Vibro Meter VM600 MPC4 200-510-041-021

Machinery Protection Card



Vibro Meter VM600 MPC4 200-510-041-021 is a legacy rack card in the VM600 machinery-protection family. The MPC4 family processes dynamic sensor signals for machine protection and vibration monitoring, with programmable measurement and alarm functions and an associated IOC4T input/output card. The photographed card has four RAW OUT connectors, two TACHO OUT connectors and a front RS-232 connection. Its complete 200-510-041-021 identity is important when replacing an installed card because later hardware and firmware combinations are not automatically equivalent.

Technical Specifications

Product Identity	
Complete legacy part number	VM600 MPC4 200-510-041-021
Functional Configuration	
System family	VM600 machinery protection system
Visible front connections	4 RAW OUT BNC, 2 TACHO OUT BNC, RS-232
Associated card family	IOC4T; confirm matching hardware and configuration
Reference data scope	Later MPC4 standard/separate-circuits versions, DS 268-021 Version 12
Channels - newer standard reference	4 dynamic inputs and 2 speed/phase inputs
Dynamic input - newer reference	DC 0 to +20 V or 0 to -20 V; AC ±10 V maximum
Configuration reference	VM600 MPSx; legacy software/firmware compatibility requires confirmation
Legacy version restrictions	No inferred 50-ohm output, SIL certification or live insertion/removal permission
Performance & Power	
Rack supply - newer reference	+5 V DC and ±12 V DC
Environment	
MPC4 family temperature reference	Operating –25 to +65 °C. Storage –40 to +85 °C. Family data from DS 268-021, common to MPC4 cards.

Selected original manufacturer material follows on pages 3–7.

Compatibility & Selection Guide

System compatibility. An MPC4 works with a matching IOC4T and a correctly configured VM600 rack. Later card pairs use VM600 MPSx configuration software via RS-232 or a rack-controller connection; verify the software and firmware supported by the legacy 041-021 card before replacement. The modern hardware manual directs old 01x/02x users to Edition 4, so current hot-swap and safety-version claims are not used as instructions for this legacy unit.

Wiring & Installation Reference

Installation precautions

Do not infer functional-safety certification for a legacy card from a newer family datasheet.

No live insertion/removal approval is claimed for 200-510-041-021.

View connector reference (PDF) — page 6 · View version reference (PDF) — page 7

DESCRIPTION

MPC4 card

The MPC4 machinery protection card is the central element in the VM600 series machinery protection system (MPS), from Meggitt's Vibro-Meter® product line. This very versatile card is capable of measuring and monitoring up to four dynamic signal inputs and up to two speed inputs simultaneously.

The dynamic signal inputs are fully programmable and can accept signals representing acceleration, velocity and displacement (proximity), among others. On-board multi-channel processing allows measurement of various physical parameters, including relative and absolute vibration, S_{max}, eccentricity, thrust position, absolute and differential housing expansion, displacement and dynamic pressure.

Digital processing includes digital filtering, integration or differentiation (if required), rectification (RMS, mean value, true peak or true peak-to-peak), order tracking (amplitude and phase) and measurement of the sensor-target gap.

The speed (tachometer) inputs accept signals from a variety of speed sensors, including systems based on proximity probes, magnetic pulse pick-up sensors or TTL signals. Fractional tachometer ratios are also supported.

The configuration can be expressed in metric or imperial units. Alert and Danger set points are fully programmable, as are alarm time delay, hysteresis and latching. The Alert and Danger levels can also be adapted as a function of the speed or any external information.

A digital output is available internally (on the corresponding IOC4T input/output card) for each alarm level. These alarm signals can drive four local relays on the IOC4T card and/or can be routed using the VM600 rack's Raw bus or Open Collector (OC) bus to drive relays on optional relay cards such as the RLC16 or IRC4.

The processed dynamic (vibration) signals and speed signals are available at the rear of the rack (on the front panel of the IOC4T) as analog output signals. Voltage-based (0 to 10 V) and current-based (4 to 20 mA) signals are provided.

The MPC4 performs a self-test and diagnostic routine on power-up. In addition, the card's built-in "OK system" continuously monitors the level of signals provided by a measurement chain (sensor and/or signal conditioner) and indicates any problem due to a broken transmission line, faulty sensor or signal conditioner.

An LED indicator on the MPC4 front panel indicates whether a processing or hardware error has occurred. Six additional LEDs (one per input channel) indicate whether the OK System has detected a fault and whether an alarm has occurred on the channel.

The MPC4 card is available in three versions: a "standard" version, a "separate circuits" version and a "safety" (SIL) version, all of which function as a card pair using a corresponding IOC4T input/output card.

Different versions of the MPC4 card

The MPC4 card is available in different versions, including "standard", "separate circuits" and "safety" (SIL) versions. In addition, some versions are available with a conformal coating applied to the circuitry of the card for additional environmental protection against chemicals, dust, moisture and temperature extremes.

Both the 'standard' version and the "safety" (SIL) versions of the MPC4 card are certified to IEC 61508 and ISO 13849, for use in functional safety contexts, such as SIL 1 in accordance with IEC 61508 and PL c in accordance with ISO 13849-1.

The "standard" MPC4 card is the original version and supports all features and processing modes. The "standard" MPC4 is intended for safety systems using a VM600 rack with a limited range of cards, that is, "standard" MPC4/IOC4T card pairs and RLC16 relay cards. It has a VME-compatible slave interface so it is software configurable via VME when there is a CPUx card acting as a rack controller in the VM600 rack. It is also software configurable via RS-232 (on the front panel of the card).

SPECIFICATIONS – COMMON TO ALL MPC4 CARDS

Dynamic signal inputs

Number of inputs	: 4 per MPC4 card
DC range	: 0 to +20 V or 0 to −20 V
AC range	: ±10 V max.
Common mode voltage range	: −50 to +50 V
CMRR	: >60 dB at 50 Hz
Crosstalk	: −72 dB
Input impedance	: 200 kΩ
Current input range	
• DC signals	: 0 to 25 mA
• AC signals	: ±8 mA max.
Analog frequency range	: DC to 60 kHz (−3 dB). : Note: Applicable when dynamic signal outputs are shared using the Raw bus (VM600 rack). Dynamic signal outputs can be shared with XMx16/XIO16T card pairs but cannot be shared with other MPC4/IOC4T card pairs.
Analog AC frequency range	
• *Without integration*	: 0.1 Hz to 10 kHz
• *With integration*	: 2.5 Hz to 10 kHz
Current measuring resistor	: 324.5 Ω

Buffered dynamic signal outputs

The buffered "raw" dynamic signal outputs are available on the front-panel BNC connectors (MPC4 card) and the screw-terminal connectors (IOC4T card).

Output impedance	: 50 Ω
Analog frequency range	: DC to 10 kHz (−0.1 dB with a load >1 MΩ). DC to 10 kHz (−0.2 dB with a load >200 kΩ). DC to 40 kHz (−3 dB). Note: Applicable when buffered "raw" dynamic signal outputs are shared using the front-panel BNC connectors (VM600 MPC4 card) and the screw-terminal connectors (VM600 IOC4T card).
Phase error	: <5° (DC to 1 kHz). <30° (DC to 10 kHz).
Transfer ratio	
• Voltage input	: 1 V/V
• Current input	: 0.3245 V/mA

Speed / phase reference inputs and outputs

See **Additional specifications – for "standard" and "separate circuits" MPC4 cards only on page 9**.
The "standard" and "separate circuits" versions of the MPC4 card support speed/phase reference inputs and buffered speed/phase reference outputs but the "safety" version of the card (MPC4SIL) does not.

Discrete signal interface (DSI) inputs

Discrete signal interface (DSI) control signal inputs are available on the associated IOC4T card.
Refer to the IOC4T input/output card data sheet for further information.

SPECIFICATIONS – COMMON TO ALL MPC4 CARDS *(continued)*

Communications

VME bus	: A24/D16 slave mode
RS-232 port	: Configuration and communications port, proprietary protocol (see **Connectors on page 8**)
MPC4 to IOC4T bus	: Similar to industry pack (IP)

Note: The VME bus provides access to the MPC4/IOC4T card pair via a CPUx card, in order to support Ethernet and/or fieldbus communications. The RS-232 port (front-panel serial interface) provides access to the MPC4/IOC4T card pair for standalone operation, that is, when a CPUx card is not installed in the VM600 rack. An MPC4/IOC4T card pair is software configurable via VME or RS-232 (see **Configuration on page 7)**.

Note: The "standard" and "separate circuits" versions of the MPC4 card include a VME bus but the "safety" version of the card (MPC4SIL) does not. Therefore, the "standard" and "separate circuits" versions of the MPC4 card are software configurable via RS-232 or VME but the MPC4SIL card is software configurable via RS-232 only.

Configuration

MPC4/IOC4T card pair	: Software configurable via an RS-232 or Ethernet connection, using a computer running the VM600 MPSx software. Hardware configurable using jumpers on the MPC4/IOC4T card pair.

Note: Configuration via an Ethernet connection requires a CPUx card acting as a rack controller in the VM600 rack.

Status indicators (LEDs)

DIAG/STATUS	: One multicolour (green/yellow/red) LED used to indicate the status of the MPC4/IOC4T card pair, such as normal operation, configuration status or internal hardware or firmware failures
RAW OUT 1 to 4	: Four multicolour (green/yellow/red) LED used to indicate the status of the individual dynamic channels
TACHO OUT 1 to 2	: Two multicolour (green/yellow) LED used to indicate the status of the individual tachometer (speed) channels

Power supply to card (input)

Power source	: VM600 rack power supply
Supply voltages	: +5 V_{DC} and ±12 V_{DC}
Consumption from +5 V_{DC} supply	: 12.5 W typ., plus an additional 1 W per sensor used
Consumption from ±12 V_{DC} supply	: 2.5 W max.

Power supply to sensors (output)

Voltage power supply	: +27.2 V ±5% in the range 0 to 25 mA. −27.2 V ±5% in the range 0 to 25 mA. +15.0 V ±5% in the range 0 to 25 mA.
Current power supply	: 6.16 mA ±5% in the range 1 to 23 V
Over-current protection (on-board)	: 11.0 A on +5 V line

SPECIFICATIONS – COMMON TO ALL MPC4 CARDS *(continued)*

Connectors

RAW OUT 1	: BNC connector (female). Buffered "raw" sensor output (analog signal) for dynamic measurement channel 1.
RAW OUT 2	: BNC connector (female). Buffered "raw" sensor output (analog signal) for dynamic measurement channel 2.
RAW OUT 3	: BNC connector (female). Buffered "raw" sensor output (analog signal) for dynamic measurement channel 3.
RAW OUT 4	: BNC connector (female). Buffered "raw" sensor output (analog signal) for dynamic measurement channel 4.
TACHO OUT 1	: BNC connector (female). Buffered "raw" sensor output (digital signal) for tachometer (speed) channel 1.
TACHO OUT 2	: BNC connector (female). Buffered "raw" sensor output (digital signal) for tachometer (speed) channel 2.
RS232	: 9-pin D-sub connector (DCE), female. Serial connection for communication between the MPC4/IOC4T card pair and a computer running the VM600 MPSx software. Note: The RS232 connector allows a connection to a host computer using a standard serial cable.

Physical

Height	: 6U (262 mm, 10.3 in)
Width	: 20 mm (0.8 in)
Depth	: 187 mm (7.4 in)
Weight	: 0.40 kg (0.88 lb) approx.

ORDERING INFORMATION

To order please specify

Type	Designation	Ordering number (PNR)
MPC4	Different versions of the VM600 machinery protection card:	
	– Standard	200-510-SSS-1Hh
	– Separate circuits	200-510-SSS-2Hh
	– SIL safety (MPC4SIL)	200-510-SSS-3Hh

Notes
Versions of the MPC4 card are available with a conformal coating ("varnish") applied to the circuitry of the card for additional environmental protection against chemicals, dust, moisture and temperature extremes.

In 2017, the MPC4 / IOC4T machinery protection card pairs were improved to (1) be RoHS compliant and (2) provide a reduced buffered dynamic signal output impedance, which required a redesign of the underlying buffered "raw" dynamic signal output circuitry. Accordingly, the different versions of the MPC4/IOC4T machinery protection card pairs in use are:

- Later versions of the MPC4 (PNRs 200-510-SSS-115, 200-510-SSS-214 and 200-510-SSS-313 or later) and IOC4T (PNR 200-560-000-114 and 200-560-000-212 or later), which are RoHS compliant and have an output impedance of 50 Ω.
- Earlier versions of the IOC4T (PNRs 200-510-SSS-114, 200-510-SSS-213 and 200-510-SSS-312 or earlier) and IOC4T (PNR 200-560-000-113 and 200-560-000-211 or earlier), which are not RoHS compliant and have an output impedance of 2000 Ω.

"SSS" represents the firmware (embedded software) version and "Hh" the hardware version. "H" increments are for major modifications that can affect product interchangeability. "h" increments are for minor modifications that have no effect on interchangeability.