

# XM Dynamic Measurement Module Terminal Base

Catalog Number 1440-TBS-J

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### 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://www.rockwellautomation.com/literature/>) 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.

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

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## Environment and Enclosure

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**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 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 or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication 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 the following:

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

### The following information applies when operating this equipment in hazardous locations.

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.

### Informations sur l'utilisation de cet équipement en environnements dangereux.

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

### The following applies when the product bears the Ex Marking.

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

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

**ATTENTION**

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

**WARNING**

This equipment must be mounted in an ATEX certified enclosure with a minimum ingress protection rating of at least IP54 (as defined in IEC60529) and used in an environment of not more than Pollution Degree 2 (as defined in IEC 60664-1) when applied in Zone 2 environments. The enclosure must utilize a tool removable cover or door.

**WARNING**

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

**WARNING**

This equipment must be used within its specified ratings defined by Rockwell Automation.

**WARNING**

Provision must 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.



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### WARNING



This equipment must be used only with ATEX-certified Allen-Bradley backplanes.

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### WARNING



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

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### WARNING



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

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## Prevent Electrostatic Discharge

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### 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.
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## About the Terminal Base

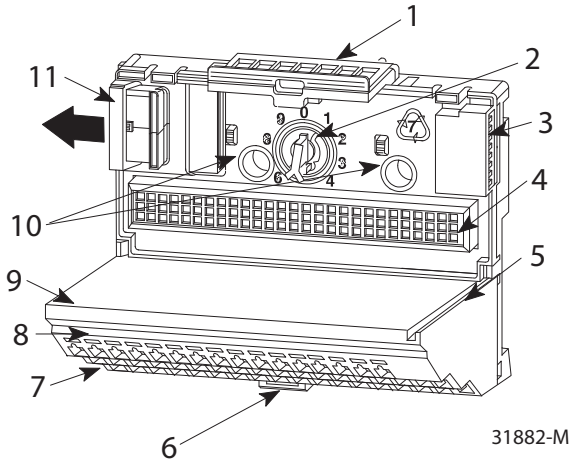
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### IMPORTANT

The 1440-TBS-J terminal base unit is compatible only with 1440-DYN02-01RJ module. Do not attempt to install other XM® modules on these terminal base units.

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The 1440-TBS-J uses spring-clamp termination.



### Component Identification

1	Locking tab
2	Keyswitch - set to the position required for the installed module
3	Male XM Bus connector
4	96 pin female I/O connector
5	Terminal base unit
6	Locking tab
7, 8, 9	Terminal strips for connecting transducer wiring, common, power supplies, relays, functional earth ground
10	Mounting holes for panel mounting
11	Female XM Bus connector

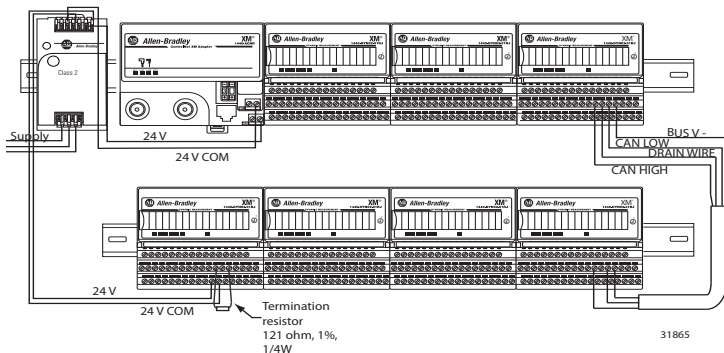
### Before You Begin

To effectively use the terminal base, note the following considerations.

### Power Requirements

Use a single Class 2 power supply to power the XM modules. Total current draw through the side connector cannot exceed 3 A. Refer to the specification for the specific modules for power requirements.

### XM Modules with Separate Power Connections



#### 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).

#### ATTENTION



Multiple power sources are not allowed.



## Wiring Requirements

Use solid or stranded wire. All XM wiring must meet the following specifications:

- 2.1...0.34 mm<sup>2</sup> (22...14 AWG) copper conductors without pretreatment; 8.4 mm<sup>2</sup> (8 AWG) or 1 in. copper required for grounding the DIN rail for electromagnetic interference (EMI) purposes
- Recommended strip length 8 mm (0.31 in.)
- Minimum insulation rating of 300V
- Soldering the conductor is forbidden
- Wire ferrules can be used with stranded conductors; copper ferrules recommended

## Grounding Requirements

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

### *DIN Rail Grounding*

**ATTENTION**

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

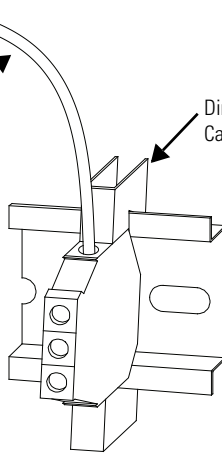
The DIN rail must be connected to a ground bus or grounding electrode conductor using 8.4 mm<sup>2</sup> (8 AWG or 1 in.) copper braid. The grounding wire can be connected to the DIN rail using a DIN Rail Grounding Block.

## DIN Rail Grounding Block

To Earth Ground

■ 8.4 mm<sup>2</sup> (AWG 8) Wire

Din Rail Grounding Block  
Cat. No. 1492-WG10



### *24V Common Grounding*

■ The XM system is sourced by a single Class 2 power supply. We recommend grounding the 24V power to the XM modules.

### *Transducer Grounding*

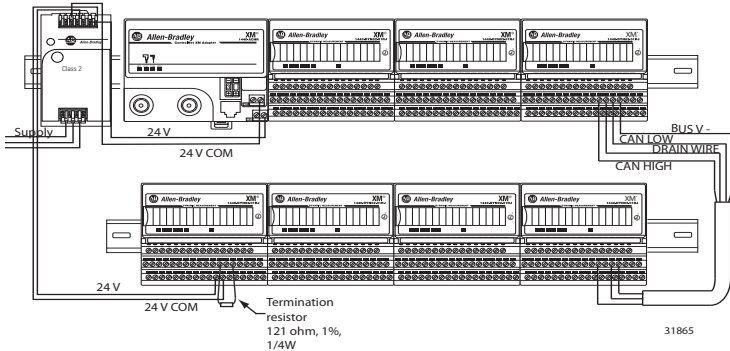
■ Be sure that the transducers are electrically isolated from earth ground. Cable shields must be grounded at one end of the cable, and the other end left floating or not connected. Where possible, ground the cable shield to the XM terminal base (Functional Earth terminal) and not at the transducer.

## Terminating Resistors

The XM Bus operates correctly when there is a terminating resistor at each end of the XM Bus:

- Terminating resistors must be 121Ω, 1%, 1/4 W.
- When installing the XM ControlNet adapter with XM modules, the ControlNet adapter has an internal terminating resistor. The other terminating resistor must be installed at the opposite end of the bus.

A second terminating resistor is installed across the CAN\_High and CAN\_Low terminals of the XM module at the other end of the XM Bus. [Refer to Terminal Assignments on page 16.](#)



### 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.

#### ATTENTION



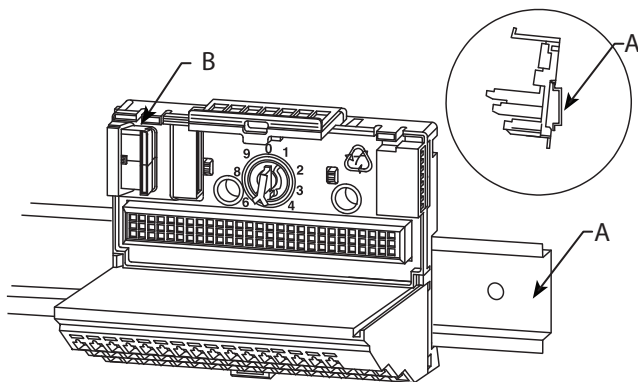
Do not remove or replace a terminal base unit while power is applied.

Interruption of the backplane can result in unintentional operation or machine motion.

### Mount on a DIN Rail

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

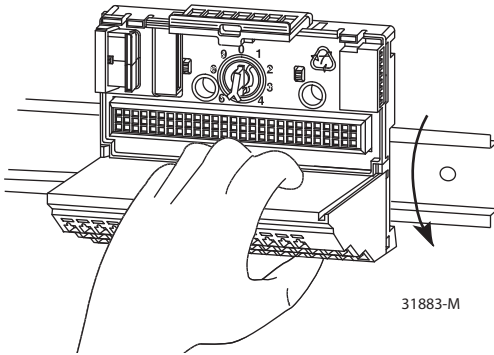
1. Position the terminal base unit on the 35 x 7.5 mm DIN rail (A) (A-B pt no. 199-DR1 or 199-DR4) at a slight angle.



31887-M

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

2. Slide the terminal base unit over leaving room for the side connector (B).
3. 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. Press down on the terminal base unit to lock the terminal base on the DIN rail.

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

5. Connect the wiring for the terminal base unit as shown under Wiring later in this document.

### Interconnect Terminal Base Units

Follow the steps below to install another terminal base unit.

**IMPORTANT**

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

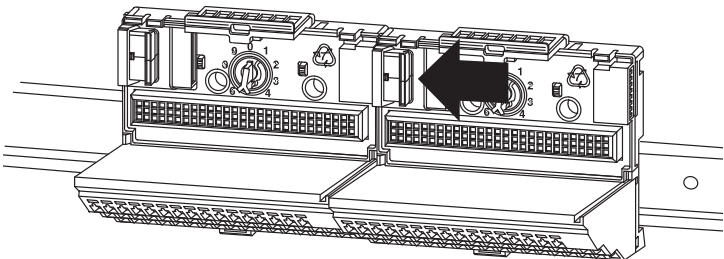
1. Position the terminal base on the 35 x 7.5 mm DIN rail (A).
2. Make certain the side connector (B) is **fully retracted** into the base unit.
3. Slide the terminal base unit over tight against the neighboring terminal base.

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

4. Press down on the terminal base unit to lock the terminal base on the DIN rail.

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

5. Gently push the side connector into the side of the neighboring terminal base to complete the backplane connection.



## Panel/Wall Mounting

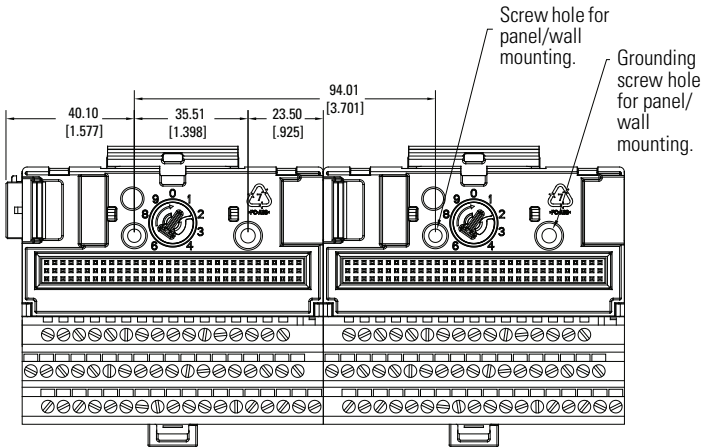
Installation on a wall or panel consists of:

- laying out the drilling points on the wall or panel.
- drilling the pilot holes for the mounting screws.
- installing the terminal base units and securing them to the wall or panel.

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

1. Lay out the required points on the wall/panel as shown in the drilling dimension drawing below.

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



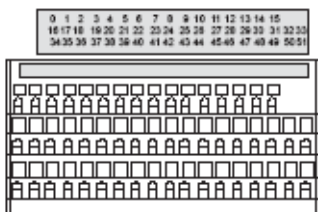
2. Drill the necessary holes for the #6 self-tapping mounting screws.
3. Secure the terminal base unit using two #6 self-tapping screws.
4. To install another terminal base unit, retract the side connector into the base unit; make certain it is **fully retracted**.

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5. Position the terminal base unit up tight against the neighboring terminal base; make certain the hook on the terminal base slides under the edge of the terminal base unit.
6. Gently push the side connector into the side of the neighboring terminal base to complete the backplane connection.
7. Secure the terminal base to the wall with two #6 self-tapping screws.

### Wiring



1440-TBS-J

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#### IMPORTANT

For more wiring connection information, see the XM Dynamic Measurement Module User Manual, publication [ICM-UM002](#).

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### Terminal Assignments

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#### IMPORTANT

The terminal block assignments are different for different terminal base units. The following table applies only to the 1440-TBS-J. Refer to the installation instructions for the specific terminal base unit for its terminal assignments.

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#### 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.

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	<b>No.</b>	<b>Desc.</b>		<b>No.</b>	<b>Desc.</b>		<b>No.</b>	<b>Desc.</b>
<b>Channel 0</b>	0	Xdcr 0 (+)	<b>Channel 1</b>	16	Xdcr 1 (+)	<b>Tachometer</b>	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	<b>Power</b>	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	<b>XM Bus</b>	27	CAN_High	<b>Bussed Tach</b>	45	24V common
	12	Functional Earth		28	Shield		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

## Specifications

### XM Dynamic Measurement Terminal Base - 1440-TBS-J

Attribute	Value
Enclosure Type Rating	None (open-style)
Isolation Voltage	Established by installed module
Voltage Ratings XM Bus Power Terminals I/O Terminals	24V DC, 3 A max, Class 2/SELV/PELV 24V DC, 3 A, Class 2/SELV/PELV 24V DC, 60 mA, Class 2/SELV/PELV
Wire Size	0.34... 2.1 mm <sup>2</sup> (22...14 AWG) solid or stranded copper wire rated at 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max, recommended strip length 8 mm (0.31 in.)
Wiring Category <sup>(1)</sup>	Established by installed module
North American Temp Code	T5
IEC Temp Code	T4

<sup>(1)</sup> 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)
Temperature, surrounding air, max	70 °C (158 °F)

**Environmental Specifications**

Attribute	Value
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% noncondensing
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 (IEC 61000-6-4):	Class A
ESD Immunity IEC 61000-4-2:	6 kV contact discharges 8 kV air discharges
Radiated RF Immunity IEC 61000-4-3:	10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
EFT/B Immunity IEC 61000-4-4:	±4 kV at 5 kHz on power ports ±2 kV at 5 kHz on signal and shielded ports

## Environmental Specifications

Attribute	Value
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
Conducted RF Immunity IEC 61000-4-6:	10V rms with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz

## Certifications

Certifications <sup>(1)</sup> (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: <ul style="list-style-type: none"> <li>• EN 61326-1; Meas./Control/Lab., Industrial Requirements</li> <li>• EN 61000-6-2; Industrial Immunity</li> <li>• EN 61000-6-4; Industrial Emissions</li> <li>• EN 61131-2; Programmable Controllers (Clause 8, Zone A &amp; B)</li> </ul>
C-Tick	Australian Radiocommunications Act, compliant with: <ul style="list-style-type: none"> <li>• AS/NZS CISPR 11; Industrial Emissions</li> </ul>
Ex	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none"> <li>• EN 60079-15; Potentially Explosive Atmospheres, Protection "n" (II 3 G Ex nA IIC T4X Gc)</li> <li>• EN 60079-0; General Requirements (Zone 2)</li> </ul>

**Certifications**

<b>Certifications<sup>(1)</sup> (when product is marked)</b>	<b>Description</b>
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: <ul style="list-style-type: none"><li>• Article 58-2 of Radio Waves Act, Clause 3</li></ul>

<sup>(1)</sup> 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 products from Rockwell Automation.

Resource	Description
XM Monitoring Modules Specifications Technical Data, publication <a href="#">1440-TD001</a>	Provides specifications for the 1440 series of Allen-Bradley® monitoring modules.
Dynamic Measurement Module Installation Instructions, publication <a href="#">ICM-IN002</a>	Provides information about mounting the Dynamic Measurement module and technical specifications.
Dynamic Measurement Module User Manual, publication <a href="#">ICM-UM002</a>	Provides details about how to install, wire and use the Dynamic Measurement module.
XM ControlNet Adapter Installation Instructions, publication <a href="#">ICM-IN001</a>	Provides details about how to install and wire the adapter, and adapter technical specifications.
XM ControlNet Adapter User Manual, publication <a href="#">ICM-UM001</a>	Provides details about how to install, wire and configure the adapter.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, <a href="http://www.ab.com">http://www.ab.com</a>	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:**

# Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://www.rockwellautomation.com/support/>, 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://www.rockwellautomation.com/support/>.

## 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 or Canada	1.440.646.3434
Outside United States or Canada	Use the <a href="#">Worldwide Locator</a> at <a href="http://www.rockwellautomation.com/support/americas/phone_en.html">http://www.rockwellautomation.com/support/americas/phone_en.html</a> , or contact your local Rockwell Automation representative.

## 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 to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

## Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication [RA-DU002](#) available at <http://www.rockwellautomation.com/literature/>.

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