Brochure

Wind turbine generators
Reliable technology for all turbine applications
We provide motors and generators, services and expertise to save energy and improve customers’ processes over the total lifecycle of our products, and beyond.
### Induction generators

ABB induction generators utilize proven design techniques and state of the art winding technology. Generators can be made based on standard or custom solutions according to customers’ needs.

#### Fixed speed generator
The traditional stall concept with the generator directly coupled to the grid. Various designs for a wide range of purposes: from single- to two-speed, air- and water-cooling to cast iron and welded housings.

**Simple and robust**

Typical rated speed 1000 – 1500 rpm, 4 – 6 poles

Normally powers from 1 MW to 2 MW

#### Doubly-fed generator
Mainstream concept consisting of a direct online stator and a wound rotor connected to the grid using a frequency converter. A rotational speed range limited by the converter power rating is obtained, as well as higher utilization of wind gusts. The generator torque is regulated by the converter, which guarantees a constant stator frequency and enables a high energy yield with good power quality. At peak load the power is limited by the pitch control.

Economical way to obtain variable speed and supply reactive power, and to increase energy yield at low wind speeds

Simple turbine construction and increased reliability by reduced torque loads in the drive train

Typical rated speed 1000 – 1500 rpm, 4 – 6 poles

Normally powers from 1.5 MW to 5 MW

#### Full variable speed generator
The full speed range of the generator is enabled by the full power converter between the generator and the grid. The concept is based on well-proven technology from industrial drive systems, successfully adapted to the wind turbine application. The variable speed concept enables full control of the turbine in different grid conditions. The concept is applicable for both induction and permanent magnet generators.

Welded modular construction

Fully controlled with variable speed

Reactive power supply

High power quality and efficiency for the end user

Typical rated speed 1000 – 1500 rpm, 4 - 6 poles

Normally powers from 2 MW to 5 MW
**Synchronous generators**

**Permanent Magnet (PM) generators**
The PM generator system utilizes a full converter concept. It is fully controllable in different grid conditions and provides the highest efficiency and power quality for the end user. The powerful NDFeB magnets used in the rotor construction eliminate the need for any separate excitation resulting in:

- No excitation losses – highest efficiency
- High power intensity – smaller size and weight
- Low rotor losses – lower thermal stress on generator and bearings
- Fewer parts – maximum reliability

1. **Low speed, a robust gearless system**
In a direct drive application the turbine and the generator are integrated to form a compact and structurally integrated unit. The design gives free access to all parts for easy installation and maintenance. The simple and robust low speed rotor design with no separate excitation or cooling system results in minimum wear, reduced maintenance needs, lower life cycle costs, and a long lifetime.

   - High efficiency
   - Simple and robust
   - Lowest maintenance demand
   - Maximum reliability
   - Typical rated speed 14 – 30 rpm, multi-pole
   - Normally powers from 1.5 MW to 3 MW

2. **Medium speed, a compact integrated unit**
This is a very compact slow speed system with the turbine main bearing and the permanent magnet generator integrated with a single-stage gearbox giving high efficiency with low maintenance needs. It emphasizes the same simple and robust low speed rotor design with no separate excitation or cooling system, resulting in less wear, reduced maintenance requirements, lower life cycle costs, and a long lifetime.

   - High power with small space requirement
   - High efficiency
   - Simple and robust
   - Low maintenance demand
   - Typical rated speed 120 – 450 rpm, multi-pole
   - Normally powers from 1 MW to 5 MW

3. **High speed, a small power pack**
The system is mechanically similar to the doubly-fed type with even smaller space requirements. It enables the highest power density utilizing a well-proven, high speed gear solution.

   - Mechanically similar frame design to mainstream solutions
   - High efficiency
   - No slip rings
   - Low maintenance demand
   - Typical rated speed 1000 – 2000 rpm, 4 to 8 poles
   - Normally powers from 2 MW to 5 MW
Experience and global resources guarantee an optimal solution for every application

**ABB has designed and manufactured generators for wind turbines for over 25 years.** The electrical performance of an individual generator is optimized in co-operation with the wind turbine manufacturer, ensuring high electrical performance at full and partial load.

**Our global network ensures the availability of generators, engineering and service support within easy reach of customers at any location in the world.** Our local presence enables us to provide lifetime customer support.

**Reliable operation in all environments**

The generator insulation and impregnation are designed to withstand high environmental stress factors. The F-class form wound winding insulation system ensures a long lifetime using the same high voltage insulation technology as in high-voltage industrial motors.

The generator bearing system is designed for reliable operation, easy maintenance and long service intervals. Proven high quality bearing design keeps your generator running for years and years.

**Generators for a wide range of applications**

ABB supplies generators for both stall and pitch regulated wind turbines with outputs ranging up to 5 MW and more. We offer all main concepts from fixed speed and doubly-fed to permanent magnet generators.

Our strength is a wide product range, innovative technologies and a synergetic approach. This means that advantages from technological innovations and solutions in one area can easily be integrated in another, including wind turbine generators.

We provide standardized as well as custom-designed generators. Standard components are used wherever feasible, guaranteeing efficient production and fast deliveries.
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