



- › Realtime DSP grid measurement module
- › Surveillance of 3 currents and 3 voltages
- › New, improved algorithms for precise, fast and reliable grid measurements
- › Calculation of all grid data
- › Grid protection
- › Supports FRT/LVRT
- › Supplies data for machine control
- › Supplies data for production statistics
- › Intelligent thermal control
- › Configurable measuring modes to present Power, Energy and Powerfactor

The WP4x00 MK II Control Concept

The WP-Line 151 MK II Grid Measurement module is part of the WP4x00 MK II Control Concept which has been specially designed to control large wind turbines - on- and offshore. The WP4x00 MK II Control Concept ensures optimal operation, high security, and advanced data collection.

The concept typically consists of a power supply/backbone module, a WP4x00 MK II controller, a grid measurement module as well as an analog/digital I/O module dependent on the specific configuration task. The WP4x00 MK II Control Concept makes it possible to have redundant solutions. The concept is constructed as a plug-and-play system with automatic module detection and error reporting.

Advantages of the WP4x00 MK II Control Concept:

- › Corrosion robust construction
- › Robust WP-Line interconnection
- › Fast and easy DIN-rail mounting
- › Automatic node assignment of WP-Line modules
- › Simplified module status indication
- › Supports removable LED matrix display
- › Service-friendly

The WP-Line 151 MK II

The WP-Line 151 MK II module has three voltage and three current analog inputs. The module is powered from the WP-Line BUS.

The WP4x00 MK II controller can automatically update the programs via the network. The communication to the WP4x00 MK II controller is event-based, which means that only changed values are transmitted via the network. Analog part is based on 16 bit precision ADC.

The WP-Line 151 MK II module performs three basic functions:

- › Calculates main grid parameters
- › Switches turbine off the grid in case of grid fault
- › Provides WP4x00 MK II controller with data

Main grid parameters like voltage, current, active and reactive powers, etc. are used by the WP4x00 control application for turbine overall control. Calculation of main grid parameters by precise and reliable DSP algorithms has the following features:

- › Frequency calculation algorithm assures measurement accuracy 0.01 Hz and higher
- › Voltage and currents are calculated using FFT algorithms
- › Powers and energies are measured according to IEC 61400-21 standard
- › Precise DSP algorithms and high update rate make support for FRT/LVRT

Specifications subject to change

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Apart from just measuring main grid parameters the WP-Line 151 MK II module can perform grid protection functions. In particular, it can protect the grid in case of the following grid faults:

- › Over/under voltage
- › Over/under average voltage
- › Over current
- › Over/under frequency
- › Over power
- › Reactive power high/voltage low
- › Vector jump
- › Rate of change of frequency (ROCOF) high

By default, the grid protection functionality of the WP-Line 151 MK II module is disabled. For the WP-Line 151 MK II module to perform grid protection functions it must be properly configured. The grid protection functionality of the WP-Line 151 MK II module provides two level of grid protection:

- › The first level is passive, that is, faults are only detected and registered but no active actions are undertaken.
- › The second level is active, that is, when grid fault happens the relay is activated and thus the turbine is switched off the grid.

Furthermore, there is an option for manual relay activation regardless of grid faults state. Relay can be reset (closed) automatically, if voltage and frequency is within the specified range or manually. Grid protection by WP-Line 151 MK II module operates with such definitions as threshold, dropout level and timeout.

- › Threshold level defines a value crossing of which up or down – dependent on whether it is high or low threshold - leads to activation of "timeout" timer.
- › Dropout level defines a value crossing of which down or up – dependent on whether it is high or low threshold - leads to fault clearance.
- › Timeout value defines time interval between crossing threshold and fault activation.

Once the relay is activated, it stays in this state during certain minimum period which is configurable value. There is an option for programmatical inversion of relay behavior - relay activation can be associated with either relay open or relay close state.

Fault reaction time, that is, time interval between fault detection and relay activation is configurable timeout value. If minimum reaction time is required then timeout is set to 0.

In case of voltage fault maximum relay reaction time is 30 ms. In case of frequency fault maximum relay reaction time is 50 ms.

Over/under voltage protection, over/under frequency protection and automatic relay closing are certified by TÜV according to the BDEW 2008 standard. Certificate registration number is 44 797 15179701. The certificate is valid till 2021-03-14.



Technical Data

WP-Line BUS Supply Voltage	
Nominal	12 VDC
Allowed range	10.5 to 13.5 VDC
Current Consumption (WP-Line BUS)	
Typical	0.40 A
Maximum	0.45 A
Standard module load	2
Module Power Dissipation	
Typical	4.6 W
Grid Measurement Input	
No. of current inputs	3
Current input range	5 A RMS
Current input impedance	10 mΩ
No. of voltage inputs	3
Voltage input range	18 V RMS
Voltage input impedance	8.3 kΩ
Resolution	16 bit
Accuracy	0.2 % of full scale
Sample speed	4 kHz
Relay output	
Max. switching current	1A
Max. switching voltage	125 VDC/AC
Max. response time	20 ms
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	
Dimensions (WxHxD)	85 x 165 x 65 mm
Required gap (top/buttom)	Min. 25 mm
Weight	0.35 Kg (incl. plug in terminal blocks)
Degree of protection	IP30
Applied Standards	
Damp heat	EN60068-2-78
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)

Specifications subject to change

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Mita-Teknik Ordering Information

Order Number	Order Name
978015102	WP-Line 151 MK II Grid Measurement
Accessories	
9788080	WP-Line 80 LED module
978800101	WP-Line BUS flat transmission cable, 27 mm molded
978800202	WP-Line BUS Terminator MK II
978915101	Connector Kit
978802020	Cable WP-Line 151 - WP3090 2 m
Grid Measurement	
9723090	Grid Measurement Interface

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