

Generators and Drives for Wind Power

Sophisticated technology for all wind turbine applications





Customized solutions and state-of-art technology for every application

In-depth know-how, long experience and thorough understanding of application have made ABB the world's leading manufacturer of motors, generators and drives. Today our products are widely used in manufacturing, process and consumer industries, utilities, the oil and gas sector and infrastructure markets worldwide.

Experience and global resources guarantee the optimal solution for every application

ABB has been designing and manufacturing generators for wind turbines for over twenty years. All generator types are specifically designed for wind turbine applications. Electrical performance of an individual generator is optimized in co-operation with the wind turbine manufacturer. This close co-operation ensures a superior generator design, with high electrical performance at full and partial load.

ABB offers a comprehensive range of low and medium voltage drives. They are based on premium frequency converter technology and are especially designed for harsh operating environments. The converters provide rapid and accurate control over the specified speed range, and ensure continuous operation even during times of grid fault.

The converter control principle, Direct Torque Control (DTC), has advantages that are of prime importance for a wind turbine applications, including fast control, robustness, high availability and good quality of generated power.

Reliable operation at all locations

The generator insulation and impregnation are designed to withstand high environmental stress factors. ABB's F-class insulation system, using the same high voltage insulation technology as in HV generators, ensures a long lifetime and provide high momentary overload capacity.

The bearing system used in ABB generators is designed for reliable operation, easy maintenance and long service intervals. Deep groove ball bearings of high quality together with a proven system design will keep your generator running for years and years.

Global support

ABB's global network ensures that engineering and service support is always within easy reach of customers anywhere in the world. At the same time our local presence enables us to provide lifetime customer support based on specific knowledge of local conditions and application requirements.

Industrial^{IT}

A key element of ABB's business strategy is its commitment to a broad program of product development and positioning under the Industrial IT umbrella. This initiative is geared towards increasing integration of ABB products as the 'building blocks' of larger solutions, while incorporating functionality that will allow multiple products to interact seamlessly as components of real-time automation and information systems.

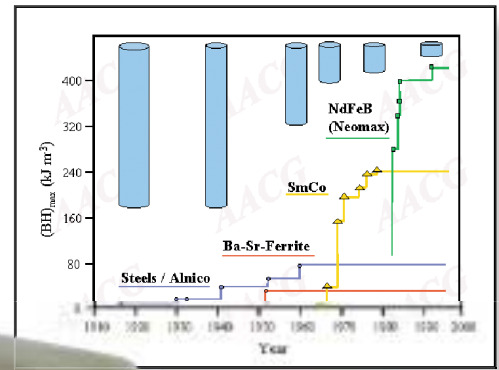
Motors, generators and drives are fundamental building blocks in the Industrial IT architecture.

Permanent Magnet Generators

Modern permanent magnet generators need no separate excitation system. They can be gearless or with gear box, and are fully controlled with variable speed and reactive power supply. They provide the highest power quality and efficiency for the end user. ABB has a great deal of experience in the serial production of various permanent magnet motor and generator applications.

ABB offers three different concepts of permanent magnet generator technology.

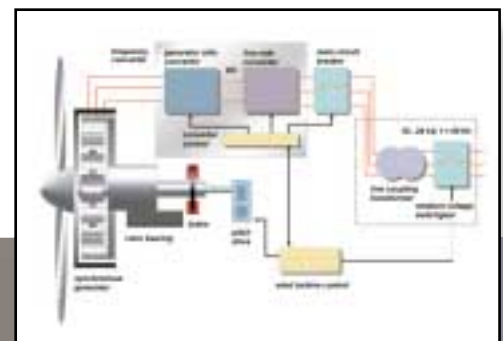
Development of permanent magnet materials.

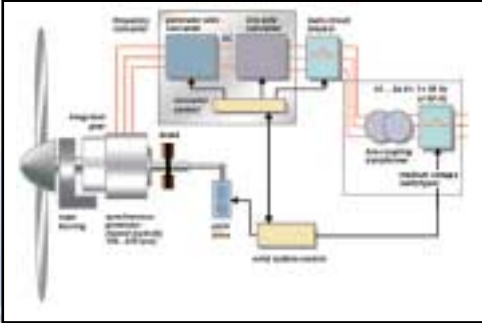


Low speed, a robust gearless system

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 requirements, lower life cycle costs, and a long lifetime.

- high efficiency
- simple and robust
- lowest maintenance demand
- maximum reliability





Medium speed, a compact and economical unit

This is a very compact slow speed system with the turbine main bearing and the permanent magnet generator integrated to 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.

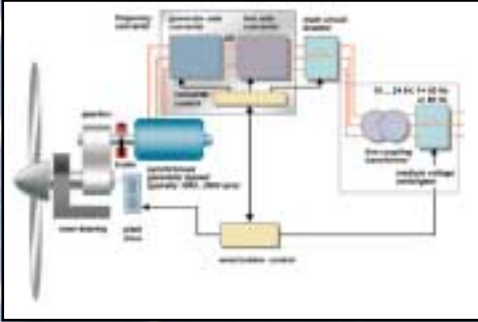
- high power with small space requirement
- high efficiency
- simple and robust
- low maintenance demand



High speed, a small power pack

The system is mechanically similar to the doubly fed type with even smaller space requirements. Extremely high power from a small size. Typical speed range is from 1000 to 2000 rpm using a 6 or 8 pole generator.

- extremely small size
- mechanically identical to mainstream solutions
- high efficiency
- no slip rings
- maintenance free



Low voltage converters for wind turbine systems



ABB has over three decades of experience with AC drives. ABB offers:

- compact, optimized converter design
- modular, expandable system for doubly fed and full scale converter systems
- converters for severe and varying conditions
- totally enclosed IP54, water-cooled for offshore applications

Proven reliability

ABB uses premium DTC technology. This guarantees a proven and reliable control

platform for different types of wind turbine concepts.

Optimized turbine construction

The fast DTC control makes it possible to optimize the turbine design. It is used to damp the shaft train oscillations. This means reduced mechanical stress, which gives a longer lifetime for the turbine blades and gearbox.

Ride-through using active crowbar

Safe and continuous operation during grid fault conditions. The modern control technology provides the drive system with ride-through capability during grid fault conditions, enabling it to continuously generate and support the grid without disconnection from network.



1 MW water-cooled converter

3 MW line converter.



Grid compatibility

ABB converters guarantee high quality power with a low harmonics level. Fast and accurate control ensures that the system is reliable even during strong wind gusts and network voltage fluctuations. Electrical and reactive power can be controlled independently.

New control concept

The innovative Fold-Back Control concept for doubly fed systems ensures tripless operation and keeps the turbine running through voltage dips. It provides a safety margin of up to 15% in the operating speed range. A full-scale 1.8 MW laboratory test set-up is used for testing different operation requirements.

Remote monitoring

AC drive converters provide various fieldbus communication options for monitoring and controlling the drive. Up-to-date PC-based tools are used for commissioning and service. Remote maintenance, monitoring and even control is possible via a secure Internet connection using ABB's intelligent Ethernet module, a compact web server, providing access via modem, network cable or wireless connection. Remote access to the drives reduce maintenance cost and wind turbine downtime.



Intelligent Ethernet module.



2 MW doubly fed converter.



All electrical components for wind power

A comprehensive offering from ABB: from components to turnkey projects. An ABB delivery is your guarantee of a safe and reliable solution. Our global experience and resources enable us to supply you with

- Generators
- Motors
- LV and MV Drives
- Switchgears
- Transformers
- Low voltage products
- Cables
- Control and protection
- Electrical sub-stations
- Components and systems in power and automation technology for electrical infrastructure and grid connection of wind parks.



ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impacts. The ABB Group of companies operates in more than 100 countries and employs about 133,000 people.



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Generator and drives factories are certified in accordance with ISO 14001.

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