

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 that is 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. The XM-124 is suitable for monitoring almost any rotating machine, including steam turbines, aeroderivative and industrial gas turbines, hydro turbines, motors, pumps, fans, compressors, and gearboxes.

Table 2 - XM-124 Standard Dynamic Measurement Module Attribute Descriptions

Attribute	XM-124 (1440-SDM02-01RA)
Inputs	
Two dynamic channel inputs	<ul style="list-style-type: none"> Eddy current transducer signals Accelerometer signals Voltage signals from any dynamic measurement device, such as a velocity or pressure transducer
Transducer power	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> -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							

Tachometer Input	
One tachometer input	<ul style="list-style-type: none"> \pm25V (50V max peak-to-peak) 1...50,000 events/revolution
Input impedance	> 120 k Ω
Range	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Each output is independently programmed to represent any measured parameter, from either channel Two isolated outputs 300 Ω max load

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Attribute	XM-124 (1440-SDM02-01RA)
Buffered outputs	<ul style="list-style-type: none"> • One active buffer per dynamic channel • One resistive buffer for tachometer
Indicators	
Status indicators	<ul style="list-style-type: none"> • Module • Network • Channel 1 • Channel 2 • Tachometer • Setpoint multiplier • Virtual relay
Communication	
DeviceNet network	<ul style="list-style-type: none"> • 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 that is 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: <ul style="list-style-type: none"> – Selectable poll response assembly – Selectable poll response size (bytes)
Serial	<ul style="list-style-type: none"> • RS-232 via mini-connector or terminal base unit • Communication rate that is fixed at 19.2 Kbps • Local configuration via the Serial Configuration Utility
Signal Conditioning	
Sampling mode	<ul style="list-style-type: none"> • Selectable per channel • Dynamic Measurements <ul style="list-style-type: none"> – Asynchronous FMAX: 1 Hz . . . 20 kHz – Synchronous • Order range: 4 . . . 200 <ul style="list-style-type: none"> – Min FMAX: 10 Hz – Max FMAX: 5000 Hz, Measured: Orders x Speed (Hz) • Spike Energy • Static Measurements <ul style="list-style-type: none"> – Eccentricity Peak-to-Peak Eccentricity • Thrust Normal mode (single channel measurement)
Resolution	<ul style="list-style-type: none"> • A/D conversion: 24 bits • Dynamic range: 80 dBfs (0.01% fs), 90 dBfs, typical
FFT lines	100, 200, 400, 800, 1600
Integration	None, single, or double
High pass analog filters	<ul style="list-style-type: none"> • -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	<ul style="list-style-type: none"> • Applied to integrated acceleration measurements • -3 dB corner: 5kHz Roll off: -18 dB/octave
Low pass digital filter	Independently configured per channel <ul style="list-style-type: none"> • Optional Overall LP Filter • 100 . . . 20000 Hz • Spike Energy • Spectra FMAX: 10 . . . 5000 Hz • Roll Off: -24 dB/octave

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Attribute	XM-124 (1440-SDM02-01RA)
Tracking digital filter	Independently configured per channel <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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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Attribute	XM-124 (1440-SDM02-01RA)
Data⁽¹⁾	
Complex data	<ul style="list-style-type: none"> • Spectra (synchronous or asynchronous) • Waveform (synchronous or asynchronous) • Simultaneous waveforms (synchronous) • gSE Spectra
Accuracy, min	<ul style="list-style-type: none"> • ±1% of full scale range for the channel • ±1% of alarm setpoint for speed
Measurements⁽²⁾	
Types	<ul style="list-style-type: none"> • FFT and time waveform • Asynchronous or synchronous
Real time	<ul style="list-style-type: none"> • Overall • RMS • Peak (true or calculated) • Peak-to-peak (true or calculated) • gSE⁽⁵⁾ • Optional low pass filter <ul style="list-style-type: none"> – -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	<ul style="list-style-type: none"> • FFT bands <ul style="list-style-type: none"> – Four bands per channel – Defined in frequency or order domain – Overall or max peak in band • Orders <ul style="list-style-type: none"> – Magnitude: 1x, 2x, 3x – Phase: 1x, 2x • Not 1x • Sum harmonics
Data Buffers	
Delta time buffer	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 that is 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
Alarms	
Number	16 alarm and danger pairs
Alarm parameters	Any measured parameter
Operators	<ul style="list-style-type: none"> • Greater than • Less than • Inside range • Outside range

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Attribute	XM-124 (1440-SDM02-01RA)
Hysteresis	User configurable in software
Startup inhibit/setpoint multiplication	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Capacity, nominal: 1.5 A @ 24V DC • Capacity, min 100 µA @ 100 mV DC • Power, max 41.4 W • Voltage, max 27.6V DC • Current, max 1.5 A
Expected life (min operations)	<ul style="list-style-type: none"> • Mechanical: 2×10^7 • Electrical @ 20 cpm – 1.5A, 24VDC: 10^5
Failsafe	<ul style="list-style-type: none"> • Normally energized (failsafe) or • Normally de-energized (non-fail-safe)
Latching	<ul style="list-style-type: none"> • Latching • 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	<ul style="list-style-type: none"> • Local reset switch on top of module • Remote reset switch wired to terminal base • Digital reset command via serial or DeviceNet interface
Activation on	<ul style="list-style-type: none"> • Alarm status <ul style="list-style-type: none"> – Normal – Alert – Danger – Disarm – Transducer fault – Module fault – Tacho fault
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	<ul style="list-style-type: none"> • A copy of the module configuration is retained in nonvolatile memory from which the configuration is loaded upon powerup • The configuration that is 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	<ul style="list-style-type: none"> • 24V DC • 350 mA • Requires Class 2/SELV/PELV power supply
Power dissipation	8.7 W, max

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Attribute	XM-124 (1440-SDM02-01RA)
Isolation voltage	<ul style="list-style-type: none"> • 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⁾	<ul style="list-style-type: none"> • 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)
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	<ul style="list-style-type: none"> • 6 kV contact discharges • 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • ±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	<ul style="list-style-type: none"> • ±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	<ul style="list-style-type: none"> • Module: 0.172 kg (0.38 lb) • Terminal base: 0.172 kg (0.38 lb)

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Attribute	XM-124 (1440-SDM02-01RA)
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)
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.



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