

General Description

The VMS-1201 Controller card is a component which is capable to perform parallel computing, communicate with backend VMS server, control the system, and configure the channels. It mainly contains embedded microprocessor, high-performance FPGA, ethernet interfaces to back-end server, and interconnection to VMS-100X chassis. In addition, it supports local service USB port for prophylaxis and maintenance, and RS485 interface for integration of third-party components.

VMS-1201 is compatible with all VMS-1XXX series platform.

Applications and Benefits

- Parallel processing of all 16 measuring channels with time resolution of 10 ns
- Configuration of all VMS modules
- Phase marker conditioning and distribution
- Managing oscillogram data reading
- Managing remote firmware update of all VMS modules
- All configuration backed up against power shortage



VMS-1201 – VMS Controller

Parameters

Parameter	Value		
	Minimum	Typical	Maximum
Mounting	3U card with DIN41612 connector		
Width	4 HP		
Number of digital input channels	32		
Ethernet communication	100Base-Tx		
USB communication	2.0 Full speed		
Modbus RTU baud rates	9600	19200	115200
Ambient temperature	-40 °C		85 °C
Power supply consumption at +5 V supply		400 mA	
Power supply consumption at +12/-12 V supply		0 mA	
Back-up battery life	5 years		
FPGA processing clock frequency	100 MHz		



VMS Platform Overview

The VMS-1201 is a communication gateway of the VMS platform to server as highlighted below. It also gathers signals from all channels and meters in the system. This figure represents example of VMS installation based on VMS-1001.

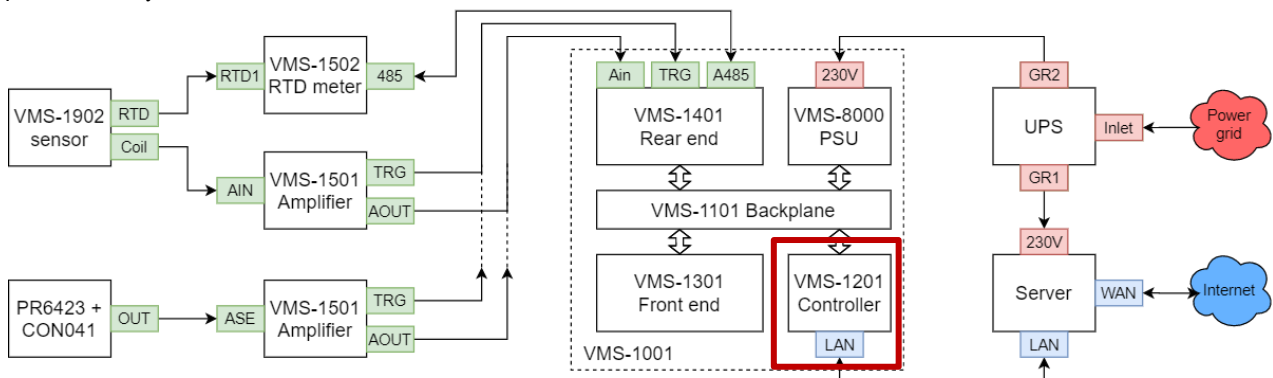
At the very beginning of measuring chain, there is an inductive sensor VMS-1902 that measures response of passing-by blade and returns a voltage signal. This signal is amplified and conditioned by VMS-1501 amplifier and lead to the VMS-1401 rear-end entry point in form of both differential analog and digital (threshold) signals. Note that other sensors (such as eddy current PR6423, magnetic speed sensor PR9376, or isolator P27000) can be used for measurement if they are connected through VMS-1501 amplifier. Inside the the VMS-1001 chassis, these signals are connected through VMS-1101 backplane into VMS-1301 front-end card for analog-to-digital conversion and/or digital signal capture.

The set of VMS-1902 (or other sensor), VMS-1501, VMS-1401, and VMS-1301 compose a single measurement channel. The chassis VMS-1001 supports up to 16 independent channels, chassis VMS-1002 supports up to 4 channels.

If the sensor contains RTD temperature detector (PT100 or PT1000), RTD meter VMS-1502 can be used. The VMS-1502 measures 6 RTD sensors at the time, so 6 measurement channels share a single device. It communicates directly with VMS-1201 controller that supports up to 3 RTD meters.

The result of analog conversion and triggering (or capture of digital signal) inside the VMS-1301 is then sent to the VMS-1201 controller by means of LVDS (low-voltage differential signaling) time mark. The VMS-1201 controller gathers time marks from all channels and creates time mark data package upon phase marker arrival. The data package is then sent to the Server for processing and vibration analysis. Server also runs software for complete VMS platform configuration and monitoring.

It is a good practice to have the whole platform connected to an Uninterruptable Power Supply as a sudden power shortage may disrupt consistency of the software.



Led Indication

For simple behavior indication, the VMS-1201 is equipped with 8 LED diodes on the front panel in 2 rows. The upper row is dedicated to FPGA and have the following meaning.

Label	Color	Meaning
FPGA STATUS	Green	FPGA firmware status. This LED should blink at 1 Hz when FPGA is working correctly.
PHASE MARK	Green	This LED blinks every time the phase marker is generated for the entire system.
ERROR	Red	FPGA encountered some error. This can happen when MCU is not working properly and it does not handle FPGA requests properly.
CONF DONE	Red	Configuration of FPGA NOT done. If this LED shines, FPGA is not able to load configuration from external memory. Firmware is probably corrupted, and the device is not working.

The bottom row is dedicated to MCU and the LEDs have the following meaning:

Label	Color	Meaning
STATUS	Green	MCU firmware status. This LED should blink at 1 Hz when MCU is working correctly.
COMM	Green	Communication with server is established and timestamp data are transmitted to server.
ERROR	Red	Error that prevents this device to operate correctly. Mainly hardware malfunction.
WARNING	Red	Warning that does not prevent from correct operation.



VMS Controller

When all MCU LEDs are ON at the same time, it indicated the bootloader or early initialization stage. This condition should not last more than 15 seconds (when bootloader updates new firmware). If it last longer, the current MCU firmware may be corrupted should be revert.

Pinhole Buttons

There are two pinhole buttons with the following meaning:

Label	Action	Meaning
RST	Single push	The whole system will be reset. MCU will turn off all FE cards, reset itself, reset FPGA and turn on all FE cards.
FCT	Single push	Factory reset of configuration. After setting default configuration, device will reset.
FCT + RST	Hold FCT, push RST, keep FCT	Holding FCT button during power up will instruct bootloader to revert firmware to the previous one. In case the device does not respond on FCT button, RST button can be used to restart device.

Factory Settings

Out-of-box or after Factory reset, the following configuration is used by VMS-1201. These values are valid for firmware version 20210120 and newer:

Configuration	Value	Description
LAN DHCP client	Enabled	DHCP client feature is enabled. However, static IP setting is used after 15 second timeout if DHCP server is not responding.
LAN static IP	10.0.0.10	IP addressed to be used by VMS-1201 if DHCP is disabled or not responding.
LAN static IP mask	255.255.255.0	IP mask to be used by VM-1201 if DHCP is disabled or not responding.
LAN static gateway, DNS and NTP server	10.0.0.1	Gateway, DNS and NTP server IP address to be used by VM-1201 if DHCP is disabled or not responding.
Computer IP address for all sockets	10.0.0.1	IP address of computer that should run VMS Setup SW and accept incoming connection from VMS-1201 on given ports. VMS-1201 tries to connect to this IP address by 3 sockets.
Timestamp port	50000	Port number for timestamp communication.
Primary configuration port	50001	Port number for primary configuration communication.
Secondary config port	50002	Port number for secondary configuration communication.
Power channel on/off	0	All channels are powered off. They must be enabled from VMS Setup SW.
Phase marker enable	disabled	Phase marker should be enabled after power-up of used channels. (Master-> Control_0 = 1)
Phase marker arming	1000	Arming of phase marker is set to 10 us.
Channel arming	100	Arming of all channels is set to 1 us.
Channel trigger	5	Channel ADC is enabled, and trigger is set to rising edge with hysteresis. (Frontend-> control_0 = 5)
Channel comparator	0	Comparison value is set to 0 V.
Channel hysteresis	0.5	Hysteresis of comparator is set to 0.5 V. This value must be crossed in both directions to generate a trigger. I.e., trigger is generated when voltage goes from -0.5 V above 0.5V for default settings at the time of crossing 0.5 V.
Channel multiplexer	4	Result of ADC comparator is routed to LVDS-A signal from VMS-1301 to VMS-1201.
Logger divider	100	Logger is sampled at sample rate of 1 million samples per second. So, result waveform of 1024 samples capture little bit more than 1 millisecond.
RTD meter address	030201	Modbus addresses 1, 2, and 3 are used to find 3 RTD meters VMS-1502.
RTD sensor configuration	1	All sensors are PT100, and no filtering is enabled.



Norm compliance

This product was developed and manufactured with the compliance of following European norms (EN):

- EN 61000-4
- EN 55032
- EN 50581:2013



Document revisions

Revision number	Date	Remarks
Rev 01.0	05/2017	Document release
Rev 02.0	09/2020	Add block diagram and description. New parameters table.
Rev 02.1	03/2021	Add Factory Settings section

