

Product Introduction



HG3-40.5 Cubical Type Green Gas Insulated Metalclad Switchgear (C-GIS) is a new environmental product designed and developed independently by our company, and the first gas type insulated metalclad switchgear to use dry air or N₂ as insulation gas and to fill the gaps in this field in China. HG3-40.5 Switchgear is a new generation of M. products combined with vacuum-interrupting technology, APG technology, gas insulation technology as well as the interface insulation technology.

According to the requirements of environment protection and avoidance of greenhouse effects, dry air or N₂ has been used as the insulation gas between phases and from phase to earth, making the product structure more compact and in small size, covering less areas, which can largely save the limited urban land.

Small sized distribution and transmission equipment will not only reduce the total cost of the equipment including the building, but also be helpful for decreasing the burden to the environment.

It is of metal-clad gastight design. All the middle voltage components are completely sealed in the gastight box, with no surroundings influence and maintenance free; the adoption of spring operation drive and embedded CB pole vacuum interrupter reduces the number of components.

HG3-40.5 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. The design of reliable mechanical and electrical interlock can effectively avoid maloperation.

Silicone rubber bus bar bushings are used to connect the panels, which are convenient and flexible. Stainless panels are welded by laser gastight weld, guaranteeing the gas low leakage.

It has been designed according to the Chinese standards of GB3906, GB11022, DL/T404 etc.

产品特性 *Main Features*

● 环保型 Environmental Protection

HG3-40.5 产品采用干燥空气 / 氮气作为绝缘气体，密封在密闭的焊接箱体内部。与同电压等级的产品比（使用 SF6 气体为绝缘介质），对环境没有影响，是绿色环保产品。

HG3-40.5 switchgear is specially designed that dry air or N₂ is used as insulation gas sealed in gastight laser-welded box. Compared with other product (using SF₆ as insulation gas), it has no influence to the environment, which is environment protection product.

● 结构紧凑 Compact Structure

由于采用环保气体绝缘，开关设备结构更紧凑，可以大幅度节约有限的城市用地。与 AIS 产品相比，HG3 开关设备的尺寸较小，占地面积少。

HG3-40.5 switchgear adopts green gas for insulation, with compact structure, largely saving the area. Compared with AIS product, HG3 switchgear possesses smaller size and less area.

● 免维护 Maintenance Free

主回路部分所有的高压元件安装在完全密封的环境中，不受恶劣环境条件（如凝露、污秽、湿气等）的影响，可以防止外部物体（如污秽、尘埃、小动物等）进入。断路器采用现代真空灭弧技术和固封极柱技术，并使用可靠的驱动装置，开断容量可达 31.5kA，机械寿命可达 10000 次。开关设备的安装、操作、扩展及更换无需涉及压缩气体操作。

All high voltage components are completely sealed in the gastight box, therefore it is of no influence upon the serious surrounding conditions (such as congeal dew, dust, humidity, ect.) . Any accidents caused by dust, chemical vapors or small animals are excluded forever. HG3-40.5 switchgear combines the most modern vacuum interrupter technology, the embedded pole design and a reliable spring drive so that highest breaking capacity can reach 31.5kA and the mechanical life can reach 10000 times. The installation, operation, expansion and replacement of the switchgear can be undertaken without operation of dry compressed air.

●安全可靠 Safety and Reliability

已通过了国家认可试验室的全部型式试验。本产品具有自主知识产权，是国内外首台（套）利用干燥空气 / 氮气为绝缘介质的 40.5kV 电压等级的 C-GIS 产品，填补国际空白，技术水平处于国际领先水平。标准化的数控生产流程。质量控制符合 ISO9001 标准。

接地的金属外壳安全可触摸。所有高压部件，包括电缆终端，母线和电压互感器均用接地层或金属外壳封闭。一次回路中所有高压元件的防护等级为 IP65，设备外壳的防护等级为 IP40。逻辑机械联锁可防止误操作。

HG3-40.5 switchgear has passed all type tests. It is confirmed that this product has proprietary intellectual property right, which is the first C-GIS of 40.5kV level using dry air/N₂ as insulation gas to fill the gaps in this field in the world, whose technology has reached international advanced level. The product is produced through standardized numerical control work flow. The quality control is in compliance with ISO9001 standard.

The earthed shell is safe and touchable. All high voltage components including cable plugs, busbar and VT are 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. Logic mechanical interlocking can avoid maloperation.

●操作稳定性 Stable Operation

气密性焊接箱体不受环境影响（污秽，湿气及小动物等）。电流互感器为低压环形铁芯结构，套装在电缆上。电压互感器、避雷器均采用柜外插接方式，安装在气室外，安装、更换灵活。断路器和三位置开关同时具备手动和电动操作功能，在断路器和三位置开关之间设有可靠的机械联锁。免维护的断路器采用固定式安装。

The gastight welded panel is not influenced by environment. The CT is of low voltage ring shape iron core structure, suiting on the cable. The VT and surge arrester are all in plug-in type outside the panel, which are equipped outside the gas tank, which are easy to install or change. The circuit breaker with the embedded pole and the three position switch can be operated manually or by a motor drive, the reliable mechanical interlock is set between the CB and the three position switch. The maintain-free circuit breaker is installed in fixed type.

技术参数

Technical Parameter

序号 Item	项目 Name	单位 Unit	技术参数 Technical parameter
1	额定电压 Rated voltage	kV	40.5
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
		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
		隔离断口 DS isolation distance	
		隔离断口 DS isolation distance	
	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 2500
5	额定短路开断电流 Rated short circuit breaking current	kA	31.5
6	额定短路关合电流(峰值) Rated short circuit making current (peak value)	kA	80
7	额定短时耐受电流 Rated short time withstand current	kA	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	80
10	用作绝缘的气体 Insulation gas		洁净干燥空气 / 氮气 Clean dry air/N ₂
11	气室中水份含量 Water content in the gas box	ppm	≤225
12	年漏气率 Leakage rate/year	%	≤0.5
13	额定充入压力 (abs,20°C) Rated filling pressure (20°C)	MPa	0.23
14	报警压力 (abs,20°C) Alarm pressure (20°C)	MPa	0.21
15	最低功能压力 (abs,20°C) Minimum function pressure (20°C)	MPa	0.20
16	真空断路器等级 Vacuum circuit breaker		M2, E2, C2
17	额定操作顺序 Rated operation sequence		O-0.3s-CO-180s-CO
18	真空断路器机械寿命 Vacuum circuit breaker mechanical life	次 time	10000
19	三位置开关机械寿命 EDS mechanical life	次 time	2000(M1)
20	额定操作电压 Rated operating voltage		AC110/220 DC110/220
21	继电器室防护等级 Protection degree of the relay compartment		IP4X
22	产品外形尺寸(宽 w × 深 d × 高 h) Dimensions (W*D*H)	mm	700 × (1300) × 2300

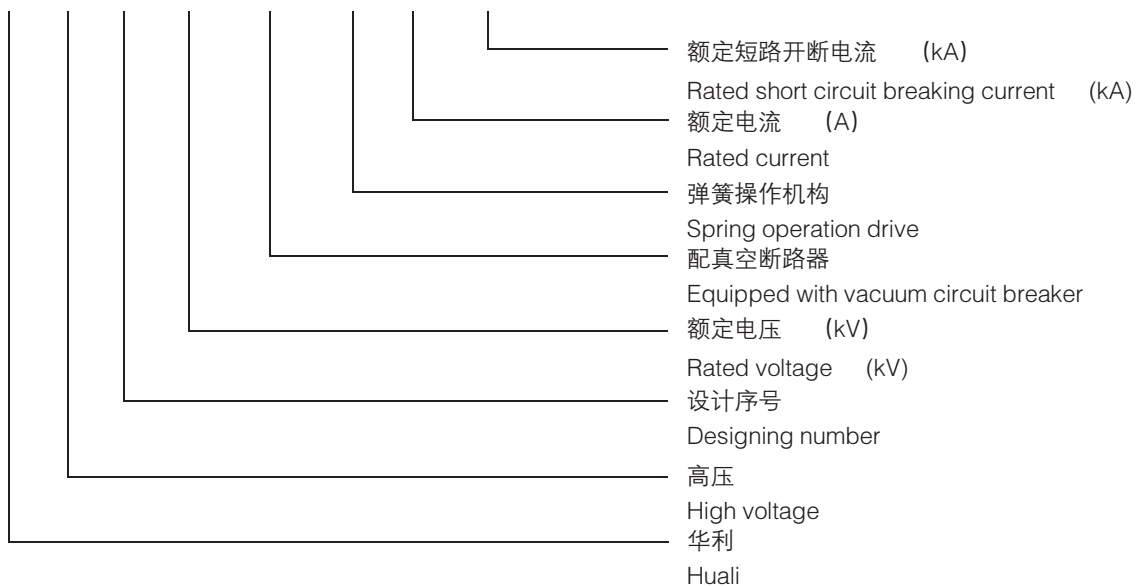
产品正常使用条件

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%
- 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
- 与海拔高度无关
- 如果使用条件超出以上规定，及 GB3906、GB11022 规定的正常使用条件，用户应与制造厂协商确定
- Indoor type
- Ambient temperature:
maximum temperature +40 C
minimum temperature -25 C
- Humidity:
daily average relative humidity ≤ 95%
monthly average relative humidity: ≤ 90%
- 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 GB 3906, GB11022, please contact the manufacturer.

产品型号和意义 The type and meaning

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产品结构 *Product Structure*

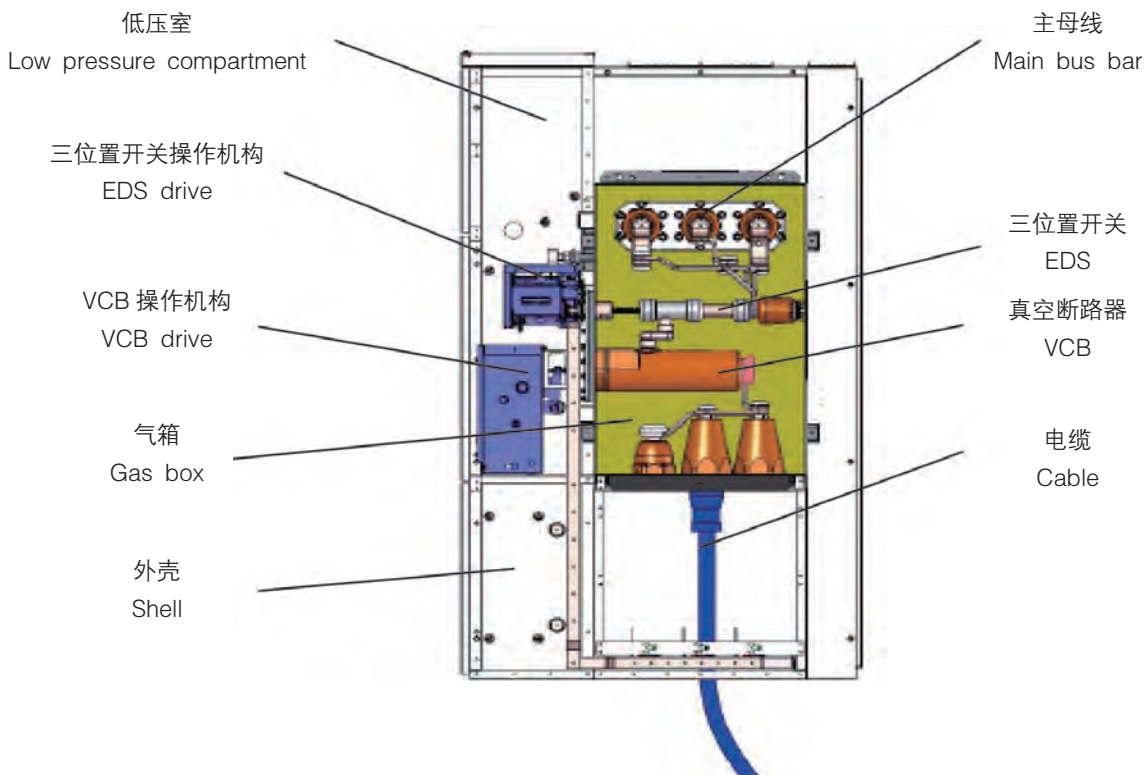
整体结构采用单气箱形式：断路器、母线及三位置开关在一个气密隔室。充气隔室为无磁不锈钢板经激光切割、激光焊接而成，非焊接密封连接面，均采用 O 型橡胶圈密封。

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产品前上部，机构同时具备手动及电动操作功能。

HG3-40.5 switchgear is with single gas box structure: the circuit breaker, bus bar and three-position switch are in one gastight compartment. The gas box is made of nonmagnetic stainless steel plate, which is laser-cut and laser-welded. 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 drives can be operated manually or by motor.

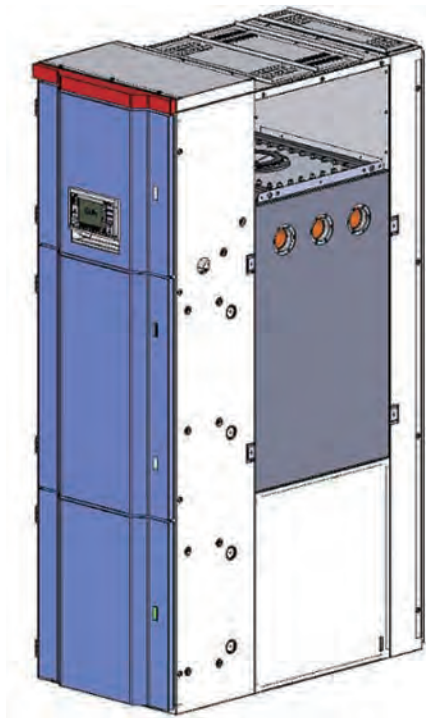
产品结构示意图 Diagram of Product Structure



充气隔室后下方安装有内锥电缆连接套管，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。

HG3-40.5 产品为三相共箱式结构，断路器功能单元、三位置开关及母线单元密闭在一个充气隔室内，低压室（仪表室，操作机构室），电缆间隔等组成。采用 O 型橡胶圈密封，和气密焊接波纹管密封

在充气隔室上部设有压力释放装置，当充气隔室内部气压升高超过一定限值时，压力释放装置将被自动打开，释放压力和排泄气体，以确保操作人员和产品的安全。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 bushings are placed on the lower-rear and upper-rear sides of the gas box, which can be used to connect cables, PTs, SAs and CTs .CTs can be assembled on the cable and fixed with the frame.

The switchgear is modular designed with three-phase-in-one-box structure, which is formed by CB function unit, three-position switch function unit, low voltage compartment (instrument, operation drive compartment) and cable room, etc. Rubber O-rings and gastight micro plasma welded bellows are used for seal.

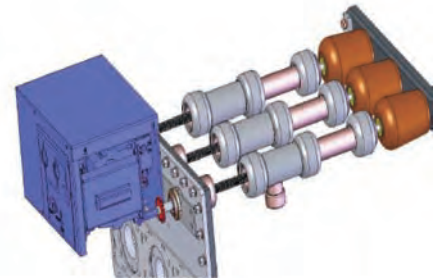
The gastight box is equipped with gas-filling valve and pressure relief device. When the pressure inside the gas box increase and exceeds the limitation, the pressure relief will operate automatically to discharge gas and relieve pressure, in order to guarantee the safety of operation personnel and product.

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 " Protection-Earth".

主要部件 *Main Components*

三位置开关 EDS (Three-Position Switch)

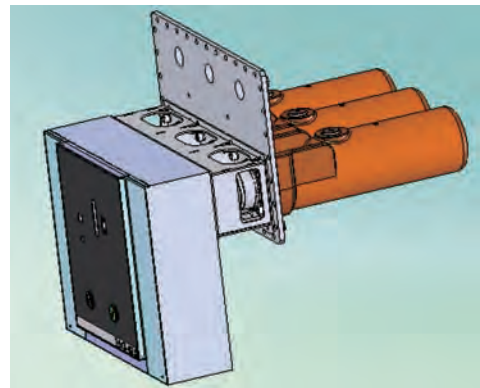
- 三位置开关水平布置
- 由电机驱动的直动式三位置开关，具有：接通、断开及接地三个位置的功能
- 三位置开关具有机械和电气联锁，防止各种误操作
- 可以手动操作三位置开关
- 具有机械位置指示器



- Horizontal 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 maloperations.
- It can be operated manually.
- Mechanical position indicator.

真空断路器 VCB (Vacuum Circuit Breaker)

- 断路器水平布置
- 断路器采用固封极柱 APG 技术
- 操作机构在气室外
- 断路器固封极柱与机构间的拉杆，通过波纹管实现整体密封连接
- 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接地功能



- The VCB is of horizontal arrangement.
- It 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.
- The interlocking function guarantees that the opening and closing operation can only be carried out when the EDS is in the correct position.
- It works with EDS to achieve the earthing function.

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 standards 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
- 安装在充气箱体外,金属封闭, 安全可触摸
- 通过插接头与系统相连
- 2# 或 3# 标准内锥插接头
- 环氧树脂浇铸绝缘, 不受环境影响
- 通过柜内插接头实现二次连接
- 无需单独柜体
- 满足 IEC60044-2 标准和 GB1207 标准
- 通过了型式试验验证

- Induction type, single phase and plug-in design.
- Installed outside of gas box, metal enclosed and safe to touch.
- Connect with the system through the connection-peg.
- Standard #2 or #3 inner cone plug connector.
- The manufacture of epoxy resin casting makes it free from surrounding influence.
- The secondary connection is completed through the inside plug connector.
- It does not need separate panel.
- It meets with the standards of IEC60044-2 and GB1207.
- Passed the type test.

主要部件 *Main Components*

避雷器 Surge Arrester

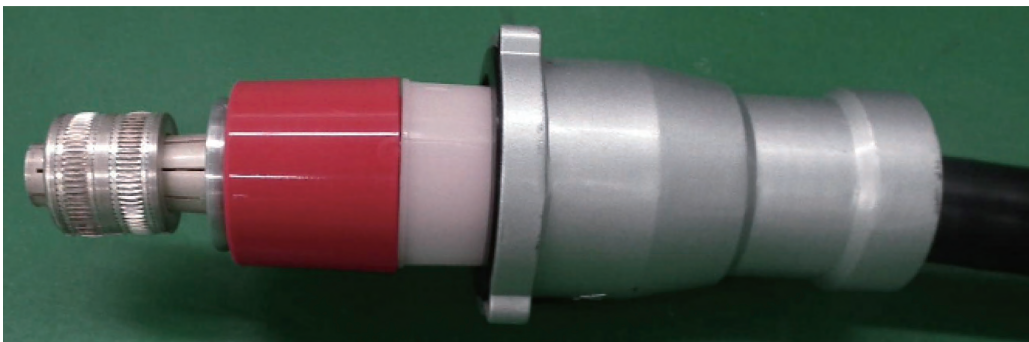
- 全金属壳体屏蔽，安全可触摸
- 配有硅橡胶绝缘插拔式终端
- 2# 或 3# 标准内锥插接头
- 安装方便、性能可靠
- 无需单独柜体
- 满足IEC60099-4标准和GB11032标准
- 通过了型式试验验证
- Shielded metal shell, safe to touch.
- Equipped with plug-in type silicone insulation end.
- Standard #2 or #3 inner cone plug terminals.
- Easy to install. Reliable performance.
- Unnecessary to separate panel.
- Meets with standard of IEC60099-4 and GB11032.
- Passed type test.

母线 Bus Bar

- 分支母线采用矩形母线，具有很高的机械强度和短路电流耐受能力，特殊的设计有效的改善了电场的分布
- The branchbus use rectangle bus bar, so is with strong mechanical strength and standing capability of short circuit current. Special design improves effectively the electric fields distribution.
- 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
- 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 Bushing (3#)

- 与 3# 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 3# inner cone cable bushing.
- Well earthed metal shell and safe to touch.
- Cross-sectional area of the cable connectable is related to the rated voltage of the cable.
- Each phase can max, connect two cables.
- Meet with standard of EN50181.
- Passed type test.



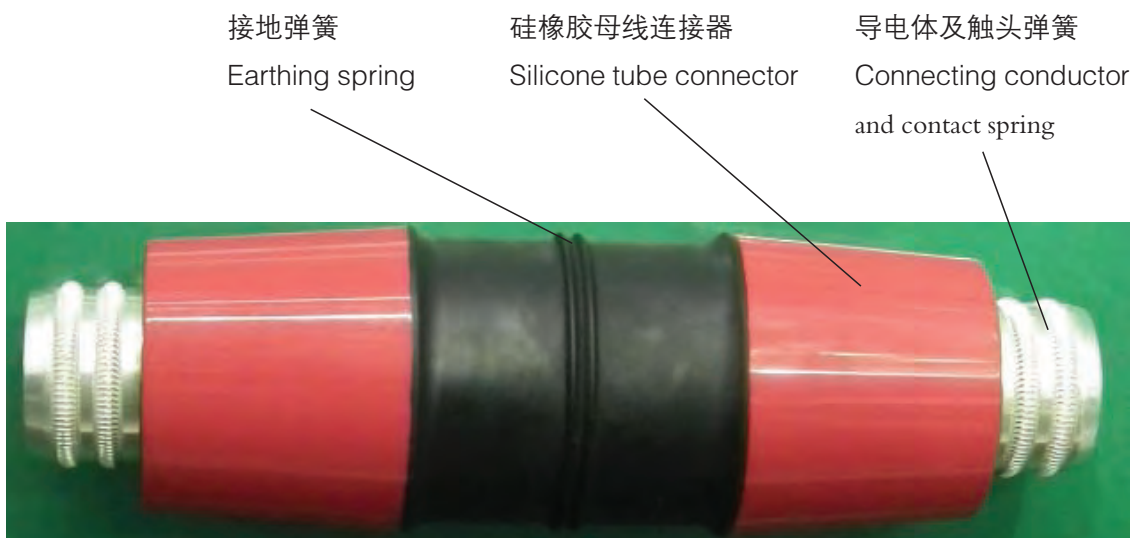


绝缘插头 Dummy Plug(3#)

- 与 3# 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 3# inner cone bushing.
- Shell is earthed and safe to touch.
- Meet with standard of EN50181
- Passed type test

硅橡胶母线连接器 Silicone Tube Connector

- 与母线内锥插座配合使用
 - 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 bus bar inner cone bushing
- Used for electric connection between gas boxes.
- Meet with standard of EN50181
- Passed type test



典型一次方案

Scheme

开关柜型号及一次方案编号:		01	02	03	04	05	06	07	08
一次接线方案									
柜内电气设备	型号/数量								
真空断路器	HV3	1	1	1	1				
三位开关	HD3	1	1	1	1				
PT加隔离开关				(1)	(1)			(1)	(1)
电流互感器	电缆穿心式	3	3	3	3	3 (可选)	3 (可选)	3 (可选)	3 (可选)
	支柱式					3 (可选)	3 (可选)	3 (可选)	3 (可选)
电压互感器	内锥插拔式			3	3			3	3
熔断器	PT (内置)			3	3			3	3
带电显示器		有	有	有	有	有	有	有	有
避雷器	内锥插拔式		3		3			3	
开关柜用途		电缆进出线				母线提升柜			
开关柜型号及一次方案编号:		09	10	11	12	13	14	15	16
一次接线方案									
柜内电气设备	型号/数量								
真空断路器	HV3					1			
三位开关	HD3	1	1	1	1	1	1	1	1
PT加隔离开关				(1)	(1)			(1)	
电流互感器	电缆穿心式	3 (可选)	3 (可选)	3 (可选)	3 (可选)			3 (可选)	3 (可选)
	支柱式	3 (可选)	3 (可选)	3 (可选)	3 (可选)		3 (可选)	3 (可选)	3 (可选)
电压互感器	内锥插拔式			3	3			3	
熔断器	PT (内置)			3	3			3	
带电显示器		有	有	有	有	有	有	有	有
避雷器	内锥插拔式		3	3					3
开关柜用途		隔离提升柜				分段开关柜	分段隔离柜		
开关柜型号及一次方案编号:		17	18	19	20	21			
一次接线方案									
柜内电气设备	型号/数量								
真空断路器	HV3								
三位开关	HD3			1	1				
PT加隔离开关				(1)					
电流互感器	电缆穿心式								
	支柱式	3 (可选)	3 (可选)						
电压互感器	内锥插拔式	3		3	3				
熔断器	PT (内置)	3		3	3				
带电显示器		有	有	有	有	有			
避雷器	内锥插拔式		3	3					
开关柜用途		母联提升柜		PT+避雷器柜	PT柜	母线接地柜			

HG3-40.5 型环保气体绝缘金属封闭开关设备

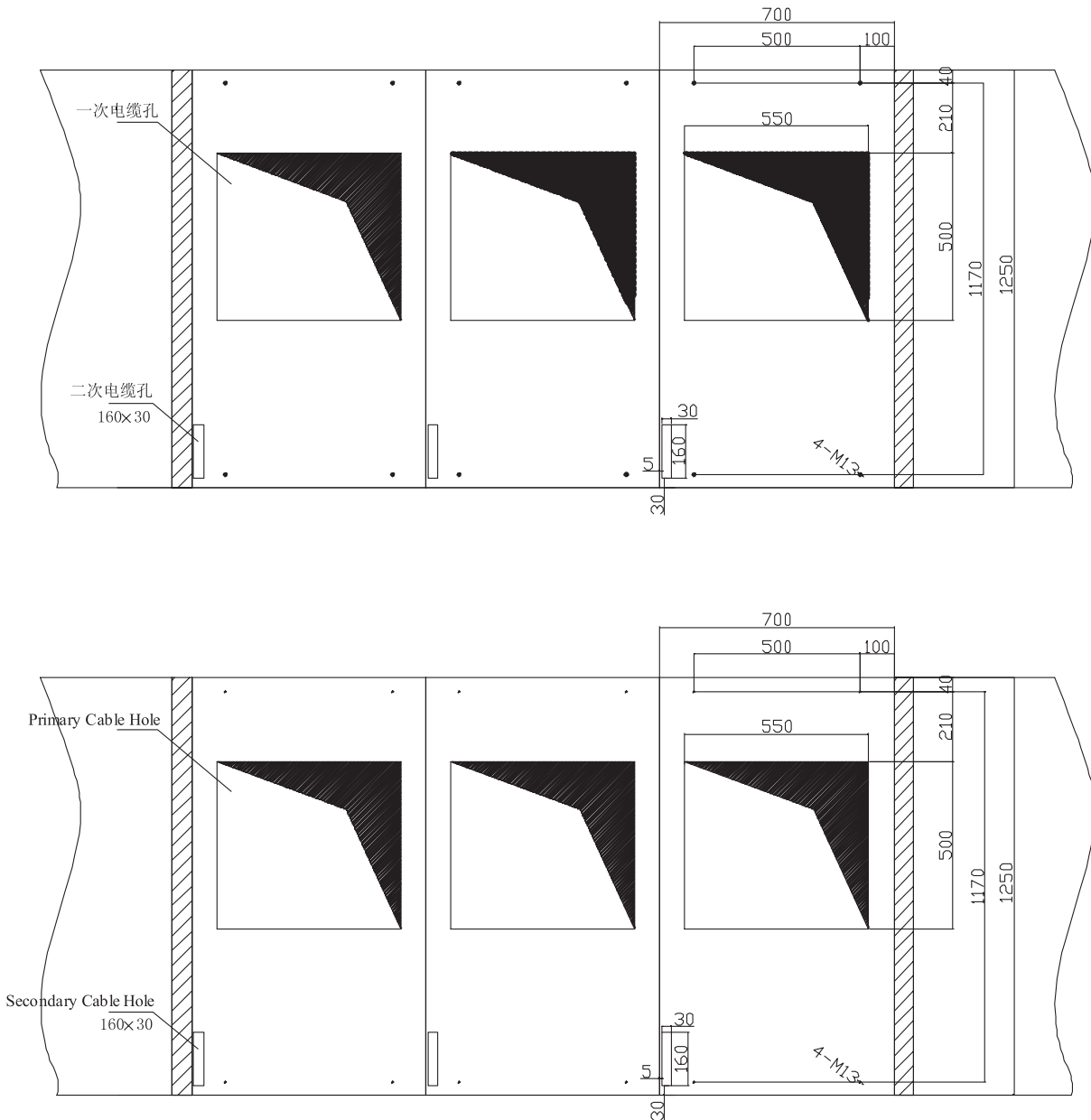
HG3-40.5 Cubical Type Green Gas Insulated Switchgear (C-GIS)



Code for Primary Wiring Scheme		01	02	03	04	05	06	07	08
Primary Wiring Scheme									
Name of Components	Type \ QTY								
VCB	HV3	1	1	1	1				
EDS	HD3	1	1	1	1				
PT+Isolation				(1)	(1)			(1)	(1)
CT	Cable Feed Through Type	3	3	3	3	3 (Choice)	3 (Choice)	3 (Choice)	3 (Choice)
	Support Type					3 (Choice)	3 (Choice)	3 (Choice)	3 (Choice)
PT	Inner Cone Plug Type			3	3			3	3
FUSE	PT (inner)			3	3			3	3
Displayer		With	With	With	With	With	With	With	With
SA	Inner Cone Plug Type		3		3			3	
Remarks		Incoming and Outgoing Panel				Busbar Riser			
Code for Primary Wiring Scheme		09	10	11	12	13	14	15	16
Primary Wiring Scheme									
Name of Components	Type \ QTY								
VCB	HV3					1			
EDS	HD3	1	1	1	1	1	1	1	1
PT+Isolation				(1)	(1)			(1)	
CT	Cable Straight Through Type	3 (Choice)	3 (Choice)	3 (Choice)	3 (Choice)				
	Support Type	3 (Choice)	3 (Choice)	3 (Choice)	3 (Choice)		3 (Choice)	3 (Choice)	3 (Choice)
PT	Inner Cone Plug Type			3	3			3	
FUSE	PT (inner)			3	3			3	
Displayer		With	With	With	With	With	With	With	With
SA	Inner Cone Plug Type		3	3					3
Remarks		Isolation Riser				Sectionalizer Panel	Sectional Isolation Panel		
Code for Primary Wiring Scheme		17	18	19	20	21			
Primary Wiring Scheme									
Name of Components	Type \ QTY								
VCB	HV3								
EDS	HD3			1	1				
PT+Isolation		(1)							
CT	Cable Straight Through Type								
	Support Type	3 (Choice)	3 (Choice)						
PT	Inner Cone Plug Type	3		3	3				
FUSE	PT (inner)	3		3	3				
Displayer		With	With	With	With	With			
SA	Inner Cone Plug Type		3	3					
Remarks		Busbar connection Riser Panel		PT+SA Panel	PT Panel	Busbar Grounding Panel			

安装基础

Foundation frame



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（GB3181-82Y01）（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
- 如用户有其它特殊要求，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及时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, 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.