FDSL 系列小型风力发电机
用户安装使用手册
FDSL series small wind generators User installation manual
致用户

首先我们感谢您购买、使用我公司生产的小型风力发电机，并为能向您提供产品和服务而感到自豪。

我们建议您在安装、使用 FDSL 系列小型风力发电机前，详细阅读本《用户安装使用手册》，以保证您更加熟悉产品、并进行正确地安装、连接及使用。

请妥善保管本《用户安装使用手册》以备将来查阅。

To consumer

Firstly, we are thankful for your purchasing, using our products -the small wind generators, and we are proud of being able to provide you with the products and services.

Read this "user installation and use handbook." carefully before you install or use the product.

Please keep this "user installation using manual" properly for future reference.

This handbook is based on GB/T19068.1-2003"from the nets type WTG part 1: technical conditions", GB9969.1-1998 "industrial product manuals general "and T5995-1992 "JB/industrial product manuals electromechanical products instructions written provisions of relevant requirements."
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SLM 型水平轴小型风力发电机用户安装使用手册

1  产品组成、特点和用途

FDSL 系列小型风力发电机是一种水平轴风力发电机，主要由风叶、永磁式发电机、集
流转向装置、尾翼连杆和尾翼、整流桥、控制器、逆变器等部分组成，适合在风力资源较好、
市电保证不便的地区或场合使用，如海岛、边防哨所、牧场、农场、通讯基站、风光互补、
野外作业等，根据风力资源的情况可以部分或完全取代市电，满足在其额定输出功率范围内
各种用电器的用电要求，具有工作噪声低、使用免维护、可靠性高、安装架设方便、工作寿
命长等特点。

2  产品规格

FDSL 系列小型风力发电机共有 3 种规格，分别是 FDSL1.0-200、FDSL1.2-300、
FDSL1.5-400，以 FDSL1.0-200 小型风力发电机为例，规格符号表示该小型风力发电机为风
轮直径为 1.0m、额定输出功率为 200W 的水平轴风力发电机。其余规格的表示意义类似。

3  产品的使用环境

请在以下环境条件中使用 FDSL 系列小型风力发电机：

1） 温度：风力发电机为-25~+45℃、控制器为-10~+45℃、逆变器为 0~+40℃

2） 湿度：风力发电机为≤90%、控制器和逆变器为≤80%

3） 海拔高度：≤4500m（额定工况海拔高度为 1000m）

4） 最大风速：≤35m/s，瞬间最大风速≤50m/s

5） 风力发电机安装高度：4.5~6m
1 the product composition, characteristics and uses
FD series small wind-driven generator is a horizontal axis wind-driven generator, mainly by wind turbines, analyzed. combined generators, collecting steering device, connecting empennage and tail, rectifier bridge, controller, inverter components, suitable for regions with sufficient wind resources, poor electricity regions, such as island, border posts, pasture, farm, communication station, the scenery complementary, outdoor work and so on, It can partly or completely replace the utility power according to the wind resources situation, it can meet the requirement of all the electric equipment in the range of its rated output power, It has low noise and need free maintenance, besides, it is of high reliability, convenience and long, working life etc.

2 product specification
There are three kinds of specifications for the small wind generators of FDSL series, respectively is FDSL1.0-200, FDSL1.2-300, FDSL1.5-400, Take the FDSL1.0-200 small wind generators for example, specifications symbols show its is a horizontal axis wind-driven generator, with its diameter is 1.0 m, rated power output is 200w. The remaining specifications show the similar meaning.

3 Product use environment
Please use the FDSL series small wind generators in the following environmental conditions:
1) temperature: wind generators - 25 ~ + 45 °C, controller - 10 ~ + 45 °C, inverter is 0 ~ + 40 °C
2) Humidity: wind generator is more than 90%, controller and inverter are more than 80%
3) Altitude: acuities 4500m (rated conditions for altitude 1000m)
4) The maximum wind speed: more than 35m/s, instant maximum wind speed: more than 50m/s
5) wind-driven generator installation height: 4.5 ~ 6m
4 工作原理

FDSL 系列风力发电机的工作原理是风叶在风力作用下旋转，将风的动能转变为风叶轴旋转的机械能，发电机在风叶轴的带动下旋转发电，整流器将发电机产生的交流电转化成直流电，并通过集流转向装置和连接电缆将电能传递到发电控制器，尾翼在风力作用下通过集流转向装置使风力发电机偏航，保证风叶始终正对风的来向，从而最大限度地利用风能。发电控制器的主要作用是控制和显示风力发电机对蓄电池的充电状态，当风力达到切入风速、发电机产生的电压和电流达到蓄电池的充电要求时，形成稳定的电压和电流输出，进而向蓄电池组充电；而当风力达到切出风速、发电机产生的电压和电流超出蓄电池的充电要求或在蓄电池组已充满时，断开充电电流，形成卸荷，进而保护蓄电池不会过充，同时卸荷后在风力发电机内部形成阻尼，进而降低发电机的转速，保证风力发电机的运行安全。逆变器的主要作用是将风力发电机产生的低压直流电和蓄电池组贮存的电能转化成 220V/50Hz 的交流电，进而满足各种用电器的使用要求。

4 Working principle

The wind turbine rotates in the wind, converting the wind kinetic into mechanical energy. The wind turbine axis, driven by the rotation of wind turbine, the electricity generator will be started. the rectifier will switch ac to dc, and transfer the electricity to power generating controller through collecting steering device and connection cables. The rear makes the wind generator yaws through the collecting steering device in the wind, this can guarantee the wind turbine is always to the wind, thus we can use the wind power fully. The main function of the generating controller is to control and display battery charging status of the wind generators, when the wind reaches cut-in speed, generator produces the voltage and current that reach the battery charging requirement then produce a stable output voltage and current, and then charging the storage battery. when the wind speed is close to the cut-out speed or the generator produces more voltage and current than battery recharging requirements or the battery is filled, then the charging current will be disconnected to avoid being overcharged. At the same time the damping is formed within the wind generators after unloading, which reduces the generator speed and ensure the safety operation of the wind generator. Inverter's main function is to transform low voltage dc generated by wind generator and storage battery power into 220V / 50Hz alternating currents, and then meet various appliances the use requirement.
# 5 水平风力发电机装箱清单

Horizontal wind generators packing list

箱内物品至少应包括以下内容：Cabinet items shall at least include the following content:

<table>
<thead>
<tr>
<th>名称</th>
<th>数量</th>
<th>说明</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind-driven generator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wind turbine</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Former cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Empennage</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Connecting rod</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Former cover retaining screw</td>
<td>3</td>
<td>Self-tapping screws GB/T845-1985 ST4.8×3</td>
</tr>
<tr>
<td>Wind turbine fixed bolts and nuts</td>
<td>12</td>
<td>GB/T5781-2000 M5×35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Including the instruction for use (options)</td>
</tr>
<tr>
<td>Empennage fixed bolts and nuts</td>
<td>2</td>
<td>GB/T95-1985 2</td>
</tr>
<tr>
<td>Controller</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Product certification</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>User installation manual</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
6 水平轴风力发电机安装步骤
Installation steps

1) 用支撑物将连接好的立杆支起，使立杆上端距地面约 1.3m 左右。
Put up the upright tube with a propping, to make the upright tube about 1.3 m or so from the ground.

2) 从包装箱内依次取出风叶、尾翼连杆、连接螺栓、控制器、逆变器、前罩和尾翼。
Take out the empennage, empennage connecting rod, connecting bolts, controller, inverter, front cover and tail from the packing-case in turns.

3) 将连接电缆和风机电缆用快速接头接好，根据风机电缆上的正、负极标记，记好连接电缆的正、负极，然后用绝缘胶布将电缆连接处缠好。
Connect the cable and the fan cable with fast connection and remember the positive, negative pole of the cable according to positive, negative pole of the fan cables, then wrap the cable joints with insulating tape.

4) 抬起风机，同时从立杆座处逐渐拉出连接电缆，按图将风机连接轴插入到立杆 4 中，并将连接轴上螺纹孔对准立杆 4 的连接孔，然后上紧 2 个连接螺栓。
Lift the fan, pull out the connecting cables from the upright tube seat gradually at the same time, insert the fan connecting shaft into the upright tube 4 according to the following figure, and aim the threaded hole at the connection hole on the upright tube 4, then tighten the 2 connecting bolts.

5） 按下图将尾翼连杆插入尾翼上的安装孔内并对准连接孔，然后上紧连接螺栓、螺母。Insert the Empennage connecting rod into the mounting hole and aim it at the connection hole according to the following figure, and then tighten the connecting bolt, nut.

按下图将尾翼连杆的另一端插入风机的连接孔内，并对准连接孔，这时注意应使尾翼上有圆孔的部位向下，然后上紧连接螺栓、螺母等。Insert the other Empennage connecting rod into the wind turbine connection hole and aim it at the connection hole according to the following figure, at this time you should be careful to make the parts with circular hole on the empennage downward, and then connect to tighten the downward bolts and nuts.

6） 按下图在风叶安装盘上安装风叶并上紧螺栓、螺母。Install the wind turbine on the installation disk according to the following figure and tighten bolts and nuts.

这时一定注意风叶应按下图安装，切不可装错。Now you should be careful to make sure that you install the parts according to the
following figure, and never to make any mistakes.

7) 按同样的方法将 6 片风叶安装并上紧螺栓、螺母。
Install all the 6 wind turbines and tighten the bolts and nuts in the same way.

8) 按下图安装前罩并上紧 3 个固定螺丝。
Install the Former cover and tighten 3 set screws according to the following figure.

7  接线流程  Wiring process

1. 先连接控制器和蓄电池（在有风的情况下，如果先连接风力发电机和控制器，风力发电机发的电输送到控制器里，但是控制器不能及时把电释放到蓄电池组里，可能会造成控制器内部件零件烧坏）。

   1. Firstly, connect the controller and battery (if connecting wind turbine and controller in the case of wind firstly, the wind turbines conveying the wind into the controller but the controller can not release of electricity to the battery timely, which may cause the internal parts of controller internal burn out).

   2. FD-200W. 300W 小型水平轴风力发电机采用盘式无铁芯三相交流发电机（专利号 ZL200920141922.9）做为功率输出枢纽，风机和控制器连接处不分正负、风机三条引线和控制器任意连接。

   2. FD - 200W. 300W small horizontal axis wind turbines with horizontal axis, using disc coreless three-phase alternator (patent no. ZL200920141922.9) as power output hub, the junction between the fan and the controller both positive and negative, the three fuses of fan and controller can be arbitrary connection.
3. Connect the load, the system completes connection line, and the load can be normal operation.

4. On the basis of different needs of customers, if there is only 2 output line, the rectifier has installed in the generators. Specifically agreed: the red line represents the positive "+'", black line represents the negative "-'".

8  使用注意事项  the notices during the use

1) Controller and inverter should be used under the conditions of -10°C ~+45°C, 0°C ~+40°C, the relative humidity should be less than 80%. we should stop using the inverter and the controller when the temperature reached 40°C.

2) We should prevent any conductive object from accessing the controller, inverter, batteries as they all have bare terminals.

3) Tell the children and relevant personnel not to contact and play with the controller, inverter, batteries to avoid the occurrence of electric shock accidents and damage to equipment.

4) The environment around the controller, inverter, battery should be well ventilated and dry. Do not make the controller, inverter, battery exposure to rain, snow, fog directly. Do not wipe them with wet cloth.

5) The power of the Electrical equipment connected with the inverter should not be larger than the rated power of the wind generator. Turn off the air switch before connecting the Electrical equipment then turn off the output.
switch of the inverter.

6) 注意如用电设备的功率过大，将可能使设备和电缆过热，产生火灾。
   The equipment and cable may be overheating and result in the outbreak of fire if the power
   of the electrical equipment is too high.

7) 当发现风力太大或预知将出现 10 级以上大风时，请用带绳子的铁钩钩住尾翼上的圆孔，将
   风机拉扯到与风向垂直的方向并固定好绳索，同时避免人员在风机附近活动。
   Use the iron hook with ropes to hook on to the round hole on the rear wing, move the fan to
   the direction vertical to the direction of the wind, fasten the ropes and avoid walking
   around the fan when you find the wind is too strong or predict that winds level may be
   above 10.

8) 如控制器出现故障或在控制器送修过程中，应避免将风机的输出线长时间处于短路或断路
   状态，这时可在输出线间连接 1 个承受功率 1000W 左右、3Ω 的功率电阻，也可先将风机的
   输出线直接接在逆变器的输入端上。The output lines of the fan should avoid being in short
   circuit or open circuit status for a long time if the controller break down or it is being
   repaired, you can connect a resistance of 100w、3Ω between the output line or connect the
   output line with the output terminal of the inverter at first.

9) 使用中应特别注意避免蓄电池短路，否则将损坏蓄电池，还可能产生火灾等严重后果。
   Especially you should be careful to avoid the state of short-circuit, otherwise it will do harm
   to the battery, and result in the outbreak of fire or other serious consequences.

9 特别提示 Special reminding

不要自行拆卸、维修风力发电机、控制器、逆变器，否则将丧失它们的保修条件。
Do not disassemble, maintain the wind generators, controller, inverter, otherwise you will
lose their warranty conditions.

不要将本手册叙述的风力发电机和设备用于医院的生命保障系统。
Don't use the wind generator and equipment referenced in this manual in hospital life
safeguard system.
<table>
<thead>
<tr>
<th>故障现象</th>
<th>故障的可能原因</th>
<th>故障的排除方法和步骤</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind reaches more than 4 class, but the wind turbine run slowly, controller charging indicator does not shine</td>
<td>1.风机的两条输出线短路&lt;br&gt;2.发电机内部出现故障</td>
<td>1.查看控制器上风机的连接端子是否出现短路，如短路则重新连接&lt;br&gt;2.若连接端子不短路或重新连接后故障仍然存在，则将输出线的两端短路，观察风叶转动是否变慢，如变慢则需更换发电机；如风叶依然转得很快，用万用表测量输出线两端间的电阻，如没有电阻或电阻很小，则说明连接电缆的内部出现短路，这时应查找断路部位并予以排除。</td>
</tr>
<tr>
<td>The wind is not strong enough, but the wind turbine run quickly, controller charging indicator does not shine</td>
<td>1.风机的两条输出线断路&lt;br&gt;2.发电机内部出现故障</td>
<td>1.查看控制器上风机的连接端子是否已断开，如断开则重新连接。&lt;br&gt;2.若连接端子连接良好或重新连接后故障仍然存在，则将输出线的两端短路，观察风叶转动是否变慢，如变慢则需更换发电机；如风叶依然转得很快，用万用表测量输出线两端间的电阻，如没有电阻或电阻很小，则说明连接电缆的内部出现短路，这时应查找断路部位并予以排除。</td>
</tr>
</tbody>
</table>

Change the generator if all the above checking is ok
<table>
<thead>
<tr>
<th>风叶转起来抖动</th>
<th>风叶的固定螺栓松动</th>
<th>放倒立杆，重新紧固螺栓</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wind turbine shakes when it is running</td>
<td>the fixed bolts of the wind turbine are loose</td>
<td>Put down the upright tubes, then fasten the bolts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>风叶转起正常，但不能向蓄电池充电</th>
<th>风机的控制器保险丝烧断</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind turbine runs normally, but can not charge the battery</td>
<td>the fuse of the controller is burnout</td>
</tr>
</tbody>
</table>

1、控制器保险丝烧断 the fuse of the controller is burnout
2、控制器已烧坏 The controller is broken
3、发电机内部出现故障 internal malfunction of the Generator

1、先从控制器上拆下风机输出线，从控制器后面板上拔下保险丝罩，然后再拔下保险丝，检查保险丝是否断开，如已断开则更换保险丝。Pull out the output wire from the controller, pull out the fuse cover from the rear panel of the controller, then pull out the fuse and check whether it is broken. Change the fuse if the fuse is broken.
2、如更换保险丝、重新在控制器上连接风机输出线后故障仍然存在，则再断开风机输出线，用万用表测量两线间的电压，如电压正常，则需更换或维修控制器；如没有电压，则需更换或维修发电机。If the fault still exists after changing the fuse, reconnecting the output wire, then cut off the output wire of the wind turbine, then measure the voltage with multimeter. Change or repair the controller if the voltage is normal, Change or repair the generator if there is no voltage.

### 11 定期检查 Regular inspection

1）检查拉索和立杆 Examine the stay rope and upright stem
通过晃动立杆的拉索，检查其是否松动，如感觉比较松，则旋紧螺旋扣使拉索有足够的张紧力。用目测或吊锤法检查立杆是否处于垂直状态，如出现倾斜，则先稍微放松倾斜方向上拉索的螺旋扣，旋紧相反方向上拉索的螺旋扣，使立杆处于垂直状态，之后再同时旋紧全部拉索的螺旋扣。这样的检查在立杆竖装后的头3天之内每天检查1次，以后每月检查1次。在经历大风后，应马上进行此项检查。Shake the stay rope of the upright stem to see whether it is loose or not. Tighten the turnbuckle to make the stay rope tensed if the stay rope is loose. Examine whether the upright stem is vertical by the way of visual inspection or using a drop-hammer, loose the turnbuckle of the stay rope slightly at first if the upright stem is tilted, tighten the turnbuckle of the stay rope in the opposite direction to keep the upright stem vertical, then tighten all of the turnbuckle of the stay rope. Do the examination 1 time a day in the 3 days after the upright stem is held up, 1 time a month in the following day. Do the examination immediately after a strong wind.

2）检查立杆和拉索的锈蚀情况
Examine the corrosion of the stay rope and upright stem
用目视的方法检查立杆和立杆间连接螺栓、以及拉索的钢丝、绳夹、螺旋扣的锈蚀情况。此项检查每年至少进行1次，使用5年后每年至少检查2次。当发现上述部位出现比较严重的
锈蚀后，应及时更换已锈蚀的部件。Examine the corrosion level of the upright stem, the connecting bolts and the Wire, rope clamps, turnbuckle of the stay rope. Do the examination 1 time a year at least, 2 times every year after using it for 5 years. Change the component that is of serious corrosion.

3）检查风力发电机的工作情况
Examine the working condition of the wind generator
在有风时，观察风力发电机叶片的转动是否随风力大小的变化而及时产生变化，同时观察风力发电机是否随风向的变化而及时作出调整。此项检查每月至少进行 1 次，在经历大风后，应马上进行此项检查，发现问题后请及时和生产厂家取得联系。Examine the wind turbine to make sure whether it changes its running when the wind changes its direction or the wind is weak or strong. Do the examination 1 time a month at least. Do the examination immediately after a strong wind. Contact us if you meet with any problems.

4）检查电气线路 Check the electric circuit
每半年检查1次电气线路，重点检查线路连接点是否牢固、连接端子有无松动。
Check the electric circuit twice a year, especially examine whether the connection points and the connection terminals are loose or not.

4）检查蓄电池 examine the battery
按照蓄电池使用说明书的要求定期检查并维护蓄电池。Examine and maintain the battery according to the instruction book.

12 特别声明 special declaration
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<table>
<thead>
<tr>
<th>风级</th>
<th>名称</th>
<th>风速范围 (m/s)</th>
<th>平均风速 (m/s)</th>
<th>地面物象</th>
<th>海面波浪</th>
<th>浪高 (m)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>无风</td>
<td>0.0~0.2</td>
<td>0.1</td>
<td>烟直上 no wind</td>
<td>海面平静 no waves</td>
<td>0.01</td>
</tr>
<tr>
<td>1</td>
<td>轻风</td>
<td>0.3~1.5</td>
<td>0.9</td>
<td>烟示风向 Smoke shows the wind</td>
<td>微波、峰顶无沫 Gentle waves, no foam</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>轻风</td>
<td>1.6~3.3</td>
<td>2.5</td>
<td>感觉有风 feel the wind</td>
<td>小波、峰顶有沫 Small waves, foam</td>
<td>0.2</td>
</tr>
<tr>
<td>3</td>
<td>微风</td>
<td>3.4~5.4</td>
<td>4.4</td>
<td>旗帜展开 flag unfold</td>
<td>小波、峰顶破裂 small waves, Peak rupture</td>
<td>0.6</td>
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<tr>
<td>4</td>
<td>和风</td>
<td>5.5~7.9</td>
<td>6.7</td>
<td>尘土吹起 wind with Dust</td>
<td>小浪、波峰白沫 Small Swell, white foam</td>
<td>1.0</td>
</tr>
<tr>
<td>5</td>
<td>劲风</td>
<td>8.0~10.7</td>
<td>9.4</td>
<td>小树摇摆 The tree swings</td>
<td>中浪、峰群折沫 medium swell, many foam</td>
<td>2.0</td>
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<td>6</td>
<td>强风</td>
<td>10.8~13.8</td>
<td>12.3</td>
<td>电线有声 wire make a noise</td>
<td>大浪、多个飞沫 huge swell, fling foam</td>
<td>3.0</td>
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<tr>
<td>7</td>
<td>疾风</td>
<td>13.9~17.1</td>
<td>15.5</td>
<td>步行困难 Hard to walk</td>
<td>破峰白沫成条 white foam in line</td>
<td>4.1</td>
</tr>
<tr>
<td>8</td>
<td>大风</td>
<td>17.2~20.7</td>
<td>19.0</td>
<td>折毁树枝 Branches damage</td>
<td>浪长高、有浪花 high waves,</td>
<td>5.5</td>
</tr>
<tr>
<td>9</td>
<td>烈风</td>
<td>20.8~24.4</td>
<td>22.6</td>
<td>房屋小损 house damage</td>
<td>浪峰倒卷 Crest rewind</td>
<td>7.0</td>
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<tr>
<td>10</td>
<td>狂风</td>
<td>24.5~28.4</td>
<td>26.5</td>
<td>树木拔起 Trees uprooted</td>
<td>浪峰翻滚咆哮 tumbling roaring of the crest</td>
<td>9.0</td>
</tr>
<tr>
<td>11</td>
<td>暴风</td>
<td>28.5~32.6</td>
<td>30.6</td>
<td>毁损普遍 Damage is common</td>
<td>波峰全呈飞沫 Peaks are all droplets</td>
<td>11.5</td>
</tr>
<tr>
<td>12</td>
<td>飓风</td>
<td>32.7~37.0</td>
<td>34.7</td>
<td>摧毁巨大 huge Destroy</td>
<td>海浪滔天 Waves monstrous</td>
<td>14.0</td>
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