



User Manual

Installation • Operation • Maintenance



(For MAX Series Small Wind Turbine)

MAX-600W MAX-800W MAX-1200W MAX-1600W

Safety Instructions

1 For your safety, please read these instructions carefully before installation or operation.

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

2.1 Please read these instructions before use.

2.2 MAX 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. Wiring requirements:

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 Accident prevention measures.

Please make sure all the operator and staff have enough safety awareness.

3.1 All operation must:

A. Following the instruction when operating.

B. Operated by professional staff.

C. Staff and device may get hurt and damage if the operation is wrong.

3.2 What does the operator should master:

A. Device identification.

B. Correct behavior of operating.

C. Safety knowledge.

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

1 Wind Turbine Introduction

1.1 Blades: Patented blades with efficient twisted aerodynamic design are made with nylon and reinforced fiber glass 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. MAX 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 MAX series wind turbine can be started up in a gentle breeze.

1.3 Body: MAX 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 $-40\text{ }^{\circ}\text{C}$ to $120\text{ }^{\circ}\text{C}$, high humidity, sand and salt corrosive environment as well.

MAX 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 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.

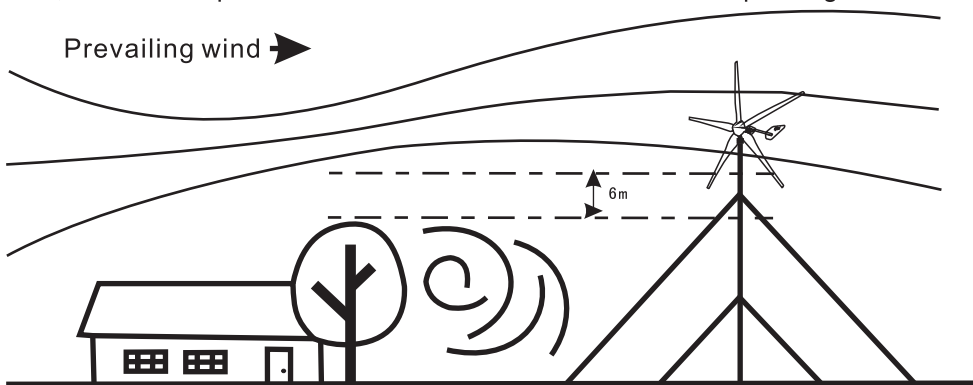
Specific requirements about installation and sitting of wind turbine are as follows:

2.1 The minimum recommended tower height is 8m on open ground or 5m above nearby obstructions (Fig. 1), 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.

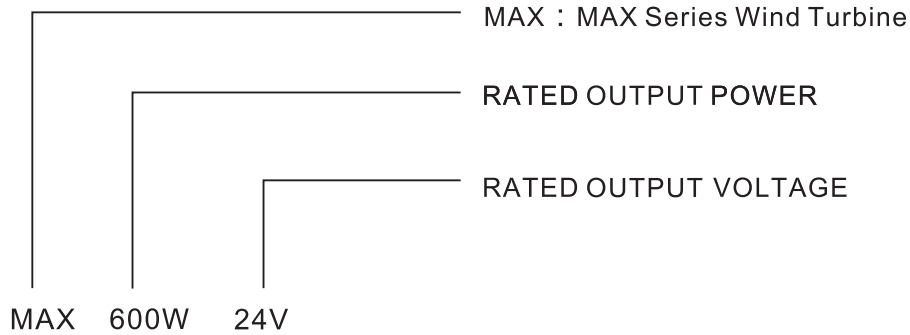
2.3 Less natural disaster places are preferred.

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.



3. Selections, Technical Specification

3.1 Selection of MAX Series Wind Turbine



OUTPUT	TURBINE RATED OUTPUT POWER		
	24V	48V	110V
600W	•		
800W		•	
1200W		•	•
1600W		•	•

• - MEANS HAVE THAT TYPE OF WIND TURBINE

MAX series wind turbine is applicable to various-climate regions. Please fully consider the surrounding environment resources to bring the best performance while selection of MAX wind turbine.

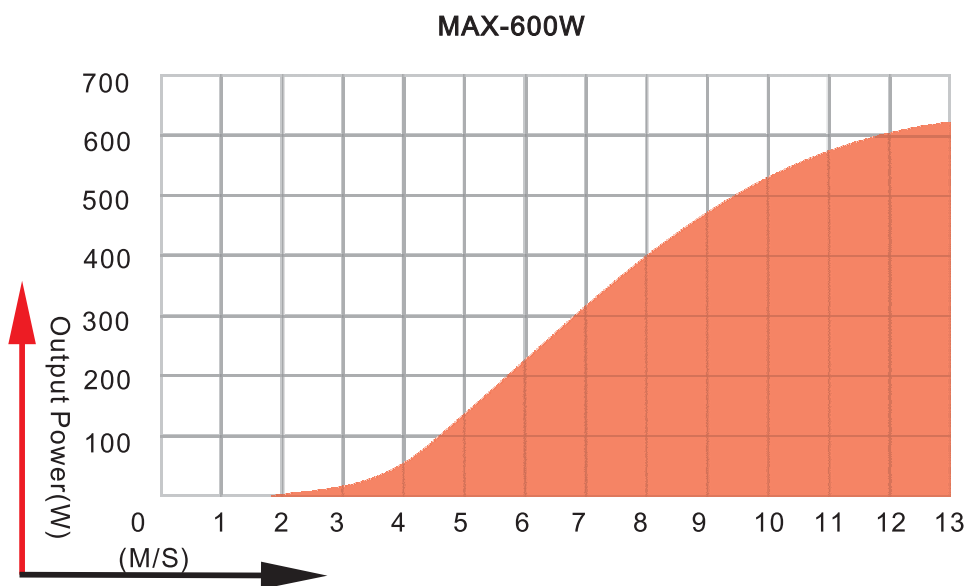
3.2 Environmental Temperature: it's recommended to use low-temperature type at regions where minimum temperature is less than -20 °C.

3.3. Technical Specifications

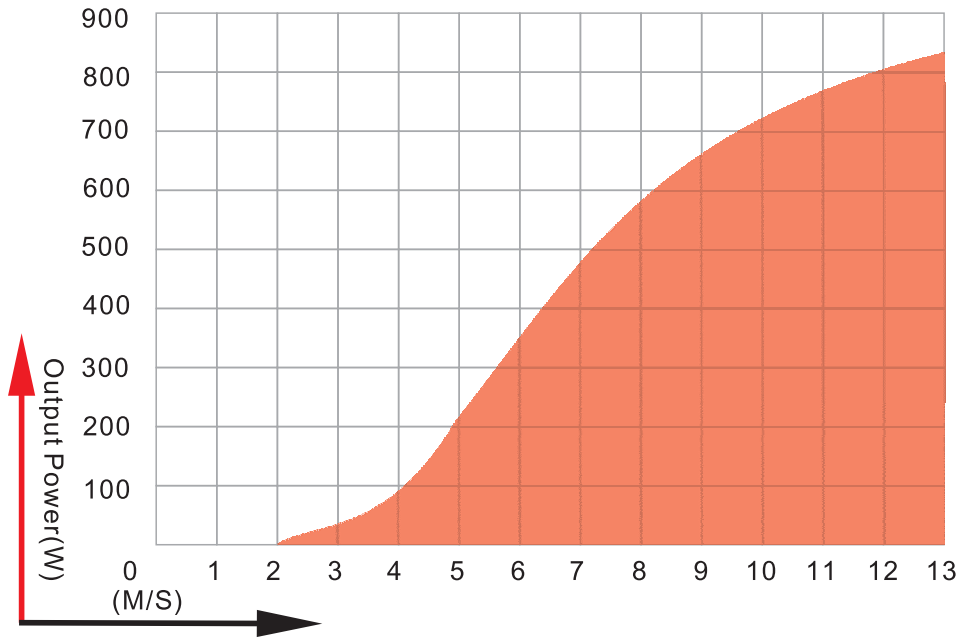
(1) MAX-600W、 MAX-800W、 MAX-1200W、 MAX-1600W

Product Name	MAX-600W	MAX-800W	MAX-1200W		MAX-1600W	
Start-up speed (m/s)	1.5	1.5	2.0		2.0	
Rated speed (m/s)	12	12	12		12	
Cut-in speed (m/s)	2.0	2.0	2.5		2.5	
Rated voltage(DC)	24V	48V	48V	110V	48V	110V
Rated output (W)	600	800	1200		1600	
Rotor diameter (m)	1.7	1.8	2.0		2.2	
Blades	5	5	5		5	
Rated rotation speed	650					
Heavy wind protection	Dump load and with electromagnetic breaking					
Certificate	CE、 ISO9001、 RoHS					

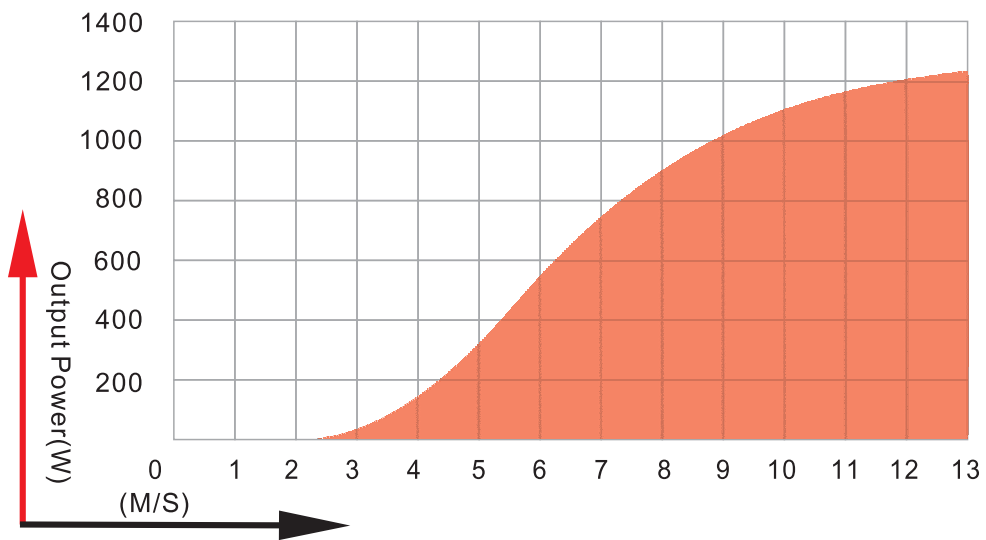
(2) MAX Wind Turbine Power Curve



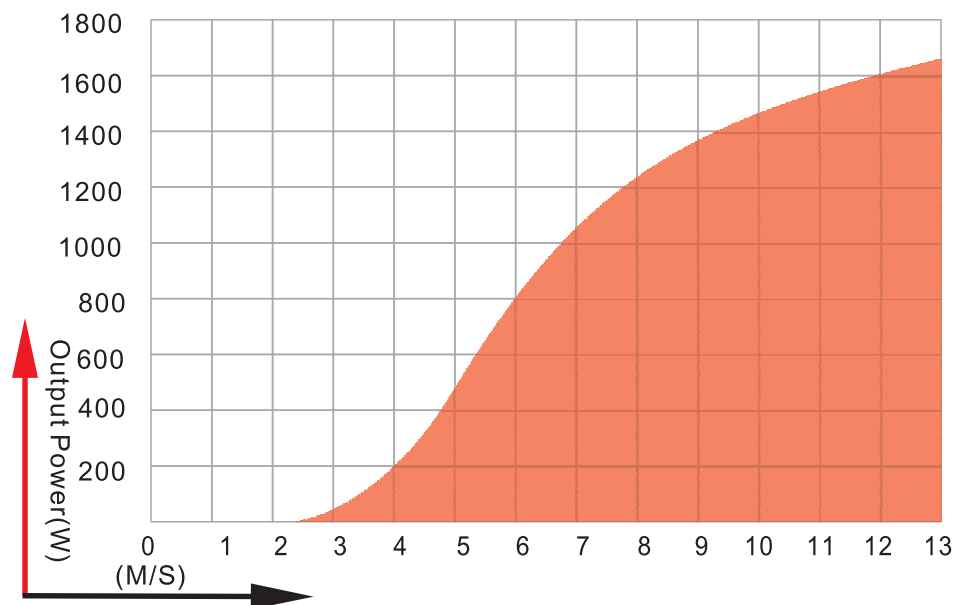
MAX-800W



MAX-1200W



MAX-1600W



4 Application Range

At present, MAX series wind turbine has widely applied in:

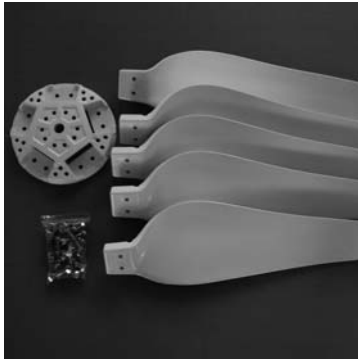
- 4.1 Lighting System: city street lights, road lights, landscape lighting;
- 4.2 Highway Monitoring;
- 4.3 Telecommunication;
- 4.4 Offshore Oil Platform;
- 4.5 Isolated Island Desalination;
- 4.6 Wind Solar Spring System;
- 4.7 Power Supply System for Ship;
- 4.8 Power Supply System for Home;
- 4.9 Power Supply System for Farm.

5 Wind Turbine Assembly

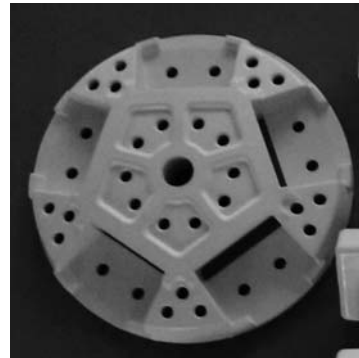
Most of MAX series wind turbine assembly has been finished in the factory; installation on site is simpler, mainly including mounting blades on the hub, mounting wind turbine on the tower, suspension setting on site and system wiring.

Please install the whole turbine in accordance with the following instructions of corresponding type.

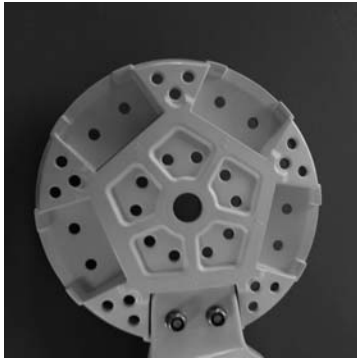
5.1 Mounting Blades Of Wind Turbine



① The blades (total five).



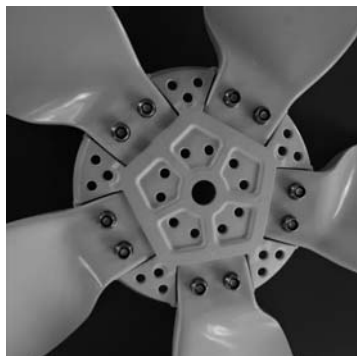
② The hub of five blades.



③ Blade and hub screw down the nuts.



④ Mounting other blades as the same way.
Notice: blades should not be reversed
nuts should be tightened.



⑤ Blades have been mounted on the hub accordingly.



⑥ Completed pattern.

5.2 Flanged Joint Assembly Instructions of MAX Series Wind Turbine



① The wind turbine.



② Screwing out one terminal of cable cover and connect the cables three-phase wire with wind turbine three-phase wire.



③ Fastening the cable cover.

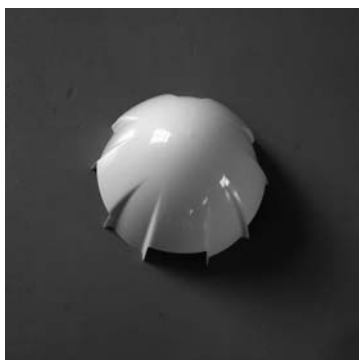


④ Mounting flange and tower with locknuts

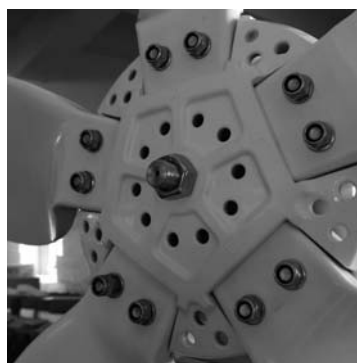


⑤ Assembly finished, erecting the tower.

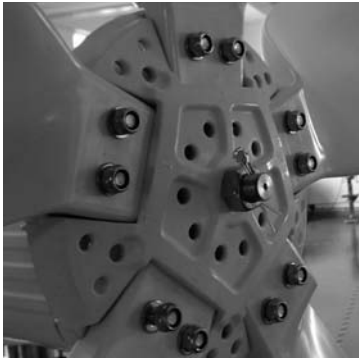
5.3 Cone Assembly Instructions of MAX Series Wind Turbine



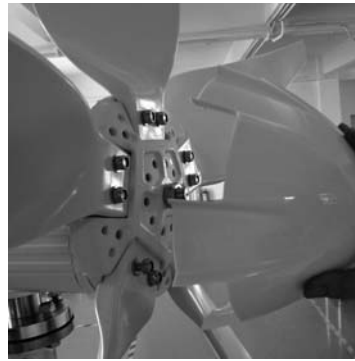
① Taking out the cone from carton.



② Mounting the hub with blades onto the motor shaft.



③ Tightening the hub by nuts and spring washer, and locking up split pin.

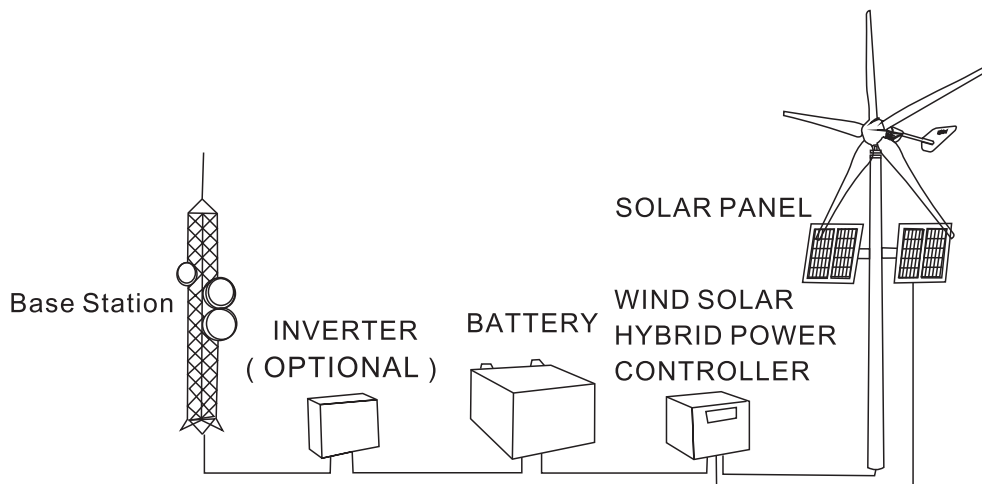


④ Pressing the cone onto the hub (strength equally).

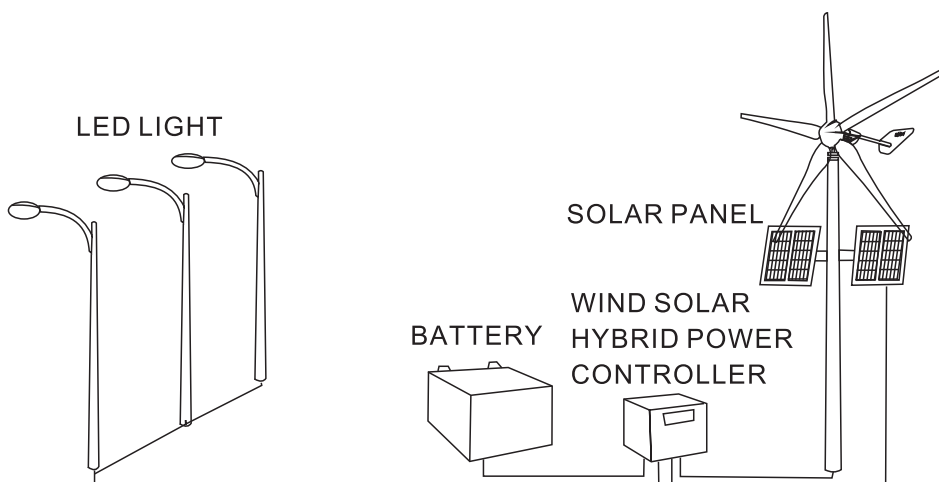
6 System Configurations

There are three common system configurations for MAX-600W MAX-800W MAX-1200W and MAX1600W series wind turbine:

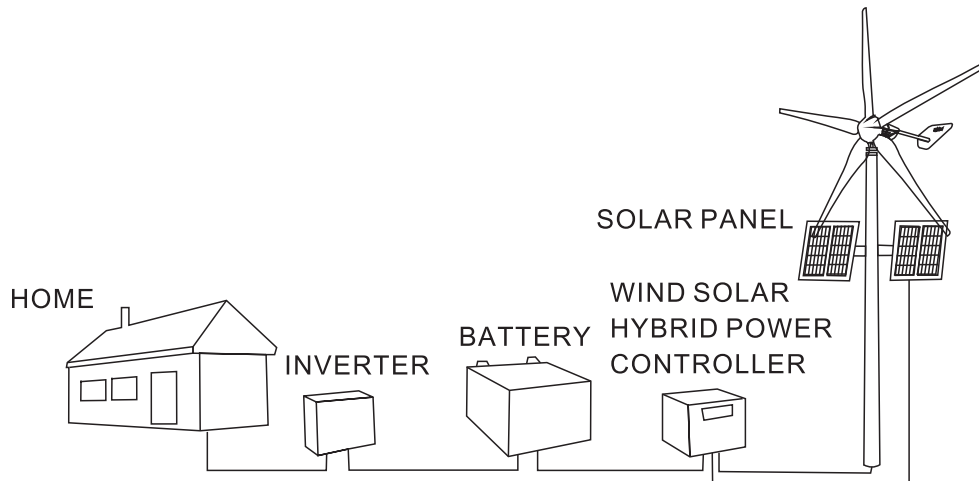
(A) Wind and Solar Hybrid Power System for Base Station:



(B) Wind and Solar Hybrid Power System for Street Light:



(C) Wind and Solar Hybrid Power System for Home



MAX Series Wind and Solar Hybrid Power System Configuration Introduction

6.1 Wind and Solar Hybrid Controller

Wind and solar Hybrid controller will be matched with MAX 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.

6.2 Inverter

For customers who need AC power, it is recommended to use AC220V/50HZ or AC110V/60HZ inverter, the capacity should be determined according to maximum electricity load.

6.3 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 MAX wind turbine owners. Negative pole of the battery should be a good grounding. The capacity must be based on electricity load of the owners.

6.4 Solar Panel

The common solar panel models for wind and solar hybrid system have the following standard:

Power(W)	Voltage (VDC)	
120W	18V	36V
150W	18V	36V
250W	18V	36V
300W	18V	36V

The capacity should be designed in accordance with wind turbine and local wind and sun resources.

6.5 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 MAX 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 : 24 Volt Systems, RVV /Metric Wire Size

Unit: mm²

NO. Of Turbines	0-9m	10-20m	20-40m	40-60m
1	4mm ²	6mm ²	10mm ²	16mm ²
2	6mm ²	10mm ²	10mm ²	16mm ²
3	10mm ²	10mm ²	16mm ²	16mm ²

No.Of Turbine	0-9m	10-20m	20-40m	40-60m
1	6mm ²	10mm ²	16mm ²	25mm ²
2	10mm ²	16mm ²	16mm ²	25mm ²
3	16mm ²	16mm ²	16mm ²	25mm ²

7 Debug and Test

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

7.1 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, loads;

7.2 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;

7.3 The wire leads of wind turbine and connection wires of battery should refer to 6.5 requirement and regulations;

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

7.5 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 blinking), measure output current by DC clamp meter, the current size depends on illumination intensity and battery capacity;

7.6 Wind turbine charging debug: wind turbine operation is normal or not when it is windy, while reach or exceed cut-in wind speed, the controller's 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;

7.7 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;

7.8 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.

The controller specification and detailed debug methods are subject to controller manual

8 Maintenance

Although your high reliability of MAX 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 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.

9 Trouble Shooting

9.1 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.

9.2 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.

9.3 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.

9.4 Wind Turbine Insensitive to Adjust Blades Direction

MAX 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.

9.5 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.

9.6 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.

9.7 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.

9.8 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;
- ④The mode setting on the controller is not correct and needs to be reset according to controller manual.

9.9 Wind Turbine Does Not Charge Battery

This situation is mainly caused by:

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

10 Packing, Transportation and Storage

10.1 MAX wind turbine components are packaged separately in accordance with national standard packaging requirements.

10.2 MAX wind turbine meets transportation requirements of all components.

10.3 MAX wind turbine meets storage requirements of all components.

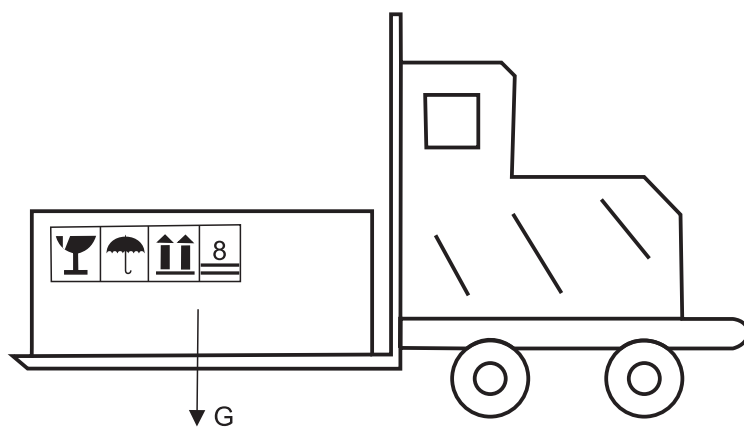
10.4 The packaging design of MAX wind turbine meets the following criteria:

GB/T 4857.3 Transport Packages Stacking Test Methods Using a Static Load

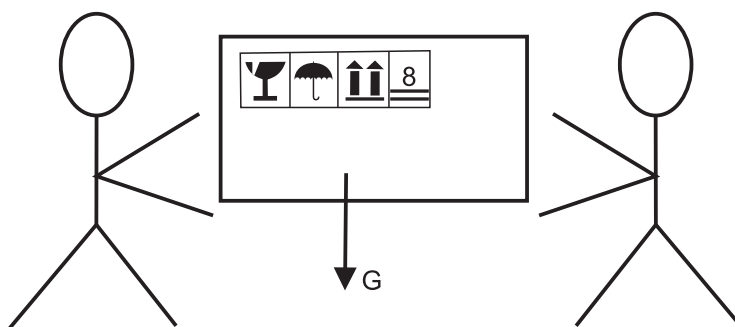
GB/T 4857.5 Transport Packages Drop Test Methods

GB/T 1974-88 General Specification for Transport Packages of General Cargo

Recommended handling ways:



Fork lift work



Manual work

WIND SPEED, WIND TURBINE AND NATURAL CONDITION COMPARATION

Tropical cyclone classification	Wind force	Classification	Wave height (m)		Appearance on Land	Appearance on Water	Wind speed(equivalent to 10m high of ground)		Wind pressure (10N/m ²)
			Usual	Highest			m/s	km/s	
	0	Calm			Calm, smoke rises vertically	Sea surface smooth and mirror-like.	0.0 ~ 0.2	< 1	0-0.0025
	1	Light Air	0.1	0.1	Smoke drift indicates wind direction. Wind vanes are still.	Scaly ripples, no foam crests.	0.3 ~ 1.5	1 ~ 5	0.0056-0.014
	2	Light Breeze	0.2	0.3	Wind Felt on face, leaves rustle, wind vanes begin to move.	Small wavelets, crests glassy, no breaking.	1.6 ~ 3.3	6 ~ 11	0.016-0.68
	3	Gentle Breeze	0.6	1.0	Leaves and small twigs constantly moving, light flags moving.	Large wavelets, crest begins to break, scattered whitecaps.	3.4 ~ 5.4	12 ~ 19	0.72-1.82
	4	Moderate Breeze	1.0	1.5	Dust, leaves and loose paper lifted, small tree branches move.	Small waves 1 -4 ft. becoming longer, numerous whitecaps.	5.5 ~ 7.9	20 ~ 28	1.89-3.9
	5	Fresh Breeze	2.0	2.5	Small trees with leaves begin to sway.	Moderate waves, 4-8 ft. taking longer from, many whitecaps, some spray.	8.0 ~ 10.7	29 ~ 38	4-7.16
	6	Strong Breeze	3.0	4.0	Larger tree branches moving, whistling in wires.	Larger waves, 8-13 ft, whitecaps common, more spray	10.8 ~ 13.8	39 ~ 49	7.29-11.9
Tropical depression		Moderate gale	4.0	5.5	Whole trees moving, resistance to walking against wind.	Sea heaps up 13 – 20 ft, white foam streaks off breakers.	13.9 ~ 17.1	50 ~ 61	12.08-18.28

Tropical storm	8	Fres gale	5.5	7.5	Whole trees in motion, resistance to walking against wind.	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks.	17.2 ~ 20.7	62 ~ 74	18.49-26.78
	9	Strong gale	7.0	10	Chimney destroyed	Violent waves along the direction of the wind, foam blown in dense streaks, wave began to roll over.	20.8 ~ 24.4	75 ~ 88	27.04-37.21
Strong tropical storms	10	Whole gale	9.0	12.5	Trees uprooted	Raging sea, long crests is rolling over, foam blown in dense streaks, the sea is white.	24.5 ~ 28.4	89 ~ 102	37.52-50.41
	11	Storm	11.5	16	onshore rare	Extraordinarily raging sea, the sea is covered by foam, waves break into spindrift everywhere, visibility is affected	28.5 ~ 32.6	103 ~ 117	50.77-66.42
Typhoon	12	Hurricane	14.0	--	wave monstrous	White spindrift is filled with air, the sea is totally white, visibility is seriously affected	32.7 ~ 36.9	118 ~ 133	66.42-85.1

MAX

INFINITE WIND