

**\*\*\*Please Read This Manual Carefully before Installation\*\*\***

# **User Manual For EFD Series Wind Turbines**



**(Applies to)**

**EFD 300W**

**EFD 400W**

**EFD 500W**

**EFD 600W**

**Service No. : 400 688 3971**

## Brief Contents

- Part 1) Brief introduction to wind turbines
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Thank you for choosing our Wind turbine. Before you install or use this product, please read through this manual carefully. This will help you use the product safely and efficiently. We hope you enjoy the product and have many years of reliable green power generation with this high quality Wind turbine.

This manual was updated in August, 2011, file number is: 0EFS.466.002.

For the latest changes or revisions to this manual, please visit [www.motiondynamics.com.au](http://www.motiondynamics.com.au) for downloading the latest updates.



### Warning!

Wind turbine systems can be a safe and rewarding experience, provided you follow some simple safety instructions.

A faulty system can be a danger, offering hazards from batteries, bad installation, support structure and more if not installed correctly.

A poorly fitted unit could collapse and potentially kill or damage property! If the system is connected to a AC power inverter, then high voltages from the inverter could cause injury or death!

These wind generators are designed for permanent terrestrial installation only.

Never stand in line with the spinning blades.

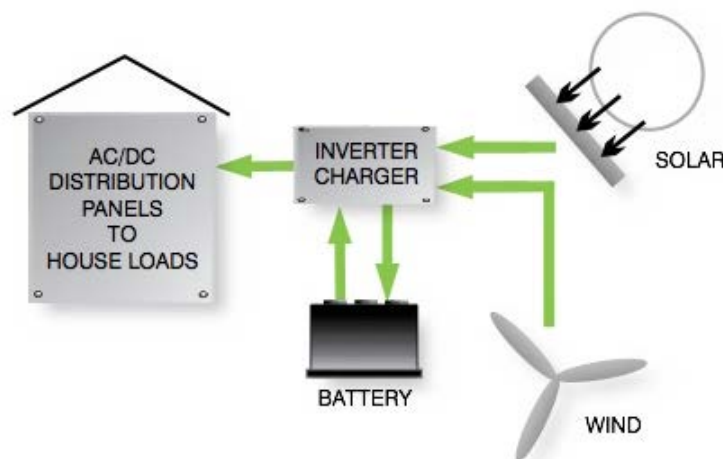
A vibrating wind generator can be potentially fatal, especially if a blade snaps. Never exceed the wind rating of the blades.

Disclaimer:

Unless specifically agreed to in writing, we:

- (a) Make no warranty as to the accuracy, sufficiency or suitability of any technical or other information provided in this manual or other documentation.
- (b) Assume no responsibility or liability for loss or damage, whether direct, indirect, consequential or incidental, which might arise out of the use of such information. The use of any such information will be entirely at the user's risk.

Typical setup application:



## Part 1) Brief introduction to Wind Turbines

Wind Turbines are an electrical device that transforms wind energy into electrical energy. Our wind turbine is welcome in many territories thanks to its high stability, high efficiency and reliable design.

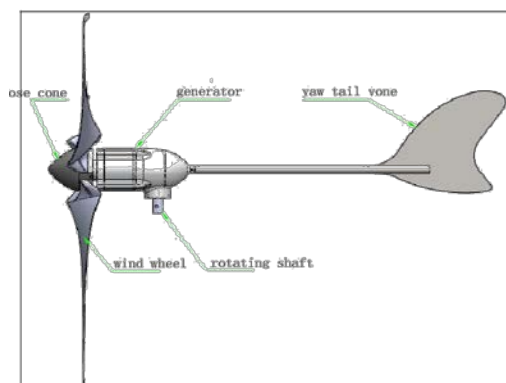
***Fan Blades:*** The blades are the most important part of the wind turbines ability to capture and convert wind energy. The manufacturer of the product holds dozens if patents in regards to the design and manufacturing processes of the fan blades. The design of the blade offers low start-up and cut-in speed, high aerodynamic efficiency which will go to speed-loss working

condition in strong winds, which helps to lower the possibility of the fan blades spinning too fast, which may damage the blades. Our blades are made of high strength reinforced fiber glass material, adopting new RTM technologies, along with modern vacuum processes to guarantee the blades won't be damaged under extreme wind conditions up to 35m/s.

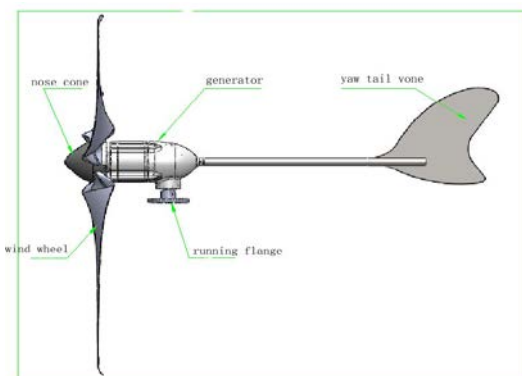
***Synchronized Permanent Magnetic Generator (hereinafter called PMG):*** PMG is the key parts of wind turbine. Our PMG use tombarthite as permanent magnetic material. Our PMG, with small size, low weight, high efficiency, low starting torque, have adopted many advanced technology, so it can be started with a low wind speed.

***Wind Turbine Unit:*** Our wind turbine has a long lifespan thanks to our design using superior Aluminum Alloys while adopting accurate die-casting technology and anticorrosion technology. It's the small things like this that make the unit suitable for placement in all kinds of environments.

Photograph of Wind Turbine



**Chart 1** Illustration of wind turbine without flange



**Chart 2** Illustration of wind turbine with flange

## Part 2) Select an installation area

The location where wind turbine will be installed, have an important effect on the usage and effectiveness of the wind turbine. Here's some aspects have to pay attention to:

a) **High annual average wind speed**

Output Power generated by wind turbine is in proportion to the cube of wind speed. So, the higher average wind speed is, the more electrical energy will be generated, the shorter the period for recovery of investment, the better economic benefit it will have. In each case, you should choose a good spot with high horizon and high average wind speed. There should not be any large obstacles around wind turbine. It should be mounted on a flat surface; while the suggested height of tower should be no less than 6-8 meters.

b) **Low turbulent environment**

The flow factors such as air velocity, air pressure changes randomly along with time and space. The disordered, circuitous tract of air molecule blends together, forms air turbulence. Working in turbulent area is very harmful to wind turbine, and could lower the life expectancy of the wind turbine, (or possibly even damage it).

In this regard you should choose another location for the wind turbine.

It should not be installed in circumstances where there's many cluttered buildings, trees or other obstacles that can create turbulence.

c) **Keep distance from resident**

There will be some noise while the wind turbine is working. To avoid angering neighbors or residents close the wind turbine, it's considered polite to install it as far away from areas where people live.

d) **Comply with local laws and regulations**

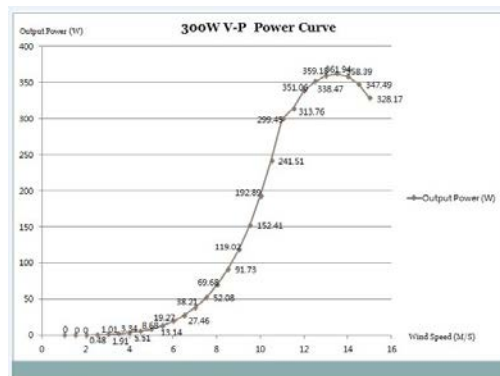
Any individual or organization who use wind turbine should follow the laws and regulations in local territory.

## Part 3) Specifications and performance of wind turbine

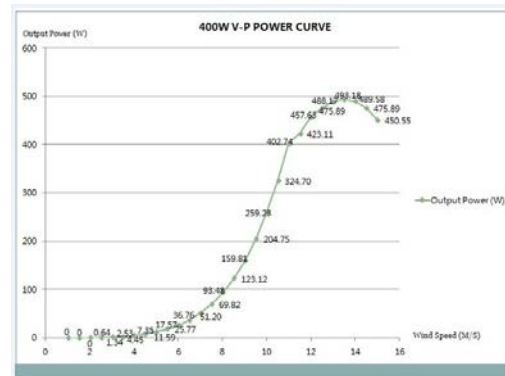
### A. Specification of Wind turbine

NAME	EFD300W	EFD400W	EFD500W	EFD600W
Rated Power (W)	300	400	500	600
Rated Rotation (RPM)	840	690	610	560
Rated Wind Speed (m/s)	11	11	11	11
Start-up Wind Speed (m/s)	1.8	2.0	2.2	2.0
Cut-in Wind Speed (m/s)	2.2	2.4	2.6	2.8
Survival Wind Speed (m/s)	35	35	35	35
Rated Voltage (V)	28/14	28/14	28/14	28/14
Rotor Diameter (m)	1.46	1.68	1.91	2.02
Generator	3 phase PMG	3 phase PMG	3 phase PMG	3 phase PMG
Speed Regulation	Electromagnetic Brake+ Ratio stall	Electromagnetic Brake+ Ratio stall	Electromagnetic Brake+ Ratio stall	Electromagnetic Brake+ Ratio stall

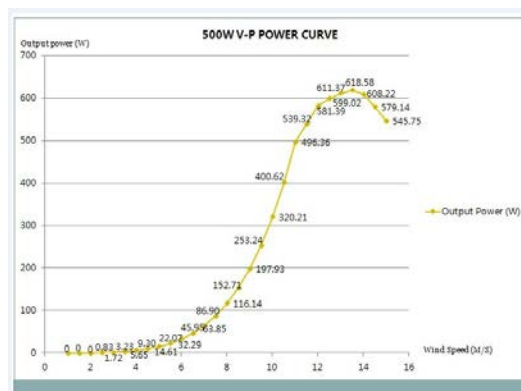
### B. Wind speed – power output curve of wind turbine



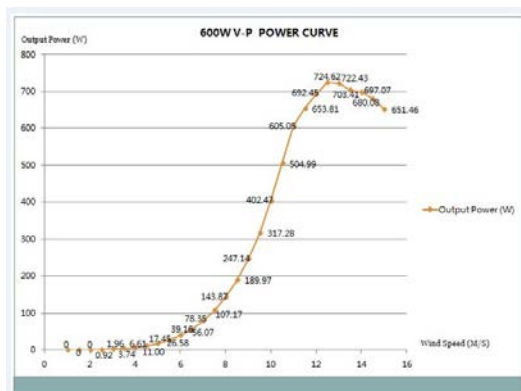
**Chart 3** 300W Curve



**Chart 4** 400W curve



**Chart 5** 500W Curve



**Chart 6** 600W Curve



## Part 4) Preparation prior to installation

### a) Select installation spot, prepare the foundation (to fix the tower)

According to the installation requirements, confirm the location where wind turbine will be installed.

To install the tower, it's better to choose mudstone geology environment. The length, width and depth of fundamental pit should be more than  $1/6 \sim 1/10$  of the height of tower. First put the steel reinforcement cage which connect with the flange of the tower in the pit, then pour concrete into the pit (The proportion of concrete is C10 to C20). Normally the curing period of concrete is 100 hours; so do not install the tower within the curing period of concrete.

The levelness of the flange of the steel reinforcement cage should be in horizontal, and keep it 30 to 100 cm higher to the ground. Wind turbines that are installed on fishing boats should be mounted in a stable part of the boat with good strength.

Remember to set the output wires for the wind turbine before you pour the concrete!

### b) Prepare the tower and relevant parts

Please check carefully the tower, controller, inverter, protection bush and wires before installation.

### c) Prepare batteries

Prepare batteries, and do initial charges to comply with technical regulations.

### d) Prepare tools, instruments and relevant materials

For tools, instruments and materials that are needed during the installation, please refer to the following form.

Tools list for installation				
No.	Tools	Quantity	Specifications	Remark
1	Internal hexagonal wrench	1	8 in 1	For wind turbine installation
2	Shifting wrench	1	12"	For wind turbine installation
3	Steel measure tape	1	3m	For wind wheel installation
4	Wire stripper	1		For connecting wires
5	Nipper pliers	1		For connecting wires
6	Insulating tape	1		For connecting wires
7	Multi-meter	1	Standard	For checking circuit
8	1.5m holder	1	handmade	For wind turbine installation
	Wires	1	3* $\phi 1.5\text{mm}^2$	
9	Hemp rope	3	$\phi 30/15\text{m}$	For tower/pole installation
10	Plain end screwdriver	1	Big/medium/small	For tower/pole installation
11	Cross screwdriver	1	Big/medium/small	For tower/pole installation
12	Leveling instrument	1	3m	For checking verticality

- e) Open the package and read the manual carefully  
Open the box, check the parts according to parts list, and read the manual carefully.
- f) Confirm the installation spot
- g) Prepare equipment that is needed during installation
  - 1. Prepare crane or other vehicle to install large tower or wind turbine.
  - 2. Prepare relevant brackets, holders and any ropes that are required.

## Part 5) Installation of wind turbine

- a) Install on sunny days when there is little to no wind. Installing during windy days is strictly prohibited (and stupid!)



**CHECK ALL PARTS IN CARTON**

1. Check all parts in carton

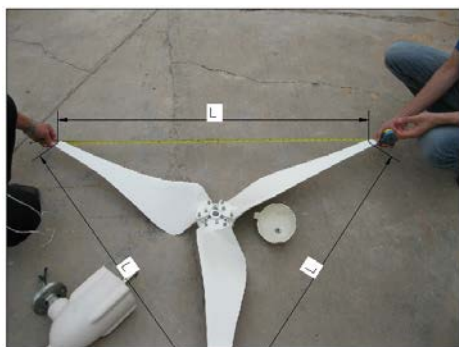
### BLADE ASSEMBLING



2. Take out the blades, hub and bolts



3. Fix blades to the hub initially



4. Make sure the length between each tip of the blades are identical.



5. Fasten all 9 bolts

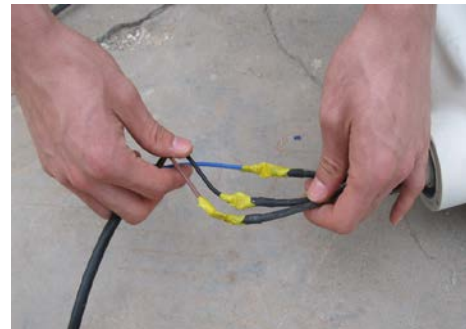
## WIRING



6. Put wires through the tower



7. Connect the wires between tower & PMG



8. Cover the connect point with insulating tape

## COPPER CONNECTING WITH POLE



9. Put extra wires into the tower



10. Without flange; fasten the bolt between tower and main shaft of the yaw body

## FLANGE CONNECTING WITH POLE



11. The generator is supplied with a flange fitting. You should manufacture your pole to suit.

## ROTOR SET INSTALLATION



13. Take off the cover on the generator shaft



14. Short-circuit the three wires of PMG and fasten the blades to the main shaft



15. Fasten the nose cone



16. Rotate the rotor and main body to make sure it spins freely

**FINISHED!!!**

## Part 6) Do's and don'ts for use

### A) Principles of use

1. The Wind turbine should be installed in an open area where there are no obstructions.
2. The AC generated by an off-grid wind turbine is converted into DC by the controller, and can charge a battery group. Remember not to overcharge or over discharge the battery; or the lifespan of battery may suffer.  
Users should adjust electricity consumption according to local wind conditions and regulate consumption to the wind turbines output power.
3. The 3 phase AC current generated by wind turbine is rectified into DC by bridge type rectifier in the controller, normally DC12V~DC14V (1 x 12V battery), or DC24V~DC28V (2 x batteries). The whole system will get the best efficiency when the battery voltage matches the output voltage of the wind turbine controller.
4. The input DC voltage of inverter should in accordance with wind turbines working voltage.
5. According to different requirements, the electric case should have both DC and AC output and be labeled. Be cautious while using mains power. And never attempt ANY installations with high voltages.

### B) Safety matters

1. Wind turbine working under no-load or continuous rotating speed is prohibited.
2. Check the tightness of bolts and fasteners regularly, if a bolt begins to loosen, it should be maintained immediately.
3. People are not allowed to stand under wind turbine when the wind wheel is in high rotating speed.
4. When the wind is predicted to be large than 10 grade, please stop the wind turbine by hand in time, and put the wind turbine onto ground.
5. Whenever there's abnormal noise or vibration while wind turbine is working, it should be stopped and checked.
6. The charging line of wind turbine should be unique, and cannot mix with other wires; it's more economic to use DC power on lamps; house hold appliances use AC power converted by inverter, and refrigerator should be plugged in to special plug seat with power-on-delay functions.
7. The battery should be connected first and later with output wires of wind turbine. When disassemble the system, should disconnect the output line of the wind turbine, and then batteries.
8. Always put the switch on the controller at "OPEN". This can be switched to "Close" only when batteries are fully charged or to avoid storms. Never switch this button when there's strong wind.
9. Batteries should be kept away from fire, heating places. The harmful gas generated

while charging should be let out.

### C) Keep the balance of the wind wheel

If there's any imbalance of the blades due to external damage, and lead to violent vibration, the device should be stopped and maintained immediately. To disassemble the wind wheel, you need firstly remove the nuts and gaskets at both ends of the shaft, using wrench to set the screw M16×100, and remove the wheel off the shaft (see picture 8). The imbalance torque of the wind wheel should not be larger than 0.05N-M after maintenance.

## Part 7) Maintenances in lifespan

### A) Maintenances:

1. The shaft and rotatable parts should be examined by visual inspection and noise inspection, to find any problems
2. All fastening parts should be washed and spread with antirust oil before rainy season every year.
3. All main shaft and rotatable parts should be lubricated every 3 years.
4. Every outer part should be cleaned, anti-dust, antirust and painted.

### B) Breakdown maintenances and elimination

Our wind turbine is designed and manufactured with advanced technology, correct installation and use won't lead to breakdown. In case of device breakdown, please refer to the following form for solutions:

Breakdown	Reasons	Methods to maintain
<b>Severe vibration</b>	1、Connecting parts loose 2、fixed bolt loose 3、blades damage 4、blades iced up	1、fasten the bolt 2、replace new blades 3、clean the ice
<b>Not yawing</b>	1、breakdown of shaft of yaw body 2、collecting ring breakdown	1、maintain or replace the shaft 2、repair or replace the collecting ring
<b>Abnormal noise</b>	1、fixed bolt loose 2、shaft loose 3、shaft damage 4、attrition between parts 5、rotor damage	1、check and fasten the bolt 2、check and maintain the shaft 3、replace the shaft 4、check and maintain 5、replace the rotor
<b>Rpm goes down</b>	1、Rotor breakdown 2、Shaft damage 3、short circuit 4、button on "Close"	1、replace the rotor 2、replace the shaft 3、check and repair the wires 4、switch the button to "Open"
<b>Low output voltage</b>	1、Low wind speed 2、rotor's demagnetization 3、short circuit or imbalance between phases of the generator 4、bad connection in collecting ring 5、short circuit in rectifier 6、wires too long under low voltage.	1、check the output voltage under high wind speed 2、replace the rotor 3、check and repair the wires 4、clean the collecting ring 5、repair the rectifier 6、shorten the wires, replace for wide wires



<b>No output ampere</b>	1、 open circuit or fuse melt 2、 output wires damage 3、 stator windings damage	1、 check and repair the circuit or replace the fuse 2、 check and reconnect the wire 3、 dismantle and repair the stator
<b>Normal AC output, but no DC output</b>	1、 output wires damage of rectifier 3、 Controller breakdown	1、 check and reconnect the wire 2、 repair or replace the controller
<b>Battery low Output</b>	1、 generator's low voltage output or no output 2、 bad connection of battery wires 3、 battery failure	1、 check the above and repair 2、 clean the connection point and repair, and paint protection oil 3、 replace battery