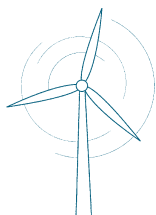


NORDEX CONTROL 2

The cockpit for wind power plants



Automation and information technology for trouble-free management – just like any other modern power plant.

 **NORDEX**
We've got the power.

NORDEX CONTROL 2: INTELLIGENT MANAGEMENT FOR AN OPTIMISED "WIND HARVEST"

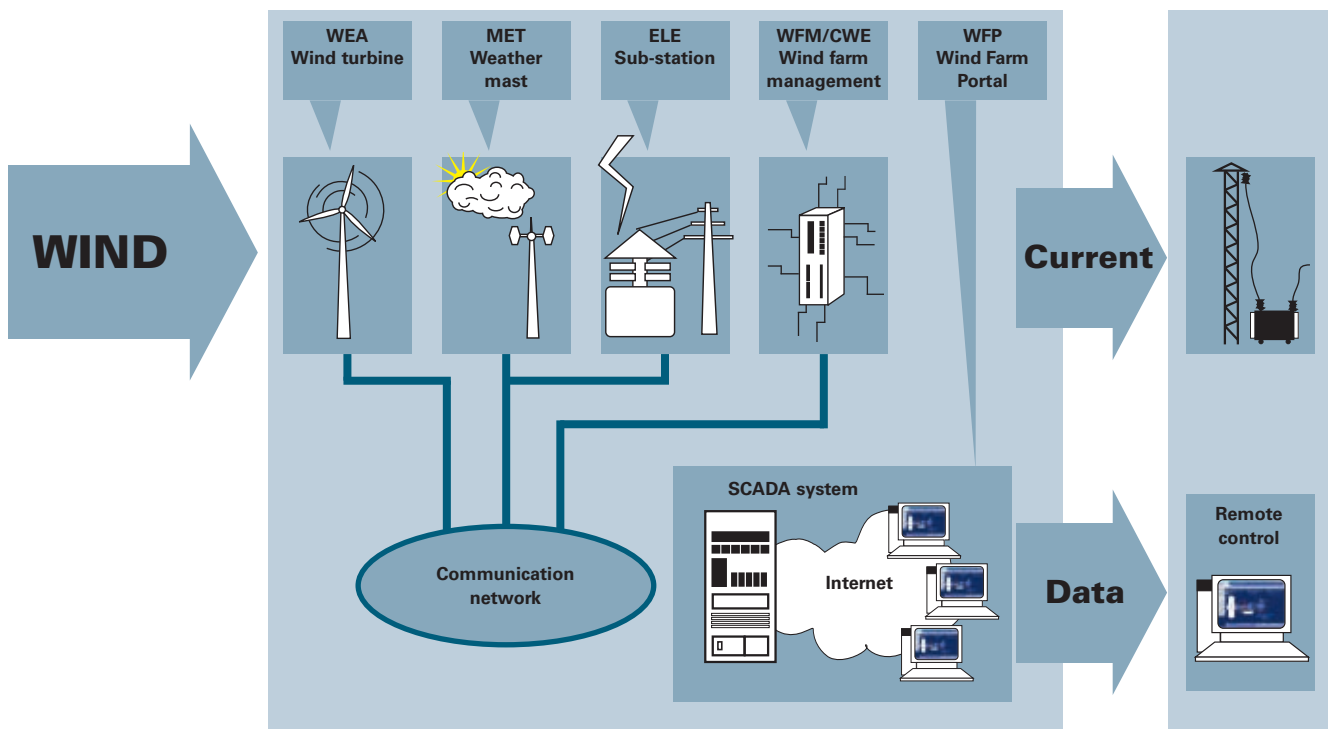


Nordex Control 2 provides interactive access to all of the principle operating modes and data concerning all aspects of the wind turbines and the wind parks. This real-time recording and analysis of the data by Nordex Control 2 can be carried out seven days a week, around the clock, both nationally and internationally.

As an operator of wind power plants, you expect them to be controlled, regulated and monitored like any other modern power plant. Only technically trouble-free operation can guarantee an optimum and continuous "wind harvest" – whether from an individual turbine or an entire wind park. For this to be possible, the dependable exchange of information between the modules for control, regulation, monitoring, visualisation and data archiving is essential. Nordex Control 2 ensures that these requirements are fulfilled by providing you with interactive access to all of the principle operating modes and data concerning all aspects of the wind turbines and the wind park, onshore and offshore, independent of location.

Nordex Control 2 converts the exchange of information into yields: from the actor-sensor level to the turbine control level, from the turbine control level to the central control level. By consistently merging automation and information technologies, the modules of Nordex Control 2 facilitate the comprehensive and modern management of all wind turbines and wind parks, both nationally and internationally.

We supply Nordex Control 2 with all Nordex turbines as well as optionally as an upgrade or extra package. Whether you need to extend and modernise your existing turbine management or develop a new system, the Nordex team has the suitable know-how, enabling them to support you with the analysis required to draw up, jointly with you, a demand-oriented concept for your application. We will then remain your partner for management and long-term system maintenance after delivery and integration of the system.



The Nordex Control 2 Wind Farm Portal® registers all the data concerning individual wind turbines, the meteorological and management systems, the sub-station as well as the complete wind park.



THE WIND FARM PORTAL®: THE BROWSER-BASED COCKPIT FOR THE MODERN POWER PLANT

Nordex Control 2 provides the necessary hardware and software for operating both individual wind turbines and decentralised wind power plants at the power plant control centre via the Wind Farm Portal®. The Wind Farm Portal® offers a large number of Web-capable services, permitting authorised access for the monitoring, observation, operation and analysis of the wind turbines.

The Wind Farm Portal® provides services for the monitoring, control and analysis of, amongst others:

- operating modes
- availability
- daily, monthly and annual output
- plant-specific wind conditions
- meteorological conditions

for all wind machines, the meteorological and management systems (wind farm management) and the sub-station.

The Nordex Control 2 Wind Farm Portal® helps register the data of individual wind turbines and wind parks spread over a wide area. The system pools all information and displays this on request, or event-controlled online via browser. This online recording, documentation and analysis of the data from individual turbines and of an entire wind park can be carried out seven days a week, around the clock, independent of location. This makes it possible to monitor wind turbines from any part of the world and to react at all times.

The Nordex Control 2 Wind Farm Portal® combines the advantages of a solution, specific to wind energy, with the flexibility of modular architecture for customers' specific requirements. The consistent use of innovative technologies and internationally recognised standards and interfaces means that it is possible to use Nordex Control 2 well into the future, even against the backdrop of the rapidly changing hardware and software market.

1 **The active transmission** of the data via e-mail or SMS ensures that the user is always provided with the latest information. Furthermore, this data transmission capability ensures, through a 24-hour remote monitoring service, a rapid reaction time.

NORDEX CONTROL 2 WIND FARM PORTAL® – FLEXIBLE, OPEN, CONVENIENT AND FUTURE-SAFE

The Nordex Control 2 Wind Farm Portal® is more than a sophisticated SCADA system. With the Wind Farm Portal® the traditional range of functions of a SCADA system (Supervision, Control and Data Acquisition) has been extended to include the specific requirements of wind energy production:

- The independent back-up of all data held within the wind turbines by means of PLC-integrated data archives (ten-minute averages, alarm histories, output and availability statistics) offers protection against data loss in the event of communication breakdowns between the wind turbines and the Wind Farm Portal®. The transparent history recording system and the data stored in the archive make it possible to precisely image all downtimes to the second. The system knows which technical data were last amended and how high the yields were.
- The interaction between the operator and the wind farm portal, which is browser-based and independent of both platform and location, provides worldwide access around the clock.
- The link-up to various IT and TC network topologies (e.g. LAN, WAN, intranet, Internet, extranet) provides flexible scope both for individual PC users and for an entire network.
- The active transmission of the data via e-mail or SMS to the operator's mobile phone ensures that he is always provided with the latest information in real time, wherever he is.
- Standardised and open interfaces (PLC-integrated), which support access with OPC servers, secure flexible application within the different types of power plant IT infrastructure.
- The vertical client-server architecture (OPC server/client, SCADA server/client, Web server/client) results in a slim, easy-to-operate and holistic solution.

The Nordex Control 2 Wind Farm Portal® is easy to operate because:

- It provides all real-time data in seconds, and stores historical data over 32 days, 13 months and 21 years for periodic comparison.
- The possibility of choosing between daily, monthly and annual accounting systems means that the system can be tailor-made to suit individual requirements.
- The consistent ergonomic user-prompting system displays data in a tabular or graphic form. Furthermore, data can be directly exported into standard MS Office applications and visualised on screen.
- The precise navigation system makes rapid ad-hoc reactions in the event of a large number of messages.
- The company's own development of an operator-specific password algorithm for data transmission ensures security in the network.
- Manual calculations are not necessary.
- Long and arduous searches are superfluous.
- The online help offers full operational support.

The Nordex Control 2 Wind Farm Portal® is a future-safe system because:

- It is compatible with modern standard software.
- It is based on the latest system standards and therefore guarantees continuous further development and opportunity for innovation.
- There is no hardware installation inside the wind turbines and hence material and environment-related wear is minimised, thereby minimising costs.

NORDEX CONTROL 2: MONITORING THE WIND FARM

Monitoring/Control WTG System

- Overview (General Status, Gearbox, Generator)
- Temperature (General Status, Gearbox, Generator)
- Pressure (Hydraulic, Gearbox)
- System Status (General, Gearbox, Generator, Tip, Safety Chain)
- Yaw (Status, Wind, Yaw)
- Grid (Status, Supply, Voltage, Current, Power, Capacitors, Lightning Protectors, Misc.)
- Turbine Control (Start, Stop, Reset, Enter)
- Yaw Control (Auto, Manual, CW, CCW, Stop, Enter)
- Motor Control (Rotor) (Start, Stop, Enter)
- Capacitor Test (Test, Enter)

Monitoring Meteorological System

- Overview (Wind, Temperature, Pressure, Humidity, Status)

Monitoring Electrical System

- Overview (Power, Voltage, Current, Frequency, Power Factor, Status)

Logging/Reporting

- Alarm Log
- Active Alarm
- Alarm History
- Event History
- 10 min. Value Log
- Fast Log
- Production Statistics
- Availability Statistics
- Power Curve
- Power Distribution
- Performance Reports
- 10 min. Value Reports

Authorisation

- Application Login
- Location Login

Messaging

- E-mail

Export

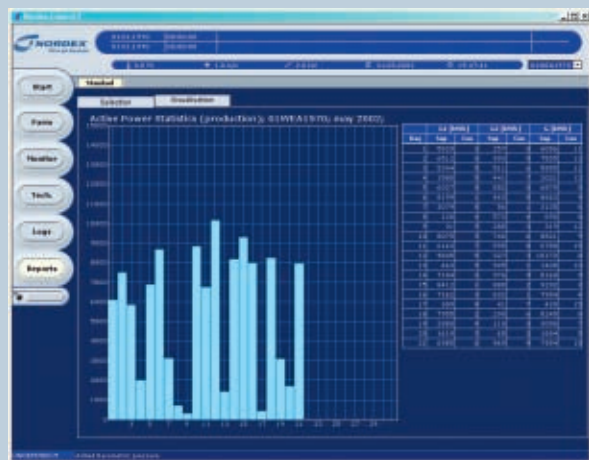
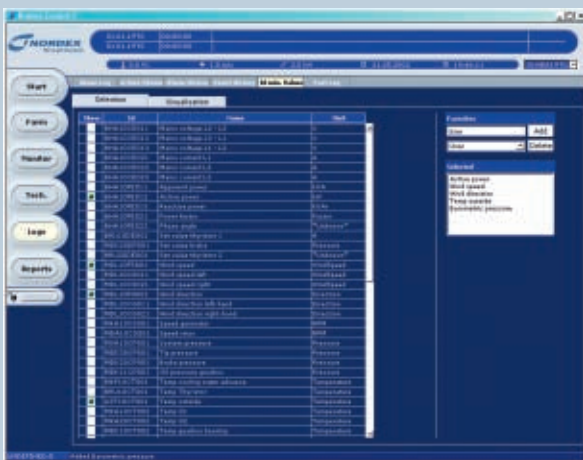
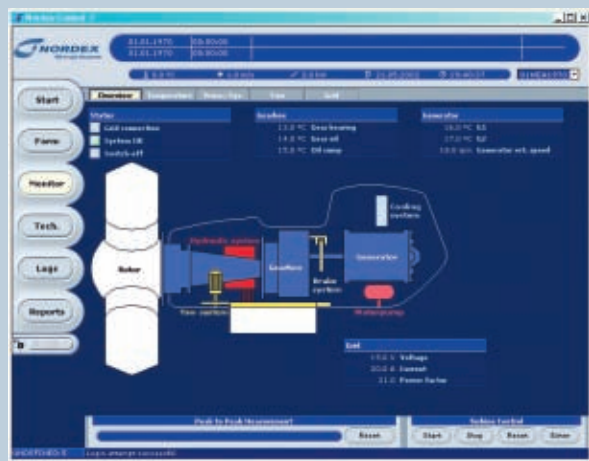
- CSV
- XML

Interfaces

- External: SOAP (HTTP, XML-CSV)
- Internal: OPC, ODBC, SQL

Database

- SQL



1 Nordex Control 2 makes it possible to display the values in either tabular or graphic form. The data can also be exported directly into databases or other Windows programs.



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