Turbine Control

Ensuring higher profits, performance and Levelized Cost of Energy (LCOE) for all types of wind turbines and wind parks.
Intelligent Control Systems

We lead the drive for innovative solutions with our Turbine Control platforms, ensuring higher profits, performance and Levelized Cost of Energy (LCOE).

Making Wind Competitive

The Turbine Control platforms from Mita-Teknik benefit from the experience and success of more than 50,000 installed systems worldwide and +35 years within the wind business. In 1984, we delivered the first wind turbine Control System. Since then, we have combined our well-known technology and knowhow with outstanding robustness and dedicated user-friendliness, making our Control platforms the strongest, most powerful and advanced solutions on the market today.

The Mita-Teknik Turbine Control platforms ensure safe and reliable operation, and optimize the wind turbine’s output according to the given weather conditions. It handles all communication interfaces, and make collected and stored operation data available for further analysis and optimization.

Modular, Plug-and-Play Solution

Our Turbine Control platforms are highly modulized, ensuring our customers maximum flexibility. Our modular plug-and-play solution supports a scalable and open control setup in order to minimize complexity and ensure easy maintenance. Our extensive product portfolio enables us to deliver solutions for all setups, ranging from small wind turbines to large on- and offshore wind turbines, securing maximum performance, high availability and optimal energy production.

Key Benefits:

› **Proven Track Record:** 50,000 installed systems and +35 years within the wind business.
› **Designed for Wind:** robust hardware, specifically designed for operating in harsh environments.
› **Modular Plug-and-Play Solution:** highly modulized plug-and-play solution ensuring maximum flexibility.
› **Powerful Redundant Concept:** hardware and software redundancy ensuring the highest operation reliability and higher availability.
› **Event-based Operation:** fast data sampling and precise control.
› **Unique Control Strategies:** advanced Control algorithms reducing loads and/or improving energy production.
› **Self-configuration:** easy installation with automatic module detection and self-configuration.
› **Self-diagnostic:** self-diagnosing in each module for optimal operation and error reporting.
› **Data Logging:** advanced event based data logging and storage.
› **Multiple Programming and Simulations:** CoDeSys, Matlab, C/C++, GH Bladed and Simpack.
› **Maintenance Free:** designed to be maintenance free for the whole wind turbine lifetime.
## Control Overview

### Control System Platforms

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<th>WP4200 CPU Controller</th>
<th>WP100 CPU Controller</th>
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- **CPU:** 2x ARM Cortex™- A15 1.2 GHz
- **DSP:** 2x TI C66X 750 MHz
- **DDR III RAM:** 1 GB
- **Flash disk:** 1 GB SLC NAND + 4 (up to 64) GB eMMC
- **Communication speed:** 10/100/1000 Mbit/s
- **Integrated CMS**
- **Operation temperature:** -30 to +60°C (fanless operation)
- **Storage temperature:** -40 to +85°C

The WP4200 platform is based on the multicore CPU technology. It offers superior performance and with its built-in floating point unit it is perfectly suited for high demanding control- and regulation applications. The controllers are equipped with high-speed gigabit Ethernet interface, for communication in the wind farm. It also features safety chain relay logic that integrates with the Safety System to fulfill the requirements in the ISO 13849-1 standard.

- **CPU:** ARM Cortex™- A8 1000 MHz
- **DDR III RAM:** 1024 MB
- **Flash Disk:** 1024 MB
- **Communication speed:** 10 kbit/s to 1 Mbit/s
- **Built-in GPS receiver**
- **Operation temperature:** -30 to +60°C (fanless operation)
- **Storage temperature:** -40 to +85°C

The WP100 platform is specially designed for control of small and medium sized wind turbines. The WP100 Controller is built with focus on compatibility and flexibility and has various on-board I/O channels that makes it possible to use the controller as standalone (without additional I/O modules) to control systems with limited complexity. The controller is equipped with two high-speed interfaces that work as separate network interfaces. The controller also features safety chain relay logic.

### Interface Modules

- **WP-Line 111 MK II - Power Supply**
- **WP-Line 112 MK II - Gigabit Ethernet Switch/PSU**
- **WP-Line 151 MK II - Grid Measurement**
- **WP-Line 351 MK II - COMBI I/O**
- **WP-Line 411 MK II - 16 PT100/PT1000**
- **WP-Line 412 MK II - 32 PT100/PT1000**
- **WP-Line 413 MK II - 16 Analog Current Output**
- **WP-Line 414 MK II - COMBI I/O (DI/DO/PT)**
- **WP-Line 415 MK II - 32 Analog Input**
- **WP-Line 416 MK II - 64 Digital Input**
- **WP-Line 417 MK II - 64 Digital Output**
- **WP-Line 418 MK II - COMBI I/O (DI/DO/AI/PT)**
- **WP-Line 419 MK II - COMBI I/O (DI/AO/AI)**
- **WP-Line 420 MK II - 32 digital input**
- **WP-Line 421 MK II - 32 digital input**
- **WP-Line 422 MK II - 48 digital input**
- **WP-Line 423 MK II - 64 digital input**
- **WP-Line 424 MK II - 32 DIN/16 DOUT**
- **WP-Line 425 MK II - 32 DIN/16 DOUT/16x AIN(I)**
- **WP-Line 426 MK II - 16 DIN, 16 PT100/PT1000**
- **WP-Line 511 MK II - CANopen Master**

The WP-Line interface modules adds flexibility to the Mita Teknik Turbine Control systems. With the WP-Line modules you are able to combine, build and create your ultimate setup.

### HMI Interfaces

- **WP4052 Touch Display**
  - 15” TFT with 1024 x 768 resolution, 16 bit colours
  - Maximum user comfort via the HMI principle
  - User-friendly menu structure
  - USB port available
  - Pressure sensitive touch screen; responds to finger, gloved hand or pen

The WP4052 Graphic Color Touch Screen Display ensures quick and reliable survey of functions and data in the wind turbine. It provides maximum user comfort via the HMI principle and a user-friendly menu structure. The WP4052 display is available in a cold climate version with internal heater.

- **WP4053 Touch Display**
  - 7” TFT with 800 x 480 resolution, 16 bit colours
  - Maximum user comfort via the HMI principle
  - User-friendly menu structure
  - USB port available

The WP4053 Graphic Color Touch Screen Display is compatible with the WP4x00, WP100 and WP3x00 MK II platforms. It gives the possibility to start/stop the turbine, access diagnostic data, parameter changing and troubleshooting. It is the perfect solution for cost-optimized setups where size of the display is one of the crucial factors.

- **Soft HMI**
  - Manage profiles for quick access to pre-configured wind turbines
  - Navigate intuitively through data
  - View overall system status, principal mechanical and electrical characteristics
  - Monitor data changes in real-time

With the MiConnect Mobile Diagnostic App, monitoring and visualization of your wind turbine’s operation process is now possible via your smartphone and tablet. MiConnect makes service easy, and gives you the overview you need to ensure optimal operation and performance of your wind turbine.
**Take Control - PEPTOOL Automation Suite**

We provide our unique and open automation environment, the PEPTOOL software suite. With PEPTOOL, you get complete control of your wind turbine/wind park and gain the power to rapidly change the application source code, controlling the behavior of the control system. This way, you are able to quickly respond to changes and new requirements and you can continuously expand your facility extending the potential and lifetime of your investment.

PEPTOOL allows your engineers and technicians customize the software in an intuitive environment built around the standard Microsoft Windows platform. In addition, PEPTOOL allows you to create new additional applications for the controller including generation of detailed documentation and reports. PEPTOOL supports the programming languages ANSI C/C++ and Structured Text and compiles ready-to-use applications for the Mita-Teknik controllers and DLLs for the Emulator and simulation tools.
Great at Control

Our solutions offer superior performance and are developed specifically to withstand the harsh environmental conditions in the wind industry on- and offshore. Our systems are developed for unmanned operation and contain no moving parts.

Our own EMC laboratory enables us to test all components during development and all series productions. Our Turbine Control hardware is tested twice the EMC standard. We have tested our modules against this standard through more than 25 years, ensuring the highest level of robustness and reliability throughout the product lifetime.

A wind turbine has an expected lifetime of 20 to 30 years. Our Turbine Control platforms are designed to be maintenance free for the whole wind turbine lifetime.

Reducing the Cost of Energy

A Turbine Control system consists of hardware and software to operate the turbine machinery. At Mita-Teknik, we are not only specialized in the hardware setup. We also have leading industry knowledge in Load and Control Optimization features.

The Mita Load & Control team is specialized in wind turbine optimization and delivers a wide range of advanced control features. By applying advanced control integration knowhow and services, we are able to reduce loads and/or improve energy production and hereby reduce the Cost of Energy (CoE).

This includes algorithms and drives for controlling main turbine blade pitch, rotor speed, generator power and yaw positioning, but also the supporting functions such as cooling, lubrication, power supply etc.

We reduce the Cost of Energy by:

- Load calculation and optimization to improve AEP.
- Unique proprietary Control Strategies to improve production and performance (2PI and Torque).
- Robust pitch and power control for optimal power production.
- Individual Pitch Control (IPC) for reduction of nacelle tilt and yaw, blade and tower extreme and fatigue loads.
- Drivetrain damping for reduction of fatigue loads on drivetrain and gearbox.
- Active tower damping for reduction of tower fatigue loads.
- Load and Control Toolbox - MiLaCtool - to optimize the design and load calculations for all sizes of wind turbines.