Allen-Bradley

PowerFlex™ Communications

DeviceNet Adapter

20-COMM-D
FRN 1.xxx

User Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "*Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls*" (Publication SGI-1.1) 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 the Allen-Bradley Company 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, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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

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

Attentions help you:

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

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

Shock Hazard labels may be located on or inside the drive to alert people that dangerous voltage may be present.

Table of Contents

Notes:

About This Manual

Related Documentation

For:	Refer to:	Publication
DeviceNet™ Cables and Components	*DeviceNet Product Overview*	DN-2.5
DeviceNet Network Installation	*DeviceNet Cable System Planning and Installation Manual*	DN-6.7.2
DeviceNet Networks	*DeviceNet Starter Kit*	DN-6.5.16
DriveExplorer™	*DriveExplorer Getting Results Manual* Online help (installed with the software)	9306-5.2
DriveTools 2000™	*DriveTools 2000 Online Help*	–
DriveTools32™	*DriveTools32 Getting Started Manual* Online help installed with the software	9303-5.23
HIM	*HIM Quick Reference*	20HIM-QR001…
Logix 5550	*ControlLogix DeviceNet Scanner Installation Instructions*	1756-5.66
PowerFlex™ 70 Drive	*PowerFlex 70 User Manual* *PowerFlex 70 Reference Manual*	20A-UM001… 20A-RM001…
PowerFlex 700 Drive	*PowerFlex 700 User Manual* *PowerFlex 700 Reference Manual*	20B-UM001… 20B-RM001…
RSLinx™	*Getting Results with RSLinx* Online help (installed with the software)	9399-WAB32GR
RSLogix™ 5	*RSLogix 5 Getting Results Guide* Online help (installed with the software)	9399-RL53GR
RSLogix 500	*RSLogix 500 Getting Results Guide* Online help (installed with the software)	9399-RL50GR
RSLogix 5000	*RSLogix 5000 Getting Results Guide* Online help (installed with the software)	9399-RLD300GR
RSNetWorx™ for DeviceNet	*RSNetWorx for DeviceNet Getting Results Guide* Online help (installed with the software)	9398-DNETGR
SLC 500™ and 1747-SDN	*DeviceNet Scanner Module Installation Instructions* *DeviceNet Scanner Module Configuration Manual*	1747-5.8 1747-6.5.2
PLC-5™ and 1771-SDN	*DeviceNet Scanner Module Installation Instructions* *DeviceNet Scanner Module Configuration Manual*	1747-5.14 1771-6.5.118

Documentation can be obtained online at http://www.ab.com/manuals.

Conventions Used in this Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the following format **Parameter xxx - [*]**. The xxx 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.
- RSNetWorx for DeviceNet (version 2.22.18) and RSLinx (version 2.10.118) were used for the examples in this manual. Different versions of the software may differ in appearance and procedures.
- 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. This manual is for Firmware release 1.xxx.
- This manual provides information about the DeviceNet adapter and using it with PowerFlex drives. The adapter can be used with other products that implement DPI. Refer to the documentation for your product for specific information about how it works with the adapter.

Rockwell Automation Support

Rockwell Automation 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 representatives are in every major country in the world.

Local Product Support

Contact your local Rockwell Automation representative for sales and order support, product technical training, warranty support, and support service agreements.

Technical Product Assistance

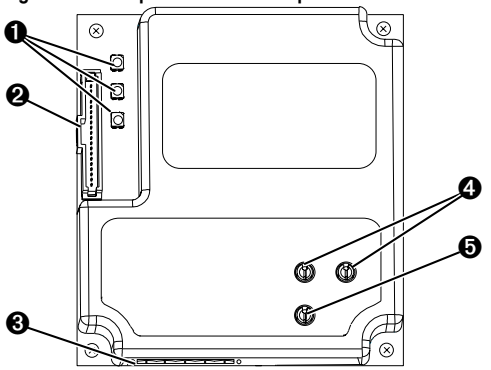
If you need to contact Rockwell Automation for technical assistance, please review the information in Chapter 7, Troubleshooting first. If you still have problems, then call your local Rockwell Automation representative.

Getting Started

The 20-COMM-D DeviceNet adapter is an embedded communication option for any one drive in the PowerFlex family. It can also be used with other Allen-Bradley products implementing DPI™, a functional enhancement to SCANport™.

Components

Figure 1.1 Components of the Adapter



#	Part	Description
1	Status Indicators	Three LEDs that indicate the status of the connected drive, adapter, and network. 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 can be connected.
4	Node Address Switches	Switches for setting the node address.
5	Data Rate Switch	Switch for setting the DeviceNet data rate at which the adapter communicates.

Features

The DeviceNet adapter features the following:

- The adapter is mounted in the PowerFlex drive. It receives the required power from the drive and from the DeviceNet network.
- Switches let you set a node address and network data rate before applying power to the PowerFlex drive. Alternatively, you can disable the switches and use parameters to configure these features.
- Captive screws are used to secure and ground the adapter to the drive.
- A number of configuration tools can be used to configure the adapter and connected drive. The tools include the PowerFlex HIM on the drive, network software such as RSNetWorx for DeviceNet, or drive-configuration software such as DriveExplorer (version 2.01 or higher) or DriveTools 2000 (version 1.xx or higher).
- Status indicators report the status of the drive communications, adapter, and network. They are visible both when the cover is opened and when it is closed.
- I/O, including Logic Command/Reference and up to four pairs of Datalinks, may be configured for your application using a parameter.
- Explicit and UCMM (Unconnected Message Manager) Messages are supported.
- Multiple data exchange methods, including Polled, Cyclic, and Change of State (COS), can be used to transmit data between the network and adapter.
- Master-Slave or Peer-to-Peer hierarchies can be set up so that the adapter and connected PowerFlex drive transmit data to and from either a scanner or another PowerFlex drive on the network.
- User-defined fault actions determine how the adapter and PowerFlex drive respond to communication disruptions on the network and controllers in idle mode.
- Faulted node recovery is supported. 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.

Compatible Products

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

- PowerFlex 70 drives
- PowerFlex 700 drives
- PowerFlex 7000 drives

Required Equipment

Equipment Shipped with the Adapter

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

- ❑ One DeviceNet 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 five-pin linear DeviceNet plug (connected to the DeviceNet connector on the adapter)
- ❑ One grounding wrist strap
- ❑ This manual

User-Supplied Equipment

To install and configure the DeviceNet 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 HIM
  - – DriveExplorer (version 2.01 or higher)
  - – DriveTools 2000 (version 1.xx or higher)
  - – RSNetWorx for DeviceNet
  - – Smart Self-powered Serial Converter (1203-SSS, v3.001 or higher)
- ❑ Computer with a DeviceNet communications adapter installed (Examples: 1784-PCD, 1784-PCID, 1784-PCIDS, or 1770-KFD)
- ❑ Controller configuration software (Examples: RSLogix5, RSLogix500, or RSLogix 5000)

Safety Precautions

Please read the following safety precautions carefully

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 a DeviceNet adapter. Failure to comply may result in injury and/or equipment damage.

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

ATTENTION: Risk of injury or equipment damage exists. DPI or SCANport host products must not be directly connected together via 1202 cables. Unpredictable behavior due to timing and other internal procedures can result if two or more devices are connected in this manner.

ATTENTION: Risk of injury or equipment damage exists. If the DeviceNet 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 PowerFlex drive if communications are disrupted. By default, these parameters fault the PowerFlex drive. You can set these parameters so that the PowerFlex drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

ATTENTION: Hazard 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: Hazard 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 does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

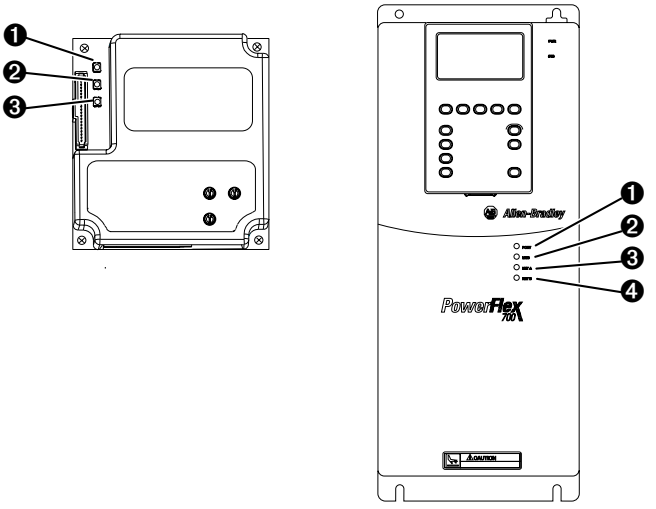
This section is designed to help experienced users start using the DeviceNet adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step		Refer to
1	**Review the safety precautions for the adapter.**	Throughout This Manual
2	**Verify that the PowerFlex drive is properly installed.**	Drive User Manual
3	**Commission the adapter.** Set a unique node address and the appropriate data rate using the switches on the adapter. If desired, you can disable the switches and use parameter settings instead.	Chapter 2, Installing the Adapter
4	**Install the adapter.** Verify that the PowerFlex drive and DeviceNet network are 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.	Chapter 2, Installing the Adapter
5	**Apply power to the adapter.** The adapter receives power from the drive and network. Apply power to the network and to the drive. The status indicators should be green. If they flash red, there is a problem. Refer to Chapter 7, Troubleshooting.	Chapter 2, Installing the Adapter
6	**Configure the adapter for your application.** Set the parameters for the following features as required by your application: • Node address and data rate (if the 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
7	**Apply power to the DeviceNet master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with DeviceNet standards, and then apply power to them.	*DeviceNet Cable System Planning and Installation Manual*
8	**Configure the scanner to communicate with the adapter.** Use a network tool such as RSNetWorx for DeviceNet to configure the scanner on the network. Make sure to: • Set up the scan list. • Map the adapter data to the scan list. • Save your DeviceNet configuration to the scanner and a file.	Chapter 4, Configuring the Scanner
9	**Create a ladder logic program.** Use a programming tool such as RSLogix to create a ladder logic program that enables you to do the following: • Control the adapter and connected drive. • Monitor or configure the drive using Explicit Messages.	Chapter 5, Using I/O Messaging Chapter 6, Using Explicit Messaging

Modes of Operation

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

Figure 1.2 Status Indicators *(location on drive may vary)*



#	Status Indicator	Status(1)	Description
❶	PORT	Green	Normal Operation. The adapter is properly connected and is communicating with the drive.
		Flashing Green	The adapter is in the process of establishing a connection to the drive. This status indicator will turn solid green or red.
❷	MOD	Green	Normal Operation. The adapter is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The adapter is operational but is not transferring I/O data.
❸	NET A	Green	Normal Operation. The adapter is properly connected and communicating on the network.
		Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.
❹	NET B	Off	Not used for DeviceNet.

(1) If all status indicators are off, the adapter is not receiving power. Refer to Chapter 2, Installing the Adapter, for instructions on installing the adapter. If any other conditions occur, refer to Chapter 7, Troubleshooting.

Installing the Adapter

Chapter 2 provides instructions for installing the adapter on a PowerFlex drive.

Preparing for an Installation

Before installing the DeviceNet adapter:

- Read the *DeviceNet Product Overview Manual*, Publication DN-2.5, and the *DeviceNet Cable System Planning and Installation Manual*, Publication DN-6.7.2. These manuals will provide information on selecting cables, setting up a network, and network basics.
- Verify that you have all required equipment. Refer to Chapter 1, Getting Started.

Commissioning the Adapter

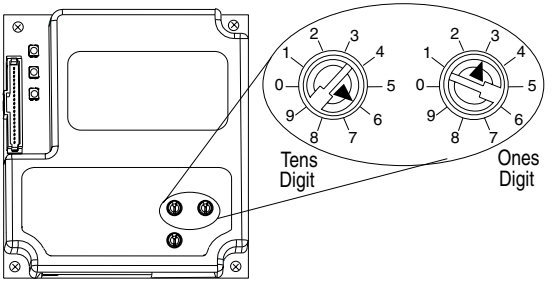
To commission the adapter, you must set a unique node address and the data rate that is used by the network. (Refer to the Glossary for details about data rates and node addresses.)

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

ATTENTION: Risk of equipment damage exists. The DeviceNet 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.

1. Set the node address switches.

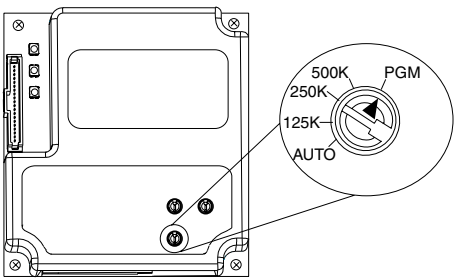
Figure 2.1 Setting the Node Address



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 will use the setting of **Parameter 03 - [DN Addr Cfg]** for the node address. The default parameter setting is 63. Refer to Chapter 3, Configuring the Adapter.
64 – 99	Do not use. The adapter will not recognize these addresses.

2. Set the data rate switch.

Figure 2.2 Setting the Data Rate



Setting	Description
Auto	The adapter is set to the data rate used by other network devices. Another device on the network must be set to a data rate.
125 K 250 K 500 K	The adapter is set 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 Chapter 3, Configuring 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 an adapter.

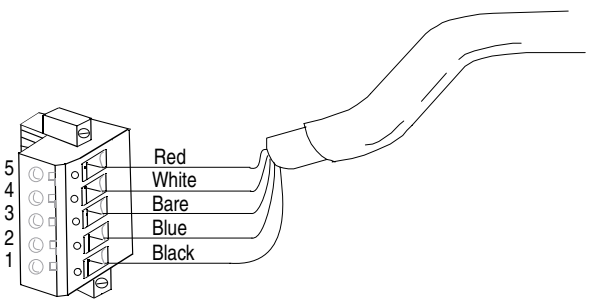
1. Remove power from the network and drive.
2. Use static control precautions.
3. Connect a DeviceNet cable to the network, and route it through the bottom of the PowerFlex drive. DeviceNet Thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended. (See Figure 2.5.)

   Important: Maximum cable length depends on data rate. Refer to the Glossary.

4. Connect a 5-pin linear plug to the DeviceNet cable.

   A 10-pin linear plug is not supported. A 5-pin linear plug is shipped with the adapter.

Figure 2.3 Connecting a 5-Pin Linear Plug to the Cable



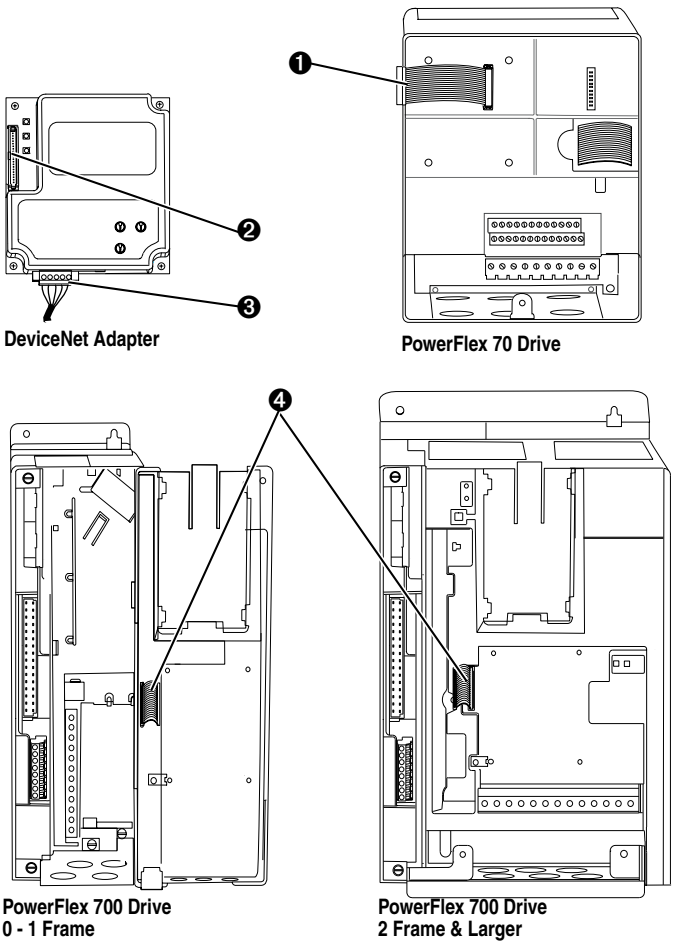
Terminal	Color	Signal	Function
5	Red	V+	Power Supply
4	White	CAN_H	Signal High
3	Bare	SHIELD	Shield
2	Blue	CAN_L	Signal Low
1	Black	V–	Common

5. Connect the DeviceNet cable to the adapter, and secure it with the two screws. (See Figure 2.4.)

Connecting the Adapter to the Drive

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

Figure 2.4 DPI Ports and Internal Interface Cables



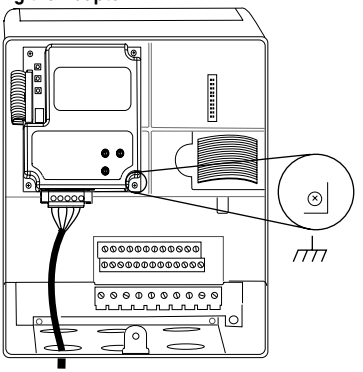
#	Description
❶	15.24 cm (6 in.) Internal Interface cable
❷	DPI Connector

#	Description
❸	DeviceNet cable
❹	2.54 cm (1 in.) Internal Interface cable

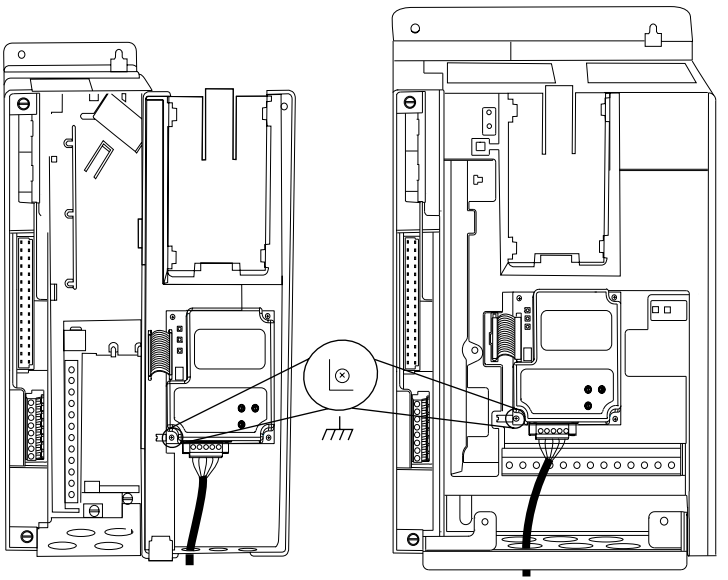
4. Mount the adapter on the drive, using the four captive screws to secure it in place and ground it to the drive.

Important: On a PowerFlex 700 drive, tighten the screw in the lower left hole to ground the adapter.
On a PowerFlex 70 drive, tighten the screw in the lower right hole to ground the adapter.

Figure 2.5 Mounting the Adapter



PowerFlex 70 Drive
Adapter mounts in drive.



PowerFlex 700 Drive (0 - 1 Frames)
Adapter mounts on door.

PowerFlex 700 Drive (2 Frame & Larger)
Adapter mounts in drive.

Applying Power

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

1. Close the door or reinstall the cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.
2. Ensure that the adapter will have a unique address on the network and is set at the correct data rate or to autobaud. If a new data rate or address is needed, reset its switches (refer to Commissioning the Adapter in this chapter).
3. Apply power to the network.
4. Apply power to the PowerFlex drive. The adapter receives its power from the connected drive and network. When you apply power to the product and network for the first time, the status indicators should be green after an initialization. If the status indicators go red, there is a problem. Refer to Chapter 7, Troubleshooting.
5. If the data rate switch is set to "PGM," use a configuration tool to set the data rate and node address parameters in the adapter (Chapter 3, Configuring the Adapter). If you are using RSNetWorx for DeviceNet, you need to create a point-to-point connection to the drive.
6. Apply power to the master device (scanner) and other devices on the network.

Configuring the Adapter

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

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

Configuration Tools

The DeviceNet 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:
DriveExplorer Software (version 2.01 or higher)	*DriveExplorer Getting Results Manual*, Publication 9306-5.3, or the online help
DriveTools 2000 Software (version 1.xx or higher)	*DriveTools 2000 Online Help*
PowerFlex HIM	page 3-2
RSNetWorx for DeviceNet Software	page 3-3

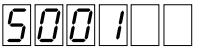
RSNetWorx for DeviceNet (version 2.22.18) and RSLinx (version 2.10.118) were used for examples in this manual. Different versions of software may differ in appearance and procedures.

TIP: Explicit Messaging can also be used to configure an adapter and drive. Refer to Chapter 6, Using Explicit Messaging.

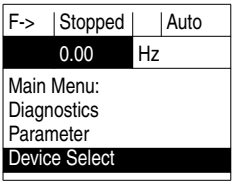
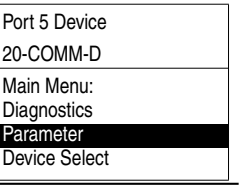
Using the PowerFlex HIM

If your drive has either an LED or LCD HIM (Human Interface Module), 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 HIM 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 the ALT and then Sel (Device) to display the Device Screen.	ALT, Sel (Device)	
2. Press the Up Arrow or Down Arrow to scroll to the DeviceNet adapter. Letters represent files in the drive, and numbers represent ports. The adapter is usually connected to port 5.	Up Arrow OR Down Arrow	
3. Press the Enter key to enter your selection. A parameter database is constructed, and then the first parameter is displayed.	Enter	
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**.	Up Arrow OR Down Arrow	
2. Press Enter to enter your selection.	Enter	
3. Press the Up Arrow or Down Arrow to scroll to the **DeviceNet** adapter (20-COMM-D).	Up Arrow OR Down Arrow	
4. Press Enter to select the DeviceNet adapter. A parameter database is constructed, and then the main menu for the adapter is displayed.	Enter	
5. Edit the parameters using the same techniques that you use to edit drive parameters.		

Using RSNetWorx for DeviceNet

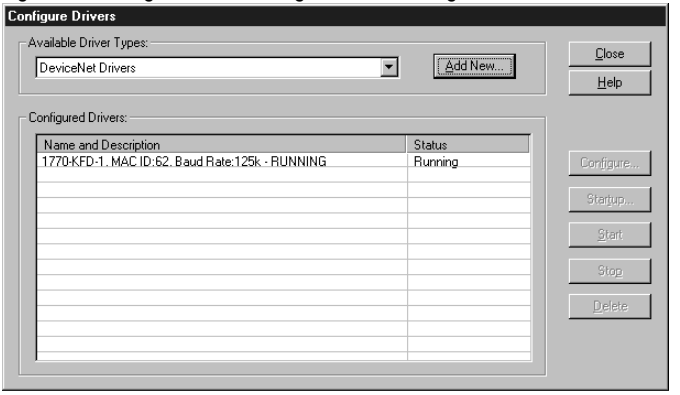
RSNetWorx for DeviceNet is a Rockwell Software application that can be used to set up DeviceNet networks and configure connected devices.

To set up RSLinx for RSNetWorx for DeviceNet

To use RSNetWorx for DeviceNet, you must first set up a driver in RSLinx. The driver provides a communications link between the computer and DeviceNet network.

Step	Icons
1. Start RSLinx, and select **Communications > Configure Drivers** to display the Configure Drivers dialog box. 2. In the Available Driver Types box, select **DeviceNet Drivers**, and then click **Add New**. The DeviceNet Driver Selection dialog box appears. 3. In the Available DeviceNet Drivers list, select the adapter connected to your computer, and then click **Select**. A Driver Configuration dialog box appears. 4. Configure the driver for your computer and network settings, and then click **OK**. The Configure Drivers dialog box reports the progress of the configuration. Then, the Add New RSLinx Driver dialog box appears. 5. Type a name (if desired), and then click **OK**. The Configure Drivers dialog box reappears, and the new driver is in the Configured Drivers List (Figure 3.1). 6. Click **Close** to close the dialog box. Leave RSLinx running.	 Shortcut to RSLinx

Figure 3.1 Configure Drivers Dialog Box with a Configured Driver

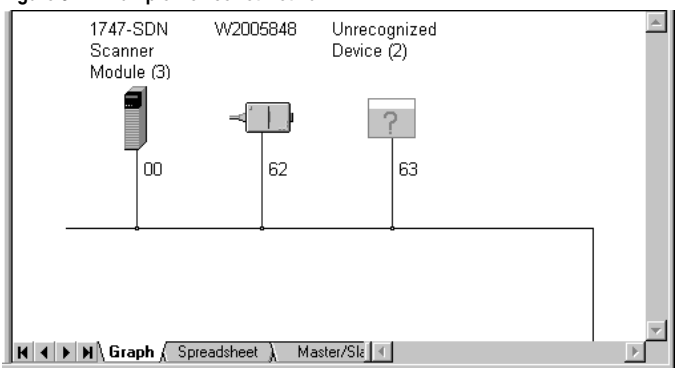


To go online with RSNetWorx for DeviceNet

You can view the devices on a DeviceNet network by going online. A device may appear as an unrecognized device (node 63 in Figure 3.2) if RSNetWorx for DeviceNet does not have an EDS file for it.

Step	Icons
1. After setting up a driver in RSLinx, start RSNetWorx for DeviceNet. 2. Select **Network > Online**. If the Browse for Network dialog box appears, RSLinx has multiple drivers configured. Select your DeviceNet network, and click **OK**. A prompt appears. 3. Click **OK** to go online. The devices on the network appear in the Configuration View. You can select Graph, Spreadsheet, or Master/Slave views. Figure 3.2 shows an example network in a Graph view.	 Shortcut to RSNetWorx

Figure 3.2 Example DeviceNet Network



To create an EDS file

If the adapter and drive appear as an unrecognized device, create an EDS file for it.

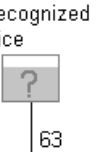
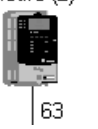
Step	Icons
1. Right-click the "Unrecognized Device" icon, and select **Register Device** in the menu. The EDS Wizard (Figure 3.3) appears.	
2. Click **Next** to display the next step.	
3. Select **Upload EDS**, and then click **Next**.	
4. Type a description (if desired), and then click **Next**.	
5. Under Polled, select **Enabled**, type **4** in the Input Size and Output Size boxes, and then click **Next**. RSNetWorx will upload the EDS file from the drive and adapter.	
6. Click **Next** to display the icon options for the node. We recommend that you use the icon for your product. You can change icons by clicking **Change icon**.	
7. Click **Next** to view a summary, and then click **Next** again to accept it.	
8. Click **Finish** to finish the EDS creation. A new icon represents the PowerFlex drive and adapter in the Configuration View.' **Important:** RSNetWorx for DeviceNet (versions 2.22.18 and earlier) replaces 32-bit values with exponential values. For the EDS file to work in RSNetWorx, you must edit the EDS file, replacing exponential values with 32-bit values (typically 4294967295), and then restart RSNetWorx.	

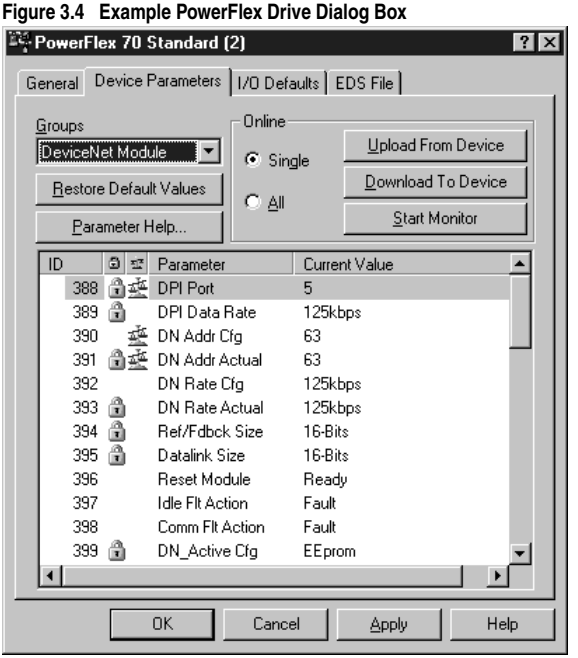
Figure 3.3 EDS Wizard

To access and edit parameters

Parameters in the drive and adapter can be edited with RSNetWorx. The adapter parameters are appended to the list of drive parameters. In Figure 3.4, for example, the drive has 387 parameters, so parameter 388 is the first adapter parameter.

Step	Icons
1. After creating an EDS file, right-click on the icon for the PowerFlex drive and adapter and select **Properties**. The PowerFlex Drive dialog box appears. 2. Click the **Device Parameters** tab (Figure 3.4). If an EDS Editor message appears, click **Upload** to load the parameter values in the drive to the computer. Parameters are displayed in numerical order under Parameter. You can either scroll through the list or select a specific group of parameters in the Groups box. The available groups and the numbers of the adapter parameters will vary based on the type of drive that is connected to the adapter. 3. In the Current Value column, double-click a value to edit it. 4. Click **Apply** to save changes to the device.	PowerFlex 70 Standard (2)  63

Figure 3.4 Example PowerFlex Drive Dialog Box

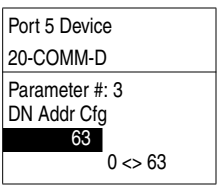


Setting the Node Address

If the adapter Data Rate switch 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 use it as the default address. Address 63 is also used for Automatic Device Recovery (ADR).

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

Figure 3.5 DeviceNet Node Address Screen on an LCD HIM



2. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

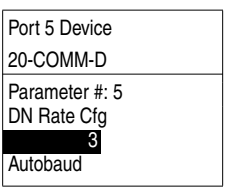
TIP: If you are using RSNetWorx for DeviceNet, select **Network > Single Browse Path** to see the new address; then delete the old address.

Setting the Data Rate

If the adapter Data Rate switch is set to "PGM," the value of **Parameter 05 - [DN Rate Cfg]** determines the DeviceNet 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 3.6 DeviceNet Data Rate Screen on an LCD HIM



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

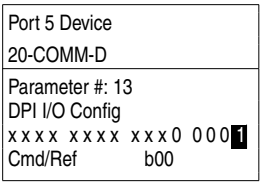
2. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

Setting the I/O Configuration

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

1. Set the bits in **Parameter 13 - [DPI I/O Config]**:

Figure 3.7 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 3.7, it is highlighted and equals “1.”

2. Set a Master-Slave or Peer-to-Peer hierarchy. Refer to the Selecting Master-Slave or Peer-to-Peer section in this chapter.

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

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). Also, ensure that the DeviceNet adapter is the only adapter using the enabled Datalink(s).

5. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

Selecting Master-Slave or Peer-to-Peer

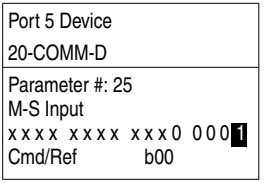
A hierarchy determines the type of device with which the adapter exchanges data. In a Master-Slave hierarchy, an adapter exchanges data with a scanner. In a Peer-to-Peer hierarchy, an adapter can exchange data with one or more DeviceNet adapter(s) connected to PowerFlex drives that have similar data structures.

To set a Master-Slave hierarchy

1. Enable the desired I/O in **Parameter 13 - [DPI I/O Config]**. Refer to Figure 3.7.

2. Set the bits in the **Parameter 25 - [M-S Input]**. This parameter determines the data transmitted from the scanner to the drive. A "1" enables the I/O. A "0" disables the I/O.

Figure 3.8 Master-Slave Input Screen on an LCD HIM

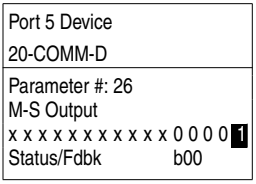


Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A Input
2	Datalink B Input
3	Datalink C Input
4	Datalink D Input
5 - 15	Not Used

Bit 0 is the right-most bit. In Figure 3.8, it is highlighted and equals "1."

3. Set the bits in the **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 3.9 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 3.9, it is highlighted and equals "1."

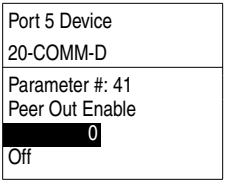
4. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

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

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

1. Verify that **Parameter 41 - [Peer Out Enable]** is set to **Off**. This parameter must be set to Off while you configure some of the peer output parameters.

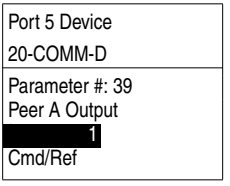
Figure 3.10 Peer Out Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

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

Figure 3.11 Peer A Output Screen on an LCD HIM

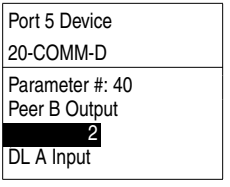


Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input
6 - 9	Datalink A, B, C, or D Output

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

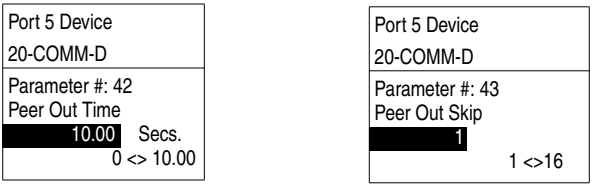
Figure 3.12 Peer B Output Screen on an LCD HIM



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. The minimum interval is set in Parameter 42 - [Peer Out Time]. The maximum interval is the value of Parameter 42 - [Peer Out Time] multiplied by the value of Parameter 43 - [Peer Out Skip].

Figure 3.13 Min Peer TX Time and Peer Out Skip Screens on an LCD HIM

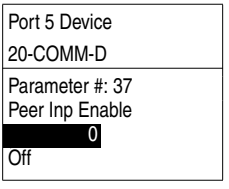


5. Set **Parameter 41 - [Peer Out Enable]** to **On**. The adapter will transmit the data selected in **Parameters 39 - [Peer A Output]** and **40 - [Peer B Output]** to the network. Another adapter must be configured to receive the data.

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

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

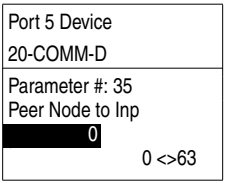
Figure 3.14 Peer Input Enable Screen on an LCD HIM



Value	Setting
0	Off (Default)
1	On

2. Select the node from which you want to receive data in **Parameter 35 - [Peer Node to Inp]**. Valid nodes must have 20-COMM-D adapters connected to drives with similar data structures.

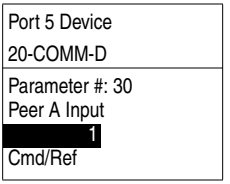
Figure 3.15 Peer Node to Input Screen on an LCD HIM



Default = 0

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

Figure 3.16 Peer A Input Screen on an LCD HIM

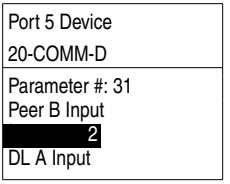


Value	Description
0	Off (Default)
1	Logic Command/Reference
2 - 5	Datalink A, B, C, or D Input

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, select the destination of the data to input to the drive in **Parameter 31 - [Peer B Input]**.

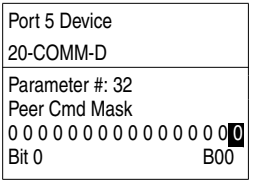
Figure 3.17 Peer B Input Screen on an LCD HIM



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

5. If you are receiving a Logic Command, set the bits in it that should be used in **Parameter 32 - [Peer Cmd Mask]**. The bit definitions for the Logic Command word will depend on the drive to which the adapter is connected. Refer to the drive documentation.

Figure 3.18 Peer Logic Command Mask Screen on an LCD HIM



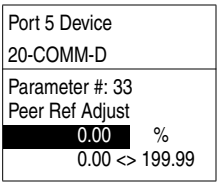
Value	Description
0	Ignore this command bit. (Default)
1	Use this command bit.

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. If you are receiving a Reference, set the scale in **Parameter 33 - [Peer Ref Adjust]**. It can be scaled between 0.00 and 199.99%.

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.

Figure 3.19 Peer Reference Adjust Screen on an LCD HIM

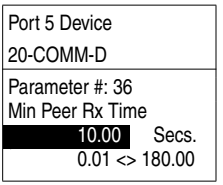


Default = 0.00%

7. 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.

Figure 3.20 Minimum Peer Receiving Time Screen on an LCD HIM

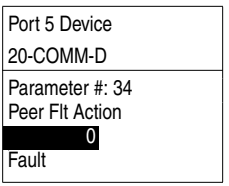


Default = 10.00 Secs

8. **Parameter 34 - [Peer Flt Action]** sets 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.

Figure 3.21 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, refer to the Setting a Fault Action section in this chapter.

9. Set **Parameter 37 - [Peer Inp Enable]** to **On**. The adapter is now configured to receive I/O from the specified node. Ensure that the specified node is configured to transmit 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. The adapter can be configured to use one of the following data exchanges:

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

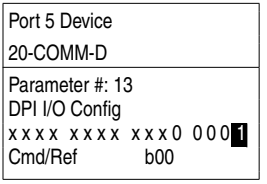
If “Polled and COS” or “Polled and Cyclic” is used, the adapter receives the I/O from the polled messages. It transmits its Logic Status and Feedback in COS or Cyclic messages. Other data is transmitted in Polled messages.

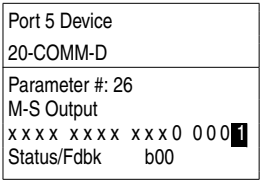
Cyclic and Polled data exchanges are configured in the scanner, so you only need to set the I/O configuration in the adapter. COS data exchange must be configured in both the adapter and the scanner. You need to set the I/O configuration and COS parameters in the adapter.

To use 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 or Feedback trigger messages in COS data exchange.

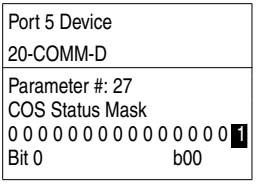
Figure 3.22 I/O Configuration Screens on an LCD HIM





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

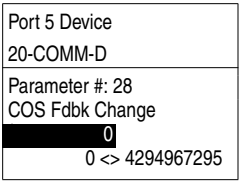
Figure 3.23 COS Status Mask Configuration Screen on an LCD HIM



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

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

Figure 3.24 COS Fdbk Change Configuration Screen on an LCD HIM



The adapter is now configured for COS data exchange. You must configure the scanner to allocate it using COS (Chapter 4, Configuring the Scanner).

Setting a Fault Action

By default, when communications are disrupted (for example, a cable is disconnected) or the scanner is idle, 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 scanner using **Parameter 11 - [Idle Flt Action]**.

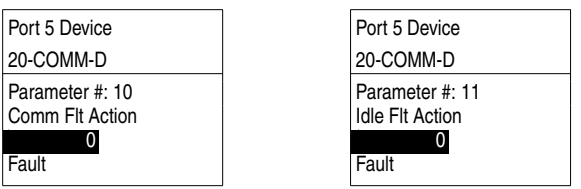
ATTENTION: Risk of injury or equipment damage exists. **Parameters 10 - [Comm Flt Action]** and **11 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

To change 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 (default)	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent 0 for output data after a communications disruption. This does not command a stop.
3	Hold Last	The drive continues in its present state after a communications disruption.
4	Send Flt Cfg	The drive is sent the data that you set in the fault configuration parameters (Parameters 15 - [Flt Cfg Logic] through 24 - [Flt Cfg D2 In]).

Figure 3.25 Fault Action Screens on an LCD HIM



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

To set the fault configuration parameters

If you set **Parameter 10 - [Comm Flt Action]**, **11 - [Idle Flt Action]**, or **34 - [Peer Flt Action]** to the "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.

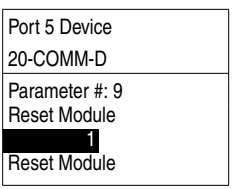
Resetting the Adapter

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

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

- Set the **Parameter 09 - [Reset Module]** to **Reset Module**:

Figure 3.26 Reset Screen on an LCD HIM

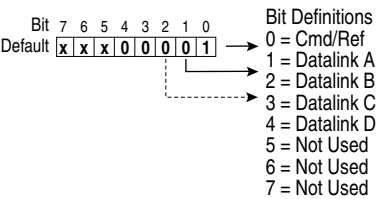


Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter **1 = Reset Module**, the adapter will be immediately reset. When you enter **2 = Set Defaults**, the adapter will set all adapter parameters to their factory-default settings. 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
01	DPI Port	The port on the drive to which the adapter is connected. Usually, it is port 5.
02	DPI Data Rate	The data rate used by DPI in the drive. It will be either 125 kbps or 500 kbps. It is set in the drive, and the adapter detects it.
04	DN Addr Actual	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] if the switches have been disabled. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
06	DN Rate Actual	The data rate used by the adapter. This will be one of the following values: • The data rate set by the DIP switch. • The value of Parameter 05 - [DN Rate Cfg] if the switches have been disabled. • An old data rate of the switches or parameter if they have 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 switches or parameters in EEPROM. It is determined by the settings of the switches on the adapter.
14	DPI I/O Active	The Reference/Feedback and Datalinks used by the adapter. This value is the same as Parameter 13 - [DPI I/O Config] unless the parameter was changed and the adapter was not reset. 

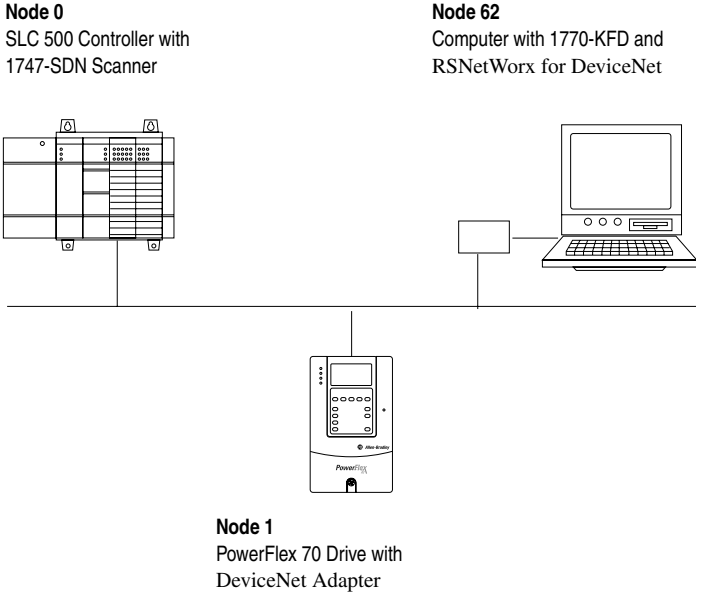
Configuring the Scanner

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

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This chapter provides the steps that are needed to configure a simple network like the network in Figure 4.1. In our example, we will configure the drive for using Logic Command/ Status and Reference Feedback over the network.

Figure 4.1 Example DeviceNet Network

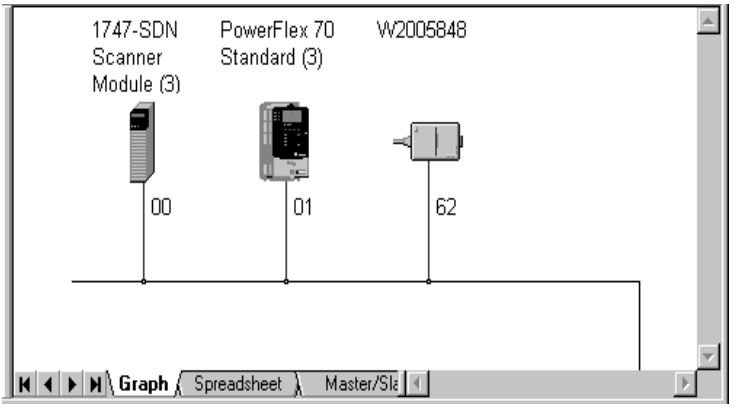


Setting Up the Scan List

For the scanner to communicate with a drive, the scanner must be configured and the drive's node number must be added to its scan list.

1. Go online with RSNetWorx for DeviceNet. Refer to the Using RSNetWorx for DeviceNet section in Chapter 3. The devices on the network are displayed in the configuration view.

Figure 4.2 Configuration View (Graph)



2. Right-click the DeviceNet scanner (node 00 in Figure 4.2) and select **Properties**. The Scanner Module dialog box appears.

   Important: If your scanner is an unrecognized device, you must create an EDS file for it and then configure it. Create an EDS file by following the instructions in the Using RSNetWorx for DeviceNet section in Chapter 3. Configure the scanner using the General and Module tabs. Click **Help** or refer to your scanner documentation if you need more information.

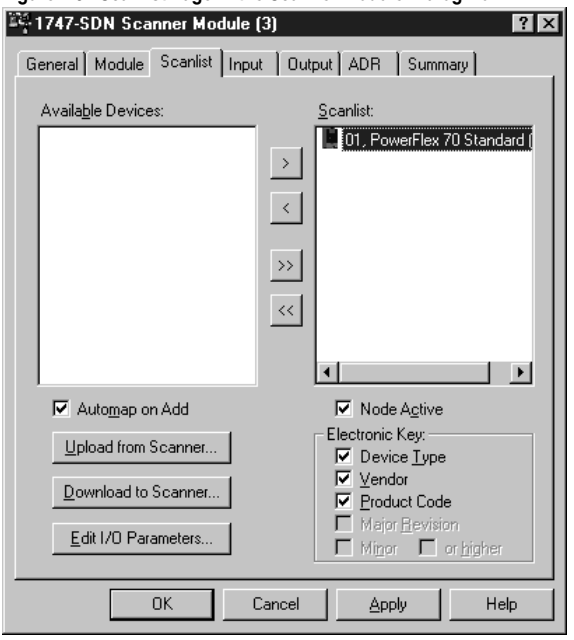
3. Click the **Scanlist** tab. A message box prompts you to upload.

4. Click **Upload**. Data is uploaded from the scanner, and then the Scanlist page (Figure 4.3) appears.

5. Select the **Automap on Add** box (a check mark will appear).

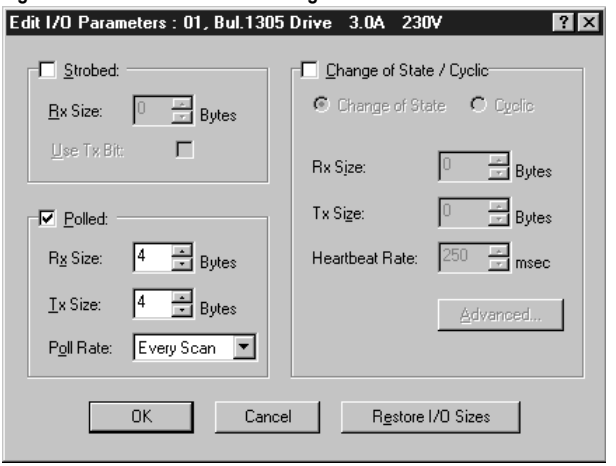
6. Under Available Devices, select the drive, and then click **>** (Right Arrow) to add it to the scanlist.

Figure 4.3 Scanlist Page in the Scanner Module Dialog Box



7. Under Scanlist, select the drive, and then click **Edit I/O Parameters**. The Edit I/O Parameters dialog box (Figure 4.4) appears.

Figure 4.4 Edit I/O Parameters Dialog Box



8. Select the type(s) of data exchange (Polled, Change of State, and /or Cyclic). In our example, we selected Polled.

9. Type the number of bytes that are required for your I/O in the Rx Size and Tx Size boxes. The size will depend on the following:

   - I/O that you enabled in the adapter. This information can be found in **Parameter 14 - [DPI I/O Active]** in the adapter.
   - Size of the Reference/Feedback and Datalinks in your drive. This information can be viewed using **Parameters 07 - [Ref/Fdbk Size]** and **08 - [Datalink Size]** in the adapter. A 16-bit word is two bytes, and a 32-bit word is four bytes.
   - The actual size value used in the Rx Size box can be determined by the setting of the M-S Input parameter as shown in Table E.A or Table E.B for "Poll Only."
   - The actual size value used in the Tx Size box can be determined by the setting of the M-S Output parameter as shown in Table E.C or Table E.D for "Poll Only."
   - Table 4.A and Table 4.B show common configuration Tx/Rx sizes.

   In our example, we typed 4 in the Rx Size and Tx Size boxes because we enabled only the Logic Command/Status for I/O in the adapter and our drive uses a 16-bit Reference/Feedback.

   Both the M-S Input and M-S Output parameters are set to 00001. Therefore, the Logic Command/Status uses 2 bytes and the Reference/Feedback uses 2 bytes totaling 4 bytes.

Table 4.A Host Products using 16-bit Reference/Feedback & Datalinks(1)

Rx Size	Tx Size	Logic Command/ Status	Reference/ Feedback (16-bit)	Datalinks (16-bit)			
				A	B	C	D
4	4	✔	✔				
8	8	✔	✔	✔			
12	12	✔	✔	✔	✔		
16	16	✔	✔	✔	✔	✔	
20	20	✔	✔	✔	✔	✔	✔

Table 4.B Host Products using 32-bit Reference/Feedback & Datalinks

Rx Size	Tx Size	Logic Command/ Status	Reference/ Feedback (32-bit)	Datalinks (32-bit)			
				A	B	C	D
8	8	✔	✔				
16	16	✔	✔	✔			
24	24	✔	✔	✔	✔		
32	32	✔	✔	✔	✔	✔	
40	40	✔	✔	✔	✔	✔	✔

10. Set the scan rate. (Click **Help** for more information.)

Data Exchange	Rate to set
Polled	Polled Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

11. Click **OK**. If you changed any settings, a Scanner Applet asks if it is OK to unmap the I/O. Click **Yes** to continue. The Edit I/O Parameters dialog box closes and then the Scanner Module dialog box (Figure 4.3) reappears. You will map the I/O in the next section in this chapter.

Mapping the Drive Data in the Scanner

Data from I/O messages must be mapped in the scanner. This mapping determines where a ladder logic program can find data that is passed over the network. You must map both the Input I/O and the Output I/O.

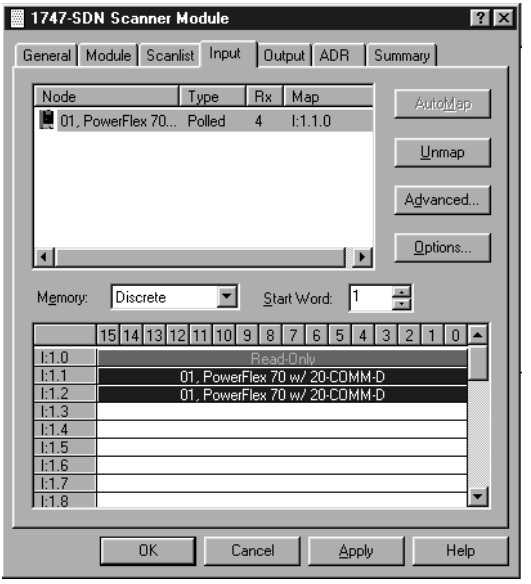
For:	Refer to:
Mapping the Input I/O	4-6
Mapping the Output I/O	4-7

(1) PowerFlex 70 & 700 use 16-bit.

Mapping the Input I/O

1. In the Scanner Module dialog box, click the **Input** tab. (If necessary, right-click the scanner in the configuration view (Figure 4.2) to display this dialog box.)

Figure 4.5 Input Page on the Scanner Module Dialog Box



If you selected the **Automap on Add** box in the Scanlist page (Figure 4.3), RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

2. In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 – 57

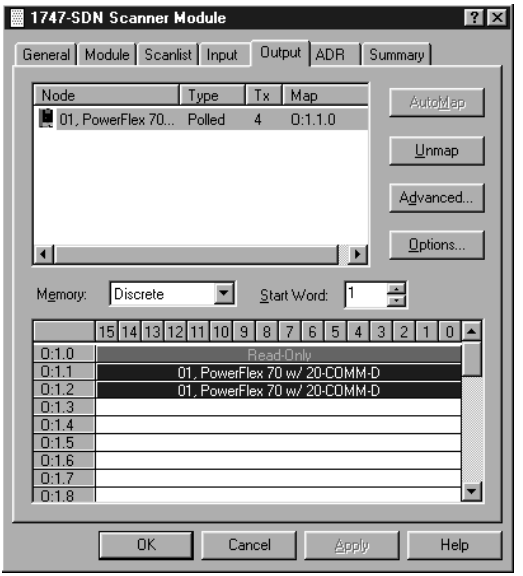
In our example, we are using a 1747-SDN and selected Discrete.

3. In the Start Word box, select the word in memory at which the data should start. In our example, we selected 1. Logic Status and Speed Feedback information will be found in I:1.1 and I:1.2, respectively.

Mapping the Output I/O

1. In the Scanner Module dialog box, click the **Output** tab. To display this dialog box, right-click the scanner in the configuration view (Figure 4.2).

Figure 4.6 Output Page on the Scanner Module Dialog Box



If you selected the **Automap on Add** box in the Scanlist page (Figure 4.3), RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

2. In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 – 57

In our example, we are using a 1747-SDN and selected Discrete.

3. In the Start Word box, select the word in memory at which the data should start. In our example, we selected 1. Logic Command and Speed Reference data should be written to O:1.1 and O:1.2, respectively.

Saving the Configuration

After configuring a scanner, you must download it to the scanner. You should also save it to a file on your computer.

1. In the Scanner Module dialog box (Figure 4.6), click **Apply** to save the configuration to the scanner. A Scanner Configuration Applet appears and asks if it is OK to download the changes.

2. Click **Yes** to download the changes. The changes are downloaded and then the Scanner Module dialog box reappears.

3. Click **OK** to close the Scanner Module dialog box.

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

Using I/O Messaging

Chapter 5 provides information and examples that explain how to use I/O Messaging to control a PowerFlex drive.

ATTENTION: Hazard 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 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 drives.

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

- The size of I/O can be configured by enabling or disabling the Logic Command/Reference and Datalinks.
- A Master-Slave hierarchy or Peer-to-Peer communications can be set up.
- Change of State, Cyclic, or Polled data exchange methods can be used.

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

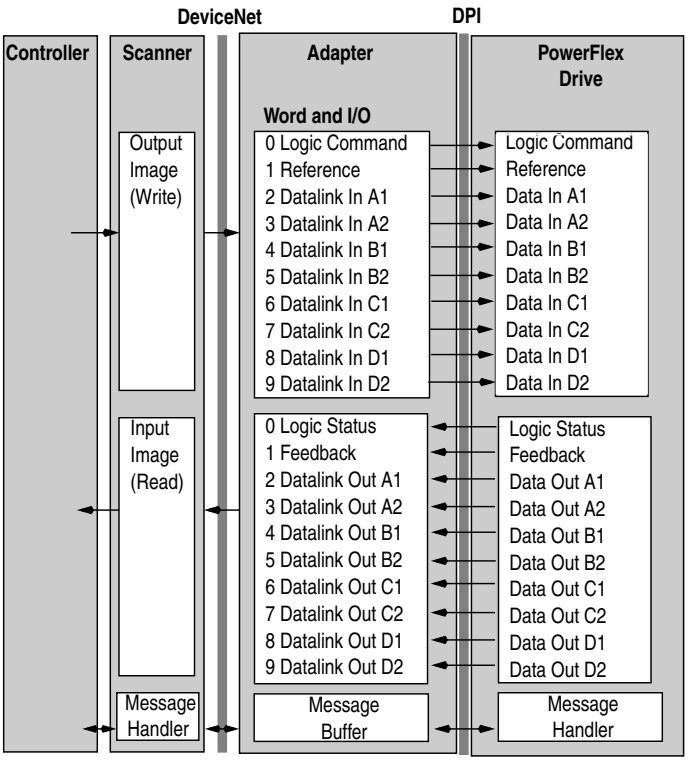
Understanding the I/O Image

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

- Size (either 16-bit or 32-bit) of the Reference/Feedback word and Datalink words used by the drive.
- Configuration of **Parameter 13 - [DPI I/O Config]** in the adapter. If all I/O is not enabled, the image table is truncated. The image table always uses consecutive words starting at word 0.

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

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



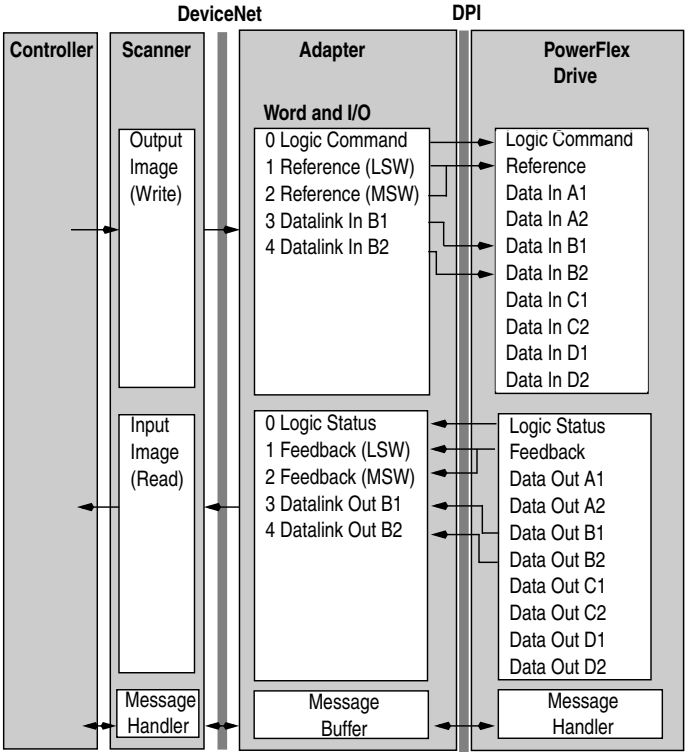
An image that uses 32-bit words for Reference and Datalinks would change the I/O image in Figure 5.1 as follows:

Word	I/O
0	Logic Command/Status
1 - 2	Reference/Feedback
3 - 6	Datalink A

Word	I/O
7 - 10	Datalink B
11 - 14	Datalink C
15 - 18	Datalink D

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

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



LSW = Least Significant Word (Bits 15 - 0)
MSW = Most Significant Word (Bits 31 - 16)

Using Logic Command/Status

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

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

Using Reference/Feedback

When enabled, Reference/Feedback always begins at word 1 in the I/O image. The *Reference* (16 bits or 32 bits) is produced by the controller and consumed by the adapter. The *Feedback* (16 bits or 32 bits) is produced by the adapter and consumed by the controller. The size of the Reference/Feedback is determined by the drive and displayed in **Parameter 07 - [Ref/Fdbk Size]** in the adapter.

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

Using Datalinks

A Datalink is a mechanism used by PowerFlex drives to transfer data to and from the controller. Datalinks allow a parameter value to be changed without using an Explicit Message. When enabled, each Datalink occupies two 16 or 32-bit words in both the input and output image. **Parameter 08 - [Datalink Size]** will indicate whether the drive uses 16 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.

32-Bit Parameters using 16-Bit Datalinks

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

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

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

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

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

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

32-bit data is stored in binary as follows:

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

Example:

Parameter 242 - [Power Up Marker] = 88.4541 hours

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

LSW = 32573

851968 + 32573 = 884541

Example Ladder Logic Programs

These example ladder logic programs (Figure 5.4 – Figure 5.7) work with PowerFlex 70 or PowerFlex 700 drives.

Functions of the Example Programs

The example programs use an operator station wired to an I/O module in Slot 0, Module Group 0, Rack 0. The operator can perform the following actions:

- Obtain status information from the drive.
- Use the Logic Command to control the drive (for example, start, stop).
- Send a Reference to the drive.

Adapter Settings for the Example Programs

- Node address 1 is set using the switches.
- Logic Command/Reference and Datalink A are enabled in **Parameter 13 - [DN I/O Config]**.
- Master-Slave Hierarchy is set using **Parameters 25 - [M-S Input]** and **26 - [M-S Output]**.
- Polled I/O was enabled during the scanner configuration.

Scanner Settings for the Example Programs

- The scanner is node 0 on the DeviceNet network.
- The scanner is in slot 1.
- The adapter I/O is mapped in word 0 and word 1.
- Data files, when used, are pointed out in the examples.

Logic Command/Status Words

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

ControlLogix Example

Figure 5.3 Tags for the Example Program

Tag Name	Type
Local:1:I	DINT[]
Local:1:O	DINT[]
DriveCommandClearFault	BOOL
DriveCommandJog	BOOL
DriveCommandStart	BOOL
DriveCommandStop	BOOL

Tag Name	Type
DriveFeedback	INT
DriveInputImage	INT[2]
DriveOutputImage	INT[2]
DriveReference	INT
DriveStatusFaulted	BOOL
DriveStatusRunning	BOOL

Figure 5.4 Example ControlLogix Ladder Logic Program

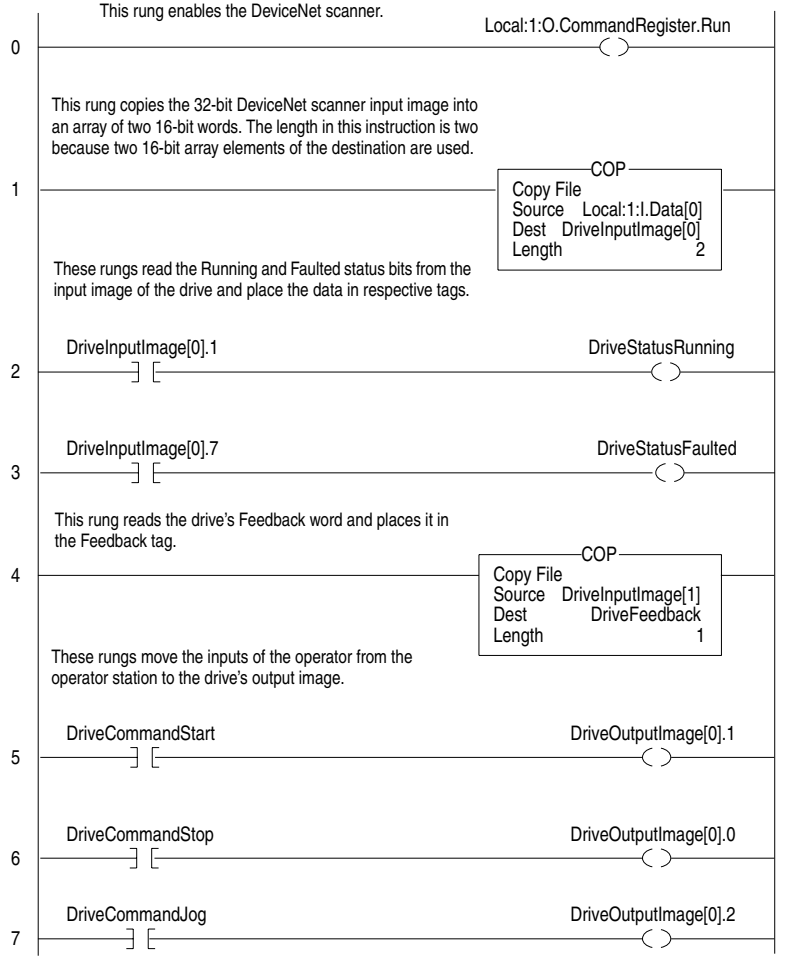
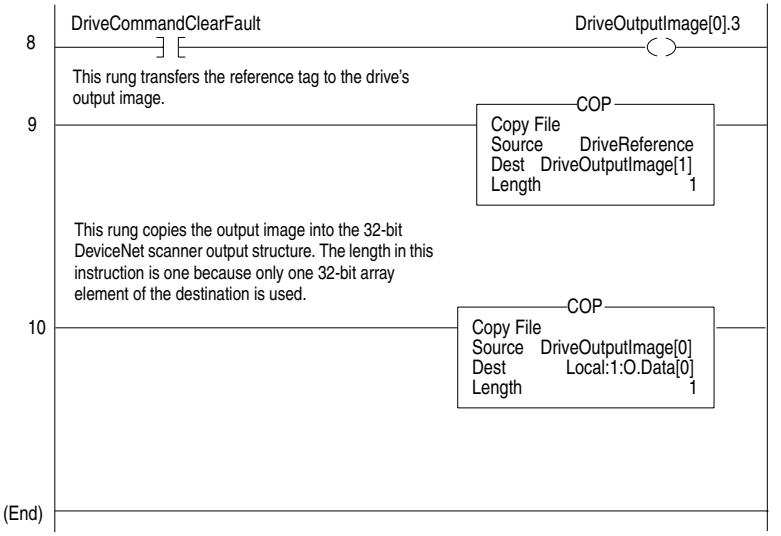


Figure 5.4 Example ControlLogix Ladder Logic Program (Continued)



PLC-5 Example

Figure 5.5 Control File for Block Transfers

	EN	ST	DN	ER	CO	EW	NR	TO	RW	RLEN	DLEN	FILE	ELEM	R	G	S
BT20:0	0	0	0	0	0	0	0	0	0	62	0	9	0	00	0	0
BT20:1	0	0	0	0	0	0	0	0	0	62	0	10	0	00	0	0

Figure 5.6 Example PLC-5 Ladder Logic Program

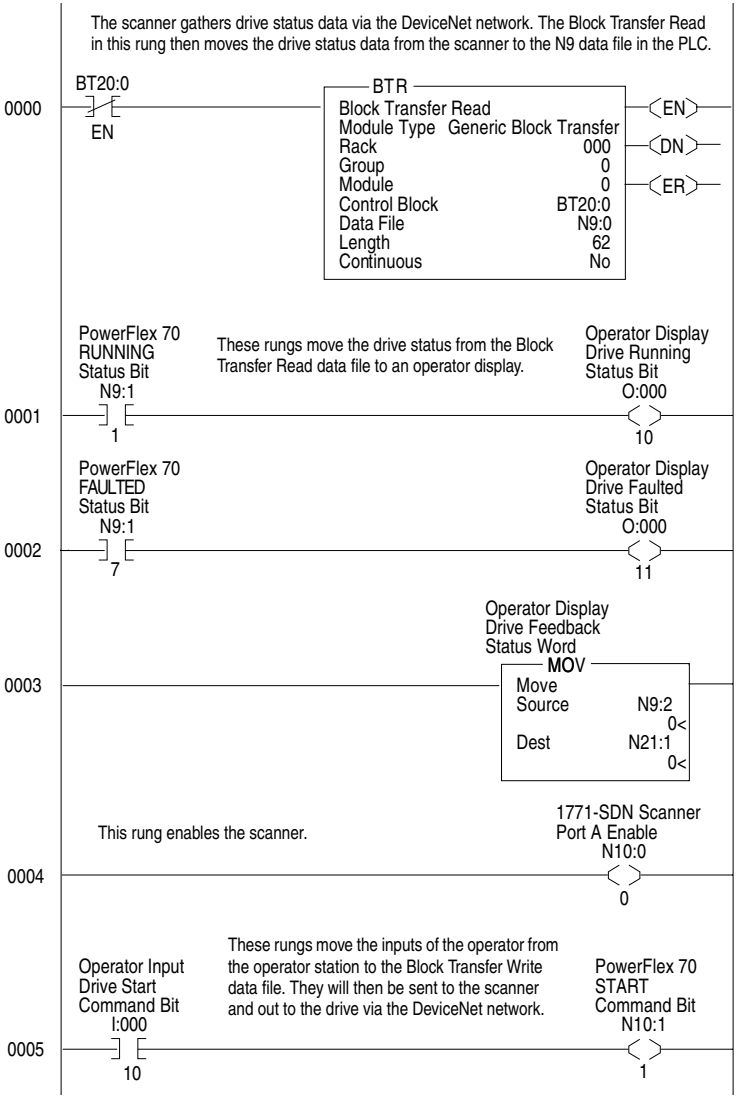
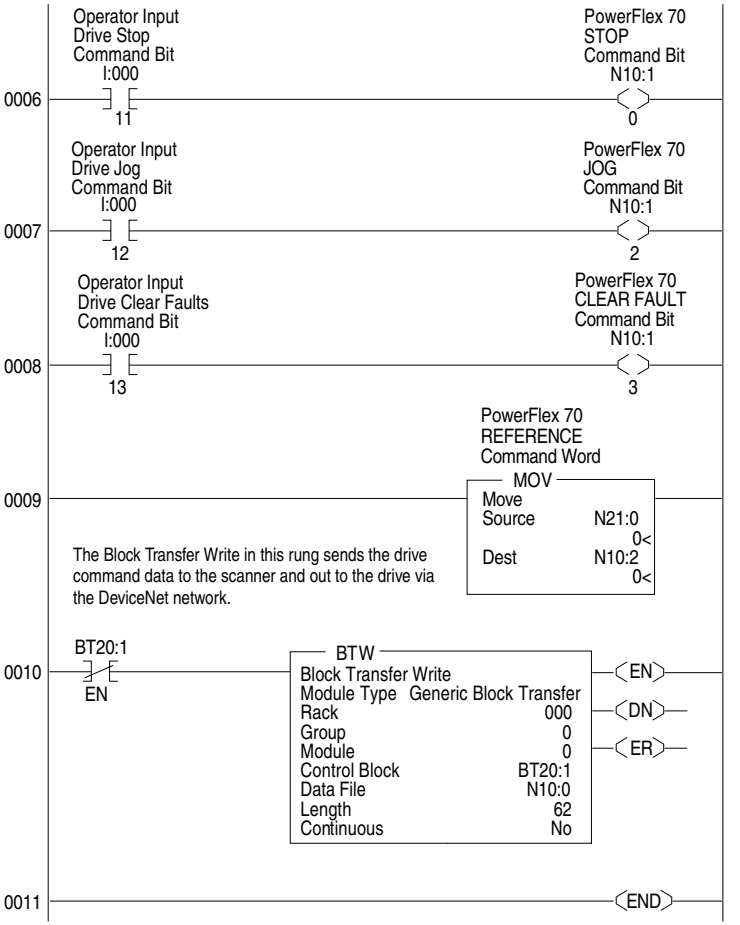


Figure 5.6 Example PLC-5 Ladder Logic Program (Continued)



SLC Example

Figure 5.7 Example SLC Ladder Logic Program

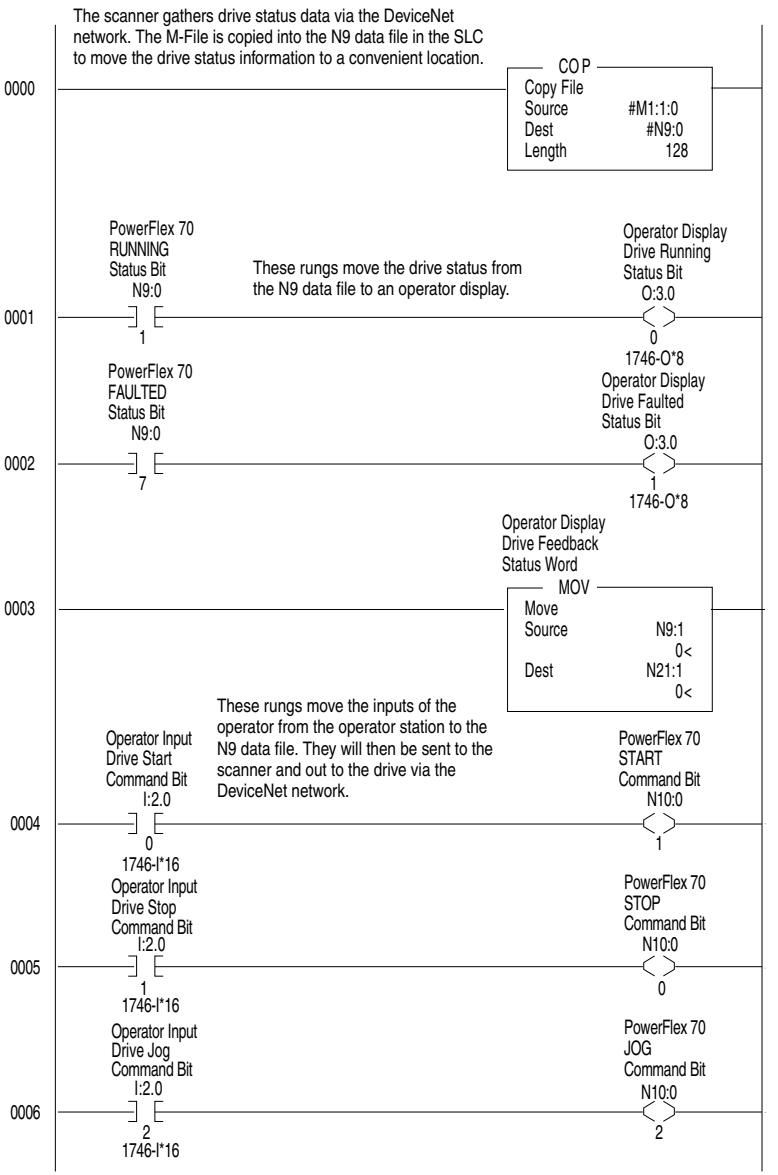
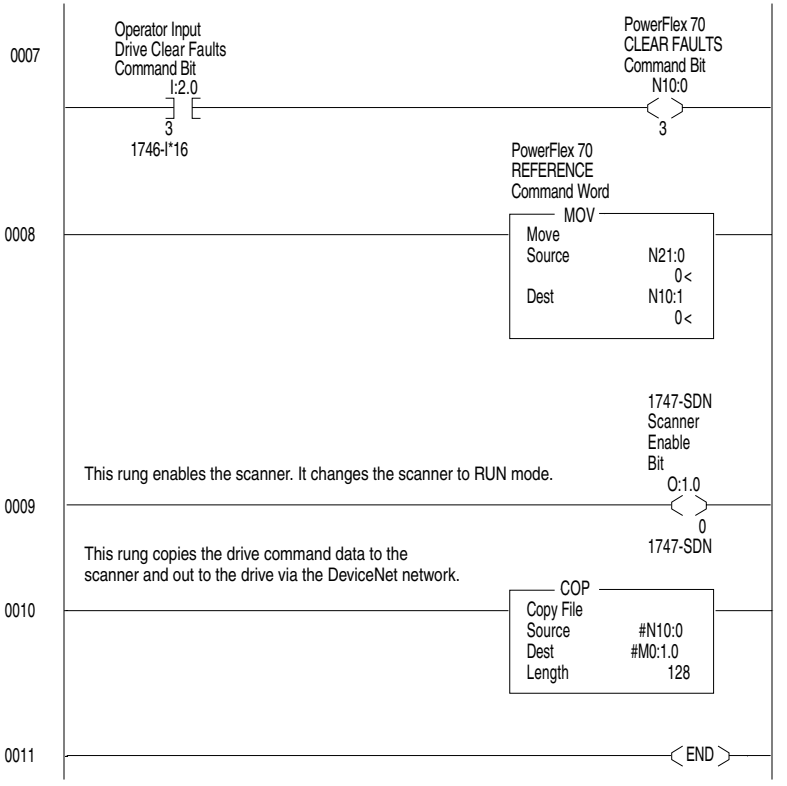


Figure 5.7 Example SLC Ladder Logic Program (Continued)



Using Explicit Messaging

Chapter 6 provides information and examples that explain how to use Explicit Messaging to monitor and configure the adapter and connected PowerFlex drive.

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ATTENTION: Hazard 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.

About Explicit Messaging

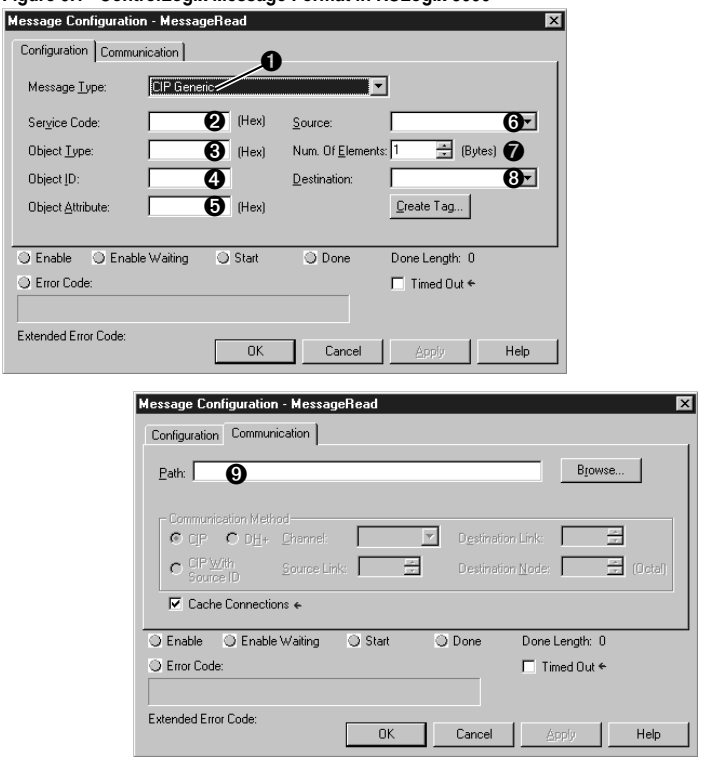
Explicit Messaging is used to transfer data that does not require continuous updates. With Explicit Messaging, you can configure and monitor a slave device's parameters on the DeviceNet network.

Formatting Explicit Messages

Explicit Messages for a ControlLogix Controller

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

Figure 6.1 ControlLogix Message Format in RSLogix 5000



Refer to Page 6-3 for a description of the data that is required in each box (1 – 9).

TIP: To display the Message Configuration dialog box in RSLogix 5000, add a message instruction, create a tag for the message (properties: base tag, MESSAGE data type, controller scope), and click the blue box inside the message.

The following table identifies the number of Explicit Messages that can be executed at a time.

Scanner	Messages at One Time	Refer To
1756-DNB	5	Figure 6.1

ControlLogix Message Requests and Responses

Box	Description
❶	**Message Type** The message type must be CIP Generic.
❷	**Service Code** The service code is the requested DeviceNet service. Available services depend on the class and instance that you are using. Refer to Appendix C, DeviceNet Objects.
❸	**Object Type** The object type is a DeviceNet class. Refer to Appendix C, DeviceNet Objects, for available classes.
❹	**Object ID** The object ID is an instance of a DeviceNet class. Refer to Appendix C, DeviceNet Objects, for available instances.
❺	**Object Attribute** The object attribute is a class or instance attribute. Refer to Appendix C, DeviceNet Objects, for available classes.
❻	**Source** This box contains the name of the tag for any service data to be sent from the scanner to the adapter and drive. A tag must be specified even if it is not used.
❼	**Num. of Elements** This box contains the number of bytes of service data to be sent or received in the message.
❽	**Destination** This box contains the name of the tag that will receive service response data from the adapter and drive. A tag must be specified even if it is not used.
❾	**Path** The path includes the following: • Name of the DeviceNet scanner. • Communication port on the front of the 1756-DNB scanner. Always 2. • Node address of the DeviceNet adapter. This is set with switches or parameters in the DeviceNet adapter. **Tip:** Click **Browse** to find the path or type in the name of a module that you previously mapped.

Explicit Messages for a PLC or SLC Controller

Transaction blocks in PLC and SLC scanners accommodate both downloading Explicit Message Requests and uploading Explicit Message Responses. The scanner module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown in Figure 6.2 or Figure 6.3.

Figure 6.2 PLC Explicit Message Format

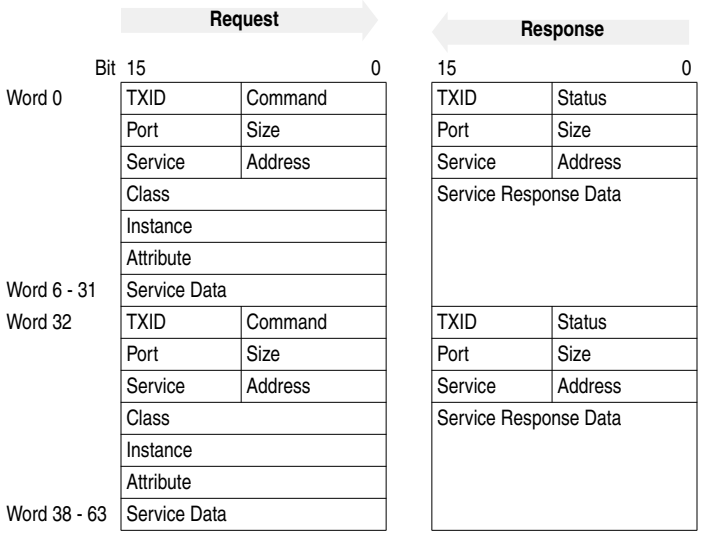
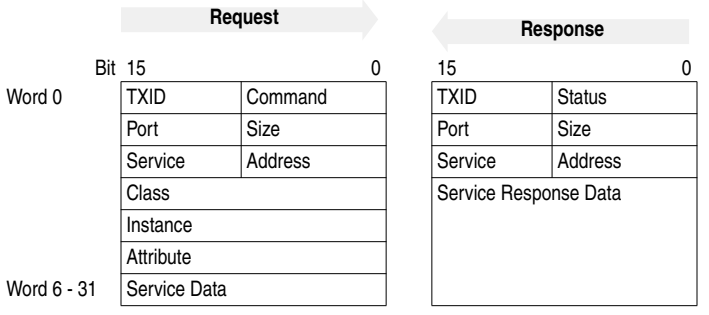


Figure 6.3 SLC Explicit Message Format



Refer to Page 6-5 and Page 6-6 for a description of the data that is required in each word.

The following table identifies the number of transaction blocks within a scanner that are reserved for Explicit Messaging.

Scanner	Number of Transaction Blocks	Words in Each Transaction Block	Refer To
1747-SDN	10	32	Figure 6.3
1771-SDN	10	32 (two blocks can be moved at once)	Figure 6.2

PLC / SLC Explicit Message Requests

Word	Description
0	**Command** (Least Significant Byte) The Command is a code that instructs the scanner how to administer the request during each download. 00 = Ignore transaction block (empty) 01 = Execute this transaction block 02 = Get status of transaction TXID 03 = Reset all client/server transactions 04 = Delete this transaction block (available only for SLC) 05 – 255 = Reserved
	TXID (Most Significant Byte) The Transaction ID is a 1-byte integer between 1 and 255. It is assigned in the ladder logic program when the processor creates and downloads a request to the scanner. The scanner uses it to track the transaction to completion. It returns this value with the response that matches the request downloaded by the processor.
1	**Size** (Least Significant Byte) The size of the service data is in bytes. Service data includes the words for the class, instance, attribute, and any data. The maximum size is 58 bytes (29 words).
	Port (Most Significant Byte) The port that is used by the message is always zero (Channel A) on an SLC scanner. It is zero (Channel A) or one (Channel B) for a PLC scanner.
2	**Address** (Least Significant Byte) The node address of the slave device to which the transaction is sent. For the Explicit Message to be successful, the slave device must be in the scanlist of the scanner, and it must be online.
	Service (Most Significant Byte) Available services depend on the class and instance that you are using. Refer to Appendix C, DeviceNet Objects.
3	**Class** Refer to Appendix C, DeviceNet Objects, for available classes.
4	**Instance** Refer to Appendix C, DeviceNet Objects, for available instances.
5	**Attribute** Refer to Appendix C, DeviceNet Objects, for available attributes.
6 – 31	**Request Data** This is data used for the message. For example, it may be the value written to a parameter.

PLC / SLC Explicit Message Responses

Word	Description
0	**Status** (Least Significant Byte) One of the following status codes is provided during each upload: 00 = Ignore transaction block (empty) 01 = Transaction completed successfully 02 = Transaction in progress (not ready) 03 = Slave not in scan list 04 = Slave offline 05 = DeviceNet port disabled or offline 06 = Transaction TXID unknown 08 = Invalid command code 09 = Scanner out of buffers 10 = Other client/server transaction in progress 11 = Could not connect to slave device 12 = Response data too large for block 13 = Invalid port 14 = Invalid size specified 15 = Connection busy 16 – 255 = Reserved
	TXID (Most Significant Byte) The transaction ID is a 1-byte integer in word 31 with a range of 1 to 255. It is assigned in the ladder logic program when the processor creates and downloads a request to the scanner. The scanner uses it to track the transaction to completion. It returns this value with the response that matches the request downloaded by the processor.
1	**Size** (Least Significant Byte) The size of the service data is in bytes. The service data includes words used for the response data. The maximum size is 58 bytes (29 words).
	Port (Most Significant Byte) The port that is used by the message is always zero (Channel A) on an SLC scanner. It is zero (Channel A) or one (Channel B) for a PLC scanner.
2	**Address** (Least Significant Byte) The node address of the slave device to which the transaction is sent. For the Explicit Message to be successful, the slave device must be in the scanlist of the scanner, and it must be online.
	Service (Most Significant Byte) If the message was successful, 0x80 is added to the service. If it is unsuccessful, 0x94 is returned.
3 – 31	**Response Data** This is data used for the message. For example, it may be the value read from a parameter.

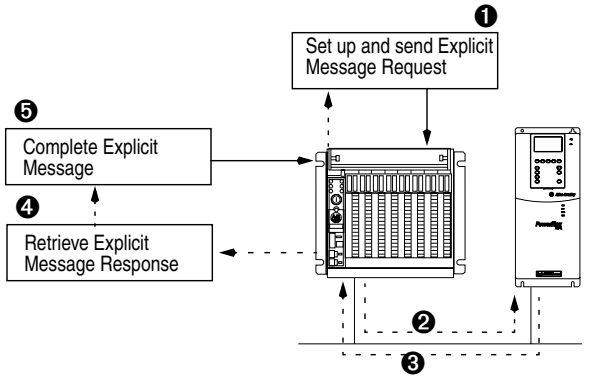
Refer to Page 6-5 for a description of the words in a PLC/SLC Explicit Message request.

Running Explicit Messages

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

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

Figure 6.4 Explicit Message Process



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

2. The scanner module transmits the Explicit Message Request to the slave device over the DeviceNet network.

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

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

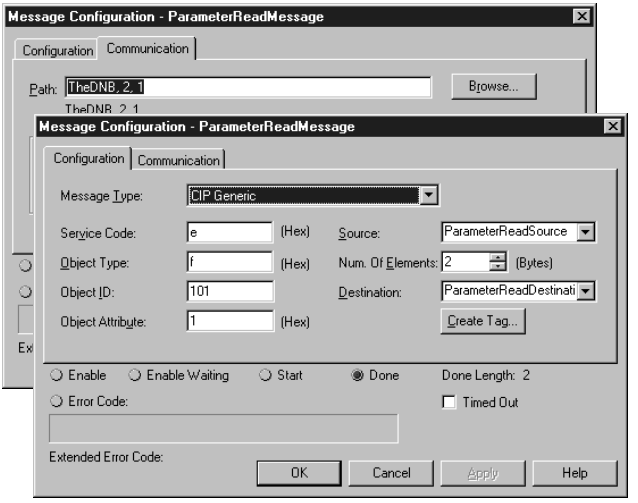
5. The Explicit Message is complete. If you are using a PLC or SLC, delete the transaction ID so that it can be reused.

ControlLogix Example

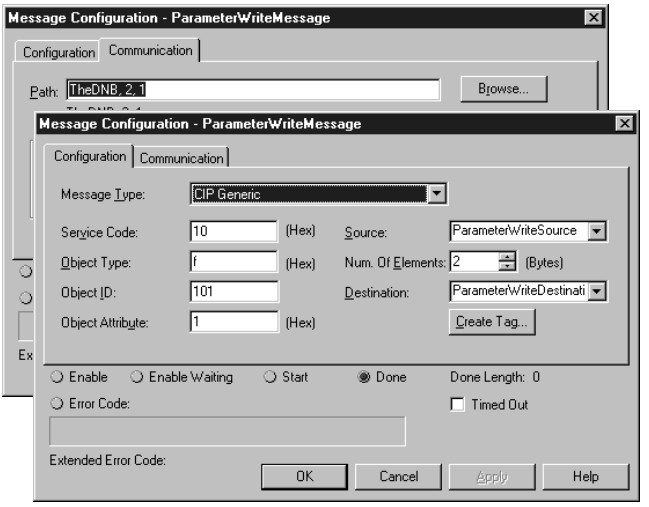
Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content in each box.



Configuration	Value	Description	Refer to . . .
Service Code	e (hex)	Get_Attribute_Single	C-10
Object Type	f (hex)	Parameter Object	C-8
Object ID	101 (dec)	Parameter Address	
Object Attribute	1 (hex)	Parameter Value	C-9



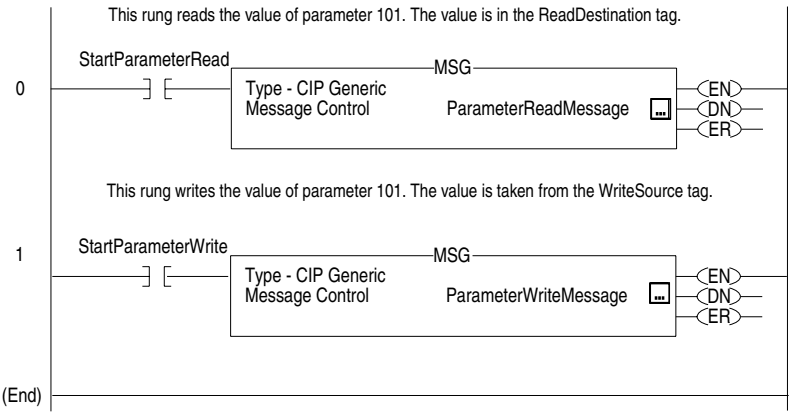
Configuration	Value	Description	Refer to . . .
Service Code	10 (hex)	Set_Attribute_Single	C-10
Object Type	f (hex)	Parameter Object	C-8
Object ID	101 (dec)	Parameter Address	
Object Attribute	1 (hex)	Parameter Value	C-9

Figure 6.5 Tags for the Example Explicit Messaging Program

Tag Names for Read Message	Type
StartParameterRead	BOOL
ParameterReadDestination	INT
ParameterReadMessage	MESSAGE
ParameterReadSource	INT

Tag Names for Write Messages	Type
StartParameterWrite	BOOL
ParameterWriteDestination	INT
ParameterWriteMessage	MESSAGE
ParameterWriteSource	INT

Figure 6.6 Example ControlLogix Ladder Logic Program



PLC-5 Example

Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content of the data file.

Request Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N30:0	0101	TXID = 01, Command = 01 (execute)	6-5
N30:1	0006	Port = 00, Size = 06 bytes	6-5
N30:2	0E01	Service = 0E (Get_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N30:3	000F	Class = 0F (Parameter Object)	C-8
N30:4	0065	Instance = Parameter 101 (65 hex)	
N30:5	0001	Attribute = 01 (Parameter Value)	C-9

Response Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N30:70	0101	TXID = 01, Status = 01 (successful)	6-6
N30:71	0002	Port = 00, Size = 02 bytes	6-6
N30:72	8E01	Service = 8E (successful), Address = 01 (Node Address)	6-6
N30:73	03E8	Response Data = 1000 (3E8 hex) = 10.00 seconds	

Request Data for Write to Drive Parameter 101

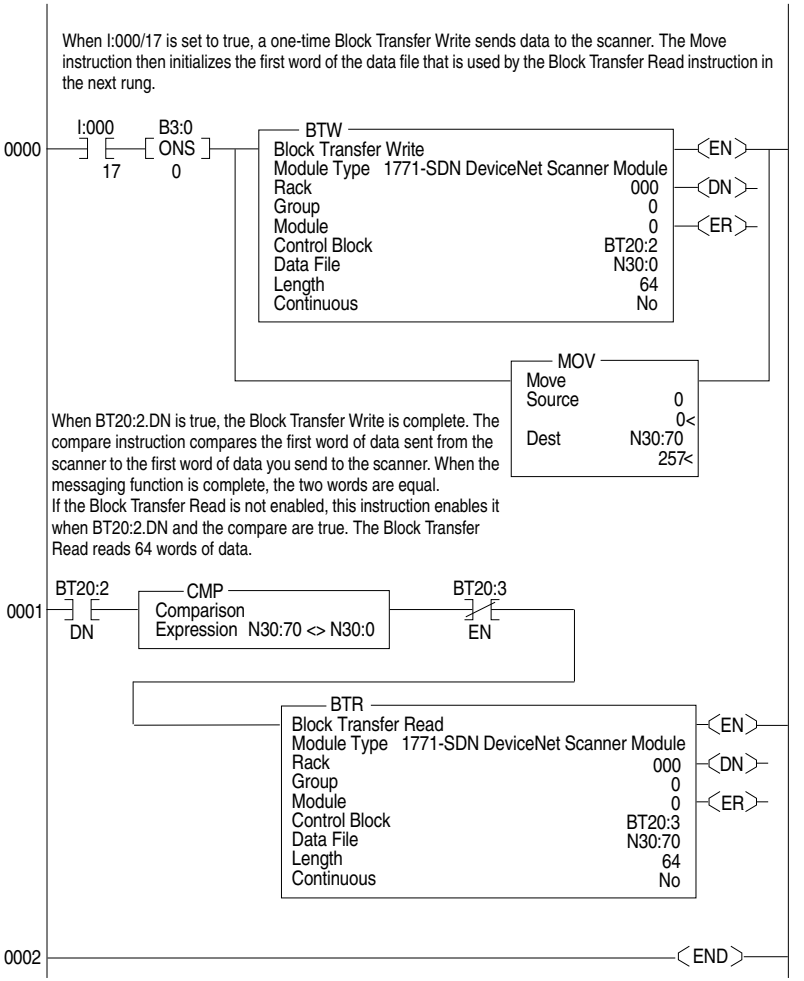
Address	Value (hex)	Description	Refer to . . .
N30:0	0101	TXID = 01, Command = 01 (execute)	6-5
N30:1	0008	Port = 00, Size = 08 bytes	6-5
N30:2	1001	Service = 10 (Set_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N30:3	000F	Class = 0F (Parameter Object)	C-8
N30:4	0065	Instance = Parameter 101 (65 hex)	
N30:5	0001	Attribute = 01 (Parameter Value)	C-9
N30:6	07D0	Data = 2000 (7D0 hex) = 20.00 seconds	

Response Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N30:70	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N30:71	0000	Port = 00, Size = 00 bytes	6-6
N30:72	9001	Service = 90 (successful) Address = 01 (Node Address)	6-6

Ladder Logic Program

Figure 6.7 Example PLC-5 Ladder Logic Program



SLC Example

Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content of the data file.

Request Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N20:10	0101	TXID = 01, Command = 01 (execute)	6-5
N20:11	0006	Port = 00, Size = 06 bytes	6-5
N20:12	0E01	Service = 0E (Get_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N20:13	000F	Class = 0F (Parameter Object)	C-8
N20:14	0065	Instance = Parameter 101 (65 hex)	
N20:15	0001	Attribute = 01 (Parameter Value)	C-9

Response Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N20:50	0101	TXID = 01, Status = 01 (successful)	6-6
N20:51	0002	Port = 00, Size = 02 bytes	6-6
N20:52	8E01	Service = 8E (successful) Address = 01 (Node Address)	6-6
N20:53	03E8	Response Data = 1000 (3E8 hex) = 10.00 seconds	

Request Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N20:10	0101	TXID = 01, Command = 01 (execute)	6-5
N20:11	0008	Port = 00, Size = 08 bytes	6-5
N20:12	1001	Service = 10 (Set_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N20:13	000F	Class = 0F (Parameter Object)	C-8
N20:14	0065	Instance = Parameter 101 (65 hex)	
N20:15	0001	Attribute = 01 (Parameter Value)	C-9
N20:16	07D0	Data = 2000 (7D0 hex) = 20.00 seconds	

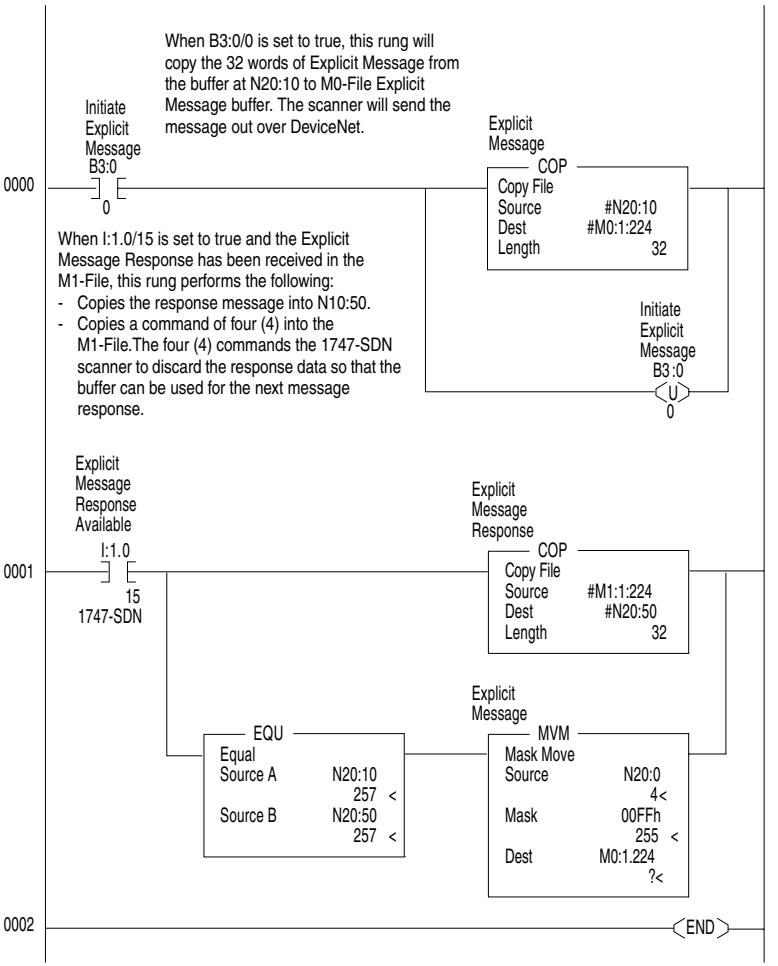
Response Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N20:50	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N20:51	0000	Port = 00, Size = 00 bytes	6-6
N20:52	9001	Service = 90 (successful) Address = 01 (Node Address)	6-6

Program

Important: To originate a scanner transaction, use a copy operation to M0:[slot number]:224. Then, use a copy operation to read M1:1.224 for the result. If more than one message is enabled, use the TXID to determine which message you are reading.

Figure 6.8 Example SLC Ladder Logic Program



Notes:

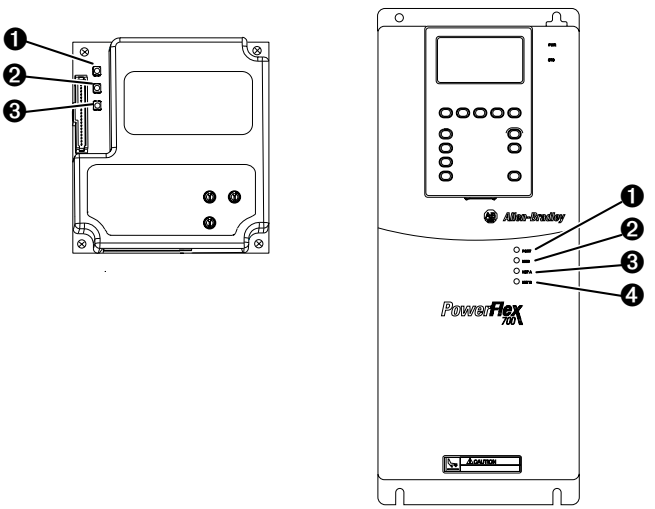
Troubleshooting

Chapter 7 contains troubleshooting information.

Locating the Status Indicators

The DeviceNet adapter has three 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)*



Number	Status Indicator	Description	Page
❶	PORT	DPI Connection Status	7-2
❷	MOD	Adapter Status	7-2
❸	NET A	DeviceNet Status	7-3
❹	NET B	Not Used for DeviceNet	

PORT Status Indicator

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

MOD Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter has failed the firmware test or the node address switch setting is invalid.	• Verify that the node address switch setting is between 0 and 63. • Clear faults in the adapter. • Cycle power to the drive. • If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module. • If resetting defaults does not correct the problem, flash the adapter with the latest firmware release.
Solid Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the adapter. • Configure the adapter for the program in the controller.
Solid Green	The adapter is operational and transferring I/O data.	• No Action.

NET A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter and/or network is not powered or adapter is not connected properly to the network.	• Securely connect the adapter to the drive using the Internal Interface cable and to the network using a DeviceNet cable. • Correctly connect the DeviceNet cable to the DeviceNet plug. • Apply power to the drive and network.
Flashing Red/ Green	The adapter has received an Identify Comm Fault request.	• Wait for the faulted node recovery to complete.
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.
Solid Red	Failed duplicate 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 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 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.

Module Diagnostic Items

The following diagnostic items can be accessed using DriveExplorer (version 2.01 or higher).

No.	Name	Description
1	Common Logic Cmd	Current value of the Common Logic Command being transmitted to the host by this peripheral.
2	Prod Logic Cmd	Current value of the Product Specific Logic Command being transmitted to the host by this peripheral.
3	Reference	Current value of the Product Specific Reference being transmitted to the host by this peripheral.
4	Common Logic Sts	Current value of the Common Logic Status being received from the host by this peripheral.
5	Prod Logic Sts	Current value of the Product Specific Logic Status being received from the host by this peripheral.
6	Feedback	Current value of the Product Specific Feedback being received from the host by this peripheral.
7	Datalink A1 In	Current value of Datalink A1 In being transmitted to the host by this peripheral (if not using Datalink A1, this parameter should have a value of zero).
8	Datalink A2 In	Current value of Datalink A2 In being transmitted to the host by this peripheral (if not using Datalink A2, this parameter should have a value of zero).
9	Datalink B1 In	Current value of Datalink B1 In being transmitted to the host by this peripheral (if not using Datalink B1, this parameter should have a value of zero).
10	Datalink B2 In	Current value of Datalink B2 In being transmitted to the host by this peripheral (if not using Datalink B2, this parameter should have a value of zero).
11	Datalink C1 In	Current value of Datalink C1 In being transmitted to the host by this peripheral (if not using Datalink C1, this parameter should have a value of zero).
12	Datalink C2 In	Current value of Datalink C2 In being transmitted to the host by this peripheral (if not using Datalink C2, this parameter should have a value of zero).
13	Datalink D1 In	Current value of Datalink D1 In being transmitted to the host by this peripheral (if not using Datalink D1, this parameter should have a value of zero).
14	Datalink D2 In	Current value of Datalink D2 In being transmitted to the host by this peripheral (if not using Datalink D2, this parameter should have a value of zero).
15	Datalink A1 Out	Current value of Datalink A1 being received from the host by this peripheral.
16	Datalink A2 Out	Current value of Datalink A2 being received from the host by this peripheral.
17	Datalink B1 Out	Current value of Datalink B1 being received from the host by this peripheral.
18	Datalink B2 Out	Current value of Datalink B2 being received from the host by this peripheral.
19	Datalink C1 Out	Current value of Datalink C1 being received from the host by this peripheral.
20	Datalink C2 Out	Current value of Datalink C2 being received from the host by this peripheral.
21	Datalink D1 Out	Current value of Datalink D1 being received from the host by this peripheral.
22	Datalink D2 Out	Current value of Datalink D2 being received from the host by this peripheral.
23	Field Flash Cntr	Current value of the Field Flash Counter.
24	DPI Rx Errors	Current value of the DPI CAN Transmit Error Counter register.
25	DPI Tx Errors	Maximum value of the DPI CAN Transmit Error Counter register.
26	DNet Rx Errors	Current value of the DNet CAN Receive Error Counter register.
27	DNet Tx Errors	Maximum value of the DNet CAN Receive Error Counter register.

Viewing and Clearing Events

The adapter maintains an event queue that reports the history of its actions. You can view the event queue using an LCD PowerFlex HIM, DriveExplorer (2.01) software, or DriveTools 2000 (1.xx) software.

To view and clear events

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

Events

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

Code	Event	Description
0	No Event	Empty event queue entry.
1	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.
2	Ping Time Flt	A ping message was not received on DPI within the specified time.
3	Port ID Flt	The adapter is not connected to a correct port on a DPI product.
4	Port Change Flt	The DPI port changed.
5	Host Sent Reset	The DPI product issued this because it was reset.
6	EEPROM Sum Flt	The EEPROM in the adapter is corrupt.
7	Online @ 125kbps	The adapter and DPI product are communicating at 125kbps.
8	Online @ 500kBps	The adapter and DPI product are communicating at 500kbps.
9	Bad Host Flt	The adapter was connected to an incompatible product.
10	Dup. Port Flt	Another peripheral with the same port number is already in use.
11	Type 0 Login	The adapter has logged in for type 0 control.
12	Type 0 Time Flt	The adapter has not received a type 0 status message within the specified time.
13	DL Login	The adapter has logged into a Datalink.
14	DL Reject Flt	The host rejected an attempt to log in to a Datalink because the Datalink is not supported or is used by another peripheral.
15	DL Time Flt	The adapter has not received a Datalink message within the specified time.
16	Control Disabled	The adapter has sent a “Soft Control Disable” command to the DPI product.
17	Control Enabled	The adapter has sent a “Soft Control Enable” command to the DPI product.
18	PCCC IO Time Flt	The adapter has not received a PCCC control message within the specified time-out interval.
19	Normal Startup	The adapter successfully started up.
20	Message Timeout	A Client-Server message sent by the peripheral was not completed.
21	DPI Fault Msg	The DPI Host has faulted.
22	DN Poll Timeout	A Polled I/O connection has timed out.
23	DN I/O Too Long	Reconfigure the I/O length in the scanner.

Code	Event	Description
24	Bad I/O Fragment	A DeviceNet I/O fragment was received out of sequence. Possible line noise problem.
25	Idle I/O Message	The DeviceNet scanner was placed in program mode.
26	Peer I/O Timeout	The adapter has not received Peer I/O from another device on the network within the specified time-out interval.
27	DPI Fault Clear	The DPI product issued this because a fault was cleared.
28	DN COS Timeout	A Change of State (COS) connection has timed out.
29	DN Poll Allocate	A Polled connection has been allocated.
30	DN COS Allocate	A Change of State (COS) I/O connection has been allocated.
31	DN Poll Closed	A Polled I/O connection was explicitly closed.
32	DN COS Closed	A Change of State (COS) connection was explicitly closed.
33	Safe State Error	At least one of the Fault Configuration parameters contains a value greater than 65535 and the DPI product expects a 16-bit value.
34	Language CRC Bad	The language text memory segment is corrupt.

Notes:

Specifications

This chapter present 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.
Drive	
Protocol	DPI
Data Rates	125K or 500K

Electrical

Consumption	
Drive	150 mA at 5 V supplied through the drive
Network	60 mA at 24 V supplied through DeviceNet 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 149°F)
Storage	-40 to +85°C (-40 to 185°F)
Relative Humidity	-5 to 95% non-condensing

Regulatory Compliance

UL	508C and CUL
CE	EN61800-3

Adapter Parameters

Appendix B provides information about the DeviceNet adapter parameters.

About Parameter Numbers

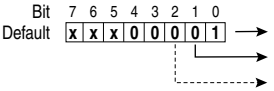
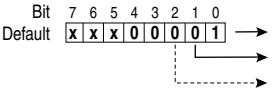
The parameters in the adapter are numbered consecutively. However, depending on which configuration tool you use, they may have different numbers.

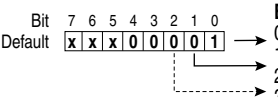
Configuration Tool	Numbering Scheme
• DriveExplorer • DriveTools 2000 • HIM	The adapter parameters begin with parameter 1. For example, Parameter 01 - [DPI Port] is parameter 1 as indicated by this manual.
• Explicit Messaging • RSNetWorx for DeviceNet	The adapter parameters are appended to the list of drive parameters. For example, with a drive with 300 parameters, Parameter 01- [DPI Port] is parameter 301.

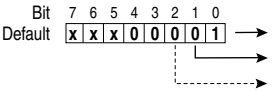
Parameter List

Parameter No.	Name and Description	Details	
01	**[DPI Port]** Port to which the adapter is connected. This will usually be port 5.	Default: Minimum: Maximum: Type:	0 0 7 Read Only
02	**[DPI Data Rate]** 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]** Node address 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 Actual]** DeviceNet node address actually used by the adapter.	Default: Minimum: Maximum: Type:	63 0 63 Read Only
05	**[DN Rate Cfg]** DeviceNet data rate if the data rate switch is set to "PGM" (Program).	Default: Values: Type: Reset Required:	3 = Autobaud 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps 3 = Autobaud Read/Write Yes
06	**[DN Rate Actual]** DeviceNet data rate actually 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]** Size of the Reference/Feedback. The drive determines the size of the Reference/Feedback.	Default: Value: Type:	0 = 16-bit 0 = 16-bit 1 = 32-bit Read Only
08	**[Datalink Size]** 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 "Ready." Resets the adapter if set to "Reset Module." Restores the adapter to its factory default settings if set to "Set Defaults." This parameter is a command. It will be reset to "0 = Ready" after the command has been performed.	Default: Values Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No
	ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting I/O that controls the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.		
10	**[Comm Flt Action]** Action that the adapter and drive take if the adapter detects that DeviceNet 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 hazard of injury or equipment damage.		

Parameter No.	Name and Description	Details
11	**[Idle Flt Action]** Sets the action that the adapter and drive take if the adapter detects that scanner is idle because the controller was switched to program mode. 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 if the scanner is idle. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage.	
12	**[DN Active Cfg]** 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 Config]** I/O that is transferred through the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes
		**Bit Definitions** 0 = Cmd/Ref 1 = Datalink A 2 = Datalink B 3 = Datalink C 4 = Datalink D 5 = Not Used 6 = Not Used 7 = Not Used
14	**[DPI I/O Active]** 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 Config.	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read Only
		**Bit Definitions** 0 = Cmd/Ref 1 = Datalink A 2 = Datalink B 3 = Datalink C 4 = Datalink D 5 = Not Used 6 = Not Used 7 = Not Used

Parameter No.	Name and Description	Details
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 Send Flt Cfg and communications are disrupted. • Parameter 11 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program or Test mode. • Parameter 34 - [Peer Flt Action] is set to Fault Cfg and communications are disrupted. The bit definitions will depend on the product to which the adapter is connected.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No
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 Send Flt Cfg and communications are disrupted. • Parameter 11 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode. • Parameter 34 - [Peer Flt Action] is set to Send Flt Cfg and communications are disrupted.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.
17 18 19 20 21 22 23 24	**[Flt Cfg A1]** **[Flt Cfg A2]** **[Flt Cfg B1]** **[Flt Cfg B2]** **[Flt Cfg C1]** **[Flt Cfg C2]** **[Flt Cfg D1]** **[Flt Cfg D2]** Sets the data that is sent to the Datalink in the drive if any of the following is true: • Parameter 11 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode. • Parameter 10 - [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 34 - [Peer Flt Action] is set to Send Flt Cfg and communications are disrupted.	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses 16-bit Datalinks, the most significant word of this value must be set to zero (0) or a fault will occur.
25	**[M-S Input]** 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 Definitions** 0 = Cmd/Ref 1 = DL A Input 2 = DL B Input 3 = DL C Input 4 = DL D Input 5 = Not Used 6 = Not Used 7 = Not Used

Parameter No.	Name and Description	Details
26	**[M-S Output]** Master-Slave output data. This data is produced by the adapter and consumed by the scanner.  	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes **Bit Definitions** 0 = Status/Fdbk 1 = DL A Output 2 = DL B Output 3 = DL C Output 4 = DL D Output 5 = Not Used 6 = Not Used 7 = Not Used
27	**[COS Status Mask]** Mask of 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 depend on the drive.	Default: 0000 0000 0000 0000 Values: 0 = Off 1 = On Type: Read/Write Reset Required: No
28	**[COS Fdbk Change]** 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
29	**[COS/Cyc Interval]** 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 configured in the scanner.	Default: 0 Seconds Minimum: 0 Seconds Maximum: 655.35 Seconds Type: Read Only
30 31	**[Peer A Input]** **[Peer B Input]** Destination in the drive of the Peer Input. The adapter receives this data from the network and sends it to the drive. **Important:** These parameters can be changed only when the Parameter 37 - [Peer Inp Enable] is Off. **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: 0 = Off Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = DL A Input 3 = DL B Input 4 = DL C Input 5 = DL D Input Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details	
32	**[Peer Cmd Mask]** Mask that is used 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: Type: Reset Required:	0000 0000 0000 0000 0 = Ignore bit 1 = Use bit Read/Write No
33	**[Peer Ref Adjust]** Scale of the Reference received from a peer. **Important:** Changes to this parameter take effect immediately. A drive receiving its Reference from peer I/O will receive the newly scaled Reference, resulting in a change of speed.	Default: Minimum: Maximum: Type: Reset Required:	0.00 0.00% 199.99% Read/Write No
34	**[Peer Flt Action]** Action that the adapter and drive take if the adapter detects that DeviceNet 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 hazard of injury or equipment damage.		
35	**[Peer Node to Inp]** Node address of the node producing the peer I/O. **Important:** This parameter can be changed only when the Parameter 37 - [Peer Inp Enable] is Off.	Default: Minimum: Maximum: Type: Reset Required:	0 0 63 Read/Write No
36	**[Peer Inp Timeout]** Time-out for a Change of State peer-to-peer connection. If the time is reached without the adapter receiving 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]** Determines if peer input is on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No

Parameter No.	Name and Description	Details	
38	**[Peer Inp Status]** Status of the consumed peer input connection.	Default: Values: Type:	0 = Off 0 = Off 1 = Waiting 2 = Running 3 = Faulted Read Only
39 40	**[Peer A Output]** **[Peer B Output]** Source of Peer output data.The adapter transmits this data to the network. **Important:** These parameters can be changed only when the Parameter 41 - [Peer Out Enable] is Off. **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 = DL A Input 3 = DL B Input 4 = DL C Input 5 = DL D Input 6 = DL A Output 7 = DL B Output 8 = DL C Output 9 = DL D Output Read/Write No
41	**[Peer Out Enable]** Determines if peer output is on or off.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = On Read/Write No
42	**[Peer Out Time]** Minimum time that an adapter will wait when transmitting data to a peer.	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
43	**[Peer Out Skip]** Maximum time that an adapter will wait when transmitting data to a peer. The value of Parameter 42 - [Min Peer Tx Time] is multiplied by the value of this parameter to set the time.	Default: Minimum: Maximum: Type: Reset Required:	1 1 16 Read/Write No

Notes:

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).

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Instances

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

Instance	Description
0	Class
1	Entire device (host and adapter)
2 ... (n - 1)	Host components
n	DeviceNet adapter

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Vendor ID	UINT	1 = Allen-Bradley
2	Get	Device Type	UINT	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 2 = Configured Bit 10 = Recoverable fault Bit 11 = Unrecoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_ STRING	Product name and rating

Identity Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x11	Yes	N/A	Find_Next_Obj_Instance

Connection Object

Class Code

Hexadecimal	Decimal
0x05	5

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 Class Trigger	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.)

Connection Object *(Continued)*

Instance Attributes (Continued)

Refer to the DeviceNet Specification for more information.

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

Services

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

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

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.

Class Attributes

Not supported.

Register Object *(Continued)*

Instance Attributes

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

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

Important: Setting a register object attribute can 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.

Services

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

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

Instances

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

Instance	Description
0	Class Attributes
1	Drive Parameter 1 Attributes
⋮	⋮
n	Last Drive Parameter Attributes
n + 1	Adapter Parameter 1 Attributes
⋮	⋮
n + 43	Last Adapter Parameter Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	Number of parameters
8	Get	Parameter Class Descriptor	WORD	Bits that describe parameters.
9	Get	Configuration Assembly Instance	UINT	0
10	Get	Native Language	USINT	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch

Parameter Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	(1)	Parameter Value	(2)	(3)
2	Get	Link Path Size	USINT	0 = No link specified n = Link specified
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) 4 = BOOL 5 = SINT 6 = DINT 7 = LINT 8 = USINT
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	0
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 connection path.

Parameter Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
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

Parameter Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Instances

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

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

Class Attributes

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

Parameter Group Object *(Continued)*

Instance Attributes

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

(1) Value varies based on group instance.

Services

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

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Instances

Not supported

Class Attributes

Not supported.

Instance Attributes

Not supported.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x4B	No	Yes	Execute_PCCC
0x4D	No	Yes	Execute_Local_PCCC

PCCC Object *(Continued)*

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

Message Structure for Execute_Local_PCCC

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

DPI Device Object

Class Code

Hexadecimal	Decimal
0x92	146

Instances

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

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

Class Attributes

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

DPI Device Object *(Continued)*

Class Attributes (Continued)

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

DPI Device Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
3	Get	Component Name	STRING[32]	Name of the component
4	Get	Component Firmware Revision	STRUCT of BYTE BYTE	 Major Revision Minor Revision
5	Get	Component Hardware Change Number	BYTE	0 = Not Available
6	Get	First Flash Object Instance	WORD	Instance in the Flash Object used for the firmware in the component
7	Get	Number of Flash Object Instances	BYTE	Number of segments in memory that can be flashed.
8	Get	Component Serial Number	DWORD	Value between 0x00 and 0xFFFFFFFF

Services

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

DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x93	147

Instances

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

Number	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	Get/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 (Refer to pages C-20 – C-21) 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 (Refer to pages C-20 – C-21)
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 (Refer to pages C-20 – C-21) 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-21.

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

DPI Parameter Object *(Continued)*

Descriptor Attributes

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

DPI Parameter Object *(Continued)*

Descriptor Attributes

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

Formulas for Converting

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

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

Common Services

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

Object Specific Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x4B	Yes	Yes	Get_Attributes_Scattered
0x4C	Yes	Yes	Set_Attributes_Scattered

DPI Parameter Object *(Continued)*

Format for Get_Attributes_Scattered Service

The structure shown below can get up to eight parameters in a single message. In the Response Message, a parameter number with the high bit set indicates that the associated parameter value field actually contains an error code.

	Request		Response	
Word 0	**TXID**	**Command**	**TXID**	**Status**
1	Port	Size	Port	Size
2	Service	Address	Service	Address
3	Class		Parameter Number	
4	Instance		Parameter Value LSW	
5	Attribute		Parameter Value MSW	
6	Parameter Number		Parameter Number	
7	Pad Word		Parameter Value LSW	
8	Pad Word		Parameter Value MSW	
9	Parameter Number		Parameter Number	
10	Pad Word		Parameter Value LSW	
11	Pad Word		Parameter Value MSW	
12	Parameter Number		Parameter Number	
13	Pad Word		Parameter Value LSW	
14	Pad Word		Parameter Value MSW	
15	Parameter Number		Parameter Number	
16	Pad Word		Parameter Value LSW	
17	Pad Word		Parameter Value MSW	
18	Parameter Number		Parameter Number	
19	Pad Word		Parameter Value LSW	
20	Pad Word		Parameter Value MSW	
21	Parameter Number		Parameter Number	
22	Pad Word		Parameter Value LSW	
23	Pad Word		Parameter Value MSW	
24	Parameter Number		Parameter Number	
25	Pad Word		Parameter Value LSW	
26	Pad Word		Parameter Value MSW	
27	Parameter Number		Not Used	
28	Pad Word		Not Used	
29	Pad Word		Not Used	
30	Not Used		Not Used	
Word 31	Not Used		Not Used	

DPI Parameter Object *(Continued)*

The PLC data in this example is for a Get_Attributes_Scattered of PowerFlex 70 parameters; 1 - [Output Freq], 3 - [Output Current] and 6 - [Output Voltage] from a device at node address 1.

Request Data for Get_Attributes_Scattered

Address	Value (hex)	Description	Refer to . . .
N30:0	0101	TXID = 01, Command = 01 (execute)	6-5
N30:1	0018	Port = 00, Size = 24 bytes (18 hex)	6-5
N30:2	4B01	Service = 4B (Get_Attributes_Scattered)	C-21
		Address = 01 (Node Address)	6-5
N30:3	0093	Class = 93 (DPI Parameter Object)	C-18
N30:4	0000	Instance = Class Attributes (drive)	C-18
N30:5	0000	Attribute (not used for this service)	C-18
N30:6	0001	Parameter Number 1	
N30:7	0000	Pad Word	
N30:8	0000	Pad Word	
N30:9	0003	Parameter Number 3	
N30:10	0000	Pad Word	
N30:11	0000	Pad Word	
N30:12	0006	Parameter Number 6	
N30:13	0000	Pad Word	
N30:14	0000	Pad Word	

Response Data for Get_Attributes_Scattered

Address	Value (hex)	Description	Refer to . . .
N30:70	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N30:71	0012	Port = 00, Size = 18 bytes (12 hex)	6-6
N30:72	CB01	Service = CB (successful)	6-6
		Address = 01 (Node Address)	6-6
N30:73	0001	Parameter Number 1	
N30:74	0258	Value = 600 (258 hex) = 60.0 Hz	
N30:75	0000		
N30:76	0003	Parameter Number 3	
N30:77	0001	Value = 1 (1 hex) = 0.1A	
N30:78	0000		
N30:79	0006	Parameter Number 6	
N30:80	0864	Value = 2148 (864 hex) = 214.8V AC	
N30:81	0000		

DPI Parameter Object *(Continued)*

Format for Set_Attributes_Scattered Service

The structure shown below can get up to eight parameters in a single message. In the Response Message, a parameter number with the high bit set indicates that the associated pad word field contains an error code.

	Request		Response	
Word 0	**TXID**	**Command**	**TXID**	**Status**
1	Port	Size	Port	Size
2	Service	Address	Service	Address
3	Class		Parameter Number	
4	Instance		Pad Word or Error Code	
5	Attribute		Pad Word	
6	Parameter Number		Parameter Number	
7	Parameter Value LSW		Pad Word or Error Code	
8	Parameter Value MSW		Pad Word	
9	Parameter Number		Parameter Number	
10	Parameter Value LSW		Pad Word or Error Code	
11	Parameter Value MSW		Pad Word	
12	Parameter Number		Parameter Number	
13	Parameter Value LSW		Pad Word or Error Code	
14	Parameter Value MSW		Pad Word	
15	Parameter Number		Parameter Number	
16	Parameter Value LSW		Pad Word or Error Code	
17	Parameter Value MSW		Pad Word	
18	Parameter Number		Parameter Number	
19	Parameter Value LSW		Pad Word or Error Code	
20	Parameter Value MSW		Pad Word	
21	Parameter Number		Parameter Number	
22	Parameter Value LSW		Pad Word or Error Code	
23	Parameter Value MSW		Pad Word	
24	Parameter Number		Parameter Number	
25	Parameter Value LSW		Pad Word or Error Code	
26	Parameter Value MSW		Pad Word	
27	Parameter Number		Not Used	
28	Parameter Value LSW		Not Used	
29	Parameter Value MSW		Not Used	
30	Not Used		Not Used	
Word 31	Not Used		Not Used	

DPI Parameter Object *(Continued)*

The PLC data in this example is for a Set_Attributes_Scattered of PowerFlex 70 parameters; 140 - [Accel Time 1], 142 - [Decel Time 1] and 100 - [Jog Speed] to a device at node address 1.

Request Data for Set_Attributes_Scattered

Address	Value (hex)	Description	Refer to . . .
N30:0	0101	TXID = 01, Command = 01 (execute)	6-5
N30:1	0018	Port = 00, Size = 24 bytes (18 hex)	6-5
N30:2	4C01	Service = 4C (Set_Attributes_Scattered)	C-21
		Address = 01 (Node Address)	6-5
N30:3	0093	Class = 93 (DPI Parameter Object)	C-18
N30:4	0000	Instance = Class Attributes (drive)	C-18
N30:5	0000	Attribute (not used for this service)	
N30:6	008C	Parameter Number 140 (8C hex)	
N30:7	0032	Value = 50 (32 hex) = 5.0 seconds	
N30:8	0000		
N30:9	008E	Parameter Number 142 (8E hex)	
N30:10	0032	Value = 50 (32 hex) = 5.0 seconds	
N30:11	0000		
N30:12	0064	Parameter Number 100 (64 hex)	
N30:13	0064	Value = 100 (64 hex) = 10.0 Hz	
N30:14	0000		

Response Data for Set_Attributes_Scattered

Address	Value (hex)	Description	Refer to . . .
N30:70	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N30:71	0012	Port = 00, Size = 18 bytes (12 hex)	6-6
N30:72	CC01	Service = CC (successful)	6-6
		Address = 01 (Node Address)	6-6
N30:73	008C	Parameter Number 140 (8C hex)	
N30:74	0000		
N30:75	0000		
N30:76	008E	Parameter Number 142 (8E hex)	
N30:77	0000		
N30:78	0000		
N30:79	0064	Parameter Number 100 (64 hex)	
N30:80	0000		
N30:81	0000		

DPI Fault Object

Class Code

Hexadecimal	Decimal
0x97	151

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

Instances

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

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

Class Attributes

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

DPI Fault Object *(Continued)*

Instance Attributes

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

Services

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

DPI Alarm Object

Class Code

Hexadecimal	Decimal
0x98	152

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

Instances

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

Number	Description
0	Class Attributes
1	Most Recent Alarm
2	Second Most Recent Alarm
⋮	⋮

Class Attributes

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

DPI Alarm Object *(Continued)*

Instance Attributes

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

Services

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

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Instances

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

Number	Description
0	Class Attributes
1	Real Time Clock (Predefined) (Not always supported)
2	Timer 1
3	Timer 2
⋮	⋮

Class Attributes

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

DPI Time Object *(Continued)*

Instance Attributes

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

Services

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

Notes:

Logic Command/Status Words

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

PowerFlex 70 and PowerFlex 700 Drives

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	0 = Not Stop 1 = Stop
														x		Start*	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	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

* A 0 = Not Stop condition (logic 0) must first be present before a 1 = Start condition will start the drive.

PowerFlex 70 and PowerFlex 700 Drives

Logic Status Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Status**	**Description**
															x	Ready	0 = Not Ready 1 = Ready
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control	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

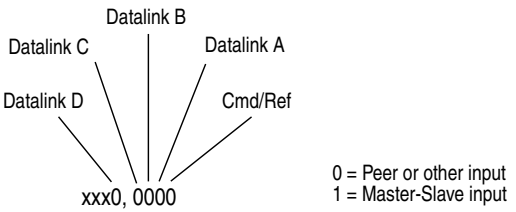
Master-Slave I/O Configuration

Appendix E lists possible configurations for the M-S Input/Output parameters and the possible data size allocation associated with each value depending on the method of data transfer.

M-S Input Parameter Configurations

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

Figure E.1 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 method of data transfer.

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	NA	NA	NA	NA
00001	xxxx0	4	NA	NA	NA	NA
00010	xxxx0	4	NA	NA	NA	NA
00011	xxxx0	8	NA	NA	NA	NA
00100	xxxx0	4	NA	NA	NA	NA
00101	xxxx0	8	NA	NA	NA	NA
00110	xxxx0	8	NA	NA	NA	NA
00111	xxxx0	12	NA	NA	NA	NA
01000	xxxx0	4	NA	NA	NA	NA
01001	xxxx0	8	NA	NA	NA	NA
01010	xxxx0	8	NA	NA	NA	NA
01011	xxxx0	12	NA	NA	NA	NA
01100	xxxx0	8	NA	NA	NA	NA
01101	xxxx0	12	NA	NA	NA	NA
01110	xxxx0	12	NA	NA	NA	NA
01111	xxxx0	16	NA	NA	NA	NA
10000	xxxx0	4	NA	NA	NA	NA
10001	xxxx0	8	NA	NA	NA	NA
10010	xxxx0	8	NA	NA	NA	NA
10011	xxxx0	12	NA	NA	NA	NA
10100	xxxx0	8	NA	NA	NA	NA
10101	xxxx0	12	NA	NA	NA	NA
10110	xxxx0	12	NA	NA	NA	NA
10111	xxxx0	16	NA	NA	NA	NA
11000	xxxx0	8	NA	NA	NA	NA
11001	xxxx0	12	NA	NA	NA	NA
11011	xxxx0	16	NA	NA	NA	NA
11100	xxxx0	12	NA	NA	NA	NA
11101	xxxx0	16	NA	NA	NA	NA
11110	xxxx0	16	NA	NA	NA	NA
11111	xxxx0	20	NA	NA	NA	NA
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

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

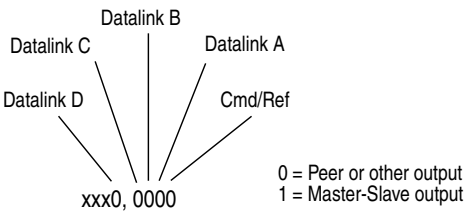
M-S Input	M-S Output	Allocation (Number of Bytes)				
		Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
00000	xxxx0	0	NA	NA	NA	NA
00001	xxxx0	8	NA	NA	NA	NA
00010	xxxx0	8	NA	NA	NA	NA
00011	xxxx0	16	NA	NA	NA	NA
00100	xxxx0	8	NA	NA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

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 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	NA	NA	NA	NA
xxxxx	00010	4	NA	NA	NA	NA
xxxxx	00100	4	NA	NA	NA	NA
xxxxx	00110	8	NA	NA	NA	NA
xxxxx	01000	4	NA	NA	NA	NA
xxxxx	01010	8	NA	NA	NA	NA
xxxxx	01100	8	NA	NA	NA	NA
xxxxx	11100	12	NA	NA	NA	NA
xxxxx	10000	4	NA	NA	NA	NA
xxxxx	10010	8	NA	NA	NA	NA
xxxxx	10100	8	NA	NA	NA	NA
xxxxx	10110	12	NA	NA	NA	NA
xxxxx	11000	8	NA	NA	NA	NA
xxxxx	11010	12	NA	NA	NA	NA
xxxxx	11100	12	NA	NA	NA	NA
xxxxx	11110	16	NA	NA	NA	NA
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	NA	NA	NA	NA
xxxxx	00010	8	NA	NA	NA	NA
xxxxx	00100	8	NA	NA	NA	NA
xxxxx	00110	16	NA	NA	NA	NA
xxxxx	01000	8	NA	NA	NA	NA
xxxxx	01010	16	NA	NA	NA	NA
xxxxx	01100	16	NA	NA	NA	NA
xxxxx	11100	24	NA	NA	NA	NA
xxxxx	10000	8	NA	NA	NA	NA
xxxxx	10010	16	NA	NA	NA	NA
xxxxx	10100	16	NA	NA	NA	NA
xxxxx	10110	24	NA	NA	NA	NA
xxxxx	11000	16	NA	NA	NA	NA
xxxxx	11010	24	NA	NA	NA	NA
xxxxx	11100	24	NA	NA	NA	NA
xxxxx	11110	32	NA	NA	NA	NA
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 is an adapter that connects, PowerFlex 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. The scanner uploads and stores a devices 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

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

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 (Control and Information Protocol)

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

Classes

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."

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 data rate is 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	**125 K**	**250 K**	**500 K**
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 125 K, 250 K, or 500 K. 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

A DeviceNet network uses a producer/consumer Controller Area Network (CAN) to connect 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

DPI is a second generation peripheral communication interface used by various Allen-Bradley drives and power products. 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" and "modules." The serial converter and PowerFlex HIM 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 drive is a DPI product. In this manual, a DPI product is also referred to as "product" or "host."

DriveExplorer Software

DriveExplorer software is a tool for monitoring and configuring Allen-Bradley products and adapters. It can be run on computers running Microsoft Windows 95, Windows 98, Windows NT (version 4.0 or greater), and Windows CE (version 2.0 or greater) operating systems. DriveExplorer (version 2.xx) 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 Software

A software suite designed for Microsoft Windows 95, Windows 98, and Windows NT (4.0 or greater) operating systems. This software suite provides a family of tools that you can use to program, monitor, control, troubleshoot, and maintain Allen Bradley products. DriveTools 2000 (version 1.xx) can be used with PowerFlex drives. Information about DriveTools can be accessed at http://www.ab.com/drives.

E

Electronic Data Sheet (EDS) Files

EDS files are 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 configure, monitor, and diagnose devices over DeviceNet.

F

Fault Action

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

Fault Configuration

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive in the fault configuration parameters (**Parameters 15 - [Flt Cfg Logic]** through **24 - [Flt Cfg D2]**). When a fault action parameter is set to use the fault configuration and a fault occurs, the data from these parameters is sent as the Command Logic, 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 the adapter. The adapter can be flash updated using the X-Modem protocol and a 1203-SSS Smart Self-powered Serial converter (firmware 3.xx).

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 PowerFlex drive. New HIMs (20-HIM-x) can be used to configure connected peripherals.

Hold Last

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

I

I/O Data

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

L

Logic Command/Logic Status

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

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

M

Master-Slave Hierarchy

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

On a network with multiple scanners (called a multimaster hierarchy), each slave device must have a scanner specified as its 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 DriveTools 2000) 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 – 4 words) and one or more adapters to receive the data.

Ping

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

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 Status Command from the scanner and then sends the Logic Status of the connected PowerFlex drive.

PowerFlex Drives

The Allen-Bradley PowerFlex family of drives include the PowerFlex 70 and PowerFlex 700. These drives can be used for applications ranging from 0.37 kW (0.5 HP) to 3,000 kW (4,000 HP). All PowerFlex drives implement DPI, allowing them to use the 20COMM-D DeviceNet adapter. This manual focuses on using the adapter with PowerFlex drives. Other products that implement DPI can also use the adapter.

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

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

RSNetWorx for DeviceNet

RSNetWorx for DeviceNet software is a tool for configuring and monitoring DeviceNet networks and connected devices. It is a 32-bit Windows application that runs on Windows 95, Windows 98, and Windows NT. Information about RSNetWorx for 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 command data. If the drive was running and using the Reference from the adapter, it will stay running but at zero Reference.

Numerics

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