

ACCIONA Windpower

AW-3000



AW-3000

Benefits

- 1 **Reliability** Based on the same design concept that has made the AW-1500 one of the most reliable turbines in the market on the megawatt segment. It is the result of more than ten years' experience in the operation of wind parks by the ACCIONA group with different technologies and under a variety of conditions.
- 2 **Durability** Designed to extend the turbine's working life and maximize its profitability.
- 3 **Performance** With the largest swept area in the market (3 MW), which optimizes production in comparison with other wind turbines of similar power.
- 4 **Versatility** Offers a wide range of models with configurations adapted to sites under the most diverse conditions. Pre-designed for offshore applications.
- 5 **Cost reduction** Medium-voltage generator (12 kV), that minimizes losses and transformation costs.
- 6 **Ease of operation** Spacious, ergonomically designed nacelle with easy access to the hub.
- 7 **Technology** Variable speed with independent hydraulic pitch control for each blade, to minimize loads and capture the maximum energy. Optimal calculation and design of all components, aimed at maximum durability.
- 8 **Strength** Double support for the main shaft to reduce loads on the gearbox and extend its working life. Main frame, made of nodular cast iron, is designed to deal with the most demanding conditions.
- 9 **Safety** Access to the hub from the nacelle. Protection of rotating parts. Anti-slip materials inside and outside the nacelle. Noise insulation and fireproof materials.
- 10 **Advanced engineering** Control software for monitoring and automatic intelligent operation. Double-fed asynchronous generator with IGBT pulses (PMW) that improves voltage and frequency stability. Supplies reactive power to the grid when required and manages the power factor in inductive or capacitive power as required.
- 11 **Appearance** Novel nacelle cover that combines visual attractiveness and aerodynamic shape.

AW-3000

NEW WIND TURBINE

The AW-3000 is based on Acciona's experience of operating thousands of megawatts of wind turbines worldwide in all types of conditions. Like its successful predecessor the AW-1500, it has been designed to optimize the life-cycle cost of a wind turbine, not merely the upfront capital cost.

The turbine is designed from an owner's perspective. Features such as two bearings reducing the axial loads on the gear box, access to the inside of the hub from the nacelle, and a wider nacelle for easier serviceability.

The AW-3000 is a horizontal shaft wind turbine, with three blades, variable speed, rated power of 3000 kW, rated voltage of 12 kV and available for electricity generation in frequencies of 50 or 60 Hz.

Certified by Germanischer Lloyd (GL) and Det Norske Veritas (DNV) for a wide range of wind types, available in IEC classifications: classes Ia, IIa and IIIa.



Rotor

- Available in three diameters, suitable for sites with different wind conditions: 100 meters (class IEC Ia), 109 meters (class IEC IIa) and 116 meters (class IEC IIIa).
- Hub heights of 100 and 120 meters.
- Clockwise turn with a 5° inclination angle (tilt) to the vertical.
- Hub made of nodular cast iron. The hub contains the hydraulic pitch system capable of locking the blades in the event of an emergency stop.
- Designed for easy access to the interior of the hub from the nacelle. Eliminates the need to enter from outside.

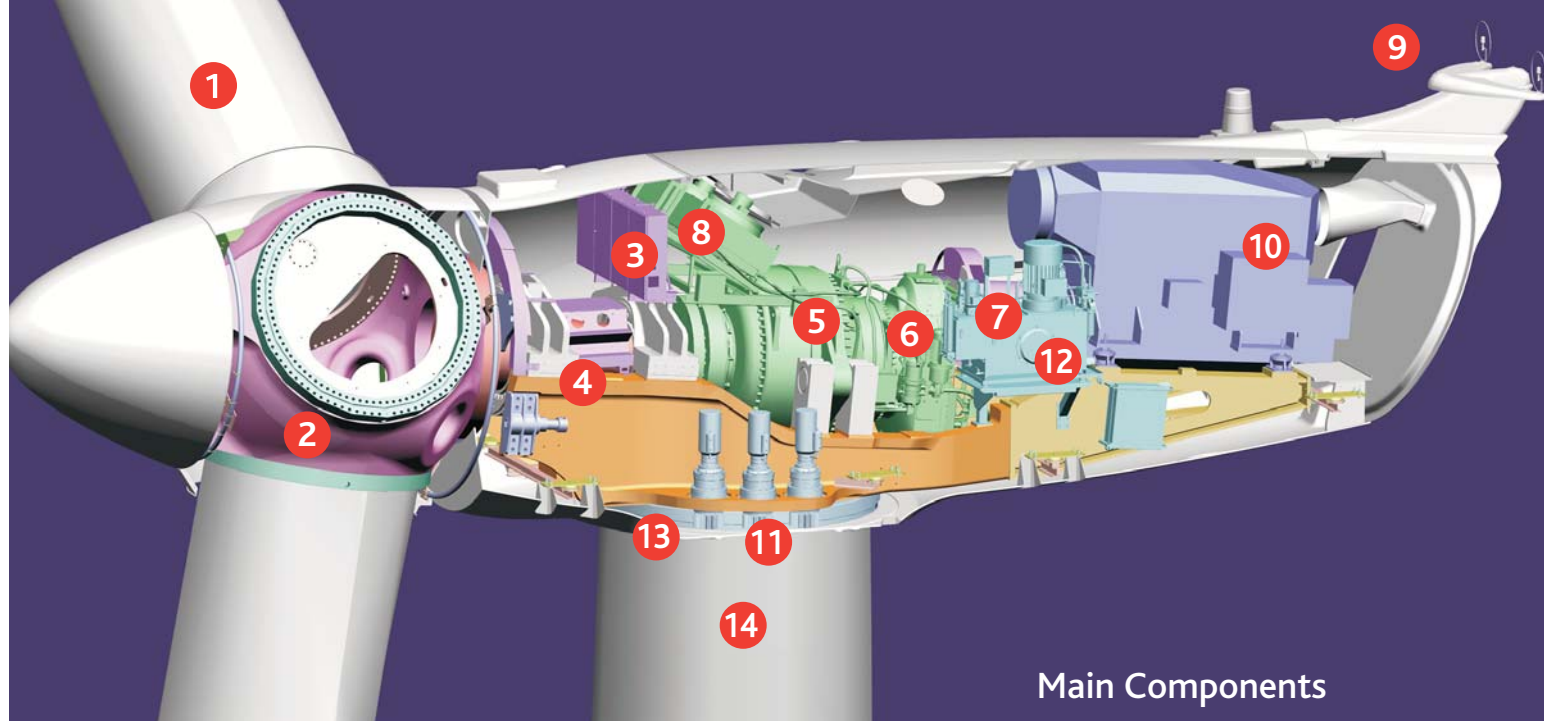
Blades

- Made of polyester-reinforced fiberglass and coated with a special surface protection.
- Available in three lengths depending on the rotor diameter: 48.7 m, 53.2 m. and 56.7 m.
- Equipped with an independent pitch system that allows the pitch angle of each blade to turn on its horizontal axis, to optimize the regulation of capacity generated at high winds and increases the safety of the aerodynamic braking system.

Nacelle

- Innovatively designed cover made from fiberglass-reinforced polyester.
- Spacious interior with easy access to the hub and the top part.
- Crane to hoist materials up to 500 kg (1100 pounds) in weight.
- Robust double frame that reduces the stress on the drive train.
- Double-fed, three-phase asynchronous induction generator with wound rotor and excitation by collector rings. Generates at medium voltage (12 kV), which reduces losses and avoids the need for a transformer.
- Yaw system uses a gear ring integrated into the tower and six geared motors integrated into the nacelle.





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|-----------------------------|-----------------|-------------------------|---------------------|----------------|
| 1 Rotor blades | 4 Rotor bearing | 7 Generator coupling | 10 Generator | 13 Yaw bearing |
| 2 Hub | 5 Gearbox | 8 Cooling radiator | 11 Yaw drive | 14 Tower |
| 3 Control system monitoring | 6 Disk brake | 9 Wind measuring system | 12 Hydraulic system | |

Tower

- Concrete tower consists of five or six sections depending on the wind turbine's height (100 or 120 m). A lift for safe and easier nacelle access is available as an option.

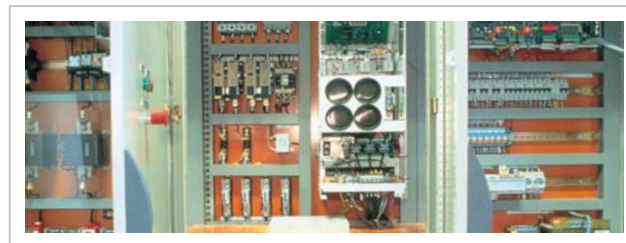


Automatic Greasing System

- Automatic greasing system for yaw system, main shaft bearings, blade bearings and generator bearings. (Optional).

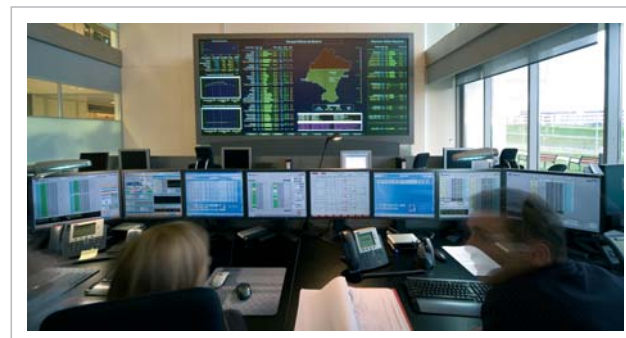
Control and Power Unit

- Based on the INGECON-W system, the 3.0 MW machine is capable of continuously optimizing its power production in a wide range of wind speeds.



Condition Monitoring System

- Predictive maintenance system with sensors in the gearbox and on the main shaft bearings and the generator bearings. (Optional).



Technical information

	AW-100/3000	AW-109/3000	AW-119/3000
Rotor diameter	100 m.	109 m.	116 m.
Wind class (IEC)	IEC Ia	IEC IIa	IEC IIIa

OPERATING DATA

Cut-in wind speed	4 m/s	3,5 m/s	3 m/s
Nominal power wind speed	11.7 m/s	11.1 m/s	10.6 m/s
Cut-out wind speed	25 m/s		20 m/s
Nominal power	3,000 kW		

COMPONENT DATA

Number of blades	3		
Orientation	Upwind		
Diameter	100 m	109 m	116 m
Swept area	7,864 m ²	9,331 m ²	10,568 m ²
Rotational direction	Clockwise		
Nominal rotational speed	14.2 rpm	13.2 rpm	12.3 rpm
Power regulation	Full span blade pitch		
Overspeed control			
Rotor shaft tilt angle	5°		
Nominal tip speed	74.3 m/s	74.7 m/s	74.7 m/s
Cone angle	3°		

BLADES

Model	LM 48.8P2	LM 53.2P	AW56.7
Material	GFRP		
Total length	48.7 m	53.2 m	56.7 m
Aerofoil	NACA/ DU		
Weight	10,400 kg/blade	11,540 kg/blade	12,280 kg/blade
Pitch	Full span		
Aerodynamic brake	Full feathering		

HUB

Hub type	Rigid		
Material	Cast iron GJS 400 18U LT		
Protection	Metalized Zn + Epoxy		

PITCH SYSTEM

Pitch bearings	Double row tour point contact		
Actuation	Hydraulic		
Linkage	Through hydraulic cylindre		
Failsafes	Accumulators on hub		

DRIVE TRAIN

Gearbox	3 stages: 2 planetary/helical		
Gearbox nominal power	3,000 kW		
Gearbox ratio	1:77	1:83	1:89
Input nominal speed	14.2 rpm	13.1 rpm	12.3 rpm
Output nominal speed	1.100 rpm		
Lubrication	Pressure and splash with oil cooler/oil filter		
Gearbox oil volume	600 Liters		
Condition Monitoring System	included		

ROTOR SHAFT

Type	Forged hollow shaft		
Material	34 Cr Ni Mo 6		
Supporting	2 bearings		

MAIN SHAFT BEARINGS

Type	Double spherical roller bearings
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PARKING BRAKE

Type	Single disk/Two callipers
Location	High Speed shaft

YAW SYSTEM

Type	Four point ball bearing
Slewing ring	External
Slewing ring/yaw drive pinion ration	11.21:1
Braking system	Disk + callipers

YAW GEARS AND MOTORS

Type	5 Planetary stages
Ratio	1:1451
Yaw rate	0.08 rpm
Motor types	4 Asynchronous poles
Voltage / Frequency	230/400 V - 50 Hz
Number of yaw gears	6

HYDRAULIC POWER UNIT

Voltage / Frequency	380 V / 50Hz
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GENERATOR

Type	6 poles, double feeding
Insulation type (stator / rotor)	H / H
Rated power	3,000 kW
Degree of protection	IP 54
Frequency	50 / 60Hz (available)
Voltage	12,000 V
Speed range (50 Hz)	770-1,320 rpm 50 (Hz)/924-1,584 rpm 60 (Hz)

CONTROL SYSTEM

Type	Ingecon-W
Master processor	80 – 386.32 bits
Scada interface	OPMT
Power factor correction	Programmable by software

TOWER

Material	Concrete
Tower height (hub 100/120)	98.2 m/118.2 m
Access to tower	Door with lock system
Access to nacelle cabin	Ladder or lift
Weight (hub 100/120)	850 t/1,100 t
Foundation connection	Anchor bars embedded in the foundation and high quality grout

WEIGHT

Nacelle	118 t
Rotor (100 m)	66 t
Nacelle + hub	154 t

DIMENSIONS

Nacelle + Hub	
Lenght	17.5 m
Width	4.5 m
Height	4 m

AUTOMATIC LUBRICATION SYSTEM

Bearings	Pitch, yaw, main shaft and generator
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