CUTTING EDGE
POWER
"Innovative Renewable Energy Solutions"

Mini Wind Turbine Design Guide

(15W and 33W Generator manual)

SAFETY INFORMATION

- This device is not a toy. Do not allow children under 10 years old to use this device without supervision.
- Do not allow children to play under a wind turbine.
- Ensure you have a strong foundation/mount for your turbine. Wind turbines are prone to a moderate amount of vibration, so it should be considered when designing your base/mount.

The warnings, precautions, and instructions discussed in this instruction sheet cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator. **While Cutting Edge Power is proud to be an American company dedicated to producing a high quality product, we are not responsible for any property or personal damage to you or your device due to use/misuse of this product. Always use good judgement and never try to modify or disassemble this product.**

Maximum Power Output	• Mini Wind Turbine Generator: Up to 15W • Cyclone Wind Turbine Generator: Up to 33W
Open Circuit Voltage	**Open circuit voltage** is the measured voltage of a circuit with no load (no current). **Variable. Based on:** • Wind speed • Blade type • Blade quantity • Blade size **Typically the open circuit voltage varies between 0-36 V DC.** The open circuit voltage will be higher with a higher generator RPM. It's important to remember that open circuit voltage only tells half the story: Once the generator is connected to a battery for charging, the output voltage will be "clamped" down close to the battery voltage. For example, a generator is producing an open circuit voltage of 30V DC. It's then connected to a battery with a voltage of 11.9V. The generator voltage output will then be clamped down to about 12.0V. It's typically normal and desirable to have the generator's output voltage clamped down close to the battery voltage. This is because it allows the maximum amount of charging current. However, it can be damaging to your battery if the turbine output is too high for the size of battery you're charging. In this case, we would recommend a charge controller. Check out our blog post here about charge controllers with mini wind turbines. **...So, why do we even care about open circuit voltage?** Two reasons: First, in order to charge a battery AT ALL, the open circuit voltage needs to be higher than the battery's voltage. Second, open circuit voltage gives a good overview of a generator's performance. It helps compare generators based on their performance. For example, generator A can produce 15V DC open circuit at 1000 RPM. Generator B can produce 15V DC open circuit at 3000 RPM. Generator B will need to be rotating much faster to charge a 12V battery than generator A.

Cut In Wind Speed

Variable. Based on:

- Blade type
- Blade quantity
- Blade size
- Turbine installation height

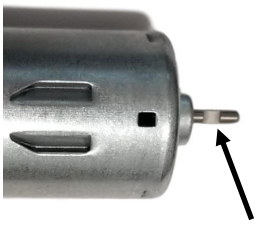
Cut In Wind Speed refers to the wind speed required to get the blades moving. It is entirely dependent on the above variables.

Blade Mounting

Ensure your blade(s) are press-fit firmly on the generator's shaft. **If your blade is not press-fit on, there is a chance it could fly off. Blades flying off are a safety hazard and should be dealt with in a serious way.** It's important to test prototypes in an area away from other people, children or pets so no one gets hurt.

Remember, a mini wind turbine is designed to rotate at around 1000+ RPM. Any loose parts will not last very long at those speeds. To put it in perspective, the average car/truck engine idle speed at a stop light is about 500-1000 RPM. Imagine a loose fan rotating on your car engine.

There is a flat spot on the generator shaft to fasten a safety set screw. We recommend a #4 set screw size.



Flat spot for set screw

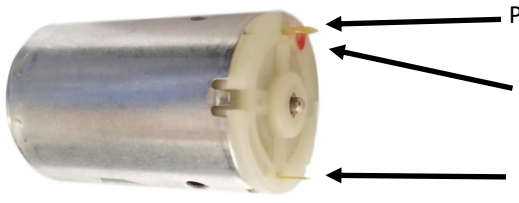
Generator Theory

You will notice that your Mini Wind Turbine DC Generator looks a lot like a DC motor. That's because it essentially **is** a modified DC brushed motor. However, It's far from any standard DC brushed motor. it's a special one designed specifically by Cutting Edge Power with a few things in mind.

- It's designed to develop the critical voltages that wind turbines need at low RPMs. This is achieved by altering the number and size of the copper windings internal to the generator.
- It's designed to handle the high vibrations that mini wind turbines are subjected to. This is achieved by using special weather resistant bearings on the front and rear shaft.

Wiring

On the back of the generator, the positive terminal is marked with a red dot and the negative terminal is not marked. This polarity configuration only works for blades that rotate counter clockwise (viewing from the front of the generator). ***If your blade rotates clockwise***, you must connect positive to the unmarked terminal and negative to the red terminal.



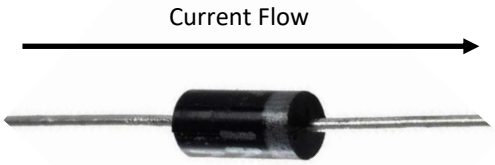
What is a Diode?

When charging a battery, you must use a blocking diode with this generator. If you don't, upon hooking up the generator to the battery, it will immediately start spinning like a fan.

Similar to a one way valve in hydraulic systems, a blocking diode only allows current flow in one direction.

The positive end of a diode is called the anode, and the negative end is called the cathode. Current can flow from the anode end to the cathode, but not the other direction.

When installing with our mini wind turbine generator, install diode in the positive (+) wire with the white band oriented toward the battery.



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