



XM Monitoring Modules Specifications

Catalog Numbers 1440 series

The XM series of intelligent I/O modules process, in real-time, the critical parameters used to assess the current health and predict the future health of industrial machinery—providing machinery protection and reducing downtime. Use the XM modules in a standalone system, or integrate them with existing automation and control systems.

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XM-124 Standard Dynamic Measurement Module

The XM-124 module (catalog number 1440-SDM02-01RA) is a two-channel, general purpose monitor that supports dynamic measurements such as vibration, pressure, strain, and spike energy (gSE). The module also supports static (DC) thrust and eccentricity measurements.

The XM-124 consolidates and improves on most of the functionality provided by the earlier XM-120, XM-120E, XM-121, XM-122 and XM-123 modules. It also provides the same basic, single-channel, thrust measurement as the XM-320 module. This makes the XM-124 suitable for monitoring of almost any rotating machine, including steam turbines, aeroderivative and industrial gas turbines, hydro turbines, motors, pumps, fans, compressors, and gear boxes.

Attribute	XM-124 (1440-SDM02-01RA)
Inputs	
Two dynamic channel inputs	Eddy current transducer signals Accelerometer signals Voltage signals from any dynamic measurement device, such as a velocity or pressure transducer
Transducer power	Constant voltage: 24V DC, -24V DC, 40 mA Constant current 4.5 mA \pm 30% / -20% from 24V DC (IEPE) None (voltage input) Tachometer can be powered, constant voltage, or configured as voltage input
Voltage range	-20...0V DC -10...10V DC 0...20V DC
Input impedance	> 100 k Ω
Sensitivity	Up to 15% from nom

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							

Attribute	XM-124 (1440-SDM02-01RA)
Tachometer Input	
One tachometer input	\pm 25V (50V max peak-to-peak) 1...50,000 events/revolution
Input impedance	> 120 k Ω
Range	1...1,200,000 rpm 0.0167...20,000 Hz
Pulses per revolution	0 (tach off)...50,000
Rate of change of speed, max	500 Hz/s
Outputs	
4...20 mA	Each output is independently programmed to represent any measured parameter, from either channel Two isolated outputs 300 Ω max load
Buffered outputs	One active buffer per dynamic channel One resistive buffer for tachometer
Indicators	
Status indicators	Module Network Channel 1 Channel 2 Tachometer Setpoint multiplier Virtual relay
Communication	
DeviceNet network	Standard DeviceNet protocol for all functions (not power—module power is provided independently) Available EDS file provides support for most DeviceNet compliant systems Communication rate automatically set by bus master to 125, 250, or 500 Kbps Configurable I/O Poll Response message helps optimize space utilization within scanner input tables: Selectable poll response assembly Selectable poll response size (bytes)
Serial	RS-232 via mini-connector or terminal base unit Communication rate fixed at 19.2 Kbps Local configuration via the Serial Configuration utility

Attribute	XM-124 (1440-SDM02-01RA)
Signal Conditioning	
Sampling mode	Selectable per channel Dynamic Measurements Asynchronous FMAX: 1 Hz...20 kHz Synchronous Order range: 4...200 Min FMAX: 10 Hz Max FMAX: 5000 Hz Measured: Orders x Speed (Hz) Spike Energy Static Measurements Eccentricity Peak-to-Peak Eccentricity Thrust Normal mode (single channel measurement)
Resolution	A/D conversion: 24 bits Dynamic range: 80 dBfs (0.01% fs), 90 dBfs, typical
FFT lines	100, 200, 400, 800, 1600
Integration	None or single
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 analog filter	Applied to integrated acceleration measurements -6 dB corner: 2 kHz Roll off: -12 dB/octave
Low pass digital filter	Independently configured per channel Optional Overall LP Filter 100...20000 Hz Spike Energy Spectra FMAX: 10...5000 Hz Roll Off: -24 dB/octave
Tracking digital filter	Independently configured per channel Tracked speed multiple: 0.1...20.0 times the measured (tachometer) rpm Constant Q: 1...200 Constant bandwidth: 0.1...25 Hz Roll off: -36 dB/octave, typical
Band pass digital filter	Independently configured per channel Frequency, min 25...1000 Hz Frequency, max 100...5500 Hz Roll off: -60 dB/octave
Units	g, ips, mm/s, mils, μ m, PSI, mbar, volt

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Data⁽¹⁾	
Complex data	Spectra (synchronous or asynchronous) Waveform (synchronous or asynchronous) Simultaneous waveforms (synchronous) gSE Spectra
Accuracy, min	$\pm 1\%$ of full scale range for the channel $\pm 1\%$ of alarm setpoint for speed
Measurements⁽²⁾	
Types	FFT and time waveform Asynchronous or synchronous
Real time	Overall RMS Peak (true or calculated) Peak-to-peak (true or calculated) gSE ⁽⁵⁾ Optional low pass filter - -3 dB corner: 200 Hz...20 kHz - Roll off: -24 dB/octave Gap (or transducer bias voltage) Speed SMAX magnitude SMAX phase Band pass filter value Tracking filter magnitude Tracking filter phase Thrust position Eccentricity
FFT derived	FFT bands Four 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
Data Buffers	
Delta time buffer	Number of records: 2048 Delta time interval: 1...3600 s Trigger mode: Relay is activated or trigger event (such as DeviceNet command from a controller or host)
Delta rpm buffer	Number of records: 512 Delta speed interval: 1...3600 rpm Trigger mode: Startup collects data in increasing rpm direction only; coast-down collects data in both increasing and decreasing directions The data collected in the buffer is user configurable and can contain up to 16 of the measurements
Spectra or waveform	Saved upon same trigger as delta time buffer

Attribute	XM-124 (1440-SDM02-01RA)
Alarms	
Number	16 alarm and danger pairs
Alarm parameters	Any measured parameter
Operators	Greater than Less than Inside range Outside range
Hysteresis	User configurable in software
Startup inhibit/setpoint multiplication	Period: 0...1092 min, adjustable in 0.1 min increments Inhibit/multiplication function: Multiply by N (0...10, 0 = Disarm)
Speed inhibit	A speed range can be specified for each alarm. When applied, the alarm is disabled when speed is outside of the defined range.
Relays	
Number	Single on-board relay, Single Pole Single Throw (SPST), 1 Form A Four additional DPDT relays when interconnected to an XM-441 expansion relay module, or Four virtual relays whose status can be used by remote control systems or the XM-440 master relay module, also 4 DPDT relays
Rating (resistive)	Capacity, nominal: 1.5 A @ 24V DC Capacity, min 100 μ A @ 100 mV DC Power, max 41.4 W Voltage, max 27.6V DC Current, max 1.5 A
Expected life (min operations)	Mechanical: 2×10^7 Electrical @ 20 cpm – 1.5A, 24VDC: 10^5
Failsafe	Normally energized (failsafe) or Normally de-energized (non-fail-safe)
Latching	Latching or Non-latching
Time delay	0...25.5 s, adjustable in 100 ms increments
Logic	Single or paired AND or OR logic applied to any alarm
Reset	Local reset switch on top of module Remote reset switch wired to terminal base Digital reset command via serial or DeviceNet interface
Activation on	Alarm status: Normal Alert Danger Disarm Transducer fault Module fault Tacho fault

Attribute	XM-124 (1440-SDM02-01RA)
Peak speed capture	The XM-124 retains the value of the highest speed observed since module power was cycled or the peak speed value was manually reset
Configuration	
Nonvolatile configuration	A copy of the module configuration is retained in nonvolatile memory from which the configuration is loaded upon powerup The configuration stored in nonvolatile memory can be deleted only by a module-reset command sent via a serial interface, using the Serial Configuration utility or via a DeviceNet interface from any compliant software application
Module	
Power supply	24V DC 350 mA Requires Class 2/SELV/PELV power supply
Power dissipation	8.7 W, max
Isolation voltage	50V (continuous), basic insulation type between uninsulated live parts and the enclosure with the relay contacts open and closed Type tested at 707V DC for 60 s between uninsulated live parts and the enclosure with the relay contacts open and closed Type tested at 707V DC for 60 s between supply and output terminals
Wiring category ⁽³⁾	2 - on signal ports 1 - on power and relay ports 2 - on DeviceNet ports 3 - on serial ports
North American temp code	T5
IEC temp code	T4
Environmental	
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	-20...65 °C (-4...149 °F)
Temperature, surrounding air max	65 °C (149 °F)
Temperature, storage IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...85 °C (-40...185 °F)

Attribute	XM-124 (1440-SDM02-01RA)
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing
Vibration IEC 60068-2-6 (Test Fc, Operating)	5 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	15 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Emissions CISPR11 (IEC 61000-6-4)	Class A
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% pulse 100% AM at 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
EFT/B immunity IEC 61000-4-4	±3 kV at 5 kHz on power ports ±3 kV at 5 kHz on signal ports ±3 kV at 5 kHz on DeviceNet ports
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power and relay ports ±2 kV line-earth (CM) on shielded signal ports ±2 kV line-earth (CM) on DeviceNet ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz
Enclosure type rating	None (open-style)
Physical	
Terminal base	1440-TB-A (XM-940) Series C
Dimensions (H x W x D), approx	97 x 94 x 94 mm (3.8 x 3.7 x 3.7 in.)
Weight	Module: 0.172 kg (0.38 lb) Terminal base: 0.172 kg (0.38 lb)
Certifications⁽⁴⁾	
c-UL-us	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
CE	European Union 2004/108/EC EMC Directive, compliant with: <ul style="list-style-type: none"> • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)

Attribute	XM-124 (1440-SDM02-01RA)
RCM	Australian Radiocommunications Act, compliant with: <ul style="list-style-type: none"> • AS/NZS CISPR 11; Industrial Emissions
Ex	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none"> • EN 60079-15; Potentially Explosive Atmospheres, Protection "n" • EN 60079-11; Explosive Atmospheres, Protection "i" • EN 60079-0; General Requirements • II 3 G Ex nAC [ic] IIC T4 Gc X
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: <ul style="list-style-type: none"> • Article 58-2 of Radio Waves Act, Clause 3

- (1) Complex data is available when the channel is configured for dynamic measurements.
- (2) Measurement availability is dependent on channel configuration.
- (3) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication, [1770-4.1](#).
- (4) When product or packaging is marked. See the Product Certification link at <http://www.rockwellautomation.com> for Declarations of Conformity, Certificates, and other certification details.
- (5) gSE Measurements can be configured to update continuously, or to alternate with standard acceleration or velocity measurements. The gSE Overall will update in "Real Time" only when configured for continuous update.