

**T4-48V SMALL WIND TURBINES**

**Operation Manual**

**GRADE-AAA**

**\*\*Please read the manual carefully before using \*\***



### 1. The aim of Application

Use wind energy to generate electricity and charge into storage battery group. Through the multi-voltages power supply system, the electricity can be changed into DC and AC used for illumination, home appliances, communication devices and electric tools.

### 2. Structure and Main technical performances

The unit is mainly composed of blades rotor, rotor, permanent magnet generator, tail vane, tower, on grid controller with dump load, grid tie inverter. (See fig.1).

#### Main technical performances:

Rotor Diameter (m)	3.2
Material of the blades & Number of blades	FRB 3PCs
Rated power (w)	4000
Rated rotate speed (r/min)	400
Rated wind speed (m/s)	10
Starting wind speed (m/s)	3
Working wind speed (m/s)	3 –30
Survived wind speed	50
Working voltage	DC48V
Generator style	Three phase, Permanent magnet A.C
Weight (kg)	80
Speed regulation method	Yaw
Stop method	Auto brake
Matched battery group voltage	48v

### 3. Preparation

3.1 Prepare battery group, pure sine wave inverter, wind turbine tower and necessary cables, installation equipment...etc.

3.2 Battery group rated voltage is 48vdc; Pure sine wave inverter input voltage is 48vdc, output local grid single phrase voltage and frequency; Make sure battery is full charged before assembly.

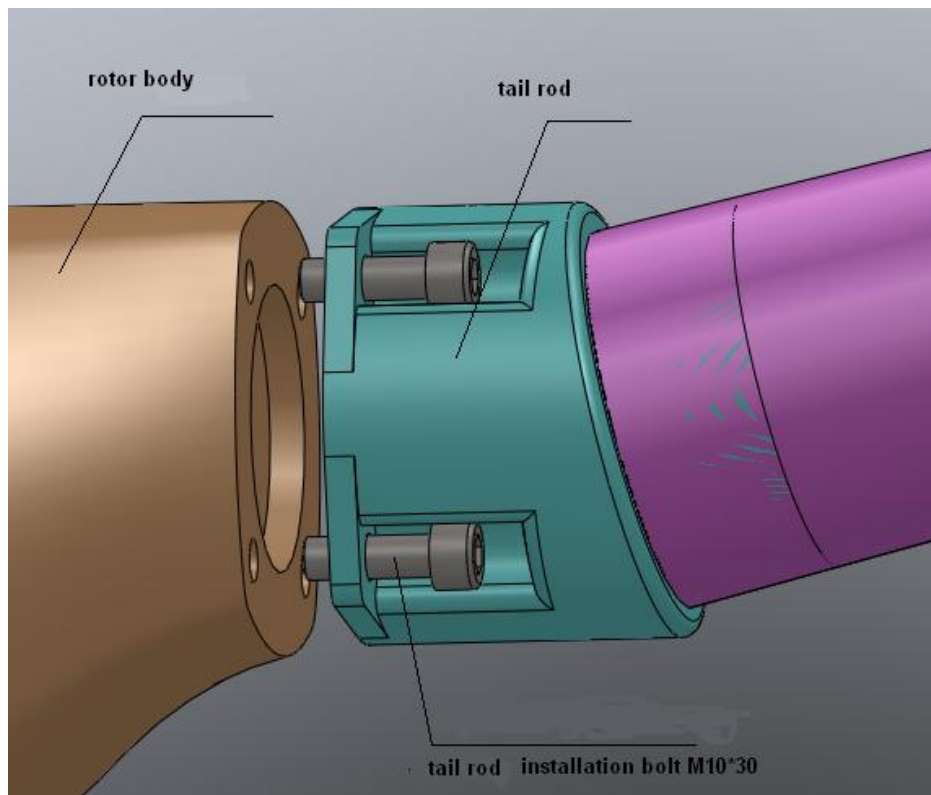
3.3 Check the wind turbine main body, controller parts according to packing list.

3.4 Select an open and flat place without barriers in surroundings for wind turbine installation. In order to avoid circuit power loses, the distance between wind turbine and batteries should be as short as

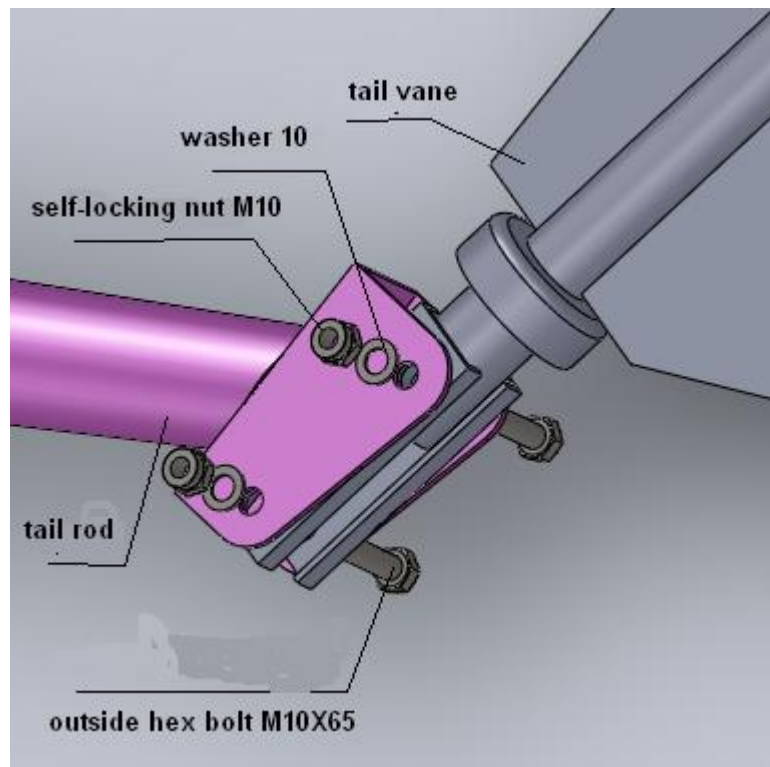
possible, usually it should be less than 30m.

#### 4. Installation procedure

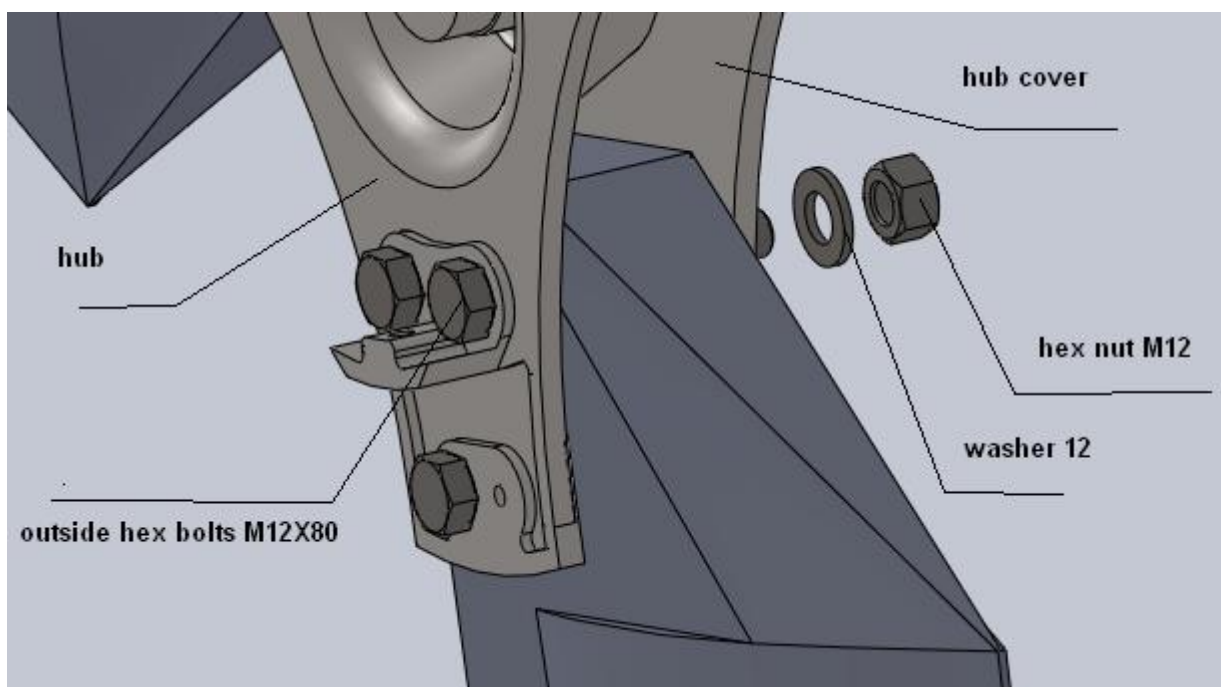
- 4.1 Select a day without wind or wind speed smaller than light breeze.
- 4.2 First insert the electric cable into the tower tube from its bottom end, and pull the cable out from the top of the tube for about 200mm. Then make a temporary knot.
- 4.3 Lift the generator with rotor body, connect the cable which is out from the top end of the tower mast with the connector on the electric transmit slip ring, then set the sleeve of the stand shaft into the top tower mast and fixed them together firmly by four sets of M10 screws, spring washers and nuts.
- 4.4 According to below picture, assemble the tail rod to the rotor body, set the M10 holes correctly, insert the spring washer and screw on the four M10×30 inner hexangular nuts tightly.



- 4.5 Insert the tie-in of tail vane into the trough shape fastener of the tail rod; insert M10X65 screws into the 2- $\phi$ 10 holes correctly; put in washer10, spring washer 10 and M10 self-locked nuts. Adjust the angle between tail rod and the horizontal according to the local wind resources and electricity consumption. Increasing the angle can reduce the running speed of the rotor; decreasing the angle can increase the rotating speed of the rotor. After adjusting, tighten the two self-locked nuts

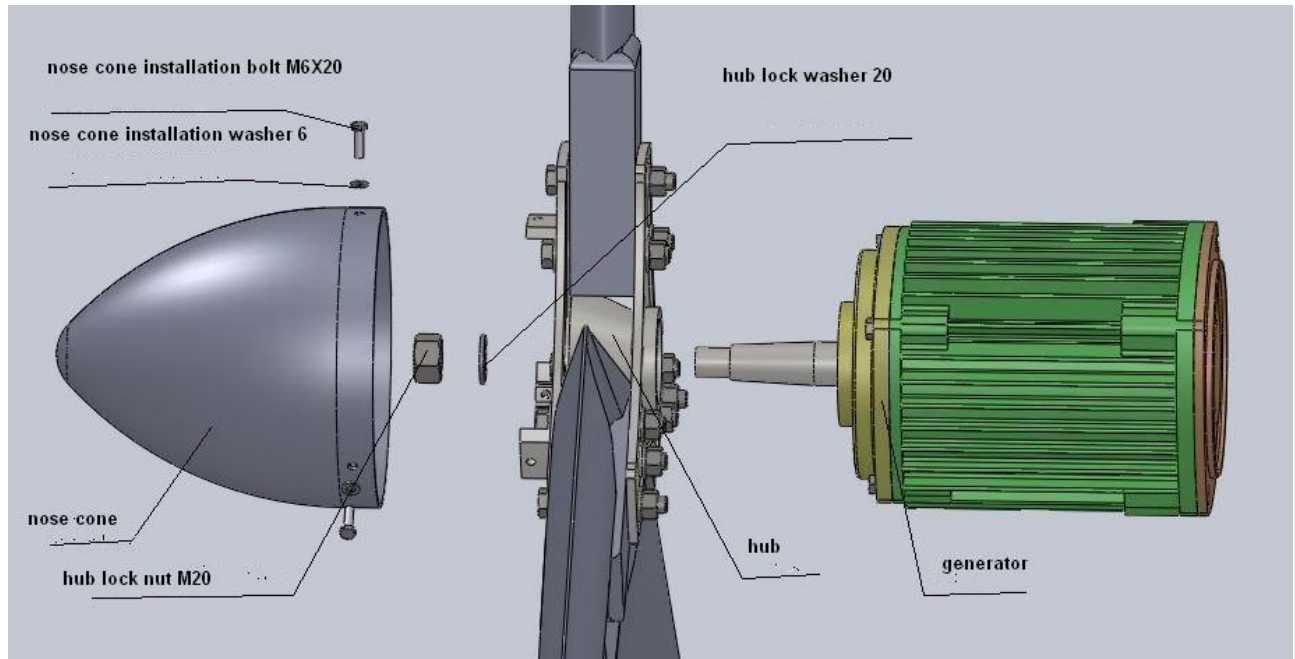


4.6 Before leaving the factory, every blade rotor had been assembled and passed the balance adjustment, for transport, the rotor has been disassembled. When reassembling the rotor, please check the marks on the parts, so as to make them return to the former positions. Then fit the M12×80 screws, washers, and M12 self-locked nuts one by one. Tighten the nuts with a small force first, then measuring the distances between the tip end of blades A, B, C, the distance differences of the three should less than 5mm, then tighten the nuts firmly. The tighten torque should be 30 – 35 N.m



4.7 Mount the rotor on the generator, put on the flat washer, spring washer one by one, and then tighten the self-locked nut firmly.

4.8 Fix the nose cone to the hub of the rotor by screwing on M6 screws, spring washers and flat washers.



4.9 Connect the three phase output wires of the generator to the connectors of the controller with dump load.

## 5. Application notices

### 5.1 Application principles

5.1.1 The wind turbine should be installed in an open and flat area, where no barriers nearby and wind can flow easy.

5.1.3 After passing full wave bridge rectification, the three phase AC electricity generated by wind generator is transit out as DC power, resume charging voltage is  $54 \pm 1V$ , stop charging voltage is  $60 \pm 1V$ .

### 5.2 Safety regulations

5.2.1 The wind generator is not allowed to rotate unloaded continually or running at a very high rotating speed continually.

5.2.2 Checking the tower condition regularly, if there are any loosen phenomenon, it should be tighten in

good time to prevent the wind turbine from falling down.

5.2.3 When the rotor is rotating in a high speed, people are not allowed to stay under the wind turbine.

5.2.4 When wind speed is more than 24 m/s, the wind turbine should be stopped artificially.

5.2.5 When vibration or strange noises are found during the operation, please stop the wind turbine and check.

5.2.6 The power supply line of the wind generator should be arranged independently, it can not be mixed used with other power supply lines.

5.2.8. The "ON & OFF" switches on the controller & inverter box should keep at "ON" position in normal conditions. Only when maintains wind turbine, storm is coming, the switch can be put on "OFF" position. It is not allowed to turn the switch when wind is stronger and rotor is rotating at high speed. Turn the switch to "OFF" position when rotor is rotating slowly.

5.2.9. The controller and inverter should be set on a place which is far from fire or heat resource, ventilate and dry place.

5.3. Keep the rotor in balance and eliminate vibration.

When the blades lost balance caused by outside damage and create strong vibration, the wind generator must be stopped and checked, until the trouble is eliminated. The attached special tools would be useful for disassembling the rotor. Remove the nut and washer from the shaft end of generator first, screw the special tool sleeve onto the hub firmly, and then drive the M16×100 screw into the sleeve, so as to remove the rotor from the shaft of the generator. After repairing, the un-balance torque should less than 0.02N.m.

## **6. The maintenance of the wind generator**

The maintenance of high quality product (AAA)

- a. Exposed parts are made of stainless steel or have been treated by special long time effective rust-protection treatment, so the surfaces of those parts do not need maintenance.
- b. The generator has adopted SKF/NSK bearings and high-grade lithium grease, if there is no special noise, no need maintenance.

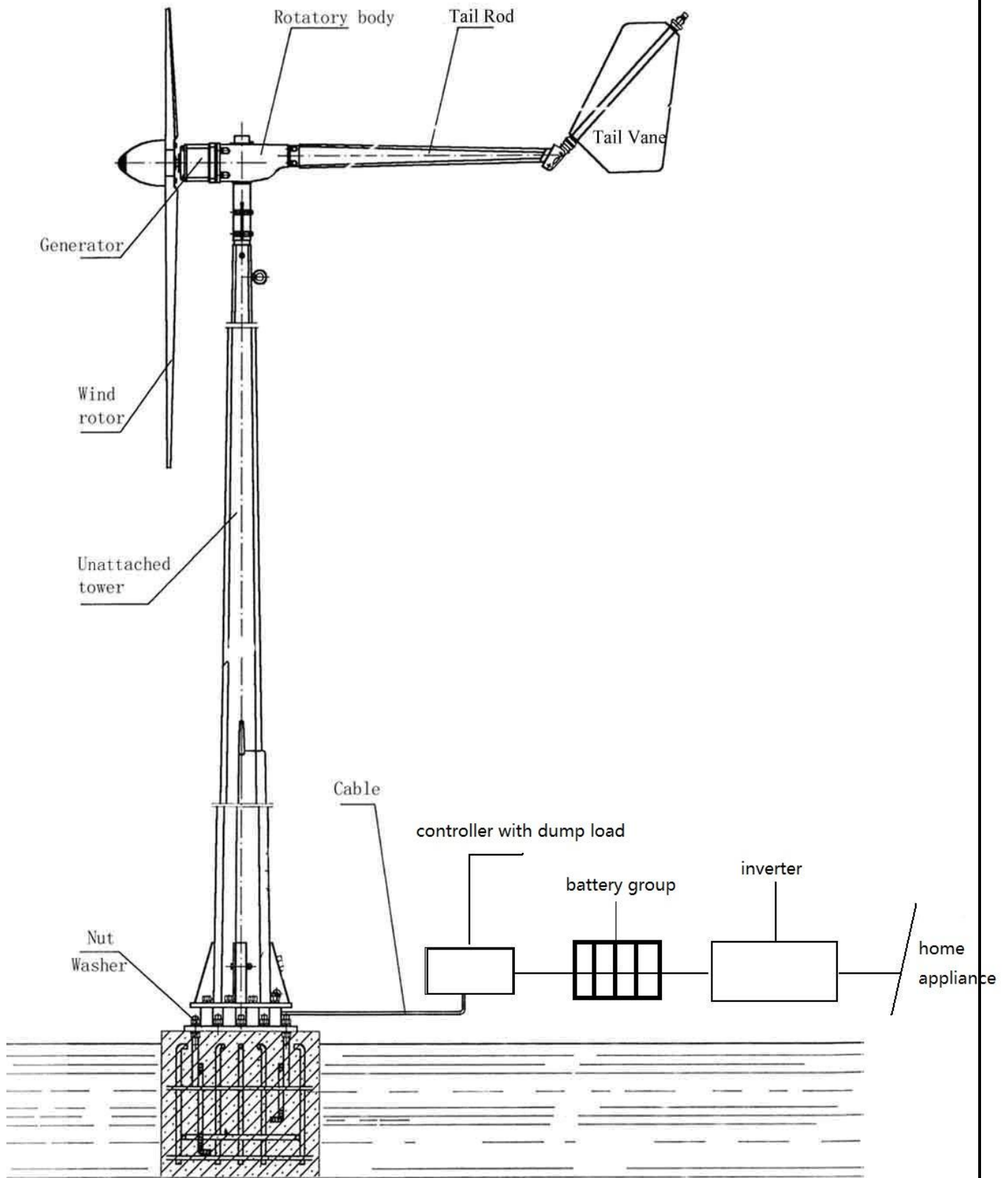
## **7. Elimination of malfunction**

The wind generator is designed and manufactured according to trouble- free and non- maintenance principle, if the installation and operation are correct, the breakdown will not appear in normal conditions. In case of breakdown, please consult the following table.

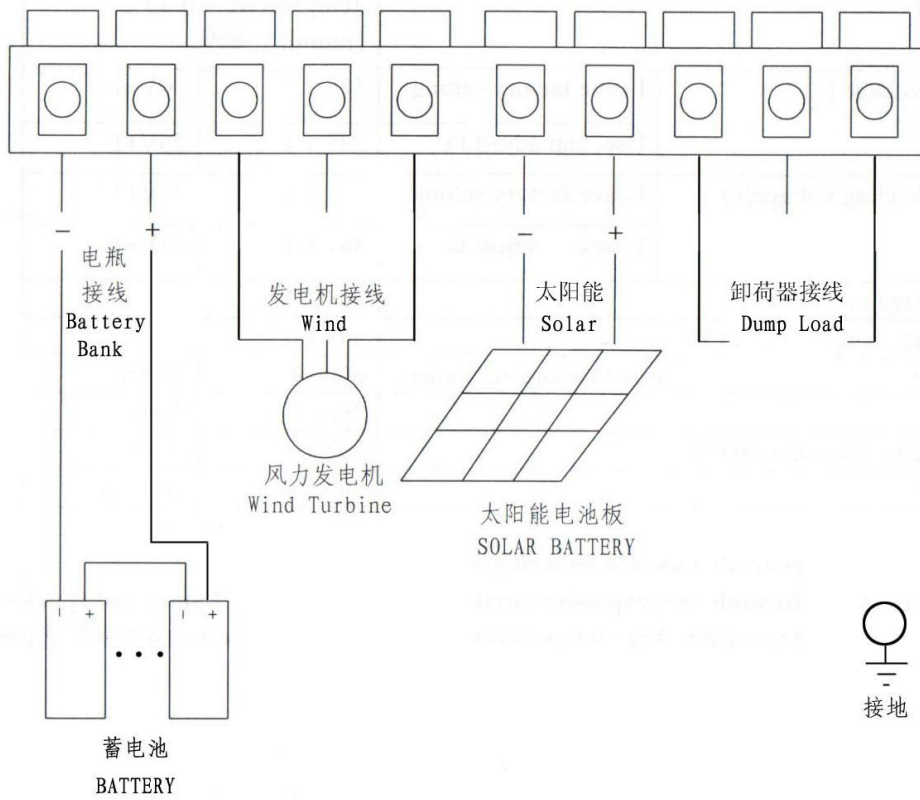
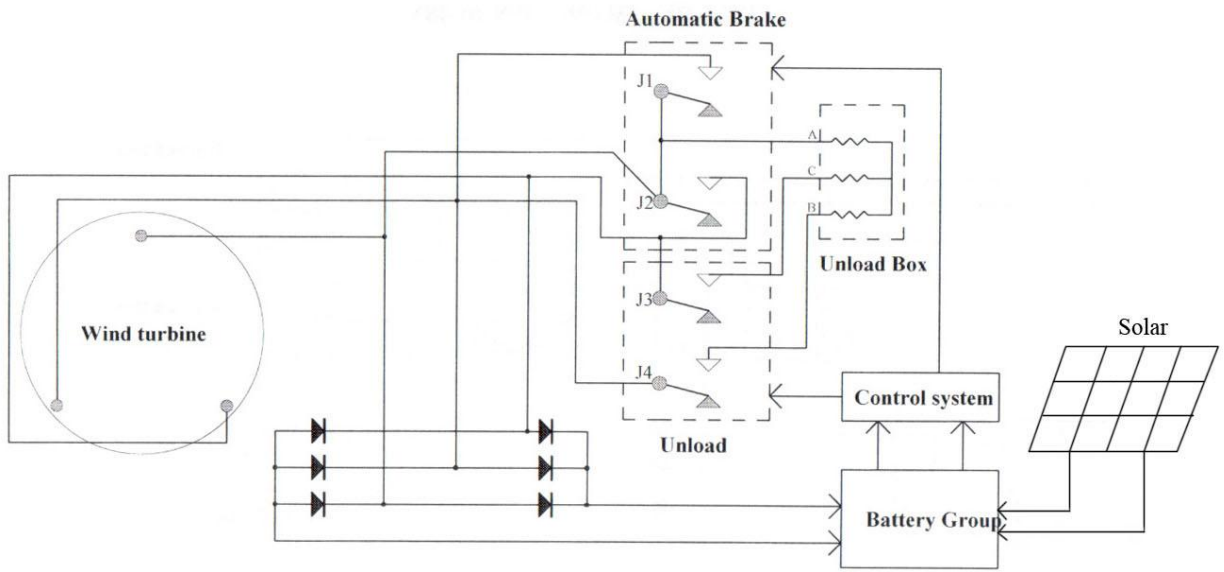
Breakdown	Reason	Eliminating method
Wind generator vibrating strongly	<ol style="list-style-type: none"> <li>1. Guy wire is loose.</li> <li>2. Fixed bolts of blades are loose.</li> <li>3. Blade is damaged by outside force.</li> <li>4. Ices over on the surface of blades, and cause unbalance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the steel wire rope appropriately.</li> <li>2. Tighten the loose parts.</li> <li>3. Replace a new one and adjust the rotor to balance state again.</li> <li>4. Eliminate the attached ices.</li> </ol>
Direction regulating is ineffective	<ol style="list-style-type: none"> <li>1. There is too much greasy filth in the rotating body.</li> <li>2. Rotating part is deformed by outside force.</li> <li>3. The interspaces between vertical shaft and sleeve are too small, or there is no space for axial move.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clear away the dirty filth, and make a lubricating maintenance.</li> <li>2. Recover and correct the deformation.</li> <li>3. Repair and enable the interspaces meet the requirement.</li> </ol>
Unusual noise	<ol style="list-style-type: none"> <li>1. Fixed parts is loose</li> <li>2. Generator bearing is loose from its seat.</li> <li>3. Generator bearing is damaged</li> <li>4. Wind rotor is rubbing with other part.</li> </ol>	<ol style="list-style-type: none"> <li>1. Put the wind turbine down to the ground, check every fixed part, and take measures.</li> <li>2. Find out the loose place, then repair and eliminate the trouble.</li> <li>3. Replace the damaged bearing.</li> <li>4. Check and eliminate the trouble.</li> </ol>
The rotating speed of the wind rotor is reduced obviously	<ol style="list-style-type: none"> <li>1. Blade pitch control is ineffective.</li> <li>2. Stator winding is short –circuit or output circuit is short pass.</li> <li>3. Break disk is rubbing.</li> <li>4. Switch is set at “close” position:</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and eliminate the trouble, then make lubrication and maintenance.</li> <li>2. Find out short circuit position, separate the lines and isolate them...</li> <li>3. Readjust the break gap.</li> <li>4. Set switch at “open” position.</li> </ol>
The output voltage of the generator is low	<ol style="list-style-type: none"> <li>1. The rotating speed of the generator is low.</li> </ol>	<ol style="list-style-type: none"> <li>1. Find out the reason, restoring to normal rotating speed.</li> </ol>

	<ol style="list-style-type: none"> <li>2. Permanent magnet rotor has lost its magnet.</li> <li>3. There is short circuit in three-phase stator winding.</li> <li>4. The conductivity of the connect point between slip ring and output circuit is weak.</li> <li>5. There is short circuit in rectifier.</li> <li>6. Circuit line is too long, or the diameter of wire is too thin.</li> </ol>	<ol style="list-style-type: none"> <li>2. Charge magnet, or change the rotor of generator.</li> <li>3. Find out short circuit position, separate the lines and paint insulating lacquer.</li> <li>4. Clean slip ring and contacting point, so as to reduce resistance.</li> <li>5. Replace.</li> <li>6. Shorten the circuit line or increase the diameter of the wires, so as to reduce circuit electricity loss.</li> </ol>
<p>There are not output electric current in AC circuit of the Generator</p>	<ol style="list-style-type: none"> <li>1. There are circuit break in AC lines of the generator, or the fuse is fused.</li> <li>2. There are circuit break in output line.</li> <li>3. Stator winding is burnt and circuit is broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Find out the reason, and connect the wires.</li> <li>2. Find out the beak point then connect the wires.</li> <li>3. Disassemble, then repair and recover it</li> </ol>





wind turbine off grid working system



**Controller wire diagram and wiring connection**