

EOC-WORTHY USER S MANUAL



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ECO-WORTHY

USER'S MANUAL



200W/400W wind generator

THANK YOU FOR YOUR PURCHASE OF ECO SERIES SMALL WIND TURBINE. BEFORE ASSEMBLY AND OPERATION, PLEASE CAREFULLY READ THE OWNER'S MANUAL FOR SAFETY USE AND OUTSTANDING PERFORMANCE. ENJOY THE CONVENIENCE WHICH ECO SERIES WIND TURBINE BRINGS YOU! THIS OWNER MANUAL IS ISSUED ON OCTOBER 2012. PLEASE UNDERSTAND IN CASE OF ANY PRODUCT IMPROVEMENT OCCUR, IT WILL BE UPDATED IN APPENDIX.

BEFORE INSTALLATION, PLEASE ENSURE ALL COMPONENTS IN CARTON ARE FULLY MATCHED THE PACKING LIST, IF IN LACK OF ANY PARTS, PLEASE CONTACT DISTRIBUTOR IMMEDIATELY.

Preface

Dear ECO Owner:

Thank you for your purchase of ECO series small wind turbine! You have purchased the most advanced wind turbine in the world! We believe you will find it easy to install, moreover, we are confident you will experience years of dependable service from it.

Please make sure you have read the manual carefully before any assembly, installation or operation of your ECO wind turbine, it will help you to better improve wind turbine using experience. If any property loss due to the failure of following this ECO wind turbine manual's instructions and requirements, we will not be liable for it.

This manual has been strictly reviewed to ensure you properly install and use ECO wind turbine system. We are committed to continuously improve ECO wind turbine features and service quality, to reserves the right to change any products and any other information in the manual without prior notice.

This manual can help you better understand and properly use ECO series small wind turbine, however, the content of hardware configuration is not included in the manual.











Regarding to whole system configuration, please refer to the relevant contract (if any) or distributor. Pictures in the manual are for reference only, if there is some different from objects, please be subject to objects.

If you find actual situation of ECO wind turbine is inconsistent with the description in the manual, or you would like to know the latest information, or you have any questions or comments, please contact us freely.

Sincerely,

ECO Energy

Important Safety Instructions


1. For your safety, please read these instructions carefully before installation or operation.
2. Important: Please comply with the following instructions before using your wind turbine.
 - 2.1  please read these instructions carefully before use.
 - 2.2  Safety instructions before installation:
 - 2.2.1 Install ECO wind turbine on sunny day. 
 - 2.2.2 Do not install ECO wind turbine during dusty day with more than 10 m/s wind speed. 
 - 2.2.3 Wear wet gloves or clothes are prohibited. 
 - 2.2.4 Install and maintain ECO wind turbine under professionals guidance, or contact distributor.
 - 2.2.5 Do not use too thin or poor quality cables, use original cables as far as possible in order to avoid leakage or fires and line losses.
 - 2.2.6 Non-professionals do not open controller and inverter casing. 
 - 2.2.7 Install grounding device in accordance with application standard and installation instructions. 
 - 2.2.8 Battery may be sparks flying while wiring, make sure that no inflammables the work environment nearby. 
 - 2.2.9 Do not place the controller, inverter and battery in damp, rain, vibration, corrosion and strong electromagnetic interference environment, the places in direct sunlight, near heater or other heat sources are not allowed, either. 
 - 2.3  Selection and installation requirements of controller, battery:
 - 2.3.1 Controller specification should be matched with voltage, power and current of the battery, solar panel, wind turbine and load.

2.3.2 Controller and battery should be put in a power housing cabinet, and the housing is located in ventilated place where people are not easy to touch.

2.3.3 Controller and battery must be installed in accordance with corresponding electric equipment installation standard and operation regulations of manufacturer.

2.3.4 Power housing cabinet is placing near people living room, adoption of sealed battery is far more safe.

2.3.5 Negative pole of battery should be in good grounding.

2.4  Wiring requirements:

2.4.1 Connections between components in the system should be fixed and reliable, plug and socket are not allowed for the connection.

2.4.2 The Wind system's power output terminal must be firmly fixed with consumption load terminal, or the wind system's power output terminal adopted of using power socket.

2.4.3 Do not use two-way plug for the connection of wind system's output terminal with consumption load terminal.

2.4.4 Any cables or wires of the system, which might be damaged due to outdoor exposure, should be coated with conduit for protection.

3. Precautions:

Operators must clearly know safety measurement. Safety relies on our joint efforts.

3.1 All operations must:	3.2 Operation workers must master:
a. Follow instructions in the manual.	a. Equipment recognition.
b. Operated by specialized workers.	b. Correct equipment operation ability.
c. Accident or injury or possible severe damage to equipment may result if false operation.	c. Relevant safety knowledge.

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1. Wind Turbine Introduction

1.1 Blades: Patented blades with efficient twisted aerodynamic design are made with Nylon and reinforced carbon fiber materials by precision injection molding technology. The blades are of exceptional consistency and aerodynamic outline with a mass distribution that ensures the rotor operates with minimum noise and minimal vibration. ECO wind turbine has very low start-up/cut-in wind speed and a high coefficient of productivity, which is specially designed to prevent the blades from feathering post stall.

1.2 Generator: Made from high-quality rare earth permanent magnets material. The wind turbine is of small size, light weight and high-efficiency power generation characteristics. Unique electromagnetic design technique has endowed the wind turbines in an excellent start performance, which effectively ensures ECO series wind turbine can be started up in a gentle breeze.

1.3 Body: ECO wind turbine, adopts high-quality aluminum alloy material and stainless steel accessories, which is light weight. It has such high reliability that can be applicable to various working conditions, such as severe climate, an ambient temperature from -30°C to 60°C , high humidity, sand and salt corrosive environment as well.

ECO series small wind turbine is elegant and easy to install, which makes you enjoy clean energy in all-weather circumstances, as well as a joyful landscape.

2. Siting

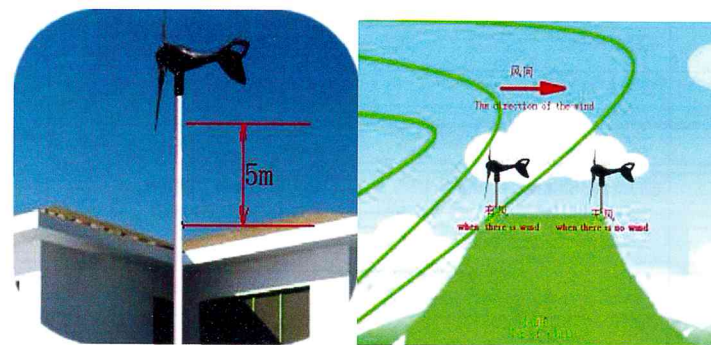
Small changes in wind speed and wind direction can have a dramatic effect on power production. In general, the higher the tower, the greater the wind speed and ultimately power production are. Therefore, the site of your wind turbine should be carefully considered. Each installation is different and is often compromised among the tower height, distance from the battery bank, local zoning requirements and obstacles such as buildings and trees.

2.1 Detailed requirements are as follows:

A: The wind turbine should be installed where there is strong wind or no tall buildings, no obstacles, if the wind turbines are installed on the hills, it also needs to choose reasonable position (as shown in figure), or if in the low-lying terrain, but looks like the corridor, with strong winds and advantageous.

B: If installing the wind turbines near the obstacles, the position is better as far as possible from obstructions, or the installation height should be 5m higher than the top of building, which can make full use of the wind power.

C: When setting the wind turbines on the roof, the installation height should be at least 5 meters higher than the roof. As shown in figure:



2.2 The installation distance between two wind turbines should be 8-10 times of rotor diameter.

Try to locate the wind turbine in the “cleanest” turbulent free air as possible. Turbulence will reduce the efficiency of the wind turbine and may accelerate wear on rotating components.

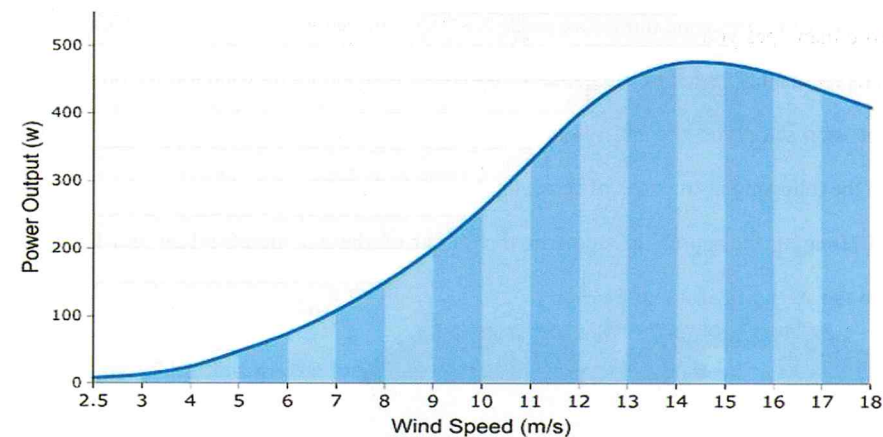
2.3 Less natural disaster places are preferred.

2.4 Safety must be the primary concern when selecting the mounting location. Even if installing the wind turbine in a less ideal location, don't attempt to mount the turbine while blades are spinning.

3. Technical Specifications

Rated power	200W	400W
Rated voltage	DC27-54V	DC27-54V
Battery voltage	DC12/24V	DC12/24V
Start-up wind speed	2.5M/S	2.5M/S
Rated wind speed	8.2M/S	10.5M/S
Number of Blades	3	3
Material of wind leaf	carbon fiber composite	carbon fiber composite
rotor diameter	1.15M	1.2M
rated speed	600N/MINRPM	800/MINRPM
tower diameter	Suggest to be more than 80 mm	
Tower height	4.5M-10M	4.5M-10M
battery capacity	80AH-200AH	200AH-400AH
Net weight	7KG	8KG
packing dimension	687mm/365mm/210mm	687mm/365mm/210mm
Product life	15 years	
warranty	1 years	
Certification	CE	

ECO - 400 Wind Turbine Power Curve



4. Parts list

Please check all parts according to the component list before installation. Contact the supplier if some parts missing.

components	quantity	remarks
wind driven generator	1	
wind wheel	3	
nose cone	1	
Screw sand nuts	1	
Controller	1	
User installation manual	1 copy	
Certificate of soundness	1 copy	
Mill test report	1 copy	
Container loading list	1 copy	

5. Wind Turbine Assembly

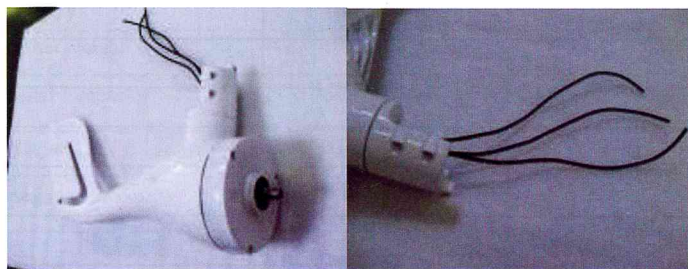
Most of ECO series wind turbine assembly has been finished in the factory; installation on site is simpler, mainly including mounting blades on the hub, mounting wind turbine on the tower, suspension setting on site and system wiring. Please install the whole turbine in accordance with the following instructions of corresponding type.

5.1 Hanging the top of the tower at the height of about 1 meter, taking out the cables from the steel pipe inside the tower.



5.2 Connection of the Wind Turbine with tower

5.2.1 Taking out the wind turbine, fastening the three cables of the wind turbine with the cables through the tower correctly. Packing the cables well with the insulating tape.



Notes: the cables to connect the the wind turbine from the tower are not included here.

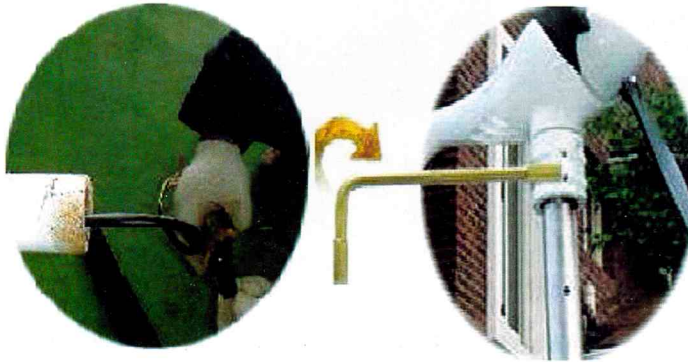
5.2.2 Nesting the black leather cushion inside the reducing joint of the wind turbine



5.2.3 Passing cables through the tower wrenches. Fastening the cable cover and putting the tower inside reducing joint. Connecting the cover of reducing joint by screws and fastening. Tightening the screws by hex key.



5.2.4 The wind turbine and the tower has been connected well.

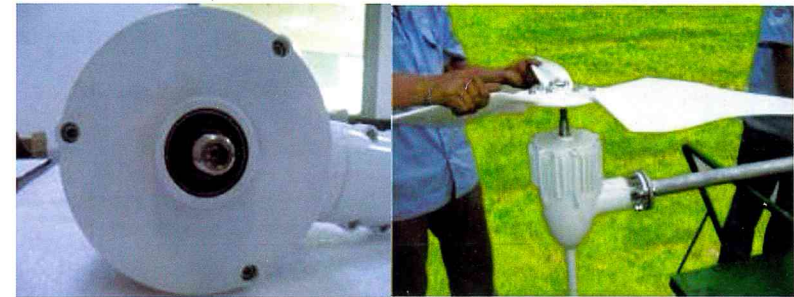


5.3 Mounting Blades on The Hub

① The blades.	② The hub.	③ The nuts and screws
④ One-to-one mounting blade on the hub according to the number of blade and hub and screw down the nuts.	⑤ Mounting other blades as the same way. Notice: blades should not be reversed. nuts should be tightened.	⑥ Finished.

5.4 connection of the blades and the generator

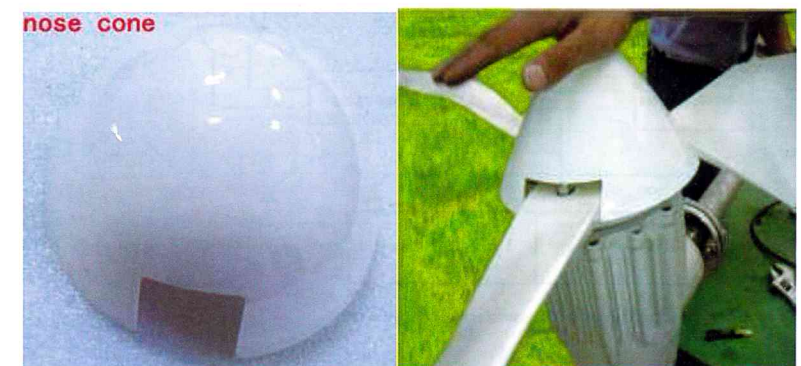
5.4.1 Mounting the hub with blades onto the rotor shaft.



5.4.2 Tightening the hub by locking nuts and M16 spring washer, and locking up split pin.



5.4.3 Pressing the nose cone onto the hub washer, and locking up split pin. (strength equally).

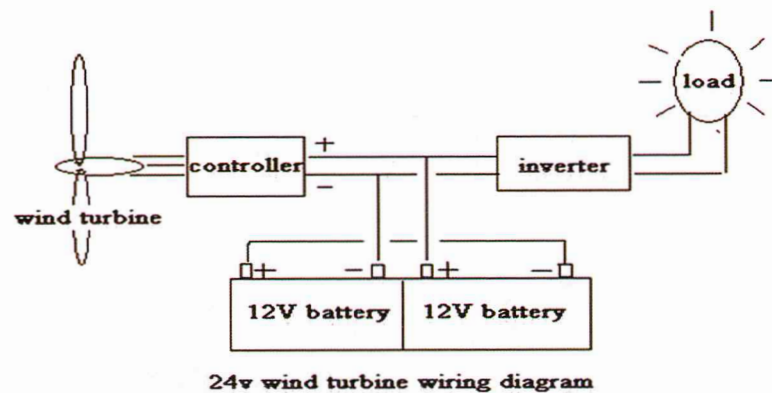


5.4.4 Assembly finished



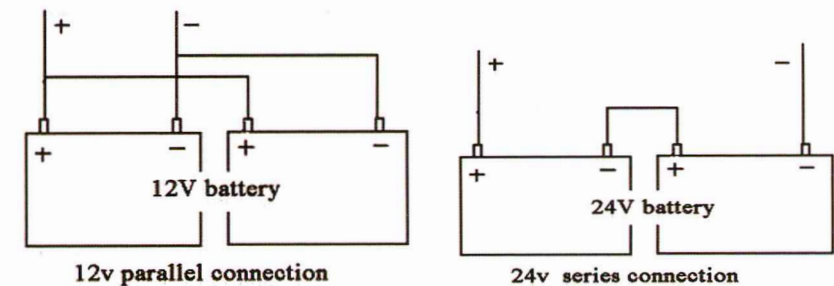
6. System Configurations

For this series wind turbines, please connecting the system correctly as the following wiring diagram.

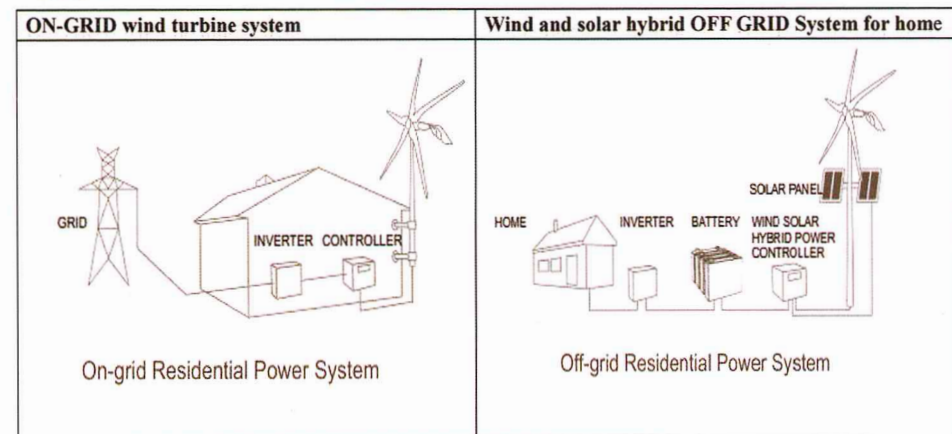


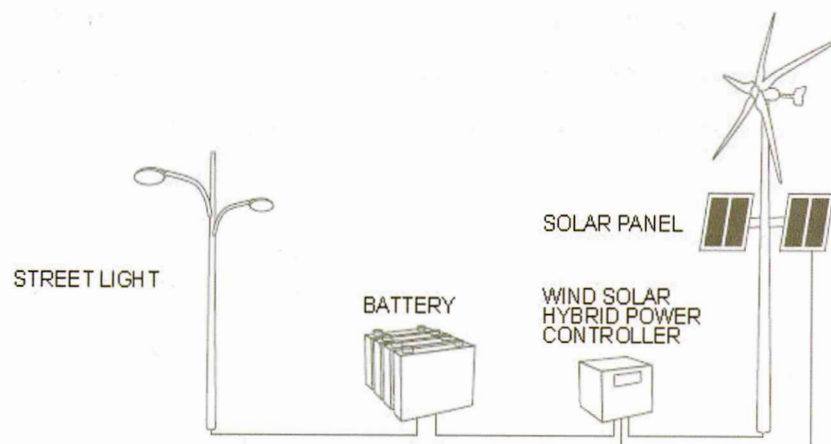
if you choose the 12v wind turbine, you need to use the 12v battery、12v controller、12v inverter, you can use the battery quantity based on your actual needs, for more than 2pcs you can use parallel connection.

if you choose the 24v wind turbine, you need to use the 24v battery、24v controller、24v inverter, you can use the battery quantity based on your actual needs, for more than 2pcs you can use series(series-parallel) connection.



You can configure your generating system according to your actual application. Below system configurations are for your reference only.



Wind and solar hybrid street light system:**Wire Size Selection**

All electrical systems lose energy due to resistance in conductors: the wires. Large wires have less resistance but can be considerably more costly. Resistance losses will also increase with increasing current; therefore, if yours is a high wind site, it may be worthwhile to go with a larger size wire to take advantage of the greater power production potential of your site. Conversely, in low wind sites it may not be cost effective to increase the wire size since power production will be low.

For selection of wire size, the following factors should be taken into consideration:

- ① Measuring the distance from the batteries to your ECO wind turbine. Be sure to include height of the tower;
- ② Your system voltage;
- ③ Your system power distance.

For selection of wire size, the following factors should be followed:

- ① Practical and affordable;
- ② Satisfying using condition;
- ③ The positive pole of battery is red line, negative pole is black line(or blue line); The following wiring sizes provide maximum annual energy losses of 5% or less for sites with a 5.4m/s average wind speed (assuming the standard Rayleigh distribution of wind speeds) which is sufficient for most sites.

Refer to the appropriate chart for your system voltage and number of turbines and select the wire size.

A: 12 Volt Systems, AWG/Metric Wire Size Unit: mm²

No. of Turbines	0-9m	9-18m	18-27m	27-46m	46-58m	58-76m	76-95m	95-119m	119-152m
1	8/10	6/16	4/24	2/35	1/50	00/50	00/10	000/90	000/90
2	6/16	4/25	1/50	00/70	000/90	000/120			
3	4/25	2/35	0/50	000/90	000/120				

B: 24 Volt Systems, AWG/Metric Wire Size Unit: mm²

No. of Turbines	0-9m	9-18m	18-27m	27-46m	46-58m	58-76m	76-95m	95-119m	119-152m
1	14/2.5	12/4	10/6	8/10	6/16	4/50	4/10	4/90	2/90
2	12/4	8/10	6/16	4/25	4/25	2/35	2/35	1/50	0/50
3	10/6	8/10	6/16	4/25	2/35	2/35	1/50	0/50	00/10

C: 48 Volt Systems, AWG/Metric Wire Size Unit: mm²

No. of Turbines	0-27m	27-76m	76-95m	95-152m
1	14/2.5mm ²	12/4mm ²	6/16mm ²	8/10mm ²
2	12/4 mm ²	8/10mm ²	6/16mm ²	4/25mm ²
3	10/6mm ²	8/10mm ²	10/6mm ²	4/25mm ²

7. Maintenance

Although your high reliability of HY wind turbine has been designed to run for long periods without requiring any maintenance, reliability and performance will be enhanced if you periodically inspect your system.

The following situations need regular maintenance:

No.	Maintenance Item	After storm	Every six months	Every a year	Every two years	Every five years
1	Check the guy rope tightness of tower	√	√			
2	Check the working condition of the whole system and connector tightness	√		√		
3	Maintain battery (refer to battery manual)			√		
4	Check all electrical connections to make sure they are tight and free from corrosion.	√			√	
5	Wash off any built-up dirt or debris from the blades and check blades for chips or nicks	√		√		
6	Check damaged degree of nosecone	√			√	
7	Replace blades					
8	Replace battery					√
Remark: "√" indicates maintenance.						

Notes: Lie down the pole before some extremely bad weather, like typhoon, in case of some unpredictable accidents happen.

8 Trouble Shooting

8.1 Wind turbine's Abnormal Vibration

Wind turbine vibration is mainly caused by the following reasons:

- ① Guy rope is loose and needs to be tightened;
- ② The blades mounting bolts on are loose and need to be tightened;
- ③ The surface of blades freeze and needs to be removed;
- ④ The blades have been distorted, defected and need to be replaced by contact of supplier.

CAUTION: Turbine operation should be stopped as soon as abnormal vibration happened, and then solve problems.

8.2 Abnormal Noise

Besides wind turbine running well creates noise, it is probably cause by friction between rotor and stator, bearing damaged, in case of these situations, please contact supplier to solve problems.

8.3 Rotational Speed Dramatically Decreases

Wind turbine rotational speed dramatically decreases under heavy wind condition, which can be mainly divided into normal deceleration and abnormal deceleration:

- ① Turbine normal deceleration is mainly due to wind turbine over-voltage protection, dump load, electromagnetic braking and normal short circuit, which is wind turbine regular work;
- ② Turbine abnormal deceleration is mainly due to friction between rotor and stator, bearing damaged, generator burned, in case of these situations, please contact supplier to solve problems.

8.4 Wind Turbine Insensitive to Adjust Blades Direction

ECO wind turbine mainly adopts tail yaw to adjust the blades direction, if it is not sensitive to

adjust blades direction, which is because the turbine alternator shaft is damaged, the tower is out of vertical, in case of these situations, the shaft should be replaced and tower verticality must be adjusted.

8.5 Generator Abnormal AC Output

Generator abnormal AC output mainly is divided into:

- ① Generator output voltage is low, which is due to low wind speed or long connection line, small wire size results in high pressure drop, therefore, selection of wire size should refer to 6.5 regulations and requirements.
- ② Generator three-phase output voltage is imbalanced. Voltage unbalanced rate shall not exceed 10% (same wind speed or rotational speed) in accordance with related national standards, if exceeded, the generator fails, please contact supplier to solve problems.
- ③ Generator has no output voltage under heavy condition, check whether generator is normal short-circuited or not and three-phase resistance values are balanced or not (uncharged operation), if imbalanced, the generator fails, please contact supplier to solve problems.

8.6 Generator Has AC Output but No DC Output

Off-grid wind turbine charges battery, wind turbine transfers AC to DC by controller, the DC voltage must be higher than battery voltage, or turbine will not generate power.

If AC input voltage of the generator is normal (voltage higher than battery voltage after rectification) while there is no current display on DC terminal, check whether the controller's wind turbine indicator work or not (blinking), connection is normal or not, connection terminals are burned or not, fuses are burned out or not etc. Analyze these situations and get rid of the troubles. In the event of burning of controller, please contact supplier to solve problems.

8.7 Solar Output Voltage Too Low or No Output in Wind and Solar Hybrid System

Check whether solar panel lead is short circuit, circuit break, open circuit or not.

8.8 Light Source Is Not On in Wind and Solar Hybrid System

This situation is mainly cause by:

- ① Light source is damaged and need to be replaced;
- ② Battery is under voltage, controller does not supply power, which is system normal protection;
- ③ Controller is burned out and needs to be replaced;
- ④ The mode setting on the controller is not correct and needs to be reset according to controller manual.

8.9 Wind Turbine Does Not Charge Battery

This situation is mainly caused by:

- ① Wind speed is too small to reach cut in state, output DC voltage of wind turbine is lower than battery voltage;
- ② Type of battery is not matched with controller, battery should be replaced (commonly use lead acid battery);
- ③ Burning of controller results in not charging battery, controller should be replaced;
- ④ Battery is fully charged, controller is over-voltage protection.

9. Warranty Terms

We provide 1 year for wind turbine from the date of shipment, warranty covers free replacement of all damage parts within warranty period, our obligation in this respect is limited to replacing parts which have been promptly reported to us via photo or video shows the damage part for technician analysis, the free replacement will only be provided after

confirmation by our technician. A valid proof of purchase will be required if making a warranty claim. This warranty does not extend to supporting posts, inverters, batteries or ancillary equipments not supplied by us. Following defects will not be covered in this warranty:

1. Wind turbine, controller and inverter are used, replaced, repaired incorrectly without in accordance with instructions or either generator or yawing parts opened by owner.
2. Damage caused by improper installation, owner neglect, misuse, or any damage caused by weak basement or supporting post structure.
3. Damage caused by natural disasters including lightning, hurricane force winds, flood, earthquake etc.
4. Damage caused by the use of any unauthorized controller, inverter not provided or confirmed by us.

Replacement of damage parts

Owner is responsible for shipping the defect or damage part to us for repairing if needed, then we will repair or replace with new one for free and ship to owner on our cost, if no defected piece ship back to us but need replacement, we will provide the part for free but shipping expense will be at owner side.

Consequential losses

ECO is not responsible for any responsibility of consequential losses.

Consequential losses mean:

1. Indirect, unexpected or special losses or damages;
2. Losses of margin or expected margin of products or any ways related with products.