User Manual

Original Instructions

Allen-Bradley

XM Dynamic Measurement Module with ControlNet Adapter

Catalog Numbers 1440-DYN02-01RJ, 1440-ACNR, 1440-TBS-J

Allen-Bradley • Rockwell Software

Rockwell Automation

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).

This manual introduces you to the Dynamic Measurement module. It is intended for anyone who installs, configures, or uses the Dynamic Measurement module.

Additional Resources

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

Resource	Description
XM® Monitoring Modules Specifications Technical Data, publication 1440-TD001	Provides specifications for the 1440 series of Rockwell Automation® monitoring modules.
XM Dynamic Measurement Module User Manual, publication ICM-UM002	Provides information on how to install and configure the Dynamic Measurement 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.ab.com	Provides declarations of conformity, certificates, and other certification details.

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

Notes:

ControlNet Adapter

The 1440-ACNR module operates as a communication adapter for the 1440-DYN02-01RJ module. It provides an interface for controlling this module on an XM® bus and transferring data to the processor over a ControlNet network.

The ControlNet network is a communication architecture that enables the exchange of messages between ControlNet products compliant with the ControlNet International specification. It provides high-speed transport of time-critical I/O and interlocking data and messaging data, including upload/download of programming and configuration data on a physical media link.

The module supports:

- Control of I/O on the XM bus, with up to 10 XM Dynamic Measurement modules (Cat. No. 1440-DYN02-01RJ) connected to the adapter.
- Unscheduled messaging data for configuration and retrieval of data.
- Local communication network access through the network access port (NAP).

ControlNet Adapter Components

The 1440-ACNR module consists of the following hardware components.

Figure 1 - ControlNet Adapter Components

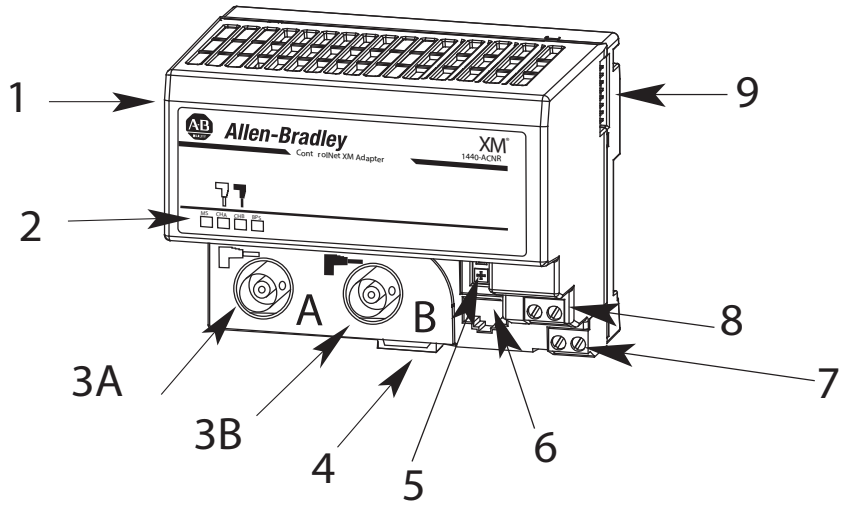

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Table 1 - ControlNet Adapter Components

Item	Component	Description
1	ControlNet Adapter Module	Operates as a communication adapter for the 1440-DYN02-01RJ module.
2	Status Indicators	Four status indicators that indicate the adapter, backplane, and network status.
3A	Channel A Coax Receptacle	Channel A BNC connection.
3B	Channel B Coax Receptacle	Channel B BNC connection.
4	Module Locking tab	Tab that is used to lock the module into place.
5	ControlNet Node Address Switches	Pushwheel switches for setting the node address. See Set the Node Address for the ControlNet Adapter on page 25.
6	Network Access Port (NAP)	Provides a bidirectional electrical interface for programming, maintenance, and I/O monitoring devices. See the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002.
7	24V DC Connections	+V DC power connections.
8	24V Common Connections	-V common connections.
9	XM bus Connector	Connects the adapter to the XM modules on the XM bus.

Dynamic Measurement Module

The Dynamic Measurement module is part of the Allen-Bradley® XM® Series, a family of distributed machine condition monitoring and protection devices.

IMPORTANT The 1440-DYN02-01RJ module must reside on its own network that is dedicated to one 1440-ACNR module and one to ten 1440-DYN02-01RJ modules. Other XM family member modules cannot be mixed with the 1440-DYN02-01RJ module on the same network.

The 1440-DYN02-01RJ module is a two-channel general-purpose monitor that supports measurements of dynamic inputs such as vibration, pressure, and strain. The module can be used to monitor shaft, casing, and pedestal vibration in equipment that rotates.

You can use these types of inputs:

- Allen-Bradley non-contact eddy current probe
- Standard integrated electronics piezoelectric (IEPE) accelerometer
- Velocity transducer
- AC voltage output measurement device
- DC voltage output measurement device

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:

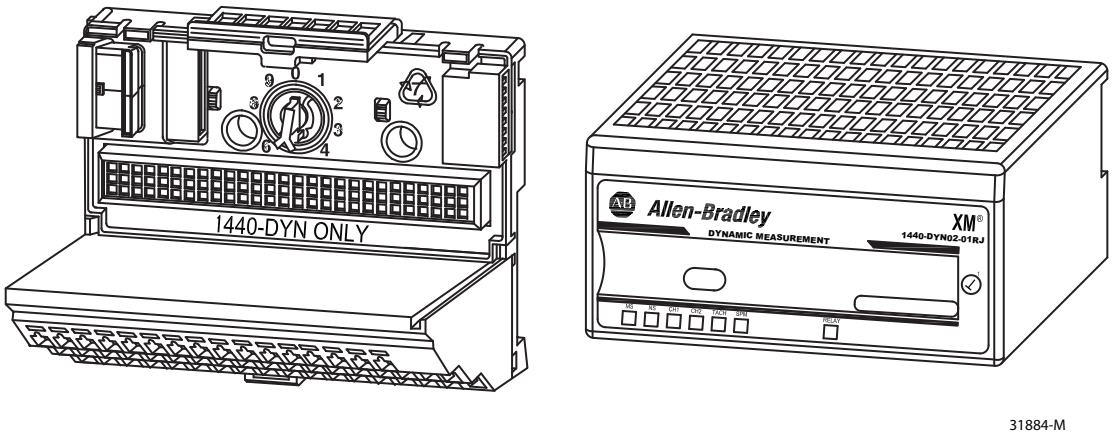
- Eddy current probe
- Unpowered magnetic probe
- Other powered and unpowered tachometer sensors

The module provides onboard processing of critical vibration parameters, advanced alarm, and relay logic. The module can be integrated with existing automation and control systems, including PLCs and displays, which can provide information when you troubleshoot machinery failures.

Dynamic Measurement Module Components

The Dynamic Measurement module consists of a terminal base unit and an instrument module. The Dynamic Measurement module and terminal base are shown in Figure 2.

Figure 2 - Module Components



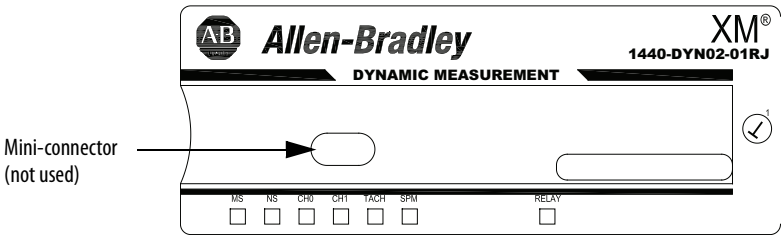
Dynamic Measurement Terminal Base Unit
Cat. No. 1440-TBS-J

Dynamic Measurement Module
Cat. No. 1440-DYN02-01RJ

- Dynamic Measurement Terminal Base - A DIN rail-mounted base unit that provides terminations for all field wiring that the Dynamic Measurement module requires.
- Dynamic Measurement Module - The module mounts only on the 1440-TBS-J terminal base via a keyswitch and a 96-pin connector. The module contains the measurement electronics, and processors.

IMPORTANT The mini-connector under the label on the top of the module is not used.

Figure 3 - Mini-connector



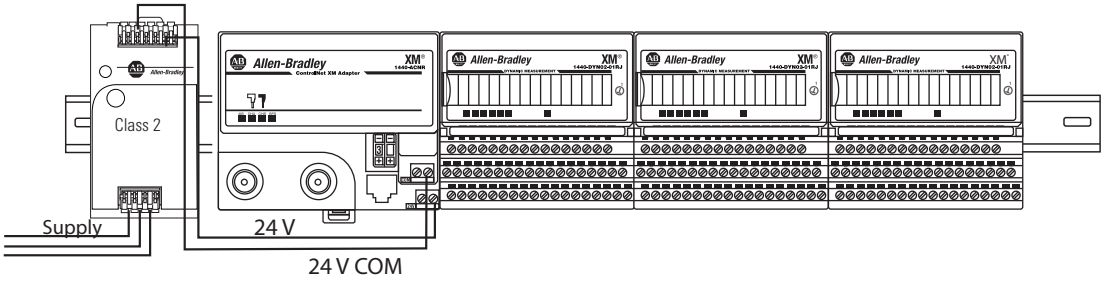
XM Bus

The XM bus connector, on each side of Dynamic Measurement module, connects the module to the 1440-ACNR adapter and other 1440-DYN02-01RJ modules on the DIN rail, as shown in Figure 4.

The 1440-ACNR module operates as a communication adapter for 1440-DYN02-01RJ modules. It provides an interface for controlling XM1440-DYN02-01RJ modules on the XM bus and transferring data to the processor over a ControlNet network.

For more information about the 1440-ACNR module, see Wire the ControlNet Adapter on page 26.

Figure 4 - XM Bus



The XM bus connector passes power and XM communications between the connected modules. The XM bus communicates using standard DeviceNet protocols and CAN transceivers, but it does not share specifications for the media (wire) and isolation characteristics.

ATTENTION: The total current draw through the XM bus connector cannot exceed 3 A. Multiple power sources are not allowed.

ATTENTION: To comply with the CE Low Voltage Directive (LVD), all connections to this equipment must be powered from a source compliant with the following: Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

To comply with UL restrictions, this equipment must be powered from a source compliant with the following: Class 2.

Notes:

Install the Adapter and Module

This chapter describes how to install the terminal base, adapter, and the module. It also describes how to connect to the network.

Environment and Enclosure

ATTENTION: 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 environments.

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. Check subsequent sections of this publication for possible 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 provided by different types of enclosures.

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:
Products marked "CL I, DIV 2, GP A, B, C, D" are suitable only for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations. 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) can 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.	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.
WARNING: **EXPLOSION HAZARD -** • 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 can impair suitability for Class I, Division 2. • If this product contains batteries, they must be changed only in an area known to be nonhazardous.	**WARNING:** **RISQUE D'EXPLOSION -** • 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.

European Hazardous Location Approval

The following applies to products marked ⟨Ex⟩ II 3 G. Such modules:

- Are Equipment Group II, Equipment Category 3, and comply with the Essential Health and Safety Requirements relating to the design and construction of such equipment given in Annex II to Directive 94/9/EC.
- See the EC Declaration of Conformity at http://www.rockwellautomation.com/products/certification for details. The type of protection for the 1440-DYN02-01RJ, 1440-TBS-J, and 1440-ACNR is `Ex nA IIC T4 Gc' according to EN 60079-15.
- Can have catalog numbers followed by a `K' to indicate a conformal coating option.
- Are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification according to ATEX directive 1999/92/EC.
- The 1440-DYN02-01RJ, 1440-ACNR, and 1440-TBS-J modules comply to Standards EN 60079-0:2012, EN 60079-15:2010, reference ATEX certificate number DEMKO 14 ATEX 1361X.

Special Conditions for Safe Use

WARNING: Special Conditions for Safe Use:

- This equipment shall be mounted in an ATEX/IECEx Zone 2-certified enclosure with a minimum ingress protection rating of at least IP54 (as defined in EN/IEC60529) and used in an environment of not more than Pollution Degree 2 (as defined in EN/IEC 60664-1) when applied in Zone 2 environments. The enclosure must be accessible only by the use of a tool.
- This equipment shall be used within its specified ratings defined by Rockwell Automation.
- Any external connections that mate to this equipment shall be secured by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Equipment shall not be disconnected unless power has been removed or the area is known to be nonhazardous.
- 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.
- This equipment must be used only with ATEX/IECEx-certified Rockwell Automation backplanes.
- Instructions in the user manual shall be observed.

IEC Hazardous Location Approval

The following applies to products marked IECEx:

- Such modules are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists, or air are unlikely to occur, or are likely to occur only infrequently and for short periods. Such locations correspond to Zone 2 classification to IEC 60079-0.
- The type of protection for the 1440-DYN02-01RJ, 1440-TBS-J, and 1440-ACNR is `Ex nA IIC T4 Gc' according to IEC 60079-15.
- The 1440-DYN02-01RJ, 1440-ACNR, and 1440-TBS-J modules comply to Standards IEC 60079-0:2011,
  IEC-60079-15:2010, reference IECEx certificate number IECEx UL 14.0076X.

Prevent Electrostatic Discharge

ATTENTION: 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 wrist strap.
- 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.

Install the Terminal Base

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 electrical arc can occur. This could cause an explosion in hazardous location installations.

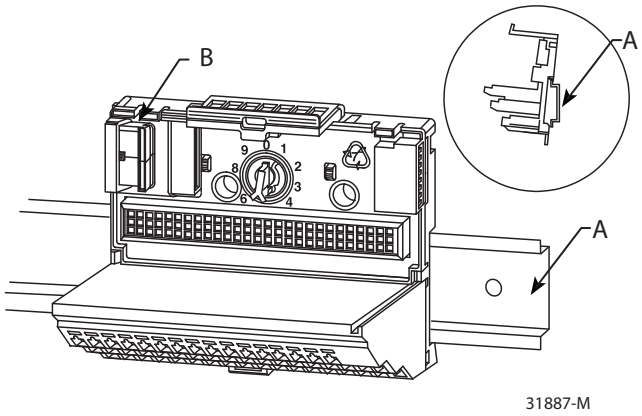
Be sure that power is removed or the area is nonhazardous before proceeding.

WARNING: 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.

Mount on a DIN Rail

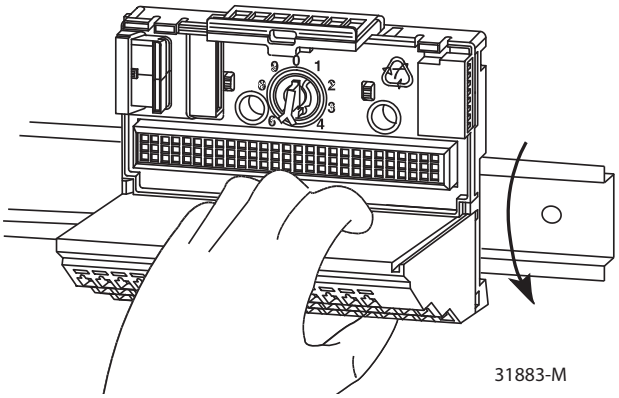
Follow these steps to mount the terminal base on the DIN rail.

1. Position the terminal base unit on the 35 x 7.5 mm DIN rail (A) (Allen-Bradley® part number 199-DR1 or 199-DR4) at a slight angle.



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

2. Slide the terminal base unit over, leave room for the side connector (B).
3. Hook the lip on the rear of the terminal base onto the top of the DIN rail, and rotate the terminal base onto the rail.



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 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. Connect the wiring for the terminal base.

   See Wire the ControlNet Adapter on page 26 for information about how to wire the adapter.

Interconnect Terminal Base Units

To install another terminal base unit, follow these steps.

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

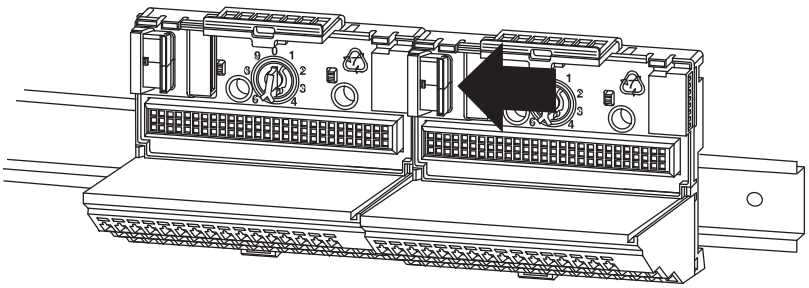
1. Position the terminal base on the 35 x 7.5 mm DIN rail (A).
2. Verify that the side connector (B) is **fully retracted** into the base unit.
3. Slide the terminal base unit over tight against the neighboring terminal base.

   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 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.



Panel/Wall Mounting

Installation on a wall or panel consists of:

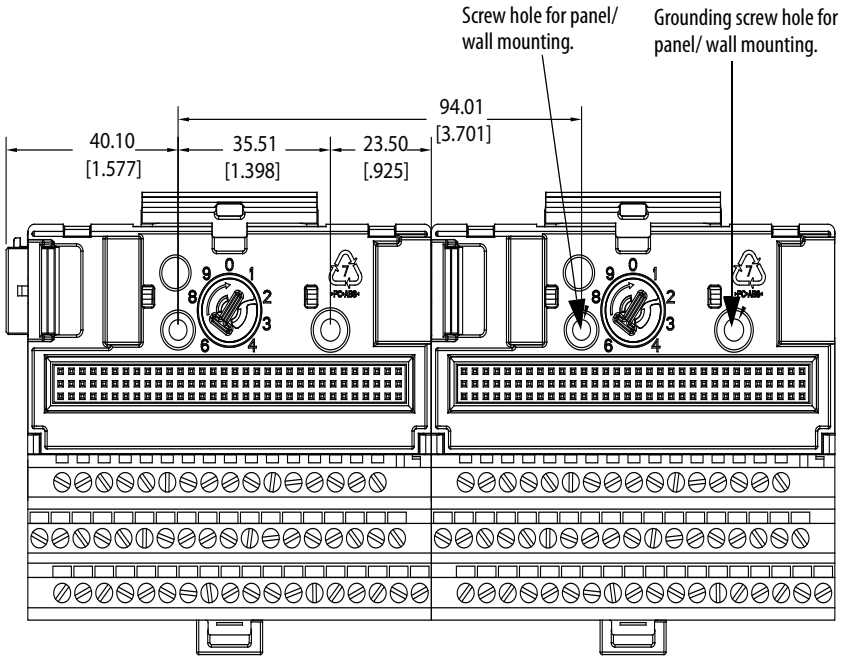
- Lay out the drilling points on the wall or panel.
- Drill the pilot holes for the mounting screws.
- Install the terminal base units and secure them to the wall or panel.

To install the terminal base on a wall or panel, follow these steps.

1. Lay out the required points on the wall/panel as shown in Figure 5.

   Maintain at least 25.4 mm (1.0 in.) air space around your XM® system installation.

Figure 5 - Terminal Base Drilling Dimensions



2. Drill the necessary holes for the #6 self-tapping mounting screws.
3. Secure the terminal base unit by using the two #6 self-tapping screws.
4. To install another terminal base unit, retract the side connector into the base unit; verify that it is **fully retracted**.
5. Position the terminal base unit up tight against the neighboring terminal base.

   Verify that the hook on the terminal base slides under the edge of the terminal base unit.
6. To complete the backplane connection, gently push the side connector into the side of the neighboring terminal base.
7. Secure the terminal base to the wall with two #6 self-tapping screws.

Terminal Assignments

IMPORTANT The terminal block assignments are different for different terminal base units. The following table applies only to the 1440-TBS-J.

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

	No.	Desc.		No.	Desc.		No	Desc.
Channel 00	0	Xdcr 0 (+)	Channel 1	16	Xdcr 1 (+)	Tachometer	34	Tach (+)
	1	Xdcr 0 (-)		17	Xdcr 1 (-)		35	Tach (-)
	2	Functional Earth		18	Functional Earth		36	Functional Earth
	3	24V (-)		19	24V (-)		37	Tach 24V (-)
	4	24V (+)		20	24V (+)		38	Tach 24V (+)
	5	Buf 0 (+)		21	Buf 1 (+)		39	Tach buffer (+)
	6	Buf 0 (-)		22	Buf 1 (-)		40	Tach (-)
	7	Not connected		23	Not connected		41	Sig Common
	8	Not connected		24	Not connected	Power	42	Not connected
	9	Functional Earth		25	Functional Earth		43	24V common
	10	Not connected		26	Not connected		44	24V in 1
	11	Not connected	XM Bus	27	CAN_High		45	24V common
	12	Functional Earth		28	Shield	Bussed Tach	46	Tach (-)
	13	Not connected		29	CAN_Low		47	Tach (+)
	14	Not connected		30	Bus V (-)		48	Tach (-)
	15	Functional Earth		31	Not connected		49	Not connected
				32	Not connected		50	Not connected
				33	Not connected		51	Not connected

Install the ControlNet Adapter

ATTENTION: Do not remove or replace an adapter while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.

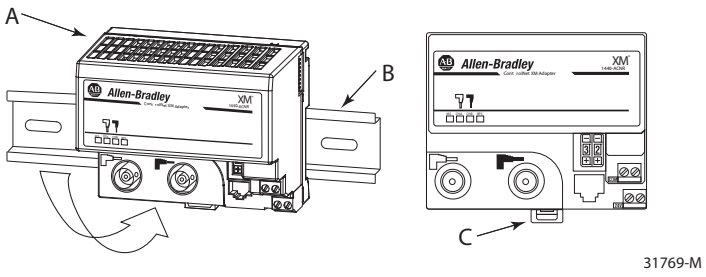
ATTENTION: This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent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

IMPORTANT The 1440-DYN02-01RJ Standard Dynamic Measurement module is used with the 1440-ACNR adapter. No other XM catalog number works with the 1440-ACNR adapter.

IMPORTANT The XM bus must be terminated on each end with a 120 ohm, 1 %, 1/4 W resistor. Because the adapter has an internal terminator resistor, the second resistor must be installed at the opposite end of the bus.

To install the adapter on the DIN rail before you install the XM terminal base units, follow these steps.

1. Position the ControlNet adapter (A) on a 35 x 7.5 mm DIN rail (B) at a slight angle.



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2. Hook the lip on the rear of the adapter onto the top of the DIN rail, and rotate the adapter onto the rail.
3. Press the adapter down onto the DIN rail until flush.

   Locking tab C snaps into position and lock the adapter to the DIN rail.
4. If the adapter does not lock in place, follow these steps.
   a. Use a screwdriver or similar device to move the locking tab down while pressing the adapter flush onto the DIN rail.
   b. To lock the adapter in place, release the locking tab.
   c. If necessary, push up on the locking tab to lock.
5. Connect the adapter wiring.

   See Wire the ControlNet Adapter on page 26.

Power Requirements

The ControlNet adapter requires one Class 2 power supply. Before installing your module, calculate the power requirements of all modules in each chassis. The total current draw through the side connector cannot exceed 3 A.

The adapter provides a maximum output current of 3 A.

ATTENTION: Multiple power sources are not allowed.

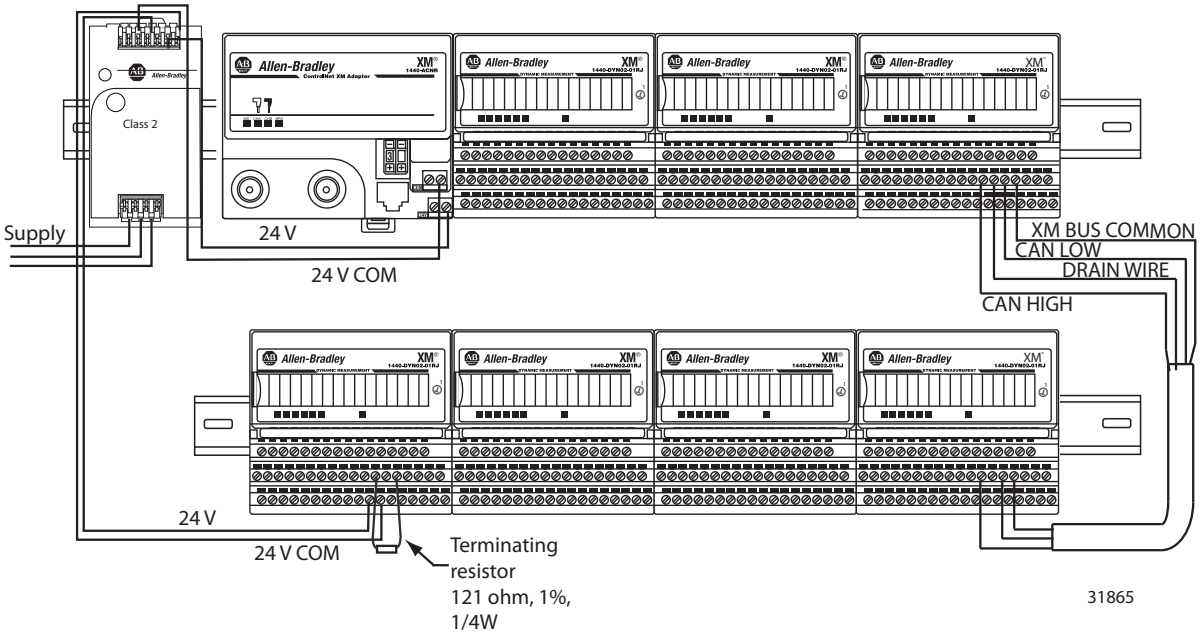
Terminating Resistors

The XM bus operates correctly when there is a terminating resistor at each end of the XM bus.

- Terminating resistors must be 121 ohms, 1 %, 1/4 W.
- The ControlNet adapter has an internal terminating resistor. Install a second terminating resistor across the CAN_HI and CAN_LO terminals of the XM module at the other end of the XM bus.

  For information on the XM module, see Install the Module on page 28.

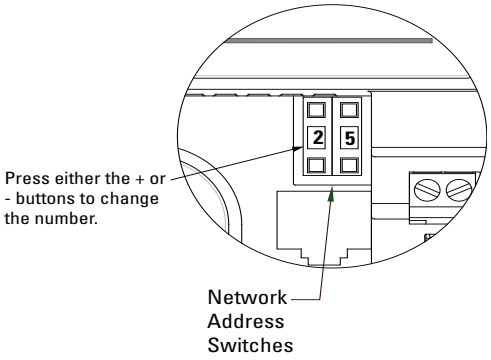
Figure 6 - Terminating Resistor Placement



Set the Node Address for the ControlNet Adapter

Set the network address by using the 2-button pushwheel switch. The range of valid settings is 01...99.

Figure 7 - Set the Network Address Switches



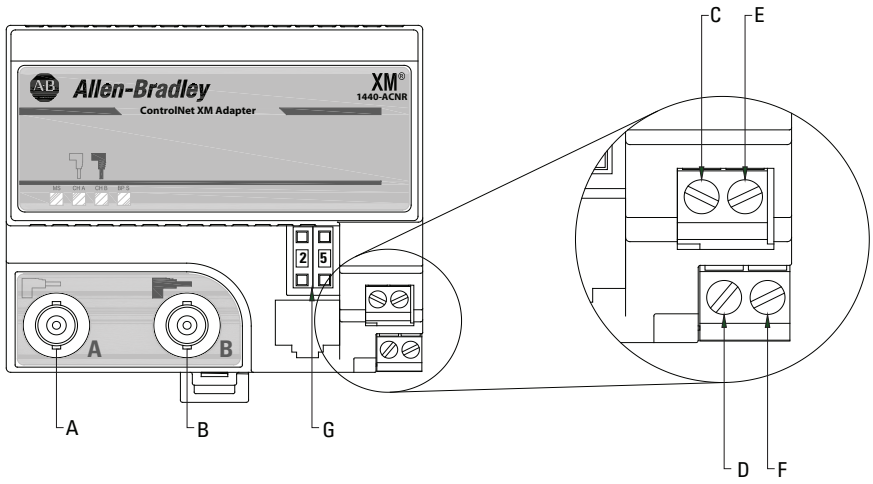
Wire the ControlNet Adapter

WARNING: If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

If you connect or disconnect the communication cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations

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

Figure 8 - XM1440-ACNR Wiring Terminals



ATTENTION: Do not wire more than two conductors onto any single terminal.

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

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

1. Connect the ControlNet network cable to connector A.
2. Connect the redundant ControlNet network cable to connector B.

ATTENTION: When you connect wires, torque terminal screws C, D, E, and F to 0.8 N•m (7 lb•in.).

3. Connect +V DC power to the lower connector, terminal F or D.
4. Connect -V common to the upper connector, terminal E or C.

Install a Replacement ControlNet Adapter Into an Existing System

ATTENTION: If you insert or remove the module while backplane power is on, an electrical arc can occur. This 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 an adapter while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.

WARNING: If you connect or disconnect wiring while the field-side power is on, an electric arc can occur. An electric arc can 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 the communications cable with power that is applied to this module or any device on the network, an electric arc can occur. An electric arc can cause an explosion in hazardous location installations.

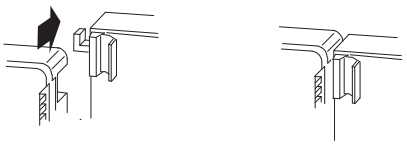
Be sure that the power is removed or the area is nonhazardous before proceeding.

Remove the existing adapter from the DIN rail as follows.

1. Disconnect any wiring that is connected to the adjacent terminal base.
2. Disconnect one or more BNC connectors from the front of the adapter.
3. On the XM module that is adjacent to the adapter, open the latching mechanism and remove the module from the terminal base unit that is attached to the adapter.
4. To unplug the backplane connection, push the XM bus connector toward the right side of the terminal base.
5. Release the locking tab and remove the adapter.

Install the replacement adapter on the DIN rail as follows.

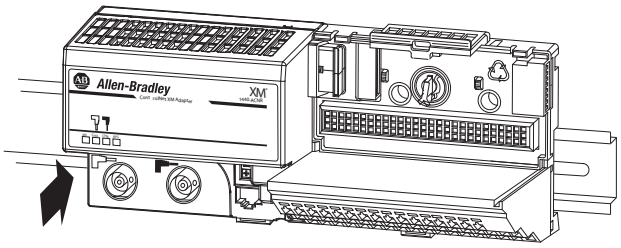
1. Before installing the replacement adapter, verify that the XM bus connector of the terminal base is fully retracted into the base unit.
2. Position the replacement adapter on the DIN rail. The hook on the terminal base slides under the edge of the adapter.



3. To lock the adapter to the DIN rail, push down and in simultaneously.

   If the adapter does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter flush onto the DIN rail. Release the locking tab to lock the adapter in place.

4. To complete the backplane connection, gently push the XM bus connector into the side of the adapter.



31768-M

5. Reinstall the XM module in the adjacent terminal base.
6. Connect the wiring to the adjacent terminal base.
7. Connect the ControlNet cable to the adapter.

Install the Module

The module mounts on a 1440-TBS-J terminal base unit. We recommend that you insert the module after you have connected the wiring on the terminal base unit.

See Install the Terminal Base on page 19 for more information about how to wire the terminal base.

ATTENTION: The 1440-DYN02-01RJ module is compatible only with the 1440-TBS-J terminal base unit. The keyswitch on the terminal base unit is at position 1 for the module.

Do not attempt to install the 1440-DYN02-01RJ module on other terminal base units.

Do not change the position of the keyswitch after wiring the terminal base units.

ATTENTION: To comply with the CE Low Voltage Directive (LVD), all connected I/O must be powered from a source compliant with the following: Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

To comply with UL restrictions, this equipment must be powered from a source compliant with the following: Class 2.

WARNING: If you insert or remove the module while backplane power is on, an electric arc can occur. An electric arc can cause an explosion in hazardous location installations.

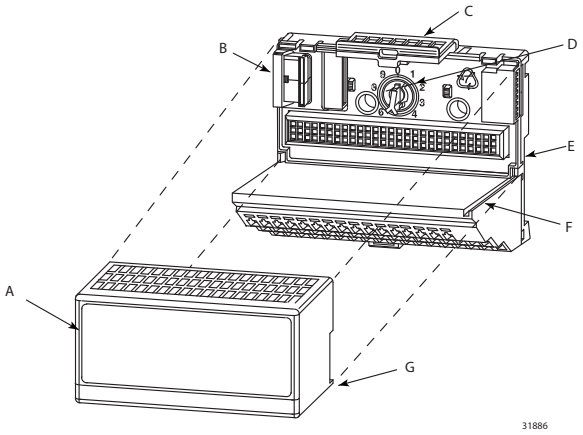
Be sure that the power is removed or the area is nonhazardous before proceeding.

WARNING: If you connect or disconnect wiring while the field-side power is on, an electric arc can occur. An electric arc can cause an explosion in hazardous location installations.

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

ATTENTION: Multiple power sources are not allowed.

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



2. Verify that the side connector (B) is pushed completely to the left.

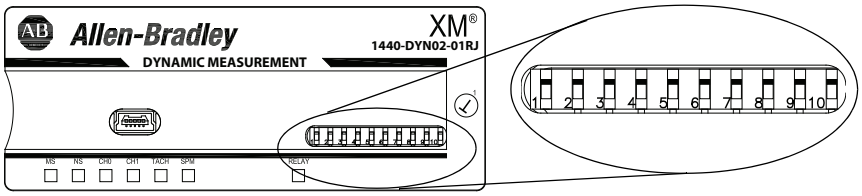
   You cannot install the module unless the connector is fully extended.

3. Verify that the pins on the bottom of the module are straight so they align properly with the connectors 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.
6. To install the next module in its terminal base, repeat the above steps.

Set the Node Address for the Module

The module has a DIP switch for setting the network node address. DIP switches 5...10 set the node address for the module by using binary addressing. The module is shipped from the factory with the node address set to 63, as shown in Figure 9.

Figure 9 - Module DIP Switches.



TIP DIP switches 1...4 are not used.

TIP The node addresses start with one for the module closest to the ACNR, and increase for each consecutive module.

Using a pointed tool, slide switches 5...10 to the appropriate positions (1 or 0).

Figure 10 - DIP Switch Positions

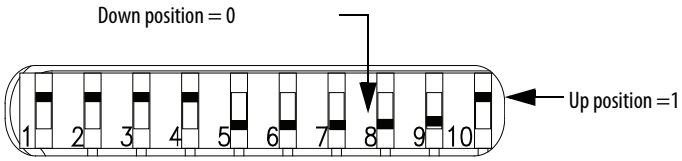


Table 2 - Switch Settings for Node Address

Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10
0(1)	000000	16	010000	32	100000	48	110000
1	000001	17	010001	33	100001	49	110001
2	000010	18	010010	34	100010	50	110010
3	000011	19	010011	35	100011	51	110011
4	000100	20	010100	36	100100	52	110100
5	000101	21	010101	37	100101	53	110101
6	000110	22	010110	38	100110	54	110110
7	000111	23	010111	39	100111	55	110111
8	001000	24	011000	40	101000	56	111000
9	001001	25	011001	41	101001	57	111001
10	001010	26	011010	42	101010	58	111010
11	001011	27	011011	43	101011	59	111011
12	001100	28	011100	44	101100	60	111100

Table 2 - Switch Settings for Node Address (Continued)

Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10	Node Addr	Switch Setting SW5->SW10
13	001101	29	011101	45	101101	61	111101
14	001110	30	011110	46	101110	62	111110
15	001111	31	011111	47	101111	63	111111

(1) Do not set the node address to 0. Node addresses start with 1 for the module closest to the ACNR.

Self-test

The XM module performs a self-test when it powers up. The self-test includes a status indicator test and a device test. During the status indicator test, the indicators turn 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.

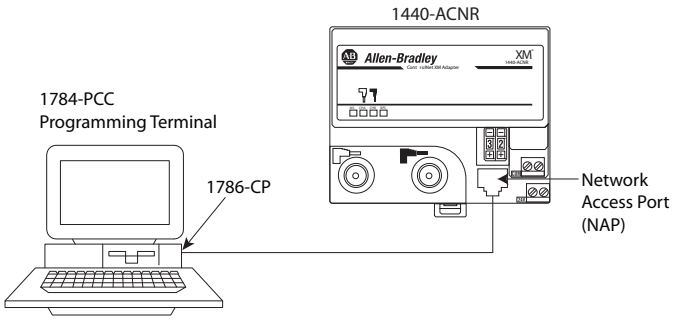
Table 3 - MS Indicator State Descriptions

MS Indicator State	Description
Flashing Red and Green	Device self-test is in progress.
Solid Green or Flashing Green	Device self-tests completed successfully, and the firmware is valid and running.
Flashing Red	• Device self-tests completed, the hardware is OK, but the firmware is invalid. • The firmware download is in progress.
Solid Red	Unrecoverable fault, hardware failure, or Boot Loader program can be corrupted.

Connect a Programming Terminal to the Network

You can connect the programming terminal to the ControlNet network by connecting to the network access port (NAP), as shown in Figure 11.

Figure 11 - NAP Connection Via 1786 Cable



The 1786-CP cable can be plugged into any ControlNet product NAP to provide programming capability on the ControlNet network. A programming terminal that is connected through this cable is counted as a node and must have a unique address.

ATTENTION: Use the 1786-CP cable when connecting a programming terminal to the network through NAPs. If you use a a commercially available RJ-style cable, it could result in possible network failures.

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

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

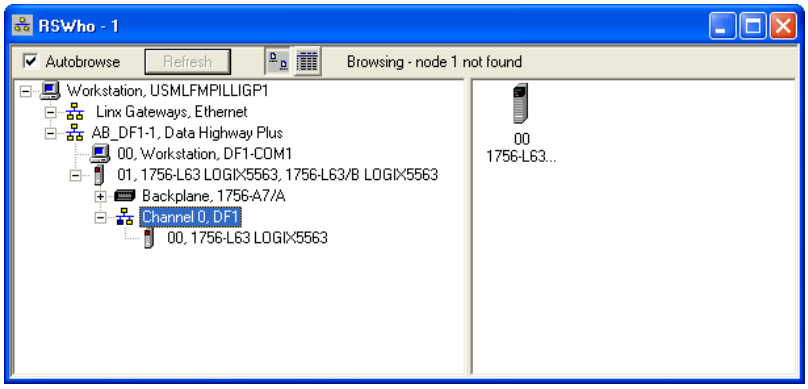
Configure the Adapter and Module

Add the Adapter to the I/O Configuration Tree

To establish communication between the controller and adapter over the network, you must add the ControlLogix® controller and its bridge to the I/O Configuration.

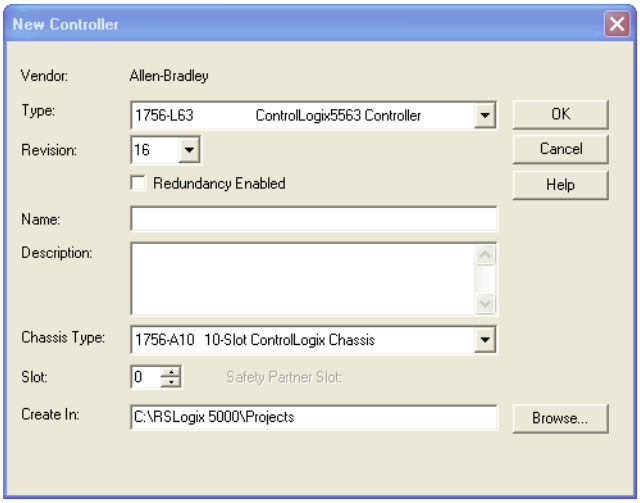
Select a Controller

1. Start RSLinx® software.



2. Start RSLogix 5000® Enterprise series software, version 16 or later.
3. From the File menu, choose New.

The New Controller dialog box opens.



4. Complete the following entries.

Table 4 - New Controller Field Values

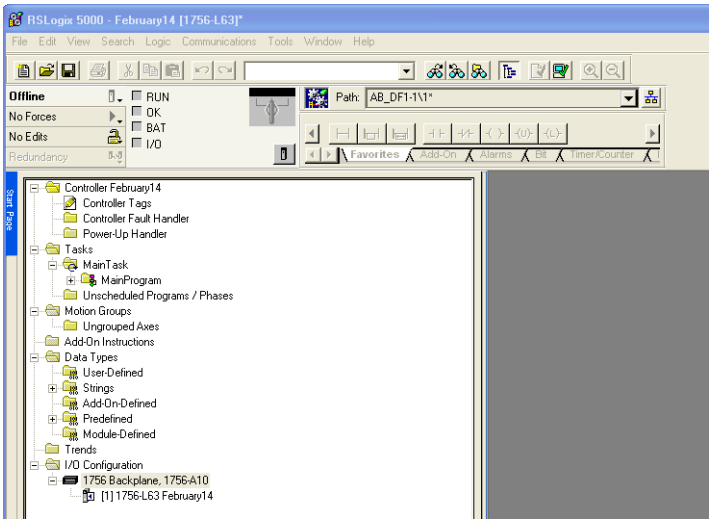
In This Field	Enter
Type	Choose the controller type.
Revision	Choose the major revision of the firmware for which the project is configured.
Name	Enter a unique name for the controller.
Chassis Type	Choose the appropriate chassis type.
Slot	Enter the slot of the controller in the chassis.
Create In	Enter the directory in which you want to store the project file.

5. Verify that the revision of the controller is compatible with the XM® products.

   The revision of the controller must be 16 or later.

6. Click OK to create the project.

The Controller Organizer appears.

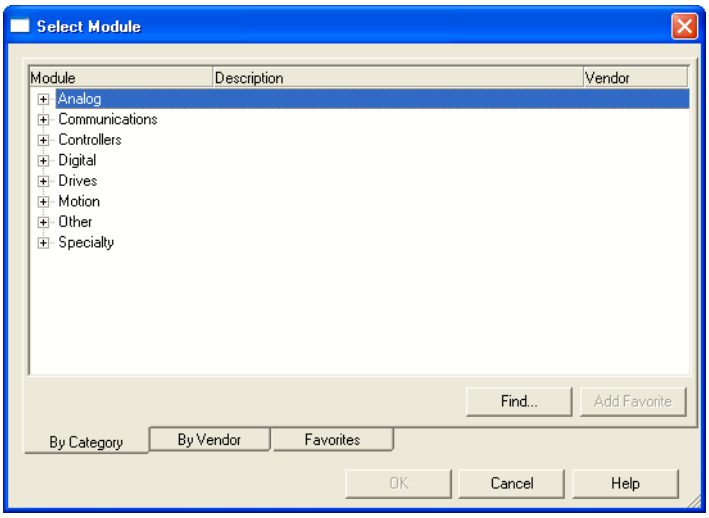


Select a ControlNet Bridge

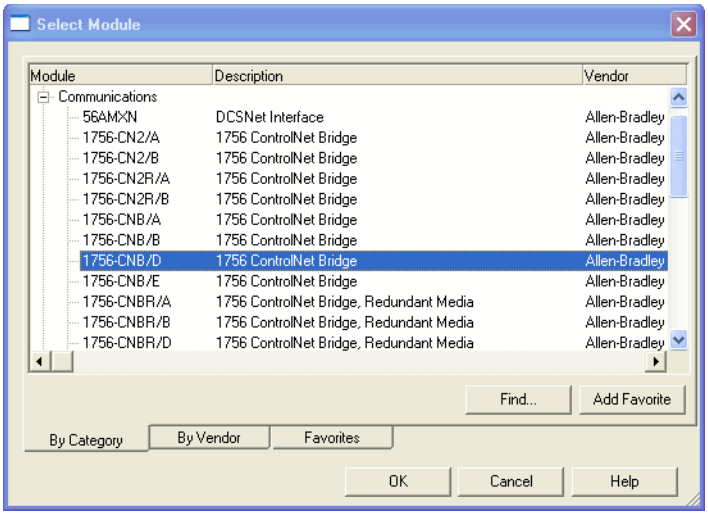
You need a ControlNet bridge to access the 1440-ACNR adapter from the ControlLogix network. In our example, we configure a 1756-CNB (Series D) bridge to communicate with 1440-ACNR adapter.

1. In the Controller Organizer, right-click the I/O Configuration folder and select New Module.

   The Select Module dialog box opens.

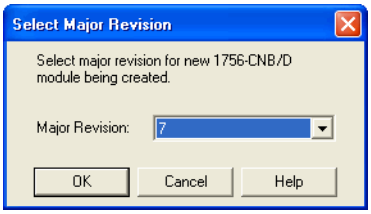


2. To display a list of available communication modules, click the plus sign next to the Communications folder.



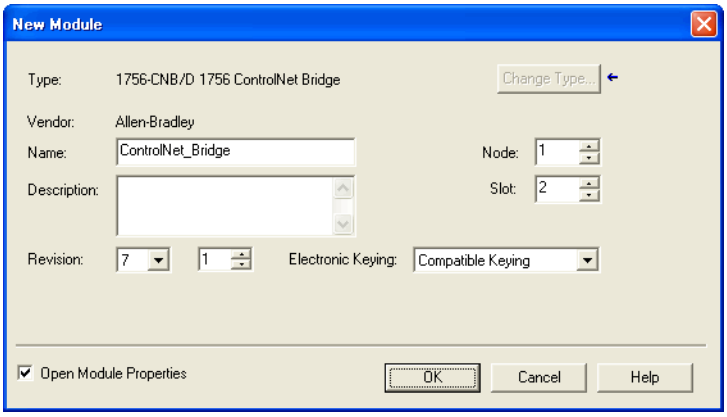
3. Select the ControlNet Bridge and click OK. In this example, we use a 1756-CNB ControlNet Bridge (Series D).

   The Select Major Revision dialog box opens.



4. Select the number for the Major Revision, and click OK.

   The New Module dialog box opens.



5. Enter the following information.

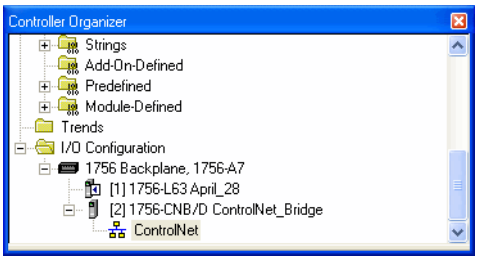
Table 5 - New Module Field Values

On This Tab	In This Field	Enter
General	Name	Enter a unique name for the module.
	Node Address	Enter the node address of the module.
	Slot	Enter the slot of the bridge in the rack.
	Revision	Select the major and minor revision level.
	Electronic Keying	Choose the appropriate electronic keying method.

The Module Properties dialog box opens when Open Module Properties is checked.

6. Clear the Open Module Properties checkbox if you do not need to configure the module any further.
7. Click OK to accept the configuration.

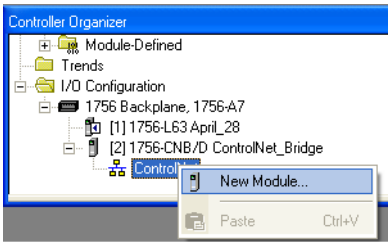
The ControlNet Bridge is added to the I/O Configuration.



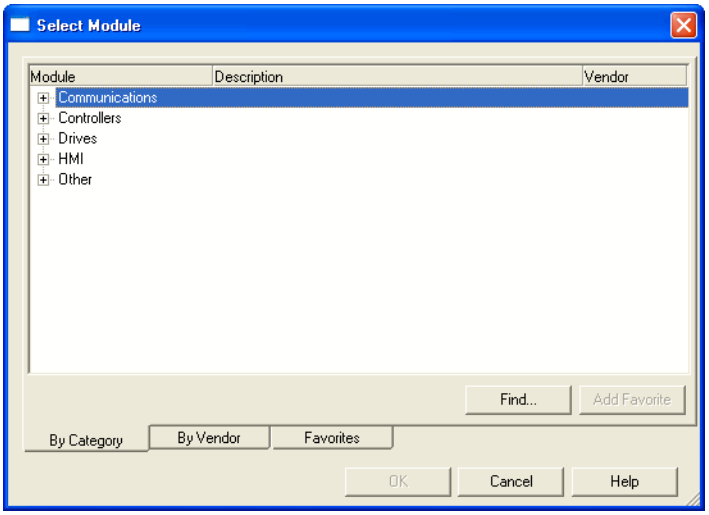
Add the 1440-ACNR Adapter

The 1440-ACNR adapter is added as a child of the local 1756-CNB/D module.

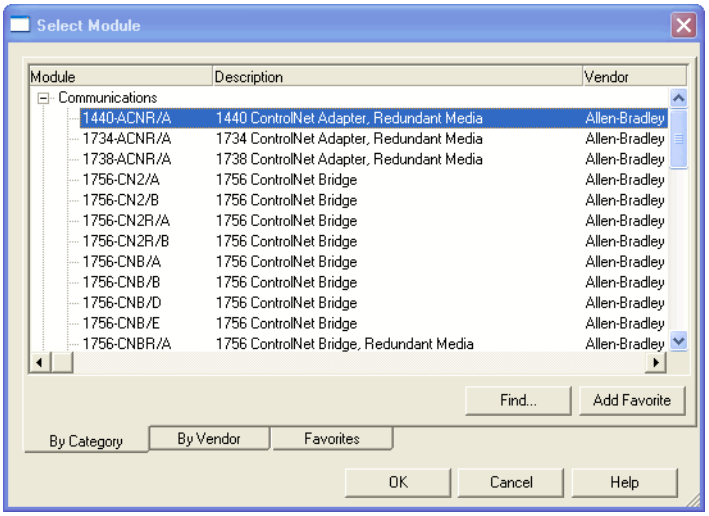
1. Under the I/O Configuration folder, right-click the ControlNet icon and select New Module.



The Select Module dialog box opens.

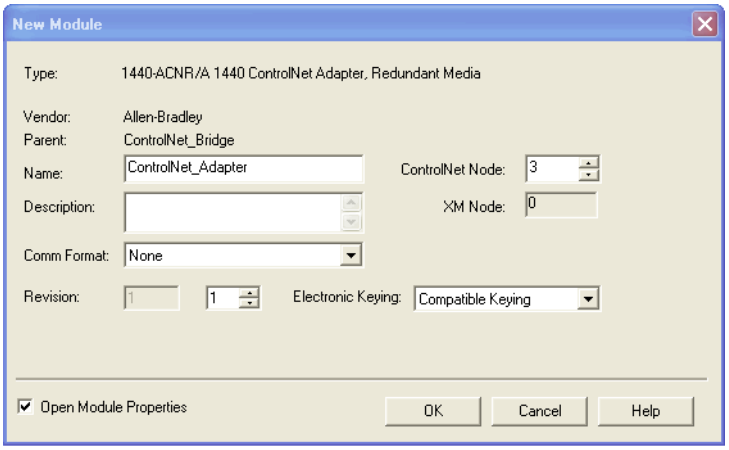


2. To display a list of available communication modules, click the plus sign next to the Communications folder.



3. Select the 1440-ACNR/A ControlNet adapter and click OK.

   The New Module dialog box opens.



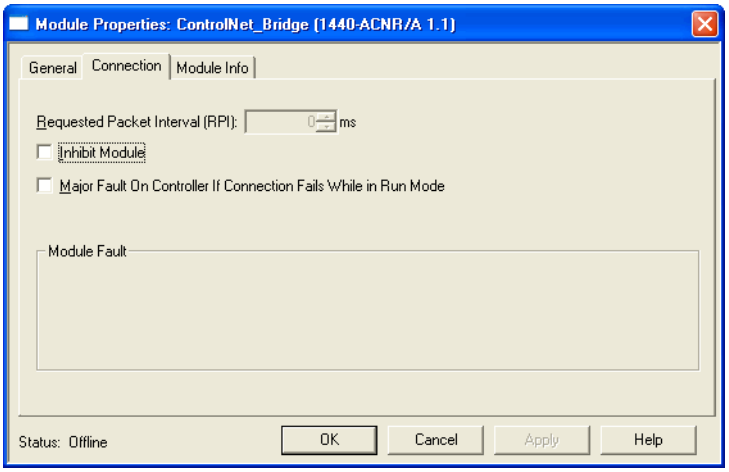
4. Enter the following information.

Table 6 - New ControlNet Module Values

On This Tab	In This Field	Enter
General	Name	Enter a unique name for the adapter.
	Controller Node	Enter the node address of the adapter.
	Comm Format	The Comm Format for the 1440-ACNR module is None. The adapter makes a direct connection to the XM module referenced by the data.
	Revision	Select the major and minor revision level.
	Electronic Keying	Choose the appropriate electronic keying method.

5. Click OK to accept the configuration.

   The Module Properties dialog box opens if you checked Open Module Properties



TIP The requested packet interval (RPI) is disabled when the Comm Format is None.

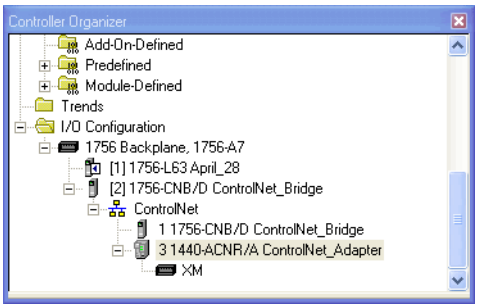
6. From the Connection tab, enter the following information.

Table 7 - Connection Tab Values

On This Tab	In This Field	Enter
Connection	Inhibit Module	Check to disable communication between the controller and the module. Clear to restore communications.
	Major Fault on Controller if Connection Fails While in Run Mode	Check to have the controller produce a major fault if the connection fails in Run mode. Clear if you do not want the controller to produce a major fault.
	Module Fault	Displays the fault code that is returned from the controller and the text that details the Module Fault.

7. Click OK to close the dialog box.

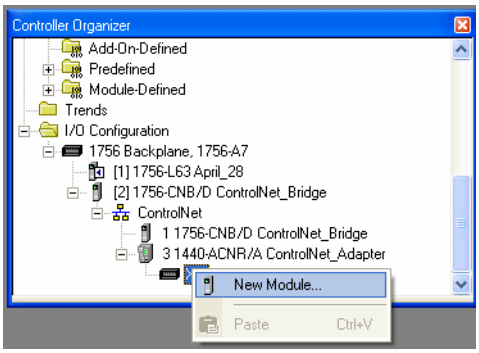
The 1440-ACNR adapter is added to the I/O Configuration.



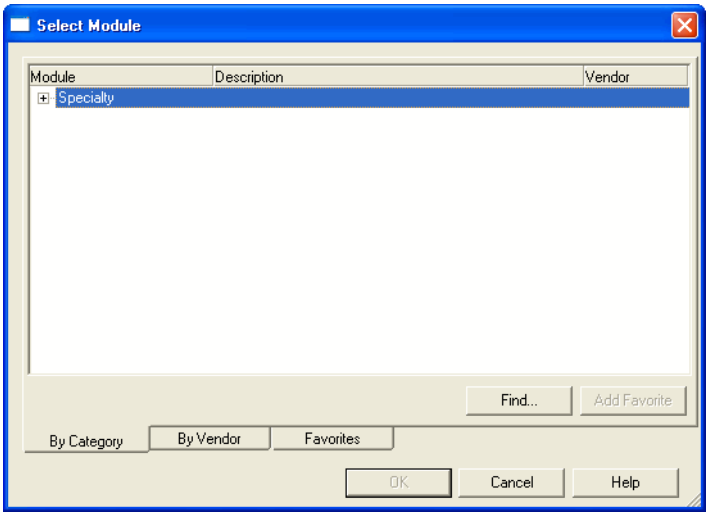
Add XM Modules

Select Specialty in the Select Module dialog box to add the XM Dynamic Measurement module.

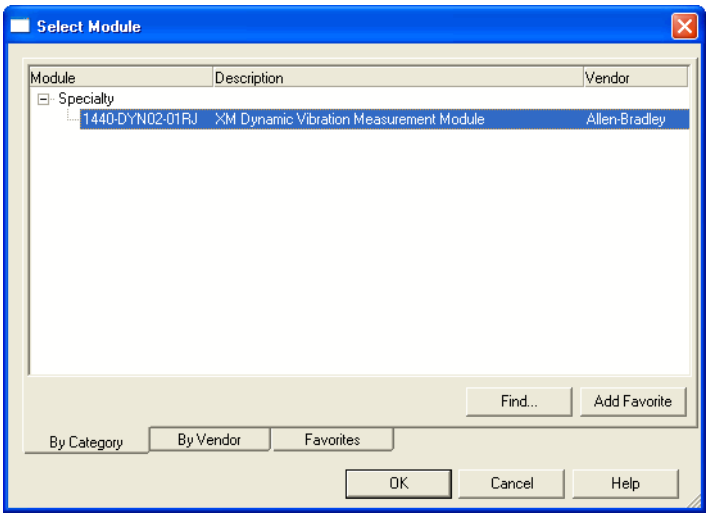
1. Under the I/O Configuration folder, right-click the XM icon and select New Module.



The Select Module dialog box opens.



2. Click the plus sign next to the Specialty folder to display a list of XM modules.

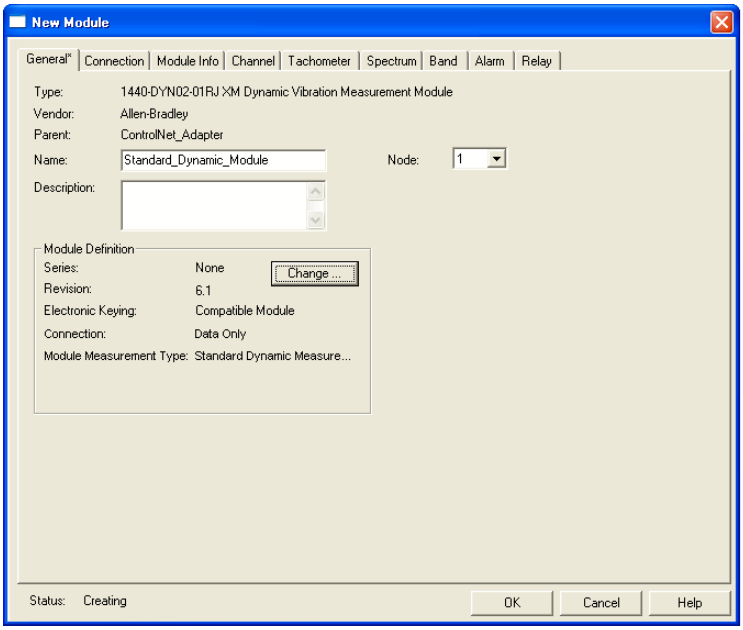


3. Select the 1440-DYN02-01RJ module and click OK.

TIP If you do not see the module in the list, obtain the AOP from the Rockwell Automation support website, http://www.rockwellautomation.com/support/

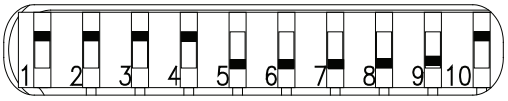
Click Downloads > RSLogix 5000 I/O Modules > Add-on Profiles and select the 1440-DYN02-01RJ XM Dynamic Vibration Measurement Module Add-on Profile.

The New Module dialog box opens.



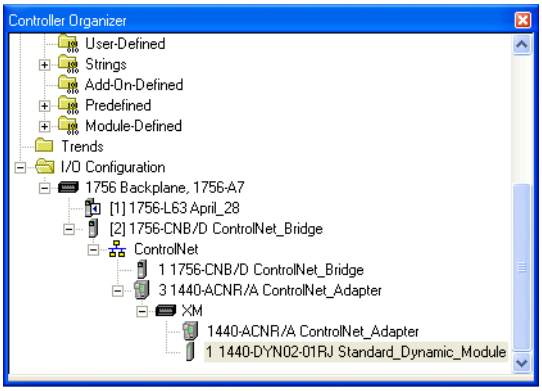
4. From the General tab, enter the following information.

Table 8 - General Tab Field Values

On This Tab	In This Field	Enter
General	Name	Enter a unique name for the module.
	Node Address	Enter the node address of the module. This number and the DIP switches on the module must match. DIP switches 5…10 set the node address for the module by using binary addressing.  We recommend that you set the node address to the position of the module. For example, the module next to the adapter is node address 1. If there are two modules between this module and the adapter, the node address is 3. See Set the Node Address for the Module on page 30 for more information about the DIP switches.

5. Click OK to close the dialog box.

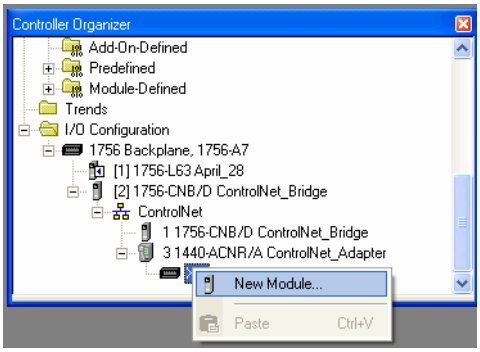
The 1440-DYN02-01RJ module is added to the I/O Configuration.



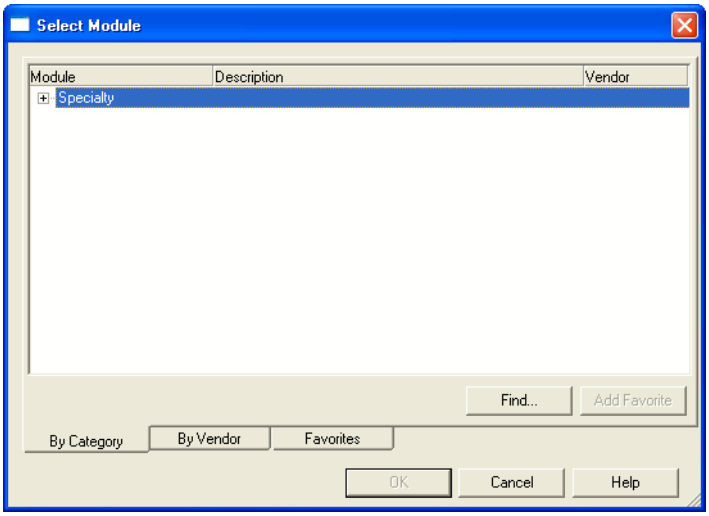
Add the Module to the I/O Configuration Tree

To add the XM module in RSLogix 5000 software, complete the following steps.

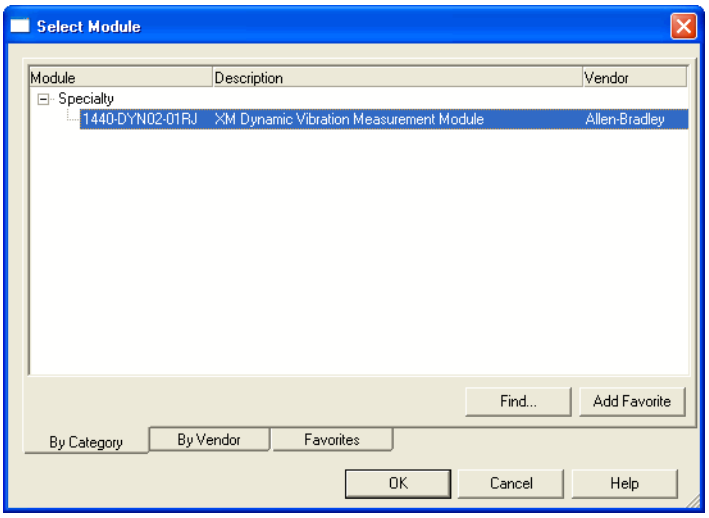
1. Right-click the 1440-ACNR ControlNet Adapter under I/O configuration and select New Module.



The Select Module dialog box opens.



2. To display a list of XM modules, click the plus sign next to the Specialty folder.

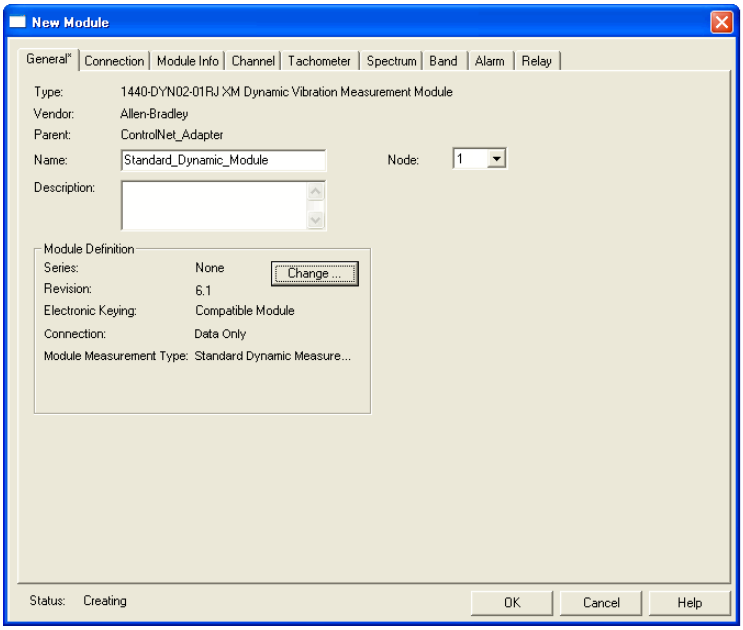


3. Select the 1440-DYN02-01RJ module and click OK.

TIP If you do not see the module in the list, obtain the AOP from the Rockwell Automation support website, http://www.rockwellautomation.com/support/.

Click Downloads/RSLogix 5000 I/O Modules Add-on Profiles, and select the 1440-DYN02-01RJ XM Dynamic Vibration Measurement Module Add-on Profile.

The New Module dialog box opens.



4. From the Module Properties dialog box, enter this information.

Table 9 - General Tab Values

On This Tab	In This Field	Value/Comment
General	Name	Enter a unique name for the module.
	Node Address	Enter the XM node address of the module. This number and the DIP switches on the module must match. See Set the Node Address for the ControlNet Adapter on page 25.

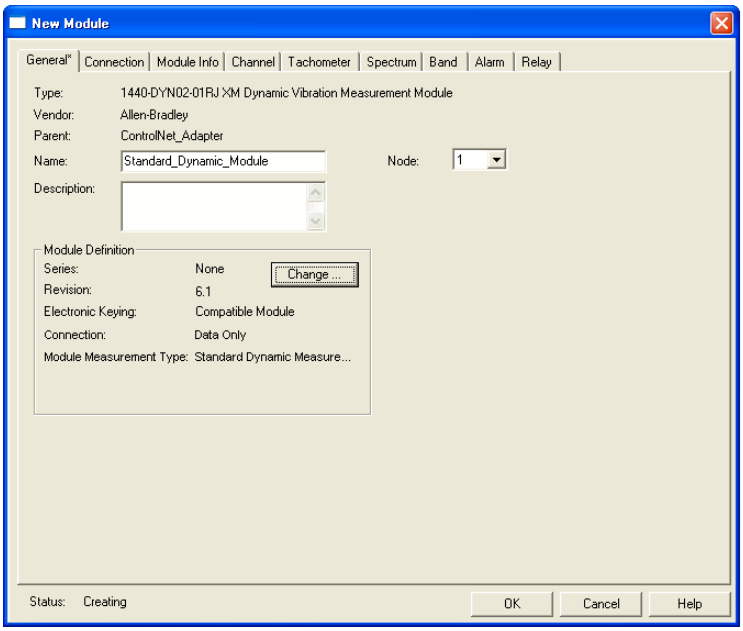
5. Click OK.

   The module is added to the project.

Configure Module Properties

Follow these steps to configure the Module Properties for the Dynamic Measurement module.

If the Module Properties dialog box is not already open, double-click the Dynamic Measurement module in the I/O configuration tree.



The Module Properties dialog box contains these tabs.

Table 10 - Module Properties

Tab	Value/Comment
General	Create or view the module properties for the module.
Connection	Define the controller-to-module behavior
Module Information	Displays the module and status information about the module. It also lets you reset a module to the power-up state.
Channel	Define the characteristics of the transducer and the signal processing performed on each channel of the XM module.
Tachometer	Define the characteristics of the tachometer and defines the signal processing that you can perform on the tachometer signal.

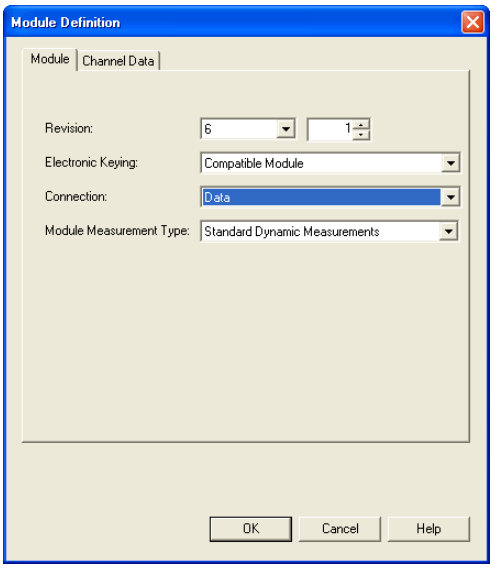
Table 10 - Module Properties (Continued)

Tab	Value/Comment
Spectrum	Create the spectrum and waveform measurements, such as the sampling mode and frequency maximum.
Band	Configure the bandwidth for each band measurement.
Alarm	Configure the behavior of the XM Dynamic Measurement alarm and which measurement is associated with the alarm.
Relay	Configure the behavior of the virtual relay and the associated alarms.

Configure the Module Definition Properties

You can use the Module Definition dialog box to modify module properties and select the measurements that you want the Dynamic Measurement module to collect. The measurements that you select are used to calculate the size of the connection and to generate the input tag data type.

1. From the General tab, click Change.

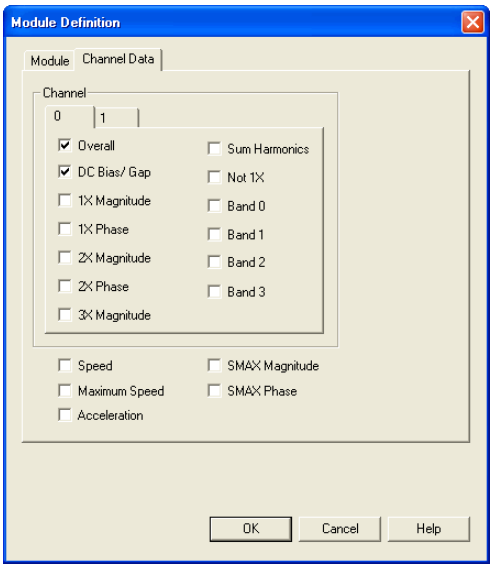


2. From the Module tab, enter the following information.

Table 11 - Module Values

On This Tab	In This Field	Value/Comments
Module	Revision	Choose the appropriate major and/or minor revision of the module.
	Electronic Keying	Choose the appropriate electronic keying method.
	Connection	Data is the only valid choice.
	Module Measurement Type	Standard Dynamic Measurement is the only valid measurement type. This parameter determines the parameters and type of measurements that are collected by the Dynamic Measurement module. The Standard Dynamic Measurement Type supports measurements of dynamic inputs such as vibration, pressure, and strain. The module also provides a tachometer that makes it well-suited for monitoring shaft and casing and pedestal vibration in rotating equipment.

3. To select the measurements for each channel, click Channel Data tab to select the measurements for each channel.



4. Click the Channel and then click the measurements that you want to store in the input data tag.

   This configuration determines which input data tags to generate and the size of the ControlNet connection

IMPORTANT When you include more measurements in the Input Tag, it increases the size of the ControlNet Connection.

Table 12 - Channel Data Values

On This Tab	In This Field	Value/Comments
Channel Data	Channel	Sets the corresponding configuration parameters for the channel.
	Overall	The measured overall value. Overall measures the amplitude of the vibration signal at all frequencies between the analog high and low pass filter, or if specified, the digital low pass filter.
	DC Bias/Gap	The measured average DC offset of the transducer signal.
	1X Magnitude	The measured magnitude of the vibration at the machine speed.
	1X Phase	The measured phase of the vibration at the machine speed.
	2X Magnitude	The measured magnitude of the vibration at two times the machine speed.
	2X Phase	The measured phase of the vibration at two times the machine speed.
	3X Magnitude	The measured magnitude of the vibration at three times the machine speed.
	Sum Harmonics	The sum of the amplitude of the harmonics in the range from the specified starting order through the frequency maximum.
	Not 1X	The measured magnitude of the vibration excluding the vibration at the machine speed.
	Band 0...3	The measured magnitude of the vibration within selected band frequency bands.
	Speed	The measured speed value for the machine.
	Maximum Speed	The maximum speed value for the machine, it is the greatest measured speed value since the most recent reset. You can reset the Maximum Speed using MaxSpeedReset in the output tag. See I/O Data Tags on page 79.
Channel Data	Acceleration	The measured acceleration value for the machine. The acceleration is the rate of change in the speed.
	SMAX Magnitude	The greatest peak magnitude around the orbit.
	SMAX Phase	The phase at which the greatest peak magnitude occurs around the orbit.

5. When finished selecting the measurements, click OK.

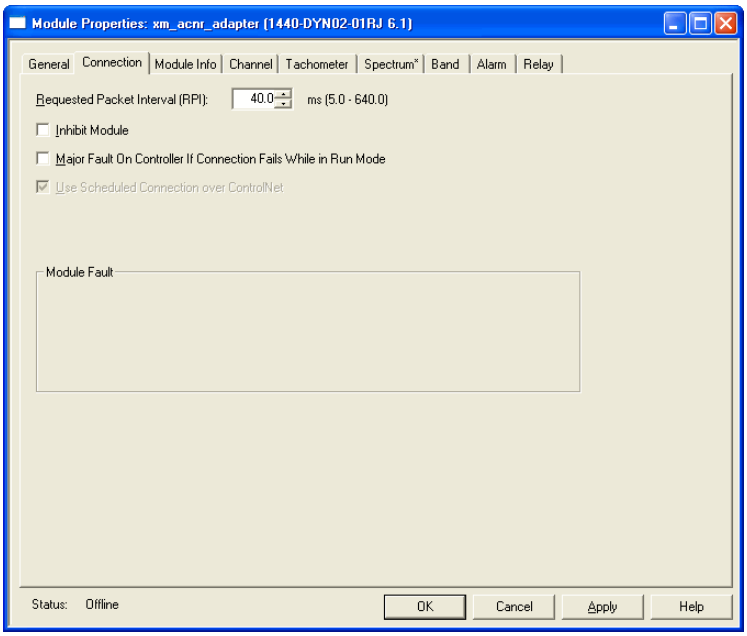
   A confirmation dialog box appears to confirm any changes that you are making to the module definition.

- Click Yes to update the appropriate values and return the General tab.
- Click No to return to the General tab, discards any changed values.

Configure the Connection Properties

Use the Connection tab to modify the controller-to-module behavior.

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



2. Enter the following information.

Table 13 - Module Properties Connection Values

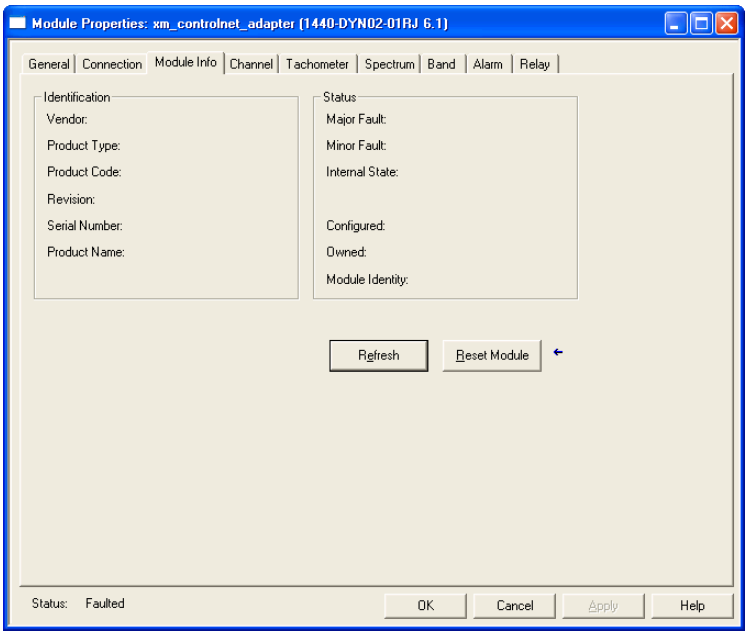
In This Field	Values Are	Comments
Requested Packet Interval (RPI)	Enter a value between 20…640 ms, in 1 ms increments. The default is 40 ms.	Specifies the period at which data updates over a connection. If four updates are missed, the connection closes and CommFault is set in the input tag. See Input Data Type on page 80.
Inhibit Module	Disable communication Restore communication	Check to disable communication between the controller and the module. Clear to restore communication between the controller and the module.
Major Fault on Controller if Connection Fails While in Run Mode	Produce and clear major faults.	Check to have the controller produce a major fault if the connection fails in Run mode. Clear if the controller does not produce a major fault if the connection fails in Run mode.
Module Fault	Fault details.	Displays the fault code that is returned from the controller and the text that details the Module Fault. Click Help for additional information.

3. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog box and continue editing.

Monitor and Reset the Module Status Information

Use the Module Info tab to view module and status information. You can also reset the module to its power-up state from this tab. The data on this tab comes directly from the module when it is online.

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

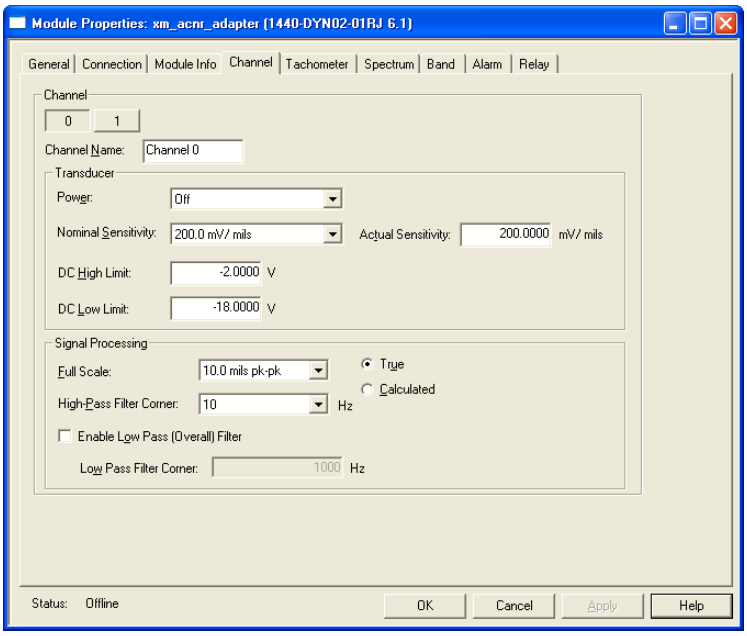


2. Click Refresh to refresh tab with new data from the module.
3. To return a module to its power-up state by emulating the cycling of power, click Reset Module.

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 Dynamic Measurement module has two input channels.

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



2. Click the Channel that you want to configure.
3. Configure the parameters as necessary.

Table 14 - Module Properties Channel Values

In this field	Values are	Comments
Channel Name	Enter a descriptive name for the channel.	The channel name is not sent to the XM module.
Power	Choose the type of power supplied to the transducer. • Off • IEPE (externally supplied) • -24V (externally supplied) • +24V (externally supplied from the terminal base) • Bias Current (externally supplied)	See Approximate Expected Bias Voltage (V DC) on page 51.

Table 15 - Approximate Expected Bias Voltage (V DC)

Power	Normal Connected Sensor	Open Circuit	Short Circuit	Unconnected Sensor	DC Low Limit Default	DC High Limit Default	Buffered Output Range
Off	Sensor bias voltage (-10…10V DC typical)	2	0	2	-10	10	-12…12V
IEPE	Sensor bias voltage (12…20V DC typical)	24	0	24	12	20	0 …24V
+24V	Sensor bias voltage (1…20V DC typical)	2	0	2	1	20	0 …24V
-24V	Sensor bias voltage (-14…-8V DC typical)	2	0	2	-14	-8	-24…0V
Bias Current	0.47V with 2000 ohm coil	13	0	13	0.2	2	-12…12V

Table 14 - Module Properties Channel Values

In this field	Values are	Comments
Nominal Sensitivity	Choose the sensitivity of the transducer. **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; 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; 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; 3.94 mV/ µm; 5.91 mV/ µm; 7.87 mV/ µm; 11.2 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	Your choice controls the list of possible full scale selections. The default is 200.0 mV/mil (displacement).
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.	This value is +/- 15% of the Nominal Sensitivity value, see the above table. **Note**: The nominal sensitivity is used if you leave this field blank.
DC High Limit	Enter the maximum expected DC bias voltage from the transducer.	Enter a value between -24…24 volts. See Approximate Expected Bias Voltage (V DC) on page 51. **Note:** 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. • See Status Indicators on page 73 for information about the status indicators. • See I/O Data Tags on page 79 for information about the input tags.
DC Low Limit	Enter the minimum, or most negative, expected DC voltage from the transducer.	

Table 14 - Module Properties Channel Values

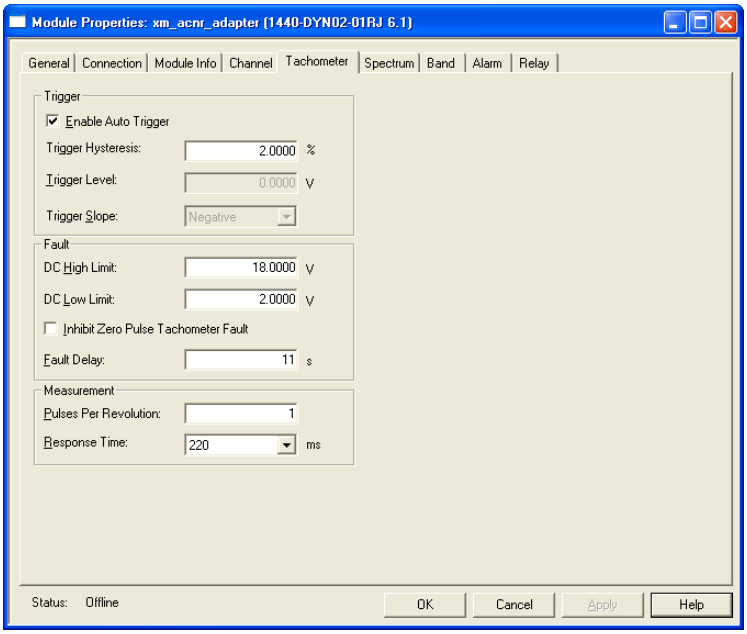
<table>
<tr><th>In this field</th><th>Values are</th><th>Comments</th></tr>
<tr><td>Full Scale</td><td>Choose the maximum signal level expected to be processed by the channel. If the full scale value is peak or peak-to-peak, select the measurement performed (true or calculated) to produce the overall value.</td><td>The default value and the available values depend on the Nominal Sensitivity selection.
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 (see following table) will be applied prior to the measurement.
By assuring the absence of high-frequency content, gains can be applied to maximize the accuracy of the measurements below the LPF corner frequency.</td></tr>
<tr><td>True</td><td>The actual or literal measure of the signal. It is the maximum peak in the sample (time waveform) for pk measurements, or the difference between the maximum and minimum peaks for pk-pk measurements.</td><td>These parameters are dimmed when full scale is set to an RMS value.
Note: For a pure sine wave, the true and calculated values are equal. 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.</td></tr>
<tr><td>Calculated</td><td>The RMS value of the sample (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 Pk or Calculated Pk-Pk, the XM module is configured to accept input signals as high as 6X the specified full scale without saturating the electronics. This is because a signal with moderate RMS value can have very high spikes because RMS is an averaging mechanism. If True Pk or True Pk-Pk 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 gives better resolution within the full scale range but causes the signals to be clipped at levels just above the full scale.</td><td></td></tr>
<tr><td>High-Pass Filter Corner</td><td>Choose the high pass filter to apply to the measurement.
• 0.2 Hz
• 1 Hz
• 5 Hz
• 10 Hz
• 40 Hz</td><td>The high pass filter is useful in removing low frequency signal components that can dominate the signal, particularly when integrating. The high pass filter attenuates all frequencies below the filtered frequency. It enables, or passes, frequencies above the defined frequency.</td></tr>
<tr><td>Enable Low Pass (Overall) Filter</td><td>Check to apply a low pass filter to the Overall Measurement.
Clear to disable the low pass filter.</td><td>The filter is applied only to the Overall Measurement. It does not affect the time waveform, spectrum, or measurements made from the spectrum.</td></tr>
<tr><td>Low Pass Filter Corner</td><td>Enter the frequency value above which the input signal is significantly attenuated.
Low Pass Filter
<table><tr><th>Hardware Series</th><th>A</th><th>B</th></tr><tr><td>Cut off frequency</td><td>2 kHz</td><td>5 kHz</td></tr><tr><td>Roll off</td><td>12 dB/Octave</td><td>24 dB/Octave</td></tr></table>Filter is automatically applied to all integrated measurements.</td><td>Enter a value between 200…20,000 Hz.
Note: This parameter is available only when Enable Low Pass Filter is checked.
When integrating this (digital) Overall Low Pass Filter Corner may not be set greater than the analog LPF that is applied to all integrating measurements.</td></tr>
</table>

4. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog box and continue editing.

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 16 - Module Properties Tachometer Values

In This Field	Values Are	Comments
Enable Auto Trigger	Check to enable Auto Trigger mode. The minimum signal amplitude for triggering is 2 volts 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 millivolts peak-to-peak and the minimum frequency is 1 CPM (0.016 Hz).	Auto Trigger mode can cause the tachometer to trigger on noise, if the signal is small. For example, you have 1 volt of noise on a 2 volt signal. To help prevent a trigger on noise, make sure the % 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 vary by 180° depending on whether the Trigger Slope is set to positive or negative.	

Table 16 - Module Properties Tachometer Values (Continued)

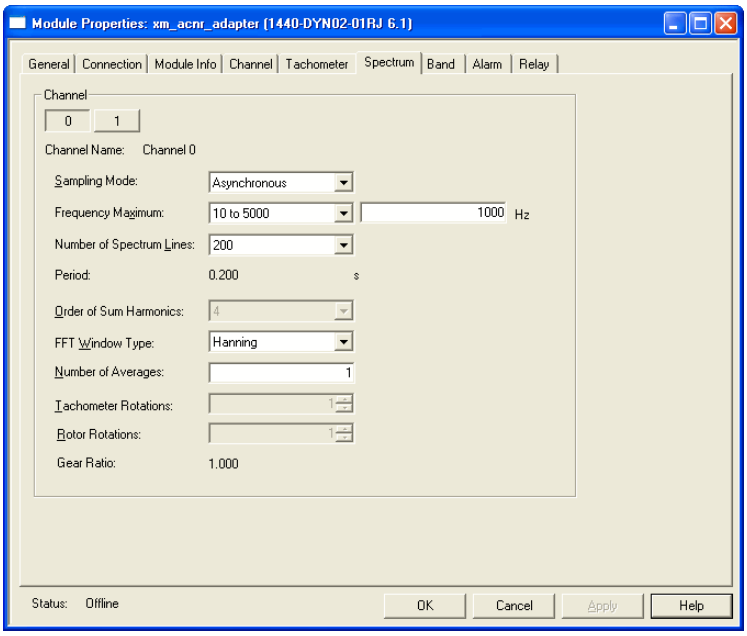
In This Field	Values Are	Comments
DC High Limit	Enter the maximum expected DC bias voltage from the transducer.	A voltage reading outside this range constitutes a transducer fault, which is indicated with the tachometer status indicator blinking red and the TachFault input tag. • See Status Indicators on page 73 for information about the status indicators. • See I/O Data Tags on page 79 for information about the input tags.
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 for the module to 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. When you enter 0, it 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 response time to 220 ms means that the speed is averaged over a quarter second. Then 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 used when you want to track rapid speed changes. Slow response times are used for steady speed applications or applications where it is not necessary to track speed during rapid changes.

3. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog and continue editing.

Configure the Spectrum Properties

The Spectrum tab configures the spectrum and waveform measurements from the Dynamic Measurement module. There are two instances of the spectrum/ waveform measurements, one for each channel.

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



2. Click the Channel that you want to configure.
3. Configure the parameters, as necessary.

Table 17 - Module Properties Spectrum Values

In This Field	Values Are	Comments
Channel Name	A descriptive name for the channel.	The description can be entered on the Channel tab. See Configure the Channel Properties on page 51.
Sampling Mode	Choose the sampling mode. • 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.	**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.	

Table 17 - Module Properties Spectrum Values (Continued)

In This Field	Values Are	Comments
Frequency Maximum	The maximum frequency or order for the spectrum measurement.	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. • 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. 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. When integrating, the Maximum Frequency cannot be set greater than the analog LPF that is applied to all integrating measurements.

Frequency	A	B
10 to 5000	X	X
6250	X	X
7500	X	X
8000	X	
9375	X	X
10000	X	
12500	X	
15000	X	
18750	X	X
20000	X	

		Full Scale Units (Channel tab)				
		mil µm	in/s mm/s	g	V	Psi mbar
Sensitivity Units (Channel tab)	mil µm	Column A				
	in/s mm/s	Column A	Column A			
	g	Column B	Column B	Column A		
	V				Column A	
	Psi mbar					Column A

Number of Spectrum Lines	Choose the number of lines (bins) in the spectrum measurement. • 100 • 200 • 400 • 800	The number of spectrum lines determines the frequency resolution of the spectrum measurement. **Note:** When Sampling Mode is synchronous, the Number of Spectrum Lines must be evenly divisible by the Frequency Maximum value (no remainder).
Period	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.	The value is in seconds when Sampling Mode is set to asynchronous. The value is in cycles when Sampling Mode is set to synchronous.
Order of Sum Harmonics	Choose the starting order for the sum harmonics measurement. • 1 • 2 • 3 • 4 • 5	The amplitudes of all harmonics from the specified harmonic through the Frequency Maximum are included in the sum. **Note:** 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.

Table 17 - Module Properties Spectrum Values (Continued)

In This Field	Values Are	Comments
FFT Window Type	Choose the type of window to be applied to the waveform measurement before computing the spectrum. • Rectangular - Also know 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. In data with closely spaced peaks, a Flat Top window can smear the peaks together into one wide peak. 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 average calculation. When you use averages, it reduces the random errors and provides a better measurement.	In asynchronous mode, the spectrum is averaged. In synchronous mode, the time waveforms are averaged. **Note:** 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. These parameters are dimmed in asynchronous sampling.
Rotor Rotations	Enter the number of teeth on the external shaft gear.	
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. The gear ratio 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 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 that is divided by number of pulses per revolution).	This parameter applies only to synchronous sampling.

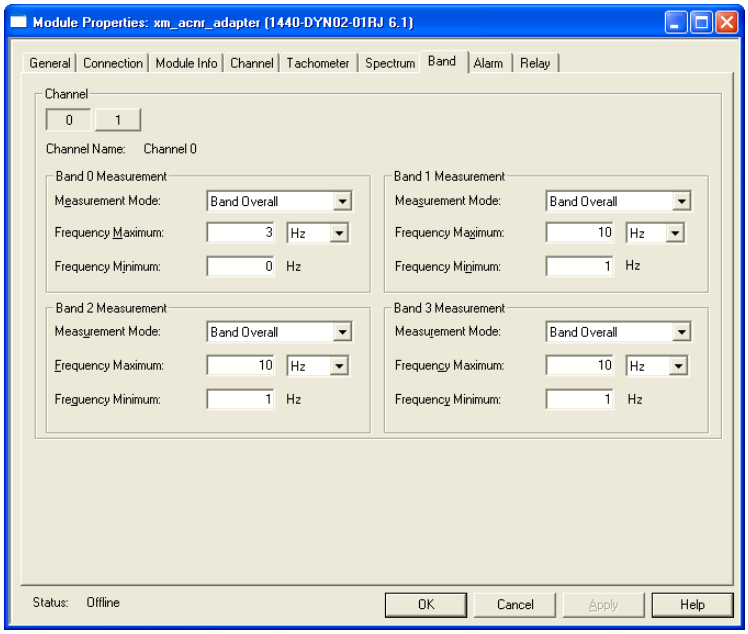
4. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog and continue editing.

Configure the Band Properties

The Band tab configures the bandwidth for each band measurement from the Dynamic Measurement module. There are four sets of band measurement for each channel.

TIP The frequency ranges for each band can overlap. 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.

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



2. Click the Channel that you want to configure.
3. Configure the parameters, as necessary.

Table 18 - Module Properties Band Values

In This Field	Values Are	Comments
Channel Name	A descriptive name for the channel.	The description can be entered on the Channel tab. See Configure the Channel Properties on page 51.
Measurement Mode	Choose the measurement (or calculation) performed to produce the Band Value. • Band Overall - The band value is the square root of the sum of the squares (RSS) of the amplitude values for the bins that compose the band. • Maximum Peak - The band value is equal to the maximum bin amplitude found within the band.	

Table 18 - Module Properties Band Values (Continued)

<table>
<tr><th>In This Field</th><th>Values Are</th><th>Comments</th></tr>
<tr><td>Frequency Maximum</td><td>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.
<table>
<tr><th>Sampling Mode</th><th>Spectrum Frequency Max Units</th><th>Band Units</th><th>Band Frequency Max</th></tr>
<tr><td>Synchronous</td><td>Orders</td><td>Hz</td><td>0…5000</td></tr>
<tr><td></td><td></td><td>Orders</td><td>0.01…200</td></tr>
<tr><td>Asynchronous</td><td>Hz</td><td>Hz</td><td>0…20,000</td></tr>
<tr><td></td><td></td><td>Orders</td><td>0.01…200</td></tr>
</table></td><td>This value must be greater than the Band Frequency Minimum.
When integrating, the Maximum Frequency cannot be set greater than the analog LPF that is applied to all integrating measurements.</td></tr>
<tr><td>Frequency Minimum</td><td>Enter the spectrum bin with the least frequency to be included in the band measurement.</td><td>NA</td></tr>
</table>

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 that are represented in the spectrum. If any of the bands fall 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

The following 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.

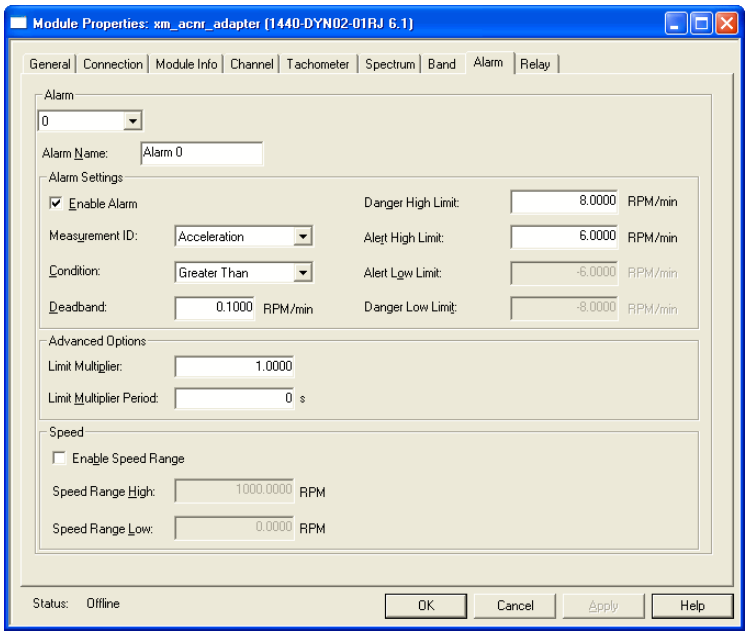
Speed (RPM)	Max Frequency Represented in Spectrum (Hz)	Band Min (Hz)	Band Max (Hz)
2400	400	150	250
1800	300	150	250
1200	200	150	200
600	100	n/a	n/a

4. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog and continue editing.

Configure the Alarm Properties

Use the Alarm tab to configure the alarms for the Dynamic Measurement module. Each alarm supports two alarm levels (Alert level and Danger level). The AOP supports six alarms.

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

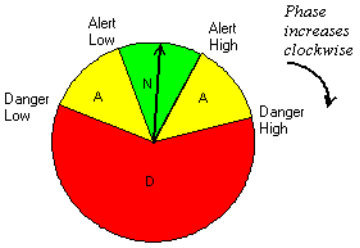


2. Choose an alarm from the Alarm list. The Add-on Profile supports six alarms.
3. Configure the parameters, as necessary.

Table 19 - Module Properties Alarm Values

In this field	Values are	Comments
Alarm Name	Enter a descriptive name for the alarm.	The alarm name is not sent to the XM module.
Enable Alarm	Check to enable the alarm. Clear to disable the alarm.	
Measurement ID	Choose the measurement and channel that is associated with the alarm. • Ch 0 / Ch 1 Overall • Ch 0 / Ch 1 DC Bias/Gap • Ch 0 / Ch 1 Band 0 • Ch 0 / Ch 1 Band 1 • Ch 0 / Ch 1 Band 2 • Ch 0 / Ch 1 Band 3 • Speed • SMAX Magnitude • Ch 0 / Ch 1 1X Magnitude • Ch 0 / Ch 1 2X Magnitude • Ch 0 / Ch 1 3X Magnitude • Ch 0 / Ch 1 Not 1X • Ch 0 / Ch 1 Sum Harmonics • Ch 0 / Ch 1 1X Phase • Ch 0 / Ch 1 2X Phase • SMAX Phase • Acceleration	Multiple alarms can be set on the same measurement.

Table 19 - Module Properties Alarm Values (Continued)

In this field	Values are	Comments
Condition	Choose when the alarm triggers. • Greater Than - Trigger the alarm when the measurement value is greater than or equal to the Alert and Danger Limit values. The Danger High Limit value must be greater than or equal to the Alert High Limit value for the trigger to occur. • Less Than - Trigger the alarm when the measurement value is less than or equal to the Alert and Danger Limit values. The Danger High Limit value must be less than or equal to the Alert High Limit value for the trigger to occur. • Inside Range - Trigger the alarm when the measurement value is equal to or inside the range of the Alert and Danger Limit values. The Danger High Limit value must be less than or equal to the Alert High Limit value AND the Danger Low Limit value must be greater than or equal to the Alert Low Limit value for the trigger to occur. • Outside Range - Trigger the alarm when the measurement value is equal to or outside the range of the Alert and Danger Limit values. The Danger High Limit value must be greater than or equal to the Alert High Limit value AND the Danger Low Limit value must be less than or equal to the Alert Low Limit value for the trigger to occur.	
Deadband	Enter the amount that the measured value must fall (below the limit) before the alarm condition is cleared. For example, Alert High Limit is 120 and the deadband is 2. The alarm (alert) activates when the measured value is 120 and does not clear until the measured value is 118 or less.	Set the value between 0…9999. **Note:** For the Outside Range condition, the deadband value must be less than the Alert High Limit - Alert Low Limit.
Danger High Limit	Enter the High Limit value for the danger (shutdown) condition. This parameter is the greater value when Condition is set to Inside Range or Outside Range, or the measurement is a phase measurement.	Phase measurement requirements: • 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 were to plot the thresholds on a clock face (illustration below) with phase increasing in the clockwise direction, then: – 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. 
Alert High Limit	Enter the High Limit value for the alert (alarm) condition. This parameter is the greater value when Condition is set to Inside Range or Outside Range, or the measurement is a phase measurement.	
Alert Low Limit	Enter the lesser limit value for the alert (alarm) condition. This parameter is not used when Condition is set to Greater Than or Less Than.	
Danger Low Limit	Enter the lesser limit value for the danger (shutdown) condition. This parameter is not used when Condition is set to Greater Than or Less Than.	
Limit Multiplier	Enter a value to be applied when the AlarmLimitMultiply bit in Output tag is set to 1. The module applies the multiplier to the alarm limits during this time to avoid false alarms at resonance frequencies.	Set the value between 0…10. **Note:** Enter 0 (zero) to disable the alarm during the startup period.
Limit Multiplier Period	Enter the length of time that the Limit Multiplier is applied to the threshold.	Set the value between 0…65535.
Enable Speed Range	Check to enable the speed range alarm. Clear to disable the speed range alarm.	Controls whether the selected alarm is enabled only when the measured speed is within a machine speed range. **Note:** You cannot enable the Speed Range alarm when the Measurement ID is set to Speed.
Speed Range High	Enter the greater threshold of the machine speed range.	These parameters are dimmed when Enable Speed Range is disabled.
Speed Range Low	Enter the lesser threshold of the machine speed range.	

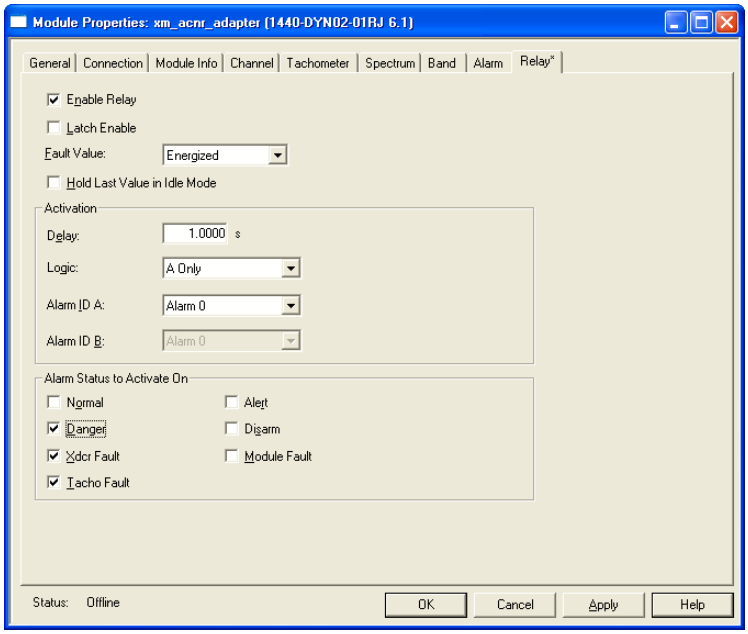
4. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog and continue editing.

Configure the Relay Properties

Use the Relay tab to configure the virtual relay for the Dynamic Measurement module. The Relay parameters control the operation of the virtual relay. Use these parameters to configure one or more alarms associated with the relay and the behavior of the relay.

TIP Any reference to the relay implies a virtual relay.

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



2. Configure the parameters, as necessary.

Table 20 - Module Properties Relay Values

In This Field	Values Are	Comments
Enable Relay	Check to enable the virtual relay. Clear to disable the virtual relay.	
Latch Enable	Check if the relay must be explicitly reset after the alarm subsides. Clear if you want the relay to reset itself once the alarm condition has passed.	A latched relay can be reset using RelayReset in the output tag. See I/O Data Tags on page 79.

Table 20 - Module Properties Relay Values (Continued)

In This Field	Values Are	Comments
Fault Value	Choose the fault value. • Energized - The relay is de-energized under normal operating conditions and becomes energized when the alarm limits are exceeded. Under non-alarm conditions, the relay closes the circuit between the common and the normally closed (N.C.) terminals. Under alarm conditions, the relay changes state to close the circuit between the common and the normally open (N.O.) terminals. • De-energized - The relay is energized under normal conditions, and becomes de-energized when the alarm limits are exceeded. The normally energized operating mode can also be referred to as fail-safe. Under non-alarm (with power that is 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 N.C. terminals.	The fault value determines what happens to the relay when an alarm is indicated. **Note**: Only the virtual relay is affected. The Relay tag in the input data type works the same regardless of this configuration setting. 1 = the associated Condition is present 0 = the associated Condition is not present
Hold Last Value in Idle Mode	Check to retain the last relay state during configuration. For example, if the relay is energized under normal conditions, the relay remains energized on subsequent idle/program mode transitions. If clear, the relay goes to normal state during reconfiguration.	
Delay	Enter the length of time for which the Activation Logic must be true before the relay is activated.	Set the value between 0…65.535 seconds. This reduces the nuisance alarms caused by external noise and/or transient vibration events.
Logic	Choose the relay activation logic. The relay can monitor up to two alarms. • A Only - Relay is activated when Alarm A meets or exceeds the selected Alarm Status to Activate On conditions. • A OR B - Relay is activated when either Alarm A or Alarm B meets or exceeds the selected Alarm Status to Activate On conditions. • A AND B - Relay is activated when Alarm A and Alarm B meet or exceeds the selected Alarm Status to Activate On conditions.	
Alarm ID A	Choose the first alarm for the relay to monitor. The alarm must be from the same device as the relay.	Only enabled alarms appear in the Alarm ID A list.
Alarm ID B	Choose the second alarm for the relay to monitor. The alarm must be from the same device as the relay.	Only enabled alarms appear in the Alarm ID B list. **Note:** This parameter is dimmed when Logic is set to A only.
Alarm Status to Activate On	Choose the alarm conditions that cause the relay to activate. You can select multiple conditions. • Normal - Activate the relay when the current measurement is not in excess of any alarm limits. • Danger - Activate the relay when the current measurement is in excess of the danger level limits. • Xdcr Fault - Activate the relay when a transducer fault is detected on the associated transducer. • Tacho Fault - Activate the relay when the required tachometer signal has not been detected and there is no transducer fault. • Alert - Activate the relay when the current measurement is in excess of the alert level limits but not in excess of the danger level limits. • Disarm - Activate the relay when the alarm is disabled. If Setpoint Multiplication is on and the setpoint multiplier is set to zero, the alarm is disabled and in the Disarm state. • Module Fault - Activate the relay when a failure or error is detected in the hardware or firmware and the proper operation of the device is inhibited.	

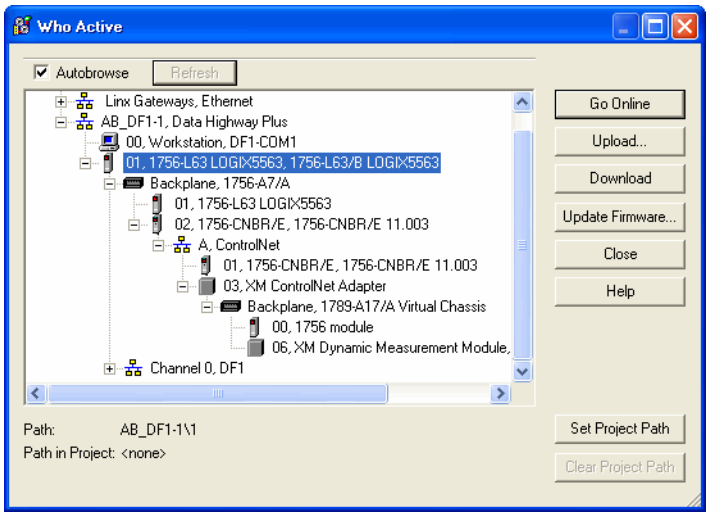
3. When finished, click one of these choices as needed.
   - OK - Click to accept your edits and close the dialog box.
   - Cancel - Click to close the dialog box without accepting your edits.
   - Apply - Click to accept and apply your edits on any dialog and continue editing.

Download to the Controller

After adding the adapter and the XM module to the I/O configuration, you must download the configuration to the controller and save the configuration to a file on your computer.

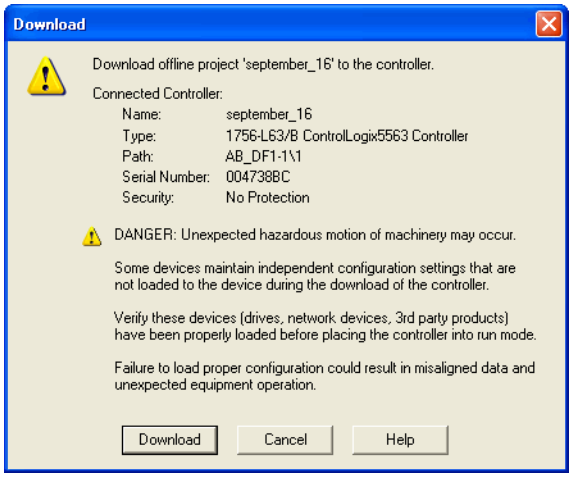
1. From the Communications menu, choose Who Active.

   The Who Active dialog box opens.



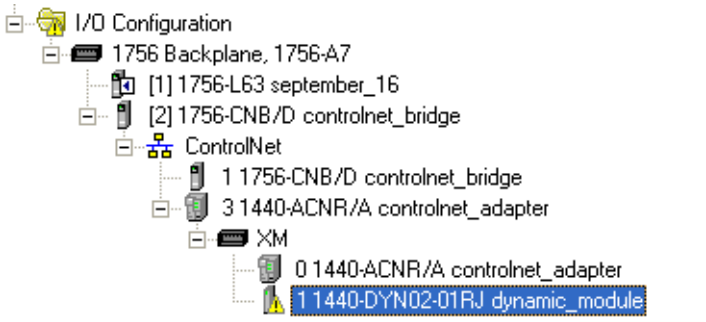
2. Select the controller that you want to download a project to and click Set Project Path to establish the path.
3. Click Download to download the configuration to the controller.

   The Download dialog box opens.



4. Click Download.

When the download is successfully completed, RSLogix 5000 goes into the Online mode and the I/O Not Responding box in the upper left of the window flashes green. Also a yellow warning symbol displays on the I/O Configuration folder in the I/O tree and on the 1440-DYN02-01RJ module. The warning is because the connections have not yet been scheduled using RSNetWorx™ for ControlNet software.



5. From the File menu, choose Save to save the project.

   To verify that the present project configuration values are saved, RSLogix 5000 prompts you to upload them. Click Yes to upload and save configuration values.

Schedule the I/O Module Connections

You must use RSNetWorx for ControlNet software to schedule the network to activate the configured XM module.

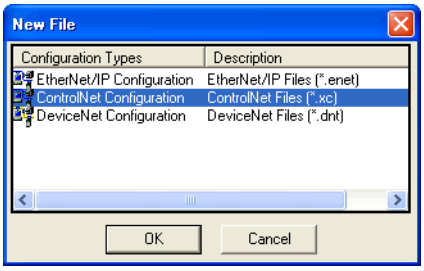
Schedule the Network Online

If your network has already been scheduled and you decide to change the schedule, you must reschedule it.

See Reschedule a ControlNet Network That Has Previously Been Scheduled on page 71.

1. Start RSNetWorx for ControlNet software.
2. From the File menu, choose New.

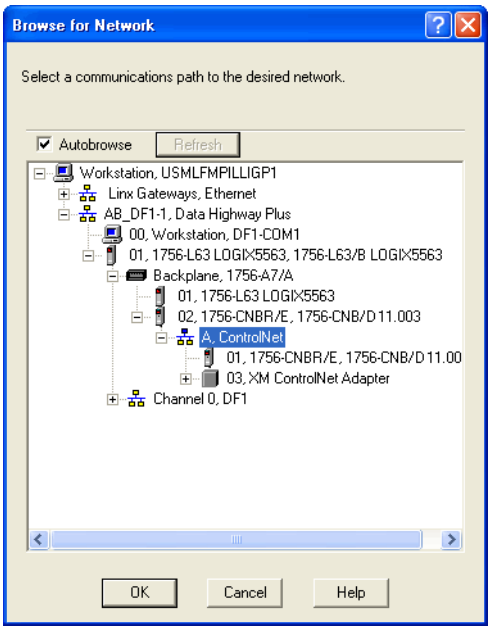
   The New File dialog box opens.



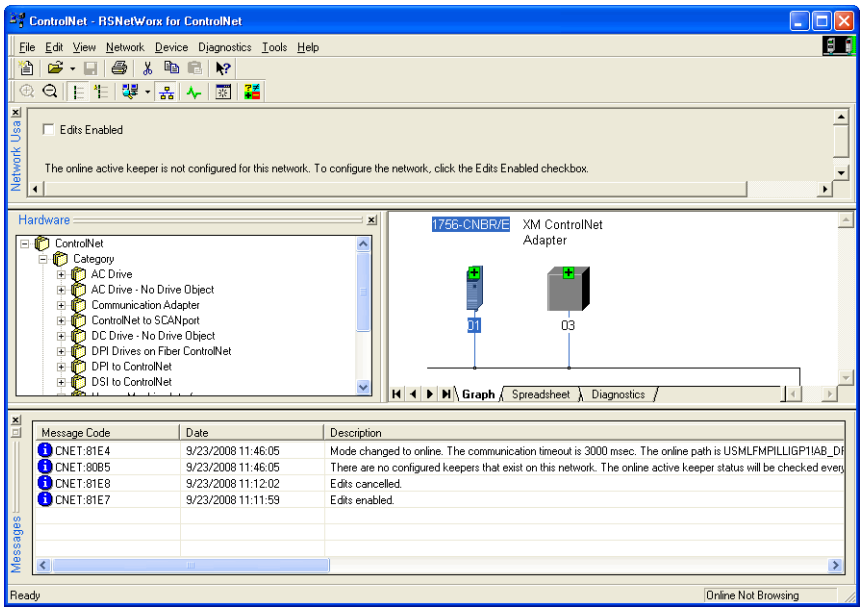
3. Choose ControlNet Configuration and click OK.

4. From the Network menu, choose Online

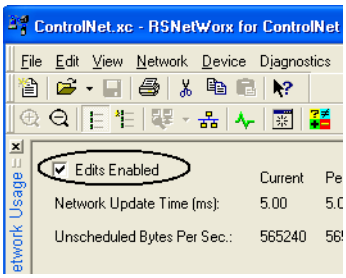
   The Browse for Network dialog box opens.



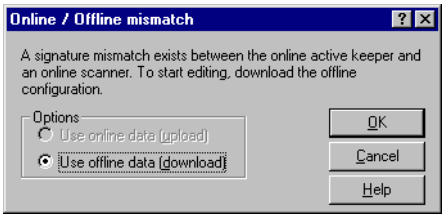
5. Expand the tree to find and choose the communication path to the ControlNet network.
6. Click OK.
7. As the selected ControlNet path is browsed, RSNetWorx for ControlNet software creates a graphical representation of the devices on the network.



8. Click the Edits Enabled checkbox or choose Enable Edits from the Network menu.



If there is another I/O configuration than the configuration now being saved, the Online / Offline mismatch dialog box opens.

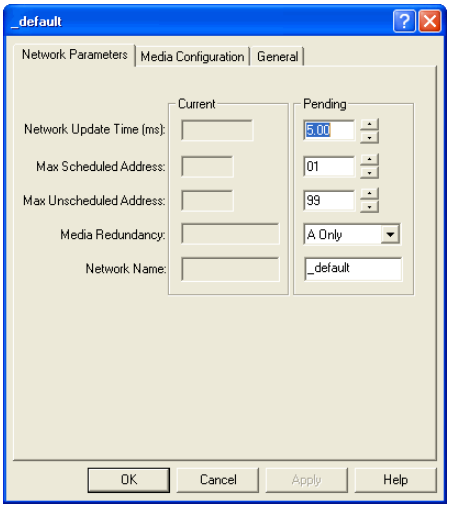


Click OK to close the dialog box.

When you enable edits, RSNetWorx for ControlNet software reads data in the ControlNet modules and builds a schedule for the network.

9. To change the network properties from the default settings to the settings that best fit your network, choose Properties from the Network menu.

The Default dialog box opens.



10. Click the Network Parameter tab.
11. In the Network Update Time, select the smallest repetitive time cycle in milliseconds at which data can be sent on a ControlNet link.

12. In Max Schedule Address, select the node with the highest network address that can use scheduled time on a ControlNet link.

    I/O data is transferred during scheduled time. RSNetWorx for ControlNet software sets this value.

13. In Max Unscheduled Address, select the node with the highest network address that can use unscheduled time on a ControlNet link.
    - Messaging data is transferred during unscheduled time.
    - Nodes set at addresses higher than the maximum unscheduled node do not communicate on the network.

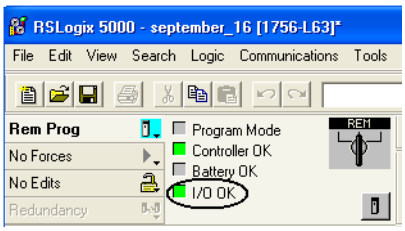
14. In the Media Redundancy, select the appropriate option depending on your configuration.

15. Click OK.

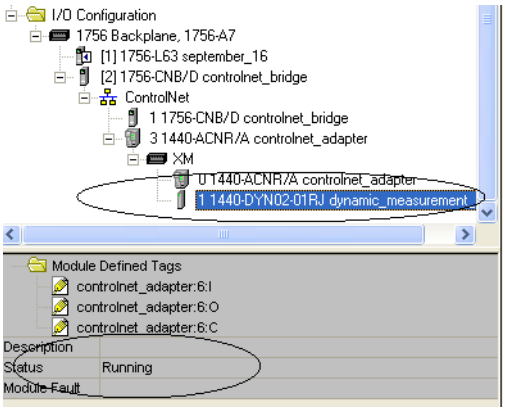
16. To save your network configuration, choose Save from the File menu.

    If you save, you lose the edit resource. To obtain the edit resource again, click the Edits Enabled checkbox.

- Notice the I/O OK in your RSLogix 5000 project is solid green.



- Notice that the warning triangle next to the XM module is gone in the I/O Configuration and the module is Running with no faults.

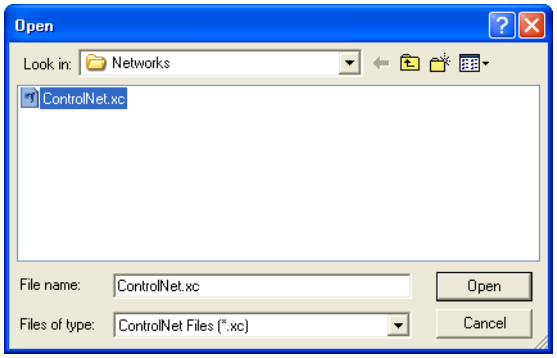


Reschedule a ControlNet Network That Has Previously Been Scheduled

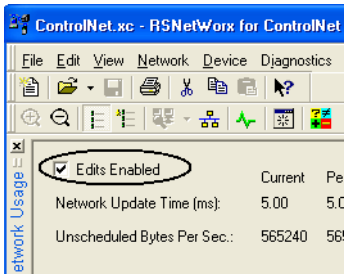
If you change a network that has already been scheduled, you must reschedule the network for the changes to take effect. For example, if you add I/O to an existing ControlNet network, you must reschedule the network for the I/O to become active.

1. In RSNetWorx for ControlNet software, choose Open from the File menu.

   The Open dialog box opens.



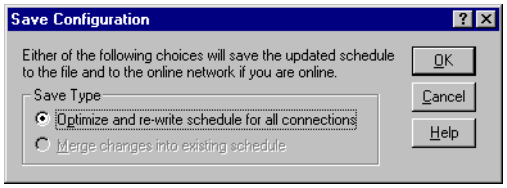
2. Choose the ControlNet file that matches the existing network and click Open.
3. From the Network menu, choose Online.
4. Check Edits Enabled.



   When you enable edits, RSNetWorx for ControlNet software reads data in the ControlNet modules and builds a schedule for the network.

5. Save the file.

   The Save Configuration dialog box opens.

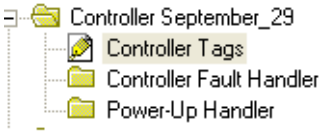


6. Choose Optimize and rewrite schedule for all connections.
7. Click OK.
8. In RSLogix 5000 programming software, save the online project.

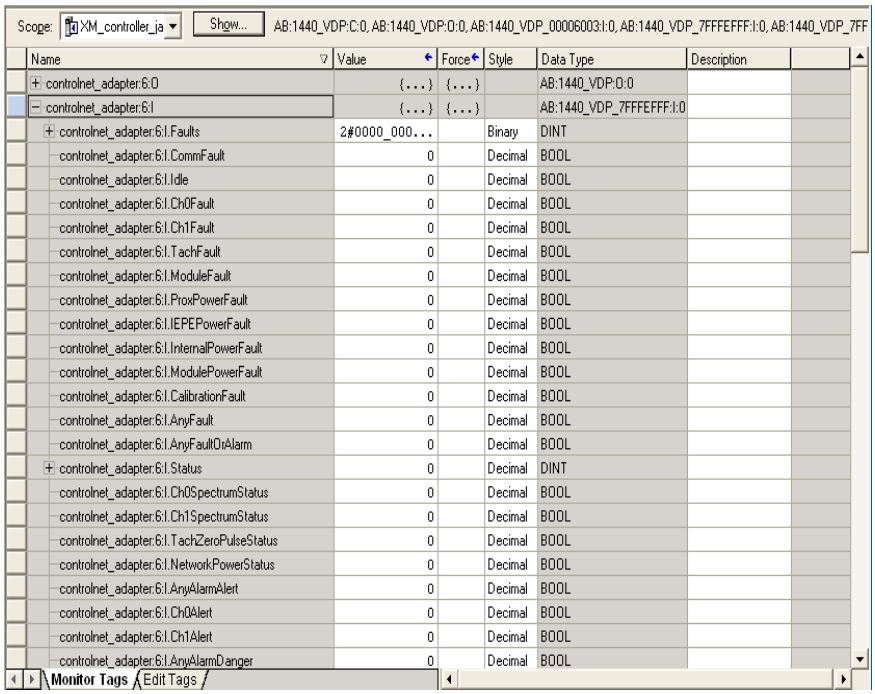
Access Module Data by Using the ACNR

The module-defined data types and tags are automatically created when you configured the XM module in RSLogix 5000 software. These tags allow you to access the input, output, and configuration data of the module via the ladder logic.

To access the module data, double-click Controller Tags.



The Controller Tags dialog box opens.



Status Indicators

ControlNet Adapter Indicators

The XM® ControlNet Adapter has four status indicators.

- Module status (MS) indicator
- Network status (BPS) indicator
- Indicator for each channel (CH A and CH B).

The indicators are positioned on top of the adapter as shown Figure 12.

Figure 12 - Status Indicators on Adapter

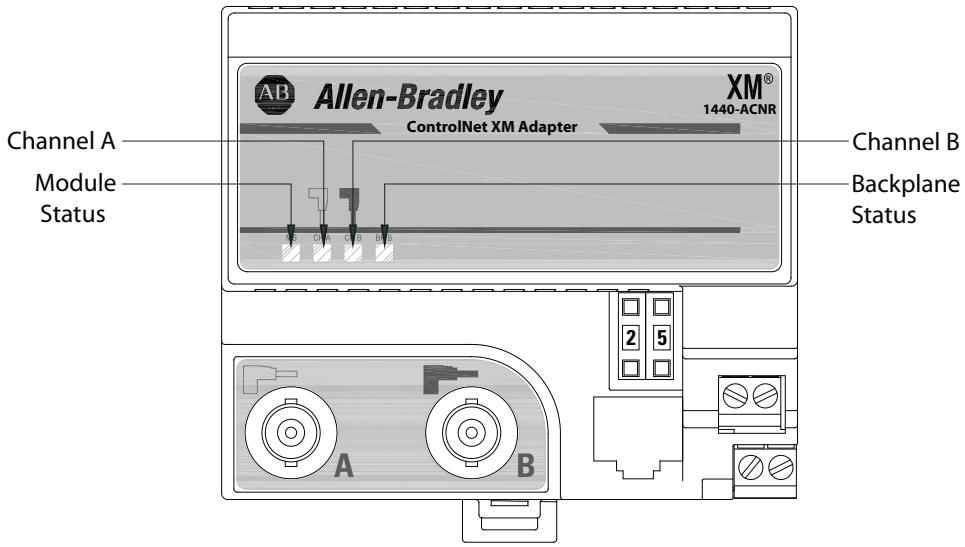


Table 21 - Module Status Indicators

State	Probable Cause
Off	There is no power that is applied to device
Alternating Red/Green	Status indicator power-up test (module self-test)

Table 21 - Module Status Indicators

State	Probable Cause
Flashing Red	Recoverable fault has occurred: • Firmware (NVS) download is in progress. • The MAC ID has changed. • CPU load has been exceeded.
Solid Red	Unrecoverable fault has occurred: • Self-test failure (checksum failure at power-up, RAM test failure at power-up • Firmware fatal error
Solid Green	Device is operating correctly (normal mode)

Table 22 - ControlNet A and ControlNet B Status Indicators Together

State	Probable Cause
Both Off	Reset, no power, or entire network interface deactivated
Alternating Red/Green	Self-test mode
Alternating Red/Off	Bad/invalid node configuration (such as duplicate MAC ID)
Both Red	Failed link interface or failed module

Table 23 - ControlNet A or ControlNet B Status Indicator Individually

State	Probable Cause
Off	Channel is disabled or channel is not supported
Flashing Red/Green	Invalid link configuration
Flashing Red/Off	Severe Link error - link fault or no MAC frames received
Flashing Green/Off	Temporary channel error or listen-only
Solid Green	Normal operation - MAC frames are being received without detected errors

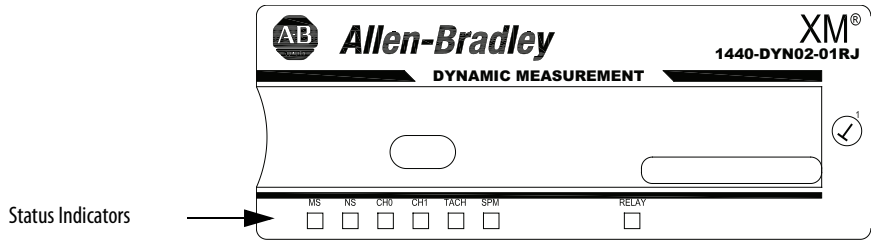
Table 24 - Backplane Status Indicator

State	Probable Cause
Off	Device is not powered - check Module Status (MS) indicator
Flashing Red	Recoverable fault has occurred One or more connections have timed-out Applies to ControlNet and XM Bus connections
Solid Red	Unrecoverable fault has occurred: • Adapter is "bus off" • Adapter has failed its duplicate MAC ID check
Flashing Green	Adapter on-line with no connections established
Solid Green	Adapter on-line with connections established (normal operation, in run mode)

Module Indicators

The module has seven status indicators on top of the module.

Figure 13 - Status Indicators



The status indicators include the following.

- Module Status (MS)
- Network Status (NS)
- Channel 0
- Channel 1
- Tachometer
- Setpoint Multiplier (SPM)
- Relay

The following table describes the Module Status indicator.

Table 25 - Module Status (MS) Indicators

State	Probable Cause
Off	There is no power that is applied to the module.
Alternating Red/Green	Module performing power-up self-test.
Flashing Red	• Application firmware is invalid or not loaded. Download firmware to the module. • Firmware download is in progress.
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.

The following table describes the network status indicator.

Table 26 - Network Status (NS) Indicators

State	Probable Cause
Off	Module is not online. • Module is autobauding. • No power applied to the module; review Module status indicators.
Flashing Red	One or more I/O connections are in the timed-out state.
Solid Red	Failed communications (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.

The following table describes the channel indicators.

Table 27 - Channel 0 and Channel 1 Status Indicators

State	Probable Cause
Off	• Normal operation within alarm limits on the channel. • No power applied to the module. Review 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.

The following table describes the tachometer indicator.

Table 28 - Tachometer Status Indicators

State	Probable Cause
Off	• Normal operation within alarm limits on the channel. • No power applied to the module. Review 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.

The following table describes the setpoint multiplier indicator

Table 29 - Setpoint Multiplier Indicators

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

The following table describes the relay indicator.

Table 30 - Relay Indicators

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

Using RSLogix 5000 Software to Troubleshoot Your Module

In addition to the status indicators on the module, RSLogix 5000® software alerts you to fault conditions. You are alerted in one of these ways:

- Warning signal in the I/O Configuration next to the module when the connection to the module is broken
- Fault message in a status line
- Notification in the Tag Monitor
  - General module
  - Diagnostic faults
- Status on the Connection and Module Info tabs

Notes:

I/O Data Tags

IMPORTANT When the 1440-DYN02-RJ01 module is used with Logix controllers, Logix automatically configures most of the CIP objects by using a Configuration Assembly. The Configuration Assembly overwrites the values of some attributes that can be set by using the Services described in this appendix.

If you are using RSLogix 5000® software to configure the XM® module, we recommend that you do not use the Services in this appendix to configure signal processing, measurements, or alarms because it conflicts with the RSLogix 5000 configuration.

Use the Services to collect data, for example Spectrum and Time Waveforms. Because diagnostic information and many measurements are reported to Logix in the input tag, you need to use only these additional Services to collect data beyond what is available in the input tag.

See I/O Data Tags on page 79 for more information about the input tag.

Tag Names and Definitions

The set of tags that are associated with any module depends on the module type and the selections you make in the Module Definition dialog box in the AOP. For each module you create, specific instances of these data types are created. These sets of tags apply:

- Input - diagnostic, alarms, and measurements to be sent from the XM module to the Logix controller
- Output - data that is sent from the Logix controller to the XM module to multiply Alarm Limits, unlatch the virtual relay, and reset the maximum speed measurement
- Configuration - data that is created with the XM module AOP to configure your transducers, filtering, measurements, and set alarm limits

This table shows the tag and main module type for the 1440-DYN02-01RJ module standard dynamic measurement type.

Tag	Main Module Defined Type	Subtype Used by Main Type
Input	AB:1440_VDP_7FFFFFFF:I:0[(1)]	None
Output	AB:1440_VDP:O:0	None
Configuration	AB:1440_VDP:C:0	AB:1440_VDP_ChConfig_Struct.C:0 AB:1440_VDP_AlarmConfig_Struct:C:0

(1) The input data tag is dynamically created by the measurements you select in the Channel Data tab in the Module Definition dialog box. The input data type name varies slightly depending on which measurements you select.

Module-defined Data Types

The following tables list and describe module-defined data types for the 1440-DYN02-01RJ standard dynamic measurement type. The data types define the structure of the data that is used by the module to store input, output, and configuration data. These tags let you access this data via the ladder logic.

These tables include information for input (as indicated by an I), configuration (as indicated by a C), and output (as indicated by an O).

Input Data Type

The members of the input data type are dynamically generated by the measurements you select in the Module Definition dialog box in the RSLogix 5000 software AOP. The size of the connection is calculated by this profile.

See Configure the Module Definition Properties on page 46.

Table 31 shows the complete input data type when all measurements are selected.

Table 31 - Input Data Types

Member Name	Type	Location	Description
Faults	DINT		Contains the following Fault indicators.
CommFault	BOOL	Faults:0	0 = No communication fault 1 = Communication fault
Idle	BOOL	Faults:17	0 = Module in Run mode 1 = Module in Idle mode Note: Measurements and alarms are not evaluated during Idle mode.
Ch0Fault	BOOL	Faults:18	0 = No fault on Channel 0 1 = Fault on Channel 0 from bias voltage reading outside the DC bias limits
Ch1Fault	BOOL	Faults:19	0 = No fault on Channel 1 1 = Fault on Channel 1 from bias voltage reading outside the DC bias limits
TachFault	BOOL	Faults:20	0 = No fault on tachometer 1 = Fault on tachometer; tachometer is enabled and receiving no pulses within fault timeout period & the Tach DC bias is outside the Tach DC Low and High Limits
ModuleFault	BOOL	Faults:21	0 = No fault on module 1 = Fault on module; either calibration, watchdog, or bad 5V, 24V, IEPE or proximity probe power
ProxPowerFault	BOOL	Faults:22	0 = No fault on proximity probe power 1 = Fault on proximity probe power
IEPEPowerFault	BOOL	Faults:23	0 = No fault on IEPE power 1 = Fault on IEPE power
InternalPowerFault	BOOL	Faults:24	0 = No fault on module 5V supply 1 = Fault on module 5V supply
ModulePowerFault	BOOL	Faults:25	0 = No fault on 24V supply 1 = Fault on 24V supply; check the supply voltage to the module
CalibrationFault	BOOL	Faults:28	0 = No ROM fault 1 = ROM fault
AnyFault	BOOL	Faults:29	0 = No fault exists on the module 1 = At least one fault exists on the module

Table 31 - Input Data Types (Continued)

Member Name	Type	Location	Description
AnyFaultOrAlarm	BOOL	Faults:30	0 = No alarms or faults exist on the module 1 = At least one alarm or fault exists on the module
Status	DINT		Contains the following Status indicators
Ch0SpectrumStatus	BOOL	Status:8	0 = Band or vector data has been calculated 1 = Data has not been collected due to warm up period or speed limit condition
Ch1SpectrumStatus	BOOL	Status:9	0 = Band or vector data has been calculated 1 = Data has not been collected due to warm up period or speed limit condition
TachZeroPulseStatus	BOOL	Status:10	0 = No zero pulse tachometer fault 1 = Zero Pulse fault; tachometer is enabled and it is not receiving pulses
NetworkPowerStatus	BOOL	Status:11	0 = Power is applied at the external network terminal 1 = No power is detected at the external network terminal
AnyAlarmAlert	BOOL	Status:12	0 = No alarms are in Alert 1 = At least one alarm is in Alert
Ch0Alert	BOOL	Status:13	0 = No alarms on Channel 0 1 = Channel 0 has an alarm with a measurement in Alert
Ch1Alert	BOOL	Status:14	0 = No alarms on Channel 1 1 = Channel 1 has an alarm with a measurement in Alert
AnyAlarmDanger	BOOL	Status:15	0 = No alarms are in Danger 1 = At least one alarm is in Danger
Ch0Danger	BOOL	Status:16	0 = No alarms on Channel 0 1 = Channel 0 has an alarm with a measurement in Danger
Ch1Danger	BOOL	Status:17	0 = No alarms on Channel 1 1 = Channel 1 has an alarm with a measurement in Danger
RelaysHeld	BOOL	Status:18	Relay is being held at last state while in Idle mode
AlarmLimitMultiply	BOOL	Status:20	0 = Startup switch is not activated; alarm multiplier is not applied to the alarm limits 1 = Startup switch is activated; alarm limit multiplier is applied to alarm limits to avoid false alarms
StartupTime	BOOL	Status:21	0 = Currently not in startup time (alarm multiplier is not active) 1 = Currently in startup time (alarm multiplier is active) which means the startup switch is activated or it is the start up period following the release of the startup switch
Relay	BOOL	Status:23	0 = Relay 0 not tripped (conditions are not met) 1 = Relay 0 tripped
Alarms	DINT		Contains the following Alarm indicators
Alarm0Alert	BOOL	Alarms:0	0 = Alarm 0 is not in Alert 1 = Alarm 0 is in Alert
Alarm0Danger	BOOL	Alarms:1	0 = Alarm 0 is not in Danger 1 = Alarm 0 is in Danger
Alarm1Alert	BOOL	Alarms:2	0 = Alarm 1 is not in Alert 1 = Alarm 1 is in Alert
Alarm1Danger	BOOL	Alarms:3	0 = Alarm 1 is not in Danger 1 = Alarm 1 is in Danger
Alarm2Alert	BOOL	Alarms:4	0 = Alarm 2 is not in Alert 1 = Alarm 2 is in Alert
Alarm2Danger	BOOL	Alarms:5	0 = Alarm 2 is not in Danger 1 = Alarm 2 is in Danger
Alarm3Alert	BOOL	Alarms:6	0 = Alarm 3 is not in Alert 1 = Alarm 3 is in Alert

Table 31 - Input Data Types (Continued)

Member Name	Type	Location	Description
Alarm3Danger	BOOL	Alarms:7	0 = Alarm 3 is not in Danger 1 = Alarm 3 is in Danger
Alarm4Alert	BOOL	Alarms:8	0 = Alarm 4 is not in Alert 1 = Alarm 4 is in Alert
Alarm4Danger	BOOL	Alarms:9	0 = Alarm 4 is not in Danger 1 = Alarm 4 is in Danger
Alarm5Alert	BOOL	Alarms:10	0 = Alarm 5 is not in Alert 1 = Alarm 5 is in Alert
Alarm5Danger	BOOL	Alarms:11	0 = Alarm 5 is not in Danger 1 = Alarm 5 is in Danger
Ch0Overall(2)	REAL		The measured overall value for Channel 0. Overall measures the amplitude of the vibration signal at all frequencies.
Ch0DCBiasGap(2)	REAL		The measured average DC offset of the transducer signal for Channel 0.
Ch0SumHarmonics(2)	REAL		The sum of the amplitude of the harmonics in the range from the specified starting order through the frequency maximum for Channel 0.
Ch0Not1X(2)	REAL		The measured magnitude of the vibration excluding the vibration at the machine speed for Channel 0.
Ch0Band0(2)	REAL		The measured band values for Channel 0.
Ch0Band1(2)	REAL		
Ch0Band2(2)	REAL		
Ch0Band3(2)	REAL		
Ch0Vector1XMagnitude(2)	REAL		The measured magnitude of the vibration at the machine speed for Channel 0.
Ch0Vector1XPhase(2)	REAL		The measured phase of the vibration at the machine speed for Channel 0.
Ch0Vector2XMagnitude(2)	REAL		The measured magnitude of the vibration at 2 times the machine speed for Channel 0.
Ch0Vector2XPhase(2)	REAL		The measured phase of the vibration at 2 times the machine speed for Channel 0.
Ch0Vector3XMagnitude(2)	REAL		The measured magnitude of the vibration at 3 times the machine speed for Channel 0.
Ch1Overall(2)	REAL		The measured overall value for Channel 1. Overall measures the amplitude of the vibration signal at all frequencies.
Ch1DCBiasGap(2)	REAL		The measured average DC offset of the transducer signal for Channel 1.
Ch1SumHarmonics(2)	REAL		The sum of the amplitude of the harmonics in the range from the specified starting order through the frequency maximum for Channel1.
Ch1Not1X(2)	REAL		The measured magnitude of the vibration excluding the vibration at the machine speed for Channel 1.
Ch1Band0(2)	REAL		The measured band values for Channel 1.
Ch1Band1(2)	REAL		
Ch1Band2(2)	REAL		
Ch1Band3(2)	REAL		
Ch1Vector1XMagnitude(2)	REAL		The measured magnitude of the vibration at the machine speed for Channel 1.
Ch1Vector1XPhase(2)	REAL		The measured phase of the vibration at the machine speed for Channel 1.
Ch1Vector2XMagnitude(2)	REAL		The measured magnitude of the vibration at 2 times the machine speed for Channel 1.
Ch1Vector2XPhase(2)	REAL		The measured phase of the vibration at 2 times the machine speed for Channel 1.
Ch1Vector3XMagnitude(2)	REAL		The measured magnitude of the vibration at 3 times the machine speed for Channel1.
Speed(2)	REAL		The measured speed value for the machine.

Table 31 - Input Data Types (Continued)

Member Name	Type	Location	Description
MaxSpeed[2]	REAL		The maximum speed value for the machine. This is the greatest measured speed value since the most recent reset. You can reset the Maximum Speed using MaxSpeedReset in the output tag.
Acceleration[2]	REAL		The measured acceleration value for the machine. The acceleration is the rate of change in the speed.
SMAXMagnitude[2]	REAL		The greatest peak magnitude around the orbit.
SMAXPhase[2]	REAL		The phase at which the greatest peak magnitude occurs around the orbit.

(1) The input data type name varies depending on the measurements you select in the Channel Data tab in the RSLogix 5000 software AOP. See Configure the Module Definition Properties on page 46.

(2) The measurement appears in the input data type only if you select it in the Channel Data tab. See Configure the Module Definition Properties on page 46.

Configuration Data Type

Table 32 - Configuration Data Types

Member Name	Type	Default Display Style	Description
OverallFilterEN	BOOL	Decimal	0 = None 1 = Low Pass Filter
SynchronousModeEN	BOOL	Decimal	0 = Asynchronous (Default) 1 = Synchronous with tach
XdcrPower	SINT	Decimal	0 = Off (Default) 1 = IEPE 2 = +24V 3 = -24V 4 = Bias Current
XdcrSensitivityUnits	SINT	Decimal	0 = mV/ mil (Default) 1 = mV/ in/s 2 = mV/ g 3 = mV/ psi 4 = V/ V 5 = mV/ mm/s 6 = mV/ µm 8 = mV/ mbar 9 = V/ g
XdcrLLimit	REAL	Float	-24.0…24.0 volts (Default = -18.0 volts)
XdcrHLimit	REAL	Float	-24.0…24.0 volts (Default = -2.0 volts)
XdcrSensitivity	REAL	Float	Default = 200.0 (XdcrSensitivityUnits selection determines the units)
FullScale	REAL	Float	Default = 10.0 (FullScaleUnits selection determines the units)
FullScaleUnits	SINT	Decimal	0 = mil (Default) 1 = in/s 2 = g 3 = psi 4 = volt 5 = mmps 6 = µm 8 = mbar

Table 32 - Configuration Data Types (Continued)

Member Name	Type	Default Display Style	Description
SignalMeasurementType	SINT	Decimal	0 = RMS 1 = Calculated peak 2 = Calculate pk-pk 3 = True peak 4 = True pk-pk (Default)
FFTWindowType	SINT	Decimal	0 = Rectangular 1 = Hamming 2 = Hanning (Default) 3 = Flat Top 4 = Kaiser Bessel
HighPassFilterSelection	SINT	Decimal	0 = 0.2 Hz 1 = 1 Hz 2 = 5 Hz 3 = 10 Hz (Default) 4 = 40 Hz
FrequencyMax	INT	Decimal	Default = 1000
LowPassFilterSelection	INT	Decimal	200…20,000 (Default = 1000)
TachometerRotations	INT	Decimal	1…65,535 (Default = 1)
RotorRotations	INT	Decimal	1…65,535 (Default = 1)
SpectrumLineCount	DINT	Decimal	100, 200, 400, 800 (Default = 200)
AveragesCount	INT	Decimal	1…99 (Default = 1)
SelectedSumHarmonicsOrder	SINT	Decimal	0 = 1 1 = 2 2 = 3 3 = 4 4 = 5 (Default = 3)
Band0OrderModeEn	BOOL	Decimal	0 = Hz (Default) 1 = Orders
Band1OrderModeEn	BOOL	Decimal	0 = Hz (Default) 1 = Orders
Band2OrderModeEn	BOOL	Decimal	0 = Hz (Default) 1 = Orders
Band3OrderModeEn	BOOL	Decimal	0 = Hz (Default) 1 = Orders
Band0MaxPeakEn	BOOL	Decimal	0 = Band Overall (Default) 1 = Maximum Peak
Band1MaxPeakEn	BOOL	Decimal	0 = Band Overall (Default) 1 = Maximum Peak
Band2MaxPeakEn	BOOL	Decimal	0 = Band Overall (Default) 1 = Maximum Peak
Band3MaxPeakEn	BOOL	Decimal	0 = Band Overall (Default) 1 = Maximum Peak
Band0FrequencyMin	INT	Decimal	Default = 1
Band0FrequencyMax	INT	Decimal	Default = 10
Band1FrequencyMin	INT	Decimal	Default = 1
Band1FrequencyMax	INT	Decimal	Default = 10

Table 32 - Configuration Data Types (Continued)

Member Name	Type	Default Display Style	Description
Band2FrequencyMin	INT	Decimal	Default = 1
Band2FrequencyMax	INT	Decimal	Default = 10
Band3FrequencyMin	INT	Decimal	Default = 1
Band3FrequencyMax	INT	Decimal	Default = 10
LAlertLimit	REAL	Float	-999,999…999,999 (Default = -6)
HAlertLimit	REAL	Float	-999,999…999,999 (Default = 6)
LDangerLimit	REAL	Float	-999,999…999,999 (Default = -8)
HDangerLimit	REAL	Float	-999,999…999,999 (Default = 8)
Deadband	REAL	Float	0…9999 (Default = 0.1)
LimitMultiply	REAL	Float	0…10 (Default = 1.0)
SpeedLLimit	REAL	Float	0…9,999,999 (Default = 0)
SpeedHLimit	REAL	Float	0…9,999,999 (Default = 1000)
LimitMultiplyPeriod	INT	Decimal	0…65535 seconds (Default = 1.0)
Condition	SINT	Decimal	0 = Greater Than (Default) 1 = Less Than 2 = Inside Range 3 = Outside Range
MeasurementID	SINT	Decimal	0 = Ch 0 Overall (Default) 1 = Ch 1 Overall 2 = Ch 0 DC Bias/Gap 3 = Ch 1 DC Bias/Gap 4 = Ch 0 Band 0 5 = Ch 1 Band 0 6 = Ch 0 Band 1 7 = Ch 1 Band 1 8 = Ch 0 Band 2 9 = Ch 1 Band 2 10 = Ch 0 Band 3 11 = Ch 1 Band 3 12 = Speed 13 = SMAX Magnitude 14 = Ch 0 1X Magnitude 15 = Ch 1 1X Magnitude 16 = Ch 0 2X Magnitude 17 = Ch 1 2X Magnitude 18 = Ch 0 3X Magnitude 19 = Ch 1 3X Magnitude 20 = Ch 0 Not 1X 21 = Ch 1 Not 1X 22 = Ch 0 Sum Harmonics 23 = Ch 1 Sum Harmonics 24 = Ch 0 1X Phase 25 = Ch 1 1X Phase 26 = Ch 0 2X Phase 27 = Ch 1 2X Phase 28 = SMAX Phase 29 = Acceleration
Ch0			AB:1440_VDP_ChConfig_Struct:C:0
Ch1			AB:1440_VDP_ChConfig_Struct:C:0

Table 32 - Configuration Data Types (Continued)

Member Name	Type	Default Display Style	Description
TachAutoTriggerEn	BOOL	Decimal	0 = Manual Trigger 1 = Auto Trigger (Default)
TachTriggerSlope	BOOL	Decimal	0 = Positive 1 = Negative (Default)
TachInhibitZeroPulseFault	BOOL	Decimal	0 = No pulses on tachometer produces fault (Default) 1 = Inhibit zero pulses fault on tachometer
TachResponseTime	SINT	Decimal	0 = 2640.0 ms 1 = 220.0 ms (Default) 2 = 22.0 ms
TachFaultDelay	SINT	Decimal	1…64 seconds (Default = 11)
TachFaultLLimit	REAL	Float	-9,999,999…9,999,999 volts (Default = 2)
TachFaultHLimit	REAL	Float	-9,999,999…9,999,999 volts (Default = 18)
TachTriggerHysteresis	REAL	Float	0.0…50.0 (Default = 2.0) If TachAutoTriggerEn is set to 0, this value is volts. If TachAutoTriggerEn is set to 1, this value is % of the peak-to-peak input signal.
TachTriggerLevel	REAL	Float	-9,999,999…9,999,999 volts (Default = 0)
TachPulsesPerRevolution	INT	Decimal	Default = 1
Alarm0En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm1En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm2En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm3En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm4En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm5En	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm0SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm1SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm2SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm3SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm4SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm5SpeedRangeEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable
Alarm0			AB:1440_VDP_AlarmConfig_Struct:C:0
Alarm1			AB:1440_VDP_AlarmConfig_Struct:C:0
Alarm2			AB:1440_VDP_AlarmConfig_Struct:C:0
Alarm3			AB:1440_VDP_AlarmConfig_Struct:C:0

Table 32 - Configuration Data Types (Continued)

Member Name	Type	Default Display Style	Description
Alarm4			AB:1440_VDP_AlarmConfig_Struct:C:0
Alarm5			AB:1440_VDP_AlarmConfig_Struct:C:0
RelayDelay	INT	Decimal	0 to 65535 seconds (Default = 1000)
RelayActivationLogic	SINT	Decimal	0 = A Only (Default) 1 = A OR B 2 = A AND B
RelayAlarmIDA	SINT	Decimal	Alarm number 0…5 (Default = 0)
RelayAlarmIDB	SINT	Decimal	Alarm number 0…5 (Default = 0)
RelayTripNormal	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripAlert	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripDanger	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripDisarm	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripXdcrFault	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripModuleFault	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayTripTachFault	BOOL	Decimal	0 = Disable (Default) 1 = Enable
RelayEn	BOOL	Decimal	0 = Disable Relay (Default) 1 = Enable Relay
RelayLatch	BOOL	Decimal	0 = Non-latching (Default) 1 = Latching
RelayFaultValue	BOOL	Decimal	0 = Energized (Default) 1 = De-energized
RelayIdleHoldEn	BOOL	Decimal	0 = Disable (Default) 1 = Enable

Output Data Type

Table 33 - Output Data Types

Member Name	Type	Default Display Style	Description
Output0	SINT	Decimal	Contains the following values.
RelayReset	BOOL	Decimal	Resets all latched relays.
AlarmLimitMultiply	BOOL	Decimal	Multiply the alarm setpoints, or disarm the alarms during startup period.
MaxSpeedReset	BOOL	Decimal	Reset maximum speed.

Notes:

CIP Objects

This appendix defines the specific CIP Objects, Instances, Attributes, and Services supported by the Dynamic Measurement module.

IMPORTANT When the 1440-DYN02-RJ01 module is used with Logix controllers, Logix automatically configures most of the CIP objects by using a Configuration Assembly. The Configuration Assembly overwrites the values of some attributes that can be set by using the Services described in this appendix.

If you are using RSLogix 5000® software to configure the XM® module, we recommend you do not use the Services in this appendix to configure signal processing, measurements, or alarms because it conflicts with the RSLogix 5000 configuration.

Use the Services to collect data, for example Spectrum and Time Waveforms. Because diagnostic information and many measurements are reported to Logix in the input tag, you need to use only these additional Services to collect data beyond what is available in the input tag.

See I/O Data Tags on page 79 for more information about the input tag.

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 34 - Identity Object Instance Attributes

Attr ID	Access	Name	Data Type	Default Value
1	Get	Vendor ID	UINT	1 = Allen-Bradley
2	Get	Device Type	UINT	109 (Specialty I/O)
3	Get	Product Code	UINT	21 (0x15) XM Dynamic Measurement Module
4	Get	Revision: Major Minor	STRUCT OF USINT USINT	Value varies with each firmware revision.
5	Get	Status	WORD	NA
6	Get	Serial Number	UDINT	NA
7	Get	Product Name	SHORT_ STRING	XM Dynamic Measurement Module

Status

The Status is a 16 bit value. The following bits are implemented.

Table 35 - 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 non-volatile memory. This bit is cleared whenever the default configuration is restored or loaded.
3	Reserved	Set to 0
4…7	Boot Program	Vendor-specific, indicates that the boot program is running. The Main Application must be corrupt or missing. Use ControlFlash to reload the Main Application.
8	Minor Recoverable Fault	Set whenever there is a transducer or tachometer fault.
9	Minor Unrecoverable Fault	Not implemented
10	Major Recoverable Fault	Set when there is a major recoverable fault.
11	Major Unrecoverable Fault	Set when there is a module status fault (Module Status status indicator is solid red).
12…15	Reserved	Set to 0

ID_STATUS_SELF_TESTING	0x0000
ID_STATUS_NVS_UPDATE	0x0010
ID_STATUS_COMM_FAULT	0x0020
ID_STATUS_AWAIT_CONN	0x0030
ID_STATUS_CONNECTED	0X0060
ID_STATUS_IDLE	0X0070

Services

Table 36 - 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 the DeviceNet network.

Class Attributes

Table 37 - DeviceNet Object Class Attributes

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

Instance Attribute

Table 38 - DeviceNet Object Instance Attributes

Attr ID	Access	Name	Data Type	Default Value
1	Get	MAC ID	USINT	On DIP switches under label
2	Get	Baud Rate	USINT	The baud rate is determined by automatic baud rate detection (autobaud). The module listens to network traffic to determine the baud 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
100	Get	Autobaud Disable	BOOL	0 (always autobaud)

Services

Table 39 - 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 enable data to or from each object to be sent or received in a single message.

The XM module provides both static and dynamic assemblies.

Class Attribute

Table 40 - Assembly Object Class Attributes

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

Instances

Table 41 - Assembly Object Instances

Instance	Name	Type	Description
100	Vibration Alarm Values	Input	Alarm and Relay Status values
101	Default Poll Response Message	Input	Measurement values
142	Logix Configuration Assembly	Configuration	Used by Logix to configure the module
190	Logix Output Assembly	Output	Used by Logix for Output Tag
198	Logix Input Assembly	Input	Special Dynamic Assembly used only by Logix Controllers
199	Alternate Dynamic Poll Response Message	Input	User configurable measurement values and configuration parameters

Instance Attributes

Table 42 - Assembly Object Instance Attributes

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

Assembly Instance Attribute Data Format

Instance 100 - Alarm and Relay Status

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

Table 43 - 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 0 Status	Set Point Multiplier	Alarm 1 Status			Alarm 0 Status		
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved							
5	0	0	Alarm 11 Status			Alarm 10 Status		
6	0	0	Alarm 13 Status			Alarm 12 Status		
7	0	0	Alarm 15 Status			Alarm 14 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.

Table 44 - 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 0 Overall value							
4 - 7	Channel 1 Overall value							
8 - 11	Channel 0 Gap value (Analog Input Point (AIP) Object Instance #1)							
12 - 15	Channel 1 Gap value (AIP Object Instance #2)							
16 - 19	Speed value							
20 - 23	Maximum Speed value							
24 - 27	Channel 0 Band 0 value							
28 - 31	Channel 1 Band 0 value							
32 - 35	Channel 0 Band 1 value							
36 - 39	Channel 1 Band 1 value							
40 - 43	Channel 0 Band 2 value							
44 - 47	Channel 1 Band 2 value							
48 - 51	Channel 0 Band 3 value							
52 - 55	Channel 1 Band 3 value							
56 - 59	Channel 0 Vector 1 Magnitude value							
60 - 63	Channel 0 Vector 1 Phase value							
64 - 67	Channel 1 Vector 1 Magnitude value							
68 - 71	Channel 1 Vector 1 Phase value							

Table 44 - 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
72 - 75	Channel 0 Vector 2 Magnitude value							
76 - 79	Channel 0 Vector 2 Phase value							
80 - 83	Channel 1 Vector 2 Magnitude value							
84 - 87	Channel 1 Vector 2 Phase value							
88 - 91	Channel 0 Vector 3 Magnitude value							
92 - 95	Channel 1 Vector 3 Magnitude value							
96 - 99	Channel 0 Not 1X value (AIP Object Instance #3)							
100 - 103	Channel 1 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 0 Sum Harmonics value (AIP Object Instance #7)							
116 - 119	Channel 1 Sum Harmonics (AIP Object Instance #8)							
120 - 123	Acceleration value							

Instance 199 - Dynamic Assembly

This Assembly instance can be created and configured with the XM Configuration Tool. Using the configuration software, you 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 of the measurement values included in Assembly instance 101. In addition, the dynamic Assembly can include the following configuration parameters.

Table 45 - 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	AlarmEnable	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	AlarmCondition	7	USINT
21 1D 03 24 ii 30 08	Alarm	$31D_h$	1 - 16	AlarmHAlertLimit	8	REAL
21 1D 03 24 ii 30 09	Alarm	$31D_h$	1 - 16	AlarmHDangerLimit	9	REAL
21 1D 03 24 ii 30 0A	Alarm	$31D_h$	1 - 16	AlarmLAlertLimit	10	REAL
21 1D 03 24 ii 30 0B	Alarm	$31D_h$	1 - 16	AlarmLDangerLimit	11	REAL
21 1D 03 24 ii 30 0C	Alarm	$31D_h$	1 - 16	AlarmDeadband	12	REAL
21 1D 03 24 ii 30 0D	Alarm	$31D_h$	1 - 16	AlarmLimitMultiply (Setpoint Multiplication function)	13	REAL
21 1D 03 24 ii 30 0E	Alarm	$31D_h$	1 - 16	AlarmLimitMultiplyPeriod	14	UINT
21 1D 03 24 ii 30 0F	Alarm	$31D_h$	1 - 16	AlarmSpeedRangeEn	15	BOOL
21 1D 03 24 ii 30 10	Alarm	$31D_h$	1 - 16	AlarmSpeedHLimit	16	REAL
21 1D 03 24 ii 30 11	Alarm	$31D_h$	1 - 16	AlarmSpeedLLimit	17	REAL

Table 45 - Instance 199 Component Mapping (Continued)

EPATH (where ii = instance number)	Class Name	Class Number	Instance Number	Attribute Name	Attribute Number	Data Type
21 0F 00 24 ii 30 01	Param	$0F_h$	10 - 25	Parameter Value (AlarmMeasurementID)	1	USINT
21 23 03 24 ii 30 04	Relay	323_h	1	RelayEn	4	BOOL
21 23 03 24 ii 30 05	Relay	323_h	1	RelayLatch	5	BOOL
21 23 03 24 ii 30 06	Relay	323_h	1	RelayFaultValue	6	BOOL
21 23 03 24 ii 30 07	Relay	323_h	1	RelayDelay	7	UINT
21 23 03 24 ii 30 09	Relay	323_h	1	RelayAlarmLevel	9	BYTE
21 0F 00 24 ii 30 01	Param	$0F_h$	26 - 30	Parameter Value (RelayAlarmIDA)	1	USINT
21 0F 00 24 ii 30 01	Param	$0F_h$	31 - 35	Parameter Value (RelayAlarmIDB)	1	USINT
21 23 03 24 ii 30 0C	Relay	323_h	1 - 5	RelayActivationLogic	12	USINT
21 23 03 24 ii 30 0E	Relay	323_h	1 - 5	RelayInstalled	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 Assembly 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 46 - Assembly Object Services

Service Code	Class/Instance Usage	Name
$0E_h$	Class/Instance	Get_Attribute_Single
10_h	Instance	Set_Attribute_Single(1)
08_h	Class	Create
09_h	Instance	Delete

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

Connection Object (Class ID 05H)

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

Class Attributes

The Connection Object provides no class attributes.

Instances

Table 47 - 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 48 - Connection Object Instance Attributes

Attr 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(s) across which productions and consumptions 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(s) whose data is to be produced by this Connection Object. 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 Object(s) that are to receive the data consumed by this Connection Object. See DeviceNet Specification Volume 1 Appendix I.
17	Get	Production Inhibit Time	UINT	Defines minimum time between new data production.

Services

Table 49 - 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 50 - Discrete Input Object Class Attributes

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

Instance Attributes

Table 51 - Discrete Input Object Instance Attributes

Attr 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 the following 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. See I/O Data Tags on page 79.

Services

Table 52 - 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 the 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 performed by the Dynamic Measurement module.

Class Attributes

Table 53 - Analog Input Point Object Class Attributes

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

Instances

Table 54 - Analog Input Point Object Instances

Instance	Name	Description
1	Ch0DCBiasGap	Gap measurement for Channel 0
2	Ch1DCBiasGap	Gap measurement for Channel 1
3	Ch0Not1X	Not 1X measurement for Channel 0
4	Ch1Not1X	Not 1X measurement for Channel 1
5	SMAXMagnitude	SMAX magnitude of synchronized channels
6	SMAXPhase	SMAX phase of synchronized channels
7	Ch0SumHarmonics	Sum Harmonics measurement for Channel 0
8	Ch1SumHarmonics	Sum Harmonics measurement for Channel 1

Instance Attributes

Table 55 - Analog Input Point Object Class Attributes

Attr 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 represent the actual field value.
8	Get	Value Data Type	USINT	Determines the data type of the **Value**.	1 = REAL
147	Get	Data Units	ENGUNIT	The units context of the **Value** attribute.	See DeviceNet Specification Volume 1 Appendix K.

Services

Table 56 - 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 Dynamic Measurement module configuration data. There are 39 Parameter Object instances 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. And 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 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.

Class Attributes

Table 57 - Parameter Object Class Attributes

Attr 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 non-volatile store Bit 3 Params in non-volatile
9	Get	Config. Assembly Instance	UINT		Set to 0

Instances

There are 39 instances of this object.

Table 58 - 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

Table 58 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
2	No	Transducer 2 Sensitivity Units	USINT	0 = mil 1 = in/s 2 = g 3 = psi 4 = volts 5 = mm/s 6 = µm 7 = Pa 8 = mbar	0
3	No	Channel 0 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 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
5	No	Starting Order for Channel 0 Sum Harmonics meas.	USINT	0=1 1=2 2=3 3=4 4=5	3
6	No	Starting Order for Channel 1 Sum Harmonics meas.	USINT	1-5	2
7…8		Reserved		NA	
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 58 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
10	No	Alarm 0 Measurement ID	USINT	0 = CH 0 Overall 1 = CH 1 Overall 2 = CH 0 Gap 3 = CH 1 Gap 4 = CH 0 Band 0 5 = CH 1 Band 0 6 = CH 0 Band 1 7 = CH 1 Band 1 8 = CH 0 Band 2 9 = CH 1 Band 2 10 = CH 0 Band 3 11 = CH 1 Band 3 12 = Speed 13 = SMAX Mag. 14 = CH 0 1X Mag. 15 = CH 1 1X Mag. 16 = CH 0 2X Mag. 17 = CH 1 2X Mag. 18 = CH 0 3X Mag. 19 = CH 1 3X Mag. 20 = CH 0 Not 1X 21 = CH 1 Not 1X 22 = CH 0 Sum Harmonics 23 = CH 1 Sum Harmonics 24 = CH 0 1X Phase 25 = CH 1 1X Phase 26 = CH 0 2X Phase 27 = CH 1 2X Phase 28 = SMAX Phase 29 = Acceleration	0
11	No	Alarm 1 Measurement ID	USINT	Same as Alarm 0 Measurement ID	1
12	No	Alarm 2 Measurement ID	USINT	Same as Alarm 0 Measurement ID	0
13	No	Alarm 3 Measurement ID	USINT	Same as Alarm 0 Measurement ID	1
14	No	Alarm 4 Measurement ID	USINT	Same as Alarm 0 Measurement ID	0
15	No	Alarm 5 Measurement ID	USINT	Same as Alarm 0 Measurement ID	1
16	No	Alarm 6 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	0
17	No	Alarm 7 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	1
18	No	Alarm 8 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	0
19	No	Alarm 9 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	1
20	No	Alarm 10 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	0
21	No	Alarm 11 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	1
22	No	Alarm 12 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	0
23	No	Alarm 13 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	1
24	No	Alarm 14 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	0
25	No	Alarm 15 Measurement ID(1)	USINT	Same as Alarm 0 Measurement ID	1

Table 58 - Parameter Object Instances (Continued)

Instance	Read Only	Name	Data Type	Valid Values	Default Value
26	No	Relay 0 Alarm ID A	USINT	0 = Alarm 0 1 = Alarm 1 2 = Alarm 2 3 = Alarm 3 4 = Alarm 4 5 = Alarm 5 6 = Alarm 6 7 = Alarm 7 8 = Alarm 8 9 = Alarm 9 10 = Alarm 10 11 = Alarm 11 12 = Alarm 12 13 = Alarm 13 14 = Alarm 14 15 = Alarm 15	0
27…30	No	Reserved			0
31	No	Relay 0 Alarm ID B	USINT	0 = Alarm 0 1 = Alarm 1 2 = Alarm 2 3 = Alarm 3 4 = Alarm 4 5 = Alarm 5 6 = Alarm 6 7 = Alarm 7 8 = Alarm 8 9 = Alarm 9 10 = Alarm 10 11 = Alarm 11 12 = Alarm 12 13 = Alarm 13 14 = Alarm 14 15 = Alarm 15	0
32…35	No	Reserved			0
36	Yes	Channel 0 Vector Measurement Speed Data Units	USINT	0 = CPM 1 = Orders	0
37	Yes	Channel 1 Vector Measurement Speed Data Units	USINT	0 = CPM 1 = Orders	0
38	No	Poll Connection Produced Connection Path[2]	USINT	101, 198, 199 (Assembly Object Instance number)	101
39	No	Poll Connection Produced Connection Size[2]	UINT	4 - 124	124

(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 a little 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 59 - Parameter Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
1	Set	Parameter Value		Actual value of parameter	See Table 58 on page 100 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.	NA
		Segment Type/Port	BYTE	See DeviceNet Specification Volume 1 Appendix I for format.	NA
		Segment Address		See DeviceNet Specification Volume 1 Appendix I for format.	NA
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.	NA

Services

Table 60 - 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 be set only while the device is in Program Mode.
See the description of the Device Mode Object Instance Attributes on page 111 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 a single 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 61 - Acknowledge Handler Object Instance Attributes

Attr 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 62 - 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 models a two-stage (alert and danger levels) alarm.

Class Attributes

Table 63 - Alarm Object Class Attributes

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

Instances

There are 16 instances of this object.

IMPORTANT Alarms 6 through 15 are not available when the module is configured in the RSLogix 5000 software.

Instance Attributes

Table 64 - Alarm Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Alarm Status	3 BITS	The current 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
8	Get/Set	AlarmHAlertLimit	REAL	The threshold value for the alert state of the alarm. (For range conditions, this is the greater threshold value.)	NA
9	Get/Set	AlarmHDangerLimit	REAL	The threshold value for the Danger state of the alarm. (For range conditions, this is the greater threshold value).	NA

Table 64 - Alarm Object Instance Attributes (Continued)

Attr ID	Access Rule	Name	Data Type	Description	Semantics
10	Get/Set	AlarmLAlertLimit	REAL	The lesser threshold value for the Alert state of the alarm with a range condition type.	NA
11	Get/Set	AlarmLDangerLimit	REAL	The lesser threshold value for the Danger state of the alarm with a range condition type.	NA
12	Get/Set	AlarmDeadband	REAL	The amount on the safe side of a threshold by which the value must recover to clear the alarm.	NA
13	Get/Set	AlarmLimitMultiply (Setpoint Multiplier)	REAL	Indicates how to adjust the threshold 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 startup 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 enabled only 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.	NA
19	Get/Set	Measurement Identifier	EPATH	Identifies the measurement object to which this alarm is applied.	See Parameter Object instances 10. . . 25. See Table 58 on page 100.

Services

Table 65 - Alarm Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 8 instances of this object.

Table 66 - Band Measurement Object Instances

Instance	Description
1	Channel 0 Band Measurement #0
2	Channel 1 Band Measurement #0
3	Channel 0 Band Measurement #1
4	Channel 1 Band Measurement #1
5	Channel 0 Band Measurement #2
6	Channel 1 Band Measurement #2
7	Channel 0 Band Measurement #3
8	Channel 1 Band Measurement #3

Instance Attributes

Table 67 - Band Measurement Object Instance Attributes

Attr 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 represent 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 Output Data Units on page 109 for more information.
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.	NA
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 68 - Band Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 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 2 instances of this object.

Instance Attributes

Table 69 - Channel Object Instance Attributes

Attr 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 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** 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
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 used as the tachometer source.
8	Get/Set	External Gear Teeth	UINT	The number of gear teeth on the shaft used as the tachometer source.	
9	Get/Set	Name	STRING2	A name to help identify this channel.	NA

Table 69 - Channel Object Instance Attributes (Continued)

Attr ID	Access Rule	Name	Data Type	Description	Semantics
10	Get/Set	Full Scale	REAL	The maximum signal expected to be processed by the channel.	It is set according to the Output Data Units attribute on page 109. 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 lets the signal 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 configured for this channel.	0 = Normal 1 = Alert (alarm) 2 = Danger (shutdown) 3 = Disarm

Services

Table 70 - Channel Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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. This object's Device Mode attribute must be in PROGRAM mode to enable the module's configuration parameters to be Set (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 71 - Device Mode Object Instance Attributes

Attr 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 the following values to perform the specified service: 05_h = Reset 09_h = Delete 15_h = Restore 16_h = Save

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 72 - Device Mode Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Return the value of a single attribute.
10_h	Instance	Set_Attribute_Single	Set the value of a single 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 non-volatile 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 non-volatile memory.
09_h	Instance	Delete	Delete the saved configuration from non-volatile memory.
15_h	Instance	Restore	Load the saved configuration or the factory default configuration from non-volatile 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 2 instances of this object.

Instance Attributes

Table 73 - Overall Measurement Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Overall Value	REAL	Measured value	The output value of the measurement performed by the Overall Measurement Object on the input signal. The result of the measurement process 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 represent the actual field value.
5	Get	Data Units	ENGUNIT	The units context of the **Overall Value** attribute.	This setting is determined by the Channel Object's **Output Data Units** attribute (see page 109).
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 associated with the output smoothing filter (for the RMS and DC meters) or the decay rate of the peak meters.	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. If **Measurement** is set to 0, 1, or 2, the table below shows the Time Constant.
8	Get	Damping Factor	REAL	The damping factor associated with output smoothing filter for the RMS and DC meters (not used with peak meters).	1.0

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

Table 73 - Overall Measurement Object Instance Attributes (Continued)

Attr ID	Access Rule	Name	Data Type	Description	Semantics
9	Get/Set	Overall Filter	USINT	Overall filter type 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.	200…20000 Hz

Services

Table 74 - Overall Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 75 - Relay Object Class Attributes

Attr 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.

Instance Attributes

Table 76 - Relay Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Relay Status	BOOL	The current 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
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 seconds (specified in 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 58 on page 100.

Table 76 - Relay Object Instance Attributes (Continued)

Attr ID	Access Rule	Name	Data Type	Description	Semantics
12	Get/Set	Logic	USINT	Indicates the number of associated alarms that must have a status value 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 77 - 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 a single attribute.
10_h	Class/Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 where it is held 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 2 instances of this object.

Instance Attributes

Table 78 - Spectrum Waveform Measurement Object Instance Attributes

Attr 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 represent the actual field value.
4	Get	Data Units	ENGUNIT	The units context of the **Data** attributes.	This setting is determined by the Channel Object's **Output Data Units** attribute (see page 109).
5	Get	Domain	USINT	The domain 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…20000 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, or 800
8	Get/Set	Window Type	USINT	The window function to be applied to the waveform data prior to 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.

Table 78 - Spectrum Waveform Measurement Object Instance Attributes (Continued)

Attr ID	Access Rule	Name	Data Type	Description	Semantics
10	Get	Number of Waveform Points	UDINT	Number of points in the waveform data.	256, 512, 1024, or 2048
11	Get	Overlap	USINT	The percent overlap applied to the waveform data sets used for calculating the spectrum.	Only 0% supported.
12	Get	Data Format	USINT	The format of the spectrum data.	0 = Complex data
13	Get	Average Type	USINT	The type of averaging performed.	0 = Asynchronous (spectrum) 1 = Synchronous (waveform) 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.
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

Services

Table 79 - Spectrum Waveform Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single 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 be set only 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 enable the data structures to 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 performed by the Spectrum/Waveform Measurement Object 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 80 - 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 is equal to the **Number of Spectrum Lines** attribute setting. It is provided within this structure to assist in determining the size of the structure.
4 (1)	FMAX	REAL	The maximum frequency or order of the spectrum data. This is the actual FMAX of the spectrum data and can vary from 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 must be converted to floating point values by using the Amplitude Reference value. The **Data Format** attribute determines whether these are INT or UINT and exactly what conversion to apply.

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

- For Real or Power Data Format: 3 + (Number of Spectrum Lines / 2)
- For Complex Data Format: 3 + (**Number of Spectrum Lines**)

If the data format is Real Data or Power 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 the following equation:

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

Where **Float Data$_n$** is the value for the nth spectrum bin, and $0 \le n \le$ **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 -32768...32767). 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 the following equations:

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

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

Where **Real Data$_n$** and **Imaginary Data$_n$** are the real and imaginary values for the nth spectrum bin, and $0 \le n \le$ **Number of Spectrum Line**.

The **Real Data** and **Imaginary Data** values are converted into magnitude and phase values with the following equations:

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

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

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

Table 81 - 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 is equal to the **Number of Waveform Points** attribute setting. It is provided within this structure to assist in determining the size of the structure.
4 (1)	Period	REAL	The period of the waveform. This is the actual period of the waveform and can vary from 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 must be converted to floating point values by 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 the following equations:

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

Where **Float Data$_n$** is the value for the nth waveform point, and $0 \le n \le$ **Number of Waveform Points**.

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

Table 82 - 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 <= offset < 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 is small enough to fit in the explicit message buffer. This is likely less than the total size of the data structure, requiring several calls to the service to get the entire data structure.

Table 83 - 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 actually returned in the Data Chunk array of the response. (Can be less than the number of DWORDs requested.)	If less DWORDs are returned than were 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.	NA

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 84 - Speed Measurement Object Instance Attributes

Attr 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 represent the actual field value.
5	Get	Maximum Speed	REAL	The maximum (peak) measured speed value since the most recent reset.	CPM
12	Get	Time Constant	UINT	The time constant value used for exponential averaging of the **Speed Value** (a low pass filter/ output smoothing filter).	Milliseconds You can set this by using the TachResponseTime configuration tag in the RSLogix 5000 software. See I/O Data Tags on page 79.
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. This means that 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 table below.

Meas. Response	Settling Time	Time Constant
0	2640 ms	1200 ms
1	220 ms	100 ms
2	22 ms	10 ms

Services

Table 85 - 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 a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

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

Tachometer Channel Object (Class ID 326_H)

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

Class Attributes

The Tachometer Channel Object provides no class attributes.

Instance Attributes

Table 86 - Tachometer Channel Object Instance Attributes

Attr 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 to 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 87 - Tachometer Channel Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 3 instances of this object.

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

Instance Attributes

Table 88 - Transducer Object Instance Attributes

Attr 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 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**.	This value must be +/- 15% of the Nominal Sensitivity value on page 52.
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 100). 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 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
9	Get/Set	Power Type	USINT	Indicates the type of power 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 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 a single attribute.
10_h	Instance	Set_Attribute_Single	Sets a single attribute.(1)

(1) Attributes can be set only 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 6 instances of this object.

Table 90 - Vector Measurement Object Instances

Instance	Description
1	Channel 0 1X Vector Measurement
2	Channel 1 1X Vector Measurement
3	Channel 0 2X Vector Measurement
4	Channel 1 2X Vector Measurement
5	Channel 0 3X Vector Measurement
6	Channel 1 3X Vector Measurement

Instance Attributes

Table 91 - Vector Measurement Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Magnitude Value	REAL	The measured magnitude value.	NA
4	Get	Phase Value	REAL	The measured phase value.	Degrees **Note:** 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 represent the actual field value.

Table 91 - Vector Measurement Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
6	Get	Magnitude Data Units	ENGUNIT	The units context of the **Magnitude Value** attribute.	This setting is determined by the Channel Object's **Output Data Units** setting (see page 109).
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 is set to Orders.

Services

Table 92 - Vector Measurement Object Services

Service Code	Class/Instance Usage	Name	Description
$0E_h$	Instance	Get_Attribute_Single	Returns a single attribute.

Notes:

Numerics

A

B

C

D

H

I

M

N

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P

R

S

T

V

X

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Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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