



Data Sheets
Condition Monitoring



The MiCMS

The MiCMS Condition Monitoring System provides features which help to avoid possible failures and downtimes in wind turbines. The MiCMS is designed to be equally suitable for both experts and users without knowledge of vibration analysis. Users with no prior experience can use proven baseline values from appropriate ISO and VDI standards to monitor changes in turbine conditions and compare key parameters against thresholds. Experienced users can apply the settings with sophisticated algorithms for spectral analysis in different bands to perform advanced diagnostics automatically. It enables optimum planning of maintenance schedules, personnel and materials forecasting the expected cost. The MiCMS has flexible hardware configuration and supports different solutions for deployment either as stand-alone, mobile or integrated built-in solution with the control system.

Vibration-analysis is the cornerstone of the Condition Monitoring System. The hardware of MiCMS is based on the WP4200 Controller platform with Heterogeneous System Architecture (HSA) that utilizes various processor types (CPU and DSP) both for fast data processing and computing.

Performing a simultaneous data sampling by 8 connected accelerometers, the CMS controller provides all-embracing monitoring with integrated analysis of the distributed components of the wind turbine.

- › Preventative maintenance and fault diagnosis system
- › Control and safety integration
- › Improving reliability and performance
- › Mechanical components performance assessments
- › Decision support system
- › Increasing ROI
- › Fully automated data measuring and processing
- › Scalable system architecture
- › In complete compliance with the GL Guideline for CMS System Development (2013)

Development concepts of MiCMS include both integrated and stand-alone solutions based on the powerful controller, that operates either as a built-in or as a distributed system with functions of the turbine control and monitoring correspondingly. In order to match the specified functional requirements, the hardware architecture can be extended with set of WP-Line modules which possess various interfaces of I/O channels for data sampling and communication.

Implemented state-of-the-art algorithms on the front end and back ends of MiCMS allow revealing correlation between mechanical, operational and production conditions of the wind turbine. The results of online data processing and mechanical condition assessment by severity level examination are automatically dispatched to end-users through e-mail and SMS.

The front end of MiCMS is part of the SCADA software with integrated database which facilitates interoperable data exchange for offline analysis including statistical methods for trends evaluation and data mining. Built-in builder provides visualized wizard for configuration of kinematic model based on the components and nodes which compose backbone of the drive-train.

The integrated Algorithm Toolbox enables advanced data analysis by collected raw signals using the set of instrumented algorithms for signals processing.

The integrated report generator provides the possibility for manual and automatic report preparation with arrangement of the information by components/turbine states. Customization of the report templates is available by means of report designer that is included as well.

Conformity with IEC 61400-25.

Advantages of MiCMS:

- › Vibration severity assessment with considering operation conditions
 - › Scalable hardware and software architecture
 - › IEPE accelerometers support regardless manufacturer
 - › Autonomous and built-in installation in regards of Mita-Teknik main turbine controller
 - › Flexibility at installation and configuration
 - › Permanent online data access
 - › Advanced severity assessment and exceeding handling corresponding to ISO 10816, 2372 and VDI 3834 standards
 - › Synchronous data sampling from connected sensors/modules
 - › Scheduled or event based data acquisition
 - › 24 x 7 monitoring and secured data access
 - › User unattended surveillance of the wind turbines
 - › Web access to online and offline data
 - › Interoperable data exchange with main turbine controller and SCADA
 - › Secured multi-user concept
 - › Meaningful data representation
 - › Regular reporting through documents
- › Offline data mining. Root cause analysis
 - › Diagnostic tool with extended set of algorithms for advanced analysis by experts
 - › Corresponding to international standards and certificates
 - › CMS hardware protection category IP 30
 - › Oil condition and temperatures monitoring



Technical Data

CPU System	
CPU	ARM Cortex™- A8 1.2 GHz
DSP	TI C674X Core 1 GHz
FPGA	Xilinx FPGA Spartan - 3 AN
NVRAM	Dynamic allocated up to 10 MB
DDR III RAM	256 MB
Flash disk	512 MB

USB	
USB type	Host, type A connector
USB ver.	2.0
Supported devices	USB Mass Storage Class (up to 2TB)

Ethernet RJ45 LAN Port	
Communication speed	10/100/1000 Mbit/s
Connector	RJ45 Shielded

Ethernet WP-Line BUS	
Communication speed	10/100 Mbit/s
Connector	WP-Line BUS connector (left side)

Relay Output - Safety	
Isolation type	Relay contact
Nominal voltage	24 VDC
Input current/signal "1"	10 mA to 1 A
Input impedance	2.4 kΩ

Redundant System Interface - Master	
Isolation type	Optocoupler
Nominal voltage	24 VDC
Input impedance	1.6 kΩ

Serial Communication Port - COM 1	
Port type	RS232 (RTS/CTS/RI)
Communication speed	300 BAUD to 230.4 kBAUD (software configuration)
Connector	9-pin Sub D connector

Serial Communication Port - COM 2	
Port type	RS232 (RTS/CTS)
Communication speed	300 BAUD to 230.4 kBAUD (software configuration)
Connector	9-pin Sub D connector

Accelerometer Inputs (WP4200 Controller - 08, -09 and -10 only)				
Variant	-00	-08	-09	-10
Number of inputs	None	8	16	8
Galvanic isolation	-	500 V	500 V	500 V

Specifications subject to change
 MT_MiCMS_DataSheet_R3_0

Technical Data

Supported sensors	IEPE type - integrated electronics piezoelectric
ADC	Resolution: 24 Bit Range of measurement: 0.1 to 25 g (supporting ICP sensors) Frequency range: 0.1 to 10 000 Hz Sampling rate: 48 kHz

High Speed Counter Inputs (WP4200 Controller - 10)	
Number of inputs	2
Galvanic isolation	500 V
<i>Nominal voltage:</i>	
Signal "1"	15 to 30 VDC
Signal "0"	0 to 5 VDC
Input impedance	2400 Ω
Frequency range	0.05 Hz to 1k Hz

Digital Inputs (WP4200 Controller - 10)	
Number of inputs	2 with common ground
Galvanic isolation	500 V
<i>Nominal voltage:</i>	
Signal "1"	15 to 30 VDC
Signal "0"	0 to 5 VDC
Input impedance	Min. 2400 Ω
Minimum pulsewidth	>20ms
Sampling rate	50 Hz

Digital Output (WP4200 Controller - 10)	
Number of outputs	1
Output type	NPN
Galvanic isolation	500 V
Nominal voltage	24 V
Maximum current	0.1 A

PT100 Inputs (WP4200 Controller - 10)	
Number of inputs	2 with common ground
Galvanic isolation	500 V
Temperature measuring range	-40 to +211°C
Accuracy	±0.5% of full scale
Resolution	0.1°C
Current for PT100 input	Max. 1 mA
Conversion time for each channel, max	250 ms

Analog Inputs (WP4200 Controller - 10)	
Number of inputs	4 with common ground
Galvanic isolation	500 V
Input current	0 to 20 mA
Analog bandwidth	0 to 100 Hz
Accuracy	±0.5% of full scale

Specifications subject to change
MT_MiCMS_DataSheet_R3_0

Technical Data

Measurement resolution	0.01 mA
Input resistance	<200 Ω

WP-Line BUS	
Nominal voltage	12 VDC (10.5 to 13.5 VDC)
Standard module load	3

External 24 V				
Variant	-00	-08	-09	-10
<i>Current consumption (excluding connected WP-Line modules consumption up to 0.6A):</i>				
Maximum	0.9 A @ 24 VDC	1.0 A @ 24 VDC	1.10 A @ 24 VDC	1.10 A @ 24 VDC
Typical	0.5 A @ 24 VDC	0.58 A @ 24 VDC	0.66 A @ 24 VDC	0.65 A @ 24 VDC
Required voltage	24 VDC (19 to 30 VDC)			

Module Power Consumption				
Variant	-00	-08	-09	-10
Typical	12.0 W	13.9 W	15.9 W	15.6 W

Permissible Ambient Conditions	
Operation temperature	-30 to +60°C (fanless operation)
Storage temperature	-40 to +85°C
Relative humidity	Max. 95% RH (non-condensing @ 40°C)
Operation altitude	Max. 2000 m above sea level (up to 4000 m at derated temperature)

Mechanical Information				
Variant	-00	-08	-09	-10
Weight	0.6 kg	0.66 kg	0.72 kg	0.7 kg
Dimensions (WxHxD)	170 x 165 x 65 mm			
Required gap (top/buttom)	Min. 25 mm			
Degree of protection	IP30			

Applied Standards	
Damp heat	EN 60068-2-78
Vibration	EN 60068-2-6
Bump	EN 60068-2-27
Shock	EN 60068-2-27
Temperature	EN 60068-2-1, EN 60068-2-2 and EN 60068-2-14
EMC	EN 61000-6-2 (Immunity standard for industrial environments) EN 61000-6-4 (Emission standard for industrial environments)

Mita-Teknik Ordering Information

Order Number	Variant	Order Name
9784201	- 08-01	WP4200 Controller with stand-alone capability - Basic 8 accelerometer inputs (PCB plug)
	- 09-01	WP4200 Controller with stand-alone capability - Advanced 16 accelerometer inputs (PCB plugs)
	- 10-01	WP4200 Controller with stand-alone capability - Extended 8 accelerometer inputs (PCB plug) & I/O

Accessories		
For all variants		
978011102		WP-Line 111 MK II Power Supply / Backbone
978800101		WP-Line BUS flat cable 27 mm molded
978800202		WP-Line BUS Terminator MK II
9788080		WP-Line MK II 80 LED module
9788106		Serial Cable RS232 WP4x00 / N-Port 5 m
978810601		Serial Cable RS232 WP4x00 / N-Port 1.5 m
9788108		Serial Cable RS232 WP4x00 / Modem 2 m
9788109		Serial Cable RS232 WP4x00 / PC 3 m
3389210		Ethernet Patch Cable RJ45, Cat. 6 STP Shielded Grey 1 m
3389220		Ethernet Patch Cable RJ45, Cat. 6 STP Shielded Grey 2 m
3389250		Ethernet Patch Cable RJ45, Cat. 6 STP Shielded Grey 5 m
337609002		Fiber Optic Cable Trunk 6 x 62.5/125 um SC/SC 90 m

For WP4200 Controller - 08 only		
978904200	- 08-01	Connector Kit Screw Black WP4200 - 08-01

For WP4200 Controller - 09 only		
978904200	- 09-01	Connector Kit Screw Black WP4200 - 09-01

For WP4200 Controller - 10 only		
978904200	- 10-01	Connector Kit Screw Black WP4200 - 10-01
7621700		Cylindrical Proximity Sensor M12
7628010		Shielded cable for the Proximity Sensor 10 m

Common for WP4200 Controller - 08, - 09 & -10		
8946032		Accelerometer, 100 mV/g, 80 g, 0.5 - 14 000 Hz, M12 top connector
8946033		Accelerometer, 500 mV/g, 10 g, 0.2 - 3 700 Hz, M12 top connector
8946039		Accelerometer, 100 mV/g, 80 g, 0.5 - 12 000 Hz, M12 side connector (incl. M6 bolt)
8946029		Accelerometer, 500 mV/g, 10 g, 0.2 - 3 700 Hz, M12 side connector (incl. M6 bolt)
894604405		Accelerometer Cable, Shielded, 4-pin M12 connector, 5 m
894604410		Accelerometer Cable, Shielded, 4-pin M12 connector, 10 m
894604415		Accelerometer Cable, Shielded, 4-pin M12 connector, 15 m
894604420		Accelerometer Cable, Shielded, 4-pin M12 connector, 20 m
7983212		Mounting stud with M6 x 1 to M6 x 1 thread
7983213		Mounting stud with M6 x 1 to M8 x1.25 thread
7983140		Mounting pad, M6 x 1 integral stud, stainless steel

Specifications subject to change
 MT_MiCMS_DataSheet_R3_0

Mita-Teknik Ordering Information

7983150	Magnetic mounting pad, M6X1 integral stud, stainless steel
8702015	Glue for accelerometer mounting pads
For upgrade from WP4100 Controller to WP4200 Controller only	
9788042	WP4100 to WP4200 SC/MS Adapter