ECC®

# KYN61-40.5

## 铠装移开式交流金属封闭开关柜

Metal-clad Withdrawout High Voltage Cubicle

中国·上海中科电气集团

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上海人民电力设备股份有限公司

SHANGHAI RENMIN ELECTRIC POWER EQUIPMERIL CO., LTD.

ECC
China-Science

## 概述

KYN61-40.5(Z)型铠装移开式交流金属封闭开关柜（以下简称开关柜）系三相交流量50Hz、额定电压40.5kV的户内成套配电装置。作为发电厂、变电站及工矿企业接受和分配电能之用、对电路起到控制、保护和检测等功能，还可用于频繁操作的场所。本开关柜符合GB/T11022-1999、GB3906-1991及DL404-1997等标准。

## Brief

KYN61 – 40.5 (Z) Metal-clad Withdrawout AC Metal-enclosed Switchgear ( hereinafter referred to as the Cubicle in short ) is an indoor three-phase AC 50Hz complete set distributing equipment with rated voltage 40.5kV for electric power acceptance and distribution in power plants, substations, industrial and mineral enterprises as well as for circuit control, protection and metering in places where frequent operations are needed. The Cubicle complies with GB/T11022 – 1999, GB3906 – 1991 and DL 404 – 1997 Standards.

## 主要特点

- 柜体结构采用组装式，断路器采用手车落地式结构；
- 配用全新型复合绝缘真空断路器，并具有互换性好更换简单之特点；
- 手车车架中装有丝杠螺母推进机构，可轻松移动手车，并防止误操作而损坏推进结构；
- 所有的操作均可在柜门关闭状态下进行；
- 主开关、手车、开关柜门之间的联锁均采用强制性机械闭锁方式，满足“五防”功能；
- 电缆室空间充裕，可连接多根电缆；
- 快速接地开关用于接地和回路短路；
- 外壳防护等级IP3X，手车室门打开状态下，防护等级IP2X；
- 产品符合GB3906-1991、DL404-1997及参照采用国际IEC-298标准。

## Main Features

- Set up frame body and standing breaker truck structure;
- Brand new synthetic insulating vacuum circuit breakers featuring full interchangeability and easy displacement;
- Threaded shaft and nut propelling mechanism mounted on truck support moves truck just as easily and freely without mal-operation resulting in damaging it;
- Every and all operations may be realized when the cubicle door is closed;
- Compulsory mechanical block among master circuit breaker, truck and cubicle door satisfies so called “5 preventive” functions;
- Multiple cables may be connected at spacious cable compartment;
- High speed earth switch is applied for the purpose of earthing and circuit shorting.
- Class of protection for enclosure is IP3X whereas IP2X for those with truck compartment door open;
- The product complies with GB3906–1991, DL404 – 1997 and equivalent IEC Standards.

## 使用环境条件

- 环境温度：
  上限+40℃，且24h内测得的平均值不超过35℃，下限-10℃。
- 海拔高度：
  海拔不超过1000m。
- 相对温度：
  日平均值不超过95%，月平均值不超过90%。
- 地震烈度：
  不超过8度。
- 水蒸汽压力：
  日平均值不超过2.2kPa，月平均值不超过1.8kPa。
- 周围环境：
  无火灾、爆炸危险、严重污秽、化学腐蚀及剧烈振动的场所。

## Working Conditions

- Ambient temperature:
  Max. +40℃ and Min. -10℃ with average value within 24 hours not over 35℃.
- Altitude:
  Not exceeding 1000 meters above sea level.
- Relative humidity:
  Daily average not over 95% and monthly average not over 90%.
- Earthquake intensity:
  No greater than Force 8.
- Steam pressure:
  Daily average not over 2.2kPa and monthly average not over 1.8kPa.
- Ambient environment:
  No potential conflagration, nor explosion risk, without severe pollution, chemical corrosion, nor severe shock.

## 技术参数 Technical parameters

### 真空开关柜主要技术参数 Main technical parameters for vacuum cubicle

表1

| 序 号 No | 名 称 Description | 单 位 Unit | 数 值 Value |
|---|---|---|---|
| 1 | 额定电压 Rated voltage | kV | 40.5 |
| 2 | 额定电流 Rated current | A | 1250, 1600, 2000 |
| 3 | 额定频率 Rated frequency | Hz | 50 |
| 4 | 额定短时耐受电流 Rated short time withstand current | kA | 20, 25, 31.5 |
| 5 | 额定峰值耐受电流 Rated peak value withstand current | kA | 50, 63, 80 |
| 6 | 额定工频耐受电压 Rated power frequency withstand voltage | kV | 95/1min |
| 7 | 额定雷电冲击耐受电压 Rated Lightning Impulse withstand voltage | kV | 185 |
| 8 | 额定短路持续时间 Rated short circuit duration | ms | 4 |
| 9 | 防护等级 Class of protection | | IP3X |

### 真空断路器主要技术参数 Main technical parameters for vacuum circuit breaker

表2

| 序 号 No | 名 称 Description | 单 位 Unit | 数 值 Value |
|---|---|---|---|
| 1 | 额定电压 Rated voltage | kV | 40.5 |
| 2 | 额定电流 Rated current | A | 1250, 1600, 2000 |
| 3 | 额定频率 Rated frequency | Hz | 50 |
| 4 | 额定短时耐受电流 Rated short time withstand current | kA | 20, 25, 31.5 |
| 5 | 额定短时开断电流 Rated short circuit breaking current | kA | 20, 25, 31.5 |
| 6 | 额定峰值耐受电流 Rated peak value withstand current | kA | 50, 63, 80 |
| 7 | 额定工频耐受电压 Rated power frequency withstand voltage | kV | 95/1min |
| 8 | 额定雷电冲击耐受电压 Rated Lightning Impulse withstand voltage | kV | 185 |
| 9 | 额定短路持续时间 Rated short circuit duration | ms | 4 |
| 10 | 分闸时间 Closing time | ms | 30≤ t ≤ 60 |
| 11 | 合闸时间 Opening time | ms | 50≤ t ≤ 100 |
| 12 | 额定短时开断电流次数 Rated short circuit current breaking operations | 次 | 20 |
| 13 | 机械寿命 Mechanical endurance | 次 | 10000 |

### 弹簧操动机械主要技术参数 Main technical parameters for spring operating mechanism

表3

| 名 称 Description | | 单 位 Unit | 数 值 Value |
|---|---|---|---|
| 额定操作电压 Rated operating voltage | 分闸线圈 Trip coil | V | DC220/110 AC220/110 |
| | 合闸线圈 Closing coil | | |
| 额定操作电流 Rated operating current | 分闸线圈 Trip coil | A | 0.96 (220V) 1.05 (110V) |
| | 合闸线圈 Closing coil | | |
| 储能电机功率 Power consumption of charging motor | | W | 230 |
| 储能电机额定电压 Rated voltage of charging motor | | V | DC220/110, AC220/110 |
| 储能时间 Energy charging time | | S | ≤ 12 |

## 开关柜结构说明

开关柜按GB3906–1991和IEC298中铠装式金属封闭开关设备标准而设计。整体由柜体和可抽出部分（手车）两部分组成。柜体结构为组装式，用螺栓栓接组合成型。用金属隔板将开关柜内部分隔为断路器室、主母线室、电缆室和继电器仪表室。外壳防护等级达到IP3X，各隔室间防护等级为IP2X，并且所有金属结构件可靠接地，主回路系统的各隔室有独立排气的压力释放通道。

### 外壳与隔板

开关柜的外壳和隔板是用冷轧钢板经数控机床加工和折弯之后栓接而成。因此装配好的开关柜能保证结构尺寸的统一性。开关柜被隔为断路器室、主母线室、电缆室和继电器仪表室，各部分以接地的金属隔板分隔。

### 手车

手车根据用途可分为断路器手车、电压互感器手车、计量手车、隔离手车等，各类手车的外型尺寸相同，相同用途的手车具有互换性。手车在柜内有实验/隔离位置和工作位置，每一次位置都设有联琐装置以保证手车处于以上两位置时不能随便移动。

### 断路器隔室

断路器隔室内安装了特定的轨道供手车移动。断路器在试验位置与工作位置之间移动时，隔离活门自动打开或关闭，保障了工作人员不触及带电体。手车可在柜门关闭的情况下被操作，通过观察窗可看到手车在柜内所处的位置，同时看到手车上的任何功能标志。

## Structure

The switchgear is designed as per IEC 298 and China National Standard GB 3906 – 1991 "Metal-clad and Metal-enclosed Switchgear". It may be divided into two parts: cubicle frame and withdrawable (truck) parts. Cubicle frame is of set up style, combined with bolts and nuts. Metal partitions separate the internal cubicle into circuit breaker compartment, main busbar compartment, cable compartment and relay and instrument compartment. The class of protection for the enclosure is up to IP3X, and for the compartments in between is IP2X with all metal structural parts reliably earthed. The compartments for main circuit is equipped with independent ventilating pressure release channels.

### Enclosure and partition

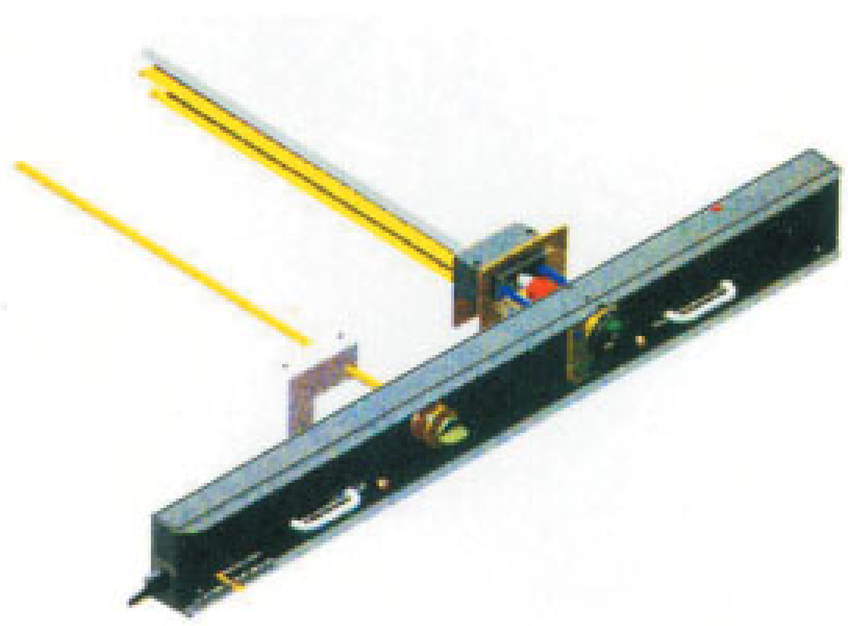
The enclosure and partition of the switchgear is made of cold rolled steel sheet formed by machining and bending with digital controlled machines and then is bolted. And therefore, a completed switchgear is highly uniformed in terms of structural construction. The cubicle may be separated into circuit breaker compartment, main busbar compartment, cable compartment, relay and instrument compartment with earthed metal partitions in between.

### Truck

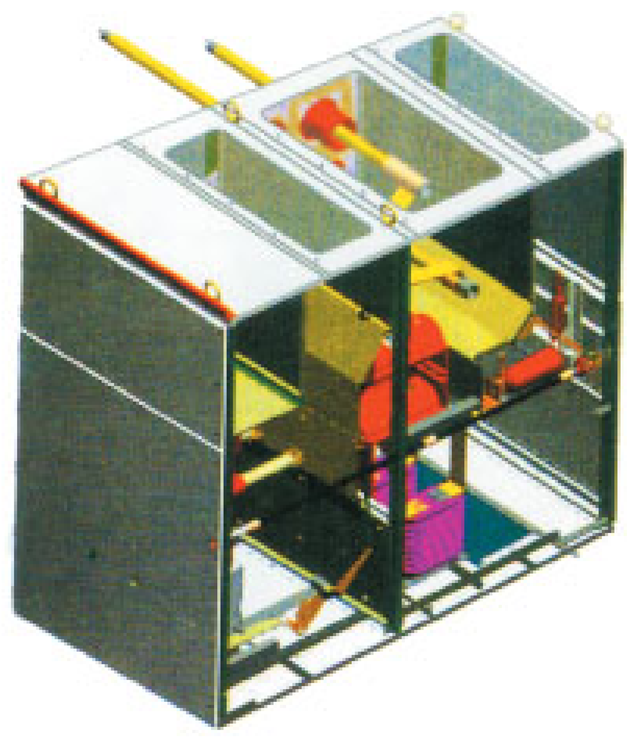
In light of application, the truck may be called circuit breaker truck, potential transformer truck, metering truck, isolating truck and so on. The overall dimensions of different trucks are same and the same kind trucks have total interchangeability. In the cubicle, the truck has its test/isolated position and working position. Each position has its locking device so as to guarantee the truck locked in the said position without any displacing by accidents.

### Circuit breaker compartment

There is a particular rail equipped for truck to move in the circuit breaker compartment. When a circuit breaker compartment move between test position and working position, the isolating shutter will be open or closed automatically so as to prevent operators from contacting live parts. The truck may be operated when the cubicle door is closed. Through a viewing window, the position and any legend on the truck can be seen clearly.



推进联锁装置



KYN61–40.5（Z）铠装式手车柜

■ 母线小室

主母线从一个开关柜引至另一个开关柜通过分支小母线和静触头盒固定，在穿越邻柜侧板时用母线套管固定。全部母线采用复合绝缘方式。

■ 电缆隔室

电缆室可安装PT、接地开关、避雷器和多根电缆。

■ 继电器室

继电器室内板和面板可安装控制、保护元件、计量、显示仪表、带电监测批示器等二次元件。

■ 联锁装置

开关柜具有可靠的联缩装置，切实保障了操作人员及设备的安全：

当接地开关在分闸位置时，手车才能从试验/隔离位置移至工作位置；且后门不可能打开，防止了误入带电间隔。

当手车完全拉出柜外时或手车在柜内试验/隔离位置且接地开关联锁解锁时，可以进行接地开关合闸操作；手车在工作位置时，不能闭合接地开关。防止了带电误合接地开关，阻止了接地开关处在闭合位置时将手车移至工作位置。

断路器手车在试验/隔离位置或工作位置时，才能操作断路器；且断路器合闸后，手车无法移动，防止了带电负荷误推拉断路器。

各柜体间可装电气联锁。

■ 接地装置

在电缆室内，单独设有6×50mm²的接地母线，此母线能贯穿相邻各柜，与柜体良好接触。

■ **Busbar compartment**

The busbar from cubicle to cubicle is fixed with branch busbar and fixed contact box whereas the busbar going through a side wall of a vicinity cubicle is fixed with a busbar bushing. All busbar is synthetic insulated.

■ **Cable compartment**

PT, earth switch, surge arrester and several pieces of cable may be mounted in the cable compartment.

■ **Relay compartment**

On the panel and internal plate of the compartment, secondary components such as control and protective components, meters and indicating instruments, live monitoring devices may be mounted.

■ **Interlocking device**

With reliable interlocking device, the cubicle really ensures safety of both equipment and operators.

Only when the earth switch is in opening position can the truck be moved from test/isolated position to working position and still, the rear door is then impossible to be open so as to prevent operators from access to live bays.

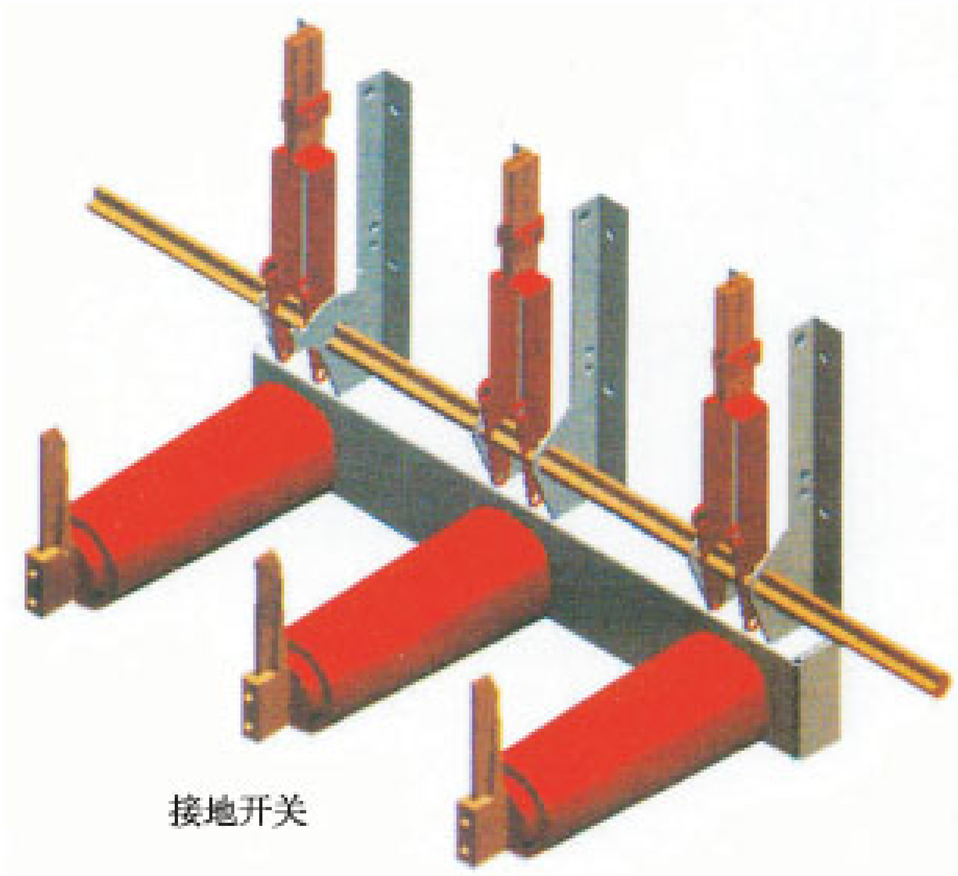
When the truck is fully pulled out of the cubicle or the truck is in test/isolated position in the cubicle with interlocking of earth switch disabled, the earth switch can be in closing operation. When the truck is in working position, the earth switch is impossible to be closed.

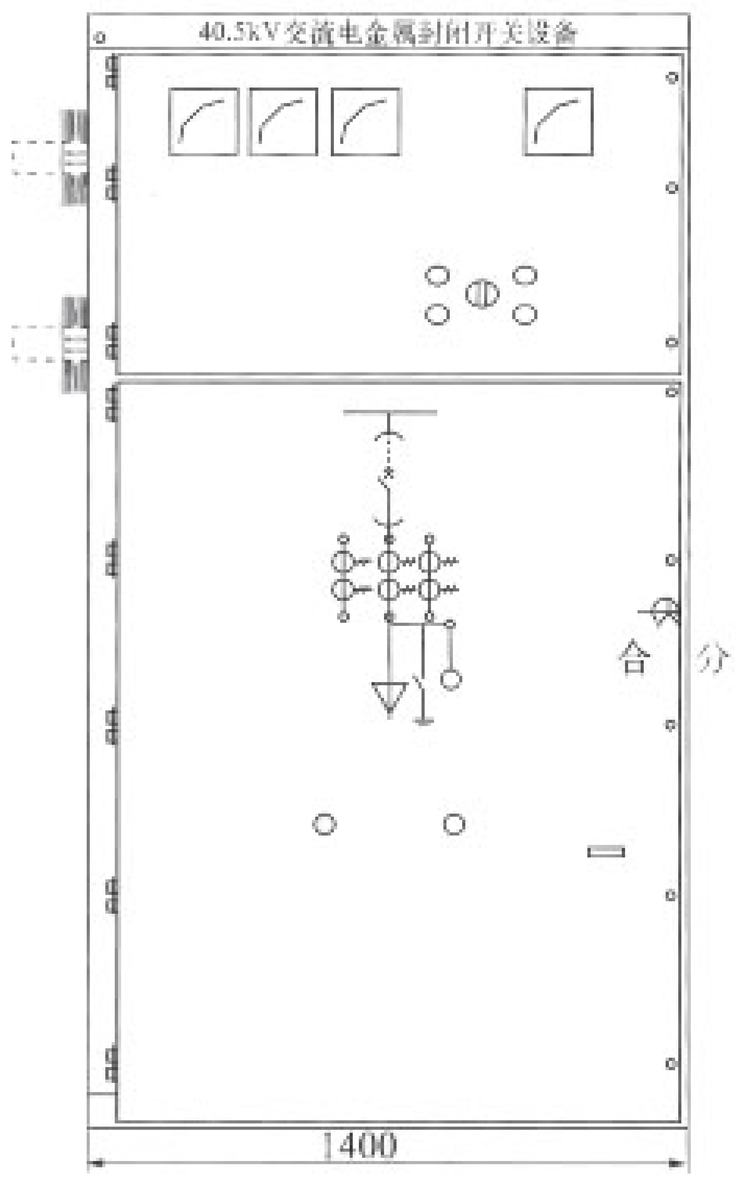
Only when the circuit breaker truck is in test/isolated position or working position can the circuit breaker be operated. And when the circuit breaker is in closed position, the truck is impossible to move.

The electric interlocking between cubicles is possible.

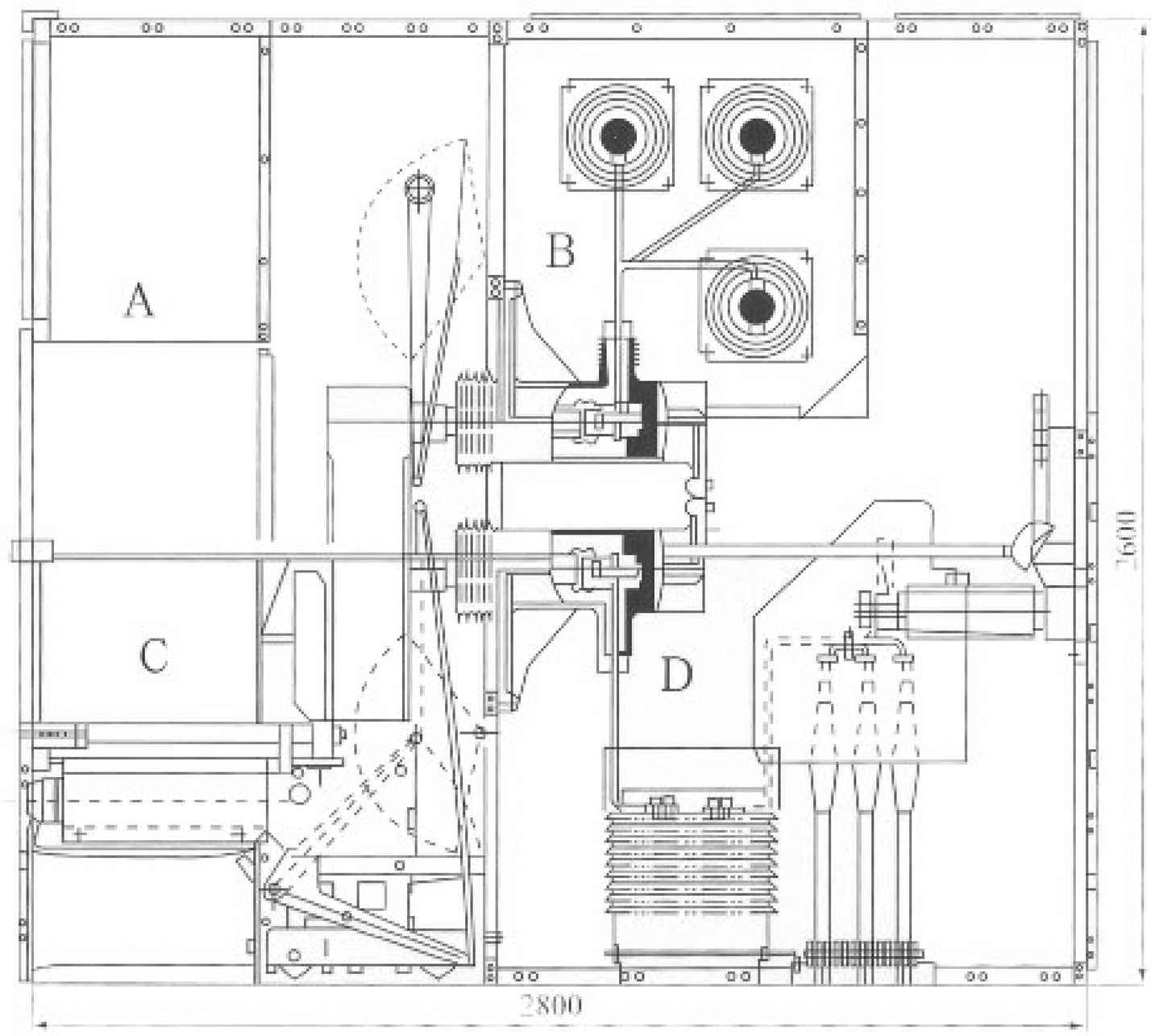
■ **Earthing device**

In the cable compartment, there is an individually set 6 × 50mm² earthing busbar breakthrough vicinity cubicles with well contact to cubicle frames.






开关柜外型尺寸（Overall dimensions of the cubicle）
宽 X 深 X 高（MM）：1400 X 2800 X 2600

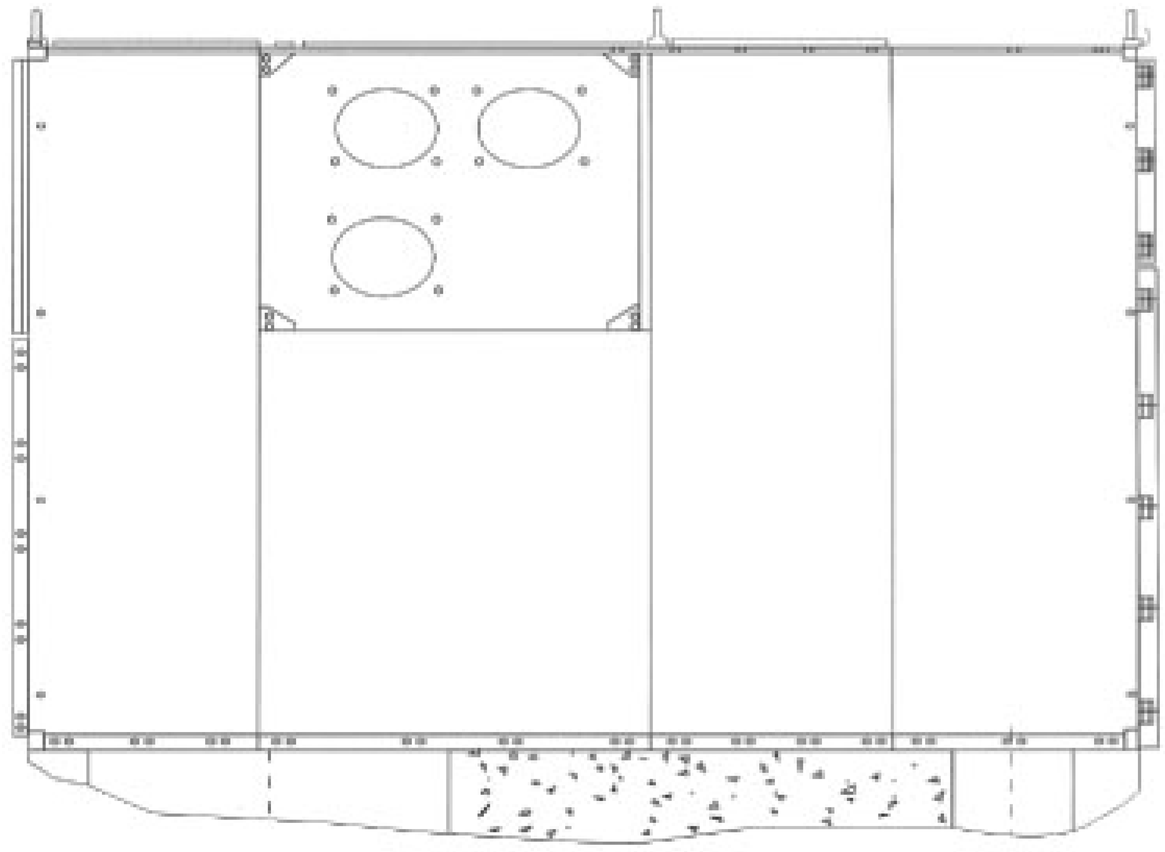


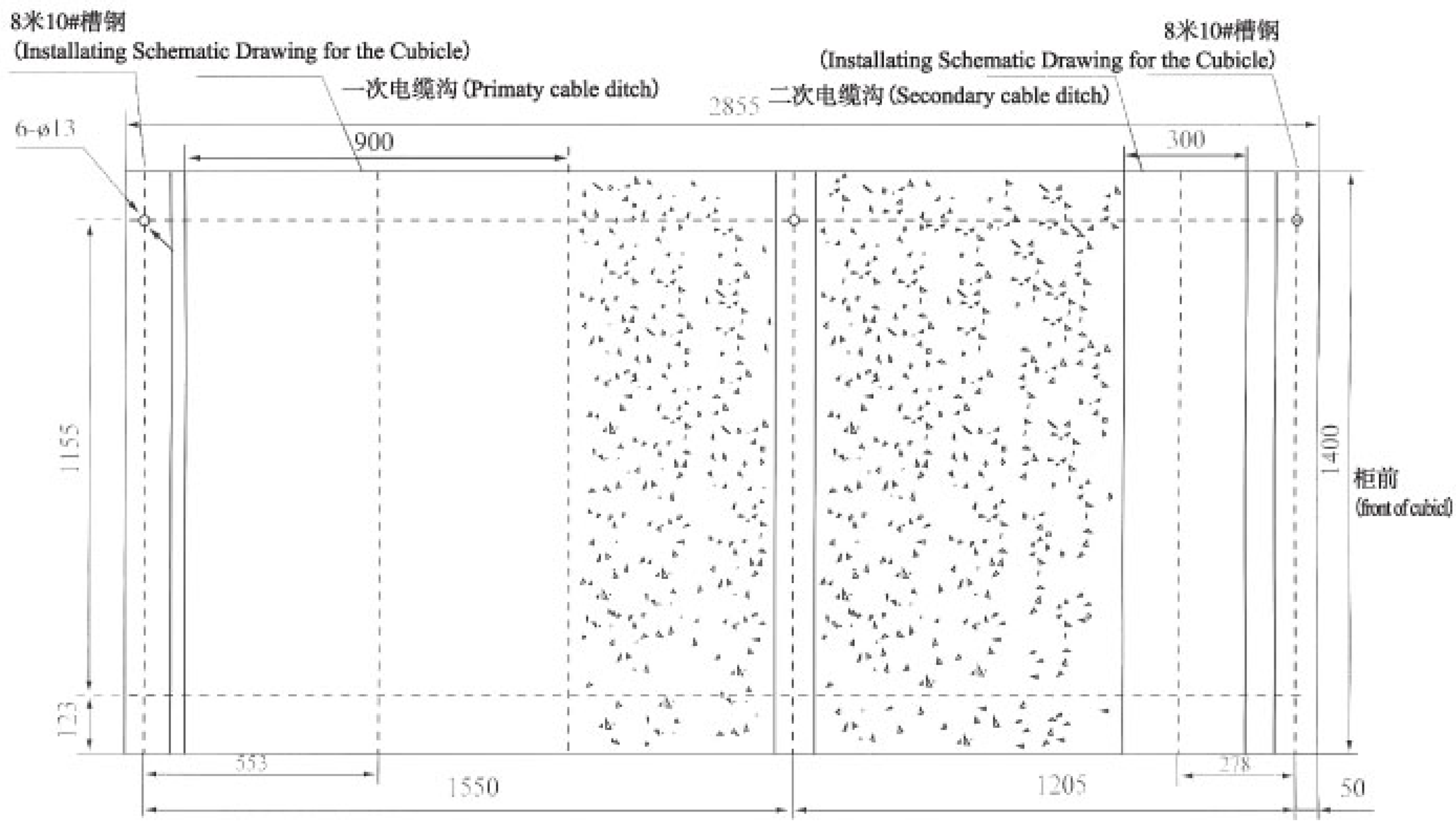

开关柜结构示意图（Schematic drawing of the cubicle）
A：继电器仪表室（Relay and instrument compartment）B：母线室（Busbar compartment）
C：断路器室（Circuit breaker compartment）D：电缆室（Cable compartment）

## 开关柜的安装 Installation

- 电器室的高度：≥4500mm；
  Height of apparatus compartment:
- 柜后距墙距离：≥1500mm；
  Distance between wall and rear plate
- 基础构架的平面度：≤1mm/m²；
  Surface incline on foundation support
- 基础预埋槽钢高出地面部分不得超过3mm；
  Above ground part of pre-immerged channel steel is not over 3mm higher than ground
- 可用螺栓或焊接方式固定在基础上；
  Cubicle may be fixed on foundation with bolts or welding
- 开关柜重量约1800Kg；
  The weight of the cubicle is about 1800kg
- 开关柜操作走廊宽度（单列）：
  The width of operating corridor:

  ≥3000mm，双列（面对面）≥4000mm。
  For single row arranged: ≥ 3000mm
  For double row arranged: ≥ 4000mm






开关柜安装基础示意图
（Installating Schematic Drawing for the Cubicle）

## 订货须知

- 订货时用户需提供以下资料：
  - 一次线路主方案编号、单母线系统图、排列图及平面布置图；
  - 二次回路电气原理图及端子排列图；
  - 开关柜电器元件的型号、规格及数量；
  - 主母线、分支母线的规格及材质；
  - 备品、备件的名称及数量；
  - 特殊要求同厂方商定。

### 说明

因产品技术需不断改进，所有数据应以本厂技术部门最新确认为准，如有变动，恕不另行通知。

## Notice for order

- **User shall submit following material when placing an order:**
  - Primary circuit main scheme No. single bus system diagram, layout diagram, floor chart;
  - Secondary circuit electric diagram and terminal layout diagram;
  - Model,specification and quantity of switchboard elements;
  - Specifications and material of main bus and branch bus;
  - Spare parts name and quantity;
  - If you have any special requirements,please negotiatewith manufacturer;

### Note

Because the product technology needs to be changed continuously, all data are referred to the latest confirmation from our technology department,The specification is subject to change without otherwise notice.

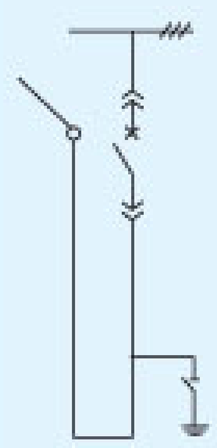
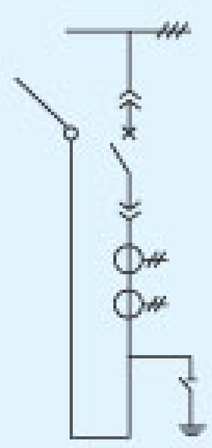
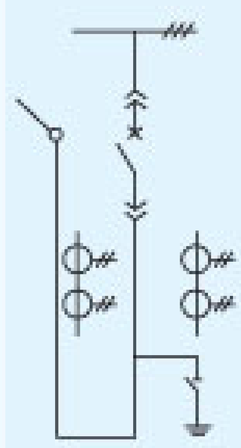
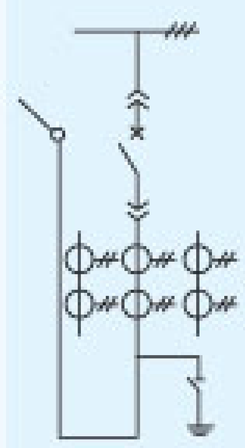
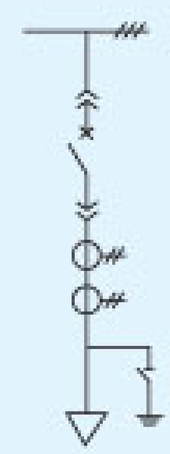
## 一次接线方案

开关柜的一次接线方案有27个常用典型方案，能满足用户电缆进出线、架空进出线，联络及测量、保护等的需要，若有不同与现有方案的其他方案的需要，请与厂商协商。

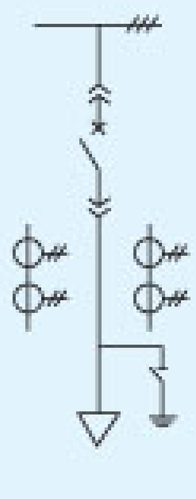
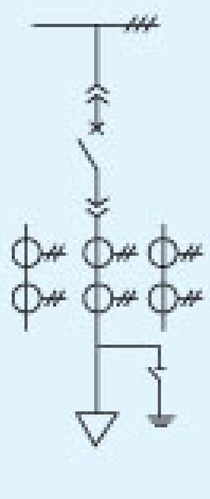
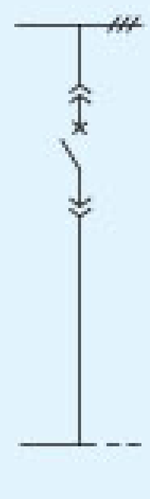
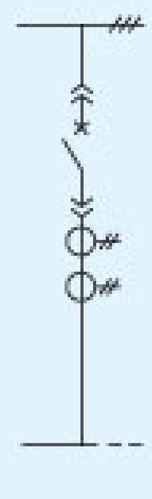
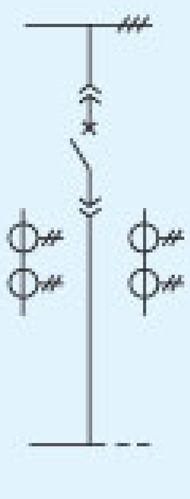
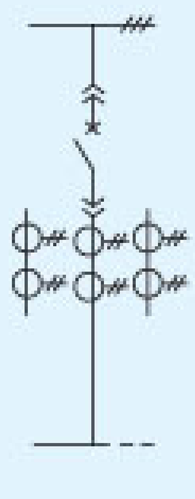
## Primary connection scheme

There are 27 typical schemes to satisfy multiple demands of our customers such as cable incoming and outgoing, overhead line incoming and outgoing, bus coupling and measurement, protection and others. If there is a need other than the following, please contact the manufacturer.

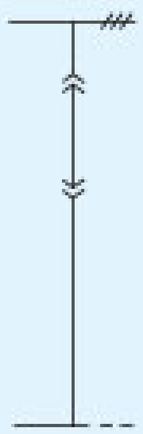
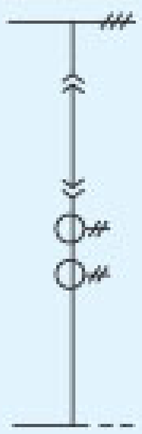
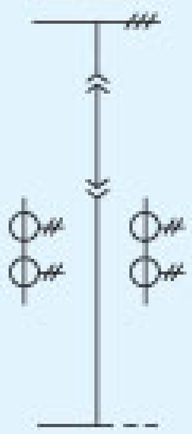
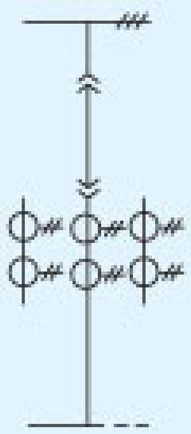
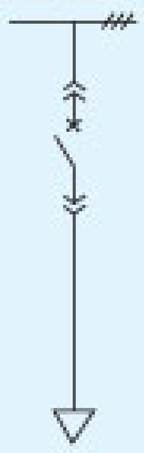
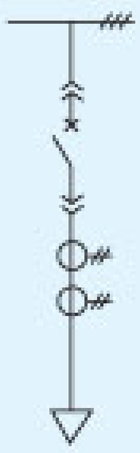
表 4 (Table 4)

| 方案号 Scheme NO. | | 01 | 02 | 03 | 04 | 05 | 06 |
|---|---|---|---|---|---|---|---|
| 一次线路图 Primary diagram | |  |  |  |  | |  |
| 额定电流 Rated current | | 1250, 2000 | | | | | |
| 主要元件 Main components | 断路器 ZF85-40.5 (Circuit breaker) | 1 | 1 | 1 | 1 | 1 | 1 |
| | 电流互感器 LZZBJ9-35A(Current transformer) | | 1 | 2 | 3 | | 1 |
| | 接地开关 JN-40.5/31.5 (Earth switch) | 1 | 1 | 1 | 1 | 1 | 1 |
| | 熔断器 XRNP-35 | | | | | | |
| | 避雷器 YH5WR-51/134Q | | | | | | |
| | | | | | | | |
| 用途 (Application) | | 架空出线 (Overhead outgoing) | 架空出线 (Overhead outgoing) | 架空出线 (Overhead outgoing) | 架空出线 (Overhead outgoing) | 电缆出线 (Cable outgoing) | 电缆出线 (Cable outgoing) |

续表 4 (Table 4)

| 方案号 Scheme NO. | | 07 | 08 | 09 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|
| 一次线路图 Primary diagram | |  |  |  |  |  |  |
| 额定电流 Rated current | | 1250, 2000 | | | | | |
| 主要元件 Main components | 断路器 ZF85-40.5 (Circuit breaker) | 1 | 1 | 1 | 1 | 1 | 1 |
| | 电流互感器 LZZBJ9-35A(Current transformer) | 2 | 3 | | 1 | 2 | 3 |
| | 接地开关 JN-40.5/31.5 (Earth switch) | 1 | 1 | | | | |
| | 熔断器 XRNP-35 | | | | | | |
| | 避雷器 YH5WR-51/134Q | | | | | | |
| | | | | | | | |
| 用途 (Application) | | 电缆出线 (Cable outgoing) | 电缆出线 (Cable outgoing) | 左(右)联络 (Coupling to left(right)) | 左(右)联络 (Coupling to left(right)) | 左(右)联络 (Coupling to left(right)) | 左(右)联络 (Coupling to left(right)) |

续表 4 (Table 4)

| 方案号 Scheme NO. | | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|
| 一次线路图 Primary diagram | |  |  |  |  |  |  |
| 额定电流 Rated current | | 1250, 2000 | | | | | |
| 主要元件 Main components | 断路器 ZF85-40.5 (Circuit breaker) | | | | | 1 | 1 |
| | 电流互感器 LZZBJ9-35A(Current transformer) | | 1 | 2 | 3 | | 1 |
| | 接地开关 JN-40.5/31.5 (Earth switch) | | | | | | |
| | 熔断器 XRNP-35 | | | | | | |
| | 避雷器 YH5WR-51/134Q | | | | | | |
| | | | | | | | |
| 用途 (Application) | | 隔离、联络 (Lsolation,Coupling) | 隔离、联络 (Lsolation,Coupling) | 隔离、联络 (Lsolation,Coupling) | 隔离、联络 (Lsolation,Coupling) | 电缆进线 (Cable incoming) | 电缆进线 (Cable incoming) |

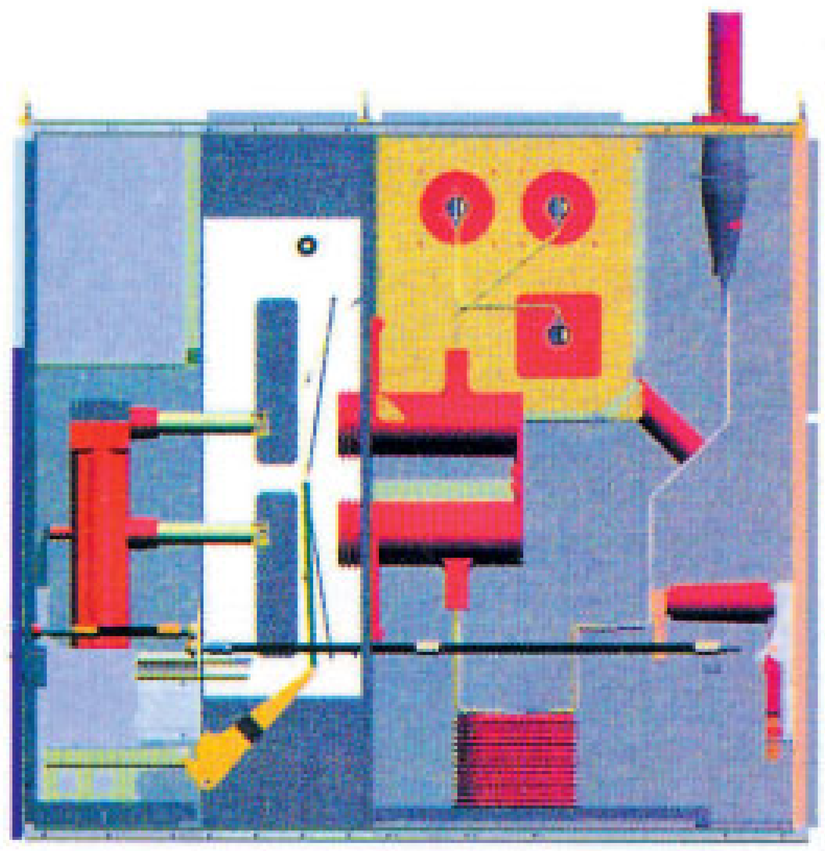
续表 4 (Table 4)

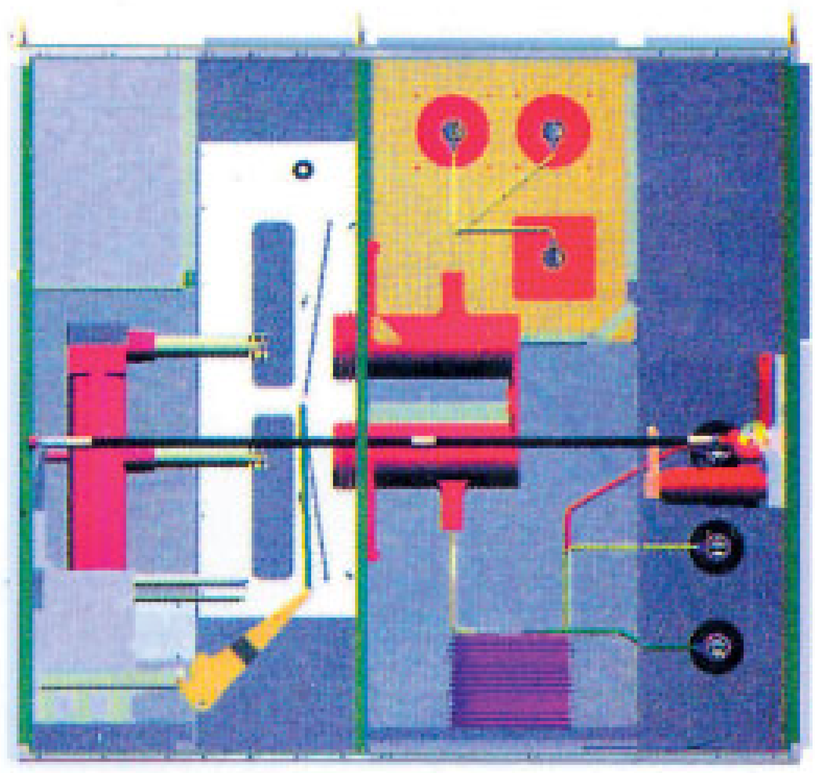
| 方案号 Scheme NO. | | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|
| 一次线路图 Primary diagram | | | | | | | |
| 额定电流 Rated current | | 1250, 2000 | | | | | |
| 主要元件 Main components | 断路器 ZF85-40.5 (Circuit breaker) | 1 | 1 | 1 | 1 | 1 | 1 |
| | 电流互感器 LZZBJ9-35A (Current transformer) | 2 | 3 | | 1 | 2 | 3 |
| | 接地开关 JN-40.5/31.5 (Earth switch) | | | | | | |
| | 熔断器 XRNP-35 | | | | | | |
| | 避雷器 YH5WR-51/134Q | | | | | | |
| | | | | | | | |
| 用途 (Application) | | 电缆进线 (Cable incoming) | 电缆进线 (Cable incoming) | 架空进线 (Overhead incoming) | 架空进线 (Overhead incoming) | 架空进线 (Overhead incoming) | 架空进线 (Overhead incoming) |

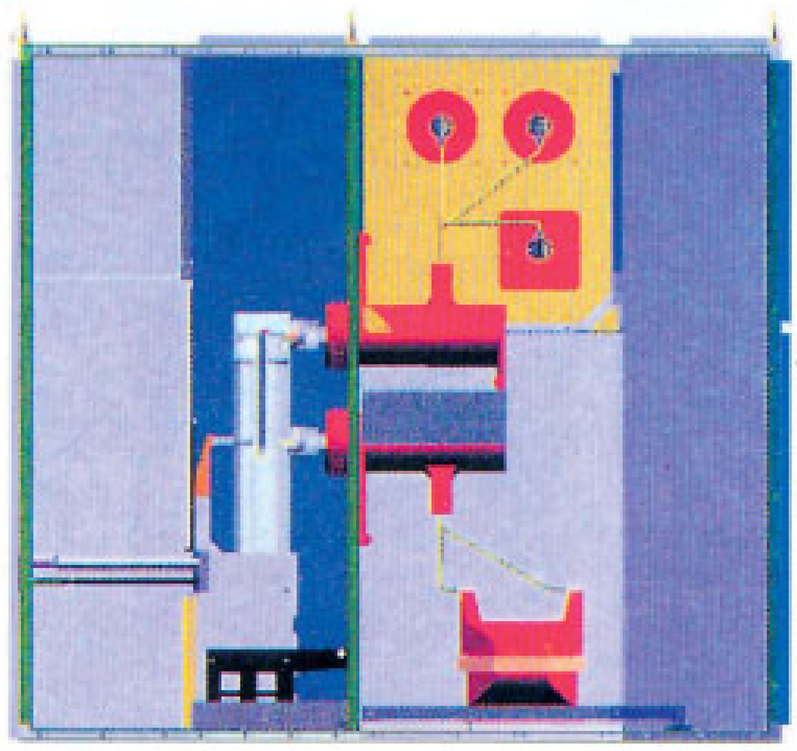
续表 4 (Table 4)

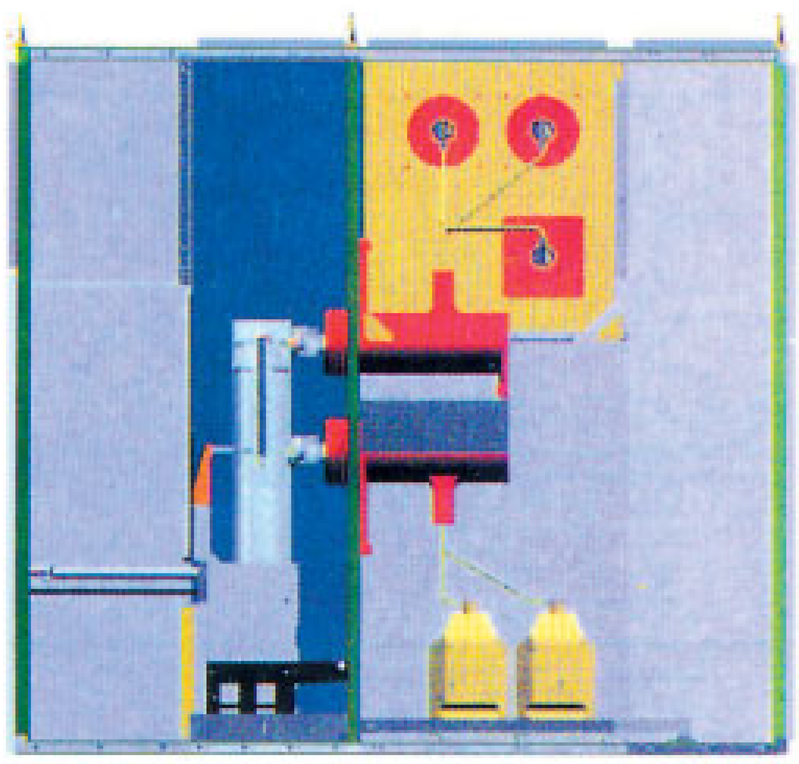
| 方案号 Scheme NO. | | 25 | 26 | 27 |
|---|---|---|---|---|
| 一次线路图 Primary diagram | | | | |
| 额定电流 Rated current | | 1250, 2000 | | |
| 主要元件 Main components | 断路器 ZF85-40.5 (Circuit breaker) | | | |
| | 电流互感器 LZZBJ9-35A (Current transformer) | 2 | 3 | |
| | 接地开关 JN-40.5/31.5 (Earth switch) | | | |
| | 熔断器 XRNP-35 | 3 | 3 | 3 |
| | 避雷器 YH5WR-51/134Q | 3 | 3 | |
| | | | | |
| 用途 (Application) | | 电压互感器 (PT) | 电压互感器 (PT) | 所用变 (Aux. transformer) |

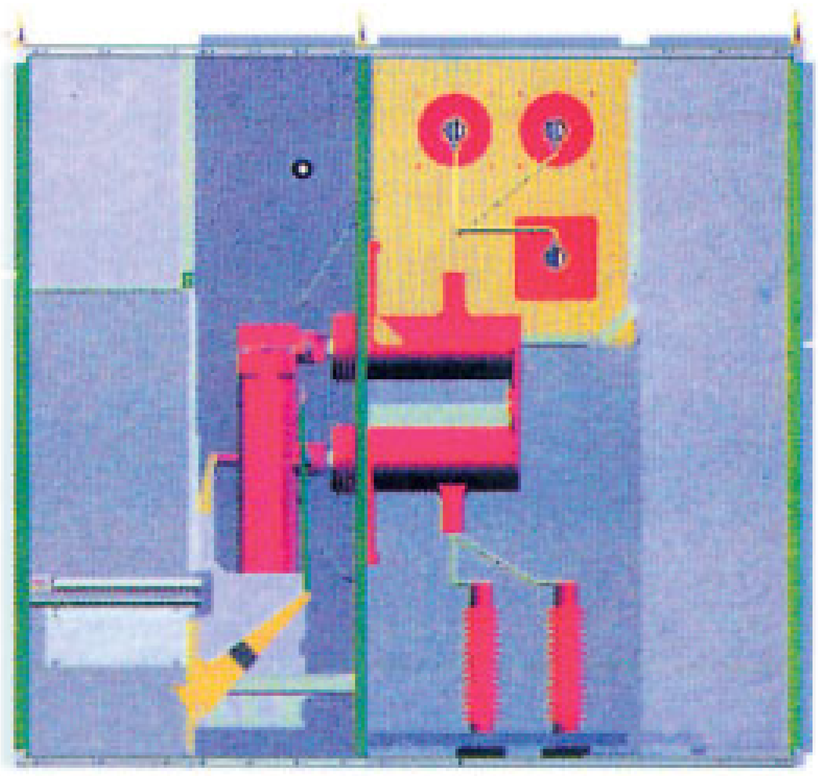
完善多样的主接线方案
Perfect and various primary connection schems











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