User Manual



# FLEX I/O Dual Port EtherNet/IP Adapter Modules

Catalog Numbers 1794-AENTR, 1794-AENTRXT





# **Important User Information**

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication <u>SGI-1.1</u> available from your local Rockwell Automation sales office or online at <u>http://www.rockwellautomation.com/literature/</u>) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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



Allen-Bradley, Rockwell Automation, FLEX I/O, ControlLogix, RSlogix, RSLinx, and TechConnect are trademarks of Rockwell Automation, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Appendix B

Appendix C

	Read this preface to familiarize yourself with the rest of the information concerning:	ne manual. It provides
	• who should use this manual	
	• the purpose of this manual	
	<ul> <li>related documentation</li> </ul>	
	• conventions used in this manual	
Who Should Use this Manual	This manual is intended for control engineers and technicians who are installing, configuring, and maintaining a redundant EtherNet/IP control system that communicates with FLEX I/O through a 1794-AENTR or 1794-AENTRXT adapter.	
	We assume you have a good understanding of Ethernet and If you do not, refer to your software user manuals or onlin attempting to use these modules.	*
Purpose of this Manual	with your controller. The manual helps you install, program, and trou your module.	
	For Information About	See
	Overview of FLEX I/O and Your Redundant EtherNet/IP Adapter Module	Chapter 1
	Install Your FLEX I/O Adapter	Chapter 2
	Configure the Adapter for Your EtherNet/IP Network	Chapter 3
	Rack Optimized Discrete I/O	Chapter 4
	Analog I/O with Direct Connection	Chapter 5
	Interpret Status Indicators	Appendix A

Configure the RSLinx Ethernet Communication Driver

Adapter Web Dialogs

### **Related Documentation**

The following documents contain additional information concerning Rockwell Automation products.

Resource	Description
FLEX I/O Selection Guide, publication <u>1794-SG002</u>	A description and overview of the 1794 series FLEX I/O, FLEX I/O XT and FLEX Ex modules and compatible control platforms.
FLEX I/O Dual Port EtherNet/IP Adapter Modules, publication <u>1794-IN131</u>	Information on how to install the FLEX I/O redundant EtherNet/IP adapter modules Catalog No. 1794-AENTR, 1794-AENTRXT
1794 FLEX I/O Communication Adapters Specifications Technical Data Sheet, publication <u>1794-TD014</u>	Technical specifications and certifications for FLEX I/O communication adapters
ControlLogix System User Manual, publication <u>1756-UM001</u>	Detailed information on how to install, configure and troubleshoot the ControlLogix Sequence of Events module in your ControlLogix application.
FLEX I/O DC Power Supply Installation Instructions, publication <u>1794-IN069</u>	Information on how to install the FLEX I/O DC Power Supply Catalog No. 1794-PS13, 1794-PS3
EtherNet/IP Embedded Switch Technology Application Guide, publication <u>ENET-AP005</u>	Information on how to install, configure and maintain linear and Device-level Ring (DLR) networks using Rockwell Automation EtherNet/IP devices with embedded switch technology.
EtherNet/IP Modules in Logix5000 Control Systems User Manual, publication <u>ENET-UM001</u>	Detailed information on how to use EtherNet/IP modules with Logix5000 controllers and communicate with various devices on the Ethernet network.
Interconnect Cable Installation Instructions, publication <u>1794-5.12</u>	Information on how to install the extension cables. Catalog No. 1794-CE1, 1794-CE3
Industrial Automation Wiring and Grounding Guidelines, publication <u>1770-4.1</u>	In-depth information on grounding and wiring Allen-Bradley programmable controllers.
Allen-Bradley Industrial Automation Glossary, publication <u>AG-7.1</u>	A glossary of industrial automation terms and abbreviations.

You can view or download publications at

<u>http://www.rockwellautomation.com/literature/</u>. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

# Common Techniques Used in this Manual

The following conventions are used throughout this manual:

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

# Preface

Who Should Use this Manual	iii
Purpose of this Manual	iii
Related Documentation	iv
Common Techniques Used in this Manual	iv

# **Table of Contents**

# **Chapter 1**

Overview	T
The FLEX I/O System	1
Adapter Features	2
Types of Adapters	2
Hardware and Software Compatibility	2
What the Adapter Does	3
Use of the Control and Information Protocol (CIP)	3
Understanding the Producer/Consumer Model	3
Specifying the Requested Packet Interval (RPI)	4
Support of Rack Optimized and Direct Connections	
Mixing Rack Optimized and Direct Connections	5
Chapter Summary	5

# **Chapter 2**

Overview	7
Module Components	7
Mount Your Adapter on a DIN Rail	8
Mount on a Panel or Wall	9
Connect Wiring 1	1
Set the Network Address 12	2
Mounting Dimensions 1	3

# Chapter 3

•	
Overview	15
Configuration Requirements	15
IP Address	15
Gateway Address	16
Subnet Mask	17
Use the Rockwell BootP/DHCP Utility	18
Save the Relation List	21
Configure Your Adapter using DHCP Software	21
Chapter Summary	22

# Overview of FLEX I/O and Your Redundant EtherNet/IP Adapter Module

# Install Your FLEX I/O Adapter

# Configure the Adapter for Your EtherNet/IP Network

# **Rack Optimized Discrete I/O**

# Analog I/O with Direct

# Connection

# **Interpret Status Indicators**

Configure the RSLinx Ethernet Communication Driver

**Adapter Web Dialogs** 

# **Chapter 4**

Overview	3
Set Up the Hardware 22	3
Create the Example Application 24	4
Configure the I/O 20	6
Add the Local EtherNet/IP Bridge to the I/O Configuration 20	6
Add the FLEX I/O Adapter to the I/O Configuration	7
Add the FLEX I/O Modules to the I/O Configuration	9
Create the Ladder Program	4
Download the Program to the Controller	4
Test the Example Application	5
Chapter Summary	6

# Chapter 5

Overview	7
Set Up the Hardware	7
Create the Example Application	8
Add the Analog Modules to the I/O Configuration	9
Add the Analog Input Module to the I/O Configuration 39	9
Add the Analog Output Module to the I/O Configuration 42	2
Edit the Controller Tags 4	5
Modify the Ladder Program 4'	7
Download the Program 4'	7
Test the Example Application 44	8
Chapter Summary	9

# Appendix A

Overview	51
Status Indicators	51
1794-AENTR, 1794-AENTRXT Module	51
Chapter Summary	52

# Appendix **B**

Overview	53
About the Ethernet Communication Driver	53
Install the RSLinx Software	53
Configure the AB_ETH Driver	53

# Appendix C

Overview	57
Work with the Home Page	57
Work with the Diagnostics Pages	
Use the Diagnostic Overview Page	
Use the Network Settings Page	61

Use the Ethernet Statistics Page	62
Use the I/O Connections Page	
Work with the Configuration Pages	
Use the Device Identity Page	
Use the Network Configuration Page	
Use the Device Services Page	

# Index

# **Overview of FLEX I/O and Your Redundant EtherNet/IP Adapter Module**

# **Overview**

This chapter provides a description of the FLEX I/O dual port EtherNet/IP adapter modules and an overview of how they communicate with programmable controllers.

Торіс	Page
The FLEX I/O System	1
Adapter Features	2
Types of Adapters	2
Hardware and Software Compatibility	2
What the Adapter Does	3
Use of the Control and Information Protocol (CIP)	3
Understanding the Producer/Consumer Model	3
Specifying the Requested Packet Interval (RPI)	4
Support of Rack Optimized and Direct Connections	4

# The FLEX I/O System

Adapter

The FLEX I/O system is a small, modular I/O system for distributed applications that performs all of the functions of rack-based I/O. The FLEX I/O system contains the following components:



- Adapter transfers read and write configuration data to and from the I/O module
- Terminal base contains a terminal strip to terminate wiring for two- or • three-wire devices
- I/O module contains the bus interface and circuitry needed to perform specific functions related to your application

The FLEX system consists of an adapter module, terminal base unit, DIN rail, power supply, and adapter cabling components. You can use up to 8 terminal bases per adapter module.

For detailed instructions on how to set up and install your module, refer to the topic, Install Your FLEX I/O Adapter on page 7.

### **Adapter Features**

The 1794-AENTR and 1794-AENTRXT adapter features include:

- use of EtherNet/IP messages encapsulated within standard TCP/UDP/IP protocol
- common application layer with ControlNet and DeviceNet
- interfacing via Category 5 rated twisted pair cable
- half/full duplex 10 Mbit or 100 Mbit operation
- DIN rail mounting
- communication to and from other FLEX I/O modules on the same DIN rail
- communication supported by RSLinx software
- IP address assigned via standard BootP/DHCP tools
- I/O configuration via RSLogix 5000 software
- no network scheduling required
- no routing tables required

The adapter refers to the following catalogs.

Catalog	Voltage	Module Capacity	Description
1794-AENTR	24V DC	8, max.	Dual port EtherNet/IP adapter
1794-AENTRXT	24V DC	8, max.	Dual port EtherNet/IP adapter with extended temperatures range

# Hardware and Software Compatibility

**Types of Adapters** 

The adapters and the applications described in this manual are compatible with the following firmware versions and software releases. Contact Rockwell Automation if you need software or firmware upgrades to use this equipment.

#### Hardware and Software Compatibility

Product	Firmware Version/ Software Release
1794-AENTR/1794-AENTRXT adapter	1.xx or higher
Logix 557x Controller	20 or higher
RSLogix 5000 Software	20 or higher
RSLinx software	2.59 or higher

Refer to the 1794 FLEX I/O Communication Adapters Specifications Technical Data Sheet, publication <u>1794-TD014</u>, for technical specifications and certifications for your adapter.

3

### What the Adapter Does

The 1794-AENTR and 1794-AENTRXT adapters perform two primary tasks:

• Control of real time I/O data (implicit messaging). The adapter serves as a bridge between I/O modules and the network.



• Support of messaging data for configuration and programming information (explicit messaging).

#### The 1794-AENTR and 1794-AENTRXT adapters use the Control and Information Protocol (CIP). CIP is the application layer protocol specified for EtherNet/IP, the Ethernet Industrial Protocol, as well as for ControlNet and DeviceNet. It is a message-based protocol that implements a relative path to send a message from the producing device in a system to the consuming devices.

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

This has two significant benefits:

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

# Understanding the Producer/Consumer Model

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

# Use of the Control and Information Protocol (CIP)

(multicast) their data either upon a change of state (COS) or periodically. The frequency of update depends upon the options chosen during configuration and where on the network the input module resides. The input module, therefore, is a producer of input data and the controller is a consumer of the data.

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

The RPI is the update rate specified for a particular piece of data on the network. The RPI can be specified for the adapter and include all of the I/O modules communicating through it (using a rack optimized connection) or specified for a particular module (using direct connection). When you add a module or an adapter to the I/O configuration of a controller, you must enter the RPI as a parameter. This value specifies how often to produce the data for that device. For example, if you specify an RPI of 50 ms, it means that every 50ms the device should send its data to the controller or the controller should send its data to the device.

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

The 1794-AENTR and 1794-AENTRXT adapters support both direct and rack optimized connections. A direct connection is a real-time data transfer link between the controller and the device that the configuration data references. Direct connection messaging occurs at a cyclic rate specified by the RPI during configuration. A rack optimized connection is a grouping of data from more than one I/O module into a single block of data sent over a single connection at the same data rate.

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

> Assume you have set up a system that contains 8 discrete I/O modules interfaced to an adapter. If you use direct connections to transfer data to each of the these I/O modules, you need 8 connections to transfer all of the data, one to each of

# Specifying the Requested **Packet Interval (RPI)**

# Support of Rack Optimized and Direct Connections

the 8 I/O modules. If you use a rack-optimized connection to transfer the data, you only need a single connection – the connection to the adapter.

IMPORTANT	Although rack optimized connections offer an efficient way to use resources, there are a few limitations on their use:
	<ul> <li>You can only use rack optimized connections to send data to and from discrete I/O modules. Analog I/O requires direct connections.</li> </ul>
	<ul> <li>Rack optimized connections can contain I/O data and status information only. Additional module information, such as diagnostics, is not available through a rack-optimized connection.</li> <li>All data is sent at the same time at the RPI rate of the adapter.</li> </ul>

Refer to the EtherNet/IP Embedded Switch Technology Application Guide, publication number <u>ENET-AP005</u>, for more information on connections.

### **Mixing Rack Optimized and Direct Connections**

You can mix communication formats for different I/O modules communicating through the same adapter. I/O modules set up to use rack optimization will communicate at the rate of the requested packet interval (RPI) configured for the 1794-AENTR or 1794-AENTRXT adapter. I/O modules configured for direct communication will communicate at their own set RPIs and ignore the adapter RPI.

Chapter Summary

This chapter briefly described the FLEX I/O system, the FLEX I/O dual port EtherNet/IP adapters, and the basic adapter features. Read the next chapter to learn how to physically install the adapters and connect them to the EtherNet/IP network.

# Notes:

# Install Your FLEX I/O Adapter

# **Overview**

This chapter describes how to physically install the 1794-AENTR or 1794-AENTRXT adapter on the DIN rail and connect it to the EtherNet/IP network. The following table lists where to find specific information.

Topic	Page
Module Components	7
Mount Your Adapter on a DIN Rail	8
Mount on a Panel or Wall	9
Connect Wiring	11
Set the Network Address	12
Mounting Dimensions	13

# **Module Components**

Use the following illustration to identify the external features of the FLEX I/O EtherNet/IP adapter.

#### Dual Port EtherNet/IP Adapter – 1794-AENTR, 1794-AENTRXT



#### **Component Identification**

1	Dual Port EtherNet/IP adapter	6	Module locking tab
2	FlexBus connector 7		Network cable RJ45 connectors (underside)
3	24V common connections	8	MAC ID label
4	24V DC connections	9	Status indicators
5	IP address switches	•	·

# Mount Your Adapter on a DIN Rail

Follow these steps to mount the adapter on a new system before installing any I/O modules.





**ATTENTION:** During mounting of all devices, be sure that all debris (for example, metal chips, wire strands) is kept from falling into the module. Debris that falls into the module could cause damage on power up.



**ATTENTION:** Do not remove or replace an Adapter Module while power is applied. Interruption of the backplane can result in unintentional operation or machine motion.

- 1. Position the adapter module (A) on an IEC standard (35 x 7.5 x 1 mm) top-hat DIN rail (B) at a slight angle (DIN rail: Allen-Bradley part number 199-DR1; 46277-3; EN50022).
- 2. Hook the lip on the rear of the adapter onto the top of the DIN rail, and pivot the adapter module onto the rail.
- 3. Press the adapter module down onto the DIN rail until flush. Locking tab (C) snaps the adapter into position and locks it onto the DIN rail.
- **4.** If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter module flush onto the DIN rail, and release the locking tab to lock the adapter module in place.

If necessary, push up on the locking tab to lock.

5. Connect the adapter wiring as shown in the Connect Wiring diagram.

### Mount on a Panel or Wall

If mounting this adapter to a panel or wall, refer to publication <u>1794-TD013</u>, Panel Mounting Kit, Cat. No. 1794-NM1.





**WARNING:** When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

Mount or Replace the Adapter on an Existing System

- 1. Disconnect any wiring jumpered to the adjacent terminal base.
- 2. Remove the Ethernet connectors from the bottom of the adapter.



**WARNING:** If you connect or disconnect the communication cable with power applied to the adapter or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

- 3. Disconnect any user power wiring connections to the adapter.
- 4. Open the module latching mechanism and remove the module from the base unit to which the adapter will be attached.
- 5. Push the FlexBus connector toward the right side of the terminal base to unplug the backplane connection.



**ATTENTION:** Make certain the FlexBus connector is completely clear of the adapter. The slide must be completely to the right and the raised spot on the slide visible.

6. Release the locking tab and remove the adapter module.

Before installing the new adapter, notice the notch on the right rear of the adapter. This notch accepts the hook on the terminal base unit. The notch is open at the bottom. The hook and adjacent connection point keep the

terminal base and the adapter tight together, reducing the possibility of a break in communication over the backplane.



7. Complete the adapter mounting as shown below.

Push down and in at the same time to lock the adapter to the DIN rail.

If the adapter does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter flush onto the DIN rail, and release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.



When the adapter is locked onto the DIN rail, gently push the FlexBus connector into the adapter to complete the backplane.

8. Reinstall the module in the adjacent terminal base unit.

### **Connect Wiring**





**WARNING:** If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

- 1. Connect an Ethernet network cable to the RJ45 connector (A).
- 2. Connect the redundant Ethernet network cable to the RJ45 connector (B).





**ATTENTION:** When connecting wiring, torque terminal screws C, D, E and F to 0.8 Nm (7 lb-in.).

**ATTENTION:** If multiple power sources are used, do not exceed the specified isolation voltage.

**ATTENTION:** Power wiring must be less than 10 m (32.8 ft.) in length.

**ATTENTION:** Do not wire more than two conductors on any single terminal.

- 3. Connect 24V DC common to the left side of the upper connector, terminal F.
- 4. Connect +24V DC input power to the left side of the lower connector, terminal C.
- 5. Use connections D and E to pass +24V DC common (E) and 24V DC power (D) to the next module in the series (if required).

### Set the Network Address

The adapter ships with the thumbwheel switches set to 999 and DHCP enabled. You can set the network Internet Protocol (IP) address in these ways:

- Use the thumbwheel switches on the module.
- Use a Dynamic Host Configuration Protocol (DHCP) server, such as Rockwell Automation DHCP.
- Retrieve the IP address (if previously set) from nonvolatile memory.

The adapter reads the thumbwheel switches first to determine if the switches are set to a valid number. You set the node address by using the three-position thumbwheel switch. Press the + or - buttons to change the number. Valid settings are 001...254.

When the switches are set to a valid number, the adapter IP address is 192.168.1.xxx (where xxx represents the number set on the switches). The adapter subnet mask is 255.255.255.0. The adapter gateway address is set differently depending on the firmware revision:

- For Firmware Revision 1.013 and earlier, when the address switches are set to 001...254, the adapter gateway address is set to 0.0.0.0.
- For Firmware Revision 1.014, when the address switches are set to 001, the adapter gateway address is set to 0.0.0.0. When the address switches are set to 002...254, the adapter gateway address is set to 192.168.1.1.

The adapter does not have a host name assigned, or use any Domain Name System when using the thumbwheel settings.



If you set the switches to an invalid number (such as 000, or a value greater than 254), the adapter checks to see if you enabled DHCP.

# **Mounting Dimensions**

The module has the following mounting dimensions.

#### 1794-AENTR shown



# Notes:

# Configure the Adapter for Your EtherNet/IP Network

# **Overview**

This chapter describes how to configure the 1794-AENTR or 1794-AENTRXT adapter module for the ControlLogix system.

Торіс	Page
Configuration Requirements	15
IP Address	15
Gateway Address	16
Subnet Mask	17
Use the Rockwell BootP/DHCP Utility	18
Configure Your Adapter using DHCP Software	21

# Configuration Requirements

Before you can use your 1794-AENTR or 1794-AENTRXT adapter, you must configure its IP address, and optionally, its subnet mask and gateway address. You can use the Rockwell BootP/DHCP utility to perform the configuration. You can also use generic BootP software or, within some limitations, a DHCP server.

IMPORTANT	When using the BootP protocol, you must enter the Ethernet hardware address of your adapter. Rockwell assigns each 1794-AENTR or 1794-AENTRXT adapter a unique 48-bit hardware address at the factory. The address is printed on a label on the front of your 1794-AENTR or 1794-AENTRXT adapter. It consists of six hexadecimal digits separated by colons. This address is fixed by the hardware and cannot be changed.
	If you change or replace the 1794-AENTR or 1794-AENTRXT adapter, you must enter the new Ethernet hardware address of the adapter when you configure the new adapter.

# **IP Address**

The IP address identifies each node on the IP network (or system of connected networks). Each TCP/IP node on a network (including the 1794-AENTR or 1794-AENTRXT adapter) must have a unique IP address.

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



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

Range of first integer	Class	Range of first integer	Class
0127	А	192223	С
128191	В	224255	other

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

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

EXAMPLE	For example, the 32-bit IP address:
	10000000 00000001 00000000 00000001 is written as 128.1.0.1.
TIP	Contact your network administrator or the Network Information Center for a unique fixed IP address to assign to your module.

### **Gateway Address**

The Gateway Address is the default address of a network. It provides a single domain name and point of entry to the site. Gateways connect individual physical networks into a system of networks. When a node needs to communicate with a node on another network, a gateway transfers the data between the two



networks. The following figure shows gateway G connecting Network 1 with Network 2.

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

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

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

### Subnet Mask

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

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

These two bits of the host ID used to extend the net ID

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

The new configuration is:



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

Hosts D and E use Gateway G2 to communicate with hosts not on Network 2.2. Hosts B and C use Gateway G to communicate with hosts not on Network 2.1. When B is communicating with D, G (the configured gateway for B) routes the data from B to D through G2.

The Rockwell BootP/DHCP utility is a stand alone program that incorporates the functionality of standard BootP/DHCP software with a user-friendly graphical interface. It is located in the Utils directory on the RSLogix 5000 installation CD. The module must have DHCP enabled (factory default and the network address switches set to an illegal value) to use the utility.

To configure your module using the BootP/DHCP utility, perform the following steps:

1. Run the BootP/DHCP software.

# Use the Rockwell BootP/DHCP Utility

57	BOOTP/DHCP 9	5erver 2.	3				_ 🗆 ×
File	Tools Help						
R	equest History-						
	Clear History Add to Relation List						
	(hr:min:sec)	Туре	Ethernet Addre	ess (MAC)	IP Address	Hostname	
	8:09:34 8:09:26	DHCP	00:00:BC:21:2 00:00:BC:21:2				
	8:09:26	DHCP	00:00:BC:21:2				
	8:09:13 8:08:57	DHCP	00:00:BC:21:2 00:00:BC:21:2				
	8:08:57	DHCP	00:00:BC:21:2	0:14			
B	elation List						
	New Delete	Enable	BOOTP Ena	He DHCP Dis	able BOOTP/DHCP	1	
						1	 
	Ethernet Addre	ss (MAC)	Туре	IP Address	Hostname	Description	
-	tatus						Entries
U	nable to service	UHCP red	quest from UU:UU	(BC:21:20:14)			0 of 256

The BOOTP/DHCP Request History dialog appears showing the hardware addresses of devices issuing BootP/DHCP requests.

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

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

New Entry		×
Ethernet Address (MAC):	00:00:BC:21:20:14	
IP Address:	10 . 88 . 70 . 2	
Hostname:		
Description:		
	OK Cancel	

3. Enter the IP Address you want to assign to the device and click OK.

e Tools Help	te 💶 🗵 🗙
e Tools Help	
Request History	
Clear History Add to Relation List	
(hr:min:sec) Type Ethernet Address (MAC) IP Address Hostname	
12:47:24 DHCP 00:00:BC:21:20:14 10:88:70.2	
12:47:24 DHCP 00:00:BC:21:20:14	
Relation List	
New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP	
Ethernet Address (MAC) Type IP Address Hostname Description	
00:00:BC:21:20:14 DHCP 10.88.70.2	
	- Entries
Status	Enules

The device is added to the Relation List, displaying the Ethernet Address (MAC) and corresponding IP Address, Hostname and Description (if applicable).

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

- 4. To assign this configuration to the device, highlight the device in the Relation List panel and click Disable BOOTP/DHCP. When power is cycled to the device, it uses the configuration you assigned and not does not issue a DHCP request.
  - **TIP** To enable DHCP for a device that has had DHCP disabled, highlight the device in the Relation List and click Enable DHCP. You must have an entry for the device in the Relation List panel to re-enable DHCP.

File Tools Help	Server 2	.3 - C:\Documents and Sett	ings\tiggs\Desktop	\Bootp Server\	control syste 💶 🗶
-Request History-					
Clear History	Add to	o Relation List			
(hr:min:sec)	Туре	Ethernet Address (MAC)	IP Address	Hostname	
12:47:24 12:47:24	DHCP DHCP	00:00:BC:21:20:14 00:00:BC:21:20:14	10.88.70.2		
Relation List			,		
New Delet	e Enabl	e BOOTP Enable DHCP Di	sable BOOTP/DHCP		
Ethernet Addre		Type IP Address	Hostname	Description	
Ethernet Addre 00:00:BC:21:20		Type IP Address DHCP 10.88.70.2	Hostname	Description	
			Hostname	Description	
			Hostname	Description	
			Hostname	Description	
			Hostname	Description	Entries

### **Save the Relation List**

You can save the Relation List to use later. To save the Relation List do the following:

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

🚟 ВООТР/DHCP	Server 2.	3 - C:\Documents an	d Setti	ngs\tiggs\Desktop	\Bootp Serve	r\control sys	te 💶 🗙
File Tools Help							
New							
Open	Add to	Relation List					
Save Save As	Туре	Ethernet Address (MAC	C)	IP Address	Hostname		
	DHCP	00:00:BC:21:20:14 00:00:BC:21:20:14		10.88.70.2			
Exit		00.00.BC.21.20.14					
- Relation List							
New Delet	e Enable	e BOOTP Enable DHO	CP Dis	able BOOTP/DHCP			
Ethernet Addre	ess (MAC)	Type IP Add	ress	Hostname	Description		
00:00:BC:21:2		DHCP 10.88.					
- Status							- Entries
Sent 10.88.70.2	to Ethernet	address 00:00:BC:21:20	):14				1 of 256

#### The Save As dialog box appears.

Save As					<u>?</u> ×
Save in: 🔂	Bootp Server	•	۱ 🖻	* 🎫	
					- 1
File name:	control system configuration			Sav	•
Save as type:	Bootp Config Files (*.bpc)		•	Canc	el

- 2. Select the folder you want to save the list to.
- **3.** Enter a file name for the Relation List (for example, control system configuration) and click Save.

If you want to see your saved file names in the Open dialog box, save your files using the default file type (\*.bpc).

# Configure Your Adapter using DHCP Software

DHCP (Dynamic Host Configuration Protocol) software automatically assigns IP addresses to client stations logging onto a TCP/IP network. DHCP is based on BootP and maintains some backward compatibility. The main difference is that BootP was designed for manual configuration, while DHCP allows for dynamic allocation of network addresses and configurations to newly attached devices.

Be cautious about using DHCP software to configure your adapter. A BootP client, such as the 1794-AENTR or 1794-AENTRXT adapter, can boot from a DHCP server only if the DHCP server is specifically written to also handle BootP queries. This is specific to the DHCP software package you use. Check with your system administrator to see if your DHCP package supports BootP commands and manual IP allocation.



**ATTENTION:** The 1794-AENTR or 1794-AENTRXT adapter must be assigned a fixed network address. The IP address of this adapter must not be dynamically provided.

Failure to observe this precaution may result in unintended machine motion or loss of process control.

## **Chapter Summary**

This chapter described how to configure the module to communicate on your EtherNet/IP network by providing an IP address, gateway address, and Subnet mask. Read the next chapter to learn how to set up your adapter for a rack optimized system.

# **Rack Optimized Discrete I/O**

## **Overview**

In this example a ControlLogix processor communicates with FLEX I/O via the 1794-AENTR adapter using a rack optimized connection. The processor reads data from all digital input modules and sends data to all digital output modules configured in a rack connection simultaneously.

The following table lists where to find specific information within this chapter.

Topic	Page
Set Up the Hardware	23
Create the Example Application	24
Configure the I/O	26
Add the Local EtherNet/IP Bridge to the I/O Configuration	26
Add the FLEX I/O Adapter to the I/O Configuration	27
Add the FLEX I/O Modules to the I/O Configuration	29
Add the Digital Input Module	30
Add the Digital Output Module	31
Edit the Controller Tags	33
Create the Ladder Program	34
Download the Program to the Controller	34
Test the Example Application	35

## Set Up the Hardware

In this example, a ControlLogix chassis contains the Logix5572 controller in slot 0 and a 1756-EN2TR bridge module in slot 1. The adapter is mounted on a DIN rail with a 1794-IB16 digital input module and 1794-OB16 digital output module. You also need a power supply (not shown) for the FLEX I/O.



To work along with this example set up your system as shown above.

- Note that in the example application, the Logix5572 controller and 1756-EN2TR module are assumed to be in the slots shown above.
- Verify the IP addresses for your programming terminal, 1756-EN2TR module, and 1794-AENTR adapter.
- Verify the position (slot) of the I/O modules on the DIN rail.
- Verify that all wiring and cabling is properly connected.
- Make sure your communication driver (for example, AB\_ETH-1 or AB-ETHIP-1) is configured in RSLinx as described in <u>Appendix B</u>.

Perform the following steps to create the example application:

# Create the Example Application

1. Start the RSLogix 5000 Enterprise Series software. The RSLogix 5000 main dialog opens.

Ċ	RSLog	jix 500	0										
E	le <u>E</u> dit	⊻iew	<u>S</u> earch	Logic	Communication	ns <u>T</u> ools	⊻indow	Help					
	<u>N</u> ew				Ctrl+N				あみ	5	ĪF.		
	<u>O</u> pen <u>C</u> lose	N			Ctrl+O				 100100	_	Control		RUN
	<u>S</u> ave Save <u>A</u> s				Ctrl+S					No Fo No Eo	dits		■ OK ■ BAT ■ I/O
	Ne <u>w</u> Co	mponer	ıt		•				_	Redu	ndancy	Ŀ÷Ū	
									 ▼				
	<u>Print</u> Print Op <u>l</u>	tions			Ctrl+P	• out/Output	!						
	2 CN2DI 3 Device 4 Consu 5 Produc 6 Ethern	N_Cont eNet_C mer.AC cer.ACD et_IO_( iet_IO_(	) Controller_ Controller.	CD _2.ACD	CD								
	E <u>x</u> it												

2. From the File menu, select New. The New Controller dialog opens.

New Controller			×
Vendor:	Allen-Bradley		
Туре:	1756-L72 ControlLogix5572 Controller	•	OK
Revision:			Cancel
	Redundancy Enabled		Help
Name:			
Description:		A	
		-	
Chassis Type:	1756-A4 4-Slot ControlLogix Chassis	•	
Slot:	□ 🚊 Safety Partner Glot: <none></none>		
Create In:	C:\RSLogix 5000\Projects		Browse
Security Authority:	No Protection	7	
	Use only the selected Security Authority for Authentication and Authorization		

- **3.** Enter an appropriate Name for the Controller, for example: FLEX\_IO\_Controller.
- 4. Select the correct Chassis Type and Slot number of the Logix5572 controller, and the folder where you want to save the RSLogix 5000 file (Create In). The Description is optional.
- 5. Click OK.

# Configure the I/O

Setting up a sample I/O Configuration project involves the following:

- Adding the local 1756-EN2TR module to the I/O configuration.
- Adding the 1794-AENTR adapter as a child of the 1756-EN2TR module.
- Adding the I/O modules as children of the adapter.

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

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



2. The Select Module Type window opens.

Selec	t Module Type						
C.	italog   Module Disc						
	Kalog   Module Disc	overy Pavonies					
	Enter Search Tex	t for Module Type		Clear Fi	lters		Hide Filters 🕿
	ঘ	Module Type Catego	u Filters		T		Module Type Vendor Filters
	Analog	iniodalo 13po odrogo	y r illoro			Allen-Bra	
	Communica	tion					istruments, Inc.
	Controller				$\overline{\mathbf{v}}$	Molex Inc	corporated
	Digital				$\overline{\mathbf{v}}$	Online De	evelopment Inc.(Automation Value)
	Drive .				9	Dhaaniu (	Diaital Corporation
					<u> </u>		
	Catalog Number	Description	Vendor	Cate	qory		
	1756-DMB30		Allen-Bradley	Driv			
	1756-DMD30		Allen-Bradley	Driv			
	1756-DMF30	1756 SF3000 Dr	Allen-Bradley	Driv	-		
	1756-DNB	1756 DeviceNet	Allen-Bradley	Com	- munic	ation	
	1756-EN2F	1756 10/100 M	Allen-Bradley	Com	munic	ation	
	1756-EN2T	1756 10/100 M	Allen-Bradley	Com	munic	ation	
	1756-EN2TR	1756 10/100 M	Allen-Bradley	Com	munic	ation	
	1756-EN3TR	1756 10/100 M	Allen-Bradley	Com	munic	ation	- -
	J			-			
	123 of 123 Module	e Types Found					Add to Favorites
	Close on Create						Create Close Help
		,					
					_		

3. Select the 1756-EN2TR EtherNet/IP Bridge, and then click Create. The New Module dialog opens.

New Module General <sup>®</sup> Con Type: Vendor: Parent: Name: Description: Module Def Revision: Electronic K Connection: Time Sync (	nection Time Sync   Module Info   Internet Pr 1756-EN2TR 1756 10/100 Mbps Ethernet Br Allen-Bradley Local EN2TR EN2TR Compatible Module None	otocol Port Configuration Network RSNetWorx idge, 2-Port, Twisted-Pair Media Ethernet Address C: Private Network: 192.168.1. C: IP Address: 130 . 130 . 130 . 2 C: Host Name: Slot: 0
tatus: Creating		OK Cancel Help

4. Configure your 1756-EN2TR EtherNet/IP Bridge module through the different tabs available.

Enter values for Name, IP Address, Slot, Electronic Keying, and Revision, as follows:

Name	EN2TR
IP Address	130.130.130.2
Slot	0
Electronic Keying	Compatible Module
Revision	3.1

5. Click OK to accept the configuration.

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

Next, you must add the 1794-AENTR adapter as a child of the local 1756-EN2TR module.



 In the Project dialog, right-click the local 1756-EN2TR module under the I/O Configuration folder, and then select New Module. The Select Module Type dialog opens.

pro posto (brit)	for Module Type		Clear Filters		Hide Filters 🛭 🚖
	Module Type Catego	ry Filters	▲ <b>▼</b>	Module Type Vendor F	ilters
Communicatio	n		Allen-	Bradley	
Controller			🗕 🗹 Cogne	ex Corporation	
Digital			🗹 Endre	ess+Hauser	
Drive				er-Toledo	
			Parke	er Hannifin Corporation	
			ا لغال		
Catalog Number	Description	Vendor	Category		<b></b>
1783-ETAP1F	3 Port Ethernet	Allen-Bradley	Communication		
	3 Port Ethernet	Allen-Bradley	Communication		
1783-ETAP2F					
1783-ETAP2F 1788-EN2DN	1788 Ethernet to	Allen-Bradley	Communication		
	1788 Ethernet to 1788 10/100 M	Allen-Bradley Allen-Bradley	Communication Communication		
1788-EN2DN 1788-ENBT 1794-AENT	1788 10/100 M 1794 10/100 M	Allen-Bradley Allen-Bradley	Communication Communication		
1788-EN2DN 1788-ENBT 1794-AENT 1794-AENTR	1788 10/100 M 1794 10/100 M 1794 10/100 M	Allen-Bradley Allen-Bradley Allen-Bradley	Communication Communication Communication		
1788-EN2DN 1788-ENBT 1794-AENT 1794-AENTR 1799ER-IQ10	1788 10/100 M 1794 10/100 M 1794 10/100 M 10 Point Input/1	Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley	Communication Communication Communication Digital		
1788-EN2DN 1788-ENBT 1794-AENT 1794-AENTR 1799ER-IQ10	1788 10/100 M 1794 10/100 M 1794 10/100 M	Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley	Communication Communication Communication		

2. Select the 1794-AENTR Ethernet adapter from the list and click Create. The Module Properties dialog opens.

Vendor: Parent:	Allen-Bradley EN2TB		Ethernet Address
Name:	FLEX_IO_Adapter		O Private Network: 192.168.1.
Description:		*	IP Address: 130 . 130 . 130 . 3     Host Name:
- Module Defi Revision:	nition 1.1	Change	
Electronic Ke		odule	
Rack Conne	ction: Rack Optimiza	ation	
Chassis Siz	e: 8		

**3.** Specify the following parameters in the General tab of the New Module dialog:

Name	FLEX_IO_Adapter
IP Address	130.130.130.3

4. Verify that the Module Definition values are as follows:
| Comm Format       | Rack Optimization |
|-------------------|-------------------|
| Chassis Size      | 8 (default)       |
| Electronic Keying | Compatible Module |

5. If you need to change the values, click Change... The Module Definition dialog opens.

Hodule Definition		
Revision:		
Electronic Keying:	Compatible Module	-
Rack Connection:	Rack Optimization	-
Chassis Size:	8	•
OK	Cancel Help	

6. Click OK to accept the configuration. The 1794-AENTR adapter appears indented under

The 1794-AENTR adapter appears indented under the local 1794-ENBT in the I/O Configuration folder.



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

You must now add the FLEX I/O modules to the I/O Configuration List under the 1794-AENTR adapter.

In this example, you add a 1794-IB16 digital input module and a 1794-OB16 digital output module with standard configurations. Use these steps as a guide when you are configuring different I/O modules for your system.

**TIP** This example application uses I/O module default configurations. For more information, refer to the I/O module publications <u>1794-IN093</u> and <u>1794-IN094</u>. Add the Digital Input Module

1. Under the I/O Configuration folder, right-click the remote 1794-AENTR adapter, and then select New Module.





	Module Type Clea	ır Filters		Hid	e Filters  🗙
	fodule Type Category Filters	- -	Module Type	Vendor Filters	
<ul> <li>✓ Analog</li> <li>✓ Digital</li> <li>✓ Other</li> <li>✓ Specialty</li> </ul>		Allen-B	Iradley		
Catalan Number	Description	,	Vendor	[ C-1	
Catalog Number 1794-IA16	16 Point 120V AC Input		Allen-Bradley	Category Digital	
1794-IA8	8 Point 120V AC Input		Allen-Bradley	Digital	
1794-IA8	8 Point 120V AC Isolated Input		Allen-Bradley	Digital	
1794-1810×086	10 Input/6 Output 24V DC. Sink/Source		Allen-Bradley	Digital	
1794-IB16	16 Point 24V DC Input, Sink	0	Allen-Bradley	Digital	
1794-IB16D	16 Point 24V DC Diagnostic Input, Sink		Allen-Bradley	Digital	
	16 Input/16 Output 24V DC, Sink/Protected Source		Allen-Bradley	Digital	
1794-IB16XOB16					

2. Select the 1794-IB16 module from the list, and then click Create. The New Module dialog opens.

New Module	د	1
Type: Vendor: Parent: Name:	1794-IB16/A 16 Point 24V DC Input, Sink Allen-Bradley FLEX_IO_Adapter FLEX_Digital_Input Slot: 0	
Description:	× ×	I
Comm Format:	Rack Optimization	I
Revision:	Image: Section Compatible Keying         Image: Section Compatible Keying	
🔽 Open Modul	e Properties OK Cancel Help	

3. Enter the following parameters:

Name	FLEX_Digital_Input
Slot	0
Comm Format	Rack Optimization
Electronic Keying	Compatible Module

4. Click OK to save the configuration.

The digital input module appears in the I/O configuration indented under the 1794-AENTR adapter.



#### Add the Digital Output Module

1. Under the I/O Configuration folder, right-click the remote 1794-AENTR adapter, and then select New Module.



The Select Module Type window opens.

Enter Search Text for	Module Type Clear Filters		Hide	e Filters 🕱
Image: Analog       Image: Digital       Image: Di	todule Type Category Filters	Module Type \ Ilen-Bradley	/endor Filters	
Catalog Number	Description	Vendor	Category	
1794-IV32	32 Point 24V DC Input, Source	Allen-Bradley	Digital	
1794-0A16	16 Point 120V AC Output	Allen-Bradley	Digital	
1794-0A8	8 Point 120V AC Output	Allen-Bradley	Digital	
1794-0A8I	8 Point 120V AC Isolated Output	Allen-Bradley	Digital	
1794-0B16	16 Point 24V DC Output, Source	Allen-Bradley	Digital	
1794-0B16D	16 Point 24V DC Diagnostic Output, Source	Allen-Bradley	Digital	
1794-0B16P	16 Point 24V DC Protected Output, Source	Allen-Bradley	Digital	
1794-0B32P	32 Point 24V DC Protected Output, Source	Allen-Bradley	Digital	

2. Select the 1794-OB16 module from the list, and then click Create. The New Module dialog opens.

New Module	x
Type: Vendor: Parent: Name: Description:	1794-0B16/A 16 Point 24V DC Output, Source Allen-Bradley FLEX_IO_Adapter FLEX_Digital_Output Slot: 1
Comm Format:	Rack Optimization
Revision:	1 Electronic Keying: Compatible Keying
🔽 Open Modul	e Properties OK Cancel Help

3. Enter the following parameters:

Name	FLEX_Digital_Output
Slot	1
Comm Format	Rack Optimization
Electronic Keying	Compatible Module

4. Click OK to save the configuration.

The digital input module appears in the I/O configuration indented under the 1794-AENTR adapter.



Edit the Controller Tags

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



1. Double-click the Controller Tags folder in the project window. The Controller Tags window opens. You see the tags created for the 1794-AENTR and digital I/O modules.



2. Make sure you select the Edit Tags tab at the bottom of the Controller Tags window, and then create the following tag:

Tag	Туре
Parts_Count	Counter

3. Close the Controller Tags window.

## **Create the Ladder Program**

Next, create the example ladder program to test the I/O.



1. Double-click Main Routine under the Main Program folder, and then enter the following ladder program, using the tag previously created.



**2.** Save the program.

#### Download the Program to the Controller

To download the program to the controller do the following:

1. Click on the Communications menu and select Who Active. The Who Active window opens .



- 2. Select your Ethernet driver (for example, AB\_ETH-1) and expand the tree through the backplane of the local ControlLogix chassis.
- 3. Highlight the Logix5572 controller and click Download. A Download dialog appears:

Download		×
A	Download to the controller: Name: <no name=""> Type: 1756-L72 ControlLogix 5572 Controller Path: AB_ETH-1\130.130.130.2\Backplane\0</no>	
	Download Cancel Help	

- **4.** Click Download. The program downloads to the controller.
- 5. Minimize the RSLogix 5000 software.

Test the example application by using a momentary switch to simulate a parts sensor.

# Test the Example Application

1. Remove power from the FLEX I/O and wire inputs 0 and 2 of the 1794-IB16 FLEX I/O input module as shown in the following figure:



- 2. Restore power to the FLEX I/O.
- **3.** Restore the RSLogix 5000 software window and place the controller in Run mode.
- 4. Repeatedly press and release the momentary switch at Input 0 (Count) on the 1794-IB16 input module.

Each time you press the switch the Parts\_Count accumulated value increments on the screen and the LEDs of the 1794-OB16 output module increment in binary.



- Press and release the momentary switch at Input 2 (Reset) on the 1794-IB16 input module. The accumulated value of the Parts\_Count reset to zero and all of the LEDs on the 1794-OB16 output module turn off.
  - **TIP** For more information on wiring and interpreting status LED indicators on the I/O modules, refer to the I/O module publications <u>1794-IN093</u> and <u>1794-IN094</u>.

This completes the Rack Optimized Discrete I/O example.

#### **Chapter Summary**

This chapter described how to set up and use rack optimized discrete I/O. The next chapter describes how to add analog I/O modules to a configuration using direct connection.

## **Analog I/O with Direct Connection**

#### **Overview**

In this example you add analog input and output modules to the FLEX I/O configured with two digital I/O modules in the previous chapter. Analog modules default to direct connection, so you will open a direct connection to each analog module while still using a single rack optimized connection for the two digital I/O modules.

To test the system, the example of the previous chapter is modified to send a signal to one of the analog output channels and read the signal back in through one of the analog input channels.

Topic	Page
Set Up the Hardware	37
Create the Example Application	38
Add the Analog Modules to the I/O Configuration	39
Add the Analog Input Module to the I/O Configuration	39
Add the Analog Output Module to the I/O Configuration	42
Edit the Controller Tags	45
Modify the Ladder Program	47
Download the Program	47
Test the Example Application	48

#### Set Up the Hardware

Change the system hardware setup of the previous chapter to that shown below, adding the FLEX analog input and output modules to the DIN rail with the 1794-AENTR adapter and digital I/O modules.



- Note that in the example application, the Logix5572 controller and 1756-EN2TR module are in the slots shown above in the ControlLogix chassis.
- Verify that the IP addresses for the 1756-EN2TR module, 1794-AENTR adapter, and programming terminal are correct.
- Verify the position (slot) of the I/O modules on the DIN rail.
- Verify that all wiring and cabling is properly connected.
- Make sure you have your communication driver (for example, AB\_ETH-1 or AB\_ETHIP-1) configured in RSLinx as described in <u>Appendix B</u>.

Perform the following steps to create the example application:

1. Start the RSLogix 5000 Enterprise Series software. The RSLogix 5000 main dialog opens.

o RSLogix 5000			_ 8 ×
<u>File</u> <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>Logic</u>		ons <u>T</u> ools <u>W</u> indow Help	
<u>N</u> ew	Ctrl+N	- KAA E PP QQ	
Open Close	Ctrl+0	No Controller 🔒 🔲 RUN	
		No Enrees DK	
		No Edits 🔐 🗖 IAT	
New Component	•	Redundancy by	
Compact			
Print Print Options	UMHP		
1 FLEX_IO_Controller.ACD		ogical 🔨	
2 Ethernet_FLEX_IO_Controlle	CD		
3 CN2DN_Controller.ACD			
<u>4</u> DeviceNet_Controller.ACD 5 Consumer.ACD			
6 Producer.ACD			
7 Ethernet_IO_Controller_2.ACD			
8 Ethernet_IO_Controller.ACD			
E <u>x</u> it			

# Create the Example Application

2. Open the project file from the previous chapter (for example, FLEX\_IO\_Controller).

ave As	×
Save in: 🔄 Projects	🗾 🔁 🖻
🚞 Samples	📓 CNET_L1_to_PLC5.ACD 🛛 👪 I
🟙 Cn2dn.ACD	👪 CNet_Sender.ACD 🛛 👪 I
😫 CN2DN_Controller.ACD	📓 Consumer.ACD   📓
CNET_L1_from_L1.ACD	📓 Consumer_from_PLC5.ACD 🛛 👪 I
🚵 CNET_L1_from_PLC5.ACD	
🔀 CNET_L1_to_L1.ACD	👪 DeviceNet_Controller2.ACD 🛛 👪
	N
File name: FLEX_10_Cont	troller_2 Save
Save as type: RSLogix 5000	Project File (*.ACD) Cancel
	Help

**3.** Save the file using a different name (for example, FLEX\_IO\_Controller\_2).

# Add the Analog Modules to the I/O Configuration

You must now add the analog I/O modules to the I/O Configuration. In this example, you add a 1794-IF4I analog input module and a 1794-OF4I analog output module. Use these steps as a guide when you are configuring different I/O modules for your system.

**IMPORTANT** Click Help on the configuration screens shown in this section if you need assistance in selecting and setting the parameters.

#### Add the Analog Input Module to the I/O Configuration



 Right click the 1794-AENTR adapter under the I/O Configuration folder, and then select New Module. The Select Module Type window opens.

	or Module Type	ear Filters		Hid	le Filters 🕱
<b>v</b>	Module Type Category Filters	<u> </u>	Module Type <sup>1</sup>	Vendor Filters	
🗹 Analog		Allen-Bra	idley		
🗹 Digital					
Other					
Specialty					
		1			
Catalog Number	Description		Vendor	Category	<b></b>
1794-IE8	8 Channel 24V DC Non-Isolated Volta	ge/Current Analo	Allen-Bradley	Analog	
1794-IE8H	8 Channel Analog Input /HART		Allen-Bradley	Analog	
1794-IE8H	8 Channel HART Analog Input		Allen-Bradley	Analog	
1794-IE8KOE4	8 Input/4 Output Channel 24V DC No	n-Isolated Voltag	Allen-Bradley	Analog	
1794-IF2X0F2I	2 Input/2 Output 24V DC Isolated Ana	alog	Allen-Bradley	Analog	
1794-IF4I	4 Channel 24V DC Isolated Analog In	put	Allen-Bradley	Analog	
		and Canfornable	Allen-Bradley	√ Analog	
1794-IF4ICF	4 Channel 24V DC Isolated Analog Inj	put, conigurable	Alicitoridaley	· Analog	

2. Select the 1794-IF4I/A analog input module from the list, and then click Create.

General Conne	ection Module Info Configuration Calibration
Туре:	1794-IF4I/A 4 Channel 24V DC Isolated Analog Input
Vendor:	Allen-Bradley
Parent:	FLEX_IO_Adapter
Name:	FLEX_Analog_Input Slot: 2
Description:	×
Comm Format:	Input Data
Revision:	1 Electronic Keying: Compatible Keying
Status: Offline	OK Cancel Apply Help

The New Module dialog opens.

3. Enter the following parameters:

Name	FLEX_Analog_Input
Slot	3
Comm Format	Input Data <sup>(1)</sup>
Electronic Keying	Compatible Module

 $^{(1)}$   $\,$  All analog Comm Formats use direct connection. The default here is Input Data.

4. Click OK to save the configuration. The Module Properties Report dialog opens. **5.** On the Connection tab, adjust the Requested Packet Interval (RPI) to meet your system requirements.

General Connection Module Info Configuration Calibration
Requested Packet Interval (RPI): 50.0 ms (2.0 - 750.0 ms)
Inhibit Module
Major Fault On Controller If Connection Fails While in Run Mode
Use Unicast Connection over EtherNet/IP
r Module Fault
Status: Offline OK Cancel Apply Help

For this example you can leave it at the default 50 ms rate.

This RPI is used for the direct connection to this analog module.

The two rack connected digital I/O modules continue to communicate at the RPI of the rack connection.

- 6. Click Apply to save the configuration.
- 7. On the Configuration tab, use the pull-down list to set the Voltage/Current Range for Channel 0 to 0 to 10V Binary.

Channel     Range     Rate     Time Constant       0     4 to 20 mA - Signed 2's Complement     1 200 Hz     None       1     4 to 20 mA - Signed 2's Complement     1 200 Hz     None       2     4 to 20 mA - Signed 2's Complement     1 200 Hz     None       3     4 to 20 mA - Signed 2's Complement     1 200 Hz     None       iteal Time Sample:     0     ms	Input	Voltage/C	Conversion Rate	Low Pass Time Constant
1         4 to 20 mA - Signed 2's Complement         ¥         1200 Hz         None         ¥           2         4 to 20 mA - Signed 2's Complement         ¥         1200 Hz         None         ¥           3         4 to 20 mA - Signed 2's Complement         ¥         1200 Hz         None         ¥           a         4 to 20 mA - Signed 2's Complement         ¥         1200 Hz         None         ¥           eal Time Sample:         0         ms         ¥         1200 Hz         None         ¥	Channel		 	
2         4 to 20 mA - Signed 2's Complement         ▼         1200 Hz         ▼ None         ▼           3         4 to 20 mA - Signed 2's Complement         ▼         1200 Hz         ▼ None         ▼           eel Time Sample:         0         ■         ms         ■         ■			 	
3 4 to 20 mA - Signed 2's Complement 1200 Hz None teal Time Sample: 0 ms	-	-	 	
ieal Time Sample: 0 ms			 	
	_ Interlea	ave Module Interrupts		

This range allows you to easily monitor the output with a voltmeter when you test the application.

Leave the other channels at their default values.

8. Click Apply to save the configuration, and then OK to close the dialog. The analog input module appears in the I/O configuration indented under the 1794-AENTR adapter.



#### Add the Analog Output Module to the I/O Configuration

1. Under the I/O Configuration folder, right-click the remote 1794-AENTR adapter, and then select New Module.



The Select Module Type window opens.

Enter Search Text fo	r Module Type	Clear Filters		Hide	Filters 🕱
_					
✓ Analog	Module Type Category Filters	Allen-Br-	Module Type <sup>1</sup>	Vendor Hilters	
✓ Analog ✓ Digital		Allenton	suley		
Specialty					
0.1 N 1			1		
Catalog Number	Description		Vendor	Category	<b>^</b>
1794-0E4	4 Channel 24V DC Non-Isolated Volt	tage/Current Analo	Allen-Bradley	Analog	
1794-0E8H	8 Channel Analog Output /HART		Allen-Bradley	Analog	
1794-0E8H	8 Channel HART Analog Output		Allen-Bradley	Analog	
1794-0F4I	4 Channel 24V DC Isolated Analog 0		Allen-Bradley	Analog	
1794-0F8IH	8 Channel HART Analog Current Iso	lated Output	Allen-Bradley	Analog	
	16 Point 5V DC TTL Output		Allen-Bradley	Digital	
1794-0G16	16 Point 240V AC Output		Allen-Bradley	Digital	
	TO FOIR 240V AC Output		ALL D. II	Digital	
1794-OG16	8 Point 220V AC Output		Allen-Bradley	Digital	•

2. Select the 1794-OF4I module from the list, and then click Create. The New Module dialog opens.

New Module		×
Type: Vendor: Parent: Name:	1794-0F4I/A 4 Channel 24V DC Isolated Analog Output, Source Allen-Bradley FLEX_I0_Adapter FLEX_Analog_Output Slot: 3	
Description:	×	
Comm Format:	Output Data	
Revision:	1 1 - Electronic Keying: Compatible Keying	
🔽 Open Modul	e Properties OK Cancel Help	

**3.** Enter the following parameters:

Name	FLEX_Analog_Output
Slot	3
Comm Format	Output Data <sup>(1)</sup>
Electronic Keying	Compatible Module

 $^{(1)}$   $\,$  All analog Comm Formats use direct connection. The default here is Output Data.

4. Click OK to save the configuration. The Module Properties Report dialog opens. **5.** On the Connection tab, adjust the Requested Packet Interval (RPI) to meet your system requirements.

General Connection Module Info Configuration Calibration
Requested Packet Interval (RPI): 50.0 📩 ms (2.0 - 750.0 ms)
Major Fault On Controller If Connection Fails While in Run Mode
Use Unicast Connection over EtherNet/IP
Module Fault
Status: Offline OK Cancel Apply Help

For this example change the RPI to 50 ms rate.

This RPI is used for the direct connection to this analog module.

The two rack connected digital I/O modules continue to communicate at the RPI of the rack connection.

- 6. Click Apply to save the configuration.
- 7. Click the Fault/Idle Action tab.

General Co	onnection   Module In	fo Fault/Idle Action	Configuration ]		
	ation Fault Behavior: Iode Behavior:	Reset Outputs Reset Outputs	•		
Channel 0	Safe State Value 0				
1 2	0				
3	0				
Status: Offline		OK	Cancel	Apply	Help

For this example, leave these parameters at the default setting.

For an explanation of these parameters click Help.

8. On the Configuration tab, use the pull-down list to set the Voltage/Current Range for Channel 0 to 0 to 10V – Binary to match the input configuration of the 1794-IF4I module.

Output Channel	Voltage/Current Range	Hold For Initialization	Note: Set OutputEnable, in the output tag for this module,
0	4 to 20 mA - Signed 2's Complement 🛛 💌		to one (1) or selecting 'Hold
1	4 to 20 mA - Signed 2's Complement 📃 💌		For Initialization' will have no
2	4 to 20 mA - Signed 2's Complement 📃 💌		effect.
3	4 to 20 mA - Signed 2's Complement 🛛 💌		
i intene	ave Module Interrupts		
	ave Module Interrupts		

Leave the other channels at their default values.

**9.** Click Apply to save the configuration, and then OK to close the dialog. The analog input module appears in the I/O configuration indented under the 1794-AENTR adapter.



#### **Edit the Controller Tags**

When you add modules to the I/O configuration the system creates Controller Tags for those modules. For the example program you need to add one more Controller Tag.



	S	сор	e: Flex_IO_Controller(ci	Show: Show All	So <u>r</u> t:	Tag Name 💌	
		Ρ	Tag Name ⊽	Alias For	Base Tag	Туре	Style 🔺
	►					AB:1794_IB16:C:0	
				FLEX_10_Adapter	FLEX_10_Adapter	INT	Binary
						AB:1794_D016:C:0	
				FLEX_10_Adapter	FLEX_10_Adapter	INT	Binary
						AB:1794_IF4I:C:0	
						AB:1794_IF4I:I:0	
New tags created ———						AB:1794_0F4I:C:0	
by the system for						AB:1794_0F4I:I:0	
the analog modules						AB:1794_0F4I:0:0	
the dilatog modules						AB:1794_AEN_8	
						AB:1794_AEN_8	
			⊕-Parts_Count			COUNTER	
	*						
		<u>-</u>	Monitor Tags A Edit Tag				

 Double-click the Controller Tags folder in the project window. Note that new tags have been added for the analog I/O modules.

Make sure you select the Edit Tags tab at the bottom of the Controller Tags window, and then create the following tag:

Tag	Туре
Analog_Test_Signal	Timer

		e: Flex_IO_Controller(c.		▼ Sort:		
	P	TagName ⊽	Alias For	Base Tag	Туре	Style
					AB:1794_IB16:C:0	
			FLEX_10_Adapter	FLEX_10_Adapter	INT	Binary
					AB:1794_D016:C:0	
			FLEX_IO_Adapter	FLEX_IO_Adapter	INT	Binary
					AB:1794_IF4I:C:0	
					AB:1794_IF4I:I:0	
					AB:1794_0F4I:C:0	
					AB:1794_0F4I:I:0	
					AB:1794_0F4I:0:0	
					AB:1794_AEN_8	
					AB:1794_AEN_8	
		+-Parts_Count			COUNTER	
					TIMER	
*	Ī					

#### **Modify the Ladder Program**

Make the following change to the ladder program to test the new configuration.



**2.** Double-click Main Routine under the Main Program folder, and then add rungs 3 and 4 to the ladder program.



**3.** Save the program.

#### **Download the Program**

To download the program to the controller do the following:

1. Click the Communications menu, and then select Who Active. The Who Active window opens.



- 2. Select your Ethernet driver (for example, AB\_ETH-1) and expand the tree through the backplane of the local ControlLogix chassis.
- Highlight the controller. and then click Download to download the program to the Logix5572 controller. A Download dialog appears:



- **4.** Click Download. The program downloads to the controller.
- 5. Minimize the RSLogix 5000 software window.

Use the following procedure to test the operation of the FLEX analog input and output modules:

1. Connect analog output channel 0 on the 1794-OF4I/A module to analog input channel 0 on the 1794-IF4I/A input module.



- 2. Restore the RSLogix 5000 software window and place the controller in Run mode.
- 3. Double-click the Controller Tags folder, and then select the Monitor tab.

Scope: Flex_ID_Controller(ci 💌 Show: Show All 💌 Sort: Tag Name 💌					
Tag Name 🗸 🗸	Value 🔸	Force Mask 💦 🔦 🗲	Style	Туре	
	{}	{}		AB:17	
	2#0000_000		Binary	INT	
	{}	{}		AB:17	
	2#0000_000		Binary	INT	
	{}	{}		AB:17	
-FLEX_I0_Adapter:2:1	{}	{}		AB:17	
FLEX_I0_Adapter:2:I.Fault	2#0000_000		Binary	DINT	
FLEX_I0_Adapter:2:I.Ch0Data	25461		Decimal	INT	
	0		Decimal	INT	
	0		Decimal	INT	
	0		Decimal	INT	

### Test the Example Application

	<ul> <li>4. Monitor channel 0 of the 1794-IF4I input module (FLEX_IO_Adapter:2.I.Ch0Data above). The value slowly rises to approximately 32000, resets to zero, starts risin again, and so on, as the output of the timer is received from the 1794-OF4I output module.</li> </ul>			
	TIP	For information on wiring and troubleshooting the I/O modules, refer to the FLEX I/O Analog I/O Module Installation Instructions, publications <u>1794-IN037</u> and <u>1794-IN038</u> .		
	This compl	etes the Direct Connect Analog I/O example.		
Chapter Summary	This chapter descr connection.	ribed how to set up and use analog I/O modules with direct		

## Notes:

# **Interpret Status Indicators**

#### **Overview**

**Status Indicators** 

The faceplates of the 1794-AENT and 1794-AENTRXT adapters are provided with status indicators that display the Module Status, Network Status, and Link Status for both links.

#### 1794-AENTR, 1794-AENTRXT Module

#### 1794-AENTR shown



Use the following table to determine the indicator conditions and status.

#### **Status Indicator Identification**

Indicator	State	Status
Link 1 or Link 2 (individually)	Off	No link exists. Verify network cabling. Correct as necessary.
	Solid green	Link exists at 100 Mbps.
	Flashing green	I/O is being transmitted or received at 100 Mbps.
	Flashing yellow	I/O is being transmitted or received at 10 Mbps.
	Solid yellow	Link exists at 10 Mbps.

Indicator	State	Status
Module Status Indicator	Off	No power. Adapter does not have 24V DC power. Make sure power is being supplied to the adapter.
	Flashing green	Standby. Adapter not configured. Configure adapter.
	Green	Operational. Adapter operating correctly. No action required.
	Flashing red	Minor fault. A recoverable fault has been detected. This could be caused by an incorrect or inconsistent configuration. Check configuration and reconfigure as needed.
	Solid red	Major fault. An unrecoverable fault has been detected. Recycle power to the adapter. If this does not clear the fault, replace the adapter.
	Flashing red/green	Self test. Adapter performing power-up self test. Wait until completed.
Network Status Indicator	Off	Not powered. No IP address. Adapter is not powered or does not have an IP address. Verify there is power and the adapter is correctly wired to the power supply. Make sure the adapter is configured.
	Flashing green	No connection. Adapter has obtained an IP address, but has no established connections.
	Green	CIP connections. Adapter has an IP address and at least one established connection.
	Flashing red	Connection timeout. One or more of the connections in which the adapter is the target has timed out.
	Red	Duplicate IP address. Adapter has detected that its IP address is already in use. Configure the adapter with a unique IP address.
	Flashing red/green	Self-test. Adapter performing power-up self test.

#### **Status Indicator Identification**

## **Chapter Summary**

This appendix described how to troubleshoot your adapter module by interpreting the status indicators.

# **Configure the RSLinx Ethernet Communication Driver**

Overview	Read this appendix to install, and configure the AB_ETH driver.				
	For Information On	Page			
	About the Ethernet Communication Driver	53			
	Install the RSLinx Software	53			
	Configure the AB_ETH Driver	53			
About the Ethernet Communication Driver	In order to communicate with your 1794-AENTR or 1794-AENTRXT ada over your network you must configure the RSLinx Ethernet communication driver (AB_ETH). You can configure the AB_ETH driver with the IP addr of all the Ethernet devices on your system. You will need this driver to down the example application programs in this manual.				
Install the RSLinx Software	<ul> <li>Use the following procedure to install RSLinx software on your computer.</li> <li>Insert the CD in the CD-ROM drive. Note: The CD-ROM supports Windows Autorun. Once inserted into a CD-ROM drive, if you have Autorun configured, the installation will automatically start at the first setup screen.</li> </ul>				
	If Autorun is not configured for your CD-ROM drive, go to step 2.				
	<ol> <li>From the Start menu, choose Run. The Run pop-up window appears.</li> </ol>	~ <b>-</b>			
	<ol> <li>Type D:/setup (if it doesn't appear automatically), where D: is your CD-ROM driver letter.</li> </ol>				
	4. Click OK. The progress bar appears, followed by the welcome scree	:n.			
Configure the AB_ETH Driver	To configure the AB_ETH Ethernet communication driver pe following steps:	rform the			

1. Start RSLinx.



- 2. From the Communications menu, select Configure Drivers.
- From the Available Driver Types drop down menu, select Ethernet Devices, and then click Add/New. The Add New RSLinx Driver dialog box appears.

Add New RSLinx Driver	×
Choose a name for the new driver. (15 characters maximum)	ОК
AB_ETH-1	Cancel
, -	

4. Select the default driver name (for example, AB\_ETH-1) or type in your own name and click OK.

The Configure driver dialog appear with the Station Mapping tab open.



- 5. Click Add New and enter the IP address or Host Name of your Ethernet device (for example, 130.130.130.2, "Pump1").
- 6. Repeat step 5 for each additional Ethernet device you need to access.

7. When you are done entering the IP addresses, click Apply and then click OK to close the Configure driver window.

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

onfigure Drivers - Available Driver Types:		?
Ethernet devices	► <u>A</u> dd New	<u>C</u> lose <u>H</u> elp
- Configured Drivers:		 
Name and Description	Status	
AB_ETH-1 A-B Ethemet RUNNING AB_KT-1 DH+ Stat0 Addr:D700 RUNNING	Bunning Running	Configure
AB_KTC-1 CNet Node:17 Addr:d000 Intr:None RUNNING	Running	Startup
		<u>S</u> tart
		Stop
		<u>D</u> elete

8. Close RSLinx.

## Notes:

# **Adapter Web Dialogs**

#### **Overview**

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

Topic	Page
Work with the Home Page	57
Work with the Diagnostics Pages	59
Use the Diagnostic Overview Page	60
Use the Network Configuration Page	66
Use the Ethernet Statistics Page	62
Use the I/O Connections Page	63
Work with the Configuration Pages	64
Use the Device Identity Page	65
Use the Network Configuration Page	66
Use the Device Services Page	68

#### Work with the Home Page

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

- ModuleName
- Module Description
- Module Location
- IP Address
- Ethernet Address (MAC)
- DHCP Enabled
- Status
- Serial Number
- Product Revision
- Firmware Version Date

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

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



**2.** From the Home page, click Expand to show options, or minimize to see Diagnostics and Configuration.

	Allen-Bradley 179	94-AENTR/A	
Click Expand to show options.	External Minimize	Home	
	Diagnostics	Module Name	1794-AENTR/A
	Diagnostic Overview	Module Description	User Entered Te
	Network Settings	Module Location	User Entered Te
	I/O Connections	IP Address	192.168.1.1 from
		Ethernet Address (MAC)	00:00:BC:CC:9
	Identity	DHCP Enabled	False
	Network	Status	Awaiting Connec
	Services	Serial Number	405D5323

- 3. From the Home page, complete one of these, as desired.
  - Click one of the following to access <u>www.ab.com</u>.
    - Allen-Bradley logo at the top of the page
    - AB.com link under Resources on the right hand side of the page
  - Click Rockwell Automation at the top right to go to <u>www.rockwellautomation.com</u>.
  - Click the following to see additional diagnostics web pages.
    - Diagnostics Diagnostic overview, Network Settings, Ethernet Statistics, I/O Connections
    - Configuration Identity, Network, Services

### Work with the Diagnostics Pages

To work with the Diagnostics options, follow these procedures.

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

Click tabs to see the	Allen-Bradley 179	94-AENTR/A		
corresponding page.	Expand Minimize	Diagnostic Overview Network	Settings Ethernet Sta	tistics VI/O Connection
Click Diagnostics ————— options to see	Home Diagnostics Diagnostic Overview	Refresh Rate [sec] 15		
corresponding pages	Network Settings	Ring Status		Module Setting
	Ethernet Statistics	Network Topology	Linear	Switches
	I/O Connections	Network Status	Normal	
Type a refresh rate.	Configuration	Ring Supervisor	00:00:00:00:00:00 0.0.0.0	
		System Resource Utilization	1	
		CPU Utilization	23.8% (23.8%[pk])	
		Module Uptime	01h:23m:22s	
		CIP Connection Statistics		
		Current CIP Msg Connections	0	
		CIP Msg Connection Limit	32	
		Max Msg Connections Observed	i o	
		Current CIP I/O Connections	0	
		CIP I/O Connection Limit	31	
		Max I/O Connections Observed	0	
	$\searrow$	Conn Opens	0	
		Open Errors	0	
		Conn Closes	0	
		Close Errors	0	
		Conn Timeouts	0	
		LED Status :		
		Module Status		
		Network Status		
Download EDS files for — your adapter			Get 1794-AENTI	<u>R EDS Files</u>

#### **Use the Diagnostic Overview Page**

To use the Diagnostic Overview page for general diagnostics information, click Diagnostic Overview from the tab at the top of the page or panel on the left.

From the Diagnostic Overview page, you can view the following:

- Ring Status
  - Network Topology
  - Network Status
  - Ring Supervisor
- System Resource Utilitization
- CPU Utilization
- Module Uptime
- CIP Connection Statistics
  - Current CIP MSG Connections
  - CIP MSG Connection Limit
  - Max Msg Connections Observed
  - Current CIP I/O Connections
  - CIP I/O Connection Limit
  - Max I/O Connections Observed
  - Conn Opens
  - Open Errors
  - Conn Closes
  - Close Errors
  - Conn Timeout
  - Module Settings
  - Switches

#### **Use the Network Settings Page**

To use the Network Settings page for network related information, click Network Settings tab at the top of the page or panel on the left. This opens the Network Settings page.

Expand Minimize	Diagnostic Overview Net	work Settings Ethernet St	tatistics I/O Connections	
Diagnostics	Network Interface		Ethernet Port 1	
Diagnostic Overview	Ethernet Address (MAC)	00:00:BC:CC:91:D7	Interface State	Enabled
Network Settich	IP Address	192.168.1.1	Link Status	Active
Ethernet Statistics     I/O Connections     Configuration	Subnet Mask	255.255.255.0	Media Speed	100Mbps
	Default Gateway	0.0.0.0	Duplex	Full Duplex
	Primary Name Server	0.0.0.0	Autonegotiate Status	Media speed and
	Secondary Name Server	0.0.0.0		duplex found
	Default Domain Name		Ethernet Port 2	
	Host Name		Interface State	Enabled
	Name Resolution	DNS Disabled	Link Status	Active
			Media Speed	100Mbps
		Ethernet Interface Configuration	Duplex	Full Duplex
	Obtain Network Configuration	on Static	Autonegotiate Status	Media speed and duplex found

From the Network Settings page, you can view the following:

- Network Interface
  - Ethernet Address (MAC)
  - IP Address
  - Subnet Mask
  - Default Gateway
  - Primary Name Server
  - Secondary Name Server
  - Default Domain Name
  - Host Name
  - Name Resolution
- Ethernet Interface Configuration
  - Obtain Network Configuration
- Ethernet Port 1 and 2
  - Interface State
  - Link Status
  - Media Speed
  - Duplex
  - Autonegotiate Status

#### **Use the Ethernet Statistics Page**

To use the Ethernet Statistics page for information about the Ethernet link and interface and media counters, click Ethernet Statistics tab at the top of the page or from the panel on the left.

The Ethernet Statistics page opens.

dley 1794-AENTR/A			Rock Automa	
Minimize Diagnostic Overview	Network Settings Ethernet Sta	tistics I/O Connections		
	Refresh Rate [sec] 15			
s Ethernet Port 1		Media Counters Port 1		
Interface State	Enabled	Alignment Errors	0	
Link Status	Active	FCS Errors	0	
Media Speed	100Mbps	Single Collisions	0	
Duplex	Full Duplex	Multiple Collisions	0	
Autonegotiate Statu	s Media speed and duplex	SQE Test Errors	0	
	found	Deferred Transmissions	0	
Ethernet Port 2		Late Collisions	0	
Interface State	Enabled	Excessive Collisions	0	
Link Status	Active	MAC Transmit Errors	0	
Media Speed	100Mbps	Carrier Sense Errors	0	
Duplex	Full Duplex	Frame Too Long	0	
	Media greed and dupley	MAC Receive Errors	0	
Autonegotiate Statu	s found			
		Media Counters Port 2		
Interface Counter	<b>'</b> 5	Alignment Errors	0	
In Octets	770245	FCS Errors	0	
In Ucast Packets	2501	Single Collisions	0	
In NUcast Packets	724	Multiple Collisions	0	
In Discards	0	SQE Test Errors	0	
In Errors	0	Deferred Transmissions	0	
In Unknown Protos	0	Late Collisions	0	
Out Octets	617352	Excessive Collisions	0	
Out Ucast Packets	1637	MAC Transmit Errors	0	
Out NUcast Packets	103	Carrier Sense Errors	0	
Out Discards	0	Frame Too Long	0	
Out Errors	0	MAC Receive Errors	0	

From the Ethernet Statistics page, you can view the following:

- Ethernet Port 1 and Port 2
  - Interface State
  - Link Status
  - Media Speed
  - Duplex
  - Autonegotiate Status
- Media Counters Port 1 and Port 2
  - Alignment Errors

- FCS Errors
- Single Collisions
- SQE Test Errors
- Deferred Transmissions
- Late Collisions
- Excessive Collisions
- MAC Transmit Errors
- Carrier Sense Errors
- Frame Too Long
- MAC Receive Errors
- Interface Counters
  - In Octets
  - In Ucast Packets
  - In NUcast Packets
  - In Discards
  - In Errors
  - In Unknown Protos
  - Out Octets
  - Out UCast Packets
  - Out NUcast Packets
  - Out Discards
  - Out Errors

#### Use the I/O Connections Page

To use the I/O Connections page for CIP I/O (Class 1) connection information, click I/O Connections tab at the top of the page or panel on the left. The I/O Connections page opens.



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

Connection Number / Uptime

- Received / Transmitted packets
- Connection ID
- Source
- Destination
- Multicast Address
- RPI
- Lost Packets
- Size

### Work with the Configuration Pages

To work with the Configuration pages, follow these procedures.

IMPORTANT	The values on these pages are in non-volatile memory. Changes to these parameters do not take effect until you reset or cycle power through the FLEX I/O adapter.
IMPORTANT	<ul> <li>If you set the value of the adapter switch to 888 and then power cycle the module, the following occurs:</li> <li>The DHCP Enabled function is enabled (set to True).</li> <li>The Ethernet link is negotiated automatically. The Auto Negotiate function is set to True.</li> <li>The web server is enabled. The Disabled Web Server function is disabled.</li> <li>The Ethernet port are disabled. Both ports are re-enabled once the switches are returned to their previous value and power is cycled.</li> <li>The password for this page resets to the factory default which is " blank&gt;".</li> </ul> Note the value of the switches before you enter the 888 value because you must return the adapter to those values once this process is complete.

- 1. From the Home page, click Configuration or Expand to see the Configuration options, if needed.
- 2. From the Configuration page, click one of the following:
  - Identity
  - Network
  - Services
A login dialog opens as shown. The dialog may vary in appearance depending on your operating system and browser.

Connect to 192.16	58.1.1 <b>?</b> 🗙
	GP
The server 192.168 and password.	3.1.1 at Administrator requires a username
	er is requesting that your username and n an insecure manner (basic authentication nnection).
User name:	🛃 Administrator
Password:	
	Remember my password
	OK Cancel

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

#### **Use the Device Identity Page**

To use the Device Identity page to make entries for the device name, device description, and device location, click Device Identity from the tab at the top of the page or panel on the left.

Allen-Bradley 179	4-AENTR/A		Rockwell Automation
Expand Minimize  Home  Jiagnostics  Configuration  Identity Network Services	Identity Network Con Device Information Host Name Module Description Module Location	nfiguration       Services         1794-AENTR       1794-AENTR         1794-AENTR       Interview         Apply Changes       Interview         (eg. &, ?) are not supported. Values on this page are in non-voletters do not take effect until the module has been rest or power         Copyright © 2011, Rockwell Automation, Inc. All rights reserve	Automation

The Identity page opens.

From the Identity page, complete entries for the following, noting that the description and location help you identify where modules are in the facility:

- Host Name
- Module Description
- Module Location
- 6. Click Apply Changes to save the modified values.

#### **Use the Network Configuration Page**

To use the Network Configuration page to make entries for enabling or disabling DHCP and setting TCP/IP parameters and Ethernet link operation, click Network Configuration tab at the top of the page or panel on the left.

Allen-Bradley 1	794-AENTR/A	Rockwe Automatio
Expand Minimize	Identity Network Configuration Services	
Home		
Diagnostics Configuration	Initial Network Configuration	
Identity	Ethernet Interface Configuration Static	<b>•</b>
Network Serves	Network Interface	
	IP Address 192.168.1.1	
	Subnet Mask 255.255.255.0	
	Gateway Address 0.0.0.0	
	Primary Name Server 0.0.0.0	
	Secondary Name Server 0.0.0.0	
	Domain Name	
	Ethernet Link Port 1	
	Port 1 Enabled Enabled	
	Autonegotiate Status Autonegotiate Speed and Duplex	-
	Select Port Speed 100 Mbps 💌	
	Select Duplex Mode Half Duplex	
	Ethernet Link Port 2	
	Port 2 Enabled Enabled	
	Autonegotiate Status Autonegotiate Speed and Duplex	•
	Select Port Speed 100 Mbps	
	Select Duplex Mode Half Duplex	
	Apply Chapage	
	Apply Changes	
	Note: Special characters (eg. &, ?) are not supported. Values on this p Changes to these parameters do not take effect until the module has b	
	Copyright © 2011, Rockwell Automation, I	

The Network Configuration page opens.

From the Network Configuration page, complete these entries, noting that values for Network Interface are disabled when DHCP is Dynamic DHCP and port speed and duplex mode are disabled when Autonegotiate Speed and Duplex is selected.

- For Initial Network Configuration:
  - Ethernet Interface Configuration
  - Static
  - Dynamic DHCP
- For Network Interface, fill out these fields:
  - IP Address
  - Subnet Mask
  - Gateway Address
  - Primary Name Server

- Secondary Name Server
- Domain Name
- For Ethernet Link Port 1 and Port 2, specify the following:
  - Autonegotiate Status
  - Autonegotiate Speed and Duplex
  - Force Speed and Duplex
  - Select Port Speed 10 megabits, 100 megabits
  - Select Duplex Mode Half Duplex, Full Duplex
- 7. From the Network Configuration page, click Apply Changes to save the modified values.

#### **Use the Device Services Page**

To use the Services page to change the password for the Configuration web page or disable the web server, click Device Services tab at the top of the page or panel on the left.

Allen-Bradley 1794	I-AENTR/A				Rockwell Automation
Expand Minimize	Identity Network	: Configuration	Services		
Diagnostics	Service	Description	Status	Enable	
Configuration	НТТР	Web Server	Running		
Network	Set Password				
<u> </u>	New Password				
	Confirm Password				
			Apply Changes		
			e not supported. Values on ake effect until the module		
		Copyrigh	t © 2011, Rockwell Autom	ation, Inc. All rights res	erved.

The Device Services page opens.

From the Services page, make these entries.

- Click the Enable box to change whether the web server runs after the module is reset.
- Change the password by typing a new value for New Password and Confirm Password, noting the following:
  - The entry is case sensitive.
  - The default value is <blank>.
- 8. Click Apply Changes.

#### Numerics

1756-EN2TR 24, 38 module 28, 38 1756-EN2TR bridge 27 1756-EN2TR module 24, 28, 38 1794-IB16 24

# A

**AB ETH** 35, 38, 48, 53, 54 configured 24 ethernet communication driver 53 adapter 1, 7 1794-AENTR iii, 2, 3, 5, 7, 15, 23, 24, 26, 27, 28, 29, 30, 33, 37, 38, 40, 42, 45, 51, 53 1794-AENTRXT iii, 2, 3, 5, 7, 15, 53 add 27 bridae 3 cabling components 2 child 27 CIP protocol 3 communicating through 5 compatibility 2 connect or disconnect 9 connection to 5 diagnostics 57 FDS file 59 Ethernet hardware address 15 faceplate 51 features 2 fixed network address 22 FLEX I/O iii, 1, 7 FlexBus 9 hook 8 install 7 IP address 22, 58 lock 10 module 2 mount 8, 9, 23 position 8 rack optimized 23 refers to 2 remove 9 remove or replace 8 replace 9 RPI 4, 5 **RPI** rate 5 subnet mask 12 support 4 unique IP address 15 web server dialog 57 wiring 8

#### adapter module 1 address

default 16 ethernet 19 Ethernet hardware 15 gateway 12, 15, 16 hardware 19 host ID 17 IP 2, 12, 15, 16, 53 MAC 17 network 12, 18, 22 node 12 analog I/O module 39

# В

BootP 21 protocol 15 utility 15 BootP utility 15 BootP/DHCP utility 18 BootP/DHCP utility 18 bridge 1756-EN2TR 23, 27 bridge module 4 bridging module 3

# C

capacity module 2 communicate 1 programmable controllers 1 communication driver 24, 38 compatibility hardware 2 software 2 configuration device identity 65 identity 64 network 64 network configuration 66 services 64 configuration data 1 configure 1756-EN2TR 27 AB ETH driver 53 BootP/DHCP 18 digital I/O 37 direct communication 5 ethernet communications driver 53

gateway 18 gateway address 15 IP address 15 new adapter 15 rack connection 23 routing tables 3 RPI 5 RSLinx 24, 38 subnet mask 15 TCP/IP settings 57 configure driver window 55 connection adjacent 9 backplane 9 direct 4, 37, 41, 44 1/0 58 power wiring 9 rack 41, 44 rack optimized 4, 23 single 5 connection point 9 connections 84 1/0 59 connector FlexBus 9 controller Logix5572 23 conventions iv corresponding IP address 20

# D

data 24 configuration 1, 4 consumed 4 exchange 4 1/03,5 input 4 messaging 3 output 43 produce 4 read 23 send 23 transfer 4 data input 40 data transfer real time 4 default address 16 description 20 device identity host name 66

module description 66 module location 66 device services enable 68 new password 68 **DHCP** 21 **DHCP enabled** 57 diagnostic overview 59 diagnostics options 59 dimensions 1794-AENTR 13 1794-AENTRXT 13 mounting 13 **DIN rail** 2, 7, 10, 23, 24, 37, 38 mounting 2 top-hat 8 direct connection 4 discrete I/O modules 5 driver configure 55 duplex full 2 half 2 dynamic allocation network address 22

# Ε

EDS file adapter 59 Electronic Keying 27 ethernet address (MAC) 19 Ethernet device 54 ethernet statistics 59 ethernet port 1 62 ethernet port 2 62 interface counters 63 media counters 62 example direct connection 37 rack optimized 23

# F

faceplate adapter 51 features adapter 2 firmware upgrades 2

#### FLEX I/O 23

adapter 1 description 1 I/O module 1 module components 7 system 1 terminal base 1 FLEX I/O module 2, 29 FLEX I/O system 1 components 1 definition 1 FlexBus connector 9

## G

gateway 16 gateway address 12, 15, 16 configure 15

#### H

hardware compatibility 2 hardware address 19 Host ID 16 host ID address 17 host name 54 hostname 20

## I

I/O connections 59 connection ID 64 connection number 63 destination 64 lost packets 64 mulitcast addresss 64 received packets 64 RPI 64 size 64 source 64 transmitted packets 64 uptime 63 I/O data 3, 5 real time 3 **I/O module** 1, 3, 4, 5, 8, 26 indicators status 7.51 input data 40 input module 3, 23, 29 install physically 7

**Internet Protocol** IP 12 invalid number thumbwheel switches 12 IP Internet Protocol 12 **IP Address** 19, 27 IP address 2, 12, 15, 16, 17, 20, 53, 54, 57, 58 adapter 22 class 16 configure 15 corresponding 20 dotted-decimal 16 gateway 17 retrieve 12 switches 7 unique 15, 16 verify 24, 38 IP network 15

## L

LED indicators interpret 36 locking tab 10

#### Μ

MAC address 17 manuals related iv messaging direct connection 4 module 8 1756-EN2TR 24, 26, 27 1794-IB16 23, 29, 30, 36 1794-IF4I 45 1794-0B16 23, 29, 32, 36 1794-0F4I 43 adapter 1 analog I/O 39 analog input 39 analog output 42 bridge 4 bridging 3 capacity 2 components 7 configurations 29 definition 28 description 57 digital input 23 digital output 23 dimensions 13

FLEX I/O 2, 29 1/0 1, 3, 4, 5, 8, 26 input 3, 23, 29, 37 input, add 30 insert or remove 9 latching mechanism 9 location 57 locking tab 7 name 57 output 23, 29, 37 output, add 31 reinstall 10 settings 60 type 26 uptime 60 module capacity 2 module description 57 module location 57 module name 57 module settings 60 module type 26 module uptime 60 modules analog input 37 analog output 37

## Ν

**Net ID** 16 net ID 17, 18 network 3 cable 11 devices 3 EtherNet/IP 3, 4, 7 scheduling 2 TCP/IP 21 traffic 3 network address 12, 18, 22 network cable 11 network configuration ethernet link port 1 68 ethernet link port 2 68 initial 67 netowrk interface 67 network scheduling 2 network settings 59 ethernet interface configuration 61 ethernet port 1 61 ethernet port 2 61 network interface 61 networking consumer 3

node address 12 set 12

## 0

output data 43 output module 23, 29 overview diagnostic 59

## Ρ

power supply 23 Protocol Dynamic Host Configuration (DHCP) 12, 21 Internet (IP) 12 protocol application layer 3 BootP 15 CIP 3 message based 3 TCP/IP iii TCP/UDP/IP 2 publications download iv related iv view iv purpose of this manual iii

# R

rack optimized connection 23 real time data transfer 4 refresh rate 59 RPI 41 RSLinx 38

S

settings network 59 software compatibility 2 statistics ethernet 59 status link 51 module 51 network 51 status indicators 7, 51 subnet mask configure 15 switches IP address 7 thumbwheel 12

# T

TCP/IP network 21 protocol iii terminal base 1, 2, 9 adjacent 9, 10 unit 9 thumbwheel settings 12 switches 12 thumbwheel switches invalid number 12 read 12 transfer data 4

U

#### unique

48-bit hardware address 15 combination of bits 18 IP address 15, 52 **unique IP address** 15

#### W

web dialogs CIP connection statistics 60 configuration 64 diagnostic overview 59, 60 ethernet statistics 59, 62 home page 57 I/O connections 59, 63 module settings 60 network settings 59, 61 password 65 ring status 60 system resource utilization 60 user name 65 web server 57

Rockwell Automation Publication 1794-UM066B-EN-E - March 2015

# **Rockwell Automation Support**

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

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

best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect

support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <u>http://www.rockwellautomation.com/support/</u>.

## **Installation Assistance**

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual.

You can contact Customer Support for initial help in getting your product up and running.

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

## **New Product Satisfaction Return**

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

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

# **Documentation Feedback**

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

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

#### www.rockwellautomation.com

#### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444 Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640 Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846