



7.2-15kV Unitole UR4 型金属铠装移开式开关设备
Unitole Type UR4 metal-clad with-drawable switchgear

UR4铠装式金属封闭开关设备（开关柜）

UR4 metal-clad enclosed switchgear

配移开式真空断路器

with withdrawable VCB

12~15kV,...5000A,...63kA

UR4 安全可靠的开关柜

- 完全金属铠装及全封闭
- 开关柜内的各小室均隔开为各自独立的小室
- 快速合闸接地开关用于接地和人工短路
- 可靠的五防联锁能有效地防止误操作及误入带电隔室
- 所有设备的操作，包括断路器的合闸和分闸，手车的推入或移出，以及接地开关的操作，能/也应在门板关闭状态下进行
- 透过前门观察窗，可方便地察看断路器所处位置及其分合、储能状态
- 根据客户要求可方便采用前维护或后维护方式
- 按照国际电工委员会标准IEC60298和中国标准GB3906、DL404，通过荷兰KEMA、西安国家高压电器质量监督检验中心各项型式试验
- 采用大爬距与复合绝缘的措施，具有较高的技术性能

UR4 safe and reliable switchgear

- Totally metal-clad and enclosed
- All the compartments are totally enclosed separately
- Quickly closed earthing switch can earth and artificial short circuit.
- Have reliable "five prevention" interlock device and prevent from mal-operation and entering into live compartment effectively.
- Operation all the equipment, including close and trip VCB, drive in and withdraw the truck and operation of earthing switch, can/should be done when door closed
- The opening or closing status of VCB and position of truck, charging status of mechanism can be inspected through the viewing window.
- Front or rear maintenance option according to the requirement of client
- In compliance with IEC60298、GB3906、DL404, pass type tests in KEMA and Xi'an national HV electrical equipment quality supervision and test center
- Adopt Long creepage and compound insulation measures to attain higher technical performance

UR4实用性强的开关柜

- 壳体封装严密，可防止污物及小动物进入
- 真空断路器小车为免维护型的，与其配套的操动机构仅需少量维护
- 真空断路器中压门上带有紧急分合闸装置，在中压门无需打开的情况下，可实现对真空断路器的紧急分合闸操作
- 手车互换性极好
- 二次线敷设于尺寸宽裕的线槽内，容易查找
- 提供充裕的空间，便于电缆联接

UR4 practical switchgear

- Frame enclosed rigorously, can prevent the pollution and beastie from entering
- VCB is free-maintenance and its mechanism only need little maintenance
- There is emergency on and trip device on VCB compartment door, can close and trip VCB without opening the door
- Excellent truck exchangeability
- Secondary wire lay in big cable duct, and easy for finding
- Enough room for cable connection

UR4适用性广的开关柜

- 装设标准型的互感器
- 可使用各种常规的电缆头
- 可以并接多根电缆(每相最多可并接6根电缆)
- 可适应电缆或母排进出，也适应电缆与母排混合进出

UR4 applicable switchgear

- Installed standard transformer
- Can use all kinds of normal cable lugs
- Can parallelly connect several cable (Max. connect 6 cable each phase)
- Cable or busbar incoming or outgoing, cable and busbar combined incoming and outgoing

1. 概述

镇江大全伊顿电器有限公司生产的UR4型铠装移开式金属封闭开关设备(以下简称开关柜),系三相交流50Hz, 7.2~15kV单母线分段系统的户内成套配电设备,主要使用于发电厂、城市供电、工业系统及商业建筑中,作为接受和分配电能之用,并具有对电路进行控制、保护和检测等功能。

开关柜内配置美国伊顿公司(西屋技术)生产的NVU12、150VCP-W(G)型移开式真空断路器。成套设备可满足中国电网对中压开关柜之要求,并适合“五防”和全密封、全隔离、全绝缘、全工况的特殊性能要求。

General

Type UR4 metal-clad withdrawable Switchgear (hereafter called switchgear), is a 3-phase AC 50Hz, 7.2~15kV single busbar sectionalizer system, manufactured by Zhenjiang Daqo Eaton Electrical Systems Co., Ltd., for application in indoor distribution networks. It is used in a wide variety of applications: power plants, main transformer stations or substations, industrial applications, public utilities, etc. for electricity distribution, circuit control, protection and measuring.

The switchgear is equipped with NVU12 and 150VCP-W(G) withdrawable vacuum circuit breaker, which meets the requirements of China Electric Power system, and such special requirements as "Five Prevention", full enclosed, full disconnection, full insulation, full behaviour etc.

2. 参照采用的主要标准

Reference Standards

IEC60298 GB3906 ANSI

IEC60694 GB11022 GB14808

IEC60056 GB1984 DL404 DL402

3. 开关柜的设计报告

Design Reports

3.1 技术参数, 见表1, 2, 3

Technical data(see Table 1,2,3)

3.2 框架

设计采用IEC60298、GB3906标准。

材料采用敷铝锌钢板,厚度为2.5mm。门和封板采用优质冷轧钢板,厚度为3.0mm。加工后的柜壳以螺栓拼合成坚固的一体。

低压室、手车室、母线室以及电缆室全部用钢板封闭隔离。为保证运行、维护人员的安全,开关柜设计有独立的压力释放通道。压力释放试验证明详见内部故障燃弧报告。

柜体无任何焊接点。组装时采用特殊的夹具,保证很高的装配精度。

手车室内设计有带自动锁扣和开启的金属或SMC活门,满足手车断路器与母排侧和电缆侧之间同时自动隔离的要求。

开关柜技术参数

Technical data of switchgear

表1
Table 1

型号 Type		UR4
额定运行电压 Rated service voltage	kV	6 10 13.8
最高运行电压 Max.service voltage	kV	7.2 12 15
1 min.工频耐压 1 min. Power-frequency withstand voltage	kV	32 42 50
雷电冲击电压(峰值) Lightning impulse voltage (peak)	kV	60 75 110
额定频率 Rated frequency	Hz	50/60
3s热稳定电流(有效值) 3s short-time withstand current (rms)	kA	25 31.5 40 50 63
额定动稳定电流(峰值)(注1) Rated peak withstand current (peak)	kA	63 80 100 125 158
主母线额定电流 Main busbar rated current	A	630-5000 (注3)
分支母线额定电流 T-off rated current	A	630-5000
柜宽 (W)	mm	620 800 900 1000
柜深 (D)	mm	1400-1800
柜高 (H)	mm	2200
防护等级 Protection degree		外壳IP4X(最大IP5X)断路器室门打开为IP2X enclosure IP4X(max.IP5X), IP2X with door opened
重量 Weight	kg	800-1100(包括手车在内) (including truck)

真空断路器技术参数

Technical Data of VCB

表2
Table 2

断路器型号 Type of VCB		NVU12	150VCP-W(G)
额定运行电压 Rated service voltage	kV	7.2 12	15
1 min.工频耐压 1 min. Power-frequency withstand voltage	kV	32 42	50
雷电冲击电压(峰值) Lightning impulse withstand voltage (peak)	kV	60 75	110
额定频率 Rated frequency	Hz	50/60	
额定电流 Rated current	A	630 1250 1600 2000 2500 3150 4000 5000 (注3)	
额定短路开断电流(有效值) Rated short circuit breaking current (rms)	kA	25 31.5 40 50 63	
额定短路关合电流(峰值)(注1) Rated short circuit making current (peak)	kA	63 80 100 125 158	
开断短路电流直流分量 D.C. component		> 35% (注2)	
合闸时间 Closing time	ms	40-60	
分闸时间 Opening time	ms	35-55	
最大燃弧时间 Max.arcing time	ms	<15	
合闸弹跳时间 Breaking-making bouncing time	ms	< 2	

注1: 特殊使用场合可选择更高参数。

Note1: Higher parameter can be choosed in special application.

注2: 变电站一般选择<35%, 发电厂可根据计算要求选择合适的参数。

Note2: Substation normally select less than 35%, power plant can select proper parameter according to caculation.

注3: 4000-5000A开关柜需采用强迫风冷。

Note3: 4000-5000A switchgear need enforced cooling.

续表2
Table 2 continued

机电寿命 Mechanical & electrical life	次	30000	
自动重合闸操作顺序 Auto-reclosing operating sequence		分—0.3s—合分—3min—合分 O-0.3s-CO-3min.-CO	
储能电机功率 Charging motor power	W	34	<500
储能电机电压(DC/AC) Charging motor voltage	V	110/220	
电动机储能时间 Motor charging time	S	<10	
分合闸线圈电压(DC/AC) Opening-closing coil voltage	V	110/220	
合闸线圈电流 Closing coil current	A	1.5/0.75	6/3
分闸线圈电流 Opening coil current	A	0.32/0.16	6/3
辅助触点 Aux. contact		10对常开 10对常闭 10 normally-closed, 10 normally-opened	

带熔断器的真空接触器柜技术参数
Fused contactor panel

表3-1
Table 3-1

额定电压 Rated voltage	kV	6 10
最高运行电压 Max. service voltage	kV	7.2 12
主母线额定电流 Main busbar rated current	A	630-5000
4s热稳定电流 Short-time withstand current	kA	25-63kA
动稳定电流 Peak withstand current	kA	63-158kA

真空接触器技术参数
Vacuum contactor

表3-2
Table 3-2

型号 Type	SL-400		SL-400
额定工作电压(kV) Rated service voltage	7.2/12		7.2/12
1 min.工频耐压 1 min. Power-frequency withstand voltage	32/42		32/42
额定工作电流(A) Rated service current	400		400
短时耐受电流(kA) Short-time withstand current	4/12s 8/2s		4/12s 8/2s
半周波允许通过电流(峰值) Overcurrent strength (10ms) (kA)	85		85
分断电流(25次) (A) Breaking current (25 times)	3200		3200
关合电流(100次) (A) Making current (100 times)	4000		4000
操作频率(次/小时) Frequency of operation	1200		1200
机械寿命(次) Mechanical life	3 × 10 ⁶		3 × 10 ⁶
电气寿命(次) Electrical life	1 × 10 ⁶		1 × 10 ⁶
操作机构 Mechanism	电磁式 Electromagnetic		机械保持式 Latched
操作电压 Operation voltage	合闸 Close	AC/DC 110-220V	
	分闸 Trip	DC110-220	
合闸电流 (A) 110V/220V Closing current	5/-		5.5/-
保持电流 (A) 110V/220V Holding current	0.6/-		----
分闸电流 (A) 110V/220V Tripping current	----		1.8/-
额定负载 Rated load	电动机 (kW) Motor	750-3000	
	变压器 (kVA) Transformer	1000-4000	
	电容器组 (kVAR) Capacitor	1000-2000	

手车室内安装了特定的导轨，供手车可以轻巧的推进或拉出。
各功能单元均装有门，门上装有锁和铰链，铰链之间距离 $\leq 400\text{mm}$ 。
加工和装配后的框架整齐、牢固和美观。
开关柜外壳封闭后可达到防护等级IP4X。

Frame

The design complies with IEC60298 and GB3906.

The frame are made up of Al-Zn-coated sheet steels with a thickness of 2.5mm. The door and cover are made up of cold-rolling sheet steels with a thickness of 3.0mm. The case is assembled into a strong unit with bolts.

The low-voltage compartment, switch compartment, busbar compartment and cable compartment are totally enclosed by sheet steel. They have their own independent to guarantee the safety of the maintenance and operation. See the internal fault arcing report for details.

There are no welded joints in the frame. A special clamping jig is used during assembly to ensure high degree of precision.

The switch compartment is equipped with automatic metal or SMC shutters, which can disconnect the circuit breaker automatically from the busbar side and the cable side at the same time.

Special guides are designed to run the truck easily in or out.

Each functional unit has its own separate door with lock and hinges on it (the distance between hinges doesn't exceed 400mm).

The frames present a firm and beautiful appearance.

The protection degree of the enclosure with closed door reaches IP4X.

3.3表面处理

门和终端封板采用环氧树脂粉末喷涂，其它钢构件与钢封板采用敷铝锌钢板，采取上述处理方法和材料使开关柜外壳具备很强的防腐能力。

Surface Treatment

The doors and end covers are epoxy powder coated, and other steel structures are made of Al-Zn-coated sheet steel. The advantage is a high degree of corrosion resistance.

3.4母排和辅助导线

Busbar and auxiliary wiring inside

3.4.1母排

设计符合IEC60694标准，柜内所有母排材料均为优质电解铜。

每相母排装置的规格最大为4片，可长期承载连续负载电流5000A。母排截面的选择同时可满足系统短路时动稳定158kA、热稳定63kA的要求。在环境气候特殊异常时，此截面仍可保证系统正常工作。

母排材料选择时按IEC60431标准。

母排出厂前已预先钻孔，四边加工成圆角。母排结合部分均镀银。

母排固定螺栓采用高强度钢制螺栓。固定方式为耦接式，使母排安装方便，灵活且十分牢固

母排的排列顺序符合IEC60298、GB3906标准。

开关柜接地母排规格一般为 $40 \times 10\text{mm}^2$ ，此截面短时可享受40kA/1s的电流。接地母线出厂前预先钻孔。

Busbar

The busbar system is constructed of high-quality electrolytic copper which satisfies IEC60694 standard.

The busbar with up to four copper sheets is mounted in each phase, and is capable of carrying a load current of 5000A max.. When the system has a short-circuit fault, the busbar system can withstand peak currents of 158kA, short-time currents of 63kA/3s. It is suitable for severe climates.

The material of the busbars is conform to IEC60431.

The busbars have round edges. Holes in the busbar are punched before leaving the factory. The joints are silver-plated.

The bolts of the busbar are made of high tensile strength stainless steel. The busbar coupling is mounted easily, flexible and firm.

The sequence in which the busbars are mounted as conform to IEC60298,GB3906.

The earthing busbar is $40 \times 10\text{mm}^2$, which can carry a current of 40kA/1s. Holes in the earthing busbar have been punched before leaving the factory.

3.4.2 辅助导线

导线截面规格: 电流回路为 $\geq 2.5\text{mm}^2$

电压回路为 $\geq 1.5\text{mm}^2$

绝缘等级 2000V

连接方式: 端子排固定

端子排数量满足线路要求, 预留10%备用, 并备有连接片。

Auxiliary wiring

Cross-section: current circuit $\geq 2.5\text{mm}^2$

voltage circuit $\geq 1.5\text{mm}^2$

Insulation grade 2000V

Connection method: fixed at the block terminal

Enough terminals are prepared; 10% terminals and some connection strips are reserved.

3.5 断路器室 (图1)

在断路器室内装有手车导轨和丝杠传动机构, 供断路器手车在小室内运动使用。手车在小室内有“工作”、“试验”和“移开”位置。手车从“试验”位置移至“工作”位置时, 活门自动打开; 手车反方向运动时, 则自动关闭, 将一次触头完全隔离, 从而保证了维护人员的安全。

断路器只能在手车室门关闭的情况下从“试验”位置运动至“工作”位置, 通过设在门上的视察窗可以看到手车所处的位置, 还能看到断路器面板上的分合闸指示器以及弹簧的储能/释放状态指示器。

手车室门上设有机械紧急分合闸按钮 (镇江大全伊顿公司的独特设计), 当遇到紧急情况时, 可以不需要打开手车室门, 即可进行手动分合闸, 确保了操作人员的安全。

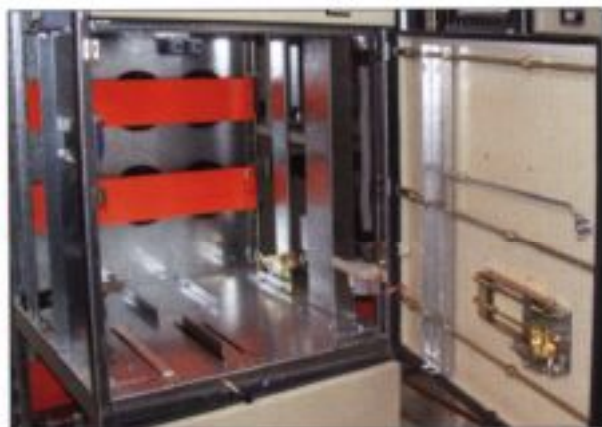


图1 (Fig.1)

VCB compartment(Fig.1)

There is truck rail and threaded rod power transfer mechanism for truck moving. The truck has "service" "test" and "disconnect" position when moving. When truck moves from "test" position to "service" position, the shutter opens automatically. When moves reversely, the shutter closes automatically isolating the primary contacts to guarantee the safety of personnel.

Only when door closed, the truck can be moved from "test" position to "service" position. The opening or closing status of VCB and position of truck, charging status of mechanism can be inspected through the viewing window.

There is mechanical emergency close and trip button on the door. When in emergency, VCB can be closed and tripped without opening the door to guarantee the safety of personnel.

3.6 断路器手车(图2)

断路器为真空型,手车为中置式。手车设计符合 IEC60056标准。

型式和额定容量值相同的断路器完全可互换使用。断路器手车与开关柜之间有防误操作机械联锁装置。当断路器闭合时,手车不能推进或拉出。只有当手车在工作或试验位置时,断路器才能合闸。

动触头呈梅花状,表面镀银。弹性紧固允许较高的公差裕度($\pm 10\text{mm}$)。动静触头接触良好,主回路电阻小、温升低。

真空断路器短路电流开断次数可达100次。

操作机构为电动机储能弹簧式,在断路器分闸瞬间,弹簧重新储能。

断路器工作次数可以从面板上计数器显示。

断路器安装有显示器和控制器。各项具体如下:

- 断开和闭合状态的机械显示(O和符号)
- 储能电动机储能显示
- 手动弹簧储能装置
- 就地合闸按钮
- 就地跳闸按钮
- 10对备用辅助触点

真空灭弧室预期寿命25年,真空灭弧室截流值限制在 $\leq 3\text{A}$,上列技术措施可限制和消除断路器开断小电感电流时操作过电压的产生。出线柜一般可免装氧化锌避雷器。

Circuit breaker truck (Fig.2)

The circuit breaker is a vacuum, the truck is compact type (located in the middle of panel), designed according to IEC60056 standard.

VCBs with the same ratings and type are exchangeable. The combination of the truck and panel is protected against mis-operation. Only when the truck is in the operating position or test position the switch can be closed. An interlock prevents the truck from being removed or inserted while the switch is closed.

Moving contacts are tulip type with silver-plated surface. The flexible fixation allows high tolerance ($\pm 10\text{mm}$). The fixed and moving contacts make a good contact, which make the main circuit has a low resistance and prevents the contacts from overheating.



图 2: 小型化真空断路器
Fig.2: Compact VCB

The short-circuit breaking of VCB is 100 times.

The circuit breakers are equipped with motor spring charging drive mechanism. As soon as VCB is opened, the spring will re-charge.

The counter of switching operations is on the front plate.

The indicator and controller are mounted on the circuit breaker. See the following for details:

- Mechanical indication of open and close status (O and I)
- Motor charging indication
- Manual operation spring charging device
- Local closing push-button
- Local tripping push-button
- 10 standby auxiliary contacts

The vacuum interrupter has a prospective life of 25 years. The normal current chopping in the vacuum interrupter is limited to 3A. So that the over-voltage caused when breaking a small inductive current can be limited within the allowed range. Generally it is unnecessary to mount zinc-oxide arrestors in outgoing panels.

3.7 电缆室(图3)

电缆室内可安装电流互感器、接地开关及避雷器, UR4开关柜为用户提供柜前和柜后安装维护方式, 柜前或柜后封门打开后直接进入电缆室。电缆室与开关柜的设计可满足电缆的各种进出方式, 例如: 下进下出或上进上出方式。

电缆连接导体可同时并接3根 240mm^2 三芯电缆, 电缆芯接头距柜底面 700mm , 连接方便。电缆室底部配备了开缝可卸的封板与电缆沟隔离, 确保运行安全。

Cable Compartment (Fig.3)

CT, earthing switch and arresters can be mounted in the cable compartment. UR4 panel can be installed and maintained from front or rear. The design of the cable compartment and panel permits different kinds of cable connections, e.g. coming in or going out via the bottom or top.

Cable connection can be made using 3 three-core cables with 240mm^2 . The cable connection joint is 700mm from base plate. This makes the cable connection easy. Safe operation is ensured by using a removable cover plate on the bottom of the cable compartment.



图3 (Fig.3)

3.8 母线室部分

可按照中国用户的要求, 相邻母线室之间采用金属隔板和套管隔离, 以防止事故蔓延。母排支撑采用环氧树脂绝缘子, 支撑绝缘子采用大爬距 ($\geq 240\text{mm}$)。柜内母排当相间和对地距离大于 125mm 时, 一般采取空气绝缘方式, 否则采取复合绝缘, 即全部母线用热缩绝缘套管覆盖, 母线搭接处加绝缘罩保护。

Busbar Compartment

On request, metal partitions and bushings can be supplied between two neighbouring busbar compartments to prevent fault expanding. In each panel, the busbars are supported by epoxy insulators, supporting insulators have a creepage distance $\geq 240\text{mm}$. Busbars can be supplied with extra insulation if the phase to phase or phase to earth distance is less than 125mm. All busbars can be covered with heat-shrink sleeves or powder coating insulation, and insulation caps can be used on the busbar connection joints.

3.9 低压仪表室部分(图4)

配置先进的微机型继电器, 附加通讯接口, 可以实现电站综合自动化。

微机型断路器除提供保护功能外, 还具有变电所主要信息的显示、记录和报警功能。并配置有标准的RS232或RS485串行接口, 可与变电所监控系统连接。

低压室面板上设下列控制和显示装置:

- 功能单元控制开关
- 就地/遥控选择开关
- 信号指示: 分合闸状态以及反映断路器

手车工作、试验位置及接地开关闭合位置。

- 高压带电显示器(与电缆室的电容器分压器相连接)
- 各类仪表

低压室与移动手车的二次接线采用针式航空插头。



图4 (Fig.4)

Low-voltage Compartment (Fig.4)

This is equipped with a microcomputerized protective relay unit with a communication interface, which can be used for a comprehensive automation of the substation.

The microcomputerized protective relay unit can not only protect, but also can show, and record and send alarms from the sub-station. It reserves an RS232 or RS485 serial interface for communication with the monitoring system.

The following indicating and control devices are provided on the panel of the low-voltage compartment:

- Functional unit control switch
- Local/remote selection switch
- Signal indication: breaking or making, service position and test position of the VCB, closed status of earthing switch.
- Voltage indicator. These indicators are connected with a capacitive layer in the cable compartment.
- Different kinds of meters

Pin-type flexible cable plug is used to connect the low-voltage compartment and the withdrawable truck.

4. 安全与维护

开关柜在设计中, 保证运行人员和设备自身的安全, 并使中国用户维护方便。

Safety and Maintenance

UR4 systems offer a high degree of operational safety and maintenance convenience.

4.1 安全操作

为了保证开关柜和手车正确操作的程序性，开关柜设置有可靠的机械或电气联锁机构，主要措施见表4。

本开关柜还可以在接地开关操作机构上加装电磁铁锁定装置以满足接地开关与断路器手车之间的电气联锁要求。

可以在两路进线开关与母联开关之间加电气与机械联锁，任何情况下不允许出现三个开关同时合闸。

Safe in Operation

The panel has reliable mechanical and electrical interlocks to ensure the proper operation procedure of truck or panel by the following features: (see table 4)

On request, the panel can also use additional magnetical interlocking devices on the drive mechanism of earthing switch, to meet the needs of electrical interlock between the earthing truck and VCB truck.

Mechanical and electrical interlocks can be added between the 2-line incoming switches and the coupling panel. No permission to close those 3 switches at the same time.

表4
Table 4

五防要求 Five "Preventions"	具体措施 Measurement
防止误分、合断路器 Preventing from mis-switching -on/off the circuit breaker	断路器手车上可装设两把机械锁及配套钥匙。 The VCB truck is equipped with two mechanical locks and keys.
防止带负荷推拉手车 Preventing from pushing and pulling the truck with load	隔离手车与断路器手车柜之间增加了电气联锁，当隔离手车不合上，断路器就不能合上，当误拉隔离手车时就会自动跳开断路器。也可通过机械程序完成此项功能。 Electrical interlocks are provided between disconnecter trucks and VCB. If the disconnecter truck is not closed, the circuit breaker can not be switched on. The circuit breaker will be automatically switched off with the disconnecter truck removed by mistake. The function can be achieved by amounting interlock locks.
防止带电合接地开关 Preventing from closing earthing switch with electricity	当电缆室带电时，断路器手车处于工作位置，通过机械联锁接地开关不能合上。 With the cable compartment electrified and the truck in operating position, the earthing switch cannot be closed because of mechanical interlocks.
防止接地开关处在接地位置送电 Preventing from closing circuit breaker with earthing switch in earth position	当接地开关已合上，则通过机械联锁，断路器手车不能进到工作位置，一次回路不能接通。 When earthing switch is on, the truck cannot be moved to operation position by the mechanical interlocks.
防止误入带电间隔 Preventing from accessing electrified space by mistake	母线室、手车室、电缆室相互隔开，当拉开手车，活门自动关闭，一次静触头被完全隔离。电缆室门装带电指示器或机械联锁。 The busbar compartment, VCB compartment, cable compartment are separated from each other. With the truck out, the shutter will be automatically closed, primary contact is completely disconnected. Voltage indicator or mechanical interlock is equipped on the rear door of the panel.

4.2 运行人员的安全

UR4型开关柜已通过内部电弧故障型式试验的考核。

只有在柜门关闭或无法接近带电体的情况下，才可操作断路器。

在柜门关闭时或不必要接近带电体，即可测试柜内是否有电。

开关柜柜体及所有金属隔板接地，并设有专用接地线端子供连接，接地连续性好。

Safe for Operators

UR4 type switchgear has passed the internal fault type test.

Only when the panel door is closed or the live part cannot be accessed, the operation of the VCB is possible.

With the panel door closed or when it is not necessary to access the live part, testing whether the panel is live can be proceeded.

All metal plates and panel are earthed, with special earthing terminals to achieve continuous connection.

4.3维护

如下特征使用户对设备免维护或极少维护:

灭弧室为陶瓷外壳, 真空度 $\leq 10^{-4}\text{Pa}$, 工作寿命保证25年。

“铁芯式纵向磁场”灭弧, 电弧能量低, 触头磨损可忽略不计。

弹簧操作机构仅需少量维护。

开关柜后门打开后, 即可装修电缆终端盒和电流互感器。

采用标准元器件, 而且备有现货, 满足用户需要。

Maintenance

The following features make this equipment free of maintenance or low-maintenance:

Enclosure of vacuum interrupter is made of ceramic, with vacuum degree of $\leq 10^{-4}\text{Pa}$, service life 25 years.

With an internal axial magnetic field, low and arc energy, a neglectable contact wear is achieved.

Low-maintenance spring operating mechanism.

With back door opened, cable terminal cassette and CT can be mounted.

Use of standard parts and components and stock-line equipment.

5.气候与环境

10kV UR4型开关柜在设计中, 已充分考虑到客户当地的气候及周围环境, 并满足其特殊要求。条件与措施见表5。

Climate and Environment

During the design of 10kV UR4, local climate and environmental conditions have been fully considered and the panels fully comply with the applicable standards.

Conditions and Measurements (see following table 5).

6.适应中国电力标准的要求

- 在IEC标准基础上, 开关柜采取其它措施, 进一步满足中国电力部门的标准;
- 柜内带电部分相对相、相对地的净距为 $\geq 125\text{mm}$ 。
*上述条件若未能满足部分, 采用阻燃材料制成的绝缘挡板, 挡板距带电部分的空气间隙大于30mm。
- 绝缘子爬电距离 $\geq 240\text{mm}$ 。
- 工频耐压和雷电冲击耐压值均符合中国标准。

Requirements Applicable for China Electric Power Standards

- On the basis of the IEC standards, further measures are taken to satisfy the requirements of the Ministry of China Electric Power.

表5
Table 5

气候与环境条件 Weather and environment	产品正常适合的条件 Normal operation conditions	辅助措施 Aux. Measure
海拔高度(m) Height above sea level	≤1000	采用辅助措施可≤3000 Use aux. measure
最高温度(℃) Highest temperature	40	>40℃, 开关柜技术参数 选择可满足 Use aux. measure
最低温度(℃) Lowest temperature	-15	装加热器 Heater
日平均相对湿度 Relative humidity daily average	≤95%	装加热器防凝露 Heater
月平均相对湿度 Relative humidity monthly average	≤90%	装加热器防凝露 Heater
地震地面加速度 Earthquake ground acceleration	水平加速不超过0.2G Horizontal acceleration not exceeding 0.2G 垂直加速不超过0.1G Vertical acceleration not exceeding 0.1G 安全系数>1.67 Safety factor is higher than 1.67	已通过抗震动试验 Passed the anti- quake test
轻度海风含盐影响 Light sea wind effect with salt	IP4X	外壳采用敷铝锌钢板 或环氧粉末喷涂 Zn-Al-coated enclosure or epoxy coating

- In the switchgear the clearance between the electrified parts phase-to-phase, phase-to-ground is not less than 125mm.
- * Insulated fending plates made of fire-resisting material are added where necessary, more than 30mm away from the electrical parts.
- Insulator creepage distance more than 240mm.
- Power frequency withstand voltage and lightning impulse withstand voltage conform to the Chinese standards.

7.开关柜选择说明

Choice note

7.1 技术参数与结线方案

详见技术数据表1、2、3和主结线方案表。UR4型开关柜和F-C柜可以混合组成一个配电系统。

Technical data and single-line scheme

See the table (1,2,3) for technical data and main single-line schemes for details. Panels type UR4 and F-C can easily be built together in one system.

7.2外形尺寸选择(见表6)

Choice of dimensions (see following table 6)

表6
Table 6

额定电流 (A) Rated current	短路电流 (kA) Short-circuit breaking current	外形尺寸 (mm) Dimensions (W × D × H)	说 明 Remark
400	≤63	620(650) × 1400~1800 × 2200	单列F-C柜 Single circuit F-C
		1000(2*500) × 1400~1800 × 2200	双列F-C柜 Double circuit F-C
630~5000	25~63	620(800、900、1000) × 1400~1800 × 2200	配NVU12/150VCP-W(G)断路器 With NVU12/150VCP-W(G) VCB

当选择上进上出方式时，标准柜深增加300mm附柜；

当进线为架空母线时，标准柜深增加300mm附柜。

When choosing for incoming or outgoing from top, an extra panel with a depth of 300mm is added.

When the incoming panel has overhead busbars, an extra panel with a depth of 300mm is added.

7.3 其它

断路器采取低截流触头材料，平均截流值 $\leq 3A$ ，通过各项试验证明，当开断小电感电流负荷时，操作过电压值明显低于 $2.5P_u$ 。一般馈电柜可免装避雷器。但当电机容量小于300kW时，建议用户尽量采用辅助的限制过电压装置。

开关柜的排列组合方式、土建工程的配合要求参见图12~15。

用户若有特殊要求，请与本公司相关部门垂询与协商。

Others

The vacuum circuit breaker is designed with the 1000 chopping level contact material and the principle of Advanced Opening Pole and has passed KEMA's tests in the Netherlands. When breaking a small inductive current, the VCB limits the overvoltage effectively, so it is unnecessary to mount arresters in feeding panels. When the capacity of the motor is less than 300kW, It is recommended to use other measures to limit the overvoltage, because different motors have different insulations levels.

For a proper arrangement of the panels, see fig.12~15.

If you have special requirements, please consult with the manufacturer.

8. 开关柜安装的一般要求

开关柜的安装基础应符合“电力建设施工及验收技术规范”中的有关条款规定。开关柜的安装基础一般要分两次浇灌混凝土。第一次为开关柜安装预埋件，并铺设基础槽钢。第二次浇灌混凝土是地面的补充层。在浇注混凝土补充层时，混凝土高度应低于槽钢顶面3-6mm。

安装基础示意图见图14、15。开关柜一二次电缆沟的形式，视开关柜数量及建筑条件而定。

开关柜安装基础平整度每米误差不大于1mm，全长不超过3mm。

按工程需要与图纸标明，将开关柜运至它们特定的位置，如果一排较长的开关柜排列(为10台以上)，建议拼柜从中间开始。

用特定的运输工具如吊车、插车等，严禁使用滚筒撬棍。从开关柜内抽出断路器手车，可先放别处妥善保管。

移去开关室与母线室之间的隔板。安装时先校平第一台柜子或第一个截面保证水平和垂直两个方面的要求。开关柜安装不平度不得超过2mm。

校正好第一台柜子后，安装其它柜子，注意侧孔与已安装的截面对齐，连接柜之间的距离至少要有2mm，使隔板可以装下。

General installation requirements

The floor for the installation shall conform to the rules of Electric Power Engineering Work and Receipt Specification. Generally, it shall be coated with two sheets of concrete. The first sheet is for the installation of the pre-installed rigs, and the second is the complementary sheet. When coating the complementary concrete sheet, its height shall be 3-6mm lower.

See fig.14,15 for a floorplan example. The form of the primary or secondary cable duct is in accordance with the position of the switchgear and the building structure.

The installation position of the switchgear shall be within 1mm tolerance, and within 3mm in the whole length.

Transport the switchgear to the exact place according to the requirement of the engineering annotation on the drawings. If there is a line with more than 10 panels, we suggest to begin from the middle point.

Use special tools such as crane and forktruck to transport the panels. Do not use rolling roles or crowbar. Draw out the circuit breaker from the panel, and place them safely in other places.

Remove the partition plate between the switch compartment and the busbar compartment. Before installation, adjust the first panel evenly, and ensure the horizontal and vertical position. The installation shall be within 2mm tolerance.

After having adjusted the first panel, install the other panels. Be careful of keeping the side-hole evenly with the installed cross-section. The distance between panels shall be not less than 2mm in order to install the partitional plate.

母线的安装

主母线用绝缘子支撑，主母线与主母线之间以及与分支母线之间为耦接形式。(见图11)

用清洁干燥的软布擦揩母线，检查母线是否损伤，在连接处涂上导电膏或中性凡士林。

如图13先移去螺栓1，松开螺栓2，安装好母线后以适当的扭矩拧紧螺栓。

套好连接处的绝缘罩。

Busbar installation

The main busbar is supported by insulators. The connection between main busbars and T-off is a coupling connection. (See fig.11)

Use a clean and dry cloth to clean the busbars, inspect whether the busbar has some shortcomings. Coat the coupling points with electric conducting fat.

According to fig.13, remove bolt 1, loose bolt 2, after installing the busbars, tighten them again with the appropriate torques.

Take care of the insulation caps over the coupling points.

开关柜接地装置

用预先准备的连接板将各柜连接在一起。

在开关柜内部联结所有需要接地的引线。

将基础框架与接地排相连，如果柜子排列数量超过10面，必须有两个接地排连接点。

Panel earthing

Connect every panel with the pre-installed rig.

Connect all wires needed to be earthed inside the panels.

Connect the foundation frame with the earthing busbars. If there are more than 10 panels, there should be two earthing connection points.

9. 随机文件、备品备件及附件

9.1 随机文件清单

产品合格证;
装箱单;
产品出厂检验报告;
安装使用说明书;
运输储存说明书;
随机备品备件及附件清单;
二次接线图;
其它相关资料。

Accompanying documents include:

product certificate;
packing list;
product routine test report;
installation usage manual;
transport manual;
spare part and accessories list;
auxiliary drawings;
other documents.

9.2 备品备件及附件:

根据客户要求和需要供应,由供需双方共同决定。

Spare parts and accessories:

According to the requirements of the customer, and as decided by the buyer.

10. 订货须知

订货时应提供以下技术资料:

1. 主接线方案编号、单线系统图及平面布置图。
2. 用户提供二次原理图(此图设计前应先与本公司联系)、端子接线图,若无端子接线图则按制造厂编排。
3. 开关柜内电气元件的型号、规格与数量。
4. 电气设备汇总表。
5. 需要母线桥时提供跨距和高度尺寸(两列柜之间母线桥和墙与柜之间)。建议配电室无障碍顶高 $\geq 2.8\text{m}$ 。
6. 开关柜若使用在特殊环境下时应在订货时说明。
7. 需要其它或超额附件、备件时应提出具体种类和数量。

Ordering note:

User should provide the following information before ordering:

1. Single-line drawings and main scheme drawing, lay-out, planning arrangement of the substation.
2. Wiring drawings (contact the manufacturer before designing it) and terminal arrangement, if no terminal arrangement is provided, the manufacturer will arrange it.
3. The type, specification and amount of electrical parts in the switchgears.
4. Total partlist of the electrical parts.
5. Specification of main busbar when needed. Provide length and height between two lines of the switchgear or between the switchgear line and the wall. The height from the floor to the ceiling suggested is more than 2.8 meters.
6. If using the switchgears in a special environment, please note it clearly.
7. If there is an additional requirement on spare parts and accessories, please provide the type and quantity.

方案编号 Scheme No.		001	002	003	004
主结线方案 Main schematic diagram					
用途 Application		电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	2	2	3	3
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch		1		1
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 Optional	按客户要求 Optional	按客户要求 Optional	按客户要求 Optional
	继电保护INT-PA系列 Protective Relay	1	1	1	1

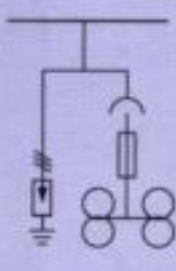
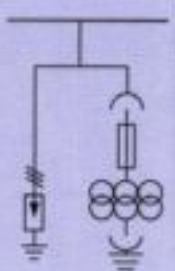
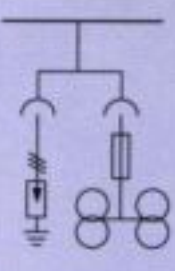
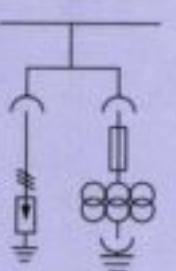
方案编号 Scheme No.		005	006	007	008
主结线方案 Main schematic diagram					
用途 Application		右联络 Right coupling	左联络 Left coupling	右联络 Right coupling	左联络 Left coupling
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	2	2	3	3
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 Optional	按客户要求 Optional	按客户要求 Optional	按客户要求 Optional
	继电保护INT-PA系列 Protective Relay	1	1	1	1

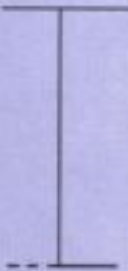

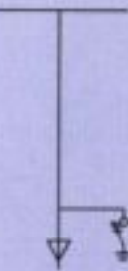
方案编号 Scheme No.		009	010	011	012
主结线方案 Main schematic diagram					
用途 Application		右联络 Right coupling	左联络 Left coupling	右联络 Right coupling	左联络 Left coupling
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	2	2	3	3
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch	1	1	1	1
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional	按客户要求 optional	按客户要求 optional
继电保护INT-PA系列 Protective Relay		1	1	1	1

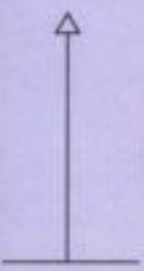
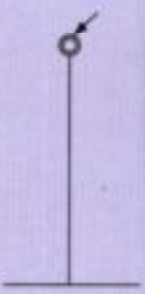


方案编号 Scheme No.		013	014	015	016
主结线方案 Main schematic diagram					
用途 Application		母线联络 Busbar coupling			
额定电流 (A) Rated current		630-5000			
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1			
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional			
继电保护INT-PA系列 Protective Relay		1			





方案编号 Scheme No.		017	018	019	020
主结线方案 Main schematic diagram					
用途 Application		电压测量 Voltage measuring	电压测量 Voltage measuring	电压测量 保护 Voltage measuring Protection	电压测量 保护 Voltage measuring Protection
额定电流 (A) Rated current					
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX	2 JDZ ₂ -10	3 JDZX-10	2 JDZ ₂ -10	3 JDZX-10
	高压熔断器 H.V. fuse XRNP1-10/0.5	3	3	3	3
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17			3	3
	带电指示器 LED Voltage indicator				
备注 Remarks					

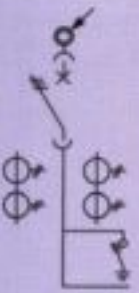

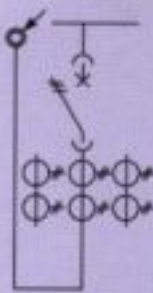
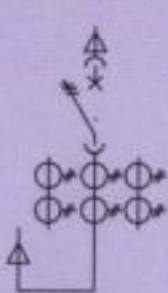
方案编号 Scheme No.		021	022	023	024
主结线方案 Main schematic diagram					
用途 Application		电压左右联络 Voltage left and right coupling	电压左右联络 Voltage left and right coupling	电压测量 保护 Voltage measuring Protection	电压测量 保护 Voltage measuring Protection
额定电流 (A) Rated current					
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX	2 JDZ ₂ -10	3 JDZX-10	2 JDZ ₂ -10	3 JDZX-10
	高压熔断器 H.V. fuse XRNP1-10/0.5	3	3	3	3
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17			3	3
	带电指示器 LED Voltage indicator				
备注 Remarks					

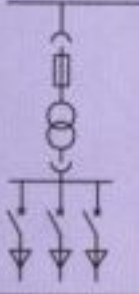
方案编号 Scheme No.		025	026	027	028
主 结 线 方 案 Main schematic diagram					
用 途 Application		电压测量 保护 Voltage measuring Protection	电压测量 保护 Voltage measuring Protection	电压测量 保护 Voltage measuring Protection	电压测量 保护 Voltage measuring Protection
额定电流 (A) Rated current					
主 要 设 备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX	2 JDZ ₂ -10	3 JDZX-10	2 JDZ ₂ -10	3 JDZX-10
	高压熔断器 H.V. fuse XRNP1-10/0.5	3	3	3	3
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17	3	3	3	3
	带电指示器 LED Voltage indicator				
备 注 Remarks					

方案编号 Scheme No.		029	030	031	032
主 结 线 方 案 Main schematic diagram					
用 途 Application		左右联络 Left and right coupling	电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing	
额定电流 (A) Rated current		630-5000	630-5000	630-5000	
主 要 设 备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch			1	
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional	按客户要求 optional	
备 注 Remarks					

方案编号 Scheme No.		033	034	035	036
主结线方案 Main schematic diagram					
用途 Application		电缆架空进线 Cable overhead incoming	架空进线 Overhead incoming	架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)			1	1
	电流互感器 CT LZZB8-10A3			2	2
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户需要 optional	按客户需要 optional	按客户需要 optional	按客户需要 optional
继电保护INT-PA系列 Protective Relay					

方案编号 Scheme No.		037	038	039	040
主结线方案 Main schematic diagram					
用途 Application		架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	3	3	3	3
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch			1	1
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户需要 optional	按客户需要 optional	按客户需要 optional	按客户需要 optional
继电保护INT-PA系列 Protective Relay		1	1	1	1

方案编号 Scheme No.		041	042	043	044
主 结 线 方 案 Main schematic diagram					
用 途 Application		架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing	架空进出 Overhead incoming and outgoing
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主 要 设 备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	2	2	3	3
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5				
	接地开关 JN15 Earthing switch	1	1		
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional	按客户要求 optional	按客户要求 optional
继电保护INT-PA系列 Protective Relay		1	1	1	1

方案编号 Scheme No.		045	046	047	048
主 结 线 方 案 Main schematic diagram					
用 途 Application		站用变压器 Self feeding tra.			
额定电流 (A) Rated current					
主 要 设 备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				
	电压互感器 PT JDZ2/JDZX				
	高压熔断器 H.V. fuse XRNP1-10/0.5	3			
	干式变压器 SC4 Dry insulation tra.	1 (30/50kVA)			
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator				
备 注 Remarks		柜宽 800mm Width: 800mm			

方案编号 Scheme No.		049	050	051	052
主结线方案 Main schematic diagram					
用途 Application		计量 Metering	计量 Metering	隔离进出 Isolated incoming and outgoing	隔离联络 Isolated coupling
额定电流 (A) Rated current				630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3	2	2		
	电压互感器 PT JDZ2/JDZX	2 JDZ2-10	2 JDZ2-10		
	高压熔断器 H.V. fuse XRNP1-10/0.5	3	3		
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator			按客户要求 optional	按客户要求 optional
备注 Remarks					

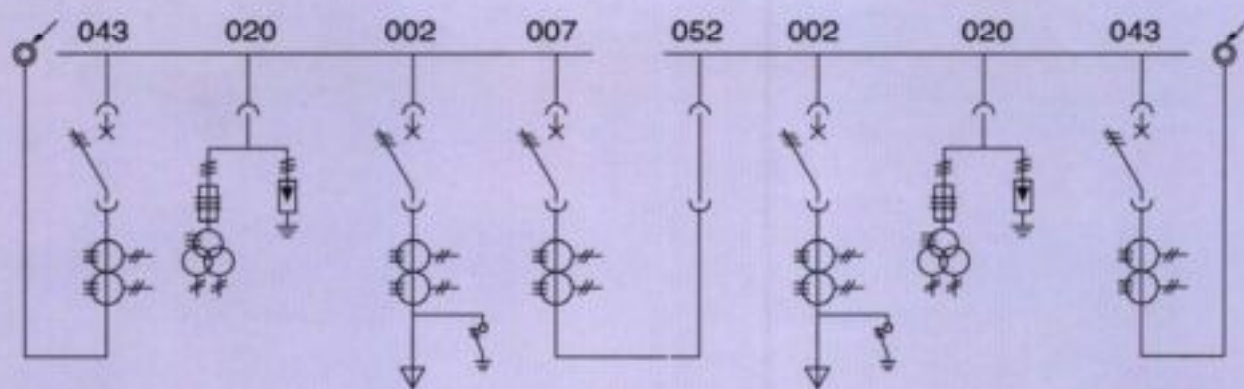
方案编号 Scheme No.		053	054	055	056
主结线方案 Main schematic diagram					
用途 Application					计量 Metering
额定电流 (A) Rated current					
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)				
	电流互感器 CT LZZB8-10A3				2
	电压互感器 PT JDZ2/JDZX				2 JDZ2-10
	高压熔断器 H.V. fuse XRNP1-10/0.5				3
	接地开关 JN15 Earthing switch				
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator				
继电保护INT-PA系列 Protective Relay					

方案编号 Scheme No.		057	058	059	060
主 结 线 方 案 Main schematic diagram					
用 途 Application		电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing
额定电流 (A) Rated current		630-5000	630-5000	630-5000	630-5000
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1	1	1
	电流互感器 CT LZZB8-10A3	2	2	3	3
	电压互感器 PT JDZ2/JDZX	2	2	2	2
	高压熔断器 H.V. fuse XRNp-10/0.5	3	3	3	3
	接地开关 JN15 Earthing switch		1		1
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional	按客户要求 optional	按客户要求 optional
继电保护INT-PA系列 Protective Relay		1	1	1	1

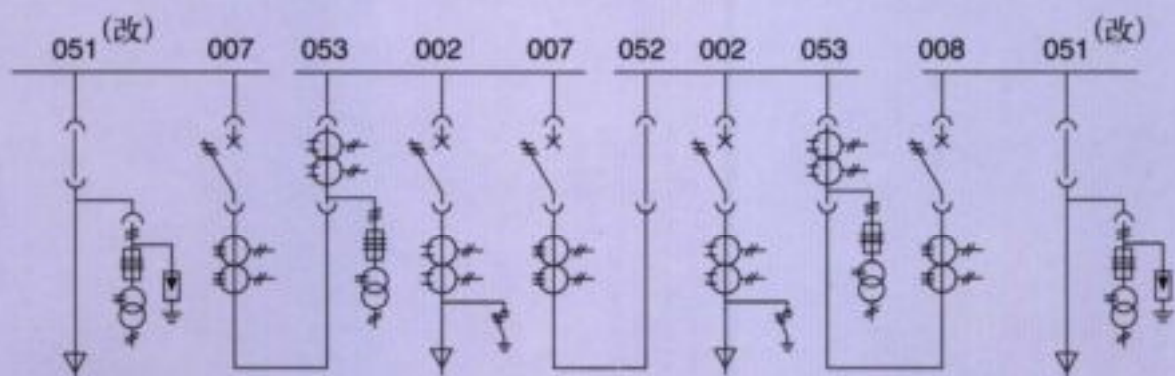
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主 结 线 方 案 Main schematic diagram					
用 途 Application		电缆进出 Cable incoming and outgoing	电缆进出 Cable incoming and outgoing		
额定电流 (A) Rated current		630-5000	630-5000		
主要设备 Main equipment	真空断路器 VCB NVU12/150VCP-W(G)	1	1		
	电流互感器 CT LZZB8-10A3	2	2		
	电压互感器 PT JDZ2/JDZX	3	3		
	高压熔断器 H.V. fuse XRNp-10/0.5	3	3		
	接地开关 JN15 Earthing switch		1		
	避雷器 Surge arrester TBP/HY5WZ-17				
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional		
继电保护INT-PA系列 Protective Relay					

方案编号 Scheme No.		065	066	067	068
主结线方案 Main schematic diagram					
用途 Application		电动机进线 Motor feeder	电动机进线 Motor feeder	电动机进线 Motor feeder	
额定电流 (A) Rated current		400	400	400	
主要设备 Main equipment	真空接触器 VC SL-400	1	1	1	
	电流互感器 CT LZZB8-10A3	2	3	2	
	高压熔断器 H.V. fuse	3	3	3	
	接地开关 JN15 Earthing switch			1	
	避雷器 Surge arrester TBP/HY5WZ-17			3	
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional	按客户要求 optional	
继电保护INT-PA系列 Protective Relay					

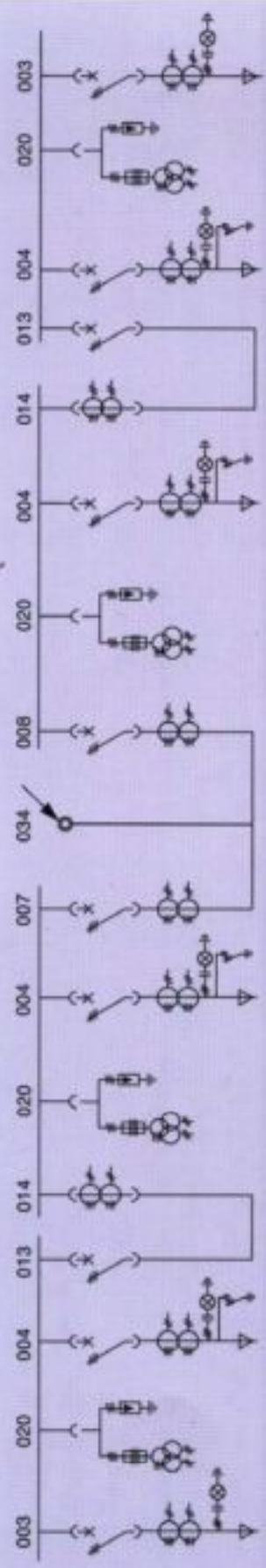
方案编号 Scheme No.		069	070	071	072
主结线方案 Main schematic diagram					
用途 Application		电动机进线 Motor feeder	电动机进线 Motor feeder		
额定电流 (A) Rated current		400	400		
主要设备 Main equipment	真空接触器 VC SL-400	1	2		
	电流互感器 CT LZZB8-10A3	3	6		
	高压熔断器 H.V. fuse	3	6		
	接地开关 JN15 Earthing switch	1	2		
	避雷器 Surge arrester TBP/HY5WZ-17	3	6		
	带电指示器 LED Voltage indicator	按客户要求 optional	按客户要求 optional		
继电保护INT-PA系列 Protective Relay					



典型一次方案 (一)
Typical one-line diagram (one)



典型一次方案 (二)
Typical one-line diagram (two)



典型一次方案 (三)
Typical one-line diagram (three)

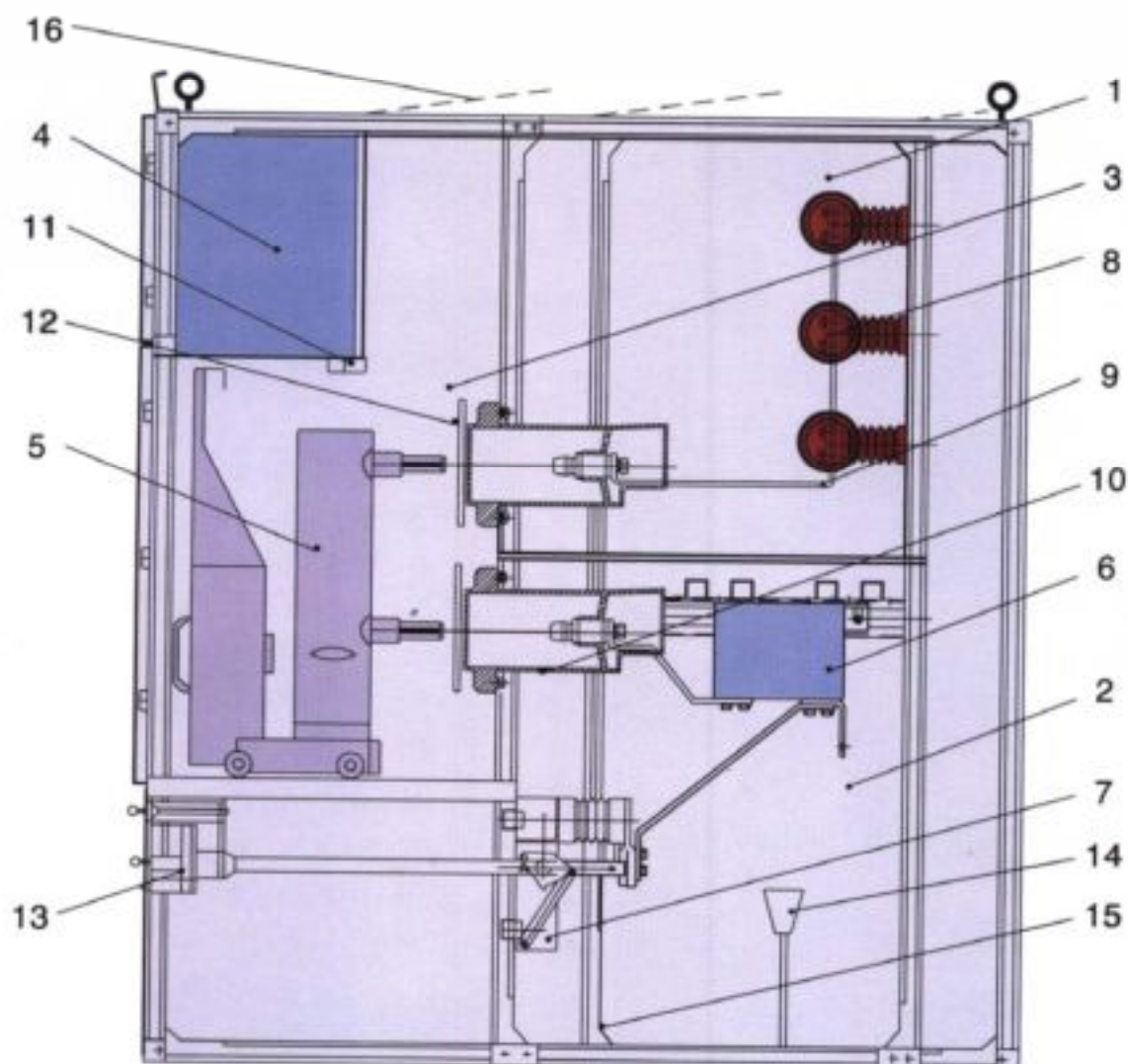


图5：电缆进出线柜基本结构剖面图

Fig.5: Section view of cable incoming or outgoing panel

- | | | |
|-------------------------------------------|----------------------------------|---------------------------------|
| 1. 母线室
Busbar compartment | 2. 电缆室
Cable compartment | 3. 断路器室
Switch compartment |
| 4. 低压仪表室
L.V.compartment | 5. 断路器
Vacuum circuit breaker | 6. 电流互感器
Current transformer |
| 7. 接地开关
Earthing switch | 8. 主母线
Main busbar | 9. 分支母线
Branch busbar |
| 10. 动静触头装置
Main contact fittings | 11. 二次插头
Secondary plug | 12. 活门
Shutter |
| 13. 接地开关操作位置
Earthing switch operation | 14. 电缆终端密封
Cable terminal | 15. 接地母线
Earthing busbar |
| 16. 泄压板
Over-pressure relief plate | | |

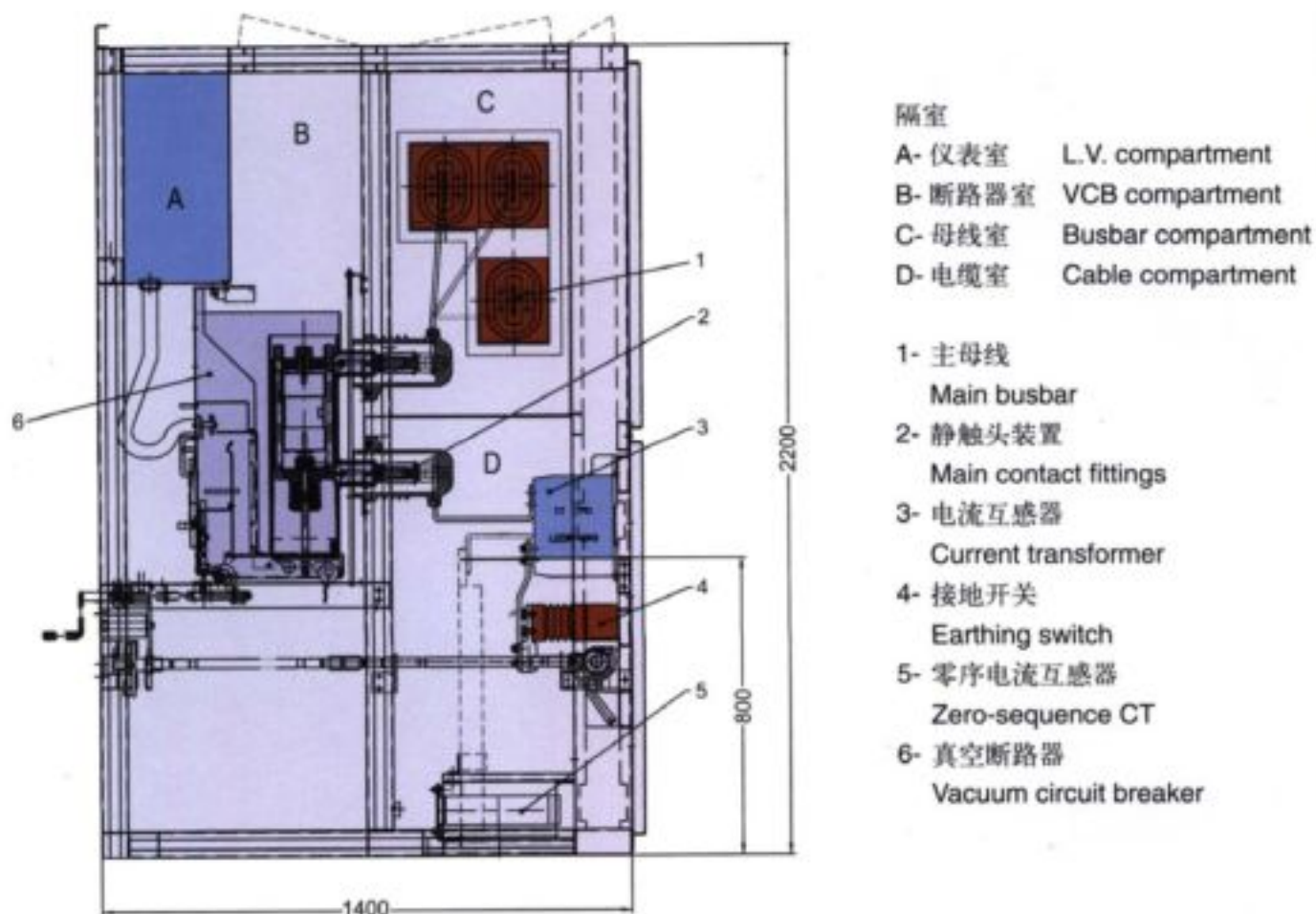
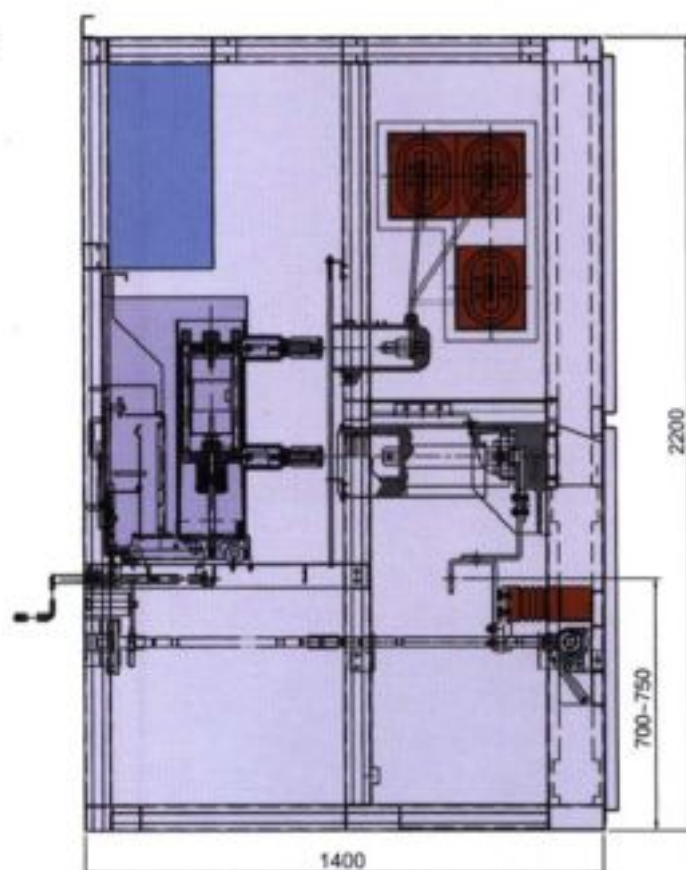


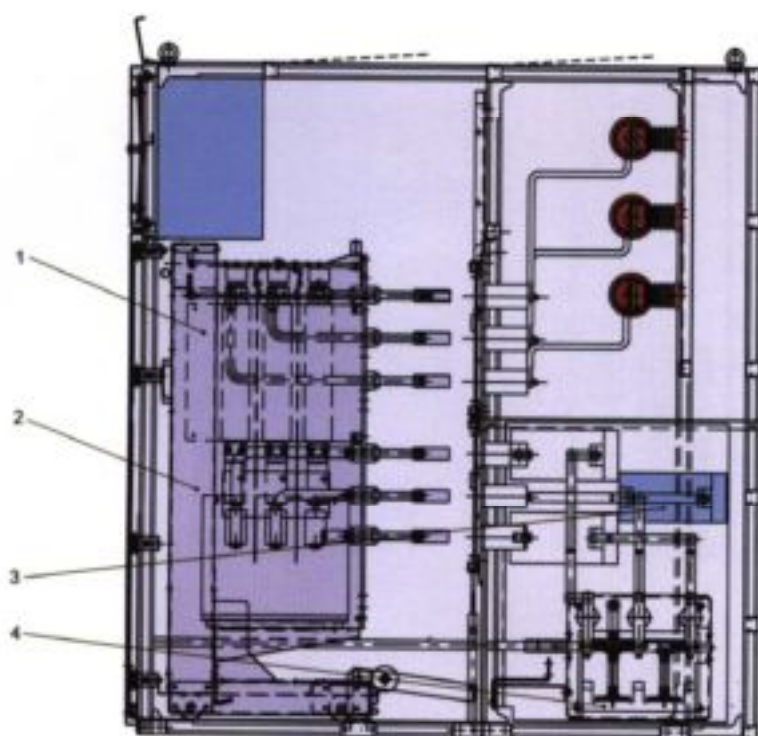
图6: 电缆进线或出线柜基本结构剖视图
(正面维护式)

Fig.6: Section view of cable incoming
or outgoing panel
(Maintenance of front)

图7: 带复合型互感器出线柜基本结构
(正面维护式)

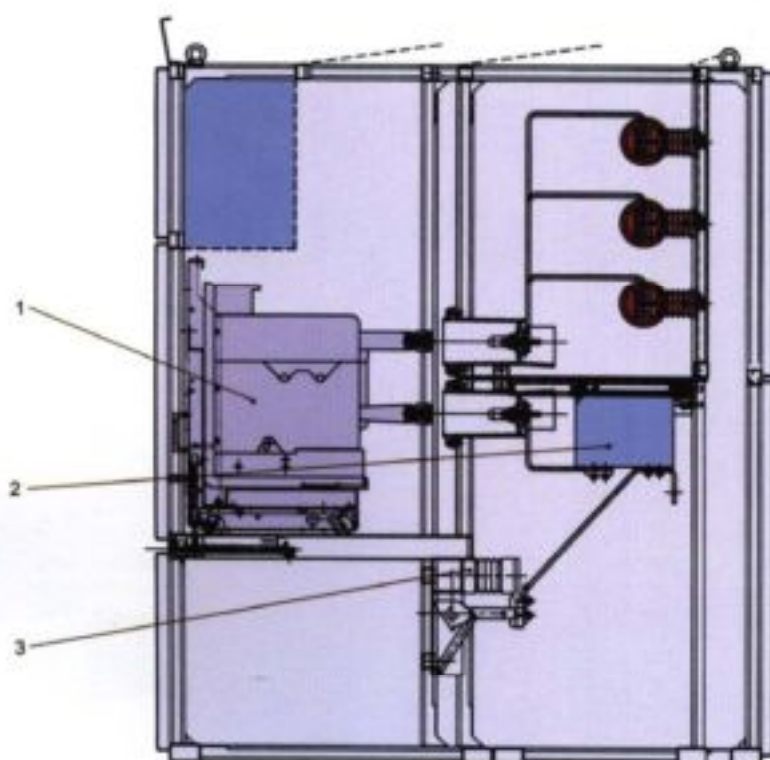
Fig.7: Section view of outgoing panel
including compound CT
(Maintenance of front)





- 1. 真空接触器
Vacuum contact
- 2. 真空接触器手车
Vacuum contact truck
- 3. 电流互感器
Current transformer
- 4. 接地开关
Earthing switch

图8: F-C双回路开关柜基本结构
Fig.8: Section view of double circuit F-C panel



- 1. 真空接触器手车
Vacuum contact truck
- 2. 电流互感器
Current transformer
- 3. 接地开关
Earthing switch

图9: F-C中置式开关柜基本结构
Fig.9: Section view of compact F-C panel

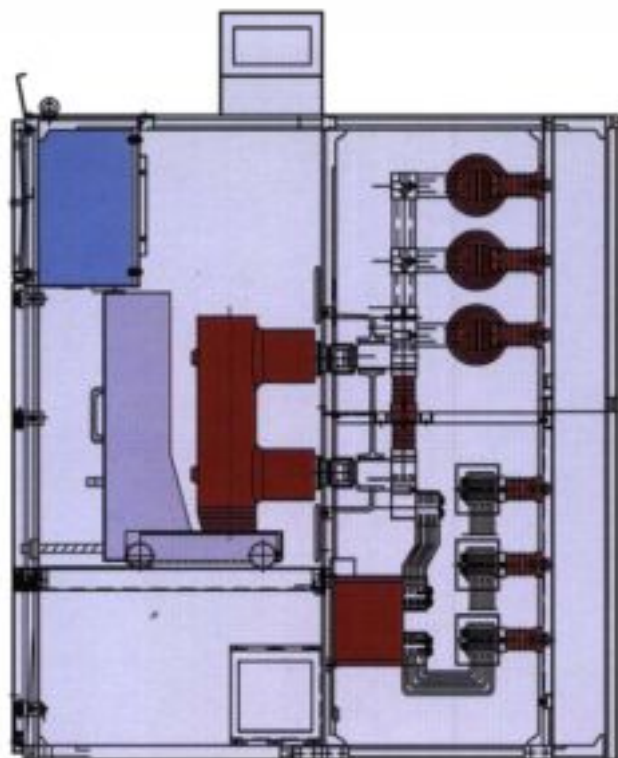


图10: 3150~5000A开关柜结构剖面图
Fig.10: 3150~5000A Section view of busriser panel

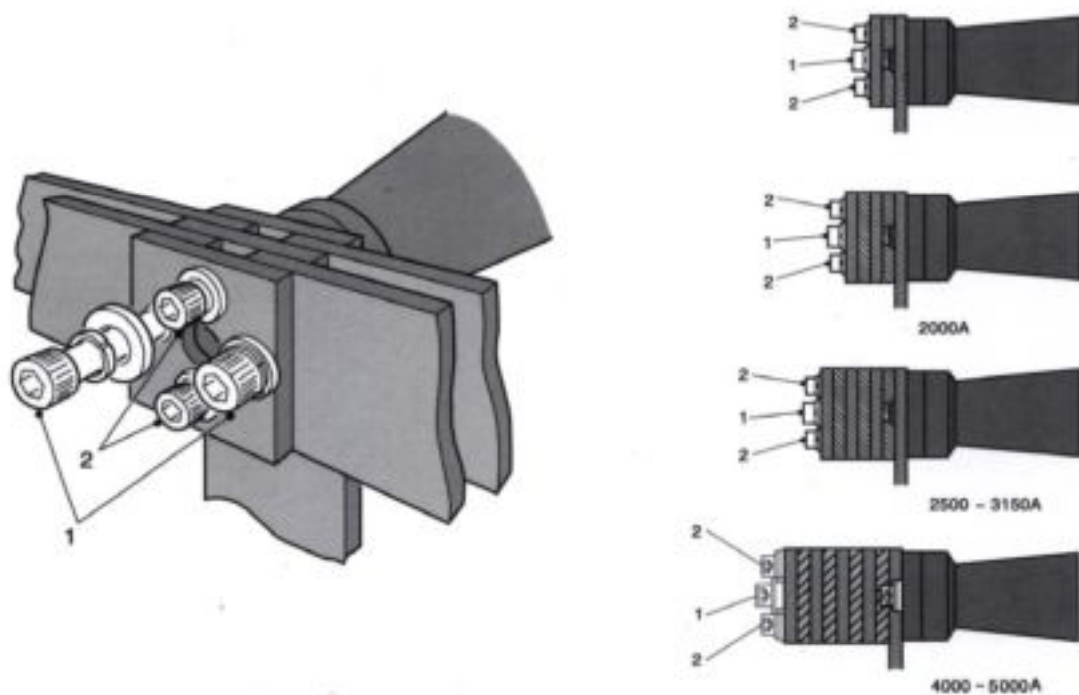


图11: 母线的耦合
Fig.12: Bubar's coupling

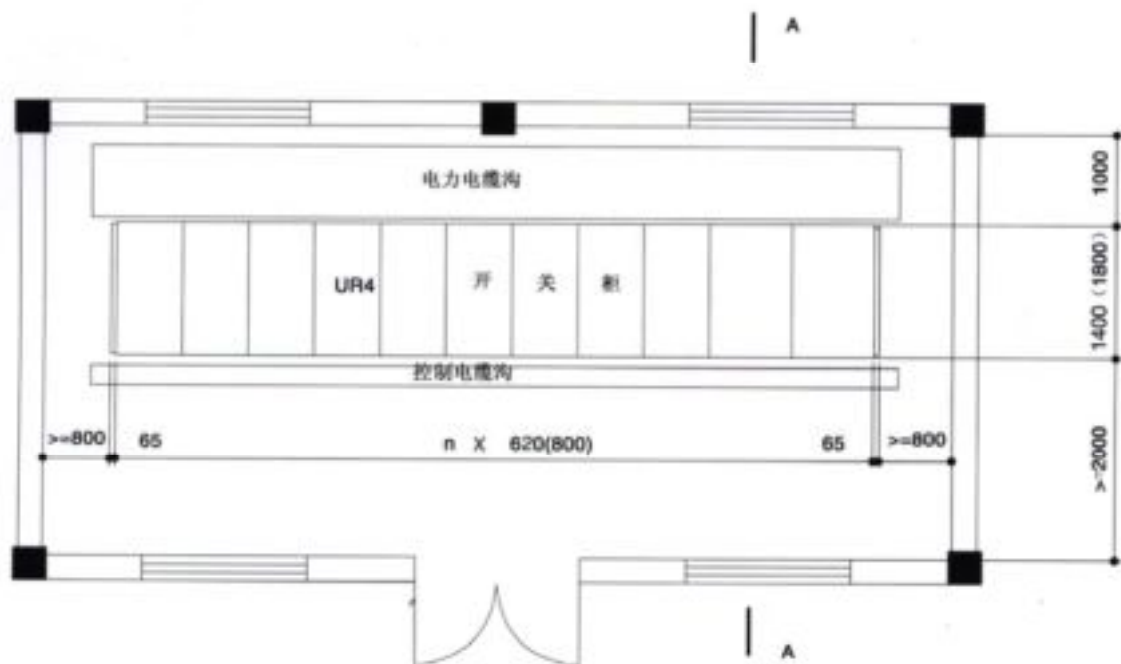


图12: 配电室典型平面布置图－后维护

Fig.12: Typical arrangement of the panel-maintenance from the rear of panel

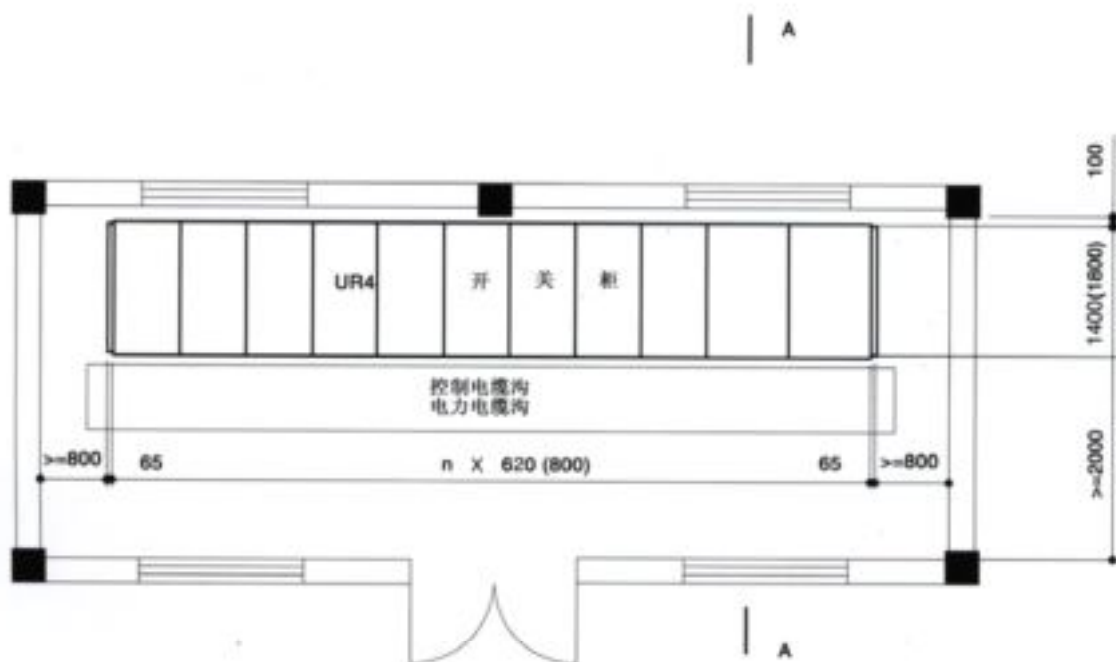


图13: 配电室典型平面布置图－前维护

Fig.13: Typical arrangement of the panel-maintenance from the front of panel

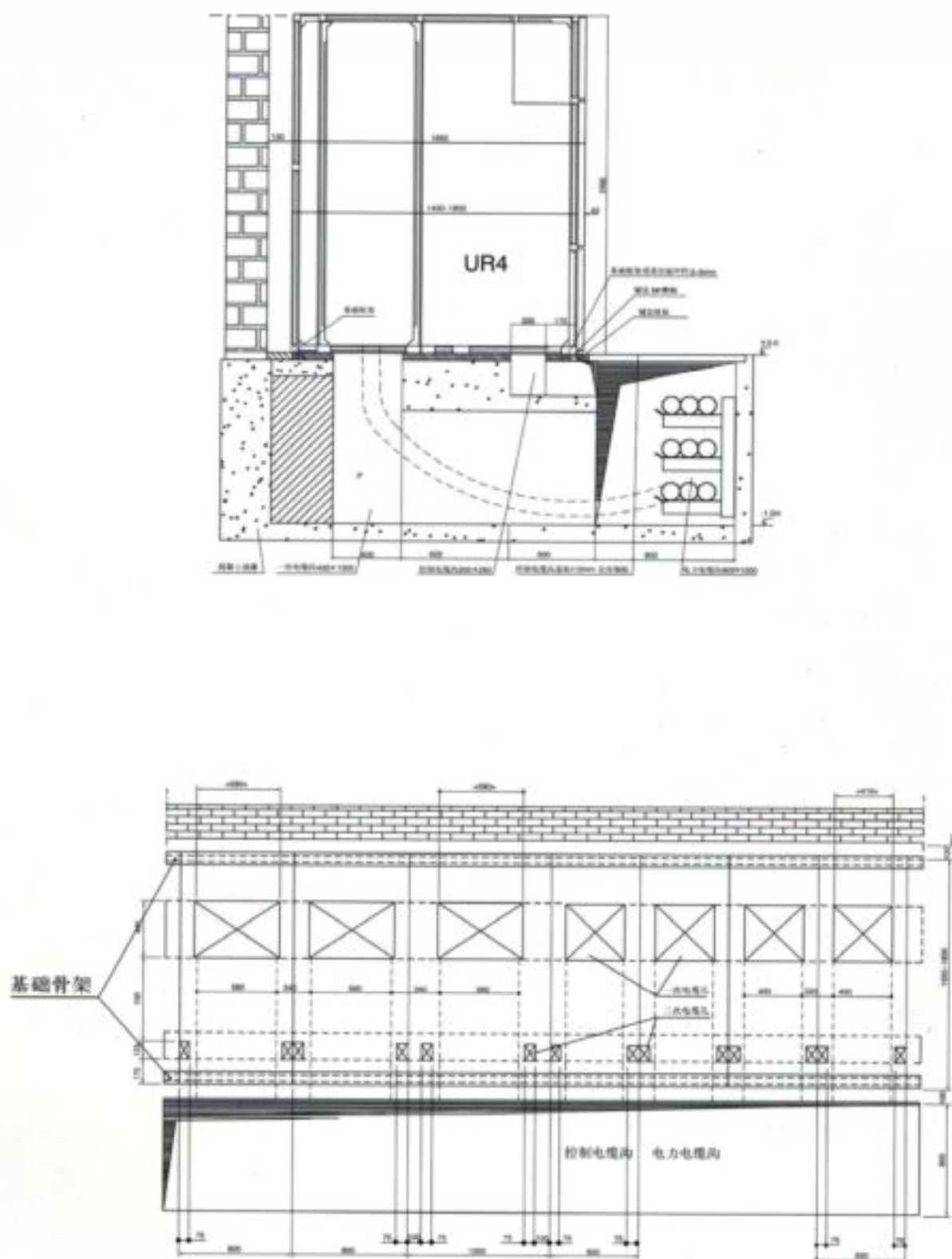


图15：开关柜安装基础示意图（供参考）－前维护

Fig.15: Installation construction reference drawing-maintenance from the front of panel

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