

WIND TURBINES DESIGNED FOR RESIDENTIAL, AGRICULTURAL AND CORPORATE CUSTOMERS



JUST PLUG IT IN...

Endurance 
wind power

GREEN ENERGY THAT WORKS... RELIABLE, QUIET, EFFICIENT, DURABLE, SAFE



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ENDURANCE WIND TURBINE DESIGNED TO ENDURE

1. Fiberglass blades use high-performance airfoils designed specifically for insensitivity to roughness (bugs and dirt), low Reynold's number operation (low speed) and stall control (constant speed operation), making the Endurance one of the quietest running small wind turbines in the world.
2. Rotor Hub is a sandwich construction for high strength and long life, with taper-lock bushing connections to the main shaft for easy alignment and high torque capacity.
3. Dual pneumatic brake calipers operate independently to ensure redundant, failsafe protection against over-speed, making the Endurance safe for residential, agricultural and corporate uses.
4. Large 16" brake disk provides high torque capacity, and is located close to the turbine rotor for maximum safety.
5. Main shaft bearings were selected following detailed engineering analysis for extreme loading, maximum deflection and extended life. Bearings are housed in pillow blocks for self-alignment and ease of serviceability.
6. Induction generator delivers grid-compatible power eliminating the need for an inverter, batteries or any other power electronics, thus improving efficiency, increasing reliability and lower product costs.
7. Gearbox is an inline helical with a 9:1 gear ratio, a high service factor (2.4) for long life, and a hollow shaft for direct connection to the main shaft (no couplings).
8. Tail orients the rotor upwind of the tower using free yaw, thereby minimizing yaw error operation and eliminating tower shadow noise.
9. All electrical and electronic controls are neatly housed in a panel at the base of the tower, making maintenance and servicing quick, convenient and easy. The turbine system is tied directly to the electric grid at the control panel, similar to any large appliance.
10. Tower is available in heights of 63', 84', 105' and 126', designed with tilt-up convenience for ease of installation and maintenance, and maximum safety. (Inquire about other tower options).

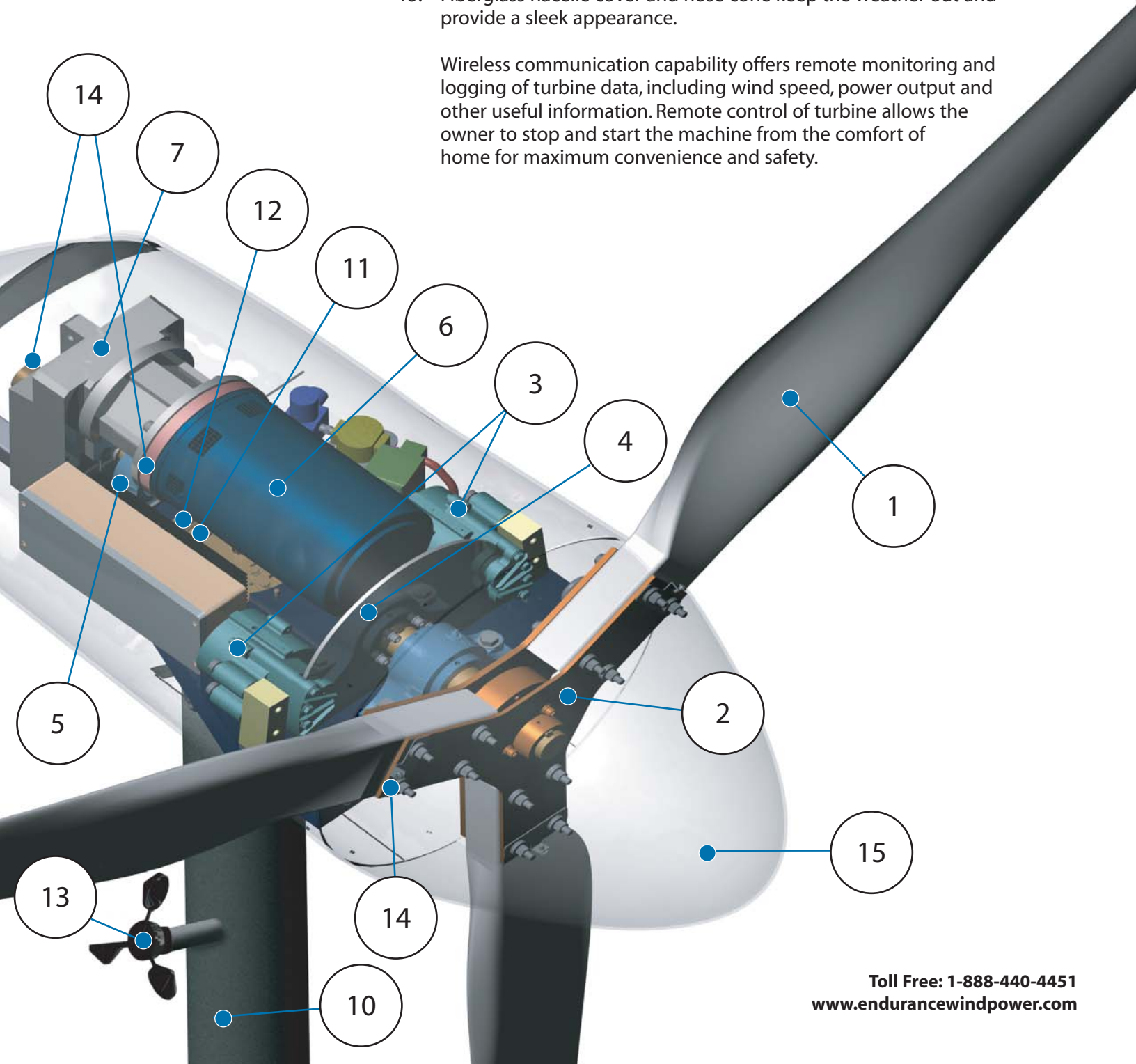


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Designed by a team with decades of specialized experience in the wind energy industry. Built to connect directly to the power grid, producing grid-compatible power in the most efficient way. Save and earn money while you reduce your carbon footprint.

- Slipring feeds generated power and controller signals down the tower, allowing the turbine to track changing wind direction without twisting wires.
- Turntable yaw bearing is a 4-point contact ball bearing designed for high overturning and thrust loads and oscillatory motions.
- Anemometer senses cut-in and cut-out wind speeds, helping the control system protect the turbine from extreme wind events, and providing a means to assess system performance.
- RPM sensors for both the rotor and generator offer redundancy for increased safety.
- Fiberglass nacelle cover and nose cone keep the weather out and provide a sleek appearance.

Wireless communication capability offers remote monitoring and logging of turbine data, including wind speed, power output and other useful information. Remote control of turbine allows the owner to stop and start the machine from the comfort of home for maximum convenience and safety.



Specifications

Rotor

Number of blades	3	
Blade length	2.56m	8ft 8in
Diameter	5.5m	18ft
Swept Area	23.5m ²	256ft ²
Rotor Speed	200.4 - 206 rpm	
Operating tip speed	58 m/s	133 mph
Maximum tip speed*	<71 m/s	<160 mph

Overspeed Protection

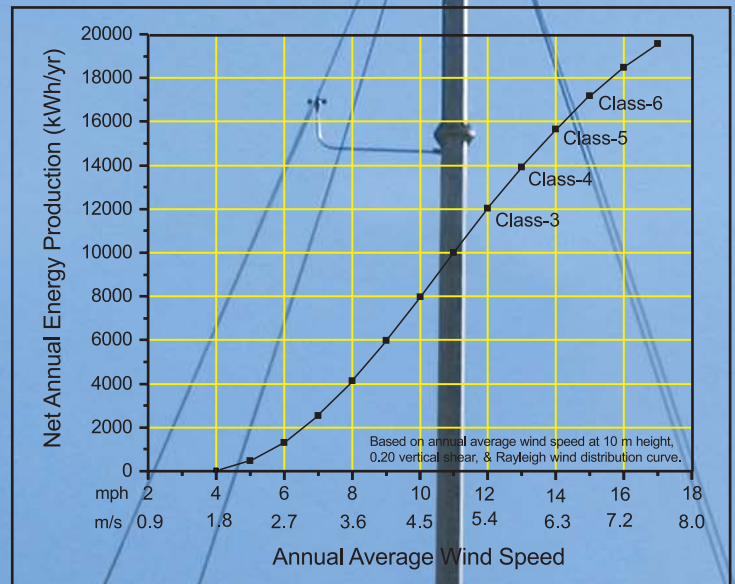
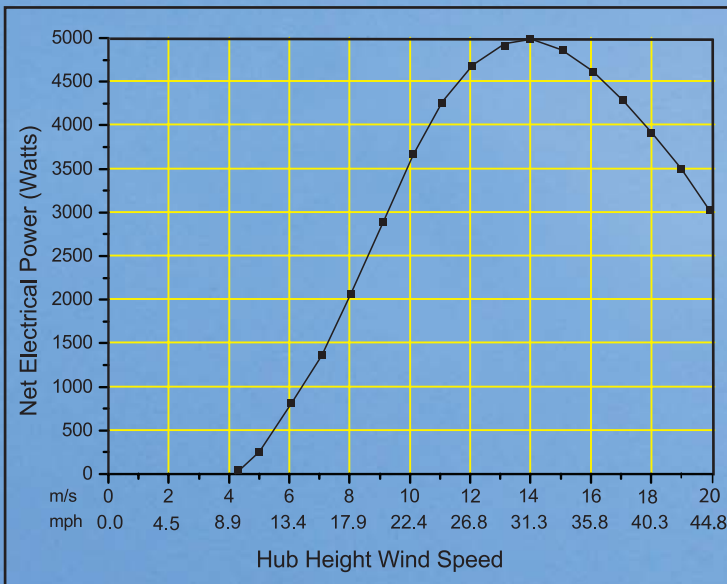
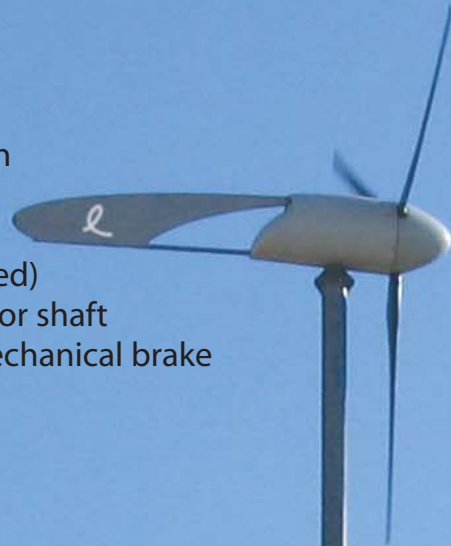
Power regulation	Stall control (constant speed)
Fault or high wind	Rapid, failsafe brake on rotor shaft
Backup protection	Redundant and failsafe mechanical brake

Performance

Cut-in wind speed	4.0 m/s	8.9 mph
Cut-out wind speed	24 m/s	54 mph
Rated power	5.0 kW	
Rated wind speed	14 m/s	31 mph
AEP**	12,860 kWh	

* Occurs during primary brake failure, with fully worn pads (on secondary brake), during worst possible wind condition and generating fault.

** Net power to the grid based on Class-3 (Rayleigh) wind resource (12 mph annual average).



Power curve and energy estimates derived from 180 hours of 1-minute average, binned wind speed data and electrical power delivered to the grid.

