

## PowerWind 60-900KW

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The PowerWind 60 is a variable-speed, pitch-controlled wind turbine, certified in accordance with IEC wind class IIB and DIBt WZ III. It has a rated power output of 900 kW and a rotor with a diameter of 60 m. The design of the PowerWind 60 is based on the proven concept of the modular drive train. This concept has undergone advanced further development by applying the experience gained from large multi-megawatt turbines.

The design of the PowerWind 60 meets the specific requirements of the emerging wind markets. Suitable logistics make the PowerWind 60 particularly beneficial for locations that are difficult to access or have weak infrastructure. The advanced cooling concept allows for smooth operation even under challenging climate conditions. The PowerWind 60 is equipped with a water-cooled asynchronous generator or optional with an air-cooled permanent magnet synchronous generator. Thanks to its full scale converter technology, the PowerWind 60 can be connected even to weak electrical grids.



PowerWind 60-900 KW in Candela, Italy

The PowerWind 60 is modelled after the proven modular drive train concept.

- · High reliability due to the combination of sophisticated components by reputable European manufacturers
- · Robust engineering

By using a full scale converter in the megawatt class, the PowerWind 60 benefits from the experience gained with multi-megawatt turbines.

- · Minimal disturbances (harmonics and flicker) due to use of a full scale converter
- · Large reactive power control range for potential of grid support
- · System is suitable for 50 Hz and 60 Hz grids
- · Optional: Fault ride through in accordance with international grid requirements
- · Optional: Transformer in tower

Variable speed and pitch control allow maximum energy production at reduced system loads.

- · Active pitch system with individual blade pitch control
- · Reduced drive train loads

The flexible system design allows alternative generator configurations.

- · Water-cooled asynchronous generator
- · Optional: Air-cooled permanent magnet synchronous generator
- · Low-maintenance generators without slip rings

The innovative cooling concept with independent cooling systems enables operation in challenging climate conditions.

- · Three independent cooling circuits: Gearbox (oil-cooled), generator (air- or water-cooled), converter (water-cooled)
- · Operating temperature range from  $-20^{\circ}\text{C}$  up to  $+45^{\circ}\text{C}$

By consciously reducing the system dimensions, difficult logistic requirements are met.

- · Transporting in containers possible
- · Transport of the three rotor blades on a single truck
- · Less crane requirements compared to multi-megawatt turbines, therefore significantly higher crane availability
- · No special permit for road transport required in many countries

With its full range of features, the PowerWind 60 perfectly matches the requirements of the international wind markets.

- Full scale converter makes the system suitable even for weak grids
- The triple active cooling system enables the turbine to be used even in regions with challenging climatic conditions
- Compact design facilitates logistics and installation even in difficult locations

All key components are sourced from reputable European manufacturers and meet high durability standards.

- Close cooperation with leading companies in the wind industry
- Core suppliers certified to ISO 9001:2008

The modern control concept offers web-based system monitoring and control.

- Simple web-based remote monitoring (SCADA) independent of a specific site
- Main control cabinet with large touch screen display

The high importance given to environmental protection is clearly reflected in our design.

- Where possible, no hydraulic units are used
- Enclosed oil and grease collecting trays
- Use of a readily biodegradable, non-water hazardous transformer fluid (Midel)

Compliance with all applicable safety standards is guaranteed.

- Lightning and surge protection corresponds to the lightning protection zone concept of IEC 61400-24
- Design of the tower fixtures is in accordance with DIN EN 25817-B and EN 50308

The PowerWind 60 was developed to provide easy service and maintenance.

- Accessibility to all main components with the possibility of easy replacement
- Customized service packages available

## Performance

Rated power output	900 kW
Cut-in wind speed	3 m/s
Rated wind speed	10.2 m/s
Cut-out wind speed	25 m/s
Rotor diameter	60 m
Rotor swept area	2827 m <sup>2</sup>
Rotor speed	5-28 rpm
Speed control	Individual electrical pitch
Aerodynamic breaking	Individual full span pitch
Operating temperature range	-20°C to +45°C
Power factor	0.9 ind. to 0.9 cap. (Hot Climate optical)
Wind class	IEC WT Class IIB and DIBt WZ III
Gearbox	One planetary and two spur gears
Gear ratio	1:54.2
Mechanical brake	Disc brake on high speed shaft (hydraulic)
Yaw brake	Friction brake

Generator	Asynchronous, water-cooled (optional: synchronous permanent magnet, air-cooled)
Nominal rotation	1,500 rpm
Enclosure class	IP 55 Asynchronous/IP54PMG
Converter	Full scale converter (water-cooled) LVRT Compliant
Tower	Conical steel tower
Hub height	59 m or 71 m
Nacelle	Glass fibre reinforced plastic
Blades	Glass fibre reinforced plastic
Blade length	29.1 m
Number of blades	3
Control system	PowerWind
SCADA	PowerWind SCADA System
Grid connection	50 Hz or 60 Hz/690 V

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