

# Wind Generator Installation Instructions

Welcome to your renewable energy system and many years of enjoyably producing your own electricity.

These instructions should be read with the 'owner's manual' as a supplement to ensure the safe installation and operation of your Aero Generator.

## **Before starting**

Your kit should contain the following items:

- 3 section tower, labelled upper, middle and lower;
- Tilt-up baseplate for the tower, including securing bolt;
- Wind turbine body including cabling and bolt for tail;
- Blade hub with 6 bolts and restraining pieces;
- 3 blades;
- Tail including 6 bolts for fin;
- Fin;
- A nose cone;
- 4 catenary wire pieces for stays (generally supplied as two uncut cables);
- 6 U bolts to secure catenary wire;
- 2 round spikes for securing footing;
- 3 or 4 guy anchors to secure catenary wire to ground;
- 3 or 4 turnbuckles with hook and eye ends;
- A charge controller
- An inverter

Click here for pictures of components (online only!):

[200W kit](#)   300W kit   500W kit   1kW kit

In addition to the above you will need to have suitable batteries, using 2,3 or 4 batteries depending on turbine voltage of around 100 Ah rating for each battery.

You will also need a North American style plug adapter (or two) for use with the inverter, these are available from supermarkets and electrical stores for around £3 each. The system beyond the inverter is not included in the kit.

You will also need to mix up concrete for the base of the tower and for the guyline anchors.

A trestle and various sizes of ratchet attachments and some other standard tools.

### **Wind Turbine Site**

You should place the turbine in the windiest position with some restrictions:

- The wind turbine should not be placed where children can meddle with it, it is not a toy. A falling tower is lethal.
- In case of catastrophic tower failure the turbine should not be within 10 metres of any building or structure likely to be damaged
- No individual should stand within a distance equivalent to the height of the tower when the wind turbine is turning, for safety reasons. Likewise, the turbine should be sited far enough from buildings and parked cars etc, so that damage to property is avoided if the tower should fail.
- The turbine does create noise, on a very windy day (25 mph plus) this can be appreciable, therefore the turbine should be sited as far away from neighbours and homes as possible
- You should attempt to estimate your prevailing wind direction and wind speed. Sometimes where there are buildings or trees nearby a small change in location may make a big difference to output.
- The ground conditions should be taken into account as the stays need to be very secure. Level ground is preferred to keep the stays similar lengths.
- Some consideration of storing the electronics should be given. It is better to make a small housing near to the turbine than have a long cable run to the electronics. It is more efficient to have a long cable run from the inverter to where the power is required, this is because at higher voltage less voltage drop occurs. However, the inverter will consume significant amounts of power when idling, so if you intend to keep your inverter switched on at all times, please consider using one of our optional low-consumption inverters.

### **Installation**

Your first consideration must be to position the tower correctly with the stays secured.

- Fit together the 3 parts of the tower (do not install the turbine at this point)
- Put the footing in the rough location you want to install the turbine
- Use the spikes to secure to the ground (approx 85% into the ground for now)
- Attach the tower to the footing using the bolt provided.
- Take the 4 catenary wire lengths and thread each one through all three hooks on the top section of the tower (newer turbines now have a tube welded across the diameter of the tower, through which the guywires should be looped).

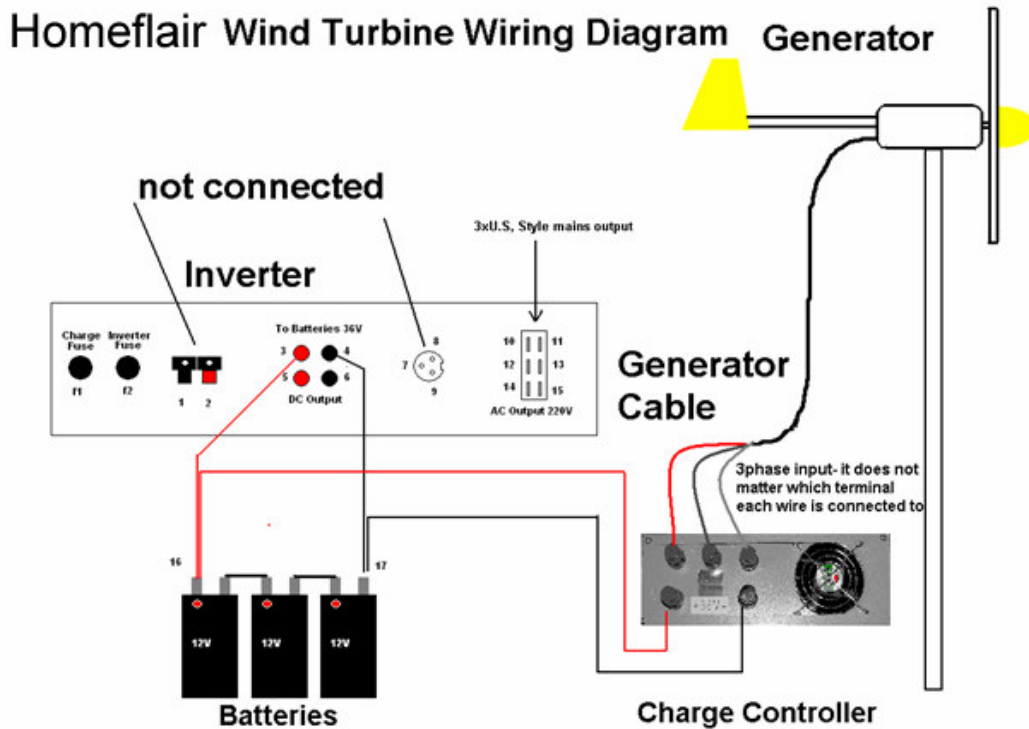
- Use a U-bolt to secure a 'loop'. Tighten but be aware that over tightening can lead to threading the bolts. I recommend using an extra U-bolt to double up at each end of each cable. The U of the bolt should always be fitted over the 'tail' of the cable.
- The lower end of the catenary wire fits through the eye of the turnbuckle. Try to keep all stays roughly the same length. Ensure the turnbuckles are adjusted to around the mid point to give some leeway with peg positioning.
- Fit the turnbuckle to the angle pegs. Estimate where these pegs should be placed, try about 6 paces away from the footing, they should be 90 degrees apart. The two guylines to the side of the tower can be tensioned, which will help stabilise the tower during erection. The pegs should be secure but not 'driven home'. This is because you will have to move them a few times.
- With assistance raise the tower, moving pegs or footing until the stays are correctly positioned. Also position the third peg. **WARNING:** A falling tower is lethal, always ensure you are out of its possible falling zone and take extreme caution, don't work on a turbine when you're tired or it's windy

### Tower and Turbine Installation

- Once the position is correct, take down the tower and secure the footing and pegs with cement. They should as far into the ground as possible, only the attachment hole of the peg should be above ground. Dig a hole where the peg will go and use roughly 25 kg of cement for each hole for the smaller turbines, more for the larger turbines. Pegs should be angled away from the turbine to give extra strength. The base of the hole dug for the concrete should be wider than at ground level. ***These specifications are given for guidance only. The requirements will vary according to the wind turbine size and the maximum wind experienced by your particular site. Please check with an engineer before commencing.***
- Do not work on the turbine again until cement is fully cured.
- Once cured, place the wind turbine body on the top tower section threading the electrical cable through the tower first. It is easiest to do this section by section, pulling the cable fully through the top section before threading it through the middle section. Use the 2 bolts to secure the wind turbine body to the tower (6 bolts on newer models).
- Once threaded, reassemble tower and use a support (e.g. a carpenter's trestle) to support the tower and turbine to give ground clearance.
- Take the long tail and attach to the turbine using the bolt provided. It only fits one way.
- Bolt on the fin to the tail, again it only fits one way.
- If you have assistance to raise the tower you may also wish to add the hub and blades and the nosecone. Some people prefer to assemble the hub and blades then place on the turbine once it is up using a long properly secured ladder/step ladder/tower scaffolding.

- The blades only fit one way on the hub, be careful not to over tighten the bolts securing them. The convex side always is to the rear of the turbine.
- Tie one blade (not too tight) to the tower to ensure the blades to not turn until the electronics are complete.

## Electronics Installation



- **SAFETY WARNING** - Always remove all metallic jewellery before working on any electronics equipment, especially batteries. Short circuits of batteries to jewellery can lead to loss of a finger: you must take off jewellery and rings especially.
- Wiring is straightforward if you follow the labels on the equipment.
- Warning: The wind turbine and its electronics will be damaged (outside of warranty) if allowed to run without all connections being made and batteries in the circuit. Never run it any other way. Do not attempt to run any electrical equipment directly from the wind turbine without the batteries and charge controller being connected.
- The cable from the turbine is 3 phase, this means all have the same output. They connect to the regulator where the three terminals are labelled 'to wind turbine'. Take off the outer sheathing of the cable to expose the 3 wires inside, cut the string, and remove the sheathing of these wires and attach.
- For connection to battery follow the labels, ensure you have the correct polarity
- Ensure the batteries are arranging in series correctly. To make 2 x 12 volt batteries into a 24 volt bank, one of the negative terminals must be connected to the other batteries positive (just like putting two

batteries in a torch). This method extends to 3 or 4 batteries to make 36 or 48 volt banks. Test the voltage with a multimeter to check the bank voltage is correct (though please note 12 volt batteries should measure over 12.5 volts and can measure as much as 14 volts, this is normal).

- The inverter should now be connected following the labels. The inverter does not have to be switched on constantly, you can keep it off to save power if not in use. It should always have the battery voltage on one of the meters.
- Please note, if you have connected batteries with a low state of charge the inverter may show a voltage error, give your batteries time to charge if this is the case. The inverter will cut out when the voltage falls below a critical level to prevent battery damage.
- Batteries are critical to the system. Many types that look ok are in fact not suitable. Car batteries are not designed for lengthy usage and are not appropriate. Do not use gel cell batteries - these are designed for constant current charging through part of their charge cycle - you cannot do this with wind power! Instead, we recommend that you use deep cycle wet lead-acid batteries. We can supply these at competitive prices if required - please ask for details.
- In most cases, you should also consider fitting a diversion load controller to prevent overcharging of the batteries - we recommend using the Xantrex C35 or similar.

## Wind Conditions

Your wind turbine is a low-wind speed model - this means that it is designed to provide decent amounts of power in low wind speeds when other wind turbines would be producing little or nothing. However, it is not designed to operate at high wind speeds - the maximum wind speed it can handle is 40m/s. If you expect winds above this speed, then the turbine should be immobilised - either by lowering to the ground, tying a blade to the tower or by electrical braking. If you intend to use the turbine in an exposed site, where wind speeds or gusts expect to exceed this figure, you can trim the blade length to improve the wind-resistance. However, this will reduce the sensitivity and will reduce the output in low wind conditions.

Your Aero Generator will now give you many years of trouble free service. If you need any other equipment or need to have a larger machine in the future or perhaps have a local market and wish to purchase a number of turbines please get in contact with me.

Until then, happy wind turbinning!