

Service note

Upgrading ABB doubly-fed wind power generators



Over the last 30 years ABB has supplied 30 000 generators to the world's leading wind turbine manufacturers. Now our upgrade program makes the benefits of the latest technology - including improved efficiency, better cooling performance, and high reactive power production – available to our customers. ABB's technical innovations will boost the overall performance of your turbine and ensure continuous power production with the highest efficiency.

ABB upgrade program for doubly-fed generators consists of :

- New rotor construction
- Proven slip ring unit
- Special end shield insulation against bearing currents

Doubly-fed concept is very demanding

The doubly-fed (DF) generator is a wound rotor asynchronous machine, where the rotor windings are connected to a small converter via slip rings and brushes. The generator feeds power both from the directly connected stator (approx 2/3 of nominal power) and the rotor (1/3). Grid codes require a reactive power feed from the generator, which leads to high currents and temperatures. In addition the use of a converter causes high voltage peaks.

ABB's upgrade program, using reliable ABB parts, meets these challenges and ensures the highest availability and production for your wind turbine.



Rotor

The winding-end support is one of the most important aspects of the rotor. It must be strong enough to secure a long lifetime even after sudden high overspeeds, but it must also allow for efficient cooling when maximum reactive power is produced. In addition, some of the converters in use in the markets set great demands on the rotor winding insulation in terms of high voltage peaks.

The new ABB carbon-fiber winding-end support rings can withstand overspeeds up to 3000 rpm and the increased insulation level (2.5 kV) offers high voltage peak integrity and thus provides an easy match with most of the converters used in turbines.

Slip-ring unit

The generator needs a reliable slip ring unit to feed power from the rotor via a converter. This involves high currents and high temperatures, so efficient cooling is a must.

Other factors in designing a reliable unit are the correct material selection between the slip ring and the brushes, efficient dust removal and easy servicing. In fact, optimized airflow is one of the most important factors for the reliable functioning of the unit. ABB's proven slip ring unit is based on more than half a century of in-house expertise.

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Bearing end shield insulation

Earthing brushes do not fully prevent the formation of bearing currents. The higher speed designs now used in power electronics mean that previously used methods are no longer sufficient. ABB therefore uses a special end shield with a new type of insulation in its DF generators. Our robust solution allows the use of standard bearings, which are easily available.

Life cycle management

ABB's global presence through its worldwide organization and network of selected partners provides systematic life cycle management with services that maximize production, availability, reliability and performance.

The local authorized service network with over 5,000 field service engineers in more than 100 countries ensures efficient response to service needs, wherever customers and their turbines are located.

Univalled experience in wind power applications

ABB has been making motors and generators for demanding applications since 1889. It is the largest global supplier of generators for the wind power industry. Leading wind turbine manufacturers rely on ABB's proven technology for all drive train types.

ABB has built up application-specific expertise and optimized its direct drive, medium and high speed generators for wind power. Tried and tested products together with local support make ABB the ideal partner for turbine users planning to upgrade to the latest technology.

For more information please contact:

www.abb.com/motors&generators