LOW-VOLTAGE CONVERTERS FOR DOUBLY-FED INDUCTION GENERATORS

POWER CONVERSION
Controlling the Power of Energy
WIND IS OUR PASSION

Woodward is one of the leading suppliers of wind-converters used for renewable energy generation. More than 7,000 installed converters used in onshore and offshore applications attest to the competence and experience of Woodward within the wind-energy business.

The precise and intelligent control algorithms of CONCYCLE wind-converters together with variable-speed generators create an optimized power-generation system.

CONCYCLE wind-converters actively dampen dynamic torque loads in the drive-train and thus protect the gearbox. This will extend the lifetime and increase the reliability of your system.

The intelligent control of your CONCYCLE wind-converter ensures compliance with all valid international grid-code requirements at the point of common coupling. The modular design of CONCYCLE frequency converters currently covers different power classes up to 6 MW.

Woodward’s modern manufacturing facilities in the US and China also guarantee converter availability for growth markets.
CONCYCLE wind-converters have considerably enhanced the success of large wind turbines. The unmatched reliability and quality of CONCYCLE wind-converters results in a perfect power-generating system for variable-speed wind turbines. The high technology – made in Germany – provides the best way of integrating modern wind-power plants in the supply chain of renewable energy.

CONCYCLE PERFORMANCE

The CONCYCLE wind-converter sets benchmarks in product innovation for compact and modular system design. The CONCYCLE wind-converter is successfully established in onshore and offshore wind turbines and is being constantly developed in accordance with the latest international grid-code requirements. This is verified by simulations and successful field tests in different international system variations for 50-Hz and 60-Hz grids.

CONCYCLE BENEFITS

- High efficiency
- High power density
- Reactive power compensation
- Asymmetrical fault compensation
- CONCYCLE activeFRT™
- Highly dynamic regulation control
- Low inrush currents
- Detailed simulation models
- Compact, modular design
- Rugged design
- Service organisation worldwide
- Integrated data logger and fault data recorder
- Variable field-bus communication interfaces
- Fast software updates

www.woodward.com
Stator terminals
Rotor terminals
Water-cooled IGBT stacks
Grid terminals
Grid filter
du/dt filter
With the new CONCYCLE NGx wind design, a modular converter platform for the multi-megawatt class has been created.

NGx considered all aspects of the mains supply and grid codes
- Full-size converter solutions
- Competence in system simulations
- Concepts and solutions for all-round protection, including mains protection of entire wind farms
- Patent consultation

THE NGx PLATFORM
- Modular and water-cooled design for wind-power converters
- Combination of four standardised or customized sections:
  - IGBT cabinet
  - Choke cabinet (variable design)
  - Control cabinet (variable design)
  - Grid/stator cabinet (variable design)
- The optimal solution for your relevant power ratings
- Four basic sizes dependent on current:
  650 A, 1000 A, 1250 A, > 1250 A
- Three major footprints (length/square/separated) for tower, base or nacelle installation
- Minimal number of components
- Specific local standards as well as options for extreme environmental conditions are available
- Flexible manufacturing worldwide
- Cost-effective construction
- Integrated water-cooled design: compact, extended lifetime
- Improved control algorithms with the new Converter Control Unit CSC4
- No crowbar activation during voltage sags necessary
WELL-ESTABLISHED FUNCTIONAL FEATURES
- Optimum system efficiency
- High-efficiency gain from the drivetrain
- Highly dynamic regulation response
- Designed to conform to the latest grid-code requirements; optimized system due to CONCYCLE activeFRT™ functionality
- Good mains compatibility with low fluctuation values
- Reactive power management in operation and during standstill
- Low inrush currents
- Active auto-reclosing detection
- Soft ride-through and compensation of asymmetrical currents
- System integration by using conventional protocols and communication standards
- Integrated data logger and fault data recorder
- Menu-supported commissioning tool

DESIGN AND CONSTRUCTION
- Compact, modular design with highest power density
- Use of modern, low-loss trench-gate IGBTs
- Directed heat dissipation by integrated water cooling, with optional water-air-heat-exchanger
- Polypropylene capacitors: non-aging, maintenance-free and environmentally compliant
- Optimised service and maintenance work thanks to handling by front access and compact single components
- Vibration-damping construction
- Rugged design, high protection against environmental impact

SIMULATION MODELS FOR CUSTOMERS
- Detailed models for dynamic system performance simulation and simplified simulation to help customers analyse the integration of wind-power plants into the mains
- Constant verifications based on real field measurements ensure the data quality for the simulation
Our service

Maximum availability and operational reliability rank first in the catalogue of requirements of frequency converter systems for wind turbines. Apart from quality, there are growing expectations in terms of customer care.

Woodward provides maximum service support worldwide. We offer you the entire service spectrum from one source.

Highly qualified staff members in our international set-up service offices guarantee customer service at the highest level for the constantly growing number of systems in use worldwide. They give information on warranties, downtimes, spare parts, repairs, orders and technical training.

Apart from local service and delivery of spare parts, we offer individual solutions worked out for you by a team of highly competent staff members.

Highly developed, state-of-the-art remote diagnostic systems can monitor and analyze the operating status of your Woodward system from anywhere and at all times.

Our strengths are reliability, short reaction times as well as highly qualified and motivated personnel.

With our service expertise we can cover every requirement and maintain an exceptionally high standard when it comes to the performance and efficiency of your systems.
ENABLING ELECTRICAL POWER SYSTEMS INTEGRATION

The shift to distributed generation is changing long-established concepts about how electricity should be produced, transmitted and used. Power flow through the grid is becoming more decentralised and bidirectional. Local measurement, fault detection and remote control are now essential for stability and intelligent load management. A new approach is needed: one that encourages greater use of renewable resources and facilitates the interconnection of distributed power generation using advanced monitoring, communication and control. Woodward is recognized as a leader in the field of advanced power generation and distribution control products. We continue to build on our legacy by creating cutting-edge control and protection devices, designed to work in complex systems to meet the needs of tomorrow’s smart grids. Our global strategy for merging all aspects of power generation and distribution to enable electrical power systems integration is called PowerConnect.