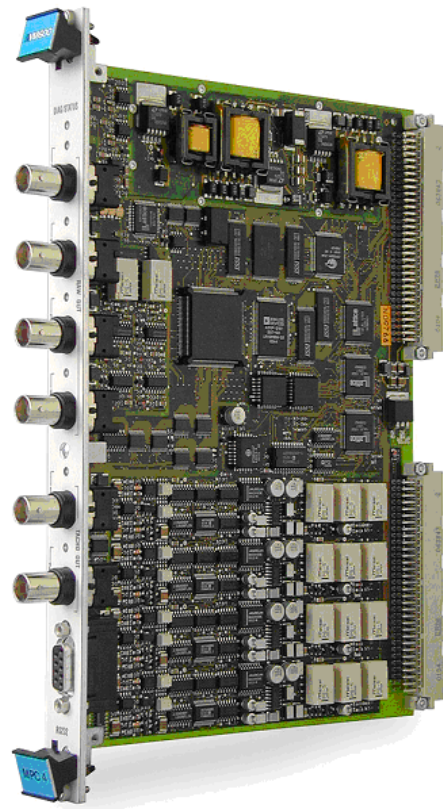


Machinery Protection Card Type MPC 4

FEATURES

- Continuous on-line Machinery Protection Card
- Real-time measurement and monitoring using state-of-the-art DSP techniques
- Fully VME-compatible slave interface
- Fully software configurable via RS-232 or VME
- Four programmable inputs (e.g. vibration, pressure, etc.) and two programmable tachometer inputs
- Programmable broad-band and tracking filters
- Performs 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 raw signals
- 7 front panel LEDs showing monitoring status and alarms
- Provides power supply for ICP accelerometers, proximity systems, and many Vibro-Meter front-ends
- Live insertion / removal of cards possible



DESCRIPTION

The MPC 4 Machinery Protection Card is the central element in Vibro-Meter's VM 600 series Machinery Protection System. This very versatile card is capable of measuring and monitoring up to 4 dynamic signal inputs and up to 2 speed inputs simultaneously.

A variety of speed sensors may be connected (e.g. systems based on proximity probes, magnetic pulse pick-up sensors, systems providing TTL signals). Fractional tacho ratios are supported.

The dynamic signal inputs are fully programmable and can accept signals representing acceleration, velocity, displacement (proximity) or other parameters. 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, dynamic pressure, etc.

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 transducer-target gap.

The calibration may 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 be adapted as a function of the speed or any external information.

A digital output is available internally (on the IOC 4T card) for each alarm level. These alarm signals may be routed within the rack to drive change-over relays on an optional RLC 16 relay card.

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

The MPC 4 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 the sensors and indicates any problem due to a broken transmission line, faulty transducer or conditioner.

An LED indicator on the MPC 4 front panel indicates whether a processing or hardware error has occurred. Six additional LEDs (one per channel) indicate whether the OK System has detected a fault and whether an alarm has occurred on the channel.

SPECIFICATIONS

DYNAMIC SIGNAL INPUTS

Number of inputs	: 4 per MPC 4 card
DC range	: 0 to +20 V or 0 to -20 V
AC range	: Max. ± 10 V
Common mode voltage range	: -50 V to +50 V
CMRR	: > 60 dB at 50 Hz
Crosstalk	: -72 dB
Input impedance	: 200 k Ω
Current input range	
• DC signals	: 0 to 25 mA
• AC signals	: Max. ± 8 mA
Analog AC frequency band	: 0.1 Hz to 10 kHz
Analog frequency band for throughput to other cards and buffered AC outputs	: DC to 60 kHz (-3 dB)
Current measuring resistor	: 324.5 Ω

SPECIFICATIONS (Continued)**PROCESSING OPTIONS****Broad-Band**

Filtering options	: High-pass, low-pass or band-pass
LP/HP ratio in pass-band	: Max. 500
Ripple	: ± 0.3 dB
Slope	: 6 to 60 dB/octave (software settable)
Attenuation outside pass band	: > 50 dB
Amplitude accuracy	: $\pm 1\%$ of full-scale
Linearity error	: < $\pm 1\%$
Equivalent input noise (no integration)	: < 200 μ V RMS

Narrow-Band (Tracking)

Constant Q filter	: Q = 28
Frequency range	: 0.15 Hz to 10 kHz
Max. frequency ratio in selected band	: $f_{\text{upper}} / f_{\text{lower}} = 25$
Rate of change of speed	: 450 Hz/sec. (in band 25 to 500 Hz)
Order extraction	: 1/3 X, 1/2 X, 1X, 2X, 3X, 4X
Phase error	: < $\pm 6^\circ$ maximum < $\pm 1^\circ$ typical (with order = 1X)
Amplitude linearity	: $\pm 1.2\%$

Relative Shaft Vibration

Frequency band	
• <i>Vibration</i>	: 0.1 Hz to 10 kHz
• <i>Gap / position</i>	: DC to 1 Hz
Linearity	
• <i>Vibration</i>	: $\pm 1.2\%$ of full-scale
• <i>Gap / position</i>	: $\pm 1\%$ of full-scale
Initial gap / Offset compensation	: Available

BUFFERED (RAW) DYNAMIC SIGNAL OUTPUTS (On BNC outputs and raw outputs to IOC)

Frequency range	: DC to 10 kHz (-0.1 dB or 1%) DC to 60 kHz (-3 dB)
Admissible load on output	: > 50 k Ω
Amplitude error	: < 2%
Phase error	: < 5° (DC to 10 kHz)
Transfer ratio	
• <i>Voltage input</i>	: 1 V/V
• <i>Current input</i>	: 0.3245 V/mA

SPEED/PHASE REFERENCE INPUTS

Number of inputs	: 2 per MPC 4 card
Triggering method	: Crossing of thresholds on rising / falling edge of signal
Triggering thresholds	: Rising = 2/3 of peak-peak value, falling = 1/3 of peak-peak value
Tacho range	: 0.016 Hz to 50 kHz on input 0.016 Hz to 1092 Hz (1 to 65,535 RPM) after division by the "wheel teeth number"
Speed resolution	: 0.001 Hz (internal)

SPECIFICATIONS (Continued)

Input voltage range	: 0.4 to 500 Vpp in range 0.3 Hz to 10 kHz 2 to 500 Vpp in range 10 kHz to 50 kHz
Min. input voltage for reliable detection	
• <i>Square-wave input signal</i>	: 0.8 Vpp (0.016 Hz to 10 kHz) 2.0 Vpp (10 kHz to 50 kHz)
• <i>Sinusoidal input signal</i>	: 10 Vpp (0.016 Hz to 1 Hz) 2 Vpp (1 Hz to 10 Hz) 0.8 Vpp (10 Hz to 10 kHz) 2.0 Vpp (10 kHz to 50 kHz)
Range of DC component	: -20 to +20 V

SPEED/PHASE REFERENCE OUTPUTS

BNC outputs	: TTL compatible
Outputs to IOC 4T and Tacho Bus	: TTL compatible
Speed resolution	: 1 RPM (external)

ALARM PROGRAMMING

Level detectors	
• <i>Vibration systems</i>	: Over-level switching (A+, D+) and under-level switching (A-, D-)
• <i>Accelerometer systems</i>	: Over-level switching (A+, D+)
• <i>Speed channel</i>	: 2 Alert levels (A-, A+)
Alarm scanning interval	: Max. 100 ms
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)
Adaptation criteria (for adaptive monitoring)	: Speed or digital input
Logical combinations	: AND, OR, majority voting logic
Number of logical combinations	: 8 basic functions and 4 advanced functions

OK SYSTEM

Range	: -20 to +20 V
Operating principle	
• <i>Powered sensors</i>	: DC voltage monitoring (open circuit and short circuit line check)
• <i>Unpowered sensors</i>	: Open circuit line check only

TRANSDUCER POWER SUPPLY

Voltage power supply	: +27.2 V \pm 5% in range 0 to 25 mA - 27.2 V \pm 5% in range 0 to 25 mA +15 V \pm 5% in range 0 to 25 mA
Current power supply	: 6.16 mA \pm 5% in range 1 to 23 V
Over-current protection (on-board)	: 11 A on +5 V line

SPECIFICATIONS *(Continued)*

POWER SUPPLY TO MPC CARD

Supply voltage	: 5 V _{DC} ± 5% and ±12 V _{DC}
Consumption from +5 V _{DC} supply	: 12.5 W, plus an additional 1 W per sensor used
Consumption from ±12 V _{DC} supply	: 2.5 W max.

COMMUNICATIONS

VME bus	: D16 / A24 slave mode
RS-232 port	: Configuration port, proprietary protocol
Bus to IOC card	: IP (Industry Pack)

ENVIRONMENTAL

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

PHYSICAL

Height	: 6 U (262 mm, 10.31 in)
Width	: 20.1 mm
Depth	: 187 mm
Weight	: 0.4 kg

ORDERING INFORMATION

To order please specify:

Type	Designation	Ordering Number
MPC 4	Machinery Protection Card	
	- Standard version	200-510-SSS-1Hh
	- Separate circuits in accordance with IEC/CEI 60255-5 standard	200-510-SSS-2Hh

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



In this publication, a dot (.) is used as the decimal separator and thousands are separated by spaces. Example : 12 345.678 90. Although care has been taken to assure the accuracy of the data presented in this publication, we do not assume liability for errors or omissions. We reserve the right to alter any part of this publication without prior notice.

Sales offices

Vibro-Meter has offices in more than 30 countries. For a complete list, please visit our website.

Your local agent

Head office

Vibro-Meter SA
Rte de Moncor 4
P.O. Box
CH-1701 Fribourg
Switzerland

Tel: +41 26 407 11 11
Fax: +41 26 407 13 01

www.vibro-meter.com

