Installation Instructions

XM Dynamic Measurement Module

Catalog Number 1440-DYN02-01RJ

Allen-Bradley • Rockwell Software Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
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 consequences.
SHOCK HAZARD 	Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures.

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 publication 60664-1), at altitudes up to 2000 meters (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

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 will be 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, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements, Allen-Bradley publication 1770-4.1.
- NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

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 for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	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 may impair suitability for Class I, Division 2.
- If this product contains batteries, they must only be changed in an area known to be nonhazardous.

AVERTISSEMENT

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

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

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

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

ATTENTION

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

WARNING

This equipment must be installed in an enclosure providing at least IP54 protection when applied in Zone 2 environments.

WARNING

This equipment shall be used within its specified ratings defined by Allen-Bradley.

WARNING

Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Zone 2 environments.

WARNING

This equipment must be used only with ATEX certified backplanes.

WARNING

Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.

WARNING

Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.

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 wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

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.

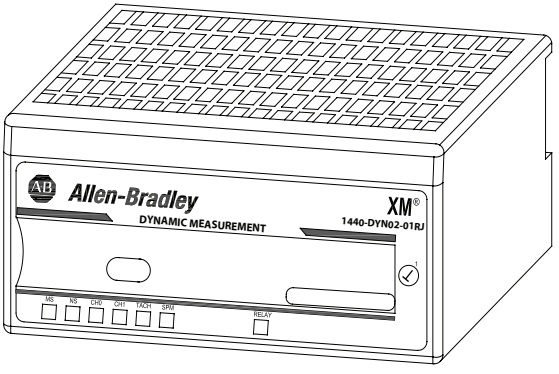
ATTENTION

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

About the Module

The 1440-DYN02-01RJ module is a 2-channel general purpose monitor that supports measurements of dynamic inputs such as vibration, pressure, and strain.The module can be used for monitoring shaft, casing, and pedestal vibration in rotating equipment. Inputs accepted include eddy current probe, standard integrated electronics piezoelectric (IEPE) accelerometer, or voltage output measurement device such as a pressure transducer. The module also accepts a tachometer input to provide speed measurement and order analysis functions. The module can work with most tachometer signal sources such as eddy current probe, unpowered magnetic probe, and other powered and unpowered tachometer sensors.

The module provides onboard processing of critical vibration parameters and advanced alarm and virtual relay logic. It can be integrated with existing automation and control systems, including PLC's and displays, to provide information to aid in protecting machinery from catastrophic failures.



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. Refer to the XM Dynamic Measurement Terminal Base Installation Instructions, publication ICM-IN003, for wiring information.

ATTENTION

The 1440-DYN02-01RJ module is compatible only with the 1440-TBS-J terminal base unit. The keyswitch on the terminal base unit should be 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

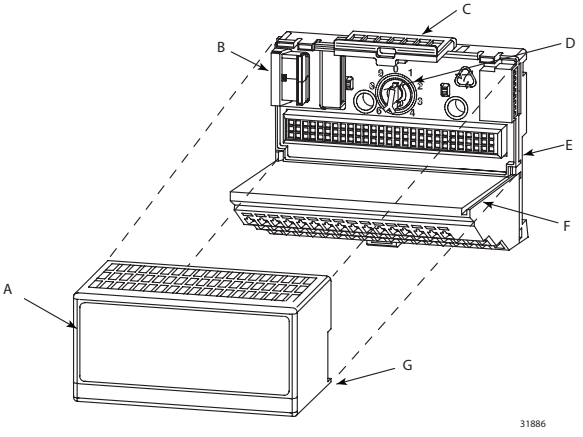
If you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

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

WARNING

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

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



2. Make certain the side connector (B) is pushed all the way to the left. **You cannot install the module unless the connector is fully extended.**

3. Make certain that the pins on the bottom of the module are straight so they will align properly with the connectors in the terminal base unit.

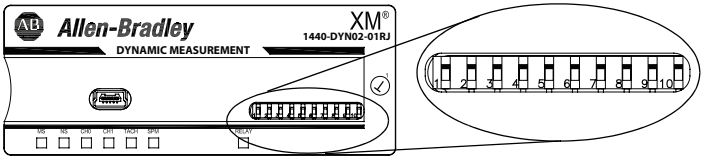
4. Position the module (A) with its alignment bar (G) aligned with the groove (F) on the terminal base.

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

Set the Node Address

The module has a DIP switch for setting the network node address. DIP switches 5 through 10 set the module's node address using binary addressing. The module is shipped from the factory with the node address set to 63 (as shown below).

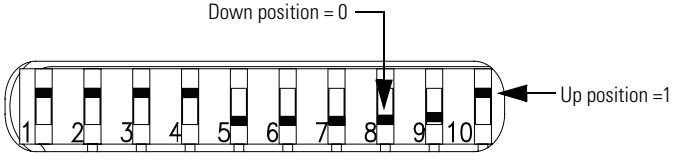


TIP DIP switches 1 through 4 are not used.

TIP The node addresses start with 1 for the module closest to the ACNR, and increase for each consecutive module.

Follow the steps below to set the node address.

1. Refer to the table on page 11 for the switch settings of an address.
2. Using a pointed tool, slide switches 5 through 10 to the appropriate positions (1 or 0).



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
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

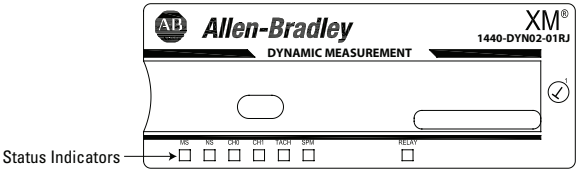
The XM module performs a self-test when it powers up. The self-test includes an LED test and a device test. During the LED test, the indicators will turn on independently and in sequence for approximately 0.25 seconds.

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

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

Status Indicators

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



Indicator	State	Description
Module Status (MS)	Off	No power 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 currently in progress.
	Solid Red	An unrecoverable fault has occurred. The module may need to be repaired or replaced.
	Flashing Green	Module operating in Program Mode.
	Solid Green	Module operating in Run Mode.

Indicator	State	Description
Network Status (NS)	Off	Module is not online. • Module is autobauding. • No power applied to the module; look at Module Status LED.
	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.
Channel 0 & Channel 1	Off	• Normal operation within alarm limits on the channel. • No power applied to the module; look at the Module Status LED.
	Solid Yellow	Alarm associated with this channel is in Alert.
	Solid Red	Alarm associated with this channel is in Danger.
	Flashing Red	A transducer fault exists on the channel. DC bias is outside the DC Low and High Limits.
Tachometer	Off	• Normal operation within alarm limits on the channel. • No power applied to the module; look at the Module Status LED.
	Solid Yellow	Alarm on Speed or Acceleration is in Alert.
	Solid Red	Alarm on Speed or Acceleration is in Danger.

Indicator	State	Description
	Flashing Yellow	Tachometer fault other than a transducer fault (for example no pulse received).
	Flashing Red	Tachometer signal DC bias is not within the DC Low and High Limits.
Setpoint Multiplier	Off	Alarm Limit Multiplier is not in effect.
	Solid Yellow	Alarm Limit Multiplier is in effect.
Relay	Off	Virtual relay is not activated.
	Solid Red	Virtual relay is activated.

Specifications

XM Dynamic Measurement Module - 1440-DYN02-01RJ

Attribute	Value
Enclosure Type Rating	None (open-style)
Input Voltage (mounted in the 1440-TBS-J)	24V DC Current Draw Max 250 mA
Output Voltage	-24V DC, 60 mA Max
Isolation Voltage	Not Rated (Class 2 power source required) No isolation between I/O or backplane
Wire Size	Determined by installed terminal base
Wiring Category[1]	2 - on signal ports 1 - on power ports 2 - on communications ports
North American Temp Code	T4A
IEC Temp Code	T4

(1) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental Specifications

Attribute	Value
Operating Temperature IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock):	-20…70 °C (-4…158 °F)
Non-Operating Temperature IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Non-operating Thermal Shock):	-40…85 °C (-40…185 °F)
Relative Humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat):	5…95% non-condensing
Vibration IEC 60068-2-6 (Test Fc, Operating):	5 g @ 10…500 Hz
Operating Shock IEC 60068-2-27 (Test Ea, Unpackaged Shock):	15 g
Nonoperating Shock IEC 60068-2-27 (Test Ea, Unpackaged Shock):	20 g
Emissions CISPR 11:	Group 1, Class A
ESD Immunity IEC 61000-4-2:	4 kV contact discharges 8 kV air discharges

Environmental Specifications

Attribute	Value
Radiated RF Immunity IEC 61000-4-3:	10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B Immunity IEC 61000-4-4:	±4 kV at 5 kHz on power ports ±2 kV at 5 kHz on signal ports ±2 kV at 5 kHz on communications ports
Surge Transient Immunity IEC 61000-4-5:	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports ±2 kV line-earth (CM) on shielded ports ±2 kV line-earth (CM) on communications ports
Conducted RF Immunity IEC 61000-4-6:	10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz

(1) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Certifications

Certifications[1] (when product is marked)	Description
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
CE	European Union 2004/108/EC EMC Directive, compliant with: • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Emissions
Ex	European Union 94/9/EC ATEX Directive, compliant with: • EN 60079-15; Potentially Explosive Atmospheres, Protection "n" (II 3 G Ex nA IIC T4 X) • EN 60079-0; General Requirements (Zone 2)

(1) See the Product Certification link at http:// www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
XM Dynamic Measurement Module Terminal Base Installation Instructions, publication ICM-IN003	Provides details about how to install the terminal base for the XM Dynamic Measurement module.
XM Dynamic Measurement Module User Manual, publication ICM-UM002	Provides details about how to install, wire and configure the Dynamic Measurement module.
XM ControlNet Adapter Installation Instructions, publication ICM-IN001	Provides details about how to install and wire the adapter, and adapter technical specifications.
XM ControlNet Adapter User Manual, publication ICM-UM001	Provides details about how to install, use and configure the adapter.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://ab.com	Provides declarations of conformity, certificates, and other certification details.

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

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Publication ICM-IN002A-EN-P - March 2009 PN 35149