

**A. Notice**

<b>1.</b>	Information provided is believed to be accurate; however, Vorp Energy accepts no responsibility for incorrectness or exclusions. The user of this information and product assumes full liability and risk.	
<b>2.</b>	Specifications may change without notice.	
<b>3.</b>	Wind turbines must be installed following protocol established by local regulations.	

**B. Safety Precautions (Important)**

1.	Safety needs to be the fundamental interest as you plot the location, installation and operation. Take note of all blade, mechanical, and electrical risks.
2.	DO NOT install the turbine where one could access the blades.
3.	Use common sense
4.	During installing, make sure the turbine is not connected to the batteries.
5.	Ensure the blades do not spin freely until it is mounted on the pole.
6.	Never approach the turbine during operation.

**C. About this Wind Turbine**

1.	The turbine has an integrated charge controller with dump load. It controls battery charging and safeguards the turbine in high winds.
2.	The wind turbine is designed to charge Lead-Acid batteries. It is 12V/24V auto select. It can only work with a 12V or 24V battery voltage. Do not connect it to other voltage sized batteries.
3.	Ensure that the RED wire (+) of the turbine connects to battery V+ (positive) and the BLUE wire (-) of the turbine connects to battery V- (negative).
4.	Warranty does not cover damage from incorrect battery voltage or incorrect wire connection.

<b>D: Packing List</b>			
1	Main Body		1 pcs
2	Hub		1 pcs
3	Nose Cone		1 pcs
4	Blades		6 pcs
5	Tail Vane		1 pcs
6	Manual		1 pcs
7	<b>Fastener &amp; Tools</b>	<b>Pcs</b>	<b>Application</b>
	• M16 Nut	1	For Hub
	• $\Phi$ 2.5 Cotter Pin	1	For Hub
	• $\Phi$ 6*30 Screw	12	For Blades
	• $\Phi$ 6*25 Screw	3	For Tail Vane
	• M6 Nut (Nyloc)	15 + 2 (spare)	For Blades & Tail
	• 5mm Hex Key	1	For Screws

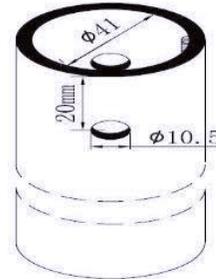
The image shows the assembled components of the wind turbine. A yellow nose cone is positioned at the top. Below it is the main body, which is a grey metal frame. At the front of the main body is a silver hub. Six white blades are attached to the hub. To the left of the main body is a grey tail vane. A small white envelope containing fasteners and a manual is placed next to the main body. Labels with leader lines point to each of these components: Nose Cone, Main Body, Hub, Blades (6), Tail Vane, and Fastners & Manual.

**E: Preparing for Installation**

<b>E.1</b>	<b>Tools for Installation</b>			
Multi-Meter	Soldering Iron	Electrical Tape	Wrench or Spanner	Screw Driver
<b>E.2</b>	<b>Pole</b>			
1.	The wind turbine was devised to suit an aluminum or steel tube with an inside diameter of 41mm. An inside diameter 41mm (1.6" or 1 5/8" steel pole is readily available water pipe or scaffold tube). Usually it has an internal weld seam. The wind turbine mount has a flat on one side to clear the seam. Please do not use plastic pipe!			
2.	A suitable mounting pole can be erected using a 6 meter galvanized pipe supported by 3 or 4 guy wires. (see Figure E.2.2 below)			
<b>Figure E.2.2</b>				
3.	Make sure there is a minimum of 20 inches of clearance provided between the blade tips and any obstructions. (see Figure E.2.3 below)			
<b>Figure E.2.3</b>				

4. Mark and center-punch two positions diametrically opposite, at 90° to the pipe seam, 1" from the top of the tube. (see figure E.2.4 below). Then drill two .5" diameter holes.

**Figure E.2.4**



**E.3 Wire**

1. If the cross section area of the wires is NOT sufficient, the wires will heat up and could create a fire hazard. Please choose the right size of wire.

**Minimum Wire Size (X-Section Area):**

Distance from batteries to Turbine	0-29 M	0-29 M	0-29 M	0-29 M
Wire X-Section Area for 12V Wind Turbine	44mm <sup>2</sup>	44mm <sup>2</sup>	44mm <sup>2</sup>	44mm <sup>2</sup>
Wire X-Section Area for 24V Wind Turbine	2.5mm <sup>2</sup>	2.5mm <sup>2</sup>	2.5mm <sup>2</sup>	2.5mm <sup>2</sup>

**E.4 Fuse**

The fuse size should be based on the SMALLEST wire (largest gage number) in the circuit. Use the following table to determine the maximum current for whatever wire gage is being used.

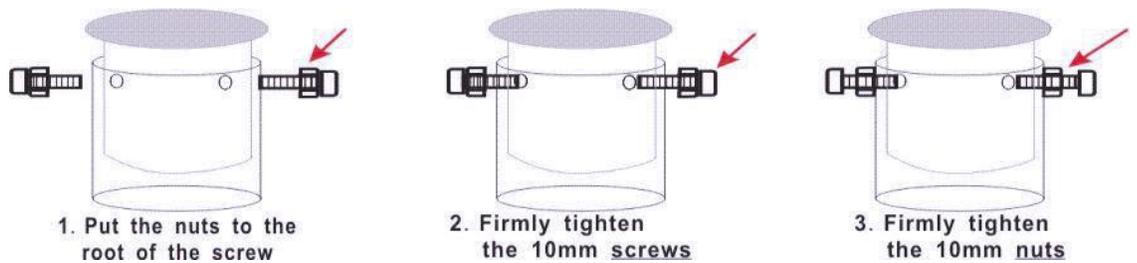
AWG Gauge	Maximum Current (A)						
1	238	6	74	11	24	16	7.4
2	188	7	60	12	18.6	17	5.8
3	150	8	48	13	14.8	18	4.6
4	120	9	38	14	11.8	19	3.6
5	94	10	30	15	9.4	20	3

Take the maximum current value obtained from the table and find the largest fuse you can find that still falls within the limitations. **DO NOT EXCEED THE VALUES ON THIS TABLE!** Common automotive blade-style fuses exist at 5A-20A in 5A Increments. Ex: 5A,10A,15A,20A

**F: Installation**

<b>F.1</b>	<b>Please follow these precautions during the installation:</b>
<b>1.</b>	<b>THINK SAFETY! Have someone available to help when installing.</b>
<b>2.</b>	Disconnect batteries from the Turbine.
<b>3.</b>	Be careful not to pinch the wires when attaching the turbine to pole.
<b>F.2</b>	<b>Step-By-Step Instructions</b>
<b>1.</b>	Connect the Wires and mount the Turbine
<p>Run the 2 wires from the battery location, through the pole to the top of the pole. DO NOT connect the wires to the battery until everything else has been completed. Strip the insulation back from each side of wires. Mark both ends of the wires with tape to identify the polarity: Red = Positive (+); Blue = Negative (-)</p>	
<p><b>Caution:</b> <i>If you are uncertain of the polarity of the wires, simply spin the rotor shaft clockwise and measure the voltage direction with a volt meter.</i></p>	
<b>2.</b>	Connect the Red(+) and Blue(-) wires from the wind turbine to the wires from the battery location. Insulate the connections using either heat shrink tubing or a quality electrical tape or wire nuts.
<b>3.</b>	Once the wires are attached to the turbine, gently pull the wires down through the tower sliding the yaw shaft into the steel pipe. Slide the yaw shaft down inside the end of the pole carefully, so as not to pinch the wires. Leave enough slack in the wires so that, if necessary, the turbine can be removed from the pole. Strain relieve the wires so the weight of the long wires isn't pulling on the red and blue turbine wires.
<b>4.</b>	Once the yaw shaft is mounted in the pole;
a.	First, firmly tighten the two 10mm screws with a wrench.
b.	Then, firmly tighten the two 10mm nuts.

**Figure F.2.4**



**CAUTION:** Make sure that your turbine is securely attached to the pole. Remember that this attachment will have to hold in high winds.

<b>F.3</b>	<b>Fix the Blades, the Hub, and the Tail</b>
<b>1.</b>	Hold the shaft with a screw driver, turn the Hub counter-clockwise to remove the Hub from the shaft.
<b>2.</b>	Attach the blades to the Hub. Securely tighten all the screws and nuts.

**CAUTION:** Make sure the front face of the blade is toward the wind.

<b>3.</b>	Put the M16 nut onto the middle of the Hub, then put the Hub on the top of the rotor shaft. Hold on the rotor shaft with a screw driver and turn the Hub <b>clockwise</b> to tighten it onto the shaft. (Figure F.3.3.)
<b>4.</b>	Insert the cotter pin into the small hole on the top of the shaft. (Figure F.3.4.)
<b>5.</b>	Assemble the nose cone to the head of the shaft by snapping into place.
<b>6.</b>	Attach the tail vane to the tail bracket, securely tighten the screws and nuts. (Figure F.3.6.)

<b>Figure F.3.3.</b>	<b>F.3.4.</b>	<b>Figure F.3.6</b>
 <p><b>Blades &amp; Hub</b></p>	 <p><b>Cotter Pin</b></p>	 <p><b>Tail Attachment</b></p>

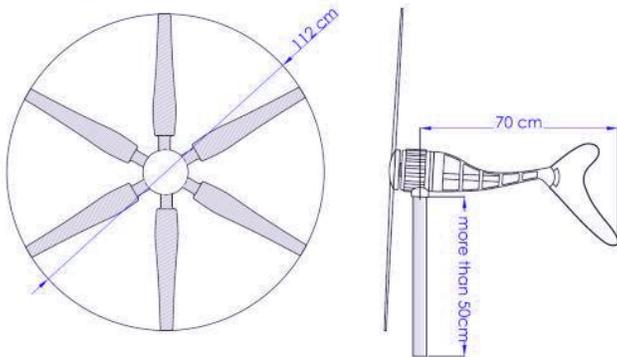
<b>F.4</b>	<b>Connect the wires</b>
<b>1.</b>	Run the wires from the wind turbine to the battery, fusing the positive wire with the correct fuse size (see section E.4). Attach wires to the battery. <b>Wind turbine Red = Battery Positive (+)</b> - <b>Wind turbine Blue = Battery Negative (-)</b>

**CAUTION:** If the battery is not connected properly, it may damage the wind turbine. Failure to Fuse the positive wire between the Wind Turbine and the Battery Array could cause risk of fire.  
Fuses are readily available at any Auto Supply Store.

**G: Operation**

<b>G.1.</b>	<b>Check support structures, blades, and electrical systems.</b>
<b>1.</b>	Do not let the rotor blades come in contact with a solid object. Use common sense about safety when locating the turbine.
<b>2.</b>	Before you inspect the wind turbine or approach the path of the blades, disconnect the power leads from the battery. The turbine should slow down or stop spinning. Be very careful when working near a spinning turbine. Wait till the turbine stops spinning then tie one of the blades to the mounting pole using a rope or bungee.
<b>3.</b>	Note: The bearings in the turbines may require about 100 hours of operation in normal wind before they are running at peak efficiency. It is called 'break-in period'.
<b>4.</b>	When expecting high winds such as from a Hurricane, it's best to remove the hub/ blade assembly before the storm and then re-install after the storm passes. Removal is simple and involves only one cotter pin and one nut.

**H: Specifications**

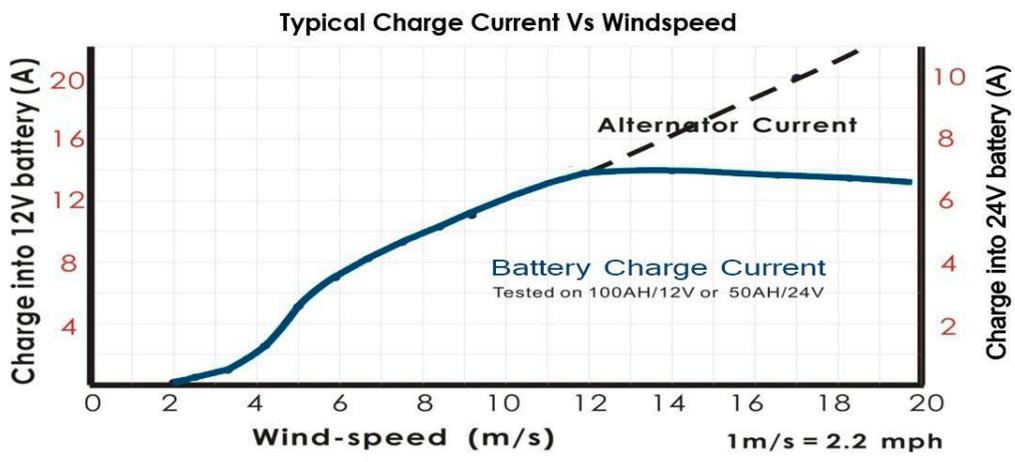
	Rotor Diameter	1.12M
	Net Weight	7.8Kg
	Cut-in Wind Speed	2.1M/S
	Rated Power	250W
	Max Power	400W
	Pole Dimensions (Inner diameter)	41mm
	Package Weight	9.5Kg

**I. Additional Information**

<b>I.1.</b>	<b>How the embedded controller works:</b>
<b>1.</b>	The embedded PWM controller is mounted inside the wind turbine body. It continuously monitors and controls the output of the wind turbine to optimize battery charging and protect the wind turbine from over-speed.
<b>2.</b>	The controller continually feeds any excess current to the embedded dump load located in the tail section of the turbine in order to control the wind turbine output and rotational speed.

**Caution:** *If the batteries are fully charged and the wind is strong, the dump load may get extremely hot. In order to avoid serious burns, never touch the dump load.*

<b>I.2.</b>	<b>Trouble shooting</b>
An AMP meter is recommended to be connected in your system, to verify the output current when the blades are rotating.	
<b>Problem:</b>	<b>Check to See:</b>
No Output	If battery is well connected.
	Battery voltage, make sure it is not over-charged, or failed.
	Disconnect Wind Turbine from batteries and measure voltage output when the turbine is spinning. Should be able to measure over 12VDC.
Vibration	Check if all the fasteners are fixed tightly.
Click-click noise	Check if all the fasteners are fixed tightly.
	Check if the blades move smoothly.
If you can't determine cause of the problems, such as: big vibration; no output; very small output in large wind. Please take the following steps:	
<b>1</b>	Uninstall the wind turbine immediately and check if there is obvious damage on the shell, blades or yaw part.
<b>2.</b>	Spin the shaft or hub by hand, to see if it is easy to turn.
<b>3.</b>	Disconnect the wind turbine from the battery. Spin the shaft or the hub, test the output voltage. This open-connect voltage can easily exceed 12V.
<b>4.</b>	Connect the turbine to the battery directly with an ampere meter, spin the turbine by hand or by tools, to see the charge current is OK.



## Limited Warranty

Vorp Energy wind turbines are supplied with a limited 2 year warranty which covers material and workmanship defects. **This warranty does not cover the following:**

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|----|--|
| 1. | Parts requiring replacement due to improper installation, misuse, poor site conditions, faulty power, etc. |
| 2. | Lightning damage.  |
| 3. | Physical damage to the external & internal parts.  |
| 4. | Products that have been opened, altered, or defaced.   |
| 5. | Units that were not properly grounded.   |
| 6. | Usage other than in accordance with instructions and the normal intended use.                              |

**Do not return any products until you receive a Return Material Authorization (RMA) number. Products received without a valid RMA number will be rejected and returned to sender.**

## Warranty Repairs

All returns must have a valid RMA number written clearly on the outside of the box. Without an RMA number the shipment will be refused. For customers located in United States and Canada, customer pays all shipping charges incurred to ship the product to Vorp Energy. Vorp Energy pays shipping charges to return the product to the original purchaser. For all other countries, the original purchaser shall pay all shipping, broker fees, duties and taxes incurred in shipping products to and from Vorp Energy. Provided the goods have not been modified or repair attempted by someone other than Vorp Energy, at the option of Vorp Energy, products may be returned either as repaired or replaced. If it is determined that there is no fault found (NFF) on a unit within warranty, the customer will be charged \$75 USD for testing time. For products out of warranty, the standard NFF charge is \$200. This charge will be at the discretion of Vorp Energy. The RMA number is valid for 14 days from date of issue. The product must be received by the repair depot within these 14-days or the shipment may be refused.

## Shipping and Damage Claims

All shipping damage claims are the purchaser's responsibility. Inspect each shipment upon delivery and immediately report all damage, to the carrier. There may be time limits and inspections may be required.

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