

FLEX 5000 EtherNet/IP Adapter

Catalog Numbers 5094-AENTR, 5094-AENTRXT, 5094-AEN2TR, 5094-AEN2TRXT, 5094-AENSFPR, 5094-AENSFPRXT, 5094-AEN2SFPR, 5094-AEN2SFPRXT



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

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

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT

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

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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This manual describes how to use FLEX 5000™ EtherNet/IP™ adapters in Logix 5000™ control systems. Use this manual in conjunction with the EtherNet/IP Network Devices User Manual, publication [ENET-UM006](#).

Make sure that you are familiar with the following:

- Use of a controller in a Logix 5000 control system
- Use of an EtherNet/IP network
- Use of various software applications from Rockwell Automation

Summary of Changes

This manual contains new and updated information as indicated in the following table.

Topic	Page
Updated screenshots related to Studio 5000 Logix Designer and FLEX 5000 EtherNet/IP adapters web pages.	Throughout manual
Added Summary of Changes.	5
Updated FLEX 5000 Adapter Features topic with information on FLEX 5000 I/O interconnect cable and support for FLEX 5000 Safety I/O modules.	11
Updated FLEX 5000 Adapter EtherNet/IP Features table with PRP support.	11
Updated Important table with information about PRP support under Set the IP Address with Rotary Switches topic.	22
Added topic Select the Network Redundancy Mode.	23
Added section Performance Impact of PRP Network Redundancy Mode.	24
Updated LINK 1 and LINK 2 descriptions in FLEX 5000 EtherNet/IP Adapter Status Indicators table.	33
Added Alarms category to Diagnostics with the Logix Designer Application topic.	41
Added Network category to Diagnostics with the Logix Designer Application topic.	44
Added Important table related to DLR diagnostics data to Ring Statistics section.	58
Added PRP Statistics section to EtherNet/IP Adapter Diagnostic Web Pages topic.	58
Added PRP Nodes section to EtherNet/IP Adapter Diagnostic Web Pages topic.	59
Added tags related to PRP to FLEX 5000 EtherNet/IP Adapter Module System Tags table.	61
Added warnings related to PRP to FLEX 5000 EtherNet/IP Adapter System Warnings table.	66
Added fault indicators related to PRP to FLEX 5000 EtherNet/IP Adapter Network Faults table.	67
Added Other Information topic to Troubleshoot the Adapter appendix.	68

Additional Resources

These documents contain more information concerning related products from Rockwell Automation.

Table 1 - Additional Resources

Resource	Description
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Provides configuration information for standard EtherNet/IP features
EtherNet/IP Parallel Redundancy Protocol Application Technique, publication ENET-AT006	Provides information on Parallel Redundancy Protocol (PRP) features and how to configure a PRP network.
FLEX 5000 Modules Specifications Technical Data, publication 5094-TD001	Provides FLEX 5000 modules and EtherNet/IP adapters specifications.
FLEX 5000 EtherNet/IP Adapters with RJ45 Ports Installation Instructions, publication 5094-IN001	Describes how to install a FLEX 5000 EtherNet/IP adapter with RJ45 ports.
FLEX 5000 EtherNet/IP Adapters with SFP Support Installation Instructions, publication 5094-IN002	Describes how to install a FLEX 5000 EtherNet/IP adapter with SFP Support.
EtherNet/IP Media Planning and Installation Manual	Describes how to use the required media components and how to plan for, install, verify, troubleshoot, and certify your EtherNet/IP network. This manual is available from the Open DeviceNet Vendor Association (ODVA) at: http://www.odva.org .
Network Technology web page, http://www.rockwellautomation.com/rockwellautomation/products-technologies/network-technology/overview.page?	Provides information on reference architectures and white papers on networking.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/rockwellautomation/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

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

FLEX 5000 Module Operation in a Logix 5000 Control System

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IMPORTANT You cannot use FLEX 5000 I/O modules with all Logix 5000 controllers. For example, you can use FLEX 5000 I/O modules with CompactLogix™ 5380 and ControlLogix® 5580 controllers but not with CompactLogix 5370 and ControlLogix 5570 controllers.

You can use FLEX 5000 I/O modules with Logix 5000 controllers as remote I/O modules only.

Throughout this publication, the term **Logix 5000 controller** refers to the controllers with which you can use FLEX 5000 I/O modules in a given capacity. The term does not refer to all Logix 5000 controllers. For the most current information on the Logix 5000 controllers with which you can use FLEX 5000 I/O modules, see the product description at <https://www.ab.com>.

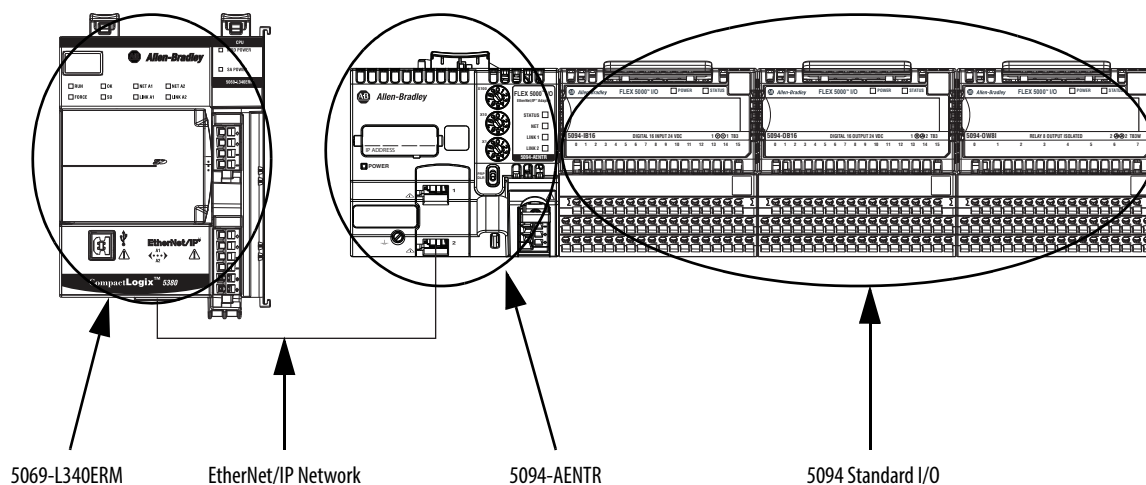
Logix 5000 controllers use FLEX 5000 standard and safety I/O modules to control devices in a control system. The controllers access the modules over an EtherNet/IP™ network. FLEX 5000 I/O modules use terminal base (TB) assemblies to connect field-side wiring.

FLEX 5000 I/O modules use the Producer/Consumer network communication model. This communication is an intelligent data exchange between modules and other system devices in which each module produces data without first being polled.

You use FLEX 5000 I/O modules as remote I/O modules that are accessible via an EtherNet/IP network. The modules are installed to the right of a FLEX 5000 EtherNet/IP adapter.

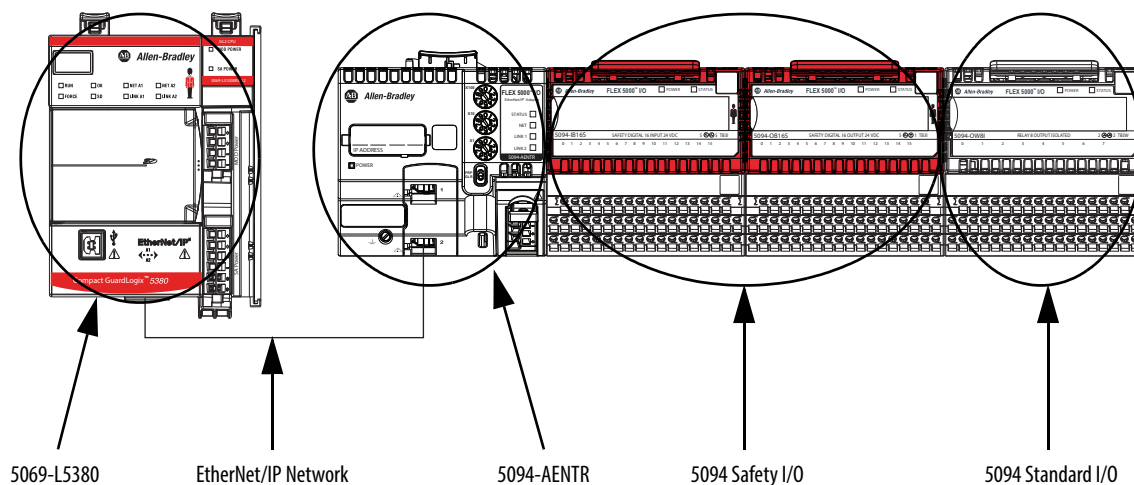
Logix 5000 controllers can exchange data with the modules over the network. [Figure 1](#) shows a standard controller with a FLEX 5000 adapter and standard I/O modules. Standard controllers do not support safety I/O modules.

Figure 1 - FLEX 5000 Standard I/O Modules in a Logix 5000 Control System



[Figure 2](#) shows a safety controller with a FLEX 5000 adapter, and both standard and safety I/O modules. Safety controllers support both standard and safety I/O modules.

Figure 2 - FLEX 5000 Safety I/O Modules in a Logix 5000 Control System



Controller and Software Compatibility

Controller and programming software compatibility requirements apply when you use FLEX 5000 standard and safety I/O modules. A module type and how it is used affect which requirements apply.

You must also consider Logix Designer application version requirements when you design your system. For example, you can use FLEX 5000 safety I/O modules with only version 32 or greater of the Logix Designer application.

Controller Compatibility

Compatibility between Logix 5000 controllers and FLEX 5000 I/O modules varies based on module type, that is, whether the module is standard or safety.

While you must pair safety I/O with a safety controller, you can also pair standard I/O with a safety controller. For example, ControlLogix 5580 controllers are compatible with FLEX 5000 standard I/O modules.

GuardLogix® 5580 controllers are compatible with FLEX 5000 standard and safety I/O modules.

Firmware and Software Compatibility

Table 2 describes the module compatibility requirements when you use FLEX 5000 I/O standard and safety modules with Logix 5000 controllers.

IMPORTANT You must use adapter firmware revision 3.011 or later with safety I/O modules and firmware revision 2.011 or later of standard I/O modules.

Modules	Controllers		Logix Designer Application Version
	System	Cat. Nos.	
Standard Modules 5094-IB16, 5094-IB16XT, 5094-OB16, 5094-OB16XT, 5094-OW8I, 5094-OW8IXT, 5094-IF8, 5094-IF8XT, 5094-IY8, 5094-IY8XT, 5094-OF8, 5094-OF8XT, 5094-HSC, 5094-HSCXT	CompactLogix 5380	5069-L320ER, 5069-L340ERM	31.00.00 or later
		5069-L306ER, 5069-L306ERM, 5069-L310ER, 5069-L310ERM, 5069-L310ER-NSE, 5069-L310ERS2, 5069-L320ERM, 5069-L330ER, 5069-L330ERM, 5069-L340ER	31.00.00 or later
		5069-L350ERM, 5069-L380ERM, 5069-L3100ERM	31.00.00 or later
	Compact GuardLogix 5380	5069-L306ERMS2, 5069-L306ERS2, 5069-L310ERS2, 5069-L310ERMS2, 5069-L320ERS2, 5069-L320ERMS2, 5069-L330ERS2, 5069-L330ERMS2, 5069-L340ERS2, 5069-L340ERMS2, 5069-L350ERS2, 5069-L350ERMS2, 5069-L380ERS2, 5069-L380ERMS2, 5069-L3100ERS2, 5069-L3100ERMS2	31.00.00 or later
	ControlLogix 5580	1756-L83E, 1756-L85E	31.00.00 or later
		1756-L81E, 1756-L82E, 1756-L84E	31.00.00 or later
Safety Modules 5094-IB16S, 5094-IB16SXT, 5094-OB16S, 5094-OB16SXT	GuardLogix 5580	1756-L81ES, 1756-L82ES, 1756-L83ES, 1756-L84ES	31.00.00 or later
	Compact GuardLogix 5380	5069-L306ERMS2, 5069-L306ERS2, 5069-L310ERS2, 5069-L310ERMS2, 5069-L320ERS2, 5069-L320ERMS2, 5069-L330ERS2, 5069-L330ERMS2, 5069-L340ERS2, 5069-L340ERMS2, 5069-L350ERS2, 5069-L350ERMS2, 5069-L380ERS2, 5069-L380ERMS2, 5069-L3100ERS2, 5069-L3100ERMS2	32.00.00 or later
		1756-L81ES, 1756-L82ES, 1756-L83ES, 1756-L84ES	32.00.00 or later

Secure Access to the System

To secure access to the [device] by authorized users only, consider these options:

- Password helps protect the source and execution of the control program
- Remove the key from the controller
- Deploy EtherNet/IP devices in accordance with recommended architectures and concepts. See the Converged Plantwide Ethernet (CPwE) Design and Implementation Guide, publication [ENET-TD001](#).
- Implement physical barriers, such as locked cabinets

To secure access to the system, consider these options:

- Follow industry best practices to harden your personal computers and servers, including anti-virus/anti-malware and application whitelisting solutions.
- The recommendations are published at the Rockwell Automation technical support center in Knowledgebase article *Rockwell Automation Customer Hardening Guidelines*, #546987. The technical support center is available at: <https://rockwellautomation.custhelp.com/>.
- Develop and deploy backup and disaster recovery policies and procedures. Test backups on a regular schedule.
- Minimize network exposure for all control system devices and systems, and confirm that they are not accessible from the Internet.
- Locate control system networks and devices behind firewalls and isolate them from the business network.
- Subscribe to the Rockwell Automation Security Advisory Index, Knowledgebase article KB54102, so you have access to information about security matters that affect Rockwell Automation products.

FLEX 5000 Adapter Features

A FLEX 5000 adapter performs the following functions:

- Facilitates high-speed data transfer between some Logix 5000™ controllers and remote I/O modules.
- Provides system-side power to FLEX 5000 I/O modules.
- Connects to multiple EtherNet/IP network topologies.
- Supports the Removal and Insertion Under Power (RIUP) of I/O modules, and live bank changes.
- Supports I/O modules, as follows:
 - 5094-AENTR, 5094-AENTRXT, 5094-AENSFPR, and 5094-AENSFPRXT adapters support as many as 8 FLEX 5000 I/O modules.
 - 5094-AEN2TR, 5094-AEN2TRXT, 5094-AEN2SFPR, and 5094-AEN2SFPRXT adapters support as many as 16 FLEX 5000 I/O modules.
 - Also supports FLEX 5000 Safety I/O modules from firmware revision 3.011 or later.
- 5094-AENSFPR, 5094-AENSFPRXT, 5094-AEN2SFPR, and 5094-AEN2SFPRXT adapters support fiber or copper small form-factor pluggable (SFP) modules via two SFP slots.

FLEX 5000 Adapter EtherNet/IP Features

The adapters support these EtherNet/IP features.

Features	5094-AENTR 5094-AENTRXT	5094-AEN2TR 5094-AEN2TRXT	5094-AENSFPR 5094-AENSFPRXT	5094-AEN2SFPR 5094-AEN2SFPRXT
10 Mbps, 100 Mbps, 1 Gbps	Y			
Media	Copper		• Copper • Fiber ⁽¹⁾	
DLR/Linear/Star network support	Y			
PRP network support	Firmware release 4.011 or later			
Ability to operate as a DLR Supervisor	Y			
Implicit Protected Mode	Y			
Explicit Protected Mode	Firmware release 2.011 or later		Y	
Web server and SNMP enable/disable feature				
Rotary switches, PRP/DLR switch monitoring				
Thermal Monitoring	Y			
Power Monitoring	Configurable			
End-cap monitoring	Y			

(1) For media support, refer to [Supported SFP modules](#).

Notes:

FLEX 5000 Adapter Power Requirements

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Power I/O Modules and Field-side Devices

The adapters provide system-side power that powers the I/O modules and lets them transfer data and execute logic.

- System-side power is provided through the Module (MOD) Power connector and is passed to each module as it is added to the system.
- System-side power is also known as MOD power.
- Field-side power is provided through the Sensor/Actuator (SA) Power connectors on each module's terminal base and is added to the system.
- Field-side power is also known as SA power.

System power begins at the EtherNet/IP adapter and passes across the I/O module internal circuitry via power buses. The MOD power bus and SA power bus are isolated from each other.

IMPORTANT We recommend the following power supplies for FLEX 5000 EtherNet/IP adapters:

- 1606-XLP72E power supply for 5094-AENTR, 5094-AENTRXT, 5094-AENSFPR, and 5094-AENSFPRXT adapters
- 1606-XLE80E power supply for 5094-AEN2TR, 5094-AEN2TRXT, 5094-AEN2SFPR, and 5094-AEN2SFPRXT adapters

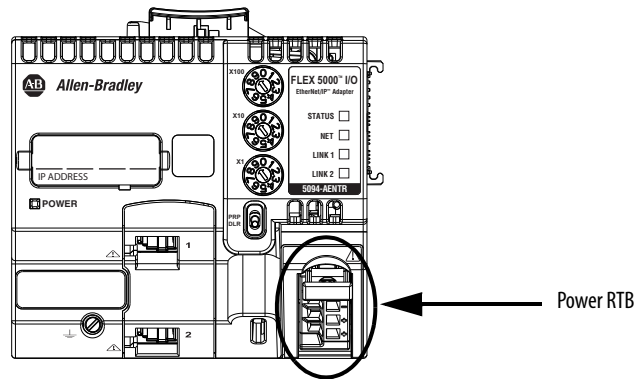
For more information, refer to Switched Mode Power Supplies Technical Data, publication [1606-TD002](#).

Power Connectors

You connect external power supplies to removable terminal blocks (RTBs) to provide MOD power and SA power. The adapters use different RTBs to connect power.

FLEX 5000 EtherNet/IP adapters use one 4-terminal Power RTB.

Figure 3 - FLEX 5000 EtherNet/IP Adapter Power Connection



For more information on how to connect MOD power, see the FLEX 5000 EtherNet/IP Adapters with RJ45 Ports Installation Instructions, publication [5094-IN001](#) or FLEX 5000 EtherNet/IP Adapters with SFP Support, publication [5094-IN002](#).

MOD Power Bus

MOD power is a DC power source that is required to operate the adapter and the I/O modules installed with it. Remember the following:

- The adapter and the I/O modules that are installed with it use only one MOD power bus.
- Every module draws current from the MOD power bus and passes the remaining current to the next module.
- You must limit the MOD power source to 10 A, max, at 18...32V DC.
- We recommend that you use an external power supply that is adequately sized for the total MOD power bus current drawn by the adapter and I/O modules.

For example, if the total MOD power current draw is 5 A, you can use a MOD power supply that is limited to 5 A.

You must consider **current inrush requirements** when you calculate the total MOD power bus current draw in the system.

When the MOD power source is turned on, that is, I/O modules receive system-side power, the following occurs.

1. The adapter draws current from the MOD power bus current and passes the remaining current through to the next module.
2. The next module draws MOD power bus current and passes the remaining current through to the next module.
3. The process continues until MOD power bus current needs are met for all modules.

For more information on the current that the modules draw from the MOD power bus, see the FLEX 5000 I/O Modules Specifications Technical Data, publication [5094-TD001](#).

Notes:

FLEX 5000 Adapters with SFP Support

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SFP Module Support

The 5094-AENSFPR, 5094-AENSFPRXT, 5094-AEN2SFPR, and 5094-AEN2SFPRXT adapters support Ethernet network transceiver modules in Small Form-factor Pluggable (SFP) format.

Table 2 - Supported SFP modules

Catalog Number	Maximum Network Speed	Standard
1783-SFP100FX	100 Mbps	100BASE-FX
1783-SFP100EXC	100 Mbps	100BASE-EX
1783-SFP1GSX	1 Gbps	1000BASE-SX
1783-SFP1GLX	1 Gbps	1000BASE-LX/LH
1783-SFP100LX	100 Mbps	100BASE-LX
1783-SFP1GEXE	1 Gbps	1000BASE-EX
1783-SFP100ZXC	100 Mbps	100BASE-ZX
1783-SFP1GZX	1 Gbps	1000BASE-ZX
1783-SFP1GTE	10 Mbps, 100 Mbps, 1 Gbps	1000BASE-T over SGMII

You must purchase SFP modules separately. For SFP module specifications, refer to Stratix Ethernet Device Specifications Technical Data, publication [1783-TD001](#).

SFP Module Compatibility

SFP module media and standard must be compatible in order to maintain transceiver module functionality. Use official Allen-Bradley modules that can be correctly detected and initialized by the firmware.

For more information on identifying correctly initialized modules, see [SFP module status on page 18](#).



WARNING: Using a transceiver module that is not recommended may cause data loss, hardware damage, or may interfere with control process.

Install a SFP module

You can insert or remove SFP modules during run time.

To confirm that your SFP module is properly inserted, the corresponding LINK status indicator is ON if the network cable is connected between transceiver module and an operating network device.

-
- IMPORTANT**
- Fiber SFP modules have no auto-negotiation capabilities. You must use identical fiber modules at either end of a fiber cable and settings.
 - Copper RJ45 modules have auto-negotiation capabilities.
-

SFP module status

To check status of an inserted SFP module, do the following:

- On the Adapter web page go to Diagnostic → Network Settings
- Locate the SFP module type under the Ethernet port information.
- If the module is successfully detected and initialized, the catalog number or type of standard displays.

Ethernet Port 2	
Interface State	Unknown
Link Status	Inactive
Speed	
Duplex	
Autonegotiate Status	
SFP module type	1783-SFP1GZX

If the module is not recognized and not initialized the SFP module type displays as Unknown.



The screenshot shows a configuration window for 'Ethernet Port 2'. It contains several rows of status information. The 'SFP module type' row at the bottom has the value 'Unknown' circled in black.

Ethernet Port 2	
Interface State	Unknown
Link Status	Inactive
Speed	
Duplex	
Autonegotiate Status	
SFP module type	Unknown

Refer to [SFP Module Compatibility on page 68](#) for more information on selecting SFP modules to use with your FLEX 5000 adapters.

Notes:

Connect to the EtherNet/IP Network

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You must set the IP address on the adapter for the adapter to operate on an EtherNet/IP network.

The following are adapter conditions in which you set the IP address:

- Set the IP address for the **first time** after it powers up in the out-of-box state.

IMPORTANT The adapter powers up in the out-of-box state the first time you install it. However, the adapter also returns to the out-of-box state if the adapter is configured so that you must set the IP address each time that power is cycled.

- Change the IP address after it has been set.

IMPORTANT Verify that the IP address for the adapter is not a duplicate of any existing devices on the network.

Requirements

To set the IP address, have the following:

- EtherNet/IP drivers installed on the programming workstation
- MAC ID from the device QR code, which is on the label on the side of the device
- Recommended IP address for the device

Set the IP Address

When the adapter is in the out-of-the-box state, the following apply regarding IP addresses:

- The adapters ship without an IP address.
- The rotary switches on the FLEX 5000 adapter are set to 999
- The adapter is DHCP-enabled. That is, the adapter is configured to obtain an IP address via a DHCP server.

If there is no DHCP server or the DHCP server is not configured to set the IP address, you must set the IP Address manually.

- The adapter issues requests for an IP address via DHCP until an IP address is set by using one of the tools that are described in this section.
- The adapter is configured so that it must obtain the IP address over DHCP each time that power is cycled.

You can change the adapter configuration so that it is not required to obtain the IP address over DHCP each time that power is cycled.

Set the IP Address with the Rotary Switches

If the network uses 192.168.1.x, use the rotary switches on the adapter to set the last octet of network IP address. Valid numbers range from 001...254.

IMPORTANT The rotary switches only set the IP address when power is cycled.

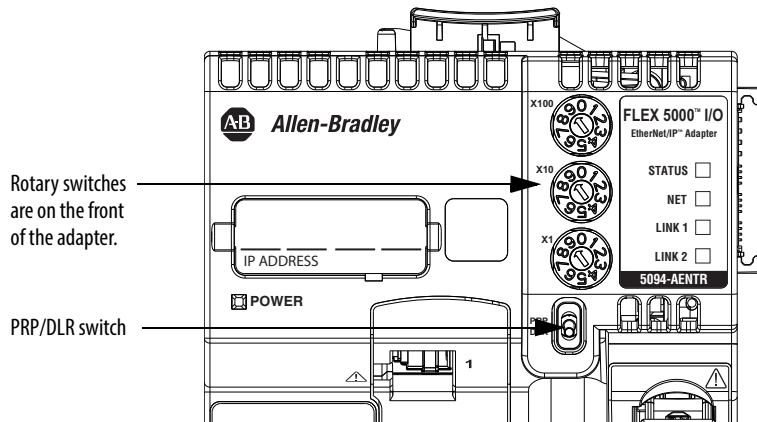


WARNING: When you change switch settings on the adapter while power is on, an electric arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

From firmware revision 2.011 onwards, if you change the rotary switches when the device is powered up, a Minor Recoverable Fault occurs on the device in order to alert you of an unexpected configuration change.

IMPORTANT: FLEX 5000 EtherNet/IP adapters do not have a reset button.

FLEX 5000 EtherNet/IP adapters - The bottom switch represents the first digit in the octet, the middle switch represents the second digit, and the top switch represents the third digit.



IMPORTANT The PRP feature is available from firmware revision 4.011 onwards. If you are using an earlier firmware revision, the adapter cannot establish connection with I/O modules when the PRP/DLR switch is in the PRP position.

Select the Network Redundancy Mode

The FLEX 5000 EtherNet/IP Adapter supports two types of network redundancy:

- DLR (Device Level Ring)
- PRP (Parallel Redundancy Protocol)

In these modes, all Ethernet ports of the adapter are used to provide redundant network paths.

IMPORTANT Make sure that both Ethernet ports are enabled and configured correctly (recommended setting: auto-negotiation is ON).

To select one of the network redundancy modes, do the following:

1. Power down the adapter.
2. Use the PRP/DLR switch to select the redundancy mode.
3. Power up the adapter.

Before you select one of the redundancy modes, verify your network settings to determine the redundancy mode used by your network.

IMPORTANT If you switch the adapter to a redundancy mode that is different from your network, the adapter disconnects from the network.

IMPORTANT You cannot switch the network redundancy mode while the adapter is running. A Minor Recoverable Fault occurs to warn about the unintentional change to the network redundancy mode.

Performance Impact of PRP Network Redundancy Mode

When you enable the PRP network redundancy mode, there is an impact on the maximum possible performance of the adapter for I/O connections.

Table 3 - Maximum Packet per Second [pps] Values for I/O Connections

Redundancy Mode	Maximum pps for I/O Connections for all Traffic, to and from Chassis
DLR	100,000
PRP	50,000

To achieve the best possible performance when using the PRP network, make sure that LAN A and LAN B are symmetric. Both networks should have the same topology and utilize the same type of devices. PRP networks work best when the path for redundant network packets is the same or very similar in both networks.

For more information about PRP and how to configure a PRP network, see the EtherNet/IP Parallel Redundancy Protocol Application Technique, publication [ENET-AT006](#).

Other Methods to Set the IP Address

The FLEX 5000 adapters support the following additional methods to change the IP address:

- BOOTP/DHCP utility
- RSLinx® Classic software
- For more information on how to use these methods, see EtherNet/IP Network Device User Manual, publication [ENET-UM006](#).

Configure the Adapter

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Use your Adapter to Substitute an Other Adapter

For convenience, FLEX 5000 EtherNet/IP adapters can act as substitutes for other FLEX 5000 EtherNet/IP adapters in Studio 5000®.

For example, if your Studio 5000 project requires a 5094-AENTR adapter; that can support eight I/O modules, but you have a 5094-AEN2TR adapter; that can support 16 I/O modules, you can select the compatible mode in the 5094-AENTR adapter add-on profile. The compatibility mode allows you to use a 5094-AEN2TR adapter instead of a 5094-AENTR adapter, without making any changes to your Studio 5000 project.

See [Table 4 on page 25](#) to identify which adapters are compatible as substitutes in your projects.

Table 4 - FLEX 5000 EtherNet/IP Adapter Configuration Compatibility

In Use (✓ means compatible)									
Configured	5094-	AENTR	AENSFPR	AEN2TR	AEN2SFPR	AENTRXT	AEN2TRXT	AENSFPRXT	AEN2SFPRXT
	AENTR	✓	✓	✓	✓	✓	✓	✓	✓
	AENSFPR	✓ ⁽¹⁾	✓	✓ ⁽¹⁾	✓	✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓
	AEN2TR			✓	✓		✓		✓
	AEN2SFPR			✓ ⁽¹⁾	✓		✓ ⁽¹⁾		✓
	AENTRXT					✓	✓	✓	✓
	AEN2TRXT						✓		✓
	AENSFPRXT					✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓
	AEN2SFPRXT						✓		✓

(1) Adapter must use cooper RJ45 Ethernet network cables.

Protected Mode

Protected Mode is a state where the device is operational, but has implemented defenses against disruptive changes that would take the product out of service for the process. For more complete information on how Protected Mode works, refer to EtherNet/IP Network Devices User Manual, publication [ENET-UM006](#).

There are two types of Protected Mode: Implicit and Explicit. These modes differ in how a device is entered in such state and what type of action is prohibited in each of these modes.

Implicit Protected Mode is a security enhancement that is automatically triggered as soon as one of the following occur:

- The adapter bridges I/O connections.
- The adapter is a target of I/O connections.

Explicit Protected Mode is a security enhancement, supported with firmware revision 2.011 onwards, that is triggered when a certain rotary switches pattern is selected.

This security enhancement occurs on the I/O module level and helps prevent unauthorized configuration changes that can affect system behavior and cause unintended and unforeseen changes.

Enter and Exit Implicit Protected Mode

The adapter enters Protected Mode as soon as I/O connections are established through or to the adapter (status connection). The adapter exits Protected Mode as soon as all I/O connections through or to the adapter (status connection) are stopped.

Enter and Exit Explicit Protected Mode

The adapter enters Protected Mode when rotary switches are set to value 900 during boot up.

To enter Explicit Protected Mode, do the following:

1. Note the current position of the rotary switches.
2. Power down the device.
3. Set the rotary switches to 900, then power up the device.

The adapter confirms entering into Explicit Protected Mode with the following status indicator flashing sequence:

- OK indicator – flashing red
- All other indicators – off.

4. Power down the device and restore previous values to the rotary switches.
5. Power up the device to normal work with Explicit Protected Mode enabled.

To exit Explicit Protected Mode, do the following:

1. Note the current position of the rotary switches.
2. Power down the device.
3. Set the rotary switches to 000, then power up the device.

The adapter confirms exiting Explicit Protected Mode with the following status indicator flashing sequence:

- OK indicator – flashing red
- All other indicators – off.

4. Power down the device and restore previous values to the rotary switches.
5. Power up the device to normal work with Explicit Protected Mode disabled.

Restrictions Imposed By Implicit Protected Mode

Protected Mode prevents access to services that are not required after the device is configured and in normal operation. Protected Mode disables features that can make the device vulnerable to disruptive actions. By doing so, Protected Mode helps to reduce the attack surface.

When it is in Protected Mode, the adapter prevents execution of the following tasks:

- Changing Ethernet configuration settings, such as port speed.
- Changing IP settings, such as IP address, mask, and DHCP mode.
- Updating the adapter firmware revision.
- Disabling or re-enabling external product ports.
- Performing remote adapter resets.

Restrictions Imposed By Explicit Protected Mode

Protected Mode prevents access to services that are not required after the device is configured and in normal operation. Protected Mode disables features that can make the device vulnerable to disruptive actions. By doing so, Protected Mode helps to reduce the attack surface.

When it is in Protected Mode, the adapter prevents execution of the following tasks:

- Changing Ethernet configuration settings, such as port speed.
- Changing IP settings, such as IP address, mask, and DHCP mode.
- Updating the adapter firmware revision.
- Disabling or re-enabling external product ports.
- Performing remote adapter resets.
- Disabling or enabling WWW server.
- Disabling or enabling SNMP server.

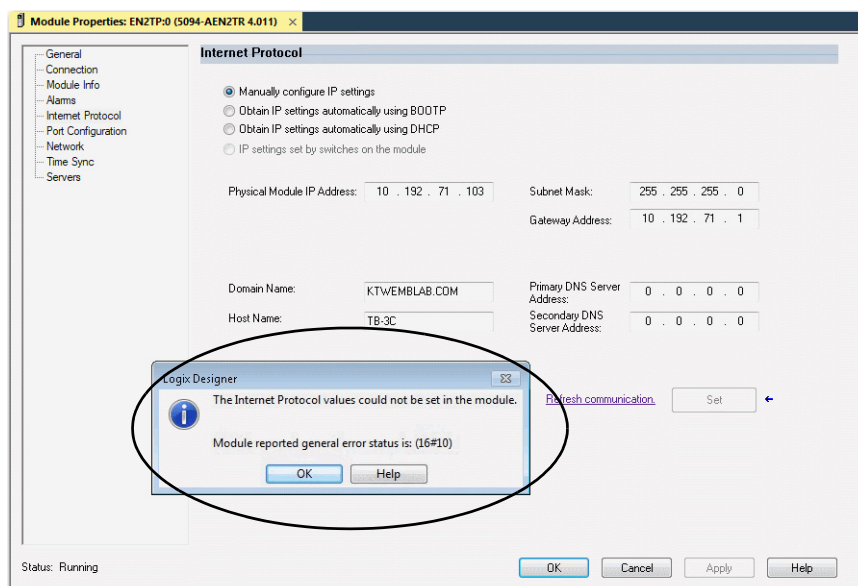
Perform Tasks When Restricted

If the adapter is in Protected Mode and you attempt to perform any of the restricted tasks, you are alerted that such a task cannot be performed because the adapter is in Protected Mode.

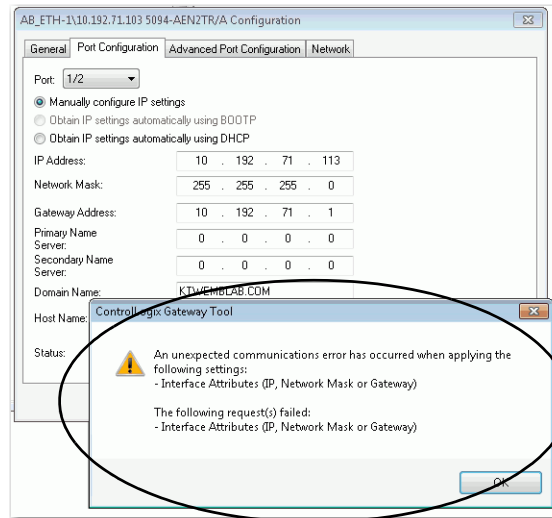
The following are example alerts that result from an attempt to set IP values on the adapter when the adapter is in Protected Mode:

IMPORTANT Protected Mode is not configurable.

- Studio 5000 Logix Designer® application



- RSLinx software



If the adapter is not in Protected Mode, the adapter does not reject attempts to perform the tasks that are described previously.

For example, after the adapter is initially powered up, but no I/O connections are established yet, the adapter is not in Explicit Protected Mode. Additionally, if the adapter is not in Explicit Protected Mode then you can attempt to update the adapter firmware revision and the adapter does not reject the attempt.

TIP If the adapter enters Protected Mode each time the adapter powers up, check application controllers to determine if there are active I/O connections that are opened via the adapter.

Enable or Disable HTTP Server and SNMP Server

You can enable or disable the HTTP server and SNMP server as an added security feature from firmware revision 2.011 or later. The HTTP server and SNMP server are disabled by default from firmware revision 3.011 or later. Disabling these servers in conjunction with using the Explicit Protected Mode decreases the possibility of a security breach.

Enable the HTTP Server in Studio 5000 Software

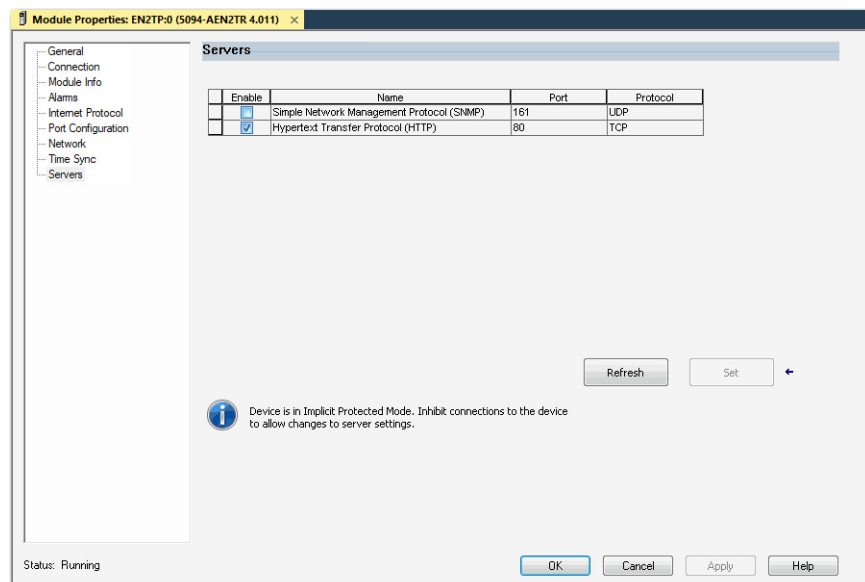
To change the settings in the Add-on Profile Server pages, make sure that the adapter is not in Explicit Protected Mode. To exit Explicit Protected Mode, refer to [Enter and Exit Explicit Protected Mode on page 26](#).

IMPORTANT From firmware revision 3.011 or later, the HTTP server is disabled by default in out of box state and after performing Factory Reset.

1. In Studio 5000, select the adapter device from the Controller Organizer pane.
2. Right-click on the adapter and select Properties from the menu.
3. On the Module Properties page, click on Servers in the tree view.
4. Select the Enable check box next to the Hypertext Transfer Protocol (HTTP) server.
5. Click the Apply button to accept the changes. You do not need to cycle power to the adapter.
6. Enter Explicit Protected Mode.



ATTENTION: In order to decrease the possibility of a security breach, use Explicit Protected Mode and do not enable the HTTP server.



Enable the SNMP Server in Studio 5000 Software

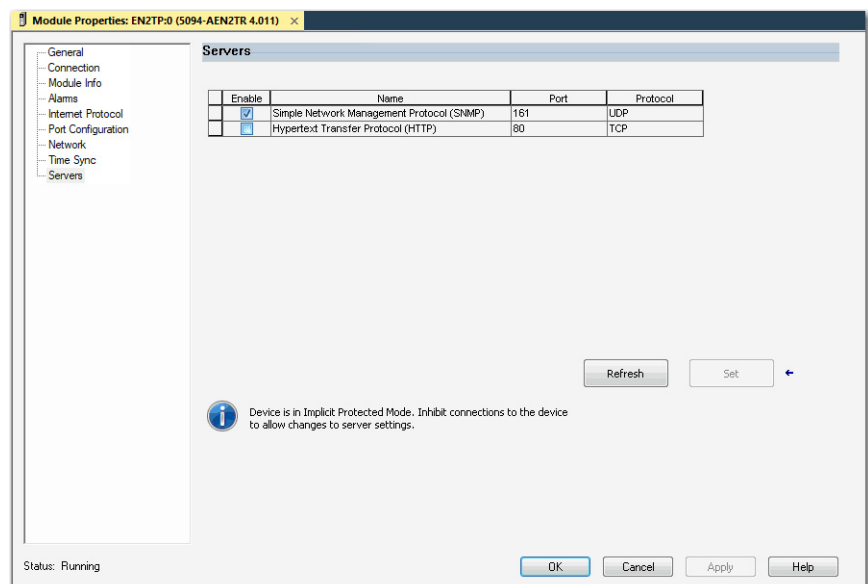
To change the settings in the Add-on Profile Server pages, make sure that the adapter is not in Explicit Protected Mode. To exit Explicit Protected Mode, refer to [Enter and Exit Explicit Protected Mode on page 26](#).

IMPORTANT From firmware revision 3.011 or later, the SNMP server is disabled by default in out of box state and after performing Factory Reset.

1. In Studio 5000, select the adapter device from the Controller Organizer pane.
2. Right-click on the adapter and select Properties from the menu.
3. On the Module Properties page, click on Servers in the tree view.
4. Select the Enable check box next to the Simple Network Management Protocol (SNMP) server.
5. Click the Apply button to accept the changes. You do not need to cycle power to the adapter.
6. Enter Explicit Protect Mode.



ATTENTION: In order to decrease the possibility of a security breach, use Explicit Protected Mode and do not enable the SNMP server.



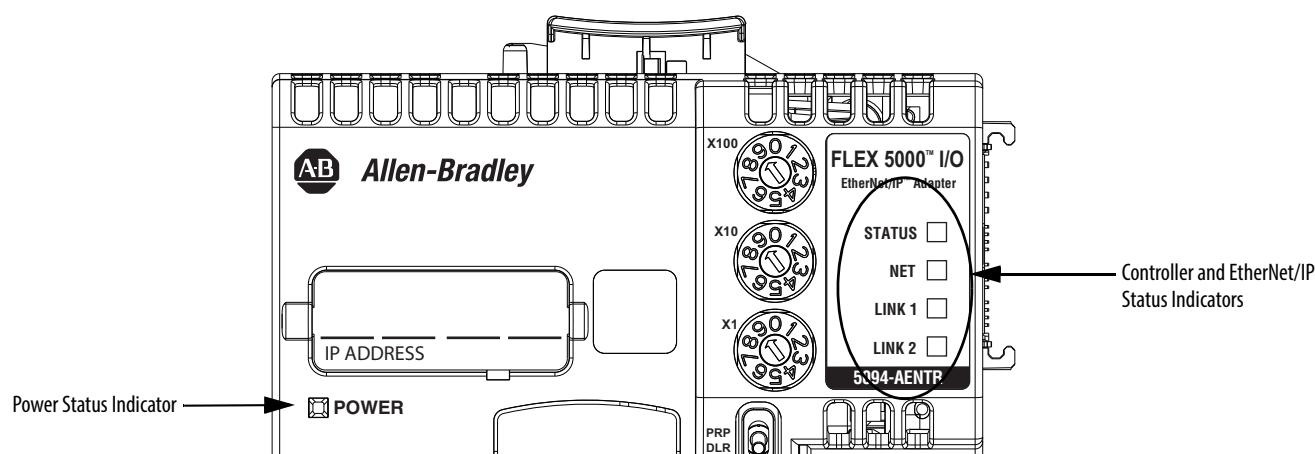
Notes:

FLEX 5000 Adapter Status Indicators

EtherNet/IP communication modules have multi-character displays and status indicators to assist with performance and diagnostics.

FLEX 5000 EtherNet/IP Adapter Status Indicators

Figure 5 - FLEX 5000 EtherNet/IP Adapter Status Indicators



[Table 4](#) describes the FLEX 5000 EtherNet/IP adapter status indicators.

Table 4 - FLEX 5000 EtherNet/IP Adapter Status Indicators

Indicator	State	Description	Recommended Action
STATUS	Off	There is no power applied to the device.	Apply power as necessary
	Flashing green	There is no IP address assigned to or being used by the device.	Set the IP address on the adapter.
	Steady green	The device is operating in a normal condition.	None
	Flashing red	One of the following: <ul style="list-style-type: none"> The device has a recoverable fault. The fault can be read from the diagnostic web pages. A firmware update is being performed on the device. The adapter has powered up and is in the Factory Default state. 	One of the following: <ul style="list-style-type: none"> Cycle power. Wait for the firmware update to finish. Use adapter as necessary.
	Steady red	The device has an unrecoverable fault.	Cycle power. If the fault persists, replace the device.

Table 4 - FLEX 5000 EtherNet/IP Adapter Status Indicators

Indicator	State	Description	Recommended Action
NET	Off	The device is not configured, or does not have an IP address.	Configure the device or assign an IP address. For more information on how to configure the adapter and assign an IP address.
	Flashing green	The device has an IP address, but no active connections are established.	Establish connections as required by the project.
	Steady green	The device has an IP address and at least one established active connection.	None
	Steady red	There is a Duplicate IP Address condition or invalid configuration.	Troubleshoot the issue and remedy the cause. For example, if a Duplicate IP address condition exists, determine which devices on the network use the same IP address and change the IP addresses to unique values.
LINK 1/ LINK 2	Off	No activity. One of these conditions exists: <ul style="list-style-type: none"> The module is not powered. 	One of the following: <ul style="list-style-type: none"> If there is no power to the device, complete one of the following: <ul style="list-style-type: none"> Turn on power. Verify that the module RTB is properly seated in the adapter. IMPORTANT: Before you touch the module RTB, verify that power is not applied to the adapter. Once the module RTB is properly seated, turn on power.
		<ul style="list-style-type: none"> The RJ45 cables are properly seated in the adapter and connected devices. SFP module is not properly inserted to port slot of adapters with SFP support. 	<ul style="list-style-type: none"> Verify that the cable or SFP modules are properly seated in the adapter and connected devices.
		<ul style="list-style-type: none"> No link exists on the port. 	<ul style="list-style-type: none"> If there is power to the device but no link exists, troubleshoot the issue and remedy the cause.
		<ul style="list-style-type: none"> The port is administratively disabled. 	<ul style="list-style-type: none"> If the port is administratively disabled, confirm that is the desired state. If not, use RSLinx Classic software or the Logix Designer application to enable the port.
		<ul style="list-style-type: none"> The port is disabled due to rapid ring faults. 	<ul style="list-style-type: none"> If the port is disabled due to rapid ring faults, troubleshoot the cause of the fault and remedy it.
		<ul style="list-style-type: none"> The port configuration is configured in a manner that can result in issues. For example, the port can be configured to Autonegotiate and the port at the other end of the cable is configured such that Autonegotiate is disable. 	Check configuration for the links at both ends of the cable and verify that they are correct to perform normal operation.
	Flashing green	Activity exists on the port.	None
	Steady green	Adapter is the supervisor of a Device Level Ring network.	None

FLEX 5000 Adapter Diagnostics

Topic	Page
Diagnostics with the Logix Designer Application	35
Diagnostics with RSLinx Classic Software	49
EtherNet/IP Adapter Diagnostic Web Pages	53
Reset the FLEX 5000 Adapter	60

This chapter describes how to diagnose and troubleshoot issues with the FLEX 5000 adapter.

Diagnostics with the Logix Designer Application

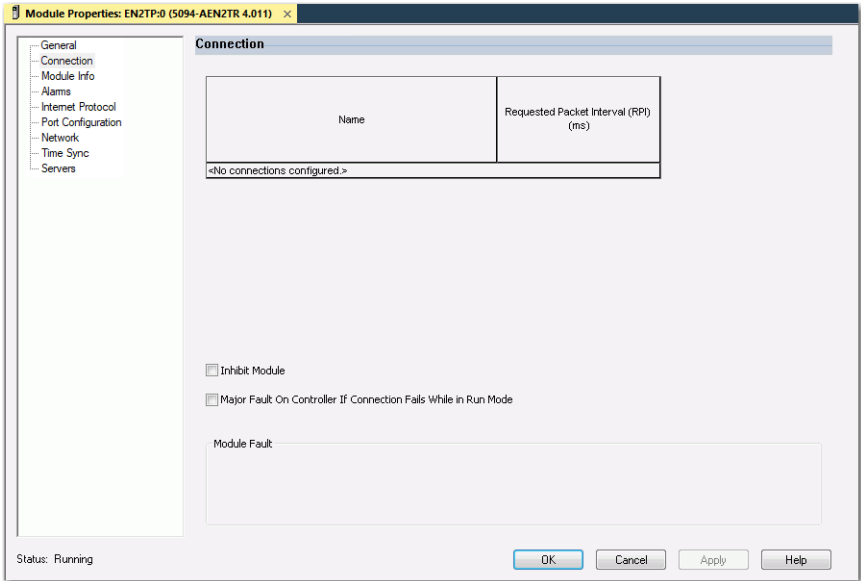
You can use the Module Properties in the Logix Designer application to diagnose issues with the adapter.

When your project is online, these categories display information about the state and status of the adapter:

- [Connection Category](#)
- [Module Info Category](#)
- [Alarms Category](#)
- [Port Configuration Category](#)
- [Network Category](#)
- [Time Sync Category](#)

Connection Category

The Connection category displays information about the condition of the connection between the controller and the module. The data on this tab comes directly from the controller.



Module Fault

Module Fault displays the fault code that is returned from the controller, and text on the Module Fault that occurred. In the Logix Designer online help, type the fault code into the Search field to find information on the fault code.

The following are common categories for errors.

Connection Request Error	The controller is attempting to make a connection to the module and has received an error. The connection was not made.
Service Request Error	The controller is attempting to request a service from the module and has received an error. The service was not performed successfully.
Module Configuration Invalid	The configuration in the module is invalid.
Electronic Keying Mismatch	Electronic Keying is enabled and some part of the keying information differs between the software and the module.

Status

The Status line at the bottom of the Module Properties dialog box displays the status that the controller has about the module.

Status	Meaning
Standby	A transient state that occurs when shutting down.
Faulted	The controller is unable to communicate with the module. When the status is Faulted, the Connection tab displays the fault.
Validating	A transient state that occurs before connecting to the module.
Connecting	A state that occurs while connections are being established to the module.
Running	The module is communicating and everything is working as expected.
Shutting Down	The connections are closing.
Inhibited	The connection to the module is inhibited.
Waiting	The connection to this module is not made due to one of the following: <ul style="list-style-type: none"> The parent has not yet made a connection to it. The parent is inhibited. The parent is faulted.
Offline	You are not online.
Reconfiguring	The configuration information is being downloaded to the module again.
Firmware Updating	The modules firmware is being updated.
Configuring	Indicates that the Logix controller is configuring the module.

Module Info Category

Module Info displays the module identity and status information about the module. See [Table 5](#) for parameter descriptions.

Module Properties: ENZTP-0 (5094-AEN2TR 4.011)

Module Info

Identification

Vendor: Rockwell Automation/Allen-Bradley

Product Type: Communications Adapter

Product Code: 5094-AEN2TR

Revision: 4.011

Serial Number: 60A7D492

Product Name: 5094-AEN2TR/A

Status

Major Fault: None

Minor Fault: None

Internal State: Run mode

Configured: No

Owned: No

Module Identity: Match

Diagnostics...

Refresh

Reset Module

☐ Inhibit Module

☐ Major Fault: On Controller IF Connection Fails While in Run Mode

Module Fault

Status: Running

OK Cancel Apply Help

Table 5 - Module Info Parameters

Parameter	Description
Identification	<p>Displays the following:</p> <ul style="list-style-type: none"> • Vendor • Product Type • Product Code • Revision • Serial Number • Product Name <p>The name that is displayed in the Product Name field is read from the module. This name displays the series of the module.</p>
Major/Minor Fault	<p>Displays one of the following fault types:</p> <ul style="list-style-type: none"> • None • Unrecoverable • Recoverable
Internal State	<p>Displays the current operational state of the module:</p> <ul style="list-style-type: none"> • Self-test • Flash update • Communication fault • Unconnected • Flash configuration bad • Major Fault (refer to Major/Minor Fault) • Run mode • Program mode • (16#xxxx) unknown <p>If you selected the wrong module from the module selection tab, this field displays a hexadecimal value. A textual description of this state is only given when the module identity you provide is a match with the actual module.</p>
Configured/Owned	For I/O modules only. Does not apply to adapters, scanners, bridges, or other communication modules
Module Identity	<p>Match</p> <ul style="list-style-type: none"> • Agrees with what is specified on the General Tab. • For the Match condition to exist, the following must agree: <ul style="list-style-type: none"> – Vendor – Module Type (the combination of Product Type and Product Code for a particular Vendor) – Major Revision <p>Mismatch</p> <ul style="list-style-type: none"> • Does not agree with what is specified on the General Tab. <p>The Module Identity field does not consider the Electronic Keying or Minor Revision selections for the module that were specified on the General Tab.</p>

Refresh

Click this button to refresh the tab with new data from the module.

Reset Module

To reset a module to its power-up state, click Reset Module.

IMPORTANT You cannot reset the FLEX 5000 adapter when it is in Protected Mode.

Diagnostics for FLEX 5000 EtherNet/IP Adapters

Click this button to access the diagnostics for a module.

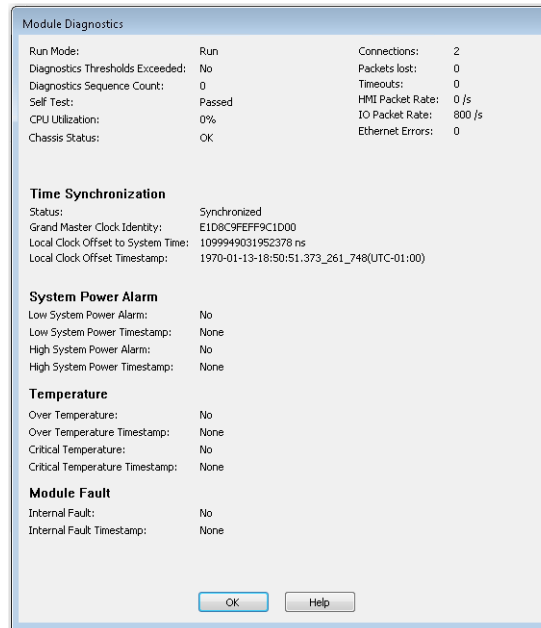


Table 6 - Module Diagnostics Parameters

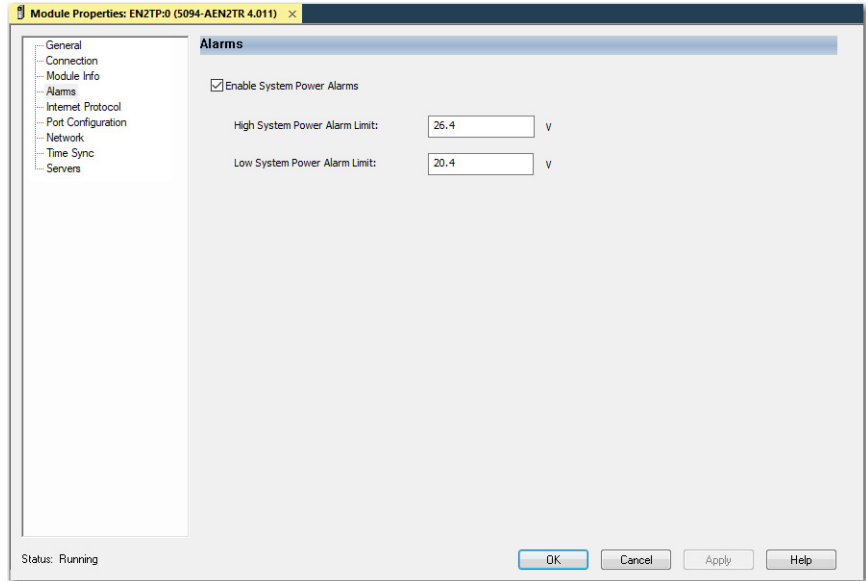
Parameter	Description
Run Mode	Shows the operating state for the module. Run Mode is blank when the module is offline, or when the connection is not established to the module.
Diagnostics Thresholds Exceeded	Shows whether any diagnostics are active or a threshold has been reached when the event occurred.
Diagnostics Sequence Count	Shows the count for each time a distinct diagnostic condition was detected, and also each time a distinct diagnostic condition transitioned from detected to not detected.
Self Test	Shows whether the product initialization code detected an error.
CPU Utilization	Shows the usage of the compute engine.
Chassis Status	Shows whether the end cap and the module bases are properly connected.
Connections	Shows the number of CIP connections currently open to and through the adapter.
Packets Lost	Shows the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.
Timeouts	Shows the running count of the number of connections that time out, both originated and targeted, to and through the adapter.
HMI Packet Rate	Shows the rate at which the HMI sent data. The number of Class 3 packets and unconnected packets sent and received by the device in the previous second.
IO Packet Rate	Shows the rate at which the I/O sent data. The number of Class 0 and Class 1 packets that were transmitted or received by the adapter in the previous second.
Ethernet Errors	Shows the sum over all ports of the following Ethernet Link object values: In Discards, In Errors, In Unknown Protos, Out Discards, Out Errors, Alignment Errors, FCS Errors, Single Collisions, Multiple Collisions, SQE Test Errors, Deferred Transmissions, Late Collisions, Excessive Collisions, MAC Transmit Errors, Carrier Sense Errors, Frame Too Long, and MAC Receive Errors.
Time Synchronization Status	Shows whether the module is currently synchronized with a 1588 master.

Table 6 - Module Diagnostics Parameters

Parameter	Description
Grand Master Clock Identity	Shows the identity of the Grand Master clock to which the module is synced.
Local Clock Offset to System Time	Shows the offset, in nanoseconds, from the local clock to the system time. Use this value to detect steps in time. This value updates when a precision time protocol (PTP) update message is received.
Local Clock Offset Timestamp	Shows the timestamp of the local clock offset in YYYY-MM-DD-HH:mm:ss.mmm format. <ul style="list-style-type: none"> • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Low System Power Alarm	Shows whether the input system power voltage has moved below the configured Low System Power Limit. If it is below the configured Low System Power Limit, it remains set until the input system power voltage moves above the configured Low System Power Alarm Limit.
Low System Power Timestamp	The time when a Low System Power condition most recently transitioned from No to Yes.
High System Power Alarm	Shows whether the input system power voltage moves above the configured High System Power Limit. If it is above the configured High System Power Limit, it remains set until the input system power voltage moves below the configured High System Power Alarm Limit.
High System Power Timestamp	The time when a High System Power condition most recently transitioned from No to Yes.
Over Temperature	Shows whether the product temperature is higher than its rated operating limits.
Over Temperature Timestamp	Shows the time when the product most recently became higher temperature than its operating limits.
Critical Temperature	Shows whether the product is above critical temperature limit for proper operation and may shutdown without further warning.
Critical Temperature Timestamp	The time when the module temperature most recently transitioned above the Critical Temperature.
Internal Fault	Shows whether one or more I/O module on the backplane was not correctly recognized and enumerated by the adapter. See FLEX 5000 EtherNet/IP Adapter Hardware Faults for more details.
Internal Fault Timestamp	The time when an Internal Fault condition most recently transitioned from false to true.

Alarms Category

The Alarms category allows you to enable or disable the power monitoring feature in the adapter. It also allows you to configure appropriate alarm thresholds.



If you enable power monitoring, the controller is allowed to use certain diagnostic tags. See [FLEX 5000 Adapter Tags on page 61](#) for more information on the LSystemPowerAlarm and HSystemPowerAlarm tags.

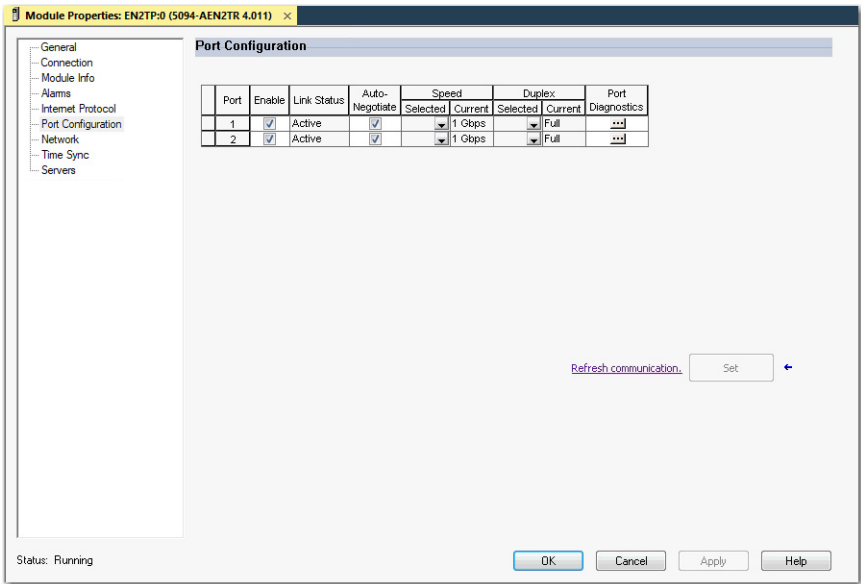
IMPORTANT Power monitoring works only when status connections to adapter are opened.

To enable power monitoring, do the following:

1. Select the Enable Systems Power Alarms checkbox.
2. Set the voltage threshold for the highest acceptable voltage level.
3. Set the voltage threshold for the lowest acceptable voltage level.
4. Click Apply or OK.

Port Configuration Category

Port Configuration displays the status information of the module ports. You can configure speed and duplex mode and disable or enable ports.



Port Diagnostics

On the Port Configuration category, click the Port Diagnostics button to view information for the port. See [Table 7 on page 43](#) for parameter descriptions.

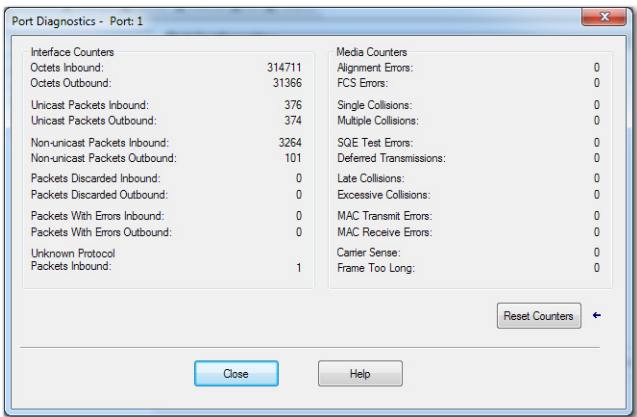


Table 7 - Port Diagnostics Parameters - Logix Designer

Parameter	Description
Interface Counters	The interface Counters values have no value when you are offline or online and there is a communication error.
Octets Inbound	Displays the number of octets that are received on the interface.
Octets Outbound	Displays the number of octets that are transmitted to the interface.
Unicast Packets Inbound	Displays the number of unicast packets that are received on the interface.
Unicast Packets Outbound	Displays the number of unicast packets that are transmitted on the interface.
Non-unicast Packets Inbound	Displays the number of non-unicast packets that are received on the interface.
Non-unicast Packets Outbound	Displays the number of non-unicast packets that are transmitted on the interface.
Packets Discarded Inbound	Displays the number of inbound packets that are received on the interface but discarded.
Packets Discarded Outbound	Displays the number of outbound packets that are transmitted on the interface but discarded.
Packets With Errors Inbound	Displays the number of inbound packets that contain errors (excludes discarded inbound packets).
Packets With Errors Outbound	Displays the number of outbound packets that contain errors (excludes discarded outbound packets).
Unknown Protocol Packets Inbound	Displays the number of inbound packets with unknown protocol.
Media Counters	The Media Counters values have no value when you are offline or online and there is a communication error.
Alignment Errors	Displays the number of frames received that are not an integral number of octets in length.
FCS Errors	Displays the number of frames received that do not pass the FCS check.
Single Collisions	Displays the number of successfully transmitted frames that experienced exactly one collision.
Multiple Collisions	Displays the number of successfully transmitted frames that experienced multiple collisions.
SQE Test Errors	Displays the number of times an SQE test error message was generated.
Deferred Transmissions	Displays the number of frames for which the first transmission attempt is delayed because the medium is busy.
Late Collisions	Displays the number of times a collision is detected later than 512 bit-times into the transmission of a packet.
Excessive Collisions	Displays the number of frames for which transmission fails due to excessive collisions.
MAC Transmit Errors	Displays the number of frames for which transmission fails due to an internal MAC sub layer transmit error.
MAC Receive Errors	Displays the number of frames for which reception on an interface fails due to an internal MAC sub layer receive error.
Carrier Sense	Displays the number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
Frame Too Long	Displays the number of frames received that exceed the maximum permitted frame size.
Reset Counters	Click Reset Counter to reset the interface and media counter values to zero. The values then update to the current counter values. Reset Counter appears dimmed in the following conditions: <ul style="list-style-type: none"> The project is offline. The project is online and a communication error occurred.

Network Category

The Network category displays statistics and diagnostics information related to the selected network redundancy mode. The information shown varies depending on the network redundancy protocol.

For more information about PRP and how to configure a PRP network, see the EtherNet/IP Parallel Redundancy Protocol Application Technique, publication [ENET-AT006](#).

Property Dialog for PRP Mode

This dialog displays the properties for the PRP network redundancy mode.

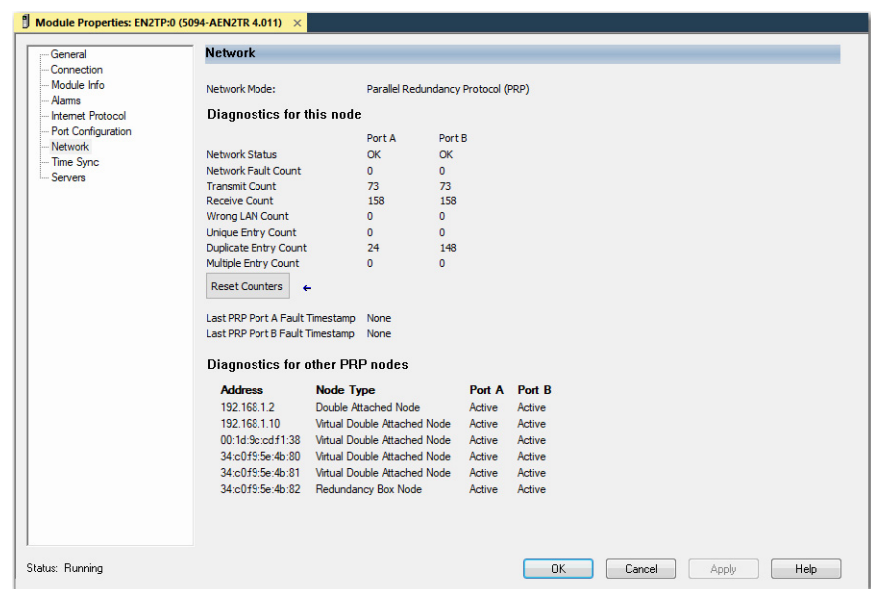


Table 8 - Network Diagnostics Parameters – PRP

Parameter	Description
Network Mode	Displays the selected network redundancy protocol.
Network Status	PRP LAN A or LAN B status
Network Fault Count	Increments each time the PRP Network Status changes to Fault.
Transmit Count	Number of PRP-tagged frames that are transmitted over each LAN since the last Reset Counters operation or powerup.
Receive Count	Number of PRP-tagged frames that are received on each LAN since the last Reset Counters operation or powerup.
Wrong LAN Count	The count of PRP packets received on one PRP port that should have been received on the other PRP port.
Unique Entry Count	The count of PRP packets only received on the current port.
Duplicate Entry Count	The count of PRP packets received on one PRP port after the same packet was received on the other PRP port.

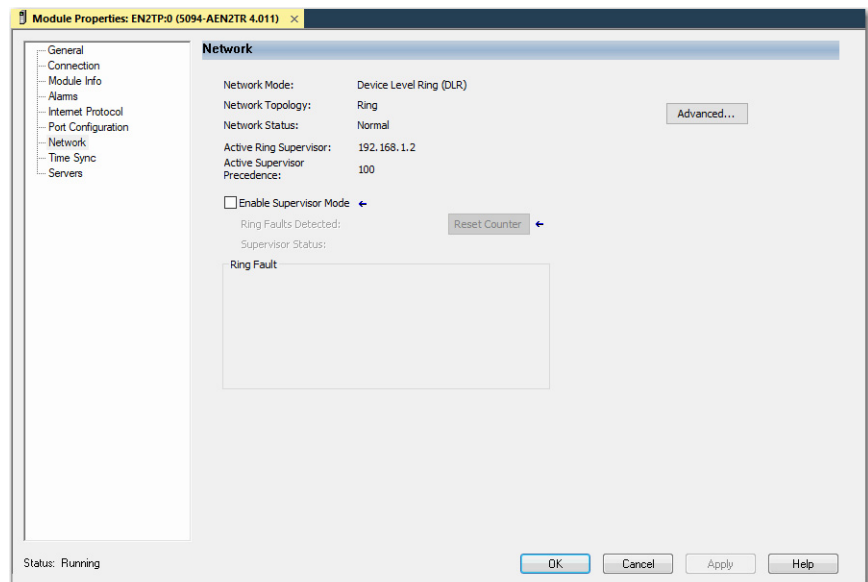
Table 8 - Network Diagnostics Parameters – PRP

Parameter	Description
Multiple Entry Count	The count of PRP packets received on one port more than once.
Last PRP Port A Fault Timestamp	Time since last PRP fault at network A was detected.
Last PRP Port B Fault Timestamp	Time since last PRP fault at network B was detected.

To reset the statistics counters, click the Reset Counter button.

Property Dialogs for DLR Mode

This dialog displays the properties for the DLR network redundancy mode using ring network topology.



This dialog displays the properties for the DLR network redundancy mode using linear/star network topology.

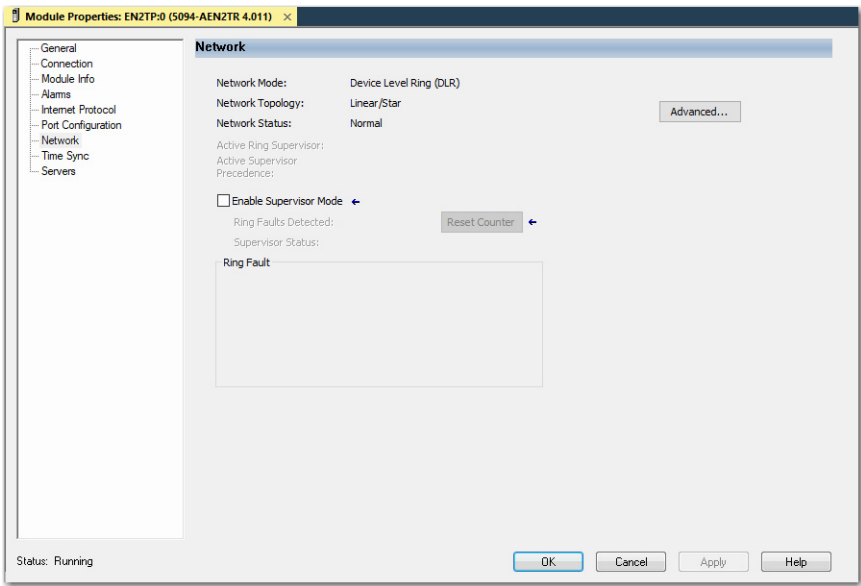


Table 9 - Network Diagnostics Parameters – DLR

Parameter	Description
Network Mode	Displays the currently selected network redundancy protocol.
Network Topology	Specifies whether the network topology is linear/star or ring.
Network Status	Specifies whether the network is operating normally or otherwise.
Active Ring Supervisor	Specifies IP address of active ring supervisor.
Active Supervisor Precedence	The precedence value of the module. If the operation of the active supervisor node is interrupted, the backup supervisor with the next highest precedence value becomes the active supervisor node.
Ring Faults Detected	Value increases each time a ring fail is detected (enabled only when local device is selected as a Ring Supervisor).
Supervisor Status	Indicates if ring supervisor is Active (enabled only when local device is selected as a Ring Supervisor).

To reset the Ring Faults Detected counter, click the Reset Counter button.

To display the Advanced Network Configuration dialog, click the Advanced button.

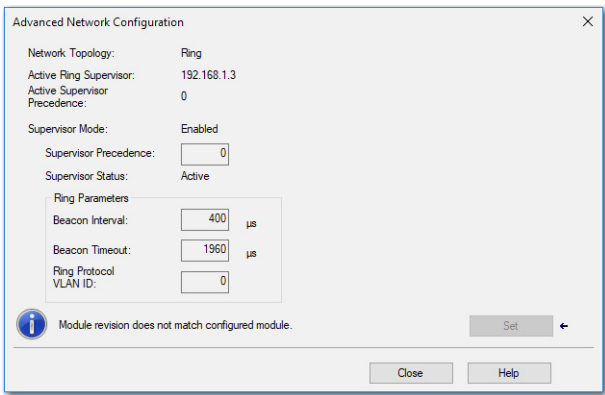


Table 10 - Advanced Network Configuration Parameters

Parameter	Description
Network Topology	Displays the Ethernet network topology, linear or ring.
Active Ring Supervisor	Displays the IP address or MAC address of the active ring supervisor.
Active Supervisor Precedence	Precedence value for current active supervisor device.
Supervisor Mode	Enabled/Disabled depends of option selected at Network DLR dialog.
	<p>You can configure a supervisor precedence number for each device configured as a ring supervisor. The highest possible supervisor precedence value is 255.</p> <p>When multiple nodes are enabled as supervisor, the node with the highest precedence value is assigned as the active ring supervisor; the other nodes automatically become back-up supervisors.</p> <p>We recommend the following:</p> <ul style="list-style-type: none"> • Configure at least one back-up supervisor node. • Set your desired Active Ring Supervisor with a relatively high supervisor-precedence value compared to the back-up node(s). • Keep track of the supervisor precedence values of your network. <p>If multiple supervisors are configured with the same precedence value (the factory default value for all supervisor-capable devices is zero), the node with the numerically highest MAC address becomes the active supervisor.</p>
Supervisor Status	Displays whether this node is the active ring supervisor (Active), a back-up supervisor (Back-up), a ring node, or part of a linear network.
Beacon Interval	Frequency the active ring supervisor uses when transmitting a beacon frame through both of its ring ports.
Beacon Timeout	Amount of time that supervisor or ring nodes wait before timing out the reception of beacon frames and taking appropriate action.
Ring Protocol VLAN ID	Reserved

IMPORTANT For Beacon Interval, Beacon Timeout, and Ring Protocol VLAN ID parameters, we recommend that you use the default values.

Time Sync Category

The Time Sync displays information that is related to CIP Sync time synchronization. The information appears only if the project is online and CIP Sync is enabled.

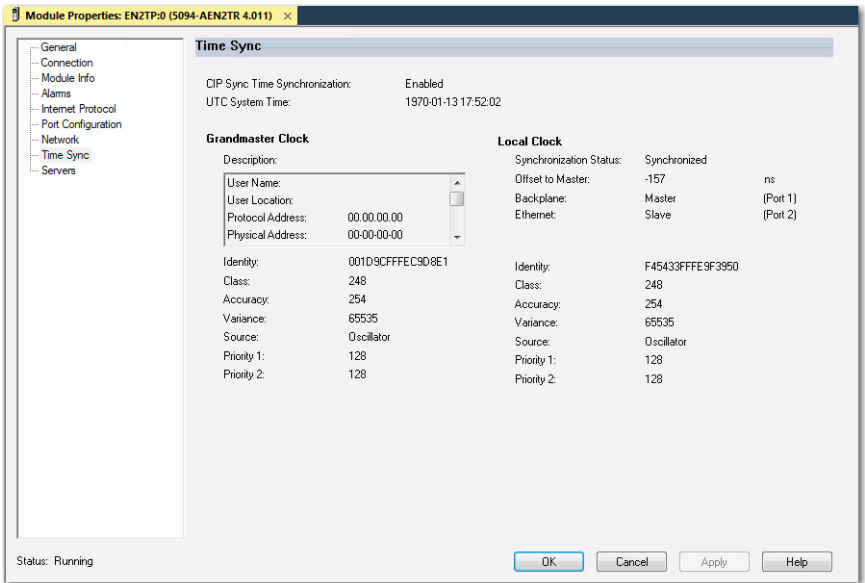


Table 11 - Time Sync Parameters

Grandmaster Clock	
Description	Displays information about the Grandmaster clock. The vendor of the Grandmaster device controls this information. The following information is specified: <ul style="list-style-type: none">User Name tUser LocationProtocol AddressPhysical AddressClock TypeManufacturer NameModelSerial NumberHardware RevisionFirmware RevisionSoftware VersionProfile IdentityPhysical ProtocolNetwork ProtocolPort Number Use the vertical scroll bar to view the data.
Identity	Displays the unique identifier for the Grandmaster clock. The format depends on the network protocol. Ethernet network encodes the MAC ID into the identifier.
Class	Displays a measure of the quality of the Grandmaster clock. Values are defined from 0...255 with zero as the best clock.
Accuracy	Indicates the expected absolute accuracy of the Grandmaster clock relative to the PTP epoch. The accuracy is specified as a graduated scale that starts at 25 nsec and ends at greater than 10 seconds or unknown. The lower the accuracy value, the better the clock.
Variance	Displays the measure of inherent stability properties of the Grandmaster clock. The value is represented in offset scaled log units. The lower the variance, the better the clock.
Source	Displays the time source of the Grandmaster clock. The available values are: <ul style="list-style-type: none">PTPOscillator

Table 11 - Time Sync Parameters

Priority 1 / Priority 2	Displays the relative priority of the Grandmaster clock to other clocks in the system. The priority values range from 0 . . . 255. The highest priority is zero. The default value for both settings is 128.
Local Clock	
Synchronization Status	Displays whether the local clock is synchronized or not synchronized with the Grandmaster reference clock. A clock is synchronized if it has one port in the slave state and is receiving updates from the time master.
Offset to Master	Displays the amount of deviation between the local clock and the Grandmaster clock in nanoseconds.
Backplane	Displays the current state of the backplane. The available values are: Initializing, Faulty, Disabled, Listening, PreMaster, Master, Passive, Uncalibration, Slave, or None.
Ethernet	Displays the state of the Ethernet port. The available values are: Initializing, Faulty, Disabled, Listening, PreMaster, Master, Passive, Uncalibration, Slave, or None.
Identity	Displays the unique identifier for the local clock. The format depends on the network protocol. Ethernet network encodes the MAC ID into the identifier.
Class	Displays a measure of quality of the local clock. Values are defined from 0 . . . 255, with zero as the best clock.
Accuracy	Indicates the expected absolute accuracy of the local clock relative to the PTP epoch. The accuracy is specified as a graduated scale that starts at 25 nsec and ends at greater than 10 seconds or unknown. The lower the accuracy value, the better the clock.
Variance	Displays the measure of inherent stability properties of the local clock. The value is represented in offset scaled log units. The lower the variance, the better the clock.
Source	Displays the time source of the local clock. The available values are: <ul style="list-style-type: none"> • PTP • Oscillator
Priority 1 / Priority 2	Displays the relative priority of the Local clock to other clocks in the system. The priority values range from 0 . . . 255. The highest priority is zero. The default value for both settings is 128.

Diagnostics with RSLinx Classic Software

You can also view diagnostic information in RSLinx® Classic software. Diagnostic information is available on the following tabs:

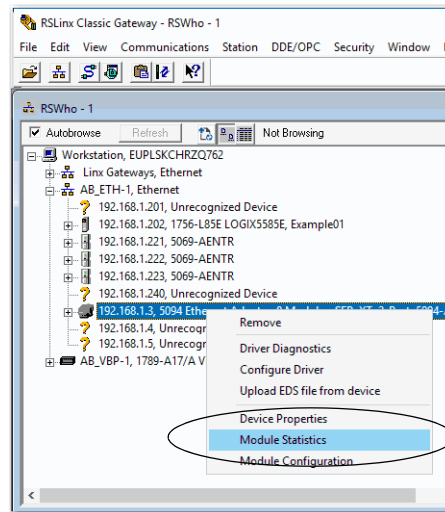
- [General Tab](#)
- [Port Diagnostics Tab](#)
- [Connection Manager Tab](#)

1. From the Communications menu, click RSWho.

The RSWho dialog box appears.

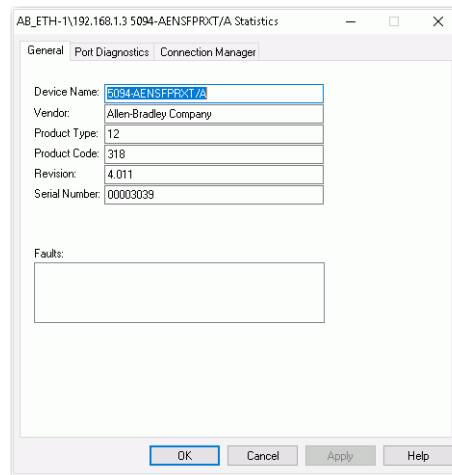
2. Navigate to the Ethernet network.

3. Right-click the EtherNet/IP module and click Module Statistics.



General Tab

The General tab shows device information and any faults on the adapter.



Port Diagnostics Tab

The Port Diagnostics tab shows information for the port. See [Table 12 on page 51](#) for parameter descriptions.

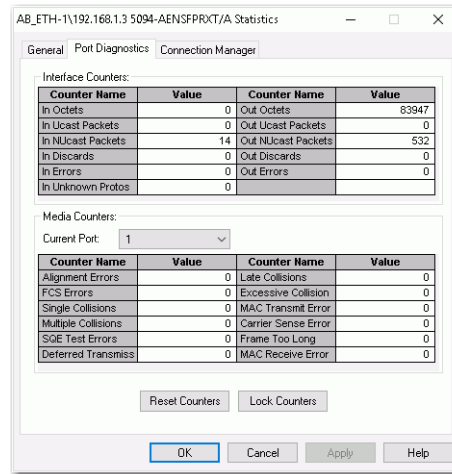


Table 12 - Port Diagnostics Parameters - RSLinx Classic

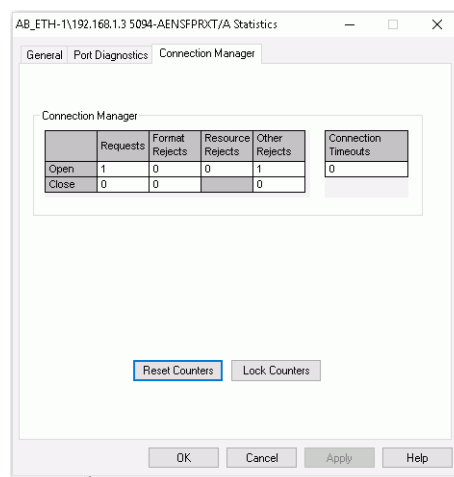
Parameter	Description
Interface Counters	Provides information relevant to receipt of packets on the interface
In Octets	Octets received on the interface.
Out Octets	Octets sent out from the interface.
In Ucast Packets	Unicast packets that are received on the interface.
Out Ucast Packets	Unicast packet sent out from the interface.
In NUcast Packets	Non-unicast packets that are received on the interface.
Out NUcast Packets	Non-unicast packets sent out from the interface.
In Discards	Inbound packets that were received on the interface but discarded.
Out Discards	Outbound packets that were sent out from the interface but were discarded.
In Errors	Inbound packets that contain errors (excludes In Discards).
Out Errors	Outbound packets that contain errors.
In Unknown Protos	Inbound packets with unknown protocol.
Media Counters	Provides information specific to Ethernet media you are using
Alignment Errors	Frames received that are not an integral number of octets in length.
FCS Errors	Frames received that do not pass the FCS (Frame Check Sequence) check.
Single Collisions	Successfully transmitted frames that experienced exactly one collision.
Multiple Collisions	Successfully transmitted frames that experienced multiple collisions.
SQE Test Errors	Number of times an SQE test error message was generated.
Deferred Transmissions	Frames for which the first transmission attempt is delayed because the medium is busy.
Late Collisions	Number of times a collision is detected later than 512 bit-times into the transmission of a packet.
Excessive Collisions	Frames for which transmission fails due to excessive collisions.
MAC Transmit Errors	Frames for which transmission fails due to an internal MAC sub layer transmit error.

Table 12 - Port Diagnostics Parameters - RSLinx Classic

Parameter	Description
Carrier Sense Error	Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
Frame Too Long	Frames received that exceed the maximum permitted frame size.
MAC Receive Errors	Frames for which reception on an interface fails due to an internal MAC sub layer receive error.
Reset Counters	Click Reset Counter to reset the interface and media counter values to zero. The values then update to the current counter values. Reset Counter appears dimmed in the following conditions: <ul style="list-style-type: none"> The project is offline. The project is online and a communication error occurred.

Connection Manager Tab

See [Table 13](#) for a description of the Connection Manager properties.

**Table 13 - Connection Manager Properties - RSLinx Classic**

Field	Description
Requests	Number of open/close connection requests that this module has received.
Format Rejects	Number of open/close connection requests that this module has rejected because the request was not formatted correctly or because some parameter value was not within a supported range of values.
Resource Rejects	Number of open connection requests that this module has rejected because the module did not have enough resources (buffers, link bandwidth, or CPU utilization) to honor the request.
Other Rejects	Number of forwarded open/close connection requests a module rejects.
Connection Timeouts	Number of connections that are not explicitly closed by the connection originator, but closed by this module because they were not being used.
Reset Counters	Click Reset Counter to reset the interface and connection counter values to zero. The values then update to the current counter values. Reset Counter appears dimmed in the following conditions: <ul style="list-style-type: none"> The project is offline. The project is online and a communication error occurred.
Lock Counters	Click Lock Counters to stop refreshing and updating the interface and connection counter values.

EtherNet/IP Adapter Diagnostic Web Pages

The adapters provide diagnostic web pages.

IMPORTANT Consider the following:

- The diagnostic web pages have many fields that you can use to monitor the EtherNet/IP adapter operating state. This section describes only the most common fields that are used during monitoring.

To troubleshoot problems that you diagnose, see the Troubleshoot EtherNet/IP Networks Application Technique, publication [ENET-AT003](#).

- You can disable the diagnostic and SNMP web pages for the FLEX 5000 adapter if it is not in Explicit Protected Mode. However, they are currently enabled by default.

The most commonly used diagnostic web pages for the FLEX 5000 EtherNet/IP adapters are the following:

- [Diagnostic Overview](#)
- [Network Settings](#)
- [Ethernet Statistics](#)
- [Ring Statistics](#)
- [PRP Statistics](#)
- [PRP Nodes](#)

IMPORTANT The FLEX 5000 adapter offers other diagnostic web pages. Those web pages are not as commonly used as the other pages described in this section.

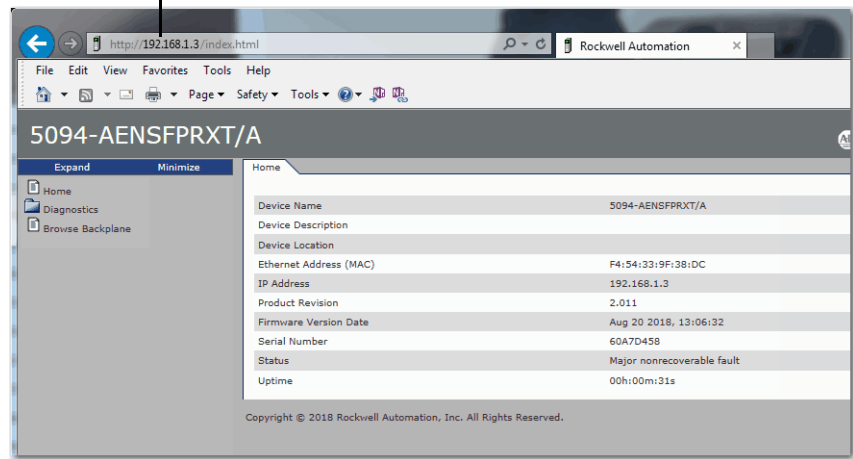
Access Web Browser Support

To access the diagnostic web pages, follow these steps.

1. Open your web browser.
2. In the Address field, type the IP address of the adapter and press Enter.

The Home diagnostic web page appears.

EtherNet/IP Module Internet Protocol (IP) Address



3. Open the Diagnostics folder in the left-most navigation bar, and click the link for each diagnostic web page you must monitor.

Diagnostic Overview

The Diagnostic Overview web page shows the status of the adapter.

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Expand Minimize

Diagnostic Overview Network Settings Application Connections Bridge Connections Ethernet Statistics Ring Statistics PRP Statistics PRP Nodes

Home
Diagnostics
Diagnostic Overview
Network Settings
Application Connections
Bridge Connections
Ethernet Statistics
Ring Statistics
PRP Statistics
PRP Nodes
Advanced Diagnostics
Browse Backplane

Module Resource Utilization (All Ports)		HMI/MSG Connected (Ethernet/IP Port)	
I/O Comms Utilization (Actual)	0.0 %	Sent Packets Per Second	0
I/O Comms Utilization (Theoretical)	0.0 %	Received Packets Per Second	0
		Sent Bytes Per Second	0
		Received Bytes Per Second	0
		Sent Packet Count	0
		Received Packet Count	0
CIP Connection Statistics (All Ports)		I/O Packets Per Second (Ethernet/IP Port)	
Active Total	0	Total	0
Active Messaging	0	Sent	0
Active I/O	0	Received	0
Maximum Total Observed	0		
Maximum Total Supported	84	I/O Packet Counts (Ethernet/IP Port)	
		Total	0
		Sent	0
		Received	0
		Rejected	0
		Missed	0
TCP Connections (Ethernet/IP Port)		Multicast Producers (Ethernet/IP Port)	
Active	0	Active	0
Maximum Observed	0	Maximum Observed	0
Maximum Supported	32	Maximum Supported	32
		Base Address	239.192.1.64
HMI/MSG Unconnected (Ethernet/IP Port)			
Sent Packets Per Second	0		
Received Packets Per Second	0		
Sent Packet Count	0		
Received Packet Count	0		

Seconds Between Refresh: Disable Refresh with 0.

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Network Settings

The Network Settings diagnostic web page shows the settings for the Network Interface configuration, Ethernet Interface Configuration, and the Ethernet ports.

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Expand Minimize

Diagnostic Overview Network Settings Application Connections Bridge Connections Ethernet Statistics Ring Statistics PRP Statistics PRP Nodes

Home
Diagnostics
Diagnostic Overview
Network Settings
Application Connections
Bridge Connections
Ethernet Statistics
Ring Statistics
PRP Statistics
PRP Nodes
Advanced Diagnostics
Browse Backplane

Network Interface		Ethernet Port 1	
Ethernet Address (MAC)	F4:54:33:9F:38:DC	Interface State	Enabled
IP Address	192.168.1.3	Link Status	Active
Subnet Mask	255.255.255.0	Speed	1000 Mbps
Default Gateway	192.168.1.1	Duplex	Full Duplex
Primary Name Server		Autonegotiate Status	Autonegotiate Speed and Duplex
Secondary Name Server		SFP module type	1783-SFP1GTE
Default Domain Name			
Host Name		Ethernet Port 2	
Name Resolution	DNS Disabled	Interface State	Unknown
SMTP Server		Link Status	Inactive
		Speed	
		Duplex	
		Autonegotiate Status	
		SFP module type	
Ethernet Interface Configuration			
Obtain Network Configuration	Static		
Switches	003		

Seconds Between Refresh: Disable Refresh with 0.

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Ethernet Statistics

The Ethernet Statistics diagnostic web page shows the status of communication activity on the Ethernet network. The most commonly monitored fields are described in [Table 14](#).

Ethernet Port 1		Ethernet Port 2	
Interface State	Enabled	Interface State	Unknown
Link Status	Active	Link Status	Inactive
Speed	1000 Mbps	Speed	
Duplex	Full Duplex	Duplex	
Autonegotiate Status	Autonegotiate Speed and Duplex	Autonegotiate Status	
SFP module type	1783-SFP1GTE	SFP module type	
Media Counters Port 1		Media Counters Port 2	
Alignment Errors	0	Alignment Errors	0
FCS Errors	0	FCS Errors	0
Single Collisions	0	Single Collisions	0
Multiple Collisions	0	Multiple Collisions	0
SQE Test Errors	0	SQE Test Errors	0
Deferred Transmissions	0	Deferred Transmissions	0
Late Collisions	0	Late Collisions	0
Excessive Collisions	0	Excessive Collisions	0
MAC Transmit Errors	0	MAC Transmit Errors	0
Carrier Sense Errors	0	Carrier Sense Errors	0
Frame Too Long	0	Frame Too Long	0
MAC Receive Errors	0	MAC Receive Errors	0
Interface Counters			
In Octets	0		
In Ucast Packets	0		
In NUcast Packets	11		
In Discards	0		
In Packet Drops	0		
In Errors	0		
In Unknown Protos	0		
Out Octets	78943		
Out Ucast Packets	0		
Out NUcast Packets	11		
Out Discards	0		
Out Errors	0		

Table 14 - Ethernet Statistic Fields

Field	Specifies
Ethernet Port 1 and Ethernet Port 2	
Interface State	Whether the port is turned off or on. Active or inactive indicates whether there is a cable that is connected.
Link Status	Whether the port is blocked for DLR protocol frames.
Speed	Whether the Ethernet port is operating at 10 Mbps, 100 Mbps, or 1 Gbps.
Duplex	If the Ethernet port is operating at full-duplex mode.
Autonegotiate Status	Whether the port speed and Duplex mode were determined via autonegotiation or whether they were manually configured.
SFP module type	Whether the SFP module is recognized and initialized. If it is recognized, the SFP module catalog number or type of standard displays.

Table 14 - Ethernet Statistic Fields

Field	Specifies
Media Counters Port 1 and Port 2	
Alignment Errors	A frame containing bits that do not total an integral multiple of eight.
FCS Errors	A frame containing eight bits, at least one of which has been corrupted.
Single Collisions	The number of outgoing packets that encountered only one collision during transmission.
Multiple Collisions	The number of outgoing packets that encountered 2...15 collisions during transmission.
SQE Test Errors	A test to detect the collision-present circuit between a transceiver and a network interface card (NIC). IMPORTANT: Because most NICs now have an integrated transceiver, the SQE test is unnecessary. Ignore this media counter.
Deferred Transmissions	The number of outgoing packets whose transmission is deferred because the network is busy when the first attempt is made to send them.
Late Collisions	The number of times two devices transmit data simultaneously.
Excessive Collisions	The number of frames that experience 16 consecutive collisions.
MAC Transmit Errors	Frames for which transmission fails due to an internal MAC sublayer transmit error.
Carrier Sense Errors	Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
Frame Too Long	The number of incoming packets that exceed the maximum Ethernet packet size.
MAC Receive Errors	Frames for which reception on the Ethernet interface failed due to an internal MAC sublayer receive error.
Interface Counters	
In Octets	Octets received on the Ethernet interface
In Ucast Packets	Unicast packets received on the Ethernet interface
In NUcast Packets	Non-unicast packets received on the Ethernet interface
In Discards	Inbound packets received on the Ethernet interface but discarded
In Packet Drops	The number of incoming packet drops on all interfaces, including backplanes, that are caused by overloading one or more adapter CPUs with high network traffic.
In Errors	Inbound packets that contain errors (does not include In Discards)
In Unknown Protos	Inbound packets with unknown protocol
Out Octets	Octets sent on the Ethernet interface
Out Ucast Packets	Unicast packets sent on the Ethernet interface
Out NUcast Packets	Non-unicast packets sent on the Ethernet interface
Out Discards	Outbound packets discarded
Out Errors	Outbound packets that contain errors

Ring Statistics

The Ring Statistics diagnostic web page shows the status of the Device Level Ring.

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ExpandMinimize

Diagnostic OverviewNetwork SettingsApplication ConnectionsBridge ConnectionsEthernet StatisticsRing StatisticsPRP StatisticsPRP Nodes

HomeDiagnosticsDiagnostic OverviewNetwork SettingsApplication ConnectionsBridge ConnectionsEthernet StatisticsRing StatisticsPRP StatisticsPRP NodesAdvanced DiagnosticsBrowse Backplane

Network

Network TopologyLinear / Star

Network StatusNormal

Ring Supervisor

Ring Supervisor ModeDisabled

Ring Supervisor StatusNo Ring

Ring Protocol Participants Count0

Ring Faults Detected0

Ring Advanced Config

Beacon Interval400

Beacon Timeout1960

Supervisor Precedence0

Protocol VLAN ID0

Ring Fault Location

IPMAC

Last Active Node on Port 10.0.0.0 000000000000

Last Active Node on Port 20.0.0.0 000000000000

Active Ring Supervisor

Address0.0.0.0 000000000000

Precedence0

Seconds Between Refresh: 15Disable Refresh with 0.

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IMPORTANT DLR diagnostics data is available only when the adapter is in DLR mode.

PRP Statistics

The PRP Statistics web page shows the statistics for Port A and Port B of the adapter.

5094-AENSFPRXT/A

ExpandMinimize

Diagnostic OverviewNetwork SettingsApplication ConnectionsBridge ConnectionsEthernet StatisticsRing StatisticsPRP StatisticsPRP Nodes

HomeDiagnosticsDiagnostic OverviewNetwork SettingsApplication ConnectionsBridge ConnectionsEthernet StatisticsRing StatisticsPRP StatisticsPRP NodesAdvanced DiagnosticsBrowse Backplane

Network redundancy mode

PRPActive

Counters

Port APort B

Transmit Count340

Receive Count00

Wrong Port Count00

Unique Entries Count00

Duplicate Entries Count00

Multiple Entries Count00

Warning Count00

Warning ActiveFalseFalse

Seconds Between Refresh: 15Disable Refresh with 0.

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IMPORTANT PRP statistics data is available only when the adapter is in PRP mode. Under Network Redundancy Mode, the PRP setting displays “Active”.

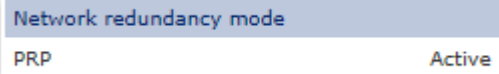
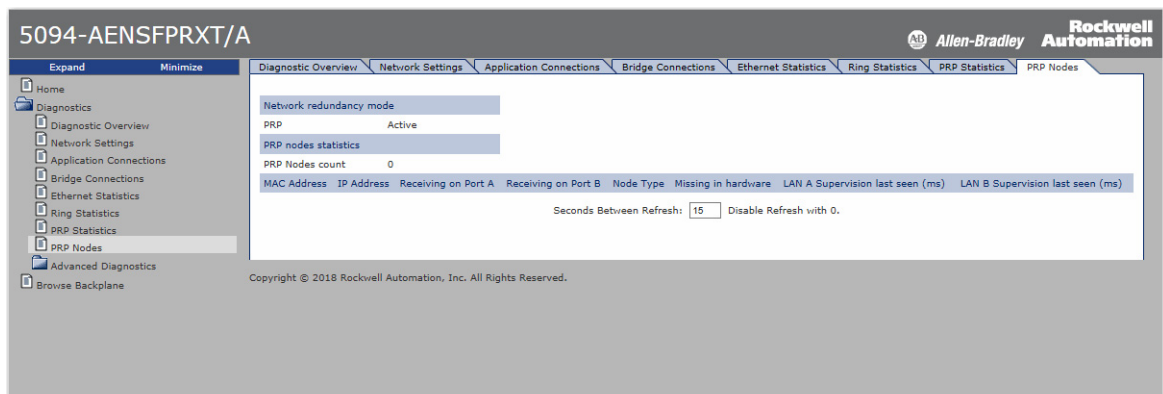


Table 15 - FLEX 5000 EtherNet/IP Adapter PRP Statistics

Parameter	Description
Network Status	Specifies whether the network is operating normally or otherwise.
Network Fault Count	Increments each time the PRP Network Status changes to Fault.
Transmit Count	Number of PRP-tagged frames that are transmitted over each LAN since the last Reset Counters operation or powerup.
Receive Count	Number of PRP-tagged frames that are received on each LAN since the last Reset Counters operation or powerup.
Wrong LAN Count	The count of PRP packets received on one PRP port that should have been received on the other PRP Port.
Unique Entry Count	The count of PRP packets only received on the current port.
Duplicate Entry Count	The count of PRP packets received on one PRP Port after the same packet was received on the other PRP port.
Multiple Entry Count	The count of PRP packets received on one port more than once.
Warning Count	A potential issue with the PRP ports exists. Count increments every time Active transitions from False to True.
Warning Active	Active is True when no PRP packets are received on this LAN in the previous 3 seconds, or if an entry in the PRP nodes table has False in the corresponding Receiving on Port A/B column (one of redundant network is disconnected). Active is True when redundant network cables are mismatched (e.g. cable network A connected to network B socket).

PRP Nodes

The PRP Nodes web page displays all active PRP nodes. Any node that the adapter module communicates with displays on the PRP Nodes page, including DANs, SANs, RedBoxes, and VDANs.



IMPORTANT PRP statistics data is available only when the adapter is in PRP mode. Under Network Redundancy Mode, the PRP setting displays “Active”.



The fields to monitor are Receiving on Port A and Port B. If either of those fields are False, it indicates a loss of PRP redundancy. Some IP addresses can display as 0.0.0.0. An IP address displayed as 0.0.0.0 is an indication that the adapter is not communicating directly with that device.

Reset the FLEX 5000 Adapter

To reset the FLEX 5000 adapter to its default settings, complete the following steps.

1. Power down the adapter.
2. Set the rotary switches to 888.
3. Power up the adapter.
4. Wait for the adapter power-up sequence to complete.
The power-up sequence is complete, and the adapter has returned to its factory default setting when the status indicator states are as follows:
 - OK indicator - Flashing red
 - All other indicators - OFF
5. Power down the adapter.
6. Set the rotary switches to the desired address.

IMPORTANT If you do not want to set the IP address via the rotary switches, set them to 999.

After the adapter powers up, set the IP address.

7. Power up the adapter.

Module Tags

Module tags are created when you add the adapter to a controller project and set the connection to Status.

FLEX 5000 Adapter Tags

The following table describes the FLEX 5000 EtherNet/IP adapter module tags:

Table 16 - FLEX 5000 EtherNet/IP Adapter Module System Tags

Tag Name	Data Type	Definition	Valid Values
RunMode	BOOL	Module's operating state	<ul style="list-style-type: none"> 0 = Idle 1 = Run
ConnectionFaulted	BOOL	Indicates if a connection to the target is running. The module always returns a zero in this member. The controller overwrites the zero with a one when the connection is not up.	<ul style="list-style-type: none"> 0 = Connection running 1 = Connection not running
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	<ul style="list-style-type: none"> 0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	<ul style="list-style-type: none"> 0 = Module is not synced 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout.	<ul style="list-style-type: none"> 0 = A valid time master has not timed out. 1 = A valid time master was detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected. Set to zero by product reset or power cycle. Wraps from 255 (-1) to 1 skipping zero.	-128...127 The value of 0 is skipped except during module power-up.
OverTemperature	BOOL	Indicates if the module is at its maximum thermal rating.	<ul style="list-style-type: none"> 0 = Module is not at its maximum thermal rating 1 = Module is at its maximum thermal rating
CriticalTemperature	BOOL	Indicates if the temperature is approaching (but below) the point of thermal runaway.	<ul style="list-style-type: none"> 0 = Temperature is not approaching the point of thermal runaway 1 = Temperature is approaching the point of thermal runaway
Port1Connected	BOOL	Indicates if the numbered Ethernet port is active.	<ul style="list-style-type: none"> 0 = Ethernet port is not active 1 = Ethernet port is active
Port2Connected	BOOL	Indicates if the numbered Ethernet port is active.	<ul style="list-style-type: none"> 0 = Ethernet port is not active 1 = Ethernet port is active

Table 16 - FLEX 5000 EtherNet/IP Adapter Module System Tags

Tag Name	Data Type	Definition	Valid Values
Port1FullDuplex	BOOL	Indicates if the numbered Ethernet port, if it is connected, is running full-duplex mode or half-duplex mode.	<ul style="list-style-type: none"> 0 = Ethernet port is running in half-duplex mode 1 = Ethernet port is running in full-duplex mode
Port2FullDuplex	BOOL	Indicates if the numbered Ethernet port, if it is connected, is running full-duplex mode or half-duplex mode.	<ul style="list-style-type: none"> 0 = Ethernet port is running in half-duplex mode 1 = Ethernet port is running in full-duplex mode
Port1AutoNegotiationStatus	SINT	Indicates the status of link auto-negotiation	<ul style="list-style-type: none"> 0 = Auto-negotiation in progress. 1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. Default values are product-dependent; recommended defaults are 10 Mbps and half-duplex. 2 = Auto negotiation failed, but detected speed. Duplex was defaulted. Default value is product-dependent; recommended default is half-duplex mode. 3 = Successfully negotiated speed and duplex mode. 4 = Auto-negotiation not attempted. Forced speed and duplex mode.
Port2AutoNegotiationStatus	SINT	Indicates the status of link auto-negotiation	<ul style="list-style-type: none"> 0 = Auto-negotiation in progress. 1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. Default values are product-dependent; recommended defaults are 10 Mbps and half-duplex. 2 = Auto negotiation failed, but detected speed. Duplex was defaulted. Default value is product-dependent; recommended default is half-duplex mode. 3 = Successfully negotiated speed and duplex mode. 4 = Auto-negotiation not attempted. Forced speed and duplex mode.
Port1Speed	INT	Indicates the actual port speed in Mbps.	10, 100, 1000
Port2Speed	INT	Indicates the actual port speed in Mbps.	10, 100, 1000
TCPConnections	INT	The number of TCP/IP connections currently open to the adapter.	All positive values
CIPConnections	INT	The number of CIP connections currently open to and through the adapter.	All positive values
CIPLostPackets	DINT	A running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections that are consumed by the adapter and its children.	All positive values
CIPTimeouts	DINT	A running count of the number of connections that time out, both originated and targeted, and connections to and through the adapter.	All positive values

Table 16 - FLEX 5000 EtherNet/IP Adapter Module System Tags

Tag Name	Data Type	Definition	Valid Values
HMIPacketRate	DINT	The number of Class 3 packets and unconnected packets that are sent and received by the device in the previous second.	All
IOPacketRate	DINT	The number of class 0 and class 1 packets transmitted or received by the adapter in the previous second.	All positive values
EthernetErrors	DINT	The sum over all ports of the Ethernet Link object values: In Discards, In Errors, In Unknown Protos, Out Discards, Out Errors, Alignment Errors, FCS Errors, Single Collisions, Multiple Collisions, SQE Test Errors, Deferred Transmissions, Late Collisions, Excessive Collisions, MAC Transmit Errors, Carrier Sense Errors, Frame Too Long, and MAC Receive Errors.	All positive values
CPUUtilization	INT	The percentage of the capacity of the product's compute engine (whether that is a CPU, or a core of a CPU, or a thread) most important to the performance of communication of packets by the product. The value equals the percentage.	0...100
DLRNetworkState	SINT	The current value of the Network Status instance attribute of the DLR object for devices with multiple Ethernet ports that support DLR.	0 - Normal 1 - Ring Fault 2 - Unexpected Loop Detected 3 - Partial Network Fault 4 - Rapid Fault/Restore Cycle
DLRSupervisorState	SINT	The current value of the Ring Supervisor Status instance attribute of the DLR object for devices with multiple Ethernet ports that support DLR.	0 - Device is functioning as a backup 1 - Device is functioning as the active ring supervisor 2 - Device is functioning as a normal ring node 3 - Device is operating in a non-DLR topology 4 - Device cannot support the current ring parameters (Beacon Interval and Beacon Timeout)
LSystemPowerAlarm	BOOL	Indicates if the input system power voltage has moved below the configured Low System Power Limit. If it is below the configured Low System Power Limit, it remains set until the input system power voltage moves above the configured Low System Power Alarm Limit.	<ul style="list-style-type: none"> 0 = Power voltage is not below configured Low System Power Limit 1 = Power voltage is below configured Low System Power Limit
HSystemPowerAlarm	BOOL	Indicates if the input system power voltage moves above the configured High System Power Limit. If it is above the configured High System Power Limit, it remains set until the input system power voltage moves below the configured High System Power Alarm Limit.	<ul style="list-style-type: none"> 0 = Power voltage is not above configured High System Power Limit 1 = Power voltage is above configured High System Power Limit
EndCapFault	BOOL	Indicates if the end cap is properly connected.	<ul style="list-style-type: none"> 0 = End cap is present on bus types that support end cap detection. 1 = End cap is not present on bus types that support end cap detection.
InternalFault	BOOL	Shows whether one or more of several internal diagnostics indicate an internal issue in the product.	<ul style="list-style-type: none"> 0 = No internal issue found in the product. 1 = One or more of several internal diagnostics indicate an internal issue in the product.
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	All
LocalClockOffsetTimestamp	LINT	The time when the Local Clock Offset was sampled. This value is initially zero, and the first time stamp occurs when the module synchronizes with the master clock.	N/A
GrandMasterClockID	SINT[8]	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	All
PRPPort1Fault	BOOL	Indicates PRP network A fault state. Fault state may be caused by missing duplicate packets (one of redundant network disconnected) or network cables mismatch.	<ul style="list-style-type: none"> 0 = No fault 1 = Fault

Table 16 - FLEX 5000 EtherNet/IP Adapter Module System Tags

Tag Name	Data Type	Definition	Valid Values
PRPPort2Fault	BOOL	Indicates PRP network B fault state. Fault state may be caused by missing duplicate packets (one of redundant network disconnected) or network cables mismatch.	<ul style="list-style-type: none"> 0 = No fault 1 = Fault
DLREnabled	BOOL	Indicates if DLR network redundancy mode is enabled.	<ul style="list-style-type: none"> 0 = DLR enabled 1 = DLR disabled
PRPEnabled	BOOL	Indicates if PRP network redundancy mode is enabled.	<ul style="list-style-type: none"> 0 = PRP enabled 1 = PRP disabled

Table 17 - FLEX 5000 EtherNet/IP Adapter Module Configuration Tags

Tag Name	Data Type	Definition	Valid Values
SystemPowerAlarmDisable	BOOL	Disables system power alarm.	<ul style="list-style-type: none"> 0 = System power alarm monitoring enabled 1 = System power alarm monitoring disabled
LSystemPowerAlarmLimit	REAL	The low system power alarm trigger point. Values are validated by the adapter firmware that triggers the LSystemPowerAlarm when the input system power moves below this limit. Units are Volts.	18.0...32.0 but \leq high system power alarm limit
HSystemPowerAlarmLimit	REAL	The high system power alarm trigger point. Values are validated by the adapter firmware that triggers the LSystemPowerAlarm when the input system power moves below this limit. Units are Volts.	18.0...32.0 but \geq low system power alarm limit

Troubleshoot the Adapter

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This chapter describes how to identify and troubleshoot issues with the FLEX 5000 adapter.

Table 18 - FLEX 5000 EtherNet/IP Adapter Hardware Faults

Indicators	Type of Issue	Cause of Issue	Corrective Action
<ul style="list-style-type: none"> Status LED is flashing red. Adapter status tag InternalFault is set to TRUE. 	Major Recoverable Fault / Internal fault	Adapter cannot perform I/O addressing with connected terminal bases and IO modules.	<ol style="list-style-type: none"> 1. Disconnect Module power from the adapter 2. Remove all I/O modules from the terminal bases. 3. Verify that the terminal bases and backplane are assembled correctly. Verify that all terminal bases are mounted completely on the DIN rail. 4. Apply Module Power. Verify that the Backplane Fault bit is clear (no error found). 5. Install the I/O modules, one at a time, starting with the terminal base next to the adapter. Wait for the I/O Module Status LED to flash green (I/O module has a slot assignment and is ready to receive a CIP connection) before inserting the next I/O module. 6. If the Backplane Fault bit is asserted (error found), replace one of the following: <ol style="list-style-type: none"> a. the I/O module that was just installed. b. the terminal base that the I/O module was just installed on. c. the terminal base adjacent and closer to the adapter (slot -1) to the terminal base that the I/O was just installed on. 7. Continue the process until all I/O modules are installed and the system is operating properly.
<ul style="list-style-type: none"> Status LED is flashing red. No communication to I/O modules but can communicate with adapter. AOP dialog for Module Info section indicates Major Fault status. 	Major Recoverable Fault / Module Count Exceeded	I/O module(s) installed outside of maximum supported chassis size – 8 or 16 depending on product code.	<ol style="list-style-type: none"> 1. Verify if any installed I/O module is outside of maximum supported chassis size (>8 slots or >16 slots). Verify if any empty terminal base is outside of maximum supported chassis size (>8 slots or >16 slots). 2. Remove any I/O modules or terminal bases that are outside the maximum supported bank size. 3. Cycle power to the adapter as for any other major recoverable fault.
<ul style="list-style-type: none"> Status LED flashing red. No communication to I/O modules but can communicate with adapter. AOP dialog for Module Info section indicates Major Fault status. 	Major Recoverable Fault / Configuration on flash is invalid	Firmware image is invalid.	<p>Use the Control Flash tool to update the device firmware.</p> <p>If this fault recurs, or if the corrupt image cannot be rewritten, the physical flash memory is corrupted and the device must be replaced with new one.</p>

Table 18 - FLEX 5000 EtherNet/IP Adapter Hardware Faults

Indicators	Type of Issue	Cause of Issue	Corrective Action
<ul style="list-style-type: none"> Status LED is solid red. No communication to module. Other LEDs are off. 	Major unrecoverable fault	Hardware malfunction.	Major device functionality is corrupted and the device can no longer be used. Replace device with a new one. Contact Rockwell Automation for instructions on replacing the device..
<ul style="list-style-type: none"> Status LED is flashing red. When device is configured, NET, LINK 1 and LINK 2 LEDs may indicate that links are UP and IP address is taken. Device can communicate with Studio 5000. AOP dialog for Module Info section indicates Minor Fault status. 	Minor recoverable fault	Several possible root causes: <ul style="list-style-type: none"> Problems with SFP module IP address switches or DLR/PRP switch changed on runtime ACD conflicts or DLR errors. 	<ul style="list-style-type: none"> Problems with SFP module: <ol style="list-style-type: none"> The SFP module plugged into a slot may be not be recognized by the firmware. Check if all SFP modules used are listed in Supported SFP modules on page 17. Check for cable condition, possible TX Fault. If using manual port configuration, for example, network speed and duplex, verify that manually selected configuration values are supported by currently inserted SFP modules. Note: if one of the SFP modules connected to one of device ports works correctly, verify port set up and SFP module status on the Ethernet section of HTTP web pages. Problem with Rotary or PRP/DLR switches: <ol style="list-style-type: none"> Check if switch position change while the module was in RUN mode. Set the required values for the PRP/DLR or IP address switch and cycle power to implement the required settings. Problems with ACD: <ol style="list-style-type: none"> Check your network for IP address conflicts. Another device on the network may already be using the IP address assigned to the faulted device. Remove duplicate IP address condition. Problems with DLR: <ol style="list-style-type: none"> Check that the DLR network cables and devices are properly connected.

Table 19 - FLEX 5000 EtherNet/IP Adapter System Warnings

Warning	Indicators	Cause of Warning	Corrective Action
End cap fault	Adapter status tag EndCapFault is set to TRUE	Adapter cannot validate End Cap status as positive.	<ol style="list-style-type: none"> Install or verify the proper installation of the end cap. If the end cap is installed and is verified as not broken, for example, the gold metal plate is in the right place, and the End Cap Absent fault occurs, the fault is likely in a terminal base. Start with only the adapter and the end cap. Add one terminal base at a time to locate the affected terminal base. If the end cap is replaced under power, wait at least 5 seconds for the adapter to refresh the end cap status. Although an end cap is not required for proper operation, it helps the adapter to diagnose backplane issues, it protects contacts at the end of the terminal base, and it prevents electrical shorts or arcs from occurring in hazardous areas. The use of end caps is recommended.
Undervoltage alarm	Adapter status tag LSystemPowerAlarm is set to TRUE	Alarm triggered: power supply voltage level is below alarm configured threshold.	<ul style="list-style-type: none"> Check power supply for shorts or overloading. Consider using a stronger power supply unit if the power supply is overloaded.
Overvoltage alarm	Adapter status tag HSystemPowerAlarm is set to TRUE	Alarm triggered: power supply voltage level is above alarm configured threshold.	Immediately replace power supply with one that works.
Over temperature alarm	Adapter status tag HSystemPowerAlarm is set to TRUE	Device is overheating as result of poor cooling conditions.	Improve cooling conditions by allowing proper air flow around the device or, if possible, by reducing the environment temperature.

Table 19 - FLEX 5000 EtherNet/IP Adapter System Warnings

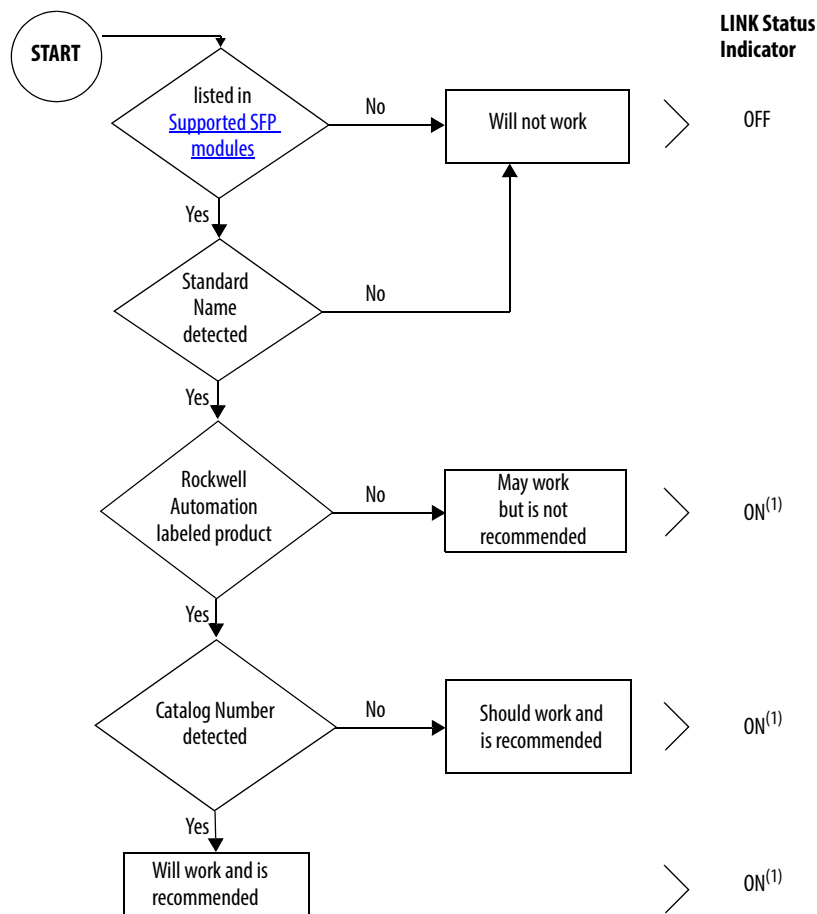
Warning	Indicators	Cause of Warning	Corrective Action
Critical temperature alarm	Adapter status tag OverTemperature is set to TRUE	Device is overheating as result of poor cooling conditions.	Improve cooling conditions by allowing proper air flow around the device or, if possible, by reducing the environment temperature.
PRP LAN A or B cables connections mismatch	LINK 1 or LINK 2 LED is blinking red. Adapter status tag PRPPort1Fault or PRPPort2Fault is set to TRUE.	The LAN A or B cables are connected to wrong Ethernet sockets at adapter device (for example, cable network A connected to network B socket).	<ul style="list-style-type: none"> Connect LAN A cable to Ethernet port 1 and LAN B cable to Ethernet port 2. Check other devices at network for cable to socket mismatch.
PRP LAN A or B is disconnected	LINK 1 or LINK 2 LED is blinking red. Adapter status tag PRPPort1Fault or PRPPort2Fault is set to TRUE.	<p>Unique network packets detected as result of break in one of redundant networks (A or B). Path between controller and adapter at one of network is disconnected.</p> <p>Unique packets count can be examined at adapter web pages: PRP Statistics page, Unique Entries Count.</p>	Check all devices and cable connections in this redundant LAN which indicates error.

Table 20 - FLEX 5000 EtherNet/IP Adapter Network Faults

Indicator	Type of Issue	Cause of Issue	Corrective Action
Cannot open diagnostic HTTP Pages	HTTP server disabled	HTTP server is disabled.	<p>Check if the HTTP server is enabled. For security reasons the HTTP server may be disabled.</p> <ol style="list-style-type: none"> In Studio 5000, enter online mode and open adapter properties. From the properties dialog, select the Servers section in the tree view. From the Servers dialog, select the Enable check box Simple Network Management Protocol and click the Apply button.
Cannot query SNMP service	SNMP server disabled	SNMP service is disabled.	<p>Check if the SNMP server is enabled. For security reasons the SNMP server may be disabled.</p> <ol style="list-style-type: none"> In Studio 5000, enter online mode and open adapter properties. From the properties dialog, select the Servers section in the tree view. From the Servers dialog, select the Enable check box Simple Network Management Protocol and click the Apply button.
<ul style="list-style-type: none"> LINK 1 or LINK 2 LED flashing red. Adapter status tag PRPPort1Fault or PRPPort2Fault set to TRUE. PRP Statistics from adapter's web page indicate warning. 	Adapter receives data from particular DAN (Dual Attached Node) on only one Ethernet port.	<p>There are disturbances on the network (for example, one of the Ethernet cable is interrupted). PRP warnings can occur when cycling power to one of the PRP devices in the network. There is a possibility that an unequal number of frames are sent on both LANs during the power up process due to the asynchronous character of Link Up in multi port devices.</p>	<ul style="list-style-type: none"> Problems with network: <ol style="list-style-type: none"> Check that the network cables and devices are properly connected. Check for cable condition. Check for other possible issues and resolve them. Problems with cycling power: <ol style="list-style-type: none"> Wait for the Links connection to stabilize.

SFP Module Compatibility

To simplify the transceiver module selection process and to troubleshoot, follow these guidelines:



⁽¹⁾ The corresponding LINK status indicator is ON if the network cable is connected between transceiver and an operating network device.



WARNING: Using an SFP module that is not recommended may cause data loss, hardware damage, or may interfere with control process.

Other Information

The Rockwell Automation Knowledgebase contains additional information that may help you to troubleshoot issues. The following lists some of the articles related to FLEX 5000 EtherNet/IP adapters.

1. “Grounding the Ethernet Cable Shield in an EtherNet/IP System”, Answer ID 167121.
2. “FLEX 5000 adapters do not support empty slots in the rack”, Answer ID 1076307.

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Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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