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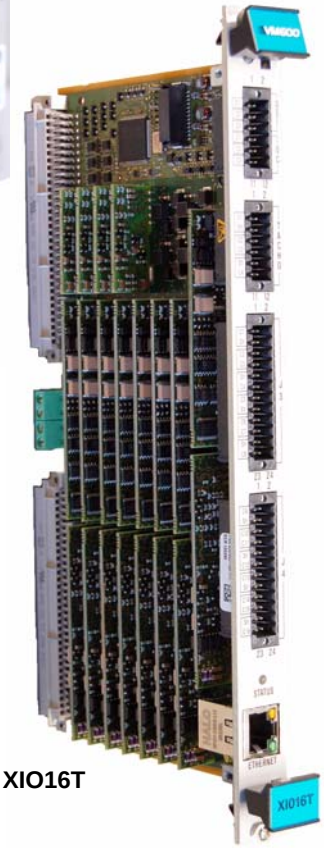
XMV16 / XIO16T

Extended vibration monitoring card pair

XMV16



XIO16T

FEATURES

- From the Vibro-Meter® product line
- Designed for operation with the VibroSight® software total monitoring solution
- 16 dynamic vibration channels and 4 tachometer channels, all individually configurable
- Simultaneous data acquisition on all channels
- Up to 20 configurable processed outputs per channel
- High resolution FFT up to 3200 lines every 1 s
- Configurable asynchronous and synchronous sampling
- 24-bit data acquisition and high SNR data processing, with data quality checks
- 5 configurable severities per processed output and 8 detection levels with hysteresis and time delay
- Supports signal sharing in VM600 racks
- EMI protection on all inputs
- Live insertion and removal of cards (hot-swappable)
- Direct gigabit Ethernet communication
- Hardware is fully software configurable

APPLICATIONS

- Condition monitoring and vibration analysis, such as the general analysis of rotating machinery and rotor dynamics

DESCRIPTION

Extended vibration monitoring card pair

The XMV16 / XIO16T extended vibration monitoring card pair consists of an XMV16 extended vibration monitoring card and an XIO16T extended input/ output card. This card pair provides all of the interfacing and signal processing functions required of an intelligent data acquisition system and is a central element in the VM600 series Total Monitoring Solution, from Meggitt Sensing Systems' Vibro-Meter® product line. The cards are designed for operation with the VibroSight® software – to acquire and analyse your vibration data before communicating the results directly to a host computer using the on-board Ethernet controller.

The XMV16 card is installed in the front of the rack and the XIO16T card is installed in the rear. Either a VM600 standard rack (ABE 04x) or slimline rack (ABE 056) can be used and each card connects directly to the rack's backplane using two connectors.

The XMV16 / XIO16T card pair is fully software configurable and can be programmed to capture data based on time (for example, continuously at scheduled intervals), events, machine operating conditions (MOCs) or other system variables. Individual measurement channel parameters including frequency bandwidth, spectral resolution, windowing function and averaging can also be configured to meet the needs of specific applications.

Extended vibration monitoring card

The XMV16 card performs the analogue to digital conversion and all of the digital signal processing functions, including the processing for each processed output (waveform or spectrum).

The XMV16 card acquires and processes data in high-resolution (24-bit A DC) to generate the desired waveforms and spectra. The principal (main) acquisition mode performs continuous data acquisition that is suitable for normal operation, increasing vibration levels and transient operations.

The 20 available processed outputs per channel can provide any configurable band based on the asynchronously or synchronously acquired waveforms and spectra. A range of rectifier functions are available, including RMS, peak, peak-to-peak, true peak, true peak-to-peak and DC (Gap). Outputs are available for display to any standard (metric or imperial).

Various methods of averaging can be performed at the processing block level and at the output (extracted data) level. The multi-channel processing functions supported include absolute shaft vibration, full spectrum, orbit and filtered orbit, shaft centerline and S_{max}.

Events are generated when values exceed one of five user configurable severities or exceed rate-of-change alarms. The amount of pre- and post-event data buffered in the on-board memory is configurable.

Machine states, such as full load (onload), overspeed and transient are detected from checks of the reference speed against trigger levels. These states can be used by the software's machine operating conditions to control system behaviour. Typically, higher density logging is available depending on machine operating conditions, configurable speed and time intervals, or any other process parameter.

Extended input / output card

The XIO16T card acts as a signal interface for the XMV16 card, performs all of the analogue signal conditioning and also supports the external communications. In addition, it protects all inputs against signal surges and EMI to meet EMC standards.

The XIO16T card's inputs are fully software configurable and can accept signals representing speed and phase reference (for example, from TQ xxx sensors) and vibration derived from acceleration, velocity and displacement (for example, from CA xxx, CE xxx, CV xxx and TQ xxx sensors). The inputs also accept any dynamic or quasi-static signals that are appropriately signal conditioned.

Externally, the XIO16T card interfaces to the transmission cables coming from the sensor system's transducers and conditioners using the rear connectors. Internally, input signals can be shared between cards (including MPC 4 cards) in a VM600 rack using the system's raw or tacho bus, which reduces external wiring requirements.

Applications information

This extended vibration monitoring card pair is highly suitable for vibration monitoring in a wide range of industrial applications. See the VibroSight software data sheet for further information.

For specific applications, contact your nearest Meggitt Sensing Systems representative.

SPECIFICATIONS

SPEED AND PHASE REFERENCE INPUTS

Number of independent channels	: 4
Speed measurement	: 1 to 100 000 RPM (0.017 Hz to 1.667 kHz)
Speed measurement resolution	: 5 ns
Edge detection	: Rising or falling
Input signal type	: Tachometer channels 1 and 2 support voltage and current inputs. Tachometer channels 3 and 4 support voltage inputs only.
Current measuring resistor	: 200 Ω
Tachometer voltage range	: −20 V_{DC} to +20 V_{DC}
Tachometer current range	: −30 mA to +30 mA
Input impedance	: ≥100 kΩ
Maximum pulses per revolution	: 128 for speed calculation 1 only for phase reference
Triggering thresholds	: Rising = ⅔ of peak-to-peak value, falling = ⅓ of peak-to-peak value
Input voltage range	: 0.8 to 500 $V_{peak\text{-}to\text{-}peak}$ in range 0.3 Hz to 10 kHz 2.0 to 500 $V_{peak\text{-}to\text{-}peak}$ in range 10 kHz to 50 kHz
Minimum input voltage for reliable detection	
• *Square-wave input signal*	: 0.8 $V_{peak\text{-}to\text{-}peak}$ (0.016 Hz to 10 kHz) 2.0 $V_{peak\text{-}to\text{-}peak}$ (10 kHz to 50 kHz)
• *Sinusoidal input signal*	: 10.0 $V_{peak\text{-}to\text{-}peak}$ (0.016 Hz to 1 Hz) 2.0 $V_{peak\text{-}to\text{-}peak}$ (1 Hz to 10 Hz) 0.8 $V_{peak\text{-}to\text{-}peak}$ (10 Hz to 10 kHz) 2.0 $V_{peak\text{-}to\text{-}peak}$ (10 kHz to 50 kHz)
Range of DC component	: −20 to +20 V
Maximum common mode voltage	: ±50 V
VM600 routing	: To and from tacho bus (up to 6 lines)
Protection filters	: Filtered for protection against EMI (electromagnetic interference), conforming to CE standards

DYNAMIC INPUTS

Number of independent channels	: 16
A/D converter	: 24 bit
Maximum sampling rate	: 98 kHz
Dynamic input (voltage)	: −30 V to +30 V (20 V_{DC} + 10 V_{AC}) (input impedance ≥ 200 kΩ)
Dynamic input (current)	: −25 mA to +25 mA (current measuring resistor = 100 Ω)
Accuracy	
• *Amplitude*	: 1% of input FSD
• *Phase*	: −1.35° (up to 1 kHz bandwidth, no HP filter) −6.70° (up to 5 kHz bandwidth, no HP filter)
Measurement range	
• *AC*	: 0.1, 0.25, 0.5, 1.0, 2.5, 5.0, 10.0 V_{peak} FSD
• *AC/DC*	: 5.0, 10.0 V_{peak} FSD
• *DC*	: −20 V to +20 V

SPECIFICATIONS *(continued)*

Frequency bandwidth	
• *AC*	: 0.10 Hz to 38 kHz (HP filter at −3 dB). An optional (software configurable) high-pass filter can be added to the AC path to increase the HP cutoff frequency to 1.0 Hz, 3.0 Hz or 10.0 Hz.
• *DC*	: DC to 1.0 Hz (LP filter at −3 dB)
Signal to noise ratio (SNR)	: 115 dB (1 kHz measurement BW with 2.5 V_{peak} FSD) 105 dB (10 kHz measurement BW with 2.5 V_{peak} FSD) 100 dB (full BW)
Crosstalk attenuation	: Typically 80 dB
Maximum common mode voltage	: 50 V
CMRR	: 75 dB at 50/60 Hz
VM600 routing	: To and from raw bus
Protection filters	: Filtered for protection against EMI (electromagnetic interference), conforming to CE standards

PRINCIPAL ACQUISITION MODE

Fixed frequency bandwidth (asynchronous)	: 40 Hz to 38 kHz (configurable)
Order tracking speed range (synchronous)	: 15 to 100000 RPM
Order tracking bandwidth (synchronous)	: 1.56, 3.125, 6.25, 12.5, 25, 50, 100, 200 and 400 orders
FFT resolution	: 100 to 6400 lines
FFT window	: Rectangular, Hanning, Hamming, Flat top, Blackman and Blackman-Harris
Real-time sampling rate	: 2.56 x frequency bandwidth
Update rate	: 1 s maximum for an FFT up to 3200 lines. Higher resolutions are available at lower update rates, for example, ≥4 seconds for an FFT up to 6400 lines.
Extracted variable	: 20 per processing block (configurable)
Extracted variable type	: Amplitude, phase and frequency (configurable)
Integration count	: 0, 1 or 2
Averaging	: Time domain (complex) and frequency domain (mean, RMS, peak hold)
Rectifiers	: Time domain rectifiers: true peak, true RMS, true peak-to-peak, minimum, maximum, average, electrical DC and common-mode voltage. Frequency domain rectifiers: RMS, peak (scaled peak) and peak-to-peak (scaled peak-to-peak).

AUXILIARY ACQUISITION MODE

Fixed frequency bandwidth (asynchronous)	: 40 Hz to 38 kHz (configurable)
Order tracking speed range (synchronous)	: 15 to 100000 RPM
Order tracking bandwidth (synchronous)	: 1.56, 3.125, 6.25, 12.5, 25, 50, 100, 200 and 400 orders
FFT resolution	: 100 to 6400 lines
FFT window	: Rectangular, Hanning, Hamming, Flat top, Blackman and Blackman-Harris
Sampling rate	: 2.56 x frequency bandwidth
Logging rate	: 10 min maximum, on a scheduled basis
Integration count	: 0, 1 or 2
Averaging	: Time domain (complex) and frequency domain (mean, RMS, peak hold)

SPECIFICATIONS *(continued)*

PRE-EVENT DATA (IN CARD BUFFER)

Principal mode – extracted data

- *On-board memory capacity* : A maximum of 1140 extracted data items per extracted output
- *Data storage rate* : 100 ms and/or 1 s

Principal mode – waveforms and spectra

- *On-board memory capacity* : A maximum of 38 waveforms and spectra per processing block
- *Data storage rate* : 1 s and/or 10 s

CONFIGURATION

XMV16 / XIO16T hardware : Fully software configurable

TIME SYNCHRONIZATION

Protocol used between cards and host computer : Network Time Protocol (NTP)

COMMUNICATIONS

On-board Ethernet LAN

- *Type* : Gigabit Ethernet
- *Network interface* : 1000BASE-T
- *Data transfer rate* : Up to 1000 Mbps (1 Gbps)
- *Maximum distances* : The XMV16 can support a distance of up to 100 m at 1000 Mbps (1000BASE-T compliant).
  The XIO16T can support a distance of up to 60 m at 1000 Mbps.
  For distances greater than the specified maxima, the cards operate at reduced data transfer rates.

RS-232 port : Reserved for system test (proprietary protocol)

USB port : Reserved for future use

CONNECTORS

XMV16 card

- *Ethernet* : 8P8C (RJ45) modular jack, female
- *RS-232* : DCE 9-pin D-sub connector, female
- *USB* : USB Standard-A, receptacle

XIO16T card

- *J1* : Weidmüller B2L 12-pin tension clamp connector,
  Digital inputs (DSI) and outputs (OC) – reserved for future use
- *J2* : Weidmüller B2L 12-pin tension clamp connector,
  Speed and phase reference inputs (channels 1 to 4)
- *J3* : Weidmüller B2L 24-pin tension clamp connector,
  Dynamic inputs (channels 1 to 8)
- *J4* : Weidmüller B2L 24-pin tension clamp connector,
  Dynamic inputs (channels 9 to 16)
- *Ethernet* : 8P8C (RJ45) modular jack, female

SPECIFICATIONS *(continued)*

POWER SUPPLY TO CARDS

Power source	: VM600 power supply
Supply voltages	: +5 V_{DC} and ±12 V_{DC}
Consumption from +5 V_{DC} supply	: <14 W
Consumption from +12 V_{DC} supply	: <8 W
Consumption from −12 V_{DC} supply	: <4 W
Total power consumption (sum of XMV16 + XIO16T card pair)	: <26 W

ENVIRONMENTAL

Operating

- *Temperature* : 0°C to +65°C (+32°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

XMV16 card

- *Height* : 6 U (262 mm, 10.3 inches)
- *Width* : 20 mm (0.8 inches)
- *Depth* : 187 mm (7.4 inches)
- *Weight* : 0.39 kg (0.86 lb)

XIO16T card

- *Height* : 6 U (262 mm, 10.3 inches)
- *Width* : 20 mm (0.8 inches)
- *Depth* : 125 mm (4.9 inches)
- *Weight* : 0.32 kg (0.71 lb)

ORDERING INFORMATION

To order please specify:

Type	Designation	Ordering Number
XMV16	Extended monitoring card for vibration	600-003-VVV-VVV
XIO16T	Extended input/output card for XMV 16	620-002-000-HHH

For combustion monitoring applications, such as combustion dynamics and dynamic pressure pulsation, please specify:

XMC16	Extended monitoring card for combustion	600-002-VVV-VVV
XIO16T	Extended input/output card for XMC16	620-002-000-HHH

Notes:
“VVV” represents the different firmware (embedded software) versions and hardware versions that can be used by a finished product.
“HHH” represents the hardware version.

Headquartered in the UK, Meggitt PLC is a global engineering group specializing in extreme environment components and smart sub-systems for aerospace, defence and energy markets.
Meggitt Sensing Systems is the operating division of Meggitt specializing in sensing and monitoring systems, which has operated through its antecedents since 1927 under the names of ECET, Endevco, Ferroperm Piezoceramics, Lodge Ignition, Sensorex, Vibro-Meter and Wilcoxon Research. Today, these operations are integrated under one strategic business unit called Meggitt Sensing Systems, headquartered in Switzerland and providing complete systems, using these renowned brands, from a single supply base.
The Meggitt Sensing Systems facility in Fribourg, Switzerland was formerly known as Vibro-Meter SA, but is now Meggitt SA. This site produces a wide range of vibration and dynamic pressure sensors capable of operation in extreme environments, leading-edge microwave sensors, electronics monitoring systems and innovative software for aerospace and land-based turbo-machinery.

In this publication, a dot (.) is used as the decimal separator and thousands are separated by spaces. Example: 12345.67890.

Sales offices

Meggitt Sensing Systems has offices in more than 30 countries. For a complete list, please visit our website.

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