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Ampair 100 Wind Turbine

A complete wind turbine system for land or marine use

The Ampair 100 wind turbine has an unrivalled pedigree as the microwind turbine of choice for absolute reliability for charging battery systems in harsh conditions. Although it only generates up to 100 watts of electrical power in practice it often outperforms so-called 400 watt machines because of its very good low windspeed performance.

- Generates up to 100 watts for 12 volt or 24 volt battery systems.
- Designed to survive the severe marine environment.
- Heavy duty, all-weather generator, sealed to keep corrosion out.
- Permanent installation as a fit & forget unit.
- Found in many other applications such as weekend chalets, radio repeaters, navigation equipment or anywhere that requires 12v/24v battery charging.
- Save the cost of fuel and the need to run noisy engines. Reduce engine running under light loads.
- Supplement solar charger output with energy that is potentially available day and night; winter and summer.
- Improve battery condition and extend battery lifetime. Increase battery charging out of summer season when electrical demand increases but sunlight reduces.
- The Ampair 100 frequently produces in a day what an equivalent costing solar array would take a week to accumulate. The only penalty is the need to have a safe and secure mounting in as exposed a location as possible but just think of all that ENERGY



Models and colours

The Ampair 100 is available in white, or black & silver. For the last five years the white version has been called the Ampair Pacific 100 and the black & silver version has been the Ampair Hawk 100. They are available in either 24 volt or 12 volt configurations. All versions have the same no-compromise design for use throughout the world in hot or cold climates; lowland or high plateau; marine or desert.

Performance

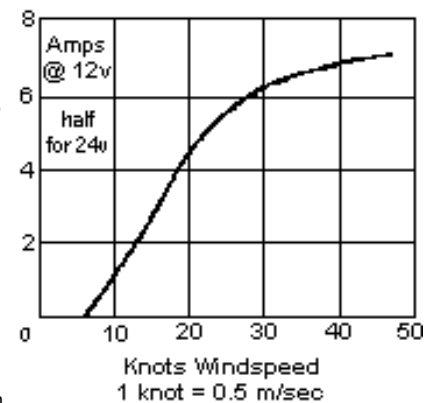
Up to 100 watts of power is developed by the permanent magnet alternator. The design allows the charging of totally flat batteries and prevents reverse current flow due to internal rectifiers. The machine has no commutator brushes to wear out and cannot overheat. It requires no thermal cut-outs, chokes or other forms of control to safeguard generator & protect windings from burn-out. Slip rings and brush gear allow the wind turbine generator to seek the wind and feed two wires connecting directly to the battery.



Power output

With the Ampair 100 the output is continuously available. The maximum current automatically flattens out at a safe value, due to self-inductance of the heavy duty windings. Similar sized machines, with low inductance and light duty windings, have to be protected against burnout by the use of temperature activated cut-out switches which interrupt charging. CHECK performance figures of alternative machines which only give best case figures while concealing reduced average output when machine is in cut-out mode. Ampair current (Amps) values are continuous.

- Halve amp values for 24v generator.
- Charging values decrease only slightly with rising battery voltage.
- For Amp Hours per day, multiply charging current at average location wind speed by 24.
- For Amp Hours per week multiply by 168.
- For Watt Hours multiply Amps by 12.5V by hours.
- Windspeed: 1 Knot = 0.5m/sec
- A Pacific generator can charge a battery simultaneously with other sources such as solar panels and an engine driven alternator.



Reliability

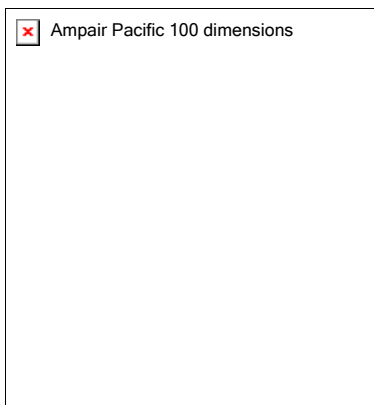
A highly reliable microwind turbine is especially important for unattended and remote installations. In the Ampair 100 this is achieved by the extreme simplicity of the direct drive alternator and total sealing of internal electrical and mechanical parts. It is built to professional standards and easily outlasts cheap and lightweight alternatives. Offers superior value for money. In ten years of coastal operation, an Ampair microwind generator does as many revolutions as the engine of a car on a one million mile journey!

Size

- Optimised for use on small yachts, where space is limited and large units can be unsafe.

Special features

- Smooth running and quiet balanced six-bladed wind turbine with blades replaceable as matched pairs.
- Fully enclosed and sealed pivot and slip ring assembly allows unlimited weather vaning.
- Compact tail fin minimises turning radius.
- Shaft seal protects front bearing of generator. All other parts fitted with seals.
- Pivot axis aligned with centre of gravity of unit to minimise effects of yacht motion or turbulent wind conditions.
- Charging levels do not appreciably diminish as battery voltage increases.



Materials, and low temperature operation

Excellent corrosion resistance is achieved by the exclusive use of aluminium alloy, stainless steel and plastic materials for all external parts, backed up by the comprehensive use of elastomer seals and topped off by a stoved white paint finish. Plastic materials do not perform well in extreme cold, becoming brittle and breaking. This applies to wind turbine blades, whether glass filled or not. Operation at around zero Centigrade should not be a problem, but most materials are vulnerable at -20C and cannot be warranted to survive. The Ampair 100 uses glass filled polypropylene blades, moulded with large sized fibres in a compression process, which are superior to nylon, carbon polymer or other plastics in this respect. However, when icing is also considered, the prediction of blade reliability is even more difficult. Other materials are also suspect. Examples are Nitrile used in exposed seals and O-rings and basic PVC cable sheathing. For this reason Ampair uses Neoprene components where possible. Grease used in sealed bearings allows performance to -30C or below, but component tolerances (ball and ring) can lead to greater friction and increased wear causing reduced bearing life. If desired Ampair can quote for special components to operate in Arctic/Antarctic conditions.

Maintenance and recommended spares

The Ampair 100 is designed so that users can strip it down in the field and replace those components that wear out over time or that become damaged in accidents. In remote locations or on long sailing voyages accidental damage is always a possibility. We suggest that two spare wind turbine blades be carried. Other spares to consider are: Pivot Seal, Shaft Seal, Set of Brushes and Caps.

Mounting options

Ampair manufactures a range of mountings for the Ampair Pacific 100. Some are only intended for use on boats, some are only intended for use on land, and some can be employed in both situations.

Mizzen bracket

The Ampair 100 **mizzen bracket** for ketch mounting is bolted or riveted to the mast and is constructed of 100mm x 50mm aluminium alloy box section to withstand torsional loading from any wind direction. Finish is stoved white paint. This bracket can be fitted to masts of differing dimensions by bending the fixing plates to suit or packing with spacers. Bracket is then bolted or riveted in position. Installation can be above or below a radar scanner without threat of interference.



Stern mount kit

The Ampair Pacific 100 **stern mount kit** consists of two white stoved aluminium extension tubes and joiners, strut to backstay, two stainless steel wire side stays, all necessary fasteners and 2 base mounting brackets.

When installed the lowest blade tip height is 2.2m (7 feet) above the deck.

Mounting Note:- The thrust loading of the wind turbine far exceeds the gravitational weight of the generator in a storm. This factor must therefore be taken into consideration when selecting and designing an installation. The mounting should be substantial and braced by at least 2 solid stays at right angles or 3 equally spaced wire stays, or a combination. This is why the kit includes one solid stay and two guy wires.



Gantry mount

Ampair manufacture a basic gantry mount which can be installed on stern gantries of cruising yachts, or also on suitable land locations.



Guyed or unguyed masts

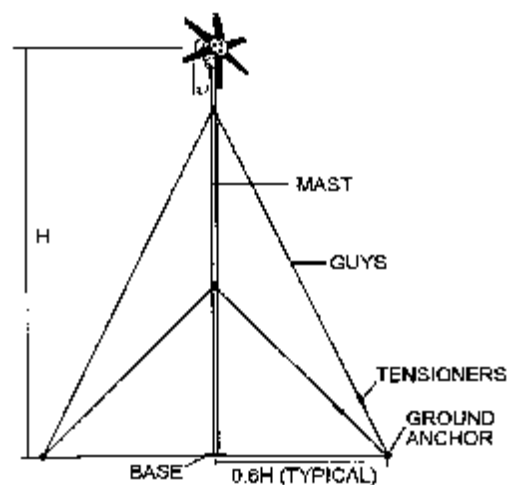
Ampair can supply prefabricated masts, but many clients choose to manufacture their own locally. Free-standing installations should generally conform to the sketch on the right

Mast

Mast of steel tube (water pipe or scaffold tube), alloy tube or wood (telegraph pole) If the guys are unsuitable (grazing cattle), then use a telegraph pole one third buried or a lattice tower as an expensive alternative.

Guys:

Usually galvanised steel wire protected by plastic sheath and fitted with end thimbles. Do not use a material that will stretch or deteriorate. Three equally spaced guys (120 degrees) will assist raising and lowering the assembled mast. A high mast will require intermediate guying. The top guys hold the mast upright, the lower prevent it from buckling. The top fixing point should allow for minimum overhang of the generator i.e. be only a short distance below the wind turbine blade tips.



Tensioners:

The simple and easiest method of tensioning guys, but adjustment must be uniform, since it is the guys that resist the thrust of the wind turbine.

Ground anchors:

These should be suitable eyebolts fixed in the ground and in line with the guys. Anchors in soft earth may require concrete. Gravel or

clay soils require "auger" type anchors and rocky ground may need drilling and expanding rock anchors. Only the eye should be visible above ground. Avoid waterlogged soils which have poor holding and anchor below the frost level.

Base:

This is to carry the weight of the generator and mast only. Fixing again depends on the ground state but metal pegs driven into soil are often sufficient. A lattice tower would need a concrete base with rawlbolt fixings. It is often convenient to make a pivot arrangement for the base in-line with one guy anchor to aid raising and lowering. Generally, the mast is light enough not to require a gin-pole arrangement to raise or lower it with a winch.

Lightning:

Directly earth all metalwork. Bury output cables (1/2m depth) between mast and battery position for better protection than suspending in air. Either run cabling through plastic conduit or use a type specified for burying.

Adaptors



Ampair 38mm to 40mm adaptor

The older Mk I Ampair 100 units have 38mm OD pivot shafts and this adaptor allows the newer Mk II Ampair Pacific 100 to be inserted in the same mountings. Made from anodised alloy.

Ampair DIY scaffold pole adaptor

Many clients choose to manufacture their own land mountings using 48mm OD scaffold pole. This adaptor has a 48mm ID section at one end to suit a scaffold pole and a 40mm ID section at the other end to accept an Ampair generator. Made from anodised alloy.

Ampair DIY pole

Many clients wish to manufacture their own mounting solutions using Ampair supplied marine grade poles. These are of powder coated aluminium alloy and are available in 0.8m lengths, 1.2m lengths, and 2.4m lengths. All are drilled to suit the Ampair pivot shaft fixing. Joiner sections can also be supplied.

Ampair 100 charge control regulators

AMPAIR manufactures three 100 watt power **Charge Control Regulators** in 12-volt or 24-volt options for protecting lead acid batteries from overcharge. They are not "shunt" type regulators, which dissipate excess charge as heat, but an electronic power switch which disconnects the generator from the battery at the regulation voltage.

Choosing an Ampair 100W charge control regulators

Model	Voltage	Number of inputs (Aquair, Ampair, or solar)	Number of outputs (battery banks)
S-1B-12	12 volt	One	One
S-1B-24	24 volt	One	One
S-3B-12	12 volt	One	Three
S-3B-24	24 volt	One	Three
D-1B-12	12 volt	Two	One
D-1B-24	24 volt	Two	One

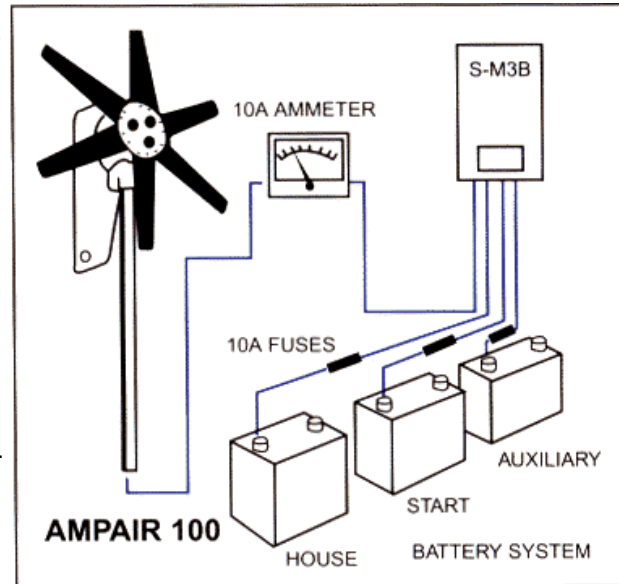
Regulators S-1B & S-3B have a single 100 watt input (Ampair, Aquair or Solar) and 2 level sensing. Regulator type S-M1B has one output battery connection and regulator S-M3B has three output connections to serve up to three battery banks. The third Regulator D-M1B has two 100Watt inputs (any two from Ampair, Aquair or Solar), supplying a single battery bank at a fixed regulation voltage.



Advanced operation of Ampair charge control regulators

Ampair charge control regulators continuously monitor the battery voltage. The lower voltage (Lo) connection regulates at 0.4 Volts

below the high (Hi) connection, "Hi" connection is appropriate for liquid electrolyte batteries and/or live aboard situations. "Lo" connection for gel batteries and/or infrequent use. The battery voltage is sensed at the regulator output connection therefore install the regulator as near the battery as practicable and keep the connecting cables short. All regulators feature the same multi-stage regulation programme which has regulation voltages of Lo = 13.6v Hi = 14.0v. for 12V systems (27.2V & 28V for 24V systems). Charging is continuous until the Lo or Hi voltage is reached, depending on the battery output used. The generator is now disconnected from the battery. Off-charge, the battery voltage will fall. At a voltage of 0.5V below the regulation voltage a 30 second time delay is activated. This delay prevents the regulator from oscillation (hunting) when charging batteries under load.



After 30 seconds has elapsed the generator/battery connection is remade and charging continues to the regulation cut-out voltage. A cycle counter counts the charge/disconnect cycles and at the tenth cycle increases the regulation voltage for one cycle only by 0.4 volt to Lo = 14.0v or Hi = 14.4v for 12 volt systems (0.8V for 24V systems Lo = 28.0V, Hi = 28.8V). This provides an equalisation charge for the battery. Subsequent cycles return to the lower settings until a further 9 cycles are completed.

Ammeter: We recommend fitting an ammeter (see our price list) to monitor charging.

Fuses: Battery protection fuses should be fitted. Use 10 Amp values in 12 volt systems, 5 Amp for 24 volts