

# 1738 ArmorPOINT I/O EtherNet/IP Adapters

Catalog Numbers 1738-AENT, Series B



## 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.

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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.

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

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Read this preface to familiarize yourself with the rest of the manual. It provides information concerning:

- who should use this manual
- the purpose of this manual
- related documentation
- conventions used in this manual

## Who Should Use this Manual

This manual is intended for control engineers and technicians who are installing, configuring, maintaining, and troubleshooting an EtherNet/IP control system that communicates with ArmorPOINT I/O® through a 1738-AENT Series B adapter. You must be able to use RSLogix® 5000 software to configure your adapter.

## Purpose of This Manual

This manual contains an overview of the ArmorPOINT I/O adapter. It describes how to install and configure the adapter and provides examples showing how to use the adapter to communicate with ArmorPOINT I/O modules over an EtherNet/IP network.

## Related Documentation

The following documents contain additional information concerning Rockwell Automation products. To obtain a copy, contact your local Rockwell Automation office or distributor.

Resource	Description
1738 ArmorPOINT I/O Selection Guide, publication <a href="#">1738-SG001</a>	A description and overview of the 1738 series adapters, I/O modules, and compatible control platforms.
EtherNet/IP Performance and Application Guide, publication <a href="#">ENET-RM002</a> .	Using EtherNet/IP for Industrial Control.
EtherNet/IP Modules in Logix5000™ Control Systems User Manual, publication <a href="#">ENET-UM001</a>	A manual describing how to use EtherNet/IP modules with Logix5000 controllers and communicate with various devices on the Ethernet network.
ControlLogix® Chassis and Power Supplies Installation Instructions, publication <a href="#">1756-IN005</a> .	Describes how to install and troubleshoot standard and ControlLogix-XT versions of the 1756 chassis and power supplies, including redundant power supplies.
ControlLogix EtherNet/IP Bridge Module Installation Instructions, publication <a href="#">1756-IN019</a>	ControlLogix EtherNet/IP Bridge Module installation instructions.
ControlLogix System User Manual, publication <a href="#">1756-UM001</a>	Detailed information on how to install, configure and troubleshoot the ControlLogix Sequence of Events module in your ControlLogix application.
RSLinx® Classic Getting Results Guide, publication <a href="#">LINX-GR001</a>	Information on how to install and navigate the RSLinx Classic software. It explains how to access and navigate the help, and how to effectively use the RSLinx Classic software.
1738 ArmorPOINT I/O® EtherNet/IP Adapter Installation Instructions, publication <a href="#">1738-IN030</a>	Installation instructions for installing the 1738 POINT I/O EtherNet/IP Adapter.
Pinout Guide for 1738 ArmorPOINT Adapters and Power Supplies Wiring Diagram, publication <a href="#">1738-WD011</a>	Information on wiring 1738 ArmorPOINT I/O EtherNet/IP Series B Adapters and Power Supplies.

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Resource	Description
EtherNet/IP Embedded Switch Technology Application Guide, publication <a href="#">ENET-AP005</a>	An application guide describing how to install, configure and maintain linear and Device-level Ring (DLR) networks using Rockwell Automation EtherNet/IP devices with embedded switch technology.
Allen-Bradley Industrial Automation Glossary, publication <a href="#">AG-QR071</a>	A glossary of industrial automation terms and abbreviations.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-IN041</a> .	Detailed information on proper wiring and grounding techniques.
EtherNet/IP Media Planning and Installation Manual ( <a href="#">ODVA</a> ).	Installing an EtherNet/IP network

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**TIP** Many of these publications are available online from:  
<http://literature.rockwellautomation.com/>

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## Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- *Italic* type is used for emphasis.

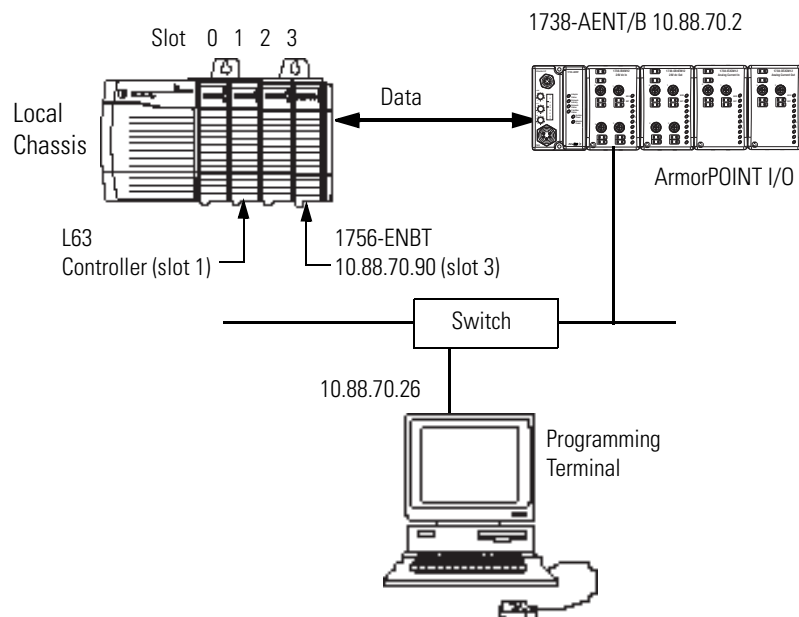
Rockwell Software products contain extensive tutorials and help screens. We recommend that you use these tutorials and help screens to learn about the products.

For more information about Rockwell Software products, visit the Rockwell Software website at <http://www.rockwellautomation.com/software/>.

## About the Example Applications

This manual presents two example applications that demonstrate the procedures for configuring and communicating with ArmorPOINT I/O modules using the ArmorPOINT I/O adapter. We intend the example applications as building blocks to help you get your own system up and running. We recommend that you set up and run the example applications and use them as guides.

Here is the type of system you'll be setting up.



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## System Components

We used the following components for the example applications. You will need the same or similar components to set up your own control system using ArmorPoint I/O on EtherNet/IP.

### System Components

Quantity	Product Name	Catalog Number
<b>Hardware</b>		
1	ArmorPoint I/O EtherNet/IP Adapter	1738-AENT
1	ArmorPoint 24V DC Input Module	1738-IB4M12
	ArmorPoint I/O 24V DC Sink Output Module	1738-OB4EM12
1	ArmorPoint I/O Analog Input Current Module	1738-IE2CM12
1	ArmorPoint I/O Analog Output Current Module	1738-OE2CM12
1	DIN Rail	199-DR1 or equivalent
1	ControlLogix chassis	1756-A4, (or 1756-A7, 1756-A13, 1756-A17)
1	ControlLogix power supply	1756-PA72, (or 1756-PB72)
1	L63 Controller	1756-L63
1	ControlLogix EtherNet/IP Bridge Module	1756-ENBT
1	Personal computer that supports RSLogix 5000 software	Any appropriate model running Windows NT, Windows 2000, Windows XP or higher Any appropriate model running Windows NT 4.0, Service Pack 6A or higher
1	Ethernet switch	Refer to manufacturer's specifications
1	24V DC power supply	1738-EP24DC
	Associated media and connectors as needed	
<b>Software</b>		
1	RSLinx communications software, V2.56 or later.	9355-WAB, 9355-WABOEM, 9355-WABC
1	RSLogix 5000 programming software, V17 or higher	9324-RLD300ENE

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# Overview of the 1738 ArmorPOINT I/O EtherNet/IP Adapter

## Overview

This chapter provides an overview of the ArmorPOINT I/O Series B EtherNet/IP adapter, its primary features, and how to use it. You need to understand the concepts discussed in this chapter to configure your adapter and use it in an EtherNet/IP control system.

The following table lists where to find specific information.

Topic	Page
<a href="#">Adapter Features</a>	1
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## Adapter Features

The ArmorPOINT I/O adapters provide connectivity to EtherNet/IP networks for ArmorPOINT I/O modules. The adapter is for the I/O backplane that provides connectivity through an RJ-45 connector for single-port pass-through support of star and tree network topologies.

Some of the module's features are as follows:

- Use of EtherNet/IP messages encapsulated within standard TCP/UDP/IP protocol
- Common application layer with ControlNet and DeviceNet networks
- Interfacing via Category 5 rated twisted pair cable

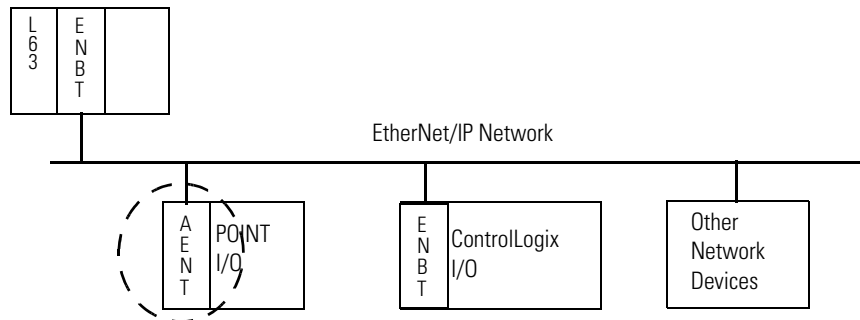
- Half/full duplex 10 Mbit or 100 Mbit operation
- Panel or wall mounting
- Communication to and from other ArmorPOINT I/O modules in the chassis
- Communication supported by RSLinx software
- IP address assigned via standard BootP or DHCP tools
- I/O configuration via RSLogix 5000 software
- No network scheduling required
- No routing tables required
- Support of connections from multiple controllers simultaneously

You must use RSLogix 5000 to configure these features. For more details on configuration, see [Configuration Requirements](#) in [Chapter 3](#).

## What the Adapter Does

The I/O adapters perform the following primary tasks:

- Control of real-time I/O data (also known as implicit messaging) - the adapter serves as a bridge between I/O modules and the network



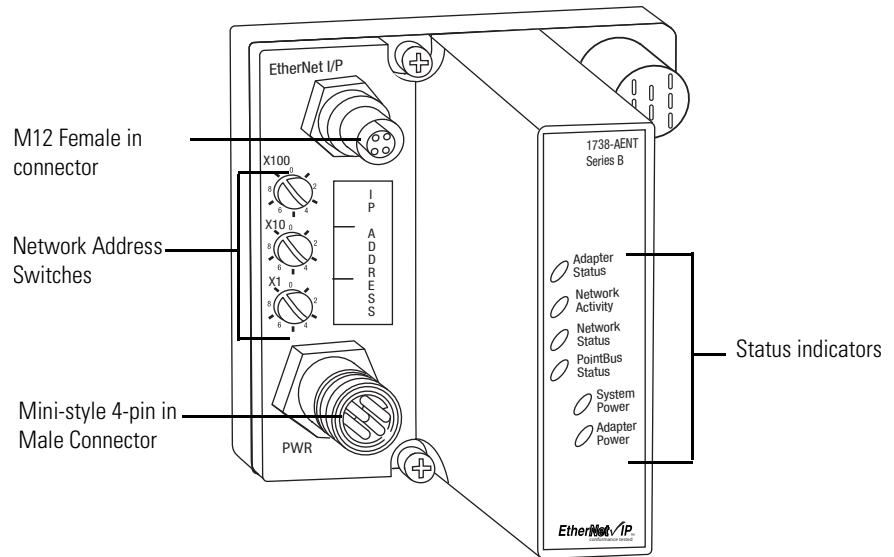
- Support of messaging data for configuration and programming information (also known as explicit messaging)

## Physical Features of Your Adapter

The 1738 Adapter has the following components:

- One EtherNet/IP Female M12 connector
- Network address Switches
- Mini Style 4-Pin in Male Auxiliary Power Connector
- Status indicators (Module Status; Network Status; POINTBus Status; Network Activity; System Power; Adapter Power)

### Physical Features of the 1738-AENT/B Adapters



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## Hardware/Software Compatibility

The I/O adapter and the software applications described in this manual are compatible with the following firmware revisions and software releases.

Contact Rockwell Automation if you need software or firmware upgrades to use this equipment

Product	Firmware Revision/ Software Release
1738-AENT Series B adapters	4.002 or later
1756-ENBT	4.5 or later
Logix Controller	17 or later
RSLogix 5000 software	17 or later
RSLinx software	2.56 or later

## Important Adapter Considerations

Before you begin using your adapter, note the following important considerations.

### Set the Chassis Size

The ArmorPOINT I/O adapters require configuration of their chassis size before you can make any I/O connections. The factory default setting for the chassis size is one slot, which represents the adapter by itself.

You must set the chassis size to a number equaling one slot for the adapter plus one slot for each I/O module present in the backplane of the adapter.

For example, an ArmorPOINT I/O system consisting of a 1738-AENT adapter, one 1738-IB8, one 1738-OB8, and one 1738-OB8S POINTGuard I/O module uses a chassis size of 4. The adapter stores this chassis size setting in non-volatile memory.

Each time the adapter is powered up, the adapter compares the number of I/O modules present on its backplane to the chassis size value from non-volatile memory. The adapter does not allow any I/O connection until the number of I/O modules present equals the chassis size value minus one for the adapter itself.

### Adapter Replacement

Note that during a connection request from the controller, the chassis size setting is not communicated to the adapter. You must always set this chassis size using a separate operation. This includes situations when you are replacing an adapter. The adapter does not allow any I/O connections until it is configured with the appropriate chassis size and the proper number of ArmorPOINT I/O modules are present.

### Empty Slots and RIUP Situations

The ArmorPOINT I/O system cannot detect an empty terminal base. For this reason, there are numerous situations in which you can potentially configure a system that is unusable or one that exercises unintended control.

In an attempt to address these situations, you must observe the following rules for I/O system construction and the removal and reinsertion of modules.

- A correct I/O system does not have any empty terminal bases.
- After you cycle power, the adapter will not allow any I/O connections until the number of modules comprising the chassis plus one for the adapter equals the stored chassis size.

- It cannot assume any safe operation until there is a match between the number of modules indicating their presence in the chassis and what the adapter has saved in non-volatile memory because it cannot detect empty terminal bases.
- Actual module identification (such as, electronic keying) is done when connection establishment requests are received from the controller or controllers.
- A POINT I/O module removed under power does not disrupt operation of the other I/O modules. On the other hand, ArmorPOINT I/O modules are not intended to be removed under power.
- If more than one contiguous module is removed under power, connections to all modules in the contiguous missing module set are disallowed until all modules are replaced. Because the adapter cannot detect an empty base, it does not know the physical positioning of the modules until all the missing modules are replaced.
- If a module separating two sets of contiguous missing modules is removed, the two sets merge into a single set. All the modules must be replaced before connections are permitted to any module in the set.
- If modules of different types are removed and returned to the wrong locations, attempts to connect to these modules will fail during verification of the electronic ID (providing that keying has not been disabled).
- If modules of the same type are removed and returned to the wrong locations, they accept connections from the controller or controllers and reconfigure with the correct data once they pass their electronic keying check.
- These removal and return situations exist whether the system is under power or not. If the system is under power, the situation arises immediately. If the system is not under power, the situation arises in the next power cycle.

## Power Up a System for the First Time

When you power the I/O for the first time, the adapter must assign slot addresses to every module in the backplane. All I/O modules ship configured at the same address.

When you first apply power, we expect that all but one module on the backplane exhibits a solid red Module Status LED.

One by one the adapter resets these modules and addresses them appropriately. The amount of time that this operation takes is proportional to the size of your I/O system.

## Use of the Common Industrial Protocol (CIP)

The adapter uses the Common Industrial Protocol (CIP). CIP is the application layer protocol specified for EtherNet/IP, the Ethernet Industrial Protocol, as well as for ControlNet and DeviceNet networks. It is a message-based protocol that implements a relative path to send a message from the producing device in a system to the consuming devices.

The producing device contains the path information that steers the message along the proper route to reach its consumers. Since the producing device holds this information, other devices along the path simply pass this information; they do not store it.

This has the following significant benefits:

- You do not need to configure routing tables in the bridging modules, which greatly simplifies maintenance and module replacement.
- You maintain full control over the route taken by each message, which enables you to select alternative paths for the same end device.

## Understand the Producer/Consumer Model

The CIP producer and consumer networking model replaces the old source and destination (master and slave) model. The producer and consumer model reduces network traffic and increases speed of transmission. In traditional I/O systems, controllers poll input modules to obtain their input status. In the CIP system, input modules are not polled by a controller. Instead, they produce (multicast or unicast) their data either upon a change of state (COS) or periodically.

Multicast is the default mode for version 17 Logix and earlier controllers and unicast is the default for version 18 with multicast as a selectable option.

The frequency of update depends upon the options chosen during configuration and where on the network the input module resides. The input module, therefore, is a producer of input data, and the controller is a consumer of the data.

The controller also produces data for other controllers to consume. The produced and consumed data is accessible by multiple controllers and other devices over the EtherNet/IP network. This data exchange conforms to the producer and consumer model.

## Specify the Requested Packet Interval (RPI)

The Requested Packet Interval or RPI is the update rate specified for a particular piece of data on the network. The RPI can be specified for the adapter and include all of the I/O modules in the I/O system (using a rack-optimized connection) or specified for a particular module (using direct connection).

When you add a module or an adapter to the I/O configuration of a controller, you must enter the RPI as a parameter. This value specifies how often to produce the data for that device. For example, if you specify an RPI of 50 ms, it means that



every 50 ms the device should send its data to the controller and the controller should send the consumed (output) data to the device.

Use RPIs only for devices that exchange data. For example, a ControlLogix EtherNet/IP bridge module in the same chassis as the controller does not require an RPI, because it is not a data-producing member of the system. Its use is only as a bridge to remote racks.

## Support for Rack-optimized and Direct Connections

The I/O adapter supports both direct and rack-optimized connections. A direct connection is a real-time data transfer link between the controller and the module occupying the slot that the configuration data references.

Direct I/O connections occur at a cyclic rate specified by the RPI during configuration. A rack-optimized connection is a grouping of data from one or more digital I/O modules into a single block of data sent over a single connection at the same data rate.

Analog, safety, and speciality modules cannot participate in the rack-optimized connection; these modules require a direct I/O connection.

Rack-optimized connections reduce the total number of connections needed to transfer data when using many digital I/O modules in a system. The following example illustrates the benefit of rack-optimized connections.

Assume you set up a system that contains eight digital I/O modules interfaced to an adapter. If you use direct connections to transfer data to each of these I/O modules, you need eight connections to transfer all of the data, one to each of the eight I/O modules. If you use a rack-optimized connection to transfer the data, you only need a single connection – the connection to the I/O adapter.

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<b>IMPORTANT</b>	Although rack-optimized connections offer an efficient way to use resources, there are a few limitations on their use: <ul style="list-style-type: none"><li>• You can use only rack-optimized connections to send data to and from digital I/O modules. Analog or speciality I/O requires direct connections.</li><li>• All data is sent at the same time as the RPI rate of the I/O adapters. If the update rate required for a digital module is different from the RPI of the rack-optimized connection, a direct connection to that digital I/O module is required.</li></ul>
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See the EtherNet/IP Embedded Switch Technology Application Guide,, publication [ENET-AP005](#), for more information on connections.

## **Mixing Rack-optimized and Direct Connections**

You can mix communication formats for different I/O modules communicating through the same adapter. I/O modules set up to use rack optimization communicate at the rate of the RPI configured for the adapter. I/O modules configured for direct communication communicate at their own individual RPIs and ignore the rack-optimized RPI.

## **Chapter Summary**

In this chapter, you were introduced to the features of the ArmorPOINT I/O Adapter, and considerations for installation and usage.

# Install Your ArmorPOINT I/O Adapter

## Overview

This chapter describes how to install and wire your module. This chapter includes the following topics:

Topic	Page
<a href="#">Mount the Adapter and I/O Base</a>	<a href="#">10</a>
<a href="#">Install the ArmorPOINT I/O Modules</a>	<a href="#">11</a>
<a href="#">Remove an ArmorPoint I/O Module</a>	<a href="#">11</a>
<a href="#">Wire an ArmorPOINT I/O Adapter</a>	<a href="#">12</a>
<a href="#">Chapter Summary</a>	<a href="#">12</a>



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



**ATTENTION:** This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the power supply's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication [1770-IN041](#), for additional information.



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

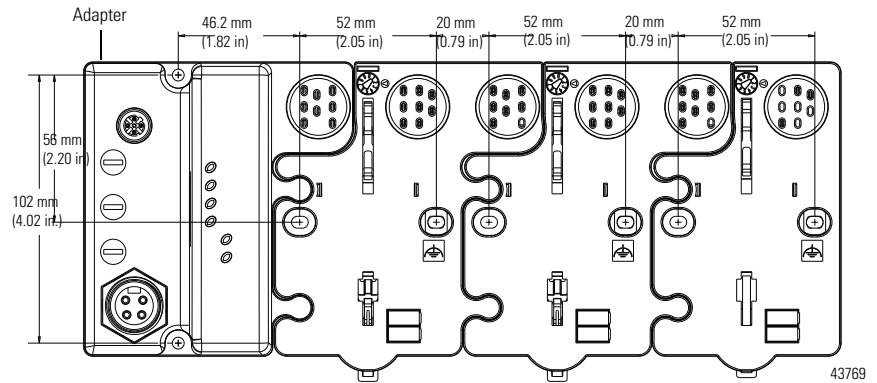


**ATTENTION:** To comply with the CE Low Voltage Directive (LVD), this equipment must be powered from a source compliant with the following:  
Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

## Mount the Adapter and I/O Base

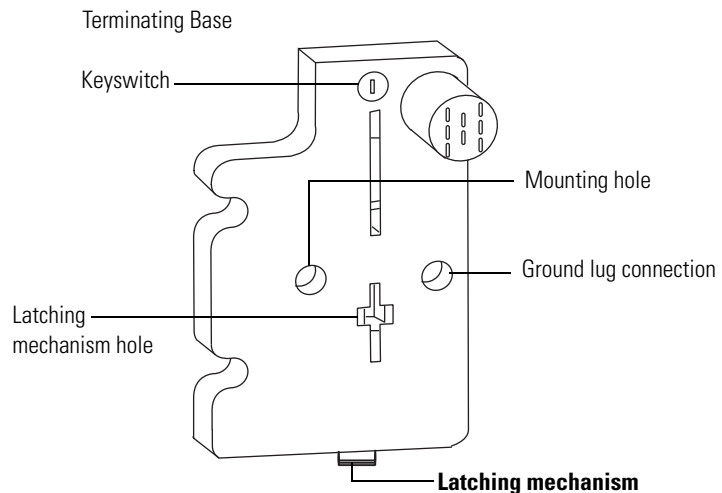
To mount the adapter on a wall or panel, use the screw holes provided in the adapter. A mounting illustration for the adapter with several attached I/O bases is shown below.

### Mounting illustration for the ArmorPOINT adapter and I/O Mounting bases



Install the adapter and its I/O mounting base as follows:

1. Lay out the required points as shown above in the drilling dimension drawing.
2. Drill the necessary holes for M4 (#8) machine or self-tapping screws.
3. Mount the adapter using M4 (#8) screws.
4. Ground the system using the ground lug connection in the adapter's I/O Mounting base. (The ground lug connection is also a mounting hole).
5. Add one or more I/O modules and their respective I/O Mounting bases to the adapter and its I/O Mounting base as required. See [Install the ArmorPOINT I/O Modules](#) on [page 11](#) for details.
6. Mount the terminating base shipped with the adapter as the last base in the backplane instead of the I/O Mounting base shipped with the I/O module.



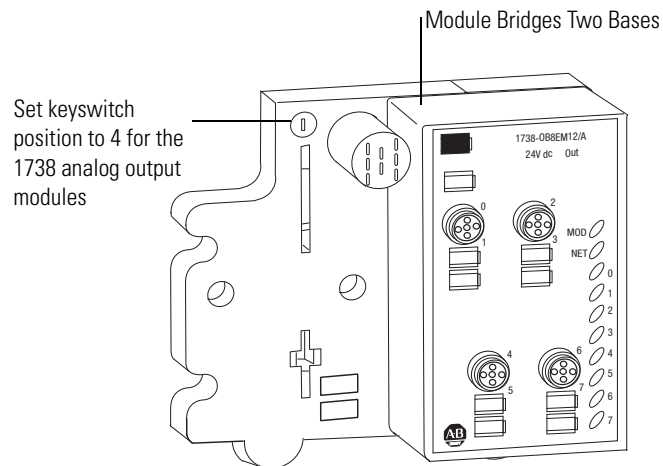
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7. Set the network rotary switches to the desired value. See [Set the Network Address for ArmorPOINT I/O Adapters](#) in Chapter 3 for details on setting the IP address.

## Install the ArmorPOINT I/O Modules

To install the ArmorPOINT I/O modules,

1. Using a bladed screwdriver, rotate the keyswitch on the I/O module mounting base clockwise until the appropriate number for the I/O module you are installing aligns with the notch in the I/O module mounting base.
2. Position the I/O module vertically above the I/O module mounting base. The module bridges two I/O module mounting bases.



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3. Push the module down until it engages the latching mechanism. You hear a clicking sound when the module is properly engaged. The locking mechanism locks the I/O module to the I/O module mounting base.

## Remove an ArmorPoint I/O Module

To remove a module from its mounting base:

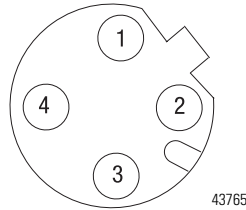
1. Put a flat-blade screwdriver into the slot of the orange latching mechanism.
2. Push the screwdriver toward the I/O module to disengage the latch. The module lifts up off the base.
3. Pull the module off the base.

## Wire the Adapter

### Wire an ArmorPOINT I/O Adapter

Refer to the following illustration to wire the adapter

#### EtherNet/IP Connectors



#### M12 Female in Connector

(view into connector)

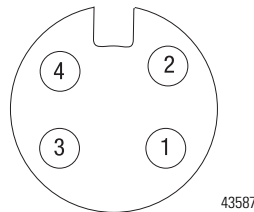
Pin 1 - Tx +

Pin 2 - Rx +

Pin 3 - Tx -

Pin 4 - Rx -

#### Auxiliary Power Connector <sup>(1)</sup>



#### Mini Style 4-Pin in Male Connector

(view into connector)

Pin 1 - User Power +

Pin 2 - Adapter Power +

Pin 3 - Adapter Power -

Pin 4 - User Power -



**ATTENTION:** Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP enclosure type requirements.

#### IMPORTANT

Analog modules have earth grounded metal rings. This should be considered when choosing shielded cables and grounding techniques.

## Chapter Summary

In this chapter, you learned how to install and wire your EtherNet/IP adapter. The following chapter describes how to configure the adapter to communicate on your EtherNet/IP network by providing an IP address, gateway address, and Subnet mask.

(1) Auxiliary power cable: standard cordset (single-ended), for example Allen-Bradley part number 889N-F4AFC-6F or 889N-R4AFC-6F; or standard patchcord (double-ended), for example, Allen-Bradley part number 889N-F4AFNU-6F or 889N-F4AFNV-6F. Refer to publication [M117-CA001A-EN-P](#) for more information.

# Configure the Adapter with RSLogix5000 software

## Introduction

This chapter guides you through the steps required to configure your modules using the RSLogix 5000 software. Note that the modules presented in this chapter can be configured using RSLogix 5000 software, version 17, or later.

Before using your adapter in an EtherNet/IP network, you need to configure it with an IP address, subnet mask, and optional Gateway address. This chapter describes these configuration requirements and the procedures for providing them. Here are ways you can do this:

- Use the Rockwell BootP/DHCP utility, version 2.3 or later, that ships with RSLogix 5000 or RSLinx software.
  - You can also use this utility to reconfigure a device with an IP address you must change.
- Use a third party DHCP server.
- Use the Network Address rotary switches.
- Have your network administrator configure the adapter via the network DHCP server.

See the table for where to find information in this chapter.

Topic	Page
<a href="#">Configuration Requirements</a>	14
<a href="#">IP Address</a>	14
<a href="#">Gateway Address</a>	15
<a href="#">Subnet Mask</a>	16
<a href="#">Set the Network Address</a>	17
<a href="#">Set the Network Address for ArmorPOINT I/O Adapters</a>	17
<a href="#">Use the Rockwell BootP/DHCP Utility</a>	18
<a href="#">Save the Relation List</a>	21
<a href="#">Use DHCP Software to Configure Your Adapter</a>	22

## Configuration Requirements

Before you can use your adapter, you must configure its IP address, its subnet mask, and, optionally, a gateway address. You can use the Rockwell BootP utility, version 2.3 or later, to perform the configuration. You can also use a DHCP server or the network address rotary switches to configure these parameters.

### IMPORTANT

If using the BootP/DHCP utility, you will need to know the Ethernet hardware address of your module. Rockwell assigns each 1738 ArmorPOINT I/O Ethernet/IP Module a unique 48-bit hardware address at the factory. The address is printed on a label on the side of your module. It consists of six hexadecimal digits separated by colons. This address is fixed by the hardware and cannot be changed.

If you change or replace the 1738 ArmorPOINT I/O Ethernet/IP Module, you must enter the new Ethernet hardware address of the module when you configure the new module.

If you need to reset the adapter to factory defaults, see [Work with the Configuration Pages on page 92](#).

## IP Address

The IP address identifies each node on the IP network (or system of connected networks). Each TCP/IP node on a network (including the adapter) must have a unique IP address.

The IP address is 32 bits long and has a Network ID part and Host ID part. Networks are classified A, B, C, (or other). The class of the network determines how an IP address is formatted.

	0	7	8	31
Class A	0 Network ID		Host ID	
	0	15	16	31
Class B	10 Network ID		Host ID	
	0	23	24	31
Class C	110 Network ID		Host ID	

You can distinguish the class of the IP address from the first integer in its dotted-decimal IP address as follows:

Range of first integer	Class	Range of first integer	Class
0 1...127	A	192...223	C
128...191	B	224... 255	other

Each node on the same physical network must have an IP address of the same class and must have the same network ID. Each node on the same network must have a different Host ID thus giving it a unique IP address.



IP addresses are written as four decimal integers (0...255) separated by periods where each integer gives the value of one byte of the IP address.

---

**EXAMPLE** For example, the 32-bit IP address:  
10000000 00000001 00000000 00000001 is written as  
128.1.0.1

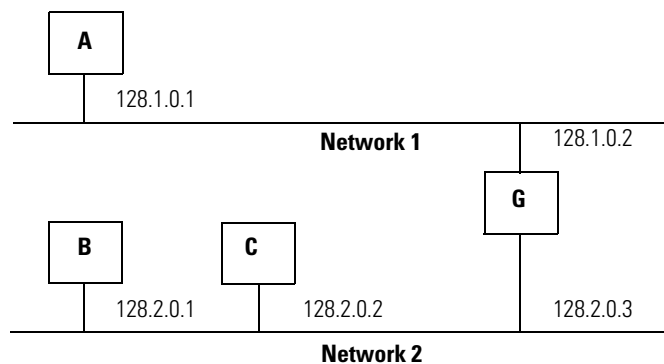
---

## Gateway Address

This section applies to multi-network systems. If you have a single network system, refer to the next section.

The Gateway Address is the default address of a network. It provides a single domain name and point of entry to the site. Gateways connect individual physical networks into a system of networks.

When a node needs to communicate with a node on another network, a gateway transfers the data between the two networks. The figure shows gateway G connecting Network 1 with Network 2.



When host B with IP address 128.2.0.1 communicates with host C, it knows from C's IP address that C is on the same network. In an Ethernet environment, B can then resolve C's IP address into a hardware address (MAC address) and communicate with C directly.

When host B communicates with host A, it knows from A's IP address that A is on another network (the network IDs are different). In order to send data to A, B must use the IP address of the gateway connecting the two networks. In this example, the gateway's IP address on Network 2 is 128.2.0.3.

The gateway has two IP addresses (128.1.0.2 and 128.2.0.3). The first must be used by hosts on Network 1 and the second must be used by hosts on Network 2. To be usable, a gateway of a host must be addressed using a network ID matching its own.

## Subnet Mask

The subnet mask is used for splitting IP networks into a series of subgroups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the Host ID address field into a field for subnets.

**EXAMPLE**

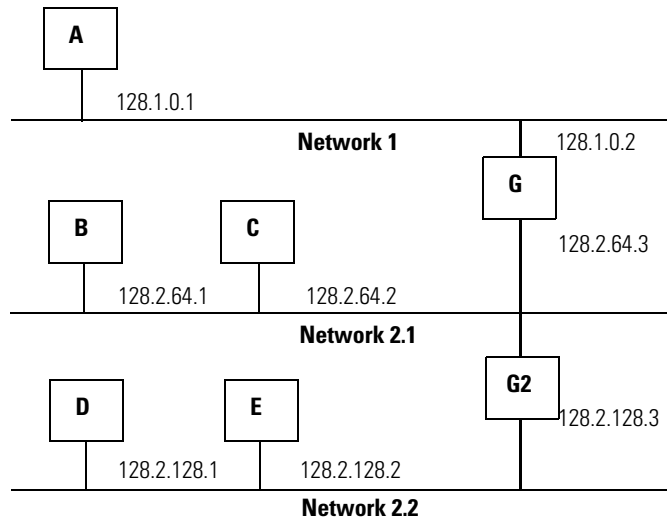
Take Network 2 (a Class B network) in the previous example and add another physical network. Selecting the following subnet mask would add two additional network ID bits, allowing for four physical networks:

$$11111111\ 11111111\ \underline{11}000000\ 00000000 = 255.255.192.0$$

These two bits of the Host ID are used to extend the network ID.

Two bits of the Class B host ID are used to extend the network ID. Each unique combination of bits in the part of the Host ID where subnet mask bits are 1 specifies a different physical network.

The new configuration is:



A second network with Hosts D and E was added. Gateway G2 connects Network 2.1 with Network 2.2.

Hosts D and E will use Gateway G2 to communicate with hosts not on Network 2.2.

Hosts B and C will use Gateway G to communicate with hosts not on Network 2.1.

When B is communicating with D, G (the configured Gateway for B) will route the data from B to D through G2.

## Set the Network Address

The adapters ship DHCP-enabled and with the switches set to **999**. You can set the network Internet Protocol (IP) address as follows.

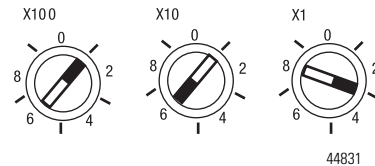
### Set the Network Address for ArmorPOINT I/O Adapters

- Adjust the rotary switches in front of the module
- Use a Dynamic Host Configuration Protocol (DHCP) server such as Rockwell Automation BootP/DHCP
- Retrieve the IP address from non-volatile memory

The adapter reads the rotary switches first to determine if they are set to a valid number. Set the network address by adjusting the three rotary switches on the front of the adapter.

**Figure 1 - Network Address Example**

This example shows the network address set at 163.



Use a small blade screwdriver to rotate the switches. Line up the small notch on the switch with the number setting you wish to use. Valid settings range from **001...254**.

When you use the switches to assign an address and set it to **001**, the adapter gateway address is set to **0.0.0.0**, and the subnet mask is **255.255.255.0**. When you use the switches to assign an address and set it to a valid number between **002...254**, the adapter gateway address is set to **192.168.1.1**.

If the switches are set to an invalid number (for example, 000 or a value greater than 254 excluding 888), the adapter checks to see if DHCP is enabled. If DHCP is enabled, the adapter requests an address from a DHCP server. The DHCP server also assigns other Transport Control Protocol (TCP) parameters.

If DHCP is not enabled, the adapter uses the IP address, along with other TCP configurable parameters, stored in non-volatile memory.



**WARNING:** When you change switch settings 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.

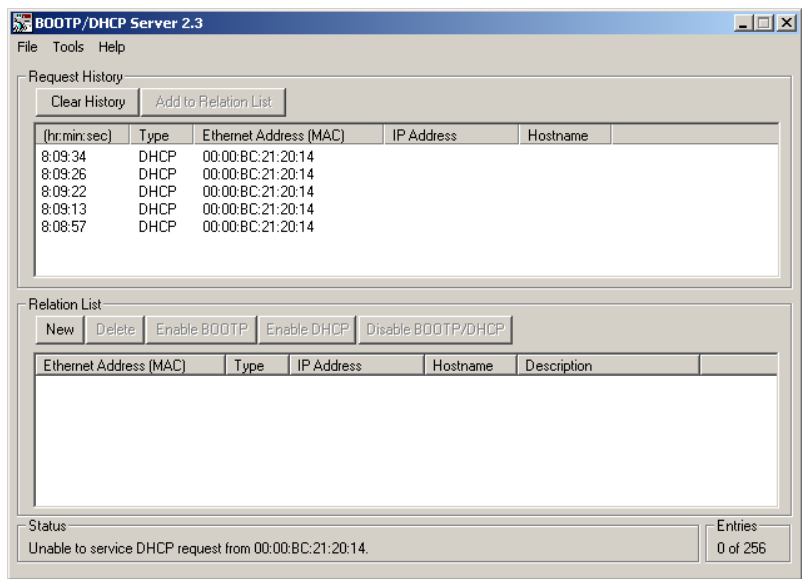
## Use the Rockwell BootP/DHCP Utility

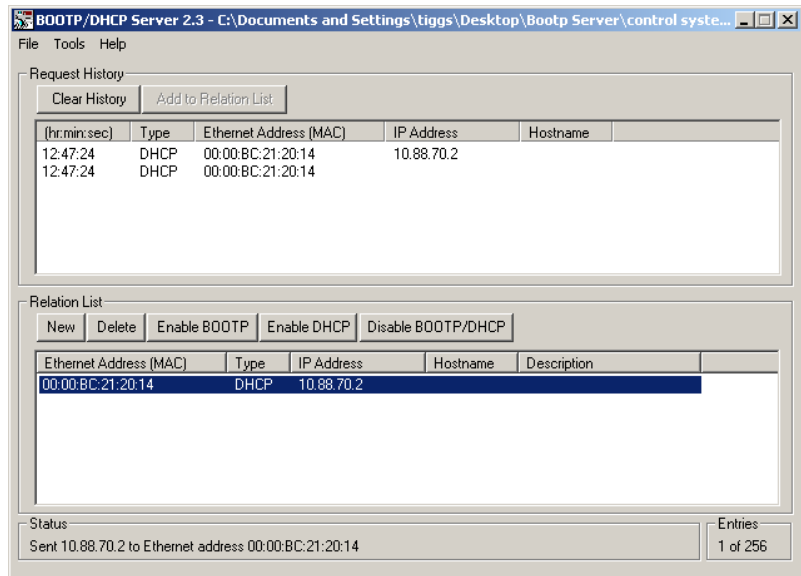
The Rockwell BootP/DHCP utility is a standalone program that incorporates the functionality of standard BootP software with a user-friendly graphical interface. It is located in the **Utils** directory on the RSLogix5000 software installation CD. The adapter must have DHCP enabled (factory default and the network address switches set to an invalid value) to use the utility.

To configure your adapter using the BootP utility, perform the following steps:

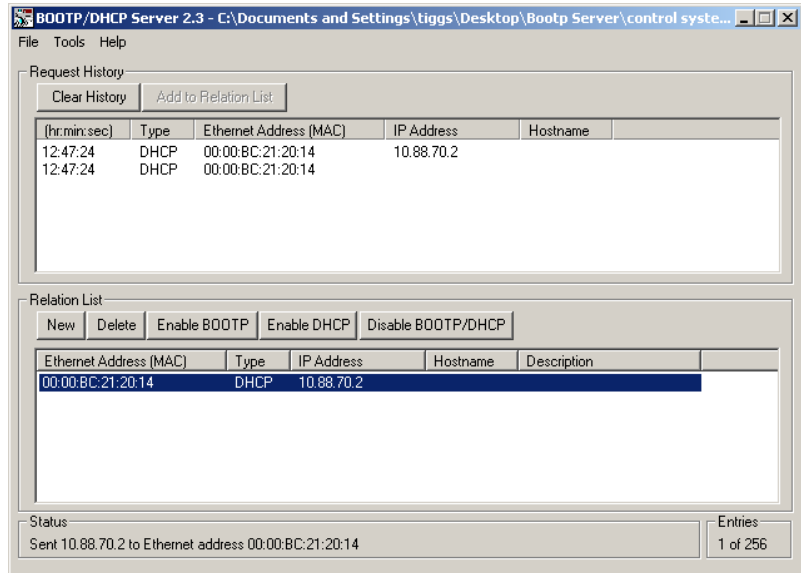
1. Run the BootP software.

In the BOOTP Request History panel you see the hardware addresses of devices issuing BootP requests.

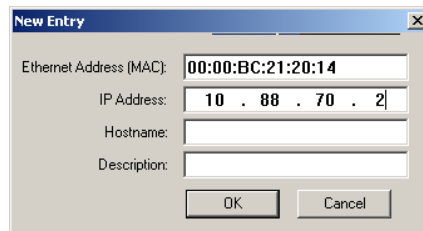




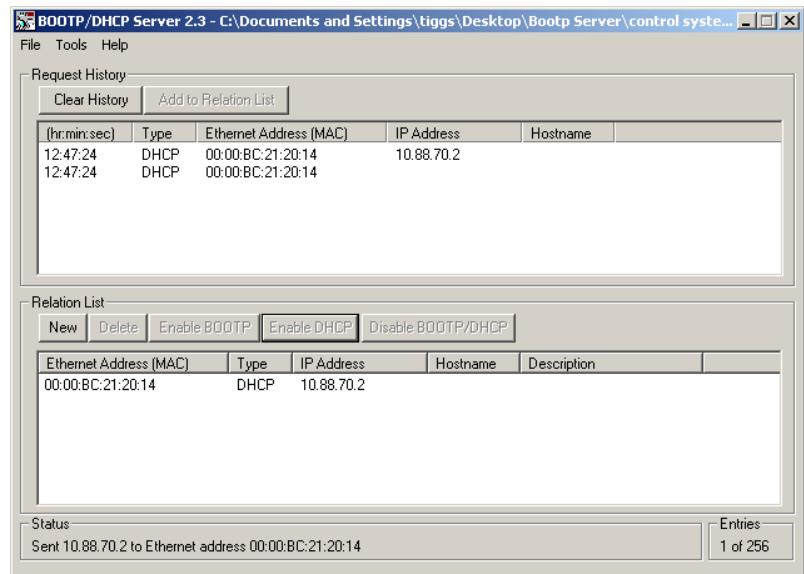
2. Double-click the hardware address of the device you want to configure.



The New Entry dialog appears with the device's Ethernet Address (MAC).



3. Enter the IP Address you want to assign to the device and click OK. The device is added to the Relation List, displaying the Ethernet Address (MAC) and corresponding IP Address, Hostname, and Description (if applicable).



When the address displays in the IP Address column in the Request History section, the IP address assignment has been made.

4. To make this configuration static in the device, highlight the device in the Relation List panel, and click the Disable BOOTP/DHCP button.

When power is cycled to the device, it uses the configuration saved in non-volatile memory and will not issue a DHCP request.

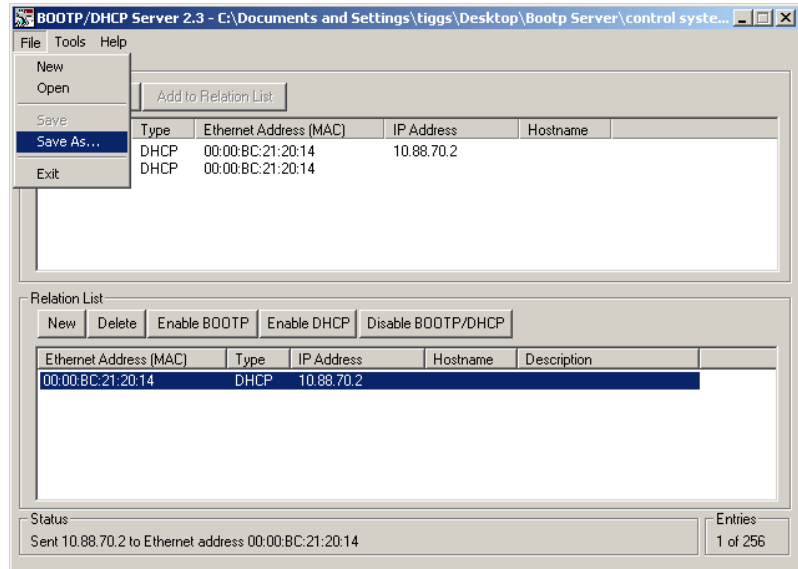
5. To enable DHCP for a device with DHCP disabled, highlight the device in the Relation List, and click the Enable DHCP button.

You must have an entry for the device in the Relation List panel to re-enable DHCP.

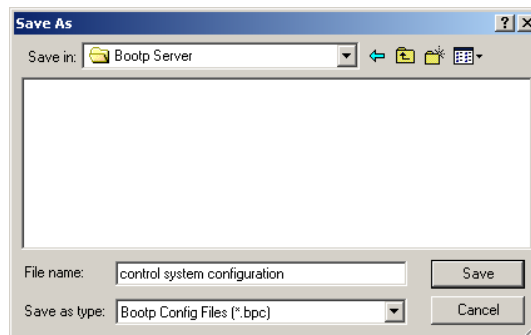
## Save the Relation List

You can save the Relation List for later use. To save the Relation List, perform the following steps:

1. Select Save As... from the File menu.



The Save As dialog appears.



2. Select the folder where you want to save the Relation List.
3. Enter a File name for the Relation List, for example, control system configuration, and click Save.

You can leave the Save as type at the default setting: Bootp Config Files (\*.bpc).

You now have the option to open the file containing the Relation List at a later session.

## Use DHCP Software to Configure Your Adapter

DHCP (Dynamic Host Configuration Protocol) software automatically assigns IP addresses to client stations logging onto a TCP/IP network.

DHCP is based on BootP and maintains some backward compatibility. The main difference is that BootP was designed for manual configuration, while DHCP allows for dynamic allocation of network addresses and configurations to newly attached devices.

Be cautious about using DHCP software to configure your adapter. A DHCP server typically assigns a finite lease time to the offered IP address.

When 50% of the leased time has expired, the adapter attempts to renew its IP address with the DHCP server.

The possibility exists that the adapter will be assigned a different IP address, which would cause the adapter to cease communicating with the ControlLogix controller.

See [Configure the Adapter with Fixed IP Address on page 49](#) to configure the adapter with a fixed IP address.



**ATTENTION:** To avoid unintended control or loss of control, the I/O adapter must be assigned a fixed IP address. A dynamically provided IP address should be used only at initial configuration. If a DHCP server is used, it must be configured to assign the same IP address to your adapter. Failure to observe this precaution may result in unintended machine motion or loss of process control.

---

## Chapter Summary

In this chapter, you learned about the EtherNet/IP network you must configure with an IP address, Subnet mask, and optional Gateway address. The following chapter provides information on how to configure your adapter for direct connection using RSLogix5000.



## Configure the Adapter for Direct Connection in RSLogix 5000 Software

### Overview

In this example, a ControlLogix controller communicates with ArmorPOINT I/O modules via the adapter using a direct connection.

The adapter makes a direct connection to each of the modules referenced by the data. The modules presented in this chapter use RSLogix 5000 software, revision 17 and above.

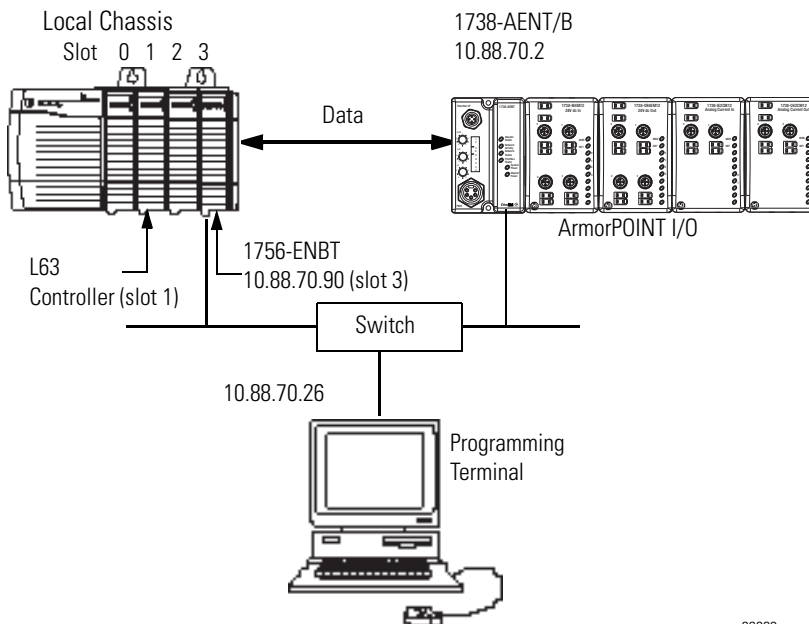
Topic	Page
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<a href="#">Create the Example Application</a>	25
<a href="#">Configure the I/O Modules</a>	26
<a href="#">Add the Local EtherNet/IP Bridge to the I/O Configuration</a>	26
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## Set Up the Hardware

The following section describes how to set up the I/O Hardware.

In this example, a ControlLogix chassis contains the Logix 63 controller in slot 1 and a 1756-ENBT bridge module in slot 3. The 1738-AENT/B adapter is mounted in slot 0, a 1738-IB4M12 input module is in slot 1, a 1738-OB4EM12 output module is in slot 2, a 1738-IE2CM12 module is in slot 3, and a 1738-OE2CM12 module is in slot 4.

To work along with this example, set up your system as shown in the figure.



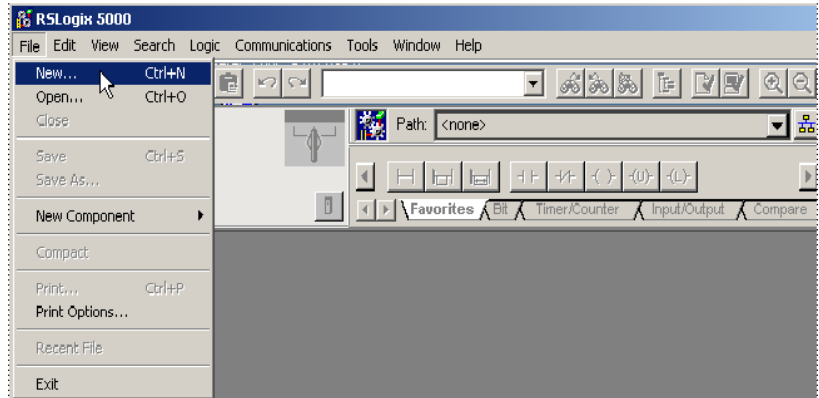
32393

- Note that in the example application, the L63 controller and 1756-ENBT bridge module (firmware version 2.3 or later) are assumed to be in the slots shown above.
- Verify the IP addresses for your programming terminal, 1756-ENBT bridge module, and 1738-AENT/B adapter.
- Verify the position (slot) of the I/O modules.
- Verify that all wiring and cabling is properly connected.
- Make sure your communication driver (for example, AB\_ETH-1 or AB-ETHIP-1) is configured in RSLinx software, as described in Appendix C in this manual.

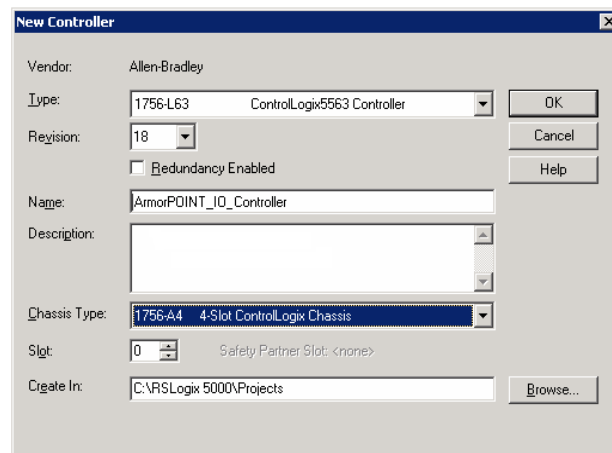
## Create the Example Application

Perform the following steps to create the example application:

1. Start RSLogix 5000 Enterprise Series software.  
The RSLogix 5000 main dialog opens.
2. From the File menu, select New.



The New Controller dialog opens.



3. Enter an appropriate Name for the Controller, for example, ArmorPOINT\_IO\_Controller.
4. Select the correct Revision, Chassis Type, and Slot number of the L63 controller, and the folder where you want to save the RSLogix 5000 file (Create In). The Description is optional.
5. Click OK.

## Configure the I/O Modules

You now add the ArmorPOINT I/O modules to the controller's I/O configuration performing these procedures:

- Add the local 1756-ENBT module to the I/O configuration.
- Add the 1738-AENT/B adapter as a child of the 1756-ENBT module on the Ethernet network.
- Add the ArmorPOINT I/O modules as children of the adapter.

---

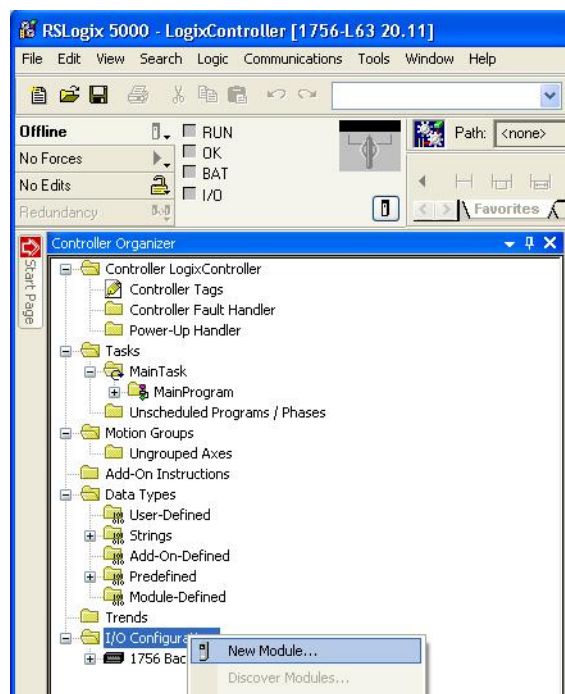
**IMPORTANT**

Click the Help button on the configuration dialogs shown in this section if you need assistance in selecting and setting the parameters.

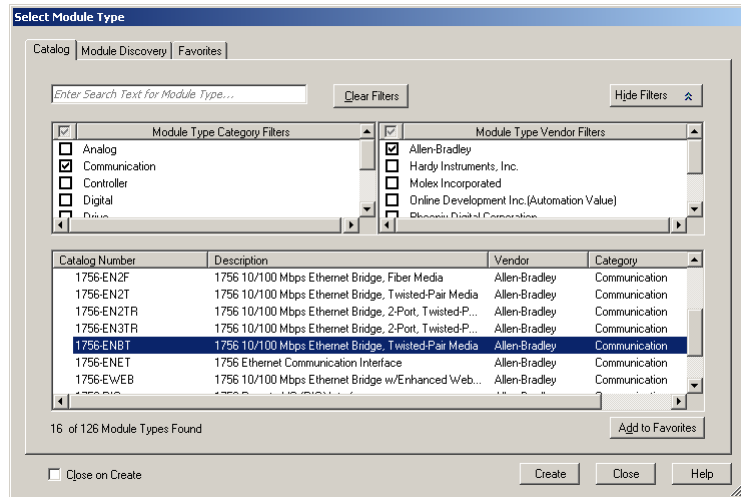
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## Add the Local EtherNet/IP Bridge to the I/O Configuration

1. Right-click the I/O Configuration folder in the project dialog, and select New Module...



The Select Module Type dialog opens.



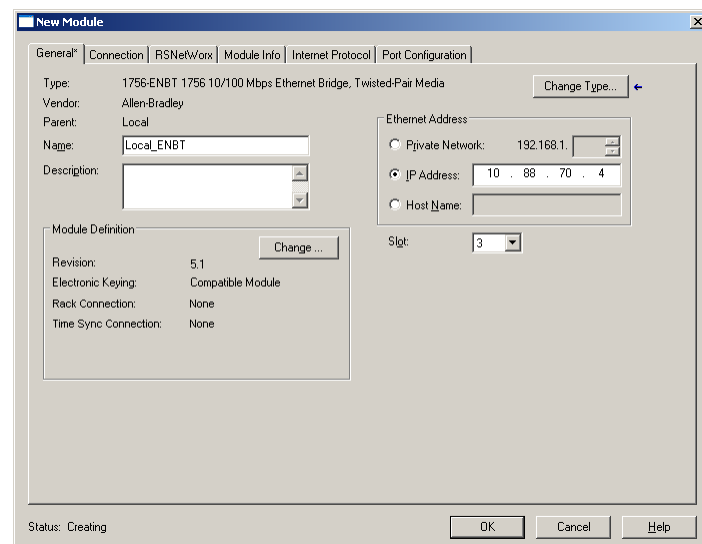
2. Select the appropriate Module Type filter Category (for the example we selected Communication), and Module Type Vendor (for the example we selected Allen-Bradley).

**TIP** In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

Note: to select only one category you will need to unselect those already selected.

3. From the list of adapters displayed, select the 1756-ENBT EtherNet/IP Bridge and click Create.

The New Module dialog opens.



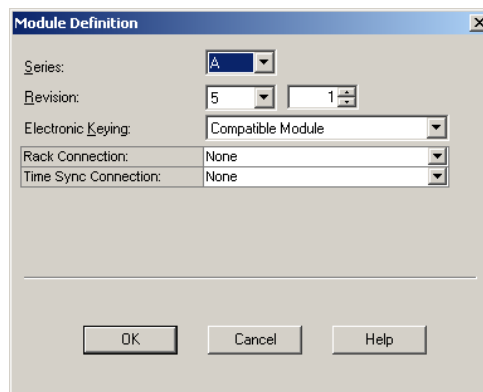
- Enter values for Name, IP Address, and Slot, noting that we used the following values:

Name	Local_ENBT
IP Address	10.88.70.4
Slot	3

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change button. Some of the properties cannot be modified while pending edits exists.

To change the default module properties,

- Click Change...  
The Module Definition dialog opens.

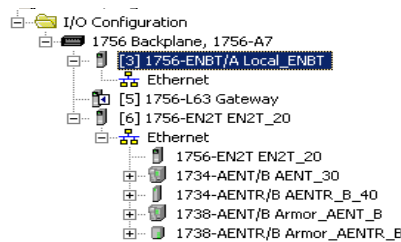


- Enter or select values for Revision, Electronic Keying, Rack Connection, and Time Sync Connection, noting that we used the following values:

Series	A
Revision	5.1
Electronic Keying	Compatible Module
Rack Connection	None
Time Sync Connection	None

- Click OK to accept the configuration.

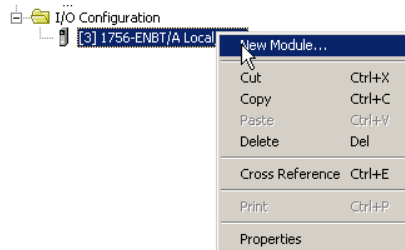
The module appears indented under under the I/O Configuration folder.



## Add the ArmorPOINT I/O Adapter to the I/O Configuration

Next, you must add the 1738-AENT/B adapter as a child of the local 1756-ENBT module.

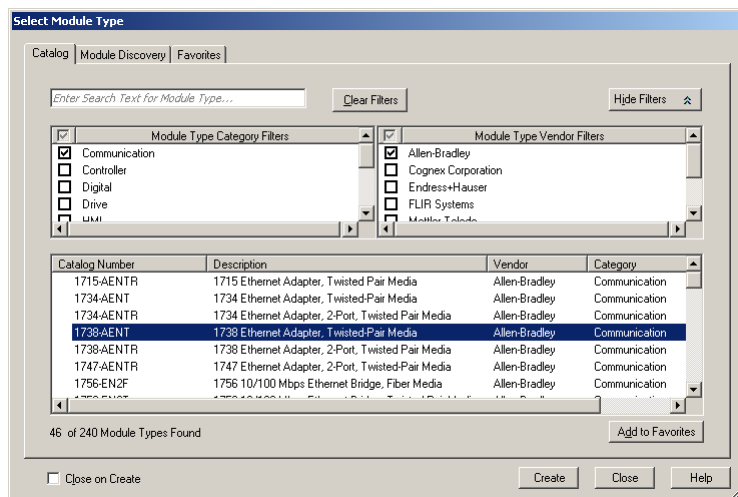
1. In the Project dialog, right-click the local 1756-ENBT module under the I/O Configuration folder, and select New Module from the dialog.



The Select Module Type dialog opens.

2. Select the appropriate Module Type filter Category (for the example we selected Communication), and Module Type Vendor (for the example we selected Allen-Bradley).

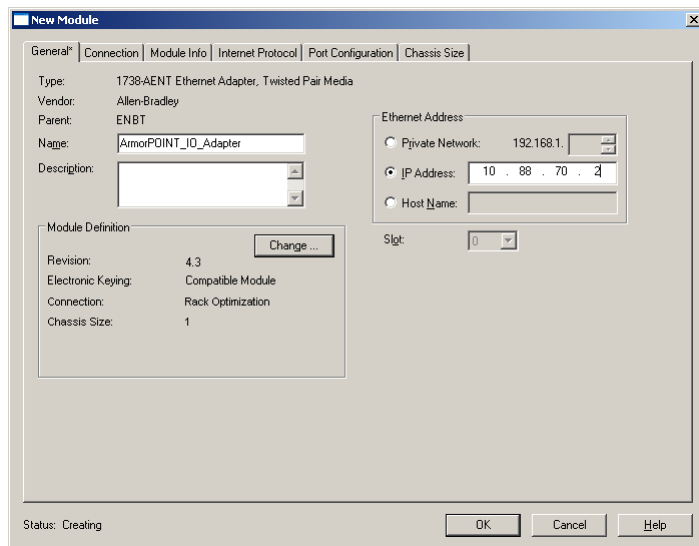
Note: to select only one category you will need to unselect those already selected.



### TIP

In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

3. Select your adapter from the list and click Create. The New Module dialog opens.



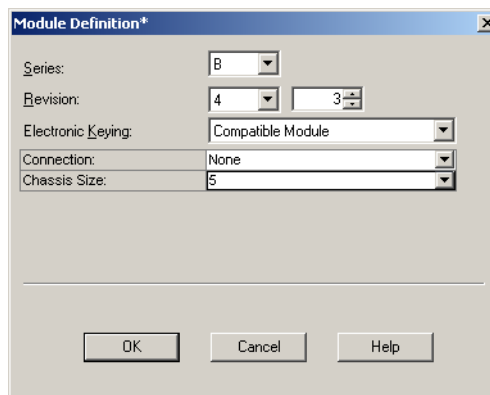
4. Select the General Tab and enter the module details, noting that we used the following values.

Name	ArmorPoint IO Adapter
IP Address	10.88.70.2

**IMPORTANT** Note that the slot field is disabled because the slot is automatically 0 for the 1738-AENT adapter.

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change button. Some of the properties cannot be modified while pending edits exist.

5. Click Change... The Module Definition dialog opens.





- Choose values for Series, Revision, Electronic Keying, Connection, and Chassis Size, noting that we used the following values:

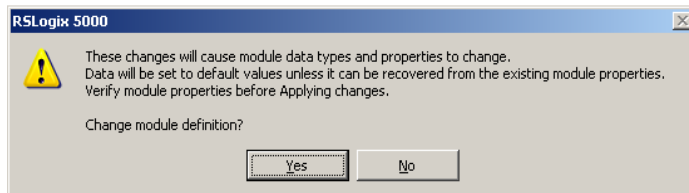
Series	B
Connection	None
Chassis Size	5
Electronic Keying	Compatible Module
Revision	4.3

**IMPORTANT** The chassis size value equals 1 for the adapter plus the number of I/O modules installed (physically present on the I/O backplane).

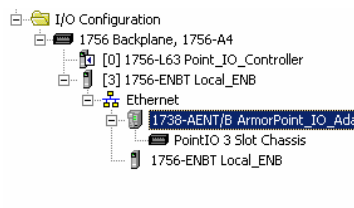
Connection choices include:

- none = the adapter will make a direct connection to each of the modules referenced by the data. RPI is disabled in this case.
  - rack optimization = digital I/O data is collected into a rack image. Note that this does not include analog or specialty I/O modules.
  - listen only - rack optimization = read or verify data only, but does not control the modules. When you have multiple controllers, one controller is used to control and the other controllers are used to monitor.
- Because we are making a direct connection, choose None as the Connection for the 1738-AENT adapter and click OK.

A dialog box opens.



- Click Yes.
- In the New Module screen click OK to accept the new configuration. The 1738-AENT/B adapter appears indented under the local 1756-ENBT bridge module in the I/O Configuration folder.



Note: The requested packet interval (RPI) is disabled because you have chosen None as the Connection.

## Add the ArmorPoint I/O Modules to the I/O Configuration

You now add the ArmorPoint I/O modules to the I/O Configuration List under the adapter.

In this example, you add a 1738-IB4M12 24V DC digital input module, a 1738-OB4EM12 24V DC digital output module, a 1738-IE2CM12 analog current input module, and a 1738-OE2CM12 analog current output module with standard configurations. Use these steps as a guide when you are configuring different I/O modules for your system.

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**TIP** This example application uses the I/O modules' default configurations. For more information, see the ArmorPoint I/O Selection Guide, publication [1738-SG001](#).

---

### Add the Digital Input Module

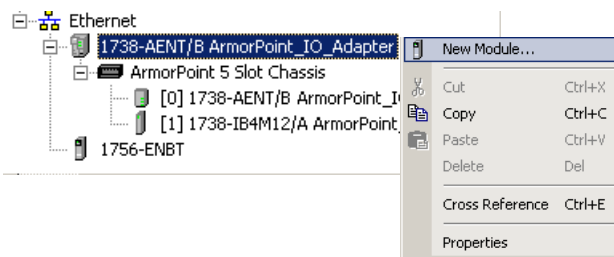
1. Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.

---

**IMPORTANT** If the 1738-AENT/B chassis base size is exceeded, (that is, you try to add more modules than you configured) the New Module selection is dimmed out and disabled. You are not able to add any more ArmorPoint I/O modules until the 1738-AENT/B chassis base size is increased.

---

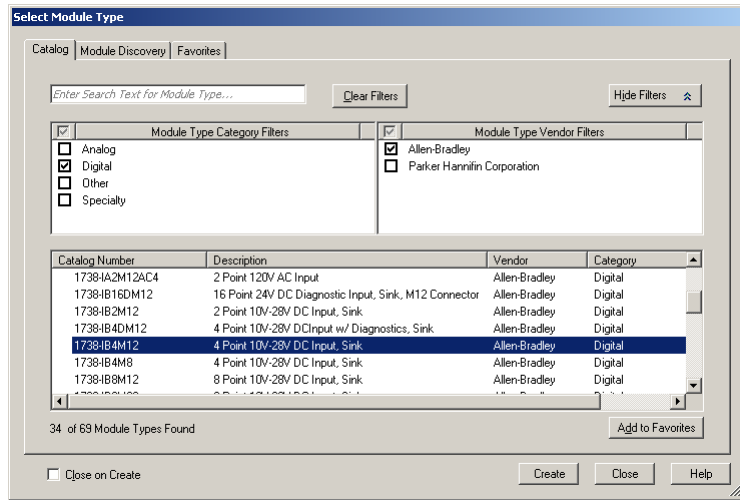
The Select Module Type dialog opens.



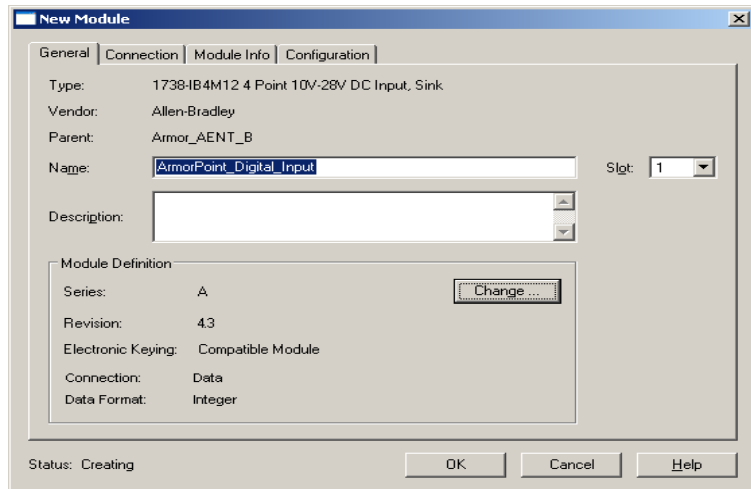
2. Select the appropriate filter for Module Type Category (for the example we selected Digital) and Module Type Vendor (for the example we selected Allen-Bradley).

Note: to select only one category you will need to unselect those already selected.

- From the modules listed select the 1738-IB4M12 module and click Create.



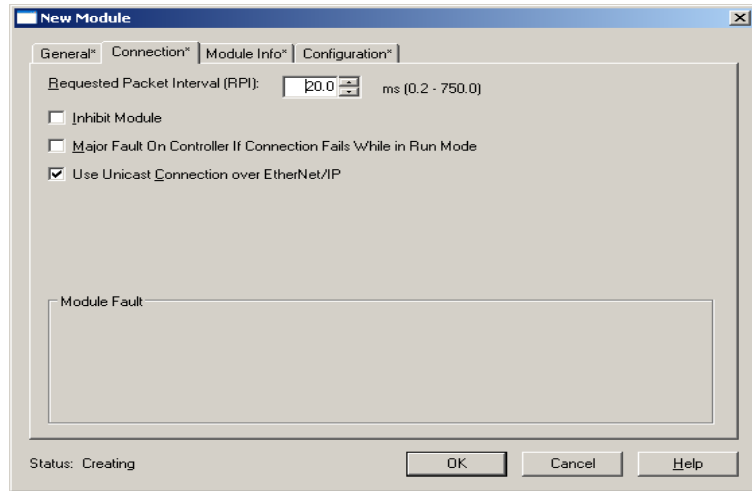
The New Module dialog opens.



- Enter values for Name and Slot, noting that we used the following values

Name	ArmorPOINT_Digital_Input
Slot	1

5. Choose the Connection tab to set the RPI value.  
RPI is selectable since it is a direct connection



Note that the RPI is selectable and has a default value. Because we are making a direct connection to each I/O module, we must specify an RPI to determine how often the data is exchanged with the 1738-AENT/B adapter for each module.

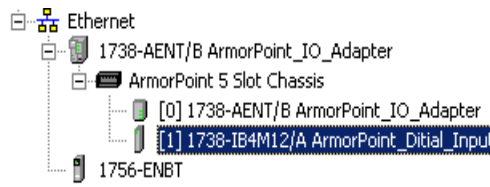
6. Enter 20 ms as the RPI for the 1738-IB4M12 module.
7. Click OK to save the configuration.

---

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 20 ms.

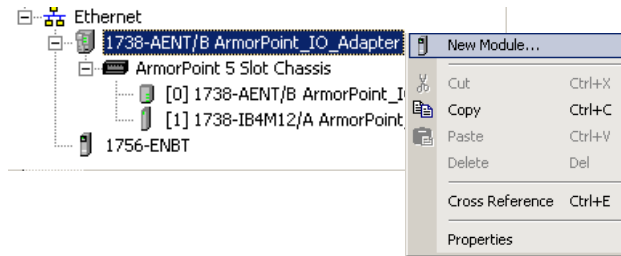
---

The digital input module appears in the I/O configuration folder indented under Ethernet.



### Add the Digital Output Module

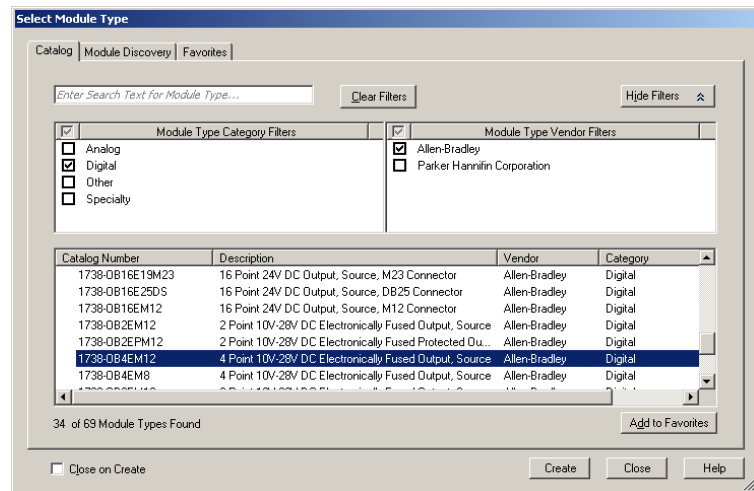
1. Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.



#### IMPORTANT

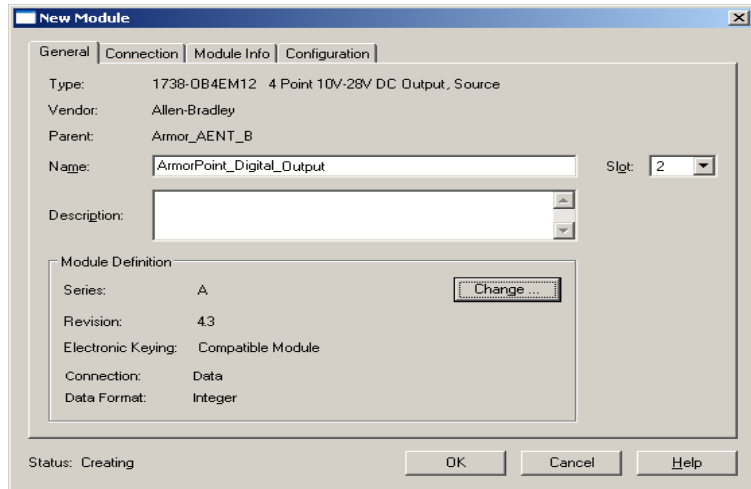
If the 1738-AENT/B chassis base size is exceeded, (that is, you try to add more modules than you configured) the New Module selection is dimmed out and disabled. You are not able to add any more ArmorPoint I/O modules until the 1738-AENT/B chassis base size is increased.

The Select Module Type dialog opens.



2. Select the appropriate Module Type Category Filter (for the example we selected Digital) and Module Type Vendor (for the example, we selected Allen-Bradley). Note: to select only one category you will need to unselect those already selected.
3. From the modules listed select the 1738-OB4EM12 module and click Create.

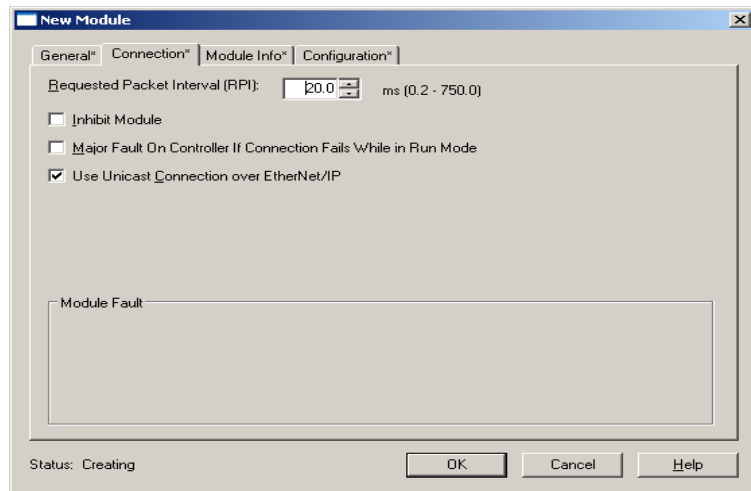
The New Module dialog opens.



4. Enter values for Name and Slot, noting that we used the following values.

Name	ArmorPOINT_Digital_Output
Slot	2

5. Choose the Connection tab to set the RPI value.  
The RPI is selectable since it is a direct connection
6. Enter 20 ms as the RPI for the 1738-IB4M12 module to set how often you exchange data with the I/O adapter.



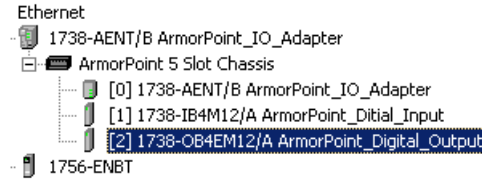
Note that the RPI is selectable on the screen and has a default value of 20.0 ms. Because we are making a direct connection to each I/O module, we must specify an RPI to determine how often the data is exchanged with the 1738-AENT adapter for each module.

---

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 20 ms.

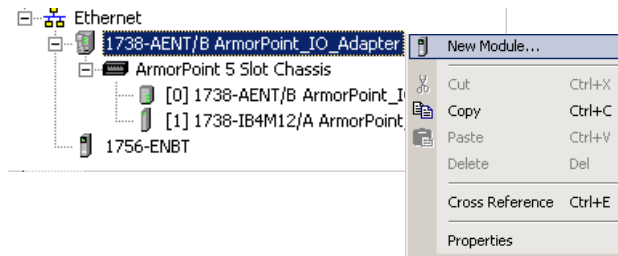
---

- Click OK to save the configuration.  
The digital output module appears in the I/O configuration indented under the 1738-AENT/B adapter.



### Add the Analog Current Input Module

- Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.




---

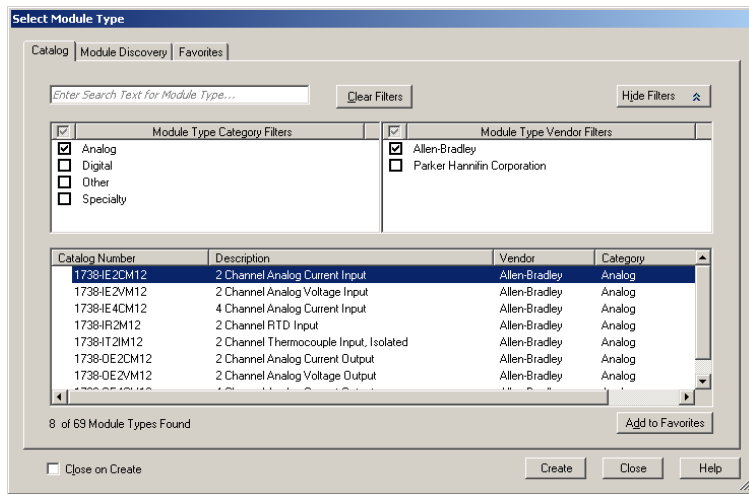
**IMPORTANT** If the 1738-AENT/B chassis base size is exceeded, (that is, you try to add more modules than you configured) the New Module selection is dimmed out and disabled. You are not able to add any more ArmorPoint I/O modules until the 1738-AENT/B chassis base size is increased.

---

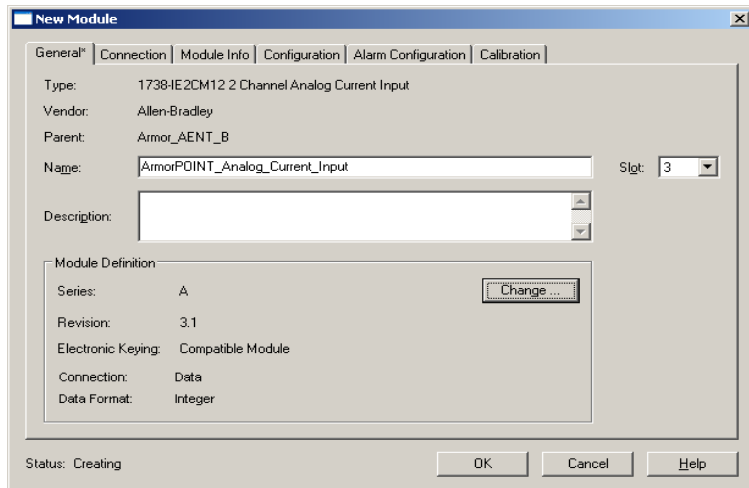
The Select Module dialog opens.

- Select the appropriate Module Type Category Filter (for the example we selected Analog) and Module Type Vendor (for the example, we selected Allen-Bradley). Note: to select only one category you will need to unselect those already selected.

- From the modules listed select the 1738-IE2CM12 module and click Create.



The New Module dialog opens.

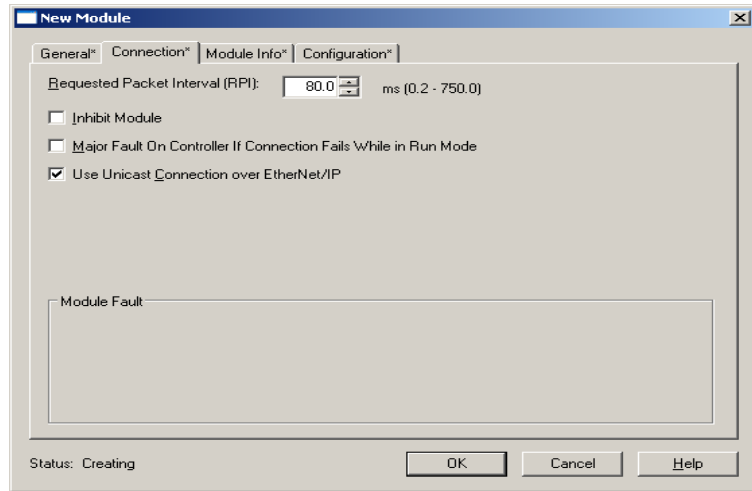


- Enter values for Name and Slot, noting that we used the following values

Name	ArmorPOINT_Analog_Current_Input
Slot	3



- Choose the Connection tab to set the RPI value.  
RPI is selectable since it is a direct connection.



Note that the RPI is selectable on the screen and has a default value of 80.0 ms. The 1738-IE2CM12 module is an analog module and, therefore, an RPI value must be assigned.

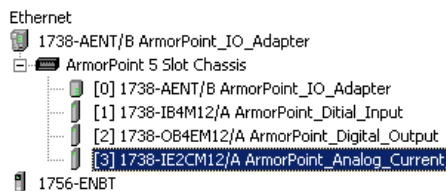
- Select 50.0 for the RPI to set how often the data is exchanged with the 1738-AENT/B adapter.

---

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 50 ms.

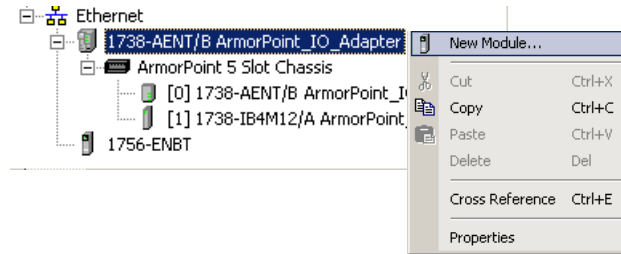
---

- Click OK to save the configuration.  
The analog current input module appears in the I/O Configuration indented under the 1738-AENT/B adapter.



### Add the Analog Current Output Module

1. Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.

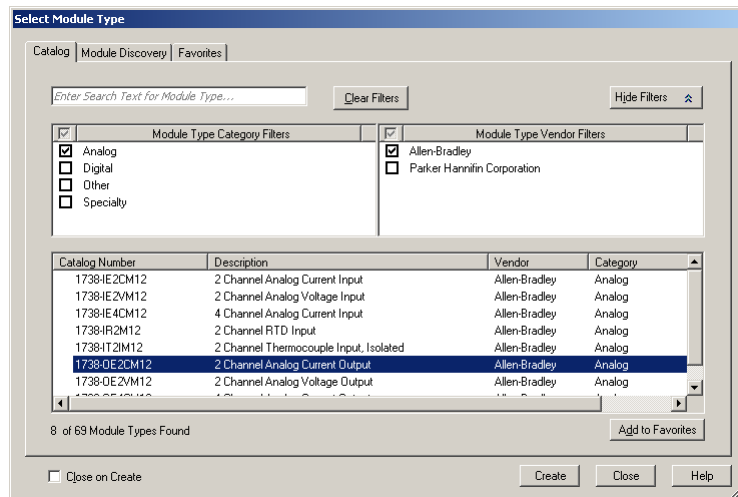


#### IMPORTANT

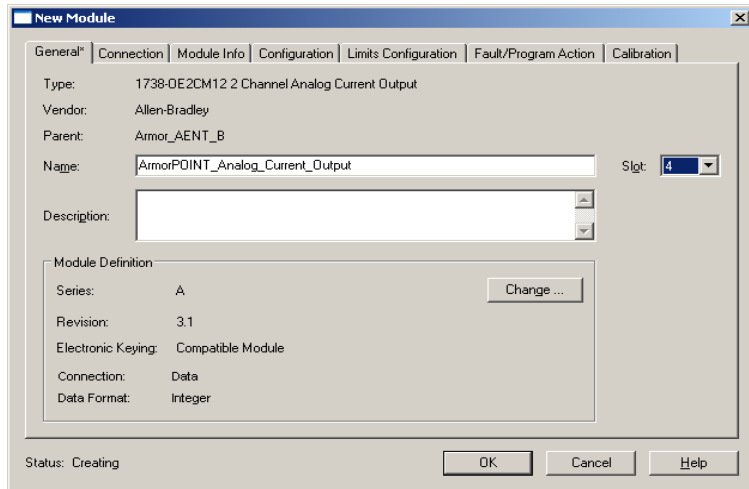
If the 1738-AENT/B chassis base size is exceeded, (that is, you try to add more modules than you configured) the New Module selection is dimmed out and disabled. You are not able to add any more ArmorPoint I/O modules until the 1738-AENT/B chassis base size is increased.

The Select Module dialog opens.

2. Select the appropriate Module Type Category Filter (for the example we selected Analog) and Module Type Vendor (for the example, we selected Allen-Bradley). Note: to select only one category you will need to unselect those already selected.
3. From the modules listed select the 1738-OE2CM12 module and click Create.



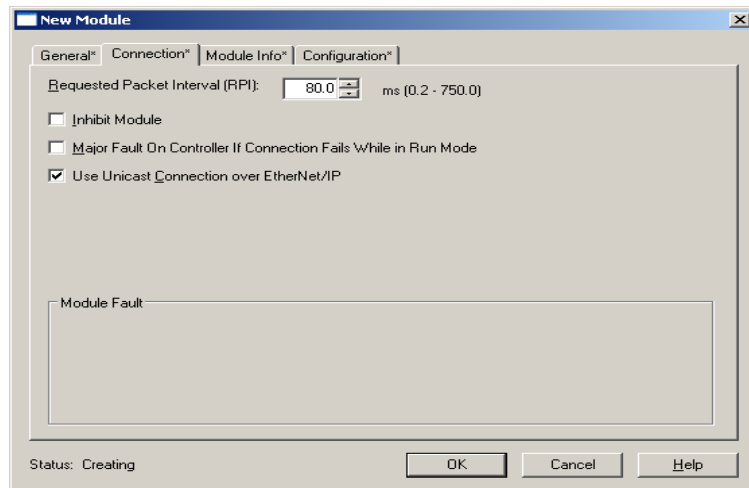
4. The New Module dialog opens.



5. Enter values for Name, Slot, noting that we used the following values

Name	ArmorPOINT_Analog_Current_Output
Slot	4

6. Choose the Connection tab to set the RPI value.  
The RPI is selectable since it is a direct connection.

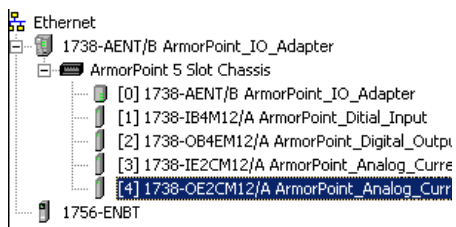


Note that the RPI is selectable on the screen and has a default value of 80.0 ms. The 1738-OE2CM12 module is an analog module and, therefore, an RPI value must be assigned.

7. Select 50.0 for the RPI to set how often the data is exchanged with the 1738-AENT/B adapter.

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 50 ms.

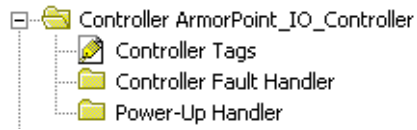
8. Click OK to save the configuration.  
The analog current output module appears in the I/O Configuration indented under the 1738-AENT/B adapter.



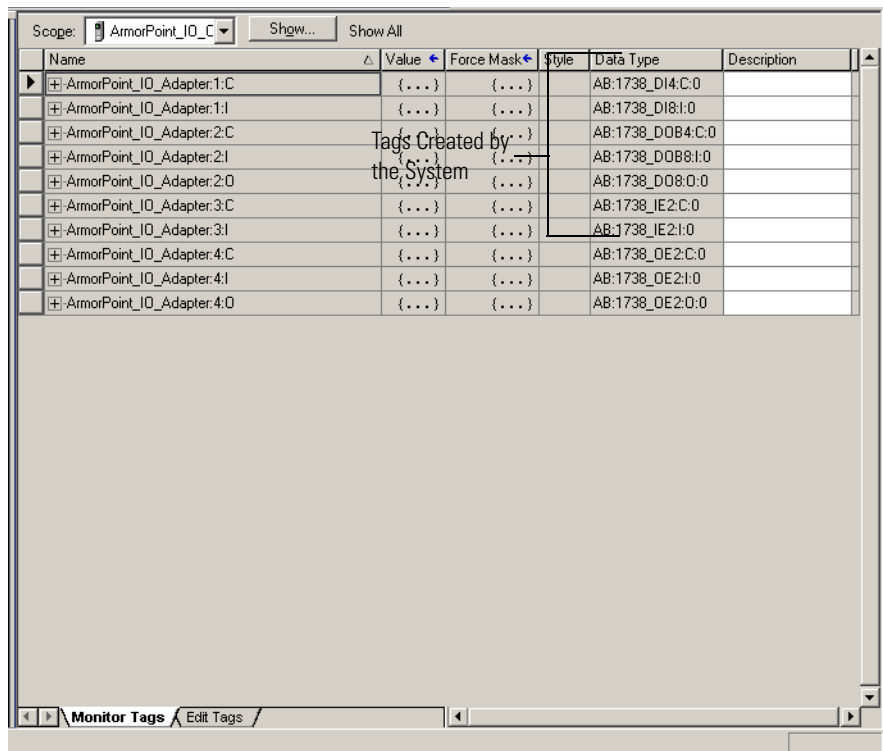
## Edit the Controller Tags

When you add modules to the I/O configuration, the system creates tags for those modules to use in the application program. For the example application, you need to add one more Controller Tag.

1. Double-click the Controller Tags folder in the project window.

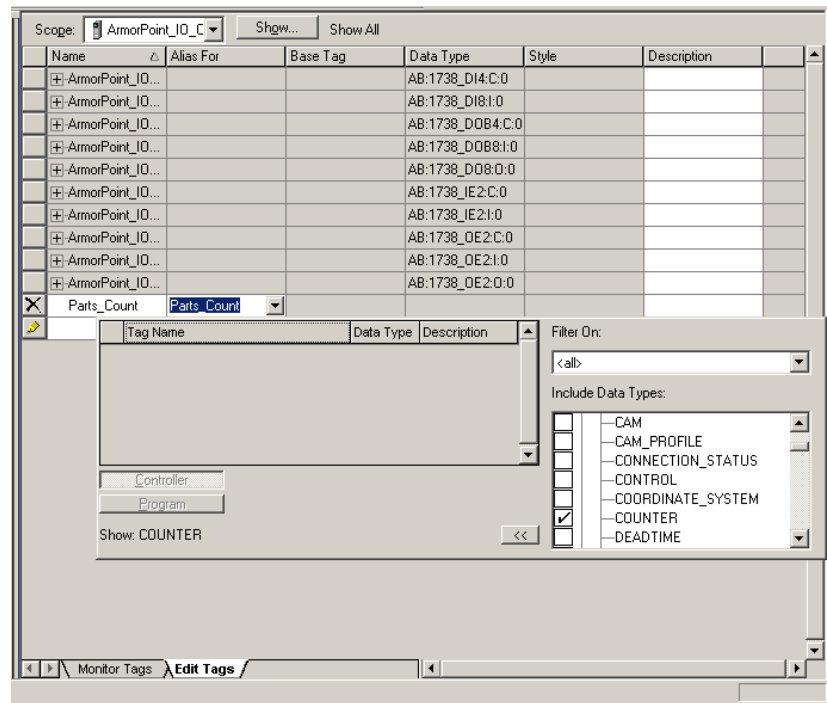


The Controller Tags dialog opens. You see the tags created for the 1738-AENT/B adapter and its I/O modules.



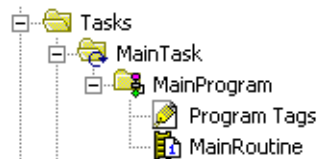
- Click the Edit Tags tab at the bottom of the Controller Tags dialog and create the following tag:

Tag	Type
Parts_Count	Counter

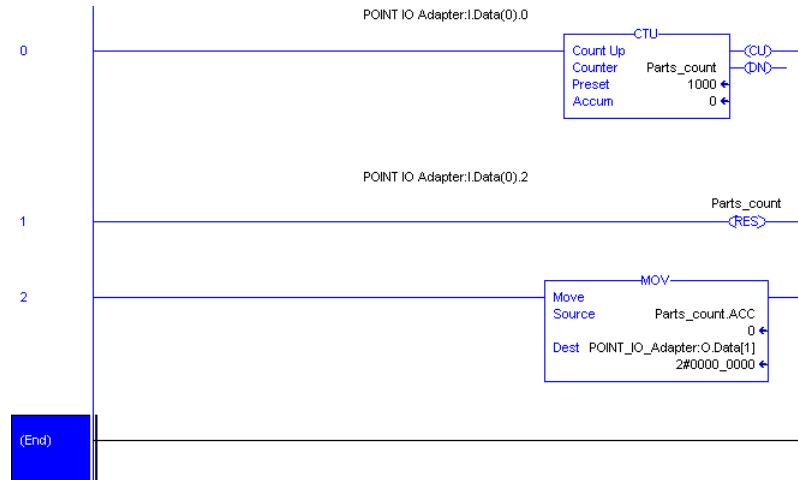


**Create the Ladder Program** Next, create the example ladder program to test the I/O.

- Under the MainProgram folder, double-click MainRoutine.



- Enter the following ladder program using the tags previously created.

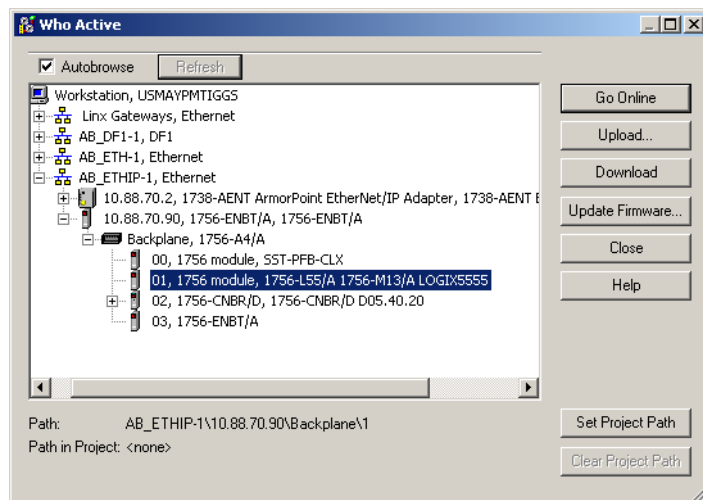


- Save the program.

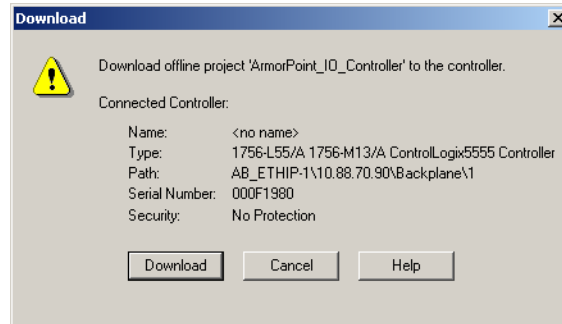
## Download the Program to the Controller

Follow this procedure to download the program we just saved to the ControlLogix controller.

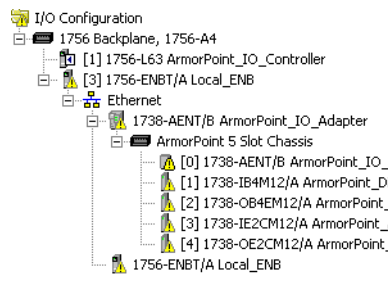
- From the main menu, choose Communications>Who Active.
- Navigate to select the slot where the controller is located in the chassis.
- Choose Set Project Path.



4. Choose Download for both instances.



Notice that the 1756-ENBT Bridge is now online. If yellow triangles are present, see the following section.



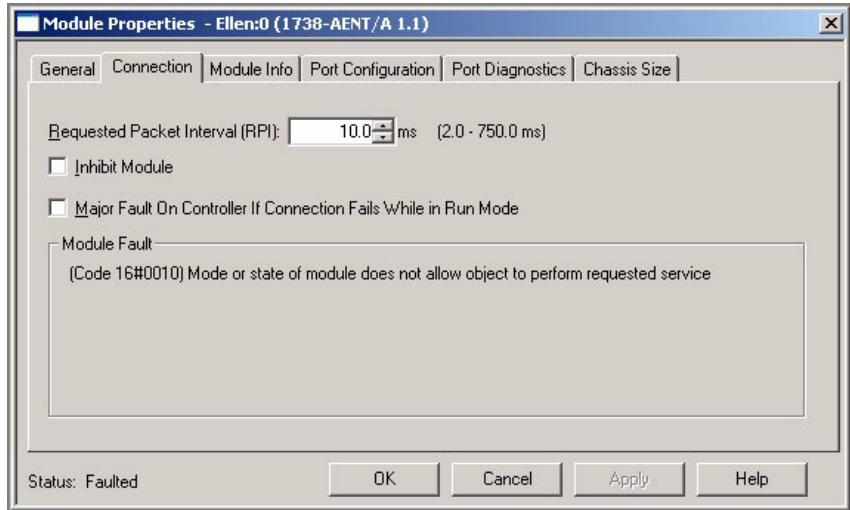
## Verify the Module Chassis Size

You have now built the I/O tree in RSLogix 5000 software and the RSLogix 5000 software used the chassis size from the 1738-AENT/B adapter General tab. Now you need to download this new chassis size value into the 1738-AENT/B adapter hardware. This procedure will synchronize the chassis size value from the RSLogix 5000 software into the 1738-AENT/B adapter hardware. Note that you must be online to perform this procedure.

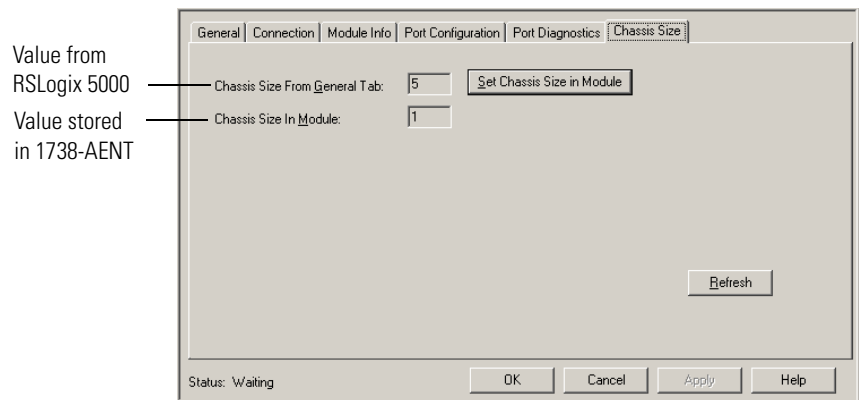
1. Verify that RSLogix 5000 software is online.
2. Right-click on the 1738-AENT/B adapter under I/O Configuration in the Project window.
3. Select Properties.
4. Click the Connection tab.



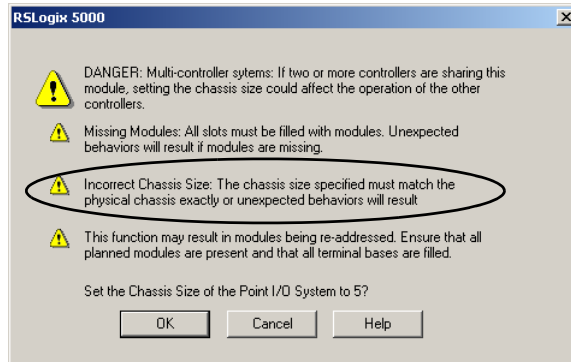
You see the Module Fault error code.



5. Click the Chassis Size tab.
6. Click Set Chassis Size in Module.

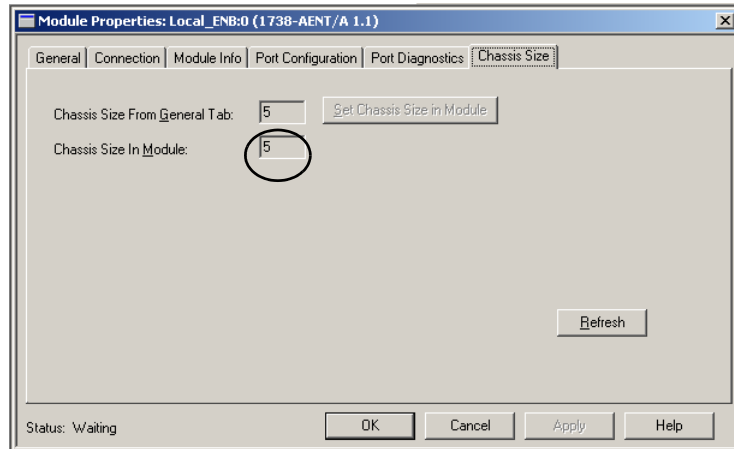


7. Read and acknowledge the warning screen.



8. Click OK to continue.

Notice the chassis size in the module has been modified to 5.



9. Click OK to close the dialog.

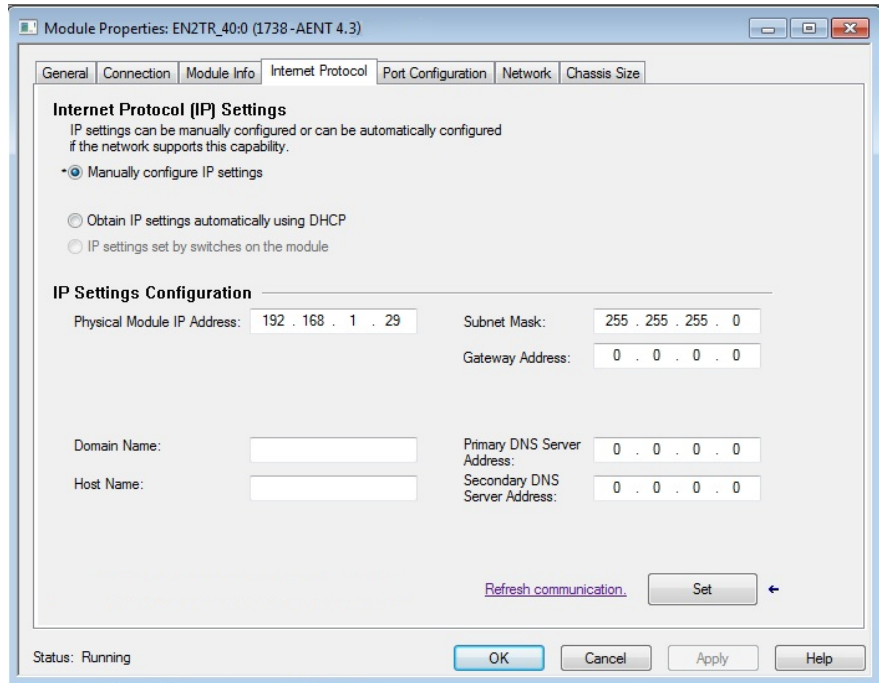
At this point, verify that your PointBus status LED is solid green and that all the yellow triangles in your I/O configuration are gone.

10. Click File>Save to save the project.

## Configure the Adapter with Fixed IP Address

To configure the adapter with a fixed IP address to prevent the adapter from ceasing to communicate with the ControlLogix controller:

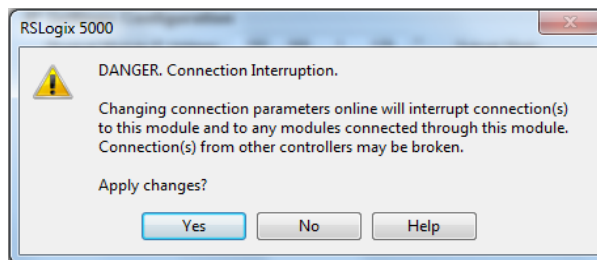
1. All controllers with I/O connections to the AENTR and/or the modules in its backplane need to be in program mode.
2. In the Module Properties dialog, click the Internet Protocol tab.



3. If it is not selected, select Manually configure IP settings.
4. Enter values for Physical Module IP Address, and Subnet Mask, noting we used the following values:

Physical Module IP Address	192.168.1.29
Subnet Mask	255.255.255.0

5. Click Set.  
Read and acknowledge the warning.



6. Click Yes to accept the changes.
7. Click the Refresh communication button to verify the changes.

## **Chapter Summary**

In this chapter, you learned how to configure the 1738-AENT/B adapter using a direct connection and how to configure the adapter for a fixed IP address. The following chapter describes an example application in which you configure I/O using a direct connection and a rack-optimized connection.

## Configure the Adapter for Direct Connection and Rack Optimization in RSLogix 5000 Software

### Overview

This chapter guides you through the steps required to configure your 1738-ArmorPOINT I/O Ethernet Adapter for both direct connection and rack optimization using RSLogix 5000 software.

It is possible to mix communication formats for different I/O modules communicating through the same adapter. I/O modules set up to use rack optimization communicate at the rate of the RPI configured for the 1738-AENT/B adapter. I/O modules configured for direct communication communicate at their own set RPIs and ignore the 1738-AENT/B adapter's RPI. Note that the modules presented in this chapter are configured using RSLogix 5000 software, version 17. The chapter contains the following main sections.

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<a href="#">Create the Example Application</a>	53
<a href="#">Configure the I/O Modules</a>	54
<a href="#">Add the Local EtherNet/IP Bridge to the I/O Configuration</a>	54
<a href="#">Add the ArmorPOINT I/O Adapter to the I/O Configuration</a>	57
<a href="#">Add the ArmorPoint Digital Modules and Configure For Rack Optimization Connection</a>	61
<a href="#">Add the ArmorPoint Analog Modules and Configure For Direct Connection</a>	65
<a href="#">Add the Digital Input Module</a>	61
<a href="#">Add The Digital Output Module</a>	63
<a href="#">Add the ArmorPoint Analog Modules and Configure For Direct Connection</a>	65
<a href="#">Add the Analog Current Input Module</a>	65
<a href="#">Add the Analog Current Output Module</a>	67
<a href="#">Download the Program to the Controller</a>	71
<a href="#">Verify the Module Chassis Size</a>	72
<a href="#">An Overloaded 1738-AENT/B Adapter</a>	74
<a href="#">Access Module Data via the 1738-AENT/B Adapter</a>	75

## Set Up the Hardware

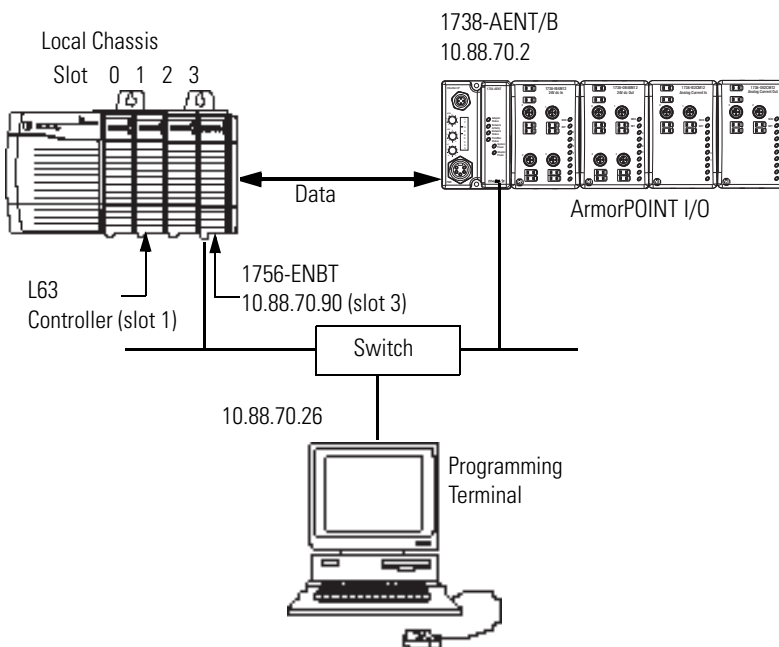
The following section describe how to set up the I/O Hardware.

### Set Up the ArmorPOINT I/O Hardware

In this example, a ControlLogix chassis contains the L63 controller in slot 1 and a 1756-ENBT bridge module in slot 3.

In this example, we mounted the 1738-AENT/B adapter on a DIN rail in slot 0, with a 1738-OW2/C relay output module in slot 1, a 1738-OV4E/C sink output module in slot 3, and two other ArmorPOINT I/O modules which will not be controlled by this Logix controller in slots 2 and 4.

To work along with this example, set up your system as shown in the figure.

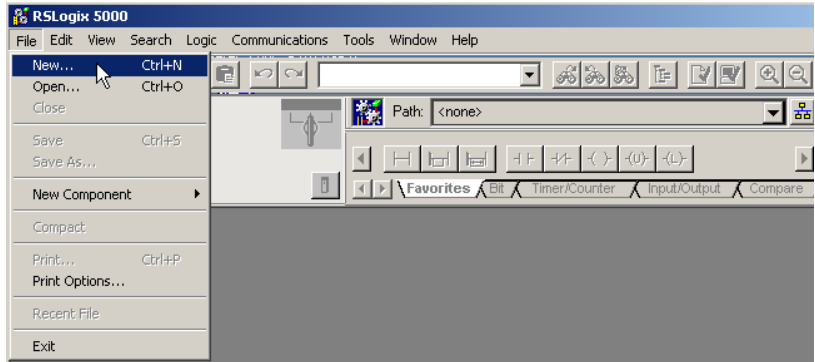


- Note that in the example application, the Logix controller and 1756-ENBT module (firmware revision 2.3 or later) are assumed to be in the slots shown above.
- Verify the IP addresses for your programming terminal, 1756-ENBT bridge module, and 1738-AENT/B adapter.
- Verify the position (slot) of the I/O modules.
- Verify that all wiring and cabling is properly connected.
- Make sure your communication driver (for example, AB\_ETH-1 or AB-ETHIP-1) is configured in RSLinx software. [See Configure the RSLinx Ethernet Communication Driver on page 99.](#)

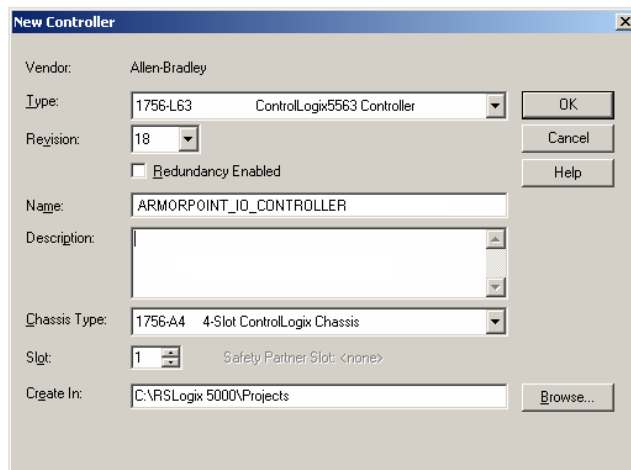
## Create the Example Application

Perform the following steps to create the example application:

1. Start the RSLogix 5000 Enterprise Series software.  
The RSLogix 5000 software main dialog opens.
2. From the File menu, select New.



3. The New Controller dialog opens.



4. Enter an appropriate Name for the Controller, for example, POINT\_IO\_Controller.
5. Select the following:
  - Revision
  - Chassis Type
  - Slot number
  - Description (optional)
6. Complete the Create In entry by selecting the folder where you want to save the file.
7. To use redundancy in your system, select the Redundancy Enabled checkbox.

RSLogix 5000 software, revision 18 and later includes enable redundancy. This example does not use redundancy.

8. Click OK.

## Configure the I/O Modules

You now add the ArmorPOINT I/O modules to the controller's I/O configuration performing these procedures:

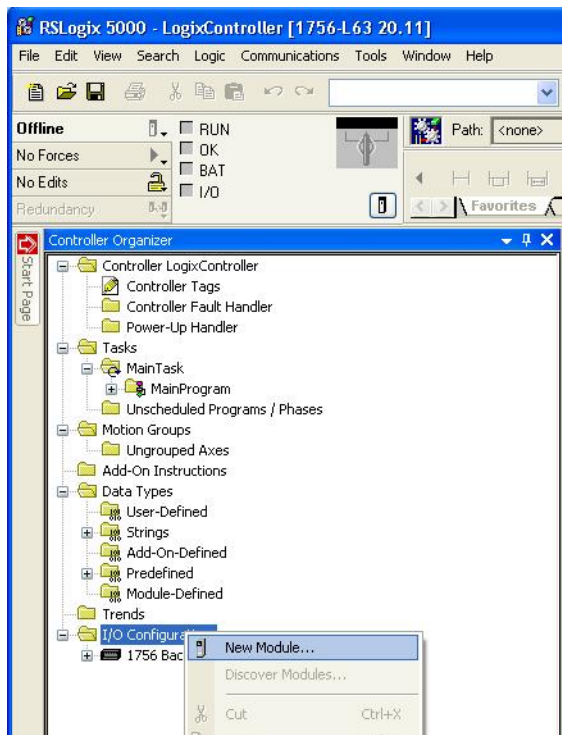
- Add the local 1756-ENBT module to the I/O configuration.
- Add the 1738-AENT/B adapter as a child of the 1756-ENBT module on the Ethernet network.
- Add the ArmorPOINT I/O modules as children of the 1738-AENT/B adapter.

### IMPORTANT

Click the Help button on the configuration dialog shown in this section if you need assistance in selecting and setting the parameters.

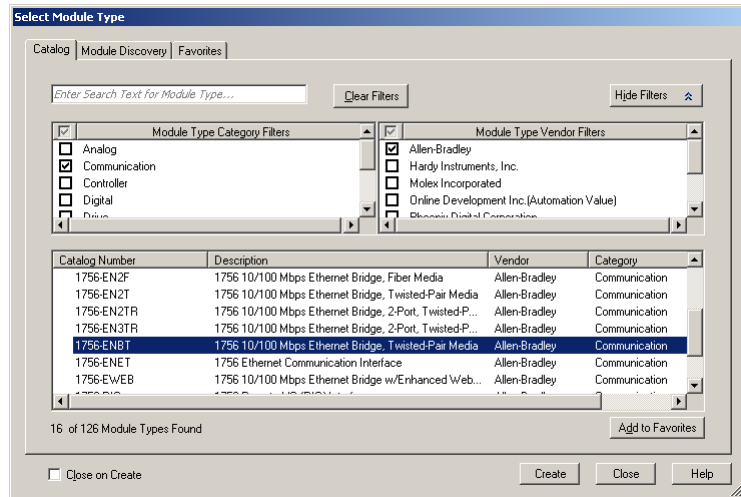
## Add the Local EtherNet/IP Bridge to the I/O Configuration

1. Right-click the I/O Configuration folder in the project dialog, and select New Module.





The Select Module Type dialog opens.



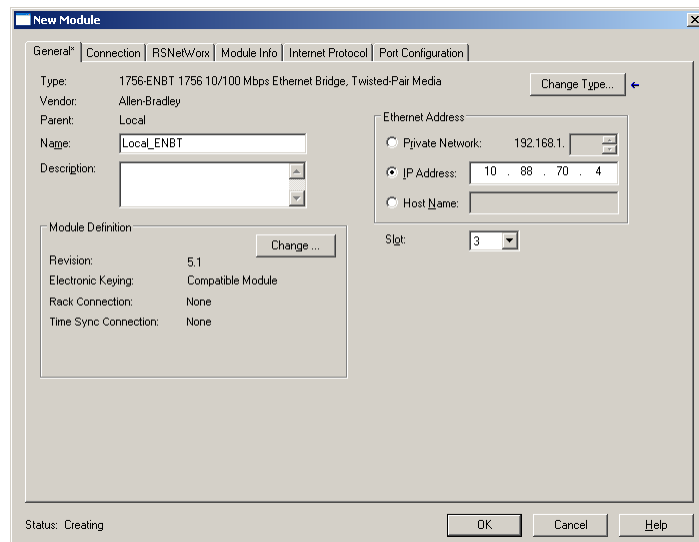
2. Select the appropriate Module Type filter Category (for the example we selected Communication), and Module Type Vendor (for the example we selected Allen-Bradley).

**TIP** In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

Note: to select only one category you will need to unselect those already selected.

3. From the list of adapters displayed, select the 1756-ENBT EtherNet/IP Bridge and click Create.

The New Module dialog opens.



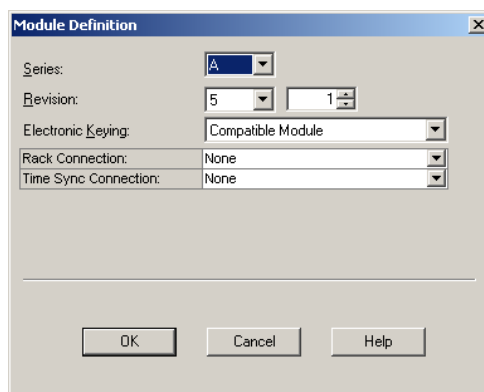
4. Enter values for Name, IP Address, and Slot, noting that we used the following values:

Name	Local_ENBT
IP Address	10.88.70.4
Slot	3

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change button. Some of the properties cannot be modified while pending edits exists.

To change the default module properties,

5. Click Change...  
The Module Definition dialog opens.

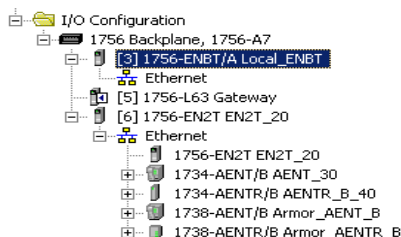


6. Enter or select values for Series, Revision, Electronic Keying, Rack Connection, and Time Sync Connection, noting that we used the following values:

Series	A
Revision	5.1
Electronic Keying	Compatible Module
Rack Connection	None
Time Sync Connection	None

7. Click OK to accept the configuration.

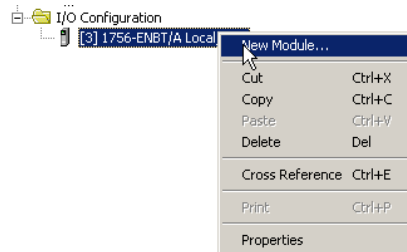
The module appears indented under under the I/O Configuration folder.



## Add the ArmorPOINT I/O Adapter to the I/O Configuration

Next, you must add the 1738-AENT/B adapter as a child of the local 1756-ENBT bridge module.

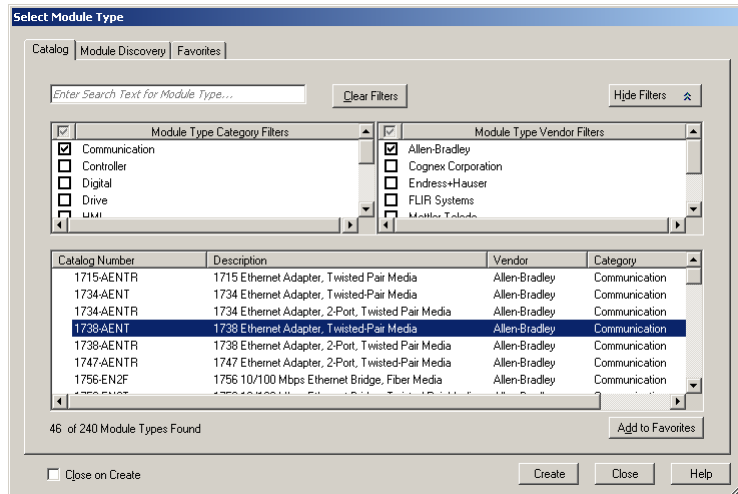
1. In the Project dialog, right-click the local 1756-ENBT bridge module under the I/O Configuration folder and select New Module from the dialog.



2. The Select Module Type dialog opens.

Select the appropriate Module Type filter Category (for the example we selected Communication), and Module Type Vendor (for the example we selected Allen-Bradley).

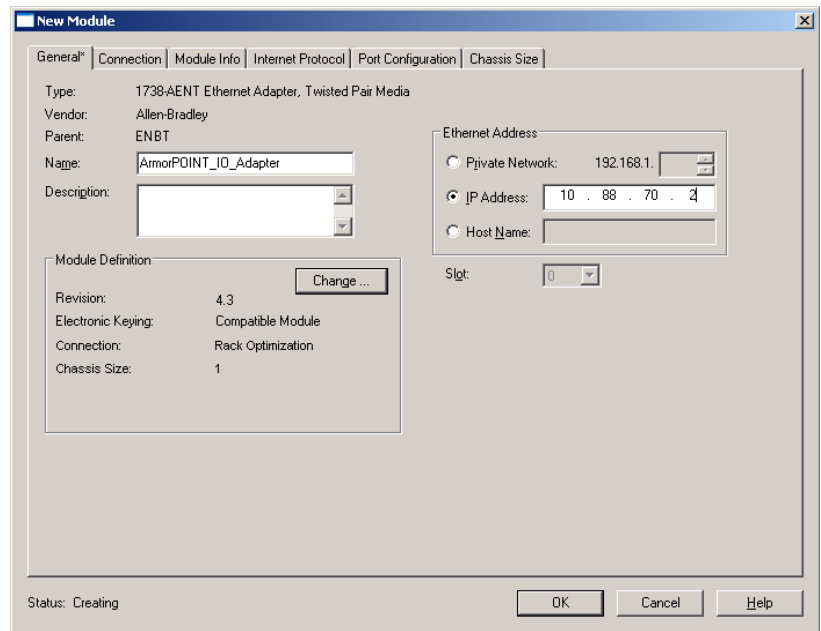
Note: to select only one category you will need to unselect those already selected.



### TIP

In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

3. Select the 1738-AENT/B adapter from the list and click Create. The New Module dialog opens.

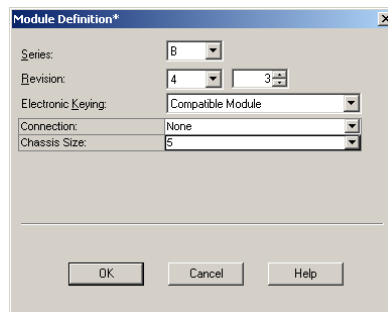


4. Enter values for Name and IP address, noting we used the following values.

Name	ArmorPoint IO Adapter
IP Address	10.88.70.2

**IMPORTANT** Note that the slot field is disabled because the slot is automatically 0 for the I/O adapter.

5. Click Change... The Module Definition dialog opens.



6. Enter or select values for Series, Revision, Electronic Keying, Connection, and Chassis Size, noting that we used the following values:

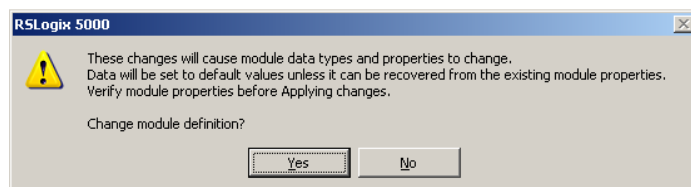
Series	B
Connection	Rack Optimization
Chassis Size	5
Electronic Keying	Compatible Module
Revision	4.3

**IMPORTANT** The chassis size value equals 1 for the adapter plus the number of I/O modules installed (physically present on the I/O backplane).

Connection choices include:

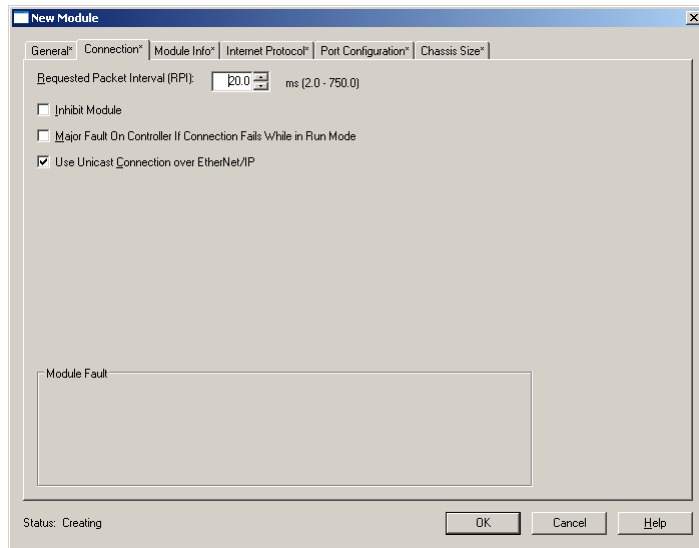
- none = the adapter will make a direct connection to each of the modules referenced by the data
  - rack optimization = digital I/O data is collected into a rack image. Note that this does not include analog or specialty I/O modules.
  - listen only - rack optimization = read or verify data only, but does not control the modules. When you have multiple controllers, one controller is used to control and the other controllers are used to monitor.
7. Because we are making a mixed connection (both a direct connection and rack-optimized connection), choose Rack Optimization as the Connection for the 1738-AENT adapter and click OK.

A dialog box opens.



8. Click Yes.

9. In the New Module screen select the Connection Tab.



10. Verify that the Requested Packet Interval (RPI) used for the rack-optimized connection to the I/O modules is appropriate for your system (20.0 ms for this example). If not, change it to the correct value.

---

**IMPORTANT** To avoid overloading the adapter, it is recommended that the RPI be no less than 10.0 ms for rack connections and 50.0 ms for direct connections.

---

11. Click OK to accept the configuration.  
The 1738-AENT/B adapter appears indented under the local 1756-ENBT bridge module in the I/O Configuration folder.



## Add the ArmorPoint Digital Modules and Configure For Rack Optimization Connection

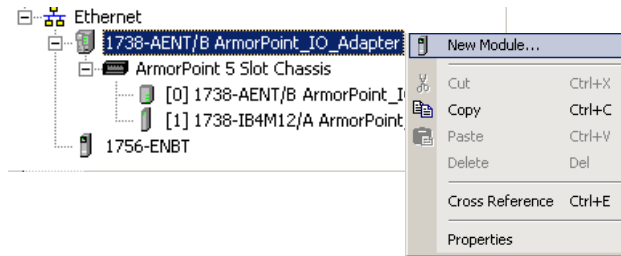
You must now add the ArmorPoint I/O modules to the I/O Configuration List under the adapter.

In this example, you add a 1738-IB4M12 24V DC digital input module, a 1738-OB4EM12 24V DC digital output, a 1738-IE2CM12 analog current input module, and a 1738-OE2CM12 analog current output module. Use these steps as a guide when you are configuring different I/O modules for your system.

In this example, the digital input and output modules are configured for rack optimization.

### Add the Digital Input Module

1. Right-click the ArmorPOINT I/O Chassis in the I/O Configuration folder, and select New Module.



---

**IMPORTANT** If you exceed the adapter chassis size trying to add more modules than you configured, the New Module selection appears dim and is disabled. Increase the adapter chassis size to add more I/O modules.

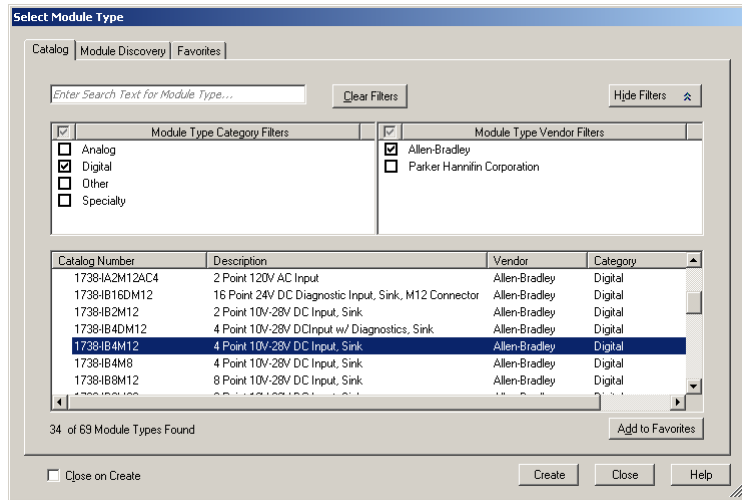
---

The Select Module Type dialog opens.

2. Select the appropriate filter for Module Type Category (for the example we selected Digital) and Module Type Vendor (for the example we selected Allen-Bradley).

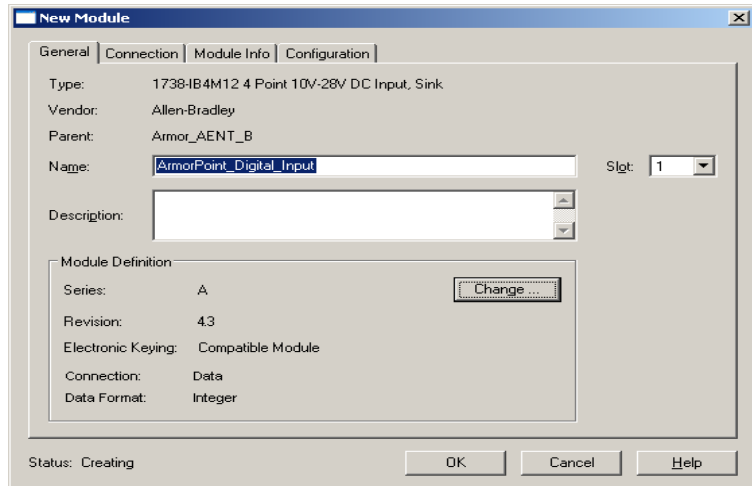
Note: to select only one category you will need to unselect those already selected.

- From the modules listed select the 1738-IB4M12 module and click Create.



**TIP** In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

The New Module dialog opens.



- Enter values for Name and Slot, noting that we used the following values

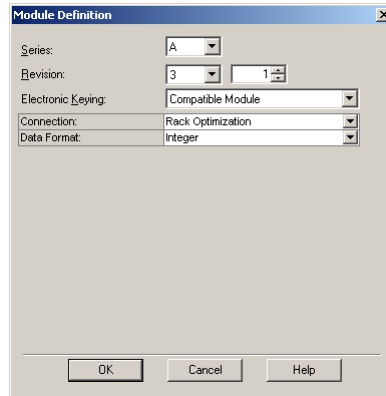
Name	ArmorPOINT_Digital_Input
Slot	1

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change... button. Some of the properties cannot be modified while pending edits exist.

- Select Change...  
The Module Definition dialog displays.

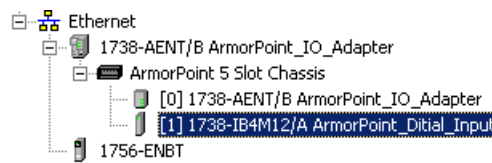


- Change the Connection from Data to Rack Optimization and click OK.



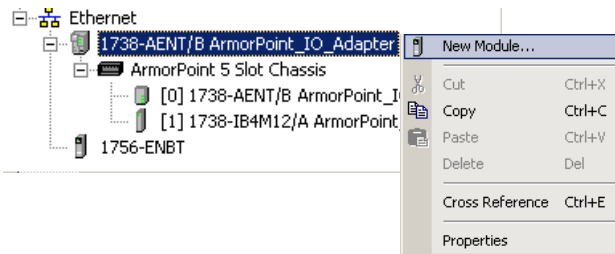
- In the New Module screen, click OK to accept the configuration.

The digital input module appears in the I/O configuration indented under the 1738-AENT/B adapter.



### Add The Digital Output Module

- Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.



### IMPORTANT

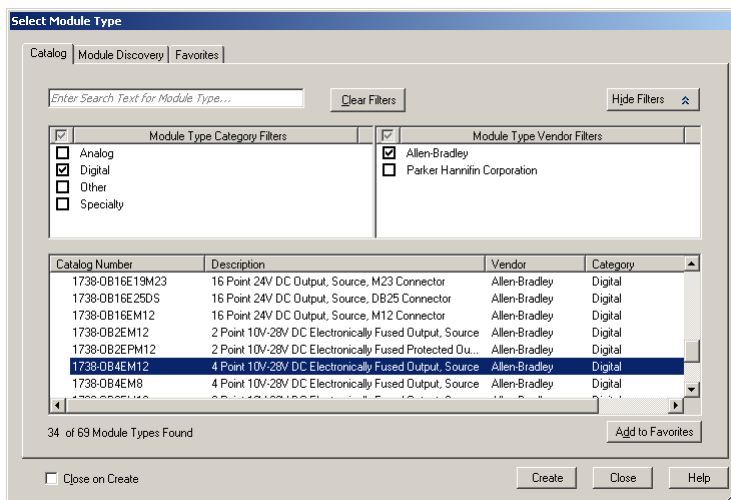
If the 1738-AENT/B adapter chassis size is exceeded, (that is, you try to add more modules than you configured) the New Module selection is dimmed out and disabled. You are not able to add any more ArmorPOINT I/O modules until the 1738-AENT/B adapter chassis size is increased.

The Select Module Type dialog opens.

2. Select the appropriate filter for Module Type Category (for the example we selected Digital) and Module Type Vendor (for the example we selected Allen-Bradley).

Note: to select only one category you will need to unselect those already selected.

3. Choose the 1738-OB4EM12 module from the list and click Create.

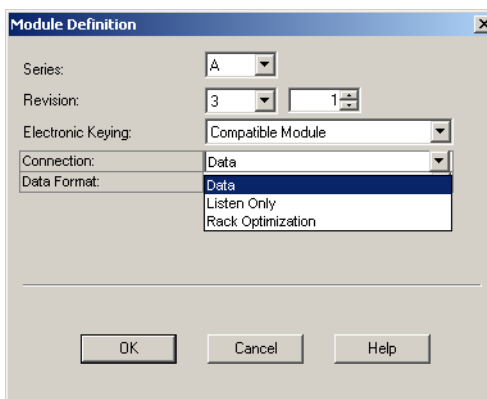


4. Enter these values in the New Module dialog:

Name	ArmorPoint Digital Output
Slot	2

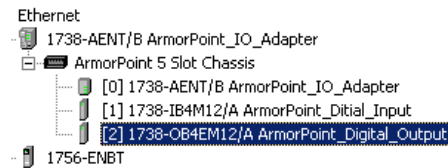
Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties. Note that some of the properties cannot be modified while pending edits exists.

5. Select Change...  
The Module Definition dialog displays.



6. Change the Connection properties to Rack Optimization and select OK.
7. In the New Module dialog, click OK to accept the configuration.

The digital output module appears in the I/O configuration indented under the 1738-AENT/B adapter.

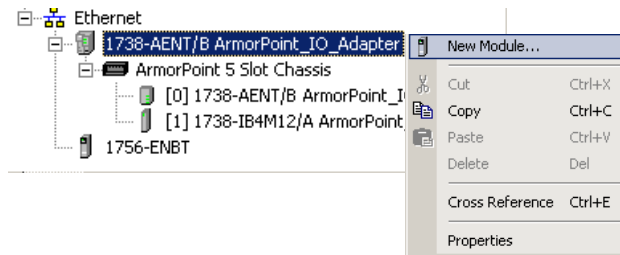


## Add the ArmorPoint Analog Modules and Configure For Direct Connection

Analog and specialty modules must be configured for direct connection. Refer to the following procedure to add the 1738-IE2CM12 and the 1738-OE2CM12 analog modules to the I/O configuration.

### Add the Analog Current Input Module

1. Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.

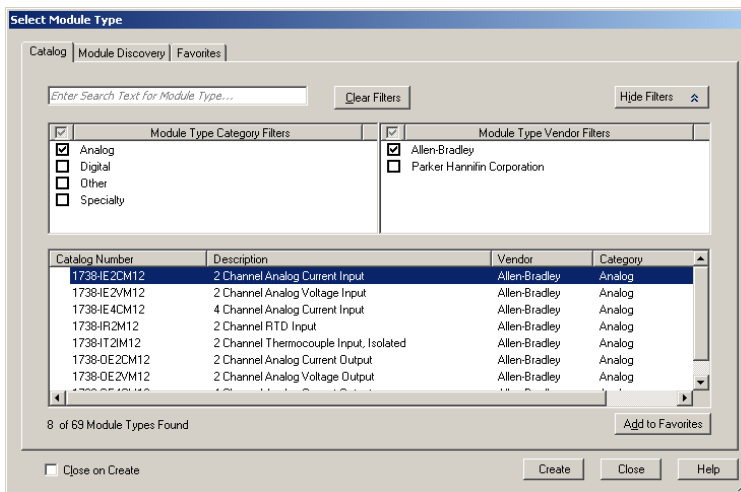


The Select Module Type dialog opens.

2. Select the appropriate filter for Module Type Category (for the example we selected Analog) and Module Type Vendor (for the example we selected Allen-Bradley).

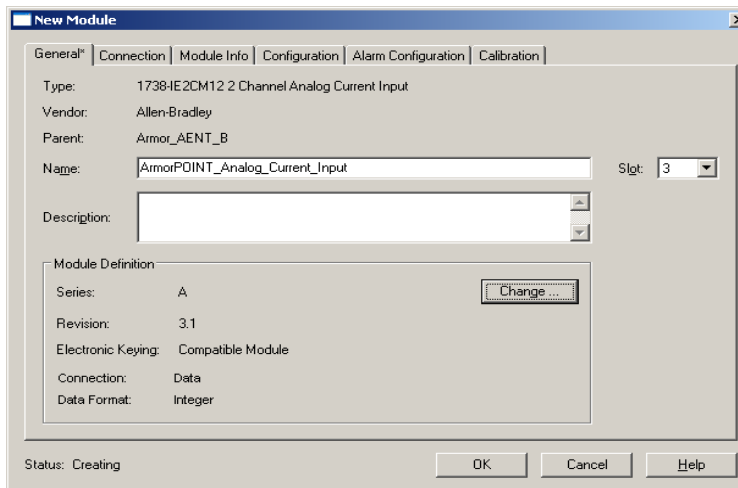
Note: to select only one category you will need to unselect those already selected.

- From the modules listed select the 1738-IE2CM12 and click Create.



**TIP** In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

The New Module dialog opens.

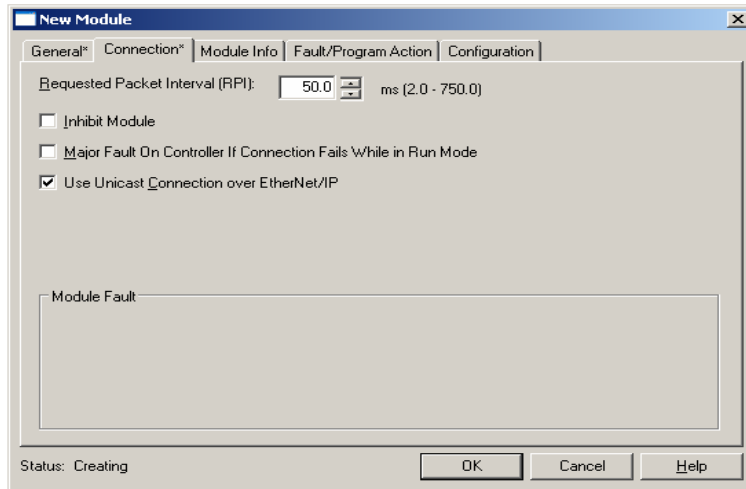


- Enter values for Name and Slot, noting that we used the following values

Name	ArmorPoint Analog Current Input
Slot	2

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change... button. Some of the properties cannot be modified while pending edits exist.

5. Select the Connection tab to set the RPI value.  
RPI is selectable since it is a direct connection.



Note that RPI is selectable on the screen because you are adding an analog module and an RPI value must be assigned for the module.

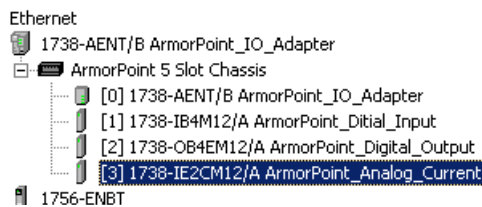
6. Enter 50.0 for the RPI and click OK to save the configuration.

---

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 50.0 ms.

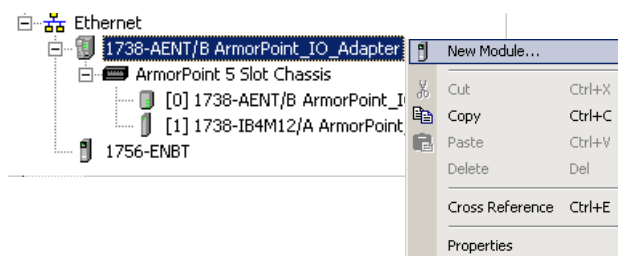
---

The analog current input module appears in the I/O Configuration indented under the 1738-AENT/B adapter.



### *Add the Analog Current Output Module*

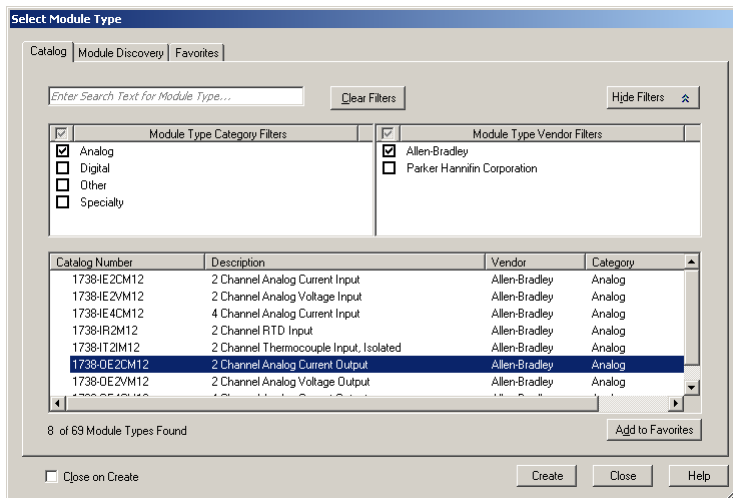
1. Highlight the 1738-AENT/B adapter under the I/O Configuration folder, right-click and select New Module.



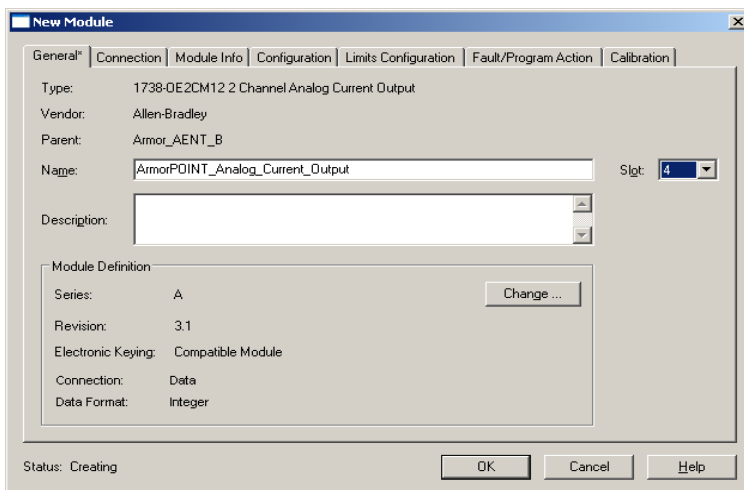
The Select Module dialog opens.

2. Select the appropriate filter for Module Type Category (for the example we selected Analog) and Module Type Vendor (for the example we selected Allen-Bradley).

Note: to select only one category you will need to unselect those already selected.



3. Choose the 1738-OE2CM12 module from the list and click Create.



**TIP**

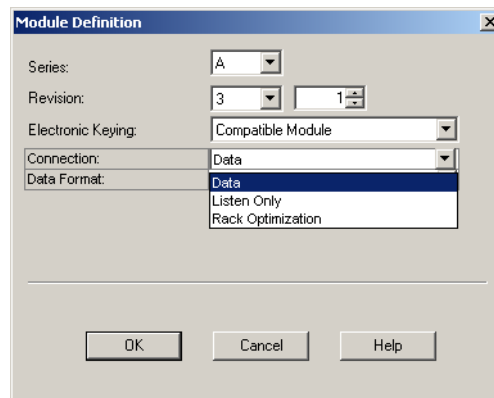
In the Select Module Type dialog, you have options to search for a specific module, add modules to a Favorites list, filter by Category and/or Vendor, Hide and Show Filters, use Module Discovery, sort by vendor, or access your Favorites list.

4. Enter values for Name and Slot, noting that we used the following values

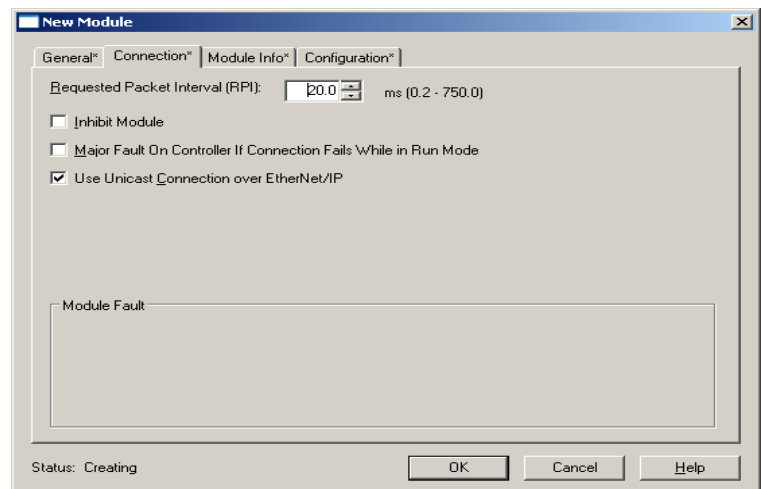
Name	ArmorPoint Analog Current Output
Slot	4

Note the module definition properties on the bottom left of the New Module dialog. You have the option to change these properties by clicking the Change... button. Some of the properties cannot be modified while pending edits exist.

5. Select Change...  
The Module Definition dialog displays.



6. Change the Connection properties from the default value to Data for Direct Connection and click OK.  
7. In the New Module dialog, click the Connection tab to set the RPI value.



Note that RPI is selectable on the screen because you are adding an analog module and an RPI value must be assigned for the module.

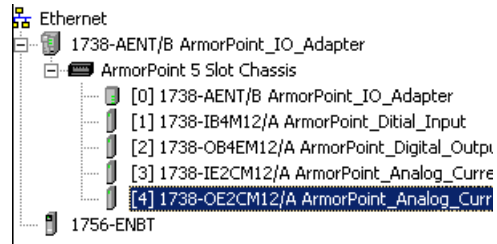
8. Enter 50.0 for the RPI and click OK to save the configuration.

---

**IMPORTANT** To avoid overloading the 1738-AENT/B adapter, it is recommended that the RPI be no less than 50.0 ms.

---

9. Click OK to save the configuration.
10. The analog current input module appears in the I/O Configuration indented under the 1738-AENT/B adapter

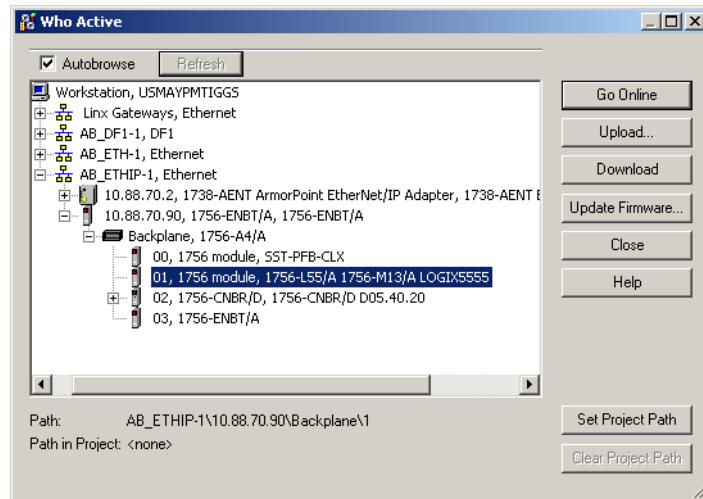




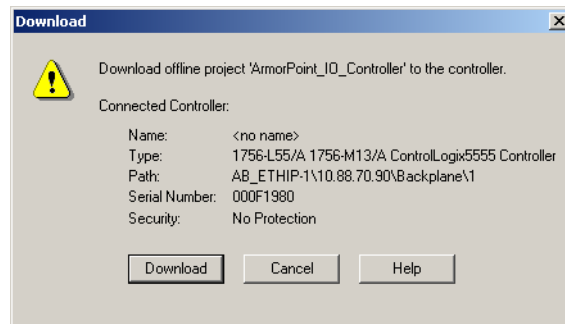
## Download the Program to the Controller

Follow this procedure to download the program we just saved to the ControlLogix controller.

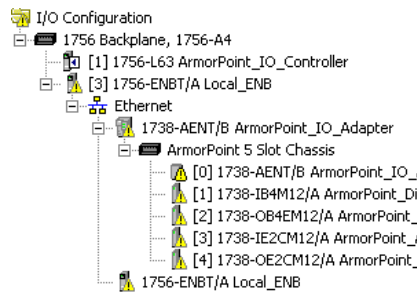
1. From the main menu, choose Communications>Who Active.
2. Navigate to select the slot where the controller is located in the chassis.
3. Choose Set Project Path.



4. Choose Download for both instances.



Notice that the 1756-ENBT Bridge is now online. If yellow triangles are present, see the following section.

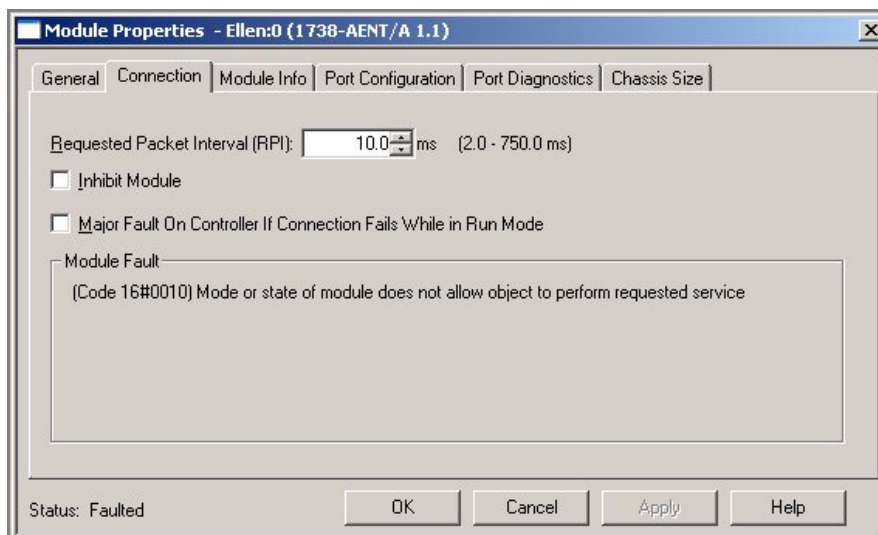


## Verify the Module Chassis Size

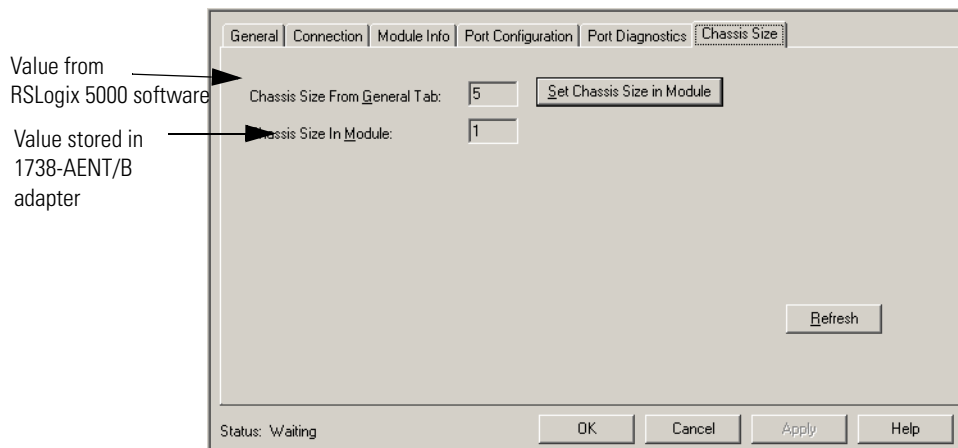
You have now built the I/O tree in RSLogix 5000 software and the RSLogix 5000 software used the chassis size from the 1738-AENT/B adapter General tab. Now you need to download this new chassis size value into the 1738-AENT/B adapter hardware. This procedure will synchronize the chassis size value from the RSLogix 5000 software into the 1738-AENT/B adapter hardware. Note that you must be online to perform this procedure.

1. Verify that RSLogix 5000 software is online.
2. Right-click the 1738-AENT/B adapter under I/O Configuration in the Project window.
3. Select Properties.
4. Click the Connection tab.

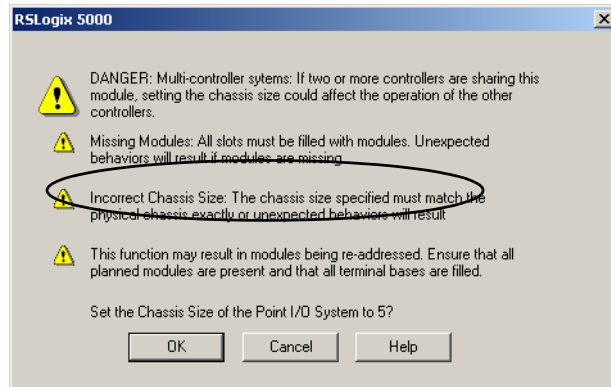
You see the Module Fault error code



5. Click the Chassis Size tab.
6. Click Set Chassis Size in Module.

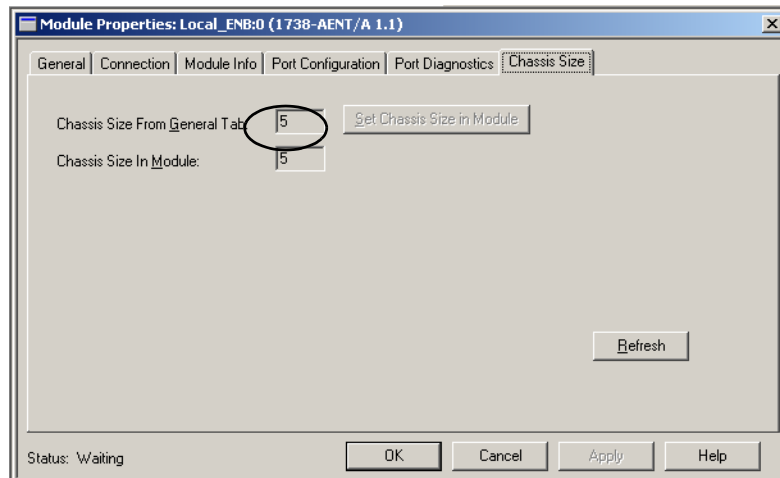


7. Read and acknowledge the warning screen.



8. Click OK to continue.

Notice the chassis size in the module has been modified to 5.



9. Click OK to close the dialog.

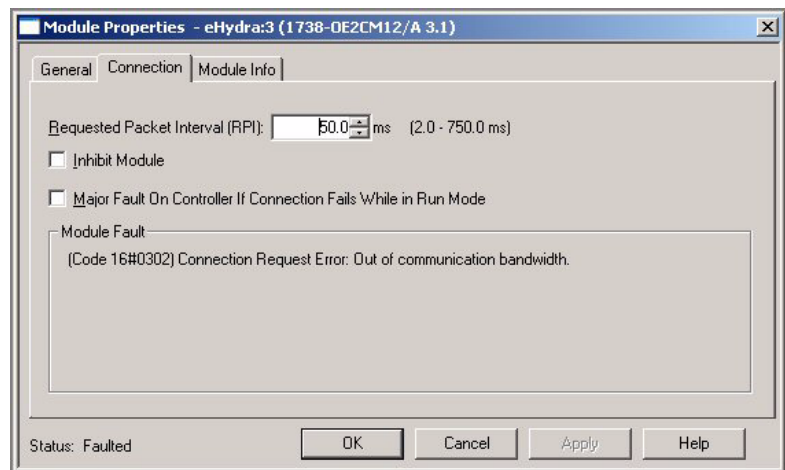
At this point, verify that your POINTBus status LED is solid green and that all the yellow triangles in your I/O configuration are gone.

10. Click File>Save to save the project.

## An Overloaded 1738-AENT/B Adapter

Each ArmorPOINT I/O connection established with the 1738-AENT/B adapter will consume a portion of the microprocessor's bandwidth. The amount of bandwidth used by a connection depends on a number of variables, including the RPI, the number of ArmorPOINT I/O modules involved in the connection, and the rate of change of the I/O. The 1738-AENT/B adapter continuously monitors this bandwidth and will reject requests for new connections when there is insufficient bandwidth available to support the new connection.

The condition where the 1738-AENT/B adapter cannot support the connection due to a limit of the microprocessor's bandwidth is shown below.



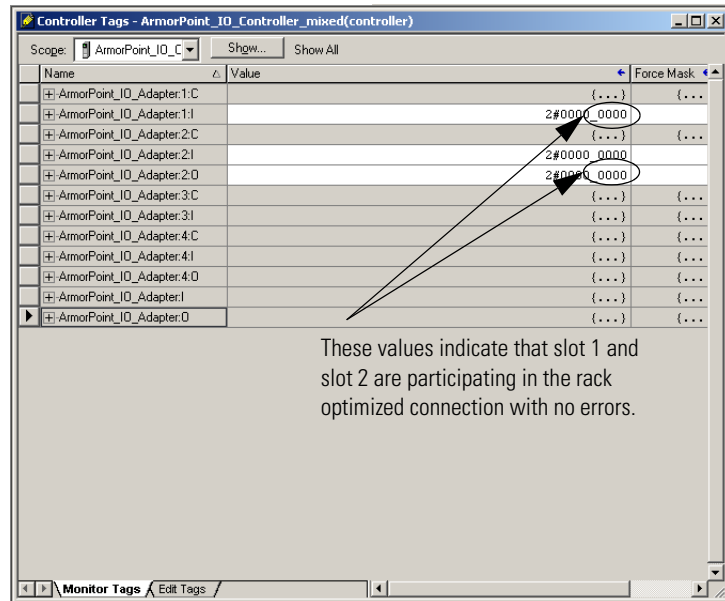
If this condition is encountered, alter the existing connections to reduce the amount of microprocessor bandwidth consumed. The most likely fixes for this condition include:

- Increase the RPI
- Decrease the number of connections.

## Access Module Data via the 1738-AENT/B Adapter

Use the following information for 1738 ArmorPOINT I/O Ethernet adapter data in the ladder logic program.

- ArmorPoint\_IO\_Adapter = the name you gave to your Ethernet adapter
- # = slot number of ArmorPOINT I/O adapter
- C = configuration, I = input, O = output



Use the controller tags in your ladder program to read input data or write output data.

- For RSLogix 5000 programming instructions, refer to EtherNet/IP Modules in Logix5000 Control Systems User Manual, publication [ENET-UM001](#)
- For ControlLogix controller information, refer to ControlLogix System User Manual, publication [1756-UM001](#).
- Slot Status Bits display the connection status for each of the ArmorPOINT I/O modules that use a rack-optimized connection. Bit 0 is reserved for the adapter and always reports a value of 1. Each of the other bits (1 to 63) correspond to an ArmorPOINT I/O module that is installed in the ArmorPOINT I/O backplane. Note that in this example, the 1738-AENT/B adapter is configured for both rack-optimized and direct connections. The slot status bits indicate that the modules in slot 1 and slot 2 are installed and operating correctly (0=module participating with no errors and 1=module not participating or connection error (typically, module removed/missing)).

## Chapter Summary

In this chapter, you learned how to configure the 1738-AENT/B adapter using a rack-optimized and direct connection. The following chapter describes the LED status indicators.

## **Notes:**

# Troubleshoot the Adapter

This chapter describes the different status indicators available in the 1738 ArmorPOINT I/O EtherNet/IP adapter and how to interpret these indicators to help troubleshoot the module. The following table lists where to find specific information

Topic	Page
<a href="#">Interpret the Status Indicators</a>	<a href="#">75</a>
<a href="#">Status Indicators for ArmorPOINT I/O Adapters</a>	<a href="#">76</a>

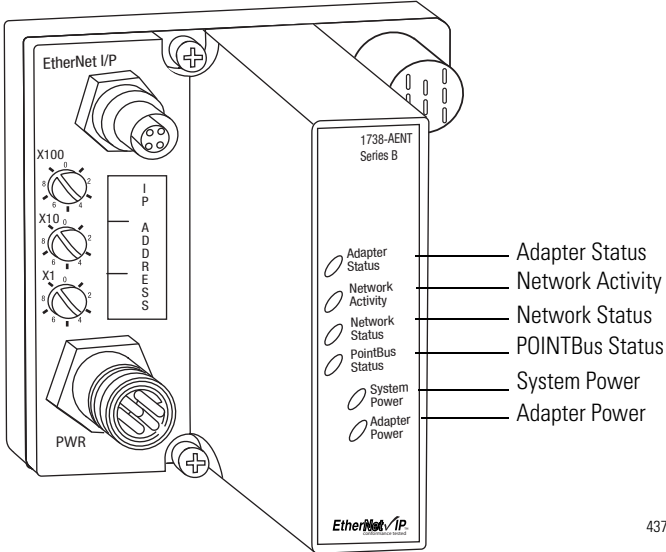
## Interpret the Status Indicators

The 1738 ArmorPOINT I/O EtherNet/IP adapters have the following status indicators:

- Module Status,
- Network Activity, Network Status,
- POINTBus Status
- System Power
- Adapter Power

## Status Indicators for ArmorPOINT I/O Adapters

The following describes the status indicators on the 1738-AENT.



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**Status Indicators for 1738-AENT/B Adapter**

Indicator	Status	Description
Adapter Status	Off	No power applied to device
	Flashing green	Device needs commissioning due to missing, incomplete, or incorrect configuration.
	Solid green	Device operating normally
	Flashing red	Recoverable fault. Complete firmware update, verify address switches.
	Solid red	Unrecoverable fault has occurred: <ul style="list-style-type: none"> <li>self test failure (checksum failure at power cycle, ramtest) at power cycle.</li> <li>firmware fatal error.</li> </ul>
	Flashing red/green	Module self-test
Network Activity	Off	No Link established.
	Flashing green/Off	Transmit or receive activity present.
	Solid green	Link established.
Network Status	Off	Device not initialized. The module does not have an IP address.
	Flashing green	No CIP connections present. Device has an IP address, but no CIP connections are established.
	Solid green	CIP connections present. Device online and has an IP address, and CIP connections are established.
	Flashing red	One or more CIP connections in timed-out state. Check for I/O module failure and controller operation.
	Solid red	Duplicate IP address detected. Verify IP address setting and correct, as needed.
	Flashing red/green	The module is performing a self-test (only occurs during cycle power test).
POINTBus Status	Off	Device not powered – check module status indicator.
	Flashing red/green	LED cycle power test present.
	Flashing red	Recoverable fault occurred: <ul style="list-style-type: none"> <li>At cycle power, the number of expected modules does not equal the number of modules present.</li> <li>A module is missing.</li> <li>Node fault (I/O connection timeout) occurred.</li> </ul>
	Solid red	Unrecoverable fault occurred – the adapter is bus off.
	Flashing green	Firmware (NVS) update in progress.
	Solid green	Adapter online with connections established (normal operation, Run mode).
	System Power	Off
	Solid green	System power is on; DC-DC converter is active (5V).
Field Power	Off	Not active; field power is off.
	Solid green	Power is on; 24V is present.



**Notes:**



## Specifications

### General Specifications

The 1738-AENT/B adapters have the following general specifications.

#### General Specifications

Attributes	Description
Expansion I/O capacity, max	<p>63 modules</p> <ul style="list-style-type: none"> <li>• 5 rack-optimized connections (for digital modules only)</li> <li>• 31 direct connections</li> <li>• 1738-AENT/B backplane current output = 1.0 A.</li> <li>• Actual number of modules can vary.</li> <li>• Add up current requirements of modules you want to use to make sure they do not exceed the amperage limit of 1.0 A for the 1738-AENT/B adapter.</li> <li>• Backplane current can be extended beyond 1.0 A by using 1738-EP24DC backplane extension power supplies and, as required, 1738-FPD modules.</li> <li>• Add multiple 1738-EP24DC and 1738-FPD modules to reach the 63 module max.</li> </ul>
POINTBus current requirements, max	<p>50 mA (Catalog number 1738-IB4DM12)            75 mA (Catalog numbers 1738-OB2EM12, 1738-OB8EM8, 1738-OB2EPM12, 1738-OB4EM8, 1738-OB4EM12, 1738-OB8EM12, 1738-OB8EM23, 1738-IB2M12, 1738-IB4M12, 1738-IB4M8, 1738-IB8M8, 1738-IB8M12, 1738-IB8M23, 1738-IB16DM12, 1738-8CFGM8, 1738-8CFGM23, 1738-8CFGDLXM8, 1738-8CFGDLXM12, 1738-8CFGDLXM23, 1738-OV4EM12, 1738-IV4M12, 1738-IV8M8, 1738-IV8M12, 1738-IV8M23, 1738-IA2M12AC3, 1738-IA2M12AC4, 1738-OA2M12AC3, 1738-IE2CM12, 1738-IE4CM12, 1738-IE2VM12, 1738-OE2CM12, 1738-OE4CM12, 1738-OE2VM12)            80 mA (Catalog numbers 1738-OW4M12, 1738-OW4M12AC)            100mA (Catalog numbers 1738-8CFGM8, 1738-8CFGM12, 1738-8CFGM23, 1738-8CFGDLXM8, 1738-8CFGDLXM12, 1738-8CFGDLXM23)            110mA (Catalog number 1738-VHSC24M23)            150 mA (Catalog numbers 1738-OB16E25DS, 1738-OB16E19M23, 1738-OB16EM12)            160mA (Catalog number 1738-IJM23)            175mA (Catalog number 1738-IT2IM12)            220 mA (Catalog number 1738-IR2M12)</p>
Module location	Starter module – left side of the system.

**General Specifications**

Attributes	Description
Status indicators	3 red/green status indicators on CPU: <ul style="list-style-type: none"> <li>• Adapter Status</li> <li>• Network Status</li> <li>• POINTBus Status</li> </ul> 1 green status indicator on CPU: <ul style="list-style-type: none"> <li>• Network Activity</li> </ul> 2 green power supply status indicators on DC-DC Converter: <ul style="list-style-type: none"> <li>• System Power (5V DC to POINTBus Out)</li> <li>• Adapter Power (24V DC from Field In)</li> </ul>
Power consumption, max	8.1 W @ 28.8V DC
Wiring category <sup>(1)</sup>	1 – on power ports 1 – on communications ports
Power dissipation, max	2.8 W @ 28.8V DC
Input overvoltage protection	Reverse polarity protected
Thermal dissipation, max	9.5 BTU/hr @ 28.8V DC
Isolation voltage	Type Tested @ 500V AC for 60 s: <ul style="list-style-type: none"> <li>•Comm to system</li> <li>•Comm to user power</li> <li>•User power to system</li> <li>•User power to ground</li> <li>•System to ground.</li> </ul>
Field power supply	10...28.8V DC @ 10A
Field power output	10...28.8V DC @ 9A
Module input	10...28V DC @ 1000 mA
Dimensions (HxWxD), approx.	112.0 x 72.0 x 65.0 mm (4.41 x 2.83 x 2.56 in.)
Mounting type	Metal panel
Enclosure type rating	Meets IP65/66/67/69K (when marked)
Terminal base screw torque	0.8 Nm (7 lb-in)
Weight, approx.	0.36 Kg (0.8 lb)

(1) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication [1770-IN041](#) and to the appropriate System Level Installation Manual.

## Power Supply

The 1738-AENT/B modules have the following power supply specifications.

**Power Supply Specifications**

Attributes	Description
Input voltage rating	24V DC @ 500mA 12V DC @ 1.0A
Input voltage, range	10...28.8V DC
Field side power, max	24V DC @ 10A
Inrush current, max	6 A for 10 ms
Input overvoltage protection	Reverse polarity protected

**Power Supply Specifications**

Attributes	Description
POINTBus output current, max	5V DC @ 1.0A
Auxiliary power cable <sup>(1)</sup>	Standard cordset (single-ended), for example Allen-Bradley part number 889N-F4AFC-6F or 889N-R4AFC-6F. Standard patchcord (double-ended), for example, Allen-Bradley part number 889N-F4AFNU-6F or 889N-F4AFNV-6F.
Interruption	Output voltage stays within specifications when input drops out for 10 ms @ 10V with max load

(1) Refer to publication [M117-CA001A-EN-P](#) for more information.

**EtherNet Communication**

The 1738-AENT/B adapter modules have the following EtherNet communication specifications.

**EtherNet Communication Specifications**

Attributes	Description
Ethernet communication rate	10/100 Mbps/s, half or full-duplex
Ethernet ports	1
Ethernet network topologies supported	Star, Tree
Ethernet connectors	M12, D code, female, with Ethernet keying
Ethernet cable	Category 5: shielded or unshielded

**Environmental Specifications**

1738-AENT/B EtherNet/IP Adapter modules have the following environmental specifications.

**Environmental Specifications**

Attributes	Description
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20...60 °C (-4...140 °F)
Temperature, nonoperating	IEC60068-2-1 (Test Ab, Unpackaged Nonoperating Cold) IEC60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat) IEC60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40...85 °C (-40...185 °F)
Temperature, surrounding air, max	60 °C (140 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5...95% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5 g @ 10...500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 30 g

### Environmental Specifications

Attributes	Description
Shock, nonoperating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 50 g
Emissions	CISPR 11: Class A
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz
EFT/B immunity	IEC 61000-4-4: ±4 kV @ 2.5 kHz on power ports ±3 kV @ 5 kHz on communications ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on communications ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz...80 MHz

## Certifications

1738-AENT/B EtherNet/IP Adapter modules have the following Certifications..

Certification (when product is marked) <sup>(1)</sup>	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E322657.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR11; Industrial Emissions
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications

(1) See the Product Certification link at <http://www.rockwellautomation.com/products/certification/> for Declaration of Conformity, Certificates, and other certification details.

## Adapter Web Dialogs

### Overview

The Web dialog of the I/O adapter offers extensive internal and network diagnostics. To view the Web dialogs, enter the IP address of the I/O adapters into your browser.

For Information About	Page
<a href="#">Work with the Home Page</a>	83
<a href="#">Work with the Diagnostics Pages</a>	85
<a href="#">Use the Diagnostic Overview Page</a>	86
<a href="#">Use the Network Settings Page</a>	87
<a href="#">Use the Ethernet Statistics Page</a>	88
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<a href="#">Work with the Browse Chassis Page</a>	97

**IMPORTANT** Make sure that your PC Internet LAN setting and your TCP/IP settings are configured to access the subnet on which your adapter communicates.

### Work with the Home Page

Use the adapter diagnostics home page to access other adapter diagnostics web pages and see the following information.

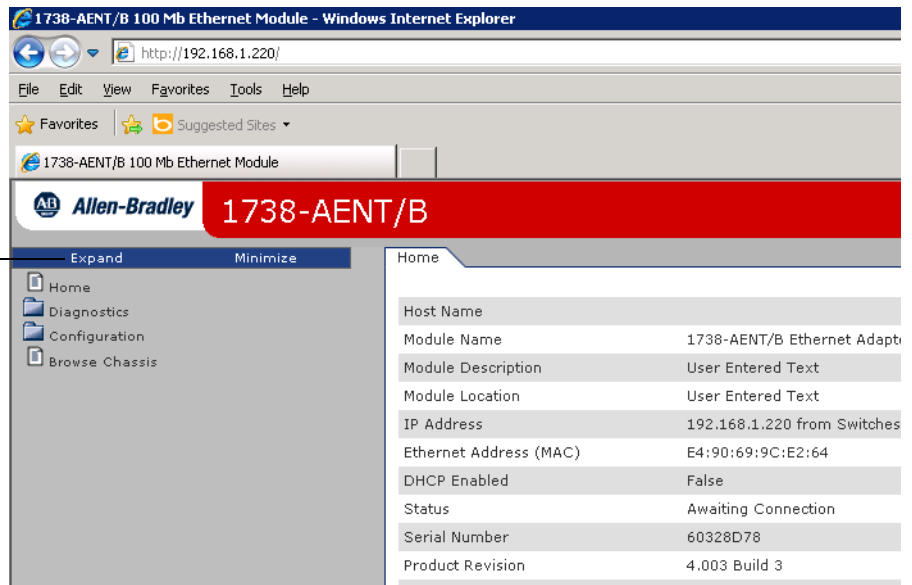
- Host Name
- Module Name
- Module Description
- Module Location
- IP Address
- Ethernet Address (MAC)
- DHCP Enabled
- Status
- Product Revision
- Firmware version Date

To display and work with the adapter diagnostics home page, follow these procedures.

**IMPORTANT** Make sure that your PC Internet LAN setting and your TCP/IP settings are configured to access the subnet on which your adapter communicates.

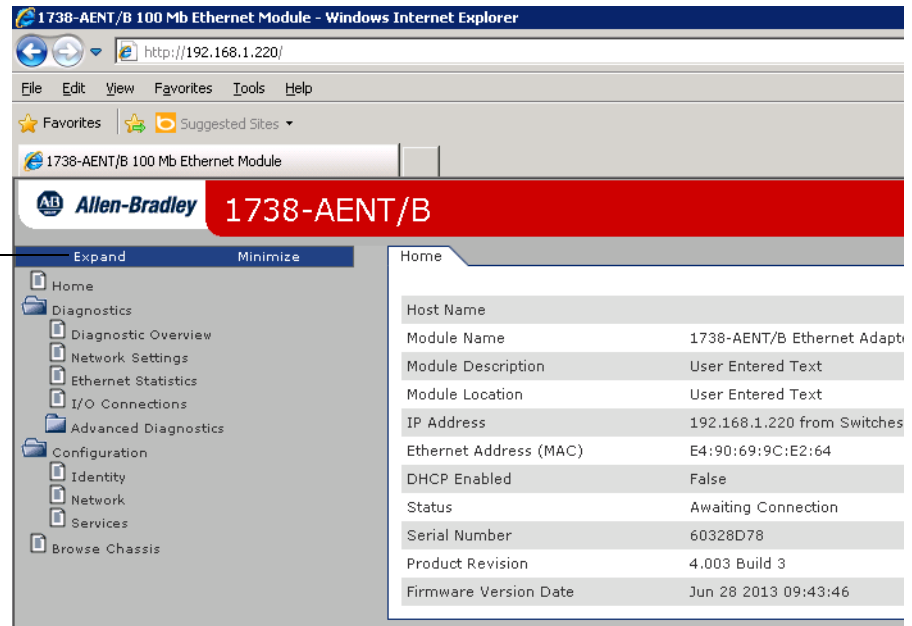
1. From your web browser, enter the adapter IP address to see the Home page.

Enter the adapter IP address to see the home page.



2. From the Home page, click Expand to show options, or Minimize to see Diagnostics, Configuration, and Browse Chassis options without the expansion.

Click Expand to show options.



3. From the Home page, complete one of these, as desired.
  - Click one of the following to access [www.ab.com](http://www.ab.com).



- Allen-Bradley logo at the top of the page
- Visit [ab.com](http://ab.com) for additional information statement under Resources
- Click Rockwell Automation at the top right to go to [www.rockwellautomation.com](http://www.rockwellautomation.com).
- Click the following to see additional diagnostics web pages.
  - Diagnostics - Diagnostic overview, Network Settings, Ethernet Statistics, I/O Connections, Advanced Diagnostics
  - Configuration - Identity, Network, Services
- Browse Chassis

## Work with the Diagnostics Pages

To work with the Diagnostics options, follow these procedures.

1. From the Home page, click Diagnostics or Expand to see the following diagnostics options from the panel at the left.
  - Diagnostic Overview
  - Network Settings
  - Ethernet Statistics
  - I/O Connections
  - Advanced Diagnostics
2. In the Diagnostic overview: Refresh Rate field, you can type a refresh rate, noting that the default refresh rate is 15 seconds.
3. From the panel at the left or tabs at the top of the page, click one of the diagnostics options to see the corresponding page.

Click tabs to see the corresponding page.

Click from this panel to see the corresponding page.

Type a refresh rate.

Ethernet Link		Module S
Media Speed (10/100Mb)	100Mbps	Chassis S
Half or Full Duplex	Full Duplex	Switches
Autonegotiate Status	Autonegotiation completed	

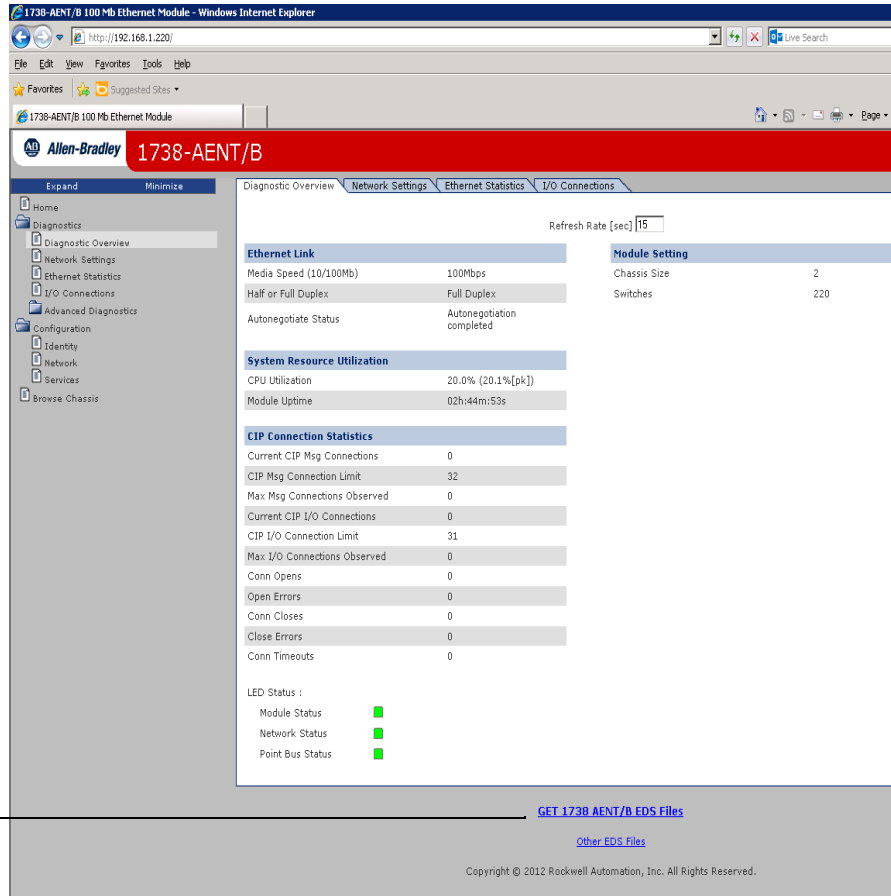
  

System Resource Utilization	
CPU Utilization	20.1% (20.1%[pk])
Module Uptime	02h:24m:44s

## Use the Diagnostic Overview Page

To use the Diagnostic Overview page for general diagnostics information, follow this procedure.

1. Click Diagnostic Overview from the tab at the top of the page or panel on the left.  
The Diagnostic Overview page opens.



Download EDS files for your adapter

2. From the Diagnostic Overview page, view the following:
  - Ethernet Link
    - Media Speed (10/100 Mbps)
    - Half or Full Duplex
    - Autonegotiate Status
  - System Resource Utilitization
    - CPU Utilization
    - Module Uptime
  - CIP Connection Statistics
    - Current CIP Msg Connections
    - CIP MSG Connection Limit
    - Max Msg Connections Observed

- Current CIP I/O Connections
- CIP I/O Connection Limit
- Max I/O Connections Observed
- Conn Opens
- Open Errors
- Conn Closes
- Close Errors
- Conn Timeouts
- LED Status
  - Module Status
  - Network Status
  - Pointbus Status
- Module Setting
  - Chassis Size
  - Switches

## Use the Network Settings Page

To use the Network Settings page for network related information, follow this procedure.

1. Click Network Settings from the tab at the top of the page or panel on the left.

This opens the Network Settings page.

The screenshot shows the Network Settings page for the 1738-AENT/B Ethernet Module. The page is displayed in a Windows Internet Explorer browser window. The left sidebar contains a navigation tree with the following items: Home, Diagnostics (Diagnostic Overview, Network Settings, Ethernet Statistics, I/O Connections), Advanced Diagnostics, Configuration (Identity, Network, Services), and Browse Chassis. The main content area is titled 'Network Settings' and contains the following information:

Network Interface		Ethernet Port 1	
Ethernet Address (MAC)	E4:90:69:9C:E2:64	Interface State	Enabled
IP Address	192.168.1.220	Link Status	Active
Subnet Mask	255.255.255.0	Media Speed	100Mbps
Default Gateway	192.168.1.1	Duplex	Full Duplex
Primary Name Server	0.0.0.0	Autonegotiate Status	Autonegotiation completed
Secondary Name Server	0.0.0.0		
Default Domain Name			
Host Name			
Name Resolution	DNS Disabled		

Below the table, there is an 'Ethernet Interface Configuration' section with the following information:

Ethernet Interface Configuration	
Obtain Network Configuration	Static

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2. From the Network Settings page, view the following:

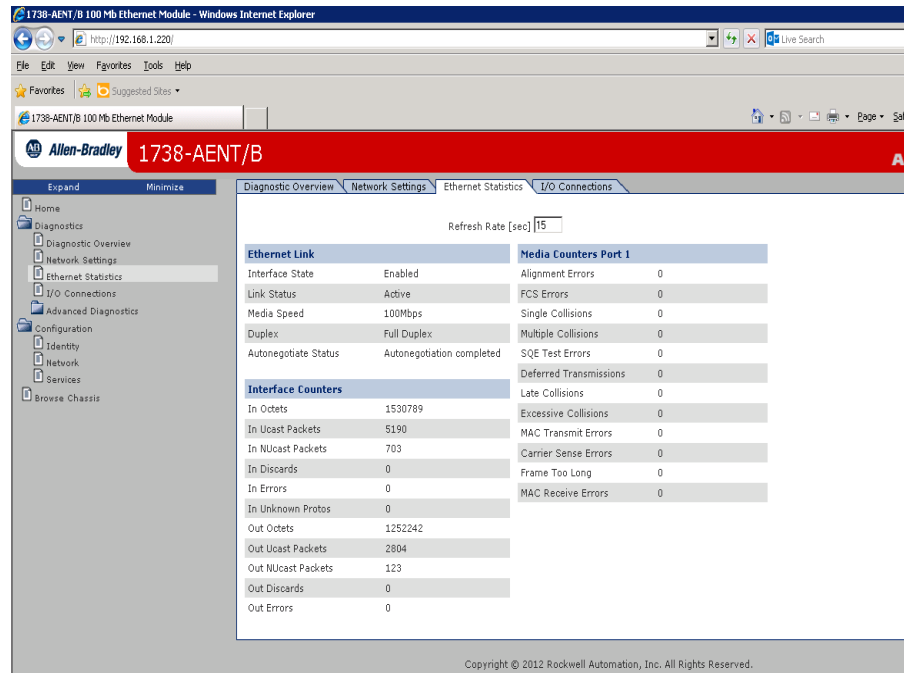
- Network Interface
  - Ethernet Address (MAC)
  - IP Address
  - Subnet Mask
  - Default Gateway
  - Primary Name Server
  - Secondary Name Server
  - Default Domain Name
  - Host Name
  - Name Resolution
- Ethernet Interface Configuration
  - How the Network Configuration was obtained - Static or Dynamic
- Ethernet Port 1
  - Interface State
  - Link Status
  - Media Speed
  - Duplex
  - Autonegotiate Status

## **Use the Ethernet Statistics Page**

To use the Ethernet Statistics page for information about the Ethernet link and interface and media counters, use this procedure.

1. Click the Ethernet Statistics tab at the top of the page or on the left panel.

The Ethernet Statistics page opens.



2. From the Ethernet Statistics page, view the following:

- Refresh Rate (sec)
- Ethernet Link
  - Interface State, Link Status, Media Speed, Duplex, Autonegotiate Status
- Interface Counters
  - In Octets, In UCast Packets, In NUCast Packets, In Discards, In Errors, In Unknown Protos, Out Octets, Out Ucast Packets, Out NUCast Packets, Out Discards, Out Errors
- Media Counters Port 1
  - Alignment Errors
  - FCS Errors
  - Single Collisions
  - Multiple Collisions
  - SQE Test Errors
  - Deferred Transmissions
  - Late Collisions
  - Excessive Collisions
  - MAC Transmit Errors
  - Carrier Sense Errors
  - Frame Too Long
  - MAC Receive Errors

## Use the I/O Connections Page

To use the I/O Connections page for CIP I/O (Class 1) connection information, follow this procedure.

1. Click I/O Connections from the tab at the top of the page or panel on the left.

The I/O Connections page opens.

The top value in this column representing Lost shows the number of packets from the missing source.

The value for Slot shows the slot number of the I/O module this connection is controlling.

Conn #/Uptime	Rcv/Xmt	Conn. ID	Source	Dest	Multicast Addr.	RPI	Lost/Slot	Size
65	Rcv	0x00031BE0	192.168.1.1 (O)	192.168.1.3		250	0	0
00h:01m:07s	Xmt	0x00224215	192.168.1.3 (T)	192.168.1.1		20	1	5
66	Rcv	0x00031BE1	192.168.1.1 (O)	192.168.1.3		20	0	5
00h:01m:07s	Xmt	0x00224216	192.168.1.3 (T)	192.168.1.1		20	1	5
67	Rcv	0x00031BE2	192.168.1.1 (O)	192.168.1.3		80	0	8
00h:01m:07s	Xmt	0x00224217	192.168.1.3 (T)	192.168.1.1		80	4	6
68	Rcv	0x00031BF5	192.168.1.1 (O)	192.168.1.3		500	0	0
00h:01m:07s	Xmt	0x00224218	192.168.1.3 (T)	192.168.1.1		80	3	10

2. From the I/O Connections page, view the following:

- Connection Number
- Uptime
- Receive and Transmit (Rcv/Xmt)
- Connection ID
- Source IP Address with an indication of the following:
  - (O) for originator
  - (T) for target
- Destination IP Address
- Multicast Address
- Requested Packet Interval (RPI)
- Lost/Slot that shows the number of lost packets and the slot number for the connection, with a slot value of 0 indicating that this is a rack-optimized connection
- Size of data in bytes

## Use the Advanced Diagnostics Page

To use the Advanced Diagnostics page to review message services, use this procedure.

1. Click Advanced Diagnostics from the tab at the top of the page or panel on the left. The Advanced Diagnostics page opens.
2. From the Advanced Diagnostics page, select Backplane Statistics to see values similar to those shown.

The screenshot shows a web browser window displaying the Allen-Bradley 1738-AENT/B interface. The left sidebar contains a navigation tree with 'Advanced Diagnostics' selected, and 'Backplane Statistics' highlighted. The main content area shows two tables: 'BP Bus Load Counters' and 'BP Counters' on the left, and 'Module Timeout Counters' on the right. A 'Refresh Rate [sec]' input field is set to 15. A note at the bottom states: 'Note: Maximum Timeout Counter value is set to 9999.'

BP Bus Load Counters	
BP Bus Load	0.0%
BP Bus Peak Load	0.72%
BP Packet Rate [pkt/s]	0

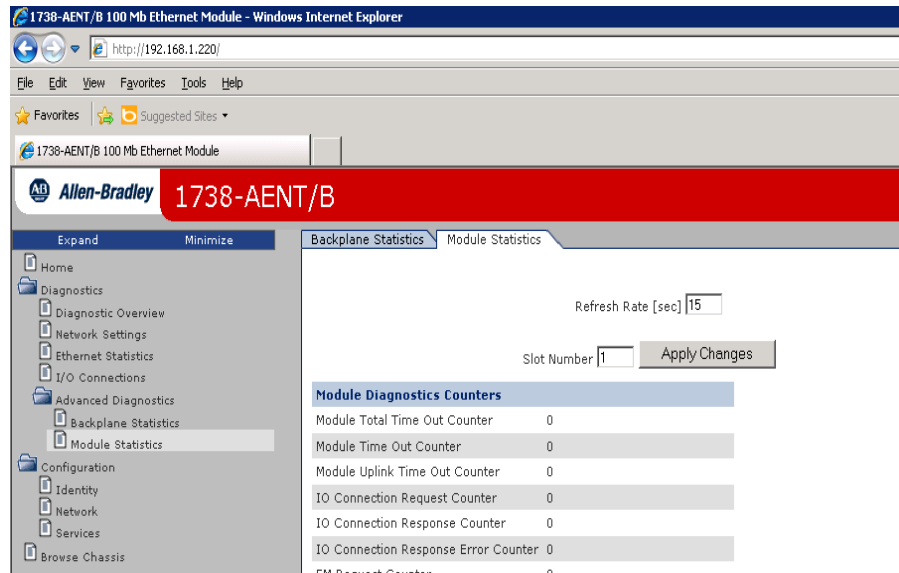
BP Counters	
Receive Interrupt	10
Receive Message Counter	10
Receive IO Message	0
Receive EM Message	10
Receive Queue Full Discard	0
Transmit Interrupt	1734
Transmit Message	1734
Transmit Length Error	0
Transmit Queue Full Discard	0
BP Interrupt Errors	2
BP Overrun Error	0
BP Driver Interrupt	1745
BP Signal Interrupt	1745
BP Driver Reset	0
BP Driver ISR Discard	0
BP Rx Bytes	113
BP Tx Bytes	15857
BP Transmit Not Ready	3

Module Timeout Counters			
Slot No	Timeout Counters	Slot No	Ti Cc
1	0	22	0
2	0	23	0
3	0	24	0
4	0	25	0
5	0	26	0
6	0	27	0
7	0	28	0
8	0	29	0
9	0	30	0
10	0	31	0
11	0	32	0
12	0	33	0
13	0	34	0
14	0	35	0
15	0	36	0
16	0	37	0
17	0	38	0
18	0	39	0
19	0	40	0
20	0	41	0
21	0	42	0

Note: Maximum Timeout Counter value is set to 9999.

3. From the Advanced Diagnostics page, select Module Statistics to see values similar to those shown.



## Work with the Configuration Pages

To work with the Configuration pages, follow these procedures.

### IMPORTANT

The values on these pages are in non-volatile memory. Changes to these parameters do not take effect until you reset or cycle power through the I/O adapters.

### IMPORTANT

If you set the value of the I/O adapters switch to 888 and then power cycle the module, the following occurs:

- The DHCP Enabled function is enabled (set to True).
- The Ethernet link is negotiated automatically. The Auto Negotiate function is set to True.
- The web server is enabled. The Disabled Web Server function is disabled.
- The Ethernet port are disabled. Both ports are re-enabled once the switches are returned to their previous value and power is cycled.
- The password for this page resets to the factory default which is "password".

Note the value of the switches before you enter the 888 value because you must return the adapter to those values once this process is complete.



1. From the Home page, click Configuration or Expand to see the Configuration options, if needed.
2. From the Configuration page, click one of the following:
  - Identity
  - Network
  - Services

A login dialog opens as shown. The dialog may vary in appearance depending on your operating system and browser.



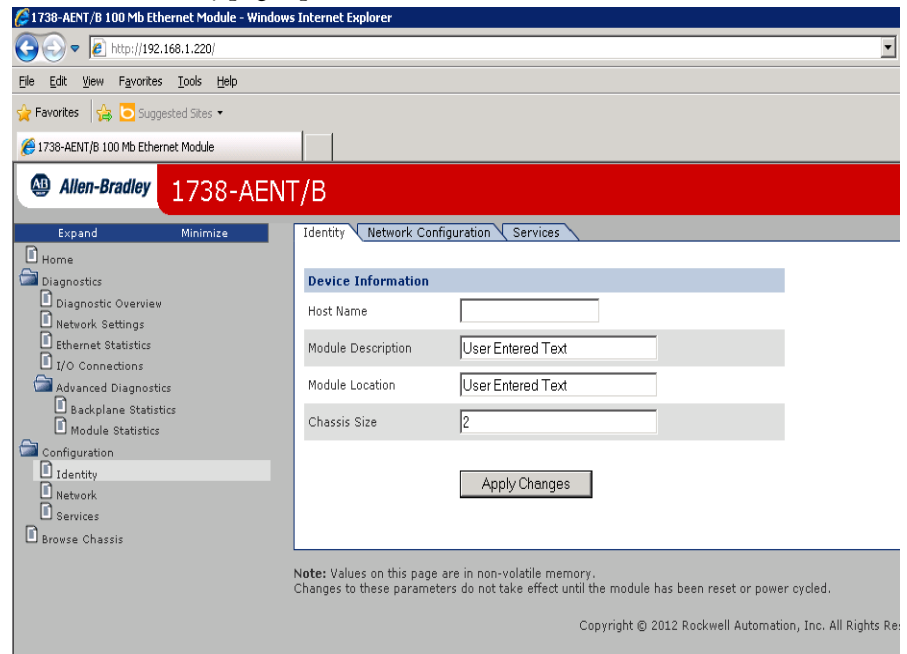
3. From the user name and password dialog, enter values, noting the following:
  - The values for user name and password are case sensitive.
  - The default user name is admin.
  - The default password is "password".
4. Click OK to log in. After you log in, you can go to any of the Configuration pages without having to log in again.
5. Refer to the section of this manual that corresponds to the section you clicked:
  - Identity
  - Network Configuration
  - Services

## Use the Identity Page

To use the Identity page to make entries for the host name, module description, module location, and chassis size, use this procedure.

1. Click Identity from the tab at the top of the page or panel on the left.

The Identity page opens

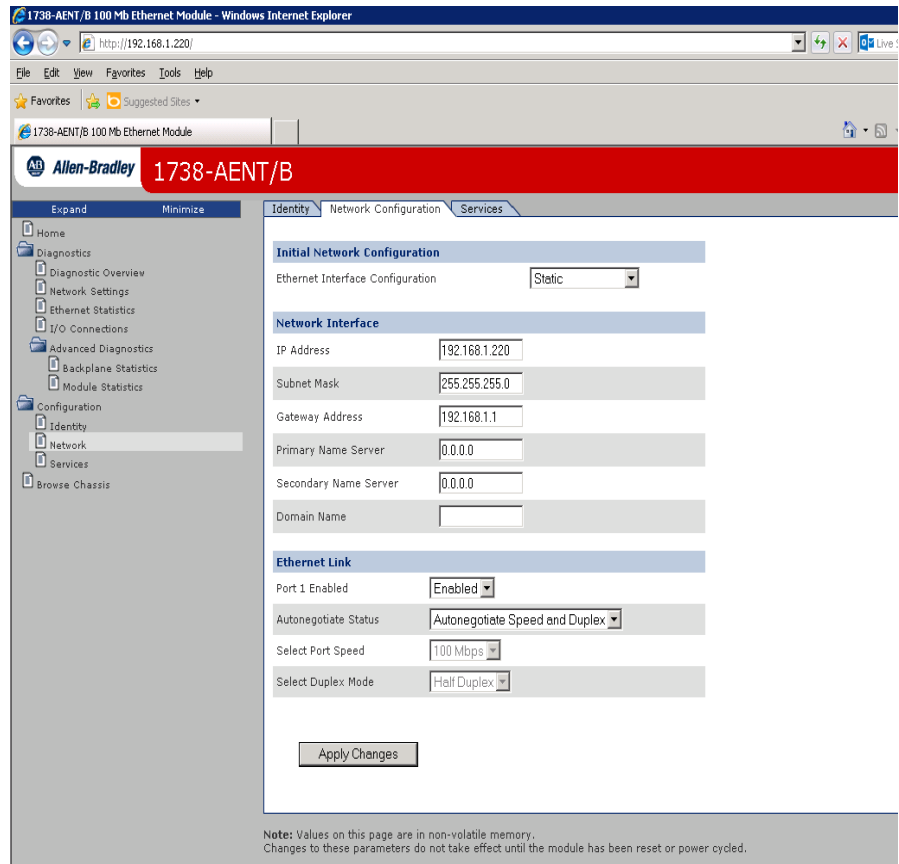


2. From the Identity page, complete entries for the following, noting that the description and location help you identify where modules are in the facility:
  - Host Name – the name a Domain Name Server uses to resolve this adapter’s IP address
  - Module Description
  - Module Location
  - Chassis Size - the value that shows the number of I/O modules plus the adapter. This value must match the number of I/O modules plus 1 for the adapter before any I/O connections are allowed.
3. Click Apply Changes to save the modified values.

## Use the Network Configuration Page

To use the Network Configuration page to make entries for enabling or disabling DHCP and setting TCP/IP parameters and Ethernet link operation, follow this procedure.

1. Click Network from the tab at the top of the page or panel on the left. The Network Configuration page opens.



2. From the Network Configuration page, complete these entries, noting that values for Network Interface are disabled when DHCP is Dynamic.
3. DHCP and Select Port Speed and Select Duplex Mode are disabled when Autonegotiate Speed and Duplex is selected.
  - For Initial Network Configuration:
    - Ethernet Interface Configuration
      - Static
      - Dynamic DHCP
  - For Network Interface, select from these choices:
    - IP Address
    - Subnet Mask
    - Gateway Address
    - Primary Name Server

- Secondary Name Server
  - Domain Name
  - For Ethernet Link, select from these choices:
  - Autonegotiate Status
    - Autonegotiate Speed and Duplex
    - Force Speed and Duplex
  - Select Port Speed - 10 megabits, 100 megabits
  - Select Duplex Mode - Half Duplex, Full Duplex
4. From the Network Configuration page, click Apply Changes to save the modified values.

---

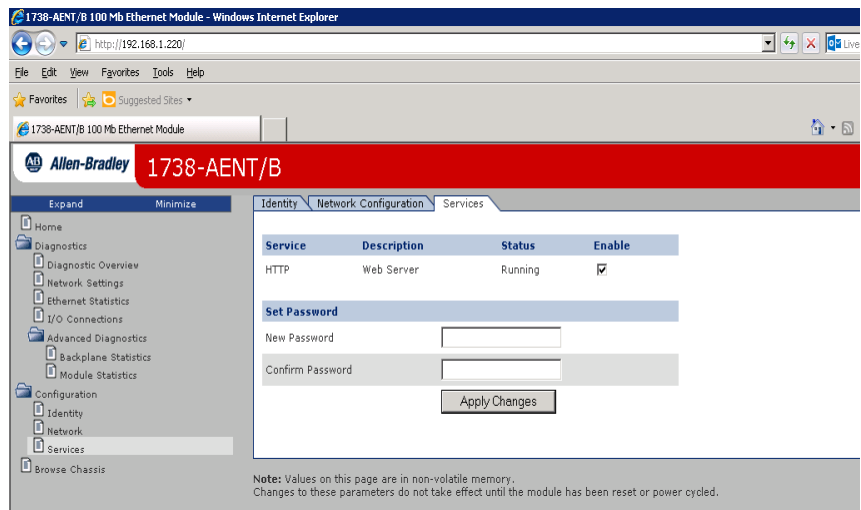
**IMPORTANT** If there is a mismatch in duplex between the adapter and the connected equipment you may experience 'intermittent connectivity.' For complete details and information on how to resolve this, refer to publication [ENET-A003](#).

---

## Use the Services Page

To use the Services page to change the password for the Configuration web page or disable the web server, complete these procedures.

1. Click Services from the tab at the top of the page or panel on the left. The Services page opens.



2. From the Services page, make these entries.
  - Click in the Enable box to change whether the web server runs after the module is reset.
  - Change the password by typing the new value for New Password and Confirm Password, noting the following:
    - The entry is case sensitive.
    - The default value is the word password.

### 3. Click Apply Changes.

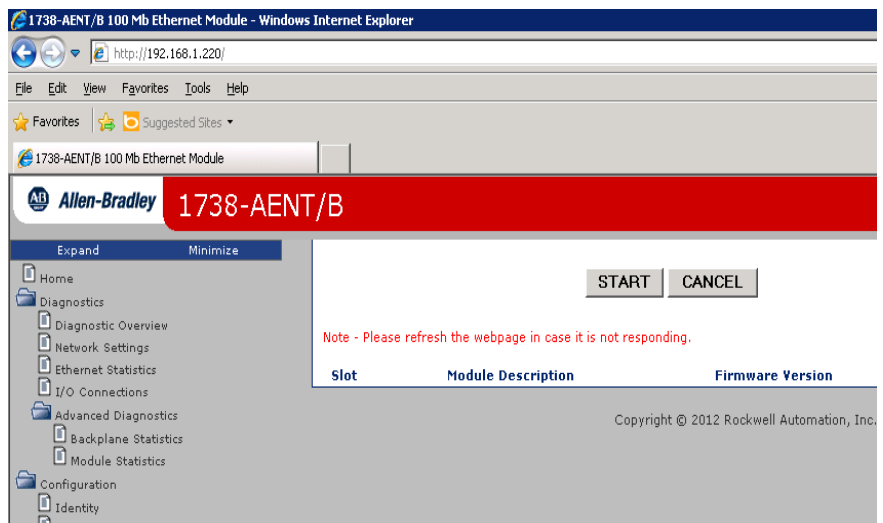
## Work with the Browse Chassis Page

Use the Browse Chassis page for the following:

- See what modules are present on the system.
- Run a query from slot 1 to slot 63.
- Display the modules found based on the query.
- Provide an easy way to see which modules the adapter recognizes on your system.

To work with the Browse Chassis page, follow these procedures.

1. From the Home page, click Browse Chassis.  
The following page displays.



2. Click START to run a query. A Browser Chassis page opens.  
Note that module hyperlinks are inactive before the query completes or is cancelled.

After completing a query, here is how a typical Browse Chassis page looks.

If there is no response to the query, the Module not found message appears.

Slot	Module Description	Firmware Versio
1	1738-IE2VM12 2PT VOLTAGE IN	3.004
2	Module Not Found	0.000

- To view information about a particular module, click the corresponding Module Description hyperlink. In the following example, the first Module has been selected:

Module Information	Slot 1
Product Name	1738-IE2VM12 2PT VOLTAGE IN
Vendor	1
Product Type	115
Product Code	124
Module Revision	3.004
Serial Number	6020bb20
Device Status	5

Ch. 0@ 100% Ch. 1@ 100%

The 1738 Module Information page opens showing this information about the module:

- Product Name
- Vendor
- Product Type
- Product Code
- Module Revision
- Serial Number
- Device Status

## Configure the RSLinx Ethernet Communication Driver

### Overview

To communicate with your adapter over your network, you must configure the RSLinx Ethernet Communication Driver (AB\_ETH) or the EtherNet/IP driver (AB-ETHIP). You can configure the AB\_ETH driver with the IP addresses of all the Ethernet devices on your system. You need one of these drivers to download the example application programs in this manual.

See the table for a list of the contents of this Appendix.

For Information About	Page
<a href="#">Install the RSLinx Software</a>	<a href="#">99</a>
<a href="#">Configure the AB_ETH Driver</a>	<a href="#">100</a>
<a href="#">Configure the AB_ETH/IP Driver</a>	<a href="#">102</a>

### Install the RSLinx Software

Use this procedure to install the RSLinx software on your computer.

1. Insert the CD in the CD-ROM drive.

Note that the CD-ROM supports Windows Autorun. Once inserted into the CD-ROM drive, if you have Autorun configured, the installation automatically starts at the first setup screen.

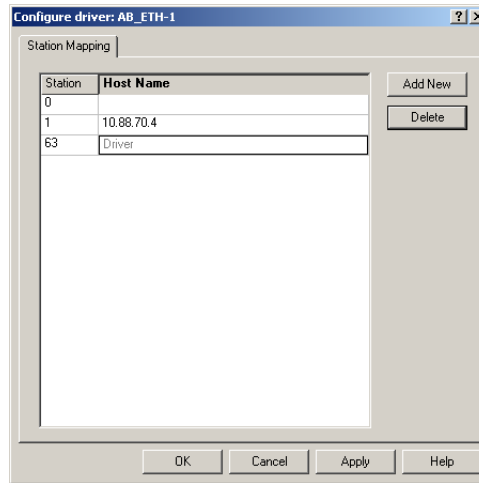
If Autorun is not configured for your CD-ROM drive, go to step 2.

2. From the Start menu, choose Run. The Run dialog opens.
3. Type D:/setup (if it doesn't appear automatically), where D: is your CD-ROM drive letter.
4. Click OK.  
The progress bar, followed by the welcome screen opens.



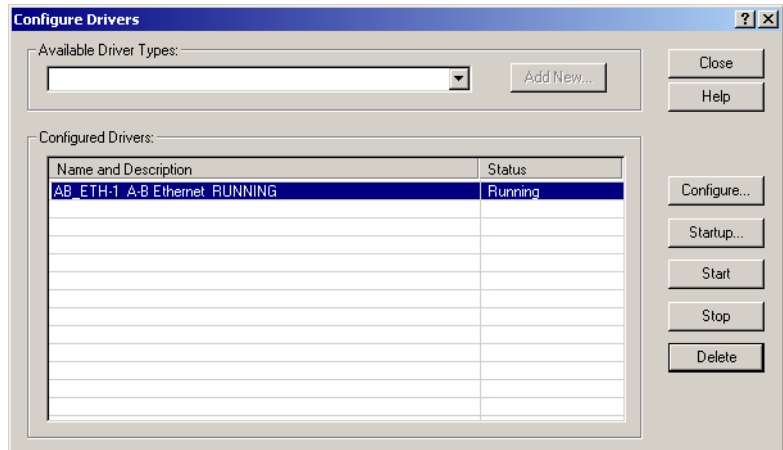


5. Click Add New and enter the IP address or Host Name of your Ethernet device (for example, 10.88.70.4, Pump1).



6. Repeat step 6 for each additional Ethernet device you need to access.
7. After entering the IP addresses, click Apply.
8. Click OK to close the Configure driver dialog.

The new driver appears in the list of configured drivers. Your list displays the drivers you configured on your workstation.

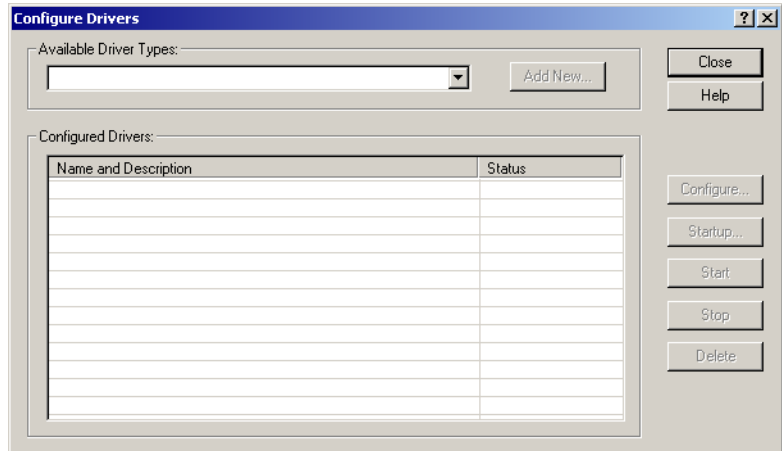


9. Close the RSLinx software.

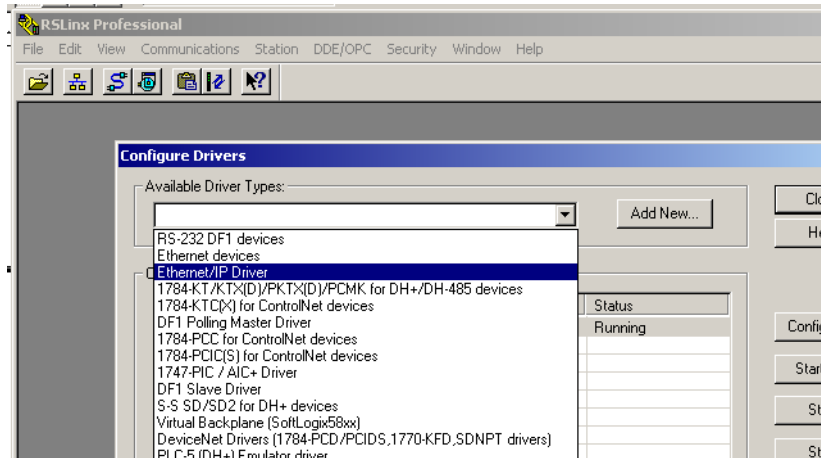
## Configure the AB\_ETH/IP Driver

To configure the AB-ETHIP Ethernet communication driver, perform the following steps.

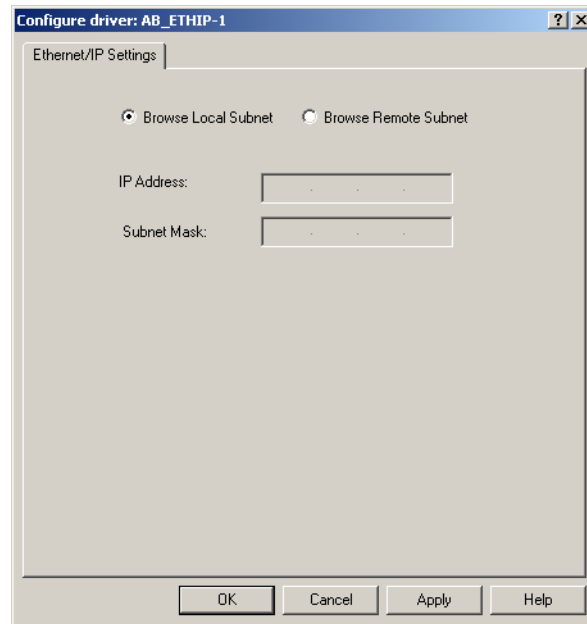
1. Start the RSLinx software.
2. From the Communications menu, select Configure Drivers.



3. Select EtherNet/IP Devices from the list and click Add/New...



The Configure Driver dialog box opens.

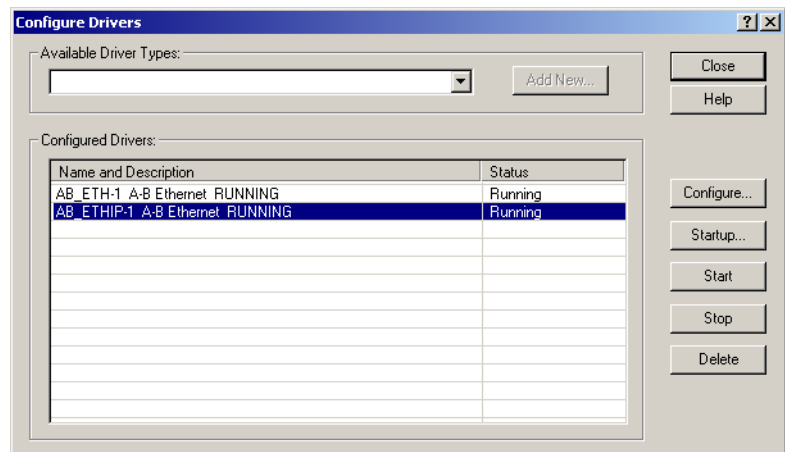


Make sure the Browse Local Subnet button is selected.

The RSLinx software browses your local subnet and automatically reads the IP address.

4. Click OK.

The AB-ETHIP driver is now configured and appears in the configured drivers window.



5. Close the RSLinx software.

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**Notes:**





# Rockwell Automation Support

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

At <http://www.rockwellautomation.com/support/>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

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

## Installation Assistance

If you experience a problem within the first 24 hours of installation, 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
Outside United States or Canada	Use the <a href="#">Worldwide Locator</a> at <a href="http://www.rockwellautomation.com/support/americas/phone_en.html">http://www.rockwellautomation.com/support/americas/phone_en.html</a> , or contact your local Rockwell Automation representative.

## New Product Satisfaction Return

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

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

## Documentation Feedback

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