

# TECHNICAL DATA

## XM-122gSE VIBRATION MODULES

### SPECIAL PURPOSE MONITORING

The award winning Allen-Bradley XM® series is the world's first machine monitoring and protection system designed as a distributed network of modules deployed on an open standard industrial bus.

The XM-122 gSE Vibration Module is an intelligent 2-channel special-purpose monitor that is uniquely suited for monitoring of vibration in rotating equipment fitted with rolling-element bearings. The XM-122 includes special circuitry and firmware that enable it to measure both "standard" vibration, similarly to the XM-120, and g's Spike Energy™ (gSE). gSE is a Rockwell Automation developed signal-processing technique that provides an accurate measure of the energy generated by transient or mechanical impacts.

For over 20 years gSE measurements have been used to provide the earliest possible detection of surface flaws in rolling-element bearings, metal-to metal contacts, insufficient bearing lubrication, and process-related problems, such as dry running, cavitation, flow change, and internal re-circulation. Typical applications include monitoring critical gearboxes, machine tool spindle bearings, and both magnetic drive and canned motor seal-less pumps.

Like the XM-120 the XM-122 provides onboard processing of critical vibration parameters, advanced alarm and relay logic, easy installation and superior serviceability. However, unlike the XM-120, the XM-122 is not a real-time protection monitor. Because the XM-122 continuously alternates between standard and gSE measurements, updating each every 4 to 80 seconds (depending on the selected blocksize and bandwidth), the module is not suitable for applications requiring true real-time monitoring and protection.

Inputs to each channel include standard integrated Electronics Piezo Electric (IEPE) accelerometer, or any voltage output measurement device such as a



With two 4-20mA outputs and a single onboard relay, expandable to five, and an integral tachometer, the XM-122 gSE Vibration module offers a complete monitoring system in a small, simple, easily installed, easily maintained package.

The XM-122 module can operate stand alone, with no interface to higher-level control systems or interactive user interfaces. It can also be deployed on a standard or dedicated DeviceNet network where it can provide data and status information to other XM modules, PLC's, DCS and Condition Monitoring Systems

Configuration can be performed either locally or remotely via the DeviceNet network. Local configuration is provided by the included simple and intuitive Serial Configuration Utility executing on a PC connected to the modules serial communications port. Remote configuration can be performed from any networked PC executing either any standard DeviceNet configuration software, or the XM specific XM EOL Configuration software from Rockwell Software.

### SPECIFICATIONS

#### Communications

##### DeviceNet:

- Standard DeviceNet protocol for all functions
- Available Electronic Data Sheet (EDS) file provides support by most DeviceNet compliant systems
- Autobaud to 125kb, 250kb or 500kb
- Configurable I/O Poll Response size (bytes) and Assembly (6 to choose from) helps optimize space utilization within users scanner input tables

*Note: The XM-122 uses only the DeviceNet protocol, not power. Module power is provided independently.*

**Side Connector:** All XM measurement and relay modules include side connectors that allow interconnecting adjacent modules thereby simplifying the external wiring requirements. The Interconnect provides primary power, DeviceNet communication and the circuits necessary to support expansion modules such as the XM-441 Expansion Relay module.

**Serial:** Local configuration via Serial Utility Program

- RS-232 via mini-connector or terminal block
- Baud rate auto baud to 19200 or 57600

## Tachometer

### 1 Tachometer Inputs:

- $\pm 25V$  (50V max peak to peak)
- 1 to 50,000 events per revolution

**Input Impedance:** 120k ohms minimum

### Speed/Frequency Range:

1 to 1,200,000 RPM  
0.0167 to 20,000Hz

### Speed Measurement Error:

1 to 12,000 RPM +/- 1 RPM  
12,001 to 120,000 RPM +/- 6 RPM  
120,001 to 1,200,000 RPM +/- 50 RPM

## Inputs

### 2 Channels of:

- Accelerometer signals
- Voltage signals from any dynamic measurement device, such as a velocity or pressure transducer

### Transducer Power:

- Constant current (4.5mA  $\pm 20\%$  from +24V dc)\*
  - None (voltage input)
- \* Tachometer may be powered, constant voltage, or configured as voltage input

**Voltage Range:** Selectable in software as 0 to  $\pm 20V$  (min) 40Vmax. peak-to-peak

**Sensitivity:** User configurable

**Input Impedance:**  $>100k\Omega$

## Outputs

### 4-20mA Outputs:

- Each output is independently programmed to represent speed or acceleration, from either channel
- 2 isolated outputs
- 300 ohm max load

### Buffered Outputs:

- 1 active buffer per input channel
- Resistive buffer for tachometer

## Indicators

### 7 LEDs:

- Module Status - red/green
- Network Status - red/green
- Channel 1 Status - off/yellow/red
- Channel 2 Status - off/yellow/red
- Tachometer Status - off/yellow/red
- Relay - off/red

## Signal Conditioning

### Sampling Modes:

- Asynchronous
- Synchronous

**Frequency range:** 1 Hz to 20 kHz

### Resolution:

- A/D Conversion: 24 bits
- Dynamic Range:  $<80dBfs$  (0.01% fs),  $-90dBfs$  (typical)
- FFT Lines / Waveform block size
  - 100 / 256
  - 200 / 512
  - 400 / 1024
  - 800 / 2048

**Amplitude range:** Dependent on sensitivity

**Integration:** Two levels provided, first in hardware, second in firmware

**Averaging:** Any number of averages may be specified. If sampling mode is:

- Asynchronous: Averaging will be done on the spectra.
- Synchronous: Averaging will be performed on the time waveforms

**Low Pass Filters:** Independently configured per channel

- Spectra FMAX: 10 Hz - 20 kHz
- gSE Spectra FMAX: 10Hz – 5 kHz
- Optional Overall measurement LP filter: 200 Hz - 20 kHz  
Roll Off: -24 dB per octave

**High Pass Filters:** Independently configured per channel

- Integration OFF: 1, 5, 10, 40, 1000 Hz  
Roll Off: -30 dB per octave for the 1 Hz HPF, otherwise -24 dB per octave
- Integration ON: 5, 10, 40, 1000 Hz  
Roll Off:
  - Single Integration: -30 dB per octave for the 5 Hz HPF, otherwise -24 dB per octave
  - Double Integration: -42 dB per octave for the 5 Hz HPF, otherwise -24 dB per octave

**gSE High Pass Filters:** 200, 500, 1000, 2000, 5000 Hz

Roll Off: -12 dB per octave

### Units:

- |           |        |        |
|-----------|--------|--------|
| • g       | • volt | • mils |
| • $\mu m$ | • mm/s | • Pa   |
| • ips     | • psi  |        |

## Complex Data

- **Spectra** (synchronous or asynchronous)
- **gSE Spectra**
- **Time Waveform** (synchronous or asynchronous)

- **Simultaneous Time Waveforms** (synchronous)

### Data Buffer

**Trend Buffer:** Stores a set of records containing measured parameters in response to a trigger event

- Trend Record: 1 to 16 parameters
- Trend Interval: 1 to 3600 seconds
- Trigger: The trend is saved when a specified relay actuates, or on command from an XM-440, host or controller
- Capacity: 170 to 2048 records depending on the number of parameters stored

**Trip Spectra or Time Waveform:** The current time waveforms or spectra are saved upon the same trigger event defined for the Trend Buffer (above).

**Speed Buffer:** Stores a startup/coast-down trend of measurement parameters in response to changes in speed

- Su/Cd Record: 1 to 16 parameters
- Su/Cd Interval: 1 to 3600 RPM
- Trigger: Records are sampled while speed is between user specified minimum and maximum values
- Sampled while speed is increasing only during startup.
- Capacity: 113 to 512 records depending on the number of parameters stored
- Su/Cd buffer may be latched to preserve the initial trip data in the event of subsequent trips

### Measured Parameters

**Overall:**

- RMS
- gSE Overall
- Peak (true or calculated)
- Peak to Peak (true or calculated)

**4 Bands per Channel:** Limits defined in frequency or order Domain. Bands may overlap

Calculated Value:

- Overall in band
- Max peak in band

**Gap (or transducer bias voltage)**

**Speed**

**Orders:**

- Magnitude: 1x, 2x, 3x
- Phase: 1x, 2x

**Not 1x**

**Sum Harmonics:** Sum Harmonics is the sum of all harmonics from a user defined first order to the maximum order in the spectra.

### Alarms

**Number:** 16 alarm and danger pairs

**Alarmed Parameters:** Any measured parameter

**Operators:**

- Greater than
- Less than
- Inside Range
- Outside Range

**Hysteresis:** User defined

**Speed Inhibit:** A speed range may be specified for each alarm. The alarm is disabled when the speed is outside of the range.

### Relays

**Number:**

- Single on-board relay, two sets of contacts – DPDT (2 Form C)
- Four virtual relays Four virtual relays whose status can be used by remote Control Systems - or -
- Four additional relays when linked to an XM-441 Expansion Relay module

**Onboard Relay Rating:**

- Max. Voltage = 120 Vdc, 125 Vac
- Max. Current = 3.5 (Max current is up to 40°C, and then derates to 2A at 65°C)
- Min. Current = 0
- Max. Power = 60 W, 62.5 VA
- UL Rating:
  - 120 Vac @ 0.5 Amps resistive;
  - 110 Vdc @ 0.3 Amps resistive;
  - 30 Vdc @ 1.0 Amps resistive

**Failsafe:**

- Normally energized (failsafe), or
- Normally de-energized (non-fail-safe)

**Latching:**

- Latching, or
- Non-latching

**Time Delay:** 0 to 25.5 seconds in 100msec increments

**Voting Logic:** Single or paired “And” or “Or” logic applied to any alarms

**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	Fault
Normal	Sensor Out of Range
Alert	Module Fault
Danger	Tachometer Fault
Disarm	

### Non-Volatile Configuration

A copy of the module configuration is retained in non-volatile memory from where it is read upon power up.

Note: The configuration stored in Non-Volatile memory can only be deleted by module-reset command sent via the serial interface, using the Serial Configuration Utility, or via DeviceNet from any compliant software application.

### Power

**Redundant Power:** All XM Measurement and Relay modules support redundant power. Each module includes redundant power inputs on its terminal base.

**Module:** 21.6 - 26.4Vdc

**Consumption:**

- Max: 300 mA
- Typical: 175 mA

**Heat Production:**

- Max: 7 Watts (24 BTU/hr)
- Typical: 4 Watts (14 BTU/hr)

**Transducer:** 24V DC, user configurable with wiring

**Environmental**

**Operating Temperature:** -20 to +65°C (-4 to 149°F)

**Storage Temperature:** -40 to +85°C (-40 to 185°F)

**Relative Humidity:** 95% non-condensing

**Conformal Coating:** All printed circuit boards are conformal coated:

**HOW TO ORDER**

The XM-122 gSE Vibration Module can be ordered by contacting your local authorized Allen-Bradley distributor or Rockwell Automation sales office.

Catalog Number	Description
1440-VSE02-01RA	XM-122 gSE Vibration Module*
1440-TB-A	Terminal Base A for XM-12x
1440-SCDB9FXM2	XM Serial Communications Cable

\* Requires Terminal Base A

- Per material specifications: MIL-I-46058C/IPC-CC-830
- In accordance with IPC-A-610C

**Physical****Dimensions:**

- Height: 3.8in (97mm)
- Width: 3.7in (94mm)
- Depth: 3.7in (94mm)

**Weight:**

- Module: 6.8 ounces (193 grams)
- Terminal Base: 8.2 ounces (232 grams)

**Approvals**

CE, C-Tick, ODVA, UL, EEX,  
CSA Class I Div 2 Groups A,B,C,D

[www.rockwellautomation.com](http://www.rockwellautomation.com)

**Power, Control and Information Solutions**

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

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