

产品概述 Product overview



ZHN3-72.5型气体绝缘金属封闭式组合电器（C-GIS）为我公司自主研发，填补国内空白，技术水平国际领先的环保型新产品。它适用于额定电压72.5kV,三相交流50Hz的电力系统，作为接受和分配网络电能，并对系统正常运行实施测量、监控、通讯、控制和保护等作用。它广泛应用于国民经济的各个系统，如输变电站网络、城市供电网、大型工矿企业、石油化工、冶金、铁路电气化。

ZHN3-72.5产品首次将真空灭弧室的固封技术应用于72.5 kV电压等级，它是集真空灭弧技术、固封极柱技术、气体绝缘技术和界面绝缘技术于一体的新一代高压成套电器产品。产品采用智能控制和保护单元，具有强大的控制、保护、测量功能，完全满足配网自动化要求。

根据环保和避免温室效应的要求，使用低压力（0.02MPa）的SF₆气体作为设备的相间和相对地的绝缘介质，气体用量极少，并采用真空开断，避免了有毒有害气体的产生，大大减少了SF₆的使用和排放，是环保型产品。密封气箱使高压部件防水、防尘，不受环境影响。产品对环境不敏感，可达到完全免维护。

产品完全符合有关标准：GB11022、GB7674、GB3906及IEC62271-100、IEC62271-203等并通过国家级新产品技术鉴定以及全部型式试验。

ZHN3-72.5 Cubical Type Gas Insulated Metalclad Switchgear (C-GIS) is a new environmental product designed and developed independently by our company, firstly using in embedded circuit-breaker pole technology of the vacuum interrupter in the products of 72.5kV and filling the gaps in this field in China. It can be widely used in various fields of national economy, such as distribution and transformer substation, city power supply grid, large industry and mine enterprises, petrochemical industry, metallurgy, and railway, etc.

ZHN3-72.5 Switchgear is a new generation of H.V. products combined with vacuum-interrupting technology, embedded CB pole technology, gas insulation technology as well as the interface insulation technology.

According to the requirements of environment protection and avoidance of greenhouse effects, low pressure (0.02 MPa) SF₆, which is only a few amount, has been used as the insulation gas between phases and from phase to earth. The adoption of vacuum interruption avoids generation of the poisonous gas, and the use and emission of SF₆ can be greatly reduced. Therefore, it is friendly to environment. It is of metalclad gastight design. All the high voltage components are completely sealed in the gastight box, with no surrounding influence and maintenance free.

ZHN3-72.5 Switchgear adopts intelligent control and protection units, which have powerful functions of control, protection, and measurement to meet requirements of automatization in the electricity distribution grid. It has been designed in compliance to the Chinese standards of GB11022, GB7674 and GB3906, IEC62271-100, IEC62271-203etc. ZHN3-72.5 Switchgear passed all the type tests and the evaluation for new product technology.



P 产品特性 Performance

● 环保型 Environmental protection

ZHN3-72.5产品采用真空断路器开断，无SF₆气体排放。在小体积的绝缘气室内采用低压力的SF₆，并采用先进的密封工艺，气体泄露的可能性和使用量大大减小，使用寿命长，30年不用补气。SF₆不参与电弧放电，不会产生各种有毒有害气体。该产品获得国家级认证环保产品。

ZHN3-72.5 switchgear designed with Vacuum Circuit Breaker, no SF₆ could be emission. The leakage of SF₆ gas is extremely lower due to the low pressure in the gas boxes. Service life of SF₆ could be long enough for 30 years without air supply. SF₆ as the insulation gas doesn't participate in extinguishing the arc so there is no toxic and harmful gas could be produced. This environmental protection product has obtained national level certification.

● 小型化 Miniature.

产品采用低压力SF₆气体绝缘，真空断路器开断，因此柜体尺寸小，占地面积少，结构更紧凑。ZHN3-72.5kV产品柜宽仅为1米，而且重量轻，运输方便。

ZHN3-72.5 switchgear use SF₆ as insulation gas, and interrupt with VCB. As a result, the tank has limited size, small area and compact structure. Moreover, convenient transportation with light weight.

● 安装操作简单 Easy operation and installation

产品采用积木式模块化设计结构，各种方案组合灵活。开关柜之间通过母线连接器连接，方便易操作。电缆终端，电压互感器、避雷器均采用柜外插拔式连接，安装在气箱上预留的插座孔，安装方便可靠。

The modular design of ZHN3-72.5 switchgear provides dielectrically sealed plug-in connections for the voltage transformers, cable bushings and bus bar bushings assembled outside the gas box, which is more flexible for the installation and replacement. The panels can easily be connected to each other by a bus bar silicon connection.

● 免维护 Maintenance

所有高压部件均密闭在低压充气不锈钢箱体内，不受环境影响，防止了外部物体进入，安全可靠。产品的安装，操作，扩展及更换无需涉及SF₆气体操作。不锈钢箱体采用激光气密焊接，年漏气率小于0.5%。真空断路器采用现代真空灭弧技术和固封极柱技术以及机构采用弹簧操作机构，因此产品可靠性高，开断能力强，电场分布均匀，机械寿命长，免维护。

All high voltage components are completely sealed in the gastight box, therefore it is of no influence upon the serious surrounding conditions..Any accidents caused by congeal dew, dust, humidity, chemical vapors or small animals are excluded forever.The installation, operation, expansion and replacement of the switchgear can be undertaken without operation of SF₆. Laser welding technology has been used to the stainless steel boxes,so the yearly leakage rate of SF₆ is less than 0.5%. ZNH3-72.5 switchgear combines the most modern vacuum interrupter technology, the embedded pole design and a reliable spring drive so that highest breaking currents and a high reliability are achieved The vacuum circuit breaker pole is maintenance free for the lifetime of the switchgear.

● 安全可靠 Safety and reliability

断路器和三位置开关同时具备手动和电动操作功能，完善的五防机械连锁可防止误操作。所有高压部件，包括电缆终端，母线和互感器均用接地的金属外壳封闭，安全可触摸。一次回路中所有高压设备的防护等级为IP65，设备外壳的防护等级为IP40。产品的不锈钢气箱箱体是由德国进口的激光切割，焊接设备加工而成的，并采用进口的氦检测设备对箱体气密性进行检测，使产品安全可靠。产品严格按照ISO9001标准加工制造，获得多项国家专利，并已通过全部型式试验和国家级新产品技术鉴定。

The circuit breaker with the embedded pole and the three position switch can be operated manually or by a motor drive, the complete Five-Prevention mechanical interlocking can avoid misoperation. It is safe and touchable because all high voltage components including cable plugs, and CT are completely sealed in the shell earthed to the ground. The protection degree of all the high voltage parts in the primary circuit is IP65. and the protection degree of the shell is IP40. The body of the gas is manufactured by a highly advanced laser cutting and laser welding process. After assembly, all tanks are checked for leaking by a helium leakage detecting system imported from Germany. The gas boxes are gastight for the lifetime. The quality control is in compliance with ISO9001 standards and the National Appraisal Certificate was acquired for the new patented ZHN3-72.5 switchgear.





P 技术参数 Parameter

序号 Item	项目 Name	单位 Unit	技术参数 Technical parameter		
1	额定电压 Rated voltage	kV	72.5		
2	额定频率 Rated frequency	Hz	50		
3	额定绝缘水平 Rated insulating level	1min 工频耐受电压 Power frequency withstand voltage (1min.)	对地、相间灭弧室断口 Phase to ground, phase to phase, CB isolation distance	kV	160
			隔离断口 DS isolation distance	kV	202
		雷电冲击耐受电压 (峰值) Lightning withstand voltage (peak value)	对地、相间灭弧室断口 Phase to ground, phase to phase, CB isolation distance	kV	350
			隔离断口 DS isolation distance	kV	410
	辅助和控制回路 1min 工频耐受电压 Aux. and control circuit PF withstand voltage (1 min.)	kV	2.0		
4	额定电流 Rated current	A	1250 1600 2000 2500		
5	额定短路开断电流 Rated short circuit breaking current	kA	25/31.5		
6	额定短路关合电流 (峰值) Rated short circuit making current (peak value)	kA	63/80		
7	额定短时耐受电流 Rated short time withstand current	kA	25/31.5		
8	额定短路持续时间 Rated short circuit duration	s	4		
9	额定峰值耐受电流 Rated peak withstand current	kA	63/80		
10	用作绝缘的气体 Insulation gas		SF ₆		
11	气室中的 SF ₆ 气体水份含量 Water content of SF ₆ in the gas box	ppm	≤120		
12	年漏气率 Leakage rate/year	%	≤0.5		
13	SF ₆ 额定充入压力 (20℃) SF ₆ rated filling pressure (20℃)	MPa	0.02		
14	SF ₆ 气体报警压力 (20℃) SF ₆ alarm pressure (20℃)	MPa	0.01		
15	SF ₆ 气体最低功能压力 (20℃) SF ₆ minimum function pressure (20℃)	MPa	0.0		
16	充气隔室设计压力 Design pressure of gas box	MPa	0.05		
17	压力释放装置释放压力 Discharge pressure of the pressure relief device	MPa	≥0.12		
18	真空断路器 Vacuum circuit breaker		M1, E2, C1		
20	真空断路器操作机构 VCB drive		弹簧操作机构 Spring operation drive		
21	三位置开关机械寿命 EDS mechanical life	次 time	M1		
22	额定操作电压 Rated operating voltage		AC110/220 DC110/220		
24	储能时间 Energy charging time	s	≤15		
25	继电器室防护等级 Protection degree of the relay compartment		IP40		
26	产品外形尺寸 (宽 w×深 d×高 h) Dimensions (W*D*H)	mm	1000×2400×2700		

说明: 表中气体压力值为在大气条件为20℃和0.1013MPa时的相对值 (表压)。

Note: Gas pressure vale in the table is the relative value under the air condition of 20℃ temperature and 0.1013MPa(Gauge Value).

产品正常使用条件

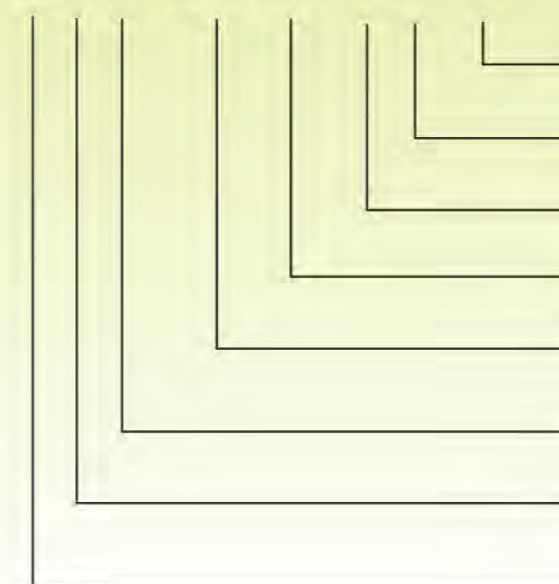
Normal operating conditions

- 户内使用
- 周围环境温度
最高气温 +40℃
最低气温 -25℃
- 湿度
日平均相对湿度不大于 95%
月平均相对湿度不大于 90%
- Indoor type
- Ambient temperature:
maximum temperature +40℃
minimum temperature -25℃
- Humidity:
daily average relative humidity ≤ 95%
monthly average relative humidity: ≤ 90%

- 周围空气不受腐蚀性或易燃气体、水蒸气的严重污染
- 无严重污秽及剧烈震动
- 一次侧高压元件与海拔高度无关
- 如果使用条件超出以上规定, 及 GB11022、GB7674、IEC62271 规定的正常使用条件, 用户应与制造厂协商确定
- The installation site should not suffer distinctive pollution caused by corrosive or flammable gas, vapor etc.
- With no serious foulness and intense vibration.
- With no relations of altitude.
- If the operation conditions exceed the normal conditions listed above, and/or in the GB11022, GB7674, please contact the manufacturer.

产品型号意义 The type and meaning

ZH N 3-72.5 (Z) / T □ - □



- 额定短路开断电流 (kA)
Rated short circuit breaking current (kA)
- 额定电流 (A)
Rated current (A)
- 弹簧操作机构
Spring operation drive
- 配真空断路器
Equipped with vacuum circuit breaker
- 额定电压 (kV)
Rated voltage (kV)
- 设计序号
Designing number
- 户内用
Indoor type
- 组合电器
Combined electrics



S 产品结构 Structure

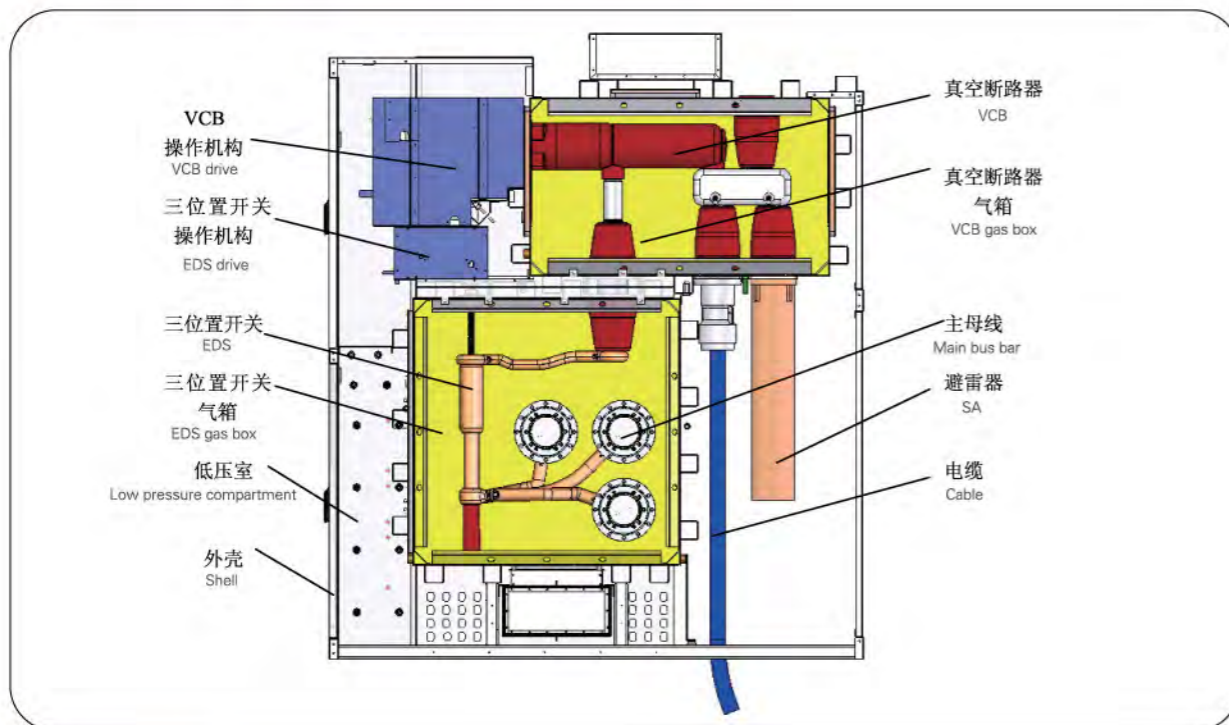
ZHN3-72.5组合电器的整体结构采用双气箱形式：上气箱为断路器气箱，下气箱为母线及三位置开关气箱。各气箱为无磁不锈钢板经激光切割、激光焊接而成，上下气箱通过母线连接器连接。

高压元件采用复合化设计，隔离开关与接地开关复合为一个三位置开关，共用一个动触头，设于母线侧。断路器及三位置开关操作机构位于设备前上部，机构同时具备手动及电动操作功能。

ZHN3-72.5 switchgear is of two gas boxes structure. The upper gas box is the VCB box and the lower gas box is the bus bar and EDS box. Both the gas boxes are made of nonmagnetic stainless steel plate, which is laser-cut and laser-welded. The upper and low gas boxes are connected by the bus bar connector. All the non-welded connection sections are sealed by the rubber O-rings.

The high voltage parts are of complex design. The disconnecter and earthing switch are compounded to be three-position switch (EDS), assembled beside the bus bar with the same moving contact. CB and EDS drives are installed in the front-upper position. Both two drives can be operated manually or by motor.

■ 产品结构示意图 Production structure



断路器气箱上方和后下方安装有内锥电缆连接插座，可并联插接多根电缆，也可连接电压互感器和避雷器等，电流互感器可套装在电缆上，并与开关设备框架固定。

ZHN3-72.5产品为三相共箱式，模块化设计。由断路器功能单元（充气单元）、三位置开关及母线单元（充气单元）、低压室（仪表室、操作机构室）、电缆间隔等组成。静密封采用O型橡胶圈密封，动密封采用特殊设计的橡胶圈和气密焊接波纹管密封。

在真空断路器气箱上部和三位置开关气箱的下部设有压力释放装置，以确保操作人员和设备的安全。气箱上设有充气阀门和气体压力表，用以监测气箱内的气体压力。每个充气壳体、低压室壳体，及各隔室的门等按规定接地，并标以“保护接地”符号。



The inner cone cable flange plates are placed on the lower-rear and upper-rear sides of the CB box, which can be used to connect cables, PTs, SAs, and CTs.

The switchgear is modular designed with three-phase-in-one-box structure, which is formed by CB function unit (gas box), three-position switch function unit (gas box), low voltage compartment (instrument, operation drive compartment) and cable room, etc. The low voltage compartment is in front of the panel. Frame is under the gas box and supports the box. The core parts are CB function unit (gas box) and three-position switch and bus bar unit (gas box). The gas manometer and manometer with temperature compensation function are equipped in the switchgear, which are used to monitor the gas pressure inside of the box.

The gastight box is equipped with gas-filling valve and pressure relief device. Rubber O-rings are used for the static seal. The special designed rubber rings and gastight micro plasma welded bellows are used for the dynamic seal.

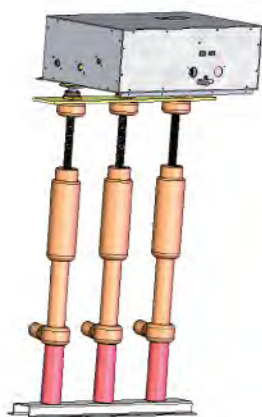
The shells of each gas box, low voltage compartment and the doors of each compartment are well earthed according to the regulations, and marked with the signs of "Earthing protection"



C 主要部件 Components

三位置开关

EDS (three-position switch)

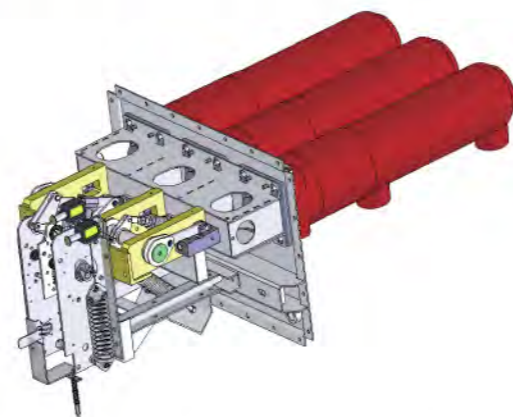


- 电机驱动的直动式三位置开关，垂直布置，具有：接通、断开及接地三个位置的功能
- 三位置开关具有机械和电气联锁，防止各种误操作
- 可以手动操作三位置开关
- 具有机械位置指示功能

- Vertical arrangement. Motor-driven direct-action type EDS has three positions: ON, OFF and Earthing.
- Mechanical and electric interlocking functions, which guarantee the operations only when the CB is closed. It can protect from all kinds of misoperation.
- Operated manually.
- Mechanical position indicator.

真空断路器

VCB (vacuum circuit breaker)



- 断路器水平布置，操作机构在气室外
- 断路器采用固封极柱APG 技术
- 断路器固封极柱与机构间的拉杆，通过波纹管实现整体动密封连接
- 联锁保证只有在三位置开关处于三个正确位置时，才可以进行分合闸操作
- 与三位置开关配合实现防短路接地功能
- The VCB is of horizontal arrangement.
- Adopts the APG embedded circuit-breaker pole technology.
- The VCB drive is outside of the gas box. The operation rod between the embedded CB pole and VCB drive is completely gas-tightened through the bellows.
- Interlocking function guarantees that the opening and closing operation can only be carried out when the EDS is in the correct position.
- Working with EDS to achieve the earthing function for prevention short circuit.

电流互感器

CT (current transformer)



- 环形铁芯结构，布置在气室外
- 套装在进出线电缆上，主回路构成一次接线
- 不受介电应力的影响
- 满足 IEC60044-1 标准和 GB1208 标准
- 通过了型式试验验证

- Ring iron-core structure, locates outside of gas box.
- Assembling in the incoming and outgoing cable, forming the primary wiring with the main loop.
- Free from the influence of dielectric stress.
- Meet with the standard of IEC60044-1 and GB1208.
- Passed type test.

电压互感器

PT (voltage transformer)



- 电感型，单极，插接式设计
- 安装在气箱外，金属封闭，安全可触摸
- 通过 4# 标准内锥插接头与系统相连
- 环氧树脂浇铸绝缘，不受环境影响
- 满足 IEC60044-2 标准和 GB1207 标准
- 通过了型式试验验证

- Single phase and plug-in design.
- Installed outside of gas box, metal enclosed and safe to touch. Connecting with system through connection-peg.
- Standard #4 inner cone plug connector. Induction type.
- The manufacture of epoxy resin casting makes it free from surrounding influence.
- Meet with the standard of IEC60044-2 and GB1207.
- Passed type test.



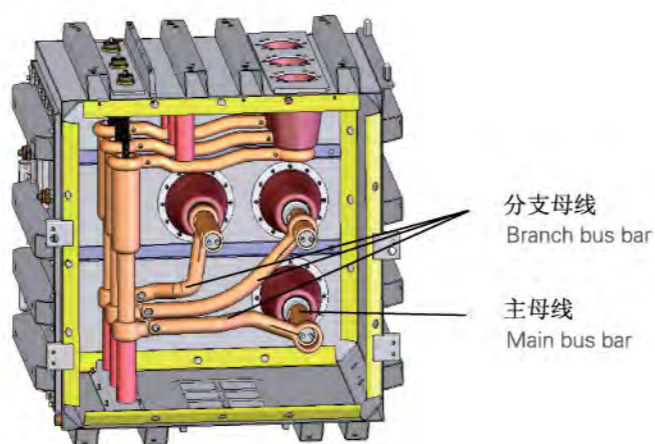
避雷器 Surge Arrester

- 配有硅橡胶绝缘插拔式终端，无需单独柜体
- 终端为4#标准内锥插拔式终端
- 全金属壳体屏蔽，安全可触摸
- 安装方便、性能可靠
- 满足IEC60099-4标准和GB11032标准
- 通过了型式试验验证
- Equipped with plug-in type silicone insulation end. And shielded metal shell, which is safe to touch.
- Standard #4 inner cone plug terminals.
- Easy to install. Reliable performance.
- Unnecessary to separate panel.
- Meets with standard of IEC60099-4 and GB11032
- Passed type test.



母线 Bus bar

- 分支母线采用熔模铸造工艺，特殊的轮廓形状有效的改善了电场的分布，并具有很高的机械强度和短路电流耐受能力
- 主母线采用圆筒形结构，载流量可达2500A
- 柜间母线连接采用硅橡胶母线连接器，有效的解决了柜间连接的绝缘问题，使得并柜连接更快捷、更灵活
- Made with the techniques of investment casting process. Special figure improves effectively the electric fields distribution. Strong mechanical strength, standing capability of short circuit current.
- The main bus bar is of cylinder structure with the carrying capacity achieving 2500A.
- Silicone tube connector is used for the connection between panels, which solves the insulation problems and makes the connection more efficient and flexible.



电缆终端 Cable plug (4#)

- 与4#内锥电缆插座配合使用
- 金属铠装，外壳接地，安全可触摸
- 可连接的电缆截面积与电缆的额定电压有关
- 每相最多可连接两颗电缆
- 满足EN50181标准
- 通过型式试验验证
- Used together with 4# inner cone cable flange plate.
- Well earthed metal shell and safe to touch.
- Cross-sectional area of the cable connectable is related to rated voltage of the cable.
- Each phase can max, connect two cables.
- Meet with the standard of EN50181.
- Passed the type



绝缘堵头

Dummy plug (4#)



- 与4#内锥插座配合使用
- 外壳接地，安全可触摸
- 满足EN50181标准
- 通过型式试验验证
- Dummy plug is used together with 4# inner cone bushing.
- Shell is earthed and safe to touch.
- Meet with standard of EN50181.
- Passed the type test.

硅橡胶母线连接器

Silicone tube connector (4#)



- 与4#内锥插座配合使用
- 用于气箱间的电气联接
- 满足EN50181标准
- 通过型式试验验证
- Silicone tube connector is used together with 4# inner cone flange plate.
- Used for electric connection between gas boxes.
- Meet with the standard of EN50181.
- Passed the type test.



S 典型一次方案 Scheme

一次接线方案代号		1	2	3	4					
一次方案图										
序号	元件名称	型号	规格	数量	规格	数量	规格	数量	规格	数量
1	真空断路器	ZN142-72.5		1		1		1		
2	三位置开关	HD1-72.5		1		1		1		
3	电流互感器	LMZ30-0.5	用户要求	(3)	用户要求	(3)	用户要求	(3)		
4	电压互感器	JDZX9-72.5CQ(C)	用户要求	(3)	用户要求	(3)	用户要求	(3)		
5	避雷器	CM-66	用户要求	(3)	用户要求	(3)	用户要求	(3)	用户要求	(3)
6	进线套管									3
7										
设备重量		max.2.5t	max.2.0t	max.2.5t	max.2.0t					
备注		进出线柜	进出线柜	进出线柜	母线提升柜					
一次接线方案代号		5	6	7	8					
一次方案图										
序号	元件名称	型号	规格	数量	规格	数量	规格	数量	规格	数量
1	真空断路器	ZN142-72.5				1				
2	三位置开关	HD1-72.5				1		1		
3	电流互感器	LMZ30-0.5				用户要求	3			
4	电压互感器	JDZX9-72.5CQ(C)				用户要求	(3)		用户要求	(3)
5	避雷器	CM-66	用户要求	(3)		用户要求	(3)	用户要求	用户要求	(3)
6	进线套管									
7										
设备重量		max.2.0t	max.2.5t	max.2.0t						
备注		母线提升柜	分段柜	PT+避雷器柜						

说明：数量栏中带()的元件为可按用户要求的可选项，通过是否选用和数量变化可派生出多个接线方案。

Scheme

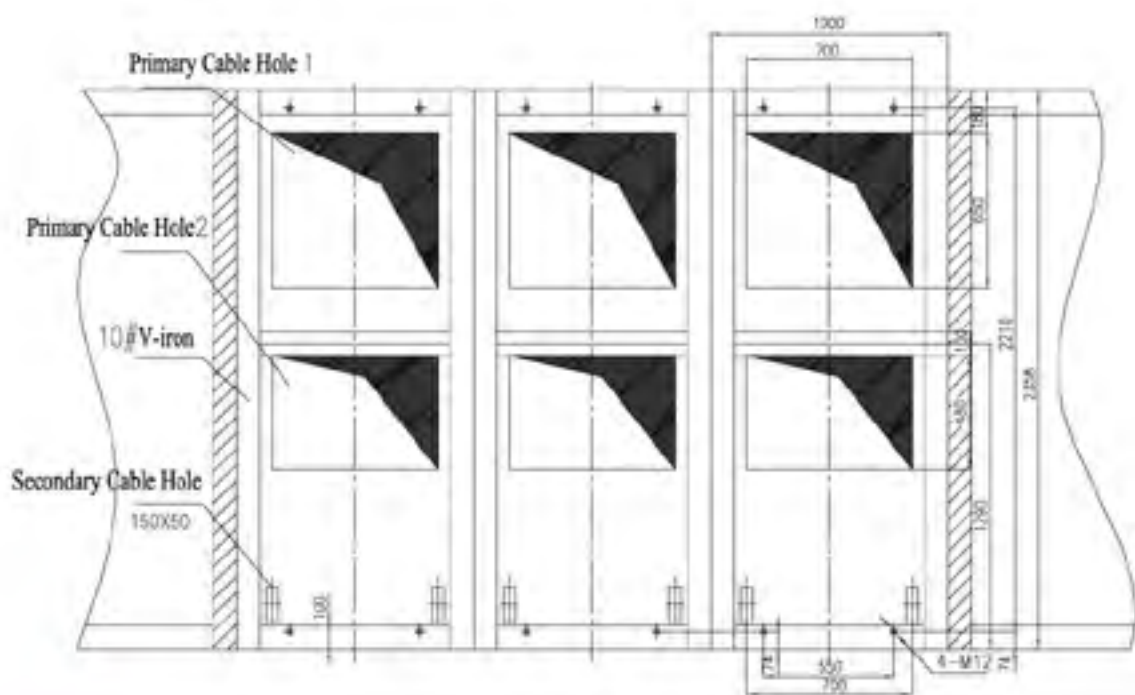
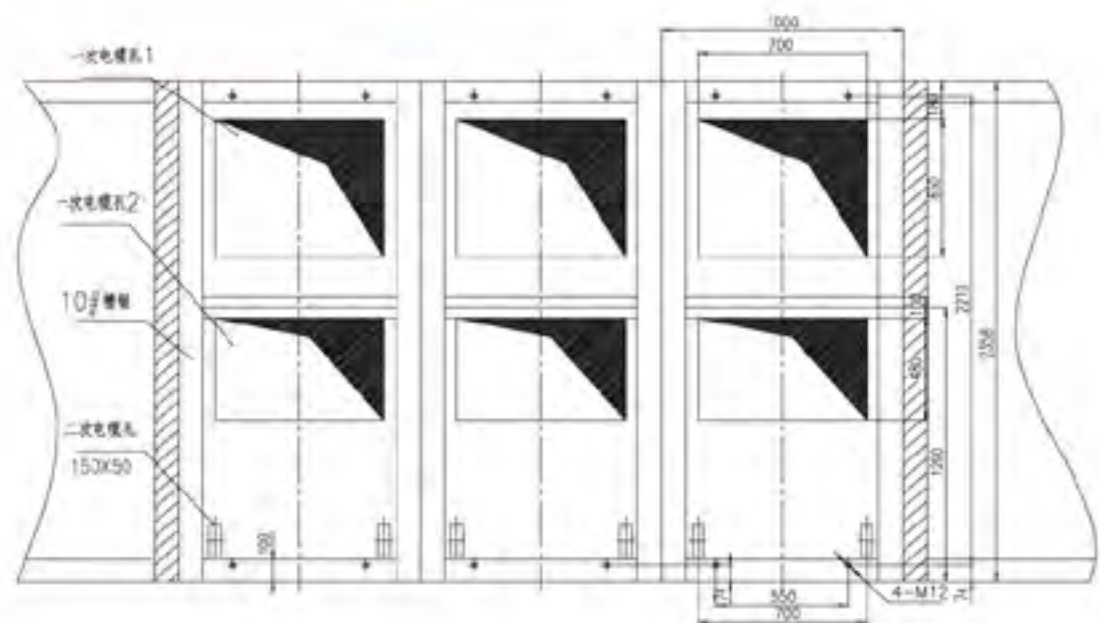
Code for Primary Wiring Scheme		1	2	3	4					
Primary Wiring Scheme										
Pos	Name of Components	Type	Specification	Qty	Specification	Qty	Specification	Qty	Specification	Qty
1	VCB	ZN142-72.5		1		1		1		
2	EDS	HD1-72.5		1		1		1		
3	CT	LMZ30-0.5	*	(3)	*	(3)	*	(3)		
4	PT	JDZX9-72.5CQ(C)	*	(3)	*	(3)	*	(3)		
5	SA	CM-66	*	(3)	*	(3)	*	(3)	*	(3)
6	Incoming Bushing									3
7										
Weigh of the Product		max.2.5t	max.2.0t	max.2.5t	max.2.0t					
Remarks		Incoming and Outgoing Panel			Bus Bar Riser					
Code for Primary Wiring Scheme		5	6	7	8					
Primary Wiring Scheme										
Pos	Name of Components	Type	Specification	Qty	Specification	Qty	Specification	Qty	Specification	Qty
1	VCB	ZN142-72.5				1				
2	EDS	HD1-72.5				1		1		
3	CT	LMZ30-0.5				*	(3)			
4	PT	JDZX9-72.5CQ(C)				*	(3)		*	(3)
5	SA	CM-66	*	(3)		*	(3)	*	*	(3)
6										
7										
Weigh of the Product		max.2.0t	max.2.5t	max.2.0t						
Remarks		Bus Bar Riser	Sectionalizer Panel	PT+SA Panle						

Notes:

1. Numbers inside of () brackets mean that the quantities of this component is selectable according to the customer's. More wiring schemes can be derived from the selection and the changes of quantities.
2. *--According to the customer's requirements



F 安装基础 Foundation frame



注：一次电缆孔 2 只适用于一次接线方案 3

Note: Primary Cable Hole 2 just fits for Primary Scheme 3.

O 订货须知 Ordering Information

订货时用户应提供的技术资料 Technical data provided by customer when ordering

- 一次线路方案单线系统图 (包括系统电压), 平面排列图
- 一、二次线路所用主要电器设备的名称、型号、规格、数量等
- 柜体颜色: 制造厂推荐的标准色为 Y01 驼灰色 (GB3181-82 Y01) (亦称浅驼中皱), 表面处理工艺为静电粉末喷涂
- 如用户需要高原型或 "TH" 型产品时, 订货要特别提出
- 如用户有特殊要求, 应在订货时特别提出
- Primary circuit scheme and single-line system diagram (including the system voltage), plane arrangement diagram
- Name, type, specification, quantity of the main electric parts used for primary and secondary circuit.
- The color of panel. Manufacturer recommend the Y01 camel gray (GB3181-82 Y01) as the standard color, with the surface of panel processed by electrostatic powder coating.
- Making a special announcement if customers need to purchase "plateau type" or "TH type".
- Declaring specially if customers have other requirements for ordering.

备忘录 Memorandum

由于产品在不断的更新, 内配的电器元件也在不断的更新, 产品的说明书内容也会被修改。如果因某些修改的通知不及时, 请予谅解。诚望您在选型或使用能与我们及时沟通一些最新的信息, 使产品的设计和制造达到一个新的高度和水平。

Since the product, as well as the electric components used inside the switchgear is under development and innovation, the content of this instruction is subject to revision. Please be understood and forgiven us if you are not informed of the revision in time. We are sincerely hoping that when you make a selection or use our product, we can communicate with each other about the latest information to make the design and manufacture works reach a new level.