Technical Data

Original Instructions

XM Monitoring Modules Specifications

Bulletin 1440

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

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated the environmental specifications	2
Updated the certifications	3
Updated the isolation voltage specification	Throughout

Environmental and Physical Specifications

Attribute	1440-SDM02-01RA, 1440-TB-A	1440-SPD02-01RB, 1440-TB-B	1440-REX00-04RD, 1440-TB-D 1440-REX03-04RG, 1440-TB-G	1440-ACNR	1440-DYN02-01RJ, 1440-TBS-J
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 ≤ Ta ≤ +65 °C (-4 ≤ Ta ≤ +149 °F)			-20 ≤ Ta ≤ +70 °C (-4 ≤ Ta ≤ +158 °F)	
Temperature, surrounding air max	65 °C (149 °F)			70 °C (158 °F)	
Temperature, nonoperating 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	2 g @ 10...500 Hz		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	20 g			
Emissions CISPR 11 (IEC 61000-6-4)	Class A				
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges		4 kV contact discharges 8 kV air discharges	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 kH on signal ports ±3 kV at 5 kHz on DeviceNet® ports	±2 kV at 5 kHz on power ports ±1 kV at 5 kHz on relay and shielded signal ports ±1 kV at 5 kHz on XM bus port		±4 kV at 5 kHz on power port ±2 kV at 5 kHz on communication ports	±4 kV at 5 kHz on power port ±2 kV at 5 kHz on signal and XM bus 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	±2 kV line-earth (CM) on relay and shielded signal ports ±2 kV line-earth (CM) on XM bus port	±1 kV line-earth (CM) on relay ports ±1 kV line-earth (CM) on signal ports ±1 kV line-earth (CM) on XM bus port	±1 kV line-earth (CM) on all ports	
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz				
Conformal coating	–	All printed circuit boards are conformally coated in accordance with IPC-A-610C		–	
Temp code	T4				
Enclosure type rating	None (open-style)				

Environmental and Physical Specifications

Attribute	1440-SDM02-01RA, 1440-TB-A	1440-SPD02-01RB, 1440-TB-B	1440-REX00-04RD, 1440-TB-D 1440-REX03-04RG, 1440-TB-G	1440-ACNR	1440-DYN02-01RJ, 1440-TBS-J
Wiring category[1]	2 - on signal ports 1 - on power and relay ports 2 - on DeviceNet ports 3 - on serial ports	2 - on relay and signal ports 3 - on serial and power ports 2 - on XM bus ports	2 - on relay, power, and signal ports 3 - on serial and power ports 2 - on XM bus ports	1 - on power ports 2 - on communication ports	2 - on signal ports 1 - on power ports 2 - on communication ports
Wire Type	–	Signal connections: shielded Power and relay connections: unshielded		Power connection: 22…14 AWG (0.34…2.1 mm^2) solid or stranded copper wire, rated at 75 °C (167 °F) or greater, with 1.2 mm (3/64 in.) insulation, max	
Pilot duty rating, relay port	–	Not rated		–	
Terminal screw torque	0.8 N•m (7 lb•in)				
Dimensions, approx (H x W x D)	97 x 94 x 94 mm (3.8 x 3.7 x 3.7 in.)				
Weight, approx	Module: 0.172 kg (0.38 lb) Terminal base: 0.172 kg (0.38 lb)				

(1) Use this Conductor Category information to plan the conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Certifications

Certification	1440-REX00-04RD, 1440-TB-D 1440-REX03-04RG, 1440-TB-G 1440-SDM02-01RA 1440-SPD02-01RB, 1440-TB-B	1440-TB-A	1440-DYN02-01RJ, 1440-TBS-J 1440-ACNR
c-UL-us	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, which are certified for U.S. and Canada. See UL File E194810		
CE	European Union 2014/30/EU EMC Directive, compliant with: 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: AS/NZS CISPR 11; Industrial Emissions		
Ex	European Union 2014/34/EU ATEX Directive, compliant with: EN IEC 60079-0; Explosive Atmospheres, General Requirements EN IEC 60079-7; Explosive Atmospheres, Equipment protection by increased safety "e" EN IEC 60079-15; Explosive Atmospheres, Equipment protection by type of protection "n" (Zone 2, Protection "n, e")		European Union 2014/34/EU ATEX Directive, compliant with: EN IEC 60079-0; Explosive Atmospheres, General Requirements EN IEC 60079-7; Explosive Atmospheres, Equipment protection by increased safety "e"
	II 3 G Ex ec nC IIC T4 Gc DEMKO 17 ATEX 1915X	II 3 G Ex ec IIC T4 Gc DEMKO 17 ATEX 1915X	II 3 G Ex ec IIC T4 Gc DEMKO 14 ATEX 1361X
IECEx	–		IECEx System, compliant with: IEC 60079-0; General Requirements IEC 60079-7; Explosive Atmospheres, Protection "e" Ex ec IIC T4 Gc IECEx UL 14.0076X
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of the Radio Waves Act, Clause 3		
CCC	CNCA-C23-01:2019 强制性产品认证实施规则 防爆电气 CNCA-C23-01:2019 CCC Implementation Rule Explosion-Proof Electrical Products CCC: 2021122309114171, 2021122309114172		
See the Product Certification link at rok.auto/certifications for Declarations of Conformity, Certificates, and other certification details.			

Notes:

XM DYN Dynamic Measurement Module

The XM DYN module is a two-channel, general-purpose monitor that supports measurements of dynamic inputs such as vibration, pressure, and strain. You can use the module to monitor shaft, casing, and pedestal vibration in equipment that rotates. The module is designed specifically for integration with ControlLogix® controllers, which are connected through the 1440-ACNR ControlNet® adapter.

Technical Specifications - 1440-DYN02-01RJ

Attribute	1440-DYN02-01RJ
Inputs, dynamic channel	• Number of inputs: 2 • Eddy current transducer signals • Accelerometer signals • Voltage signals from any dynamic measurement sensor such as a velocity or pressure transducer
Transducer power options	• Constant voltage: 24V DC, -24V DC, 60 mA • Constant current: 4.5 mA +30%/-20% from 24V DC (IEPE) • Bias current: monitors self-powered coil-based transducers • None
Voltage ranges	• -20...0V DC • -10...10V DC • 0...20V DC
Input impedance	> 100 kΩ
Sensitivity	Up to 15% from nom

mV/g	mV/ips	mV/mms	mV/mil	mV/µm	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							

Inputs, tachometer	• Number of inputs: 2 • ±25V (50V max peak-to-peak)
Input impedance	> 120 kΩ
Range	1...1.2 M rpm/0.0167...20 kHz
Pulses per revolution	0 (tach off)...50,000
Rate of change of speed, max	500 Hz/s
Outputs, buffered	• Number of outputs: 1 per dynamic channel • One resistive buffer per tachometer
Status indicators	• Module • Network • Channel 0 • Channel 1 • Tachometer • Setpoint multiplier • Virtual relay
Communication	• Autobaud 125 Kbps, 250 Kbps, or 500 Kbps • Max distance: 10 m (32.81 ft) • Node number that is mechanically set to simplify installation and commissioning • Customizable poll assembly optimizes space utilization within the scanner • Logix Controller integration over the ControlNet network Via 1440-ACNR Adapter
Signal Conditioning	Sampling mode, selectable per channel • Asynchronous FMAX: 1 Hz...20 kHz • Synchronous FMAX: 10 Hz...5000 Hz Order range: 4...200 10 Hz < Orders x Speed (Hz) < 5000 Hz
Resolution	• A/D conversion: 24 bits • Dynamic range: 80 dBfs (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 Hz, 1 Hz, 5 Hz, 10 Hz, 40 Hz, Roll off: 24 dB/octave, -30 dB/octave for the 0.2 Hz filter • Spike Energy • gSE HPF: 200, 500, 1000, 2000, 5000 Hz, Roll off: -12 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

Technical Specifications - 1440-DYN02-01RJ (continued)

Attribute	1440-DYN02-01RJ
Measurements	• FFT and 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: 200 Hz...20 kHz, Roll off: -24 dB/octave • Gap (or transducer bias voltage) • Speed • SMAX magnitude • SMAX phase
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
Alarms	• Six alert and danger pairs • Alarm on any measured value
Operators	• Greater than • Less than • Inside range • Outside range
Hysteresis	User-defined
Startup inhibit/ setpoint	• Period 0...1092 min • 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 if the speed is outside the defined range
Automatic module configuration	Automatically configured from module memory at power-up, or from a configuration in a Logix 5000® controller.
Relay, virtual	• Number of relays: 1 • Logic is provided to drive the virtual relay • Relay status indicator
Relay function	• Normally energized (fail-safe) or normally de-energized (non-failsafe) • Latching or non-latching • Time delay: 0...25.5 s in100 ms increments • Single or paired AND or OR logic that is applied to any alarm • Reset by digital command from the configuration software, via a command from the XM bus, or from an output tag when integrated with a ControlNet adapter
Alarm status to activate on	• Normal • Alert • Danger • Gap/bias out of range • Module fault • Tachometer fault • Disarm
Power	Requires a Class 2/SELV power supply
Voltage and current ratings	Supply: 24V DC, 250 mA Relay: 24V DC, 60 mA
Consumption	• 250 mA, max • 210 mA, typical
Heat production	• 4.56 W, max • 3.60 W, typical

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

XM-124 Standard Dynamic Measurement Module

The XM-124 module 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 module consolidates and improves upon most of the functionality that is provided by the 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.

Technical Specifications - 1440-SDM02-01RA

Attribute	1440-SDM02-01RA
Inputs, dynamic channel	• Number of inputs: 2 • Eddy current transducer signals • Accelerometer signals • Voltage signals from any dynamic measurement device, such as a velocity or pressure transducer
Transducer power options	• Constant voltage: 24V DC, -24V DC, 40 mA • Constant current: 4.5 mA ± 30% / -20% from 24V DC (IEPE) • None (voltage input) • The 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 kΩ
Sensitivity	Up to 15% from nom

mV/g	mV/ips	mV/mms	mV/mil	mV/µm	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							

Inputs, tachometer	• Number of inputs: 1 • ±25V (50V max peak-to-peak) • 1…50,000 events/revolution
Input impedance	> 120 kΩ
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	• Number of outputs: 2 isolated • Each output is independently programmed to represent any measured parameter, from either channel • 300 Ω max load
Outputs, buffered	• Number of outputs: 1 per dynamic channel • One resistive buffer per tachometer
Status indicators	• Module • Network • Channel 1 • Channel 2 • Tachometer • Setpoint multiplier • Virtual relay
Communication, DeviceNet	• Standard DeviceNet protocol for all functions (except power, module power is provided independently) • Available EDS file supports most DeviceNet compliant systems • Communication rate that the bus leader automatically sets to 125 Kbps, 250 Kbps, or 500 Kbps • Configurable I/O Poll Response message helps optimize space utilization within scanner input tables with selectable poll response assembly and size (bytes)
Communication, Serial	• 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

Technical Specifications - 1440-SDM02-01RA (continued)

Attribute	1440-SDM02-01RA
Signal Conditioning	Sampling mode, selectable per channel • Dynamic Measurements – Asynchronous FMAX: 1 Hz…20 kHz – Synchronous FMAX: 10 Hz…5000 Hz Order range: 4…200 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, single, or double
High pass analog filters	• -3 dB corners: 0.2, 1, 5, 10, 40 Hz, Roll off: -30 dB/octave, 24 dB/octave for the 0.2 Hz filter
Low pass analog filter	• Applied to integrated acceleration measurements • -3 dB corner: 5 kHz, Roll off: -18 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 0: 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, µm, PSI, mbar, volt
Complex data	• Spectra (synchronous or asynchronous) • Waveform (synchronous or asynchronous) • Simultaneous waveforms (synchronous) • gSE Spectra
Accuracy, min	• ±1% of the full-scale range for the channel • ±1% of the alarm setpoint for speed

Technical Specifications - 1440-SDM02-01RA (continued)

Attribute	1440-SDM02-01RA
Measurements	Dependent on channel configuration. • FFT and time waveform • Asynchronous or synchronous
Real time	• Overall • RMS • Peak (true or calculated) • Peak-to-peak (true or calculated) • gSE - Can be configured to update continuously, or to alternate with standard acceleration or velocity measurements. The gSE Overall only updates in "real-time" when it is configured for continuous update. • 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 buffer, Delta time	• 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)
Data buffer, Delta rpm	• Number of records: 512 • Delta speed interval: 1…3600 rpm • Trigger mode: Startup collects data only when the rpm direction increases; coast-down collects data when the rpm direction increases and decreases • The data that is collected in the buffer is configurable and can contain up to 16 of the measurements
Spectra or waveform	Saved upon same trigger as delta time buffer
Alarms	16 alarm and danger pairs
Parameters	Any measured parameter
Operators	• Greater than • Less than • Inside range • Outside range
Hysteresis	Configurable in the 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.

Technical Specifications - 1440-SDM02-01RA (continued)

Attribute	1440-SDM02-01RA
Relays	• One onboard relay, Single Pole Single Throw (SPST), and one Form A • Four additional DPDT relays when connected to an XM-441 expansion relay module, or • Four virtual relays and four DPDT relays - remote control systems or the XM-440 module can use the status from the virtual relays
Rating (resistive)	• Capacity, nominal: 1.5 A @ 24V DC • Capacity, min: 100 µA @ 100 mV DC • Voltage, max: 27.6V DC • Current, max: 1.5 A • Power, max: 41.4 W
Expected life (min operations)	• Mechanical: $2x10^7$ • Electrical @ 20 CPM: 1.5 A, 24V DC: 10^5
Fail-safe	• Normally energized (fail-safe) or • Normally de-energized (non-fail-safe)
Latching	• Latching • Non-latching
Time delay	0…25.5 s, adjustable in 100 ms increments
Logic	Single or paired AND or OR logic that is applied to any alarm
Reset	• Local reset switch on top of module • Remote reset switch that is wired to the terminal base • Digital reset command via serial or DeviceNet interface
Activation on	Alarm status: • Normal • Alert • Danger • Disarm • Transducer fault • Module fault • Tacho fault
Peak speed capture	The XM-124 retains the value of the highest speed that is observed since module power was cycled or the peak speed value was manually reset
Nonvolatile configuration	• A copy of the module configuration is retained in nonvolatile memory from which the configuration is loaded upon powerup • Delete the configuration that is stored in nonvolatile memory with a module-reset command that is sent via a serial interface, via the Serial Configuration Utility, or via a DeviceNet interface from any compliant software application
Voltage and current ratings	Supply: 24V DC (21.6…26.4V DC), 350 mA max Relay: 24V DC, 1.5 A RES 1440-TB-A/C Input: 30V DC, 1.5 A
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

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

XM-220 Dual Speed Module

The XM-220 module measures speed, rotor acceleration, and peak speed, and can detect zero speed, locked rotor, and reverse rotation. Also, the module can serve as a component of an Electronic Overspeed Detection System (EODS).

Technical Specifications - 1440-SPD02-01RB

Attribute	1440-SPD02-01RB
Inputs, tachometer	• Number of inputs: 2 • ±25V (50V max peak-to-peak) • Eddy current transducer signals • Magnetic pickups • TTL output devices
Input impedance	120 kΩ, min
Speed/frequency range	• 1…1,200,000 rpm • 0.0167…20,000 Hz
Speed measurement error	• 1…240 rpm: ±0.2 rpm • 241…12,000 rpm: ±2 rpm • 12,001…20,400 rpm: ±5 rpm • 20,401…120,000 rpm: ±20 rpm • 120,001…360,000 rpm: ±50 rpm • 360,001…1,200,000 rpm: ±160 rpm
Outputs, 4…20 mA	• Number of outputs: 2 isolated • Each output is independently programmed to represent speed or acceleration, from either channel • 300 Ω max load • One active buffer per input channel
Outputs, buffered	• Number of outputs: 2 • Output range configurable by wiring: – -24…9V – -5…24V – -5…9V • A third buffered output is available when the channel mode for the module is single redundant. Outputs a CMOS (0…5V) level square-wave that corresponds to the active input signal
Sensor Fault Detection	• Eddy current transducer - Bias voltage is compared with the fault limits • Magnetic pickups - A current source is available for biasing passive magnetic pickups to detect open or short circuits
Status indicators	• Module - red/green • Network - red/green • Channel 1 - yellow/red • Channel 2 - yellow/red • Startup - yellow • Relay - red • AUX - reserved for future use
Communication, DeviceNet	• Standard DeviceNet protocol for all functions (not power—module power is provided independently) • Available EDS file supports most DeviceNet compliant systems • Communication rate that the bus leader automatically sets to 125 Kbps, 250 Kbps, or 500 Kbps • Configurable I/O Poll Response message helps optimize space utilization within scanner input tables with selectable poll response assembly and size (bytes)
Communication, Serial	• 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
Measurements	• rpm • Direction of rotation • Acceleration in rpm/min
Measured parameters	• Forward • Reverse • rpm • Direction of rotation • Acceleration in rpm/min
Peak speed capture	The module retains the value of the highest speed that is observed since module power was cycled or the peak speed value was manually reset
Dual channel mode	Two sensors perform two, separate measurements for speed, acceleration, and peak speed
Single redundant channel mode	One sensor performs measurements for speed, acceleration, and peak speed. If the current sensor fails, the module automatically switches to the second, redundant sensor
Reverse rotation mode	Two sensors monitor both speed and direction. They must be mounted out of phase from each other so the rotational direction is determined by which sensor the shaft keyway passes first.

Technical Specifications - 1440-SPD02-01RB (continued)

Attribute	1440-SPD02-01RB
Alarms	Eight alarms, which are fixed per channel
Alarm parameters	An alarm and danger pair is provided for: • Speed • Acceleration • Zero speed • Locked rotor
Operators	• Greater than • Less than • Inside range • Outside range
Hysteresis	Configurable in the software
Relays	• Single onboard relay, two sets of contacts - DPDT (two Form C) • Four additional relays when interconnected to an XM-441 expansion relay module, or • Four virtual relays - remote control systems or the XM-440 module can use the status
Rating	• Voltage, max: 120V DC, 125V AC • Current, max: 3.5 A up to 40 °C (104 °F), derates to 2 A at 65 °C (149 °F) • Current, min: 0 • Power, max: 60 W, 62.5VA
Fail-safe	• Normally energized (fail-safe) • Normally de-energized (non-fail-safe)
Latching	• Latching • Non-latching
Time delay	0…25.5 s, adjustable in 100 ms increments
Logic	Single or paired AND or OR logic that is applied to any alarm
Reset	• Local reset switch on top of the module • Remote reset switch that is wired to the terminal base • Digital reset command via serial or DeviceNet interface
Activation on	Alarm Status: • Normal • Alert • Danger • Disarm • Transducer fault • Module fault • Tacho fault
Nonvolatile configuration	• A copy of the module configuration is retained in nonvolatile memory from which the configuration is loaded upon powerup • Delete the configuration that is stored in nonvolatile memory with a module-reset command that is sent via the serial interface, via the Serial Configuration Utility, or via a DeviceNet interface from any compliant software application
Power	Requires a Class 2/SELV power supply
Voltage and current ratings	Supply: 24V DC, 0.3 A max Relay: • 120V AC, 0.5 A • 110V DC, 0.5 A • 30V DC, 1.0 A
Consumption	• 300 mA, max • 225 mA, typical
Heat production	• 7 W (24 BTU/hr), max • 4 W (14 BTU/hr), typical
Transducer	Isolated 24V DC, configurable with wiring
Dissipation, max	7 W
Isolation voltage	250V (continuous), basic insulation type, relay to all other circuits Isolation between other circuits is not rated

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

XM-441 Expansion Relay Module

The XM-441 expansion relay module adds four relays to any XM measurement module.

The XM-441 module communicates to a host module via the side connector of the terminal base. All XM measurement modules support only one expansion module, which must be to the right of and directly connected to the host module.

Technical Specifications - 1440-REX00-04RD

Attribute	1440-REX00-04RD
Status indicators	• Module power - green • Relay 1 - red • Relay 2 - red • Relay 3 - red • Relay 4 - red
Relays	Four relays, two sets of contacts each - DPDT (two Form C)
Fail-safe	• Normally energized (fail-safe) • Normally de-energized (non-failsafe)
Other features	The host XM module manages these features: • Latching • Time delay • Logic • Reset • Activation
Voltage and current ratings	Supply: 24V DC, 0.2 A max, Class 2/SELV Relay: 250V AC, 50/60 Hz, 3 A Res
Power dissipation	2.9 W (9.9 BTU/hr) max

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

XM-442 Voted EODS Relay Module

The XM-442 module combines with three XM-220 modules to provide an API-compliant, triple-redundant Electronic Overspeed Detection System (EODS).

The XM-442 module communicates to the speed modules connected to it only via the three digital inputs on the front of the terminal base. The module passes power and communication through the side connector of the terminal base but does not use them.

Technical Specifications - 1440-REX03-04RG

Attribute	1440-REX03-04RG
Status indicators	• Module power - red/green • Shutdown relay - red • Alarm relay - red
Relays	Four relays, two sets of contacts each - DPDT (2 Form C)
Fail-safe	Normally energized
Latching	The shutdown and alarm relays latch when the conditions that activate them are met
Logic	• Two-out-of-three • One-out-of-three
Activation	Low logic level (< 0.8V) on the overspeed/circuit fault inputs
Reset	• Local reset switch on top of module • Remote reset switch that is wired to the terminal base
Voltage and current ratings	Supply: 24V DC, 0.2 A max, Class 2/SELV Relay: • 250V AC, 50/60 Hz, 3 A Res • 150V DC, 1.6 A Res
Heat production	2.9 W (9.9 BTU/hr), max
Power dissipation	2.9 W max

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

ControlNet Adapter

The ControlNet adapter connects an XM bus network to a ControlNet network.

Technical Specifications - 1440-ACNR

Attribute	1440-ACNR
Maximum number of 1440-DYN02-01RJ modules	≤ 10
Communication, ControlNet	5 M, fixed rate
Communication, XM bus	500 Kbps, fixed rate
Status indicators	• Module • Backplane (XM bus) • ControlNet A • ControlNet B
Power consumption, max	2.4 W
Power dissipation, max	2.4 W
Thermal dissipation	8.194 BTU/hr
Input over voltage protection	Reverse-polarity protected
Voltage and current ratings	Supply: 24V DC, 120 mA max, Class 2/SELV XM bus: 24V DC, 3 A
Isolation voltage	50V (continuous), basic insulation type, between the system to ControlNet and ControlNet to power

For **Environmental and Physical Specifications**, see page 2.
For **Certifications**, see page 3.

Terminal Bases

The 1440 terminal bases support these XM modules.

Cat. No.	Supported XM Module
1440-TB-A	XM-124, 1440-SDM02-01RA
1440-TB-B	XM-220, 1440-SPD02-01RB
1440-TB-D	XM-441, 1440-REX00-04RD
1440-TB-G	XM-442, 1440-REX03-04RG
1440-TBS-J	XM DYN, 1440-DYN02-01RJ

Environmental and Physical Specifications - Terminal Bases

Attribute	1440-TB-A, 1440-TB-B, 1440-TB-D, 1440-TB-G, 1440-TBS-J
Temperature, operating	-20...+65 °C (-4...+149 °F)
Temperature, storage	-40...+85 °C (-40...+185 °F)
Relative humidity	95% noncondensing
Temp code	T4
Dimensions, approx (H x W x D)	97 x 94 x 94 mm (3.8 x 3.7 x 3.7 in.)
Weight, approx	0.172 kg (0.38 lb)
Side connector	The interconnection passes these items to adjacent modules: • power - 3 A, max • DeviceNet protocol and power - 300 mA, max • circuits that are necessary to support expansion modules
Terminal screw torque	0.8 N•m (7 lb•in)

For **Certifications**, see page 3.

Accessories

These accessories are available to use with the XM modules.

Fuse Kit

The fuse kit limits the available current from listed safety extra low voltage or protected extra low voltage (PELV) sources. The kit lets you use safety, extra-low voltage, or PELV supplies as an alternative to a listed Class 2 power source for an XM system.

Specifications - 1440-5AFUSEKIT

Attribute	1440-5AFUSEKIT
Fuse	Bussmann model MDA-5-R
Wire	30…10 AWG (0.2…6 mm^2) solid or stranded, with 10 mm (0.4 in.) of stripped insulation
Torque	0.5…0.6 N•m (4.5…5.3 lb•in)

Serial Communication Cable

The serial communication cable connects a computer to an XM module for configuration with the XM Serial Configuration Utility.

Specifications - 1440-SCDB9FXM2

Attribute	1440-SCDB9FXM2
Length	2 m (6.56 ft)
Connectors	9-pin female serial to micro-USB

Serial Configuration Utility

Use the XM Serial Configuration Utility to commission and configure XM modules. Download the utility at rok.auto/pcdc.

The utility provides these features.

- Security through a password facility that precludes unauthorized use
- DeviceNet address management, 0…63
- Auto save configuration
- Alarm and relay management
- Module firmware update
- Store highest tachometer speed with reset
- Plots - the available plots depend on the module providing the data
  - Spectra
  - Time waveform
  - Trend
  - Level
  - Alarm and relay status

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

Resource	Description
XM Module Installation Instructions	Describes how to install and wire these XM modules.
Publication 1440-IN001	XM-124 Standard Dynamic Measurement Module
Publication 1440-IN002	XM Dynamic Module
Publication ENMON-IN220	XM-220 Dual Speed Module
Publication ENMON-IN441	XM-441 Expansion Relay Module
Publication GMSI10-IN016	XM-442 Voted EODS Relay Module
Publication GMSI10-IN017	XM-946 EODS Relay Terminal Base
Publication GMSI10-IN021	XM-941 Speed/Position Terminal Base
Publication GMSI10-IN023	XM-943 Expansion Relay Terminal Base
XM-124 Standard Dynamic Measurement Module User Manual, publication 1440-UM001	Describes how to configure, and operate the XM 124 module.
XM Dynamic Measurement Module with ControlNet Adapter User Manual, publication 1440-UM002	Describes how to configure, and operate the XM DYN module and the ControlNet adapter.
Ethernet Reference Manual, publication ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
System Security Design Guidelines Reference Manual, publication SECURE-RM001	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
UL Standards Listing for Industrial Control Products, publication CMPNTS-SR002	Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories.
American Standards, Configurations, and Ratings: Introduction to Motor Circuit Design, publication IC-AT001	Provides an overview of American motor circuit design based on methods that are outlined in the NEC.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Selection and Configuration tools, rok.auto/systemtools	Helps configure complete, valid catalog numbers and build complete quotes based on detailed product information.
Rockwell Automation Global SCCR tool, rok.auto/sccr	Provides coordinated high-fault branch circuit solutions for motor starters, soft starters, and component drives.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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