

TECHNICAL DATA

XM DYNAMIC MEASUREMENT MODULE

GENERAL PURPOSE MACHINE MONITORING AND PROTECTION

The XM[®] series is Allen-Bradley's award winning, and the worlds most comprehensive, family of distributed machine condition monitoring and protection devices.

With the XM[®] series discrete or networked monitoring solutions can be quickly and cost effectively deployed for steam, gas and hydro turbines, motors, compressors, pumps, fans, blowers, and most other rotating machinery.

The Dynamic Measurement Module is an intelligent 2-channel general-purpose monitor that supports measurements of dynamic inputs such as vibration, pressure and strain. The modules built-in tachometer makes it particularly well suited for monitoring shaft, casing and pedestal vibration in rotating equipment.

Inputs accepted include eddy current probe, standard Integrated Electronics Piezo Electric (IEPE) accelerometer, or voltage output measurement device such as a velocity or pressure transducer. In addition to vibration inputs, the module accepts one tachometer input to provide speed measurement and order analysis functions.

The module employs a 24-bit A/D converter which provides unsurpassed resolution and aids in making the module well suited for detecting most machinery problems. Virtually any fault that manifests itself through changes in the magnitude or phase of vibration can be detected by the advanced signal processing capabilities of the XM Dynamic Measurement module. These include most mechanical and electrically induced faults such as unbalance, bearing wear, rotor cracks and rubs, instabilities such as oil whirl, pre-load conditions / misalignment and anti-friction bearing defects.



1440-DYN02-01RJ

SPECIFICATIONS

Inputs

Inputs

- 2 Dynamic Channel Inputs
 - Eddy Current Transducer signals
 - Accelerometer signals
 - Voltage signals from any dynamic measurement sensor such as a velocity or pressure transducer
- Transducer Power
 - Constant voltage: +24Vdc, -24Vdc
 - Constant current: 4.5mA +30% / -20% from +24Vdc (IEPE)
 - Bias current: monitors self powered coil based transducers
 - None
- Voltage Ranges: -20 to 0Vdc, -10 to +10Vdc, 0 to +20Vdc
- Input Impedance: >100k Ω
- Sensitivity: Up to 15% from nominal

Nominal Sensitivities							
mV/g	mV/ips	mV/mms	mV/mil	mV/ μ m	mV/psi	mV/mbar	V/V
10	100	4	100	3.94	20	0.29	1
25	150	6	150	5.91	50	0.73	
50	200	8	200	7.87	100	1.45	
100	500	20	285	11.2			
500	1000	40					
1000							
10000							

- 1 Tachometer Input
 - $\pm 25V$ (50V max. peak to peak)
 - Input impedance: $>120k\Omega$
 - Range: 1 to 1.2M RPM / 0.0167 to 20kHz
 - Pulses per Revolution: 0 (tach off) to 50,000
 - Max Rate of Change of Speed: 500 Hz/sec

Outputs

- Buffered Outputs
 - 1 active buffer per dynamic channel
 - 1 resistive buffer for tachometer

Indicators

- 7 Status LED's

Module	Tachometer
Network	Setpoint Multiplier
Channel 0	Logical Relay
Channel 1	

Communication

- XM Bus

Provides digital communications between XM modules. The network communicates using standard DeviceNet protocols, but does not share the same specifications for the media (the wire) and isolation characteristics.

 - Autobaud to 125kb, 250kb or 500kb
 - Maximum distance: 10 meters
 - Node number mechanically set to simplify installation and commissioning
 - Customizable poll assembly optimizes space utilization within users scanner
 - Supports Logix Controller integration over ControlNet via adapter (1440-ACNR)
- Side Connector
 - Connects adjacent XM modules
 - Connects ControlNet adapter
 - Passes:
 - DeviceNet protocol and power (300mA maximum)
 - Primary power (3A maximum)
- Serial:

Provides temporary local access for module configuration

 - RS-232 via mini-connector
 - Requires cable (PN 1440-SCDB9FXM2)

Signal Conditioning

- Sampling Modes

Selectable per channel

 - Asynchronous
 - FMAX: 1 Hz to 20 kHz
 - Synchronous
 - FMAX: $10 < \text{Orders} \times \text{Speed (Hz)} < 5000$
 - Order Range: 4 to 200
 - Minimum FMAX: 10 Hz
 - Maximum FMAX: 5000 Hz
- Resolution
 - A/D Conversion: 24 bits
 - Dynamic Range: 80dBfs (0.01% fs), 90 dBfs (typical)
- FFT Lines: 100, 200, 400, 800
- Integration: none, single or double
- High Pass Analog Filters:
 - -3 dB Corners: 0.2, 1, 5, 10, 40 Hz
 - Roll Off: -30 dB/octave for the 0.2 Hz filter, otherwise -24 dB/octave
- Low Pass Filter

Applied to integrated acceleration measurements

 - -6 dB Corner: 2 kHz
 - Roll Off: -12 dB/octave
- Units: g, ips, mm/s, mils, μm , psi, mbar, volt

Measurements

- FFT & Time Waveform
- Asynchronous or Synchronous
- Real Time
 - Overall
 - RMS
 - Peak (true or calculated)
 - Peak to Peak (true or calculated)
 - Optional Low Pass Filter
 - -3 dB Corner: 100 Hz to 20 kHz
 - Roll Off: -24 dB/Octave
 - Gap (or transducer bias voltage)
 - Speed
 - SMAX Magnitude
 - SMAX Phase

www.rockwellautomation.com

Power, Control and Information Solutions

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 Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

- FFT Derived
 - FFT Bands
 - 4 bands per channel
 - Defined in frequency or order domain
 - Overall or Max Peak in band
 - Orders
 - Magnitude: 1x, 2x, 3x
 - Phase: 1x, 2x
 - Not 1x
 - Sum Harmonics

Alarms

- Number: 6 alert and danger pairs
- Alarm on any measured value
- Operators:

greater than	inside range
less than	outside range
- Hysteresis: User defined
- Startup inhibit/Set point multiplication:
 - Period: 0 to 1092 minutes
 - Inhibit/multiplication function: Multiply by N (0-10, 0=Disarm)
- Speed Inhibit: A speed range may be specified for each alarm. When applied, if the speed is outside of the defined range, the alarm is disabled.

Relays

- One Logical Relay

Logic is provided to drive one virtual relay. Relay status is indicated by the module's Relay LED.
- Relay Function
 - Normally energized (failsafe) or Normally deenergized (non-failsafe)
 - Latching or Non-latching
 - Time Delay:
 - 0 to 25.5 seconds
 - 100 millisecond increments
 - Logic

Single or paired "AND" or "OR" logic applied to any alarms.
 - Reset by digital command from configuration software or via a command from the XM Bus...
 - Or from Logix Output Tag when integrated via ControlNet adapter
 - Alarm Status to Activate On:

Normal	Gap/bias out of range
Alert	Module fault
Danger	Tachometer fault
Disarm	

Automatic Module Configuration

At power up automatically configured from a configuration stored in module memory, or from a configuration held in a Logix controller

Approvals

- EMC - EN61000-6-2, EN61000-6-4, EN61326-1 (Industrial), and EN61131-2 (Clause 8, Zones A&B)
- UL - UL 508
- ULH – UL 1604 Class I Div 2, Groups A,B,C,D
- CUL - CSA C22.2 No 142-M1987
- CULH - CSA C22.2 No. 213-M1987 Class I Division 2, Groups A,B,C and D
- LVD - EN61131-2 (Clause 11)
- C-Tick (Australia) - AS/NZS CISPR11 (Group 1, Class A)
- ATEX – EN60079-15, EN60079-0

Power

- Requires Class 2 power supply
- Module: 24Vdc nominal
- Consumption: 250mA Max / 210mA Typical
- Heat Production: 4.56W Max / 3.60W Typical

Environmental

- Operating Temperature: -20 to 70°C (-4 to 158°F)
- Storage Temperature: -40 to 85°C (-40 to 185°F)
- Relative Humidity: 95% non-condensing

Physical

- Dimensions (Height/Width/Depth):
 - 97mm / 94mm / 94 mm
 - 3.8 in / 3.7 in / 3.7 in
- Weight:
 - Module: 6.1 ounces (172 grams)
 - Terminal Base: 6.1 ounces (172 grams)

Ordering Information

Catalog Number	Description
1440-DYN02-01RJ	Dynamic Measurement Module Requires J terminal base
1440-ACNR	ControlNet Adapter
1440-TBS-J	Spring type Terminal Base J
1440-SCDB9FXM2	Serial Communications Cable

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