

Brochure

Wind power generators

High speed PM generator series for full converter concept from 1.5 MW upwards

Power and productivity
for a better world™



High speed permanent magnet generators



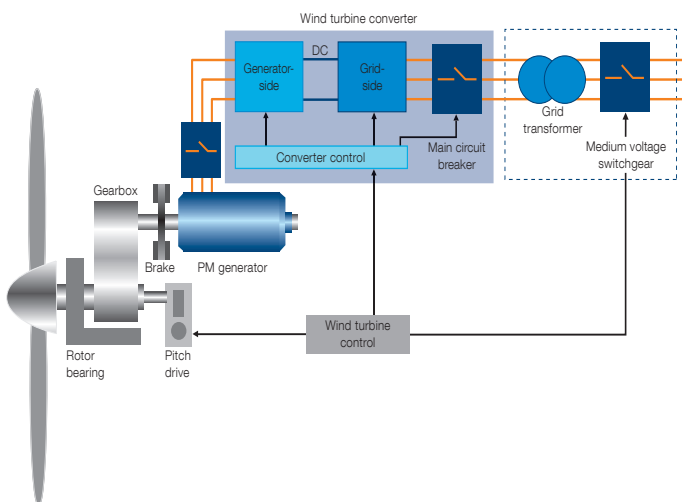
Mechanically interchangeable with DF solution – same drivetrain design can be used
Standard platform from 1.5 MW upwards – reliable, cost-effective, fast delivery
Proven PM rotor construction – withstanding overspeeds up to 3000 rpm

Designing a cost-effective PM generator for serial manufacturing demands experience. The most critical factor is the magnetic circuit itself. Selecting the right material as well as correct positioning and installation of the magnets for different speed range solutions is also important. The design must prevent high temperatures, which in a fault situation like a short circuit could cause weakening of the magnetic properties. Stabilizing and ageing prevention of the magnets and corrosion protection are needed for a long operational lifetime. Know-how is also required in meeting the challenges of serial production incorporating extremely powerful magnets.

Full converter system using PM generators

PM generators are synchronous machines with rotor windings replaced by permanent magnets. They need no separate excitation so rotor excitation losses – about 30% of total generator losses – are eliminated. This results in high power density and small size with the highest efficiency at all speeds, offering the maximum annual production of energy with the lowest lifetime cost.

The full converter (FC) concept, where all the generated power goes through the converter, enables the turbine to operate across the whole speed range. The converter's DC link decouples the generator and the mechanical drivetrain from the grid, allowing maximum drivetrain damping, leading to easier design and low weight. The turbine can thus operate at any rotor speed and the grid independent voltage means that changes in the grid do not affect generator dynamics. The FC solution therefore provides all the benefits of the doubly-fed system and many more, offering full grid compliance with the most advanced grid fault support and ride-through capability, full control of the generator and the grid. In addition, generator topologies which allow 100% speed variation can enable greater aerodynamic efficiency.



The high speed configuration with three stage gearbox is mechanically similar to doubly-fed system and provides the most straightforward route for turbine manufacturers to broaden their offering to gain all the benefits of the full converter concept.

– an easy step to full converter concept



Proven ABB winding design:

Robust reliable construction

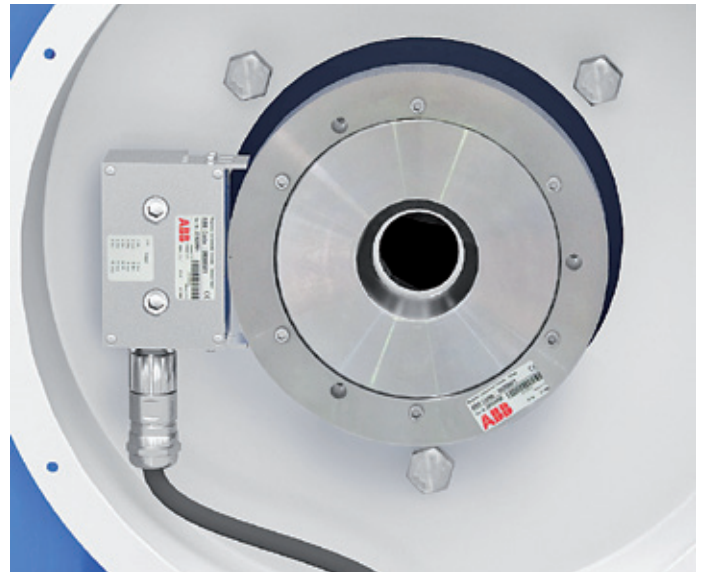
- withstanding short circuit forces

High voltage insulation technology

- long lifetime in converter applications

Mica based materials and vacuum pressure impregnation

- expertise since 1977



New encoder design:

Innovative magnet encoder solution

- simple compact, durable

No bearings or torque support arm

- maintenance free

Contactless design

- no bearing current risks

Typical performance characteristics of the AMG 500 and 560 series:

Power	1.5 to 3.6 MW
Efficiency at rated speed	98% (at 20% load > 97%)
Cooling	air or water cooling
Mounting and protection	IM1001 (inclined 4...6 deg), IP54
Voltage	690 V +/-10 %, 50 or 60 Hz Medium voltage (i.e. 4 kV)
Rated speed options	from 1000 to 1800 rpm
Operation speed range	0...2000 rpm
Max. overspeed	up to 3000 rpm
Insulation class/Temp. rise	F/B
Ambient temperature range	-20°C ... +40°C; extended -30°C ... +50°C
Typical dimensions, weight	500: L2500 x W1700 x H1800, 5–7 tn 560: L3000 x W2100 x H1900, 7–10 tn

Proven ABB solutions provide continuous operation for maximum energy production with lowest lifetime cost.

Your reliable partner

ABB is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 135,000 people.

In the wind power sector, ABB is the largest worldwide supplier of electrical solutions and the market and technology leader in generators, converters, motors, circuit breakers & contactors, transformers and HVDC.

Over the last 30 years ABB has delivered 30,000 generators to leading wind turbine customers all over the world – corresponding to a total 30 GW of power.

ABB built its first megawatt class PM generator for wind power in 1999 based on more than 100 years of experience in electrical machines.

For more information: www.abb.com/motors&generators

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