

1. 概 述 Outline

XGNS9-12/24 气体绝缘环网开关设备采用模块化设计，以其固定式与灵活扩展的完美统一，以适合终端用户或网络节点的要求，同时满足各种配电开闭所、箱式变电站、电缆分支箱的需要，具有结构紧凑、安全可靠、长寿命、免维护的特点。

开关柜包括一个用3mm不锈钢焊接而成的气箱，所有带电部件和开关功能都置于其中。

产品出厂之前，对所有的单元/模块都进行了例行试验。这些单元/模块出厂后便可安装，不需要任何特殊工具。

XGNS9-12/24 Gas Insulated Ring Main Unit Switchgear adopts modular design, which fits the requirement of end user or network node by relying on perfect combination of fixed and flexible expansion. It also meets the demand of various distribution switching stations, box-type substation and cable branch boxes. It has characteristics of compact structure, safe, reliable, long life and free maintenance.

The switchgear includes an air tank welded by 3.0mm stainless steel, all live parts and switches are placed in it.

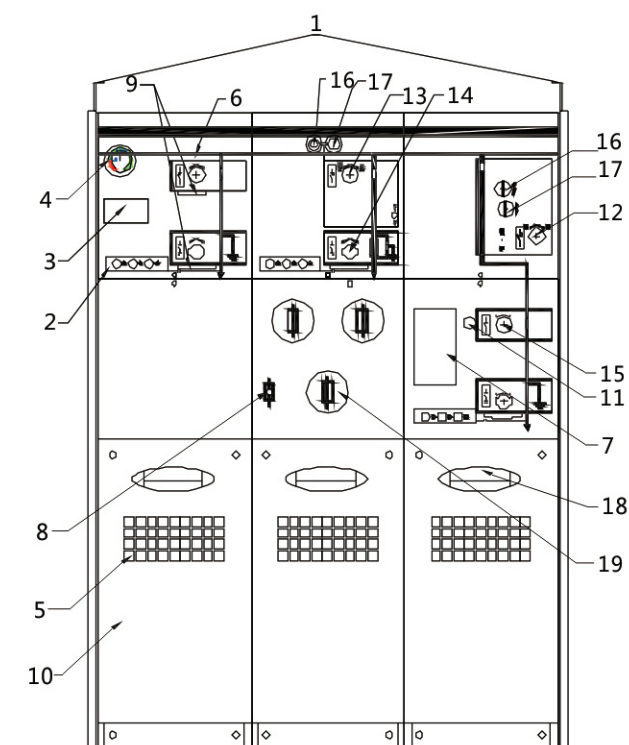
Routine test shall be carried out for all elements/modules before the product leaves the factory. These elements/modules can be installed after delivery, and any special tool is not required.

1.1 可用的模块 Available module

- C 负荷开关模块 Load break switch module
- De 带接地刀的电缆连接模块 Cable connection module with earthing switch
- D 不带接地刀的电缆连接模块 Cable connection module without earthing switch
- F 负荷开关—熔断器组合电器模块 Load switch – fuse-combination unit module
- V 真空断路器 Vacuum circuit breaker
- Be 母线接地模块 Bus ground module
- M 表计模块 Meter module
- SL 母线分段开关模块(负荷开关) Bus section switch module (load switch)
- Sv 母线分段开关模块(真空断路器) Bus section switch module (vacuum circuit breaker)

1.2 开关柜结构图 Structural drawing of switchgear

- | | |
|--|---|
| 1.吊环 Ring | 2.电压指示器 Voltage indicator |
| 3.电缆故障指示器 Cable failure indictor | 4.压力指示器 Pressure indicator |
| 5.下门观测窗 Observation window for lower door | 6.模拟线路图 Analog circuit diagram |
| 7.综保保护 Integrated protection | 8.熔断器熔断指示器 Blown fuse indicator |
| 9.面板上的挂锁装置 Padlock device on the panel | 10.电缆室盖板 Cover plate of cable chamber |
| 11.钥匙锁(附件) Key lock (accessory) | 12.断路器储能操作孔 Energy storage handle hole of circuit breaker |
| 13.负荷开关操作孔 (F单元储能) Load break switch handle hole (F unit energy storage) | |
| 14.接地开关操作孔 Earthing switch handle hole | 15.隔离开关操作孔 Isolating switch handle hole |
| 16.分闸按钮(旋钮) Opening button (knob) | 17.合闸按钮(旋钮) Closing button (knob) |
| 18.电缆室盖板把手 Handle of cover plate of cable plate | |
| 19.熔断器室 Fuse room | |

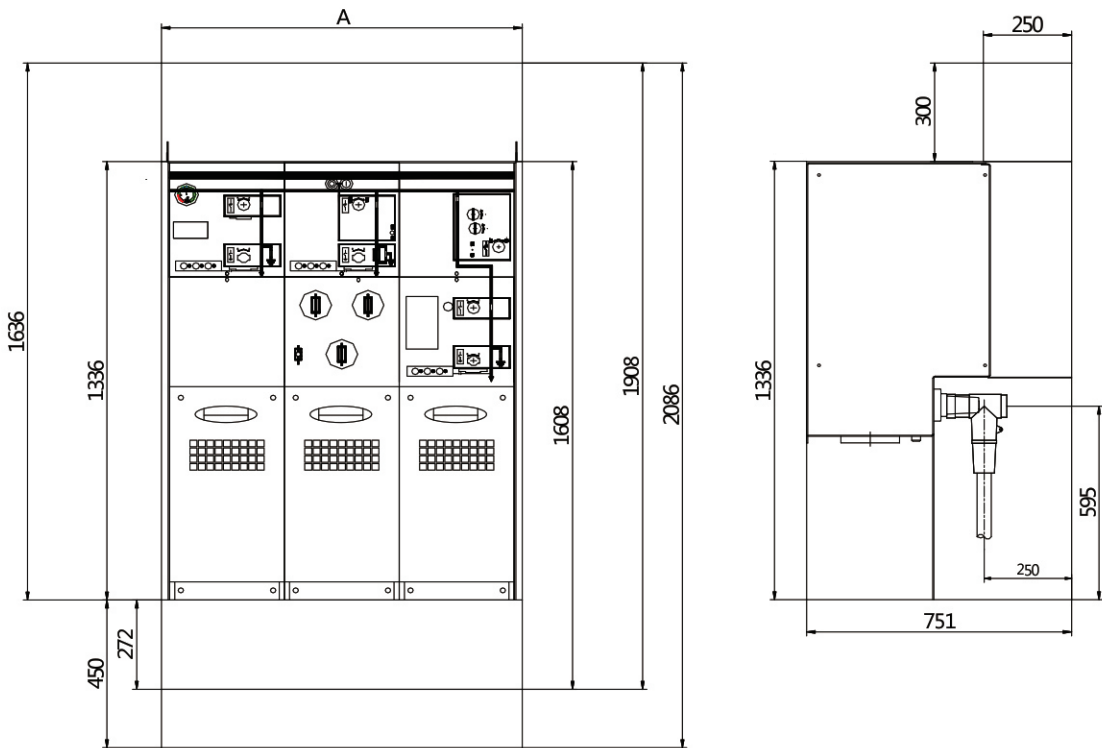


2. 主要技术参数 Main technical parameters

序号 S/N	名称 Name	单位 Unit	参数 Parameter		
			负荷开关柜 Load switch cabinet	组合电器柜 Combined switchgear	断路器柜 Circuit breaker cabinet
1	额定电压 Rated voltage	kV	12 /24		
2	额定电流 Rated current	A	630	125	630/1250
3	额定短时耐受电流 Rated short-time withstand current	kA/s	20/3,25/2	/	20/4,25/4, 31.5/4
4	额定峰值耐受电流 Rated peak withstand current	kA	50,63	/	50,63,80
5	额定短路开断电流 Rated short-circuit breaking current	kA	/	31.5	20,25,31.5
6	额定短路关合电流 Rated short-circuit closing current	kA	50,63	80	50,63,80
7	额定转移电流 Rated transfer current	A	/	1700	/
8	额定闭环开断电流 Rated closed loop breaking current	A	630	/	/
9	满容量开断次数 Full capacity breaking times	次 times	100	/	30
10	机械寿命 Mechanical life	次 times	5000	5000	10000
11	1min工频耐受电压/相间、对地 1min power frequency withstand voltage/phase to phase,to earth	kV	42/50		
12	1min工频耐受电压/隔离断口 1min power frequency withstand voltage/Isolation fracture	kV	48/58		
13	额定雷电冲击耐受电压/相间、对地 Rated lightning impulse withstand voltage / phase to phase,to ground	kV	75/125		
14	额定雷电冲击耐受电压/隔离断口 Rated lightning impulse withstand voltage /Isolation fracture	kV	85/125		
15	二次回路1min工频耐压 Two circuit 1min power frequency withstand voltage	kV	2		

3. 安装 Installation

3.1 开关柜外形尺寸图 Outline drawing of the switchgear



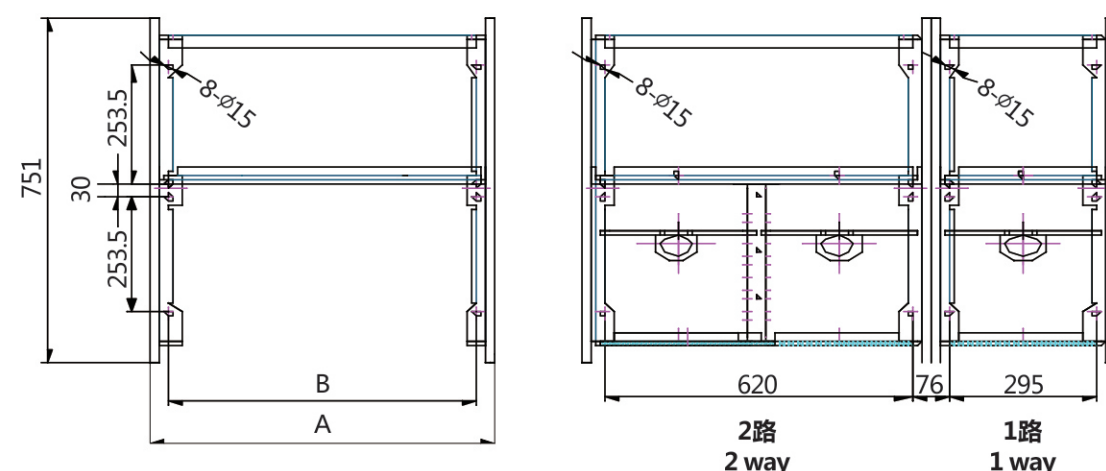
Unit	A
1 路 1 way	371 mm
2 路 2 way	696 mm
3 路 3 way	1021 mm
4 路 4 way	1346 mm
5 路 5 way	1671 mm
6 路 6 way	1996 mm

3.2地基安装图 Foundation installation drawing

开关柜户内安装时 When the switchgear is installed indoors

底装必须平整，根据模块数或单元数确定尺寸图，紧固在地脚螺栓上，也可以焊接安装。

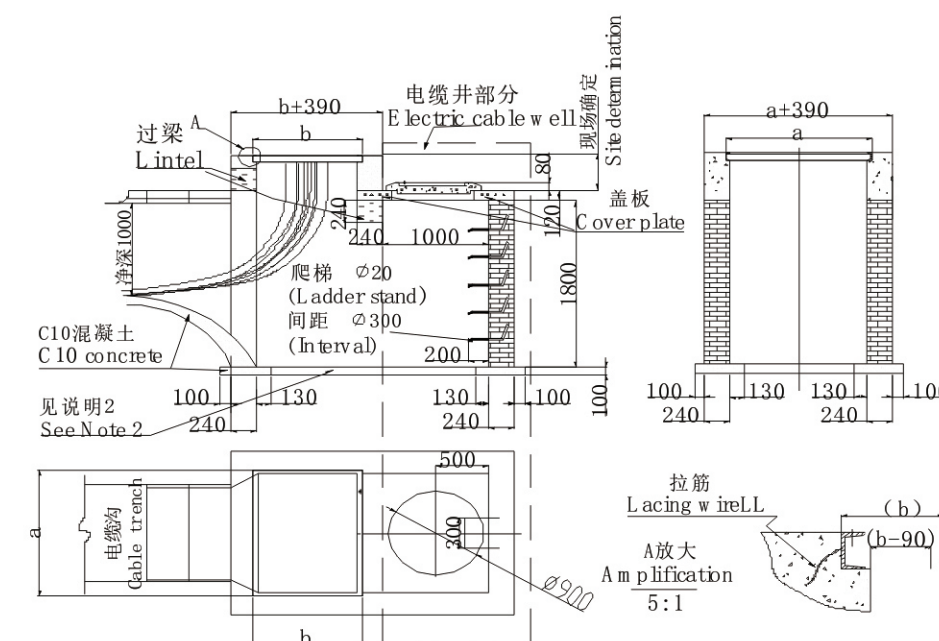
The bottom mounting must be level. Dimension drawing is determined according to the number of modules or units.
The switchgear is fastened on the foundation bolts and also can be installed with welding.



CSG	A	B
1 路 1 way	371 mm	297 mm
2 路 2 way	696 mm	622 mm
3 路 3 way	1021 mm	947 mm
4 路 4 way	1346 mm	1272 mm
5 路 5 way	1671 mm	1597 mm
6 路 6 way	1996 mm	1922 mm

开关柜安装在户外箱内的基础图

Foundation drawing of switchgear installed inside an outdoor box



说明 Note

- 砖墙M5水泥砂浆砌筑，里边及地面上的外边以1：2.5水泥砂浆抹面；
Brick wall M5 cement mortar bricking, interior and outer edge on the ground are plastered by 1:2.5 cement sand;
- 底层在地下水位以下时做防水处理，否则做渗水处理；
Waterproofing work shall be carried out for the ground floor below under ground water level, otherwise water seepage treatment shall be carried out.
- 过梁采用Φ6钢筋及砼20制作；
Lintel is made by Φ6 reinforcing steel bar and concrete 20;
- 8#槽钢基座加工组焊后，进行防腐处理（用户确定防腐方式）；
Preservative treatment shall be carried out after 8# box iron foundation bed is installed and welded (the user shall determine preservation way);
- 8#槽钢基座放置基础槽口，用拉筋及砼固定；
Foundation notch can be placed for 8# box iron foundation bed, and fixed by lacing wire and concrete.
- 用户可以根据施工现场具体情况不制作电缆井（虚线框内部分）
Users can made cable well according to specific condition at construction site (dashed box)
- a表示户外箱底座的宽度mm，b表示户外箱底座的深度mm，户外箱具体尺寸大小需根据实际设计情况来确定。
a denotes the width mm of foundation of outdoor box, b denotes the depth mm of foundation of outdoor box. The specific size of outdoor box is determined according to actual design condition.

3.3 电缆室 Cable chamber

开关柜户内安装时 When the switchgear is installed indoors

移开电缆室盖。注意！电缆室盖能与接地开关互锁。当装有互锁机构时，只有在接地开关处于闭合位置时，才可以进入电缆室。

Remove the cover of cable chamber. Attention! The cover can be interlocked with earthing switch. When mutual interlocking gear is equipped, it can enter the cable chamber only earthing switch is in closing position.



电缆夹梁
Cable clamped beam

电缆夹
Cable clamp



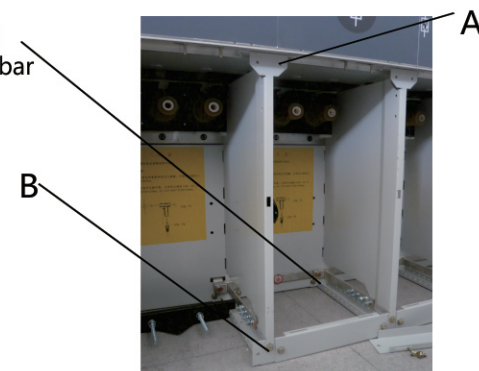
1. 松开电缆室盖板的螺丝，将盖板拿出并移开
Loosen the screw of cover plate of cable chamber, take out the cover plate and remove.

2. 移开前挡板
Remove head damper.



3. 前挡板移开后
After head damper is removed

接地铜排
Ground copper bar



4. 松开A和B可以取下隔板
Loosen A and B to remove the claspboard.

3.4 电缆连接 Cable connection

开关柜装备了外部套管，所有套管距离地面的高度相同，并受电缆室盖板的保护。

Switchgear is equipped with external casing pipe, the height from all casing pipes to the ground, and is controlled by the cover plate of cable chamber.

必须依照制造商的安装指南安装。一定要使用提供的硅脂膏全面地对套管进行润滑。

Installation must be carried out according to manufacturer's installation instruction. Silicon grease must be used to lubricate casing pipe fully.

注意 Attention!

在电缆没有连上之前，在单元投入运行之前，接地开关必须锁定于闭合位置，或者套管必须套上绝缘封帽。

Earthing switch must be locked in closing position or casing pipe must be put with insulated cap before cable is not connected and the unit is put into operation.

3.5 用于继电保护的电流互感器的安装

Installation of current transformer for relay protection

3.5.1 安装电流互感器。电缆屏蔽通过中心孔倒回并接地。

Install current transformer. Cable shield is returned and earthed by centre hole.

3.5.2 在每个真空开关模块中都安装保护继电器，并将保护继电器到电流互感器的电缆放置在电缆室中，作好与提供的三相电流互感器相连接的准备。

Keep relay is installed at each vacuum switch module, and the cable from keep relay to current transformer is placed in the cable chamber to prepare to connect three-phase current transformer.

3.5.3 安装之前 Before installation

3.5.3.1 检查三相电流互感器已经到货，并且对应均为同一类型。

Check three-phase current transformer arrives or not, and they are the same type.

3.5.3.2 检查该电流互感器型号是正确的，变压器的额定电流，保护继电器的调整范围，互感器的变比正确。（参见保护继电器手册）

Check the type of current transformer is correct, rated current of transformer, adjustment range of keep relay and transformation ratio of instrument transformer. (See Keep Relay Manual)

3.5.3.3在电缆接头装配之前，所有电流互感器都必须装配到其本身的高压电缆上。

Before assembling cable connector, all current transformers must be assembled to high voltage cable. Earth shield on the cable must be returned by central hole of current transformer (see right figure), and earthed by earthing bar in the cable chamber. The mounting plate of current transformer shall be assembled in the cable chamber.

3.5.3.4电缆上的接地屏蔽必须通过电流互感器的中心孔倒回(见右图)，并通过电缆室中的接地母排接地。电流互感器的安装板应装配到电缆室中。

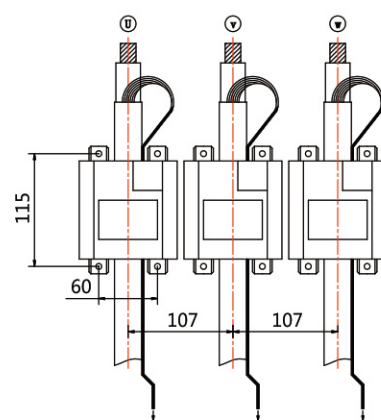
Current transformer shall be connected with the cable of keep relay after installation. For the description of connection, refer to User Manual offered together with keep relay.

3.5.4 使用真空断路器的XGNS9-12支持两种不同类型的保护继电器：自供电数字继电器型和微机保护监控装置。

XGNS9-12 Vacuum circuit breaker supports two types of keep relays: self-powered digital relay and microprocessor protection monitor.

3.5.5 针对每种保护继电器都准备了专门的手册，并带有调节实例。电流互感器的正确连接和保护继电器的适当调整是发挥正确功能的基本要求。

Specialized manual is prepared for each type of keep relay, followed by adjustment cases. Correct connection of current transformer and proper adjustment of keep relay are basic requirement of playing correct function.



电缆上的接地屏蔽通过中心孔倒回并接地

Earth screen on the cable is returned and earthed by centre hole

3.6 气体压力 Gas pressure

在20℃下开关柜气箱中SF₆气体的额定绝对压力为1.4bar。开关柜是永久密封的，并配备一个气体压力表指示压力。指针位于绿色区域 1.2~1.4bar (20℃)时，说明设备压力正常。

The rated absolute pressure of SF₆ gas in the air tank of switchgear is 1.4bar. under 20℃. The Switchgear is permanently sealed, and equipped with a gas gauge to indicate the pressure. When the pointer is in green area 1.2~1.4bar (20℃), indicating the equipment pressure is normal.

4. 运行 Operation

4.1 运行条件 Operation condition

正常环境条件 Normal environment condition

开关柜一般在正常的条件下运行/服务，符合：IEC62271-200。

Switchgear operates under normal condition, which is in accordance with: IEC62271-200.

具体的限度如下：

The specific limit is as follows:

环境温度 Environment temperature	温度 Temperature	最大平均相对湿度 Maximum average relative humidity	
最高温度 Max temperature	+40℃	24小时测量 24 hours measurement	≤95%
最低温度 Min temperature	-25℃	1个月测量 1 month measurement	≤95%

在不降低气体压力安装的情况下：

Under the condition that does not lower gas pressure:

最大的海拔高度：3000m

Maximum altitude：3000m

特殊条件 Special condition

对于有别于正常操作条件下的特殊运行条件，制造商和最终用户必须取得一致。如果涉及特殊恶劣的运行环境，则必须向制造商和供应商咨询。

The manufacturer must reach a consensus with final user for special operation condition that is different from normal operation. If poor operating environment is involved, consult the manufacturer and supplier.

例如：当电气设备安装海拔高度为3000m以上时，大气压将降低，因而也必须消除柜中的过压。

For example: when electrical equipment is installed at above 3000m altitude, barometric pressure will reduce, thus overpressure in the switchgear must be eliminated.

4.2 开关柜操作 Switchgear operation

所有的开关必须使用配备的手柄进行操作。

All switches must be operated by using the handle.

负荷开关/真空开关和对应的接地开关之间的内部机械互锁, 可以防止错误操作。负荷开关/真空开关和对应的接地开关的操作可以通过挂锁进一步互锁。接地开关通过一个快动机构进行操作, 以确保快速闭合。

Internal mechanical interlock between load switch/vacuum switch and the corresponding switch can prevent faulty operation. The operation between load switch/vacuum switch and the corresponding earthing switch can be interlocked further by padlock. Earthing switch can be operated by a quick-mechanism to make sure quick closing.

顺时针旋转手柄, 可以闭合接地开关。逆时针旋转手柄, 则可以分开接地开关。

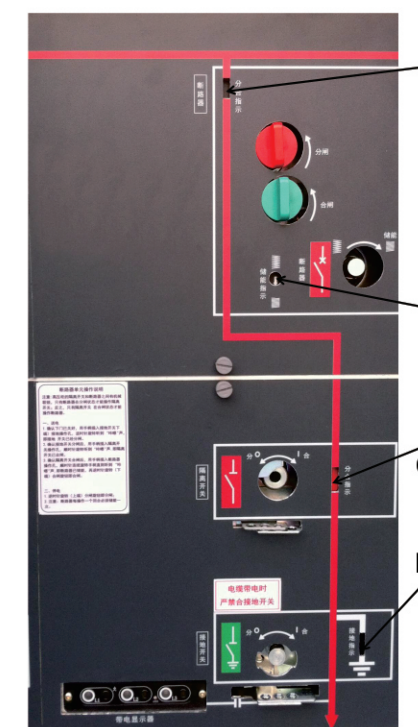
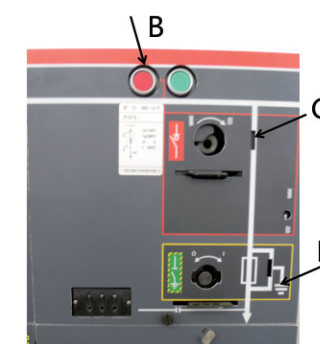
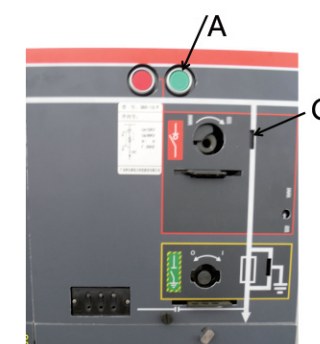
Rotate clockwise the handle to close earthing switch. Rotate the handle counterclockwise to separate the earthing switch.

闭合负荷开关—熔断器组合电器或断路器开关时, 弹簧必须储能。顺时针旋转操作手柄, 储能到位, 然后, 必须按绿色合闸按钮/按箭头方向操作机构上的旋钮, 以闭合开关/断路器。

The spring must be stored with energy when closing load switch – fuse-combination unit or breaker switch. Rotate the operating handle clockwise, the energy storage is in place, then green closing knob/knob on the operation mechanism following the direction of arrow must be pressed to close switch/breaker.



负荷开关 Load switch	接地开关 Earthing switch	负荷开关—熔断器组合电器 Load switch – fuse -combination unit
合闸：顺时针旋转操作手柄 Closing: rotate clockwise the operating handle	合闸：顺时针旋转操作手柄 Closing: rotate clockwise the operating handle	合闸：顺时针旋转操作手柄给“分/合”弹簧储能, 然后合闸：按绿色按钮。(A) Closing: rotate clockwise the operating handle to store energy for “opening/closing” spring, then closing: press green knob. (A)
分闸：逆时针旋转操作手柄 Opening: rotate counterclockwise the operating handle	分闸：逆时针旋转操作手柄 Opening: rotate counterclockwise the operating handle	分闸：按红色按钮。(B)在负荷开关—熔断器组合电器中, 如果发生过流和短路, 负荷开关由熔断器撞针触发跳闸 Opening: press red knob. (B)If overcurrent and short circuit happen in load switch – fuse – combination unit, load switch will trip by firing pin triggered by fuse.



真空断路器 Vacuum circuit breaker

合闸：用手柄插入断路器操作孔，顺时针连续旋转手柄直到听到“咔嚓”声,即断路器已储能（控制回路带电时电机自动储能）。

Closing: Insert the handle into the operation hole of the circuit breaker, and rotate it clockwise continuously until a “crack” sound is heard , which means circuit breaker has been stored with energy (the motor will be stored with energy automatically when control circuit is electrified).

手动或电动合断路器。手动时，逆时针旋转（下端）合闸旋钮即合闸；电动时，按下低压箱上的合闸按钮即合闸。

Manual or electric break circuit. For manual operation, rotate anticlockwise (lower end) closing button for closing; for electrical operation, press closing button on low-voltage switchgear for closing.

分闸：逆时针旋转（上端）分闸旋钮即分闸。

Opening: Rotate anticlockwise (upper end) opening button for opening;

断路器储能一次后，可对断路器进行合、分闸 各一次。

It can operation closing and opening one time for each after the breaker is stored energy one time.

隔离开关 Isolating switch

合闸：顺时针旋转操作手柄

分闸：逆时针旋转操作手柄

Closing: rotate clockwise the operating handle

Opening: rotate counterclockwise the operating handle

接地开关 Earthing switch

合闸：顺时针旋转操作手柄

分闸：逆时针旋转操作手柄

Closing: rotate clockwise the operating handle

Opening: rotate counterclockwise the operating handle

机械位置指示 Mechanical position indication

C：负荷开关-熔断器组合电器分闸 Load switch –fuse-combination unit opening

D：接地开关分闸 Earthing switch opening

E：断路器开关分闸 Breaker switch opening

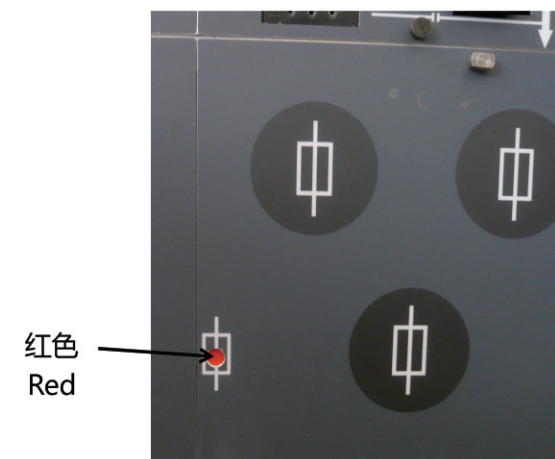
F：断路器储能 Breaker energy storage

G：隔离开关分闸 Isolating switch opening

4.3 熔断器的安装和更换 Installation and change of the fuse

在前面板下部的熔断器室面板上有熔断器状态指示，指示熔断器是否跳闸。熔断器的更换次序如下图。负荷开关-熔断器组合电器模块的配置中事先不预装熔断器。

There is fuse status indicator on the panel in fuse room under the front panel, which indicates whether the fuse is tripping. The fuse replacement order is shown as below. Configuration of the load switch-fuse combination module does not pre-install the fuse.



① 熔断器跳闸指示。
Fuses tripping indication.



② 顺时针旋转操作手柄，闭合接地开关。
Rotate the operating handle clockwise to close the earthing switch



③ 松开熔断器室面板。
Loosen the panel in fuse room.

④ 倾斜熔断器室面板，以便能够对熔断筒进行操作。
Incline the panel in fuse room, in order to operate fuse unit.



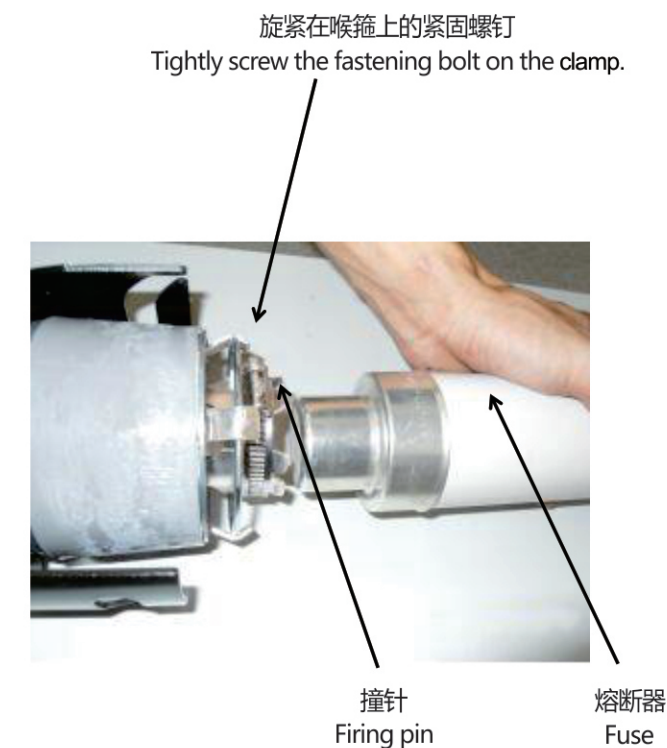
⑤ 使用操作手柄逆时针旋转，打开熔断器筒。
Rotate counterclockwise with the operating handle to open the fuse unit.



⑥ 拉熔断器筒手柄。熔断器是被紧紧固定在熔断器盒端盖上的。
Pull the handle of fuse unit. The fuse is fixed on the box cover of the fuse tightly.



⑦ 取下故障熔断器，换上新的熔断器。用紧固螺钉将熔断器紧固在熔断器筒端盖上。撞针必须指向外部以使熔断器能正常动作。
Replace the fault fuse with a new fuse. Fix the fuse on the cover of the fuse unit with a fastening screw. The firing pin must point to the outside so that the fuse can operate normally.



⑧ 将熔断器水平推入熔丝筒，使用操作手柄顺时针旋转熔断器筒端盖上柄，以闭合并密封熔断器筒。
Push the fuse into fuse unit horizontally, use the operating handle to rotate clockwise the upper handle on the cover of the fuse unit to close and seal the fuse unit.

⑨ 关闭熔断器室面板。断开接地开关，负荷开关可以投入运行。
Close the panel in the fuse room. Disconnect the earthing switch, and the load switch can come into operation.

5. 运输和搬运 Shipment and transportation

这些单元出厂可方便安装。

开关柜不同模块组合单元的重量表。

These units can be installed easily after leaving the factory.

Weight table of assembly units of different modules for switchgear

标准2路 DF/CF/260□

Standard 2-way

标准3路 CCC/CCF/CFC/300□

Standard 3-way

标准4路 CCCC/CCCF/CCFF/CFFC/CCVV/400□

Standard 4-way

标准5路 CCCCC/CCFFF/CCCFF/CCCCF/520□

Standard 5-way

标准6路 CCCCCC/560□

Standard 6-way



开关柜装有吊环用于吊装，同时也可以使用叉式升降机的插铲移动。

Switchgear is fitted with lifting rings for lifting, and it can be moved by using the shovel of the fork lifter.

5.1 收货检验 Inspection tests

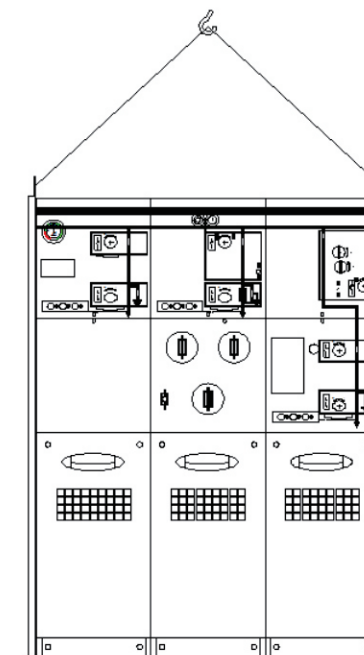
收到开关柜以后，请检查在运输过程中设备是否损坏。如果发生了损坏，必须立即向承运商声明。开箱之后，必须检查下列部件：

After receiving switchgear, please check if there is any damage during the transportation. If any, the carrier must be informed immediately. After unpacking, the following parts shall be checked:

- 必须包含操作手柄1只。 ONE operating handle must be included.
- 检查压力指示器的指针应在绿色区域内。 The pointer in pressure indicator shall be in the green area.
- 对于机械部分进行功能测试。 Carry out functional test for mechanical parts.
- 任何的缺陷和遗漏都必须立即向供应商声明。 Any defect and omission must be informed to the supplier immediately.

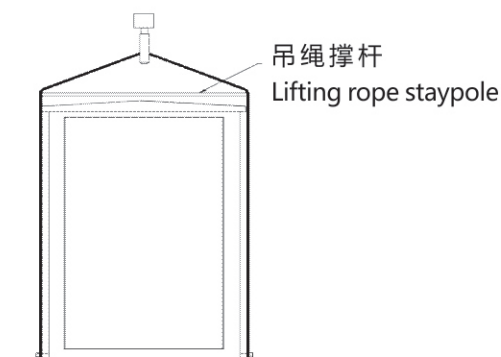
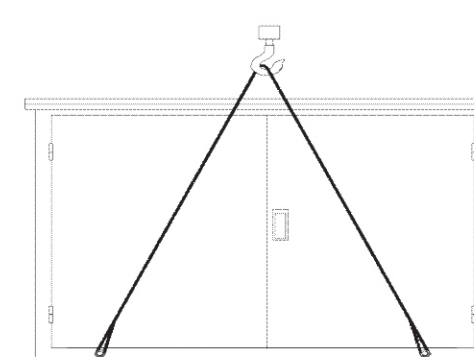
开关柜吊装示意图

Switchgear hoisting schematic drawing



带外箱的开关柜吊装示意图

Hoisting schematic drawing of the switchgear with housing



吊绳撑杆
Lifting rope staypole

5.2 存放 Storage

开关柜在安装使用之前，必须存放在干燥而且通风良好的地方，并且要盖好。

Before the installation and use of switchgear, it shall be stored in a dry and well ventilated place, and be covered well.

6. 维护 Maintenance

开关柜中的所有组件在声明的产品寿命期内都是免维修的。充气箱体是由不锈钢制造的。如果仪表板被划伤或损坏，则必须用油漆修复，以免腐蚀。

All components of switchgear are maintenance free in the statement life period of the product. Gas tank is made of stainless steel. If the dashboard is scratched or damaged, oil paint must be used to repair in order to avoid corrosion.

设备的机械部分位于充气箱的外面，前面板之后。这样，如果需要，就可以比较方便地进行操作和更换。
The mechanical parts of the equipment are located in the outside of the gas tank and after the front panel. In this way, if necessary, it can be operated and replaced conveniently.

机械部分经过了表面防腐处理。其活动部分在出厂前进行了润滑，可以满足产品寿命期的使用。在极端环境下(灰尘、沙子和污染)，则必须进行检查和维修，而在某些情况下，可能还必须进行更换。请检查润滑油是否被从机械活动部分中冲洗或擦掉了。

Surface anti-corrosion treatment is carried out for the mechanical parts.. The moving parts are lubricated before leaving the factory, which could meet the using during life period. In the extreme conditions (dust, sand, and pollution), it must be inspected and maintained. In some certain cases, it may be replaced. Please check whether the lubrication oil is rinsed or wiped off in the moving mechanical parts.

6.1 气体的控制和监视 Control and supervision of air

开关柜作为一个压力密封系统，正常情况下不需要特殊的检查。但是，在运行之前一定要查看压力表上气体压力，正常情况下压力指示器的指针应在绿色区域内。

As a pressure sealing system, Switchgear does not need special inspection normally. But, gas pressure on pressure gage must be checked before operation, the pointer on pressure indicator shall be in the green area under normal condition.

6.2 产品的寿命期 Life period of the product

本产品的开发遵循IEC298标准。在正常条件下运行的设计寿命超过30年。开关设备为气密型，气体泄漏的期望值小于每年0.1%。参照参考压力1.4bar，开关设备在其设计寿命期间将维持气密性，并且其气体压力大于1.2bar(在20℃)。

The development of the product follows IEC298 standard. Its designed life is more than 30 years under the normal condition. The switchgear is hermetic type, the expectation value of gas leakage is less than 0.1% every year. According to the reference pressure 1.4bar, the switchgear will maintain the gas tightness during its life period, and the pressure is more than1.2bar (when it is 20℃).

7. 随机文件 File with the machine

- a. 安装使用说明书；
Installation instructions
- b. 所选用的主要电器元件的说明书；
Instructions for main electrical components selected
- c. 产品合格证；
Product qualification certificate
- d. 产品出厂试验记录;
Product test record
- e. 装箱单；
Packing list
- f. 环网柜排列图、二次接线图。
Layout diagram and two wiring diagram of ring net cabinet

8. 订货须知 Order notes

订货时应提供以下资料：

The following information should be provided when ordering.

- a. 产品名称、型号、方案号、数量及交货期限；
product name, type, plan number, quantity and delivery deadline;
The name, type, specification and quantity of the components in the
- b. 柜内所装元器件的名称、型号规格及数量；
cabinet
- c. 环网柜排列图或平面布置图；
ring network cabinet layout or floor plan;
- d. 主母线材料种类可由客户提出，如无要求则按制造厂标准供给；
main busbar materials can be put forward by customers. If not required, they will be supplied according to manufacturer's standards.
- e. 二次接线图，端子排列图，若无端子排列图时按制造厂家端子排列图；
the two wiring diagram, terminal arrangement diagram, if there is no terminal layout diagram, according to the manufacturer terminal layout.
- f. 柜体颜色，如无要求则按制造厂标准供给。
cabinet color, if not required, according to manufacturer standard supply.