ECC®

KYN28A-24

金属铠装中置移开式开关设备

Metal-clad Central-located Withdrawble Switchgear

上海中科电气集团

SHANGHAI CHINA-SCIENCE.ELE GROUP

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概述

◆ 适用范围和主要用途

KYN28A-24铠装移开式交流金属封闭开关设备（以下简称开关设备），适用于户内三相50/60Hz、额定电压24kV的电力系统中，主要应用于发电厂、变电所、工矿企业及高层建筑中，作为接受和分配电能并对电路实行、保护和监测。

KYN28A-24开关设备具有各种防止误操作的功能，包括防止带负荷移动手车，防止接地开关闭合位置合断路器、防止带电合接地开关和防止误入带电隔室等功能。KYN28开关设备配置性能优良的VHP系列中置式高压交流真空断路器及固封式真空断路器。开关设备二次回路配置先进可靠的控制保护元件；母线采用热缩绝缘材料或环氧涂覆的绝缘手段，优化电极开关，柜体结构紧凑，是技术先进、性能稳定、结构合理、使用方便、安全可靠的配电设备。

General

◆ Application

KYN28 – 24 Withdrawout Metal-clad and Metal-enclosed AC Switchgear (hereinafter referred to as the switchgear) is competently applied in 24 kV 3-phase 50/60Hz for electricity acceptance and distribution as well as control, protection and supervision of circuits mainly in power plants, substations, industrial and mineral enterprises and high rises.

The switchgear is equipped with various interlocking devices to prevent from erroneous operations such as moving truck with load, closing circuit breaker with earth switch in closed position, closing earth switch alive, access to live compartments and so on. With excellent VHP Series central-located and fixedly enclosed vacuum circuit breakers, advanced and reliable control components in secondary circuit, thermal shrinking insulating material or epoxy covering means, and optimized electrode shape, the switchgear is compact in structure, advanced in technology, stable in performance, reasonable in structure, easy in application. Actually, it is a safe and reliable distributing switchgear.

◆ 产品制造标准 Applied standards

DL/T404，DL/T593	户内交流高压开关柜订货技术条件/高压开关设备的功用订货技术导则。 Ordering technical conditions of indoor AC high voltage switchgear / Common ordering technical guidelines on high voltage switchgear
GB1984	高压交流断路器 High voltage AC circuit breaker
GB3906	3.6kV－40.5kV交流金属封闭开关设备和控制设备 3.6kV–40.5kV AC metal-enclosed switchgear and controlgear
GB/T11022	高压开关设备和控制设备标准的共用技术要求 Common technical requirements in standards for high voltage switchgear and controlgear
IEC62270-100	高压开关设备和控制设备第100部分：高压交流断路器 Part 100 of high voltage switchgear and controlgear: High voltage AC circuit breaker
IEC60694	高压开关设备和控制设备标准的共用技术要求 Common technical requirements in standards for high voltage switchgear and controlgear
IEC62271-200：2003	高压开关设备的控制设备第200部分：Part 200 of high voltage switchgear and controlgear 额定电压1kV以上52kV及以下的交流金属封闭开关设备和控制设备 AC metal-enclosed switchgear and controlgear with rated voltage 1kV above up to 52kV

正常和特殊使用条件

◆ 正常使用条件

- 环境温度：最高温度：+40℃，最低温度：-15℃，且在24h内测得的平均值不超过35℃。
- 湿度条件如下：
  ——日相对湿度的平均值不超过95%；月相对湿度平均值不超过90%；
  ——日水蒸汽压力的平均值不超过2.2kPa；月水蒸气压力平均值不超过1.8kPa；在这样的条件下偶而会出现凝露；
- 海拔不超过1000m；
- 周围空气没有明显地受到尘埃、烟、腐蚀性和/或可燃性气体、蒸气或盐雾的污染；
- 来自开关设备和控制设备外部的振动或地动是可以忽略的；
- 在二次系统中感应的电磁干扰的幅值不超过1.6kV。

Working conditions

◆ Normal working conditions

- Ambient temperature: Maximum +40℃, minimum -15℃, with average value not over 35℃ within 24 hours.
- Relative humidity:
  Daily average not over 95% and monthly average not over 90%.
  Daily average value of saturate steam pressure not exceeding 2.2 kPa and monthly average not over 1.8kPa. Condensation will sometimes occurs in this condition.
- Altitude not over 1000 meters above sea level.
- Places not polluted obviously by dust, smoke, corrosive and/or inflammable gaseous, steam or salty mist.
- Vibration and shock by the switchgear and outside of it or earth shock should be negligible.
- The amplitude value of induced voltage by electromagnetic interference in the secondary system should not be large than 1.6kV.

◆ 特殊使用条件

在超过GB/T11022规定的正常环境条件下使用时，本公司和用户可就特殊运行条件进行协商，并达成协议。

为防止凝露现象，开关设备设有加热器，当开关设备处于备用状态时即应投入使用。开关设备正常运行时也应注意投运加热器。

◆ Special working conditions

If working conditions are worse than that of specified in GB / T 11022, please contact us and discuss for solution.

Space heaters are equipped for the switchgear for prevention from condensation. These heaters should be used both in normal operation and in storage status.

技术参数 Technical parameters 开关设备主要技术参数 For switchgear

额定电压 Rated voltage of main circuit		(kV)	24				
额定频率 Rated frequency		(Hz)	50/60				
额定绝缘水平	1min工作耐受电压（有效值） 1min power frequency withstand voltage (rms)	(kV)	相间 between phases	65	隔离 between breaks	79	
	雷电冲击耐受电压（峰值） Lightning impulse withstand voltage (peak)	(kV)	相对地 between phases	125	断口 between breaks	145	
	辅助控制回路工频耐受电压 Power frequency withstand voltage on auxiliary control circuit	(V)	2000				
额定电流 Rated current		(A)	630，1250，1600，2000，2500，3150				
额定短路开断电流 Rated short circuit breaking current		(kA)	20	25	31.5		
额定短路关合电流（峰值） Rated short circuit making current (peak)		(kA)	50	63	80		
额定短时耐受电流（4s） Rated short time withstand current		(kA)	20	25	31.5		
额定峰值耐受电流 Rated peak value withstand current		(kA)	50	63	80		
辅助控制回路额定电压 Rated voltage of auxiliary control circuit		(V)	直流或交流110/220 DC or AC				
防护等级 Class of protection			IP4X（断路器室门打开或隔室间为IP2X） IP4X with transformer compartment door open and IP2X for compartments in between				
外形尺寸（宽×深×高） Overall dimensions (W×D×H)		(mm)	800×1810×2380		1000×1810×2380		
质量 Weight		(kg)	840～1440				

VHP-24真空断路器主要技术参数 For VHP－24 Vacuum Circuit Breaker

额定电压 Rated voltage of main circuit		(kV)	24		
额定频率 Rated frequency		(Hz)	50/60		
额定绝缘水平	1min工作耐受电压(有效值) 1min power frequency withstand voltage (rms)	(kV)	65		
	雷电冲击耐受电压(峰值) Lightning impulse withstand voltage (peak)	(kV)	125		
额定电流 Rated current		(A)	630,1250,1600,2000,2500,3150		
额定短路开断电流 Rated short circuit breaking current		(kA)	20	25	31.5
额定短时关合电流（峰值） Rated short circuit making current (peak)		(kA)	50	63	80
额定短时耐受电流（4s） Rated short time withstand current		(kA)	20	25	31.5
额定峰值耐受电流 Rated peak value withstand current		(kA)	50	63	80
额定背对背电容器组开断电流 Rated back-to-back capacitor bank breaking current		(A)	400		
额定单个电容器组开断电流 Rated single capacitor bank breaking current		(A)	630		
额定短路开断电流开断次数 Breaking times of rated short-circuit breaking current		(次)	50		
机械寿命 Mechanical endurance		(次)	20000（M2级）		
额定操作顺序 Rated operating sequence			O-0.3s-CO-1.80s-CO		

弹簧操动机构技术参数 **For spring operating mechanism**

额定操作电压 Rated operation voltage	合闸脱扣器 Closing release	（V）	AC220或AC110或DC220或DC110，波动范围65%～120%
	分闸脱扣器 Opening release	（V）	AC220或AC110或DC220或DC110，波动范围85%～110%
工作电流 Working current	合闸脱扣器 Closing release	（A）	AC220或DC220为1.1
	分闸脱扣器 Opening release	（A）	AC110或DC110为3.1
储能电机功率 Power of energy storing motor		（W）	80，100
储能电机额定电压 Rated voltage of energy storing motor		（V）	AC220或AC110或DC220或DC110，波动范围85%～110%
电机储能时间 Energy storing time		（s）	≤10

结构和工作原理 Structure and working principle

结构简述

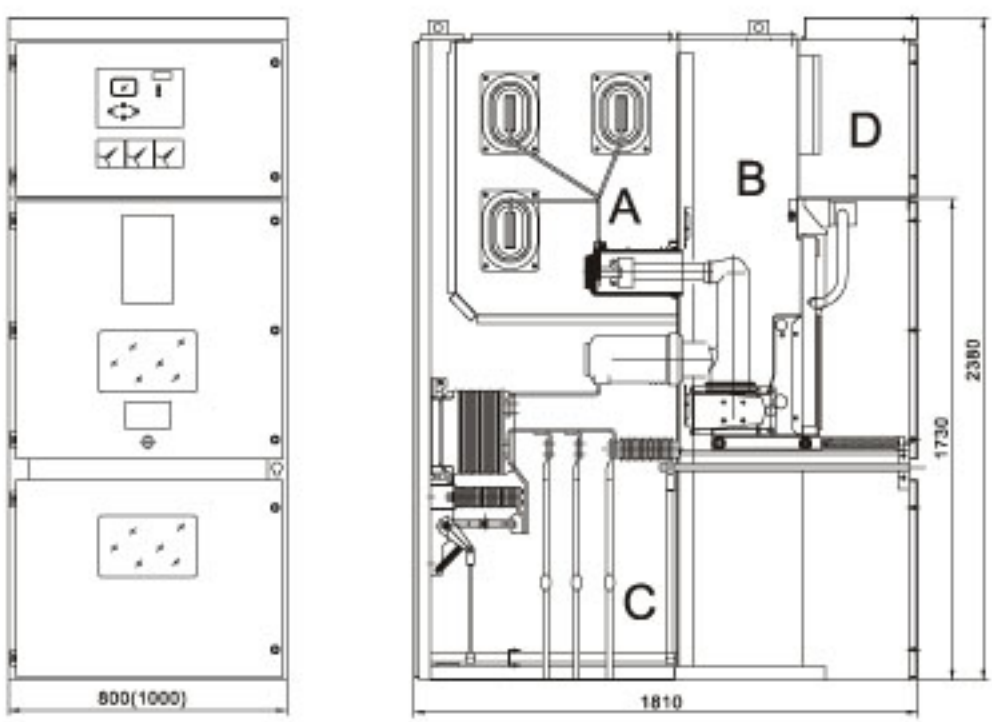
KYN28A-24开关设备由柜体和可移开部件（俗称手车）两大部分组成。柜体用金属隔板分成多个功能隔室，如母线室、断路器室、电缆室和继电器仪表室等。

开关设备的可移开部件可配置真空断路器手车、电压互感器手车、避雷器手车、隔离手车和熔断器手车等。

Brief

KYN 28A-24 Switchgear is composed of two major parts, i.e., fixed frame and central-located withdrawout part (truck in short) as shown in Figure 1. The frame may be divided into several separate compartments such as busbar compartment, circuit breaker compartment, cable compartment, relay and instrument compartment and so on with metal partitions.

The withdrawout part may be configured as vacuum CB truck, PT truck, arrester truck, isolating truck and fuse truck.

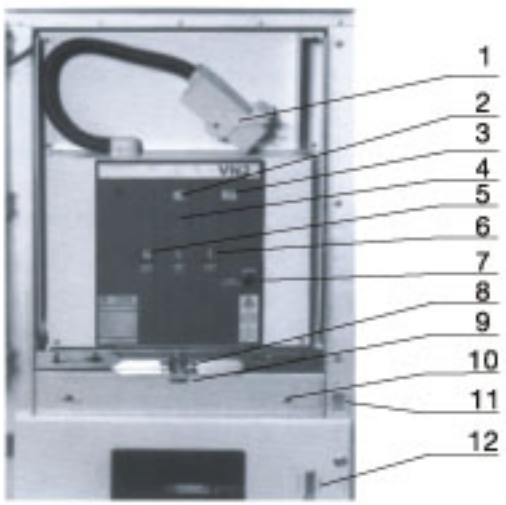


A、母线室 B、断路器手车室 C、电缆室 D、继电器仪表室

A Busbar compartment B CB truck compartment C Cable compartment D Relay and instrument compartment

图一 KYN28A-24开关设备结构示意图

Structural schematic drawing for KYN 28A－24 Switchgear



1、	二次插头	1 Secondary plug
2、	分合指示	2 ON/OFF indication
3、	储能指示	3 Energy storing indication
4、	计数器	4 Counter
5、	分闸按纽	5 Opening pushbutton
6、	合闸按纽	6 Closing pushbutton
7、	手动储能	7 Manual energy storing
8、	摇进机构	8 Propelling mechanism
9、	转运车锁孔	9 Blocking hole for transfer cart
10、	转运车定位	10 Position blocking for transfer cart
11、	接地开关	11 Earth switch
12、	紧急解锁	12 Emergent block disable

图二　开关设备操作面板布置图
Arranging drawing for operating panel of the switchgear

◆ 主要结构特点

开关设备可以背靠背组成双重排列或靠墙安装，既提高了开关设备的安全性和灵活性，又减少占地面积。

* 外壳：

开关设备的外壳选用进口敷铝锌钢板，经CNC机床加工，采取多重折边工艺制作而成。整个柜体具有精度高和很强的抗腐蚀与抗氧化性能，而且由于采用多生折边工艺，使柜体比其它同类设备柜体整体重量轻、机械强度高，外形美观。柜体采用组装式结构，用拉铆螺母和高强度的螺栓连接而成，使加工生产周期缩短，零部件通用性强，占地面积少，便于组织生产。

* 手车：

手车骨架采用薄钢板经CNC机床加工后组装而成。手车与柜体配合精度高，机械联锁安全、可靠、灵活。手车根据用途不同分为断路器手车、电压互感器手车、计量手车、隔离手车等，同规格手车可以自由互换。手车在柜体内有断开/试验位置和工作位置，每一位置都分别有定位装置，以保证联锁可靠。各种手车均采用丝杆推进、退出，操作轻便、灵活，适合值班人员操作。当手车需要移开柜体时，用一台专用转运车，就可方便取出，以便进行各种检查和维护。

当手车用运转车运入柜体断路器室时，便能可靠锁定在断开/试验位置，并且柜体位置指示灯显示其所在位置。只有手车完全全锁定后，才能摇动丝杆推进机构，将手车推向工作位置。手车到达工作位置时，推进手柄操作力突然加大并摇转不动，其对

◆ Main features

The switchgear may be installed back-to-back into double-row or against wall to boost safety and flexibility as well as reduce land area occupied.

* Enclosure:

The enclosure of the cubicle are made of imported sheet steel covered with aluminum and zinc, machined by CNC turning machines and multi-bent by bending machines resulting in low weight, high accuracy, high corrosive proof, high oxidation resistance, high mechanical strength and eye appealing as well. Of setup structure, the frame is connected with rivet nuts and high intensity bolts to make the assembled cubicle uniform in dimension. Therefore, its delivery period is short, components are common, land area occupied is less, and subsequently, production is easy to be organized.

* Truck:

The truck skeleton is made of imported thin sheet steel machined by CNC machines. The truck is coordinated with the frame in high accuracy and the mechanical interlocking is safe, reliable and flexible. In light of its application, the truck may be divided into CB truck, PT truck, meter truck and isolating truck. Trucks with same specification are interchangeable from each other. In the cubicle, there are test, work and disconnected poisons for the truck. And for each position, there is a positioning device to secure the truck unit in the right position.

Adoption of screw thread to push in and pull out the truck is easy and flexible, which is suitable for various duty operators. If the truck is to move away from the cubicle, a special transferring cart is configured just as easily for inspection and maintenance.

When the truck comes in CB compartment through a transferring cart, it will be locked into disconnected position

应位置指示灯便显示其所在位置。手车的机械联锁能可靠保证手车只有在工作位置或试验位置，断路器才能进行合闸；而且断路器只有在分闸状态，手车才能移动。

* 隔室：

开关设备主要电气元件都在其独立的隔室，即：断路器手车室、母线室、电缆室、继电器仪表室等。各隔室防护等级都达到IP2X。除继电器登记表室外，其它三个隔室都分别有泄压通道。由于采用了中置式形式，电缆室空间大为增加，因此设备可并接多路电缆。

A）母线室隔室A：

主母线是单台拼接相互贯穿联接，通过分支母线（静触头盒）及主母线绝缘套管固定。主母线和联络母线为矩形截面的铜排，用于大电流负荷时采用双母排。对于特殊需要，母线可用热缩套管和定制的绝缘罩盒覆盖。相邻柜母线间安装有绝缘套管，如果出现内部故障电弧时，套管能有效把事故限制在隔室内而不向其它柜蔓延。

B）断路器隔室B：

隔室两侧安装了轨道，供手车在柜内由断开/试验位置移动至工作位置。静触头盒的隔板（活门）安装在手车室的后壁处，当手车从断开/试验位置移动到工作位置过程中，静触头盒口上的上、下活门与手车联动自动打开；当反向移动时，活门则自动闭合，在检修时，可锁定带电侧的活门，从而保证检修维护人员不触及带电体。在断路器室门关闭时，手车同样能被操作。通过门上的观察窗，可以观察隔室内手车所处的位置，合、分闸指示及储能状况。

C）电缆隔室C：

开关设备采用中置式，回面电缆室空间较大。电流互感器、接地开关装在隔室后壁上（接地开关也可根据客户需要装在开关柜的中部），避雷器安装于隔室后下部。将手车和可抽出式水平隔板移开后，施工人员能从正面进入柜内安装和维护。电缆室内的电缆连接导体，每相可并接1～3根电费，必要时每相可并接6根电费，电费隔室的柜底配制可卸式开缝的金属封板或不导磁金属封板，确保施工方便。

D）继电器仪表室D：

继电器仪表室内可安装继电保护元件、仪表、带电显示器以及特殊要求的二次设备。控制线路敷设在线槽内，线槽有金属盖板，可使二次线与高压元件隔离。左前侧线槽是为控制电费的引进和引出预留的，底板相应部位开有二次线与电缆穿电孔。在继电器仪表室的顶板上带留有便于施工的小母线穿越孔，接线时仪表室顶盖板可翻开，便于小母线的安装。

or test position reliably and a relevant position-indicating lamp turns on. Only when the truck is locked in place entirely can one rotate propelling mechanism to push the truck into work position. It is impossible to rotate the handle still further after the truck comes to work position. At this, the corresponding indicating lamp will turn on. Its mechanical interlocking reliably guarantees that the circuit breaker can only be closing operated when the truck is in work position; and the truck can only be moved from position to position when the circuit breaker is in open status.

* Compartment:

All the main apparatus are located in there own compartments such as CB compartment, busbar compartment, cable compartment, relay and instrument compartment and so on. The class of protection for those compartments comes to IP2X. All compartments are equipped with pressure relief channel except for relay instrument compartment. The space in cable compartment increases greatly due to central location type resulting in more cables may be connected in.

a) Busbar compartment A

Main busbar leads from one cubicle to another and fixed via branch busbar (fixed contact box) and its own insulating sleeves. Main busbar and couple busbar is made of copper bars with oblong crossing area. Double busbar are adopted for large current load. On special requirement, the busbar may be protected with heat shrinking cover and customer made insulating cover. Insulating bushings are quipped between adjacent cubicles for purpose of preventing accident from spreading in case of internal arc failure.

b) Circuit breaker compartment B

Guiding rails are set on both sides of the compartment for the truck to move from disconnected/test position to work position. Partition (flexible shutter) of fixed contact holder is mounted at rear wall of the compartment. During the truck moves from disconnected/test position to work position, the up and down flexible shutters open automatically whereas the truck moves in opposite direction, the shutters close automatically to form an effective isolation. Since there is no interacting between up and low flexible shutters, the live shutter may be locked when reparation so as to ensure operators not to touch live conductor in any situation. The truck can be operated just as the same when the compartment door is closed. The actual position in which the truck is situated may be seen through a viewing window. Via this window, the ON/OFF button for the circuit breaker, the ON/OFF mechanical position indicator and energy stored/released status indicator mounted on the truck can also be seen.

c) Cable compartment C

As a central-located cubicle, the cable compartment is relatively spacious. On the back wall of the compartment, CT and earth switch may be mounted. From requirement of our customer, the earth switch also may be mounted in middle of the compartment. Surge arrester is mounted in rear lower part of the compartment. When truck and horizontal partition are moved away, installing people may install cable in front access into the cubicle. Cable connection conductor in the compartment is for connection of 1 ~ 3 single core cables or, when necessary, 6 single core cables. On lower part of the

- 泄压装置：

在手车室、母线室和电缆室的上方均设有泄压装置，当隔室内发生故障产生电弧时，开关柜内部气压升高，装设在前门上的特殊密封圈把柜门封闭起来，顶部装置的泄压金属板被自动打开，释放压力和高温气体，确保操作人员和开关设备的安全。

- 二次插头与手车的位置联锁：

开关设备和手车的二次连线是通过二次插头的联络实现的，二次插头通过一根尼龙波纹伸缩管与手车相联，二次插座装设在开关柜手车的右上方。手车只有在试验/断开位置时，才能插上或拔除二次插头。手车进入工作位置时二次插头被锁定。配装合闸闭锁电磁铁的断路器手车，在二次插头接通之前，手车的合闸机构被电磁铁锁定，仅能分闸，无法进行合闸操作。

- 带电显示装置：

开关设备可装检测一次回路运行的带电显示装置，该装置有高压传感器和显示器两部分组成。该装置可以提示高压回路带电状况，还可以和电磁锁配合，对操作手柄、柜门和邻柜实现强制闭锁，达到防止带负荷移动隔离手车、防止带电关合接地开关、防止误入带电间隔的目的，提高配套产品的防误性能。

- 防止凝露：

为了防止在高湿度或温度变化较大的环境中产生凝露，在断路器室和电缆室分别装设电加热器，以便在上述运行条件下防止绝缘事故的发生。

- 接地装置：

在电费室内单独设有5 × 40 mm2的接地铜排，且贯穿相邻各柜并与柜体良好连接，供直接接地之元器件使用。由于整个柜体用敷铝锌板相拼连，这样使整个柜体都处在良好的接地状态之中，确保运行操作人员触及柜体时的安全。

◆ 防止误操作联锁装置及工作原

开关设备内装有安全可靠的联锁装置，完全满足“五防”的要求。

- 仅表室内装有提示性的按钮或者KK型转换开关以防止误合、误分断路器；
- 断路器手车只有在试验或工作位置时，断路器才能进行合、分操作，而且在合闸后，手车被锁住无法移动，防止带负荷时推、拉手车；
- 仅当接地开关处在分闸位置时，断路器手车才能从试验/断开位置移至工作位置；仅当断路器手车处于试验/断开位置时，接地开关才能进行合闸操作（接地开关可带电压显示装置），这样实现了防止接地开关处在闭合位置时关合断路器以及防止带电误合接地开关；
- 接地开关处于分闸位置时，下门及后门被闭锁，防止误入带点间隔；

compartment, there is detachable seam metal plate or non-magnetic conductivity plate to ensure convenience of work.

d) Relay and instrument compartment D

Relay protection components, instruments, live indicator and other particular secondary equipments may be mounted in this compartment. Control wiring is laid out in wiring vessels with metal covers on it to isolate primary circuits. The left front wiring vessel is pre-left for incoming and outgoing of control wirings. On corresponding position of the bottom plate, secondary wire and cable holes are drilled. On top wall of the compartment, go-through hoses for control busbar are left for easy installation.

- Pressure relief device:

There are pressure relief devices situated in the upper part of CB truck compartment, busbar compartment and cable compartment. In case there is an internal failure arc in circuit breaker and busbar compartment, the internal gas pressure will increase with the appearance of arc. A special seal ring on the door seals the cubicle front hermetically and the gas pressure relief metal plate mounted at the top will be open automatically to release pressure and drain out high temperature gas from inside to ensure safety for both operators and cubicles.

- Interlocking between secondary plug and the truck:

Connection between secondary wiring of cubicle and truck is realized with manual-operated secondary plug. The secondary plug is connected to the truck through a nylon bellows. The secondary socket is mounted in the right upper part in the CB truck compartment. Only when the truck is in test/disconnected position can the secondary plug be pushed in and pulled out. If the truck is in work position, the secondary plug is locked and cannot be disabled because of mechanical interlocking. Because the closing mechanism is blocked by an electromagnetic lock, the circuit breaker can only be manually opening operated without the secondary plug connected. At this time, closing operation of the breaker is impossible before the secondary plug is plugged in and energized.

- Live indicating device:

The switchgear may be equipped with a live indication device to detect the primary circuit. This device is composed of a high voltage sensor and a display to indicate whether the high voltage circuit is energized or not. With an electromagnetic lock, forced block may be realized among operating handle, cubicle door and adjacent cubicle to prevent against moving isolating truck with load, operating earth switch with primary circuit on, access to alive compartment.

- Prevention from condensation:

Space heaters are fixed in breaker compartment and cable compartment respectively to get rid of condensation caused by severe temperature fluctuation and high humidity surroundings so as to prevent from insulation fault.

- Earthing device:

An earthing copper busbar with a sectional crossing area of 5mm×40mm is set independently in cable compartment. This bar extends through adjacent cubicles and keeps good contact to cubicle frame. This earthing busbar is used for directly earthed components. Meanwhile, the whole cubicle frame made of connected sheet steel coated with aluminum and zinc makes whole cubicle frame in excellent good earthing situation to ensure safety of operators and cubicles.

- 按客户要求配装合闸闭锁电磁铁的断路器手车，在未使闭锁装置解锁的情况下，能阻止手动或电动合闸操作；
- 断路器手车在工作位置时，二次插头被锁定不能拔除；
- 各柜间可装电气联锁。

本开关设备还可在接地开关操作机构上加装电磁铁锁定装置以提高可靠性，并可按用户要求提供后柜门与接地开关操作的反向联锁装置，订货时按用户的需求选择。

◆ **开关设备电气控制接线原理：**

VHP-24真空断路器电气控制原理见图三，控制回路（典型）见图四。

真空断路器的二次控制原理分别由储能回路、合闸回路、分闸回路、闭锁回路和辅助开关回路等部分组成，闭锁电磁铁可供选用。断路器手车在试验位置或工作位置，有操作电源时闭锁电磁铁Y1带电吸合，限位开关SP5接点13-14闭合，合闸线圈HQ可以正常进行电气合闸操作，并且闭锁电磁铁Y1吸合后合闸弯板被解锁，也可以手动合闸。因此，在二次控制电源未接通情况下，闭锁电磁铁能阻止手动或电动合闸操作。

运输、安装和调试

◆ **运输和存放注意事项：**

- 产品在装卸、运输时不准倾翻、倒置和遭受剧烈振动，吊绳应置于包装箱或开关设备指定的部位；
- 防止雨淋、以免产品受潮；
- 开关设备抵达现场时，收货人应检查货物外包装是否完整，货物有无受到损坏或短缺，必要时应通知供货方到现场共同检查；
- 产品的搁置应平衡，不得随意拆卸电器元件及零部件。

◆ **开关设备的安装：**

- 基础框架表面应平整且高出地坪2～4mm，框架平整度和直线度允许公差为1mm/m；
- 在基础框架上逐台调整开关设备的位置依次拼接，垂直度不超过2mm。当开关设备数量多于10台时最好从中间开始拼接。开关设备与基础框架彩螺栓连接或焊接；
- 为方便主母线安装，开关设备的拼柜安装宜与主母线安装交替进行；
- 用预制的接地母排逐柜连接开关设备的主接地母线，将开关设备主接地母线与配电宜的接地极相连；
- 一次电缆和二次电缆安装完成后，要封堵电缆穿线孔周边的空隙，并装好封板和隔板。

◆ **开关设备的调试：**

- 检查隔离触头的插入深度和接触是否良好；
- 开关设备安装后要进行操作试验，手动操作断路器、手车和接地开关等部件，并检查机械联锁全部程序的

◆ **Interlocking device for avoiding erroneous operation and its working principle:**

The reliable interlocking device in cubicle offers reliable safety and protection with the following functions:

- KK change over switch or hint pushbutton mounted on the door of instrument compartment prevents from erroneous closing and opening operation of the circuit breaker.
- Only when the CB truck is exactly in test or work position and blocked in the position can the circuit breaker be operated. It is impossible to move the truck after the circuit breaker is in closed position so as to avoid moving the truck with load.
- Only when the earth switch is in open position can CB truck move from test/disconnected position to work position. And for the same reason, only when the truck is locked in test or disconnected position can the earth switch be closing operated. The earth switch may be equipped with a live indicator.
- It is impossible to open lower door and rear door when the earth switch is in open position for purpose of prevention against access to live compartment.
- If a CB truck is equipped with an electromagnetic lock as per customer's demand, both manual and motor-driven operation of the circuit breaker are impossible before the lock is disabled.
- If a CB truck is in test or work position, the secondary plug is locked and cannot be pulled out.
- Each cubicle can be equipped with electrical interlocking device. On requirements of our customer, the operating mechanism of the earth switch may be equipped with electro-magnetic lock to enhance reliability. Customers may place the order as per own requirements.

◆ **Electric control wiring for the switchgear:**

Fig.3 shows the electric control schematic drawing for VHP – 24 Vacuum Circuit Breaker and Fig. 4 shows its typical control circuit.

The secondary control schematic drawing of the vacuum circuit breaker is formed by energy storing circuit, closing circuit, opening circuit, blocking circuit and auxiliary change over circuit. The blocking solenoid is optional. If the CB truck is in test position or work position and energized, the blocking solenoid Y1 picks up, contacts 13 and 14 on limit switch SP5 are closing to let closing coil HQ perform electric closing operation normally. Manual closing operation may also be done after closing bending plate is disabled during the pickup of the blocking solenoid Y1. Here we can see the blocking solenoid prevents against manual or motor-driven closing operation in case the secondary control power supply is not energized.

Transportation, installation and regulation

◆ **Transportation and storage:**

- No tilt, no turn over, no upside down, no subject to severe shock during handling and transportation. Lifting rope should be put at a designated position on package case or the switchgear;
- No exposure to rain lest moisture should intrude the apparatus; On arrival, the addressee should visually inspect whether package case is complete, whether the goods damage or lack in number. When necessary, inform the supplier to the site for joint inspection;

操作，动作要准确，应灵活无卡滞现象；
- 检查断 器的机械特性是否符合规定要求，并按规定的最高、最低操作电压进行操作试验，合分应正常；
- 对二次回路进行通电试验，检查保护、控制和信号回路动作的正确性；
- 主回路电阻测量，断路器的回路电阻应不超过标准规定值；
- 主回路相间和相对地间工频耐压试验，按交接验收规定进行；
- 二次回路绝缘强度试验2000V1min应无击穿闪络现象。二次回路中的电子器件部分，试验电压由用户与制造厂商定。

开关设备的操作程序

虽然开关设备设计有保证各部分操作程序正确的联锁装置，但是操作人员对开关设备仍应严格按操作规程和本技术文件的要求进行操作，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。

无接地开关的断路器柜操作

- 将断路器可移开部件装入柜体：把断路器手车装在转运车上并锁定好，将转运车推到柜前，把小车升到合适位置后，将转运车前部定位锁插入柜体中隔板插口并将转运车与柜体锁定，打开断路器小车的锁定钩，将断路器手车平衡推入柜体同时锁定，当确认已将手车与柜体锁定之后，解除转运车与柜体的锁定，将转运车拉开。
- 手车在柜内操作：断路器手车装入柜体后即牌断开位置，将辅助回路二次插头插好后手车牌试验位置。若通电则仪表室面板上试验位置指示灯亮，此时可在主回路未接通的情况下对手车进行电气操作实验。若想继续进行操作，必须先把所有柜门关好并把门锁好。

确认断路器处于分闸状态，此时可将手车操作摇把插入面板操作孔内，顺时针转动摇把，直到摇把明显受阻并听到清脆的辅助开头争换声，同时仪表室面板上工作位置指示灯亮，然后取下摇把。此时，主回路接通，断路器牌工作位置，可通过控制回路对其进行合、分操作。

若准备将小车从工作位置退出，首先应确认断路器已牌分闸状态，插入手车操作摇把，逆时针转动直到摇把明显受阻并听到明显的辅助开关切换声，小车使回到试验位置。此时，主回路已经完全断开，金属活门关闭。
- 从柜中取出手车：从柜内取出手车时要确定断路器已处于分闸状态，然后解除辅助回路二次插头并将插头和锁在手车架上，此时将转运车推至柜前（与把手车装入柜内时相同）并锁定，然后将手车解锁并向外拉出。当手车完全进到转运车上并确认与转运车锁定后，解除转运车与柜体的锁定，把转运车向后拉出。如手车要用转运车运输较长距离出，在

- The apparatus should be put on an even and horizontal place. No dismantle components and parts inside.
- These five different kinds of drawers may be assembled in cubicle both in same or mixed mode. Table 3 shows the maximum content when all the same drawers assembled in one cubicle.

Installation:

- The installation foundation should be smooth and even, and 2 ~ 4mm higher above the ground. The tolerance of foundation smoothness and linearity is 1mm/m;
- Regulate and connect the cubicle one by one on foundation with verticality not over 2mm. For a longer cubicle row, say, covering 10 bays, the cubicle connection should begin from the middle of the row. The connection between cubicle and foundation should be made with bolts or welding;
- For convenience in installation of main busbar, installation of the cubicle and the main busbar should be done in an alternative way;
- Connect the main earthing busbar of each cubicle one by one with pre-fabricated earthing busbar and connect the main earthing busbar of the switchgear to earth electrode in distributing room.
- On completion of primary and secondary cables, block peripheral gaps of cable holes and then put covers and partitions on them.

Regulation:

- Inspect the depth of the isolated contact overtravel and their contact situation;
- On completion of installation, operating test should be made. Manually operate the circuit breaker, truck and earth switch and others, inspect all the procedures of operation in mechanical interlocking to make sure that all operations are correct and flexible without any awkward action;
- Inspect the mechanical performance to see whether it is in conformity with specified requirements. Operating test should be made with specified maximum and minimum operating voltage and normal closing and opening operations should be guaranteed;
- Energizing test should be made on the secondary circuit. Inspect the correctness of protective, control and signal circuits;
- Measure resistance in primary circuit and in the circuit breaker, making sure that all the resistance is not over specified value by standards applied;
- Power frequency withstand voltage test should be made between phases and from phase to earth in primary circuit;
- 2000V 1-minute insulation test on the secondary circuit should be made without any flashover and breakthrough. The test voltage on electronic components should be discussed and settled down between customer and manufacturer.

Operating procedure

Although there are several interlocking systems to guarantee correct operating procedure, operators are still supposed to strictly abide by operating specifications and requirements specified in this manual. Otherwise, equipment damage or even accident would occur.

Operation of a breaker cubicle without earth switch

Put a breaker truck unit into cubicle: Place the breaker truck onto a transfer cart and lock it on the cart. Push the transfer

推动转运小车过程中要格外小心，以避免运输过程中发生倾翻等意外事故。

- 断路器手车在柜内的分、合闸状态确认：分、合闸状态可由断路器手车面板上的分、合指示牌及仪表室面板上分、合闸指示灯来判定。若透过柜体中面板观察窗看到手车面板上绿色的分闸指示牌则判定断路器牌分闸状态，此时如果辅助回路二次插头接通操作电源，则登记表面板上分闸指示打亮。若透过柜体面板观察窗看到手车面板上的红色合闸指示牌则判定断路器处于合闸状态，此时如果辅助回路二次插头接通操作电源，则仪表面板上合闸指示灯亮。

◆ 有接地开关的断路器柜操作

将断路器手车推入柜内和从柜内取出手车的程序，与无接地开关的断路器柜的操作程序完全相同。仅将手车在柜内操作和接地开关操作过程中要注意的地主叙述如下：

- 手车在柜内操作：当准备将手车推入工作位置时，除了要遵守6.1b）中提请注意的诸项要求外，还应确认接地开关要牌分闸状态，否则下一步操作无法完成。
- 合、分接地开关操作：若要合接地开关，首先应确定手车已既定到试验/断开位置，并取下推进摇把，然后按下接地开关操作孔的联锁弯板，插入接地开关操作手柄，顺时针转动90°，接地开关牌合闸状态。若再逆时针转动90°，便将接地开关分闸。

◆ 一般隔离柜的操作

隔离插送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不允许移动手车。在进行隔离手车操作时，必须保证先将与之本配合的断路器分闸（见6.1中d），断路器分闸后其辅助触点转换解除与之配合的隔离手车上的电气联锁，只有这时才能操作隔离手车。具体操作程序与断路器手车操作程序相同。

KYN28A开关设备是以机械联锁为主，辅之以电气联锁实现其“防误”功能。联锁操作过程中如发现操作阻力增大，应在排除有误操作可能的前提下，及时检查联锁装置。

cart in front of the cubicle, lift the truck to a suitable height and insert the positioning pin on front of the cart into a partition socket in cubicle to lock the cart in the cubicle firmly. Open the locking hook of the truck on cart, push the truck smoothly into cubicle and lock it on cubicle. After reconfirmation of the truck locked onto cubicle, then disable the lock between cart and cubicle and move the cart away.

- Operation of the breaker truck in cubicle: As soon as the truck comes into cubicle from the transfer cart, it is in disconnected position. If you want to operate the truck, you have to place the truck into test position, insert the secondary plug into a socket. If the secondary circuit is energized, the test position indicating lamp on instrument panel goes on. At this, you may conduct an electrical operation test on the truck without energizing primary circuit. If you want to make a further operation of the truck, you may close all cubicle doors and lock these doors with keys.

  And still, you must make sure that the circuit breaker is in open status. Insert the truck operating handle into an operating hole on panel, rotate the handle clockwise until the handle is obviously resisted and a very bristle click of change over voice from an auxiliary switch is heard which reveals that the truck unit is in work position. Meanwhile, an indicating lamp on instrument panel is on. Then withdraw the handle out of the hole and put it aside. At this, the primary circuit is energized and the circuit breaker is in work position. Operation of the circuit breaker through control circuit is possible now through control circuit.

  If you want to withdraw the truck unit from work position, first you are supposed to make sure the circuit breaker is in open status. Insert the truck operating handle into an operating hole on panel, rotate the handle counterclockwise until the handle is obviously resisted and a very bristle click of change over voice from an auxiliary switch is heard which reveals that the truck unit is back in test position. Now the primary circuit is entirely de-energized with the metal shutter closed.
- If you want to withdraw the breaker truck out of cubicle, make sure the circuit breaker is in open position, unplug the auxiliary circuit plug, fix the plug on the truck rack and lock it in place. Bring the transfer cart in front of the cubicle just as the case you put the truck in cubicle, lock the cart to the cubicle, disable the lock between truck and cubicle, and pull the truck outside. After the truck is fully on the cart, lock the truck to the cart and disable the lock between cart and cubicle. Then withdraw the cart from cubicle to a certain place. Special attention must be paid to guarantee that no damage would happen to the truck during movement of the cart.
- Confirmation of opening and closing status of the circuit breaker in cubicle: The actual status of the circuit breaker may be judged with ON/OFF indicating board on truck panel as well as ON/OFF indicating lamp on instrument compartment panel.

  If a green OFF indicating board on truck panel can be seen through a viewing window on cubicle, the circuit breaker is in open status. If auxiliary circuit plug is energized now, the OFF indicating lamp on instrument compartment panel will be on.

  If a red ON indicating board on truck panel can be seen through a viewing window on cubicle, the circuit breaker is in closed status. If auxiliary circuit plug is energized now, the ON indicating lamp on instrument compartment panel will be on.

- **Operation of a breaker cubicle with earth switch**

The procedure for pushing the breaker truck in cubicle and pulling the breaker truck out from cubicle is just as same as that for a breaker cubicle without earth switch. However, during the operating course for the truck and earth switch, attention should be paid as follows:

- Operation of the truck in cubicle

When you are ready to push the truck in work position in cubicle, apart from requirements specified in 6.1 b) you should follow, you should still confirm the earth switch is in open status, otherwise, the next operation is impossible to perform.

- Closing and opening operation of earth switch

If you want to close the earth switch, make sure that the truck is withdrawn to test or disconnected position first, move away the propelling handle, press down an interlocking bent board near operating hole of the earth switch, insert an operating handle for the earth switch and then rotate the handle clockwise by 90 degrees to close the earth switch. If the handle is rotated counterclockwise by 90 degrees, the earth switch is open.

- **Operation of general isolating cubicle**

Since the isolating truck has not a capability to close and open load current, the truck is not allowed to be operated with load. When operate the isolating truck in cubicle, the corresponding circuit breaker must be in open position first just as described in 6.1 d). After open operation of the circuit breaker, auxiliary contacts on CB must be properly coordinated with electric interlocking system on its isolating truck. Then you can operate the isolating truck. Its procedure is same as that of the breaker truck.

For KYN28A – 24 Switchgear, the mechanical interlocking plays a major part in interlocking function and electrical interlocking takes a minor part in it. If an awkward operation occurs, inspection should be made to see whether there is mal-operation or inspect interlocking system in time.

开关设备的维护和保养

设备/元件（如易损件）的检查和维护周期，取决于其运行时间的长短、操作频繁程度和故障开断情况等。根据运行条件和现场环境,每3～5年对开关设备进行一次检查和保养。

- 按真空断路器使用说明书的要求，检查断路器和操动机构的工作情况，并进行必要的调整和润滑；
- 检查手车进车、出车全过程的工况，必要时进行调整和润滑；
- 检查联锁装置是否灵活可靠，必要时进行调整和润滑；
- 检查动、静隔离触头接触表面有无损伤，插入深度是否符合要求，弹簧压力有无减弱，表面镀层有无异常氧化现象，并更换隔离触头上的陈旧导电膏；
- 检查母线和各导电连接部位的接触情况并紧固连接，发现表面有发热现象要进行处理；
- 检查接地回路部分的情况，如接地触头、主接地线及过门接地线的接触情况，保证其导电的连续性；
- 用软布擦拭真空来弧室和绝缘件表面的灰尘。如因凝露至使出现局部放电现象，可以在放电表面涂一层薄的硅脂作为临时修补。

Maintenance

The interval of inspection and maintenance of the cubicle and components depends on general operation time, operation frequency and situation of fault operation. As per working conditions, the switchgear should be inspected and maintained once every three to five years.

- In light of requirements specified in the operating manual, the working situations of VCB and its operating mechanism should be inspected. And necessary regulation and lubrication should be done;
- Inspect the working situation of the whole course of pulling out and pushing in. Regulation and lubrication should be made if necessary;
- Inspect whether the interlocking is reliable and flexible. Regulation and lubrication should be made if necessary;
- Inspect the fixed and movable contact to see whether there is injury on contacting surface, whether the inserting travel is in conformity with requirement, whether there is attenuation in spring pressure force, and whether there is abnormal oxidation on plating coats of the surface. Replace the old conductive plaster on isolating contacts with new one;
- Inspect contacting situation of busbar and connections and tight loosening ones. If overheated surface is found, proper treatment should be done immediately;
- Inspect contacting situation of earthing circuit and relative components such as earthing contacts, main earthing bar and each earth connection, make sure there continuity is intact;
- Do away with dusts on surfaces of vacuum interrupter and insulating parts with a soft cloth. If a partial discharge is found due to condensation, coat with a thin layer of silicon grease on discharged surfaces as a provisional remedy.

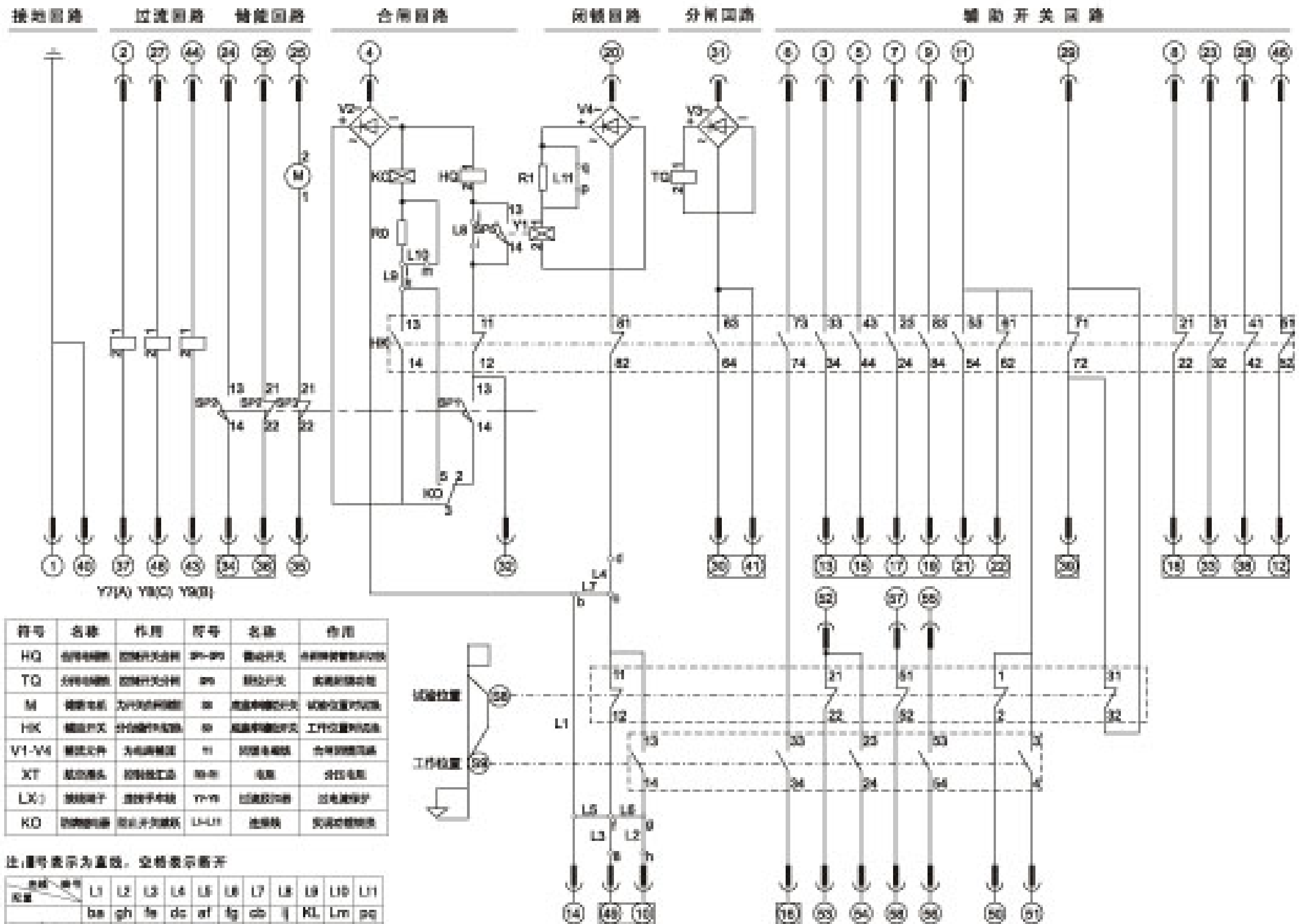
随机文件 Documents provided with the product

- 产品合格证(Certificate)；
- 安装使用说明书(Installation and Operation Manual)；
- 装箱单(Packing List)；
- 开关设备主要元件的使用说明书等技术文件和附件
  (Accessories and technical documents such as operating manuals for main apparatus in cubicle.)
- 出厂检验报告(Routine test report)；
- 二次接线图(Secondary wiring drawing)；
- 专用工具(Special tools)；

订货须知 Information given for ordering

用户订货时请提供以下资料和信息(When ordering, the following information should be given)：

- 主接地方案图(Primary connection scheme drawing)；
- 开关设备排列和配电室平面布置图(Layout drawing for the cubicle and plane arrangement drawing for distributing room)；
- 开关设备内主要电器设备的型号、规格和数量(The type, specification and quantity of main electrical apparatus in cubicle)；
- 二次回路图(Secondary circuit)；
- 开关设备在特殊环境条件下使用(Particular requirements for the cubicle to work in particular environment and conditions)；
- 其它特殊要求。



符号	名称	作用	符号	名称	作用
HQ	[illegible]	[illegible]	SP1~SP3	[illegible]	[illegible]
TQ	[illegible]	[illegible]	SP4	[illegible]	[illegible]
M	[illegible]	[illegible]	S8	[illegible]	[illegible]
HK	[illegible]	[illegible]	S9	[illegible]	[illegible]
V1~V4	[illegible]	[illegible]	Y1	[illegible]	[illegible]
XT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LX()	[illegible]	[illegible]	Y7~Y9	[illegible]	[illegible]
KO	[illegible]	[illegible]	L1~L11	[illegible]	[illegible]

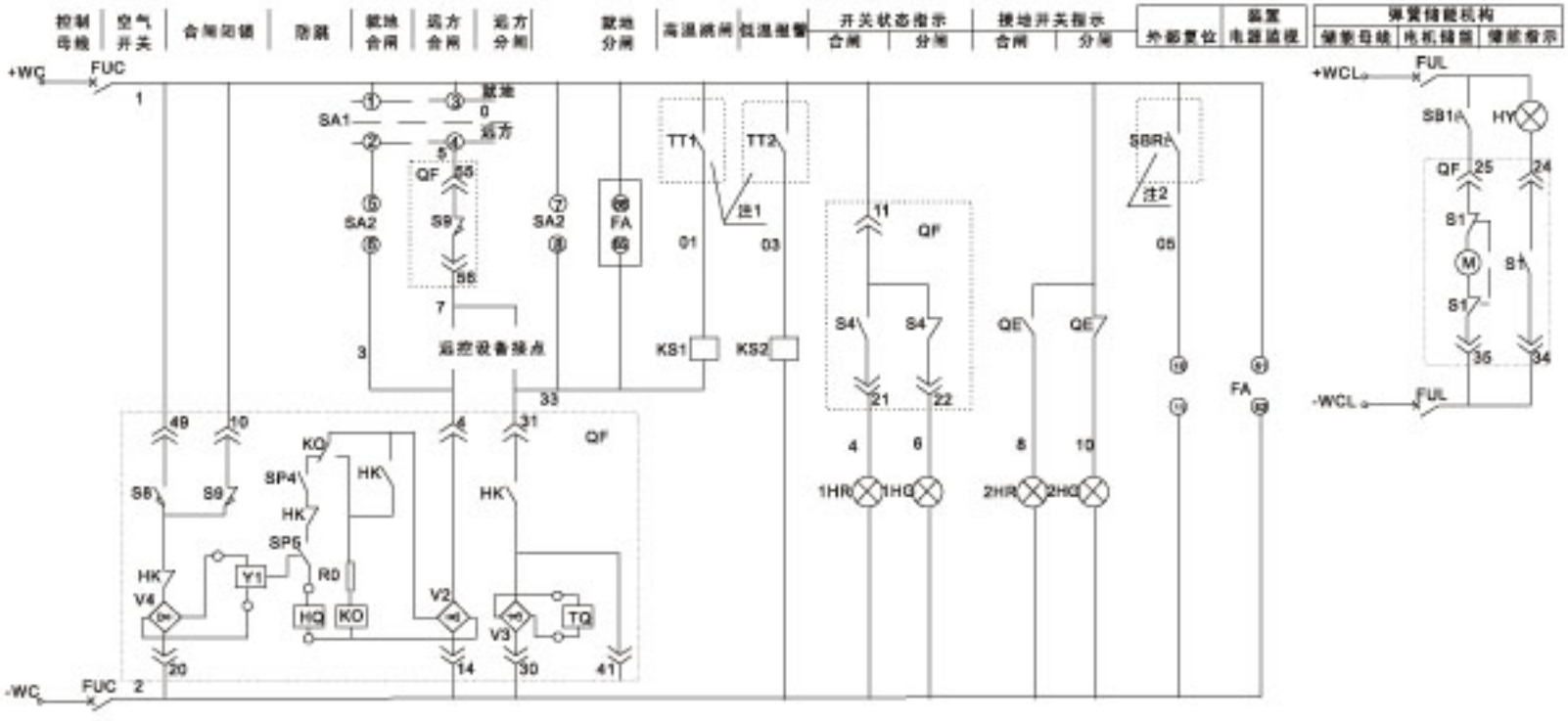
注：■号表示为直线，空格表示断开

位置		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11
		ba	gh	fe	dc	af	fg	cb	ij	KL	Lm	pq
[illegible]	[illegible]	■	■	■	■					■		
	[illegible]					■	■	■	■	■		
[illegible]	[illegible]	■	■	■	■							
	[illegible]					■	■	■	■			
AC/DC 110V											■	■
AC/DC 220V												

技术要求：

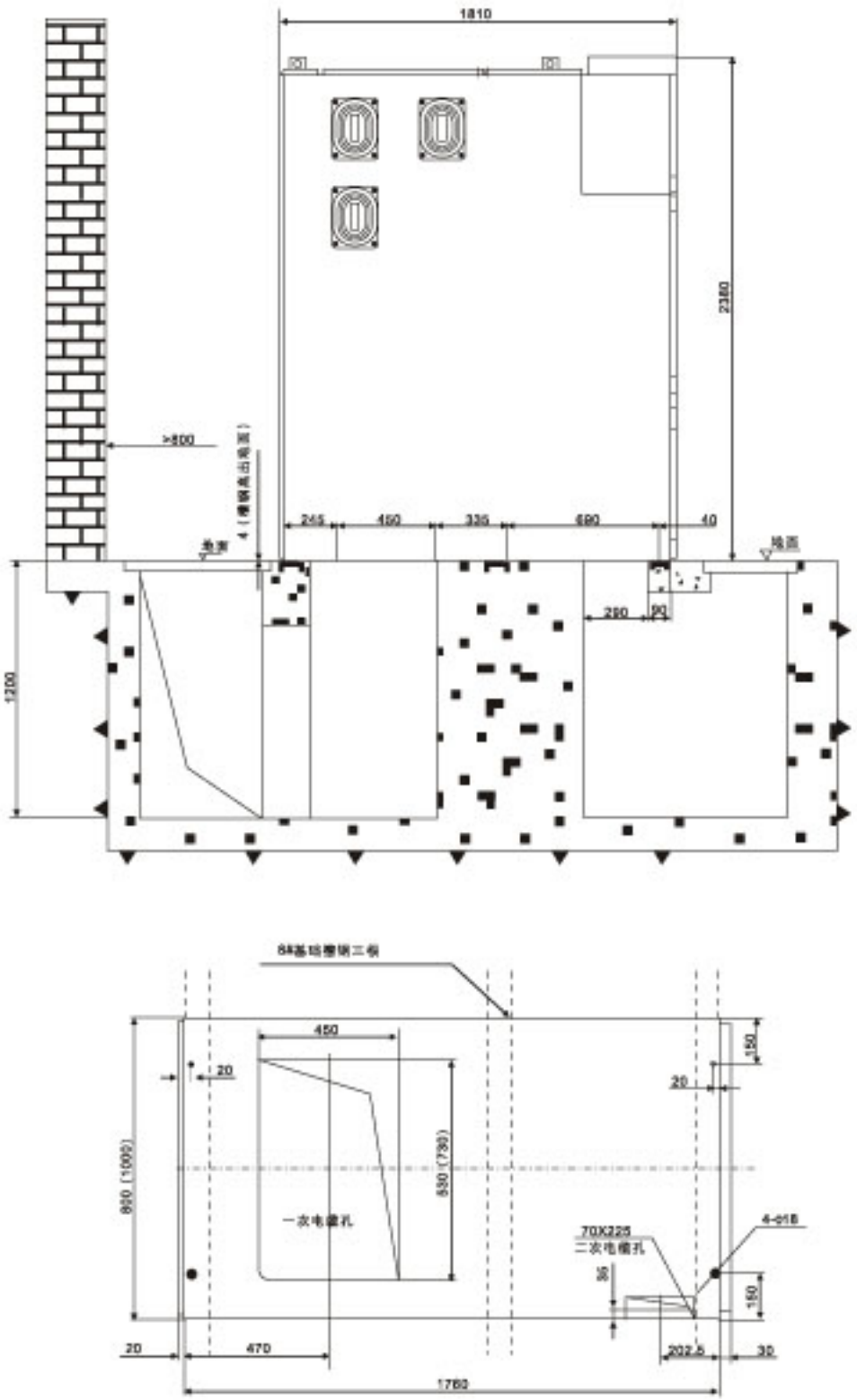
1. 开关状态为：未储能，分闸位置，手车试验位置。
2. 控制回路选用$1mm^2$线；接地线选用$2.5mm^2$线。
3. XT选用58芯针孔航空插头。
4. Y7.Y8.Y9.Y1.KO为可选用件。
5. 可选功能配置见表（注：KO，V1~V4，L1~L11，A1~A14，B1~B15，R0~R1为线路板上的元件）。

图三　VHP断路器（手车式）内部控制原理图
Internal Control Schematic Drawing for VHP Circuit Breaker (Truck Type)



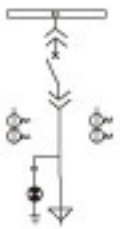
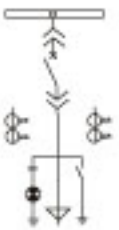
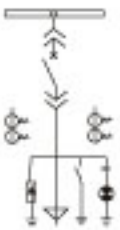
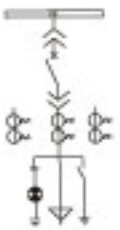
图四　KYN28A-24 开关设备配用VHP-24 真空断路器典型控制回路图

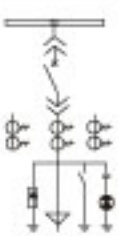
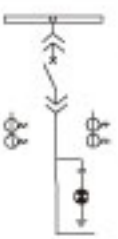
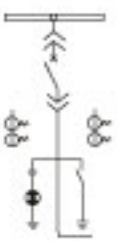
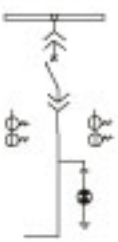
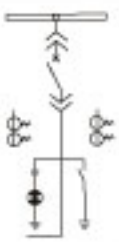
Typical Control Circuit Diagram for KYN28A-24 Switchgear with VHP-24 VCB

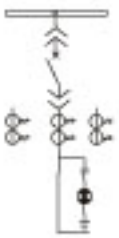
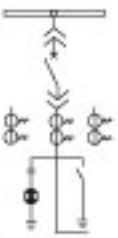
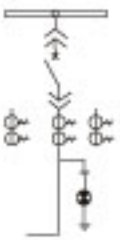
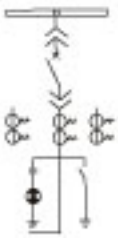
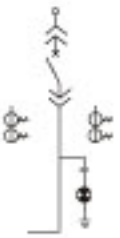


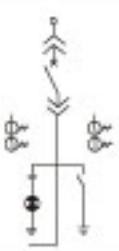
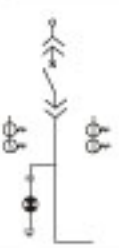
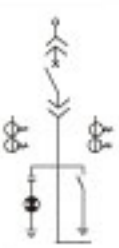
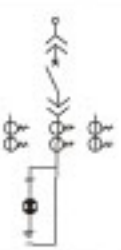
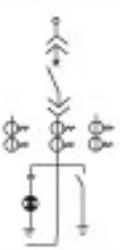
图五　开关设备安装基础及底板开孔尺寸图
Installing Foundation and holes piercing on bottom plate

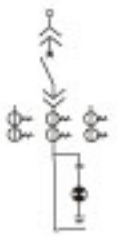
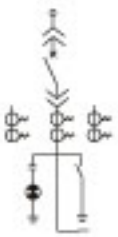
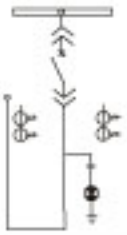
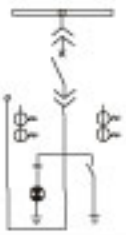
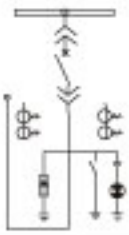
一次接线方案 Schemes for primary connection

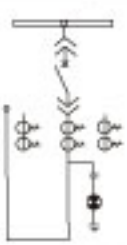
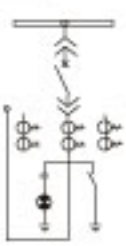
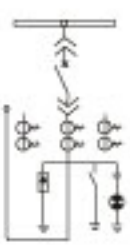
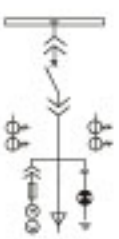
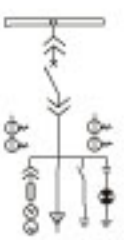
方案编号 Scheme No.		001	002	003	004	005
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	2	2	2	3	3
	电压互感器JDZX11-20/JDZX11-20 PT					
	高压熔断器XRNP-24 0.5A HV Fuse					
	接地开关JN15-24 ES		1	1		1
	避雷器HY5WZ-32/84 Surge Arrester			3		
用途 Application		受电、馈电 Electricity acceptance, feeding	馈电 Feeding	馈电 Feeding	受电、馈电 Electricity acceptance, feeding	馈电 Feeding

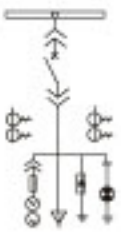
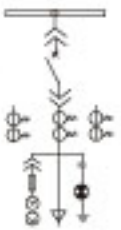
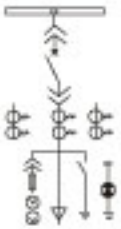
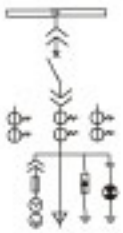
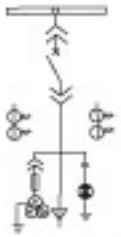
方案编号 Scheme No.		006	007	008	009	010
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	3	2	2	2	2
	电压互感器JDZX11-20/JDZX11-20 PT					
	高压熔断器XRNP-24 0.5A HV Fuse					
	接地开关JN15-24 ES	1		1		1
	避雷器HY5WZ-32/84 Surge Arrester	3				
用途 Application		馈电 Feeding	联络（右） Coupling to right	联络（右） Coupling to right	联络（左） Coupling to left	联络（左） Coupling to left

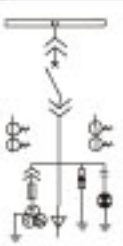
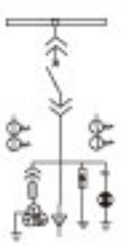
方案编号 Scheme No.		011	012	013	014	015
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	3	3	3	3	2
	电压互感器JDZX11-20/JDZX11-20 PT					
	高压熔断器XRNP-24 0.5A HV Fuse					
	接地开关JN15-24 ES		1		1	
	避雷器HY5WZ-32/84 Surge Arrester					
用途 Application		联络（右）Coupling to right	联络（右）Coupling to right	联络（左）Coupling to left	联络（左）Coupling to left	架空进线(左联络) Overhead incoming (left coupling)

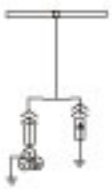
方案编号 Scheme No.		016	017	018	019	020
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	2	2	2	3	2
	电压互感器JDZX11-20/JDZX11-20 PT					
	高压熔断器XRNP-24 0.5A HV Fuse					
	接地开关JN15-24 ES	1		1		1
	避雷器HY5WZ-32/84 Surge Arrester					
用途 Application		架空进线(左联络) Overhead incoming (left coupling)	架空进线(右联络) Overhead incoming (right coupling)	架空进线(右联络) Overhead incoming (right coupling)	架空进线(左联络) Overhead incoming (left coupling)	架空进线(左联络) Overhead incoming (left coupling)

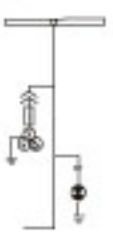
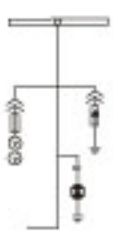
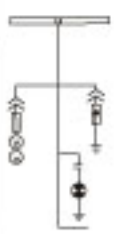
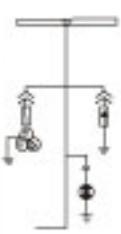
方案编号 Scheme No.		021	022	023	024	025
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	3	3	2	2	2
	电压互感器JDZX11-20/JDZX11-20 PT					
	高压熔断器XRNP-24 0.5A HV Fuse					
	接地开关JN15-24 ES		1		1	1
	避雷器HY5WZ-32/84 Surge Arrester					3
用途 Application		架空进线(右联络) Overhead incoming (right coupling)	架空进线(右联络) Overhead incoming (right coupling)	架空进出线 Overhead incoming	架空进出线 Overhead incoming	架空进出线 Overhead incoming

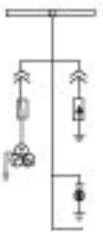
方案编号 Scheme No.		026	027	028	029	030
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	3	3	3	2	2
	电压互感器JDZX11-20/JDZX11-20 PT				2/	2/
	高压熔断器XRNP-24 0.5A HV Fuse				3	3
	接地开关JN15-24 ES		1	1		1
	避雷器HY5WZ-32/84 Surge Arrester			3		
用途 Application		架空进出线 Overhead incoming	架空进出线 Overhead incoming	架空进出线 Overhead incoming	受电、馈电 Electricity acceptance, feeding	馈电 Feeding

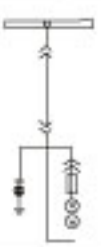
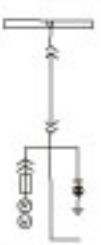
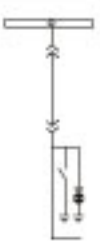
方案编号 Scheme No.		031	032	033	034	035
一次线路图 Primary circuit						
额定电流（A） Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	2	3	3	3	2
	电压互感器JDZX11-20/JDZX11-20 PT	2/	2/	2/	2/	3/
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES			1		
	避雷器HY5WZ-32/84 Surge Arrester	3			3	
用途 Application		受电、馈电 Electricity acceptance, feeding	受电、馈电 Electricity acceptance, feeding	馈电 Feeding	受电、馈电 Electricity acceptance, feeding	受电、馈电 Electricity acceptance, feeding

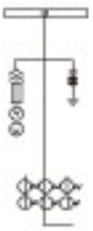
方案编号 Scheme No.		036	037	038	039	040
一次线路图 Primary circuit						
额定电流（A） Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1			
	电流互感器LZZB9-24 CT	2	2			
	电压互感器JDZX11-20/JDZX11-20 PT	/3	/3	2/	/3	2/
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES	1				
	避雷器HY5WZ-32/84 Surge Arrester	3	3			3
用途 Application		馈电 Feeding	受电、馈电 Electricity acceptance, feeding	电压测量 Voltage measurement	电压测量 Voltage measurement	电压测量+避雷器 Voltage measurement + Surge arrester

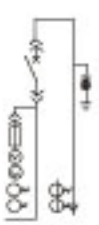
方案编号 Scheme No.		041	042	043	044	045
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB					
	电流互感器LZZB9-24 CT					
	电压互感器JDZX11-20/JDZX11-20 PT	/3	2/	/3	2/	3/
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester	3	3	3		
用途 Application		电压测量+避雷器 Voltage measurement + Surge arrester	电压测量+避雷器 Voltage measurement + Surge arrester	电压测量+避雷器 Voltage measurement + Surge arrester	电压测量+左联 Voltage measurement + Left coupling	电压测量+右联 Voltage measurement + Right coupling

方案编号 Scheme No.		046	047	048	049	050
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1			
	电流互感器LZZB9-24 CT					
	电压互感器JDZX11-20/JDZX11-20 PT	/3	/3	2/	2/	/3
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester			3	3	3
用途 Application		电压测量+左联 Voltage measurement + Left coupling	电压测量+右联 Voltage measurement + Right coupling	电压测量+避雷器+左联 Voltage measurement + Arrester + Left coupling	电压测量+避雷器+右联 Voltage measurement + Arrester + Right coupling	电压测量+避雷器+左联 Voltage measurement + Arrester + Left coupling

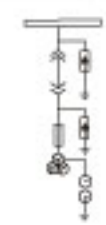
方案编号 Scheme No.		051	052	053	054	055
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB					
	电流互感器LZZB9-24 CT					
	电压互感器JDZX11-20/JDZX11-20 PT	/3				
	高压熔断器XRNP-24 0.5A HV Fuse	3				
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester	3				
用途 Application		电压测量+避雷器+右联 Voltage measurement + Arrester + Right coupling	联络（右） Coupling to right	联络（左） Coupling to left	隔离 Isolation	隔离+联络（左） Isolation + Left coupling

方案编号 Scheme No.		056	057	058	059	060
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB					
	电流互感器LZZB9-24 CT					
	电压互感器JDZX11-20/JDZX11-20 PT		2/	2/		
	高压熔断器XRNP-24 0.5A HV Fuse		3	3		
	接地开关JN15-24 ES					1
	避雷器HY5WZ-32/84 Surge Arrester					
用途 Application		隔离+联络（右） Isolation + Right coupling	隔离+联络(左)+电压测量 Isolation + Left coupling + Voltage measurement	隔离+联络(右)+电压测量 Isolation + Right coupling + Voltage measurement	电缆进出线 Cable incoming and outgoing	隔离 Isolation

方案编号 Scheme No.		061	062	063	064	065
一次线路图 Primary circuit						
额定电流 (A) Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB					
	电流互感器LZZB9-24 CT	2	2	3	3	2
	电压互感器JDZX11-20/JDZX11-20 PT	2/	2/	2/	2/	/3
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester					
用 途 Application		计量+右联 Metering + Right coupling	计量+左联 Metering + Left coupling	计量+左联 Metering + Left coupling	计量+右联 Metering + Right coupling	计量+左联 Metering + Left coupling

方案编号 Scheme No.		066	067	068	069	070
一次线路图 Primary circuit						
额定电流 (A) Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB				1	1
	电流互感器LZZB9-24 CT	2	3	3	2	2
	电压互感器JDZX11-20/JDZX11-20 PT	/3	/3	/3	2/	2/
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester					
用 途 Application		计量+右联 Metering + Right coupling	计量+左联 Metering + Left coupling	计量+右联 Metering + Right coupling	进线+计量 Incoming + Metering	进线+计量 Incoming + Metering

方案编号 Scheme No.		071	072	073	074	075
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1	1	1	1	1
	电流互感器LZZB9-24 CT	3	3	2	2	3
	电压互感器JDZX11-20/JDZX11-20 PT	2/	2/	/3	/3	/3
	高压熔断器XRNP-24 0.5A HV Fuse	3	3	3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester					
用途 Application		进线+计量 Incoming + Metering	进线+计量 Incoming + Metering	进线+计量 Incoming + Metering	进线+计量 Incoming + Metering	进线+计量 Incoming + Metering

方案编号 Scheme No.		076	077	078	079	080
一次线路图 Primary circuit						
额定电流（A）Rated current		630-3150				
一次主要电器元件 Primary main apparatus	真空断路器VHP-24 VCB	1				
	电流互感器LZZB9-24 CT	3				
	电压互感器JDZX11-20/JDZX11-20 PT	/3	变压器由用户自选推荐选用干变 1	并联电容器 Bm24/.3-16-1 3	/4	/4
	高压熔断器XRNP-24 0.5A HV Fuse	3	XRNT3	XRNT3	3	3
	接地开关JN15-24 ES					
	避雷器HY5WZ-32/84 Surge Arrester			3	3	3
用途 Application		进线+计量 Incoming + Metering	所用变压器柜 (配变压器外形尺寸定) Aux. Transformer cubicle	电容器柜 Condenser cubicle	电压测量+避雷器 Voltage measurement + Arrester	电压测量+避雷器 Voltage measurement + Arrester

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