

Reliable and robust embedded wind park controller

Based on extensive experience in wind turbine control and optimization, the Wind Park Controller made for power management also intelligently coordinates tasks between wind turbines in a wind park for optimized power output - including yaw untwist, wake control and aviation light control.

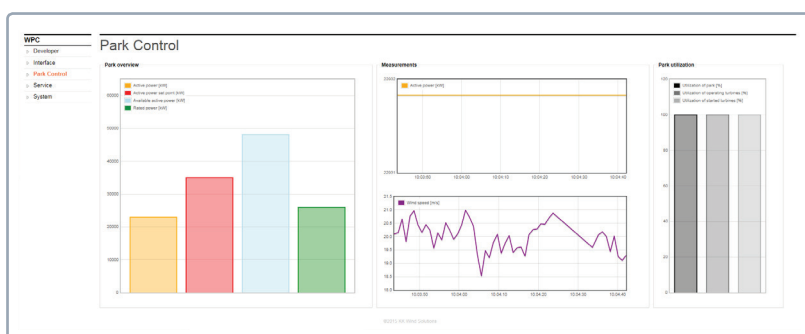
The embedded Wind Park Controller (WPC) is based on the hardware and software building practice known from KK Wind Solutions' 6th generation control system.

While KK SCADA allows for monitoring and surveillance, the park controller retrieves operational data to perform analysis and adaptive changes in park operation. The web-based service interface provides an easy overview of both the general wind park operation and the details of the different control algorithms and functions.

The park controller is based on the flexible software platform KK Core that enables easy implementation of additional control algorithms in the park controller, for instance in order to comply with specific grid codes or to implement special coordination or maintenance modules.

Key benefits

- ✓ Ensures grid code compliance
- ✓ Provides intelligent control of site-specific turbine coordination tasks
- ✓ Allows for easy addition of user-defined functionalities
- ✓ Web-based service interface for easy access
- ✓ Robust construction to tolerate high levels of vibration and EMC disturbance
- ✓ Supports C/C++, IEC61131 and Matlab/Simulink, allowing for customized extensions



Example of Wind Power Controller Operation Overview.

Integration & interfaces

The wind park controller involves several interfaces. In order to measure the grid conditions in the Point of Common Coupling (PCC), the wind park controller obtains data from grid measurement equipment supplied by KK or others, through a number of communication interface options. Communication with the Transmission System Operator (TSO), from where the park controller will get its set-point, is often different depending on the country. The software makes it easy to change this configuration for exchange the data over different physical interfaces: Analog input/output, Digital input/output, Modbus and IEC61400-25 (MMS)

The data communication interfaces supports different Ethernet-based protocols, including IEC61400-25 and Modbus TCP/IP.

Modules

The park control application contains five different modules for performing the power management of the wind park:

- **Active Power Controller** operates in different modes fitted to frequency and power control
- **Reactive Power Controller** calculates the common reactive power reference and handles various tasks related to set-point control, cos-phi control and voltage control.
- **Reference Distributor** obtains the desired grid power, frequency, voltage and cos-phi Point of Common Coupling (PCC).
- **Status Monitoring** gives an overview of available and required power compared to configuration.
- **Turbine Coordination** handles special tasks that require coordination amongst the turbines.



Example of Park Control Overview allowing the user to start and stop individual turbines.

Easy extensions

The flexible system enables the user to add modules and algorithms with additional functionality, allowing for adjustment of existing modules to meet site specific requirements.

Modification of the WPC software can be done by the customer alone or in cooperation with KK Wind Solutions. The WPC application modules from KK Wind Solutions are implemented in structured text (IEC61131-3), C/C++ or in Matlab/Simulink. Any language from the IEC61131-3 family can also be used for implementing additional WPC application modules, allowing a developer to implement modules with the language preferred for specific task.

Environmental requirements:

- Temperature range for normal operation: -35°C to 70°C
- Max temperature for high altitudes:
1500m to 3000m: 63°C
3000m to 4500m: 53°C
- Temperature range for storage: -40°C to 85°C
- Humidity at all above temperatures: 5 - 95% RH non-condensing

EMC standards:

EN61000-4-2,
-3:2006+A1+A2, -4:2004,
-4:2007, -5:2006, -6:2009,
-8:2010

Vibration standards:

IEC 60068-2-6, -27, -29, -64.

kkwindsolutions.com

Contact

KK Wind Solutions A/S
Bøgildvej 3
DK-7430 Ikast

+45 96 92 43 00

main@kkwindsolutions.com
www.kkwindsolutions.com

About us

Building on more than 35 years of experience in electrical systems for wind, KK Wind Solutions' capabilities span development of state-of-the-art technologies, high quality lean manufacturing, cost-efficient supply chain solutions and flexible service of turbines.

We innovate to integrate®