



固体绝缘全封闭开关设备 Solid-insulated Switchgear

GTXGN □-12



天仑电气 - 为您提供一流的电力系统解决方案
Tianlun Electric, provide you with first-class power system solution

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宁波天仑电气有限公司
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公司简介 Introduction

宁波天仑电气有限公司(以下简称公司)成立于2001年1月。

公司坐落于浙江宁波,毗邻“东方大港”北仑港。拥有10000平方米的研发生产基地,年产值超亿元,目前有80多名年轻朝气的员工,其中60%为本科学历。公司是集研发、生产、销售、服务于一体的高新技术企业,致力于打造高品质的智能化、节能型、定制模式的输变电设备产品。

公司目前有符合国际及国内标准3大类18种产品,包括24kV中置式开关柜及环网柜,12kV中置式开关柜及环网柜,440V固定式分隔柜,抽屉式开关柜,预装式变电站,低压母线槽(合作生产),10kV变压器(合作生产)等等,同时部分为ABB、Schneider的授权产品。公司立足于浙江,为很多大型的制造企业、房产开发、学校、港口等用户提供了许多高质量的产品和服务,同时也出口到东非、北非及东南亚国家,获得了客户的一致满意。

公司严格执行ISO9001质量保证体系,标准化体系,安全生产标准体系,国家CCC认证体系。坚持持续提升产品质量,追求零缺陷产品,全心全意服务用户的质量方针,坚持以人为本,鼓励创新,精细化的管理理念,坚持以感恩在心为核心价值观,为我们的用户提供最好的产品和服务。

Ningbo TIANLUN Electric Co., Ltd was established in year 2001, January. It is located in Ningbo, near Beilun port, which is called "oriental grand port". TIANLUN has 10000-square-meter researching and developing workshop and annual output value exceeds 100 million. TIANLUN has a professional team composed of 80 innovative staff, most of them have bachelor's degrees. TIANLUN is a company that integrates researching, developing, selling and service. Our purpose is to create high quality electric equipment product which is intelligentized, energy-saving and customized.

TIANLUN mainly have 18 types of products which belong to 3 majors as follow: 24 kV Intermediate switchgear and Ring Main Unit Switchgear, 12kV Intermediate Switchgear and Ring Main Unit Switchgear, 440V Fixed Isolated Switchgear, Preparatory Transformer Substation, Low Voltage Bus Duct (coproduction) and 10kV transformer (coproduction). Some products are Licensed by ABB and Schneider. TIANLUN have been providing high quality products to large manufacture enterprise, real estate, school and port constructions. At the mean time, our product are exported to Africa and southeastern countries and win satisfaction from the overseas customers.

TIANLUN strictly stick to ISO9001 standard system, standardization system, safety standard system and CCC authentication system. Our quality policy is producing good and zero defect product, having customers well served. Our management policy is people orientation, creation encouragement and high-effective system. TIANLUN always hold a thankful heart and provide top-level product with best service.

概述

General

GTXGN-12 固体绝缘开关设备是一种全绝缘、全封闭的新一代环保开关设备,所有带电部件全部密封在一个 APG 注塑成型的环氧树脂壳体内,相邻柜间通过接插式固体绝缘母线连接,整个开关设备不受外部环境影响。

GTXGN-12 固体绝缘开关设备具有真空负荷开关柜、真空负荷开关-熔断器组合电器柜和真空断路器柜三种基本功能单元柜,适用于10kV三相交流50Hz单母线系统,作为接受和分配电能的设备;它自身具备对线路进行控制、保护、监视和通讯功能,可适用于机场、地铁、大型建筑、二次变电站及工矿企业等,特别适合于场地狭小、环境恶劣、海拔高、要求免维护等场合使用。

GTXGN-12 Solid-insulated Switchgear is a new generation of fully-insulated and fully-enclosed environment-friendly switchgear. All live parts are enclosed in epoxy resin housing with APG injection moulding, and the adjacent cabinets are connected by plug-in solid-insulated bus, so the switchgear will not be affected by external environment.

GTXGN-12 Solid-insulated Switchgear includes three cabinets of basic functional units: vacuum load switch cabinet, vacuum load switch & fuse cabinet combination, and vacuum circuit breaker cabinet, which applies to 10kV three-phase AC 50Hz single-busbar system. As an equipment to receive and distribute electric energy, it is provided with line control, protection, monitoring and communication, and can be used in airport, subway, large building, secondary substation and mining or industrial enterprises, especially suitable for those occasions with narrow place, poor environment, high altitude and maintenance-free requirement.

质量保证:

Quality Assurance

产品质量保证建立在符合质量体系各方面要求的研究、开放、设计和生产过程的不断改进之上,生产工厂取得了ISO9001的认证。

产品在国家高压试验检测中心进行了规定项目的型式试验验证,产品的基本参数和技术指标均符合以下标准:

GB1984-2014	高压交流断路器
GB3804-2004	3.6kV~40.5kV 高压交流负荷开关
GB3906-2006	3.6kV~40.5kV 交流金属封闭开关设备和控制设备
GB16926-2009	高压交流负荷开关-熔断器组合电器
G/GDW730-2012	12kV 固体绝缘环网柜技术条件(国网企标)

Quality assurance is established based on continuous improvement in the process of research, development, design and production in compliance with quality system. The manufacturing factory has passed ISO9001 certification.

The product has been provided with type test as required by National High-voltage Test and Inspection Center, whose basic parameters and technical index conform the following standards:

- GB 1984-2014 High-voltage alternating-current circuit-breakers
- GB3804-2004 High-voltage alternating-current switches for rated voltage above 3.6 kV and less than 40.5 kV
- GB3906-2006 Alternating-current metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV
- GB16926-2009 High-voltage alternating current switch-fuse combinations
- Q/GDW730-2012 Specifications for 12kV solid-insulated ring main units



ISO9001-2000



CCC 认证



WSC 北京世标认证中心



产品特点

Product Features

- 安全可靠——带电部件全部密封在外表面进行了接地屏蔽处理的环氧树脂绝缘筒和硅橡胶封闭母线内，实现全绝缘、全封闭、免维护。使用时不受环境和高海拔影响。分箱设计避免了相间放电可能性。
- 结构紧凑——同类环网柜体积最小的产品之一：负荷开关柜、断路器柜尺寸 400×750×1500，负荷开关 + 熔断器组合电器柜尺寸 440×750×1500。
- 绿色环保——无 SF6 等温室气体。
- 智能化——断路器机构具有重合闸功能，负荷开关机构具有脱扣功能，可选配智能控制单元组件，适应电力企业实现配网自动化要求。
- 断口可视——三工位隔离开关的导通、隔离、接地三个位置可视。
- 灵活扩展——通过插接式绝缘母线可进行各种方案组合方案扩展，且扩展母线设在柜的顶部，符合用户使用习惯，便于安装。
- 负荷开关 + 熔断器组合电器功能柜的熔断器下端出线侧设有下接地装置，确保更换熔断器时的人身安全。
- 进行了内部故障泄压通道和结构设计，是一款达到 IAC 内燃弧级别的固体绝缘柜。
- 具有完善的机械、电气联锁功能，满足“五防”要求。

- Safe and reliable – all live parts are enclosed in the epoxy resin-insulated cylinder and silicon rubber-sealed busbar with external surface grounded and shielded so as to achieve full-insulation, full-enclosure and maintenance-free. The operation will not be affected by environment and altitude. Branch boxes prevent phase-to-phase discharge.
- Compact structure the smallest in the similar looped-network cabinets: load switchgear and circuit breaker 400 x 750 x 1500; load switch-fuse combination 440 x 750 x 1500.
- Environmental protection – without greenhouse gases such as SF6.
- Intelligent – the circuit breaker mechanism is functioned with reclosing and the load switch mechanism is functioned with tripping. The intelligent control unit components can be optional to meet the distribution and automation requirement in electric power enterprises.
- Visual port – the conducting, isolating and grounding position of three-position isolated switch are visual.
- Flexible expansion – with plug-in isolated bus, it can realize different combinations and expansions. The expanded bus is set on the top of cabinet, which caters for users and convenient for installation.
- In order to ensure human safety in fuse replacement, the grounding device is provided on the lower outgoing side of load switch-fuse combination.
- The solid-insulated cabinet is provided with internal fault relief passage and structure, and reaches to IAC internal arc class.
- It is complete with mechanical and electrical interlocking and meets five-prevention requirement.

使用环境条件

Service Environmental Conditions

海拔高度：不超过 1000m；
周围空气温度：上限 +45℃，下限 -40℃；
相对湿度：日平均不大于 95%，月平均不大于 90%；
周围无腐蚀或可燃性气体等明显污染；
无经常性的剧烈振动，地震强度不超过 8 级。
注：顾客若偏离正常使用条件可与制造厂家协商。

Altitude: not higher than 1000m;
Ambient temperature: upper limit +45℃, lower limit -40℃;
Relative humidity: daily mean Rh not more than 95%, monthly mean Rh not more than 90%;
No obvious pollutions such as erosion or combustible gas;
No frequent violent vibrations, earthquake intensity not above 8-magnitude.
Note: the customers shall consult any deviations from normal service conditions with the manufacturer.

型号及含义

Type Designation

GT	X	G	N	□	-12	CFV	/630 /125 /1250	-20 -31.5 25
固体绝缘 Solid-insulated	箱型 Cubicle	固定式 Fixed	户内 Indoor	设计序号 Design sequence number	额定电压 kV Rated voltage kV	主元件 C: 负荷开关 F: 负荷开关 + 熔断器组合电器 V: 断路器 Main element C: load switch F: load switch + fuse combination V: circuit breaker	额定电流 A Rated current A	20: 负荷开关柜热稳定电流 kA 31.5: 熔断器额定短路开断电流 kA 25: 断路器额定短路开断电流 kA 20: thermal stability current of load switchgear kA 31: rated short-circuit breaking current of fuse kA 25: rated short-circuit breaking current of circuit breaker kA

技术数据

Technical Data

固体绝缘柜、负荷开关、负荷开关—熔断器组合电器、断路器的电气参数

Electrical data of solid insulated cabinet, load switch, load switch & fuse combination, circuit breaker

序号 No.	名称 Name	单位 Unit	GTXGN □—12			
			C 模块 C module	F 模块 F module	V 模块 V module	断路器 circuit breaker
1	额定电压 Rated voltage	kV	12	12	12	12
2	1min 工频耐受电压表 (有效值) (相间、对地 / 端口) 1min power frequency withstand voltage (effective) (phase-to-phase, phase-to-ground/connection)	kV	42/48			
3	雷电冲击耐受电压 (有效值) (相间、对地 / 端口) Impulse withstand voltage (effective) (phase-to-phase, phase-to-ground/connection)	kV	75/85			
4	额定电流 Rated current	A	630/1250	630	125	630、1250
5	额定频率 Rated frequency	Hz	50			
6	额定短路开断电流 Rated short-circuit breaking current	kA	20、25		31.5	20、25
7	异相接地故障开断电流 Breaking current at earth-fault with different phases	kA				17.3、21.7
8	额定电缆充电电流 Rated cable charging current	A		10		25
9	额定短时耐受电流 / 短路持续时间 Rated short-time withstand current / duration of short-time	kA/s	20、25/4	20/4		20、25/4
10	额定峰值耐受电流 Rated peak withstand current	kA	50、63	50		50、63
11	额定短路关合电流 Rated short-circuit making current (peak)	kA	50、63	50		50、63
12	额定操作顺序 Rated operation sequence					O-0.3s-CO -180s-CO
13	额定交接 (转移) 电流 Rated transfer current	A			3500	
14	局部放电 Partial discharge	PC	≤ 20	≤ 5	≤ 5	≤ 5
15	机械寿命 Mechanical life			10000	10000	10000
16	内部电弧等级 Internal arc level	IAC	A(F.L) 20kA/0.5s			
17	防护等级 Degrees of protection		带电密封 IP67 柜体 IP4X Electrified seal IP67 Cabinet IP4X	IP67	IP67	IP67

负荷开关、断路器机械特性参数

Mechanical data of load switch and circuit breaker

序号 No.	名称 Name	单位 Unit	参数 Data	
			负荷开关 Load Switch	断路器 Circuit Breaker
1	额定电压 Rated voltage	kV	12	12
2	额定短路开断电流 Rated short-circuit breaking current	kA		20 25
3	触头压力 Contact pressure	N	1000 ± 150	1700 ± 150 2400 ± 200
4	触头开距 Clearance between contacts	mm		9 ± 1
5	超行程 Overtravel	mm		4 ± 1
6	平均合闸速度 Average closing speed	ms	0.75 ± 0.25	0.75 ± 0.25
7	平均分闸速度 Average opening speed	ms	1.25 ± 0.25	1.25 ± 0.25
8	触头合闸弹跳时间 Closing bouncing time of contact	ms		≤ 2
9	三相触头分、合闸不同期性 Opening/closing non-simultaneity of three-pole contact	ms		≤ 2

高压熔断器电气参数

Electrical data of high-voltage fuse

型号 Model	额定电压 kV Rated Voltage kV	熔断器电流 A Current of Fuse A	熔体额定电流 A Rated Current of Fuse Element A	额定短路开断电流 kA Rated Short-circuit Breaking Current kA
XRNT □ -12	12	125	10\16\20\25\31.5\40\50\63\ 80\100\125	31.5

可触摸式过压保护 (避雷器) 电气参数

Electrical data of touching-type over-voltage protection (arrester)

型号 Model	系统标称电压 Nominal Voltage of System	持续运行电压 Continuous Operating Voltage	直流 1mA 参考电压 kV<DC 1mA Reference Voltage	2ms 方流容量 A 2ms Square Current Capacity A	陡坡冲击 电流下残压 Residual Voltage at Steep Impulse Current	雷电冲击 电流下残压 Residual Voltage at Lightning Impulse Current	操作冲击电流 下残压 Residual Voltage at Operating Impulse Current	工频参考电压 Power Frequency Reference Voltage
AHY5WZ7-17	10	13.6	25	150		45		39

电流互感器电气参数

Electrical data of current transformer

序号 Model	额定一次电流 (A) Rated Primary Current (A)	额定二次电流 (A) Rated Secondary Current (A)	准确级及其额定二次输出 (VA) Accuracy Class and Rated Secondary Output (VA)		
			0.2S	0.2	0.5
LT10C	50	5 (或 1)		1	1
	75			1.5	1.5
	100			2.5	2.5
	150		2.5	3.75	3.75
	200		3.75	5	5
	600		12.5	15	15

序号 Model	额定一次电流 (A) Rated Primary Current (A)	额定二次电流 (A) Rated Secondary Current (A)	准确级及其额定二次输出 (VA) Accuracy Class and Rated Secondary Output (VA)		
			10P15	10910	10P5
LP10P	50	5 (或 1)		1	1.5
	75		1	1.5	2.5
	100		1	1.5	3.75
	150		1.5	2.5	5
	200		2.5	3.75	7.5
	600		7.5	12.5	25

电压互感器电气参数

Electrical data of voltage transformer

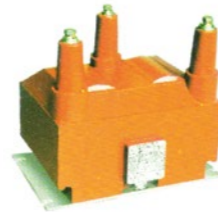
型号 Model	额定电压比 Rated Voltage Ratio	准确级组合 Accuracy Combination	额定二次输出 (VA) Rated Secondary Output (VA)	极限输出 (VA) Limited Output (VA)
JSZV16-10R	10/0.1	0.2	50	2X400
		0.5	100	
		1.0	150	
JSZV1610R	10/0.1/0.22	0.2	40	电源最大输出 2X400 Max.output 2*400
		0.5	80	
		1.0	150	



避雷器
Arrester



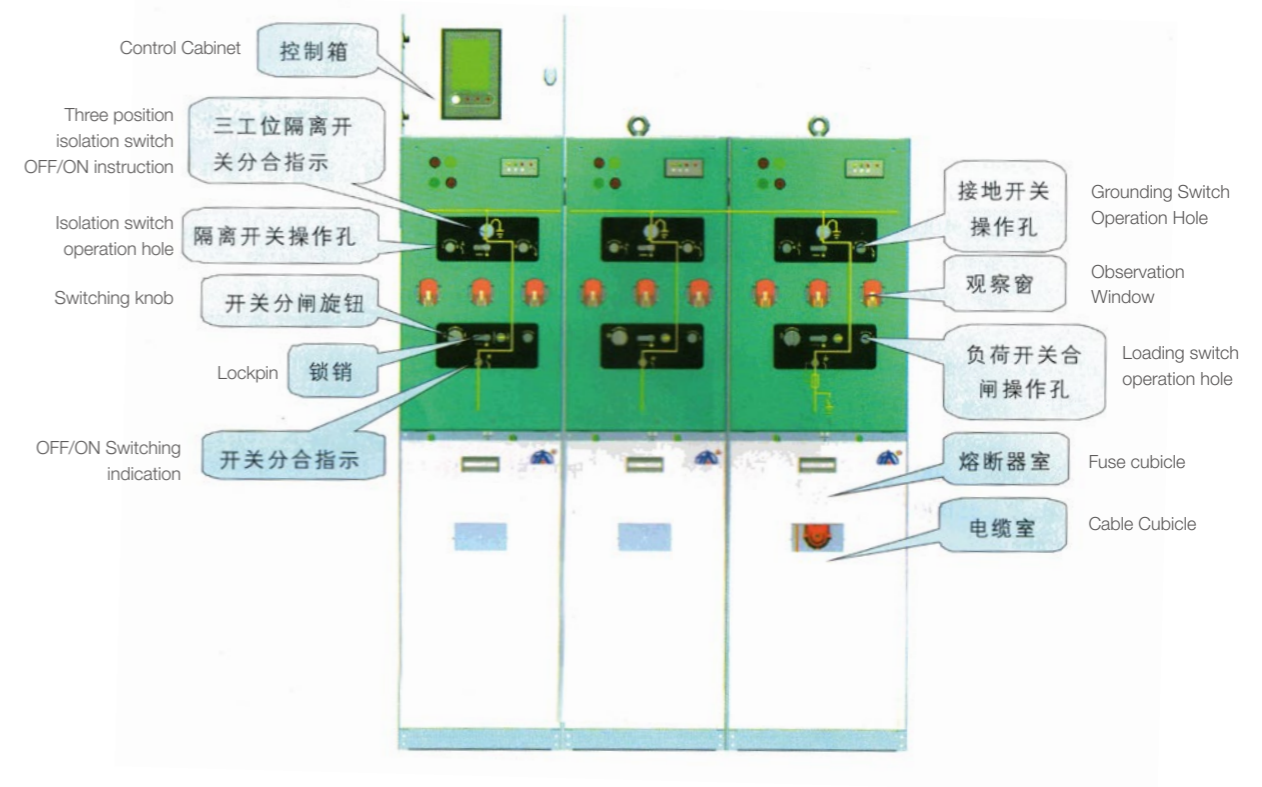
电流互感器
Current transformer



电压互感器
Voltage transformer

结构说明与操作方式

Structure Description and Mode of Operation



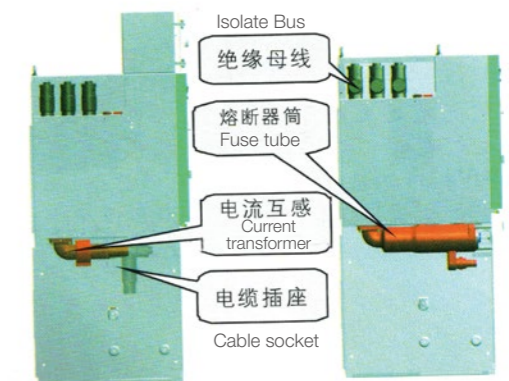
整体结构简述

Brief introduction to structure

固体绝缘开关设备的顶部为插接式绝缘母线室，中部布置绝缘筒，绝缘筒外表面进行了特殊工艺的屏蔽处理，内部封闭有真空灭弧室、三工位隔离开关等带电部件，防护等级达 IP67，下部为熔断器室、电缆室。柜正面上方为仪表室，根据需要可在柜上方布置控制箱，柜正面中部为操作机构室。

断路器操作机构具有重合闸功能，负荷开关与断路器操作机构室均具有手电操作功能。

固体绝缘开关设备具有真空负荷开关柜、真空负荷开关—熔断器组合电器柜和真空断路器柜三种基本功能单元柜，另外还有电缆提升柜、联络柜、计量柜等多种功能单元柜可供选择、组合。



The solid-insulated switchgear has plug-in insulated busbar cubicle in the upper, insulated cylinder in the middle, and fuse cubicle and cable cubicle in the lower. With special shielding process on the external surface, the insulated cylinder encloses vacuum interrupter, three-position isolating switch and other live parts with the degree of protection of IP67. The instrument cubicle is located in the upper of cabinet front, and the operating mechanism cubicle is located in the middle of cabinet front. Any users can arrange control box as requested in the upper side of cabinet.

The operating mechanism of circuit breaker is capable of reclosing. Both operating mechanisms of load switch and circuit breaker are capable of manual/electric operation.

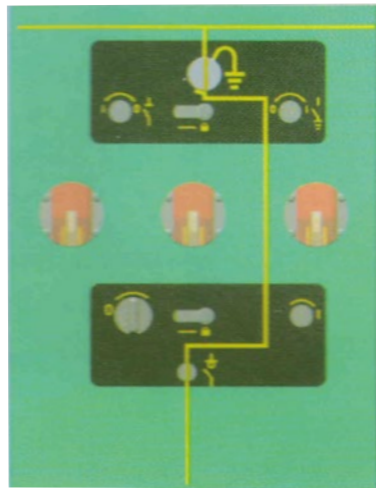
The solid-insulated switchgear includes three basic functional units cabinets: vacuum load switch cabinet, vacuum load switch & fuse cabinet combination, and vacuum circuit breaker cabinet. It also provides cable lifting cabinet, contact cabinet, metering cabinet etc. for option and combination.

操作方式

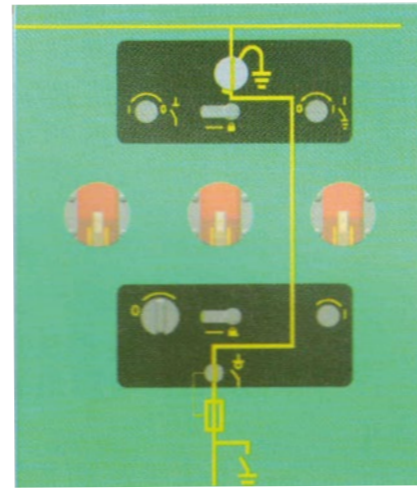
Mode of operation

负荷开关柜、负荷开关 + 熔断器组合电器柜 (如下图)

Load switchgear, load switch + fuse cabinet combination (see following figure)



负荷开关操作柜面板
Operation panel of load switchgear



负荷开关 + 熔断器组合电器柜操作面板
Operation panel of load switch + fuse cabinet combination

送电操作:

- 关好电缆室门
- 负荷开关操作面板操作的锁销拨向左边
- 逆时针旋转负荷开关分闸旋钮使负荷开关分闸
- 三工位隔离开关操作面板的锁销拨向左边
- 把操作手柄插入接地开关的操作孔内, 逆时针转动使接地开关分闸
- 把操作手柄插入隔离开关的操作孔内, 逆时针转动使隔离开关合闸
- 负荷开关操作面板的锁销拨向左边, 把操作手柄插入负荷开关开关合闸操作孔内, 顺时针转动使负荷开关合闸
- 负荷开关操作面板的锁销拨向右边, 完成送电操作, 此时按需要可在锁销上加挂锁。

停电操作:

- 负荷开关操作面板的锁销拨向左边
- 逆时针旋转负荷开关分闸旋钮使负荷开关分闸
- 三工位隔离开关操作面板的锁销拨向左边
- 把操作手柄插入隔离开关的操作孔内, 顺时针转动使隔离开关分闸
- 把操作手柄插入接地开关的操作孔内, 逆时针转动使接地开关分闸
- 负荷开关操作面板的锁销拨向左边, 把操作手柄插入负荷开关开关合闸操作孔内, 顺时针转动使接地开关合闸 (此时电缆侧实现了接地)
- 负荷开关操作面板的锁销拨向右边, 完成停电操作, 此时电缆室门可打开。若是负荷开关 + 熔断器组合电器柜组合电器柜侧可打开电缆室门更换熔断器。

Power ON operation:

- Close the door of cable cubicle.
- Toggle the lock pin on the operation panel of load switch to the left.
- Turn the ON/OFF knob of load switch in anti-clockwise direction to switch it off.
- Toggle the lock pin on the operation panel of three-position disconnecting switch to the left.
- Insert the operating handle into the operation hole of grounding switch and turn it in anti-clockwise direction to switch it off.
- Insert the operating handle into the operation hole of disconnecting switch and turn it in anti-clockwise direction to switch it off.
- Toggle the lock pin on the operation panel of load switch to the left, insert the operating handle into the operation hole of load switch and turn it in clockwise direction to switch it off.
- Toggle the lock pin on the operation panel of load switch to the right to complete power supply. At this time, a lock shall be hanged on the pin as required.

Power OFF operation:

- Toggle the lock pin on the operation panel of load switch to the left.
- Turn the ON/OFF knob of load switch in anti-clockwise direction to switch it off.
- Toggle the lock pin on the operation panel of three-position disconnecting switch to the left.
- Insert the operating handle into the operation hole of disconnecting switch and turn it in clockwise direction to switch it off.
- Insert the operating handle into the operation hole of grounding switch and turn it in clockwise direction to switch it off.
- Toggle the lock pin on the operation panel of load switch to the left, insert the operating handle into the operation hole of load switch and turn it in clockwise direction to switch it off (the cable side is grounded).
- Toggle the lock pin on the operation panel of load switch to the right to complete power OFF. At this time, the door of cable cubicle can be opened. As for load switch + fuse combination, it can open the door of cable cubicle to replace fuse.

断路器柜（如右图）

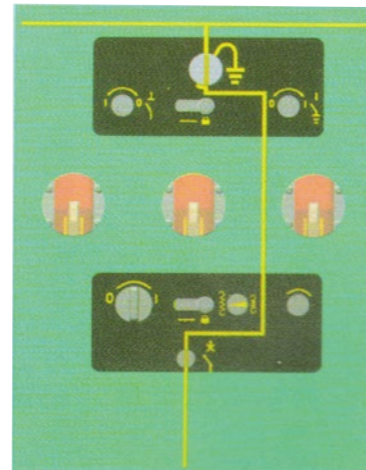
Load switchgear, load switch + fuse cabinet combination (see following figure)

送电操作：

- 关好电缆室门
- 断路器操作面板的锁销拨向左边
- 逆时针旋转断路器分合旋钮使断路器分闸
- 三工位隔离开关操作面板的锁销拨向左边
- 把操作手柄插入接地开关的操作孔内，逆时针旋转使接地开关分闸
- 把操作手柄插入隔离开关的操作孔内，逆时针旋转使隔离开关合闸
- 断路器操作面板的锁销拨向左边，把操作手柄插入断路器储能操作孔内，顺时针转动使断路器机构储能
- 顺时针旋转断路器分合旋钮使断路器合闸
- 断路器操作面板的锁销拨向右边，完成送电操作，此时按需要可在锁销上加挂锁。

停电操作：

- 断路器操作面板的锁销拨向左边
- 逆时针旋转断路器分合旋钮使断路器分闸
- 三工位隔离开关操作面板的锁销拨向左边
- 把操作手柄插入隔离开关的操作孔内，顺时针转动使隔离开关分闸
- 把操作手柄插入接地开关的操作孔内，顺时针旋转使接地开关合闸
- 断路器操作面板的锁销拨向左边，顺时针旋转断路器分合旋钮使断路器合闸（此时电缆侧实现了接地）
- 断路器操作面板的锁销拨向右边，完成停电操作，此时电缆室门可打开。



断路器柜操作面板
Operation panel of circuit breaker

负荷开关 + 熔断器组合电器熔断器室

Fuse cubicle of load switch + fuse cabinet combination

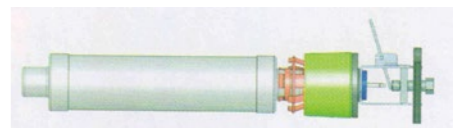
GTXGN □ -12 提供两种变压器保护方式：负荷开关 + 熔断器组合电器和具有继电保护的断路器。

采用高压熔断器保护时，负荷开关具有三相联动脱扣功能。熔断器安装在一个独立的环氧树脂绝缘筒内，熔断器下出线端设有接地装置，该接地装置与三工位隔离开关的接地轴联动，在三工位隔离开关处于接地位置时，该接地装置同时接地。

更换熔断器时，可以用专用工具来拆卸熔断器的端盖。

GTXGN-12 provides two protection ways for transformer: load switch + fuse combination and fuse with relay protection.

To make protection with high-voltage fuse, the load switch is provided with three-phase linked tripping function. The fuse is installed in a separate epoxy resin insulation cylinder, and the lower outlet of fuse is provided with grounding device, which is linked with grounding axle of three-position disconnecting switch. When the three-position disconnecting switch is at grounding position, the grounding device is grounded at the same time. The special tool can be used to remove the end cover of fuse before replacement.



配网自动化解决方案

Distribution Automation Solution

TA-D20 环网柜智能配电终端（DTU）

TA-D20 Looped-network Cabinet Intelligent Distribution Terminal (DTU)

GTXGN □ -12 系列开关设备可配置 TA-D20 环网柜智能配电终端（DTU），可通过多种通信网络（RS232、RS485、以太网等）将环网开关设备纳入到配网自动化系统的数据采集与监控系统（SCADA 系统），实现对环网柜的遥控、遥测和遥信功能。配合主站系统，还可以实现配电网的故障定位、故障隔离、恢复和网络重构等功能。

TA-D20 系列装置主要功能包括测控、周边智能设备信息接入与转发（通信管理）、线路故障检测、故障在线仿真等，最大配置 12 回线全量监控。

GTXGN □ -12 series switchgear can be provided with TA-D20 Looped-network Cabinet Intelligent Distribution Terminal (DTU), which connects looped-network switchgear into data acquisition and monitoring system of distribution automation system (SCADA system) through different communication networks (RS232, RS485, Ethernet etc.) so as to achieve remote control, metering and communication of looped-network cabinet. Together with main station system, the fault location, fault isolation, recovery and network restructuring of distribution network can be achieved.

TA-D20 series product has the functions including metering & control, data connection and forward from peripheral intelligent device (communication management), line fault detection, fault online simulation etc. The complete monitoring can be realized to 12 circuits at maximum.

信息采集

Information acquisition

采集状态量信息，并具有重要状态量变位上报及时间记录功能。

采集馈线电流、电压。计算馈线电压、电流、零序、有功功率、无功功率、视在功率、功率因数、频率等、

Acquire state data, and be capable of reporting important state changes and recording time.

Acquire feeder current and voltage. Compute feeder voltage, current, zero-sequence, active power, reactive power, apparent power, power factor, and frequency etc.

数据处理及传送功能

Data processing and transmission

具备将遥测数据整点记录存储的功能，存储容量大于 30 天。

具备检测遥测极值（日极值）并生成历史记录的功能，存储容量大于 30 天。

统计配变负载率、电压日（月）合格率。

支持主站召唤全数据（当年遥测值、遥信状态及历史数据）。

识别馈线故障，并上报故障告警信息。

It can record and store the telemetering data at integral hour for more than 30 days.

It is capable of checking the telemetering extreme value (daily extreme value) and generating historical records. The storage capacity is more than 30 days.

It is capable of making statistics of load ratio, daily (monthly) yield of voltage at the distribution substation.

The main station can revoke all data (current telemetering value, telemetering status and historical data).

It is capable of identifying feeder fault and reporting fault alarm messages.

遥控功能

Telecontrol

接收并执行遥控指令，控制开关的开、合。

采取：“选择控制对象—遥控返校—遥控执行”的方式。

控制输出可灵活配置闭锁条件。

Receive and execute telecontrol commands, and control the switch on/off.

Implement the way of “selecting control objects – telecontrol recalibration – telecontrol execution”.

Controlling output can flexibly configure blocking conditions.

事件记录及上报功能

Event recording and reporting

记录开关状态变化的时间并上报。

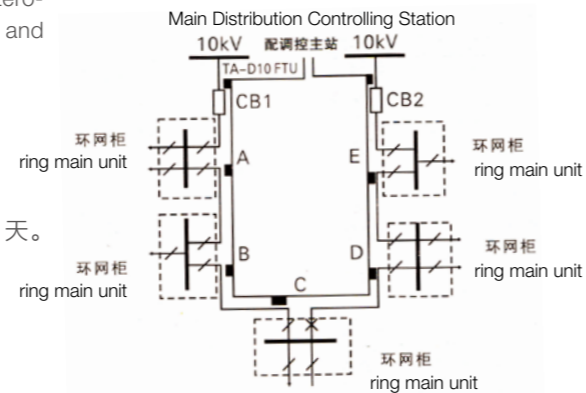
记录馈线发生故障的时间并上报。

记录电源发生故障的时间并上报。

Record the time of switching status changes and report it.

Record the fault time of feeder and report it.

Record the fault time of power supply and report it.



环网配电系统示例
Looped-network Distribution System Example

通讯功能

Communication functions

与上级站进行通信，将采集和处理的信息向上发送并接受上级站的命令。

汇集、转发其他智能设备数据，提供规约转换功能。

支持多个通道、多种远动规约同时运行。

支持多主站，规约丰富，提供 IEC60870-5-101、IEC60870-5-104、CDT92、MODBUS 等多种常用规约，规约以动态库方式加载。

Make communication with higher stations, forward the acquired and processed messages upward and take the orders from higher stations.

Collect and forward data from other intelligent devices, and provide protocol conversions.

Support multi-channel and multi-protocol operation simultaneously.

Support multiple main stations and various protocols such as IEC 60870-5-101, IEC 60870-5-104, CDT92, MODBUS etc., all of which will be loaded as dynamic library.

馈线自动化功能

Feeder automation

馈线自动化功能包括故障检测和故障在线仿真。

故障检测以回线为单位，实现三段式过流监测、零流检测、故障跳闸、一次重合闸（可选）、过负荷告警（可选）、PT断线/失压告警（可选）等功能。

支持故障录波。

故障信息通过传统虚拟遥信方式和专用故障信息通道上送。

Feeder automation includes fault detection and fault online simulation.

Fault detection is based on circuit unit, realizing the functions of three-section over-current detection, zero-current detection, fault tripping, primary reclosing (optional), over-load alarm (optional), PT broken/under-voltage alarm (optional) etc.

Support fault record.

Fault messages will be forwarded upward by means of traditional telesignalling and special fault message channel.

自诊断、自恢复

Self-diagnosis and self-recovery

具有丰富的自诊断功能，支持板级的自检、互检及自恢复功能。

具有上电软件及配置参数自检、自恢复功能。

具有故障告警及上报功能。

It is capable of self-diagnosis, and supports board-level self-inspection, mutual inspection and self-recovery.

It is provided with power-on software and configured with self-inspection and self-recovery.

It is capable of fault alarm and reporting.

调试功能

Debugging

支持串口或以太网当地及远方调试。

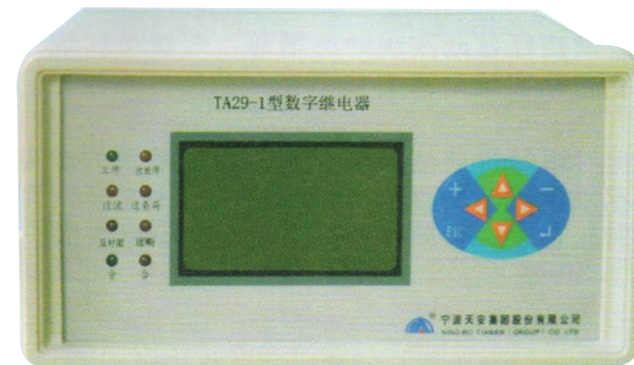
Support local and remote debugging from serial port or Ethernet port.

二次保护继电器

Secondary Protection Relay

GTXGN □-12 系列固体绝缘开关设备可选配置 TA29 型负荷开关保护装置、TA26-2 型微机保护监控装置、TA-SDR04 自供电数字电流继电器等，也可选配其它型号的二次保护继电器。

GTXGN-12 series solid-insulated switchgear can be provided with TA29 load switch protection device, TA26-2 micro-processor protection monitoring device, TA-SDR04 self-supplied digital current relay, or other secondary protection relays.



TA29 型负荷开关保护装置

TA29 load switch protection device

主要保护功能有：

Main protection functions:

1. 大电流闭锁保护，电流定值可任意设置；
2. 定时限过流保护；
3. 定时限过负荷保护；
4. 反时限过流保护；
5. 熔丝断相保护。

1. Large current blocking protection with current value set freely;
2. Definite-time over-current protection;
3. Definite-time over-load protection;
4. Inverse-time over-current protection;
5. Fuse phase-failure protection.

主要测控功能有：

Main metering functions:

1. 两路遥信开入采集；
2. 正常断路器遥控分、合；
3. IA、IB、IC 三相模拟量遥测；
4. 开关事故、分闸次数统计及事件 SOE 等。

1. Two-circuit telesignaling data acquisition;
2. Telecontrol ON/OFF for normal circuit breaker;
3. Telemetering of IA, IB and IC three-phase analog value;
4. Switch failure OFF times statistics and event SOE etc.

讯功能：

Communication function:

具备 RS485 通讯功能。
Support RS485 communication.

TA26-2 型微机保护监控装置

TA26-2 microprocessor protection monitoring device

保护功能

Protection functions

- | | |
|-----------------|--|
| 1. 三段式（方向）电流保护； | 1. Three-segment (directional) current protection; |
| 2. 低频减载； | 2. Under-frequency load shedding; |
| 3. 三相一次重合闸； | 3. Three-phase one-shot reclosing; |
| 4. 反时限过流保护； | 4. Inverse-time over-current protection; |
| 5. 零序电流保护； | 5. Zero-sequence current protection; |
| 6. 检同期功能； | 6. Synchronism check |



保护功能

Monitoring functions

1. 遥信：外部采集具体有断路器分位置、断路器合位置、手车试验位置、手车工作位置、接地刀闸位置、信号复归等；
2. 遥测：F、UAB、UBC、UCA、3U0、3I0、IA、IB、IC、P、Q、COSΦ
3. 遥脉：2 路脉冲电度输入；
4. 遥控：正常断路器遥控分、合；

1. Telesignaling: the external telemetering data acquired includes circuit breaker OFF position, circuit breaker ON position, handcart test position, handcart operation position, grounding disconnecter position, signal reset etc.
2. Telemetering: F, UAB, UBC, UCA, 3U0, 3I0, IA, IB, IC, P, Q, COSΦ
3. Remote pulse: 2 pulse watt-hour inputs;
4. Telecontrol: remote ON/OFF of normal circuit breaker

通讯功能

Communication functions

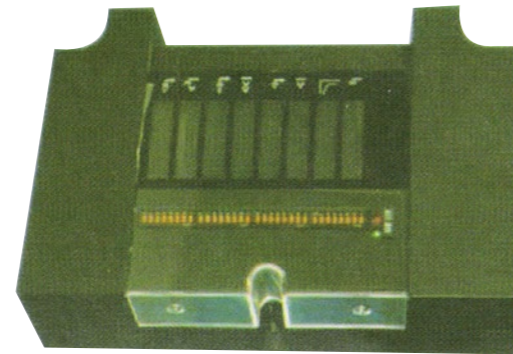
具备 RS485 通讯功能。
Support RS485 communication.

TA-SDR04 自供电数字继电器 TA-SDR04 self-supplied digital relay

TA-SDR04 自供电数字电流继电器 (也称过电流保护装置) 是一个由 CT 供电的保护继电器, 带反时限和定时限保护特性, 专为带有断路器和极小额定输出电流的开关柜而设计。TA-SDR04 适用于 6~35kV 开闭所、配电所、环网柜等无电源且需要保护功能的场所。可配合断路器完全取代熔断器加负荷隔离开关的保护模式, 可显著提高配电网负载保护功能。

TA-SDR04 self-supplied digital current relay (also referred to "over-current protection device") is a CT-supplied protection relay with inverse-time and definite-time protection. It is designed for switchgears with circuit breaker and very-small rated output current. TA-SDR04 is suitable for 6-35kV switching station, distribution station, looped-network cabinet and the occasion without power supply and requiring protection. Together with circuit breaker, fuse and load disconnecting switch protection can be completely replaced, which can greatly improve distribution load protection.

- 无需电源: 该装置工作时是由一次回路的电流互感器汲取电源, 断路器的跳闸无需操作电源。
- 电流满量程自动实现动态增益: 装置可实现三相过电流保护功能。宽范围相电流输入以及电流满量程能自动实现动态增益调整, 适用性比较好。
- 多种时限特性曲线可供选择: 保护装置的过电流保护功能具有可选择的定时限/反时限特性。除了四个标准反时限特性: 一般反时限、非常反时限、极端反时限、长时间反时限之外, 该装置还具有 RI- 反时限、HV- 保险丝、FR- 保险丝等特殊保护特性, 从而更好地匹配整个电网。



- Without power supply: this device is supplied by current transformer in primary circuit. The power supply is not to be disconnected for circuit breaker tripping.
- Achieve dynamic gain in full range of current automatically: this device can achieve three-phase over-current protection. It can realize dynamic gain adjustment in wide range of phase current and full range of current, so the adaptability is strong.
- Provide several time characteristics curves for option: this device is capable of definite-time/inverse-time over-current protection. In addition to four standard inverse-time features (normal inverse-time, very inverse-time, extreme inverse-time, long inverse-time), this device is also capable of such special protections as RI-inverse time, HV-fuse and FR-fuse so as to match the power grid in a better way.

典型方案 Typical Schemes

方案号 Scheme No.	C 负荷开关模块 (可选避雷器) Load switch module (voltage transformer optional)	F 负荷开关熔断器组合电器模块 Load switch fuse Combination module	V 负荷开关模块 (可选避雷器) Load switch module (arrestor optional)
一次接线图 Primary wiring diagram			
标准配置 Standard configuration	三相母线 三工位隔离开关 真空负荷开关 带电显示器 Three-phase bus Three-position disconnecting switch Vacuum load switch Live display	三相母线 三工位隔离开关 真空负荷开关 带电显示器 高压限流熔断器 Three-phase bus Three-position disconnecting switch Vacuum load switch Live display High-voltage current-limiting fuse	三相母线 三工位隔离开关 真空断路器 带电显示器 Three-phase bus Three-position disconnecting switch Vacuum circuit breaker Live display
可选一次元件 Optional primary element	电流互感器 电压互感器 电缆欧式分离连接器 Current transformer Voltage transformer European cable disconnecting connector	电缆欧式分离连接器 European cable disconnecting connector	电流互感器 电缆欧式分离连接器 Current transformer European cable disconnecting connector
可选辅助配置 Optional accessories	低压室 (控制箱) 继电保护装置 电动操作机构 加热器 短路故障指示器 Low-voltage chamber (control box) Relay protection device Electric operating mechanism Heater Short-circuit fault indicator	低压室 (控制箱) 电动操作机构 加热器 短路故障指示器 Low-voltage chamber (control box) Electric operating mechanism Heater Short-circuit fault indicator	低压室 (控制箱) 继电保护装置 电动操作机构 加热器 短路故障指示器 Low-voltage chamber (control box) Relay protection device Electric operating mechanism Heater Short-circuit fault indicator
尺寸 (mm) Dimension	宽 400 深 750 高 1500 Width 400 Depth 750 Height 1500	宽 400 深 750 高 1500 Width 400 Depth 750 Height 1500	宽 400 深 750 高 1500 Width 400 Depth 750 Height 1500

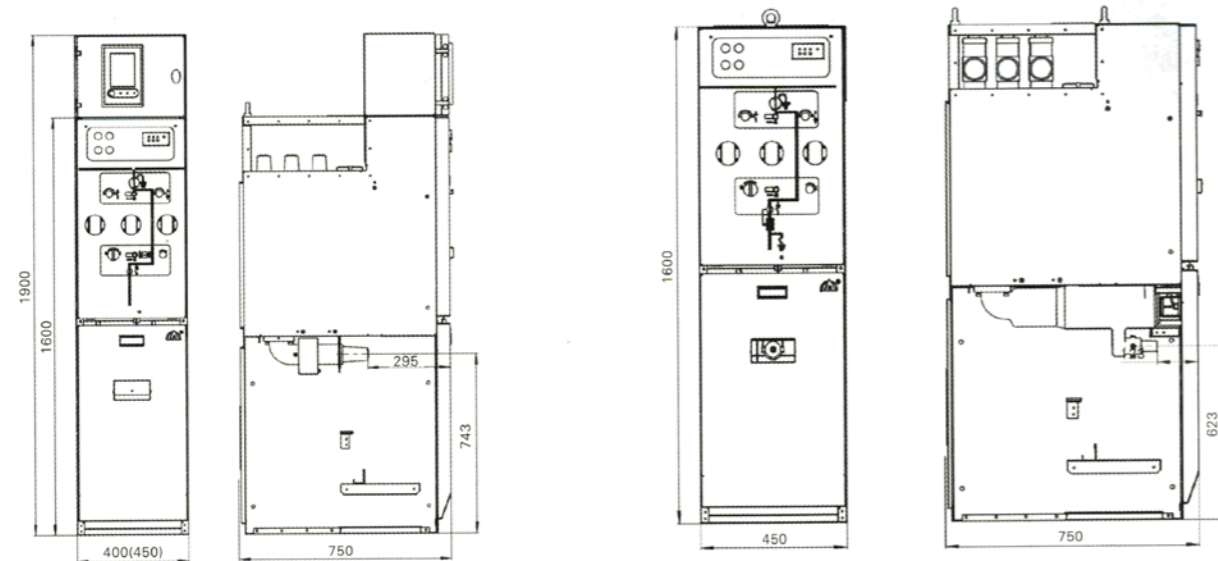
典型方案 Typical Schemes

方案号 Scheme No.	CL 负荷开关联络模块 Load switch contact module	VL 断路器联络模块 Circuit breaker contact module	D 电缆提升模块 Cable lifting module
一次接线图 Primary wiring diagram			
标准配置 Standard configuration	三相母线 三工位隔离开关 真空负荷开关 带电显示器 Three-phase bus Three-position disconnecting switch Vacuum load switch Live display	三相母线 三工位隔离开关 真空断路器 带电显示器 Three-phase bus Three-position disconnecting switch Vacuum circuit breaker Live display	三相母线 带电显示器 Three-phase bus Live display
可选一次元件 Optional primary element	电流互感器 Current transformer	电流互感器 Current transformer	避雷器 电缆欧式分离连接器 Current transformer European cable disconnecting connector
可选辅助配置 Optional accessories	低压室(控制箱) 继电保护装置 电动操作机构 加热器 Low-voltage chamber (control box) Relay protection device Electric operating mechanism Heater	低压室(控制箱) 继电保护装置 电动操作机构 加热器 Low-voltage chamber (control box) Relay protection device Electric operating mechanism Heater	低压室(控制箱) 加热器 短路故障指示器 Low-voltage chamber (control box) Heater Short-circuit fault indicator
尺寸(mm) Dimension	宽 800 深 750 高 1500 Width 800 Depth 750 Height 1500	宽 800 深 750 高 1500 Width 800 Depth 750 Height 1500	宽 400 深 750 高 1500 Width 400 Depth 750 Height 1500

典型方案 Typical Schemes

方案号 Scheme No.	M 计量模块 Metering module	P 电压互感器模块 Voltage transformer module	B 隔离模版 Isolation module
一次接线图 Primary wiring diagram			
标准配置 Standard configuration	三相母线 带电显示器 电流互感器 电压互感器 Three-phase bus Live display Current transformer Voltage transformer	三相母线 三工位隔离开关 电压互感器 带电显示器 Three-phase bus Three-position disconnecting switch Voltage transformer Live display	三相母线 三工位隔离开关 带电显示器 Three phase bus Three position isolation switch Charged display
可选一次元件 Optional primary element			避雷器 电缆欧式分离连接器 Arrester European type Cable separation connector
可选辅助配置 Optional accessories	低压室(控制箱) 加热器 Low-voltage chamber (control box) Heater	低压室(控制箱) 加热器 Low-voltage chamber (control box) Heater	低压室(控制箱) 加热器 low voltage cubicle (Control box)Heater
尺寸(mm) Dimension	宽 800 深 750 高 1500 Width 800 Depth 750 Height 1500	宽 800 深 750 高 1500 Width 800 Depth 750 Height 1500	宽 450 深 750 高 1600 Width 450 Depth 750 Height 1600

外形尺寸 Overall Dimension



负荷开关柜、断路器柜尺寸
Dimension of Load Switchgear and Circuit Breaker Cabinet

负荷开关柜、断路器柜尺寸
Dimension of Load Switch-Fuse Cabinet Combination

安装 Installation

安装 Installation

负荷开关、真空开关在分、合闸时产生的动负载，向上、向下约为 8000N，此数据为设计基础时估算基础应力的依据。开关设备基础估量参考右图进行设计和施工，基础应平整。

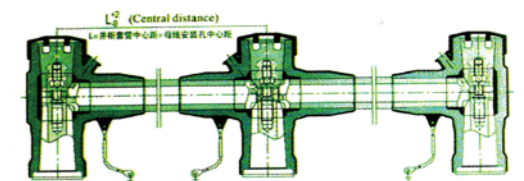
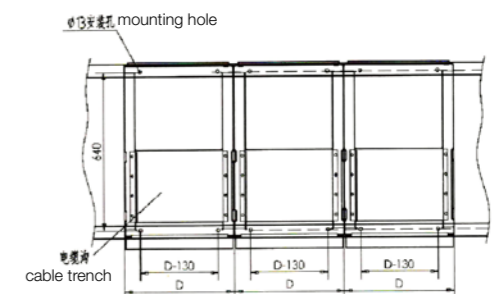
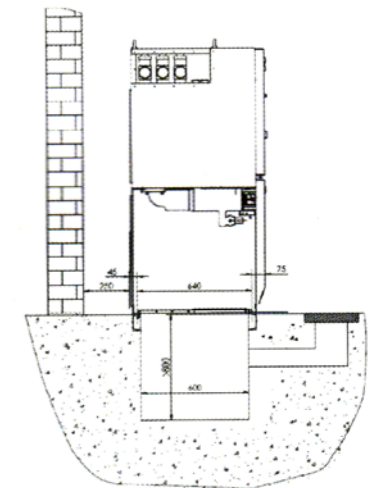
Load switch and vacuum switch will generate 8000N dynamic load upward and downward in opening and closing. This data is the basis to estimate basic stress in design.

The foundation of switchgear can be designed and constructed with reference to right figure, and the foundation shall be flat.

安装程序及注意事项 Installation procedures and precautions

- 将开关柜按排列顺序放置在基础上，调整好成组开关设备的直线度、垂直度、水平度，然后用 M10 螺栓或用点焊方法将开关柜紧固在基础槽钢上；
- 用 M8X30 螺栓进行柜间固定；
- 安装顶部固体绝缘母线；
安装前，请将所有安装零部件用清洁纸清洁干净，安装方式可参考电缆终端头的安装方式。
- 电缆终端头在安装前，绝缘套管应清洁并涂上硅油脂（硅油脂附在电缆终端盒内）。整个安装过程中，请注意不要让尖锐物件划破硅橡胶制品。电缆施工完后应用隔板将电缆室与电缆沟封闭。
- 柜间用接地母线连接，使之成为一体，检查工作接地和保护接地是否有遗漏，连接回路是否导通；
- 安装二次电缆，电缆由柜体左侧底部穿入，沿侧壁进入电缆室，分接到相应的端子排上，施工时应注意电缆号，端子号不要漏穿或穿错，二次电缆施工完成后，注意勿忘封盖电缆孔。
- 熔断器的安装与检查。

- Put the switchgears on the foundation in a good order, adjust the linearity, verticality and levelness of switchgear group, and secure them to foundation steel channel with M10 bolts or by spot welding.
- Secure the space between cabinets with M8X30 bolts.
- Install the solid-insulated bus on the top:
Please clean all parts with cleaning paper before installation. The installation can refer to that of cable terminal.
- Before the cable terminal is installed, the insulated sleeve should be cleaned and applied with silicon grease (attached in the cable terminal box). During installation, please take care not to scratch silicone rubber products with sharp objects. After cable installation, the cable cubicle and cable trench should be separated with a baffle.
- The cabinets are connected together with grounding bus. Check that whether the operating grounding and protection grounding is missing, and whether the connection circuit is conducted.
- To install the secondary cable, the cable will flow from the left bottom of cabinet and into cable cubicle along side wall, and be connected to corresponding terminal strip. Pay attention to cable marker in construction. The cable marker should not be missing or have faults. After installation of secondary cables, never forget to seal the cable hole.
- Install the fuse and check it.



熔断器检查与更换

Inspection and Replacement of Fuse

对于正常运行的熔断器，其寿命可在 20 年以上，若定期检修设备时，可用测量熔断器内阻的变化来判断其是否变化，内阻的变化范围在 $\pm 10\%$ 之内。

在更换熔断器时必须非常小心，因为限流熔断器在运行时有一个安全范围，它不能保证每一个故障条件均在其安全范围内，如开关装置的脱扣失灵，或熔断器低于其最小分断电流下动作等。为安全起见，至少要等待熔断器动作 10 分钟以后和电路被负荷开关隔离开，且接地开关合闸，熔断器二端均接地的条件下才能更换，一定要保证熔断器在不带电的条件下更换。三工位隔离开关处于接地位置且负荷开关处于合闸状态（接地）时，方可打开熔断器室门。在熔断器室门打开后，用专用工具拧松螺钉，即可按顺序取出熔断器，在取出熔断器时，需小心轻拿，以免损坏装熔断器的壳体，同时检查硅橡胶头有无损伤。

在完成熔断器更换后，在装入硅橡胶堵头之前，需将熔断器筒与硅橡胶头接触部分用无水乙醇擦干净，待干燥后，插入熔断器组件并旋紧。

The fuse at normal operation will have a service life for more than 20 years. If the equipment is maintained regularly, it can measure the changes of internal resistance of fuse to make judgment. Generally the change tolerance is within $\pm 10\%$.

A special attention must be paid in fuse replacement, because current-limiting fuse should operate safely within a range, which cannot ensure every fault falling within the range, i.e. tripping fault of switchgear, fuse operation below minimum breaking current etc. For the purpose of safety, the fuse can be replaced after it has operated for 10 minutes, the circuit is disconnected by load switch, the grounding switch is off and the two ends of fuse are grounded. Make sure the fuse is replaced without power supply.

When the three-position disconnecting switch is at grounding position and the load switch is at OFF (grounding) position, the door of fuse cubicle can be opened. After the door is opened, loosen the screws with special tools and take out fuse in a good order. Handle with fuse carefully, and pay attention not to damage the fuse housing. Meanwhile, check the damage of silicone rubber head.

After fuse installation and before silicone rubber plug insertion, the contact between fuse cylinder and silicone rubber should be cleaned with absolute ethyl alcohol. After drying, insert fuse assembly and tighten it.

验收试验及投入运行前的准备工作

Acceptance test and preparations before putting into operation

验收实验项目

Acceptance items

- 根据订货资料检查柜内安装的电气元件的型号、规格是否相符；
- 检查紧固件是否有松动，发现有松的应予以拧紧；
- 手动操作隔离开关、熔断器、机械程序联锁 3~5 次，应灵活无卡滞现象，动作精确，程序无误；
- 检查二次接线是否符合图纸要求，在主回路不通电情况下对二次线路进行动作实验，各种二次元件应符合设计要求，各继电器动作应准确可靠；
- 主回路电阻测量，测量方法采用直流压降法，通以 100A 电流，测其电压降；
- 二次回路绝缘强度试验，在导体与外壳之间，施加交流 50Hz 电流 2000V 历时 1min 应无击穿放电现象，二次回路中有电子器件部分，试验电压由制造厂与用户商定；
- 主回路工频绝缘电压试验，在相对地和相间施加交流 50Hz，根据开关设备的额定电压，按 GB311.1 规定的 80% 历时 1min 应无击穿闪络现象。

- Check the model and specification of electrical components installed in the cabinet according to ordering data;
- Check the looseness of fasteners. If any, tighten them accordingly;
- Operating disconnecting switch, circuit breaker and mechanical interlocking for 3-5 times by manual, it must be flexible without clamping, accurate and error-free in procedures;
- Check the secondary wiring in compliance with drawing. Conduct operation test to secondary circuit when the main circuit is not powered. All secondary components should conform to design, and all relay operations should be accurate and reliable;
- Measure the resistance of main circuit in DC voltage-drop method. Apply 100A current to measure the voltage drop;
- Conduct insulation strength test for secondary circuit. Apply 50Hz 2000V AC between conductor and housing for 1 minute. During the period, there should be no disruptive discharge. For the electronic components in the secondary circuit, the test voltage should be negotiated by manufacturer and users;
- Conduct power frequency insulation voltage test for main circuit. Apply 50Hz AC between phase-to-ground and phase-to-phase with rated voltage at 80% of that in GB311.1 for 1 minute. During the period, there should be no flashover or breakdown.

投入运行准备工作

Preparations before putting into operation

- 活动摩擦及传动部位需加润滑油；
- 接通控制、信号、照明等电源；
- 在其它开关设备的隔离开关、真空开关等处于分闸状态时，给主母线送电，按规定操作程序使进线柜投入运行；
- 合上电压互感器柜内的隔离开关，检查电压表指示是否正确，确定正确后方可进行下一步操作；
- 合上避雷器、站内用变压器的隔离开关及有关辅助电器使其投入运行；
- 依次合上馈线柜断路器，检查电流表是否正确。

- Apply lubricating oil at moving friction and transmission parts;
- Connect the control, signal and lighting power;
- Supply the main bus when the disconnecting switch and vacuum switch of other switchgears are at OFF status, and put the incoming cabinet into operation as specified;
- Switch on the disconnecting switch in the voltage transformer cabinet, and check the correctness of voltmeter. If yes, continue next step;
- Switch on the disconnecting switch of arrester, station transformer and relevant auxiliary equipment so as to put them into operation;
- Switch on the circuit breaker of feeder cabinet in a sequence, and check the correctness of ampere meter.

维护与检修

Maintenance and Overhaul

开关设备投入运行后，监视和维护工作如下：

After the switchgear is put into operation, the monitoring and maintenance shall be carried out as follows:

- 观察顶部的绝缘母线，如发现异常应进行检修；
- 观察控制、信号、照明电源是否正常供电；
- 记录断路器的动作次数。

- Observe the insulated bus on the top. If any abnormality is detected, be sure to make repair immediately;
- Observe that whether the control, signal and lighting power is supplied in normal condition;
- Record the action times of circuit breaker.

检修

Overhaul

- a. 开关设备检修，有故障检修和定期检修，故障检修是为了防止故障运行和防止事故扩大，在发现故障出现或断定即将出现时，立即对故障部位进行检修，及时排除故障；
- b. 定期检修，按运行规定进行，检修内容如下：
- 检查机械连锁，动作灵活可靠；
 - 按真空开关、隔离开关、操作机构等电器的规定进行检修和调试；
 - 检查高压电缆、固体绝缘母线的连接是否正确、可靠。检查接地回路，保持连续导通。

- a. The overhauling of switchgear includes trouble overhaul and periodic overhaul. Trouble overhaul is to hunt the troubles in case of faults or definite occurrence and remove troubles immediately so as to avoid fault operation and expansion.
- b. Periodic overhaul is conducted as specified, including:
- Check the flexibility and reliability of mechanical interlocking action;
 - Make overhauling and debugging according to specifications of vacuum switch, disconnecting switch and operating mechanism;
 - Check the correctness and reliability of high-voltage cable and solid-insulated bus. Check the grounding circuit to keep conducting continuously.

故障处理

Troubleshooting

在进线柜发生故障保修时，应先切断电源，将负荷开关分闸，同时检查进线柜显示器，证明无电压时，合接地开关，打开前门，方可入内检修。

在出线柜（出线柜的输出电缆）发生故障时，应先断开该柜内的负荷开关，再合接地开关，打开前门，方可入内检修，此时主母线处于带电状态。熔断器若需调换，应在满足进出线柜入内检修的条件后，方可入内调换。

Before making trouble overhauling for incoming cabinet, it shall disconnect the power first, open the load switch, and check the display of incoming cabinet. If the voltage does not exist, it must close the grounding switch and open the front door before entry for troubleshooting.

If the outgoing cabinet (output cable of outgoing cabinet) is faulty, it shall disconnect the load switch in the cabinet. Then, close the grounding switch and open the front door so as to enter for troubleshooting. At this time, the main bus is at energized status. If the fuse is required for replacement, the incoming/outgoing cabinet access overhauling conditions should be satisfied.

运输与保管

Transportation and Storage

产品经出厂检验合格后可进行包装和发运。包装时，产品用螺栓固定在底盘上，运输过程，只准直立放置，不准倒置、倾翻、翻滚、掉下。

产品在安装前，应以原包装存放在库房中，如不能入库房，应防雨淋，防受潮，不得随意拆卸电器元件及零部件。

All products should not be packed and shipped before ex-factory inspection. The products should be secured to bottom with bolts in packaging. During transportation, the products should be stand vertically and without inversing, tipping, rolling or falling.

The products should be kept in original package in the warehouse before installation. If warehousing not available, it must take relevant actions to prevent rain or moisture. Do not dismantle electric components or parts freely.

随机文件

Accompanying documents

- 产品合格证；
- 产品说明书；
- 二次施工接线图；
- 技术协议中规定的其它文件；
- 装箱单。
- Manufacturing certificate;
- Product instruction;
- Secondary wiring diagram;
- Other documents specified in technical agreement;
- Packing list.

订货须知

Ordering Instructions

- 主接线方案编号及单线系统图，平面布置图；
- 二次回路原理图，端子排列图，如端子无排列图时按制造厂规定；
- 开关柜的电器元件的型号、规格、数量；
- 电缆及电缆终端应在订货时确定其规格、型号；
- 开关柜使用在特殊环境条件，应在定货时提出并与制造厂协商；
- 需要备件、附件时，应提出其名称和数量。

注：产品如有更新，恕不另行通知。

- Main wiring diagram number and single-line systematic diagram, plan layout;
- Secondary circuit schematic diagram, terminal arrangement (if not, follow the specification of manufacturer);
- Model, specification and quantity of electrical components in the switchgear;
- The model and specification of cable and cable terminal should be specified in ordering;
- If the switchgear is to be used in special environment, it must be specified in ordering and negotiated with manufacturer;
- If any spare parts or attachments are required, the name and quantity should be specified.

Note: products are subject to changes without prior notice.