

风能变电站

Wind Power Substation

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智能型风能组合式变电站

Intelligent wind power combined substation



产品概述

随着我国经济的不断增长，对电力的需求大幅上升，能源成为矛盾的主体。由于传统的燃煤发电和燃油发电都对环境造成一定的污染，为了符合绿色环保要求，风力发电作为一种清洁能源生产方式，在我国迅猛发展，成为解决能源紧缺的主攻方向。ZGS-Z.F系列风力发电箱式变电站是满足日益增长的风力发电的供电要求，在公司生产10kV组合变的基础上，消化吸收国内外的技术结合国内需求自行开发的系列产品。该产品是将变压器、负荷开关、高压熔断管安装在变压器的箱体内部，利用变压器绝缘油作为整个产品的绝缘介质和散热介质，具有体积小、重量轻、安装方便等优点。

结构及性能特点

结构特点：

- A.**主体采用共箱式变压器的结构，将高压负荷开关、插入式熔断器、变压器器身、无励磁分接开关等高压元器件组合在密封的油箱内，变压器油作为散热和绝缘介质，整体结构紧凑，散热性能好。
- B.**整体组合式风力变电站由高压室、低压室、油箱、散热器组成，高低压室、变压器为“目”字形布置，在油箱的侧面安装片式散热器，片式散热器由导油管与散热片串通组成，更适应大功率变压器的散热需求。为防止人为破坏，对于机械强度薄弱的散热片，可采用冲散热孔的钢板防护罩加强保护。从风力发电机发出的电能经过本变电站升压后并入电网。
- C.**该产品的高压侧采用终端型负荷开关加熔断器保护，高压侧进出线采用高压电缆插头或绝缘套管和铜排出线。
- D.**该产品箱体采用钢板焊接，经国内先进的涂装工艺生产线特殊处理，具有良好防腐能力，能有效防止风沙侵蚀。

性能特点：

- A.**节能，其空载损耗和负载损耗低于同类产品，最大限度地保证了风能的充分利用。
- B.**全密封；安全可靠；箱体采用防盗结构。
- C.**耐高温，过负荷能力强，体积小，结构紧凑，安全方便。
- D.**环保，寿命期内无需滤油、换油，无污染。

Product Overview

Along with China's economy growth, the demand for electricity increased sharply. Because traditional coal-fired power generation and oil-generated electricity have caused a certain degree of pollution on the environment, wind power as a clean energy in order to comply with the green environmental protection requirements develops quickly and has become the main direction of solving the energy shortage. ZGS-ZF series wind power pad mounted transformer meets the growing demand for wind power supply.

The product integrates the transformer, load switch, HV fuse into the transformer cabinet, taking advantage of mineral oil as insulating and cooling media. It has advantages of small size, light weight, ease for installation, etc..

Structure and performance characteristics

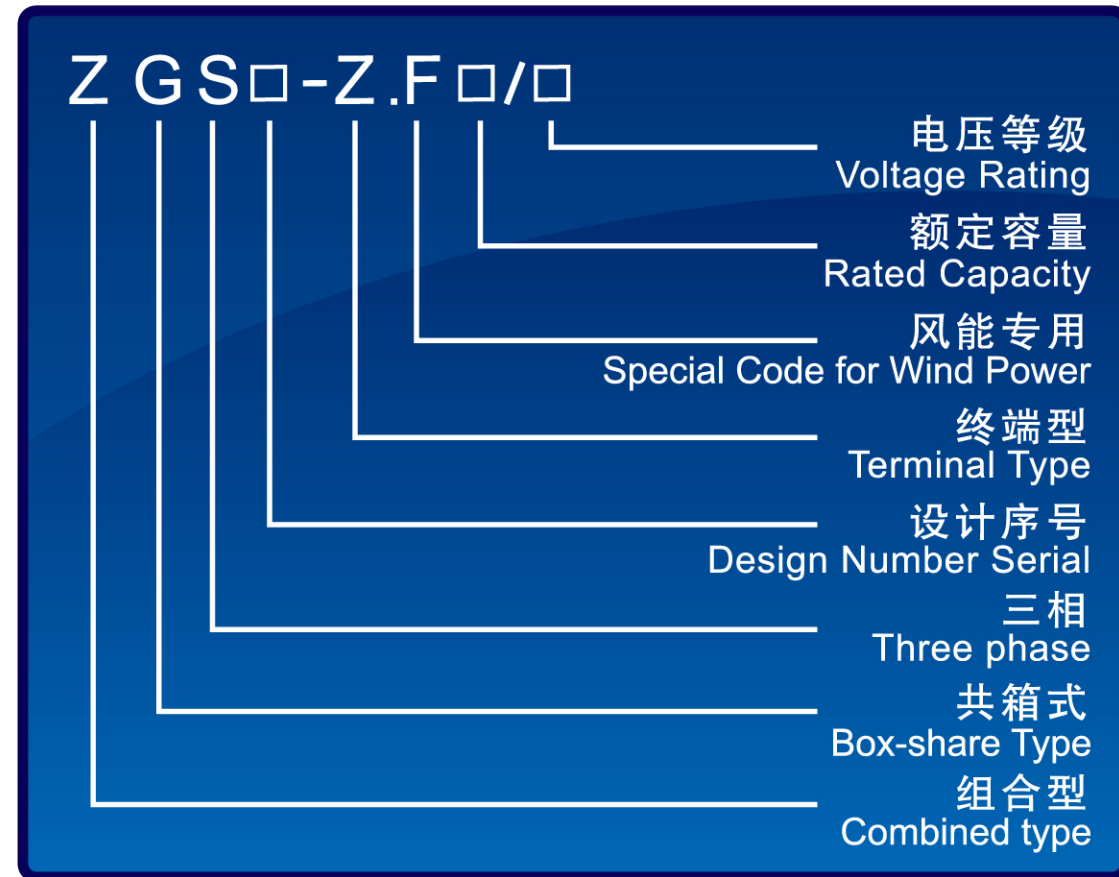
Structure Characteristics:

- A.**The main body applies shared box-type transformer structure. The high voltage load switch, plug-in fuses, transformer active part, non-excited tap changer are integrated in the sealed oil tank. It is insulated by transformer oil. This product is small in size and excellent in performance.
- B.**The overall wind power combined substation contains HV chamber, LV chamber, oil tank, Radiator. The layout of the installation can offer better cooling. To increase the weak mechanical strength of the radiator against vandalism, protection cover can be offered. The power generated from wind turbine power can be step-up transformed to grid.
- C.**The product applies terminal-type load switch plus fuse on HV side for protection, and uses HV cable plugs or insulated bushing and cooper bus bar on HV side as incoming and outgoing method.
- D.**The cabinet applies welded steel plate, electro-coated by advanced production lines with special treatment, which provides good corrosion resistance and effectively anti sand erosion.

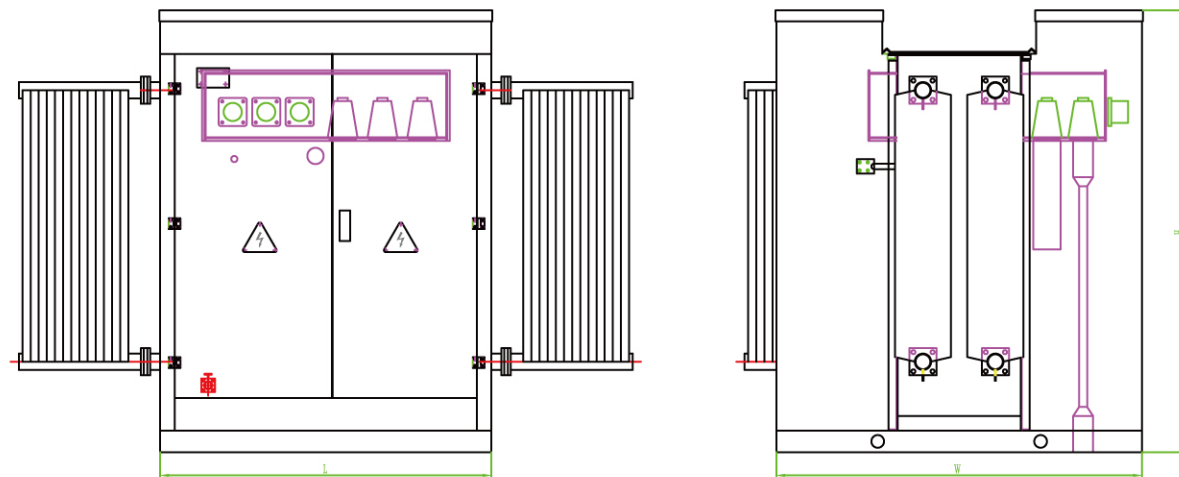
Performance characteristics:

- A.**Energy-saving: its no-load loss and load loss lower than similar products, to maximize the full use of wind energy.
- B.**Safe: reliable protection of personal safety, application of anti-theft box structure.
- C.**High temperature resistance: over-load capability, small size, compact structure, safe and convenient.
- D.**Environmental protection: no need of oil filter, no pollution.

型号说明 Model Coding



结构图 Structure Chart



外形尺寸为：长(L)X宽(W)X高(H)根据用户配置而定

Dimensions: length (L) X width (W) X high (H) based on user configuration

正常使用环境条件

- 1.海拔不超过2000m；
- 2.环境温度：上限+45℃，下限-40℃；
- 3.户外风速不超过35m/s；
- 4.相对湿度：日平均值不大于95%，月平均值不大于90%；
- 5.地震烈度不超过8级；
- 6.安装在没有火灾、爆炸危险和严重污秽、化学腐蚀的场所；
- 7.特殊使用条件：当上述正常使用条件不能满足时，公司将与用户协商最大限度满足用户要求。

主要技术参数

- 1.负荷开关采用油浸式终端型二位置负荷开关,它以变压器油为绝缘和灭弧介质,弹簧储能、三相连动,能准确快速地开断或关合额定负荷电流，参见表一。

Environmental conditions of normal operation

- 1.Installation: not more than 2000m;
- 2.Ambient temperature: upper limit +45 degrees; lower limit -40 degrees;
- 3.Outdoor wind speed not exceed 35m / s
- 4.Relative humidity: daily average not more than 95%, the monthly average not more than 90%;
- 5.Seismic intensity of less than 8 degrees;
- 6.Installed in the absence of fire, explosion and serious risk of fire, chemical corrosion;
- 7.Special conditions of application: When the above conditions can not be satisfied, user requirements could be negotiated between QRE and user.

Main technical parameters

- 1.Oil-immersed Load switch with 2 position terminal type applies transformer oil as insulation and arc-quenching media. With spring energy storage, three phase interlink, the load switch can accurately and quickly breaks or closes rated load current. Specification refers to table 1 .

表1 Table 1

序号 Serial No.	名称 Item	单位 Unit	参数 Value
1	额定电压 Rated Voltage	kV	40.5
2	额定电流 Rated Current	A	315 630
3	额定频率 Rated Frequency	Hz	50
4	额定短路耐受电流 Rated Short-circuit Withstanding Current	kA/2s	12.5 20
5	额定峰值耐受电流 Rated Withstanding Current (Peak)	kA	31.5 50
6	机械寿命 Mechanical life	次 Times	2000
7	1分钟工频耐压(相间及对地) 1 min Power Frequency Withstanding Voltage (Between phases and to earth)	kV	95
8	雷电冲击水平(相间及对地) Lightning Impulse Level (Between phases and to earth)	kV	185

2.熔断器参数 (见表2)
Specification of fuse(refers to table 2)

表2 Table 2

额定电压 Rated Voltage	熔断器额定电流A Rated Current (Fuse)	熔断体额定电流A Rated Current (Fuse element)	额定最大开断电流kA Rated max. Breaking Current
40.5	50	20,25,31.5,40,50	31.5

3.变压器技术参数 (见表3)
Specification of transformer(refers to table 3)

表3 Table 3

额定容量(kVA) Rated Capacity	35kV S11型变压器 35kV Transformer (S11 series)		阻抗电压% Impedance Voltage
	空载损耗(W) No-load Loss	负载损耗(W) Load Loss	
800	980	9400	6.5
900	1100	11390	
1600	1700	16670	
1800	1870	18340	
2150	2130	20840	

注：
变压器容量可按用户要求订制。
Different capacity of transformer is also available upon client's request.

4.联接组别: Dyn11或Yyn0

4.Vector Group: Dyn11 or Yyn0

5.高压分接范围：±5%或±2×2.5%

5.Tapping range on HV side: ±5% or ±2×2.5%

6.外壳防护等级：不低于IP33D。

6.Protection Level of Enclosure: ≥IP33D

7.组合变符合下列标准：

7.Wind power combined substation conforms to standards listed below:
GB1094.2-1996 Power Transformer Part 2 – Temperature rise
GB3906-2006 3.6kV~40.5kV AC Metal-enclosed Switchgear Equipment & Control Equipment
GB/T14048.1-2006 Low-voltage switchgear and control equipment – General
GB/T17467-1998 Technical requirements of High / low voltage prefabricated substation
DL/T537 2002 Guidelines for selection of High / low voltage prefabricated substation

GB1094.2-1996《电力变压器第2部分 温升》

GB3906-2006《3.6kV~40.5kV交流金属封闭开关设备和控制设备》

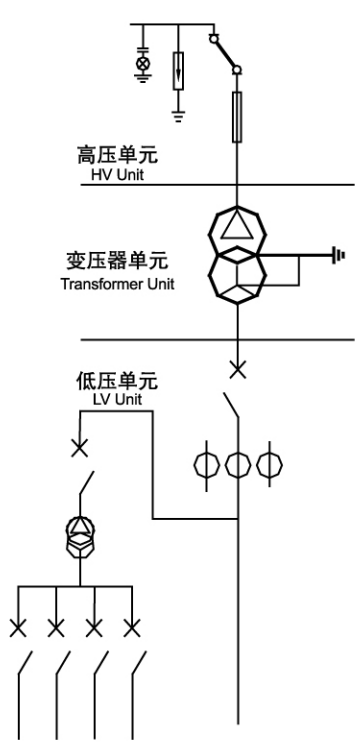
GB/T14048.1-2006《低压开关设备和控制设备 总则》

GB/T17467-1998《高压/低压预装式变电站的技术要求》

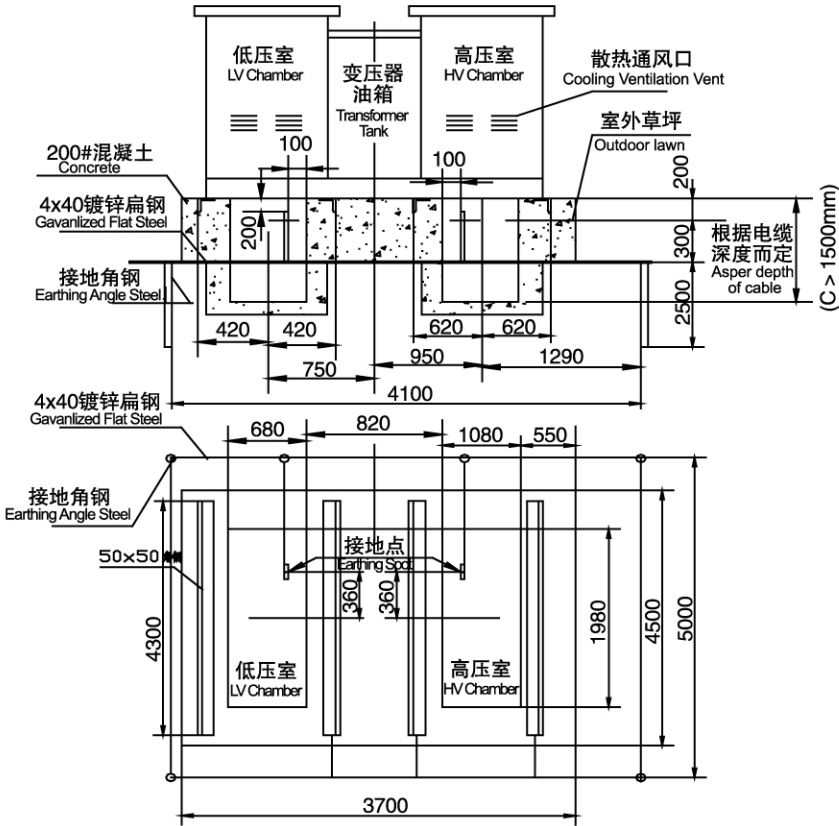
DL/T537 2002《高压/低压预装式变电站选用导则》

典型主回路一次方案和基础图

Primary proposal & foundation drawing for typical main circuit diagram



一次方案图
Primary Proposal



此基础图为1600kVA,其它尺寸根据订货要求而定
接地网安装要求:

- 1.接地体埋设深度不小于0.6米;
- 2.接地体双面焊接,焊口涂防锈漆;
- 3.接地网电阻测试必须小于4欧姆;
- 4.整机采用三相五线制。

This foundation drawing based on 1600kVA, other sizes are according to order requirement
Installation requirements of ground grid:
1. Grounding burial depth not less than 0.6 m;
2. Grounding part should be double-side welded, welded joints coated anti-rust paint;
3. Grounding resistance test must be less than 4 ohms;
4. Applies three-phase five-wire system.

预装式风能变电站

Prefabricated wind power substation



产品概述

随着我国经济的不断增长，对电力的需求大幅上升，能源成为矛盾的主体。开发利用可再生的清洁能源已成为人类面临的重大课题之一，此时风力发电作为一种清洁能源生产方式，在我国迅猛发展，成为解决能源紧缺的主攻方向。为了满足用户对高压单元及变压器单元多元化的要求，公司在研发了35kV风力发电箱式变电站的基础上，又研发生产了YFB系列预装式风能变电站，该产品将风力发电配套升压站预先在工厂内制造，包括升压变压器、高压负荷开关、低压开关以及电源变压器等辅助设备，配置在一个公用外壳内组成的变电站。从结构上与欧式箱变相同，因此又称“风电欧变”。

Product Overview

As China's economy is growing, the demand for electricity increased sharply. Energy has become the main contradiction. As a result of the traditional coal-fired power generation and oil-generated electricity have caused serious pollution to the environment, so in order to meet environmental protection requirements, as a clean source of energy production, wind power faces rapid development in China and has become the main direction to solve the energy shortage. We developed YFB series prefabricated wind power substation in accordance with such needs, which integrates step-up transformer, H.V. load break switch, L.V. switch and power supply transformer together inside common enclosure.

结构及性能特点

结构特点:

- A. 整体组合式风力变由高压室、低压室、变压器室组成，变电站高压开关选择真空断路器或根据用户要求选择真空负荷开关，防止风机故障对电网造成冲击。低压开关选择高分断断路器保护变压器和高压设备。
- B. 高压断路器上装设过电流、速断、变压器保护。低压断路器上装设过流、速断保护。
- C. 可按用户要求安装远方通讯设备，对35KV(10KV)、0.69KV侧的设备如：断路器、变压器、互感器等及相关信息进行遥测、遥信、遥控，实现智能化管理。
- D. 变电站外壳可采用复合板、不锈钢板、钢板、非金属等材料，钢结构件都经过磷化预处理，引进国外先进技术和工艺，具有耐污、耐温、耐化学侵蚀性。各室内配置自动通风机、除湿器等附件设备，使变电站内的环境接近于土建变电站，满足变电站内设备对环境的要求。

性能特点:

- A. 节能：本产品的变压器采用优质硅钢片材料，经过电磁化设计后，其空载损耗和负载损耗均比同类产品低，最大限度的保证了风能的利用。
- B. 安全可靠，高压柜没有五防联锁，避免操作人员误入带电间隔，箱体采用防盗结构。
- C. 配置丰富，产品内设散热和防凝露设备，保证内部电气元件在良好环境中运行。
- D. 配有多种保护功能的装置，使变压器可在故障情况下与电网或风力发电机隔离，保护风机和电网的安全运行。

Structure and performance characteristics

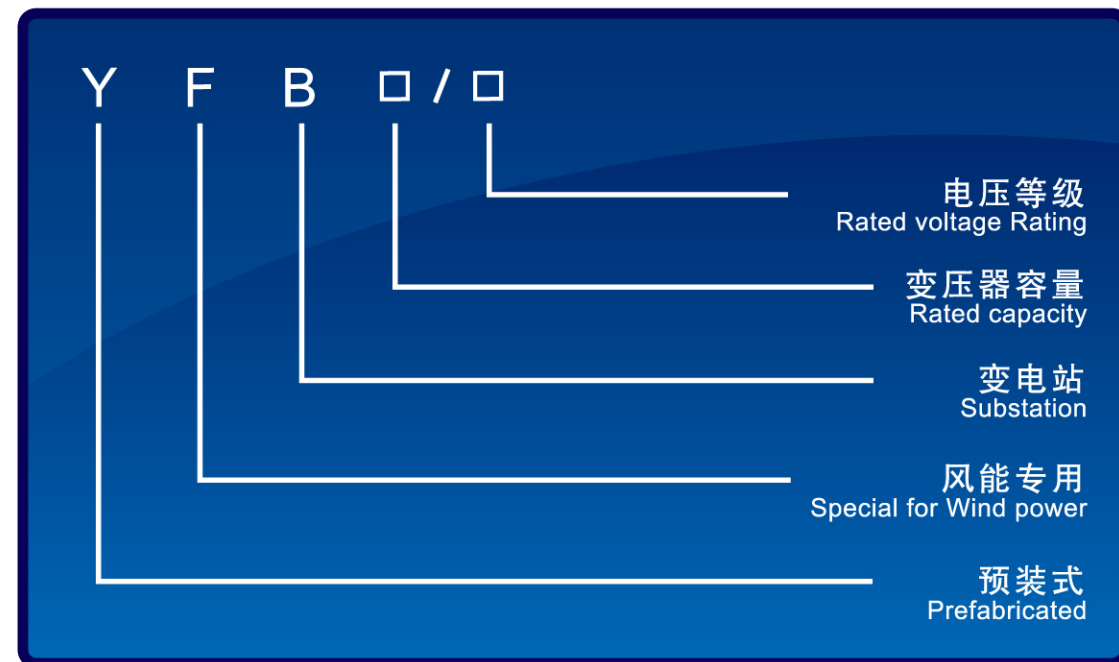
Structure Characteristics:

- A. The substation contains HV chamber, LV chamber and transformer chamber. HV vacuum circuit breaker or vacuum load switch as per user's option is applied to prevent the impact on the power grid caused by fan fault. High breaking circuit breaker is applied to protect transformers and high voltage circuit breaker equipment.
- B. There is protection against over-current, quick-break and transformer protection on HV circuit breaker while protection against over-current, quick-break on LV circuit breaker.
- C. QRE can install remote communications equipment, for 35KV (10KV), 0.69KV side equipment, such as: circuit breakers, transformers, transformers and related information, such as remote measuring, remote communication, remote control and realization of intelligent management.
- D. Substation enclosure can be composite plate, stainless steel plates, steel and other materials. All steel frames have been pre-processed of phosphate. With the import of Japan's most advanced molecular techniques fluorocarbon with super weatherability, temperature resistance, chemical corrosion. Its double-layer structure, lined with 40mm thick insulation material, make enclosure with excellent thermal insulation performance. Equipped with automatic fan & dehumidifiers for each chamber, the operation environment of the substation is close to environment on spot, which meet the requirements on the environment.

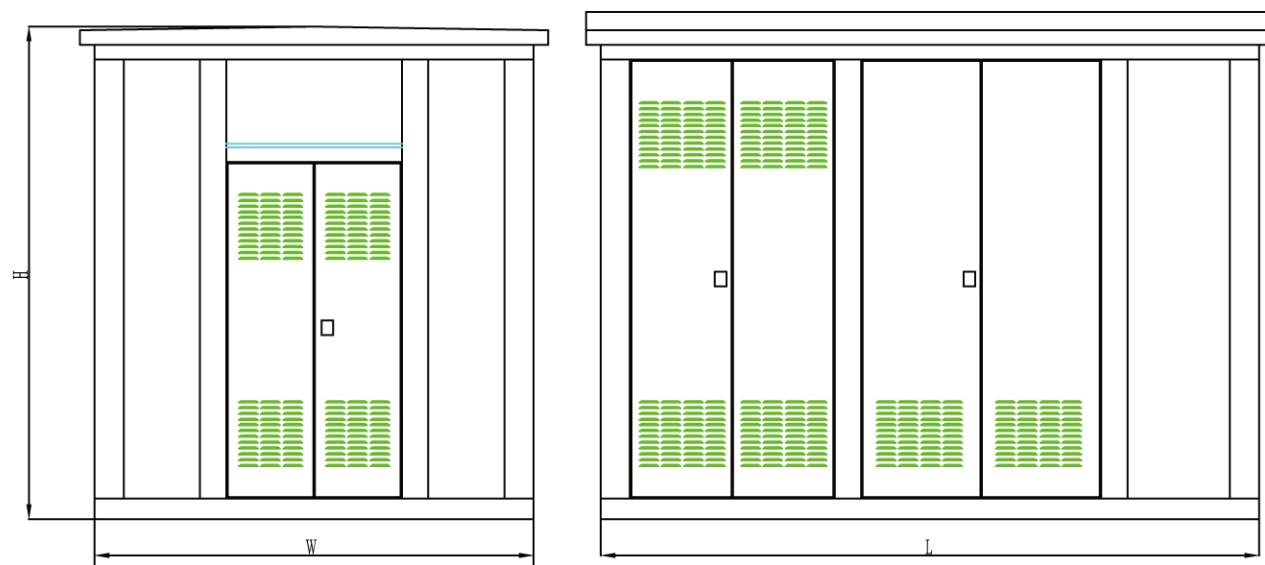
Performance characteristics:

- A. Energy-saving: its no-load loss and load loss lower than similar products, to maximize the protection of the full use of wind energy.
- B. Safe: reliable protection of personal safety, application of anti-theft box structure.
- C. High temperature resistance: good over-load capability.
- D. Equipped with multi protection device in order to disconnect from power grid or wind power generator in case of fault.

型号说明 Model Coding



结构图 Structure Chart



外形尺寸为：长(L)X宽(W)X高(H)根据用户配置而定

Dimensions: length (L) X width (W) X high (H) based on user configuration

正常使用环境条件

- 1.海拔不超过2000m;
- 2.环境温度：上限+45℃，下限-40℃；
- 3.户外风速不超过35m/s；
- 4.相对湿度：日平均值不大于95%，月平均值不大于90%；
- 5.地震烈度不超过8级；
- 6.安装在没有火灾、爆炸危险和严重污秽、化学腐蚀的场所；
- 7.特殊使用条件：当上述正常使用条件不能满足时，公司将与用户协商最大限度满足要求。

Environmental conditions of normal operation

- 1.Installation: ≤ 2000m a.b.s.l;
- 2.Ambient temperature: upper limit +45 degrees; lower limit -40 degrees;
- 3.Outdoor wind speed not exceed 35m / s
- 4.Relative humidity: daily average not more than 95%, the monthly average not more than 90%;
- 5.Seismic intensity: ≤ 8 degrees;
- 6.Installed in the absence of fire, explosion and serious risk of filth, chemical corrosion;
- 7.Special conditions of application: When the above conditions can not be satisfied, user requirements could be negotiated between QRE and user.

变电站性能参数

Key technical parameters

性能参数见下表

Performance parameters refer to below table

高压单元 HV Unit		
项目 Item	单位 Unit	参数 Value
额定频率 Rated frequency	Hz	50
额定电压 Rated voltage	kV	35
最高工作电压 Rated working voltage	kV	40.5
额定电流 Rated current	A	400,630,1250
转移电流 Transferring current	A	1200 ~ 20000
短时耐受电流 Short time withstanding current	kA	12.5/16/20(2s or 4s)
峰值耐受电流 Peak withstanding current	kA	31.5,40,50
工频耐受电压对地和相间/隔离断口 Power frequency withstanding voltage to earth and inter-phase/isolating points	kV	95/118
雷电冲击耐受电压对地和相间/隔离断口 Lightning impulse withstanding voltage to earth and inter-phase/isolating points	kV	185/215
额定短路开断电流（限流熔断器） Rated short circuit breaking current (Current-limit fuse)	kA	31.5

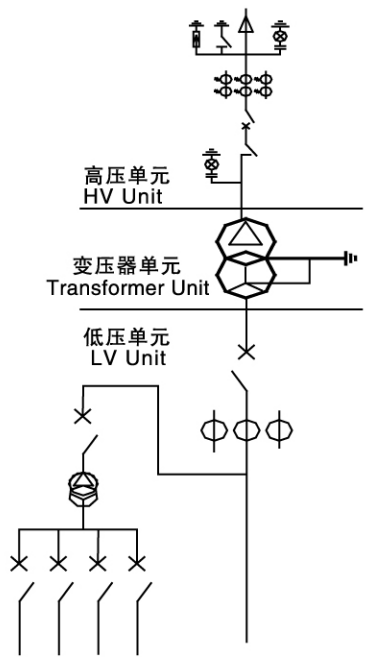
典型一次方案及基础图

Primary proposal and foundation drawing for typical main circuit diagram

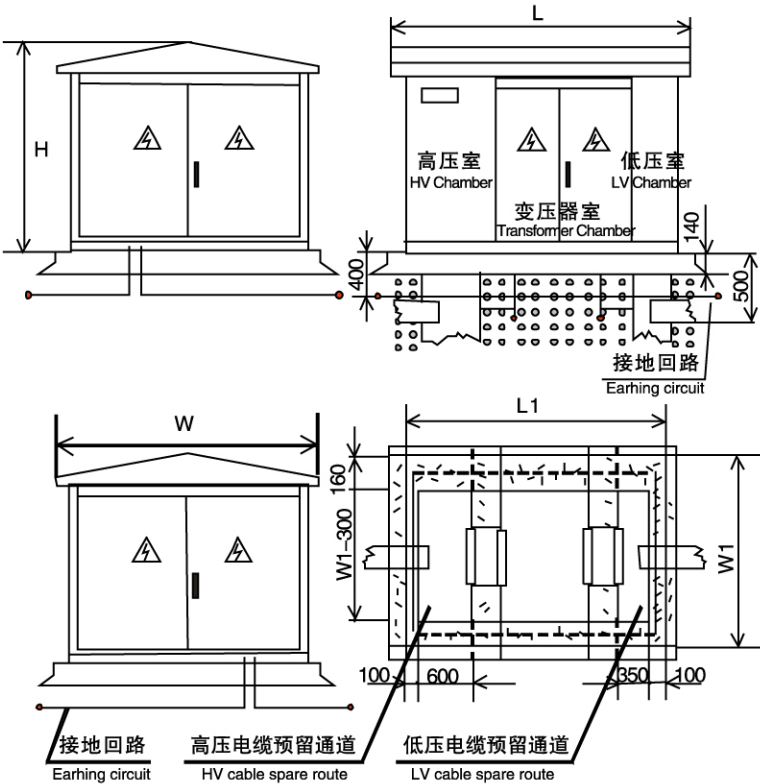
变压器单元 Transformer Unit		
项目 Item	单位 Unit	参数 Value
容量范围 Range of capacity	kVA	根据用户要求 As per client's requirement
联结组标号 Vector group	kV	根据用户要求 As per client's requirement
分接范围 Tapping range	%	± 2X2.5 or ± 5
阻抗电压 Impedance voltage	%	按国标 As per national GB standard
额定工频耐受电压（1min,有效值） Rated power frequency withstanding voltage (1min, r.m.s)	kV	85

低压单元 LV Unit		
项目 Item	单位 Unit	参数 Value
额定电压 Rated voltage	kV	0.69
主回路额定电流 Main circuit rated current	A	800 ~ 2500
主回路额定短时耐受电流(1s) Main circuit rated short circuit withstanding current (1s)	kA	15,30,50,65
主回路额定峰值耐受电流 Main circuit rated peak withstanding current	kA	30,63,110

外壳 Enclosure		
项目 Item	单位 Unit	参数 Value
防护等级 Protection grade		高压室IP54,变压器室IP34 HV Chamber: IP54, Transformer Chamber: IP34
声级水平 Noise level	dB	≤55
温升等级 Temperature rise level	K	10K(自然通风) 10K (natural cooling)



一次方案图
Primary Proposal



基础图的长、宽、高根据用户订货而定。

接地网安装要求:

- 1. 接地体埋设深度不小于0.6米;
- 2. 接地体双面焊接,焊口涂防锈漆;
- 3. 接地网电阻测试必须小于4欧姆;
- 4. 整机采用三相五线制.

Length, width and height of the foundation are according to order requirement.

Installation requirements of ground grid:

- 1. Grounding burial depth not less than 0.6 m;
- 2. Grounding part should be double-side welded, welded joints coated anti-rust paint;
- 3. Grounding resistance test must be less than 4 ohms;
- 4. Applies three-phase five-wire system.

2. 预装式风能变符合下列标准:

- GB1094.2-1996 《电力变压器第二部分 温升》
- GB3906-2006 《3.6kV ~ 40.5kV交流金属封闭开关设备和控制设备》
- GB/T14048.1-2006 《低压开关设备和控制设备 总则》
- GB/T17467-1998 《高压/低压预装式变电站的技术要求》
- DL/T537 2002 《高压/低压预装式变电站选用导则》

Applied standards for Prefabricated Wind Power Substation:

- GB1094.2-1996 Power transformer Part 2: Temperature rise
- GB3906-2006 3.6kV~40.5kV AC Metal-enclosed Switchgear Equipment & Control Equipment
- GB/T14048.1-2006 Low-voltage switchgear and control equipment - General
- GB/T17467-1998 Technical requirements of High / low voltage prefabricated substation
- DL/T537 2002 Guidelines for selection of High / low voltage prefabricated substation

产品应用领域

中国风力等新能源发电行业的发展前景十分广阔，预计未来很长一段时间都将保持高速发展，同时盈利能力也将随着技术的逐渐成熟稳步提升。随着中国风电装机的国产化和发电的规模化，风电成本可望再降。因此风电开始成为越来越多投资者的逐金之地。风电场建设、并网发电、风电设备制造等领域成为投资热点，市场前景看好，因此作为风力发电系统的最佳配套产品也将成为市场的一大亮点。因此风力变压器广范用于沿海荒郊野外、草原、沙漠的风电场所。



Applications

China's wind energy and other new energy industry have a bright future and the future is expected to be a long period with high-speed development. As China's wind power installed capacity and the large-scale power generation, wind power costs are expected to be lower and lower. Wind power station construction, network of power generation, wind power equipment manufacturing have been the hot investment with market prospects, so wind power generation system will also become a major highlight of the market. Wind power transformer are widely used in coastal, grassland, desert wind power sites.



服务承诺

- 1.及时向顾客提供按合同规定的全部技术资料 and 图纸。有义务在必要时邀请顾客参与供方的技术设计审查。
- 2.按顾客要求的时间到现场进行技术服务，指导顾客按供方的技术资料 and 图纸要求进行安装、调试与整套试运及试生产。
- 3.对于顾客选购的与合同设备有关的配套设备，我方主动提供满足设备接口要求的技术条件和资料。
- 4.严格执行供需双方就有关问题召开会议 的纪要或签订的协议。
- 5.按合同规定为顾客举办有关设备安装、调试、使用、维护技术的业务培训班。
- 6.加强售前、售中、售后服务，把“24小时服务”、“超前服务”、“全过程服务”、“终身服务”贯彻在产品制造、安装、调试、修理的全过程。
- 7.随时满足顾客对备品备件的要求。

Service Guarantee

- 1.To provide all technical information and drawings as per contract promptly. QRE is oblided to invite client, if neccessary, to attend technical design review.
- 2.To carry out spot technical service as per client's sche-dule, offer guideness for installation and commission-ing according to technical information and drawings.
- 3.For relevant auxiliary equipment procured by customers, QRE will provide related technical information to meet requirement of equipment interface.
- 4.To execute stipulations in MOU or agreement signed by seller and buyer strictly.
- 5.To train staff from client for equipment installation, commissioning, application, maintenance as stipulated in the contract.
- 6.To reinforce pre-sales, mid-sales, after-sales service, to carry out “24-hour service”, “service in advance”, “overall process service”, “lifelong service” in our manufacturing, installation, commissioning and main-tance.
- 7.To meet spare parts'requirement by customers at any time.

■ 尊敬的 用户朋友,如果您有服务需求,可以发送Email给我们,或者直接电话与我们联系:
用户服务中心:0571-82583638, 0571-82583088, 0571-82583928
传 真: 0571-82583618, 0571-82582309

Dear clients, if there is any enquiry or requirement, please feel free to send email: intl@qre.com.cn
or make phone call directly to service center:
+86-571-82583638, 82583088, 82583928
Fax:+86-571-82583618, 82582309

订货需知

- A.风电变电站的一次系统图。
- B.变压器性能水平数据。
- C.系统保护功能要求。
- D.二次系统预留接口要求。
- E.当地气候条件资料。
- F.壳体材料要求及颜色。
- G.其它要求。

Order Instructions

- A.Primary drawings of wind power substation system.
- B.Performance level data of transformer.
- C.Functional requirements of system protection.
- D.Second system interface requirements reserved.
- E.Information on local weather conditions.
- F.Enclosure material and color requirements.
- G.Other requirements.