Allen-Bradley

PowerFlex® Communications

EtherNet/IP Adapter

20-COMM-E

Series A
FRN 2.xxx

Series B
FRN 3.xxx

User Manual

Rockwell Automation

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 SGI-1.1 available from your local Rockwell Automation sales office or online at **http://www.rockwellautomation.com/literature**) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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

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

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

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

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

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Shock Hazard labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present.

Burn Hazard labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be at dangerous temperatures.

The information below summarizes the changes made to this manual since version 20COMM-UM010B-EN-P (May 2003):

Description of Changes	Page
Online literature reference www.ab.com/manuals changed to www.rockwellautomation.com/literature.	P-1
Added Web Pages Switch (item 4 in Figure 1.1) — Series B adapter only.	1-1
Added “Setting Web Pages Switch (Series B only)” section to Chapter 2.	2-2
Added tip on auto detection of baud rate and duplex.	3-7
Added Series B adapter information in “Setting Web Access Control” subsection.	3-17
Added PowerFlex 700VC I/O word table.	4-6
Added adapter diagnostic item numbers 55, 56, 57, and 58.	7-7
Added new event codes 42 - 48.	7-10
Updated adapter web pages and related information.	Chapter 8
Added chapter for using the 20-COMM-E adapter in External DPI Comms Kit.	Chapter 9

Series A Firmware Release v2.002 adds the following 20-COMM-E adapter features:

- Updated adapter web pages.
- Diagnostic item number 55.
- Event codes 42 - 45.

Series B Firmware Release v3.xxx adds the following 20-COMM-E adapter features:

- Web Pages Switch (SW2 in Figure 2.2) to enable or disable the adapter web pages.
- Parameter 54 is reserved. (This parameter is only provided with v2.xxx firmware.)
- Parameter 55 - [Web Enable] to display the setting of the Web Pages Switch (SW2) when the adapter was last reset.
- Parameter 56 - [Web Features] to set the access to the Web interface and Web-configurable features.
- Diagnostic item numbers 56 (OPT Status), 57 (OPT RX Errors), and 58 (OPT FW Version) for optional I/O Board 20-XCOMM-IO-OPT1 when using the 20-COMM-E adapter in an External DPI Comms Kit (20-XCOMM-DC-BASE).
- Event codes 46-48.
- Configuration of the 20-COMM-E adapter to use the optional I/O Board 20-XCOMM-IO-OPT1 installed in an External DPI Comms Kit (20-XCOMM-DC-BASE).

Notes:

Table of Contents

About This Manual

Related Documentation

For:	Refer to:	Publication
EtherNet/IP	*EtherNet/IP Planning and Installation Manual* *EtherNet/IP Performance and Application Guide*	ENET-IN001… ENET-AP001…
DriveExplorer™	http://www.ab.com/drives/driveexplorer, and DriveExplorer Online help (installed with the software)	—
DriveTools™ SP	http://www.ab.com/drives/drivetools, and DriveTools SP Online help (installed with the software)	—
HIM	*HIM Quick Reference*	20HIM-QR001…
PowerFlex® 70 Drive	*PowerFlex 70 User Manual* *PowerFlex 70/700 Reference Manual*	20A-UM001… PFLEX-RM001…
PowerFlex® 700 Drive PowerFlex® 700VC Drive	*PowerFlex 700 User Manual* *PowerFlex 70/700 Reference Manual*	20B-UM001… PFLEX-RM001…
PowerFlex® 700H Drive	*PowerFlex 700H Installation Instructions* *PowerFlex 700H Programming Manual*	PFLEX-IN006… 20C-PM001…
PowerFlex® 700S Drive (Frames 1 through 6)	*PowerFlex 700S with Phase I Control User Manual* *PowerFlex 700S with Phase II Control User Manual* *PowerFlex 700S Reference Manual*	20D-UM001… 20D-UM006… PFLEX-RM002…
PowerFlex® 700S Drive (Frames 9 through 11)	*PowerFlex 700S Installation Instructions* *PowerFlex 700S with Phase I Control User Manual* *PowerFlex 700S with Phase II Control User Manual* *PowerFlex 700S Reference Manual*	PFLEX-IN006… 20D-UM001… 20D-UM006… PFLEX-RM002…
RSLinx™ or RSLinx Lite	*Getting Results with RSLinx Guide* Online help (installed with the software)	LINX-GR001…
RSLogix™ 5000	*RSLogix 5000 Getting Results Guide* Online help (installed with the software)	9399-RLD300GR
RSNetWorx™ for EtherNet/IP	*RsNetWorx for EtherNet/IP Getting Results Guide*, and Online help (installed with the software)	ENET-GR001…
ControlLogix™ and 1756-ENBT or 1756-ENET/B	*ControlLogix Ethernet Bridge Module User Manual* *ControlLogix Ethernet Communications Module User Manual*	1756-UM050… 1756-UM051…

Documentation can be obtained online at **http://www.rockwellautomation.com/literature**.

Conventions Used in This Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the format **Parameter xx - [*]**. The xx represents the parameter number. The * represents the parameter name. For example **Parameter 01 - [DPI Port]**.
- Menu commands are shown in bold type face and follow the format **Menu > Command**. For example, if you read "Select **File > Open**," you should click the **File** menu and then click the **Open** command.
- The firmware release is displayed as FRN X.xxx. The "FRN" signifies Firmware Release Number. The "X" is the major release number. The "xxx" is the minor update number.
- RSNetWorx for EtherNet/IP (version 4.01), RSLinx (version 2.40), and RSLogix5000 (version 11) were used for the screen shots in this manual. Different versions of the software may differ in appearance and procedures.
- This manual provides information about the 20-COMM-E EtherNet/IP adapter and using it with PowerFlex 7-Class drives. The adapter can be used with other products that support DPI. Refer to the documentation for your product for specific information about how it works with the adapter.

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Rockwell Automation, Inc. offers support services worldwide, with over 75 sales/support offices, over 500 authorized distributors, and over 250 authorized systems integrators located through the United States alone. In addition, Rockwell Automation, Inc. representatives are in every major country in the world.

Local Product Support

Contact your local Rockwell Automation, Inc. representative for:

- Sales and order support
- Product technical training
- Warranty support
- Support service agreements

Technical Product Assistance

If you need to contact Rockwell Automation, Inc. for technical assistance, please review the information in Chapter 7, Troubleshooting, first. If you still have problems, call your local Rockwell Automation, Inc. representative.

U.S. Allen-Bradley Drives Technical Support:
E-mail: support@drives.ra.rockwell.com
Tel: (1) 262.512.8176
Fax (1) 262.512.2222
Online: www.ab.com/support/abdrives

UK Customer Support Center:
E-mail: esupport2@ra.rockwell.com
Tel: +44 (0) 870 2411802
Fax: +44 (0) 1908 838804

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E-mail: ragermany-csc@ra.rockwell.com
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Fax: +49 (0) 2104 960-501

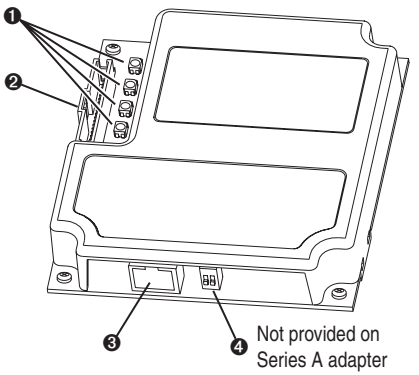
Notes:

Getting Started

The 20-COMM-E EtherNet/IP adapter is a communication option intended for installation into a PowerFlex 7-Class drive. It can also be used with other Allen-Bradley products that support a DPI™ (Drive Peripheral Interface) adapter.

Components

Figure 1.1 Components of the Adapter



Item	Part	Description
❶	Status Indicators	Four LEDs that indicate the status of the EtherNet connection, DPI, and the adapter. Refer to Chapter 7, Troubleshooting.
❷	DPI Connector	A 20-pin, single-row shrouded male header. An internal interface cable is connected to this connector and a connector on the drive.
❸	Ethernet Connector	An RJ-45 connector for the Ethernet cable. The connector is CAT-5 compliant to ensure reliable data transfer on 100Base-TX Ethernet connections.
❹	Web Pages Switch (SW2)	Enables or disables the adapter web pages. Refer to Chapter 2, Setting the Web Pages Switch (Series B only). SW1 is unused.

Features

The EtherNet/IP adapter features the following:

- The adapter is mounted in the PowerFlex 7-Class drive. It receives the required power from the drive.
- A number of configuration tools can be used to configure the adapter and connected drive. The tools include the PowerFlex HIM on the drive and drive-configuration software such as DriveExplorer (version 2.01 or higher) or DriveTools SP (version 1.01 or higher). In addition, you can use a BOOTP server to configure the network features on the adapter (for example, the IP address).
- Status indicators report the status of the drive communications, adapter, and network.
- I/O, including Logic Command/Reference and up to four pairs of Datalinks, may be configured for your application using parameters.
- Explicit messages are supported.
- Master-Slave or Peer-to-Peer hierarchies can be set up so that the adapter and connected PowerFlex drive transmit data to and from either a scanner or another PowerFlex drive on the network.
- User-defined fault actions determine how the adapter and PowerFlex drive respond to communication disruptions on the network and controllers in idle mode.
- Each adapter has Web pages that display information about the adapter, the connected drive, and other DPI devices connected to the drive.
- The adapter can be configured to send e-mail messages to desired addresses when selected drive faults occur and/or are cleared, and/or when the adapter takes a communication or idle fault action.

Compatible Products

DPI is a second generation peripheral communication interface. The EtherNet/IP adapter is compatible with Allen-Bradley PowerFlex 7-Class drives and other products that support DPI. DPI is a functional enhancement to SCANport (see Glossary). At the time of publication, compatible products include:

- PowerFlex 70 drives
- PowerFlex 700 drives
- PowerFlex 700VC drives
- PowerFlex 700H drives
- PowerFlex 700S drives
- PowerFlex 7000 drives

Required Equipment

Equipment Shipped with the Adapter

When you unpack the adapter, verify that the package includes:

- ❑ One EtherNet/IP adapter
- ❑ A 2.54 cm (1 in.) and a 15.24 cm (6 in.) Internal Interface cable (only one cable is needed to connect the adapter to the drive)
- ❑ This manual

User-Supplied Equipment

To install and configure the EtherNet/IP adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ Ethernet cable (refer to the *EtherNet/IP Media Planning and Installation Manual*, Publication No. ENET-IN001…, for details.)
- ❑ Configuration tool, such as:
  - PowerFlex 7-Class HIM (20-HIM-*)
  - DriveExplorer (version 2.01 or higher)
  - DriveExecutive (version 1.01 or higher)
  - RSNetWorx for EtherNet/IP
  - BOOTP Server (version 2.1 or higher) (network setup only)
- ❑ Controller configuration software (Examples: RSLogix 5, RSLogix 500, or RSLogix 5000)
- ❑ A PC connection to the EtherNet/IP network

Safety Precautions

Please read the following safety precautions carefully.

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing an EtherNet/IP adapter.

ATTENTION: Risk of injury or equipment damage exists. Only personnel familiar with drive and power products and the associated machinery should plan or implement the installation, start-up, configuration, and subsequent maintenance of the product using an EtherNet/IP adapter. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of equipment damage exists. The EtherNet/IP adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

ATTENTION: Risk of injury or equipment damage exists. If the EtherNet/IP adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. **Parameters 21 - [Comm Flt Action]**, **22 - [Idle Flt Action]**, and **41 - [Peer Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the controller is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable or a faulted controller).

ATTENTION: Risk of injury or equipment damage exists. When a system is configured for the first time, there may be unintended or incorrect machine motion. Disconnect the motor from the machine or process during initial system testing.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

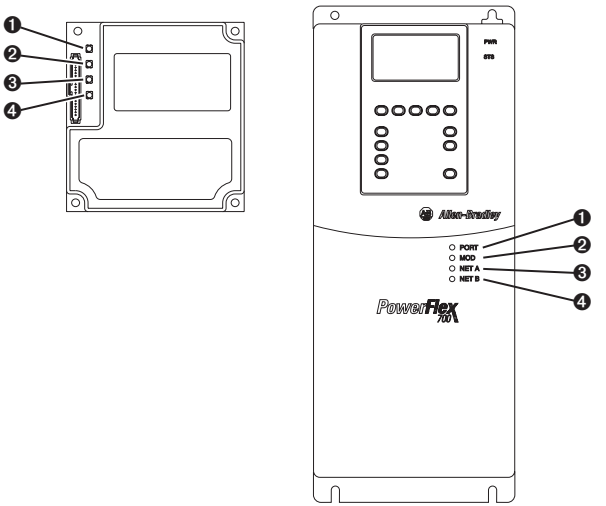
This section is provided to help experienced users quickly start using the EtherNet/IP adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step		Refer to . . .
1	**Review the safety precautions for the adapter.**	Throughout This Manual
2	**Verify that the PowerFlex drive is properly installed.**	Drive User Manual
3	**Install the adapter.** Verify that the PowerFlex drive is not powered. Then, connect the adapter to the network using an Ethernet cable and to the drive using the Internal Interface cable. Use the captive screws to secure and ground the adapter to the drive.	Chapter 2, Installing the Adapter
4	**Apply power to the adapter.** The adapter receives power from the drive. Apply power to the drive. The status indicators should be green. If they flash red, there is a problem. Refer to Chapter 7, Troubleshooting.	Chapter 2, Installing the Adapter
5	**Configure the adapter for your application.** Set the parameters for the following adapter features as required by your application: • IP address, subnet mask, and gateway address • Data rate • I/O configuration • Master-Slave or Peer-to-Peer hierarchy • Fault actions	Chapter 3, Configuring the Adapter
6	**Configure the scanner or bridge to communicate with the adapter.** Use a software tool such as RSLogix 5000 to configure the master on the EtherNet/IP network to recognize the adapter and drive.	Chapter 4, Configuring the Scanner or Bridge
7	**Create a ladder logic program.** Use a programming tool such as RSLogix to create a ladder logic program that enables you to: • Control the adapter and connected drive using I/O. • Monitor or configure the drive using Explicit messages.	Chapter 5, Using I/O Messaging Chapter 6, Using Explicit Messaging

Modes of Operation

The adapter uses four status indicators to report its operating status. They can be viewed on the adapter or through the drive cover. See Figure 1.2.

Figure 1.2 Status Indicators (location on drive may vary)



Item	Status Indicator	Normal Status (1)	Description
❶	PORT	Green	Normal Operation. The adapter is properly connected and is communicating with the drive.
❷	MOD	Green	Normal Operation. The adapter is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The adapter is operational but is not transferring I/O data.
❸	NET A	Green	Normal Operation. The adapter is properly connected and communicating on the network.
		Flashing Green	Normal Operation. The adapter is properly connected but does not have an I/O or Explicit Messaging connection.
❹	NET B	Flashing Green	Normal Operation. The adapter is properly connected and is transmitting data packets on the network.
		Off	Normal Operation. The adapter is not transmitting data packets.

(1) If all status indicators are off, the adapter is not receiving power. Refer to Chapter 2, Installing the Adapter, for instructions on installing the adapter.

If any other conditions occur, refer to Chapter 7, Troubleshooting.

Installing the Adapter

Chapter 2 provides instructions for installing the adapter in a PowerFlex 7-Class drive.

Preparing for an Installation

Before installing the EtherNet/IP adapter:

- Read the *EtherNet/IP Performance and Application Guide*, Publication ENET-AP001…, and *EtherNet/IP Media Planning and Installation Manual*, Publication ENET-IN001….
- Verify that you have all required equipment. Refer to Chapter 1, Getting Started.

Setting the Web Pages Switch (Series B only)

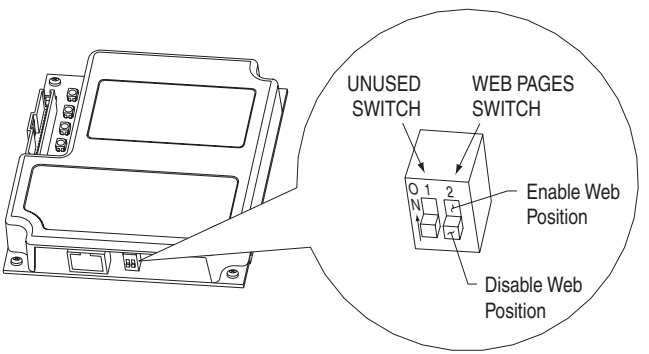
To use the adapter web pages, the Web Pages Switch (not provided on Series A adapter) must be set to its "Enable Web" position.

Important: A new setting is recognized only when power is applied to the adapter, or the adapter is reset. If you change a setting, cycle power or reset the adapter.

ATTENTION: Risk of equipment damage exists. The EtherNet/IP adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

Set the Web Pages Switch (SW2) to enable or disable the adapter web pages (see Figure 2.1 and setting descriptions below). By default, the adapter web pages are disabled. For complete details on adapter web pages, see Chapter 8, Viewing the Adapter's Web Pages.

Figure 2.1 Setting Web Pages Switch



SW2 Setting	Description
Down (OFF) position	Disables the adapter web pages (default setting).
Up (ON) position	Enables the adapter web pages.

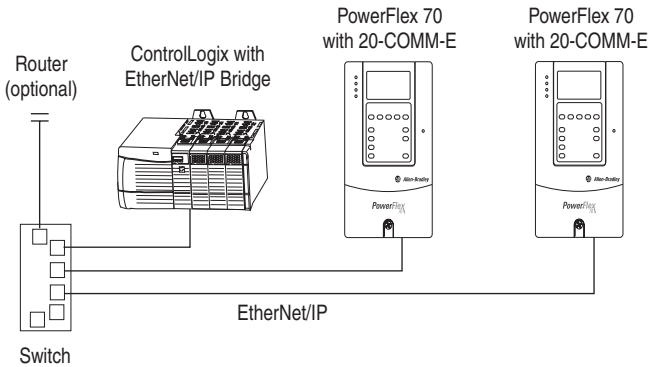
Connecting the Adapter to the Network

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove power from the drive, and then verify power has been discharged before installing or removing an adapter.

Important: To guard against device malfunction, use a grounding wrist strap when installing the EtherNet/IP adapter.

1. Remove power from the drive.
2. Use static control precautions.
3. Connect an Ethernet cable to the Ethernet/IP network. See Figure 2.2 for an example of wiring to an Ethernet/IP network.

Figure 2.2 Connecting the Ethernet Cable to the Network

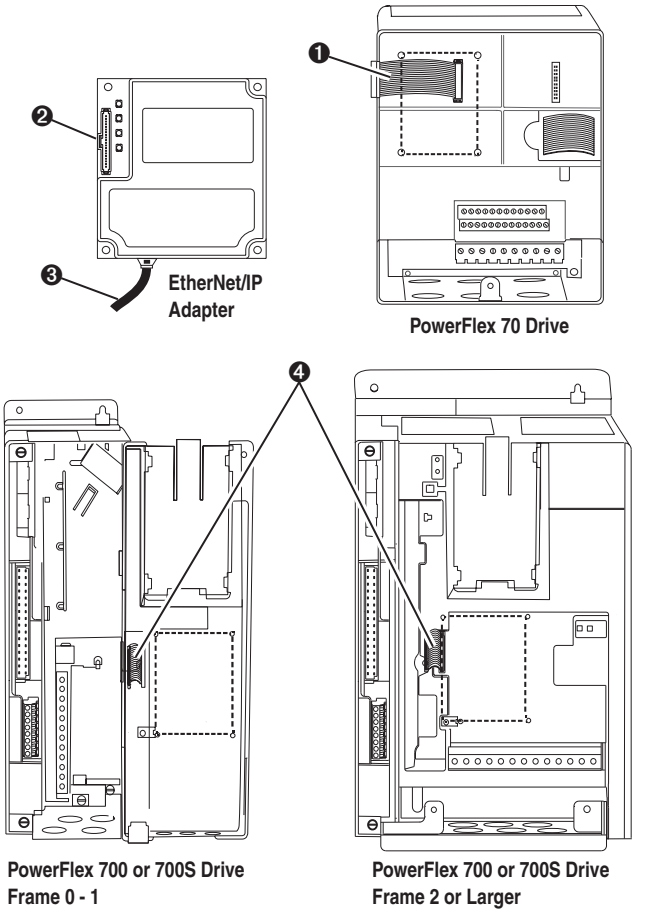


4. Route the Ethernet cable through the bottom of the PowerFlex drive (Figure 2.4), and insert the cable's plug into the mating adapter receptacle.

Connecting the Adapter to the Drive

1. Remove power from the drive.
2. Use static control precautions.
3. Connect the Internal Interface cable to the DPI port on the drive and then to the DPI connector on the adapter.

Figure 2.3 DPI Ports and Internal Interface Cables



Item	Description
❶	15.24 cm (6 in.) Internal Interface cable
❷	DPI Connector

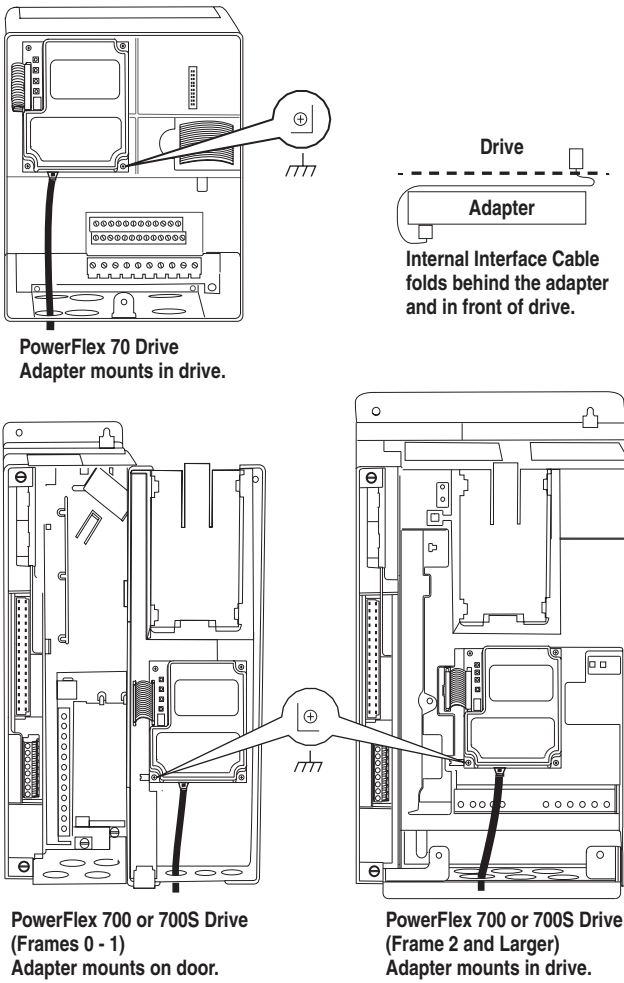
Item	Description
❸	Ethernet cable
❹	2.54 cm (1 in.) Internal Interface cable

4. Secure and ground the adapter to the drive by doing the following:

- On a PowerFlex 70, fold the Internal Interface cable behind the adapter and mount the adapter on the drive using the four captive screws.
- On a PowerFlex 700 or PowerFlex 700S, mount the adapter on the drive using the four captive screws.

Important: All screws must be tightened since the adapter is grounded through a screw. Recommended torque is 0.9 N-m (8.0 lb.-in.).

Figure 2.4 Mounting the Adapter



Applying Power

ATTENTION: Risk of equipment damage, injury, or death exists. Unpredictable operation may occur if you fail to verify that parameter settings are compatible with your application. Verify that settings are compatible with your application before applying power to the drive.

1. Close the door or reinstall the cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.

2. Apply power to the PowerFlex drive. The adapter receives its power from the connected drive. When you apply power to the product for the first time, the status indicators should be green or off after an initialization. If the status indicators go red, there is a problem. Refer to Chapter 7, Troubleshooting.

Commissioning the Adapter

To commission the adapter, you must set a unique IP address. (Refer to the Glossary for details about IP addresses.) After installing the adapter and applying power, you can set the IP address by using a BOOTP server or by setting adapter parameters.

By default, the adapter is configured so that you must set the IP address using a BOOTP server. To set the IP address using adapter parameters, you must disable the BOOTP feature. Refer to Chapter 3, Configuring the Adapter, for details.

Important: New settings for some parameters (for example, **Parameters 04 - [IP Addr Cfg 1]** through **07 - [IP Addr Cfg 4]**) are recognized only when power is applied to the adapter or it is reset. After you change parameter settings, cycle power or reset the adapter.

Configuring the Adapter

Chapter 3 provides instructions and information for setting the parameters in the adapter.

For a list of parameters, refer to Appendix B, Adapter Parameters. For definitions of terms in this chapter, refer to the Glossary.

Configuration Tools

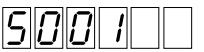
The EtherNet/IP adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters:

Tool	Refer to . . .
PowerFlex HIM	page 3-2
BOOTP Server	page 3-3
DriveExplorer Software (version 3.xx or higher)	*DriveExplorer Getting Results Manual*, Publication 9306-GR001... (Download Only), or the online help
DriveExecutive Software (version 1.xx or higher)	DriveExecutive Product Profile, Publication 9303-PP002..., or the online help

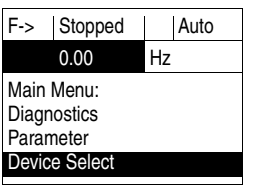
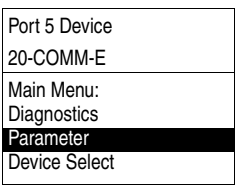
Using the PowerFlex HIM

If your drive has either an LED or LCD HIM (Human Interface Module), you can use it to access parameters in the adapter as shown below. It is recommended that you read through the steps for your HIM before performing the sequence. For additional information, refer to your PowerFlex Drive User Manual or the HIM Quick Reference card.

Using an LED HIM

Step	Key(s)	Example Screens
1. Press ALT and then Sel (Device) to display the Device Screen.	Device ALT Sel	
2. Press the Up Arrow or Down Arrow to scroll to the EtherNet/IP adapter. Letters represent files in the drive, and numbers represent ports. The adapter is usually connected to port 5.	OR	
3. Press the Enter key to enter your selection. A parameter database is constructed, and then the first parameter is displayed.		
4. Edit the parameters using the same techniques that you use to edit drive parameters.		

Using an LCD HIM

Step	Key(s)	Example Screens
1. In the main menu, press the Up Arrow or Down Arrow to scroll to **Device Select**.	OR	
2. Press Enter to enter your selection.		
3. Press the Up Arrow or Down Arrow to scroll to the EtherNet/IP adapter (20-COMM-E).	OR	
4. Press Enter to select the EtherNet/IP adapter. A parameter database is constructed, and then the main menu for the adapter is displayed.		
5. Edit the parameters using the same techniques that you use to edit drive parameters.		

Using BOOTP

By default, the adapter is configured so that you can set its IP address, subnet mask, and gateway address by using a BOOTP utility. You can select from a variety of BOOTP utilities. These instructions use Rockwell's BOOTP Server (version 2.1), a stand-alone program that incorporates the functionality of standard BOOTP utilities with a graphical interface. It is available from http://www.ab.com/networks. Refer to the Readme file and online Help for detailed directions and information.

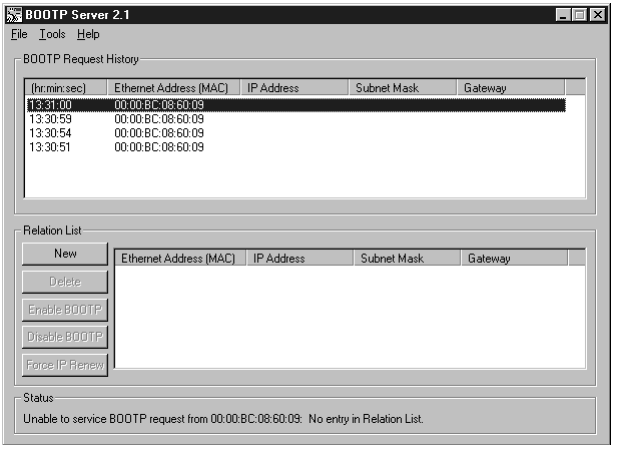
TIP: If desired, you can disable BOOTP and configure the IP address, subnet mask, and gateway address by setting parameters. For details, refer to Setting the IP Address, Subnet Mask, and Gateway Address section in this chapter.

To configure the adapter using BOOTP Server

1. On the label of the adapter, locate and note the hardware address of the adapter.

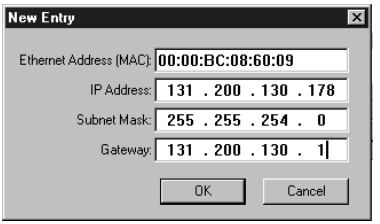
2. On a computer connected to the EtherNet/IP network, start the BOOTP software. The BOOTP Server window appears (Figure 3.1). Devices on the network issuing BOOTP requests appear in the BOOTP Request History list.

Figure 3.1 BOOTP Server Window



3. In the BOOTP Request History list, double-click the hardware address (Ethernet MAC address) of the adapter. The New Entry dialog box appears (Figure 3.2).

Figure 3.2 New Entry Dialog Box



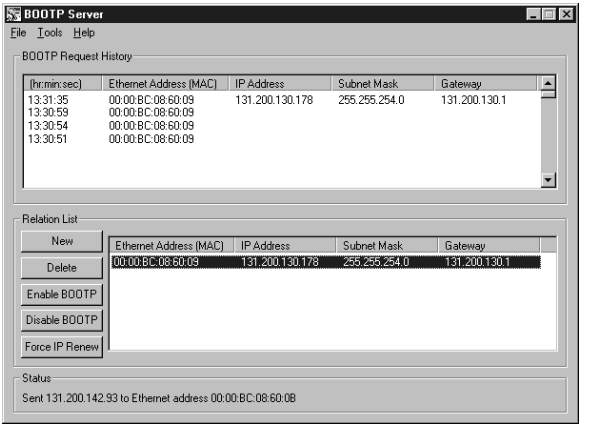
4. Edit the following:

Box [1]	Type
IP Address	A unique IP address for the adapter
Subnet Mask	The subnet mask for the adapter's network
Gateway	The IP address of the gateway device on the adapter's network

[1] For definitions of these terms, refer to the Glossary.

5. Click **OK** to apply the settings. The adapter appears in the Relation List with the new settings (Figure 3.3).

Figure 3.3 BOOTP Server Window with Adapter in the Relation List



6. To assign this configuration to the adapter permanently, click **Disable BOOTP**. When power is cycled on the adapter, it will use the configuration you assigned it and not issue new BOOTP requests.

TIP: To enable BOOTP for an adapter that has had BOOTP disabled, first select the adapter in the Relation List, then click **Enable BOOTP**, and finally reset the adapter.

7. To save the Relation List, select **File > Save**.

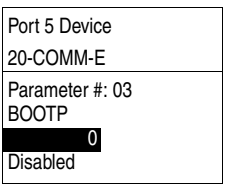
Setting the IP Address, Subnet Mask, and Gateway Address

By default, the adapter is configured so that you set its IP address, subnet mask, and gateway address using a BOOTP server. If you want to set these attributes using the adapter's parameters instead, you must disable BOOTP and then set the appropriate parameters in the adapter.

To disable the BOOTP feature

1. Set the value of **Parameter 03 - [BOOTP]** to **Disabled**.

Figure 3.4 Example BOOTP Screen on an LCD HIM



Value	Setting
0	Disabled
1	Enabled (Default)

2. Reset the adapter. See Resetting the Adapter section in this chapter.

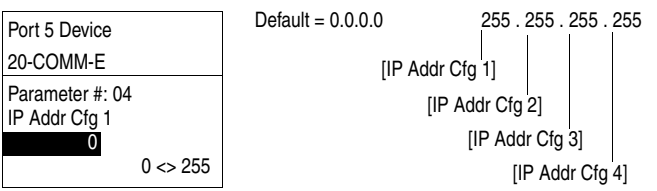
   After disabling the BOOTP feature, you can then configure the IP address, subnet mask, and gateway using the adapter's parameters.

To set an IP address using parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to **Disabled**. This parameter must be set to Disabled in order to configure the IP address using parameters.

2. Set the value of **Parameters 04 - [IP Addr Cfg 1]** through **07 - [IP Addr Cfg 4]** to a unique IP address.

Figure 3.5 Example IP Address Screen on an LCD HIM



3. Reset the adapter. See Resetting the Adapter section in this chapter.

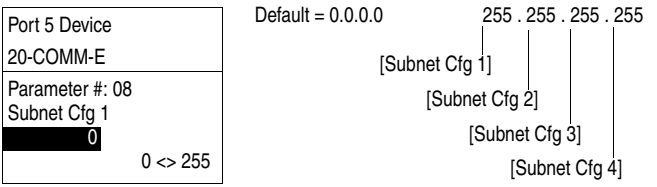
   The Net A status indicator will be solid green or flashing green if the IP address is correctly configured.

To set a subnet mask using parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to **Disabled**. This parameter must be set to Disabled in order to configure the subnet mask using parameters.

2. Set the value of **Parameters 08 - [Subnet Cfg 1]** through **11 - [Subnet Cfg 4]** to the desired value for the subnet mask.

Figure 3.6 Example Subnet Mask Screen on an LCD HIM



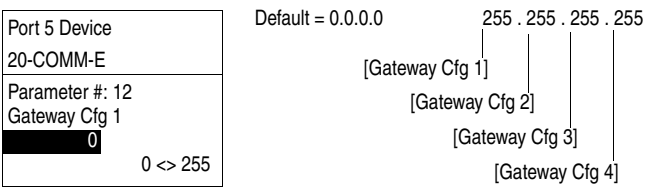
3. Reset the adapter. See Resetting the Adapter section in this chapter.

To set a gateway address for the adapter using parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to **Disabled**. This parameter must be set to Disabled in order to configure the gateway address using parameters.

2. Set the value of **Parameters 12 - [Gateway Cfg 1]** through **15 - [Gateway Cfg 4]** to the IP address of the gateway device.

Figure 3.7 Example Gateway Screen on an LCD HIM



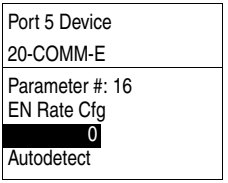
3. Reset the adapter. See Resetting the Adapter section in this chapter.

Setting the Data Rate

By default, the adapter is set to autodetect, so it automatically detects the data rate and duplex setting used on the network. If you need to set a specific data rate and duplex setting, the value of **Parameter 16 - [EN Rate Cfg]** determines the Ethernet data rate and duplex setting that the adapter will use to communicate. For definitions of data rate and duplex, refer to the Glossary.

1. Set the value of **Parameter 16 - [EN Rate Cfg]** to the data rate at which your network is operating.

Figure 3.8 Example Ethernet Data Rate Screen on an LCD HIM



Value	Data Rate
0	Autodetect (default)
1	10 Mbps Full
2	10 Mbps Half
3	100 Mbps Full
4	100 Mbps Half

TIP: Auto detection of baud rate and duplex works properly only if the device (usually a switch) on the other end of the cable is also set to auto detect the baud rate/duplex. If one device has the baud rate/duplex hard coded, the other device must be hard-coded to the same settings.

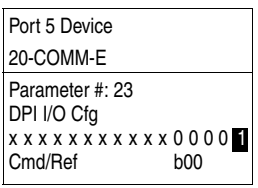
2. Reset the adapter. See Resetting the Adapter section in this chapter.

Setting the I/O Configuration

The I/O configuration determines the data that is sent to and from the drive. Logic Command/Status, Reference/Feedback, and Datalinks may be enabled or disabled. A “1” enables the I/O. A “0” disables the I/O.

1. Set the bits in **Parameter 23 - [DPI I/O Cfg]**.

Figure 3.9 Example I/O Configuration Screen on an LCD HIM



Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A
2	Datalink B
3	Datalink C
4	Datalink D
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.9, it is highlighted and equals “1.”

2. If Logic Command/Reference is enabled, configure the parameters in the drive to accept the Logic Command and Reference from the adapter. For example, set **Parameter 90 - [Speed Ref A Sel]** in a PowerFlex 70 or 700 drive to "DPI Port 5" so that the drive uses the Reference from the adapter. Also, verify that the mask parameters (for example, **Parameter 276 - [Logic Mask]**) in the drive are configured to receive the desired logic from the adapter. Refer to the documentation for your drive for details.

3. If you enabled one or more Datalinks, configure parameters in the drive to determine the source and destination of data in the Datalink(s). For example, configure the datalinks in PowerFlex 70 and 700 drives by setting **Parameters 300 - [Data In A1]** to **317 - [Data Out D2]**. Also, ensure that the EtherNet/IP adapter is the only adapter using the enabled Datalink(s).

4. Reset the adapter. See Resetting the Adapter section in this chapter.

The adapter is ready to receive I/O. You must now configure the adapter to receive I/O from a master or peer device. Refer to Selecting Master-Slave or Peer-to-Peer in this chapter. If you select a Master-Slave hierarchy, you must also configure the master to communicate with the adapter. Refer to Chapter 4, Configuring the Scanner or Bridge.

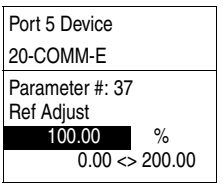
Setting the Reference Adjustment

A Reference Adjustment is a percent scaling factor for the Reference from the network and can be set from 0 to 200%. This allows the drive's Reference to either match the network Reference (=100%), scale below the network Reference (<100%), or scale above the network Reference (>100%).

ATTENTION: To guard against equipment damage and/or personal injury, note that changes to **Parameter 37 - [Ref Adjust]** take effect immediately. A drive receiving its Reference from the adapter will receive the newly scaled Reference, resulting in a change of speed.

- If the adapter is receiving a Reference, adjust the scale in **Parameter 37 - [Ref Adjust]**. It can be scaled between 0.00 and 200.00%.

Figure 3.10 Example Reference Adjust Screen on an LCD HIM



The adjustment takes effect as soon as it is entered.

Selecting Master-Slave or Peer-to-Peer

A hierarchy determines the type of device with which the adapter exchanges data. In a Master-Slave hierarchy, an adapter exchanges data with a master, such as a scanner or bridge. In a Peer-to-Peer hierarchy, an adapter exchanges data with one or more EtherNet/IP adapters connected to devices that have compatible logic command/status words.

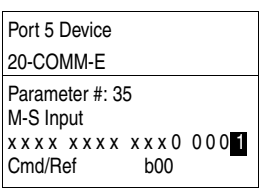
For both master-slave and peer-to-peer hierachies, the devices exchanging data must be on the same IP subnet. See “IP Addresses” in the Glossary for information about IP subnets.

To set a Master-Slave hierarchy

1. Enable the desired I/O in **Parameter 23 - [DPI I/O Cfg]**. Refer to Figure 3.9.

2. Set the bits in **Parameter 35 - [M-S Input]**. This parameter determines the data received from the master by the drive. A “1” enables the I/O. A “0” disables the I/O.

Figure 3.11 Example Master-Slave Input Screen on an LCD HIM

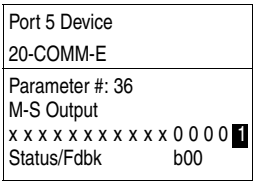


Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A Input
2	Datalink B Input
3	Datalink C Input
4	Datalink D Input
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.11, it is highlighted and equals “1.”

3. Set the bits in **Parameter 36 - [M-S Output]**. This parameter determines the data transmitted from the drive to the scanner. A "1" enables the I/O. A "0" disables the I/O.

Figure 3.12 Example Master-Slave Output Screen on an LCD HIM



Bit	Description
0	Status/Feedback (Default)
1	Datalink A Output
2	Datalink B Output
3	Datalink C Output
4	Datalink D Output
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.12, it is highlighted and equals "1."

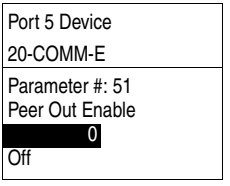
4. Reset the adapter. See Resetting the Adapter section in this chapter.

The adapter is ready to receive I/O from the master (i.e., scanner). You must now configure the scanner to recognize and transmit I/O to the adapter. Refer to Chapter 4, Configuring the Scanner or Bridge.

To set an adapter to transmit Peer-to-Peer data

1. Verify that **Parameter 51 - [Peer Out Enable]** is set to **Off**. This parameter must be Off while you configure peer output parameters.

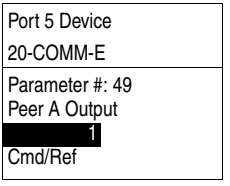
Figure 3.13 Example Peer Out Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

2. Select the source of the data to output to the network in **Parameter 49 - [Peer A Output]**.

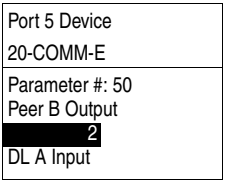
Figure 3.14 Example Peer A Output Screen on an LCD HIM



Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input
6 - 9	Datalink A, B, C, or D Output

3. If desired, select an additional source of the data to output to the network in **Parameter 50 - [Peer B Output]**.

Figure 3.15 Example Peer B Output Screen on an LCD HIM



Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input
6 - 9	Datalink A, B, C, or D Output

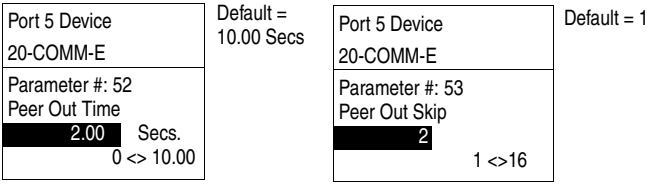
4. Set **Parameters 52 - [Peer Out Time]** and **53 - [Peer Out Skip]** to establish the minimum and maximum intervals between Peer messages. Because the adapter transmits Peer messages when a change-of-state condition occurs, minimum and maximum intervals are required.

   – The minimum interval ensures that the adapter does not transmit messages on the network too often, thus minimizing network traffic. It is set in **Parameter 52 - [Peer Out Time]**.

   – The maximum interval ensures that the adapter transmits messages often enough so that the receiving adapter(s) can receive recent data and verify that communications are working or, if communications are not working, can timeout. The maximum interval is the value of **Parameter 52 - [Peer Out Time]** multiplied by the value of **Parameter 53 - [Peer Out Skip]**.

   In the example in Figure 3.16, the minimum interval is set to 2.00 seconds, and the maximum interval is set to 4.00 seconds (2.00 x 2).

Figure 3.16 Example Peer Out Time and Peer Out Skip Screens on an LCD HIM

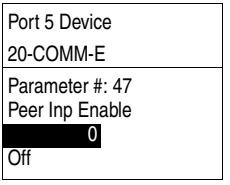


5. Set **Parameter 51 - [Peer Out Enable]** to **On**. The adapter will transmit the data selected in **Parameters 49 - [Peer A Output]** and **50 - [Peer B Output]** to the network. Another adapter must be configured to receive the Peer I/O data.

To set an adapter to receive Peer-to-Peer data

1. Verify that **Parameter 47 - [Peer Inp Enable]** is set to **Off**. This parameter must be set to Off while you configure the peer input parameters.

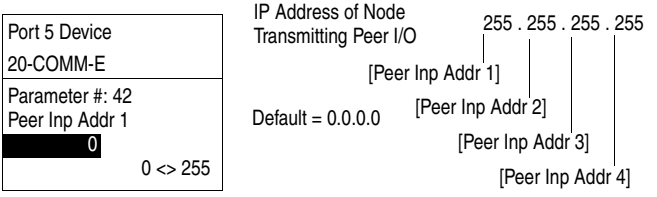
Figure 3.17 Example Peer Input Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

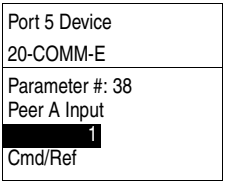
2. In **Parameters 42 - [Peer Inp Addr 1]** through **45 - [Peer Inp Addr 4]**, set the IP address of the node from which you want to receive data. Valid nodes must have 20-COMM-E adapters connected to drives with compatible logic command/status words.

Figure 3.18 Example Peer Input Address 1 Screen on an LCD HIM



3. Select the destination of the data that is input to the drive as Peer A in **Parameter 38 - [Peer A Input]**.

Figure 3.19 Example Peer A Input Screen on an LCD HIM



Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input

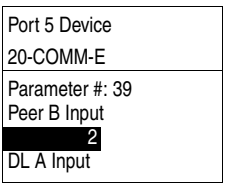
If you select a Reference or Datalink as an input, note the following:

– If a drive that uses a 32-bit Reference and 32-bit Datalinks receives a 16-bit Reference or Datalink, it uses the data in its most significant word, and its least significant word is zero.

– If a drive that uses a 16-bit Reference and 16-bit Datalinks receives a 32-bit Reference or Datalink, it uses the data in the most significant word of the 32-bit Reference or Datalink and ignores the data in the least significant word.

4. If desired, select the destination of the data to input to the drive as Peer B in **Parameter 39 - [Peer B Input]**.

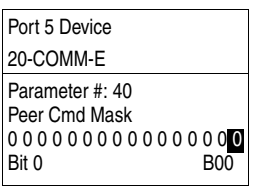
Figure 3.20 Example Peer B Input Screen on an LCD HIM



Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input

5. If the adapter receives a Logic Command, set the bits in **Parameter 40 - [Peer Cmd Mask]** that the drive should use. The bit definitions for the Logic Command word will depend on the drive to which the adapter is connected. Refer to Appendix D or drive documentation.

Figure 3.21 Example Peer Logic Command Mask Screen on an LCD HIM



Value	Description
0	Ignore this command bit. (Default)
1	Use this command bit.

If the adapter receives a Logic Command from both a Master device and a Peer device, each command bit must have only one source. The source of command bits set to “0” will be the Master device. The source of command bits set to “1” will be the Peer device.

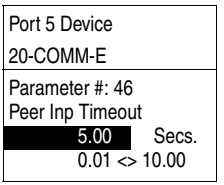
6. Set **Parameter 46 - [Peer Inp Timeout]** to the maximum amount of time the adapter will wait for a message before timing out.

Important: This value must be greater than the product of **Parameter 52 - [Peer Out Time]** multiplied by **Parameter 53 - [Peer Out Skip]** in the adapter from which you are receiving I/O.

For example, if the value of **Parameter 52 - [Peer Out Time]** is 2.00 and the value of **Parameter 53 - [Peer Out Skip]** is 2 (see

Figure 3.16), then **Parameter 46 - [Peer Inp Timeout]** needs have a value greater than 4.00, such as 5.00 (see Figure 3.22).

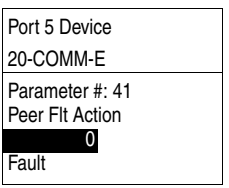
Figure 3.22 Example Peer Input Timeout Screen on an LCD HIM



7. Set the action in **Parameter 41 - [Peer Flt Action]** that the adapter will take if it times out.

ATTENTION: Risk of injury or equipment damage exists. **Parameter 41 - [Peer Flt Action]** lets you determine the action of the adapter and connected drive if communications are disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).

Figure 3.23 Example Peer Fault Action Screen on an LCD HIM



Value	Description
0	Fault (Default)
1	Stop
2	Zero Data
3	Hold Last
4	Send Flt Cfg

For details, see Setting a Fault Action section in this chapter.

8. Set **Parameter 47 - [Peer Inp Enable]** to On.

9. Reset the adapter. See Resetting the Adapter section in this chapter. The adapter is now configured to receive Peer I/O from the specified node. Ensure that the specified node is configured to transmit Peer I/O.

Setting a Fault Action

By default, when communications are disrupted (for example, a cable is disconnected) or the scanner is idle (for example, in program mode or its controller is faulted), the drive responds by faulting if it is using I/O from the network. You can configure a different response to communication disruptions using **Parameter 21 - [Comm Flt Action]** and a different response to an idle scanner using **Parameter 22 - [Idle Flt Action]**.

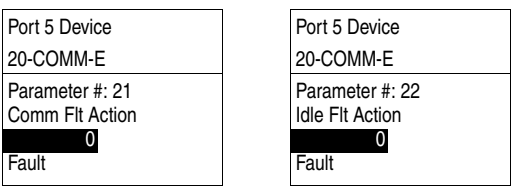
ATTENTION: Risk of injury or equipment damage exists. **Parameters 21 - [Comm Flt Action]** and **22 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable or faulted controller).

To change the fault action

- Set the values of **Parameters 21 - [Comm Flt Action]** and **22 -[Idle Flt Action]** to the desired responses:

Value	Action	Description
0	Fault	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent 0 for output data after a communications disruption. This does not command a stop.
3	Hold Last	The drive continues in its present state after a communications disruption.
4	Send Flt Cfg	The drive is sent the data that you set in the fault configuration parameters (Parameters 25 - [Flt Cfg Logic] through 34 - [Flt Cfg D2 In]).

Figure 3.24 Example Fault Action Screens on an LCD HIM



Changes to these parameters take effect immediately. A reset is not required.

To set the fault configuration parameters

If you set **Parameter 21 - [Comm Flt Action]** or **22 - [Idle Flt Action]** to "Send Flt Cfg," the values in the following parameters are sent to the drive after a communications fault and/or idle fault occurs. You must set these parameters to values required by your application.

Parameter	Name	Description
25	Flt Cfg Logic	A 16-bit value sent to the drive for Logic Command.
26	Flt Cfg Ref	A 32-bit value (0 – 4294967295) sent to the drive as a Reference or Datalink. **Important:** If the drive uses a 16-bit Reference or 16-bit Datalinks, the most significant word of the value must be set to zero (0) or a fault will occur.
27 – 34	Flt Cfg x1 In or Flt Cfg x2 In	

Changes to these parameters take effect immediately. A reset is not required.

Setting Web Access Control

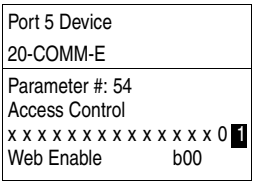
By accessing the IP address set for the adapter using a web browser, you can view the adapter's web pages for information about the adapter, the PowerFlex drive to which it is connected, and other DPI devices connected to the drive such as HIMs or serial adapters. Additionally, the adapter can be configured to automatically send e-mail messages to desired addresses when selected drive faults occur and/or are cleared, and/or when the adapter takes a communication or idle fault action. For more details on the adapter's web pages, refer to Chapter 8, Viewing the Adapter's Web Pages.

TIP: Series A adapter web pages are accessed differently than Series B web pages. Enabling/disabling e-mail configuration is also different.

Series A Adapter (version 2.002 or lower)

By default, the Series A adapter web pages are enabled. To disable the adapter web pages, use **Parameter 54 - [Access Control]** to set the Web Enable Bit 0 value to "0" (Disabled). You can also protect the configured settings for e-mail messaging using **Parameter 54 - [Access Control]**. To do this, the value of E-mail Config Bit 1 must be"0" (Disabled default). E-mail messaging will remain active regardless of whether or not its settings are protected — unless e-mail messaging was never configured. For more information about configuring adapter e-mail messaging, see Chapter 8, Configure E-mail Notification Web Page).

Figure 3.25 Example Web Access Control Screen on an LCD HIM



Bit	Description
0	Web Enable (Default = 1 = enabled)
1	E-mail Config (Default = 0 = disabled)
2 - 31	Not Used

Changes to this parameter take effect immediately. A reset is not required.

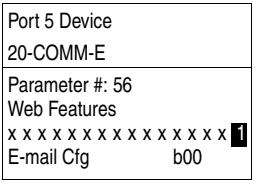
Series B Adapter (version 3.xxx or higher)

By default, the Series B adapter web pages are disabled. Refer to Figure 2.1 and set the Web Pages Switch (SW2) to the "Enable Web" (up) position.

Important: For a change to the switch setting to take effect, the adapter must be reset (see Resetting the Adapter section in this chapter).

Bit 0 of **Parameter 56 - [Web Features]** is used to protect the configured settings for e-mail notification. By default, settings are not protected and the user can make changes. To protect an e-mail configuration, set the value of E-mail Cfg Bit 0 to "0" (Disabled). You can unprotect the configuration by changing Bit 0 back to "1" (enabled). E-mail notification will always remain active regardless of whether or not its settings are protected — unless e-mail notification was *never* configured. For more information about configuring adapter e-mail notification or stopping e-mail messages, refer to Chapter 8, Configure E-mail Notification Web Page.

Figure 3.26 Example Web Features Screen on an LCD HIM



Bit	Description
0	E-mail Cfg (Default = 1 = enabled)
1 - 7	Not Used

Bit 0 is the right-most bit. In Figure 3.26 it is highlighted and equals "1."

Changes to this parameter take effect immediately. A reset is not required.

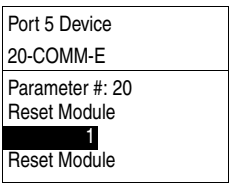
Resetting the Adapter

Changes to some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by cycling power to the drive or by using the following parameter:

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.

- Set **Parameter 20 - [Reset Module]** to **Reset Module**.

Figure 3.27 Example Reset Screen on an LCD HIM

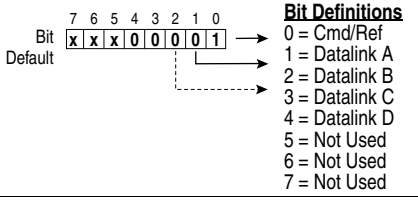


Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter **1 = Reset Module**, the adapter will be immediately reset. When you enter **2 = Set Defaults**, the adapter will set all adapter parameters to their factory-default settings. After performing a Set Defaults, enter **1 = Reset Module** so that the new values take effect. The value of this parameter will be restored to **0 = Ready** after the adapter is reset.

Viewing the Adapter Configuration

The following parameters provide information about how the adapter is configured. You can view these parameters at any time.

Number	Name	Description
17	EN Rate Act	The data rate used by the adapter.
18	Ref/Fdbk Size	The size of the Reference/Feedback. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
19	Datalink Size	The size of the Datalinks. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
24	DPI I/O Act	The Reference/Feedback and Datalinks used by the adapter. This value is the same as Parameter 23 - [DPI I/O Config] unless the parameter was changed and the adapter was not reset. 
48	Peer Inp Status	The status of the consumed peer input connection: Values 0 = Off 1 = Waiting 2 = Running 3 = Faulted

Notes:

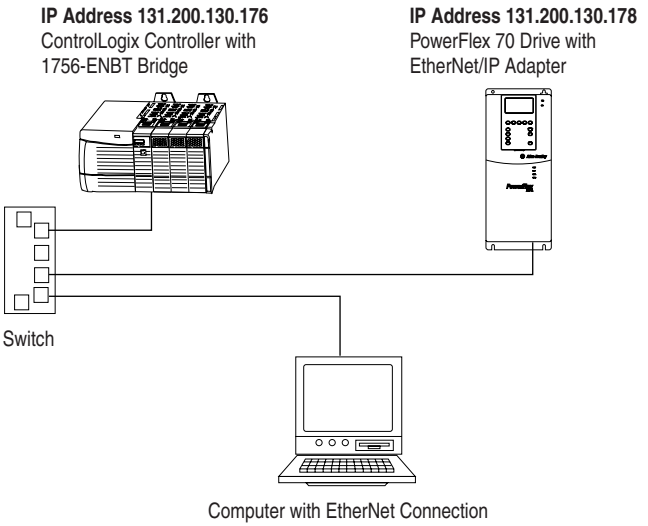
Configuring the Scanner or Bridge

Chapter 4 provides instructions on how to configure a ControlLogix bridge to communicate with the adapter and connected PowerFlex drive.

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This chapter provides the steps that are needed to configure a simple network like the network in Figure 4.1. In our example, we will configure a 1756-ENBT (series A) bridge to communicate with a drive using Logic Command/Status, Reference/Feedback, and four 16-bit datalinks over the network.

Figure 4.1 Example EtherNet/IP Network

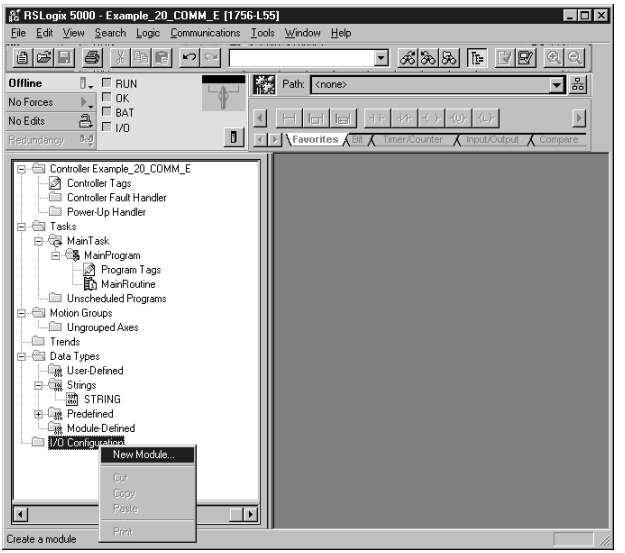


Adding a Bridge or Scanner to the I/O Configuration

To establish communications over an EtherNet/IP network, you must first add the controller and its scanner or bridge to the I/O configuration.

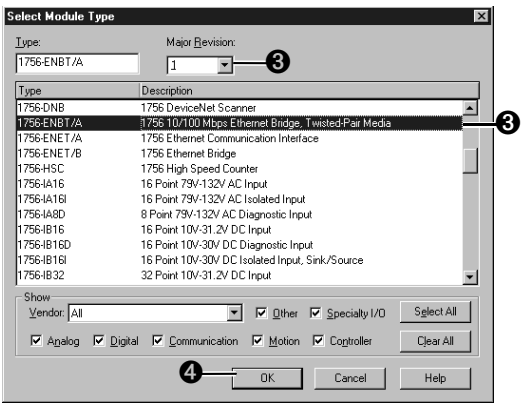
1. Start RSLogix 5000. The RSLogix 5000 window appears.

Figure 4.2 RSLogix 5000 Window



2. In the Control Organizer pane, right-click the **I/O Configuration** folder and select **New Module** (Figure 4.2). The Select Module Type dialog box (Figure 4.3) appears.

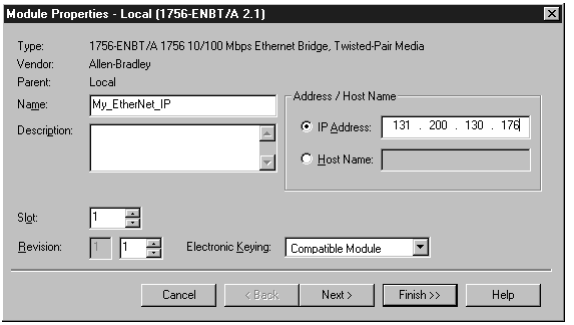
Figure 4.3 Select Module Type Dialog Box



3. In the list, select the EtherNet/IP scanner or bridge used by your controller and then select the major revision of its firmware in the Major Revision box. In this example (Figure 4.3), we use a 1756-ENBT EtherNet/IP Bridge (Series A), so the 1756-ENBT/A option is selected.

4. Click **OK**. The Module Properties dialog box (Figure 4.4) appears.

Figure 4.4 Module Properties Dialog Box - Page 1

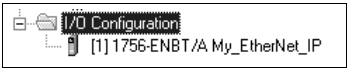


5. Edit the following:

Box	Type
Name	A name to identify the scanner or bridge.
Slot	The slot of the EtherNet/IP scanner or bridge in the rack.
Revision	The minor revision of the firmware in the scanner. (You already set the major revision in the Select Module Type dialog box, Figure 4.3.)
IP Address	The IP address of the EtherNet/IP scanner or bridge.
Electronic Keying	**Compatible Module**. This setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and scanner or bridge make a connection. Therefore, ensure that you have set the correct revision in this dialog box. Refer to the online Help if the controller and scanner have problems making a connection and you want to change this setting.

6. Click **Finish>>**. The scanner or bridge is now configured for the EtherNet/IP network. It appears in the I/O Configuration folder. In our example, a 1756-ENBT bridge appears under the I/O Configuration folder (Figure 4.5).

Figure 4.5 RSLogix 5000: I/O Configuration Folder

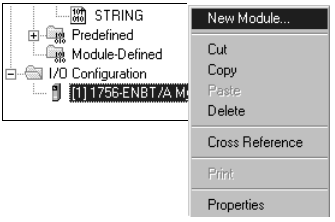


Adding the Adapter and Drive to the I/O Configuration

To transmit data between the scanner or bridge and the adapter, you must add the 20-COMM-E adapter as a child device of the scanner or bridge.

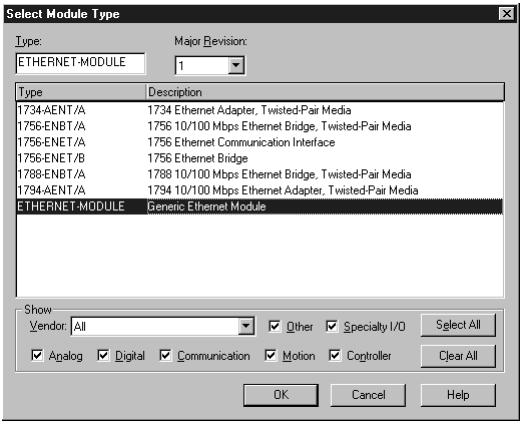
1. In the Control Organizer pane, right-click on the scanner or bridge and select **New Module** (Figure 4.6). In our example, we right-click on the 1756-ENBT/A bridge.

Figure 4.6 Right-Clicking on the Scanner



The **Select Module Type** dialog box (Figure 4.7) appears.

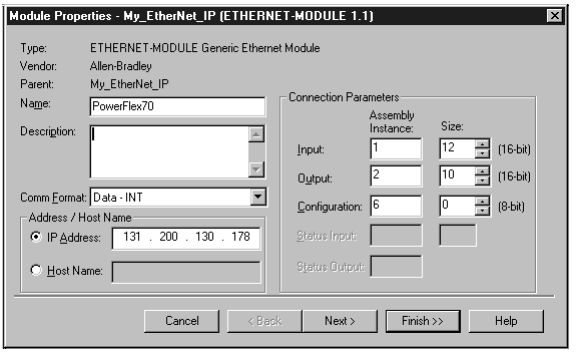
Figure 4.7 Select Module Type Dialog Box



2. Select **ETHERNET-MODULE** (Figure 4.7) to configure a 20-COMM-E, and then click **OK**.

   The Module Properties dialog box (Figure 4.8) appears.

Figure 4.8 Module Properties Dialog Box - Page 1



3. Edit the following information about the adapter:

Box	Type
Name	A name to identify the adapter and drive.
Comm. Format	**Data - INT**. This setting formats the data in 16-bit words.
IP Address	The IP address of the adapter.

4. Under Connection Parameters, edit the following:

Box	Assembly Instance	Size
Input	**1** (This value is required.)	The value will vary based on your application (setting of **Parameters 23 - [I/O Config]** and **36 - [M-S Output]**) and the size (16- or 32-bit) of the Reference/ Feedback and Datalinks in the drive. Refer to Table 4.A, Table 4.C, and Table 4.B on page 4-6.
Output	**2** (This value is required.)	The value will vary based on your application (setting of **Parameters 23 - [I/O Config]** and **35 - [M-S Input]**) and the size (16- or 32-bit) of the Reference/ Feedback and Datalinks in the drive. Refer to Table 4.A, Table 4.C, and Table 4.B on page 4-6.
Configuration	**6** (This value is required.)	**0** (This value is required.)

The following tables define the number of 16-bit words that you need for input and output depending on your configuration.

Table 4.A PowerFlex 70/700 and SMC-Flex (16-bit Reference/Feedback and Datalinks)

Input Size	Output Size	Logic Command/ Status	Reference/ Feedback (16-bit)	Datalinks (16-bit)			
				A	B	C	D
4	2	✔	✔				
6	4	✔	✔	✔			
8	6	✔	✔	✔	✔		
10	8	✔	✔	✔	✔	✔	
12	10	✔	✔	✔	✔	✔	✔

Table 4.B PowerFlex 700VC (16-bit Reference/Feedback & 32-bit Datalinks)

Input Size	Output Size	Logic Command/ Status	Reference/ Feedback (16-bit)	Datalinks (32-bit)			
				A	B	C	D
4	2	✔	✔				
8	6	✔	✔	✔			
12	10	✔	✔	✔	✔		
16	14	✔	✔	✔	✔	✔	
20	18	✔	✔	✔	✔	✔	✔

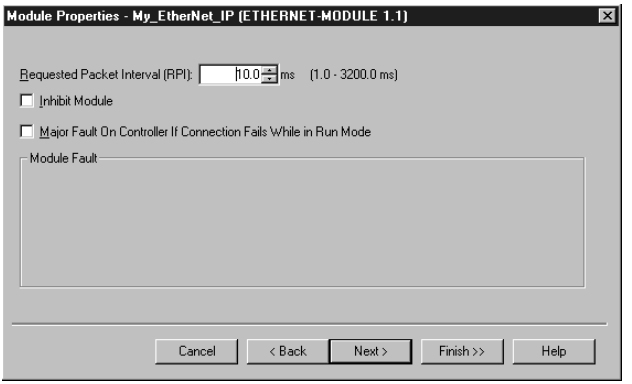
Table 4.C PowerFlex 700S (32-bit Reference/Feedback & Datalinks)

Input Size	Output Size	Logic Command/ Status	Reference/ Feedback (32-bit)	Datalinks (32-bit)			
				A	B	C	D
6	4	✔	✔				
10	8	✔	✔	✔			
14	12	✔	✔	✔	✔		
18	16	✔	✔	✔	✔	✔	
22	20	✔	✔	✔	✔	✔	✔

TIP: For instructions on configuring the I/O for the adapter (**Parameter 23 - [DPI I/O Config]**) and the Master-Slave Hierarchy (**Parameters 35 - [M-S Input]** and **36 - [M-S Output]**), refer to Chapter 3, Configuring the Adapter.

5. Click **Next >** to display the next page.

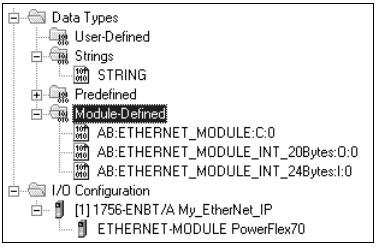
Figure 4.9 Module Properties Dialog Box - Page 2



6. In the **Requested Packet Interval (RPI)** box, set the value to 5.0 milliseconds or greater. This value determines the maximum interval that a controller should use to move data to or from the adapter. To conserve bandwidth, use higher values for communicating with low priority devices.

7. Click **Finish>>**. The new node ("PowerFlex 70" in this example) now appears under the scanner or bridge ("1756-ENBT" in this example) in the I/O Configuration folder. If you double-click the **Data Types** folder and then double-click on the **Module-Defined** folder, you will see that module-defined data types and tags have been automatically created. After you save and download the configuration, these tags allow you to access the Input and Output data of the adapter via the controller's ladder logic.

Figure 4.10 RSLogix 5000 - Data Types and I/O Configuration Folders

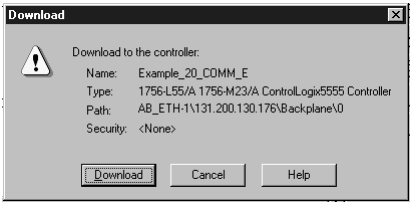


Saving the Configuration

After adding the scanner or bridge and the adapter to the I/O configuration, you must download the configuration to the controller. You should also save the configuration to a file on your computer.

1. Select **Communications > Download**. The **Download** dialog box (Figure 4.11) appears.

Figure 4.11 Download Dialog Box



TIP: If a message box reports that RSLogix is unable to go online, select **Communications > Who Active** to try to find your controller in the Who Active dialog box. If it does not appear, you need to add or configure the EtherNet/IP driver in RSLinx. Refer to the RSLinx online help.

2. Click **Download** to download the configuration to the controller. When the download is completed successfully, RSLogix enters online mode and the I/O OK box in the upper-left part of the screen is green.

3. Select **File > Save**. If this is the first time that you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click **Save** to save the configuration to a file on your computer.

Using I/O Messaging

Chapter 5 provides information and examples that explain how to use a ControlLogix controller to send I/O Messaging to control, configure, and monitor a PowerFlex 70 or 700 drive.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Important: At the time of publication, only ControlLogix controllers can make an EtherNet/IP network I/O connection as described in this chapter; PLC-5's and SLC's cannot. However, these controllers can perform control using explicit messaging to the CIP Register object and PCCC N41 and N42 files.

About I/O Messaging

On EtherNet/IP, I/O messaging is used to transfer the data that controls the PowerFlex drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in PowerFlex drives.

The adapter provides many options for configuring and using I/O, including:

- The size of I/O can be configured by enabling or disabling the Logic Command/Reference and Datalinks.
- A Master-Slave hierarchy or a Peer-to-Peer hierarchy can be set up.

Chapter 3, Configuring the Adapter, and Chapter 4, Configuring the Scanner or Bridge, discuss how to configure the adapter and scanner or bridge on the network for these options. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the adapter and scanner or bridge.

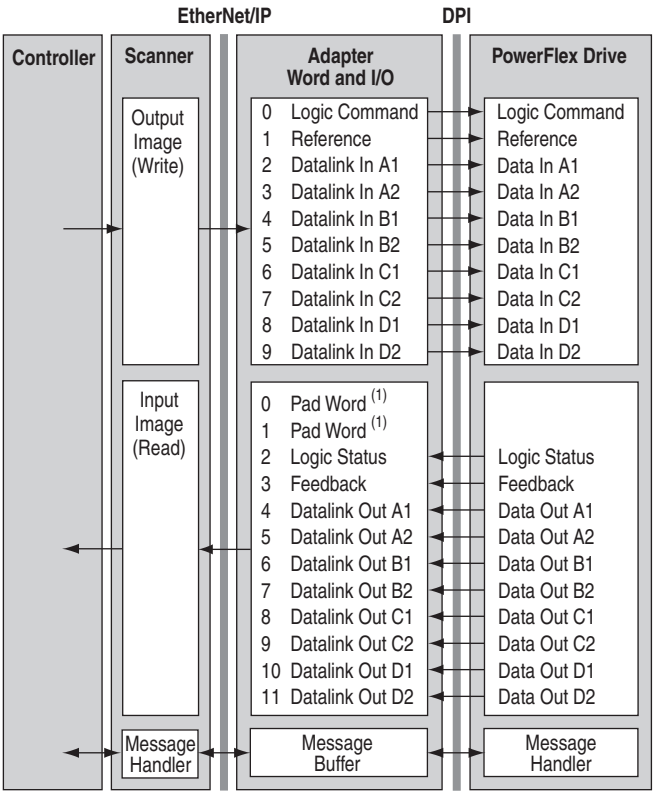
Understanding the I/O Image

The terms *input* and *output* are defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the EtherNet/IP adapter. Input I/O is status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the following:

- Size (either 16-bit or 32-bit) of the Reference/Feedback words and Datalink words used by the drive.
- Configuration of I/O (**Parameter 23 - [DPI I/O Config]**). If all I/O is not enabled, the image table is truncated. The image table always uses consecutive words starting at word 0.

Figure 5.1 illustrates an example of an I/O image with 16-bit words.

Figure 5.1 Example I/O Image with All I/O Enabled



[1] Required by ControlLogix. May or may not be required by other controllers.

In Figure 5.1, the configuration is shown using 10 words of output and 12 words of input (the adapter adds two pad words at the beginning of the input). Depending on your application needs, this may vary. For example, an image that uses 32-bit words for Reference and four Datalinks would change the I/O image in Figure 5.1 as follows:

Word	Output I/O
0	Logic Command/Status
1	Pad Word
2 - 3	Reference/Feedback
4 - 7	Datalink A1/A2
8 - 11	Datalink B1/B2
12 - 15	Datalink C1/C2
16 - 19	Datalink D1/D2

Word	Input I/O
0 - 1	Pad Word
2	Logic Command/Status
3	Pad Word
4 - 5	Reference/Feedback
6 - 9	Datalink A1/A2
11 - 13	Datalink B1/B2
14 - 17	Datalink C1/C2
18 - 21	Datalink D1/D2

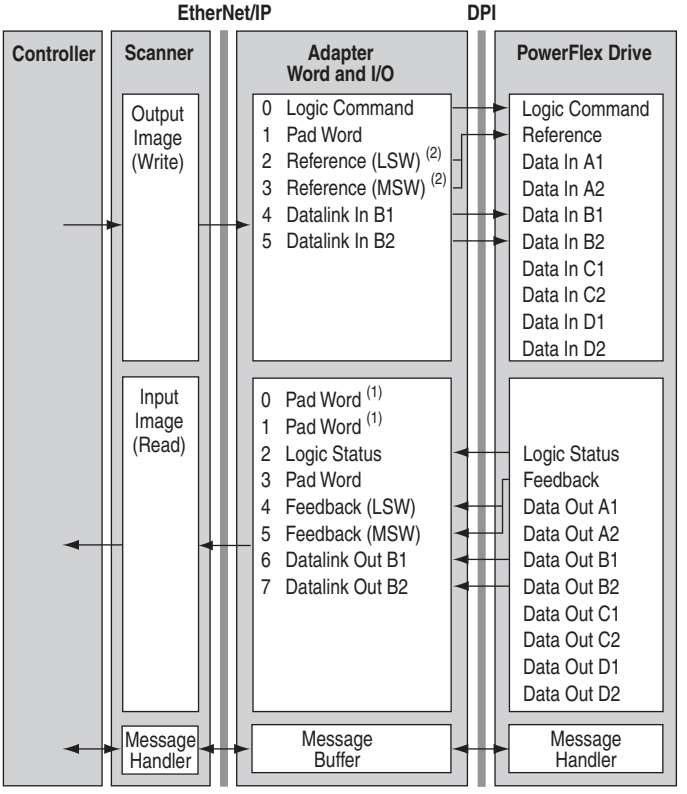
An image that uses a 16-bit Reference and 32-bit Datalinks would change the I/O image in Figure 5.1 as follows:

Word	Output I/O
0	Logic Command/Status
1	Pad Word
2	Reference/Feedback
3	Pad Word
4 - 7	Datalink A1/A2
8 - 11	Datalink B1/B2
12 - 15	Datalink C1/C2
16 - 19	Datalink D1/D2

Word	Input I/O
0 - 1	Pad Word
2	Logic Command/Status
3	Pad Word
4	Reference/Feedback
5	Pad Word
6 - 9	Datalink A1/A2
11 - 13	Datalink B1/B2
14 - 17	Datalink C1/C2
18 - 21	Datalink D1/D2

Figure 5.2 illustrates an example of an I/O image that does not use all of the I/O data. Only the Logic Command/Reference and Datalink B are enabled. In this example, the Reference is a 32-bit word, and Datalinks are 16-bit words.

Figure 5.2 Example I/O Image with Only Logic/Reference and Datalink B Enabled



[1] Required by ControlLogix. May or may not be required by other controllers.

[2] LSW is Least Significant Word (Bits 15 - 0). MSW is Most Significant Word (Bits 31 - 16).

Using Logic Command/Status

When enabled, the Logic Command/Status word is always word 0 in the output image and word 2 in the input image. The *Logic Command* is a 16-bit word of control produced by the scanner and consumed by the adapter. The *Logic Status* is a 16-bit word of status produced by the adapter and consumed by the scanner.

This manual contains the bit definitions for compatible products available at the time of publication in Appendix D, Logic Command/ Status Words. For other products, refer to their documentation.

Using Reference/Feedback

When enabled, Reference/Feedback begins at word 1 (16-bit) or word 2 (32-bit) in the I/O image. The *Reference* (16 bits or 32 bits) is produced by the controller and consumed by the adapter. The *Feedback* (16 bits or 32 bits) is produced by the adapter and consumed by the controller. The size of the Reference/Feedback is determined by the drive and displayed in **Parameter 18 - [Ref/Fdbk Size]** in the adapter.

Size	Valid Values	In I/O Image	Example
16-bit	-32768 to 32767	Word 1	Figure 5.1
32-bit	-2147483648 to 2147483647	Word 2 and Word 3	Figure 5.2

The Reference value is a scaled value; it is not an engineering value. For example, in PowerFlex 70/700 drives, the Reference is scaled based on the value of **Parameter 55 - [Maximum Freq]** where "32,767" equals the Parameter 55 frequency value, and "0" equals 0 Hz. Note that the commanded maximum speed can never exceed the value of **Parameter 82 - [Maximum Speed]**. Table 5.A shows example References and their results on a PowerFlex 70/700 drive that has its **Parameters 55 - [Maximum Freq]** set to 130 Hz and **82 - [Maximum Speed]** set to 60 Hz.

Table 5.A Example Speed Reference and Feedback for a PowerFlex 70/700

Reference Value	Scale		Output Speed	Feedback Value
	Percent	Value		
32767 (1)	100%	130 Hz	60 Hz (2)	15123 (3)
16384	50%	65 Hz	60 Hz (2)	15123 (3)
8192	25%	32.5 Hz	32.5 Hz	8192
0	0%	0 Hz	0 Hz	0

(1) A value of 32767 is equivalent to the Parameter 55 frequency value. The effects of values greater than 32767 depend on whether the DPI product uses a bipolar or unipolar direction mode. Refer to the documentation for your DPI product.

(2) The drive runs at 60 Hz instead of 130 Hz or 65 Hz because Parameter 82 - [Maximum Speed] sets 60 Hz as the maximum speed.

(3) The Feedback value is also scaled based on the value of Parameter 55 - [Maximum Freq], For example, 60/130 = 0.46 so 32767 x 0.46 = 15123.

For Reference/Feedback details about other DPI Hosts, refer to their respective User Manuals.

Using Datalinks

A Datalink is a mechanism used by PowerFlex drives to transfer data to and from the controller. Datalinks allow a parameter value to be changed without using an Explicit Message. When enabled, each Datalink occupies two 16-bit or 32-bit words in both the input and output image. **Parameter 19 - [Datalink Size]** will indicate whether the drive uses 16-bit or 32-bit words for Datalinks.

Rules for Using Datalinks

- Each set of Datalink parameters in a PowerFlex drive can be used by only one adapter. If more than one adapter is connected to a single drive, multiple adapters must not try to use the same Datalink.
- Parameter settings in the drive determine the data passed through the Datalink mechanism. Refer to the documentation for your drive.
- When you use a Datalink to change a value, the value is not written to the Non-Volatile Storage (NVS). The value is stored in volatile memory and lost when the drive loses power. Thus, use Datalinks when you need to change a value of a parameter frequently.

32-Bit Parameters using 16-Bit Datalinks

To read (and/or write) a 32-bit parameter using 16-bit Datalinks, typically both Datalinks of a pair (A, B, C, D) are set to the same 32-bit parameter. For example, to read **Parameter 09 - [Elapsed MWh]** in a PowerFlex 70, both Datalink A1 and A2 are set to "9." Datalink A1 will contain the least significant word (LSW) and Datalink A2 will contain the most significant word (MSW). In this example, the Parameter 9 value of 5.8 MWh is read as a "58" in Datalink A1.

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	LSW	9	58
A2	MSW	9	0

Regardless of the Datalink combination, x1 will always contain the LSW and x2 will always contain the MSW. In the following examples **Parameter 242 - [Power Up Marker]** in a PowerFlex 70 contains a value of 88.4541 hours.

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	LSW	242	32573
A2	- Not Used -	0	0

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	- Not Used -	0	0
A2	MSW	242	13

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A2	MSW	242	13
B1	LSW	242	32573

32-bit data is stored in binary as follows:

MSW	2^{31} through 2^{16}
LSW	2^{15} through 2^{0}

Example:

Parameter 242 - [Power Up Marker] = 88.4541 hours

MSW = $13_{decimal} = 1101_{binary} = 2^{19} + 2^{18} + 2^{16} = 851968$

LSW = 32573

851968 + 32573 = 884541

Example Ladder Logic Program

The example ladder logic program works with a ControlLogix controller and a PowerFlex 70 or PowerFlex 700 drive.

Function of the Example Program

This example program enables you to:

- Obtain Logic Status information from the drive.
- Use the Logic Command to control the drive (for example, start, stop).
- Send a Reference to the drive and receive Feedback from the drive.
- Send/receive Datalink data to/from the drive.

Example Parameter Settings in the Drive and Adapter

Device	Parameter	Name	Value	Description
PowerFlex 70 Drive	90	Speed Ref A Sel	22	'DPI Port 5' (20-COMM-E)
	300	Data In A1	140	Points to Par. 140 - [Accel Time 1]
	301	Data In A2	142	Points to Par. 142 - [Decel Time 1]
	302	Data In B1	100	Points to Par. 100 - [Jog Speed]
	303	Data In B2	155	Points to Par. 155 - [Stop Mode A]
	304	Data In C1	101	Points to Par. 101 - [Preset Speed 1]
	305	Data In C2	102	Points to Par. 102 - [Preset Speed 2]
	306	Data In D1	103	Points to Par. 103 - [Preset Speed 3]
	307	Data In D2	104	Points to Par. 104 - [Preset Speed 4]
	310	Data Out A1	140	Points to Par. 140 - [Accel Time 1]
	311	Data Out A2	142	Points to Par. 142 - [Decel Time 1]
	312	Data Out B1	100	Points to Par. 100 - [Jog Speed]
	313	Data Out B2	155	Points to Par. 155 - [Stop Mode A]
	314	Data Out C1	101	Points to Par. 101 - [Preset Speed 1]
	315	Data Out C2	102	Points to Par. 102 - [Preset Speed 2]
	316	Data Out D1	103	Points to Par. 103 - [Preset Speed 3]
	317	Data Out D2	104	Points to Par. 104 - [Preset Speed 4]
20-COMM-E Adapter	04 – 07	IP Addr Cfg 1 – 4	131.200.130.178	IP Address for the adapter
	23	DPI I/O Cfg	xxx1 1111	Enables Cmd/Ref, Datalinks A-D
	35	M-S Input	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	36	M-S Output	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

RSLogix 5000 Configuration

Controller Tags

When you add the adapter and drive to the I/O configuration (refer to Chapter 4), RSLogix 5000 automatically creates controller tags for them. In this example program, the following controller tags are used.

Figure 5.3 Controller Tags for the Example ControlLogix Ladder Logic Program

P	Tag Name	Type	Style	Description
	⊞ PowerFlex70:C	AB:ETHER...		
	⊞ PowerFlex70:I	AB:ETHER...		
	⊞ PowerFlex70:O	AB:ETHER...		

You can expand the Output and Input tags to reveal the output and input configuration. The Output tag for this example program requires ten 16-bit words of data (see Figure 5.4). The Input tag for this example requires twelve 16-bit words of data (see Figure 5.5).

Figure 5.4 Output Image for the Example ControlLogix Ladder Logic Program

P	Tag Name	Type	Style	Description
	⊞ PowerFlex70:C	AB:ETHER...		
	⊞ PowerFlex70:I	AB:ETHER...		
	⊟ PowerFlex70:O	AB:ETHER...		
	⊟ PowerFlex70:O.Data	INT[10]	Decimal	PowerFlex 70 Output Image Ta...
	⊞ PowerFlex70:O.Data[0]	INT	Decimal	PowerFlex 70 Logic Command
	⊞ PowerFlex70:O.Data[1]	INT	Decimal	PowerFlex 70 Reference
	⊞ PowerFlex70:O.Data[2]	INT	Decimal	PowerFlex 70 Datalink A1 In
	⊞ PowerFlex70:O.Data[3]	INT	Decimal	PowerFlex 70 Datalink A2 In
	⊞ PowerFlex70:O.Data[4]	INT	Decimal	PowerFlex 70 Datalink B1 In
	⊞ PowerFlex70:O.Data[5]	INT	Decimal	PowerFlex 70 Datalink B2 In
	⊞ PowerFlex70:O.Data[6]	INT	Decimal	PowerFlex 70 Datalink C1 In
	⊞ PowerFlex70:O.Data[7]	INT	Decimal	PowerFlex 70 Datalink C2 In
	⊞ PowerFlex70:O.Data[8]	INT	Decimal	PowerFlex 70 Datalink D1 In
	⊞ PowerFlex70:O.Data[9]	INT	Decimal	PowerFlex 70 Datalink D2 In

Figure 5.5 Input Image for the Example ControlLogix Ladder Logic Program

P	Tag Name	Type	Style	Description
	⊞ PowerFlex70:C	AB:ETHER...		
	⊟ PowerFlex70:I	AB:ETHER...		
	⊟ PowerFlex70:I.Data	INT[12]	Decimal	PowerFlex 70 Input Image Table
	⊞ PowerFlex70:I.Data[0]	INT	Decimal	System Overhead
	⊞ PowerFlex70:I.Data[1]	INT	Decimal	System Overhead
	⊞ PowerFlex70:I.Data[2]	INT	Decimal	PowerFlex 70 Logic Status
	⊞ PowerFlex70:I.Data[3]	INT	Decimal	PowerFlex 70 Feedback
	⊞ PowerFlex70:I.Data[4]	INT	Decimal	PowerFlex 70 Datalink A1 Out
	⊞ PowerFlex70:I.Data[5]	INT	Decimal	PowerFlex 70 Datalink A2 Out
	⊞ PowerFlex70:I.Data[6]	INT	Decimal	PowerFlex 70 Datalink B1 Out
	⊞ PowerFlex70:I.Data[7]	INT	Decimal	PowerFlex 70 Datalink B2 Out
	⊞ PowerFlex70:I.Data[8]	INT	Decimal	PowerFlex 70 Datalink C1 Out
	⊞ PowerFlex70:I.Data[9]	INT	Decimal	PowerFlex 70 Datalink C2 Out
	⊞ PowerFlex70:I.Data[10]	INT	Decimal	PowerFlex 70 Datalink D1 Out
	⊞ PowerFlex70:I.Data[11]	INT	Decimal	PowerFlex 70 Datalink D2 Out

Program Tags

In addition to the Controller tags that are automatically created, you need to create the following Program tags for this example program.

Figure 5.6 Program Tags for the Example ControlLogix Ladder Logic Program

Tag Name	Type	Style	Description
⊞-DatalinkDataFromDrive	INT[8]	Decimal	
⊞-DatalinkDataToDrive	INT[8]	Decimal	
DriveCommandClearFault	BOOL	Decimal	
DriveCommandJog	BOOL	Decimal	
DriveCommandStart	BOOL	Decimal	
DriveCommandStop	BOOL	Decimal	
⊞-DriveFeedback	INT	Decimal	PowerFlex 70 Speed Feedback
⊞-DriveReference	INT	Decimal	PowerFlex 70 Speed Reference
DriveStatusFaulted	BOOL	Binary	
DriveStatusRunning	BOOL	Binary	

Logic Command/Status Words

This example uses the Logic Command word and Logic Status word for PowerFlex 70 and PowerFlex 700 drives. Refer to Appendix D, Logic Command/Status Words, to view these. The definition of the bits in these words may vary if you are using a different DPI product. Refer to the documentation for your product.

Example ControlLogix Ladder Logic Program

Figure 5.7 Example ControlLogix Ladder Logic Program for I/O Messaging

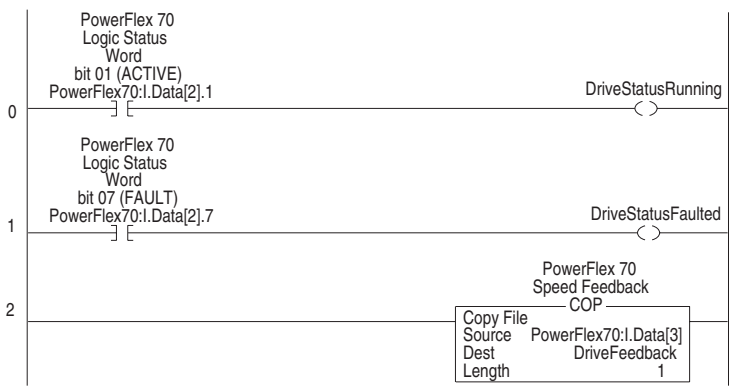
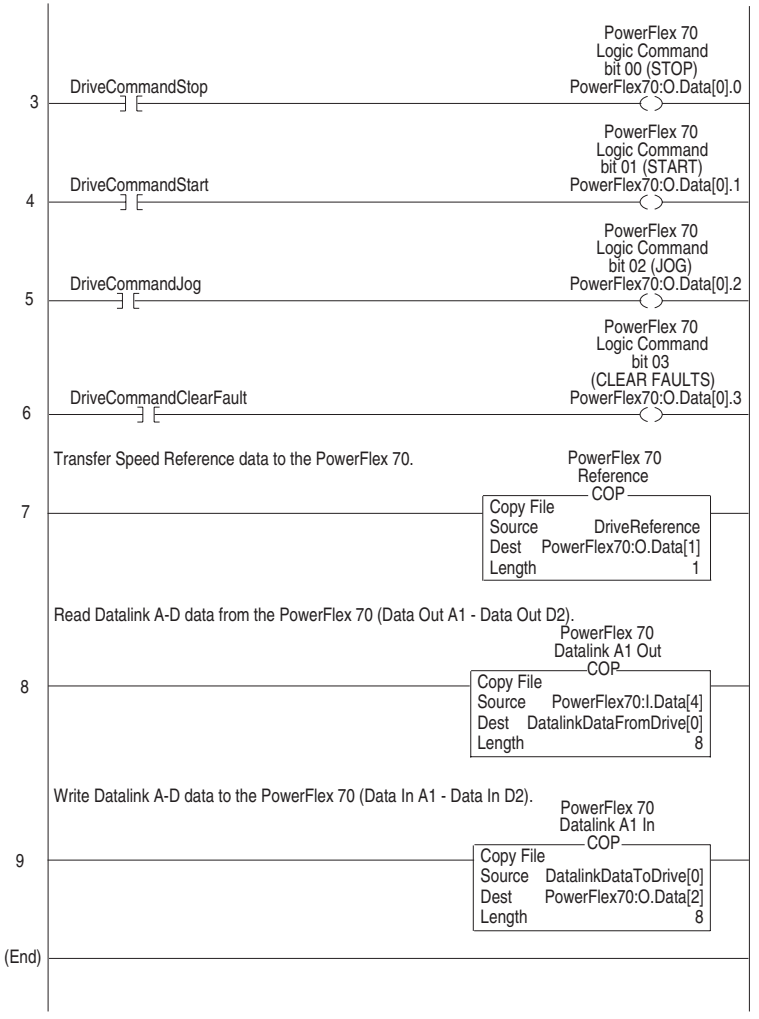


Figure 5.7 Example ControlLogix Ladder Logic Program for I/O Messaging (Cont.)



Example Datalink Data

The following figure shows the Datalink data used in the example program.

Figure 5.8 Example Datalink Data for the Example Ladder Logic Program

Tag Name	Value	Style	Type	Description
⊟ DatalinkDataFromDrive	{...}	Decimal	INT[8]	
⊞ DatalinkDataFromDrive[0]	50	Decimal	INT	PowerFlex 70 Datalink A1 Out
⊞ DatalinkDataFromDrive[1]	50	Decimal	INT	PowerFlex 70 Datalink A2 Out
⊞ DatalinkDataFromDrive[2]	100	Decimal	INT	PowerFlex 70 Datalink B1 Out
⊞ DatalinkDataFromDrive[3]	0	Decimal	INT	PowerFlex 70 Datalink B2 Out
⊞ DatalinkDataFromDrive[4]	101	Decimal	INT	PowerFlex 70 Datalink C1 Out
⊞ DatalinkDataFromDrive[5]	102	Decimal	INT	PowerFlex 70 Datalink C2 Out
⊞ DatalinkDataFromDrive[6]	103	Decimal	INT	PowerFlex 70 Datalink D1 Out
⊞ DatalinkDataFromDrive[7]	104	Decimal	INT	PowerFlex 70 Datalink D2 Out
⊟ DatalinkDataToDrive	{...}	Decimal	INT[8]	
⊞ DatalinkDataToDrive[0]	50	Decimal	INT	PowerFlex 70 Datalink A1 In
⊞ DatalinkDataToDrive[1]	50	Decimal	INT	PowerFlex 70 Datalink A2 In
⊞ DatalinkDataToDrive[2]	100	Decimal	INT	PowerFlex 70 Datalink B1 In
⊞ DatalinkDataToDrive[3]	0	Decimal	INT	PowerFlex 70 Datalink B2 In
⊞ DatalinkDataToDrive[4]	101	Decimal	INT	PowerFlex 70 Datalink C1 In
⊞ DatalinkDataToDrive[5]	102	Decimal	INT	PowerFlex 70 Datalink C2 In
⊞ DatalinkDataToDrive[6]	103	Decimal	INT	PowerFlex 70 Datalink D1 In
⊞ DatalinkDataToDrive[7]	104	Decimal	INT	PowerFlex 70 Datalink D2 In

Using Explicit Messaging

Chapter 6 provides information and examples that explain how to use Explicit Messaging to monitor and configure a PowerFlex drive and an EtherNet/IP adapter.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

ATTENTION: Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to Non-Volatile Storage (NVS) frequently, the NVS will quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS. Datalinks do not write to NVS and should be used for frequently changed parameters.

Refer to Chapter 5 for information about the I/O Image, using Logic Command/Status, Reference/Feedback, and Datalinks.

About Explicit Messaging

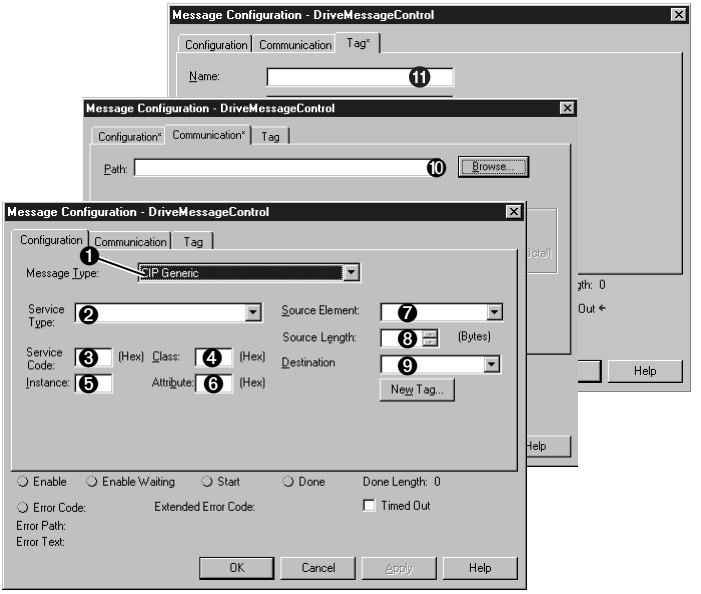
Explicit Messaging is used to transfer data that does not require continuous updates. With Explicit Messaging, you can configure and monitor a slave device's parameters on the EtherNet/IP network.

Formatting Explicit Messages

Explicit Messages for the ControlLogix Controller

ControlLogix scanners and bridges accommodate both downloading Explicit Message Requests and uploading Explicit Message Responses. The scanner or bridge module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown in Figure 6.1.

Figure 6.1 ControlLogix Message Format in RSLogix 5000



Refer to Page 6-3 for a description of the data that is required in each box (1 – 11).

TIP: To display the Message Configuration dialog box in RSLogix 5000, add a message instruction (MSG), create a new tag for the message (properties: Base tag type, MESSAGE data type, controller scope), and click the **Configure** button.

ControlLogix Message Requests and Responses

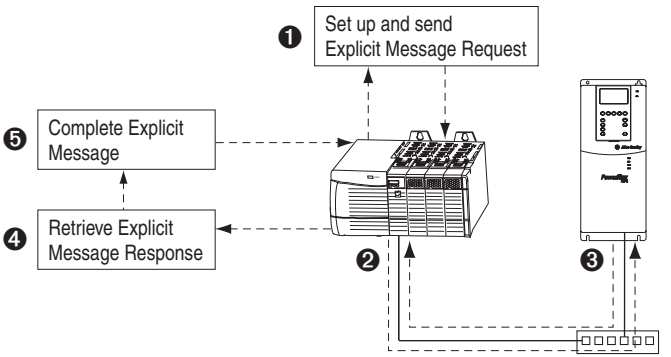
Box	Description
❶	**Message Type** The message type is usually CIP Generic.
❷	**Service Type** The service type indicates the service (for example, Get Attribute Single or Set Attribute Single) that you want to perform. Available services depend on the class and instance that you are using. Refer to Appendix C, EtherNet/IP Objects.
❸	**Service Code** The service code is the code for the requested EtherNet/IP service. This value changes based on the Service Type that has been selected. In most cases, this is a read-only box. If you select “Custom” in the Service Type box, then you need to specify a service code in this box (for example, 4B for a Get Attributes Scattered service or 4C for a Set Attributes Scattered service).
❹	**Class** The class is an EtherNet/IP class. Refer to Appendix C, EtherNet/IP Objects, for available classes.
❺	**Instance** The instance is an instance (or object) of an EtherNet/IP class. Refer to Appendix C, EtherNet/IP Objects, for available instances for each class.
❻	**Attribute** The attribute is a class or instance attribute. Refer to Appendix C, EtherNet/IP Objects, for available attributes for each class or instance.
❼	**Source Element** This box contains the name of the tag for any service data to be sent from the scanner or bridge to the adapter and drive.
❽	**Source Length** This box contains the number of bytes of service data to be sent in the message.
❾	**Destination** This box contains the name of the tag that will receive service response data from the adapter and drive.
❿	**Path** The path is the route that the message will follow. **Tip:** Click **Browse** to find the path or type in the name of an adapter that you previously mapped.
⓫	**Name** The name for the message.

Performing Explicit Messages

There are five basic events in the Explicit Messaging process defined below. The details of each step will vary depending on the controller (ControlLogix, PLC, or SLC). Refer to the documentation for your controller.

Important: There must be a request message and a response message for all Explicit Messages, whether you are reading or writing data.

Figure 6.2 Explicit Message Process



Event

1. You format the required data and set up the ladder logic program to send an Explicit Message request to the scanner or bridge module (download).

2. The scanner or bridge module transmits the Explicit Message Request to the slave device over the EtherNet/IP network.

3. The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.

4. The controller retrieves the Explicit Message Response from the scanner's buffer (upload).

5. The Explicit Message is complete.

Note: The scanner module may be integrated with the controller (for example, ControlLogix).

About the Example Explicit Messages

These examples show how to format and execute the following types of Explicit Messages using a ControlLogix controller:

- Get Attribute Single
- Set Attribute Single
- Get Attributes Scattered
- Set Attributes Scattered

Message Formats

When formatting an example message, refer to Formatting Explicit Messages in this chapter for an explanation of the content of each box.

Also, to format and execute these example messages, you need the Controller tags displayed in Figure 6.3.

Figure 6.3 Controller Tags for Explicit Messages

P	Tag Name	Type	Style	Description
	GetAttributeSingle	MESSAGE		Get Attribute Single Service
	GetAttributeSingleData	INT	Decimal	Data from the Get Attribute Single Service
	GetAttributesScattered	MESSAGE		Get Attributes Scattered Service
	GetScatteredRequestData	INT[15]	Decimal	
	GetScatteredResponseData	INT[15]	Decimal	
	PowerFlex70:C	AB:ETHER...		
	PowerFlex70:I	AB:ETHER...		
	PowerFlex70:O	AB:ETHER...		
	SetAttributeSingle	MESSAGE		Set Attribute Single Service
	SetAttributeSingleData	INT	Decimal	Data sent to Set Attribute Single Service
	SetAttributesScattered	MESSAGE		Set Attributes Scattered Service
	SetScatteredRequestData	INT[15]	Decimal	
	SetScatteredResponseData	INT[15]	Decimal	

Ladder Logic Rungs

The ladder logic rungs for the examples in this chapter can be appended after rung 9 in the ladder logic program (Figure 5.7) in Chapter 5, Using I/O Messaging.

Source and Destination Data

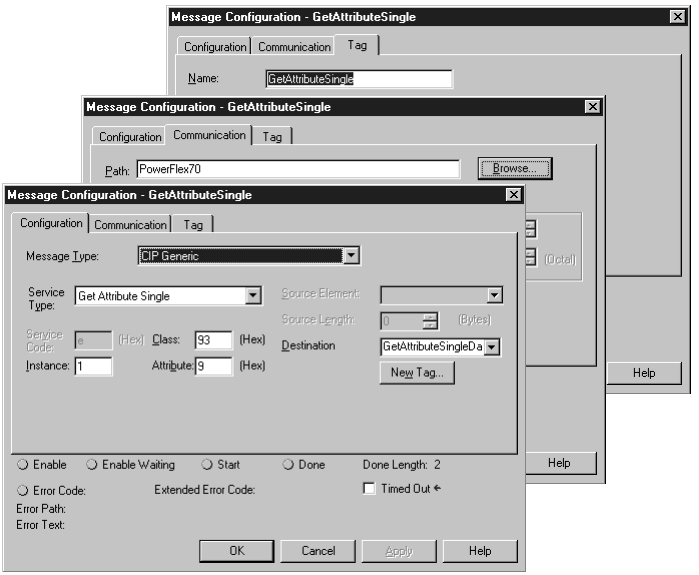
The example values for the source and destination data that appear in this chapter may vary in your application.

Example Get Attribute Single Message

A Get Attribute Single message reads a single attribute value. In this example, we read the value of a parameter in a PowerFlex 70 drive.

Example Message Format

Figure 6.4 Message Format for a Get Attribute Single Message



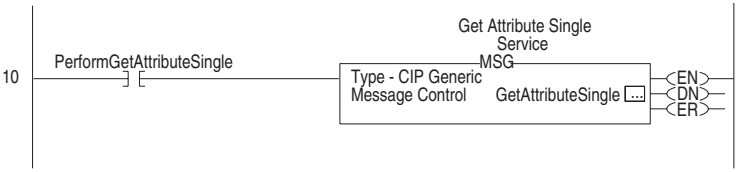
The following table identifies key settings for the message format:

Configuration	Example Value	Description	Refer to . . .
Service Type (1)	Get Attribute Single	Read parameter data	C-24
Service Code (1)	e (Hex.)	Code for Get_Attribute_Single	C-10
Class	93 (Hex.)	DPI Parameter Object	C-21
Instance	1 (Dec.)	Parameter 1 - [Output Freq]	C-21
Attribute	9 (Hex.)	Parameter Value	C-22
Destination	GetAttributeSingleData	Controller tag for response data	—

(1) The default setting for Service Type is “Custom,” which enables you to enter a Service Code that is not available from the Service Type pulldown menu. When you select a Service Type other than “Custom” from the pulldown menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (inaccessible).

Example Ladder Logic Rung

Figure 6.5 Example Get Attribute Single Message



Example Destination Data

In this example, the Get Attribute Single message reads **Parameter 1 - [Output Freq]** in the PowerFlex drive and returns its value to the destination tag named GetAttributeSingleData.

Figure 6.6 Example Destination Data from a Get Attribute Single Message

GetAttributeSingleData	325	Decimal	INT	Data from the Get Attribute Single Service

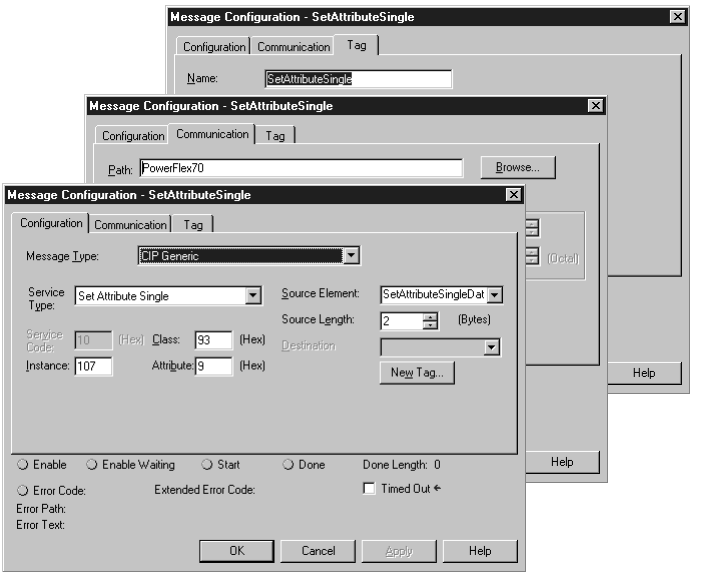
The output frequency is 32.5 Hz.

Example Set Attribute Single Message

A Set Attribute Single message writes a value for a single attribute. In this example, we write the value of a parameter in a PowerFlex 70 drive.

Example Message Format

Figure 6.7 Message Format for a Set Attribute Single Message



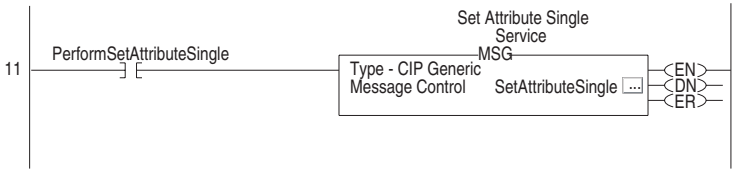
The following table identifies key settings for the data format:

Configuration	Example Value	Description	Refer to . . .
Service Type (1)	Set Attribute Single	Write parameter data	C-24
Service Code (1)	10 (Hex.)	Code for Set_Attribute_Single	C-10
Class	93 (Hex.)	DPI Parameter Object	C-21
Instance	107 (Dec.)	Parameter 107 - [Preset Speed 7]	C-21
Attribute	9 (Hex.)	Parameter Value	C-22
Source Element	SetAttributeSingleData	Controller tag for write data	—
Source Length	2 bytes	One 16-bit word of data is sent	—

(1) The default setting for Service Type is “Custom,” which enables you to enter a Service Code that is not available from the Service Type pulldown menu. When you select a Service Type other than “Custom” from the pulldown menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (inaccessible).

Example Ladder Logic Rung

Figure 6.8 Example Set Attribute Single Message



Example Source Data

In this example, the Set Attribute Single message writes 599, the value in the source tag named SetAttributeSingleData, to **Parameter 107 - [Preset Speed 7]** in the PowerFlex drive.

Figure 6.9 Example Source Data from a Set Attribute Single Message

⊞ SetAttributeSingleData	599	Decimal	INT	Data sent to Set Attribute Single Service

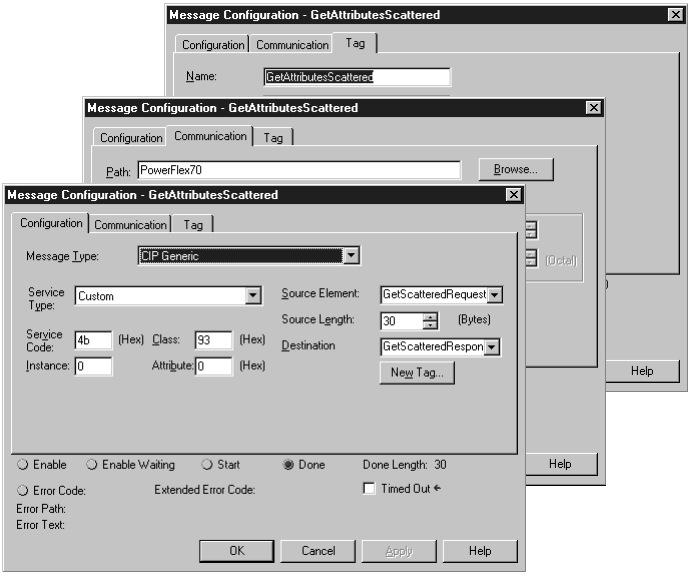
59.9 Hz is written to the parameter.

Example Get Attributes Scattered Message

A Get Attributes Scattered message reads the values of multiple attributes. In this example, we read the values of various parameters in a PowerFlex 70 drive.

Example Message Format

Figure 6.10 Message Format for a Get Attributes Scattered Message



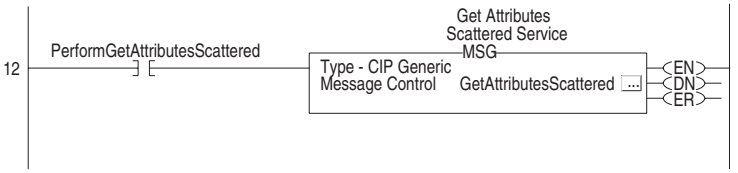
The following table identifies key settings for the message format:

Configuration	Example Value	Description	Refer to . . .
Service Type [1]	Custom	Required for scattered messages	—
Service Code [1]	4B (Hex.)	Code for Get_Attributes_Scattered	C-24
Class	93 (Hex.)	DPI Parameter Object	C-21
Instance	0 (Dec.)	Required for scattered messages	—
Attribute	0 (Hex.)	Required for scattered messages	—
Source Element	GetScatteredRequestData	Controller tag for request data	6-12
Source Length	30 Bytes	Fifteen 16-bit words of data	6-12
Destination	GetScatteredResponseData	Controller tag for response data	6-12

[1] The default setting for Service Type is “Custom,” which enables you to enter a Service Code that is not available from the Service Type pulldown menu. When you select a Service Type other than “Custom” from the pulldown menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (inaccessible).

Example Ladder Logic Rung

Figure 6.11 Example Get Attributes Scattered Message



Explanation of Source and Destination Data

The data structures in Figure 6.12 uses 16-bit words and can get up to twenty-two parameters in a single message. In the Response Message, a parameter number with the high bit set indicates that the associated parameter value field contains an error code.

Figure 6.12 Data Structures for Get Scattered Attributes Messages

	Request (Source Data)
Word 0	Parameter Number
1	Pad Word
2	Pad Word
3	Parameter Number
4	Pad Word
5	Pad Word
6	Parameter Number
7	Pad Word
8	Pad Word
9	Parameter Number
10	Pad Word
11	Pad Word
12	Parameter Number
13	Pad Word
14	Pad Word
15	Parameter Number
16	Pad Word
17	Pad Word
⋮	
63	Parameter Number
64	Pad Word
65	Pad Word

	Response (Destination Data)
Word 0	Parameter Number
1	Parameter Value LSW
2	Parameter Value MSW
3	Parameter Number
4	Parameter Value LSW
5	Parameter Value MSW
6	Parameter Number
7	Parameter Value LSW
8	Parameter Value MSW
9	Parameter Number
10	Parameter Value LSW
11	Parameter Value MSW
12	Parameter Number
13	Parameter Value LSW
14	Parameter Value MSW
15	Parameter Number
16	Parameter Value LSW
17	Parameter Value MSW
⋮	
63	Parameter Number
64	Parameter Value LSW
65	Parameter Value MSW

Example Source Data

In this example, we use the data structure in Figure 6.13 in the source tag named GetScatteredRequestData to read the following five parameters: Parameter 1 - [Output Freq], 3 - [Output Current], 6 - [Output Voltage], 12 - [DC Bus Voltage], and 17 - [Analog In1 Value].

Figure 6.13 Example Source Data

Tag Name	Value	Style	Type	Description
GetScatteredRequestData	{...}	Decimal	INT[15]	
GetScatteredRequestData[0]	1	Decimal	INT	Parameter Number (decimal)
GetScatteredRequestData[1]	0	Decimal	INT	Pad Word
GetScatteredRequestData[2]	0	Decimal	INT	Pad Word
GetScatteredRequestData[3]	3	Decimal	INT	Parameter Number (decimal)
GetScatteredRequestData[4]	0	Decimal	INT	Pad Word
GetScatteredRequestData[5]	0	Decimal	INT	Pad Word
GetScatteredRequestData[6]	6	Decimal	INT	Parameter Number (decimal)
GetScatteredRequestData[7]	0	Decimal	INT	Pad Word
GetScatteredRequestData[8]	0	Decimal	INT	Pad Word
GetScatteredRequestData[9]	12	Decimal	INT	Parameter Number (decimal)
GetScatteredRequestData[10]	0	Decimal	INT	Pad Word
GetScatteredRequestData[11]	0	Decimal	INT	Pad Word
GetScatteredRequestData[12]	17	Decimal	INT	Parameter Number (decimal)
GetScatteredRequestData[13]	0	Decimal	INT	Pad Word
GetScatteredRequestData[14]	0	Decimal	INT	Pad Word

Example Destination Data

The Get Attributes Scattered message reads the multiple parameters and returns their values to the destination tag (GetScatteredResponseData).

Figure 6.14 Example Destination Data

Tag Name	Value	Style	Type	Description
GetScatteredRequestData	{...}	Decimal	INT[15]	
GetScatteredResponseData	{...}	Decimal	INT[15]	
GetScatteredResponseData[0]	1	Decimal	INT	Parameter Number (decimal)
GetScatteredResponseData[1]	325	Decimal	INT	Parameter Value LSW
GetScatteredResponseData[2]	0	Decimal	INT	Parameter Value MSW
GetScatteredResponseData[3]	3	Decimal	INT	Parameter Number (decimal)
GetScatteredResponseData[4]	1	Decimal	INT	Parameter Value LSW
GetScatteredResponseData[5]	0	Decimal	INT	Parameter Value MSW
GetScatteredResponseData[6]	6	Decimal	INT	Parameter Number (decimal)
GetScatteredResponseData[7]	1187	Decimal	INT	Parameter Value LSW
GetScatteredResponseData[8]	0	Decimal	INT	Parameter Value MSW
GetScatteredResponseData[9]	12	Decimal	INT	Parameter Number (decimal)
GetScatteredResponseData[10]	3292	Decimal	INT	Parameter Value LSW
GetScatteredResponseData[11]	0	Decimal	INT	Parameter Value MSW
GetScatteredResponseData[12]	17	Decimal	INT	Parameter Number (decimal)
GetScatteredResponseData[13]	8318	Decimal	INT	Parameter Value LSW
GetScatteredResponseData[14]	0	Decimal	INT	Parameter Value MSW

In this example, the parameters have the following values:

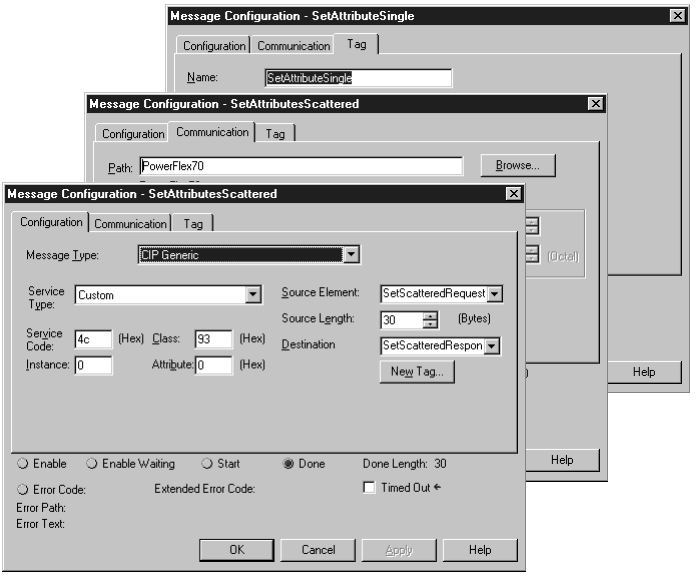
Parameter	Value
1 - [Output Freq]	32.5 Hz
3 - [Output Current]	0.1 Amp
6 - [Output Voltage]	118.7 VAC
12 - [DC Bus Voltage]	329.2 VDC
17 - [Analog In2 Value]	8.318 mA

Example Set Attributes Scattered Message

A Set Attributes Scattered message writes values to multiple attributes. In this example, we write the values of various parameters in a PowerFlex 70 drive.

Example Message Format

Figure 6.15 Message Format for a Set Attributes Scattered Message



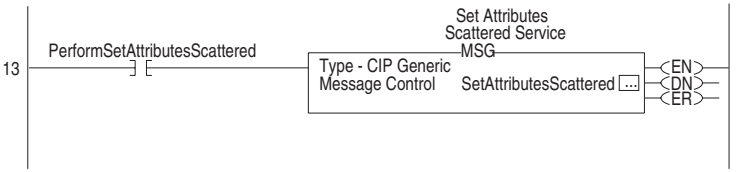
The following table identifies key settings for the message format:

Configuration	Example Value	Description	Refer to . . .
Service Type [1]	Custom	Required for scattered messages	—
Service Code [1]	4C (Hex.)	Code for Set_Attributes_Scattered	C-24
Class	93 (Hex.)	DPI Parameter Object	C-21
Instance	0 (Dec.)	Required for scattered messages	—
Attribute	0 (Hex.)	Required for scattered messages	—
Source Element	SetScatteredRequestData	Controller tag for request data	6-16
Source Length	30 Bytes	Fifteen 16-bit words of data	6-16
Destination	SetScatteredResponseData	Controller tag for response data	6-16

[1] The default setting for Service Type is “Custom,” which enables you to enter a Service Code that is not available from the Service Type pulldown menu. When you select a Service Type other than “Custom” from the pulldown menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (inaccessible).

Example Ladder Logic Rung

Figure 6.16 Example Set Attributes Scattered Message



Explanation of Source and Destination Data

The data structures in Figure 6.17 use 16-bit words and can set up to twenty-two parameters in a single message. In the Response Message, a parameter number with the high bit set indicates that the associated pad word field contains an error code.

Figure 6.17 Data Structures for Set Attributes Scattered Messages

	Request (Source Data)
Word 0	Parameter Number
1	Parameter Value LSW
2	Parameter Value MSW
3	Parameter Number
4	Parameter Value LSW
5	Parameter Value MSW
6	Parameter Number
7	Parameter Value LSW
8	Parameter Value MSW
9	Parameter Number
10	Parameter Value LSW
11	Parameter Value MSW
12	Parameter Number
13	Parameter Value LSW
14	Parameter Value MSW
15	Parameter Number
16	Parameter Value LSW
17	Parameter Value MSW
⋮	
63	Parameter Number
64	Parameter Value LSW
65	Parameter Value MSW

	Response (Destination Data)
Word 0	Parameter Number
1	Pad Word or Error Code
2	Pad Word
3	Parameter Number
4	Pad Word or Error Code
5	Pad Word
6	Parameter Number
7	Pad Word or Error Code
8	Pad Word
9	Parameter Number
10	Pad Word or Error Code
11	Pad Word
12	Parameter Number
13	Pad Word or Error Code
14	Pad Word
15	Parameter Number
16	Pad Word or Error Code
17	Pad Word
⋮	
63	Parameter Number
64	Pad Word
65	Pad Word

Example Source Data

In this example, we use the data structure in Figure 6.18 in the source tag (SetScatteredRequestData) to write new values for these parameters:

Parameter	Value
141 - [Accel Time 2]	11.1 Sec.
143 - [Decel Time 2]	22.2 Sec.
105 - [Preset Speed 5]	33.3 Hz.
106 - [Preset Speed 6]	44.4 Hz.
107 - [Preset Speed 7]1	55.5 Hz.

Figure 6.18 Example Source Data

SetScatteredRequestData	{...}	Decimal	INT[15]	
SetScatteredRequestData[0]	141	Decimal	INT	Parameter Number (decimal)
SetScatteredRequestData[1]	111	Decimal	INT	Parameter Value LSW
SetScatteredRequestData[2]	0	Decimal	INT	Parameter Value MSW
SetScatteredRequestData[3]	143	Decimal	INT	Parameter Number (decimal)
SetScatteredRequestData[4]	222	Decimal	INT	Parameter Value LSW
SetScatteredRequestData[5]	0	Decimal	INT	Parameter Value MSW
SetScatteredRequestData[6]	105	Decimal	INT	Parameter Number (decimal)
SetScatteredRequestData[7]	333	Decimal	INT	Parameter Value LSW
SetScatteredRequestData[8]	0	Decimal	INT	Parameter Value MSW
SetScatteredRequestData[9]	106	Decimal	INT	Parameter Number (decimal)
SetScatteredRequestData[10]	444	Decimal	INT	Parameter Value LSW
SetScatteredRequestData[11]	0	Decimal	INT	Parameter Value MSW
SetScatteredRequestData[12]	107	Decimal	INT	Parameter Number (decimal)
SetScatteredRequestData[13]	555	Decimal	INT	Parameter Value LSW
SetScatteredRequestData[14]	0	Decimal	INT	Parameter Value MSW

Example Destination Data

The results of the message appear in the destination tag named SetScatteredResponseData. Values of “0” indicate no errors occurred.

Figure 6.19 Example Destination Data

SetScatteredResponseData	{...}	Decimal	INT[15]	
SetScatteredResponseData[0]	141	Decimal	INT	Parameter Number (decimal)
SetScatteredResponseData[1]	0	Decimal	INT	Pad Word or Error Code
SetScatteredResponseData[2]	0	Decimal	INT	Pad Word
SetScatteredResponseData[3]	143	Decimal	INT	Parameter Number (decimal)
SetScatteredResponseData[4]	0	Decimal	INT	Pad Word or Error Code
SetScatteredResponseData[5]	0	Decimal	INT	Pad Word
SetScatteredResponseData[6]	105	Decimal	INT	Parameter Number (decimal)
SetScatteredResponseData[7]	0	Decimal	INT	Pad Word or Error Code
SetScatteredResponseData[8]	0	Decimal	INT	Pad Word
SetScatteredResponseData[9]	106	Decimal	INT	Parameter Number (decimal)
SetScatteredResponseData[10]	0	Decimal	INT	Pad Word or Error Code
SetScatteredResponseData[11]	0	Decimal	INT	Pad Word
SetScatteredResponseData[12]	107	Decimal	INT	Parameter Number (decimal)
SetScatteredResponseData[13]	0	Decimal	INT	Pad Word or Error Code
SetScatteredResponseData[14]	0	Decimal	INT	Pad Word

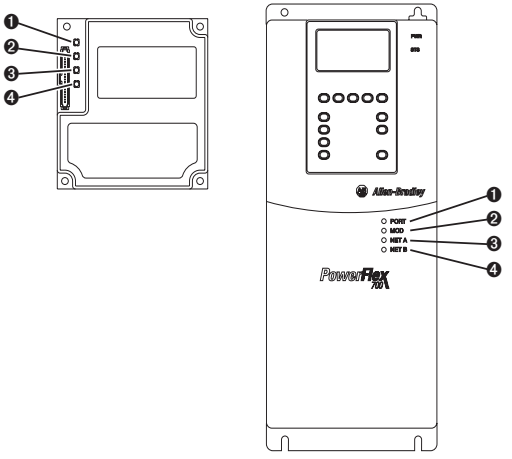
Troubleshooting

Chapter 7 provides information for diagnosing and troubleshooting potential problems with the adapter.

Understanding the Status Indicators

The EtherNet/IP adapter has four status indicators. They can be viewed on the adapter or through the drive cover. See Figure 7.1.

Figure 7.1 Status Indicators (location on drive may vary)



Item	Status Indicator	Description	Page
❶	PORT	DPI Connection Status	7-2
❷	MOD	Adapter Status	7-3
❸	Net A	EtherNet/IP Connection Status	7-4
❹	Net B	EtherNet/IP Transmit Status	7-5

PORT Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered or is not connected properly to the drive.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive.
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected. • Cycle power to the drive.
Solid Red	The drive has refused an I/O connection from the adapter. Another DPI peripheral is using the same DPI port as the adapter.	**Important:** Cycle power to the drive after making any of the following corrections: • Verify that all DPI cables are securely connected and not damaged. Replace cables if necessary. • Verify that the DPI Host supports Datalinks. • Configure the adapter to use a Datalink that is not already being used by another peripheral.
Orange	The adapter is connected to a product that does not support Allen-Bradley DPI communications.	Connect the adapter to a product that supports Allen-Bradley DPI communications (for example, PowerFlex drives).
Flashing Green	The adapter is establishing an I/O connection to the drive.	No action required. Normal behavior if no DPI I/O is enabled.
Solid Green	The adapter is properly connected and is communicating with the drive.	No action required.

MOD Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive.
Flashing Red	The adapter has failed the firmware test. The adapter is being flash upgraded.	• Clear faults in the adapter. • Cycle power to the drive. • If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the adapter. • If resetting defaults does not correct the problem, flash the adapter with the latest firmware release.
Solid Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the adapter. • Configure the adapter for the program in the controller. • Normal behavior if no DPI I/O is enabled.
Solid Green	The adapter is operational and transferring I/O data.	No action required.

Net A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter and/or network is not powered, the adapter is not connected properly to the network, or the adapter needs an IP address.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable and to the network using an Ethernet cable. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address using a BOOTP server or by disabling BOOTP and using parameters. • Apply power to the drive and network.
Solid Red	The adapter failed duplicated IP address detection test.	Configure the adapter to use a unique IP address and cycle power.
Flashing Red	An EtherNet/IP connection has timed out.	• Place the scanner in RUN mode, or apply power to the peer device that will send I/O. • Check the amount of traffic on the network.
Flashing Red/ Green	The adapter is performing a self-test.	No action required.
Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.	• Place the controller in RUN mode, or apply power to the peer device that will send I/O. • Program a controller or peer device to recognize and transmit I/O or make a messaging connection to the adapter. • Configure the adapter for the program in the controller or the I/O from the peer device.
Solid Green	The adapter is properly connected and communicating on the network.	No action required.

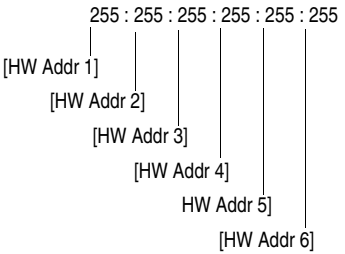
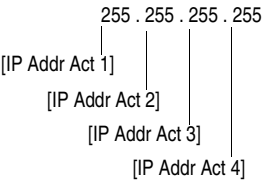
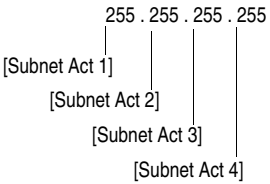
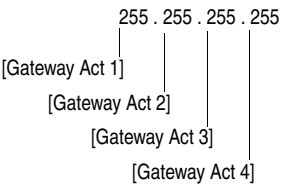
Net B Status Indicator

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not transmitting on the EtherNet/IP network.	If Net A is off: • Securely connect the adapter to the drive using the Internal Interface (ribbon) cable and to the network using a Ethernet cable. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address using a BOOTP server or by disabling BOOTP and using parameters. If Net A is solid red: • Configure the adapter to use a unique IP address and cycle power. If Net A is flashing red/green or red: • Check the IP address in the adapter and scanner. • Ping the adapter. Normal condition if the adapter is idle.
Flashing Green	The adapter is transmitting on the EtherNet/IP network.	No action required.

Viewing Adapter Diagnostic Items

The following adapter diagnostic items can be viewed using DriveExplorer (version 2.01 or higher) software, DriveExecutive (version 1.01 or higher) software, or an LCD PowerFlex HIM (Diagnostics/Device Items). These diagnostic items can help you or Rockwell Automation personnel troubleshoot communications problems.

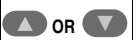
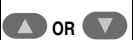
No.	Name	Description
1	Common Logic Cmd	Current value of the common Logic Command being transmitted to the drive by this adapter.
2	Prod Logic Cmd	Current value of the product-specific Logic Command being transmitted to the drive by this adapter.
3	Reference	Current value of the product-specific Reference being transmitted to the drive by this adapter.
4	Common Logic Sts	Current value of the common Logic Status being received from the drive by this adapter.
5	Prod Logic Sts	Current value of the product-specific Logic Status being received from the drive by this adapter.
6	Feedback	Current value of the product-specific Feedback being received from the drive by this adapter.
7	Datalink A1 In	Current value of respective Datalink In being transmitted to the drive by this adapter. (If not using a Datalink, this parameter should have a value of zero.)
8	Datalink A2 In	
9	Datalink B1 In	
10	Datalink B2 In	
11	Datalink C1 In	
12	Datalink C2 In	
13	Datalink D1 In	
14	Datalink D2 In	
15	Datalink A1 Out	Current value of respective Datalink Out being transmitted from the drive by this adapter. (If the drive indicates a 16-bit datalink size, the value appears in the least significant 16 bits of this diagnostic item, and the most significant 16 bits of this diagnostic item are zero.)
16	Datalink A2 Out	
17	Datalink B1 Out	
18	Datalink B2 Out	
19	Datalink C1 Out	
20	Datalink C2 Out	
21	Datalink D1 Out	
22	Datalink D2 Out	
23	DPI Rx Errors	Current value of the DPI Receive error counter.
24	DPI Rx Error Max	Maximum value (since reset) of the DPI Receive error counter.
25	DPI Tx Errors	Current value of the DPI Transmit error counter.
26	DPI Tx Error Max	Maximum value (since reset) of the DPI Transmit error counter.
27	Boot Flash Count	Number of times the boot firmware in the adapter has been flash updated.
28	App Flash Count	Number of times the application firmware in the adapter has been flash updated.
29	M-S Input Size	Size of data transferred from the network to the drive.
30	M-S Output Size	Size of data transferred from the drive to the network.

No.	Name	Description
31 32 33 34 35 36	HW Addr 1 HW Addr 2 HW Addr 3 HW Addr 4 HW Addr 5 HW Addr 6	Decimal value of each byte in the adapter's Ethernet hardware address. 
37 38 39 40	IP Addr Act 1 IP Addr Act 2 IP Addr Act 3 IP Addr Act 4	Value of each byte in the adapter's current IP address. A value of "0" appears if the adapter does not currently have an IP address. 
41 42 43 44	Subnet Act 1 Subnet Act 2 Subnet Act 3 Subnet Act 4	Value of each byte in the adapter's current subnet mask. A value of "0" appears if the adapter does not currently have a subnet mask. 
45 46 47 48	Gateway Act 1 Gateway Act 2 Gateway Act 3 Gateway Act 4	Value of each byte in the adapter's current gateway address. A value of "0" appears if the adapter does not currently have a gateway address. 
49	EN Rx Overruns	Number of receive buffer overruns reported by the Ethernet hardware.
50	EN Rx Packets	Number of Ethernet packets that the adapter has received.
51	EN Rx Errors	Number of receive errors reported by the Ethernet hardware.
52	EN Tx Packets	Number of Ethernet packets that the adapter has sent.
53	EN Tx Errors	Number of transmit errors reported by the Ethernet hardware.
54	Last TCP Reset	Last reason that the adapter reset or rejected a TCP/IP connection.
55	Missed IO Pkts	Number of incoming I/O connection packets that the adapter did not receive.
56	OPT Status	Operating status of optional I/O board (in External Comms Kit). For bit status indications, see Chapter 9, Viewing Optional I/O Diagnostic Items.
57	OPT RX Errors	Number of optional I/O board receive errors.
58	OPT FW Version	Firmware version of optional I/O board (in External Comms Kit).

Viewing and Clearing Events

The adapter maintains an event queue that reports the history of its actions. You can view the event queue using an LCD PowerFlex HIM, DriveExplorer (2.01 or higher) software, or DriveExecutive (1.01 or higher) software.

To view and clear events

Step	Keys	Example Screen
Viewing Events 1. Access parameters in the adapter. Refer to Using the PowerFlex HIM in Chapter 3.		Main Menu: Diagnostics Parameter Device Select
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		Event Q: 1 E3 Ping Time Flt
4. Repeat steps 2 and 3 to enter the **Events** option and then **View Event Queue** option.		
5. Press the Up Arrow or Down Arrow to scroll through the events. The most recent event is Event 1.		
Clearing Events 1. Access parameters in the adapter. Refer to Using the PowerFlex HIM in Chapter 3.		
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		Dgn: Events View Event Queue Clear Event Clr Event Queue
4. Repeat steps 2 and 3 to enter the **Events** option and then the **Clear Event** option or **Clr Event Queue** option. A message will pop up to confirm that you want to clear the message or queue.		
5. Press Enter to clear all events out of the event queue. All event queue entries will then display “No Event.”		

Events

Many events in the Event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Allen-Bradley personnel troubleshoot the problem. The following events may appear in the event queue:

Code	Event	Description
1	No Event	Empty event queue entry.
2	DPI Bus Off Flt	A bus-off condition was detected on DPI. This event may be caused by loose or broken cables or by noise.
3	Ping Time Flt	A ping message was not received on DPI within the specified time.
4	Port ID Flt	The adapter is not connected to a correct port on a DPI product.
5	Port Change Flt	The DPI port changed.
6	Host Sent Reset	The drive sent a reset event message.
7	EEPROM Sum Flt	The EEPROM in the adapter is corrupt.
8	Online @ 125kbps	The adapter detected that the drive is communicating at 125 kbps.
9	Online @ 500kbps	The adapter detected that the drive is communicating at 500 kbps.
10	Bad Host Flt	The adapter was connected to an incompatible product.
11	Dup Port Flt	Another peripheral with the same port number is already in use.
12	Type 0 Login	The adapter has logged in for type 0 control.
13	Type 0 Time Flt	The adapter has not received a type 0 status message within the specified time.
14	DL Login	The adapter has logged into a Datalink.
15	DL Reject Flt	The drive rejected an attempt to log in to a Datalink because the Datalink is not supported or is used by another peripheral.
16	DL Time Flt	The adapter has not received a Datalink message within the specified time.
17	Reserved	Not used.
18	Control Disabled	The adapter has sent a “Soft Control Disable” command to the drive.
19	Control Enabled	The adapter has sent a “Soft Control Enable” command to the drive.
20	Message Timeout	A Client-Server message sent by the adapter was not completed.
21	Flt Cfg Error	At least one of the Flt Cfg xx parameters is set to a value greater than 65535 and the DPI host requires a 16-bit value.
22	App Updated	Startup sequence detected new application firmware.
23	EN Comm Flt	The adapter detected a communications fault on the network.
24	EN Sent Reset	The adapter received a reset from the network.
25	EN Close Flt	An I/O connection from the network to the adapter was closed.
26	EN Idle Flt	The adapter is receiving “Idle” packets from the network.

Code	Event	Description
27	EN Open	An I/O connection to the adapter from the network has been opened.
28	EN Timeout Flt	An I/O connection from the network to the adapter has timed out.
29	PCCC IO Close	The device sending PCCC control messages to the adapter has sent the PCCC Control Timeout to a value of zero.
30	PCCC IO Open	The adapter has begun receiving PCCC control messages (the PCCC Control Timeout was previously set to a non-zero value).
31	PCCC IO Time Flt	The adapter has not received a PCCC control message within the specified PCCC Control Timeout interval.
32	Watchdog T/O Flt	The software detects a failure.
33	EEPROM Init	Startup sequence detected a blank EEPROM map revision. Intended to happen in factory test.
34	Normal Startup	The adapter successfully started up.
35	Manual Reset	The adapter was reset by changing Parameter 20 - [Reset Module].
36	EN Link Down	The Ethernet link was removed from the adapter.
37	EN Link Up	An Ethernet link is available for the adapter.
38	BOOTP Response	The adapter received a response to its BOOTP request.
39	Dup IP Addr	The adapter uses the same IP address as another device on the network.
40	Peer IO Open	The adapter received the first Peer I/O message.
41	Peer IO Time Flt	The adapter has not received a Peer I/O message for longer than the Peer I/O Timeout.
42	Email Failed	The adapter encountered an error attempting to send a requested e-mail message.
43	Msg Ctrl Open	The timeout attribute in either the CIP Register or Assembly object was written with a non-zero value, allowing control messages to be sent to the adapter.
44	Msg Ctrl Close	The timeout attribute in either the CIP Register or Assembly object was written with a zero value, disallowing control messages to be sent to the adapter.
45	Msg Ctrl Timeout	The timeout attribute in either the CIP Register or Assembly object elapsed between accesses of those objects.
46	OPT Open	The adapter began exchanging I/O data with the I/O option.
47	OPT Close	The adapter forced a fault condition on the I/O option.
48	OPT Timeout	Communication between the adapter and I/O option was disrupted.

Viewing the Adapter's Web Pages

Chapter 8 provides instructions on how to monitor the adapter and connected PowerFlex drive using the adapter's web interface.

Future enhancements may result in adapter web pages that look different than the examples shown in this chapter.

Accessing the Adapter's Web Home Page

After configuring the adapter, you can view its web pages. These pages present information about the adapter, the drive to which it is connected, and the other DPI devices connected to the drive such as a HIM.

TIP: Series A adapter web pages are accessed differently than Series B.

- Series A adapter (version 2.002 or lower) — By default the adapter web pages are enabled. To disable the web pages, use Bit 0 of **Parameter 54 - [Access Control]**. Refer to Chapter 3, Setting Web Access Control for more information.
- Series B adapter (version 3.xxx or higher) — By default the adapter web pages are disabled. To enable the web pages, set the Web Pages Switch (SW2 in Figure 2.1) to its "Enable Web" position and reset the adapter. **Parameter 55 - [Web Enable]** can be used to display the setting (enabled or disabled) of this switch.

The adapter can be configured to automatically send e-mail messages to desired addresses when selected drive faults occur and/or are cleared, and/or when the adapter takes a communication or idle fault action.

For Series A adapters, Bit 1 of **Parameter 54 - [Access Control]** can be used to protect the configured settings for the e-mail messaging feature. For Series B adapters, Bit 0 of **Parameter 56 - [Web Features]** can be used to protect the configured settings. For more details, see the Configure E-mail Notification Web Page section in this chapter.

To view the web pages of the adapter

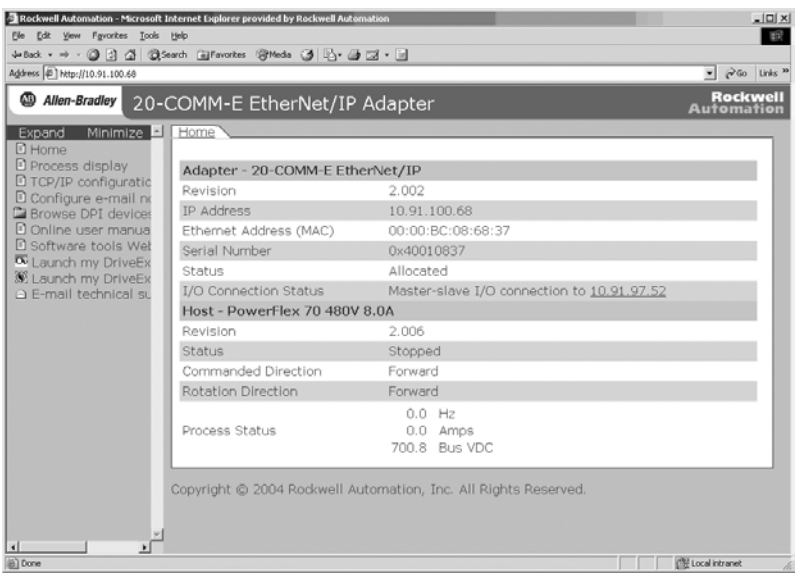
1. On a computer with access to the EtherNet/IP network on which the adapter is installed, launch a web browser such as Microsoft™ Internet Explorer (version 5.0 or greater) or Netscape® Navigator® (version 4.6 or greater).

   The computer can access the adapter web pages if it is connected to the same network as the adapter, or if it is connected to a network with access to the adapter's network via a gateway device (for example, a router).

2. In the Address box (Explorer) or Location box (Navigator), type the IP address of the adapter, and then press ENTER. The web Home Page for the adapter appears.

Important: Clicking the browser's Refresh button always re-displays the Home Page even while viewing another adapter web page.

Figure 8.1 Adapter Web Home Page Example



Title Bar on Adapter Web Pages

The title bar appears on all adapter web pages, including its Home Page. It consists of three elements:

Item	Description
Allen-Bradley logo (at far left)	This logo is also a link. Click it to view the ab.com web Home Page.
Adapter Title (middle)	Shows the adapter type or user-configurable title.
Rockwell Automation logo (at far right)	This logo is also a link. Click it to view the Rockwell Automation web Home Page.

Navigation Menu on Adapter Web Pages

The navigation menu appears on the left side of all adapter web pages, including its Home page. The navigation menu consists of links and link folders which can be expanded or minimized. The following table shows all of the navigation menu's links and link folders:

Link/Folder	Description
Home link	Click this link to view the adapter's Home Page (Figure 8.1).
Process Display link	Click this link to view the Host's Process Display pop-up window (Figure 8.2)
TCP/IP configuration link	Click this link to view the adapter's TCP/IP Configuration web page showing information about the TCP/IP configuration, such as the adapter's IP address and the number of packets being sent. Figure 8.3 shows an example TCP/IP Configuration web page.
Configure e-mail notification link	Click this link to view the adapter's Configure E-mail Notification web page (Figure 8.4) to configure the adapter to send automatic e-mail messages. E-mail notification can accommodate specific needs such as when only selected faults occur (Figure 8.5). An example e-mail message is shown in Figure 8.6.
Browse DPI devices folder	Click this folder to expand and view the Port folders for all present DPI devices, including the drive, adapter, and other DPI devices connected to the drive such as a HIM.
Port x folders	Click a respective Port folder to expand and view its device's various links which take you to related information pages. For Port 0 (PowerFlex 70 Drive) example information pages, see Figure 8.7, Figure 8.8, and Figure 8.9.
Online user manuals link	Click this link to view Allen-Bradley's web page with documentation for drives and other devices.
Software tools Web site link	Click this link to view Allen-Bradley's web page with information about software tools such as DriveExplorer and DriveExecutive.
Launch my DriveExplorer software link	Click this link to launch the DriveExplorer software already installed on your PC.
Launch my DriveExecutive software link	Click this link to launch the DriveExecutive software already installed on your PC.
E-mail technical support link	Click this link to view a new e-mail message window to send a message to Allen-Bradley's Technical Support Team.

Information on Adapter Home Page

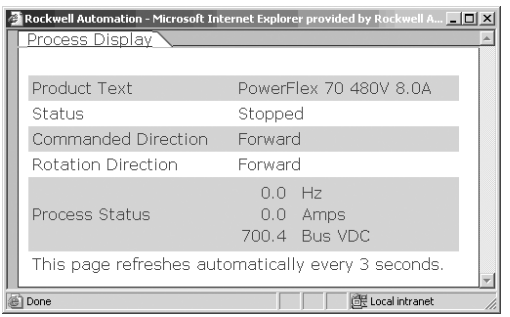
The adapter Home Page displays the following information for the adapter and host:

Item	Description
Adapter Information	• Revision • IP Address • Ethernet Address (MAC) • Serial Number • Status • I/O Connection Status
Host "X" Information	• Revision • Status • Commanded Direction • Rotation Direction • Process Status

Process Display Pop-up Windows

The Process Display pop-up window dynamically shows a host's information. To view this window, click the "Process Display" link in the navigation menu.

Figure 8.2 Example of Process Display Pop-up Window



Information	Description
Product Text	Description of host.
Status	Status of host.
Commanded Direction	Commanded direction of host.
Rotation Direction	Rotation direction of host.
Process Status	Line 1 – desired parameter of host and its dynamic value. (1) Line 2 – desired parameter of host and its dynamic value. (2) Line 3 – desired parameter of host and its dynamic value. (2)

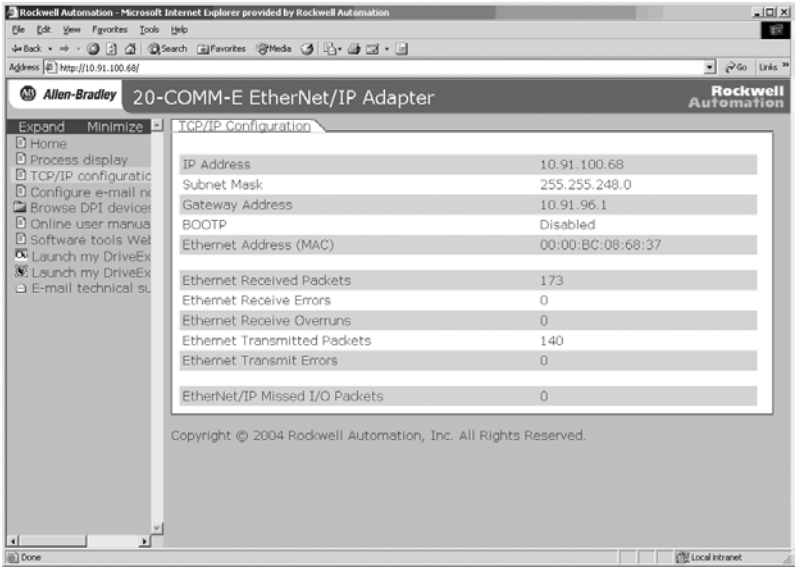
(1) The parameter whose value is shown on this line is the feedback value selected using a drive parameter. For details, see the drive User Manual.

(2) The parameter whose value is shown on this line can be set by using the HIM. For details, see the drive User Manual.

TCP/IP Configuration Web Page

The TCP/IP Configuration web page provides details about the adapter's Ethernet settings and network activities.

Figure 8.3 Example of TCP/IP Configuration Web Page



Information	Description
IP Address	IP address of the adapter.
Subnet Mask	Subnet mask for the adapter's network.
Gateway Address	Address for the gateway device on the adapter's network.
BOOTP	Whether BOOTP is being used to configure the adapter's network information.
Ethernet Address (MAC)	Hardware address for the adapter.
Ethernet Received Packets	Number of packets that the adapter has received.
Ethernet Receive Errors	Number of receive errors reported by the hardware.
Ethernet Receive Overruns	Number of receive buffer overruns reported by the hardware.
Ethernet Transmitted Packets	Number of packets that the adapter has sent.
Ethernet Transmit Errors	Number of transmit errors reported by the hardware.
EtherNet/IP Missed I/O Packets	Number of I/O connection packets that the adapter did not receive.

Configure E-mail Notification Web Page

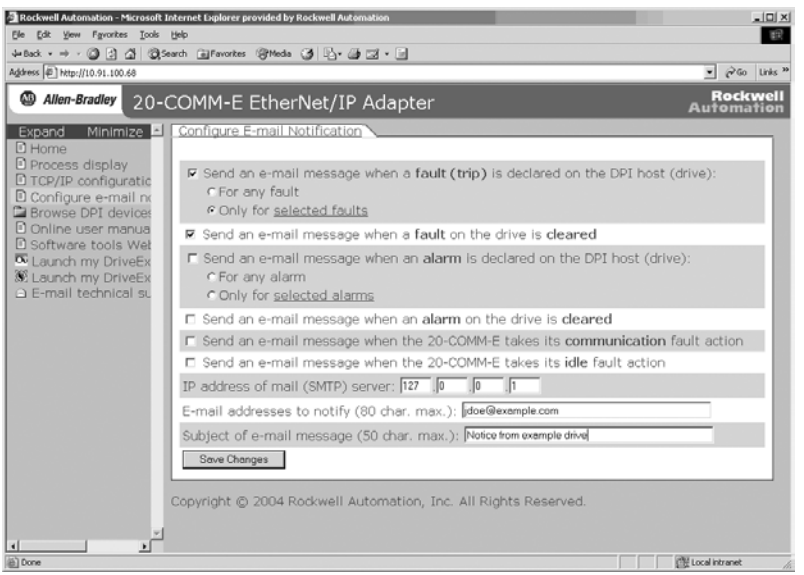
The Configure E-mail Notification web page contains selections and data fields for configuring the adapter to automatically send e-mail messages to desired addresses when selected types of events occur. E-mail configuration for Series A adapters is enabled and disabled differently than Series B adapters.

- Series A adapters (version 2.002 or lower) — By default, settings are protected and the user needs to enable configuration by setting the **Parameter 54 - [Access Control]** E-mail Config Bit 1 value to "1" (Enabled). After configuration, the settings can be protected by setting the **Parameter 54 - [Access Control]** E-mail Config Bit 1 value to "0" (Disabled).

- Series B adapters (version 3.xxx or higher) — By default, settings are not protected. After configuration, the settings can be protected by setting the **Parameter 56 - [Web Features]** E-mail Cfg Bit 0 value to "0" (Disabled). To change a protected configuration, it must first be unprotected by setting the E-mail Cfg Bit 0 value back to "1" (Enabled).

For more information, see Chapter 3, Setting Web Access Control.

Figure 8.4 Example of Configure E-mail Notification Web Page



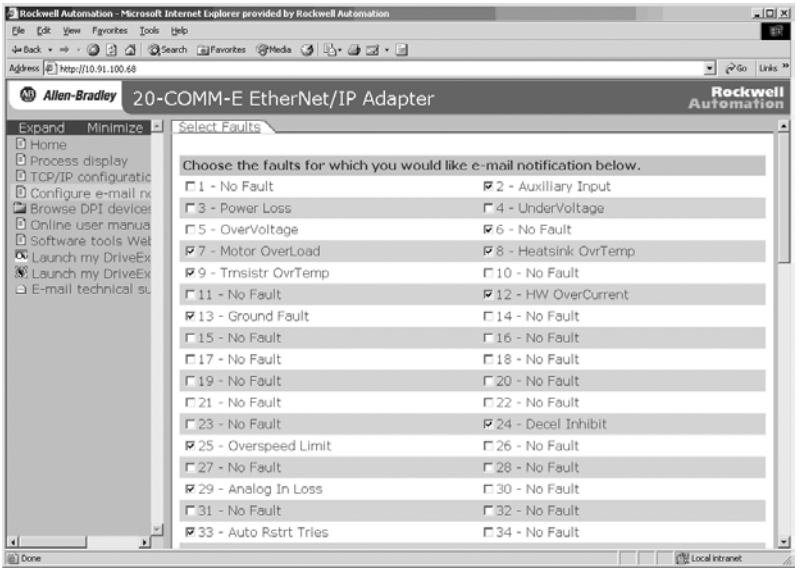
To configure e-mail notification

1. Click the desired "Send an e-mail message when ..." check boxes you want to occur that will send e-mail notification. If you only want e-mail notification when selected faults/alarms occur:

   A. Click the respective fault and/or alarm radio buttons.

   B. Click the "selected faults" link and/or "selected alarms" link. Figure 8.5 shows an example faults configuration page.

Figure 8.5 Example of Selected Faults Configuration Page



   C. Click the desired fault/alarm check boxes, and click **Save Changes**.

   D. Click the "Back to E-mail Configuration Page" link.

2. Type the following information in their respective boxes:

Information	Description
"IP address of . . . "	Type in the address of the mail server that will be used to deliver the e-mail messages.
"E-mail addresses to notify . . . "	Type in addresses to where you want e-mail messages to be sent. Multiple addresses can be used, but they must be separated by commas (comma delimited).
"Subject of e-mail message . . . "	Type in the desired subject text for the e-mail message.

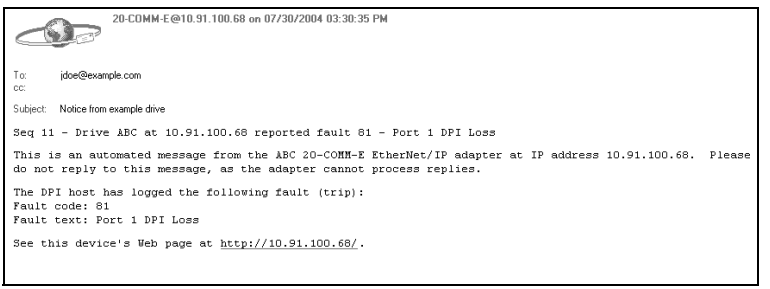
3. Click **Save changes**.

Important: For Series A adapters, it is recommended that **Parameter 54 - [Access Control]** E-mail Config Bit 1 value be set to "0" (Disabled) after E-mail Notification has been configured. Otherwise the configuration can be changed anytime the web page is accessed with a browser.

For Series B adapters, it is recommended that **Parameter 56 - [Web Features]** E-mail Cfg Bit 0 value be set to "0" (Disabled) after E-mail Notification has been configured. Otherwise the configuration can be changed anytime the web page is accessed with a browser.

An example of an e-mail message automatically sent by the adapter in response to selected events is shown below.

Figure 8.6 Example of E-mail Message Sent by Adapter


20-COMM-E@10.91.100.68 on 07/30/2004 03:30:35 PM

To: jdoe@example.com
cc:

Subject: Notice from example drive

Seq 11 - Drive ABC at 10.91.100.68 reported fault 81 - Port 1 DPI Loss

This is an automated message from the ABC 20-COMM-E EtherNet/IP adapter at IP address 10.91.100.68. Please do not reply to this message, as the adapter cannot process replies.

The DPI host has logged the following fault (trip):
Fault code: 81
Fault text: Port 1 DPI Loss

See this device's Web page at http://10.91.100.68/.

TIP: To stop e-mail messages, do one of the following:

- Delete all e-mail addresses from the Configure E-mail Notification web page.
- Uncheck all of the "Send an e-mail message when ..." boxes.

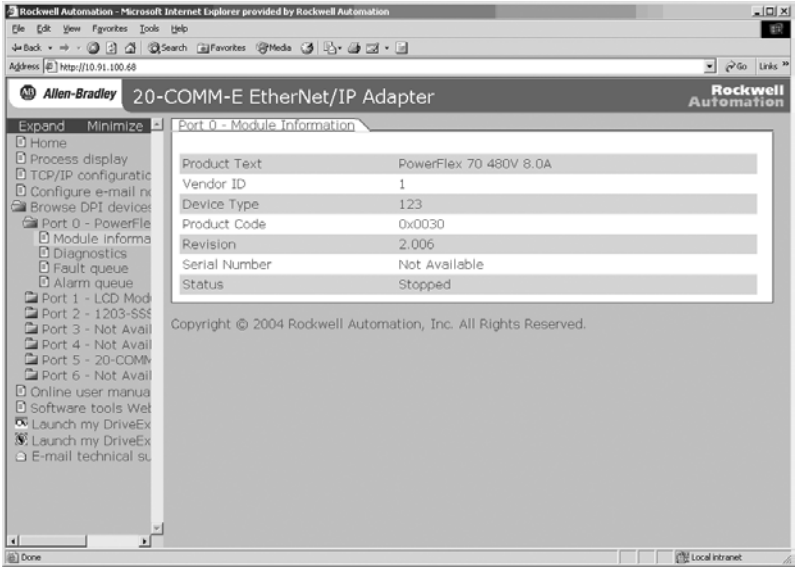
For Series A adapters, disabling the adapter web pages by using **Parameter 54 - [Access Control]** to set the Web Enable Bit 0 value to "0" (Disabled) will NOT stop the adapter from sending e-mail messages.

For Series B adapters, setting the Web Pages Switch (SW2 in Figure 2.1) to the "Disable Web" position will NOT stop the adapter from sending e-mail messages.

DPI Device Information Pages

DPI device information pages show a device's module information, diagnostic information, and fault queue. Figure 8.7 shows an example module information page for the Port 0 device (host). Figure 8.8 and Figure 8.9 respectively show example diagnostic information and fault queue pages for this device.

Figure 8.7 Example of Port 0 (PowerFlex 70 Drive) Module Information Page



Information	Description
Product Text	Text identifying the device
Vendor ID	1 = Allen-Bradley
Device Type	123
Product Code	Code for the product name and its rating
Revision	Firmware revision used by the device
Serial Number	Serial number of the device
Status	Operating status of the device (for example, faulted)

Figure 8.8 Example of Port 0 (PowerFlex 70 Drive) Diagnostic Information Page

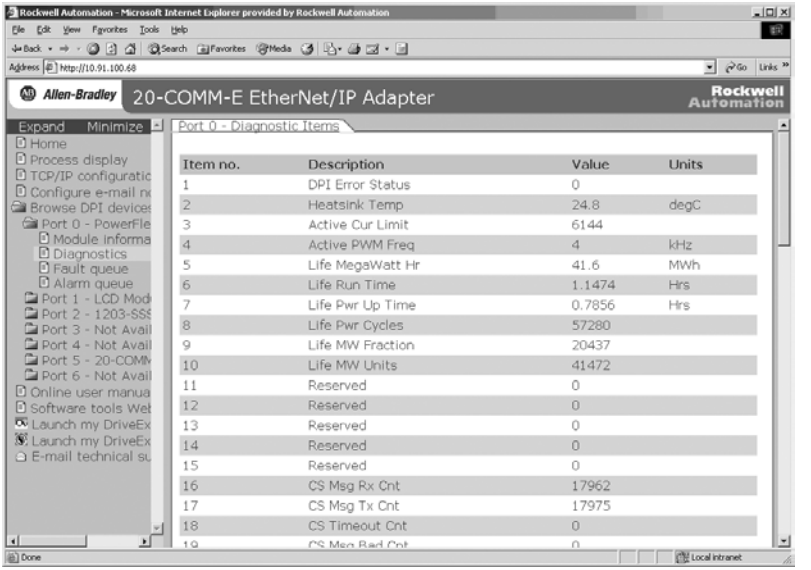


Figure 8.9 Example of Port 0 (PowerFlex 70 Drive) Fault Queue Page

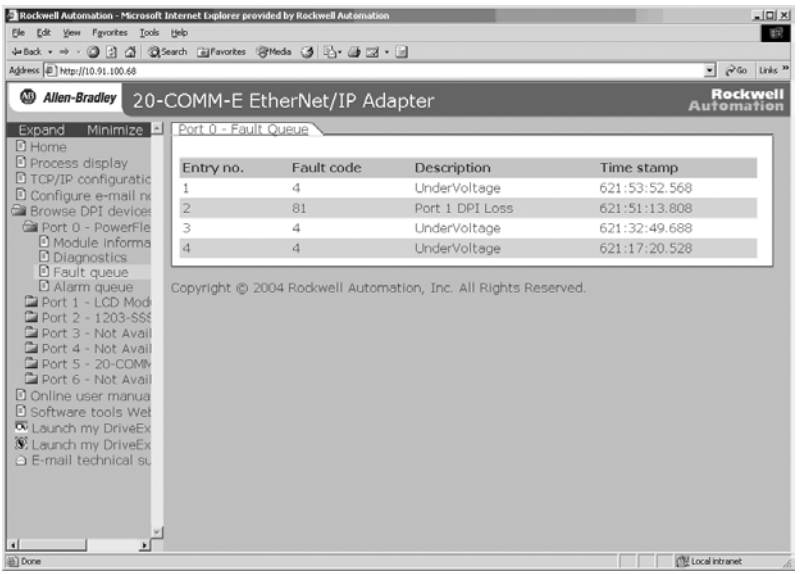
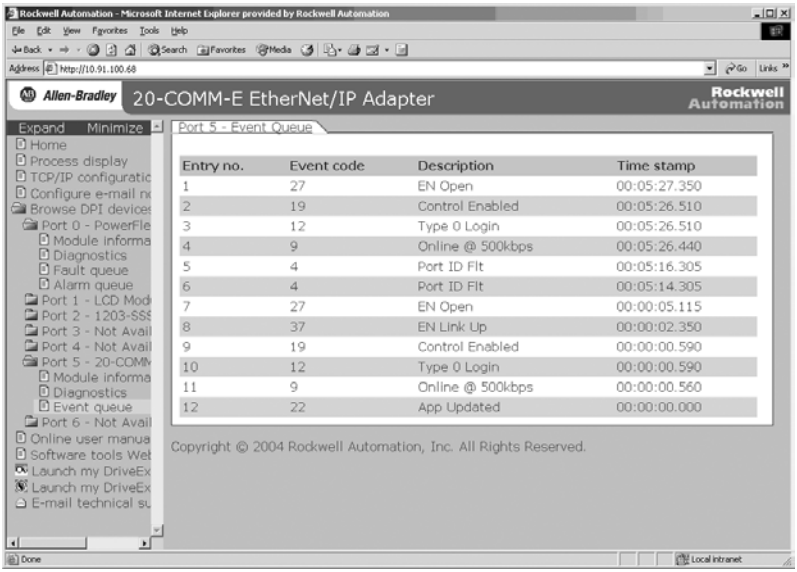


Figure 8.10 shows an example event queue page for the Port 5 device (20-COMM-E adapter).

Figure 8.10 Example of Port 5 (20-COMM-E Adapter) Event Queue Page



Notes:

Using the Adapter in an External DPI Comms Kit

Chapter 9 provides information and examples that explain how to use the adapter in an External DPI Comms Kit (20-XCOMM-DC-BASE).

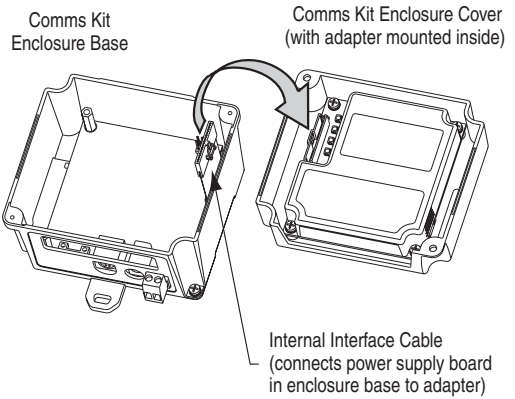
The adapter is typically installed in the internal communication slot on the PowerFlex drive. However, there are some instances when an externally mounted adapter may be desired:

- The PowerFlex drive is already connected to an existing network, such as Remote I/O, and a second network is desired for software tools (DriveExplorer, DriveExecutive, etc.), data collection, etc.
- The PowerFlex drive is remotely located next to some I/O devices that also need to be networked. The External DPI Comms Kit has an option slot for general-purpose network I/O that a controller can use. Both the drive and I/O devices are handled as one node on the network, saving network node count.

External DPI Comms Kit (20-XCOMM-DC-BASE)

This adapter can be installed in an External DPI Comms Kit.

Figure 9.1 Mounting and Connecting the Adapter

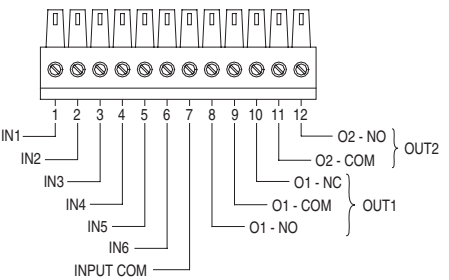


For further information, refer to the 20-XCOMM-DC-BASE Installation Instructions (*Publication Number 20COMM-IN001…*).

I/O Board Option (20-XCOMM-IO-OPT1)

The I/O Board option can be used with the adapter (Series B, Firmware 3.xxx or higher required) when installed in the External DPI Comms Kit. The I/O Board provides (6) DC inputs and (2) Relay outputs for use by a controller on the network.

Figure 9.2 I/O Connector Function Descriptions

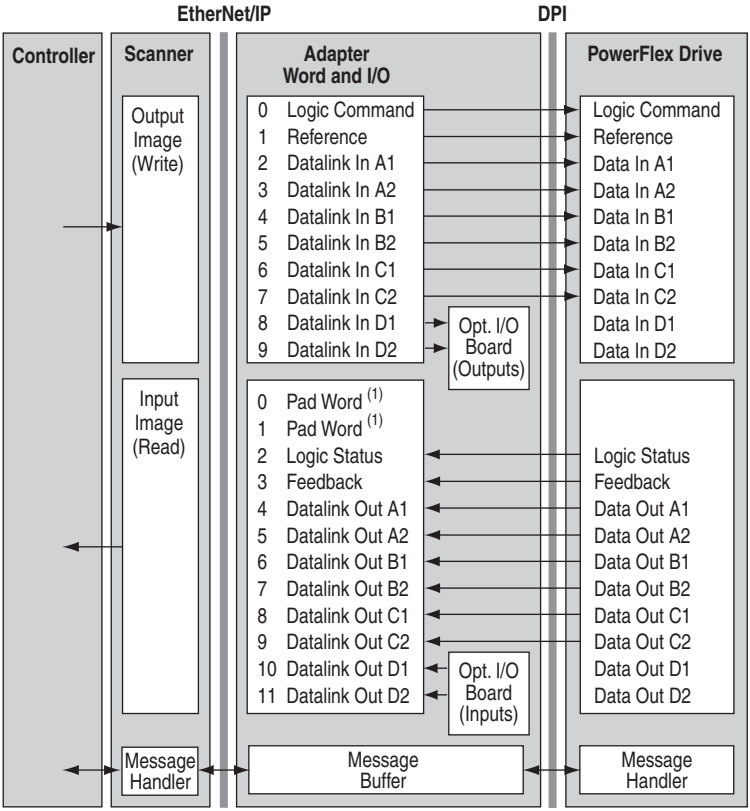


For further information, refer to the 20-XCOMM-IO-OPT1 Installation Instructions (*Publication Number 20COMM-IN002…*).

Understanding the I/O Image (Drive + I/O Option)

The data for the optional I/O Board is sent over the I/O connection using Datalink D. When the optional I/O Board is installed in the External DPI Comms Kit, Datalink D is dedicated for this function only and is not available for other uses. When the 20-COMM-E adapter detects the presence of the optional I/O Board, the I/O image is modified as shown in Figure 9.3.

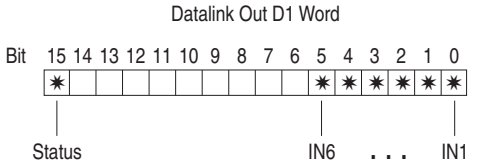
Figure 9.3 Example I/O Image with Datalink D Dedicated to I/O Board and All I/O Enabled



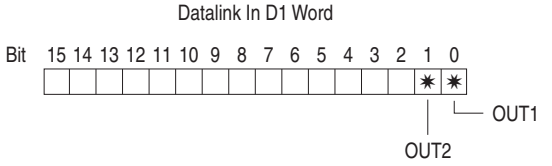
[1] Required by ControlLogix. May or may not be required by other controllers.

The data from the I/O Board is loaded into the Datalink word starting with bit 0 of Datalink D1 and concluding with bit 14. Bit 15 of Datalink D1 is reserved as an input valid Status flag. When the input data is valid, bit 15 = 1.

For example, for the 20-XCOMM-IO-OPT1, the digital inputs are mapped as follows:



The digital outputs are mapped as follows:



Important: On power-up or reset, the outputs will be in a "non-activated" state.

Configuring the Communication Adapter to Use the Optional I/O Data

To configure the Communication Adapter to use the optional I/O Board, **Parameters 23, - [DPI I/O Cfg], 35 - [M-S Input]** and **36 - [M-S Output]** must be set.

To send Input and Output data from the optional I/O board to the network

- Turn on bit 4 in **Parameter 35 - [M-S Input]** ("1xxxx").
- Turn on bit 4 in **Parameter 36 - [M-S Output]** ("1xxxx").
- Turn off bit 4 in **Parameter 23 - [DPI I/O Cfg]** ("0xxxx").

Setting the Datalink D bit 4 in the M-S Input and M-S Output parameters directs the Communication Adapter to send Datalink D back to the controller. Turning off bit 4 in the DPI I/O Cfg parameter directs the Communication Adapter to not send Datalink D data back to the drive. For more information on I/O Messaging and Configuring Datalinks, please see Chapter 5, Using I/O Messaging.

If the I/O Board Fault Action Jumper (JMP1) is set to the Fault Configurable position, **Parameter 33 - [Flt Cfg D1 In]** is used to set the states of the outputs when the I/O Board takes its Fault Action. For details on setting the Fault Action jumper, see the 20-XCOMM-IO-OPT1 Installation Instructions (*Publication Number 20COMM-IN002…*).

Viewing Optional I/O Diagnostic Items

Viewing communication adapter diagnostic item 56 (OPT Status) shows the operating status of the optional I/O board:

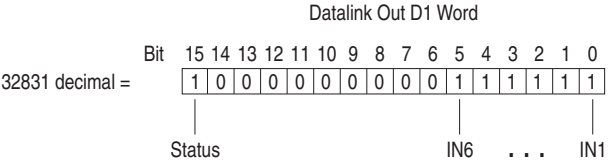
Bit	State	Status Indication	Description
0	1 (On)	OPT Present	I/O data is being exchanged with the host.
1	1 (On)	OPT Faulted	Slave is taking its fault action.
2	1 (On)	Hold Last	Fault Action is “Hold Last.”
3	1 (On)	Send Flt Cfg	Fault Action is “Fault Config.”

Viewing communication adapter diagnostic item 57 (OPT RX Errors) shows the number of I/O board receive errors.

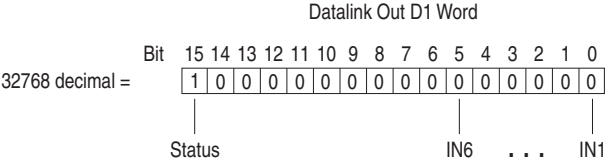
Viewing communication adapter diagnostic item 58 (OPT FW Version) shows the present firmware version on the optional I/O board.

Diagnostic item 13 (Datalink D1 In) will show the status of the outputs as a combined decimal value. For example, a “0” decimal (“00” binary) indicates both outputs are off and a “3” decimal (“11” binary) indicates both outputs are on. **Note:** A status bit is not used for outputs.

Diagnostic item 21 (Datalink D1 Out) will show the status of the inputs as a combined decimal value, including the status bit 15. For example, inputs valid and all on would show:



Inputs valid and all off (zero) would show:



Notes:

Specifications

Appendix A presents the specifications for the adapter.

Communications

Network	
Protocol	EtherNet/IP
Data Rates	10 Mbps Full Duplex, 10 Mbps Half Duplex, 100 Mbps Full Duplex, or 100 Mbps Half Duplex
Drive	
Protocol	DPI
Data Rates	125 kbps or 500 kbps

Electrical

Consumption	
Drive	350 mA at 5 VDC supplied by the host (for example, drive)
Network	None

Mechanical

Dimensions	
Height	19 mm (.75 inches)
Length	86 mm (3.39 inches)
Width	78.5 mm (3.09 inches)
Weight	85g (3 oz.)

Environmental

Temperature Operating Storage	 -10 to 50° C (14 to 149° F) -40 to 85° C (-40 to 185° F)
Relative Humidity	5 to 95% non-condensing
Atmosphere	**Important:** Adapter **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the adapter is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.

Regulatory Compliance

UL	UL508C
cUL	CAN / CSA C22.2 No. 14-M91
CE	EN50178 and EN61800-3
CTick	EN61800-3

NOTE: This is a product of category C2 according to IEC 61800-3. In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.

Adapter Parameters

Appendix B provides information about the EtherNet/IP adapter parameters.

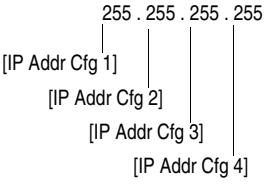
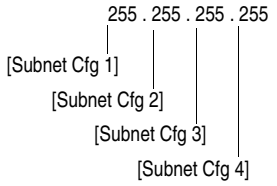
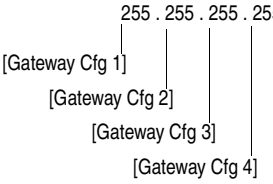
About Parameter Numbers

The parameters in the adapter are numbered consecutively. However, depending on which configuration tool you use, they may have different numbers.

Configuration Tool	Numbering Scheme
• HIM • DriveExplorer • DriveExecutive	The adapter parameters begin with parameter 01. For example, Parameter 01 - [DPI Port] is parameter 01 as indicated by this manual.
• Explicit Messaging	Refer to Chapter 6, Using Explicit Messaging, and AppendixC, EtherNet/IP Objects, for details.

Parameter List

Parameter No.	Name and Description	Details	
01	**[DPI Port]** Displays the port to which the adapter is connected. This will usually be port 5.	Default: Minimum: Maximum: Type:	5 0 7 Read Only
02	**[DPI Data Rate]** Displays the data rate used by the drive. This data rate is set in the drive, and the adapter detects it.	Default: Values: Type:	0 = 125 kbps 0 = 125 kbps 1 = 500 kbps Read Only
03	**[BOOTP]** Configures the adapter to use BOOTP so that you can set its IP address, subnet mask, and gateway address with a BOOTP server.	Default: Values: Type: Reset Required:	1 = Enabled 0 = Disabled 1 = Enabled Read/Write Yes

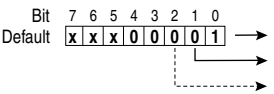
Parameter No.	Name and Description	Details
04 05 06 07	**[IP Addr Cfg 1]** **[IP Addr Cfg 2]** **[IP Addr Cfg 3]** **[IP Addr Cfg 4]** Sets the bytes in the IP address.  **Important:** To set the IP address using these parameters, Parameter 03 - [BOOTP] must be set to Disabled.	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes
08 09 10 11	**[Subnet Cfg 1]** **[Subnet Cfg 2]** **[Subnet Cfg 3]** **[Subnet Cfg 4]** Sets the bytes of the subnet mask.  **Important:** To set the subnet mask using these parameters, Parameter 03 - [BOOTP] must be set to Disabled.	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes
12 13 14 15	**[Gateway Cfg 1]** **[Gateway Cfg 2]** **[Gateway Cfg 3]** **[Gateway Cfg 4]** Sets the bytes of the gateway address.  **Important:** To set the gateway address using these parameters, Parameter 03 - [BOOTP] must be set to Disabled.	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes

Parameter No.	Name and Description	Details	
16	**[EN Rate Cfg]** Sets the network data rate at which the adapter communicates. (Updates Parameter 17 - [EN Rate Act] after reset.)	Default: Values Type: Reset Required:	0 = Autodetect 0 = Autodetect 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half Read/Write Yes
17	**[EN Rate Act]** Displays the network data rate currently being used by the adapter.	Default: Values Type:	0 = No Link 0 = No Link 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half Read Only
18	**[Ref/Fdbk Size]** Displays the size of the Reference/Feedback. The drive determines the size of the Reference/ Feedback.	Default: Values: Type:	0 = 16-bit 0 = 16-bit 1 = 32-bit Read Only
19	**[Datalink Size]** Displays the size of each Datalink word. The drive determines the size of Datalinks.	Default: Values: Type:	0 = 16-bit 0 = 16-bit 1 = 32-bit Read Only
20	**[Reset Module]** No action if set to “Ready.” Resets the adapter if set to “Reset Module.” Restores the adapter to its factory default settings if set to “Set Defaults.” This parameter is a command. It will be reset to “0 = Ready” after the command has been performed.	Default: Values Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No
	ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting I/O that controls the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.		
21	**[Comm Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that network communications have been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 21 - [Comm Flt Action]** lets you determine the action of the adapter and connected drive if the communications are disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).		

Parameter No.	Name and Description	Details
22	**[Idle Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that the controller is set to program mode or faulted. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No

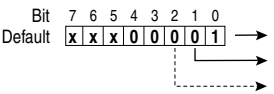
ATTENTION: Risk of injury or equipment damage exists. **Parameter 22 - [Idle Flt Action]** lets you determine the action of the adapter and connected drive if the scanner' is idle. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a faulted controller).

Parameter No.	Name and Description	Details
23	**[DPI I/O Cfg]** Sets the I/O that is transferred through the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes



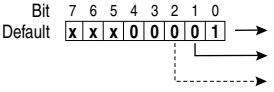
Bit Definitions
0 = Cmd/Ref
1 = Datalink A
2 = Datalink B
3 = Datalink C
4 = Datalink D
5 = Not Used
6 = Not Used
7 = Not Used

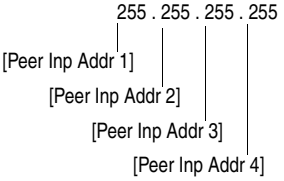
Parameter No.	Name and Description	Details
24	**[DPI I/O Act]** Displays the I/O that the adapter is actively transmitting. The value of this parameter will usually be equal to the value of Parameter 23 - [DPI I/O Config].	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read Only



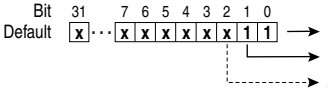
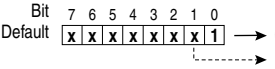
Bit Definitions
0 = Cmd/Ref
1 = Datalink A
2 = Datalink B
3 = Datalink C
4 = Datalink D
5 = Not Used
6 = Not Used
7 = Not Used

Parameter No.	Name and Description	Details
25	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • Parameter 21 - [Comm Flt Action] is set to "Send Flt Cfg" and communications are disrupted. • Parameter 22 - [Idle Flt Action] is set to "Send Flt Cfg" and the scanner is idle. • Parameter 41 - [Peer Flt Action] is set to "Send Flt Cfg" and communications are disrupted. The bit definitions will depend on the product to which the adapter is connected.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No
26	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • Parameter 21 - [Comm Flt Action] is set to "Send Flt Cfg" and communications are disrupted. • Parameter 22 - [Idle Flt Action] is set to "Send Flt Cfg" and the scanner is idle. • Parameter 41- [Peer Flt Action] is set to "Send Flt Cfg" and communications are disrupted.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.
27 28 29 30 31 32 33 34	**[Flt Cfg A1 In]** **[Flt Cfg A2 In]** **[Flt Cfg B1 In]** **[Flt Cfg B2 In]** **[Flt Cfg C1 In]** **[Flt Cfg C2 In]** **[Flt Cfg D1 In]** **[Flt Cfg D2 In]** Sets the data that is sent to the Datalink in the drive if any of the following is true: • Parameter 21 - [Comm Flt Action] is set to "Send Flt Cfg" and communications are disrupted. • Parameter 22 - [Idle Flt Action] is set to "Send Flt Cfg" and the scanner is idle. • Parameter 41 - [Peer Flt Action] is set to "Send Flt Cfg" and communications are disrupted.	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses 16-bit Datalinks, the most significant word of this value must be set to zero (0) or a fault will occur.
35	**[M-S Input]** Sets the Master-Slave input data. This data is produced by the scanner and consumed by the adapter. Bit 7 6 5 4 3 2 1 0 Default x x x 0 0 0 0 1	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes **Bit Definitions** 0 = Cmd/Ref 1 = Datalink A Input 2 = Datalink B Input 3 = Datalink C Input 4 = Datalink D Input 5 = Not Used 6 = Not Used 7 = Not Used

Parameter No.	Name and Description	Details
36	**[M-S Output]** Sets the Master-Slave output data. This data is produced by the adapter and consumed by the Master device (for example, scanner).  	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes **Bit Definitions** 0 = Status/Fdbk 1 = Datalink A Output 2 = Datalink B Output 3 = Datalink C Output 4 = Datalink D Output 5 = Not Used 6 = Not Used 7 = Not Used
37	**[Ref Adjust]** Sets the percent scale factor for the Reference from the network.	Default: 100.00% Minimum: 0.00% Maximum: 200.00% Type: Read/Write Reset Required: No
	ATTENTION: To guard against equipment damage and/or personal injury, note that changes to **Parameter 37 - [Ref Adjust]** take effect immediately. A drive receiving its Reference from the adapter will receive the newly scaled Reference, resulting in a change of speed.	
38 39	**[Peer A Input]** **[Peer B Input]** Sets the destination in the drive of the Peer I/O input. The adapter receives this data from the network and sends it to the drive. **Important:** Changes to these parameters are ignored when Parameter 47 - [Peer Inp Enable] is On. **Important:** If the parameter is set to input a Logic Command, configure the mask in Parameter 40 - [Peer Cmd Mask] so that the desired bits from the Peer device are used.	Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = Datalink A Input 3 = Datalink B Input 4 = Datalink C Input 5 = Datalink D Input Type: Read/Write Reset Required: No
40	**[Peer Cmd Mask]** Configures the mask for the Logic Command word when it is received through peer input. If the mask bit is 0 (Off), the command bit is ignored and not used. If the mask bit is 1 (On), the command bit is checked and used. **Important:** If the adapter receives a Logic Command from both a Master device and a Peer device, each command bit must have only one source. The source of command bits set to “0” will be the Master device. The source of command bits set to “1” will be the Peer device.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Values: 0 = Ignore bit 1 = Use bit Type: Read/Write Reset Required: Yes

Parameter No.	Name and Description	Details
41	**[Peer Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that the Ethernet/IP communications with a peer have been disrupted. This setting is effective only if I/O is transmitted through the adapter.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 41 - [Peer Flt Action]** lets you determine the action of the adapter and connected drive if the adapter is unable to communicate with the designated peer. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	
42 43 44 45	**[Peer Inp Addr 1]** **[Peer Inp Addr 2]** **[Peer Inp Addr 3]** **[Peer Inp Addr 4]** Sets the bytes in the IP address that specifies the device from which the adapter receives (consumes) Peer I/O data.  **Important:** The Peer Inp Addr must be on the same subnet as the 20-COMM-E. See “IP Addresses” in the Glossary for more information. Changes to these parameters are ignored when Parameter 47 - [Peer Inp Enable] is On.	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: No
46	**[Peer Inp Timeout]** Sets the time-out for a peer connection. If the time is reached without the adapter receiving (consuming) a message, the adapter will respond with the action specified in Parameter 41 - [Peer Flt Action]. In an adapter receiving (consuming) Peer I/O, the value of this parameter must be greater than the product of the value of Parameter 52 - [Peer Out Time] in the adapter transmitting (producing) Peer I/O multiplied by the value of Parameter 53 - [Peer Out Skip] in the adapter transmitting (producing) Peer I/O.	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details	
47	**[Peer Inp Enable]** Determines if Peer I/O input is on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No
48	**[Peer Inp Status]** Displays the status of the consumed peer input connection.	Default: Values: Type:	0 = Off 0 = Off 1 = Waiting 2 = Running 3 = Faulted Read Only
49 50	**[Peer A Output]** **[Peer B Output]** Selects the source of the Peer I/O output data. The adapter transmits this data to the network. **Important:** Changes to these parameters are ignored when Parameter 51 - [Peer Out Enable] is On.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = Cmd/Ref 2 = Datalink A Input 3 = Datalink B Input 4 = Datalink C Input 5 = Datalink D Input 6 = Datalink A Output 7 = Datalink B Output 8 = Datalink C Output 9 = Datalink D Output Read/Write No
51	**[Peer Out Enable]** Determines if Peer I/O output is on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No
52	**[Peer Out Time]** Sets the minimum time that an adapter will wait when transmitting data to a peer. **Important:** Changes to these parameters are ignored when Parameter 51 - [Peer Out Enable] is On.	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
53	**[Peer Out Skip]** Sets the maximum time that an adapter will wait when transmitting data to a peer. The value of Parameter 52 - [Peer Out Time] is multiplied by the value of this parameter to set the time. **Important:** Changes to these parameters are ignored when Parameter 51 - [Peer Out Enable] is On.	Default: Minimum: Maximum: Type: Reset Required:	1 1 16 Read/Write No

Parameter No.	Name and Description	Details
54	**[Access Control]** This parameter is only available for Series A (version 2.002 or lower) adapters. Sets the access to the Web interface and Web-configurable features such as e-mail notification.  	Default: xxxx xx01 Bit Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No **Bit Definitions** 0 = Web Enable 1 = E-mail Config 2-31 = Not used
55	**[Web Enable]** This parameter is only available for Series B (version 3.xxx or higher) adapters. Displays the setting of the Web Pages Switch (SW2) on the module when the module was last reset.	Default: 0 = Disabled Minimum: 0 = Disabled Maximum: 1 = Enabled Type: Read Only
56	**[Web Features]** This parameter is only available for Series B (version 3.xxx or higher) adapters. Sets the access to the Web interface and Web-configurable features.  	Default: xxxx xxx1 Bit Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No **Bit Definitions** 0 = E-mail Cfg 1-7 = Not used

Notes:

EtherNet/IP Objects

Appendix C presents information about the EtherNet/IP objects that can be accessed using Explicit Messages. For information on the format of Explicit Messages and example ladder logic programs, refer to Chapter 6, Using Explicit Messaging.

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

Supported Data Types

Data Type	Description
BYTE	8-bit unsigned integer
WORD	16-bit unsigned integer
DWORD	32-bit unsigned integer
LWORD	64-bit unsigned integer
SINT	8-bit signed integer
USINT	8-bit unsigned integer
INT	16-bit signed integer
UINT	16-bit unsigned integer
DINT	32-bit signed integer
UDINT	32-bit unsigned integer
BOOL	8-bit value -- low bit is true or false
BOOL[n]	Array of n bits
STRING[n]	Array of n characters
SHORT_STRING	1-byte length indicator + that many characters
STRUCT	Structure name only - no size in addition to elements
CONTAINER	32-bit parameter value - sign extended if necessary
TCHAR	8 or 16-bit character
REAL	32-bit floating point

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Instances

The number of instances depends on the number of components in the device connected to the adapter. This number of components can be read in Instance 0, Attribute 2.

Instance	Description
0	Class
1	Entire device (DPI host)
2 - 7	DPI Peripherals on ports 1 - 6

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
2	Get	Max Instance	UINT	Total number of instances

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Vendor ID	UINT	1 = Allen-Bradley
2	Get	Device Type	UINT	123
3	Get	Product Code	UINT	Number identifying product name and rating
4	Get	Revision: Major Minor	STRUCT of: USINT USINT	 Value varies Value varies
5	Get	Status	WORD	Bit 0 = Owned Bit 2 = Configured Bit 10 = Recoverable fault Bit 11 = Unrecoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_ STRING	Product name and rating

Identity Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x01	Yes	Yes	Get_Attributes_All

Assembly Object

Class Code

Hexadecimal	Decimal
0x04	4

Instances

Instance	Description
1	All I/O data being read from the DPI device (read-only)
2	All I/O data written to the DPI device (read/write)

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	2
2	Get	Max Instance	UINT	2
100	Set	Control Timeout	UINT	Control timeout in seconds

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Number of Members	UINT	1
2	Get	Member List	ARRAY of STRUCT: UINT UINT Packed EPATH	 Size of member data Size of member path Member path
3	Conditional [1]	Data	Array of Bits	Data to be transferred
4	Get	Size	UINT	Size of assembly data in bits

[1] For instance 1, access rule for the data attribute is Get. For instance 2, it is Get/Set.

Important: Setting an assembly object attribute can be done only when the Control Timeout (class attribute 100) has been set to a non-zero value.

Assembly Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Instances

Instance	Description
1	All I/O data being read from the DPI device (read-only)
2	All I/O data written to the DPI device (read/write)
3	Logic Status and Feedback data (read-only)
4	Logic Command and Reference data (read/write)
5	Datalink A (input data from device to scanner) (read only)
6	Datalink A (output data from scanner to device) (read/write)
7	Datalink B (input data from device to scanner) (read only)
8	Datalink B (output data from scanner to device) (read/write)
9	Datalink C (input data from device to scanner) (read only)
10	Datalink C (output data from scanner to device) (read/write)
11	Datalink D (input data from device to scanner) (read only)
12	Datalink D (output data from scanner to device) (read/write)
13	Logic Status and Feedback Data (read-only)
14	Mask (1) (read/write)
15	Logic Status (read-only)
16	Logic Command (read/write)
17	Feedback (read-only)
18	Reference (read/write)

(1) The mask command word is set to the value of the first word of the data where there are ones in the second word of the data. Command = (word 1 and not word 2) or (word 1 and word 2). This only controls specified bits in the Logic Command data to the DPI product and does not change the Reference value.

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
100	Set	Control Timeout	UINT	Control timeout in seconds

Register Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Bad Flag	BOOL	If set to 1, then attribute 4 may contain invalid, bad or otherwise corrupt data. 0 = good 1 = bad
2	Get	Direction	BOOL	Direction of data transfer 0 = Producer Register (drive to EtherNet/IP) 1 = Consumer Register (EtherNet/IP to drive)
3	Get	Size	UINT	Size of register data in bits
4	Conditional [1]	Data	ARRAY of BITS	Data to be transferred

[1] The access rule of Set is optional if attribute 2, Direction = 1. If Direction = 0, the access rule is Get.

Important: Setting a Register object attribute can be done only when the Control Timeout (class attribute 100) has been set to a non-zero value.

Services

Service Code	Implemented for: Class	Implemented for: Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

Instances

The number of instances depends on the number of parameters in the DPI drive. The adapter parameters are appended to the list of drive parameters. The total number of parameters can be read in Instance 0, Attribute 2.

Instance	Description
0	Class Attributes
1	Drive Parameter 1 Attributes
⋮	⋮
n	Last Drive Parameter Attributes
n + 1	Adapter Parameter 1 Attributes
⋮	⋮
n + 53	Last Adapter Parameter Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	Number of parameters
8	Get	Parameter Class Descriptor	WORD	0 = False, 1 = True Bit 0 = Supports parameter instances Bit 1 = Supports full attributes Bit 2 = Must do NVS save command Bit 3 = Parameters are stored in NVS
9	Get	Configuration Assembly Instance	UINT	0
10	Set	Native Language	USINT	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch

Parameter Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	(1)	Parameter Value	(2)	(3)
2	Get	Link Path Size	USINT	0 = No link specified n = The size of Attribute 3 in bytes
3	Get	Link Path		(4)
4	Get	Descriptor	WORD	0 = False, 1 = True Bit 1 = Supports ENUMs Bit 2 = Supports scaling Bit 3 = Supports scaling links Bit 4 = Read only Bit 5 = Monitor Bit 6 = Extended precision scaling
5	Get	Data Type	USINT	0xC2 = SINT (8-bits) 0xC3 = INT (16-bits) 0xC4 = DINT (32-bits) 0xC6 = USINT (8-bits) 0xC7 = UINT (16-bits) 0xCA = REAL (32-bits) 0xD2 = WORD (16-bits)
6	Get	Data Size	USINT	(3)
7	Get	Parameter Name String	SHORT_ STRING	(3)
8	Get	Units String	SHORT_ STRING	(3)
9	Get	Help String	SHORT_ STRING	Null string
10	Get	Minimum Value	(1)	(3)
11	Get	Maximum Value	(1)	(3)
12	Get	Default Value	(1)	(3)
13	Get	Scaling Multiplier	UINT	(3)
14	Get	Scaling Divisor	UINT	(3)
15	Get	Scaling Base	UINT	(3)
16	Get	Scaling Offset	UINT	(3)
17	Get	Multiplier Link	UINT	(3)
18	Get	Divisor Link	UINT	(3)
19	Get	Base Link	UINT	(3)
20	Get	Offset Link	UINT	(3)
21	Get	Decimal Precision	USINT	(3)

(1) Access rule is defined in bit 4 of instance attribute 4. 0 = Get/Set, 1 = Get.

(2) Specified in descriptor, data type, and data size.

(3) Value varies based on parameter instance.

(4) Refer to the EtherNet/IP specification for a description of the link path.

Parameter Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	Yes	Yes	Get_Attributes_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single
0x4B	No	Yes	Get_Enum_String

Parameter Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Instances

The number of instances depends on the number of groups in the device. A group of adapter parameters is appended to the list of groups in the device. The total number of groups can be read in Instance 0, Attribute 2.

Number	Description
0	Class Attributes
1	Drive Group 1 Attributes
⋮	⋮
n	Last Drive Group Attributes
n + 1	Adapter Group Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Parameter group version	UINT	1
2	Get	Max Instance	UINT	Total number of groups
8	Set	Native Language	USINT	0 = English 1 = French 2 = Spanish (Mexican) 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch

Parameter Group Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Group Name String	SHORT_ STRING	Group name
2	Get	Number of Members in Group	UINT	Number of parameters in group.
3	Get	1st Parameter Number in Group	UINT	(1)
4	Get	2nd Parameter Number in Group	UINT	(1)
n	Get	⋮	UINT	(1)

(1) Value varies based on group instance.

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	No	Set_Attribute_Single

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Instances

Supports Instance 1.

Class Attributes

Not supported.

Instance Attributes

Not supported.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x4B	No	Yes	Execute_PCCC
0x4C	No	Yes	Execute_DH+

Message Structure for Execute_PCCC

Request		
Name	Data Type	Description
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte

Response		
Name	Data Type	Description
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte

PCCC Object *(Continued)*

Message Structure for Execute_PCCC (Continued)

Request			Response		
Name	**Data Type**	**Description**	**Name**	**Data Type**	**Description**
STS	USINT	0	STS	USINT	Status byte
TNSW	UINT	Transport word	TNSW	UINT	Transport word. Same value as the request.
FNC	USINT	Function code. Not used for all CMD's.	EXT_STS	USINT	Extended status. Not used for all CMD's.
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters	PCCC_ results	ARRAY of USINT	CMD/FNC specific result data

Message Structure for Execute_DH+

Request			Response		
Name	**Data Type**	**Description**	**Name**	**Data Type**	**Description**
DLink	UINT	Destination Link ID	DLink	UINT	Destination Link ID
DSta	USINT	Destination Station number	DSta	USINT	Destination Station number
DUser	USINT	Destination "User" number	DUser	USINT	Destination "User" number
SLink	UINT	Source Link ID	SLink	UINT	Source Link ID
SSta	USINT	Source Station number	SSta	USINT	Source Station number
SUser	USINT	Source User number	SUser	USINT	Source User number
CMD	USINT	Command byte	CMD	USINT	Command byte
STS	USINT	0	STS	USINT	Status byte
TNSW	UINT	Transport word	TNSW	UINT	Transport word. Same value as the request.
FNC	USINT	Function code; not used for all CMD's	EXT_STS	USINT	Extended Status; not used for all CMD's
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters	PCCC_ results	ARRAY of USINT	CMD/FNC specific result data

PCCC Object *(Continued)*

The 20-COMM-E supports the following PCCC command types:

CMD	FNC	Description
0x06	0x03	Identify host and some status
0F	67	PLC-5 typed write
0F	68	PLC-5 typed read
0F	95	Encapsulate other protocol
0F	A2	SLC 500 protected typed read with 3 address fields
0F	AA	SLC 500 protected typed write with 3 address fields
0F	A1	SLC 500 protected typed read with 2 address fields
0F	A9	SLC 500 protected typed write with 2 address fields
0F	00	Word range read
0F	01	Word range write

See DF1 Protocol and Command Set Manual, Allen-Bradley Publication No. 1770-6.5.16.

N-Files

<table>
<tr><th>N-File</th><th colspan="4">Description</th></tr>
<tr><td>N40</td><td colspan="4">This N-file lets you use Emulated Block Transfer messages to read and write many types of DPI messages. To use Emulated Block Transfer messages, you send a Write message to N40:0 – N40:63, wait until the adapter responds with a reply message, and then read the response data in N40:0 – N40:63 with a Read message.

For details about Block Transfer messages and the data required for each byte in the N-File, refer to the Remote I/O Adapter User Manual, Publication 20COMM-UM004….

Bits 15 to 8 are the Most Significant Byte. Bits 7 to 0 are the Least Significant Byte.</td></tr>
<tr><td></td><td colspan="2">Write</td><td colspan="2">Read</td></tr>
<tr><td>Bits</td><td>15</td><td>0</td><td>15</td><td>0</td></tr>
<tr><td>N40:0</td><td>0x00</td><td>Length (in Bytes)</td><td>0x00</td><td>Length (in Bytes)</td></tr>
<tr><td>N40:1</td><td>DPI Port</td><td>0x81</td><td>Status Size</td><td>Status Type</td></tr>
<tr><td>N40:2</td><td>0x00</td><td>CIP Service</td><td colspan="2" rowspan="5">Data
(length varies based on message)</td></tr>
<tr><td>N40:3</td><td colspan="2">CIP Class</td></tr>
<tr><td>N40:4</td><td colspan="2">CIP Instance</td></tr>
<tr><td>N40:5</td><td colspan="2">CIP Attribute</td></tr>
<tr><td>N40:6
⋮
N40:63</td><td colspan="2">Data
(length varies based on message)</td></tr>
</table>

PCCC Object *(Continued)*

N-Files (Continued)

N-File	Description	
N41	This N-file lets you read and write control I/O messages. You can write control I/O messages only when all of the following conditions are true: • The adapter is not receiving I/O from a scanner. For example, there is no scanner on the network, the scanner is in idle (program) mode, the scanner is faulted, or the adapter is not mapped to the scanner. • The adapter is not receiving Peer I/O from another adapter. • The adapter is configured to receive I/O (for example, the [DPI I/O Cfg] parameter). • The value of N42:3 is set to a non-zero value.	
	Write	*Read*
N41:0	Logic Command Word	Logic Status Word
N41:1	Reference (least significant word)	Feedback (least significant word)
N41:2	Reference (most significant word)	Feedback (most significant word)
N41:3	Datalink A1 (least significant word)	Datalink A1 (least significant word)
N41:4	Datalink A1 (most significant word)	Datalink A1 (most significant word)
N41:5	Datalink A2 (least significant word)	Datalink A2 (least significant word)
N41:6	Datalink A2 (most significant word)	Datalink A2 (most significant word)
N41:7	Datalink B1 (least significant word)	Datalink B1 (least significant word)
N41:8	Datalink B1 (most significant word)	Datalink B1 (most significant word)
N41:9	Datalink B2 (least significant word)	Datalink B2 (least significant word)
N41:10	Datalink B2 (most significant word)	Datalink B2 (most significant word)
N41:11	Datalink C1 (least significant word)	Datalink C1 (least significant word)
N41:12	Datalink C1 (most significant word)	Datalink C1 (most significant word)
N41:13	Datalink C2 (least significant word)	Datalink C2 (least significant word)
N41:14	Datalink C2 (most significant word)	Datalink C2 (most significant word)
N41:15	Datalink D1 (least significant word)	Datalink D1 (least significant word)
N41:16	Datalink D1 (most significant word)	Datalink D1 (most significant word)
N41:17	Datalink D2 (least significant word)	Datalink D2 (least significant word)
N41:18	Datalink D2 (most significant word)	Datalink D2 (most significant word)
N42	This N-file lets you read and write some values configuring the port.	
N42:3	Time-out (read/write): Time (in seconds) allowed between messages to the N41 file. If the adapter does not receive a message in the specified time, it performs the fault action configured in its [Comm Flt Action] parameter.	
N42:7	Adapter Port Number (read only): DPI port on the drive to which the adapter is connected.	
N42:8	Peer Adapters (read only): Bit field of devices having DPI Peer capabilities.	

PCCC Object *(Continued)*

N-Files (Continued)

Important: If your controller or HMI platform supports CIP messaging, use the CIP Parameter object to get and set parameters.

N-File	Description
N150 – N199	These N-files let you read and write parameter values in the DPI Host (for example, a PowerFlex drive) as 32-bit double words. You can interpret the data in various ways (for example, 32-bit real, 32-bit integer) To read a parameter, you need to send a message with two elements. For example, to read parameter 1, read two elements beginning at N150:2. As another example, to read parameters 2 - 6, read ten elements beginning at N150:4.
N150:0 – 1	Number of parameters in the drive
N150:2 – 249	Drive parameters 1 – 124
N151:0 – 249	Drive parameters 125 – 249
N152:0 – 249	Drive parameters 250 – 374
N153:0 – 249	Drive parameters 375 – 499
⋮	⋮
N199:0 – 249	Drive parameters 6125 – 6249
N201 – N212	These N-files let you read and write parameter values in DPI Peripherals (for example, a HIM or adapter) as 32-bit double words. You can interpret the data in various ways (for example, 32-bit real, 32-bit integer) To read a parameter, you need to send a message with two elements. For example, to read parameter 1 in the peripheral connected to DPI port 1, read two elements beginning at N201:2. As another example, to read parameters 2 – 6 in the peripheral connected to DPI port 5 (the adapter), read ten elements beginning at N209:4.
N201:0 – 1	Number of parameters in the DPI peripheral at DPI port 1
N201:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 1
N202:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 1
N203:0 – 1	Number of parameters in the DPI peripheral at DPI port 2
N203:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 2
N204:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 2
N205:0 – 1	Number of parameters in the DPI peripheral at DPI port 3
N205:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 3
N206:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 3
N207:0 – 1	Number of parameters in the DPI peripheral at DPI port 4
N207:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 4
N208:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 4
N209:0 – 1	Number of parameters in the DPI peripheral at DPI port 5
N209:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 5
N210:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 5
N211:0 – 1	Number of parameters in the DPI peripheral at DPI port 6
N211:2 – 249	Parameters 1 – 124 in the DPI peripheral at DPI port 6
N212:0 – 249	Parameters 125 – 249 in the DPI peripheral at DPI port 6

DPI Device Object

Class Code

Hexadecimal	Decimal
0x92	146

Instances

The number of instances depends on the number of components in the device. The total number of components can be read in Instance 0, Class Attribute 4.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
0x4000 – 0x43FF	16384 – 17407	Adapter
0x4400 – 0x47FF	17408 – 18431	DPI Port 1
0x4800 – 0x4BFF	18432 – 19455	DPI Port 2
0x4C00 – 0x4FFF	19456 – 20479	DPI Port 3
0x5000 – 0x53FF	20480 – 21503	DPI Port 4
0x5400 – 0x57FF	21504 – 22527	DPI Port 5
0x5800 – 0x5BFF	22528 – 23551	DPI Port 6

Example	Description
0	Class Attributes (Drive)
1	Drive Component 1
2	Drive Component 2
⋮	⋮
16384	Class Attributes (Adapter)
16385	Adapter Component 1
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Family Code	BYTE	0x00 = Communications Adapter 0x30 = PowerFlex 70 0x38, 0x39, or 0x3A= PowerFlex 700 0x40 = PowerFlex 7000 0x48, 0x49, or 0x4A = PowerFlex 700S 0xFF = HIM
1	Get	Family Text	STRING[16]	Text identifying the device.
2	Set	Language Code	BYTE	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch
3	Get	Product Series	BYTE	1 = A 2 = B …
4	Get	Number of Components	BYTE	Number of components (e.g., main control board, I/O boards) in the device.

DPI Device Object *(Continued)*

Class Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description
5	Set	User Definable Text	STRING[16]	Text identifying the device with a user-supplied name
6	Get	Status Text	STRING[12]	Text describing the status of the device.
7	Get	Configuration Code	BYTE	Identification of variations.
8	Get	Configuration Text	STRING[16]	Text identifying a variation of a family device.
9	Get	Brand Code	WORD	0x0001 = Allen-Bradley
11	Get	NVS Checksum	WORD	Checksum of the Non-Volatile Storage in a device.
12	Get	Class Revision	WORD	2 = DPI
13	Get	Character Set Code	BYTE	0 = SCANport HIM 1 = ISO 8859-1 (Latin 1) 2 = ISO 8859-2 (Latin 2) 3 = ISO 8859-3 (Latin 3) 4 = ISO 8859-4 (Latin 4) 5 = ISO 8859-5 (Cyrillic) 6 = ISO 8859-6 (Arabic) 7 = ISO 8859-7 (Greek) 8 = ISO 8859-8 (Hebrew) 9 = ISO 8859-9 (Turkish) 10 = ISO 8859-10 (Nordic) 255 = ISO 10646 (Unicode)
15	Get	Languages Supported	STRUCT of: BYTE BYTE[n]	 Number of Languages Language Codes (see Class Attribute 2)
16	Get	Date of Manufacture	STRUCT of: WORD BYTE BYTE	 Year Month Day
17	Get	Product Revision	STRUCT of: BYTE BYTE	 Major Firmware Release Minor Firmware Release
18	Get	Serial Number	DWORD	Value between 0x00 and 0xFFFFFFFF
19	Set	Language Selected	BYTE	0 = Default (HIM will prompt at start up) 1 = Language was selected (no prompt)
20	Set	Customer-Generated Firmware	STRING[36]	GUID (Globally Unique Identifier) identifying customer firmware flashed into the device.
128	Get	Customization Code	WORD	Code identifying the customized device.
129	Get	Customization Revision Number	WORD	Revision of the customized device.
130	Get	Customization Device Text	STRING[32]	Text identifying the customized device.

DPI Device Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
3	Get	Component Name	STRING[32]	Name of the component
4	Get	Component Firmware Revision	STRUCT of: BYTE BYTE	 Major Revision Minor Revision
5	Get	Component Hardware Change Number	BYTE	0 = Not available
8	Get	Component Serial Number	DWORD	Value between 0x00 and 0xFFFFFFFF

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x93	147

Instances

The number of instances depends on the number of parameters in the device. The total number of parameters can be read in Instance 0, Attribute 0.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
0x4000 – 0x43FF	16384 – 17407	Adapter
0x4400 – 0x47FF	17408 – 18431	DPI Port 1
0x4800 – 0x4BFF	18432 – 19455	DPI Port 2
0x4C00 – 0x4FFF	19456 – 20479	DPI Port 3
0x5000 – 0x53FF	20480 – 21503	DPI Port 4
0x5400 – 0x57FF	21504 – 22527	DPI Port 5
0x5800 – 0x5BFF	22528 – 23551	DPI Port 6

Example	Description
0	Class Attributes (Drive)
1	Drive Parameter 1 Attributes
2	Drive Parameter 2 Attributes
⋮	⋮
16384	Class Attributes (Adapter)
16385	Adapter Parameter 1 Attributes
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Number of Instances	WORD	Number of parameters in the device
1	Set	Write Protect Password	WORD	0 = Password disabled n = Password
2	Set	NVS Command Write	BYTE	0 = No Operation 1 = Store values in active memory to NVS 2 = Load values in NVS to active memory 3 = Load default values to active memory
3	Get	NVS Parameter Value Checksum	WORD	Checksum of all parameter values in a user set in NVS
4	Get	NVS Link Value Checksum	WORD	Checksum of parameter links in a user set in NVS
5	Get	First Accessible Parameter	WORD	First parameter available if parameters are protected by passwords. A “0” indicates all parameters are protected.
7	Get	Class Revision	WORD	2 = DPI
8	Get	First Parameter Processing Error	WORD	The first parameter that has been written with a value outside of its range. A “0” indicates no errors.
9	Set	Link Command	BYTE	0 = No Operation 1 = Clear All Parameter Links (This does not clear links to function blocks.)

DPI Parameter Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
7	Get	DPI Online Read Full	STRUCT of: BOOL[32] CONTAINER (1) CONTAINER CONTAINER CONTAINER WORD WORD STRING[4] UINT UINT UINT INT BYTE[3] BYTE STRING[16]	 Descriptor (see pages C-23 – C-24) Parameter value Minimum value Maximum value Default value Next parameter Previous parameter Units (e.g., Amp, Hz) Multiplier (2) Divisor (2) Base (2) Offset (2) Link (source of the value) (0 = no link) Always zero (0) Parameter name
8	Get	DPI Descriptor	BOOL[32]	Descriptor (see pages C-23 – C-24)
9	Get/Set	DPI Parameter Value	Various	Parameter value in NVS. (3)
10	Get/Set	DPI RAM Parameter Value	Various	Parameter value in temporary memory.
11	Get/Set	DPI Link	BYTE[3]	Link (parameter or function block that is the source of the value) (0 = no link)
12	Get	Help Object Instance	WORD	ID for help text for this parameter
13	Get	DPI Read Basic	STRUCT of: BOOL[32] CONTAINER CONTAINER CONTAINER CONTAINER STRING[16] STRING[4]	 Descriptor (see pages C-23 – C-24) Parameter value Minimum value Maximum value Default value Parameter name Units (e.g., Amp, Hz)
14	Get	DPI Parameter Name	STRING[16]	Parameter name
15	Get	DPI Parameter Alias	STRING[16]	Customer supplied parameter name. Only supported by PowerFlex 700S at time of publication.
16	Get	Parameter Processing Error	BYTE	0 = No error 1 = Value is less than the minimum 2 = Value is greater than the maximum

(1) A CONTAINER is a 32-bit block of data that contains the data type used by a parameter value. If signed, the value is sign extended. Padding is used in the CONTAINER to ensure that it is always 32-bits.

(2) This value is used in the formulas used to convert the parameter value between display units and internal units. Refer to Formulas for Converting on page C-24.

(3) Do NOT continually write parameter data to NVS. Refer to the attention on page 6-1.

DPI Parameter Object *(Continued)*

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0). 000 = BYTE used as an array of Boolean 001 = WORD used as an array of Boolean 010 = BYTE (8-bit integer) 011 = WORD (16-bit integer) 100 = DWORD (32-bit integer) 101 = TCHAR (8-bit (not unicode) or 16-bits (unicode) 110 = REAL (32-bit floating point value) 111 = Use bits 16, 17, 18
1	Data Type (Bit 2)	
2	Data Type (Bit 3)	
3	Sign Type	0 = unsigned 1 = signed
4	Hidden	0 = visible 1 = hidden
5	Not a Link Sink	0 = Parameter can sink a link 1 = Parameter cannot sink a link
6	Not Recallable	0 = Recallable from NVS 1 = Not Recallable from NVS
7	ENUM	0 = No ENUM text 1 = ENUM text
8	Writable	0 = Read only 1 = Read/write
9	Not Writable When Enabled	0 = Writable when enabled (e.g., drive running) 1 = Not writable when enabled
10	Instance	0 = Parameter value is not a Reference to another parameter 1 = Parameter value refers to another parameter
11	Reserved	Must be zero
12	Decimal Place (Bit 0)	Number of digits to the right of the decimal point. 0000 = 0 1111 = 15
13	Decimal Place (Bit 1)	
14	Decimal Place (Bit 2)	
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 1)	Right bit is least significant bit (16). 000 = Reserved 001 = DWORD used as an array of Boolean 010 = Reserved 011 = Reserved 100 = Reserved 101 = Reserved 110 = Reserved 111 = Reserved
17	Extended Data Type (Bit 2)	
18	Extended Data Type (Bit 2)	

DPI Parameter Object *(Continued)*

Descriptor Attributes (Continued)

Bit	Name	Description
19	Parameter Exists	Reserved
20	Not Used	Reserved
21	Formula Links	Reserved
22	Access Level (Bit 1)	Reserved
23	Access Level (Bit 2)	Reserved
24	Access Level (Bit 3)	Reserved
25	Writable ENUM	Reserved
26	Not a Link Source	0 = Parameter can be a source for a link 1 = Parameter cannot be a source for a link
27	Enhanced Bit ENUM	Reserved
28	Enhanced ENUM	Reserved
29	Not Used	Reserved
30	Not Used	Reserved
31	Not Used	Reserved

Formulas for Converting

Display Value = ((Internal Value + Offset) x Multiplier x Base) / (Divisor x $10^{\text{Decimal Places}}$)

Internal Value = ((Display Value x Divisor x $10^{\text{Decimal Places}}$) / (Multiplier x Base)) - Offset

Common Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

Object Specific Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x4B	Yes	No	Get_Attributes_Scattered
0x4C	Yes	No	Set_Attributes_Scattered

DPI Fault Object

Class Code

Hexadecimal	Decimal
0x97	151

Products such as PowerFlex drives use this object for faults. Adapters use this object for events.

Instances

The number of instances depends on the maximum number of faults or events supported in the queue. The maximum number of faults/events can be read in Instance 0, Attribute 2.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
0x4000 – 0x43FF	16384 – 17407	Adapter
0x4400 – 0x47FF	17408 – 18431	DPI Port 1
0x4800 – 0x4BFF	18432 – 19455	DPI Port 2
0x4C00 – 0x4FFF	19456 – 20479	DPI Port 3
0x5000 – 0x53FF	20480 – 21503	DPI Port 4
0x5400 – 0x57FF	21504 – 22527	DPI Port 5
0x5800 – 0x5BFF	22528 – 23551	DPI Port 6

Example	Description
0	Class Attributes (Drive)
1	Most Recent Drive Fault
2	Second Most Recent Drive Fault
⋮	⋮
16384	Class Attributes (Adapter)
16385	Most Recent Adapter Event
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	WORD	Revision of object
2	Get	Number of Instances	WORD	Maximum number of faults/events that the device can record in its queue
3	Set	Fault Command Write	BYTE	0 = No Operation 1 = Clear Fault/Event 2 = Clear Fault/Event Queue 3 = Reset Device
4	Get	Fault Trip Instance Read	WORD	Fault that tripped the device. For adapters, this value is always 1 when faulted.
5	Get	Fault Data List	STRUCT of: BYTE BYTE WORD[n]	Reserved
6	Get	Number of Recorded Faults	WORD	Number of faults/events in the queue. A “0” indicates the fault queue is empty.
7	Get	Fault Parameter Reference	WORD	Reserved

DPI Fault Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description

0	Get	Full/All Information	STRUCT of
			  WORD
			STRUCT of:
			  BYTE
			  BYTE
			  STRING[16]
			STRUCT of:
			  LWORD
			  BOOL[16]
			
			WORD
			CONTAINER[n]
				
				Fault code
				Fault source
				DPI port
				DPI Device Object
				Fault text
				Fault time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2 - 15]: Not used
				Reserved
				Reserved

1	Get	Basic Information	STRUCT of:
			  WORD
			STRUCT of:
			  BYTE
			  BYTE
			STRUCT of:
			  LWORD
			  BOOL[16]
				
				Fault code
				Fault source
				DPI port
				DPI Device Object
				Fault time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2 - 15]: Not used

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

DPI Alarm Object

Class Code

Hexadecimal	Decimal
0x98	152

Products such as PowerFlex drives use this object for alarms or warnings. Adapters do not support this object.

Instances

The number of instances depends on the maximum number of alarms supported by the queue. The maximum number of alarms can be read in Instance 0, Attribute 2.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
Only host devices can have alarms.		

Example	Description
0	Class Attributes (Drive)
1	Most Recent Alarm
2	Second Most Recent Alarm
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	WORD	Revision of object
2	Get	Number of Instances	WORD	Maximum number of alarms that the device can record in its queue
3	Set	Alarm Command Write	BYTE	0 = No Operation 1 = Clear Alarm 2 = Clear Alarm Queue 3 = Reset Device
4	Get	Fault Data List	STRUCT of: BYTE BYTE WORD[n]	Reserved
5	Get	Number of Recorded Alarms	WORD	Number of alarms in the queue. A “0” indicates the alarm queue is empty.

DPI Alarm Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description

0	Get	Full/All Information	STRUCT of
			  WORD
			STRUCT of:
			  BYTE
			  BYTE
			  STRING[16]
			STRUCT of:
			  LWORD
			  BOOL[16]
			
			WORD
			CONTAINER[n]
				
				Alarm code
				Alarm source
				DPI port
				DPI Device Object
				Alarm text
				Alarm time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2 - 15] Reserved
				Reserved
				Reserved

1	Get	Basic Information	STRUCT of
			  WORD
			STRUCT of:
			  BYTE
			  BYTE
			STRUCT of:
			  LWORD
			  BOOL[16]
				
				Alarm code
				Alarm source
				DPI port
				DPI Device Object
				Alarm time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2 - 15] Reserved

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

DPI Diagnostic Object

Class Code

Hexadecimal	Decimal
0x99	153

Instances

The number of instances depends on the maximum number of diagnostic items in the device. The total number of diagnostic items can be read in Instance 0, Attribute 2.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
0x4000 – 0x43FF	16384 – 17407	Adapter
0x4400 – 0x47FF	17408 – 18431	DPI Port 1
0x4800 – 0x4BFF	18432 – 19455	DPI Port 2
0x4C00 – 0x4FFF	19456 – 20479	DPI Port 3
0x5000 – 0x53FF	20480 – 21503	DPI Port 4
0x5400 – 0x57FF	21504 – 22527	DPI Port 5
0x5800 – 0x5BFF	22528 – 23551	DPI Port 6

Example	Description
0	Class Attributes (Drive)
1	Drive Diagnostic Item 1
2	Drive Diagnostic Item 2
⋮	⋮
16384	Class Attributes (Adapter)
16385	Adapter Diagnostic Item1
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	WORD	1
2	Get	Number of Instances	WORD	Number of diagnostic items in the device
3	Get	ENUM Offset	WORD	DPI ENUM object instance offset

DPI Diagnostic Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Full/All Info	STRUCT of: BOOL[32] CONTAINER (1) CONTAINER CONTAINER CONTAINER WORD WORD STRING[4] UINT UINT UINT INT DWORD STRING[16]	 Descriptor (see pages C-23 – C-24) Value Minimum value Maximum value Default value Pad Word Pad Word Units (e.g., Amp, Hz) Multiplier (2) Divisor (2) Base (2) Offset (2) Link (source of the value) (0 = no link) Always zero (0) Parameter name
1	Get/Set	Value	Various	Diagnostic item value

(1) A CONTAINER is a 32-bit block of data that contains the data type used by a value. If signed, the value is sign extended. Padding is used in the CONTAINER to ensure that it is always 32-bits.

(2) This value is used in the formulas used to convert the value between display units and internal units. Refer to Formulas for Converting on page C-24.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Instances

The number of instances depends on the number of timers in the device. Instance 1 is always reserved for a real time clock although a device may not support it. The total number of timers can be read in Instance 0, Attribute 2.

Instances (Hex.)	(Dec.)	Device
0x0000 – 0x3FFF	0 – 16383	Host
0x4000 – 0x43FF	16384 – 17407	Adapter
0x4400 – 0x47FF	17408 – 18431	DPI Port 1
0x4800 – 0x4BFF	18432 – 19455	DPI Port 2
0x4C00 – 0x4FFF	19456 – 20479	DPI Port 3
0x5000 – 0x53FF	20480 – 21503	DPI Port 4
0x5400 – 0x57FF	21504 – 22527	DPI Port 5
0x5800 – 0x5BFF	22528 – 23551	DPI Port 6

Example	Description
0	Class Attributes (Drive)
1	Real Time Clock (Predefined) (not always supported)
2	Timer 1
3	Timer 2
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	WORD	Revision of object
2	Get	Number of Instances	WORD	Number of timers in the object, excluding the real time clock that is predefined.
3	Get	First Device Specific Timer	WORD	Instance of the first timer that is not predefined.
4	Set	Time Command Write	BYTE	0 = No Operation 1 = Clear all timers (Does not clear the real time clock or read only timers)

DPI Time Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Read Full	STRUCT of: STRING[16] LWORD or STRUCT BOOL[16]	 Name of the timer Elapsed time in milliseconds unless timer is a real time clock (see attribute 2) See Attribute 3
1	Get	Timer Text	STRING[16]	Name of the timer
2	Get/Set	Timer Value	LWORD -OR- STRUCT of: WORD BYTE BYTE BYTE BYTE BYTE BYTE	Elapsed time in milliseconds unless the timer is a real time clock. Real Time Clock Data: Milliseconds (0 – 999) Seconds (0 – 59) Minutes (0 – 59) Hours (0 – 23) Days (1 – 31) Months (1 = January, 12 = December) Years (since 1972)
3	Get	Timer Descriptor	BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data) BOOL[1]: (0 = elapsed time, 1 = real time) BOOL[2 - 15]: Not used

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	Yes	Set_Attribute_Single

TCP/IP Interface Object

Class Code

Hexadecimal	Decimal
0xF5	245

Instances

The adapter supports one instance of the TCP/IP Interface object.

Number	Description
0	Class Attributes
1	Object Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	The revision of this object

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Status of TCP/IP Network Interface	DWORD	0 = Not configured 1 = Valid configuration 2 to 15 = Reserved
2	Get	Configuration Capability	DWORD	Bit	Value (0 = False, 1 = True) 0 = Supports BOOTP 1 = DNS Client (able to resolve host names by query to DNS server) 2 = DHCP Client (able to obtain network configuration through DHCP) 3 = DHCP-DNS Update (able to send its host name in the DHCP request) 4 = Configuration Settable (able to set the network configuration via TCP/IP) 5 to 31 = Reserved

TCP/IP Interface Object *(Continued)*

Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description
3	Set	Configuration Control	DWORD	Bit | Value 1 – 3 = Startup configuration 0 = Use configuration saved in NVS 1 = Obtain configuration via BOOTP 2 = Obtain configuration via DHCP 3 to 15 = Reserved 4 = DNS Enabled (resolves host names by query to DNS server) 5 to 31 = Reserved
4	Get	Physical Link Object	STRUCT of: UINT Padded EPATH	 Path size Path
5	Get	Interface Configuration	STRUCT of: UDINT UDINT UDINT UDINT UDINT STRING	 Adapter's IP address Adapter's subnet mask Adapter's gateway address Primary name server Secondary name server Default domain name
6	Get	Host Name	STRING	Host name when using DHCP

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Ethernet Link Object

Class Code

Hexadecimal	Decimal
0xF6	246

Instances

The adapter supports one instance of the TCP/IP Interface object.

Number	Description
0	Class Attributes
1	Object Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	The revision of this object

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Interface Speed	UDINT	Speed in megabits per second (Mbs)
2	Get	Interface Flags	DWORD	Bit I Value 0 = Link status (0 = inactive, 1 = active) 1 = Duplex (0 = half duplex, 1 = full duplex) 2 to 31 = Reserved
3	Get	Physical Address	USINT[6]	MAC address (XX-XX-XX-XX-XX-XX) The first octet (USINT[0]) is on the left.

Ethernet Link Object *(Continued)*

Instance Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description
4	Get	Interface Counters	STRUCT of:	
			UDINT	Octets received
			UDINT	Unicast packets received
			UDINT	Non-unicast packets received
			UDINT	Inbound packets received but discarded
			UDINT	Inbound packets with errors (not discarded)
			UDINT	Inbound packets with unknown protocol
			UDINT	Octets sent
			UDINT	Unicast packets sent
			UDINT	Non-unicast packets sent
			UDINT	Outbound packets discarded
			UDINT	Outbound packets with errors
5	Get	Media Counters	STRUCT of:	RX = Received, TX = Transmitted
			UDINT	RX frames not having integral number of octets long
			UDINT	RX frames not passing FCS check
			UDINT	TX frames having one collision
			UDINT	TX frames having multiple collisions
			UDINT	Number of times of SQE test error message
			UDINT	TX Frames delayed first attempt by busy medium
			UDINT	Collisions detected later than 512 bit-times in trans.
			UDINT	TX frames failing due to excessive collisions
			UDINT	TX frames failing due to intern MAC sublayer TX error
			UDINT	Times of carrier sense condition loss during trans.
			UDINT	RX frames exceeding the maximum frame size
			UDINT	RX frames failing due to intern MAC sublayer RX error

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x4C	No	Yes	Get_and_Clear

Logic Command/Status Words

Appendix D presents the definitions of the Logic Command and Logic Status words that are used for some products that can be connected to the EtherNet/IP adapter. If you do not see the Logic Command/Logic Status for the product that you are using, refer to your product's documentation.

PowerFlex 70, PowerFlex 700, PowerFlex 700VC, and PowerFlex 700H Drives

Logic Command Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															x	Stop [1]	0 = Not Stop 1 = Stop
														x		Start [1][2]	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									x							Local Control	0 = No Local Control 1 = Local Control
								x								MOP Increment	0 = Not Increment 1 = Increment
						x	x									Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command 10 = Decel Rate 2 Command 11 = Hold Decel Rate
	x	x	x													Reference Select [3]	000 = No Command 001 = Ref. 1 (Ref A Select) 010 = Ref. 2 (Ref B Select) 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
x																MOP Decrement	0 = Not Decrement 1 = Decrement

(1) A "0 = Not Stop" condition (logic 0) must first be present before a "1 = Start" condition will start the drive. The Start command acts as a momentary Start command. A "1" will start the drive, but returning to "0" will not stop the drive.

(2) This Start will not function if a digital input (parameters 361-366) is programmed for 2-Wire Control (option 7, 8 or 9).

(3) This Reference Select will not function if a digital input (parameters 361-366) is programmed for "Speed Sel 1, 2 or 3" (option 15, 16 or 17). Note that Reference Select is "Exclusive Ownership."

PowerFlex 70, PowerFlex 700, PowerFlex 700VC, and PowerFlex 700H Drives *(Continued)*

Logic Status Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															x	Ready	0 = Not Ready 1 = Ready
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control (1)	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Port 6 111 = No Local
x	x	x	x													Reference	0000 = Ref A Auto 0001 = Ref B Auto 0010 = Preset 2 Auto 0011 = Preset 3 Auto 0100 = Preset 4 Auto 0101 = Preset 5 Auto 0110 = Preset 6 Auto 0111 = Preset 7 Auto 1000 = Term Blk Manual 1001 = DPI 1 Manual 1010 = DPI 2 Manual 1011 = DPI 3 Manual 1100 = DPI 4 Manual 1101 = DPI 5 Manual 1110 = DPI 6 Manual 1111 = Jog Ref

(1) See “Owners” in drive User Manual for further information.

PowerFlex 700S Drives

Logic Command Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															x	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
														x		Start (1)	0 = Not Start 1 = Start
													x			Jog 1	0 = Not Jog using [Jog Speed 1] 1 = Jog using [Jog Speed 1]
												x				Clear Fault (2)	0 = Not Clear Fault 1 = Clear Fault
										x	x					Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									x							Reserved	
								x								Jog 2	0 = Not Jog using [Jog Speed 2] 1 = Jog using [Jog Speed 2]
							x									Current Limit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
						x										Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
					x											Spd Ramp Hold (3)	000 = Spd Ref A 001 = Spd Ref B 010 = Preset 2 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
				x												Reserved	
			x													Spd Ref Sel0 (3)	000 = Spd Ref A 001 = Spd Ref B 010 = Preset 2 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
		x														Spd Ref Sel1 (3)	000 = Spd Ref A 001 = Spd Ref B 010 = Preset 2 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
	x															Spd Ref Sel2 (3)	000 = Spd Ref A 001 = Spd Ref B 010 = Preset 2 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
x																Reserved	

(1) A Not Stop condition (logic bit 0 = 0, logic bit 8 = 0, and logic bit 9 = 0) must first be present before a 1 = Start condition will start the drive.

(2) To perform this command, the value must switch from “0” to “1.”

(3) This command is available only for PowerFlex 700S drives with Phase II Control. For drives with Phase I Control, the command is reserved.

PowerFlex 700S Drives *(Continued)*

Logic Status Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															x	Enabled	0 = Not Enabled 1 = Enabled
														x		Running	0 = Not Running 1 = Running
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Jogging	0 = Not Jogging 1 = Jogging
								x								Fault	0 = No Fault 1 = Fault
							x									Alarm	0 = No Alarm 1 = Alarm
						x										Flash Mode	0 = Not in Flash Mode 1 = In Flash Mode
					x											Run Ready	0 = Not Ready to Run 1 = Ready to Run
				x												At Limit (1)	0 = Not At Limit 1 = At Limit
			x													Tach Loss Sw	0 = Not Tach Loss Sw 1 = Tach Loss Sw
		x														At Zero Spd	0 = Not At Zero Speed 1 = At Zero Speed
	x															At Setpt Spd	0 = Not At Setpoint Speed 1= At Setpoint Speed
x																Reserved	

(1) See Parameter 304 - [Limit Status] in the PowerFlex 700S drive for a description of the limit status conditions.

A

Adapter

Devices such as drives, controllers, and computers usually require an adapter to provide a communication interface between them and a network such as EtherNet/IP. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The 20-COMM-E EtherNet/IP adapter connects PowerFlex drives to an EtherNet/IP network. Adapters are sometimes also called “cards,” “embedded communication options,” “gateways,” “modules,” and “peripherals.”

B

BOOTP (Bootstrap Protocol)

BOOTP lets the adapter configure itself dynamically at boot time if the network has a BOOTP server. The BOOTP server assigns the adapter a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these using the parameters in the adapter. BOOTP can make it easier to administer an Ethernet network. A free version of Rockwell Software’s BOOTP Server can be accessed at http://www.ab.com/networks.

Bridge

A bridge refers to a network device that can route messages from one Ethernet network to another.

A bridge also refers to a communications module in a ControlLogix controller that connects the controller to a network. See also Scanner.

C

CAN (Controller Area Network)

A CAN is a serial bus protocol on which DPI is based.

CIP (Common Industrial Protocol)

CIP is the transport and application layer protocol used for messaging over EtherNet/IP networks. The protocol is used for implicit messaging (real time I/O) and explicit messaging (configuration, data collection, and diagnostics).

ControlFLASH

ControlFLASH is an Allen-Bradley software tool that lets users electronically update firmware on printed circuit boards. The tool takes advantage of the growing use of flash memory (electronic erasable chips) across industrial control products.

Controller

A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/output interface, and memory. See also Scanner.

D

Data Rate

The data rate is the speed at which data is transferred on the EtherNet/IP network.

You can set the adapter to a data rate of 10 Mbps Full-Duplex, 10 Mbps Half-Duplex, 100 Mbps Full-Duplex, or 100 Mbps Half-Duplex. If another device on the network sets or auto-negotiates the data rate, you can set the adapter to automatically detect the data rate.

Datalinks

A Datalink is a type of pointer used by some PowerFlex drives to transfer data to and from the controller. Datalinks allow specified parameter value(s) to be accessed or changed without using explicit messages. When enabled, each Datalink consumes either four bytes or eight bytes in both the input and output image table of the controller. The drive determines the size of Datalinks.

DPI (Drive Peripheral Interface)

DPI is a second generation peripheral communication interface used by various Allen-Bradley drives and power products, such as PowerFlex 70 and PowerFlex 700 drives. It is a functional enhancement to SCANport.

DPI Peripheral

A device that provides an interface between DPI and a network or user. Peripheral devices are also referred to as “adapters” or “modules.” The serial converter and PowerFlex 7-Class HIMs (20-HIM-xxx) are examples of DPI peripherals.

DPI Product

A device that uses the DPI communications interface to communicate with one or more peripheral devices. For example, a motor drive such as a PowerFlex 7-Class drive is a DPI product. In this manual, a DPI product is also referred to as “drive” or “host.”

DriveExplorer Software

DriveExplorer software is a tool for monitoring and configuring Allen-Bradley products and adapters. It can be run on computers running Microsoft Windows 95, Windows 98, Windows ME, Windows NT 4.0 SP6a, Windows 2000, Windows XP, and Windows CE (version 2.0 or higher) operating systems. DriveExplorer (version 3.xx or higher) can be used to configure this adapter and PowerFlex drives. Information about DriveExplorer software and a free lite version can be accessed at http://www.ab.com/drives/driveexplorer.

DriveTools SP Software

A software suite designed for Microsoft Windows 98 Second Edition, Windows ME, Windows NT 4.0 SP6a, Windows 2000 SP3, and Windows XP operating systems. This software suite provides a family of tools, including DriveExecutive, that you can use to program, monitor, control, troubleshoot, and maintain Allen Bradley products. DriveTools SP (version 1.01 or higher) can be used with PowerFlex drives. Information about DriveTools SP can be accessed at http://www.ab.com/drives/drivetools.

Duplex

Duplex describes the mode of communication. *Full-duplex* communications let a device exchange data in both directions at the same time. *Half-duplex* communications let a device exchange data only in one direction at a time. The duplex used by the adapter depends on the type of duplex that other network devices, such as switches, support.

E

EDS (Electronic Data Sheet) Files

EDS files are simple text files that are used by network configuration tools such as RSNetWorx for EtherNet to describe products so that you can easily commission them on a network. EDS files describe a product device type, revision, and configurable parameters. EDS files for many Allen-Bradley products can be found at http://www.ab.com/networks/eds.

EtherNet/IP Network

EtherNet/IP (Industrial Protocol) is an open producer-consumer communication network based on the Ethernet standard (IEEE 802.3), TCP/IP, UDP/IP, and CIP. Designed for industrial communications, both I/O and explicit messages can be transmitted over the network. Each device is assigned a unique IP address and transmits data on the network. The number of devices that an EtherNet/IP network can support depends on the class of IP address. For example, a network with a Class C IP address can have 254 nodes.

General information about EtherNet/IP and the EtherNet/IP specification are maintained by the Open DeviceNet Vendor's Association (ODVA). ODVA is online at http://www.odva.org.

Explicit Messaging

Explicit Messages are used to transfer data that does not require continuous updates. They are typically used to configure, monitor, and diagnose a device over the network.

F

Fault Action

A fault action determines how the adapter and connected drive act when a communications fault (for example, a cable is disconnected) occurs or when the controller is switched out of run mode. The former uses a communications fault action, and the latter uses an idle fault action.

Fault Configuration

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive in the fault configuration parameters (**Parameters 25- [Flt Cfg Logic]** through **34- [Flt Cfg D2 In]**). When a fault action parameter is set to use the fault configuration and a fault occurs, the data from these parameters is sent as the Logic Command, Reference, and/or Datalink(s).

Flash Update

The process of updating firmware in the adapter. The adapter can be flash updated using the Allen-Bradley software tool ControlFLASH, the X-modem protocol and a 1203-SSS Smart Self-powered Serial converter (version 3.001 or higher firmware), or the built-in flash capability of DriveExplorer (version 4.01 or higher).

G

Gateway

A gateway is a device on a network that connects an individual network to 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. You need to configure the address for the gateway device in the adapter if you want the adapter to communicate with devices that are not on its network.

H

Hardware Address

Each Ethernet device has a unique hardware address (sometimes called a MAC address) that is 48 bits. The address appears as six digits separated by colons (for example, xx:xx:xx:xx:xx:xx). Each digit has a value between 0 and 255 (0x00 and 0xFF). This address is assigned in the hardware and cannot be changed. It is required to identify the device if you are using a BOOTP utility.

HIM (Human Interface Module)

A device that can be used to configure and control a PowerFlex 7-Class drive. PowerFlex 7-Class HIMs (20-HIM-xxx) can be used to configure connected peripherals.

Hold Last

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond by holding last. Hold last results in the drive receiving the last data received via the EtherNet/IP connection before the disruption. If the drive was running and using the Reference from the adapter, it will continue to run at the same Reference.

I

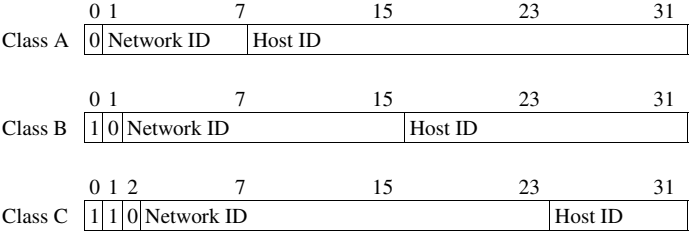
I/O Data

I/O data, sometimes called " implicit messages" or "input/output," is time-critical data such as a Logic Command and Reference. The terms "input" and "output" are defined from the scanner's point of view. Output is transmitted by the scanner and consumed by the adapter. Input is transmitted by the adapter and consumed by the scanner.

IP Addresses

A unique IP address identifies each node on an EtherNet/IP network. An IP address consists of 32 bits that are divided into four segments of one byte each. It appears as four decimal integers separated by periods (xxx.xxx.xxx.xxx). Each "xxx" can have a decimal value from 0 to 255. For example, an IP address could be 192.168.0.1.

An IP address has two parts: a network ID and a host ID. The class of network determines the format of the address.



The number of devices on your EtherNet/IP network will vary depending on the number of bytes that are used for the network address. In many cases you are given a network with a Class C address, in which the first three bytes contain the network address (subnet mask = 255.255.255.0). This leaves 8 bits or 256 addresses on your network. Because two addresses are reserved for special uses (0 is an address for the network usually used by the router, and 255 is an address for broadcast messages to all network devices), you have 254 addresses to use on a Class C address block.

To ensure that each device on the Internet has a unique address, contact your network administrator or Internet Service Provider for unique fixed IP addresses. You can then set the unique IP address for the adapter by using a BOOTP server or by manually configuring parameters in the adapter. The adapter reads the values of these parameters only at power-up.

L

Logic Command/Logic Status

The Logic Command is used to control the PowerFlex drive (e.g., start, stop, direction). It consists of one 16-bit word of input to the adapter from the network. The definitions of the bits in this word depend on the drive.

The Logic Status is used to monitor the PowerFlex drive (for example, operating state, motor direction). It consists of one 16-bit word of output from the adapter to the network. The definitions of the bits in this word depend on the drive.

M

Master-Slave Hierarchy

An adapter configured for a master-slave hierarchy exchanges data with the master device. Usually, a network has one scanner which is the master device, and all other devices (for example, drives connected to EtherNet/IP adapters) are slave devices.

On a network with multiple scanners (called a multimaster hierarchy), each slave device must have a scanner specified as a master.

N

NVS (Non-Volatile Storage)

NVS is the permanent memory of a device. Devices such as the adapter and drive store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called “EEPROM.”

P

PCCC (Programmable Controller Communications Command)

PCCC is the protocol used by some controllers to communicate with devices on a network. Some software products (for example, DriveExplorer and DriveTools SP) also use PCCC to communicate.

Peer-to-Peer Hierarchy

An adapter that is configured for a peer-to-peer hierarchy can exchange data with a device on the network that is not a scanner. This type of hierarchy can be set up so that a scanner configures or transmits data to one PowerFlex drive which then sends the same configuration or data to other PowerFlex drives on the network. To use a peer-to-peer hierarchy, you configure one adapter to transmit data (2 or 4 words) and one or more adapters to receive the data.

Ping

A ping is a message that is sent by a DPI product to its peripheral devices. They use the ping to gather data about the product, including whether it can receive messages and whether they can log in for control. On Ethernet, a ping can be used to determine if a node exists.

PowerFlex 7-Class Drives

The Allen-Bradley PowerFlex 7-Class family of drives includes the PowerFlex 70, PowerFlex 700, PowerFlex 700VC, PowerFlex 700H, PowerFlex 700S, and PowerFlex 7000. These drives can be used for applications ranging from 0.37 kW (0.5 HP) to 3,000 kW (4,000 HP). All PowerFlex 7-Class drives support DPI, allowing them to use the 20-COMM-E EtherNet/IP adapter. This manual focuses on using the adapter with PowerFlex 7-Class drives. Other products that support DPI can also use the adapter.

R

Reference/Feedback

The Reference is used to send a Reference (for example, speed, frequency, torque) to the drive. It consists of one word of input to the adapter from the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

Feedback is used to monitor the speed of the drive. It consists of one word of output from the adapter to the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

RSLogix

RSLogix software is a tool for configuring and monitoring controllers to communicate with connected devices. It is a 32-bit application that runs on various Windows operating systems. Information about RSLogix software can be found at http://www.software.rockwell.com/rslogix.

RSNetWorx for EtherNet/IP

RSNetWorx for EtherNet/IP software is a tool for configuring and monitoring EtherNet/IP networks and connected devices. It is a 32-bit Windows application that runs on Windows 95, Windows 98, and Windows NT. Information about RSNetWorx for EtherNet/IP software can be found at http://www.software.rockwell.com/rsnetworx.

S

Scanner

A scanner is a separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with adapters connected to a network. See also Controller.

Status Indicators

Status indicators are LEDs that are used to report the status of the adapter, network, and drive. They are on the adapter and can be viewed on the front cover of the drive when the drive is powered.

Subnet Masks

A subnet mask is an extension to the IP addressing scheme that lets you use a single network ID for multiple physical networks. A bit mask identifies the part of the address that specifies the network and the part of the address that specifies the unique node on the network. A “1” in the subnet mask indicates the bit is used to specify the network. A “0” in the subnet mask indicates that the bit is used to specify the node.

For example, a subnet mask on a Class C address may appear as follows: 11111111 11111111 11111111 11000000 (255.255.255.192). This mask

indicates that 26 bits are used to identify the network and 6 bits are used to identify devices on each network. Instead of a single physical Class C network with 254 devices, this subnet mask divides it into four networks with up to 62 devices each.

Switches

Switches are network devices that provide virtual connections that help to control collisions and reduce traffic on the network. They are able to reduce network congestion by transmitting packets to an individual port only if they are destined for the connected device. In a control application, in which real time data access is critical, network switches may be required in place of hubs.

T

TCP (Transmission Control Protocol)

EtherNet/IP uses this protocol to transfer Explicit Messaging packets using IP. TCP guarantees delivery of data through the use of retries.

U

UDP (User Datagram Protocol)

EtherNet/IP uses this protocol to transfer I/O packets using IP. UDP provides a simple, but fast capability to send I/O messaging packets between devices. This protocol ensures that adapters transmit the most recent data because it does not use acknowledgements or retries.

Z

Zero Data

When communications are disrupted (for example, a cable is disconnected), the adapter and drive can respond with zero data. Zero data results in the drive receiving zero as values for Logic Command, Reference, and Datalink data. If the drive was running and using the Reference from the adapter, it will stay running but at zero Reference.

Notes:

A

B

C

D

E

F

G

H

I

Q

R

S

T

U

W

Z

Notes:

Notes:

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