

User Guide
Firmware Revision 5



Allen-Bradley

XM-440 Master Relay Module

Catalog Numbers 1440-RMA00-04RC



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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 [SGL-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.

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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



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.

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

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Safety Approvals

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 <ul style="list-style-type: none"> Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. Substitution of components may impair suitability for Class I, Division 2. If this product contains batteries, they must only be changed in an area known to be nonhazardous. 		WARNING: RISQUE D'EXPLOSION <ul style="list-style-type: none"> Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. S'assurer que l'environnement est classé non dangereux avant de changer les piles.

IMPORTANT Wiring to or from this device, which enters or leaves the system enclosure, must utilize wiring methods suitable for Class I, Division 2 Hazardous Locations, as appropriate for the installation in accordance with the product drawings as indicated in the following table.

Model	Catalog Number	Haz Location Drawings*		Model	Catalog Number	Haz Location Drawings*	
		w/o Barriers	w/ Barriers			w/o Barriers	w/ Barriers
XM-120	1440-VST0201RA	48178-HAZ	48179-HAZ	XM-320	1440-TPS0201RB	48238-HAZ	48239-HAZ
XM-121	1440-VLF0201RA			XM-360	1440-TPR0600RE	48295-HAZ	48299-HAZ
XM-122	1440-VSE0201RA			XM-361	1440-TUN0600RE		
XM-123	1440-VAD0201RA			XM-361	1440-TTC0600RE		
XM-160	1440-VDRS0600RH	51263-HAZ	51264-HAZ	XM-440	1440-RMA0004RC	48240-HAZ	N/A
XM-161	1440-VDRS0606RH			XM-441	1440-REX0004RD	48241-HAZ	N/A
XM-162	1440-VDRP0600RH			XM-442	1440-REX0304RG	48642-HAZ	N/A
XM-220	1440-SPD0201RB	48640-HAZ	48641-HAZ				

* Drawings are available on the included CD

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Introduction

This chapter provides an overview of the XM-440 Master Relay module. It also discusses the components of the module.

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Introducing the XM-440 Relay Module

The XM-440 Master Relay module combines four relay outputs with XM bus master capabilities to provide remote, shared, and voted relay operation for distributed XM measurement modules. It is a member of the Allen-Bradley™ XM® Series, a family of DIN rail mounted condition monitoring and protection modules that operate both in stand-alone applications or integrate with Programmable Logic Controllers (PLCs) and control system networks.

The XM-440 offers four high power relays suitable for use in most protection applications. The module also supports connecting one or two XM-441 Expansion Relay modules, providing a total of up to 12 relays.

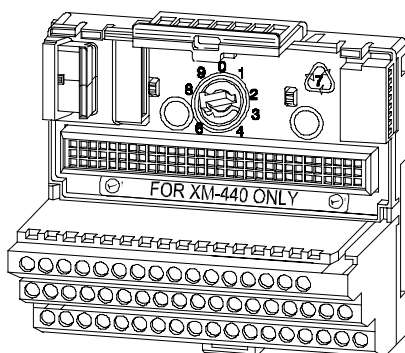
The module provides “A Out of B” voting logic. This logic, defined uniquely per relay, can be applied to an alarm status broadcast from XM measurement modules located anywhere on the XM bus. The XM-440 can also send a trigger event to a group of XM measurement modules when one or more of its relays are activated, causing the XM measurement modules to collect their triggered trend data.

The XM-440 module is configurable over a DeviceNet network or using a serial connection to a PC or laptop. For list of configuration parameters for the XM-440, refer to Chapter 3.

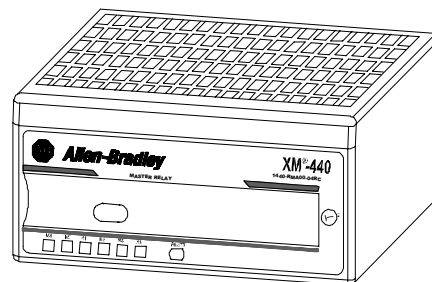
XM-440 Module Components

The XM-440 consists of a terminal base unit and an instrument module. The XM-440 Master Relay Module and the XM-942 Master Relay Terminal Base are shown below.

Figure 1.1 XM-440 Module Components



XM-942 Master Relay Module Terminal Base Unit
Cat. No. 1440-TB-C



XM-440 Master Relay Module
Cat. No. 1440-RMA00-04RC

- XM-942 Master Relay Terminal Base Unit - A DIN rail mounted base unit that provides terminations for all field wiring required by the XM-440.
- XM-440 Master Relay Module - Mounts on the XM-942 terminal base unit via a keyswitch and a 96-pin connector. The XM-440 contains the processor, four on-board relays, and serial interface port for local configuration.

IMPORTANT

Up to two XM-441 Expansion Relay modules may be connected to the XM-440 module via the terminal base unit.

When connected to the XM-440, the Expansion Relay modules simply “expand” the capability of the XM-440 by providing an additional four to eight relays. The XM-440 controls the Expansion Relay modules by extending to them the same logic and functional controls as the XM-440 module’s on-board relays.

Using this Manual

This manual introduces you to the XM-440 Master Relay module. It is intended for anyone who installs, configures, or uses the XM-440 Master Relay module.

Organization

To help you navigate through this manual, it is organized in chapters based on these tasks and topics.

Chapter 1 “Introduction” contains an overview of this manual and the XM-440 module.

Chapter 2 “Installing the XM-440 Relay Module” describes how to install, wire, and use the XM-440 module.

Chapter 3 “Configuration Parameters” provides a complete listing and description of the XM-440 parameters. The parameters can be viewed and edited using the XM Serial Configuration Utility software and a personal computer.

Appendix A “Specifications” lists the technical specifications for the XM-440 module.

Appendix B “DeviceNet Information” provides information to help you configure the XM-440 over a DeviceNet network.

Appendix C “DeviceNet Objects” provides information on the DeviceNet Objects supported by the XM-440 module.

For definitions of terms used in this Guide, see the Glossary at the end of the Guide.

Document Conventions

There are several document conventions used in this manual, including the following:

The XM-440 Relay module is referred to as XM-440, Master Relay module, device, or module throughout this manual.

TIP

A tip indicates additional information which may be helpful.

EXAMPLE

This convention presents an example.

Installing the XM-440 Master Relay Module

This chapter discusses how to install and wire the XM-440 Master Relay Module. It also describes the module indicators and the basic operations of the module.

For information about	See page
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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 IED publication 60664–1), at altitudes up to 2000 meters without derating.

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 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.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosures.

XM Installation Requirements

This section describes wire, power and grounding requirements for an XM system.

Wiring Requirements

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

- 14 to 22 AWG copper conductors without pretreatment; 8 AWG required for grounding the DIN rail for electromagnetic interference (emi) purposes
- Recommended strip length 8 millimeters (0.31 inches)
- Minimum insulation rating of 300V
- Soldering the conductor is forbidden
- Wire ferrules can be used with stranded conductors; copper ferrules recommended

ATTENTION

See the XM Documentation and Configuration Utility CD for Hazardous Locations installation drawings. The XM Documentation and Configuration Utility CD is packaged with the XM modules.

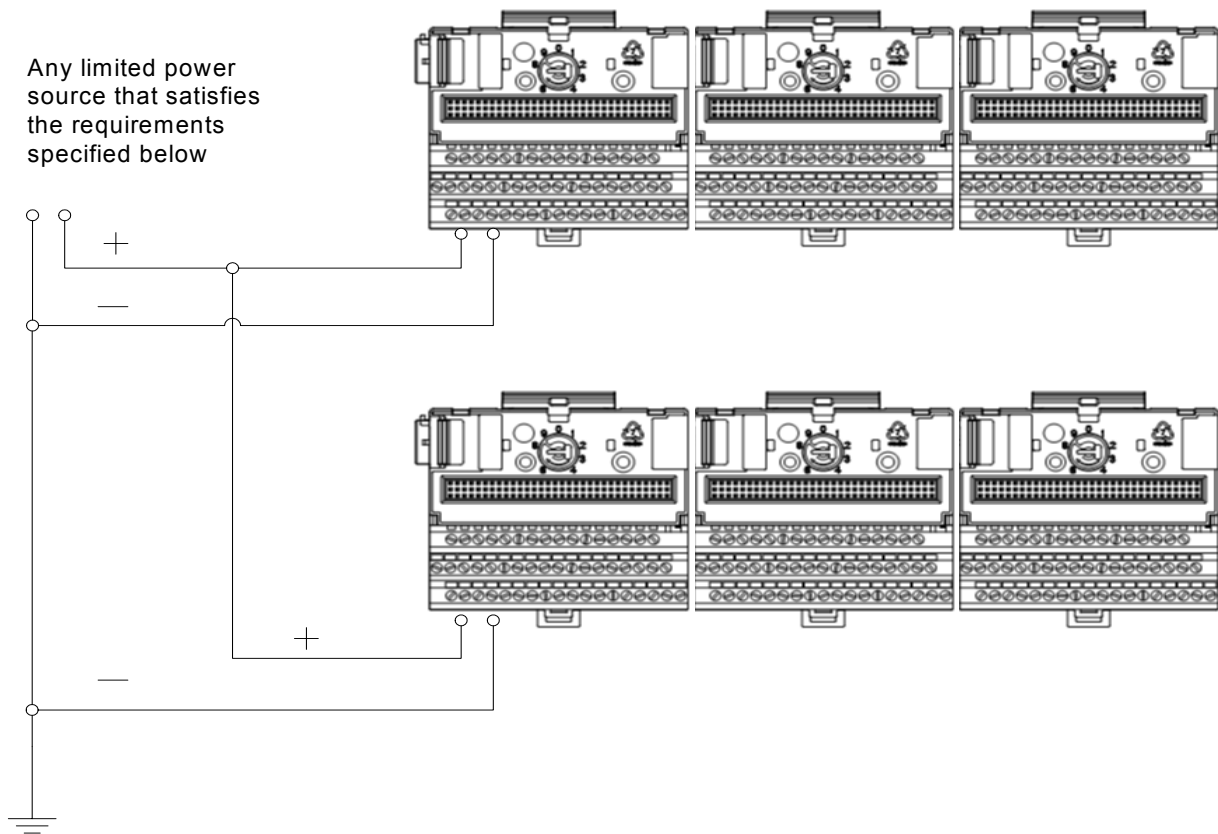
Power Requirements

Before installing your module, calculate the power requirements of all modules interconnected via their side connectors. The total current draw through the side connector cannot exceed 3A. Refer to the specifications for the specific modules for power requirements.

ATTENTION

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

Figure 2.1 is an illustration of wiring modules using separate power connections.

Figure 2.1 XM Modules with Separate Power Connections**Power Supply Requirements****XM Power Supply Requirements**

Protection	Listed Class 2 rated supply, or
	Fused* ITE Listed SELV supply, or
	Fused* ITE Listed PELV supply
Output Voltage	24 Vdc \pm 10%
Output Power	100 Watts Maximum (~4A @ 24 Vdc)
Static Regulation	\pm 2%
Dynamic Regulation	\pm 3%
Ripple	< 100mVpp
Output Noise	Per EN50081-1
Overshoot	< 3% at turn-on, < 2% at turn-off
Hold-up Time	As required (typically 50mS at full rated load)

* When a fused supply is used the fuse must be a 5 amp, listed, fast acting fuse such as provided by Allen-Bradley part number 1440-5AFUSEKIT

IMPORTANT

See Application Technique "XM Power Supply Solutions", publication ICM-AP005A-EN-E, for guidance in architecting power supplies for XM systems.

Grounding Requirements

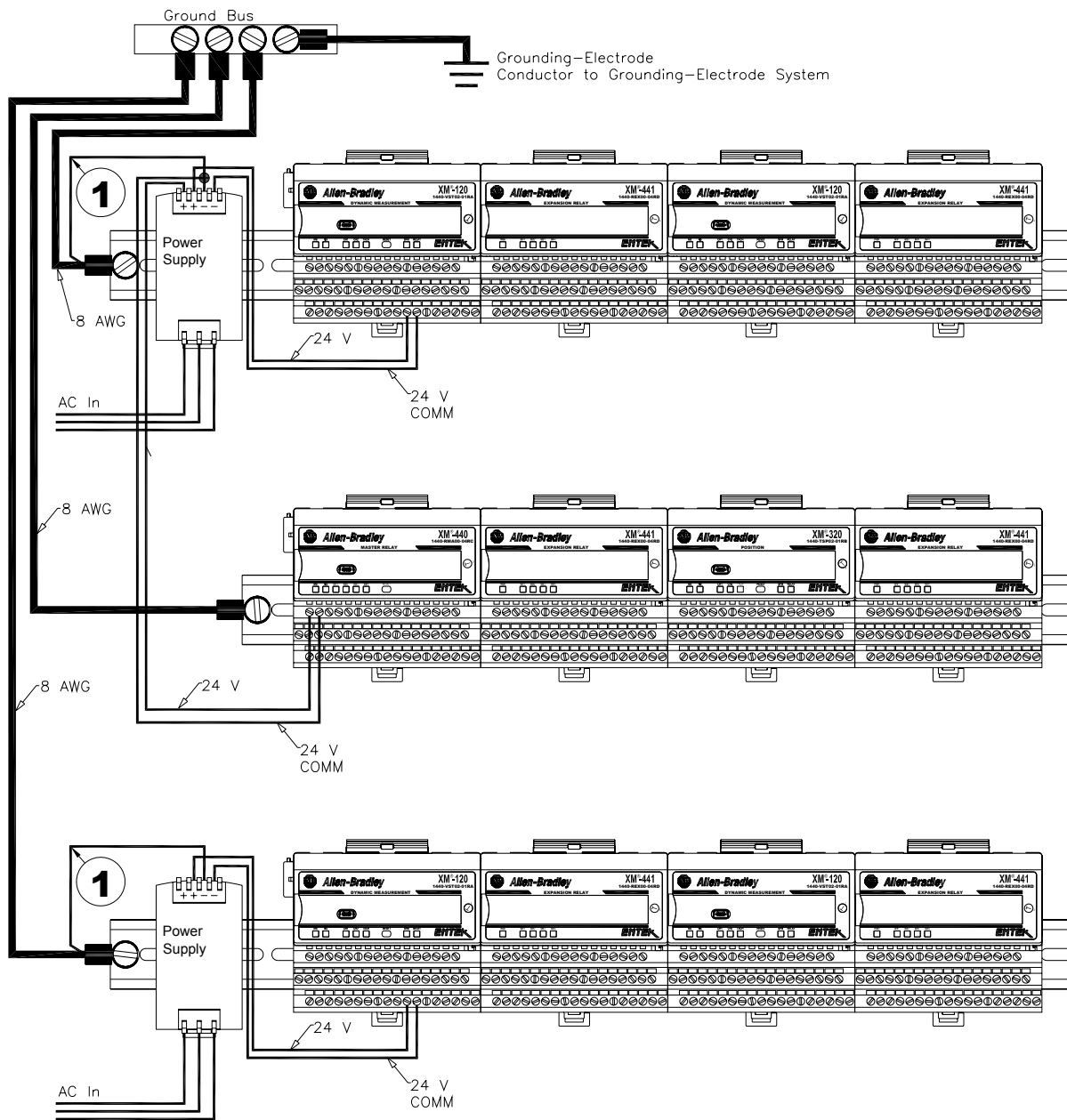
Use these grounding requirements to ensure safe electrical operating circumstances, and to help avoid potential emi and ground noise that can cause unfavorable operating conditions for your XM system.

DIN Rail Grounding

The XM modules make a chassis ground connection through the DIN rail. The DIN rail must be connected to a ground bus or grounding electrode conductor using 8 AWG or 1 inch copper braid. See Figure 2.2.

Use zinc-plated, yellow-chromated steel DIN rail (Allen-Bradley part no. 199-DR1 or 199-DR4) or equivalent to assure proper grounding. Using other DIN rail materials (e.g. aluminum, plastic, etc.), which can corrode, oxidize, or are poor conductors can result in improper or intermittent platform grounding.

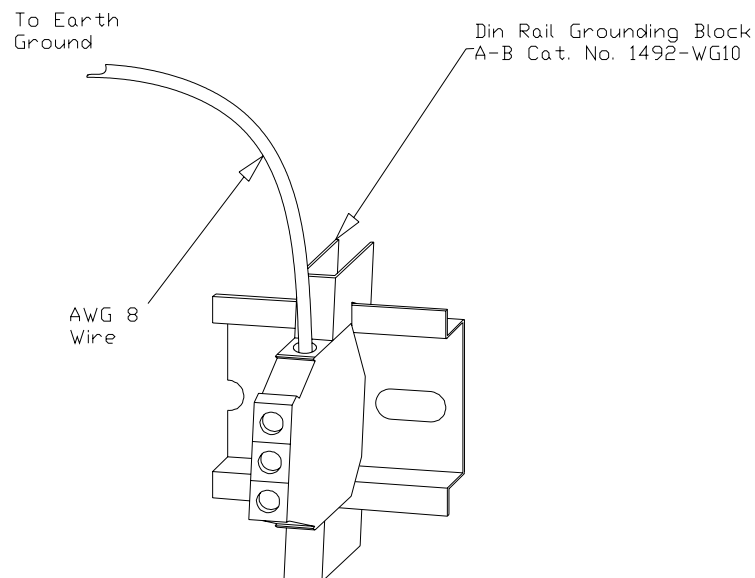
Figure 2.2 XM System DIN Rail Grounding



1 Use 14 AWG wire.

The grounding wire can be connected to the DIN rail using a DIN Rail Grounding Block (Figure 2.3).

Figure 2.3 Grounded DIN Rail with Block



Panel/Wall Mount Grounding

The XM modules can also be mounted to a conductive mounting plate that is grounded. See Figure 2.5. Use the grounding screw hole provided on the terminal base to connect the mounting plate the Chassis terminals.

Figure 2.4 Grounding Screw on XM Terminal Base

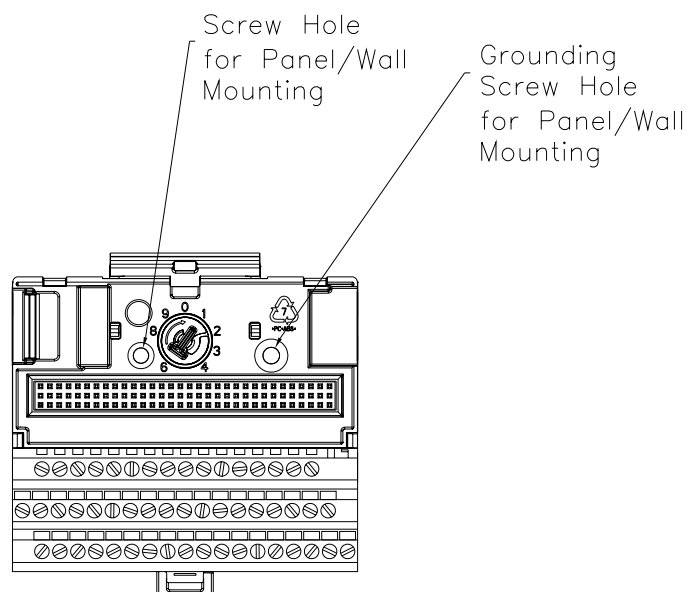
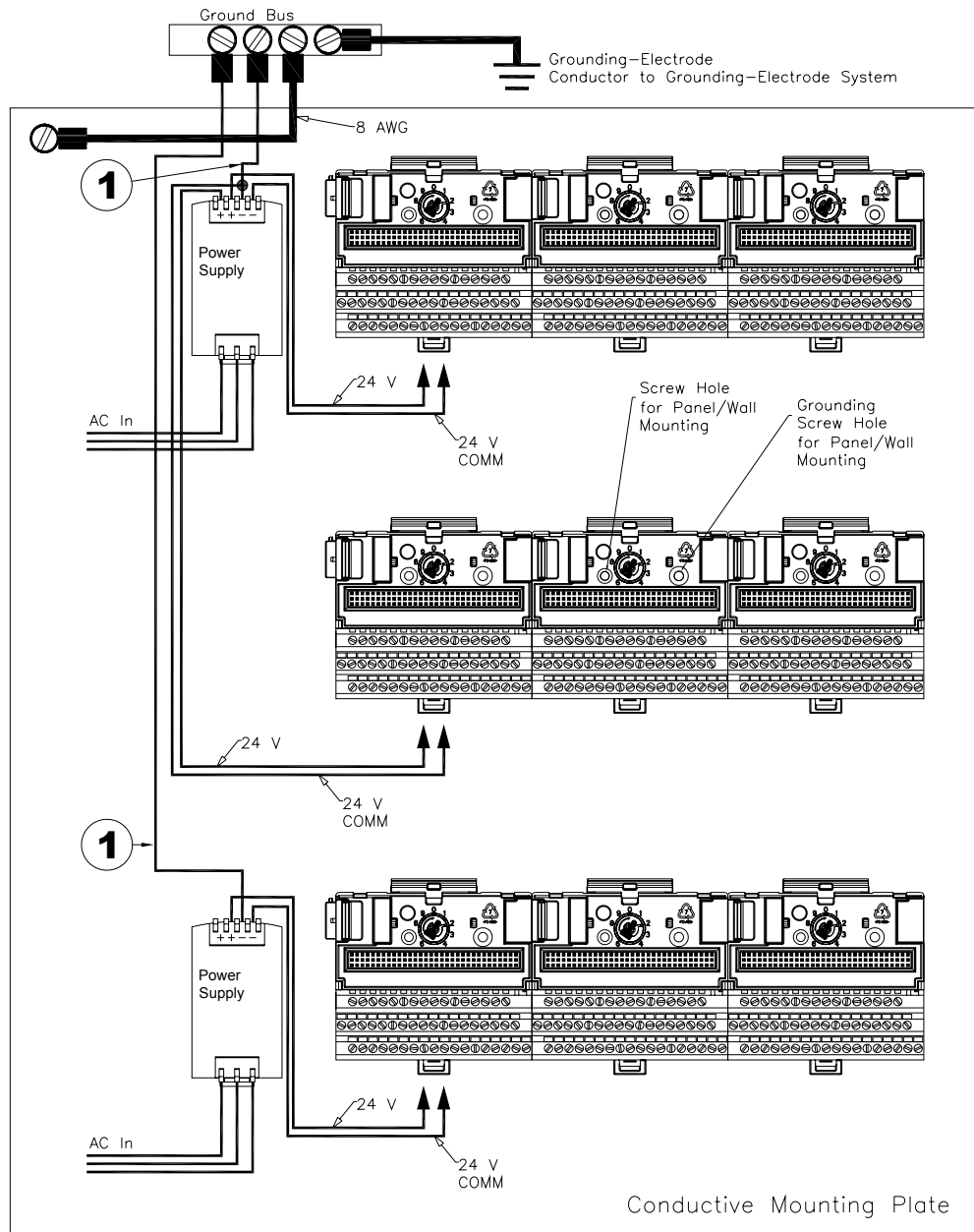


Figure 2.5 Panel/Wall Mount Grounding

1 Use 14 AWG wire.

24V Common Grounding

24 V power to the XM modules must be grounded. When two or more power supplies power the XM system, ground the 24 V Commons at a single point, such as the ground bus bar.

IMPORTANT

If it is not possible or practical to ground the -24Vdc supply, then it is possible for the system to be installed and operate ungrounded. However, if installed ungrounded then the system must not be connected to a ground through any other circuit unless that circuit is isolated externally. Connecting a floating system to a non-isolated ground could result in damage to the XM module(s) and/or any connected device. Also, operating the system without a ground may result in the system not performing to the published specifications regards measurement accuracy and communications speed, distance or reliability.

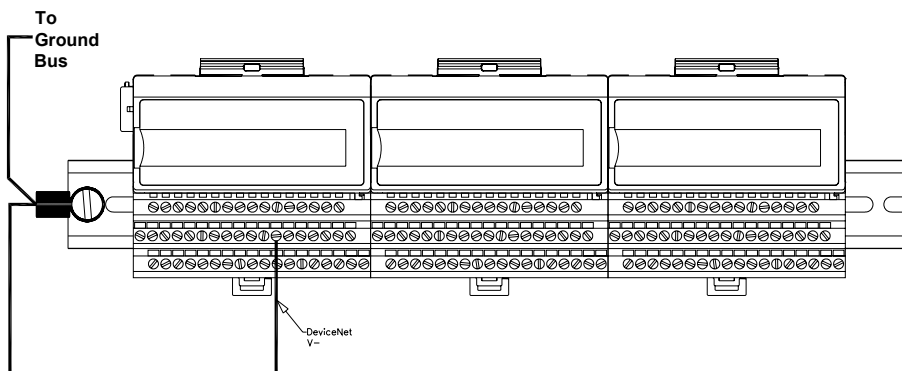
IMPORTANT

The 24 V Common and Signal Common terminals are internally connected. They are isolated from the Chassis terminals unless they are connected to ground as described in this section. Refer to Terminal Block Assignments on page 25 for more information.

DeviceNet Grounding

The DeviceNet network is functionally isolated and must be referenced to earth ground at a single point. XM modules do not require an external DeviceNet power supply. Connect DeviceNet V- to earth ground at one of the XM modules, as shown in Figure 2.6.

Figure 2.6 Grounded DeviceNet V- at XM Module



ATTENTION

Use of a separate DeviceNet power supply is not permitted. See Application Technique "XM Power Supply Solutions", publication ICM-AP005A-EN-E, for guidance in using XM with other DeviceNet products.

For more information on the DeviceNet installation, refer to the ODVA Planning and Installation Manual - DeviceNet Cable System, which is available on the ODVA web site (<http://www.odva.org>).

Switch Input Grounding

The Switch Input circuits are electrically isolated from other circuits. It is recommended that the Switch RTN signal be grounded at a single point. Connect the Switch RTN signal to the XM terminal base (Chassis terminal) or directly to the DIN rail, or ground the signal at the switch or other equipment that is wired to the switch.

Mounting the Terminal Base Unit

The XM family includes several different terminal base units to serve all of the XM modules. The XM-942 terminal base, Cat. No. 1440-TB-C, is the only terminal base unit used with the XM-440.

The terminal base can be DIN rail or wall/panel mounted. Refer to the specific method of mounting below.

ATTENTION

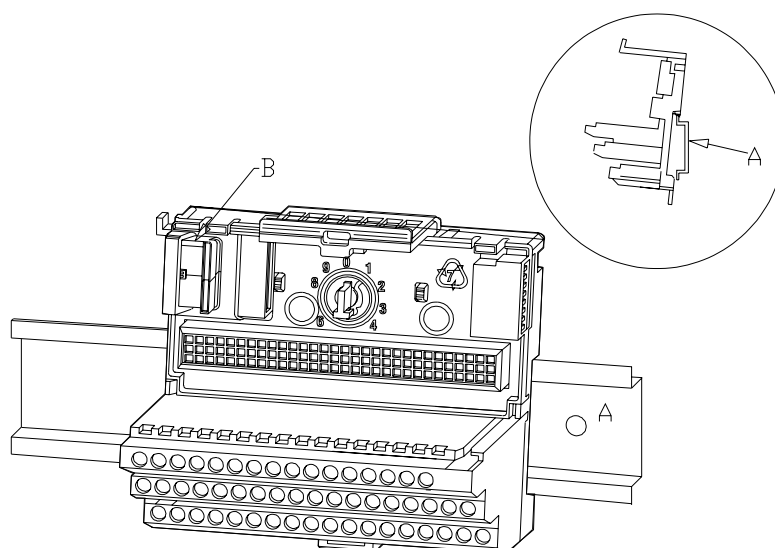
The XM modules make a chassis ground connection through the DIN rail. Use zinc plated, yellow chromated steel DIN rail to assure proper grounding. Using other DIN rail materials (e.g. aluminum, plastic, etc.), which can corrode, oxidize or are poor conductors can result in improper or intermittent platform grounding.

You can also mount the terminal base to a grounded mounting plate. Refer to Panel/Wall Mount Grounding on page 18.

DIN Rail Mounting

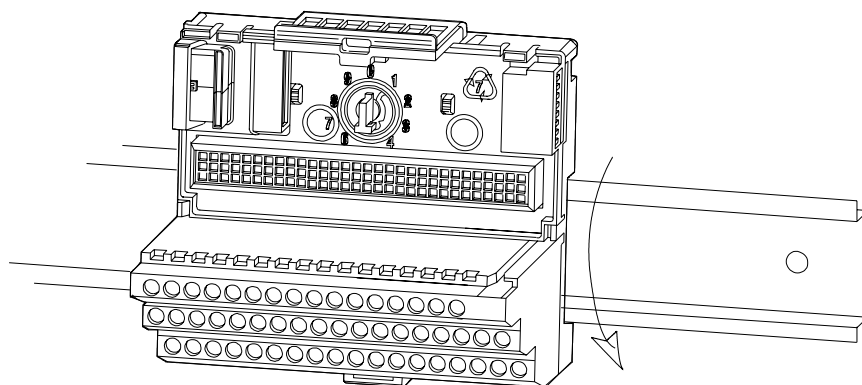
Use the following steps to mount the XM-942 terminal base unit on a DIN rail (A-B pt no. 199-DR1 or 199-DR4).

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



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

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



4. 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.

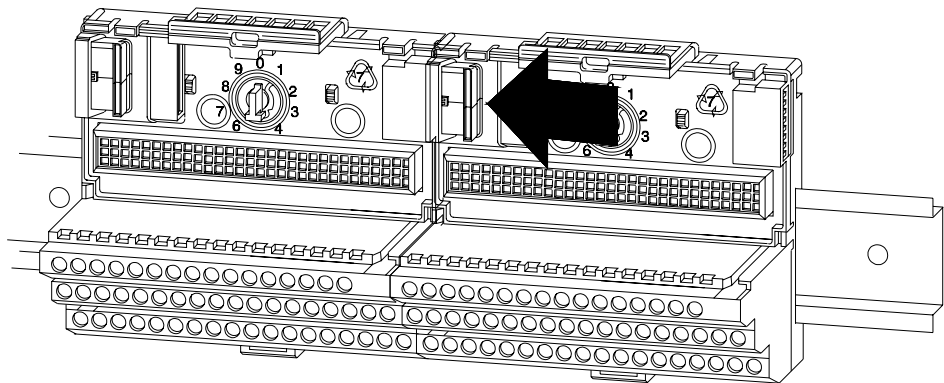
Interconnecting Terminal Base Units

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

IMPORTANT

Make certain you install the terminal base units in order of left to right.

1. Position the terminal base on the 35 x 7.5mm 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.



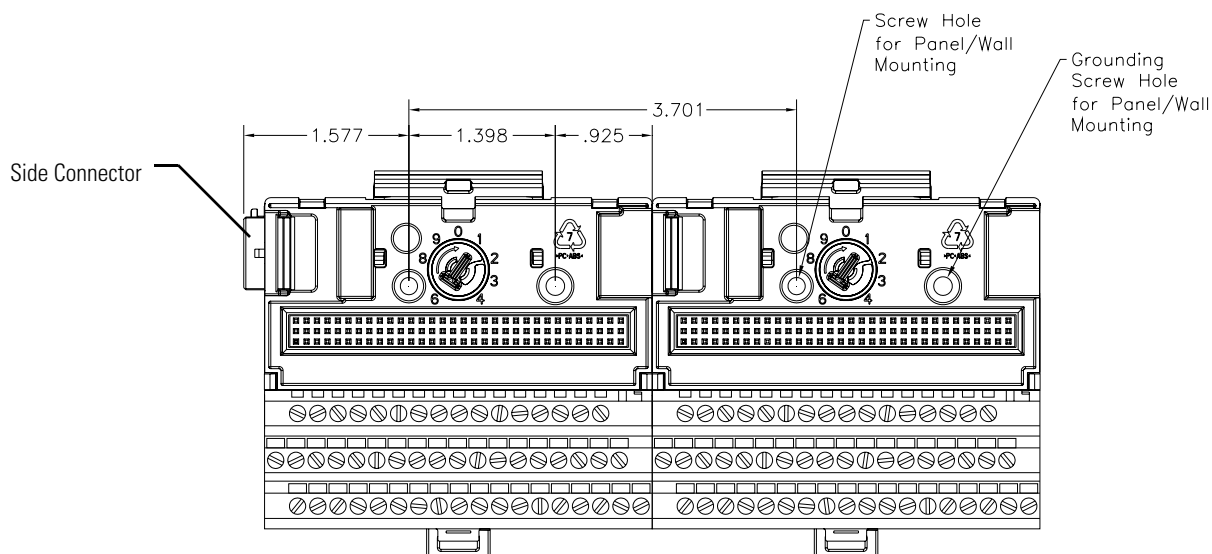
Panel/Wall Mounting

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

Use the following 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.



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 sure it is **fully retracted**.
5. Position the terminal base unit up tight against the neighboring terminal base. Make sure the hook on the terminal base slides under the edge of the terminal base unit.
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.

Connecting Wiring for Your Module

Wiring to the module is made through the terminal base unit on which the module mounts. The XM-440 is compatible only with the XM-942 terminal base unit, Cat. No. 1440-TB-C.

Figure 2.7 XM-942 Terminal Base Unit

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏																	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏																	
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏⏏																	

Row A

Row B

Row C

XM-942, Cat. No. 1440-TB-C

Terminal Block Assignments

The terminal block assignments and descriptions for the XM-440 module are shown below.

ATTENTION



The terminal block assignments are different for different XM modules. The following table applies only to the XM-440. Refer to the installation instructions for the specific XM module for its terminal assignments.

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.

Terminal Block Assignments

No.	Name	Description
0	24V In	Connection to primary external +24V power supply, positive side
1	24V Common	Connection to external +24V power supply, negative side (internally DC-coupled to circuit ground)
2	Reset Relay	Switch input to reset internal relay (active low)
3	Reserved	
4	Relay 1 N.O. 2	Relay #1 Normally Open contact 2
5	Relay 1 N.O. 1	Relay #1 Normally Open contact 1
6	Relay 2 N.O. 2	Relay # 2 Normally Open contact 2

Terminal Block Assignments

No.	Name	Description
7	No Connection	
8	Relay 2 N.O. 1	Relay # 2 Normally Open contact 1
9	Relay 3 N.O. 2	Relay #3 Normally Open contact 2
10	No Connection	
11	Relay 3 N.O. 1	Relay #3 Normally Open contact 1
12	Relay 4 N.O. 2	Relay #4 Normally Open contact 2
13	Relay 4 N.O. 1	Relay #4 Normally Open contact 1
14	No Connection	
15	Chassis	Connection to DIN rail ground spring or panel mounting hole
16	TxD	PC serial port, transmit data
17	XRTN	Circuit return for TxD and RxD
18	Switch RTN	Switch return, Reset Relay
19	24V Out	Diode-ORed output for 24V In 1 and 24V In 2 DO NOT CONNECT
20	Relay 1 Common 2	Relay #1 Common contact 2
21	Relay 1 Common 1	Relay #1 Common contact 1
22	Relay 2 Common 2	Relay #2 Common contact 2
23	No Connection	
24	Relay 2 Common 1	Relay #2 Common contact 1
25	Relay 3 Common 2	Relay #3 Common contact 2
26	No Connection	
27	Relay 3 Common 1	Relay #3 Common contact 1
28	Relay 4 Common 2	Relay #4 Common contact 2
29	Relay 4 Common 1	Relay #4 Common contact 1
30	No Connection	
31	Chassis	Connection to DIN rail ground spring or panel mounting hole
32	DNet V (+)	DeviceNet bus power input, positive side (red wire)
33	CAN_High	DeviceNet bus connection, high differential (white wire)
34	RxD	PC serial port, receive data
35	No Connection	
36	No Connection	
37	No Connection	
38	Relay 1 N.C. 2	Relay #1 Normally Closed contact 2
39	Relay 1 N.C. 1	Relay #1 Normally Closed contact 1
40	Relay 2 N.C. 2	Relay #2 Normally Closed contact 2
41	No Connection	

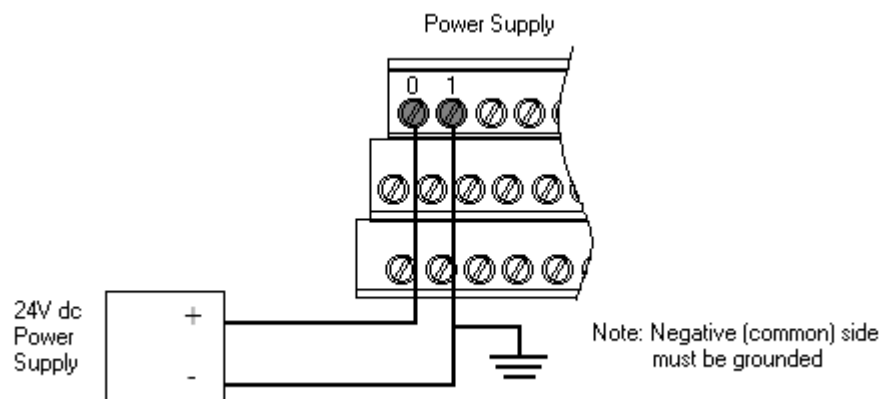
Terminal Block Assignments

No.	Name	Description
42	Relay 2 N.C. 1	Relay #2 Normally Closed contact 1
43	Relay 3 N.C. 2	Relay #3 Normally Closed contact 2
44	No Connection	
45	Relay 3 N.C. 1	Relay #3 Normally Closed contact 1
46	Relay 4 N.C. 2	Relay #4 Normally Closed contact 2
47	Relay 4 N.C. 1	Relay #4 Normally Closed contact 1
48	No Connection	
49	Chassis	Connection to DIN rail ground spring or panel mounting hole
50	DNet V (-)	DeviceNet bus power input, negative side (black wire)
51	CAN_Low	DeviceNet bus connection, low differential (blue wire)

Connecting the Power Supply

Power supplied to the module must be nominally 24 Vdc ($\pm 10\%$) and must be a Class 2 rated circuit.

Wire the DC-input power supply to the terminal base unit as shown in Figure 2.8.

Figure 2.8 DC Input Power Supply Connections**IMPORTANT**

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

IMPORTANT

24Vdc needs to be wired to terminal 0 (+24 V In) to provide power to the device and other XM modules linked to the wired terminal base via the side connector.

ATTENTION

The power connections are different for different XM modules. Refer to the installation instructions for your specific XM module for complete wiring information.

Connecting the Relays

The XM-440 has both Normally Open (NO) and Normally Closed (NC) relay contacts. Normally Open relay contacts close when the control output is energized. Normally Closed relay contacts open when the control output is energized.

The alarms associated with the relay and whether the relay is normally de-energized (non-failsafe) or normally energized (failsafe) depends on the configuration of the module. Refer to Relay Parameters on page 45 for details.

There are four double pole double throw relays in the XM-440. All relay contacts (24 total) are available for wiring on the terminal base unit, as shown in Table 2.1 on page 30.

IMPORTANT

All XM relays are double pole. This means that each relay has two contacts in which each contact operates independently but identically. The following information and illustrations show wiring solutions for both contacts; although, in many applications it may be necessary to wire only one contact.

TIP

Up to two Expansion Relay modules may be connected to the XM-440 to provide an additional four to eight relays. Refer to the XM-441 Expansion Relay Module User Guide for wiring details.

IMPORTANT

The NC/NO terminal descriptions (pages 25–27) correspond to a de-energized (unpowered) relay.

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

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

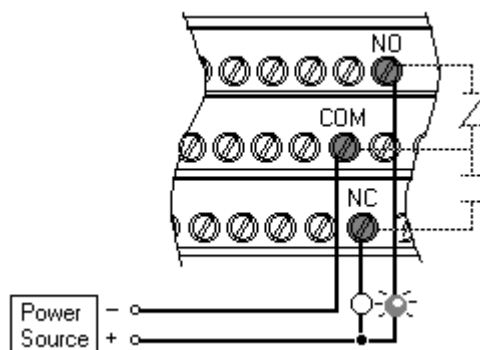
Table 2.1 Relay Connections for XM-440

Configured for Failsafe Operation		Wire Contacts	Relay 1 Terminals		Relay 2 Terminals		Relay 3 Terminals		Relay 4 Terminals	
Nonalarm	Alarm		Contact 1	Contact 2	Contact 1	Contact 2	Contact 1	Contact 2	Contact 1	Contact 2
Closed	Opened	COM	21	20	24	22	27	25	29	28
		NO	5	4	8	6	11	9	13	12
Opened	Closed	COM	21	20	24	22	27	25	29	28
		NC	39	38	42	40	45	43	47	46

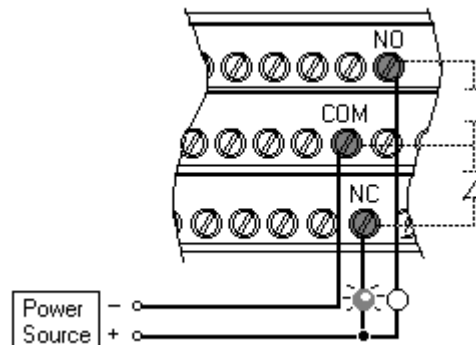
Configured for Non-failsafe Operation		Wire Contacts	Relay 1 Terminals		Relay 2 Terminals		Relay 3 Terminals		Relay 4 Terminals	
Nonalarm	Alarm		Contact 1	Contact 2	Contact 1	Contact 2	Contact 1	Contact 2	Contact 1	Contact 2
Closed	Opened	COM	21	20	24	22	27	25	29	28
		NC	39	38	42	40	45	43	47	46
Opened	Closed	COM	21	20	24	22	27	25	29	28
		NO	5	4	8	6	11	9	13	12

Figures 2.9 and 2.10 illustrate the behavior of the NC and NO terminals when the relay is wired for failsafe, alarm or nonalarm condition or non-failsafe, alarm or nonalarm condition.

**Figure 2.9 Relay Connection - Failsafe, Nonalarm Condition
Non-failsafe, Alarm Condition**



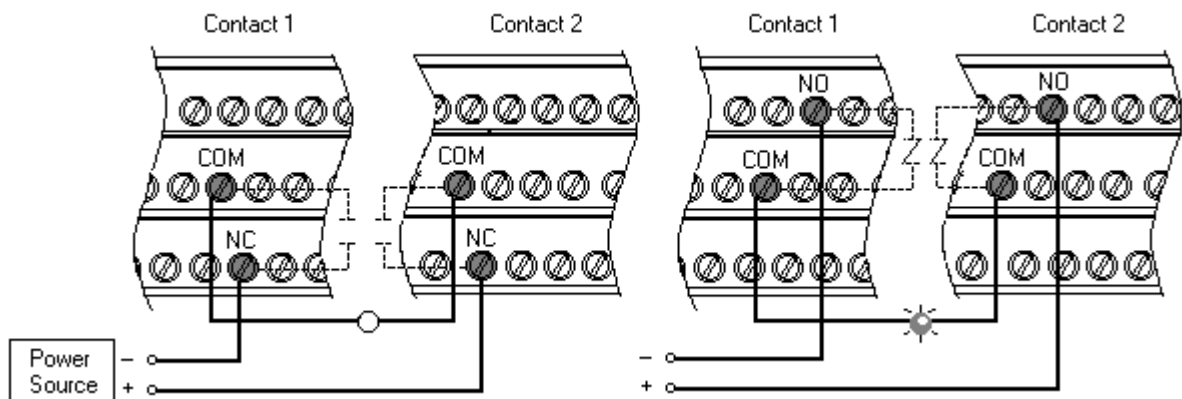
**Figure 2.10 Relay Connection - Failsafe Alarm Condition
Non-failsafe, Nonalarm Condition**



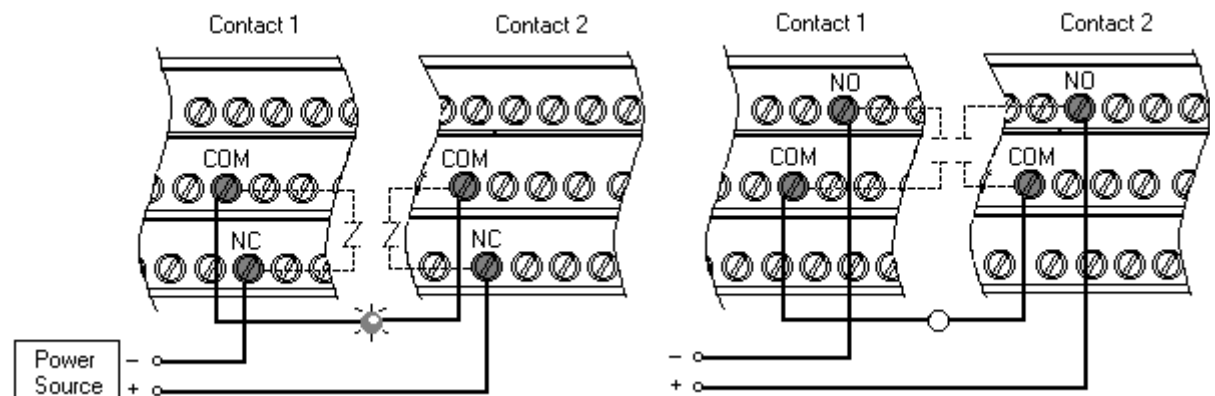
Alternate Relay Wiring

Figures 2.11 and 2.12 show how to wire both ends of a single external indicator to the XM terminal base for failsafe, nonalarm or alarm condition or non-failsafe, nonalarm or alarm condition.

**Figure 2.11 Relay Connection - Failsafe, Nonalarm Condition
Non-failsafe, Alarm Condition**



**Figure 2.12 Relay Connection - Failsafe, Alarm Condition
Non-failsafe, Nonalarm Condition**



Connecting the Remote Relay Reset Signal

If you set the module relay to latching and the relay activates, the relay stays activated even when the condition that caused the alarm has ended. The remote relay reset signal enables you to reset your module relay remotely after you have corrected the alarm condition. This includes latched relays in the Expansion Relay module when it is attached to the XM-440..

TIP

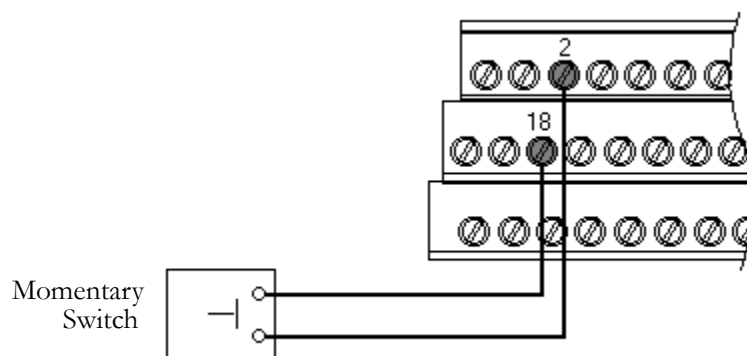
You can discretely reset a relay using the serial or remote configuration tool.

TIP

If you set a measurement module relay to latching, make sure that any linked relays, such as relays in an XM-440 module, are **not** configured as latching. When both relays are set to latching, the relay in each module will have to be independently reset when necessary.

Wire the Remote Relay Reset Signal to the terminal base unit as shown in Figure 2.13.

Figure 2.13 Remote Relay Reset Signal Connection



ATTENTION



The Switch Input circuits are electrically isolated from other circuits. It is recommended that the Switch RTN signal be grounded at a signal point. Connect the Switch RTN signal to the XM terminal base (Chassis terminal) or directly to the DIN rail, or ground the signal at the switch or other equipment that is wired to the switch.

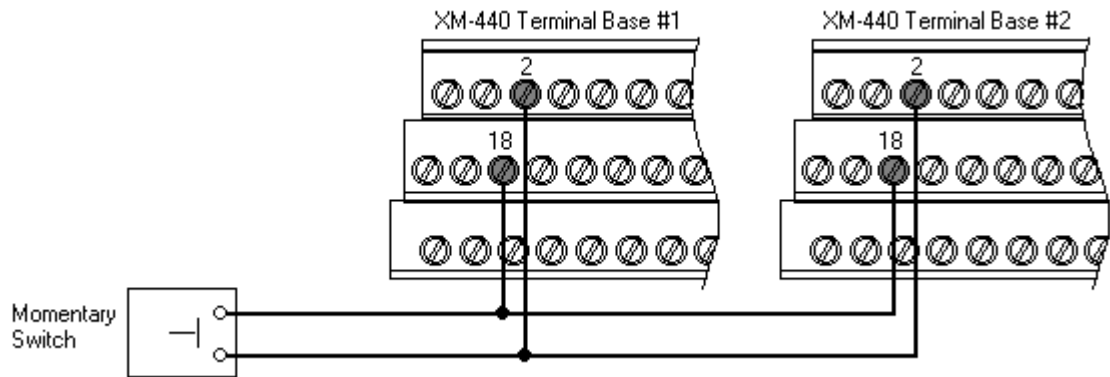
A single switch contact can also be shared by multiple XM modules wired in parallel as shown in Figure 2.14.

ATTENTION



The relay reset connections may be different for different XM modules. Figure 2.14 applies only to the XM-440 module. Refer to the installation instructions for the module for its terminal assignments.

Figure 2.14 Typical Multiple XM Modules Remote Relay Reset Signal Connection



PC Serial Port Connection

The XM-440 includes a serial port connection that allows you to connect a PC to it and configure the module's parameters. There are two methods of connecting an external device to the module's serial port.

- **Terminal Base Unit** - There are three terminals on the terminal base unit you can use for the serial port connection. They are TxD, RxD, and RTN (terminals 16, 34, and 17, respectively). If these three terminals are wired to a DB-9 female connector, then a standard RS-232 serial cable with 9-pin (DB-9) connectors can be used to connect the module to a PC (no null modem is required).

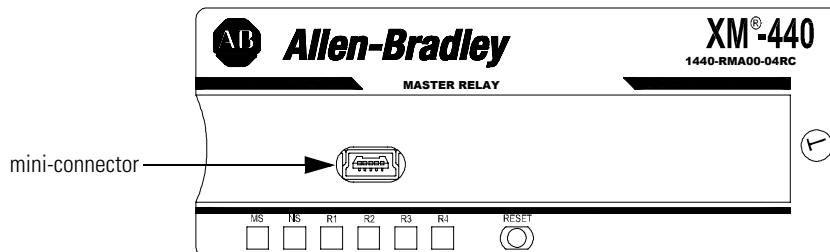
The DB-9 connector should be wired to the terminal base unit as follows.

XM-440 Terminal Base Unit (Cat. No. 1440-TB-C)

DB-9 Female Connector

TX Terminal (terminal 16)	-----	Pin 2 (RD - receive data)
RX Terminal (terminal 34)	-----	Pin 3 (TD - transmit data)
RTN Terminal (terminal 17)	-----	Pin 5 (SG - signal ground)

- **Mini-Connector** - The mini-connector is located on the top of the XM-440, as shown below.

Figure 2.15 Mini-Connector

A special cable (Cat. No. 1440-SCDB9FXM2) is required for this connection. The connector that inserts into the PC is a DB-9 female connector, and the connector that inserts into the module is a USB Mini-B male connector.

WARNING

If you connect or disconnect the serial cable with power applied to this module or the serial device on the other end of the cable, an 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.

IMPORTANT

If 24V Common is not referenced to earth ground, we recommend you use an RS-232 isolator, such as Phoenix PSM-ME-RS232/RS232-P (Cat. No. 1440-ISO-232-24), to protect both the XM module and the computer.

DeviceNet Connection

The XM-440 includes a DeviceNet™ connection that allows the module to communicate directly with a programmable controller, distributed control system (DCS), or another XM module.

DeviceNet is an open, global, industry-standard communications network designed to provide an interface through a single cable from a programmable controller to a smart device such as the XM-440 module. As multiple XM modules are interconnected, DeviceNet also serves as the communication bus and protocol that efficiently transfers data between the XM modules.

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

Connect	To	Terminal Base Unit
Red Wire	DNet V+	32 (Optional - see note)
White Wire	CAN High	33
Bare Wire	Shield (Chassis)	49
Blue Wire	CAN Low	51
Black Wire	DNet V-	50

IMPORTANT

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

To preclude this possibility, even unintentionally, it is recommended that DeviceNet V+ be left unconnected.

ATTENTION



You must ground the DeviceNet shield at only one location. Connecting the DeviceNet shield to terminal 49 will ground the DeviceNet shield at the XM-440 module. If you intend to terminate the shield elsewhere, do not connect the shield to terminal 49.

ATTENTION



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

ATTENTION



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

IMPORTANT

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

The device is shipped from the factory with the network node address (MAC ID) set to 63 and the baud rate set to “autobaud.” Both parameters are software settable.

IMPORTANT

At least one master device on the DeviceNet network must be set to a fixed baud rate. If the only DeviceNet master on your network is the XM-440, make certain to change its baud rate from “autobaud” to 500 kbps, 250 kbps, or 120 kbps as appropriate.

You can use the XM Serial Configuration Utility or RSNetWorx for DeviceNet (Version 3.0 or later) to set the network node address and baud rate. Refer to the appropriate documentation for details.

Mounting the Module

The XM-440 mounts on the XM-942 terminal base unit, Cat. No. 1440-TB-C. You should mount the module after you have connected the wiring on the terminal base unit.

ATTENTION

The XM-440 is compatible only with the XM-942 terminal base unit. The keyswitch on the terminal base unit should be at position 2 for the XM-440.

Do not attempt to install XM-440 modules on other terminal base units.

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

ATTENTION

This module is designed so you can **remove and insert it under power**. However, when you remove or insert the module with power applied, I/O attached to the module can change states due to its input/output signal changing conditions. Take special care when using this feature.

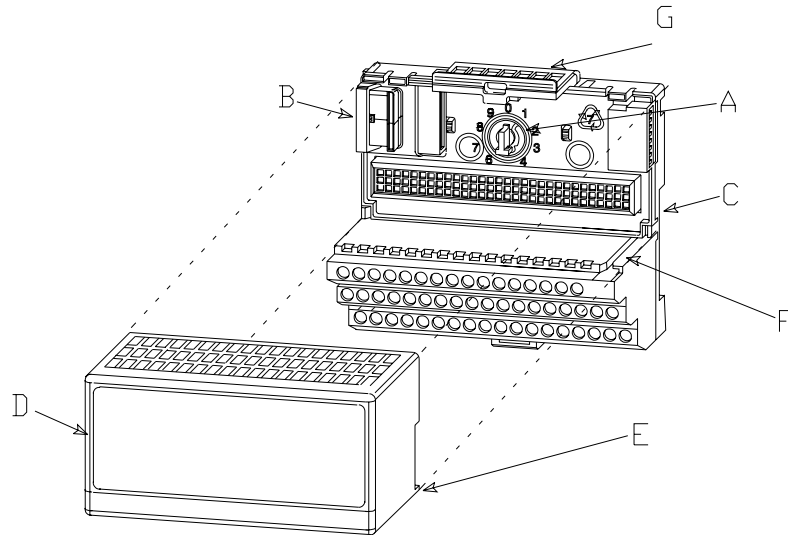
WARNING

When you insert or remove the module while 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.

IMPORTANT

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

1. Make certain the keyswitch (A) on the terminal base unit (C) is at position 2 as required for the XM-440.

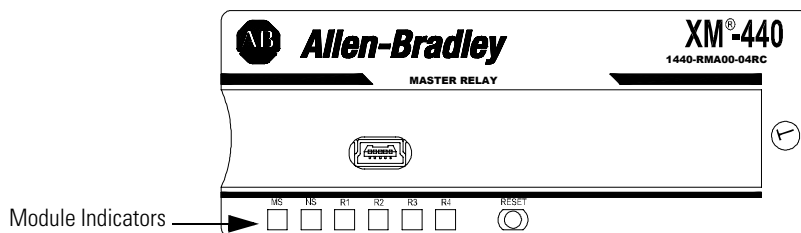


2. Make certain the side connector (B) is pushed all the way to the left.
You cannot install the module unless the connector is fully extended.
3. Make sure that the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base unit.
4. Position the module (D) with its alignment bar (E) 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 (G) is locked into the module.
6. Repeat the above steps to install the next XM-440 module in its terminal base.

Module Indicators

The XM-440 has six LED indicators, which include a module status (MS) indicator, a network status (NS) indicator, and a status indicator for each Relay (four in all). The LED indicators are located on top of the module.

Figure 2.16 LED Indicators



The following tables describe the states of the LED status indicators.

Module Status (MS) Indicator

Color	State	Description
No color	Off	No power applied to the module.
Green	Flashing Red	Module performing power-up self test.
	Flashing	Module operating in Program Mode ¹ .
	Solid	Module operating in Run Mode ² .
Red	Flashing	<ul style="list-style-type: none"> Application firmware is invalid or not loaded. Download firmware to the module. Firmware download is currently in progress. Module is configured incorrectly. Verify that each slave's module type is correct.
	Solid	An unrecoverable fault has occurred. The module may need to be repaired or replaced.

1 Program Mode - Typically this occurs when the module configuration settings are being updated with the XM Serial Configuration Utility. The module closes I/O connections with the XM measurement modules in its scanlist. The alarm monitoring is stopped, the relay outputs are deactivated unless they are latched. Configuration parameters can be read, updated and downloaded to the XM module.

2 Run Mode - The module establishes I/O connections with the XM measurement modules in its scanlist, collects their alarm status, and controls its own relay outputs accordingly.

Network Status (NS) Indicator

Color	State	Description
No color	Off	Module is not online. <ul style="list-style-type: none"> • Module is autobauding. • No power is applied to the module, look at Module Status LED.
Green	Flashing	Module is online (DeviceNet) but no connections are currently established.
	Solid	Module is online with connections currently established.
Red	Flashing	One or more I/O connections are in the Timed-Out state.
	Solid	Failed communications (Duplicate MAC ID or Bus-off).

Relay Indicators (4 in all)

Color	State	Description
Red	Off	On-board relay is not activated.
	Solid	On-board relay is activated.

Basic Operations

Powering Up the Module

The XM-440 performs a self-test at power-up. The self-test includes an LED test and a device test. During the LED test, the indicators will be turned 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.

Device Self-Test Status

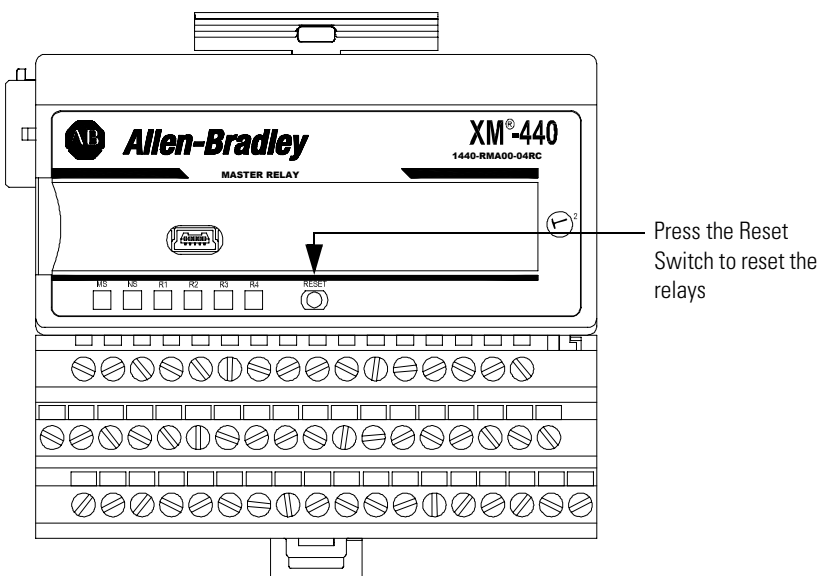
MS Indicator State	Description
Flashing Red and Green	Device self test is in progress.
Solid Green or Flashing Green	Device self test completed successfully, and the firmware is valid and running.
Flashing Red	Device self test completed, the hardware is OK, but the firmware is invalid. Or, the firmware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

Refer to Module Indicators on page 38 for more information about the LED indicators.

Manually Resetting Relays

The XM-440 has an external reset switch located on top of the module, as shown in Figure 2.17.

Figure 2.17 Reset Switch



The switch can be used to reset all latched relays in the module. This includes the relays in the Expansion Relay Module when it is connected to the XM-440.

IMPORTANT

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

Configuration Parameters

This chapter provides a complete listing and description of the XM-440 parameters. The parameters can be viewed and edited using the XM Serial Configuration Utility software and a personal computer. If the module is installed on a DeviceNet network, configuring can also be performed using a network configuration tool such as RSNetWorx (Version 3.0 or later). Refer to your configuration tool documentation for instructions on configuring a device.

For information about	See page
XM Network Node List	41
Relay Parameters	45
Group Triggers Parameters	48
Device Mode Parameters	50
Event Log Parameters	50

IMPORTANT

The appearance and procedure to configure the parameters may differ in different software.

XM Network Node List

The XM Network Node List parameters identify the XM measurement modules on the network. Use these parameters to set up the XM-440 Node List (or Scanlist in the EDS file).

TIP

Refer to Using RSNetWorx with the XM-440 on page 62 for more information on setting up the XM-440 Scanlist.

XM Network Node List Parameters

Parameter Name	Description	Values/Comments
Node Address (XM Configuration Utility only)	The XM measurement module's node address.	

XM Network Node List Parameters

Parameter Name	Description	Values/Comments
Module Type	The type of XM measurement module at this node address.	Options: XM-120 XM-120E XM-121 XM-121A XM-122 XM-123 XM-160 XM-161 XM-162 XM-220 XM-320 XM-360 XM-361 XM-362 None (EDS file only)
Share Option	<p>Sets the relationship between the XM-440 (master) and the XM measurement module (slave).</p> <ul style="list-style-type: none"> • Primary - The XM-440 is the primary master of the XM measurement module. • Shared - The XM-440 is sharing the XM measurement module with a primary master/scanner device. <p>Note: An XM measurement module can have only one primary master/scanner. And, the XM measurement module must have a primary master before it can be shared.</p>	Options: Primary Shared
Node Status (XM Serial Configuration Only)	Shows the status of all the nodes in the scanlist. This information is useful when the XM-440 cannot connect to a slave in the scanlist.	

XM Network Node List Parameters

Parameter Name	Description	Values/Comments
Interscan Delay	<p>Defines the amount of time the XM-440 pauses between consecutive scans. This means that the XM-440 will poll all the slaves in its scanlist, then pause for interscan delay, then begin the next series of polls.</p> <p>During the pause time, slave responses and other network traffic can access the network. This other network traffic could be another primary master scanning the network or lower priority messages (for example, network browsing, configuration upload/download).</p> <p>Note that the interscan delay also affects the rate at which the XM-440 requests Poll data from the XM slave measurement modules. The Poll request rate is equal to the scan time plus the interscan delay. The scan time is dependant on the number of modules in the scanlist, the amount of competing network traffic, and the ISD.</p>	<p>Enter a value from 2 to 9,000 milliseconds. The default is 400 milliseconds.</p> <p>Note:</p> <ul style="list-style-type: none"> Decrease the interscan delay value if you need to increase the data refresh rate for devices (e.g. PanelView module) on the network that are listening for the Poll data that is being collected by the XM-440. If you do not have a device listening for the Poll data, then there is no need to decrease the interscan delay. Increase the interscan delay value if you want more time for slave responses and other network traffic. For example, if your network browsing and configuration tools seem sluggish or unresponsive, it may be because the higher priority scan traffic is blocking the lower priority traffic. Increasing the interscan delay will allow the lower priority traffic more time to access the network. <p>Or, if you have many slaves in the scanlist, the XM-440 may have trouble keeping connections open to the slave devices. Increasing the interscan delay can relieve this problem because the slaves will have more time to access the network.</p>

XM Network Node List Parameters

Parameter Name	Description	Values/Comments
Slave EPR	<p>Sets the rate at which the packets will be expected to be received by the XM-440.</p> <p>When the XM-440 opens a polled I/O connection, it sets a maximum timeout (Expected Packet Rate (EPR)) with the slave. If the slave does not receive a packet from the XM-440 within 4 times the EPR value, the slave drops the connection. If the XM-440 does not receive a packet from the slave within 4 times the EPR value, it drops the connection and periodically attempts to open a new connection.</p>	<p>Enter a value from 10 to 32,000 milliseconds. The default is 200 milliseconds.</p> <p>Note:</p> <ul style="list-style-type: none"> • Increase the Slave EPR if you are experiencing timeouts and your scanlist is longer than typical. If the Slave EPR value is much less than the XM-440 total scan period, the XM-440 and/or slave devices may timeout because the XM-440 is not hearing from the slaves within the 4 times the EPR. The total scan period increases with the number of modules in the scanlist, the amount of competing network traffic, and the interscan delay. • Decrease the Slave EPR if it takes too long for the XM-440 to detect a missing device and your total scan period is shorter than typical. <p>Important: Changing the EPR value should be done carefully.</p>

Relay Parameters

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

IMPORTANT

A relay can be defined, regardless of whether or not it is physically present. A non-physical relay is a virtual relay. When a relay (physical or virtual) activates, the module sends a Change of State (COS) message to its master, which acts on the condition as necessary. An XM-440 Master Relay Module can activate its own relays in response to a relay (physical or virtual) activation at any of its slaves.

Relay Parameters

Parameter Name	Description	Options/Comments	
Number (XM Serial Configuration Utility only)	Sets the relay to be configured in XM Serial Configuration Utility.	Relay Numbers 1 through 4 are the on-board relays. Relay Numbers 5 through 12 are either relays on the Expansion Relay modules when they are connected to the XM-440 or virtual relays. Up to two Expansion Relay modules may be connected to the XM-440. Virtual relays are non-physical relays. Use them when you want the effect of the relay (monitor alarms, activation delay, and change status) but do not need an actual contact closure. For example, a PLC or controller monitoring the relay status. Note: The Relay Installed parameter indicates whether a relay is a virtual relay or a physical relay on a module.	
Name (XM Serial Configuration Utility only)	A descriptive name to help identify the relay in the XM Serial Configuration Utility.	Maximum 18 characters	
Enable	Enable/disable the selected relay. Note: The Relay Status is set to "Not Activated" when the relay is disabled.	XM Configuration Utility	EDS File
		Check to Enable	Enabled
		Clear to Disable	Disabled

Relay Parameters

Parameter Name		Description	Options/Comments	
XM Configuration Utility	EDS File	Controls whether the relay must be explicitly reset after the alarm subsides.	XM Configuration Utility	EDS File
Latching	Latching Option		Check means latching (relay must be explicitly reset)	Latching
			Clear means non-latching (relay is reset once the alarm condition has passed)	Nonlatching
Activation Delay		Enter the length of time for which the relay activation logic (Activate relay when parameter) must be true before the relay is activated.	Enter a value from 0 to 25.5 seconds, adjustable in increments of 0.1 seconds. Default is 1 second	
XM Configuration Utility	EDS File	Sets the alarm conditions that will cause the relay to activate. You can select more than one.	Options: Normal Danger Xdcr Fault Tacho Fault Alert Disarm Module Fault Unknown Check to enable. Clear to disable.	
Alarm Status to Activate On	Alarm Levels			
		<ul style="list-style-type: none"> • Normal - The current measurement is not in within excess of any alarm thresholds. • Alert - The current measurement is in excess of the alarm level threshold(s) but not in excess of the danger level threshold(s). • Danger - The current measurement is in excess of the danger level threshold(s). • Disarm-The alarm is disabled or the device is in Program mode. • Xdcr (Transducer) Fault - A transducer fault is detected on the associated transducer. • Module Fault - Hardware or firmware failure, or an error has been detected and is preventing proper operation of the device. • Tacho Fault - A required tachometer signal has not been detected. Note that there is no transducer fault either. • Unknown - The current alarm status cannot be determined. This is useful when the XM-440 loses its communication link and can no longer receive the actual alarm status values. 		
Relay Installed		Indicates whether the relay is a physical relay on a module or a virtual relay. If the relay is a physical relay, then you can set the Failsafe parameter. If the relay is a virtual relay, the Failsafe parameter is not used or it is disabled.	XM Configuration Utility	EDS File
			Check = Physical Relay	Installed = Physical Relay
			Clear = Virtual Relay	Not Installed = Virtual Relay

Relay Parameters

Parameter Name		Description	Options/Comments	
XM Configuration Utility	EDS File	<p>Determines whether the relay is failsafe or non-failsafe.</p> <p>Failsafe operation means that when in alarm, the relay contacts are in their “normal,” de-energized, or “shelf-state” positions. In other words, normally closed relays are closed in alarm, and normally open relays are open in alarm. With failsafe operation, a power failure equals an alarm.</p> <p>The following are true of a relay in failsafe operation:</p> <ul style="list-style-type: none"> • The relay is energized when power is applied to the module. • The relay in a nonalarmed condition has power applied to the coil. • In alarm condition, power is removed from the relay coil, causing the relay to change state. <p>For non-failsafe operation, the following are true:</p> <ul style="list-style-type: none"> • Under nonalarm conditions, the relay closes the circuit between the common and the N.C. (normally closed) terminals. • Under alarm conditions, the relay changes state to close the circuit between the common and the N.O. (normally open) terminals. <p>For failsafe operation, the following are true:</p> <ul style="list-style-type: none"> • Under nonalarm (with power applied to the unit) conditions, the relay closes the circuit between the common and the N.O. terminals. • Under alarm or loss-of-power conditions, the relay changes state to close the circuit between the common and the N.C. terminals. 	XM Configuration Utility	EDS File
Failsafe Relay	Failsafe Option		Check means failsafe	Failsafe
			Clear means non-failsafe	Nonfailsafe
XM Configuration Utility	EDS File	<p>Sets the relay activation logic. Enter or select the number of Input List entries (alarms and relays) that must be active before the XM-440 relay will activate.</p> <p>For example, there is one alarm and one relay in the Input List and you set the Activate relay when (Logic) parameter to “1.” The module will activate the relay when either the alarm in the list meets or exceeds the selected Alarm Status condition(s) or the relay in the list is activated.</p>		
Activate relay when any n of n inputs are activated.	Logic			

Relay Parameters

Parameter Name		Description	Options/Comments
XM Configuration Utility	EDS File	The node address of the XM measurement module that maintains the alarm or relay. Note: The XM-440 module uses the input list table to determine which inputs in the XM measurement modules to monitor.	Notes: <ul style="list-style-type: none"> • In the XM Configuration Utility, the XM measurement module must be added to the XM Network Node List before it can be added to an Alarm List. • In the network configuration tool (RSNetWorx), adding a node that has the Module Type set to "None" to an input list will result in an Invalid Device Configuration error. See Appendix B for details.
Input List Node Address (Module Type)	Input Node		
XM Configuration Utility	EDS File	The alarm or relay in the XM measurement module that the current XM-440 relay will monitor. Note: The XM-440 module uses the input list table to determine which inputs in the XM measurement modules to monitor.	
Input List Input	Input Number		
Relay Status		Shows the status of the current relay.	Possible status values: Activated Not Activated

Group Triggers Parameters

The XM-440 can send a trigger event to a group of XM measurement modules (slaves) when one or more of its relays are activated. The XM measurement modules will collect their triggered trend data and store their spectrum or waveform when they receive this trigger.

Use the group trigger parameters to select the XM measurement modules included in the group, which relays trigger the collection of data, and whether any or all of the relays must be activated in order for a group trigger to occur. Note that when a group trigger occurs, a trigger event is sent to all of the XM measurement modules in the group.

Important Considerations

- The XM measurement module must be in the XM-440 Node List before it can be added to the trigger group.
- The relay must be enabled before it can be used as a trigger in the trigger group.
- You can create up to four trigger groups for each XM-440 module.

- The group trigger will work only with XM measurement modules running revision 4 or later firmware.

IMPORTANT

The Group Triggers parameters are not included in the EDS file and cannot be edited using generic configuration tools such as RSNetWorx for DeviceNet.

Group Trigger Parameters

Parameter Name	Description	Values/Comments
Group List	Sets the trigger group to be configured.	You can create up to four trigger groups for each XM-440 module.
Node Address	The node address of the XM measurement module in the selected trigger group.	The XM measurement module must be added to the XM Network Node List before it can be added to the trigger group. Refer to XM Network Node List on page 41.
Module Type	The type of XM measurement module at this node address.	
Trigger when...	<p>Determines whether the group trigger occurs when any or all of the selected relays are activated.</p> <p>Important: When this parameter is set to "Any," the trigger event will be sent to the group on the initial activation of any relay in the group. Subsequent activations of relays in the group will not generate subsequent trigger events. A subsequent trigger event will not be sent until all of the relays in the group are deactivated.</p>	
Relay 1–12	Sets the XM-440 relays to use as the trigger for the selected trigger group.	The relay must be enabled before it can be used as a trigger. Refer to Relay Parameters on page 45.

Device Mode Parameters

The Device Mode parameters are used to control the functions and the behavior of the device.

IMPORTANT

The XM Serial Configuration Utility handles these parameters automatically and transparently to the user.

Device Mode Parameters

Parameter Name	Description	Values/Comments
Device Mode	Sets the current operation mode of the device. Refer to Changing Operation Modes on page 57 for more information.	Options: Run Mode Program Mode
Autobaud	Enables/disables autobaud. When autobaud is set to "Enabled," the module will listen to other devices on the network to determine the correct baud rate to use for communications. When autobaud is set to "Disabled," the module baud rate must be set manually.	Options: Enabled Disabled

Event Log Parameters

The Event Log contains records of the 128 most recent events that occurred in the XM-440 or in a module that is in the XM-440 Node List. New log entries after the 128th event over-write old entries one entry at a time. Event records may include:

- alarm status changes
- relay status changes
- setpoint multiplier activation
- changes made to the XM-440 configuration

TIP

The Event Log will be cleared when module power is cycled.

IMPORTANT

The Event Log is not included in the EDS file.

Event Log Parameters

Parameter Name	Description	Values/Comments
Number	The number of the event in the log.	
Time Stamp	Displays the data and time the event occurred.	
Event	Displays a description of the event.	

Event Log Parameters

Parameter Name	Description	Values/Comments
Node	Displays the node address of the module where the event occurred.	
Alarm & Relay	Displays the alarm or relay that changed status (if applicable).	
New Status	Displays the new status of the alarm/relay (if applicable).	

Specifications

The Appendix lists the technical specifications for the XM-440 module.

XM-440 Technical Specifications

Product Feature		Specification
Communications	DeviceNet	Standard DeviceNet protocol for all functions <i>NOTE: The XM-440 uses only the DeviceNet protocol, not power. Module power is provided independently.</i> Available Electronic Data Sheet (EDS) file provides support for most DeviceNet compliant systems Baud rate: 125kb, 250kb, 500kb
	Side Connector	All XM measurement and relay modules include side connectors that allow interconnecting adjacent modules, thereby simplifying the external wiring requirements. The interconnect provides primary power, DeviceNet communication, and the circuits necessary to support expansion modules such as the XM-441 Expansion Relay module.
	Serial	RS-232 via mini-connector or terminal base unit Baud rate fixed at 19200 <i>NOTE: Local configuration via Serial Configuration Utility.</i>
Indicators	6 LEDs	Module Status - red/green Network Status - red/green Relay 1 Status - red Relay 2 Status - red Relay 3 Status - red Relay 4 Status - red

XM-440 Technical Specifications

Product Feature		Specification
Relays	Number	Four relays, two sets of contacts each - DPDT (2 Form C) Four or eight additional relays when connected to one or two XM-441 Expansion Relay modules
	Contacts	250V AC, 50/60 Hz, 3 A Resistive
	Failsafe	Normally energized (failsafe), or Normally de-energized (non-fail-safe)
	Latching	Latching, or Non-latching
	Time Delay	0 to 25.5 seconds, adjustable in 100msec increments
	Voting Logic	Per relay, defined as "A out of B" where "B" is up to 16 alarms and/or relays from any XM measurement module(s) on the bus and "A" is from 1 to "B"
	Reset	Local reset switch on top of module Remote reset switch wired to terminal base Digital reset command via serial or DeviceNet interface
Power	Module	24V DC
	Consumption	200mA maximum
	Heat Production	3.4 Watts (11.6 BTU/hr) maximum
Environmental	Operating Temperature	-20° to +65°C (-4 to +149°F)
	Storage Temperature	-40 to +85°C (-40 to +185°F)
	Relative Humidity	95% non-condensing
		<i>All printed circuit boards are conformally coated in accordance with IPC-A-610C.</i>
Physical	Dimensions	Height: 3.8in (97mm) Width: 3.7in (94mm) Depth: 3.7in (94mm)
	Terminal Screw Torque	7 pound-inches (0.6Nm)

XM-440 Technical Specifications

Product Feature	Specification
Agency Certification (when product or packaging is marked)	UL UL Listed for Ordinary Locations
	UL UL Listed for Class I, Division 2 Group A, B, C, and D Hazardous Locations
	CSA CSA Certified Process Control Equipment
	CSA CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, and D Hazardous Locations
	EEX* European Union 94/9/EEC ATEX Directive, compliant with EN 50021; Potentially Explosive Atmospheres, Protection “n”
	CE* European Union 89/336/EEC EMC Directive
	C-Tick* Australian Radiocommunications Act, compliant with: AS/NZS 2064, Industrial Emissions
* See the Product Certification link at www.rockwellautomation.com for Declarations of Conformity, Certificates and other certification details.	

DeviceNet Information

Electronic Data Sheets

Electronic Data Sheet (EDS) files are simple text files used by network configuration tools such as RSNetWorx (Version 3.0 or later) to help you identify products and easily commission them on a network. The EDS files describe a product's device type, product revision, and configurable parameters on a DeviceNet network.

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

Refer to your DeviceNet documentation for instructions on registering the EDS files.

Changing Operation Modes

XM modules operate in two modes.

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

To change the operation mode of the module, use the Device Mode parameter in the EDS file. Note that the Stop and Start services described on page 59 can also be used to change the operation mode.

IMPORTANT

The XM Serial Configuration Utility software automatically puts XM modules in Program mode and Run mode without user interaction.

Transition to Program Mode

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

To transition an XM module from Run mode to Program mode on a DeviceNet network, set the **Device Mode** parameter to "Program mode" and click **Apply**. Note that you cannot change any other parameter until you have downloaded the Program mode parameter.

TIP

The Module Status indicator flashes green when the module is in Program mode.

Refer to your DeviceNet documentation for specific instructions on editing EDS device parameters.

TIP

You can also use the Stop service described on page 59 to transition XM modules to Program mode.

Transition to Run Mode

In order to collect data and monitor measurement devices, XM modules must be in Run mode. To transition an XM module from Program mode to Run mode on a DeviceNet network, set the **Device Mode** parameter to "Run mode" and click **Apply**.

TIP

The Module Status indicator is solid green when the module is in Run mode.

Refer to your DeviceNet documentation for specific instructions on editing EDS device parameters.

TIP

You can also use the Start service described on page 59 to transition XM modules to Run mode.

XM Services

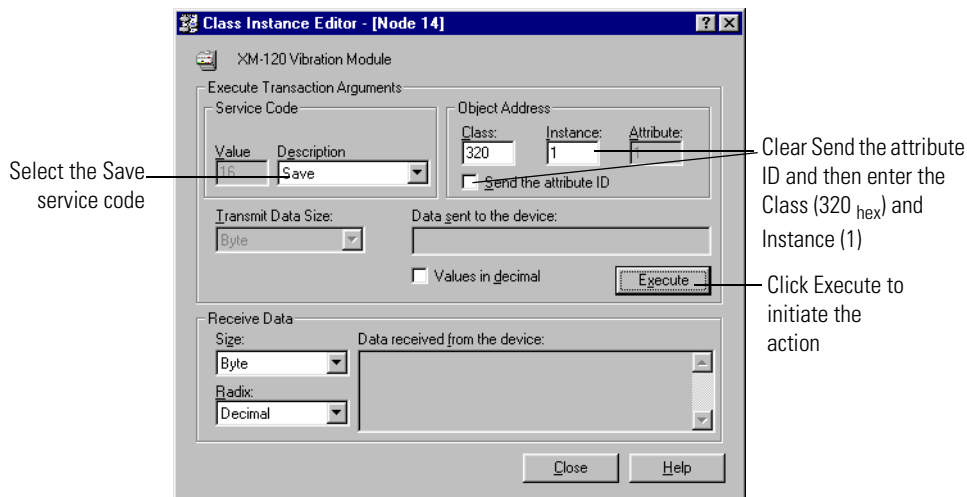
The table below defines the services supported by the XM modules. The table includes the service codes, classes, instances, and attributes by their appropriate hexadecimal codes. Use the Class Instance Editor in RSNetWorx to execute these services, as illustrated in the example below.

XM Services

Action	Service Code (Hex)	Class (Hex)	Instance	Attribute	Data
Transition to Run Mode	Start (06)	Device Mode Object (320)	1	None	None
Transition to Program Mode	Stop (07)	Device Mode Object (320)	1	None	None
Save configuration to non-volatile memory (EEPROM)	Save (16)	Device Mode Object (320)	1	None	None
Delete saved configuration from non-volatile memory (EEPROM)	Delete (09)	Device Mode Object (320)	1	None	None
Reset a specific latched relay	Reset (05)	Relay Object (323)	Relay number 1-C for XM-440, 1-5 for XM-12X, XM-320 and XM-220, 1-8 for XM-36X and XM-16X	None	None
Reset all latched relays	Reset (05)	Relay Object (323)	0	None	None
Reset the Peak Speed (XM-12X only)	Reset (05)	Speed Measurement Object (325)	1, 2 for XM-220	None	None
Close the virtual setpoint multiplier switch to activate the alarm setpoint multipliers (not applicable to all XM modules)	Other (33)	Discrete Input Point Object (08)	1	None	None
Open the virtual setpoint multiplier switch to start the setpoint multiplier timers and eventually cancel alarm setpoint multiplication (not applicable to all XM modules)	Other (32)	Discrete Input Point Object (08)	1	None	None

Example

To save the configuration parameters to the non-volatile memory (EEPROM), fill in the Class Instance Editor as shown below.



Invalid Configuration Errors

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

The general error code for the Invalid Device Configuration error is D0_{hex}. An additional error code is returned with the general error code to specify which configuration settings are invalid. The table below lists the additional error codes associated with the Invalid Device Configuration error.

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

Error Code (Hex)	Description
01	No specific error information is available.
02	Mismatched transducer, channel, and/or measurement unit.
03	Inverted transducer fault high/low values.
04	Alarm thresholds conflict with the alarm condition.
05	Alarm speed range is invalid.
06	Band minimum frequency is greater than maximum frequency. Or, maximum frequency is greater than FMAX.
07	Relay is associated with an alarm that is not enabled.
08	Tachometer must be enabled for alarm or channel settings.
09	A senseless speed range is enabled on a speed alarm.

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

Error Code (Hex)	Description
0A	Too many alarms associated with a single measurement.
0B	Invalid node address in the alarm list.
0C	Too many alarms in the alarm list. Or, no alarms in the alarm list.
0D	Alarm levels cannot be zero for alarms that are enabled.
0E	Too many slaves in the scanner's input data table.
0F	The FMAX and Number of Lines do not yield correct vector calculations.
10	Phase (vector) alarms prohibited with synchronous sampling and more than 1 pulse per revolution.
11	Order-based bands are prohibited with asynchronous sampling.
12	Unsupported Sensor Type and Channel ID combination.
13	Invalid Alarm Type for the associated measurement ID.
14	Synchronous sampling is required for alarm on synchronous measurements.
15	Integration is not supported with the Bypass High Pass Filter option.

XM-440 I/O Message Formats

The XM-440 module supports Change of State (COS) I/O messages. The COS messages are used to produce the Alarm and Relay Status.

COS Message Format

The XM-440 COS message contains two bytes of data as defined in the table below. The COS data can also be requested explicitly through Assembly Object (Class ID 0x4), Instance 100 (0x64) Data Attribute (3).

XM-440 COS Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Relay 8 Status	Relay 7 Status	Relay 6 Status	Relay 5 Status	Relay 4 Status	Relay 3 Status	Relay 2 Status	Relay 1 Status
1	Reserved	Reserved	Reserved	Reserved	Relay 12 Status	Relay 11 Status	Relay 10 Status	Relay 9 Status

XM Status Values

The XM Status values included in the COS messages are defined in the table below.

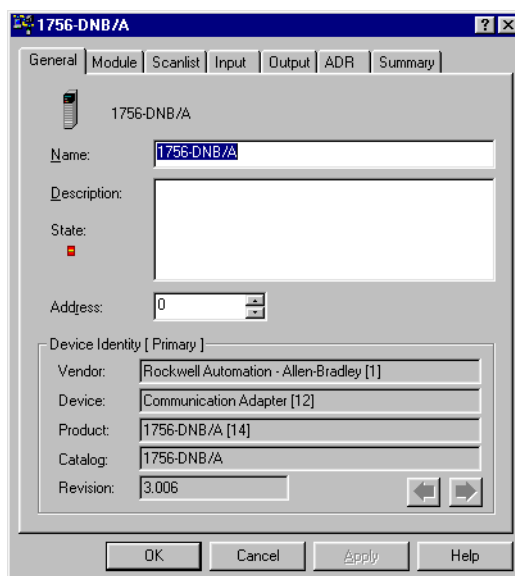
Relay Status Descriptions

Relay Status Value	Description
0	Not Activated
1	Activated

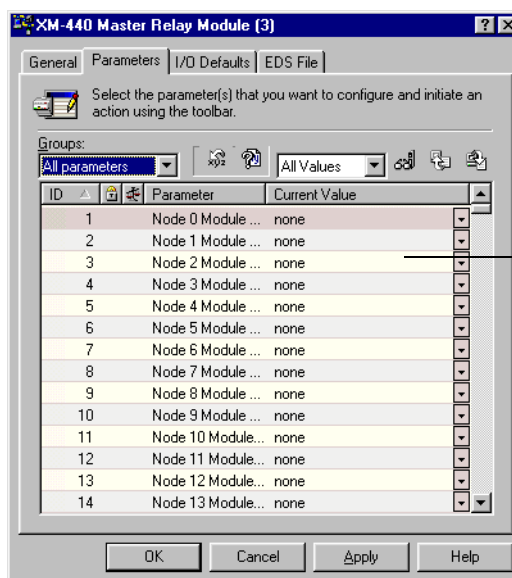
Using RSNetWorx with the XM-440

The XM-440 acts as a DeviceNet master/scanner on the XM network. The measurement modules are slaves to the XM-440. The XM-440 is an *application specific* master, however. This means that it should be used to scan only XM measurement modules and not other DeviceNet devices.

Generic DeviceNet master/scanner devices can be used to scan any DeviceNet device, including XM modules. These scanners are configured in RSNetWorx with the DeviceNet Scanner applet, as shown below.



As an application specific master, the XM-440 has application specific parameters in addition to the parameters related to the scanlist. Since the Scanner applet can configure only scanlist parameters, it cannot be used to configure the XM-440. Instead, the EDS Devices applet is used, as shown below.



Lists all the parameters in the EDS file in numerical order by parameter number

Application specific parameters and some scanlist parameters are included in the XM-440 EDS file, and the user must configure the scanlist manually.

IMPORTANT

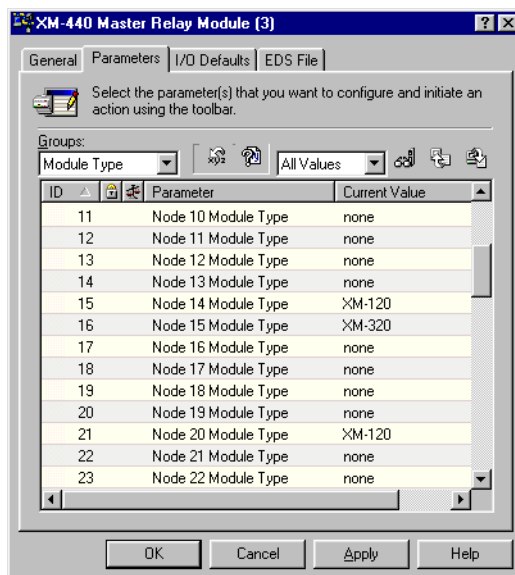
The XM-440 input and output data table mappings are not included in the EDS file. The XM-440 builds these mappings itself when it enters Run mode.

Configuring the XM-440 Scanlist

The scanlist parameters in the XM-440 EDS file include: Module Type and Share Status for every possible node address. You must configure these parameters manually when setting up the XM-440 scanlist.

To configure the Module Type

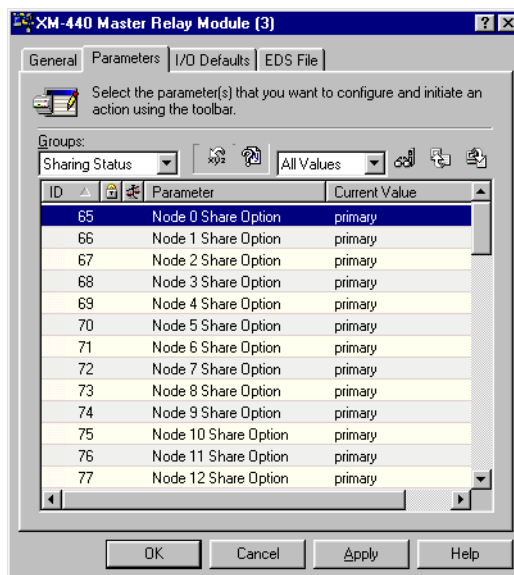
Parameters 1 to 64 (Module Type group) are used to enter the module type information.



You must select the XM measurement module type at each node address, or select "None" for the node addresses that are not used. For every node that is used in any XM-440 alarm list, the corresponding Module Type parameter must be set to the appropriate XM measurement module type. Adding a node that has the Module Type set to "None" to an alarm list will result in an Invalid Device Configuration error.

To configure the Sharing Status

Parameters 65 to 128 (Sharing Status group) are used to enter the share status information.



Follow these guidelines when configuring the Share Option parameter.

- If the XM-440 is the primary master of an XM measurement module, then the Share Option parameter for the corresponding node address must be set to "primary."
- If another master/scanner is the primary master of the XM measurement module, and the XM-440 is to share the XM measurement module, then the Share Option parameter for the corresponding node address must be set to "shared."

Note that a generic master/scanner must always be the primary master and the XM-440 must always share the slave. This is because of the way the Scanner applet works. If the Share Option parameter is set to "primary," the Scanner applet would not know that a primary master has been selected for the XM measurement module (because the Scanner applet was not used to configure the XM-440). So the Scanner applet would not be able to enable the shared inputs function when adding the XM measurement module to the generic master/scanner's scan list. And both the generic master/scanner and the XM-440 would try to be the primary master for the XM measurement module.

IMPORTANT

There can be only one primary master of a slave. And a slave must have a primary master before it can be shared with another master/scanner.

ADR for XM Modules

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

IMPORTANT

It is recommended that ADR not be used in safety related applications. If the failure of the ADR server, and a subsequent power cycle, would result in the loss of protection for a machine, then ADR should not be implemented.

ADR can be used with XM modules but keep the following in mind when setting up the XM modules.

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

TIP

To delete a saved configuration from non-volatile memory, use the Delete service in RSNetWorx for DeviceNet or perform the following steps in the XM Serial Configuration Utility.

1. Save the current configuration to a file. From the **File** menu, click **Save As** and enter a file name for the configuration.
 2. Reset the module to factory defaults. Click the **Module** tab and click the **Reset** button.
 3. Reload the saved configuration. From the **File** menu, click **Open** and select the configuration file.
 4. Make certain to disable auto save. From the **Device** menu, clear the **Auto Save Configuration** check mark.
- An XM module will enter Run mode automatically after the ADR scanner restores the module's configuration only if the module is in Run mode at the time the configuration is saved to the scanner. If the module is in Program mode when the configuration is saved, then the module will remain in Program mode after the configuration is downloaded by the ADR scanner.

- The ADR scanner saves and restores only the configuration parameters contained in the module's EDS file. Some XM parameters are not included in the EDS file because they are not supported by either the EDS specification or the tools that read the EDS files, for example RSNetWorx for DeviceNet. These configuration parameters will not be restored with ADR.

Below is a list of the configuration parameters that are not included in the EDS file and can not be saved or restored with ADR.

- Channel Name
 - Tachometer Name
 - Alarm Name
 - Relay Name
 - All Triggered Trend related parameters
 - All SU/CD Trend related parameters
 - Custom Assembly structure
- The ADR and trigger group functions cannot be used together. A module can have only one primary master so a module cannot be both configured for ADR and included in a trigger group. The ADR scanner must be the primary master for the modules configured for ADR. The XM-440 Master Relay module must be the primary master for modules included in a trigger group.

DeviceNet Objects

Appendix C provides information on the DeviceNet objects supported by the XM-440 module.

For information about	See page
Identity Object (Class ID 01H)	70
DeviceNet Object (Class ID 03H)	72
Assembly Object (Class ID 04H)	73
Connection Object (Class ID 05H)	75
Parameter Object (Class ID 0FH)	76
Acknowledge Handler Object (Class ID 2BH)	81
Entek Log Object (Class ID 321H)	82
Relay Object (Class ID 323H)	85

TIP

Refer to the DeviceNet specification for more information about DeviceNet objects. Information about the DeviceNet specification is available on the ODVA web site (<http://www.odva.org>).

Identity Object (Class ID 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 C.1 Identity Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Default Value
1	Get	Vendor ID	UINT	668 = Entek
2	Get	Device Type	UINT	109 (Specialty I/O)
3	Get	Product Code	UINT	25 (0x19)
4	Get	Revision: Major Minor	STRUCT OF USINT USINT	Value varies with each firmware revision Value varies with each firmware revision
5	Get	Status	WORD	
6	Get	Serial Number	UDINT	
7	Get	Product Name	SHORT_STRING	" XM-440 Master Relay Module"

Status

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

Table C.2 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

Table C.2 Identity Object Status

Bit	Name	Description
4	Boot Program	Vendor-specific, indicates that the boot program is running. The Main Application must be corrupt or missing.
5 - 7		Vendor-specific, not implemented
8	Minor Recoverable Fault	Not implemented
9	Minor Unrecoverable Fault	Not implemented
10	Major Recoverable Fault	Set when the module detects a major problem that the user may be able to recover from. The Module Status LED will flash red. An example of this condition is when the boot program is running.
11	Major Unrecoverable Fault	Set when there is a module status fault (Module Status LED is solid red).
12 - 15		Reserved, set to 0

Services

Table C.3 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 ¹

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

DeviceNet Object (Class ID 03_H)

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

Class Attributes

Table C.4 DeviceNet Object Class Attributes

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

Instance Attributes

Table C.5 DeviceNet Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Default Value
1	Get/Set	MAC ID ¹	USINT	63
2	Get/Set	Baud Rate ²	USINT	0
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/Set	Autobaud Disable	BOOL	0 (Ignore attribute 2 and always autobaud)

- 1 Setting the MAC ID causes the device to reset automatically, after which it will go online with the new MAC ID.
- 2 The Baud Rate setting can not be set while **Autobaud Disable** is equal to 0. Applying the Baud Rate does not occur until the Reset service to the Identity Object.

The **MAC ID**, **Baud Rate**, and **Autobaud Disable** settings are stored in non-volatile memory so they do not reset to the default with each power cycle. The **Baud Rate** attribute supports the following settings:

- 0 = 125 kbps
- 1 = 250 kbps
- 2 = 500 kbps

The Baud Rate setting is used only when automatic baud rate detection is disabled (Autobaud Disable = 1). When Autobaud Disable is set to zero (0), the module ignores its Baud Rate setting and performs automatic baud rate

detection instead. This means that the module will determine the network baud rate by listening for network traffic before attempting to go online.

Services

Table C.6 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_Connetion_Set
4C _h	Instance	Release_Group_2_Identifier_Set

Assembly Object (Class ID 04_h)

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

The XM-440 module provides only static assemblies. Dynamic assemblies are not supported.

Class Attribute

The Assembly Object provides no class attributes.

Instances (DeviceNet Slave)

Table C.7 Assembly Object Instances

Instance	Name	Type	Description
100	Relay Status	Input	Contains Relay status information on all relays in the module.

Instance Attributes

Table C.8 Assembly Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Value
3	Get	Data	Defined in tables below.	

Assembly Instance Attribute Data Format

Instance 100 - Relay Status

When the Relay Module acts as a slave, it sends the following in a COS message.

Table C.9 Instance 100 Data Format (Relay Status Values Assembly)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Relay 8 Status	Relay 7 Status	Relay 6 Status	Relay 5 Status	Relay 4 Status	Relay 3 Status	Relay 2 Status	Relay 1 Status
1	0	0	0	0	Relay 12 Status	Relay 11 Status	Relay 10 Status	Relay 9 Status

Instances 101 to 163

These instances contain the slave devices alarm data. The format is unique for each slave type.

Services

Table C.10 Assembly Object Services

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

Connection Object (Class ID 05_H)

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 (DeviceNet Slave)

Table C.11 Connection Object Instances

Instance	Description
1	Explicit Message Connection for pre-defined connection set
2	I/O Poll Connection
4	I/O COS (change of state) Connection
11 - 14	Explicit Message Connection

Instance Attributes

Table C.12 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.

Table C.12 Connection Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description
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 C.13 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

Parameter Object (Class ID 0F_H)

The Parameter Object provides the interface to the XM-440 configuration data.

Parameter Object instances 1-128 provide additional information for the Scan List. Instances 1-64 are used to specify the Module Type of the device located at network nodes 0-63, respectively. Instances 65-128 are used to specify the Share Option for each node on the network.

Parameter Object instances 129-512 provide an alternate method of setting complex Relay Object attributes. The odd attributes in this range are used to specify the node address (MAC ID) of the slave that produces each alarm in the Alarm List for each Relay instance. The even attributes in this range are used to specify the alarm number for the alarm from the slave.

Parameter instances 513-524 are for the Group feature. There are four groups with three parameters per group. The first parameter specifies the slave nodes that are members of the Group. The second parameter specifies the Relay Object instances that are inputs for the Group's trigger. The third parameter determines whether any or all of the Relay inputs must be activated in order for a Group trigger to occur. When the Group trigger occurs, a trigger event is sent to all of the member nodes.

Class Attributes

Table C.14 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

Table C.15 Parameter Object Instances

Instance	Read Only	Name	Data Type	Valid Values	Default Value
1-64	No	Module Type of MAC ID <i>n</i> (where <i>n</i> is the instance number -1)	USINT	0 = None 1 = XM-120 2 = XM-320 3 = XM-360 4 = XM-361 5 = XM-362 6 = XM-121 7 = XM-122 8 = XM-120E 9 = XM-220 10 = XM-123 11 = XM-121A 12 = XM-160 13 = XM-161 14 = XM-162	0
65-128	No	Share Option for MAC ID <i>m</i> (where <i>m</i> is the instance number -65)	BOOL	0 = Master Relay is primary master of this slave 1 = Master Relay is sharing this slave	0
129	No	MAC ID for Relay 1, Alarm List entry 1	USINT	0-63 = Alarm is used and references this MAC ID 64 = Alarm entry is not used	64
130	No	Alarm Number for Relay 1, Alarm List entry 1	USINT	1-16	1
131	No	MAC ID for Relay 1, Alarm List entry 2	USINT	0-63 = Alarm is used and references this MAC ID 64 = Alarm entry is not used	64
132	No	Alarm Number for Relay 1, Alarm List entry 2	USINT	1-16	1
...
511	No	MAC ID for Relay 12, Alarm List entry 16	USINT	0-63 = Alarm is used and references this MAC ID 64 = Alarm entry is not used	64
512	No	Alarm Number for Relay 12, Alarm List entry 16	USINT	1-16	1
513	No	Group 1 Member Nodes	LWORD	64-bits (one bit for each node) 1 = Group member 0 = Non-member	0
514	No	Group 1 Relays to trigger from	WORD	16-bits (bits 0-11 correspond to relay instances 1-12) 1 = Trigger on relay 0 = Ignore relay	

Table C.15 Parameter Object Instances

Instance	Read Only	Name	Data Type	Valid Values	Default Value
515	No	Group 1 Trigger Logic	BOOL	0 = Trigger when all relays activated 1 = Trigger when any relay is activated	
516	No	Group 2 Member Nodes	LWORD	64-bits (one bit for each node) 1 = Group member 0 = Non-member	0
517	No	Group 2 Relays to trigger from	WORD	16-bits (bits 0-11 correspond to relay instances 1-12) 1 = Trigger on relay 0 = Ignore relay	
518	No	Group 2 Trigger Logic	BOOL	0 = Trigger when all relays activated 1 = Trigger when any relay is activated	
519	No	Group 3 Member Nodes	LWORD	64-bits (one bit for each node) 1 = Group member 0 = Non-member	0
520	No	Group 3 Relays to trigger from	WORD	16-bits (bits 0-11 correspond to relay instances 1-12) 1 = Trigger on relay 0 = Ignore relay	
521	No	Group 3 Trigger Logic	BOOL	0 = Trigger when all relays activated 1 = Trigger when any relay is activated	
522	No	Group 4 Member Nodes	LWORD	64-bits (one bit for each node) 1 = Group member 0 = Non-member	0
523	No	Group 4 Relays to trigger from	WORD	16-bits (bits 0-11 correspond to relay instances 1-12) 1 = Trigger on relay 0 = Ignore relay	
524	No	Group 4 Trigger Logic	BOOL	0 = Trigger when all relays activated 1 = Trigger when any relay is activated	
525	No	MAC ID for Relay 1, Bool List entry 1	USINT	0-63 (Boolean is used and references this MAC ID) 64 (Boolean entry is not used)	64
526	No	Input Relay number for output Relay 1, Bool List entry 1	USINT	1-8	1

Table C.15 Parameter Object Instances

Instance	Read Only	Name	Data Type	Valid Values	Default Value
527	No	MAC ID for Relay 1, Bool List entry 2	USINT	0-63 (Boolean is used and references this MAC ID) 64 (Boolean entry is not used)	64
528	No	Input Relay number for output Relay 1, Bool List entry 2	USINT	1-8	1
...
715	No	MAC ID for Relay 12, Bool List entry 8	USINT	0-63 (Boolean is used and references this MAC ID) 64 (Boolean entry is not used)	64
716	No	Input Relay number for output Relay 12, Bool List entry 8	USINT	1-8	1

Instance Attributes

Table C.16 Parameter Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
1	Set	Parameter Value		Actual value of parameter	See Table C.15 for a list of valid values for each instance.
2	Set	Link Path Size	USINT	Size of Link Path	0 (These Parameter instances do not link directly to another object attribute.)
3	Set	Link Path	ARRAY of DeviceNet path	DeviceNet path to the object for the Parameter value.	
		Segment Type/Port	BYTE	See DeviceNet Specification Volume 1 Appendix I for format.	
		Segment Address		See DeviceNet Specification Volume 1 Appendix I for format.	

Table C.16 Parameter Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
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.
6	Get	Data Size	USINT	Number of Bytes in Parameter value.	

Services

Table C.17 Parameter Object Services

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

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

Acknowledge Handler Object (Class ID 2B_H)

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 C.18 Acknowledge Handler Object Instance Attributes

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

Services

Table C.19 Acknowledge Handler Object Services

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

Entek Log Object (Class ID 321_h)

The Entek Log Object models an event log, which is a historical record of notable events.

Class Attributes

The Entek Log Object provides no class attributes.

Instance Attributes

Table C.20 Entek Log Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
3	Get	Number of Logged Events	UINT	The number of events (entries) recorded in the log.	
4	Get	Time Stamp Data Type	UINT	Determines the data type of Time Stamp.	Set to 1 (LTIME) Time stamps are relative.
5	Get	Current Time	LTIME	Relative time stamps are relative to this current time.	64-bit microsecond counter

Services

Table C.21 Entek Log Object Services

Service Code	Class/Instance Usage	Name	Description
05 _h	Instance	Reset	Clears the Event Log.
0E _h	Instance	Get_Attribute_Single	Returns the contents of the specified attribute.
4B _h	Instance	Get_Event	Returns information about the specified event from the log.

Get_Event Service Request Data Format

Table C.22 Get_Event Service Request Data Format

Byte	Name	Data Type	Description	Semantics
0 - 1	Event Number	UINT	The number of the event.	0 (zero) is the most recent.

Get_Event Service Response Data Format

Table C.23 Get_Event Service Response Data Format

Byte	Name	Data Type	Description	Semantics
1 - 8	Time Stamp	LTIME	The relative time of the event occurrence.	64-bit microsecond counter
9 - 10	Event Type	UINT	Identifies the type of the event.	6 = Application notification
11 - 12	Event Data Format	UINT	Identifies the format of the event data. This may be useful for discriminating between different revisions of the event data format. For example, the format changed from one product revision to the next.	1 (initial revision)
13	Event Data Length	USINT	The number of bytes of Event Data .	
14	Event Data	Array of BYTE	Event related data in format based upon the Event Type	Application Specific See below for format for Application Notification event.

Event Data Format for Application Notification Event Type

Table C.24 Event Data Format for Application Notification Event Type

Byte	Name	Data Type	Description	Semantics
14	Event Data	Array of BYTE	A more detailed Event classification.	0 = Alarm Status Change 1 = Relay Status Change 2 = Setpoint Multiplier Occurrence 3 = Configuration Change Occurrence
15	MAC ID	MAC ID	The MAC ID of the device that originated the Alarm or Relay events.	0 to 63
16	Instance Number	USINT	The Alarm or Relay Object instance number for Alarm or Relay events.	1 to 255
17	New Status	USINT	The new Alarm Status or Relay Status value for Alarm and Relay events.	<u>Relay Status Value</u> 0 = Not activated 1 = Activated <u>Alarm Status Value</u> 0 = Normal 1 = Alert 2 = Danger 3 = Disarm 4 = Transducer or Sensor OOR Fault 5 = Module Fault 6 = Tachometer Fault 7 = Reserved

Relay Object (Class ID 323_H)

The Relay Object holds information about controlling the operation of an on-board relay.

Class Attributes

Table C.25 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.	12
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 are 12 instances of the Relay Object.

Instance Attributes

Table C.26 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)

Table C.26 Relay Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
7	Get/Set	Delay	USINT	The time period that the voting logic must be true before the relay is activated.	0 to 25.5 seconds (specified in tenths of seconds)
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 will cause the relay to activate.	0 = Normal 1 = Alert 2 = Danger 3 = Disarm 4 = Xdcr Fault 5 = Module Fault 6 = Tachometer Fault 7 = Unknown
12	Get/Set	Logic	USINT	Indicates the number of associated alarms that must have a status value specified by Alarm Level in order to activate the relay.	The number of alarms that must meet or exceed the Alarm Level condition(s) before the relay is activated. For example if there are 8 alarms in the Alarm List and the Logic attribute is set to 3, the relay will activate when any 3 or more of the 8 alarm statuses exist at the same time.
13	Get/Set	Alarm List	STRUCT of	A list of Alarms used to determine the relay status.	
		Number	USINT	The number of alarms in the list.	The number of 3 USINT sets that follow (1-16). The USINT specify the device from which the alarm comes from and the location within that device's COS Assembly where the particular alarm status is found.
		List	Array of STRUCT of		
		MAC ID	USINT	Specifies the device that maintains the alarm.	0-63
		Byte Offset	USINT	Specifies the byte in the device's COS Assembly that contains the alarm status.	0-255
		Bit Offset	USINT	Specifies the bit within the byte where the alarm status value begins.	

Table C.26 Relay Object Instance Attributes

Attr ID	Access Rule	Name	Data Type	Description	Semantics
14	Get	Relay Installed	BOOL	Indicates whether an actual relay is associated with this instance.	0 = Not installed 1 = Installed
15	Get/Set	Bool List	STRUCT of	A list of Booleans used as inputs to determine the output relay status.	The COS Assembly data from the slave device may contain several Boolean values. The Relay object's Bool List members are represented with three USINT that specify the device from which the Boolean comes from and the location within that device's COS Assembly where the particular Boolean is found.
		Number	USINT	The number of Booleans in the list.	The number of 3 USINT sets that follow (1-8).
		List	Array of STRUCT of		
		MAC ID	USINT	Specifies the device that maintains the Boolean	0-63
		Byte Offset	USINT	Specifies the byte in the device's COS Assembly that contains the Boolean.	0-255
		Bit Offset	USINT	Specifies the bit within the byte where the Boolean value resides.	0-7

Services

Table C.27 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 the contents of the specified attribute.
10 _h	Class/Instance	Set_Attribute_Single	Sets a single attribute. ¹

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

alarm

An alarm alerts you to a change in a measurement. For example, an alarm can notify you when the measured vibration level for a machine exceeds a pre-defined value.

alarm list

An alarm list is a set of alarms (from XM measurement modules) that will be monitored by a relay in the XM-440 Master Relay module. Each XM-440 relay has its own alarm list.

Automatic Device Replacement (ADR)

A means for replacing a malfunctioning device with a new unit, and having the device configuration data set automatically. The ADR scanner uploads and stores a device's configuration. Upon replacing a malfunctioning device with a new unit (MAC ID 63), the ADR scanner automatically downloads the configuration data and sets the MAC ID (node address).

baud rate

The baud rate is the speed at which data is transferred on the DeviceNet network. The available data rates depend on the type of cable and total cable length used on the network:

Cable	Maximum Cable Length		
	125K	250K	500K
Thick Trunk Line	500m (1,640ft.)	250m (820ft.)	100m (328ft.)
Thin Trunk Line	100m (328ft.)	100m (328ft.)	100m (328ft.)
Maximum Drop Length	6m (20ft.)	6m (20ft.)	6m (20ft.)
Cumulative Drop Length	156m (512ft.)	78m (256ft.)	39m (128ft.)

The XM measurement modules' baud rate is automatically set by the bus master. You must set the XM-440 Relay module baud rate. You set the XM-440 Master Relay to 125kb, 250kb, 500kb, or Autobaud if another device on the network has set the baud rate.

bus off

A bus off condition occurs when an abnormal rate of errors is detected on the Control Area Network (CAN) bus in a device. The bus-off device cannot receive or transmit messages on the network. This condition is often caused by corruption of the network data signals due to noise or baud rate mismatch.

Change of State (COS)

DeviceNet communications method in which the XM module sends data based on detection of any changed value within the input data (alarm or relay status).

current configuration

The current configuration is the most recently loaded set of configuration parameters in the XM module's memory. When power is cycled, the current configuration is loaded with either the saved configuration (in EEPROM) or the factory defaults (if there is no saved configuration). In addition, the current configuration contains any configuration changes that have been downloaded to the module since power was applied.

DeviceNet network

A DeviceNet network uses a producer/consumer Controller Area Network (CAN) to connect devices (for example, XM modules). A DeviceNet network can support a maximum of 64 devices. Each device is assigned a unique node address (MAC ID) and transmits data on the network at the same baud rate.

A cable is used to connect devices on the network. It contains both the signal and power wires. General information about DeviceNet and the DeviceNet specification are maintained by the Open DeviceNet Vendor's Association (ODVA). ODVA is online at <http://www.odva.org>.

EEPROM

See NVS (Non-Volatile Storage).

Electronic Data Sheet (EDS) Files

EDS files are simple text files that are used by network configuration tools such as RSNetWorx for DeviceNet to describe products so that you can easily commission them on a network. EDS files describe a product device type, revision, and configurable parameters.

Help window

A window that contains help topics that describe the operation of a program. These topics may include:

- An explanation of a command.
- A description of the controls in a dialog box or property page.
- Instructions for a task.
- Definition of a term.

MAC ID

See node address.

master device

A device which controls one or more slave devices. The XM-440 Master Relay module is a master device.

node address

A DeviceNet network can have as many as 64 devices connected to it. Each device on the network must have a unique node address between 0 and 63. Node address 63 is the default used by uncommissioned devices. Node address is sometimes called "MAC ID."

NVS (Non-Volatile Storage)

NVS is the permanent memory of an XM module. Modules store parameters and other information in NVS so that they are not lost when the module loses power (unless Auto Save is disabled). NVS is sometimes called "EEPROM."

online help

Online help allows you to get help for your program on the computer screen by pressing **F1**. The help that appears in the Help window is context sensitive, which means that the help is related to what you are currently doing in the program.

Polled

DeviceNet communications method in which the XM module sends data in response to a poll request from a master device.

Program mode

The XM module is idle. Typically this occurs when the module configuration settings are being updated with the XM Configuration program. In Program mode, the XM-440 closes I/O connections, stops monitoring the alarms from the XM measurement modules, and the relays are deactivated unless they are latched.

Run mode

In Run mode, the XM-440 module establishes I/O connections with the XM measurement modules in its scan list and monitors their alarms, and controls its own relay outputs accordingly.

slave device

A device that receives and responds to messages from a Master device but does not initiate communication. Slave devices include the XM measurement modules, such as the XM-120 Dynamic Measurement module and the XM-320 Position module.

transducer

A transducer is a device for making measurements. These include accelerometers, velocity pickups, displacement probes, and temperature sensors.

trend

A set of records of one or more measurement parameter(s) collected at regular intervals of a base parameter such as time.

trigger

An event that prompts the collection of trend data.

triggered trend

A time-based trend that is collected in an XM module when a relay on the XM module is activated, or when the module receives a trigger event.

trigger group

A group of XM measurement modules defined from a Node List in an XM-440 Master Relay module. When the selected XM-440 relays are activated, the XM-440 sends a trigger event to the modules in the group, causing them to collect their triggered trend data.

virtual relay

A virtual relay is a non-physical relay. It has the same capabilities (monitor alarms, activation delay, change status) as a physical relay only without any physical or electrical output. The virtual relay provides additional relay status inputs to a controller, PLC, or an XM-440 Master Relay module (firmware revision 5.0 and later).

XM configuration

XM configuration is a collection of user-defined parameters for XM modules.

XM Serial Configuration Utility Software

XM Serial Configuration Utility software is a tool for monitoring and configuring XM modules. It can be run on computers running Windows 2000 service pack 2, Windows NT service pack 6, or Windows XP operating systems.

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Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products.

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

United States or Canada	1.440.646.3434
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Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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