

# **FDV Series Vertical Axis Wind Turbine system**



## **USER'S MANUAL**

**(FDV 300W-2KW)**

*Please read this manual before using*

## **TABLE OF CONTENTS**

- 1) SUMMARY**
- 2) MACHINES TECHNICAL PARAMETER**
- 3) WIND TURBINE PARTS**
- 4) CHECKING THE CONTENTS**
- 5) CHOOSING A PLACE FOR INSTALLATION**
- 6) SETTING THE FOUNDATION**
- 7) PUTTING THE WIND TURBINE TOGETHER**
- 8) SPECIAL ATTENTION ITEMS**
- 9) DAILY UP-KEEP**
- 10) COMMON PROBLEMS AND SOLUTIONS**
- 11) PRODUCT WARRANTY**

Thank you for purchasing the FDV-series medium and small-scale wind turbine. Before installation, please thoroughly read the instruction manual, as it will help keep yourself, and the product safe. We hope you enjoy your FDV series medium and small-scale wind turbines!

The content of this instruction manual is for FDV series medium and small-scale wind turbines only.

### **1) SUMMARY**

- a) This manual covers the following FDV series wind turbines: FDV-300W, FDV-600W, FDV-1KW, FDV-2KW,
- b) Product mechanisms and the principles for power;

A wind turbine uses the wind to create mechanical energy, this in turn creates energy. The energy produced from the wind turbine flows to the battery and is stored there. Afterwards, the inverter uses a pure sine wave pulse to turn the stored energy into 220 or 380 volts at 50Hz. Wind Turbines do not need to burn any fuels, do not produce energy, and produce little to no sound. The best places to take advantage of wind turbines are in places that are far from the electrical grid, or the electrical grid cannot provide a stable amount of electricity. The energy generated from wind turbines are enough to amply power water pumps, washing machines, refrigerators, televisions, computers, lighting, as well as various other electrical appliances. Wind energy is a practical and renewable alternative fossil fuel use.;

- c) Because this is a Vertical Axis Wind Turbine, the turbine rotor can use with from any direction. They produce little to no sound, and even have lower start-up speed than Horizontal Axis Wind Turbines. Besides a aesthetically pleasing design, the turbine also has an automatic brake for high winds, and is suitable for wind-solar hybrid hook ups.

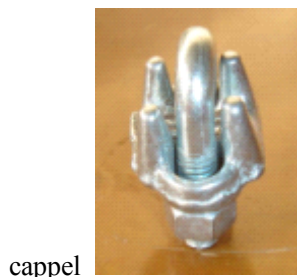
## 2) MACHINE TECHNICAL PARAMETER

Power	300W	600W	1KW	2KW
Wind wheel diameter (m)	1.0	1.0	1.5	1.5
Number of blade	5	5	5	5
Blade material	FRP			
Orientation of the rotor	Clockwis			
Rated rotated speed(r/m)	200	200	180	160
Rated wind speed (m/s)	7-8	7-8	8-9	8-9
Type of generator	Permanent magnet generator			
Stop method	By manual			
Rated power(w)	300	600	1000	2000
Max power(w)	350	750	1200	2200
Output voltage(v)	24	24	48	96/48
Start up wind speed(m/s)	2.5	2.5	2.5	2.5
Operating wind speed(m/s)	3-25			
Security wind speed(m/s)	40			
Height of tower (m)	6	6	6	6
ControllerParameter	DC24V	DC24V	DC48V	DC96V/48V
Inverter Parameter	AC 220V sine wave			

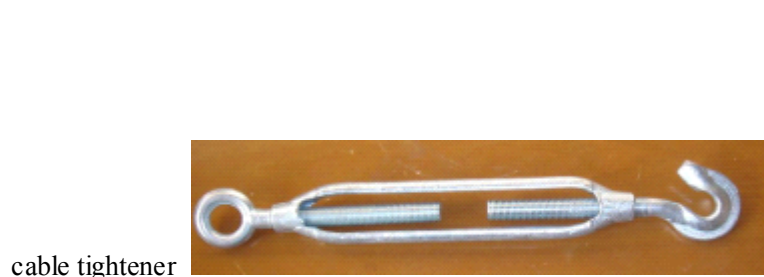
## 3) WIND TURBINE PARTS

- a) Guy tower: Wind Turbine Generator, Generator, tower, steel rope, steel rope tighteners, rigging cap, steel rope cappel, guy tower base structure, and ground anchors. Electronic equipment: controller, inverter, battery set, electrical lines.
- b) Monopole tower: Wind Turbine Generator, Generator, tower, tower base structure, ground anchors.

Accessories:

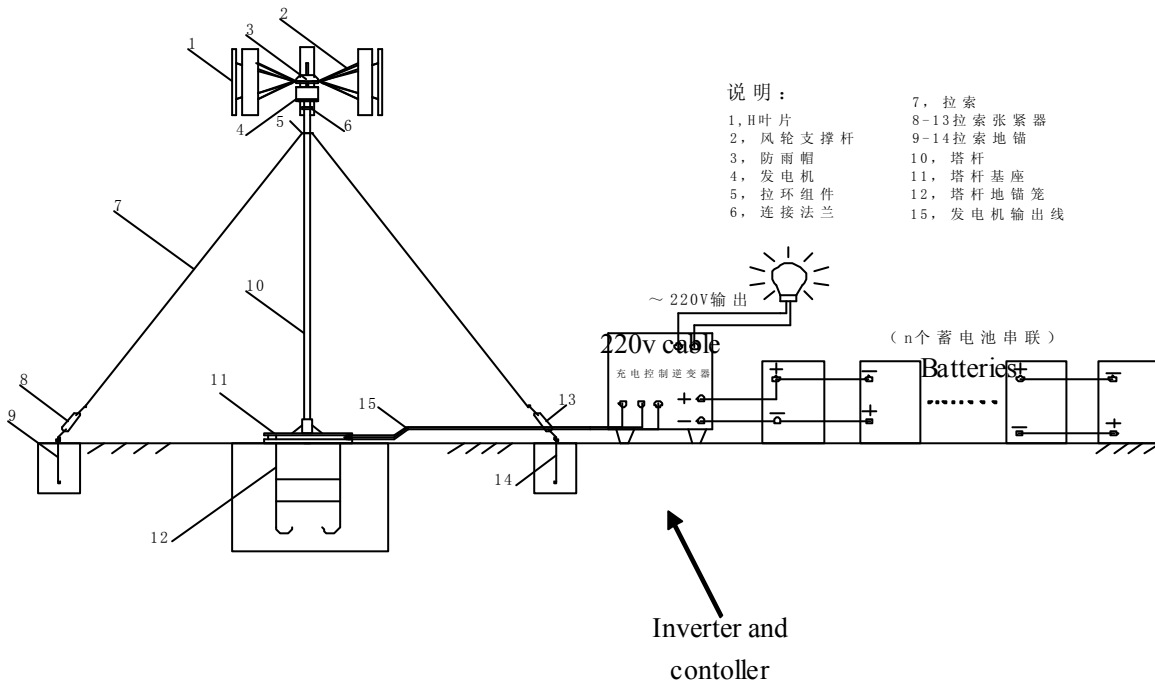


cappel



cable tightener

Set up picture:



**Key:**

- |                                |                                  |
|--------------------------------|----------------------------------|
| <b>1.</b> H-style blade        | <b>8-13.</b> Guy wire tighteners |
| <b>2.</b> Blade supports       | <b>9-14.</b> Ground Anchors      |
| <b>3.</b> Rain prevention cap  | <b>10.</b> Guy tower             |
| <b>4.</b> Generator            | <b>11.</b> Guy tower base        |
| <b>5.</b> Guy wire attachment  | <b>12.</b> Guy wire tower base   |
| <b>6.</b> Generator attachment | <b>15.</b> Inverter Output cable |
| <b>7.</b> Guy wire             |                                  |

**4) CHECKING THE CONTENTS**

Before installation, please carefully check the contents of the box in order to make sure there is no missing parts.

The Contents of the box

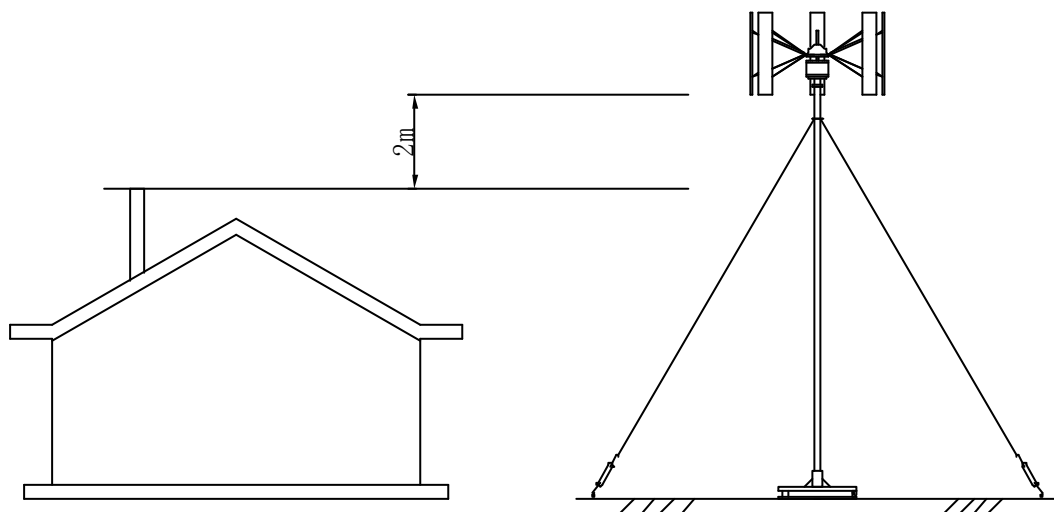
Name	Amount	Rate	Model Number	Product Number	Package person's signature	Remarks
Generator						
Blades						
Blade brackets						
Wheel boss						
Rain prevention cap						
Guy wire set-up						
Guy wire						

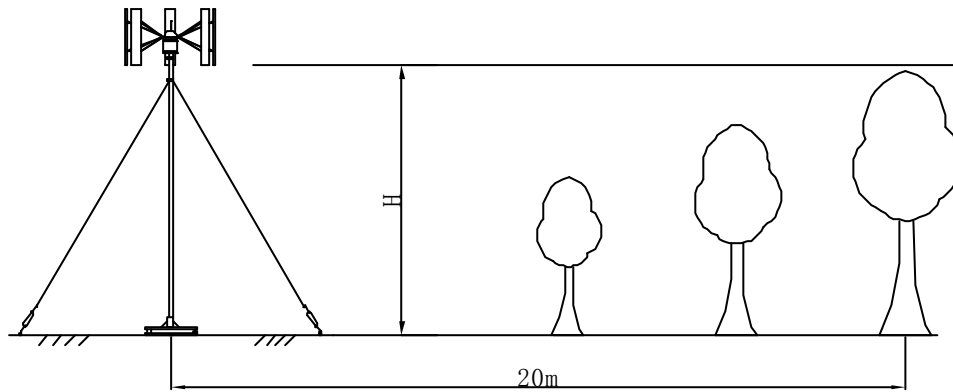
Guy wire tightener						
Tightener ring						
Steel rope cappel						
Support stand						
Guy wire ground anchors						
Base ground anchors						
Blade bolts						
Guy wire connecting bolts						
Inverter and controller						
Electrical wire						
User's Manual						
Shipping crate						

## 5) CHOOSING A PLACE FOR INSTALLATION

Choosing the safest and most optimal place to install your turbine is extremely important. Below are a few recommendations:

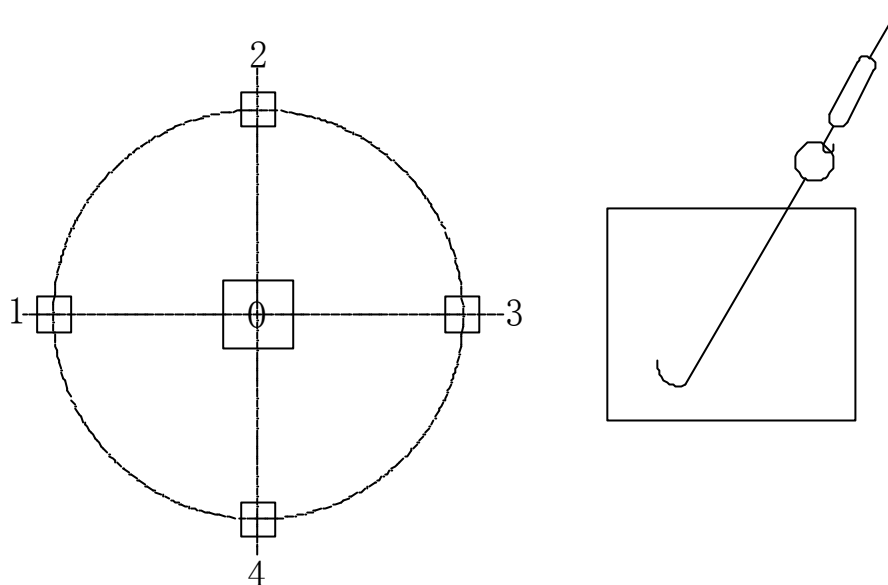
1. The average wind speed is proportional to the height of the wind turbine. A wind turbine installed at a height with a 5 m/s average wind speed will produce twice as much power as a wind turbine installed at a height where the average wind speed is 4 m/s.
2. Do not select a location with turbulent air flow, as this will cause the wind turbine to malfunction, reduce its generating capacity, and shorten its service life. If turbulent airflow is present, please select another location.
3. As stated above, air flow is important to optimizing the performance of the wind turbine. In flat terrain, the recommended minimum height is 8 meters. Buildings, trees, front and rear obstacles, etc. can all obstruct a good airflow. It is recommended that the user refrain from installing the wind turbine in these areas. If barriers exist, please allow for an appropriate amount of room between the barrier and the wind turbine. (See Figure)





## 6) SETTING THE FOUNDATION

1. Dig a 500mm× 500mm× 500mm square hole to form the center. (See Picture)



2. From the center, measure a distance of 5000mm from the center and mark into four spots consisting of A, B, C, and D. Once marked, dig a 500mm × 500mm square hole in each of these locations. Please be advised that the A-C and B-D diagonal connections will connect to the tower at the center hole.

3. Be sure to install one ground anchor in each of the four anchor blocks. Next, connect the turnbuckle to the corresponding ground anchor, and then connect the turnbuckle to the cable (shown around 20mm from the bottom of the bolts ), using the pin hole axis at B, D (or A, C), or 40-50mm above the ground. The below information is based on a concrete mixture using concrete, sand, and gravel, represented at a ratio of 1:2:3.

4. Attach the cable along the lateral side of the square hole to anchor the pole or tower. At that bottom of each anchor hole, lay a 2-5kg rock or stone on the bottom. Next cast the concrete and fill the hole until the hole is filled with the concrete, sand, gravel mixture. Once the hole has been filled, insert the ground anchor at 60 degree angle (from ground level).

5. Please make sure that only the top ring of the ground anchor is above ground.

6. The concrete slabs normally cure around 100 hours. During the curing stage, installation of the wind turbine is not recommended.

## 7) PUTTING THE WIND TURBINE TOGETHER

a) Please do not install the wind turbine on very windy or rainy days, as this will create a safety hazard. Only install the wind turbine on days with a level 2 wind or below. In such, please consult your local weather report before installation.

b) Installation of the Vertical Axis Wind Turbine is very complicated as the swept area is key to the wind turbine's use. When attaching the blades to the wind turbine, make sure the wheel boss and the blades are properly installed, as this will affect its performance by lowering its rotation speed, electrical output, etc. Be sure to take the swept area into consideration (fig. 1), and the wind turbine as a whole (fig. 2)

Fig. 1

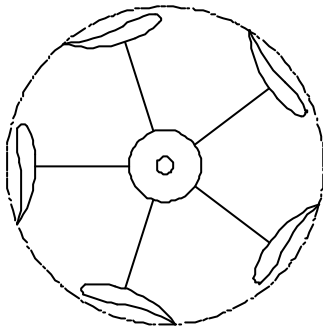
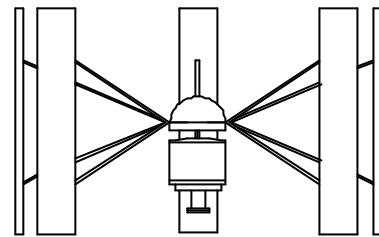
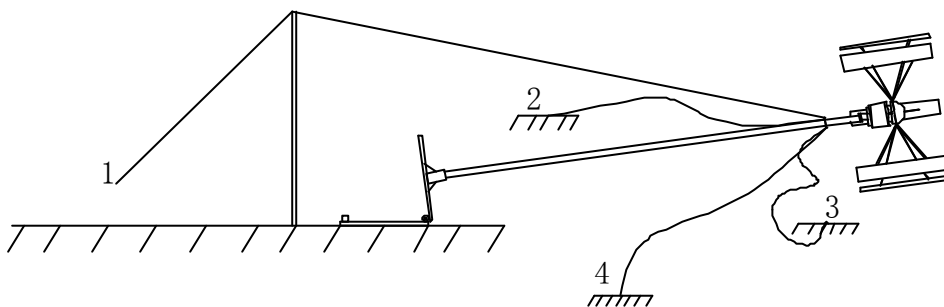


fig. 2



c) Putting the wind turbine together; First, find the three generator wires, coat them in some water-proof grease, and then attach them with the electrical output wires. Secondly, attach the generator to the guy tower attachment. Next, attach the turbine blades to the wind generator. Finally, attach the rest of the guy tower.

d) Raising the tower; First, place the base of the wind turbine tower in the holes. Second, make sure all four wires are attached to the guy tower (three wires are attached to ground anchors). Next, slowly lift the wind turbine to the vertical position. (see below picture)

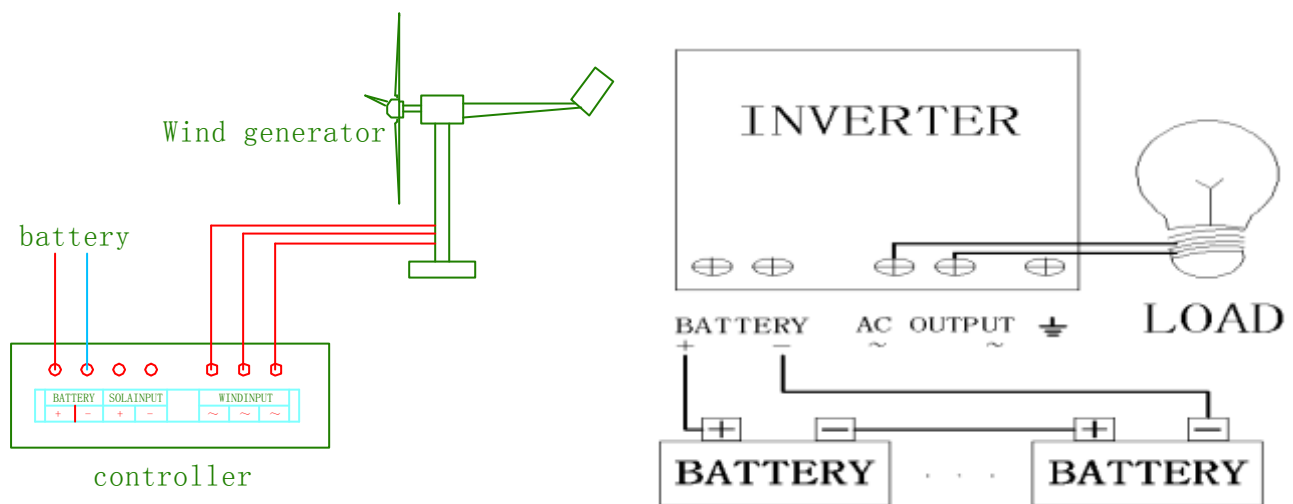


e) Attaching the electrical wires; Place the three electrical wires from the wind turbine to the slots on the controller. Next, connect the wires to a DC electrical source, or to batteries. Attach the red wire to the “+” terminal, and the black wire to the “-” terminal. Attach the positive electrical cable to the positive terminal, and the negative electrical cable to the negative terminal. DO NOT mix up the wires! Please also pay attention to the electrical charging load, the battery load, and inverter electrical load.

## 8) SPECIAL ATTENTION ITEMS

- 1) If the wind turbine is shaking or making unusual sounds, please shut the turbine down and preform an immediate maintenance check.
- 2) Please keep a suitable distance away from the wind turbine during operation. This is to prevent any unforeseen injuries.
- 3) The battery should be kept in a dry and clean place. This will prevent short circuiting the battery. Putting metal articles on the battery pack is strictly forbidden.
- 4) The electrical box and single anode ground circuits should not be placed together, as to avoid a short circuit. Please refer to the inverter operation manual in regards to the operation specifications of the inverter.
- 5) If after a strong wind the cables becomes loose, re-tighten them.
- 6) The wind turbine wiring should be separate, and should not mixed with other lines. The inverter output power can be set to AC power, but it is recommended using DC power for lighting and other household appliances. (Inverters and the inverter output lines cannot be parallel. Also, the inverter output line and the city electric-line cannot connected directly).
- 7) When connecting wires to the electrical box, first connect the battery, then connect output line. This method will prevent short circuits.
- 8) The electrical box stop switch is located near the power switch. In case of an impending natural disaster, it is recommended that you use the stop switch and turn off the power as soon as possible in order to prevent short circuits and/or harm to the wind turbine.

**Equipments connection diagram refer to the following:**



## 9) DAILY UP-KEEP

The FDV series wind turbine is highly reliability and does not need routine maintenance checks. However, It is recommended that a timely inspection of the wind turbine and its output circuitry be carried out in order to ensure the wind turbine system is working to its maximum potential.

1. During the first three months after installation, a thorough and routine check of the support cables (guy wires) should be done, in order to ensure the wind turbine tower has adequate support. After the occurrence of strong winds, it is recommended that a check of the support cables (guy wires) be done. In the event the cables have become loose, readjust and tighten them.



2. Inspect the electrical output cables in various parts in order to check for sturdiness and corrosion.
3. A periodic inspection for corrosion of the electric cables is recommended.
4. Please follow the procedures found in the battery guide when caring out battery checks.
5. In the case of a predictable natural occurrences (i.e. Hurricanes or typhoons), a complete dismantling of the wind turbine beforehand is recommended.

## 10) COMMON PROBLEMS AND SOLUTIONS

After proper installation, the FDV series wind turbine should not experience any problems. If problems do occur, please consult the list for commonly identified problems and their solutions.

<b>Problem</b>	<b>Possible reason</b>	<b>Solution</b>
The wind turbine vibrates	<ol style="list-style-type: none"> <li>1. Support cables (guy wires) are loose</li> <li>2. Blade bolt is loose</li> <li>3. The turbine blade is damaged</li> <li>4. The turbine blade has ice build-up</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-tighten the support cables</li> <li>2. Re-tighten the blade bolt</li> <li>3. Replace the turbine blade and make sure the rotor is balanced</li> <li>4. De-ice the wind turbine</li> </ol>
The wind turbine is making unusual sounds	<ol style="list-style-type: none"> <li>1. The turbine has a loose bolt or support cable</li> <li>2. Turbine has a bearing failure</li> <li>3. The rotor is encountering too much friction</li> </ol>	<ol style="list-style-type: none"> <li>1. Take down the wind turbine and check for any loose bolts</li> <li>2. Replace the bearing</li> <li>3. Inspect the rotor for any foreign objects causing friction</li> </ol>
The wind turbine rotor's speed has dramatically been reduced	<ol style="list-style-type: none"> <li>1. The turbine's stator and rotor are rubbing</li> <li>2. The turbine's stator wires, or output wires have been cut and have caused a short circuit</li> <li>3. Controller's switch in the engine is set to the "OFF" position</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the bearings</li> <li>2. Find and replace the shorted circuit, then insulate the problem area</li> <li>3. Flip the control switch to the "ON" position</li> </ol>
Wind turbine's electrical output voltage is low	<ol style="list-style-type: none"> <li>1. Generator's rotational speed is low</li> <li>2. The stator three-phase wires have a short circuit</li> <li>3. The controller has short circuit</li> <li>4. The electric wire is too long, or the wire line has become too thin</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect the turbine for any foreign parts that may interfere with the rotor</li> <li>2. Find the short circuit, replace it, and insulate the fixed area</li> <li>3. Replace and insulate the shorted area</li> <li>4. Reduces the line's length or add mass to the thinned electrical wire</li> </ol>
Battery's electricity output capacity is insufficient	<ol style="list-style-type: none"> <li>1. Wind turbine's output voltage is too low</li> <li>2. Battery's wiring column has a bad connection or is corroded</li> <li>3. Battery's expiration date has past</li> </ol>	<ol style="list-style-type: none"> <li>1. See the "Wind turbine's electrical output is low" section</li> <li>2. Find the corroded wire or bad connection, change out the wire, and cover in grease for corrosion protection.</li> <li>3. Replace the battery</li> </ol>

## **11) PRODUCT WARRANTY**

- 1) Generator, inverter, controller have a 1 year replacement warranty.**
- 2) Only three valid replacements will be honored under the warranty period. The warranty begins on the date of purchase.**
- 3) The following situations are not covered under the product warranty:**
  - a. Incorrect installation of the wind turbine that results in equipment damage.**
  - b. The equipment was destroyed by a natural disaster.**
  - c. Equipment was damaged by a fall.**
  - d. Unauthorized modifications done to the equipment.**

*Explained above are subject to change without notice.*

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