Advantys ETB

IP67 Ethernet Block I/O Modules for EtherNet/IP User Guide

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When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

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Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

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A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book

At a Glance

Document Scope

Advantys ETB IP67 Ethernet modules are block I/O with embedded 2-port Ethernet switches. The modules are intended for high-moisture environments, and they provide connectivity to sensors/actuators through EtherNet/IP messaging.

This document describes the following ETB IP67 models:

Model Number	Description
ETB1EI16CP00	16 I/O points, each point configurable as input or output.
ETB1EI16EPP0	16 PNP inputs / 0 outputs
ETB1EI12E04SPP0	12 PNP inputs / 4 PNP outputs
ETB1EI08E08SPP0	8 PNP inputs / 8 PNP outputs

Validity Note

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Chapter 1
Introducing the Advantys ETB I/O Modules

Overview

This chapter introduces the Advantys ETB I/O family of modules for EtherNet/IP networks.

What Is in This Chapter?

This chapter contains the following topics:

Features of the Advantys ETB I/O Modules

Introduction

The Advantys ETB family of I/O modules includes modules designed for use with either the Modbus TCP/IP or the EtherNet/IP protocols. This manual describes modules designed for the EtherNet/IP protocol.

Advantys ETB I/O modules combine the functionality of a block I/O with an embedded 2-port Ethernet switch. These modules can be used in applications where I/O is mounted directly on equipment without an enclosure. They can be exposed to water or oil spray.

IP67 Rated

Each Advantys ETB I/O module is housed in an IP67 rated enclosure that when properly installed—according to IEC 60529—provides protection against the ingress of:

- dust
- water, when temporarily immersed (for up to 30 minutes) to a depth of 1 meter

Data Access for the ETB I/O EtherNet/IP Module

Module data is accessible via EtherNet/IP messaging using:

- implicit messages for I/O data transfer
- explicit messages for:
  - reading ETB module configuration settings
  - reading ETB module diagnostic data
  - writing the event status

System View

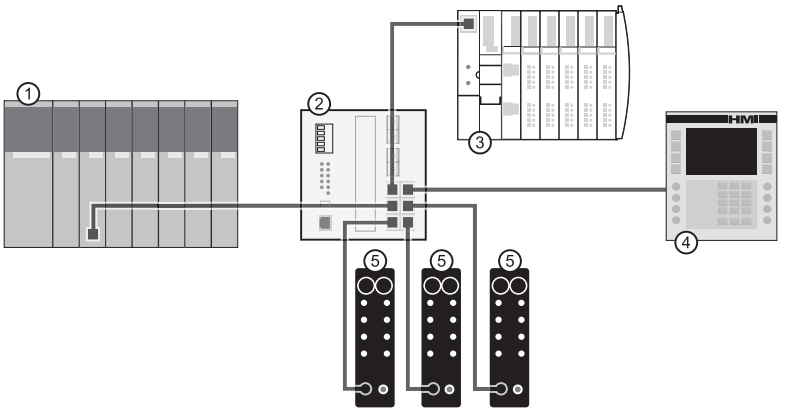
Description

Advantys ETB I/O modules can be used with a protocol compliant scanner as part of control system architecture. The modules' built-in unmanaged 2-port Ethernet switch allows you to use the network topology that meets your application needs. These topologies include the following:

- star
- daisy-chain
- combination of star and daisy-chain

Star

Star topology allows you to connect mixed I/O blocks or additional network equipment. Performing maintenance on one module—for example, by removing the network cable, or by cycling power to the module—does not affect other modules.



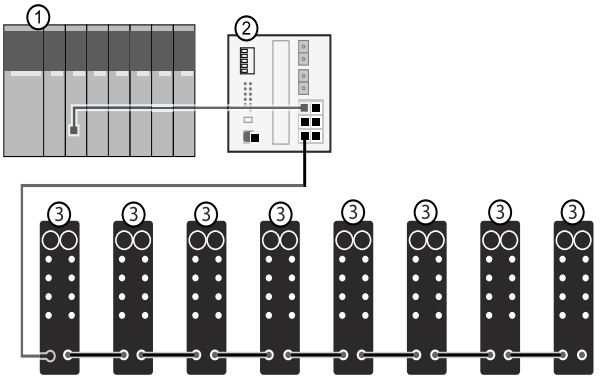
1 Quantum PLC
2 Ethernet switch
3 Advantys STB Island
4 Magelis HMI device
5 Advantys ETB I/O modules

Daisy-chain

You can create a daisy-chain topology by using the module's embedded switch ports to connect a series of up to 8 Advantys ETB I/O modules.

NOTE: When considering the daisy chain topology, note that:

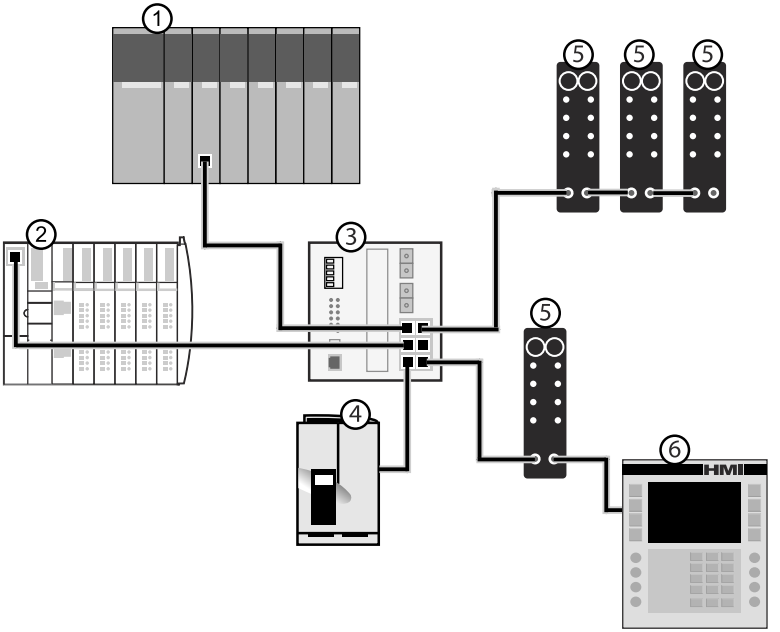
- Performing maintenance on any module not physically located at the end of the daisy chain—for example, by removing the network cable, or by cycling power to the module—affects any modules located down the chain from the maintained module.
- The embedded dual port Ethernet switch located in each module eliminates the need for additional Ethernet switches.



1 Quantum PLC
2 Ethernet switch
3 Advantys ETB I/O modules

Combination of Star and Daisy-chain

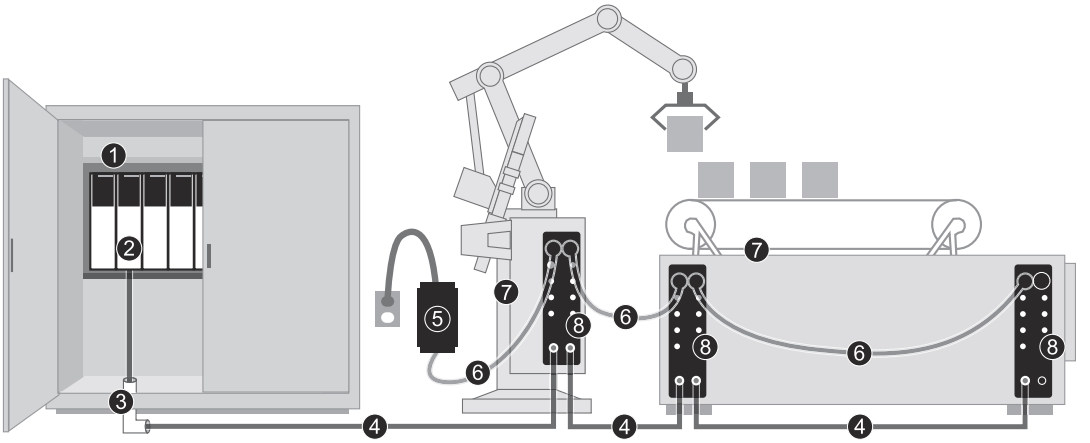
Combining star and daisy-chain topology allows you to connect Advantys ETB I/O modules with mixed I/O blocks or additional network equipment.



1 Quantum PLC
2 Advantys STB Island
3 Ethernet switch
4 Altivar drive
5 Advantys ETB I/O modules
6 Magelis HMI device

Application

This diagram shows you an example of how to arrange your Advantys ETB I/O modules in a daisy-chain topology.



1 cabinet mounted PLC
2 Ethernet interface module on PLC system
3 Ethernet adapter
4 Ethernet connector cable
5 24 VDC power supply
Note: Alternatively, the power supply could be mounted in the cabinet.
6 power supply cable
7 machine
8 Advantys ETB I/O modules mounted on machine

Advantys ETB for EtherNet/IP

Introduction

This topic provides you with the part numbers and descriptions of the Advantys ETB I/O modules, as well as the associated cables and accessories.

Advantys ETB I/O Modules for EtherNet/IP

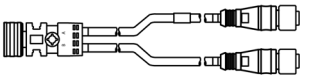
Advantys ETB I/O modules provide 16 I/O points on 8 I/O ports–2 points per port. Each model is distinguished by the number of I/O ports designated as inputs and outputs.

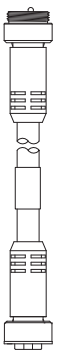
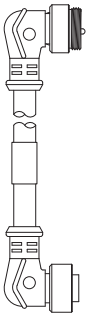
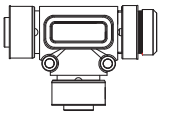
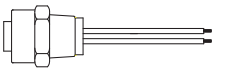
The EtherNet/IP product line includes the following modules:

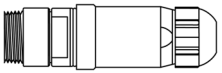
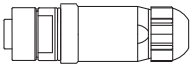
Model Number	Description
ETB1EI16CP00	16 I/O points, each configurable as inputs or outputs
ETB1EI16EPP0	16 PNP inputs (0 outputs)
ETB1EI12E04SPP0	12 PNP inputs / 4 PNP outputs
ETB1EI08E08SPP0	8 PNP inputs / 8 PNP outputs
1. PNP Inputs refer to the sensor source or push current from the field sensor to the input circuit of the module. 2. PNP Outputs are the source type output, also referred to as true high output. When energized, the output pushes current through the load to turn on the output point.	

Cables and Accessories

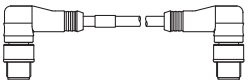
The EtherNet/IP product line includes the following I/O cables, power cables, and accessories:

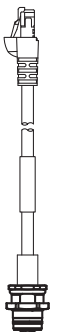
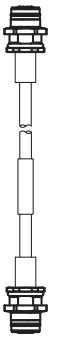
Type	Model Number	Description	Image
Sensing cables	ETXSC412M1M3010	I/O cable - M12 connector - 1 m (3.28 ft) long	
	ETXSC412M1M3020	I/O cable - M12 connector - 2 m (6.56 ft) long	
	ETXSC412M1M3050	I/O cable - M12 connector - 5 m (16.40 ft) long	
	ETXSC412U1M3010	I/O cable - Ultra-Lock™ and M12 connector - 1 m (3.28 ft) long	
	ETXSC412U1M3020	I/O cable - Ultra-Lock™ and M12 connector - 2 m (6.56 ft) long	
	ETXSC412U1M3050	I/O cable - Ultra-Lock™ and M12 connector - 5 m (16.40 ft) long	
	ETXSC412U2M3010	I/O cable - Ultra-Lock™ and M12 connector -1 m (3.28 ft) long	
	ETXSC412U2M3020	I/O cable - Ultra-Lock™ and M12 connector - 2 m (6.56 ft) long	
	ETXSC412U2M3050	I/O cable - Ultra-Lock™ and M12 connector - 5 m (16.40 ft) long	
	ETXSC413U1M3003	I/O splitter cable - Ultra-Lock™ 1 end, M12s other end - 30 cm (0.98 ft) long	

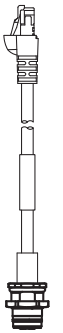
Type	Model Number	Description	Image
Power cables	ETXPC411M300040	7/8 mini-change 4-pin power cable, female straight connector, single ended, 4 m (13.12 ft) long	
	ETXPC412M1M3010	7/8 mini-change 4-pin power cable, straight connectors, 1 m (3.28 ft) long	
	ETXPC412M1M3020	7/8 mini-change 4-pin power cable, straight connectors, 2 m (6.56 ft) long	
	ETXPC412M1M3050	7/8 mini-change 4-pin power cable, straight connectors, 5 m (16.40 ft) long	
	ETXPC412M2M4006	7/8 mini-change 4-pin power cable, 90° connectors, 0.6 m (1.97 ft) long	
	ETXPC412M2M4010	7/8 mini-change 4-pin power cable, 90° connectors, 1 m (3.28 ft) long	
	ETXPC412M2M4020	7/8 mini-change 4-pin power cable, 90° connectors, 2 m (6.56 ft) long	
	ETXPC412M2M4050	7/8 mini-change 4-pin power cable, 90° connectors, 5 m (16.40 ft) long	
	ETXPC411M400020	7/8 mini-change 4-pin power cable, 90° female connector, single ended, 2 m (6.56 ft) long	
	ETXPC411M400040	7/8 mini-change 4-pin power cable, 90° female connector, single ended, 4 m (13.12 ft) long	
Power tee	ETXPA413M	auxiliary power tee, 7/8 mini-change 4-pin, straight connector	
Power receptacle	ETXPA411M3	auxiliary power receptacle, 7/8 mini-change 4-pin, straight female connectors	

Type	Model Number	Description	Image
field attachables	**NOTE:** Do not use ETXPA4M1 and ETXPA4M3 connectors at the same time. These two connectors are not designed to be used together.		
	ETXPA4M1	field attachable connector, 7/8 mini-change 4-pin, straight male connectors	
	ETXPA4M3	field attachable connector, 7/8 mini-change 4-pin, straight female connectors	

The EtherNet/IP product line includes the following Ethernet cables and accessories:

Type	Model Number	Description	Image
Ethernet cables	TSECL2M2M06S2	4-pin Ethernet cable, M12 D coded male to M12 D coded male, 90° connectors, 0.6 m (1.97 ft) long	
	TSECL2M2M1S2	4-pin Ethernet cable, M12 D coded male to M12 D coded male, 90° connectors, 1 m (3.28 ft) long	
	TSECL2M2M2S2	4-pin Ethernet Cable, M12 D coded male to M12 D coded male, 90° connectors, 2 m (6.56 ft) long	

Type	Model Number	Description	Image
Ethernet patch cord	TCSECL1M3M1S2	straight Ethernet patch cord, RJ45 male to M12 D coded 4 pole male, 1 m (3.28 ft)	
	TCSECL1M3M3S2	straight Ethernet patch cord, RJ45 male to M12 D coded 4 pole male, 3 m (9.84 ft)	
	TCSECL1M3M10S2	straight Ethernet patch cord, RJ45 male to M12 D coded 4 pole male, 10 m (32.81 ft)	
	TCSECL1M3M25S2	straight Ethernet patch cord, RJ45 male to M12 D coded 4 pole male, 25 m (82.02 ft)	
	TCSECL1M3M40S2	straight Ethernet patch cord, RJ45 male to M12 D coded 4 pole male, 40 m (131.23 ft)	
	TCSECL1M1M1S2	straight Ethernet patch cord, M12 D coded 4 pole male to M12 D coded 4 pole male, 1 m (3.28 ft)	
	TCSECL1M1M3S2	straight Ethernet patch cord, M12 D coded 4 pole male to M12 D coded 4 pole male, 3 m (9.84 ft)	
	TCSECL1M1M10S2	straight Ethernet patch cord, M12 D coded 4 pole male to M12 D coded 4 pole male, 10 m (32.81 ft)	
	TCSECL1M1M25S2	straight Ethernet patch cord, M12 D coded 4 pole male to M12 D coded 4 pole male, 25 m (82.02 ft)	
	TCSECL1M1M40S2	straight Ethernet patch cord, M12 D coded 4 pole male to M12 D coded 4 pole male, 40 m (131.23 ft)	
Sealing plugs	ETXSA12B	sealing plug for M12 connectors - 10 per package	
	ETXPA78BE	sealing plug for 7/8 mini-change connectors external - 1 per package	
	ETXPA78BI	sealing plug for 7/8 mini-change connectors internal - 1 per package	

Type	Model Number	Description	Image
Adapter	ETXADRJM12	Adapter RJ45 to M12, for panel mounting. M12 female (straight) to RJ45 male plug. 0.6 m (1.97 ft) long.	

Chapter 2
Specifications and Physical Description

Overview

This chapter describes the physical, electrical, and environmental characteristics of the EtherNet/IP modules.

What Is in This Chapter?

This chapter contains the following topics:

Specifications

Description

The specifications for each EtherNet/IP module are listed below:

NOTICE
EQUIPMENT DAMAGE Do not unplug the cables while the module is powered, as this may damage the module's connectors. **Failure to follow these instructions can result in equipment damage.**

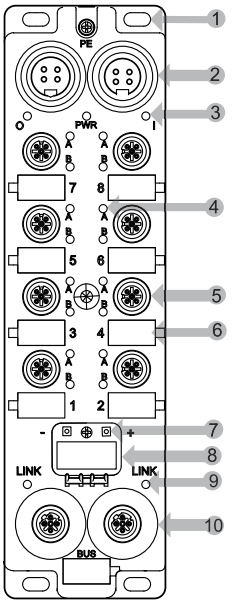
Data	Model Number			
	ETB1EI16EPP0	ETB1EI08E08SPP0	ETB1EI12E04SPP0	ETB1EI16CP00
Inputs	16	8	12	16 configurable input and output points
Outputs	0	8	4	
Ethernet connector	M12/Ultra-Lock™ (female D-Code)			
I/O connector	M12/Ultra-Lock™ (A-Code)			
Power in (left) connector	mini-change 5 Pole (male)			
Power out (right) connector	mini-change 5 Pole (female)			
Module and input power	24 VDC (13...30V)			
Output power	N/A	24 VDC (13...30V)		
Output current	N/A	2.0 A / point Sum = 8 A Max		
Short circuit current (typical)	N/A	6.5 A		
Output switching frequency	N/A	200 Hz		
Output voltage: on-state drop/point	N/A	1 Vdc		
Output type	N/A	sourcing (PNP)		
ETB input internal load consumption	129 mA without Ethernet 135 mA with Ethernet (1 or 2 ports)			

Data	Model Number			
	ETB1EI16EPP0	ETB1EI08E08SPP0	ETB1EI12E04SPP0	ETB1EI16CP00
ETB output internal load consumption	N/A	6.8 mA		
Input signal voltage (“0”)	-2V...5V			
Input signal voltage (“1”)	10V...30V			
Input filter	2.5 ms			configurable
Input short circuit (per point)	600 mA 24 Vdc current limit on pin 1 (per port)			
Input current (per point)	140 mA			
Input type	PNP			PNP/NPN configurable
Operating temperature	-25°C...+70°C			
Storage temperature	-40°C...+85°C			
Vibration resistance	conforms to IEC68-2-6			
EMC	EN 61000-6-2			
Protection class	IP67			
MTBF	296,000 hours at 30°C GB (ground benign)			

Front Face

Description

The front face of the module includes the mounting holes, connectors, port connector labels, LEDs, push buttons, and the HMI display. The details and locations of these features are shown below.



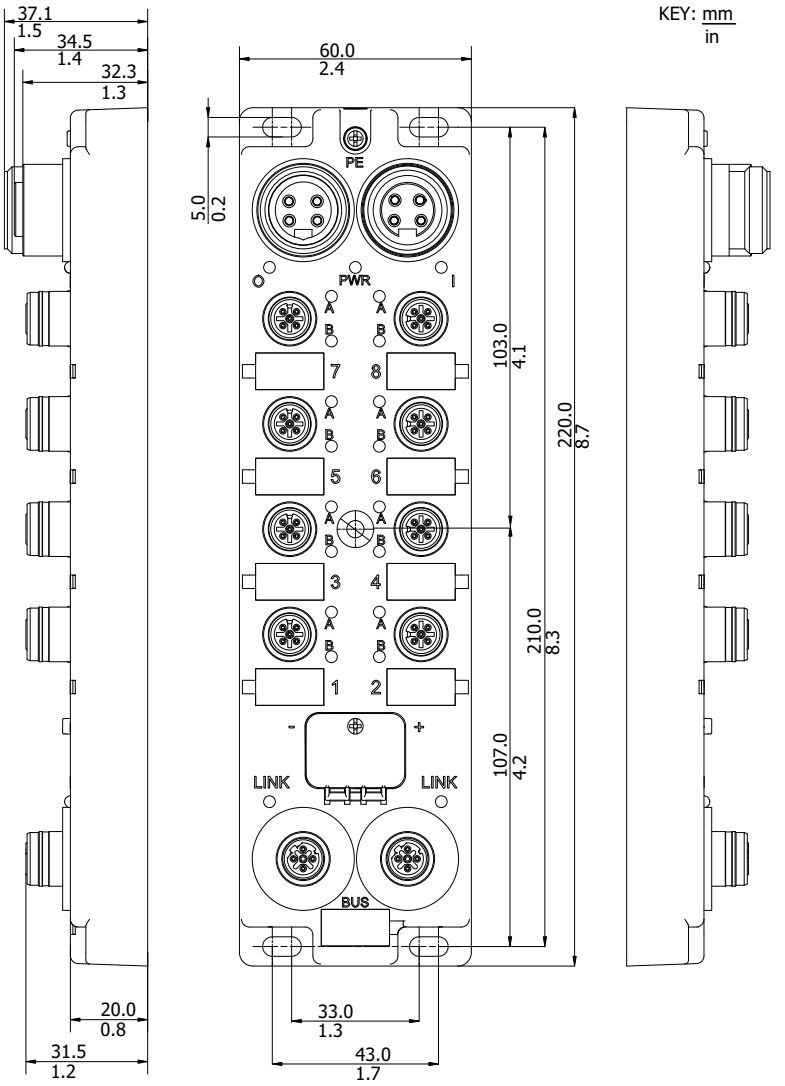
1 five mounting holes, including the center one
2 two 4-pin power connectors including input (left) and output (right) to connect the next module in the system
3 three power LEDs: O = output; PWR = not used; I = both input and module
4 sixteen I/O point LEDs
5 eight 5-pin I/O port connectors numbered from bottom to top (2 points per port connector)
6 eight white port connector labels
7 two buttons for selecting the method of IP address assignment
8 four-character scrolling display
9 two Link LEDs
10 two 4-pin Ethernet network connectors

NOTE: The MAC address label is located on the back of the module.

Size and Dimensions

Description

The module conforms to the following dimensions:



Connector Pin Assignments

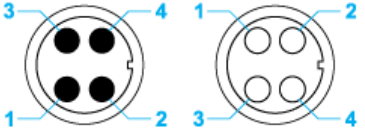
Introduction

The pin assignments for the module are described below for:

- 4-pin power connectors (7/8 mini-change cables)
- 5-pin I/O port connectors (M12 or Ultra-Lock™ M12 cables)
- 4-pin Ethernet network connectors (M12 D coded cables)

Power Connectors

The pin assignments for the power connectors are outlined in the following figure, with the male on the left and the female on the right.



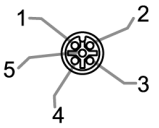
1 output power (24 V)
2 module/input power (24 V)
3 module/input power (0 V)
4 output power (0 V)

NOTE: There are two conventions that determine the pin number location with respect to the keyway (CENELEC EN 50 044 and SAE-J-1738A). In most cases these two conventions match, except for 4 pole mini-change connectors. Read carefully the pin assignment before connecting any power cable to the power connectors.

NOTE: For proper functioning of the ETB startup self test, apply the 24 Vdc module/input power before applying output power, or apply module/input power and output power at the same time. Maintaining output power while the module/input power is off can lead to a condition where I/O scanning continues but the block's LED display does not function, the block's web pages cannot be accessed, and the block does not respond to PING messages.
If the power up sequence has not been properly applied and these results are observed, normal LED display and communication can be restored by power cycling the module/input power.

I/O Port Connectors

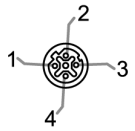
The following figure displays an ETB I/O port connector on the left of the module and its corresponding point assignments. Note that the port connectors on the right side of the module are rotated 90° counter-clockwise from the ones on the left.



1 +24 Vdc
2 Point B Input or Output
3 GND
4 Point A Input or Output
5 PE

Ethernet Network Connectors

The following figure shows the pin assignments of the two Ethernet network connectors on the module.



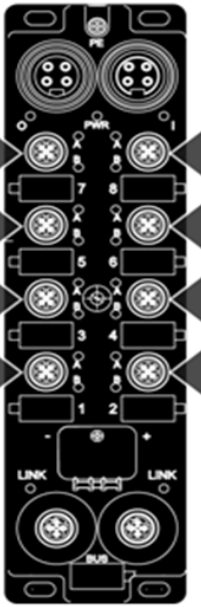
1 TX+
2 RX+
3 TX-
4 RX-

I/O Assignments

Description

The I/O assignments for the modules with fixed I/O sizes are as follows:

8 In 8 Out	12 In 4 Out	16 In	Point	Connector Number
Out 6	Out 2	In 14	7B Point2	Port 7
Out 5	Out 1	In 13	7A Point 4	
Out 2	In 10	In 10	5B Point 2	Port 5
Out 1	In 9	In 9	5A Point 4	
In 6	In 6	In 6	3B Point 2	Port 3
In 5	In 5	In 5	3A Point 4	
In 2	In 2	In 2	1B Point 2	Port 1
In 1	In 1	In 1	1A Point 4	



Connector Number	Point	16 In	12 In 4 Out	8 In 8 Out
Port 8	8B Point 2	In 16	Out 4	Out 8
	8A Point 4	In 15	Out 3	Out 7
Port 6	6B Point 2	In 12	In 12	Out 4
	6A Point 4	In 11	In 11	Out 3
Port 4	4B Point 2	In 8	In 8	In 8
	4A Point 4	In 7	In 7	In 7
Port 2	2B Point 2	In 4	In 4	In 4
	2A Point 4	In 3	In 3	In 3

Process Image Mapping

Introduction

The forward open establishes the module's I/O configurations. Each module has the same fixed process image map (input and output). Use these maps to communicate with your module.

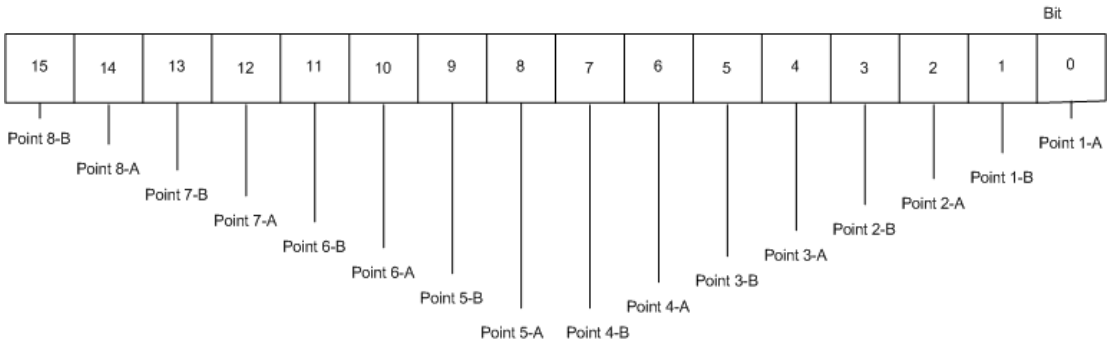
Input Mapping

Input data mapping (assembly, input instance = 0x65):

Byte Offset	Type	Description
0x00	UNIT	Input Data
0x02	UNIT	Point Current Status (input or output)
0x04	UNIT	Point Event Status (input or output)
0x06	UNIT	Watchdog

This process image map reflects the following data for your module:

- Input data buffer (offset 0x00)
- Current status data buffer (offset (0x02)
- Event status data buffer (0x04)
- Watchdog buffer (0x06)



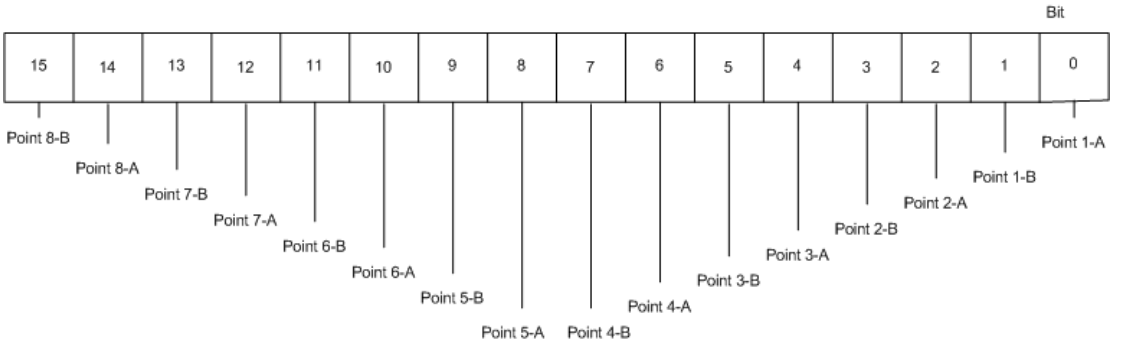
NOTE: The input mapping remains identical regardless of whether any inputs are configured.

Output Mapping

Output data mapping (assembly, output instance = 0x66):

Offset	Type	Description
0x00	UNIT	Output Data

This process image map reflects the output data buffer (0x00) for your module.



NOTE: The output mapping remains identical regardless of whether any outputs are configured.

Output Status: The output status is a value read in the module therefore it is provided through the input mapping *(see page 31)*. The input mapping provides the current status and event status of each point of the module whether it is an input or output (depending on the module reference or configuration).

Idle Mode

Description

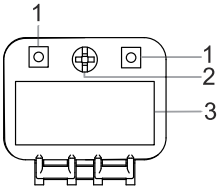
When the PLC is set from run to stop, it goes into idle mode and the connection between it and the EtherNet/IP module is maintained. Below is the behavior of the module while in idle mode.

- The module continues to transfer input states into the frame, so you can still read inputs from within your programming interface.
- The configuration of the watchdog determines the output behavior:
  1. If the module is set up to apply output value, then the module applies the output values.
  2. If the module is set up to hold output value, then the output maintains the same state it had before the idle mode.
- The output behavior is applied even if the watchdog is inactive. This behavior occurs right after the module goes into idle mode, regardless of the watchdog timer's settings.

HMI Display

Introduction

The Advantys ETB I/O modules include a 4-character scrolling display with 2 push buttons. Use these tools to configure certain IP address *(see page 48)* parameters and view diagnostic LED messages *(see page 98)*.



1 Pushbuttons
2 Screw to lock HMI door
3 HMI Display

Chapter 3
Configuration

Overview

This chapter shows you how to configure the IP and I/O settings for your module. Note that the Application *(see page 63)* chapter provides examples of configuring these settings.

What Is in This Chapter?

This chapter contains the following sections:

Section 3.1
Using the Embedded Web Pages

Overview

Advantys ETB I/O modules contain embedded web pages. This section introduces these web pages and shows you how to manage your password. The remaining web pages are described elsewhere in this document.

What Is in This Section?

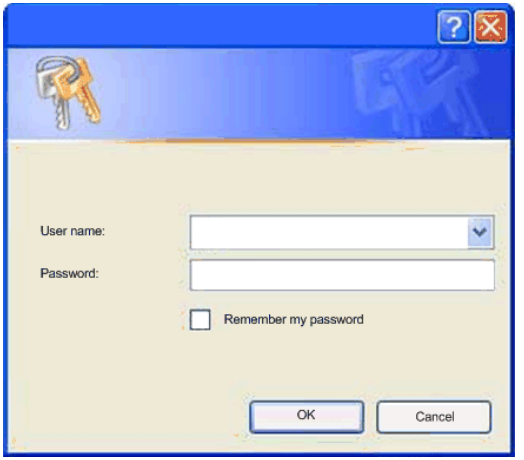
This section contains the following topics:

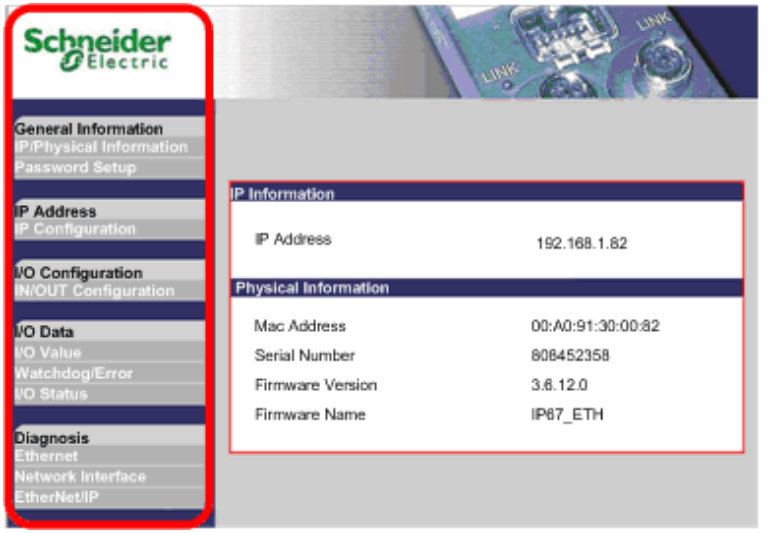
Accessing the Embedded Web Pages

Before you begin, be sure that both your PC and the Advantys ETB I/O module are configured with IP addresses that are located in the same subnet (or, alternatively, are connected via a routing mechanism). Since DHCP is the factory default source, obtain an IP address by either of the following two methods:

- Use a standard DHCP server to obtain an IP address by way of the factory default source, or,
- if you wish to obtain an IP address by a source other than a DHCP server, use the HMI push buttons *(see page 48)* to obtain an IP address from a BootP server or to set a static user-defined IP address.

After you complete the above steps, use the table below to access the embedded web pages:

Step	Action	
1	Using either a straight or crossed Ethernet cable, connect the module to a PC running a standard web browser.	
2	On your PC, open a web browser, then:	
	a	Enter the module's IP address in the address line of the browser and hit **Enter** on your keyboard. You can see the IP address on the module's HMI display. If no IP address displays, see the topic on Scrolling LED Messages *(see page 98)*.
	b	A dialog box opens and prompts you for a user name and password. 
3	Enter the factory default settings for **User name** and **Password**: ● **User name**: admin ● **Password**: admin **NOTE:** If you previously changed the password, you must instead enter the new password in this dialog box.	

Step	Action
4	Click **OK**. The home page is displayed. 
5	Click on a specific web page description on the left side to open that page.

General Information: IP / Physical Information

Description

This read only page displays the information describing the selected Advantys ETB I/O module including its: IP address, MAC address, serial number and firmware information.

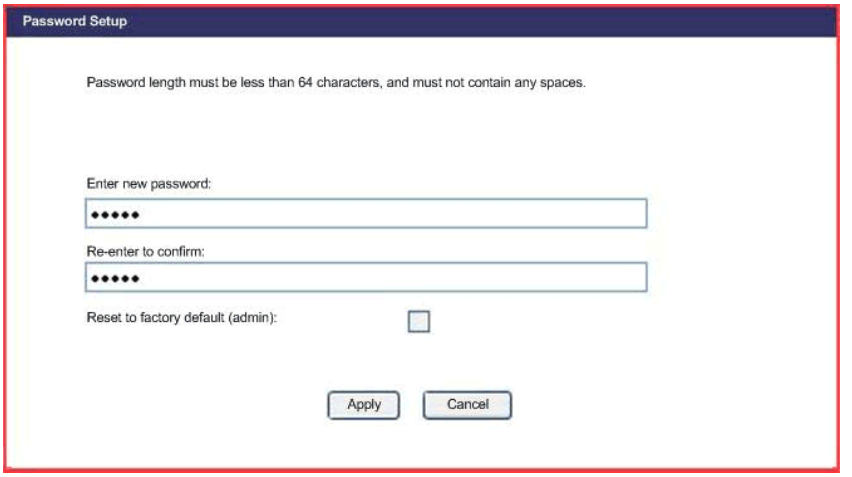
General Information: Password Setup

Description

Use this page to modify the password for web page access.

- Click **Apply** to save your changes.
  NOTE: You will then need to re-login using your user name and new password.

  NOTE: You cannot change the existing user name or add new ones.
- Click **Cancel** to close the window without saving your changes.



Section 3.2
Configuring IP Parameters

Introduction

This section shows you how to configure the Advantys ETB I/O module's IP parameters.

What Is in This Section?

This section contains the following topics:

Introducing IP Parameters

Introduction

The module can obtain its IP address from any one of the following 3 sources:

- a DHCP server, the factory default source
- a BootP server
- a static user-defined IP address, stored locally on the module

You can select the source of the IP address by using either:

- web pages *(see page 44)*
- HMI push buttons *(see page 48)*

NOTE: Stop I/O communication with the module before you attempt to change the IP parameters, as no such changes are possible during I/O communication.

NOTE: Your IP address changes take effect—and are displayed on the module's 4-character scrolling HMI panel—when they are made. You do not need to power cycle the module.

Recommended Practices for IP Configuration

Overview

Each method of assigning an IP address has advantages and disadvantages. Unlike the Internet, PLCs typically communicate to I/O modules using an IP address rather than a name. It is key that the module uses the same IP address, even after being power cycled. For the majority of applications, using a static IP address is the easiest to implement; however, it is important for you to choose the method of assigning an IP address that is appropriate for your network environment.

Static

A static IP address is stored locally on the module and is retained even after a power cycle. No IP address server is required on the network. When replacing a module, you need to manually configure the same IP parameters in the replacement module. You also need to manually maintain a list of assigned IP addresses. Do not use duplicate IP addresses on your network.

BootP

A BootP server is required on your network to assign IP parameters to modules. This server can exist on a PC or PLC and must be configured to assign specific IP settings to a module with a specific MAC address. Each time a module is power cycled, it will need to get its IP parameters from the BootP server. If the server is not present, the module will not get an IP address. When replacing a module, you only need to configure the new module for BootP and reconfigure the server to assign the IP settings to the new module's MAC address.

DHCP

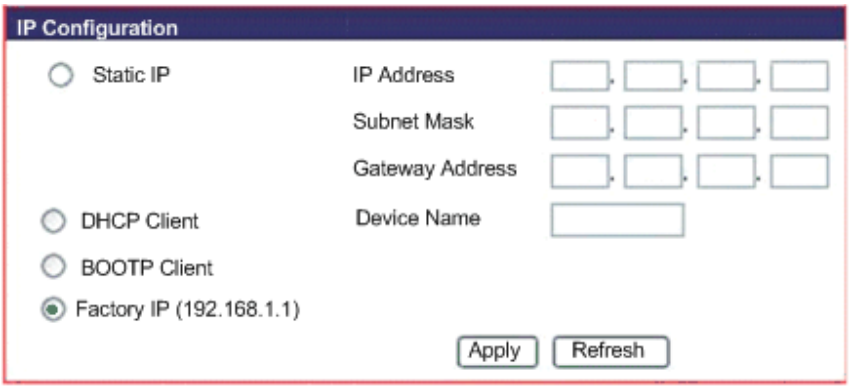
A DHCP server is required on your network to assign IP parameters to modules. This server can exist on a PC or PLC. There are two ways for a module to get its IP parameters from a DHCP server, either by referencing a Device Name or instead a MAC address (if the Device Name is blank). The DHCP server must be configured in a similar manner to assign specific IP settings to a module by either method. Each time a module is power cycled, it needs to get its IP parameters from the DHCP server. If the server is not present, the module will not get an IP address. When replacing a module using a Device Name to assign IP parameters, you need to configure the replacement module for DHCP and set the same Device Name as the module being replaced. If using the MAC address to assign IP parameters, you need configure the replacement module for DHCP and leave the Device Name blank. You also need to change the MAC address used by your DHCP server to that of the replacement module.

Configuring IP Parameters Using Web Pages

Introduction

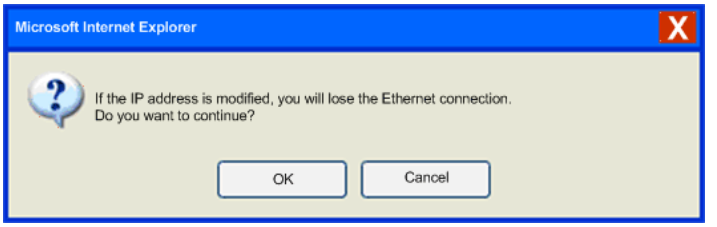
You can use the module's **IP Configuration** embedded web page *(see page 37)* to:

- specify the source of IP parameters for the module,
- configure user-defined static IP parameters, and
- input a **Device Name** value for DHCP server assigned IP parameters.



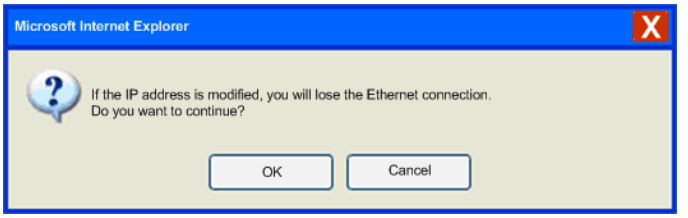
Accessing the IP Configuration Page

To access the **IP Configuration** embedded web page for IP parameter configuration:

Step	Action
1	Access the embedded web pages *(see page 37)* using the module's present IP address, which is shown on the HMI display. The **Home** page opens.
2	On the left side of the web page, under **IP Address**, select **IP Configuration**.
3	Make your edits in the **IP Configuration** page.
4	After your edits are complete, click **Apply** to save the new IP configuration. The following dialog opens: 
5	Click **OK** to accept your IP parameter changes. **NOTE:** If you changed the actual IP address assigned to the module, you must point your browser to that new address to continue viewing the web pages.

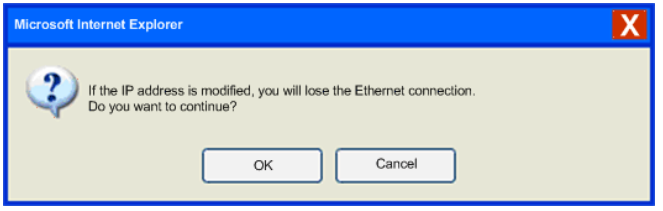
Configuring User-Defined Static IP Parameters

After accessing the **IP Configuration** page, configure user-defined static IP parameters as follows:

Step	Action	
1	Stop all other communication with the module.	
2	In the **IP Configuration** page, select **Static IP**.	
3	Type in values for the following IP parameters:	
	IP Address	4 decimal octet values from 0...255.
	Subnet Mask	4 decimal octet values from 0...255.
	Gateway Address, optional	4 decimal octet values from 0...255.
4	Click **Apply** to save your static IP parameters. The following dialog opens: 	
5	Click **OK** to accept your IP parameter changes.	
6	Look at the module's scrolling 4-character HMI to confirm that the intended IP address is displayed.	
7	Connect to the module using the new IP address.	

Applying the Factory Static IP Address

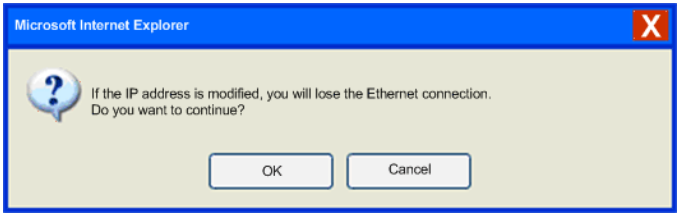
After accessing the **IP Configuration** page, apply the factory static IP address as follows:

Step	Action
1	Stop all other communication with the module.
2	In the IP Configuration page, select **Factory IP**. **NOTE:** This also sets the **Subnet Mask** to 255.255.255.0 and the default **Gateway Address** to 0.0.0.0.
3	Click **Apply** to save the factory IP address of 192.168.1.1. 

Step	Action
4	Click **OK** to accept your IP parameter changes.
5	Look at the module's scrolling 4-character HMI to confirm that the factory IP address is displayed.
6	Connect to the module using the factory IP address of 192.168.1.1.

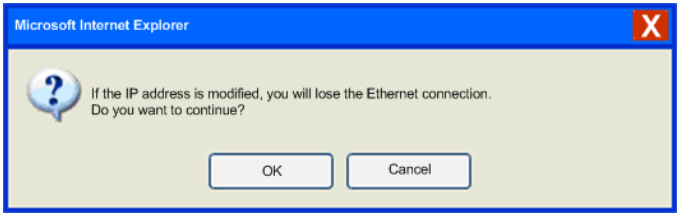
Configuring the Module to Receive IP Parameters from a DHCP Server

After accessing the **IP Configuration** page, configure the module to receive its IP address from a DHCP server as follows:

Step	Action
1	Stop all other communication with the module.
2	In the IP Configuration page, select **DHCP Client**.
3	Type in a **Device Name**, up to eight alphanumeric characters including underscores. **NOTE:** If the **Device Name** field is left blank, the DHCP server assigns IP parameters based on the module's MAC address.
4	Click **Apply** to save your IP parameter changes. 
5	Click **OK** to accept your IP parameter changes.
6	Configure your DHCP server to serve a constant IP address based either upon a MAC address or a **Device Name**.
7	Physically connect the module to the network.
8	Look at the module's scrolling 4-character HMI to confirm that the intended IP address is displayed.
9	Connect to the module using the new IP address.

Configuring the Module to Receive IP Parameters from a BootP Server

After accessing the **IP Configuration** page, configure the module to receive IP parameters from a BootP server as follows:

Step	Action
1	Stop all other communication with the module.
2	In the **IP Configuration** page, select **BootP Client**.
3	Click **Apply** to save your changes. 
4	Click **OK** to accept your IP parameter changes.
5	Configure your BootP server to serve a constant IP address based upon the MAC address of the module.
6	Physically connect the module to the network.
7	Look at the module's scrolling 4-character HMI to confirm that the intended IP address is displayed.
8	Connect to the module using the new IP address.

Configuring IP Parameters Using HMI Push Buttons

Introduction

You can use the push buttons, located on the front of the module above the 4-character HMI display *(see page 23)*, to:

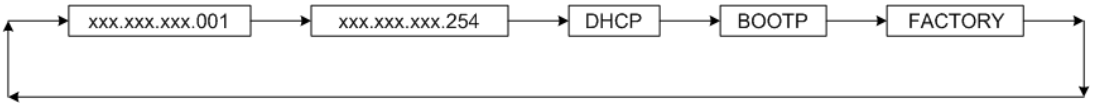
- set the source of the module's IP address,
- assign the factory address of 192.168.1.1, and
- assign a new, static IP address by modifying the last octet of the current IP address

NOTE: The remaining IP parameters—**Subnet Mask**, **Gateway Address**, and **Device Name**—cannot be configured using the HMI push buttons.

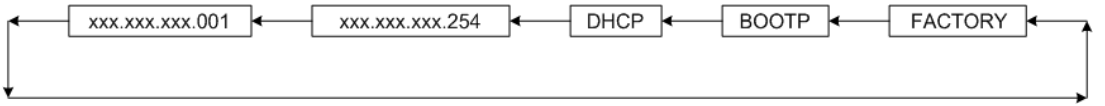
Push Button Behavior

Use the below diagrams when manipulating the push buttons.

The right push button increments:



The left push button decrements:



Manipulating Push Buttons

To set the source of the IP address:

Step	Action
1	Stop all communication with the module.
2	Use a Phillips screwdriver to open the plastic cover on the display.
3	When the IP addressing source is displayed, use the screwdriver or a similar shaped object to toggle either of the push buttons. Press the push button once to advance to the next selection, or hold the button down and the display will increment by itself.

Step	Action	
4	Select the desired source of IP address from the list:	
	xxx	This selection displays the last octet of the present IP address. Make this selection with the push buttons and: ● use either the left or right push button to toggle the last octet of the IP address to a number from 1 to 254 ● use your PC's web browser to navigate to the **IP Configuration** page where you can configure the **Subnet Mask** and **Gateway Address** parameters.
	DHCP	Make this selection with the push buttons and: ● configure a DHCP server with the MAC address or **Device Name**, and ● use your PC's web browser to navigate to the **IP Configuration** page where you can enter the **Device Name** if necessary.
	BootP	Make this selection with the push buttons and configure a BootP server with the MAC address and IP parameters for this module.
	FACTORY	This selection applies the factory IP address, **Subnet Mask**, **Gateway Address**, and **Device Name**.
5	When the desired source displays on the HMI, remove pressure from the push button to select it as the new source of the IP address. Your IP addressing changes will be applied 3 seconds after you remove pressure from the push button.	
6	Look at the module's 4-character HMI to confirm that the desired IP address has been applied.	
7	Replace the plastic cover with a Phillips screwdriver.	
8	Connect to the module using the new IP address.	

Section 3.3
Configuring Module Settings

Overview

The Advantys ETB I/O modules contain configurable attributes. This section discusses these attributes and how to configure them with the PLC project configuration.

What Is in This Section?

This section contains the following topics:

Configuring I/O for ETB1EI16CP00

Introduction

The ETB1EI16CP00 module contains configurable points that can be configured for in, out, or automatic. This topic shows you how to configure the ETB1EI16CP00 module's I/O points per your application needs and only applies to this specific module.

NOTE: By default, each point is pre-configured as an auto-configurable I/O point.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
If the point is connected to a sensor and used as an input, do not write a 1 to the corresponding output bit of the process image, as this can conflict with the current state of the input.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

In addition to configuring the **I/O Type** (described above) for each point, you can also configure the following settings that apply to all inputs:

- **Input Type**: PNP or NPN
- **Input Filter**: the minimum time period—in milliseconds—an input signal must persist in order for the module to recognize it as valid (and not merely noise).

PLC

You must use the PLC configuration to set the I/O settings. This facilitates module replacement since configuration parameters are transferred to the module within the forward open.

While there is only one method to configure the I/O settings, there are different approaches depending on your PLC.

- For a Schneider Electric *(see page 69)* PLC with NOC or ETC: you can import the EDS file so that the parameter settings become part of your PLC project.
- For an Allen-Bradley *(see page 83)* PLC, which does not support the importing of EDS files: you need to manually set the parameters.

Configuring the Watchdog

Introduction

During normal operations, each Advantys ETB I/O module remains in continuous communication with the PLC. If communication with the PLC is lost, the behavior of the outputs is governed by its watchdog settings.

The following settings are configurable through the PLC:

- watchdog timeout
- watchdog behavior
- fallback value

PLC

Refer to the application examples for instructions on configuring the watchdog with a Schneider Electric *(see page 76)* PLC or an Allen-Bradley *(see page 87)* PLC.

Chapter 4
Installing the Module

Overview

This chapter describes how to mount the module and attach the cables.

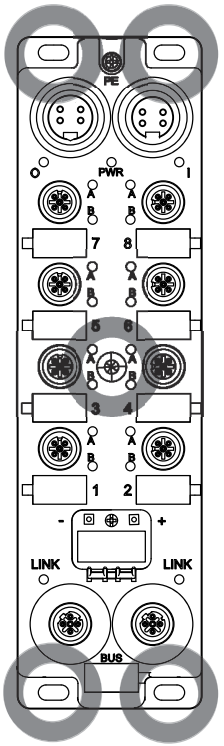
What Is in This Chapter?

This chapter contains the following topics:

Mounting the Module

Description

Each module has 5 mounting holes, which are circled in the diagram below. Use of the middle hole is optional. Use M5 (#10) bolts in the perimeter slotted holes and an M4 (#8) bolt in the center hole to attach the module to a flat surface. Make sure to properly torque so as not to overtighten and damage the module case. The topic Size and Dimensions *(see page 27)* provides dimensions that you can use to prepare your panel or machine for mounting.



Connecting Cables

Introduction

Connect the cables to complete the physical installation of the module. The chapter I/O Wiring Diagrams *(see page 60)* shows a diagram using Schneider Electric cables *(see page 18)*.

⚠ CAUTION

LOSS OF COMMUNICATION

To ensure proper functioning of the self test at startup of ETB module, it is mandatory to power up the module/input power 24 Vdc at the same time or before the output power 24 Vdc.

Failure to follow these instructions can result in injury or equipment damage.

⚠ WARNING

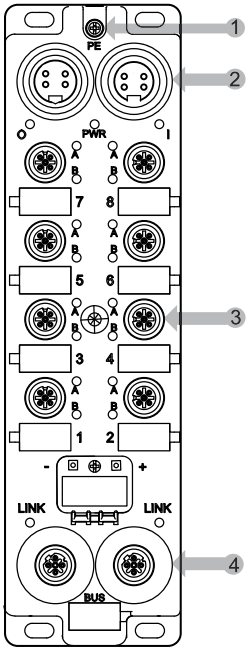
PERSONAL INJURY

Make sure you disconnect the power before attaching any cables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: For proper functioning of the ETB startup self test, apply the 24 Vdc module/input power before applying output power, or apply module/input power and output power at the same time. Maintaining output power while the module/input power is off can lead to a condition where I/O scanning continues but the block's LED display does not function, the block's web pages cannot be accessed, and the block does not respond to PING messages.
If the power up sequence has not been properly applied and these results are observed, normal LED display and communication can be restored by power cycling the module/input power.

Step	Action
1	Attach a PE ground cable per your local electric code.
2	Connect I/O cables.
3	Connect Ethernet network cables.
4	Connect the power cables.
5	Cover unused ports with sealing plugs.



1 Physical Earth (PE)
2 two 4-pin power connectors including input (left) and output (right)
3 eight 5-pin I/O port connectors (2 points each)
4 two 4-pin Ethernet network connectors

Ground Cable

Attach the module to a ground cable with a ring or spade connector at the PE size M3 screw (1 in the above diagram). Refer to your electric code for proper grounding instructions.

I/O Cables

Connect I/O cables to the module (3 in the above diagram) by either screwing a threaded connector to the inside of the port, or by pressing an Ultra-Lock™ connector over the outside of the port. Depending on your application needs, you may elect to use I/O splitter cables.

Ethernet Network Cables

Connect Ethernet network cables to the module (4 in the above diagram) by screwing a threaded connector to the inside of the port.

Power Cables

Connect the power cable (2 in the above diagram) by using a threaded cable connector and screwing it to the outside (power input connector) or inside (power output connector) of the module power connector.

Sealing Plugs

Cover unused ports with sealing plugs. Not covering ports in harsh environments may cause contaminants to come in contact with internal components of the module.

⚠ WARNING

EQUIPMENT DAMAGE

Make sure you cover unused ports with sealing plugs to maintain the IP67 rating of the modules.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Use this sealing plug...	To cover this connector...
ETXSA12B	M12 connectors (Ethernet and I/O ports)
ETXPA78BE	7/8 external connectors (power input port)
ETXPA78BI	7/8 internal connectors (power output port)

Chapter 5
I/O Wiring Diagrams

At a Glance

This chapter shows you examples of how to connect Schneider Electric cables to your module. IEC I/O wiring diagrams are also available for your reference.

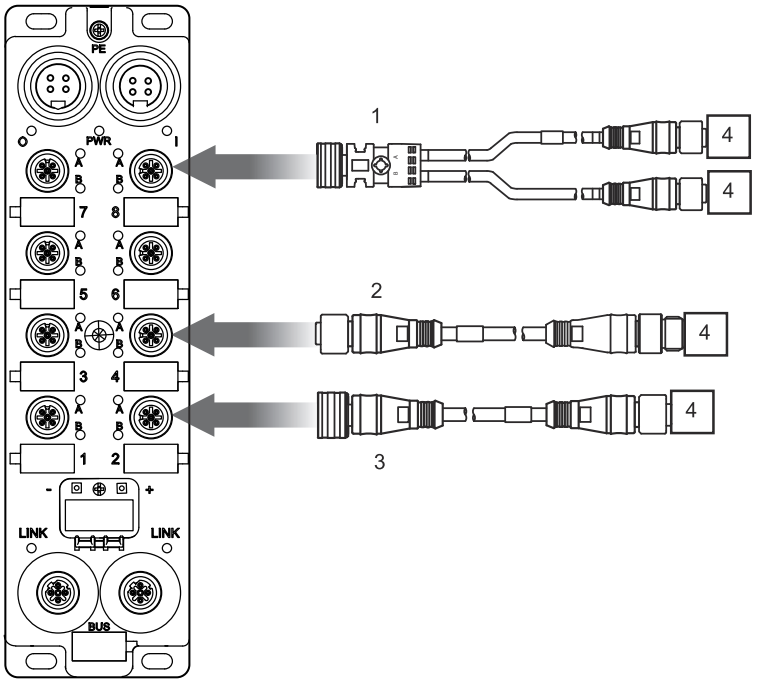
What Is in This Chapter?

This chapter contains the following topics:

Module Wired with Schneider Electric Cables

Description

The below image shows you examples of how to connect Schneider Electric cables *(see page 18)* to your module.



1 ETXSC413U1M3003: I/O splitter cable, Ultra-Lock 1 end and M12s other end
2 ETXSC412M1M3010: I/O cable, M12 connectors
3 ETXSC412U1M3010: I/O cable, Ultra-Lock™ 1 end and M12 other end
4 I/O

IEC I/O Wiring Diagrams

Introduction

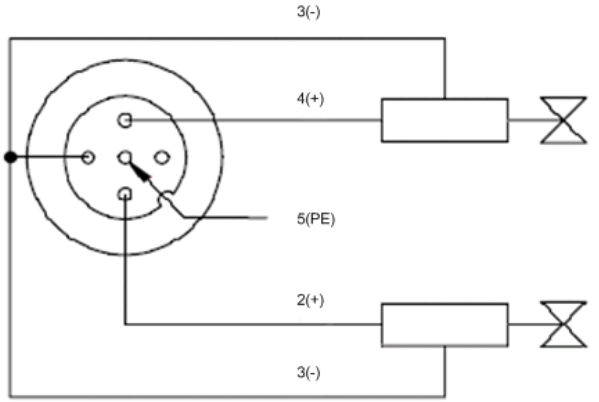
These diagrams show the wiring of an I/O port wired to support:

- 2 outputs
- 2 inputs
- 1 input and 1 output

NOTE: These diagrams are here for your convenience and to aid in troubleshooting.

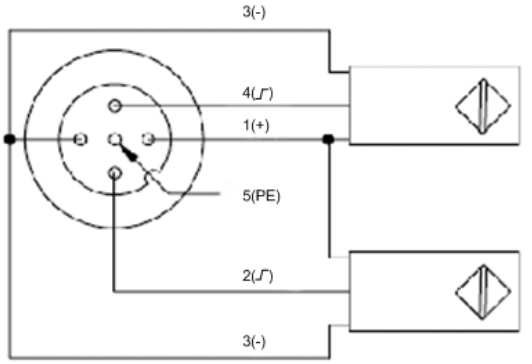
2 Outputs

Use this diagram to field-wire two actuators to a module using 2 outputs per port.



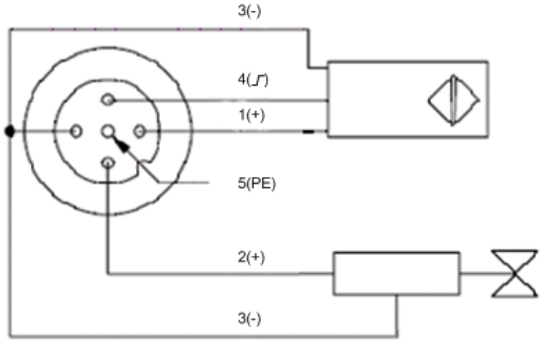
2 Inputs

Use this diagram to field-wire two sensors to a module using 2 inputs per port.



1 Input and 1 Output

The ETB1EI16CP00 is a configurable module that allows you to connect to any combination of up to 16 inputs or outputs. This diagram shows a connection where an input and output are connected to a single port.



Chapter 6
Application Example: Configuring the Advantys ETB I/O Module with Unity and RSLogix

Overview

This chapter presents two sample configurations of the ETB1EI16CP00 configurable I/O module.

The application examples shows you how to configure the module's:

- IP parameters, using the module's embedded web pages, and
- configuration parameters, using a Quantum PLC configured with Unity (version 4.0) or an Allen-Bradley ControlLogix PLC configured with RSLogix 5000 (version 16.03)

What Is in This Chapter?

This chapter contains the following sections:

Section 6.1
Before You Begin

Overview

Prepare your module for configuration with Unity or RSLogix by using a standard DHCP server to obtain an IP address, and then by accessing the embedded web pages to assign your module with a static IP address.

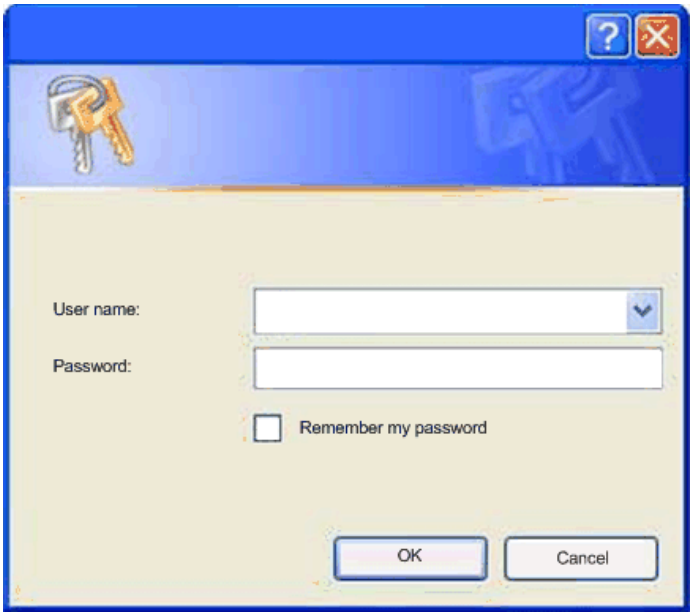
What Is in This Section?

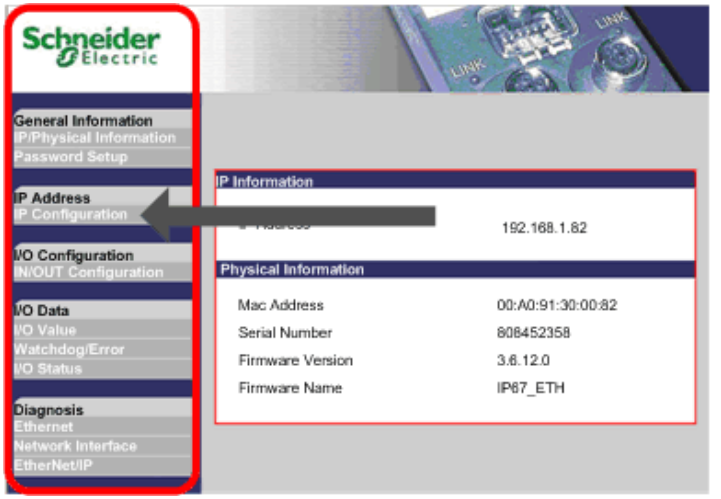
This section contains the following topics:

Accessing the Embedded Web Pages

Description

Follow these steps to access the module's embedded web pages, where you can configure the module's IP parameters.

Step	Action
1	Use an Ethernet cable to connect the module to a PC running a standard web browser. **NOTE:** Both the PC and the module must be part of the same subnet.
2	Use a standard DHCP server to obtain an IP address for your module, and then type this IP address—shown on the HMI display—in the address line of your web browser. A dialog opens prompting you for a user name and password. 
3	Enter the following factory default settings: • **User name**: admin • **Password**: admin

Step	Action
4	Click **OK**. The home page is displayed. 
5	Click on **IP Configuration** on the left side of this screen to open that page.

Next

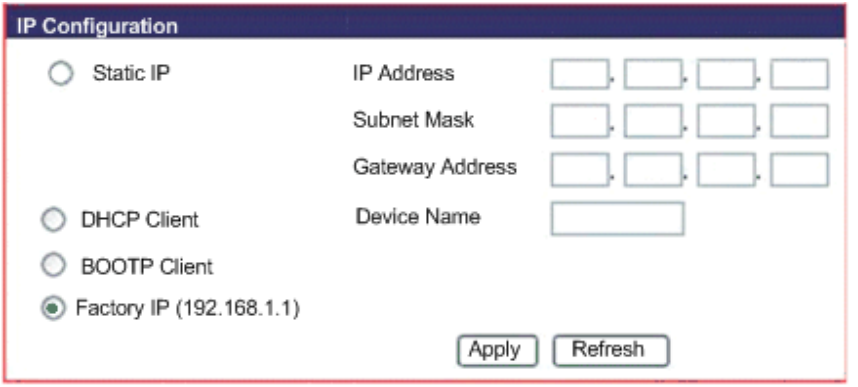
Assign the module with a static IP address.

Setting a Static IP Address

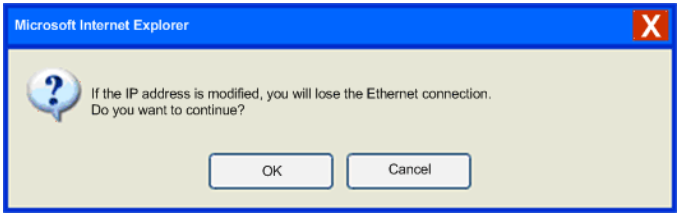
Description

Use the module's IP Configuration web page to set a static IP address and edit the related parameters.

The following web page opens when you select the description for **IP Configuration**. Note that the screen capture below indicates that the module is configured to use the factory IP address.



To configure the module to use a static IP address, follow these steps:

Step	Action	
1	In the **IP Configuration** page, select **Static IP**.	
2	Type in values for the following IP parameters: **NOTE:** Type in values that are accurate for your module. For the purpose of this example, the following parameters are used:	
	IP Address	192.168.1.21
	Subnet Mask	255.255.255.0
	Gateway Address	0.0.0.0
3	Click **Apply** to save your static IP configuration settings. The following dialog opens: 	

Step	Action
4	Click **OK** to accept your IP address change. **NOTE:** In order to connect to the module, you must point the web browser to the new IP address.

Next

Configure your module using either Unity or RSLogix, depending on your application needs.

Section 6.2
Configuring the Module with Unity

Overview

After completing the steps in the section Before You Begin *(see page 64)*, connect your module to a Schneider Electric Quantum PLC configured with Unity (version 4.0). This is the earliest version of Unity that contains the EtherNet/IP configuration tool, but the same basic steps apply to the Premium processor running Unity communicating through an ETC.

What Is in This Section?

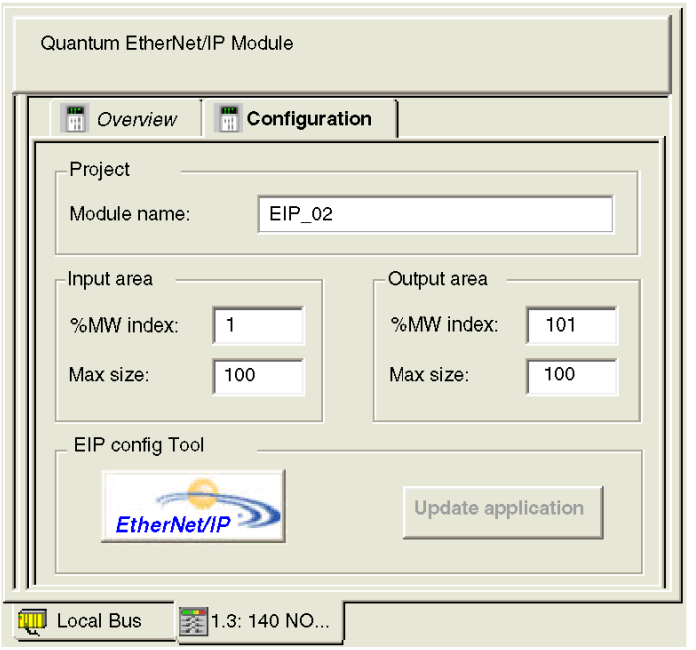
This section contains the following topics:

Accessing the EtherNet/IP Configuration Tool

Introduction

100 words are assigned to inputs beginning at word %MW1. This is an arbitrary amount selected for ease of assignment. The first 16 bytes of the input area make up the Connection Health Table. Each bit of each byte is assigned to a device for a total of 128 devices supported per network.

Use a Quantum processor running Unity with a NOC 771 00 EtherNet/IP scanner, and start the **EIP Configuration Tool** by clicking on the bottom left button.



Next

Use the EDS management wizard to import EDS files.

Importing EDS Files to the Device Library

Introduction

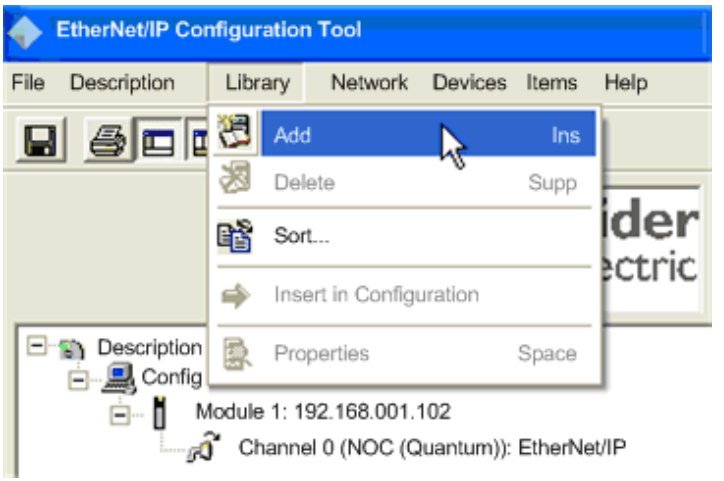
The EtherNet/IP configuration tool includes an EDS Management wizard that allows you to add one or more EDS files to the Device Library (available at www.schneider-electric.com). This wizard includes a series of instruction screens that:

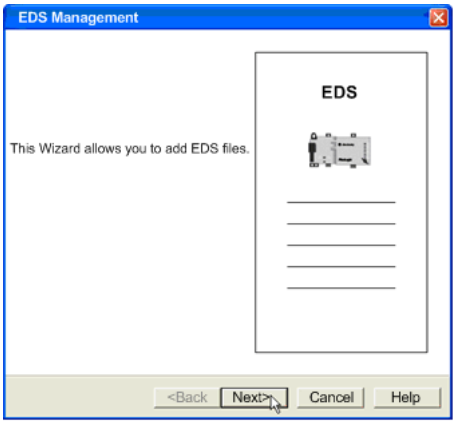
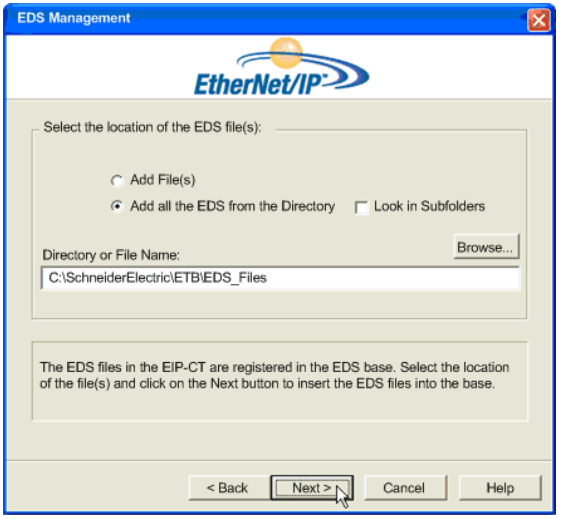
- simplify the process of adding EDS files to the Device Library
- provide a redundancy check in case you attempt to add duplicate EDS files to the Device Library

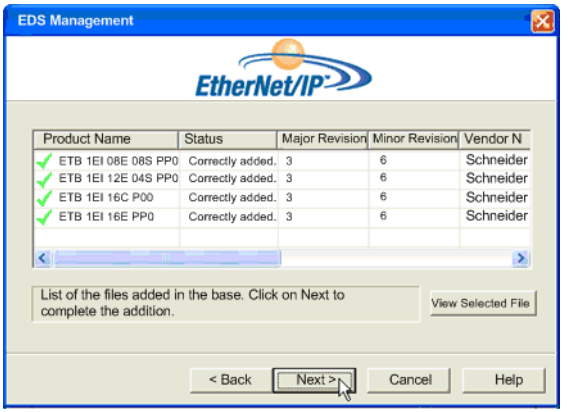
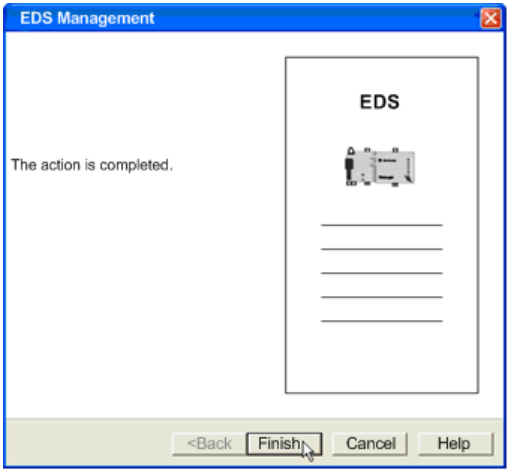
Open the **Display Options** window by selecting **Options → Devices**. In this window, you can enable/disable messages indicating that the EDS file you are adding is a duplicate or a different version of an existing EDS file.

Importing EDS Files

Make sure your EtherNet/IP Configuration Tool library contains the module's name. If it does not, add the module by importing the EDS files with the following steps.

Step	Action
1	Choose **Add** from the **Library** drop-down menu. 

Step	Action
2	Click **Next** in the **EDS Management** dialog window. 
3	Choose one of the following options to select the location of the EDS file(s). ● **Add File(s)** to add one or more specific files ● **Add all the EDS from the Directory** to add all the files from a specific folder
4	Click **Browse**, and then select one of the following to open ● one or more EDS files, or ● a folder containing EDS files
5	The **Open** dialog box closes and your selection displays under **Directory or File Name**. Click **Next**. 

Step	Action
6	Use this table to verify that the files were added correctly, and then click **Next**. ● green check: the EDS file can be added ● blue icon: the EDS file is redundant ● red check: the EDS file is invalid 
7	Click **Finish** to close the wizard.  **NOTE:** The EDS files are now part of the Library and can be used to add devices to the EtherNet/IP network configuration.

Next

Set the IP and configuration parameters for your module.

Configuring Module Properties

Introduction

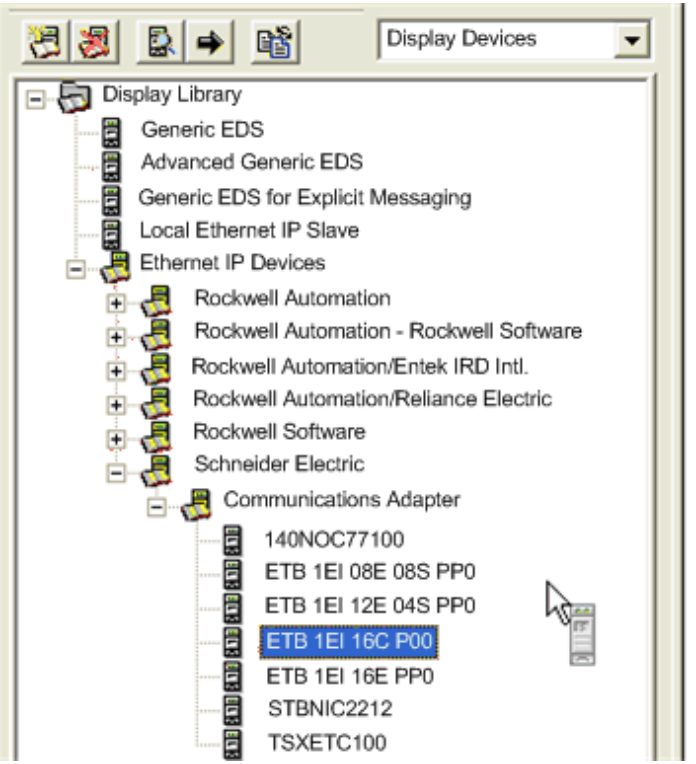
The Unity Pro EtherNet/IP configuration tool offers a window for the immediate configuration of your module. When offline, the window contains the following 5 pages:

- **General** tab: enter IP parameters
- **Connections** tab: enter configuration parameters
- **Online Parameters** tab: not accessible offline (no configuration required)
- **Port Configuration** tab: not accessible offline (no configuration required)
- **EDS File** tab: read only page (no configuration required)

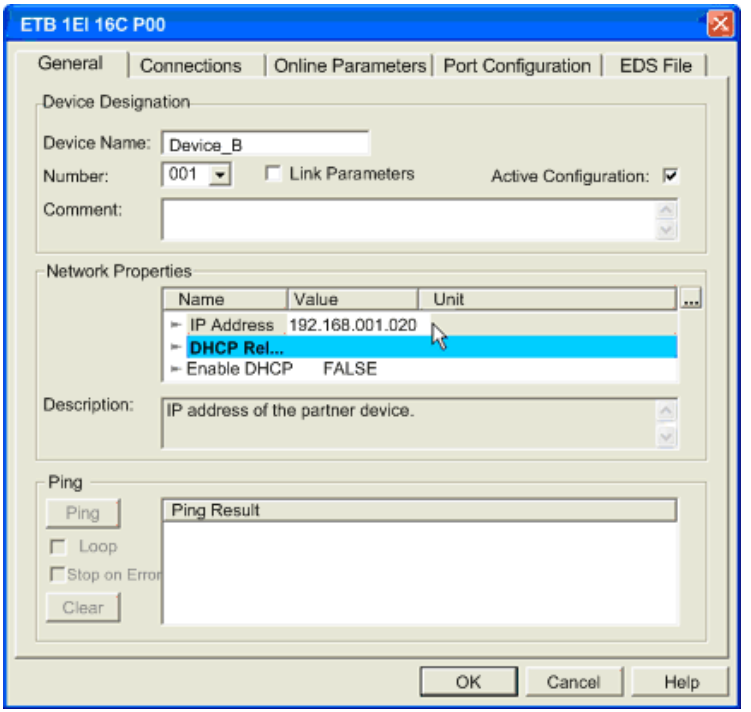
NOTE: For most applications you only need to complete the first two pages. If you want to accept the module's default parameters, then you only need to assign the IP parameters on the first page.

General Tab: Configuring the IP Address

In order to configure the settings of your module, you must first drag the module from the library and into the workspace on the right side of this page.

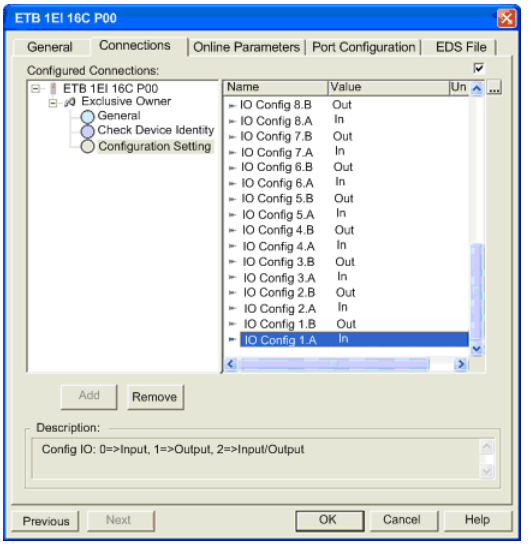
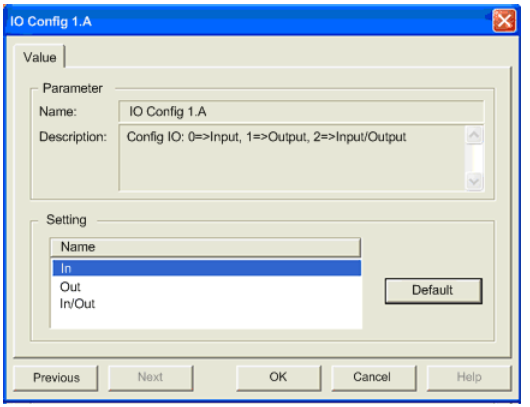


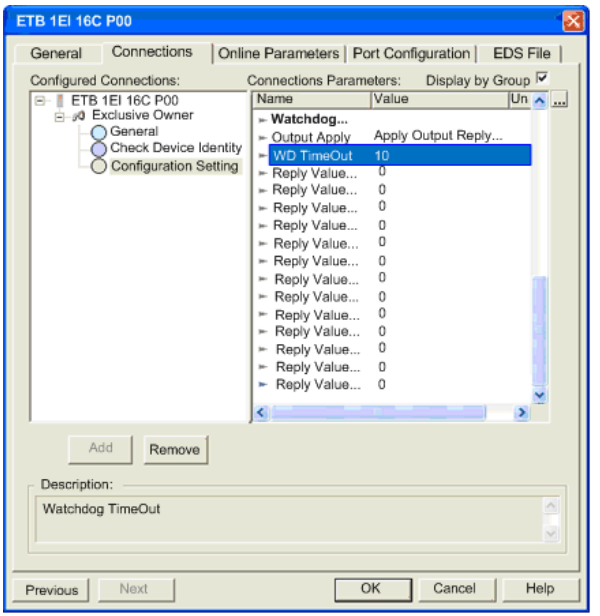
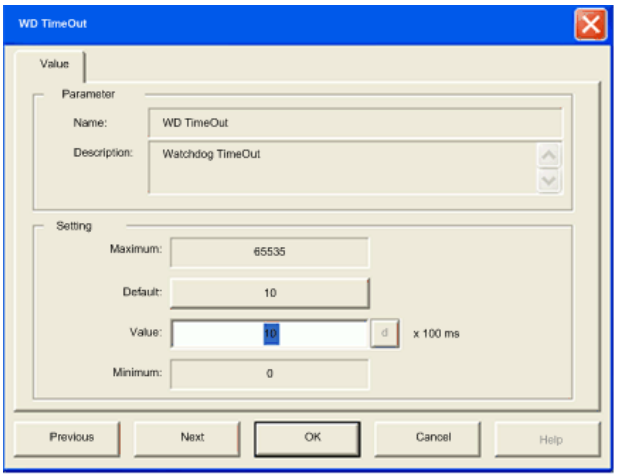
Once the module is in the workspace, set the IP address in the **Network Properties** section of the **General** tab.

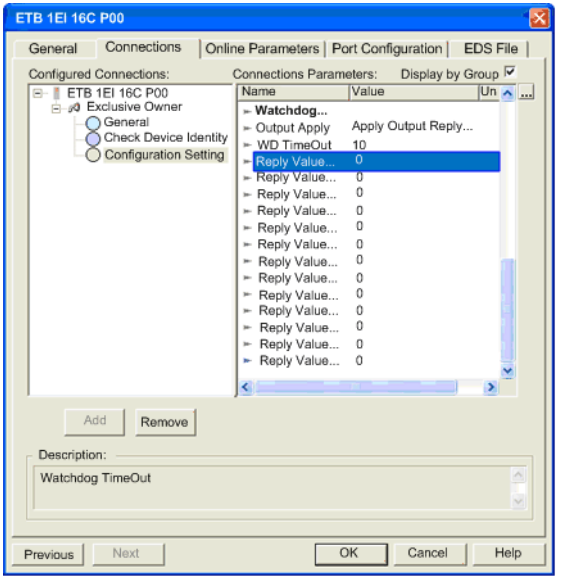
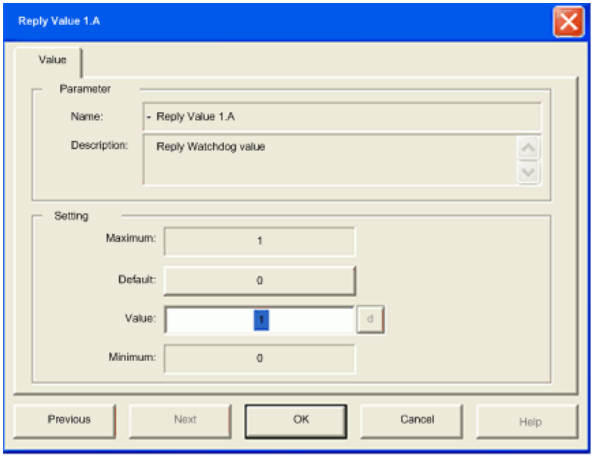


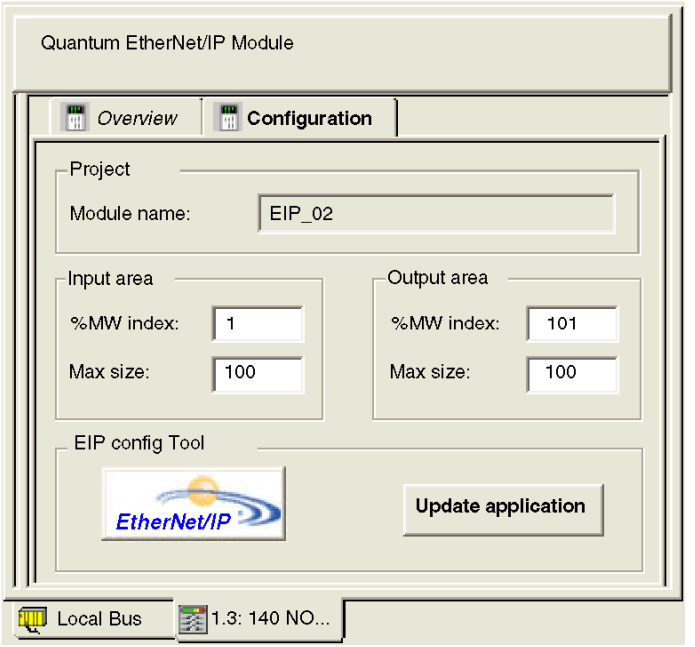
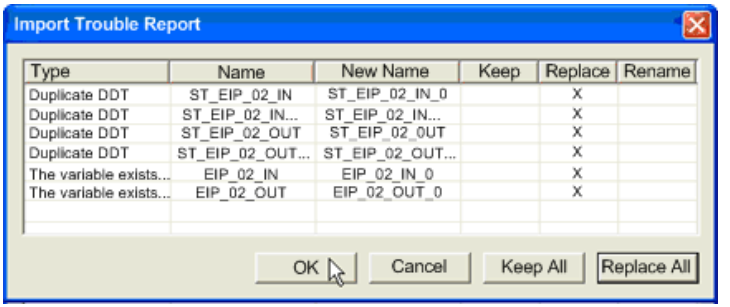
Connections Tab: Configuring Module Parameters

Use the **Connections** tab to configure the I/O assignments for your module.

Step	Action
1	Select the **Configuration Setting** folder from the left side of the window.
2	Double click on the desired parameter to open a dialog box. Note that you can alternatively right click on the parameter to reveal a drop-down menu.  **NOTE:** In order to set up a listen only connection, you must remove the exclusive owner connection and add a listen only connection. In this listen only connection, you must replicate all of the configuration settings used to establish an exclusive owner connection.
3	Set the I/O assignment, and then click **OK**. 

Step	Action
4	You can set the watchdog parameters by scrolling up in the **Connections** tab. Double click on **WD Timeout** to open a dialog box.  **NOTE:** You can alternatively single click on **WD Timeout** to change the value.
5	Modify the watchdog timeout next to **Value**, and then click **OK**. 

Step	Action
6	As part of the watchdog parameters, you can also configure the fallback values. Double click on **Reply Value** to open a dialog box. Note that you can alternatively single click on **Reply Value** to change the value. You can set the **Output Apply** to either apply output value or hold last value. 
7	Modify the fallback value next to **Value**, and then click **OK**. 
8	Save and close the EtherNet/IP Configuration Tool.

Step	Action
9	Click **Update Application**.  **NOTE:** This button is greyed out until a configuration change is saved.
10	Click **Replace All** if necessary to update an existing configuration, and then click **OK**. 

NOTE: After the initial configuration, you can only modify these settings by going back to the EIP-CT or through the use of explicit messaging within your PLC program.

Breaking the Connection Between the PLC and Module

Description

Since the connection between the PLC and the EtherNet/IP module is maintained when the PLC is set from run to stop, the module goes into Idle Mode *(see page 33)*.

In order to break the connection between the PLC and EtherNet/IP module, use your Unity project and follow the below steps in your EtherNet/IP Configuration Tool.

Step	Action
1	Select **File** → **Preferences** → **Advanced Mode**. Make sure the check box is present to enable the advanced mode.
2	Double click on the EtherNet/IP module in the right panel. A dialog box opens with the heading **Channel Properties**.
3	Select the third tab labeled **EtherNet/IP**.
4	Under **Behavior**, change **Stop Behavior** from **false** to **true**, and then click **OK**.
5	Save and close the EtherNet/IP Configuration Tool, and then update the application.
6	In the **Import Trouble Report** dialog box, click **Replace All** and then **OK** to confirm your modifications and build the changes.

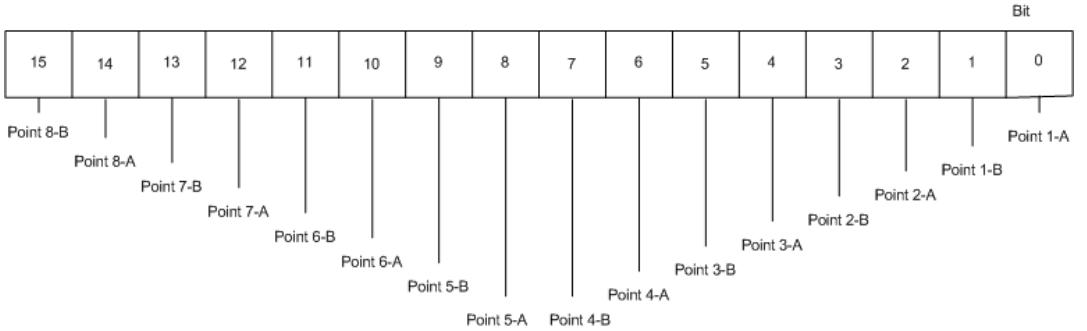
I/O Data

Objective

I/O data for the module is assigned according to the following chart.

⚠ WARNING
EQUIPMENT DAMAGE, UNINTENDED EQUIPMENT OPERATION
Do not write to a bit assigned as an input, as an undesirable behavior may occur.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following figure displays the input process image instance 101 (0x65) and the output process image instance 102 (0x66). The figure applies to all bytes or words, whether input, output, or status.

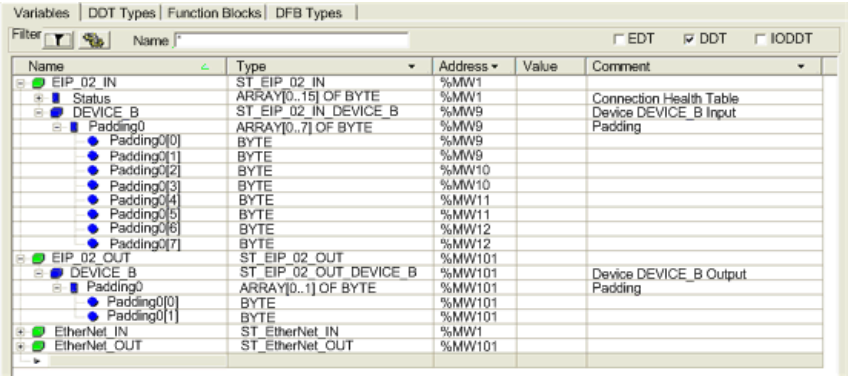


NOTE: The Appendix contains a a listing of Ethernet/IP objects supported by the module.

Derived Data

Derived Data Types, created by the EtherNet/IP scanner and each module, are assigned to derived variables.

- The input data is located within the EIP_02_IN-DEVICE_B-Padding0-Padding0[0] and Padding0[1].
- The output data is located within EIP_02_OUT-DEVICE_B-Padding0-Padding0[0] to Padding0[1].



Name	Type	Address	Value	Comment
EIP_02_IN	ST_EIP_02_IN	%MW1		
Status	ARRAY[0..15] OF BYTE	%MW1		Connection Health Table
DEVICE_B	ST_EIP_02_IN_DEVICE_B	%MW9		Device DEVICE_B Input
Padding0	ARRAY[0..7] OF BYTE	%MW9		Padding
Padding0[0]	BYTE	%MW9		
Padding0[1]	BYTE	%MW9		
Padding0[2]	BYTE	%MW10		
Padding0[3]	BYTE	%MW10		
Padding0[4]	BYTE	%MW11		
Padding0[5]	BYTE	%MW11		
Padding0[6]	BYTE	%MW12		
Padding0[7]	BYTE	%MW12		
EIP_02_OUT	ST_EIP_02_OUT	%MW101		
DEVICE_B	ST_EIP_02_OUT_DEVICE_B	%MW101		Device DEVICE_B Output
Padding0	ARRAY[0..1] OF BYTE	%MW101		Padding
Padding0[0]	BYTE	%MW101		
Padding0[1]	BYTE	%MW101		
EtherNet_IN	ST_EtherNet_IN	%MW1		
EtherNet_OUT	ST_EtherNet_OUT	%MW101		

NOTE: The input data is written to %MW9 and the output data to %MW101. The current status is written to %MW10, the event status to %MW11, and the watchdog to %MW12.

Section 6.3
Configuring the Module with RSLogix

Overview

After completing the steps in the section Before You Begin *(see page 64)*, connect your module to an Allen-Bradley ControlLogix PLC with an Ethernet bridge configured with RSLogix 5000 (version 16.03). You can also use a CompactLogix PLC. This application example can be used with versions of RSLogix 5000 back to version 13.

What Is in This Section?

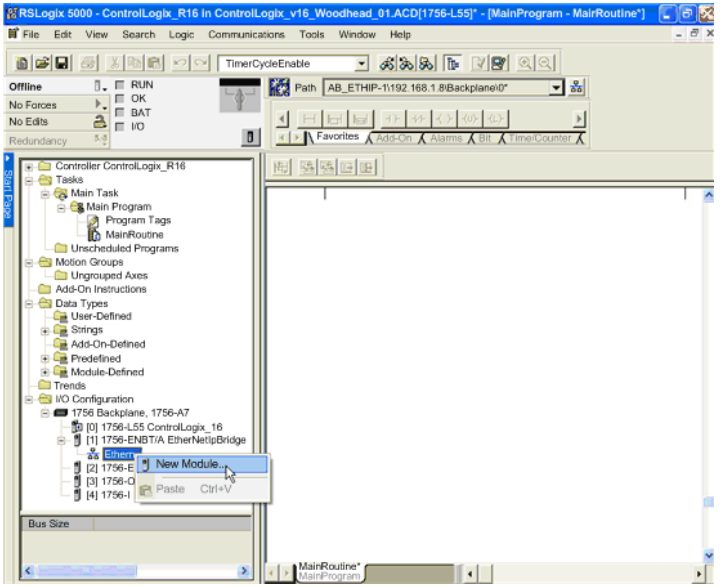
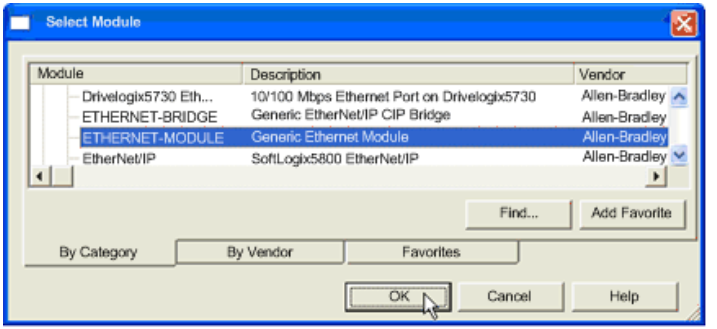
This section contains the following topics:

Using RSLogix 5000

Description

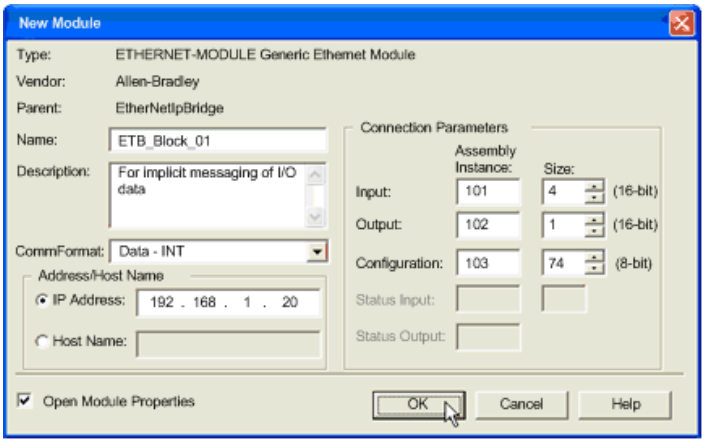
Use an Allen-Bradley ControlLogix PLC with your module, and open your RSLogix 5000 project.

Open the window for **Generic Ethernet Module**:

Step	Action
1	Right click on the Ethernet network under **I/O Configuration**, and click **New Module**. 
2	Expand the communications heading and highlight **Generic Ethernet Module**. 
3	Click **OK** to select the highlighted module.

New Module Window

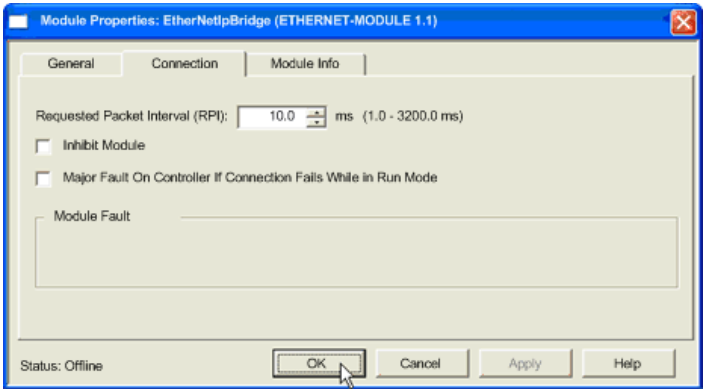
Assign connection parameters for the module.

Step	Action
1	Enter a name in the free-text **Name** field, and optionally type a description. 
2	Select **Data - INT** from the drop-down menu next to **CommFormat**.
3	Enter the **IP Address**.
4	Enter 101 for the input assembly instance and set the size to 4 (16 bit words).
5	Enter 102 for the output assembly instance and set the size to 1 (16 bit word).
6	Enter 103 for the configuration (diagnostic) assembly instance and set the size to 74 (8 bit bytes).
7	Make sure the field for **Open Module Properties** is selected in order to facilitate assessing the Requested Packet Interval for the next step.
8	Click **OK** to save your changes.

NOTE: In order to set up a listen only connection, you must set the **CommFormat** to **Data - INT** and set the output assembly instance to 199. In this listen only connection, you must replicate all of the configuration settings used to establish an exclusive owner connection.

Module Properties Window

In the **Connection** tab, if necessary, modify the **Requested Packet Interval** for your module. The module can be set to a recommended minimum RPI of 10 ms.

Step	Action
1	Assign the appropriate RPI for your application needs. 
2	Click **OK** to apply your changes.

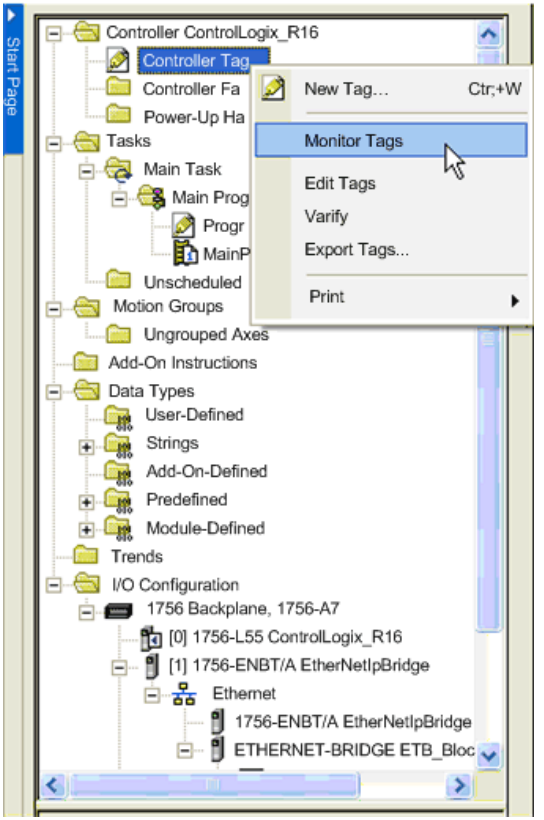
Next

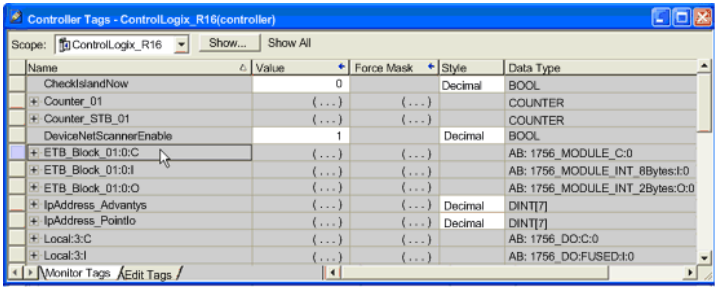
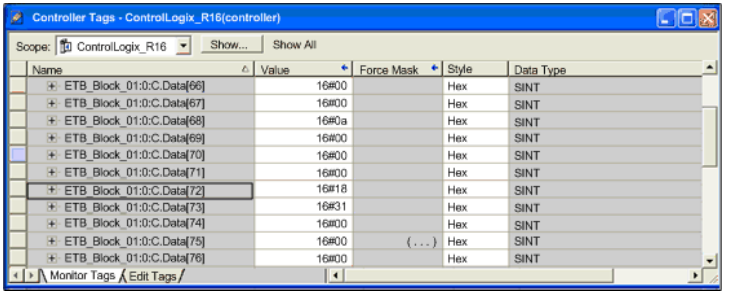
Configure the I/O and watchdog settings for your module.

Configuring the Module with RSLogix 5000

Description

After the scanner setup, you must enter the configuration data for the module. The configuration data is part of the PLC program, not part of the project configuration as in Unity. It is easier to enter this information in Hex instead of Decimal since the configuration is defined in bytes, and the Most Significant Byte comes before the Least Significant Byte for each 16 bit word (big endian).

Step	Action
1	Right click on the **Controller Tags** folder and select **Monitor Tags**. 

Step	Action
2	Expand the tag labeled with a C that has the same name *(see page 85)* you assigned in the **New Module** window. This tag is generated after your previous module configuration is complete. This array is for configuration.  **NOTE:** The configuration parameters for the EtherNet/IP module are listed below this table.
3	Assign the ports as inputs, outputs, or inputs/outputs by entering 0, 1, or 2 in elements 0 to 31. Since the Most Significant Byte is first, you must configure the I/O points accordingly. For example, set the I/O configuration for point 1. A in ETB_Block_01:C.Data[1] and not ETB_Block_01:C.Data[0].  **NOTE:** The configuration parameters for the EtherNet/IP module are listed below this table.
4	If necessary, enter the watchdog value in elements 67 and 68 of the configuration tag. The watchdog value acts as a variable and can be changed at any time. You can also enter the input filter and fallback values. **NOTE:** The configuration parameters for the EtherNet/IP module are listed below this table. **NOTE:** Since the connection between the PLC and the EtherNet/IP module is maintained when the PLC is set from run to program or test mode. the module goes into Idle Mode *(see page 33)*. There is currently no method in RSLogix 5000 (version 16.03) to break this connection when the PLC goes into program or test mode.

Step	Action
5	Enter the product code, available in each module's individual EDS file, in elements 72 and 73. **NOTE:** Where 12568 (0x3118 in Hex) is the product code for ETB1EI16CP00, element 72 is populated with 18 and element 73 with 31 since the Most Significant Byte comes first. See below for a portion of the EDS file for ETB1EI16CP00. The product code is listed next to the attribute **ProdCode**. [File] DescText = "EDS for Schneider ETB 1EI 16C P00"; CreateDate = 09-29-2008; CreateTime = 10:01:24; ModDate = 11-06-2008; ModTime = 14:48:05; Revision = 2.2; [Device] VendCode = 243; VendName = "Schneider Electric"; ProdType = 12; ProdTypeStr = "Communications Adapter"; ProdCode = 12568; MajRev = 3; **NOTE:** See below for a listing of the product codes for each EtherNet/IP module. ETB1EI16EPP0: 12560 (0x3110 in Hex) ETB1EI12E04SPP0: 12562 (0x3112 in Hex) ETB1EI08E08SPP0: 12563 (0x3113 in Hex) ETB1EI16CP00: 12568 (0x3118)

Configuration Parameters

The table below lists the configuration parameters for the EtherNet/IP module. You can assign these parameters to each module in the configuration array of your RSLogix 5000 project, as described in the table above. Note that not all of these parameters apply to each module. For instance, only the points on the ETB1EI16CP00 can be configured using the first 32 bytes.

Configuration Tag Name	Description
ETB_BLOCK_01:C.DATA[0]	Point 1.A: 0=Input, 1=Output, 2=Self Configuring
ETB_BLOCK_01:C.DATA[2]	Point 1.B
ETB_BLOCK_01:C.DATA[4]	Point 2. A
ETB_BLOCK_01:C.DATA[6]	Point 2.B
ETB_BLOCK_01:C.DATA[8]	Point 3. A
ETB_BLOCK_01:C.DATA[10]	Point 3.B
ETB_BLOCK_01:C.DATA[12]	Point 4. A
ETB_BLOCK_01:C.DATA[14]	Point 4.B
ETB_BLOCK_01:C.DATA[16]	Point 5. A

Configuration Tag Name	Description
ETB_BLOCK_01:C.DATA[18]	Point 5.B
ETB_BLOCK_01:C.DATA[20]	Point 6. A
ETB_BLOCK_01:C.DATA[22]	Point 6.B
ETB_BLOCK_01:C.DATA[24]	Point 7. A
ETB_BLOCK_01:C.DATA[26]	Point 7.B
ETB_BLOCK_01:C.DATA[28]	Point 8. A
ETB_BLOCK_01:C.DATA[30]	Point 8.B
ETB_BLOCK_01:C.DATA[32]	Input Type: 0=PNP, 1=NPN
ETB_BLOCK_01:C.DATA[34]	Input Filter: 0=No filter, 1=0.5ms, 2=1.0ms, 3=1.5ms, 4=2.0ms, 5=2.5ms, 6=5.0ms
ETB_BLOCK_01:C.DATA[36]	Fallback Value Point 1.A: 0=Output to 0, 1=Output to 1
ETB_BLOCK_01:C.DATA[38]	Fallback Value Point 1.B
ETB_BLOCK_01:C.DATA[40]	Fallback Value Point 2. A
ETB_BLOCK_01:C.DATA[42]	Fallback Value Point 2.B
ETB_BLOCK_01:C.DATA[44]	Fallback Value Point 3. A
ETB_BLOCK_01:C.DATA[46]	Fallback Value Point 3.B
ETB_BLOCK_01:C.DATA[48]	Fallback Value Point 4. A
ETB_BLOCK_01:C.DATA[50]	Fallback Value Point 4.B
ETB_BLOCK_01:C.DATA[52]	Fallback Value Point 5. A
ETB_BLOCK_01:C.DATA[54]	Fallback Value Point 5.B
ETB_BLOCK_01:C.DATA[56]	Fallback Value Point 6. A
ETB_BLOCK_01:C.DATA[58]	Fallback Value Point 6.B
ETB_BLOCK_01:C.DATA[60]	Fallback Value Point 7. A
ETB_BLOCK_01:C.DATA[62]	Fallback Value Point 7.B
ETB_BLOCK_01:C.DATA[64]	Fallback Value Point 8. A
ETB_BLOCK_01:C.DATA[66]	Fallback Value Point 8.B
ETB_BLOCK_01:C.DATA[68]	Fallback Timeout Value LSB
ETB_BLOCK_01:C.DATA[69]	Fallback Timeout Value MSB
ETB_BLOCK_01:C.DATA[70]	Output Apply Mode: 0=Outputs apply fallback value, 1=Outputs hold last value
ETB_BLOCK_01:C.DATA[72]	Product Code LSB
ETB_BLOCK_01:C.DATA[73]	Product Code MSB

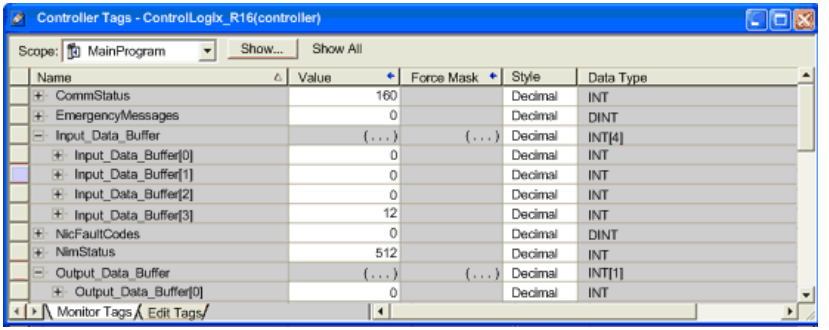
Next

Use I/O data and the Get System Value.

Writing to a Buffer Array

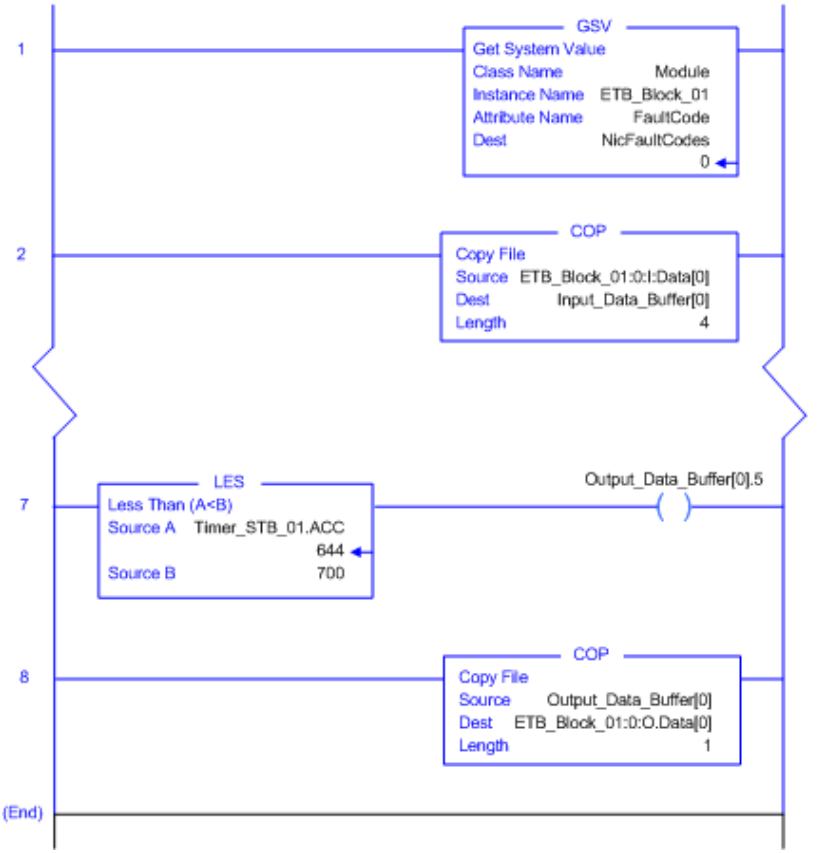
Description

It is good programming practice to write all input data to a buffer array at the beginning of the program scan, as the communication with the module is not synchronized with the PLC scan. This buffer array is used for all subsequent calculations and logic solving. All output writes are sent to a temporary output buffer, and at the end of the program scan, the data in the buffer is written to the actual outputs.



In lines 2 and 8 of the following figure, use the copy command to:

- write input values to a buffer before any processing occurs
- write outputs to a buffer
- write the output buffer to the actual outputs

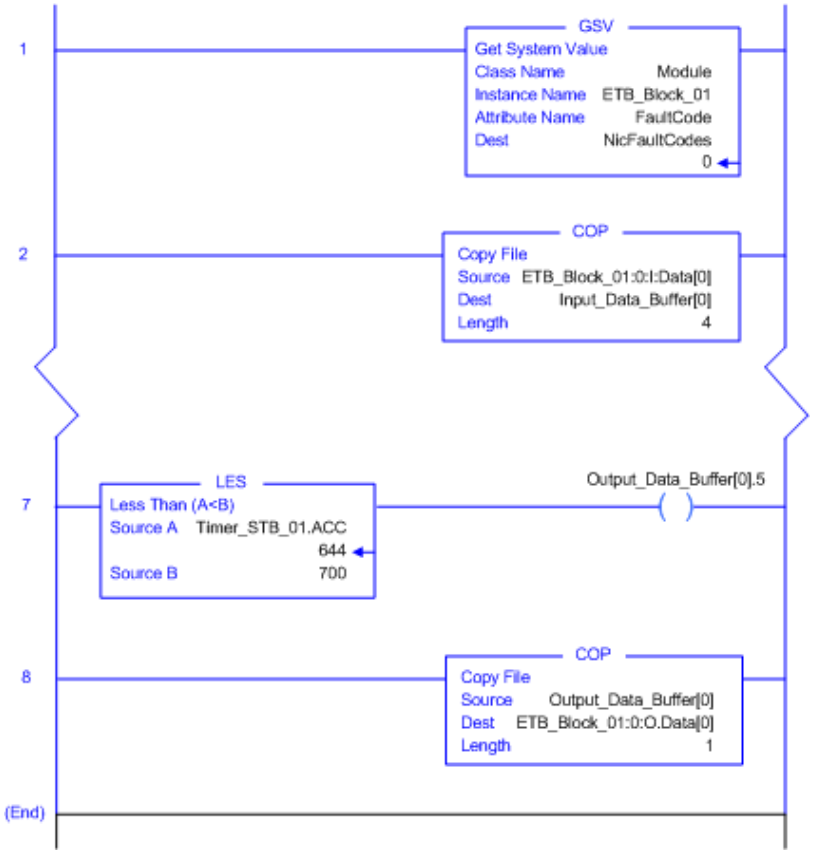


Using the Get System Value

Description

The **Get System Value** allows you to retrieve communication codes from the module. This code should report 0 during normal operation.

In line 1 of the following figure, use the **Get System Value** to retrieve detected **NicFaultCodes.**



Chapter 7
Diagnostics

Overview

This chapter describes the tools available for diagnosing the state of the module.

What Is in This Chapter?

This chapter contains the following sections:

Section 7.1
LEDs

Introduction

The Advantys ETB I/O modules provide LEDs to diagnose the state of the modules. You can use the LED descriptions in this section to troubleshoot your module.

What Is in This Section?

This section contains the following topics:

LED Behaviors

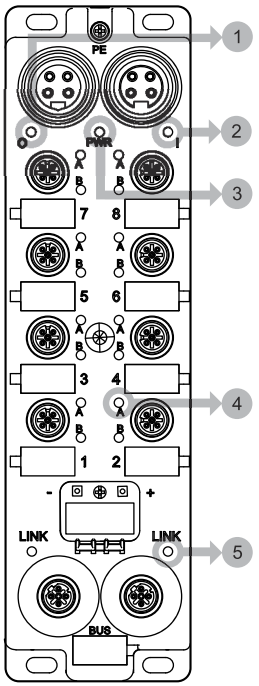
Description

The module provides LEDs for you to visually check its status. You can use the LEDs to monitor power, I/O points, and network link status.

- 2 power LEDs: output (O) and input/module (I)
- 16 logic sided I/O point LEDs
- 2 Ethernet network link LEDs

NOTE: If you cannot see the physical 16 I/O point LEDs, you can instead use the web page labeled I/O Status *(see page 106)*.

The following table shows the LEDs and their indications.

LED Position	Indication
	1 O (green): ● on: output power source present ● off: output power source not present
	2 I (green): ● on: input/module power source present ● off: input/module power source not present
	3 PWR: not used
	4 I/O ● green: input or output active ● red: detected error on I/O points *(see page 29)* ● off: input or output not active
	5 Link ● solid green: link at 100 Mbit without activity ● flashing green: link at 100 Mbit with activity ● solid yellow: link at 10 Mbit without activity ● flashing yellow: link at 10 Mbit with activity

Scrolling LED Messages

Description

The module's scrolling LED displays messages for you to check the module's status. During normal operation, only the source of the IP address, the address itself, and the state of the I/O scanning is displayed. The HMI shows the following specific information when available.

Source information displayed on the HMI:

Message	Description
DHCP	The module is waiting for a response from a DHCP server.
BOOT	The module is waiting for a response from a BootP server.
FACT	The module is applying the factory IP address of 192.168.1.1.

IP address information displayed on the HIMI:

Message	Description
DHCP:192.168.1.1	The IP address of 192.168.1.1 was acquired by a DHCP server.
BOOTP:192.168.1.1	The IP address of 192.168.1.1 was acquired by a BootP server.
FACTORY:192.168.1.1	The IP address is set to the factory IP address of 192.168.1.1.
STATIC:192.168.1.21	The IP address of 192.168.1.21 was manually set by the user, either through the embedded web pages or push buttons.
DEFx	The module detects an IP conflict and defends its own IP address. **NOTE:** x: number of times the module defends its IP address.
IP CONFLICT on 192.168.1.1	The module detects an IP address conflict on 192.168.1.1.

Module status information displayed on the HMI:

Message	Description
WLNK	There is no Ethernet link on any ports of the switch.
PING	The module is receiving PING requests on the network.
IO:ERR	A detected I/O error exists on one or more points.
WD:ACTIV	The watchdog was triggered and is now active.

Additional messages displayed on the HMI in conjunction with the above messages:

Message	Description
EIP:NO_CONF	The module did not receive any exclusive owner connection from an EtherNet/IP scanner.
EIP:BAD_CONF	The module received an exclusive owner connection from an EtherNet/IP scanner, but at least one configuration parameter was out of range.
EIP:NO_CNX	The module received an exclusive owner connection from an EtherNet/IP scanner, but then lost the connection.
EIP:OPERAT	A connection is in progress: an exclusive owner connection was opened, but I/O data has not yet been exchanged with the scanner.
EIP:IDLE	The scanner set the module to an idle state.
EIP:RUN	The module has an active exclusive owner connection with an EtherNet/IP scanner, and I/O exchanges are in progress.
RST	The module is in the process of resetting after being commanded to do so.

Section 7.2
Diagnostic Web Pages

Introduction

The Advantys ETB I/O modules provide embedded web pages that you can use to display the state of the modules. Use these pages to verify settings and troubleshoot your module.

What Is in This Section?

This section contains the following topics:

I/O Configuration: IN/OUT Configuration

Description

This embedded web page is read only and shows the I/O settings for the module. Use this page to verify the I/O configuration against your system drawings.

The **I/O Type** shows the I/O configuration of each point for the configurable module:

- **IN**: the selected point is configured as an input
- **OUT**: the selected point is configured as an output
- **IN/OUT**: the selected point will auto-configure as an:
  - input, if it detects that it is connected to a sensor, or
  - output, if it detects that it is connected to an actuator

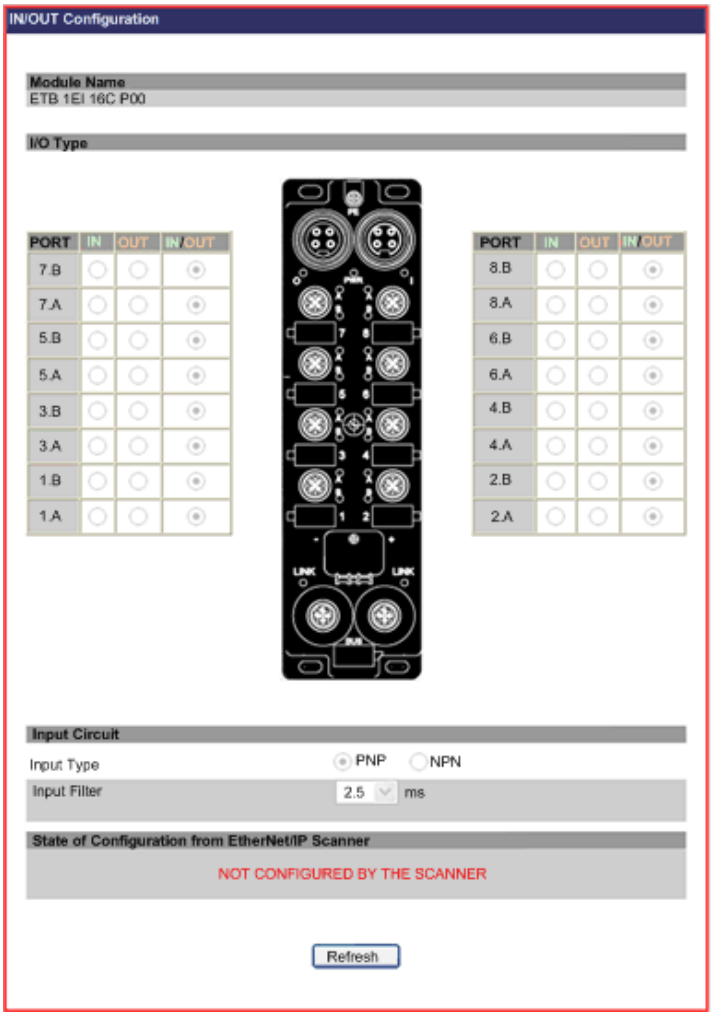
If configured as an input:

- The **Input Type** reflects whether all input points on the configurable module are configured as PNP or NPN.
- The **Input Filter** shows the minimum time period in milliseconds that an input signal must persist in order for the configurable module to recognize it as valid and not simply noise.

This page also displays the state of configuration of the module for the configurable and non-configurable modules. The possible options are:

- **NOT CONFIGURED BY THE SCANNER**
- **CONFIGURED BY THE SCANNER**

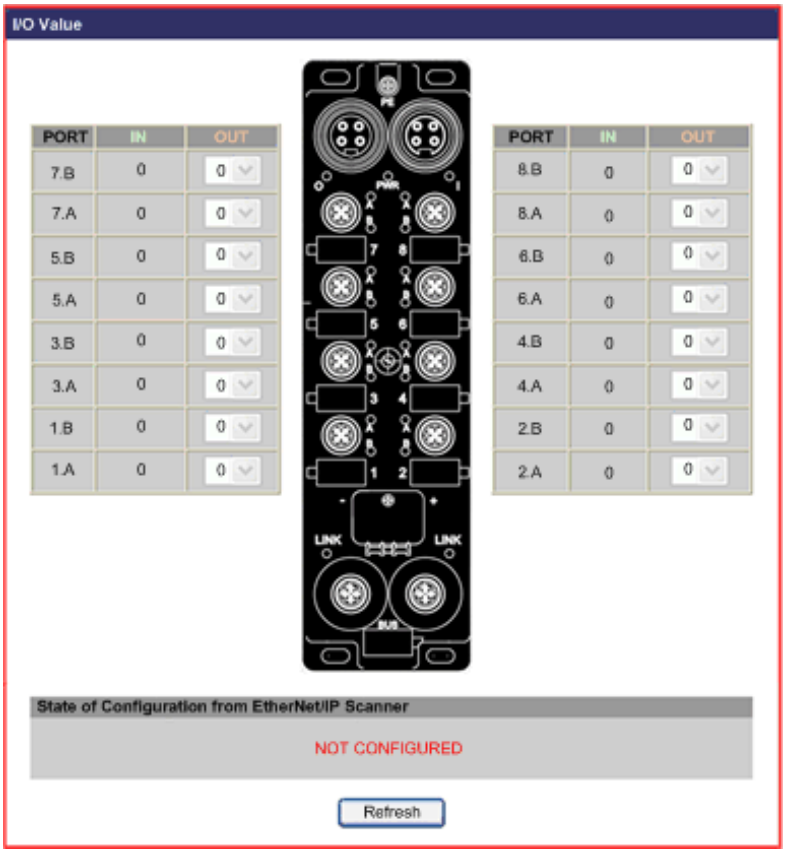
Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.



I/O Data: I/O Value

Description

This web page displays the configuration status of the module, as well as the current state of the inputs and outputs for the module. Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.



I/O Data: Watchdog

Description

The watchdog monitors the communications with the module. In the case of an event where the connection to the module is lost, the watchdog either employs the assigned fallback values or holds the last state.

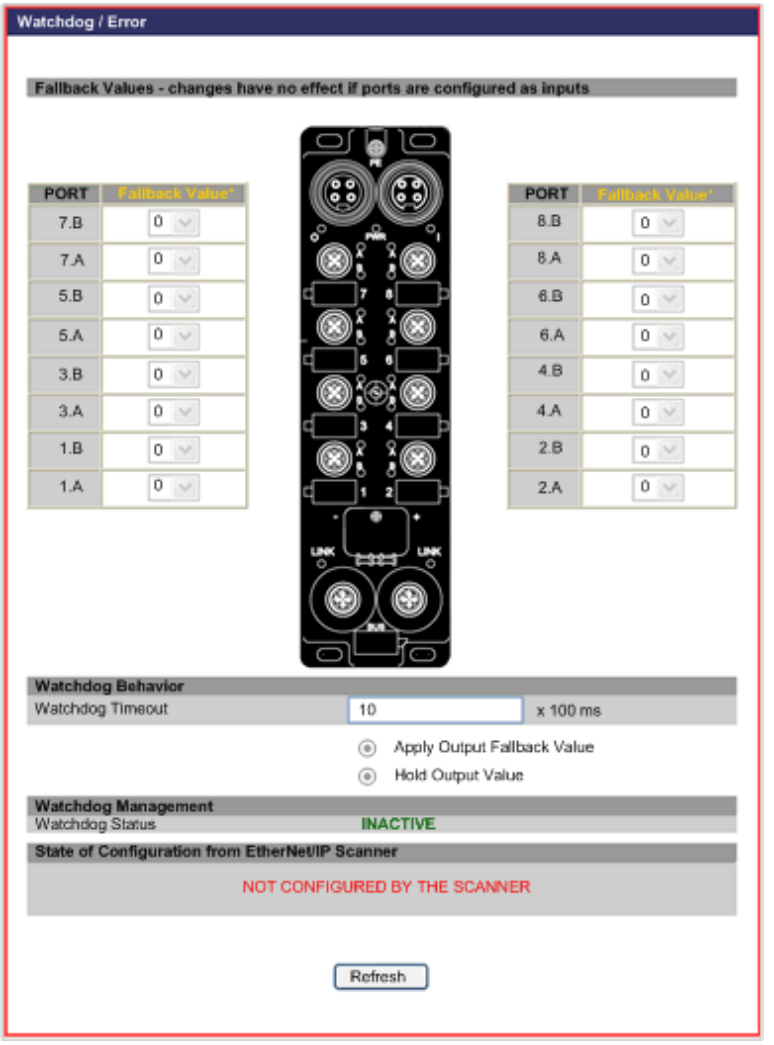
This web page displays the watchdog behavior in a read only format. The **Watchdog Status** field indicates whether the watchdog is active (on) or inactive (off). During normal operation, the watchdog is inactive. Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.

Setting	Description
Watchdog Timeout	The time period—in milliseconds—that the module waits after communication with the PLC is lost and before adopting the pre-configured **Watchdog Behavior**.
Watchdog Behavior	The behavior that the module's output points will adopt if communication with the PLC is lost for a continuous period greater than the **Watchdog Timeout**. Choices are: • **Apply Output Fallback Value**: places each output into a pre-configured on or off state, or • **Hold Output Value**: maintains the state of each output at the time communication with the PLC was lost
Fallback Value (for each output point)	The pre-determined state—on or off—each output point will adopt if communication with the PLC is lost for a time period longer than the **Watchdog Timeout**.

NOTE: The watchdog is enabled by default with a timeout of 10 x 100ms = 1s. Setting the timeout to 0 disables the watchdog.

This page also displays the state of configuration of the module for the configurable and non-configurable modules. The possible options are:

- NOT CONFIGURED BY THE SCANNER
- CONFIGURED BY THE SCANNER



I/O Data: I/O Status

Description

This page displays the I/O status of the module. Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.

NOTE: You can also retrieve the Current Status information by looking at the LEDs *(see page 97)*.

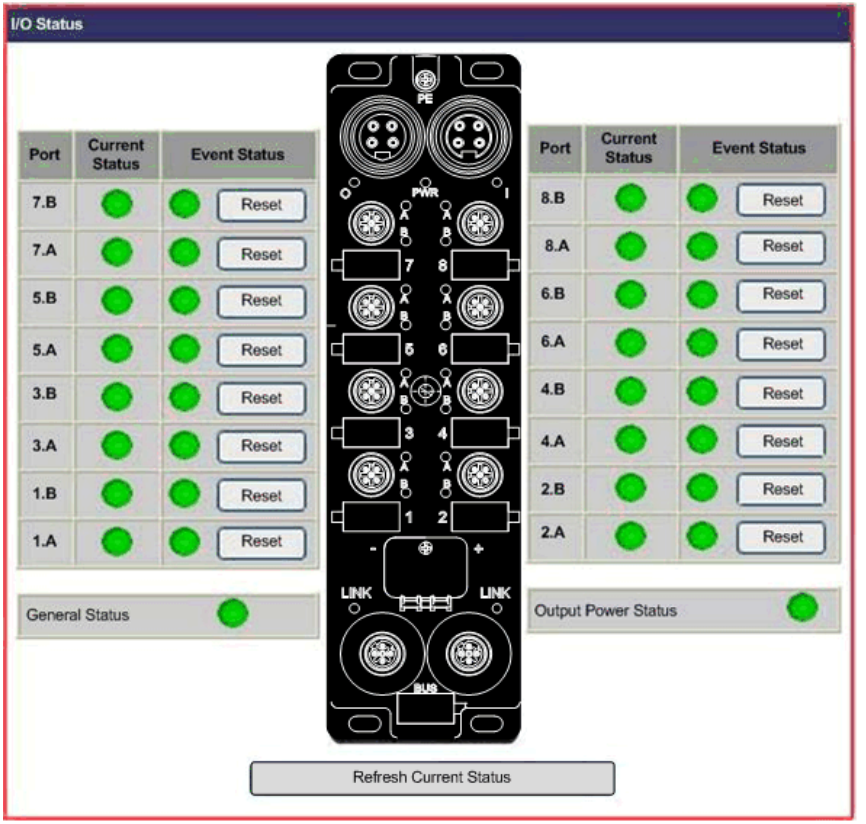
Current Status: shows the current condition of I/O points
- green: no detected output power loss and no detected short circuit on the input power
- red: detected output power loss or detected short circuit on the input power

Event Status: latches Current Status since last cleared
- green: no detected error present with the I/O points since the last reset
- red: detected error present with the I/O points since the last reset

General Status: reflects status of all I/O points
- green: neither the Current Status or Event Status is red
- red: when both the Current Status and Event Status are red, or when just the Event Status is red

Output Power Status: signals presence or absence of output power
- green: output power is present
- red: output power is absent

NOTE: You can also use this web page to reset theEvent Status of individual points. Click **Reset** to clear the Event Status for individual I/O points. This also refreshes the web page.


I/O Status
Port
Current Status
Event Status
7.B
7.A
5.B
5.A
3.B
3.A
1.B
1.A
Reset
General Status
PE
PWR
LINK
LINK
BUS
Port
Current Status
Event Status
8.B
8.A
6.B
6.A
4.B
4.A
2.B
2.A
Reset
Output Power Status
Refresh Current Status

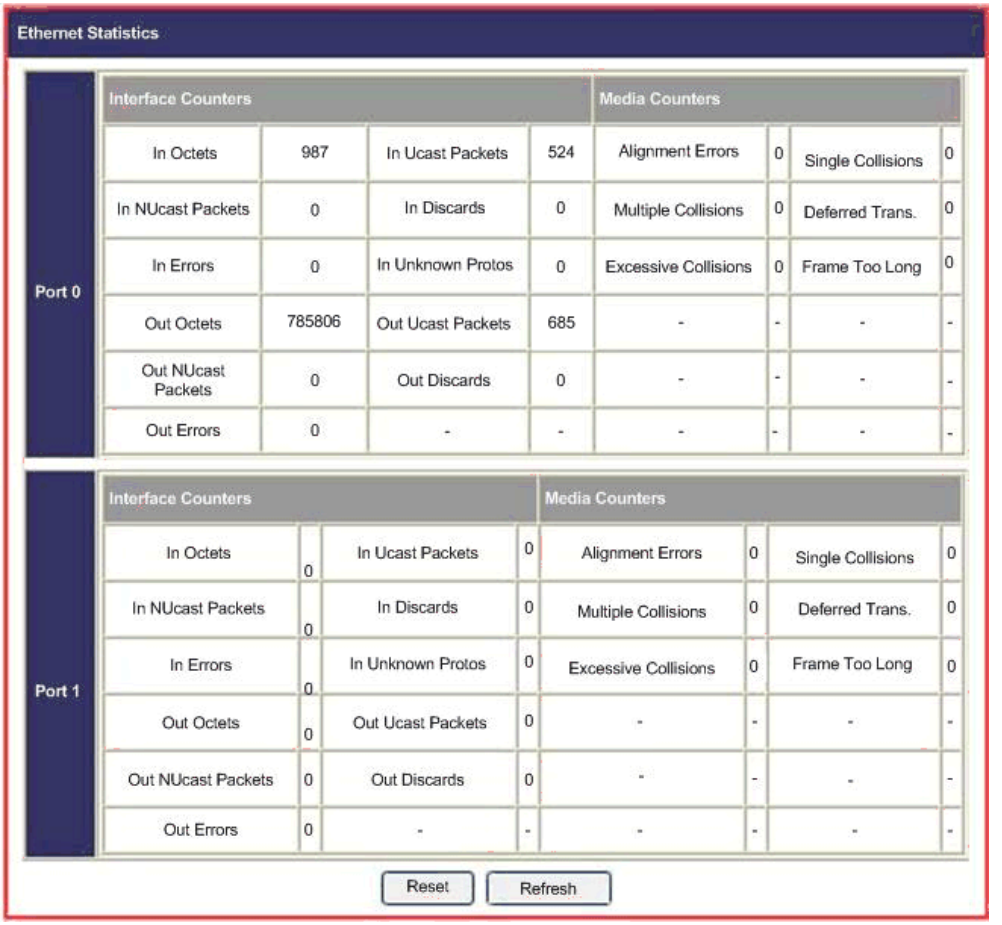
Diagnosis: Ethernet Statistics

Description

This page displays the details of the Ethernet interface counters and Ethernet media counters by port.

- Click **Reset** to set all values to 0.
- Click **Refresh** to update the information on the web page.

NOTE: Port 0 is on the bottom right of the module, and port 1 is on the bottom left.



Interface counters:

Field	Description
In Octets	Number of packets received in the interface
In Ucast Packets	Number of unicast packets received in the interface
In NUcast Packets	Number of non-unicast packets received in the interface
In Discards	Number of inbound packets discarded
In Errors	Number of incoming packets with detected errors (undersize, fragments, oversize, jabbers, detected symbol error, detected CRC error, detected alignment error)
In Unknown Protos	Inbound packets discarded due to unknown or unsupported protocol
Out Octets	Number of output packets transmitted in the interface
Out Ucast Packets	Number of unicast output packets transmitted in the interface
Out NUcast Packets	Number of non-unicast output packets transmitted in the interface
Out Discards	Number of outbound packets discarded
Out Errors	Number of outbound packets that could not be transmitted due to detected errors

Media counters:

Field	Description
Alignment Errors	Number of detected alignment errors in Rx packets
Single Collisions	Successfully transmitted frames on a port for which transmit is inhibited by exactly one collision
Multiple Collisions	Successfully transmitted frames on a port for which transmit is inhibited by more than one collision
Deferred Transmissions	Transmitted packets by a port for which the first transmit attempt is delayed due to the busy medium
Excessive Collisions	Count of frames for which transmit is unsuccessful due to excessive collisions
Frame Too Long	Received oversize packets with good CRC (max: 1536 or 1522 bytes)

Diagnosis: Network Interface

Description

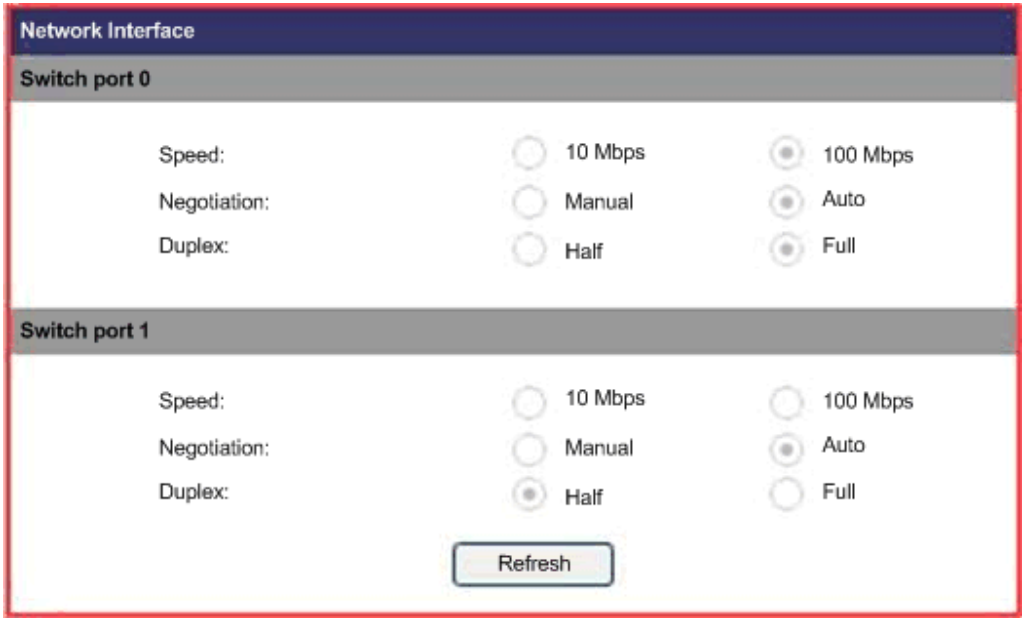
This read only page displays information about the network interface by port:

- Speed
- Negotiation
- Duplex

The module enables auto-negotiation, so the speed and duplex are automatically configured.

Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.

NOTE: Port 0 is on the bottom right of the module, and port 1 is on the bottom left.



Diagnosis: EtherNet/IP

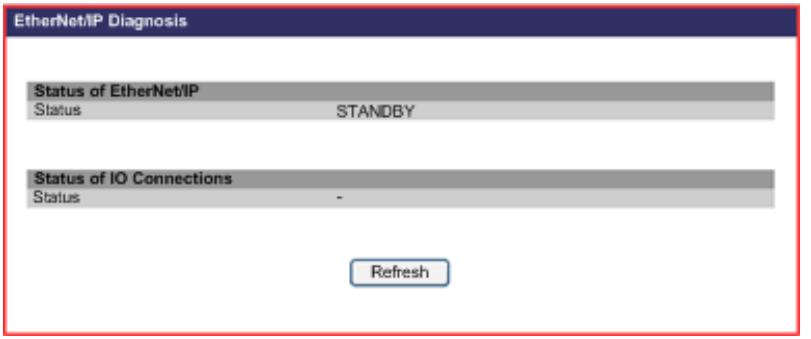
Description

This read only page displays the status of EtherNet/IP and I/O connections.

- **Status of EtherNet/IP**:
  - **STANDBY**: The module is waiting for a connection.
  - **NO CONNECTION**: The connection with the scanner has been lost.
  - **CONNECTED**: A connection is established with the scanner.
- **Status of I/O Connections**:
  - **RUN**: There is an I/O exchange with the scanner.
  - **IDLE**: The scanner is connected, but there is no I/O exchange.

  NOTE: Status of I/O Connections only displays when the scanner is connected; otherwise, it displays as **–**, as in the below image.

Like all the web pages in this section, this is a static page and you must click **Refresh** to update the information.



Chapter 8
Replacing the Advantys ETB I/O Module

Replacing the Module

Introduction

The following steps show you how to replace your EtherNet/IP module. The configuration is automatically transferred in the forward open.

The following table shows the steps needed to replace your module. Details of each step are provided after the table.

Step	Action
1	Remove power.
2	Remove original module.
3	Apply module power.
4	Assign IP address.
5	Mount replacement.
6	Attach cables.
7	Verify settings and apply output power.

Removing Original Module

Remove the power supply, I/O, and network connectors, making note of which cables go to which port. It is recommended that you mark the connector locations appropriately to make sure you reassemble them in the same order. Then detach the module from the mounted surface.

Assigning IP Address

You must assign the replacement module an IP address and the related settings identical to the ones assigned to the original.

For a static IP address and the related settings:

- Retrieve the original IP address.
- Refer to the topic Configuring IP Parameters *(see page 44)* to use the web pages, or see the topic Manipulating Push Buttons *(see page 48)* to use the HMI push buttons. Make sure to modify the IP address and the related settings to match those of the original.

For a BootP assigned IP address:

- Retrieve the original IP address.
- Refer to the topic Configuring IP Parameters *(see page 44)* to use the web pages, or see the topic Manipulating Push Buttons *(see page 48)* to use the HMI push buttons. Make sure to modify the server to serve the original IP address to the module's MAC address.

For a DHCP assigned IP address:

- Retrieve the original **Device Name**.
- Refer to the topic Configuring IP Parameters *(see page 44)* to use the web pages, or see the topic Manipulating Push Buttons *(see page 48)* to use the HMI push buttons. Make sure to modify the **Device Name** to match that of the original.

Mounting Replacement

Screw the module back in place, making sure to properly torque so as not to overtighten and damage the module case.

Attaching Cables

Attach the cables to the replacement in the same locations as they were on the original module.

Verifying Settings and Applying Power

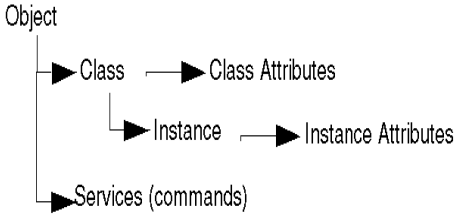
Verify that the connections and IP parameters match those of the original module. Then apply output power and check module functionality.

Appendices

Appendix A
CIP Objects

Overview

The Advantys ETB I/O module for the EtherNet/IP protocol stores data and offers services in a CIP object hierarchy, consisting of the following nested levels:



When the module is operating, remote devices can send explicit messages to the module's object hierarchy and perform services that:

- access module data
- execute module commands

This chapter describes the CIP objects that the EtherNet/IP module exposes to remote devices.

What Is in This Chapter?

This chapter contains the following topics:

CIP Object Services

Description

The Advantys ETB I/O module for the EtherNet/IP protocol supports the following CIP object services.

NOTE: Not all CIP services apply to all CIP objects.

Service Code	Service Name
01 (0x01)	Get_Attribute_All
02 (0x02)	Set_Attribute_All
05 (0x05)	Reset
14 (0x0E)	Get_Attribute_Single
16 (0x10)	Set_Attribute_Single

CIP Object Classes

Description

The EtherNet/IP module supports the following object classes.

Class Code	Object Type
(0x01)	identity
(0x02)	message router
(0x04)	assembly
(0x06)	connection manager object
(0xF6)	Ethernet link object
(0xF5)	TCP/IP interface object
(0x300)	configuration object
(0x301)	diagnostic general object
(0x302)	diagnostic I/O port object

CIP Connections

Introduction

Each Advantys ETB I/O module for the EtherNet/IP protocol supports up to 16 CIP connections, which can be any combination of implicit or explicit messaging connections.

NOTE: A smaller number of CIP connections make possible faster I/O scanning updates, as configured by the requested packet interval (RPI) setting for the connection. To optimize I/O scanning performance, configure your application so that the module supports no more than 10 CIP connections.

CIP connections support both implicit and explicit messaging:

Message Type	Data Transmitted	Includes...
Explicit	Information	• Non-time critical management data • Read/write configuration data
Implicit	I/O data	• Real-time I/O data • Real-time control data from remote devices

Explicit Messaging

Explicit messages transmit point-to-point, client-server data. The client initiates the transaction by sending a message containing both address and service request information. Explicit messaging uses CIP transport class 3 connections.

Explicit messages can be sent as either connected or unconnected, depending upon the frequency of your need for data and the level of service required:

connected explicit message	• Begins when an originating device initiates a connection by sending a request to a target device. • The connection is established when the originator receives a successful response from the target. • A CIP connected message has a high priority and better level of service, but requires a greater amount of resources from both the target and originator devices.
unconnected explicit message	• Less resource intensive.

Implicit Messaging

Implicit messaging is producer/consumer messaging. The originator defines the connection parameters, such as the required data, and how often that data must be produced. After the connection is established, both the originator and the target can act as a producer or consumer. Implicit messaging uses CIP transport class 1 connections.

An implicit message is a connected CIP message. It is cyclic. The data contained in an implicit message can include, for example:

- real-time I/O data
- functional safety data
- motion control data

After the connection is established, both sides in the transmission must produce data at the rate established when the connection was opened.

Implicit connected messages are routed either point-to-point or multicast over a CIP connection using UDP/IP data packets. Each packet contains both data and a unique connection ID. Because UDP/IP data packets do not contain additional information for addressing, flow control or error recovery, the UDP/IP data packet is smaller and its transmission speed faster than TCP/IP data packets used in explicit connected messaging.

There are 2 types of connections used for implicit messaging:

Type	Description
Exclusive Owner	A connection to an output on the target device. Only one originator at a time may control a target's outputs.
Listen Only	An Input Only connection that is owned by another Exclusive Owner connection. It received data at the rate defined by the Exclusive Owner. This connection type behaves as an Input Only connection, except that if the Exclusive Owner connection is terminated, the Listen Only connection is also terminated.

Diagnostic Objects

Introduction

Diagnostic Objects display dynamic status information about the module. The General Diagnostic Object and I/O Diagnostic Object show real-time, read only information that is accessible in explicit messaging.

General Diagnostic Object

The General Diagnostic object stores data describing the state of the module.

Attribute class supported:

Class Attribute ID	Name	Get	Set	Data Type	Value
1	revision	x	-	UINT	1
2	max instance	x	-	UINT	1
3	number of instance	x	-	UINT	1

Instances supported:

Instances Attribute ID	Name	Get	Set	Data Type	Value
1	global status	x	-	UINT	0: no detected error 1: at least one detected error found
2	power status	x	-	UINT	0: OK 1: output power not present
3	watchdog state	x	-	UINT	0: watchdog inactive 1: watchdog active
4	displayed message	x	-	SHORT_STRING	message displayed on the module

Supported services for object (0x301):

Service Code	Name	Class	Instance
0x0E	Get_Attribute_Single	x	x
0x01	Get_Attribute_All	x	x

I/O Diagnostic Object

The I/O diagnostic object stores data describing the present condition of each of the 16 I/O points. You can reset detected event errors with this object.

Attribute class supported:

Class Attribute ID	Name	Get	Set	Data Type	Value
1	revision	x	-	UINT	1
2	max instance	x	-	UINT	16
3	number of instance	x	-	UINT	16

Instances supported:

Instances Attribute ID	Name	Get	Set	Data Type	Value
1	I/O name	x	-	SHORT_STRING	“1.A,” “2.B”...
2	I/O status	x	-	UINT	0: OK 1: detected error, such as an overload or short circuit 2: no output power
3	I/O event status	x	x	UINT	0: OK 1: detected error, such as an overload or short circuit 2: no output power

Supported services for object (0x302):

Service Code	Name	Class	Instance
0x0E	Get_Attribute_Single	x	x
0x01	Get_Attribute_All	x	x
0x32	reset status	-	x

Configuration Object

Description

The configuration object stores data describing the I/O configuration of the module. This object is updated after receiving a new I/O connection and is accessible in explicit messaging. The device name is the only configuration object that can be set, as all others are read only.

Attribute class supported:

Class Attribute ID	Name	Get (Read)	Set (Write)	Data Type	Value
1	revision	x	-	UINT	1
2	max instance	x	-	UINT	1
3	number of instance	x	-	UINT	1

NOTE: x indicates that the attribute is supported

NOTE: - indicates that the attribute is not supported

Instances supported:

Instances Attribute ID	Name	Get	Set	Data Type	Value
1	I/O Configuration	x	-	ARRAY [16] of UINT	0: input 1: output 2: in/out
2	input Type	x	-	UINT	0: PNP 1: NPN
3	input Filter	x	-	UINT	0, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0
4	reply values for watchdog	x	-	ARRAY [16] of UINT	0: off 1: on
5	watchdog timeout	x	-	UINT	default: 0
6	output apply mode	x	-	UINT	0: output reply value 1: hold output value
7	DHCP device name	x	x	SHORT_STRING	default: ETB_0001

NOTE: x indicates that the attribute is supported

NOTE: - indicates that the attribute is not supported

Supported services for object (0x300):

Service Code	Name	Class	Instance
0x0E	Get_Attribute_Single	x	x
0x01	Get_Attribute_All	x	x
0x10	Set_Attribute_Single	-	x

NOTE: x indicates that the service is supported

NOTE: - indicates that the service is not supported

Glossary

A

auto-negotiation/auto-sensing

The ability of a device (at the MAC sub-layer) to identify the speed (10 or 100 Mb/s) and the duplex or half mode of a connection and to adjust it, according to clause 28 of the IEEE 802.3u standard.

B

bit/s

Bits per second, unit of transmission speed.

BootP

(*bootstrap protocol*) A TCP/IP network protocol that offers network nodes request configuration information from a BOOTP server node.

D

default

A value automatically assigned by the computer in a software program. Usually, this value can be changed.

DHCP

(*dynamic host configuration protocol*) Communications protocol that assigns IP addresses to devices on the network, based on BootP.

E

embedded web pages

Embedded Web pages (accessed by an installed HTTP server) provide Ethernet communications modules with easy access to devices anywhere in the world from standard browsers such as Internet Explorer or Netscape Navigator.

ETB

Ethernet Terminal Block

Ethernet

A LAN cabling and signaling specification used to connect devices within a defined area, e.g., a building. Ethernet uses topology such as bus or star to connect different nodes on a network.

F

fallback state

A stable state to which an Advantys I/O module can return in the event that its communication connection is disrupted.

fallback value

The value that a device assumes during fallback. Typically, the fallback value is either configurable or the last stored value for the device.

G

gateway

A combination of hardware and software that interconnects otherwise incompatible networks or networking devices. Gateways include packet assembler/disassembler (pads) and protocol converters.

H

HMI

(*human-machine interface*) The screen of a device, the design of which makes its use intuitive to the user.

I

I/O

(*input/output*) The transfer of data to and from a computer.

I/O module

In a programmable controller system, an I/O module interfaces directly to the sensors and actuators of the machine/process. This module is the component that mounts in an I/O base and provides electrical connections between the controller and the field devices. Normal I/O module capacities are offered in a variety of signal levels and capacities.

IEC

(*International Electrotechnical Commission Carrier*) Founded in 1884 to focus on advancing the theory and practice of electrical, electronics, and computer engineering, as well as computer science. IEC 1131 is the specification that deals with industrial automation equipment.

Internet

A series of interconnected local, regional, national and international networks, linked using TCP/IP. Internet links may be government, university and research sites. It provides E-mail, remote login and file transfer services.

IP

(*Internet protocol*). That part of the TCP/IP protocol family that tracks the Internet addresses of nodes, routes outgoing messages, and recognizes incoming messages.

IP address

The 32-bit address associated with a workstation in connection with TCP/IP Internet.

L

LED

Light emitting diode. An indicator that lights up when electricity passes through it. It indicates the operation status of a communications module.

link

Physical connection between two nodes in a network. It can consist of a data communication circuit or a direct channel (cable) connection.

M

MAC address

The *media access control* address of a device, which is burned into a DNI card and is added near the beginning of the packet.

Modbus

Modbus is an application layer messaging protocol. Modbus provides client and server communications between devices connected on different types of buses or networks. Modbus TCP is the Modbus type that transmits data over Ethernet.

N

network

An interconnected system of computers that can communicate with each other and share files, data and resources.

NPN inputs

The field sensor sink or pull current from input circuitry of the module to 0 VDC.

NPN outputs

NPN outputs are sinking type outputs also referred to as True Low. When energized, the outputs pull current through the load to turn on the field device.

P

ping

(*packet Internet groper*) To test the network by trying to reach a destination with an ICMP echo request and waiting for a reply, type *ping.exe* at the command line.

PLC

(*programmable logic controller*) An industrial control computer, also known simply as a controller.

PNP inputs

The sensor sources or push current from the field sensor to the input circuit of the module, typically a 24 VDC signal.

PNP outputs

PNP outputs are source type output also referred to as True High. When energized the output pushes current through the load to turn the output device on.

port

The physical connector on a device enabling the connection to be made.

process image

Serves as a real-time data area for the data exchange process. The process image includes an input buffer that contains current data and status information from the module and an output buffer that contains the current outputs for the module.

protocol

Any standard method of communicating over a network.

S

server

A computer that provides resources to be shared on the network, such as files (file server) or terminals (terminal server).

subnet

A part of a network that shares a network address with the other parts of a network. A subnet may be physically and/or logically independent of the rest of the network. A part of an internet address called a subnet mask, which is ignored in IP routing, distinguishes the subnet.

switch

A multiport Ethernet device designed to increase network performance by allowing only essential traffic on the attached individual Ethernet segments. Packets are filtered or forwarded based upon their source and destination addresses.

T

timeout

If communication stops, the program waits the specified number of seconds before trying to communicate again.

topology

The arrangement of the nodes and connecting hardware that comprises the network. Types include ring, bus, star and tree.

Index

E

F

G

H

I

L

M

N

O

P

R

S

T

W