高压开关设备系列
High-voltage switchgear Series

科技革新/开创未来>
Teknologi Inovasi / Bright new future

Security, we want you to be more comprehensive.
KYN61-40.5
铠装移开式交流金属封闭开关设备

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。

KYN61-40.5 type alternating-current metal-clad and metal-enclosed withdrawable switchgear (hereinafter referred to as switchgear) is an indoor complete set of power distribution unit of three-phase AC50Hz and rated voltage of 40.5kV.Used for receiving and distributing the electric energy in power plants, transformer substations, mining and industrial enterprises, etc., it controls, protects and detects the circuits, also is applicable to frequent operation locations. This switchgear complies with GB/T11022-1999, GB3906-1991, DL404-1997, etc.

主要特点

1. 柜体结构采用组装式，断路器采用手车落地式结构；
2. 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；
3. 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；
4. 所有的操作均可在柜门闭合状态下进行；
5. 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；
6. 电缆室空间充裕，可连接多根电缆；
7. 快速接地开关用于接地和回路短路；
8. 外壳防护等级IP3X，手车室门打开状态下，防护等级IP2X；

1. Cabinet structure is of assembly type, the circuit breaker adopts floor type handcart structure;
2. Equipped with brand new composite insulated vacuum circuit breaker, is featured with good interchangeability, and is simple to change;
3. The handcart frame is mounted with lead screw nut propelling mechanism, it is able to move the handcart easily, and prevent damage of propelling mechanism caused by misoperation;
4. All operations can be carried out when the cabinet door is closed;
5. Interlocking among the main switch, handcart and switchgear adopts compulsory mechanical locking mode, meeting the “five preventions” function;
6. Cable chamber is large enough, it could connect multi cables;
7. The fast earthing switch is used for earthing and circuit short-circuit;
8. Degree of protection of the enclosure is IP3X, and is IP2X when the door of handcart chamber is opened;

正常使用条件

1. 环境温度：上限+40℃，且24h内测得的平均值不超过35℃，下限-10℃。
2. 海拔高度：不超过1000m
3. 相对湿度：日平均值不超过95％，月平均值不超过90％。
4. 地震烈度：不超过8度。
5. 水蒸汽压力：日平均值不超过2.2kPa，月平均值不超过1.8kPa。
6. 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。

1. Ambient temperature: -10℃ ~+40℃, mean value measured within 24h should not exceed 35℃.
2. Altitude: not exceed 1000m;
3. Relative humidity: daily mean not over 95%, monthly mean not over 90%;
4. Seismic intensity: not beyond Ms8;
5. Vapor pressure: daily mean not over 2.2kPa, monthly mean not over 1.8kPa.
6. Ambient environment: the installation site should be free of fire, explosive danger, serious pollution, chemical corrosion or severe vibration.

真空开关柜主要技术参数

<table>
<thead>
<tr>
<th>名称</th>
<th>单位</th>
<th>数值</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定电压 Rated voltage</td>
<td>kV</td>
<td>40.5</td>
</tr>
<tr>
<td>额定电流 Rated current</td>
<td>A</td>
<td>1250 1600 2000</td>
</tr>
<tr>
<td>额定频率 Rated frequency</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>额定短时耐受电流 Rated short-time withstand current</td>
<td>kA</td>
<td>20 25 31.5</td>
</tr>
<tr>
<td>额定峰值耐受电流 Rated peak withstand current</td>
<td>kA</td>
<td>50 63 80</td>
</tr>
<tr>
<td>额定工频耐受电压 Rated power frequency withstand voltage</td>
<td>kV</td>
<td>95/1min</td>
</tr>
<tr>
<td>额定雷电冲击耐受电压 Rated lightning impulse withstand voltage</td>
<td>kV</td>
<td>185</td>
</tr>
<tr>
<td>额定短路持续时间 Rated short-circuit duration</td>
<td>s</td>
<td>4</td>
</tr>
<tr>
<td>防护等级 Degree of protection</td>
<td></td>
<td>IP3X</td>
</tr>
<tr>
<td>名称</td>
<td>单位</td>
<td>数值</td>
</tr>
<tr>
<td>------------------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>额定电压</td>
<td>kV</td>
<td>40.5</td>
</tr>
<tr>
<td>额定频率</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>额定工频耐受电压</td>
<td>kV</td>
<td>95/1min</td>
</tr>
<tr>
<td>额定雷电冲击耐受电压</td>
<td>kV</td>
<td>185</td>
</tr>
<tr>
<td>额定电流</td>
<td>A</td>
<td>1250 1600 2000</td>
</tr>
<tr>
<td>额定短时耐受电流</td>
<td>kA</td>
<td>20 25 31.5</td>
</tr>
<tr>
<td>额定短时开断电流</td>
<td>kA</td>
<td>20 25 31.5</td>
</tr>
<tr>
<td>额定峰值耐受电流</td>
<td>kA</td>
<td>50 63 80</td>
</tr>
<tr>
<td>额定短路持续时间</td>
<td>ms</td>
<td>4</td>
</tr>
<tr>
<td>分闸时间</td>
<td>ms</td>
<td>30 ≤t ≤60</td>
</tr>
<tr>
<td>合闸时间</td>
<td>s</td>
<td>50≤t≤100</td>
</tr>
<tr>
<td>额定短路开断电流次数</td>
<td>次</td>
<td>20</td>
</tr>
<tr>
<td>机械寿命</td>
<td>次</td>
<td>10000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>名称</th>
<th>单位</th>
<th>数值</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定操作电压</td>
<td>V</td>
<td>DC220/110, AC220/110</td>
</tr>
<tr>
<td>额定操作电流</td>
<td>A</td>
<td>0.96(220V), 1.05(110V)</td>
</tr>
<tr>
<td>储能电机功率</td>
<td>W</td>
<td>230</td>
</tr>
<tr>
<td>储能电机额定电压</td>
<td>V</td>
<td>DC220/110, AC220/110</td>
</tr>
<tr>
<td>储能时间</td>
<td>S</td>
<td>≤12</td>
</tr>
</tbody>
</table>
开关柜结构特征

开关柜外形尺寸 Outline dimension of switchgear
外形尺寸（宽 × 深 × 高） Outline dimension (W×D×H)
1400×2800×2600

开关柜结构示意图 Structural schematic diagram of switchgear
A 继电器仪表室 B 母线室 C 断路器室 D 电缆室
A relay meter chamber B bus chamber C circuit breaker chamber D cable chamber

开关柜的安装

开关柜安装基础示意图 Schematic diagram of installation foundation of switchgear
a. 电控室的高度：≥ 4500mm；
b. 柜后距墙距离：≥ 1500mm；
c. 基础构架的平面度：≤ 1mm/m2；
d. 基础预埋螺栓高出地面部分不得超过3mm；
e. 可用螺栓或焊接方式固定在基础上；
f. 开关柜重量约1800kg；
g. 开关柜操作走廊宽度(单列)：≥ 3000mm；
双面(面对面) ≥ 4000mm。
KYN28-12
铠装移开式交流金属封闭开关设备

概述

本装置系户内金属铠装抽屉式开关设备（以下简称开关设备），系3.6-12千伏三相交流50Hz单母线及单母线分段系统的成套配电装置主要用于发电厂，中小型发电厂送电、工矿企事业配电以及电站系统的二次变电所的受电、送电及大型高压电动机起动等。实行控制保护、监测之用，本开关设备满足IEC298、GB3906等标准要求，具有防止带负荷拉断路器手车、防止误分合断路器、防止接地开关处在闭合位置时关合断路器、防止误入带电室、防止在带电时误合接地开关的联锁功能，既可配用VSI真空断路器，又可配用ABB公司的VD4真空断路器。实为一种性能优越的配电装置。

This equipment is indoor metal armoring with drawable switchgear (hereafter refer to as switchgear), 3.6-12 kilovolt three phase AC 50Hz single bus bar and the single bus bar subsection system's complete electricity distribution equipment is used in the power plant, small and medium-sized generator power transmission, industry and mining business power distribution as well as electrical industry system's second transformer substation's electric take-over, power transmission and large-scale high pressure motor starting and so on. The purpose is to control, protect and monitor. This switch equipment is up to the standard of IEC298, GB3906 and can prevent the charge from pushing and pulling the breaker, from opening and closing the breaker, from insulation with electricity by mistaken, from earthed switch closing the breaker, from opening the switch's interlock when it with electricity mistakenly. It can not only use with VSI vacuum circuit-breaker, but with ABB Corporation's VD4 vacuum circuit-breaker. It is indeed a kind of power distribution equipment with superior performance.

正常使用条件

1. 正常条件
a. 周围环境空气温度：上限，+40℃ 下限，-10℃
b. 海拔：1000M
c. 相对环境湿度：日平均相对湿度不大于95%，月平均相对湿度平均不大于90%；
d. 地震：烈度不超过8度。
e. 周围空气应不受腐蚀性或可燃气体、水蒸汽等明显污染。
f. 无严重污秽及经常性的剧烈振动，严酷条件下严酷度设计满足1类要求。
2. 特殊工作条件：
* 在超过GB3906规定的正常的环境条件下使用时，由用户和制造厂协商。

1. Normal condition
a. Surrounding air temperature: -10℃ ～ +40℃
b. Altitude : 1000M
c. Relative environment humidity: The daily relative humidity average is not higher than 95%, the monthly relative humidity average is not than higher 90%.
d. Earthquake: The intensity does not exceed 8 degree.
e. The surrounding air without corrosive or flammable gas or water vapour.
f. Without a lot of dirtiness and regular fierce vibration, under the severe condition, the intensity meets the first kind requirement.

2. special working conditions
* When it is used beyond the normal environmental condition stipulated in the GB3906, the user should consult with the manufacture.

### 主要技术参数

<table>
<thead>
<tr>
<th>项目Item</th>
<th>单位Unit</th>
<th>配用断路器equipped with breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ZN63A-12(VS1)型</td>
</tr>
<tr>
<td>额定电压Rated voltage</td>
<td>kV</td>
<td>12</td>
</tr>
<tr>
<td>1min 试验耐受电压1min working frequency endurable voltage</td>
<td>kV</td>
<td>42</td>
</tr>
<tr>
<td>额定冲击耐受电压(峰值)Shock endurable rated voltage</td>
<td>kV</td>
<td>75</td>
</tr>
<tr>
<td>额定频率Rated frequency</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>额定电流Rated current</td>
<td>A</td>
<td>630, 1250, 1600, 2000, 2500, 3150, 4000, 5000</td>
</tr>
<tr>
<td>分支母线额定电流Branch bus bar rated current</td>
<td>A</td>
<td>630, 1250, 1600, 2000, 2500, 3150, 4000, 5000</td>
</tr>
<tr>
<td>额定短时耐受电流(有效值)Rated short time endurable current(virtual value)</td>
<td>kA</td>
<td>16, 20, 25, 31.5, 40, 50</td>
</tr>
<tr>
<td>额定峰值耐受电流Rated peak endurable voltage</td>
<td>kA</td>
<td>40, 50, 63, 80, 100, 125</td>
</tr>
<tr>
<td>额定短路持续时间Rated short-circuit duration</td>
<td>s</td>
<td>4</td>
</tr>
<tr>
<td>防护等级Protection degree</td>
<td></td>
<td>外壳为IP4X，隔室门、手车窗门打开时为IP2X</td>
</tr>
<tr>
<td>质量Quality</td>
<td>kg</td>
<td>700~1200</td>
</tr>
</tbody>
</table>

### 结构简介

开关设备按GB3906-91中的铠装式金属封闭开关设备而设计。整流器体是由柜体中置式可抽出部件（包括车）两大部分组成，见图1。柜体分四个单独的隔室，外壳防护等级为IP4X，各小隔室和断路器室门打开时防护等级为IP2X。具有架空进出线、电缆进出线及其它功能方案，经排列、组合后能成为各种方案形式的配电装置。本开关设备可以从正面进行安装调试和维护，因此它可以将设备分别成两端排列和柜体安装，提高开关设备的安全性、灵活性，减少了占地面积。
The switch equipment is designed according to GB3906-91 metal armoring seal switch equipment. The rectifier body is made up of the cabinet body and draw-out parts (namely handcart) placed in the middle. See chapter 1. The cabinet divides into four separate rooms, the outer covering protection grade is IP4X, when each small room and the circuit breaker is opened, the protection grade is IP2X. It can suspend the inlet, outlet line, cable's inlet, outlet line and other function plan. After arranged and combined, it can become each kind of plan form of the power distribution equipment. This switch equipment may be installed and maintained from the frontage, therefore it may compose the dual arrangement back to back and be installed against the wall, improving the switch equipment's security and flexibility and making full use of the occupying area.
A 手车Handcart

手车骨架系采用薄钢板经CNC机床加工后经铆、焊而成的。根据用途，手车可分为断路器手车、电压互感器手车、隔离手车、计量手车等等，相同规格的手车能方便互换。手车在柜内有隔离位置、试验位置和工作位置，每一位置均设有定位装置，以保证手车处于以上位置时不能随便移动，而移动手车时必需要解除联锁。

The framework of handcart is made of steel sheet through the procession of CNC machine tool and rivet welding. According to the application, the handcarts can be divided into circuit breaker handcart, voltage transformer handcart, isolating handcart and metering handcart, etc. The handcarts of the same specification can be exchanged conveniently. In the cabinet, the handcart has isolating position, testing position and operating position, each of which is designed with a location device to assure that the handcart can’t move easily at the above-mentioned positions, while the interlock must be unlocked to move the handcart.
B 母线室 Bus chamber

母线从一个开关柜引至另一开关柜，通过分支母线和静触头盒固定。扁平的分支母线通过螺栓连接于静触头盒和主母线，不需要任何其它的线夹或绝缘子联接。当用户和工程特殊需要时，母线排上的联接螺栓可用绝缘和端帽封装。在母线穿越开关柜隔板时，用母线套管固定。如果出现内部故障电弧，能限制事故蔓延到邻柜，并能保障母线的机械强度。

The bus is led from one switch cabinet to another one and fixed with static contact box through branch bus. The flat branch bus is connected through the bolt to the static contact box and main bus, not needing any other line clamps or insulators. When there is special demand of the clients or the project, the connecting bolt on the bus bar can be encapsulated with insulation and end cap. When the bus crosses the baffle of the switch cabinet, fix it with bus bushing, so that, if there is any internal fault arc, it can prevent the fault spreading to another cabinet and can guarantee the mechanical strength of the bus.

C 电缆室 Cable chamber

电缆室内可安装电流互感器、接地开关、避雷器以及电缆，并在其底部配制开缝的可卸铝板，以确保现场的施工方便。

Inside the cable chamber, the current transformer, grounding switch, arrester and cable can be installed, and on the bottom is designed slotted removable aluminum sheet to assure the convenient site construction.
D Relay instrument chamber

Relay instrument chamber is used to install all kinds of components, such as relays, instruments, signal indicator and operating switch, etc. In addition, it's available to add a small bus chamber on the top of the instrument chamber according to the demand of the clients, and set 16 lines to control the small bus.

Pressure releasing device

On the handcart chamber, bus chamber and cable chamber is installed pressure releasing device. When there is internal fault are in the breaker, main bus or inside the cable chamber, and with the appearance of electric arc, the internal pressure in the switch cabinet rises. After it rises to a certain pressure, the pressure releasing metal sheet of the top device will be opened automatically, and the pressure and the gas are released to guarantee the safety of the operator and the switch cabinet.

Latch device

Latch device is used to connect the central exit and cabinet body, and the lifting device is also designed to make it more convenient to open the central exit. When the central exit stays closed, the connecting strength with the cabinet body is the best and the capability against the internal arcing fault effectively is strengthened.
XGN66-12(Z)
固定式封闭开关设备

型号含义

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>G</td>
<td>N</td>
<td>66-12-□</td>
</tr>
</tbody>
</table>

主回路方案代号 Primary circuit scheme
额定电压 Rated voltage (kV)
设计序号 Design No.
户内 Indoor

固定式 Fixed type
箱式结构 Case type

概述

XGN66-12型固定式封闭开关设备(以下简称开关)是我公司新一代高压电器成套产品，符合国家标准GB3906《-35kV交流金属封闭开关设备》电力部DL/T404《户内交流高压开关柜订货技术条件》的要求，也满足国际标准IEC60298《1kV以上52kV以下交流金属封闭开关设备和控制设备的要求》。

该产品吸收了国外的先进技术，它体积小，仅是普通开关柜体积的50%，断路器具有可靠性高，性能好；“五防”联锁机构可靠、简单等优点。开关柜是3.6、7.2、12kV三相交流电50Hz单母线分段的户内成套装置，作为接受和分配电能之用，并具有对电路进行控制、保护和监测等功能，可使用在各类型发电厂、变电站及工矿企业，高层建筑等场所，也可与环网柜组合应用于开闭所中。

XGN66-12 type fixed closed switchgear (hereinafter referred to as switchgear) is a new generation of high-voltage electrical products of our company, in line with national standards GB3906 "-35kV AC metal enclosed switch The requirements of the "Equipment Ordering Technical Specifications for the Equipment" DL/T404 of the Ministry of Electric Power, also meeting the international standard IEC60298 "AC metal–enclosed switchgears of 1kV up to 52kV and below"Control Equipment Requirements."

This product absorbs foreign advanced technology, it is small, only 50% of the volume of ordinary switch cabinet, circuit breaker has high reliability and good performance; “five prevention” interlock mechanism is reliable, simple, etc. advantage. The switchgear is a 3.6, 7.2, and 12kV three-phase alternating current 50Hz single-bus segmented indoor unit that accepts and distributes electrical energy. And have control, protection and monitoring of the circuit$Such functions can be used in various types of power plants, substations and industrial and mining enterprises, high-rise buildings and other places, and can also be combined with ring network cabinets used in opening and closing.
正常使用条件

1. 海拔高度不超过1000m。
2. 环境温度：-25℃~+40℃，24小时内平均温度不超过+35℃。
3. 水平倾斜度不大于3℃。
4. 地震烈度不超过8℃。
5. 无剧烈振动和冲击及爆炸危险场所。

1. The altitude does not exceed 1000m.
2. Ambient temperature: -25℃ ~ +40℃, the average temperature within 24 hours does not exceed +35℃.
3. The horizontal inclination is not more than 3℃.
4. The seismic intensity does not exceed 8℃.
5. No violent vibration and impact and explosion danger places.

结构特点

1. 柜体采用优质角钢焊接而成。
2. 断路器室位于柜体中(下)部，安装、调试、维护方便。标准配装VS1断路器，并设有压力释放通道，确保人身安全。
3. 采用先进可靠的旋转式隔离开关，可在主母线带电下安全进入断路器室检修。
4. 整柜防护等级IP2X。
5. 设有可靠功能齐全的强制性机械闭锁装置，简便有效达到“五防”要求。
6. 具有可靠的接地系统。
7. 门上装有观察窗，可清楚观察到柜内元件的工作状态。
8. 操作机构闭锁采用同XGN2–12柜用的JSXGN闭锁机构，简单可靠方便实用。
9. 进出线电缆低于柜体前部，方便用户连接。

1. The cabinet body is made of high quality angle steel.
2. The circuit breaker room is located in the (lower) part of the cabinet. It is convenient for installation, commissioning and maintenance. Standard fitted with VS1 circuit breaker, and equipped with pressure release channel to ensure personal safety.
3. The use of advanced and reliable rotary switch-disconnectors allows safe access to the circuit breaker room under main busbar energized.
4. The entire cabinet protection class IP2X.
5. It is equipped with a mandatory mechanical locking device with complete functions and can easily and effectively meet the "five prevention" requirements.
6. With a reliable grounding system.
7. The observation window is installed on the door to clearly observe the working status of the components in the cabinet.
8. The operating mechanism lock adopts the JSXGN locking mechanism used with the XGN2–12 cabinet, which is simple, reliable, convenient and practical.
9. The inlet and outlet cables are lower than the front of the cabinet for user connection.
### 主要技术参数

<table>
<thead>
<tr>
<th>名称</th>
<th>单位</th>
<th>参数</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定电压</td>
<td>KV</td>
<td>3.6 7.2 12</td>
</tr>
<tr>
<td>额定电流</td>
<td>A</td>
<td>630 1250</td>
</tr>
<tr>
<td>额定短路开断电流</td>
<td>kA</td>
<td>20 25 31.5</td>
</tr>
<tr>
<td>额定短路关合电流(峰值)</td>
<td>kA</td>
<td>50 63 80</td>
</tr>
<tr>
<td>额定短时耐受电流(4s有效值)</td>
<td>kA</td>
<td>20 25 31.5</td>
</tr>
<tr>
<td>额定峰值耐受电流(峰值)</td>
<td>kA</td>
<td>50 63 80</td>
</tr>
<tr>
<td>1min工频耐受电压</td>
<td>KV</td>
<td>42</td>
</tr>
<tr>
<td>雷电冲击耐受电压</td>
<td>KV</td>
<td>75</td>
</tr>
<tr>
<td>辅助回路1min工频耐受电压</td>
<td>KV</td>
<td>2</td>
</tr>
<tr>
<td>防护等级</td>
<td>Degree of protection</td>
<td>IP3X</td>
</tr>
<tr>
<td>外形尺寸</td>
<td>mm</td>
<td>950×950×2300</td>
</tr>
</tbody>
</table>

开关柜主要技术参数 Main technical data of the switchgear
外形及安装尺寸

图1：开关柜布置示意图
Figure 1: Schematic diagram of switchgear layout

1. 柜门  1. cabinet door
2. 照明灯  2. lighting
3. 观察窗  3. observation window
4. 操作机构  4. operating mechanism
5. 小门板  5. small door
6. 仪表门  6. instrument door
7. 眉头  7. brow
8. 母线穿墙套管  8. bus wall bushing
9. 螺栓  9. bolt
10. 垫圈  10. washers
11. 垫圈  11. washers
12. 螺母  12. nuts
13. 隔离开关  13. isolation switch
14. 拉杆  14. lever
15. 后封板  15. after the closing plate
16. 电流互感器  16. current transformer
17. 真空断路器  17. vacuum circuit breaker
18. 隔离开关  18. isolation switch
19. 传感器  19. sensor
20. 螺栓  20. bolt
21. 垫圈  21. washer
22. 垫圈  22. washer
23. 骨架  23. skeleton
24. 避雷器  24. arrester

安装

1. 安装基础参考下图，基础槽钢突出地面1-3mm，每米范围内不平度不应超过1.5mm,全长范围内不超过5mm。
2. 将开关柜按顺序放置于基础上，调整好安装的位置。然后用M12螺栓或者用点焊方法进行固定，柜与柜间用M8螺栓并紧。
3. 拆开后盖板安装主母线和一次电缆，端子接触面应注意清理干净并涂中性凡士林。安装好后注封堵好一次电缆孔。
4. 连接柜间接地母线，使沿开关柜排列方向连成一体，检查工作接地和保护接地是否有遗漏，接地回路是否连续导通，工作接地电
阻应不大于1000 μΩ，保护接地电阻应不大于4 Ω。
5.安装二次电缆，电缆由柜前底部引入，侧壁进入低压室，分接于端子排上；或由柜顶二次小母线上引入低压室，装好后封堵电缆孔。
6.清理柜内灰尘杂物。

1. Installation Basics Referring to the figure below, the basic channel steel protrudes from the ground 1~3 mm, and the unevenness within the range of one meter shall not exceed 1.5 mm, and the total length shall not exceed 5 mm.
2. Place the switchgear on the foundation in order and adjust the installation position. Then use M12 bolts or spot welding method to fix, cabinet and cabinet with M8 bolts and tight.
3. Open the rear cover to install the main bus and primary cable. The terminal contact surface should be cleaned and coated with neutral petrolatum. After installation, plug the cable hole once.
4. Connect the indirect busbars of the cabinet so that they can be integrated along the direction of the switchgear cabinet arrangement. Check if there is any omission in the grounding and protective earthing of the switchgear, and if the grounding loop is continuous, the ground resistance should not exceed 1000 μΩ and the protective earthing resistance should not exceed 4 Ω.
5. Install the secondary cable. The cable is introduced from the front bottom of the cabinet, enters the low pressure chamber along the side wall, and is tapped onto the terminal row; or the low pressure chamber is introduced from the secondary busbar at the top of the cabinet, and the cable hole is plugged after installation.
6. Remove dirt from the cabinet.
HXGN15-12
箱式固定交流金属封闭开关设备

型号含义

H X G N □ - 1 2 ( S F 6 )

- 柜内主开关为SF6开关 The cabinet main switch is SF6
- 电压等级(KV) Voltage grade (KV)
- 设计序号 Design number
- 户内型 Indoor
- 固定式 Fixed type
- 箱式 Box type
- 环网 Ring main unit

概述

HXGN □-12（SF6）型单元式交流金属封闭环网开关设备（以下简称环网柜）是我们在引进国外先进技术并按照国内农网及城网改造之要求而自行设计、研制成功的新一代高压电器产品。各项技术性能指标全部达到IEC298和GB3906标准。

环网柜的主开关、操作机构及元器件采用ABB公司原装件或进口部件国内组装生产的SFL-12/24型开关设备，也可根据用户需要配装ABB公司原装HAD/US型SF6断路器或VD4-S型真空断路器，其操作方式分为手动、电动两种。

柜体经数控机床加工后焊接而成，防护等级达到IP3X，并有可靠的机械联锁和防误操作功能。本产品具有体积小、重量轻、外形美观、操作简便、长寿命、高参数、无污染、少维护等极具显著的特点。

HXGN □-12(SF6) Unit type AC metal-enclosed ring main unit (hereafter refer to as ring net cabinet) is a new generation of high-pressure electric appliance product designed and developed independently by our own company according to the requirement of the domestic agricultural electricity and the city net transformation after introduction of overseas advanced technology. Each technical performance index completely reaches the IEC298 and GB3906 standard.

The loop-net cabinet's main switch, the operating mechanism and the components is made of the ABB Corporation original piece or the SFL-12/24 switch equipment imported overseas and assembled at home. We can also install the ABB Corporation original piece of HAD/US type SF according to the request of users. The circuit breaker or the VD4-Svacuum circuit-breaker divide into two kinds: be operated manually and electrically according to the operating mode.

The cabinet body is riveted after processed by numerical control machine tool with reliable mechanical interlocking and the misoperating prevention function. The protection grade reaches IP3X. This product has the remarkable characteristics such as the small volume, light weight, artistic appearance, simple operation, long life, high parameter with no pollution and little maintenance.
正常使用条件

1. 海拔不超过2000m
2. 周围空气温度：上限+40℃下限-25℃
3. 相对温度：日平均值不大于95%，月平均值不大于90%
4. 周围空气不受腐蚀性气体或可燃性气体、水蒸气等明显污染
5. 无经常性的剧烈振动

1. The altitude should not exceed 2000m.
2. Surrounding air temperature: -25℃ → +40℃
3. Relative temperature: the daily average value is not higher than 95%, the monthly average value is not higher than 90%
4. Surrounding air without caustic gas or ignitable gas, steam and other obvious pollution
5. Without fierce vibration

用途

HXGN □-12 (SF6) 型单元式交流金属环网开关设备，适用于交流50Hz、12kV 中，作为电能的接受和分配之用。

HXGN □-12 (SF6) unit type exchange metal ring-net switching equipment, is suitable to exchange 50Hz, 12kV, serving as device of receiving and distribution of electrical energy.

主要技术参数

<table>
<thead>
<tr>
<th>项目 Item</th>
<th>单位 Unit</th>
<th>参数 Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定电压 Rated voltage</td>
<td>kV</td>
<td>12</td>
</tr>
<tr>
<td>额定频率 Rated frequency</td>
<td>Hz</td>
<td>30</td>
</tr>
<tr>
<td>主母线额定电流/熔断器最大额定电流 Main bus bar rated current/maximum rated current</td>
<td>A</td>
<td>630/125</td>
</tr>
<tr>
<td>主回路、接地回路短时耐受电流 Main loop, earthing loop short time current</td>
<td>kA/s</td>
<td>20/3</td>
</tr>
<tr>
<td>主回路、接地回路耐受电流 Main loop, earthing loop maximum current</td>
<td>kA</td>
<td>50</td>
</tr>
<tr>
<td>主回路、接地回路短路开断电流 Main loop, earthing loop short circuit current</td>
<td>kA</td>
<td>50</td>
</tr>
<tr>
<td>负荷开关开断能力 The opening number of the load switch with full capacity</td>
<td>次</td>
<td>100</td>
</tr>
<tr>
<td>熔断器开断能力 The fused breaker opening the current</td>
<td>kA</td>
<td>31.5/40</td>
</tr>
<tr>
<td>额定短路开断电流 Rated short circuit opening current</td>
<td>A</td>
<td>630</td>
</tr>
<tr>
<td>额定转移电流 Rated shift current</td>
<td>A</td>
<td>1600</td>
</tr>
<tr>
<td>机械寿命 Machine life</td>
<td>次</td>
<td>2000</td>
</tr>
<tr>
<td>1min工频耐压（峰值）相间、对地/隔离断口 1min line frequency resistance (peak value) recurrence, to the earth/isolation fracture</td>
<td>kV</td>
<td>42/48</td>
</tr>
<tr>
<td>雷电冲击耐受电压（峰值）相间、对地/隔离断口 The lightning shock resistance (peak value) recurrence, to the earth/isolation fracture</td>
<td>kV</td>
<td>75/85</td>
</tr>
<tr>
<td>二次回路1min 工频耐压 Secondary loop 1min line frequency voltage resistance</td>
<td>kV</td>
<td>2</td>
</tr>
<tr>
<td>防护等级 Protection grade</td>
<td>IPX3</td>
<td></td>
</tr>
</tbody>
</table>
结构特点及工作原理

产品外形结构见图1、图2，安装尺寸如图3所示。本环网柜是以空气为绝缘介质的，主要配装ZFN □-10/630型真空负荷开关，主要方案有进线柜和出线柜等。
1. 进线柜方案
   柜内主回路有一台ZFN □-10/630型真空负荷开关，它配装有隔离刀、断路器、接地刀、接地刀位的断路器和隔离开关所组成，三者共装在一个机架上，并互有联锁。因此可实现接通母线、隔开、接地三个工位的操作，柜内还可灵活配装CT、PT等元件。
2. 出线柜方案
   柜内主回路有一台ZFN □-10/630型真空负荷开关和带摇测器的熔断器，有隔离开关的作用及接地刀所组成，也可实现工位操作，柜内还可灵活配装CT、PT和ZNO避雷器等元件，因此有时可省去计量柜。进、出线柜均配有与接地开关联锁的绝缘防护隔板，柜内开关与隔板及柜门间采用机械联锁，并达到“五防”要求，柜体外壳防护等级为IP2X。

The outline structure of the product is referred to as diagram 1 and diagram2; the installation dimension is referred to as diagram3. This ring network type cabinet makes air as the insulating medium, mainly assembled with ZFN □-10/630 type vacuum load switch. And there are two cabinet schemes - incoming cabinet and outgoing cabinet.
1. Incoming cabinet scheme
   There is a ZFN □-10/630 type vacuum load switch on the main circuit inside the cabinet with isolating knife, and grounding knife conditionally. The three of them are all installed in one machine stand and there are interlocks among them, so that it is realized to connect the operation of three working stations of bus, isolation and grounding. Inside the cabinet the components such as CT, PT are available.
2. Outgoing cabinet scheme
   ZFN □-10/630 type vacuum load switch, fuse with striker (used as isolating switch) and grounding knife on the main circuit inside the cabinet, and the three working stations operation can be realized. Inside the cabinet the components such as CT/PT and ZNO arrester are available, so the metering cabinet can be omitted. Inside the incoming cabinet and outgoing cabinet, there is insulating protecting baffle interlocked with grounding switch. And inside the cabinets, the mechanical interlocks are adopted between each switch and baffle as well as the cabinet door with the requirement of “five-prevention” and IP2X of the protection degree of the cabinet enclosure.

吊运、安装、调试和熔断器的更换

1. 吊运
   吊运前按规定进行开箱前的检查。柜体吊运时按作业标准要求，小心轻放，防震等。

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

3. 调试
   如发现柜内元件达不到其技术要求或联锁不到位时，需按下列过程调试：
   (1) 对负荷开关和接地或隔离开关，可通过调节支撑杆长度和操作杆角度和位置来达到技术要求。
   (2) 若有联锁不到位时，可微调相应的操作杆长度来改变联锁杆的位置，使联锁到位。

4. 更换熔断器
   必须严格按停电顺序操作，首先将负荷开关分闸，然后打开熔断器箱隔离合上，在插入绝缘防护隔板后，柜门方可打开，才能进行更换熔断器。

1. Handling
   Before handling, undertake check before opening the cabinet according to the regulations. When the cabinet is handling delivered, it’s a must to operate according to the operation marking demands. Handle with care and without shake.

2. Installing
   After opening the cabinet, check whether the cabinet body and the components inside are good, whether they work normally, and whether they are moistened. Only after definite confirmation can the installation be undertaken.

3. Debugging
   It’s necessary to have a debugging according to the following steps if the components inside the cabinet don’t meet the technical requirements or the interlocks don’t locate well:
   (1) For the load switch, grounding switch or isolating switch, you can make them meet the technical demands by adjusting the drag rod length, changing the angle and position of drag rod and operating rod.
   (2) If there is any interlock that doesn’t locate well, you can make it locate by fine adjusting relevant operating rod length to change the position of interlock hole.

4. Fuse replacing
   It must operate strictly according to the sequence of poweroff. First, turn off the load switch, turn on the fuse to the isolating position and then turn on the grounding switch. Only after plugging the insulating protecting baffle can the cabinet door be opened and can the fuse be replaced.
使用与故障处理

1. 使用
请务必严格按照下列步骤操作，否则易造成损害。
(1) 负荷开关的操作顺序
a. 合闸：当负荷开关处于分闸状态时，将操作手柄插入负荷开关操作孔内顺时针转动（约180度），使其合闸。
b. 分闸：当负荷开关处于合闸状态时，可由手动脱扣按钮或脱扣电磁铁操作使负荷开关分闸，对配有带撞击器的熔断器的负荷开关，熔断器熔断后，其撞击器也可使负荷开关分闸。
(2) 停电操作顺序
a. 将负荷开关分闸，使它与隔离和接地开关之间的联锁解除。
b. 将操作手柄插入隔离和接地开关操作孔内，按顺时针方向转动（约90度），隔离刀被打开。
c. 再按顺时针方向转动（约90度）后，接地开关快速闭合。
d. 插入绝缘隔板，使门联锁解除。
e. 开门检修。
(3) 送电操作顺序
a. 关闭柜门。
b. 抽出绝缘隔板，柜门锁住。
c. 将操作手柄插入隔离和接地开关操作孔内，逆时针转动（约90度），使接地开关分闸。

2. 故障处理

1. Operation
Please operate strictly according to the following steps, otherwise some damage may be caused.
(1) Operating sequence of load switch
a. Switch-on: When the load switch stays on, plug the operating handle into the operating hole of the load switch and turn it clockwise (about 180°) to make it stay on.
b. Switch-off: When the load switch stays on, manually operate the tripping button or the tripping electromagnet to make the load switch stay off. For the load switch with fuse striker, after the fuse is fused, the striker can make the load switch stay off.
(2) Operating sequence of power off
a. Turn off the load switch to unlock the interlock between the isolating and grounding switches.
b. Plug the operating handle into the operating hole of the isolating and grounding switches and turn it clockwise (about 90°) to open the isolating knife.
c. Turn again clockwise (about 90°) to turn off the grounding switch rapidly.
d. Plug the insulating baffle to unlock the door interlock.
e. Open the door and maintain.
(3) Operating sequence of power transmission
a. Close the cabinet door.
b. Extract the insulating baffle and lock the cabinet door.
c. Plug the operating handle into the operating hole of the isolating and grounding switches and turn it anticlockwise (about 90°) to turn off the grounding switch.
d. Operate the load switch and turn it on to transmit the power.

2. Fault treatment
During the operation of the ring network type cabinet, if there is any fault, such as loose fastenings, bad lubrication of mechanical parts and reduced vacuum degree in the vacuum interrupter, etc. After the power off, check and remove the faults by fastening, adding lubricant and adding withstand voltage, etc.

储存

环网柜应储存在干燥通风，温度在-30℃～+40℃的仓库中。

Ring network cabinet should be stored in the dry and ventilated warehouse with temperature of -30℃～+40℃.
维修与修理

1. 开箱后，应对所有绝缘件进行检查，对确已受潮的元件，应将其拆下，放入70-80℃的烘箱内，烘48小时后，取出装上重新调试。
2. 产品储放期间，如发现受潮或腐蚀，应立即进行清理，清理后做好防护处理。
3. 运行中的环网柜应进行定期维修检查。
   (1) 真空灭弧室的真空度；
   (2) 触头磨损情况；
   (3) 机械紧固件是否松动；
   (4) 开距超程等机械电气参数；
   (5) 操作转动是否灵活；
   (6) 联锁是否可靠；
   (7) 所有零部件，特别是绝缘件是否清洁。
4. 下列情况时，应对环网柜进行全面检查和调试；
   (1) 每年一次的例行检查和清洁工作；
   (2) 负荷开关每动作2000次后。

环网柜安装

1. After the cabinet is open, check all of the insulation pieces and disassemble the damp ones, put them into 70-80℃ drying box, and take out for debugging again after 48 hours drying.
2. If the product is damp or rusty during the storage, please clean it at once and protect it well.
3. Maintenance and repair should be done to ring network cabinet during operation.
   (1) Vacuum extent of vacuum arc-extinguishing room
   (2) Contact abrasion degree
   (3) Whether the fastening pieces are loose or not;
   (4) Mechanical electric parameter such as open travel, over travel.
   (5) Whether the running is flexible or not;
   (6) Whether the interlock is reliable or not;
   (7) Whether all of the parts are clean, especially for insulation fittings.
4. Do overall examination and debugging to ring network cabinet in following conditions:
   (1) Routine examination and cleaning for every
   (2) After every 2000 times operation of load switch
组合电器柜

1. 柜体 Cabinet body
2. 母线 Bus
3. 套管 Bushing
4. 组合电器 Composite electrical appliance
5. 熔断器 Fuse
6. 电流互感器 Current transformer
7. 带电显示装置 Charged displaying device
8. 操作机构 Operating mechanism

随机文件

1. 产品合格证 Certificate of quality
2. 安装使用说明书 Installation and operation instruction
3. 装箱单 Packing list
4. 随机附件清单 Appending accessories list
5. 二次接线图 Secondary connection diagram
HXGN17-12箱式固定交流金属封闭开关设备

型号含义

- H: primary circuit scheme
- X: fuse
- G: vacuum load switch (Without Z is a compressor load switch)
- N: rated voltage (kV)
- 12: design No.
- F: indoor
- Z: fixed type
- R: case type
- 箱式结构: Ring main unit

概述

HXGN17-12箱式固定交流金属封闭开关设备（简称环网柜），是为城市电网改造和建设需要而生产的新型高压开关设备。在供电系统中亦作为开断负荷电流和短路电流以及关合短路电流之用。本环网柜用FZN25、FZN21真空负荷开关，操作机构为弹簧机构，该机构既可手动操作，也可电动操作。接地开关和隔离刀配用手动操作机构，本环网柜成套性强、体积小、无燃烧和爆炸危险，还具有可靠的“五防”功能。

本环网柜符合GB3906《3-35kV交流金属封闭开关设备》、IEC60420《高压交流负荷开关熔断器组合电器》标准的有关规定。
HXGN17-12 box-type fixed AC metal-enclosed switchgear (abbreviated as ring network cabinet) is a new high-voltage switchgear produced for the needs of urban power grid reconstruction and construction. In the power supply system, the system is also used for breaking load current and short-circuit current and closing short-circuit current. This ring network cabinet is equipped with FZRN25 and FZRN21 vacuum load switches, and the operating mechanism is a spring mechanism. The mechanism can be operated manually or electrically. The grounding switch and isolation knife are equipped with a manual operation mechanism. The ring network cabinet has strong suitability, small size, no risk of burning and explosion, and also has Reliable "five defense" function.

The ring network cabinet complies with the relevant provisions of GB3906 "3-35kV AC metal-enclosed switchgear" and IEC60420 "High-voltage AC load switch fuse-combination appliance" standards.

正常使用条件

1. 周围空气温度：-15℃~+40℃;
2. 海拔高度：1000m及以下;
3. 湿度条件：日平均值不小于95%，水蒸气压力日平均值不超过2.2KPA;月平均值不小于90%，水蒸气压力月平均值不超过1.8KPA。
4. 地震烈度：不超过8度;
5. 没有腐蚀性或可燃性气体等明显污染的场所。

注：超出上述正常使用条件时，用户可与本公司协商。

1. Ambient air temperature: -15°C~+40°C;
2. Altitude: 1000m and below;
3. Humidity conditions: the daily average is not more than 95%, the daily average value of water vapor pressure does not exceed 2.2KPA; the monthly mean value is not more than 90%, and the monthly mean steam pressure does not exceed 1.8KPA.
4. Seismic intensity: no more than 8 degrees;
5. There is no obvious pollution such as corrosive or flammable gas.

Note: Users can negotiate with the company if they exceed the above normal use conditions.

安装、贮运和验收

使用与故障处理

1. 包装、贮运

  ◦ 环网柜在出厂时为单体木箱包装。在贮运过程中不允许翻、倒置和剧烈振动。搬动时不允许在地面上直接推拉；在无起吊装置时，可在包装箱枕木下垫入圆筒，使其滑到安装位置。
  ◦ 防止柜体雨淋、受潮。
  ◦ 环网柜应放在通风良好，并能防止各种有害气体侵入的场所。严禁与化学药品、酸碱等存放在一仓库内。

2. 验收

  ◦ 开箱前检查包装是否损坏，拆箱时注意保护产品。
  ◦ 2.1对柜体进行外观检查；同时检查柜内各元器件有无损坏、配件是否与装箱单相符。
  ◦ 检查随机文件是否齐全。
Use and troubleshooting

◆ Packing, storage and transportation

The ring network cabinet is shipped in a single wooden box. Tipping, inversion and severe vibration are not allowed during storage and transportation. It is not allowed to push and pull directly on the ground when moving; when there is no lifting device, the cylinder can be placed under the packing of the box and slide it to the installation position.

◆ Prevent cabinet rain and moisture.

◆ Ring network cabinets should be placed in a well-ventilated place and can prevent all kinds of harmful gases from invading. It is prohibited to store chemicals, acids, and alkalis in a warehouse.

Acceptance and acceptance

Check the package for damage before unpacking and take care to protect the product when unpacking.

2.2 Visual inspection of the cabinet; at the same time, check whether the components in the cabinet are damaged and whether the accessories match the packing list.

◆ Check if the random file is safe.

主要技术参数

<table>
<thead>
<tr>
<th>序号 No.</th>
<th>项目 Project</th>
<th>单位 Unit</th>
<th>FN12-10</th>
<th>FZN25-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>额定电压 Rated voltage</td>
<td>kV</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1min工频耐受电压 1min power frequency withstand voltage</td>
<td>kV</td>
<td>对地及相间42;隔离断口48</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>雷电冲击电压(峰值) Lightning impulse voltage (peak)</td>
<td>kV</td>
<td>对地及相间75;隔离断口85</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>额定频率 Rated frequency</td>
<td>Hz</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>主母线额定电流 Main bus rated current</td>
<td>A</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>休眠电流 Rated current</td>
<td>A</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>额定电流下电寿命 Rated current discharge life</td>
<td>次</td>
<td>不小于100</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>开断空载变压器容量 Breaking open-load transformer capacity</td>
<td>kV</td>
<td>1250</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>额定热稳定电流 Rated thermal stability current</td>
<td>kA/s</td>
<td>20/4;接地开关20/2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>额定动稳定电流(峰值) Rated dynamic current (peak)</td>
<td>KA</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>额定短路关合电流(峰值) Rated short-circuit current (peak)</td>
<td>KA</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
安装尺寸

外形尺寸
Dimensions

安装尺寸
Installation size

基础施工图
Basic construction drawings
**XGN□-12**

气体绝缘环网开关设备

### 型号含义

XGN □ 12/24 CFV

- **组合方案** Combination scheme
- **电压等级 (kV)** Voltage level (kV)
- C-GIS全绝缘全封闭开关设备 C-GIS fully insulated switchgear
- **企业代号** Enterprise code

### 概述

XGN□-12系列气体绝缘环网开关设备是SF6气体绝缘的金属共箱式封闭开关设备，该设备可由负荷开关单元、负荷开关熔断器组合电器单元、真空断路器单元、母线进线单元等模块组成。采用一系列先进技术技术和材料。具有优异的电气性能和机械性能，受环境和气候影响小，体积小巧，易于安装，操作方便，无需维护，且具有灵活的组合方式。清晰直观的设计保证操作简单、直接。馈线接线容量大，适合多种接线系统。

XGN□-12 series fully insulated fully enclosed ring network switchgear is SF6 gas insulated metal common box closed switchgear, which can be used by load switch unit, load switchFused combination of electrical unit, vacuum circuit breaker unit, bus line unit and other modules. Use a range of advanced technologies and materials. Has excellent electrical properties and machinery. The performance is affected by the environment and climate, small and compact, easy to install, easy to operate, no maintenance, and a flexible combination. Clear and intuitive design ensures easy operation direct. Feeder wiring capacity is large, suitable for a variety of wiring systems.

### 四大核心竞争力

1. 操作安全。通过以下安全措施，我们为用户提供特别的安全保障；
   - 一体化三工位负荷开关
高压开关设备系列
High-voltage switchgear series

断路器采用负荷开关替代隔离开关，更安全可靠
一次侧全密闭设计提供意外接触的保护
满足五防要求的机械联锁
带电显示器可提供进出线路径指示

1. 运行可靠。全密闭设计，所有10kV开关及母线带电体均密封在3mm不锈钢板焊接的气箱中；配硅橡胶电缆插头，实现电缆头全绝缘全密封从而不受灰尘、潮湿、小动物等外界环境影响；
2. 弹簧储能操作机构，可人工或电动操作
3. 面板模拟线图提供开关位置指示
4. 柜体用镀锌板制作，表面静电喷涂，增强抗腐蚀性能

1. Operational safety. Through the following security measures, we can provide users with special security guarantees:
   ◆ Integrated three-station load switch
   ◆ Circuit breaker adopts load switch instead of isolation switch, which is more safe and reliable
   ◆ One-side fully enclosed design provides protection against accidental contact
   ◆ Mechanical interlock to meet the requirements of five defenses
   ◆ Electricity display can provide instructions for electrification on the incoming and outgoing lines

2. reliable operation. Fully sealed design, all 10kV switch and busbar charged body are sealed in the air box welded with 3mm stainless steel plate; equipped with silicone rubber cable plug to realize the cable head Edge sealed so that it is not affected by dust, moisture, small animals and other external environment:
   ◆ Spring energy storage operating mechanism, can be manually or electrically operated
   ◆ Panel model line diagram provides switch position indication
   ◆ Cabinet made of galvanized sheet, electrostatic spraying on the surface to enhance corrosion resistance
   ◆ The pressure gauge monitors the safe pressure range of SF6 gas in the box

3. Economicality.
   ◆ Maintenance-free
   ◆ highly reliable
   ◆ Service life up to 20 years

4. The program is flexible.
   ◆ A variety of ways to enter, can achieve left, right, up or forward line
   ◆ multiple combinations, any combination between the units can be achieved
   ◆ Insulation busbars can be used to combine front and back cabinets or cabinets
   ◆ Flexible design
   ◆ Optional arrangement of spring mechanism and permanent magnet mechanism
<table>
<thead>
<tr>
<th>项目</th>
<th>单位</th>
<th>C模块负荷开关单元</th>
<th>F模块负荷开关-熔断器组合电器单元</th>
<th>V模块断路器单元</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定电压 Rated voltage</td>
<td>kV</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>额定电流 Rated current</td>
<td>A</td>
<td>630</td>
<td>125注(1)</td>
<td>630</td>
</tr>
<tr>
<td>工频耐压/1分钟 Power frequency withstand voltage / 1 minute</td>
<td>kV/Phas/phase/pHase</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>冲击耐压 Impact pressure</td>
<td>kV/Phas/phase/pHase</td>
<td>75</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>额定闭环开断电流 Rated closed-loop breaking current</td>
<td>A</td>
<td>630</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>额定电缆充电开断电流 Rated cable charging breaking current</td>
<td>A</td>
<td>30</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>额定开断感性电流 Rated breaking inductive current</td>
<td>A</td>
<td>注(2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>额定短时耐受电流/3s Rated short-time withstand current /3s</td>
<td>kA</td>
<td>20</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>额定峰值耐受电流 Rated peak withstand current</td>
<td>kA</td>
<td>50</td>
<td>1700</td>
<td>50</td>
</tr>
<tr>
<td>额定转移电流 Rated transfer current</td>
<td>A</td>
<td>-</td>
<td>注(3)</td>
<td>-</td>
</tr>
<tr>
<td>额定短路开断电流 Rated short-circuit breaking current</td>
<td>kA</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>额定短路关合电流 Rated short-circuit current</td>
<td>kA</td>
<td>50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>额定短路开断次数 Rated short circuit breaking frequency</td>
<td>次</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>额定短路关合次数(负荷开关/接地开关) Rated short circuit closing times (load switch/grounding switch)</td>
<td>次</td>
<td>5/5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>额定电流开断次数 Rated current breaking frequency</td>
<td>次</td>
<td>&gt;100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>机械操作次数(负荷开关/接地开关) Number of mechanical operations (load switch/grounding switch)</td>
<td>次</td>
<td>5000/2000</td>
<td>5000/2000</td>
<td>30000</td>
</tr>
</tbody>
</table>

注：1、取决于熔断器额定电流值；2、短断1250KVA空载变压器；3、取决于高压熔断器；
Note: 1, depending on the rated current of the fuse; 2, open breaking 1250KVA no-load transformer; 3, depending on high-voltage fuses;
設計说明

XGN□-12气体绝缘环网开关设备安装在一个镀锌板框架上，开关单元在SF6气箱内，气箱由抗腐蚀和无磁性3mm厚不锈钢板制成。SF6气箱是一个“密封压力系统”，在正常工作环境下可运行20年。SF6气体正常工作时压力为0.015~0.04MPa。气箱装有压力释放装置，当压力过高时，保证气体能从底部或后部释放。

XGN□-12 fully gas-insulated fully enclosed ring network switchgear is installed on a galvanized plate frame, the switch unit is in the SF6 air box, and the air box is corrosion-resistant and non-magnetic 3mm thick stainless steel Made of steel plate. The SF6 air box is a "seal pressure system" that can operate for 20 years under normal working conditions. The normal pressure of SF6 gas is 0.015~0.04MPa. Air box pressure The force release device ensures that gas can be released from the bottom or rear when the pressure is too high.

C单元

1.负荷开关单元C
该开关可分为单体、单体双套管出线、二单元、三单元、四单元、五单元标准型和带有侧进线套管型，采用共用一个SF6气箱的结构，在各单元之间不需要母线外部连接，因此，结构相对简化，便于安装，更为安全；虽然采用了气箱一体结构，每个单元仍有独立间隔。六个单元以上采用绝缘母线并柜实现，可前后或左右并拒，柜型是标准型上侧带母线套管。

2.标准配置
◆630A母线 ◆三工位负荷/接地开关 ◆弹簧操作机构 ◆负荷开关和接地开关位置指示 ◆位于前部水平布置的出线套管
◆进线/母线电压指示器（单体或母线扩展型） ◆ 出线电压指示器 ◆所有的开关功能都可在面板上加装挂锁方式实现控制
◆接地开关与电缆室门的联锁 ◆SF6气压表 ◆接地铜排 ◆防爆泄压阀

3.可选配置
◆短路、接地故障指示器 ◆测量用环形电流互感器及电流表 ◆测量用环形电流互感器 ◆开关位置钥匙锁
◆电动操作机构 ◆永磁操作机构 ◆预留母线扩展 ◆外部母线

1. Load switch unit C
The switch can be divided into single unit, single unit double bushing outlet, two units, three units, four units, five units standard type and with side inlet sleeve type, using a common SF6 air box structure, No bus external connections are required between units. Therefore, the structure is relatively simple, easy to install and safer. Although the air box is integrated, each unit still has its own interval. Six. Above the unit, the insulated busbars are used to combine the cabinets, and they can be rejected forward and backward or left and right. The cabinet type is the standard upper side with bus bushings.

2. Standard configuration
◆630A busbars ◆ Three-station load/grounding switch ◆ Spring operating mechanism ◆ Load switch and grounding chucking position indication
◆ Outline casing arranged horizontally at the front ◆ Line/bus voltage indicator (single or bus extended) ◆ Outlet voltage indicator ◆ All switch functions can be controlled by adding padlock on the panel ◆ Interlock of grounding switch and cable compartment door ◆ SF6 barometer ◆ Grounding copper bar ◆ Explosion-proof pressure relief valve 3 optional configuration
◆ Short circuit and ground fault indicator ◆ Circular current transformer and ammeter for measurement ◆ Circulating current transformer for measurement
◆ Switch position key lock ◆ Electric operating mechanism ◆ Permanent magnet operating mechanism ◆ Reserve bus extension ◆ External bus
XGN□-12系列开关面板指示

1. 带电显示器
2. 主开关操作孔 (操作顺序: 顺时针合/逆时针分）
3. 接地开关操作孔 (操作顺序: 顺时针合/逆时针分）
4. 分合闸位置指示 (合闸显示红色/分闸显示白色）
5. 接地位位置指示
6. 负荷开关挂锁位置
7. 接地开关挂锁位置

1. charged display
2. main switch operation hole (operation sequence: clockwise/counterclockwise)
3. Earthing switch operation hole (operation sequence: clockwise/counterclockwise)
4. points closing position indication (closing display red/breaking display white)
5. ground position indication
6. load switch padlock position
7. Grounding switch padlock position

F单元

1. 组合电器单元

组合电器单元用作1250KVA及以下容量的变压器保护。本单元配有可以装入熔断器的绝缘套筒。绝缘套筒入SF6气箱之内，进一步提高其绝缘性能。接地开关闭合时，熔断器下侧同时接地，并实现熔断器上侧与电源的安全隔离，确保更换熔断器时人员的安全。为了保证熔断器在一根熔断后，不致造成电气设缺相运行，本单元中配置了跳闸联动机构，当脱扣观察窗显示红色时，表示脱扣装置动作或熔断器熔断并跳闸。本单元可以和其它单元组合，实现环网供电。

2. 配置
   ◆630A母线    ◆三工位负荷/接地开关    ◆弹簧操作机构    ◆负荷开关和接地开闸位置指示    ◆位于前部水平布置的出线套管
   ◆进线/出线电压指示器 (单体或母线扩展型)    ◆出线电压指示器    ◆所有的开关功能都可在面板上加装挂锁方式实现控制
   ◆接地开关与电缆室的联锁    ◆SF6气压表    ◆接地铜排    ◆防爆泄压阀

3. 可选配置
   ◆短路、接地故障指示器    ◆测量用环形电流互感器及电流表    ◆计量用环形电流互感器    ◆开关位置钥匙锁
   ◆电动操作机构    ◆永磁操作机构    ◆预留母线扩展    ◆外部母线
Unit electric unit

The combination unit is used for transformer protection of capacities up to 1250 KVA. This unit is equipped with an insulating sleeve that can be fitted in the fuse. Insulating sleeve into the SF6 air box, further improve its insulation properties. When the grounding switch is closed, the lower side of the fuse is grounded at the same time, and the upper side of the fuse is isolated from the power supply to ensure the safety of the personnel when replacing the disconnector. In order to protect After the fuse has been blown in one phase, it will not cause the electrical operation of the missing phase. The unit is equipped with a trip linkage mechanism. When the trip watch window shows red, the tripping device is actuated or blown. The fuse blows and trips. This unit can be combined with other units to achieve ring power supply.

2. Standard configuration

◆ 630A busbars  ◆ Three-station load/grounding switch  ◆ Spring operating mechanism  ◆ Load switch and grounding chucking position indication  ◆ Outline casing arranged horizontally at the front
◆ Line/bus voltage indicator (single or bus extended)  ◆ Outlet voltage indicator  ◆ All switch functions can be controlled by adding padlock on the panel  ◆ Interlock of grounding switch and cable compartment door  ◆ SF6 barometer  ◆ Grounding copper bar  ◆ Explosion-proof pressure relief valve

3 optional configuration
◆ Short circuit and ground fault indicator  ◆ Circular current transformer and ammeter for measurement  ◆ Circulating current transformer for measurement  ◆ Switch position key lock  ◆ Electric operating mechanism  ◆ Permanent magnet operating mechanism  ◆ Reserve bus extension  ◆ External bus

熔断器更换步骤:

用开关操作手柄逆时针旋转半圈，往外拉出更换熔断器,安装时对好挂钩位置顺时针旋转。

Rotate half a turn counterclockwise with the switch operating handle and pull the replacement fuse out. Rotate clockwise for the hook position.
XGN□-12-F 开关面板指示

1. 操作机构
2. 开关进线套管
3. SF6气压表
4. 带电显示器
5. 开关位置指示
6. 主开关操作孔
7. 接地开关操作孔
8. 接地位置指示
9. 电缆仓观察窗
10. 电缆仓门
11. 电缆抱箍

1. Operating mechanism
2. Switch inlet sleeve
3. SF6 barometer
4. Live display
5. Switch position indication
6. Main switch operation hole
7. Grounding switch operation hole
8. Grounding position indication
9. Cable compartment observation window
10. Cable compartment door
11. Cable clamp
V unit

1. Vacuum circuit breaker unit

With spring-type vacuum circuit breakers, the mechanical life can reach 10,000 times; (the protection action is fast, the opening time is not more than 30ms), and it is easy to realize the differential matching. Three-station load isolation switch. The vacuum circuit breaker and the load switch are sealed together in an SF6 air box made of a 3mm thick stainless steel plate, and the entire system is fully insulated, fully sealed, and maintenance-free.

2. Standard configuration

- 630A bus
- 630A breaker module ISM
- Controller CM (DC24V operating power supply)
- Three-station load isolation switch
- External power supply, self-powered microcomputer protection device
- Sleeve type protection CT
- SF6 barometer
- Sleeve according to DIN47636
- Grounding and cable compartment door lockout
- Vacuum circuit breaker switch position auxiliary contact: 2NO+2NC
- Operating power (including power PT, power module, backup battery)

3. Optional configuration

- Connection bus
- Measuring current transformer and ammeter
- Auxiliary contacts: Position of load isolation switch 2NO+2NC, grounding switch position 2NO+2NC
- Permanent magnet mechanism, can achieve the rapid opening and closing of the circuit breaker, used in demarcation circuit breaker switch equipment or line switch equipment.
XGN□-12-V开关面板指示

1. SF6开关气箱
2. 开关进线套管
3. SF6气压表
4. 带电显示器
5. 开关位置指示
6. 主开关分合闸旋钮
7. 断路器储能操作孔
8. 储能位置指示
9. 隔离开关操作孔
10. 隔离位置指示
11. 接地开关操作孔
12. 断路器操作机构
13. 隔离接地操作机构
14. 电缆仓观察窗
15. 电缆仓门
16. 电缆抱箍
17. 接地母排

1. SF6 switch air box
2. Switch inlet sleeve
3. SF6 barometer
4. Live display
5. Switch position indication
6. Master switch closing knob
7. Circuit breaker energy storage operation hole
8. Storage location indication
9. Disconnect switch operation hole
10. Isolation position indication
11. Grounding switch operation hole
12. Circuit breaker operating mechanism
13. Isolated grounding operating mechanism
14. Cable compartment observation window
15. Cable compartment door
16. Cable Hoop
17. Grounding busbar
非扩展标准模块

DF

标准2路DF (260 kg)

CF

标准2路CF (260 kg)

CCC

标准3路CCC (300 kg)

CCVV

标准4路CCVV (411 kg)

CCFFF

标准5路CCFFF (540 kg)

CFC

标准3路CFC (320 kg)
GT□12-630
全密封固体绝缘式环网开关设备

型号含义

GT □ 12 630 □ □ □

额定短时耐受电流(kA) Rated short-time withstand current (kA)
B:不带接地开关; B: without grounding switch;
Z: 直接出线 Z: straight out

开关类别: Switch category:
C-负荷开关; V-断路器; G-隔离开关 C-load switch; V-breaker; G-disconnector
F-负荷开关-熔断器组合电器开关 F-load switch-fuse combination switch

额定电流(A) Rated current (A)
额定电压(kV) Rated voltage (kV)
设计序号 Design Number
固体绝缘环网开关 Solid Insulated Ring Network Switch

概述

GT-12系列固体绝缘环网柜，是一种全绝缘、全密封、免维护的固体绝缘真空开关设备。所有高压带电部分均用绝缘性能优良的环氧树脂材料浇注成型，将真空灭弧室、主导电回路、绝缘支撑等有机结合为一体，功能单元通过全绝缘固体汇流母线连接。因此整个开关设备不受外部环境影响，可确保设备运行的可靠性和操作人员的安全性。

该环网柜具有结构简单、操作灵活、联锁可靠、安装方便等特点，适用于50Hz，12千伏的电力系统，广泛应用于工业及民用电缆环网及配网终端工程，作为电能的接受和分配之用，特别适用于城市居民区配电、小型变电站、开闭所、电缆分支箱、箱式变电站、工矿企业、商场、机场、地铁、风力发电、医院、体育场、铁路、隧道等场所使用。

由于该产品具有全绝缘、全密封、全屏蔽的优点，所以特别适用于高海拔、高温、湿热、严寒、污染严重等环境恶劣的地区使用。
GT-12 series solid insulated ring network cabinet is a fully insulated, fully sealed and maintenance-free solid insulated vacuum switchgear. All high voltage live parts have excellent insulation properties. The epoxy resin material is poured and molded, and the vacuum interrupter, the main conductive loop, the insulating support and the like are organically combined as a whole, and the functional units are connected by a fully insulated solid bus. Therefore, the entire switchgear is not affected by the external environment, ensuring the reliability of the equipment and the safety of the operator.

The ring network cabinet has the characteristics of simple structure, flexible operation, reliable interlock, and convenient installation. It is suitable for 50Hz, 12 dry volt power systems and is widely used in industrial and civil cables. The ring network and distribution network terminal project is used for the acceptance and distribution of electrical energy, and is particularly suitable for distribution in urban residential areas, small substations, opening and closing stations, cable branch boxes, box-type substations, and workers. Mining companies, shopping malls, airports, subways, wind power, hospitals, stadiums, railways, tunnels and other places.

Because this product has the advantages of full insulation, full sealing, and full shielding, it is particularly suitable for use in areas with high altitude, high temperature, hot and humid, severe cold, and severe environmental pollution.

产品分类

根据开关类型，分为负荷开关带接地组装件(简称C模块)，负荷开关不带接地组装件(简称CB模块)，断路器带接地组装件(简称V模块)，断路器不带接地组装件(简称VB模块)，断路器联络开关(简称VZ模块)，负荷开关+熔断器组合电器开关组装件(简称F模块)，隔离开关组装件(简称G模块)。

According to the type of switch, it is divided into load switch with grounded assembly (abbreviated as C module), load switch without grounded assembly (abbreviated as CB module), circuit breaker with grounded assembly (abbreviation V module), circuit breaker without grounding assembly (VB module for short), circuit breaker liaison switch (VZ module for short), load switch + fuse assembly switch assembly (abbreviated as F module), Isolation switch assembly (referred to as G module).

设计方案
### 主要技术参数

<table>
<thead>
<tr>
<th>项目</th>
<th>单位</th>
<th>参数</th>
</tr>
</thead>
<tbody>
<tr>
<td>额定电压 Rated voltage</td>
<td>KV</td>
<td>12</td>
</tr>
<tr>
<td>额定频率 Rated frequency</td>
<td>HZ</td>
<td>50</td>
</tr>
<tr>
<td>功能性功率 Power functional capacity</td>
<td>KA</td>
<td>50/83</td>
</tr>
<tr>
<td>额定短路耐压 Rated short-circuit withstand current</td>
<td>KA/S</td>
<td>20/4(25/4)</td>
</tr>
<tr>
<td>断路器机械寿命 Circuit breaker mechanical life</td>
<td>次</td>
<td>10000</td>
</tr>
<tr>
<td>断路器电气寿命 Circuit breaker electrical life</td>
<td>次</td>
<td>E2</td>
</tr>
<tr>
<td>额定操作顺序 Rated operation sequence</td>
<td>O-0.3S-CO-180S-CO</td>
<td></td>
</tr>
<tr>
<td>一次设备安装等级 (计数器除外)</td>
<td>IP67</td>
<td></td>
</tr>
<tr>
<td>柜体防护等级 Cabinet protection class</td>
<td>IP4X</td>
<td></td>
</tr>
<tr>
<td>防护等级 Room protection level</td>
<td>IP2X</td>
<td></td>
</tr>
<tr>
<td>操作电源电压 Operating supply voltage</td>
<td>V</td>
<td>AC110、220</td>
</tr>
<tr>
<td>导线系统 Bus system</td>
<td>A</td>
<td>360/1250</td>
</tr>
<tr>
<td>额定电流 Rated current</td>
<td>A</td>
<td>630</td>
</tr>
<tr>
<td>额定短路开断电流 Rated short-circuit breaking current</td>
<td>KA</td>
<td>50/83</td>
</tr>
<tr>
<td>额定断路器机械寿命 Load switch mechanical life</td>
<td>次</td>
<td>M2 10000</td>
</tr>
<tr>
<td>额定断路器电气寿命 Load switch electrical life</td>
<td>次</td>
<td>E3</td>
</tr>
<tr>
<td>断路器单元 Breaker unit</td>
<td>A</td>
<td>630/1250</td>
</tr>
<tr>
<td>额定断路开断电流 Rated short-circuit breaking current</td>
<td>KA</td>
<td>20/25</td>
</tr>
<tr>
<td>断路器机械寿命 Mechanical life</td>
<td>次</td>
<td>3000</td>
</tr>
<tr>
<td>机械寿命 Mechanical life</td>
<td>次</td>
<td>2</td>
</tr>
</tbody>
</table>

---

**GT-12-630**
全密封固体绝缘式环网开关设备
TBBZ
高压无功自动补偿装置

型号含义

TBB Z ( )
尾注1，2，3
Endnotes 1, 2, 3
组数及每组容量(G为固定补偿)
Number of groups and capacity per group (G is a fixed compensation)
补偿容量(kvar)
Compensation capacity (kvar)
额定工作电压(kV)
Rated working voltage (kV)
分组自动投切
Group automatic switching
并联电容补偿成套装置 Parallel capacitance compensation device

例如：TBBZ10-1500(600+900)–AK表示电压为10kV，装置容量为1500kvar，分两组自动投切，一组600kvar，一组900kvar，单星型接线，开口三角电压保护。

For example: TBBZ10-1500(600+900)–AK means the voltage is 10kV, the device capacity is 1500kvar, divided into two groups of automatic switching, a group of 600kvar, a group of 900kvar, single star Type wiring, open triangle voltage protection.

概述

TBBZ系列高压无功自动补偿装置根据6KV、10KV供电母线的电网及负荷状况，通过控制系统电容器组自动跟踪投切，进行无功功率自动跟踪补偿，功率因数达到0.9以上。极大的优化电能质量、节能降耗，提高输配电系统的输送容量。

TBBZ series of high voltage reactive power automatic compensation device based on 6KV, 10KV power bus power grid and load conditions, automatic tracking and switching through the control system capacitor bank to perform reactive power. The rate is automatically tracked and compensated. The power factor is above 0.9. Greatly optimize power quality, reduce losses and improve power transmission and distribution system’s transmission capacity.
正常使用条件

1. 海拔高度：不高于1000m；
2. 环境温度：−25℃～+55℃；
3. 相对湿度：不超过85%；
4. 运行场所不允许有爆炸危险的介质，周围介质中不应含有腐蚀性和破坏绝缘的气体及导电介质，不允许充满水蒸汽及有严重的霉菌存在。

产品特点

1. 装置能在1.1倍额定工作电压的稳态过电压下长期运行；
2. 装置能在方均根值不超过1.3倍电容器组额定电流的过电流下连续运行；
3. 装置采用真空接触器投切，可频繁操作；
4. 每组电容器设有放电线圈，在5秒内可剩余电压降至50V以下；
5. 每组电容器可选电容器保护或微机保护控制单元，实现电容器组的过流、电压不平衡、系统的欠压、过压保护。当某组电容器出现故障后，可切断本组电容器，不影响其他电容器的使用；
6. 单台电容器有电阻式熔断器保护，每组配有避雷器起作用电压及雷击过压保护；
7. 大屏幕液晶显示控制器，实时显示系统电压、电流、功率因数；具有RS232/RS485标准通讯接口，并可实现“四遥”功能；
8. 每组可配置电抗器抑制合闸涌流或抑制谐波放大。

1. The device can operate for a long period of time under a steady state overvoltage of 1.1 times the rated operating voltage;
2. The device can operate continuously under overcurrent with a root mean value of not more than 1.3 times the rated current of the capacitor bank;
3. The device adopts vacuum contactor to cut and can be frequently operated;
4. Each group of capacitors is equipped with a discharge coil, which can reduce the residual voltage to below 50V within 5 seconds.
5. Each capacitor can be protected by a relay or a microcomputer protection control unit to achieve over-current, voltage unbalance, under-voltage and over-voltage protection of the capacitor bank. When a set of capacitors appear Fault, this group of capacitors can be switched off without affecting the use of other capacitors;
6. A single capacitor is protected by a blowout fuse, each group is equipped with surge arresters to operate overvoltage and lightning overvoltage protection;
7. Large-screen LCD display controller, real-time display system voltage, current, power factor; RS232/RS485 standard communication interface, and can achieve "four remote" function;
8. Each group of configurable reactors suppresses closing surge current or suppresses harmonic amplification.
主要技术参数

1. 额定电压：6–10kV;
2. 额定频率：50Hz;
3. 额定容量：100–10000kvar;
4. 分组数量：1–5组;
5. 电抗器参数选择：抑制合闸涌流，电抗率为0.1–1%；抑制5次以上谐波，电抗率为6%；抑制3次以上谐波，电抗率为12%。

1. Rated voltage: 6–10kV;
2. Rated frequency: 50Hz;
3. Rated capacity: 100–10000kvar;
4. Number of groups: 1–5 groups;
5. Selection of reactor parameters: suppression of closing surge current, the reactance rate is 0.1–1%; suppression of harmonics more than 5 times, the reactance rate is 6%; suppression of harmonics more than 3 times, the reactance rate is 12%

一次原理图

订货须知

1. 产品的全型号，对补偿容量及分组有特殊要求请注明;
2. 是否需要微机监控仪、是户内型还是户外型;
3. 需要电抗器时，应提供谐波情况，主要是最低次谐波的次数。

1. All models of the product have special requirements for compensation capacity and grouping. Please specify;
2. Do you need a computer monitor, indoor or outdoor type?
3. When reactors are required, harmonics should be provided, mainly the number of the lowest harmonics.