型号及含义 TYPE AND DESIGNATION

XGNS1	---40.5	C F V	/630 /50	---25 (31.5) ---31.5
耐森产品 Product of Naisen	额定电压 Rated voltage kV	方案 Panel Mark C：负荷开关 C：load switch F：组合电器 F：load breaker +fuse combined Apparatus V：断路器 V：VCB	630：额定电流 A 630：rated current A 50：熔断器额定电流 A 50：rated current of fuse A	25(31.5)：负荷开关动稳定电流、断路器短路开断电流 kA 25(31.5)：dynamic stable current of load switch , short circuit breaking current of circuit breaker kA 31.5：熔断器短路开断电流 kA 31.5：short circuit breaking current of fuse kA

技术数据 TECHNICAL DATA

负荷开关柜、负荷开关-熔断器组合电器柜、断路器柜的电气参数

ELECTRICAL PARAMETERS OF LOAD SWITCH, LOAD SWITCH-FUSE COMPOSITE APPARATUS AND CIRCUIT BREAKER

序号 S/N	名称 name	单位 unit	参数 parameter		
			C：负荷开关柜 C：Load switch	F：组合电器柜 F：Composite apparatus	V：断路器柜 V：Circuit breaker
1	额定电压 Rated voltage	kV		40.5	
2	额定电流 Rated current	A	630	受限于高压熔丝	630
3	额定频率 Rated frequency	Hz		50	
4	1min 工频耐受电压（有效值）（相间、对地 / 断口） 1min power frequency withstand voltage (RMS) (phase to phase , to earth/Disconnector)	kV		95/118	
5	雷电冲击耐受电压（有效值）（相间、对地 / 断口） Lightning impulse withstand voltage (RMS) (phase to phase , to earth/Disconnector)	kV		185/215	
6	额定短时耐受电流 / 短路持续时间 Rated short time withstand current/ time of duration	kA/s	25/4、31.5/4		25/4、31.5/4
7	额定峰值耐受电流 Rated peak withstand current	kA	63、80		63、80
8	额定短路关合电流（峰值） Rated short circuit making current (peak)	kA	63、80	80	63、80
9	额定短路开断电流 Rated short circuit breaking current	kA		31.5	25、31.5
10	额定操作顺序 Rated operation sequence				O-0.3s-CO-180s -CO
11	额定交接（转移）电流 Rated transfer current	A		1000	
12	额定单个电容器组 / 背对背电容器组开断电流 Rated single capacitor bank/ back to back capacitor bank breaking current	A	630/400		
13	机械寿命 Mechanical life	次 time	5000		10000
14	充气壳体防护等级 Protection degree of gas-filled tank	IP	67		
15	机构室、仪表室、电缆室防护等级 Protection degree of mechanism compartment、instrument compartment and compartment	IP	4X		
16	SF_6 气体额定压力（20℃时表压） SF_6 gas rated pressure	MPa	0.04		
17	SF_6 气体最低运行压力（20℃时表压） SF_6 gas minimum pressure (gauge pressure at 20℃)	MPa	0.02		
18	SF_6 气体年漏气率 SF_6 gas annual leakage rate		≤0.1%		

负荷开关、断路器机械特性参数

MECHANICAL CHARACTERISTIC PARAMETERS OF LOAD SWITCH AND CIRCUIT BREAKER

序号 S/N	名称 name	单位 unit	参数 parameter			
			负荷开关 Load switch	断路器 Circuit breaker		三工位隔离开关 Three-position disconnector
1	额定短路开断电流 Rated short time breaking current	kA		25	31.5	
2	触头压力 Contact pressure	N		2500±300	3100±300	
3	触头开距 Clearance between opening contacts	mm	87±3	17±1		隔离动静触头≥90 Lsolated moving ang fixed contact≥90 接地动静触头≥88 Grounding moving and fixed contact≥88
4	超行程 Over travel	mm	33±3	4±1		
5	刚合速度 Speed instant of touching	m/s	2.7±0.3	0.8±0.25		
6	刚分速度 Speed at instant of opening	m/s	2.5±0.3	1.7±0.25		
7	触头合闸弹跳时间 Contact closing bounce time	ms		≤3		
8	三极触头分、合闸不同期性 Asynchronous opening and closing of three pole contact	ms	≤3	≤3		≤5

高压熔断器电气参数

ELECTRICAL PARAMETERS OF HV FUSE

型号 Type	额定电压 kV Rate voltage kV	熔断器电流 A Fuse current A	熔体额定电流 A Rated current of fusant A	额定开断电流 kA Rated breaking current kA
XRNT□-40.5	40.5	50	3.15\6.3\10\16\20\ 25\31.5\40\50	31.5

过电压保护（避雷器）电气参数

ELECTRICAL PARAMETERS OF OVERVOLTAGE PROTECTION DEVICE（SURGE ARRESTER）

系统标称电压 System nominal voltage	持续运行电压 Continuous running voltage	直流 1mA 参考电压 kV峰 DC 1Ma reference voltage	2ms 方流容量 2ms Rectangular current discharge capacity	陡波冲击电流下残压 Residual voltage of steep impulse current	雷电冲击电流下残压 Residual voltage of lightning impulse current	操作冲击电流下残压 Residual voltage of operation impulse current	工频参考电压 Power frequency reference voltage
（kV 有效值） （kV RMS）				（峰值 kV峰） （Peak value kV峰）			
35	40.8	73	400	154	134	114	51

电流互感器电气参数

ELECTRICAL PARAMETERS OF CURRENT TRANSFORMER

额定一次电流 Rated primary current	额定二次电流 Rated secondary tcurrent	准确级及其额定二次输出（VA） Accuracy class and rated secondary output（VA）				内孔（电缆孔）直径 Inner hole（Cable hole）Diameter
		0.2	10P10	10P15	10P20	
300	5	10	15	10		80
400			20	10		80
300			15			100
400				10		100
500		15	25		10	120
600			30			120

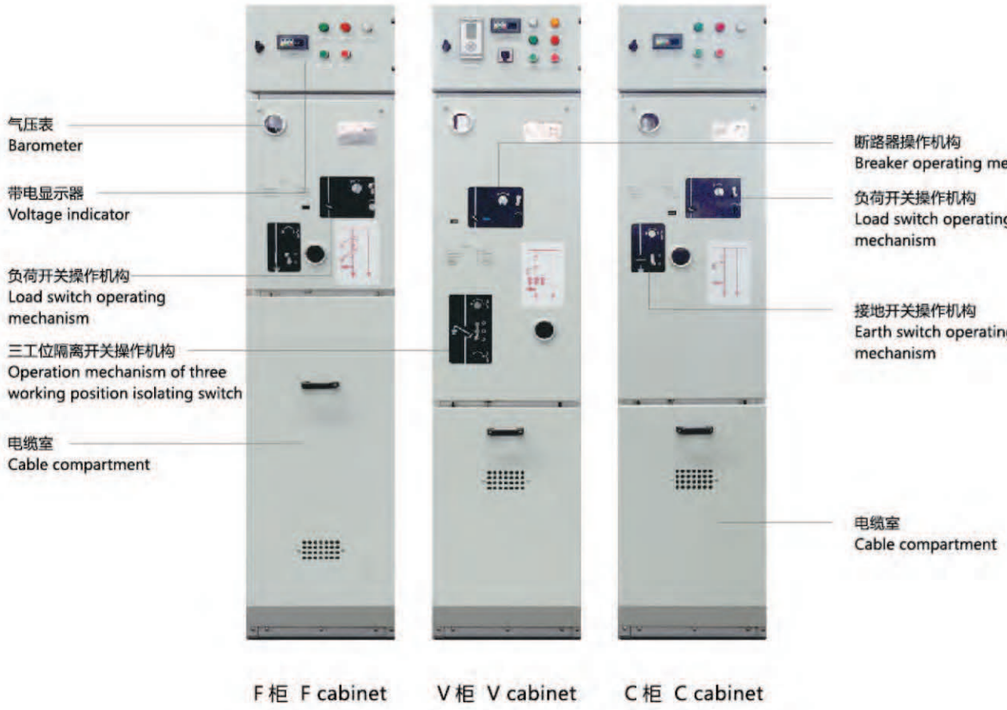
电压互感器电气参数

ELECTRICAL PARAMETER OF POTENTIAL TRANSFORMER

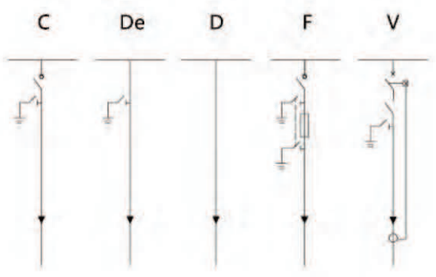
额定电压比 Rated voltage ratio	准确级组合 Accuracy class combination	额定二次输出（VA） Rated secondary output（VA）	极 限 Limit
35/√3/0.1/√3/0.1/3	0.2/3P	30/100	600
	0.5/3P	100/100	
	1/3P	150/100	
	3/3P	300/100	

基本结构 BASIC STRUCTURE

标准柜型



F 柜 F cabinet　　V 柜 V cabinet　　C 柜 C cabinet



XGNS1 的每个模块具有下列配置：

Each module of XGNS1 has the configuration as follows:

C - 负荷开关单元 Load switch

D - 直接电缆连接单元 Direct cable connection

De - 带接地开关的直接电缆连接单元

De - Direct cable connection with earth switch

F - 负荷开关 - 熔断器组合电器单元

F - Load switch-fuse composite apparatus

V - 真空断路器单元 Vacuum breaker

环网柜所有高压一次元件置于有 3mm 不锈钢板焊接而成的封闭壳体内。壳体内充 0.04Mpa 压力的 SF_6 气体，作为灭弧和绝缘的介质。充气壳体内部气体压力由气压表监视。气箱背部设有防爆装置，当内部电弧压力过大时，箱体内的高压气体将动作于防爆装置向柜体背面释放，而不致伤害操作人员。

负荷开关采用压气室吹式结构，灭弧能力强，且不影响相间及对地绝缘，动静触头均带有弧指触头，大大提高了开断次数。

熔断器与负荷开关室构成变压器保护回路，高压限流熔断器装于环氧浇注的绝缘壳体内，熔断器熔断后，弹出撞针，负荷开关分闸。

操动机构室位于环网柜正面，在每个功能回路中，负荷开关、断路器配有人力（或电动）储能弹簧操动机构，三工位隔离开关和接地开关配有人力储能弹簧操动机构。面板上有开关状态显示牌。三工位隔离开关和接地开关操作机构上设有挂锁位置，不操作时可配置挂锁，防止非授权人员误操作。负荷开关—接地开关—电缆室门、断路器—三工位隔离开关—电缆室门的操作设有“五防”联锁装置。

XGNS1 是一个体型小巧的金属密封的开关设备系统，在同一个 SF_6 绝缘气室内，XGNS1 最多可以配置 4 个模块，为配电网络提供 10 种固定组合方式，适应绝大多数需要环网单元的场合。XGNS1 典型的组合形式有：DeF、CCF、CCCF、CCFF、CCC、CCCC、DeV、CCV、CCCV、CCVV。配置模块数多于 4 个的开关柜要采用扩展母线将开关柜连接起来，实现半模块化结构；也可以通过在所有的模块之间扩展母线的方式以实现全模块化配置。

All parts of primary high-voltage circuit are wholly enclosed in a welded cabinet of 3mm-thickness stainless steel sheets. The SF_6 gas at 0.04MPa is filled as arc-extinguishing and insulating medium. Monitor the pressure of gas with air gauge. The back of gas chamber is equipped with explosion-proof device. When the arc pressure is too high, the high-pressure gas in the cabinet triggers the explosion-proof device and is released behind the cabinet to protect the safety of operators.

Our load switch adopts the structure of gas compression and inwards arc blowing. It has the strong arc quenching force and has no influence on the insulation between phase and to the ground. The dynamic and static contacts are arcing contacts to increase breaking times greatly.

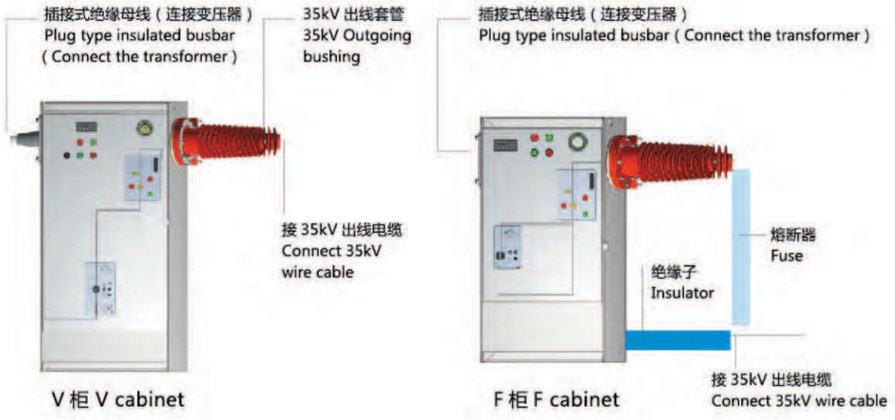
A fuse and a load switch chamber comprise a transformer protection circuit. A high-voltage current-limiting fuse is mounted in the epoxy-cast insulated housing. After the fuse burns, it triggers the pin and causes the load switch to open.

An actuation chamber is in the front of ring main unit. In each functional circuit, load switch and breaker are equipped with manually/ electrically-operated energy storage spring actuator while 3-position isolating switch and earth switch is equipped with manually-operated energy storage spring actuator. On the panel is a display of switch status. A padlock is provided for 3-position isolating switch and earth switch in order to avoid any unauthorized operation. A interlocking mechanism connects load switch, earth switch and door of cable chamber, and breaker, 3-position isolating switch and door of cable chamber respectively.

XGNS1 is a series of small metal-clad switchgears. In a SF_6 insulation chamber, it can integrate at most four modules. Provide 10 configurations for distribution network and adapt to most ring network applications. Its typical configurations include DeF, CCF, CCCF, CCFF, CCC, CCCC, DeV, CCV, CCCV and CCVV. If more than 4 modules are required in a switchgear, connect switchgears with expansion busbar to shape a semi-module structure or connect all modules with expansion busbar for modular configuration.

壁挂式柜型（箱变专用）

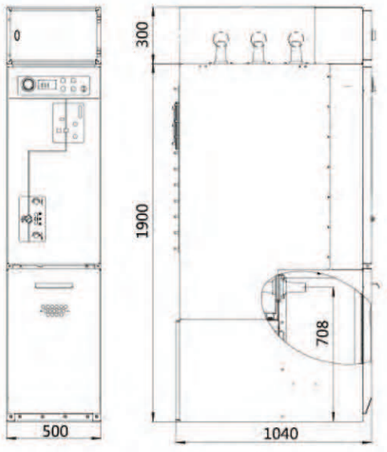
WALL-MOUNTED CABINET TYPE （BOX-TYBE SUBSTATION SPECIAL）



变压器保护 TRANSFORMER PROTECTION

- XGNS1 提供了两种变压器保护方式可供选择：负荷开关 - 熔断器组合电器，或断路器 + 继电器保护。
  XGNS1 protects transformers with load switch-fuse composite apparatus or vacuum breaker + relay.
- 对于高额定值 (超过 1600kVA) 的变压器，建议使用带有继电器的断路器保护。
  Recommend the protection with breaker and relay for transformers of higher rating (above 1600kVA).
- 继电器保护方式有两种：自供电数字继电器型、微机保护监控装置。
  The relay protection has two variants, i.e. self-powered digital relay and microprocessor protection monitor.

产品外形尺寸 OUTLINE DIMENSIONS



标准柜型

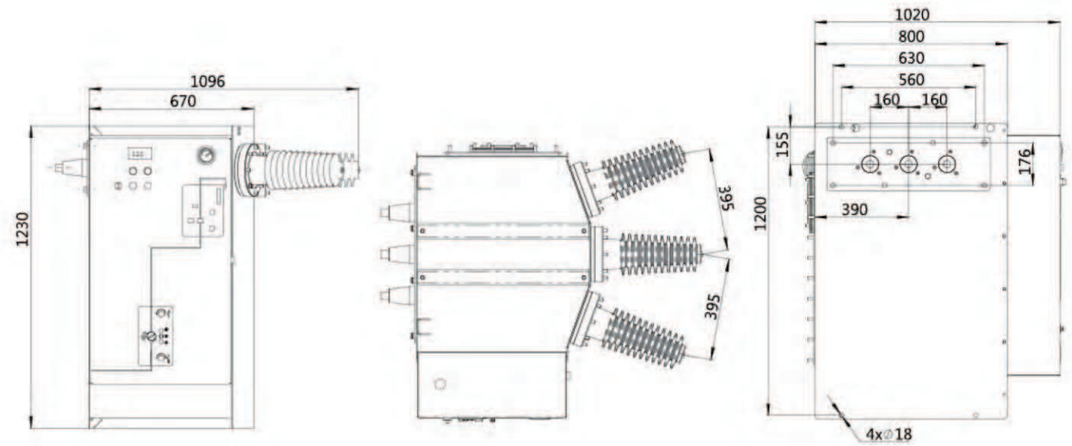
STANDARD SWITCHGEAR

C、F、V、D、De 柜的外形尺寸均为：宽 500mm，深 1010mm，高 2200mm (顶部 300mm 为仪表室)。

Overall dimensions of models C, F, V, D and De: 500mm wide, 1010mm deep and 2200mm high (300mm-height instrument chamber at the top).

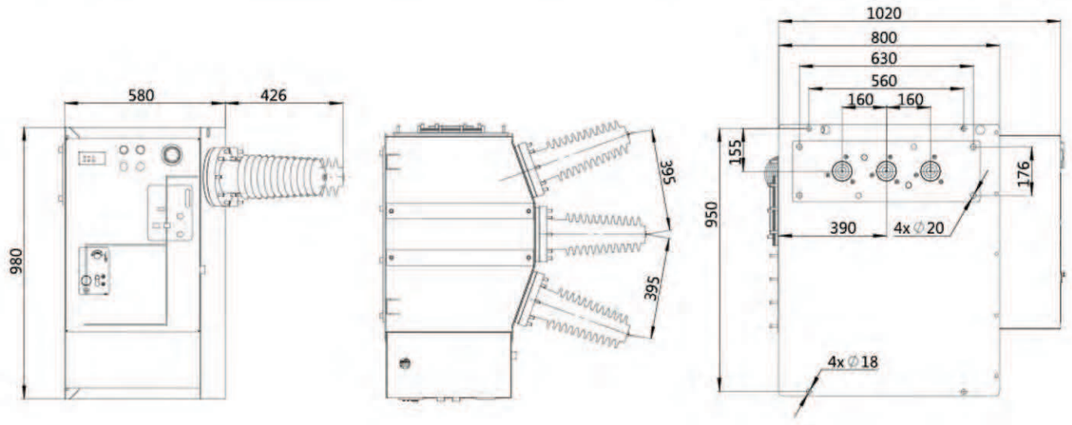
壁挂式 V 柜型（箱变专用）外形尺寸

WALL-MOUNTED V CABINET（BOX-TYPE SUBSTATION SPECIAL）DIMENSIONS



壁挂式 F 柜型（箱变专用）外形尺寸

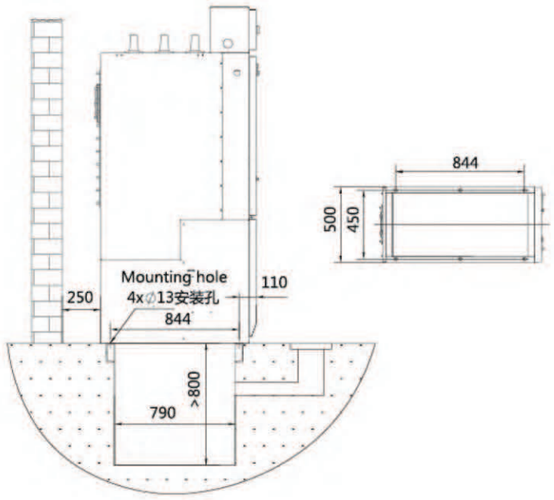
WALL-MOUNTED F CABINET（BOX-TYPE SUBSTATION SPECIAL）DIMENSIONS



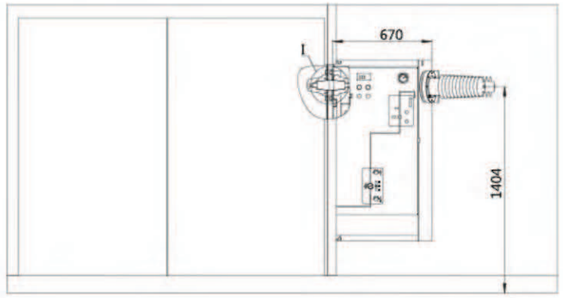
安装调整与维护
INSTALLATION, ADJUSTMENT AND MAINTENANCE

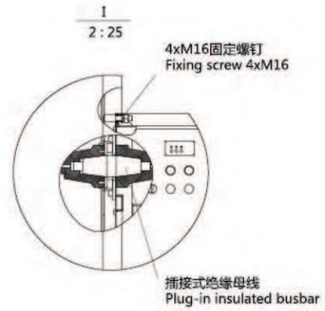
标准柜型安装
STANDAR CABINET INSTALLATION

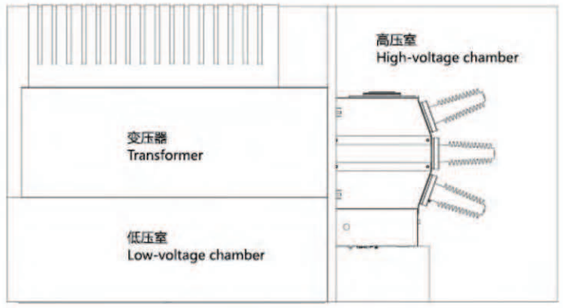
- 负荷开关、真空开关在分、合闸时产生的动负载，向上、向下约为 8000N±150N，此数据为设计基础时估算基础应力的依据。
- Load switch and vacuum switch produce a dynamic load of 8000N±150N upwards and downwards upon opening and closing. It provides the basis for foundation stress estimation during the foundation design.
- 开关设备基础参考下图进行设计和施工，基础应平整。
- Design and build the foundation with reference to the following diagram. Keep the foundation level.

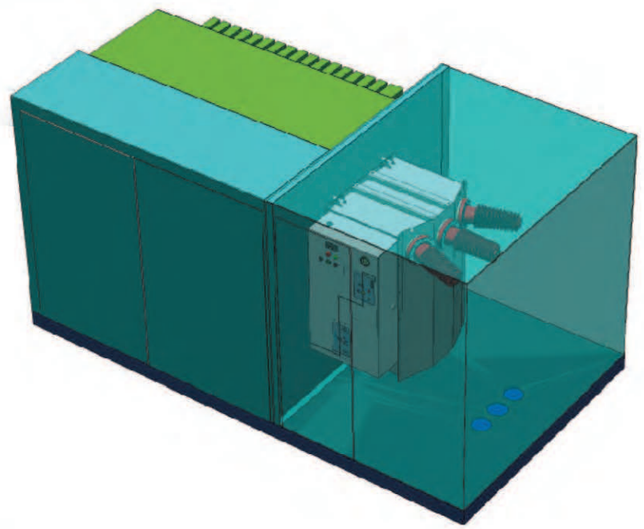


壁挂式柜型安装
WALL-MOUNTED CABINET INSTALLATION









安装程序及注意事项

INSTALLATION PROCEDURE AND NOTES

① 将开关柜按排列顺序放置在基础上，调整好开关设备的直线度、垂直度、水平度，然后用 M10 螺栓或用点焊方法将开关柜紧固在基础槽钢上。

② 用 M8X30 螺栓进行柜间固定。

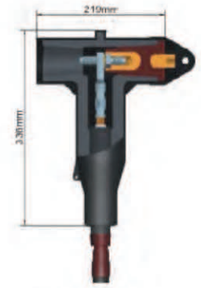
③ 安装顶部固体绝缘母线（扩展柜）。

④ 安装前，请将所有安装零件用清洁纸清洁干净。

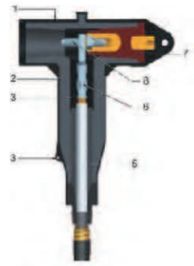
⑤ 电缆终端头在安装前，绝缘套管应清洁并涂上硅油脂（硅油脂附在电缆终端盒内）。整个安装过程中，请注意不要让尖锐物件划破硅橡胶制品。电缆施工完后应用隔板将电缆室与电缆沟封闭。

⑥ 柜间用接地母线连接，使之成为一体，检查工作接地和保护接地是否有遗漏，连接回路是否导通。

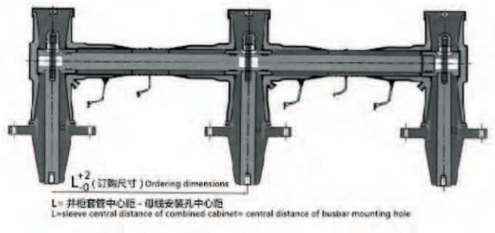
⑦ 安装二次电缆，电缆由柜体左侧底部穿入，沿侧壁进入电缆室，分接到相应的端子排上，施工时应注意电缆号，端子号不要漏穿或穿错，二次电缆施工完成后，注意勿忘封盖电缆孔。



图一：外形尺寸图
Figure 1 :product structure drawing



图二：产品构造图
Figure 2 :product structure drawing



① Rank the switchgear on the basis according to a certain order , abjust the straightness , verticality and levelness of the assembly , Then fix the switchgear on the basis U-steel by M10 bolt or using the method of spot welding.

② The fixed connection between the switchgears uses M8X30 bolt.

③ Installation of top solid insulating busbar (expansion cabinet).

④ Before installation , please clean all the components and accessories by cleaning paper.

⑤ Before the installation of cable terminals , the insulating bushing should be cleaned and coated with silicon grease (silicon grease is attached at the cable terminal box) .During the whole installation process , please make sure that the silicone rubber products won,t be lacerated by sharp-pointed items.After finishing the work of cable , the cable room and cable duct should be sealed by partitions.

⑥ The switchgears are integrated by the connection of earth busbars , Check the omissions of working earth and protection earth.And check the connection circuit is breakovered or not.

⑦ Installation of secondary cable , The cable threads from the left bottom of the cabinet , enter the cable room along the side wall , and then connect to the relative terminal clock.During construction , pay attention to the correctness of cable number and terminal number.After finishing the secondary cable construction ,do not forget closing over the cable hole.

熔断器检查与更换

INSPECTION AND REPLACEMENT FOR FUSE

a. 对于正常运行的熔断器，其寿命可在 20 年以上，若定期检修设备时，可用测量熔断器内阻的变化来判断其是否变化，内阻的变化范围在 ±10%之内。

b. 在更换熔断器时必须非常小心，因为限流熔断器在运行时有一个安全范围，它不能保证每一个故障条件均在其安全范围内，如开关装置的脱扣失灵，或熔断器低于其最小分断电流下动作等。为安全起见，至少要等待熔断器动作 10 分钟以后和电路被负荷开关隔离开，且接地开关合闸，熔断器二端均接地的条件下才能更换，一定要保证熔断器在不带电的条件下更换。

c. 因更换熔断器需要，要打开熔断器室 必须先将接地开关合闸(接地)，联锁机构打开，方可打开熔断器室的门，换装熔断器，切不可强行打开，以防触电及破坏联锁机构。

d. 负荷开关分闸，上、下接地开关合闸(接地)后 ,方可打开熔断器室门。在取出熔断器时，需小心轻拿，以免损坏装熔断器的壳体，同时检查硅橡胶头有无损伤。

a. For the fuse with normal operation , its mechanical life can be more than 20 years.During the periodic inspection and maintenance of the equipment , the change of the fuse can be judged by the change of the fuse’ s internal resistance.The change range of internal resistance is with in ±10%.

b. Pay special attention to the replacement of fuse , for the reason that there is a safety range for the current limit fuse when in operation , it can not ensure that every fault condition is within the safety range.Such as release failure of the switchgear or the fuse is below its minimum breaking current action.For safety sake , after at least 10 minutes action of the fuse , isolate with the loaded switch of the circuit , and it should be replaced only when the earth switch is closed and both ends of the fuse are earthed.It should be ensured that the fuse is replaced with neutral condition.

c. For the replacement of the fuse , fuse room should be opened.Before that , the earth switch should be closed (earth) and the interlocking mechanism should be opened firstly , then the fuse room door can be opened to replace the fuse。 In order to avoid electric shock and the damage of interlocking mechanism , the door should not be opened forcedly.

d. The fuse room door can be opened only when the load switch is opened and the upper and lower earth switch are closed (earth) .When taking out the fuse , be gentle to avoid damaging the fuse enclosure.Meanwhile , check the silicon rubber head is intact or not.

验收试验及投入运行前的准备工作
ACCEPTANCE TEST AND PREPARATIONS BEFORE OPERATION

试验项目 TEST ITEMS

充气柜的现场交接试验应按照 DL/T618《气体绝缘金属封闭开关设备现场交接试验规程》的要求进行，其试验项目如下：
The field acceptance test of the gas filled cabinet should comply with DL/T618 Gas insulation Metal-Clad Switchgear Field Acceptance Test Regulation。Its test items are as follows.

- 外观检查。Appearance check.
- 主回路电阻测量。Main circuit resistance measuring.
- 元件试验。Component test.
- SF_6 气体的验收。Check and acceptance of SF_6 gas.
- 气体密封性试验。Gas leakage test.
- SF_6 气体水分含量测试。Moisture content test of SF_6 gas.
- 主回路绝缘试验。Main circuit insulation test.
- 辅助回路绝缘试验。Auxiliary circuit insulation test.
- 联锁试验。Interlock test.

投入运行准备工作 PREPARATIONS BEFORE COMMISSIONING

- 接通控制、信号、照明等电源。
- 在其他开关设备的负荷开关、隔离开关、真空开关等处于分闸状态时，给主母线送电，按规定操作程序使进线柜投入运行。
- 依次合上馈线柜断路器，检查电流表是否正确。
- Turn on the power supply of control , signal , and lighting.
- When the load switch , ddisconnector and vacuum switch in other switchgears are in opening state , transmit power to the main busbar , and put the incoming cabinet into operation according to the specified operation procedure.
- Turn on the circuit breakers of the outgoing cubicle in turn , check the ammeter.

维护与检修 MAINTENANCE AND OVERHAUL

充气柜的运行和维护应按照 DL/T603《气体绝缘金属封闭开关设备运行及维护规程》执行。维护项目和周期如下：

- 巡视检查:每天至少一次，无人值班另定。对运行中的充气柜进行外观检查，主要检查设备有无异常情况，并做好各种参数纪录。
- 定期检查:每年进行一次 ,或按实际情况而定。充气柜处于全部或部分停电状态下 ,专门组织的维修检查 ,充气壳体内部无需检查，仅对充气壳体外部的操作机构、辅助开关、压力表、充气接头等进行全面检查和维护。
- 临时性检查：负荷开关、断路器达到规定的开断次数或累计开断电流值时；当发现有异常现象或充气柜内部发生故障时；充气柜处于全部或部分停电状态下，对负荷开关、断路器或其他设备进行分解检修，内容与范围应根据运行中发生的问题而定，这类分解检修宜有制造厂承包或在制造厂指导下协同进行。

The operation and maintenance of the gas-filled cabinet should comply with DL/T603 Gas Insulation Metal-Clad Switchgear operation and maintenance Procedure.

- Patrol and inspection : at least once a day , if no one is on duty , other arrangement will be made。Inspect the appearance of the running gas-filled cabinet, notably inspect whether there is anything wrong with the equipment and make parameter record.
- Periodic inspection : once a year , or decided according to the actual situation。The inspection is arranged when the gas-filled cabinet is total or partial power cut. It is unnecessary to check the internal part of the gas-filled enclosure.
- Interim inspection: when a load switch or a breaker reaches the specified breaking times or the accumulative breaking current; when any abnormality is found or there is any failure in an inflatable switchgear. Dismantle and inspect a load switch, a breaker or other equipment in an inflatable switchgear after turning it off completely or partially. Determine the content and scope of inspection according to troubles. Such dismantling and inspection must be conducted or instructed by manufacturer.

SF_6气体质量监督
SF_6 GAS QUALITY SUPERVISION

- SF_6 泄漏检测：根据 SF_6 压力温度曲线监视气体压力变化，但气箱内压力降至最低运行压力时，系统会发出警报信号，此时应及时进行补气。
- SF_6 leakage detection : monitor the change of gas pressure according to the SF_6 pressure temperature curve , However , when the pressure inside the gas tank achieves to the lowest operational pressure , the system will sound the alarm , then gas should be supplemented in time.

运输与保管 TRANSPORTATION AND STORAGE

- 产品经出厂检验合格后可进行包装和发运。
  包装时，产品用螺栓固定在底盘上，运输过程，只准直立放置，不准倒置、倾翻、翻滚、掉下。
- 产品在安装前，应以原包装存放在库房中，如不能入库房，应防雨淋，防受潮，不得随意拆卸电器元件及零部件。
- After passing the factory test , the products can be packed and shipped , When packing , the products should be fixed on the chassis by bolt.During the transportation , the products can only stand on end and should not roll over or drop down.
- Before installation , the original packages of the products should be kept in the storage , If they can not be put in the storage , they should protect against rain and moisture.The electrical components and spare parts should not be dismounted at discretion.

随机文件 ATTACHED DOCUMENTS

- 产品合格证。Certificate of approval for the products.
- 产品说明书。Instructions of the products.
- 二次施工接线图。Secondary construction wiring diagram.
- 技术协议中规定的其他文件。Other documents specified in the technical protoco.
- 装箱单。 Packing list.

订货须知 NOTES FOR ORDER

- 主接线方案编号及单线系统图，平面布置图。
- 二次回路原理图，端子排列图，如端子无排列图时按制造厂规定。
- 电缆及电缆终端应在订货时确定其规格、型号。
- 开关柜使用在特殊环境条件，应在定货时提出并与制造厂协商。
- 需要备件、附件时，应提出其名称和数量。

- Major connection scheme number and single line systematic diagram , layout chart.
- Secondary circuit schematic diagram , Terminal arrangement diagram , if not include , according to the specification of the manufacturer.
- Cable and cable termination,s specification and type should be confirmed when ordering.
- If the switchgear is used in special environment , the customer should negotiate with the manufacturer when ordering.
- If spare parts or accessories are in need , the customer should speak out its name and quantity.