

The PowerWind 60 is a variable-speed, pitch-controlled wind turbine, certified in accordance with IEC wind class IIIA and DIBt WZ II. It has a rated power output of 850 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

**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

**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 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)

**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

<b>Rated power output</b>	850 kW
<b>Cut-in wind speed</b>	3 m/s
<b>Rated wind speed</b>	12.0 m/s
<b>Cut-out wind speed</b>	25 m/s
<b>Rotor diameter</b>	60 m
<b>Rotor swept area</b>	2,827 m <sup>2</sup>
<b>Rotor speed</b>	5-25.8 rpm
<b>Speed control</b>	Individual electrical pitch
<b>Aerodynamic breaking</b>	Individual full span pitch
<b>Operating temperature range</b>	-20°C to +45°C
<b>Power factor</b>	0.9 ind. to 0.9 cap.
<b>Wind class</b>	IEC 61400 IIIA
<b>Gearbox</b>	One planetary and two spur gears
<b>Gear ratio</b>	1:54.2
<b>Mechanical brake</b>	Disc brake on high speed shaft (hydraulic)
<b>Yaw drive</b>	3 AC motor drives with planetary gear
<b>Yaw brake</b>	Friction brake

<b>Generator</b>	Asynchronous, water-cooled (optional: synchronous permanent magnet, air-cooled)
<b>Nominal rotation</b>	1,400 rpm
<b>Enclosure class</b>	IP 55
<b>Converter</b>	Full scale converter (water-cooled)
<b>Tower</b>	Conical steel tower
<b>Hub height</b>	70 m
<b>Nacelle</b>	Glass fibre reinforced plastic
<b>Blades</b>	Glass fibre reinforced plastic
<b>Blade length</b>	29.1 m
<b>Number of blades</b>	3
<b>Control system</b>	PowerWind
<b>SCADA</b>	PowerWind SCADA System
<b>Grid connection</b>	50 Hz or 60 Hz/690 V

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