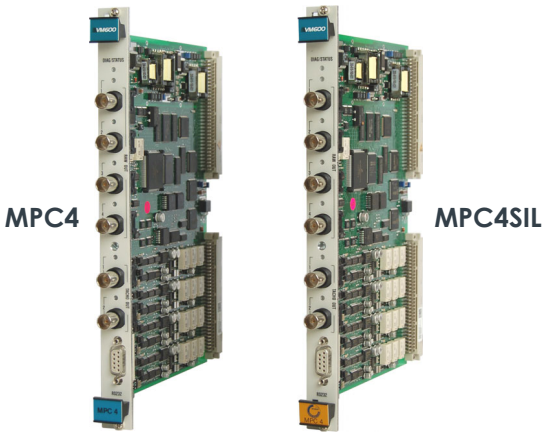
MEGGITT

DATA SHEET

Vibro-Meter®

VM600 MPC4 machinery protection card



KEY FEATURES AND BENEFITS

- From the Vibro-Meter® product line
- Continuously online machinery protection card
- Real-time measurement and monitoring using state-of-the-art DSP techniques
- 4 dynamic signal channels and 2 tachometer (speed) channels, all individually programmable
- Programmable broad-band and narrow-band filters
- Simultaneous amplitude and phase monitoring in order-tracking mode
- Programmable Alert, Danger and OK set points
- Adaptive Alert and Danger levels
- Front-panel BNC connectors for easy analysis of buffered "raw" sensor signals
- Front-panel LEDs indicate status and alarms

KEY BENEFITS AND FEATURES *(continued)*

- Integrated power supplies for sensors and signal conditioners such as IEPE accelerometers and proximity measurement systems
- Live insertion and removal of cards (hot-swappable)
- Available in "standard", "separate circuits" and "safety" (SIL) versions

APPLICATIONS

- Machinery protection and/or basic condition monitoring

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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)*

Analog (DC) outputs and discrete outputs

Analog (DC) outputs and discrete outputs (relays) are available on the associated IOC4T card.
Refer to the IOC4T input/output card data sheet for further information.

Measurement chain OK check (OK system)

Number of levels	: Two configurable threshold levels (upper and lower)
OK level range	
• Voltage inputs	: ±20 V_{DC}
• Current inputs	: 0 to 23 mA
Operating principle	
• Powered sensors	: Line-fault detection of conditions such as open-circuit or short-circuit
• Unpowered sensors	: Line-fault detection of conditions such as open-circuit

Processing functions

Broad-band processing

Filtering options	: High-pass, low-pass or band-pass
LP/HP ratio in pass band	: 500 max.
Ripple	: ±0.3 dB
Slope	: 6 to 60 dB/octave (software configurable)
Attenuation outside pass band	: >50 dB
Amplitude accuracy	: ±1% of full-scale
Linearity error	: <±1%
Equivalent input noise (without integration)	: <200 µV RMS

Narrow-band (tracking) processing

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 narrow-band tracking but the "safety" version of the card (MPC4SIL) does not.

Relative shaft vibration processing

Frequency range	
• Vibration	: 0.1 Hz to 10 kHz
• Gap/position	: DC to 1 Hz
Amplitude accuracy	
• Vibration	: ±1% of full-scale
• Gap/position	: ±1% of full-scale
• Linearity error	: <±1%
Initial gap/offset compensation	: Available

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

Alarm processing and combination

Level detectors	
• Vibration systems	: Over-level switching (A+, D+) and under-level switching (A−, D−)
• Accelerometer systems	: Over-level switching (A+, D+)
• Speed channel	: 2 Alert levels (A−, A+)
Alarm scanning interval	: 100 ms max.
Alarm level value	: User-programmable within range
Hysteresis	: User-programmable within range
Latching	: User-programmable within range
Alarm delay time	: User-programmable within range
Alarm outputs	: Individual alarms and common alarms (open-collector transistor)
Adaptive monitoring	: Adaptive monitoring uses a control parameter (such as speed) to multiply the configured alarm limits by multiple coefficients configured for different ranges of the control parameter. Trip multiplier uses the DSI TM control signal to multiply the configured alarm limits by a single configurable coefficient.
Adaptation criteria (for adaptive monitoring)	: Speed or digital input
Logical combinations	: AND, OR and majority voting logic
Number of logical combinations	: 8 basic functions and 4 advanced functions

Environmental

Temperature	
• Operating	: −25 to 65°C (−13 to 149°F)
• Storage	: −40 to 85°C (−40 to 185°F)
Humidity	
• Operating	: 0 to 90% non-condensing
• Storage	: 0 to 95% non-condensing

Approvals

Conformity ("standard" and "safety" versions)	: CE marking, European Union (EU) declaration of conformity. EAC marking, Eurasian Customs Union (EACU) certificate / declaration of conformity.
Electromagnetic compatibility	: IEC/EN 61000-6-2 and IEC/EN 61000-6-4. TR CU 020/2011.
Electrical safety	: IEC/EN 61010-1. TR CU 004/2011.
Vibration	: IEC 60255-21-1 (Class 2)
Insulation coordination for measuring relays and protection equipment	: Separate circuits according to IEC 60255-5 for the "separate circuits" version of the MPC4
Safety integrity level	: SIL 1 according to IEC 61508 for the "safety" version of the MPC4
Environmental management	: RoHS compliant
Russian federal agency for technical regulation and metrology (Rosstandart)	: Pattern approval certificate CH.C.28.004.A N° 60224

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.