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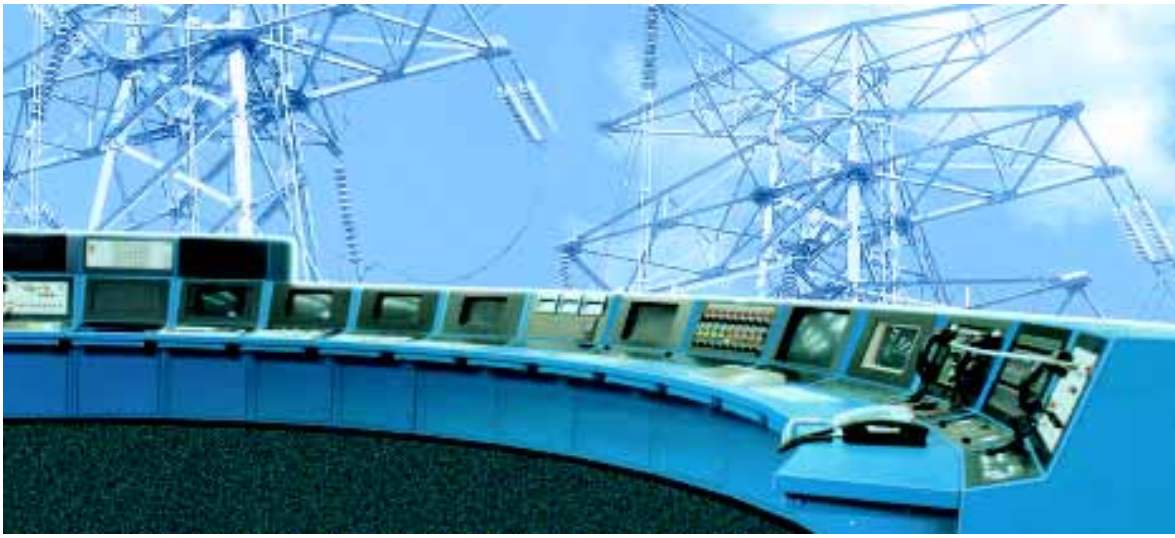
HXGN-12

交流金属封闭开关设备

AC Metal-enclosed Switchgear

Westhouse 西屋成套

HXGN



1、概　述

HXGN□-10ZF(R)箱型固定式金属封闭开关柜(简称环网柜)适用于交流50HZ，10KV的网络作为开断负荷和负路及关合短路电流用。本环网柜配用手动、电动弹簧机构来操作负荷开关，接地开关和隔离开关配用手动操作机构。

1. General

The HXGN□- 10ZF(R) Cased & Fixed Type Metal-enclosed Switchgear(Ring Main Cubicle in short) is suitably used in 50Hz,10kV power systems for switching off load,breaking and making short circuit current. A manual and motor driven spring operating mechanism is equipped for a load switch in the cubicle, and a manual operating mechanism is equipped for a disconnector and earth switch.

2、型号含义

2. Type designation

HXGN□-10 ZF (R)/□-□ □

- 额定电流(A)
- Rated current(A)
- 操作机构特性
- Operating mechanism
- 方案号
- Scheme number
- 配熔断器
- With fuse
- 真空负荷开关
- Vacuum load switch
- 额定电压(KV)
- Rated voltage(kV)
- 设计序号
- Design serial number
- 户内
- Indoor
- 固定式
- Fixed type
- 箱型
- Cased
- 环网柜
- Ring main cubicle

3、使用环境条件

a.环境温度上限+40℃，下限-25℃;

b.海拔高度不超过1000m;

c.空气相对湿度日平均值不大于95%，月平均值不大于90%；水蒸气日平均值不大于2.2 × 10 ³MPa,月平均值不大于1.8 × 10 ³MPa;

d.周围空气不受腐蚀或可燃气体、水蒸气等明显污染

e.无经常性的剧烈振动。

3. Working conditions

a. Ambient temperature not higher than +40℃ nor lower than -25℃;

b. The altitude of application site not over 1000 meters above sea level;

c. The daily average value of relative humidity of ambient air not exceeding 95% and the monthly average of that not greater than 90% whereas the daily average value of vapor pressure not more than 2.2 × 10^{-3} MPa and the monthly average of that not greater than 1.8 × 10^{-3} MPa;

d. Ambient air free from substantial pollution caused by corrosive or flammable gaseous and vapor;

e. Places where there is no frequently vibration and shock.

4、技术数据　环网柜的技术数据见表1。

4. Main technical parameters

表1

Table 1

序号 No.	名称 Description			单位 Unit	数据 Value
1	额定电压/最高工作电压		Rated voltage/max.working voltage	kV	10/12
2	额定电流		Rated current	A	630
3	主母线电流 Main busbar current	进线柜	Incoming cubicle	A	630
		出线柜	Outgoing cubicle		125
4	额定短时耐受电流		Rated short time withstand current	kA	20
5	额定短路持续时间		Rated short circuit duration	S	4
6	额定峰值耐受电流		Rated peak value withstand current	kA	50
7	额定短路关合电流		Rated short citcuit making current	kA	50
8	额定有功负载开断电流		Rated active load breaking current	A	630
9	闭环开断电流		Closed loop breaking current	A	630
10	额定电缆充电电流		Rated cable charging current	A	20
11	接地开关额定短时耐受电流		Rated short time withstand current for earth switch	kA	20
12	接地开关额定短路持续时间		Rated short circuit duration for earth switch	S	4(2)
13	接地开关额定峰值耐受电流		Rated peak value withstand current for earth switch	kA	50
14	接地开关额定短路关合电流		Rated short circuit making current for earth switch	kA	50
15	1min额定工频耐受电压 1min rated power frequency withstand voltage		相间、相对地、真空负荷开关断口 Between phases,phase to earth,between breaks of vacuum load switch	kV	42
			隔离开关断口 Between breaks of disconnector		48
16	额定雷电冲击耐受电压 Rated lightning impulse withstand vltage		相间、相对地、真空负荷开关断口 Between phases,phase to earth,between breaks of vacuum load switch	kV	75
			隔离开关断口 Between breaks of disconnector		85
17	机械寿命 Mechanical endurance		真空负荷开关 Vacuum load switch	次	10000
			接地开关(刀)、隔离开关(刀) Earth switch (Knife), disconnector (knife)		2000
18	转移电流 Take-over current			A	870

5、技术要求

装有ZFNⅡ-10/630型真空负荷开关的环网柜应能满足ZFN-10/630型真空负荷开关的所有相应的技术要求。

6、结构和工作原理

产品外形结构见图1、图2，安装尺寸如图3所示。本环网柜是以空气为绝缘介质的、主要配装ZFNⅡ-10/630型真空负荷开关，主要方案有进线柜和出线柜等(见表2)。

6.1 进线柜方案

柜内主回路有一台ZFNⅡ-10/630型真空负荷开关，它配装有隔离刀，酌情还配装接地刀所组成，三者共装在一个机架上，并互有联锁。因此可实现接通母线、隔离、接地三个工位的操作，柜内还可灵活配装CT、PT等元件。

6.2 出线柜方案

柜内主回路有一台ZFNⅡ-10/630型真空负荷开关和带撞击器的熔断器(有隔离开关的作用)及接地刀所组成，也可实现三工位操作。柜内还可灵活配装CT/PT和ZNO避雷器等元件，因此有时可省去计量柜。

进、出线柜均配有与接地开关联锁的绝缘防护隔板，柜内各开关与隔板及柜门间采用机械联锁，并达到“五防”要求，柜体外壳防护等级为IP2X。

7、吊运、安装、调试和熔断器的更换

7.1 吊运

吊运前按规定进行开箱前的检查。柜体吊运时按作业标记要求，小心轻放、防震等。

7.2 安装、

开箱后，检查柜体及柜内元件是否完好，动作是否正常，有否受潮等，在确认无误后，方可进行安装。

7.3 调试

如发现柜内元件达不到其技术要求或联锁不到位时，需按下列过程调试:

a.对负荷开关和接地或隔离开关，可通过调节拉杆长度和变换拉杆与操作杆角度和位置来达到技术要求。

b.若有联锁不到位时，可微调相应的操作拉杆长度来改变联锁孔的位置，使联锁到位。

7.4 更换熔断器

必须严格按停电顺序操作，首先将负荷开关分闸，然后打开熔断器到隔离位置，并将接地开关合上，在插入绝缘防护隔板后，柜门方可打开，才能进行更换熔断器.

5. Technical requirements

The ring main cubicle with a ZFNⅡ- 10/630 Vacuum Load Switch should meet all the relevant technical requirements of the vacuum load switch.

6. Structure and working principle

The overall structure is shown in Figs 1 and 2 whereas installation dimensions are shown in Fig.3. Taking the air as an insulating medium, the cubicle is mainly equipped with a ZFNⅡ- 10/630 Vacuum Load Switch.The main schemes for incoming and outgoing cubicles are shown in Table 2.

6.1 Scheme for incoming cubicle

In primary circuit of the cubicle, there is a ZFNⅡ- 10/630 Vacuum Load Switch equipped with isolating knives and earting knives when necessary together on a rack with interlocking facilities among them. So three position operations, i.e., connection to busbar, isolation and earthing are realized, and still more, CT, PT and other apparatus may be mounted on the cubicle flexibly.

6.2 Scheme for outgoing cubicle

In primary circuit of the cubicle, there are a ZFNⅡ- 10/630 Vacuum Load Switch, fuses with strikers perfoming a function of disconnector, and earthing knives. With these three,3-position operation is also realized. Since the cubicle may also be equipped with components such as CT, PT and ZnO arrester and so on, sometimes a metering cubicle may be omitted.

By the way,all the incoming and outgoing cubicles are equipped with insulating protection partitions which interlock with the earth switch. There are mechanical interlocking devices among switches in cubicles, partitions and cubicle doors. As a matter of fact, the switchgear fully satiafies the so called “Five Preventive” requirements. The protective class on enclosure of the cubicle is IP2X.

7. Lift, installation, regulation and fuse replacement

7.1 Lift

Before lift, unpacking inspection should be done carefully as per specified. Lift should be conducted in accordance with operating marks such as “Handle with Care”, “No Shock” etc..

7.2 Installation

After unpacking, check whether the components in cubicle are sound and safe, whether their operations are in good condition, whether there is moisture intruded or not. Make sure everything is OK prior to installation.

7.3 Regulation

If some components are found not to meet the technical requirements or the interlocking is not in place, regulation should be done as follows:

a. For the load switch,earth switch or disconnector, reguation of the length, angle and position of pull rod is to be performed to meet the technical requirements.

8、使用与故障处理

8.1 使用

请务必严格按照下列要求操作，否则易造成损害。

8.1.1 负荷开关的操作顺序

a.合闸：当负荷开关处于分闸状态时，将操作手柄插入负荷开关操作孔内顺时针转动(约 180 度)，使其合闸。

b.分断：当负荷开关处于合闸状态时，可由手动脱扣按钮或脱扣电磁铁操作使负荷开关分闸，对配有带撞击器的熔断器的负荷开关，熔断器熔断后，其撞击器也可使负荷开关分闸。

8.1.2 停电操作顺序

a.将负荷开关分闸，使它与隔离和接地开关之间的联锁解除。

b.将操作手柄插入隔离和接地开关操作孔内，按顺时针方向转动(约 90 度)，隔离刀被打开。

c.再按顺时针方向转动(约 90 度)后，接地开关快速闭合。

d.插入绝缘隔板，使门联锁解除。

e.开门检修。

8.1.3 送电操作顺序

a.关闭柜门。

b.抽出绝缘隔板，柜门锁住。

c.将操作手柄插入隔离和接地开关操作孔内，逆时针转动(约 90 度)，使接地开关分断。

d.将操作手柄沿逆时针方向转动(约90度)，隔离开关被合上。

e.对负荷开关进行操作，合闸送电。

8.2 故障处理

环网柜在工作过程中，如果出现紧固件松动，机械部分润滑不良，真空灭弧室真空度下降等故障，在停电后采用紧固、加润滑剂、打耐压等方法来检查和消除以上故障。

b. Fine regulation of corresponding pull rod to change the position of interlocking hole is to be done to make the interlocking in right place.

7.4 Procedure of fuse replacement

Open the load switch, put the fuse into isolated position, close the earth switch and insert the insulating partition. Only on completion of the above-mentioned procedures can the cubicle door be opened and fuse replacement is thus possibly be done.

8. Operation and fault treatment

8.1 Operation

Make sure the following procedure should be strictly followed,otherwise,damage will easily occur

8.1.1 Operation procedure for load switch

a. Closing operation: Insert the operating handle into the operating hole of a load switch in open position, rotate it clockwise by about 180°.

b. Opening operation: Use manual tripping pushbutton or tripping solenoid to make the load switch open from closed position. For those load switches with striker fuses, the striker also can be used to make the switch open after the fuse element is burnt out.

8.1.2 Power off operation procedure

a. Open the load switch to disable interlocking between the disconnector and earth switch.

b. Insert the operating handle into the operating hole of the disconnector and earth switch, turn it clockwise by about 90° to open the disconnector.

c. Turn the handle clockwise by about another 90° to close the earth switch in quick speed.

d. Insert the insulating partition to disable door interlocking.

e. Open the cubicle door for inspection and reparation.

8.1.3 Power on operation procedure

a. Close the cubicle door.

b. Withdraw the insulating partition to restore door interlocking.

c. Insert the operating handle into the operating hole of the disconnector and earth switch, turn it counterclockwise by about 90° to open the earth switch.

d. Turn the handle counterclockwise by about another 90° to close the disconnector.

e. Close the load switch to restore power.

8.2 Fault treatment

If some faults are found when the cubicle is in operation such as loose fasteners, poor lubrication conditions in mechanical parts, reduced vacuity in vacuum interrupters, make power off operations, test and eliminate these faults by tightening, adding appropriate lubricant and withstand voltage verification and so on.

9、维护与修理

9.1 开箱后，应对所有绝缘件进行检查，对确已受潮的元件，应将其拆下，防入70-80℃的烘箱内，烘48小时后，取出装上重新调试。

9.2产品储放期间，如发现受潮或腐蚀,应立即进行清理,清理后做好防护处理。

9.3 运行中的环网柜应进行定期维修检查。

9.3.1 检查内容

a.真空灭弧室的真空度;

b.触头磨损情况;

c.机械紧固件是否松动;

d.开距超程等机械电气参数;

e.操作转动是否灵活;

f.联锁是否可靠;

g.所有零部件，特别是绝缘件是否清洁。

9.3.2 下列情况时，应对环网柜进行全面检查和调试:

a.每年一次的例行检查和清洁工作;

b.负荷开关每动作2000次后;

检查内容见9.3.1条，调整见7.3条。

10、储　存

环网柜应储存在干燥通风,温度-30～+40℃的仓库中。

11、随机文件

a.产品合格证;

b.安装使用说明书;

c.装箱单;

d.随机附件清单

e. 二次接线图。

12、订货须知

订货时须提供以下资料:

a. 一次系统排列图;

b. 二次原理图;

c.环网柜的型号和方案号;

d.柜内需安装元件的型号规格和数量;

e.柜体颜色等要求。

9. Maintenance and reparation

9.1 After unpacking, inspection of all insulating parts should be done. If some parts are found to be moisture intruded, dismantle and bake them in an oven of 70-80℃ for 48 hours. Then re-mount and regulate them again.

9.2 During the storage course, if some parts are found to be wet or corroded, clean them right away and then proper protection measures should be done to them.

9.3 The ring main cubicle in operation shoule be regularly maintained and repaired.

9.3.1 Inspection items

a. Vacuity of the vacuum breaker interrupter

b. Contact wear

c. Mechanical fasteners

d. Electromechanical parameters such as clearance and over-travel etc

e. Whether operation and rotation are flexible or not

f. Whether interlocking is reliable or not

g. Whether all parts and components especially insulating parts are clean or not

9.3.2 In case of the following, the cubicle should be inspected and regulated thoroughly

a. Routine inspection once a year

b. Each 2000 operation of the load switch

Please refer to 9.3.1 for inspection items and refer to 7.3 for regulation.

10. Storage

The storage of the ring main cubicle must be conducted in a ventilated and dry warehouse with the temperature ranging from -30℃～+40℃

11. Documents with the product provided

a. Product Certificate

b. Instructions for Installation and Operation

c. Packing List

d. Accessory List

e. Secondary Wiring Drawings

12. Information given for ordering

When ordering, the following information is supposed to submit to the manufacturer:

a. Arrangement drawing for primary system

b. Secondary schematic drawing

c. Type and scheme No. of the cubicle

d. Type, specification and quantity of the components in cubicle

e. Color of the cubicle

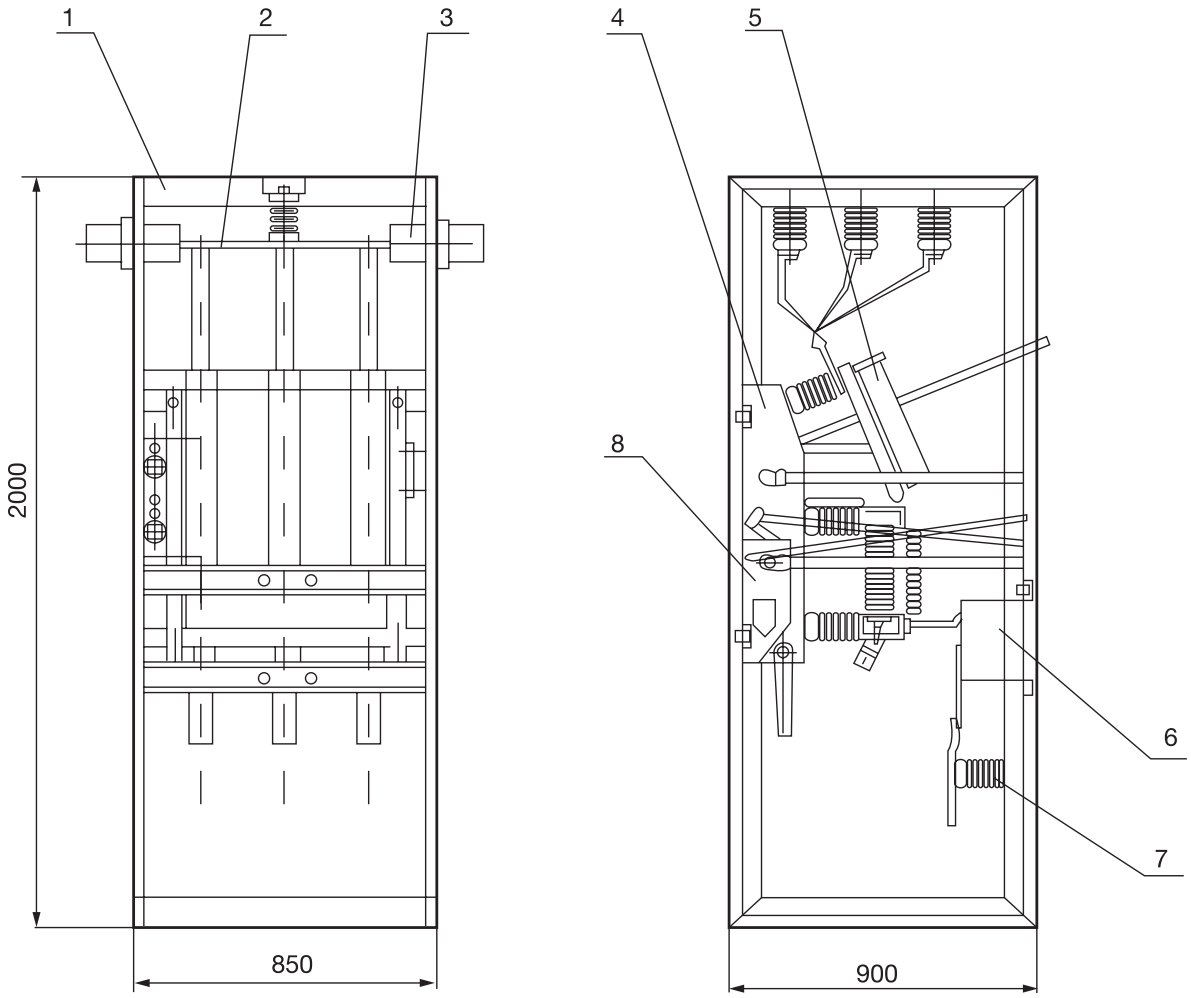


图1　组合电器柜

Fig1 Combined Electrical Apparatus Cubicle

1、柜体 cubicle body　2、母线 busbar　3、套管 bush　4、组合电器 combined apparatus

5、熔断器 fuse　6、电流互感器 current transformer　7、带电显示装置 electrical indicator　8、操作机构 operating mechanism

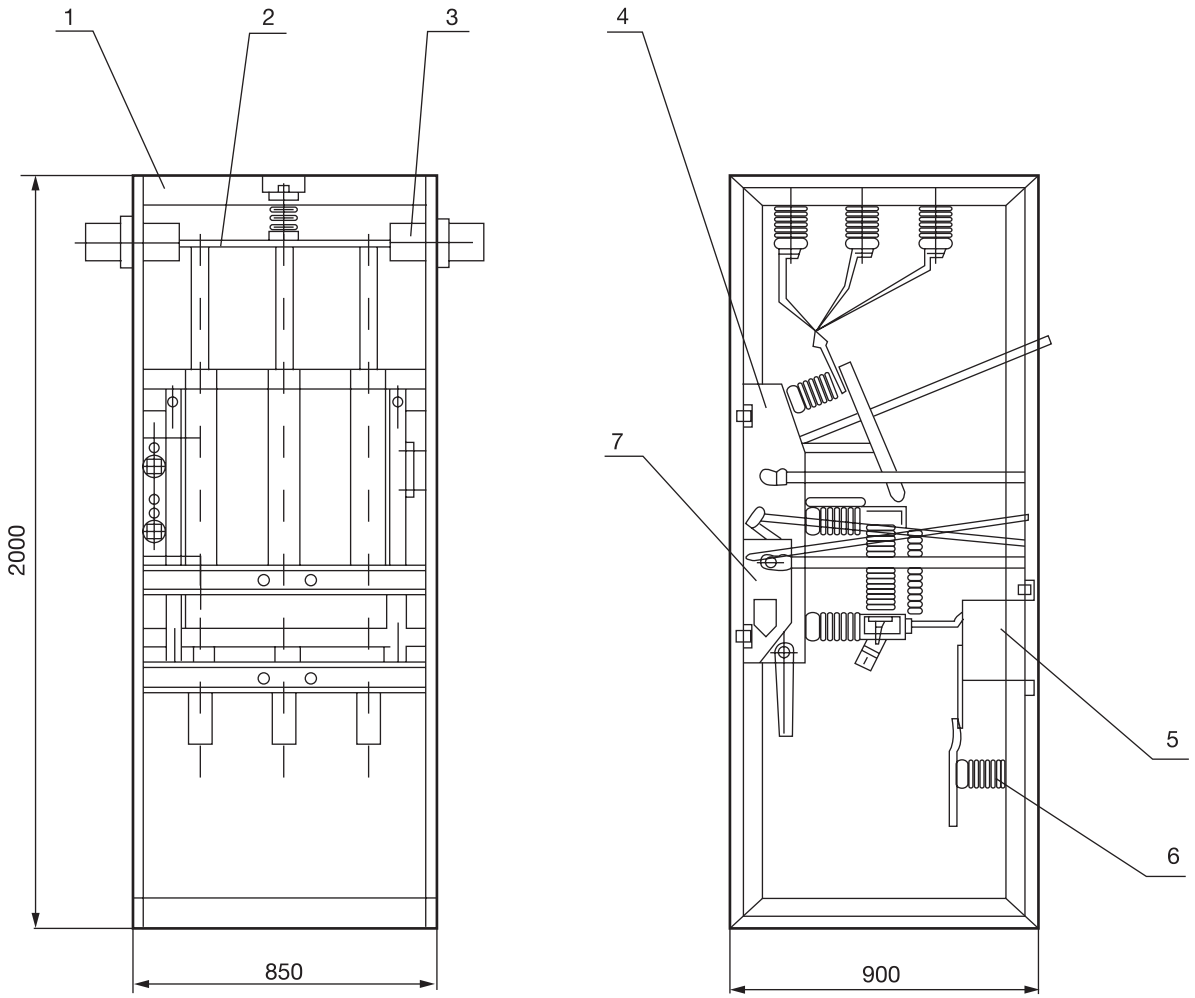


图2　负荷开关柜

Figure 2 Load Switch Cubicle

1、柜体 cubicle body　2、母线 busbar　3、套管 bush　4、负荷开关 load switch
5、电流互感器 current transformer　6、带电显示装置 electrical indicator　7、操作机构 operating mechanism

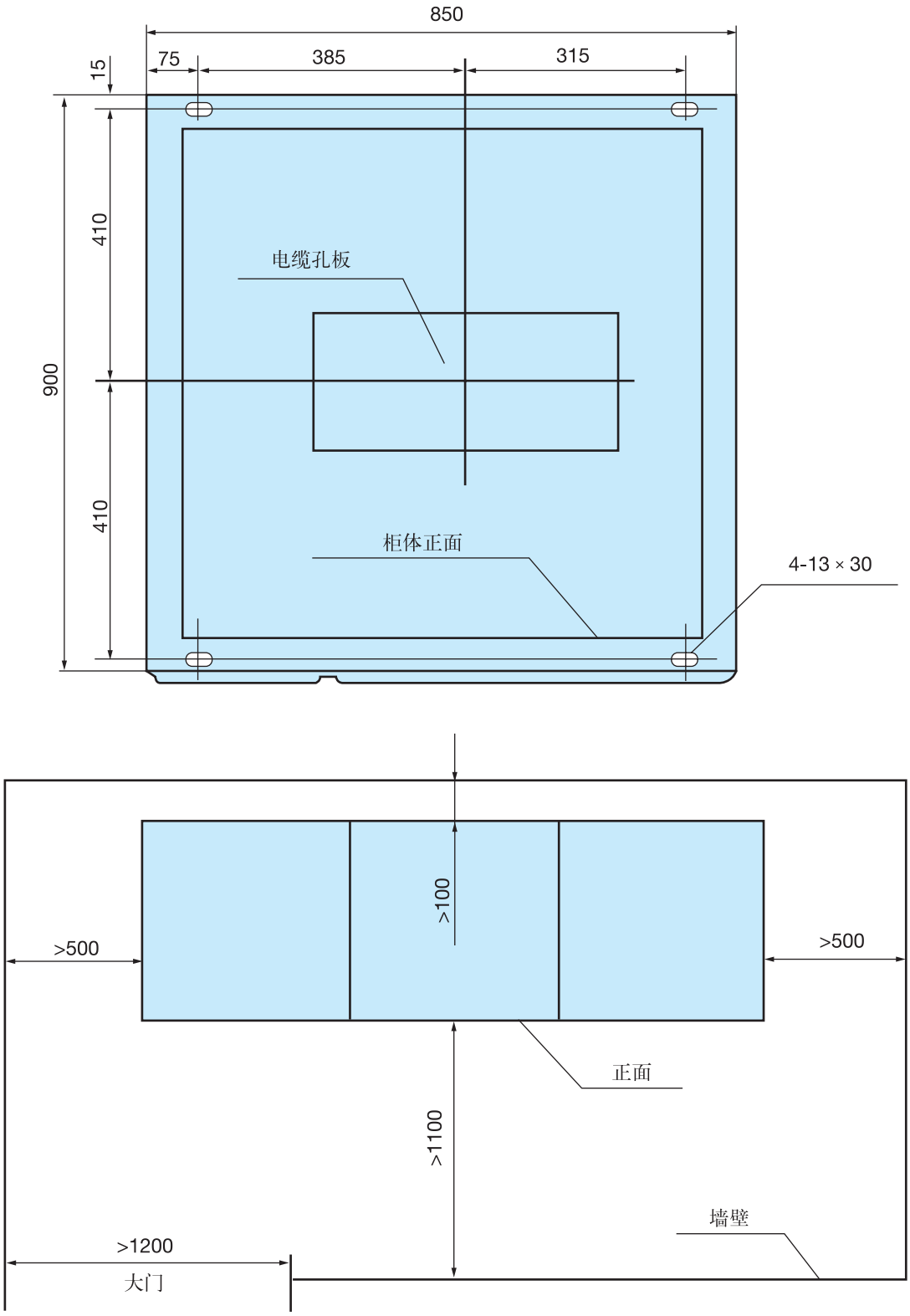
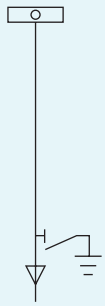
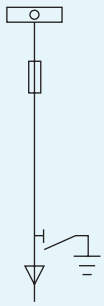
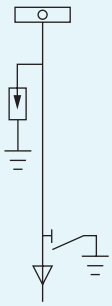
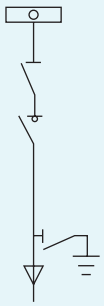
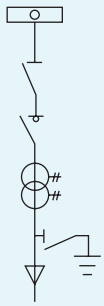
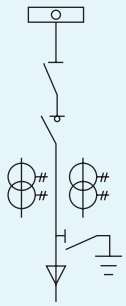


图 3　环网柜安装图

Figure 3 Installation Drawing for Ring Main Cubicle

表 2

Table 1

方案号 Scheme No.		01	02	03	04	05	06
主电路方案图 Main circuit scheme							
用途 Application		电缆进线或出线 Cable incoming or outgoing					
一次元件 Primary components	负荷开关 ZFN-10 Load switch				1	1	1
	隔离开关 Disconnector				1	1	1
	接地开关 Earth switch	1	1	1	1	1	1
	熔断器 SFL-J Fuse		3				
	熔断器 RN2 Fuse						
	电流互感器 LZZEJ CT					1	2
	电压互感器 JDZ-10 PT						
	避雷器 Y5W Arrestor			3			

续表 2

Table 2 (contd)

方案号 Scheme No.		07	08	09	10	11	12
主电路方案图 Main circuit scheme							
用途 Application		电缆进线或出线 Cable incoming or outgoing					
一次元件 Primary components	负荷开关 ZFN-10 Load switch	1	1	1	1	1	1
	隔离开关 Disconnector	1	1	1	1	1	1
	接地开关 Earth switch	1	1	1	1	1	1
	熔断器 SFL-J Fuse						
	熔断器 RN2 Fuse				3	3	3
	电流互感器 LZZEJ CT		1	2		1	2
	电压互感器 JDZ-10 PT				2	2	2
	避雷器 Y5W Arrestor	3	3	3			

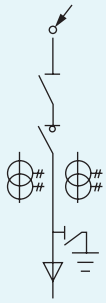
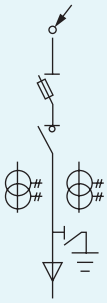
续表 2

Table 2 (contd)

方案号 Scheme No.		13	14	15	16	17	18
主电路方案图 Main circuit scheme							
用途 Application		计量和电缆进线 Metering and cable incoming	电缆出线 Cable outgoing			计量和电缆出线 Metering and cable outgoing	架空进线电缆出线 Overhead incoming cable outgoing
一次元件 Primary components	负荷开关 ZFN-10 Load switch	1	1	1	1		
	隔离开关 Disconnector	1	1	1	1		
	接地开关 Earth switch	1	1	1	1		1
	熔断器 SFL-J Fuse		3	3	3		3
	熔断器 RN2 Fuse	3				3	
	电流互感器 LZZEJ CT	2		1	2	2	
	电压互感器 JDZ-10 PT	2				2	
	避雷器 Y5W Arrestor						

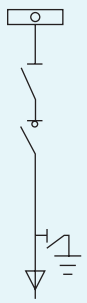
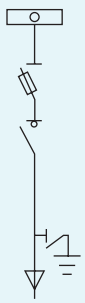
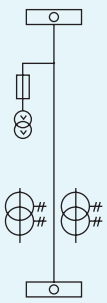
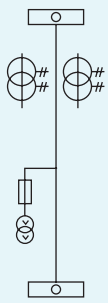
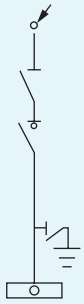
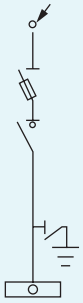
续表 2

Table 2 (contd)

方案号 Scheme No.		19	20	21	22	23	24
主电路方案图 Main circuit scheme							
用途 Application		架空进线电缆出线 Overhead incoming Cable outgoing					
一次元件 Primary components	负荷开关 ZFN-10 Load switch	1	1	1	1	1	1
	隔离开关 Disconnector	1	1	1	1	1	1
	接地开关 Earth switch	1	1	1	1	1	1
	熔断器 SFL-J Fuse				3	3	3
	熔断器 RN2 Fuse						
	电流互感器 LZZEJ CT		1	2		1	2
	电压互感器 JDZ-10 PT						
	避雷器 Y5W Arrestor						

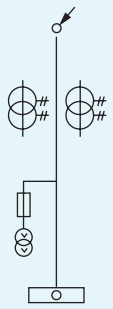
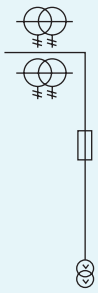
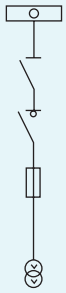
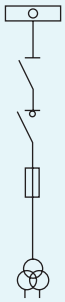
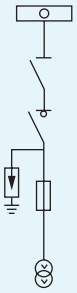
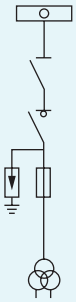
续表 2

Table 2 (contd)

方案号 Scheme No.		25	26	27	28	29	30
主电路方案图 Main circuit scheme							
用途 Application		联络 Coupling		计量联络 Metering coupling		架空进线联络 Overhead incoming coupling	
一次元件 Primary components	负荷开关 ZFN-10 Load switch	1	1			1	1
	隔离开关 Disconnector	1	1			1	1
	接地开关 Earth switch	1	1			1	1
	熔断器 SFL-J Fuse		3				3
	熔断器 RN2 Fuse			3	3		
	电流互感器 LZZEJ CT			2	2		
	电压互感器 JDZ-10 PT			2	2		
	避雷器 Y5W Arrestor						

续表 2

Table 2 (contd)

方案号 Scheme No.		31	32	33	34	35	36
主电路方案图 Main circuit scheme							
用途 Application		计量架空进线联络 Metering over-head incoming coupling	计量 Metering	电压互感器 Potential transformer		电压互感器避雷器 Potential transformer arrestor	
一次元件 Primary components	负荷开关ZFN-10 Load switch			1	1	1	1
	隔离开关 Disconnector			1	1	1	1
	接地开关 Earth switch						
	熔断器SFL-J Fuse						
	熔断器RN2 Fuse	3	3	3	3	3	3
	电流互感器LZZBJ CT	2	2				
	电压互感器JDZ-10 PT	2	2	2	JDZJ-10 3只3Pcs	2	JDZJ-10 3只3Pcs
	避雷器Y5W Arrestor					3	3

续表 2

Table 2 (contd)

方案号 Scheme No.		37	38	39	40	41	42
主电路方案图 Main circuit scheme							
用途 Application		电缆进线或出线 Cable incoming or outgoing					
一次元件 Primary components	负荷开关 ZFN-10 Load switch				1	1	1
	隔离开关 Disconnector				1	1	1
	接地开关 Earth switch						
	熔断器 SFL-J Fuse		3				
	熔断器 RN2 Fuse						
	电流互感器 LZZEJ CT					1	2
	电压互感器 JDZ-10 PT						
	避雷器 Y5W Arrestor			3			

续表 2

Table 2 (contd)

方案号 Scheme No.		43	44	45	46	47	48
主电路方案图 Main circuit scheme							
用途 Application		电缆进线或出线 Cable incoming or outgoing					
一次元件 Primary components	负荷开关 ZFN-10 Load switch	1	1	1	1	1	1
	隔离开关 Disconnector	1	1	1	1	1	1
	接地开关 Earth switch						
	熔断器 SFL-J Fuse						
	熔断器 RN2 Fuse				3	3	3
	电流互感器 LZZEJ CT		1	2		1	2
	电压互感器 JDZ-10 PT				2	2	2
	避雷器 Y5W Arrestor	3	3	3			

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