

MarineKinetix MK450

Marine Wind Turbine

INSTALLATION AND OWNER'S MANUAL



**99 SOUTH HARRIS RD
PIEDMONT, SC
USA 29673
(864) 214-5337**

Thank you for purchasing the MarineKinetix MK450 wind turbine.

**PLEASE READ THIS MANUAL THOROUGHLY BEFORE
INSTALLATION AND KEEP IN MIND ALL SAFETY INSTRUCTIONS
AND WARNINGS.**

We recommend installation by a qualified professional marine electrician. A professional installation will ensure that you have proper wire-sizing, grounding, and appropriate electrical safety devices. Our warranty does not cover damage resulting from improper installation.

The cruising lifestyle is all about independence; doing your own thing, on your own time, and on your own terms. It's about freedom from the constraints of city-life, and the ties to shore, without giving up all of the creature comforts that make life enjoyable. Unfortunately, many of these comforts require energy, and that is where the MarineKinetix MK450 comes into play.

The MarineKinetix MK450 has been developed to provide reliable, abundant 12 or 24 volt power, with virtually no maintenance, so as to ensure many years of quiet enjoyment. Our priorities in development were:

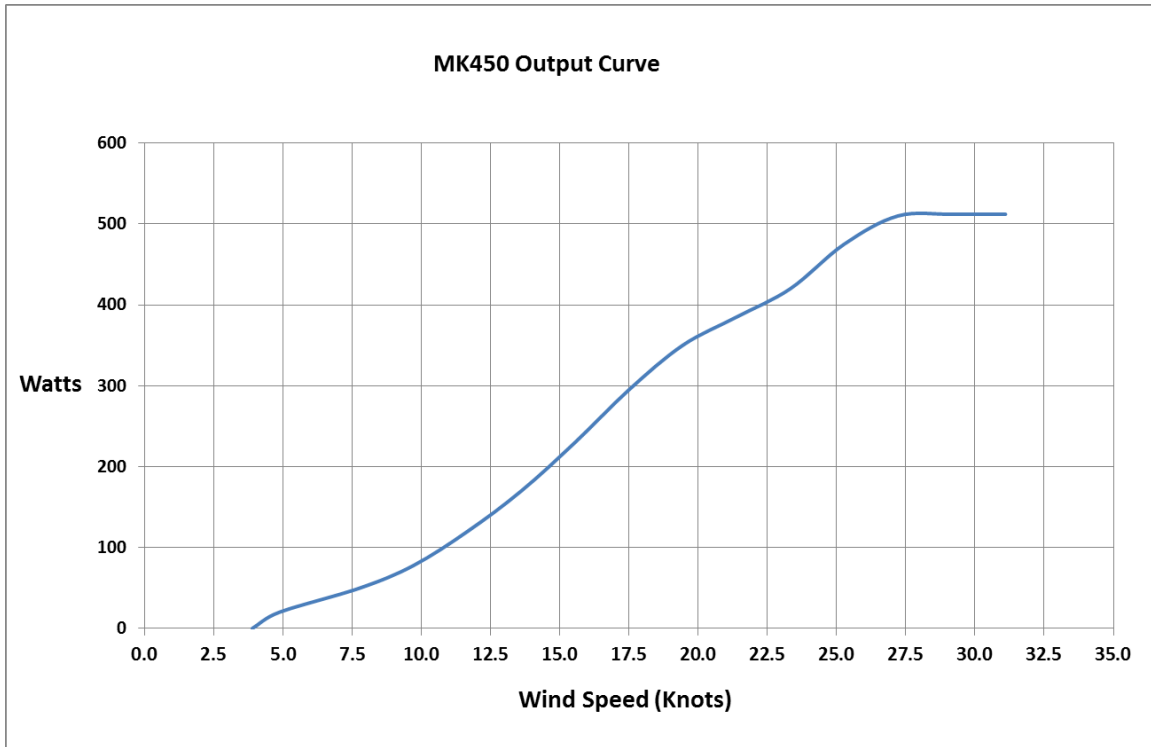
- High output in low wind speeds
- Compact size and attractive appearance
- Quiet in all wind speeds
- Self-regulation with no user activity required
- Reliability without maintenance

While the initial appearance of the MarineKinetix MK450 may be familiar, the technology and performance are innovative and unique in this market.

We are certain that you will be well satisfied with your purchase and have backed it with a full 3-year warranty on materials and workmanship. However, reliable operation will not only depend on our product quality, but also on your assembly, installation and proper wiring.

NOTICE: The information contained herein is correct at time of publishing. However we assume no responsibility for inaccuracies or omissions. The user of this information and product assumes full responsibility and risk.

1.1 General information and references:

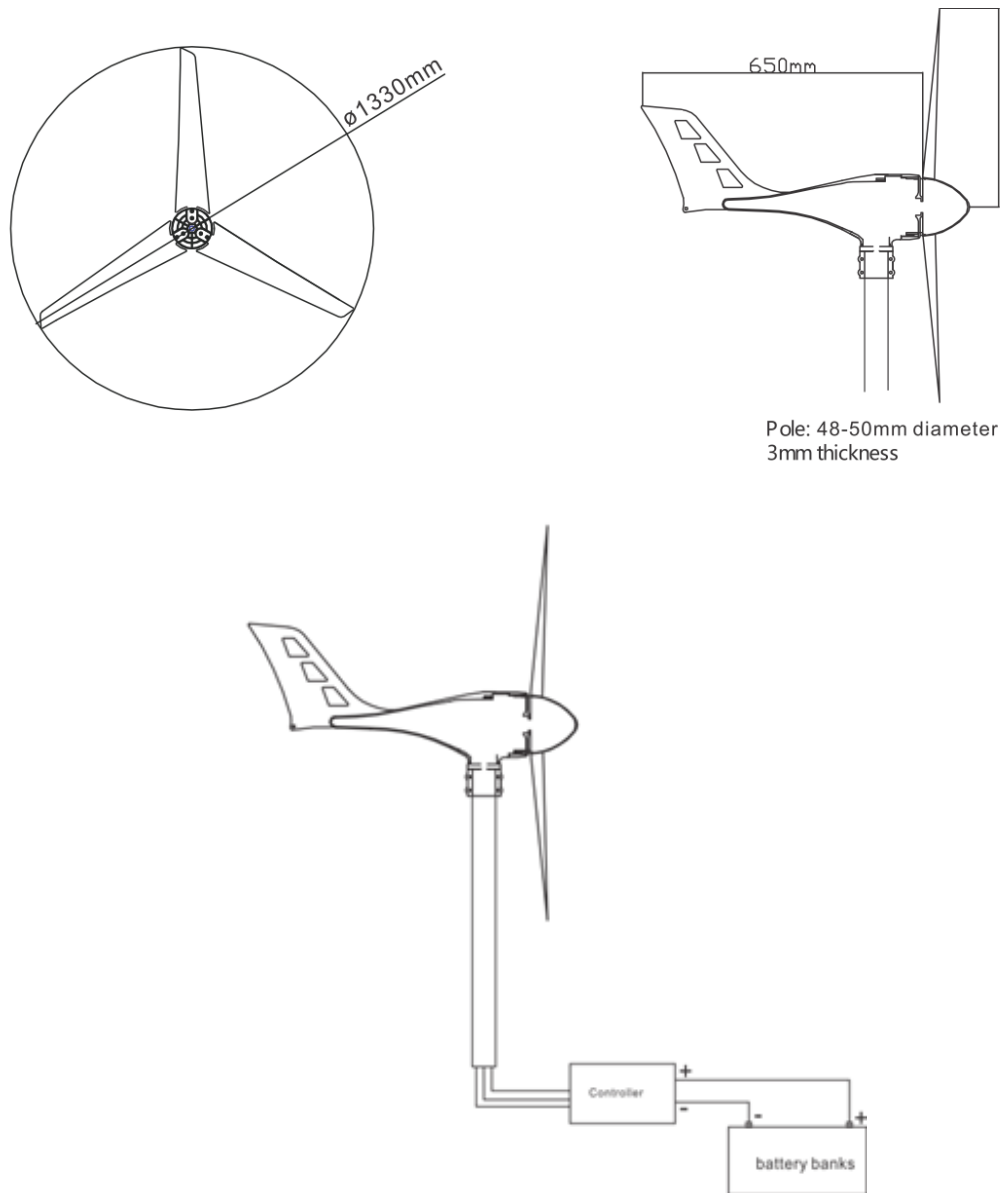


The electricity generated by the MarineKinetix MK450 is converted from 3-phase AC to 12 volt DC power by the Micro-computer Controller. This DC power can be used to operate 12 volt appliances directly, charge 12V batteries, or operate AC appliances with the use of an AC Inverter (not supplied). A 24 volt model is also available.

Ideal applications include sailing vessels, campers or RVs, summer homes and cabins, industrial or agricultural applications; basically anywhere power is required off-the-grid.

The MarineKinetix MK450 can also operate in combination with solar arrays, or water generators. Such "Hybrid" systems take advantage of available kinetic energy whenever it is available, thus minimizing your required battery capacity.

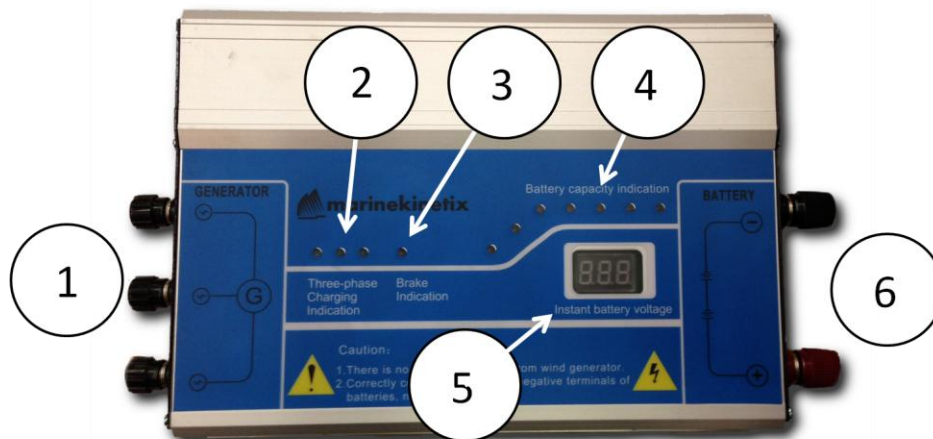
1.2 MarineKinetix MK450 Wind Turbine Schematic & Features



- Compact design 1.3 meter diameter wing-span
- Innovative quiet blade design with aero-coustic leading edges and tips
- Pre-balanced blade set with 20% carbon fiber reinforcement (CFRP)
- Upright tail with vented section for low yaw-error and clean tracking
- Powder coated aluminum/magnesium alloy housing
- Maintenance free operation
- 3-year warranty

1.3 Microcomputer Controller Features and Indicators

1. These (3) 5mm terminals are for connecting the 3-phase wiring from the generator. It is not necessary to wire these in any particular order.
2. These 3 LEDs indicate that the generator is making power on all three of the phases.
3. This LED indicates that the charge controller is in hysteresis braking mode because the batteries are full. In braking mode the 3 LEDs in #2 are off.
4. These LEDs indicate the percentage of battery charged (40-100%).
5. This display indicates the current battery voltage.
6. These (2) 6mm post terminals are the output to the battery. Correct polarity must be maintained.



Functions:

- Rectifies 3-phase AC to 12 or 24 Volt DC power
- Maximizes charge with Pulse Width Modulation
- Slows or stops turbine with PWM when current limit point exceeded
- Slows or stops turbine with PWM when voltage limit point exceeded
- 3 LEDs indicate 3-phase power available to the controller
- Single LED indicates when charge is being regulated
- 7 LEDs indicate percentage of battery charge
- Digital LCD display indicates battery charging voltage
- Quiet computer fan cools unit when regulating

2 Safety Instructions

Please follow these instructions carefully. The information provided is for your safety during mounting, operation, and in case of trouble. If you have any additional questions, please contact your dealer directly by phone or e-mail before proceeding.

2.1 Mechanical Dangers

The main danger is the spinning blades. The blades are sharp and can be revolving at extremely high speeds capable of causing serious injury.

Never touch the turning rotor or attempt to stop it manually. Under no circumstances should you mount the wind turbine where it is within reach, or can be accidentally touched, while in operation.

2.2 Electrical Dangers

Cable sizing is very important. Undersized cables can heat-up and cause fire. Care should be taken NEVER to short-circuit the batteries. Batteries should be located in a ventilated area as charging may produce hazardous gas.

Do not install the charge controller near flammable vapors.

3 Specifications

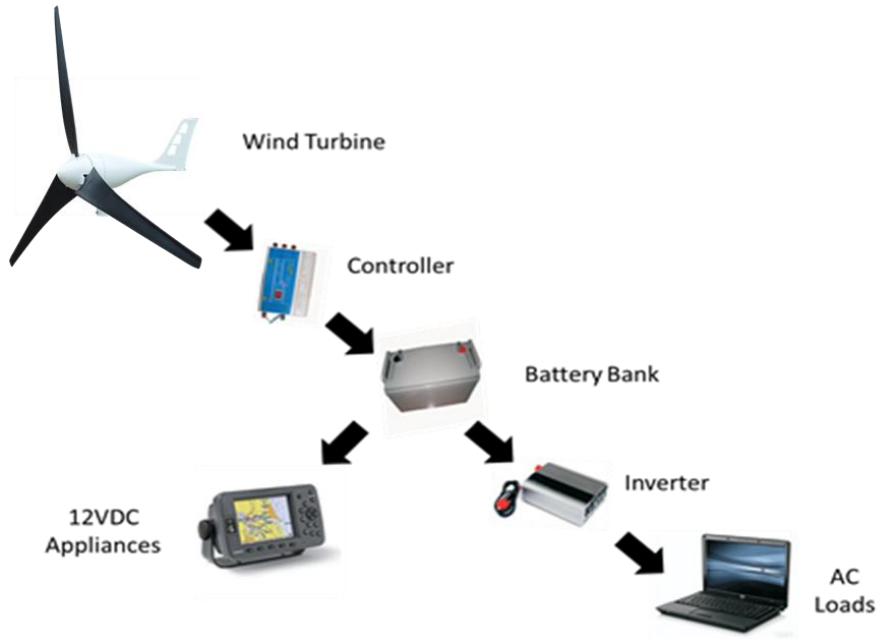
3.1 MarineKinetix MK450 Technical Data

Model	MK450
Rated power	450 watts
Max power	500 watts
Rated wind speed	14 m/s (28 kts)
Start-up wind speed	2.5 m/s (5 kts)
Rotor diameter	1.3 m
Number of blades	3
Blade material	Carbon-fiber reinforced composite (CFRP)
Body material	Powder-coated magnalium
Rotor speed	500-1000 rpm
Machine	Neodymium Iron Boron, 3-phase AC output
Rated voltage	12V DC or 24V DC
Brake	Electromagnetic brake
Weight	17 lbs.

3.2 Charge Controller Technical Data

Rated power	450 watts
Dimensions	24 X 17 X 4 cm
Weight	1.25 kg (2lb 12 oz)
Voltage	12V DC (24V DC model available)
Wind turbine braking voltage	14.5 V (29V on 24V model)
Recovery voltage after braking	13V (26V on 24V model)
Charge current max	28 Amps (17Amps on 24V model)
Controller Mode	Pulse Width Modulation
Display parameters	Battery charging voltage
Working temperature/humidity	-20 to +55C / 35 to 85% RH
Standby current	≤ 20 mA
Protection function	Battery overcharge protection Battery undercharge protection Overload protection Turbine current limiting Turbine automatic brake Controller temperature protection Turbine over-speed protection

4 Installation & Setup



4.1 Carton Contents

A. Generator	1 piece
B. Hub	1 piece
C. Nose Cone	1 piece
D. Bolts	10 pieces
E. Nylox Nuts	10 pieces
F. Urethane Pad	1 piece
G. User Manual	1 piece
H. Blades	3 pieces
I. Controller	1 piece

Extra bolts & nuts are provided. If you are missing any components, please contact your dealer immediately.

Please check all contents before beginning your installation



4.2 Additional Required Materials (not supplied)

You will require materials specific to your application and choice of mounts. These will include the following:

- 6mm eyelet (ring) or lug type terminals for wire connections, sized for your wire
- A marine-grade terminal block or suitable plug-type connection to connect the wind turbine wires to your cables. We don't recommend butt connectors, as this junction may connect wires of different sizes
- 3-Wire 12 AWG wiring to run from the wind turbine to the Charge Controller (up to 30'). Use 10 AWG if using two turbines
- 2-Wire 10 AWG wiring to run from the charge controller to the battery (up to 30'). Use 8 AWG wire if installing two turbines
- Four (4) #10 mounting screws or bolts for mounting charge controller
- One 1½" Schedule 40 **pipe** (1.90" OD), or 48-50mm OD **tubing** of adequate height to mount the generator
- One base mount for the pole
- Two 1" diameter poles with brackets for lateral support
- Two base mounts and collars for the lateral supports
- Assorted screws, connectors and wire wraps for installation
- Waterproof gasket or gland for wires to enter deck or hull
- Fuse (50A) or manual reset type circuit-breaker is recommended between Charge Controller and positive (+) terminal on battery
- Marinekinetix recommends using Eck[®] Corrosion Inhibitor on all fasteners to prevent galling and corrosion. It can be ordered through www.marinebeam.com
- While a stop switch is not required, it is possible to add one to this installation as an option. Please contact us for wiring instructions if you intend to add a stop switch.

Notes on Pole Mounting:

For marine applications we recommend 1.5” Schedule 40 aluminum or stainless-steel pipe (1.90” OD), or 48mm - 50mm tubing, supported by at least two 1” triangulated lateral supports. Marine fabricators or handy sailors can configure a simple mounting solution. Standard marine mounting hardware kits are available on the market, and we also recommend the boat-specific mounting kits from Kato Marine (www.katomarine.com).

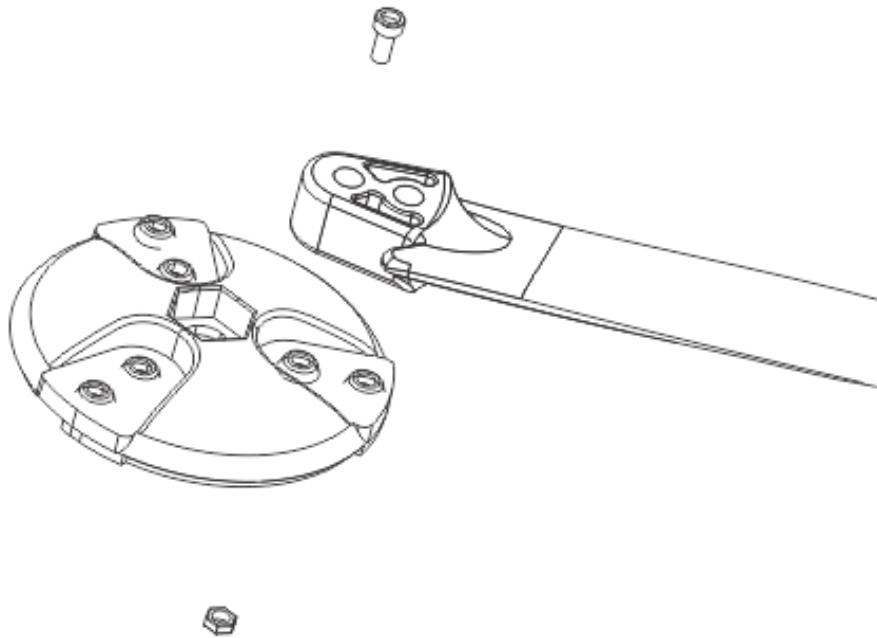
Pay careful attention when selecting the mounting location to be sure that the blades cannot come in contact with crew or rigging under any circumstances, and that the turbine’s wind is not blocked by major obstructions in any direction. Generally the turbine should be mounted as high as practical, and the mounting system should be exceptionally sturdy, and take into consideration the forces generated by high velocity winds and heavy seas.

4.3 Layout and Preparation for your project

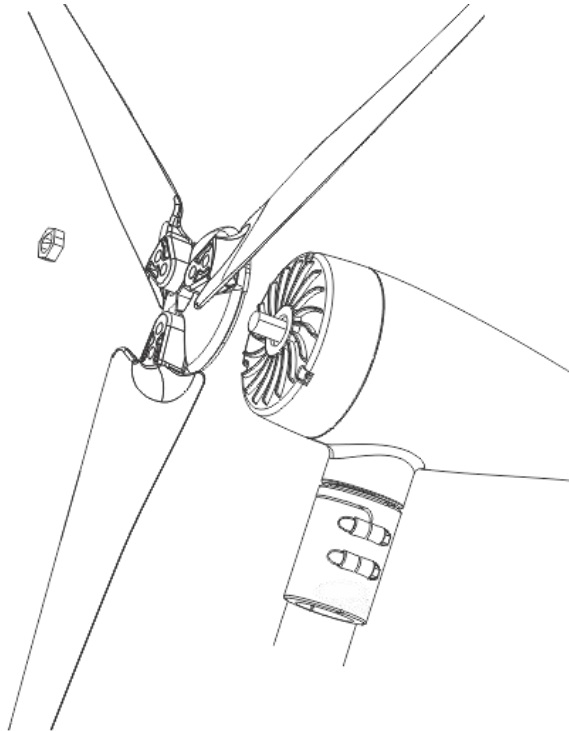
- Locate base mount and support pole positions, and install pole. These support areas should have solid laminate, or backing plates installed from below
- Locate a suitable spot for controller located as close to the turbine as practical. It should be mounted in an area with easy access, and a good line-of-sight to the display. Provide a good buffer of open space around the controller for air movement and cooling. If locating in bunk areas, keep in mind that there will be lights and a computer fan operating occasionally, as well as periodic switching when regulating (some low-level clicking noise from the internal relay)
- Measure wiring runs, including bends, etc., and gather appropriate eyelet type lug terminals. You will need one terminal on each end of each wire
- Route all cables with proper wiring practices (large radius bends, chafe protection, tie-wraps, cable-glands, fuse-protection, etc.), and use properly-sized marine grade cables. Use waterproof cable glands where wires penetrate the deck

4.4 Assembly

- Wait for a calm day before mounting the turbine
- Disconnect the batteries during installation
- Install all required 3-phase AC wiring from top of pole to controller site, and route DC wiring to the area adjacent to the battery
- Attach each of the 3 blades carefully on the hub by placing Nylox nuts in the captive socket and screwing the bolt in securely (~5 ft-lbs.), making sure that the blades retain their alignment. The counter-sunk hole on the blade faces up, and accepts the cap bolt.



- Attach the Rotor assembly (hub and blades) onto the generator shaft and torque nut (shaft) securely with included Allen wrench without exerting undue force (~22ft-lbs.)



- Curl the urethane pole cushion and slide it into the collar
- Connect the 3 wires to the 3 wires exiting the top of your pole (no polarity required). We recommend a terminal strip, wire nuts, or plug connection here (avoid butt connectors). Protect from corrosion.
- Restrain the blades with a line or shock cord and slide the collar (with cushion) onto the pole. Fully seat the collar to find the fully seated position, and then lift it about 1/8" to unseat it slightly before tightening the clamp bolts using the Allen wrench (this provides a slight gap between the pole and the collar allowing the cushion to dampen any vibrations).
- Clip on the nose cone securely
- Connect the 3 wires to the Charge Controller.
- Connect the 2 wires from your battery to the Charge Controller, **carefully observing correct polarity**. We recommend a 50A fuse between the controller and the battery positive terminal (+).

4.5 Start-Up

- Carefully remove the restraining device from blades during calm weather to allow blades to turn freely
- Discharge batteries to below 13V (26V for 24V model) to begin automatic charging from turbine. This can be done by running high-wattage appliances, lights, etc.
- Once the wind begins turning the blades, the red LED indicator on the bottom of the turbine will begin to blink, and then go steady as the wind picks up. This confirms that the machine is making power
- Confirm that the 3-LEDs on the controller indicate that 3-phases of power are present from the turbine
- The controller display will indicate battery-voltage, and the 7-LEDs will indicate state of battery charge
- If the shunt light indicates, then the batteries are nearing full charge, and the controller will begin slowing down or stopping the turbine via hysteresis braking. The 3-phase indicators will also turn off.
- Charging voltage and current are a function of wind-speed, and battery acceptance rates (% of charge)
- If you experience any vibration, check that the blades are fully seated, fully tightened, and flat on the hub

4.6 Maintenance and Operation

- You will immediately notice that the MarineKinetix MK450 wind system is a super-quiet, self-regulating, and hands-off system that needs no regular interaction from the user. There are no diversion loads, and no need for extra relays, switches or buttons. There is generally no need for manually furling, however, in tropical storm and hurricane conditions we recommend removing the unit completely from the pole. Never attempt to stop the unit by hand.
- After several hours of initial operation, check all of the wiring terminal connections, as well as the mounts, blades, and associated hardware. Re-tighten if necessary. You may wish to leave the nose cone off for the first week for easy access.
- Blades and turbine mounts should be cleaned and inspected every month or so. Wash off any salt deposits regularly with fresh water.

Warranty

Marinekinetix warrants your product to be free from defects in material and/or workmanship for a period of 3 years from original date of purchase. Warranty coverage is extended only to customer (original purchaser).

If product proves defective during warranty period, Marinekinetix, at its option will:

1. Replace wind turbine with new or refurbished product.
2. Correct reported problem

Customers warranty continues to be valid on repaired or replaced product from original warranty date.

Restrictions

This warranty covers defects in manufacturing discovered while using the product as recommended by the manufacturer. The warranty does not apply to:

- a) Equipment, materials, or supplies not manufactured by Marinekinetix.
- b) Product that has been modified or altered other than by Marinekinetix, or without prior Marinekinetix approval.
- c) Has been exposed to winds exceeding 100MPH
- d) Lightning or hail damage
- e) Repairs performed by other than authorized Marinekinetix support staff
- f) Normal wear and tear, and corrosion from exposure to the marine environment
- g) Acts of God; misuse, negligence, and accidents

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