LISTEN.
THINK.
SOLVE.®

20-COMM-D DeviceNet Adapter

USER MANUAL

20-COMM-D
Series B
Firmware Version 2.xxx

Allen-Bradley • Rockwell Software
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.

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

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

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

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 a 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) linking to the date of the publication on the back cover. The back cover publication date line hyperlinks to the newest version of the publication on Rockwell Automation's Literature Library web site.	Throughout Manual
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: • "Creating Descriptive Controller Tags (Optional)" through using the DeviceNet Tag Generator feature in RSLogix 5000 • "PLC-5 Example" • "SLC 500 Example"	 4-14 4-19 4-30
Revised Chapter 5 (Using the I/O) by including new ladder logic program examples and more information about the: • "ControlLogix Example" • "PLC-5 Example" • "SLC 500 Example"	 5-10 5-19 5-32
Revised Chapter 6 (Using Explicit Messaging) by including new ladder logic program examples and more information about the: • "ControlLogix Example" • "PLC-5 Example" • "SLC 500 Example"	 6-3 6-17 6-26

Table of Contents

About This Manual

Related Documentation

For:	Refer to:	Publication
DeviceNet™ Cables and Components	*DeviceNet Product Overview*	DNET-SO002…
DeviceNet Network Installation	*DeviceNet Cable System Planning and Installation Manual*	DN-6.7.2
DeviceNet Networks	*DeviceNet Starter Kit User Manual*	DNET-UM003…
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-DNB	*DeviceNet Modules in Logix5000 Control Systems User Manual*	DNET-UM004…
PLC-5® and 1771-SDN	*DeviceNet Scanner Module Installation Instructions* *PLC-5 DeviceNet Scanner Module User Manual*	1771-IN014… 1771-UM118…

For:	Refer to:	Publication
SLC™ 500 and 1747-SDN	*DeviceNet Scanner Module Installation Instructions* *SLC 500 DeviceNet Scanner Module User Manual*	1747-IN058… 1747-UM655…
RSNetWorx™ for DeviceNet™	*RSNetWorx for DeviceNet Getting Results Guide*, and online help (installed with the software)	DNET-GR001…

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

Rockwell Automation Support

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

Local Product Support

Contact your local Rockwell Automation, Inc. representative for:

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

Technical Product Assistance

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 or contact Rockwell Automation, Inc.

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), RSNetWorx for DeviceNet (version 7.00), 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.

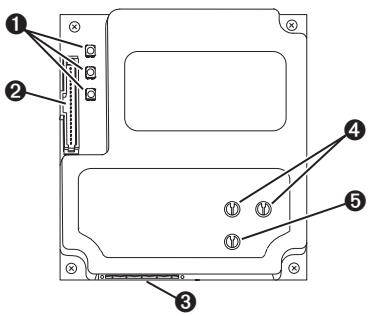
Notes:

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-D adapter (FRN v2.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
1	Status Indicators	Three LEDs that indicate the status of the DPI, the adapter, and network connection. Refer to Chapter 7, Troubleshooting.
2	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.
3	DeviceNet Connector	A 5-pin connector to which a 5-pin linear plug (supplied with adapter) can be connected for the DeviceNet cable.
4	Node Address Switches	Switches for setting the node address. Refer to Setting the Node Address Switches on page 2-2.
5	Data Rate Switch	Switch for setting the DeviceNet data rate at which the adapter communicates. Refer to Setting the Data Rate Switch on page 2-3.

Features

The adapter features include:

- Typical mounting in a PowerFlex 7-Class drive. The Series B 20-COMM-D adapter (FRN v2.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 1.xxx	No	No
Series B/FRN 2.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.
- Switches to set a node address and network data rate before applying power to the PowerFlex drive. Alternately, you can disable the switches and use adapter parameters to configure these functions.
- 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).
- 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 and UCMM (Unconnected Message Manager) support.
- Multiple data exchange methods, including Polled, Cyclic, and Change of State (COS), to transmit data between the network and adapter.
- 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.

- Faulted node recovery support. You can configure a device even when it is faulted on the network if you have a configuration tool that uses faulted node recovery and have set the data rate switch to “PGM” (Program). With the PGM setting, the adapter uses parameter settings for the data rate and node address instead of switch settings.
- Support for DPI routing, enabling access to any networked PowerFlex 7-Class drive (with 20-COMM-D 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)
- ❑ One 5-pin linear DeviceNet plug (connected to the DeviceNet connector on the adapter)
- ❑ This manual

User-Supplied Equipment

To install and configure the adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ DeviceNet cable – thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended
- ❑ Configuration tool, such as:
  - PowerFlex 7-Class HIM (20-HIM-*)
  - RSNetWorx for DeviceNet
  - 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)
- ❑ Controller configuration software (such as RSLogix 5/500/5000)
- ❑ A PC connection to the DeviceNet network (such as 1784-PCD, 1784-PCID, 1784-PCIDS or 1770-KFD)

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 10 - [Comm Flt Action]**, **11 - [Idle Flt Action]**, and **34 - [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

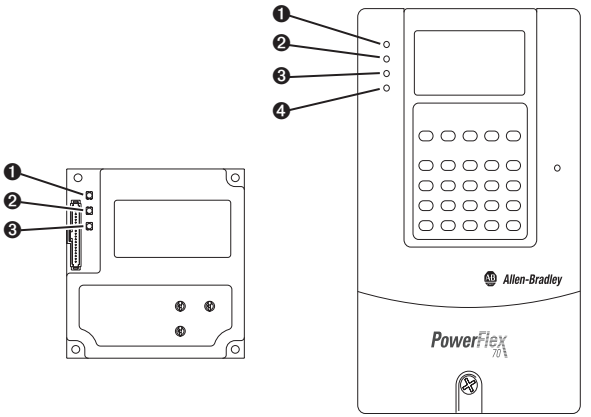
This section is provided to help experienced users quickly start using the adapter. If you are unsure how to complete a step, refer to the referenced chapter.

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 a DeviceNet 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: • Node address and data rate (if Data Rate switch is set to “PGM”) • I/O configuration • Change of State, Cyclic or Polled I/O data exchange • Master-Slave or Peer-to-Peer hierarchy • Fault actions	Chapter 3, Configuring the Adapter
6	**Configure the scanner to communicate with the adapter.** Use a controller configuration tool such as RSNetWorx for DeviceNet and RSLogix to configure the master on the DeviceNet 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 three 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 (not used for DeviceNet)

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.

Notes:

Installing the Adapter

This chapter provides instructions for installing the adapter in a PowerFlex 7-Class drive. The Series B 20-COMM-D adapter (FRN v2.xxx or higher) 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 *DeviceNet Product OverView Manual* (Publication DNET-SO002…) and the *DeviceNet Cable System Planning and Installation Manual* (Publication DN-6.7.2). These publications provide information on selecting cables, setting up a network, and network basics.
- Verify that you have all required equipment. Refer to Required Equipment on page 1-4.

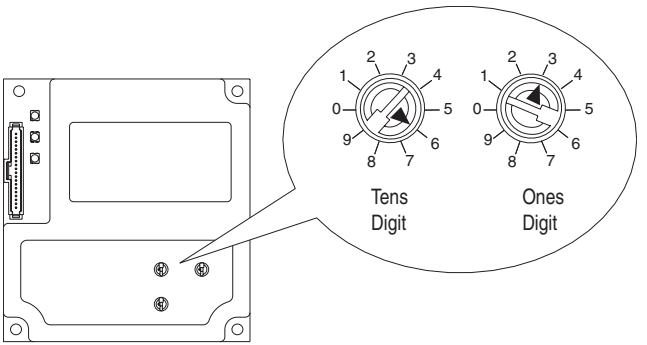
ATTENTION: Risk of equipment damage exists. The adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer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

Setting the Node Address Switches

Set the adapter node address switches (Figure 2.1) by rotating the switches to the desired value for each digit.

Important: Each node on the DeviceNet network must have a unique address. Set the node address before power is applied because the adapter uses the node address it detects when it first receives power. To change a node address, you must set the new value and then remove and reapply power to (or reset) the adapter.

Figure 2.1 Setting Adapter Node Address Switches



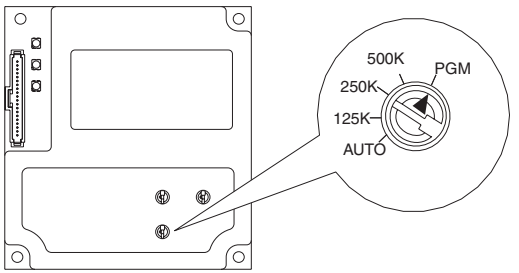
Setting	Description
0 - 63	Node address used by the adapter if switches are enabled. The default switch setting is 63. Node address 63 is also the default address used by all uncommissioned devices. We recommend that you do not use this address as the final adapter address. **Important:** If the Data Rate switch is set to "PGM" (Program), the adapter uses the **Parameter 03 - [DN Addr Cfg]** setting for the node address. The default parameter setting is 63. Refer to Setting the Node Address on page 3-3.
64 - 99	Do not use. The adapter will not recognize these addresses.

The switch settings can be verified using a PowerFlex HIM, DriveExplorer software, or DriveExecutive software and viewing Diagnostic Device Item number 30 (page 7-6).

Setting the Data Rate Switch

Set the adapter Data Rate switch (Figure 2.2) by rotating the switch to the desired setting.

Figure 2.2 Setting the Data Rate Switch



Setting	Description
Auto	Sets the adapter to the data rate used by other network devices. Another device on the network must be set to a data rate.
125K, 250K, 500K	Sets the adapter to the respective data rate.
PGM	The adapter uses the setting of **Parameter 05 - [DN Rate Cfg]** for the data rate. This is the default parameter setting. Refer to Setting the Data Rate on page 3-3.

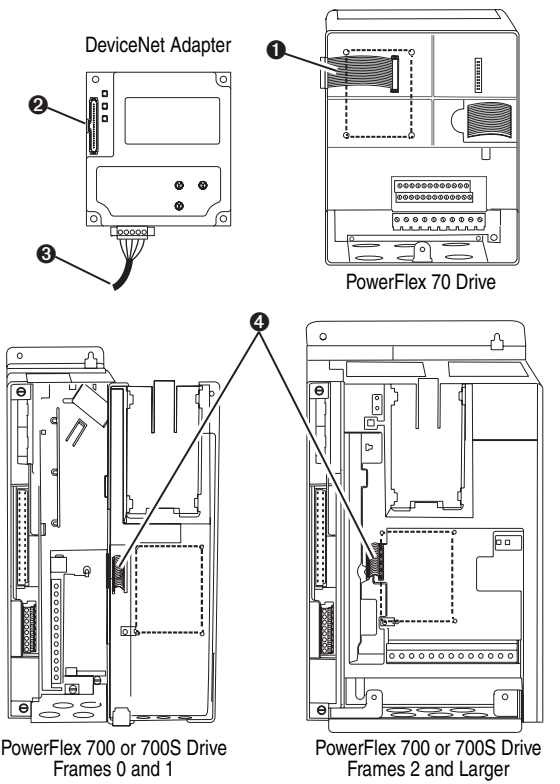
The switch settings can be verified using a PowerFlex HIM, DriveExplorer software, or DriveExecutive software and viewing Diagnostic Device Item number 29 (page 7-6).

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 2.3 DPI Ports and Internal Interface Cables



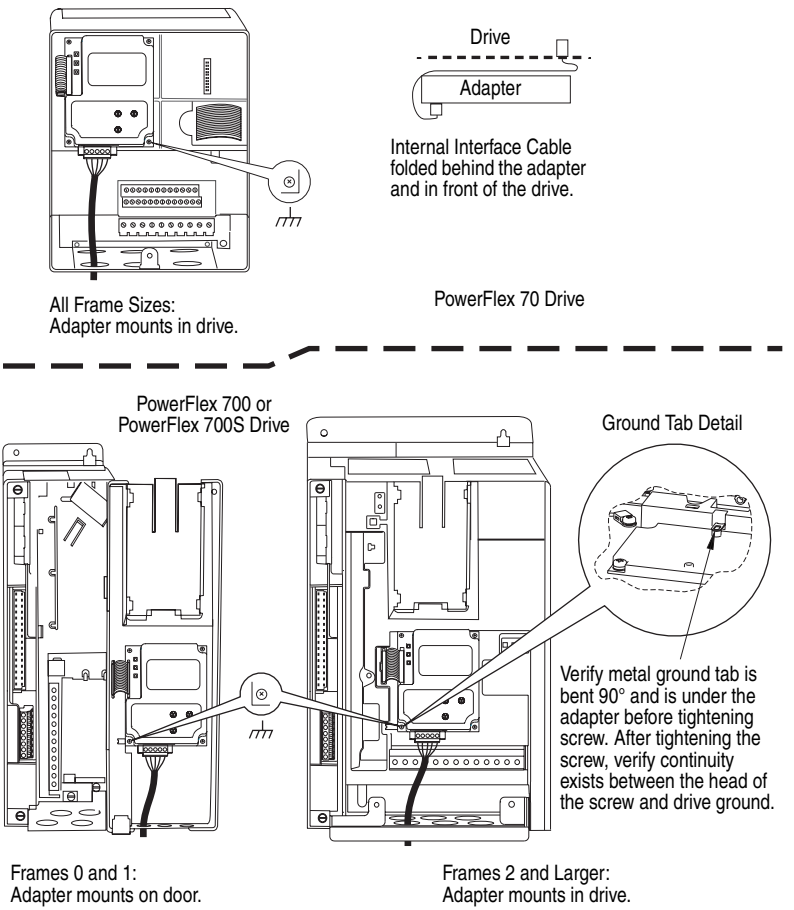
Item	Description
1	15.24 cm (6 in.) Internal Interface cable
2	DPI Connector

Item	Description
3	DeviceNet cable
4	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: To properly ground the adapter, tighten the specific screw shown in Figure 2.4. Recommended torque is 0.9 N-m (8.0 lb.-in.). Thereafter, verify continuity exists between the head of the screw and drive ground.

Figure 2.4 Mounting and Grounding the Adapter



Connecting the Adapter to the Network

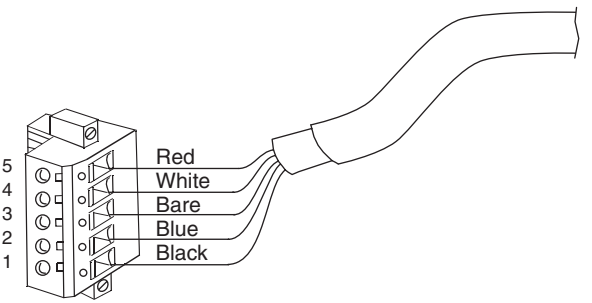
ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove power from the drive, and then verify power has been discharged before installing or removing the adapter.

1. Remove power from the network and drive.
2. Use static control precautions.
3. Connect a DeviceNet cable to the network, and route it through the bottom of the PowerFlex drive (Figure 2.4). DeviceNet Thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended.

   Important: Maximum cable length depends on data rate. For details, refer to Data Rate in the Glossary.

4. Connect the 5-pin linear plug (shipped with the adapter) to the DeviceNet cable (Figure 2.5). The adapter can also support a 10-pin linear plug.

Figure 2.5 Connecting the 5-Pin Linear Plug to the DeviceNet Cable



Terminal	Color	Signal	Function
5	Red	V+	Power Supply
4	White	CAN_H	Signal High
3	Bare	SHIELD	Shield
2	Blue	CAN_L	Signal Low
1	Black	V–	Common

5. Insert the DeviceNet cable plug into the mating adapter socket, and secure it with the two screws. Verify that the colors of the wires on the plug match the color codes on the 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 2.6) after power has been applied. Possible start-up status indications are shown in Table 2.A.

Figure 2.6 Drive and Adapter Status Indicators (location on drive may vary)

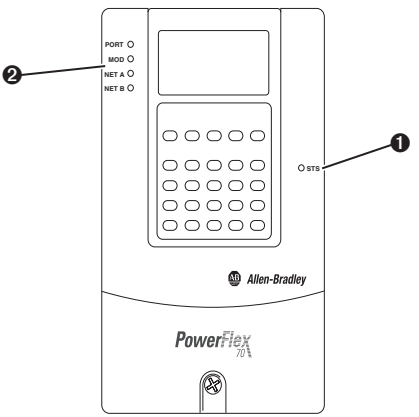


Table 2.A Drive and Adapter Start-Up Status Indications

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	n/a	n/a	Not used for DeviceNet.

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 the digital inputs are not used, change drive Parameters P361 - [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 node address on the network. (Refer to Setting the Node Address Switches on page 2-2 and the Glossary for details about node addresses.)

Important: New settings are recognized only when power is applied to the adapter, or the adapter is reset. If you change a setting, cycle power or reset the adapter to apply the changes.

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

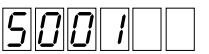
The adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters:

Tool	Refer to...
PowerFlex HIM	page 3-2
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)

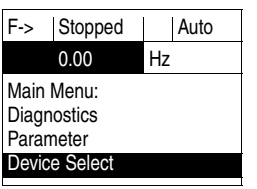
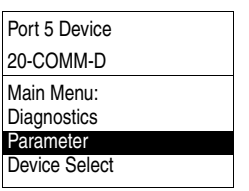
Using the PowerFlex 7-Class HIM

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

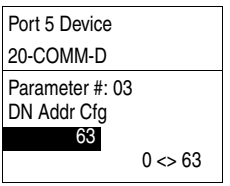
Step	Key(s)	Example Screens
1. In the main menu, press the Up Arrow or Down Arrow to scroll to **Device Select**.	or	
2. Press Enter to enter your selection.		
3. Press the Up Arrow or Down Arrow to scroll to the adapter (20-COMM-D).	or	
4. Press Enter to select the adapter. A parameter database is constructed, 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.		

Setting the Node Address

If the adapter Data Rate switch (Figure 2.1) is set to "PGM," the value of **Parameter 03 - [DN Addr Cfg]** determines the node address. We recommend that you do not use node address 63 because all new devices on the network use this address as the default address. Also, node address 63 is used for Automatic Device Recovery (ADR).

1. Set the value of **Parameter 03 - [DN Addr Cfg]** to a unique node address.

Figure 3.1 Example Node Address Screen on an LCD HIM



2. Reset the adapter (see Resetting the Adapter on page 3-15).

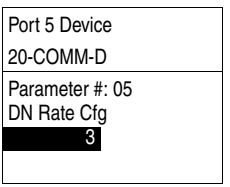
   The NET A status indicator will be solid green or flashing green if the node address is correctly configured, and the adapter is connected to an operational network.

Setting the Data Rate

If the adapter Data Rate switch (Figure 2.1) is set to "PGM," the value of **Parameter 05 - [DN Rate Cfg]** determines the data rate. The Autobaud setting will detect the data rate used on the network if another device is setting the data rate. Your application may require a different setting.

1. Set the value of **Parameter 05 - [DN Rate Cfg]** to the data rate at which your network is operating.

Figure 3.2 Example Data Rate Screen on an LCD HIM



Value	Baud Rate
0	125 kbps
1	250 kbps
2	500 kbps
3	Autobaud

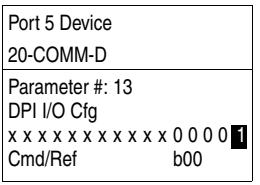
2. Reset the adapter (see Resetting the Adapter on page 3-15).

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 13 - [DPI I/O Cfg]**.

Figure 3.3 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 3.3, it is highlighted and equals “1.”

2. If a controller is used to control the drive, adapter **Parameters 25 - [M-S Input]** and **26 - [M-S Output]** for Master-Slave Hierarchy must be set (see Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication) on page 3-5).

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 DeviceNet adapter is the only adapter using the enabled Datalink(s).

5. Reset the adapter (see Resetting the Adapter on page 3-15).

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 3-5. 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.

Selecting Master-Slave or Peer-to-Peer

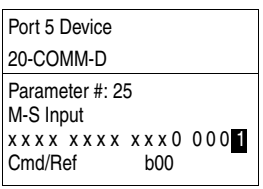
A hierarchy determines the type of device with which the adapter exchanges data. In a Master-Slave hierarchy, the adapter exchanges data with a master, such as a scanner (1756-DNB, 1771-SDN, 1747-SDN, etc.). In a Peer-to-Peer hierarchy, the adapter exchanges data with one or more DeviceNet adapters connected to other drives that have compatible Logic Command/Status words.

Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication)

1. Enable the desired I/O in **Parameter 13 - [DPI I/O Cfg]**. Refer to Figure 3.3.

2. Set the bits in **Parameter 25 - [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 3.4 Example Master-Slave Input Screen on an LCD HIM

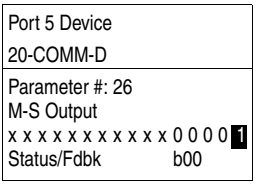


Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A Input
2	Datalink B Input
3	Datalink C Input
4	Datalink D Input
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.4, it is highlighted and equals “1.”

3. Set the bits in **Parameter 26 - [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 3.5 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 3.5, it is highlighted and equals "1."

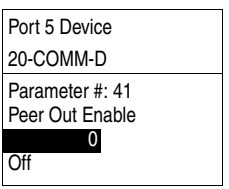
4. Reset the adapter (see Resetting the Adapter on page 3-15).

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 (Drive-to-Drive Communication)

1. Verify that **Parameter 41 - [Peer Out Enable]** is set to "0" (Off). This parameter must be Off while you configure peer output parameters.

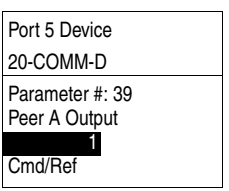
Figure 3.6 Example Peer Out Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

2. Set **Parameter 39 - [Peer A Output]** to select the source of the data to output to the network.

Figure 3.7 Example Peer A Output Screen on an LCD HIM

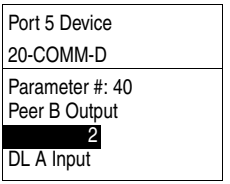


Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input
6 - 9	Datalink A, B, C, or D Output

If you are transmitting a 32-bit Reference or 32-bit Datalink, only Peer A Output will be available. Peer B Output cannot be used.

3. If desired, set **Parameter 40 - [Peer B Output]** to select an additional source of the data to output to the network.

Figure 3.8 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

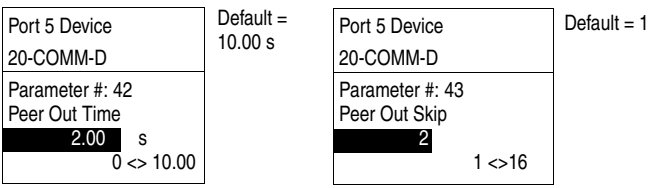
4. Set **Parameters 42 - [Peer Out Time]** and **43 - [Peer Out Skip]** to establish the minimum and maximum intervals between Peer messages. Because the adapter transmits Peer messages when a change-of-state condition occurs, minimum and maximum intervals are required.

   – 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 42 - [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 42 - [Peer Out Time]** multiplied by the value of **Parameter 43 - [Peer Out Skip]**.

   In the Figure 3.9 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 3.9 Example Peer Out Time and Peer Out Skip Screens on an LCD HIM



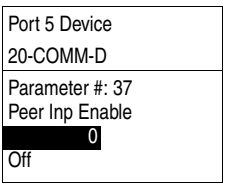
5. Set **Parameter 41 - [Peer Out Enable]** to “1” (On). The adapter will transmit the data selected in **Parameters 39 - [Peer A Output]** and **40 - [Peer B Output]** to the network. Another adapter must be configured to receive the Peer I/O data.

Setting the Adapter to Receive Peer-to-Peer Data

Important: The device receiving peer data must match the data sizes of the sending device. For example, if the sending device uses a 16-bit Reference, the receiving device must also use a 16-bit Reference. Datalinks, if used, must also be the same size.

1. Verify that **Parameter 37 - [Peer Inp Enable]** is set to "0" (Off). This parameter must be Off while you configure the peer input parameters.

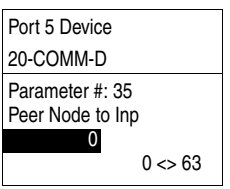
Figure 3.10 Example Peer Input Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

2. Set **Parameter 35 - [Peer Node to Inp]** to the address of the node from which you want to receive data. Valid nodes must have 20-COMM-D adapters connected to drives with compatible Logic Command/Status words.

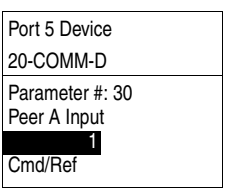
Figure 3.11 Example Node to Input Screen on an LCD HIM



Default = 0

3. Set **Parameter 30 - [Peer A Input]** to select the destination of the data that is input to the drive as Peer A.

Figure 3.12 Example Peer A Input Screen on an LCD HIM

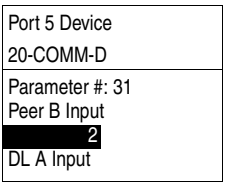


Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input

If you are receiving a 32-bit Reference or 32-bit Datalink, only Peer A Input will be available. Peer B Input cannot be used.

4. If desired, set **Parameter 31 - [Peer B Input]** to select the destination of the data to input to the drive as Peer B.

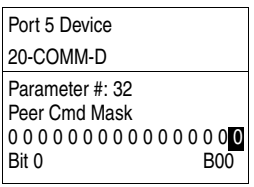
Figure 3.13 Example Peer B Input Screen on an LCD HIM



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 32 - [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 3.14 Example Peer Logic Command Mask Screen on an LCD HIM



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

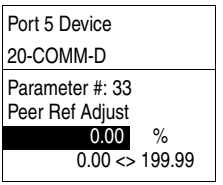
If the adapter receives a Logic Command from both a Master device and a Peer device, each command bit must have only one source. The source of command bits set to “0” will be the Master device. The source of command bits set to “1” will be the Peer device.

6. Reset the adapter (see Resetting the Adapter on page 3-15) so that changes to **Parameter 32 - [Peer Cmd Mask]** take effect.

7. If the adapter is receiving a Reference, it can be scaled using **Parameter 33 - [Peer Ref Adjust]** to the desired scaling factor between 0.00 and 199.99%.

ATTENTION: To guard against equipment damage and/or personal injury, note that changes to adapter **Parameter 33 - [Peer Ref Adjust]** take effect immediately. A drive receiving its Reference from Peer I/O will receive the newly scaled Reference, resulting in a change of speed.

Figure 3.15 Example Peer Reference Adjust Screen on an LCD HIM

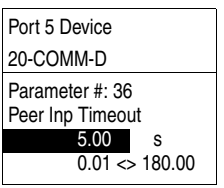


8. Set **Parameter 36 - [Peer Inp Timeout]** to the maximum amount of time the adapter will wait for a message before timing out.

   Important: This value must be greater than the product of **Parameter 42 - [Peer Out Time]** multiplied by **Parameter 43 - [Peer Out Skip]** in the adapter from which you are receiving I/O.

   For example, if the value of **Parameter 42 - [Peer Out Time]** is 2.00 seconds and the value of **Parameter 43 - [Peer Out Skip]** is 2 (see Figure 3.9), then **Parameter 36 - [Peer Inp Timeout]** needs to have a value greater than 4.00, such as 5.00 (see Figure 3.16).

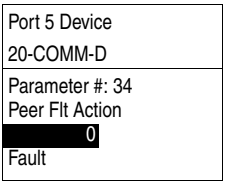
Figure 3.16 Example Peer Input Timeout Screen on an LCD HIM



9. Set **Parameter 34 - [Peer Flt Action]** to the action that the adapter will take if it times out.

ATTENTION: Risk of injury or equipment damage exists. **Parameter 34 - [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 3.17 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 3-13.

10. Set **Parameter 37 - [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.

Selecting COS, Cyclic or Polled I/O

The data exchange (sometimes called allocation) is the method that the adapter uses to exchange data on the DeviceNet network. Polled is the default and is recommended — unless one of the other following data exchanges, which the adapter supports, is more appropriate for your application:

- COS (Change of State)
- Cyclic
- Polled
- Polled and COS
- Polled and Cyclic

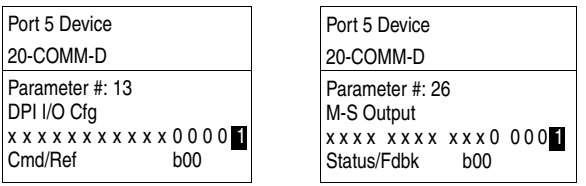
If "Polled and COS" or "Polled and Cyclic" is used, the adapter receives the I/O from the polled messages. It transmits its Logic Status and Feedback in COS or Cyclic messages. Other data is transmitted in Polled messages.

Cyclic and Polled data exchanges are configured in the scanner, so you only need to set the I/O configuration in the adapter. COS data exchange must be configured in both the adapter and the scanner. You need to set the I/O configuration and COS parameters in the adapter.

Using COS (Change of State) Data Exchange

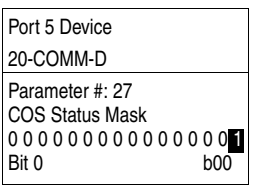
1. Set Bit 0 (the Logic Command/Reference bit) in **Parameter 13 - [DPI I/O Config]** to "1" (Enabled) and Bit 0 (the Logic Status/ Feedback bit) in **Parameter 26 - [M-S Output]** to "1" (Enabled). Changes to bits in the Logic Status/Feedback trigger messages in COS data exchange.

Figure 3.18 Example I/O Configuration Screens on an LCD HIM



2. Set **Parameter 27 - [COS Status Mask]** for the bits in the Logic Status word that should be checked for changes. The bit definitions for the Status Mask will depend on the drive to which the adapter is connected. Refer to Appendix D or drive documentation.

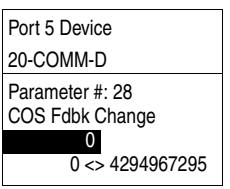
Figure 3.19 Example COS Status Mask Configuration Screen on an LCD HIM



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

3. Set **Parameter 28 - [COS Fdbk Change]** for the amount of change to the Feedback that is required to trigger a Change of State message.

Figure 3.20 Example COS Fdbk Change Configuration Screen on an LCD HIM



Default = 0

The adapter is now configured for COS data exchange. You must configure the scanner to allocate it using COS (Chapter 4, Configuring the 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 10 - [Comm Flt Action]** and a different response to an idle controller using **Parameter 11 - [Idle Flt Action]**.

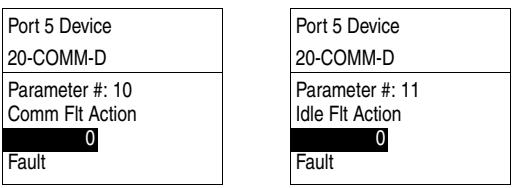
ATTENTION: Risk of injury or equipment damage exists. **Parameters 10 - [Comm Flt Action]** and **11 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the controller is idle. By default, these parameters fault the drive. You can set 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 10 - [Comm Flt Action]** and **11 - [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 15 - [Flt Cfg Logic]** through **24 - [Flt Cfg D2 In]**).

Figure 3.21 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 10 - [Comm Flt Action]** or **11 - [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
15	Flt Cfg Logic	A 16-bit value sent to the drive for Logic Command.
16	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.
17 – 24	Flt Cfg x1 In or Flt Cfg x2 In	

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

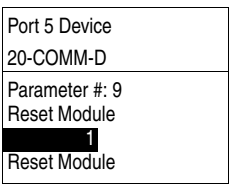
Resetting the Adapter

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 09 - [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 09 - [Reset Module]** to “1” (Reset Module).

Figure 3.22 Example Reset Screen on an LCD HIM

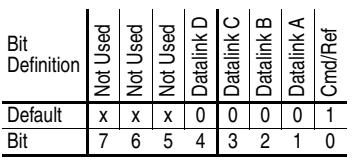


Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

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 values. 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
04	DN Addr Act	The node address used by the adapter. This will be one of the following values: • The address set by the rotary switches. • The value of **Parameter 03 - [DN Addr Cfg]**. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
06	DN Rate Act	The data rate used by the adapter. This will be one of the following values: • The data rate set by the rotary switch. • The value of **Parameter 05 - [DN Rate Cfg]**. • An old data rate of the switch or parameter if it has been changed and the adapter has not been reset.
07	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.
08	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.
12	DN Active Cfg	Source from which the adapter node address and data rate are taken. This will be either “1” (Switches) or “0” (EEPROM) in which the address from **Parameter 03 - [DN Addr Cfg]** and the data rate from **Parameter 05 - [DN Rate Cfg]** is stored. The source is determined by the settings of the switches on the adapter.
14	DPI I/O Act	The Reference/Feedback and Datalinks used by the adapter. This value is the same as **Parameter 13 - [DPI I/O Cfg]** unless the parameter was changed and the adapter was not reset. 

Flash Updating the Adapter

The adapter can be flash updated over the network or serially through a direct connection from a computer to the drive using a 1203-USB or 1203-SSS serial converter.

When flashing over the network, you can use the Allen-Bradley software tool ControlFLASH, the built-in flash capability of DriveExplorer Lite or Full, or the built-in flash capability of DriveExecutive.

When flashing through a direct serial connection from a computer to a drive, you can use the same Allen-Bradley software tools described above, or you can use HyperTerminal set to the X-modem protocol.

To obtain a flash update for this adapter, go to http://www.ab.com/support/abdrives/webupdate. This site contains all firmware update files and associated Release Notes that describe firmware update enhancements/anomalies, how to determine the existing firmware version, and how to flash update using DriveExplorer, DriveExecutive or ControlFLASH.

Notes:

Configuring the I/O

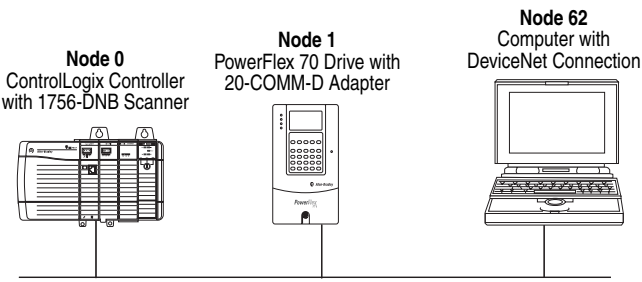
This chapter provides instructions on how to configure Rockwell Automation controllers (ControlLogix, PLC-5 or SLC 500) to communicate with the adapter and connected PowerFlex drive.

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 DeviceNet network (see Figure 4.1). In our example, we will configure a ControlLogix controller with 1756-DNB scanner to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.1 Example ControlLogix DeviceNet Network

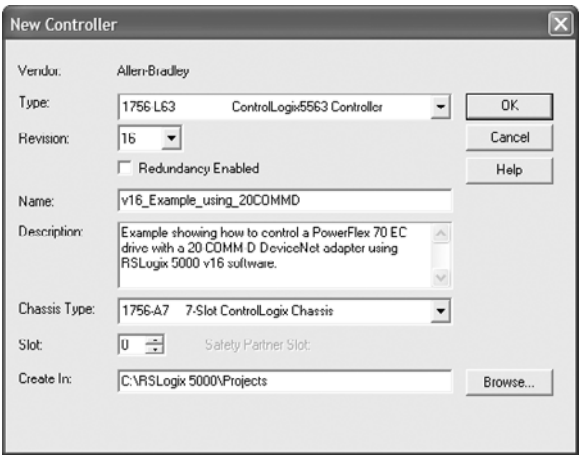


Adding the Scanner to the I/O Configuration

To establish communications between the controller and adapter over the network, you must first add the ControlLogix controller and its scanner 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).

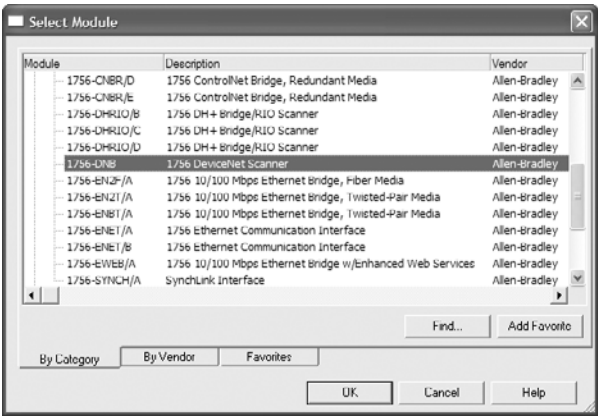
Figure 4.2 New Controller Screen (RSLogix 5000 v16 shown)



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).

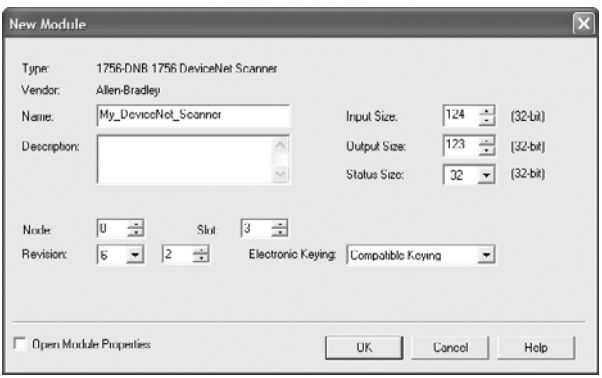
Figure 4.3 Scanner Select Module Screen



3. In the list, select the DeviceNet scanner used by your controller. In this example, we use a 1756-DNB DeviceNet Scanner, so the 1756-DNB 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 scanner's New Module screen (Figure 4.4) appears.

Figure 4.4 Scanner New Module Screen



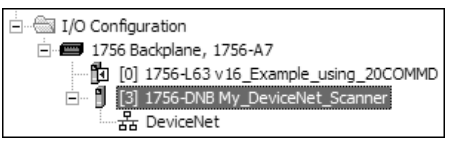
5. Edit the following:

Box	Setting
Name	A name to identify the scanner.
Description	Optional – description of the scanner.
Node	The node address of the DeviceNet scanner.
Slot	The slot of the DeviceNet scanner in the rack.

Box	Setting
Revision	The minor revision of the firmware in the scanner. (You already set the major revision by selecting the scanner 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 scanner 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.
Input Size	The size of the input data for the DeviceNet scanner. It is recommended to use the default value of 124.
Output Size	The size of the output data for the DeviceNet scanner. It is recommended to use the default value of 123.
Status Size	The size of the status data for the DeviceNet scanner. It is recommended to use the default value of 32.
Open Module Properties	When this box is checked, additional module properties screens will appear to further configure the scanner after clicking **OK**. When unchecked, the scanner's New Module screen will close after clicking **OK**. For this example, uncheck this box.

6. Click **OK**. The scanner is now added to the RSLogix 5000 project. It appears in the I/O Configuration folder. In our example, a 1756-DNB scanner appears under the I/O Configuration folder (Figure 4.5) with its assigned name. For convenience, keep the project open. Later in this chapter the project will need to be downloaded to the controller.

Figure 4.5 RSLogix 5000: I/O Configuration Folder



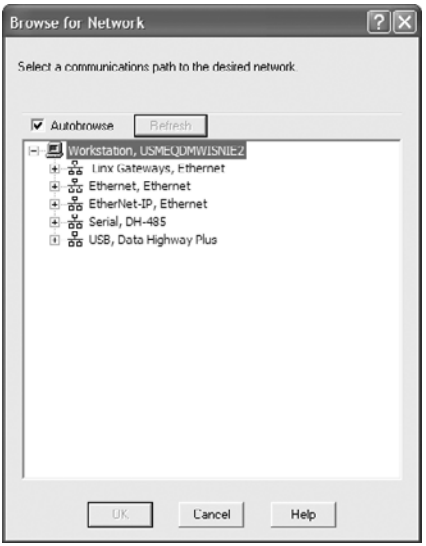
Using RSNetWorx for DeviceNet to Configure/Save the I/O to the Scanner

After adding the scanner to the I/O configuration, you now must configure and save the I/O to the scanner.

1. Start RSNetWorx for DeviceNet. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen. Then select “DeviceNet Configuration” as the network configuration type, and click **OK**.

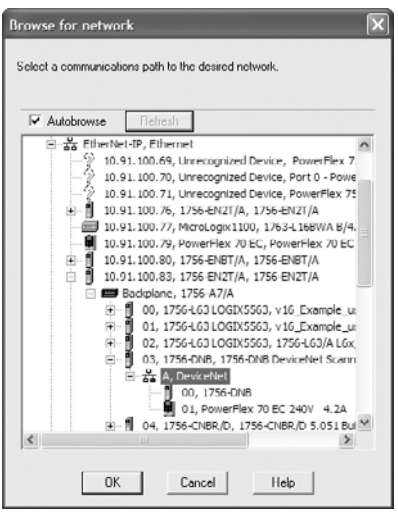
2. Select **Network > Online** to display the Browse for Network screen (Figure 4.6).

Figure 4.6 Browse for Network Screen



3. Expand the communications path from your computer to the DeviceNet scanner. Figure 4.7 shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

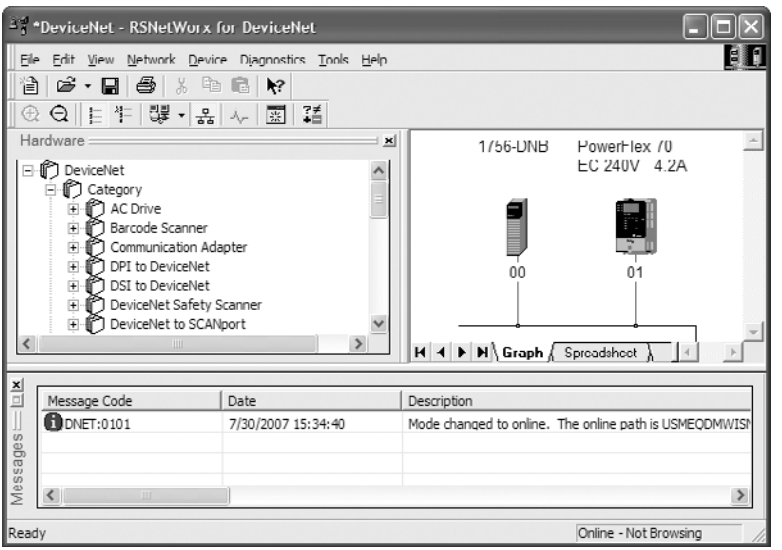
Figure 4.7 Expanded Browse for Network Screen



If a message box appears about uploading or downloading information, click **OK**.

4. As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet creates a graphical representation of the devices on the network (Figure 4.8).

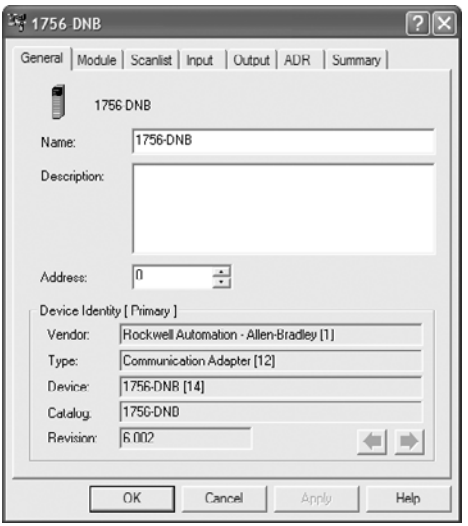
Figure 4.8 RSNetWorx for DeviceNet Graph View Screen



TIP: If the icon for the drive (for this example, PowerFlex 70 EC) on the network appears as Unrecognized Device, use RSNetWorx for DeviceNet to register or create the appropriate drive EDS file. For information to register or create a drive EDS file, refer to RSNetWorx for DeviceNet online help. You can also download the EDS file from www.ab.com/networks/eds. **Note:** If the optional DeviceNet Tag Generator is going to be used for creating descriptive controller tags (page 4-14), the EDS file from the web site must be downloaded and used.

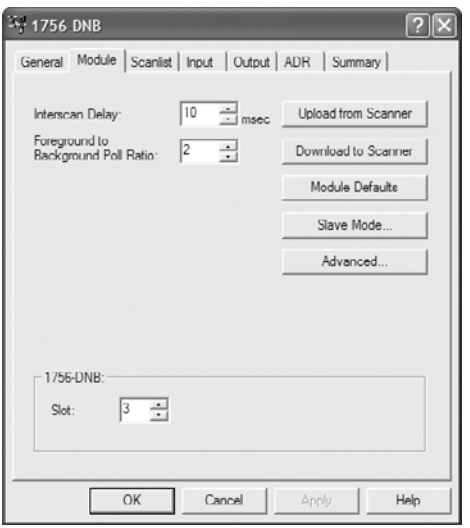
5. In the graph view, right-click the 1756-DNB icon and select **Properties…** to display its properties screen (Figure 4.9).

Figure 4.9 1756-DNB Properties Screen



6. Click the Module tab to display the Scanner Configuration Applet screen. Click **Upload** to upload the 1756-DNB configuration to the RSNetWorx for DeviceNet project and display the 1756-DNB Module Tab screen (Figure 4.10).

Figure 4.10 1756-DNB Module Tab Screen



7. Edit the following:

Box	Setting
Interscan Delay	Sets the scanner time delay between consecutive I/O scans on the network. For this example, it is recommended to leave the default setting of 10 milliseconds.
Foreground...	Sets the ratio of foreground to background polls. For this example, it is recommended to leave the default setting of 2.
Slot	Sets the slot location in which the scanner is installed. For this example, Slot 3 is selected.

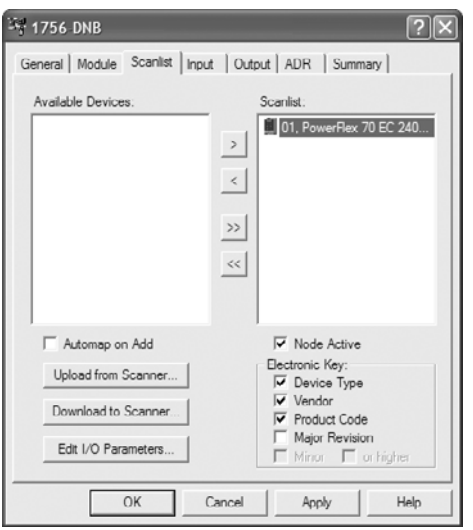
Then click **Apply**.

8. Click the Scanlist tab to begin the drive I/O configuration. The Available Devices window (left) shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist window (right) shows devices that are presently on the DeviceNet network and are configured.

TIP: The Automap on Add box is checked by default and allows RSNetWorx for DeviceNet to automatically map the drive I/O into the scanner in the next available registers. The mapping is based on the minimum I/O requirements (4 bytes for input and 4 bytes for output) that the scanner obtains from the drive EDS file.

For this example, uncheck the Automap on Add box. Then select the PowerFlex 70 EC drive in the Available Devices window and click the **>** button to move it to the Scanlist window (Figure 4.11).

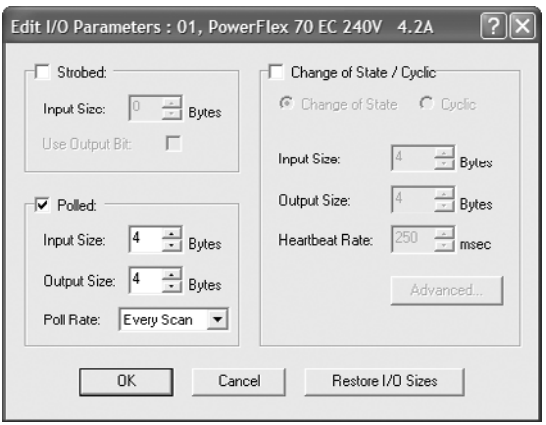
Figure 4.11 1756-DNB Scanlist Tab Screen



Box	Setting
Node Active	Activates/deactivates the scanlist in the 1756-DNB for the selected device. For this example, keep the box checked.
Device Type Vendor Product Code Major Revision	These Electronic Key category check boxes select how specific the device in the scanlist must be for the 1756-DNB to match its compatibility for I/O operation. The more boxes that are checked, the more specific the device must be to operate. For this example, leave the default boxes (Device Type, Vendor, and Product Code) checked.

9. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen (Figure 4.12) for the PowerFlex 70 EC drive used in this example.

Figure 4.12 Edit I/O Parameters Screen



In this screen, select the type(s) of data exchange (Polled, Change of State, and/or Cyclic). For this example, we selected Polled. Then enter the number of bytes that are required for your I/O in the Input Size and Output Size boxes. The size will depend on the I/O that you enabled in the adapter using **Parameter 13 - [DPI I/O Cfg]**, and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of “20” and an Output Size of “20” are selected.

Important: Make sure that the bits for **Parameters 25 - [M-S Input]** and **26 - [M-S Output]** are set to match **Parameter 13 - [DPI I/O Cfg]**. Refer to Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication) on page 3-5 for details.

Table 4.A, Table 4.B, and Table 4.C list the number of bytes required for the Input Size and Output Size boxes for specific I/O configurations and only the Polled data exchange method. For Input Sizes and Output Sizes for other data exchange methods and specific I/O configurations, refer to the tables in Appendix E.

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (16-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				8	8	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			12	12	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		16	16	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	20	20	...1 1111	...1 1111	...1 1111

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				12	12	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			20	20	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		28	28	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	36	36	...1 1111	...1 1111	...1 1111

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

Logic Cmd/ Status	Ref/ Fdbk (32-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					8	8	...0 0001	...0 0001	...0 0001
✔	✔	✔				16	16	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			24	24	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		32	32	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	40	40	...1 1111	...1 1111	...1 1111

10. Set the scan rate for the selected data exchange method. (For more information about scan rates, refer to RSNetWorx for DeviceNet online help.)

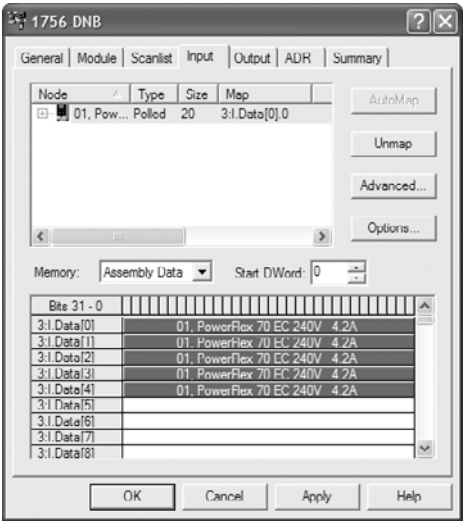
Data Exchange Method	Rate Field to Set
Polled	Poll Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

11. Click **OK**. If a Scanner Configuration Applet appears, click **Yes** to continue. The Edit I/O Parameters screen closes and then the 1756-DNB Scanlist tab screen (Figure 4.11) reappears.

12. Click the Input tab to display the input registers for the 1756-DNB. Click **AutoMap** to map the drive input image to the 1756-DNB as shown in Figure 4.13.

TIP: If your RSLogix 5000 project requires a different starting DWord (double word, 32-bit) than the default value of 0 for the drive input image, set the Start DWord field to the appropriate value.

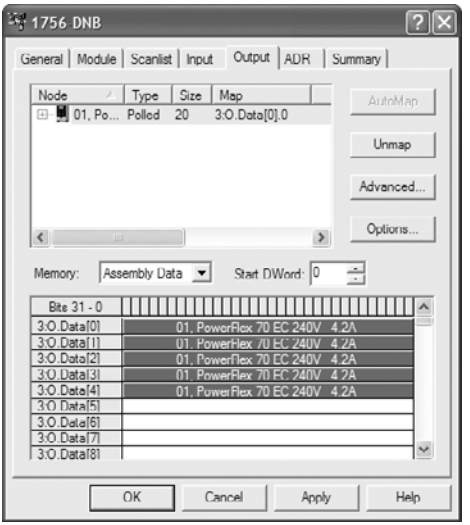
Figure 4.13 1756-DNB Input Tab Screen



13. Click the Output tab to display the output registers for the 1756-DNB. Click **AutoMap** to map the drive output image to the 1756-DNB as shown in Figure 4.14.

TIP: If your RSLogix 5000 project requires a different starting DWord (double word, 32-bit) than the default value of 0 for the drive output image, set the Start DWord field to the appropriate value.

Figure 4.14 1756-DNB Output Tab Screen



14. Click **OK**. If the Scanner Configuration Applet appears asking to download these settings to the 1756-DNB, click **Yes**.

15. Click **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.

Setting Datalinks in the Drive (Optional)

After configuring the 1756-DNB, datalinks in the drive must be set to parameters that are appropriate for your application. This enables the DeviceNet Tag Generator to create descriptive controller tags for your RSLogix 5000 project.

1. Use the drive HIM, RSNetWorx for DeviceNet, or DriveExecutive to set the datalinks in the drive. For this example, RSNetWorx for DeviceNet and the following datalink values are used.

Table 4.D Example PowerFlex 70 EC Drive Datalink Settings

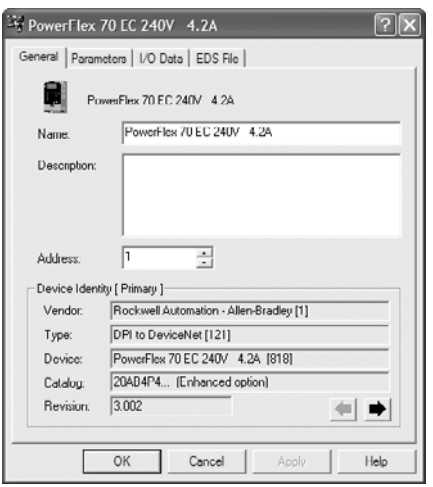
Parameter	Name	Value	Description
300	Data In A1	140	Points to Par. 140 - [Accel Time 1]
301	Data In A2	142	Points to Par. 142 - [Decel Time 1]
302	Data In B1	100	Points to Par. 100 - [Jog Speed]
303	Data In B2	155	Points to Par. 155 - [Stop Mode A]

Parameter	Name	Value	Description
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]

TIP: Data In's are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). Data Out's are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

2. In the RSNetWorx for DeviceNet graph view screen (Figure 4.8), right-click the PowerFlex 70 EC drive icon and select **Properties…** to display the drive's properties screen (Figure 4.15).

Figure 4.15 PowerFlex 70 EC Drive Properties Screen



3. Click the Parameter tab to display the Parameters screen. If the EDS Editor dialog box appears, asking to upload the configuration from the drive to the software configuration, click **Upload**. Depending on the type of drive, the upload may take several minutes to complete.

4. With the parameter list showing, set the various Data In and Data Out parameters. In this example, the datalinks are set to the values shown in Table 4.D. The click **OK**. If the EDS Editor dialog box appears, asking to download the configuration to the drive from the software configuration, click **Yes**. After the download is completed, the PowerFlex 70 EC Drive Properties screen closes.

Creating Descriptive Controller Tags (Optional)

DeviceNet controller tags for I/O configurations in RSLogix 5000 projects are non-descriptive. However, the DeviceNet Tag Generator, a free Rockwell software tool, can generate descriptive controller tags for basic control I/O words (Logic Command/Status and Reference/ Feedback) and Datalinks. Additionally, Datalinks automatically take the name of the drive parameter to which they are assigned. **Note:** The DeviceNet Tag Generator will only create correct tag names if the EDS file used is downloaded from the web site (see the TIP on page 4-6) — not uploaded from the device.

To use the DeviceNet Tag Generator, the following compatible software is required:

Software	Version (or Higher)
RSNetWorx for DeviceNet	7.00
RSLinx Classic	2.51
RSLogix 5000	13.00

The DeviceNet Tag Generator is only recommended when:

- A new DeviceNet system and/or new drive is being installed.
- Migration to required software is acceptable for an existing system or application.

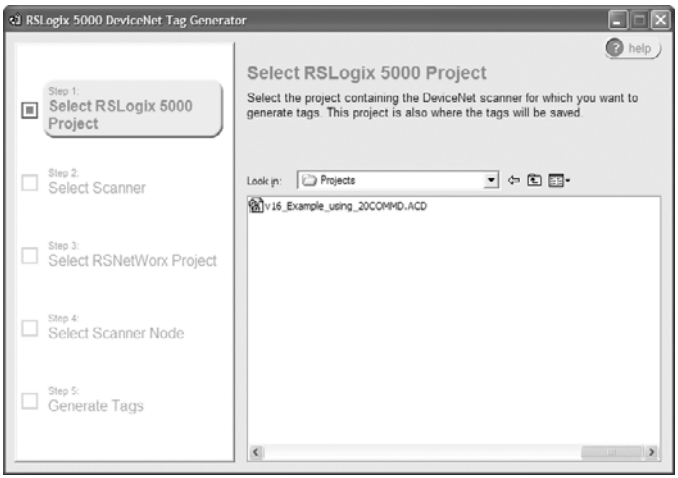
The free DeviceNet Tag Generator software is available for download on the Rockwell Automation Get Support Now Software Updates site located at http://www.rockwellautomation.com/support/webupdates.

1. Close RSNetWorx for DeviceNet software.

2. Verify that the controller is in Rem Prog or Program Mode, and that the RSLogix 5000 project is offline with the controller.

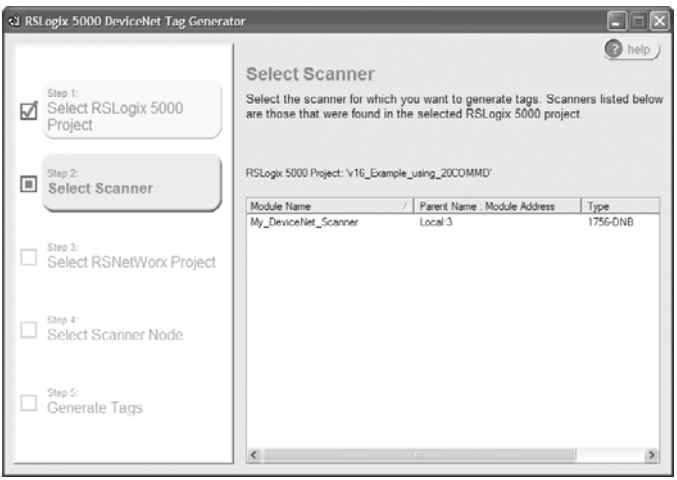
3. In RSLogix 5000 software, select **Tools > DeviceNet Tag Generator** to display the RSLogix 5000 DeviceNet Tag Generator Step 1 window (Figure 4.16).

Figure 4.16 RSLogix 5000 DeviceNet Tag Generator Step 1 Window



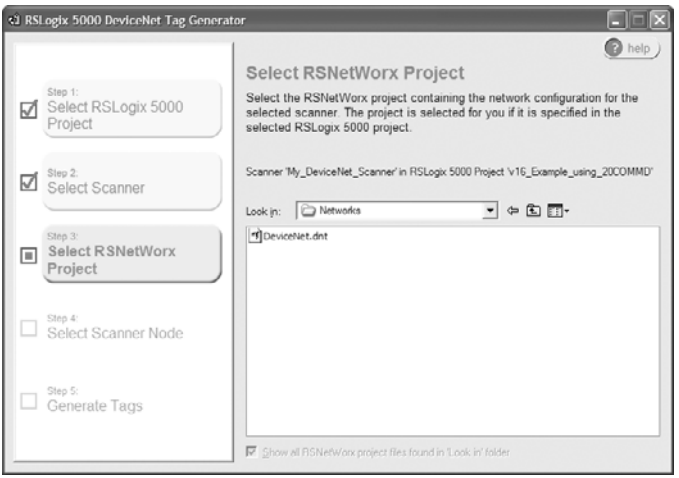
4. Select the appropriate RSLogix 5000 project (.ACD file) and click **Step 2** in the left pane to display the Step 2 window (Figure 4.17).

Figure 4.17 RSLogix 5000 DeviceNet Tag Generator Step 2 Window



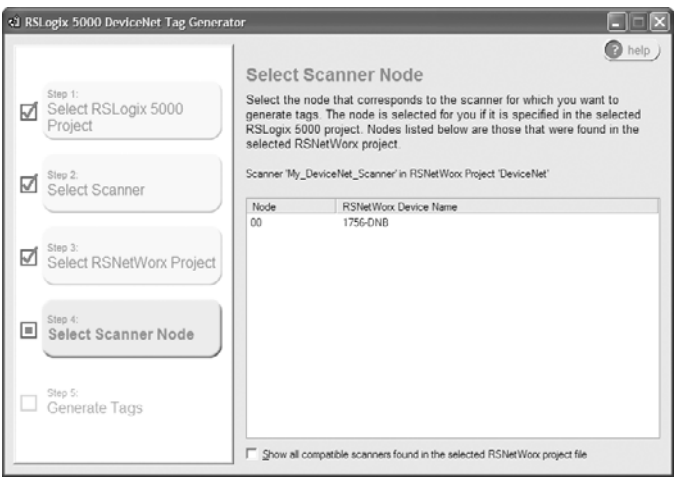
5. Select the appropriate scanner (for this example, My_DeviceNet_Scanner) and click **Step 3** in the left pane to display the Step 3 window (Figure 4.18).

Figure 4.18 RSLogix 5000 DeviceNet Tag Generator Step 3 Window



6. Browse to and select the appropriate RSNetWorx for DeviceNet project (.dnt file) and click **Step 4** in the left pane to display the Step 4 window (Figure 4.19).

Figure 4.19 RSLogix 5000 DeviceNet Tag Generator Step 4 Window



7. Select the appropriate scanner node (for this example, node 00) and click **Step 5** in the left pane to display the Step 5 window (Figure 4.20).

Figure 4.20 RSLogix 5000 DeviceNet Tag Generator Step 5 Window

8. In the right pane, click **Generate Tags**. When the dialog box appears asking to continue, click **Yes**. If there are any errors listed in the Results pane, correct them before continuing.

9. Close the DeviceNet Tag Generator software by clicking the X button in the upper-right corner of the window.

Downloading the Project to the Controller and Going Online

After adding the scanner 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 4.21) appears.

Figure 4.21 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 DeviceNet 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.

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

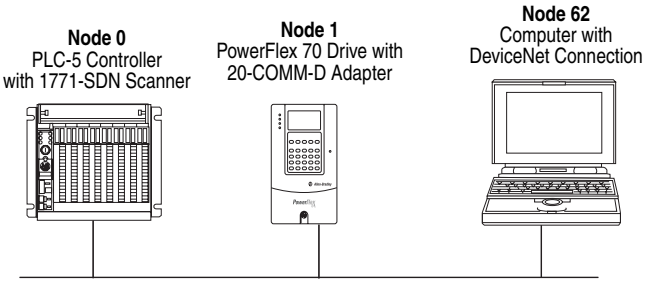
5. Place the controller in Remote Run or Run Mode.

PLC-5 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 DeviceNet network (see Figure 4.22). In our example, we will configure a PLC-5 controller with 1771-SDN scanner to communicate with a drive using Logic Command/Status, Reference/ Feedback, and Datalinks over the network.

Figure 4.22 PLC-5 Example DeviceNet Network



Configuring Parameters for Network I/O

Since the I/O for the drive is defined in the next subsection Using RSNetWorx for DeviceNet to Configure the I/O and Save It to the Controller on page 4-20, there is no need to configure any I/O inside the RSLogix 5 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
13 - [DPI I/O Cfg]	xxxx xxxx xxx1 1111
25 - [M-S Input]	xxxx xxxx xxx1 1111
26 - [M-S Output]	xxxx xxxx xxx1 1111

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 (1)
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
301 - [Data In A2]	142 (Decel Time 1)
302 - [Data In B1]	100 (Jog Speed)
303 - [Data In B2]	155 (Stop Mode A)
304 - [Data In C1]	101 (Preset Speed 1)
305 - [Data In C2]	102 (Preset Speed 2)
306 - [Data In D1]	103 (Preset Speed 3)
307 - [Data In D2]	104 (Preset Speed 4)
310 - [Data Out A1]	140 (Accel Time 1)
311 - [Data Out A2]	142 (Decel Time 1)
312 - [Data Out B1]	100 (Jog Speed)
313 - [Data Out B2]	155 (Stop Mode A)
314 - [Data Out C1]	101 (Preset Speed 1)
315 - [Data Out C2]	102 (Preset Speed 2)
316 - [Data Out D1]	103 (Preset Speed 3)
317 - [Data Out D2]	104 (Preset Speed 4)

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

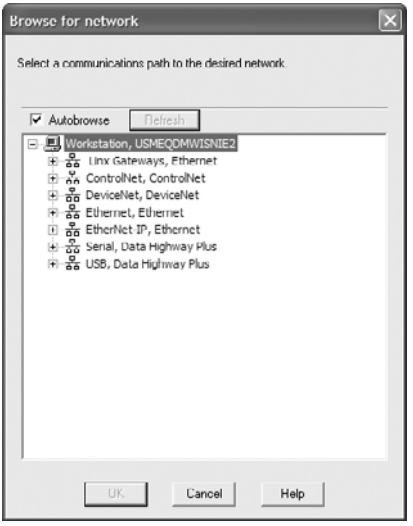
Using RSNetWorx for DeviceNet to Configure the I/O and Save It to the Controller

To establish an I/O configuration that can be used between the controller and drive over a DeviceNet network, you must first create an I/O image for the 1771-SDN scanner.

1. Start RSNetWorx for DeviceNet. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen. Then select “DeviceNet Configuration” as the network configuration type, and click **OK**.

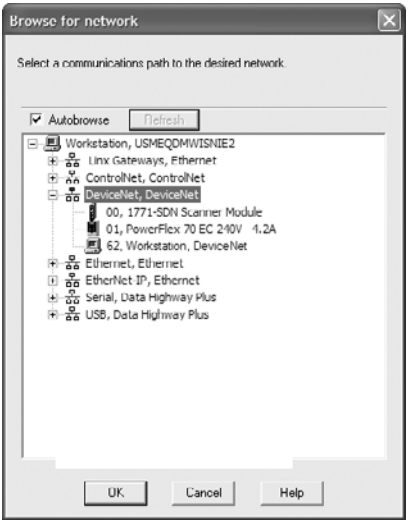
2. Select **Network > Online** to display the Browse for Network screen (Figure 4.23).

Figure 4.23 Browse for Network Screen



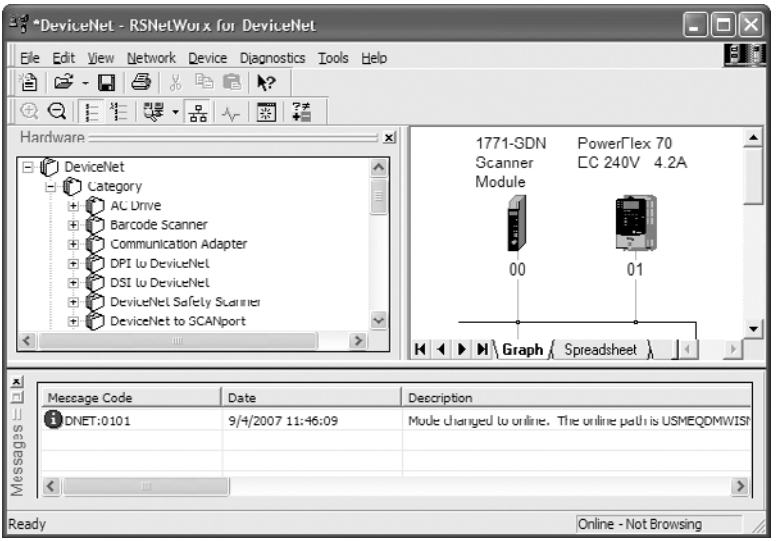
3. Expand the communications path from your computer to the 1771-SDN scanner. Figure 4.24 shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

Figure 4.24 Expanded Browse for Network Screen



4. As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet creates a graphical representation of the devices on the network (Figure 4.25).

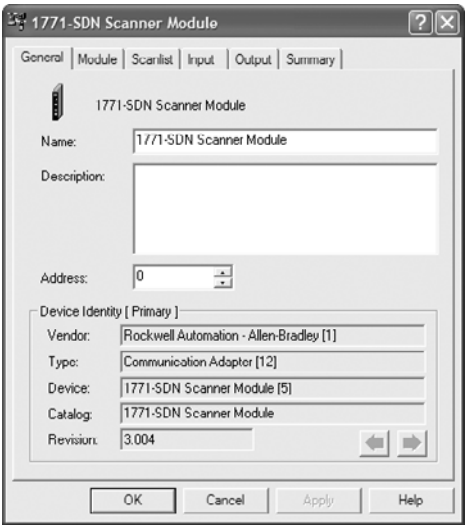
Figure 4.25 RSNetWorx for DeviceNet Graph View Screen



TIP: If the icon for the drive (for this example, PowerFlex 70 EC) on the network does not appear, use RSNetWorx for DeviceNet to register or create the appropriate drive EDS file. For information to register or create a drive EDS file, refer to RSNetWorx for DeviceNet online help. You can also download the EDS file from www.ab.com/networks/eds.

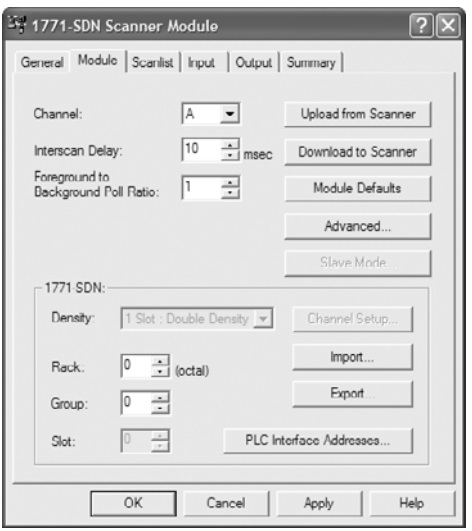
5. In the graph view, right-click the 1771-SDN icon and select **Properties…** to display its properties screen (Figure 4.26).

Figure 4.26 1771-SDN Scanner Properties Screen



6. Click the Module tab to display the Scanner Configuration Applet screen. Click **Upload** to upload the 1771-SDN configuration to the RSNetWorx for DeviceNet project and display the 1771-SDN Module Tab screen (Figure 4.27).

Figure 4.27 1771-SDN Module Tab Screen



7. Edit the following:

Box	Setting
Channel	Selects the scanner channel to which the DeviceNet network is connected. For this example, Channel A is selected.
Interscan Delay	Sets the scanner time delay between consecutive I/O scans on the network. For this example, it is recommended to leave the default setting of 10 milliseconds.
Foreground...	Sets the ratio of foreground to background polls. For this example, it is recommended to leave the default setting of 1.
Rack	Sets the rack location in which the scanner is installed. For this example, Rack 0 is selected.
Group	Sets the group location in which the scanner is installed. For this example, Group 0 is selected.

8. Set the PLC-5 addresses that correspond to an existing RSLogix 5 project or will be used for a new project. If an address file exists from a previous network configuration, click **Import...** to import those addresses into the RSNetWorx for DeviceNet project. For a new application where addresses do not exist, click **PLC Interface Addresses...** to display the PLC Interface Addresses screen. It is recommended to use the default addresses shown on this screen. However, if a different address is required, click the ... button to edit the address.

After the addresses match your project requirements, they can be saved for future use by clicking **Export...** and selecting a desired location.

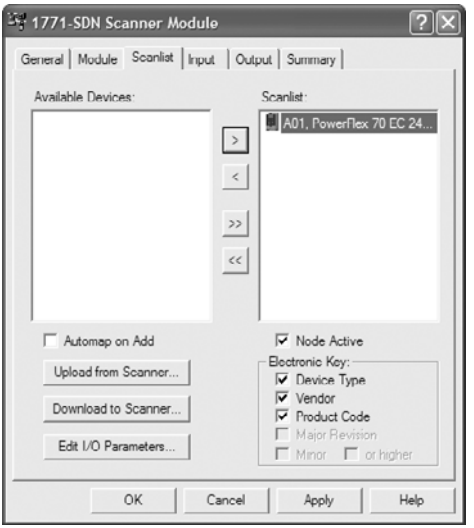
Then click **Apply** to set the PLC-5 addresses.

9. Click the Scanlist tab to begin the drive I/O configuration. The Available Devices window (left) shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist window (right) shows devices that are presently on the DeviceNet network and are configured.

TIP: The Automap on Add box is checked by default and allows RSNetWorx for DeviceNet to automatically map the drive I/O into the scanner in the next available registers. The mapping is based on the minimum I/O requirements (4 bytes for input and 4 bytes for output) that the scanner obtains from the drive EDS file.

For this example, uncheck the Automap on Add box. Then select the PowerFlex 70 EC drive in the Available Devices window and click the **>** button to move it to the Scanlist window (Figure 4.28).

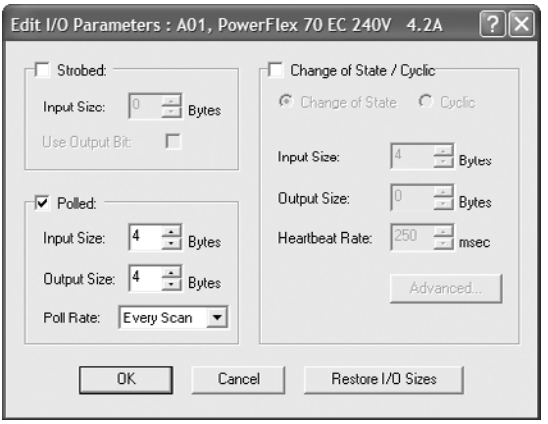
Figure 4.28 1771-SDN Scanlist Tab Screen



Box	Setting
Node Active	Activates/deactivates the scanlist in the 1771-SDN for the selected device. For this example, keep the box checked.
Device Type	These Electronic Key category check boxes select how specific the device in the scanlist must be for the 1771-SDN to match its compatibility for I/O operation. The more boxes that are checked, the more specific the device must be to operate. For this example, leave the default boxes (Device Type, Vendor, and Product Code) checked.
Vendor	
Product Code	
Major Revision (only 1771-SDN Series C version 6.xxx or later)	

10. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen (Figure 4.29) for the PowerFlex 70 EC drive used in this example.

Figure 4.29 Edit I/O Parameters Screen



In this screen, select the type(s) of data exchange (Polled, Change of State, and/or Cyclic). For this example, we selected Polled. Then enter the number of bytes that are required for your I/O in the Input Size and Output Size boxes. The size will depend on the I/O that you enabled in the adapter using **Parameter 13 - [DPI I/O Cfg]**, and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of "20" and an Output Size of "20" are selected.

Important: Make sure that the bits for **Parameters 25 - [M-S Input]** and **26 - [M-S Output]** are set to match **Parameter 13 - [DPI I/O Cfg]**. Refer to Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication) on page 3-5 for details.

Table 4.E, Table 4.F, and Table 4.G list the number of bytes required for the Input Size and Output Size boxes for specific I/O configurations and only the Polled data exchange method. For Input Sizes and Output Sizes for other data exchange methods and specific I/O configurations, refer to the tables in Appendix E.

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (16-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				8	8	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			12	12	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		16	16	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	20	20	...1 1111	...1 1111	...1 1111

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				12	12	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			20	20	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		28	28	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	36	36	...1 1111	...1 1111	...1 1111

Table 4.G PowerFlex 700S (32-bit Reference/Feedback and 32-bit Datalinks)

Logic Cmd/ Status	Ref/ Fdbk (32-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					8	8	...0 0001	...0 0001	...0 0001
✔	✔	✔				16	16	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			24	24	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		32	32	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	40	40	...1 1111	...1 1111	...1 1111

11. Set the scan rate for the selected data exchange method. (For more information about scan rates, refer to RSNetWorx for DeviceNet online help.)

Data Exchange Method	Rate Field to Set
Polled	Poll Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

12. Click **OK**. If a Scanner Configuration Applet appears, click **Yes** to continue. The Edit I/O Parameters screen closes and then the 1771-SDN Scanlist tab screen (Figure 4.28) reappears.

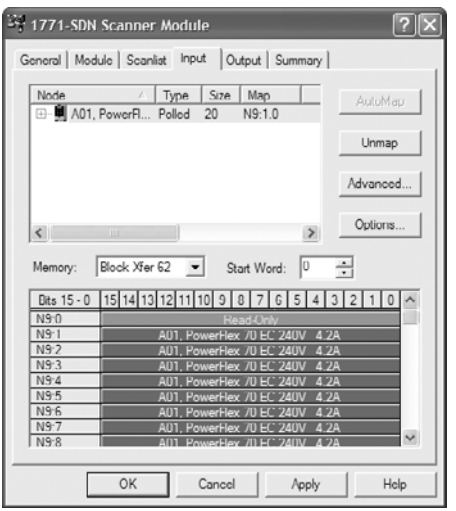
13. Click the Input tab to display the input registers for the 1771-SDN.

Important: If your RSLogix 5 project requires a different memory selection than the default setting for the drive input image, set the Memory field to the appropriate setting. For this example, the default setting of Block Xfer 62 and its corresponding N-files are used.

Click **AutoMap** to map the drive input image to the 1771-SDN as shown in Figure 4.30.

TIP: If your RSLogix 5 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive input image, set the Start Word field to the appropriate value.

Figure 4.30 1771-SDN Input Tab Screen



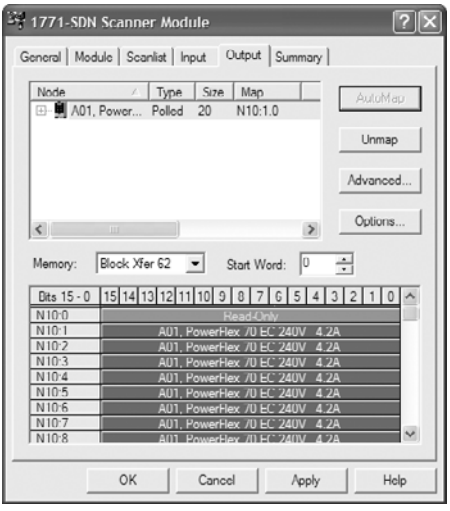
14. Click the Output tab to display the output registers for the 1771-SDN.

Important: If your RSLogix 5 project requires a different memory selection than the default setting for the drive output image, set the Memory field to the appropriate setting. For this example, the default setting of Block Xfer 62 and its corresponding N-files are used.

Click **AutoMap** to map the drive output image to the 1771-SDN as shown in Figure 4.31.

TIP: If your RSLogix 5 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive output image, set the Start Word field to the appropriate value.

Figure 4.31 1771-SDN Output Tab Screen



15. Click **OK**. If the Scanner Configuration Applet appears asking to download these settings to the 1771-SDN, click **Yes**.

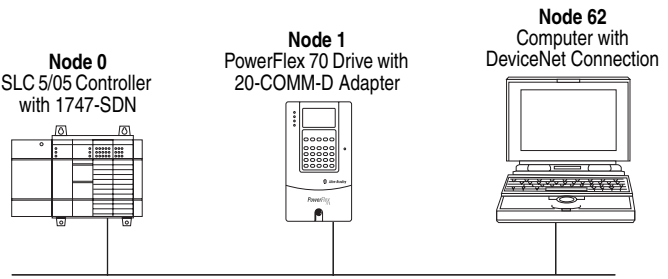
16. Click **File > Save**. If this is the first time you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click **Save** to save the configuration to a file on your computer.

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 DeviceNet network (see Figure 4.32). 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 4.32 SLC 500 Example DeviceNet Network



Configuring Parameters for Network I/O

Since the I/O for the drive is defined in the next subsection Using RSNetWorx for DeviceNet to Configure the I/O and Save It to the Controller on page 4-31, 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
13 - [DPI I/O Cfg]	xxxx xxxx xxx1 1111
25 - [M-S Input]	xxxx xxxx xxx1 1111
26 - [M-S Output]	xxxx xxxx xxx1 1111

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 (1)
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
301 - [Data In A2]	142 (Decel Time 1)
302 - [Data In B1]	100 (Jog Speed)
303 - [Data In B2]	155 (Stop Mode A)
304 - [Data In C1]	101 (Preset Speed 1)
305 - [Data In C2]	102 (Preset Speed 2)
306 - [Data In D1]	103 (Preset Speed 3)
307 - [Data In D2]	104 (Preset Speed 4)
310 - [Data Out A1]	140 (Accel Time 1)
311 - [Data Out A2]	142 (Decel Time 1)
312 - [Data Out B1]	100 (Jog Speed)
313 - [Data Out B2]	155 (Stop Mode A)
314 - [Data Out C1]	101 (Preset Speed 1)
315 - [Data Out C2]	102 (Preset Speed 2)
316 - [Data Out D1]	103 (Preset Speed 3)
317 - [Data Out D2]	104 (Preset Speed 4)

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

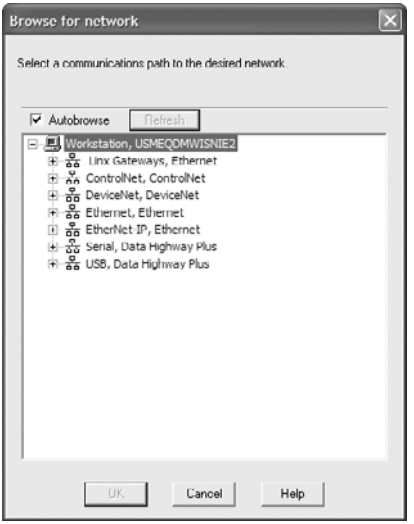
Using RSNetWorx for DeviceNet to Configure the I/O and Save It to the Controller

To establish an I/O configuration that can be used between the controller and drive over a DeviceNet network, you must first create an I/O image for the 1747-SDN scanner.

1. Start RSNetWorx for DeviceNet. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen. Then select “DeviceNet Configuration” as the network configuration type, and click **OK**.

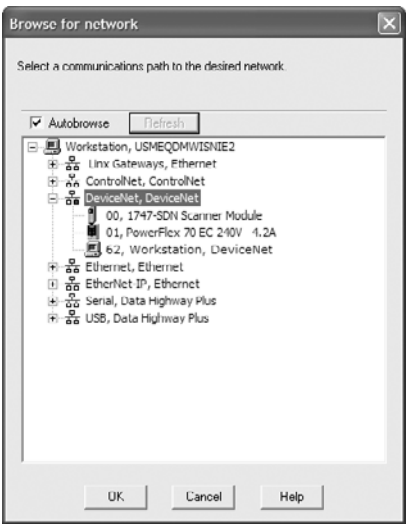
2. Select **Network > Online** to display the Browse for Network screen (Figure 4.33).

Figure 4.33 Browse for Network Screen



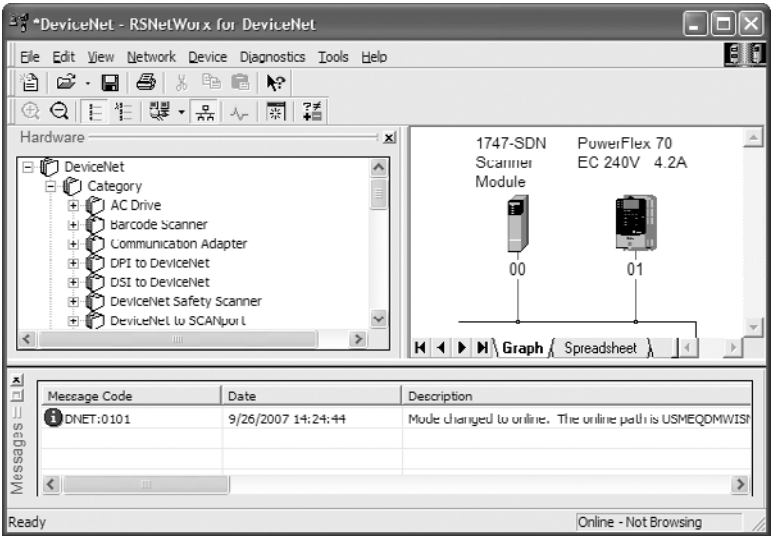
3. Expand the communications path from your computer to the 1747-SDN scanner. Figure 4.34 shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

Figure 4.34 Expanded Browse for Network Screen



4. As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet creates a graphical representation of the devices on the network (Figure 4.35).

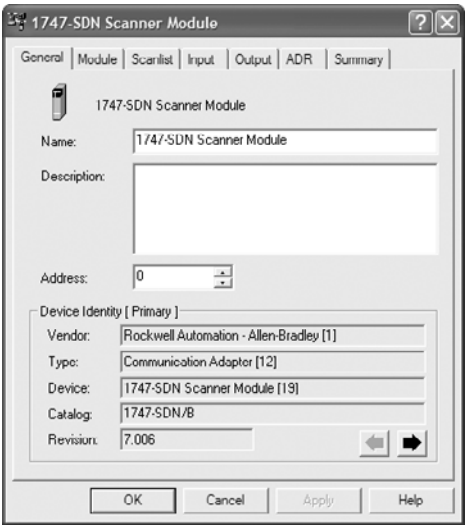
Figure 4.35 RSNetWorx for DeviceNet Graph View Screen



TIP: If the icon for the drive (for this example, PowerFlex 70 EC) on the network does not appear, use RSNetWorx for DeviceNet to register or create the appropriate drive EDS file. For information to register or create a drive EDS file, refer to RSNetWorx for DeviceNet online help. You can also download the EDS file from www.ab.com/networks/eds.

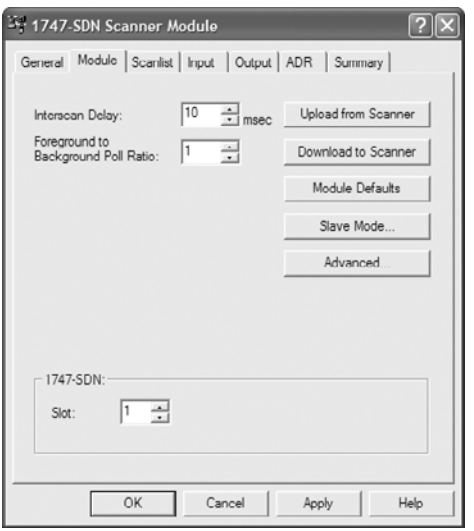
5. In the graph view, right-click the 1747-SDN icon and select **Properties…** to display its properties screen (Figure 4.36).

Figure 4.36 1747-SDN Scanner Properties Screen



6. Click the Module tab to display the Scanner Configuration Applet screen. Click **Upload** to upload the 1747-SDN configuration to the RSNetWorx for DeviceNet project and display the 1747-SDN Module Tab screen (Figure 4.37).

Figure 4.37 1747-SDN Module Tab Screen



7. Edit the following:

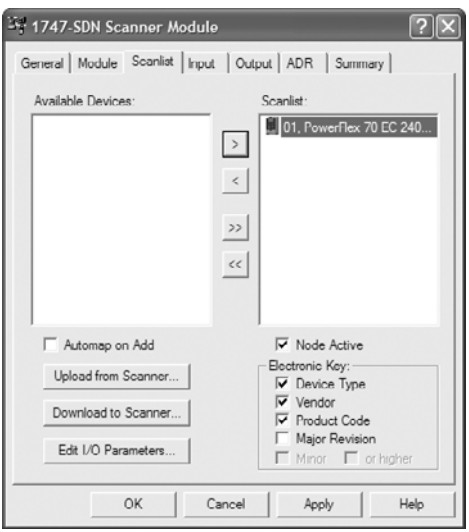
Box	Setting
Interscan Delay	Sets the scanner time delay between consecutive I/O scans on the network. For this example, it is recommended to leave the default setting of 10 milliseconds.
Foreground...	Sets the ratio of foreground to background polls. For this example, it is recommended to leave the default setting of 1.
Slot	Sets the slot location in which the scanner is installed. For this example, Slot 0 is selected.

8. Click the Scanlist tab to begin the drive I/O configuration. The Available Devices window (left) shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist window (right) shows devices that are presently on the DeviceNet network and are configured.

TIP: The Automap on Add box is checked by default and allows RSNetWorx for DeviceNet to automatically map the drive I/O into the scanner in the next available registers. The mapping is based on the minimum I/O requirements (4 bytes for input and 4 bytes for output) that the scanner obtains from the drive EDS file.

For this example, uncheck the Automap on Add box. Then select the PowerFlex 70 EC drive in the Available Devices window and click the **>** button to move it to the Scanlist window (Figure 4.38).

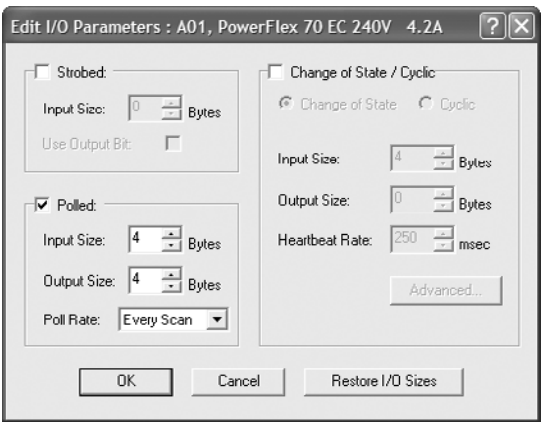
Figure 4.38 1747-SDN Scanlist Tab Screen



Box	Setting
Node Active	Activates/deactivates the scanlist in the 1747-SDN for the selected device. For this example, keep the box checked.
Device Type	These Electronic Key category check boxes select how specific the device in the scanlist must be for the 1747-SDN to match its compatibility for I/O operation. The more boxes that are checked, the more specific the device must be to operate. For this example, leave the default boxes (Device Type, Vendor, and Product Code) checked.
Vendor	
Product Code	
Major Revision	

9. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen (Figure 4.39) for the PowerFlex 70 EC drive used in this example.

Figure 4.39 Edit I/O Parameters Screen



In this screen, select the type(s) of data exchange (Polled, Change of State, and/or Cyclic). For this example, we selected Polled. Then enter the number of bytes that are required for your I/O in the Input Size and Output Size boxes. The size will depend on the I/O that you enabled in the adapter using **Parameter 13 - [DPI I/O Cfg]**, and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of "20" and an Output Size of "20" are selected.

Important: Make sure that the bits for **Parameters 25 - [M-S Input]** and **26 - [M-S Output]** are set to match **Parameter 13 - [DPI I/O Cfg]**. Refer to Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication) on page 3-5 for details.

Table 4.H, Table 4.I, and Table 4.J list the number of bytes required for the Input Size and Output Size boxes for specific I/O configurations and only the Polled data exchange method. For Input Sizes and Output Sizes for other data exchange methods and specific I/O configurations, refer to the tables in Appendix E.

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (16-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				8	8	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			12	12	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		16	16	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	20	20	...1 1111	...1 1111	...1 1111

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

Logic Cmd/ Status	Ref/ Fdbk (16-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					4	4	...0 0001	...0 0001	...0 0001
✔	✔	✔				12	12	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			20	20	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		28	28	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	36	36	...1 1111	...1 1111	...1 1111

Table 4.J PowerFlex 700S (32-bit Reference/Feedback and 32-bit Datalinks)

Logic Cmd/ Status	Ref/ Fdbk (32-bit)	Datalinks (32-bit)				User Configured Settings				
		A	B	C	D	Size in Bytes		Par. 13 - [DPI I/O Cfg]	Par. 25 - [M-S Input]	Par. 26 - [M-S Output]
						Input	Output			
✔	✔					8	8	...0 0001	...0 0001	...0 0001
✔	✔	✔				16	16	...0 0011	...0 0011	...0 0011
✔	✔	✔	✔			24	24	...0 0111	...0 0111	...0 0111
✔	✔	✔	✔	✔		32	32	...0 1111	...0 1111	...0 1111
✔	✔	✔	✔	✔	✔	40	40	...1 1111	...1 1111	...1 1111

10. Set the scan rate for the selected data exchange method. (For more information about scan rates, refer to RSNetWorx for DeviceNet online help.)

Data Exchange Method	Rate Field to Set
Polled	Poll Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

11. Click **OK**. If a Scanner Configuration Applet appears, click **Yes** to continue. The Edit I/O Parameters screen closes and then the 1747-SDN Scanlist tab screen (Figure 4.38) reappears.

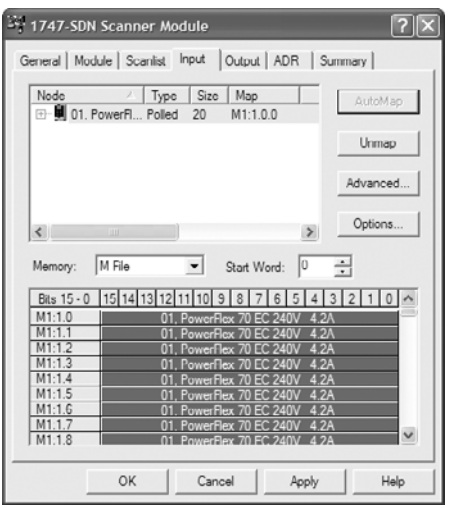
12. Click the Input tab to display the input registers for the 1747-SDN.

Important: If your RSLogix 500 project requires a different memory selection than the default setting for the drive input image, set the Memory field to the appropriate setting. For this example, change the default setting of Discrete to M File and its corresponding M-files are used.

Click **AutoMap** to map the drive input image to the 1747-SDN as shown in Figure 4.40.

TIP: If your RSLogix 500 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive input image, set the Start Word field to the appropriate value.

Figure 4.40 1747-SDN Input Tab Screen



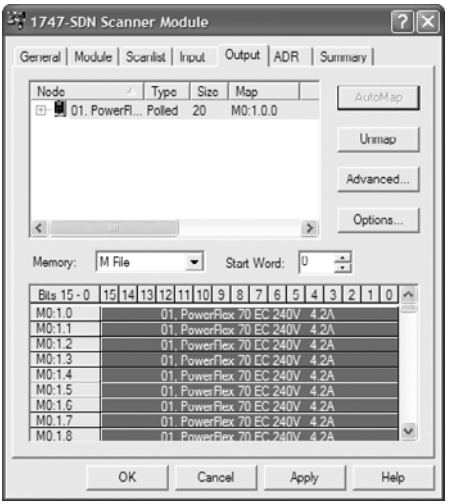
13. Click the Output tab to display the output registers for the 1747-SDN.

Important: If your RSLogix 500 project requires a different memory selection than the default setting for the drive output image, set the Memory field to the appropriate setting. For this example, change the default setting of Discrete to M File and its corresponding M-files are used.

Click **AutoMap** to map the drive output image to the 1747-SDN as shown in Figure 4.41.

TIP: If your RSLogix 500 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive output image, set the Start Word field to the appropriate value.

Figure 4.41 1747-SDN Output Tab Screen



14. Click **OK**. If the Scanner Configuration Applet appears asking to download these settings to the 1747-SDN, click **Yes**.

15. Click **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.

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 DeviceNet, 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 or Peer-to-Peer hierarchy.
- Using a Change of State, Cyclic or Polled data exchange method

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. To determine the size of the Reference/Feedback and Datalinks, view adapter **Parameters 7 - [Ref/Fdbk Size]** and **8 - [Datalink Size]**. For information to access parameters, see Using the PowerFlex 7-Class HIM on page 3-2.
- Configuration of I/O (**Parameter 13 - [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 Controller Image

Controller tag names for the I/O image may vary based on the drive being used and if the DeviceNet Tag Generator software tool was used to replace the generic (non-descriptive) names with descriptive names.

The ControlLogix controller I/O image changes depending on the size of the drive's Reference/Feedback and Datalinks. Table 5.A through Table 5.D show the I/O image when using various combinations of 16-bit and 32-bit Reference/Feedback and Datalinks.

TIP: The ControlLogix controller's 1756-DNB scanner is a DWORD (double word) device. The following tables show the I/O as 32-bit words. For example, if 4 bytes, 2 words or one DWORD is consumed, then the lower 16 bits of the output (Least Significant Word) is the Logic Command word and the upper 16 bits (Most Significant Word) is the speed Reference. For the input, the lower 16 bits (LSW) is the Logic Status word and the upper 16 bits (MSW) is the speed Feedback.

Table 5.A ControlLogix I/O Image for a Drive Using a 16-bit Reference/Feedback and 16-bit Datalinks (PowerFlex 70/700/700H and SMC Flex)

DWORD	Output I/O
0	Logic Command (LSW)
	Reference (MSW)
1	Datalink In A1 (LSW)
	Datalink In A2 (MSW)
2	Datalink In B1 (LSW)
	Datalink In B2 (MSW)
3	Datalink In C1 (LSW)
	Datalink In C2 (MSW)
4	Datalink In D1 (LSW)
	Datalink In D2 (MSW)

DWORD	Input I/O
0	Logic Status (LSW)
	Feedback (MSW)
1	Datalink Out A1 (LSW)
	Datalink Out A2 (MSW)
2	Datalink Out B1 (LSW)
	Datalink Out B2 (MSW)
3	Datalink Out C1 (LSW)
	Datalink Out C2 (MSW)
4	Datalink Out D1 (LSW)
	Datalink Out D2 (MSW)

Table 5.B ControlLogix I/O Image for a Drive Using a 16-bit Reference/Feedback and 32-bit Datalinks (PowerFlex 700 VC)

DWORD	Output I/O
0	Logic Command (LSW)
	Reference (MSW)
1	Datalink In A1 (LSW)
	Datalink In A1 (MSW)
2	Datalink In A2 (LSW)
	Datalink In A2 (MSW)
3	Datalink In B1 (LSW)
	Datalink In B1 (MSW)
4	Datalink In B2 (LSW)
	Datalink In B2 (MSW)
5	Datalink In C1 (LSW)
	Datalink In C1 (MSW)
6	Datalink In C2 (LSW)
	Datalink In C2 (MSW)
7	Datalink In D1 (LSW)
	Datalink In D1 (MSW)
8	Datalink In D2 (LSW)
	Datalink In D2 (MSW)

DWORD	Input I/O
0	Logic Status (LSW)
	Feedback (MSW)
1	Datalink Out A1 (LSW)
	Datalink Out A1 (MSW)
2	Datalink Out A2 (LSW)
	Datalink Out A2 (MSW)
3	Datalink Out B1 (LSW)
	Datalink Out B1 (MSW)
4	Datalink Out B2 (LSW)
	Datalink Out B2 (MSW)
5	Datalink Out C1 (LSW)
	Datalink Out C1 (MSW)
6	Datalink Out C2 (LSW)
	Datalink Out C2 (MSW)
7	Datalink Out D1 (LSW)
	Datalink Out D1 (MSW)
8	Datalink Out D2 (LSW)
	Datalink Out D2 (MSW)

Table 5.C ControlLogix I/O Image for a Drive Using a 32-bit Reference/Feedback and 32-bit Datalinks (PowerFlex 700S)

DWORD	Output I/O
0	Logic Command (LSW)
	Not Used
1	Reference (LSW)
	Reference (MSW)
2	Datalink In A1 (LSW)
	Datalink In A1 (MSW)
3	Datalink In A2 (LSW)
	Datalink In A2 (MSW)
4	Datalink In B1 (LSW)
	Datalink In B1 (MSW)
5	Datalink In B2 (LSW)
	Datalink In B2 (MSW)
6	Datalink In C1 (LSW)
	Datalink In C1 (MSW)
7	Datalink In C2 (LSW)
	Datalink In C2 (MSW)
8	Datalink In D1 (LSW)
	Datalink In D1 (MSW)
9	Datalink In D2 (LSW)
	Datalink In D2 (MSW)

DWORD	Input I/O
0	Logic Status (LSW)
	Not Used
1	Feedback (LSW)
	Feedback (MSW)
2	Datalink Out A1 (LSW)
	Datalink Out A1 (MSW)
3	Datalink Out A2 (LSW)
	Datalink Out A2 (MSW)
4	Datalink Out B1 (LSW)
	Datalink Out B1 (MSW)
5	Datalink Out B2 (LSW)
	Datalink Out B2 (MSW)
6	Datalink Out C1 (LSW)
	Datalink Out C1 (MSW)
7	Datalink Out C2 (LSW)
	Datalink Out C2 (MSW)
8	Datalink Out D1 (LSW)
	Datalink Out D1 (MSW)
9	Datalink Out D2 (LSW)
	Datalink Out D2 (MSW)

Table 5.D ControlLogix I/O Image for a Drive Using a 32-bit Reference/Feedback and One 32-bit Datalink B (PowerFlex 700S)

DWORD	Output I/O
0	Logic Command
	Not Used
1	Reference (LSW)
	Reference (MSW)
2	Datalink In B1 (LSW)
	Datalink In B1 (MSW)
3	Datalink In B2 (LSW)
	Datalink In B2 (MSW)

DWORD	Input I/O
0	Logic Status
	Not Used
1	Feedback (LSW)
	Feedback (MSW)
2	Datalink Out B1 (LSW)
	Datalink Out B1 (MSW)
3	Datalink Out B2 (LSW)
	Datalink Out B2 (MSW)

PLC-5 and SLC 500 Controller Image

The I/O image for these controllers changes depending on the size of the drive's Reference/Feedback and Datalinks. Table 5.E, Table 5.G, and Table 5.G shows the I/O image when using various combinations of 16-bit and 32-bit Reference/Feedback and Datalinks.

Table 5.E PLC-5 or SLC 500 I/O Image for a Drive Using a 16-bit Reference/ Feedback and 16-bit Datalinks (PowerFlex 70/700/700H and SMC Flex)

Word	Output I/O
0	Logic Command
1	Reference
2	Datalink In A1
3	Datalink In A2
4	Datalink In B1
5	Datalink In B2
6	Datalink In C1
7	Datalink In C2
8	Datalink In D1
9	Datalink In D2

Word	Input I/O
0	Logic Status
1	Feedback
2	Datalink Out A1
3	Datalink Out A2
4	Datalink Out B1
5	Datalink Out B2
6	Datalink Out C1
7	Datalink Out C2
8	Datalink Out D1
9	Datalink Out D2

Table 5.F PLC-5 or SLC 500 I/O Image for a Drive Using a 16-bit Reference/ Feedback and 32-bit Datalinks (PowerFlex 700 VC)

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

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

Table 5.G PLC-5 or SLC 500 I/O Image for a Drive Using a 32-bit Reference/ Feedback and 32-bit Datalinks (PowerFlex 700S)

Word	Output I/O
0	Logic Command
1	Not Used
2	Reference (LSW)
3	Reference (MSW)
4	Datalink In A1 (LSW)
5	Datalink In A1 (MSW)
6	Datalink In A2 (LSW)
7	Datalink In A2 (MSW)
8	Datalink In B1 (LSW)
9	Datalink In B1 (MSW)
10	Datalink In B2 (LSW)
11	Datalink In B2 (MSW)
12	Datalink In C1 (LSW)
13	Datalink In C1 (MSW)
14	Datalink In C2 (LSW)
15	Datalink In C2 (MSW)
16	Datalink In D1 (LSW)
17	Datalink In D1 (MSW)
18	Datalink In D2 (LSW)
19	Datalink In D2 (MSW)

Word	Input I/O
0	Logic Status
1	Not Used
2	Feedback (LSW)
3	Feedback (MSW)
4	Datalink Out A1 (LSW)
5	Datalink Out A1 (MSW)
6	Datalink Out A2 (LSW)
7	Datalink Out A2 (MSW)
8	Datalink Out B1 (LSW)
9	Datalink Out B1 (MSW)
10	Datalink Out B2 (LSW)
11	Datalink Out B2 (MSW)
12	Datalink Out C1 (LSW)
13	Datalink Out C1 (MSW)
14	Datalink Out C2 (LSW)
15	Datalink Out C2 (MSW)
16	Datalink Out D1 (LSW)
17	Datalink Out D1 (MSW)
18	Datalink Out D2 (LSW)
19	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. 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 is used, specific controller tags are automatically created, sized (16-bit or 32-bit), and placed in the I/O image. If the DeviceNet Tag Generator was used, the generic (non-descriptive) tag names were replaced with descriptive tag names.

When using a ControlLogix controller and a drive with a 16-bit Reference/Feedback, the Reference is word 0 in the I/O image and the Feedback is also word 0. For a drive with a 32-bit Reference/Feedback, the Reference is word 1 (16 bits for the least significant word and 16 bits for the most significant word) in the I/O image and the Feedback is also word 1 (16 bits for the least significant word and 16 bits for the most significant word).

When using a PLC-5 or SLC 500 controller and a drive that uses a 32-bit Reference/Feedback, the Reference/Feedback are words 2 (least significant word) and 3 (most significant word). When the drive uses a 16-bit Reference/Feedback, the Reference/Feedback is word 1.

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 07 - [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.H 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.H 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.

TIP: For PowerFlex 700 VC drives (firmware v3.xxx or higher), Parameter 299 - [DPI Fdbk Select] enables you to select the feedback data coming from the drive over DPI. The default is "Speed Fdbk" in Hz or RPM determined by Parameter 079 - [Speed Units]. The data selection for Parameter 299 is also displayed on the 1st line of the HIM and on DriveExplorer and DriveExecutive screens in the drive status area of the screen.

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 08 - [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 with Non-Descriptive Tags Using RSLogix 5000 (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]

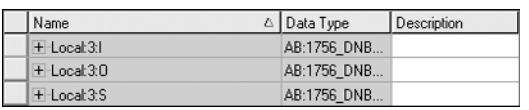
Device	Parameter	Name	Value	Description
PowerFlex 70 EC Drive	306	Data In D1	103	Points to Par. 103 - [Preset Speed 3]
	307	Data In D2	104	Points to Par. 104 - [Preset Speed 4]
	310	Data Out A1	140	Points to Par. 140 - [Accel Time 1]
	311	Data Out A2	142	Points to Par. 142 - [Decel Time 1]
	312	Data 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-D Adapter	03	CN Addr Cfg	2	Node address for the adapter
	13	DPI I/O Cfg	xxx1 1111	Enables Cmd/Ref, Datalinks A-D
	25	M-S Input	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26	M-S Output	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

TIP: Data In's are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). Data Out's are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

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. In this example program, the following controller tags are used.

Figure 5.1 ControlLogix Non-Descriptive Controller Tags for Example Ladder Logic Program



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 5.2). The Input tag for this example requires ten 16-bit words of data (see Figure 5.3).

Figure 5.2 ControlLogix Output Image with Non-Descriptive Controller Tags for Example Ladder Logic Program

Name	Data Type	Description
Drive_Output_Image	INT[10]	Output Image
Drive_Output_Image[0]	INT	Logic Command
Drive_Output_Image[1]	INT	Speed Reference
Drive_Output_Image[2]	INT	Datalink In A1
Drive_Output_Image[3]	INT	Datalink In A2
Drive_Output_Image[4]	INT	Datalink In B1
Drive_Output_Image[5]	INT	Datalink In B2
Drive_Output_Image[6]	INT	Datalink In C1
Drive_Output_Image[7]	INT	Datalink In C2
Drive_Output_Image[8]	INT	Datalink In D1
Drive_Output_Image[9]	INT	Datalink In D2

Figure 5.3 ControlLogix Input Image with Non-Descriptive Controller Tags for Example Ladder Logic Program

Name	Data Type	Description
Drive_Input_Image	INT[10]	Input Image
Drive_Input_Image[0]	INT	Logic Status
Drive_Input_Image[1]	INT	Speed Feedback
Drive_Input_Image[2]	INT	Datalink Out A1
Drive_Input_Image[3]	INT	Datalink Out A2
Drive_Input_Image[4]	INT	Datalink Out B1
Drive_Input_Image[5]	INT	Datalink Out B2
Drive_Input_Image[6]	INT	Datalink Out C1
Drive_Input_Image[7]	INT	Datalink Out C2
Drive_Input_Image[8]	INT	Datalink Out D1
Drive_Input_Image[9]	INT	Datalink Out D2

Program Tags

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

Figure 5.4 ControlLogix Program Tags for Example Ladder Logic Program with Non-Descriptive Controller Tags

Name	Data Type	Description
Command_Clear_Faults	BOOL	
Command_Forward_Reverse	BOOL	
Command_Jog	BOOL	
Command_Start	BOOL	
Command_Stop	BOOL	
Speed_Feedback	DINT	
Speed_Reference	DINT	
Status_Active	BOOL	
Status_At_Speed	BOOL	
Status_Faulted	BOOL	
Status_Forward	BOOL	
Status_Ready	BOOL	
Status_Reverse	BOOL	
Drive_Input_Image	INT[10]	Input Image
Drive_Output_Image	INT[10]	Output Image

Figure 5.5 ControlLogix Example Ladder Logic Program with Non-Descriptive Controller Tags for Logic Status/Feedback

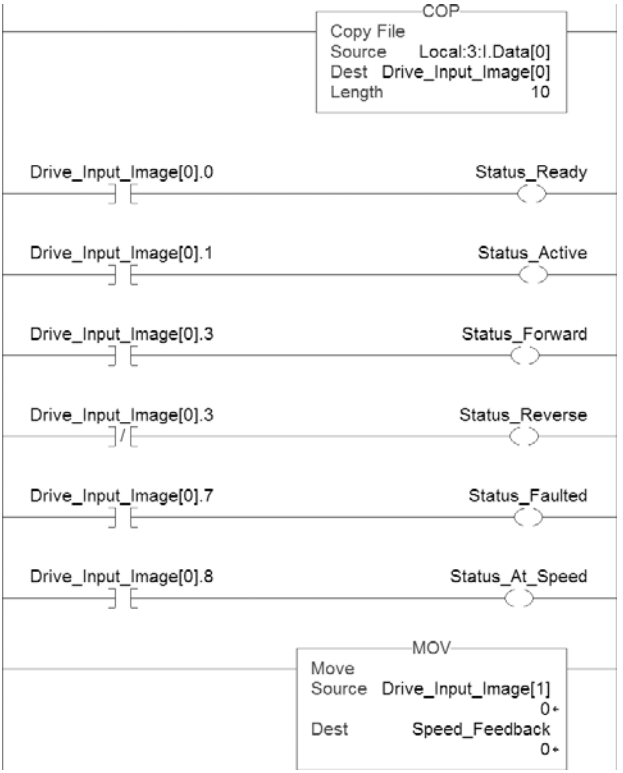
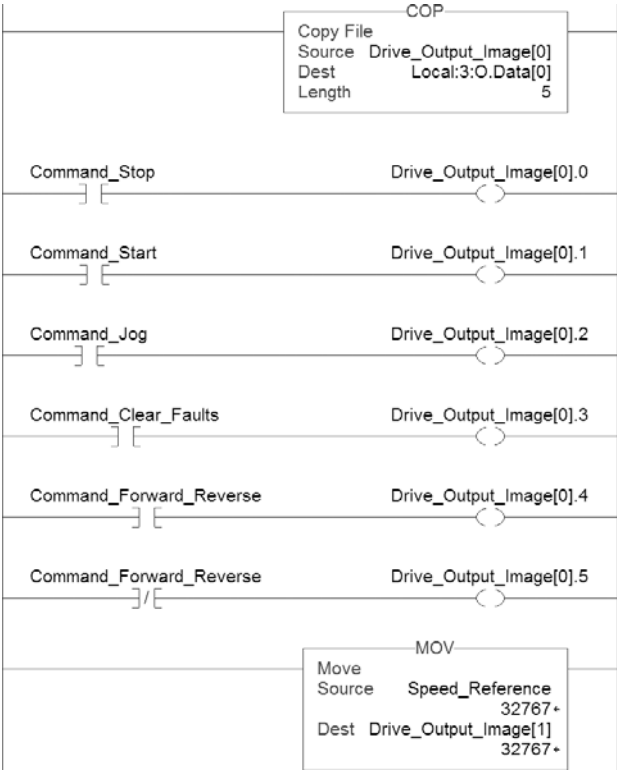


Figure 5.6 ControlLogix Example Ladder Logic Program with Non-Descriptive Tags for Logic Command/Reference



Enabling the DeviceNet Scanner

A rung in the ladder logic must be created and assigned to the 1756-DNB scanner Command Register Run bit. This rung (Figure 5.7) enables the scanner to transfer I/O on the network.

Figure 5.7 Rung for Command Register Run Bit

Important: This rung must always be included in the ladder logic program.

Example Datalink Data

The Datalink data used in the example program is shown in Figure 5.8. 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 5.8 ControlLogix Example Datalinks for Ladder Logic Program with Non-Descriptive Controller Tags

Name	Value	Data Type	Description
− Drive_Input_Image	{...}	INT[10]	Input Image
+ Drive_Input_Image[0]	0	INT	Logic Status
+ Drive_Input_Image[1]	0	INT	Speed Feedback
+ Drive_Input_Image[2]	50	INT	Datalink Out A1
+ Drive_Input_Image[3]	50	INT	Datalink Out A2
+ Drive_Input_Image[4]	100	INT	Datalink Out B1
+ Drive_Input_Image[5]	1	INT	Datalink Out B2
+ Drive_Input_Image[6]	200	INT	Datalink Out C1
+ Drive_Input_Image[7]	300	INT	Datalink Out C2
+ Drive_Input_Image[8]	400	INT	Datalink Out D1
+ Drive_Input_Image[9]	500	INT	Datalink Out D2
− Drive_Output_Image	{...}	INT[10]	Output Image
+ Drive_Output_Image[0]	0	INT	Logic Command
+ Drive_Output_Image[1]	0	INT	Speed Reference
+ Drive_Output_Image[2]	50	INT	Datalink In A1
+ Drive_Output_Image[3]	50	INT	Datalink In A2
+ Drive_Output_Image[4]	100	INT	Datalink In B1
+ Drive_Output_Image[5]	1	INT	Datalink In B2
+ Drive_Output_Image[6]	200	INT	Datalink In C1
+ Drive_Output_Image[7]	300	INT	Datalink In C2
+ Drive_Output_Image[8]	400	INT	Datalink In D1
+ Drive_Output_Image[9]	500	INT	Datalink In D2

Creating Ladder Logic with Descriptive Tags Using RSLogix 5000 (v13 or higher)

If the DeviceNet Tag Generator was used in Chapter 4 to automatically create descriptive controller tags for the entire I/O image, these tags can be used 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 5.9) and a ladder logic program that will pass the Controller tag data to the Program tags.

TIP: If the descriptive controller tags created by the DeviceNet Tag Generator are not properly named, the correct EDS file may not have been used. Refer to the TIP on page 4-6 about downloading the EDS file from the web site.

Figure 5.9 ControlLogix Descriptive Program Tags for 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

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 5.10 and Figure 5.11. Note that the prefix for the drive Controller tags is determined by the name assigned when configuring the I/O (Chapter 4).

Figure 5.10 ControlLogix Example Ladder Logic Program with Descriptive Controller Tags for Logic Status/Feedback

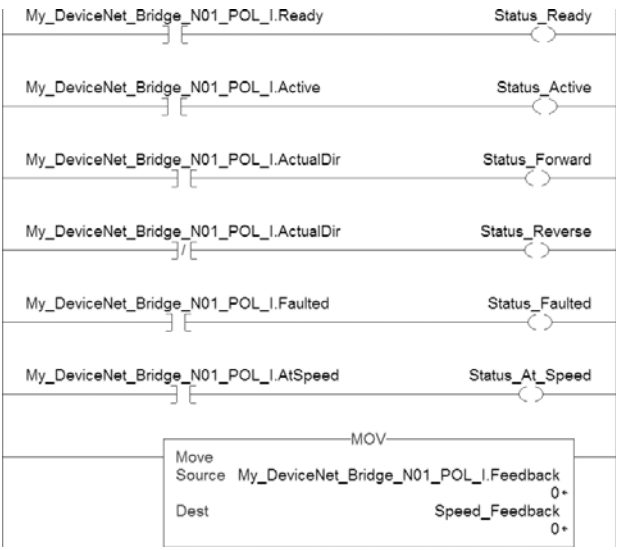
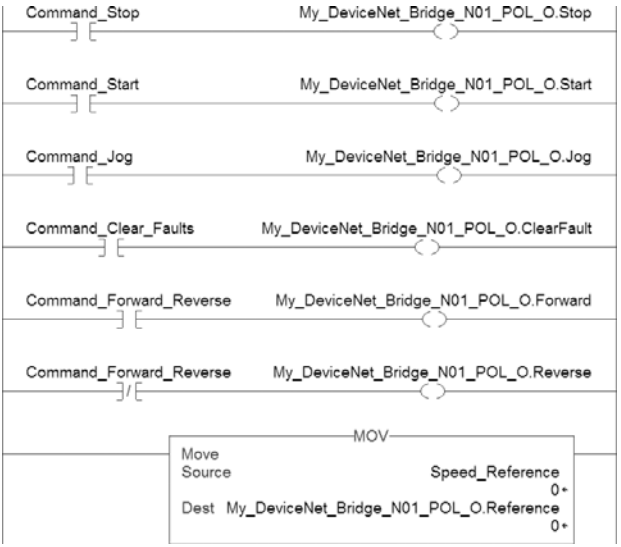


Figure 5.11 ControlLogix Example Ladder Logic Program with Descriptive Controller Tags for Logic Command/Reference



Enabling the DeviceNet Scanner

A rung in the ladder logic must be created and assigned to the 1756-DNB scanner Command Register Run bit. This rung (Figure 5.12) enables the scanner to transfer I/O on the network.

Figure 5.12 Rung for Command Register Run Bit

This rung must always be included in the ladder logic program.

Example Datalink Data

The Datalink data used in the example program is shown in Figure 5.13. Note that the parameters to which the Datalinks are assigned are descriptive.

Figure 5.13 ControlLogix Example Datalinks for Ladder Logic Program with Descriptive Controller Tags

Name	Value	Data Type	Description
My_DeviceNet_Bridge_N01_POL_I	{...}	AB_0079_03...	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Ready	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Active	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.CommandDir	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.ActualDir	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Accelerating	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Decelerating	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Alarm	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Faulted	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.AtSpeed	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.LocalID0	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.LocalID1	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.LocalID2	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.SpdRefID0	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.SpdRefID1	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.SpdRefID2	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.SpdRefID3	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.Feedback	0	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.AccelTime1	50	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.DecelTime1	50	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.JogSpeed1	100	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.StopBrkModeA	1	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.PresetSpeed1	200	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.PresetSpeed2	300	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.PresetSpeed3	400	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_I.PresetSpeed4	500	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O	{...}	AB_0079_03...	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Stop	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Start	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Jog	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.ClearFault	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Forward	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Reverse	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.LocalControl	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.MOPInc	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Accel1	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Accel2	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Decel1	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Decel2	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.SpdRefID0	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.SpdRefID1	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.SpdRefID2	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.MOPDec	0	BOOL	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.Reference	0	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.AccelTime1	50	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.DecelTime1	50	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.JogSpeed1	100	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.StopBrkModeA	1	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.PresetSpeed1	200	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.PresetSpeed2	300	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.PresetSpeed3	400	INT	PowerFlex 70 EC...
My_DeviceNet_Bridge_N01_POL_O.PresetSpeed4	500	INT	PowerFlex 70 EC...

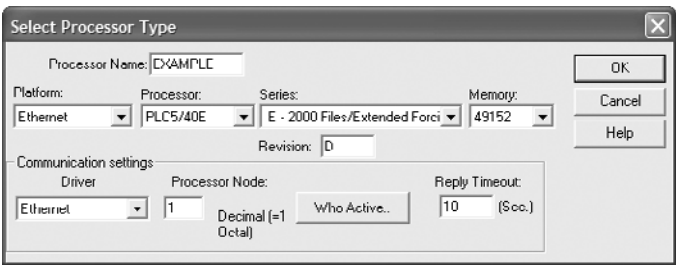
PLC-5 Example

Creating an RSLogix 5 Project

To transmit (read and write) data between the controller and drive, you must create discrete I/O instructions in the controller for Logic Command/ Status, Reference/Feedback, and Datalinks.

1. Start RSLogix 5. The RSLogix 5 window appears. Select **File > New** to display the Select Processor Type screen (Figure 5.14).

Figure 5.14 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.

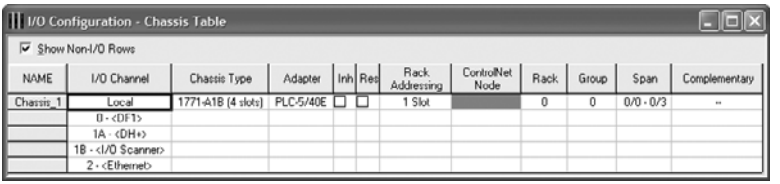
Important: Note that for this example, the processor being used has direct Ethernet communication capability. DeviceNet always uses a dedicated module (for example, 1771-SDN scanner, etc.) which cannot be used for a direct PLC-5 processor connection. Therefore, this example screen shows an Ethernet configuration.

Creating Logic for Communication Between the 1771-SDN Scanner and PLC-5 Processor

To transmit (read and write) data between the 1771-SDN DeviceNet scanner and PLC-5 processor, you must create message instructions that allocate data table addresses in the controller. By doing the following configuration, RSLogix 5 automatically creates the needed logic rungs for this communication.

1. In the RSLogix 5 project treeview left pane, double-click on IO Configuration to display the I/O Configuration - Chassis Table screen (Figure 5.15).

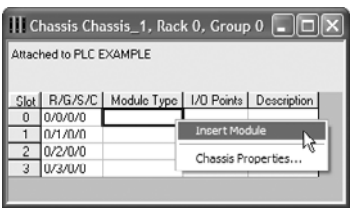
Figure 5.15 I/O Configuration - Chassis Table Screen



2. In the Chassis Type column, set the chassis type to match the chassis being used. For this example, the 1771-A1B (4 slots) is selected.

3. In the I/O Channel column, right-click the **Local** cell and select **Display Chassis** to display the Chassis configuration screen (Figure 5.16).

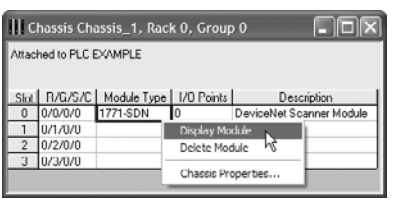
Figure 5.16 Chassis Configuration Screen



4. In the Module Type column, right-click the cell that corresponds with the slot row in which the 1771-SDN scanner physically resides (for this example, Slot 0) and select **Insert Module** to display the Edit Module screen.

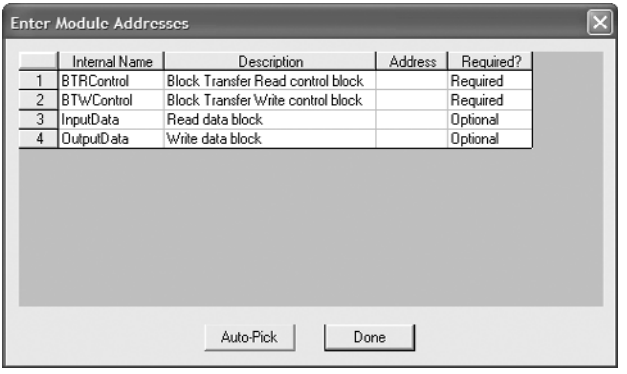
5. In the Edit Module screen, select "1771-SDN - DeviceNet Scanner Module" and click **OK**. The 1771-SDN should now appear in the Module Type column in the appropriate slot row (Figure 5.17).

Figure 5.17 Chassis Configuration Screen with 1771-SDN Selected



6. Right-click the “1771-SDN” cell and select **Display Module** to display the Enter Module Addresses screen (Figure 5.18).

Figure 5.18 Enter Module Addresses Screen

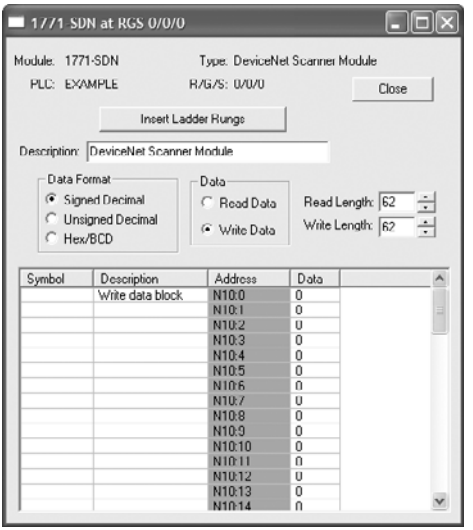


7. In the Enter Module Addresses screen, enter unique block transfer read and write control block addresses in the Address column. For this example, BT11:0 is used for the block transfer read and BT11:1 is used for the block transfer write.

   For the input data and output data rows, enter the corresponding N-files that were used in configuring the I/O (see Step 8 on page 4-24). For this example, N9:0 is used for the input data and N10:0 is used for the output data.

   After the Address column has been configured, click **Done**. When the Monitor message screen appears, click **Yes**. The 1771-SDN at RGS 0/0/0 screen appears (Figure 5.19).

Figure 5.19 1771-SDN RGS 0/0/0 Screen



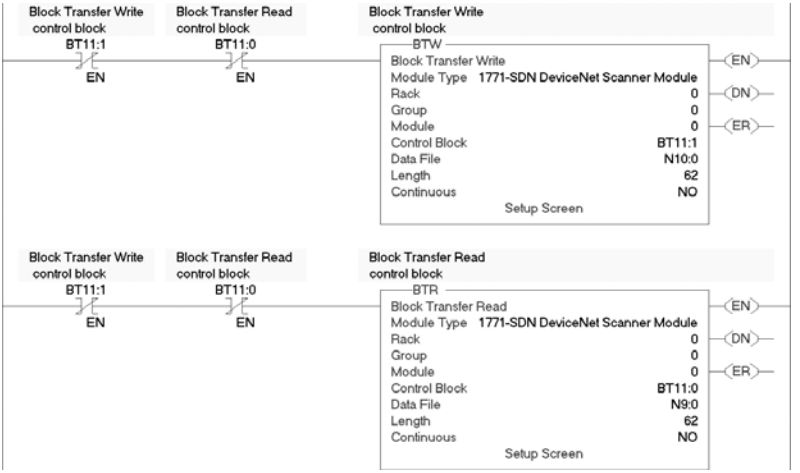
8. In the 1771-SDN at RGS 0/0/0 screen, set the Read Length and Write Length fields to correspond with the default Block Xfer 62 and its associated N-files that were configured in Step 8 on page 4-24.

   Important: The Read Length and Write Length fields actually define the data file locations. Therefore, these fields were set to "62" to correspond with Block Xfer 62 used in this example.

9. In the 1771-SDN at RGS 0/0/0 screen, click **Insert Ladder Rungs** to display the Select Program File For Rung Insertion screen. In this screen, select the ladder file that you want the ladder rungs to be inserted into, and click **OK**. In the 1771-SDN at RGS 0/0/0 screen, click **Close** to close this screen. When the Monitor message screen appears, click **Yes**. The instructions will now appear in the form of rungs in the ladder file you selected.

The resulting ladder logic from this configuration is shown in Figure 5.20.

Figure 5.20 Ladder Logic for Communication Between the 1771-SDN Scanner and PLC-5 Processor



Drive and Adapter Parameter Settings

These 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]

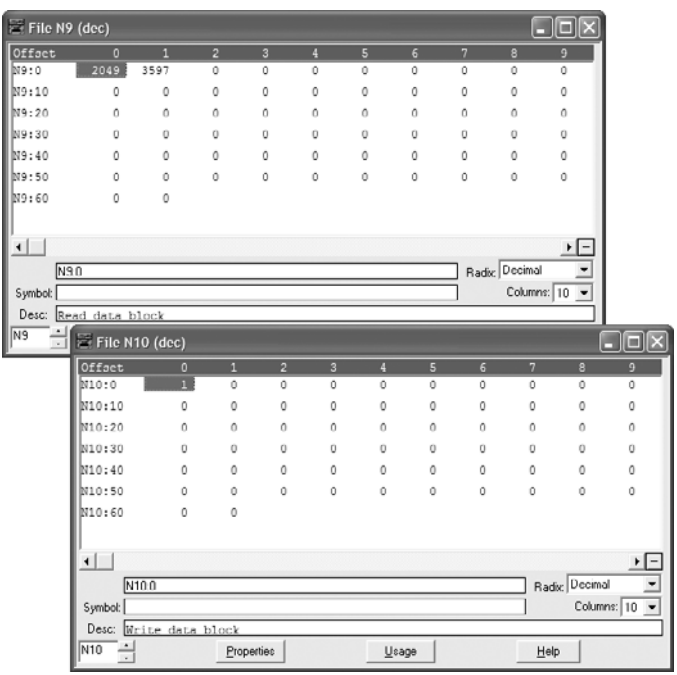
Device	Parameter	Name	Value	Description
20-COMM-D Adapter	03	CN Addr Cfg	2	Node address for the adapter
	13	DPI I/O Cfg	xxx1 1111	Enables Cmd/Ref, Datalinks A-D
	25	M-S Input	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26	M-S Output	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

TIP: Data In's are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). Data Out's are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

Understanding PLC-5 Controller Data Table Addresses

When the I/O was configured (Chapter 4), two available data table addresses (N9:0 for input data and N10:0 for output data) were used. Figure 5.21 shows the entire data file address structure for this example.

Figure 5.21 Data FIle Tables for Example Ladder Logic Program



Depending on the drive you are using, Table 5.I, Table 5.J, Table 5.K or Table 5.L shows the I/O definitions as they relate to the N9:0 and N10:0 data table addresses (Figure 5.21) being used in this example.

When using PowerFlex 70 SC or 70 EC, PowerFlex 700 SC, PowerFlex 700H drives or SMC Flex, which all contain INT (16-bit format) data types, you will read from and write to a single 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.I PLC-5 Data Table Addresses for PowerFlex 70 SC/EC, PowerFlex 700 SC, PowerFlex 700H Drives, and SMC Flex

Data Table Address	Description
N9:0	1771-SDN Scanner Status Word (see its User Manual for bit definitions)
N9:1	Logic Status (see Appendix D)
N9:2	Speed Feedback
N9:3	Value of parameter assigned to Parameter 310 [Data Out A1]
N9:4	Value of parameter assigned to Parameter 311 [Data Out A2]
N9:5	Value of parameter assigned to Parameter 312 [Data Out B1]
N9:6	Value of parameter assigned to Parameter 313 [Data Out B2]
N9:7	Value of parameter assigned to Parameter 314 [Data Out C1]
N9:8	Value of parameter assigned to Parameter 315 [Data Out C2]
N9:9	Value of parameter assigned to Parameter 316 [Data Out D1]
N9:10	Value of parameter assigned to Parameter 317 [Data Out D2]
N10:0	1771-SDN Scanner Command Word (see its User Manual for bit definitions)
N10:1	Logic Command (see Appendix D)
N10:2	Speed Reference
N10:3	Value of parameter assigned to Parameter 300 [Data In A1]
N10:4	Value of parameter assigned to Parameter 301 [Data In A2]
N10:5	Value of parameter assigned to Parameter 302 [Data In B1]
N10:6	Value of parameter assigned to Parameter 303 [Data In B2]
N10:7	Value of parameter assigned to Parameter 304 [Data In C1]
N10:8	Value of parameter assigned to Parameter 305 [Data In C2]
N10:9	Value of parameter assigned to Parameter 306 [Data In D1]
N10:10	Value of parameter assigned to Parameter 307 [Data In D2]

Table 5.J PLC-5 Data Table Addresses for PowerFlex 700 VC Drives

Data Table Address	Description
N9:0	1771-SDN Scanner Status Word (see its User Manual for bit definitions)
N9:1	Logic Status (see Appendix D)
N9:2	Speed Feedback
N9:3	Value of parameter assigned to Parameter 310 [Data Out A1] LSW
N9:4	Value of parameter assigned to Parameter 310 [Data Out A1] MSW
N9:5	Value of parameter assigned to Parameter 311 [Data Out A2] LSW
N9:6	Value of parameter assigned to Parameter 311 [Data Out A2] MSW
N9:7	Value of parameter assigned to Parameter 312 [Data Out B1] LSW
N9:8	Value of parameter assigned to Parameter 312 [Data Out B1] MSW
N9:9	Value of parameter assigned to Parameter 313 [Data Out B2] LSW
N9:10	Value of parameter assigned to Parameter 313 [Data Out B2] MSW
N9:11	Value of parameter assigned to Parameter 314 [Data Out C1] LSW
N9:12	Value of parameter assigned to Parameter 314 [Data Out C1] MSW
N9:13	Value of parameter assigned to Parameter 315 [Data Out C2] LSW
N9:14	Value of parameter assigned to Parameter 315 [Data Out C2] MSW
N9:15	Value of parameter assigned to Parameter 316 [Data Out D1] LSW
N9:16	Value of parameter assigned to Parameter 316 [Data Out D1] MSW
N9:17	Value of parameter assigned to Parameter 317 [Data Out D2] LSW
N9:18	Value of parameter assigned to Parameter 317 [Data Out D2] MSW
N10:0	1771-SDN Scanner Command Word (see its User Manual for bit definitions)
N10:1	Logic Command (see Appendix D)
N10:2	Speed Reference
N10:3	Value of parameter assigned to Parameter 300 [Data In A1] LSW
N10:4	Value of parameter assigned to Parameter 300 [Data In A1] MSW
N10:5	Value of parameter assigned to Parameter 301 [Data In A2] LSW
N10:6	Value of parameter assigned to Parameter 301 [Data In A2] MSW
N10:7	Value of parameter assigned to Parameter 302 [Data In B1] LSW
N10:8	Value of parameter assigned to Parameter 302 [Data In B1] MSW
N10:9	Value of parameter assigned to Parameter 303 [Data In B2] LSW
N10:10	Value of parameter assigned to Parameter 303 [Data In B2] MSW
N10:11	Value of parameter assigned to Parameter 304 [Data In C1] LSW
N10:12	Value of parameter assigned to Parameter 304 [Data In C1] MSW
N10:13	Value of parameter assigned to Parameter 305 [Data In C2] LSW
N10:14	Value of parameter assigned to Parameter 305 [Data In C2] MSW
N10:15	Value of parameter assigned to Parameter 306 [Data In D1] LSW
N10:16	Value of parameter assigned to Parameter 306 [Data In D1] MSW
N10:17	Value of parameter assigned to Parameter 307 [Data In D2] LSW
N10:18	Value of parameter assigned to Parameter 307 [Data In D2] MSW

Table 5.K PLC-5 Data Table Addresses for PowerFlex 700S Drives – Phase I Control

Data Table Address	Description
N9:0	1771-SDN Scanner Status Word (see its User Manual for bit definitions)
N9:1	Logic Status (see Appendix D)
N9:2	Not Used
N9:3	Speed Feedback LSW
N9:4	Speed Feedback MSW
N9:5	Value of parameter assigned to Parameter 724/725 [Data Out A1] LSW
N9:6	Value of parameter assigned to Parameter 724/725 [Data Out A1] MSW
N9:7	Value of parameter assigned to Parameter 726/727 [Data Out A2] LSW
N9:8	Value of parameter assigned to Parameter 726/727 [Data Out A2] MSW
N9:9	Value of parameter assigned to Parameter 728/729 [Data Out B1] LSW
N9:10	Value of parameter assigned to Parameter 728/729 [Data Out B1] MSW
N9:11	Value of parameter assigned to Parameter 730/731 [Data Out B2] LSW
N9:12	Value of parameter assigned to Parameter 730/731 [Data Out B2] MSW
N9:13	Value of parameter assigned to Parameter 732/733 [Data Out C1] LSW
N9:14	Value of parameter assigned to Parameter 732/733 [Data Out C1] MSW
N9:15	Value of parameter assigned to Parameter 734/735 [Data Out C2] LSW
N9:16	Value of parameter assigned to Parameter 734/735 [Data Out C2] MSW
N9:17	Value of parameter assigned to Parameter 736/737 [Data Out D1] LSW
N9:18	Value of parameter assigned to Parameter 736/737 [Data Out D1] MSW
N9:19	Value of parameter assigned to Parameter 738/739 [Data Out D2] LSW
N9:20	Value of parameter assigned to Parameter 738/739 [Data Out D2] MSW
N10:0	1771-SDN Scanner Command Word (see its User Manual for bit definitions)
N10:1	Logic Command (see Appendix D)
N10:2	Not Used
N10:3	Speed Reference LSW
N10:4	Speed Reference MSW
N10:5	Value of parameter assigned to Parameter 707/708 [Data In A1] LSW
N10:6	Value of parameter assigned to Parameter 707/708 [Data In A1] MSW
N10:7	Value of parameter assigned to Parameter 709/710 [Data In A2] LSW
N10:8	Value of parameter assigned to Parameter 709/710 [Data In A2] MSW
N10:9	Value of parameter assigned to Parameter 711/712 [Data In B1] LSW
N10:10	Value of parameter assigned to Parameter 711/712 [Data In B1] MSW
N10:11	Value of parameter assigned to Parameter 713/714 [Data In B2] LSW
N10:12	Value of parameter assigned to Parameter 713/714 [Data In B2] MSW
N10:13	Value of parameter assigned to Parameter 715/716 [Data In C1] LSW
N10:14	Value of parameter assigned to Parameter 715/716 [Data In C1] MSW
N10:15	Value of parameter assigned to Parameter 717/718 [Data In C2] LSW
N10:16	Value of parameter assigned to Parameter 717/718 [Data In C2] MSW
N10:17	Value of parameter assigned to Parameter 719/720 [Data In D1] LSW
N10:18	Value of parameter assigned to Parameter 719/720 [Data In D1] MSW
N10:19	Value of parameter assigned to Parameter 721/722 [Data In D2] LSW
N10:20	Value of parameter assigned to Parameter 721/722 [Data In D2] MSW

Table 5.L PLC-5 Data Table Addresses for PowerFlex 700S Drives – Phase II Control

Data Table Address	Description
N9:0	1771-SDN Scanner Status Word (see its User Manual for bit definitions)
N9:1	Logic Status (see Appendix D)
N9:2	Not Used
N9:3	Speed Feedback LSW
N9:4	Speed Feedback MSW
N9:5	Value of parameter assigned to Parameter 660 [DPI Data Out A1] LSW
N9:6	Value of parameter assigned to Parameter 660 [DPI Data Out A1] MSW
N9:7	Value of parameter assigned to Parameter 661 [DPI Data Out A2] LSW
N9:8	Value of parameter assigned to Parameter 661 [DPI Data Out A2] MSW
N9:9	Value of parameter assigned to Parameter 662 [DPI Data Out B1] LSW
N9:10	Value of parameter assigned to Parameter 662 [DPI Data Out B1] MSW
N9:11	Value of parameter assigned to Parameter 663 [DPI Data Out B2] LSW
N9:12	Value of parameter assigned to Parameter 663 [DPI Data Out B2] MSW
N9:13	Value of parameter assigned to Parameter 664 [DPI Data Out C1] LSW
N9:14	Value of parameter assigned to Parameter 664 [DPI Data Out C1] MSW
N9:15	Value of parameter assigned to Parameter 665 [DPI Data Out C2] LSW
N9:16	Value of parameter assigned to Parameter 665 [DPI Data Out C2] MSW
N9:17	Value of parameter assigned to Parameter 666 [DPI Data Out D1] LSW
N9:18	Value of parameter assigned to Parameter 666 [DPI Data Out D1] MSW
N9:19	Value of parameter assigned to Parameter 667 [DPI Data Out D2] LSW
N9:20	Value of parameter assigned to Parameter 667 [DPI Data Out D2] MSW
N10:0	1771-SDN Scanner Command Word (see its User Manual for bit definitions)
N10:1	Logic Command (see Appendix D)
N10:2	Not Used
N10:3	Speed Reference LSW
N10:4	Speed Reference MSW
N10:5	Value of parameter assigned to Parameter 651 [DPI Data In A1] LSW
N10:6	Value of parameter assigned to Parameter 651 [DPI Data In A1] MSW
N10:7	Value of parameter assigned to Parameter 652 [DPI Data In A2] LSW
N10:8	Value of parameter assigned to Parameter 652 [DPI Data In A2] MSW
N10:9	Value of parameter assigned to Parameter 653 [DPI Data In B1] LSW
N10:10	Value of parameter assigned to Parameter 653 [DPI Data In B1] MSW
N10:11	Value of parameter assigned to Parameter 654 [DPI Data In B2] LSW
N10:12	Value of parameter assigned to Parameter 654 [DPI Data In B2] MSW
N10:13	Value of parameter assigned to Parameter 655 [DPI Data In C1] LSW
N10:14	Value of parameter assigned to Parameter 655 [DPI Data In C1] MSW
N10:15	Value of parameter assigned to Parameter 656 [DPI Data In C2] LSW
N10:16	Value of parameter assigned to Parameter 656 [DPI Data In C2] MSW
N10:17	Value of parameter assigned to Parameter 657 [DPI Data In D1] LSW
N10:18	Value of parameter assigned to Parameter 657 [DPI Data In D1] MSW
N10:19	Value of parameter assigned to Parameter 658 [DPI Data In D2] LSW
N10:20	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.M and Table 5.N) and a ladder logic program that will pass the controller address data to the program data table addresses.

Table 5.M PLC-5 and Program Data Table Address Descriptions for Example Logic Status/Feedback Ladder Logic Program

Description	PLC-5 Data Table Address	Description	Program Data Table Address
Drive Ready	N9:1/0	Status Ready	B3:1/0
Drive Active	N9:1/1	Status Active	B3:1/1
Actual Direction (XIO)	N9:1/3	Status Forward	B3:1/3
Actual Direction (XIC)	N9:1/3	Status Reverse	B3:1/4
Drive Faulted	N9:1/7	Status Faulted	B3:1/7
Drive At Speed	N9:1/8	Status At Speed	B3:1/8
Speed Feedback	N9:2	Speed Feedback	N20:2

Table 5.N Program and PLC-5 Data Table Address Descriptions for Example Logic Command/Reference Ladder Logic Program

Description	Program Data Table Address	Description	PLC-5 Data Table Address
Command Stop	B3:20/0	Drive Stop	N10:1/0
Command Start	B3:20/1	Drive Start	N10:1/1
Command Jog	B3:20/2	Drive Jog	N10:1/2
Command Clear Faults	B3:20/3	Drive Clear Faults	N10:1/3
Command Forward Reverse (XIO)	B3:20/4	Drive Forward	N10:1/4
Command Forward Reverse (XIC)	B3:20/4	Drive Reverse	N10:1/5
Speed Reference	N30:2	Speed Reference	N10:2

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 5.22 and Figure 5.23.

Figure 5.22 PLC-5 Example Ladder Logic Program for Logic Status/Feedback

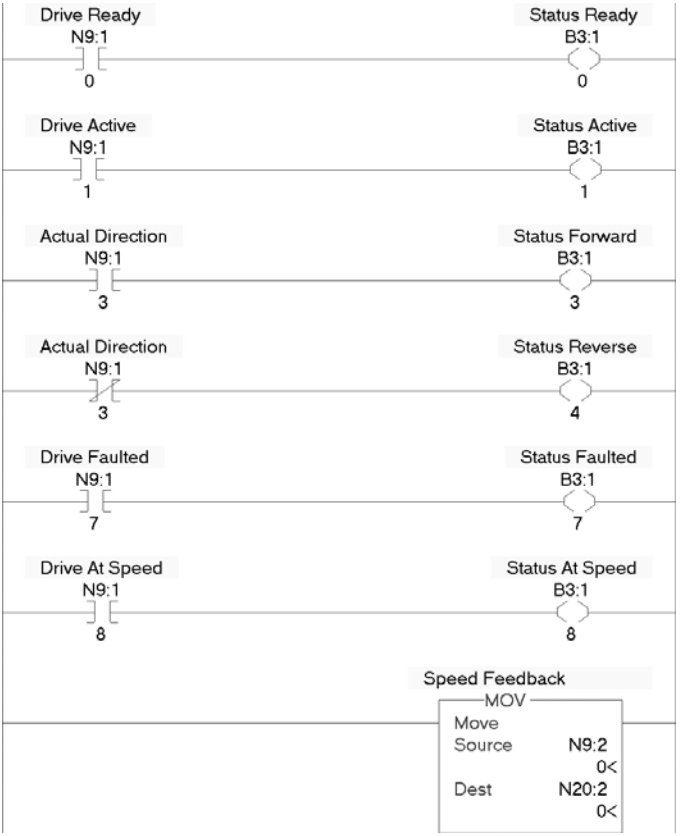
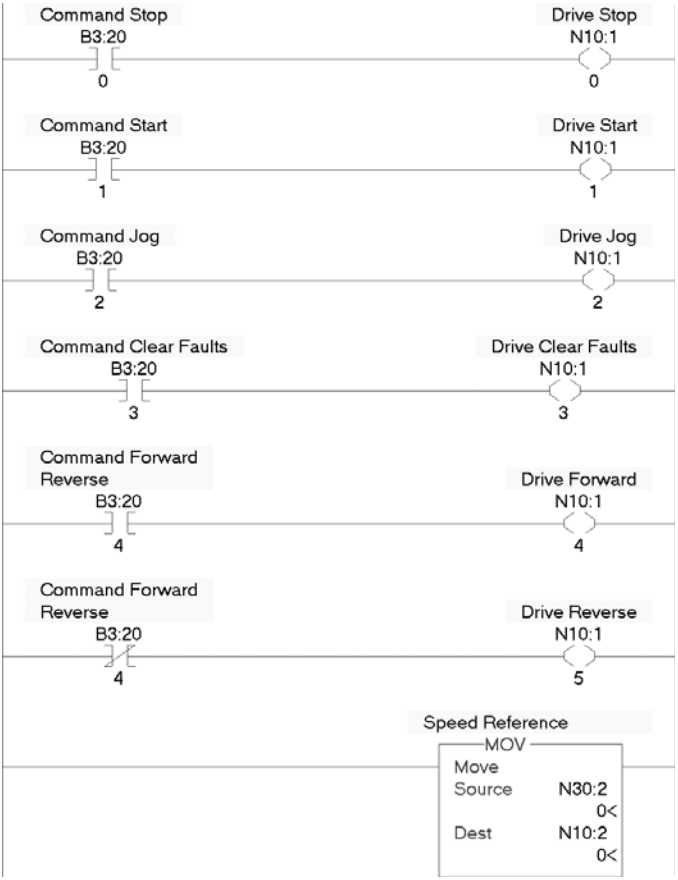


Figure 5.23 PLC-5 Example Ladder Logic Program for Logic Command/Reference



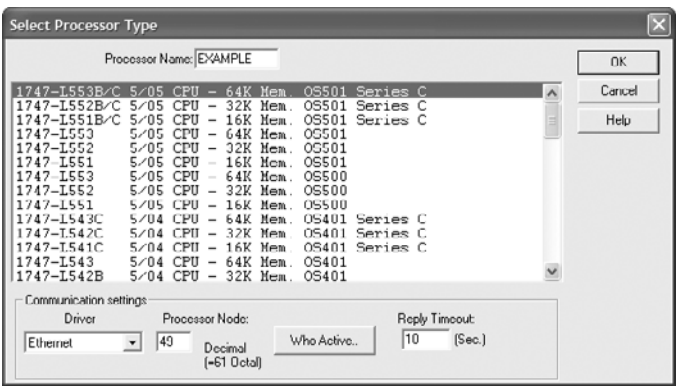
SLC 500 Example

Creating an RSLogix 500 (v7 or higher) Project

To transmit (read and write) data between the controller and drive, you must create discrete I/O instructions in the controller for Logic Command/Status, Reference/Feedback, and Datalinks. Also, COP instructions must be included in the ladder logic program to convert the default memory addresses in Configuring the I/O (Chapter 4) to data table addresses.

1. Start RSLogix 500. The RSLogix 500 window appears. Select **File > New** to display the Select Processor Type screen (Figure 5.24).

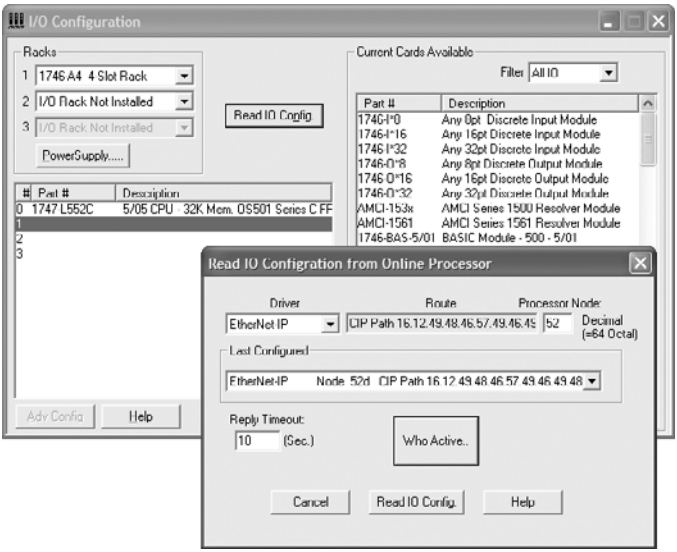
Figure 5.24 SLC 500 Select Processor Type Screen



2. Assign a name for the processor. In the list, select the appropriate processor (for this example, 1747-L552C 5/05) and choices for the screen fields to match your application, and click **OK**. The RSLogix 500 project window reappears.

3. In the project treeview, right-click on IO Configuration and select **Open** to display the I/O Configuration screen (Figure 5.25).

Figure 5.25 Configuring Processor I/O Screens



4. Click **Read IO Config.** to display the Read IO Configuration from Online Processor screen (Figure 5.25). Click **Who Active..** and select the communication path to the processor, and then click **OK**.

5. On the Read IO Configuration from Online Processor screen, click **Read IO Config.** to list the 1747-SDN DeviceNet Scanner Module. Note that the # column shows the slot number that the scanner occupies. Then close this screen.

Drive and Adapter Parameter Settings

These 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-D Adapter	03	CN Addr Cfg	2	Node address for the adapter
	13	DPI I/O Cfg	xxx1 1111	Enables Cmd/Ref, Datalinks A-D
	25	M-S Input	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26	M-S Output	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

TIP: Data In's are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). Data Out's are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

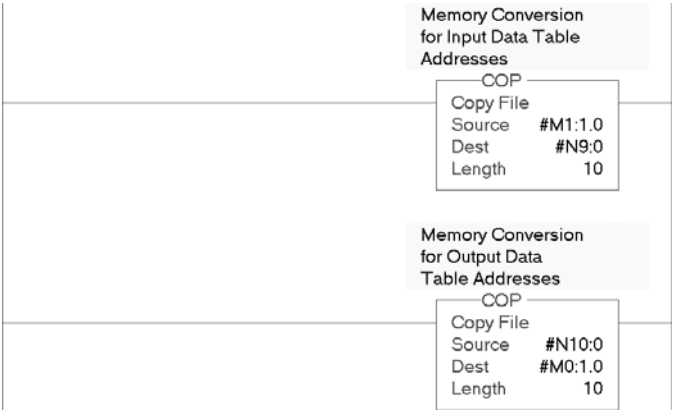
Understanding SLC 500 Controller Data Table Addresses

When the I/O was configured (Chapter 4), two available default memory address ranges (M1:1.x for input data and M0:1.x for output data) were used. However, since memory addresses cannot be used to display real data, COP instructions will be used in this example to convert these addresses to N data table addresses. With this conversion, the M1:1.0

address will become N9:0 and the M0:1.0 address will become N10:0.

Figure 5.26 shows an example ladder logic program to convert memory addresses to N data table addresses.

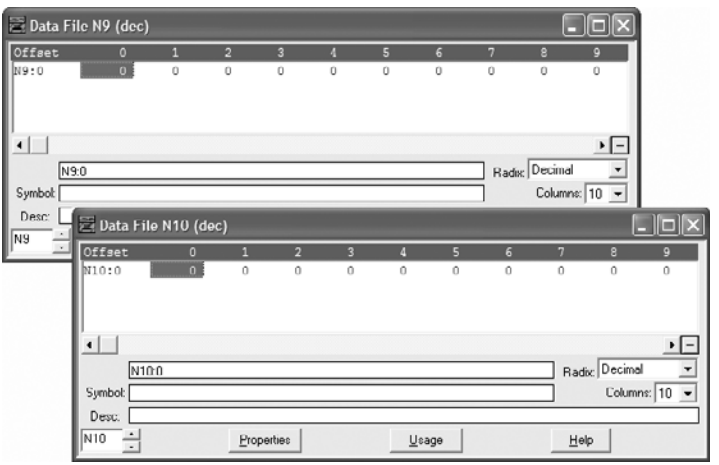
Figure 5.26 SLC 500 Example Ladder Logic Program to Convert Memory Addresses



TIP: In the ladder logic COP instructions, the number following the colon in the #M1 and #M0 addresses is the slot number in which the scanner resides. For example, if the 1747-SDN is in slot 3, then the #M1 address becomes #M1:3.0 and the #M0 address becomes #M0:3.0.

After the conversion, Figure 5.27 shows the entire data file address structure for this example.

Figure 5.27 Data File Tables for Example Ladder Logic Program



Depending on the drive you are using, Table 5.O, Table 5.P, Table 5.Q or Table 5.R shows the I/O definitions as they relate to the N9:0 and N10:0 data table addresses (Figure 5.27) being used in this example.

When using PowerFlex 70 SC or 70 EC, PowerFlex 700 SC, PowerFlex 700H drives or SMC Flex, which all contain INT (16-bit format) data types, you will read from and write to a single 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.O SLC 500 Data Table Addresses for PowerFlex 70 SC/EC, PowerFlex 700 SC, PowerFlex 700H Drives, and SMC Flex

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Speed Feedback
N9:2	Value of parameter assigned to Parameter 310 [Data Out A1]
N9:3	Value of parameter assigned to Parameter 311 [Data Out A2]
N9:4	Value of parameter assigned to Parameter 312 [Data Out B1]
N9:5	Value of parameter assigned to Parameter 313 [Data Out B2]
N9:6	Value of parameter assigned to Parameter 314 [Data Out C1]
N9:7	Value of parameter assigned to Parameter 315 [Data Out C2]
N9:8	Value of parameter assigned to Parameter 316 [Data Out D1]
N9:9	Value of parameter assigned to Parameter 317 [Data Out D2]
N10:0	Logic Command (see Appendix D)
N10:1	Speed Reference
N10:2	Value of parameter assigned to Parameter 300 [Data In A1]
N10:3	Value of parameter assigned to Parameter 301 [Data In A2]
N10:4	Value of parameter assigned to Parameter 302 [Data In B1]
N10:5	Value of parameter assigned to Parameter 303 [Data In B2]
N10:6	Value of parameter assigned to Parameter 304 [Data In C1]
N10:7	Value of parameter assigned to Parameter 305 [Data In C2]
N10:8	Value of parameter assigned to Parameter 306 [Data In D1]
N10:9	Value of parameter assigned to Parameter 307 [Data In D2]

Table 5.P SLC 500 Data Table Addresses for PowerFlex 700 VC Drives

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Speed Feedback
N9:2	Value of parameter assigned to Parameter 310 [Data Out A1] LSW
N9:3	Value of parameter assigned to Parameter 310 [Data Out A1] MSW
N9:4	Value of parameter assigned to Parameter 311 [Data Out A2] LSW
N9:5	Value of parameter assigned to Parameter 311 [Data Out A2] MSW
N9:6	Value of parameter assigned to Parameter 312 [Data Out B1] LSW
N9:7	Value of parameter assigned to Parameter 312 [Data Out B1] MSW
N9:8	Value of parameter assigned to Parameter 313 [Data Out B2] LSW
N9:9	Value of parameter assigned to Parameter 313 [Data Out B2] MSW
N9:10	Value of parameter assigned to Parameter 314 [Data Out C1] LSW
N9:11	Value of parameter assigned to Parameter 314 [Data Out C1] MSW
N9:12	Value of parameter assigned to Parameter 315 [Data Out C2] LSW
N9:13	Value of parameter assigned to Parameter 315 [Data Out C2] MSW
N9:14	Value of parameter assigned to Parameter 316 [Data Out D1] LSW
N9:15	Value of parameter assigned to Parameter 316 [Data Out D1] MSW
N9:16	Value of parameter assigned to Parameter 317 [Data Out D2] LSW
N9:17	Value of parameter assigned to Parameter 317 [Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Speed Reference
N10:2	Value of parameter assigned to Parameter 300 [Data In A1] LSW
N10:3	Value of parameter assigned to Parameter 300 [Data In A1] MSW
N10:4	Value of parameter assigned to Parameter 301 [Data In A2] LSW
N10:5	Value of parameter assigned to Parameter 301 [Data In A2] MSW
N10:6	Value of parameter assigned to Parameter 302 [Data In B1] LSW
N10:7	Value of parameter assigned to Parameter 302 [Data In B1] MSW
N10:8	Value of parameter assigned to Parameter 303 [Data In B2] LSW
N10:9	Value of parameter assigned to Parameter 303 [Data In B2] MSW
N10:10	Value of parameter assigned to Parameter 304 [Data In C1] LSW
N10:11	Value of parameter assigned to Parameter 304 [Data In C1] MSW
N10:12	Value of parameter assigned to Parameter 305 [Data In C2] LSW
N10:13	Value of parameter assigned to Parameter 305 [Data In C2] MSW
N10:14	Value of parameter assigned to Parameter 306 [Data In D1] LSW
N10:15	Value of parameter assigned to Parameter 306 [Data In D1] MSW
N10:16	Value of parameter assigned to Parameter 307 [Data In D2] LSW
N10:17	Value of parameter assigned to Parameter 307 [Data In D2] MSW

Table 5.Q SLC 500 Data Table Addresses for PowerFlex 700S Drives – Phase I Control

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Not Used
N9:2	Speed Feedback LSW
N9:3	Speed Feedback MSW
N9:4	Value of parameter assigned to Parameter 724/725 [Data Out A1] LSW
N9:5	Value of parameter assigned to Parameter 724/725 [Data Out A1] MSW
N9:6	Value of parameter assigned to Parameter 726/727 [Data Out A2] LSW
N9:7	Value of parameter assigned to Parameter 726/727 [Data Out A2] MSW
N9:8	Value of parameter assigned to Parameter 728/729 [Data Out B1] LSW
N9:9	Value of parameter assigned to Parameter 728/729 [Data Out B1] MSW
N9:10	Value of parameter assigned to Parameter 730/731 [Data Out B2] LSW
N9:11	Value of parameter assigned to Parameter 730/731 [Data Out B2] MSW
N9:12	Value of parameter assigned to Parameter 732/733 [Data Out C1] LSW
N9:13	Value of parameter assigned to Parameter 732/733 [Data Out C1] MSW
N9:14	Value of parameter assigned to Parameter 734/735 [Data Out C2] LSW
N9:15	Value of parameter assigned to Parameter 734/735 [Data Out C2] MSW
N9:16	Value of parameter assigned to Parameter 736/737 [Data Out D1] LSW
N9:17	Value of parameter assigned to Parameter 736/737 [Data Out D1] MSW
N9:18	Value of parameter assigned to Parameter 738/739 [Data Out D2] LSW
N9:19	Value of parameter assigned to Parameter 738/739 [Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Not Used
N10:2	Speed Reference LSW
N10:3	Speed Reference MSW
N10:4	Value of parameter assigned to Parameter 707/708 [Data In A1] LSW
N10:5	Value of parameter assigned to Parameter 707/708 [Data In A1] MSW
N10:6	Value of parameter assigned to Parameter 709/710 [Data In A2] LSW
N10:7	Value of parameter assigned to Parameter 709/710 [Data In A2] MSW
N10:8	Value of parameter assigned to Parameter 711/712 [Data In B1] LSW
N10:9	Value of parameter assigned to Parameter 711/712 [Data In B1] MSW
N10:10	Value of parameter assigned to Parameter 713/714 [Data In B2] LSW
N10:11	Value of parameter assigned to Parameter 713/714 [Data In B2] MSW
N10:12	Value of parameter assigned to Parameter 715/716 [Data In C1] LSW
N10:13	Value of parameter assigned to Parameter 715/716 [Data In C1] MSW
N10:14	Value of parameter assigned to Parameter 717/718 [Data In C2] LSW
N10:15	Value of parameter assigned to Parameter 717/718 [Data In C2] MSW
N10:16	Value of parameter assigned to Parameter 719/720 [Data In D1] LSW
N10:17	Value of parameter assigned to Parameter 719/720 [Data In D1] MSW
N10:18	Value of parameter assigned to Parameter 721/722 [Data In D2] LSW
N10:19	Value of parameter assigned to Parameter 721/722 [Data In D2] MSW

Table 5.R SLC 500 Data Table Addresses for PowerFlex 700S Drives – Phase II Control

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Not Used
N9:2	Speed Feedback LSW
N9:3	Speed Feedback MSW
N9:4	Value of parameter assigned to Parameter 660 [DPI Data Out A1] LSW
N9:5	Value of parameter assigned to Parameter 660 [DPI Data Out A1] MSW
N9:6	Value of parameter assigned to Parameter 661 [DPI Data Out A2] LSW
N9:7	Value of parameter assigned to Parameter 661 [DPI Data Out A2] MSW
N9:8	Value of parameter assigned to Parameter 662 [DPI Data Out B1] LSW
N9:9	Value of parameter assigned to Parameter 662 [DPI Data Out B1] MSW
N9:10	Value of parameter assigned to Parameter 663 [DPI Data Out B2] LSW
N9:11	Value of parameter assigned to Parameter 663 [DPI Data Out B2] MSW
N9:12	Value of parameter assigned to Parameter 664 [DPI Data Out C1] LSW
N9:13	Value of parameter assigned to Parameter 664 [DPI Data Out C1] MSW
N9:14	Value of parameter assigned to Parameter 665 [DPI Data Out C2] LSW
N9:15	Value of parameter assigned to Parameter 665 [DPI Data Out C2] MSW
N9:16	Value of parameter assigned to Parameter 666 [DPI Data Out D1] LSW
N9:17	Value of parameter assigned to Parameter 666 [DPI Data Out D1] MSW
N9:18	Value of parameter assigned to Parameter 667 [DPI Data Out D2] LSW
N9:19	Value of parameter assigned to Parameter 667 [DPI Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Not Used
N10:2	Speed Reference LSW
N10:3	Speed Reference MSW
N10:4	Value of parameter assigned to Parameter 651 [DPI Data In A1] LSW
N10:5	Value of parameter assigned to Parameter 651 [DPI Data In A1] MSW
N10:6	Value of parameter assigned to Parameter 652 [DPI Data In A2] LSW
N10:7	Value of parameter assigned to Parameter 652 [DPI Data In A2] MSW
N10:8	Value of parameter assigned to Parameter 653 [DPI Data In B1] LSW
N10:9	Value of parameter assigned to Parameter 653 [DPI Data In B1] MSW
N10:10	Value of parameter assigned to Parameter 654 [DPI Data In B2] LSW
N10:11	Value of parameter assigned to Parameter 654 [DPI Data In B2] MSW
N10:12	Value of parameter assigned to Parameter 655 [DPI Data In C1] LSW
N10:13	Value of parameter assigned to Parameter 655 [DPI Data In C1] MSW
N10:14	Value of parameter assigned to Parameter 656 [DPI Data In C2] LSW
N10:15	Value of parameter assigned to Parameter 656 [DPI Data In C2] MSW
N10:16	Value of parameter assigned to Parameter 657 [DPI Data In D1] LSW
N10:17	Value of parameter assigned to Parameter 657 [DPI Data In D1] MSW
N10:18	Value of parameter assigned to Parameter 658 [DPI Data In D2] LSW
N10:19	Value of parameter assigned to Parameter 658 [DPI Data In D2] MSW

To operate the drive and view its status using the data table addresses, Human Machine Interface devices (PanelView, etc.) or a ladder logic program, you will need to create descriptive controller data table addresses (Table 5.S and Table 5.T) and a ladder logic program that will pass the controller address data to the program data table addresses.

Table 5.S SLC 500 and Program Data Table Address Descriptions for Example Logic Status/Feedback Ladder Logic Program

Description	SLC 5000 Data Table Address	Description	Program Data Table Address
Drive Ready	N9:0/0	Status Ready	B3:1/0
Drive Active	N9:0/1	Status Active	B3:1/1
Actual Direction (XIO)	N9:0/3	Status Forward	B3:1/3
Actual Direction (XIC)	N9:0/3	Status Reverse	B3:1/4
Drive Faulted	N9:0/7	Status Faulted	B3:1/7
Drive At Speed	N9:0/8	Status At Speed	B3:1/8
Speed Feedback	N9:1	Speed Feedback	N20:1

Table 5.T Program and SLC 500 Data Table Address Descriptions for Example Logic Command/Reference Ladder Logic Program

Description	Program Data Table Address	Description	SLC 500 Data Table Address
Command Stop	B3:20/0	Drive Stop	N10:0/0
Command Start	B3:20/1	Drive Start	N10:0/1
Command Jog	B3:20/2	Drive Jog	N10:0/2
Command Clear Faults	B3:20/3	Drive Clear Faults	N10:0/3
Command Forward Reverse (XIO)	B3:20/4	Drive Forward	N10:0/4
Command Forward Reverse (XIC)	B3:20/4	Drive Reverse	N10:0/5
Speed Reference	N30:1	Speed Reference	N10:1

Important: In addition to the Run mode for the processor, the scanner also has its own Run mode. To change the scanner mode from IDLE to RUN, set Bit 0 in data table address O:e.0, where e = the scanner slot number. For this example, we set Bit 0 in data table address O:1.0.

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 5.28 and Figure 5.29.

Figure 5.28 SLC 500 Example Ladder Logic Program for Logic Status/Feedback

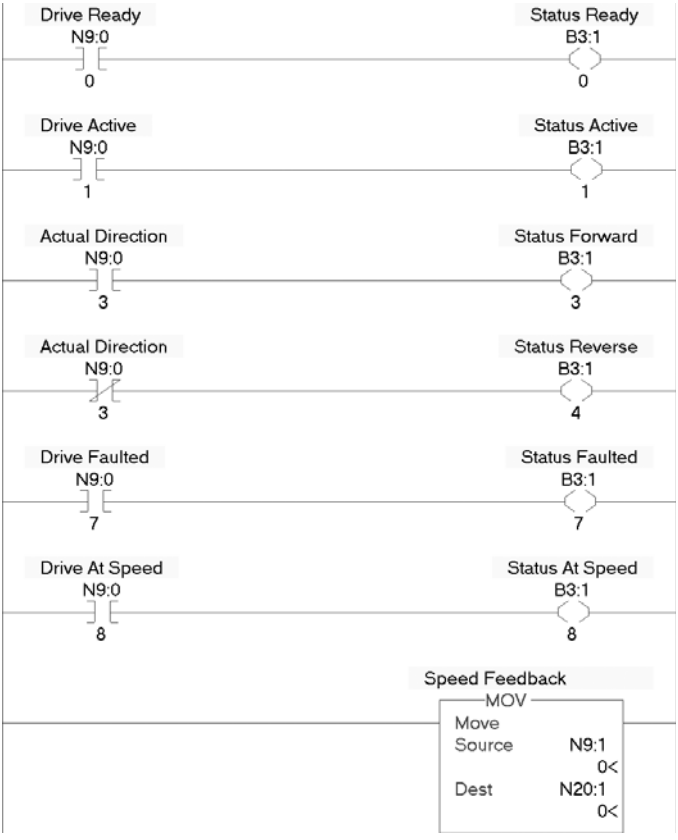
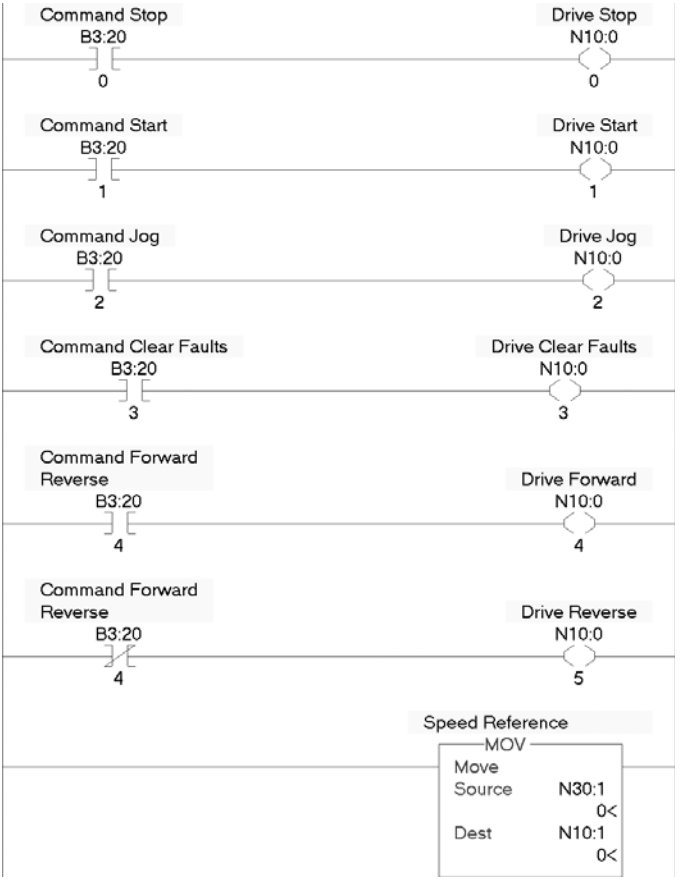


Figure 5.29 SLC 500 Example Ladder Logic Program for Logic Command/Reference



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

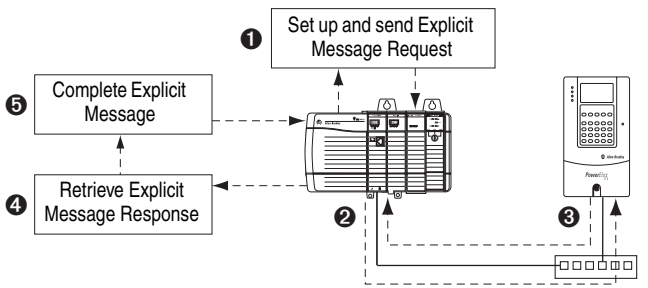
the Communications tab message configuration screen during message setup. These message connections are in addition to the I/O connection. However, the trade off for more message connections is decreased network performance. If your application cannot tolerate this, do not check the “Connected” box.

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 (download).
❷	The scanner 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 scanner and/or controller that is being used.

ControlLogix Examples

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, DeviceNet Objects.

Explicit Messaging Using RSLogix 5000 (v15 or higher)

ControlLogix 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.

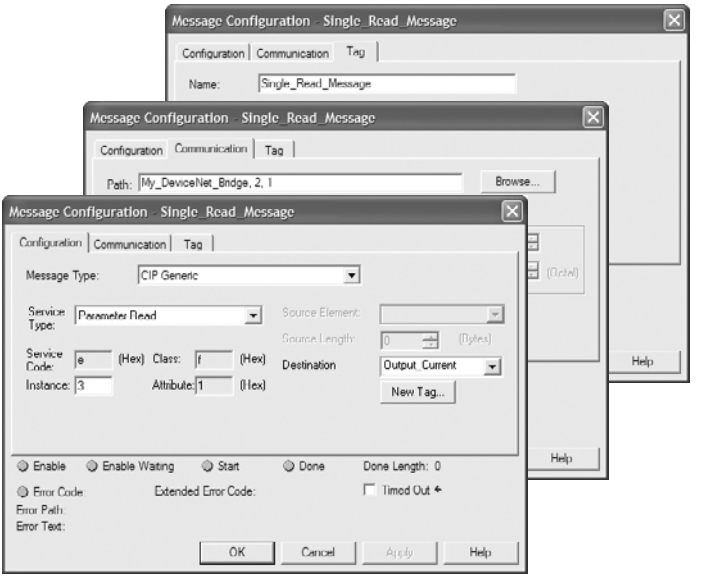
Table 6.A Example Controller Tags for Read Single Parameter Messaging Program

Operand	Controller Tags for Read Single Message	Data Type
XIC	Execute_Single_Read_Message	BOOL
MSG	Single_Read_Message	MESSAGE

Figure 6.2 Example Ladder Logic Explicit Messaging Program for Read Single

ControlLogix – 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_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

(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. When using a PowerFlex 700S drive, Output Current is a floating point number. Therefore, the Data Type field must be set to “REAL” when creating the controller tag.

ControlLogix 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.

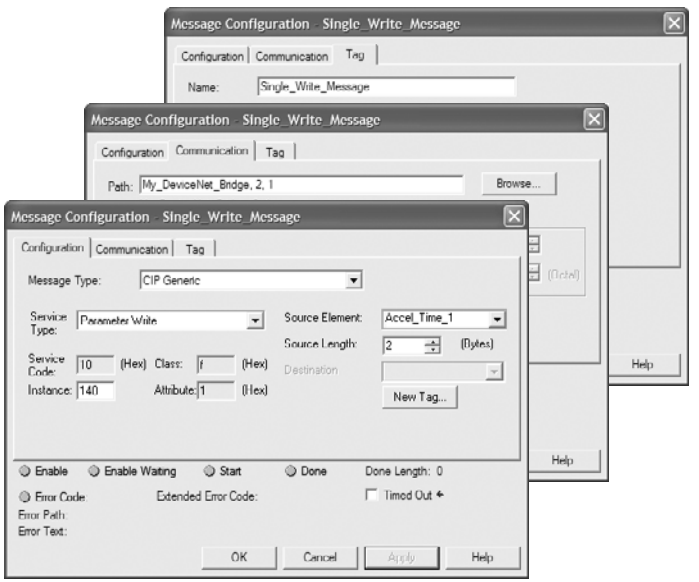
Table 6.B Example Controller Tags for Write Single Parameter Messaging Program

Operand	Controller Tags for Write Single Message	Data Type
XIC	Execute_Single_Write_Message	BOOL
MSG	Single_Write_Message	MESSAGE

Figure 6.4 Example Ladder Logic Explicit Messaging Program for Write Single

ControlLogix – 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 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_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

[3] In this example, Accel Time 1 is a 16-bit parameter and the 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 or a REAL). Refer to the drive documentation to determine the size of the parameter. When using a PowerFlex 700S drive, Accel Time 1 is a floating point number. Therefore, the Data Type field must be set to “REAL” when creating the controller tag.

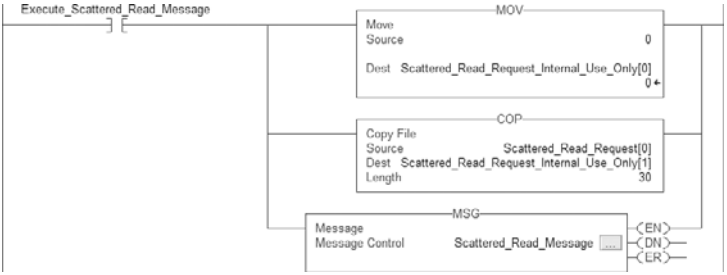
ControlLogix Example Ladder Logic Program to Read Multiple Parameters

A Scattered Read message is used to read the values of multiple parameters. Up to 22 parameters can be read. 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

Operand	Controller Tags for Read Multiple Message	Data Type
XIC	Execute_Scattered_Read_Message	BOOL
MOV	Scattered_Read_Request_Internal_Use_Only[0]	SINT[32]
COP	Scattered_Read_Request[0]	INT[15]
MSG	Scattered_Read_Message	MESSAGE

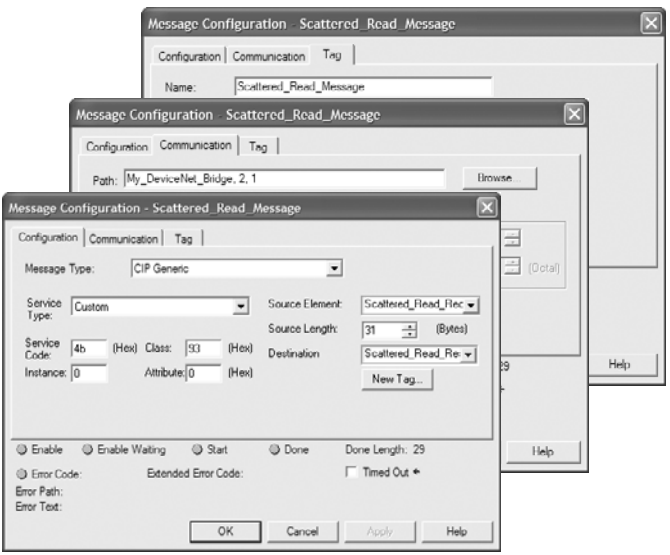
Figure 6.6 Example Ladder Logic Explicit Messaging Program for Read Multiple



TIP: The MOV (Move) and COP (Copy) instructions are required to convert the data into the necessary data types, and to align the data into a usable display format.

ControlLogix – 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 _ Internal_Use_Only[0] [3]	Name of the tag for any service data to be sent from scanner to the adapter/drive.
Source Length	31 bytes [3]	Number of bytes of service data to be sent in the message.
Destination	Scattered_Read_Response[0]	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path [2]	My_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

(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 this example, 31 bytes total; 30 bytes for an INT[15] array plus one extra required byte that is always set to zero). Scattered read messages always assume that every parameter being read is a 32-bit parameter, regardless of its actual size. Maximum length is 133 bytes; 132 bytes or 66 words which equates to 22 parameters plus one extra required byte.

ControlLogix Example Scattered Read 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].

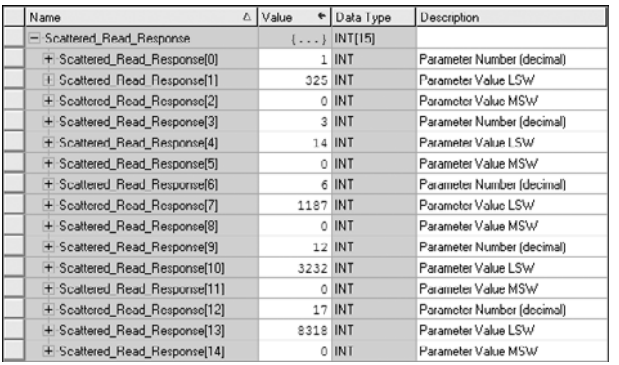
Figure 6.8 Example Scattered Read Request Data

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 (always zero)
Scattered_Read_Request[2]	0	INT	Pad Word (always zero)
Scattered_Read_Request[3]	3	INT	Parameter Number (decimal)
Scattered_Read_Request[4]	0	INT	Pad Word (always zero)
Scattered_Read_Request[5]	0	INT	Pad Word (always zero)
Scattered_Read_Request[6]	6	INT	Parameter Number (decimal)
Scattered_Read_Request[7]	0	INT	Pad Word (always zero)
Scattered_Read_Request[8]	0	INT	Pad Word (always zero)
Scattered_Read_Request[9]	12	INT	Parameter Number (decimal)
Scattered_Read_Request[10]	0	INT	Pad Word (always zero)
Scattered_Read_Request[11]	0	INT	Pad Word (always zero)
Scattered_Read_Request[12]	17	INT	Parameter Number (decimal)
Scattered_Read_Request[13]	0	INT	Pad Word (always zero)
Scattered_Read_Request[14]	0	INT	Pad Word (always zero)

ControlLogix Example Scattered Read 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 Scattered Read 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]	14	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]	3232	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

ControlLogix Example Ladder Logic Program to Write Multiple Parameters

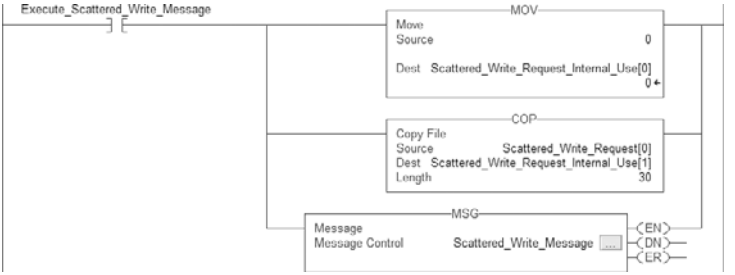
A Scattered Write message is used to write to multiple parameters. Values for up to 22 parameters can be written. This write message example writes the following values to these five parameters:

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.

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

Operand	Controller Tags for Write Multiple Message	Data Type
XIC	Execute_Scattered_Write_Message	BOOL
MOV	Scattered_Write_Request_Internal_Use_Only[0]	SINT[31]
COP	Scattered_Write_Request[0]	INT[15]
MSG	Scattered_Write_Message	MESSAGE

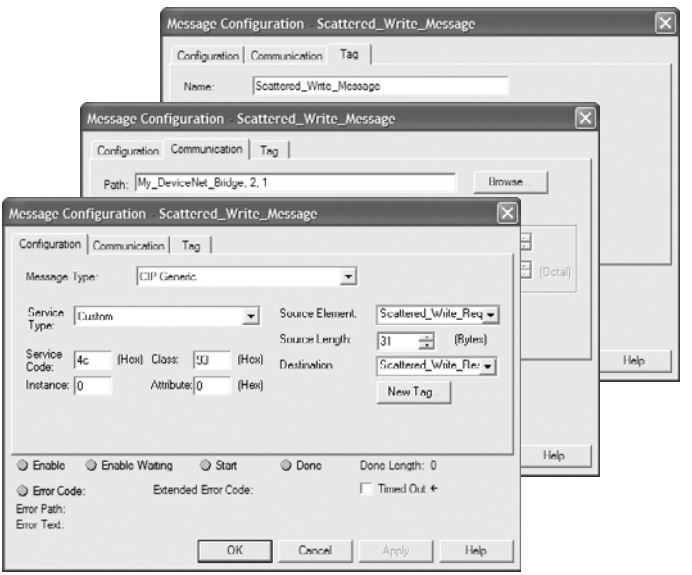
Figure 6.10 Example Ladder Logic Explicit Messaging Program for Write Multiple



TIP: The MOV (Move) and COP (Copy) instructions are required to convert the data into the necessary data types, and to align the data into a usable display format.

ControlLogix – 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_Internal_Use_Only[0] [3]	Name of the tag for any service data to be sent from scanner to the adapter/drive.
Source Length	31 bytes [3]	Number of bytes of service data to be sent in the message.
Destination	Scattered_Write_Response[0]	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path [2]	My_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

(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 this example, 31 bytes total; 30 bytes for an INT[15] array plus one extra required byte that is always set to zero). Scattered write messages always assume that every parameter being written to is a 32-bit parameter, regardless of its actual size. Maximum length is 133 bytes; 132 bytes or 66 words which equates to 22 parameters plus one extra required byte.

ControlLogix Example Scattered Write 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]	55.5 Hz.

Figure 6.12 Example Scattered Write 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

ControlLogix Example Scattered Write Response Data

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

Figure 6.13 Example Scattered Write 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 (always zero)
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 (always zero)
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 (always zero)
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 (always zero)
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 (always zero)

ControlLogix – Explanation of Request and Response Data

The data structures in Figure 6.14 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 6.14 Data Structures for Scattered Read/Write Messages

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

Explicit Messaging Using RSLogix 5000 (v14 or lower)

ControlLogix 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.

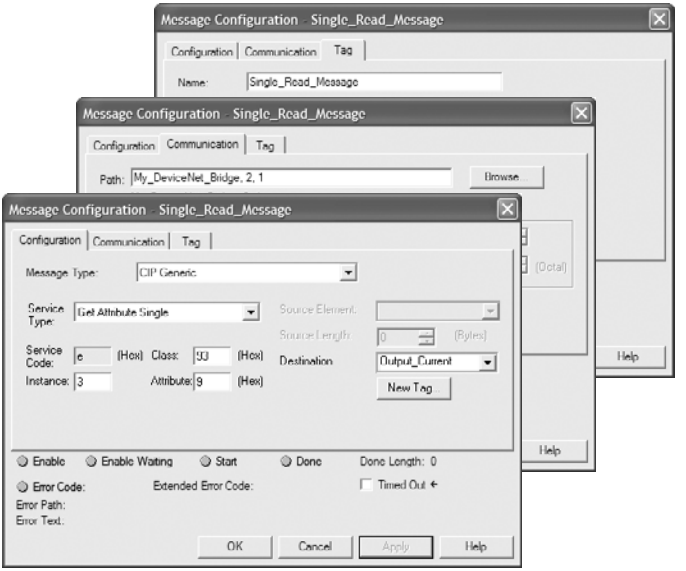
Table 6.E Example Controller Tags for Read Single Parameter Messaging Program

Operand	Controller Tags for Read Single Message	Data Type
XIC	Execute_Single_Read_Message	BOOL
MSG	Single_Read_Message	MESSAGE

Figure 6.15 Example Ladder Logic Explicit Messaging Program for Read Single

ControlLogix – Formatting a Message to Read Single Parameter

Figure 6.16 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_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

(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. When using a PowerFlex 700S drive, Output Current is a floating point number. Therefore, the Data Type field must be set to “REAL” when creating the controller tag.

ControlLogix 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.

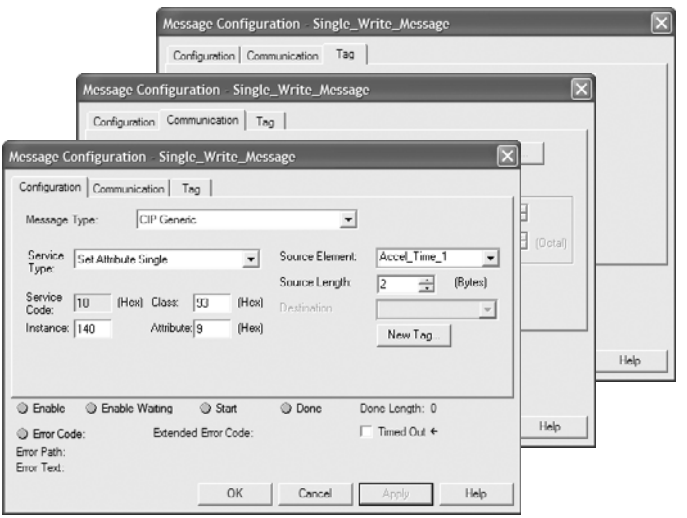
Table 6.F Example Controller Tags for Write Single Parameter Messaging Program

Operand	Controller Tags for Write Single Message	Data Type
XIC	Execute_Single_Write_Message	BOOL
MSG	Single_Write_Message	MESSAGE

Figure 6.17 Example Ladder Logic Explicit Messaging Program for Write Single

ControlLogix – Formatting a Message to Write Single Parameter

Figure 6.18 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 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_DeviceNet_Bridge	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 (for this example, My_DeviceNet_Bridge). Then always type in “2” which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, “1”).

(4) In this example, Accel Time 1 is a 16-bit parameter and the 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 or a REAL). Refer to the drive documentation to determine the size of the parameter. When using a PowerFlex 700S drive, Accel Time 1 is a floating point number. Therefore, the Data Type field must be set to “REAL” when creating the controller tag.

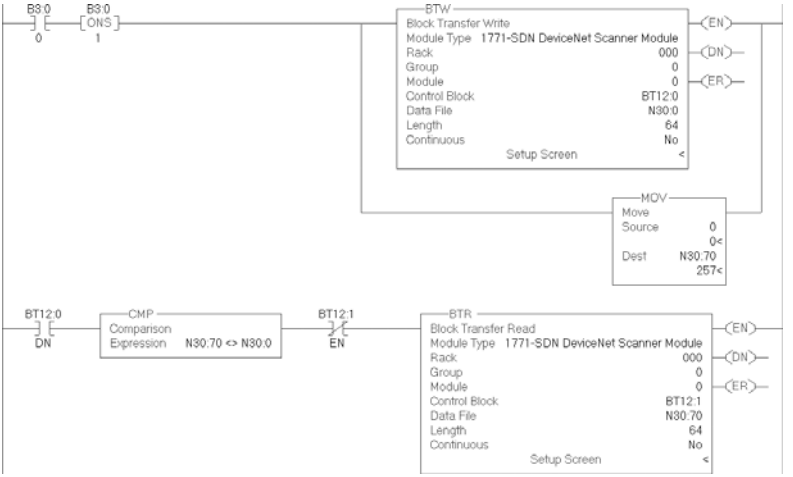
ControlLogix Example Ladder Logic Program to Read or Write Multiple Parameters

Since the example ladder logic rungs, configuration screens, and request/response data to read or write multiple parameters using RSLogix 5000 v14 or lower are identical to those for RSLogix 5000 v15 or higher, please refer to the information contained on page 6-6 through page 6-13 for complete details.

PLC-5 Examples

To perform explicit messaging on a DeviceNet network with a PLC-5 controller, a combination of a block transfer read and a block transfer write must be used (Figure 6.19).

Figure 6.19 PLC-5 Example Ladder Logic Program for All Explicit Messaging



PLC-5 Example 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.

Table 6.G Example Single Read Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0008	8	Port = 00, Size = 08 bytes
N30:2	0E01	3585	Service = 0E (Get_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0003	3	Instance = Parameter 3
N30:5	0009	9	Attribute = 9 (Parameter Value)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0008” in address N30:1 is shown as “8.”

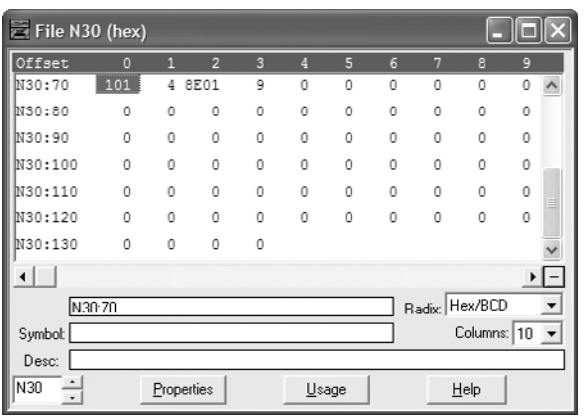
Figure 6.20 Example Single Read Request Data File

Table 6.H Example Single Read Response Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0004	4	Port = 00, Size = 04 bytes
N30:72	8E01	-29183	Service = 8E (successful), Address = 01 (Node)
N30:73	0009	9	Parameter Value Read (LSW) = 0.09 amps
N30:74	0000	0	Parameter Value Read (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0004” in address N30:71 is shown as “4.”

Figure 6.21 Example Single Read Response Data File



PLC-5 Example to Write Single Parameter

A write message is used to write to a single parameter. This write message example writes a value of 10.0 seconds to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Table 6.I Example Single Write Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0008	8	Port = 00, Size = 08 bytes
N30:2	1001	4097	Service = 10 (Set_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	008C	140	Instance = Parameter 140
N30:5	0009 (2)	9	Attribute = 9 (Parameter Value)
N30:6	0064	100	Parameter Value Written (LSW) = 10.0 seconds
N30:7	0000	0	Parameter Value Written (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0008” in address N30:1 is shown as “8.”

(2) Setting the data file address 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 data file address value to “A” (hex.) will write the parameter value to temporary memory, so the parameter value will be lost after the drive is power cycled.

Figure 6.22 Example Single Write Request Data File

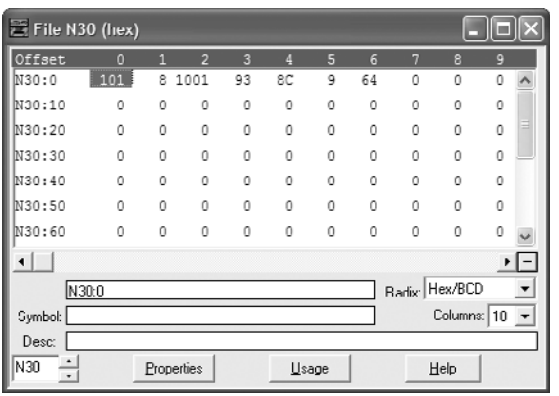
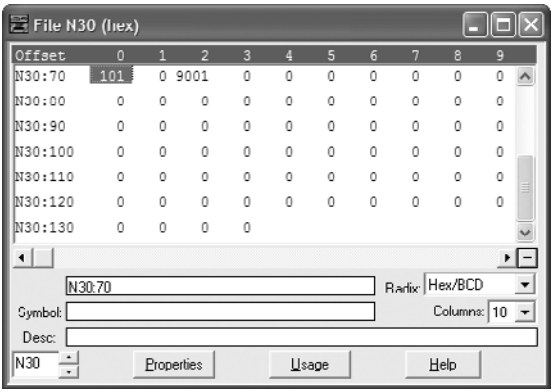


Table 6.J Example Single Write Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0000	0	Port = 00, Size = 00 bytes
N30:72	9001	-28671	Service = 90 (successful), Address = 01 (Node)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, "0000" in address N30:71 is shown as "0."

Figure 6.23 Example Single Write Response Data File



PLC-5 Example to Read Multiple Parameters

A scattered read message is used to read the values of multiple parameters. Up to 19 parameters can be read. 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 In2 Value].

Table 6.K Example Scattered Read Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0024	36	Port = 00, Size = 36 bytes (2)
N30:2	4B01	19201	Service = 4B (Get_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0000	0	Instance = Class Attributes (drive)
N30:5	0000	0	Attribute = 0 (Parameter Value)
N30:6	0001	1	Parameter Number Read = 1 [Output Freq]
N30:7	0000	0	Pad Word = 0 (always zero)
N30:8	0000	0	Pad Word = 0 (always zero)
N30:9	0003	3	Parameter Number Read = 3 [Output Current]
N30:10	0000	0	Pad Word = 0 (always zero)
N30:11	0000	0	Pad Word = 0 (always zero)
N30:12	0006	6	Parameter Number Read = 6 [Output Voltage]
N30:13	0000	0	Pad Word = 0 (always zero)
N30:14	0000	0	Pad Word = 0 (always zero)
N30:15	000C	12	Parameter Number Read = 12 [DC Bus Current]
N30:16	0000	0	Pad Word = 0 (always zero)
N30:17	0000	0	Pad Word = 0 (always zero)
N30:18	0011	17	Parameter Number Read = 17 [Analog In2 Value]
N30:19	0000	0	Pad Word = 0 (always zero)
N30:20	0000	0	Pad Word = 0 (always zero)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:1 is shown as “24.”

(2) The maximum number of bytes that can be entered is 120 (78 Hex.), which represents 19 parameters. The number of required bytes always includes 2 for the Class, 2 for the Instance, 2 for the Attribute, 2 for each parameter being read, and 4 for each parameter value (2 bytes for the Least SIgnificant Word and 2 bytes for the Most Significant Word). For this example where 5 parameters are being read, a value of 36 bytes is required.

Figure 6.24 Example Scattered Read Request Data File

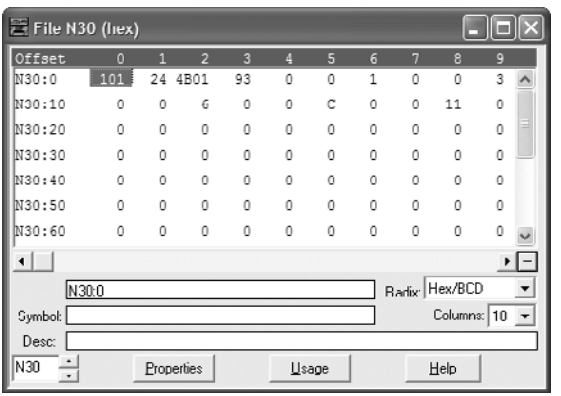
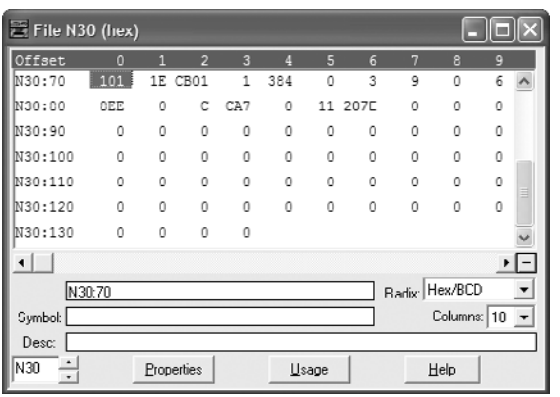


Table 6.L Example Scattered Read Response Data

Address	Value Hex.(1)	Value Dec.	Description
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CB01	51969	Service = CB (successful), Address = 01 (Node)
N30:73	0001	1	Read Value = Parameter Number (verification)
N30:74	0384	900	Parameter Value (LSW) = 90.0 Hz.
N30:75	0000	0	Parameter Value (MSW) = 0
N30:76	0003	3	Read Value = Parameter Number (verification)
N30:77	0009	9	Parameter Value (LSW) = 0.09 Amp
N30:78	0000	0	Parameter Value (MSW) = 0
N30:79	0006	6	Read Value = Parameter Number (verification)
N30:80	8EE	2286	Parameter Value (LSW) = 228.6 VDC
N30:81	0000	0	Parameter Value (MSW) = 0
N30:82	000C	12	Read Value = Parameter Number (verification)
N30:83	CA7	3239	Parameter Value (LSW) = 323.9 VDC
N30:84	0000	0	Parameter Value (MSW) = 0
N30:85	0011	17	Read Value = Parameter Number (verification)
N30:86	207E	8318	Parameter Value (LSW) = 8.318 mA
N30:87	0000	0	Parameter Value (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “001E” in address N30:71 is shown as “1E.”

Figure 6.25 Example Scattered Read Response Data File



PLC-5 Example to Write Multiple Parameters

A scattered write message is used to write values to multiple parameters. Values for up to 19 parameters can be written. 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.

Table 6.M Example Scattered Write Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0024	36	Port = 00, Size = 36 bytes (2)
N30:2	4C01	19457	Service = 4C (Set_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0000	0	Instance = Class Attributes (drive)
N30:5	0000	0	Attribute = 0 (Parameter Value)
N30:6	008D	141	Parameter Number Written To = 141 [Accel Time 2]
N30:7	006F	111	Parameter Value Written (LSW) = 11.1 seconds
N30:8	0000	0	Parameter Value Written (MSW) = 0
N30:9	008F	143	Parameter Number Written To = 143 [Decel Time 2]
N30:10	00DE	222	Parameter Value Written (LSW) = 22.2 seconds
N30:11	0000	0	Parameter Value Written (MSW) = 0
N30:12	0069	105	Parameter Number Written To = 105 [Preset Speed 5]
N30:13	014D	333	Parameter Value Written (LSW) = 33.3 seconds
N30:14	0000	0	Parameter Value Written (MSW) = 0
N30:15	006A	106	Parameter Number Written To = 106 [Preset Speed 6]
N30:16	01BC	444	Parameter Value Written (LSW) = 44.4 seconds
N30:17	0000	0	Parameter Value Written (MSW) = 0
N30:18	006B	107	Parameter Number Written To = 107 [Preset Speed 7]
N30:19	022B	555	Parameter Value Written (LSW) = 55.5 seconds
N30:20	0000	0	Parameter Value Written (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:1 is shown as “24.”

(2) The maximum number of bytes that can be entered is 120 (78 Hex.), which represents 19 parameters. The number of required bytes always includes 2 for the Class, 2 for the Instance, 2 for the Attribute, 2 for each parameter being written to, and 4 for each parameter value (2 bytes for the Least SIgnificant Word and 2 bytes for the Most Significant Word). For this example where 5 parameters are being written to, a value of 36 bytes is required.

Figure 6.26 Example Scattered Write Request Data File

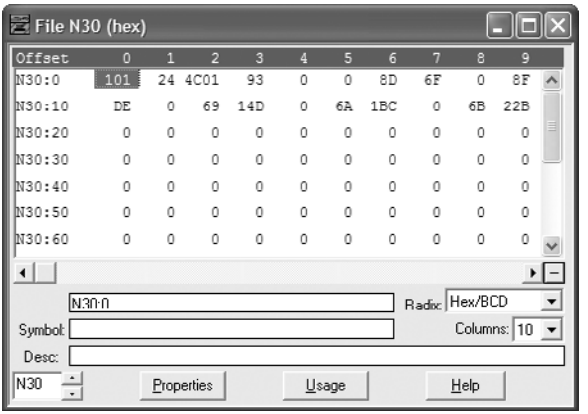
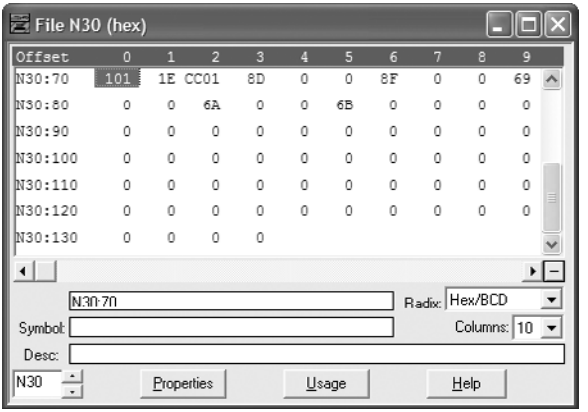


Table 6.N Example Scattered Write Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CC01	-13311	Service = CC (successful), Address = 01 (Node)
N30:73	008D	141	Parameter Number (verification)
N30:74	0000	0	Pad Word (0 = successful) or Error Code
N30:75	0000	0	Pad Word = 0 (always zero)
N30:76	008F	143	Parameter Number (verification)
N30:77	0000	0	Pad Word (0 = successful) or Error Code
N30:78	0000	0	Pad Word = 0 (always zero)
N30:79	0069	105	Parameter Number (verification)
N30:80	0000	0	Pad Word (0 = successful) or Error Code
N30:81	0000	0	Pad Word = 0 (always zero)
N30:82	006A	106	Parameter Number (verification)
N30:83	0000	0	Pad Word (0 = successful) or Error Code
N30:84	0000	0	Pad Word = 0 (always zero)
N30:85	006B	107	Parameter Number (verification)
N30:86	0000	0	Pad Word (0 = successful) or Error Code
N30:87	0000	0	Pad Word = 0 (always zero)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:71 is shown as “24.”

Figure 6.27 Example Scattered Write Response Data File



SLC 500 Examples

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, DeviceNet Objects.

DEM (DeviceNet Explicit Message) or COP (Copy) instructions can be used to perform explicit messaging.

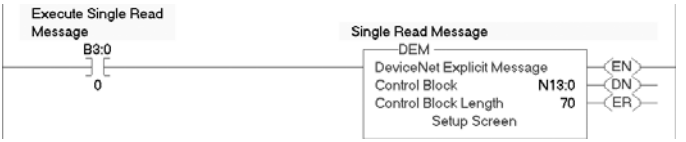
Important: RSLogix 500 version 7.10 (or higher) and a SLC 5/03, SLC 5/04 or SLC 5/05 Series C with firmware version 10 (or higher) are required to use DEM instructions. However, DEM instructions cannot perform multiple (scattered) read or write messages. Therefore, an example ladder logic program with COP instructions is provided along with example configuration screens showing how to perform explicit messaging using this type of instruction.

SLC 500 Explicit Messaging Using the Read/Write Parameter Service

Example Ladder Logic Program to Read Single Parameter

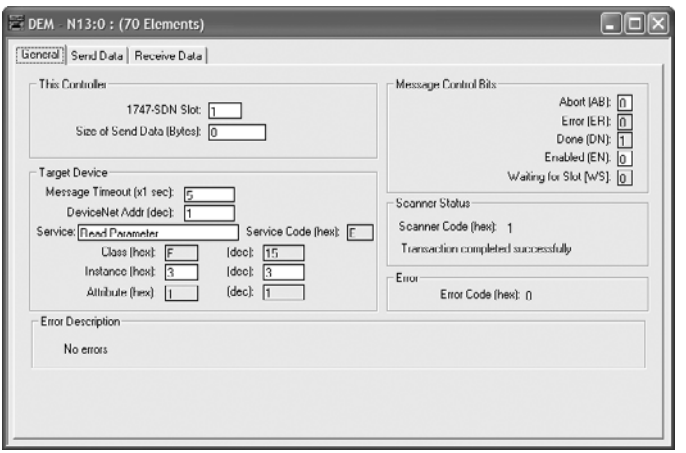
A Read Parameter message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.28 Example Ladder Logic Explicit Messaging Program for Read Single



SLC 500 – Formatting a Message to Read Single Parameter

Figure 6.29 Read Parameter Message Configuration Screen



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

General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	0	Number of bytes to be sent. For a read message, always set to zero (0).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
Service [1]	Read Parameter	Code for the requested service.
Instance	3 (Dec.)	Instance number is the same as the parameter number.

[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).

SLC 500 Example Read Single Response Data

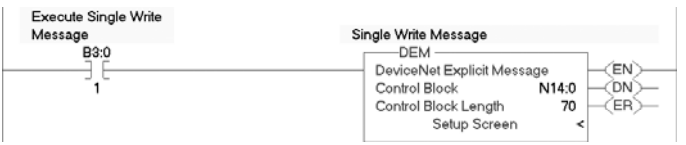
In this example, we use the data table address in Figure 6.30 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

Figure 6.30 Example Read Single Response Data File

SLC 500 Example Ladder Logic Program to Write Single Parameter

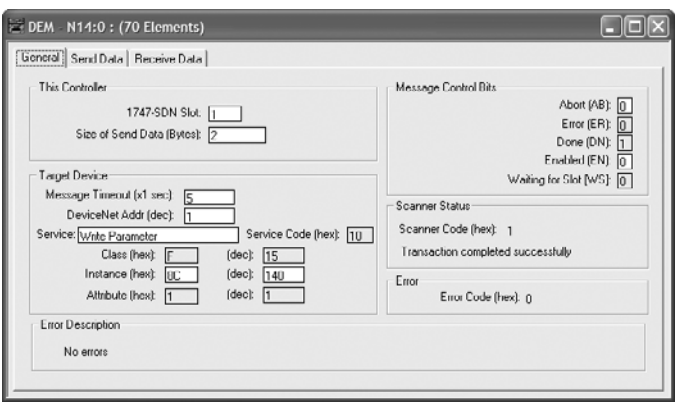
A Write Parameter message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.31 Example Ladder Logic Explicit Messaging Program for Write Single



SLC 500 – Formatting a Message to Write Single Parameter

Figure 6.32 Write Parameter Message Configuration Screen



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

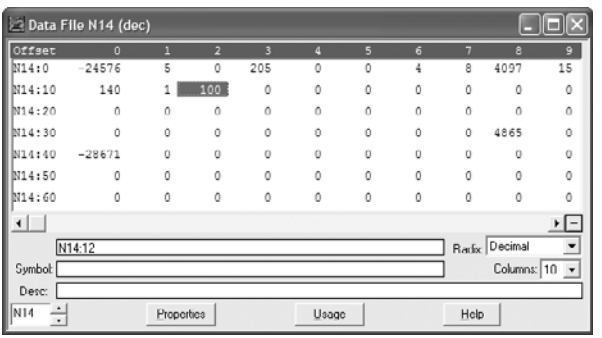
General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	2	Number of bytes to be sent (written). Two bytes equal a 16-bit integer (word).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
Service [1]	Write Parameter	Code for the requested service.
Instance	140 (Dec.)	Instance number is the same as the parameter number.

[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).

SLC 500 Example Write Single Request Data

In this example, we use the data table address in Figure 6.33 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.33 Example Write Single Request Data File

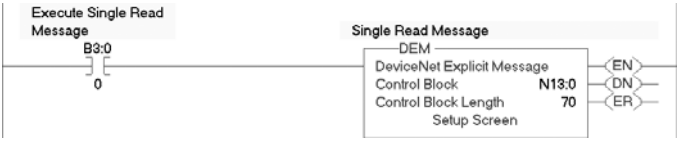


SLC 500 Explicit Messaging Using the Generic Get/Set Attribute Service

Example DEM Instruction Ladder Logic Program to Read Single Parameter

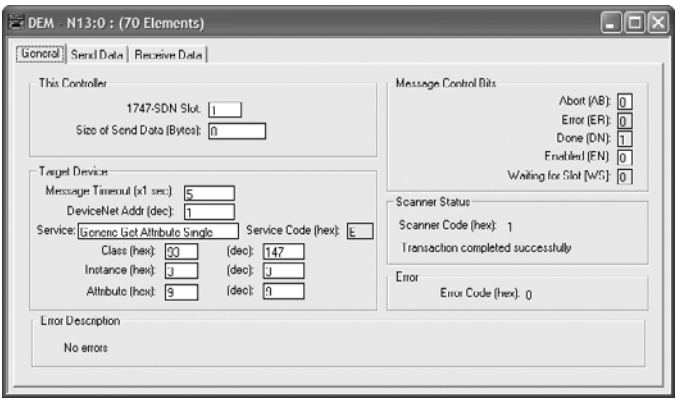
A Generic Get Attribute Single message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.34 Example DEM Instruction Ladder Logic Explicit Messaging Program for Read Single



SLC 500 – Formatting a DEM Instruction Message to Read Single Parameter

Figure 6.35 Generic Get Attribute Single DEM Message Configuration Screen



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

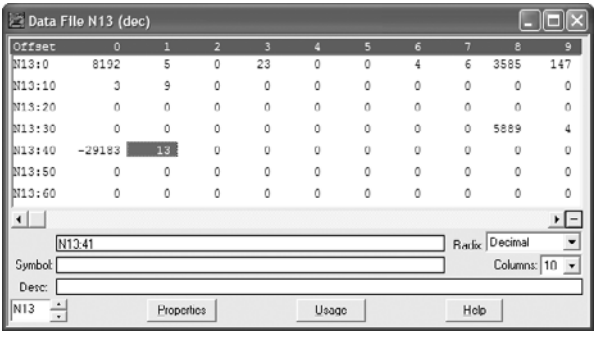
General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	0	Number of bytes to be sent. For a read message, always set to zero (0).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
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.

[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).

SLC 500 Example Response Data for DEM Read Single Message

In this example, we use the data table address in Figure 6.36 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

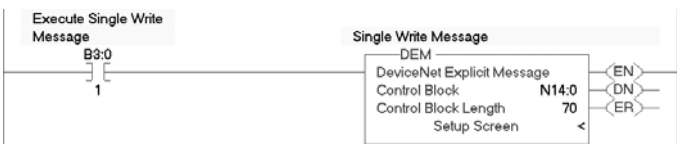
Figure 6.36 Example Response Data File for DEM Read SIngle Message



SLC 500 Example DEM Instruction Ladder Logic Program to Write Single Parameter

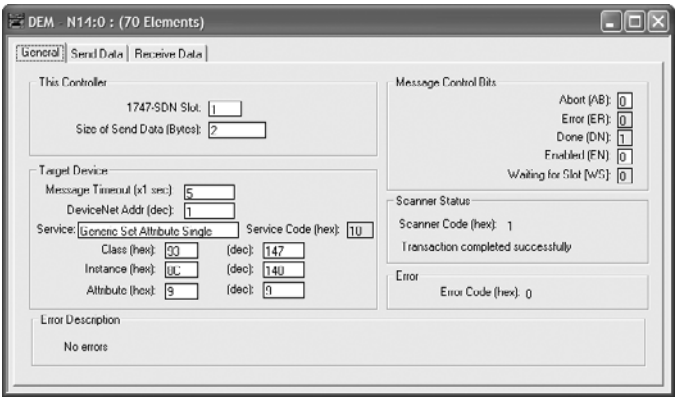
A Generic Set Attribute Single message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.37 Example DEM Instruction Ladder Logic Explicit Messaging Program for Write Single



SLC 500 – Formatting a DEM Instruction Message to Write Single Parameter

Figure 6.38 Generic Set Attribute Single DEM Message Configuration Screen



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

General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	2	Number of bytes to be sent (written). Two bytes equal a 16-bit integer (word).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
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.

(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 for DEM Write Single Message

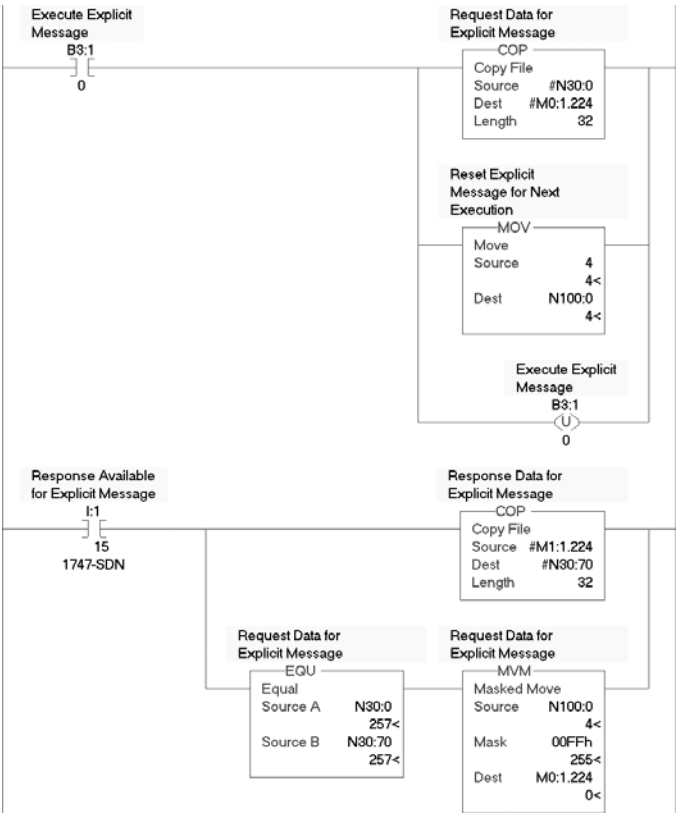
In this example, we use the data table address in Figure 6.39 to store the request value (10.0 sec.) that was written to drive parameter 140 -[Accel Time 1].

Figure 6.39 Example Request Data File for DEM Write Single Message

SLC 500 Example COP Instruction Ladder Logic Program for All Explicit Messaging

The example ladder logic program with a COP (Copy) instruction shown in Figure 6.40 can be used to perform single read, single write, scattered (multiple) read, and scattered (multiple) write explicit messaging.

Figure 6.40 Example COP Instruction Ladder Logic Program for All Explicit Messaging



SLC 500 Example COP Message 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.

Table 6.O Example Single Read COP Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0008	8	Port = 00, Size = 08 bytes
N30:2	0E01	3585	Service = 0E (Get_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0003	3	Instance = Parameter 3
N30:5	0009	9	Attribute = 9 (Parameter Value)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0008” in address N30:1 is shown as “8.”

Figure 6.41 Example Single Read COP Request Data File

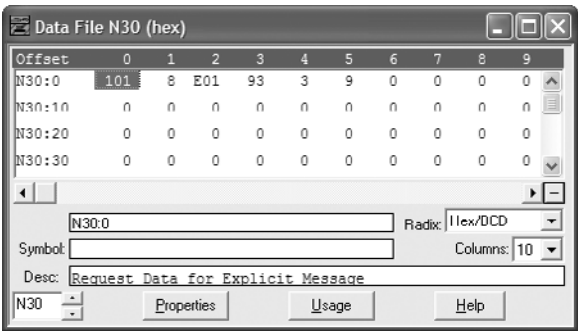
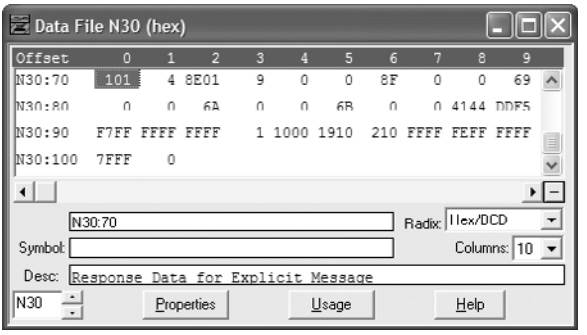


Table 6.P Example Single Read COP Response Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0004	4	Port = 00, Size = 04 bytes
N30:72	8E01	-29183	Service = 8E (successful), Address = 01 (Node)
N30:73	0009	9	Parameter Value Read (LSW) = 0.09 amps
N30:74	0000	0	Parameter Value Read (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0004” in address N30:71 is shown as “4.”

Figure 6.42 Example Single Read COP Response Data File



SLC 500 Example COP Message to Write Single Parameter

A write message is used to write to a single parameter. This write message example writes a value of 10.0 seconds to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Table 6.Q Example Single Write COP Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0008	8	Port = 00, Size = 08 bytes
N30:2	1001	4097	Service = 10 (Set_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	008C	140	Instance = Parameter 140
N30:5	0009 (2)	9	Attribute = 9 (Parameter Value)
N30:6	0064	100	Parameter Value Written (LSW) = 10.0 seconds
N30:7	0000	0	Parameter Value Written (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0008” in address N30:1 is shown as “8.”

(2) Setting the data file address 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 data file address value to “A” (hex.) will write the parameter value to temporary memory, so the parameter value will be lost after the drive is power cycled.

Figure 6.43 Example Single Write COP Request Data File

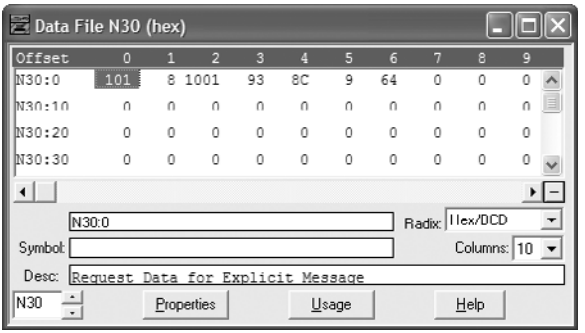
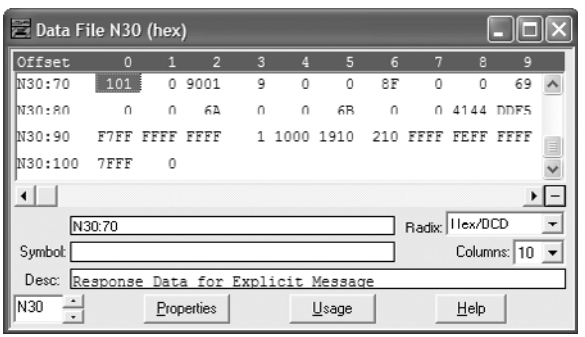


Table 6.R Example Single Write COP Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0000	0	Port = 00, Size = 00 bytes
N30:72	9001	-28671	Service = 90 (successful), Address = 01 (Node)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0000” in address N30:71 is shown as “0.”

Figure 6.44 Example Single Write COP Response Data File



SLC 500 Example COP Message to Read Multiple Parameters

A scattered read message is used to read the values of multiple parameters. Up to 8 parameters can be read. 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 In2 Value].

Table 6.S Example Scattered Read COP Request Data

Address	Value Hex.(1)	Value Dec.	Description
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0024	36	Port = 00, Size = 36 bytes (2)
N30:2	4B01	19201	Service = 4B (Get_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0000	0	Instance = Class Attributes (drive)
N30:5	0000	0	Attribute = 0 (Parameter Value)
N30:6	0001	1	Parameter Number Read = 1 [Output Freq]
N30:7	0000	0	Pad Word = 0 (always zero)
N30:8	0000	0	Pad Word = 0 (always zero)
N30:9	0003	3	Parameter Number Read = 3 [Output Current]
N30:10	0000	0	Pad Word = 0 (always zero)
N30:11	0000	0	Pad Word = 0 (always zero)
N30:12	0006	6	Parameter Number Read = 6 [Output Voltage]
N30:13	0000	0	Pad Word = 0 (always zero)
N30:14	0000	0	Pad Word = 0 (always zero)
N30:15	000C	12	Parameter Number Read = 12 [DC Bus Current]
N30:16	0000	0	Pad Word = 0 (always zero)
N30:17	0000	0	Pad Word = 0 (always zero)
N30:18	0011	17	Parameter Number Read = 17 [Analog In2 Value]
N30:19	0000	0	Pad Word = 0 (always zero)
N30:20	0000	0	Pad Word = 0 (always zero)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:1 is shown as “24.”

(2) The maximum number of bytes that can be entered is 120 (78 Hex.), which represents 19 parameters. The number of required bytes always includes 2 for the Class, 2 for the Instance, 2 for the Attribute, 2 for each parameter being read, and 4 for each parameter value (2 bytes for the Least SIgnificant Word and 2 bytes for the Most Significant Word). For this example where 5 parameters are being read, a value of 36 bytes is required.

Figure 6.45 Example Scattered Read COP Request Data File

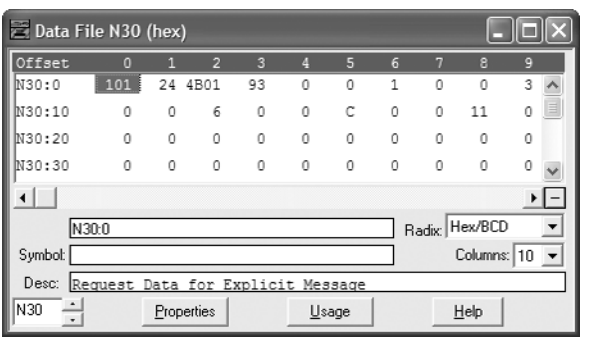
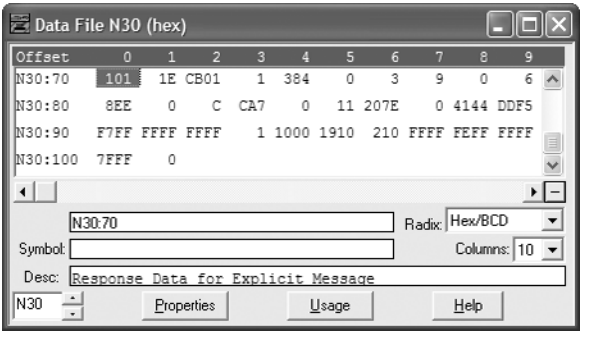


Table 6.T Example Scattered Read COP Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CB01	51969	Service = CB (successful), Address = 01 (Node)
N30:73	0001	1	Read Value = Parameter Number (verification)
N30:74	0384	900	Parameter Value (LSW) = 90.0 Hz.
N30:75	0000	0	Parameter Value (MSW) = 0
N30:76	0003	3	Read Value = Parameter Number (verification)
N30:77	0009	9	Parameter Value (LSW) = 0.09 Amp
N30:78	0000	0	Parameter Value (MSW) = 0
N30:79	0006	6	Read Value = Parameter Number (verification)
N30:80	08EE	2286	Parameter Value (LSW) = 228.6 VDC
N30:81	0000	0	Parameter Value (MSW) = 0
N30:82	000C	12	Read Value = Parameter Number (verification)
N30:83	0CA7	3239	Parameter Value (LSW) = 323.9 VDC
N30:84	0000	0	Parameter Value (MSW) = 0
N30:85	0011	17	Read Value = Parameter Number (verification)
N30:86	207E	8318	Parameter Value (LSW) = 8.318 mA
N30:87	0000	0	Parameter Value (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “001E” in address N30:71 is shown as “1E.”

Figure 6.46 Example Scattered Read COP Response Data File



SLC 500 Example COP Message to Write Multiple Parameters

A scattered write message is used to write values to multiple parameters. Values for up to 8 parameters can be written. 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.

Table 6.U Example Scattered Write COP Request Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:0	0101	257	TXID = 01, Command = 01 (execute)
N30:1	0024	36	Port = 00, Size = 36 bytes (2)
N30:2	4C01	19457	Service = 4C (Set_Attribute_Single), Address = 01 (Node)
N30:3	0093	147	Class = 93 (DPI Parameter Object)
N30:4	0000	0	Instance = Class Attributes (drive)
N30:5	0000	0	Attribute = 0 (Parameter Value)
N30:6	008D	141	Parameter Number Written To = 141 [Accel Time 2]
N30:7	006F	111	Parameter Value Written (LSW) = 11.1 seconds
N30:8	0000	0	Parameter Value Written (MSW) = 0
N30:9	008F	143	Parameter Number Written To = 143 [Decel Time 2]
N30:10	00DE	222	Parameter Value Written (LSW) = 22.2 seconds
N30:11	0000	0	Parameter Value Written (MSW) = 0
N30:12	0069	105	Parameter Number Written To = 105 [Preset Speed 5]
N30:13	014D	333	Parameter Value Written (LSW) = 33.3 seconds
N30:14	0000	0	Parameter Value Written (MSW) = 0
N30:15	006A	106	Parameter Number Written To = 106 [Preset Speed 6]
N30:16	01BC	444	Parameter Value Written (LSW) = 44.4 seconds
N30:17	0000	0	Parameter Value Written (MSW) = 0
N30:18	006B	107	Parameter Number Written To = 107 [Preset Speed 7]
N30:19	022B	555	Parameter Value Written (LSW) = 55.5 seconds
N30:20	0000	0	Parameter Value Written (MSW) = 0

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:1 is shown as “24.”

(2) The maximum number of bytes that can be entered is 120 (78 Hex.), which represents 19 parameters. The number of required bytes always includes 2 for the Class, 2 for the Instance, 2 for the Attribute, 2 for each parameter being written to, and 4 for each parameter value (2 bytes for the Least SIgnificant Word and 2 bytes for the Most Significant Word). For this example where 5 parameters are being written to, a value of 36 bytes is required.

Figure 6.47 Example Scattered Write COP Request Data File

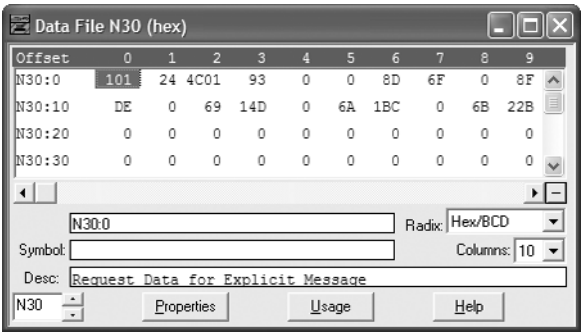
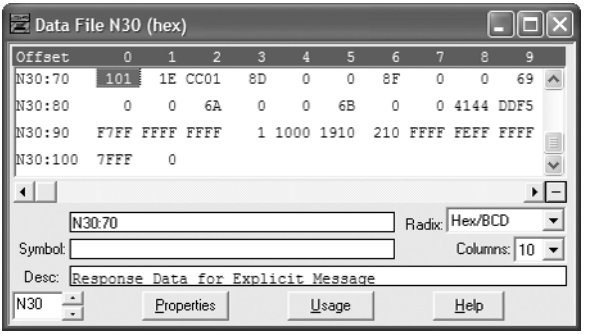


Table 6.V Example Scattered Write COP Response Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CC01	-13311	Service = CC (successful), Address = 01 (Node)
N30:73	008D	141	Parameter Number (verification)
N30:74	0000	0	Pad Word (0 = successful) or Error Code
N30:75	0000	0	Pad Word = 0 (always zero)
N30:76	008F	143	Parameter Number (verification)
N30:77	0000	0	Pad Word (0 = successful) or Error Code
N30:78	0000	0	Pad Word = 0 (always zero)
N30:79	0069	105	Parameter Number (verification)
N30:80	0000	0	Pad Word (0 = successful) or Error Code
N30:81	0000	0	Pad Word = 0 (always zero)
N30:82	006A	106	Parameter Number (verification)
N30:83	0000	0	Pad Word (0 = successful) or Error Code
N30:84	0000	0	Pad Word = 0 (always zero)
N30:85	006B	107	Parameter Number (verification)
N30:86	0000	0	Pad Word (0 = successful) or Error Code
N30:87	0000	0	Pad Word = 0 (always zero)

(1) In RSLogix 5, leading zeros are not displayed in data file addresses. For example, “0024” in address N30:71 is shown as “24.”

Figure 6.48 Example Scattered Write COP Response Data File



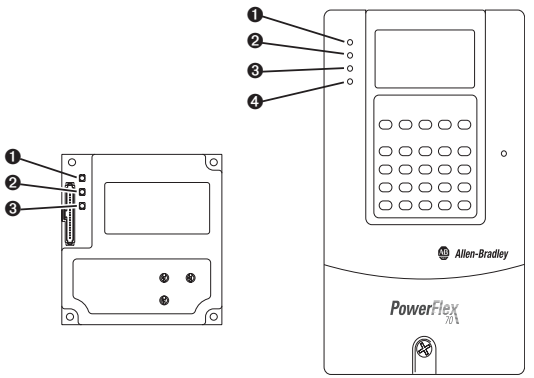
Troubleshooting

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	DeviceNet Status	7-4
4	NET B	Not used for DeviceNet	—

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. The node address switch setting is invalid.	• 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. • Verify that the node address switch setting is between 0 and 63.
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.

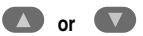
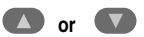
NET A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter and/or network is not powered, or the adapter is not connected properly to the network.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable and to the network using a DeviceNet cable. • Correctly connect the DeviceNet cable to the DeviceNet plug. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit).
Solid Red	The adapter failed duplicated node detection test or bus off.	• Configure the adapter to use a unique node address on the DeviceNet network. • Configure the adapter to use the correct network data rate. • Ensure network has correct media installed.
Flashing Red	A DeviceNet I/O 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 has received an Identify Comm Fault request.	Wait for the faulted node recovery to complete.
Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.	• Place the controller in RUN mode, or apply power to the peer device that will send I/O. • Program a controller or peer device to recognize and transmit I/O or make a messaging connection to the adapter. • Configure the adapter for the program in the controller or the I/O from the peer device.
Solid Green	The adapter is properly connected and communicating on the network.	No action required.

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).

Using the HIM 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**.		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 **Device Items** option.		
5. Press the Up Arrow or Down Arrow to scroll through the items.		Device Item # 3 Reference

Adapter Diagnostic Items

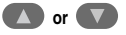
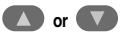
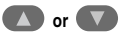
No.	Name	Description
1	Common Logic Cmd	The present value of the Common Logic Command being transmitted to the drive by this adapter.
2	Prod Logic Cmd	The present value of the Product Logic Command being transmitted to the drive by this adapter.
3	Reference	The present value of the Reference being transmitted 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	Field Flash Cnt	The number of times the firmware in the adapter has been flash updated.
24	DPI Rx Errors	The present value of the DPI Receive error counter.
25	DPI Tx Errors	The present value of the DPI Transmit error counter.
26	DN Rx Errors	The number of receive errors reported by the DeviceNet hardware.
27	DN Tx Errors	The number of transmit errors reported by the DeviceNet hardware.
28	DN Image Size	The size of I/O image on DeviceNet network.
29	Data Rate SW	The present value of the data rate switch.
30	Node Address SW	The present value of the node address switches.
31	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 8-5.
32	OPT RX Errors	Number of optional I/O board receive errors.
33	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.

Using the HIM to View and Clear 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	Control Disabled	The adapter has sent a “Soft Control Disable” command to the drive.
18	Control Enabled	The adapter has sent a “Soft Control Enable” command to the drive.
19	PCCC IO Time Flt	The adapter has not received a PCCC Control message for longer than the PCCC Control Timeout.
20	Normal Startup	The adapter successfully started up.
21	Message Timeout	A Client-Server message sent by the adapter was not completed within 1 sec.
22	DPI Fault Msg	The drive has faulted.
23	DN Poll Timeout	A Polled I/O connection has timed out.
24	DN I/O Too Long	Reconfigure the I/O length in the scanner.
25	Bad I/O Fragment	A DeviceNet I/O fragment was received out of sequence. Possible line noise problem.
26	Idle I/O Message	The DeviceNet scanner was placed in program mode.
27	Peer I/O Timeout	The adapter has not received Peer I/O from another device on the network within the specified timeout interval.
28	DPI Fault Clear	The drive issued this because a fault was cleared.
29	DN COS Timeout	A Change of State (COS) connection has timed out.
30	DN Poll Allocate	A Polled connection has been allocated.
31	DN COS Allocate	A Change of State (COS) I/O connection has been allocated.
32	DN Poll Closed	A Polled I/O connection was explicitly closed.

Code	Event	Description
33	DN COS Closed	A Change of State (COS) connection was explicitly closed.
34	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.
35	DN Dup MAC Fault	The adapter has detected another node on DeviceNet using the same node address that it is using.
36	Manual Reset	The adapter was reset by changing its Reset Module parameter.
37	Language CRC Bad	The language text memory segment is corrupt.
38	OPT Timeout	Communication between the adapter and I/O option of the DPI External Comms Kit was disrupted.
39	OPT Open	The adapter began exchanging I/O data with the I/O option of the DPI External Comms Kit.
40	OPT Close	The adapter forced a fault condition on the I/O option of the DPI External Comms Kit.

Notes:

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).

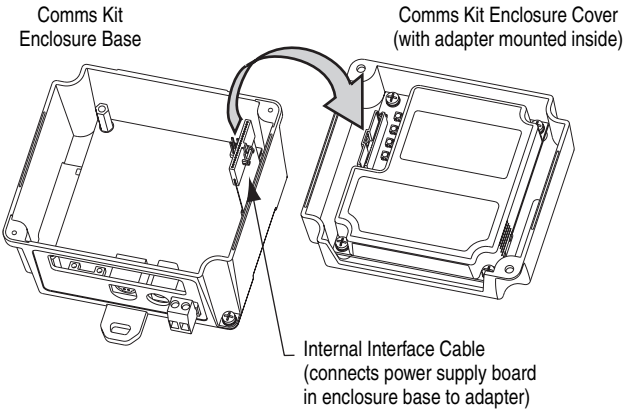
The adapter is typically installed in the internal communication slot on the PowerFlex 7-Class drive. However, there are some instances when an externally-mounted adapter may be desired:

- 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 8.1 Mounting and Connecting the Adapter

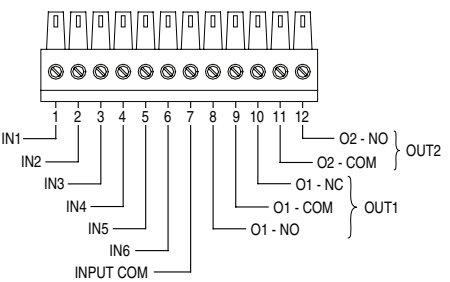


For more information, refer to the *DPI External Communications Kit Installation Instructions* (Publication 20COMM-IN001…).

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 8.2 I/O Connector Function Descriptions

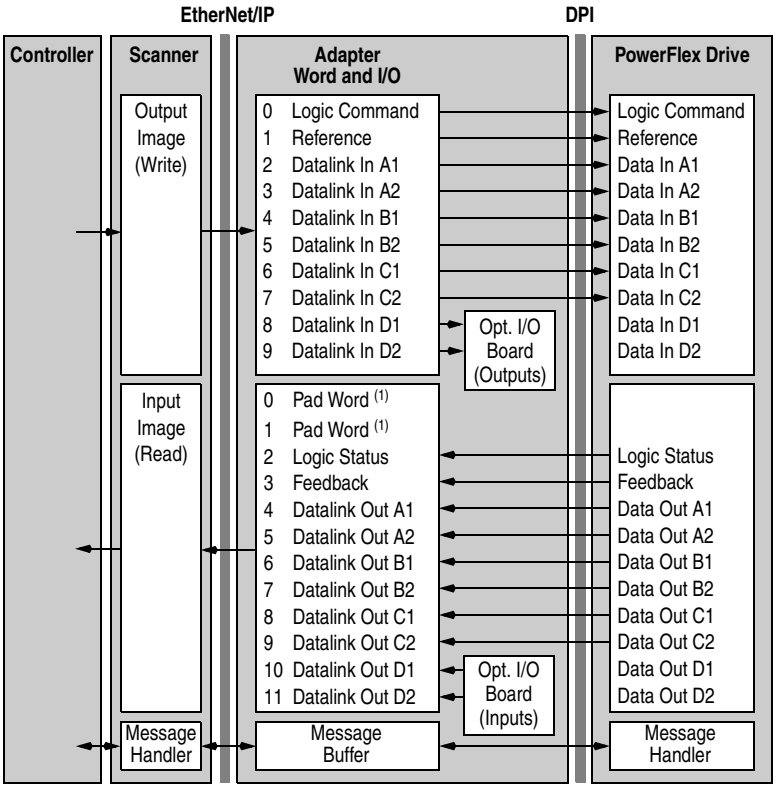


For more information, refer to the *I/O Board Option Installation Instructions* (Publication 20COMM-IN002…).

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 8.3.

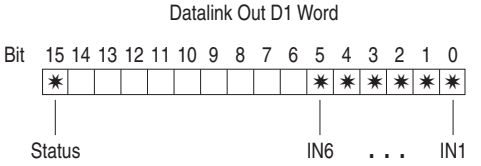
Figure 8.3 Example I/O Image with Datalink D Dedicated to I/O Board and All I/O Enabled



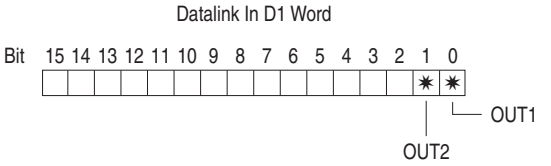
(1) Required by ControlLogix. May or may not be required by other types of controllers.

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 13, - [DPI I/O Cfg], 25 - [M-S Input]** and **26 - [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 25 - [M-S Input]**.
- Turn on bit 4 ("1xxxx") in **Parameter 26 - [M-S Output]**.
- Turn off bit 4 ("0xxxx") in **Parameter 13 - [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 23 - [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 32 (OPT Status) shows the operating status of the optional I/O board:

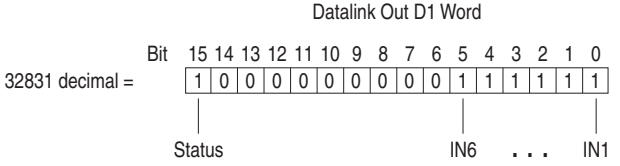
Bit	State	Status Indication	Description
0	1 (On)	OPT Present	I/O data is being exchanged with the adapter.
1	1 (On)	OPT Faulted	The I/O board is taking its fault action.
2	1 (On)	Hold Last	Fault Action is “Hold Last.”
3	1 (On)	Send Flt Cfg	Fault Action is “Fault Config.”

Viewing communication adapter diagnostic item 33 (OPT RX Errors) shows the number of I/O board receive errors.

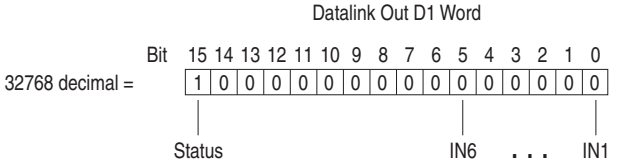
Viewing communication adapter diagnostic item 34 (OPT FW Version) shows the present firmware version on the optional I/O board.

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	DeviceNet
Data Rates	125K, 250K, 500K, Autobaud, PGM The PGM (Program) setting on the switch is used to set the data rate using the adapter parameter. Autobaud can be set only if another device on the network is setting a data rate.
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	150 mA at 5 VDC supplied by the host (for example, drive)
Network	60 mA at 24 VDC supplied by the network Use the 60 mA value to size the network current draw from the power supply.

Mechanical

Dimensions	
Height	19 mm (0.75 inches)
Length	86 mm (3.39 inches)
Width	78.5 mm (3.09 inches)
Weight	85g (3 oz.)

Environmental

Temperature	
Operating	-10 to 50°C (14 to 122°F)
Storage	-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, DeviceNet 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	**[DN Addr Cfg]** Sets the DeviceNet node address used by the adapter if the Data Rate switch is set to “PGM” (Program).	Default: Minimum: Maximum: Type: Reset Required:	63 0 63 Read/Write Yes

Parameter No.	Name and Description	Details	
04	**[DN Addr Act]** Displays the DeviceNet node address actually used by the adapter.	Default: Minimum: Maximum: Type:	63 0 63 Read Only
05	**[DN Rate Cfg]** Sets the DeviceNet data rate at which the adapter communicates if the data rate switch is set to "PGM" (Program). (Updates **Parameter 06 - [DN Rate Act]** after a reset.)	Default: Values: Type: Reset Required:	3 = Autobaud 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps 3 = Autobaud Read/Write Yes
06	**[DN Rate Act]** Displays the DeviceNet data rate presently being used by the adapter.	Default: Values: Type:	0 = 125 kbps 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps Read Only
07	**[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
08	**[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
09	**[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.		
10	**[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 10 - [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
11	**[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 11 - [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).

12	**[DN Active Cfg]** Displays the source from which the adapter node address and data rate are taken. This will either be switches or parameters in EEPROM. It is determined by the settings of the switches on the adapter.	Default: 1 = Switches Values: 0 = EEPROM 1 = Switches Type: Read Only
13	**[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

14	**[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 13 - [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
15	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • **Parameter 10 - [Comm Flt Action]** is set to "4" (Send Flt Cfg) and communications are disrupted. • **Parameter 11 - [Idle Flt Action]** is set to "4" (Send Flt Cfg) and the scanner is idle. • **Parameter 34 - [Peer Flt Action]** is set to "4" (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
16	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • **Parameter 10 - [Comm Flt Action]** is set to "4" (Send Flt Cfg) and communications are disrupted. • **Parameter 11 - [Idle Flt Action]** is set to "4" (Send Flt Cfg) and the scanner is idle. • **Parameter 34 - [Peer Flt Action]** is set to "4" (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.
17 18 19 20 21 22 23 24	**[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 10 - [Comm Flt Action]** is set to "4" (Send Flt Cfg) and communications are disrupted. • **Parameter 11 - [Idle Flt Action]** is set to "4" (Send Flt Cfg) and the scanner is idle. • **Parameter 34 - [Peer Flt Action]** is set to "4" (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
25	**[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
26	**[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
27	**[COS Status Mask]** Sets the mask for the 16-bit Logic Status word. Unless they are masked out, the bits in the Logic Status word are checked for changes when the adapter is allocated using COS (Change of State). If a bit changes, it is reported as a change in the Change of State operation. If the mask bit is 0 (Off), the bit is ignored. If the mask bit is 1 (On), the bit is checked. **Important:** The bit definitions in the Logic Status word will depend on the drive. 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 Values: 0 = Ignore bit 1 = Use bit Type: Read/Write Reset Required: No
28	**[COS Fdbk Change]** Sets the hysteresis band to determine how much the Feedback word can change before it is reported as a change in the COS (Change of State) operation.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details	
29	**[COS/Cyc Interval]** Displays amount of time that a scanner will wait to check for data in the adapter. When COS (Change of State) data exchange has been set up, this is the maximum amount of time between scans. Scans will happen sooner if data changes. When Cyclic data exchange has been set up, this interval is the fixed time between scans. This interval is the heartbeat rate configured in the scanner.	Default: Minimum: Maximum: Type:	0 Seconds 0 Seconds 655.35 Seconds Read Only
30 31	**[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 37 - [Peer Inp Enable]** is On. **Important:** If a 32-bit Datalink or Reference is used in **Parameter 30 - [Peer A Input]**, **Parameter 31 - [Peer B Input]** cannot be used.	Default: Default: Values: Type: Reset Required:	0 = Off 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
32	**[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
33	**[Peer Ref Adjust]** Sets the scaling for the Reference received from a peer.	Default: Minimum: Maximum: Type: Reset Required:	0.00% 0.00% 199.99% Read/Write No

ATTENTION: To guard against equipment damage and/or personal injury, note that changes to **Parameter 33 - [Peer Ref Adjust]** take effect immediately. A drive receiving its Reference from peer I/O will receive the newly scaled Reference, resulting in a change of speed.

Parameter No.	Name and Description	Details	
34	**[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 = Fault Cfg Read/Write No
	 **ATTENTION:** Risk of injury or equipment damage exists. **Parameter 34 - [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).		
35	**[Peer Node to Inp]** Sets the node address of the node producing the peer I/O. **Important:** A change to this parameter is ignored when **Parameter 37 - [Peer Inp Enable]** is "On."	Default: Minimum: Maximum: Type: Reset Required:	0 0 63 Read/Write No
36	**[Peer Inp Timeout]** Sets the time-out for a Change of State peer-to-peer connection. If the time is reached without the adapter receiving (consuming) a message, the adapter will respond with the action specified in **Parameter 34 - [Peer Flt Action]**. On the Slave drive, this parameter should be set to the value calculated from the following formula: Master **Parameter 42 - [Peer Out Time]** x Master **Parameter 43 - [Peer Out Skip]**	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 180.00 Seconds Read/Write No
37	**[Peer Inp Enable]** Sets Peer I/O input to be on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No
38	**[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	
39 40	**[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 41 - [Peer Out Enable]** is "On." **Important:** If a 32-bit Datalink or Reference is used in **Parameter 39 - [Peer A Output]**, **Parameter 40 - [Peer B Output]** cannot be used.	Default: Default: Values: Type: Reset Required:	0 = Off 0 = Off 0 = Off 1 = Cmd/Ref 2 = Datalink A Input 3 = Datalink B Input 4 = Datalink C Input 5 = Datalink D Input 6 = Datalink A Output 7 = Datalink B Output 8 = Datalink C Output 9 = Datalink D Output Read/Write No
41	**[Peer Out Enable]** Sets Peer I/O output to be on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No
42	**[Peer Out Time]** Sets the minimum time that an adapter will wait when transmitting data to a peer. **Important:** A change to this parameter is ignored when **Parameter 41 - [Peer Out Enable]** is "On."	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
43	**[Peer Out Skip]** Sets the maximum time that an adapter will wait when transmitting data to a peer. The value of **Parameter 42 - [Peer Out Time]** is multiplied by the value of this parameter to set the time. **Important:** A change to this parameter is ignored when **Parameter 41 - [Peer Out Enable]** is "On."	Default: Minimum: Maximum: Type: Reset Required:	1 1 16 Read/Write No

DeviceNet Objects

Appendix C presents information about the DeviceNet 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 DeviceNet specification for more information about DeviceNet objects. Information about the DeviceNet 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

	Implemented for:		
Service Code	Class	Instance	Service Name
0x05	Yes	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single

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	121
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 8 = Minor recoverable fault Bit 10 = Major recoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_ STRING	Product name and rating

Connection Object

Class Code

Hexadecimal	Decimal
0x05	5

Services

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

Instances

Instance	Description
1	Master-Slave Explicit Message Connection
2	Polled I/O Connection
4	Change of State/Cyclic Connection
6-10	Explicit Message Connection

Instance Attributes

Refer to the DeviceNet specification for more information.

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 2 = Waiting for connection ID 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	0 = Explicit message 1 = I/O message
3	Get	Transport	USINT	The Transport Class Trigger for this instance
4	Get	Produced Cnxn ID	USINT	CAN Identifier to transmit on
5	Get	Consumed Cnxn ID	USINT	CAN Identifier to receive on
6	Get	Initial Comm Char	USINT	Defines the DeviceNet message groups that the Tx/Rx Cnxn's apply
7	Get	Produced Cnxn Size	UINT	Max bytes to transmit across this connection
8	Get	Consumed Cnxn Size	UINT	Max bytes to receive across this connection
9	Get/Set	EPR	UINT	Expected Packet Rate (timer resolution = 2 msec.)

Attribute ID	Access Rule	Name	Data Type	Description
12	Get/Set	Watchdog Action	USINT	0 = Transition to timed out 1 = Auto delete 2 = Auto reset
13	Get	Produced Path Length	UINT	Number of bytes of data in the produced connection path
14	Get	Produced Connection Path	ARRAY of UINT	Byte stream which defines Application objects whose data is to be produced by this Connection object
15	Get	Consumed Path Length	UINT	Number of bytes of data in the consumed connection path
16	Get	Consumed Connection Path	ARRAY of USINT	Byte stream which defines Application objects whose data is to be consumed by this Connection object

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Services

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

Instances

Instance	Description
1	All polled data being read from the DPI device (read-only)
2	All polled 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)

[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

Not supported.

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 data. 0 = good 1 = bad
2	Get	Direction	BOOL	Direction of data transfer 0 = Producer Register (drive to network) 1 = Consumer Register (network to drive)
3	Get	Size	UINT	Size of register data in bits
4	Conditional [1]	Data	ARRAY of BITS	Data to be transferred

[1] For this attribute, the access rule is Get if Direction = 0. The access rule is Set if Direction = 1.

Important: Setting a Register object attribute can only be accomplished through a connection with a non-zero expected packet rate (EPR). This feature is to prevent accidental control of a DPI device.

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x01	No	Yes	Get_Attribute_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x15	Yes	No	Restore_Request
0x16	Yes	No	Save_Request
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 n Attributes (1)
n + 1	Adapter Parameter 1 Attributes
⋮	⋮
n + m	Last Adapter Parameter m Attributes (2)

(1) n represents the number of parameters in the drive.

(2) m represents the number of parameters in the adapter.

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	Get	Native Language	USINT	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 6 = Portuguese 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	1 = WORD (16-bit) 2 = UINT (16-bit) 3 = INT (16-bit) 5 = SINT 6 = DINT 8 = USINT 9 = UDINT 11 = REAL 23 = SHORT_STRING 24 = BYTE 25 = DWORD
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 DeviceNet specification for a description of the link path.

Parameter Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_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 3 = Italian 4 = German 6 = Portuguese 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:		Service Name
	Class	Instance	
0x4B	No	Yes	Execute_PCCC
0x4D	No	Yes	Execute_Local_PCCC

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_Local_PCCC

Request		
Name	**Data Type**	**Description**
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**
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

The adapter 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	00	Word range read
0F	01	Word range write

For more information regarding PCCC commands, see DF1 Protocol and Command Set Manual, Allen-Bradley Publication No. 1770-6.5.16.

PCCC Object *(Continued)*

N-Files

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 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.	

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 6 = Portuguese 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-21 – C-22) 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-21 – C-22)
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-21 – C-22) 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-22.

(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)	
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.

DPI Parameter Object *(Continued)*

Descriptor Attributes (Continued)

Bit	Name	Description
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

The table below lists the parameters for the Get_Attributes_Scattered and Set_Attributes_Scattered object-specific service:

Name	Data Type	Description
Scattered Parameters	STRUCT of	
Parameter Number	WORD	Parameter to read or write
Parameter Value LSW	WORD	Low word of Parameter value to read or write (zero when reading)
Parameter Value MSW	WORD	High word of Parameter value to read or write (zero when reading)

Important: The STRUCT may repeat up to 24 times in a single message.

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

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

	Implemented for:		
Service Code	Class	Instance	Service Name
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	No	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	Alarm code
			STRUCT of:	Alarm source
			BYTE	DPI port
			BYTE	DPI Device Object
			STRING[16]	Alarm text
			STRUCT of:	Alarm time stamp
			LWORD	Timer value (0 = timer not supported)
			BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2 - 15] Reserved
			WORD	Reserved
			CONTAINER[n]	Reserved
1	Get	Basic Information	STRUCT of	
			WORD	Alarm code
			STRUCT of:	Alarm source
			BYTE	DPI port
			BYTE	DPI Device Object
			STRUCT of:	Alarm time stamp
			LWORD	Timer value (0 = timer not supported)
			BOOL[16]	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-21 – C-22) 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-22.

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

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 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

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															Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
															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																Enabled	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.

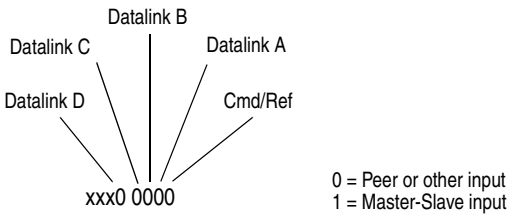
Master-Slave I/O Configuration

Appendix E lists possible I/O configurations and their corresponding M-S Input and M-S Output parameter settings, and the required data size allocations for all data exchange methods except Polled. The required data size allocations for the Polled data exchange method are shown in Table 4.A, Table 4.B, and Table 4.C.

M-S Input Parameter Configurations

Parameter 25 - [M-S Input] has the following five configurable bits.

Figure E.1 Parameter 25 - [M-S Input] Bits and Corresponding I/O



When you enable *Cmd/Ref* or *Datalink* in the adapter, you must set the corresponding bit in **Parameter 25 - [M-S Input]** if you want the input data to come from the scanner or master device.

Tables E.A and E.B list possible configurations for **Parameter 25 - [M-S Input]** and the possible data size allocation associated with each value depending on the data exchange method.

Table E.A Host Products using 16-bit Reference/Feedback & Datalinks

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
00000	xxxx0	0				
00001	xxxx0	4				
00010	xxxx0	4				
00011	xxxx0	8				
00100	xxxx0	4				
00101	xxxx0	8				
00110	xxxx0	8				
00111	xxxx0	12				
01000	xxxx0	4				
01001	xxxx0	8				
01010	xxxx0	8				
01011	xxxx0	12				
01100	xxxx0	8				
01101	xxxx0	12				
01110	xxxx0	12				
01111	xxxx0	16				
10000	xxxx0	4				
10001	xxxx0	8				
10010	xxxx0	8				
10011	xxxx0	12				
10100	xxxx0	8				
10101	xxxx0	12				
10110	xxxx0	12				
10111	xxxx0	16				
11000	xxxx0	8				
11001	xxxx0	12				
11011	xxxx0	16				
11100	xxxx0	12				
11101	xxxx0	16				
11110	xxxx0	16				
11111	xxxx0	20				
00000	xxxx1	0	0	0	0 & 0	0 & 0
00001	xxxx1	4	4	4	4 & 0	4 & 0
00010	xxxx1	4	4	4	4 & 0	4 & 0
00011	xxxx1	8	8	8	8 & 0	8 & 0
00100	xxxx1	4	4	4	4 & 0	4 & 0
00101	xxxx1	8	8	8	8 & 0	8 & 0
00110	xxxx1	8	8	8	8 & 0	8 & 0
00111	xxxx1	12	12	12	12 & 0	12 & 0
01000	xxxx1	4	4	4	4 & 0	4 & 0
01001	xxxx1	8	8	8	8 & 0	8 & 0
01010	xxxx1	8	8	8	8 & 0	8 & 0

Table E.A Host Products using 16-bit Reference/Feedback & Datalinks (Continued)

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
01011	xxxx1	12	12	12	12 & 0	12 & 0
01100	xxxx1	8	8	8	8 & 0	8 & 0
01101	xxxx1	12	12	12	12 & 0	12 & 0
01110	xxxx1	12	12	12	12 & 0	12 & 0
01111	xxxx1	16	16	16	16 & 0	16 & 0
10000	xxxx1	4	4	4	4 & 0	4 & 0
10001	xxxx1	8	8	8	8 & 0	8 & 0
10010	xxxx1	8	8	8	8 & 0	8 & 0
10011	xxxx1	12	12	12	12 & 0	12 & 0
10100	xxxx1	8	8	8	8 & 0	8 & 0
10101	xxxx1	12	12	12	12 & 0	12 & 0
10110	xxxx1	12	12	12	12 & 0	12 & 0
10111	xxxx1	16	16	16	16 & 0	16 & 0
11000	xxxx1	8	8	8	8 & 0	8 & 0
11001	xxxx1	12	12	12	12 & 0	12 & 0
11011	xxxx1	16	16	16	16 & 0	16 & 0
11100	xxxx1	12	12	12	12 & 0	12 & 0
11101	xxxx1	16	16	16	16 & 0	16 & 0
11110	xxxx1	16	16	16	16 & 0	16 & 0
11111	xxxx1	20	20	20	20 & 0	20 & 0

Table E.B Host Products using 32-bit Reference/Feedback & Datalinks

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
00000	xxxx0	0				
00001	xxxx0	8				
00010	xxxx0	8				
00011	xxxx0	16				
00100	xxxx0	8				
00101	xxxx0	16				
00110	xxxx0	16				
00111	xxxx0	24				
01000	xxxx0	8				
01001	xxxx0	16				
01010	xxxx0	16				
01011	xxxx0	24				
01100	xxxx0	16				
01101	xxxx0	24				
01110	xxxx0	24				
01111	xxxx0	32				
10000	xxxx0	8				
10001	xxxx0	16				
10010	xxxx0	16				
10011	xxxx0	24				
10100	xxxx0	16				
10101	xxxx0	24				
10110	xxxx0	24				
10111	xxxx0	32				
11000	xxxx0	16				
11001	xxxx0	24				
11011	xxxx0	32				
11100	xxxx0	24				
11101	xxxx0	32				
11110	xxxx0	32				
11111	xxxx0	40				
00000	xxxx1	0	0	0	0 & 0	0 & 0
00001	xxxx1	8	8	8	8 & 0	8 & 0
00010	xxxx1	8	8	8	8 & 0	8 & 0
00011	xxxx1	16	16	16	16 & 0	16 & 0
00100	xxxx1	8	8	8	8 & 0	8 & 0
00101	xxxx1	16	16	16	16 & 0	16 & 0
00110	xxxx1	16	16	16	16 & 0	16 & 0
00111	xxxx1	24	24	24	24 & 0	24 & 0
01000	xxxx1	8	8	8	8 & 0	8 & 0
01001	xxxx1	16	16	16	16 & 0	16 & 0
01010	xxxx1	16	16	16	16 & 0	16 & 0

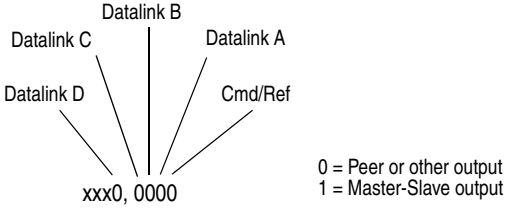
Table E.B Host Products using 32-bit Reference/Feedback & Datalinks (Continued)

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
01011	xxxx1	24	24	24	24 & 0	24 & 0
01100	xxxx1	16	16	16	16 & 0	16 & 0
01101	xxxx1	24	24	24	24 & 0	24 & 0
01110	xxxx1	24	24	24	24 & 0	24 & 0
01111	xxxx1	32	32	32	32 & 0	32 & 0
10000	xxxx1	8	8	8	8 & 0	8 & 0
10001	xxxx1	16	16	16	16 & 0	16 & 0
10010	xxxx1	16	16	16	16 & 0	16 & 0
10011	xxxx1	24	24	24	24 & 0	24 & 0
10100	xxxx1	16	16	16	16 & 0	16 & 0
10101	xxxx1	24	24	24	24 & 0	24 & 0
10110	xxxx1	24	24	24	24 & 0	24 & 0
10111	xxxx1	32	32	32	32 & 0	32 & 0
11000	xxxx1	16	16	16	16 & 0	16 & 0
11001	xxxx1	24	24	24	24 & 0	24 & 0
11011	xxxx1	32	32	32	32 & 0	32 & 0
11100	xxxx1	24	24	24	24 & 0	24 & 0
11101	xxxx1	32	32	32	32 & 0	32 & 0
11110	xxxx1	32	32	32	32 & 0	32 & 0
11111	xxxx1	40	40	40	40 & 0	40 & 0

M-S Output Parameter Configurations

Parameter 26 - [M-S Output] has the following five configurable bits.

Figure E.2 Parameter 26 - [M-S Output] Bits and Corresponding I/O



When you enable *Cmd/Ref* or *Datalink* in the adapter, you must set the corresponding bit in **Parameter 26 - [M-S Output]** if you want the output data to be sent to the scanner or master device.

Tables E.C and E.D list possible configurations for **Parameter 26 - [M-S Output]** and the possible data size allocation associated with each value depending on the method of data transfer.

Table E.C Host Products using 16-bit Reference/Feedback & Datalinks

M-S Input	M-S Output	Allocation (Number of Bytes)				
		Data Size sent from the Adapter to the Controller				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
xxxxx	00000	0				
xxxxx	00010	4				
xxxxx	00100	4				
xxxxx	00110	8				
xxxxx	01000	4				
xxxxx	01010	8				
xxxxx	01100	8				
xxxxx	11100	12				
xxxxx	10000	4				
xxxxx	10010	8				
xxxxx	10100	8				
xxxxx	10110	12				
xxxxx	11000	8				
xxxxx	11010	12				
xxxxx	11100	12				
xxxxx	11110	16				
xxxxx	00001	4	4	4	4 & 4	4 & 4
xxxxx	00011	8	4	4	8 & 4	8 & 4
xxxxx	00101	8	4	4	8 & 4	8 & 4
xxxxx	00111	12	4	4	12 & 4	12 & 4
xxxxx	01011	12	4	4	12 & 4	12 & 4
xxxxx	01101	12	4	4	12 & 4	12 & 4
xxxxx	01111	16	4	4	16 & 4	16 & 4
xxxxx	10001	8	4	4	8 & 4	8 & 4
xxxxx	10011	12	4	4	12 & 4	12 & 4
xxxxx	10101	12	4	4	12 & 4	12 & 4
xxxxx	10111	16	4	4	16 & 4	16 & 4
xxxxx	11001	12	4	4	12 & 4	12 & 4
xxxxx	11011	16	4	4	16 & 4	16 & 4
xxxxx	11101	16	4	4	16 & 4	16 & 4
xxxxx	11111	20	4	4	20 & 4	20 & 4

Table E.D Host Products using 32-bit Reference/Feedback & Datalinks

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Adapter to the Controller				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
xxxxx	00000	0				
xxxxx	00010	8				
xxxxx	00100	8				
xxxxx	00110	16				
xxxxx	01000	8				
xxxxx	01010	16				
xxxxx	01100	16				
xxxxx	11100	24				
xxxxx	10000	8				
xxxxx	10010	16				
xxxxx	10100	16				
xxxxx	10110	24				
xxxxx	11000	16				
xxxxx	11010	24				
xxxxx	11100	24				
xxxxx	11110	32				
xxxxx	00001	8	8	8	8 & 8	8 & 8
xxxxx	00011	16	8	8	16 & 8	16 & 8
xxxxx	00101	16	8	8	16 & 8	16 & 8
xxxxx	00111	24	8	8	24 & 8	24 & 8
xxxxx	01011	24	8	8	24 & 8	24 & 8
xxxxx	01101	24	8	8	24 & 8	24 & 8
xxxxx	01111	32	8	8	32 & 8	32 & 8
xxxxx	10001	16	8	8	16 & 8	16 & 8
xxxxx	10011	24	8	8	24 & 8	24 & 8
xxxxx	10101	24	8	8	24 & 8	24 & 8
xxxxx	10111	32	8	8	32 & 8	32 & 8
xxxxx	11001	24	8	8	24 & 8	24 & 8
xxxxx	11011	32	8	8	32 & 8	32 & 8
xxxxx	11101	32	8	8	32 & 8	32 & 8
xxxxx	11111	40	8	8	40 & 8	40 & 8

Notes:

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 DeviceNet. 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-D DeviceNet adapter connects PowerFlex 7-Class drives to a DeviceNet network. Adapters are sometimes also called “cards,” “embedded communication options,” “gateways,” “modules,” and “peripherals.”

Automatic Device Replacement (ADR)

A means for replacing a malfunctioning device with a new unit, and having the device configuration data set automatically. The DeviceNet scanner is set up for ADR using RSNetWorx for DeviceNet. The scanner uploads and stores a device’s configuration. Upon replacing a malfunctioning device with a new unit (node 63), the scanner automatically downloads the configuration data and sets the node address.

B

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.

Bus Off

A bus off condition occurs when an abnormal rate of errors is detected on the Control Area Network (CAN) bus in a device. The bus-off device cannot receive or transmit messages on the network. This condition is often caused by corruption of the network data signals due to noise or data rate mismatch.

C

CAN (Controller Area Network)

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

Change of State (COS) I/O Data Exchange

A device that is configured for Change of State I/O data exchange transmits data at a specified interval if its data remains unchanged. If its data changes, the device immediately transmits the change. This type of exchange can reduce network traffic and save resources since unchanged data does not need to be transmitted or processed.

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).

Class

A class is defined by the DeviceNet specification as "a set of objects that all represent the same kind of system component. A class is a generalization of an object. All objects in a class are identical in form and behavior, but may contain different attribute values."

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.

Cyclic I/O Data Exchange

A device configured for Cyclic I/O data exchange transmits data at a user-configured interval. This type of exchange ensures that data is updated at an appropriate rate for the application, preserves bandwidth for rapidly-changing devices, and allows data to be sampled at precise intervals for better determinism.

D

Data Rate

The speed at which data is transferred on the DeviceNet network. The available data rates depend on the type of cable and total cable length used on the network:

	Maximum Cable Length		
Cable	**125K**	**250K**	**500K**
Thick Trunk Line	500 m (1,640 ft.)	250 m (820 ft.)	100 m (328 ft.)
Thin Trunk Line	100 m (328 ft.)	100 m (328 ft.)	100 m (328 ft.)
Maximum Drop Length	6 m (20 ft.)	6 m (20 ft.)	6 m (20 ft.)
Cumulative Drop Length	156 m (512 ft.)	78 m (256 ft.)	39 m (128 ft.)

Each device on a DeviceNet network must be set for the same data rate. You can set the DeviceNet adapter to 125K, 250K, or 500K. You can set it to Autobaud if another device on the network has set 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.

DeviceNet Network

An open producer/consumer Controller Area Network (CAN) which connects devices (for example, controllers, drives, and motor starters). Both I/O and explicit messages can be transmitted over the network. A DeviceNet network can support a maximum of 64 devices. Each device is assigned a unique node address and transmits data on the network at the same data rate.

A cable is used to connect devices on the network. It contains both the signal and power wires. Devices can be connected to the network with drop lines, in a daisy-chain connection, or a combination of the two.

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

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-D 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.

E

EDS (Electronic Data Sheet) Files

Simple text files that are used by network configuration tools such as RSNetWorx for DeviceNet 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.

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).

Faulted Node Recovery

This DeviceNet feature lets you change a configuration of a device that is faulted on the network. For example, if you add a device to a network and it does not have a unique address, it will fault. If you have a configuration tool that supports faulted node recovery and your adapter is using parameters to set its node address and data rate, you can change the node address.

Flash Update

The process of updating firmware in a device. The adapter can be flash updated using various Allen-Bradley software tools. Refer to Flash Updating the Adapter on page 3-17 for more information.

H

Heartbeat Rate

The heartbeat rate is used in Change of State (COS) data exchange. It is associated with producing data once every EPR (Expected Packet Rate) duration. There may be four heartbeats before a time-out happens.

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

Idle Action

An idle action determines how the module and connected drive act when the controller is switched out of run mode.

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.

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 DeviceNet 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

Node Address

A DeviceNet network can have as many as 64 devices connected to it. Each device on the network must have a unique node address between 0 and 63. Node address 63 is the default used by uncommissioned devices. Node addresses are sometimes called “MAC IDs.”

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.”

O

Objects

The DeviceNet specification defines an object as “an abstract representation of a particular component within a product.”

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.

Polled I/O Data Exchange

A device that is configured for polling I/O data exchange sends data immediately after it receives a request for the data. For example, an adapter receives a Logic Command from the scanner and then sends back the Logic Status of the connected PowerFlex drive.

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).

Producer/Consumer Network

On producer/consumer networks, packets are identified by content rather than an explicit destination. If a node needs the packet, it will accept the identifier and consume the packet. The source therefore sends a packet once and all the nodes consume the same packet if they need it. Data is produced once, regardless of the number of consumers. Also, better synchronization than Master-Slave networks is possible because data arrives at each node at the same time

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.

RSNetWorx for DeviceNet

A software tool for configuring and monitoring DeviceNet networks and connected devices. It is a 32-bit Windows application that can be used on computers running various Microsoft Windows operating systems. Information about RSNetWorx for DeviceNet software can be found at http://www.software.rockwell.com/rsnetworx.

S

Scanner

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

Status Indicators

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

T

Type 0/Type 1/Type 2 Control

When transmitting I/O, the adapter can use different types of messages for control. The Type 0, Type 1, and Type 2 events help Allen-Bradley personnel identify the type of messages that an adapter is using.

U

UCMM (UnConnected Message Manager)

UCMM provides a method to create connections between DeviceNet devices.

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.

Numerics

A

B

C

D

E

F

G

H

I

Q

R

S

T

U

W

Z

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

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 20COMM-UM002E-EN-P – January, 2008 P/N 307972-P04
Supersedes 20COMM-UM002D-EN-P – November 2004