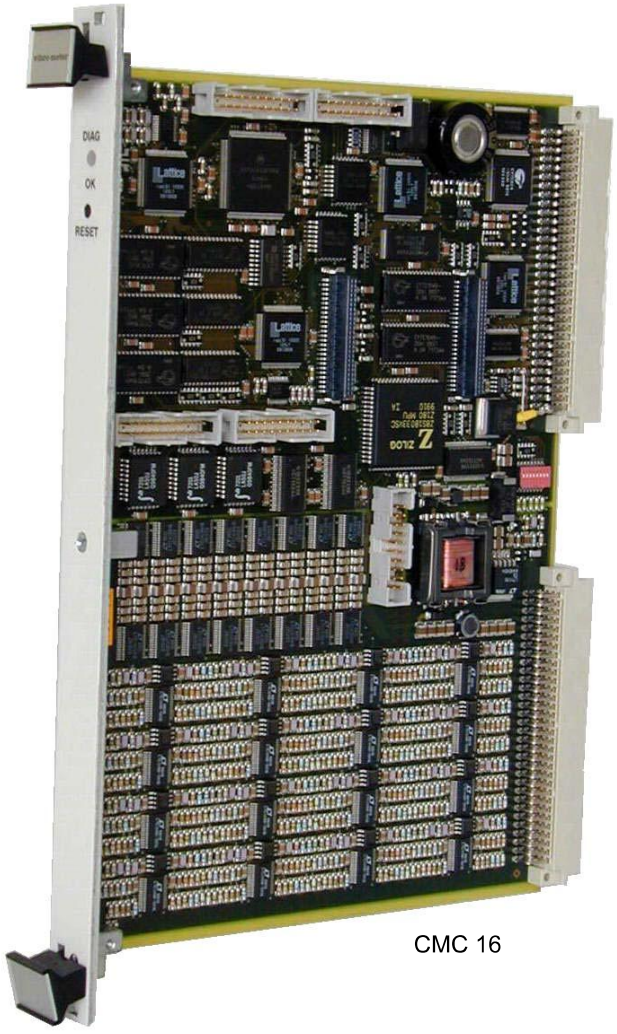
Vibro-Meter

CMC 16

Condition Monitoring Card Type CMC 16

FEATURES

- 16 individually configurable dynamic channels
- 16 parallel programmable anti-aliasing filters and ADCs
- First 4 channels also configurable as tacho inputs
- Last 12 channels also configurable as process values
- VME architecture
- Configurable Synchronous and Asynchronous sampling
- High resolution 3200-line FFT
- 10 fully configurable processed outputs per channel, which can be either frequency bands or time-domain based outputs
- 6 configurable alarms per processed output with hysteresis deadbands
- Schedule, 'on-alarm' and 'on exception' based logging
- On-board buffer storage
- Status indication by 3-colour LED on front panel
- Live insertion / removal of cards with automatic configuration
- Ethernet and Serial RS-485[1] communication options



CMC 16

1.Supported by Unix based 501 software.

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DESCRIPTION

The CMC 16 Condition Monitoring Card is the central element in Vibro-Meter's VM600 series Condition Monitoring System (CMS).

This intelligent front-end Data Acquisition Unit (DAU) is used in conjunction with the VM600 CMS software to acquire, analyse and transmit results to a host computer via the VM600 series CPU M module with Ethernet controller or directly via serial links.

The inputs are fully programmable and can accept signals representing speed, phase reference, vibration (acceleration, velocity or displacement), dynamic pressure, airgap rotor and pole profile, any dynamic signals or any quasi-static signals. Signals can be input from adjacent Machinery Protection Cards (MPC 4) via the VM600 'Raw Bus' and 'Tacho Bus' or externally via the screw terminal connectors on the IOC 16T. The IOC 16T modules also afford signal conditioning and EMC protection and allow inputs to be routed to the CMC 16, which includes 16 programmable tracked anti-aliasing filters, and Analog-to-Digital Converters (ADC). On-board processors handle all control of acquisition, conversion from time domain to frequency domain (Fast Fourier Transform), band extraction, unit conversion, limit checking, and communication with the host system.

The 10 available outputs per channel can include RMS, peak, peak-peak, true peak, true peak-peak values, Gap, Smax, or any configurable band based upon synchronous or asynchronously acquired spectra. Acceleration (g), velocity (in/sec, mm/sec) and displacement (mil, micron) signals are catered for and can be converted for display to any standard. If configured, data is sent to the host computer only on exception, for example, only if the change of value exceeds a pre-defined threshold. Values can also be averaged for smoothing or noise reduction.

Events are generated when values exceed one of the 6 configurable limits, exceed rate-of-change alarms or deviate from stored baselines. However, adaptive monitoring techniques can also be employed to dynamically adjust alarm set points based upon machine parameters such as speed and load.

Machine start-ups, shutdowns and overspeeds are detected from checks of speed reference against configured trigger levels. In Transient Mode, higher density logging is available based upon configurable time and speed intervals. Vibration measurement and logging is achieved in speed ranges from 15 rev/min to 30,000 rev/min.

The CMC 16 acquires and processes high-resolution data captured at scheduled intervals or on alarm detection (waveforms, spectra and orbits). Spectral resolution, frequency span or order span, window type, averaging mode and number of averages are fully configurable. The capacity also exists to trigger extended capture of time-based data over several minutes using an 'Oscilloscope Mode' as this can provide valuable data, particularly during machine start-up.[1]

For specific applications, contact your Vibro-Meter representative.

1. The data acquisition function of the CMC 16 card requires a permanent connection to a PC.

SPECIFICATIONS

SPEED/PHASE REFERENCE INPUT

Triggering method	: Rising or falling edge
Input voltage range	: 1 to 24 V pulse (AC coupled in the -24 V / +24 V range)
Frequency range	: 0.25 to 10,000 Hz
Maximum pulses per revolution	: 128 for speed calculation (1 only for phase reference)
Minimum rise time	: 4 volts/second
Minimum pulse duration	: 10 µs
Max. common mode voltage	: 50 V
Machine speed resolution	: ±1 rev/min
Maximum number allowed	: 4, amongst the first four channels*

*For best results, and optimum configuration, tacho channels should be defined starting from Channel 1.

SPECIFICATIONS *(Continued)*

VIBRATION AND ANALOG INPUTS

A/D converter	: 1 converter per channel, 14 bits Values transmitted to PC are truncated to 12 bits + sign (resolution 1 in 4096)
Maximum sampling rate	: 51.2 kHz
Accuracy	
• *AC measurement (voltage based)*	: 1% of input FSD
• *DC measurement (voltage based)*	: 1% of input FSD
• *DC measurement (current based)*	: 2% of input FSD, or 1% with externally mounted resistors
Input range (switch selected)	
• *AC measurement*	: 0.1, 0.2, 0.5, 1.0, 2.0, 4.0, 10.0, 20.0 V FSD
• *DC measurement*	: 0 to +24 V FSD or -24 to 0 V FSD (fixed)
• *DC thermocouple*	: 61.022 mV FSD
Maximum frequency span	: 20 kHz
Minimum frequency	: AC measurement with 0.16 Hz HP filter (at -3 dB)
DC bandwidth	: DC measurement with 0.20 Hz LP filter (at -3 dB)
Anti-aliasing attenuation	: 70 dB at f > 1.56 x fc
Signal / noise	: > 70 dB up to 10 kHz > 60 dB at 20 kHz
Crosstalk isolation	: < -75 dB
Max. common mode voltage	: 50 V for vibration/process inputs, 3 V for thermocouple inputs

BACKGROUND ACQUISITION MODE

Order tracking range (synchronous)	: 15 RPM to 30,000 RPM
Order tracking span (synchronous)	: 1.56, 3.125, 6.25. 12.5, 25, 50, 100, 200 and 400 orders
Fixed frequency span (asynchronous)	: 0 to .1, .2, .5, 1, 2, 5, 10 and 20 kHz
FFT resolution	: 400 lines
FFT window	: Rectangular in order tracking mode Hanning in fixed frequency mode
Real-time sampling rate	: 2.56 x frequency or order span
Real-time waveform sent to host	: 256 samples / revolution over 4 revolutions
Real-time spectra resolution	: 12 bits

ALTERNATIVE ACQUISITION MODE (LOGGED ON SCHEDULE OR ALARM)

Order tracking span (synchronous)	: 0 to 1.56, 3.125, 6.25. 12.5, 25, 50, 100, 200 and 400 orders
Fixed frequency span (asynchronous)	: 0 to .1, .2, .5, 1, 2, 5, 10 and 20 kHz
Time domain averaging	: 1, 2, 4, 8 or 16 averages, triggered by phase reference input
FFT resolution	: 400, 800, 1600 and 3200 lines
FFT window	: Rectangular or hanning
FFT averaging number	: 1, 2, 4, 8 or 16 averages
FFT averaging mode	: RMS peak hold, linear
FFT amplitude resolution	: 12 bits
Scheduled sampling rate	: 2.56 x frequency or order span
No. of samples in waveform sent to host	: (2.56 x FFT resolution) samples
Scheduled minimum interval	: 1 minute
Scheduled maximum interval	: 59 hours
Orbit resolution (historic/scheduled)	: 256 samples

SPECIFICATIONS *(Continued)*

Orbit waveforms	: 4 revolutions, unfiltered

TRANSIENT ACQUISITION

Sampling characteristics	: Same as background logging sampling characteristics
Maximum transient duration	: 18 hours 12 minutes
Minimum storage interval (transient for trends)*	: 200 msecs (when configuration includes 1 tacho, all channels configured similarly and sampling bandwidth > 2.5 kHz)

*Subject to limitations depending on the actual board configuration

Maximum number of points available	: 270, more if the transient has a long duration
Maximum number of cascade spectra	: 88

OSCILLOSCOPE ACQUISITION

Fixed frequency span (asynchronous)	: 0 to .025, .05, .1, .2, .5, 1, 2, 5, 10 and 20 kHz
Scheduled sampling rate	: 2.56 x frequency span
No. of samples in waveform sent to host	: 42,799 samples
Sampling duration	: 0.84, 1.67, 3.34, 8.36, 16.72, 33.44, 83.59, 167.18, 334.37 and 668.73 secs.

ON-BOARD BUFFER STORAGE*

*For short term buffering of data (e.g. temporary loss of communication due to networking problems).

RAM memory	: 1 MByte
Buffer size for transient trends	: 3276 values per channel
Buffer size for historic trends	: 26,200 values per CMC 16
Buffer size, run-up cascades	: 88 spectra of 400 lines per channel
Buffer size, run-down cascades	: 88 spectra of 400 lines per channel

PROCESSORS

Micro-controller	: Zilog Z8S180
DSP	: Motorola 56002

COMMUNICATIONS

Ethernet LAN via CPU M

VMEbus to CPU M

• *Type*	: D16 / A24 slave mode
• *Transmit / receive rate*	: 1 Mbyte/s

Serial communication

*Supported by Unix based 501 software. :

• *Type*	: RS-485 multi-drop line
• *Maximum distance to PC*	: 1220 m (4000 ft) without repeaters
• *Transmit / receive rate*	: 19200, 38400 Baud (asynchronous)
• *Isolation*	: 50 V

POWER SUPPLY TO CMC CARD

Supply voltage	: 5 V_{DC} ± 5%
Consumption from +5 VDC supply	: 15 W

SPECIFICATIONS *(Continued)*

ENVIRONMENTAL

Operating

- *Temperature* : -25°C to +65°C (-13°F to +149°F)
- *Humidity* : 0 to 90% non-condensing

Storage

- *Temperature* : -40°C to +85°C (-40°F to +185°F)
- *Humidity* : 0 to 95% non-condensing

PHYSICAL

Height	: 6 U (262 mm, 10.31 inches)
Width	: 20 mm (0.8 inches)
Depth	: 187 mm (7.4 inches)
Weight	: 0.35 kg (0.77 lb)

ORDERING INFORMATION

To order please specify :

Type	Designation	Ordering Number
CMC 16	Condition Monitoring Card	200-530-SSS-HHh

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

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

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