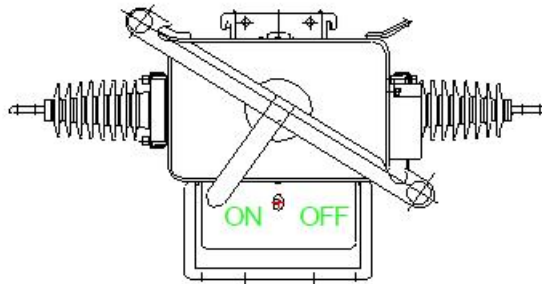


Installation Manual of SF6 Load Break Switch

ZBLBS-11/24/33/630-20



1. Overview

The ZBLBS-11-24-33/630-20 pole-mounted load break switch is suitable for the rated voltage 12KV/24kV/33KV rated current 630A, 50/60Hz distribution network breaking and the load current and overload current in the closing power system, which can automatically isolate the faulted distribution line section. ZBLBS can be operated manually, electrically and remotely. The controller is housed in a stainless steel enclosure and can be used in a variety of climatic conditions. In addition, wired and wireless modems can be installed in the cubicle, enabling remote monitoring and control. The simple pole-mounted and arranged is convenient and fast, and the construction cost is reduced.

2. Standard Conditions of Use

The SF6 load break switch adapts to the operating conditions:

2.1 Ambient temperature

2.1.1 Ambient air temperature: upper limit +50°C, lower limit -40°C.

2.1.2 Relative humidity: 100%

2.2 The altitude shall not exceed 3000m.

2.3 The wind pressure should not exceed 700pa (equivalent to wind speed of 34m/s).

2.4 Earthquake intensity: 8 degrees.

2.5 Installation site: no fire, explosion hazard, no chemical corrosion and frequent violent vibration.

2.6 Pollution level: Class III, Class IV.

3. Features

3.1 SF6 gas insulation

3.1.1 SF6 gas is a non-toxic, non-flammable electrical insulating gas with excellent arc extinguishing properties.

3.2 Bushing diversity

3.2.1 In addition to standard ceramic bushings, various options are available, including rubber insulators on epoxy equipment bushings.

3.3 Visible open/closed state

3.3.1 The color-coded main contact position indicators (green - open; red - closed) are easily visible from the ground. The indicator is directly connected to the main contact drive shaft assembly to ensure accurate display of contact status.

3.4 Quick Action

3.4.1 The spring energy storage operating mechanism ensures fast closing and opening operations (less than 100 milliseconds).

3.5 Remote control can be realized

3.5.1 Equipped with an electronic controller, which can be operated locally or at the main console with the FTU interface.

3.6 Rugged switch

3.6.1 The switch is made of proven durable and corrosion-resistant materials (304L stainless steel plate for warships) to ensure a long service life (30 years), and can implement a series of operations, which is ideal for pole-mounted equipment. characteristic.

3.7 Standards

3.7.1 Each switch has been filled with SF6 gas before leaving the factory, sealed and tested according to IEC60265-1 (1988) and GB3804-1990 standards.

4. Types and Ratings

4.1 Product Model ZBLBS Class I product, SF6 load break switch.

4.2 Types of ZBLBS



Fig1) Ceramic Sleeve – Moulded Cable outlet



Fig 2) Rubber Split Sleeve – Moulded Cable Outlet

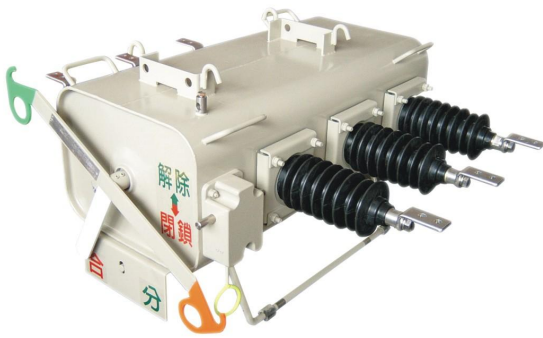


Fig. 3) Rubber integrated bushing - Terminal outlet

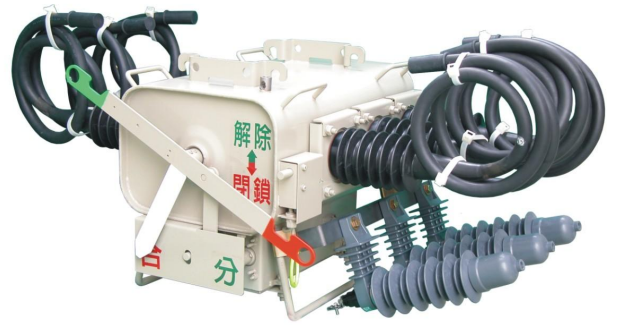


Fig. 4) With arrester



Fig. 5) Ceramic Sleeve – Terminal Outlet

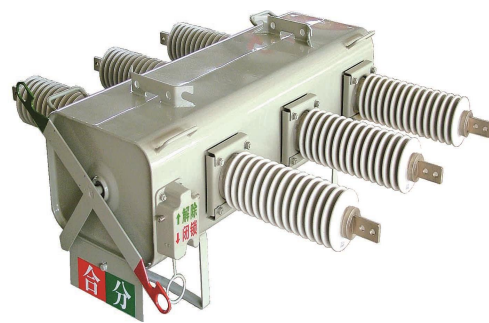


Fig. 6) 35KV Ceramic Sleeve – Terminal Outlet

4.3 Parameter ratings

Table 1

No	Description		Unit	Data			
1	Rated voltage		kV	11	24	33	
2	Rated frequency		Hz	50/60	50/60	50/60	
3	Rated insulation level (The filled SF6 gas is 0.07Mpa / 20℃)	Lightning impulse withstand voltage	kV	Phase-to-phase, phase to ground	75	125	185
				Fracture	85	145	215
		Power frequency withstand voltage 1min	kV	Phase-to-phase, phase to ground	42	64	95
	Fracture	50		79	110		
4	Insulation level under (The filled SF6 gas is 0Mpa	Power frequency withstand voltage 1min	kV	30			

	/ 20℃)	Reverse phase withstand voltage 1min		30		
		Maximum phase voltage 5min		9		
5	Rated current		A	630	630	630
6	Rated breaking load current (0.05Mpa / 20℃)		A	630	630	630
7	Breaking current (The filled SF6 gas is 0Mpa / 20℃)		A	630	630	630
8	Peak withstand current		kA	50	50	50
9	Rated short-time making current		kA	50	50	50
10	Rated short-time withstand current		KA/s	20/4	20/4	20/4
11	Rated cable charging breaking current		A	25	25	25
12	Rated line charging breaking current		A	16	16	16
13	Rated closed-loop breaking current		A	630	630	630
14	Excitation current		A	21	21	21
15	Rated current breaking times		次	≥400	≥400	≥400
16	Rated working pressure		MPa	0.05	0.07	0.10
17	Main circuit resistance of each phase		μΩ	≤150	≤150	≤180
18	Gas relative leakage rate		Year	≤1%	≤1%	≤1%
19	SF6 gas moisture content	Delivery value	ppm	≤150	≤150	≤150
		Switching operating value	ppm	≤300	≤300	≤300
20	Mechanical stability operations		Times	6000	6000	6000
21	Rated operating voltage and auxiliary circuit rated voltage		V	DC 24	DC 24	DC 24
				AC 220/110	AC 220/110	AC 220/110
22	Weight	M type	kg	115	125	135
		A type		135	155	175
23	Enclosure and controller degrees of protection		IP44			

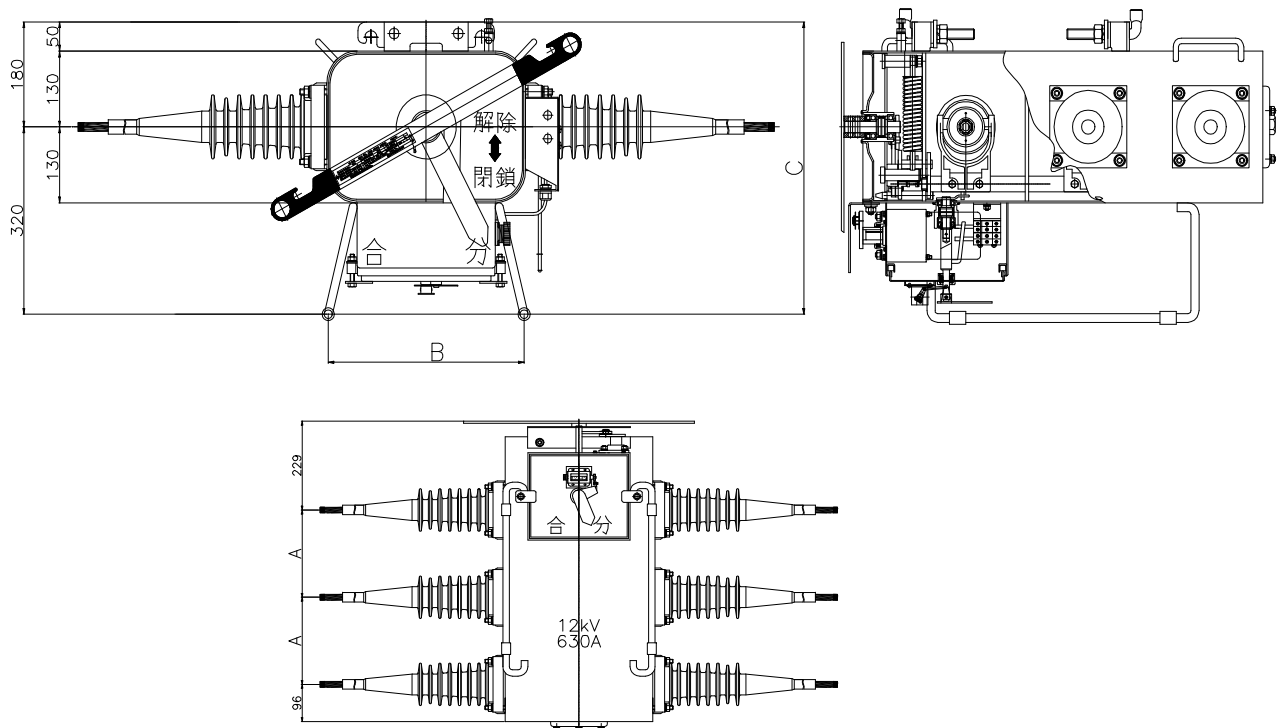
Note: The above parameters are conventional product parameters, and the special technical parameters are subject to the order, and explained in the selection and order.

5. Structure

5.1 Appearance of Switch and Controller (Model:ZBLBS-12/24/33)



5.2 Appearance and dimensions of the switch



5.3 Switch body

5.3.1 SF6 gas insulated switch is a three-phase linkage operation switch designed for segmented application of power distribution system cables and overhead power lines. It can be operated manually in the field or remotely from the control center.

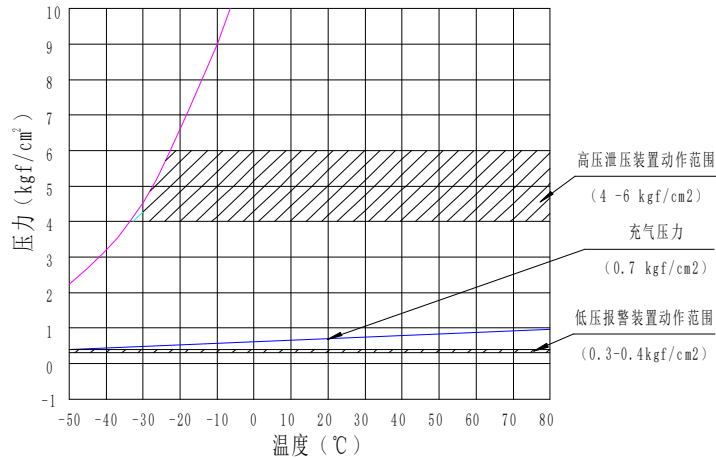
5.3.2 The switch enclosure is sealed by welding, the bushing and the enclosure are sealed by a rubber sealing ring, and all other parts are assembled in the welded stainless steel enclosure.

5.3.3 The enclosure housing is designed to withstand internal voltage without affecting the normal operation of the switch.

5.3.4 The shell shall be made of cold-rolled stainless steel (SUS 304L) or better material with a thickness of more than 3 mm to withstand the internal gas pressure. And the enclosure is treated with outdoor resin

anti-corrosion.

5.4 Insulating gas



Inflation pressure (0.5 kg/cm²G)

Rated working pressure (0.5kg/cm²G)

Action pressure of high-pressure pressure relief explosion-proof device (4-6 kg/cm²G)

Low air pressure locking alarm device locking pressure (0.3-0.4kg/cm²G)

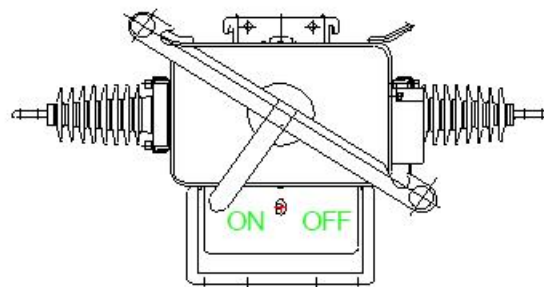
5.4.1 The SF₆ gas used is a high-purity product specially designed and manufactured to ensure that the water content of the gas in the housing during operation of the load switch is below 300 ppm.

5.4.2 See Figure 8 for the application temperature range of gas in the switch, gas leakage, charging pressure, rated working pressure, minimum working pressure, maximum relief pressure, and minimum gas blocking pressure.

5.5 Switch structure

5.5.1 Manual operation handle.

The LBS should be operated safely with a high-voltage insulating rod, and its structure can be turned on or off in one operation.



5.5.2 Manual locking device

In case of power failure, it is set to prevent the switch from being operated incorrectly. During operation, pull down the pull ring of the manual mechanical locking device to lock the switch mechanism in the "on" or "off" position, and the switch can no longer be

operated in the closed or open state. After the operation is completed, push up the pull ring of the manual mechanical locking device to unlock the switch mechanism, and the switch can be operated again. Ensure operational reliability and safety.

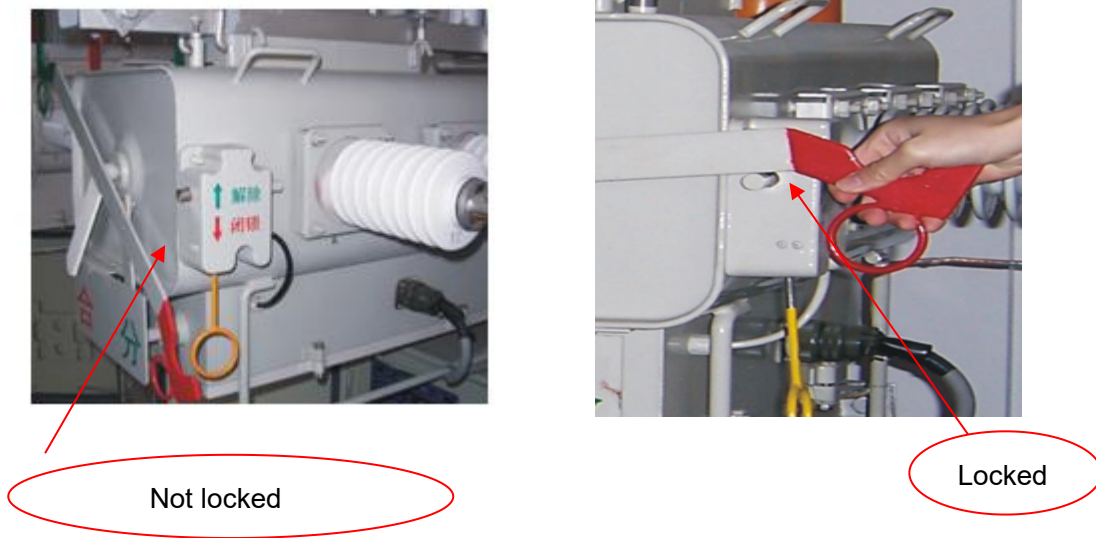


Figure 10) Manual locking device

5.5.3 Contact position indicator

The color-coded switch position indication (green - open; red - closed) is easy to read while standing on the ground.

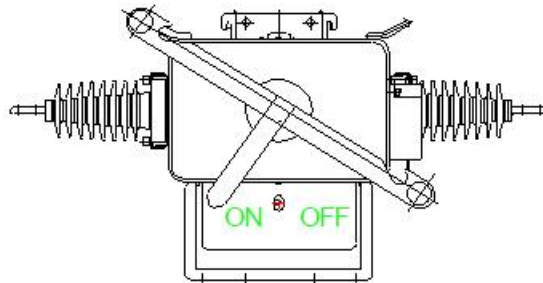


Figure 11) Contact position indicator



Figure 12) Low Air Pressure Lockout Indicating Device

5.5.4 High pressure relief alarm device

In order to prevent the container from rupture when the gas pressure rises sharply due to internal abnormality, a high-pressure explosion-proof pressure relief device is specially set up; the pressure relief film acts when the pressure is 0.4MPa~0.6MPa (4-6 kg/cm²G), releasing the internal pressure. The high-pressure explosion-proof pressure relief device is installed in the opposite direction of the manual operation handle to prevent the rupture of the pressure relief membrane from endangering the operator and public safety.



Figure 13) High-pressure pressure relief explosion-proof device

5.5.5 Charge valve

Equipped with this valve to fill the switch housing with SF6 gas when required.

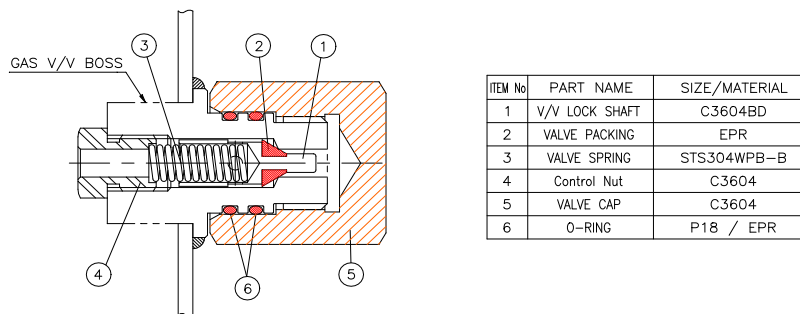


Figure 14) Inflation valve

5.5.6 Ground terminal

There is a φ13 stainless steel grounding compass on the top/bottom of the front end of the switch housing for installing the grounding wire. Its construction allows easy connection to ground with 22 – 38 mm² copper conductors without the use of additional auxiliary clips.



Figure 15) Ground terminal

5.5.7 Lifting lugs

There are four special lifting ears and four handling handles on the top of the main box, which is convenient for handling and hoisting.

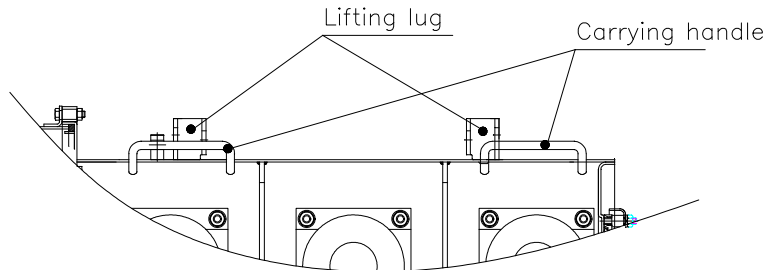


Figure 16) Lifting lugs

Carrying handle

Lifting lug

5.6 Polymer rubber sleeves



Fig17) Rubber sleeve

Fig18) Rubber terminal and rubber molded cable

5.6.1 The material of the bushing is epoxy resin and EPDM rubber or ceramic.

5.6.2 There are two types of switch inlet and outlet bushings: porcelain bushings and organic insulator bushings, bushing creepage distance: 576mm, leakage ratio distance: 38mm/1kV.

5.6.3 The porcelain bushing is fired from alumina material, which has high dielectric strength and mechanical strength. The part where the porcelain sleeve is connected to the housing is coated with semiconducting paint, which can effectively prevent corona discharge during the operation of the switch.

5.6.4 The organic insulator bushing is made of imported outdoor epoxy resin and silicone rubber, which completely eliminates the cracking of the porcelain bottle caused by external force and lightning and the cracking caused by the porcelain factor, which greatly improves the reliability of the switch operation.

5.6.5 There is also a split installation method for the organic insulator sleeve. That is, the switch epoxy resin inlet and outlet line casing and the switch are integrated. The sleeve is

designed according to ANS/IEEE 386, and its standard connection surface can be connected with traditional cable elbow connectors or integral rubber sleeves.

5.6.6 Outlet bussing sheds and terminal (connection cable) are integrated. When the switch is installed, cover the outlet sleeve shed and the wiring terminal (wiring cable) on the outlet sleeve and tighten it. The transportation volume is small, and the terminal or wiring cable can be replaced at any time according to the needs of the project, and the installation is convenient. The sleeve flange is made of stainless steel and is grounded together with the housing.

5.7 External connection terminals

5.7.1 When using the molded cable lead method, the high-voltage insulated cable has great flexibility and good weather resistance. The nominal cross-section for 400A is greater than 125 mm^2 (159/1.0), and the nominal cross-section for 630A is greater than 200 mm^2 (19/14/1.0), optional length from 1.5m to 2m.

5.7.2 When the terminal type is used, the terminal is tinned copper, which is connected with the equipment clip of the busbar, the overlapping surface of the outgoing terminal is $76\text{mm} \times 40\text{mm}$, and the allowable current of the cross-section is 630A.

5.8 Operating mechanism

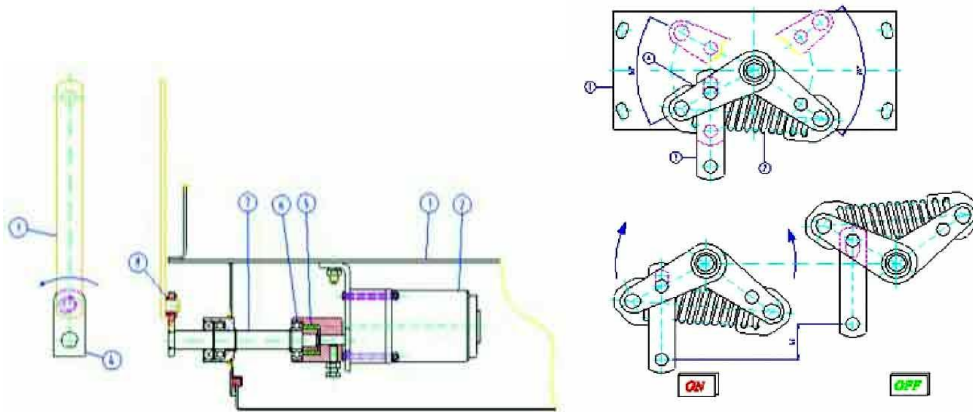
5.8.1 The operating mechanism is sealed in the switch air box, and there are two types of electric mechanisms (optional).

5.8.1.1 The specially designed triangular spring energy storage operating mechanism is used, and the over-dead point is used to drive the main shaft to quickly open and close the contacts. The opening and closing speed mainly depend on the function of the spring energy storage, which is basically independent of external force. The opening and closing speed is stable, and the mechanism operation is simple and reliable.

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No	Name
1	Bottom plate
2	Triangle crank
3	Spring
4	Closing indication

No	Name
1	Bottom shell of switch body
2	Electric motor
3	link
4	Motor drive arm
5	Reduction bearing
6	Bearing sleeve
7	Motor shaft
8	Power plant

Figure19) Operating mechanism

5.8.1.2 The fast spring operating mechanism is adopted and the mechanism is sealed in the switch body, so that condensation and corrosion will not occur, which can ensure that the closing and opening speed of the switch is not affected by the strength of the person, the proficiency of operation technology and the instability closing power supply, ensure that the switch has a reliable breaking function under the condition of the line short circuit;

The operating mechanism adopts a novel and miniaturized spring operating mechanism, which has the function of maintaining the opening/closing position, and the energy consumption of opening and closing is low;

The operating mechanism is placed in a sealed mechanism box, which solves the problem of mechanism corrosion and improves the reliability of the mechanism. The opening and closing operations of the switch can be manually or electrically operated and remotely controlled according to instructions.

Can use manual or electric operation to store energy. After the switch is closed, the energy storage motor automatically charges the energy storage spring. After the energy storage spring is charged, the switch is in a state of preparation for opening; at the same time, the energy storage is locked, so that the mechanism cannot be charged again.

When the switch is closed, the opening spring is charged. When the mechanism is in the closed state, the energy storage operation is performed again, and the closing spring is charged again and blocked to prevent the mechanism from closing by mistake. The reclosing has stored energy, the mechanism is in the reclosing state, and can realize the one-time reclosing operation of "open-0.3s-close-open".

6. Connection diagram of incoming and outgoing wires

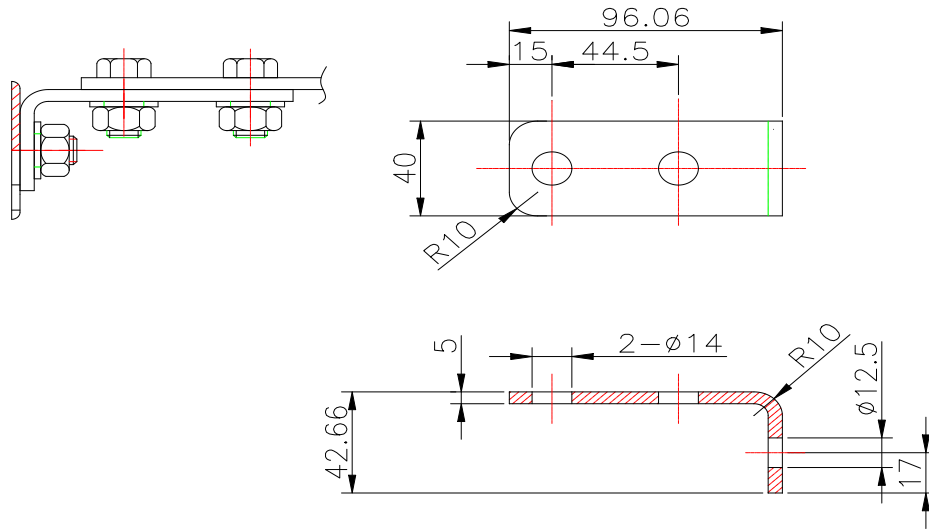


Figure 21) Connection diagram of lug terminals

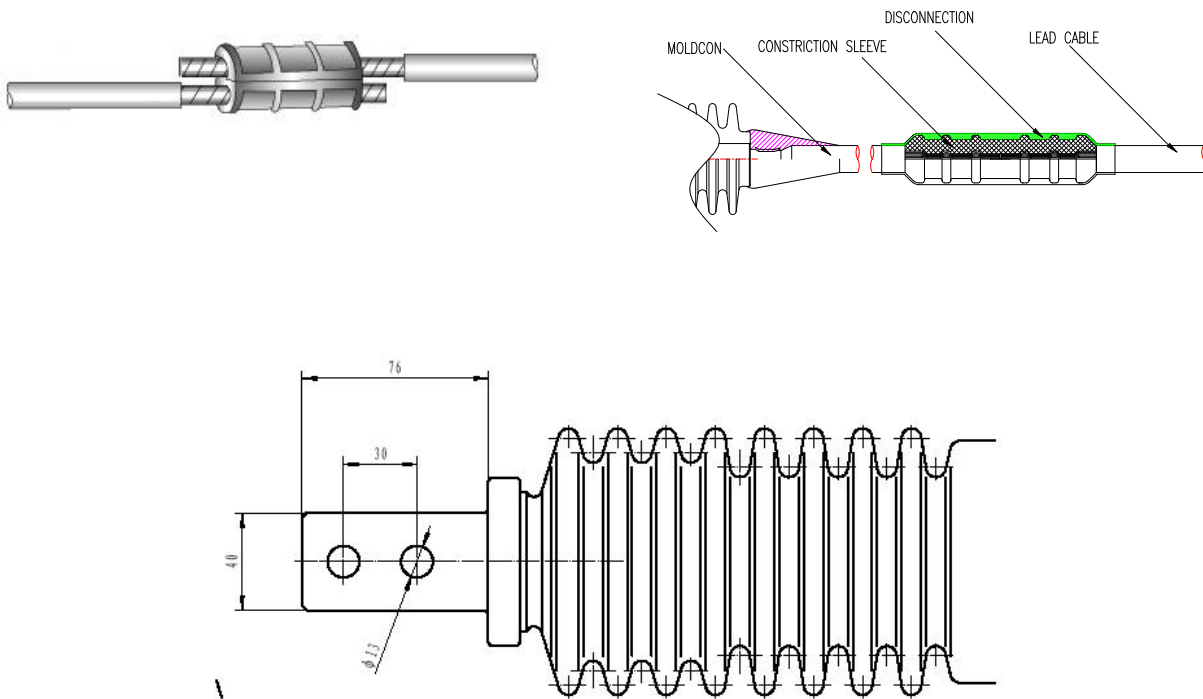
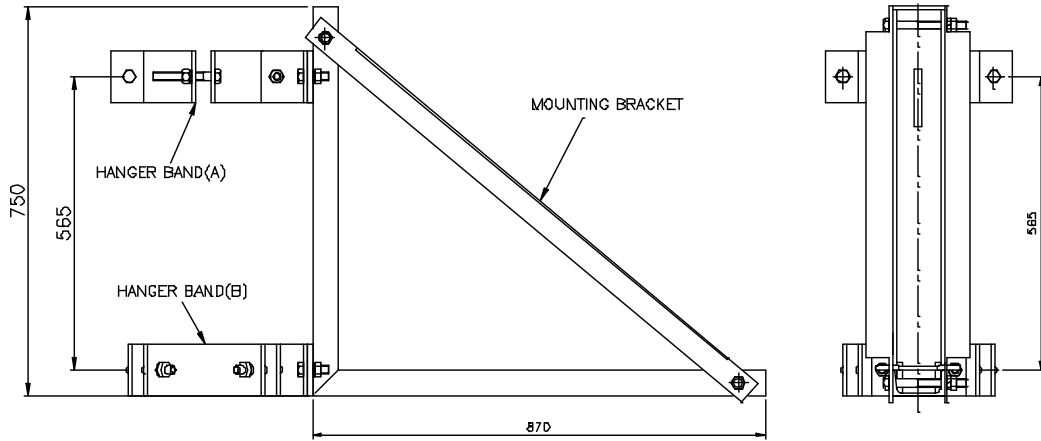


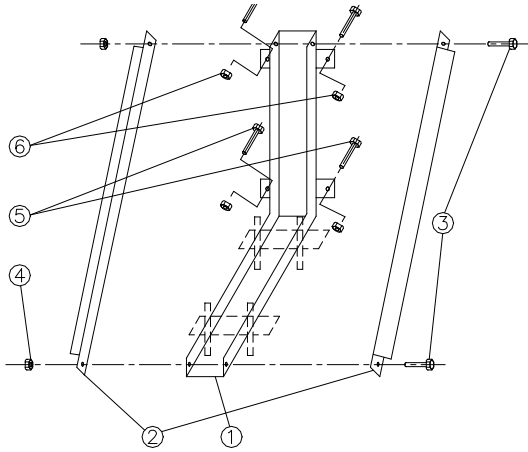
Figure 22) Insulated through connectors Figure 23) Crimp sleeve

7. Detail of the hanger mounted on the pole

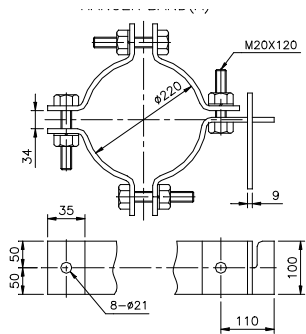


Mounting bracket

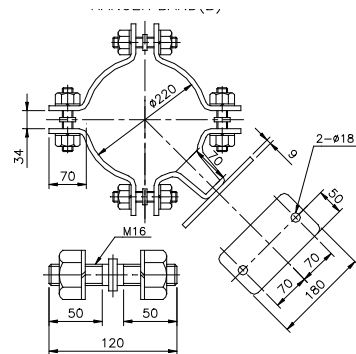
Mounting



Pictorial diagram of mounting bracket



Hanger band (A)



Hanger band (B)

Figure 24) Pendant mount

8. Connection of lines and switches

8.1 Switch installation and dimensions (Electric, Automatic)

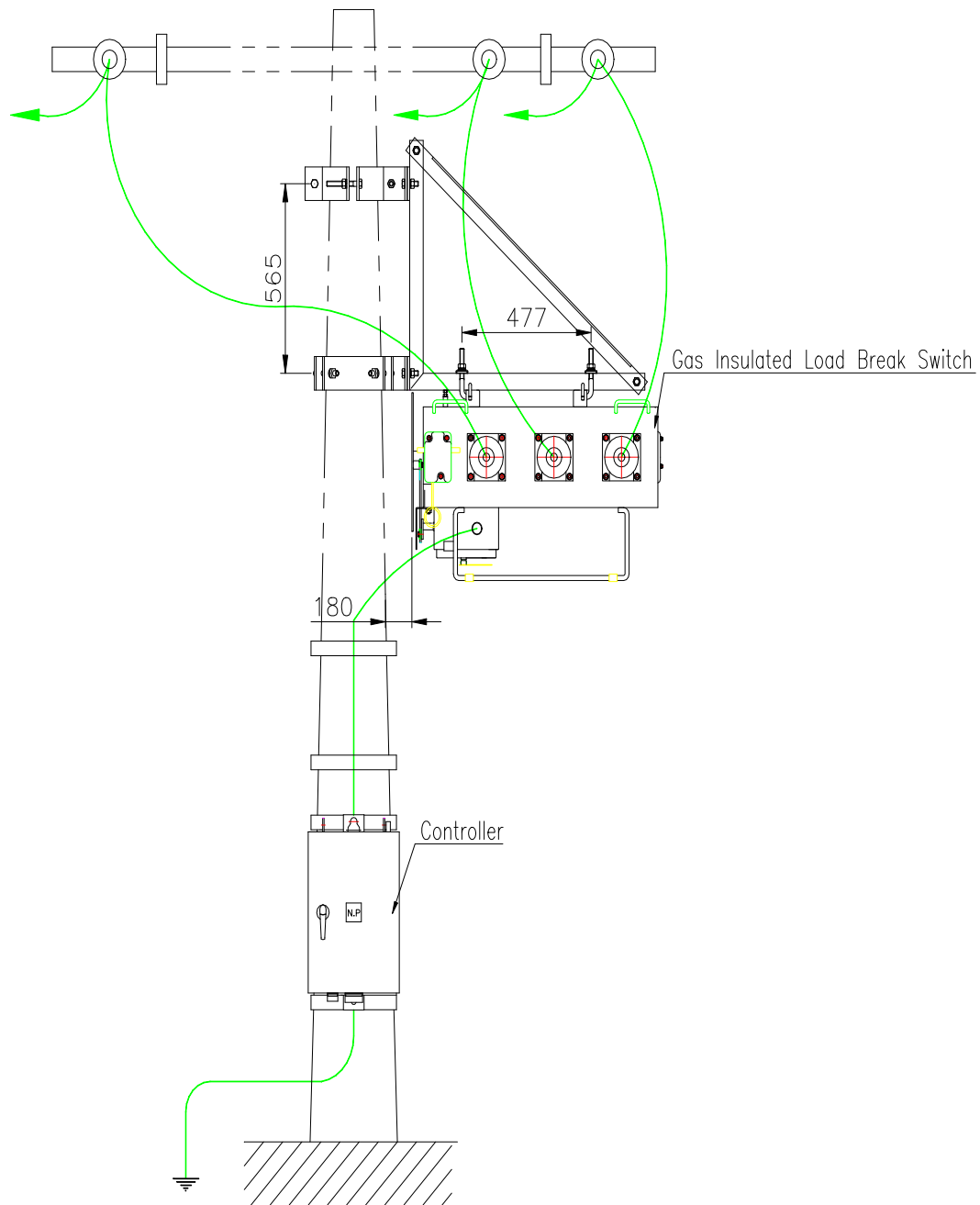


Figure 25) Switch installation and dimensions

8.2 Switch hanging installation (manual type)

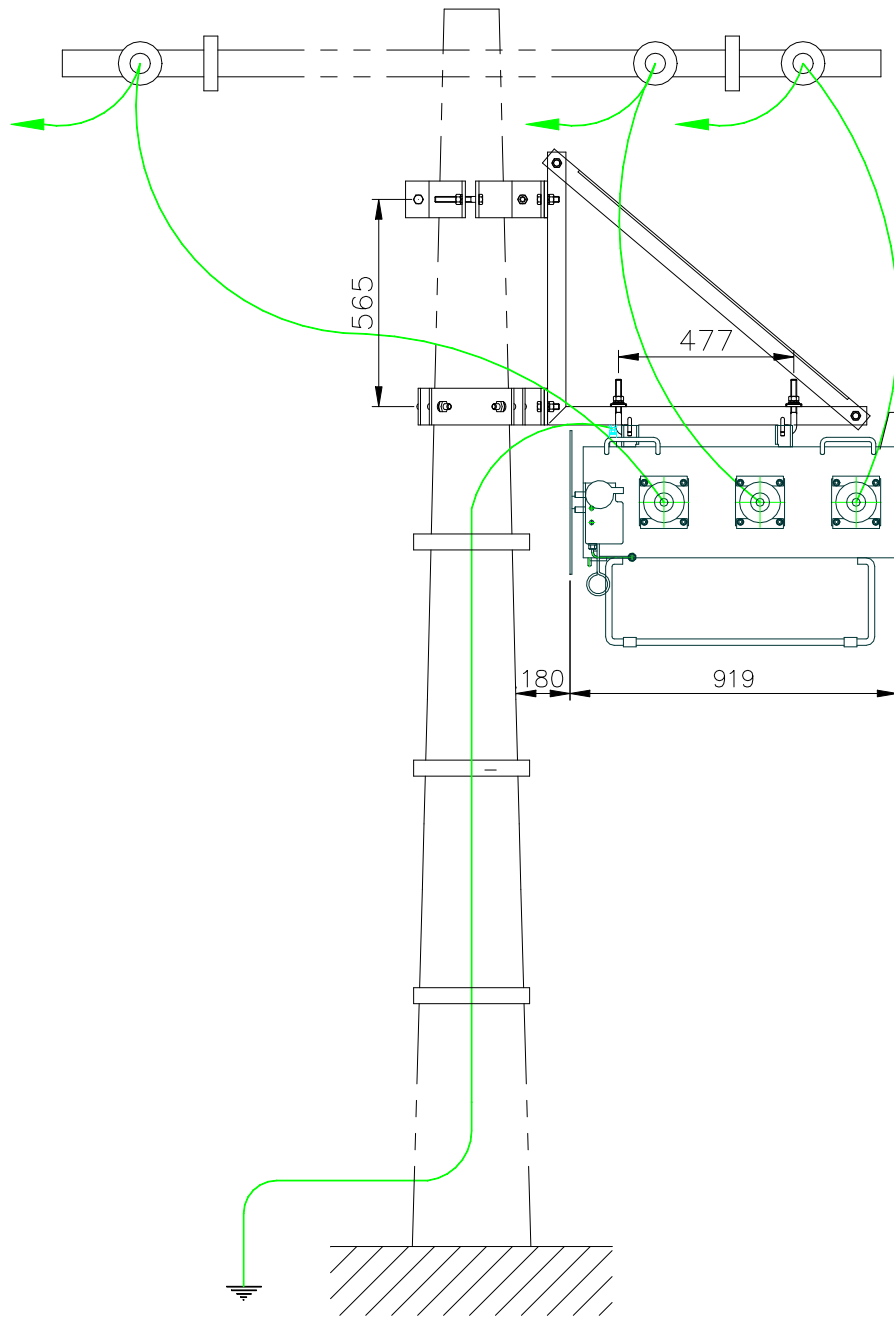


Figure 26) Switch pendant installation

8.3 Switch seat installation

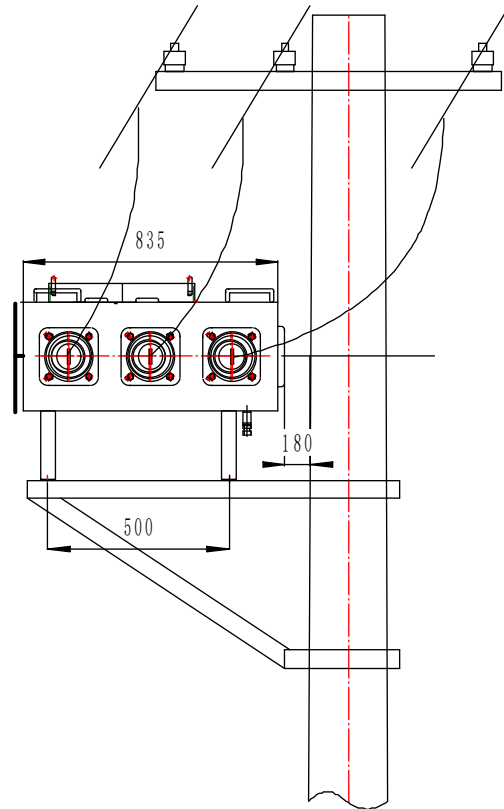


Figure 27) Switch seat type installation

9 Maintenance

The factory product has been adjusted to the best state, and the maintenance of the switch is generally limited to the following conditions:

- 9.1 After the product runs for a certain period of time, clean the switch housing;
- 9.2 Within 5 years from the time of leaving the factory, the manufacturer is responsible for replacement or repair due to unqualified product manufacturing quality or air leakage (mainly at local maintenance points or maintenance centers).
- 9.3 The pressure-temperature curve of SF6 gas is shown in Figure 8.

10. Transportation, acceptance and storage

10.1 Transport

This product must be packaged for transport. When transporting or hoisting, no strong vibration is allowed, and no inversion or rollover is allowed.

10.2 Acceptance

Acceptance should be carried out according to the following procedures:

- 10.2.1 Unpack the box indoors, and check whether the random documents are complete according to the packing list;
- 10.2.2 Carefully take out the switch, observe whether the product has bump marks from the outside, and pay special attention to whether the porcelain sleeve is cracked;
- 10.2.3 Observe whether the gauge pressure is 0.05MPa (at 20°C) (when the pressure

gauge is installed according to the user's requirements);

10.2.4 Try to operate the switch 5 times, and there should be no refusal to close and refusal to open.

10.2.5 If possible, check the loop resistance value (should be less than 130 microohms).

10.3 Storage

This product should be stored indoors where it is not easy to be bumped and well ventilated.

11. Random files

11.1 One installation manual

11.2 One certificate of conformity

11.3 Packing List One copy

11.4 One copy of product inspection report

12. Ordering Instructions

12.1 Please determine the model, name, quantity, rated current, type of operating power supply, operating voltage, etc. of the product as required.

12.2 According to the user's request, we can provide:

- (a) Terminal outlet or cable outlet;
- (b) Porcelain bushings and organic insulator bushings;
- (c) Special fixtures for busbar connection;
- (d) hanging mounts;

Note: The pictures in the manual are for reference only, the specific appearance is subject to the actual product!

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