



**ZTELEC GROUP**  
Powered Green & Reliability

# Box type substation

箱式变电站





Founded in 1958, Henan ZhongTian Electric Equipment Group (hereinafter referred to as Ztelec Group) was formerly owned by the Ministry of Light Industry. Ztelec Group adheres to the core value concept of "Vision, Innovation and Responsibility", takes "Power the world with green and reliability" as its own responsibility. Focusing on production and manufacturing over 50 years, the group has developed into an integrated group company specializing in four industries: Electric equipment, Composite materials, Enamelled copper wires and Photovoltaic energy. The Ztelec Group company is represented by 7 manufacturing bases across 5 cities (Xuchang, Zhengzhou, Guiyang, Chengdu, Dongguan) in China, with more than 1500 employees word wide.

河南中天电气装备集团（以下简称中天电气集团）成立于1958年，前身为轻工业部所有的企业。集团秉承愿景、创新和责任”的核心价值理念，以“为世界提供绿色和可靠的能源”为己任。专注于生产和制造超过50年，中天集团现已发展成为一家专注于四大行业的综合性集团公司：电气设备、复合材料、漆包铜线和光伏发电。现在在中国5个城市（许昌、郑州、贵阳、成都、东莞）拥有7个制造基地，在全球拥有1500多名员工。



Oil type transformer  
油浸式变压器

Dry type transformer  
干式变压器

Phase-shift rectifier transformer  
移相整流变压器

HV and LV switchgear  
高、低压开关设备

Ztelec Group focuses on the manufacturing of high-voltage variable frequency control equipment, complete sets of equipment for medium and low voltage power transmission and distribution networks, smart grids, ESS pre-installed energy storage stations (ESS), and distributed power generation systems. Ztelec owns 1 national postdoctoral research station, 2 provincial technology centers, closely cooperates with National Advanced Materials Laboratory of Beihang University and Institute of Plasma of Chinese Academy of Sciences, promoting intelligent manufacturing level and digitization transformation.

Ztelec is a Chinese enterprise committed to the development of globalization, committed to promoting an open technology and partner ecosystem, and actively practicing the common values of meaning, inclusiveness and empowerment.

中天集团专注于高压变频控制设备，中低压输、配电网成套装备，智能电网，预装配储能系统（ESS）以及分布式发电系统的制造。拥有 1 个国家博士后研究站，2 个省级技术中心，与北航国家先进材料实验室和中国科学院等离子体研究所紧密合作，推动智能制造水平的提升和数字化转型。

中天是一家致力于全球化发展的中国企业，致力于促进开放的技术和合作伙伴生态系统，并积极践行意义、包容和赋权的共同价值观。

A

7

Manufacturing bases  
生产制造基地

1

National postdoctoral  
research station  
国家博士后科研站

1500+

Number of employees  
员工数量

2

Provincial technology  
centers  
省级技术中心



“ It is our responsibility to help customers create maximum value by providing highly reliable and appropriate products. Adhering to innovation based on customer needs, embracing changes, we accept challenges together with our customers.

通过提供高度可靠和合适的产品，帮助客户创造最大价值是我们的责任。秉承基于客户需求的创新，拥抱变化，与客户一起接受挑战。

**Mr. ALan Zhang**

PHD, General Manager, Group Board Member

An aerial photograph of a dense, vibrant green forest. A light-colored, winding river or stream meanders through the trees, creating a series of curves and loops. The lighting is bright, highlighting the various shades of green in the foliage.

## 02

## SUSTAINABILITY AT ZTELEC

### 可持续发展

The continuous improvement of economics and environment in our community and the promotion life quality of our staff and their families are the sustained aims of Ztelec.

持续提高我们所在地区的经济发展水平、改善当地环境、提高员工及其家庭的生活品质是我们一直追求的目标。

In order to achieve these aims, Ztelec has made great efforts on the balance among economic developments and environment protection, including how to design and manufacture product; how to refine product and service provided; how to cooperate with local suppliers and to evaluate risks and opportunities; how to fulfill its responsibility and so on.

为了实现这些目标，中天集团努力在经济发展和环境保护之间实现平衡，这包括如何设计和制造产品、如何提升产品和服务、如何与本地供应商合作、如何评估风险和机遇，以及如何在社区履行自己的责任等等。

## 03 Our purpose / 我们的策略



## + Our culture / 我们的文化

### Customer First 客户第一

- Partner with our customers 与客户成为伙伴
- Listen firstly 先要倾听
- Always smile and Enthusiasm 保持微笑与热情

### Embrace Changes 拥抱变化

- More choices, more laughs 更多选择, 更多微笑
- Believe there is always a better way 相信总有一个更好的方式
- Learn from failures as well as successes 从失败和成功中学习

### Devotion 奉献

- Grow faster with more shares 越分享, 越成长
- Proud of your team 为团队而骄傲
- Speak up and ask for help 积极寻找帮助

### Care with Respect 尊重下的关怀

- Take care of our people as well as their family 关怀员工及他们的家庭
- Respect and value differences 尊重不同
- Direct speak and Act with integrity 诚信与直言



## 04 Industrial development history / 工业领域发展历程



Introduced complete testing equipment and manufacturing machines, started to produce power equipment including 10kV & 35kV oil immersed transformers & 10kV switchgear.

引进全部检测和生产设备，开始生产 10kV&35kV 的油浸式变压器和 10kV 级的开关柜。

**2003**



Won multiple bids with total amount about \$6 million on bids on the power transmission and transformation projects from State Grid Corporation of China.

在国家电网公司成功中标多个输配电项目总计约 600 万美金。

**2009**

**2006**

Successfully obtained ISO9001:2008 and ISO14001 certifications; full series of 6kV, 10kV, 35kV transformers passed the type test and special test from Suzhou Electric Appliance Research Institute.

取得了 ISO9001 国际质量管理体系认证，和 ISO14001 组织环境体系认证；6kV,10kV,35kV 级 S10 系列变压器通过苏州电科院型式试验和特殊试验的全套试验。



**2010**

Started the the production of S11 and S13 series cast resin dry-type transformers. Made significant progress in the S15 series of high-efficiency amorphous alloy transformers.

开始生产 S11 和 S13 系列铸造树脂干式变压器。S15 系列高效非晶合金变压器取得了重大进展。





Through the cooperation with CNOOC, developed transformers for offshore power supply system under marine operation environment.

通过与中海油的合作，研发适用于海洋作业环境的海上平台供电系统使用的变压器。

2012



Successfully passed the audit of SAM supplier management system from Schneider Electric and became their supplier in the field of Variable frequency transformer.

通过施耐德电气 (Schneider Electric) 的 SAM 体系审核，成为变频变压器领域的供应商。

2017



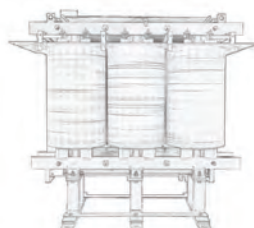
Began to provide container-type or box-type step-up integrated equipment for energy storage power stations (CESS), which integrates 35kV high-voltage switchgear, low-voltage switchgear and dry-type isolation transformers. 开始为储能电站 (CESS) 配套集装箱式或箱变式升压一体设备，该集成了 35kV 高压控制柜，低压柜和干式隔离变压器。

2022

2014

It has gradually formed four product production lines, including oil immersed transformer, dry type transformer, high and low voltage switch gear, and box type substation. Meanwhile, started the sample making and market development of mining transformer, open type transformer and variable frequency transformer.

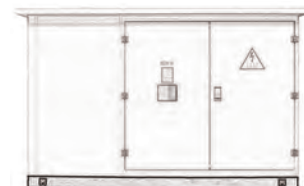
开始逐渐形成油浸变压器，干式变压器，高低压开关柜，箱式变电站等 4 种产品生产线。同时，开始矿用变压器，敞开式变压器和变频变压器的打样和市场开拓。



2019

Started batch production of traction transformer for railway, prefabricated photovoltaic intelligent substation and photovoltaic power generation system equipment.

开始批量生产铁路牵引变压器、预装光伏智能变电站和光伏发电系统设备。



2023

## 05 Flexible & high efficient manufacture / 高效灵活的制造工艺

Make quick response to the customer's special requirements on environment, appearance, efficiency, delivery time, transportation, special quality and others, provide personalized design, and shorten the delivery cycle time.

根据客户在使用环境、外观、效率、交付时间、运输以及特殊的质量要求，进行快速响应，个性化设计，缩短交货周期。

Organize production in accordance with GB and international (IEC) standards, implement full-process

control concept from warehousing raw material control to finished products inspection, focus on customer's experiences and core needs, and provide products and services that exceed customers' expectation.

严格按照国家标准和国际标准组织生产，从原材料自产到成品出库实行全过程控制，关注客户的使用体验和核心诉求，提供超过客户期望的产品和服务。



### + Manufacturing equipment

生产设备

- 1 Vacuum casting system  
真空浇注系统
- 2 Cut-to-length line for core sheets  
硅钢片横剪生产线
- 3 Vacuum drying equipment  
真空干燥设备
- 4 Winding equipment  
绕线设备







## + Implementation of TQM and System

全面质量管理体系 TQM 与 SAM

Introduced lean production concept, we established 50 lean improvement quality criteria (LS). Each process is provided with operation instructions and standardized operations criteria to implement the production plan, through timely management (SIM) to improve communication efficiency and continuously shorten delivery time. TPS with core of production process management (MPS) has gradually been developed by connecting sales, materials, planning, supply chain, services and so on.

引进精益 (Lean) 生产理念，建立起 50 条精益改进质量准则 (LS)。每道工序有作业指导书和标准化作业下进行实施生产计划，通过及时化管理 (SIM) 提高沟通效率，不断缩短交付时间。逐步涵盖销售、物料、计划、供应链、服务等，建立起以生产流程管理 (MPS) 为核心的全面质量管控体系 (TPS)。



Kanban System



Design



Test



Service

## 06 Testing / 测试

### Regular Tests 常规试验

- + Voltage ratio measurement  
电压比测量
- + Applied withstand voltage test  
外施耐压试验
- + Induced withstand voltage test  
感应耐压试验
- + Partial discharge measurement  
局部放电测量
- + No load loss and current measurement  
空载损耗和电流测量
- + Winding resistances measurement  
绕组电阻测量
- + Insulation resistance test  
绝缘电阻测试
- + Load loss and short circuit impedance measurement  
负载损耗和短路阻抗测量
- + Transformer oil test  
变压器油品测试

### Type Tests 型式试验

- On customer requirements  
根据客户需求
- + Temperature rise test  
温升实验
  - + Lightning impulse test  
雷电冲击实验
  - + Noise level test  
噪音实验

### Special Tests 特殊试验

- On customers' requirements, below parameters can be checked  
根据客户要求, 可检查以下参数
- + Zero-sequence impedance  
零序阻抗
  - + No-load voltage harmonic  
空载电压谐波
  - + Parallel capacity of windings  
绕组并联容量
  - + Anti-corrosion protection checking  
防腐检查
  - + Short circuit test  
突发短路试验

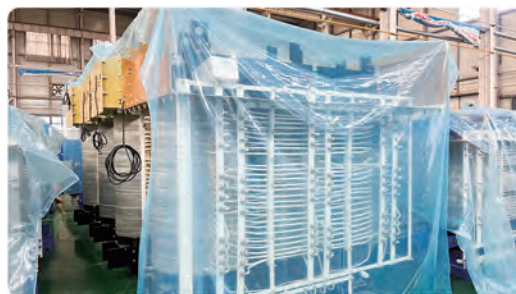


## 07 Installation and Service / 安装与服务

### Warehouse 仓储

- + In the warehouse, transformer should be protected from the pollution of water droplets, dust and sand. If provided with plastic cover, the transformer should be covered during storage.

在仓库中，变压器应避免水滴、灰尘或沙粒的污染，如果提供塑料罩，变压器在存储期间，应用塑料罩盖着。



### Transport 装运

- + The transformer is equipped with safety transport devices. The transformer without shell shall be lifted with lifting lugs, the medium and small dry transformers with shell shall be lifted with lifting rings, and the large transformer shall be lifted with special lifting device for foundation channel steel.

变压器配有安全运输装置。不带外壳的变压器用吊耳吊起，带外壳的中小型干式变压器用吊环吊起，大型变压器用地脚槽钢专用的起吊装置吊起。



### Shipping 运输

- + The product is ready for shipping either by truck or seafreight once it has passed the tests. We take care of all official documents, depending on destinations and delivery terms. We also provide different packaging for special applications or conditions.

一旦产品通过测试，就可以用卡车或海运发货。我们会根据目的地和交货条件保管所有官方文件。我们也为特殊应用或条件提供不同的包装。



### Installation 安装

- + We supply the installation guide and user manual for each transformer. Under normal conditions, check the transformer once a year and clear the dust by vacuum cleaner. The frequency of cleaning depends on the running conditions.

我们提供每台变压器出厂时的安装指南和用户手册。正常情况下，每年检查一次变压器，并用吸尘器清除灰尘。清洗频率取决于运行环境。



### Service 服务

- + When some parts need to be replaced or any information is required, the main parameters on the nameplate must be provided, especially the serial number. We provide stock in regular quantities of spare parts, in case of customer needs.

当某些零件需要更换或需要任何信息时，必须提供铭牌上的主要参数，尤其是序列号。我们提供备品、备件的常规数量库存，以备客户之需。



## 08 Customer case / 客户案例



Subway Line 01, Zhengzhou 2014



Xinzheng Airport Terminal



A carrier rocket with Shenzhou-11 spacecraft, CASA, 2016



SAIF 225MW Gas Turbine Combined Cycle Power Project, Pakistan



Yuzhou Peak Photovoltaic Power Station Project



Khutul, "CEMENT-SHOKHO" JSC, Mongolia, 2015

### Other achievements (in no particular order) 其他业绩 (排名不分先后)

#### Aerospace and military projects: 航天军工项目:

- + Xinxiang Aviation Industry Group  
新乡航空工业集团
- + Guilin Aerospace Electronics Co., Ltd.  
桂林航天电子有限公司
- + Guizhou Aerospace Electric Co., Ltd.  
贵州航天电器股份有限公司
- + AVIC Chengdu Aircraft Industry Group  
航空工业成飞集团

#### Wind and light new energy projects: 风、光新能源项目:

- + Mahayana Wind Power Project  
大乘山风电工程
- + Mahayana Wind Power Project  
隆基股份光伏电站
- + Mingyang Electric Co., Ltd.  
明阳电气股份有限公司
- + Xuchang City Public Traffic Power Charging Construction  
许昌市公共交通充电系统建设项目

#### Automation field: 自动化领域:

- + Huichuan Technology Co., Ltd.  
汇川技术股份有限公司
- + Hekang New Energy Technology Co., Ltd.  
合康新能源科技有限公司
- + Wolong Electric Group Co., Ltd.  
卧龙电气集团股份有限公司
- + Leadford Electric Technology Co., Ltd.  
利德华福电气技术有限公司
- + Shandong Xinfeng Electronics Technology Co., Ltd.  
山东新风光电子科技股份有限公司
- + Shenzhen Kumark Drier & Automation  
库马克自动化
- + Shanghai Dongfang Electric  
上海东方电气

#### Metallurgy and petrochemical: 冶金石化:

- + Shenhua Group  
神华集团
- + Yongfeng Iron and Steel Group Co., Ltd.  
永锋钢铁集团有限公司
- + Harbin Electric Wind Energy Co., Ltd.  
哈电风能有限公司
- + China Pingmei Shenma Group  
平煤神马集团
- + China Shenhua Coal  
中国神华煤业
- + Baosteel Group  
宝钢集团
- + Anyang Iron and Steel  
安阳钢铁
- + State Grid Henan Electric Power Company  
国网河南省电力公司



Business school program:

商业学校项目:

- + Xinzheng South China City  
新郑华南城
- + Xinzheng Wuyue Plaza  
新郑吾悦广场
- + The main venue of the National Peasant Games  
全国农运会主场馆
- + Zhengshang Stock Business Centers  
正商股份
- + Jianye Group  
建业集团
- + Yongwei Group  
永威集团
- + CRCC No.18 Bureau Group  
中铁十八局集团
- + Country Gradend Holdings Group  
碧桂园控股集团
- + Henan National University Science Park  
河南省国家大学科技园

Industrial manufacturing project:

工业制造项目:

- + Puyang Longfeng Power Plant  
濮阳龙丰电厂
- + Xuchang Jinhui Stainless Steel Group Co., Ltd.  
许昌金汇不锈钢集团有限公司
- + Henan Zhigu Industrial Park  
河南智谷工业园
- + Vietnam Tinh Bac Ninh Solar Project  
越南北宁光伏项目
- + Philippine Paper Mill Powering System  
菲律宾造纸项目
- + Geely Automobile Zhejiang Intelligent Plant  
吉利汽车浙江智能化工厂电气项目

Pulp & Paper:

制浆造纸:

- + Huatai Group  
华泰集团
- + Chenming Group  
晨鸣集团
- + Hengan Group  
恒安集团
- + Yinge Group  
银鸽集团
- + Lee & Man Paper Mill  
理文纸业
- + Henli Group  
亨利纸业
- + Yilin Paper Mill  
一林纸业



## Prefabricated substation

(Box-type substation)

预装式变电站（欧式箱变）



### Overview 概述

Box-type substations, also known as prefabricated substations, provide power directly to users. It is a prefabricated indoor and outdoor compact power distribution equipment that integrates high-voltage switchgear (high-voltage room), distribution transformer (transformer room) and low-voltage power distribution device (low-voltage room) according to a certain wiring scheme. The functions of voltage reduction and low-voltage power distribution are organically combined, and the substation is installed in a moisture-proof, dust-proof, fire-proof, fully enclosed, movable steel structure box, especially suitable for urban and rural power grid construction and reconstruction.

箱式变电站，又叫预装式变电站，直接向用户提供电源。是一种高压开关设备（高压室）、配电变压器（变压器室）和低压配电装置（低压室），按一定接线方案集成为一体的预制户内、户外紧凑型配电设备，即将变压器降压、低压配电等功能有机的组合在一起，安装在一个防潮、防尘、防火、全封闭、可移动的钢结构箱内，特别适用于城、乡电网建设与改造。

The high-voltage room is the power supply side, generally 35kV, 20kV or 10kV incoming lines, including high-voltage busbars, circuit breakers or fuses, voltage transformers, arresters, etc. The transformer is located in the transformer room and it is the main equipment of the box-type substation. The transformer room includes transformers, which is the main equipment of substation. The low-voltage room includes low-voltage busbars, low-voltage circuit breakers, metering devices, etc. The lines are led out from the low-voltage busbars to supply power to users.

高压室就是电源侧，一般是 35kV, 20kV 或 10kV 进线，包括高压母排、断路器或者熔断器、电压互感器、避雷器等，变压器室里是变压器，是箱变的主要设备。低压室里面有低压母排、低压断路器、计量装置等，从低压母排上引出线路对用户供电。

Box-type transformers are divided into "triangle" and "rectangular" type according to the structure layout; "terminal type" box-type substations and "ring network" box-type substations according to the high-voltage power supply mode. Both sides of the bottom of the box are equipped with push-pull lifting devices, which can facilitate lifting, transportation and installation. The high and low voltage room can adopt standard structure or screen-mounted or framed structure. The former structure is highly complete and the latter has a compact overall size.

我们的箱变按结构布局分为“品”字型、“目”字型；按高压供电模式有“终端型”箱式变电站和“环网型”箱式变电站。箱体底部两侧装有推拉式起吊装置，可方便起吊、运输、安装。高、低压室可采用标准型结构，也可采用屏装式或框架式结构，前者成套性强，后者整机整体尺寸紧凑小巧。

## ▶ Implementation standards 执行标准

GB 1094.1-2013: Power transformers Part 1: General	电力变压器 第一部分: 总则
GB 1094.2-2013: Power transformers Part 2: Temperature rise	电力变压器 第二部分: 温升
GB 1094.3-2003: Power transformers - Part 3: Insulation levels, insulation tests and air gaps for external insulation	电力变压器 第三部分: 绝缘水平、绝缘试验和外绝缘空气间隙
GB 3906-2006: 3.6kV-40.5kV AC metal-enclosed switchgear and controls	3.6kV ~ 40.5kV 交流金属封闭开关设备和控制设备
GB/T 11022-2011: Common technical conditions for high-voltage switchgear and controls standards	高压开关设备和控制设备标准的共同技术条件
GB 7251.1-2013: Low voltage packages and controls Part 1: General	低压成套设备和控制设备 第一部分: 总则
GB 14048.1-2006: Low-voltage switchgear and controls Part 1: General	低压开关设备和控制设备 第一部分: 总则
GB/T17467-2010: HV/LV prefabricated substations	高压 / 低压预装式变电站

## ▶ Features 特点

- + Small size, small footprint, movable at any time according to demand, and convenient transportation and installation;  
体积小, 节省占地面积, 可根据需求随时移动, 运输安装方便;
- + Reasonable structure distribution, can be made into "triangle" and "rectangular" type according to demand;  
结构分布合理, 可根据需求做成“目”字型或“品”字型;
- + Each functional room is independent of each other, and maintenance and replacement of parts are convenient and fast;  
每个功能室相互独立, 检修和更换零部件方便快捷;
- + The shell is naturally ventilated, which can reduce the heat during operation;  
壳体自然通风, 可降低运行时的发热;
- + Can be used in various environments with high protection level.  
可在各类环境中使用, 防护等级高。

## ▶ Environmental conditions 使用环境

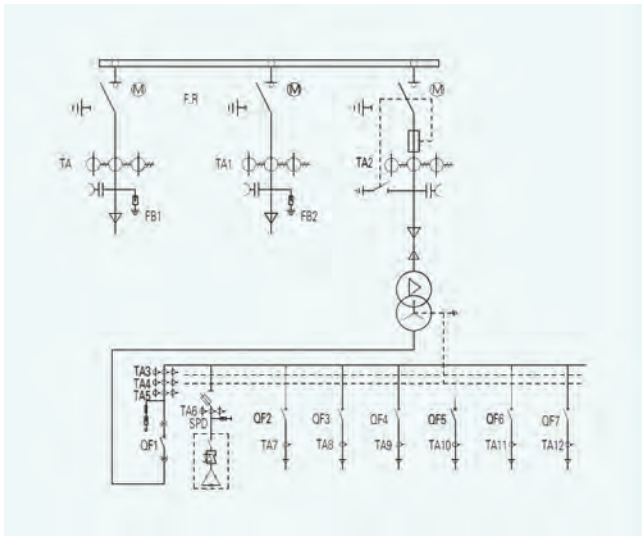
- a** The altitude is below 4000m;  
海拔 4000m 以下;
- b** Ambient temperature  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$  ;  
环境温度  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$  ;
- c** Relative humidity: the daily average humidity is not more than 95%, and the monthly average is not more than 90%.  
相对湿度: 日平均湿度不大于 95%, 月平均值不大于 90%。

Note: If it is out of the above conditions, you need to negotiate with the manufacturer.

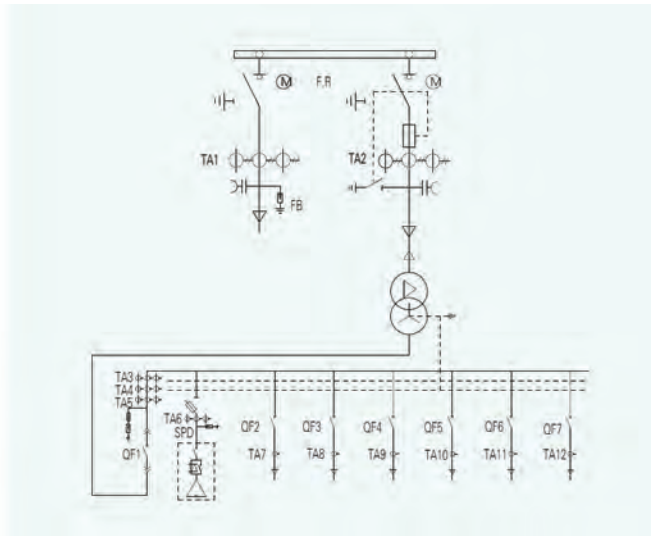
注: 超过以上使用条件的需与厂商协商解决。

▶ A typical one-line diagram 典型一次单线图

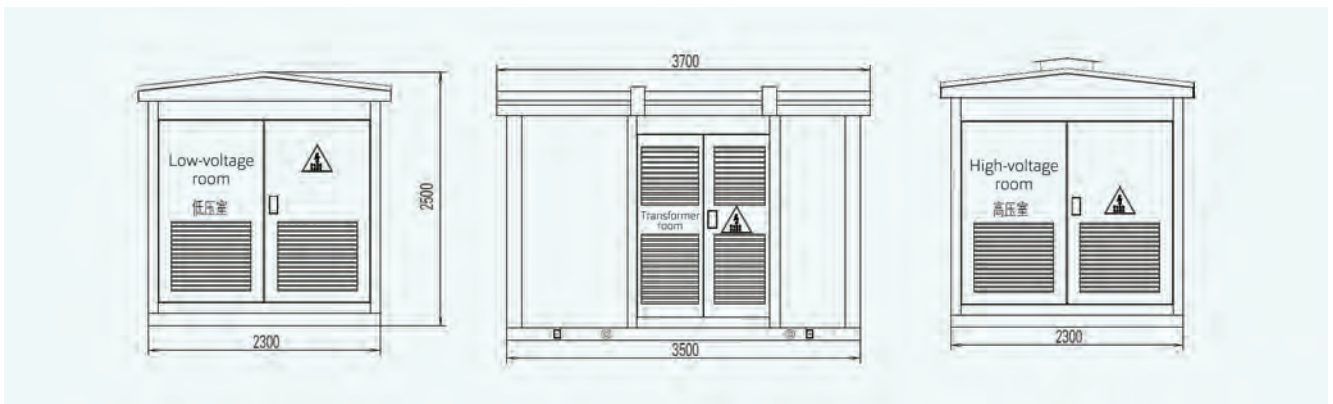
Primary single line diagram of ring network substation  
环网型变电站一次单线图:



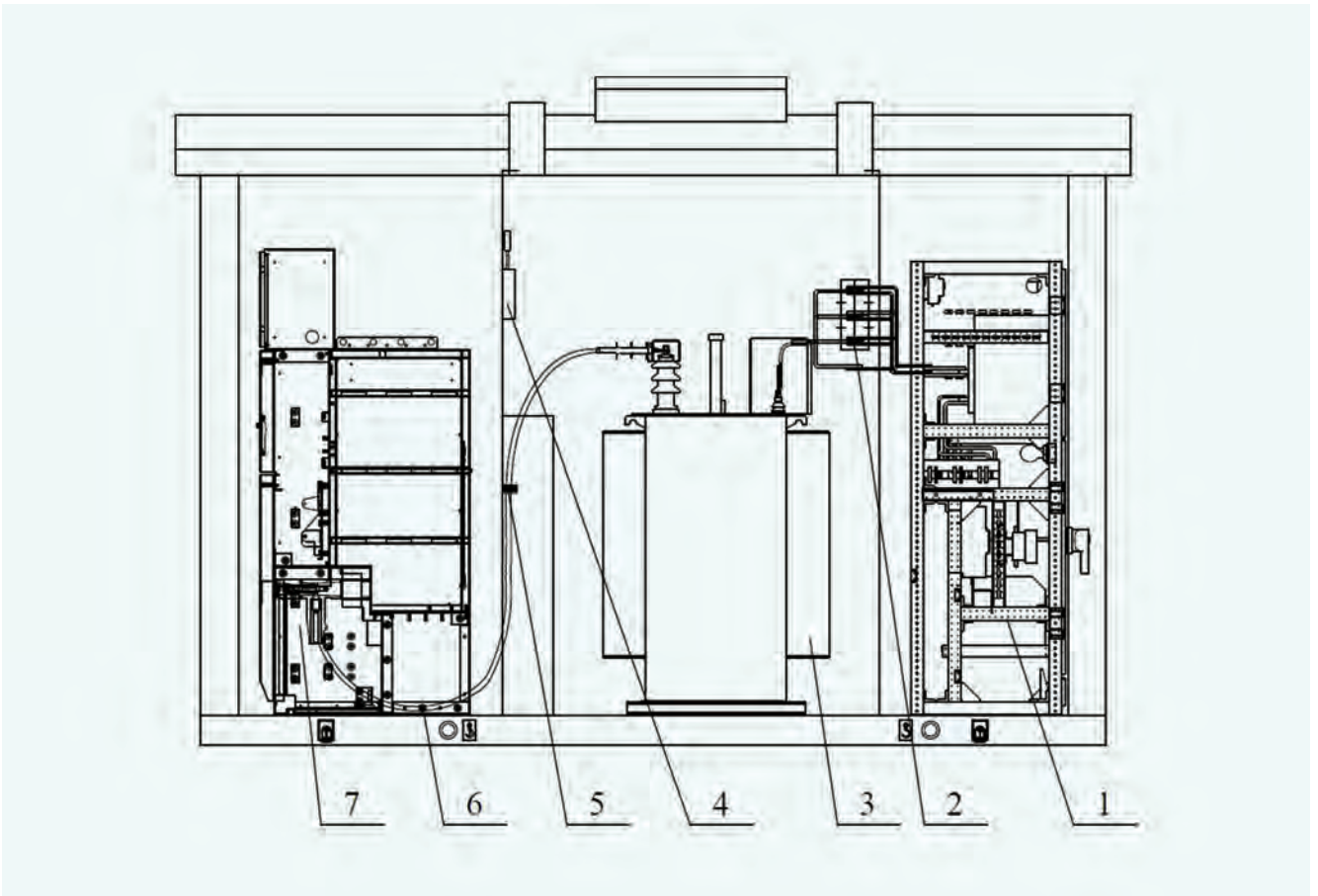
Primary one-line diagram of terminal type substation  
终端型变电站一次单线图:



▶ Box boundary drawing: (take 630kVA as an example) 箱体外形图: (以 630kVA 为例)







① Low voltage switchgear  
低压开关设备

② Insulated busbar frame  
绝缘母线框

③ Transformer  
变压器

④ Box-type transformer shell  
箱变外壳

⑤ Cable clamp  
电缆夹

⑥ 10kV high voltage cable  
10kV 高压电缆

⑦ High voltage switchgear  
高压开关设备



## New energy (photovoltaic/wind) power generation special box transformer

新能源（光伏 / 风力）发电专用箱变

### ▶ Overview 概述

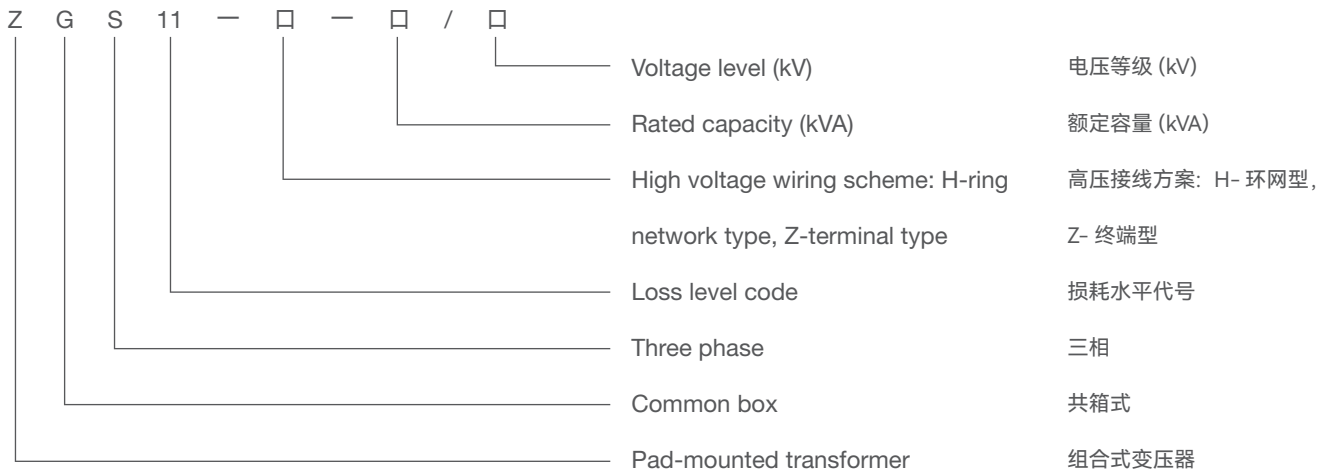
As a production method of clean energy, new energy power generation has developed rapidly at home and abroad. ZGS series new energy (photovoltaic/wind) power generation combined transformers is pad-mounted transformer, which combines transformer body, oil immersed load switch, oil immersed fuse, switchgear, low voltage power distribution device and other supporting equipment. The high and low voltage chambers and transformers are arranged in triangle shape. It can simultaneously meet various configuration requirements such as user energy metering, reactive power compensation, low-voltage shunt, etc. It is suitable for terminal power supply systems of 35kV and below, with a capacity range of 500--5000kVA. The enclosure protection level can reach IP54 or above, and it is suitable for photovoltaic and wind farms on land, water and sea.

新能源发电作为一种清洁能源的生产方式，在国内外得到迅速的发展。ZGS 系列新能源（光伏 / 风力）发电组合式变压器，是将变压器器身、油浸式负荷开关、油浸式熔断器、开关设备、低压配电装置等配套设备进行组合的变压器，高、低压室和变压器呈现出“品”字型排列。能同时满足用户电能计量、无功补偿、低压分路等各种配置要求，适用于 35kV 及以下终端供电系统，容量范围为 500--5000kVA。外壳防护等级可达到 IP54 以上，适用于陆地、水面及海上的光伏、风力发电场。

▶ Implementation standards 执行标准

GB 1094.1-2013: Power transformers Part 1: General	电力变压器 第一部分: 总则
GB 1094.2-2013: Power transformers Part 2: Temperature rise	电力变压器 第二部分: 温升
GB 1094.3-2003: Power transformers - Part 3: Insulation levels, insulation tests and air gaps for external insulation	电力变压器 第三部分: 绝缘水平、绝缘试验和外绝缘空气间隙
GB 1094.5-2008: Power transformers - Part 5: Ability to withstand short circuits	电力变压器 第五部分: 承受短路的能力
GB/T 11022-2011: Common technical conditions for high-voltage switchgear and controls standards	高压开关设备和控制设备标准的共同技术条件
GB 7251.1-2013: Low voltage packages and controls Part 1: General	低压成套设备和控制设备 第一部分: 总则
GB 50150-2006: Electric device installation engineering - Electrical equipment handover test standard	电气装置安装工程 电气设备交接试验标准
JG/T 10217-2013: Pad-mounted transformer	组合式变压器

▶ Type description 型号说明



## ▶ Features 特点

- + Small size, compact structure, small footprint, convenient transportation and installation;  
体积小，结构紧凑，占地面积小，运输、安装方便；
- + Low loss, low noise, low temperature rise, strong overload capacity, strong resistance to sudden short circuit;  
低损耗，低噪音，低温升，过负载能力强，抗突发短路能力强；
- + Fully enclosed, fully insulated structure, safe and reliable operation;  
全封闭，全绝缘结构，运行安全可靠；
- + The wiring method is flexible and the operation is convenient, which can be used in both the terminal system and the ring network system;  
接线方式灵活，操作方便，既可用于终端系统，也可用于环网系统；
- + The transformer body is installed on the outside of the box, with good heat dissipation and convenient maintenance;  
变压器本体装在箱体外侧，散热好，方便维护检修；
- + The box is treated with cold-rolled steel plate electrophoretic spray paint (plastic), which is corrosion-resistant and has strong mechanical properties;  
箱体采用冷轧钢板电泳喷漆（塑）处理，耐腐蚀，机械性能强；

## ▶ Environmental conditions 使用环境

- a** The altitude is below 4000m;  
海拔 4000m 以下；
- b** Ambient temperature  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$  ;  
环境温度  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$  ;
- c** Pollution level: III  
污秽等级: III级
- d** Relative humidity: the daily average humidity is not more than 95%, and the monthly average is not more than 90%;  
相对湿度: 日平均湿度不大于 95%，月平均值不大于 90%；

 Technical parameters 技术参数

No. 序号	Name 名称		Unit 单位	Data 数据
1	Rated voltage 额定电压	HV 高压侧	kV	10、20、35
		LV 低压侧	kV	0.315 ~ 0.5
2	Rated capacity 额定容量		kVA	630 ~ 5000
3	No-load voltage regulation 无载调压		$\pm 2 \times 2.5\%$	$\pm 2 \times 2.5\%$
4	Vector group 连接方式			Dyn11、Dyn11yn11、Yd11d11
5	Insulation level 绝缘水平	Lightning impulse withstand voltage 雷电冲击耐受电压	kV	75、125、200
		Power frequency withstand voltage (HV) 工频耐压 (高压侧)	kV	35、55、85
		Power frequency withstand voltage (LV) 工频耐压 (低压侧)	kV	5
		Secondary control loop 二次控制回路		2.0
6	Noise level 噪音等级		dB	60
7	Protection class 防护等级			Oil tank IP68, high and low voltage chamber IP54 油箱 IP68, 高低压室 IP54

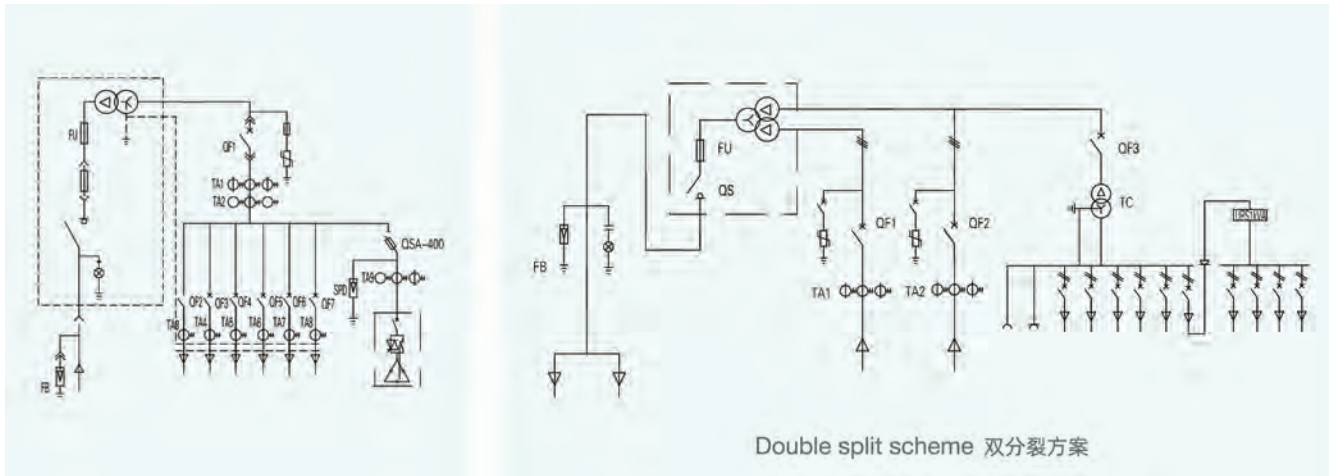
Note: Due to continuous product improvement, the dimensions provided in this sample are for reference only. If necessary, our company can design and produce according to user requirements. Please contact the company in time.

备注：因产品不断改进，本样本提供的尺寸仅供参考；如有需要，我公司可按用户要求进行设计和生产，请及时与本公司联系。

▶ Primary single-line diagram (typical scheme) 一次单线图 (典型方案)

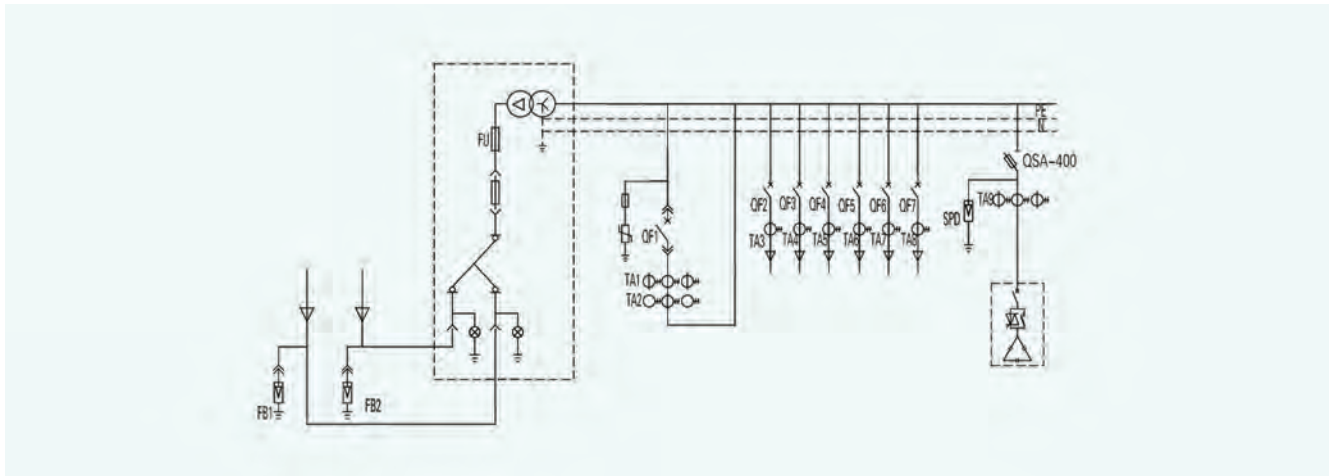
1. Primary one-line diagram of terminal type substation

终端型变电站一次单线图:

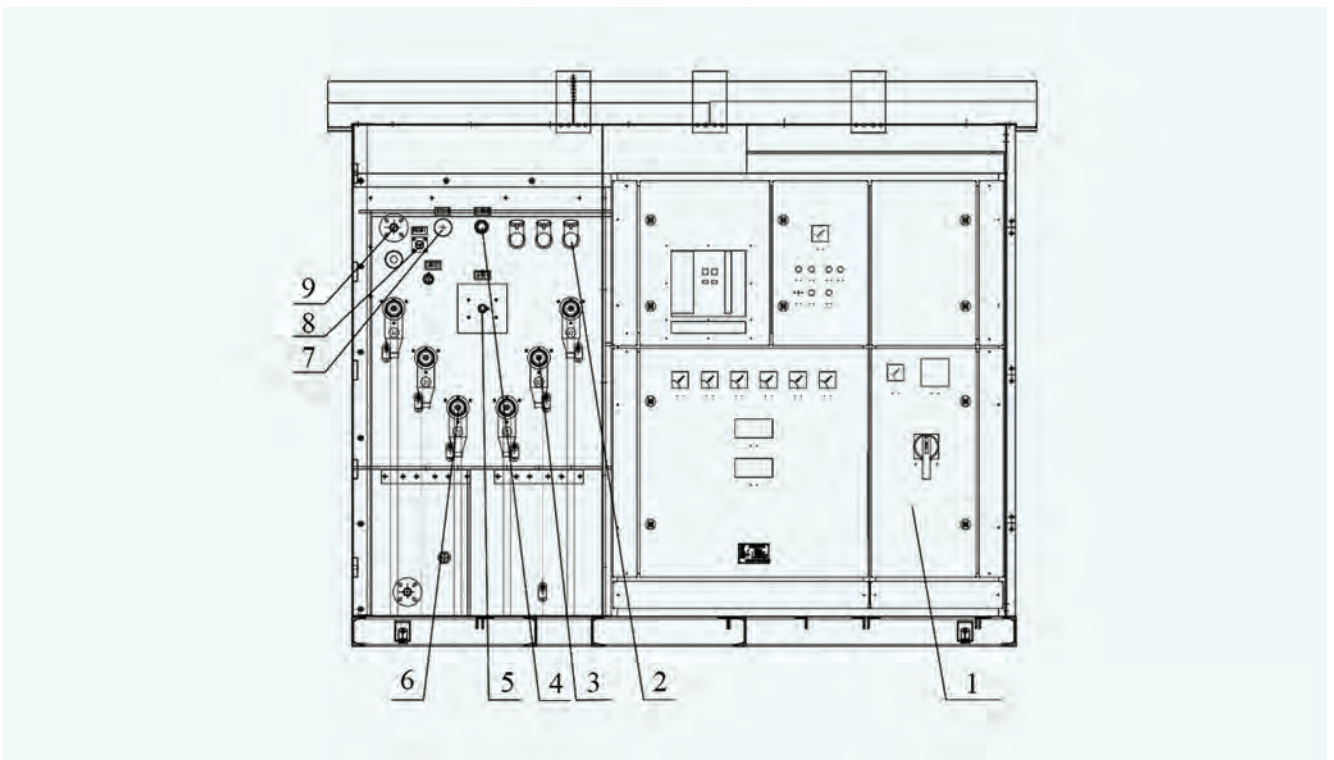
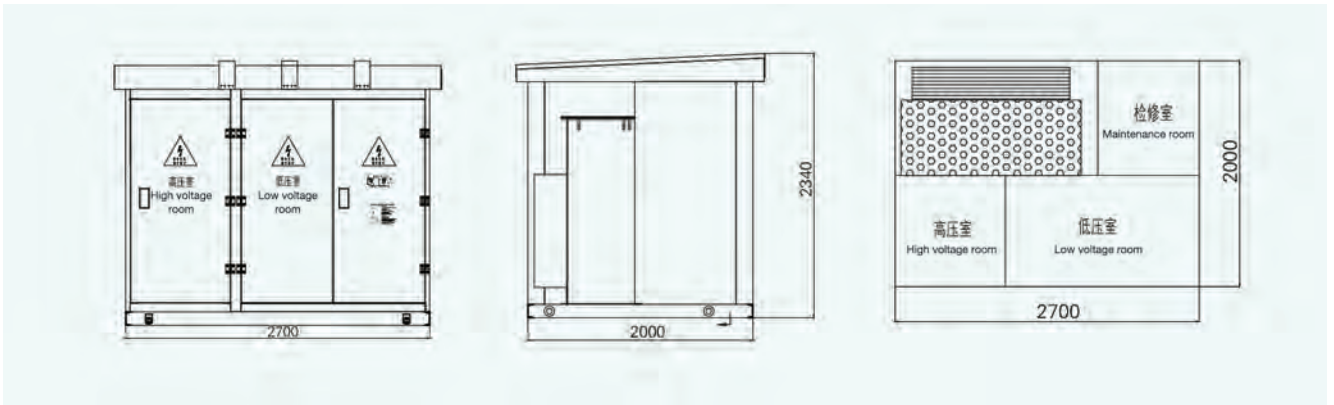


2. Primary single-line diagram of ring network substation

环网型变电站一次单线图:



▶ Box boundary drawing: (take 630kVA as an example) 箱体外形图: (以 630kVA 为例)



1 Low voltage switchgear  
低压开关设备

2 Plug-in fuse  
插入式熔断器

3 External plug connector  
外插式插接头

4 Pressure relief valve  
压力释放阀

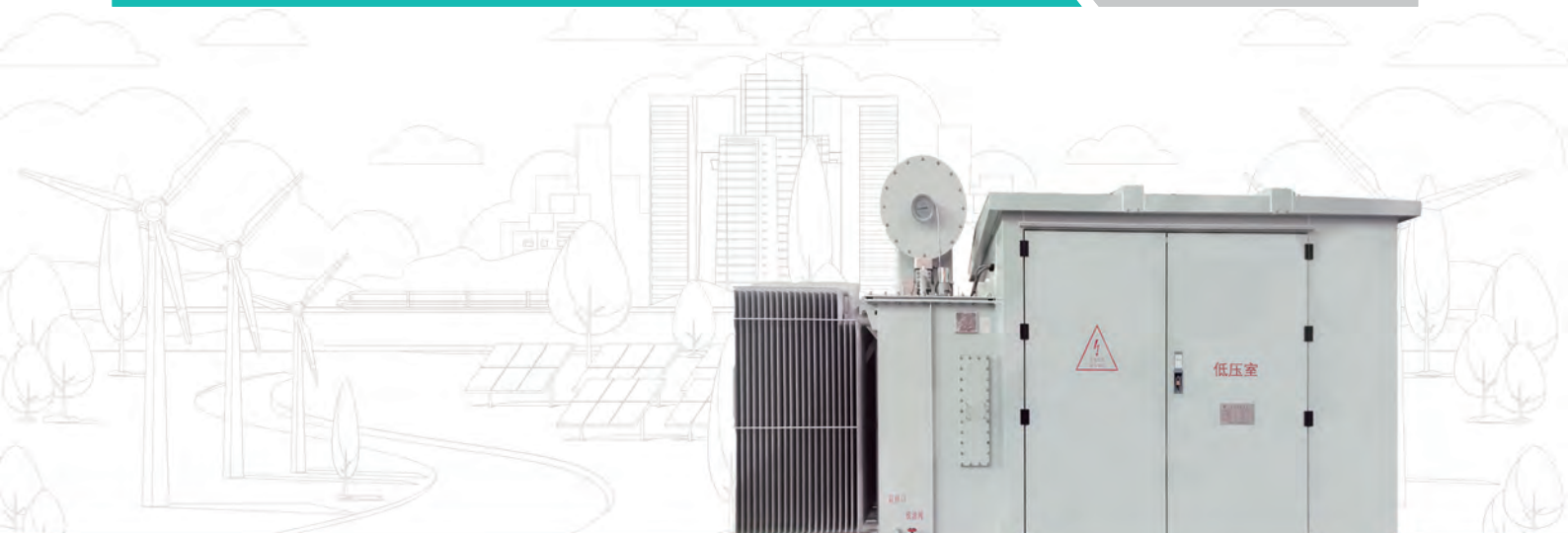
5 Four-position T-type load switch  
四工位 T 型负荷开关

6 Casing seat  
套管座

7 Vacuum pressure gauge  
真空压力表

8 Oil level gauge  
油位计

9 Oil filling valve  
注油阀



## Special box transformer for new energy

(photovoltaic, wind) power generation

新能源（光伏、风力）发电专用箱变

### Overview 概述

This kind box transformer is also suitable for new energy (photovoltaic/wind) power generation. Transformer room, high and low voltage rooms are arranged in "rectangle" shape, and high voltage fuses and load switches are moved from the inside of the transformer tank and placed in the high voltage room. The transformer adopts an external oil storage tank structure, the oil level is clear at a glance, and it is more convenient to fill and drain oil. The capacity range can be expanded to 6300kVA, and the external transformer is more convenient for maintenance. The protection level of the fuel tank is IP68, and the protection level of the high and low voltage rooms is IP54, which can be used in various harsh environments. 这种结构的箱变同样适用于新能源（光伏 / 风力）发电，变压器室、高、低压室呈“目”字型排列，高压熔断器、负荷开关从变压器油箱内外移，置于高压室。变压器采用外置储油柜结构，油位一目了然，且注、放油更方便。容量范围可扩大至 6300kVA，变压器的外置更利于检修。油箱防护等级 IP68，高、低压室防护等级 IP54，可用于各类恶劣的环境。

### Environmental conditions 使用环境

- a** The altitude is below 4000m;  
海拔 4000m 以下;
- b** Ambient temperature  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$  ;  
环境温度  $-45^{\circ}\text{C} \sim +45^{\circ}\text{C}$ ;
- c** Pollution level: III  
污秽等级: III级



- d** Relative humidity: the daily average humidity is not more than 95%, and the monthly average is not more than 90%;  
相对湿度：日平均湿度不大于 95%，月平均值不大于 90%；

Note: If it is out of above conditions, please negotiate with the manufacturer.

注：超过以上使用条件的需与厂商协商解决

## Implementation standards 执行标准

GB 1094.1-2013: Power transformers Part 1: General

电力变压器 第一部分：总则

GB 1094.2-2013: Power transformers Part 2: Temperature rise

电力变压器 第二部分：温升

GB 1094.3-2003: Power transformers - Part 3: Insulation levels, insulation tests and air gaps for external insulation

电力变压器 第三部分：绝缘水平、绝缘试验和外绝缘空气间隙

GB 1094.5-2008: Power transformers - Part 5: Ability to withstand short circuits

电力变压器 第五部分：承受短路的能力

GB/T 11022-2011: Common technical conditions for high-voltage switchgear and controls standards

高压开关设备和控制设备标准的共同技术条件

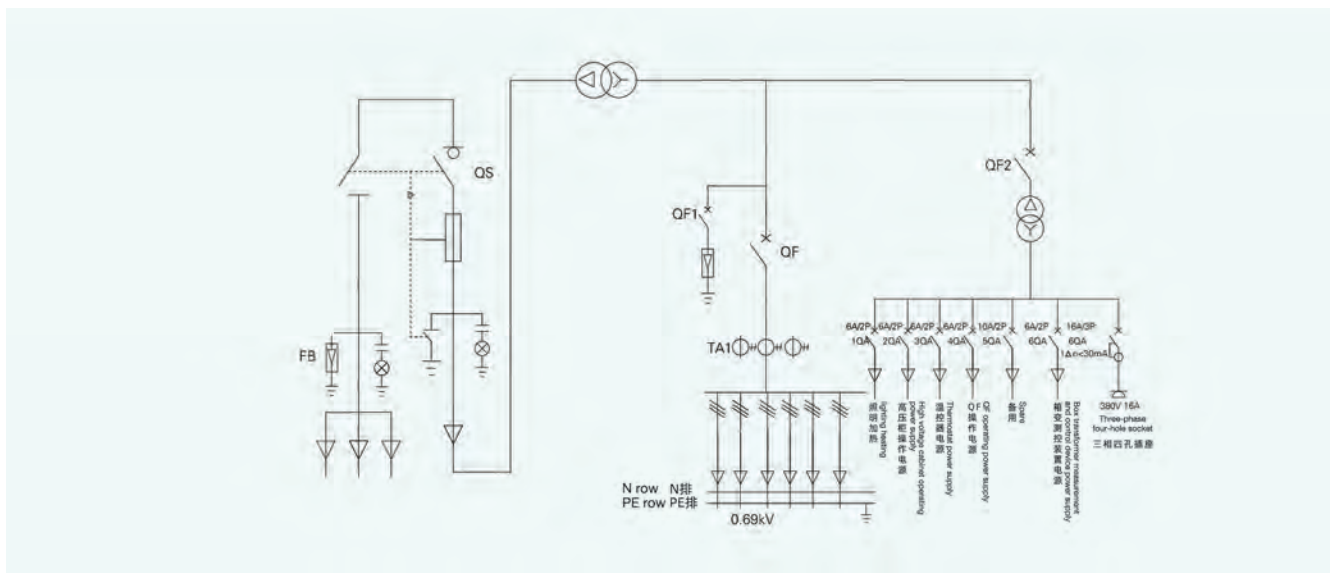
GB 7251.1-2013: Low voltage packages and controls Part 1: General

低压成套设备和控制设备 第一部分：总则

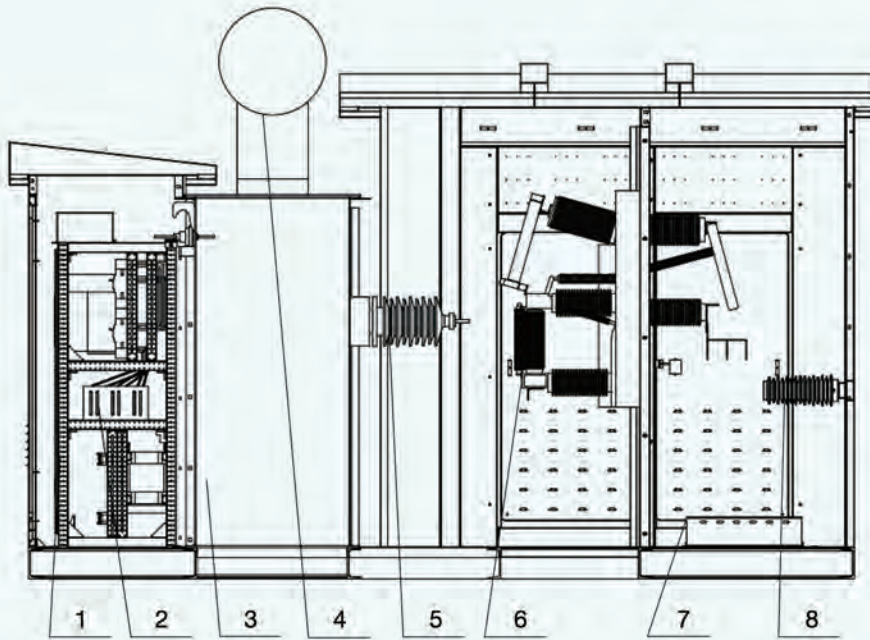
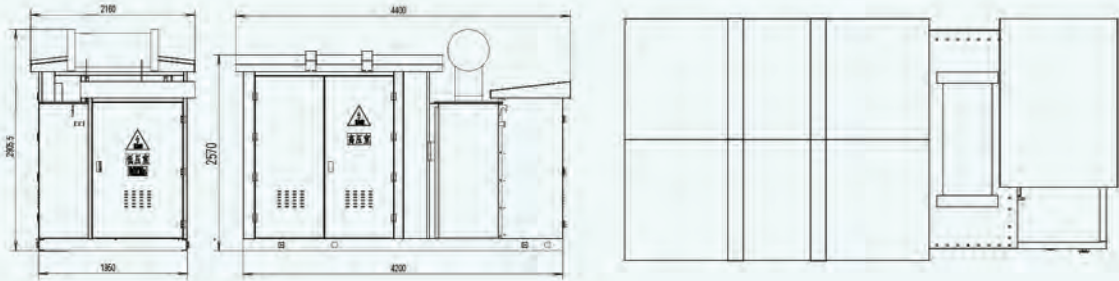
GB 50150-2006: Electric device installation engineering - Electrical equipment handover test standard

电气装置安装工程 电气设备交接试验标准

## Primary single-line diagram (typical scheme) 一次单线图（典型方案）



▶ Structure and boundary dimensions 结构及外形尺寸



1 Low voltage switchgear  
低压开关设备

3 Transformer  
变压器

5 High voltage bushing  
高压套管

7 Cable clamp bracket  
电缆夹支架

2 Insulated busbar frame  
绝缘母线框

4 Oil conservator  
储油罐

6 Vacuum load switch  
真空负荷开关

8 Post insulators  
支柱绝缘子

## Order Information / 订货须知

### ▶ Normal use conditions for the product 产品正常使用条件

- a** Environment temperature: highest temperature 40°C , lowest -30°C .  
环境温度：最高气温 40°C，最低温度 -30°C
- b** Elevation: no more than 1000m.  
海拔：不超过 1000m
- c** Relative humidity: daily average≤95%, monthly average≤90%.  
相对湿度：日平均≤ 95%，月平均≤ 90%
- d** Maximum wind speed (outdoor): 35m/s (10m above the ground and average value over 10 min).  
最大风速（户外）：35m/s（距地面 10m 高 10min 平均值）
- e** Anti-earthquake performance (with stand): 8.  
抗地震能力（带机座）：按 8 级

### ▶ Order Information 订货须知

In order to provide you with better service, the following data are required when ordering.  
为了给您提供更好地服务，订货时需提供以下数据：

- |                                   |                           |
|-----------------------------------|---------------------------|
| + Specification and type<br>规格及型号 | + Tapping range<br>调压范围   |
| + High voltage<br>高压电压            | + Rated frequency<br>额定频率 |
| Low voltage                       | Vector group              |
| + 低压电压                            | + 联结组别                    |
| Coil material                     | Insulation grade          |
| + 线圈材质                            | + 绝缘等级                    |
| Phases                            | Noise                     |
| + 相数                              | + 噪音                      |

Note: Please specify your requirements for special products.  
注：特殊产品请注明特殊要求。



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