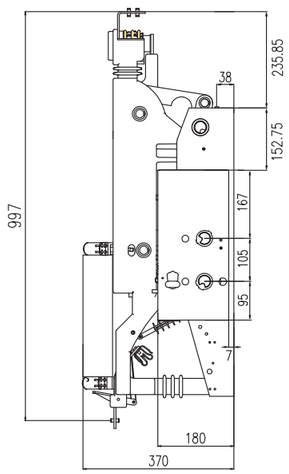
VI. External Dimensions Drawing

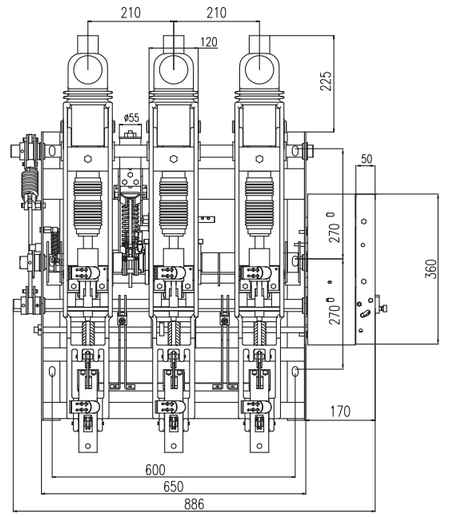
FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted right-hand operation



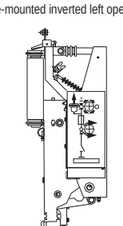
FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted inverted left operation



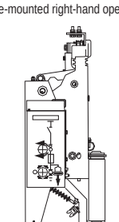


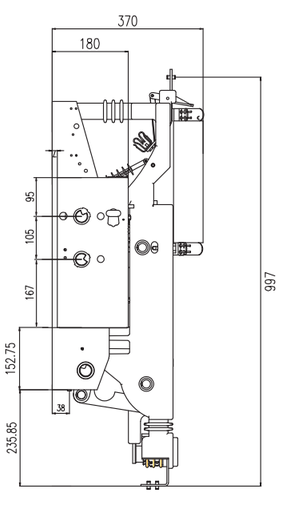


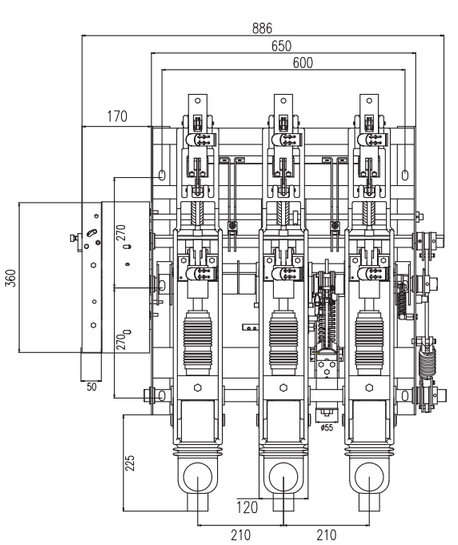
FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted inverted left operation



FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted right-hand operation

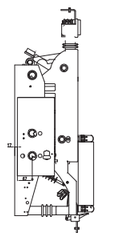






VI. External Dimensions Drawing

FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted left-hand operation



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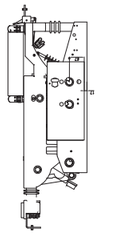
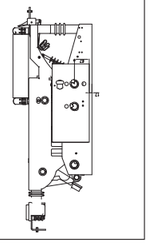
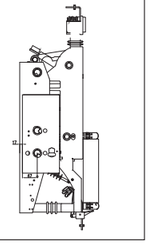
FZRN61-12GD/T200-31.5
Side-mounted inverted right operation

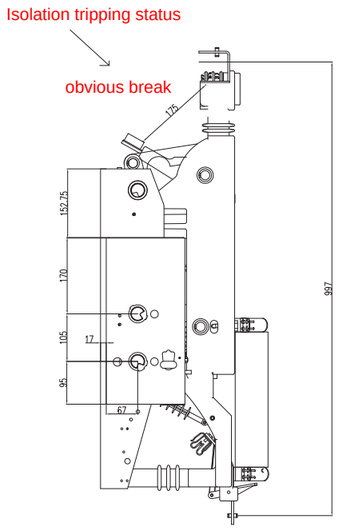


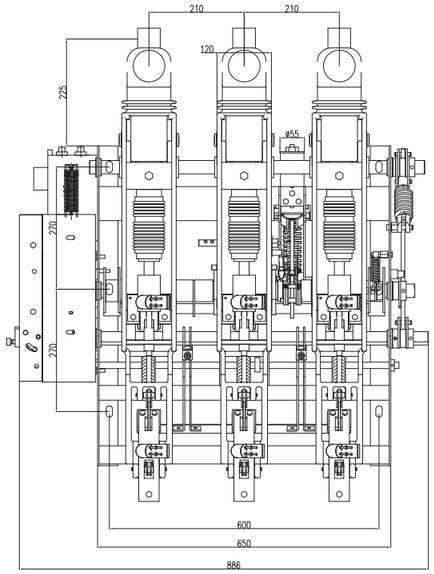
FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted inverted right operation



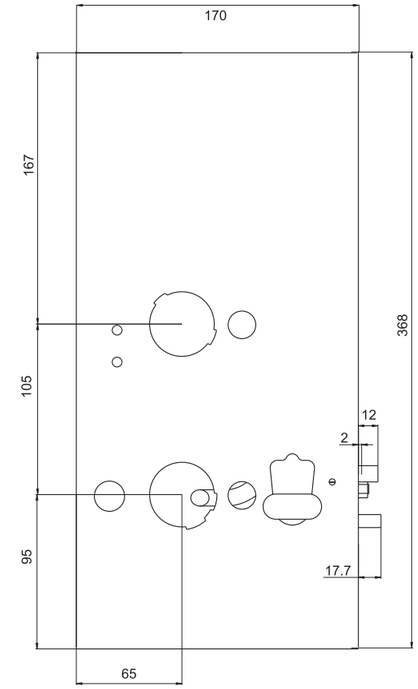
FZRN61-12G/T200-31.5
FZRN61-12GD/T200-31.5
Side-mounted left-hand operation



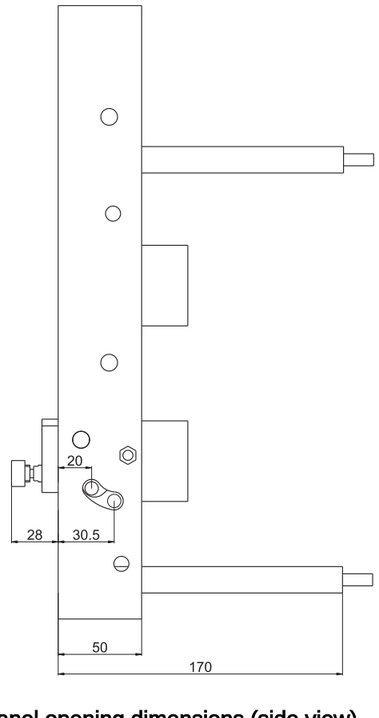




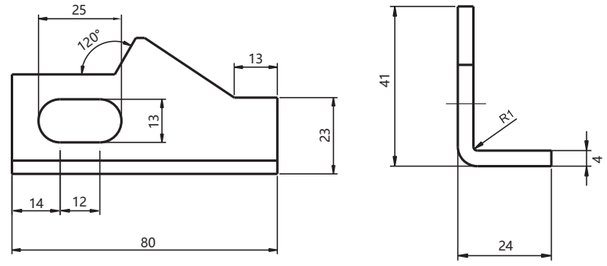
VII. Panel Dimensions



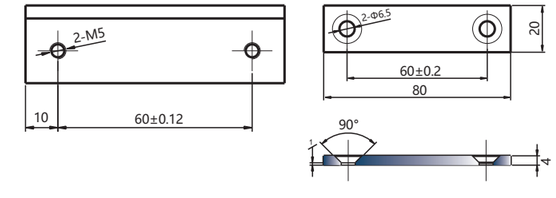
Panel opening dimensions diagram (correct)



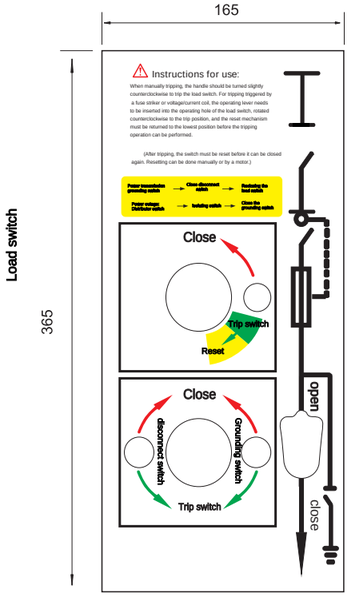
Panel opening dimensions (side view)



Cabinet door interlock plate

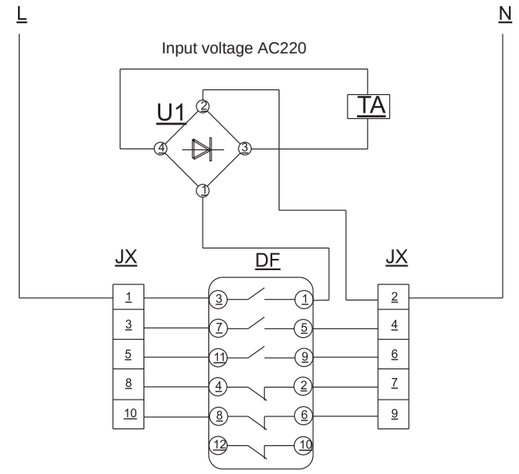


Emergency unlocking pressure plate



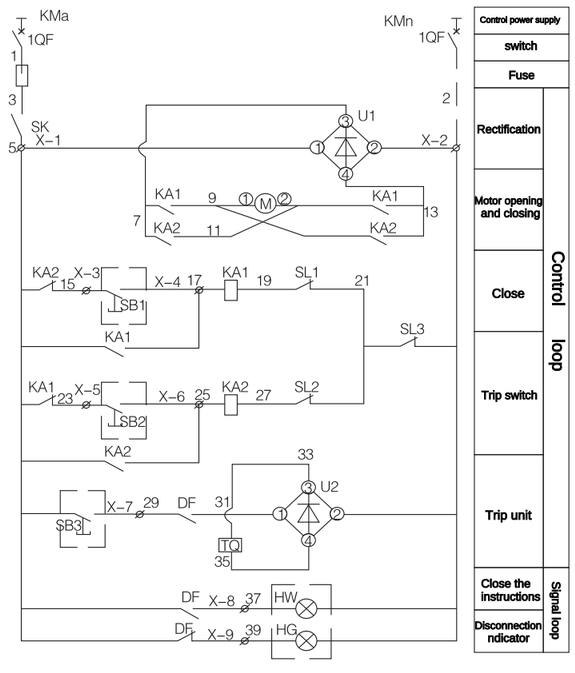
8. Electrical Schematic Diagram

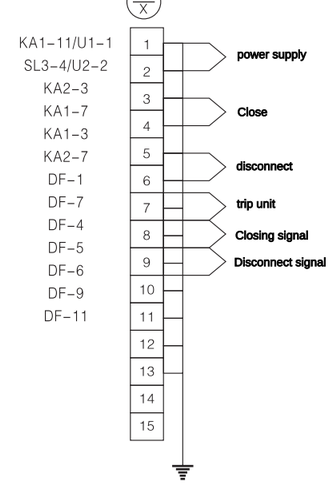
■ Electrical separation principle diagram



NO	Sign	Name	Remark	unit	quantity
6		/			
5		/			
4	TA	Trip coil	AC220V	pcs	1
3	U1	T0.07605;Silicon push	KBPC25-10	pcs	1
2	DF	Auxiliary switch	F10-10/W	pcs	1
1	JX	Terminal blocks	JH9- 660V/15A	pcs	1

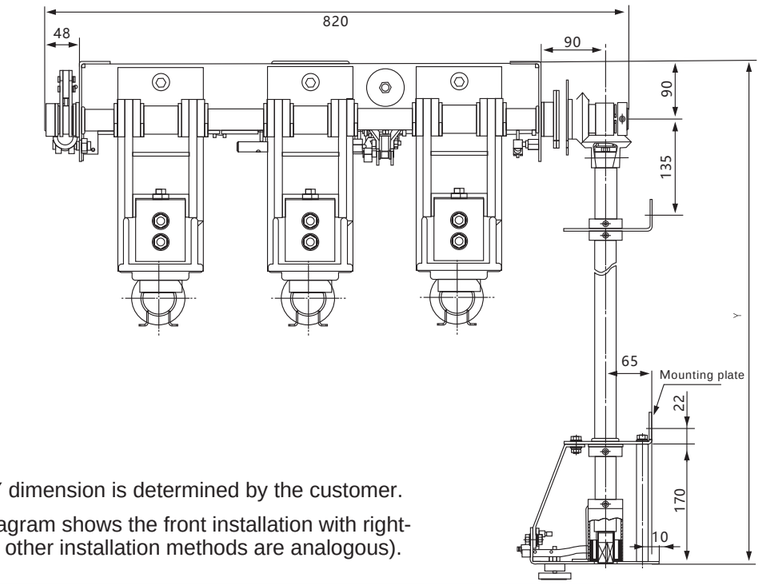
■ Electrical schematic diagram of electric mechanism





NO	Name	quantity	Remark
DF	Auxiliary switch FK10 modification	1	
TQ	Trip coil	1	
SL3	Grounding knife interlock limit switch LXW2-11	1	
SL2	Tip switch LXW2-11	1	
SL1	Closing Limit Switch LXW2-11	1	
SB3	Emergency disconnect button	1	User-provided
SB2	Disconnect button	1	User-provided
SB1	Close button	1	User-provided
M	Motor 59YZCJO2	1	
KA2	Tripping relay HH54P	1	
KA1	Closing Relay HH54P	1	
U1U2	KBPC2510 rectifier	1	
HG	Disconnect indicator light	1	User-provided
HW	Close indicator light	1	User-provided
SK	Main switch LS2-2	1	User-provided
FU	Fuse RT19-6A	1	User-provided
QF	Circuit breaker C45N-10	1	User-provided

■ Front mounting top view



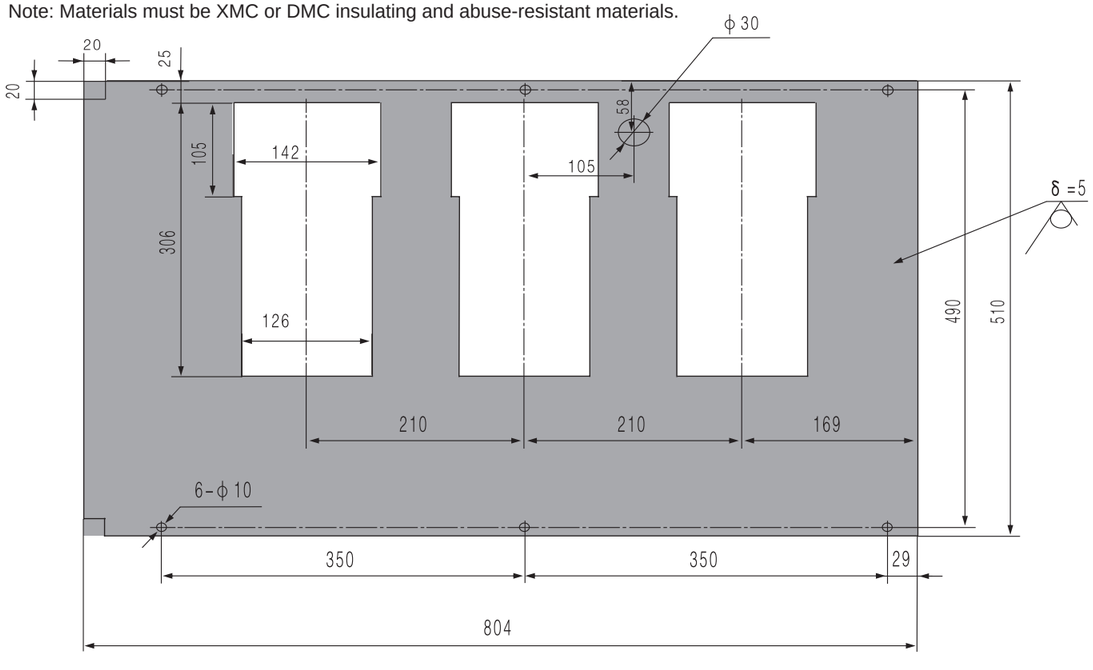
Note 1: Depth Y dimension is determined by the customer.

Note 2: (This diagram shows the front installation with right-hand operation; other installation methods are analogous).

IX. Dimensions of Insulation Boards Installed on High-Altitude Terrain

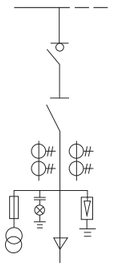
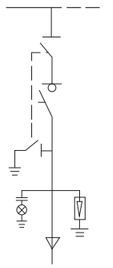
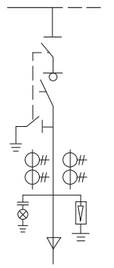
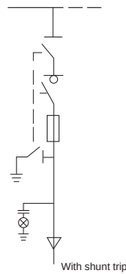
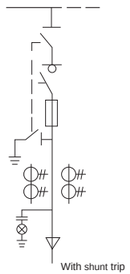
Mother compartment insulation panel dimensions (switch: side-mounted, left-operated; cabinet width 520)

Note: Materials must be XMC or DMC insulating and abuse-resistant materials.

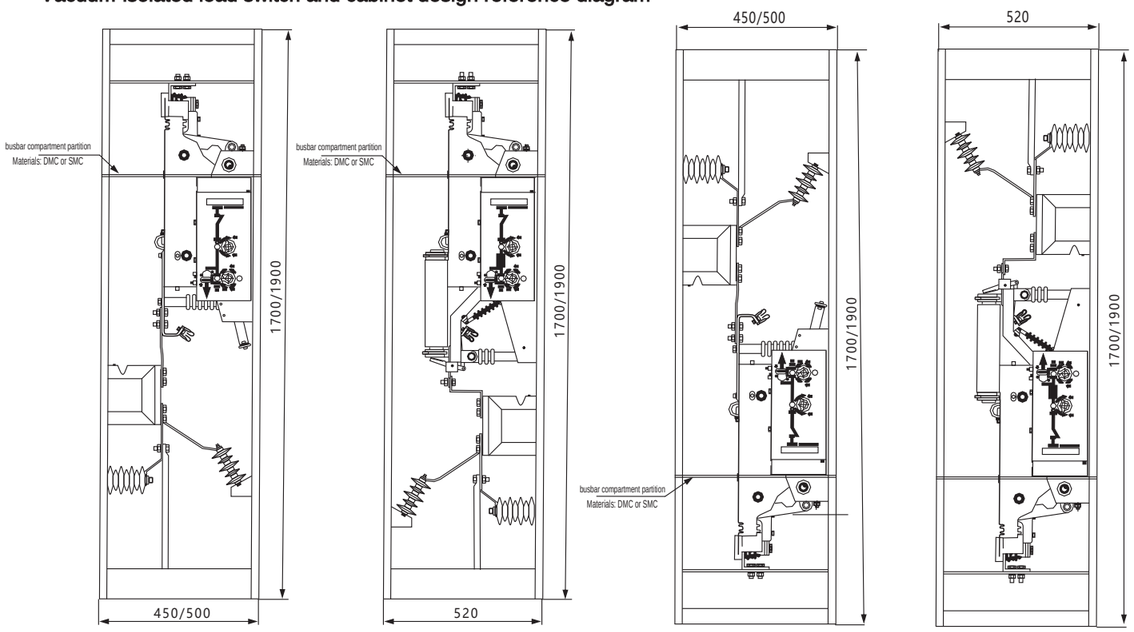


10. Cabinet Design Reference Drawings

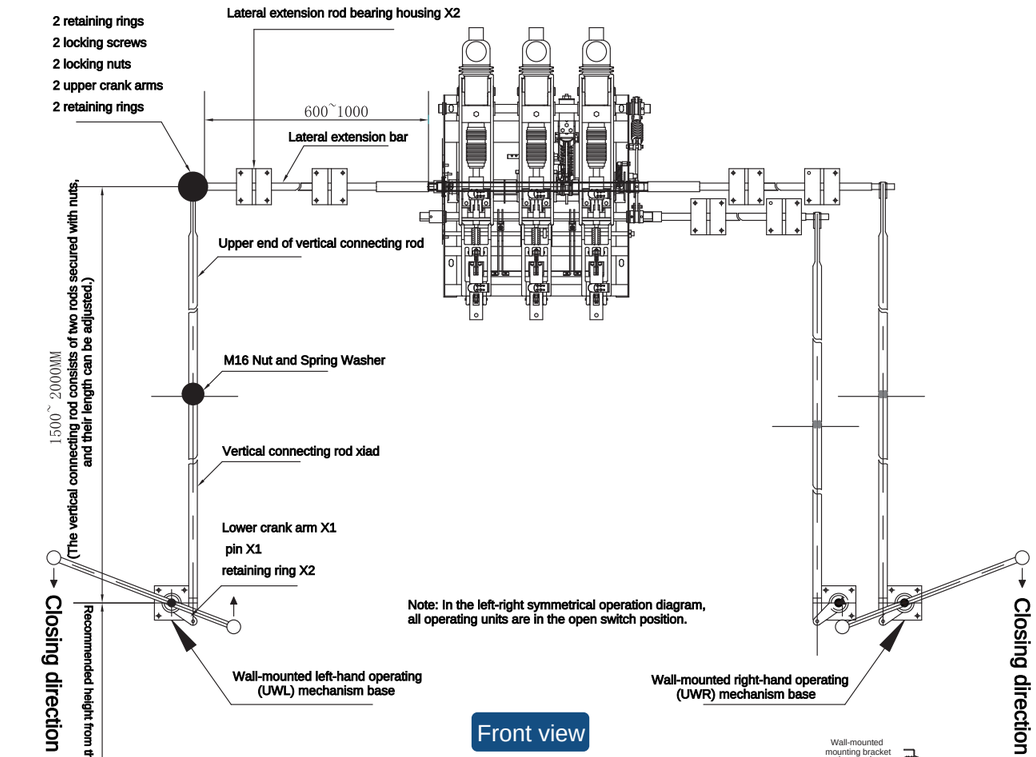
A single scheme diagram

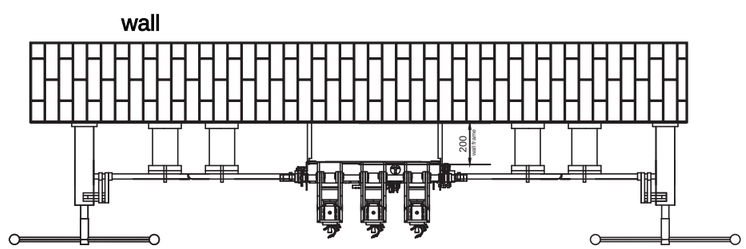
Scheme Number		01		02		03		04		05	
Main route map								 With shunt trip		 With shunt trip	
Switch cabinet model		HXGN-12		HXGN-12		HXGN-12		HXGN-12		HXGN-12	
use		Cable entry cabinet	quantity	Cable entry/exit cabinet	quantity	Cable entry/exit cabinetF	quantity	Transformer outgoing switchgear	quantity	Transformer Outgoing Line Cabinet	quantity
Main equipment components	Vacuum disconnect load switch	FZN61-12G	1	FZN61-12G	1	ZN61-12G	1	FZRN61-12GD	1	FZRN61-12GD	1
	Fuse							SF(D)LAJ-12/XXA	3	SF(D)LAJ-12/XXA	3
	Current transformer	LZZBJ9-10 XX/5A	2			LZZBJ9-10 XX/5A	2			LZZBJ9-10 XX/5A	2
	Voltage transformer	JDZ10-10R 10/0.1	1								
	Live indicator	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
	Surge arrester	HY5WS-17/50	3	HY5WS-17/50	3	HY5WS-17/50	3				
	Electromagnetic lock	DSN2-Z	1								
	cabinet interior lighting	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A	1	KGD-A	1
Cabinet dimensions (width x depth x height)		500X900X1900		500X900X1900		500X900X1900		500X900X1900		500X900X1900	

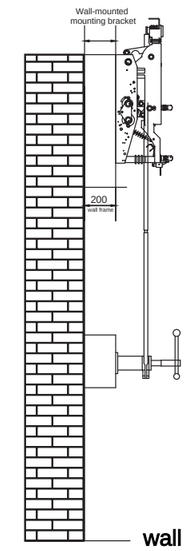
Vacuum-isolated load switch and cabinet design reference diagram



XI. Wall-mounted installation diagram







Unit of measurement: mm

12. Routine Matters

12.1 Packaging and Lifting Requirements

12.1.1 Load switches are shipped individually. When lifting is required during transportation, it should be done according to the position and direction indicators marked on the outside of the packaging box.

12.2 Unpacking Inspection

12.2.1 Upon receiving the product, the user should promptly inspect it. Check the switch packaging for any damage or breakage during transportation; check if the accessories match the packing list; check if the product model and specifications are the same as ordered. If any damage is found, contact the transportation company and the factory immediately for handling.

12.3 Random Documents, Spare Parts, and Accessories

12.3.1 Product Instruction Manual / 1 copy

12.3.2 Product Certificate of Conformity / 1 copy

12.3.3 Factory Inspection Report / 1 copy

12.3.4 Packing List / 1 copy

12.3.5 Hand Crank / 1 piece

12.3.6 Door Lock or Lock Plate (Door Interlock Angle Steel) / 1 piece each

12.4 Storage

12.4.1 The product should be stored indoors in a well-ventilated, dry place, free from severe vibration and corrosive gases. Protect it from rain, moisture, and direct sunlight.

12.4.2 If the environment is particularly humid, please have a desiccant available.

12.5 Installation

12.5.1 Before installation, check that the product is intact and that all fasteners are secure.

12.5.2 The mounting surface of the switchgear and the switch must fit snugly. If there is a gap, shims must be added to level it. Never force it with fasteners.

12.5.3 The installation dimensions of the busbars connecting to the switch's inlet and outlet lines must be accurate. Do not force them by pulling or tightening them.

12.6 Maintenance

12.6.1 Clean the insulating parts with a clean, dry cotton cloth.

12.6.2 Clean the moving contacts with a cotton cloth soaked in lubricating oil, covering their surface with a lubricating film.

12.6.3 When a fuse blows and trips the circuit breaker, a three-phase fuse of the same model and specifications must be replaced.

High-voltage load switch maintenance and repair procedures

1. Maintenance cycle and work

1. Maintenance Cycle

1.1 After the switch is put into operation, it should be maintained 1-2 times per year. A comprehensive maintenance should be carried out after interrupting 20 load currents , with a focus on the arc-extinguishing tube.

1.2 Maintenance Procedures

1.2.1 Clean dust and dirt from all components of the load switch.

1.2.2 Inspect the ceramic parts.

1.2.3 Inspect the contact parts.

1.2.4 Rust removal and corrosion protection for the metal structure.

1.2.5 Adjustment and testing after maintenance.

2. Maintenance and Inspection Engineering and Standards

1.1 The insulation components of the load switch should be clean and free from damage, cracks, and discharge marks.

1.2 The operating mechanism, transmission device, shafts, and other pins of the load switch should be complete and not loose.

1.3 All electrical connections, including moving and stationary contacts, should have tight contact, without overheating or discoloration.

1.4 The interlocking device should be in good working order and operate accurately.

1.5 The opening and closing indications of the display switch should be correct.

1.6 The grounding wire of the load switch should be free from looseness, broken strands, and corrosion.

To prevent damage to the switch due to third-party causes during operation, annual inspection and maintenance are required.