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, and 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 its last release (November 2004):

Description of Changes	Page
To all pages, added a new footer containing a: • Publication description (1st line). • Publication number hyperlink underlined in blue (2nd line) that links to the date of the publication on the back cover (see below).  The back cover publication date line hyperlinks to the newest version of the publication on Rockwell Automation's Literature Library web site.	Throughout Manual
Added DPI External Comms Kit compatibility table.	1-2
Revised Chapter 2 (Installing the Adapter) by adding: • "Start-Up Status Indications" • "Verifying/Configuring Key Drive Parameters"	 2-7 2-8
Revised Chapter 4 (Configuring the I/O) by adding: • "Using RSLogix 5000 Integrated Drive Profiles" • "PLC-5 Example" • "SLC 500 Example" • "MicroLogix 1100 Example"	 4-4 4-22 4-30 4-38
Revised Chapter 5 (Using the I/O) by including new ladder logic program examples/information and adding: • "Creating Ladder Logic Using RSLogix 5000 Integrated Drive Profiles" • "PLC-5, SLC 500, and MicroLogix 1100 Example"	 5-10 5-17
Revised Chapter 6 (Using Explicit Messaging) by adding: • "Using RSLogix 5000 Integrated Drive Profiles" • "PLC-5 Example" • "SLC 500 Example" • "MicroLogix 1100 Example"	 6-3 6-16 6-21 6-35

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 (includes DriveExecutive™)	http://www.ab.com/drives/drivetools, and DriveExecutive online help (installed with the software)	—
HIM	*HIM Quick Reference*	20HIM-QR001…
PowerFlex® 70 Drive (Std. and enhanced control)	*PowerFlex 70 User Manual* *PowerFlex 70/700 Reference Manual*	20A-UM001… PFLEX-RM001…
PowerFlex® 700 Drive (Standard and vector control)	*PowerFlex 700 User Manual* *PowerFlex 700 Series B User Manual* *PowerFlex 70/700 Reference Manual*	20B-UM001… 20B-UM002… 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*, and online help (installed with the software)	LINX-GR001…
RSLogix™ 5 RSLogix™ 500 RSLogix™ 5000	*RSLogix 5 Getting Results Guide** *RSLogix 500 Getting Results Guide** *RSLogix 5000 Getting Results Guide** * And online help (installed with the software)	LG5-GR001… LG500-GR001… 9399-RLD300GR
ControlLogix™ and 1756-ENBT or 1756-EN2T	*EtherNet/IP Modules in Logix5000 Control Systems User Manual*	ENET-UM001…
PLC-5®	*Enhanced and Ethernet PLC-5 Programmable Controllers User Manual*	1785-UM012…
SLC™500 and 1747-L5-xxx	*SLC 500 Modular Hardware Style User Manual*	1747-UM011…
MicroLogix™ 1100	*MicroLogix 1100 Programmable Controllers User Manual*	1763-UM001…

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

Rockwell Automation Support

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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, then access the Allen-Bradley Technical Support web site at www.ab.com/support/abdrives.

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.
- RSLinx (version 2.51), RSLogix 5 (version 7.20), RSLogix 500 (version 7.20), and RSLogix 5000 (version 16) 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 adapter and using it with PowerFlex 7-Class (Architecture-Class) drives. The adapter can be used with other products that support a DPI ™ adapter, such as the DPI External Comms Kit (20-XCOMM-DC-BASE). Refer to the documentation for your product for specific information about how it works with the adapter.

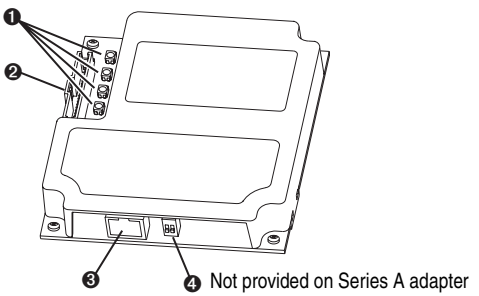
Notes:

Getting Started

The 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. The Series B 20-COMM-E adapter (FRN v3.xxx or higher) can also be installed in an External DPI Comms Kit (20-XCOMM-DC-BASE).

Components

Figure 1.1 Components of the Adapter



Item	Part	Description
❶	Status Indicators	Four LEDs that indicate the status of the DPI, the adapter, and network connection. 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 Setting the Web Pages Switch (Series B only) on page 2-3. SW1 is unused.

Features

The adapter features include:

- Typical mounting in a PowerFlex 7-Class drive. The Series B 20-COMM-E adapter (FRN v3.xxx or higher) can also be installed in a DPI External Comms Kit and used with the kit's optional I/O board.

  DPI External Comms Kit Compatibility

Series/Firmware	Will Adapter Operate in DPI External Comms Kit (20-XCOMM-DC-BASE)?	Will Adapter Operate the Optional I/O Board (20-XCOMM-IO-OPT1)?
Series A/FRN 1.xxx	No	No
Series A/FRN 2.xxx	No	No
Series B/FRN 3.xxx	Yes	Yes

- Captive screws to secure and ground the adapter to the drive or, when mounted in a DPI External Comms Kit, to the kit's metal enclosure.
- Compatibility with various configuration tools 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 DriveExecutive (version 3.01 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 that report the status of the drive communications, the adapter, and network. They are visible when the drive cover is open or closed.
- Parameter-configurable I/O (Logic Command/Reference and up to four pairs of Datalinks) to meet application requirements.
- Explicit Messaging support.
- Master-Slave or Peer-to-Peer hierarchy that 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 to determine how the adapter and PowerFlex drive respond to communication disruptions on the network and controllers in idle mode.
- Web pages, viewed using a web browser, that show information about the adapter, connected drive, and other DPI devices connected to the drive.
- Configurable e-mail messaging to desired addresses when selected drive faults occur and/or are cleared, and/or when the adapter takes a communication or idle fault action.

- Support for DPI routing, enabling access to any networked PowerFlex 7-Class drive (with 20-COMM-E adapter) using DriveExplorer (version 2.01 or higher) to monitor and configure that drive and its connected peripherals.

Compatible Products

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

- PowerFlex 70 drives
- PowerFlex 700 drives
- PowerFlex 700H drives
- PowerFlex 700S drives
- DPI External Comms Kit
- SMC-Flex

Required Equipment

Equipment Shipped with the Adapter

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

- ❑ One 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 adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ Ethernet cable (refer to the *EtherNet/IP Media Planning and Installation Manual*, Publication ENET-IN001…, for details)
- ❑ Ethernet switch (refer to the *EtherNet/IP Performance Application Solution*, Publication ENET-AP001…, for details)
- ❑ Configuration tool, such as:
  - PowerFlex 7-Class HIM (20-HIM-*)
  - DriveExplorer (version 2.01 or higher)
  - DriveExecutive stand-alone software (version 3.01 or higher) or bundled with the DriveTools SP suite (version 1.01 or higher)
  - BOOTP Server (version 2.1 or higher) (network setup only)
- ❑ Controller configuration software (such as RSLogix 5/500/5000)
- ❑ 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 discharged before installing or removing an 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 adapter. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of equipment damage exists. The 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 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

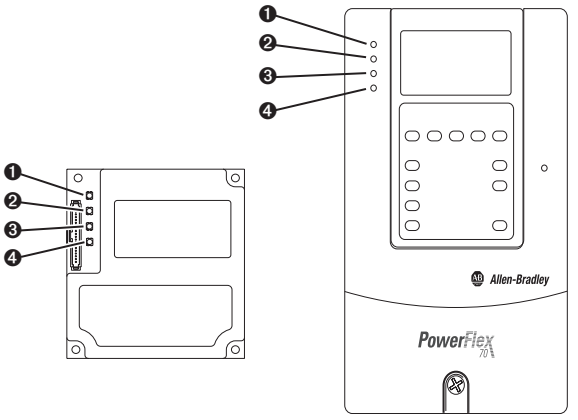
This section is provided to help experienced users quickly start using the adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step	Action	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. **Note:** When installing the adapter in a DPI External Comms Kit, refer to the *20-XCOMM-DC-BASE Installation Instructions* (Publication 20COMM-IN001…) supplied with the kit.	Chapter 2, Installing the Adapter
4	**Apply power to the adapter.** A. The adapter receives power from the drive. Verify that the adapter is installed correctly and then apply power to the drive. The status indicators should be green. If they flash red, there is a problem. Refer to Chapter 7, Troubleshooting. B. Configure/verify key drive parameters.	Chapter 2, Installing the Adapter
5	**Configure the adapter for your application.** Set adapter parameters for the following functions 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 controller configuration tool such as RSLogix to configure the master on the EtherNet/IP network to recognize the adapter and drive.	Chapter 4, Configuring the I/O
7	**Create a ladder logic program.** Use a controller configuration 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 the I/O Chapter 6, Using Explicit Messaging

Status Indicators

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

Figure 1.2 Status Indicators (location on drive may vary)



Item	Adapter Status Indicator Name
1	PORT
2	MOD
3	NET A
4	NET B

After installing the adapter and applying power to the drive, refer to Start-Up Status Indications on page 2-7 for possible start-up status indications and their descriptions.

Installing the Adapter

This chapter provides instructions for installing the adapter in a PowerFlex 7-Class drive. This adapter can also be installed in a DPI External Comms Kit. In this case, refer to the *20-XCOMM-DC-BASE Installation Instructions* (Publication 20COMM-IN001…) supplied with the kit.

Preparing for an Installation

Before installing the adapter:

- Read the *EtherNet/IP Performance and Application Guide* (Publication ENET-AP001…) and *EtherNet/IP Media Planning and Installation Manual* (Publication ENET-IN001…).

  IGMP Snooping/Ethernet Switches

  Much of EtherNet/IP implicit (I/O) messaging uses IP multicast to distribute I/O control data, which is consistent with the CIP producer/consumer model. Historically, most switches have treated multicast packets the same as broadcast packets. That is, all multicast packets are re-transmitted to all ports.

  IGMP snooping constrains the flooding of multicast traffic by dynamically configuring switch ports so that multicast traffic is forwarded only to ports associated with a particular IP multicast group.

  Switches that support IGMP snooping “learn” which ports have devices that are part of a particular multicast group and only forward the multicast packets to the ports that are part of the multicast group.

Be careful as to what level of support a switch has of IGMP snooping. Some layer 2 switches that support IGMP snooping require a router (which could be a layer 3 switch) to send out IGMP polls to learn what devices are part of the multicast group. Some layer 2 switches can use IGMP snooping without a router sending polls. If your control system is a stand-alone network or is required to continue performing if the router is out of service, make sure the switch you are using supports IGMP snooping without a router being present.

- Verify that you have all required equipment. Refer to Required Equipment on page 1-3.

Setting the Web Pages Switch (Series B only)

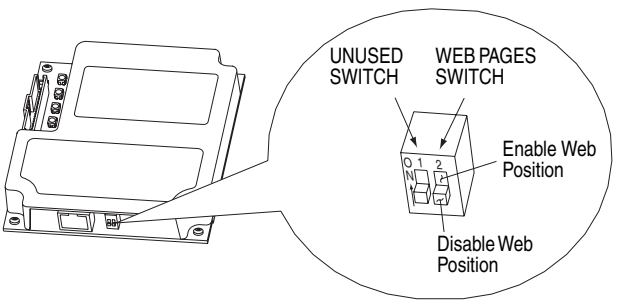
To use the adapter web pages, the Web Pages Switch (not provided on Series A adapter) must be set to its "Enable Web" position.

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

ATTENTION: Risk of equipment damage exists. The 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 in Figure 2.1) to enable or disable the adapter web pages. By default, the adapter web pages are disabled. For complete details on adapter web pages, see Viewing the Adapter's Web Pages on page 8-1.

Figure 2.1 Setting Web Pages Switch



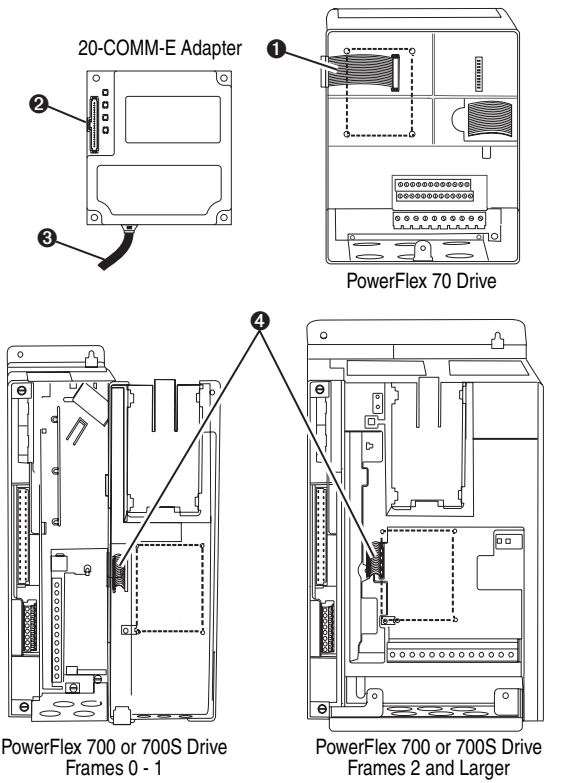
SW2 Setting	Description
Down (OFF) position	Disables the adapter web pages (default setting).
Up (ON) position	Enables the adapter web pages.

Connecting the Adapter to the Drive

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 the adapter.

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

Figure 2.2 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

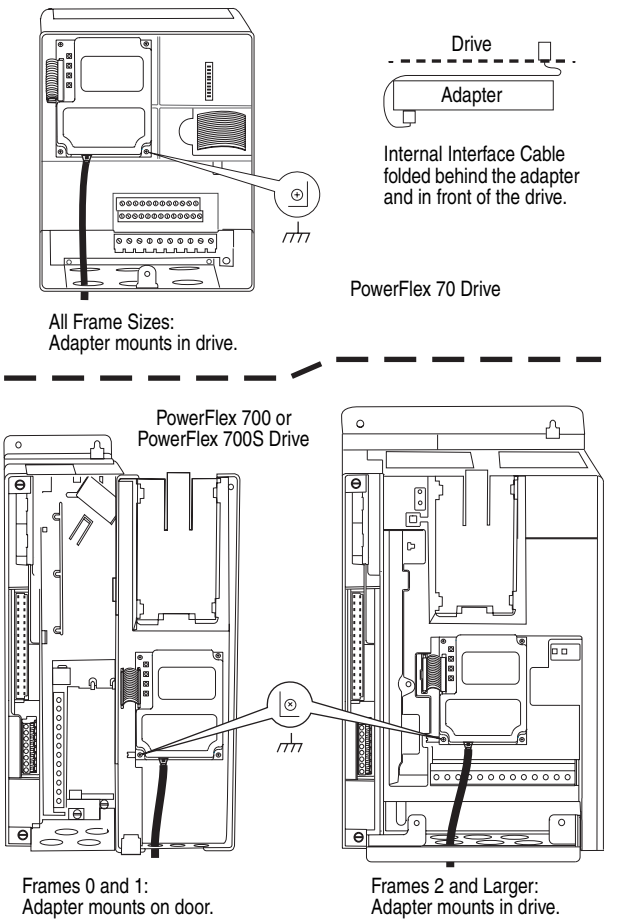
5. Secure and ground the adapter to the drive by doing the following:

   – On a PowerFlex 70 drive, 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 drive, mount the adapter on the drive using the four captive screws.

   Important: Tighten all screws to properly ground the adapter. Recommended torque is 0.9 N-m (8.0 lb.-in.).

Figure 2.3 Mounting and Grounding the Adapter

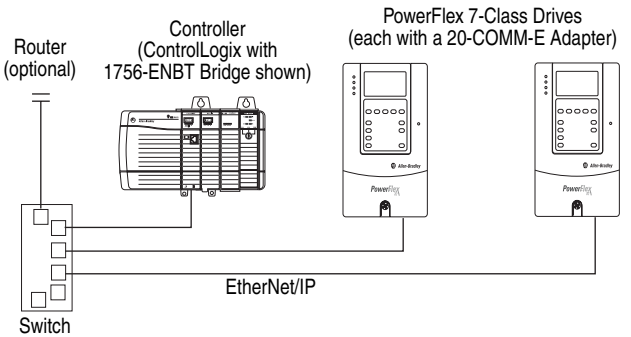


Connecting the Adapter to the Network

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 the adapter.

1. Remove power from the drive.
2. Use static control precautions.
3. Remove the drive cover or open the drive door.
4. Connect an Ethernet cable to the EtherNet/IP network. See Figure 2.4 for an example of wiring to an EtherNet/IP network.

Figure 2.4 Connecting the Ethernet Cable to the Network



5. Route the Ethernet cable through the bottom of the PowerFlex drive (Figure 2.3), and insert the cable's plug into the adapter's mating socket.

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.

Install the drive cover or close the drive door, and apply power to the drive. The adapter receives its power from the connected drive. When you apply power to the adapter for the first time, its topmost "PORT" status indicator should be solid green after an initialization. If it is red, there is a problem. Refer to Chapter 7, Troubleshooting.

Start-Up Status Indications

Status indicators for the drive and communications adapter can be viewed on the front of the drive (Figure 2.5) after power has been applied. Possible start-up status indications are shown in Table 2.A.

Figure 2.5 Drive and Adapter Status Indicators (location on drive may vary)

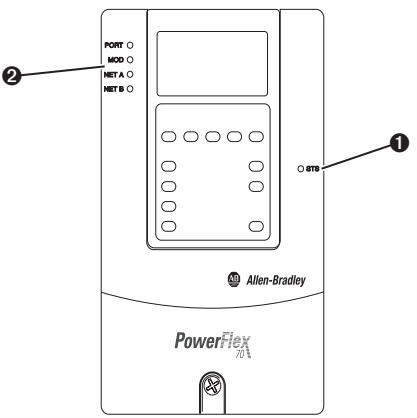


Table 2.A Drive and Adapter Start-Up Status Indications

Item	Name	Color	State	Description
Drive STS Indicator				
❶	STS (Status)	Green	Flashing	Drive ready but not running, and no faults are present.
			Steady	Drive running, no faults are present.
		Yellow	Flashing, Drive Stopped	An inhibit condition exists – the drive cannot be started. Check drive Parameter 214 - [Start Inhibits].
			Flashing, Drive Running	An intermittent type 1 alarm condition is occurring. Check drive Parameter 211 - [Drive Alarm 1].
			Steady, Drive Running	A continuous type 1 alarm condition exists. Check drive Parameter 211 - [Drive Alarm 1].
		Red	Flashing	A fault has occurred.
			Steady	A non-resettable fault has occurred.
Adapter Status Indicators				
❷	PORT	Green	Flashing	Normal Operation. The adapter is establishing an I/O connection to the drive. It will turn solid green or red.
			Steady	Normal Operation. The adapter is properly connected and communicating with the drive
	MOD	Green	Flashing	Normal Operation. The adapter is operating but is not transferring I/O data.
			Steady	Normal Operation. The adapter is operating and transferring I/O data.
	NET A	Green	Flashing	Normal Operation. The adapter is properly connected but does not have an I/O connection.
			Steady	Normal Operation. The adapter is properly connected and communicating on the network.
	NET B	Green	Off	Normal Operation. The adapter is properly connected but is idle.
			Flashing	Normal Operation. The adapter is properly connected and transmitting data packets on the network.

Configuring/Verifying Key Drive Parameters

The PowerFlex 7-Class drive can be separately configured for the control and Reference functions in various combinations. For example, you could set the drive to have its control come from a peripheral or terminal block with the Reference coming from the network. Or you could set the drive to have its control come from the network with the Reference coming from another peripheral or terminal block. Or you could set the drive to have both its control and Reference come from the network.

The following steps in this section assume that the drive will receive the Logic Command and Reference from the network.

1. Use drive Parameter 090 - [Speed Ref A Sel] to set the drive speed Reference to “22” (DPI Port 5).

2. If digital inputs are not used, change drive Parameters 361 - [Dig In1 Sel] through 366 - [Dig In6 Sel] to “0” (Not Used).

3. Verify that drive Parameter 213 - [Speed Ref Source] is reporting that the source of the Reference to the drive is “22” (DPI Port 5). This ensures that any Reference commanded from the network can be monitored by using drive Parameter 002 - [Commanded Speed]. If a problem occurs, this verification step provides the diagnostic capability to determine whether the drive/adapter or the network is the cause.

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. See Disabling the BOOTP Feature on page 3-6 for details.

Important: New settings for some adapter 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.

Notes:

Configuring the Adapter

This chapter 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

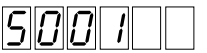
The adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters:

Tool	Refer to...
PowerFlex HIM	page 3-2
BOOTP Server	page 3-3
DriveExplorer Software (version 2.01 or higher)	http://www.ab.com/drives/driveexplorer, or DriveExplorer online help (installed with the software)
DriveExecutive Software (version 3.01 or higher)	http://www.ab.com/drives/drivetools, or DriveExecutive online help (installed with the software)

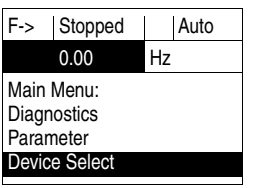
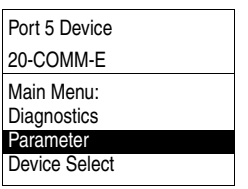
Using the PowerFlex 7-Class HIM

If your drive has either an LED or LCD HIM (Human Interface Module), it can be used 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 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 adapter (20-COMM-E).	or	
4. Press Enter to select the 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

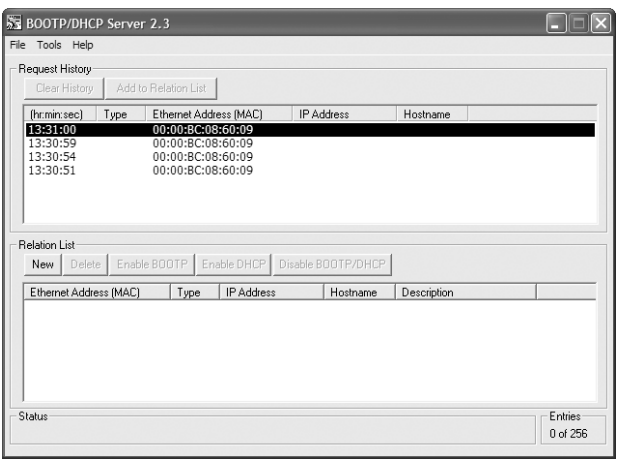
By default, the adapter is configured so that you can set its IP address, subnet mask, and gateway address by using a BOOTP utility. You can select from a variety of BOOTP utilities. These instructions use Rockwell's BOOTP Server (version 2.3 or higher), a stand-alone program that incorporates the functionality of standard BOOTP utilities with a graphical interface. It is available from http://www.ab.com/networks/bootp.html. 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, see Setting the IP Address, Subnet Mask, and Gateway Address on page 3-6.

Configuring the Adapter Using BOOTP Server

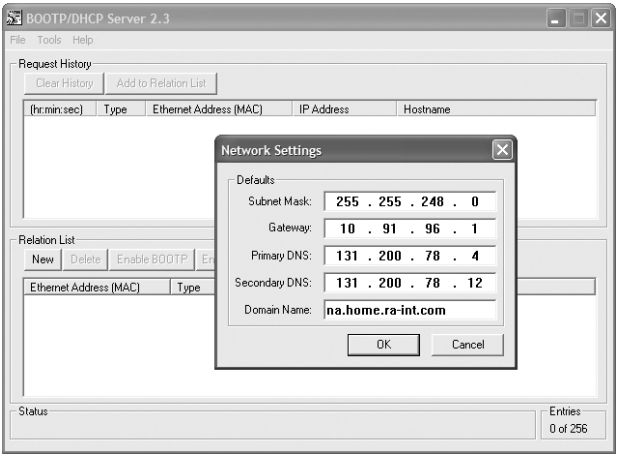
1. On the adapter label, locate and note the adapter's hardware address.
2. On a computer connected to the EtherNet/IP network, start the BOOTP software. The BOOTP Server window (Figure 3.1) appears.

Figure 3.1 BOOTP Server Window



3. To properly configure devices on your EtherNet/IP network, you must configure settings in the BOOTP software to match the network. Select **Tools > Network Settings** to display the Network Settings window (Figure 3.2).

Figure 3.2 Network Setting Window



4. Edit the following:

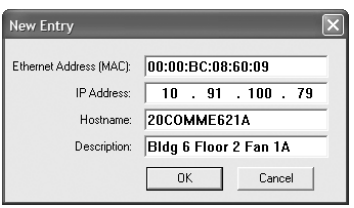
Box	Type
Subnet Mask (1)	The subnet mask for the adapter's network.
Gateway (1)	The IP address of the gateway device on the adapter's network.
Primary DNS	The address of the primary DNS server to be used on the local end of the link for negotiating with remote devices.
Secondary DNS	Optional — the address of the secondary DNS server to be used on the local end of the link for negotiating with remote devices when the primary DNS server is unavailable.
Domain Name	The text name corresponding to the numeric IP address that was assigned to the server that controls the network.

(1) For definitions of these terms, refer to the Glossary.

5. Click **OK** to apply the settings. Devices on the network issuing BOOTP requests appear in the BOOTP Request History list.

6. In the BOOTP Request History list, double-click the hardware address (Ethernet MAC address) of the adapter, or in the Relation List, click **New**. The New Entry dialog box (Figure 3.3) appears.

Figure 3.3 New Entry Dialog Box



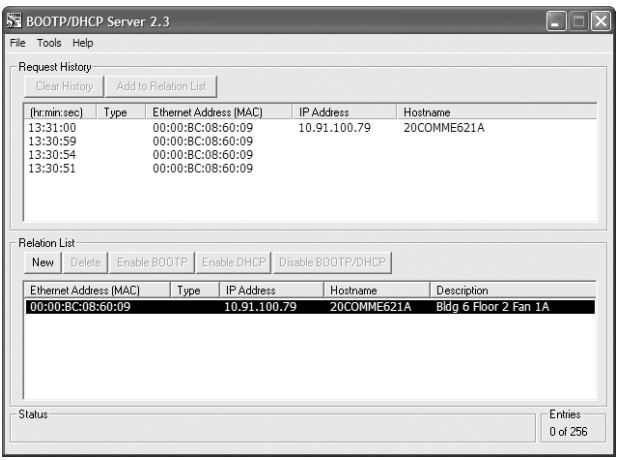
7. Edit the following:

Box	Type
IP Address (1)	A unique IP address for the adapter
Host Name	Optional
Description	Optional

(1) For definitions of these terms, refer to the Glossary.

8. Click **OK** to apply the settings. The adapter appears in the Relation List (Figure 3.4) with the new settings.

Figure 3.4 BOOTP Server Window with Adapter in the Relation List



9. To assign this configuration to the adapter permanently, select the device in the Relation List and click **Disable BOOTP/DHCP**. 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 or power cycle the drive.

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

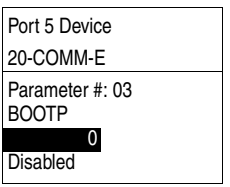
Setting the IP Address, Subnet Mask, and Gateway Address

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.

Disabling the BOOTP Feature

1. Set the value of **Parameter 03 - [BOOTP]** to "0" (Disabled).

Figure 3.5 Example BOOTP Screen on an LCD HIM



Value	Setting
0	Disabled
1	Enabled (Default)

2. Reset the adapter (see Resetting the Adapter on page 3-21).

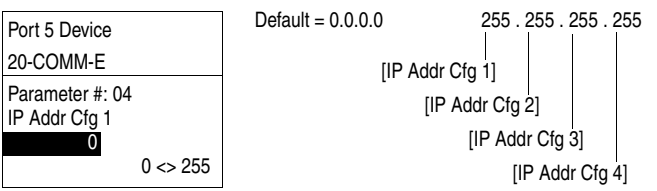
After disabling the BOOTP feature, you can then configure the IP address, subnet mask, and gateway address using adapter parameters.

Setting an IP Address Using Parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to "0" (Disabled). This parameter must be set to Disabled to configure the IP address using the adapter parameters.

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

Figure 3.6 Example IP Address Screen on an LCD HIM



3. Reset the adapter (see Resetting the Adapter on page 3-21).

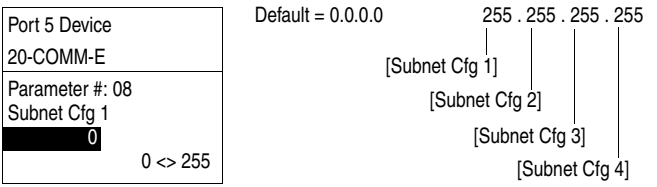
   The NET A status indicator will be solid green or flashing green if the IP address is correctly configured.

Setting a Subnet Mask Using Parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to “0” (Disabled). This parameter must be set to Disabled to configure the subnet mask using the adapter 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 3.7 Example Subnet Mask Screen on an LCD HIM



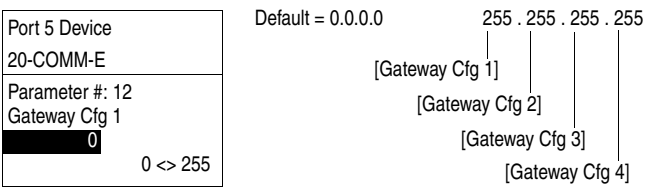
3. Reset the adapter (see Resetting the Adapter on page 3-21).

Setting a Gateway Address for the Adapter Using Parameters

1. Verify that **Parameter 03 - [BOOTP]** is set to “0” (Disabled). This parameter must be set to Disabled to configure the gateway address using the adapter 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 3.8 Example Gateway Screen on an LCD HIM



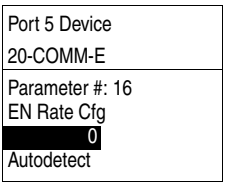
3. Reset the adapter (see Resetting the Adapter on page 3-21).

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 3.9 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.

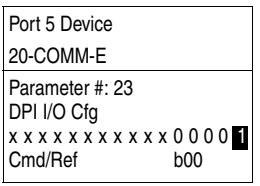
2. Reset the adapter (see Resetting the Adapter on page 3-21).

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 3.10 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 3.10, it is highlighted and equals “1.”

2. If a controller is used to control the drive, adapter **Parameters 35 - [M-S Input]** and **36 - [M-S Output]** for Master-Slave Hierarchy must be set (see Setting a Master-Slave Hierarchy on page 3-11).

3. 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 “22” (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.

4. 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).

5. Reset the adapter (see Resetting the Adapter on page 3-21).

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 on page 3-11. If you select a Master-Slave hierarchy, you must also configure the master to communicate with the adapter. Refer to Chapter 4, Configuring the I/O.

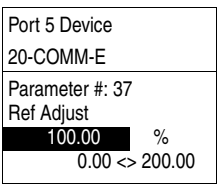
Setting the Reference Adjustment

A Reference Adjustment is a percent scaling factor for the Reference from the network. It can be set from 0.00 to 200.00% to allow the drive's Reference to either match the network Reference (= 100.00%), scale below the network Reference (< 100.00%), or scale above the network Reference (> 100.00%).

ATTENTION: To guard against equipment damage and/or personal injury, note that changes to adapter **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, set **Parameter 37 - [Ref Adjust]** to the desired scaling factor.

Figure 3.11 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, the adapter exchanges data with a master, such as a scanner or bridge. In a Peer-to-Peer hierarchy, the adapter exchanges data with one or more EtherNet/IP adapters connected to devices that have compatible Logic Command/Status words.

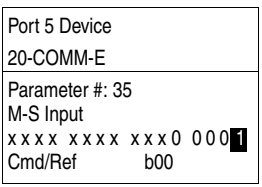
For both master-slave and peer-to-peer hierarchies, the devices exchanging data must be on the same IP subnet. See “IP Addresses” in the Glossary for information about IP subnets.

Setting a Master-Slave Hierarchy

1. Enable the desired I/O in **Parameter 23 - [DPI I/O Cfg]**. Refer to Figure 3.10.

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 3.12 Example Master-Slave Input Screen on an LCD HIM

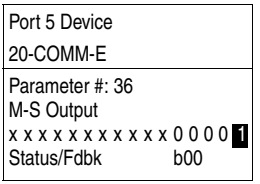


Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A Input
2	Datalink B Input
3	Datalink C Input
4	Datalink D Input
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.12, 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 3.13 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 3.13, it is highlighted and equals "1."

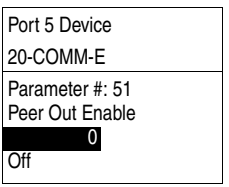
4. Reset the adapter (see Resetting the Adapter on page 3-21).

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 I/O.

Setting the Adapter to Transmit Peer-to-Peer Data

1. Verify that **Parameter 51 - [Peer Out Enable]** is set to "0" (Off). This parameter must be Off while you configure peer output parameters.

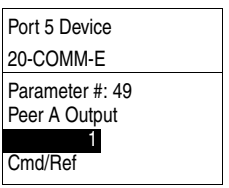
Figure 3.14 Example Peer Out Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

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

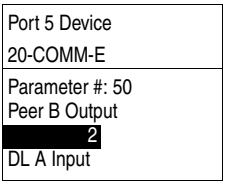
Figure 3.15 Example Peer A Output Screen on an LCD HIM



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

Figure 3.16 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

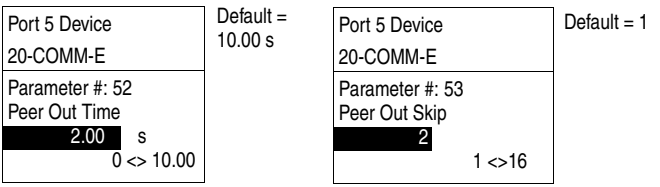
4. Set **Parameters 52 - [Peer Out Time]** and **53 - [Peer Out Skip]** to establish the minimum and maximum intervals between Peer messages. Because the adapter transmits Peer messages when a change-of-state condition occurs, minimum and maximum intervals are required.

   – The minimum interval ensures that the adapter does not transmit messages on the network too often, thus minimizing network traffic. It is set using **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 Figure 3.17 example, the minimum interval is set to 2.00 seconds, and the maximum interval is set to 4.00 seconds (2.00 x 2).

Figure 3.17 Example Peer Out Time and Peer Out Skip Screens on an LCD HIM

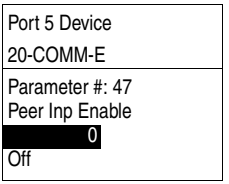


5. Set **Parameter 51 - [Peer Out Enable]** to “1” (On). The adapter will transmit the data selected in **Parameters 49 - [Peer A Output]** and **50 - [Peer B Output]** to the network. Another adapter must be configured to receive the Peer I/O data.

Setting the Adapter to Receive Peer-to-Peer Data

1. Verify that **Parameter 47 - [Peer Inp Enable]** is set to "0" (Off). This parameter must be Off while you configure the peer input parameters.

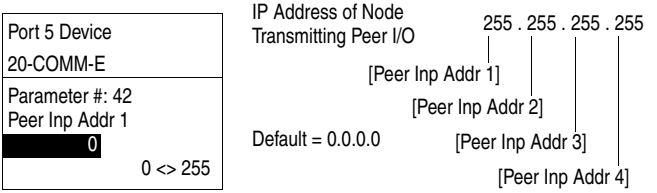
Figure 3.18 Example Peer Input Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

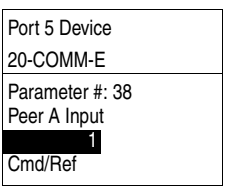
2. Set **Parameters 42 - [Peer Inp Addr 1]** through **45 - [Peer Inp Addr 4]** to the IP address of the node from which you want to receive data. Valid nodes must have 20-COMM-E adapters connected to drives with compatible Logic Command/Status words.

Figure 3.19 Example Peer Input Address 1 Screen on an LCD HIM



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

Figure 3.20 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

With the Series A adapter, if you select a Reference or Datalink as an input, note the following:

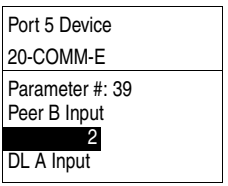
– If a drive that uses a 32-bit Reference and 32-bit Datalinks receives a 16-bit Reference or Datalink, it uses the data in its most significant word, and its least significant word is zero.

– 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.

With the Series B adapter, data is used from the least significant word in the event of a mismatch in Reference or Datalink sizes.

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

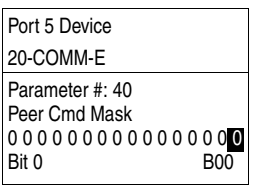
Figure 3.21 Example Peer B Input Screen on an LCD HIM



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 3.22 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. Reset the adapter (see Resetting the Adapter on page 3-21) so that changes to **Parameter 40 - [Peer Cmd Mask]** take effect.

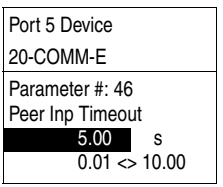
7. Set **Parameter 46 - [Peer Inp Timeout]** to the maximum amount of time the adapter will wait for a message before timing out.

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 seconds and the value of **Parameter 53 - [Peer Out Skip]** is 2 (see Figure 3.17), then **Parameter 46 - [Peer Inp Timeout]** needs to have a value greater than 4.00, such as 5.00 (see Figure 3.23).

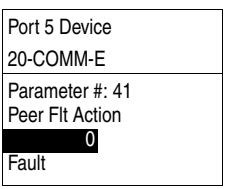
Figure 3.23 Example Peer Input Timeout Screen on an LCD HIM



8. Set **Parameter 41 - [Peer Flt Action]** to the 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 3.24 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 on page 3-17.

9. Set **Parameter 47 - [Peer Inp Enable]** to “1” (On).

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 controller is idle (in program mode or 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 controller using **Parameter 22 - [Idle Flt Action]**.

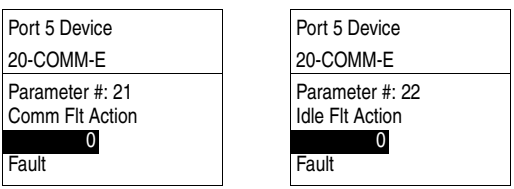
ATTENTION: Risk of injury or equipment damage exists. **Parameters 21 - [Comm Flt Action]** and **22 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the controller is idle. By default, these parameters fault the drive. You can set 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 faulted controller).

Changing 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. This does not command a stop.
3	Hold Last	The drive continues in its present state.
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 3.25 Example Fault Action Screens on an LCD HIM



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

Setting 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 using a web browser to access the IP address set for the adapter, you can view the adapter's web pages for information about the adapter, its connected drive, and other DPI devices connected to the drive, such as HIMs or converters. 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 (firmware 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). To protect the configured settings for adapter e-mail messaging, use **Parameter 54 - [Access Control]** to set the E-mail Config Bit 1 value to "0" (Disabled). 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 Configure E-mail Notification Web Page on page 8-6).

Figure 3.26 Example Web Access Control Screen on an LCD HIM

Port 5 Device 20-COMM-E
Parameter #: 54 Access Control x x x x x x x x x x x x x x 0 1 Web Enable b00

Bit	Description
0	Web Enable (Default = 1 = Enabled)
1	E-mail Config (Default = 0 = Disabled)
2 - 31	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.

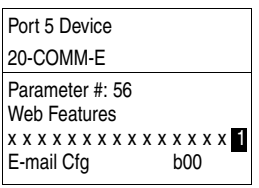
Series B Adapter (firmware version 3.xxx or higher)

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 on page 3-21).

Bit 0 of **Parameter 56 - [Web Features]** is used to protect the configured settings for e-mail messaging. By default, settings are not protected and the user can make changes. To protect the configured settings, 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 messaging will always 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 or to stop e-mail messages, refer to Configure E-mail Notification Web Page on page 8-6.

Figure 3.27 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 3.27 it is highlighted and equals "1."

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

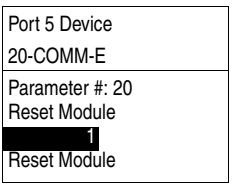
Resetting the Adapter

Changes to switch settings and 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 **Parameter 20 - [Reset Module]**.

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 “1” (Reset Module).

Figure 3.28 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 Cfg]** unless the parameter was changed and the adapter was not reset. Bit Definition: Not Used, Not Used, Not Used, Datalink D, Datalink C, Datalink B, Datalink A, Cmd/Ref Default: x, x, x, 0, 0, 0, 0, 1 Bit: 7, 6, 5, 4, 3, 2, 1, 0
48	Peer Inp Status	The status of the consumed peer input connection: Values 0 = Off 1 = Waiting 2 = Running 3 = Faulted

Configuring the I/O

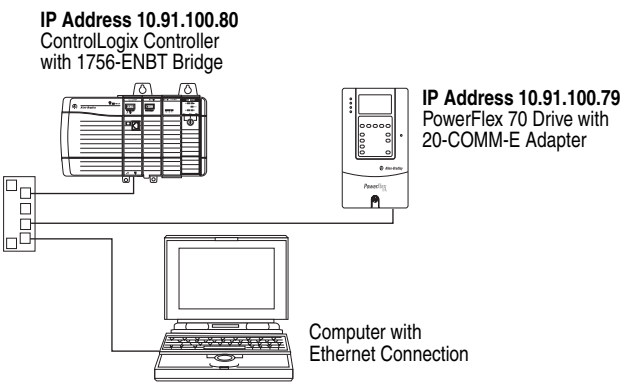
This chapter provides instructions on how to configure Rockwell Automation controllers (ControlLogix, PLC-5, SLC 500 or MicroLogix 1100) to communicate with the adapter and connected PowerFlex drive.

ControlLogix Example

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple EtherNet/IP network (see 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 Datalinks over the network.

Figure 4.1 Example ControlLogix EtherNet/IP Network

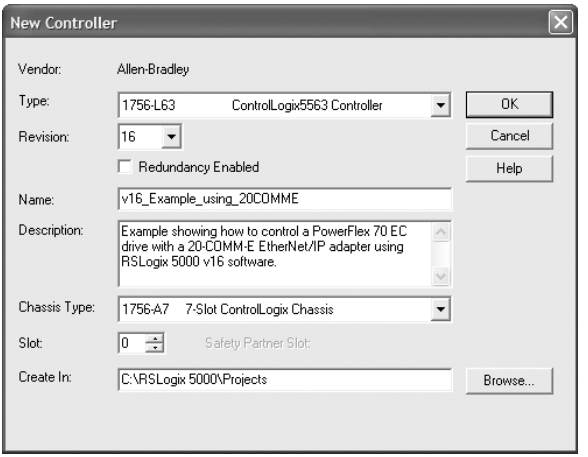


Adding the Bridge to the I/O Configuration

To establish communications between the controller and adapter over the network, you must first add the ControlLogix controller and its bridge to the I/O configuration.

1. Start RSLogix 5000. The RSLogix 5000 window appears. Select **File > New** to display the New Controller screen (Figure 4.2).

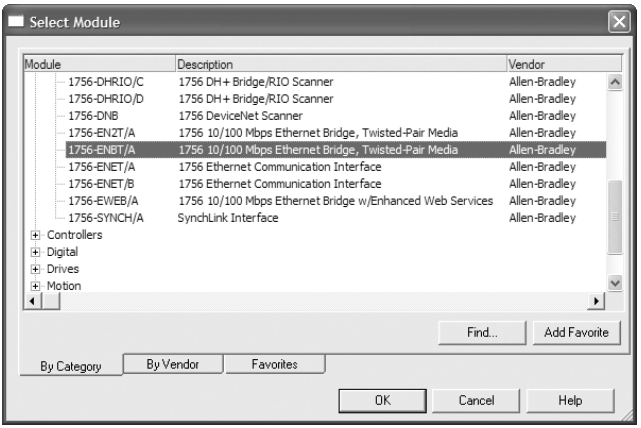
Figure 4.2 New Controller Screen (RSLogix 5000 v16 shown)



Select the appropriate choices for the fields in the screen to match your application. Then click **OK**. The RSLogix 5000 window reappears with the treeview in the left pane.

2. In the treeview, right-click the I/O Configuration folder and select **New Module…** The Select Module screen appears. Expand the Communications group to display all of the available communication modules (Figure 4.3).

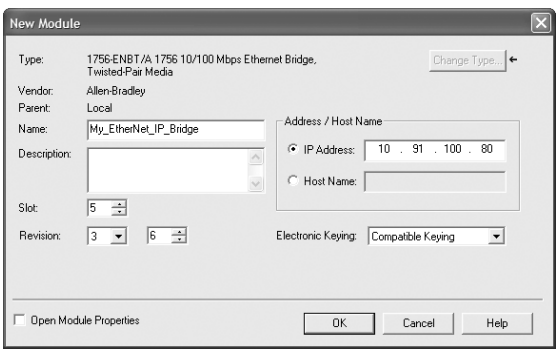
Figure 4.3 Bridge Select Module Screen



3. In the list, select the EtherNet/IP bridge used by your controller. In this example, we use a 1756-ENBT EtherNet/IP Bridge (Series A), so the 1756-ENBT/A option is selected. Then click **OK**. In the Select Major Revision pop-up dialog box, select the major revision of its firmware.

4. Click **OK**. The bridge's New Module screen (Figure 4.4) appears.

Figure 4.4 Bridge New Module Screen



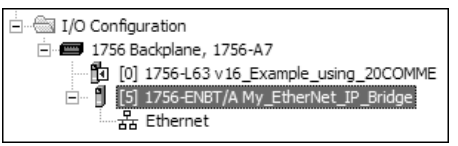
5. Edit the following:

Box	Setting
Name	A name to identify the bridge.
Description	Optional – description of the bridge.
IP Address	The IP address of the EtherNet/IP bridge.
Host Name	Not used.

Box	Setting
Slot	The slot of the EtherNet/IP bridge in the rack.
Revision	The minor revision of the firmware in the bridge. (You already set the major revision by selecting the bridge series in Step 3.)
Electronic Keying	**Compatible Module**. The "Compatible Module" setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and bridge make a connection. Therefore, ensure that you have set the correct revision in this screen. Refer to the online Help for additional information on this and other Electronic Keying settings.
Open Module Properties	When this box is checked, additional module properties screens will appear to further configure the bridge after clicking **OK**. When unchecked, the bridge's New Module screen will close after clicking **OK**. For this example, uncheck this box.

6. Click **OK**. The 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) with its assigned name.

Figure 4.5 RSLogix 5000: I/O Configuration Folder



Using RSLogix 5000 Integrated Drive Profiles (v16 or Higher)

When compared to using the RSLogix 5000 Classic Profile (v13-v15) or Generic Profile (all versions), the RSLogix 5000 Integrated Drive Profiles provide these advantages:

- Profiles for specific drives that provide descriptive controller tags for basic control I/O words (Logic Command/Status, Reference/ Feedback) and Datalinks. Additionally, Datalinks automatically take the name of the drive parameter to which they are assigned. These profiles virtually eliminate I/O mismatch errors and substantially reduce drive configuration time.

- New Drive tab eliminates the need for a separate drive software configuration tool.

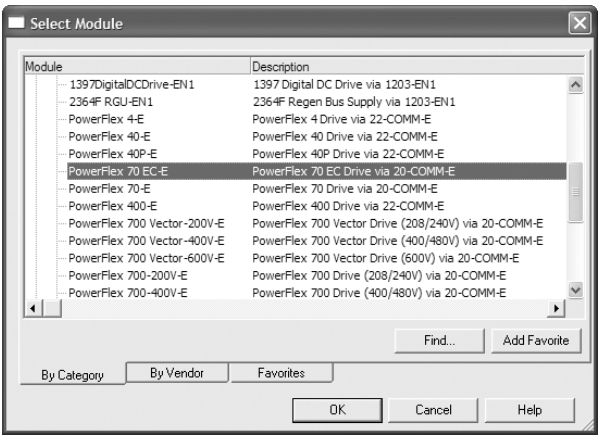
- Drive configuration settings are saved as part of the RSLogix 5000 v16 project file (.ACD) and also downloaded to the controller.

Adding the Drive/Adapter to the I/O Configuration

To transmit data between the bridge and the drive, you must add the drive as a child device to the parent bridge.

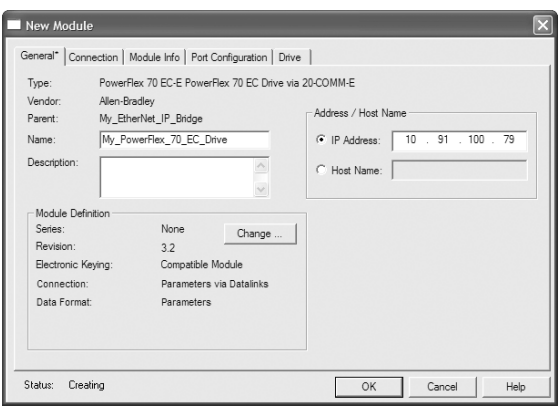
1. In the treeview, right-click on the bridge and select **New Module…** to display the Select Module screen. In our example, we right-click on the 1756-ENBT/A bridge. Expand the Drives group to display all of the available drives with their communication adapters.

Figure 4.6 Drive Select Module Screen



2. From the list (Figure 4.6), select the drive and its connected adapter. For this example, we selected “PowerFlex 70 EC-E.” Then click **OK**. The drive’s New Module screen (Figure 4.7) appears.

Figure 4.7 Drive New Module Screen

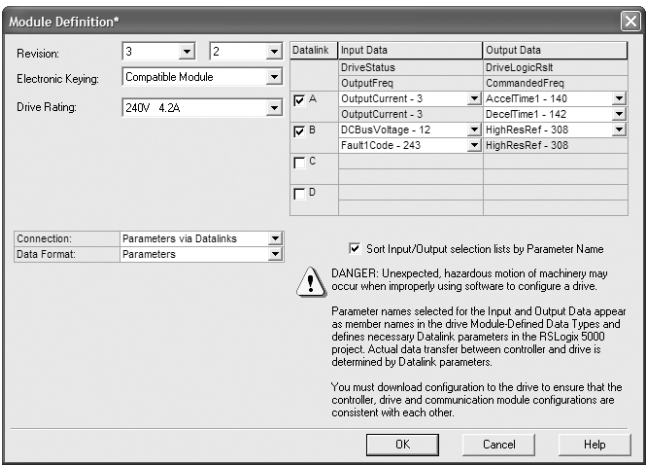


3. On the General tab, edit the following data about the drive/adapter:

Box	Setting
Name	A name to identify the drive.
Description	Optional – description of the drive/adapter.
IP Address	The IP address of the adapter.

4. In the Module Definition section, click **Change…** to launch the Module Definition screen (Figure 4.8) and begin the drive/adapter configuration process.

Figure 4.8 Module Definition Screen



5. In the Module Definition screen, edit the following information:

Box	Setting
Revision	The major and minor revision of the firmware in the drive. **Important:** If the drive's major and minor revision is not available from the Revision pull down lists, the "DriveTools SP Database Files" for the drive can be downloaded from www.ab.com/support/abdrives/webupdate.
Electronic Keying	**Compatible Module**. The "Compatible Module" setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and bridge make a connection. Therefore, ensure that you have set the correct revision in this screen. Refer to the online Help for additional information on this and other Electronic Keying settings.
Drive Rating	The voltage and current rating of the drive.
Connection	**Parameters via Datalinks.** When selecting "Parameters via Datalinks" (default), the controller tags for the Datalinks use the drive parameter names to which they are assigned. When selecting "Datalinks," the controller tags for the Datalinks have non-descriptive UserDefinedData[n] names like those used in RSLogix 5000 v15.

Box	Setting
Data Format	**Parameters.** When the Connection field is set to “Parameters via Datalinks,” “Parameters” is automatically selected. When the Connection field is set to “Datalinks,” you must select the number of Datalinks required for your application in the “Data Format” field.
Datalinks A, B, C, D	In the Input Data column, assigns selected drive parameters to be READ by the controller. In the Output Data column, assigns selected drive parameters to be WRITTEN to the controller.
Sort Input/ Output selection…	When this box is checked, sorts the Input Data and Output Data assigned parameters by name and then by number, and enables parameter search by name. When unchecked, sorts the assigned parameters by parameter number and then by name, and enables parameter search by number.

When a 32-bit parameter is selected for Input Data or Output Data for a drive with 16-bit Datalinks, two contiguous Datalinks (for example, x1 and x2 or x2 and x1) are automatically assigned as a pair to represent that parameter. See Datalink examples in Figure 4.8.

Notice that the Status Information (Logic Status and Feedback) and Control Information (Logic Command and Reference) are already enabled by default.

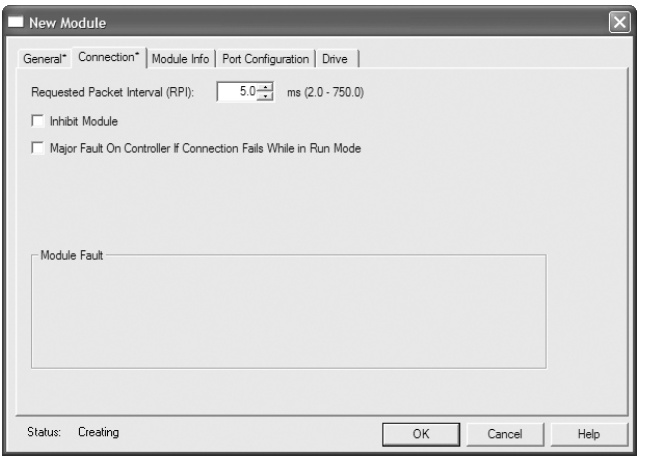
When a Datalink is enabled, the following adapter I/O parameters are automatically set:

- **Parameter 23 - [DPI I/O Cfg]** turns on the enabled Datalink bit so the 20-COMM-E adapter will communicate that Datalink’s information with the drive.
- **Parameter 35 - [M-S Input]** turns on the enabled Datalink bit so the 20-COMM-E adapter will input that Datalink’s information from the controller.
- **Parameter 36 - [M-S Output]** turns on the enabled Datalink bit so the 20-COMM-E adapter will output that Datalink’s information to the controller.

6. Click **OK** to save the drive and adapter configuration and close the Module Definition screen. The drive’s New Module screen re-appears.

7. On the New Module screen, click the Connection tab (Figure 4.9).

Figure 4.9 Connection Screen

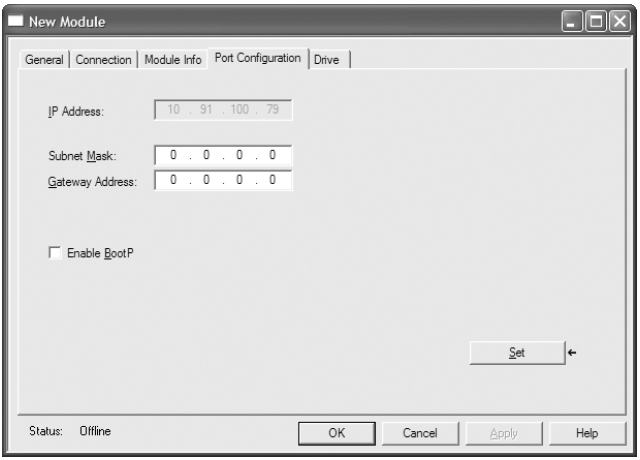


8. In the “Requested Packet Interval (RPI)” box, set the value to 5.0 milliseconds or greater. This value determines the maximum interval that a controller should use to move data to and from the adapter. To conserve bandwidth, use higher values for communicating with low priority devices.

The “Inhibit Module” box, when checked, inhibits the module from communicating with the RSLogix 5000 project. When the “Major Fault on …” box is checked, a major controller fault will occur when the module’s connection fails while the controller is in the Run Mode. For this example, leave the “Inhibit Module” and “Major Fault on …” boxes unchecked.

9. On the New Module screen, click the Port Configuration tab (Figure 4.10).

Figure 4.10 Port Configuration Screen



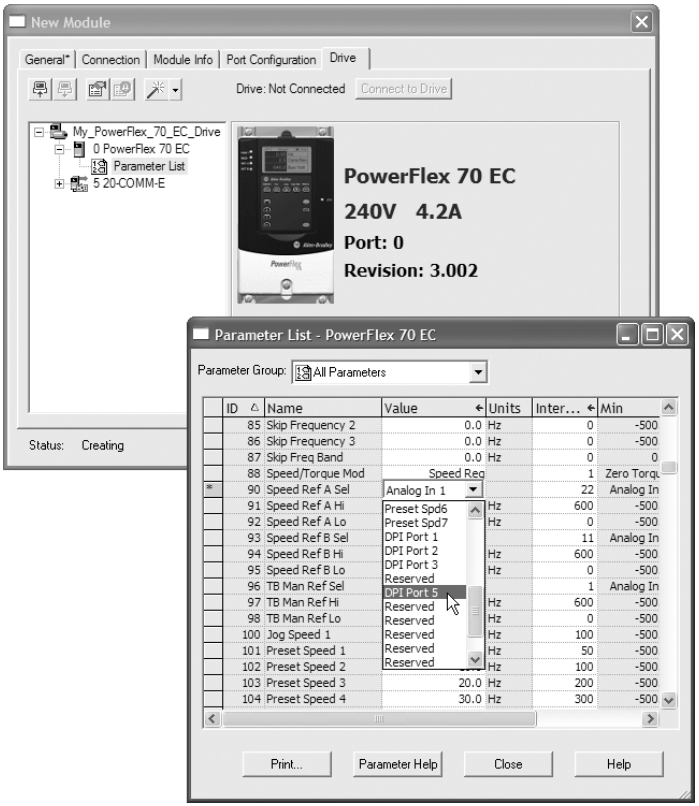
10. In the Port Configuration screen, edit the following information:

Box	Setting
IP Address	The IP address of the adapter that was already set in the General tab. This field is not configurable (grayed out).
Subnet Mask	The Subnet Mask configuration setting of the network. This setting must match the setting of other devices on the network (for example, 255.255.255.0).
Gateway Address	The Gateway Address configuration setting of the network. This setting must match the setting of other devices on the network (for example, 10.91.100.1).
Enable BootP	When this box is checked, BOOTP is enabled in the adapter and will ignore the IP address set in the General tab. When unchecked, the controller uses the set IP address. This is another method to enable/disable BOOTP in the adapter. For this example, leave this box unchecked.

11. Click **Set** to save the Port Configuration information which sets the corresponding offline Subnet Cfg x and Gateway Cfg x parameters in the adapter.

12. On the New Module screen, click the Drive tab to display its Process Display screen. In the treeview, double-click Parameter List to display the drive's linear Parameter List. Scroll to drive Parameter 90 - [Speed Ref A Sel] and set its value to "DPI Port 5" (Figure 4.11) so that the drive receives its Reference from the network via the communication adapter.

Figure 4.11 Drive Parameter List Screen



13. Click **Close** to save the setting and close the Parameter List screen. The New Module screen re-appears.

14. Click **OK**. The new node (“My_PowerFlex_70_EC_Drive” in this example) now appears under the bridge (“My_EtherNet_IP_Bridge” in this example) in the I/O Configuration folder. If you double-click on the Controller Tags (Figure 4.12), you will see that module-defined data types and tags have been automatically created. Note that all tag names are defined and Datalinks include the assigned drive parameter name. After you save and download the configuration, these tags allow you to access the Input and Output data of the drive via the controller’s ladder logic.

Figure 4.12 Controller Tags

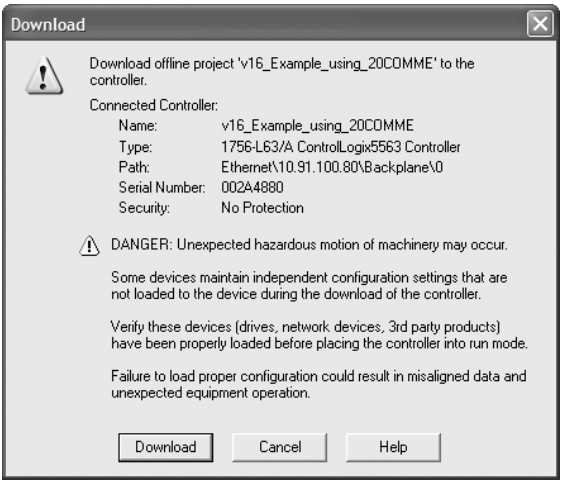
Name	Value	Force Mask	Style	Data Type
My_PowerFlex_70_EC_Drive:I	{...}	{...}		AB:PowerFlex70E...
My_PowerFlex_70_EC_Drive:I.DriveStatus	2#0000...		Binary	INT
My_PowerFlex_70_EC_Drive:I.DriveStatus_Ready	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_Active	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_CommandDir	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_ActualDir	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_Accelerating	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_Decelerating	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_Alarm	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_Faulted	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_AtSpeed	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_LocalID0	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_LocalID1	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_LocalID2	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_SpdRefID0	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_SpdRefID1	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_SpdRefID2	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.DriveStatus_SpdRefID3	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:I.OutputFreq	0		Decimal	INT
My_PowerFlex_70_EC_Drive:I.OutputCurrent	0		Decimal	DINT
My_PowerFlex_70_EC_Drive:I.DCBusVoltage	0		Decimal	INT
My_PowerFlex_70_EC_Drive:I.Fault1Code	0		Decimal	INT
My_PowerFlex_70_EC_Drive:O	{...}	{...}		AB:PowerFlex70E...
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt	2#0000...		Binary	INT
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Stop	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Start	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Jog	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_ClearFault	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Forward	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Reverse	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_LocalContrl	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_MOPInc	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Accel1	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Accel2	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Decel1	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_Decel2	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_SpdRefID0	0		Decimal	BOOL
My_PowerFlex_70_EC_Drive:O.DriveLogicRslt_SpdRefID1	0		Decimal	BOOL

Saving the I/O Configuration to the Controller

After adding the bridge and drive/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. In the RSLogix 5000 window, select **Communications > Download**. The Download dialog box (Figure 4.13) appears.

Figure 4.13 Download Dialog Box



TIP: If a message box reports that RSLogix 5000 is unable to go online, select **Communications > Who Active** to try to find your controller in the Who Active screen. After finding and selecting the controller, click **Set Project Path** to establish the path. If your controller 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 successfully completed, RSLogix 5000 goes into the Online mode and the I/O Not Responding box in the upper-left of the window should be flashing green. Also, a yellow warning symbol should be displayed on the I/O Configuration folder in the treeview and on the drive profile.

   If the controller was in Run Mode before clicking **Download**, RSLogix 5000 prompts you to change the controller mode back to Remote Run. In this case, choose the appropriate mode for your application. If the controller was in Program Mode before clicking **Download**, this prompt will not appear.

3. Select **File > Save**. If this is the first time 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.

   To ensure that the present project configuration values are saved, RSLogix 5000 prompts you to upload them. Click **Yes** to upload and save them.

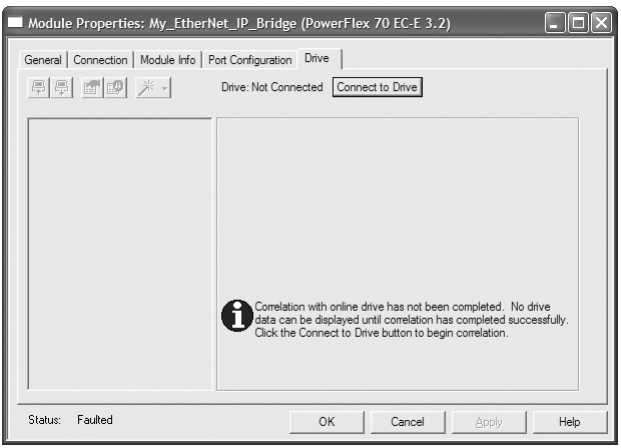
Correlating the Drive with the Controller

You must now correlate the drive settings to the RSLogix 5000 project I/O settings so that they match. This requires loading the project I/O settings into the drive.

1. In the treeview under I/O Configuration, right-click on the drive profile (for this example My_PowerFlex_70_EC_Drive) and select **Properties**.

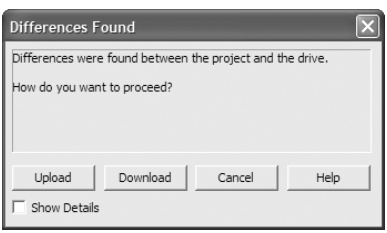
2. Click the Drive tab and then click **Connect to Drive** (Figure 4.14) to begin the correlation process.

Figure 4.14 Drive Correlation Screen



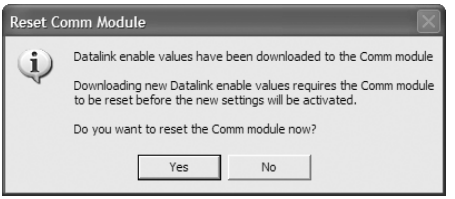
3. The Connect To Drive screen appears. Browse the communication path to the drive and select the drive. Then click **OK**. If the Differences Found screen (Figure 4.15) appears — which is typical, click **Download**. This will download the project settings from the controller to the drive and its connected adapter. If **Upload** is clicked, the drive and adapter settings are uploaded to the controller.

Figure 4.15 Differences Found Screen



When the Reset Comm Module screen (Figure 4.16) appears, click **Yes** to reset the communication adapter so that the new I/O settings take effect.

Figure 4.16 Reset Comm Module Screen



After resetting the communication module, which may take up to one minute, the I/O OK box in the upper-left of the RSLogix 5000 window should now be solid green and the yellow warning symbols in the treeview by the I/O Configuration folder and drive profile should be gone.

4. Click **OK** to close the Drive Correlation screen.

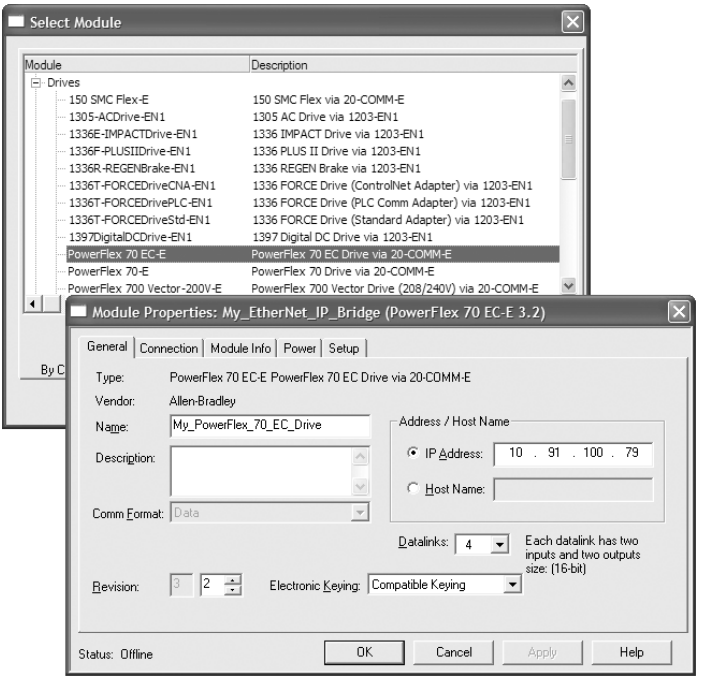
Using the RSLogix 5000 Classic Profile (v13-v15)

When compared to using the RSLogix 5000 Generic Profile (all versions), the RSLogix 5000 Classic Profile provides these advantages:

- Profiles for specific drives (Figure 4.17) that provide descriptive controller tags for basic control I/O words (Logic Command/Status, Reference/Feedback). The controller tags for Datalinks, however, have non-descriptive UserDefinedData[n] names.
- Improved I/O configuration — no I/O assembly configuration required. Basic control I/O is defined, but Datalinks still need to be configured/mapped.
- The Setup tab includes a DriveExecutive icon link to conveniently launch DriveExecutive (when installed on computer) to match the adapter I/O configuration with the controller, and to assign the Datalink parameters in the drive. This reduces I/O mismatches.

Since the RSLogix 5000 Classic Profile has been significantly improved upon by RSLogix 5000 Integrated Drive Profiles (v16 or higher), it is highly recommended to use RSLogix 5000 Integrated Drive Profiles to take advantage of its benefits (more intuitive, time saving, and less likely to make I/O configuration errors).

Figure 4.17 Classic Profile Screens for Drives



When Datalinks are used, you must enable the desired Datalinks and assign names to their non-descriptive controller tags. When a Datalink is enabled, you must set the following adapter I/O parameters:

- **Parameter 23 - [DPI I/O Cfg]** turns on the enabled Datalink bit so the 20-COMM-E adapter will communicate that Datalink's information with the drive.
- **Parameter 35 - [M-S Input]** turns on the enabled Datalink bit so the 20-COMM-E adapter will input that Datalink's information from the controller.
- **Parameter 36 - [M-S Output]** turns on the enabled Datalink bit so the 20-COMM-E adapter will output that Datalink's information to the controller.

Lastly, you must configure the enabled Datalinks in the drive to point to the desired parameters.

Using the RSLogix 5000 Generic Profile (all versions)

The basic RSLogix 5000 Generic Profile is only recommended when:

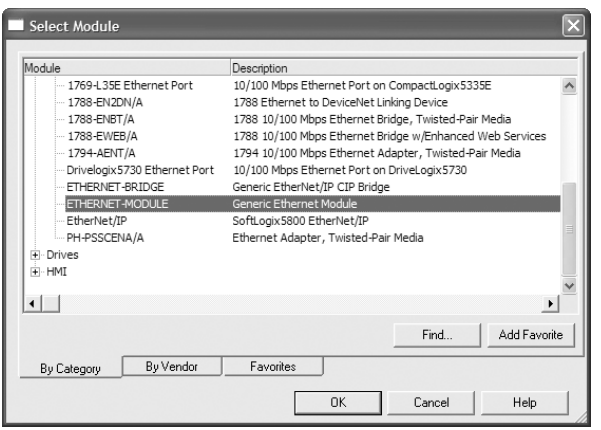
- A specific drive profile in other versions of RSLogix 5000 is unavailable.
- Users are already familiar with a Generic Profile and do not want to convert an existing project to a Classic Profile (v13-v15) or Integrated Drive Profile (v16 or higher).
- A project must maintain specific revision level control.
- **Version 16 Only** — The controller cannot be taken offline. Version 16 enables the Generic Profile to be added while the controller is online and in the Run mode.

Adding the Drive/Adapter to the I/O Configuration

To transmit data between the bridge and the drive, you must add the drive as a child device to the parent bridge.

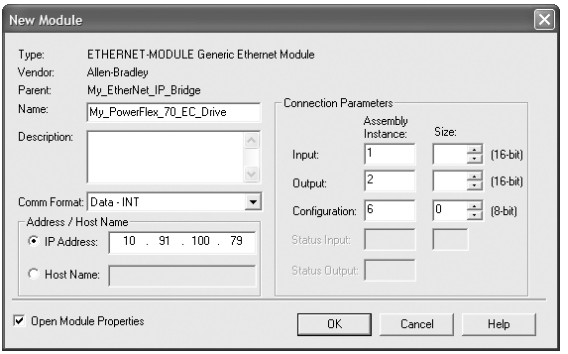
1. In the treeview, right-click on the bridge and select **New Module…** to display the Select Module screen. In our example, we right-click on the 1756-ENBT/A bridge. Expand the Communications group to display all of the available communication modules.

Figure 4.18 Drive Select Module Screen



2. Select “ETHERNET-MODULE” from the list (Figure 4.18) to configure the drive and its connected 20-COMM-E adapter, and then click **OK**. The drive’s New Module screen (Figure 4.19) appears.

Figure 4.19 Drive New Module Screen



3. Edit the following information about the drive/adapter:

Box	Setting
Name	A name to identify the drive and adapter.
Description	Optional – description of the drive/adapter.
Comm Format	**Data - INT** (This setting formats the data in 16-bit words.)
IP Address	The IP address of the adapter.
Open Module Properties	When this box is checked, the drive's New Module screen will close when clicking **OK**. When unchecked, additional module properties screens will appear to further configure the drive/adapter when **OK** is clicked. For this example, check this box.

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 - [DPI I/O Cfg]** 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.B or Table 4.C on page 4-18.
Output	**2** (This value is required.)	The value will vary based on your application (setting of **Parameters 23 - [DPI I/O Cfg]** 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.B or Table 4.C on page 4-18.
Configuration	**6** (This value is required.)	**0** (This value is required.)

The following tables define the number of 16-bit words that you need to enter for the Input Size and Output Size boxes depending on your configuration.

Table 4.A PowerFlex 70/700/700H 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)

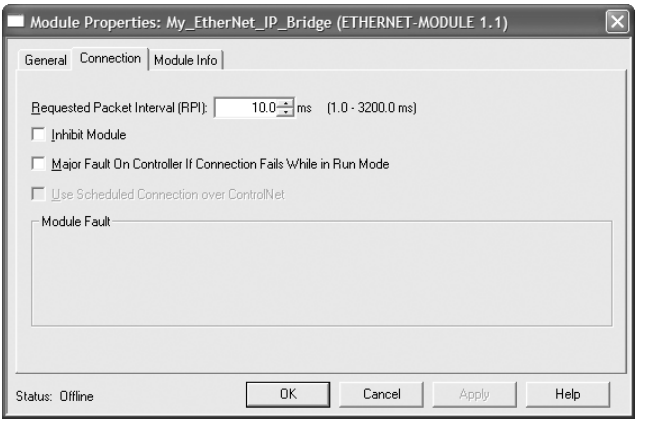
Input Size	Output Size	Logic Command/ Status	Reference/ Feedback (32-bit)	Datalinks (32-bit)			
				A	B	C	D
6	4	✔	✔				
10	8	✔	✔	✔			
14	12	✔	✔	✔	✔		
18	16	✔	✔	✔	✔	✔	
22	20	✔	✔	✔	✔	✔	✔

TIP: For instructions on configuring the I/O for the adapter (**Parameter 23 - [DPI I/O Cfg]**) and its Master-Slave Hierarchy (**Parameters 35 - [M-S Input]** and **36 - [M-S Output]**), see Setting the I/O Configuration on page 3-9.

5. After setting the information in the drive's New Module screen, click **OK**. The Module Properties screen appears.

6. Click the Connection tab (Figure 4.20).

Figure 4.20 Connection Screen



7. 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 and from the adapter. To conserve bandwidth, use higher values for communicating with low priority devices. For this example, leave the “Inhibit Module” and Major Fault …” boxes unchecked.

8. Click **OK**. The new node (“My_PowerFlex_70_EC_Drive” in this example) now appears under the bridge (“My_EtherNet_IP_Bridge” in this example) in the I/O Configuration folder. If you double-click on the Controller Tags (Figure 4.21), 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 drive via the controller’s ladder logic.

Figure 4.21 Controller Tags

Name	Value	Force Mask	Style	Data Type
+ My_PowerFlex_70_EC_Drive:C	{...}	{...}		AB:ETHERNET_...
− My_PowerFlex_70_EC_Drive:I	{...}	{...}		AB:ETHERNET_...
− My_PowerFlex_70_EC_Drive:I.Data	{...}	{...}	Decimal	INT[12]
+ My_PowerFlex_70_EC_Drive:I.Data[0]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[1]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[2]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[3]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[4]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[5]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[6]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[7]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[8]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[9]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[10]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:I.Data[11]	0		Decimal	INT
− My_PowerFlex_70_EC_Drive:O	{...}	{...}		AB:ETHERNET_...
− My_PowerFlex_70_EC_Drive:O.Data	{...}	{...}	Decimal	INT[10]
+ My_PowerFlex_70_EC_Drive:O.Data[0]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[1]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[2]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[3]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[4]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[5]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[6]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[7]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[8]	0		Decimal	INT
+ My_PowerFlex_70_EC_Drive:O.Data[9]	0		Decimal	INT

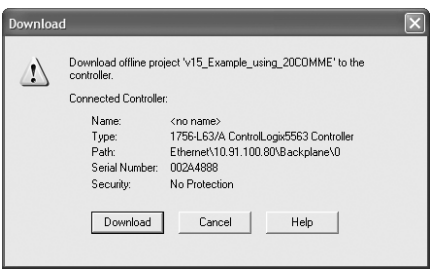
Saving the I/O Configuration to the Controller

After adding the bridge and drive/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.

TIP: When using RSLogix 5000 (v16 or higher), you can add the I/O configuration of a Generic Profile while the controller is online and in the Run mode.

1. In the RSLogix 5000 window, select **Communications > Download**. The Download dialog box (Figure 4.22) appears.

Figure 4.22 Download Dialog Box



TIP: If a message box reports that RSLogix 5000 is unable to go online, select **Communications > Who Active** to try to find your controller in the Who Active screen. After finding and selecting the controller, click **Set Project Path** to establish the path. If your controller 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 successfully completed, RSLogix 5000 goes into the Online mode and the I/O OK box in the upper-left of the screen should be solid green.

3. Select **File > Save**. If this is the first time 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.

Configuring Key Drive Parameters

Any Datalinks that were enabled in the controller and adapter during I/O configuration (Table 4.A, Table 4.B or Table 4.C) must also be configured in the drive. Each enabled Datalink must be assigned to a specific drive parameter. If this is not done, the controller cannot receive or send drive parameter values.

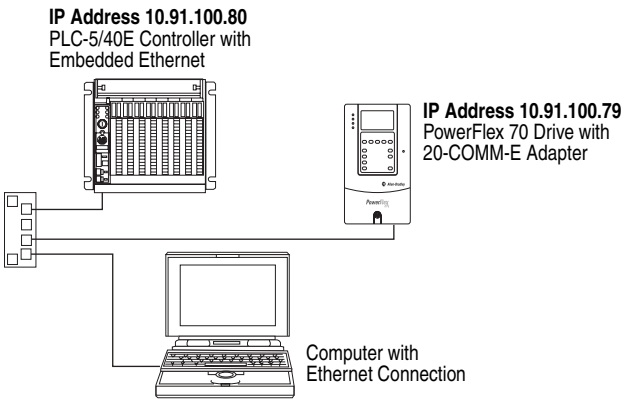
PLC-5 Example

Important: The PLC-5 must be Series E (Rev. D.1 or higher) to support the MultiHop feature that routes messaging to the drive.

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple EtherNet/IP network (see Figure 4.23). In our example, we will configure a PLC-5/40E controller to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.23 PLC-5 Example EtherNet/IP Network



Configuring Parameters for Network I/O

Since the I/O for the drive is message-based, there is no need to configure any I/O inside the RSLogix 5 (v7 or higher) project until using the I/O as described in Chapter 5.

However, to get the adapter to operate with the I/O created in Chapter 5, we need to configure the adapter to accept the I/O and drive to point to the appropriate Datalinks.

1. Set the following adapter I/O parameters to these values for this example:

Adapter Parameter No.	Setting
23 - [DPI I/O Cfg]	xxxx xxxx xxx0 0011
35 - [M-S Input]	xxxx xxxx xxx0 0011
36 - [M-S Output]	xxxx xxxx xxx0 0011

2. Reset the adapter or power cycle the drive.

3. Set the following PowerFlex 70 EC drive I/O parameters to these values for this example:

Drive Parameter No.	Setting
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
310 - [Data Out A1]	003 (Output Current) (1)
311 - [Data Out A2]	003 (Output Current) (1)

(1) Parameter 003 - [Output Current] is a 32-bit parameter. Since the PowerFlex 70 EC drive uses 16-bit Datalinks, two contiguous Datalinks (Data Out A1/A2) are required for this drive. For drives with 32-bit Datalinks, only one Datalink is required.

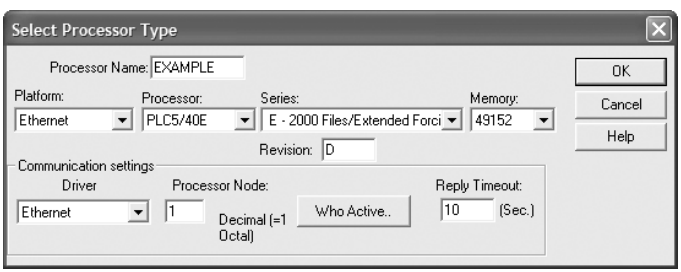
Creating RSLogix 5 (v7 or higher) Project

To transmit (read and write) data between the controller and drive, you must create message instructions that allocate data table addresses in the controller for Logic Command/Status, Reference/Feedback, and Datalinks.

Selecting the Controller

1. Start RSLogix 5. The RSLogix 5 window appears. Select **File > New** to display the Select Processor Type screen (Figure 4.24).

Figure 4.24 PLC-5 Select Processor Type Screen



2. Assign a name for the processor. From the pull-down fields, select the appropriate choices to match your PLC-5 controller and application, and click **OK**. The RSLogix 5 project window appears.

Creating the Control Timeout Logic

1. In the RSLogix 5 project window treeview under Program Files double-click on LAD 2.

2. Insert a ladder rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG10:n), and
   n is an unused element of the data file chosen for xx (for example, MG10:0)

   Then press **Enter**.

3. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

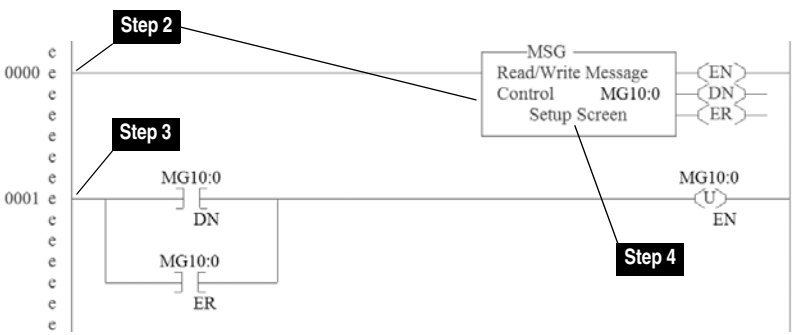
   xx and n must correspond to the assigned data file number and element (for example, MG10:0) for the message created in Step 2.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

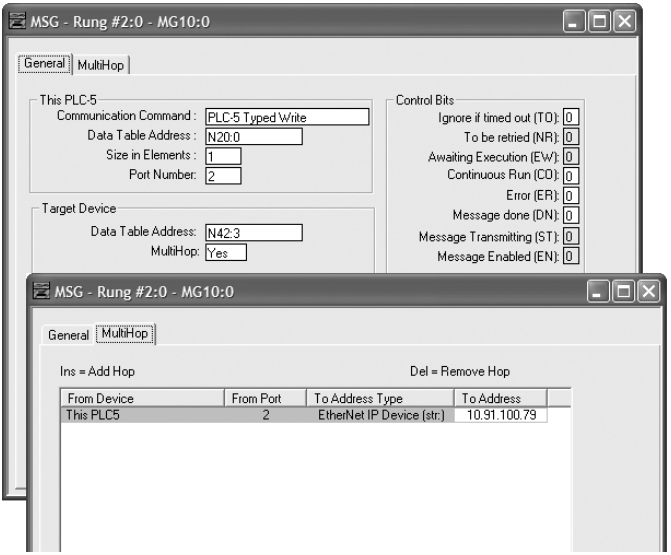
4. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.26).

Figure 4.25 PLC-5 Control Timeout Ladder Logic



5. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.26 PLC-5 Control Timeout Message Configuration Screens



General Tab Box	Setting
This PLC-5	
Communication Command	**PLC-5 Typed Write**. The controller type and command type for the controller to write the control timeout value to the drive.
Data Table Address	**N20:0**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements (1)	**1**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Port Number	**2**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Data Table Address	**N42:3**. Specific starting address of the destination file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When "Yes" is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Status, Feedback, and Datalink Out Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG11:n), and
   n is an unused element of the data file chosen for xx (for example, MG11:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

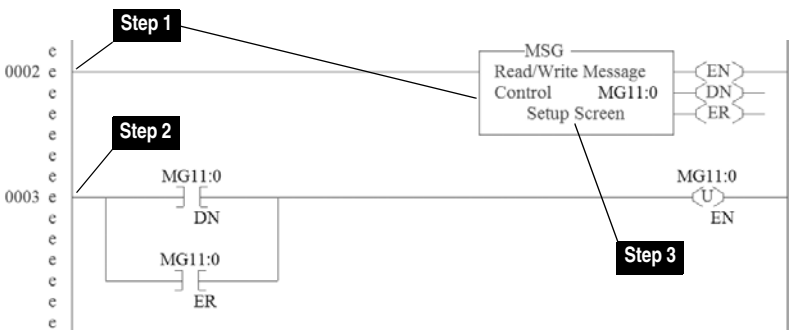
   xx and n must correspond to the assigned data file number and element (for example, MG11:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

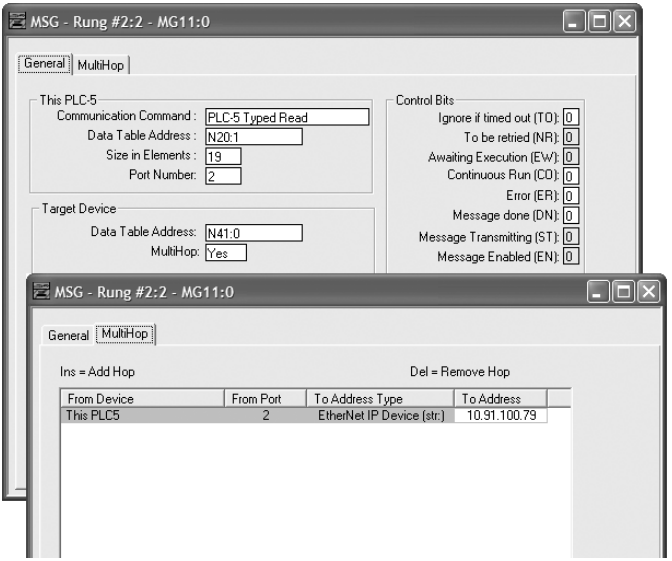
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.28).

Figure 4.27 PLC-5 Logic Status, Feedback, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.28 PLC-5 Logic Status, Feedback, and Datalink Out Message Configuration Screens



General Tab Box	Setting
This PLC-5	
Communication Command	**PLC-5 Typed Read**. The controller type and command type for the controller to read data from the drive.
Data Table Address	**N20:1**. An unused controller data table address containing the message instruction. Since the command type is a Read, this address is the starting word of the destination file.
Size in Elements (1)	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Port Number	**2**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Data Table Address	**N41:0**. Specific starting address of the source file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When "Yes" is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Command, Reference, and Datalink In Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG12:n), and
   n is an unused element of the data file chosen for xx (for example, MG12:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

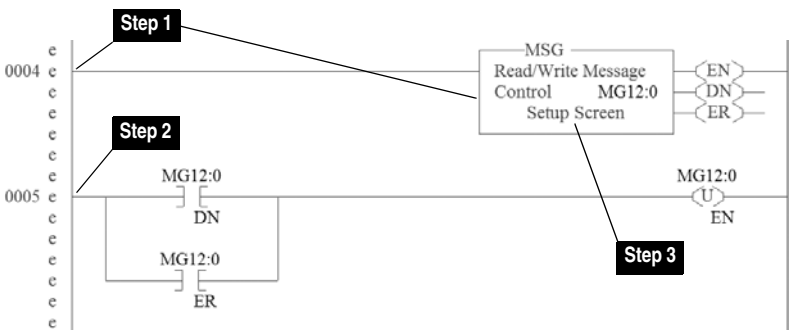
   xx and n must correspond to the assigned data file number and element (for example, MG12:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

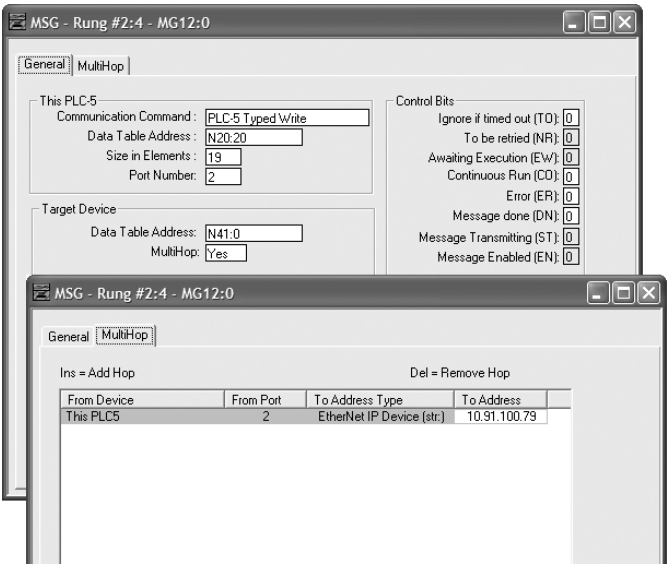
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.30).

Figure 4.29 PLC-5 Logic Command, Reference, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.30 PLC-5 Logic Command, Reference, and Datalink In Message Configuration Screens



General Tab Box	Setting
This PLC-5	
Communication Command	**PLC-5 Typed Write**. The controller type and command type for the controller to write data to the drive.
Data Table Address	**N20:20**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements [1]	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Port Number	**2**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Data Table Address	**N41:0**. Specific starting address of the destination file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When "Yes" is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

[1] For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

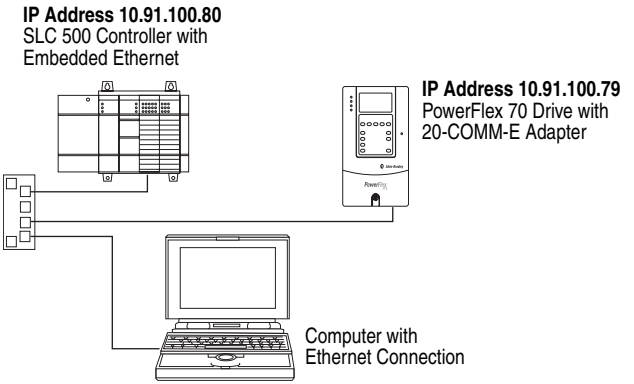
TIP: If the controller is controlling more than one drive, it is recommended to intersperse the control I/O messaging for each drive to conserve network bandwidth and decrease response time.

SLC 500 Example

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple EtherNet/IP network (see Figure 4.31). In our example, we will configure a SLC 500 controller to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.31 SLC 500 Example EtherNet/IP Network



Configuring Parameters for Network I/O

Since the I/O for the drive is message-based, there is no need to configure any I/O inside the RSLogix 500 (v7 or higher) project until using the I/O as described in Chapter 5.

However, to get the adapter to operate with the I/O created in Chapter 5, we need to configure the adapter to accept the I/O and drive to point to the appropriate Datalinks.

1. Set the following adapter I/O parameters to these values for this example:

Adapter Parameter No.	Setting
23 - [DPI I/O Cfg]	xxxx xxxx xxx0 0011
35 - [M-S Input]	xxxx xxxx xxx0 0011
36 - [M-S Output]	xxxx xxxx xxx0 0011

2. Reset the adapter or power cycle the drive.

3. Set the following PowerFlex 70 EC drive I/O parameters to these values for this example:

Drive Parameter No.	Setting
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
310 - [Data Out A1]	003 (Output Current) (1)
311 - [Data Out A2]	003 (Output Current) (1)

(1) Parameter 003 - [Output Current] is a 32-bit parameter. Since the PowerFlex 70 EC drive uses 16-bit Datalinks, two contiguous Datalinks (Data Out A1/A2) are required for this drive. For drives with 32-bit Datalinks, only one Datalink is required.

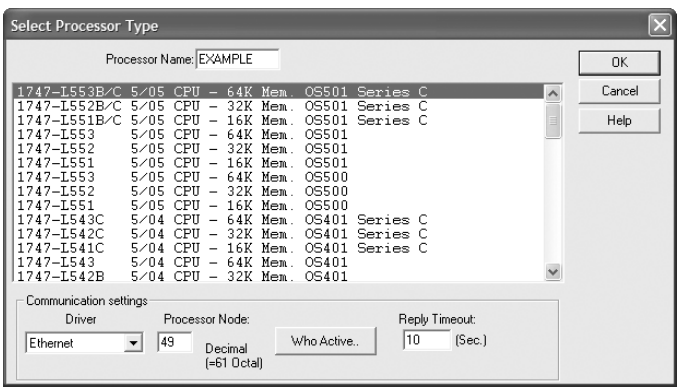
Creating RSLogix 500 (v7 or higher) Project

To transmit (read and write) data between the controller and drive, you must create message instructions that allocate data table addresses in the controller for Logic Command/Status, Reference/Feedback, and Datalinks.

Selecting the Controller

1. Start RSLogix 500. The RSLogix 500 window appears. Select **File > New** to display the Select Processor Type screen (Figure 4.32).

Figure 4.32 SLC 500 Select Processor Type Screen



2. Assign a name for the processor. In the list, select a 1747-L55x type controller. Then select the appropriate choices for the fields in the screen to match your application, and click **OK**. The RSLogix 500 project window appears.

Creating the Control Timeout Logic

1. In the RSLogix 500 project window treeview under Program Files double-click on LAD 2.

2. Insert a ladder rung, double-click on the rung to display the rung editor, and enter **MSG WRITE 500CPU LOCAL Nxx:n**, where:

   xx is an unused data file number (for example, N10:n), and
   n is an unused element of the data file chosen for xx (for example, N10:0)

   Then press **Enter**.

3. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC Nxx:n/DN NXB XIC Nxx:n/ER BND OTU Nxx:n/EN**, where:

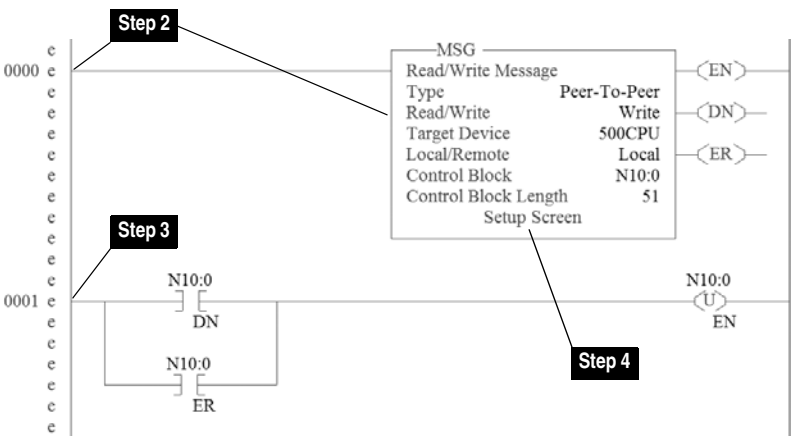
   xx and n must correspond to the assigned data file number and element (for example, N10:0) for the message created in Step 2.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

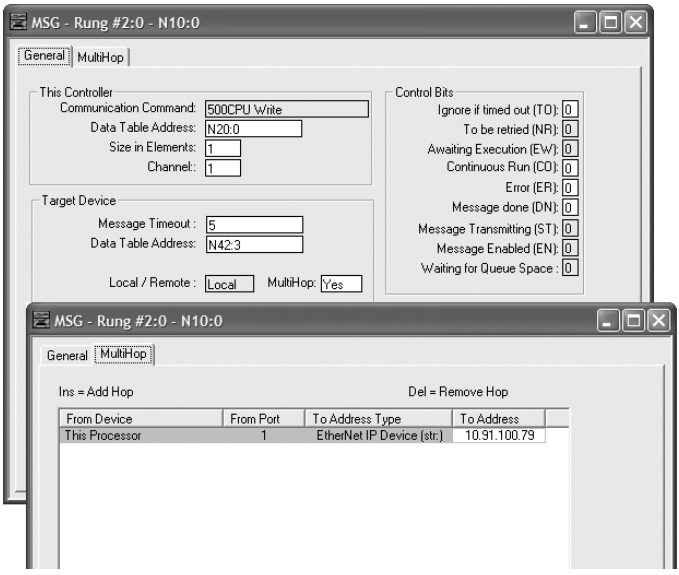
4. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.34).

Figure 4.33 SLC 500 Control Timeout Ladder Logic



5. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.34 SLC 500 Control Timeout Message Configuration Screens



General Tab Box	Setting
This Controller	
Communication Command	This setting is unavailable (grayed out) and is established when the message is created in the ladder rung.
Data Table Address	**N20:0**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements (1)	**1**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Channel	**1**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N42:3**. Specific starting address of the destination file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When “Yes” is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Status, Feedback, and Datalink Out Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG READ 500CPU LOCAL Nxx:n**, where:

   xx is an unused data file number (for example, N11:n), and
   n is an unused element of the data file chosen for xx (for example, N11:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC Nxx:n/DN NXB XIC Nxx:n/ER BND OTU Nxx:n/EN**, where:

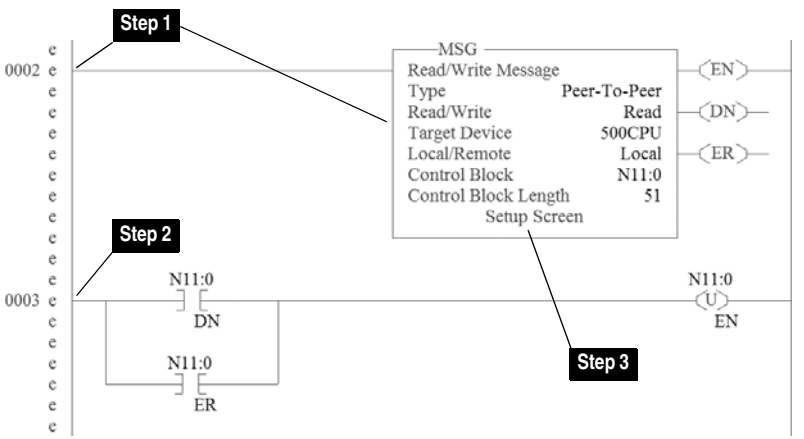
   xx and n must correspond to the assigned data file number and element (for example, N11:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

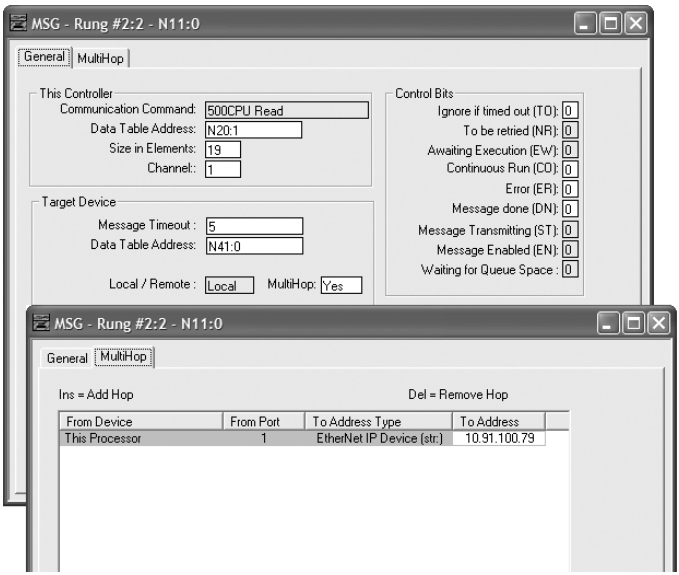
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.36).

Figure 4.35 SLC 500 Logic Status, Feedback, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.36 SLC 500 Logic Status, Feedback, and Datalink Out Message Configuration Screens



General Tab Box	Setting
This Controller	
Communication Command	This setting is unavailable (grayed out) and is established when the message is created in the ladder rung.
Data Table Address	**N20:1**. An unused controller data table address containing the message instruction. Since the command type is a Read, this address is the starting word of the destination file.
Size in Elements (1)	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Channel	**1**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N41:0**. Specific starting address of the source file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When “Yes” is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Command, Reference, and Datalink In Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG WRITE 500CPU LOCAL Nxx:n**, where:

   xx is an unused data file number (for example, N12:n), and
   n is an unused element of the data file chosen for xx (for example, N12:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC Nxx:n/DN NXB XIC Nxx:n/ER BND OTU Nxx:n/EN**, where:

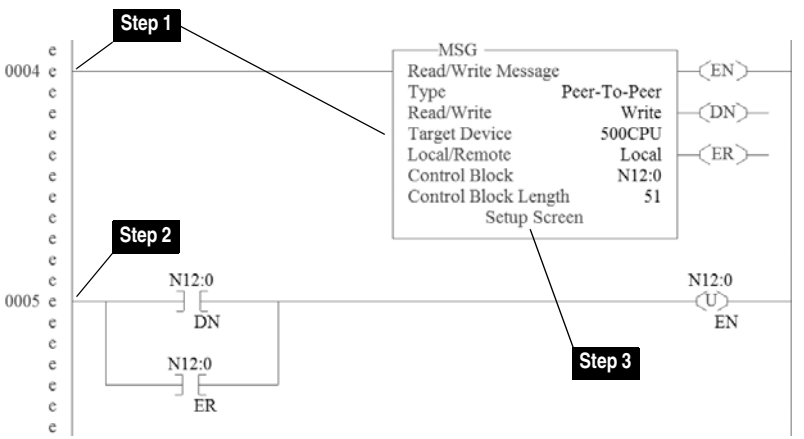
   xx and n must correspond to the assigned data file number and element (for example, N12:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

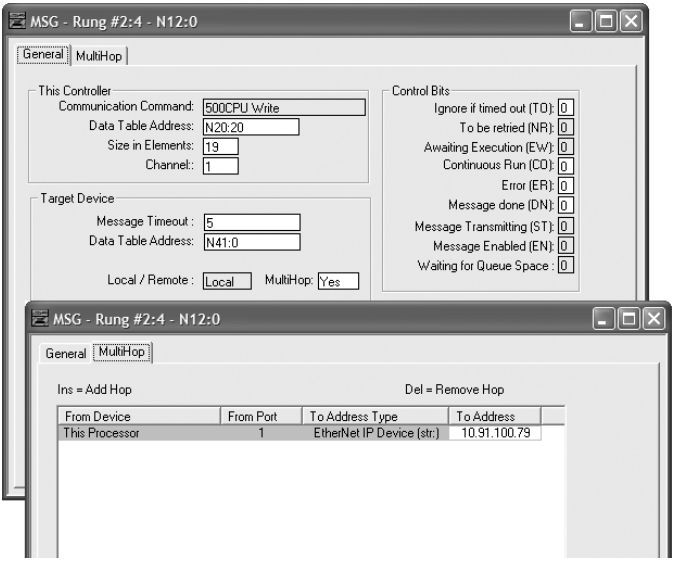
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.38).

Figure 4.37 SLC 500 Logic Command, Reference, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.38 SLC 500 Logic Command, Reference, and Datalink In Message Configuration Screens



General Tab Box	Setting
This Controller	
Communication Command	This setting is unavailable (grayed out) and is established when the message is created in the ladder rung.
Data Table Address	**N20:20**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements (1)	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Channel	**1**. Controller port to which the EtherNet/IP network is connected.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N41:0**. Specific starting address of the destination file in the drive.
MultiHop	**Yes**. Enables communication to allow Ethernet messaging to be routed to the adapter/drive. When "Yes" is selected, a MultiHop tab appears on the message configuration screen.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

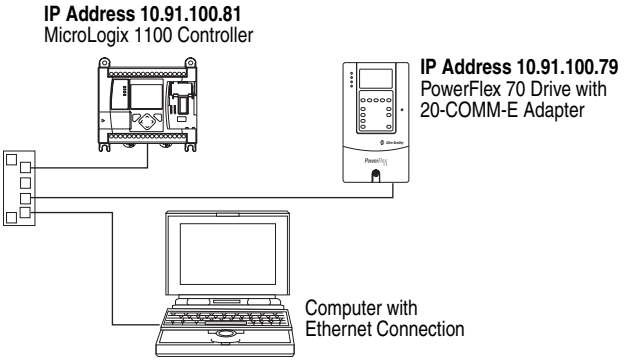
TIP: If the controller is controlling more than one drive, it is recommended to intersperse the control I/O messaging for each drive to conserve network bandwidth and decrease response time.

MicroLogix 1100 Example

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple EtherNet/IP network (see Figure 4.39). In our example, we will configure a MicroLogix 1100 controller to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.39 MicroLogix 1100 Example EtherNet/IP Network



Configuring Parameters for Network I/O

Since the I/O for the drive is message-based, there is no need to configure any I/O inside the RSLogix 500 (v7 or higher) project until using the I/O as described in Chapter 5.

However, to get the adapter to operate with the I/O created in Chapter 5, we need to configure the adapter to accept the I/O and drive to point to the appropriate Datalinks.

1. Set the following adapter I/O parameters to these values for this example:

Adapter Parameter No.	Setting
23 - [DPI I/O Cfg]	xxxx xxxx xxx0 0011
35 - [M-S Input]	xxxx xxxx xxx0 0011
36 - [M-S Output]	xxxx xxxx xxx0 0011

2. Reset the adapter or power cycle the drive.

3. Set the following PowerFlex 70 EC drive I/O parameters to these values for this example:

Drive Parameter No.	Setting
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
310 - [Data Out A1]	003 (Output Current) (1)
311 - [Data Out A2]	003 (Output Current) (1)

(1) Parameter 003 - [Output Current] is a 32-bit parameter. Since the PowerFlex 70 EC drive uses 16-bit Datalinks, two contiguous Datalinks (Data Out A1/A2) are required for this drive. For drives with 32-bit Datalinks, only one Datalink is required.

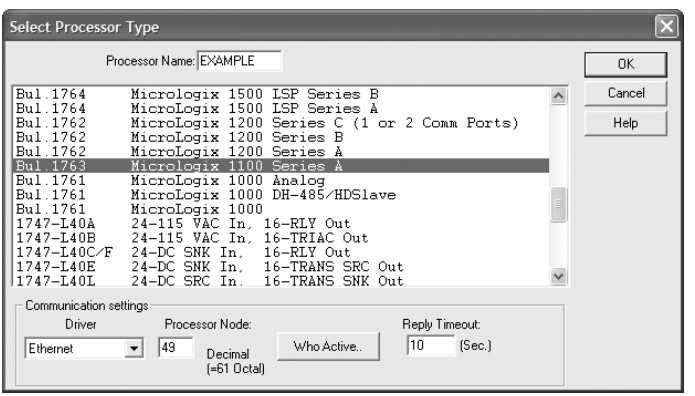
Creating RSLogix 500 (v7 or higher) Project

To transmit (read and write) data between the controller and drive, you must create message instructions that allocate data table addresses in the controller for Logic Command/Status, Reference/Feedback, and Datalinks.

Selecting the Controller

1. Start RSLogix 500. The RSLogix 500 window appears. Select **File > New** to display the Select Processor Type screen (Figure 4.40).

Figure 4.40 MicroLogix 1100 Select Processor Type Screen



2. Assign a name for the processor. In the list, select the MicroLogix 1100. Then select the appropriate choices for the fields in the screen to match your application, and click **OK**. The RSLogix 500 project window appears.

Creating the Control Timeout Logic

1. In the RSLogix 500 project window treeview under Program Files double-click on LAD 2.

2. Insert a ladder rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG10:n), and
   n is an unused element of the data file chosen for xx (for example, MG10:0)

   Then press **Enter**.

3. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

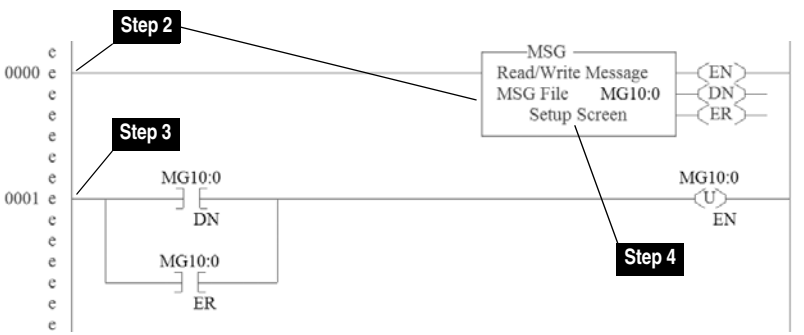
   xx and n must correspond to the assigned data file number and element (for example, MG10:0) for the message created in Step 2.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

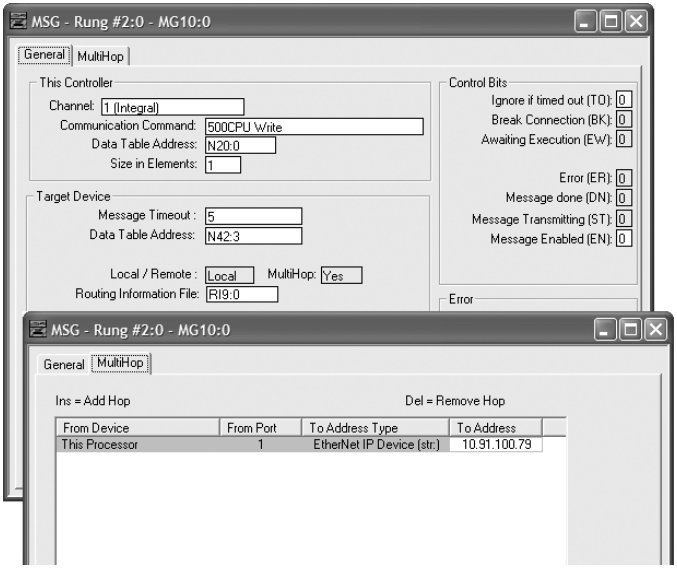
4. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.42).

Figure 4.41 MicroLogix 1100 Control Timeout Ladder Logic



5. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.42 MicroLogix 1100 Control Timeout Message Configuration Screens



General Tab Box	Setting
This Controller (data for MicroLogix 1100)	
Channel	**1 (integral)**. Controller port to which the EtherNet/IP network is connected.
Communication Command	**500CPU Write**. The controller type and command type for the controller to read or write data. Since the MicroLogix 1100 is part of the SLC-500 controller family, the “500CPU” controller type was selected. The “Write” command type was selected to write the control timeout value to the drive.
Data Table Address	**N20:0**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements (1)	**1**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N42:3**. Specific starting address of the destination file in the drive.
Routing Information File	**RI9:0**. An unused routing information file for the controller.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Status, Feedback, and Datalink Out Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG11:n), and
   n is an unused element of the data file chosen for xx (for example, MG11:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

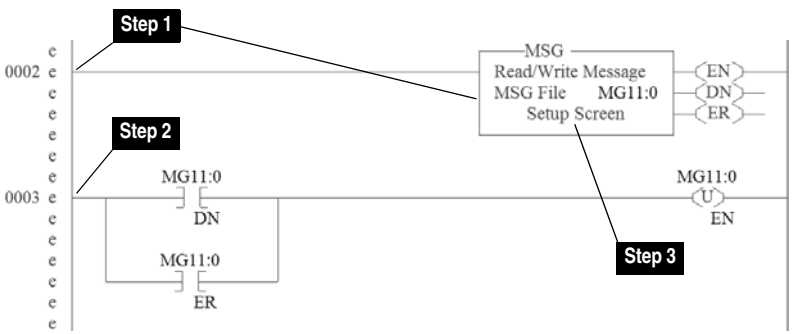
   xx and n must correspond to the assigned data file number and element (for example, MG11:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

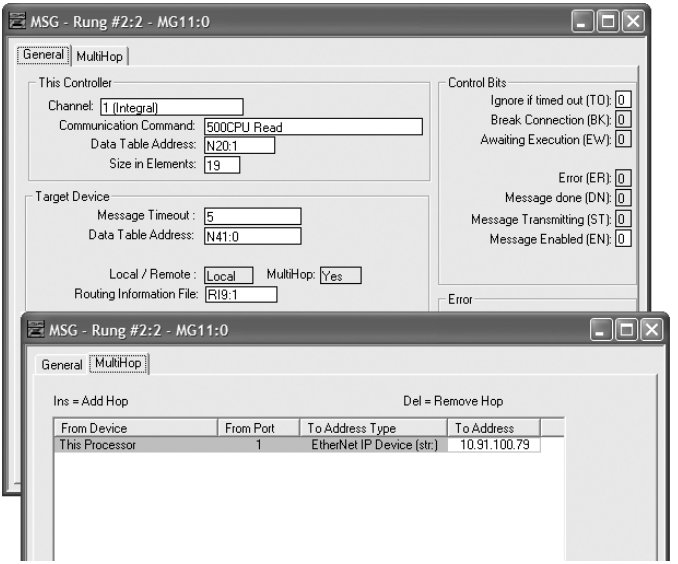
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.44).

Figure 4.43 MicroLogix 1100 Logic Status, Feedback, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.44 MicroLogix 1100 Logic Status, Feedback, and Datalink Out Message Configuration Screens



General Tab Box	Setting
This Controller (data for MicroLogix 1100)	
Channel	**1 (integral)**. Controller port to which the EtherNet/IP network is connected.
Communication Command	**500CPU Read**. The controller type and command type for the controller to read or write data. Since the MicroLogix 1100 is part of the SLC-500 controller family, the “500CPU” controller type was selected. The “Read” command type was selected to read data from the drive.
Data Table Address	**N20:1**. An unused controller data table address containing the message instruction. Since the command type is a Read, this address is the starting word of the destination file.
Size in Elements (1)	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N41:0**. Specific starting address of the source file in the drive.
Routing Information File	**RI9:1**. An unused routing information file for the controller.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

Creating the Logic Command, Reference, and Datalink In Logic

1. Insert another separate rung, double-click on the rung to display the rung editor, and enter **MSG MGxx:n**, where:

   xx is an unused data file number (for example, MG12:n), and
   n is an unused element of the data file chosen for xx (for example, MG12:0)

   Then press **Enter**.

2. Insert another separate rung, double-click on the rung to display the rung editor, and enter **BST XIC MGxx:n/DN NXB XIC MGxx:n/ER BND OTU MGxx:n/EN**, where:

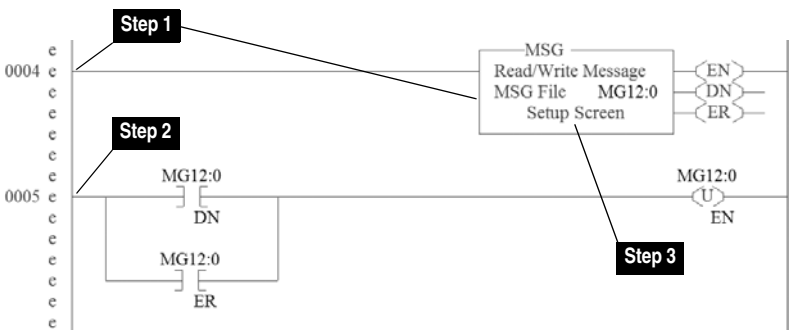
   xx and n must correspond to the assigned data file number and element (for example, MG12:0) for the message created in Step 1.

   Important: The information must be entered with appropriate numbers for "xx" and "n" for your application, and with spaces and forward slashes exactly as shown.

   Then press **Enter**.

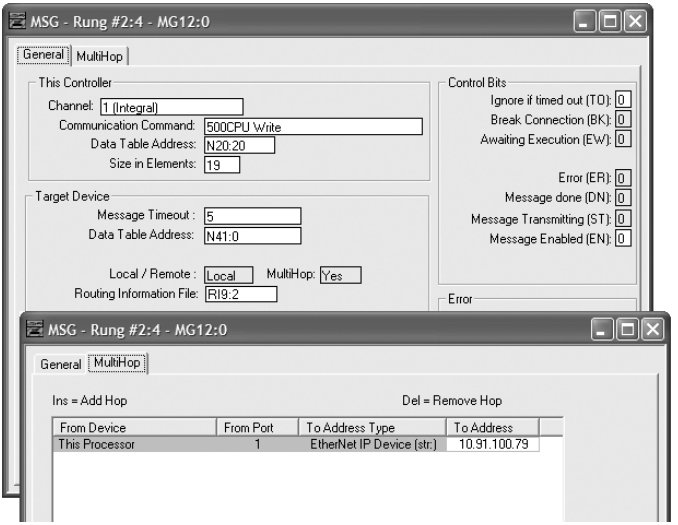
3. In the MSG instruction, double-click on Setup Screen to launch the message configuration screen (Figure 4.46).

Figure 4.45 MicroLogix 1100 Logic Command, Reference, and Datalink Out Ladder Logic



4. Configure the General tab by entering or verifying the information shown in the screen.

Figure 4.46 MicroLogix 1100 Logic Command, Reference, and Datalink In Message Configuration Screens



General Tab Box	Setting
This Controller (data for MicroLogix 1100)	
Channel	**1 (integral)**. Controller port to which the EtherNet/IP network is connected.
Communication Command	**500CPU Write**. The controller type and command type for the controller to read or write data. Since the MicroLogix 1100 is part of the SLC-500 controller family, the “500CPU” controller type was selected. The “Write” command type was selected to write data to the drive.
Data Table Address	**N20:20**. An unused controller data table address containing the message instruction. Since the command type is a Write, this address is the starting word of the source file.
Size in Elements (1)	**19**. Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Target Device (data for adapter/drive)	
Message Timeout	**5**. Message timeout duration in seconds.
Data Table Address	**N41:0**. Specific starting address of the destination file in the drive.
Routing Information File	**RI9:2**. An unused routing information file for the controller.
MultiHop Tab Box	**Setting**
To Address	**10.91.100.79.** The IP address of the adapter connected to the drive.

(1) For details to determine element size for a specific drive, refer to Understanding Controller Data Table Addresses on page 5-17.

TIP: If the controller is controlling more than one drive, it is recommended to intersperse the control I/O messaging for each drive to conserve network bandwidth and decrease response time.

Notes:

Using the I/O

This chapter provides information and examples that explain how to use the I/O to control, configure, and monitor a PowerFlex 7-Class 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.

About I/O Messaging

On EtherNet/IP, I/O messaging is used to transfer the data which controls the PowerFlex drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in PowerFlex 7-Class drives.

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

- Configuring the size of I/O by enabling or disabling the Logic Command/Reference and Datalinks.
- Setting a Master-Slave hierarchy or a Peer-to-Peer hierarchy.

Chapter 3, Configuring the Adapter, and Chapter 4, Configuring the I/O, discuss how to configure the adapter and controller 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 controller.

Understanding the I/O Image

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

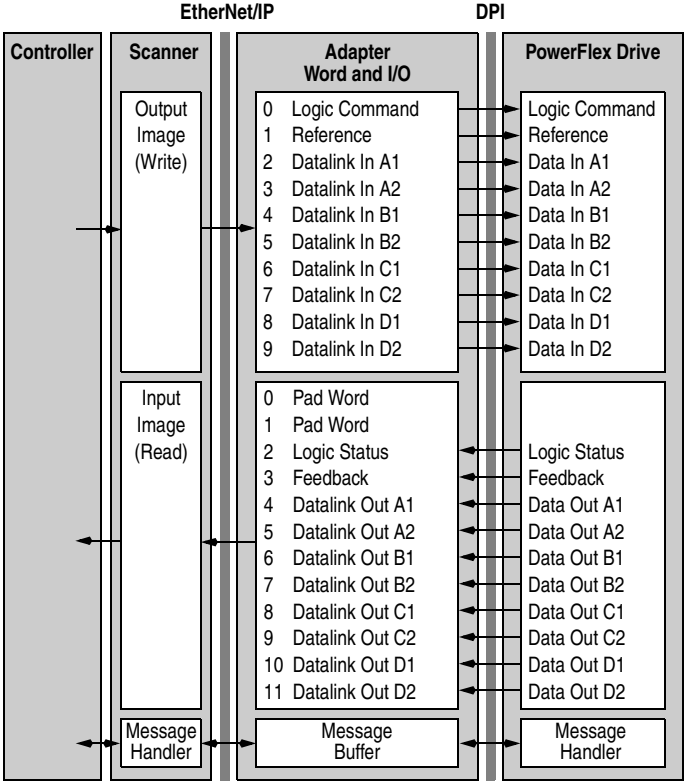
- Size (either 16-bit or 32-bit) of the Reference/Feedback words and Datalink words used by the drive.
- Configuration of I/O (**Parameter 23 - [DPI I/O Cfg]**). If all I/O is not enabled, the image is truncated. The image always uses consecutive words starting at word 0.
- **ControlLogix Controllers only** — Specific drive profile used in RSLogix 5000 (Integrated Drive Profile in v16 or higher, Classic Profile in v13-v15, or Generic Profile in all versions of RSLogix 5000).

ControlLogix Controller Image

Since the Integrated Drive Profile in RSLogix 5000 (v16 or higher) and the Classic Profile (v13-v15) provide descriptive controller tags, the I/O image (tag size and location) is automatically configured based on the drive being used.

When using the Generic Profile in RSLogix 5000, however, controller tags are not descriptive or defined. Therefore, Figure 5.1 and its associated tables are provided to better understand the I/O image when using various combinations of 16-bit and 32-bit Reference/Feedback and Datalinks.

Figure 5.1 ControlLogix I/O Image Example with All I/O (16-bit) Enabled – Generic Profile (RSLogix 5000 all versions)



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

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

Word	Input I/O
0 - 1	Pad Word
2	Logic Status
3	Pad Word
4 - 5	Feedback
6 - 9	Datalink Out A1/A2
10 - 13	Datalink Out B1/B2
14 - 17	Datalink Out C1/C2
18 - 21	Datalink Out D1/D2

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

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

Word	Input I/O
0 - 1	Pad Word
2	Logic Status
3	Pad Word
4	Feedback
5	Pad Word
6 - 9	Datalink Out A1/A2
10 - 13	Datalink Out B1/B2
14 - 17	Datalink Out C1/C2
18 - 21	Datalink Out D1/D2

An image for a drive that uses a 32-bit Reference/Feedback and has only its 32-bit Datalink B enabled would change the I/O image in Figure 5.1 as follows:

Word	Output I/O
0	Logic Command
1	Pad Word
2 - 3	Reference
4 - 5	Datalink In B1
6 - 7	Datalink In B2

Word	Input I/O
0 - 1	Pad Word
2	Logic Status
3	Pad Word
4 - 5	Feedback
6 - 7	Datalink Out B1
8 - 9	Datalink Out B2

PLC-5, SLC 500, and MicroLogix 1100 Controller Image

The I/O image for these controllers always has 19 words of output and 19 words of input. However, depending on the size of the drive's Reference/Feedback and Datalinks, specific words in the I/O image are not used.

An I/O image for a drive with all its I/O and Datalinks enabled, and using a 16-bit Reference/Feedback and 16-bit Datalinks, would be as follows:

Word	Output I/O
0	Logic Command
1	Not used
2	Reference (MSW)
3	Not used
4	Datalink In A1 (MSW)
5	Not used
6	Datalink In A2 (MSW)
7	Not used
8	Datalink In B1 (MSW)
9	Not used

Word	Input I/O
0	Logic Status
1	Not used
2	Feedback (MSW)
3	Not used
4	Datalink Out A1 (MSW)
5	Not used
6	Datalink Out A2 (MSW)
7	Not used
8	Datalink Out B1 (MSW)
9	Not used

Word	Output I/O
10	Datalink In B2 (MSW)
11	Not used
12	Datalink In C1 (MSW)
13	Not used
14	Datalink In C2 (MSW)
15	Not used
16	Datalink In D1 (MSW)
17	Not used
18	Datalink In D2 (MSW)

Word	Input I/O
10	Datalink Out B2 (MSW)
11	Not used
12	Datalink Out C1 (MSW)
13	Not used
14	Datalink Out C2 (MSW)
15	Not used
16	Datalink Out D1 (MSW)
17	Not used
18	Datalink Out D2 (MSW)

An I/O image for a drive with all its I/O and Datalinks enabled, and using a 32-bit Reference/Feedback and 32-bit Datalinks, would be as follows:

Word	Output I/O
0	Logic Command
1	Reference (LSW)
2	Reference (MSW)
3	Datalink In A1 (LSW)
4	Datalink In A1 (MSW)
5	Datalink In A2 (LSW)
6	Datalink In A2 (MSW)
7	Datalink In B1 (LSW)
8	Datalink In B1 (MSW)
9	Datalink In B2 (LSW)
10	Datalink In B2 (MSW)
11	Datalink In C1 (LSW)
12	Datalink In C1 (MSW)
13	Datalink In C2 (LSW)
14	Datalink In C2 (MSW)
15	Datalink In D1 (LSW)
16	Datalink In D1 (MSW)
17	Datalink In D2 (LSW)
18	Datalink In D2 (MSW)

Word	Input I/O
0	Logic Status
1	Feedback (LSW)
2	Feedback (MSW)
3	Datalink Out A1 (LSW)
4	Datalink Out A1 (MSW)
5	Datalink Out A2 (LSW)
6	Datalink Out A2 (MSW)
7	Datalink Out B1 (LSW)
8	Datalink Out B1 (MSW)
9	Datalink Out B2 (LSW)
10	Datalink Out B2 (MSW)
11	Datalink Out C1 (LSW)
12	Datalink Out C1 (MSW)
13	Datalink Out C2 (LSW)
14	Datalink Out C2 (MSW)
15	Datalink Out D1 (LSW)
16	Datalink Out D1 (MSW)
17	Datalink Out D2 (LSW)
18	Datalink Out D2 (MSW)

An I/O image for a drive with all its I/O and Datalinks enabled, and using a 16-bit Reference/Feedback and 32-bit Datalinks, would be as follows:

Word	Output I/O
0	Logic Command
1	Not used
2	Reference (MSW)
3	Datalink In A1 (LSW)
4	Datalink In A1 (MSW)
5	Datalink In A2 (LSW)
6	Datalink In A2 (MSW)
7	Datalink In B1 (LSW)
8	Datalink In B1 (MSW)

Word	Input I/O
0	Logic Status
1	Not used
2	Feedback (MSW)
3	Datalink Out A1 (LSW)
4	Datalink Out A1 (MSW)
5	Datalink Out A2 (LSW)
6	Datalink Out A2 (MSW)
7	Datalink Out B1 (LSW)
8	Datalink Out B1 (MSW)

Word	Output I/O
9	Datalink In B2 (LSW)
10	Datalink In B2 (MSW)
11	Datalink In C1 (LSW)
12	Datalink In C1 (MSW)
13	Datalink In C2 (LSW)
14	Datalink In C2 (MSW)
15	Datalink In D1 (LSW)
16	Datalink In D1 (MSW)
17	Datalink In D2 (LSW)
18	Datalink In D2 (MSW)

Word	Input I/O
9	Datalink Out B2 (LSW)
10	Datalink Out B2 (MSW)
11	Datalink Out C1 (LSW)
12	Datalink Out C1 (MSW)
13	Datalink Out C2 (LSW)
14	Datalink Out C2 (MSW)
15	Datalink Out D1 (LSW)
16	Datalink Out D1 (MSW)
17	Datalink Out D2 (LSW)
18	Datalink Out D2 (MSW)

Using Logic Command/Status

When enabled, the Logic Command/Status word is always word 0 in the output image and word 0 in the input image — except when using a ControlLogix controller with a Generic Profile. In this case, the Logic Command word remains word 0 in the output image, but the Logic Status word changes to 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 Reference/Feedback are enabled and a ControlLogix controller with an Integrated Drive Profile or Classic Profile is used, specific controller tags are automatically created, sized (16-bit or 32-bit), and placed in the I/O image.

When using a ControlLogix controller with a Generic Profile and a drive with a 16-bit Reference/Feedback, the Reference is word 1 in the I/O image and the Feedback is word 3. For a drive with a 32-bit Reference/ Feedback, the Reference begins at word 2 in the I/O image and the Feedback begins at word 4.

When using a PLC-5, SLC 500 or MicroLogix 1100 controller and a drive that uses a 32-bit Reference/Feedback, the Reference/Feedback are

words 1 (least significant word) and 2 (most significant word). When the drive uses a 16-bit Reference/Feedback, the Reference/Feedback is word 2 (most significant word) only.

The *Reference* is produced by the controller and consumed by the adapter. The *Feedback* is produced by the adapter and consumed by the controller. The size of the Reference/Feedback is determined by the drive and displayed using adapter **Parameter 18 - [Ref/Fdbk Size]**.

Size	Valid Values
16-bit	-32768 to 32767
32-bit	-2147483648 to 2147483647

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 drive 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 drive Parameter 82 - [Maximum Speed]. Table 5.A shows example References and their results on a PowerFlex 70/700 drive that has its Parameter 55 - [Maximum Freq] set to 130 Hz and Parameter 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 drive 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 drive Parameter 82 - [Maximum Speed] sets 60 Hz as the maximum speed.

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

TIP: For PowerFlex 70 EC drives (firmware v2.xxx or higher) or PowerFlex 700 VC drives (firmware v3.xxx or higher), Parameter 298 - [DPI Ref Select] enables you to scale Reference/Feedback values in its full Maximum Speed (parameter 082) resolution of 0-32767 instead of its default Maximum Freq (parameter 055) resolution of 0-15123.

For Reference/Feedback details about other DPI drives, 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 drive 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. Adapter **Parameter 19 - [Datalink Size]** indicates 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

This subsection only pertains to PowerFlex 70 (SC or EC), PowerFlex 700 (SC), and PowerFlex 700H drives which use 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 10 - [Elapsed Run Time] in a PowerFlex 70 drive, both Datalink A1 Out and Datalink A2 Out are set to “10.” Datalink A1 Out will contain the least significant word (LSW) and Datalink A2 Out will contain the most significant word (MSW).

32-bit data is stored in binary as follows:

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

In this example, the Parameter 10 - [Elapsed Run Time] value of 6553.9 Hrs is read as “6553.9” in Datalink A1 Out and Datalink A2 Out.

Datalink	Word	Parameter	Data (Hex)
A1 Out	LSW	10	0003
A2 Out	MSW	10	0001

Conversion Example:

Parameter 010 - [Elapsed Run Time] = 6553.9 Hrs
MSW = 0001_{hex} = 0001_{binary} = 2^{16} = 65536
LSW = 0003_{hex} =3
Engineering Value = 65536 + 3 = 65539
Parameter 10 Displayed Value = 6553.9 Hrs

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

Datalink	Word	Parameter	Data (Hex)
A2 Out	MSW	242	000D
B1 Out	LSW	242	7F3D

Conversion Example:

Parameter 242 - [Power Up Marker] = 88.4541 hours
MSW = $000D_{hex}$ = 1101_{binary} = $2^{19} + 2^{18} + 2^{16}$ = 851968
LSW = $7F3D_{hex}$ = 32573
Engineering Value = 851968 + 32573 = 884541
Parameter 242 Displayed Value = 88.4541 Hrs

Example Ladder Logic Program Information

The example ladder logic programs in the sections of this chapter are intended for and operate PowerFlex 7-Class drives.

Functions of the Example Programs

The example programs enable you to:

- Receive Logic Status information from the drive.
- Send a 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.

Logic Command/Status Words

These examples use the Logic Command word and Logic Status word for PowerFlex 70 drives. Refer to Appendix D, Logic Command/Status Words to view details. The definition of the bits in these words may vary if you are using a different DPI drive. Refer to the documentation for your drive.

ControlLogix Example

Creating Ladder Logic Using the RSLogix 5000 Integrated Drive Profiles (v16 or higher)

Since the Integrated Drive Profile automatically created descriptive controller tags (Figure 4.12) for the entire I/O image in Chapter 4, you can use these tags to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (PanelView, etc.) to operate the drive and view its status, you will need to create descriptive user-defined Program tags (Figure 5.2) and a ladder logic program that will pass the Controller tag data to the Program tags.

Figure 5.2 ControlLogix Program Tags for Integrated Drive Profile Ladder Logic Program Example

Name	Style	Data Type
Command_Clear_Faults	Decimal	BOOL
Command_Forward_Reverse	Decimal	BOOL
Command_Jog	Decimal	BOOL
Command_Start	Decimal	BOOL
Command_Stop	Decimal	BOOL
⊞ Speed_Feedback	Decimal	DINT
⊞ Speed_Reference	Decimal	DINT
Status_Active	Decimal	BOOL
Status_At_Speed	Decimal	BOOL
Status_Faulted	Decimal	BOOL
Status_Forward	Decimal	BOOL
Status_Ready	Decimal	BOOL
Status_Reverse	Decimal	BOOL

An example ladder logic program that uses the automatically created descriptive Controller tags and passes their data to the user-defined Program tags is shown in Figure 5.3 and Figure 5.4. Note that the prefix for the drive Controller tags is determined by the name assigned when configuring the I/O (Chapter 4).

Figure 5.3 Example ControlLogix Ladder Logic Program Using Integrated Drive Profiles for Logic Status/Feedback

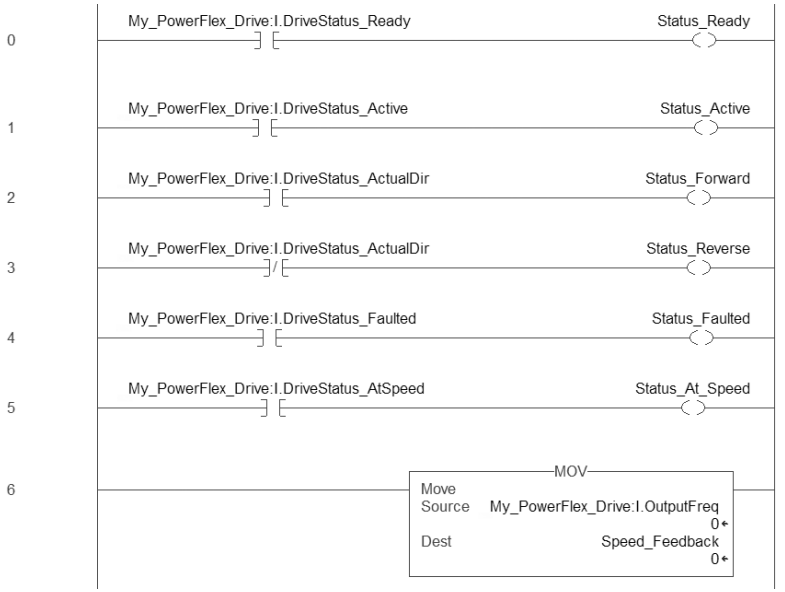
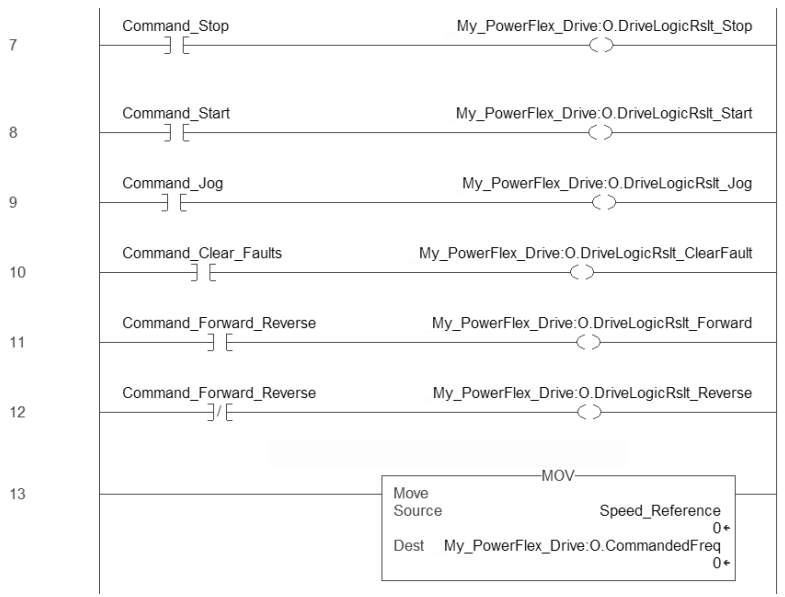


Figure 5.4 Example ControlLogix Ladder Logic Program Using Integrated Drive Profiles for Logic Command/Reference



Creating Ladder Logic Using the RSLogix 5000 Classic Profile (v13-v15)

Since the RSLogix 5000 Classic Profile has been significantly improved upon by RSLogix 5000 Integrated Drive Profiles (v16 or higher), it is highly recommended to use RSLogix 5000 Integrated Drive Profiles to take advantage of its benefits (more intuitive, time saving, and less likely to make ladder logic program errors).

Creating Ladder Logic Using the RSLogix 5000 Generic Profile (all versions)

Drive and Adapter Parameter Settings

These drive and adapter settings were used for the following example ladder logic program.

Device	Parameter	Name	Value	Description
PowerFlex 70 EC 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	10.91.100.79	IP Address for the adapter
	08 – 11	Subnet Cfg 1 – 4	255.255.248.0	Subnet mask 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.

Controller Tags

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

Figure 5.5 ControlLogix Controller Tags for Generic Drive Profile Example Ladder Logic Program

Name	Data Type	Description
⊞ My_PowerFlex_Drive:C	AB:ETHER...	
⊞ My_PowerFlex_Drive:I	AB:ETHER...	
⊞ My_PowerFlex_Drive: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 5.6). The Input tag for this example requires twelve 16-bit words of data (see Figure 5.7).

Figure 5.6 Output Image for ControlLogix Generic Drive Profile Example Ladder Logic Program

Name	Data Type	Description
⊟ My_PowerFlex_Drive:O	AB:ETHER...	
⊟ My_PowerFlex_Drive:O.Data	INT[10]	Output Image
⊞ My_PowerFlex_Drive:O.Data[0]	INT	Logic Command
⊞ My_PowerFlex_Drive:O.Data[1]	INT	Speed Reference
⊞ My_PowerFlex_Drive:O.Data[2]	INT	Datalink In A1
⊞ My_PowerFlex_Drive:O.Data[3]	INT	Datalink In A2
⊞ My_PowerFlex_Drive:O.Data[4]	INT	Datalink In B1
⊞ My_PowerFlex_Drive:O.Data[5]	INT	Datalink In B2
⊞ My_PowerFlex_Drive:O.Data[6]	INT	Datalink In C1
⊞ My_PowerFlex_Drive:O.Data[7]	INT	Datalink In C2
⊞ My_PowerFlex_Drive:O.Data[8]	INT	Datalink In D1
⊞ My_PowerFlex_Drive:O.Data[9]	INT	Datalink In D2

Figure 5.7 Input Image for ControlLogix Generic Drive Profile Example Ladder Logic Program

Name	Data Type	Description
⊟ My_PowerFlex_Drive:I	AB:ETHER...	
⊟ My_PowerFlex_Drive:I.Data	INT[12]	Input Image
⊞ My_PowerFlex_Drive:I.Data[0]	INT	Logic Status
⊞ My_PowerFlex_Drive:I.Data[1]	INT	Speed Feedback
⊞ My_PowerFlex_Drive:I.Data[2]	INT	Pad Word
⊞ My_PowerFlex_Drive:I.Data[3]	INT	Pad Word
⊞ My_PowerFlex_Drive:I.Data[4]	INT	Datalink Out A1
⊞ My_PowerFlex_Drive:I.Data[5]	INT	Datalink Out A2
⊞ My_PowerFlex_Drive:I.Data[6]	INT	Datalink Out B1
⊞ My_PowerFlex_Drive:I.Data[7]	INT	Datalink Out B2
⊞ My_PowerFlex_Drive:I.Data[8]	INT	Datalink Out C1
⊞ My_PowerFlex_Drive:I.Data[9]	INT	Datalink Out C2
⊞ My_PowerFlex_Drive:I.Data[10]	INT	Datalink Out D1
⊞ My_PowerFlex_Drive:I.Data[11]	INT	Datalink Out D2

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 5.8 ControlLogix Program Tags for Generic Drive Profile Example Ladder Logic Program

Name	Style	Data Type
Command_Clear_Faults	Decimal	BOOL
Command_Forward_Reverse	Decimal	BOOL
Command_Jog	Decimal	BOOL
Command_Start	Decimal	BOOL
Command_Stop	Decimal	BOOL
⊞ Speed_Feedback	Decimal	DINT
⊞ Speed_Reference	Decimal	DINT
Status_Active	Decimal	BOOL
Status_At_Speed	Decimal	BOOL
Status_Faulted	Decimal	BOOL
Status_Forward	Decimal	BOOL
Status_Ready	Decimal	BOOL
Status_Reverse	Decimal	BOOL

Figure 5.9 Example ControlLogix Ladder Logic Program Using Generic Drive Profiles for Logic Status/Feedback

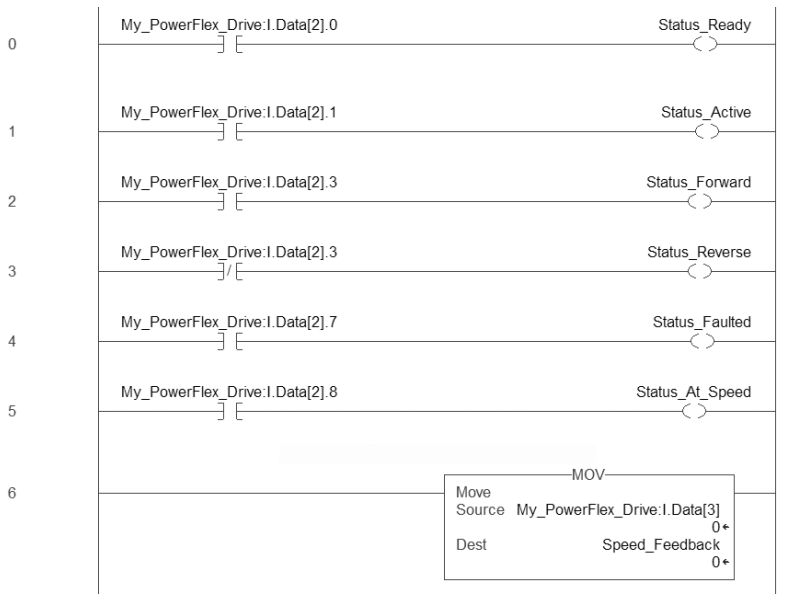
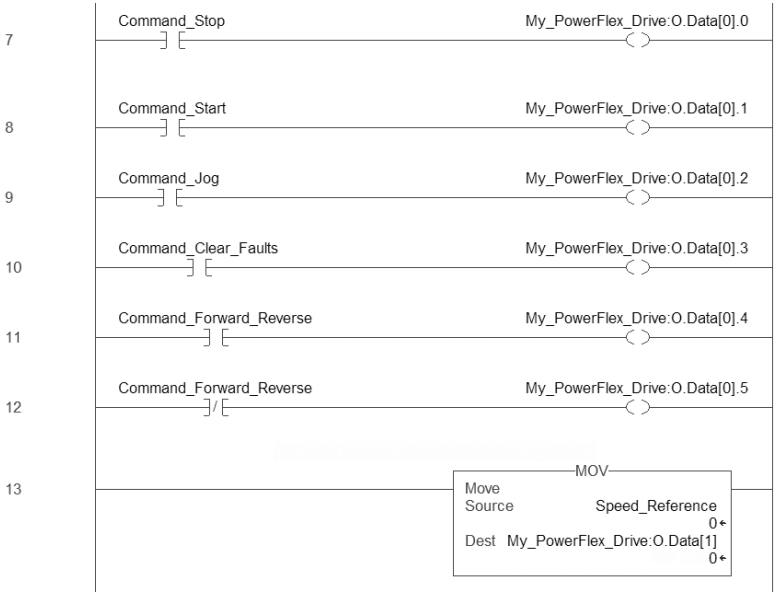


Figure 5.10 Example ControlLogix Ladder Logic Program Using Generic Drive Profiles for Logic Command/Reference



Example Datalink Data

The Datalink data used in the example program is shown in Figure 5.11. Note that to describe the parameters to which the Datalinks are assigned, you may want to add descriptions to the automatically-created generic controller tags or create User Defined Data Types (UDDT).

Figure 5.11 Example Datalinks for ControlLogix Ladder Logic Program Using Generic Drive Profile

Name	Value	Data Type	Description
My_PowerFlex_Drive:I	{...}	AB:ETHER...	
My_PowerFlex_Drive:I.Data	{...}	INT[12]	Input Image
My_PowerFlex_Drive:I.Data[0]	0	INT	Logic Status
My_PowerFlex_Drive:I.Data[1]	0	INT	Speed Feedback
My_PowerFlex_Drive:I.Data[2]	0	INT	Pad Word
My_PowerFlex_Drive:I.Data[3]	0	INT	Pad Word
My_PowerFlex_Drive:I.Data[4]	50	INT	Datalink Out A1
My_PowerFlex_Drive:I.Data[5]	50	INT	Datalink Out A2
My_PowerFlex_Drive:I.Data[6]	100	INT	Datalink Out B1
My_PowerFlex_Drive:I.Data[7]	1	INT	Datalink Out B2
My_PowerFlex_Drive:I.Data[8]	200	INT	Datalink Out C1
My_PowerFlex_Drive:I.Data[9]	300	INT	Datalink Out C2
My_PowerFlex_Drive:I.Data[10]	400	INT	Datalink Out D1
My_PowerFlex_Drive:I.Data[11]	500	INT	Datalink Out D2
My_PowerFlex_Drive:O	{...}	AB:ETHER...	
My_PowerFlex_Drive:O.Data	{...}	INT[10]	Output Image
My_PowerFlex_Drive:O.Data[0]	0	INT	Logic Command
My_PowerFlex_Drive:O.Data[1]	0	INT	Speed Reference
My_PowerFlex_Drive:O.Data[2]	50	INT	Datalink In A1
My_PowerFlex_Drive:O.Data[3]	50	INT	Datalink In A2
My_PowerFlex_Drive:O.Data[4]	100	INT	Datalink In B1
My_PowerFlex_Drive:O.Data[5]	1	INT	Datalink In B2
My_PowerFlex_Drive:O.Data[6]	200	INT	Datalink In C1
My_PowerFlex_Drive:O.Data[7]	300	INT	Datalink In C2
My_PowerFlex_Drive:O.Data[8]	400	INT	Datalink In D1
My_PowerFlex_Drive:O.Data[9]	500	INT	Datalink In D2

PLC-5, SLC 500, and MicroLogix 1100 Example

Drive and Adapter Parameter Settings

The following drive and adapter settings were used for the example ladder logic program in this section.

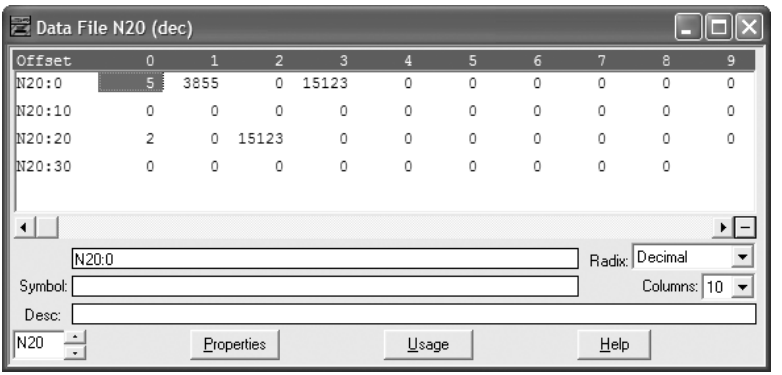
Device	Parameter	Name	Value	Description
PowerFlex 70 EC Drive	90	Speed Ref A Sel	22	'DPI Port 5' (20-COMM-E)
	300	Data In A1	140	Points to Par. 140 - [Accel Time 1]
	301	Data In A2	142	Points to Par. 142 - [Decel Time 1]
	302	Data In B1	100	Points to Par. 100 - [Jog Speed]
	303	Data In B2	155	Points 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	10.91.100.79	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.

Understanding Controller Data Table Addresses

Since PLC-5, SLC 500, and MicroLogix 1100 controllers are 16-bit platforms and are used with the 32-bit 20-COMM-E adapter, the data will be transposed from the least-significant word (LSW) to the most-significant word (MSW) in the controller.

When the I/O was configured (Chapter 4), an available data table address (N20:0) was used. Figure 5.12 shows the entire data file address structure for this example.

Figure 5.12 Data FIle Table for Example Ladder Logic Program



Important: The N20:0 data table address in this example is used to set a control timeout value (in seconds) which determines how long it will take the adapter to detect a communication loss. Enter a valid value between 1 - 32767 for N20:0. A value of zero (0) is not valid, since it disables the timeout and all I/O messages (Logic Command/Status, Reference/Feedback, and Datalinks) intended for the drive will not execute.

Depending on the drive you are using, Table 5.B, Table 5.C, Table 5.D, and Table 5.E show the I/O definitions as they relate to the N20:0 data table address (Figure 5.12) being used in this example.

When using PowerFlex 70 SC or 70 EC, PowerFlex 700 SC or PowerFlex 700H drives, which all contain INT (16-bit format) data types, you will read from and write to the MSW data table address in the controller.

When using PowerFlex 700 VC drives, which contain DINT (32-bit format) data types, you will read from and write to the LSW data table address in the controller.

When using PowerFlex 700S drives, which contain both DINT (32-bit format) and REAL (floating point format) data types, you will always read from and write to the LSW data table address in the controller first. Then if the data value exceeds 16 bits, the remaining value will be in the MSW data table address.

Table 5.B Controller Data Table Addresses for PowerFlex 70 SC/EC and PowerFlex 700 SC Drives

Data Table Address	Description
N20:1	Logic Status (see Appendix D)
N20:2	Reserved
N20:3	Speed Feedback
N20:4	Value of parameter assigned to Parameter 310 [Data Out A1] LSW
N20:5	Value of parameter assigned to Parameter 310 [Data Out A1] MSW
N20:6	Value of parameter assigned to Parameter 311 [Data Out A2] LSW
N20:7	Value of parameter assigned to Parameter 311 [Data Out A2] MSW
N20:8	Value of parameter assigned to Parameter 312 [Data Out B1] LSW
N20:9	Value of parameter assigned to Parameter 312 [Data Out B1] MSW
N20:10	Value of parameter assigned to Parameter 313 [Data Out B2] LSW
N20:11	Value of parameter assigned to Parameter 313 [Data Out B2] MSW
N20:12	Value of parameter assigned to Parameter 314 [Data Out C1] LSW
N20:13	Value of parameter assigned to Parameter 314 [Data Out C1] MSW
N20:14	Value of parameter assigned to Parameter 315 [Data Out C2] LSW
N20:15	Value of parameter assigned to Parameter 315 [Data Out C2] MSW
N20:16	Value of parameter assigned to Parameter 316 [Data Out D1] LSW
N20:17	Value of parameter assigned to Parameter 316 [Data Out D1] MSW
N20:18	Value of parameter assigned to Parameter 317 [Data Out D2] LSW
N20:19	Value of parameter assigned to Parameter 317 [Data Out D2] MSW
N20:20	Logic Command (see Appendix D)
N20:21	Reserved
N20:22	Speed Reference
N20:23	Value of parameter assigned to Parameter 300 [Data In A1] LSW
N20:24	Value of parameter assigned to Parameter 300 [Data In A1] MSW
N20:25	Value of parameter assigned to Parameter 301 [Data In A2] LSW
N20:26	Value of parameter assigned to Parameter 301 [Data In A2] MSW
N20:27	Value of parameter assigned to Parameter 302 [Data In B1] LSW
N20:28	Value of parameter assigned to Parameter 302 [Data In B1] MSW
N20:29	Value of parameter assigned to Parameter 303 [Data In B2] LSW
N20:30	Value of parameter assigned to Parameter 303 [Data In B2] MSW
N20:31	Value of parameter assigned to Parameter 304 [Data In C1] LSW
N20:32	Value of parameter assigned to Parameter 304 [Data In C1] MSW
N20:33	Value of parameter assigned to Parameter 305 [Data In C2] LSW
N20:34	Value of parameter assigned to Parameter 305 [Data In C2] MSW
N20:35	Value of parameter assigned to Parameter 306 [Data In D1] LSW
N20:36	Value of parameter assigned to Parameter 306 [Data In D1] MSW
N20:37	Value of parameter assigned to Parameter 307 [Data In D2] LSW
N20:38	Value of parameter assigned to Parameter 307 [Data In D2] MSW

Table 5.C Controller Data Table Addresses for PowerFlex 700 VC and PowerFlex 700H Drives

Data Table Address	Description
N20:1	Logic Status (see Appendix D)
N20:2	Reserved
N20:3	Speed Feedback
N20:4	Value of parameter assigned to Parameter 310 [Data Out A1] LSW
N20:5	Value of parameter assigned to Parameter 310 [Data Out A1] MSW
N20:6	Value of parameter assigned to Parameter 311 [Data Out A2] LSW
N20:7	Value of parameter assigned to Parameter 311 [Data Out A2] MSW
N20:8	Value of parameter assigned to Parameter 312 [Data Out B1] LSW
N20:9	Value of parameter assigned to Parameter 312 [Data Out B1] MSW
N20:10	Value of parameter assigned to Parameter 313 [Data Out B2] LSW
N20:11	Value of parameter assigned to Parameter 313 [Data Out B2] MSW
N20:12	Value of parameter assigned to Parameter 314 [Data Out C1] LSW
N20:13	Value of parameter assigned to Parameter 314 [Data Out C1] MSW
N20:14	Value of parameter assigned to Parameter 315 [Data Out C2] LSW
N20:15	Value of parameter assigned to Parameter 315 [Data Out C2] MSW
N20:16	Value of parameter assigned to Parameter 316 [Data Out D1] LSW
N20:17	Value of parameter assigned to Parameter 316 [Data Out D1] MSW
N20:18	Value of parameter assigned to Parameter 317 [Data Out D2] LSW
N20:19	Value of parameter assigned to Parameter 317 [Data Out D2] MSW
N20:20	Logic Command (see Appendix D)
N20:21	Reserved
N20:22	Speed Reference
N20:23	Value of parameter assigned to Parameter 300 [Data In A1] LSW
N20:24	Value of parameter assigned to Parameter 300 [Data In A1] MSW
N20:25	Value of parameter assigned to Parameter 301 [Data In A2] LSW
N20:26	Value of parameter assigned to Parameter 301 [Data In A2] MSW
N20:27	Value of parameter assigned to Parameter 302 [Data In B1] LSW
N20:28	Value of parameter assigned to Parameter 302 [Data In B1] MSW
N20:29	Value of parameter assigned to Parameter 303 [Data In B2] LSW
N20:30	Value of parameter assigned to Parameter 303 [Data In B2] MSW
N20:31	Value of parameter assigned to Parameter 304 [Data In C1] LSW
N20:32	Value of parameter assigned to Parameter 304 [Data In C1] MSW
N20:33	Value of parameter assigned to Parameter 305 [Data In C2] LSW
N20:34	Value of parameter assigned to Parameter 305 [Data In C2] MSW
N20:35	Value of parameter assigned to Parameter 306 [Data In D1] LSW
N20:36	Value of parameter assigned to Parameter 306 [Data In D1] MSW
N20:37	Value of parameter assigned to Parameter 307 [Data In D2] LSW
N20:38	Value of parameter assigned to Parameter 307 [Data In D2] MSW

Table 5.D Controller Data Table Addresses for PowerFlex 700S Drives – Phase I Control

Data Table Address	Description
N20:1	Logic Status (see Appendix D)
N20:2	Speed Feedback LSW
N20:3	Speed Feedback MSW
N20:4	Value of parameter assigned to Parameter 724/725 [Data Out A1] LSW
N20:5	Value of parameter assigned to Parameter 724/725 [Data Out A1] MSW
N20:6	Value of parameter assigned to Parameter 726/727 [Data Out A2] LSW
N20:7	Value of parameter assigned to Parameter 726/727 [Data Out A2] MSW
N20:8	Value of parameter assigned to Parameter 728/729 [Data Out B1] LSW
N20:9	Value of parameter assigned to Parameter 728/729 [Data Out B1] MSW
N20:10	Value of parameter assigned to Parameter 730/731 [Data Out B2] LSW
N20:11	Value of parameter assigned to Parameter 730/731 [Data Out B2] MSW
N20:12	Value of parameter assigned to Parameter 732/733 [Data Out C1] LSW
N20:13	Value of parameter assigned to Parameter 732/733 [Data Out C1] MSW
N20:14	Value of parameter assigned to Parameter 734/735 [Data Out C2] LSW
N20:15	Value of parameter assigned to Parameter 734/735 [Data Out C2] MSW
N20:16	Value of parameter assigned to Parameter 736/737 [Data Out D1] LSW
N20:17	Value of parameter assigned to Parameter 736/737 [Data Out D1] MSW
N20:18	Value of parameter assigned to Parameter 738/739 [Data Out D2] LSW
N20:19	Value of parameter assigned to Parameter 738/739 [Data Out D2] MSW
N20:20	Logic Command (see Appendix D)
N20:21	Speed Reference LSW
N20:22	Speed Reference MSW
N20:23	Value of parameter assigned to Parameter 707/708 [Data In A1] LSW
N20:24	Value of parameter assigned to Parameter 707/708 [Data In A1] MSW
N20:25	Value of parameter assigned to Parameter 709/710 [Data In A2] LSW
N20:26	Value of parameter assigned to Parameter 709/710 [Data In A2] MSW
N20:27	Value of parameter assigned to Parameter 711/712 [Data In B1] LSW
N20:28	Value of parameter assigned to Parameter 711/712 [Data In B1] MSW
N20:29	Value of parameter assigned to Parameter 713/714 [Data In B2] LSW
N20:30	Value of parameter assigned to Parameter 713/714 [Data In B2] MSW
N20:31	Value of parameter assigned to Parameter 715/716 [Data In C1] LSW
N20:32	Value of parameter assigned to Parameter 715/716 [Data In C1] MSW
N20:33	Value of parameter assigned to Parameter 717/718 [Data In C2] LSW
N20:34	Value of parameter assigned to Parameter 717/718 [Data In C2] MSW
N20:35	Value of parameter assigned to Parameter 719/720 [Data In D1] LSW
N20:36	Value of parameter assigned to Parameter 719/720 [Data In D1] MSW
N20:37	Value of parameter assigned to Parameter 721/722 [Data In D2] LSW
N20:38	Value of parameter assigned to Parameter 721/722 [Data In D2] MSW

Table 5.E Controller Data Table Addresses for PowerFlex 700S Drives – Phase II Control

Data Table Address	Description
N20:1	Logic Status (see Appendix D)
N20:2	Speed Feedback LSW
N20:3	Speed Feedback MSW
N20:4	Value of parameter assigned to Parameter 660 [DPI Data Out A1] LSW
N20:5	Value of parameter assigned to Parameter 660 [DPI Data Out A1] MSW
N20:6	Value of parameter assigned to Parameter 661 [DPI Data Out A2] LSW
N20:7	Value of parameter assigned to Parameter 661 [DPI Data Out A2] MSW
N20:8	Value of parameter assigned to Parameter 662 [DPI Data Out B1] LSW
N20:9	Value of parameter assigned to Parameter 662 [DPI Data Out B1] MSW
N20:10	Value of parameter assigned to Parameter 663 [DPI Data Out B2] LSW
N20:11	Value of parameter assigned to Parameter 663 [DPI Data Out B2] MSW
N20:12	Value of parameter assigned to Parameter 664 [DPI Data Out C1] LSW
N20:13	Value of parameter assigned to Parameter 664 [DPI Data Out C1] MSW
N20:14	Value of parameter assigned to Parameter 665 [DPI Data Out C2] LSW
N20:15	Value of parameter assigned to Parameter 665 [DPI Data Out C2] MSW
N20:16	Value of parameter assigned to Parameter 666 [DPI Data Out D1] LSW
N20:17	Value of parameter assigned to Parameter 666 [DPI Data Out D1] MSW
N20:18	Value of parameter assigned to Parameter 667 [DPI Data Out D2] LSW
N20:19	Value of parameter assigned to Parameter 667 [DPI Data Out D2] MSW
N20:20	Logic Command (see Appendix D)
N20:21	Speed Reference LSW
N20:22	Speed Reference MSW
N20:23	Value of parameter assigned to Parameter 651 [DPI Data In A1] LSW
N20:24	Value of parameter assigned to Parameter 651 [DPI Data In A1] MSW
N20:25	Value of parameter assigned to Parameter 652 [DPI Data In A2] LSW
N20:26	Value of parameter assigned to Parameter 652 [DPI Data In A2] MSW
N20:27	Value of parameter assigned to Parameter 653 [DPI Data In B1] LSW
N20:28	Value of parameter assigned to Parameter 653 [DPI Data In B1] MSW
N20:29	Value of parameter assigned to Parameter 654 [DPI Data In B2] LSW
N20:30	Value of parameter assigned to Parameter 654 [DPI Data In B2] MSW
N20:31	Value of parameter assigned to Parameter 655 [DPI Data In C1] LSW
N20:32	Value of parameter assigned to Parameter 655 [DPI Data In C1] MSW
N20:33	Value of parameter assigned to Parameter 656 [DPI Data In C2] LSW
N20:34	Value of parameter assigned to Parameter 656 [DPI Data In C2] MSW
N20:35	Value of parameter assigned to Parameter 657 [DPI Data In D1] LSW
N20:36	Value of parameter assigned to Parameter 657 [DPI Data In D1] MSW
N20:37	Value of parameter assigned to Parameter 658 [DPI Data In D2] LSW
N20:38	Value of parameter assigned to Parameter 658 [DPI Data In D2] MSW

You can use the controller data table addresses to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (PanelView, etc.) to operate the drive and view its status, you will need to create descriptive controller data table addresses (Table 5.F and Table 5.G) and a ladder logic program that will pass the controller address data to the program data table addresses.

Table 5.F Controller and Program Data Table Address Descriptions for Example Logic Status/Feedback Ladder Logic Program

Description	Controller Data Table Address	Description	Program Data Table Address
Drive Ready	N20:1/0	Status Ready	B3:1/0
Drive Active	N20:1/1	Status Active	B3:1/1
Actual Direction (XIO)	N20:1/3	Status Forward	B3:1/3
Actual Direction (XIC)	N20:1/3	Status Reverse	B3:1/4
Drive Faulted	N20:1/7	Status Faulted	B3:1/7
Drive At Speed	N20:1/8	Status At Speed	B3:1/8
Speed Feedback	N20:3	Speed Feedback	B30:3

Table 5.G Program and Controller Data Table Address Descriptions for Example Logic Command/Reference Ladder Logic Program

Description	Program Data Table Address	Description	Controller Data Table Address
Command Stop	B3:20/0	Drive Stop	N20:20/0
Command Start	B3:20/1	Drive Start	N20:20/1
Command Jog	B3:20/2	Drive Jog	N20:20/2
Command Clear Faults	B3:20/3	Drive Clear Faults	N20:20/3
Command Forward Reverse (XIO)	B3:20/4	Drive Forward	N20:20/4
Command Forward Reverse (XIC)	B3:20/4	Drive Reverse	N20:20/5
Speed Reference	N30:22	Speed Reference	N20:22

An example ladder logic program that uses these descriptive controller data table addresses and passes their data to the descriptive program data table addresses is shown in Figure 5.13 and Figure 5.14.

Figure 5.13 Example Ladder Logic Program for Logic Status/Feedback

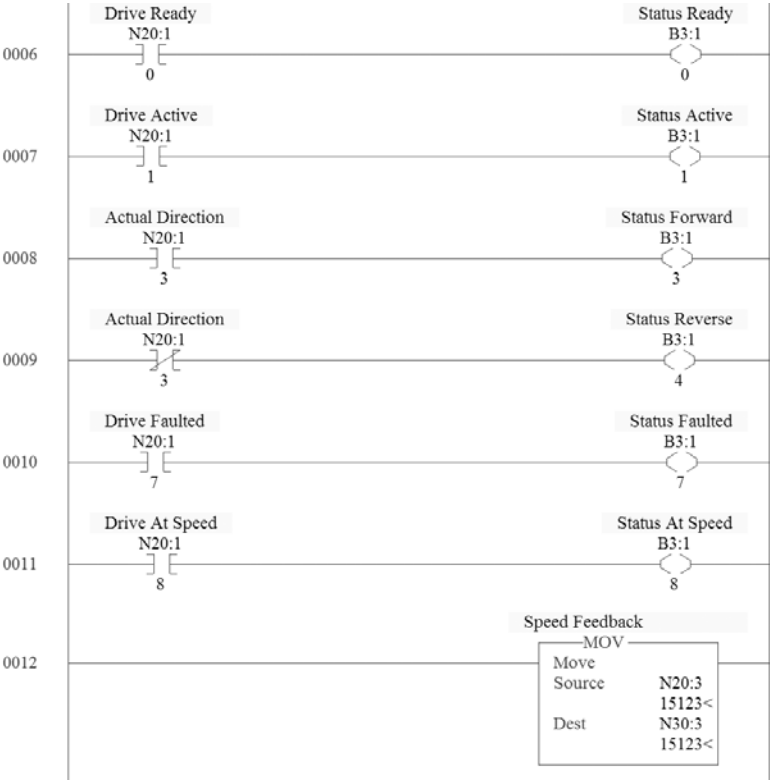
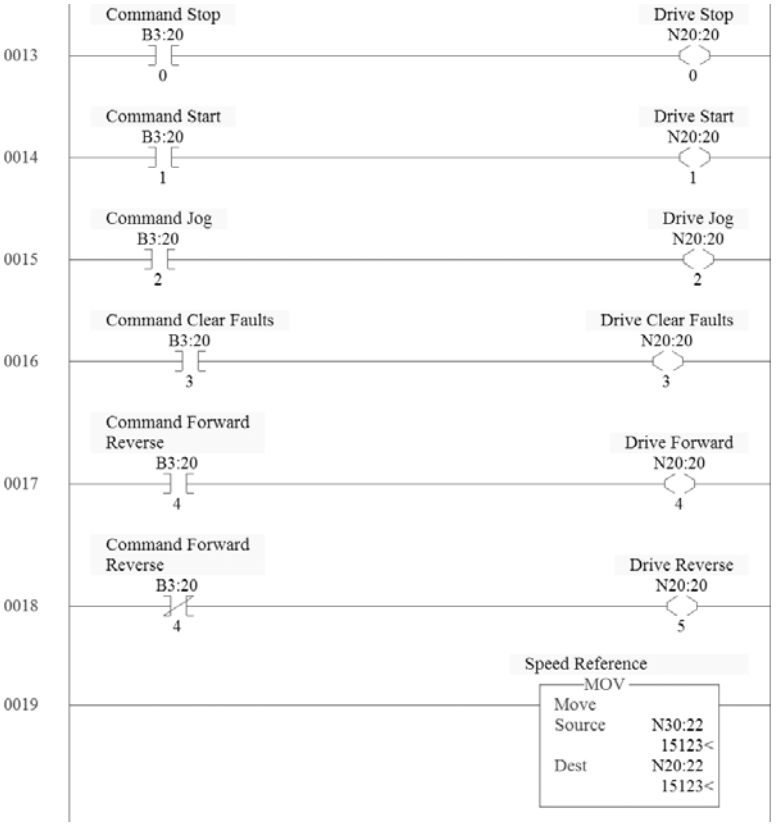


Figure 5.14 Example Ladder Logic Program for Logic Command/Reference



Notes:

Using Explicit Messaging

This chapter provides information and examples that explain how to use Explicit Messaging to configure and monitor the adapter and connected PowerFlex 7-Class 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.

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 network.

Important: When an explicit message is performed, by default no I/O connection is made since it is an "unconnected" message. When timing of the message transaction is important, you can create a dedicated message connection between the controller and drive by checking the "Connected" box on

the Communications tab message configuration screen during message setup. These message connections are in addition to the I/O connection. However, the trade off for more message connections is decreased network performance. If your application cannot tolerate this, do not check the “Connected” box.

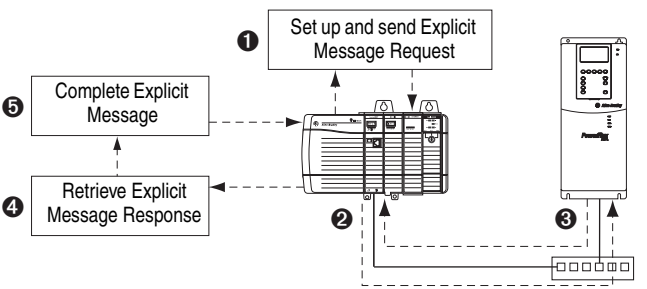
Up to 22 parameters can be read and/or written when using explicit messaging to perform multiple parameter reads and/or writes.

Performing Explicit Messages

There are five basic events in the Explicit Messaging process. The details of each step will vary depending on the type of controller being used. 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 6.1 Explicit Message Process



Event	Description
❶	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).
❷	The scanner or bridge module transmits the Explicit Message Request to the slave device over the network.
❸	The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.
❹	The controller retrieves the Explicit Message Response from the scanner’s buffer (upload).
❺	The Explicit Message is complete. **Note:** The scanner module may be integrated with the controller (for example, ControlLogix).

For information on the maximum number of Explicit Messages that can be executed at a time, refer to the user manual for the bridge or scanner and/or controller that is being used.

ControlLogix Example

TIP: To display the Message Configuration screen 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 ... button in the message instruction.

For supported classes, instances, and attributes, refer to Appendix C, EtherNet/IP Objects.

Explicit Messaging Using the RSLogix 5000 Integrated Drive Profiles (v16 or higher)

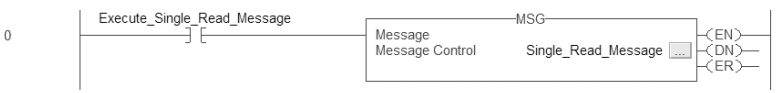
Example Ladder Logic Program to Read Single Parameter

A Parameter Read message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Table 6.A Example Controller Tags for Read Single Parameter Messaging Program

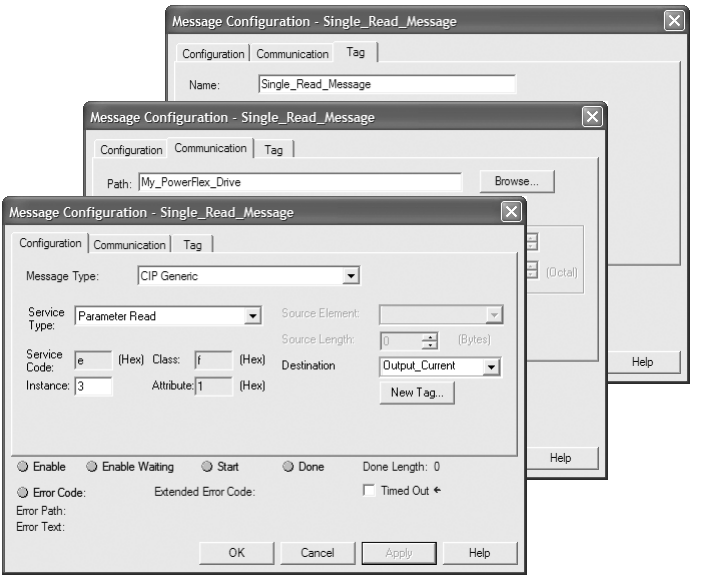
Controller Tags for Read Single Message	Type
Execute_Single_Read_Message	BOOL
Single_Read_Message	MESSAGE

Figure 6.2 Example Ladder Logic Explicit Messaging Program for Read Single



Formatting a Message to Read Single Parameter

Figure 6.3 Parameter Read SIngle Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Parameter Read	This service is used to read a parameter value.
Service Code (1)	e (Hex.)	Code for the requested service.
Class	f (Hex.)	Class ID for the DPI Parameter Object.
Instance	3 (Dec.)	Instance number is the same as parameter number.
Attribute	1 (Hex.)	Attribute number for the Parameter Value attribute.
Destination	Output_Current (3)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(3) In this example, Output Current is a 32-bit parameter and the Data Type field must be set to “DINT” when creating the controller tag. If the parameter being read is a 16-bit parameter, the tag Data Type field must be set to “INT.” Refer to the drive documentation to determine the size of the parameter.

Example Ladder Logic Program to Write Single Parameter

A Parameter Write message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

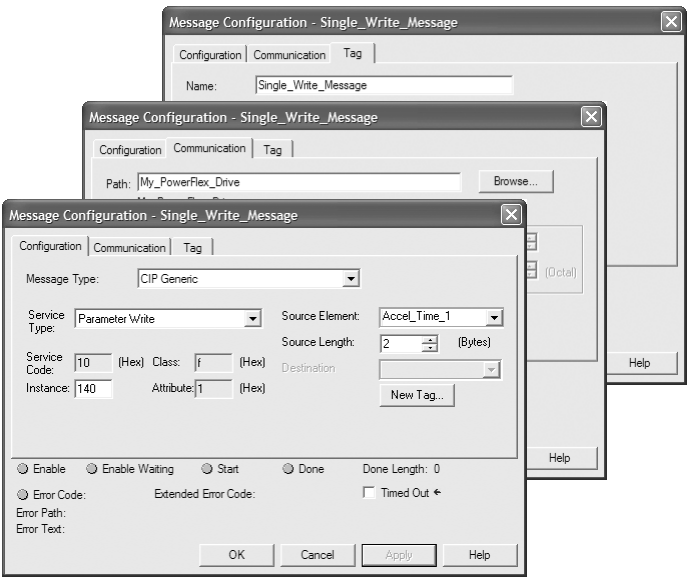
Table 6.B Example Controller Tags for Write Single Parameter Messaging Program

Controller Tags for Write Single Message	Type
Execute_Single_Write_Message	BOOL
Single_Write_Message	MESSAGE

Figure 6.4 Example Ladder Logic Explicit Messaging Program for Write Single

Formatting a Message to Write Single Parameter

Figure 6.5 Parameter Write Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type [1]	Parameter Write	This service is used to write a parameter value.
Service Code [1]	10 (Hex.)	Code for the requested service.
Class	f (Hex.)	Class ID for the DPI Parameter Object.
Instance	140 (Dec.)	Instance number is the same as parameter number.
Attribute	1 (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	Accel_Time_1 [3]	Name of the tag for any service data to be sent from the scanner or bridge to the adapter/drive.
Source Length	2 bytes [3]	Number of bytes of service data to be sent in the message.
Communication Tab	**Example Value**	**Description**
Path [2]	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(3) In this example, Accel Time 1 is a 16-bit parameter and the tag Data Type field must be set to “INT” when creating the controller tag. If the parameter being written to is a 32-bit parameter, the tag Data Type field must be set to “DINT.” Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 4 bytes for a DINT). Refer to the drive documentation to determine the size of the parameter.

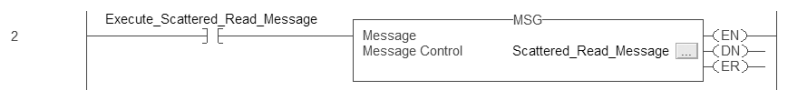
Example Ladder Logic Program to Read Multiple Parameters

A Scattered Read message is used to read the values of multiple parameters. This read message example reads the values of these five PowerFlex 7-Class drive parameters: 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In1 Value].

Table 6.C Example Controller Tags for Read Multiple Parameter Messaging Program

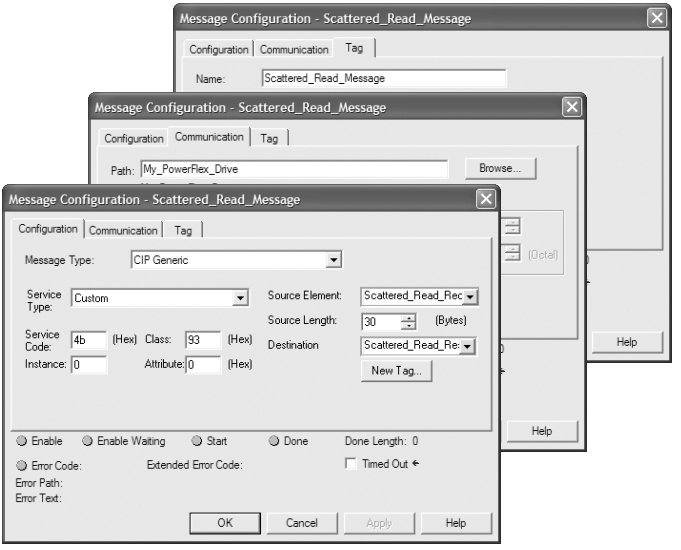
Controller Tags for Read Multiple Message	Type
Execute_Scattered_Read_Message	BOOL
Scattered_Read_Message	MESSAGE

Figure 6.6 Example Ladder Logic Explicit Messaging Program for Read Multiple



Formatting a Message to Read Multiple Parameters

Figure 6.7 Scattered Read Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple read message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access Parameter Object in the adapter.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4b (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Read_Request (3)	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	30 bytes (3)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Read_Response	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Read_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(3) In this example, five parameters are read. Each parameter being read requires an array of three INT registers. Therefore, a controller tag was created with its Data Type field set to “INT [15].” Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 30 bytes for an INT [15] array). Scattered read messages always assume that every parameter being read is a 32-bit parameter, regardless of its actual size. Maximum length is 132 bytes or 66 words which equates to 22 parameters.

Example Request Data

In this example, we use the data structure in Figure 6.8 in the source tag named Scattered Read Request to read these five PowerFlex 7-Class drive parameters: 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In1 Value].

Figure 6.8 Example Request Data

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

Example Response Data

The Scattered Read Request message reads the multiple parameters and returns their values to the destination tag (Scattered Read Response).

Figure 6.9 Example Response Data

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

In this example, the parameters have the following values:

PowerFlex 7-Class Drive Parameter	Read Value
1 - [Output Freq]	32.5 Hz
3 - [Output Current]	0.01 Amp
6 - [Output Voltage]	118.7 VAC
12 - [DC Bus Voltage]	329.2 VDC
17 - [Analog In2 Value]	8.318 mA

Example Ladder Logic Program to Write Multiple Parameters

A Scattered Write message is used to write to multiple parameters. This write message example writes the following values to these five parameters:

PowerFlex 7-Class Drive Parameter	Write 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.

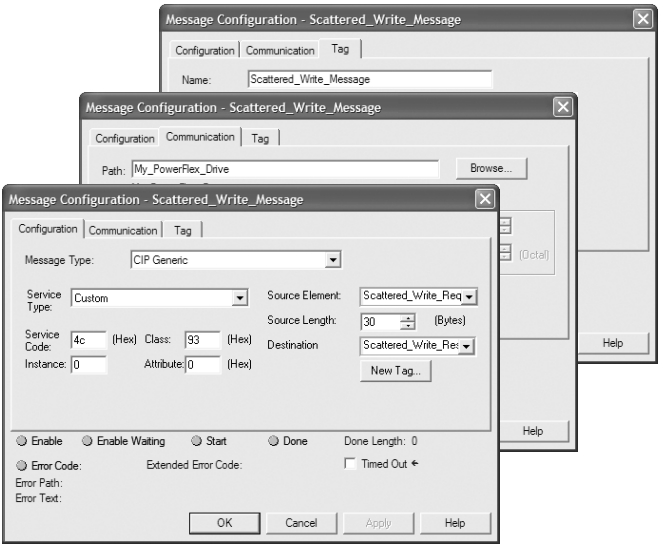
Table 6.D Example Controller Tags for Write Multiple Parameter Messaging Program

Controller Tags for Write Multiple Message	Type
Execute_Scattered_Write_Message	BOOL
Scattered_Write_Message	MESSAGE

Figure 6.10 Example Ladder Logic Explicit Messaging Program for Write Multiple

Formatting a Message to Write Multiple Parameters

Figure 6.11 Scattered Write Multiple Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple write message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access Parameter Object in the adapter.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4c (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Write_Request (3)	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	30 bytes (3)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Write_Response	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Write_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(3) In this example, we are writing to five parameters. Each parameter being written to requires an array of three INT registers. Therefore, a controller tag was created with its Data Type field set to “INT [15].” Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 30 bytes for an INT [15] array). Scattered write messages always assume that every parameter being written to is a 32-bit parameter, regardless of its actual size. Maximum length is 132 bytes or 66 words which equates to 22 parameters.

Example Request Data

In this example, we use the data structure in Figure 6.12 in the source tag (Scattered Write Request) to write new values to these parameters:

PowerFlex 7-Class Drive Parameter	Write 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 6.12 Example Request Data

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

Example Response Data

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

Example Response Data

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

Explanation of Request and Response Data

The data structures in Figure 6.13 use 16-bit words and can accommodate up to 22 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 6.13 Data Structures for Scattered Read/Write 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
⋮	
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
⋮	
63	Parameter Number
64	Parameter Value LSW
65	Parameter Value MSW

Explicit Messaging Using the RSLogix 5000 Classic Profile (v13-v15)

Since the RSLogix 5000 Classic Profile has been significantly improved upon by RSLogix 5000 Integrated Drive Profiles (v16 or higher), it is highly recommended to use RSLogix 5000 Integrated Drive Profiles to take advantage of its benefits (more intuitive, time saving, and less likely to make message configuration errors).

Explicit Messaging Using the RSLogix 5000 Generic Profile (all versions)

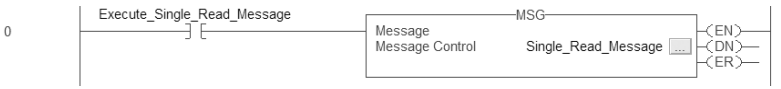
Example Ladder Logic Program to Read Single Parameter

A Get Attribute Single message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Table 6.E Example Controller Tags for Read Single Parameter Messaging Program

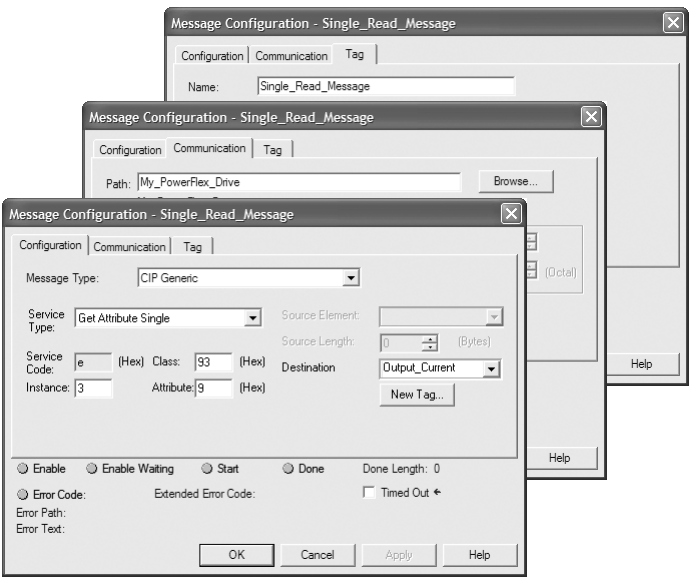
Controller Tags for Read Single Message	Type
Execute_Single_Read_Message	BOOL
Single_Read_Message	MESSAGE

Figure 6.14 Example Ladder Logic Explicit Messaging Program for Read Single



Formatting a Message to Read Single Parameter

Figure 6.15 Get Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Get Attribute Single	This service is used to read a parameter value.
Service Code (1)	e (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	3 (Dec.)	Instance number is the same as parameter number.
Attribute	9 (Hex.)	Attribute number for the Parameter Value attribute.
Destination	Output_Current (3)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(3) In this example, Output Current is a 32-bit parameter and the Data Type field must be set to “DINT” when creating the controller tag. If the parameter being read is a 16-bit parameter, the tag Data Type field must be set to “INT.” Refer to the drive documentation to determine the size of the parameter.

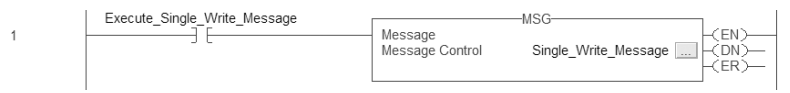
Example Ladder Logic Program to Write Single Parameter

A Set Attribute Single message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Table 6.F Example Controller Tags for Write Single Parameter Messaging Program

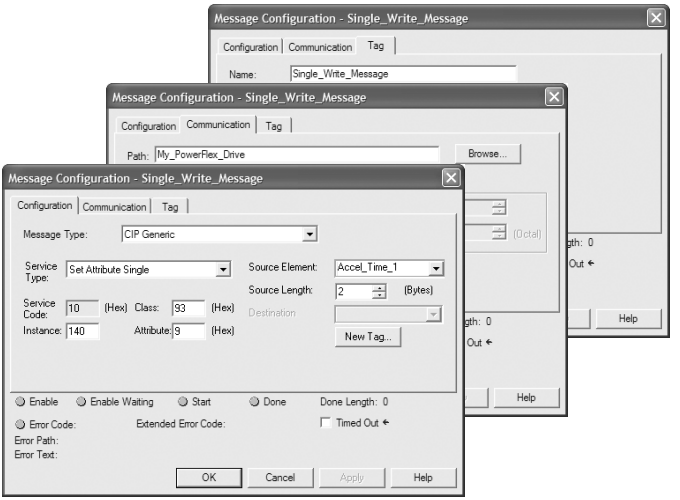
Controller Tags for Write Single Message	Type
Execute_Single_Write_Message	BOOL
Single_Write_Message	MESSAGE

Figure 6.16 Example Ladder Logic Explicit Messaging Program for Write Single



Formatting a Message to Write Single Parameter

Figure 6.17 Set Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Set Attribute Single	This service is used to write a parameter value.
Service Code (1)	10 (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	140 (Dec.)	Instance number is the same as parameter number.
Attribute (2)	9 or 10 (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	Accel_Time_1 (4)	Name of the tag for any service data to be sent from the scanner or bridge to the adapter/drive.
Source Length	2 bytes (4)	Number of bytes of service data to be sent in the message.
Communication Tab	**Example Value**	**Description**
Path (3)	My_PowerFlex_Drive	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

(1) The default setting for Service Type is “Custom,” enabling entry of a Service Code not available from the Service Type pull-down menu. When selecting a Service Type other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Setting the Attribute value to “9” will write the parameter value to the drive’s Non-Volatile Storage (EEPROM) memory, so the parameter value will remain even after the drive is power cycled. Setting the Attribute value to “10” will write the parameter value to temporary memory, so the parameter value will be lost after the drive is power cycled.

(3) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

(4) In this example, Accel Time 1 is a 16-bit parameter and the tag Data Type field must be set to “INT” when creating the controller tag. If the parameter being written to is a 32-bit parameter, the tag Data Type field must be set to “DINT.” Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 4 bytes for a DINT). Refer to the drive documentation to determine the size of the parameter.

Example Ladder Logic Program to Read or Write Multiple Parameters

Since the example ladder logic rungs, configuration screens, and request/response data to read or write multiple parameters using the RSLogix Generic Profile are identical to those for the RSLogix 5000 Integrated Drive Profiles (v16 or higher), please refer to the information contained on page 6-6 through page 6-12 for complete details.

PLC-5 Example

Important: The PLC-5 must be Series E (Rev. D.1 or higher) to support the MultiHop feature that routes messaging to the drive.

Important: Due to inherent limitations with the PCCC N-File method, only contiguous multiple parameters can be read or written using explicit messaging.

For this explicit message example, we use the N150 N-Files because they are already mapped to specific parameters in the drive and its connected peripherals. This enables direct access to any parameter. The other available N40 N-File to use for explicit messaging requires considerably more configuration to achieve the same result. Every read or write message using the N40 N-Files requires configuring a request message, inputing data into the request data table, configuring a response message, and inputing data into the response data table. However, if accessing items other than parameters (for example, drive faults or events), the N40 N-Files must be used since only parameters can be accessed using the N150 N-Files.

For PCCC N150 N-File information, refer to page C-16.

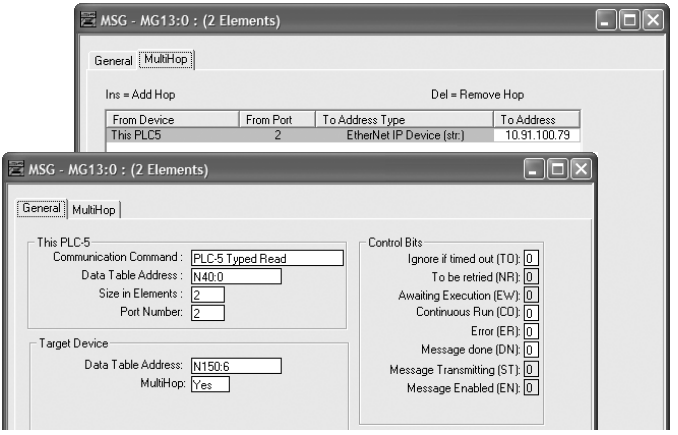
Example Ladder Logic Program to Read Single Parameter

A read message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.18 Example Ladder Logic Explicit Messaging Program for Read Single

Formatting a Message to Read Single Parameter

Figure 6.19 Read Single Message Configuration Screens



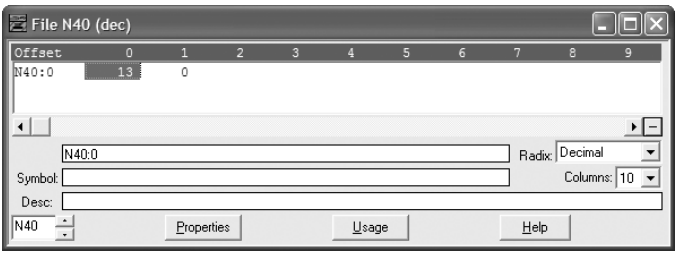
The following table identifies the data that is required in each box to format a read single message.

General Tab	Example Value	Description
Communication Command	PLC-5 Typed Read	Controller type and command type for controller to read data from the drive.
Data Table Address	N40:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Elements	2	Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Port Number	2	Controller port to which EtherNet/IP network is connected.
Data Table Address	N150:6	Specific starting address of the source file in the drive.
MultiHop	Yes	Enables communication to allow Ethernet messaging to be routed to the drive.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

Example Read Response Data

In this example, we use the data table address in Figure 6.20 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

Figure 6.20 Example Read Response Data



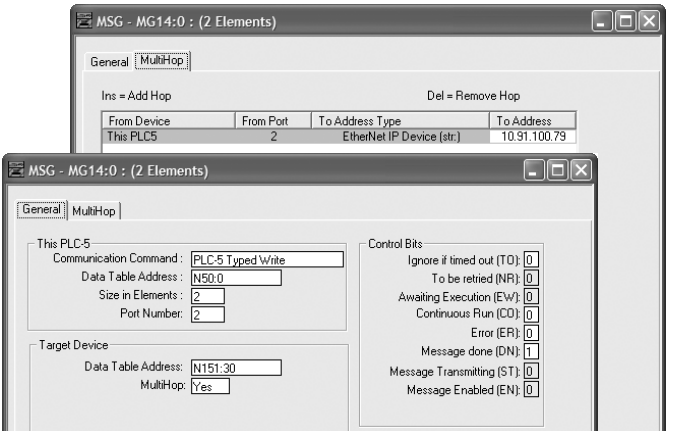
Example Ladder Logic Program to Write Single Parameter

A write message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.21 Example Ladder Logic Explicit Messaging Program for Write Single

Formatting a Message to Write Single Parameter

Figure 6.22 Write Single Message Configuration Screens



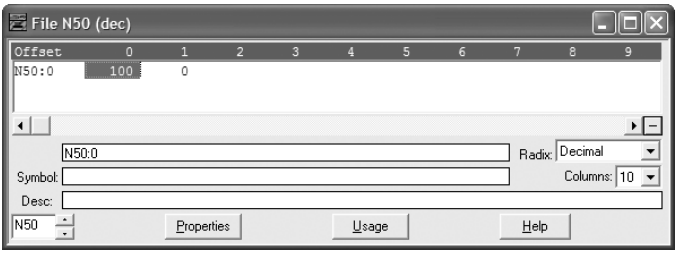
The following table identifies the data that is required in each box to format a write single message.

General Tab	Example Value	Description
Communication Command	PLC-5 Typed Write	Controller type and command type for controller to write data to the drive.
Data Table Address	N50:0	An unused controller data table address containing the message instruction. This address is the starting word of the source file.
Size in Elements	2	Number of elements (words) to be transferred. Each element size is a 16-bit integer.
Port Number	2	Controller port to which EtherNet/IP network is connected.
Data Table Address	N151:30	Specific starting address of the destination file in the drive.
MultiHop	Yes	Enables communication to allow Ethernet messaging to be routed to the drive.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

Example Write Response Data

In this example, we use the data table address in Figure 6.23 to store the request value (10.0 sec.) that was written to drive parameter 140 - [Accel Time 1].

Figure 6.23 Example Write Response Data



Reading/Writing Multiple Parameters

You can read or write only contiguous parameters. Also, the range of contiguous parameters must be contained in the same N-File. Two elements (words) are required for each parameter being read or written. For example, to read 5 contiguous parameters, 10 elements (words) must be used.

SLC 500 Example

When using RSLogix 500 v7.10 or lower, explicit messaging must be performed using the PCCC N-File method. For RSLogix 500 v7.20 or higher, the CIP messaging method has been added along with the PCCC N-File method. However, it is recommended to use the CIP method because it is easier to use and understand. For this reason, only instructions for the CIP method are provided. If you must use the PCCC N-File method, refer to the PLC-5 Example on page 6-16.

The CIP messaging method provides two ways to perform explicit messaging:

- Read/Write Parameter Service simplifies setup by requiring less data to be entered in message configuration screens. However, the Read/Write Parameter Service can only be used to perform single parameter read or single parameter write explicit messages. (Multiple parameter reads or writes must be performed using the Generic Get/Set Attribute Service described below.) Furthermore, when performing a Write Parameter message, the data will always be written to the drive's Non-Volatile Storage (NVS).

- Generic Get/Set Attribute Service requires more setup data to be entered in message configuration screens, but can be used to perform single parameter read or write and multiple parameter read or write explicit messages. Also, the Generic Set Attribute Service offers the choice of writing the data to the drive's Non-Volatile Storage (NVS) or the drive's Random Access Memory (RAM). Note that when selecting the data to be written to RAM, the data will be lost if the drive loses power.

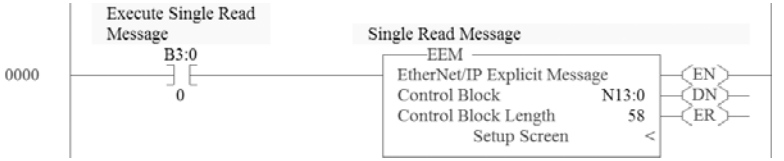
For supported classes, instances, and attributes, refer to Appendix C, EtherNet/IP Objects.

Explicit Messaging Using the Read/Write Parameter Service

Example Ladder Logic Program to Read Single Parameter

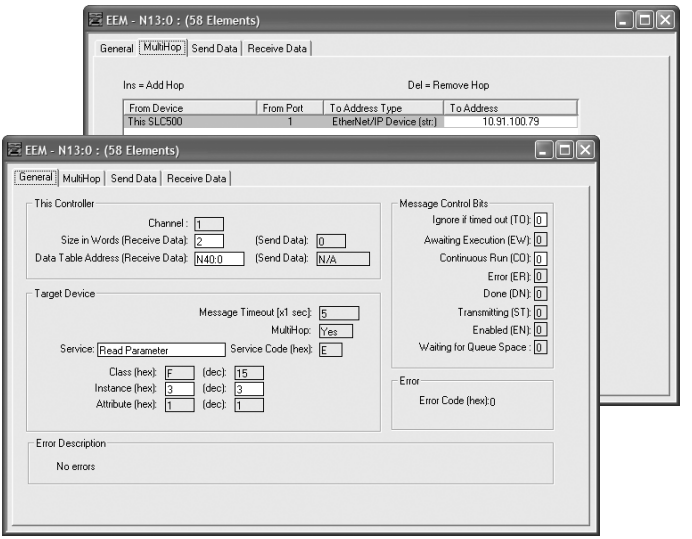
A Read Parameter message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.24 Example Ladder Logic Explicit Messaging Program for Read Single



Formatting a Message to Read Single Parameter

Figure 6.25 Read Parameter Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

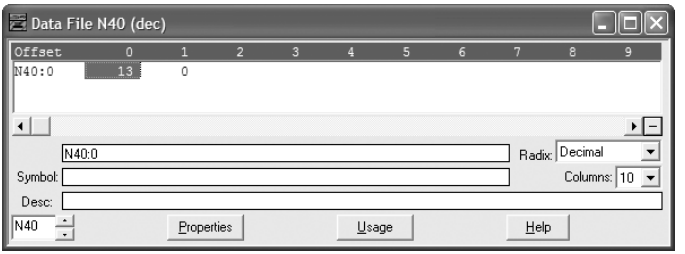
General Tab	Example Value	Description
Size in Words	2 words	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N40:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Service (1)	Read Parameter	Code for the requested service.
Instance	3 (Dec.)	Instance number is the same as the parameter number.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Response Data

In this example, we use the data table address in Figure 6.26 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

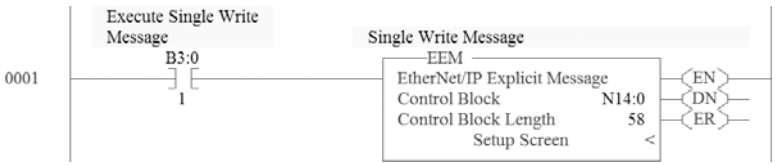
Figure 6.26 Example Response Data



Example Ladder Logic Program to Write Single Parameter

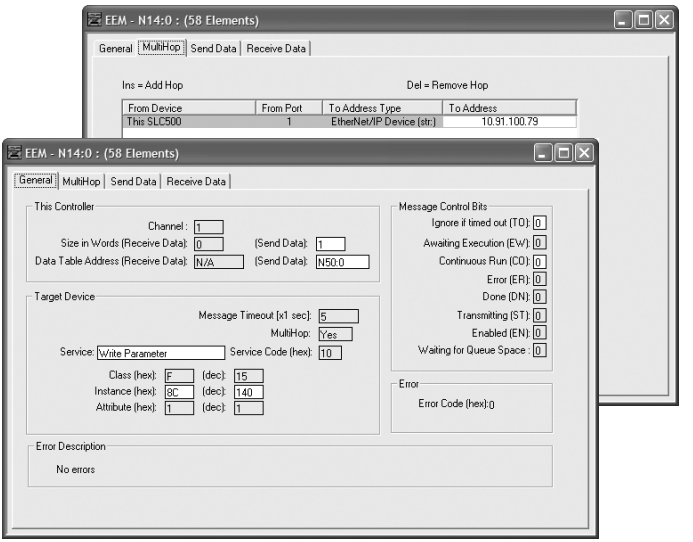
A Write Parameter message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.27 Example Ladder Logic Explicit Messaging Program for Write Single



Formatting a Message to Write Single Parameter

Figure 6.28 Write Parameter Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

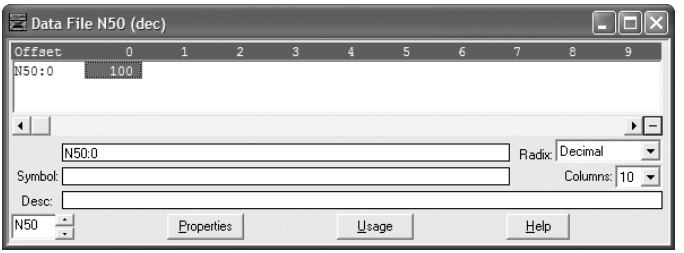
General Tab	Example Value	Description
Size in Words	1 word	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N50:0	An unused controller data table address containing the message instruction. This address is the starting word of the source file.
Service [1]	Write Parameter	Code for the requested service.
Instance	140 (Dec.)	Instance number is the same as the parameter number.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

[1] The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table address in Figure 6.29 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.29 Example Request Data

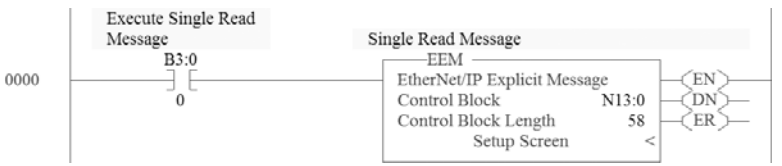


Explicit Messaging Using the Generic Get/Set Attribute Service

Example Ladder Logic Program to Read Single Parameter

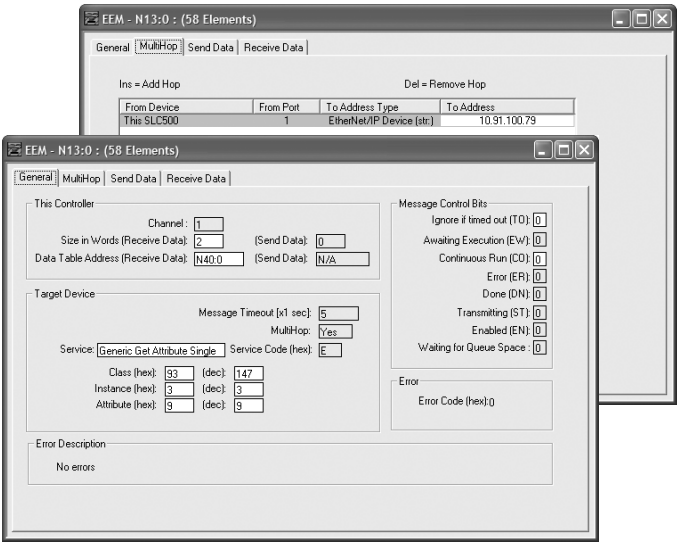
A Generic Get Attribute Single message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.30 Example Ladder Logic Explicit Messaging Program for Read Single



Formatting a Message to Read Single Parameter

Figure 6.31 Generic Get Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

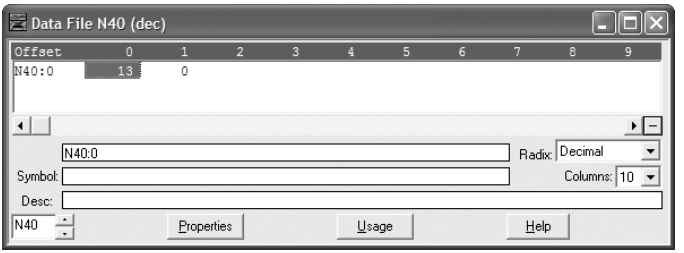
General Tab	Example Value	Description
Size in Words	2 words	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N40:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Service (1)	Generic Get Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	3 (Dec.)	Instance number is the same as the parameter number.
Attribute	9 (Dec.)	Attribute number for the Parameter Value attribute.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Response Data

In this example, we use the data table address in Figure 6.32 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

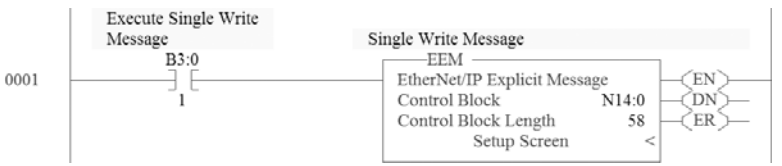
Figure 6.32 Example Response Data



Example Ladder Logic Program to Write Single Parameter

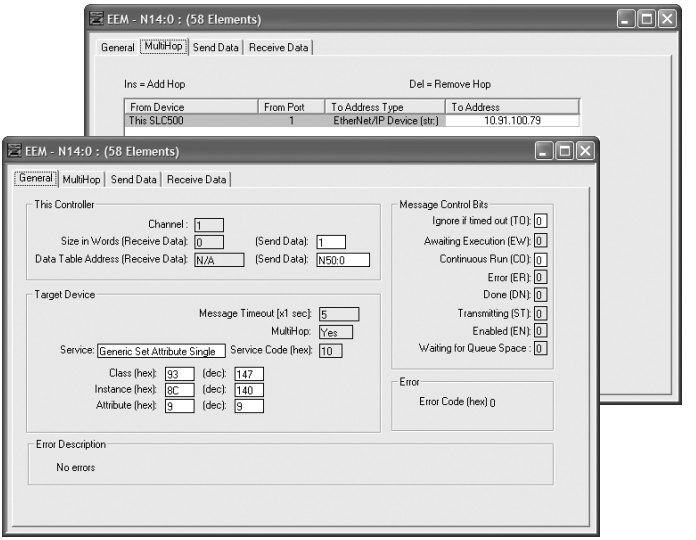
A Generic Set Attribute Single message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.33 Example Ladder Logic Explicit Messaging Program for Write Single



Formatting a Message to Write Single Parameter

Figure 6.34 Generic Set Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

General Tab	Example Value	Description
Size in Words	1 word	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N50:0	An unused controller data table address containing the message instruction. This address is the starting word of the source file.
Service (1)	Generic Set Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	140 (Dec.)	Instance number is the same as the parameter number.
Attribute (2)	9 or 10 (Dec.)	Attribute number for the Parameter Value attribute.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Setting the Attribute value to “9” will write the parameter value to the drive’s Non-Volatile Storage (EEPROM) memory, so the parameter value will remain even after the drive is power cycled. Setting the Attribute value to “10” will write the parameter value to temporary memory, so the parameter value will be lost after the drive is power cycled.

Example Request Data

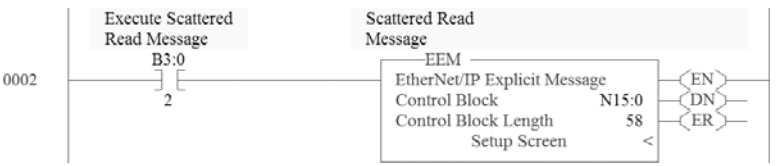
In this example, we use the data table address in Figure 6.35 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.35 Example Request Data

Example Ladder Logic Program to Read Multiple Parameters

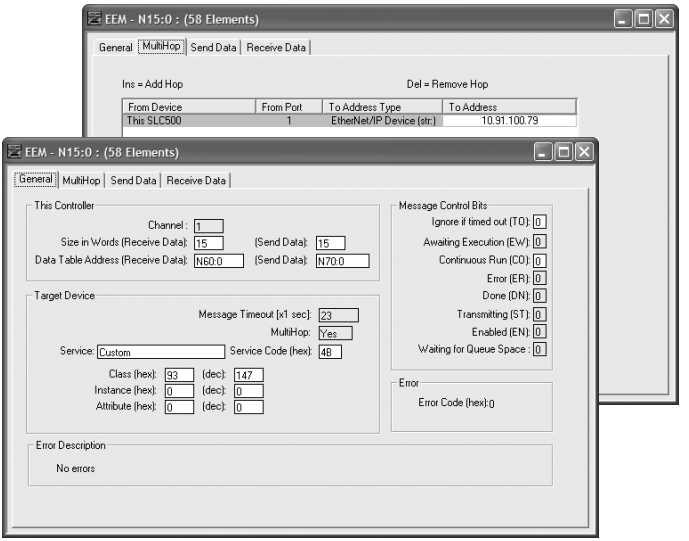
A Custom scattered read message is used to read the values of multiple parameters. This read message example reads the values of these five PowerFlex 7-Class drive parameters: 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In1 Value].

Figure 6.36 Example Ladder Logic Explicit Messaging Program for Read Multiple



Formatting a Message to Read Multiple Parameters

Figure 6.37 Custom Scattered Read Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple read message.

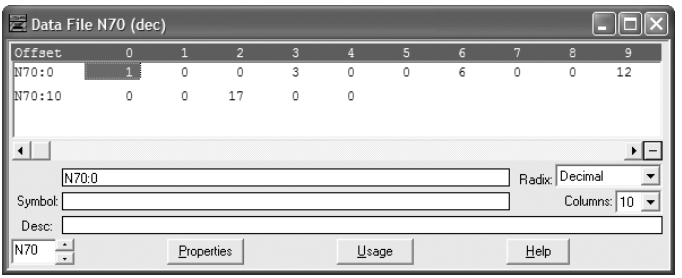
General Tab	Example Value	Description
Size in Words	15 words	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N60:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Service (1)	Custom	Required for scattered messages.
Service Code	4B (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Dec.)	Required for scattered messages.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table addresses in Figure 6.38 to store the request values to be read from drive parameters 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In1 Value].

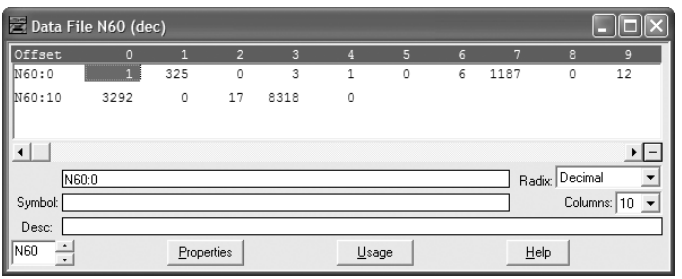
Figure 6.38 Example Request Data



Example Response Data

In this example, we use the data table addresses in Figure 6.39 to store the response values that were read from the requested drive parameters.

Figure 6.39 Example Response Data



In this example, the parameters have the following values:

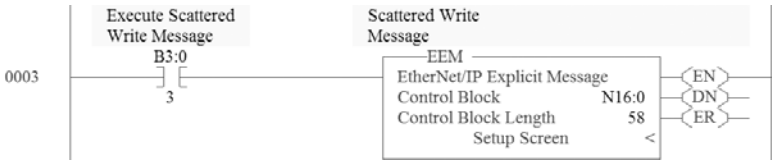
PowerFlex 7-Class Drive Parameter	Address	Read Value
1 - [Output Freq]	N60:1	32.5 Hz
3 - [Output Current]	N60:4	0.01 Amp
6 - [Output Voltage]	N60:7	118.7 VAC
12 - [DC Bus Voltage]	N60:10	329.2 VDC
17 - [Analog In2 Value]	N60:13	8.318 mA

Example Ladder Logic Program to Write Multiple Parameters

A Custom scattered write message is used to write to multiple parameters. This write message example writes the following values to these five parameters:

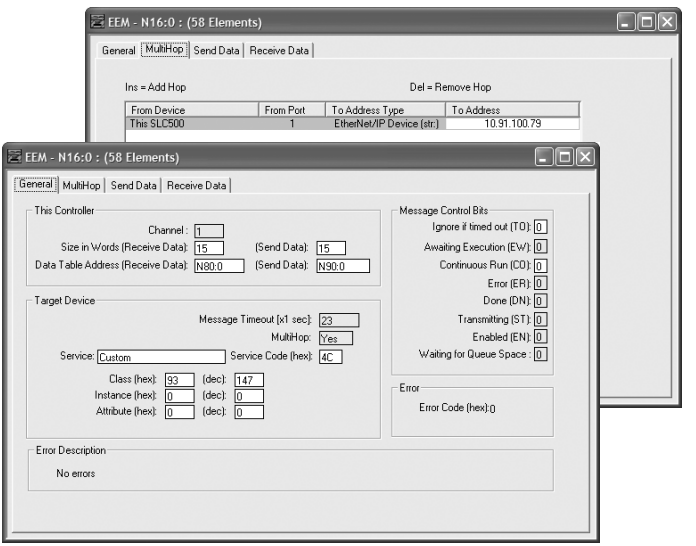
PowerFlex 7-Class Drive Parameter	Write Value
141 - [Accel Time 2]	11.1 Sec.
143 - [Decel Time 2]	22.2 Sec.
105 - [Preset Speed 5]	33.3 Hz.
106 - [Preset Speed 6]	44.4 Hz.
107 - [Preset Speed 7]	55.5 Hz.

Figure 6.40 Example Ladder Logic Explicit Messaging Program for Write Multiple



Formatting a Message to Write Multiple Parameters

Figure 6.41 Custom Scattered Write Multiple Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple write message.

General Tab	Example Value	Description
Size in Words	15 words	Number of words to be transferred. Each word size is a 16-bit integer.
Data Table Address	N80:0	An unused controller data table address containing the message instruction. This address is the starting word of the source file.
Service (1)	Custom	Required for scattered messages.
Service Code	4C (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Dec.)	Required for scattered messages.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

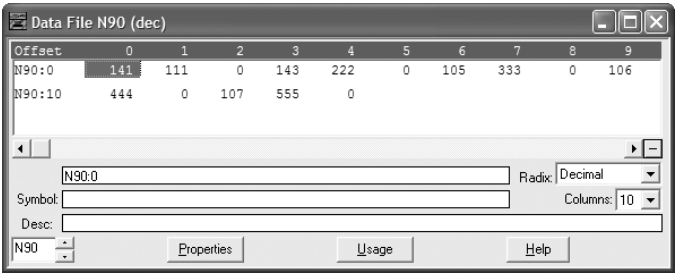
(1) The default setting for Service is "Custom," enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than "Custom" from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table addresses in Figure 6.42 to store the request values to be written to the following drive parameters:

PowerFlex 7-Class Drive Parameter	Address	Write Value
141 - [Accel Time 2]	N90:1	11.1 Sec.
143 - [Decel Time 2]	N90:4	22.2 Sec.
105 - [Preset Speed 5]	N90:7	33.3 Hz.
106 - [Preset Speed 6]	N90:10	44.4 Hz.
107 - [Preset Speed 7]1	N90:13	55.5 Hz.

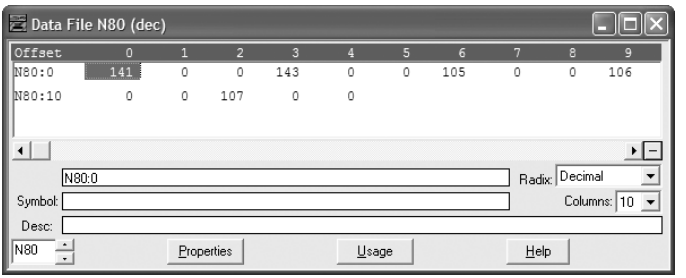
Figure 6.42 Example Request Data



Example Response Data

In this example, we use the data table addresses in Figure 6.43 to store the response values that were written to the requested drive parameters. Values of “0” indicate no errors occurred.

Figure 6.43 Example Response Data



MicroLogix 1100 Example

When using RSLogix 500 v7.10 or lower, explicit messaging must be performed using the PCCC N-File method. For RSLogix 500 v7.20 or higher, the CIP messaging method has been added along with the PCCC N-File method. However, it is recommended to use the CIP method because it is easier to use and understand. For this reason, only instructions for the CIP method are provided. If you must use the PCCC N-File method, refer to the PLC-5 Example on page 6-16.

The CIP messaging method provides two ways to perform explicit messaging:

- Read/Write Parameter Service simplifies setup by requiring less data to be entered in message configuration screens. However, the Read/Write Parameter Service can only be used to perform single parameter read or single parameter write explicit messages. (Multiple parameter reads or writes must be performed using the Generic Get/Set Attribute Service described below.) Furthermore, when performing a Write Parameter message, the data will always be written to the drive's Non-Volatile Storage (NVS).

- Generic Get/Set Attribute Service requires more setup data to be entered in message configuration screens, but can be used to perform single parameter read or write and multiple parameter read or write explicit messages. Also, the Generic Set Attribute Service offers the choice of writing the data to the drive's Non-Volatile Storage (NVS) or the drive's Random Access Memory (RAM). Note that when selecting the data to be written to RAM, the data will be lost if the drive loses power.

For supported classes, instances, and attributes, refer to Appendix C, EtherNet/IP Objects.

Explicit Messaging Using the Read/Write Parameter Service

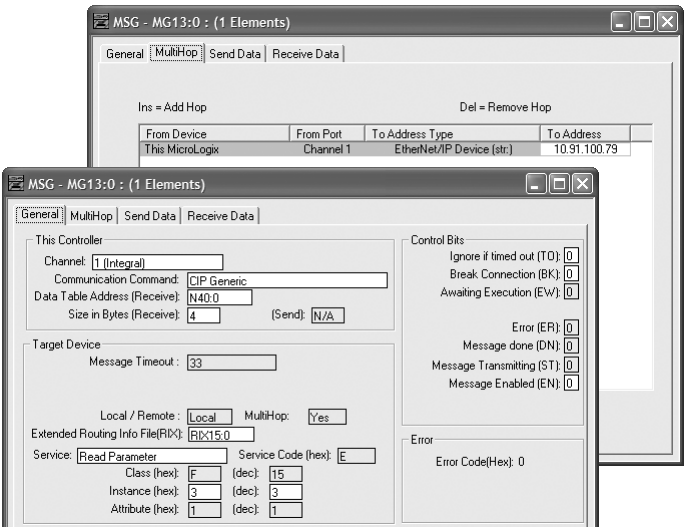
Example Ladder Logic Program to Read Single Parameter

A Read Parameter message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.44 Example Ladder Logic Explicit Messaging Program for Read Single

Formatting a Message to Read Single Parameter

Figure 6.45 Read Parameter Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

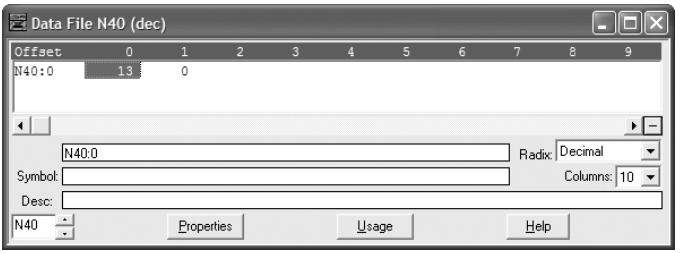
General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N40:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	4 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX15:0	An unused routing information file for the controller.
Service [1]	Read Parameter	Code for the requested service.
Instance	3 (Dec.)	Instance number is the same as the parameter number.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

[1] The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Response Data

In this example, we use the data table address in Figure 6.46 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

Figure 6.46 Example Response Data



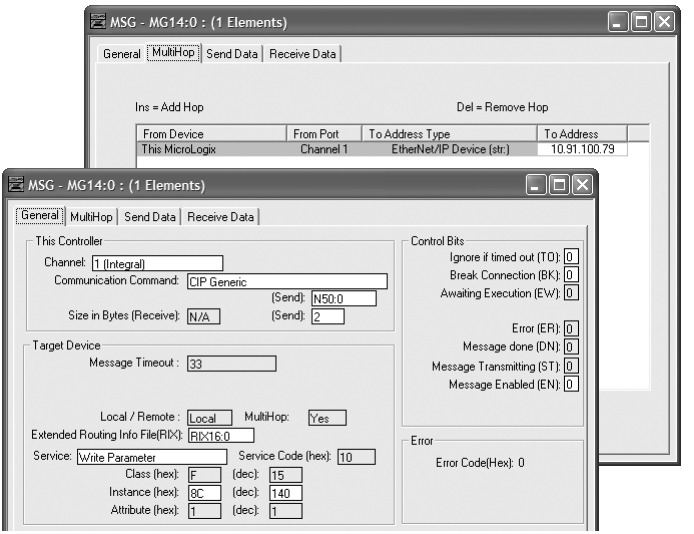
Example Ladder Logic Program to Write Single Parameter

A Write Parameter message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.47 Example Ladder Logic Explicit Messaging Program for Write Single

Formatting a Message to Write Single Parameter

Figure 6.48 Write Parameter Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

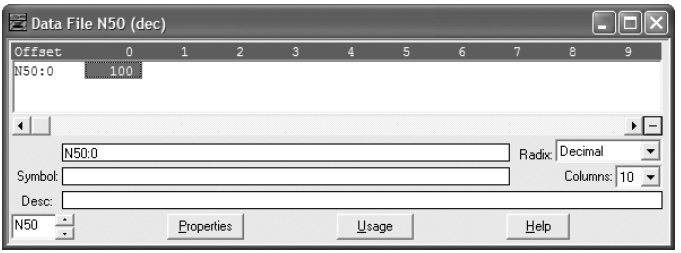
General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N50:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	2 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX16:0	An unused routing information file for the controller.
Service [1]	Write Parameter	Code for the requested service.
Instance	140 (Dec.)	Instance number is the same as the parameter number.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

[1] The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table address in Figure 6.49 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.49 Example Request Data



Explicit Messaging Using the Generic Get/Set Attribute Service

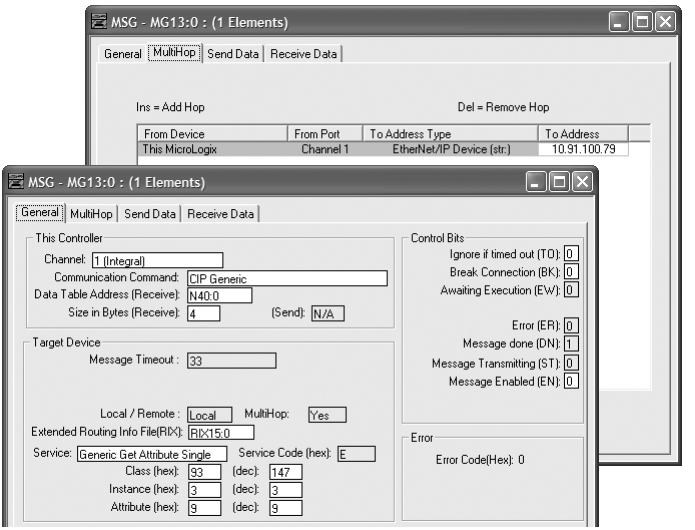
Example Ladder Logic Program to Read Single Parameter

A Generic Get Attribute Single message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.50 Example Ladder Logic Explicit Messaging Program for Read Single

Formatting a Message to Read Single Parameter

Figure 6.51 Generic Get Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single read message.

General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N40:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	4 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX15:0	An unused routing information file for the controller.
Service [1]	Generic Get Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	3 (Dec.)	Instance number is the same as the parameter number.
Attribute	9 (Dec.)	Attribute number for the Parameter Value attribute.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

[1] The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Response Data

In this example, we use the data table address in Figure 6.52 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

Figure 6.52 Example Response Data

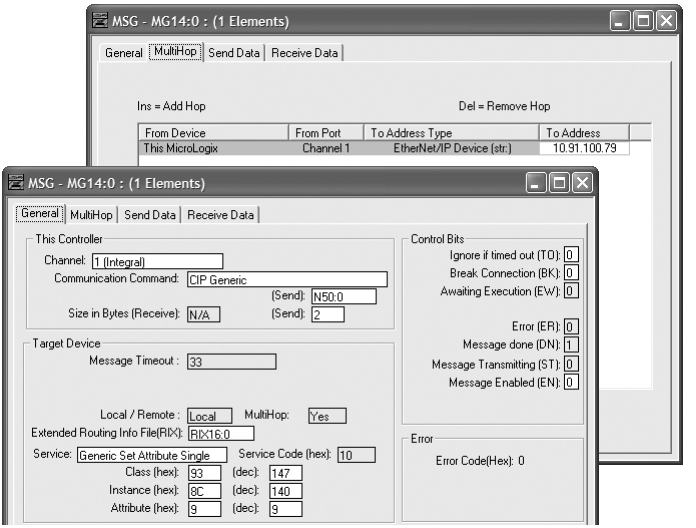
Example Ladder Logic Program to Write Single Parameter

A Generic Set Attribute Single message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.53 Example Ladder Logic Explicit Messaging Program for Write Single

Formatting a Message to Write Single Parameter

Figure 6.54 Generic Set Attribute Single Message Configuration Screens



The following table identifies the data that is required in each box to format a single write message.

General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N50:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	2 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX16:0	An unused routing information file for the controller.
Service (1)	Generic Set Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	140 (Dec.)	Instance number is the same as the parameter number.
Attribute (2)	9 or 10 (Dec.)	Attribute number for the Parameter Value attribute.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

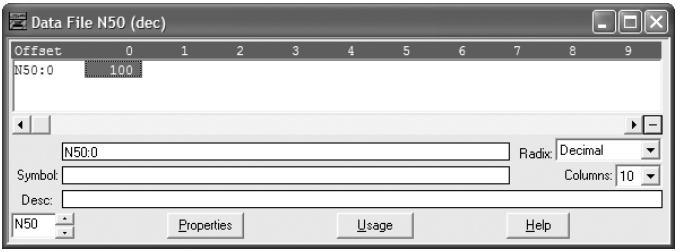
(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

(2) Setting the Attribute value to “9” will write the parameter value to the drive’s Non-Volatile Storage (EEPROM) memory, so the parameter value will remain even after the drive is power cycled. Setting the Attribute value to “10” will write the parameter value to temporary memory, so the parameter value will be lost after the drive is power cycled.

Example Request Data

In this example, we use the data table address in Figure 6.55 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.55 Example Request Data



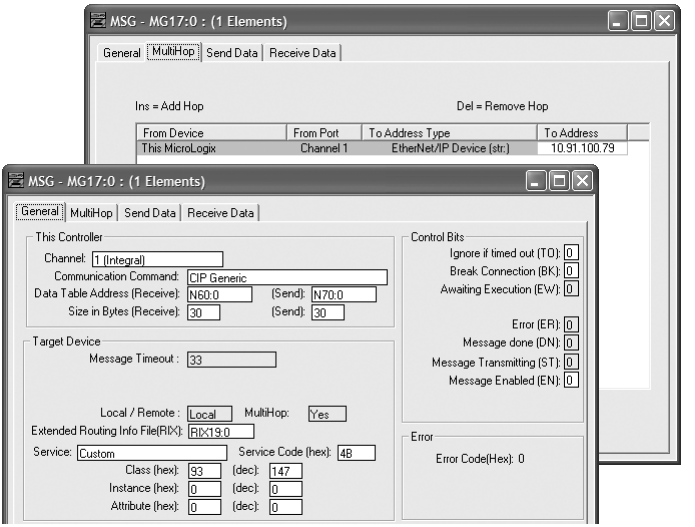
Example Ladder Logic Program to Read Multiple Parameters

A Custom scattered read message is used to read the values of multiple parameters. This read message example reads the values of these five PowerFlex 7-Class drive parameters: 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In1 Value].

Figure 6.56 Example Ladder Logic Explicit Messaging Program for Read Multiple

Formatting a Message to Read Multiple Parameters

Figure 6.57 Custom Scattered Read Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple read message.

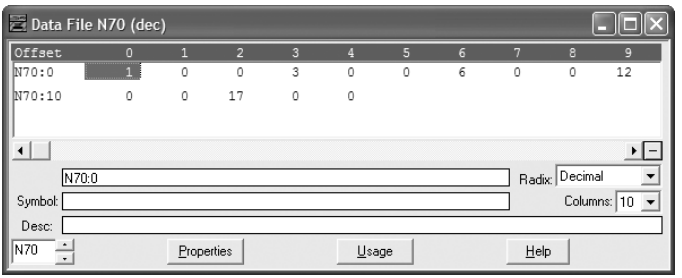
General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N60:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	30 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX19:0	An unused routing information file for the controller.
Service [1]	Custom	Required for scattered messages.
Service Code	4B (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Dec.)	Required for scattered messages.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

[1] The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table addresses in Figure 6.58 to store the request values to be read from drive parameters 001 - [Output Freq], 003 - [Output Current], 006 - [Output Voltage], 012 - [DC Bus Voltage], and 017 - [Analog In2 Value].

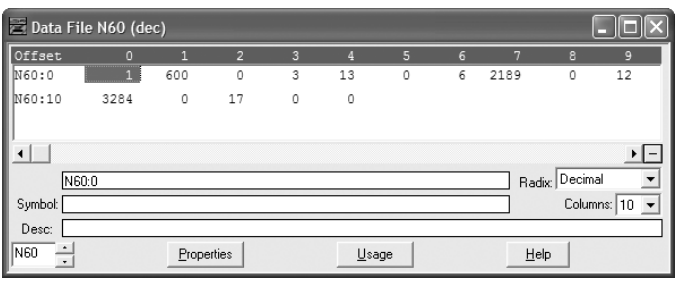
Figure 6.58 Example Request Data



Example Response Data

In this example, we use the data table addresses in Figure 6.59 to store the response values that were read from the requested drive parameters.

Figure 6.59 Example Response Data



In this example, the parameters have the following values:

PowerFlex 7-Class Drive Parameter	Address	Read Value
1 - [Output Freq]	N60:1	32.5 Hz
3 - [Output Current]	N60:4	0.01 Amp
6 - [Output Voltage]	N60:7	118.7 VAC
12 - [DC Bus Voltage]	N60:10	329.2 VDC
17 - [Analog In2 Value]	N60:13	8.318 mA

Example Ladder Logic Program to Write Multiple Parameters

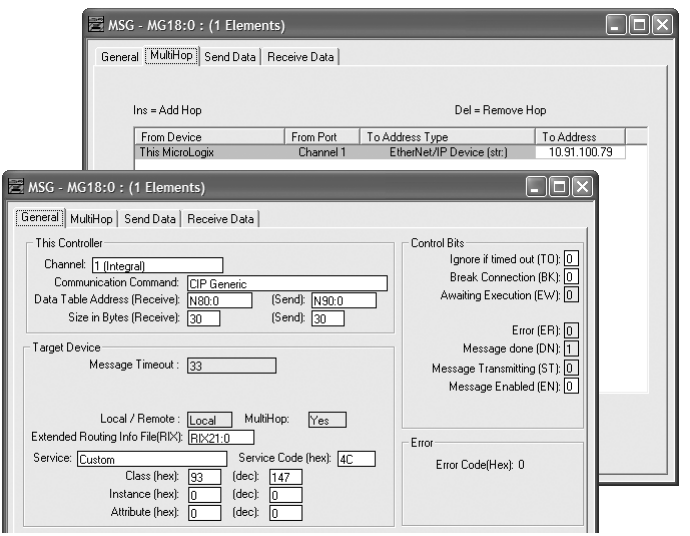
A Custom scattered write message is used to write to multiple parameters. This write message example writes the following values to these five parameters:

PowerFlex 7-Class Drive Parameter	Write 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]	55.5 Hz.

Figure 6.60 Example Ladder Logic Explicit Messaging Program for Write Multiple

Formatting a Message to Write Multiple Parameters

Figure 6.61 Custom Scattered Write Multiple Message Configuration Screens



The following table identifies the data that is required in each box to format a multiple write message.

General Tab	Example Value	Description
Channel	1	Controller port to which the EtherNet/IP network is connected.
Comm… Command	CIP Generic	Used to access the Parameter Object in the adapter.
Data Table Address	N80:0	An unused controller data table address containing the message instruction. This address is the starting word of the destination file.
Size in Bytes	30 bytes	Number of bytes to be transferred. Each byte size is an 8-bit integer.
Extended Routing…	RIX21:0	An unused routing information file for the controller.
Service [1]	Custom	Required for scattered messages.
Service Code	4C (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Dec.)	Required for scattered messages.
MultiHop Tab	**Example Value**	**Description**
To Address	10.91.100.79	IP address of the adapter connected to the drive.

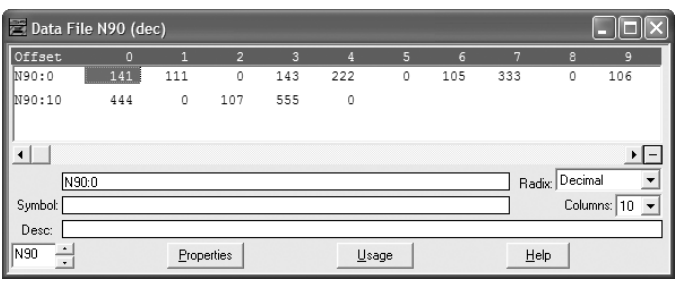
(1) The default setting for Service is “Custom,” enabling entry of a Service Code not available from the Service pull-down menu. When selecting a Service other than “Custom” from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which grays out (unavailable).

Example Request Data

In this example, we use the data table addresses in Figure 6.62 to store the request values to be written to the following drive parameters:

PowerFlex 7-Class Drive Parameter	Address	Write Value
141 - [Accel Time 2]	N90:1	11.1 Sec.
143 - [Decel Time 2]	N90:4	22.2 Sec.
105 - [Preset Speed 5]	N90:7	33.3 Hz.
106 - [Preset Speed 6]	N90:10	44.4 Hz.
107 - [Preset Speed 7]	N90:13	55.5 Hz.

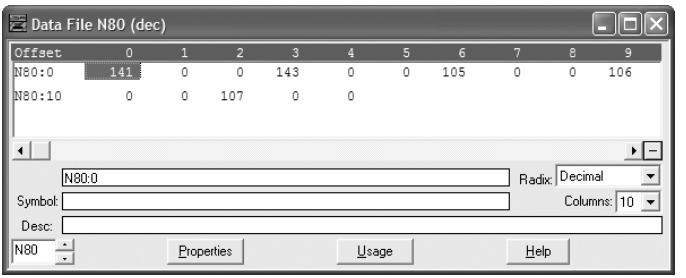
Figure 6.62 Example Request Data



Example Response Data

In this example, we use the data table addresses in Figure 6.63 to store the response values that were written to the requested drive parameters. Values of “0” indicate no errors occurred.

Figure 6.63 Example Response Data



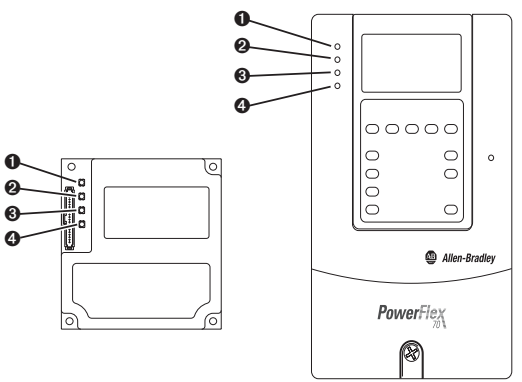
Troubleshooting

This chapter provides information for diagnosing and troubleshooting potential problems with the adapter and network.

Understanding the Status Indicators

The 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
1	PORT	DPI Connection Status	7-2
2	MOD	Adapter Status	7-3
3	NET A	EtherNet/IP Connection Status	7-4
4	NET B	EtherNet/IP Transmit Status	7-5

PORT Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered or is not properly connected to the drive.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit).
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected and not damaged. Replace cables if necessary. • Cycle power to the drive (or adapter if mounted in a DPI External Comms Kit).
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 (or adapter if mounted in a DPI External Comms Kit) after making any of the following corrections: • Verify that all DPI cables on the drive are securely connected and not damaged. Replace cables if necessary. • Verify that the DPI drive 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, a PowerFlex 7-Class drive).
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 or is not properly connected to the drive.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit).
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 (or adapter if mounted in a DPI External Comms Kit). • If cycling power does not correct the problem, the adapter 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 (or adapter if mounted in a DPI External Comms Kit). • 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 properly connected 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 adapter parameters. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit) and network.
Solid Red	The adapter failed the duplicate 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 the 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.

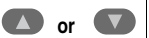
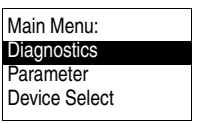
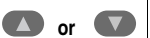
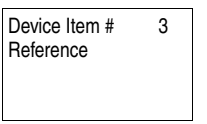
NET B Status Indicator

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not transmitting on the network.	If NET A indicator is off: • 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 adapter parameters. If NET A indicator is solid red: • Configure the adapter to use a unique IP address and cycle power. If NET A indicator is flashing red/green or red: • Check the IP address in the adapter and scanner, and verify that the controller can communicate with the adapter. • Ping the adapter. Normal condition if the adapter is idle.
Flashing Green	The adapter is transmitting on the network.	No action required.

Viewing Adapter Diagnostic Items

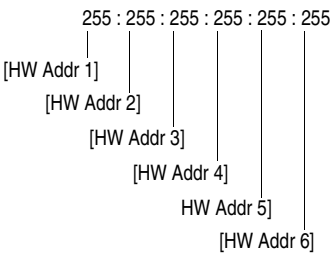
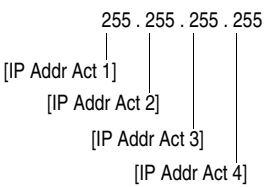
If you encounter unexpected communications problems, the adapter's diagnostic items may help you or Rockwell Automation personnel troubleshoot the problem. Adapter diagnostic items can be viewed using DriveExplorer software (version 2.01 or higher), DriveExecutive software (version 3.01 or higher), or an LCD PowerFlex 7-Class HIM (Diagnostics/Device Items).

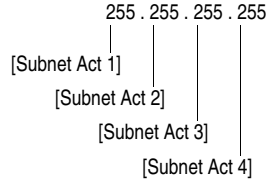
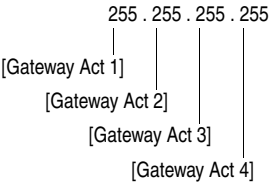
To view adapter diagnostic items

Step	Keys	Example Screen
1. Access parameters in the adapter. Refer to Using the PowerFlex 7-Class HIM on page 3-2.		
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		
4. Repeat steps 2 and 3 to enter the **Device Items** option.		
5. Press the Up Arrow or Down Arrow to scroll through the items.		

Adapter Diagnostic Items

No.	Name	Description
1	Common Logic Cmd	The present value of the Common Logic Command being transmitted to the drive by this adapter.
2	Prod Logic Cmd	The present value of the Product Logic Command being transmitted to the drive by this adapter.
3	Reference	The present value of the Reference being transmitted to the drive by this adapter. Note that a 16-bit value will be sent as the Most Significant Word of the 32-bit field.
4	Common Logic Sts	The present value of the Common Logic Status being received from the drive by this adapter.
5	Prod Logic Sts	The present value of the Product Logic Status being received from the drive by this adapter.
6	Feedback	The present value of the Feedback being received from the drive by this adapter. Note that a 16-bit value will be sent as the Most Significant Word of the 32-bit field.

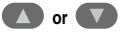
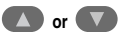
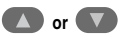
No.	Name	Description
7	Datalink A1 In	The present value of respective Datalink In being transmitted to the drive by this adapter. (If not using a Datalink, this parameter should have a value of zero.)
8	Datalink A2 In	
9	Datalink B1 In	
10	Datalink B2 In	
11	Datalink C1 In	
12	Datalink C2 In	
13	Datalink D1 In	
14	Datalink D2 In	
15	Datalink A1 Out	The present value of respective Datalink Out being received 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	The present value of the DPI Receive error counter.
24	DPI Rx Error Max	The maximum value (since reset) of the DPI Receive error counter.
25	DPI Tx Errors	The present value of the DPI Transmit error counter.
26	DPI Tx Error Max	The 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.
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. 

No.	Name	Description
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 DPI External Comms Kit. For the meanings of the individual bits, see Viewing Optional I/O Diagnostic Items on page 9-5.
57	OPT RX Errors	Number of optional I/O board receive errors.
58	OPT FW Version	Firmware version of optional I/O board (in DPI 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 7-Class HIM, DriveExplorer (2.01 or higher) software, or DriveExecutive (1.01 or higher) software.

Viewing and Clearing Events

Step	Keys	Example Screen
Viewing Events		
1. Access parameters in the adapter. Refer to Using the PowerFlex 7-Class HIM on page 3-2.		
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		Main Menu: **Diagnostics** Parameter Device Select
3. Press Enter to display the Diagnostics menu in the adapter.		
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.		Event Q: 1 E3 Ping Time Flt
Clearing Events		
1. Access parameters in the adapter. Refer to Using the PowerFlex 7-Class HIM on page 3-2.		
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		
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.		Dgn: Events View Event Queue Clear Event **Clr Event Queue**
5. Press Enter to confirm your request. If **Clr Event Queue** was selected, 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 after start up.
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 within 1 sec.
21	Flt Cfg Error	One of the Flt Cfg xx parameters is set to a value greater than 65535 and the drive 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.
27	EN Open	An I/O connection from the network to the adapter 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 set the PCCC Control Timeout to 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 for longer than the PCCC Control Timeout.

Code	Event	Description
32	Watchdog T/O Flt	The software detects a failure.
33	EEPROM Init	Startup sequence detected a blank EEPROM map revision.
34	Normal Startup	The adapter successfully started up.
35	Manual Reset	The adapter was reset by changing its Reset Module parameter.
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 of the DPI External Comms Kit.
47	OPT Close	The adapter forced a fault condition on the I/O option of the DPI External Comms Kit.
48	OPT Timeout	Communication between the adapter and I/O option of the DPI External Comms Kit was disrupted.

Notes:

Viewing the Adapter's Web Pages

This chapter 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 enabled differently than Series B.

- Series A adapter (version 2.003 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 Setting Web Access Control on page 3-19 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 Configure E-mail Notification Web Page on page 8-6.

Viewing the Web Pages of the Adapter

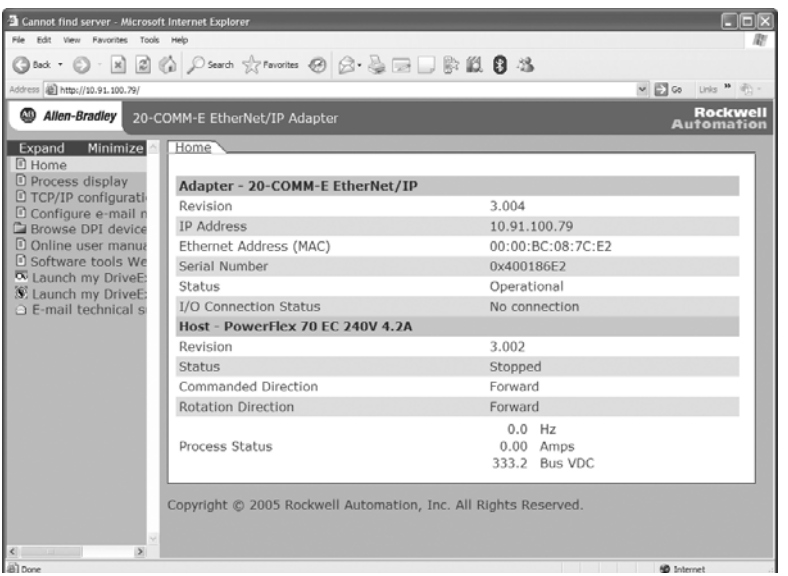
1. On a computer with access to the EtherNet/IP network on which the adapter is installed, launch a web browser such as Microsoft™ Internet Explorer (version 5.0 or greater).

   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, type the IP address of the adapter, and then press ENTER. The adapter web Home Page (Figure 8.1) 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:

Title Bar Element	Description
Allen-Bradley logo (at far left)	This logo is a hyperlink. 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 a hyperlink. 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 navigation menu 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 Rockwell Automation'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

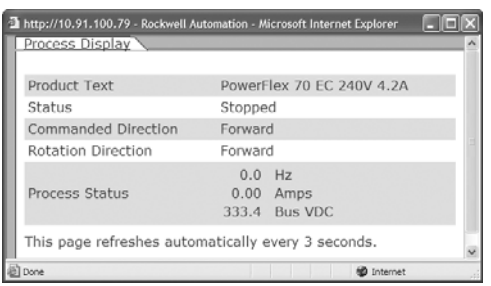
The adapter Home Page displays the following information for the adapter and host:

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

Process Display Pop-up Window

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)

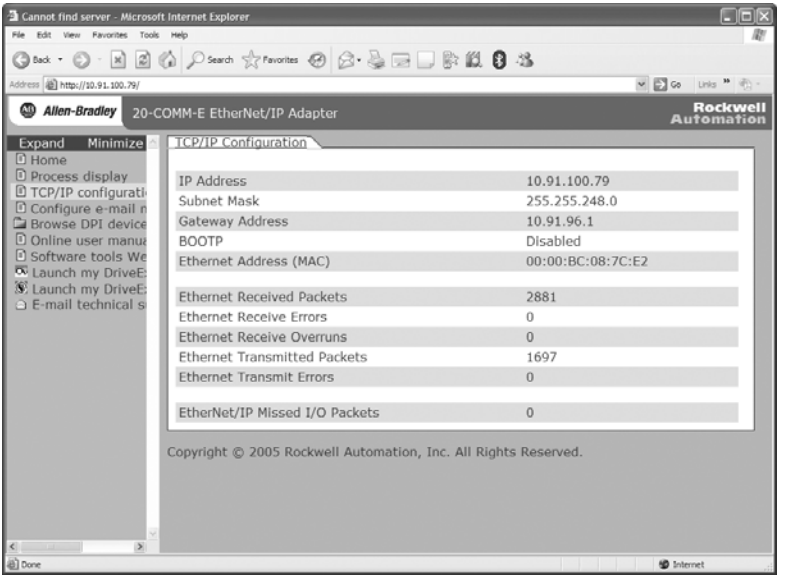
(1) The parameter whose value is shown on this line is the feedback value from the drive, and is not selectable.

(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 information 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.

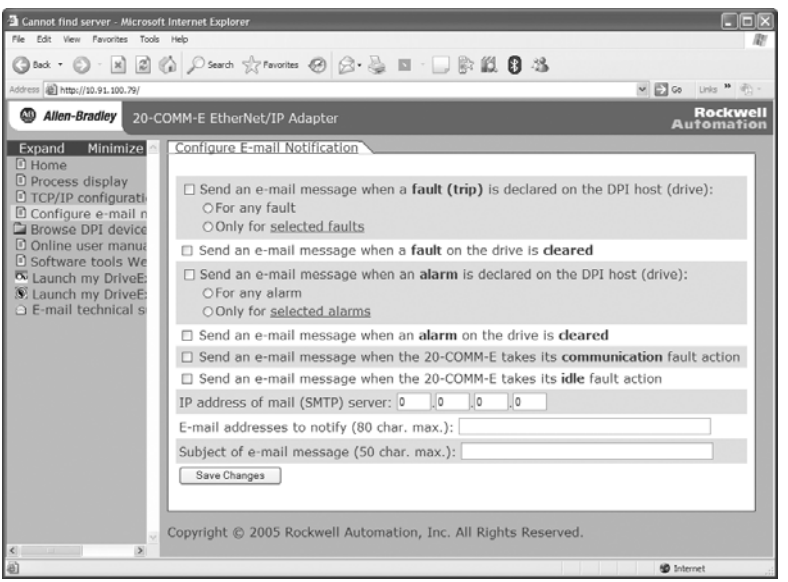
Configure E-mail Notification Web Page

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 2.003 or lower) — By default, settings are protected and the user needs to enable configuration by using **Parameter 54 - [Access Control]** to set the E-mail Config Bit 1 value to "1" (Enabled). After configuration, settings can be protected by changing the E-mail Config Bit 1 value back to "0" (Disabled).

- Series B adapters (version 3.xxx or higher) — By default, settings are not protected. After configuration, settings can be protected by using **Parameter 56 - [Web Features]** to set 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).

Figure 8.4 Example of Configure E-mail Notification Web Page



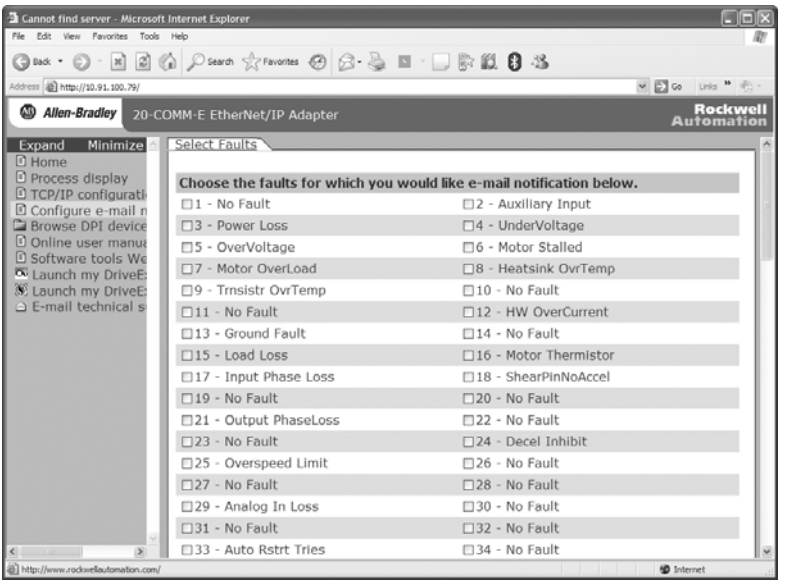
Configuring E-mail Notification

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. (When the IP address is unknown, see the TIP following this table.)
"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.

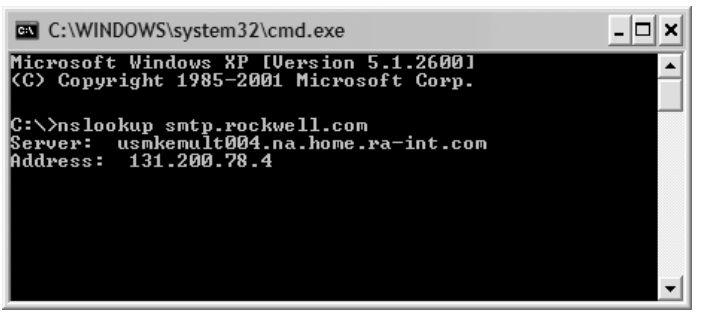
TIP: If the IP address of the e-mail server is unknown, you can contact your IT department or use the DOS window to enter a command to find its IP address.

A. On the Windows task bar, click **Start > Run** to display the Run window.

B. In the Run window Open field, type "cmd" and click **OK** to display the DOS window.

C. On the c:\ > command line, type "nslookup [name of e-mail server]." The entry "c:\ > nslookup smtp.company.com" is an example.

D. Press **ENTER** to display the e-mail server IP address (see example below). The IP address shown in the DOS window (for this example, 131.200.78.4) should be typed into the E-mail Notification Web Page shown in Figure 8.4.



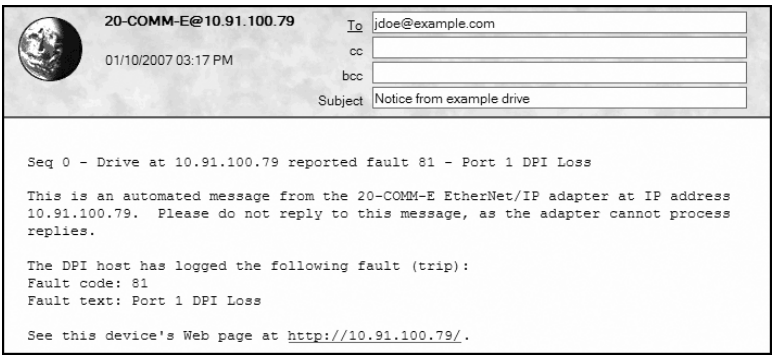
3. Click **Save changes**.

Important: After configuring E-mail Notification, it is recommended to protect the settings. Otherwise the configuration can be changed anytime the web page is accessed with a browser.

- For Series A adapters, use **Parameter 54 - [Access Control]** to set E-mail Config Bit 1 value to "0" (Disabled) to protect the settings.
- For Series B adapters, use **Parameter 56 - [Web Features]** to set E-mail Cfg Bit 0 value to "0" (Disabled) to protect the settings.

Figure 8.6 shows an example e-mail message automatically sent by the adapter in response to selected events.

Figure 8.6 Example of E-mail Message Sent by Adapter



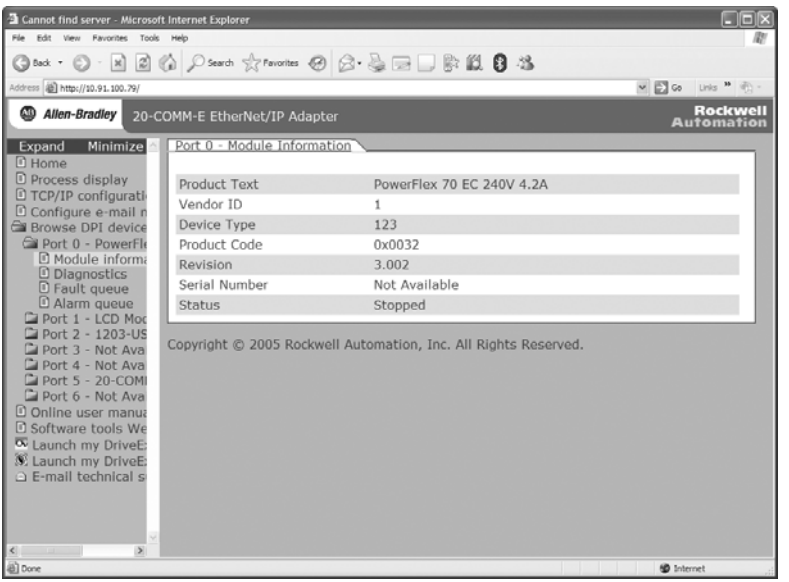
TIP: To stop e-mail messages, uncheck all of the "Send an e-mail message when…" boxes.

- 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, disabling the adapter web pages by 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 items, fault queue, event queue, and alarm queue. Figure 8.7 shows an example module information page for the Port 0 device (host). Figure 8.8, Figure 8.9, and Figure 8.10 respectively show example diagnostic items, fault queue, and alarm 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 Items Page

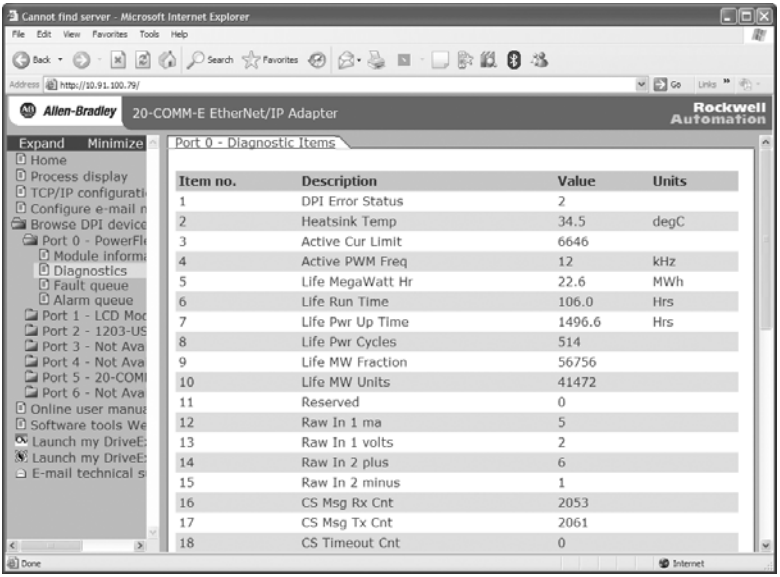
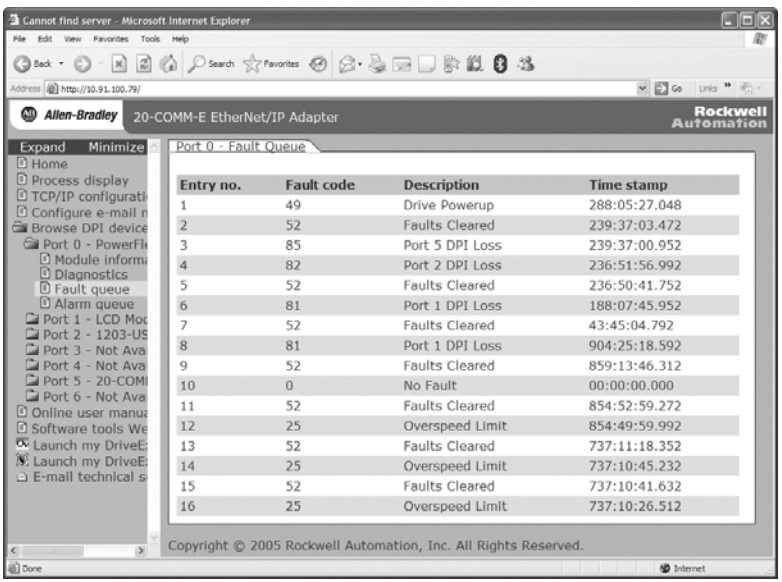


Figure 8.9 Example of Port 0 (PowerFlex 70 Drive) Fault Queue Page



For drives that do not support an alarm queue, the adapter will still display an alarm queue web page (Figure 8.10) showing that the queue is not available.

Figure 8.10 Example of Port 0 (PowerFlex 70 Drive) Alarm Queue Page

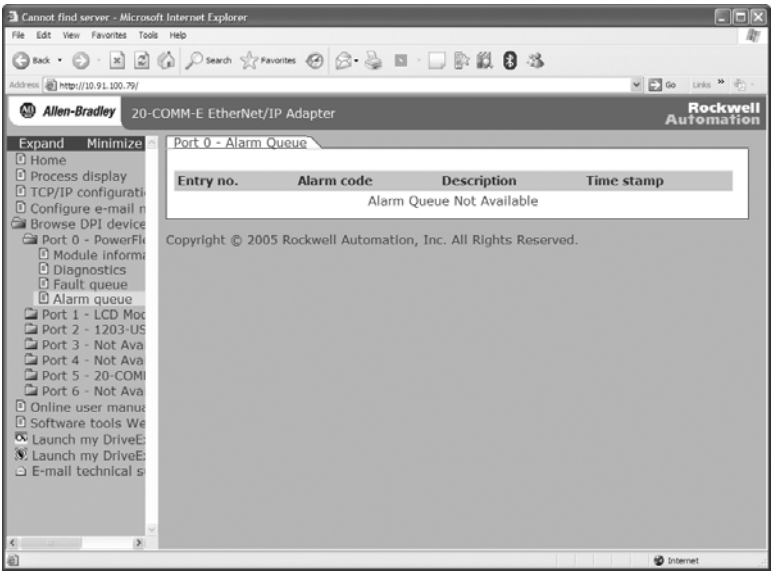
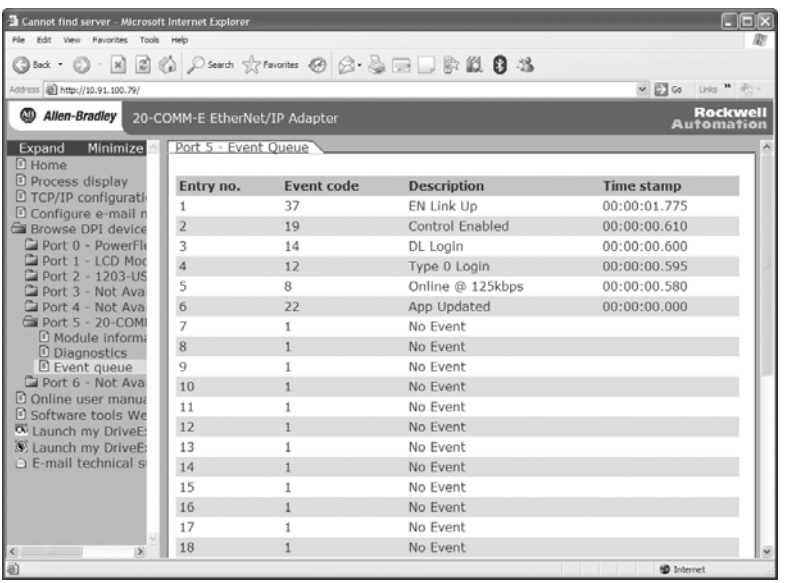


Figure 8.11 shows an example event queue page for the Port 5 device (20-COMM-E adapter).

Figure 8.11 Example of Port 5 (20-COMM-E Adapter) Event Queue Page



Using the Adapter in a DPI External Comms Kit

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

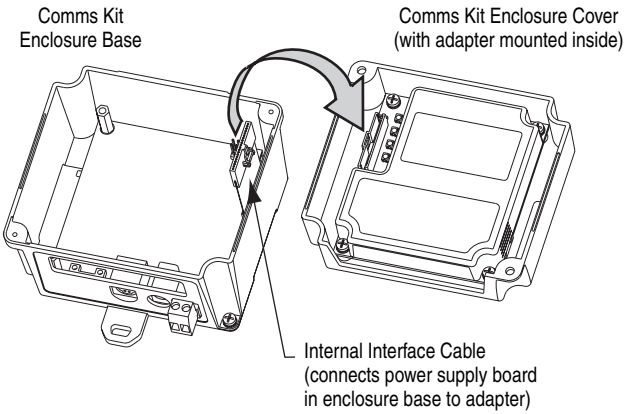
The adapter is typically installed in the internal communication slot on the PowerFlex 7-Class drive. However, there are some instances when an externally-mounted adapter may be desired:

- 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 DPI External 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 to reduce the network node count.

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

The adapter can be installed in a DPI External Comms Kit.

Figure 9.1 Mounting and Connecting the Adapter

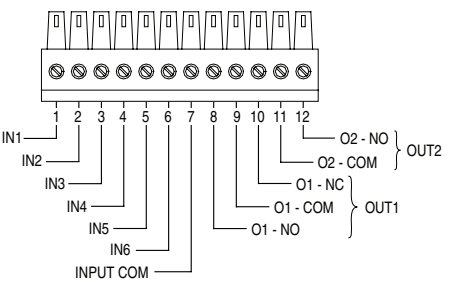


For more information, refer to the *DPI External Communications Kit Installation Instructions* (Publication 20COMM-IN001…).

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 DPI External 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

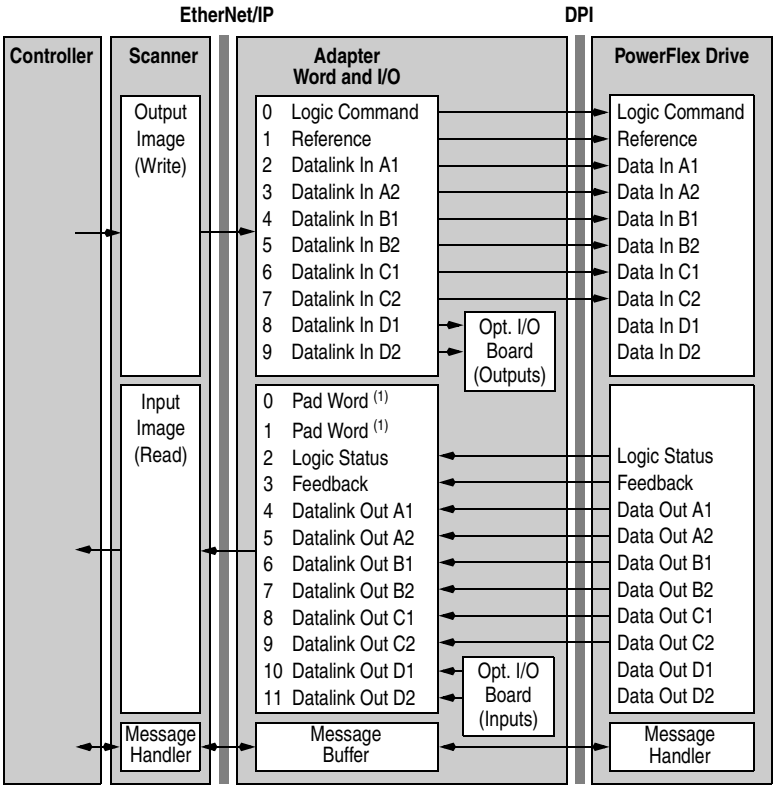


For more information, refer to the *I/O Board Option Installation Instructions* (Publication 20COMM-IN002…).

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 DPI External Comms Kit, Datalink D is dedicated for this function only and is not available for other uses. When the adapter detects the presence of the optional I/O Board, the I/O image is modified as shown in Figure 9.3.

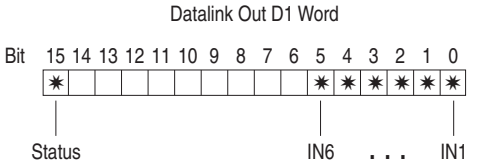
Figure 9.3 Example I/O Image with Datalink D Dedicated to I/O Board and All I/O Enabled



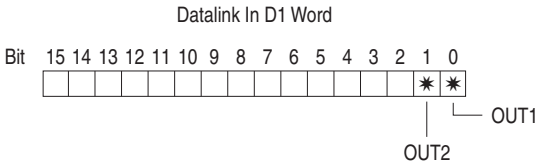
(1) Required by ControlLogix. May or may not be required by other types of controllers.

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 Adapter to Use the Optional I/O Data

To configure the 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.

Send Input/Output Data from the Optional I/O Board to the Network

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

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, see Chapter 5, Using the I/O.

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 *I/O Board Option Installation Instructions* (Publication 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:

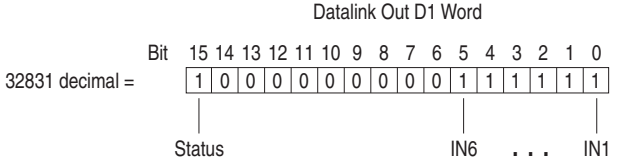
Bit	State	Status Indication	Description
0	1 (On)	OPT Present	I/O data is being exchanged with the adapter.
1	1 (On)	OPT Faulted	The I/O board is taking its fault action.
2	1 (On)	Hold Last	Fault Action is “Hold Last.”
3	1 (On)	Send Flt Cfg	Fault Action is “Fault Config.”

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

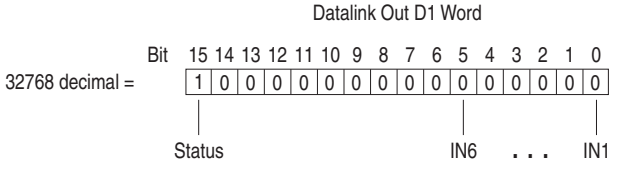
Viewing communication adapter diagnostic item 58 (OPT FW Version) shows the present firmware version on the optional I/O board.

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 that are valid and all on would show:



Inputs that are 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
Connection Limits	30 TCP connections 16 simultaneous CIP connections including 1 exclusive-owner I/O connection
Requested Packet Interval (RPI)	5 ms minimum
Packet Rate	Up to 400 total I/O packets per second (200 in and 200 out)
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 Length Width	 19 mm (0.75 inches) 86 mm (3.39 inches) 78.5 mm (3.09 inches)
Weight	85g (3 oz.)

Environmental

Temperature Operating Storage	 -10 to 50°C (14 to 122°F) -40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% non-condensing
Atmosphere	**Important:** The 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 adapter parameters.

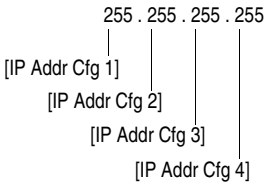
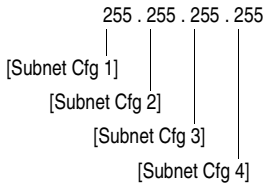
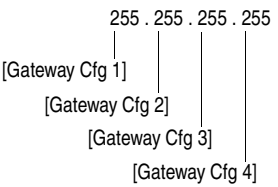
About Parameter Numbers

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 Appendix C, 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 “0” (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 “0” (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 “0” (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 (megabits per second) at which the adapter communicates. (Updates **Parameter 17 - [EN Rate Act]** after a 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 (megabits per second) actually 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 “0” (Ready). Resets the adapter if set to “1” (Reset Module). Restores the adapter to its factory default settings if set to “2” (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 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 in 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 when the controller 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 Definition	Not Used	Not Used	Not Used	Datalink D	Datalink C	Datalink B	Datalink A	Cmd/Ref
Default	x	x	x	0	0	0	0	1
Bit	7	6	5	4	3	2	1	0

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 Cfg]**.	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read Only

Bit Definition	Not Used	Not Used	Not Used	Datalink D	Datalink C	Datalink B	Datalink A	Cmd/Ref
Default	x	x	x	0	0	0	0	1
Bit	7	6	5	4	3	2	1	0

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 controller 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. See Appendix D or the documentation for the drive being used.	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 controller 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 controller 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.

Parameter No.	Name and Description	Details
35	**[M-S Input]** Sets the Master-Slave input data. This data is produced by the scanner and consumed by the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes

Bit Definition	Not Used	Not Used	Not Used	Datalink D Input	Datalink C Input	Datalink B Input	Datalink A Input	Cmd/Ref
Default	x	x	x	0	0	0	0	1
Bit	7	6	5	4	3	2	1	0

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

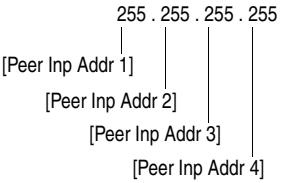
Bit Definition	Not Used	Not Used	Not Used	Datalink D Output	Datalink C Output	Datalink B Output	Datalink A Output	Cmd/Ref
Default	x	x	x	0	0	0	0	1
Bit	7	6	5	4	3	2	1	0

Parameter No.	Name and Description	Details
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.

Parameter No.	Name and Description	Details	
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 “1” (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: 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 Read/Write No
40	**[Peer Cmd Mask]** Sets 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: Minimum: Maximum: Values: Type: Reset Required:	0000 0000 0000 0000 0000 0000 0000 0000 1111 1111 1111 1111 0 = Ignore bit 1 = Use bit Read/Write Yes
41	**[Peer Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that network communications with a peer have been disrupted. This setting is effective only if I/O 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 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).

Parameter No.	Name and Description	Details	
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. Refer to IP Addresses on page G-5 for more information. Changes to these parameters are ignored when **Parameter 47 - [Peer Inp Enable]** is “1” (On).	Default: Default: Default: Default: Minimum: Maximum: Type: Reset Required:	0 0 0 0 0 255 Read/Write 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: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
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

Parameter No.	Name and Description	Details
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 "1" (On).	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 6 = Datalink A Output 7 = Datalink B Output 8 = Datalink C Output 9 = Datalink D Output Type: Read/Write Reset Required: No
51	**[Peer Out Enable]** Determines if Peer I/O output is on or off.	Default: 0 = Off Values: 0 = Off 1 = On Type: Read/Write Reset Required: 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 "1" (On).	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: 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 "1" (On).	Default: 1 Minimum: 1 Maximum: 16 Type: Read/Write Reset Required: No
54	**[Access Control]** This parameter is only available for Series A (version 2.003 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 Definition	Not Used	Not Used	Not Used	Not Used	…	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	E-mail Config	Web Enable
Default	x	x	x	x	…	x	x	x	x	x	x	0	1
Bit	31	30	29	28	…	7	6	5	4	3	2	1	0

Parameter No.	Name and Description	Details
55	**[Web Enable]** This parameter is only available for Series B (version 3.xxx or higher) adapters. Displays the setting of the adapter Web Pages Switch (SW2) when the adapter was last reset.	Default: 0 = Disabled Values: 0 = Disabled 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 Definition	Not Used	Not Used	Not Used	Not Used	Not USed	Not Used	Not Used	E-mail Cfg
Default	x	x	x	x	x	x	x	1
Bit	7	6	5	4	3	2	1	0

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

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

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

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

Identity Object *(Continued)*

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

Assembly Object

Class Code

Hexadecimal	Decimal
0x04	4

Services

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

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.

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Services

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

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.

Register Object *(Continued)*

Class Attributes

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

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.

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

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

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

Parameter Object *(Continued)*

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 Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Services

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

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.

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Services

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

Instances

Supports Instance 1.

Class Attributes

Not supported.

Instance Attributes

Not supported.

Message Structure for Execute_PCCC

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

(Message structure continued on next page.)

PCCC Object *(Continued)*

Message Structure for Execute_PCCC (Continued)

Request		
Name	**Data Type**	**Description**
STS	USINT	0
TNSW	UINT	Transport word
FNC	USINT	Function code. Not used for all CMDs.
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters

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

Message Structure for Execute_DH+

Request		
Name	**Data Type**	**Description**
DLink	UINT	Destination Link ID
DSta	USINT	Destination Station number
DUser	USINT	Destination “User” number
SLink	UINT	Source Link ID
SSta	USINT	Source Station number
SUser	USINT	Source User number
CMD	USINT	Command byte
STS	USINT	0
TNSW	UINT	Transport word
FNC	USINT	Function code; not used for all CMDs
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters

Response		
Name	**Data Type**	**Description**
DLink	UINT	Destination Link ID
DSta	USINT	Destination Station number
DUser	USINT	Destination “User” number
SLink	UINT	Source Link ID
SSta	USINT	Source Station number
SUser	USINT	Source User number
CMD	USINT	Command byte
STS	USINT	Status byte
TNSW	UINT	Transport word. Same value as the request.
EXT_STS	USINT	Extended Status; not used for all CMDs
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

N-File	Description
N40	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.

	Write		*Read*	
Bits	15 0		15 0	
N40:0	0x00	Length (in Bytes)	0x00	Length (in Bytes)
N40:1	DPI Port	0x81	Status Size	Status Type
N40:2	0x00	CIP Service	Data (length varies based on message)	
N40:3	CIP Class			
N40:4	CIP Instance			
N40:5	CIP Attribute			
N40:6 ⋮ N40:63	Data (length varies based on message)			

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

Services

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

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 0x34 = PowerFlex 700H 0x38, 0x39, or 0x3A= PowerFlex 700 0x40 = PowerFlex 7000 0x48, 0x49, or 0x4A = PowerFlex 700S 0x5A = SMC-Flex 0x68, 0x69, or 0x6A = PowerFlex 700VC 0xFF = HIM
1	Get	Family Text	STRING[16]	Text identifying the device.

DPI Device Object *(Continued)*

Class Attributes (Continued)

Attribute ID	Access Rule	Name	Data Type	Description
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.
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

DPI Device Object *(Continued)*

Class Attributes (Continued)

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.

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

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-22 – C-23) 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-22 – C-23)
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-22 – C-23) 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-23.

(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 3)	

DPI Parameter Object *(Continued)*

Descriptor Attributes (Continued)

Bit	Name	Description
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
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	Parameter supports enhanced bit ENUMs.
28	Enhanced ENUM	Parameter supports enhanced ENUMs.
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.

Services

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

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.

DPI Fault Object *(Continued)*

Class Attributes (Continued)

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

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

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.

Services

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

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

DPI Diagnostic Object

Class Code

Hexadecimal	Decimal
0x99	153

Services

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

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-22 – C-23) 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-23.

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Services

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

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

TCP/IP Interface Object

Class Code

Hexadecimal	Decimal
0xF5	245

Services

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

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 I 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

Ethernet Link Object

Class Code

Hexadecimal	Decimal
0xF6	246

Services

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

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 | 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

Notes:

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 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 7-Class Drives (except PowerFlex 700S)

Logic Command Word

Logic Bits															Command	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
															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" – see drive User Manual for more information.

PowerFlex 7-Class Drives (except PowerFlex 700S)
(Continued)

Logic Status Word

Logic Bits															Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
															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 (Phase II)

Logic Bits															Command	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
															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											Reserved	
				x												Reserved	
			x													Spd Ref Sel0	
		x														Spd Ref Sel1	
	x															Spd Ref Sel2	
x																Reserved	

Bits			
14	13	12	
0	0	0	= Spd Ref A
0	0	1	= Spd Ref B
0	1	0	= Preset 2
0	1	1	= Ref. 3 (Preset 3)
1	0	0	= Ref. 4 (Preset 4)
1	0	1	= Ref. 5 (Preset 5)
1	1	0	= Ref. 6 (Preset 6)
1	1	1	= Ref. 7 (Preset 7)

(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.”

PowerFlex 700S Drives *(Continued)*

Logic Status Word (Phase II)

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															x	Active	0 = Not Active 1 = Active
														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																Enable	0 = Not Enabled 1 = Enabled

(1) See Parameter 304 - [Limit Status] in the PowerFlex 700S drive User Manual 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 7-Class 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 network device that can route messages from one 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)

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, ControlNet, and DeviceNet networks. The protocol is used for implicit messaging (real-time I/O) and explicit messaging (configuration, data collection, and diagnostics).

ControlFLASH

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 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)

A second generation peripheral communication interface used by various Allen-Bradley drives and power products, such as PowerFlex 7-Class 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 20-COMM-E adapter, 1203-USB or 1203-SSS 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

A tool for monitoring and configuring Allen-Bradley products and adapters. It can be run on computers running various Microsoft Windows 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 running on various Microsoft Windows operating systems. This software suite provides a family of tools, including DriveExecutive (version 3.01 or higher), 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

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 devices 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 using specific fault configuration parameters in the adapter. When a fault action parameter is set to use the fault configuration data 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 a device. The adapter can be flash updated using the Allen-Bradley software tool ControlFLASH, the built-in flash capability of DriveExplorer (version 4.01 or higher), or when the adapter is installed in a DPI External Comms Kit, the X-modem protocol and a 1203-USB or 1203-SSS converter (version 3.001 or higher firmware).

G

Gateway

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 drive. PowerFlex 7-Class HIMs (20-HIM-xxx) can be used to configure PowerFlex 7-Class drives and their connected peripherals.

Hold Last

When communication is 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 network 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.

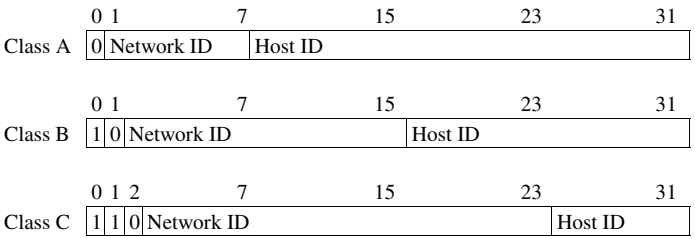
I/O Data

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 controller's point of view. Output is produced by the controller and consumed by the adapter. Input is produced by the adapter and consumed by the controller.

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 (for example, start, stop, direction). It consists of one 16-bit word of output 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 input 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 DriveExecutive) 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 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 (Architecture Class) Drives

The Allen-Bradley PowerFlex 7-Class family of drives supports DPI and includes the PowerFlex 70, PowerFlex 700, PowerFlex 700H, PowerFlex 700S, PowerFlex 700L, 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).

R

Reference/Feedback

The Reference is used to send a setpoint (for example, speed, frequency, torque) to the drive. It consists of one word of output 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 input 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 5/500/5000

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.

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 Mask

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

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.

A

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