



GE-400-12

USER MANUAL

Contents

1. SITTING	1
2. TECHNICAL SPECIFICATIONS	1
3. APPLICATION RANGE	2
4. WIND TURBINE ASSEMBLY	2
5. SYSTEM CONFIGURATIONS	3
6. DEBUG AND TEST	5
7. MAINTENANCE	6
8. TROUBLE SHOOTING	6
9. WIND AND SOLAR HYBRID CONTROLLER	8

Safety Instructions

1 Prevent winding overheating

*For winds above the cutting speed the electromagnetic brake could be insufficient, and the equipment would work outside its specifications. **It's recommended to mechanically immobilize the equipment to avoid excessive winding overheating.***

2 Notice: please comply with the following instructions before using the wind turbine.

2.1 Please read these instructions before use.

2.2 Safety installations

2.2.1 Install wind turbine in sunny day

2.2.2 Do not install wind turbine in windy day.

2.2.3 Wear wet gloves or clothes are prohibited.

2.2.4 Install and maintain wind turbine under professionals guidance, or contact distributor.

2.2.5 Do not use poor quality cables, use original cables as far as possible in order to avoid leakage or fires.

2.2.6 Do not open controller and inverter casing without professional guidance.

2.2.7 Install grounding device in accordance with application standard address installation instructions.

2.2.8 Battery may be sparks flying while wiring, make sure that no inflammables 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 the other heat sources are not allow, 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 Use distribution cabinet and adopt sealed battery in living room.

2.3.5 Negative pole of battery should be in grounding.

2.4. The connection of each internal part should be fixed and reliable, plug and socket are not allowed.

2.4.1 The connection of each internal part should be fixed and reliable, plug and socket are not allowed.

2.4.2 The connection of system output and external circuit should be fixed, or system output use the socket.

2.4.3 Please don't use the two-way plus to connect the output of system and outer circuit.

2.4.4 As for the installation of other circuit, all of it should be protected by the wire because it's easy to damage for the expose.

3 For your safety, please read these instruction carefully before installation or operation.

1 Sitting

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. Therefore, the siting of your wind turbine should be carefully considered. Each installation is different and is often a compromise among tower height, distance from the battery bank, local zoning requirements and obstacles such as buildings and trees.

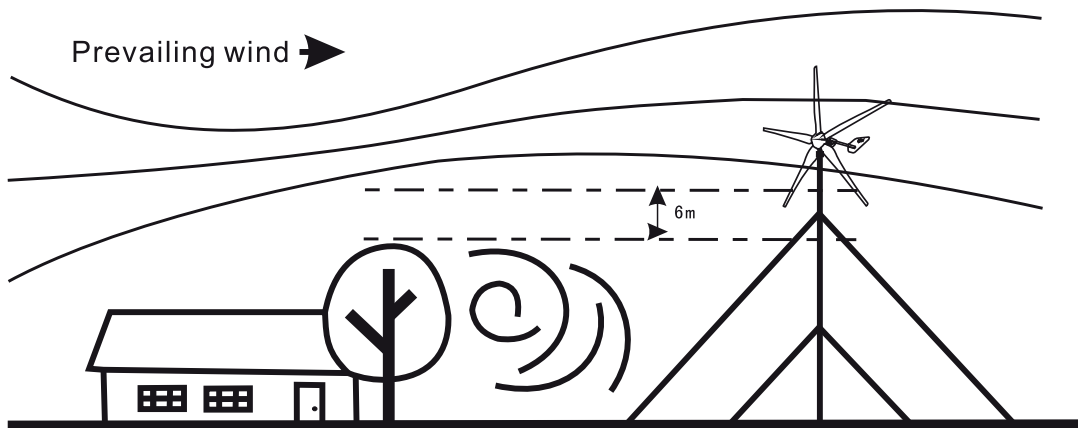
Specific requirements about installation and sitting of wind turbine are as follows:

2.1 The minimum recommended tower height is 8m on open ground or 5m above nearby obstructions. there are no obstacles within 100 meters as far as possible:

2.2 If install two wind turbines on one area, the distance between them is 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.

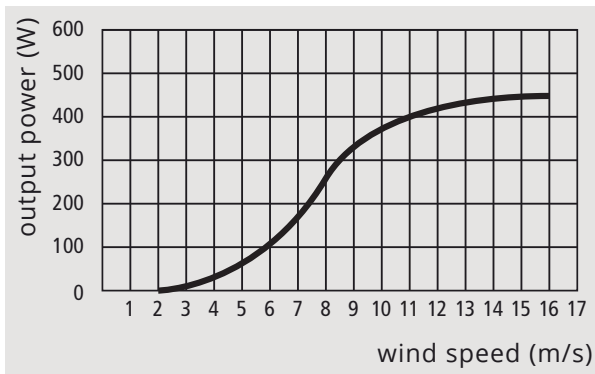
2.4 Safety must be the primary concern when selecting the mounting location. Even if installing the wind turbine in a less than ideal location. don't attempt to mount the turbine while blades are spinning.



2 Technical specification

	GE-400-12
Start-up speed (m/s)	2
Rated speed (m/s)	11
Cut-in speed (m/s)	2.5
Rated voltage (DC)	12V
Rated output (W)	400
Rotor diameter (m)	1.16
Blades	3
Rated rotation speed	1200
Heavy wind protection	Dump load - electromagnetic break
Certificate	CE - ISO9001 - RoHS

POWER CURVE



3 Application Range

- Lighting system: *city street lights, road lights, landscape lighting*
- Telecommunication
- Isolated island desalination
- Power supply system for ship, home or farm
- Highway monitoring
- Offshore oil platform
- Wind solar spring system

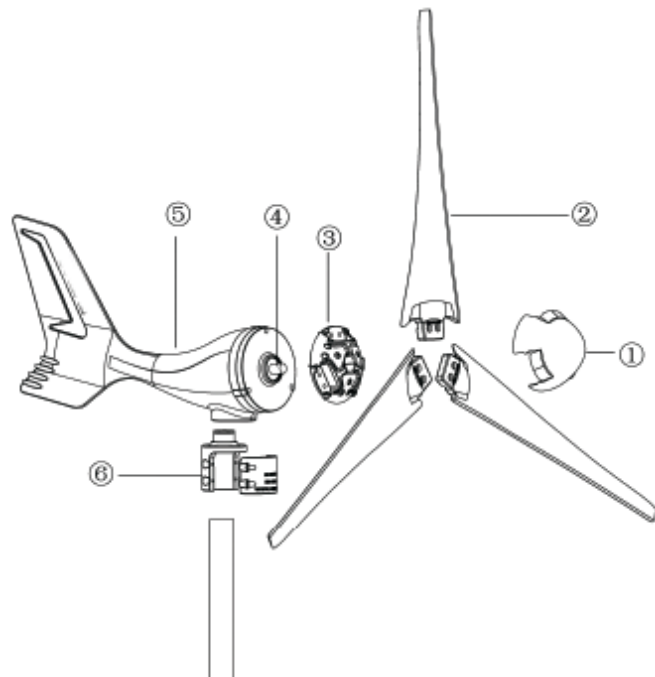
4 Wind Turbine Assembly

GE 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.

4.1 Mounting blades of wind turbine

1. Nose cone
2. Blades (3)
3. Hub
4. Motor
5. Wind turbine body
6. Yaw Assembly



4.2 Torque specifications

Blade to hub bolts, 1/4-20 x 1.25 inch, socket head bolt, 7.0 lb-ft, (13.6 N·m)

Hub to rotor nut, 5/8 - 18 inch, Jam nut, 50 lb-ft (68 N·m)

Yaw clamp bolts, M5 x 35mm, socket head bolt, 4.0 lb-ft (504 N·m)

4.3 Assembly steps

Start the assembly by examining how the blades mount to the hub, refer to fig. 1.

1. Coating the hub and blades with Tef-gel place a nylock nut (item 4) in the detent on the back of the blade hub while positioning a blade on the hub.
2. Pass a bolt through the blade and screw it into the nylock nut — do not fully tighten the bolt yet.
3. Install the second bolt and nylock nut and torque both bolts to 7 ft — lbs (9.4 N·m)
4. Install the remaining two blades following the same procedure.

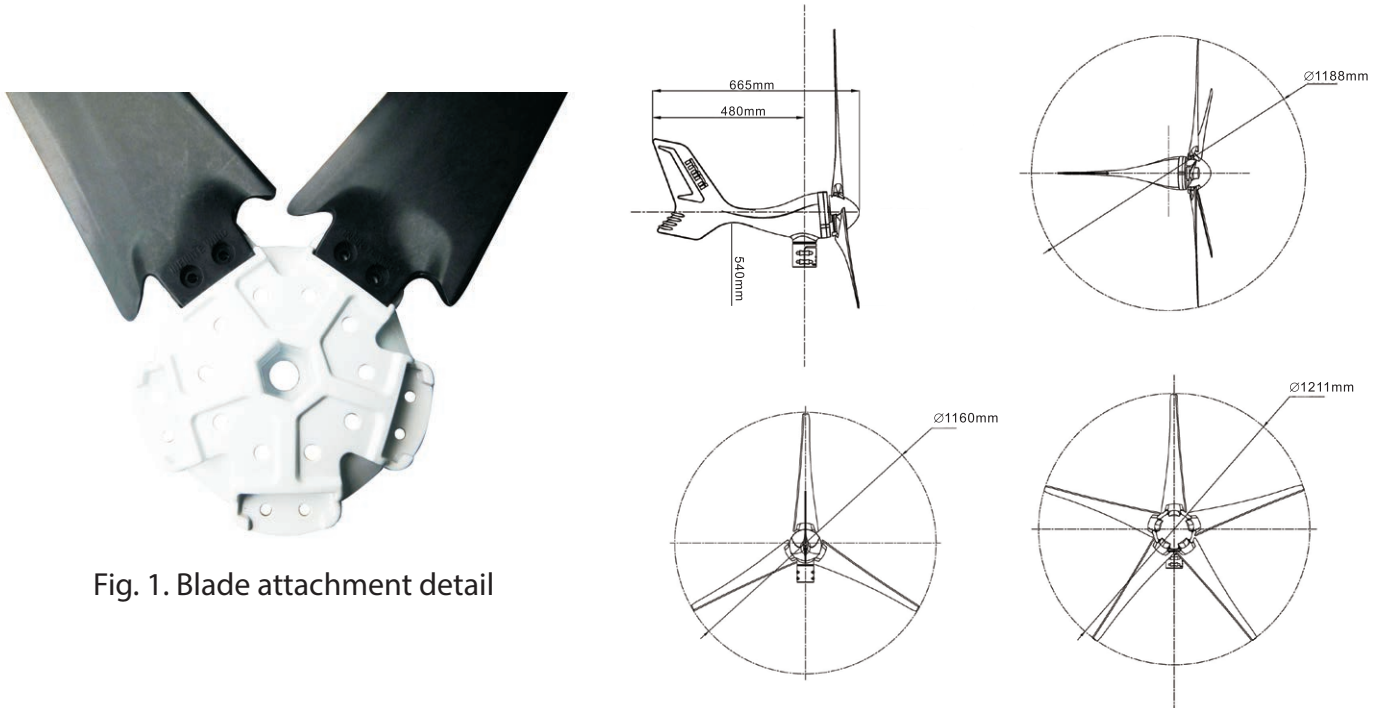
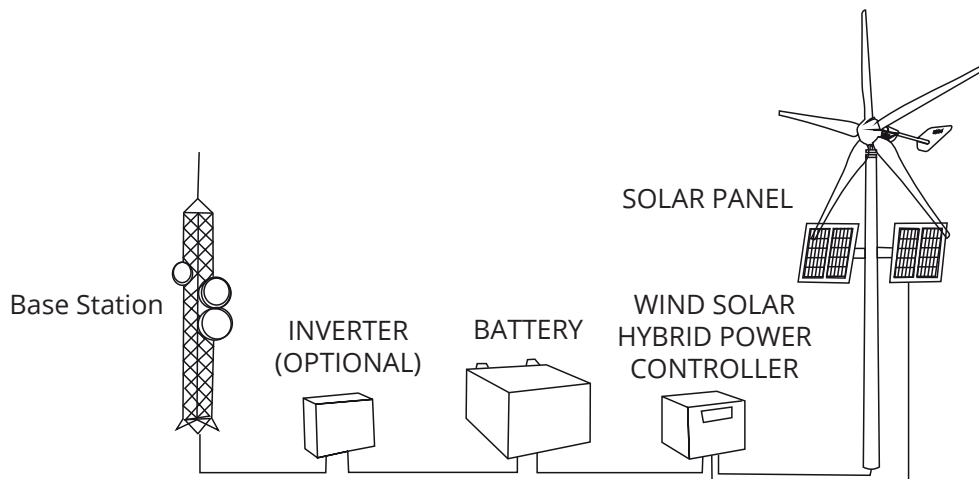


Fig. 1. Blade attachment detail

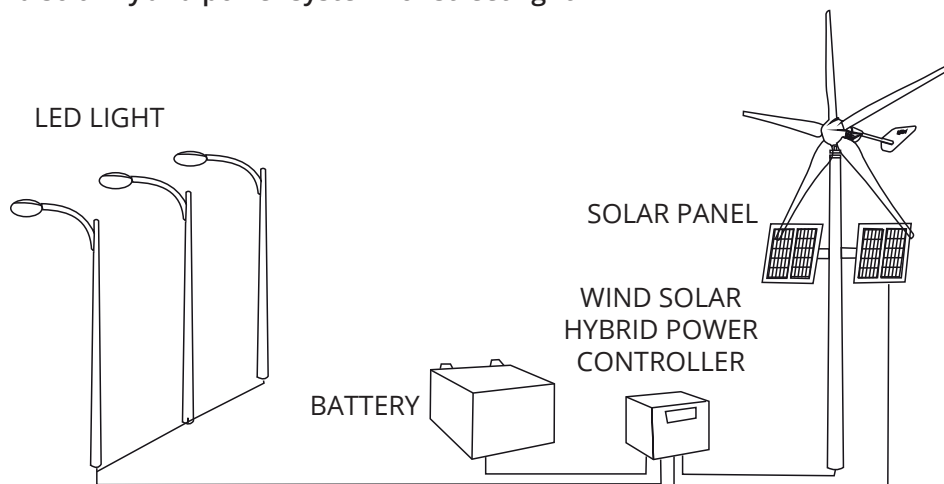
5 System configurations

There are three common system configurations:

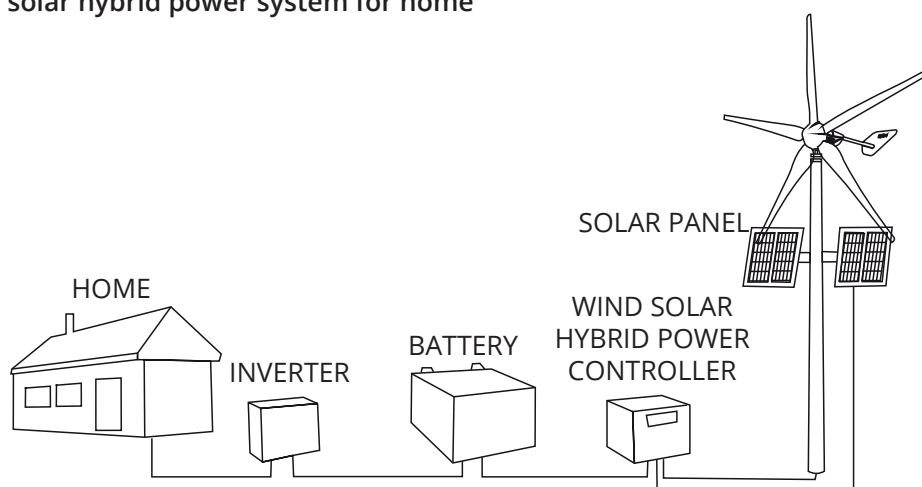
A. Wind and solar hybrid power system for BASE STATION



B. Wind and solar hybrid power system for street light



C. Wind and solar hybrid power system for home



Wind and solar Hybrid power system configuration introduction

5.1 Wind and solar hybrid controller

Wind and solar hybrid controller will be matched with the wind turbine according to different areas. The common controller has: PWM mode direct-charging wind and solar Hybrid controller which is mainly used in high wind speed areas: MPPT mode boost controller which is mainly used in low wind speed areas.

5.2 Inverter

For customers who need AC power, it is recommended to use AC220V/50HZ or AC110V/130HZ Inverter, the capacity should be determined according to maximum electricity load.

5.3 Battery

There are many battery choices available -lead acid, absorbed glass mat (AGM), gel cell and NiCad. The type of battery utilized will depend largely on the battery bank location and cost. For battery installations where fumes can be safely ventilated and the potential for acid leakage accommodated, the lead-acid battery is typically the most economical choice.

200AH/12V batteries are recommended for GE wind turbine owners. Negative pole of the battery should be a good grounding. The capacity must be based on electricity load of the owners.

5.4 Wire Size

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 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. 12V systems, RVV / Metric wire size

N° of turbines	0-9 m	10-17 m	18-27 m	28-46 m	47-60 m
1	4 mm ²	6 mm ²	10 mm ²	16 mm ²	16 mm ²
2	10 mm ²	16 mm ²	25 mm ²	25 mm ²	25 mm ²
3	10 mm ²	16 mm ²	25 mm ²	35 mm ²	50 mm ²

6 Debug and Test

The operation of wind turbine system should be debugged after Installation, the requirements are as follows:

6.1 Make sure the functions of controller meet the requirements; the specification of controller is matched with voltage and current of battery, solar panel, wind turbine and loads;

6.2 Wiring is in strict accordance with wiring requirements of controller. Firstly, connect to battery and dumper, and then connect to small wind turbine and solar panel, at last connect to load; take down connection in the reverse order.

Positive and negative pole of the battery, solar panel can not be reversed and short-circuited;

6.3 The wire leads of wind turbine and connection wires of battery should refer to wire requirement and regulations:

6.4 Please read carefully about controller instructions to set the functions after the completion of system wiring, such as model selection and regular time setting:

6.5 PV charging debug: in the light condition (output voltage of solar panel is greater than that of battery), the controller's PV indicator should be working (normal on or linking), measure output current by DC clamp meter, the current size depends on illumination intensity and battery capacity;

6.6 Wind turbine charging debug: wind turbine operation is normal or not when it is windy, while reach or exceed cut-in wind speed, the controllers wind turbine indicator should be working (normal on or blinking), measure output current by AC clamp meter, the current size depends on wind speed and battery capacity:

6.7 Light-control function debug: measure battery voltage by multimeter to ensure battery voltage is higher than over discharge recovery voltage, then set to light-control mode, disconnect any wire of solar panel from controller, several minutes later, observe whether the light of loads is on or not, it is normal if the light is on. Then connect the solar panel wire with controller again. the load output is cut off a few minutes later and the light goes out:

6.8 Time-control function debug: ensure battery voltage is higher than over discharge recovery voltage, observe whether the lighting time of load output light is the same as that of setting.

7 Maintenance

Although your high reliability of 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:

Maintenance item	After storm	Every six months	Every year	Every two years	Every five years
Check the rope tightness of tower	●	●			
Check the working condition of the whole system and connector tightness	●		●		
Maintain battery (refer to battery manual)			●		
Check all electrical connections to make sure they are tight and free from corrosion	●			●	
Wash off any built-up dirt or debris from the blades and check blades for chip or nicks	●		●		
Check damaged degree of nosecone	●			●	
Replace blades					●
Replace battery					●

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, detected 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 caused 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

GE 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 at 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 wire 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 caused 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 Wind and solar hybrid controller

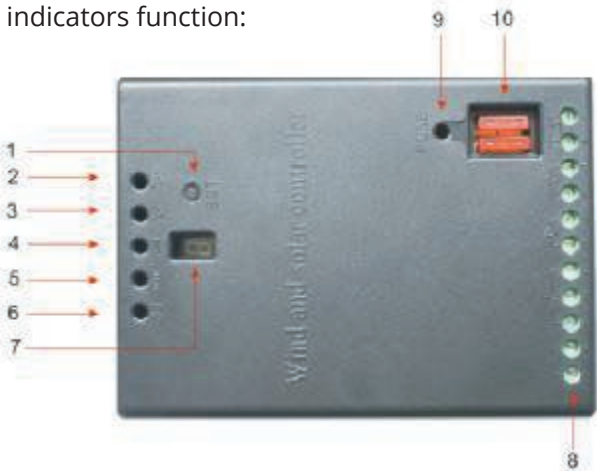


Main features as under:

- + MPPT power tracking technology, can guarantee the best use of wind power.
- + Overload protection function.
- + Short circuit protection function.
- + With float charging function.
- + Fan intelligent shutdown system.

9.1 Controller function

Diagram and indicators function:



Indicator light buttons	Explain
1. set	Set key
2. overload 2	The second load power overload or short circuit, indicator keep lighting, controller protection needs the new electricity to exit protection.
3. overload 1	The first load power overload or short circuit, indicator keep bright state, controller protection needs the new electricity to exit protection.
4. under voltage	Controller detected battery voltage below set limit, lights flashing, voltage up to the recovery of the set points, the lights go out
5. over voltage	Controller detected battery voltage over set limits, lights flash, voltage down to the recovery of the set points the lights go out, Over-voltage, controller disconnect solar charging and start up fan intelligent stop system.
6. change	When controller detected that there is wind power or solar energy to charge, battery indicator flashes, no charge indicator go out.

7. LED display	LED display all of controller setting data.
8. terminals	Connected the outside wind generator, solar panels, street lamp and batteries.
9. safety plate open indicator	Safety plate burned open circuit then indicates keep bright state.
10. safety plate	In the case charger over-current load over-current etc, it burned.

9.2 Controller parameters and specifications

Battery over charge voltage	14.8V
Battery overcharge recovery	14V
Load 1 & 2 discharge voltage	10.5V
Load 1 & 2 discharge recovery	12.3V
Size - LxWxH (mm)	176 x 135 x 56
Weight (Kg)	1.4
Working temperature	-40°C ~ +45°C
Working humidity	0 ~ 95% R.H. (not gel)
Working height	The high altitude of 3.000 m
Protection class	IP22

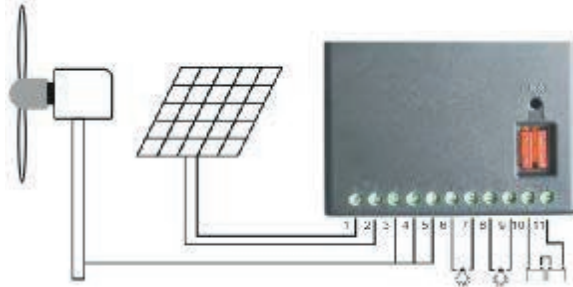
9.3 Electrical parameters of the control

Battery rated voltage	12V
The wind generator rated power	400W
Input current range	0~30A
Max input power of the wind generator	440W
Intelligent stop system start voltage	≥ 14.8V
Max power of solar charge	400W
Battery over discharge protection voltage	10.5V
Battery over discharge recovery voltage	12.3V
1 & 2 output rated current	10A / 10A

9.4 Installation guide

1. Do not install directly in a place where the rain can caught.
2. Should use the vertical wall hanging installation.
3. Battery, load, light panels at the positive and negative do not reserve.
4. Load power should not be over the power rating or electric current.
5. Ensure controller ventilated smooth, good heat dissipation.
6. Should be regularly check controller working status, promptly eliminate adverse impact.

9.5 Terminals specifications



1. Solar - (negative): solar charging negative input
2. Solar + (positive): solar charging positive input
3. R: wind generators U phase input
4. S: wind generator V phase input
5. T: wind generator W phase input
6. -2: The second loaded negative output
7. +2: The second loaded positive output
8. -1: The first loaded negative output
9. +1: The first loaded positive output
10. Battery +: Batteries positive input
11. Battery -: Batteries negative input

9.6 Instalation steps

1. Check whether the controller and fan, solar cells and batteries voltage, power match.
2. Use a multimeter to check weather the battery voltage is correct, and confirm the battery anode.
3. Connect the battery pack to the controller.
4. The wind generator connected to the controller. (When the wind generator is high speed rotating should not be installed.)
5. Use a multimeter to check weather components test voltage is correct. (Components test open voltage is higher than nominal voltage of 1.5 times or so, this is normal).
6. Connect solar cells to the controller. (optional) Note polarity!