

KYN18A-12

铠装移开式金属封闭

ARMORED MOVEABLE

METAL-SEALED

开关设备

Switching Equipment

北开电气荣誉出品



KYN18A-12 型中置式高压开关柜优势

Advantages of Type KYN18A-12 Center-style Hi-voltage Switch Cabinet

国家级新产品。

北京市科学技术进步二等奖。

北京市十佳新产品。

规格多，方案全，可满足不同用户的需要。

以空气作为主绝缘，完全避免复合绝缘对环境的要求。
符合中国国情，与其它同类产品相比，更适应比较恶劣的工作环境，有较大的安全裕度。

为彻底解决传统手车互换性不好的问题而开发设计的真正意义上的“中置式”布置。

接触性能稳定的少触点、大压力的触条式一次隔离触头。
确保操作人员安全的关门操作方式，可实现单柜双车结构。

主动式预防型闭锁设计，体现了“防范于未然”的防误操作性能。

基本性能完全达到进口产品水平，绝缘水平高于进口产品。特别适用于国内电力系统运行方式。

更符合人机工程学的体贴设计，外观美观大方，符合操作安全，人机界面清楚。

短路关合电流能力和动稳定电流承受能力高于国家标准。
内配专为30万千瓦以上火电机组配套引进的德国西门子公司3AF(国内型号ZN12-12)型真空断路器。

可提供中置 - 落地组合结构方案。

可适用于3000米的高海拔地区。

自动采集综合保护装置所需的开关量。

实现63KA，4000A的完整方案(与常规柜型系列化)。

The latest state-class product

The winner of Beijing's science and technology progress

One of top 10 new products in Beijing

A lot of specifications and solution of the cabinet satisfy the requirements of different users.

Air is used for the main insulation of cabinet, so as to avoid the environmental requirement for composite insulation. This is up to the Chinese national conditions. In comparison to other products of same type, the cabinet is more suitable to inferior working environment with bigger safety capacity.

To solve the problems of disadvantageous mutual replacement of traditional car, the truly significant center-style layout is designed and developed.

The antenna-style one-off separation contactor sees less contacting points and big pressure with the stable performance.

The close-door operating method can ensure the safety of operators, so as to achieve the single-cabinet double-car structure.

The active prevention-style locking design realizes the maloperation-resistant performance that troubles are banned before happening.

The essential performance completely reaches the advanced level of imported products. The insulation level of the cabinet is higher than those products. The cabinet therefore suits to the operating method of domestic power system.

The cabinet is more up to the considerate design of man-machine engineering science. Its appearance is good-looking with the compact man-machine interface up to the standards of safe operation.

The endurance abilities of short-circuit closing current and active stable current are higher than the national standards.

The inside of cabinet is equipped with the German Siemens Co.'s Type 3AF (whose domestic type is ZN12-12) vacuum breaker. This breaker was imported specially for the thermal generator unit of over 300,000 kilowatts. The manufacturer is able to provide the center-ground-style integrated structure solution.

The cabinet is suitable to the high-altitude areas above 3,000m.

The cabinet is able to pick the required switch volume of complex protecting device.

The cabinet is able to achieve the complete solutions of 63KA and 4,000A (to be serialized with regular cabinet styles)

运 行 报 告

北京北开电气股份有限公司：

小浪底水电站与贵公司签订的CWEMEC-XLD-003(98B-4013、99B1005)合同，产品型号：KYN18A-10，高压开关柜113面，目前自99年安装调试后，一号机组已于2000年1月9日正式投入送电运行，经半年多运行，整个枢纽工程主厂房、坝上厂房所用的高压开关成套设备运行正常，未发现异常现象。

特此证明！



水利部小浪底水利枢纽建设管理局机电处

2000年7月8日

Report on Operation

Beijing Beikai Electric Co., Ltd., :

Xiaolangdi Water Power Station had drawn up the contract of CWEMEC-XLD-003 (98B-4013, 99B1005), with 113 sets high-voltage switchgear of the Type KYN18A-10. After these switchgear were mounted and debugged in 1999, the No.1 machine set of the station was officially put into operation with power on January 9, 2000. After this set had been operated for over half a year, the sets of high-voltage switchgear machine of main plant and dam-based workroom can normally work without abnormal phenomenon.

The electromechanical department of
Construction Administration of
Xiaolangdi Water Conservation Hinge of
Ministry of Water Resources (Official Seal)
Date: July 8, 2000 机电处



KYN18A-12 型铠装移开式金属封闭开关设备安装使用说明
Type KYN8A-12 Armored Moveable Metal-sealed Switch Device

一、主题内容与适用范围

1、主题内容

本文件规定了 KYN18A-12 型铠装移开式金属封闭开关设备(以下简称开关柜)的技术数据, 结构概况, 工作原理, 安装基础尺寸, 运输保管及运行检修等方面的注意事项, 做为用户选型和使用的参考依据。

2、适用范围

本说明书适用于 KYN18A-12 系列真空开关柜。

二、产品用途

本产品符合 GB3906-91 《3-35kV 交流金属封闭开关设备》、DL404/T-97 《户内交流高压开关柜订货技术条件》、GB311-83《高压输变电设备的绝缘配合》及 DL/T539-93《户内交流高压开关柜和元部件凝露及污秽试验技术条件》的有关要求。适用于 3-12kV 交流三相 50Hz 单母线电力系统中, 做为接受和分配电能之用。本产品为户内使用。KYN18A-12 系不靠墙安装。

三、使用环境

1、周围空气温度

上限见表 1

下限 -10℃。

2、海拔

不大于 1000m(特殊定货不大于 3000m)。

3、湿度及污秽

相对日平均值不大于 95%, 月平均值不大于 90%。在高湿期内温度急降时允许产生凝露。开关柜可以在 GB3906-91 附录 E 规定的 1 级条件和 DL/T539-93II 级污秽条件下使用。

4、地震

开关柜允许在 9 级烈度地区使用。

5、周围空气不受腐蚀性气体、水蒸汽明显污染。

6、无经常性剧烈振动。

四、产品系列和主要规格

1、本产品系列可分为大电流柜(额定电流>2000A)和小电流柜(额定电流 2000A)。

2、开关柜主回路方案见附表 1。

I.Theme Content and Suitable Scope

1. Theme Content

This document regulates the following precautions about Type KYN8A-12 armored moveable metal-sealed switch device (hereinafter briefly named as switch cabinet): technical data, structural profile, work principle, basic installation size, transportation safeguard and operation overhaul, etc. All of these are usable for the reference accordance of users selecting and applying this type.

2. Suitable Scope

The user guide is applicable to Type KYN8A-12.

II. Purpose of Product

The product is in conformity to GB3906-91 and DL404/T-97, the 3-35kV AC Metal-sealed Switch Device and the Ordering and Technical Conditions of Indoors AC Switch Cabinet. Also, this product satisfies the requirements of the IEC-632-1 publication (1978) of International Electrician Committee, the Hi-voltage Motor Starter, as well as those of related terms and conditions of the IEC298 International Standard. The Type KYN8A-12 switch cabinet is not installed against wall.

III. Environment Conditions:

1. Ambient air temperature

max. see Tab.1.

min. -10℃.

2. Altitude

No higher than 1,000m. (no more than 3,000m for special order)

3. Humidity and dirtiness

The relative daily average is not more than 95% and the monthly is not more than 90%. Dew is allowed when the temperature quickly descends in the high-humidity period. The switchgear is usable under the Class-I conditions regulated in the GB3906-91 Appendix E, as well as the Class DL/T539-93II.

4. Earthquake

表 1/ Tab.1

海拔 m Altitude	1000	2000	3000
最高周围空气温度℃ The highest ambient-air temperature °C	40	35	30

3、全型号的组成：



五、名词解释

1、中置式：为使金属封闭开关设备的可移开部件实现与柜体的良好配合而将可移开部件通过安装在两侧的滚轮悬挂于处在柜内中部的运行轨道上，从而达到减小配合误差、保证良好互换性的一种布置方式。

KYN18A-12 型高压开关柜采用了这种全新设计的中置式方案。

2、关门操作：为确保操作人员的安全而设置的一种通过联锁保证只有关好柜门才可以实现一次隔离触头、断路器、接地刀闸的合分操作的安全操作方式。KYN18A-12 型高压开关柜确保所有操作必须在关门状态下进行。

3、可移开部件在开关柜内的状态

- (1) 定位状态:定位状态是可移开部件在柜内的一种稳定状态,在这种状态时,可移开部件上安装的断路器可以进行合闸或分闸操作;推进机构的摇把插口被封闭,可移开部件不能移动。可移开部件的定位状态只能在工作位置 and 试验(储存)位置实现。定位状态的实现和解除,都是通过联锁钥匙转动实现的。在定位位置,联锁钥匙可以拔出取走。
- (2) 移动状态:移动状态是可移开部件在柜内的一种暂时状态,在这种状态下,可移开部件上安装的断路器不能进行操作,推进机构摇把插口打开,可移开部件可以在柜内的试验位置和工作位置之间移动。移动状态的实现和解除,是通过联锁钥匙的转动实现的。联锁钥匙在移动状态不能拔出取走。

4、可移开部件在开关柜内的位置。

- (1) 工作位置:这是可移开部件在柜内的一种定位状态。在工作位置,开关柜的主回路接通,辅助回路也接通。
- (2) 试验位置:这是可移开部件在柜内的一种定位状态。在试验位置,开关柜的辅助回路接通,但主回路断开,并

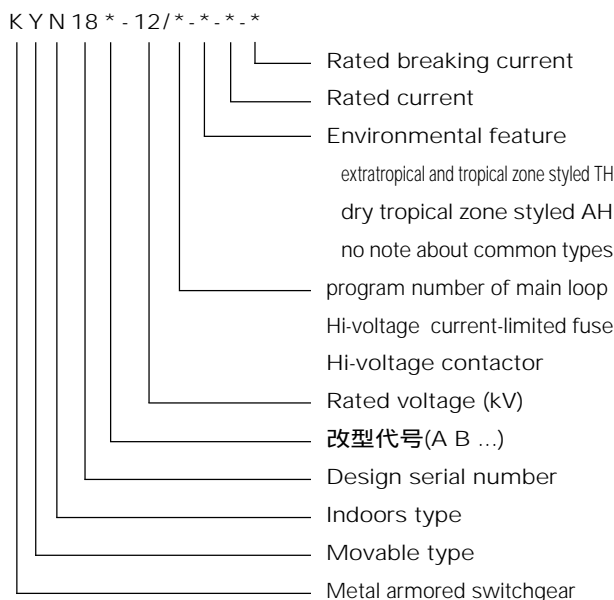
The switchgear is allowed to be used in an area of class-IX earthquake intensity.

5. Ambient air not considerably polluted by corrosive gas and vapor

6. No frequent intensive shock

IV. Series and Main Specifications of Products

1. This series can be divide into two types: the heavy current (rated current >2000A) and the light current (rated Current 2000A).
2. For the solution of switchgear's main loop, see AttachedTab. 1.
3. Composition of complete type



V. Explanations of Terms

1. Midde placed style: To achieve the good integration of the moveable parts of metal sealed switch device and the cabinet, these parts are hanged on the operating tracks in the center of cabinet via the wheels on two sides, so as to reduce the coordination error and guarantee the good mutual replacement. The type KYN18A-12 adopts this Advanced design.

2. Door closing operation: The following is set with an aim to safeguard the operators: With the interlocking, only if the door of cabinet is closed, can the close-open operation of the primary isolating contact, breakers and grounding switches be achieved. It is ensured that all the operations of Type KYN18A-12 hi-voltage switchgear must be made under the door-close state.

3. Positions of moveable parts in switch device

(1) location position: It is a stable state of the mouable parts in the switchgear. On the location position, the breaker in the mouable part can do the open and close operation; the plug hole of the push-in mechanical

KYN18A-12 铠装移开式金属封闭开关设备技术参数

表 2

Technical Specifications of Type KYN8A-12 Armored Moveable Metal-sealed Switch Device

Tab.2

额定电压 / Rated voltage	kV	(6);12				
额定短路开断电流 Rated short-circuit breaking/ current	kA	20	25	31.5	40	50
额定电流 /Rated current	A	630	1250	1250;1600 2000;2500	1600;2000;3150	
4s 额定热稳定电流 4s rated thermal stable current	kA	20	25	31.5	40	50(3s)
额定动稳定电流 Rated transient stable current	kA	50	63	80;100*	100;130*	125;140*
额定雷电冲击耐受电压 Rated Lightning impulse withstand voltage	kV	(60);75				
额定 1min 工频耐受电压 Rated 1min power-frequency withstand voltage	kV	(32);42				
外壳及隔室防护等级 Protection grade of shell and cubicle room		IP40				

如需注 * 的参数, 订货时应特别指明。/ If a parameter marked with*is needed, please designate this parameter while ordering the goods.

ZN12-12 型真空断路器主要技术参数

表 3

Technical Specifications of Type ZN12-12 Vacuum Breaker

Tab.3

额定电压 / Rated voltage	kV	12		
额定电流 / Rated current	A	1250;1600;2000;2500	1600;2000;3150	
额定短路开断电流 Rated short-circuit breaking current	kA	31.5	40	50
额定短路关合电流 Rated short-circuit making current	kA	80;100*	100;130*	125;140*
额定热稳定电流 Rated thermal stable current	kA	31.5/4s	40/4s	50/3s
额定动稳定电流 Rated transient stable current	kA	80	100	125
额定短路开断次数 Rated short-circuit breaking times	次 time	50	30	12
额定操作循环 Rated operation order		O-0.3s-CO-180s-CO		O-180s-CO-180s-CO

ZN -12B 型真空断路器主要技术参数

表 4

Technical Specifications of Type ZN-12B Vacuum Breaker

Tab.4

额定电压 / Rated voltage	kV	12
额定电流 / Rated current	A	2000
额定短路开断电流 / Rated short-circuit breaking current	kA	31.5
额定短路关合电流 / Rated short-circuit making current	kA	80
4s 额定热稳定电流 / 4s rated thermal stable current	kA	31.5
额定动稳定电流 / Rated active stable current	kA	80
额定短路开断次数 / Rated short-circuit opening times	次 / time	50
开断单个电容器组电流 / Current of opening single capacitor unit	A	630
机械寿命 / Mechanical life	次 / time	10000
额定操作顺序 / Rated operating order	O-0.3s-CO-180s-CO	

ZN51-12 型真空断路器主要技术参数

表 5

Technical Specifications of Type ZN51-12 Vacuum Breaker

Tab.5

额定电压 / Rated voltage	kV	12	
额定电流 / Rated current	A	630	1250
额定短路开断电流 / Rated short-circuit opening current	kA	20	25
额定短路关合电流 / Rated short-circuit closing current	kA	50	63
4s 额定热稳定电流 / 4s rated thermal stable current	kA	20	25
额定动稳定电流 / Rated active stable current	kA	50	63
额定短路开断次数 / Rated short-circuit opening times	次 / time	30	
额定电容器组开断电流 / Current of opening single capacitor unit	A	630	
机械寿命 / Mechanical life	次 / time	10000	
额定操作顺序 / Rated operating order	O-0.3s-CO-180s-CO		

ZN65A-12 系列真空断路器主要技术参数

表 6

Main Technical Specifications of ZN65A-12 Series Vacuum Breaker

Tab.6

名 称 / Name	单位	型 号 / Type					
	Unit	经济型 / Economic		标准型 / Standard	高寿命型 / Long-life Style		
额定电压 / Rated voltage	kV	12					
额定电流 / Rated current	A	630	1250	1250	1600	2000	3150
额定短路开断电流 Rated short-circuit breaking current	kA	20	25	31.5	40		
额定峰值耐受电流 Rated peak endured current	kA	50	63	80	100(110)		
4s 热稳定电流 4s thermal stable current	kA	20	25	31.5	40		
额定短路关合电流(峰值) Rated short-circuit current (peak)	kA	50	63	80	100(110)		
额定短路电流开断次数 Rated short-circuit current breaking times	次 Time	50		100*	50		
绝缘水平 工频 / 冲击 Insulation level, power frequency / impules	kV	42/75			42(50)/75(85)		
合闸时间 / Closing time	ms	40-80		40-85			
分闸时间 / Opening time	ms	35-60		45-85			
机械寿命 Mechanical life	次 Time	10000		20000	60000		
额定电容器组开断电流 Rated capacitor-group breaking circuit	A	630			-		
储能电机功率 Energy-storage motor power	W	200					
储能电机额定电压 Rated voltage for energy-storage motor	V	交、直流 110 220 AC, DC 110 220					
储能时间 / Energy-storage time	s	15					

* 标准型断路器亦符合 E2 类断路器的要求，且具有进行经受 272 次电寿命试验后再进行 50 次额定短路电流开断的能力。

The standard breaker type satisfies the requirements of Class-E2 Breaker. Moreover, it is able to endure the 50 times of rated short-circuit current opening after it passes the 272 times of electric life.

LAJ-10 型电流互感器技术参数

表 7

Main Technical Specifications of Type LAJ-10 Current Mutual Indicator

Tab.7

额定电流 Rated current A	准确级次及相应的额定输出 VA Accurate grade and related rated output VA			
	0.2	0.5	1	10P15
1000;1200;1500	40	40	40	25
2000;3000;4000;5000;6000	60	60	60	35

LZZBJ9-10A 型电流互感器部分技术参数

表 8

Main Technical Specifications of Type LZZBJ9-10A Current Mutual Indicator

Tab.8

额定一次电流 I_e Rated primary current (A)	准确级及相应的额定输出 VA Accurate grade and related rated output VA				1s 热稳定电流 I_{th} 1s rated thermal stable current I_m (kA)	动稳定电流 Transient stable current (kA)
	0.2	0.5	1	10P10		
15;20;30;40;50		10	20	15	$400I_e$	$2.5I_{th}$
60		10	15	15	21	52.5
75		10	20	15	31.5	80
100		10	20	15	45	112.5
150;160		10	20	15	63	130
200		15	30	15	63	130
300		10	20	15	80	160
400		10	20	20		
500		15	30	20		
600		15	30	20		
750;800	10	30	60	20		
1200;1250	20	30	60	30	100	160
1500;1600	20	30	60	15		
2000	20	30	60	20		
2500	20	30	60	20		
3000;3150	30	60	90	10P15 30		

JDZJ 型电压互感器技术参数

表 9

Main Technical Specifications of Type JDZJ Voltage Mutual Indicator

Tab.9

型 号 / Type	JDZJ-3	JDZJ-6	JDZJ-10
频率 (Hz)/ Frequency (Hz)	50		
额定电压变比 V Change ratio of rated voltage (V)	$\frac{3000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$	$\frac{6000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$	$\frac{10000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$
额定二次输出 VA Rated secondary output VA			
0.5 级 / Grade 0.5	30	50	50
1 级 / Grade 1	50	80	80
3 级 / Grade 3	80	200	200
最大输出 VA Max. output (VA)	200	400	400
额定绝缘水平(kV) Rated insulation level (kV)	3.5/23/40	6.9/32/60	11.5/42/75

JDZ 型电压互感器技术参数

表 10

Main Technical Specifications of Type JDZ Voltage Mutual Inductance

Tab.10

型 号 / Type	JDZ-3	JDZ-6	JDZ-10
频率 (Hz)/ Frequency (Hz)	50		
额定电压变比 Change ratio of rated voltage (V)	1000/100 2000/100 3000/100	6000/100	10000/100
额定二次输出 VA Rated secondary output VA			
0.5 级 / Grade 0.5	30	50	80
1 级 / Grade 1	50	80	150
3 级 / Grade 3	80	200	300
最大输出 VA Max. output (VA)	200	400	500
额定绝缘水平 (kV) Rated insulation level (kV)	3.5/23/40	6.9/32/60	11.5/42/75

JDZX9 型电压互感器技术参数

表 11

Main Technical Specifications of Type JDZX9 Voltage Mutual Inductance

Tab.11

型 号 / Type	JDZX9-3G	JDZX9-6G	JDZX9-10G
额定电压比 kV Change ratio of rated voltage (V)	$\frac{3000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$	$\frac{6000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$	$\frac{10000}{\sqrt{3}} / \frac{100}{\sqrt{3}} / \frac{100}{3}$
额定二次输出 VA Rated secondary output VA			
0.5		60	
6P		100	
最大输出 VA Max. output (VA)		400	
额定绝缘水平(kV) Rated insulation level (kV)	3.5/23/40	7.2/32/60	12/42/75

LXK-ø120 型零序电流互感器配用继电器技术参数

表 12

Main Technical Specifications of the relay matching with LxK- ø120 Zero-sequence Current Mutual Inductance

Tab.12

继电器型号 Type of the relay	继电器线圈连接方式 Connection method of relay's wiring	继电器刻度值 Scale value of the relay	一次零序电流值(A) One-off zero-order current (A)
DD-11/60	串联 Serial	15 × 1	2.4-4.5
		30 × 1	
	并联 Parallel	15 × 1	3-5
		30 × 1	
DD-1/60	串联 Serial	15 × 1	3-5
		30 × 1	
	并联 Parallel	15 × 1	3-6
		30 × 1	

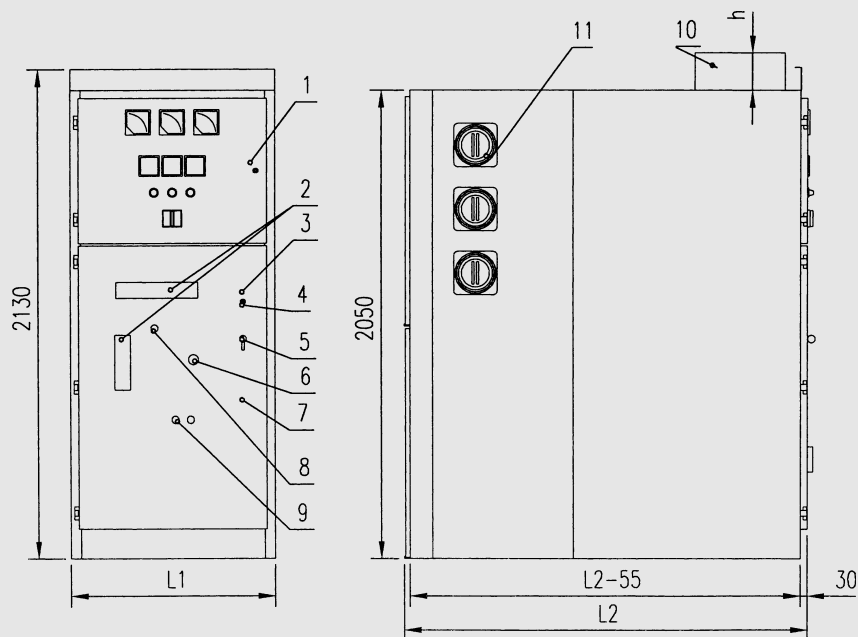
接地开关技术参数

表 13

technical Specifications of earthing Switch

Tab.13

额定电压 / Rated Voltage	kV	12
4s 额定热稳定电流 / 4s rated thermal stable current	kA	40
额定动稳定电流 / Rated transient stable current	kA	100



L1	800	用于普通绝缘型 / For common insulation style
	900	用于加强绝缘型 / For enforced insulation style
L2	1775	用于一般方案 / For general solution
	2175	用于后架空方案 / For the back-stile solution

* 当小母线为一排布置时 h=70；当小母线为两排布置时 h=180；

大电流柜的小母线室与小电流相同。

* When small busbar is arranged for one row, h=70; When small busbar is arranged for two rows, h=180;

The small-busbar room of big-current cabinet is same as that of small-current one

1. 继电器室门 / Door of relay cubicle
2. 视窗 / View Window
3. 手车室门 / Door of car
4. 门锁孔 / Keyhole of door
5. 门锁栓把 / Door locking bolt
6. 就地分闸按钮 / Locally breaking button
7. 紧急解锁螺钉(开门) / Emergency unlocking bolt (for opening door)
8. 储能摇把插孔 / Keyhole of energy-storage crank
9. 推进摇把及联锁钥匙插孔 / push-in crank and interlocking key hole
10. 小母线室 / Small busbar cubicle
11. 主母线 / Main busbar

图 1. 小电流断路器柜外形图

Fig.1 Appearance Map of Small-current Breaker Cabinet

且动、静触头被金属帘板分隔。

- (3) 储存位置: 如果可移开部件在柜内试验位置再切断辅助回路, 可移开部件就处于储存位置。

六、技术参数

1、开关柜基本技术参数见表 2。

2、真空断路器技术参数

KYN18A-12型可以配制多种型号断路器。各种断路器参数参见表 3、表 4、表 5、表 6。

3、电流互感器主要技术参数见表 7, 表 8。

4、电压互感器技术参数: 电压互感器技术参数见表 9、表 10、表 11。

5、电缆出线柜可根据用户需要配零序互感器。一般配用 LXX-ø120型零序互感器(最大穿过电缆直径(120mm)。配用继电器的技术参数见表 12。

6、接地开关技术参数见表 13。

七、结构简述

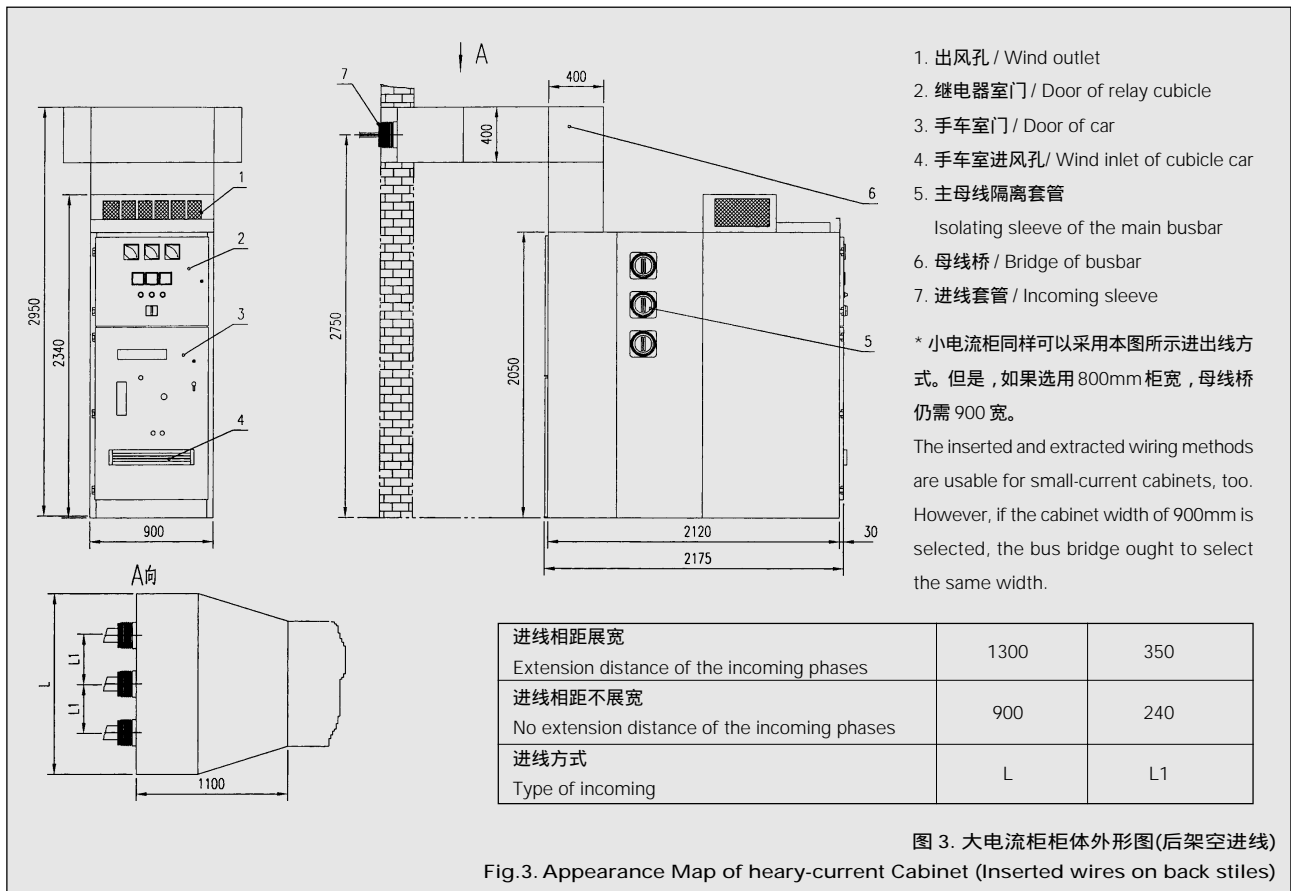
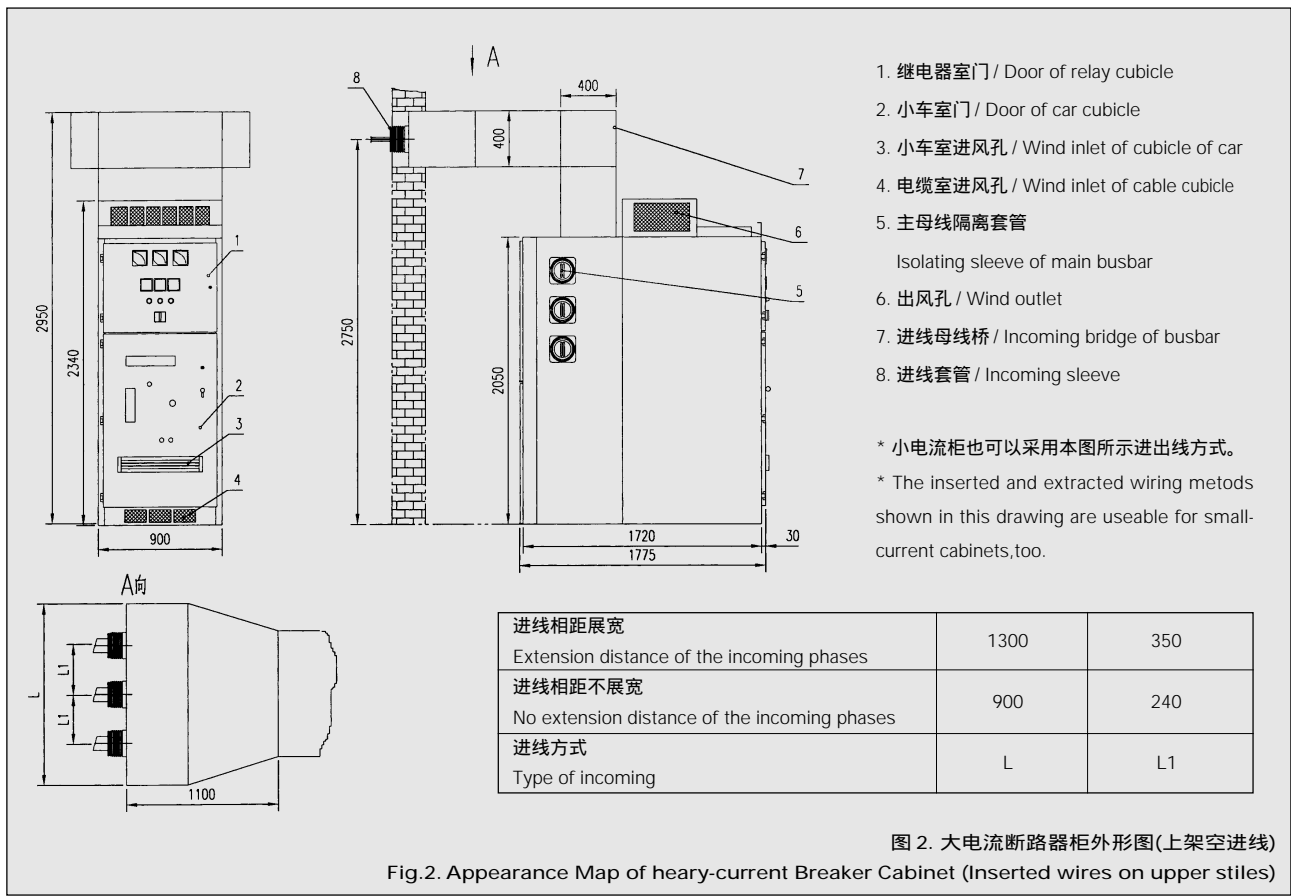
operation crank handle is closed; the mouable part is fixed. The locating state only can be achieved in the working position and Testing position. Through turning the interlocking key, the locating state can be achieved and release, In the locating state, the key can be taken down.

(2) Mociing position: It is a temporary state of the mouable parts in the switchgear. On the moving position, the breaker in the mouable pout can not do operation; the plug hole of the push-in mechanical operation crank handle is open; the mouable part can shift between the testing position and the working position. Through turning the interlocking key, the moving state can be achieved and released. In the moving position, the key can not be taken down.

4. Positions of moveable parts in switchgear

(1) Located position:

It is a positioning stateof movable parts in the cabinet.



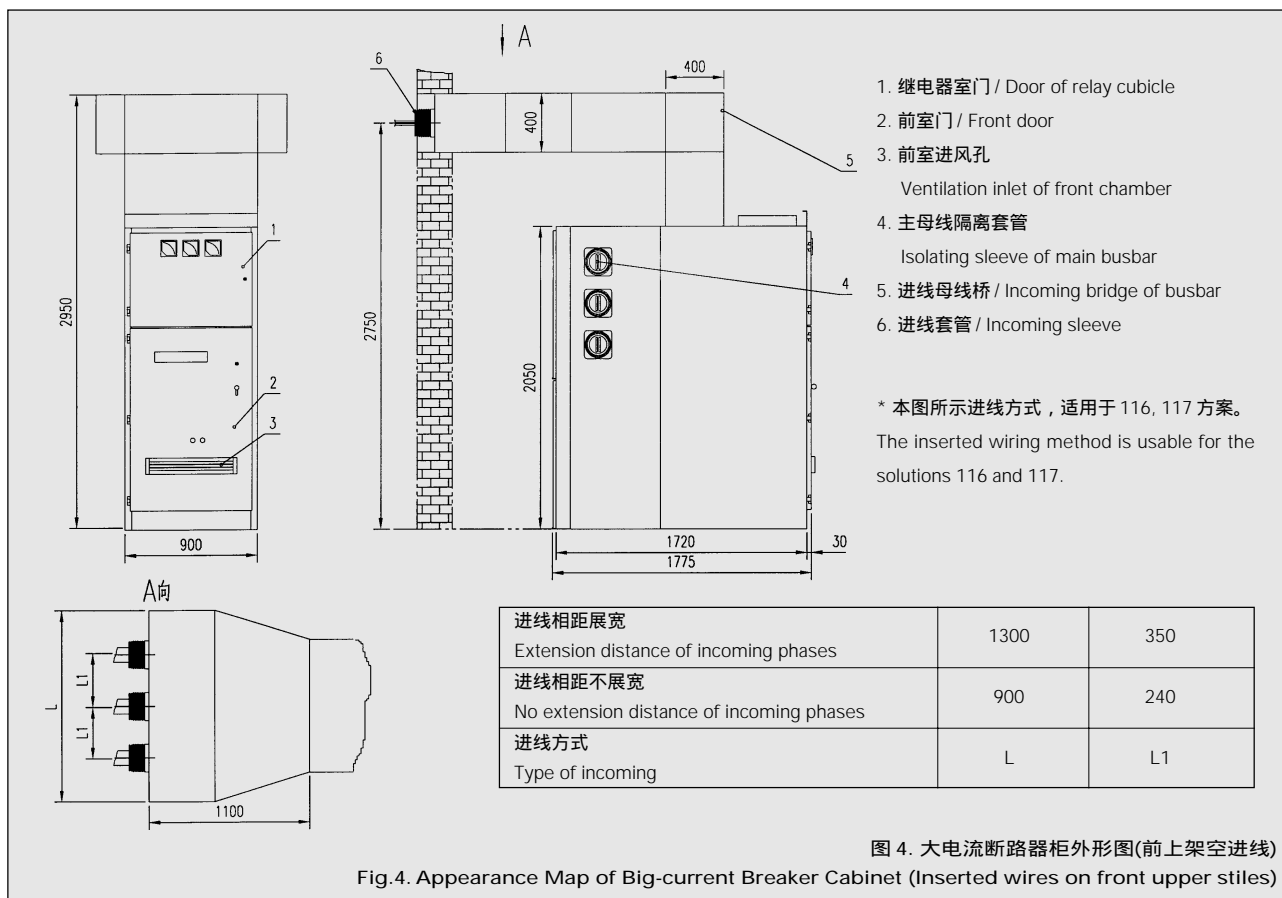


图 4. 大电流断路器柜外形图(前上架空进线)
Fig.4. Appearance Map of Big-current Breaker Cabinet (Inserted wires on front upper stiles)

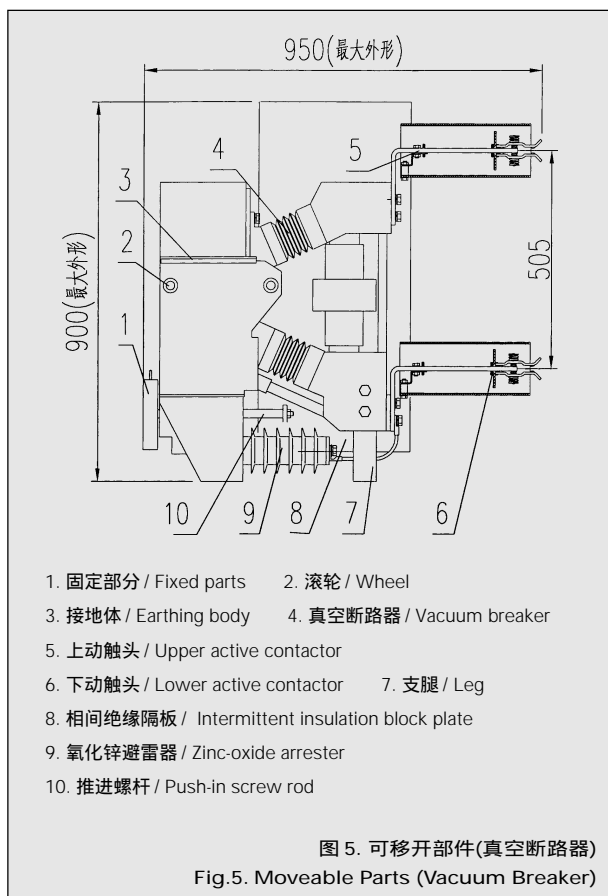


图 5. 可移开部件(真空断路器)
Fig.5. Moveable Parts (Vacuum Breaker)

On the located position, the mounted in the mouable open and close;

(2) Testing position:

It is also a positioning state of movable parts in the cabinet. On the testing position, the auxiliary loop of switch cabinet is switched on, but the main loop is turned off while the active and static contactors are separated by metal curtain plates.

(3) Storage position:

If the mouable part is on the testing position with the auxiliary loop break, the mouable part is on the storage position.

VI. Technical Specifications

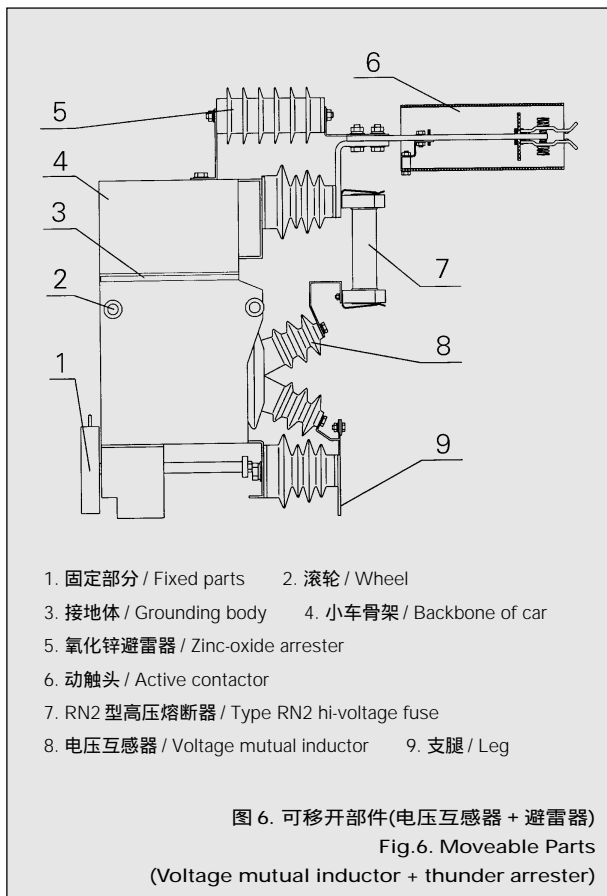
1. See Tab.2 for the basic technical specifications of switch cabinet.

2. Technical specifications of vacuum breaker.

The Type KYN8A-12 can be equipped with a variety of breakers. For the specifications of these breakers, see Tab.3, 4, 5 and 6.

3. See Tab.7 and 8 for the main technical specifications of current mutual indicator.

4. Technical specifications of voltage mutual inductor: See Tab.9, 10 and 11 for the main technical specifications of



voltage mutual indicator.

5. Users can apply the zero-sequence mutual inductor according to the requirements of outgoing cabinet. Generally, they can select the Type LxK- 120 zero-sequence mutual inductor (whose maximum run-through-cable diameter is 120mm). See Tab.12 for the technical specifications of used relay.

6. See Tab.13 for the technical specifications of earthing switch

VII. Brief Introduction to Structure

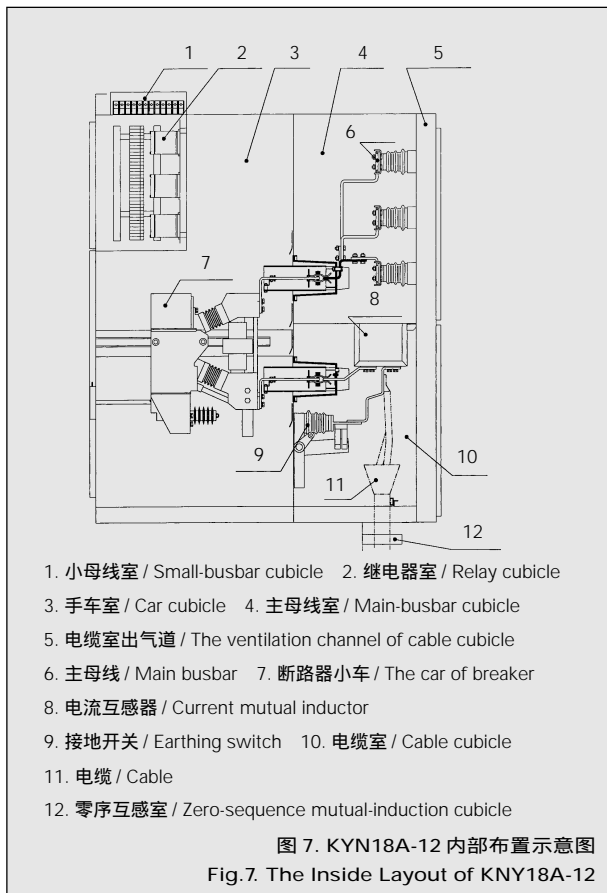
The type of switch cabinet is an armored moveable metal-sealed switch device. It structurally consists of the panel and the moveable component (cart for short). See Fig.1 for the structural appearance of the light-current switchgear whose width is related to the rated voltage; see Fig.2, Fig.3 and Fig.4 for the appearance of the structures of heavy-current switchgear and insert-bus bridge, with the width of cabinet unrelated to the rated voltage; and see Fig.5 and Fig.5 for the appearance of the cars of breaker and voltage mutual inductor.

1. The panel

The switchgear type features an assembled structure consisting of the component units of thin steel plates. Inside the cabinet, the thin steel plates divide the body into the main busbar cubicle, car cubicle, cable (current mutual inductor) cubicle and relay cubicle. The protection grades of body shell and separation cubiclecubicle all are IP40. And all of the metal components are reliable grounded by all means.

All of the cubicle are equipped with independent exhaust pressure-releasing channels. When the pressure inside switchgear unexpectedly increases, the cover on top of switchgear will open automatically to make the pressure gas exhaust in a fixed direction, so as to make sure the safety of operators and equipment.

In the middle of car cubicle, there is a track used to suspend the car. On the right of track, there is a grounded device set for the car. Both the right and left sides of track are equipped with the position limiting mechanism. If there is a earthing breaker set in the switchgear, the operating mechanism and mechanical interlock of the on-off are set in the middle of the right of car cubicle. The pushing-in mechanism of car and the connecting device of cabinet are set in the middles of left and right columns before the swithgear. Both the right and left sides of car cubicle are equipped with the automatic shade-raising devices. When the car goes from the testing position to



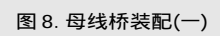


Fig.8. Assembly of busbar bridge (I)

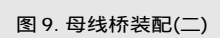


Fig.9. Assembly of busbar bridge (II)

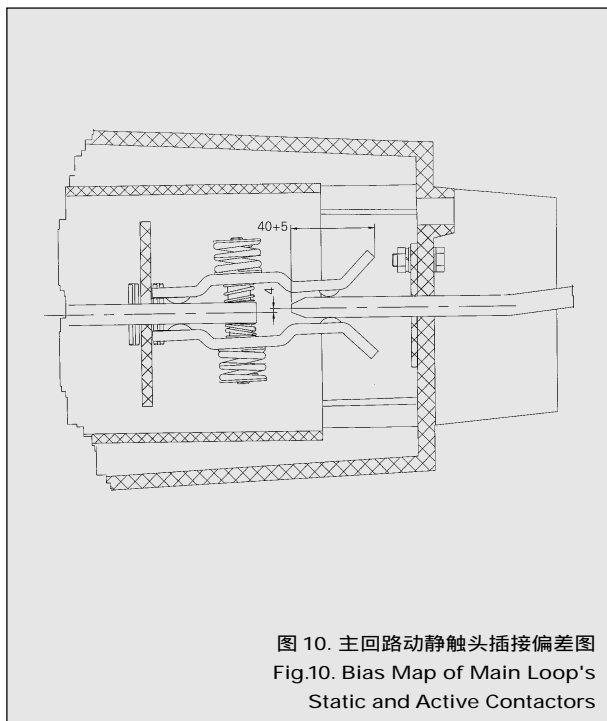


图 10. 主回路动静触头插接偏差图
Fig.10. Bias Map of Main Loop's
Static and Active Contactors

该型开关柜为铠装移开式金属封闭开关设备,结构分为柜体和可移开部件(简称小车)两部分。小电流柜的结构外形见图 1,其柜宽与额定电压有关;大电流柜的结构外形及进线母线桥外形见图 2、图 3 及图 4,其柜宽与额定电压无关;断路器小车的结构外形见图 5,电压互感器小车的外形见图 6。

1、柜体

本型开关柜柜体是由薄钢板构件组装成的装配式结构,柜内由接地薄钢板分隔为主母线室、小车室、电缆(电流互感器)室、继电器室。KYN18A-12的内部布置参见图 7。

各小室设有独立的通向柜顶的排气通道,当柜内由于意外原因压力增大时,柜顶的盖板将自动打开,使压力气体定向排放,以保护操作人员和设备的安全。

小车室中部设有悬挂小车的轨道,左侧轨道上,还设有开合主回路触头盒遮挡帘板的机构和小车运动横向限位装置。右侧轨道上,设有小车的接地装置和防止小车滑脱的限位机构。如果开关柜设有接地开关,接地开关的操动机构及其机械联锁也设在小车室右侧中部。小车推进机构与柜体的连接装置设在开关柜柜前左右立柱中部。

小车室与主母线室和电缆室的隔板上安装有主回路静触头盒,触头盒既保证了各功能小室的隔离,有时又做为静触头的支承件。当小车不在柜内时,主回路静触头由接地薄钢板制成的活动帘子板盖住,保证在小车室工作的人员安全。当小车进入时,活动帘板自动打开使动静触头顺利接通。

主母线室可安装三相矩形主母线。各柜主母线室经绝缘套管贯通,主母线安装后,各柜主母线室间被隔开。电缆室底部设有电缆进口及电缆固定槽板,电缆进口由可拆

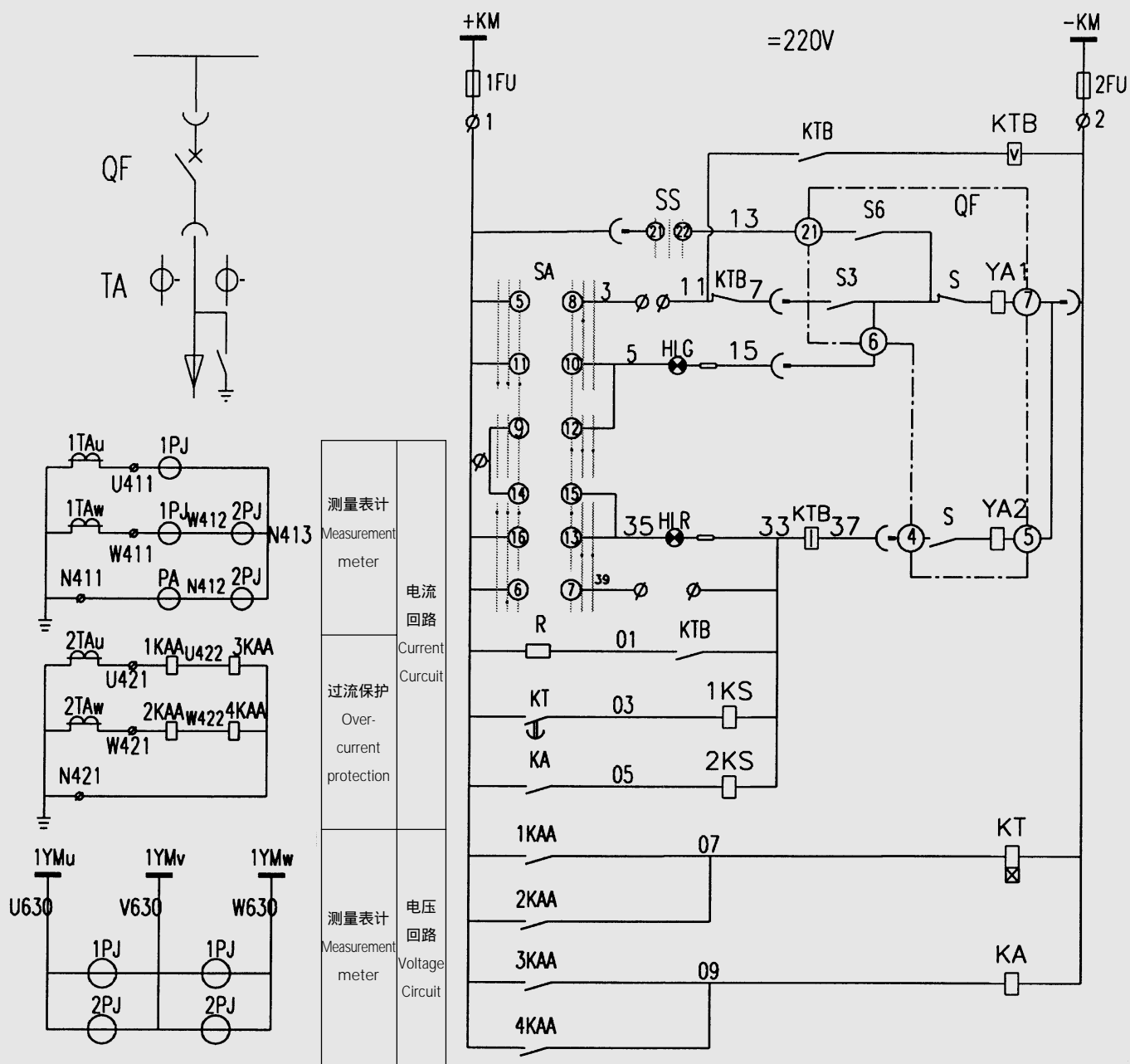
the working position, the active shade plate will be automatically opened by the crank, so as to make the tentacle of car smoothly enter the tentacle box. When the car retreats from the working position to the testing position, the crank will put down the active shade for the same time so as to make the car cubicle separated from the main-busbar cubicle and the cable cubicle.

On the separate board between the main-bus cubicle and the cable cubicle, a static-tentacle box of main loop is ready for guaranteeing the separation of all functional cubicles and working as the underprop of static tentacle. When the car is not in the switchgear, the static tentacle of main loop is covered by the active shade of grounded thin steel plate, so as to make sure the staff safety with the working of car cubicle. When the car goes into the cubicle, the active shade will automatically open to make the static and active tentacles smoothly connected.

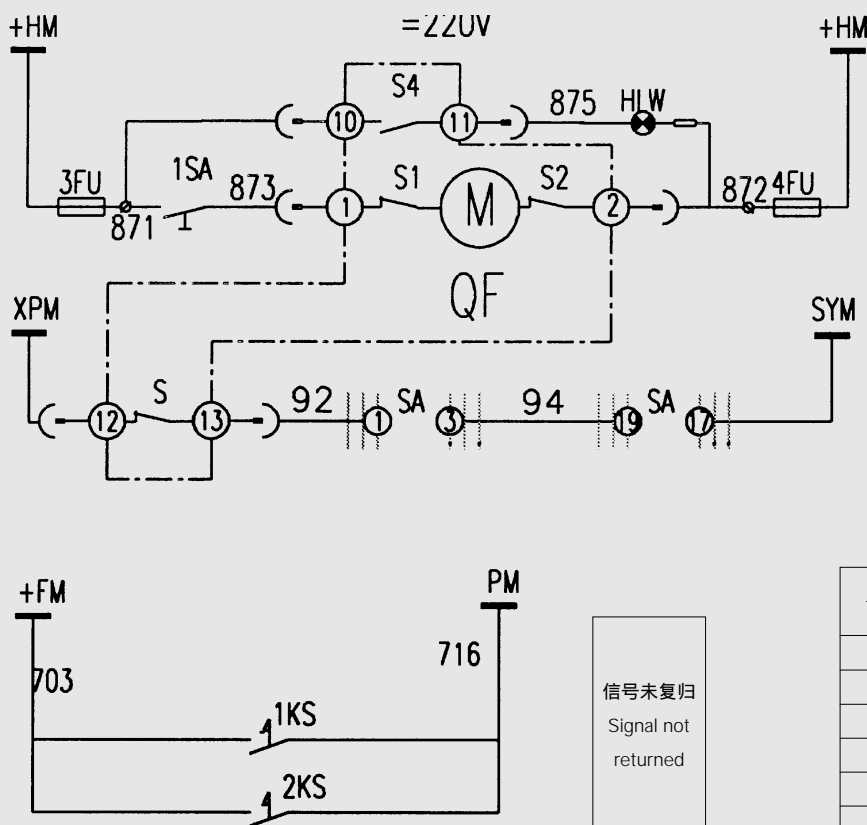
The main busbar cubicle can be equipped with a 3-phase rectangular main busbar. All the main-busbar cubicles of cabinets are connected with each other through insulated sleeve pipes. When the main busbars are installed, all the main-busbar cubicles are separated. On the bottom of cable cubicles, there are cable inlets and the cable fixing channel plates. The cable inlets can be covered by knock-down boards. Earthing breaker can be set in the cable cubicles. If the user needs to install zero-sequence mutual inductors, a special zero-sequence mutual-inductor trapeze is usable for lifting the inductors on the outside of cabinet-bottom plate (When the product is delivered from the manufacturer, the trapeze can be reversely installed in the cabinet.)

The relay cubicle is set with a relay mounting plate, which is used to install a variety of relays. The door of relay cubicle is mountable with a variety of meters, operating switches, signaling devices, embedding relates or complex protective units. The top of cubicle is equipped with a small-busbar terminal of copper rod of 6mm in diameter. At most, 11 small busbars are able to be arranged on a single layer and 20 ones are allowed to be set on double layers. Below the cubicle and on its right and left sides, a secondary terminal layer is installable and it is fixed on the mounting racket of cabinet. If the Type JH5 wiring terminal is installed, there are 100 terminals of this type at most.

When its rated current is >2,000A, the switchgear is equipped with the enforced ventilation device (See Fig.2 and Fig.3). Ventilation outlets that are set with fans are mounted on the top of switchgear; and ventilation inlets



小母线 Small busbar
熔断器 Protective fuse
防跳回路 Anti-pump resistant loop
试验合闸 Close on test position
合闸回路 Close Circuit
掉闸回路 Open Circuit
过流 Over-Current
速断 Fast breaking
过流保护 Over-current protection
速断保护 Fast breaking protection



储能信号
Energy-storage
signal

储能回路
Energy-storage
loop

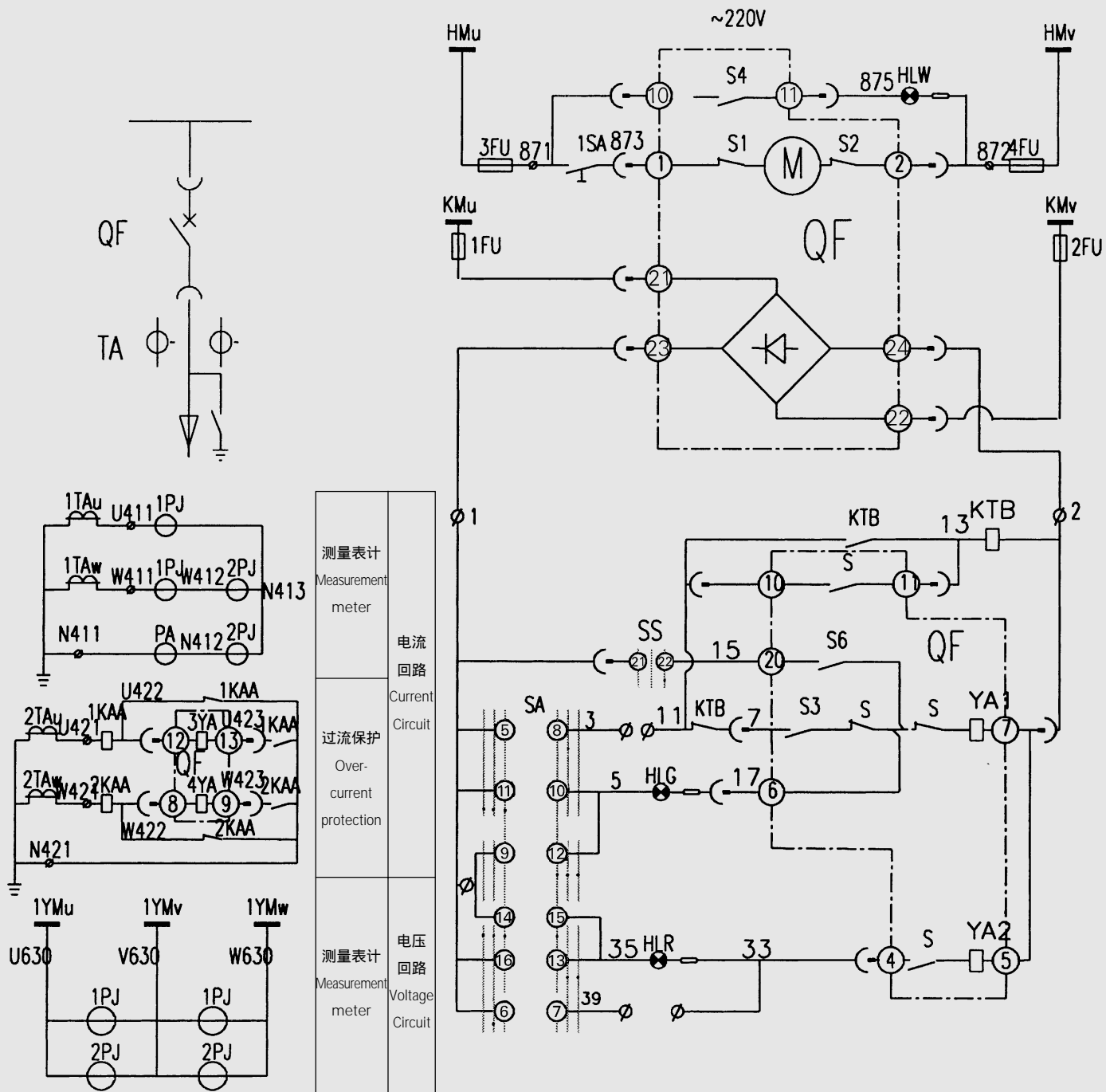
事故掉闸
警告信号
Alert signal for
accidental power
off

F10-6II/W2

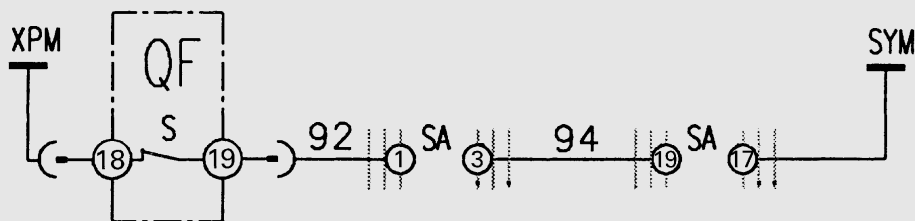
	试验 Test	移动 Shift	工作 Work
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

16	QF	Vacuum breaker 真空断路器	ZN12 (connection OJK.362.088) ZN12 (接线 OJK.362.088)	1
15	SS	Car interlock switch 手车联锁开关	F10-6II/W2	1
14	1SA	开关 / Switch	KN3 - I - I	1
13	3~4FU	熔断器 / Fuse	R1-10/10A	2
12	1~2FU	熔断器 / Fuse	R1-10/6A	2
11	KA	中间继电器 / Middle relay	DZY204 220V	1
10	R	电阻 / Resistant	ZG11-25W 1 欧姆	1
9	KT	Skip-resistant relay 防跳继电器	DZB-213 220V 0.5A	1
8	KT	时间继电器 / Time relay	DS-31C 220V	1
7	1~4KAA	Current relay 电流继电器	DL-31*A	2 for each 各 2
6	1KS 2KS	信号继电器 / Signal relay	DX31 0.5A	2
5	HLR, HLG, HLW	Signal lamp 信号灯	AD11-25 220V red, green, white AD11-25 220V 红, 绿, 白	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	Power-free watt-hour meter 无功电度表	DX863-2B 100V 3(6)A	1
2	1PJ	Power watt-hour meter 有功电度表	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序号	PA 符号	Name 名称	Type and Specification 型号及规格	Quantity 数量

图 11. ZN12-12 直流操作(弹簧机构)参考原理接线图
Fig.11.The Reference Principal Wiring Diagram of ZN12-12 DC Operation



小母线 Small busbar
储能回路 Energy-storage Circuit
小母线 Small busbar
熔断器 Protective fuse
整流回路 Rectifier circuit
防跳回路 Unti-pump Circuit
试验合闸 Close on Test Position
接触器 合闸回路 Loop of power on
掉闸回路 Circuit of power off

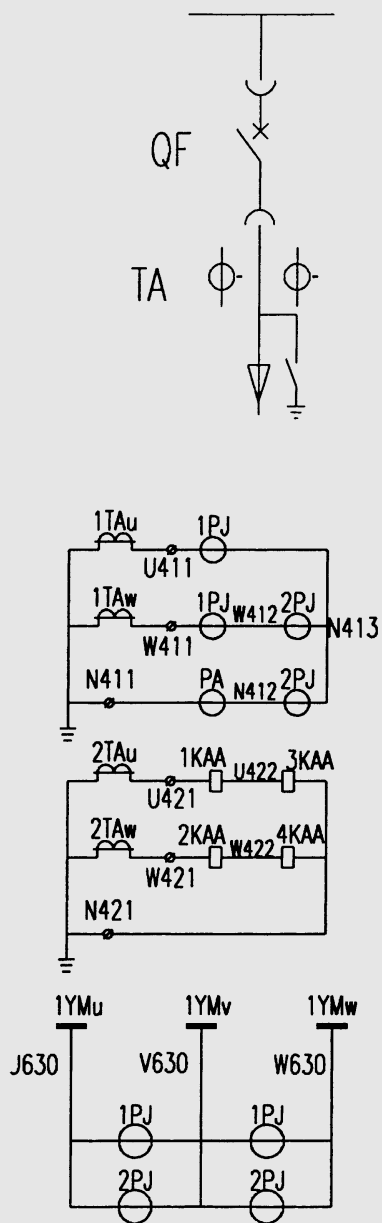


F10-6II/W2

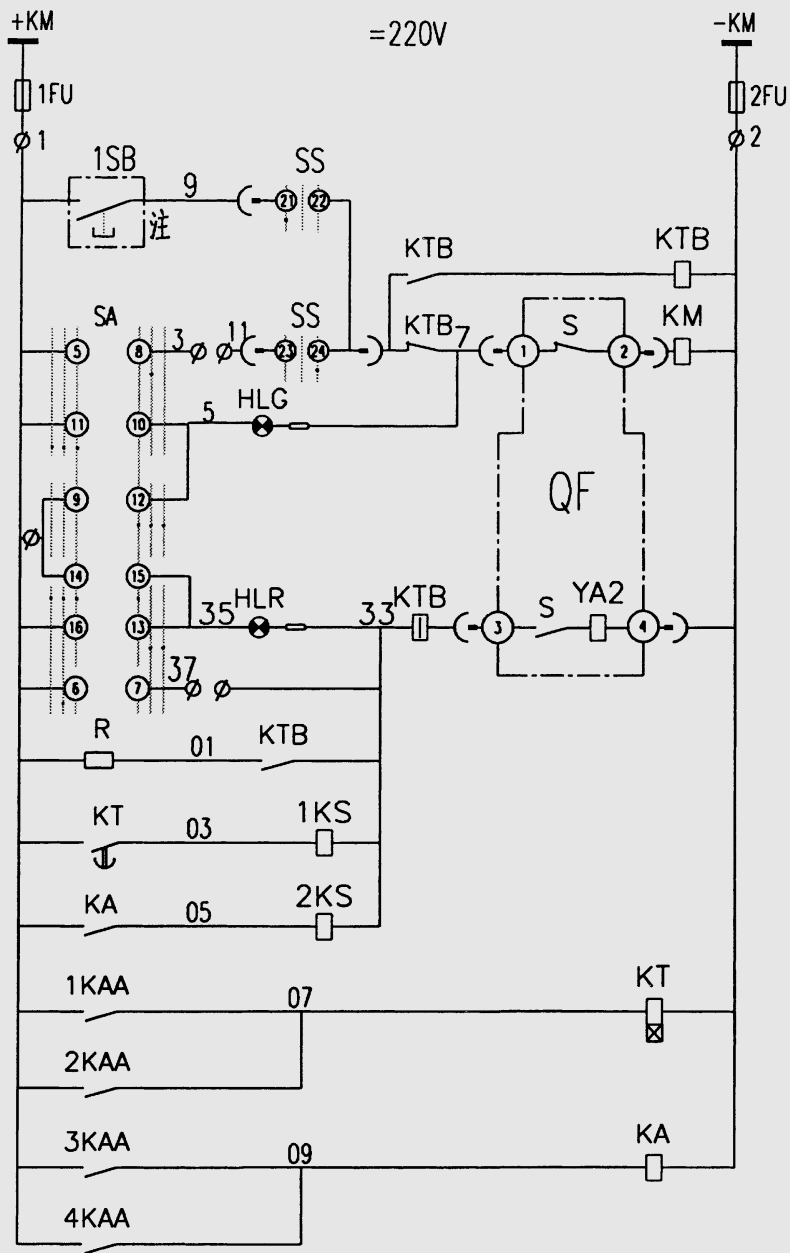
	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

13	QF	Vacuum breaker 真空断路器	ZN12(connection OJK.362.097 change) ZN12 (接线 OJK.362.097 改)	1
12	SS	Car interlock switch 手车联锁开关	F10-6II/W2	1
11	1SA	开关 / Switch	KN3 - I - I	1
10	3~4FU	熔断器 / Fuse	R1-10/10A	2
9	1~2FU	熔断器 / Fuse	R1-10/4A	2
8	KA	中间继电器 / Middle relay	DZY204 220V	1
7	KTB	Skip-resistant relay 防跳继电器	DZB204 220V	1
6	1~2KAA	电流继电器 / Current relay	GL-15/ *A	2
5	HLR, HLG	Signal lamp 信号灯	AD11-25=220V red , green 1 for each	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	Power-free watt-hour meter 无功电度表	DX863-2B 100V 3(6)A	1
2	1PJ	Power watt-hour meter 有功电度表	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序 号	PA 符 号	Name 名 称	Type and Specification 型号及规格	Quantity 数 量

图 12. ZN12-12 交流操作(弹簧机构)参考原理接线图
Fig.12. The Reference Wiring Diagram of ZN12-12 AC (Spring Mechanism) Operation



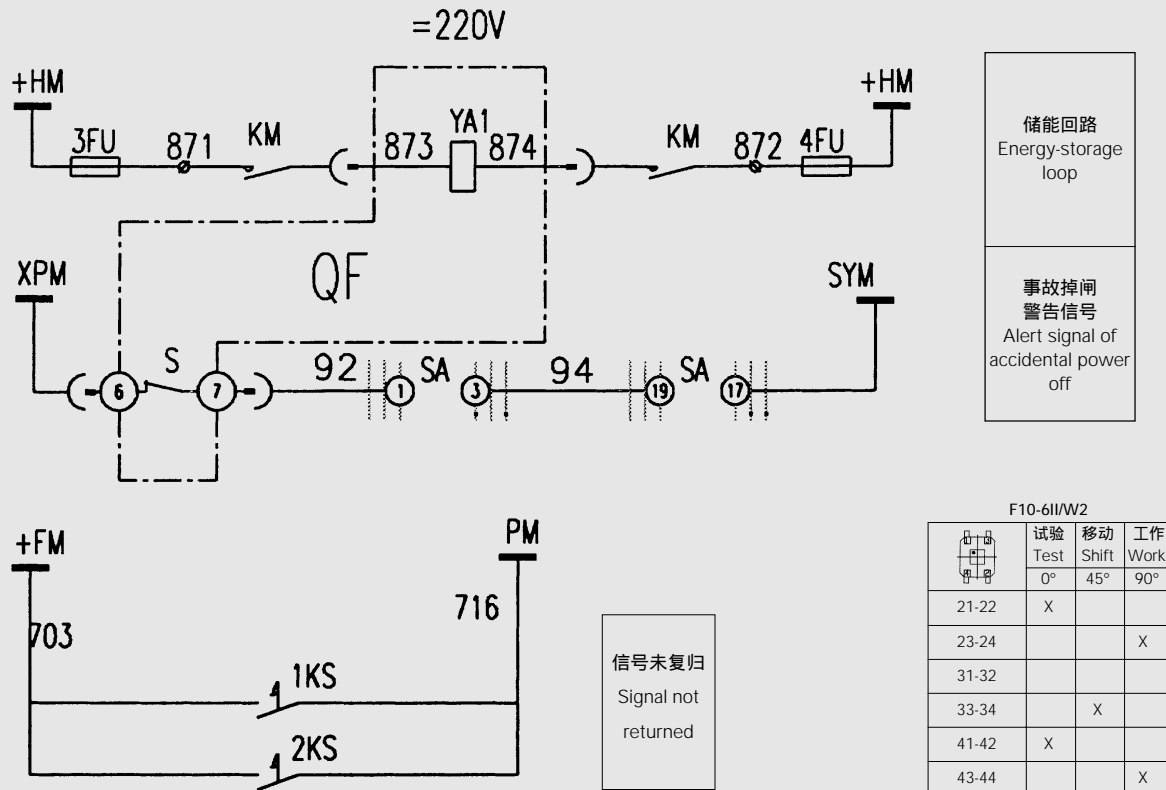
测量表计 Measurement meter	电流 回路 Current Circuit
过流保护 Over- current protection	
测量表计 Measurement meter	电压 回路 Voltage circuit



注：如果 SK 就地安装，1SB 可以取消，原理号 8 与 3 合并。

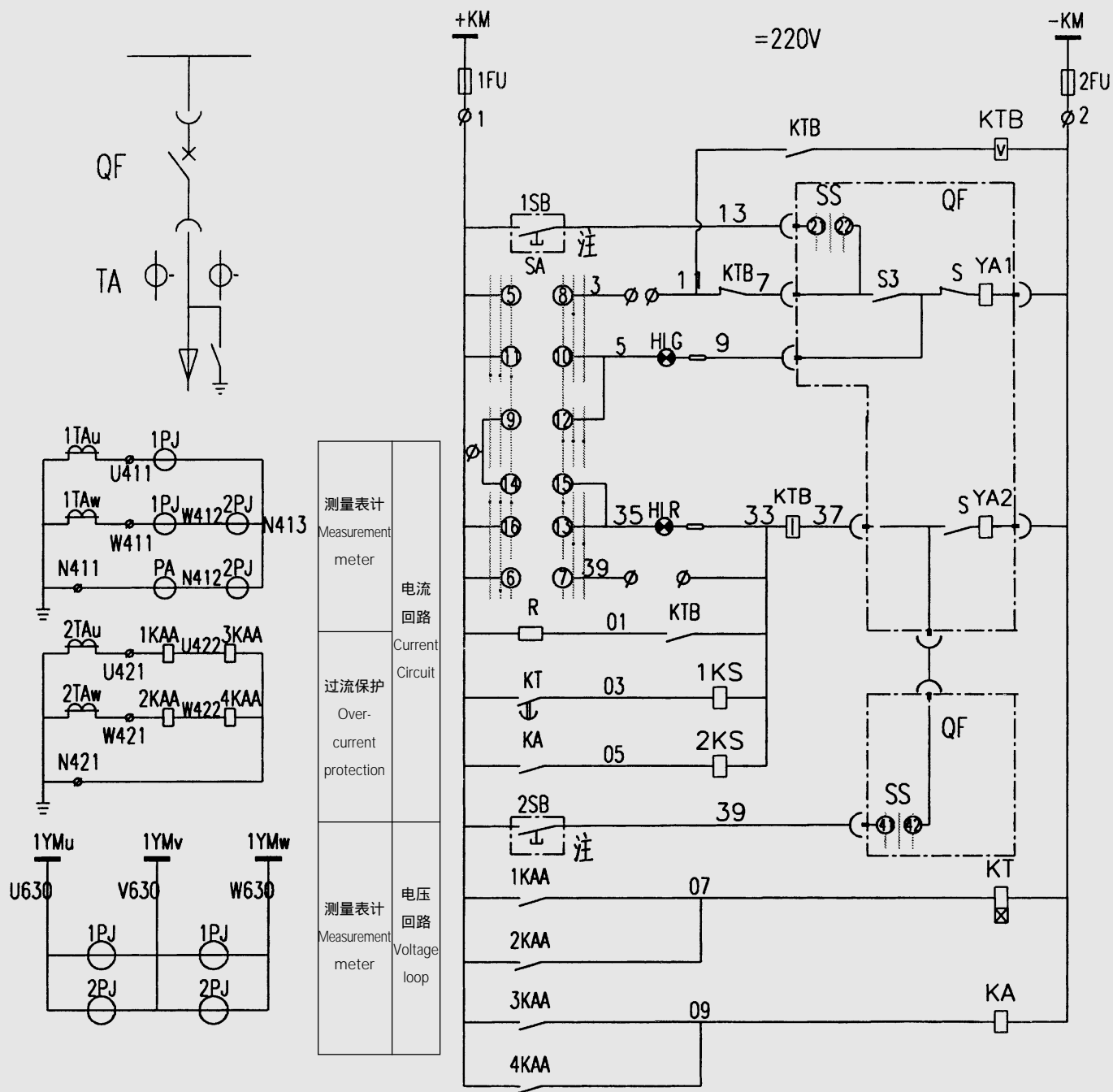
Note : If SK is mouted on this cabinet, the ISB can be removed and the principle numbers 8 and 3 can be put together.

小母线 Small busbar
熔断器 Protective fuse
防跳回路 Skip resistant loop
试验合闸 Testing power on
接触器 合闸回路 Contactor power on Loop
跳闸回路 Power-off loop
过渡 Transition
速断 Fast breaking
过流保护 Over-current protection
速断保护 Fast breaking protection



17	QF	Vacuum breaker 真空断路器	ZN*-10B (connection 96B1014S001) ZN*-10B (接线 96B1014S001)	1
16	SS	Car interlock switch 手车联锁开关	F10-6II/W2	1
15	1SB	按钮 / button	LA2	1
14	3~4FU	熔断器 / Fuse	RL1-60/35A	2
13	1~2FU	熔断器 / Fuse	R1-10/6A	2
12	KA	中间继电器 / Middle relay	DZY204 220V	1
11	KM	合闸接触器 / Closing relay	CZY-40C 220V	1
10	R	Resistant 电阻	ZG11-25W 1 ohm ZG11-25W 1 欧姆	1
9	KT	防跳继电器 / Skip-resistant relay	DZB-213 220V 1A	1
8	KT	时间继电器 / Time relay	DS-31C 220V	1
7	1~4KAA	电流继电器 / Current relay	DL-31*A	4
6	1KS 2KS	信号继电器 / Signal relay	DX31 1A	2
5	HLR, HLG	Signal lamp 信号灯	AD11-25 220v red, green AD11-25 =220V 红, 绿	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	Power-free watt-hour meter 无功电度表	DX863-2B 100V 3(6)A	1
2	1PJ	Power watt-hour meter 有功电度表	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序 号	Symbol 符 号	Name 名 称	Type and Specification 型号及规格	Quantity 数 量

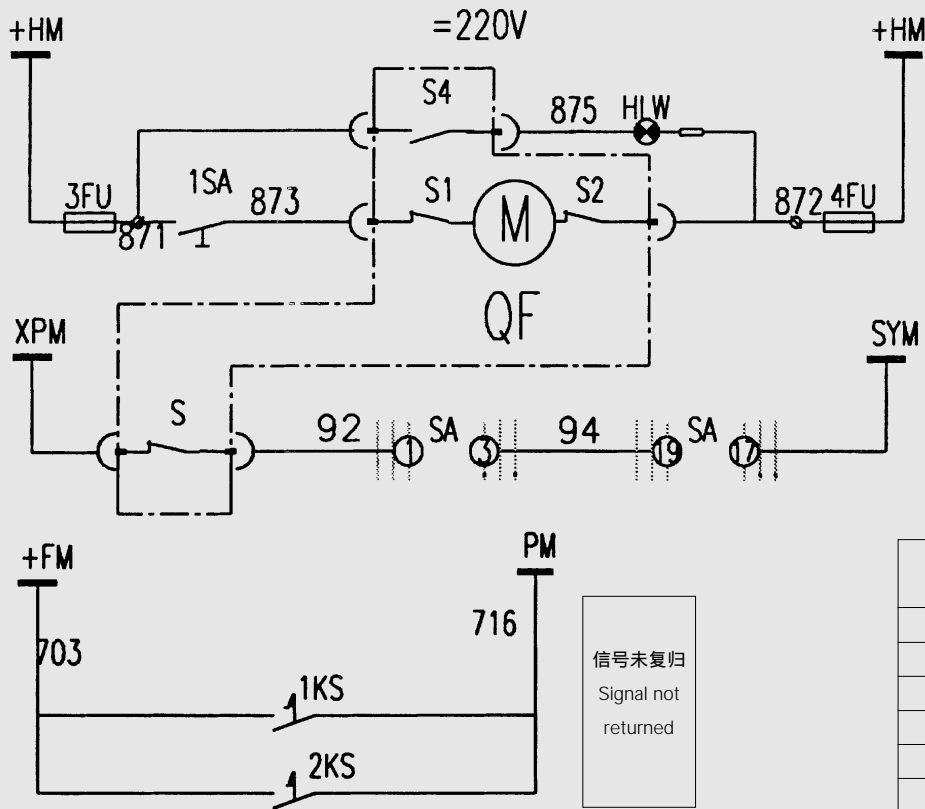
图 13. ZN*-12B 直流(电磁机构)参考原理接线图
Fig.13. The Reference Wiring Diagram of ZN*-12B AC (Electromagnetic Mechanism) Operation



注：如果 SA 就地安装，1SB 和 2SB 及相应回路可以取消。

Note: If SA is mounted on this cabinet, the 1SB, 2SB and related loops can be removed.

小母线 Small busbar
熔断器 Protective fuse
防跳回路 Power-off resistant loop
试验合闸 Testing power on
合闸回路 Loop of power on
掉闸回路 Loop of power off
过流 Transition
速断 Fast breaking
试验分闸 Test breaking
过流保护 Over-current protection
速断保护 Fast breaking protection



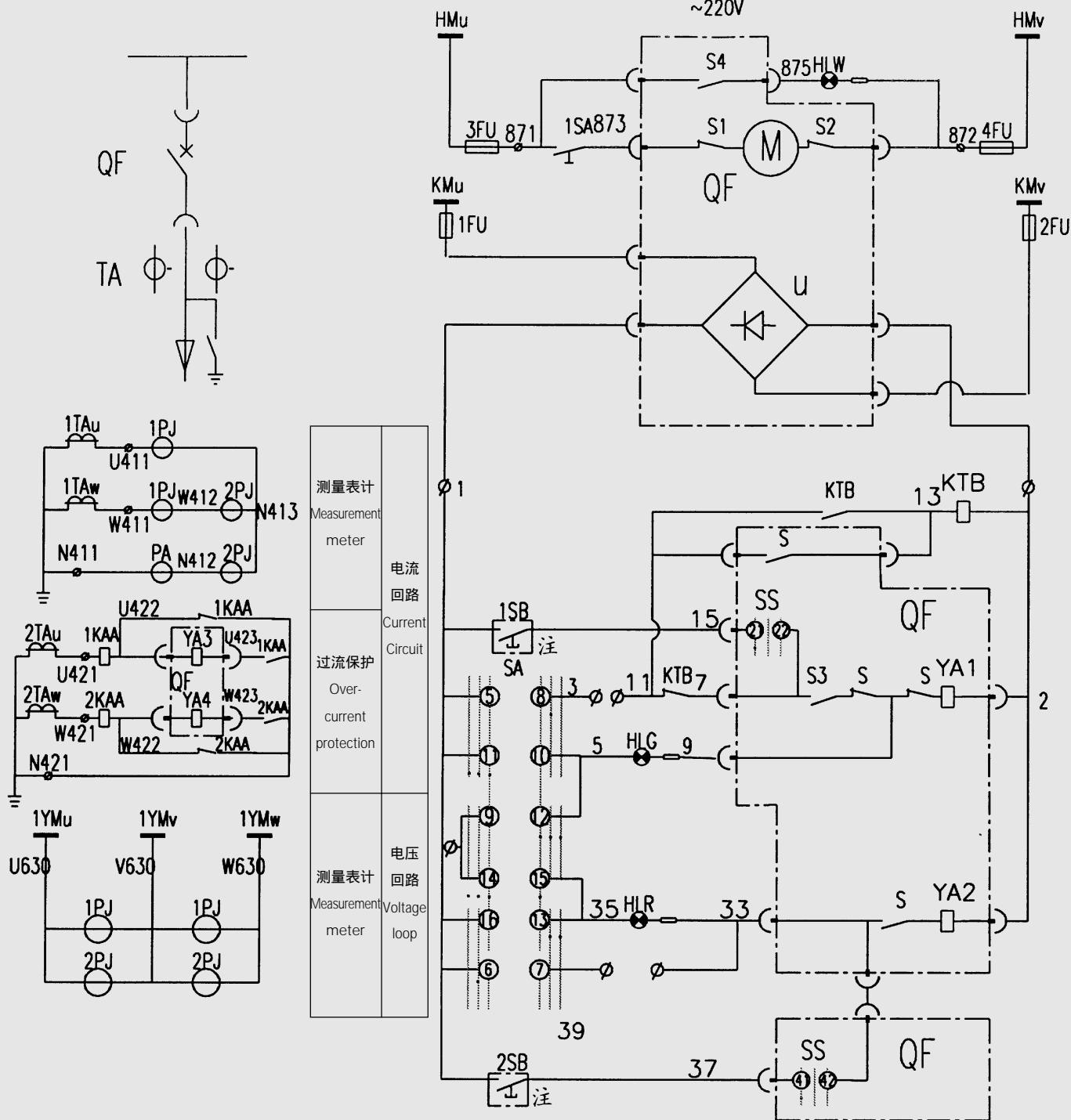
储能信号 Energy-storage signal
储能回路 Energy-storage loop
事故掉闸 警告信号 Alert signal of accidental power off

F10-611/W2

	试验 Test 0°	移动 Shift 45°	工作 Work 90°
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

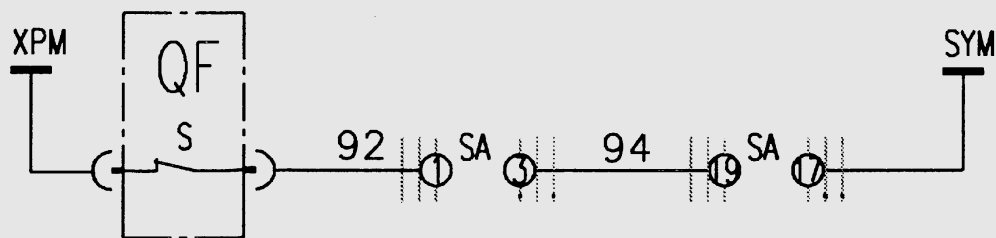
18	QF	Vacuum breaker 真空断路器小车	ZN51(connection K18S08) ZN65(connection K18S014) ZN51(接线 K18S08) ZN65A(接线 K18S014)	1
17	SS	手车联锁开关 / Car interlock switch	F10-611/W2	1
16	2SB	Closing testing button 分闸试验按钮	LA2 green 1 LA2 绿	1
15	1SB	Opening testing button 合闸试验按钮	LA2 red 1 LA2 红	1
14	1SA	开关 / Switch	KN3 - I - I	1
13	3~4FU	熔断器 / Fuse	R1-10/10A	2
12	1~2FU	熔断器 / Fuse	R1-10/6A	2
11	KA	中间继电器 / Middle relay	DZY204 220V	1
10	R	电阻 / Resistant	ZG11-25W 1 欧姆 / ohm	1
9	KTB	防跳继电器 / Skip-resistant relay	DZB-213 220V 0.5A	1
8	KT	时间继电器 / Time relay	DS-31C 220V	1
7	1~4KAA	Current relay 电流继电器	DL-31*A	2 for each 各 2
6	1KS 2KS	信号继电器 / Signal relay	DX31 0.5A	2
5	HLR, HLG, HLW	Signal lamp 信号灯	AD11-25 220v red, green, white AD11-25 220V 红, 绿, 白	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	无功电表 / Power-free watt-hour meter	DX863-2B 100V 3(6)A	1
2	1PJ	有功电表 / Power watt-hour meter	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序号	Symbol 符号	Name 名称	Type and Specification 型号及规格	Quantity 数量

图 14. ZN51-12 及 ZN65A-12-630/25 直流操作(弹簧机构)参考原理接线图
Fig.14. The Reference Wiring Diagram of ZN51-12 or ZN65A-12-630/25 AC (Spring Mechanism) Operation



注：如果 SA 就地安装，1SB 和 2SB 及相应回路可以取消。

Note: If SA is mounter on this cabinet, the 1SB, 2SB and related loops can be removed.



事故掉闸
警告信号
Alert signal
of
accidental
power off

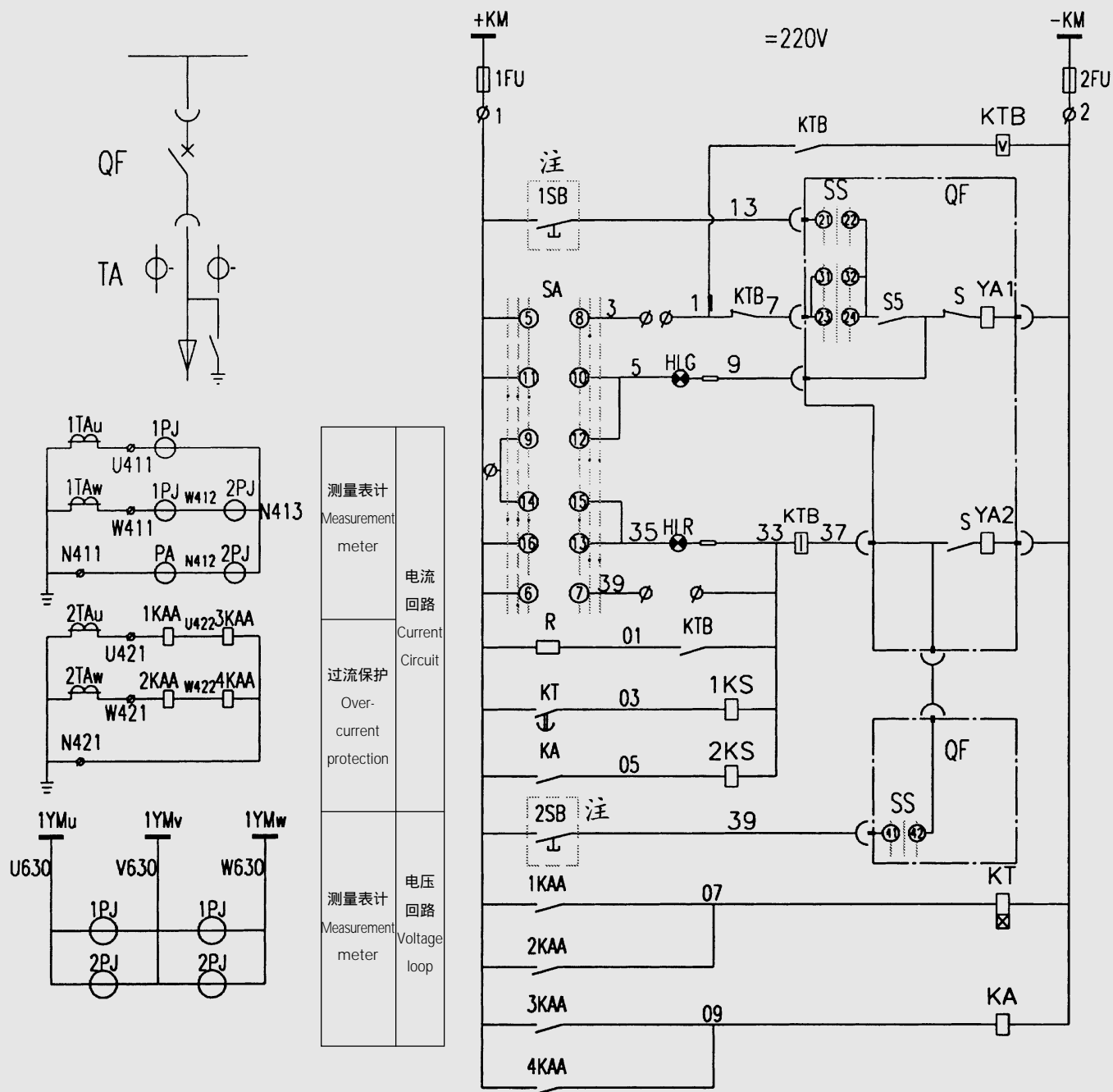
F10-6II/W2

	试验 Test	移动 Shift	工作 Work
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

16	QF	Vacuum breaker car 真空断路器小车	ZN51(connection K18S08) ZN65(connection K18S014) ZN51(接线 K18S08) ZN65A(接线 K18S014)	1
15	SS	手车联锁开关 / Car interlock switch	F10-6II/W2	1
14	HLW	Signal lamp 信号灯	AD11-25~22V white AD11-25~220V 白	1
12	2SB	Closing testing button 分闸试验按钮	LA2 green LA2 绿	1
11	1SB	Opening testing button 合闸试验按钮	LA2 red LA2 红	1
10	1SA	开关	KN3 - I - I	1
9	3~4FU	熔断器 / Fuse	R1-10/10A	2
8	1~2FU	熔断器 / Fuse	R1-10/4A	2
7	KTB	防跳继电器 / Skip-resistant relay	DZY204 220V	1
6	1~2KAA	电流继电器 / Current relay	GL 15/*A	2
5	HLR, HLG	Signal lamp 信号灯	AD11-25 220v red, green, white AD11-25 220V 红, 绿	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	Power-free watt-hour meter 无功电度表	DX863-2B 100V 3(6)A	1
2	1PJ	Power watt-hour meter 有功电度表	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序号	Symbol 符号	Name 名称	Type and Specification 型号及规格	Quantity 数量

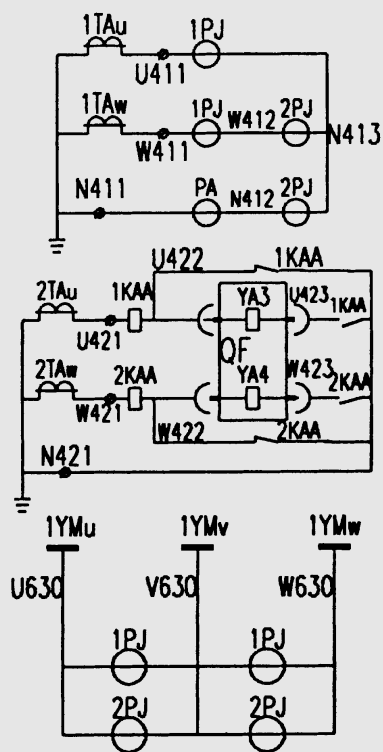
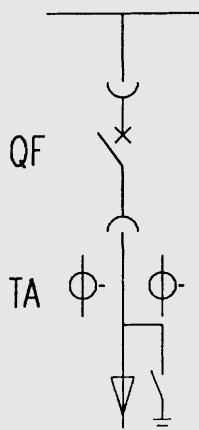
图 15. ZN51-12 及 ZN65A-12-630/25 交流操作(弹簧机构)参考原理接线图

Fig.15. The Reference Wiring Diagram of ZN51-12 or ZN65A-12-630/25 DC (Spring Mechanism) Operation

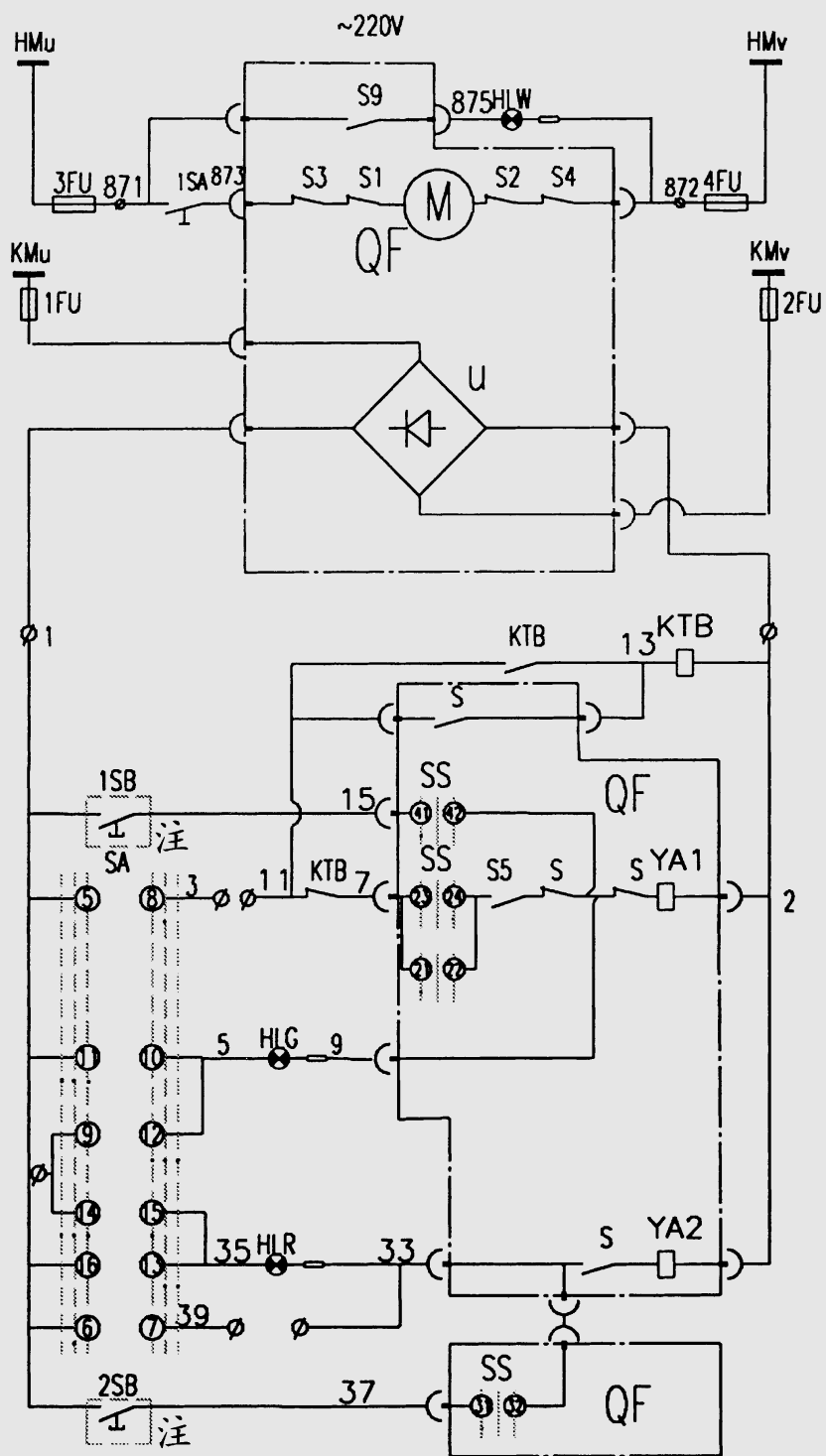


注：如果 SA 安装在本柜，1SB 和 2SB 及其相应回路取消。

Note: If SA is mounted on this cabinet, the 1SB, 2SB and related loops can be removed.



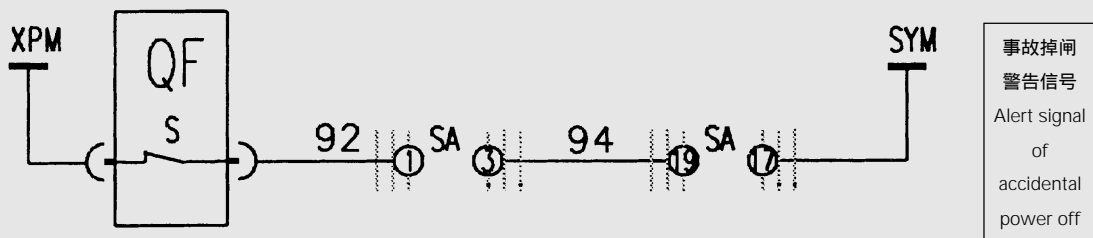
测量表计 Measurement meter	电流 回路 Current Circuit
过流保护 Over- current protection	
测量表计 Measurement meter	电压 回路 Voltage circuit



注：如果 SA 就地安装，1SB 和 2SB 及其相应回路可以取消。

Note: If SA is mounted on this cabinet, the 1SB, 2SB and related loops can be removed.

小母线 Small busbar
储能回路 Energy-storage loop
小母线 Small bus
熔断器 Protective fuse
整流回路 Rectification loop
防跳回路 Power-off resistant loop
试验合闸 Testing power on
断路器 合闸回路 Loop of power on
跳闸回路 Power-off loop
试验分闸 Testing power off

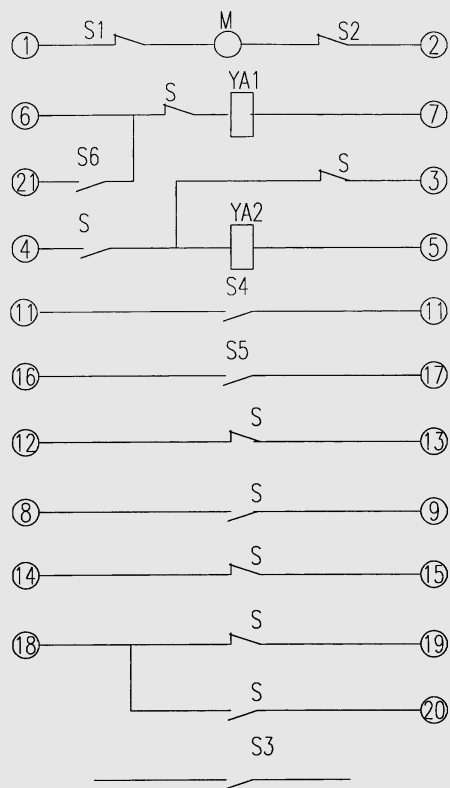


F10-6II/WT1

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32	X		
33-34			X
41-42	X		
43-44			X

15	QF	Fuse circuit 真空断路器小车	ZN65A(connection K18S013-2 change) ZN65A(接线 K18S013-2 改)	1
14	SS	手车联锁开关 / Vacuum breaker	F10-6II/WT1	1
13	HLW	信号灯 / Car interlock switch	AD11-25~220V 白 / white	1
12	2SB	Closing testing button 分闸试验按钮	LA2 green LA2 绿	1
11	1SB	Opening testing button 合闸试验按钮	LA2 red LA2 红	1
10	1SA	开关 / Switch	KN3 - I - I	1
9	3~4FU	熔断器 / Fuse	R1-10/10A	2
8	1~2FU	熔断器 / Skip-resistant relay	R1-10/4A	2
7	KTB	防跳继电器 / Time relay	DZY204 220V	1
6	1~2KAA	电流继电器 / Current relay	GL 15/*A	2
5	HLR, HLG	Signal lamp 信号灯	D11-25=220V, red, green AD11-25 =220V 红, 绿	1 for each 各 1
4	SA	控制开关 / Control switch	LW2-Z 1a 4 6a 40 20/F8	1
3	2PJ	Power-freewatt-hour meter 无功电度表	DX863-2B 100V 3(6)A	1
2	1PJ	Power watt-hour meter 有功电度表	DS862-2B 100V 3(6)A	1
1	PA	电流表 / Ammeter	42L6-A */5A	1
Item 序 号	Symbol 符 号	Name 名 称	Type and Specification 型号及规格	Quantity 数 量

图 17. ZN65A-12-1250/31.5 及 ZN65A-12-3150/40 交流操作(弹簧机构)参考原理接线图
Fig.17.The Reference Wiring Diagram of ZN65A-12-1250/31.5 or ZN65A-12-3150/40 AC (Spring Mechanism) Operation



说明：ZN12 除图上所标辅助开关接点外，尚有五开五闭可供选用，但应注意开关柜辅助回路插头最多可供 40 组接点。

Note: Except the marked auxiliary-switch connection points of ZN65A in the figure, there are the optional 5-closing and 5-opening points. The users ought to notice that the auxiliary loops of switch cabinet can be used for 40 groups of connection points at most.

7	S6	Travel switch 行程开关	Interlock with the manual locally-closing button on device panel. Press down the button to turn on 与机构面板上手动就地合闸按钮联动，按钮按下通	1
6	S5	Travel switch 行程开关	Interlock with the manual locally-closing button on device panel. Press down the button to turn on 与机构面板上手动就地合闸按钮联动，按钮按下通	1
5	S1,S2,S3,S4	Travel switch 行程开关	Energy storage action finished 储能完成动作	4
4	M	Energy-storage motor 储能电机		1
3	S	Auxiliary switch 辅助开关		1
2	YA2	Opening wiring 分闸线圈		1
1	YA1	Closing wiring 合闸线圈		1
Item 序号	Symbol 符号	Name 名称	Purpose 用途	Quantity 数量

图 18. ZN12-12 直流(弹簧储能)操动机构参考接线图(0JK.362.088)
Fig.18.The Reference Wiring Diagram of ZN12-12 DC (Spring Energy Storage) Operating Mechanism

卸的盖板覆盖。电缆室中还可以安装接地开关。如用户需要安装零序互感器，可利用专用零序互感器吊架，将零序互感器吊装在柜底板外部(产品出厂时，吊架暂时反装于柜内)。

继电器室内设有继电器安装板，可安装凸出安装的各种继电器，继电器室门上可安装各种计量仪表、操作开关、信号装置或嵌入式的继电器或各类综合保护装置等。小室顶部设有用于固定 $\phi 6\text{mm}$ 直径黄铜棍的小母线端子。单层布置时最多可设 11 条小母线；双层布置时最多可设 20 条小母线。小室内下部及左右两侧可安装二次端子排，端子排安装于固定于柜体的安装支架上。如安装 JH5 型接线端子，最多可安装 100 个。

额定电流 $>2000\text{A}$ 的大电流柜配置强制通风装置。(参见图 2、图 3)。在开关柜顶部设有内装风机的出风口。在柜前、柜后分别设有各小室独立进风口。

架空进出线柜可配置进线母线桥(其安装形式参见图 2、图 3 和图 4)；开关柜在面对面排列时，两组柜的母线也可用母线桥连接(其安装形式参见图 8、图 9)。母线桥是用薄钢板弯制而成的封闭结构。

2、小车

本型开关柜的小车是悬挂式中置结构，小车的滚轮、

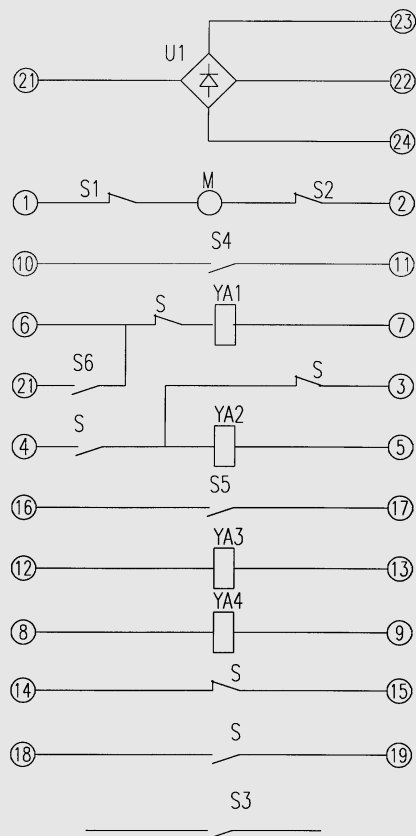
that are independently set for all the small cubicle are mounted on the front and back

The aerial incoming and outgoing switchgears are quipped with the incoming busbar bridge (For its installation style, see Fig.2, Fig.3 and Fig.4). (If the switchgear is placed face to face, the busbar can be connected with busbar bridge) (whose installation is seen in Fig.8 and Fig.9) the busbar bridge is a sealed structure of curved thin steel plate.

2. Car

The car is of a hanging middle placed. The rolling wheel, guidance device, and earthing clevice are set in the middles of the car's two sides.

The main-loop contact of car sees the following levels depending on its rated current: 1,250A, 1,600A, 2,500A and 3,150A. The contact of 1,250A guarantees that when there is the 4s rated thermal stable current of 31.5kA, the system of rated transient stable current of 80(100) kA is able to operated. Other contactors of over 1,250A guarantees that when there is the 3s rated thermal stable current of 50kA, the system of rated transient stable



说明：ZN12除图上所标辅助开关接点外，尚有五开五闭可供选用，但应注意开关柜辅助回路插头最多可供40组接点。

Note: Except the marked auxiliary-switch connection points of ZN65A in the figure, there are the optional 5-closing and 5-opening points. The users ought to notice that the auxiliary loops of switch cabinet can be used for 40 groups of connection points at most.

9	U1	整流器 / Rectifier		1
8	YA3, YA4	Current releaser 电流脱扣器		2
7	S6	Travel switch 行程开关	Interlock with the manual locally-closing button on device panel. Press down the button to turn on 与机构面板上手动就地合闸按钮联动，按钮按下通	1
6	S5	Travel switch 行程开关	Interlock with the manual locally-closing button on device panel. Press down the button to turn on 与机构面板上手动就地合闸按钮联动，按钮按下通	1
5	S1,S2,S3,S4	Travel switch 行程开关	Energy storage action finished 储能完成动作	4
4	M	Energy-storage motor 储能电机		1
3	S	Auxiliary switch 辅助开关		1
2	YA2	Opening wiring 分闸线圈		1
1	YA1	Closing wiring 合闸线圈		1
Item 序号	Symbol 符号	Name 名称	Purpose 用途	Quantity 数量

图 19. ZN12-12 交流(弹簧储能)操动机构参考接线图(OJK.362.097 改)

Fig.19. The Reference Wiring Diagram of ZN12-12 AC (Spring Energy Storage) Operating Mechanism (changed for OJK, 362 and 087)

导向装置、接地装置等，均设置在小车的两侧中部。

小车的主回路动触头视小车的额定电流不同而不同，可分为 1250A，1600A，2000A，2500A，3150A 五档，1250A 触头保证在 4s 额定热稳定电流 31.5kA、额定动稳定电流 80(100)kA 的系统可靠运行；1250A 以上触头保证 3s 额定热稳定电流 50kA、额定动稳定电流 125(140)kA 的系统可靠运行。

根据小车所配置的主回路电器的不同，小车可分为断路器小车、电压互感器小车、隔离小车和计量小车。

八、工作原理

1、推进机构

本型开关柜的小车在柜内移动和定位是靠矩形螺纹螺杆实现的；小车在结构上可分为固定和移动两部分。当小车由运载车装入柜体，并完成连接后，小车的固定部分与柜体前框架连接为一体；矩形螺杆轴向固定于固定部分，而矩形螺杆的配套螺母固定于移动部分。按照规定的操作程序，用专用的摇把顺时针转动矩形螺杆，推动小车向前移动，当小车到达工作位置时，定位装置阻止小车继续向前移动，小车可以在工作位置定位。反之，逆时针转动矩形螺杆，小车向后移动，当固定部分与移动部分并紧后，

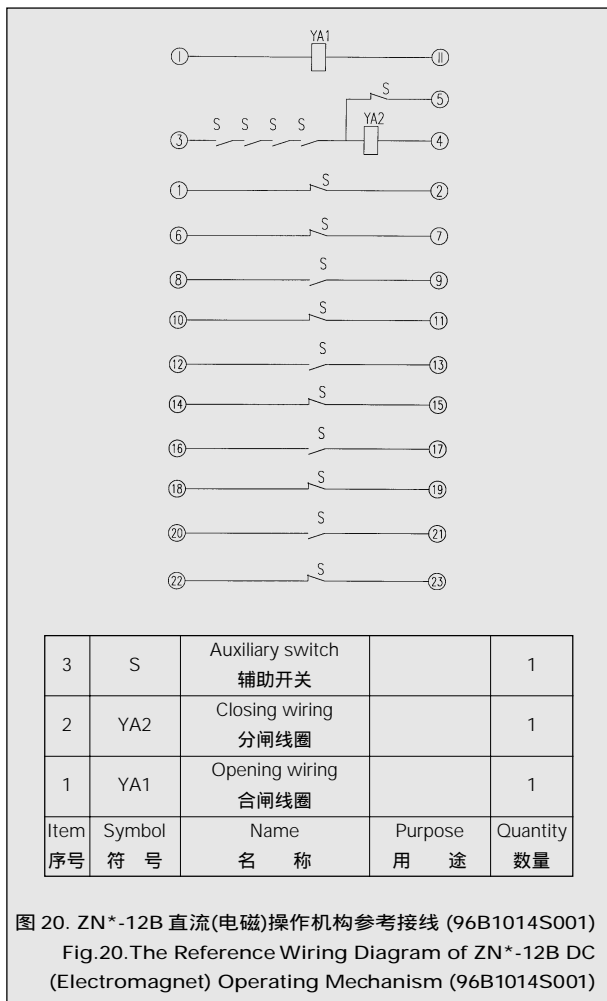
current of 125(140) kA is able to operated reliably.

Depending on the different main-loop circuits set for the car, this car sees the types of breaker, voltage mutual inductor, separation and measurement.

VIII. Work principal

1. Pushing mechanism

Of the switch cabinet of this type, the car moves and anchors inside the cabinet depending on a rectangular screw rod. Structurally, the car consists of the fixing and shifting parts. When the car goes into the cabinet, the fixing part is connected with the front frame of cabinet together. The rectangular screw rod is ready on the fixing part and its accessory nuts are in the shifting parts. According to the regulated operating program, a special handle is used to rotate the rod in clockwise, so as to pull the car to forward. When the car arrives at the working position, the positioning device can stop the continuous forwarding of car, so this car can anchor in the working position. On the contrary, if the rod rotates in counter-clockwise, the car will move backward. When the fixing



小车可以在试验位置定位。

2、主回路触头

如前所述，主回路动触头安装在小车上，为减小推进力，本型开关柜的动静触头不是同时接触，一般是上触头B相与下触头的A、C相先接触，其它相后接触，前后5mm。

不同额定电流值的触头，触头片数量和结构有所不同，但后接触相的插入深度均为40+5mm，触头水平中心公差4mm，左右公差3mm(参见图10)。

动触头上的绝缘套筒增加了触头系统的绝缘性能和抵御事故的能力，并兼有触头导向的作用。

3、联锁

本型开关柜在一些部位专门设计了联锁装置，防止误操作引起的事故发生。

(1) 推进机构与断路器之间的联锁

为了防止在断路器关合状态下推拉小车而造成带负荷推拉小车的恶性事故发生，开关柜小车上设有机械联锁。

a. 当断路器处于合闸状态时，断路器操动机构输出大轴的拐臂阻挡联锁杆向上运动，阻止联锁钥匙转动，从而使小车无法由定位状态转变为移动状态，使试图移动小车的努力失败。只有分开断路器才能改变小车的状态，使小车可以运动。b. 当移动小车未进入定位位置或推进摇把未及时

part firmly connected with the shifting part, the car can anchor at the testing position.

2. Contact of main loop

As the above mentioned, the contact of main loop are installed on the car. To reduce the pushing force, the moving and fixed contact of switch cabinet of this type do not contact for the same time. Generally, the B phase of the upper contactor firstly touch and the A and C phases of lower contactor before the other ones touch later, with a phase difference of 5mm.

Of different rated current, the number and structure of contacts are not same. However, the inserted depth of the later contacted phases is 40+5mm, with the horizontal-center tolerance of 4mm and the right-and-left tolerance of 3mm (See Fig.10.)

On the contacts, the insulating sleeves increase the insulation performance and anti-fault ability of contact system. Also, these sleeves play a role of directing the contacts.

3. Interlock

Of the switch cabinet of this type, some parts are specially designed with interlock devices to prevent faults due to maloperation.

(1) Interlock between pushing-in mechanism and breaker
To prevent with the closed breaker, pulling and pushing the car and then resulting in a terrible fault on this car under load, this car of switch cabinet is set with the mechanical interlock.

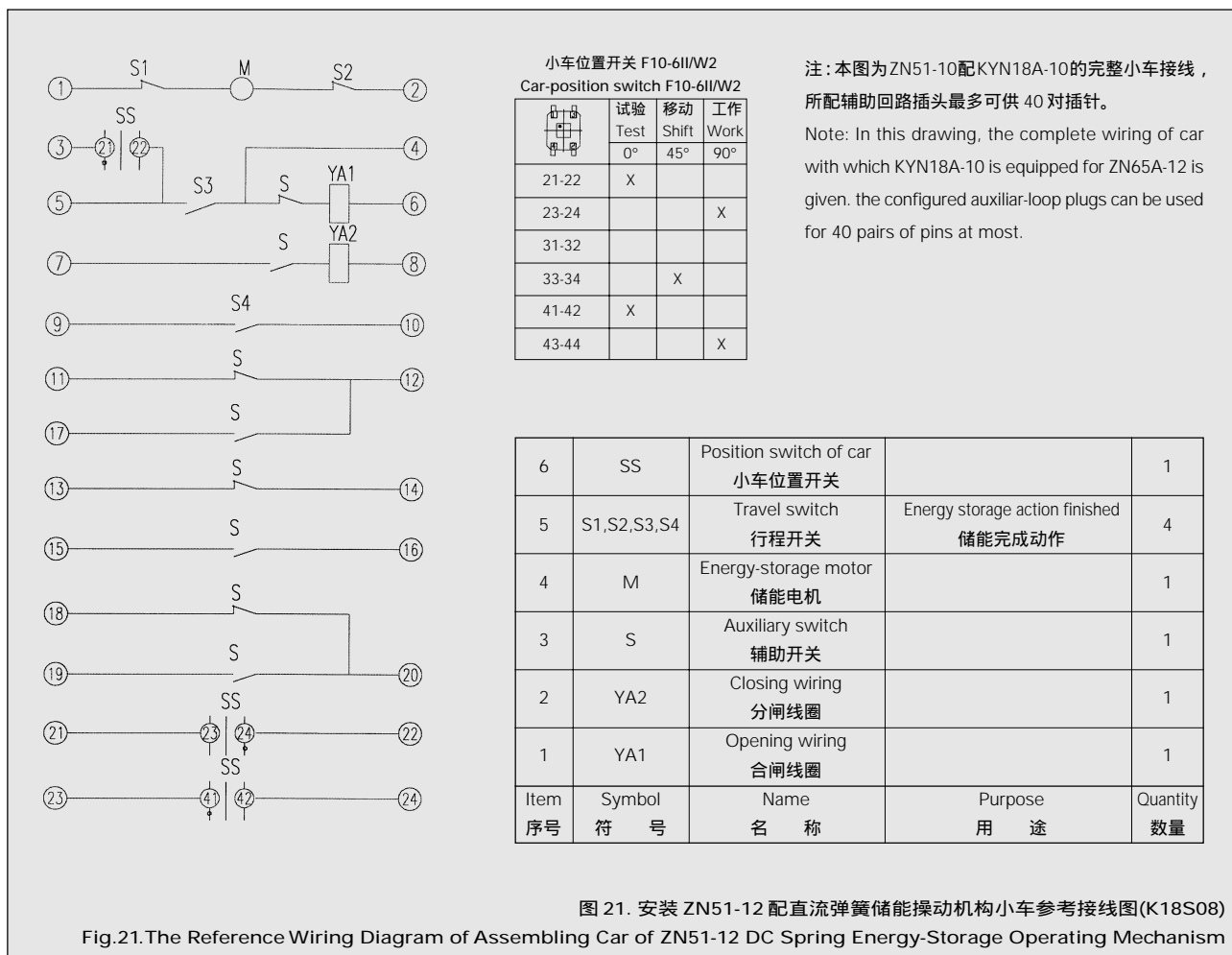
a. When a breaker is on the closing state, it will operate the mechanical to stopping interlock rods going upward and the interlock keys turning around, so as to make the car unable to change the positioning state into the shifting one. This causes a useless attempt of moving the car. Only if the breaker is separated, can the state of car be changed and then the car move.

b. When the movable car is not in location position or the pushing-in handle is not pulled out, the car cannot change its state from shifting to positioning. At this time, with the breaker's mechanical inter-lock, car's mechanical interlock stops the breaker's closing mechanism, so as to ban the electric for manual closing and make sure the operation safety.

(2) Interlock between car and earthing switch

To prevent the car is out of the cabinet the earthing switch closed or the car is pushing in cabinet with the earthing switch break, this switch cabinet is set with the mechanical interlock.

a. When the operator attempts to change the location



拔出时，小车也无法由移动状态转变为定位状态；同时，小车的机械联锁通过断路器内的机械联锁，挡住断路器的合闸机构，使电动(或手动)合闸均无法进行。从而保证了运行的安全性。

(2) 小车与接地开关之间的联锁

为了防止在小车未退出的时候，合上接地开关或接地开关未打开就推入小车，开关柜设置了机械联锁。a. 当操作者试图将小车由试验位置的定位状态转变为移动状态时，如果接地开关还处于合闸状态或接地开关的操作摇把还没有取下，机械联锁将阻止小车状态的变化。只有分开接地开关并取下摇把，小车才允许进入移动状态。b. 小车进入移动状态后，机械联锁立即将接地开关的操作摇把插入口封闭，这种状态一直保持到小车重新回到试验位置并定位才结束。

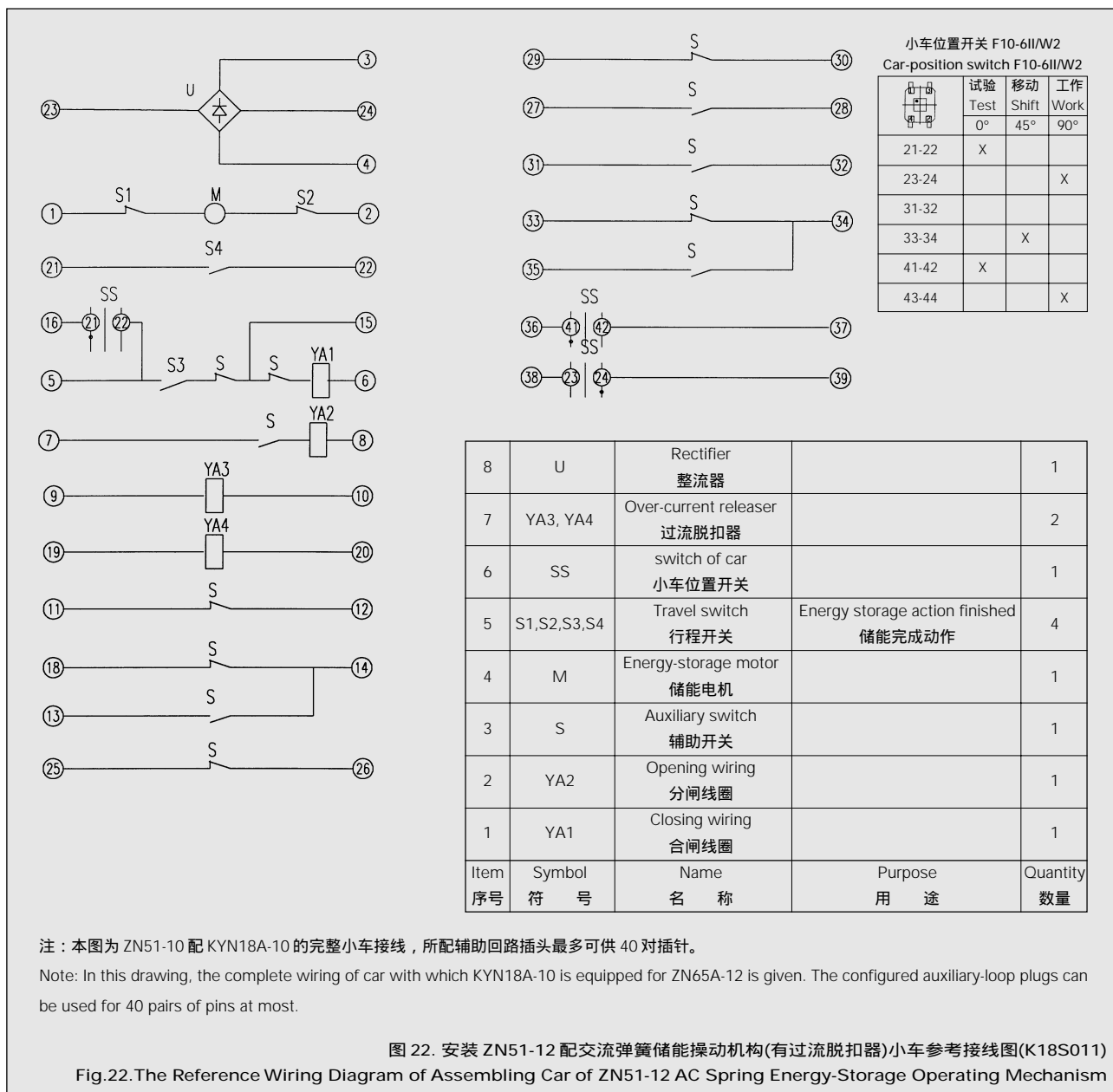
(3) 隔离小车的联锁

由于隔离小车没有分断、关合负荷电流的能力，为了避免隔离小车在相关断路器没有分闸的情况下推拉，在隔离小车的前柜下门上装有电磁锁。电磁锁通过挡板把联锁钥匙插入口挡住，使小车无法改变状态。只有当电磁锁有电(通常电源由相关断路器的常闭辅助触头控制)时，才能打开联锁，操作隔离小车的推进机构。

state of testing position into the shifting state, the mechanical interlock will prevent the car changing into the shifting state if the earthing switch stays at the closing state or its operation handle is not unbolted. Only if the earthing breaker is opened, can the car be allowed to return to the testing position and then the test be finished. b. When the car is ready for the shifting state, immediately the inlet of operation handle of earthing switch will be sealed up automatically. This state will have been there until the car return to the testing position and the test is finished.

(3) Interlock of car with disconnector

Because the car with disconnector misses the abilities of breaking and closing load current, a magnet lock is set on the front lower door of disconnector car in order to prevent the car being pulled and pushed without the opening of related breaker. This lock bans the interlocking keyhole with the block board, so as to make the car unable to change state. Only if the lock is powered (usually under the control of related breaker's often-close auxiliary contactor), can the interlock release to operate the push-



(4) 开关柜的二次接线

用户可根据自己的系统的实际情况选择控制电源和配置断路器的控制电路，并设计相应开关柜二次原理图。图 11 ~ 图 17 是几种不同型号、不同控制电源或操动机构的断路器柜的控制及保护原理图，图 18 ~ 图 26 是相应的断路器内部接线图，供用户设计时参考。图中的位置开关是安装在小车上，反映小车在柜内位置情况的开关，其接点表列于图 27，用户可根据需要选择。图 28 和图 29 是电压互感器和专用计量柜的参考原理接线图；图 30 是额定电流 >2000A 柜的强迫通风控制图，供用户设计时参考。

九、安装调整

1、开关柜安装前，首先应检查安装基础是否合格(符合《建筑电气安装工程检验评定标准》GBJ303-88

in mechanism of disconnection car.

(4) Secondary wiring of switchgear

The user can depend on their practical states to select the control supply and relevant breaker's control circuit, so as to design the secondary principal drawings of the related switch cabinets. See Fig.11-17 for the controlling and protecting principle drawings of different types, control power supplies and operating mechanisms. See Fig.18-26 for the internal wiring drawings of related breakers and This is used for the reference. In the drawings, the position switches are installed on cars, reflecting the position of cars inside the cabinet. See Fig. 27 for the list of connection points which are optional. See Fig.28 and 29 for the reference principle wiring



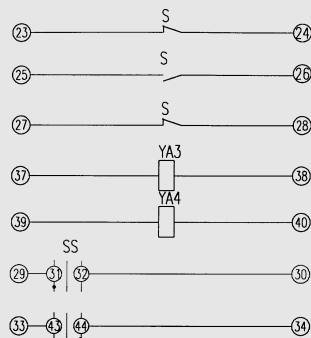
的要求。)基础槽钢布置及开关柜一、二次电缆开孔，请参见图 31、图 32。

- 2、拆箱后，应首先保管好随箱文件资料，并根据装箱单检查随柜备件、附件是否齐全，并作相关记录，然后检查开关柜有没有明显的损坏。如没有问题，可吊装就位进入安装。
- 3、开关柜并列后应与相邻柜靠紧，用螺栓固定在一起。柜底部方孔(见图 31、图 32 中涂黑方孔)应与基础槽钢焊牢。
- 4、一般情况柜体的并列安装应与主母线的安装交替进行，这样可以避免柜体安装后，安装主母线困难。
- 5、柜体并列安装后，应把各柜间的主接地母线，连接在一起，并在适当的地方与建筑预设的接地网相连接。
- 6、安装电缆的开关柜，可打开柜后部电缆盖板，取下橡

drawings of voltage mutual inductor and special measurement cabinets. See Fig.30 for the enforced ventilation control drawing of cabinet whose rated current is >2,000A. This is also for the reference.

IX. Installation and Adjustment

1. Before the switch cabinet is installed, at first the user ought to check whether the installation basis is quality (satisfying the requirements of GB303-88, Standards of Inspection and Qualification on Construction Electric Installation Project). See Fig.31 and 32 for both the layout of basis V-iron and the primary and secondary cable holes of switch cabinet.
2. After the package is dismantled, at first the user ought



	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32	X		
33-34			X
41-42	X		
43-44			X

注：本图为 ZN65A-12 配 KYN18A-10 的完整小车接线，所配辅助回路插头最多可供 40 对插针。

Note: In this drawing, the complete wiring of car with which KYN18A-10 is equipped for ZN65A-12 is given, Thconfigured auxiliary-loop plugs can be used for 40 pairs of pins at most.

胶护套，根据所安装电缆的尺寸，在护套上开设适当的线孔。在电缆引入后，再将护套装好并盖好盖板。

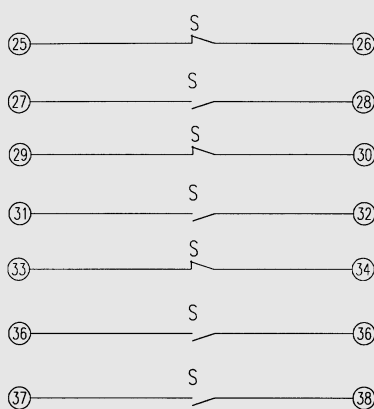
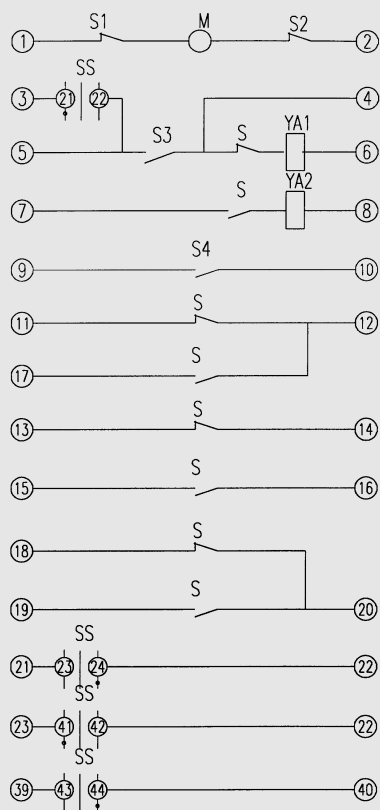
打开柜前顶小母线室盖板，用随柜带来的黄铜棒将各柜的小母线一一对应连接好。

推车前首先应认真检查主、辅回路动静触头是否有损伤。然后擦净触点处的防锈油，涂上干净的润滑脂。再检查接地触头是否完好，并涂上少许润滑脂。然后检查推进机构及其联锁是否运转良好，并适当润滑。

对小车上的断路器等主回路元件进行检查。具体的方法请参阅相关元件的技术文件。

此时可将小车缓缓推入柜内，推进时要注意触头的插接情况和小车的定位情况，小车试推后，应退回试验位置进行电气试验。根据原理接线图，检查开关柜各部分电器是否正常(控制性能)，动作是否可靠。

35



小车位置开关 F10-6II/W2 Car-position switch F10-6II/W2			
	试验 Test 0°	移动 Shift 45°	工作 Work 90°
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

Item 序号	Symbol 符号	Name 名称	Purpose 用途	Quantity 数量
6	SS	Position switch of car 小车位置开关		1
5	S1,S2,S3,S4	Travel switch 行程开关	Energy storage action finished 储能完成动作	4
4	M	Energy-storage motor 储能电机		1
3	S	Auxiliary switch 断路器辅助开关		1
2	YA2	Opening wiring 分闸线圈		1
1	YA1	Closing wiring 合闸线圈		1

注：本图为 ZN65A-12 配 KYN18A-10 的完整小车接线，所配辅助回路插头最多可供 40 对插针。

Note: In this drawing, the complete wiring of car with which KYN18A-10 is equipped for ZN65A-12 is given. The configured auxiliary-loop plugs can be used for 40 pairs of pins at most.

图 25. ZN65A-12/630 ~ 1250-25 直流弹簧储能操动机构小车参考接线图(K19S014)
Fig.25.The Reference Wiring Diagram of Assembling Car of ZN65A-12/630-1250-25
DC Spring Energy-Storage Operating Mechanism (K19S014)

十、使用与维护

1、开关柜在运行中，运行人员除应遵守有关规程外，还应注意以下问题。

(1) 操作程序

虽然开关柜设计有保证开关柜各部分操作程序正确的联锁，但是操作人员对开关柜各部分的投入和退出仍应严格按照操作规程和本技术文件的要求进行，不应随意操作，更不应在操作受阻时，不加分析强行操作。否则，容易造成设备损坏，甚至引起事故。

a. 无接地开关的断路器柜的操作

(i) 将断路器可移开部件装入柜体

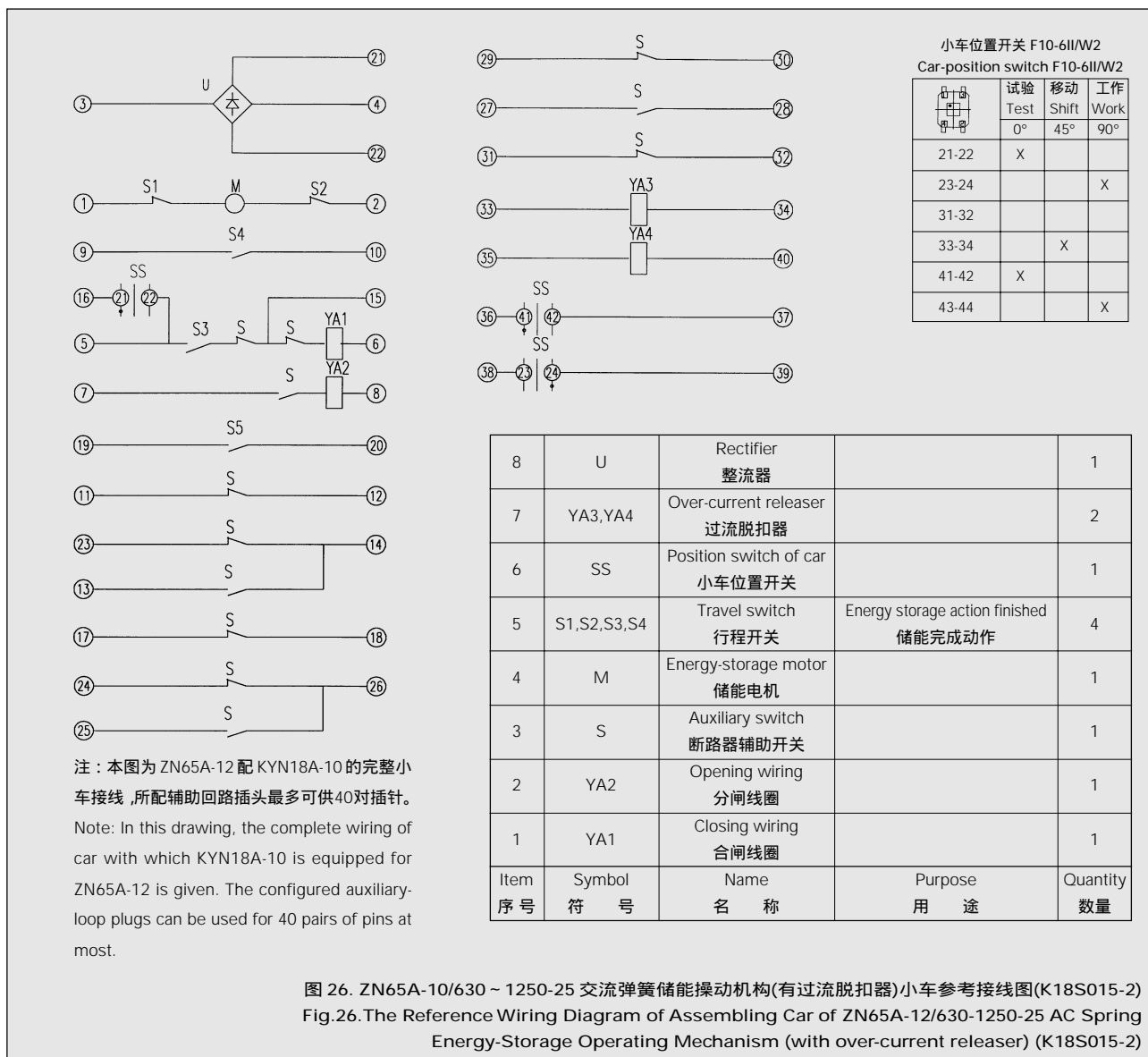
断路器小车准备由柜外推入柜内前，应认真检查断路器是否完好，有没有漏装部件，有无工具等杂物放在机构箱或开关内，确认无问题后将小车装在运载车上并锁定

5. After the apposite installation of cabinet is finished, the main earthing bus between cabinets ought to be linked with each other and connected to the embedded earthing network of building appropriately.

6. Mount the cable in the switchgear: the user can open the cable cover plate on the back of cabinet and unbolt the latex protective sleeve. Depending on the size of installed cable, the user ought to set proper wire holes on the sleeve. After the cable is led into the holes, the user will install the sleeve and put on the cover plate.

7. Open the cover plate of small busbar room on the front top of cabinet, use the annexed copper rod to appropriately connect all the small busbars of cabinet.

8. Before moving the car, the user ought to carefully check



好。将运载车推到柜前，把小车升到合适位置；注意应将运载车前部定位销插入柜体导轨插口并将运载车与柜体锁定之后，再打开运载车挂住断路器小车的锁定钩，将小车平稳推入柜体。当确认已将小车与柜体锁定好后，解除运载车与柜体的锁定，将运载车推开。(运载车的使用详见运载车上的说明。)

(ii) 小车在柜内操作

隔离小车本不具备接通和断开负荷电流的能力，因此在带负荷的情况下推拉小车是极其危险的，因此在进行隔离小车柜内操作时，必须保证首先断开与之相配合的断路器，在确认断路器确已分闸后，再进行隔离柜从试验(储存)位置进入工作位置，或从工作位置退出的操作。具体操作过程如下：(一)若想将小车推入工作位置，首先将小车装入柜内并在试验位置锁定，然后关好柜前门，按动电磁锁的按钮，电磁锁指示有电后，拨动电磁锁的主锁栓，打开联锁钥匙孔的挡板，插入联锁钥匙并打开推进摇把插入

whether the moving and fixed contacts of main and auxiliary loops are damaged. Then, the user will wipe out the antirust grease on the contacts and coat the clean lubricant oil. Also, this user will check whether the earthing contacts are perfect and coat some lubricant oil; and so the user will do for the pushing mechanism and its interlock.

9. The user ought to carefully check the main loop oriented components such as contactors on the car. For details, see the technical document of related components.

10. Here, the user can slowly push the car into the cabinet. Therefore, the user ought to see the inserting and anchoring states of contacts. Later, this car ought to retreat for the testing position and then the electric test will be made. Depending on the principle wiring drawing, the user ought to carefully check whether all the electric

F10-6II/W2

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X

F10-6II/WT1

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32	X		
33-34			X
41-42	X		
43-44			X

F10-8II/W2

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32			
33-34		X	
41-42	X		
43-44			X
51-52			
53-54		X	

F10-8II/WT2

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32	X		
33-34			X
41-42	X		
43-44			X
51-52			
53-54		X	

F10-8II/WT3

	试验 Test	移动 Shift	工作 Work
	0°	45°	90°
21-22	X		
23-24			X
31-32	X		
33-34			X
41-42	X		
43-44			X
51-52	X		
53-54		X	

图 27. 小车位置指示开关接点表
Fig.27. List of Connection Points of Car's Position Indication Switch

口；插入推进摇把，把小车摇入到位后，取下摇把，继续顺时针转动钥匙 90° 后，小车在工作位置锁定。此时可移开部件在柜内锁定，推进机构摇把口封闭。取下联锁钥匙后，联锁钥匙插入口也被封闭，隔离柜进入工作状态。在这种情况下，与之相配合的断路器柜的合闸回路已被接通，分闸回路中的短接点被断开，断路器可进行合闸操作。(二)若想把隔离小车从工作位置退出，必须首先确认与之相配合的断路器已处于分闸状态；然后按柜下门上所装电磁锁的按钮，电磁锁红灯亮，拨动锁栓，打开电磁锁，柜门上联锁钥匙孔露出，即可按与断路器小车相同步骤把隔离小车从工作位置退出。

d. 就地操作断路器

断路器小车面板上有断路器的分合操作钮，一般情况合闸操作钮是供小车在试验位置做试验用的。小车在工作位置时合闸按钮一般不起作用(如果需要在在工作位置仍然使用断路器机构箱的按钮直接合闸，请在订货时特殊说明)。

appliances of switch cabinet work normally (in controlling performance) and whether the action is reliable.

X. Use and Maintenance

1. While running the switch cabinet, the operator ought to pay attention to the following precautions except the related rules and regulations

(1) Operating program

Although the switchgear is designed with the interlock guaranteeing the correct operating programs of all of its parts, the operator still ought to make the investment and withdrawal of the parts firmly meet the requirements of operating programs and technical data, without casual operation and enforced analysis-free action if the operation is banned. Otherwise, it is easy to make the equipment and interlock become damaged or failed or even cause an accident.

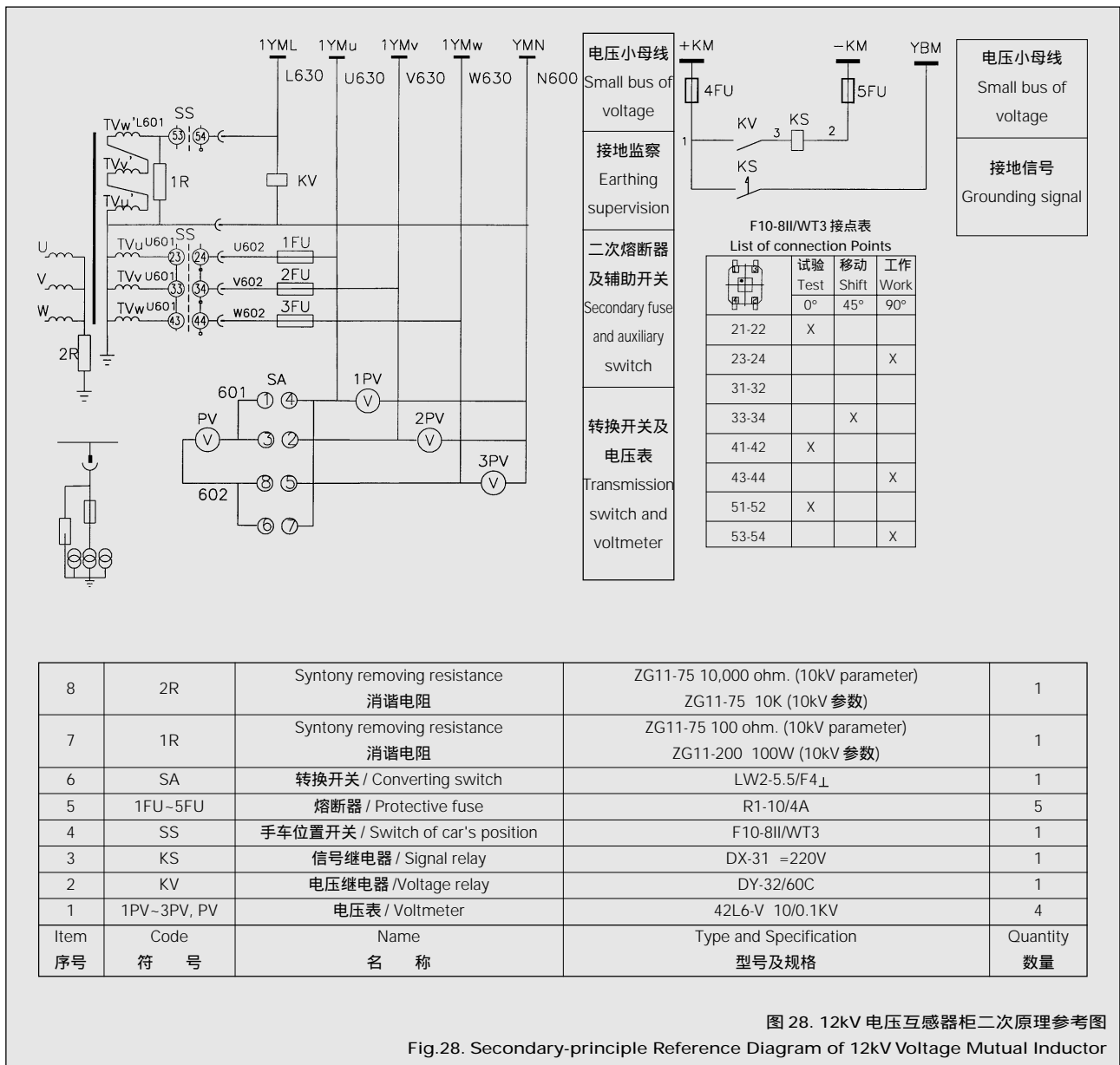


图 28. 12kV 电压互感器柜二次原理参考图
Fig.28. Secondary-principle Reference Diagram of 12kV Voltage Mutual Inductor

小车断路器的分闸按钮是做为事故状态的紧急分闸时使用的，正常情况下在工作位置不要使用，以避免控制回路逻辑混乱。合、分按钮平时是用防护罩盖住的，紧急情况用工具侧向敲击，使其从根部切槽处断开，就可以进行操作。

(2) 使用联锁的注意事项

a. 本产品的联锁功能是以机械联锁为主，辅之以电气联锁实现其功能的，功能上能实现开关柜“五防”闭锁的要求。但是操作人员不应因此而忽视操作规程，不按规程规定的要求操作，应严格遵守“二票三制”的制度。只有组织手段与技术手段相结合才能有效发挥联锁装置的保障作用，防止误操作事故的发生。

b. 本产品的联锁功能的投入与解除，大部分是在正常操作过程中同时实现的，不需要增加额外的操作步骤。如发现操作受阻(如操作阻力突然增大)应首先检查是否有误操作的可能，而不应强行操作以至损坏设备，甚至导致误

a. Operation of switchgear without earthing switch

(i) The moveable parts are placed in the cabinet.

Before the car with breaker is ready for being pushing into the cabinet, the user ought to check whether the breaks are perfect, there is a missing part, or sundries such as tools are placed in the machinery box or switch. Also, the user needs to see the opening indications of 3 protective fuses are at the unopened state. After making sure that there is no problem, the user will push the car before the cabinet, unbolt the track notched stick on the sill of cabinet and then push in the car. At this time, the user ought to carefully aim the trolleys in the middles of left and right sides of car at the operation track inside the cabinet. After the car is pushed into the cabinet, two positioning pins on the interlock box in the middle of car

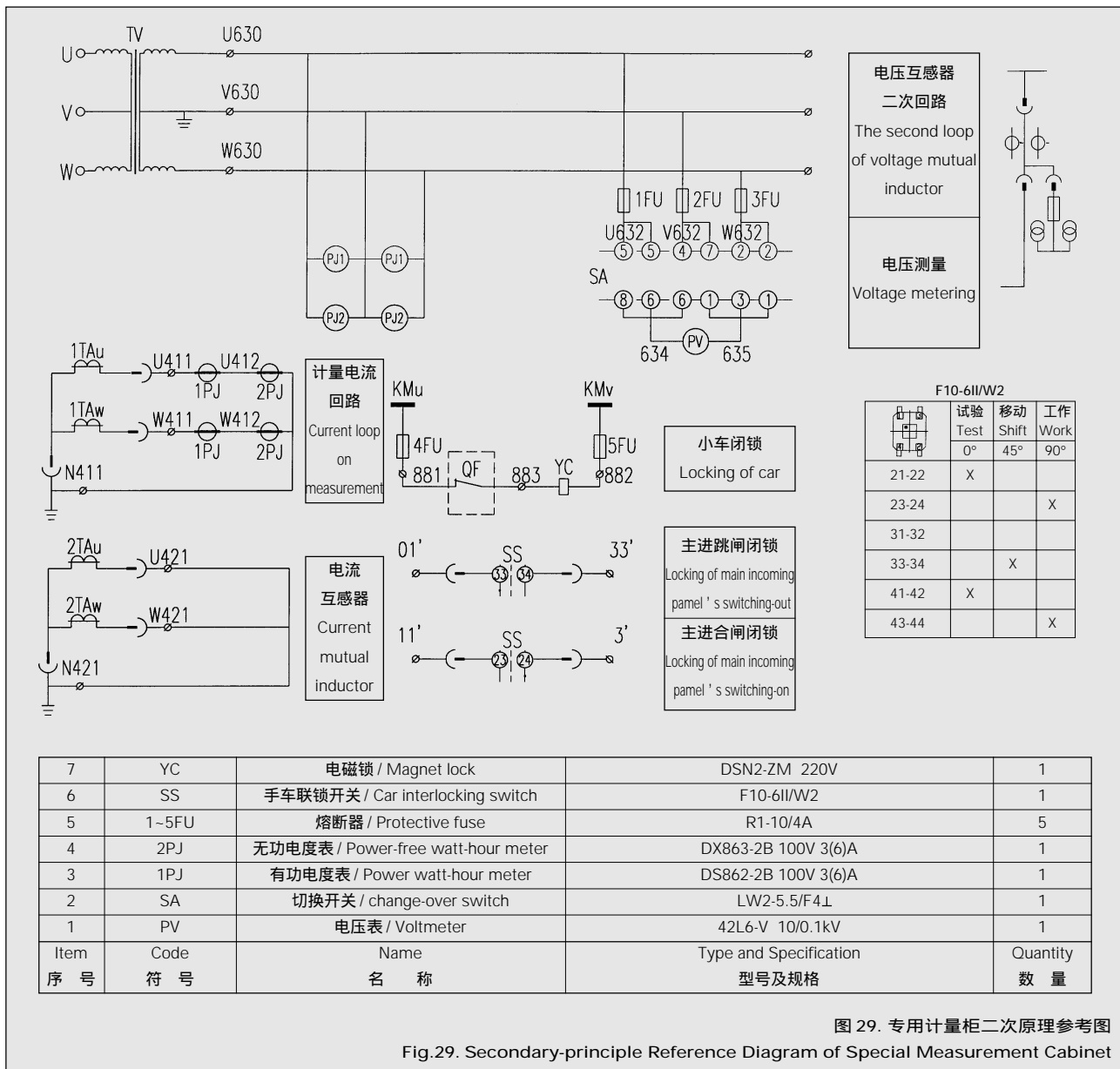


图 29. 专用计量柜二次原理参考图
Fig.29. Secondary-principle Reference Diagram of Special Measurement Cabinet

操作事故的发生。

c. 本产品联锁的主要步骤是通过联锁钥匙的使用而实现的。因此在操作中，一次操作过程只应使用一把联锁钥匙逐步进行，而不应同时使用几把联锁钥匙，导致联锁关系可能出现混乱。因此联锁钥匙应由操作人员随身携带，用毕带走，不应长期放置在开关柜上。

d. 有些联锁因特殊需要允许紧急解锁(如柜门与推进机构间的联锁；电磁锁使用解锁钥匙等)。紧急解锁的使用必须慎重，不宜随意使用，使用时也要采取必要的防护措施，一经处理完毕，应立即恢复联锁原状。

2、开关柜的检修应除按有关规程要求进行外，建议用户特别注意以下几点：

- (1) 定期按真空断路器的安装使用说明书的要求，检查断路器的情况，并进行必要的调整。
- (2) 检查小车推进机构及其联锁的情况，使其满足本说明书

are set for the locking position, so as to fix the car. Then, the track notched plate on the sill is raised for resetting (Before using the carrier, see the related description on the carrier).

(ii) Operation of car in cabinet

After the car is installed in the cabinet staying at the storing position, the user will first insert the pin of auxiliary loop in order to put the car into operation. This will make the car stay at the testing state. For this time, the user can have an electric-operation test on the car without the connection of main loop. If needing to place the car in the working position, the user ought to first close the door of cabinet, put the door-lock handle downward (see Item 5 in Fig.1) to tie the door and then insert the interlock key into the keyhole (see Item 4 in Fig.1) to lock this door.

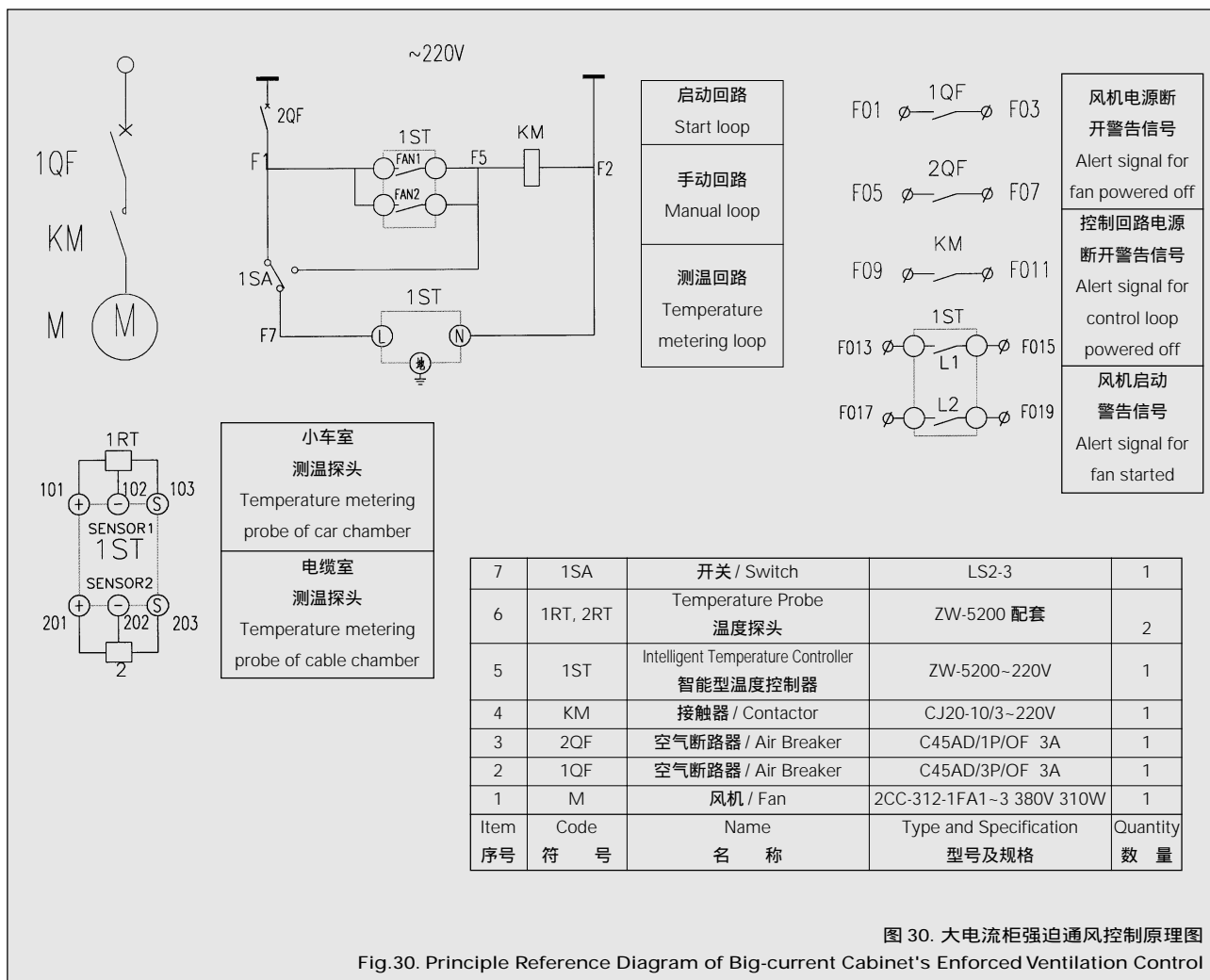


图 30. 大电流柜强迫通风控制原理图

有关要求。大电流柜推拉 200 次后，更换卡板：
KYN18A-12-532L。

- 检查主回路触头的情况，擦除动、静触头上陈旧油脂，察看触头有无损伤；弹簧力有无明显变化；有无因温度过高引起镀层异常氧化现象，如有以上情况，应及时处理。

检查辅助回路触头有无异常情况，并进行必要的修整。

- 检查接地回路各部分的情况，如接地触头、主接地线及过门接地线等，保证其电连续性。
- 检查各部分紧固件，如有松动，应及时紧固。

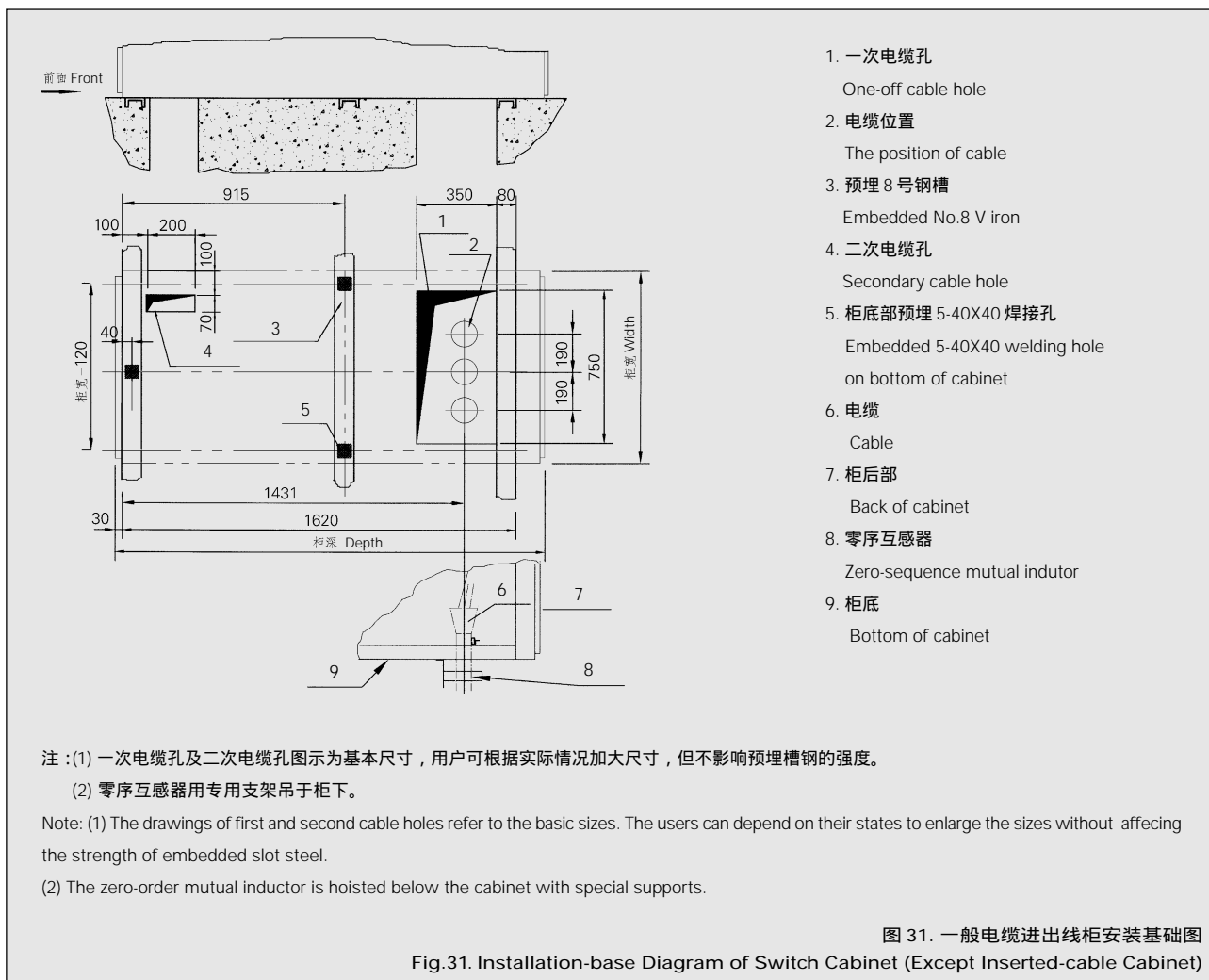
十一、运输与储存

- 开关柜的长途运输，建议不采用公路运输的方式，特别不要长距离在三级以下公路运输。
- 开关柜在包装底板上固定着时可采用滚运。无包装开关柜应采用吊运或铲运。
- 开关柜(即使是带外包装的)不宜长期在户外存放。较长时期不用的开关柜，应储放在干燥，通风的户内仓库中。开关柜的外包装有效期一般不超过一年。

十二、产品的成套性

Then, insert the interlock key again into the keyhole on the door of cabinet (see Item 9 in Fig.1) and turn this key by 90° in clockwise to make the car stay at the shifting position. Here, the front door of cabinet is locked by the interlock of pushing machinery and the insert hole of its crank opens (see Item 9 in Fig.1). At this time, the user will insert the crank and rotate it in clockwise. After the crank rotates about 25 turns by an obvious stop, take down the crank and then make the interlock key rotate by 90° in clockwise. The car is anchored at the working position. Therefore, the main loop is switched on and the breaker is ready. It is time to make the closing and opening operations with the control loop.

If the operator needs to withdraw from the working position, he or she ought to confirm the breaker status at the opening state. Then, he or she can insert the interlock key and make it rotate by 90° in clockwise, so as to make the car begin the shifting state. Later, he or she can insert the crank make it rotate by 25 turns so as to reach the stop.



产品在交货时应具备以下文件和附件：

- 1、产品的合格证明书
- 2、产品的安装使用说明书
- 3、装箱单
- 4、产品的工程设计资料(包括系统图，二次接线图，设备明细表等)。
- 5、开关柜联锁钥匙、断路器储能摇把、小车推进摇把、接地开关操作摇把及运载车(建议合同台量10台以下，每5台配一套；超过10台，每增加10台，加一套)。
- 6、开关柜内主要元件的安装使用说明书等技术文件和附件。

十三、订货须知

订货时用户应提供下述资料：

1. 主回路结线方案，注明各元件的技术参数；
2. 辅助回路原理图；
3. 设备表；
4. 平面布置图；
5. 其它特殊需要的图纸和资料。

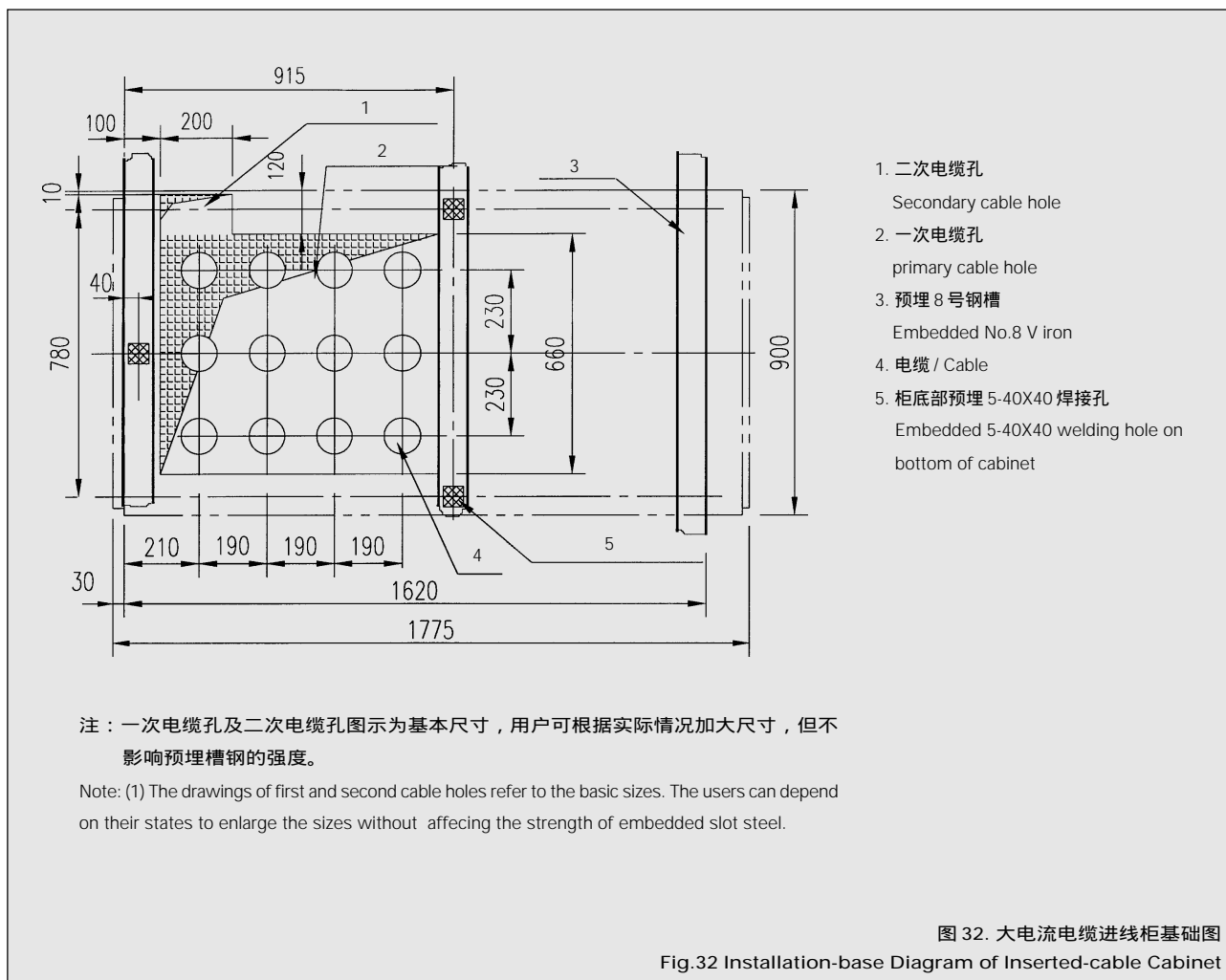
十四、推荐选用的柜体颜色：银灰 501#。

(iii) Take out car from cabinet

To take out car from cabinet, the user ought to first make sure the car has stayed at the anchoring position, then open the lower door of cabinet and remove the pin of auxiliary loop. The user will put down the track notched stick on the sill of cabinet, raise and rotate the locking pin of car, and pull the car out of the cabinet. When the car completely enters the carrier and the operator makes sure the pothook of carrier is locked, this operator can open the interlock pin between the carrier and the cabinet. After pulling the carrier back for a proper distance, the operator can tenderly put down the car. If this car needs to be conveyed by the carrier for longer distance, the operator ought to descend the car by a certain height and then push the carrier, so as to reduce opportunity for accidents during the conveyance

b. Operation of switch cabinet equipped with ground switch

The operation of switch cabinet equipped with earthing switch is completely same as that of the cabinet without



ground switch. Only the following precautions are given for the user shifting the car and handling the ground switch in cabinet:

(i) Car operated in cabinet

When the operator is ready for pushing the car for the working position, he or she must confirm that the ground switch stays at the separation state except following the several regulations of b. Otherwise, the next operation cannot be finished. Item a (ii)

(ii) Operation of closing ground switch

To close the ground switch, the operator first ought to confirm that the car has retreated for the testing (storing) position and then unbolt the handle of pushing mechanism, so as to make the car stay at the positioning state. Therefore, the operator will insert the handle of ground switch to make the closing operation. Especially, the operator should pay attention to closing or opening the switch up to the positions, without suspension during the operation.

c. General separation-cabinet operation

While the separation car is operated in the cabinet, the operator therefore must first turn off the breakers cooperating with the car. After the breaker is surely turned off, the operator can make the cabinet enter from the testing (storing) position into the working position or withdraw from this position. The concrete operation is as follows: (1) If tending to push the car for the working position, the operator first place the car in the cabinet and lock it on the testing position. Then, the operator close the front cabinet door, press the button of interlock keyhole, insert the key and open the insert hole of pushing handle, so as to insert this handle. After the car is rotated for position, the operator take down this handle and then rotate the key by 90° in clockwise. Therefore, the car is locked on the working position, so the moveable parts are locked in the working position and the hole of pushing -mechanism handle is closed. After the key is taken down, the interlocking keyhole is also closer, so the working state of separation cabinet begins. In this case, the coordinative closing loop of the breaker cabinet has been

turned on, the short-circuit connection point of opening loop is switched off and then the breaker can make the opening operation.(2) If tending to withdraw the car from the working position, the operator must first make sure the coordinative breaker has stayed on the opening state. Then, this operator presses the button of magnet lock on the lower cabinet door. After the red lamp of magnet lock turns on, the operator pokes the main lock bolt and opens the magnet lock to expose the interlock keyhole, so as to withdraw the car from the working position in accordance with the same program of breaker's car.

d. Contactor is locally operated

On the penal of breaker's car, there are closing and opening operation buttons of breaker. Generally, these buttons are used for the car on the tesing position. When the car is on this position, the buttonsplaynorable(if the button of breaker organization box is still used to directly make the closing for the working position, please give the button in the order.)The opening button of car's bresker is only used for the emergency opening of fault. Normally, it is not used for the working position in ordwe to prevent the logically disorder control loop. Both the opening and cising buttons are covered by protective tips. If there is emergency,use a tool to knock at these tips to make them break on the root slots. It is time to operate.

(2) Precautions for using interlock

a. The interlock function of product is focused on mechanical interlock with the secondary electric interlock, functionally satisfying the requirements of switch cabinet's "five-safeguard" locks. However, the operator must not ignore the operating rules but strictly follow the related regulations. Only if the organizational rules are in conformity with the technological methods, can the safeguard roles of interlocking devices are efficiently plays to prevent the malfunction.

b. The use and disuse of the product's interlock function are almost achieved in the normal operation, without the added operation program. If the operation is banned (for instance, the operation resistance is suddenly increased), the operator ought to first check whether there is the possibility of maloperation. And he or she cannot make the operation by force to damage the device or even make the fault of maloperation.

c. The main programs of the product are fulfilled through the use of interlock keys. Therefore, an operating program only applies an interlock key and cannot use several interlock keys meanwhile, because the keys will make the interlock relationship become disordered. Therefore,

the only interlock key ought to be taken by the operator herself or himself and cannot be placed on the switch cabinet for long time.

d. For special requirements, some of the interlock allows emergency unlocking (for instance, the unlocking between cabinet door and pushing mechanism and the deblocking of emergency opening of contactor). This deblocking must be cautiously used. If it is used, the deblocking must take necessary protective measures. Once if the deblocking is finished, the original interlock must be restored.

2.The overhaul staff of switch cabinet ought to pay special attention to the following points except the related operating rules:

(1) The staff must timely check whether the installation of vacuum contactor meet the requirements of user guide, taking the reins of contactors and make adjustment if necessary.

(2) The staff must check the states of car's pushing mechanism and its interlock, in order to meet the requirements of user guide. After the big-current cabinet has been pulled and pushed for 200 times, the following card board is changed: KYN18A-12-5321.

(3) The staff must check the state of main-loop contactors, wipe out old grease on the active and static contactors and see whether they have been damaged. Also, the staff must see whether the spring has considerably changed and the plate is abnormally oxidized due to extremely high temperature. If the above exists, the staff ought to make timely treatment.

(4) The staff must check the state of the ground loop's parts, including ground contactor, main ground wires and the door's ground, in order to guarantee the electric continuity.

(5) The staff must check the state of all parts' fixtures. If they are loose, these fixtures must be fastened timely.

XI.Transportation and Storage

1. In our opinion, the long-journey delivery of switch cabinet does not take the method of road transportation, especially delivery through a class-III or lower road.

2. The switch cabinet can apply the rolling delivery when it is fixed on the bottom board of package. If there is no package, the switch cabinet ought to apply the lifting or bucketing delivery.

3. The switch cabinet (even if it is the outside packed one) cannot be stored outdoors for long time. It ought to be stored in a dry and ventilated indoor warehouse. The expiry of switch cabinet's outside package is no longer

than 1 year generally.

XII. Suite of product

The product should consist of the following data and attachment while it is delivered:

1. Quality certificate of product
2. Specifications for installation and use
3. Packing list
4. Engineering design data (system drawing, secondary wiring drawing and the list of equipment included)
5. The interlock key of switch cabinet, the pushing crank of car and the operation crank of ground switch.

Suggestion: If you order no more than 10 cabinets in a contract, you need to prepare one suite for every 5 cabinets; and if you order more than 10 cabinets, you need to prepare one more suite for every 10 extra cabinets.

6. Technological document and attachment of switch cabinet's main components, such as the specifications for installation and use

XIII. Ordering Notice

If ordering the cabinet, a user ought to prepare the following materials:

The wiring solution of main loop, with the noted technical specifications of all components

The principle drawing of auxiliary loop

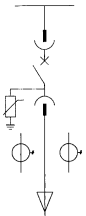
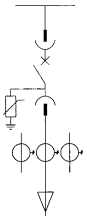
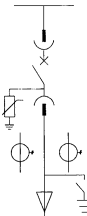
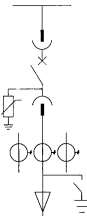
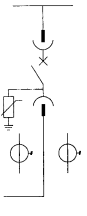
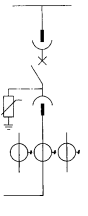
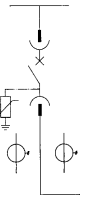
The list of devices

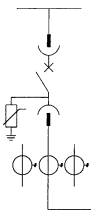
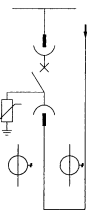
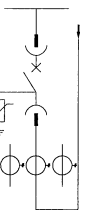
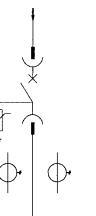
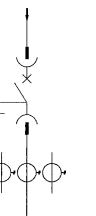
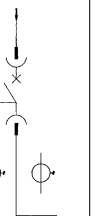
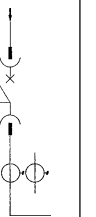
The plan

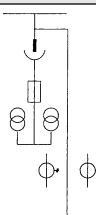
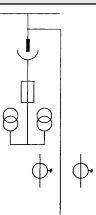
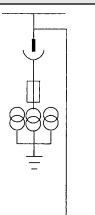
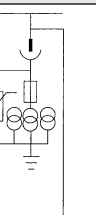
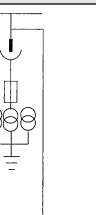
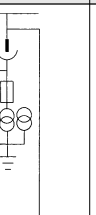
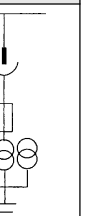
Other drawings and data for special requirements

XIV. The recommended cabinet color: silver-gray 501#

附表 1/ Attached Tab. 1

序 号 / Item	1	2	3	4	5	6	7
主回路方案编号 No. of main-loop solution	01	02	03	04	05	06	07
主回路方案 Main-loop solution							
用 途 Purpose	进出线 Incoming and outgoing	进出线 Incoming and outgoing	出线 Outgoing	出线 Outgoing	联络 Connection	联络 Connection	联络 Connection
最大工作电流(A) Maximum work current (A)	2000	2000	2000	2000	2000	2000	2000
主回路 元件 Main- loop component	真空断路器 Vacuum breaker	见表 3~ 表 6 See Tab.3-6	见表 3~ 表 6 See Tab.3-6	见表 3~ 表 6 See Tab.3-6	见表 3~ 表 6 See Tab.3-6	见表 3~ 表 6 See Tab.3-6	见表 3~ 表 6 See Tab.3-6
	电流互感器 Current mutual inductor	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A
	过电压限制装置 Over-voltage limiter	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional
备 注 / Remark							

序 号 / Item	8	9	10	11	12	13	14
主回路方案编号 No. of main-loop solution	08	09	10	11	12	13	14
主回路方案 Main-loop solution							
用 途 Purpose	隔离 Separation	隔离 Separation	隔离 Separation	隔离 Separation	电缆进线 Inserted cables	电缆进线 Inserted cables	电缆进线 Inserted cables
最大工作电流(A) Maximum work current (A)	2000	2000	2000	2000	2000	2000	2000
主回路 元件 Main- loop component	真空断路器 Vacuum breaker	见表 3~ 表 6	见表 3~ 表 6	见表 3~ 表 6	见表 3~ 表 6	见表 3~ 表 6	见表 3~ 表 6
	电流互感器 Current mutual inductor	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A
	过电压限制装置 Over-voltage limiter	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional
备 注 / Remark							

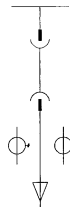
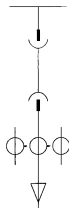
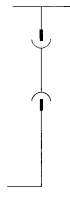
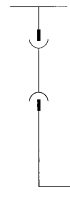
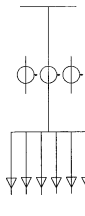
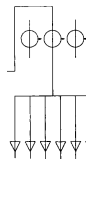
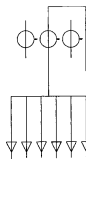
序 号 / Item	15	16	17	18	19	20	21
主回路方案编号 No. of main-loop solution	15	16	17	18	19	20	21
主回路方案 Main-loop solution							
用 途 Purpose	计量 Measurement	计量 Measurement	联络 PT Contact PT	联络 PT FV Contact PT FV	联络 PT Contact PT	联络 PT FV Contact PT FV	联络 PT Contact PT
最大工作电流(A) Maximum work current (A)	2000	2000	2500	2500	2500	2500	2500
主回路 元件 Main- loop component	电压互感器 Voltage mutual inductor	JDZ JDZ	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *
	熔断器 Protective fuse	XRNP1 或 RN2 XRNP1or RN2	XRNP1 或 RN2 XRNP1or RN2	XRNP1 或 RN2 XRNP1or RN2	XRNP1 或 RN2 XRNP1or RN2	XRNP1 或 RN2 XRNP1or RN2	XRNP1 或 RN2 XRNP1or RN2
	避雷器 Thunder arrester			HY5WZ2		HY5WZ2	
	电流互感器 Current mutual inductor	LZZBJ9-10A	LZZBJ9-10A				
备 注 / Remark							

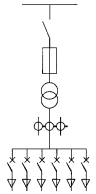
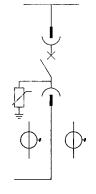
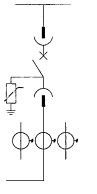
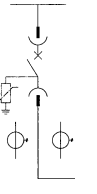
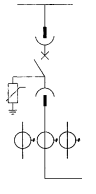
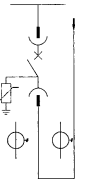
*-900mm 柜宽可配装 JDZJ 型，800mm 柜宽应配装 JDZX9 型。/ The cabinet of 900mm in width is equipped with the Type JDZJ, and that of 800mm is with JDZX9.

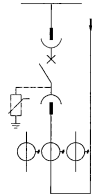
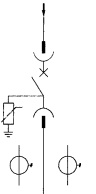
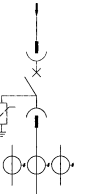
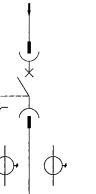
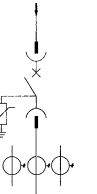
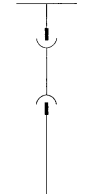
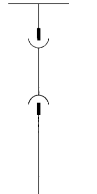
附表 1(续)/ Attached Tab. 1 (continuous)

序 号 / Item		22	23	24	25	26	27	28
主回路方案编号 No. of main-loop solution		22	23	24	25	26	27	28
主回路方案 Main-loop solution								
用 途 Purpose			联络 PT Contact PT	联络 PT FV Contact PT FV	联络 PT Contact PT	联络 PT FV Contact PT FV	进线 PT FV In-wire PT FV	隔离 Separation
最大工作电流(A) Maximum work current (A)			2500	2500	2500	2500	2500	2000
主回路 元件 Main- loop component	电压互感器 Voltage mutual inductor	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	JDZ 或 * JDZ or *	
	熔断器 Protective fuse	XRNP1 或 RN2 XRNP1 or RN2	XRNP1 或 RN2 XRNP1 or RN2	XRNP1 或 RN2 XRNP1 or RN2	XRNP1 或 RN2 XRNP1 or RN2	XRNP1 或 RN2 XRNP1 or RN2	XRNP1 或 RN2 XRNP1 or RN2	
	避雷器 Thunder arrester	HY5WZ2		HY5WZ2		HY5WZ2	HY5WZ2	
	电流互感器 Current mutual inductor							
备 注 / Remark								

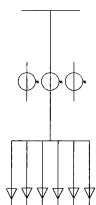
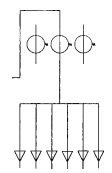
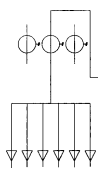
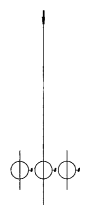

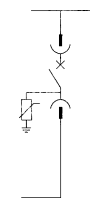
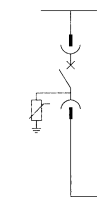
*-900mm 柜宽可配装 JDZJ 型, 800mm 柜宽应配装 JDZX9 型。/ The cabinet of 900mm in width is equipped with the Type JDZJ, and that of 800mm is with JDZX9.

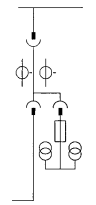
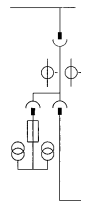
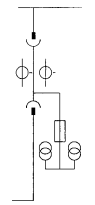
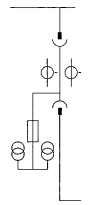
序 号 / Item		29	30	31	32	33	34	35
主回路方案编号 No. of main-loop solution		29	30	31	32	33	34	35
主回路方案 Main-loop solution								
用 途 Purpose		隔离 Separation	隔离 Separation	隔离 Separation	隔离 Separation	电缆进线 Inserted cables	电缆进线 Inserted cables	电缆进线 Inserted cables
最大工作电流(A) Maximum work current (A)		2000	2000	2000	2000	2000	2000	2000
主回路 元件 Main- loop component	电流互感器 Current mutual inductor	LZZBJ9-10A	LZZBJ9-10A			LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A
备 注 / Remark								

序 号 / Item	36	37	38	39	40	41	42
主回路方案编号 No. of main-loop solution	36		101	102	103	104	105
主回路方案 Main-loop solution							
用 途 Purpose	所用变 Electric transformation		联络 Contact	联络 Contact	联络 Contact	联络 Contact	架空进线 in coming on stiles
最大工作电流(A) Maximum work current (A)			2500	2500	2500	2500	2500
主回路 元件 Main-loop component	真空断路器 Vacuum breaker		表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6
	电流互感器 Current mutual inductor		LZZBJ9-10A2	LZZBJ9-10A2	LZZBJ9-10A2	LZZBJ9-10A2	LZZBJ9-10A2
	隔离开关 Separation on-off	GN19-10Q					
	高压熔断器 Hi-voltage fuse	SDLNJ					
备 注 Remark	干式变压器 50kVA Dry-style transformer 50KVA						

序 号 / Item	43	44	45	46	47	48	49
主回路方案编号 No. of main-loop solution	106	107	108	109	110	111	112
主回路方案 Main-loop solution							
用 途 Purpose	架空进线 In coming on stiles	架空进线 In coming on stiles	架空进线 In coming on stiles	架空进线 In coming on stiles	架空进线 In coming on stiles	联络 Contact	联络 Contact
最大工作电流(A) Maximum work current (A)	2500	2500	2500	2500	2500	3150	3150
主回路 元件 Main-loop component	真空断路器 Vacuum breaker	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6		
	电流互感器 Current mutual inductor	LZZBJ9-10A2	LZZBJ9-10A2	LZZBJ9-10A2	LZZBJ9-10A2		
	过电压限制装置 Over-voltage limiter	选配设备 Optional	选配设备 Optional	选配设备 Optional	选配设备 Optional		
备 注 / Remark							

附表 1(续)/ Attached Tab. 1 (continuous)

序 号 / Item	50	51	52	53	54	55	56
主回路方案编号 No. of main-loop solution	113	114	115	116	117	118	119
主回路方案 Main-loop solution							
用 途 Purpose	电缆进线 Inserted cables	电缆进线 Inserted cables	电缆进线 Inserted cables	架空进线 In coming on stiles	架空进线 In coming on stiles	联络 Contact	联络 Contact
最大工作电流(A) Maximum work current (A)	3150	3150	3150	3150	3150	3150	3150
主回路 元件 Main- loop component	真空断路器 Vacuum breaker					表 3 表 6 See Tab.3-6	表 3 表 6 See Tab.3-6
	电流互感器 Current mutual inductor	LAJ-10	LAJ-10	LAJ-10	LAJ-10		
	过电压限制装置 Over-voltage limiter					选配设备 Optional	选配设备 Optional
备 注 / Remark							

序 号 / Item	57	58	59	60	61	62	63
主回路方案编号 No. of main-loop solution	JL1	JL2	JL3	JL4			
主回路方案 Main-loop solution							
用 途 Purpose	专用计量 Special measurement	专用计量 Special measurement	专用计量 Special measurement	专用计量 Special measurement			
最大工作电流(A) Maximum work current (A)	2000	2000	2000	2000			
主回路 元件 Main- loop component	电压互感器 Voltage mutual inductor	JDZ-10(6)	JDZ-10(6)	JDZ-10(6)			
	电流互感器 Current mutual inductor	LZZBJ9-10A	LZZBJ9-10A	LZZBJ9-10A			
	熔断器 Protective fuse	XRNP1 或 RN2-10 XRNP1 or RN2-10	XRNP1 或 RN2-10 XRNP1 or RN2-10	XRNP1 或 RN2-10 XRNP1 or RN2-10			
	真空接触器 Vacuum contactor						
备 注 / Remark							



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