

XM-124 Standard Dynamic Measurement Module

Catalog Numbers 1440-SDM02-01RA, 1440-TB-A/C



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Notes:

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Added FMAX Options Table to Spectrum/Waveform Measurement Options	72

Notes:

Purpose

This manual describes how to install, configure, and operate the XM® 124 Standard Dynamic Measurement Module. It also contains instruction on collecting trend data, including start-up or coast-down data.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
XM-124 Standard Dynamic Measurement Installation Instructions, publication 1440-IN001	Provides general guidelines for installing the XM-124 Standard Dynamic Measurement module.
XM-120 Eccentricity Module User Guide, publication GMS10-UM010	Provides instructions for the use of the XM-120 Eccentricity module.
XM-121 Absolute Shaft Module User Guide, publication GMS10-UM014	Provides instructions for the use of the XM-121 Absolute Shaft module.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

Install the XM-124 Standard Dynamic Measurement Module

This chapter discusses how to install and wire the XM-124 Standard Dynamic Measurement module (catalog numbers 1440-SDM02-01RA and 1440-TB-A/C). It also describes the module indicators and the basic operations of the module.

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ATTENTION: Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is not intended for use in residential environments and may not provide adequate protection to radio communication services in such.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that are present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication can contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

- Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#), for additional installation requirements
- NEMA 250 and IEC 60529, as applicable, for explanations of the degrees of protection that is provided by enclosures



ATTENTION: Prevent Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

European Hazardous Location Approval

European Zone 2 Certification (The following applies when the product bears the Ex Marking)

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC and has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in Zone 2 potentially explosive atmospheres, given in Annex II to this Directive.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0, EN 60079-15, and EN 60079-11.





ATTENTION: This equipment is not resistant to sunlight or other sources of UV radiation.



WARNING: The following warnings apply to installations of the XM-124.

- This equipment must be installed in an enclosure providing at least IP54 protection when applied in Zone 2 environments.
 - This equipment shall be used within its specified ratings defined by Rockwell Automation.
 - Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 140% of the rated voltage when applied in Zone 2 environments.
 - Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
 - Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
 - This equipment shall be mounted in an ATEX certified enclosure with a minimum ingress protection rating of at least IP54 (as defined in IEC60529) and used in an environment of not more than Pollution Degree 2 (as defined in IEC 60664-1) when applied in Zone 2 environments. The enclosure must use a tool removable cover or door.
 - This equipment must be used only with ATEX certified Rockwell Automation terminal bases.
-

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations:	Informations sur l'utilisation de cet équipement en environnements dangereux:
<p>Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations, and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.</p>	<p>Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>
<div style="display: flex; align-items: center;">  <div> <p>WARNING: Explosion Hazard -</p> <ul style="list-style-type: none"> Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. Substitution of components may impair suitability for Class I, Division 2. If this product contains batteries, they must only be changed in an area known to be nonhazardous. </div> </div>	<div style="display: flex; align-items: center;">  <div> <p>AVERTISSEMENT: Risque d'Explosion -</p> <ul style="list-style-type: none"> Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. S'assurer que l'environnement est classé non dangereux avant de changer les piles. </div> </div>

Introduction

The XM-124 standard dynamic measurement module is part of the Allen-Bradley XM® Series, a family of distributed machine condition monitoring and protection devices. The 1440-SDM02-01RA module is a 2-channel general-purpose monitor that supports measurements of dynamic inputs such as vibration, pressure, strain, and position measurements. The module is typically used to monitor shaft, casing, and pedestal vibration in equipment that rotates.

Inputs that are accepted include non-contact eddy current probes, standard integrated electronics piezoelectric (IEPE) accelerometers, velocity transducers, AC voltage output, or DC voltage output measurement devices. The module also accepts a tachometer input to provide speed measurement and order analysis functions. The module can work with most tachometer signal sources including eddy current probe, unpowered magnetic probe, and other powered and unpowered tachometer sensors.

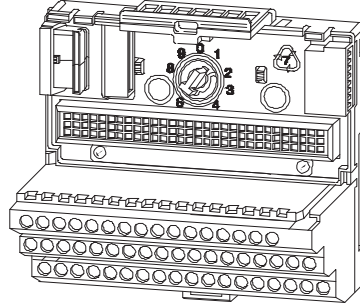
Outputs include digital measures that are communicated via a DeviceNet network, two 4...20 mA analog outputs, and one onboard relay. Output buffers exist for each vibration input channel and for the tachometer input.

The module provides onboard processing of critical vibration parameters and advanced alarm and relay logic. The XM-124 module can act independently, or it can serve data to integrated automation and control systems. These systems can then help protect machinery from failures or inform operators of abnormal conditions or faults.

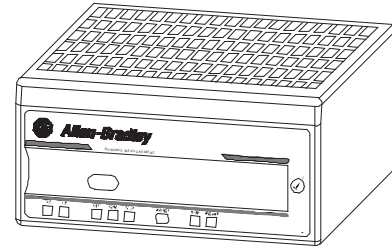
Module Components

Operation of the XM-124 standard dynamic measurement module requires the XM-940 Dynamic Measurement Module Terminal Base Unit (not included).

Figure 1 - XM-124 Module Components



XM-940 Dynamic Measurement Module
Terminal Base Unit
Catalog Number 1440-TB-A



XM-124 Standard Dynamic Measurement
Module
Catalog Number 1440-SDM02-01RA

- XM-940 Dynamic Measurement Module Terminal Base - A DIN rail-mounted base unit that provides terminations for all field wiring that is required by XM vibration modules, including the XM-124 module.

IMPORTANT XM-124 module certifications are valid only when used with the 1440-TB-A/C revision of the terminal base.

- XM-124 Standard Dynamic Measurement Modules - The modules mount on the XM-940 terminal base via a keyswitch and a 96-pin connector. The modules contain the measurement electronics, processors, relay, and serial interface port for local configuration.

IMPORTANT The XM-441Relay Expansion module can be connected to the XM-124 module via the XM-940 terminal base. When connected to the module, the Expansion Relay module simply 'expands' the capability of the XM-124 module by adding four additional epoxy-sealed relays. The module controls the Expansion Relay module by extending to it the same logic and functional controls as the onboard relay.

XM Installation Requirements

This section describes wire, power, grounding, and terminating resistor requirements for an XMsystem.



ATTENTION: The installation requirements can be different for different XM modules. The following requirements apply only to the 1440-SDM02-01RA module. See the user manual for the specific XM module for its requirements and [Additional Resources on page 11](#).

The XM-124 module is designed so that it can be used to replace an XM-120 or XM-121 module, revisions D01 or later. If an earlier revision of an XM-120/XM-121 module is being replaced, changes to wiring can be required. See the XM-120/XM-121 User Manual for details.

If replacing an XM-120/XM-121 module with which the XM-120/X-121 onboard relay is being used, be sure that the relay requirements and wiring solution are considered, as differences exist between the onboard relays of the XM-120/XM-121 and the XM-124 module.



ATTENTION: The XM-124 module requires a minimum clearance of 25 mm (1 in.) from the top and bottom of the device.

Wiring Requirements

Use solid or stranded wire. All wiring must meet these specifications:

- 2.1...0.3 mm² (14...22 AWG) copper conductors without pretreatment; 8.4 mm² (8 AWG) required for grounding the DIN rail for electromagnetic interference (EMI) purposes
- Recommended strip length 8 mm (0.31 in.)
- Minimum insulation rating of 300V
- Soldering the conductor is forbidden
- Wire ferrules can be used with stranded conductors; copper ferrules recommended

Power Requirements

Before you install the module, calculate the power requirements of all modules that are interconnected via their side connectors. The total current draw through the side connector cannot exceed 3 A. See the specifications for the individual module for power requirements.



ATTENTION: A separate power connection is necessary if the total current draw of the interconnecting modules is greater than 3 A.

[Figure 2](#) is an illustration of wiring modules using separate power connections.

Figure 2 - XM Modules with Separate Power Connections

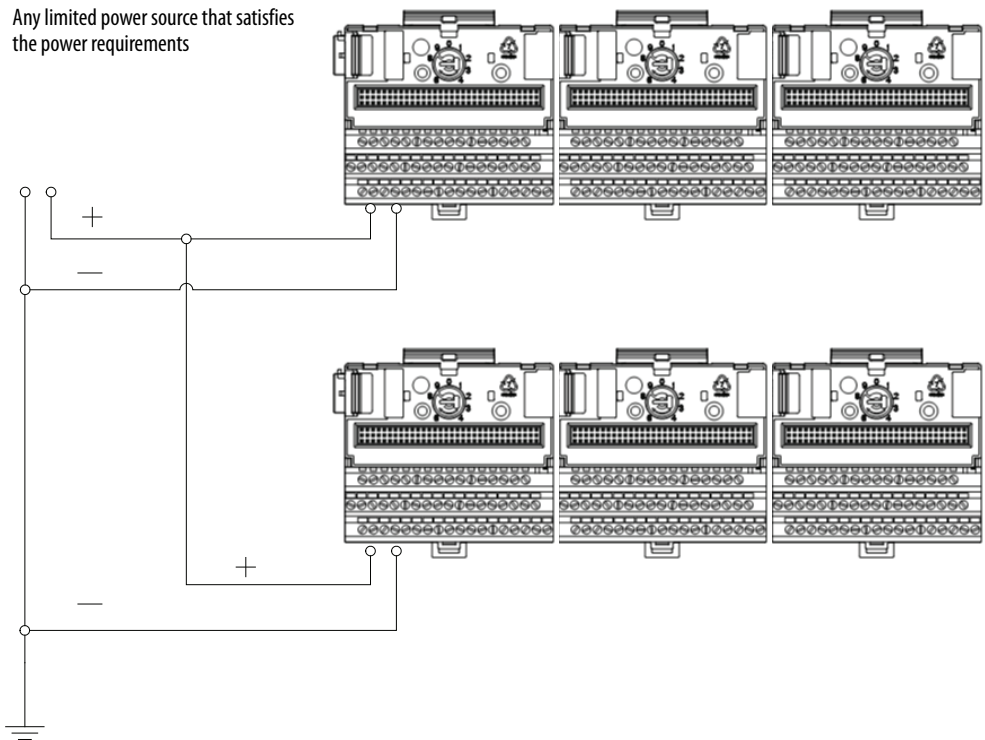


Table 1 - Power Supply Requirements

XM Power Supply Requirements	
Protection	Listed Class 2 rated supply
	Fused ⁽¹⁾ ITE Listed SELF supply
	Fused ⁽¹⁾ ITE Listed PELV supply
Output Voltage	24V DC \pm 10%
Output Power	100 W max (~4 A @ 24V DC)
Static Regulation	\pm 2%
Dynamic Regulation	\pm 3%

XM Power Supply Requirements

Ripple	<100 mV pp
Output Noise	Per EN50081-1
Overshoot	< 3% at turn-on, < 2% at turn-off
Hold-up Time	As required (typically 50 ms at full rated load)

(1) When a fused supply is used, the fuse must be a 5 A, listed, fast-acting fuse such as provided by Allen-Bradley part number 1440-5AFUSEKIT.

IMPORTANT See XM the Power Supply Solutions Application Technique, publication [ICM-AP005](#), for guidance in designing power supplies for XM systems.

Grounding Requirements

Use these grounding requirements to be sure of safe electrical operating circumstances, and to help avoid potential EMI and ground noise that can cause unfavorable operating conditions for your XM system.

DIN Rail Grounding



ATTENTION: This product is grounded through the DIN rail to chassis ground. Use zinc-plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.

The DIN rail must be connected to a ground bus or grounding electrode conductor using (8.4 mm²) 8 AWG or 1-in. copper braid. The grounding wire can be connected to the DIN rail using a DIN rail grounding block.

Figure 3 - DIN Rail Grounding Block

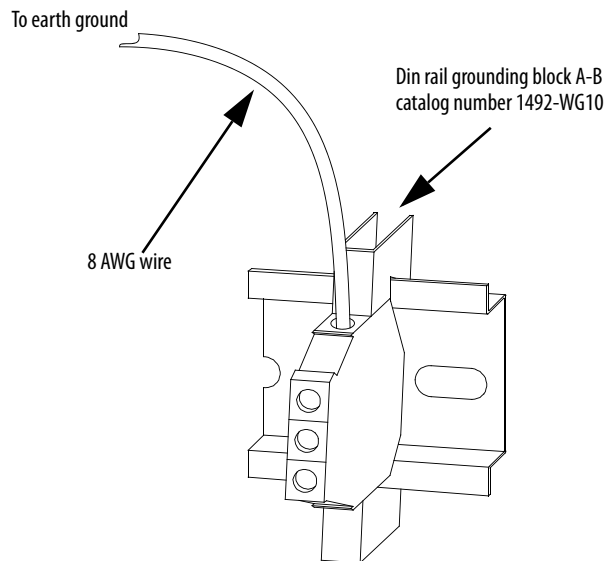
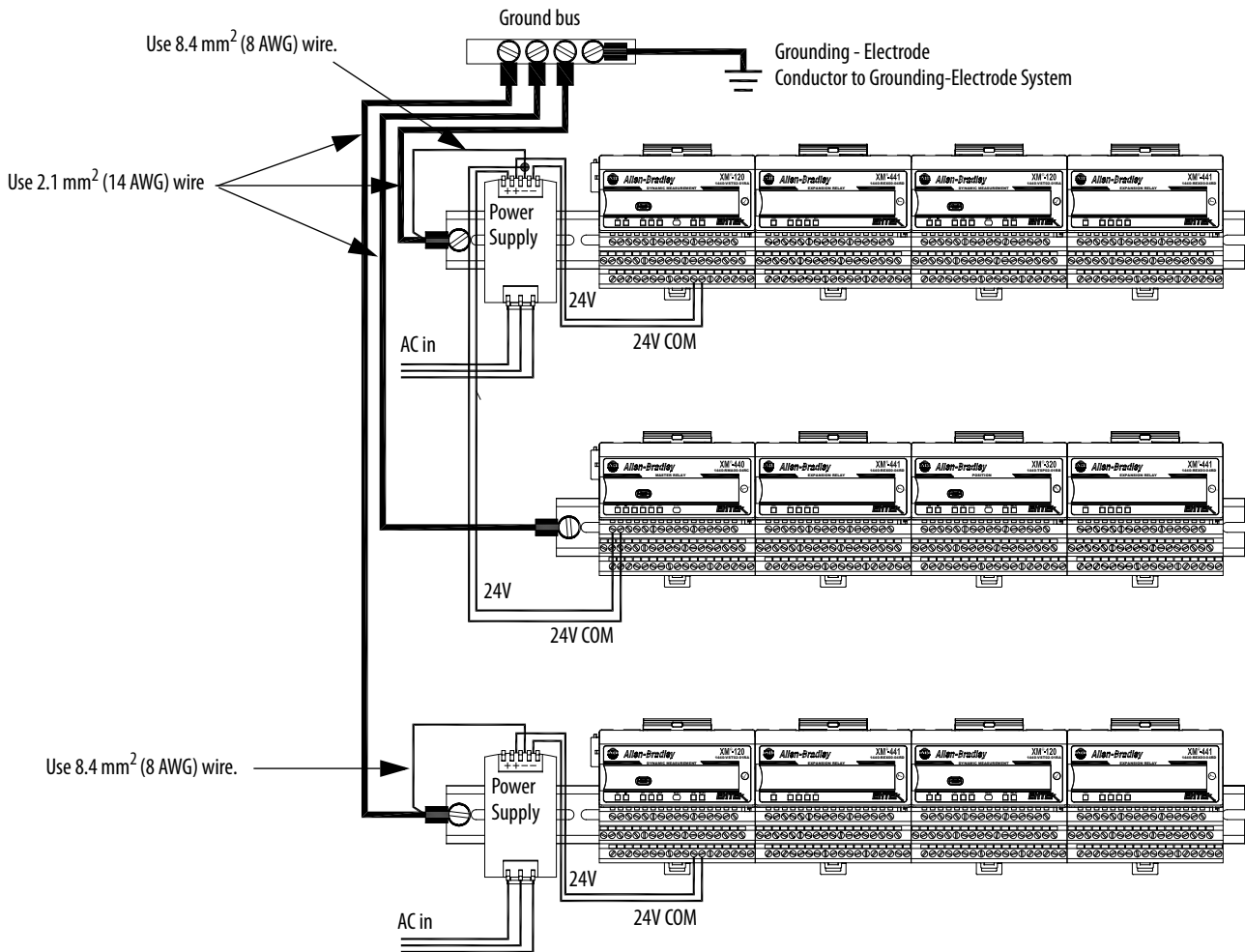


Figure 4 - XM System DIN Rail Grounding



Panel/Wall Mount Grounding

The XM modules can also be mounted to a conductive mounting plate that is grounded, as shown in [Figure 6](#). Use the grounding screw hole that is provided on the terminal base to connect the mounting plate to the Functional Earth terminals, as shown in [Figure 5](#).

Figure 5 - Grounding Screw on XM Terminal Base

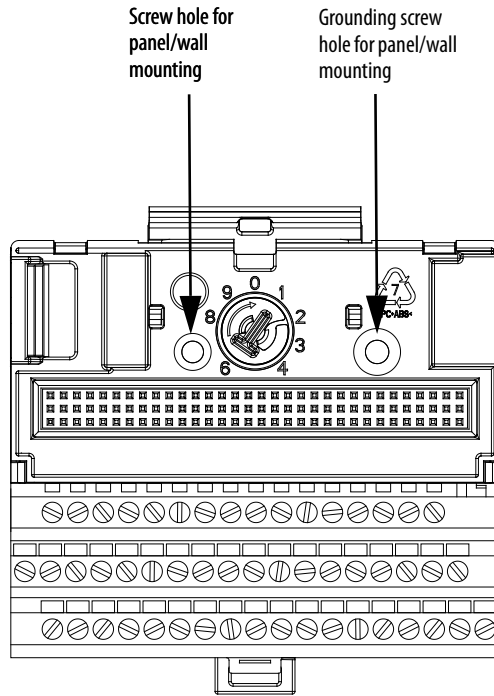
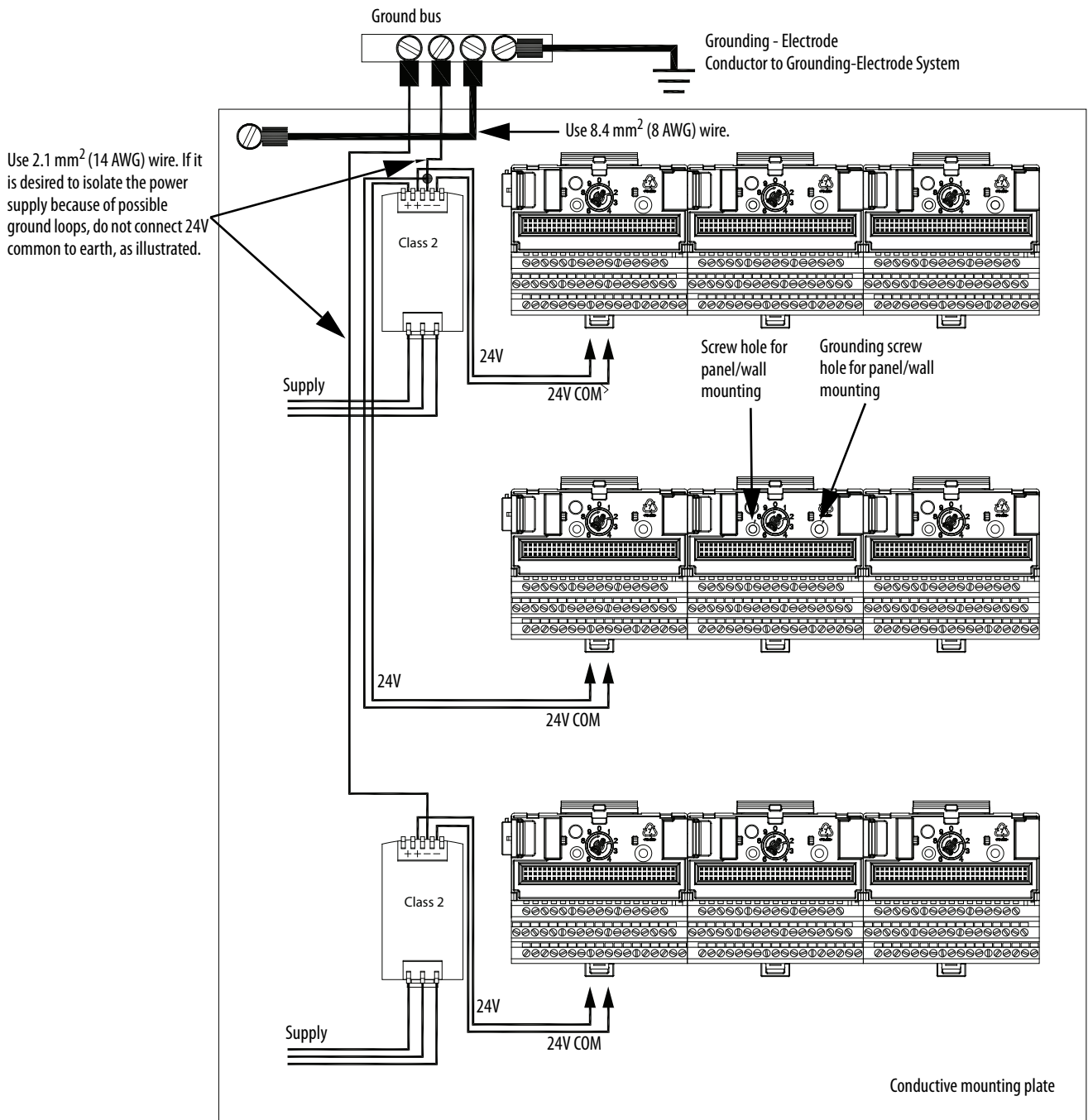


Figure 6 - Panel/Wall Mount Grounding



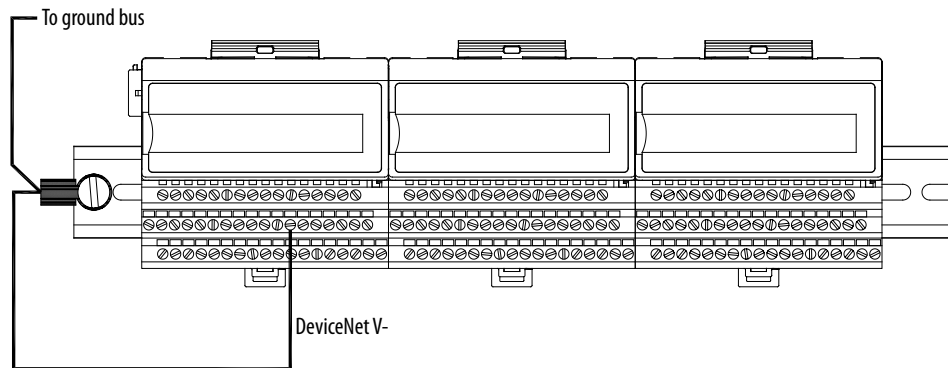
24V Common Grounding

One Class 2 power supply sources the XM system. We recommend that the 24V power to the XM modules is grounded.

DeviceNet Grounding

The XM-124 and XM-940 are able to use an external DeviceNet power supply. If DeviceNet V- is not grounded elsewhere, connect DeviceNet V- to earth ground at one of the XM modules, as shown in [Figure 7](#).

Figure 7 - Grounded DeviceNet V- at XM Module



Grounded DeviceNet V- at DeviceNet Power Supply For more information on the DeviceNet installation, see the ODVA Planning and Installation Manual - DeviceNet Cable System, which is available on the ODVA website (<http://www.odva.org>).

Mount the Terminal Base Unit

The XM family includes several different terminal base units to serve the XM modules. The 1440-TB-A/C terminal base is the only terminal base that is used with the XM-124 standard dynamic measurement module (catalog number 1440-SDM02-01RA).

The terminal base can be DIN rail or wall/panel mounted.



WARNING: If you insert or remove the module while backplane power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.



ATTENTION: Do not remove or replace a Terminal Base unit while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.

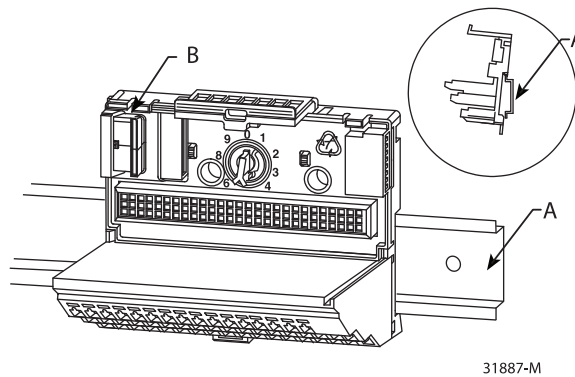
IMPORTANT Install the overlay slide label to protect serial connector and electronics when the serial port is not in use.

IMPORTANT XM-124 module certifications are valid only when used with the 1440-TB-A/C revision of the terminal base.

Mount the Terminal Base Unit on a DIN Rail

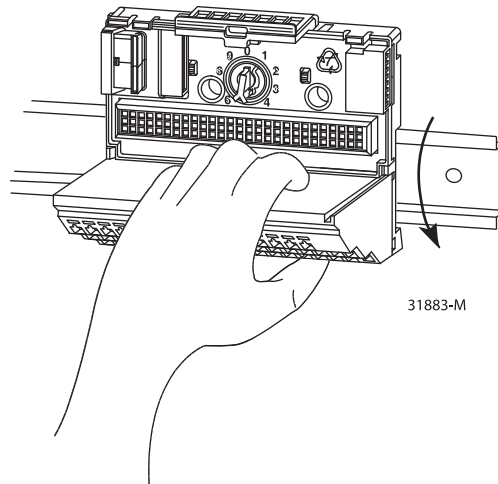
Use these steps to mount the terminal base unit on a DIN rail (Allen-Bradley catalog no. 199-DR1 or 199-DR4).

1. Position the terminal base on the 35 x 7.5 mm DIN rail (A).



Position terminal base at a slight angle and hook over the top of the DIN rail.

2. Slide the terminal base unit over leaving room for the side connector (B).
3. Rotate the terminal base onto the DIN rail with the top of the rail hooked under the lip on the rear of the terminal base.



4. To lock the terminal base on the DIN rail, press down on the terminal base unit.

If the terminal base does not lock into place, use a screwdriver or similar device to open the locking tab. Press down on the terminal base until flush with the DIN rail and release the locking tab to lock the base in place.

Interconnect Terminal Base Units

Follow these steps to install another terminal base unit on the DIN rail.

IMPORTANT Terminal base units are mounted left to right on the DIN rail.

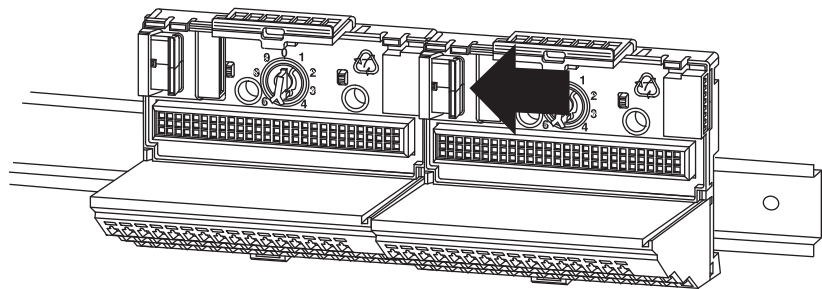
1. Position the terminal base on the 35 x 7.5 mm DIN rail (A).
2. Verify the side connector (B) is fully retracted into the base unit.
3. Slide the terminal base unit over tight against the neighboring terminal base.

Make sure the hook on the terminal base slides under the edge of the terminal base unit.

4. To lock the terminal base on the DIN rail, press down on the terminal base unit.

If the terminal base does not lock into place, use a screwdriver or similar device to open the locking tab. Press down on the terminal base until flush with the DIN rail and release the locking tab to lock the base in place.

5. To complete the backplane connection, gently push the side connector into the side of the neighboring terminal base.



Mount to Panel or Wall

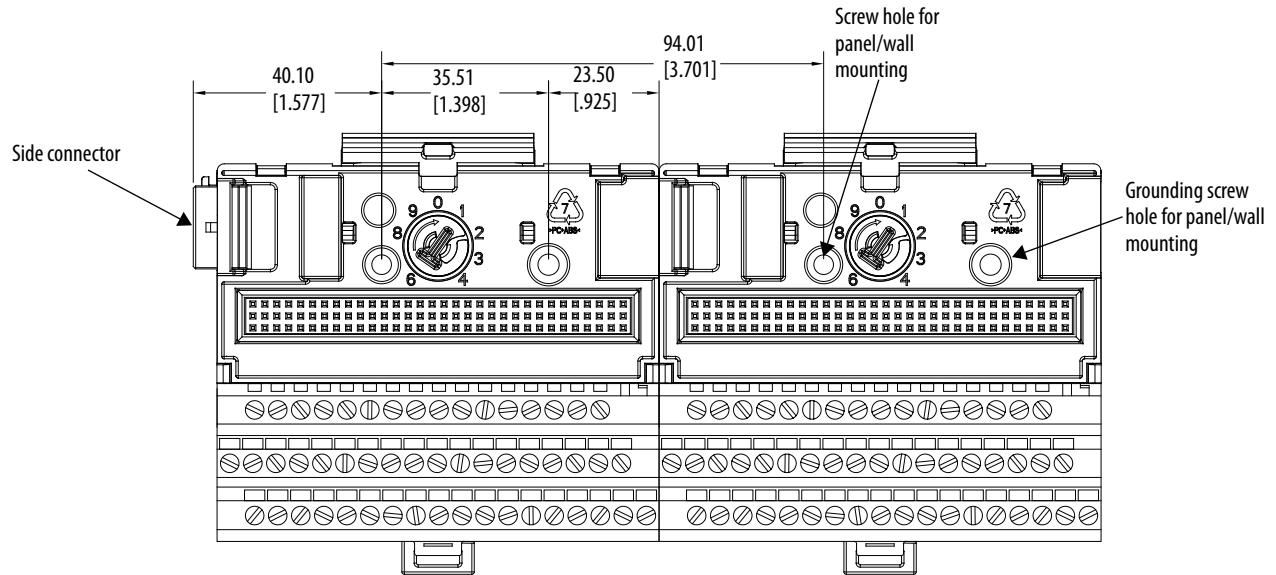
Installation on a wall or panel consists of:

- Laying out the drilling points on the wall or panel
- Drilling the pilot holes for the mounting screws

- Installing the terminal base units and securing them to the wall or panel

Use these steps to install the terminal base on a wall or panel.

1. Lay out the required points on the wall/panel as shown.



2. Drill the necessary holes for the #6 self-tapping mounting screws.

3. Secure the terminal base unit with two #6 self-tapping screws.

To install another terminal base unit, retract the side connector into the base unit.

Make sure that it is fully retracted.

4. Position the terminal base unit up tight against the neighboring terminal base.

Make sure the hook on the terminal base slides under the edge of the terminal base unit.

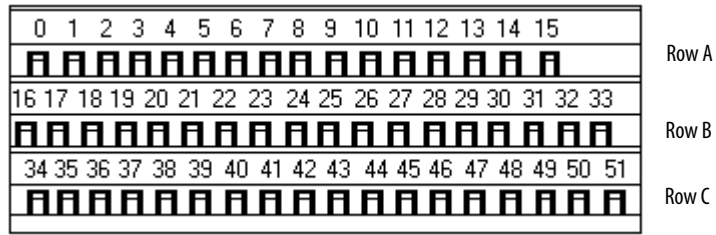
5. To complete the backplane connection, gently push the side connector into the side of the neighboring terminal base.

6. Secure the terminal base to the wall with two #6 self-tapping screws.

Wire the Terminal Base Unit

Wiring to the module is made through the terminal base unit on which the module mounts. The XM-124 module is compatible only with the XM-940 terminal base unit, catalog number 1440-TB-A.

Figure 8 - XM-940 Terminal Base Unit



XM-940 (catalog number 1440-TB-A)

Terminal Block Assignments

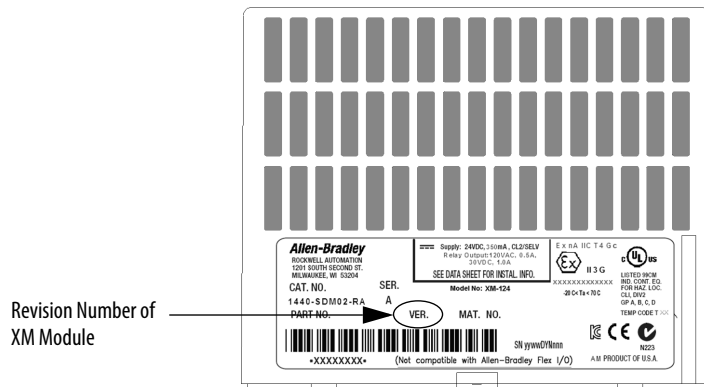
The terminal block assignments for the XM-124 standard dynamic measurement module are described in this section.



ATTENTION: The terminal block assignments are different for different XM modules. [Table 2 on page 29](#) applies only to the XM-124 module.

See the installation instructions for the specific XM module for its terminal assignments.

TIP The XM module revision number is on the product label (which is on the front of the XM module, as shown in this image).



Revision Number of XM Module



WARNING: Explosion Hazard. Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.

Table 2 - Terminal Block Assignments

No.	Name	Description
0	Xducer 1 (+)	Vibration transducer 1 connection
1	Xducer 2 (+)	Vibration transducer 2 connection
2	Buffer 1 (+)	Vibration signal 1 buffered output
3	Buffer 2 (+)	Vibration signal 2 buffered output
4	Tach/Signal In (+)	Tachometer transducer/signal input, positive side
5	Reserved	—
6	Reserved	—
7	TxD	Personal computer serial port, transmit data
8	RxD	Personal computer serial port, receive data
9	XRTN ¹	Circuit return for TxD and RxD
10	Chassis	Connection to DIN rail ground spring or panel mounting hole
11	4...20 mA 1 (+)	4...20 mA output 300 ohm maximum load
12	4...20 mA 1 (-)	
13	Chassis	Connection to DIN rail ground spring or panel mounting hole
14	Chassis	Connection to DIN rail ground spring or panel mounting hole
15	Chassis	Connection to DIN rail ground spring or panel mounting hole
16	Xducer 1 (-) ⁽¹⁾	Vibration transducer 1 connection
17	Xducer 2 (-) ⁽¹⁾	Vibration transducer 2 connection
18	Signal Common ⁽¹⁾	Vibration buffered output return
19	TACH Buffer	Tachometer transducer/signal output
20	Tachometer (-)	Tachometer transducer/signal return, TACH Buffer return
21	Xducer Pwr (-)	Transducer power supply output, negative side; used to power external sensor (40 mA maximum load)
22	Reserved	—
23	CAN_High	DeviceNet bus connection, high differential (white wire)
24	CAN_Low	DeviceNet bus connection, low differential (blue wire)
25	24 V Out	Internally connected to 24 V In (terminal 44) Used to daisy chain power if XM modules are not plugged into each other If power is not present on terminal 44, there is no power on this terminal
26	DNet V (+)	DeviceNet bus power input, positive side (red wire)
27	DNet V (-)	DeviceNet bus power input, negative side (black wire)
28	24 V Common ⁽¹⁾	Internally connected to 24 V Common (terminals 43 and 45) Used to daisy chain power if XM modules are not plugged into each other
29	4...20 mA 2 (+)	4...20 mA output 300 ohm maximum load
30	4...20 mA 2 (-)	
31	Chassis	Connection to DIN rail ground spring or panel mounting hole
32	Chassis	Connection to DIN rail ground spring or panel mounting hole
33	Chassis	Connection to DIN rail ground spring or panel mounting hole
34	Chassis	Connection to DIN rail ground spring or panel mounting hole
35	Chassis	Connection to DIN rail ground spring or panel mounting hole
36	Chassis	Connection to DIN rail ground spring or panel mounting hole

Table 2 - Terminal Block Assignments

No.	Name	Description
37	Chassis	Connection to DIN rail ground spring or panel mounting hole
38	Chassis	Connection to DIN rail ground spring or panel mounting hole
39	SetPtMult	Switch input to activate setpoint Multiplication (active closed)
40	Switch RTN	Switch return, shared between SetPtMult and Reset Relay
41	Reset Relay	Switch input to reset internal relay (active closed)
42	Reserved	
43	24 V Common ⁽¹⁾	Internally DC-coupled to circuit ground
44	24 V In	Connection to primary external 24 V power supply, positive side
45	24 V Common ⁽¹⁾	Connection to external 24 V power supply, negative side (internally DC-coupled to circuit ground)
46	Reserved	
47	Relay Common	Relay Common contact
48	Relay N.O.	Relay Normally Open contact
49	Reserved	
50	Reserved	
51	Reserved	

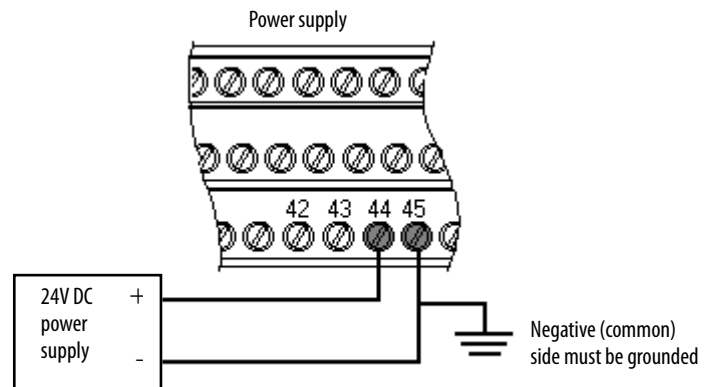
(1) Terminals are internally connected and isolated from the chassis terminals.

Connecting Power

Power that is supplied to the module must be nominally 24V DC ($\pm 10\%$) and must be a Class 2 rated source.

Wire the DC-input power supply to the terminal base unit as shown in [Figure 10](#).

Figure 9 - DC Input Power Supply Connections



IMPORTANT A Class 2 circuit can be provided by use of an NEC Class 2 rated power supply, or by using a SELV or PELV rated power supply with a 5 A current limiting fuse installed before the XM module.

IMPORTANT 24V DC must be wired to terminal 44 (24V In) to provide power to the device and other XM modules linked to the wired terminal base via the side connector.



ATTENTION: The power connections are different for different XM modules. See the installation instructions for your specific XM module for complete wiring information.

Connect the Relay

The XM-124 module has Normally Open relay contacts, which close when the control output is energized.

The alarms that are associated with the relay and whether the relay is normally de-energized (non-failsafe) or normally energized (failsafe) depends on the configuration of the module.

[See Relay Parameters on page 86](#) for more information about association of an alarm with a relay.

[Table 3](#) shows the onboard relay connections for the modules.

TIP The Expansion Relay module can be connected to the module to provide additional relays. For wiring details see the XM-441 Expansion Relay Module User Manual, publication [GMS110-UM019](#).

IMPORTANT The NO terminal descriptions correspond to a de-energized (unpowered) relay.

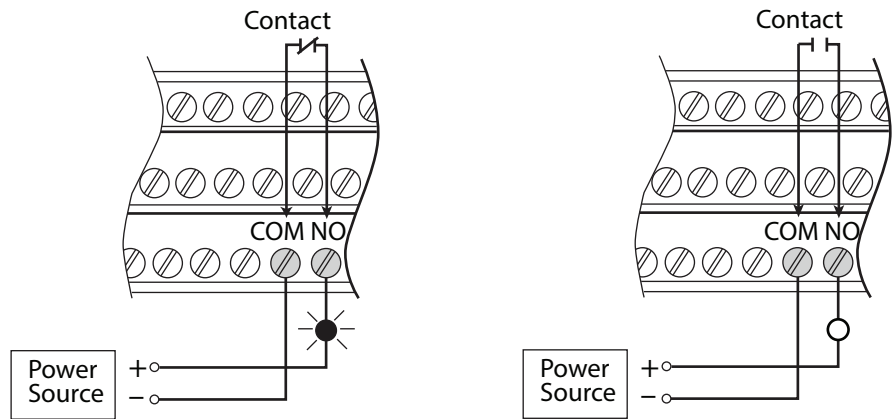
When the relay is configured for non-failsafe operation, the relay is normally de-energized.

When the relay is configured for failsafe operation, the relay is normally energized, and the behavior of the NO terminals is inverted.

Table 3 - Relay Connections for the XM-124 Module

Configured for Failsafe Operation		Wire Contacts	Relay Terminals
Nonalarm	Alarm		
Closed	Opened	COM	47
		NO	48
Configured for Non-Failsafe Operation		Wire Contacts	Relay Terminals Contact
Nonalarm	Alarm		
Opened	Closed	COM	47
		NO	48

Figure 10 - Relay Connection Wiring, Normally Closed and Normally Opened



Connect the Tachometer Signal

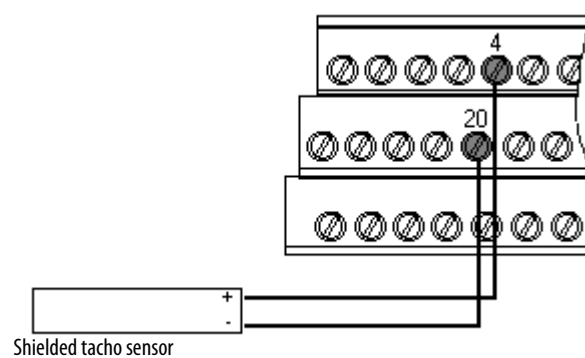
The XM-124 module provides one tachometer input signal. The signal processing that is performed on the tachometer signal depends on the configuration of the module. See [page 83](#) for a description of the tachometer parameters.

IMPORTANT If you are not using the tachometer input, set the Pulses per Revolution parameter to zero. This setting disables the tachometer measurement and prevents the module from indicating a tachometer fault (TACH indicator flashing yellow). A tachometer fault occurs when no signal pulses are received on the tachometer input signal for a relatively long period.

Connecting a Magnetic Pickup Tachometer

[Figure 12](#) shows the wiring of a magnetic pickup tachometer to the terminal base unit.

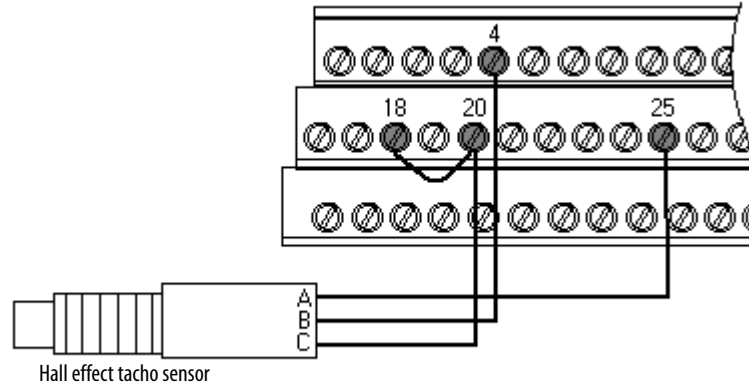
Figure 11 - Magnetic Pickup Tachometer Signal Connection



Connecting a Hall Effect Tachometer Sensor

Figure 13 shows the wiring of a Hall Effect Tachometer Sensor, catalog number 44395, to the terminal base unit.

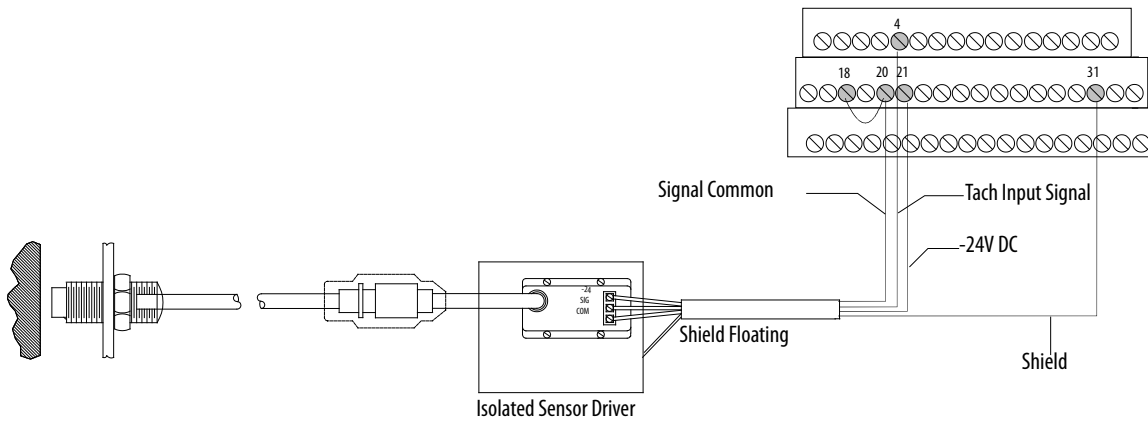
Figure 12 - Hall Effect Tachometer Signal Connection



Connecting a Non-contact Sensor to the Tachometer Signal

Figure 14 shows the wiring of a non-contact sensor to the tachometer input signal.

Figure 13 - Non-contact Sensor to Tachometer Signal Connection

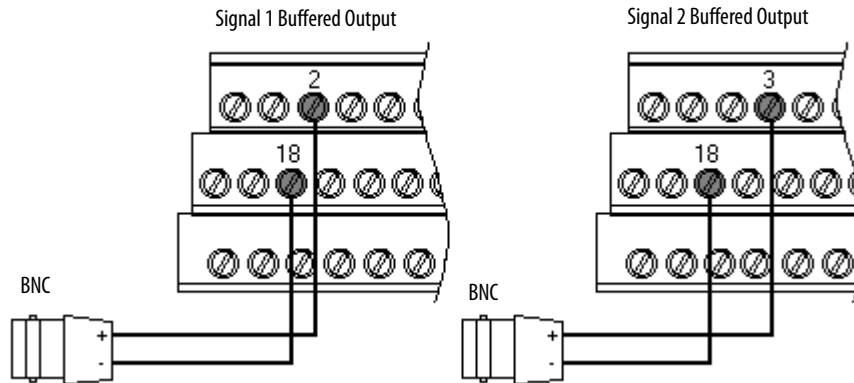


Connect the Buffered Outputs

The XM-124 module provides buffered outputs of all transducer input signals. The buffered output connections can be used to connect the module to portable data collectors or other online systems.

[Figure 15](#) shows the buffered output connections for the modules.

Figure 14 - Buffered Output Connections



Connect the Transducer

The Transducer Power Type parameter described in [Table 4](#) controls the range of the buffered output signal. The XM-124 module can accept inputs from any Allen-Bradley non-contact eddy current probe, a standard IEPE accelerometer, a velocity transducer, AC voltage output, or a DC voltage output measurement device.

Table 4 - Transducer Power Type

Transducer Power Setting	Buffered Output Range
Off	-12V...12V
IEPE	0V...24V
24V	0V...24V
-24V	-24V...0V
Bias Current	-12V...12V

Connect an IEPE Accelerometer

Figures 16 and 17 show the wiring of an IEPE accelerometer to the terminal base unit.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. You can use any convenient chassis terminal.

See [Terminal Block Assignments on page 28](#).

IMPORTANT

The internal transducer power supply is providing power to the IEPE accelerometer. Verify the channel Transducer Power Type parameter is set to IEPE.

See [Transducer Object \(Class ID 328H\) on page 158](#). (This setting also sets the buffered output to the 0...+24 Volt range.)

Figure 15 - IEPE Accelerometer to Channel 1 Wiring

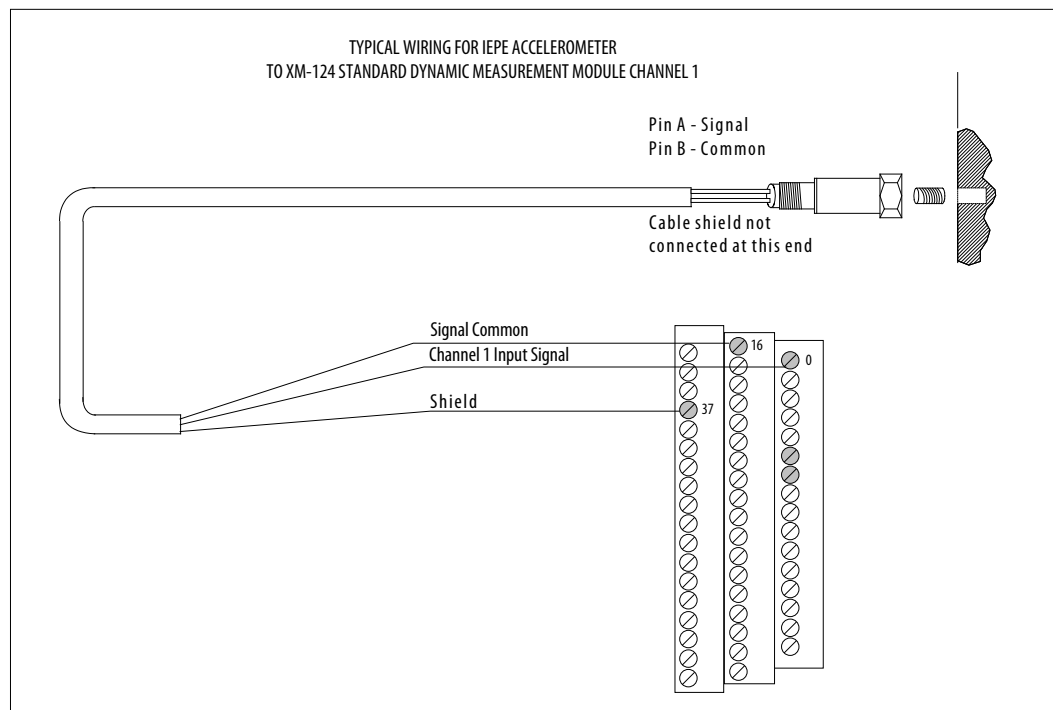
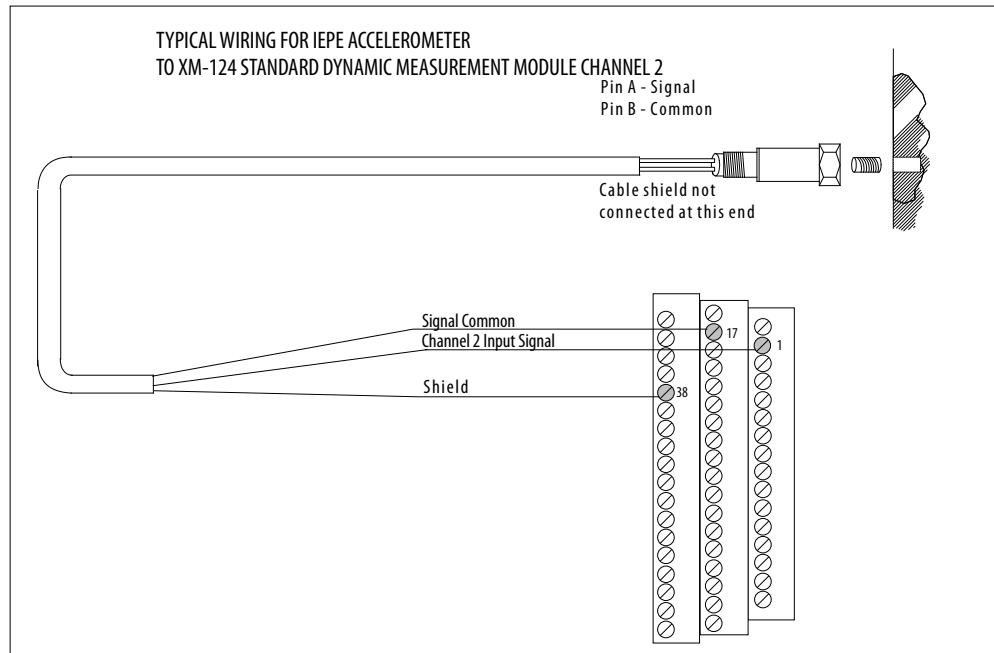


Figure 16 - IEPE Accelerometer to Channel 2 Wiring*Connect a Non-contact Sensor*

Figures [18](#) and [19](#) show the wiring of a non-contact sensor to the terminal base unit.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

See [Terminal Block Assignments on page 28](#).

IMPORTANT The internal transducer power supply is providing power to the non-contact sensor. Set the channel Transducer Power Type to -24 V so that the buffered output ranges from -24...0 Volts.

Figure 17 - Non-contact Sensor to Channel 1 Wiring

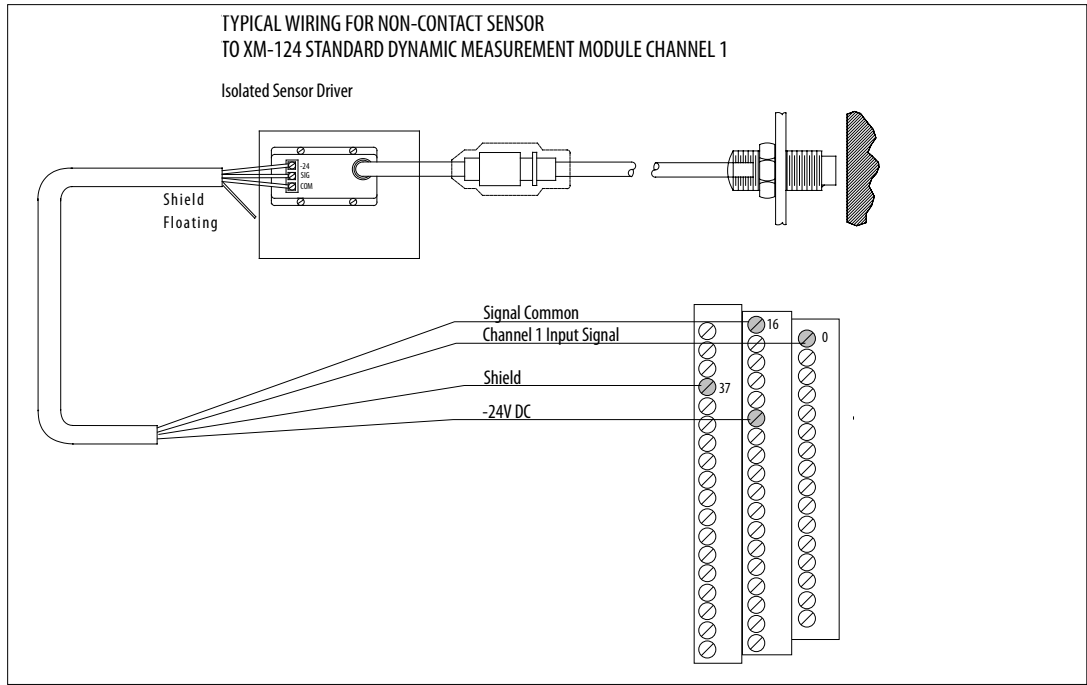
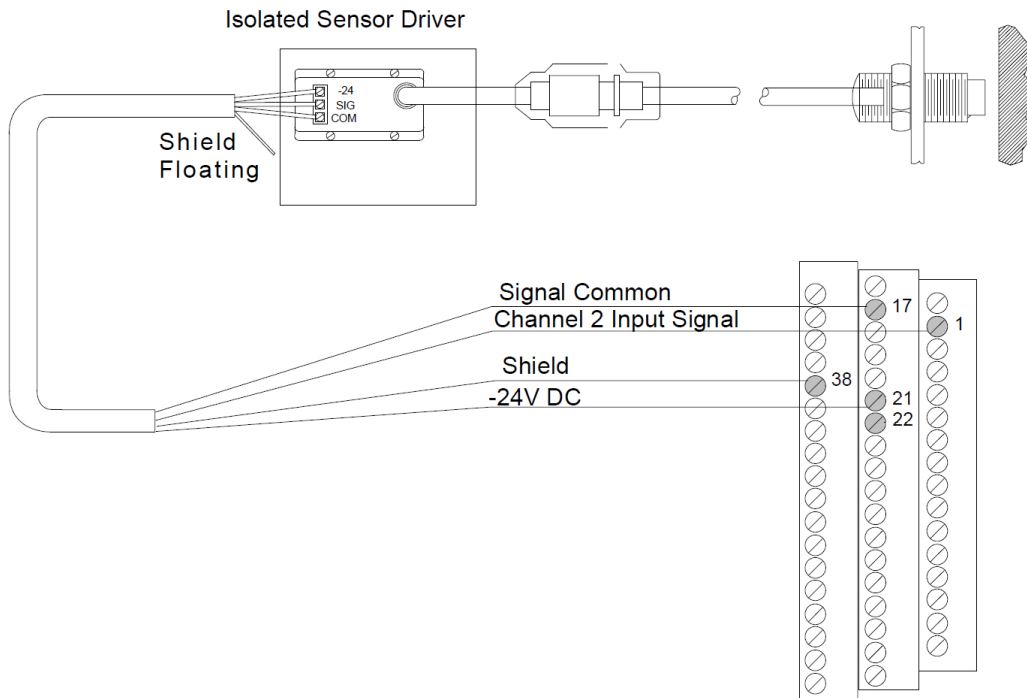


Figure 18 - Non-contact Sensor to Channel 2 Wiring

TYPICAL WIRING FOR NON-CONTACT SENSOR TO XM-124 STANDARD DYNAMIC MEASUREMENT MODULE CHANNEL 2



Connect a Passive Transducer

Figures 20 and 21 show the wiring of a passive transducer, such as a velocity sensor, to the terminal base unit.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

See [Terminal Block Assignments on page 28](#).

IMPORTANT The module does not power the sensor. It measures only the input voltage.

Figure 19 - Velocity Sensor to Channel 1 Wiring

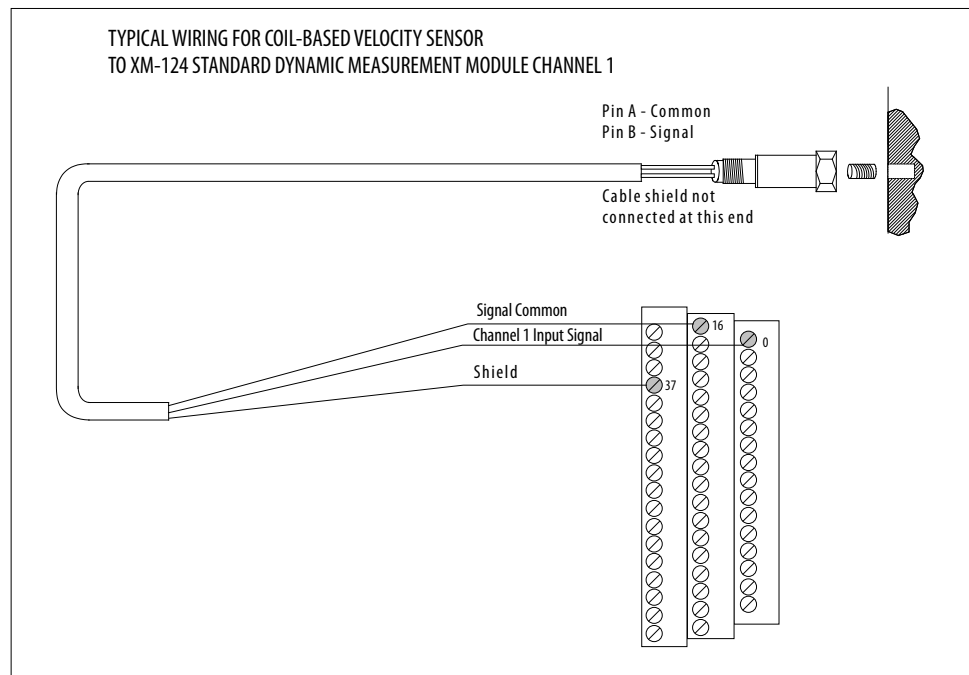
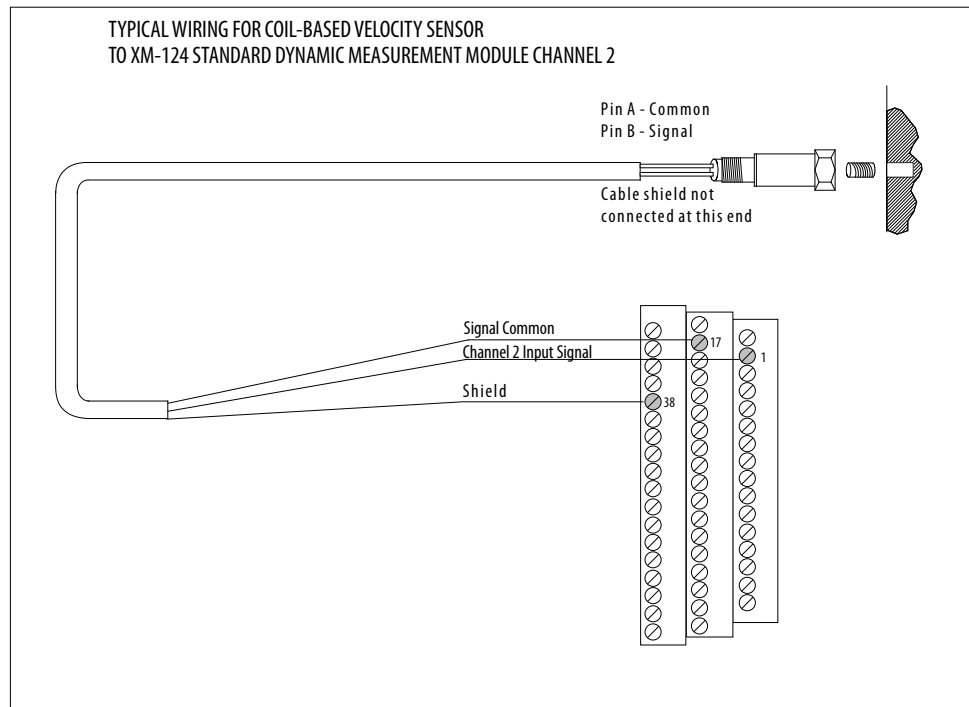


Figure 20 - Velocity Sensor to Channel 2 Wiring



Connect a Powered Sensor

Figures 22 and 23 show the wiring of a powered sensor, such as the Model 580 Vibration Pickup, to the terminal base unit.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

See [Terminal Block Assignments on page 28](#).

IMPORTANT Set the channel Transducer Power Type to 24V so that the buffered output ranges from 0 Volts to 24 Volts.

Figure 21 - Powered Sensor to Channel 1 Wiring

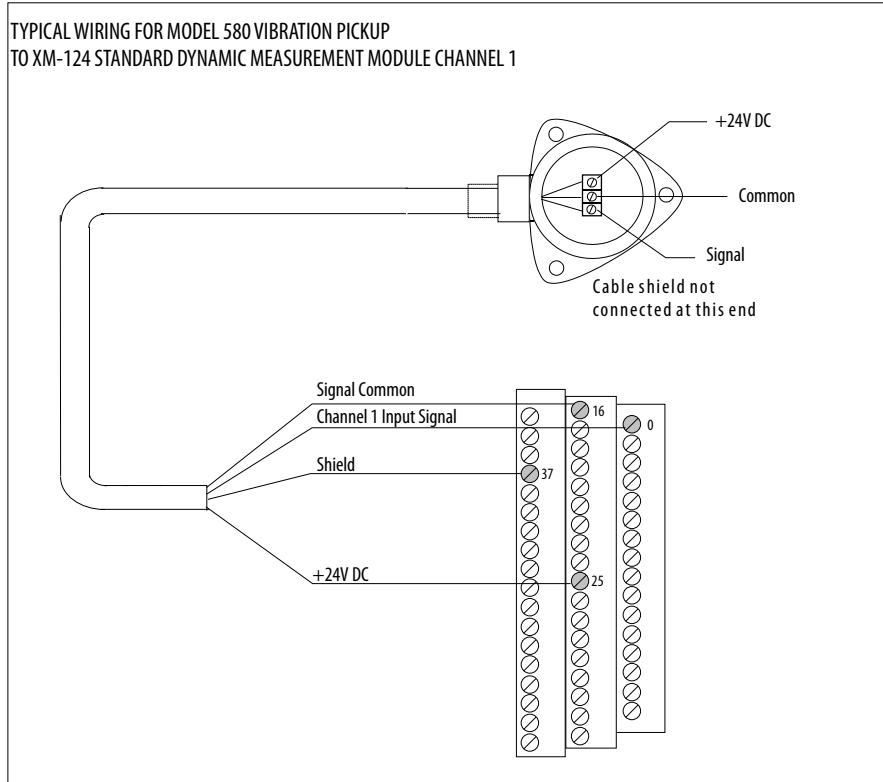
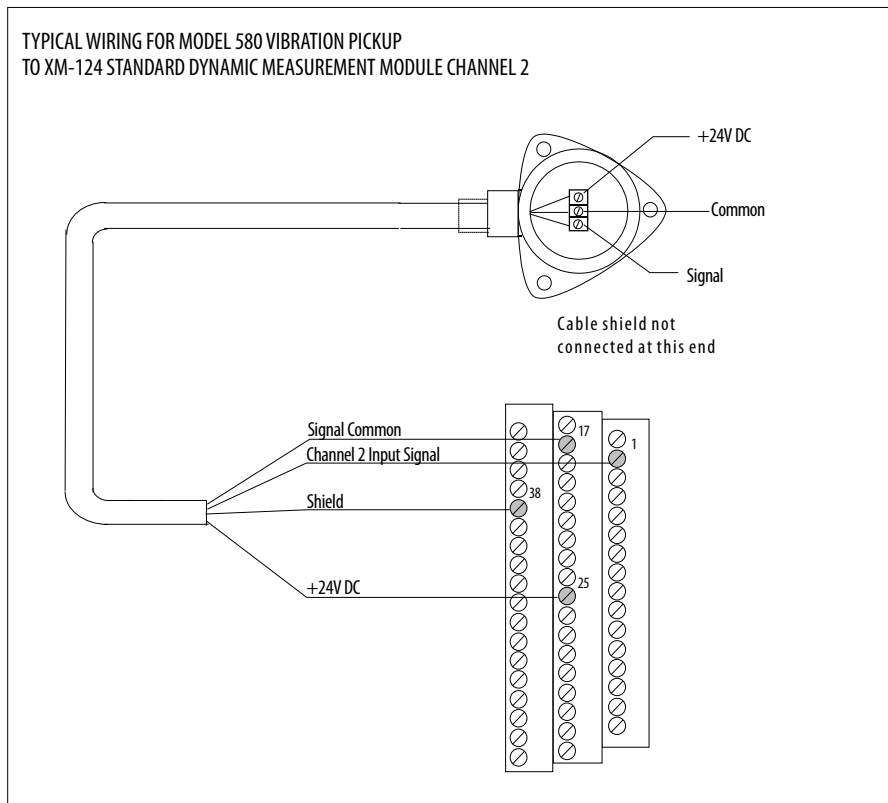


Figure 22 - Powered Sensor to Channel 2 Wiring



Connect a Process DC Voltage Signal

Figure 24 and Figure 25 show the wiring from a process DC voltage signal to the terminal base unit.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

See [Terminal Block Assignments on page 28](#).

IMPORTANT The module does not power the sensor. It measures only the input voltage.

Figure 23 - DC Voltage Signal to Channel 1 Wiring

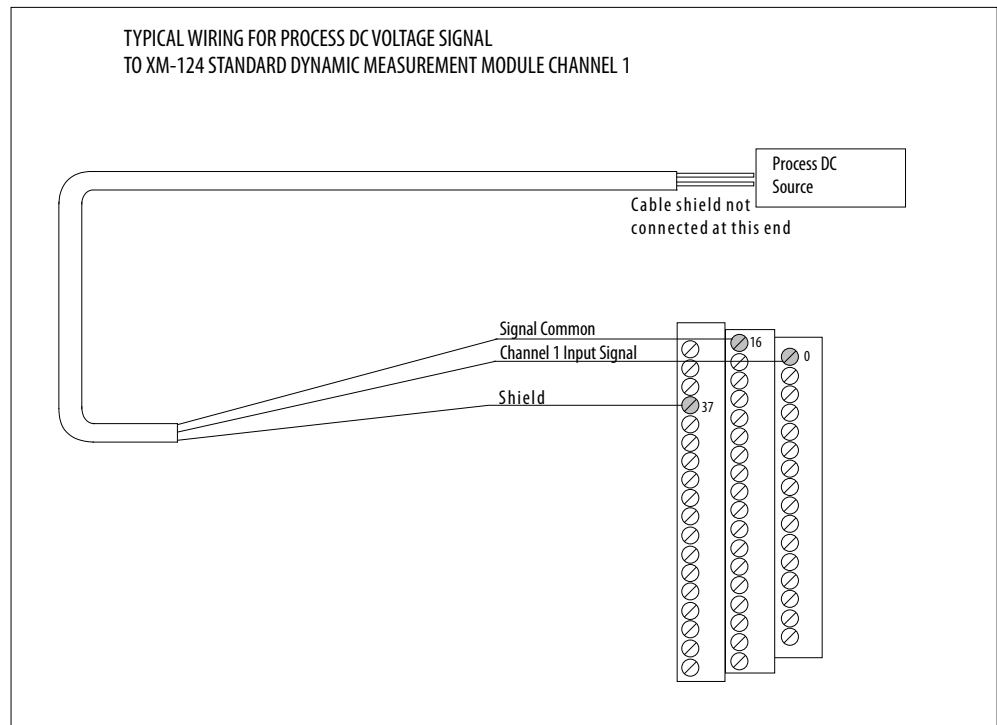
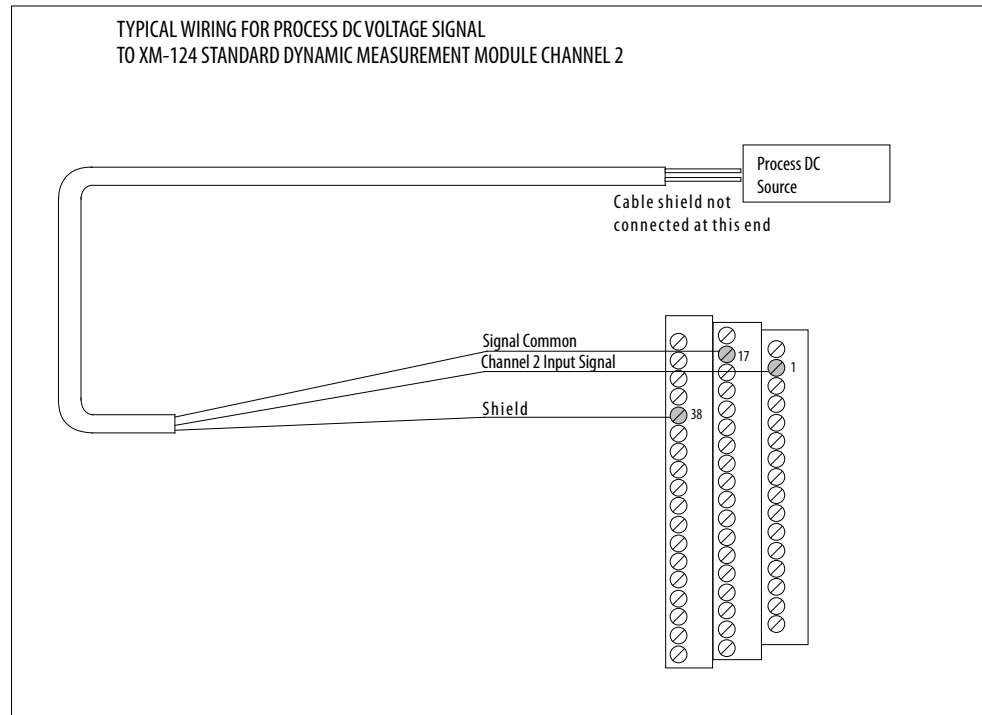


Figure 24 - DC Voltage Signal to Channel 2 Wiring

Connect an IEPE Accelerometer and Non-contact Sensor

[Figure 26](#) shows the wiring of an IEPE accelerometer to channel 1 and the wiring of a non-contact sensor to channel 2.



ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

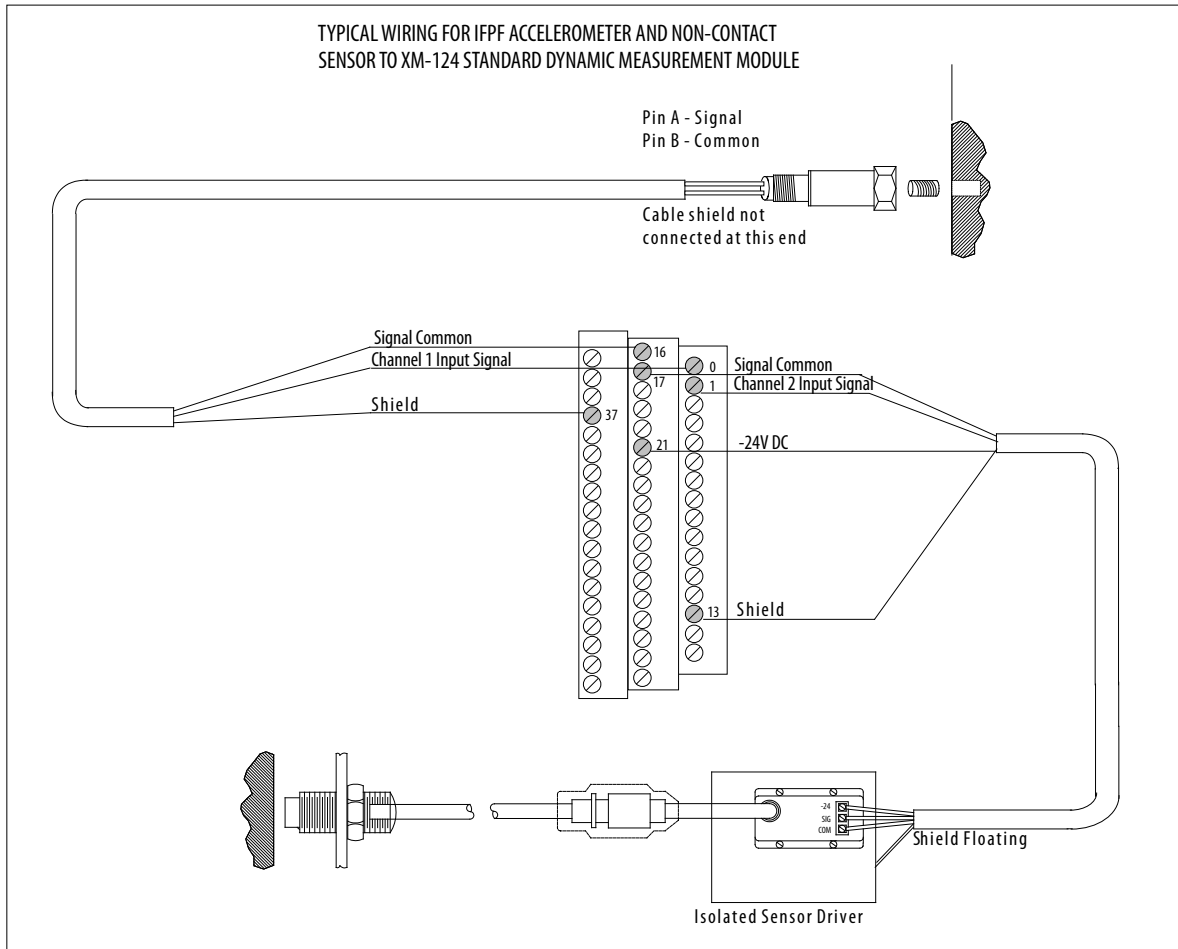
See [Terminal Block Assignments on page 28](#).

IMPORTANT Verify the Transducer Power Type parameter for channel 1 is set to IEPE so power is provided to the accelerometer.

See [Transducer Object \(Class ID 328H\) on page 158](#). (This setting also sets the buffered output to the 0...+24 Volt range.)

IMPORTANT The internal transducer power supply is providing power to the non-contact sensor. Set the Transducer Power Type for channel 2...-24 V so that the buffered output ranges from -24...0 Volts.

Figure 25 - IEPE Accelerometer and Non-contact Sensor Wiring



Connect Two Accelerometers and a Non-Contact Sensor

Figure 27 shows the wiring of two IEPE accelerometers and a non-contact sensor to the terminal base. The IEPE accelerometers are wired to channel 1 and channel 2. The non-contact sensor is wired to the tachometer input signal.



WARNING: Explosion Hazard. You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

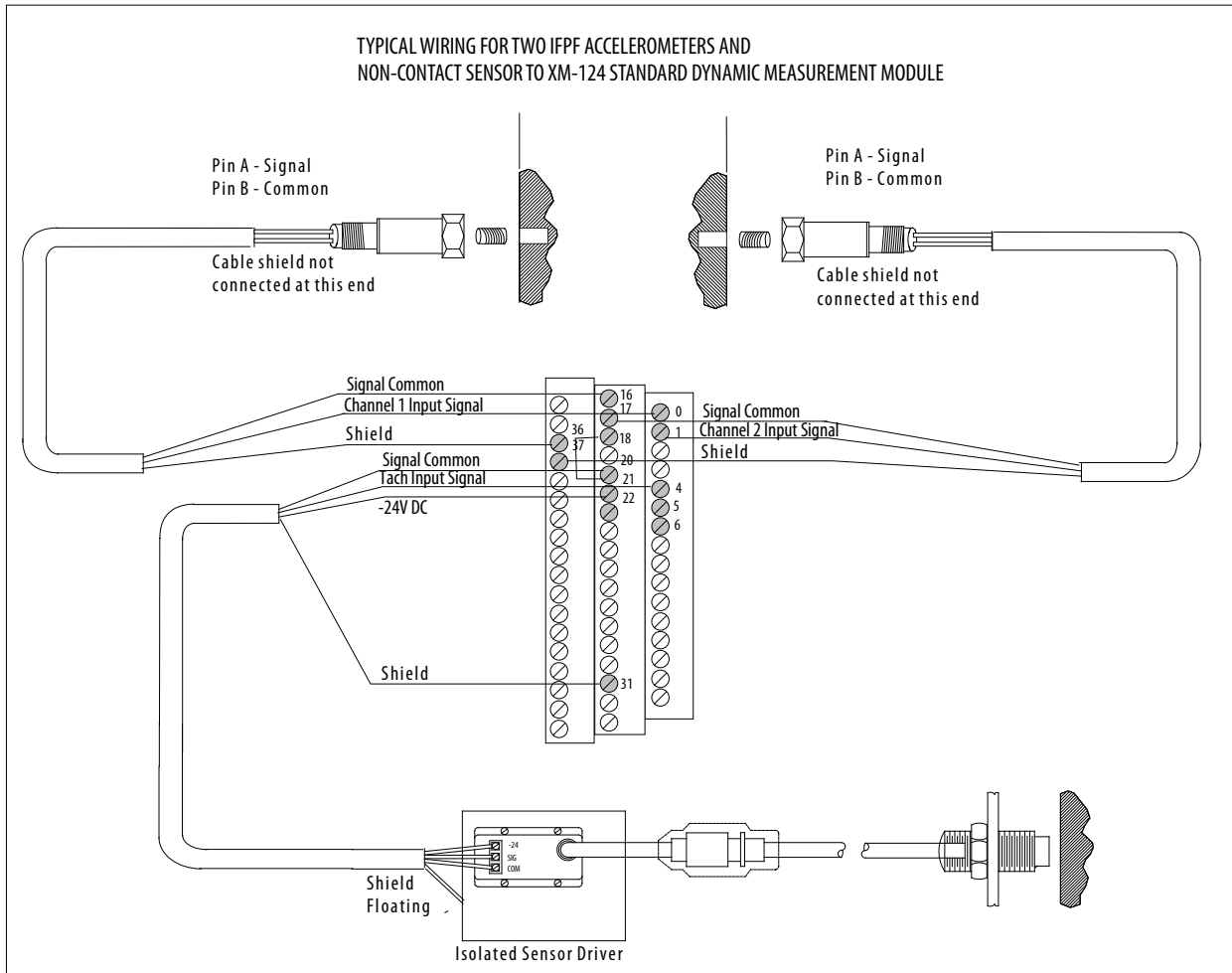
See [Terminal Block Assignments on page 28](#).

IMPORTANT

Verify the Transducer Power Type parameter is set to IEPE for both channel 1 and channel 2 so power is provided to the accelerometers. See [Transducer Object \(Class ID 328H\) on page 158](#). (This setting also sets the buffered output to the 0 Volt to 24 Volt range.)

IMPORTANT Transducer DC bias is monitored on all signals.

Figure 26 - Two IEPE Accelerometers and a Non-contact Sensor Wiring



Connect a Velocity Sensor and Two Non-contact Sensors

[Figure 28](#) shows the wiring of a velocity sensor and two non-contact sensors to the terminal base unit. The velocity sensor is wired to channel 1. The first non-contact sensor is wired to channel 2, and the other non-contact sensor is wired to the tachometer input signal.



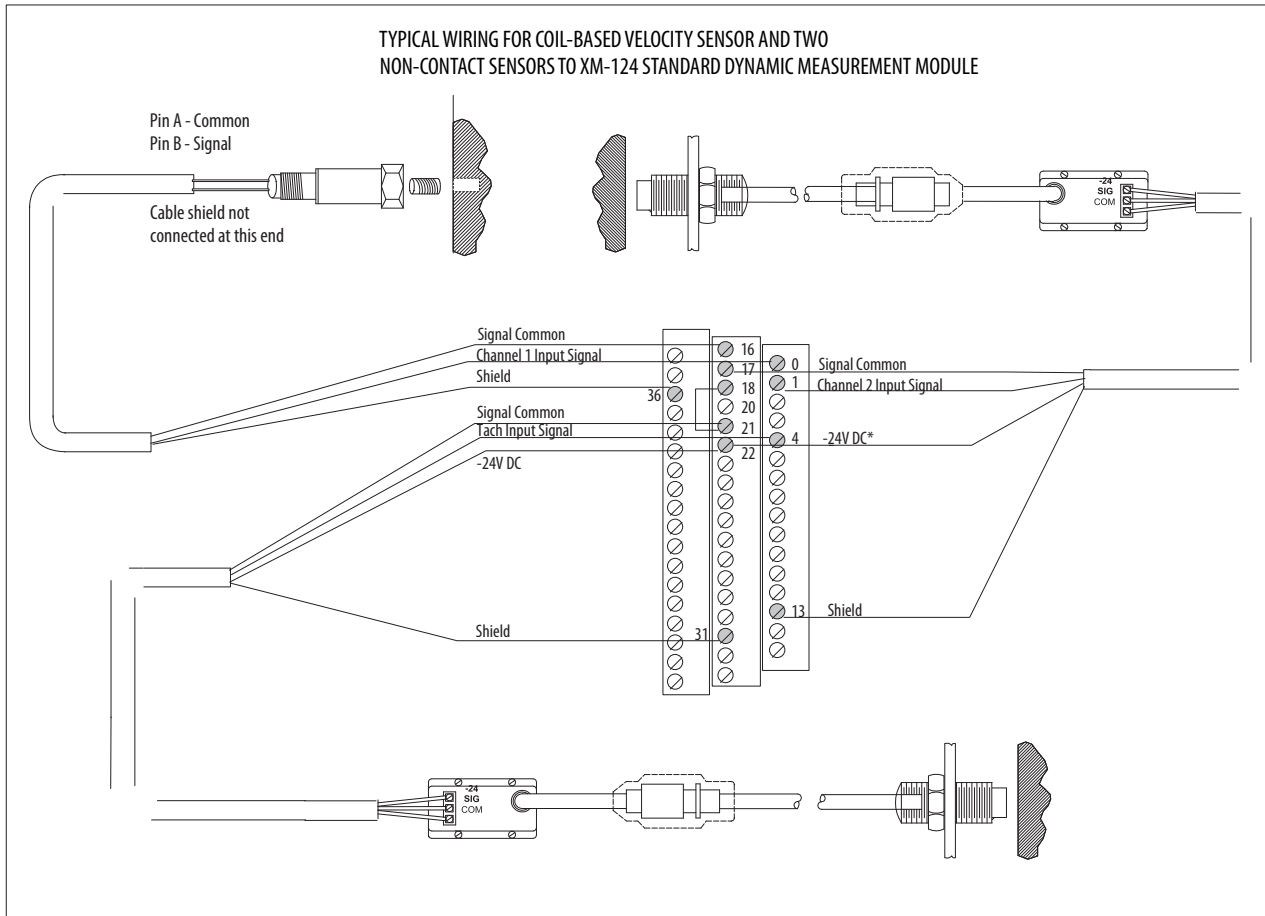
ATTENTION: You may ground the cable shield at either end of the cable. Do not ground the shield at both ends. Recommended practice is to ground the cable shield at the terminal base and not at the transducer. Any convenient chassis terminal may be used.

See [Terminal Block Assignments on page 28](#).

IMPORTANT Transducer DC bias is monitored on all signals.

IMPORTANT Set the Transducer Power Type for channel 2...-24 V so that the buffered output ranges from -24...0 Volts.

Figure 27 - Velocity Sensor and Two Non-contact Sensor Wiring



Connect the Remote Relay Reset Signal

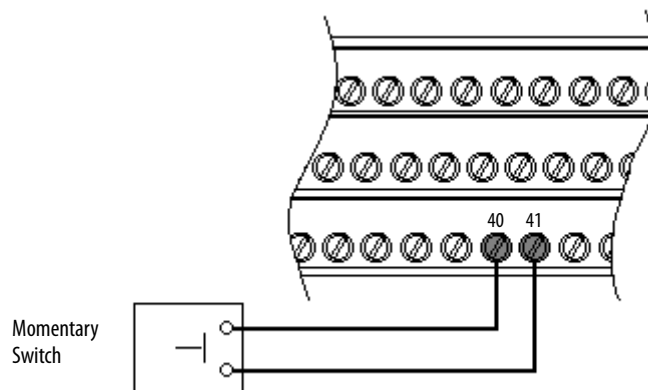
If you set the module relay to latching and the relay activates, the relay stays activated even when the condition that caused the alarm has ended. The remote relay reset signal enables you to reset your module relay remotely after you have corrected the alarm condition. This option includes latched relays in the Expansion Relay module when it is attached to the XM-124 module.

TIP If you set a module relay to latching, make sure that any linked relays, such as relays in an XM-440 Master Relay Module, are not configured as latching. When both relays are set to latching, the relay in each module has to be independently reset when necessary.

TIP You can discretely reset a relay with the serial or remote configuration tool.

Wire the Remote Relay Reset Signal to the terminal base unit as shown in [Figure 29](#).

Figure 28 - Remote Relay Reset Signal Connection



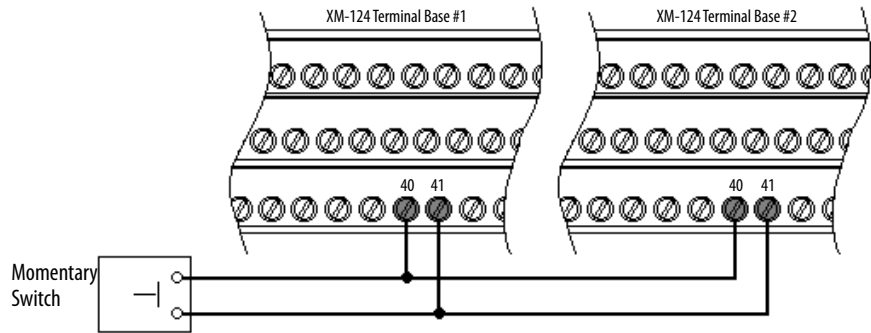
ATTENTION: The Switch Input circuits are functionally isolated from other circuits. We recommend that the Switch RTN signal is grounded at a signal point. Connect the Switch RTN signal to the XM terminal base (chassis terminal) or directly to the DIN rail, or ground the signal at the switch or other equipment that is wired to the switch.

A single switch contact can also be shared by multiple XM modules wired in parallel as shown in [Figure 30](#).



ATTENTION: The relay reset connections may be different for different XM modules. [Figure 30](#) applies only to the XM-124 module. See the installation instructions for the module for its terminal assignments.

Figure 29 - Typical Multiple XM Modules Remote Relay Reset Signal Connection

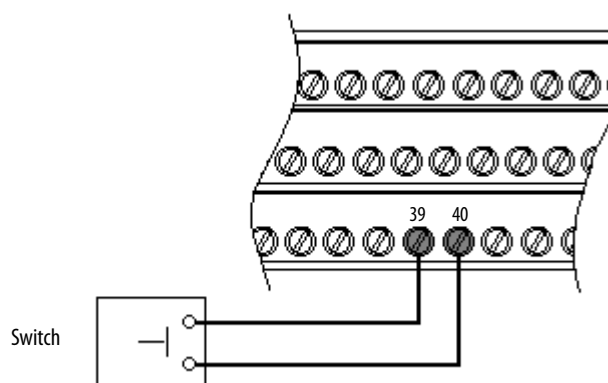


Connect the Setpoint Multiplication Switch

You can configure the module to multiply the alarm setpoints, or inhibit the alarms during the start-up period. This method can be used to avoid alarm conditions that can occur during start-up, for example, when the monitored machine passes through a critical speed.

Wire the Setpoint Multiplication switch to the terminal base unit as shown in [Figure 31](#).

Figure 30 - Setpoint Multiplication Connection



ATTENTION: The Switch Input circuits are functionally isolated from other circuits. We recommend that the Switch RTN signal is grounded at a signal point. Connect the Switch RTN signal to the XM terminal base (chassis terminal) or directly to the DIN rail, or ground the signal at the switch or other equipment that is wired to the switch.

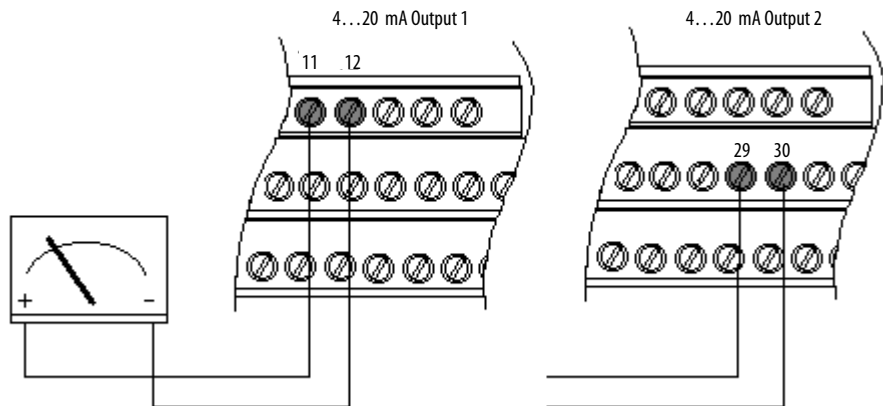
Connect the 4...20 mA Outputs

The modules include an isolated 4...20 mA per channel output into a maximum load of 300 ohms. The measurements that the 4...20 mA output tracks and the signal levels that correspond to the 4 mA and 20 mA are configurable.

[See Alarm, Relay, and 4...20 mA Output Parameters on page 84](#) for details.

Wire the 4...20 mA outputs to the terminal base unit as shown in [Figure 32](#).

Figure 31 - 4...20 mA Output Connections



ATTENTION: The 4...20 mA outputs are functionally isolated from other circuits. We recommend that the outputs be grounded at one point. Connect the 4...20 mA (-) to the XM terminal base (chassis terminal) or directly to the DIN rail, or ground the signal at the other equipment in the 4...20 mA loop.

Serial Port Connection

The XM-124 module includes a serial port connection that lets you connect a personal computer to it and configure the module parameters via the Serial Configuration software utility.

Connecting the serial port of the module to an external device can be done using either of the following methods.

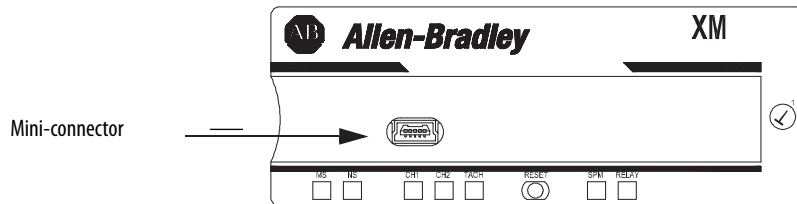
- Terminal Base Unit** - There are three terminals on the terminal base unit you can use for the serial port connection. They are TxD, RxD, and RTN (terminals 7, 8, and 9, respectively). If these three terminals are wired to a DB-9 female connector, then a standard RS-232 serial cable with 9-pin (DB-9) connectors can be used to connect the module to a personal computer (no null modem is required).

Wire the DB-9 connector to the terminal block as shown.

XM-124 Terminal Base Unit (catalog number 1440-TB-A)	DB-9 Female Connector
TX Terminal (terminal 7) -----	Pin 2 (RD - receive data)
RX Terminal (terminal 8) -----	Pin 3 (TD - transmit data)
RTN Terminal (terminal 9) -----	Pin 5 (SG - signal ground)

- Mini-connector** - The mini-connector is on the top of the module, as shown.

Figure 32 - Mini-connector



A special cable (catalog number 1440-SCDB9FXM2) is required for this connection. The connector that inserts into the personal computer is a DB-9 female connector, and the connector that inserts into the module is a USB Mini-B male connector. The default communication rate is 19.2 Kbps.



WARNING: If you connect or disconnect the serial cable with power applied to the module or the serial device on the other end of the cable, an electric arc can occur. This arc could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

IMPORTANT If 24V Common is not referenced to earth ground, we recommend that you use an RS-232 isolator, such as Phoenix™ PSM-ME-RS232/RS232-P (catalog number 1440-ISO-232-24), to help protect both the XM module and the computer.



WARNING: The serial port is intended for temporary local programming purposes only and not intended for permanent connection. If you connect or disconnect the serial cable with power applied to this module or the serial device on the other end of the cable, an electric arc can occur. This arc could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

DeviceNet Connection

The XM-124 module includes a DeviceNet connection that lets the modules communicate with a programmable logic controller (PLC), distributed control system (DCS), or another XM module.

The DeviceNet network is an open, global, industry-standard communication network that is designed to provide an interface through one cable from a programmable controller to a smart device such as the XM-124 module. As multiple XM modules are interconnected, the DeviceNet network also serves as the communication bus and protocol that efficiently transfers data between the XM modules.

Connect the DeviceNet cable to the terminal base unit as shown.

Connect	To	Terminal
Red Wire	DNet V+	26 (optional—see note)
White Wire	CAN High	23
Bare Wire	Shield (chassis)	10
Blue Wire	CAN Low	24
Black Wire	DNet V-	27

IMPORTANT The DeviceNet power circuit through the XM module interconnect, which is rated at only 300 mA, is not intended or designed to power DeviceNet loads. Doing so could damage the module or terminal base.

If the module is configured to operate in Normal mode (fully ODVA compliant), DNet V+ must be connected.

[See Connecting Power on page 30.](#)



ATTENTION: You must ground the DeviceNet shield at only one location. Connecting the DeviceNet shield to terminal 10 grounds the DeviceNet shield at the XM module. If you intend to terminate the shield elsewhere, do not connect the shield to terminal 10.



ATTENTION: The DeviceNet network must also be referenced to earth at only one location. Connect DNet V- to earth or chassis at one of the XM modules.



ATTENTION: The DNet V+ and DNet V- terminals are inputs to the XM module. Do not attempt to pass DeviceNet power through the XM terminal base to other non-XM equipment by connecting to these terminals. Failure to comply may result in damage to the XM terminal base and/or other equipment.

IMPORTANT Terminate the DeviceNet network and adhere to the requirements and instructions in the ODVA Planning and Installation Manual - DeviceNet Cable System, which is available on the ODVA website (<http://www.odva.org>).



WARNING: If you connect or disconnect the DeviceNet cable with power applied to this module or any device on the network, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Mount the Module

The XM-124 standard dynamic measurement module (catalog number 1440-SDM02-01RA) is used only with the 1440-TB-A/C terminal base.



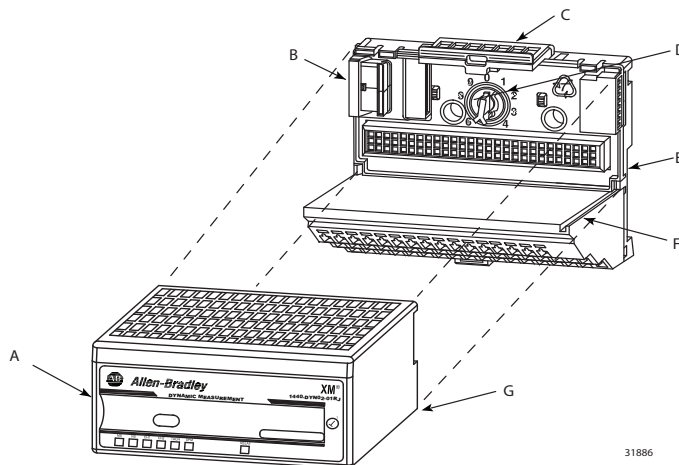
WARNING: If you insert or remove the module while backplane power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.



WARNING: If you connect or disconnect wiring while the field-side power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

IMPORTANT See XM Power Supply Solutions Application Technique, publication [ICM-APO05](#), for guidance in architecting power supplies for XM systems.

1. Verify the keyswitch (D) on the terminal base unit (E) is at position 1 as required for the module.



2. Verify the side connector (B) is pushed all the way to the left.

IMPORTANT You cannot install the module unless the connector is fully extended.

3. Make sure that the pins on the bottom of the module are straight so they align properly with the connector in the terminal base unit.
4. Position the module (A) with its alignment bar (G) aligned with the groove (F) on the terminal base.
5. Press firmly and evenly to seat the module in the terminal base unit.

The module is seated when the latching mechanism (C) is locked into the module.

Repeat the above steps to install another module in its terminal base.

Set the Module DIP Switch

Under the slide at the top of the module is a 10 position DIP switch that is used for setting the modules DeviceNet behavior, node address, and communication rate. The switches are number from left to right and applied as shown in [Figure 34](#) and in [Table 5](#).

Figure 33 - XM-124 Module DIP Switch Bank

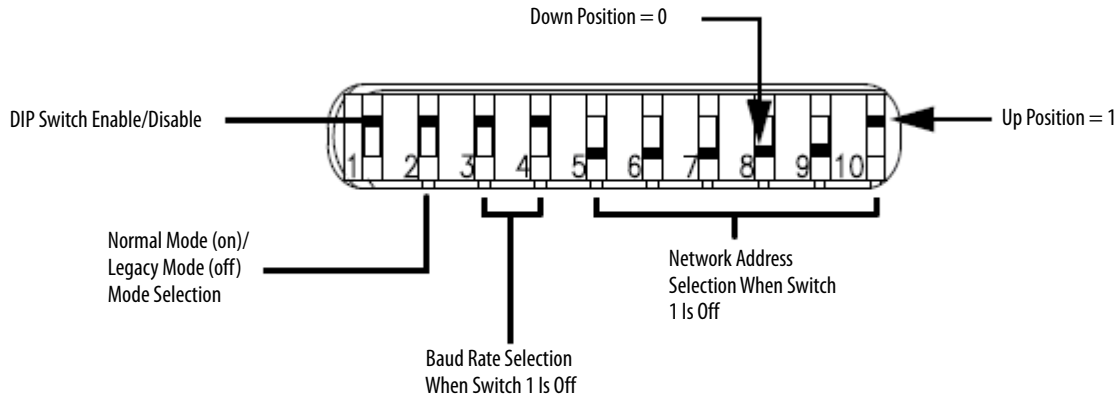


Table 5 - DIP Switch Functions and Defaults

Switch	Purpose	Function	Out-of-box Default Value	Out-of-box Switch Setting
1	DIP Switch disable	Determines whether DIP Switches 3...10 are enabled. When this switch is in the off position, DIP Switches 3...10 set the module's node address and communication rate. When the switch is on, the device ignores DIP Switches 3...10 and uses the network address and communication rate programmed in nonvolatile storage.	Switches enabled	Off
2	Network mode	Sets the DeviceNet behavior of the module to either Normal mode (ODVA compliant) or Legacy mode, which is consistent with earlier XM module versions.	Normal (fully compliant)	On
3, 4	Data rate	When switch #1 is off (0), it sets the DeviceNet communication rate.	125 Kbps	Both off
5...10	Node address	When switch #1 is off (0), it sets the DeviceNet node address.	63	All on

IMPORTANT Install the overlay slide label to help protect serial connector and electronics when not adjusting the switch.

Switch 1 - DIP Switch Enable (0) / Disable (1)

If the module's DeviceNet address is set in firmware, then the DIP switch must be disabled.

IMPORTANT When earlier XM modules are included on a network, it is left up to you to confirm that no nodes exist with the same MAC ID and that only one Client device is configured to access the same device using the Predefined Master/Slave Connection Set. Bus errors can occur if either of these conditions exists.

Switch 2 - Normal/Legacy Mode

In most cases, the module must be left in Normal (default) mode. However, if the module is used to replace an existing XM-12X module, and DeviceNet V+ is not wired, then the mode must be set to Legacy.

IMPORTANT When DIP switch #2 is set to Legacy mode (OFF), the XM 124 continues to communicate even when DNet V+ is not present. If connections are established when DNet V+ is restored, other XM modules do not perform a Duplicate MAC ID check. Consequently if an address conflict exists it is not always detected and erroneous data or unexpected behaviors including potentially a BUS OFF condition can result.

IMPORTANT When DIP switch #2 is set to Normal mode (ON), the XM-124 module behaves per the DeviceNet standard and does not communicate when power is not present on DeviceNet V+. At any time that power is detected on DeviceNet V+ the XM-124 module performs a Duplicate MAC ID check and, in the event that a module with a duplicate address is detected, terminates all communication.

TIP Legacy mode is consistent with how previous XM modules, including the XM-12x modules, behaved with respect to the presence of power-on DeviceNet V+. However, in both Legacy and Normal mode, an XM-124 module performs a Duplicate MAC ID check when the module detects power that is applied to DeviceNet V+. This check is a change in behavior from earlier XM modules.

Switches 3 and 4 - Set DeviceNet Communication Rate

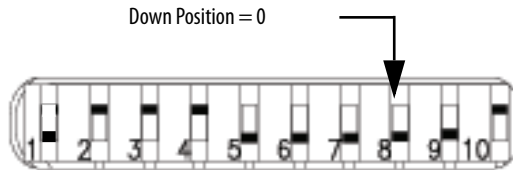
These switches are ignored if switch #1 is in the on (1) position (switch disabled). Use these switches to set the communication rate.

Communication Rate	SW 3	SW 4
125 Kbps	0	0
250 Kbps	0	1
500 Kbps	1	0
Auto Communication	1	1

Switches 5...10 - Set DeviceNet Address

Follow these steps to set the node address.

1. See [DeviceNet Node Addresses on page 59](#) for the switch settings of a specific address.
2. Using a pointed tool, slide switches 5...10 to the appropriate positions (1 or 0).



EXAMPLE If you want the node address to be 4, then set DIP switches 5...8 as follows.

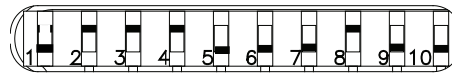


Table 6 - DeviceNet Node Addresses

Node Addr	SW 1	SW 2	SW 3	SW 4	SW5	SW6	SW7	SW8	SW9	SW1 0	Node Addr	SW 1	SW 2	SW 3	SW 4	SW5	SW6	SW7	SW8	SW9	SW1 0
0 ⁽¹⁾					0	0	0	0	0	0	32					1	0	0	0	0	0
1					0	0	0	0	0	1	33					1	0	0	0	0	1
2					0	0	0	0	1	0	34					1	0	0	0	1	0
3					0	0	0	0	1	1	35					1	0	0	0	1	1
4					0	0	0	1	0	0	36					1	0	0	1	0	0
5					0	0	0	1	0	1	37					1	0	0	1	0	1
6					0	0	0	1	1	0	38					1	0	0	1	1	0
7					0	0	0	1	1	1	39					1	0	0	1	1	1
8					0	0	1	0	0	0	40					1	0	1	0	0	0
9					0	0	1	0	0	1	41					1	0	1	0	0	1
10					0	0	1	0	1	0	42					1	0	1	0	1	0
11					0	0	1	0	1	1	43					1	0	1	0	1	1
12					0	0	1	1	0	0	44					1	0	1	1	0	0
13					0	0	1	1	0	1	45					1	0	1	1	0	1
14					0	0	1	1	1	0	46					1	0	1	1	1	0
15					0	0	1	1	1	1	47					1	0	1	1	1	1
16					0	1	0	0	0	0	48					1	1	0	0	0	0
17					0	1	0	0	0	1	49					1	1	0	0	0	1
18					0	1	0	0	1	0	50					1	1	0	0	1	0
19					0	1	0	0	1	1	51					1	1	0	0	1	1
20					0	1	0	1	0	0	52					1	1	0	1	0	0
21					0	1	0	1	0	1	53					1	1	0	1	0	1
22					0	1	0	1	1	0	54					1	1	0	1	1	0
23					0	1	0	1	1	1	55					1	1	0	1	1	1
24					0	1	1	0	0	0	56					1	1	1	0	0	0
25					0	1	1	0	0	1	57					1	1	1	0	0	1
26					0	1	1	0	1	0	58					1	1	1	0	1	0
27					0	1	1	0	1	1	59					1	1	1	0	1	1
28					0	1	1	1	0	0	60					1	1	1	1	0	0
29					0	1	1	1	0	1	61					1	1	1	1	0	1
30					0	1	1	1	1	0	62					1	1	1	1	1	0
31					0	1	1	1	1	1	63					1	1	1	1	1	1

Disable DIP Switch. Must be 0 if setting bus address with switches 5...10.

DeviceNet behavior mode selection.

Communication rate selection.

Communication rate selection.

Disable DIP Switch. Must be 0 if setting bus address with switches 5...10.

DeviceNet behavior mode selection.

Communication rate selection.

Communication rate selection.

Electronic Data Sheets

Electronic data sheet (EDS) files are simple text files that are used by network configuration tools, such as RSNetWorx™ software, version 3.0 or later, to help you identify products and easily commission them on a network. The EDS files describe a product device type, product revision, and configurable parameters on a DeviceNet network.

The EDS files for the XM modules are installed on your computer with the XM configuration software. The latest EDS files can also be obtained at <http://www.ab.com/networks/eds> or by contacting your local Rockwell Automation representative.

See your DeviceNet documentation for instructions on registering the EDS files.

ADR for XM Modules

Automatic Device Replacement (ADR) is a feature of an Allen-Bradley DeviceNet scanner. It provides a means for replacing a failed device with a new unit, and having the device configuration data set automatically. Upon replacing a failed device with a new unit, the ADR scanner automatically downloads the configuration data and sets the node address.

IMPORTANT We recommend that ADR is not used in safety-related applications. If the failure of the ADR server, and a subsequent power cycle, would result in the loss of protection for a machine, then do not implement ADR.

ADR can be used with XM modules but keep these considerations in mind when setting up the XM modules:

- The ADR scanner cannot download the configuration data to an XM module if the module has a saved configuration in its nonvolatile memory. This happens because the saved configuration is restored and the module enters Run mode when the power is cycled. (Configuration parameters cannot be downloaded while an XM module is in Run mode.) XM modules must be in Program mode for the ADR configuration to be downloaded and this occurs only when there is no saved configuration.

TIP To delete a saved configuration from nonvolatile memory, use the Delete service in RSNetWorx™ for DeviceNet software or perform these steps in the XM Serial.

1. From the File menu, choose Save As.
2. Enter a file name for the configuration.
3. Click OK.
4. Click the Module tab.
5. Click Reset to reset the module to factory defaults.
6. From the File menu, choose Open.
7. Select the configuration file and choose OK.

Make sure to disable auto save. From the Device menu, clear the Auto Save Configuration check mark.

- An XM module enters Run mode automatically after the ADR scanner restores the module's configuration only if the module is in Run mode at the time the configuration is saved to the scanner. If the module is in Program mode when the configuration is saved, then the module remains in Program mode after the ADR scanner downloads the configuration.
- The ADR scanner saves and restores only the configuration parameters contained in the EDS file of the module. Some XM parameters are not included in the EDS file because they are not supported by either the EDS specification or the tools that read the EDS files, for example RSNetWorx for DeviceNet software. These configuration parameters are not restored with ADR.

These configuration parameters are not included in the EDS file and cannot be saved or restored with ADR:

- Channel Name
- Tachometer Name
- Alarm Name
- Relay Name
- All Triggered Trend related parameters
- All SU/CD Trend-related parameters
- Custom Assembly structure

- The ADR and trigger group functions cannot be used together. A module can have only one primary master so a module cannot be both configured for ADR and included in a trigger group. The ADR scanner must be the primary master for the modules configured for ADR. The XM-440 Master Relay module must be the primary master for modules included in a trigger group.

Power Up the Module

The module performs a self-test at powerup. The self-test includes a status indicator test and a device test. During the status indicator test, the indicators are turned on independently and in sequence for approximately 0.25 seconds.

The device test occurs after the Status Indicator test. The Module Status (ms) indicator is used to indicate the status of the device self-test.

ms Indicator State	Description
Flashing Red and Green	Device self-test is in progress.
Solid Green or Flashing Green	Device self-test completed successfully, and the firmware is valid and running.
Flashing Red	Device self-test completed, the hardware is OK, but the firmware is invalid, the firmware download is in progress, or, the node address or communication rate DIP switch settings have been changed and do not match the settings in use.
Solid Red	Unrecoverable fault, hardware failure, or Boot Loader program may be corrupted.

Configure the XM-124 Standard Dynamic Measurement Module

The XM-124 module is configured by using the XM® Serial Configuration Utility software. This section details the configuration process and associated parameters.

Topic	Page
XM Serial Configuration Utility Software	61
Configuring the XM-124 Standard Dynamic Measurement Module	65

XM Serial Configuration Utility Software

The Serial Configuration Utility tool is provided for local configuration of any XM® Series module, except for the 1440-DYN02-01RJ Dynamic Measurement module, which is used exclusively with and configured from a Logix controller. The tool is available on the Rockwell Automation® Support for XM website:

<http://www.rockwellautomation.com/global/support/firmware/xm.page>.

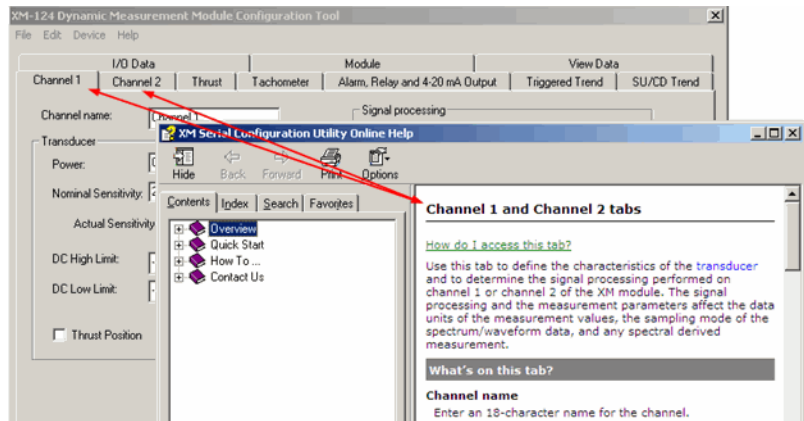
The Serial Configuration Utility, versions 7.0 and later, includes support for the XM-124 standard dynamic measurement module.

The Serial Configuration Utility is a Microsoft Windows-based program that you can use to configure XM modules via the local serial port (usually the micro connector on the top of the module). You can also use the tool to enable reading and writing of configuration files, display measurement data, and update module firmware.

Application Help

At any time, you can press the F1 function key to access the online help function for the application. When opened, the Help function presents information relative to the tab currently being viewed.

Figure 35 - Application Help Dialog Box

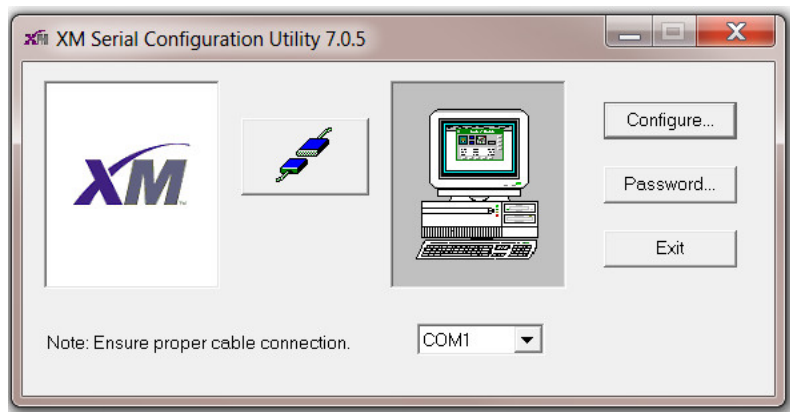


For help on topics other than module configuration, consult the back cover of this manual for contact information for Rockwell Automation® Support and Installation Assistance.

Module Selection and Connection

The XM Serial Configuration Utility welcome screen is shown in [Figure 36](#). The software version that is used for the XM-124 module can vary from the figure, but the release number must be at least 7.0.0.

Figure 36 - 1XM Serial Configuration Utility Main Dialog Box



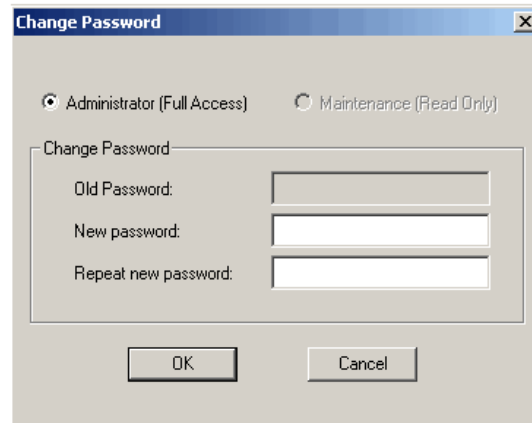
A closed connector icon indicates a computer connection to an XM-124 module, and the application allows only configuration of that specific module. If no module is connected, as in [Figure 36](#), the tool can be used to edit configuration files for any type of module.

Passwords and Access

The XM Serial Configuration Utility includes a function that enables you to create and manage passwords for Administrator and Maintenance-level access.

IMPORTANT The password function is optional, but once a password is defined for either the Administrator or Maintenance accounts, the utility requires that password to configure an XM-124 module.

Upon initial login, the Change Password dialog box appears.



An Administrator password can be verified with re-entry. Once established, the Administrator account can be used to manage the Maintenance account and fully edit and load configurations to a module.

Configurations and Commands

Choose the Configure option from the main dialog box to begin either Online Configuration or Offline Configuration, depending on the module connection status.

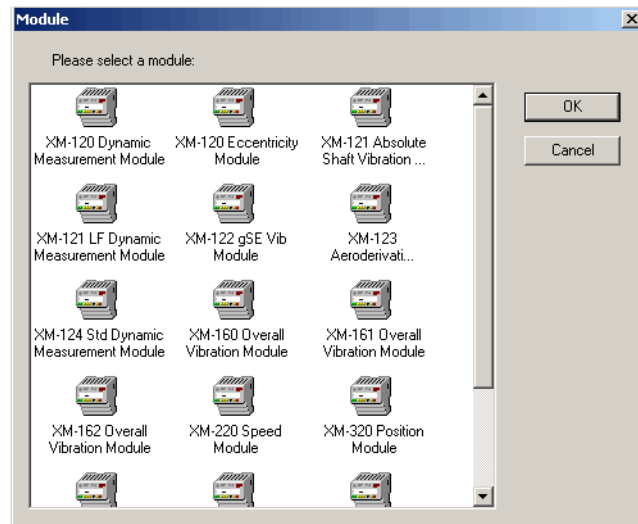
Online Configuration

If the computer is connected to a module, as indicated by a closed connector icon in the main dialog box, the Utility immediately uploads the current configuration from the module. The Utility then opens the editor appropriate for the type of module connected.

Offline Configuration

If the computer is not connected to a module, as indicated by an open connector icon in the main dialog box, the Utility displays a dialog box that shows all supported XM modules. Select the desired module and then click OK to begin configuration.

Figure 37 - 1 Offline Configuration Showing Supported XM Modules



Common Menu Functions - File, Edit, Device, and Help

The XM Serial Configuration Utility stores XM module configurations in files having type extensions that match the model of the module. For example, configuration files for the XM-124 module end with the type extension '.124'. Use the functions in the File Menu to open, close, and save these files.

IMPORTANT When logged in to the Maintenance account, the Save and Save As commands are not available.

The Edit menu provides functionality solely to copy configurations from one channel to another.

The Device menu provides the functionality necessary to download a configuration to a module and to upload a configuration from a module. When Online (connected to a module), the current module configuration is automatically uploaded when the editor is started.

IMPORTANT When logged in to the Maintenance account, the Download command is not available.

The Help menu can be selected to access the Contents and Index commands and the About XM Serial Configuration Utility command.

Configuring the XM-124 Standard Dynamic Measurement Module

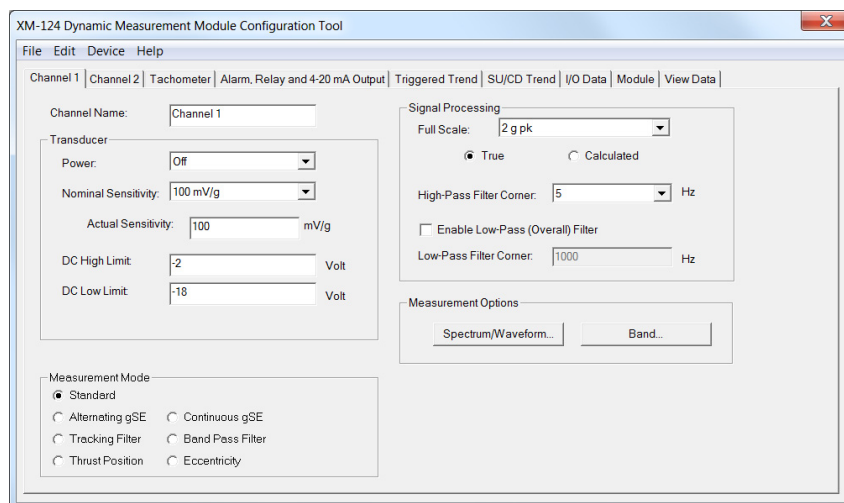
The editor for the XM-124 standard dynamic measurement module follows the same style and design as the editors for other XM modules. Each tab presents a dialog box that contains related parameters.

Generally, a module is configured from the leftmost tab, working toward the right. Begin the XM-124 module configuration with the Channel tabs.

Configure the Channel Properties

Use the Channel tab to define the characteristics of the transducer and the signal processing that is performed on the input signals. The XM-124 module has two input channels.

1. From the Module Properties dialog box, click the Channel tab.



2. Configure the parameters as necessary.

Transducer

Table 7 - Transducer parameters

In this field	Values are	Comments
Channel Name	Enter a descriptive name for the channel.	Maximum 18 characters.
Power	Choose the type of power that is supplied to the transducer: <ul style="list-style-type: none"> • Off • IEPE (externally supplied) • -24V (externally supplied) • 24V (externally supplied from the terminal base) • Bias Current (externally supplied) 	<p>See Connect the Transducer on page 35 for wiring requirements.</p> <p>See Transducer Power Settings on page 69 to view more details for each setting.</p>

Table 7 - Transducer parameters (Continued)

In this field	Values are	Comments												
Nominal Sensitivity	<p>Choose the sensitivity of the transducer.</p> <table border="1" data-bbox="446 319 899 1470"> <thead> <tr> <th data-bbox="446 319 638 359">Quantity of Measure</th> <th data-bbox="638 319 899 359">Nominal Sensitivity</th> </tr> </thead> <tbody> <tr> <td data-bbox="446 359 638 579">Acceleration</td> <td data-bbox="638 359 899 579"> 10.0 mV/g 25.0 mV/g 50.0 mV/g 100.0 mV/g 500.0 mV/g 1000.0 mV/g 10000.0 mV/g </td> </tr> <tr> <td data-bbox="446 579 638 940">Velocity</td> <td data-bbox="638 579 899 940"> 100.0 mV/ in/s 150.0 mV/ in/s 200.0 mV/ in/s 400.0 mV/ in/s 500.0 mV/ in/s 1000.0 mV/ in/s 4.0 mV/ mm/s 6.0 mV/ mm/s 8.0 mV/ mm/s 16.0 mV/ mm/s 20.0 mV/ mm/s 40.0 mV/ mm/s </td> </tr> <tr> <td data-bbox="446 940 638 1234">Displacement</td> <td data-bbox="638 940 899 1234"> 100.0 mV/ mil 150.0 mV/ mil 200.0 mV/ mil 285.0 mV/ mil 10.0 mV/ mil 3.94 mV/ μm 5.91 mV/ μm 7.87 mV/ μm 11.2 mV/ μm 0.394 mV/μm </td> </tr> <tr> <td data-bbox="446 1234 638 1423">Pressure</td> <td data-bbox="638 1234 899 1423"> 20.0 mV/ psi 50.0 mV/ psi 100.0 mV/ psi 0.29 mV/ mbar 0.73 mV/ mbar 1.45 mV/ mbar </td> </tr> <tr> <td data-bbox="446 1423 638 1470">Volts</td> <td data-bbox="638 1423 899 1470">1000.0 mV/V</td> </tr> </tbody> </table>	Quantity of Measure	Nominal Sensitivity	Acceleration	10.0 mV/g 25.0 mV/g 50.0 mV/g 100.0 mV/g 500.0 mV/g 1000.0 mV/g 10000.0 mV/g	Velocity	100.0 mV/ in/s 150.0 mV/ in/s 200.0 mV/ in/s 400.0 mV/ in/s 500.0 mV/ in/s 1000.0 mV/ in/s 4.0 mV/ mm/s 6.0 mV/ mm/s 8.0 mV/ mm/s 16.0 mV/ mm/s 20.0 mV/ mm/s 40.0 mV/ mm/s	Displacement	100.0 mV/ mil 150.0 mV/ mil 200.0 mV/ mil 285.0 mV/ mil 10.0 mV/ mil 3.94 mV/ μm 5.91 mV/ μm 7.87 mV/ μm 11.2 mV/ μm 0.394 mV/μm	Pressure	20.0 mV/ psi 50.0 mV/ psi 100.0 mV/ psi 0.29 mV/ mbar 0.73 mV/ mbar 1.45 mV/ mbar	Volts	1000.0 mV/V	<p>Your choice controls the list of possible full scale selections.</p> <p>The default is 200.0 mV/mil (displacement).</p> <p>Pressure 20.0 mV/ psi 50.0 mV/ psi 100.0 mV/ psi 0.29 mV/ mbar 0.73 mV/ mbar 1.45 mV/ mbar</p>
Quantity of Measure	Nominal Sensitivity													
Acceleration	10.0 mV/g 25.0 mV/g 50.0 mV/g 100.0 mV/g 500.0 mV/g 1000.0 mV/g 10000.0 mV/g													
Velocity	100.0 mV/ in/s 150.0 mV/ in/s 200.0 mV/ in/s 400.0 mV/ in/s 500.0 mV/ in/s 1000.0 mV/ in/s 4.0 mV/ mm/s 6.0 mV/ mm/s 8.0 mV/ mm/s 16.0 mV/ mm/s 20.0 mV/ mm/s 40.0 mV/ mm/s													
Displacement	100.0 mV/ mil 150.0 mV/ mil 200.0 mV/ mil 285.0 mV/ mil 10.0 mV/ mil 3.94 mV/ μm 5.91 mV/ μm 7.87 mV/ μm 11.2 mV/ μm 0.394 mV/μm													
Pressure	20.0 mV/ psi 50.0 mV/ psi 100.0 mV/ psi 0.29 mV/ mbar 0.73 mV/ mbar 1.45 mV/ mbar													
Volts	1000.0 mV/V													
Actual Sensitivity	Enter the sensitivity value of the transducer that is included with the transducer's calibration documentation. Due to manufacturing variation, the actual sensitivity can be different than the nominal sensitivity in some cases.	<p>This value is ±15% of the Nominal Sensitivity value,</p> <p>IMPORTANT: The nominal sensitivity is used if you leave this field blank.</p>												
DC High Limit	Enter the maximum expected DC bias voltage from the transducer.	Enter a value between -24 . . . 24V.												
DC Low Limit	Enter the minimum, or most negative, expected DC voltage from the transducer.	<p>IMPORTANT: A voltage reading outside this range constitutes a transducer fault, which is indicated by the Channel status indicator flashing red and the Ch0Fault or Ch1Fault input tag, depending on the channel.</p>												

Table 8 - Transducer Power Settings

Transducer Power Setting	Approximate Expected Bias Voltage (V DC)			DC Low Limit Default	DC High Limit Default	Buffered Output Range
	Properly connected sensor	Unconnected sensor or open circuit	Short circuit			
Off	sensor bias voltage (-10V DC...0V DC typical)	2	0	-10	10	-12V...12V
IEPE	sensor bias voltage (12V DC...20V DC typical)	24	0	12	20	0V...24V
24 V	sensor bias voltage (1V DC...20V DC typical)	2	0	1	20	0V...24V
-24 V	sensor bias voltage (-14V DC...8VDC typical)	2	0	-14	-8	-24V...0V
Bias Current	0.47 V with 200 ohm coil	13	0	0.2	2	-12V...12V

Measurement Mode

Select the Measurement mode according to the type of measurements to be performed.

Measurement Mode	Measurements performed								
	DC Bias (Gap)	Overall	FFT/TWF	gSE Overall	gSE FFT	Tracking Mag. + Phase	Band Pass	Thrust Position	Eccentricity
Standard	✓	✓	✓						
Alternating gSE ⁽¹⁾	✓	✓	✓	✓	✓				
Continuous gSE ⁽¹⁾	✓			✓	✓				
Tracking Filter	✓	✓	✓			✓			
Band Pass Filter	✓	✓	✓				✓		
Thrust Position ⁽²⁾	✓							✓	
Eccentricity ⁽²⁾	✓								✓

(1) Requires accelerometer transducer

(2) Requires displacement transducer

The Standard measurement mode performs the DC Bias (Gap), Overall, FFT, and TWF measurements. The Standard measurement mode also performs a set of measurements, which are derived from the FFT data: four Band measurements, 1X magnitude and phase, 2X magnitude and phase, 3X magnitude, Not 1X, and Sum Harmonics. The XM-120 Dynamic Measurement module performs the same measurements. The XM-124 V6 firmware also performs the same set of measurements while the Thrust Position measurement is not enabled.

The gSE measurement modes perform the Spike Energy™ measurements. The gSE measurements use a signal processing technique that provides an accurate measure of the energy that is generated by transient or mechanical impacts.

The gSE measurements can provide early 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 recirculation.

Alternation of gSE measurement mode alternates between the standard and gSE measurement sets every several seconds. This functionality is like the XM-122 gSE Vibration module. In Alternating gSE mode, the four Band measurements can be derived from either the standard or gSE FFT.

The Continuous gSE measurement mode performs the DC Bias, gSE Overall, and gSE FFT measurements. The Continuous gSE mode also performs four Band measurements, which are derived from the gSE FFT.

The Tracking Filter and Band Pass Filter measurement modes are designed specifically for monitoring aeroderivative gas turbine engines, such as the General Electric LM2500 engine.

The Tracking Filter measurement mode performs the DC Bias, Overall, FFT, TWF, Tracking Filter magnitude, and phase measurements. This functionality is similar to the Tracking Filter measurement set used by the XM-123 Aeroderivative module, except the XM-123 does not perform the FFT and TWF measurements.

The Band Pass Filter measurement mode performs the DC Bias, Overall, FFT, TWF, and Band Pass Filter measurements. This functionality is similar to the Band Pass Filter measurement set used by the XM-123 Aeroderivative module, except the XM-123 does not perform the FFT and TWF measurements.

The Thrust Position measurement mode performs a Thrust Position measurement and the Standard measurement mode measurements. This functionality contains the same set of measurements that are performed by the XM-124 V6 firmware while the Thrust Position measurement is enabled. This functionality is also like the position measurement that is performed by the XM-320 Position module when it is configured in its Normal mode.

The Eccentricity measurement mode performs the DC Bias and Eccentricity measurements. Eccentricity is the measure of the amount of bow in a rotor. The lower the eccentricity value, the more straight the shaft. Rotor bow can be a fixed mechanical bow, or it can be a temporary bow that is caused by uneven thermal heating or simply by the weight of the rotor (gravity bow). The Eccentricity measurement mode is suitable for virtually all types of rotating and reciprocating machinery where rotor bow must be measured before or during startup. This eccentricity measurement is the same as the eccentricity measurement performed by the XM-120E Eccentricity module.

Signal Processing

The Signal Processing group box options apply to the Standard, Alternating gSE, Tracking Filter, and Band Pass Filter measurement modes. These settings affect the standard Overall, FFT, and TWF measurements.

Table 9 - Signal processing parameters

In this field	Values are	Comments												
Full Scale	Choose the maximum signal level that is expected to be processed by the channel. If the full scale value is peak or peak-to-peak, select the measurement that is performed (true or calculated) to produce the overall value.	The default value and the available values depend on the Transducer Nominal Sensitivity selection. If the Engineering Units of the selected Full Scale value require integration from the Engineering Units of the selected Nominal Sensitivity, then an analog Low Pass Filter is applied before the measurement. See Low Pass Filter Corner . By assuring the absence of high-frequency content, gains can be applied to maximize the accuracy of the measurements below the LPF corner frequency.												
True	The actual or literal measure of the signal. It is the maximum peak in the time waveform for peak measurements, or the difference between the maximum and minimum peaks for peak-to-peak measurements.	The True and Calculated radio buttons are dimmed when full scale is set to an RMS value. For a pure sine-wave, the true and calculated values are equal.												
Calculated	The RMS value of the time waveform multiplied by the square root of two (1.414) if measuring the peak value, or two times the square root of two (2.828) if measuring the peak-to-peak value. IMPORTANT: When full scale is set to an RMS value, including Calculated Peak or Calculated Peak-to-Peak, the XM module is configured to accept input signals as high as 6X the specified full scale without saturating the electronics. This configuration is set because a signal with moderate RMS value can have high spikes because RMS is an averaging mechanism. If True Peak or True Peak-to-Peak is selected, the module is configured to spread the full scale range over the entire measurement range, without reserving this 6X headroom used for RMS. This configuration gives better resolution within the full scale range but causes the signals to be clipped at levels just above the full scale.	The true and calculated values diverge as additional signals are added to the waveform, or as non-sinusoidal or non-repetitive signals are included. For protection applications where the objective is to preclude contact between stationary and moving components, True is the appropriate measurement because it is a better indication of actual movement. For conditioning monitoring applications where the objective is to indicate the total energy in the system (that is, the overall value), Calculated is the preferable measurement.												
High Pass Filter Corner	Choose the high pass filter to apply to the measurement. <ul style="list-style-type: none"> • 0.2 Hz • 1 Hz • 5 Hz • 10 Hz • 40 Hz 	The high pass filter is useful in removal of low frequency signal components that can dominate the signal, particularly when integrating. The high pass filter attenuates frequencies less than the specified frequency. It passes frequencies greater than the specified frequency.												
Enable Low Pass (Overall) Filter	Check to apply a low pass filter to the Overall Measurement. Clear to disable the low pass filter.	The filter is applied only to the Overall measurement. It does not affect the time waveform, spectrum, or measurements derived from the spectrum.												
Low Pass Filter Corner	Enter a value between 100...20,000 Hz. Input signal frequencies greater than this value are significantly attenuated.	This parameter is available only when Enable Low Pass Filter is checked. When integrating this (digital), Overall Low Pass Filter Corner are not always set greater than the analog LPF that is applied to all integrating measurements. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: left;">Low Pass Filter</th> </tr> <tr> <th style="text-align: left;">Hardware Series</th> <th style="text-align: center;">A</th> <th style="text-align: center;">B</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Cut Off Frequency</td> <td style="text-align: center;">2 kHz</td> <td style="text-align: center;">5 kHz</td> </tr> <tr> <td style="text-align: left;">Roll Off</td> <td style="text-align: center;">12 dB/Octave</td> <td style="text-align: center;">24 dB/Octave</td> </tr> </tbody> </table> The filter is automatically applied to all integrated measurements.	Low Pass Filter			Hardware Series	A	B	Cut Off Frequency	2 kHz	5 kHz	Roll Off	12 dB/Octave	24 dB/Octave
Low Pass Filter														
Hardware Series	A	B												
Cut Off Frequency	2 kHz	5 kHz												
Roll Off	12 dB/Octave	24 dB/Octave												

Spectrum/Waveform Measurement Options

The Spectrum/Waveform Measurement options apply to the Standard, Alternating gSE, Tracking Filter, Band Pass Filter, and Thrust Position measurement modes. These settings affect the standard FFT and TWF measurements. Click Spectrum/Waveform to open the Spectrum/Waveform options dialog box.

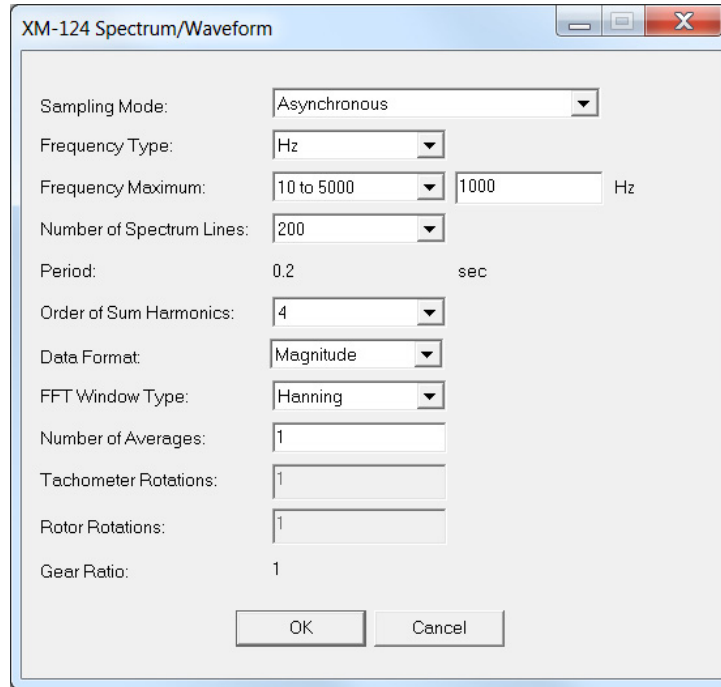


Table 10 - Spectrum/Waveform Measurement parameters

In this field	Values are	Comments								
Sampling Mode	Choose the sampling mode: <ul style="list-style-type: none"> Asynchronous Synchronous with tach 	The sampling mode determines whether the signal is synchronized with the tachometer signal and has several effects on the resulting measurements. Synchronous sampling requires a tachometer signal.								
Sampling Mode (continued)	<table border="1"> <thead> <tr> <th>Asynchronous Sampling</th> <th>Synchronous Sampling</th> </tr> </thead> <tbody> <tr> <td>The waveform measurement is time-based</td> <td>The waveform measurement is position-based.</td> </tr> <tr> <td>The spectrum measurement is frequency-based.</td> <td>The spectrum measurement is order-based and the Number of Lines must be evenly divisible by Frequency Maximum.</td> </tr> <tr> <td>The Frequency Maximum must be specified in Hz.</td> <td>Frequency Maximum must be specified in orders.</td> </tr> </tbody> </table>	Asynchronous Sampling	Synchronous Sampling	The waveform measurement is time-based	The waveform measurement is position-based.	The spectrum measurement is frequency-based.	The spectrum measurement is order-based and the Number of Lines must be evenly divisible by Frequency Maximum.	The Frequency Maximum must be specified in Hz.	Frequency Maximum must be specified in orders.	
Asynchronous Sampling	Synchronous Sampling									
The waveform measurement is time-based	The waveform measurement is position-based.									
The spectrum measurement is frequency-based.	The spectrum measurement is order-based and the Number of Lines must be evenly divisible by Frequency Maximum.									
The Frequency Maximum must be specified in Hz.	Frequency Maximum must be specified in orders.									
Frequency Type	The frequency units (Hz or CPM).	Enter the FMAX in these units.								

Table 10 - Spectrum/Waveform Measurement parameters (Continued)

In this field	Values are	Comments
Frequency Maximum	The maximum frequency or order for the spectrum measurement.	<p>The sampling mode determines whether the frequency maximum is specified in Hz or orders. It also determines whether you enter a value or choose a value from a list of available values:</p> <ul style="list-style-type: none"> • If sampling mode is synchronous with tach, enter the Frequency Maximum value. The frequency maximum range for Synchronous sampling mode is 4 . . .200 orders. • If sampling mode is Asynchronous, choose the Frequency Maximum value. Note you can enter a specific value if you choose 10 . . .5000 range. Supported maximum asynchronous frequencies are dependent on sensitivity units and full scale units you choose on the Channel tab. <p>When integrating, the Maximum Frequency is not always set greater than the analog LPF that is applied to all integrating measurements.</p>
Number of Spectrum Lines	<p>Choose the number of lines (bins) in the spectrum measurement:</p> <ul style="list-style-type: none"> • 100 • 200 • 400 • 800 • 1600 	<p>This number determines the frequency resolution of the spectrum measurement.</p> <p>IMPORTANT: When sampling mode is Synchronous, the Number of Spectrum Lines must be evenly divisible by the Frequency Maximum value (no remainder).</p>
Period	<p>Displays the total period of the waveform measurement in seconds. Samples are accumulated into a time waveform of this duration before an FFT is performed on the collected data. Period is provided to show the effect various settings, such as Number of Spectrum Lines, have on the update rate of measurements (Band and Vector) derived from the spectrum.</p>	<p>The value is in seconds when sampling mode is set to Asynchronous. The value is in cycles when sampling mode is set to Synchronous.</p>
Order of Sum Harmonics	<p>Choose the starting order for the sum harmonics measurement:</p> <ul style="list-style-type: none"> • 1 • 2 • 3 • 4 • 5 	<p>The amplitudes of all harmonics from the specified harmonic through the Frequency Maximum are included in the sum.</p> <p>IMPORTANT: The sum harmonics measurement requires the tachometer to be enabled (Pulses Per Revolution is set to 1 or more), and a tachometer signal must be present.</p>
Data Format	Choose complex or magnitude data format.	<p>Complex data includes phase information but takes longer to upload and requires more conversions before plotting.</p> <p>Magnitude data is half the size and requires fewer conversions before plotting but excludes phase information.</p> <p>See the description of the Spectrum/Waveform object's page 149 for more information.</p>
FFT Window Type	<p>Choose the type of window to be applied to the waveform measurement before computing the spectrum:</p> <ul style="list-style-type: none"> • Rectangular - Also known as Uniform (no window). Use rectangular only for transient signals that die out before the end of the time sample, or for exactly periodic signals within the time sample. Gives poor peak amplitude accuracy, good peak frequency accuracy. • Hamming - A general-purpose window that is similar to a Hanning window. It provides better frequency resolution but decreased amplitude accuracy when compared to the Hanning window. Use it to separate close frequency components. Gives fair peak amplitude accuracy, fair peak frequency accuracy. • Hanning - A general-purpose window that is similar to a Hamming window. It is used on random type data when frequency resolution is more important than amplitude accuracy. Most often used in predictive maintenance. Gives fair peak amplitude accuracy, fair peak frequency accuracy. • Flat Top - Also called Sinusoidal window. Use flat top when amplitude accuracy is more important than frequency resolution. A Flat Top window can smear the peaks together into one wide peak, in data with closely spaced peaks. Gives good peak amplitude accuracy, poor peak frequency accuracy for data with discrete frequency components. • Kaiser Bessel - Gives fair peak amplitude accuracy, fair peak frequency accuracy. 	

Table 10 - Spectrum/Waveform Measurement parameters (Continued)

In this field	Values are	Comments																																	
Number of Averages	Enter the number of individual data sets to be incorporated into the average calculation. Averaging reduces the random errors and provides a more reliable measurement.	In Asynchronous mode, the spectrum is averaged. In Synchronous mode, the time waveforms are averaged. IMPORTANT: The averaged data is used only for captured time waveform or FFTs. All data that is calculated from the FFT, such as bands, is taken from each individual sample, not the averaged sample.																																	
Tachometer Rotations	Enter the number of teeth on the buried shaft gear.	Set the value between 1 . . . 65,535.																																	
Rotor Rotations	Enter the number of teeth on the external shaft gear.	These parameters are dimmed in asynchronous sampling.																																	
Gear Ratio	Displays the relationship between the Tachometer Rotations and the Rotor Rotations parameters. The Tachometer Rotations and Rotor Rotations are used to convert the speed that is measured by the speed sensor to a shaft speed that is related by this gear ratio. This information is useful when the shaft of interest does not have a speed sensor of its own. When a gear ratio is configured, the synchronous measurements are synchronized with the rotation of the buried (internal) shaft. This synchronization includes the Vector, Not 1X, Sum Harmonics, and order-based Band measurements. Synchronous averaging is also synchronized with the internal shaft. However, the Speed measurement is not affected by the gear ratio. The Speed measurement always reflects the speed of the shaft with the speed sensor (raw tachometer speed divided by number of pulses per revolution).	This parameter applies only to synchronous sampling. <table border="1"> <thead> <tr> <th>FMAX options</th> <th>Channel is configured for no integration</th> <th>Channel is configured for any integration</th> </tr> </thead> <tbody> <tr> <td>10 . . . 5000</td> <td>X</td> <td>X</td> </tr> <tr> <td>6250</td> <td>X</td> <td></td> </tr> <tr> <td>7500</td> <td>X</td> <td></td> </tr> <tr> <td>8000</td> <td>X</td> <td></td> </tr> <tr> <td>9375</td> <td>X</td> <td></td> </tr> <tr> <td>10,000</td> <td>X</td> <td></td> </tr> <tr> <td>12,500</td> <td>X</td> <td></td> </tr> <tr> <td>15,000</td> <td>X</td> <td></td> </tr> <tr> <td>18,750</td> <td>X</td> <td></td> </tr> <tr> <td>20,000</td> <td>X</td> <td></td> </tr> </tbody> </table>	FMAX options	Channel is configured for no integration	Channel is configured for any integration	10 . . . 5000	X	X	6250	X		7500	X		8000	X		9375	X		10,000	X		12,500	X		15,000	X		18,750	X		20,000	X	
FMAX options	Channel is configured for no integration	Channel is configured for any integration																																	
10 . . . 5000	X	X																																	
6250	X																																		
7500	X																																		
8000	X																																		
9375	X																																		
10,000	X																																		
12,500	X																																		
15,000	X																																		
18,750	X																																		
20,000	X																																		

Band Measurement Options

The Band measurement options apply to the Standard, Alternating gSE, Continuous gSE, and Thrust Position measurement modes. These settings affect the Band measurements that are derived from the FFT. There are four Band measurements for each channel. Click Band to open the Band options dialog box.

TIP The frequency ranges for each Band measurement have overlap potential. For example, Band 1 Minimum Frequency is 500 Hz and Maximum Frequency is 1500 Hz, and Band 2 Minimum Frequency is 1000 Hz and Maximum Frequency is 3000 Hz.

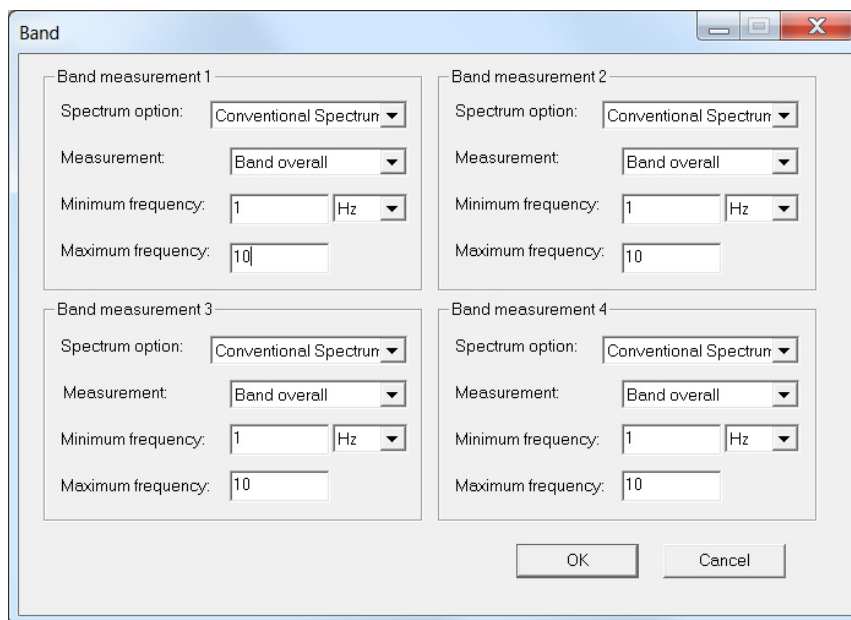


Table 11 - Band measurement parameters

In this field	Values are	Comments
Spectrum Option	Choose whether the Band measurement is derived from the conventional (standard) or gSE spectrum.	This option is only available in Alternating gSE measurement mode.
Frequency Units	Choose Hz, CMP, or Orders.	Enter Frequency Minimum and Maximum limits of the band in the selected units.
Measurement	Choose the measurement (or calculation) performed to produce the Band Value: <ul style="list-style-type: none"> • Band Overall - The band value is the square root of the sum of the squares (RSS) of the amplitude values for the bins that make up the band. • Maximum Peak - The band value is equal to the maximum bin amplitude found within the band. 	

Table 11 - Band measurement parameters (Continued)

In this field	Values are	Comments																
Frequency Maximum	<p>Enter the upper limit of the range of spectrum bins to be included in the band measurement, and the frequency units (Hz or Orders). Set the value by using this table.</p> <table border="1"> <thead> <tr> <th>Sampling Mode</th> <th>Spectrum Frequency Max Units</th> <th>Band Units</th> <th>Band Frequency Max</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Synchronous</td> <td rowspan="2">Orders</td> <td>Hz</td> <td>0...5000</td> </tr> <tr> <td>Orders</td> <td>0.01...200</td> </tr> <tr> <td rowspan="2">Asynchronous</td> <td rowspan="2">Hz</td> <td>Hz</td> <td>0...20,000</td> </tr> <tr> <td>Orders</td> <td>0.01...200</td> </tr> </tbody> </table>	Sampling Mode	Spectrum Frequency Max Units	Band Units	Band Frequency Max	Synchronous	Orders	Hz	0...5000	Orders	0.01...200	Asynchronous	Hz	Hz	0...20,000	Orders	0.01...200	<p>This value must be greater than the Band Frequency Minimum.</p> <p>When integrating, the Maximum Frequency may not be set greater than the 2 kHz analog LPF that is applied to all integrating measurements.</p>
Sampling Mode	Spectrum Frequency Max Units	Band Units	Band Frequency Max															
Synchronous	Orders	Hz	0...5000															
		Orders	0.01...200															
Asynchronous	Hz	Hz	0...20,000															
		Orders	0.01...200															
Frequency Minimum	Enter the spectrum bin with the least frequency to be included in the band measurement.																	

IMPORTANT

For bands specified in Hz on an orders-based spectrum (Sampling Mode set to Synchronous with tach), the band measurement value is zero when the Band Frequency Minimum and Frequency Maximum fall beyond the frequencies represented in the spectrum. If any of the band falls within the spectrum, only that portion contributes to the band value.

Example

Band Frequency Maximum = 250 Hz

Band Frequency Minimum = 150 Hz

Spectrum Frequency Maximum = 10 Orders

This table shows the actual Band Frequency Maximum and Minimum values given different operating speeds for this example. When the speed is 600 rpm, the Band Frequency Maximum, and Minimum values fall outside the range of the Spectrum Frequency Maximum, so that the band value is zero. When the speed is 1200 rpm, the band is calculated from 150...200 Hz.

Speed (rpm)	Max Frequency Represented in Spectrum (Hz)	Band Min (Hz)	Band Max (Hz)
2400	400	150	250
1800	300	150	250
1200	200	150	200
600	100	N/A	N/A

gSE Measurement Options

The gSE Measurement options apply to the Alternating gSE and Continuous gSE measurement modes. These settings affect the gSE Overall or gSE FFT measurements.

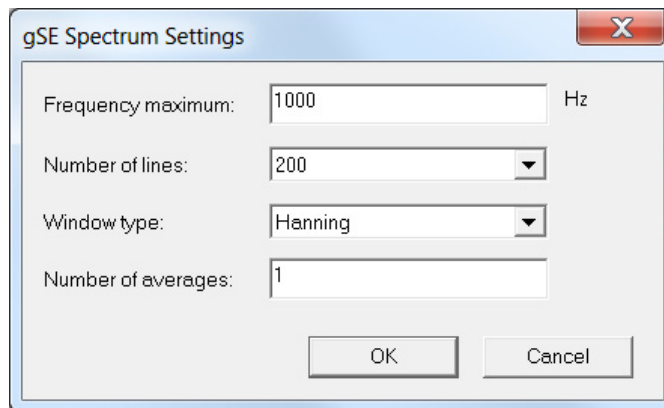
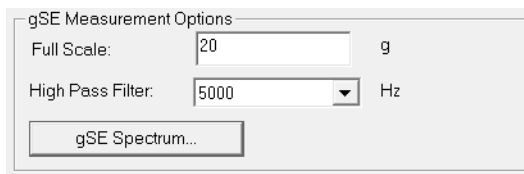


Table 12 - gSE Measurement Parameters

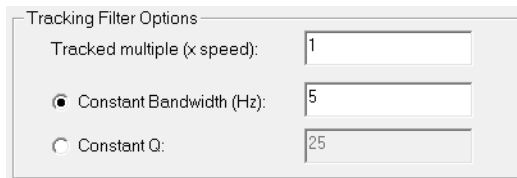
In this field	Values are	Comments
Full Scale	The maximum signal level that is expected to be processed by the channel for gSE measurements. This value is used to determine the programmable gain settings across each stage of the channel's analog signal processing circuit.	The default value is 20 gSE.
High Pass Filter	Choose the high pass filter to apply to the gSE measurement. <ul style="list-style-type: none"> • 200 Hz • 500 Hz • 1000 Hz • 2000 Hz • 5000 Hz 	The high pass filter is useful in removing low frequency signal components that could otherwise dominate the signal. The high pass filter attenuates frequencies less than the selected frequency. It allows, or passes, frequencies greater than the selected frequency.
Frequency maximum	Enter the maximum frequency for the gSE spectrum, 10...5,000 Hz.	The gSE spectrum always uses asynchronous sampling mode and the FMAX is always in Hz.
Number of lines	Choose the number of lines (bins) in the gSE spectrum measurement: <ul style="list-style-type: none"> • 100 • 200 • 400 • 800 • 1600 	This number determines the frequency resolution of the gSE spectrum.

Table 12 - gSE Measurement Parameters (Continued)

In this field	Values are	Comments
Window type	<p>Choose the type of window to be applied to the waveform measurement before computing the spectrum:</p> <ul style="list-style-type: none"> Rectangular - Also known as Uniform (no window). Use rectangular only for transient signals that die out before the end of the time sample, or for exactly periodic signals within the time sample. Gives poor peak amplitude accuracy, good peak frequency accuracy. Hamming - A general-purpose window that is similar to a Hanning window. It provides better frequency resolution but decreased amplitude accuracy when compared to the Hanning window. Use it to separate close frequency components. Gives fair peak amplitude accuracy, fair peak frequency accuracy. Hanning - A general-purpose window that is similar to a Hamming window. It is used on random type data when frequency resolution is more important than amplitude accuracy. Most often used in predictive maintenance. Gives fair peak amplitude accuracy, fair peak frequency accuracy. Flat Top - Also called Sinusoidal window. Use flat top when amplitude accuracy is more important than frequency resolution. A Flat Top window can smear the peaks together into one wide peak, in data with closely spaced peaks. Gives good peak amplitude accuracy, poor peak frequency accuracy for data with discrete frequency components. Kaiser Bessel - Gives fair peak amplitude accuracy, fair peak frequency accuracy. 	
Number of averages	Enter the number of individual data sets to be incorporated into the averaged gSE spectrum.	Averaging reduces the random errors and provides a more reliable measurement.

Tracking Filter Options

The Tracking Filter options apply to the Tracking Filter measurement mode and affect the Tracking Filter measurement.



In this field	Values are	Comments
Tracked multiple	0.1 . . . 20 times the measured machine speed	Sets the multiple of the machine speed to be tracked.
Constant Bandwidth	Enter the filter bandwidth in the range of 0.1 . . . 25 Hz	Select Constant Bandwidth to configure the tracking filter to maintain a constant bandwidth as the machine speed varies.
Constant Q	Enter the filter Q factor in the range of 1 . . . 200.	Select Constant Q to configure the tracking filter to maintain a constant ratio between the bandwidth and the center frequency (machine speed).

Band Pass Filter Options

The Band Pass Filter options apply to the Band Pass Filter measurement mode and affect the Band Pass Filter measurement.

In this field	Values are	Comments
Min Frequency	25 . . . 1000 Hz	The high pass corner frequency or low cutoff frequency of the band pass filter.
Max Frequency	100 . . . 5500 Hz	The low pass corner frequency or high cutoff frequency of the band pass filter.

Thrust Position Measurement Options

The Thrust Position measurement options apply to the Thrust Position measurement mode and affect the Thrust Position measurement.

Table 13 - Thrust position parameters

Parameter Name	Values are	Comments
Output data unit	Select mil or μ m.	The units of the Thrust Position measurement value.
Target Angle	Sets the angle between the shaft and the target surface. The target surface moves with the shaft. The transducer is mounted perpendicular to the target surface.	degrees
Upscale	Sets the movement of the target relative to the transducer that is considered positive displacement.	Options: • Away • Towards
Calibration Offset (XM Serial Configuration Utility only)	Enter the position of the current Transducer DC Bias reading.	mils

Table 13 - Thrust position parameters (Continued)

Parameter Name	Values are	Comments
Calibration Bias	<p>Sets the zero or green position. The zero position is the normal operating position. Setting the zero position compensates for the static gap. This compensation enables the module to display only the displacement around the zero position.</p> <p>Use one of the following formulas to calculate the Calibration Bias. The formula that you use depends on the Upscale setting and whether DC High Limit and DC Low Limit are both less than or equal to zero.</p> <ul style="list-style-type: none"> • If DC High Limit is greater than zero, use one of these formulas: <ul style="list-style-type: none"> – Upscale set to 'Towards' Formula Calibration bias = Transducer DC Bias + (Sensitivity x Calibration Offset) x sin (Target Angle) – Upscale set to 'Away' Formula Calibration Bias = Transducer DC Bias - (Sensitivity x Calibration Offset) x sin (Target Angle) • If DC High Limit and DC Low Limit are both less than or equal to 0, use one of these formulas: <ul style="list-style-type: none"> – Upscale set to 'Towards' Formula Calibration bias = Transducer DC Bias - (Sensitivity x Calibration Offset) x sin (Target Angle) – Upscale set to 'Away' Formula Calibration Bias = Transducer DC Bias + (Sensitivity x Calibration Offset) x sin (Target Angle) 	<p>Volts</p> <p>IMPORTANT: Check with the manufacturer about operating thrust position and acceptable tolerances before making any adjustments.</p>
Calculate Bias (XM Serial Configuration Utility only)	Automatically calculates the Calibration Bias value.	

IMPORTANT The XM-124 module supports only Normal mode position measurements. If Head-to-Head or Radial Cancel measurements are required, then the XM-320 module (catalog number 1440-TPS02-01RB) must be used.

Position measurements, including thrust, can be measured in one of three ways:

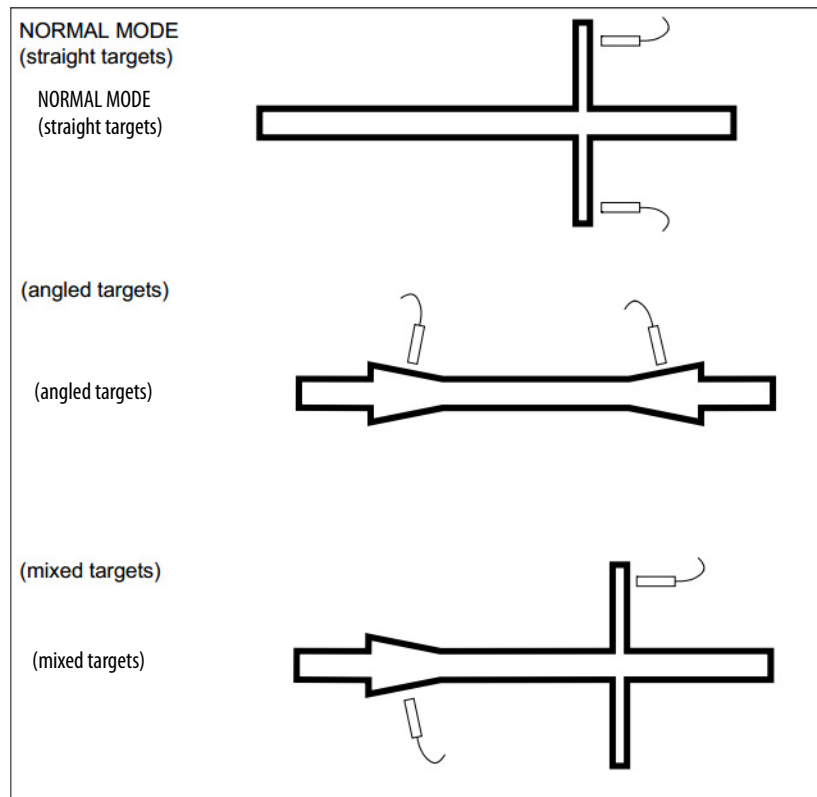
- Normal - The two sensors are used independently to perform two separate position measurements.
- Head-to-head⁽¹⁾ - The two sensors are used together, facing each other on either side of the target, to perform a single position measurement. This mode can be used to extend the measurable range beyond that of one sensor.
- Radial Cancel⁽¹⁾ - The two sensors are used together to perform a single position measurement. The second sensor is configured to measure the radial movement of the target. The radial movement is then subtracted from the position measurement performed by the first sensor.

(1) Head-to-Head and Radial Cancel modes are not available in the XM-124. See IMPORTANT note, above.

In Normal mode, the module behaves as a two channel differential unit with the probes mounted on the casing and measuring the shaft position relative to the casing. Positioning of probes is critical to be sure that valid shaft movement cannot at any time damage the probes. Selection of probe type and range is important. The static gaps of the probes are automatically subtracted from the measurement so that the system can measure small movements relative to the total gaps.

When using this mode, the module uses straight targets, angled targets, or mixed target types, as shown in [Figure 38](#).

Figure 38 - Normal Mode



The XM-124 provides monitoring facilities only for axial (thrust) measurements.

Eccentricity Measurement Options

The Eccentricity options apply to the Eccentricity measurement mode and affect the Eccentricity measurement.

In this field	Values are	Comments
Output data unit	Select mil or μm .	The units of the Eccentricity measurement value.
Update rate	Enter a value from 1...255 seconds.	When the tachometer is enabled the Eccentricity measurement value updates once per revolution. But when the tachometer is disabled or faulted then the measurement value updates at the specified period. Enter an update period that is greater than the time it takes for one machine revolution.

Configure the Tachometer Properties

The Tachometer tab defines the characteristics of the tachometer and the signal processing that is performed on the tachometer signal.

1. From the Module Properties dialog box, click the Tachometer tab.

2. Configure the parameters, as necessary.

Table 14 - Tachometer parameters

In this field	Values are	Comments
Enable Auto Trigger	Check to enable Auto Trigger mode. The minimum signal amplitude for triggering is 2V peak-to-peak and the minimum frequency is 6 CPM (0.1 Hz). Clear to enable Manual Trigger mode. The value that is entered in Trigger Threshold is used as the trigger point. The minimum signal amplitude for triggering is 500 mV peak-to-peak and the minimum frequency is 1 CPM (0.016 Hz).	Using Auto Trigger mode can cause the tachometer to trigger on noise if the signal is small. For example, you have 1V of noise on a 2V signal. To help prevent this trigger, make sure the percentage noise in the signal is less than the value entered in the Trigger Hysteresis.
Trigger Hysteresis	Enter the amount of hysteresis around the trigger threshold.	Enter a value between 0 . . .50. In Auto Trigger mode, the value that is entered is a percentage of the peak-to-peak input signal. In Manual Trigger mode, the value that is entered is a voltage level. The hysteresis voltage is added to or subtracted from the threshold voltage to determine the hysteresis range.
Trigger Level	Enter the signal level to be used as the trigger value when in Manual Trigger mode.	This parameter is dimmed in Auto Trigger mode.
Trigger Slope	Choose the input signal slope to be used with the trigger value: • Positive • Negative The trigger point of the tachometer defines 0° for phase measurement. If the tachometer is a square wave, the phase angles that are measured varies by 180° depending on whether the Trigger Slope is set to positive or negative.	
DC High Limit	Enter the maximum expected DC bias voltage from the transducer.	A voltage reading outside this range constitutes a transducer fault, which is indicated with the tachometer status indicator blinking red and the TachFault input tag.
DC Low Limit	Enter the minimum, or most negative, expected DC voltage from the transducer.	
Inhibit Zero Pulse Tachometer Fault	Check to enable Inhibit Zero Pulse Tachometer Fault. Clear to disable Inhibit Zero Pulse Tachometer Fault.	Controls whether a tachometer fault occurs if no pulses are detected on the tachometer signal.
Fault Delay	Enter the number of seconds that the module must wait after the last valid pulse signal before it indicates a tachometer fault.	Enter a value between 1 . . .64 seconds.
Pulses Per Revolution	Enter the number of tachometer signal pulses per revolution of the shaft. If the speed sensor is a proximity probe over a keyway, there is one pulse around the shaft. If the speed sensor is a proximity probe over a gear, there is a pulse for each tooth on the gear. If the sensor detects reflective tape or paint, there is a pulse for each reflective area around the shaft.	Enter 0 (zero) if you are not using a tachometer. This value disables the speed, acceleration, and most phase measurements.
Response Time	Choose how quickly the measured speed value and acceleration value responds to a change in the input signal: • 2640 ms • 220 ms • 22 ms For example, setting the time to 220 ms means that the speed is averaged over a quarter second. The reported value reaches 90% of the new steady state value about 220 ms after the change in machine speed.	Faster response times (22 ms) produce measurements that are more accurate but are more susceptible to noise. Slower response times (220 ms, 2640 ms) produce less accurate measurements but are less susceptible to noise. Fast response times are generally used when you want to track rapid speed changes. Slow response times are generally used for steady speed applications or applications where it is not necessary to track speed during rapid changes.

Alarm, Relay, and 4...20 mA Output Parameters

Use this dialog box to configure alarms, relays, and the analog output signal. The 4...20 mA output has no dependencies, so these parameters can be configured in any order. However, the relay logic is dependent on alarms, so always configure alarms before relays.

Table 15 - Alarm Parameters

Parameter Name	Description	Values/Comments						
Number (1...16) (XM Serial Configuration Utility only)	Sets the alarm to be configured in the XM Serial Configuration Utility. There are 16 alarms in the XM-124 module. The alarms are not restricted to a channel.	Select a number from 1...16.						
Name (XM Serial Configuration Utility only)	A descriptive name to identify the alarm in the XM Serial Configuration Utility.	Maximum 18 characters						
Enable	Enable/disable the selected alarm. IMPORTANT: The Alarm Status is set to 'Disarm' when the alarm is disabled.	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check to Enable</td> <td>Enabled</td> </tr> <tr> <td>Clear to Disable</td> <td>Disabled</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Check to Enable	Enabled	Clear to Disable	Disabled
XM Configuration Utility	EDS File							
Check to Enable	Enabled							
Clear to Disable	Disabled							
Measurement	The type of measurement and the channel that is associated with the alarm. IMPORTANT: A maximum of eight alarms can be associated with any one measurement.	Options: Ch1 / Ch2 Overall <ul style="list-style-type: none"> • Ch1 / Ch2 Gap • Ch1 / Ch2 Band 1-4 • Speed • Mag • Ch1 / Ch2 1X Mag • Ch1 / Ch2 2X Mag • Ch1 / Ch2 3X Mag • Ch1 / Ch2 Not 1X • Ch1 / Ch2 Sum Harmonics • Ch1 / Ch2 1X Phase • Ch1 / Ch2 2X Phase • Phase • Acceleration • Ch1 / Ch2 Thrust Position • Ch1 / Ch2 gSE Overall • Ch1 / Ch2 Tracking Mag • Ch1 / Ch2 Tracking Phase • Ch1 / Ch2 Band Pass • Ch1 / Ch2 Eccentricity 						
Condition	Controls when the alarm triggers: <ul style="list-style-type: none"> • Greater than - Triggers the alarm when the measurement value is greater than or equal to the Alert and Danger Threshold values. • The Danger Threshold value must be greater than or equal to the Alert Threshold value for the trigger to occur. • Less than - Triggers the alarm when the measurement value is less than or equal to the Alert and Danger Threshold values. • The Danger Threshold value must be less than or equal to the Alert Threshold value for the trigger to occur. • Inside range - Triggers the alarm when the measurement value is equal to or inside the range of the Alert and Danger Threshold values. • The Danger Threshold (High) value must be less than or equal to the Alert Threshold (High) value. The Danger Threshold (Low) value must also be greater than or equal to the Alert Threshold (Low) value for the trigger to occur. • Outside range - Triggers the alarm when the measurement value is equal to or outside the range of the Alert and Danger Threshold values. • The Danger Threshold (High) value must be greater than or equal to the Alert Threshold (High) value. The Danger Threshold (Low) value must also be less than or equal to the Alert Threshold (Low) value for the trigger to occur. 	Options: <ul style="list-style-type: none"> • Greater Than • Less Than • Inside Range • Outside Range IMPORTANT: This parameter is not applicable for a vector (phase) alarm type or phase measurement.						

Table 15 - Alarm Parameters (Continued)

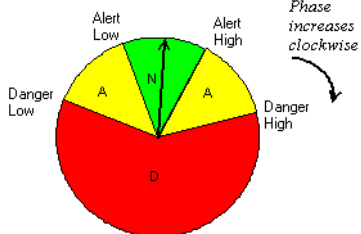
Parameter Name	Description	Values/Comments
Alert Threshold (High)	The threshold value for the alert (alarm) condition. IMPORTANT: This parameter is the greater threshold value when Condition is set to 'Inside Range' or 'Outside Range,' the measurement is a phase measurement (Configuration Utility), or the alarm type is a vector alarm (EDS file).	Same measurement unit as Output Data Unit selection for the specified channel except when measurement/alarm type is phase (vector). Phase Measurements/Vector Alarm Type Requirements: <ul style="list-style-type: none"> The Alert Low, Danger Low, Alert High, and Danger High must define contiguous sections within the set of possible phase values (0...360 degrees). If you plot the thresholds on a clock face (illustration with phase increasing in the clockwise direction, then adjust these settings: <ul style="list-style-type: none"> Alert Low must be clockwise from or equal to Danger Low. Alert High must be clockwise from Alert Low. Danger High must be clockwise from or equal to Alert High. 
Danger Threshold (High)	The threshold value for the danger (shutdown) condition. IMPORTANT: This parameter is the greater threshold value when Condition is set to 'Inside Range' or 'Outside Range,' the measurement is a phase measurement (Configuration Utility), or the alarm type is a vector alarm (EDS file).	
Alert Threshold (Low)	The lesser threshold value for the alert (alarm) condition. IMPORTANT: This parameter is not used when Condition is set to 'Greater Than' or 'Less Than.'	
Danger Threshold (Low)	The lesser threshold value for the danger (shutdown) condition. IMPORTANT: This parameter is not used when Condition is set to 'Greater Than' or 'Less Than.'	
Hysteresis	The amount that the measured value must fall (below the threshold) before the alarm condition is cleared. For example, Alert Threshold = 120 and Hysteresis = 2. The alarm (alert) activates when the measured value is 120 and does not clear until the measured value is 118. IMPORTANT: The Alert and Danger Thresholds use the same hysteresis value. IMPORTANT: For the Outside Range condition, the hysteresis value must be less than Alert Threshold (High) – Alert Threshold (Low).	Same measurement unit as Output Data Unit selection for the specified channel.
Detection Delay	Enter the length of time for which the Alarm Condition must persist before the alarm is signaled. Applying delays can reduce nuisance alarms caused by external noise and/or transient vibration events. IMPORTANT: Delays can also be applied as part of the Relay definition. Delays there are associated with the Relay Activation Logic, and only begin once any Alarm condition is signaled. Consequently, applying delays to both the Alarm and Relay results in a total delay time, before relay actuation, which is the sum of the alarm and relay delay times.	Enter a value 0...65.5 seconds.
Start-up Period	The length of time that the Threshold Multiplier is applied to the thresholds. The start-up period begins when the setpoint multiplier switch is reopened (push button disengaged or toggle switch flipped to off).	Enter a value from 0...1092 minutes, adjustable in increments of 0.1 minutes.
Threshold Multiplier	The action to take when the setpoint multiplier switch is closed (push button engaged or toggle switch flipped to on) and during the start-up period once the switch is reopened. The module applies the multiplier to the alarm thresholds during this time to avoid false alarms at resonance frequencies. IMPORTANT: The multiplication can have the opposite of the intended effect under certain circumstances. For example, if the Condition is set to 'Less Than' and the thresholds are positive, then multiplication of the threshold values increases the likelihood of the measured value being within the alarm range. Therefore, it can be beneficial to set Threshold Multiplier to zero to disable the alarm during the start-up period.	Enter a floating point value in the range of 0...10. Enter 0 (zero) to disable the alarm during the start-up period.

Table 15 - Alarm Parameters (Continued)

Parameter Name	Description	Values/Comments						
Speed Range Enable	Controls whether the selected alarm is enabled only when the measured speed is within a machine speed range. Enter the machine speed range in Speed Range High and Speed Range Low.	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check to Enable</td> <td>Enabled</td> </tr> <tr> <td>Clear to Disable</td> <td>Disabled</td> </tr> </tbody> </table> <p>Important: The tachometer must be enabled (Pulses Per Revolution set to 1 or more) and a tachometer signal must be provided at the tachometer input when Speed Range Enable is enabled. Important: You cannot enable the Speed Range parameter when alarm Measurement is set to 'Speed.' See page 75.</p>	XM Configuration Utility	EDS File	Check to Enable	Enabled	Clear to Disable	Disabled
XM Configuration Utility	EDS File							
Check to Enable	Enabled							
Clear to Disable	Disabled							
Speed Range Low	The lesser threshold of the machine speed range. This value must be less than the Speed Range High value. This parameter is not used when Speed Range Enabled is disabled.	rpm						
Speed Range High	The greater threshold of the machine speed range. This value must be greater than the Speed Range Low value. This parameter is not used when Speed Range Enabled is disabled.	rpm						

Relay Parameters

The Relay parameters control the operation of the onboard relay, as well as the relays on the Relay Expansion (XM-441) module. Use these parameters to configure which alarm the relay is associated with, as well as the behavior of the relay.

IMPORTANT A relay can be defined, regardless of whether it is physically present. A non-physical relay is a virtual relay. When a relay (physical or virtual) activates, the module sends a Change of State (COS) message to its master, which acts on the condition as necessary. An XM-440 Master Relay Module can activate its own relays in response to a relay (physical or virtual) activation at any of its slaves.

Table 16 - Relay Parameters

Parameter Name	Description	Options/Comments
Number (XM Serial Configuration Utility only)	Sets the relay to be configured in the XM Serial Configuration Utility.	Relay Number 1 is the onboard relay. Numbers 2...5 are either relays on the Expansion Relay module when it's connected to the module or virtual relays. Virtual relays are non-physical relays. Use them when you want the effect of the relay (monitor alarms, delay, and change status) but do not need an actual contact closure. For example, a PLC or controller monitoring the relay status. IMPORTANT: The Relay Installed parameter indicates whether a relay is a virtual relay or a physical relay on a module.
Name (XM Serial Configuration Utility only)	A descriptive name to help identify the relay in the XM Serial Configuration Utility.	Maximum 18 characters

Table 16 - Relay Parameters (Continued)

Parameter Name		Description	Options/Comments										
Enable		Enable/disable the selected relay. IMPORTANT: The Relay Current Status is set to 'Not Activated' when the relay is disabled. See page 100 .	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check to Enable</td> <td>Enabled</td> </tr> <tr> <td>Clear to Disable</td> <td>Disabled</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Check to Enable	Enabled	Clear to Disable	Disabled				
XM Configuration Utility	EDS File												
Check to Enable	Enabled												
Clear to Disable	Disabled												
<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Latching</td> <td>Latching Option</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Latching	Latching Option	Controls whether the relay must be explicitly reset after the alarm subsides.	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check means latching (relay must be explicitly reset)</td> <td>Latching</td> </tr> <tr> <td>Clear means non-latching (relay is reset once the alarm condition has passed)</td> <td>Nonlatching</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Check means latching (relay must be explicitly reset)	Latching	Clear means non-latching (relay is reset once the alarm condition has passed)	Nonlatching	
XM Configuration Utility	EDS File												
Latching	Latching Option												
XM Configuration Utility	EDS File												
Check means latching (relay must be explicitly reset)	Latching												
Clear means non-latching (relay is reset once the alarm condition has passed)	Nonlatching												
Activation Delay		Enter the length of time for which the Activation Logic must be true before the relay is activated. This value reduces nuisance alarms caused by external noise and/or transient vibration events. IMPORTANT: True Peak and True Peak-to-Peak signal detection is more sensitive to transients and noise. To avoid false relay trips, it is recommended that the Activation Delay value is greater than the Overall Time Constant value when Signal Detection is set to 'True Peak' or 'True Peak-to-Peak.' IMPORTANT: The definition of each alarm can also include a Detection Delay time. If so, the alarm must persist for the specified Detection Delay time before the Relay Activation Logic can consider the alarm condition. Consequently, if delays are applied to both the alarm and the relay, the actual delay time of the relay is the sum of the Alarm Detection Relay and the Relay Activation Delay.	Enter a value between 0. . . 65.5 seconds. The default is 1 second.										
<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Activation Logic</td> <td>Logic</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Activation Logic	Logic	Sets the relay activation logic: <ul style="list-style-type: none"> A or B - Relay is activated when either Alarm A or Alarm B meets or exceeds the selected Alarm Status condition. A and B - Relay is activated when both Alarm A and Alarm B meet or exceed the selected Alarm Status condition. A Only - Relay is activated when Alarm A meets or exceeds the selected Alarm Status condition. 	Options: <ul style="list-style-type: none"> A only A or B A and B 							
XM Configuration Utility	EDS File												
Activation Logic	Logic												
<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Alarm A/B</td> <td>Alarm Identifier A/B</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Alarm A/B	Alarm Identifier A/B	Sets the alarm that the relay monitors. The alarm must be from the same device as the relay. When the Activation Logic is set to 'A and B' or 'A or B' you can select an alarm in both Alarm A and Alarm B. The system monitors both alarms. When the Activation Logic is set to 'A Only,' you can select an alarm only in Alarm A.	Alarm No. 1 . . . 16 IMPORTANT: You can only select an alarm that is enabled.							
XM Configuration Utility	EDS File												
Alarm A/B	Alarm Identifier A/B												
<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Alarm Status to Activate On</td> <td>Alarm Levels</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Alarm Status to Activate On	Alarm Levels	Sets the alarm conditions that cause the relay to activate. You can select more than one: <ul style="list-style-type: none"> Normal - The current measurement is not within excess of any alarm thresholds. Alert - The current measurement is in excess of the alert level threshold but not in excess of the danger level threshold. Danger - The current measurement is in excess of the danger level threshold. Disarm - The alarm is disabled or the device is in Program mode. Xdcr Fault - A transducer fault is detected on the associated transducer. Module Fault - Hardware or firmware failure, or an error has been detected and is preventing proper operation of the device. Tacho Fault - A required tachometer signal has not been detected. There is no transducer fault either. 	Options: <ul style="list-style-type: none"> Normal Danger Xdcr Fault Tacho Fault Alert Disarm Module Fault Check to enable. Clear to disable. 							
XM Configuration Utility	EDS File												
Alarm Status to Activate On	Alarm Levels												

Table 16 - Relay Parameters (Continued)

Parameter Name		Description	Options/Comments											
Relay Installed		Indicates whether the relay is a physical relay on a module or a virtual relay. If the relay is a physical relay, then you can set the Failsafe parameter. If the relay is a virtual relay, the Failsafe parameter is not used or it is disabled.	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check = Physical Relay</td> <td>Installed = Physical Relay</td> </tr> <tr> <td>Clear = Virtual Relay</td> <td>Not Installed = Virtual Relay</td> </tr> </tbody> </table>		XM Configuration Utility	EDS File	Check = Physical Relay	Installed = Physical Relay	Clear = Virtual Relay	Not Installed = Virtual Relay				
XM Configuration Utility	EDS File													
Check = Physical Relay	Installed = Physical Relay													
Clear = Virtual Relay	Not Installed = Virtual Relay													
<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Failsafe Relay</td> <td>Failsafe Option</td> </tr> </tbody> </table>		XM Configuration Utility	EDS File	Failsafe Relay	Failsafe Option	<p>Determines whether the relay is failsafe or non-failsafe. Failsafe operation means that when in alarm, the relay contacts are in their 'normal', de-energized, or 'shelf-state' positions. In other words, normally closed relays are closed in alarm, and normally open relays are open in alarm. With failsafe operation, a power failure equals an alarm.</p> <ul style="list-style-type: none"> • In failsafe operation: <ul style="list-style-type: none"> – The relay is energized when power is applied to the module. – The relay in a nonalarmed condition has power applied to the coil. – In alarm condition, power is removed from the relay coil, causing the relay to change state. • For non-failsafe operation: <ul style="list-style-type: none"> – Under nonalarm conditions, the relay closes the circuit between the common and the N.C. (normally closed) terminals. – Under alarm conditions, the relay changes state to close the circuit between the common and the N.O. (normally open) terminals. • For failsafe operation: <ul style="list-style-type: none"> – Under nonalarm (with power applied to the unit) conditions, the relay closes the circuit between the common and the N.O. terminals. – Under alarm or loss-of-power conditions, the relay changes state to close the circuit between the common and the N.C. terminals. 	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check means failsafe</td> <td>Failsafe</td> </tr> <tr> <td>Clear means non-failsafe</td> <td>Nonfailsafe</td> </tr> </tbody> </table>		XM Configuration Utility	EDS File	Check means failsafe	Failsafe	Clear means non-failsafe	Nonfailsafe
XM Configuration Utility	EDS File													
Failsafe Relay	Failsafe Option													
XM Configuration Utility	EDS File													
Check means failsafe	Failsafe													
Clear means non-failsafe	Nonfailsafe													

4...20 mA Output Parameters

The 4...20 mA output parameters define the characteristics of the two 4...20 mA output signals. The parameters are the same for each output.

Table 17 - 4...20 mA Parameters

Parameter Name	Description	Options/Comments						
Enable	Enables/disables the 4...20 mA output.	<table border="1"> <thead> <tr> <th>XM Configuration Utility</th> <th>EDS File</th> </tr> </thead> <tbody> <tr> <td>Check to enable</td> <td>Enabled</td> </tr> <tr> <td>Clear to disable</td> <td>Disabled</td> </tr> </tbody> </table>	XM Configuration Utility	EDS File	Check to enable	Enabled	Clear to disable	Disabled
XM Configuration Utility	EDS File							
Check to enable	Enabled							
Clear to disable	Disabled							
Measurement	Sets the type of measurement and the channel that the 4...20 mA output signal tracks.	Options: <ul style="list-style-type: none"> • Ch1 / Ch2 Overall • Ch1 / Ch2 Gap • Ch1 / Ch2 Band 1–4 • Speed • Mag • Ch1 / Ch2 1X Mag • Ch1 / Ch2 2X Mag • Ch1 / Ch2 3X Mag • Ch1 / Ch2 Not 1X • Ch1 / Ch2 Sum Harmonics • Acceleration • Ch1 / Ch2 Thrust Position • Ch1 / Ch2 gSE Overall • Ch1 / Ch2 Tracking Mag • Ch1 / Ch2 Band Pass • Ch1 / Ch2 Eccentricity 						
Min Range	The measured value associated with the 4 mA.	Same measurement unit as Output Data Unit selection for the specified channel.						
Max Range	The measured value associated with the 20 mA.							

IMPORTANT Measured values between Min Range and Max Range are scaled into the range from 4...20 to produce the output value. The Min Range value does not have to be less than the Max Range value. If the Min Range value is greater than the Max Range value, then the output signal is effectively inverted from the input signal.

IMPORTANT The 4...20 mA outputs are either on or off. When they are on, the 4...20 mA outputs overshoot the 4 mA and 20 mA limits by 10% when the measurement exceeds the minimum and maximum range. The minimum current produced is 3.6 mA and the maximum current produced is 22 mA.

When the 4...20 mA outputs are off, they produce a current approximately 2.9 mA. The 4...20 mA outputs are off under the following conditions:

The 4...20 mA outputs are set to 'Disable'.

See [Table 17 on page 89](#).

The module is in Program mode.

A transducer fault or tachometer fault occurs that affects the corresponding measurement.

Triggered Trend Parameters

The XM-124 module can collect a triggered trend. A triggered trend is a time-based trend that is collected when a relay on the XM module is activated, or the module receives a trigger event.

Once the triggered trend is configured, the XM module continuously monitors the trended measurements. When a trigger occurs, the XM module collects additional data as specified by the Post Trigger parameter. The XM-124 module can also store the spectrum or waveform at the time of the trigger.

The XM module can only store one triggered trend. Unless the triggered trend is latched, the trend data is overwritten with new data when the next trigger occurs.

The triggered trend parameters define the trend data that is collected by the module. Use these parameters to select the measurements included in the trend records, the interval between trend records, and which relay triggers (activates) the collection of the trend data.

IMPORTANT The Triggered Trend parameters are not included in the EDS file and cannot be edited by using generic configuration tools such as RSNetWorx™ for DeviceNet software.

Table 18 - Triggered Trend Parameters

Parameter Name	Description	Values/Comments
Enable Triggered Trend Measurements	Enables/disables the triggered trend measurements. Select to configure the triggered trend measurements.	Check to enable. Clear to disable.
Select Measurements	Sets the measurements to be collected and stored in the module.	1...16 measurements can be selected.
Number of Records	The maximum number of measurement sets that can be collected in the trend buffer. The measurement sets make up the trend data.	The Number of Records is automatically calculated based on the number of Trended Measurements selected.
Latch Enable	Determines whether the triggered trend is latched or unlatched. Latched means that subsequent triggers are ignored after the initial trigger. This latch helps prevent the trend data from being overwritten with new data until the trigger is manually reset (click Reset Trigger). Unlatched means that the trend data is overwritten with new data every time a trigger occurs.	Check means latched Clear means unlatched
Relay Number	Sets the relay that triggers the trend to be collected.	None means that the trend can only be triggered manually or by a trigger event (for example, XM-440). Relay Number 1 is the onboard relay. Numbers 2...5 are either relays on the Expansion Relay module when it's connected to the module or virtual relays. IMPORTANT: The relay must be enabled. See Relay Parameters on page 86 .
Record Interval	The amount of time between consecutive trend records. IMPORTANT: If you enter a Record Interval, the Trend Span is automatically updated.	1...3600 seconds

Table 18 - Triggered Trend Parameters (Continued)

Parameter Name	Description	Values/Comments
Trend Span	The total amount of time that can be covered by the trend data (Number of Records x Record Interval). IMPORTANT: If you edit the Trend Span, the Record Interval is automatically updated.	Seconds
Post Trigger	The percentage of records to be collected once the trigger occurs. For example, if you set Post Trigger to 20%, then 80% of the records in the trend are before the trigger occurs, and 20% of the records in the trend are after the trigger occurs. This trigger lets you evaluate what happened after the trigger occurred.	0...100%
Status	Shows the status of the trend data.	Possible status values: <ul style="list-style-type: none"> • Not collected - No trend data is collected. • Collecting - A trigger has occurred and data (including post-trigger data) is being collected. • Collected - A trend has been saved to the buffer and is available to view and upload.
Store Spectrum	Stores the current spectrum data for both Channel 1 and Channel 2 when the trigger occurs.	
Store Waveform	Stores the current waveform data for both Channel 1 and Channel 2 when the trigger occurs.	
View Trend Data	Displays a plot of the collected trend data.	
Reset Trigger	Resets the trigger if Latch enabled is selected. This reset enables the module to overwrite the previous trend data when the next trigger occurs.	
Manual Trigger	Triggers the module to collect the trend data without relay activation.	
View Collected Data	Displays a plot of the collected spectrum or waveform data.	

SU/CD Trend Parameters

The XM-124 module can collect start-up or coast-down trend data when the machine speed passes into a defined speed range. A tachometer input is required to collect the start-up/coast-down trend.

The XM module collects a start-up trend when the machine speed rises through the Minimum Speed 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data only when machine speed is increasing. It does not collect data if the machine speed is constant or decreasing.

The XM module collects a coast-down trend when the machine speed falls through the Maximum Speed - 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data when the machine speed is decreasing or increasing during a coast-down trend (for example, a coast-down restart).

The XM module can only store one start-up/coast-down trend. Unless the start-up/coast-down trend is latched, the trend data is overwritten with new data when the next trigger occurs.

The SU/CD trend parameters define the trend data that is collected by the module during the start-up or coast-down of a machine. Use these parameters to configure the measurements included in the start-up and coast-down trend records, the interval between trend records, and the minimum and maximum speed limits at which record collection starts and stops.

IMPORTANT The SU/CD Trend parameters are not included in the EDS file and cannot be edited by using generic configuration tools such as RSNetWorx™ for DeviceNet software.

Table 19 - SU/CD Trend Parameters

Parameter Name	Description	Values/Comments
Enable SU/CD Trend	Enables/disables the SU/CD trend measurements. Select to configure the SU/CD trend measurements.	Check to enable. Clear to disable.
Select Measurements	Sets the measurements to be collected and stored in the module. IMPORTANT: The Speed measurement is always included in the start-up/coast-down trend.	1...16 measurements can be selected.
Number of Records	The maximum number of measurement sets that can be collected in the trend buffer. The measurement sets make up the trend data.	The Number of Records is automatically calculated based on the number of Trended Measurements selected.
Latch Enable	Determines whether the start-up/coast-down trend is latched or unlatched. Latched means that subsequent start-up/coast-down trends are ignored after the initial start-up/coast-down. This latch helps prevent the trend data from being overwritten with new data until the trigger is manually reset (click Reset Trigger). Unlatched means that the start-up/coast-down trend data is overwritten with new data every time the machine speed crosses into the speed range.	Check means latched Clear means unlatched
Record Interval	The change in speed between consecutive records. IMPORTANT: If you enter a Record Interval, the Maximum Trend Span is automatically updated.	1...3600 rpm
Maximum Trend Span	The maximum change in speed that can be covered by the trend data (Number of Records x Record Interval). IMPORTANT: If you edit the Trend Span, the Record Interval is automatically updated.	rpm
Minimum Speed	The lesser limit of the speed range in which records are collected in the start-up/coast-down trend. This value must be less than the Maximum Speed value.	rpm
Maximum Speed	The greater limit of the speed range in which records are collected in the start-up/coast-down trend. This value must be greater than the Minimum Speed value.	rpm Start-up/Coast-down Trend Considerations: <ul style="list-style-type: none"> The XM module collects a start-up trend when the machine speed rises through the Minimum Speed 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data only when the machine speed is increasing. It does not collect data if the machine speed is constant or decreasing. The XM module collects a coast-down trend when the machine speed falls through the Maximum Speed - 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data when the machine speed is decreasing or increasing during a coast-down trend (for example, a coast-down restart).

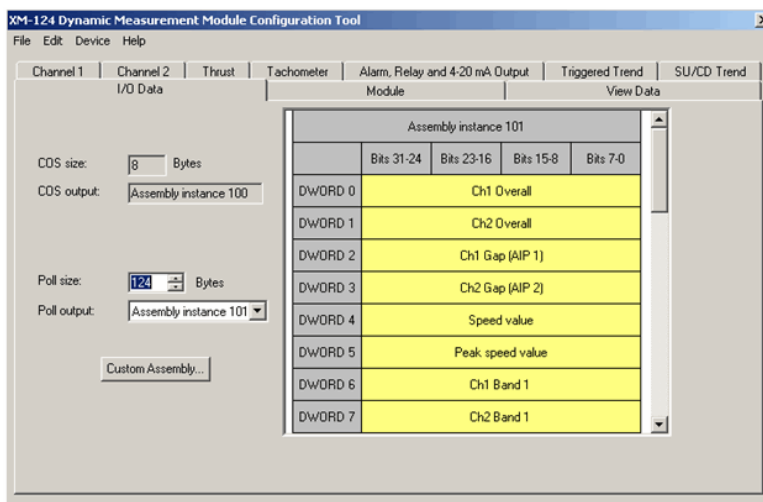
Table 19 - SU/CD Trend Parameters (Continued)

Parameter Name	Description	Values/Comments
Status	Shows the status of the trend data.	Possible status values: <ul style="list-style-type: none"> • Not collected - No trend data is collected. • Collecting - A trigger has occurred and data is being collected. • Collected - A trend has been saved to the buffer and is available to view and upload.
View Trend Data	Displays a plot of the collected trend data.	
Reset Trigger	Resets the trigger if Latch enabled is selected. This reset enables the module to overwrite the previous trend data when the machine speed crosses into the speed range.	

I/O Data Tab

If a controller reads the poll output table of the module, then consideration must be given to the content and organization of the displayed table before configuring the module. The module configuration must support (produce) the measurements defined in this table. Knowing what must be produced is critical to properly configuring the module.

Figure 39 - 1 Main Editor View, I/O Data Tab



Change of State (COS)

The editor displays the structure of the COS table if the COS size or COS output fields are clicked but the COS assembly is fixed and cannot be changed.

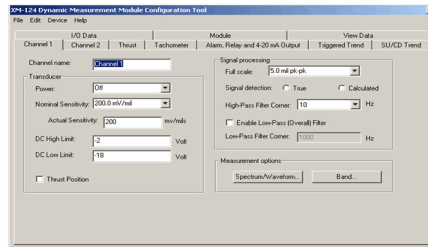
Poll Output

The output table defines the structure of the table output when polled by a scanner. The size and contents of the poll output can be modified in either Defined or Custom Assembly.

Defined Assembly

The Configuration Utility lets you define the Output Table contents either by uniquely defining a Custom Assembly, or by using the predefined assembly instance, 101.

Figure 40 - 1 Pre-defined Assembly Instances



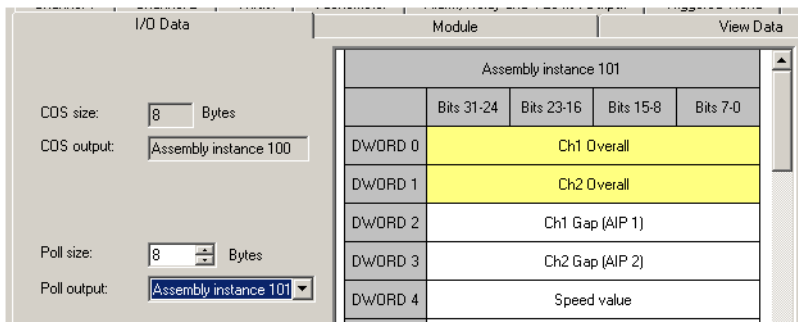
The pre-defined assembly instance 101 appears as shown.

Figure 41 - Assembly Instance 101

Assembly instance 101				
	Bits 31-24	Bits 23-16	Bits 15-8	Bits 7-0
DWORD 0	Ch1 Overall			
DWORD 1	Ch2 Overall			
DWORD 2	Ch1 Gap (AIP 1)			
DWORD 3	Ch2 Gap (AIP 2)			
DWORD 4	Speed value			
DWORD 5	Peak speed value			
DWORD 6	Ch1 Band 1			
DWORD 7	Ch2 Band 1			

When using the predefined assembly, the parameters and the order in which they appear is fixed. However, you can specify that only a subset of the assembly is communicated by limiting the number of bytes that are transmitted by using the Poll size parameter.

Figure 42 - 1 Assembly Instance 101 with Poll Size Set to 8



The importance of this is that it lets you:

- Limit the amount of data that is transmitted to just that which is necessary for the application. This limit minimizes the network loading on the DeviceNet network.
- Minimize the amount of scanner space required. DeviceNet scanners provide no more than about 500-bytes for their input table. By minimizing the size of the output table from each module, you can optimize the space available in their scanner table.

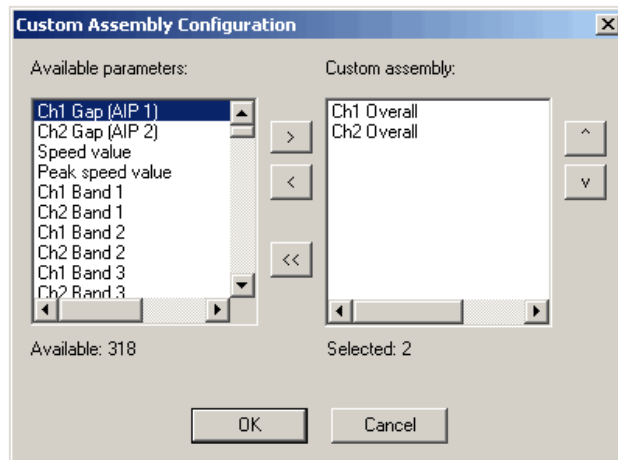
Custom Assembly

In some cases, the predefined assembly instance excludes the desired data in the required order. In these cases, a custom assembly can be specified.

IMPORTANT If a Custom Assembly is used, then the data in the controller table is not individually identified. It is up to you to map the desired data from the appropriate location in the table.

To define a Custom Assembly click Custom Assembly on the dialog box to open the Custom Assembly Configuration editor.

Figure 43 - 1 Custom Assembly Configuration Dialog Box

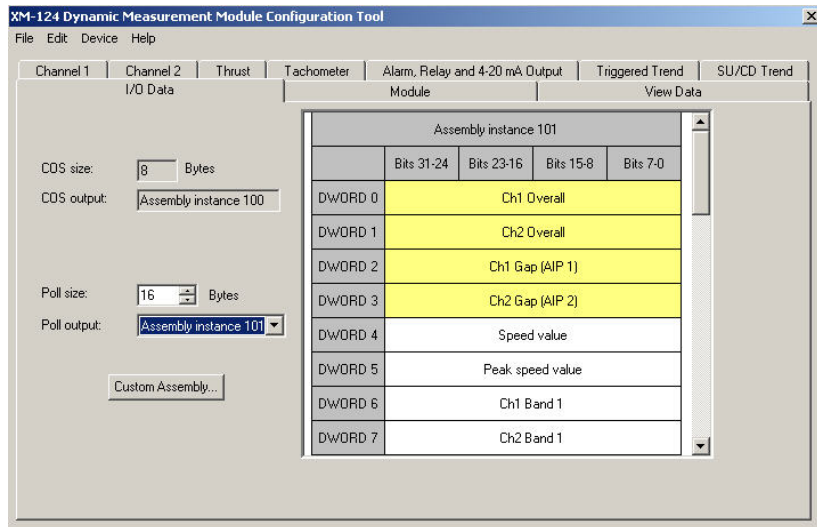


1. To move the desired parameters to the 'Custom assembly' pane (right side), click the left and right arrows between the panes.
2. To change the order of the parameters, click the up and down arrows.
3. Click OK.

The custom assembly is then presented as the assembly on the I/O dialog box.

See [Figure 44](#).

Figure 44 - 1 Custom Assembly on I/O Tab



Module

Use this dialog box to view the module identity specifics, including its DeviceNet address and communication rate. Depending on the DIP switch settings, it can also be used to set the address and communication rate of the module, as well as to update the firmware.

Identity

The identify section presents information that is read from the module. If no module is connected, these values are blank. These values may be asked for when discussing issues with the Rockwell Automation Technical Support group.

DeviceNet Network

The DeviceNet section shows the current setting of a connected modules DeviceNet address and communication rate. If no module is connected, these values display 'Node address: 63' and 'Communication rate: AutoBaud'.

SW1 (leftmost switch): DIP switch enable/disable

SW2: Normal/Legacy mode selection

SW3 – SW4: Set the communication rate

Communication Rate	SW 3	SW 4
125 Kbps	0	0
250 Kbps	0	1
500 Kbps	1	0
Autobaud	1	1

SW5 – SW10: Set the MAC ID (DeviceNet address).

See [Set the Module DIP Switch on page 54](#) for details on how to set a node address with DIP switches.

Firmware Update

The firmware update section shows the current firmware revision of the connected module. The field is blank if no module is connected. To load new firmware into the module, click update firmware.

IMPORTANT Before updating the firmware, be sure that the module is not slaved to an XM-440 Master Relay module or to a scanner.

View Data

The Data parameters are used to view the measured values of the input channels and the 4...20 mA outputs, as well as to monitor the status of the channels, alarms, and relays.

TIP To view all data parameters in the XM Serial Configuration Utility, click the View Data tab.

Monitor Data Parameters

Table 20 - Monitor Data Parameters

Parameter Name		Description	Values/Comments
XM Configuration Utility	EDS File	States whether a transducer fault exists on the associated channel. If a fault exists, the overall and gap values are not always accurate.	Possible status values: <ul style="list-style-type: none"> No Fault Fault
Transducer Fault	Transducer Status		
XM Configuration Utility	EDS File	Shows the measured average DC offset of the transducer signal. This value is compared with DC High Limit and DC Low Limit to determine whether the transducer is working properly.	
DC Bias (Gap)	Measured DC Bias		
Overall		Shows the measured standard overall value.	
gSE Overall		Shows the measured gSE Overall value.	
Band Pass		Shows the measured Band Pass Filter value.	
Tracked Mag		Shows the measured Tracking Filter Magnitude value.	
Tracked Phase		Shows the measured Tracking Filter Phase value.	
Eccentricity		Shows the measured Eccentricity value.	
Thrust Position		Shows the measured Thrust Position value.	
XM Configuration Utility	EDS File	Shows the measured sum harmonics value.	The tachometer must be enabled (Pulses Per Revolution set to 1 or more), and a tachometer signal must be present.
Sum Harmonics	Sum Harmonics Value		
Band Measurement Status (XM Serial Configuration Utility only)		States whether a fault condition exists on the associated channel. If a fault exists, the band measurements are not always accurate.	Possible status values: <ul style="list-style-type: none"> No Fault Fault
XM Configuration Utility	EDS File	Shows the measured band value.	
Band Measurement	Band Measured Value		
Not 1X and Vector Status (XM Serial Configuration Utility only)		States whether a fault condition exists on the associated channel. If a fault exists, the not 1X and vector measurements are not always accurate. These conditions can cause a fault: <ul style="list-style-type: none"> A transducer fault on the associated channel No tachometer signal or a transducer fault exists on the tachometer channel The machine speed changes too fast for the tracking algorithm to keep up or if the frequency of FMAX goes outside the specified criteria. See Sampling Mode on page 72.	Possible status values: <ul style="list-style-type: none"> No Fault Fault
Not 1X Value		Shows the magnitude of the vibration excluding the vibration at the machine speed.	The tachometer must be enabled (Pulses Per Revolution set to 1 or more), and a tachometer signal must be present.
1X Magnitude		The magnitude of the vibration at the machine speed.	
1X Phase		The phase of the vibration at the machine speed.	
2X Magnitude		The magnitude of the vibration at two times the machine speed.	
2X Phase		The phase of the vibration at two times the machine speed.	
3X Magnitude		The magnitude of the vibration at three times the machine speed.	

Table 20 - Monitor Data Parameters (Continued)

Parameter Name		Description	Values/Comments
Ch1/Ch2 Spectrum/Waveform Status (XM Serial Configuration Utility only)		States whether a fault condition exists on the associated channel. If a fault exists, the spectrum/waveform data is not always accurate. These conditions can cause a fault: <ul style="list-style-type: none"> • A transducer fault on the associated channel • Sampling Mode set to 'Synchronous' and there is no tachometer signal or there is a fault on the tachometer channel • The machine speed changes too fast for the tracking algorithm to keep up or if the frequency of FMAX goes outside the specified criteria. See Sampling Mode on page 72.	
Get Waveform Data Only (XM Serial Configuration Utility only)		Controls whether the spectrum is calculated by the Configuration Utility or the Standard Dynamic Measurement Module.	Check to upload only waveform data from the module. The Configuration Utility calculates and displays the spectrum using the collected waveform data. Clear to upload both the waveform and spectrum data from the module.
XM Configuration Utility	EDS File	States whether a fault condition (no tachometer signal or transducer fault) exists on the tachometer channel. If a fault exists, the speed value is not always accurate.	Possible status values: <ul style="list-style-type: none"> • No Fault • Fault
Speed Status	Transducer 3 Status		
XM Configuration Utility	EDS File	Shows the measured average DC offset of the tachometer signal. This value is compared with Fault High and Fault Low to determine whether the tachometer is working properly.	The tachometer must be enabled (Pulses Per Revolution set to 1 or more).
DC Bias (Gap)	Transducer 3 Measured DC Bias		
Speed Value		Shows the measured speed value.	
Peak Speed		Shows the greatest measured Speed Value (positive or negative) since the most recent reset.	
Acceleration Measured Value		Shows the measured acceleration value. The acceleration is the rate of change of the Speed Value.	
4...20 mA Output A and B (XM Serial Configuration Utility only)		Shows the current output value in the range of 4...20 mA.	
Status (XM Serial Configuration Utility only)		States whether a fault condition exists on either channel. If a fault exists, the magnitude and phase values are not always accurate.	Possible status values: <ul style="list-style-type: none"> • No Fault • Fault
SMAX Magnitude		The greatest peak magnitude around the orbit.	SMAX Measurement Requirements: <ul style="list-style-type: none"> • The transducers on channel 1 and 2 must be similar. • The transducers must be installed around the machine shaft, in the same radial plane, 90° apart (vertically and horizontally, for example). • Both channels must be configured for the same filtering and Full Scale settings. • The Transducer Nominal Sensitivity parameter must be set for displacement (mils or μm). • We recommend that the tachometer is enabled (Pulses Per Revolution set to 1 or more) and a tachometer signal present. • Both channels must be set to either Standard or Thrust Position Measurement Mode.
SMAX Phase		The phase at which the greatest peak magnitude occurs around the orbit.	

Alarm and Relay Status Parameters

Table 21 - Alarm and Relay Status Parameters

Parameter Name	Description	Values/Comments
Alarm Status	States the current status of the alarm.	Possible status values: <ul style="list-style-type: none"> • Normal - The alarm is enabled, the device is in Run mode, there is no transducer fault, and the current measurement is not within the Alert or Danger Threshold value. • Alert - The alarm is enabled, the device is in Run mode, there is no transducer fault, and the current measurement is in excess of the Alert Threshold value but not in excess of the Danger Threshold value. • Danger - The alarm is enabled, the device is in Run mode, there is no transducer fault, and the current measurement is in excess of the Danger Threshold value. • Disarm-The alarm is disabled or the device is in Program mode. • Transducer Fault - The alarm is enabled, the device is in Run mode, and a transducer fault is detected on the associated transducer. • Tachometer Fault - The alarm is enabled, the device is in Run mode, a tachometer fault exists, but there is no transducer fault. • Module Fault - Hardware or firmware failure, or an error has been detected and is preventing proper operation of the device.
Relay Status	States the current status of the relay.	Possible status values: <ul style="list-style-type: none"> • Activated • Not Activated

Operate the Module

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Module Inputs

The XM-124 module accepts eddy current transducer signals, accelerometer signals, and voltage signals from dynamic measurement sensors such as those from velocity or pressure transducers. A tachometer input is also provided.

Module Outputs

The XM-124 module provides an active buffer for each of the vibration transducer inputs. The module also provides a resistive buffer for the tachometer input, and two isolated, analog 4...20 mA outputs independently programmed to represent any measured parameter for the two transducer inputs.

The two 4...20 mA outputs are independently programmed to represent any measured parameter from either channel. Isolation is 250V between channels and to other circuits.

IMPORTANT The module has a 300 ohm maximum load.

Modes

The XM-124 module operates in two modes.

Mode	Description
Run	The XM-124 standard dynamic measurement module collects measurement data and monitors each measurement device. The XM-440 establishes I/O connections with the XM® measurement modules in its scan list and monitors their alarms, and controls its own relay outputs accordingly.
Program	The XM-124 module is idle. The XM-124 measurement modules stop the signal processing/measurement process, and the status of the alarms is set to the disarm state to prevent a false alert or danger status. The XM-440 closes the I/O connections with the XM® measurement modules in its scan list and stops monitoring their alarms, relays are deactivated unless they are latched. Configuration parameters can be read, updated, and downloaded to the XM-124 module.

To change the operation mode of the module, use the parameter in the EDS file. The Stop and Start services can also be used to change the operation mode.

IMPORTANT The XM Serial software automatically puts the XM-124 module in Program mode and Run mode without user interaction.

Transition to Program Mode

Parameter values can only be downloaded to the XM-124 module while the module is in Program mode. Any attempt to download a parameter value while the module is in Run mode results in a Device State Conflict error.

To transition from Run mode to Program mode on a DeviceNet network, set the Device Mode parameter to Program mode and click Apply. You cannot change any other parameter until you have downloaded the Program mode parameter.

TIP The module status indicator flashes green when the module is in Program mode.

See your DeviceNet documentation for specific instructions on how to edit EDS device parameters.

TIP You can also use the Stop service to transition the module to Program mode.

Transition to Run Mode

To collect data and monitor measurement devices, the module must be in Run mode. To transition the XM-124 module from Program mode to Run mode on a DeviceNet network, set the Device Mode parameter to Run mode and click Apply.

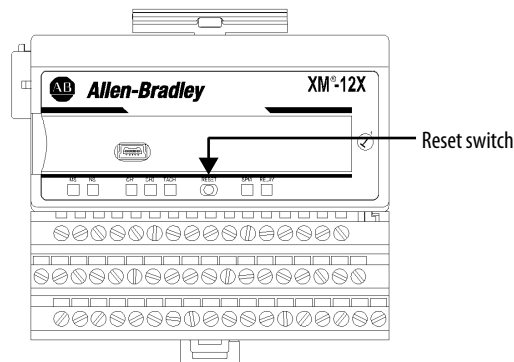
TIP The module status indicator is solid green when the module is in Run mode.

See your DeviceNet documentation for specific instructions on how to edit EDS device parameters.

TIP You can also use the Start service to transition to Run mode.

Reset Switch

The XM-124 module has an external reset switch on top of the module. The Reset switch can be used to reset all latched relays in the Relay Expansion module when it is attached to the XM-124 module.



IMPORTANT The Reset switch resets the relays only if the input is no longer in alarm or the condition that caused the alarm is no longer present.

XM Services

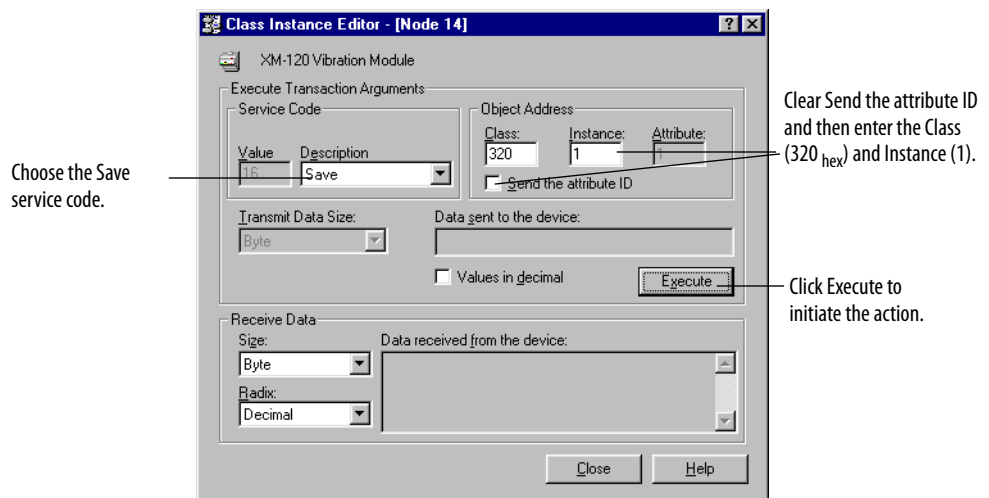
Table 22 defines services the XM-124 module supports. The table includes the service codes, classes, instances, and attributes by their appropriate hexadecimal codes. Use the Class Instance Editor in RSNetWorx™ software to execute these services, as illustrated in this example.

Table 22 - XM Services

Action	Service Code (Hex)	Class (Hex)	Instance	Attribute	Data
Transition to Run Mode	Start (06)	Object (320)	1	None	None
Transition to Program Mode	Stop (07)	Object (320)	1	None	None
Save configuration to nonvolatile memory (EEPROM)	Save (16)	Object (320)	1	None	None
Delete saved configuration from nonvolatile memory (EEPROM)	Delete (09)	Object (320)	1	None	None
Reset a specific latched relay	Reset (05)	Relay Object (323)	Relay number 1...C for XM-440, 1...5 for XM-12X, XM-320 and XM-220, 1...8 for XM-36X and XM-16X	None	None
Reset all latched relays	Reset (05)	Relay Object (323)	0	None	None
Reset the Peak Speed (XM-12X only)	Reset (05)	Speed Measurement Object (325)	1, 2 for XM-220	None	None
Close the virtual setpoint multiplier switch to activate the alarm setpoint multipliers	Other (33)	Discrete Input Point Object (08)	1	None	None
Open the virtual setpoint multiplier switch to start the setpoint multiplier timers and eventually cancel alarm setpoint multiplication	Other (32)	Discrete Input Point Object (08)	1	None	None

Example

To save the configuration parameters to the nonvolatile memory (EEPROM), enter the Class Instance Editor as shown.



Invalid Configuration Errors

A Start or Save service request to the XM-124 module can return an Invalid Device Configuration error when there is a conflict among the configuration settings.

The general error code for the Invalid Device Configuration error is D0_{hex}. An additional error code is returned with the general error code to specify which configuration settings are invalid. [Table 23](#) lists the additional error codes that are associated with the Invalid Device Configuration error.

Table 23 - Additional Error Codes returned with the Invalid Device Configuration Error (0xD0)

Error Code (Hex)	Description
01	No specific error information is available.
02	Mismatched transducer, channel, and/or measurement unit.
03	Inverted transducer fault high/low values.
04	Alarm thresholds conflict with the alarm condition.
05	Alarm speed range is invalid.
06	Band minimum frequency is greater than maximum frequency. Or, maximum frequency is greater than FMAX.
07	Relay is associated with an alarm that is not enabled.
08	Tachometer must be enabled for alarm or channel settings.
09	A senseless speed range is enabled on a speed alarm.
0A	Too many alarms are associated with one measurement.
0B	Invalid node address in the alarm list.
0C	Too many alarms in the alarm list. Or, no alarms in the alarm list.
0D	Alarm levels cannot be zero for alarms that are enabled.
0E	Too many slaves in the scanner input data table.
0F	The FMAX and Number of Lines do not yield correct vector calculations.
10	Phase (vector) alarms prohibited with synchronous sampling and multiple tachometer pulses per revolution.
11	Can't have order-based band on asynchronous channel.
12	Unsupported Sensor Type and Channel ID combination.
13	Invalid Alarm Type for the associated measurement ID.
14	Synchronous sampling is required for alarm on synchronous measurements.
15	Integration is not supported with the Bypass High Pass Filter option.

XM-124 Module I/O Message Formats

The XM-124 standard dynamic measurement module supports Poll, Change of State (COS), and Bit-Strobe I/O messages. The Poll response message is used by the module to produce measured values, and the COS message is used to produce the Alarm and Relay Status. The Bit-Strobe message is used by a master device to send a trigger event to the XM slaves on the network.

Poll Message Format

The XM-124 module Poll request message contains no data. The Poll response message can contain up to 44 REAL values for a total of 176 bytes.

The XM-124 module provides one pre-defined (static) data format of the Poll response, which is defined in Assembly Instance 101. It also provides a dynamic Assembly Instance, instance 199, with which you can define a custom data format for the Poll response. The dynamic Assembly Instance can contain any of the measurement parameters included in Assembly Instance 101 and several of the alarm and relay configuration parameters.

The default Assembly Instance is 101 and the default size is 20 bytes. You can change the Assembly Instance and define the custom Assembly Instance with the configuration software.

Refer to [I/O Data Tab on page 93](#).

The Poll response data can also be requested explicitly through Assembly Object (Class ID 0x4), Instance 101 (0x65), Data Attribute (3). When you explicitly request the Data Attribute for Assembly Instance 101, it returns the entire 176 bytes.

[Table 24](#) shows the static data format of Assembly Instance 101.

Table 24 - XM-124 Module Assembly Instance 101 Data Format

Byte	Definition
0...3	Channel 1 Overall measurement value
4...7	Channel 2 Overall measurement value
8...11	Channel 1 Gap measurement value
12...15	Channel 2 Gap measurement value
16...19	Current Speed measurement value
20...23	Peak Speed measurement value
24...27	Channel 1 Band 1 measurement value
28...31	Channel 2 Band 1 measurement value
32...35	Channel 1 Band 2 measurement value
36...39	Channel 2 Band 2 measurement value
40...43	Channel 1 Band 3 measurement value
44...47	Channel 2 Band 3 measurement value
48...51	Channel 1 Band 4 measurement value
52...55	Channel 2 Band 4 measurement value
56...59	Channel 1 1X Vector Magnitude measurement value
60...63	Channel 1 1X Vector Phase measurement value
64...67	Channel 2 1X Vector Magnitude measurement value
68...71	Channel 2 1X Vector Phase measurement value

Table 24 - XM-124 Module Assembly Instance 101 Data Format

Byte	Definition
72...75	Channel 1 2X Vector Magnitude measurement value
76...79	Channel 1 2X Vector Phase measurement value
80...83	Channel 2 2X Vector Magnitude measurement value
84...87	Channel 2 2X Vector Phase measurement value
88...91	Channel 1 3X Vector Magnitude measurement value
92...95	Channel 2 3X Vector Magnitude measurement value
96...99	Channel 1 Not 1X measurement value
100...103	Channel 2 Not 1X measurement value
104...107	SMAX Magnitude measurement value
108...111	SMAX Phase measurement value
112...115	Channel 1 Sum Harmonics measurement value
116...119	Channel 2 Sum Harmonics measurement value
120...123	Channel 1 Position Measurement
124...127	Channel 2 Position Measurement
128...131	Acceleration measurement value
132	Channel 1 Measurement Mode
133	Empty
134	Channel 2 Measurement Mode
135	Empty
136...139	Channel 1 gSE Overall measurement value
140...143	Channel 2 gSE Overall measurement value
144...147	Channel 1 Eccentricity measurement value
148...151	Channel 2 Eccentricity measurement value
152...155	Channel 1 Band Pass measurement value
156...159	Channel 2 Band Pass measurement value
160...163	Channel 1 Tracked Magnitude measurement value
164...167	Channel 1 Tracked Phase measurement value
168...171	Channel 2 Tracked Magnitude measurement value
172...175	Channel 2 Tracked Phase measurement value

COS Message Format

The XM-124 module COS message contains 8 bytes of data as defined in [Table 25](#). The COS data can also be requested explicitly through Assembly Object (Class ID 0x4), Instance 100 (0x64), Data Attribute (3).

Table 25 - XM-124 COS Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Relay 1 Status	Setpoint Multiplier Status	Alarm 2 Status		Alarm 1 Status			
1	Relay 2 Status	Channel 1 Transducer Status	Alarm 4 Status		Alarm 3 Status			
2	Relay 3 Status	Channel 2 Transducer Status	Alarm 6 Status		Alarm 5 Status			
3	Relay 4 Status	Tachometer Transducer Status	Alarm 8 Status		Alarm 7 Status			
4	Relay 5 Status	Reserved	Alarm 10 Status		Alarm 9 Status			
5	Reserved	Reserved	Alarm 12 Status		Alarm 11 Status			
6	Reserved	Reserved	Alarm 14 Status		Alarm 13 Status			
7	Reserved	Reserved	Alarm 16 Status		Alarm 15 Status			

XM Status Values

Tables [26](#), [27](#), [28](#), and [29](#) describe the XM Status values that are included in the COS messages.

Table 26 - Alarm Status Descriptions

Alarm Status Value	Description
0	Normal
1	Alert
2	Danger
3	Disarm
4	Transducer Fault (Sensor OOR)
5	Module Fault
6	Tachometer Fault
7	Reserved

Table 27 - Setpoint Multiplier Status Descriptions

Setpoint Multiplier Status Value	Description
0	Not Activated
1	Activated

Table 28 - Relay Status Descriptions

Relay Status Value	Description
0	Not Activated
1	Activated

Table 29 - Transducer Status Descriptions

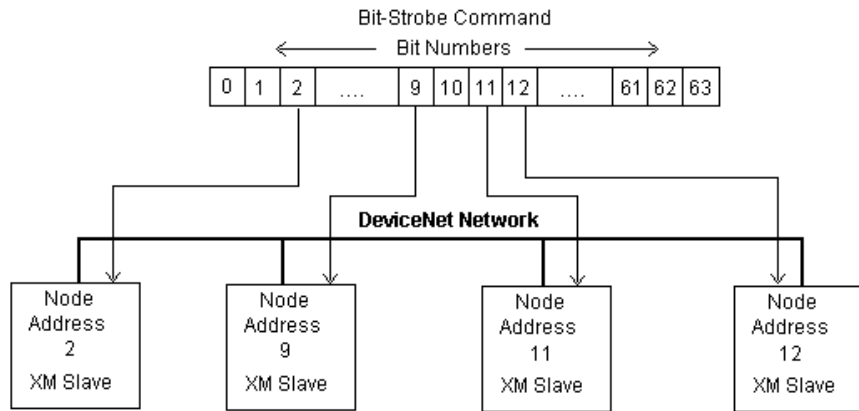
Relay Status Value	Description
0	No Fault
1	Transducer Fault

Bit-Strobe Message Format

The Bit-Strobe command sends 1 bit of output data to each XM slave whose node address appears in the master scanlist.

The Bit-Strobe command message contains a bit string of 64 bits (8 bytes) of output data, one output bit per node address on the network. One bit is assigned to each node address supported on the network (0...63) as shown in [Figure 45](#).

Figure 45 - Bit-Strobe Command



The XM-124 module uses the bit received in a Bit-Strobe connection as a trigger event. When the bit number corresponding to the module node address is set, the module collects the triggered trend data and stores the spectrum or waveform data.

The XM-124 module does not send data in the Bit-Strobe response.

Trends

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SU/CD	113

Triggered

The XM-124 module can collect a triggered trend. A triggered trend is a time-based trend that is collected when a relay on the module is activated, or when the module receives a trigger event.

Once the triggered trend is configured, the XM-124 module continuously monitors the trended measurements. When a trigger occurs, the module collects additional data as specified by the Post Trigger parameter. The XM-124 module can also store the spectrum or waveform at the time of the trigger.

The XM-124 module can only store one triggered trend. Unless the triggered trend is latched, the trend data is overwritten with new data when the next trigger occurs.

The triggered trend parameters define the trend data that the module collects. Use these parameters to select the measurements included in the trend records, the interval between trend records, and which relay triggers (activates) the collection of the trend data.

IMPORTANT The Triggered Trend parameters are not included in the EDS file and cannot be edited using generic configuration tools such as RSNetWorx™ for DeviceNet software.

Table 30 - Triggered Trend Parameters

Parameter Name	Description	Values/Comments
Enable Triggered Trend Measurements	Enables/disables the triggered trend measurements. Select to configure the triggered trend measurements.	Check to enable. Clear to disable.
Select Measurements	Sets the measurements to be collected and stored in the module.	1...16 measurements can be selected.
Number of Records	The maximum number of measurement sets that can be collected in the trend buffer. The measurement sets constitute the trend data.	The Number of Records is automatically calculated based on the number of Trended Measurements selected.

Table 30 - Triggered Trend Parameters (Continued)

Parameter Name	Description	Values/Comments
Latch Enable	Determines whether the triggered trend is latched or unlatched. Latched means that subsequent triggers are ignored after the initial trigger. This process prevents the trend data from being overwritten with new data until the trigger is manually reset (click Reset Trigger). Unlatched means that the trend data is overwritten with new data every time a trigger occurs.	Check means latched Clear means unlatched
Relay Number	Sets the relay that triggers the trend to be collected.	None means that the trend can only be triggered manually or by a trigger event (for example, XM-440). Relay Number 1 is the onboard relay. Numbers 2...5 are either relays on the Expansion Relay module when it's connected to the module or virtual relays. IMPORTANT: The relay must be enabled. See Relay Parameters on page 86 .
Record Interval	The amount of time between consecutive trend records. IMPORTANT: If you enter a Record Interval, the Trend Span is automatically updated.	1...3600 seconds
Trend Span	The total amount of time that can be covered by the trend data (Number of Records x Record Interval). IMPORTANT: If you edit the Trend Span, the Record Interval is automatically updated.	Seconds
Post Trigger	The percentage of records to be collected once the trigger occurs. For example, if you set Post Trigger to 20%, then 80% of the records in the trend are before the trigger occurs, and 20% after the trigger occurs. This data lets you evaluate what happened after the trigger occurred.	0...100%
Status	Shows the status of the trend data.	Possible status values: <ul style="list-style-type: none"> • Not collected - No trend data is collected. • Collecting - A trigger has occurred and data (including post-trigger data) is being collected. • Collected - A trend has been saved to the buffer and is available to view and upload.
Store Spectrum	Stores the current spectrum data for both Channel 1 and Channel 2 when the trigger occurs.	
Store Waveform	Stores the current waveform data for both Channel 1 and Channel 2 when the trigger occurs.	
View Trend Data	Displays a plot of the collected trend data.	
Reset Trigger	Resets the trigger if Latch enabled is selected. The reset enables the module to overwrite the previous trend data when the next trigger occurs.	
Manual Trigger	Triggers the module to collect the trend data without relay activation.	
View Collected Data	Displays a plot of the collected spectrum or waveform data.	

SU/CD

The XM-124 module can collect start-up or coast-down trend data when the machine speed passes into a defined speed range. A tachometer input is required to collect the start-up/coast-down trend.

The XM-124 module collects a start-up trend when the machine speed rises through the Minimum Speed plus 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data only when machine speed is increasing. It does not collect data if the machine speed is constant or decreasing.

The XM-124 module collects a coast-down trend when the machine speed falls through the Maximum Speed - 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data when the machine speed is decreasing or increasing during a coast-down trend (for example, a coast-down restart).

The XM-124 module can only store one start-up/coast-down trend. Unless the start-up/coast-down trend is latched, the trend data is overwritten with new data when the next trigger occurs.

The SU/CD trend parameters define the trend data that the module collects during the start-up or coast-down of a machine. Use these parameters to configure the measurements included in the start-up and coast-down trend records, the interval between trend records, and the minimum and maximum speed limits at which record collection starts and stops.

IMPORTANT The SU/CD Trend parameters are not included in the EDS file and cannot be edited using generic configuration tools such as RSNetWorx for DeviceNet software.

Table 31 - SU/CD Trend Parameters

Parameter Name	Description	Values/Comments
Enable SU/CD Trend	Enables/disables the SU/CD trend measurements. Select to configure the SU/CD trend measurements.	Check to enable. Clear to disable.
Select Measurements	Sets the measurements to be collected and stored in the module. IMPORTANT: The Speed measurement is always included in the start-up/coast-down trend.	1...16 measurements can be selected.
Number of Records	The maximum number of measurement sets that can be collected in the trend buffer. The measurement sets constitute the trend data.	The Number of Records is automatically calculated based on the number of Trended Measurements selected.
Latch Enable	Determines whether the start-up/coast-down trend is latched or unlatched. Latched means that subsequent start-up/coast-down trends are ignored after the initial start-up/coast-down. This function prevents the trend data from being overwritten with new data until the trigger is manually reset (click Reset Trigger). Unlatched means that the start-up/coast-down trend data is overwritten with new data every time the machine speed crosses into the speed range.	Check means latched Clear means unlatched
Record Interval	The change in speed between consecutive records. IMPORTANT: If you enter a Record Interval, the Maximum Trend Span is automatically updated.	1...3600 rpm

Table 31 - SU/CD Trend Parameters (Continued)

Parameter Name	Description	Values/Comments
Maximum Trend Span	The maximum change in speed that can be covered by the trend data (Number of Records x Record Interval). IMPORTANT: If you edit the Trend Span, the Record Interval is automatically updated.	rpm
Minimum Speed	The lesser limit of the speed range in which records are collected in the start-up/coast-down trend. This value must be less than the Maximum Speed value.	rpm Start-up/Coast-down Trend Considerations: <ul style="list-style-type: none"> The module collects a start-up trend when the machine speed rises through the Minimum Speed 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data only when the machine speed is increasing. It does not collect data if the machine speed is constant or decreasing. The module collects a coast-down trend when the machine speed falls through the Maximum Speed - 8 rpm, and stops when the machine speed crosses either the Minimum Speed or the Maximum Speed. The module collects data when the machine speed is decreasing or increasing during a coast-down trend (for example, a coast-down restart).
Maximum Speed	The greater limit of the speed range in which records are collected in the start-up/coast-down trend. This value must be greater than the Minimum Speed value.	
Status	Shows the status of the trend data.	Possible status values: <ul style="list-style-type: none"> Not collected - No trend data is collected. Collecting - A trigger has occurred and data is being collected. Collected - A trend has been saved to the buffer and is available to view and upload.
View Trend Data	Displays a plot of the collected trend data.	
Reset Trigger	Resets the trigger if Latch enabled is selected. This reset enables the module to overwrite the previous trend data when the machine speed crosses into the speed range.	

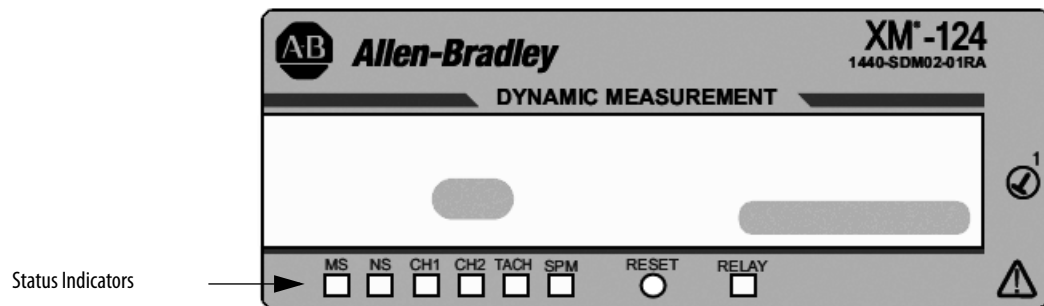
Status Indicators

This chapter details the visible status indicators of the XM-124 standard dynamic measurement module.

Topic	Page
Status Indicators	115
Module Status (MS) Indicators	116
Relay Indicator	116
Network Status (NS) Indicator	116
Channel 1 and Channel 2 Status Indicators	117
Tachometer Status Indicators	117
Setpoint Multiplier Indicator	117

Status Indicators

The module has seven status indicators, which are on the top of the module.
Status Indicators



The status indicators include:

- Module Status (MS)
- Network Status (NS)
- Channel 1
- Channel 2
- Tachometer
- Setpoint Multiplier (SPM)
- Relay

Module Status (MS) Indicators

This table describes the module status indicators.

State	Probable Cause
Off	No power applied to the module.
Alternating Red/Green	Module performing power-up self-test.
Flashing Red	<ul style="list-style-type: none"> Application firmware is invalid or not loaded. Download firmware to the module. Firmware download is in progress. The Node Address or Communication Rate DIP switches have been changed and do not reflect the settings currently in use.
Solid Red	An unrecoverable fault has occurred. The module can need to be repaired or replaced.
Flashing Green	Module operating in Program Mode, not performing its monitoring functions.
Solid Green	Module operating in Run Mode, performing its monitoring functions.

Relay Indicator

This table describes the relay indicator.

State	Probable Cause
Off	The relay is not activated.
Solid Red	The relay is activated.

Network Status (NS) Indicator

This table describes the network status indicator.

State	Probable Cause
Off	Module is not online. <ul style="list-style-type: none"> Module is autobauding. No power is applied to the module; examine module status indicator.
Flashing Red	One or more I/O connections are in the timed-out state.
Solid Red	Failed communication (duplicate MAC ID or bus-off).
Flashing Green	Module is online but no connections are currently established.
Solid Green	Module is online with connections currently established.

Channel 1 and Channel 2 Status Indicators

This table describes the channel indicators.

State	Probable Cause
Off	<ul style="list-style-type: none"> Normal operation within alarm limits on the channel. No power applied to the module. Examine module status indicator.
Solid Yellow	An alarm that is associated with this channel is in Alert.
Solid Red	An alarm that is associated with this channel is in Danger.
Flashing Red	A transducer fault exists on the channel. The DC bias is outside the DC Low and High Limits.

Tachometer Status Indicators

This table describes the tachometer indicator.

State	Probable Cause
Off	<ul style="list-style-type: none"> Normal operation within alarm limits on the channel. No power applied to the module. Examine module status indicator.
Solid Yellow	An alarm on Speed or Acceleration is in Alert.
Solid Red	An alarm on Speed or Acceleration is in Danger.
Flashing Yellow	A tachometer fault other than a transducer fault (for example, no pulse received).
Flashing Red	The tachometer signal DC bias is not within the DC Low and High Limits.

Setpoint Multiplier Indicator

This table describes the setpoint multiplier indicator.

State	Probable Cause
Off	The Alarm Limit Multiplier is not in effect.
Solid Yellow	The Alarm Limit Multiplier is in effect.

Notes:

CIP Objects

This appendix defines the specific CIP Objects, Instances, Attributes, and Services that the Standard Dynamic Measurement Module supports.

Topic	Page
Identity Object (Class Code 01H)	118
DeviceNet Object (Class Code 03H)	120
Assembly Object (Class Code 04H)	121
Connection Object (Class ID 05H)	125
Discrete Input Point Object (Class ID 08H)	127
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Parameter Object (Class ID 0FH)	129
Acknowledge Handler Object (Class ID 2BH)	135
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Channel Object (Class ID 31FH)	140
Device Mode Object (Class ID 320H)	142
Overall Measurement Object (Class ID 322H)	143
Relay Object (Class ID 323H)	145
Spectrum Waveform Measurement Object (Class ID 324H)	147
Speed Measurement Object (Class ID 325H)	153
Tachometer Channel Object (Class ID 326H)	155
Transducer Object (Class ID 328H)	156
Vector Measurement Object (Class ID 329H)	157
4...20 mA Output Object (Class ID 32AH)	159

Identity Object (Class Code 01_H)

The Identity Object provides identification and general information about the device.

Class Attributes

The Identity Object provides no class attributes.

Instance Attributes

Table 32 - Identity Object Instance Attributes

Attribute ID	Access	Name	Data Type	Default Value
1	Get	Vendor ID	UINT	1 = A/B
2	Get	Device Type	UINT	109 (Specialty I/O)
3	Get	Product Code	UINT	73
4	Get	Revision: Major Minor	STRUCT OF USINT USINT	Value varies with each firmware reversion. Value varies with each firmware reversion.
5	Get	Status	WORD	
6	Get	Serial Number	UDINT	
7	Get	Product Name	SHORT_ STRING	XM-124 standard dynamic measurement module

Status

The Status is a 16-bit value. [Table 33](#) lists the bits that are implemented.

Table 33 - Identity Object Status

Bit	Name	Description												
0	Owned	TRUE indicates that the module has an owner. More specifically, the Predefined Master/Slave Connection Set has been allocated to a master.												
1	—	Reserved, set to 0												
2	Configured	This bit is set whenever a saved configuration is successfully loaded from nonvolatile memory. This bit is cleared whenever the default configuration is restored or loaded.												
3	—	Reserved, set to 0												
4 ... 7	Extended Device Status	<table border="1"> <tbody> <tr> <td>Self-testing or unknown</td> <td>0</td> </tr> <tr> <td>Firmware update in progress</td> <td>1</td> </tr> <tr> <td>At least one faulted I/O connection</td> <td>2</td> </tr> <tr> <td>No I/O connections established</td> <td>3</td> </tr> <tr> <td>At least one I/O connection in Run mode</td> <td>6</td> </tr> <tr> <td>At least one I/O connection, all in Run mode</td> <td>7</td> </tr> </tbody> </table>	Self-testing or unknown	0	Firmware update in progress	1	At least one faulted I/O connection	2	No I/O connections established	3	At least one I/O connection in Run mode	6	At least one I/O connection, all in Run mode	7
Self-testing or unknown	0													
Firmware update in progress	1													
At least one faulted I/O connection	2													
No I/O connections established	3													
At least one I/O connection in Run mode	6													
At least one I/O connection, all in Run mode	7													
8	Minor Recoverable Fault	Set whenever there is a transducer or tachometer fault.												
9	Minor Unrecoverable Fault	Not implemented												

Table 33 - Identity Object Status (Continued)

Bit	Name	Description												
10	Major Recoverable Fault	Set when there is a major recoverable fault.												
		<table border="1"> <thead> <tr> <th>Cause</th> <th>Description</th> <th>Resolution</th> </tr> </thead> <tbody> <tr> <td>The boot program is running.</td> <td>The main application is missing or corrupt.</td> <td>Update or reinstall the module firmware.</td> </tr> <tr> <td>The Relay Expansion module has been removed.</td> <td>If an XM-441 Expansion Relay module is present at power-up and if any of Relay instances 2 . . . 5 are enabled, then a Major Recoverable Fault is indicated if the Relay Expansion module is removed.</td> <td>Reinstall the missing Relay Expansion module or disable the expansion module relays in the XM-124 configuration.</td> </tr> <tr> <td>The 24Volt power monitor measures out-of-range.</td> <td>The power supply voltage is less than approximately 19.2V or is greater than approximately 28.8V.</td> <td>Adjust or replace the power supply to ensure its output is 24V 10%.</td> </tr> </tbody> </table>	Cause	Description	Resolution	The boot program is running.	The main application is missing or corrupt.	Update or reinstall the module firmware.	The Relay Expansion module has been removed.	If an XM-441 Expansion Relay module is present at power-up and if any of Relay instances 2 . . . 5 are enabled, then a Major Recoverable Fault is indicated if the Relay Expansion module is removed.	Reinstall the missing Relay Expansion module or disable the expansion module relays in the XM-124 configuration.	The 24Volt power monitor measures out-of-range.	The power supply voltage is less than approximately 19.2V or is greater than approximately 28.8V.	Adjust or replace the power supply to ensure its output is 24V 10%.
		Cause	Description	Resolution										
		The boot program is running.	The main application is missing or corrupt.	Update or reinstall the module firmware.										
		The Relay Expansion module has been removed.	If an XM-441 Expansion Relay module is present at power-up and if any of Relay instances 2 . . . 5 are enabled, then a Major Recoverable Fault is indicated if the Relay Expansion module is removed.	Reinstall the missing Relay Expansion module or disable the expansion module relays in the XM-124 configuration.										
The 24Volt power monitor measures out-of-range.	The power supply voltage is less than approximately 19.2V or is greater than approximately 28.8V.	Adjust or replace the power supply to ensure its output is 24V 10%.												
In all cases the XM-124 attempts to continue making measurements, monitoring alarms and managing its relays regardless of the Major Fault Indication or its cause.														
11	Major Unrecoverable Fault	Set when there is a module status fault (module status indicator is solid red).												
12 . . . 15		Reserved, set to 0												

Services

Table 34 - Identity Object Services

Service Code	Class/Instance Usage	Name
01 _h	Instance	Get_Attributes_All
05 _h	Instance	Reset
0E _h	Instance	Get_Attribute_Single
10 _h	Instance	Set_Attribute_Single

DeviceNet Object (Class Code 03_H)

The DeviceNet Object is used to provide the configuration and status of a physical attachment to DeviceNet.

Class Attributes

Table 35 - DeviceNet Object Class Attributes

Attribute ID	Access	Name	Data Type	Default Value
1	Get	Revision	UINT	2

Instance Attribute

Table 36 - DeviceNet Object Instance Attributes

Attribute ID	Access	Name	Data Type	Default Value
1	Get	MAC ID	USINT	On DIP switches under label
2	Get	Communication Rate	USINT	Automatic communication rate detection (autobaud) determines the communication rate. The module listens to network traffic to determine the communication rate before it goes online.
3	Get	Bus-Off Interrupt	BOOL	0
4	Get/Set	Bus-Off Counter	USINT	0
5	Get	Allocation Information	STRUCT of BYTE USINT	0...255
6	Get	MAC ID switch changed	BOOL	0 = No change 1 = Change since last reset or powerup
7	Get	Communication rate switch changed	BOOL	0 = No change 1 = Change since last reset or powerup
8	Get	MAC ID switch value	USINT	0...99
9	Get	Communication rate switch value	USINT	0...9
100	Get	Autobaud Disable	BOOL	0 (always autobaud)

Services

Table 37 - DeviceNet Object Services

Service Code	Class/Instance Usage	Name
0E _h	Class/Instance	Get_Attribute_Single
10 _h	Instance	Set_Attribute_Single
4B _h	Instance	Allocate_Master/Slave_Connection_Set
4C _h	Instance	Release_Group_2_Identifier_Set

Assembly Object (Class Code 04_H)

The Assembly Object binds attributes of multiple objects to allow data to or from each object to be sent or received in one message.

The XM-124 module provides both static and dynamic assemblies.

Class Attribute

Table 38 - Assembly Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
1	Get	Revision	UINT	Version of the implemented object.	2

Instances

Table 39 - Assembly Object Instances

Instance	Name	Type	Description
100	Default COS Message	Input	Alarm and Relay Status values
101	Default Poll Response Message	Input	Measurement values
199	Alternate Dynamic Poll Response Message	Input	Configurable measurement values and configuration parameters

Instance Attributes

Table 40 - Assembly Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Number of Members in list	UINT	Only supported for Dynamic Assembly Instance
2	Set	Member List	Array of STRUCT:	Only supported for Dynamic Assembly Instance
		Member Data Description	UINT	Size of member data value in bits
		Member Path Size	UINT	
		Member Path	Packed EPATH	
3	Get	Data	Defined in tables on the following pages.	

Assembly Instance Attribute Data Format

Instance 100 - Alarm and Relay Status

This assembly is sent using COS messaging when any of the Alarm or Relay Status values change.

Table 41 - Instance 100 Data Format (Alarm and Relay Status Values Assembly)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Relay 1 Status	Setpoint Multiplier	Alarm 2 Status		Alarm 1 Status			
1	Relay 2 Status	Channel 1 Transducer Status	Alarm 4 Status		Alarm 3 Status			
2	Relay 3 Status	Channel 2 Transducer Status	Alarm 6 Status		Alarm 5 Status			
3	Relay 4 Status	Tachometer Transducer Status	Alarm 8 Status		Alarm 7 Status			
4	Relay 5 Status	0	Alarm 10 Status		Alarm 9 Status			
5	0	0	Alarm 12 Status		Alarm 11 Status			
6	0	0	Alarm 14 Status		Alarm 13 Status			
7	0	0	Alarm 16 Status		Alarm 15 Status			

Instance 101 - Measurement Values

This Assembly Instance can be selected to be sent in response to an I/O Poll Request from a Master. This instance is the default Poll response selection for Firmware revision 3 or later, and it is the only available Poll response for Firmware revisions 1 and 2.

Table 42 - Instance 101 Data Format (Measurement Values Assembly)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0...3	Channel 1 Overall value							
4...7	Channel 2 Overall value							
8...11	Channel 1 Gap value (Analog Input Point (AIP) Object Instance #1)							
12...15	Channel 2 Gap value (AIP Object Instance #2)							
16...19	Speed value							
20...23	Maximum Speed value							
24...27	Channel 1 Band 1 value							
28...31	Channel 2 Band 1 value							
32...35	Channel 1 Band 2 value							
36...39	Channel 2 Band 2 value							
40...43	Channel 1 Band 3 value							
44...47	Channel 2 Band 3 value							
48...51	Channel 1 Band 4 value							
52...55	Channel 2 Band 4 value							
56...59	Channel 1 Vector 1 Magnitude value							

Table 42 - Instance 101 Data Format (Measurement Values Assembly) (Continued)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
60...63	Channel 1 Vector 1 Phase value							
64...67	Channel 2 Vector 1 Magnitude value							
68...71	Channel 2 Vector 1 Phase value							
72...75	Channel 1 Vector 2 Magnitude value							
76...79	Channel 1 Vector 2 Phase value							
80...83	Channel 2 Vector 2 Magnitude value							
84...87	Channel 2 Vector 2 Phase value							
88...91	Channel 1 Vector 3 Magnitude value							
92...95	Channel 2 Vector 3 Magnitude value							
96...99	Channel 1 Not 1X value (AIP Object Instance #3)							
100...103	Channel 2 Not 1X value (AIP Object Instance #4)							
104...107	SMAX Magnitude value (AIP Object Instance #5)							
108...111	SMAX Phase value (AIP Object Instance #6)							
112...115	Channel 1 Sum Harmonics value (AIP Object Instance #7)							
116...119	Channel 2 Sum Harmonics (AIP Object Instance #8)							
120...123	Channel 1 Position measurement							
124...127	Channel 2 Position measurement							
128...131	Acceleration measurement value							
132	Channel 1 Measurement Mode							
133	Empty							
134	Channel 2 Measurement Mode							
135	Empty							
136...139	Channel 1 gSE Overall measurement value							
140...143	Channel 2 gSE Overall measurement value							
144...147	Channel 1 Eccentricity measurement value							
148...151	Channel 2 Eccentricity measurement value							
152...155	Channel 1 Band Pass measurement value							
156...159	Channel 2 Band Pass measurement value							
160...163	Channel 1 Tracked Magnitude measurement value							
164...167	Channel 1 Tracked Phase measurement value							
168...171	Channel 2 Tracked Magnitude measurement value							
172...175	Channel 2 Tracked Phase measurement value							

Instance 199 - Dynamic Assembly

This Assembly Instance can be created and configured with the XM[®] Serial or RSMACC[™] Enterprise Online. With the configuration software, you can determine the format of the data. This Assembly Instance can be selected to be sent in response to an I/O Poll request from a Master.

The dynamic Assembly can include all measurement values that are included in Assembly Instance 101. In addition, the dynamic Assembly can include these configuration parameters.

Table 43 - Instance 199 Component Mapping

EPATH (Where ii = Instance Number)	Class Name	Class Number	Instance Number	Attribute Name	Attribute Number	Data Type
21 1D 03 24 ii 30 04	Alarm	31D _h	1...16	Alarm Enable	4	BOOL
21 1D 03 24 ii 30 05	Alarm	31D _h	1...16	Type	5	USINT
21 1D 03 24 ii 30 07	Alarm	31D _h	1...16	Condition	7	USINT
21 1D 03 24 ii 30 08	Alarm	31D _h	1...16	Alert Threshold (High)	8	REAL
21 1D 03 24 ii 30 09	Alarm	31D _h	1...16	Danger Threshold (High)	9	REAL
21 1D 03 24 ii 30 0A	Alarm	31D _h	1...16	Alert Threshold Low	10	REAL
21 1D 03 24 ii 30 0B	Alarm	31D _h	1...16	Danger Threshold Low	11	REAL
21 1D 03 24 ii 30 0C	Alarm	31D _h	1...16	Hysteresis	12	REAL
21 1D 03 24 ii 30 0D	Alarm	31D _h	1...16	Threshold (setpoint) Multiplier	13	REAL
21 1D 03 24 ii 30 0E	Alarm	31D _h	1...16	Start-up Period	14	UINT
21 1D 03 24 ii 30 0F	Alarm	31D _h	1...16	Speed Range Enable	15	BOOL
21 1D 03 24 ii 30 10	Alarm	31D _h	1...16	Speed Range High	16	REAL
21 1D 03 24 ii 30 11	Alarm	31D _h	1...16	Speed Range Low	17	REAL
21 0F 00 24 ii 30 01	Param	0F _h	10...25	Parameter Value (Measurement Identifier)	1	USINT
21 1D 03 24 ii 30 15	Alarm	31D _h	1...16	Detection Delay	21	UINT
21 23 03 24 ii 30 04	Relay	323 _h	1...5	Relay Enable	4	BOOL
21 23 03 24 ii 30 05	Relay	323 _h	1...5	Latch Enable	5	BOOL
21 23 03 24 ii 30 06	Relay	323 _h	1...5	Failsafe Enable	6	BOOL
21 23 03 24 ii 30 07	Relay	323 _h	1...5	Delay	7	UINT
21 23 03 24 ii 30 09	Relay	323 _h	1...5	Alarm Level	9	BYTE
21 0F 00 24 ii 30 01	Param	0F _h	26...30	Parameter Value (Alarm Identifier A)	1	USINT
21 0F 00 24 ii 30 01	Param	0F _h	31...35	Parameter Value (Alarm Identifier B)	1	USINT
21 23 03 24 ii 30 0C	Relay	323 _h	1...5	Logic	12	USINT
21 23 03 24 ii 30 0E	Relay	323 _h	1...5	Relay Installed	14	BOOL

The dynamic Assembly Instance must be instantiated with a call to the class level Create service. Then the structure can be defined with the Set_Attribute_Single service for the Member List attribute. Only one dynamic Attribute instance is supported so subsequent calls to the Create service returns a Resource Unavailable (0x02) error. The Delete service can be used to destroy the dynamic Assembly Instance so that it can be re-created.

Services

Table 44 - Assembly Object Services

Service Code	Class/Instance Usage	Name
0E _h	Class/Instance	Get_Attribute_Single
10 _h	Instance	Set_Attribute_Single
08 _h	Class	Create
09 _h	Instance	Delete

Connection Object (Class ID 05H)

The Connection Object allocates and manages the internal resources that are associated with both I/O and Explicit Messaging Connections.

Class Attributes

The Connection Object provides no class attributes.

Instances

Table 45 - Connection Object Instances

Instance	Description
1	Explicit Message Connection for pre-defined connection set
2	I/O Poll Connection
3	I/O Strobe Connection
4	I/O COS (change of state) Connection
11...17	Explicit Message Connection

Instance Attributes

Table 46 - Connection Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	State	USINT	State of the object.
2	Get	Instance Type	USINT	Indicates either I/O or Messaging Connection.
3	Get	Transport Class Trigger	BYTE	Defines behavior of the Connection.
4	Get	Produced Connection ID	UINT	Placed in CAN Identifier Field when the Connection transmits.
5	Get	Consumed Connection ID	UINT	CAN Identifier Field value that denotes message to be received.
6	Get	Initial Comm Characteristics	BYTE	Defines the Message Group across which productions and consumptions that are associated with this Connection occur.
7	Get	Produced Connection Size	UINT	Maximum number of bytes transmitted across this Connection.
8	Get	Consumed Connection Size	UINT	Maximum number of bytes received across this Connection.
9	Get/Set	Expected Packet Rate	UINT	Defines timing associated with this Connection.
12	Get/Set	Watchdog Time-out Action	USINT	Defines how to handle Inactivity/Watchdog timeouts.
13	Get	Produced Connection Path Length	UINT	Number of bytes in the production_connection_path attribute.
14	Get	Produced Connection Path	Array of USINT	Specifies the Application Object whose data the Connection Object produces. See DeviceNet Specification Volume 1 Appendix I.
15	Get	Consumed Connection Path Length	UINT	Number of bytes in the consumed_connection_path attribute.
16	Get	Consumed Connection Path	Array of USINT	Specifies the Application Objects that are to receive the data that this Connection Object consumes. See DeviceNet Specification Volume 1 Appendix I.
17	Get	Production Inhibit Time	UINT	Defines minimum time between new data production.

Services

Table 47 - Connection Object Services

Service Code	Class/Instance Usage	Name
05 _h	Instance	Reset
0E _h	Instance	Get_Attribute_Single
10 _h	Instance	Set_Attribute_Single

Discrete Input Point Object (Class ID 08H)

The Discrete Input Point Object stores information about the value of the Setpoint Multiplier signal.

Class Attributes

Table 48 - Discrete Input Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
1	Get	Revision	UINT	Version of the implemented object.	2

Instance Attributes

Table 49 - Discrete Input Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Value	BOOL	Alarm Limit Multiplier	0 = Off 1 = On
199	Set	Backdoor Service	USINT	Setting this attribute is equivalent to requesting the specified service.	Set to one of these values to perform the specified service: 32 _h = Open 33 _h = Close The virtual Setpoint Multiplier switch can be set with the AlarmLimitMultiply output tag in RSLogix 5000 [®] software.

Services

Table 50 - Discrete Input Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Class/Instance	Get_Attribute_Single	Returns the contents of the specified attribute.
10 _h	Instance	Set_Attribute_Single	Sets the contents of the specified attribute.
32 _h	Instance	Open	Opens the virtual Setpoint Multiplier switch. ⁽¹⁾
33 _h	Instance	Close	Closes the virtual Setpoint Multiplier switch. ⁽¹⁾

(1) The AlarmLimitMultiply output tag in RSLogix 5000 software can also set the Setpoint Multiplier switch. It does not overwrite this service.

Analog Input Point (Class ID 0A_H)

The Analog Input Point Object models simple analog measurements that the Standard Dynamic Measurement Module performs.

Class Attributes

Table 51 - Analog Input Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
1	Get	Revision	UINT	Version of the implemented object.	2

Instances

Table 52 - Analog Input Point Object Instances

Instance	Description
1	Gap measurement for Channel 1
2	Gap measurement for Channel 2
3	Not 1X measurement for Channel 1
4	Not 1X measurement for Channel 2
5	SMAX magnitude of synchronized channels
6	SMAX phase of synchronized channels
7	Sum Harmonics measurement for Channel 1
8	Sum Harmonics measurement for Channel 2
9	Thrust Position Measurement for Channel 1
10	Thrust Position Measurement for Channel 2
11	gSE Overall measurement for Channel 1
12	gSE Overall measurement for Channel 2
13	Eccentricity measurement for Channel 1
14	Eccentricity measurement for Channel 2

Instance Attributes

Table 53 - Analog Input Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Value	REAL		
4	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms or faults 1 = Alarm or fault condition exists. The Value attribute does not always match the actual field value.
8	Get	Value Data Type	USINT	Determines the data type of the Value .	1 = REAL
122	Get/Set	Calibration Bias	REAL	Offset added into the raw measurement value.	Used to set the 'zero point' for the Thrust Position measurements.
147	Get	Data Units	ENGUNIT	The units context of the Value attribute.	See DeviceNet Specification Volume 1 Appendix K.

Services

Table 54 - Analog Input Point Object Services

Service Code	Class/Instance Usage	Name	Description
0E _H	Class/Instance	Get_Attribute_Single	Returns the contents of the specified attribute.

Parameter Object (Class ID 0F_H)

The Parameter Object provides the interface to the Standard Dynamic Measurement Module configuration data. There are 51 Parameter Object instances that are implemented in the module.

Parameter Object instances 1...4 and 7...37 are implemented to provide an alternate method of setting the configuration parameters with EPATH or ENGUNIT data types. Parameter Object instances 38 and 39 provide an alternate method of setting the Produced Connection Size and Produced Connection Path attributes for the Poll Connection because these attributes can be difficult to get/set directly through the Connection Object. These attributes cannot be set if there is an active Poll Connection.

Parameter Object instances 5 and 6 are for setting the starting order for the Sum Harmonics measurements. Instances 40 and 41 are for setting the Measurement Mode for each Channel. Instances 42... 49 are for setting the Spectrum Option for Band object instances 1... 8. Instances 50 and 51 are for setting the Update Rate for the Eccentricity measurements.

Class Attributes

Table 55 - Parameter Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
2	Get	Max Instance	UINT	Maximum instance number of an object in this class.	Total number of parameter object instances.
8	Get	Parameter Class Descriptor	WORD	Bits that describe the parameter.	Bit 0 Supports Parameter Instances Bit 1 Supports Full Attrib. Bit 2 Must do nonvolatile store Bit 3 Params in nonvolatile
9	Get	Config. Assembly Instance	UINT		Set to 0

Instances

There are 51 instances of this object

Table 56 - Parameter Object Instances

Instance	Read Only	Name	Data Type	Valid Values	Default Value
1	No	Transducer 1 Sensitivity Units	USINT	0 = mil 1 = in/s 2 = g 3 = psi 4 = volts 5 = mm/s 6 = μm 7 = Pa 8 = mbar	0
2	No	Transducer 2 Sensitivity Units	USINT		0
3	No	Channel 1 Measurement Units	USINT	0 = mil 1 = in/s 2 = g 3 = psi 4 = volts 5 = mm/s 6 = μm 7 = Pa 8 = mbar	0
4	No	Channel 2 Measurement Units	USINT		0
5	No	Starting Order for Channel 1 Sum Harmonics meas.	USINT	0=1 1=2 2=3 3=4 4=5	3
6	No	Starting Order for Channel 2 Sum Harmonics measurement.	USINT	1...5	2

Table 56 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
7	No	4...20 mA Output 1 Measurement Identifier	USINT	0 = CH 1 Overall 1 = CH 2 Overall	0
8	No	4...20 mA Output 2 Measurement Identifier	USINT	2 = CH 1 Gap 3 = CH 2 Gap 4 = CH 1 Band 1 5 = CH 2 Band 1 6 = CH 1 Band 2 7 = CH 2 Band 2 8 = CH 1 Band 3 9 = CH 2 Band 3 10 = CH 1 Band 4 11 = CH 2 Band 4 12 = Speed 13 = SMAX Mag. 14 = CH 1 1X Mag. 15 = CH 2 1X Mag. 16 = CH 1 2X Mag. 17 = CH 2 2X Mag. 18 = CH 1 3X Mag. 19 = CH 2 3X Mag. 20 = CH 1 Not 1X 21 = CH 2 Not 1X 22 = CH 1 Sum Harmonics 23 = CH 2 Sum Harmonics 29 = Acceleration 30 = CH1 Thrust Position 31 = CH2 Thrust Position 32 = CH1 gSE Overall 33 = CH2 gSE Overall 34 = CH1 Eccentricity 35 = CH2 Eccentricity 36 = CH1 gSE Band Pass 37 = CH2 gSE Band Pass 38 = CH1 gSE Tracking Mag. 39 = CH2 gSE Tracking Mag.	1
9	No	Transducer 3 (Tachometer) Sensitivity Units	USINT	0 = mil 1 = in/s 2 = g 3 = psi 4 = volts 5 = mm/s 6 = μm 7 = Pa 8 = mbar	0

Table 56 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
10	No	Alarm 1 Measurement ID	USINT	0 = CH 1 Overall	0
11	No	Alarm 2 Measurement ID	USINT	1 = CH 2 Overall	1
12	No	Alarm 3 Measurement ID	USINT	2 = CH 1 Gap	0
13	No	Alarm 4 Measurement ID	USINT	3 = CH 2 Gap	1
14	No	Alarm 5 Measurement ID	USINT	4 = CH 1 Band 1	0
15	No	Alarm 6 Measurement ID	USINT	5 = CH 2 Band 1	1
16	No	Alarm 7 Measurement ID ⁽¹⁾	USINT	6 = CH 1 Band 2	0
17	No	Alarm 8 Measurement ID ⁽¹⁾	USINT	7 = CH 2 Band 2	1
18	No	Alarm 9 Measurement ID ⁽¹⁾	USINT	8 = CH 1 Band 3	0
19	No	Alarm 10 Measurement ID ⁽¹⁾	USINT	9 = CH 2 Band 3	1
20	No	Alarm 11 Measurement ID ⁽¹⁾	USINT	10 = CH 1 Band 4	0
21	No	Alarm 12 Measurement ID ⁽¹⁾	USINT	11 = CH 2 Band 4	1
22	No	Alarm 13 Measurement ID ⁽¹⁾	USINT	12 = Speed	0
23	No	Alarm 14 Measurement ID ⁽¹⁾	USINT	13 = SMAX Mag.	1
24	No	Alarm 15 Measurement ID ⁽¹⁾	USINT	14 = CH 1 1X Mag.	0
25	No	Alarm 16 Measurement ID ⁽¹⁾	USINT	15 = CH 2 1X Mag.	1
				16 = CH 1 2X Mag.	0
				17 = CH 2 2X Mag.	1
				18 = CH 1 3X Mag.	0
				19 = CH 2 3X Mag.	1
				20 = CH 1 Not 1X	0
				21 = CH 2 Not 1X	1
				22 = CH 1 Sum Harmonics	
				23 = CH 2 Sum Harmonics	
				24 = CH 1 1X Phase	
				25 = CH 2 1X Phase	
				26 = CH 1 2X Phase	
				27 = CH 2 2X Phase	
				28 = SMAX Phase	
				29 = Acceleration	
				30 = CH 1 Thrust Position	
				31 = CH 2 Thrust Position	
				32 = CH 1 gSE Overall	
				33 = CH 2 gSE Overall	
				34 = CH 1 Eccentricity	
				35 = CH 2 Eccentricity	
				36 = CH 1 Band Pass	
				37 = CH 2 Band Pass	
				38 = CH 1 Tracking Mag.	
				39 = CH 2 Tracking Mag.	
				40 = CH 1 Tracking Phase	
				41 = CH 2 Tracking Phase	

Table 56 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
26	No	Relay 1 Alarm Identifier A	USINT	0 = Alarm 1	0
27	No	Relay 2 Alarm Identifier A	USINT	1 = Alarm 2	0
28	No	Relay 3 Alarm Identifier A	USINT	2 = Alarm 3	0
29	No	Relay 4 Alarm Identifier A	USINT	3 = Alarm 4	0
30	No	Relay 5 Alarm Identifier A	USINT	4 = Alarm 5 5 = Alarm 6 6 = Alarm 7 7 = Alarm 8 8 = Alarm 9 9 = Alarm 10 10 = Alarm 11 11 = Alarm 12 12 = Alarm 13 13 = Alarm 14 14 = Alarm 15 15 = Alarm 15	0
31	No	Relay 1 Alarm Identifier B	USINT	0 = Alarm 1	0
32	No	Relay 2 Alarm Identifier B	USINT	1 = Alarm 2	0
33	No	Relay 3 Alarm Identifier B	USINT	2 = Alarm 3	0
34	No	Relay 4 Alarm Identifier B	USINT	3 = Alarm 4	0
35	No	Relay 5 Alarm Identifier B	USINT	4 = Alarm 5 5 = Alarm 6 6 = Alarm 7 7 = Alarm 8 8 = Alarm 9 9 = Alarm 10 10 = Alarm 11 11 = Alarm 12 12 = Alarm 13 13 = Alarm 14 14 = Alarm 15 15 = Alarm 16	0
36	Yes	Channel 1 Vector Measurement Speed Data Units	USINT	0 = CPM 1 = Orders	0
37	Yes	Channel 2 Vector Measurement Speed Data Units	USINT	0 = CPM 1 = Orders	0
38	No	Poll Connection Produced Connection Path ⁽²⁾	USINT	101, 199 (Assembly Object Instance number)	101
39	No	Poll Connection Produced Connection Size ⁽²⁾	UINT	4...132	20
40	No	Channel 1 Measurement Mode	USINT	0 = Standard	0
41	No	Channel 2 Measurement Mode	USINT	1 = Thrust Position 2 = Alternating gSE 3 = Continuous gSE 4 = Eccentricity 5 = Band-Pass 6 = Tracking	0

Table 56 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
42	No	Band 1 Spectrum Option	USINT	0 = Standard Spectrum 1 = gSE Spectrum	0
43	No	Band 2 Spectrum Option	USINT		0
44	No	Band 3 Spectrum Option	USINT		0
45	No	Band 4 Spectrum Option	USINT		0
46	No	Band 5 Spectrum Option	USINT		0
47	No	Band 6 Spectrum Option	USINT		0
48	No	Band 7 Spectrum Option	USINT		0
49	No	Band 8 Spectrum Option	USINT		0
50	No	Eccentricity 1 Update Rate	USINT	1...255 seconds	60
51	No	Eccentricity 2 Update Rate	USINT	1...255 seconds	60

- (1) Alarms 6...15 are not available when the module is configured in the RSLogix 5000 software.
- (2) The Poll Connection Produced Connection Path and Size parameters cannot be set while the Poll connection is already established with a master/scanner. Attempting to do so results in an Object State Conflict error (error code 0xC). These Parameter instances are slightly more flexible than the actual Connection Object attributes because they can be set while the connection is in the **non-existent** state (before the master/scanner allocates the connection).

Instance Attributes

Table 57 - Parameter Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
1	Set	Parameter Value		Actual value of parameter	See Table 56 for a list of valid values for each instance.
2	Get	Link Path Size	USINT	Size of Link Path	0 (These Parameter instances do not link directly to another object attribute.)
3	Get	Link Path	ARRAY of DeviceNet path	DeviceNet path to the object for the Parameter value.	
		Segment Type/Port	BYTE	See DeviceNet Specification Volume 1 Appendix I for format.	
		Segment Address		See DeviceNet Specification Volume 1 Appendix I for format.	
4	Get	Descriptor	WORD	Description of Parameter	Bit 0 = Settable Path support Bit 1 = Enum Strings support Bit 2 = Scaling support Bit 3 = Scaling Links support Bit 4 = Read Only Bit 5 = Monitor Bit 6 = Ext. Prec. scaling
5	Get	Data Type	EPATH	Data Type Code	See DeviceNet Specification Volume 1 Appendix J, Section J-6.
6	Get	Data Size	USINT	Number of Bytes in Parameter value.	

Services

Table 58 - Parameter Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Class/Instance	Get_Attribute_Single	Returns the contents of the specified attribute.
10 _h	Class	Set_Attribute_Single	Sets the contents of the specified attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Acknowledge Handler Object (Class ID 2BH)

The Acknowledge Handler Object is used to manage the reception of message acknowledgments. This object communicates with a message producing Application Object within a device. The Acknowledge Handler Object notifies the producing application of acknowledge reception, acknowledge timeouts, and production retry limit errors.

Class Attributes

The Acknowledge Handler Object provides no class attributes.

Instances

A module provides only one instance (instance 1) of the Acknowledge Handler Object. This instance is associated with instance 4 of the Connection Object, the slave COS connection to a higher level master.

Instance Attributes

Table 59 - Acknowledge Handler Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Default Value
1	Get/Set	Acknowledge Timer	UINT	16 ms
2	Get/Set	Retry Limit	USINT	1
3	Get	COS Producing Connection Instance	UINT	4

Services

Table 60 - Acknowledge Handler Object Services

Service Code	Class/Instance Usage	Name
0E _h	Instance	Get_Attribute_Single
10 _h	Instance	Set_Attribute_Single

Alarm Object (Class ID 31DH)

The Alarm Object mode is a two-stage (alert and danger levels) alarm.

Class Attributes

Table 61 - Alarm Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
1	Get	Revision	USINT	Version of the implemented object.	2 (indicates that Threshold Multiplier is a REAL instead of USINT)

Instances

There are 16 instances of this object.

Instance Attributes

Table 62 - Alarm Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Alarm Status	3 BITS	The status of the alarm.	0 = Normal 1 = Alert (alarm) 2 = Danger (shutdown) 3 = Disarm 4 = Xdcr Fault 5 = Module Fault 6 = Tachometer Fault
4	Get/Set	Alarm Enable	BOOL	Indicates whether this alarm object is enabled.	0 = Disabled 1 = Enabled
5	Get	Type	USINT	Type of Alarm	0 = Magnitude 1 = Vector
6	Get	Threshold Units	USINT	Indicates whether the thresholds and deadband value are specified in units of measure. Not applicable to vector alarms.	Set to 1 1 = Measurement units
7	Get/Set	AlarmCondition	USINT	Indicates on which side of the threshold values the alarm and danger conditions exist. Not applicable to vector alarms.	0 = Greater than 1 = Less than 2 = Inside range 3 = Outside range

Table 62 - Alarm Object Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
8	Get/Set	AlarmHAlertLimit	REAL	The threshold value for the alert state of the alarm. (For range conditions, this is the greater threshold value.)	
9	Get/Set	AlarmHDangerLimit	REAL	The threshold value for the Danger state of the alarm. (For range conditions, this is the greater threshold value).	
10	Get/Set	AlarmLAlertLimit	REAL	The lesser threshold value for the Alert state of the alarm with a range condition type.	
11	Get/Set	AlarmLDangerLimit	REAL	The lesser threshold value for the Danger state of the alarm with a range condition type.	
12	Get/Set	AlarmDeadband	REAL	The amount on the safe side of a threshold by which the value must recover to clear the alarm.	
13	Get/Set	AlarmLimitMultiply (Setpoint Multiplier)	REAL	Indicates how the threshold must be adjusted when the Setpoint multiplication function is invoked.	0 = Disable alarm > 0 = Multiply the thresholds by the value
14	Get/Set	AlarmLimitMultiplyPeriod	UINT	The amount of time that the Threshold (Setpoint) Multiplier is applied after the start-up signal is received.	Seconds
15	Get/Set	AlarmSpeedRangeEn	BOOL	Indicates whether this alarm is enabled only within a certain machine speed range.	0 = No speed range (alarm is always enabled) 1 = Speed range (alarm only enabled within speed range)
16	Get/Set	AlarmSpeedHLimit	REAL	Indicates the greater threshold of the machine speed range for which the alarm is enabled (disabled at greater speeds).	CPM (must be greater than AlarmSpeedLLimit)
17	Get/Set	AlarmSpeedLLimit	REAL	Indicates the lesser threshold of the machine speed range for which the alarm is enabled (disabled at lesser speeds).	CPM (Must be less than AlarmSpeedHLimit)
18	Get/Set	Name	STRING2	A name to help identify this alarm.	
19	Get/Set	Measurement Identifier	EPATH	Identifies the measurement object to which this alarm is applied.	See Parameter Object instances 10...25. See Table 56 on page 130 .
21	Get/Set	Detection Delay	UINT	The period that the measurement must violate the threshold before the Alert or Danger status is indicated.	0...65,530 ms

Services

Table 63 - Alarm Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Band Measurement Object (Class ID 31E_H)

The Band Measurement Object models the measurement of the amplitude of a signal within a narrow frequency range.

Class Attributes

The Band Measurement Object provides no class attributes.

Instances

There are 10 instances of this object. Instances 1...8 are the Band measurements that are derived from the spectrum data. Instances 9 and 10 are the Band Pass measurements that are performed in Band Pass Filter measurement mode.

Table 64 - Band Measurement Object Instances

Instance	Description
1	Channel 1 Band Measurement #1
2	Channel 2 Band Measurement #1
3	Channel 1 Band Measurement #2
4	Channel 2 Band Measurement #2
5	Channel 1 Band Measurement #3
6	Channel 2 Band Measurement #3
7	Channel 1 Band Measurement #4
8	Channel 2 Band Measurement #4
9	Channel 1 Band Pass Measurement
10	Channel 2 Band Pass Measurement

Instance Attributes

Table 65 - Band Measurement Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Band Value	REAL	The measured band value.	See Data Units
4	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms or faults 1 = Alarm or fault condition exists, the Band Value attribute does not always match the actual field value.
5	Get	Data Units	ENGUNIT	The units context of the Band Value attribute.	This attribute is read only. It is set according to the Output Data Units attribute of the associated Channel Object instance. See page 140 .
6	Get/Set	Measurement	USINT	The measurement (or calculation) performed to produce the Band Value.	0 = RSS 1 = Peak
7	Get/Set	Minimum Frequency	REAL	The minimum frequency that is included in the band measurement.	
8	Get/Set	Maximum Frequency	REAL	The maximum frequency that is included in the band measurement.	The Maximum Frequency must be greater than or equal to Minimum Frequency.
9	Get/Set	Frequency Units	USINT	The units of Minimum and Maximum Frequency.	0 = Hz 1 = Orders

Services

Table 66 - Band Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Channel Object (Class ID 31F_H)

The Channel Object models front-end processing that is performed on an input signal before specific measurements are performed. This processing typically includes gain, filtering, and/or integration.

Channel Attributes

The Channel Object provides no class attributes.

Instances

There are four instances of this object. Instances 1 and 2 correspond to standard channels 1 and 2, respectively. Instances 3 and 4 correspond to gSE channels 1 and 2, respectively.

Instance Attributes

Table 67 - Channel Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get/Set	Output Data Units	ENGUNIT	The data units of the signal resulting from the signal processing that is performed in the channel.	See DeviceNet Specification Volume 1 Appendix K. Also see Parameter Object Instances 3 and 4. Valid values: g = 1504 _h in/sec = 2B07 _h mil = 0800 _h psi = 1300 _h volt = 2D00 _h mm/s = 0900 _h µm = 2204 _h Pa = 1309 _h mbar = 1308 _h This setting is directly related to the Sensitivity Units of the associated transducer and the Level of Integration that is performed on the channel.
4	Get	Integration Level of Integration	USINT	The level of integration to perform on the signal.	0 = None 1 = Single 2 = Double
5	Get/Set	Low Cutoff Frequency	USINT	The effective high pass filter (low frequency corner) selection.	0 = Very low (0.2 Hz) 1 = Low (1 Hz) 2 = Medium (5 Hz) 3 = High (10 Hz) 4 = Very high (40 Hz) See attributes 100...104.
6	Get/Set	Synchronous	BOOL	Indicates whether this channel is synchronized with the tachometer signal.	0 = Asynchronous 1 = Synchronous

Table 67 - Channel Object Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
7	Get/Set	Internal Gear Teeth	UINT	The number of gear teeth on the shaft of interest.	The Internal/External Gear Teeth values are used when synchronous operation is selected but there is a known speed difference between the shaft of interest and the shaft that is used as the tachometer source.
8	Get/Set	External Gear Teeth	UINT	The number of gear teeth on the shaft that is used as the tachometer source.	
9	Get/Set	Name	STRING2	A name to help identify this channel.	
10	Get/Set	Full Scale	REAL	The maximum signal that the channel is expected to process.	It is set according to the Output Data Units attribute on page 140 . Setting the Full Scale to a greater value enables the channel to handle greater input signals without saturating or clipping. Setting the Full Scale to a lesser value enables the signal to be measured with greater resolution.
100	Get	Very Low HPF Corner Frequency	REAL	The frequency, in Hz, of the "Very low" Low Cutoff Frequency option for attribute 5.	Hz
101	Get	Low HPF Corner Frequency	REAL	The frequency, in Hz, of the "Low" Low Cutoff Frequency option for attribute 5.	Hz
102	Get	Medium HPF Corner Frequency	REAL	The frequency, in Hz, of the "Medium" Low Cutoff Frequency (low frequency corner) option for attribute 5.	Hz
103	Get	High HPF Corner Frequency	REAL	The frequency, in Hz, of the "High" Low Cutoff Frequency option for attribute 5.	Hz
104	Get	Very High HPF Corner Frequency	REAL	The frequency, in Hz, of the "Very high" Low Cutoff Frequency option for attribute 5.	Hz
105	Get	Channel Alarm Status	USINT	Summary of the Alarms that are configured for this channel.	0 = Normal 1 = Alert (alarm) 2 = Danger (shutdown) 3 = Disarm

Services

Table 68 - Channel Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute.(1) ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Device Mode Object (Class ID 320_H)

The Device Mode object is used to control access to the configuration parameters in the module. The Device Mode attribute for this object must be in Program mode to allow configuration parameters to be Set for the module (see [Services](#)). Attempts to set the configuration parameters while the Device Mode is in Run mode returns an error. The module collects measurements while in Run mode but not while it is in Program mode.

Class Attributes

The Device Mode object provides no class attributes.

Instance Attributes

Table 69 - Device Mode Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get/Set	Device Mode	UINT	The operating mode of the module.	0 = Power Up 1 = RUN 2 = PROGRAM
199	Set	Backdoor Service	USINT	Setting this attribute is equivalent to requesting the specified service.	Set to one of these values to perform the specified service: 05 _h = Reset 09 _h = Delete 15 _h = Restore 16 _h = Save

IMPORTANT Setting the Device Mode attribute to 1 (RUN) is equivalent to executing the Start service. Setting the Device Mode attribute to 2 (PROGRAM) is equivalent to executing the Stop service.

Services

Table 70 - Device Mode Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Return the value of one attribute.
10 _h	Instance	Set_Attribute_Single	Set the value of one attribute.
07 _h	Instance	Stop	Transitions from Run to the Program state.
06 _h	Instance	Start	Validate the device configuration settings and transition to the Run state if OK.
05 _h	Instance	Reset	Transition to the Power Up state. Load the nonvolatile configuration and transition to the Run state if saved configuration restored.
16 _h	Instance	Save	Validate the device configuration settings if necessary and save them to nonvolatile memory.
09 _h	Instance	Delete	Delete the saved configuration from nonvolatile memory.
15 _h	Instance	Restore	Load the saved configuration or the factory default configuration from nonvolatile memory.

Overall Measurement Object (Class ID 322_H)

The Overall Measurement Object models the measurement of the amplitude of a signal including a wide frequency range.

Class Attributes

The Overall Measurement Object provides no class attributes.

Instances

There are two instances of this object.

Instance Attributes

Table 71 - Overall Measurement Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics												
3	Get	Overall Value	REAL	Measured value	The output value of the measurement that the Overall Measurement Object performs on the input signal. The result of the measurement process that is specified by Measurement is converted to the units specified by Data Units to produce the Overall Value.												
4	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms or faults. 1 = Alarm or fault condition exists. The Overall Value attribute does not always match the actual field value.												
5	Get	Data Units	ENGUNIT	The units context of the Overall Value attribute.	The Output Data Units attribute for the Channel Object determine the setting. (see page 140).												
6	Get/Set	Measurement	USINT	The measurement (or calculation) performed to produce the Overall Value.	0 = RMS 1 = RMS peak 2 = RMS pk-to-pk 3 = Peak 4 = Peak-to-peak 5...255 Reserved												
7	Get	Time Constant	REAL	The detection time constant that is associated with the output smoothing filter (for the RMS and DC meters) or the decay rate of the peak meters.	<p>This setting is based on the Low Frequency Cutoff (Channel object) and Measurement (attribute 6). If Measurement is set to 3 or 4, the Overall Time Constant is 1.5 seconds.</p> <p>If Measurement is set to 0, 1, or 2, this table shows the Time Constant.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Low Frequency Cutoff</th> <th>Overall Time Constant</th> </tr> </thead> <tbody> <tr> <td>0.2 Hz</td> <td>0.8</td> </tr> <tr> <td>1 Hz</td> <td>0.16</td> </tr> <tr> <td>5 Hz</td> <td>0.045</td> </tr> <tr> <td>10 Hz</td> <td>0.045</td> </tr> <tr> <td>40 Hz</td> <td>0.045</td> </tr> </tbody> </table>	Low Frequency Cutoff	Overall Time Constant	0.2 Hz	0.8	1 Hz	0.16	5 Hz	0.045	10 Hz	0.045	40 Hz	0.045
Low Frequency Cutoff	Overall Time Constant																
0.2 Hz	0.8																
1 Hz	0.16																
5 Hz	0.045																
10 Hz	0.045																
40 Hz	0.045																
8	Get	Damping Factor	REAL	The damping factor that is associated with output smoothing filter for the RMS and DC meters (not used with peak meters).	1.0												
9	Get/Set	Overall Filter	USINT	Overall filter type that is applied to the input signal before the measurement is performed.	0 = None 1 = Low Pass Filter 2...255 Reserved												
10	Get/Set	Low Pass Corner Frequency	UINT	The corner frequency of the low pass filter.	100...20,000 Hz												

Services

Table 72 - Overall Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Relay Object (Class ID 323_H)

The Relay Object models a relay (actual or virtual). A relay can be activated or deactivated based on the status of one or more alarms.

Class Attributes

Table 73 - Relay Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Number of Instances	UINT	Number of Instances in this class.	5
100	Set	Reset All	USINT	Setting this attribute is equivalent to executing the Class Reset service	Reset All is an attribute that provides a way to perform a Class level Reset service via the Set_Attribute_Single service. Setting this attribute to any value is equivalent to performing the Class level Reset service. Reading the Reset All attribute always returns zero.

Instances

There is one instance of the object. Instance 1 is a virtual relay that corresponds with the Relay status indicator on the module.

IMPORTANT Instances 2...5 are not available when the module is configured in the RSLogix 5000 software.

Instance Attributes

Table 74 - Relay Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Relay Status	BOOL	The status of the relay.	0 = Off 1 = On
4	Get/Set	Relay Enable	BOOL	Indicates whether this relay object is enabled.	0 = Disabled 1 = Enabled
5	Get/Set	Latch Enable	BOOL	Indicates whether this relay latches (requires a reset command to deactivate).	0 = Nonlatching 1 = Latching

Table 74 - Relay Object Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
6	Get/Set	Failsafe Enable	BOOL	Indicates whether this relay is normally energized (activated during power loss).	0 = Non-failsafe (not normally energized) 1 = Failsafe (normally energized)
7	Get/Set	Delay	UINT	The time period that the voting logic must be true before the relay is activated.	0...65,535 milliseconds
8	Get/Set	Name	STRING2	A name to help identify the relay.	18 characters maximum
9	Get/Set	Alarm Level	BYTE	Specifies what alarm status values cause the relay to activate.	0 = Normal 1 = Alert 2 = Danger 3 = Disarm 4 = Xdcr Fault 5 = Module Fault 6 = Tachometer Fault
10	Get/Set	Alarm Identifier A	EPATH	Identifies the first alarm status the relay monitors.	See Parameter Object instances 26...30.
11	Get/Set	Alarm Identifier B	EPATH	Identifies the second alarm status the relay monitors.	See Parameter Object instances 31...35. See Table 56 on page 130.
12	Get/Set	Logic	USINT	Indicates the number of associated alarms that must have a status value that is specified by Alarm Level to activate the relay.	0 = Ignore Alarm Identifier B and activate the relay based on the status of Alarm Identifier A. 1 = Activate the relay if the status of either Alarm Identifier A or B matches any of the statuses specified by Alarm Level. 2 = Activate the relay if the status of both Alarm Identifier A and B match any of the statuses specified by Alarm Level.
14	Get	Relay Installed	BOOL	Indicates whether an actual relay is associated with this instance.	0 = Not installed 1 = Installed
15	Get/Set	Idle Hold	USINT	Hold relay state during reconfiguration.	0 = Relay is deactivated while module is in Program mode. 1 = Relay retains last state while in Program mode.

Services

Table 75 - Relay Object Services

Service Code	Class/Instance Usage	Name	Description
05 _h	Class/Instance	Reset	Resets latched relay.
0E _h	Class/Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Class/Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Spectrum Waveform Measurement Object (Class ID 324_H)

The Spectrum/Waveform Measurement Object models a spectrum and waveform measurement.

When requesting the first byte of waveform or spectra data, the module copies the most recently sampled live measurement to a hold buffer. This buffer holds measurement until the entire measurement is uploaded to the host, or until a new first byte request is made. If the measurement mode is Synchronous, and the channels have the same number of orders and number of lines, then when the first byte of the channel 0 data is requested. The module copies the simultaneous measurements for both channel 0 and channel 1 to the hold buffer.

Class Attributes

The Spectrum/Waveform Measurement Object provides no class attributes.

Instances

There are four instances of this object. Instances 1 and 2 are the standard spectrum (and waveform) for channels 1 and 2, respectively. Instances 3 and 4 are the gSE spectrum for channels 1 and 2, respectively. Instance 3 and 4 support the gSE spectrum only and not a waveform. Also, instances 3 and 4 do not support the Complex Data Format.

Instance Attributes

Table 76 - Spectrum Waveform Measurement Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms or faults. 1 = Alarm or fault condition exists. The Spectrum and Waveform data does not always match the actual field value.
4	Get	Data Units	ENGUNIT	The units context of the Data attributes.	This setting is determined by the Output Data Units attribute for the Channel Object. See page 140 .
5	Get	Domain	USINT	The domain that is used for the spectrum and waveform measurements.	0 = Frequency/Time 1 = Order/Position
6	Get/Set	FMAX	REAL	The maximum frequency or order of the spectrum data.	0 . . . 20,000 Hz if Domain = 0. There are several predetermined FMAX settings for which spectrum data can be produced. If you select an unsupported value, then the next greater supported FMAX value is used for the spectrum data. 4 . . . 40 Orders if Domain = 1. The Number of Lines value must be evenly divisible by the FMAX value or an Invalid Device Configuration error is returned during the Device Mode Object Start and Save services.
7	Get/Set	Number of Spectrum Lines	UDINT	Number of lines or bins in the spectrum data.	100, 200, 400, 800, or 1600
8	Get/Set	Window Type	USINT	The window function to be applied to the waveform data before computing the spectrum.	0 = Rectangular 1 = Hamming 2 = Hanning 3 = Flat Top 4 = Kaiser Bessel
9	Get/Set	Period	REAL	The period of the waveform.	Seconds if Domain = 0. Cycles if Domain = 1.
10	Get	Number of Waveform Points	UDINT	Number of points in the waveform data.	256, 512, 1024, 2048, or 4096
11	Get	Overlap	USINT	The percent overlap applied to the waveform data sets used for calculating the spectrum.	Only 0% supported.
12	Get/Set	Data Format	USINT	The format of the spectrum data.	0 = Complex data 1 = Magnitude data
13	Get	Average Type	USINT	The type of averaging performed.	0 = Asynchronous (spectrum) 1 = Synchronous (waveform) <ul style="list-style-type: none"> • Determined by the Synchronous attribute of the Channel Object. • When set to Asynchronous, consecutive spectrum measurements are averaged together to produce the Spectrum data. • When set to synchronous, synchronized waveforms are averaged together to produce the Waveform data, and the Spectrum data is produced from the averaged waveform. A trigger source from a tachometer, for example, is required to obtain the synchronized waveforms.

Table 76 - Spectrum Waveform Measurement Object Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
14	Get/Set	Number of Averages	UINT	The number of individual data sets to be incorporated into the average calculation.	0 = Invalid 1 = No averaging > 1 = Averaging
15	Get/Set	Storage Option	BYTE	Determines what must be stored in response to a storage trigger event.	1 = Store waveform 2 = Store spectrum
16	Get	Storage time stamp	LTIME	Records the time stamp of the stored data.	64-bit microsecond counter-value.

Services

Table 77 - Spectrum Waveform Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾
4B _h	Instance	Get_Spectrum_Chunk	Upload a portion of the current Spectrum data.
4C _h	Instance	Get_Waveform_Chunk	Upload a portion of the current Waveform data.

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Get Spectrum Chunk/Get Waveform Chunk

These services return a portion of the respective data structure. It is likely that the spectrum and waveform data structures are too large to transfer over the network in one message. These services let the data structures be transferred over the network in smaller portions so that the explicit message buffer does not need to be so large.

The Spectrum Data structure contains an array of values that, taken together, are the output of the spectrum measurement that the Spectrum/Waveform Measurement Object performs on the input signal. The size of the Spectrum Data structure and format of the data array depends on the Data Format

attribute. In all cases, the spectrum data array values are normalized and must be converted to floating point to obtain the true values.

Table 78 - Spectrum Data Structure

Byte (DWORD) Offset Within Structure	Structure Member	Data Type	Description
0 (0)	Number of Spectrum Lines	UDINT	Number of lines or bins in the spectrum data. This number must be equal to the Number of Spectrum Lines attribute setting. It is provided within this structure to help determine the size of the structure.
4 (1)	FMAX	REAL	The maximum frequency or order of the spectrum data. This value is the actual FMAX of the spectrum data and does not always match the FMAX attribute setting.
8 (2)	Amplitude Reference	REAL	Normalization factor This factor is used to convert the normalized array data into floating point values.
12 (3)	Normalized Value Array	Array of INT or UINT	The normalized spectrum data points These data points must be converted to floating point values using the Amplitude Reference value. The Data Format attribute determines whether the values are INT or UINT and exactly what conversion must be applied.

The total size of the Spectrum Data structure in DWORD is:

- For Magnitude Data Format: 3 + (Number of Spectrum Lines / 2)
- For Complex Data Format: 3 + (Number of Spectrum Lines)

If the data format is Magnitude Data then the Normalized Value Array is an array of UINT (16-bit unsigned integers ranging from 0...65535). The number of UINTs in the spectrum data array is equal to the Number of Spectrum Lines. To convert the normalized spectrum data into floating point values, use this equation:

$$\text{Float Data}_n = \text{Amplitude Reference} \frac{\text{Normalized Data}_n}{65536}$$

Where Float Data_n is the value for the nth spectrum bin, and $0 \leq n \leq \text{Number of Spectrum Line}$.

The Float Data value represents an amplitude value if Data Format is real data. The Float Data represents a power value if Data Format is power data.

If the data format is Complex Data, then the Normalized Value Array is an array of INT (16-bit signed integers ranging from -32,768...32,767). There are two INTs (real and imaginary values) in the array for each spectrum bin (the array size is twice the Number of Spectrum Lines). To convert the normalized spectrum data into real and imaginary values, use these equations:

$$\text{Real Data}_n = \text{Amplitude Reference} \frac{\text{Normalized Data}_{2n}}{32768}$$

Where Real Data_n and Imaginary Data_n are the real and imaginary values for the nth spectrum bin, and $0 \leq n \leq \text{Number of Spectrum Line}$.

$$\text{Imaginary Data}_n = \text{Amplitude Reference} \frac{\text{Normalized Data}_{(2n + 1)}}{32768}$$

The Real Data and Imaginary Data values are converted into magnitude and phase values with these equations:

$$\text{Magnitude Data}_n = \sqrt{\text{Real Data}_n^2 + \text{Imaginary Data}_n^2}$$

$$\left(\frac{\text{Imaginary Data}_n}{\text{Real Data}_n} \right)$$

The Waveform Data structure contains an array of values that, taken together, are the output of the sampling that the Spectrum/Waveform Measurement Object performs on the input signal. The Waveform Data array values are normalized and must be converted to floating point to obtain the true values.

Table 79 - Waveform Data Structure

Byte (DWORD) Offset Within Structure	Structure Member	Data Type	Description
0 (0)	Number of Waveform Points	UDINT	Number of points in the waveform data. This value must be equal to the Number of Waveform Points attribute setting. It is provided within this structure to help determine the size of the structure.
4 (1)	Period	REAL	The period of the waveform. This value is the actual period of the waveform and does not always match the Period attribute setting.
8 (2)	Amplitude Reference	REAL	Normalization factor This factor is used to convert the normalized array data into floating point values.
12 (3)	Normalized Value Array	Array of INT	The normalized waveform data points These values must be converted to floating point values using the Amplitude Reference value.

The total size of the Waveform Data structure in DWORDs is 3 + (Number of Waveform Points / 2).

The Waveform Data is an array of INT (16-bit signed integers ranging from -32768...32767). The number of INTs in the Waveform Data array is equal to the Number of Waveform Points. To convert the normalized Waveform Data into floating point values, use these equations:

$$\text{Float Data}_n = \text{Amplitude Reference} \frac{\text{Normalized Data}_n}{32768}$$

Where Float Data_n is the value for the n th waveform point, and $0 \leq n \leq \text{Number of Waveform Points}$.

The `Get_Spectrum_Chunk` and `Get_Waveform_Chunk` services use the same request and response parameters.

Table 80 - Get_Spectrum_Chunk/Get_Waveform_Chunk Request Parameters

Name	Data Type	Description of Request Parameters	Semantics of Values
Initial DWORD Offset	UINT	The offset of the first 32-bit value within the data structure to be returned.	$0 \leq \text{offset} < \text{size of the data structure in DWORDs}$. For example: Offset = 0 refers to bytes 0...3 (the number of lines or points value) Offset = 1 refers to bytes 4...7 (the FMAX or period values) Offset = 2 refers to bytes 8...11 (the amplitude reference value) Offset = 3 refers to bytes 12...15 (the first pair of normalized values) Offset = 4 refers to bytes 16...19 (the second pair of normalized values)
Number of DWORDs	USINT	The number of 32-bit values from the data structure to be returned.	This value must be small enough to fit in the explicit message buffer. The buffer is likely less than the total size of the data structure so that several calls to the service are required to get the entire data structure.

Table 81 - Get_Spectrum_Chunk/Get_Waveform_Chunk Response Parameters

Name	Data Type	Description of Response Parameters	Semantics of Values
Number of DWORDs	USINT	The number of 32-bit values that are returned in the Data Chunk array of the response. (Can be less than the number of DWORDs requested.)	If fewer DWORDs are returned than requested, the end of the data structure has been reached (the request went beyond the end of the array).
Data Chunk	Array of DWORD	The requested portion of the data structure.	

Speed Measurement Object (Class ID 325_H)

The Speed Measurement Object models a speed measurement of a tachometer signal.

Class Attributes

The Speed Measurement Object provides no class attributes.

Instance Attributes

Table 82 - Speed Measurement Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics												
3	Get	Speed Value	REAL	The measured speed value.	CPM												
4	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms or faults. 1 = Alarm or fault condition exists. The Speed Value attribute does not always match the actual field value.												
5	Get	Maximum Speed	REAL	The maximum (peak) measured speed value since the most recent reset.	CPM												
12	Get/Set	Time Constant	UINT	The time constant value that is used for exponential averaging of the Speed Value (a low pass filter/output smoothing filter).	Milliseconds												
13	Get	Acceleration	REAL	The rate of change of the Speed Value.	CPM/min												
14	Get/Set	Measurement Response	USINT	Determines how quickly the Speed measurement responds to change. For example, setting this attribute to 1 indicates a settling time of 220 ms. The speed is averaged over a quarter second, and the reported value reaches 90% of the new steady state value about 220 ms after the change in machine speed.	See this table. <table border="1"> <thead> <tr> <th>Meas. Response</th> <th>Settling Time</th> <th>Time Constant</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>2640 ms</td> <td>1200 ms</td> </tr> <tr> <td>1</td> <td>220 ms</td> <td>100 ms</td> </tr> <tr> <td>2</td> <td>22 ms</td> <td>10 ms</td> </tr> </tbody> </table>	Meas. Response	Settling Time	Time Constant	0	2640 ms	1200 ms	1	220 ms	100 ms	2	22 ms	10 ms
Meas. Response	Settling Time	Time Constant															
0	2640 ms	1200 ms															
1	220 ms	100 ms															
2	22 ms	10 ms															

Services

Table 83 - Speed Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
05 _h	Instance	Reset	Clears Maximum (Peak) speed to 0.
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Measurement Parameters

Table 84 - Thrust Position Measurement Parameters

Parameter Name	Description	Values/Comments
Target Angle	Sets the angle between the shaft and the target surface. The target surface moves with the shaft. The transducer is mounted perpendicular to the target surface.	degrees
Upscale	Sets the movement of the target relative to the transducer that is considered positive displacement.	Options: • Away • Towards
Calibration Offset (XM Serial only)	Enter the position of the current Transducer DC Bias reading.	mils
Calibration Bias	<p>Sets the zero or green position. The zero position is the normal operating position. Setting the zero position compensates for the static gap, which enables the module to display only the displacement around the zero position.</p> <p>The formula that you use depends on the Upscale setting and whether Fault High and Fault Low are both less than or equal to zero. Use one of these formulas to calculate the Calibration Bias.</p> <ul style="list-style-type: none"> • Upscale set to 'Towards' Formula $\text{Calibration bias} = \text{Transducer DC Bias} + (\text{Sensitivity} \times \text{Calibration Offset}) \times \sin(\text{Target Angle})$ • Upscale set to "Away" Formula $\text{Calibration Bias} = \text{Transducer DC Bias} - (\text{Sensitivity} \times \text{Calibration Offset}) \times \sin(\text{Target Angle})$ <p>If Fault High and Fault Low are both less than or equal to 0, use one of these formulas:</p> <ul style="list-style-type: none"> • Upscale set to "Towards" Formula $\text{Calibration bias} = \text{Transducer DC Bias} - (\text{Sensitivity} \times \text{Calibration Offset}) \times \sin(\text{Target Angle})$ • Upscale set to "Away" Formula $\text{Calibration Bias} = \text{Transducer DC Bias} + (\text{Sensitivity} \times \text{Calibration Offset}) \times \sin(\text{Target Angle})$ 	Volts IMPORTANT: Check with the manufacturer about operating thrust position and acceptable tolerances before making any adjustments.
Calculate Bias (XM Serial only)	Automatically calculates the Calibration Bias value.	

Tachometer Channel Object (Class ID 326_H)

The Tachometer Channel Object models front end processing that is performed on a tachometer signal before specific measurements are performed.

Class Attributes

The Tachometer Channel Object provides no class attributes.

Instance Attributes

Table 85 - Tachometer Channel Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get/Set	Number of Pulses per Revolution	UINT	The number of signal pulses per revolution of the shaft (for example number of gear teeth).	0 = Tachometer disabled > 0 = Tachometer enabled
4	Get/Set	Auto Trigger	BOOL	Indicates whether the trigger level is determined automatically from the signal.	0 = Use specified Trigger Level, Trigger Slope, and Hysteresis 1 = Automatically determine trigger level and trigger slope, and use the specified Hysteresis
5	Get/Set	Trigger Level	REAL	The signal level to be used as the trigger.	Volts
6	Get/Set	Trigger Slope	USINT	The slope of the signal at the threshold crossing to be used as the trigger.	0 = Positive 1 = Negative
7	Get/Set	Trigger Hysteresis	REAL	The amount of hysteresis around the trigger level.	In Auto Trigger mode, this value is a percentage of the peak-to-peak input signal and can range from 0 . . . 50%. In Manual Trigger mode, this value is a voltage level (the hysteresis voltage is added or subtracted to the threshold voltage to determine the hysteresis range).
8	Get/Set	Name	STRING2	A name to help identify this channel.	18 characters maximum
10	Get/Set	Fault Time-out	USINT	Number of seconds with no pulses before a Tach Fault is indicated unless Zero Pulse Fault Inhibit is set to 1.	1 . . . 64 seconds
11	Get/Set	Zero Pulse Fault Inhibit	BOOL	Lack of Tach Pulses does not cause a Tach Fault.	0 = A lack of tach pulses constitutes a Tach Fault 1 = A lack of tach pulses does not constitute a Tach Fault

Services

Table 86 - Tachometer Channel Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Transducer Object (Class ID 328_H)

The Transducer Object models a transducer.

Class Attributes

The Transducer Object provides no class attributes.

Instances

There are three instances of this object.

Table 87 - Band Measurement Object Instances

Instance	Descriptions
1	Vibration Channel 0
2	Vibration Channel 1
3	Tachometer Channel

Instance Attributes

Table 88 - Transducer Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	DC Bias	REAL	The measured average DC bias of the transducer signal in volts.	Volts
4	Get	Status	BOOL	Indicates whether a transducer fault exists (the measured DC Bias is outside the range that is specified by Fault High and Low).	0 = No fault 1 = A transducer fault exists
5	Get/Set	Sensitivity Value	REAL	Value of the sensitivity of the transducer in millivolts per Sensitivity Units.	See Valid Full Scale Selections for valid Sensitivity and Full Scale value pairs.
6	Get/Set	Sensitivity Units	ENGUNIT	Units of the denominator of the Sensitivity Value.	See DeviceNet Specification Volume 1 Appendix K. Also see Parameter Object instances 1 and 2 (page 130). Valid values: g = 1504 _h in/sec = 2807 _h mil = 0800 _h psi = 1300 _h volt = 2000 _h mm/s = 0900 _h µm = 2204 _h mbar = 1308 _h Pa = 1309 _h
7	Get/Set	Fault High	REAL	The maximum expected DC Bias voltage from the transducer in volts.	Volts A reading above this value causes a transducer fault, which is indicated by the Channel Status Indicator flashing red.
8	Get/Set	Fault Low	REAL	The minimum expected DC Bias voltage from the transducer in volts.	Volts

Table 88 - Transducer Object Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
9	Get/Set	Power Type	USINT	Indicates the type of power that is supplied to the transducer.	0 = Off 1 = IEPE (externally supplied) 2 = 24V (externally applied) 3 = -24V (externally applied from terminal base) 4 = Bias Current (externally supplied)
13	Get	DC Bias Time Constant	REAL	The time constant value that is used for exponential averaging of the DC Bias value (a low pass filter/output smoothing filter).	1.769 seconds

Services

Table 89 - Transducer Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

Vector Measurement Object (Class ID 329_H)

The Vector Measurement Object models the measurement of the amplitude and phase of the input signal at a specific multiple of the machine speed.

Class Attributes

The Vector Measurement Object provides no class attributes.

Instances

There are eight instances of this object.

Table 90 - Vector Measurement Object Instances

Instance	Description
1	Channel 1 1X Vector Measurement
2	Channel 2 v1X Vector Measurement
3	Channel 1 2X Vector Measurement
4	Channel 2 2X Vector Measurement
5	Channel 1 3X Vector Measurement

Table 90 - Vector Measurement Object Instances

Instance	Description
6	Channel 2 3X Vector Measurement
7	Channel 1 Tracking Measurement
8	Channel 2 Tracking Measurement

Instance Attributes

Table 91 - Vector Measurement Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Magnitude Value	REAL	The measured magnitude value.	—
4	Get	Phase Value	REAL	The measured phase value.	Degrees Important: Not valid for instances 5 and 6.
5	Get	Status	BOOL	Indicates if a fault or alarm has occurred.	0 = Operating without alarms of faults. 1 = Alarm or fault condition exists. The Value attributes does not always match the actual field value.
6	Get	Magnitude Data Units	ENGUNIT	The units context of the Magnitude Value attribute.	This setting is determined by the Output Data Units setting for the Channel Object. See page 140 .
7	Get	Speed Value	REAL	The speed at which the magnitude and phase are measured.	Instances 1 and 2 use 1X machine speed. Instances 3 and 4 use 2X machine speed. Instances 5 and 6 use 3X machine speed. The value is valid only when synchronous sampling mode is selected for the corresponding channel.
8	Get	Speed Data Units	ENGUNIT	The units context of the Speed Value attribute.	See DeviceNet Specification Volume 1 Appendix K. This value is set to Orders.

Services

Table 92 - Vector Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
OE _h	Instance	Get_Attribute_Single	Returns one attribute.

4...20 mA Output Object (Class ID 32A_H)

The 4...20 mA Output Object models the configuration of a 4...20 mA output signal.

Class Attributes

The 4...20 mA Output Object provides no class attributes.

Instances

There are two instances of this object.

Instance Attributes

Table 93 - 4...20 mA Output Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description	Semantics
3	Get/Set	Value	REAL	The current output value.	mA
4	Get/Set	Enable	BOOL	Indicates whether this 4...20 mA output is enabled.	0 = Disabled 1 = Enabled
5	Get/Set	Max Range	REAL	The measured value that is associated with 20 mA.	
6	Get/Set	Min Range	REAL	The measured value that is associated with 4 mA.	
7	Get/Set	Measurement Identifier Path	EPATH	Identifies the class, instance, and attribute of a measurement value that this 4...20 mA output is tracking.	See Parameter Object Instances 7 and 8. See DeviceNet Specification Volume 1 Appendix I.

Services

Table 94 - 4...20 mA Output Object Services

Service Code	Class/Instance Usage	Name	Description
0E _h	Instance	Get_Attribute_Single	Returns one attribute.
10 _h	Instance	Set_Attribute_Single	Sets one attribute. ⁽¹⁾

(1) Attributes can only be set while the device is in Program mode. See the description of the Device Mode Object for more information.

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Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

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 NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, 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

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