PowerFlex 20-COMM-D DeviceNet Adapter

Allen-Bradley

Series B FRN 2.xxx

User Manual

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

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

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

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

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

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

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

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequences.

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

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

The information below summarizes the changes made to this manual since its last release (May 2012).

Description of Changes	Page
Added information about Connected Components Workbench software configuration tool for drives and connected peripherals.	Throughout manual
Added information for use with PowerFlex Digital DC drives.	

Notes:

Table of Contents

About This Manual

This manual provides information about the adapter and using it with PowerFlex 7-Class (Architecture-Class) drives. The adapter can be used with other products that support a DPI™ adapter, such as the DPI External Comms Kit (20-XCOMM-DC-BASE). See the documentation for your product for specific information about how it works with the adapter.

Conventions Used in This Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the format **Parameter xx - [*]**. The xx represents the parameter number. The * represents the parameter name — for example **Parameter 01 - [DPI Port]**.
- Menu commands are shown in bold type face and follow the format **Menu > Command**. For example, if you read 'Select **File > Open**', you should click the **File** menu and then click the **Open** command.
- The firmware revision number (FRN) is displayed as FRN *X.xxx*, where '*X*' is the major revision number and '*xxx*' is the minor revision number.
- The screen images in this manual resulted from using the following software:
  - RSLinx® Classic software, version 2.51
  - RSNetWorx™ for DeviceNet software, version 7.00
  - RSLogix™ 5 software, version 7.20
  - RSLogix 500 software, version 7.20
  - RSLogix 5000 software, version 16.00

  Different versions of the software may have screens that vary in appearance, and differences in procedures.

Rockwell Automation Support

Rockwell Automation offers support services worldwide, with over 75 sales and support offices, over 500 authorized distributors, and over 250 authorized systems integrators located throughout 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, Inc. representative for:

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

Technical Product Assistance

For technical assistance, please review the information in Chapter 7, Troubleshooting, first. If you still have problems, then access the Allen-Bradley Technical Support website at www.ab.com/support/abdrives or contact Rockwell Automation.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
PowerFlex 7-Class DPI (Drive Peripheral Interface) Network Communication Adapter Installation Instructions, publication 20COMM-IN004	Information on installing PowerFlex® 20-COMM-x Network Communication Adapters.
DeviceNet Media Design and Installation Guide, publication DNET-UM072	Information on planning, installation, and techniques used to implement a DeviceNet™ network.
DeviceNet Starter Kit User Manual, publication DNET-UM003	
Connected Components Workbench website http://www.ab.com/support/abdrives/webupdate/software.html, and online help (1)	Information on the Connected Components Workbench software tool—and includes a link for **free** software download.
DriveExplorer website http://www.ab.com/drives/driveexplorer, and online help (1)	Information on using the DriveExplorer™ software tool.
DriveExecutive website http://www.ab.com/drives/drivetools, and online help (1)	Information on using the DriveExecutive™ software tool.
PowerFlex 20-HIM-A3/-A5/-C3S/-C5S HIM Quick Reference, publication 20HIM-QR001	Information on using the PowerFlex 20-HIM-A3, 20-HIM-A5, 20-HIM-C3S, and 20-HIM-C5S HIMs.
PowerFlex 20-HIM-A6/C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001	Information on installing and using PowerFlex 20-HIM-A6 and 20-HIM-C6S HIMs.
PowerFlex 70 User Manual, publication 20A-UM001 PowerFlex 70/700 Reference Manual, publication PFLEX-RM001 PowerFlex 70 Enhanced Control and 700 Vector Control Reference Manual, publication PFLEX-RM004	Information on installing and programming PowerFlex 70 standard control and enhanced control drives.
PowerFlex 700 Series A User Manual, publication 20B-UM001 PowerFlex 700 Series B User Manual, publication 20B-UM002 PowerFlex 70/700 Reference Manual, publication PFLEX-RM001 PowerFlex 70 Enhanced Control and 700 Vector Control Reference Manual, publication PFLEX-RM004	Information on installing and programming PowerFlex 700 standard control and vector control Series A drives, and PowerFlex 700 vector control Series B drives.
PowerFlex 700H Installation Instructions, publication PFLEX-IN006 PowerFlex 700H Programming Manual, publication 20C-PM001	Information on installing and programming PowerFlex 700H drives.

Resource	Description
PowerFlex 700S w/Phase I Control Installation Manual (Frames 1…6), publication 20D-IN024 PowerFlex 700S w/Phase I Control Installation Manual (Frames 9 and 10), publication PFLEX-IN006 PowerFlex 700S w/Phase I Control User Manual (All Frame Sizes), publication 20D-UM001 PowerFlex 700S w/Phase I Control Reference Manual, publication PFLEX-RM002 PowerFlex 700S w/Phase II Control Installation Manual (Frames 1…6), publication 20D-IN024 PowerFlex 700S w/Phase II Control Installation Manual (Frames 9…14), publication PFLEX-IN006 PowerFlex 700S w/Phase II Control Programming Manual (All Frame Sizes), publication 20D-PM001 PowerFlex 700S w/Phase II Control Reference Manual, publication PFLEX-RM003	Information on installing and programming PowerFlex 700S drives.
PowerFlex 700L User Manual, publication 20L-UM001	Information on installing and programming PowerFlex 700L Liquid-Cooled AC drives.
PowerFlex 750-Series Drive Installation Instructions, publication 750-IN001 PowerFlex 750-Series Drive Programming Manual, publication 750-PM001 PowerFlex 20-750-DNET DeviceNet Option Module, publication 750COM-UM002 20-750-20COMM and 20-750COMM-F1 Communication Carrier Cards Installation Instructions, publication 750COM-IN001	Information on installing and programming PowerFlex 750-Series AC drives.
PowerFlex Digital DC Drive User Manual, publication 20P-UM001	Information on installing and programming PowerFlex Digital DC drives.
Getting Results with RSLinx Guide, publication LINX-GR001, and online help (1)	Information on using RSLinx Classic software.
RSLogix Emulate 5/500 Getting Results Guide, publication EMULAT-GR002, and online help (1)	Information on installing and navigating the RSLogix Emulate software for ladder logic programming with Allen-Bradley PLC-5 and SLC 500 processors.
RSLogix 500 Getting Results Guide, publication LG500-GR002, and online help (1)	Information on using the RSLogix 500 software tool.
RSLogix 5000 PIDE Autotuner Getting Results Guide, publication PIDE-GR001, and online help (1)	Information on using the RSLogix 5000 software tool.
RSNetWorx for DeviceNet Getting Results Guide, publication DNET-GR001, and online help (1)	Information on installing and navigating the RSNetWorx for DeviceNet™ software, effectively using it, and accessing and navigating the online help.
DeviceNet Network Configuration User Manual, publication DNET-UM004	Information on using DeviceNet modules with the Logix 5000 controller and communicating with various devices on the DeviceNet network.
DeviceNet Scanner Module Installation Instructions, publication 1771-IN014	Information on installing the 1771-SDN/C Scanner Module.
PLC-5 DeviceNet Scanner Module User Manual, publication 1771-UM118	Information on configuring a DeviceNet network using RSLinx and RSNetWorx for DeviceNet software.
1747-SDN DeviceNet Scanner Module Installation Instructions, publication 1747-IN058	Information on installing the 1747-SDN DeviceNet Scanner Module.
1747-SDN DeviceNet Scanner Module User Manual, publication 1747-UM655	Information on configuring a DeviceNet network by using RSLinx and RSNetWorx for DeviceNet software.

(1) The online help is installed with the software.

Documentation can obtained online at http://literature.rockwellautomation.com. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

To find your local Rockwell Automation distributor or sales representative, visit http://www.rockwellautomation.com/locations.

For information such as firmware updates or answers to drive-related questions, go to the Drives Service & Support web site at http://www.ab.com/support/abdrives and click on the Downloads or Knowledgebase link.

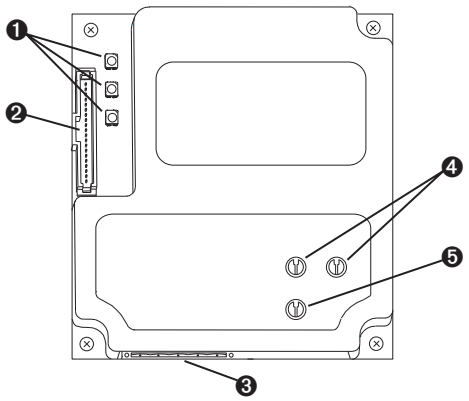
Notes:

Getting Started

The adapter is intended for installation into a PowerFlex 7-Class drive and is used for network communication. The 20-COMM-D Series B adapter, firmware revision 2.xxx or later, can also be installed in an External DPI Comms Kit (20-XCOMM-DC-BASE).

For PowerFlex 750-Series drives, we recommend using the 20-750-DNET DeviceNet option module instead of the 20-COMM-D adapter. However, this manual does include information on using the 20-COMM-D adapter with PowerFlex 750-Series drives—but there are operating limitations. For details, see Compatible Products on page 1-3.

Components



Item	Part	Description
1	Status Indicators	Three status indicators that indicate the status of the DPI, adapter, and network connection. See Chapter 7, Troubleshooting.
2	DPI Connector	A 20-pin, single-row shrouded male header. An Internal Interface cable is connected to this connector and a connector on the drive.
3	DeviceNet Connector	A 5-pin connector to which a 5-pin linear plug (supplied with adapter) can be connected for the DeviceNet network cable.
4	Node Address Switches	Switches to set the node address. See Setting the Node Address Switches on page 2-2.
5	Data Rate Switch	Switch to set the DeviceNet data rate at which the adapter communicates. See Setting the Data Rate Switch on page 2-3

Features

The features of the adapter include the following:

- Typical mounting in a PowerFlex 7-Class drive. The 20-COMM-D Series B adapter, firmware revision 2.xxx or later, can also be installed in a DPI External Comms Kit and used with the kit's optional I/O board. See Chapter 8, Using the Adapter in a DPI External Comms Kit (20-XCOMM-DC-BASE) for more information.

  DPI External Comms Kit Compatibility

20-COMM-D Adapter		Operation With	
Series	Firmware Revision	DPI External Comms Kit (20-XCOMM-DC-BASE)	Optional I/O Board (20-XCOMM-IO-OPT1)
A	1.xxx	No	No
	2.xxx	No	No
B	1.xxx	No	No
	2.xxx	Yes	Yes

- Captive screws to secure and ground the adapter to the drive or, when mounted in a DPI External Comms Kit, to the kit's metal enclosure.
- Compatibility with various configuration tools to configure the adapter and connected host drive, including the following tools:
  - PowerFlex HIM (Human Interface Module) on the drive, if available
  - Connected Components Workbench software, version 1.02 or later
  - DriveExplorer software, version 2.01 or later
  - DriveExecutive software, version 3.01 or later
- Switches to set a node address and network data rate before applying power to the PowerFlex drive, or you can disable the switches and use adapter parameters to configure these functions.
- Status indicators that report the status of the drive communications, the adapter, and network. They are visible when the drive cover is open or closed.
- Parameter-configured I/O (Logic Command/Reference and up to four pairs of Datalinks) to accommodate application requirements.
- Explicit Messaging and UCMM (Unconnected Message Manager) support.
- Multiple data exchange methods (Polled, Cyclic, and Change of State) to transmit data between the network and adapter.
- Master-Slave or Peer-to-Peer hierarchy that can be set up so that the adapter and connected PowerFlex drive transmit data to and from either a scanner or another PowerFlex drive on the network.
- User-defined fault actions to determine how the adapter and connected drive respond to the following:
  - I/O messaging communication disruptions (Comm Flt Action)
  - Controllers in idle mode (Idle Flt Action)

- Faulted node recovery support. You can configure a device even when it is faulted on the network if you have a configuration tool that uses faulted node recovery and have set the data rate switch to 'PGM' (Program). The adapter then uses parameter settings for the data rate and node address instead of switch settings.
- Access to any PowerFlex drive and its connected peripherals on the network to which the adapter is connected.

Compatible Products

At the time of publication, the adapter is compatible with the following products:

• PowerFlex 70 drives with standard or enhanced control	• PowerFlex 750-Series drives [1]
• PowerFlex 700 drives with standard or vector control	• PowerFlex Digital DC drives
• PowerFlex 700H drives	• DPI External Comms Kit
• PowerFlex 700S drives with Phase I or Phase II control	• SMC™ Flex smart motor controllers
• PowerFlex 700L drives with 700 vector control or 700S control	• SMC-50 smart motor controllers

[1] The 20-COMM-D adapter can be used with PowerFlex 750-Series drives, but with the following limitations/differences:

- Only drive Ports 0…6 are supported.
- Only the first 16 bits of the Logic Command and Logic Status words are used.
- Speed Reference/Feedback scaling are Hz (or RPM) x 1000 (depending on the setting of drive parameter 300 - [Speed Units].
- For explicit messaging, only *Device* parameters (Class code 0x93) can be accessed (drive Ports 0…6 only). *Host* parameters (Class code 0x9F) and Parameter Object (Class code 0x0F) cannot be accessed.

Instead of using the 20-COMM-D adapter with the PowerFlex 750-Series drive, the 20-750-DNET DeviceNet option module should be used whenever possible. Please see the PowerFlex 750-Series AC Drives Programming Manual, publication 750-PM001, for drive parameter information and the 20-750-DNET DeviceNet Option Module User Manual, publication 750COM-UM002, for network communication module information.

Required Equipment

Some of the equipment that is required for use with the adapter is shipped with the adapter, but some you must supply yourself.

Equipment Shipped with the Adapter

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

- ❑ One 20-COMM-D DeviceNet adapter
- ❑ One 2.54 cm (1 in.) long and one 15.24 cm (6 in.) long Internal Interface cable (only one cable is needed to connect the adapter to the drive; for which cable to use, see Figure 2.3 on page 2-5)
- ❑ One 5-pin linear DeviceNet plug (connected to the DeviceNet connector on the adapter)
- ❑ One PowerFlex 7-Class DPI (Drive Peripheral Interface) Network Communication Adapter Installation Instructions, publication 20COMM-IN004

TIP: When mounting the 20-COMM-D Series B adapter in a PowerFlex 750-Series drive, you must use a 20-750-20COMM or 20-750-20COMM-F1 Communication Carrier Card, publication 750COM-IN001—and the 20-COMM-D adapter must have firmware revision 2.001 or later.

User-Supplied Equipment

To install and configure the adapter, you must supply the following:

- ❑ A small flathead screwdriver
- ❑ DeviceNet cable – thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended
- ❑ Drive and adapter configuration tool, such as the following:
  - PowerFlex 20-HIM-xx HIM
  - RSNetWorx for DeviceNet software, version 7.00 or later
  - Connected Components Workbench software, version 1.02 or later

    Connected Components Workbench is the recommended stand-alone software tool for use with PowerFlex drives. You can obtain a **free copy** by:

    - Internet download at http://www.ab.com/support/abdrives/webupdate/software.html
    - Requesting a DVD at http://www.ab.com/onecontact/controllers/micro800/

    Your local distributor may also have copies of the DVD available.

    Connected Components Workbench software cannot be used to configure SCANport-based drives or Bulletin 160 drives.
  - DriveExplorer software, version 2.01 or later

    This software tool has been discontinued and is now available as **freeware** at http://www.ab.com/support/abdrives/webupdate/software.html. There are no plans to provide future updates to this tool and the download is being provided ‘as-is’ for users that lost their DriveExplorer CD, or need to configure legacy products not supported by Connected Components Workbench software.
  - DriveExecutive software, version 3.01 or later

    A Lite version of DriveExecutive software ships with RSLogix 5000, RSNetWorx MD, FactoryTalk AssetCentre, and ItelliCENTER software. All other versions are purchasable items:

    - 9303-4DTE01ENE Drive Executive software
    - 9303-4DTS01ENE DriveTools SP Suite (includes DriveExecutive and DriveObserver software)
    - 9303-4DTE2S01ENE DriveExecutive software upgrade to DriveTools SP Suite (adds DriveObserver software)

    DriveExecutive software updates (patches, and so forth) can be obtained at http://www.ab.com/support/abdrives/webupdate/software.html. It is highly recommended that you periodically check for and install the latest update.
- ❑ Controller configuration tool, such as RSLogix 5, RSLogix 500, or RSLogix 5000 software

- ❑ A computer connection to the DeviceNet network via a communication card, such as 1784-PCD, 1784-PCID, 1784-PCIDS, or 1770-KFD

Safety Precautions

Please read the following safety precautions carefully.

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

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

ATTENTION: Risk of equipment damage exists. The adapter contains electrostatic discharge (ESD) 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, see Guarding Against Electrostatic Damage, publication 8000-4.5.2.

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

ATTENTION: Risk of injury or equipment damage exists. **Parameters 10 - [Comm Flt Action]**, **11 - [Idle Flt Action]**, and **34 - [Peer Flt Action]** let you determine the action of the adapter and connected drive if communication is disrupted or the controller is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run, however, precautions should be taken to verify that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable or a faulted controller).

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

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

Quick Start

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

Step	Action	See
1	Review the safety precautions for the adapter.	Throughout this manual
2	Verify that the PowerFlex drive is properly installed.	Drive User Manual
3	Install the adapter. a. Verify that the PowerFlex drive is not powered. b. Connect the adapter to the drive with the Internal Interface cable. c. Use the captive screws to secure and ground the adapter to the drive. d. Connect the adapter to the network with a DeviceNet cable. **NOTE:** When installing the adapter in either of the following products, see the listed publication for instructions: • DPI External Comms Kit—see the 20-XCOMM-DC-BASE Installation Instructions, publication 20COMM-IN001, supplied with the kit. • PowerFlex 750-Series drive—see the 20-750-20COMM and 20-750-20COMM-F1 Communication Carrier Cards Installation Instructions, publication 750COM-IN001, supplied with the card.	PowerFlex 7-Class DPI Network Communication Adapter Installation Instructions (publication 20COMM-IN004) and Chapter 2, Installing the Adapter
4	Apply power to the adapter. a. Verify that the adapter is installed correctly. The adapter receives power from the drive. b. Apply power to the drive. The status indicators should be green. If they flash red, there is a problem. See Chapter 7, Troubleshooting. c. Configure and verify key drive parameters.	Chapter 2, Installing the Adapter
5	Configure the adapter for your application. Set adapter parameters for the following functions as required by your application: • Node address and data rate (when Data Rate switch is set to 'PGM') • I/O configuration • Change of State, Cyclic, or Polled I/O data exchange • Master-Slave or Peer-to-Peer hierarchy • Fault actions	Chapter 3, Configuring the Adapter
6	Configure the controller to communicate with the adapter. Use configuration tools, such as RSNetWorx for DeviceNet software and RSLogix software, to configure the master on the network to recognize the adapter and drive.	Chapter 4, Configuring the I/O
7	Create a ladder logic program. Use a controller configuration tool, such as RSLogix software, to create a ladder logic program that enables you to do the following: • Control the connected drive, via the adapter, by using I/O. • Monitor or configure the drive using explicit messages.	Chapter 5, Using the I/O Chapter 6, Using Explicit Messaging

Installing the Adapter

This chapter provides instructions for installing the adapter in a PowerFlex 7-Class drive. The 20-COMM-D Series B adapter, firmware revision 2.xxx or later, can also be installed in a DPI External Comms Kit. In this case, see Chapter 8 or the 20-XCOMM-DC-BASE Installation Instructions, publication 20COMM-IN001, supplied with the kit.

Preparing for an Installation

Before installing the adapter, do the following:

- Read the DeviceNet Media Design and Installation Guide, publication DNET-UM072.
- Read the DeviceNet Starter Kit User Manual, publication DNET-UM003.
- Verify that you have all required equipment. See Required Equipment on page 1-3.

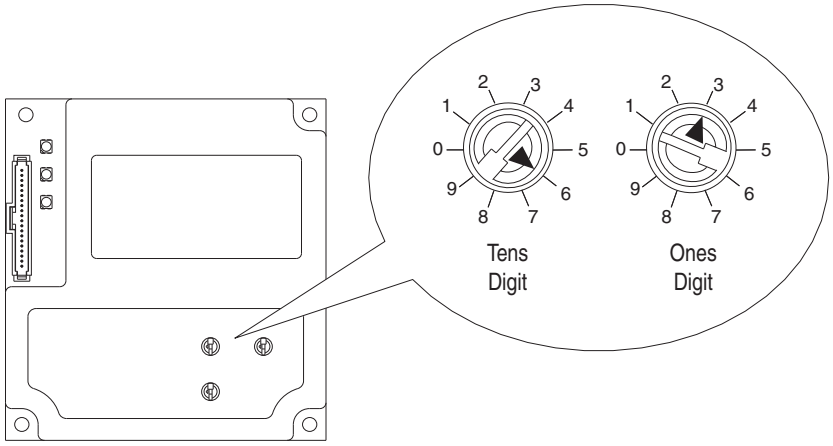
ATTENTION: Risk of equipment damage exists. The adapter contains electrostatic discharge (ESD) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, see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

Setting the Node Address Switches

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

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

Figure 2.1 Setting Adapter Node Address Switches



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

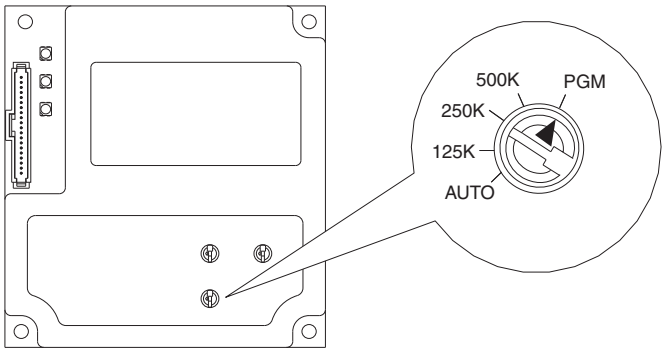
The Node Address switch settings can be verified by viewing **Parameter 04 - [DN Addr Act]** or Diagnostic Device Item number 30 (page 7-5) with any of the following drive configuration tools:

- PowerFlex HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer software, version 2.01 or later
- DriveExecutive software, version 3.01 or later

Setting the Data Rate Switch

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

Figure 2.2 Setting Adapter Data Rate Switch



Setting	Description
Auto	Sets the adapter to the data rate used by other network devices. Another device on the network must be set to a data rate.
125K, 250K, 500K	Sets the adapter to the respective data rate.
PGM (default)	The adapter uses the value stored in **Parameter 05 - [DN Rate Cfg]** for the data rate. See Setting the Data Rate on page 3-3. Also, the adapter uses the value stored in **Parameter 03 - [DN Addr Cfg]** for the node address. See Setting the Node Address on page 3-3.

The Data Rate switch setting can be verified by viewing **Parameter 06 - [DN Rate Act]** or Diagnostic Device Item number 29 (page 7-5) with any of the following drive configuration tools:

- PowerFlex HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer software, version 2.01 or later
- DriveExecutive software, version 3.01 or later

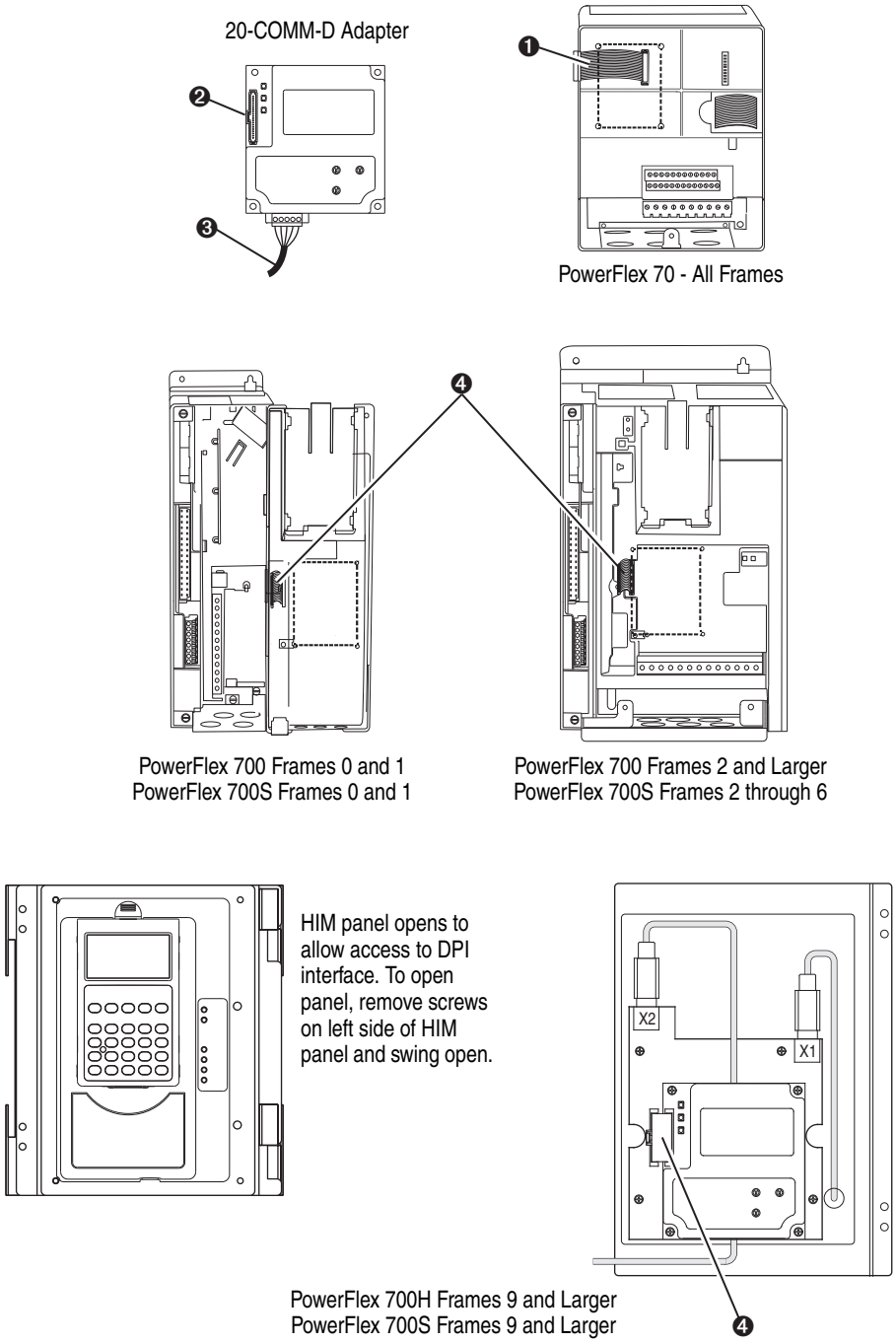
Connecting the Adapter to the Drive

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

1. Remove power from the drive.
2. Use static control precautions.
3. Remove or open the drive cover.
4. Connect the Internal Interface cable to the DPI port on the drive and then to the DPI connector on the adapter (see Figure 2.3).
5. Secure and ground the adapter to the drive (see Figure 2.4) by doing the following:
   - On a PowerFlex 70 drive, fold the Internal Interface cable behind the adapter and mount the adapter on the drive using the four captive screws.
   - On a PowerFlex 700, PowerFlex 700H or PowerFlex 700S drive, mount the adapter on the drive using the four captive screws.

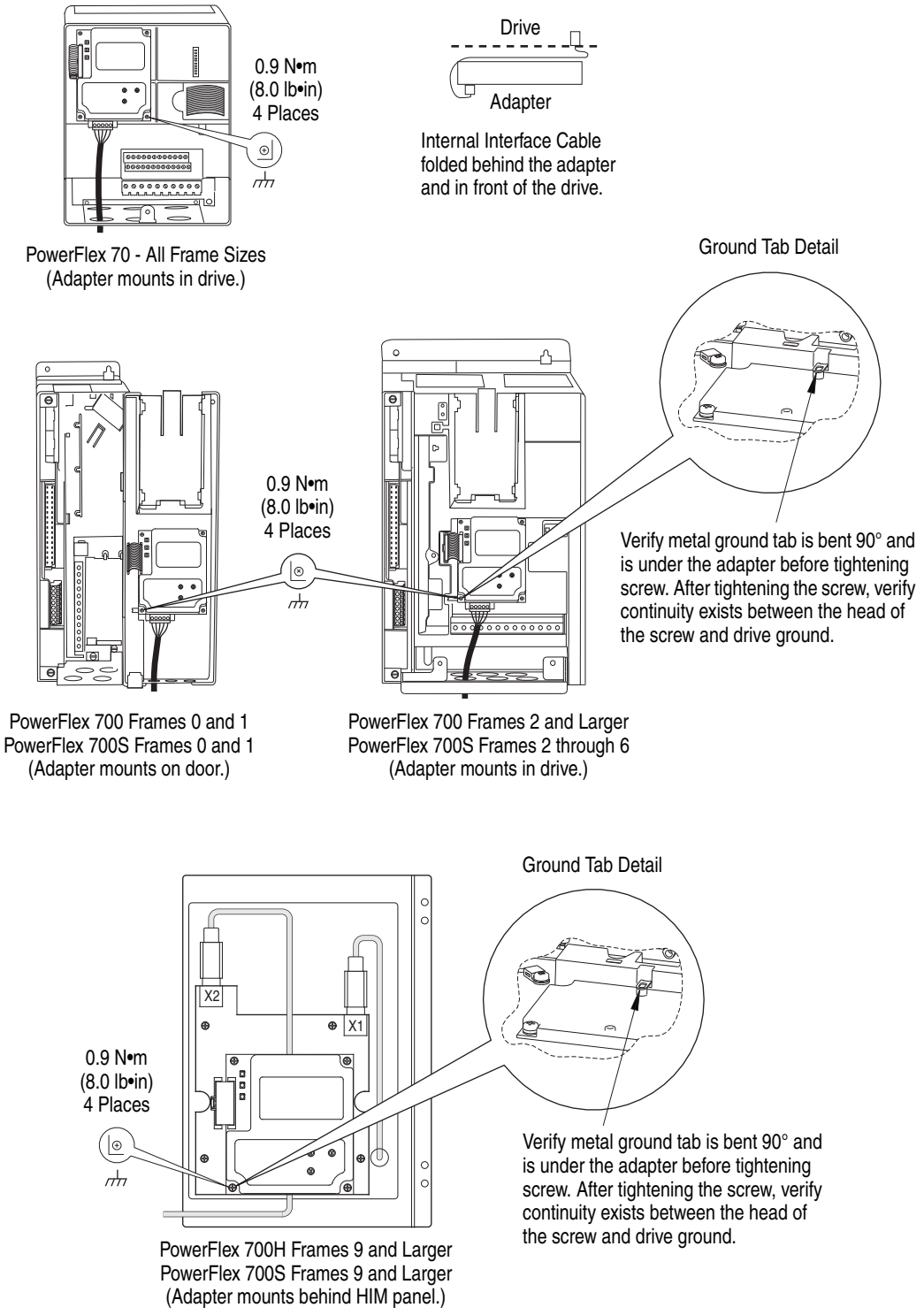
   Important: Tighten all screws to properly ground the adapter. Recommended torque is 0.9 N•m (8.0 lb•in).

Figure 2.3 DPI Ports and Internal Interface Cables



Item	Description
❶	15.24 cm (6 in.) Internal Interface cable
❷	DPI Connector
❸	DeviceNet cable
❹	2.54 cm (1 in.) Internal Interface cable

Figure 2.4 Mounting and Grounding the Adapter



NOTE: When installing the adapter in a PowerFlex 750-Series drive, see the 20-750-20COMM and 20-750-20COMM-F1 Communication Carrier Cards Installation Instructions, publication 750COM-IN001, supplied with the card.

Connecting the Adapter to the Network

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

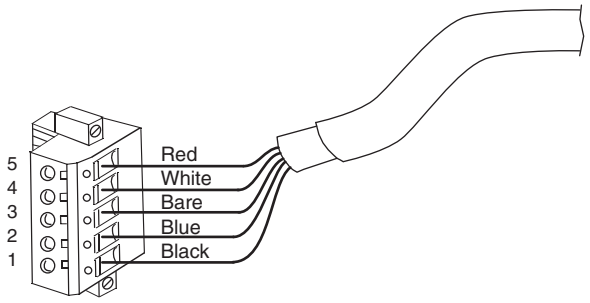
1. Remove power from the network and drive.
2. Use static control precautions.
3. Connect one end of a DeviceNet cable to the network.

   We recommend DeviceNet Thin cable with an outside diameter of 6.9 mm (0.27 in.).

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

4. Route the other end of the DeviceNet cable through the bottom of the drive (Figure 2.4), and connect its wires to the 5-pin linear plug shipped with the adapter. See Figure 2.5 for wiring details.

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



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

5. Insert the DeviceNet cable plug into the mating adapter connector, and secure it with the two screws.
6. Verify that the colors of the wires on the plug match the color codes on the connector.

Applying Power

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

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

Start-Up Status Indications

Status indicators for the drive and communication adapter can be viewed on the front of the drive (Figure 2.6) after power has been applied. Possible start-up status indications are shown in Table 2.A.

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

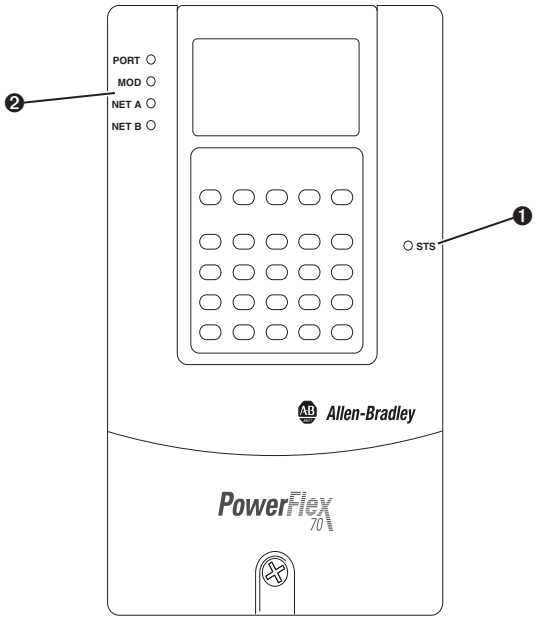


Table 2.A Drive and Adapter Start-Up Status Indications

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

For more details on status indicator operation, see page 7-2 and page 7-3.

Configuring and Verifying Key Drive Parameters

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

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

1. Use drive Parameter 090 - [Speed Ref A Sel] to set the drive speed Reference to ‘22’ (DPI Port 5).
2. If hard-wired discrete digital inputs are not used to control the drive, verify that unused digital input drive Parameters 361 - [Dig In1 Sel] and 366 - [Dig In2 Sel] are set to ‘0’ (Not Used).

3. Verify that drive Parameter 213 - [Speed Ref Source] is reporting that the source of the Reference to the drive is ‘22’ (DPI Port 5).

   This ensures that any Reference commanded from the network can be monitored by using drive Parameter 002 - [Commanded Speed]. If a problem occurs, this verification step provides the diagnostic capability to determine whether the drive/adapter or the network is the cause.

TIP: For PowerFlex 750-Series drives, use drive Parameter 545 - [Speed Ref A Sel] to set the drive speed Reference:

   a. Set the Port field to ‘Port 0 - PowerFlex 75x’.

   b. Set the Parameter field to point to the port in which the 20-COMM-D adapter/20-750-20COMM Communication Carrier Card are installed (for example, ‘876 - Port 6 Reference’).

      The number ‘876’ in the Parameter field of the example is the parameter in the drive that points to the port.

Commissioning the Adapter

To commission the adapter, you must set a unique node address on the network. See Setting the Node Address on page 3-3, and the Glossary for details about node addresses.

Important: New settings for some adapter parameters are recognized only when power is applied to the adapter or it is reset. After you change parameter settings, cycle power or reset the adapter.

Configuring the Adapter

This chapter provides instructions and information for setting the parameters to configure the adapter.

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

Configuration Tools

The adapter stores parameters and other information in its own nonvolatile storage (NVS) 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	See
PowerFlex 7-Class HIM	page 3-2
Connected Components Workbench software, version 1.02 or later	http://www.ab.com/support/abdrives/webupdate/software.html, or online help (installed with the software)
DriveExplorer software, version 2.01 or later	http://www.ab.com/drives/driveexplorer, or DriveExplorer online help (installed with the software)
DriveExecutive software, version 3.01 or later	http://www.ab.com/drives/drivetools, or DriveExecutive online help (installed with the software)

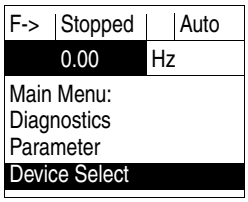
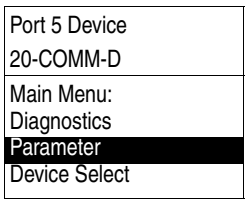
Using the PowerFlex 7-Class HIM to Access Parameters

If your drive has either an LED or LCD HIM (Human Interface Module), it can be used to access parameters in the adapter as shown below. We recommend that you read through the steps for your HIM before performing the sequence. For additional information, see the drive documentation or the PowerFlex 7-Class HIM Quick Reference, publication 20HIM-QR001.

Using an LED HIM

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

Using an LCD HIM

Step	Example Screens
1. In the main menu, press the ▲ or ▼ key to scroll to **Device Select**. 2. Press the ↵ (Enter) key to enter your selection. 3. Press the the ▲ or ▼ key to scroll to the adapter (20-COMM-D). 4. Press the ↵ (Enter) key to select the adapter. A parameter database is constructed, and then the main menu for the adapter is displayed. 5. Edit the parameters using the same techniques that you use to edit drive parameters.	 

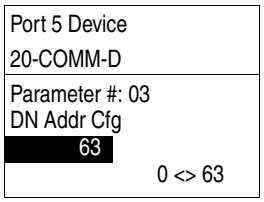
NOTE: All configuration procedures throughout this chapter use the PowerFlex 7-Class LCD HIM to access parameters in the adapter and show example LCD HIM screens.

TIP: When using a PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM, see its User Manual, publication 20-HIM-UM001.

Setting the Node Address

If the adapter Data Rate switch (Figure 2.2) is set to 'PGM' (Program), the value of **Parameter 03 - [DN Addr Cfg]** determines the node address. We recommend not to use the default node address 63 because all new devices on the network use this address as the default address. Also, node address 63 is used for Automatic Device Recovery (ADR).

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



Default = 63

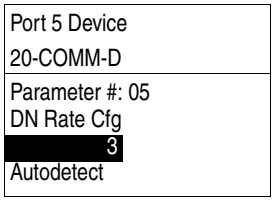
2. Reset the adapter (see Resetting the Adapter on page 3-12).

When the node address is correctly configured and the adapter is connected to an operational network, the NET A status indicator should be steady green or flashing green.

Setting the Data Rate

If the adapter Data Rate switch (Figure 2.2) is set to 'PGM' (Program), the value of **Parameter 05 - [DN Rate Cfg]** determines the data rate. The default 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.



Value	Data Rate
0	125 kbps
1	250 kbps
2	500 kbps
3	Autobaud (default)

2. Reset the adapter (see Resetting the Adapter on page 3-12).

Setting the I/O Configuration

The I/O configuration determines the data that is sent to and from the drive. Logic Command/Status, Reference/Feedback, and Datalinks may be enabled or disabled. (Datalinks allow you to read/write directly to parameters in the drive using implicit I/O.) A ‘1’ enables the I/O and a ‘0’ disables the I/O.

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

Port 5 Device 20-COMM-D
Parameter #: 13 DPI I/O Cfg x x x x x x x x x x x 0 0 0 0 **1** Cmd/Ref b00

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. It is highlighted above and equals ‘1’.

2. If a controller is used to control the drive, set adapter **Parameters 25 - [M-S Input]** and **26 - [M-S Output]** for Master-Slave Hierarchy.

   For details, see Setting a Master-Slave Hierarchy (Scanner-to-Drive Communication) on page 3-5.

3. If Logic Command/Reference is enabled, configure the parameters in the drive to accept the Logic Command and Reference from the adapter.

   For example, set Parameter 90 - [Speed Ref A Sel] in a PowerFlex 70 or 700 drive to ‘22’ (DPI Port 5) so that the drive uses the Reference from the adapter. Also, verify that the mask parameters (for example, Parameter 276 - [Logic Mask]) in the drive are configured to receive the desired logic from the adapter. See the documentation for your drive for details.

4. If you enabled one or more Datalinks, configure parameters in the drive to determine the source and destination of data in the Datalinks.

   When using Datalinks, up to 8 drive [Data In xx] parameters (300…307) and/ or up to 8 [Data Out xx] parameters (310…317) must be assigned to point to the appropriate drive parameters for your application. See Chapter 4 for an example.

5. Reset the adapter (see Resetting the Adapter on page 3-12).

The adapter is ready to receive I/O. You must now configure the adapter to receive I/O from a master or peer device. See Selecting Master-Slave or Peer-to-Peer Hierarchy on page 3-5. If you select a Master-Slave hierarchy, you must also configure the master to communicate with the adapter. See Chapter 4, Configuring the I/O.

Selecting Master-Slave or Peer-to-Peer Hierarchy

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

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

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

   See Setting the I/O Configuration on page 3-4.

2. Set the bits in **Parameter 25 - [M-S Input]**.

   This parameter determines the data received from the master by the drive. A ‘1’ enables the I/O and a ‘0’ disables the I/O.

Port 5 Device
20-COMM-D
Parameter #: 25 M-S Input x x x x x x x x x x x 0 0 0 0 **1** Cmd/Ref b00

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. It is highlighted above and equals ‘1’.

3. Set the bits in **Parameter 26 - [M-S Output]**.

   This parameter determines the data transmitted from the drive to the scanner. A ‘1’ enables the I/O and a ‘0’ disables the I/O.

Port 5 Device
20-COMM-D
Parameter #: 26 M-S Output x x x x x x x x x x x 0 0 0 0 **1** Status/Fdbk b00

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. It is highlighted above and equals ‘1’.

4. Reset the adapter (see Resetting the Adapter on page 3-12).

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

Setting the Adapter to Transmit Peer-to-Peer Data (Drive-to-Drive Communication)

1. Verify that **Parameter 41 - [Peer Out Enable]** is set to '0' (Off).

   This parameter must be Off while you configure peer output parameters.

Port 5 Device 20-COMM-D
Parameter #: 41 Peer Out Enable 0 Off

Value	Setting
0	Off (Default)
1	On

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

Port 5 Device 20-COMM-D
Parameter #: 39 Peer A Output 1 Cmd/Ref

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

   Important: When transmitting a 32-bit Reference or 32-bit Datalink, only Peer A Output will be available. Peer B Output cannot be used.

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

Port 5 Device 20-COMM-D
Parameter #: 40 Peer B Output 2 DL A Input

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

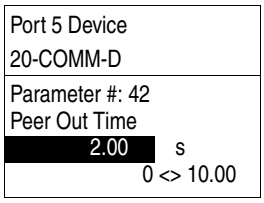
4. Set **Parameters 42 - [Peer Out Time]** and **43 - [Peer Out Skip]** to establish the minimum and maximum intervals between Peer messages.

   Because the adapter transmits Peer messages when a change-of-state condition occurs, minimum and maximum intervals are required.

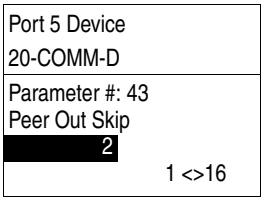
   – The minimum interval ensures that the adapter does not transmit messages on the network too often, thus minimizing network traffic. It is set using **Parameter 42 - [Peer Out Time]**.

   – The maximum interval ensures that the adapter transmits messages often enough so that the receiving adapters can receive recent data and verify that communication is working or, if communication is not working, can timeout. The maximum interval is the value of **Parameter 42 - [Peer Out Time]** multiplied by the value of **Parameter 43 - [Peer Out Skip]**.

In this example, the minimum interval is set to 2.00 seconds (Parameter 42 - [Peer Out Time]), and the maximum interval is set to 4.00 seconds (2.00 x ‘2’ setting of Parameter 43 - [Peer Out Skip]).



Default = 10.00 s



Default = 1

5. Set **Parameter 41 - [Peer Out Enable]** to ‘1’ (On).

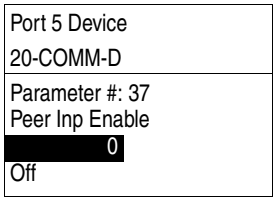
The adapter will transmit the data selected in **Parameters 39 - [Peer A Output]** and **40 - [Peer B Output]** to the network. Another adapter must be configured to receive the peer I/O data.

Setting the Adapter to Receive Peer-to-Peer Data

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

1. Verify that **Parameter 37 - [Peer Inp Enable]** is set to ‘0’ (Off).

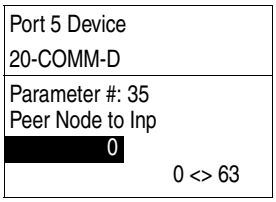
This parameter must be Off while you configure the peer input parameters.



Value	Setting
0	Off (Default)
1	On

2. Set **Parameter 35 - [Peer Node to Inp]** to the address of the node from which you want to receive data.

Valid nodes must have 20-COMM-D adapters connected to drives with compatible Logic Command/Status words.



Default = 0

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

Port 5 Device
20-COMM-D
Parameter #: 30 Peer A Input 1 Cmd/Ref

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

Important: When receiving a 32-bit Reference or 32-bit Datalink, only Peer A Input will be available. Peer B Input cannot be used.

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

Port 5 Device
20-COMM-D
Parameter #: 31 Peer B Input 2 DL A Input

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

5. If the adapter receives a Logic Command, set the bits in **Parameter 32 - [Peer Cmd Mask]** that the drive should use.

   The bit definitions for the Logic Command word will depend on the drive to which the adapter is connected. See Appendix D or the drive documentation.

Port 5 Device
20-COMM-D
Parameter #: 32 Peer Cmd Mask 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Bit 0 B00

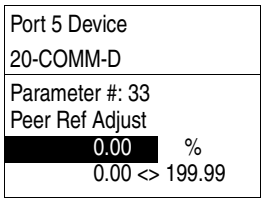
Value	Description
0	Ignore this command bit. (Default)
1	Use this command bit.

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.

6. Reset the adapter (see Resetting the Adapter on page 3-12) so that changes to **Parameter 32 - [Peer Cmd Mask]** take effect.

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

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

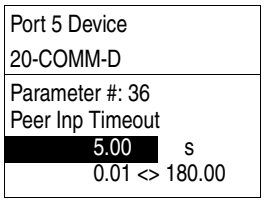


Default = 0.00%

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

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

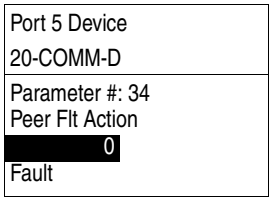
   For example, if the value of **Parameter 42 - [Peer Out Time]** is 2.00 seconds and the value of **Parameter 43 - [Peer Out Skip]** is 2, then **Parameter 36 - [Peer Inp Timeout]** needs to have a value greater than 4.00, such as 5.00 in the example below.



Default = 10.00 s

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

ATTENTION: Risk of injury or equipment damage exists. **Parameter 34 - [Peer Flt Action]** lets you determine the action of the adapter and connected drive if peer communication is disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a hazard of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).



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

For more details, see Setting a Fault Action on page 3-11.

10. Set **Parameter 37 - [Peer Inp Enable]** to ‘1’ (On).

The adapter is now configured to receive peer I/O from the specified node. Verify that the specified node is configured to transmit peer I/O.

Selecting COS, Cyclic or Polled I/O

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

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

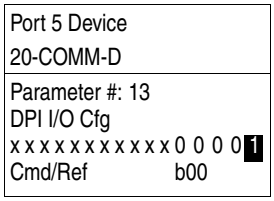
If 'Polled and COS' or 'Polled and Cyclic' is used, the adapter receives the I/O from the polled messages. It transmits its Logic Status and Feedback in COS or Cyclic messages. Other data is transmitted in Polled messages.

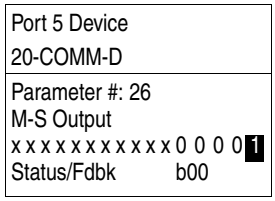
Cyclic and Polled data exchanges are configured in the scanner, so you only need to set the I/O configuration in the adapter. COS data exchange must be configured in both the adapter and the scanner. You need to set the I/O configuration and COS parameters in the adapter.

Using COS (Change of State) Data Exchange

1. Set Bit 0 (the Logic Command/Reference bit) in **Parameter 13 - [DPI I/O Config]** to '1' (Enabled) and Bit 0 (the Logic Status/Feedback bit) in **Parameter 26 - [M-S Output]** to '1' (Enabled).

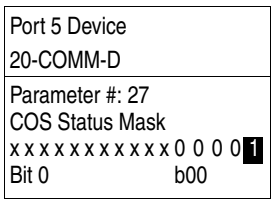
   Changes to bits in the Logic Status/Feedback trigger messages in COS data exchange.





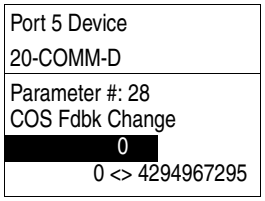
2. Set **Parameter 27 - [COS Status Mask]** for the bits in the Logic Status word that should be checked for changes.

   The bit definitions for the Status Mask will depend on the drive to which the adapter is connected. See Appendix D or the drive documentation.



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

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



Default = 0

The adapter is now configured for COS data exchange. You must configure the scanner to allocate it using COS. See Chapter 4, Configuring the I/O for details.

Setting a Fault Action

By default, when I/O communication is disrupted (for example, a cable is disconnected) or the controller is idle (in program mode or faulted), the drive responds by faulting if it is using I/O from the network. You can configure a different response to these faults:

- Disrupted I/O communication by using **Parameter 10 - [Comm Flt Action]**
- An idle controller by 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 I/O communication is disrupted or the controller is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run, however, precautions should be taken to verify that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable or faulted controller).

Changing the Fault Action

Set the values of **Parameters 10 - [Comm Flt Action]** and **11 - [Idle Flt Action]** to an action that meets your application requirements.

Value	Action	Description
0	Fault	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent ‘0’ values for data. This does not command a stop.
3	Hold Last	The drive continues in its present state.
4	Send Flt Cfg	The drive is sent the data that you set in the fault configuration parameters (**Parameters 15 - [Flt Cfg Logic]** through **24 - [Flt Cfg D2 In]**).

Port 5 Device
20-COMM-D
Parameter #: 10 Comm Flt Action 0 Fault

Port 5 Device
20-COMM-D
Parameter #: 11 Idle Flt Action 0 Fault

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

If communication is disrupted and then is re-established, the drive will automatically take commands from the network again.

Setting the Fault Configuration Parameters

When setting **Parameter 10 - [Comm Flt Action]** or **11 - [Idle Flt Action]** to 'Send Flt Cfg', the values in the following parameters are sent to the drive after an I/O communication fault and/or idle fault occurs. You must set these parameters to values required by your application.

Parameter	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.
17 - [Flt Cfg x1 In] through **24 - [Flt Cfg x2 In]**	**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.

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

Resetting the Adapter

Changes to switch settings and some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by power cycling the drive or by using **Parameter 09 - [Reset Module]**.

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

Set **Parameter 09 - [Reset Module]** to '1' (Reset Module).

Port 5 Device
20-COMM-D
Parameter #: 09 Reset Module 1 Reset Module

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

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

Viewing the Adapter Status Using Parameters

The following parameters provide information about the status of the adapter. You can view these parameters at any time.

Parameter	Description
04 - [DN Addr Act]	The node address used by the adapter. This will be one of the following values: • The address set by the rotary switches. • The value of **Parameter 03 - [DN Addr Cfg]**. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
06 - [DN Rate Act]	The data rate used by the adapter. This will be one of the following values: • The data rate set by the rotary switch. • The value of **Parameter 05 - [DN Rate Cfg]**. • An old data rate of the switch or parameter if it has been changed and the adapter has not been reset.
07 - [Ref/Fdbk Size]	The size of the Reference/Feedback. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
08 - [Datalink Size]	The size of the Datalinks. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
12 - [DN Active Cfg]	Source from which the adapter node address and data rate are taken. This will be either ‘0’ (EEPROM) in which the address from **Parameter 03 - [DN Addr Cfg]** and the data rate from **Parameter 05 - [DN Rate Cfg]** are stored or ‘1’ (Switches). The source is determined by the settings of the adapter switches.
14 - [DPI I/O Act]	The Reference/Feedback and Datalinks used by the adapter. This value is the same as **Parameter 13 - [DPI I/O Cfg]** unless the parameter was changed and the adapter was not reset. 0 = I/O disabled 1 = I/O enabled

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

Updating the Adapter Firmware

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

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

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

To obtain a firmware update for this adapter, go to http://www.ab.com/support/abdrives/webupdate. This website contains all firmware update files and associated Release Notes that describe the following items:

- Firmware update enhancements and anomalies
- How to determine the existing firmware revision
- How to update firmware using ControlFLASH, DriveExplorer, DriveExecutive, or HyperTerminal software.

Configuring the I/O

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

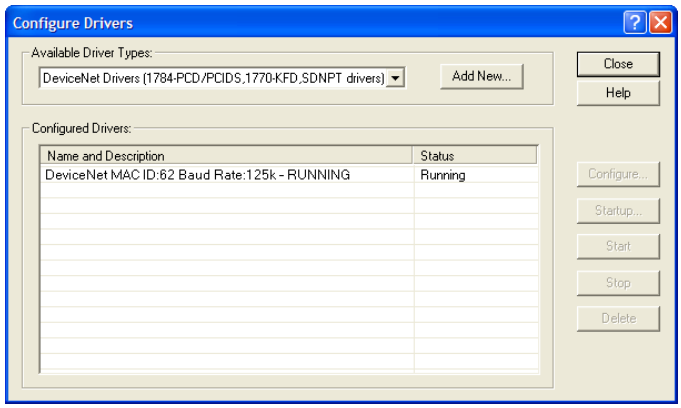
Using RSLinx Classic Software

RSLinx Classic software, in all its variations (Lite, Gateway, OEM, and so forth), is used to provide a communication link between the computer, network, and controller. RSLinx Classic software requires its network-specific driver to be configured before communication is established with network devices. To configure the RSLinx driver, follow this procedure.

1. Start RSLinx Classic software and select **Communications > Configure Drivers** to display the Configure Drivers screen.
2. From the Available Driver Types pull-down menu, choose 'DeviceNet Drivers (1784-PCD/PCIDS, 1770-KFD, SDNPT drivers)'.
3. Click **Add New…** to display the DeviceNet Driver Selection screen.
4. Select the computer communication card (1770-KFD, 1771-SDNPT, and so forth) being used to connect your computer to the network and click **Select**.
5. Configure the driver for your computer and network settings.
6. Click **OK**.
7. In the Add New RSLinx Driver screen, use the default name or type a new name.

8. Click **OK**.

   The Configure Drivers screen reappears with the new driver in the Configured Drivers list.



9. Click **Close** to close the Configure Drivers screen.

10. Keep RSLinx running and verify that your computer recognizes the drive.

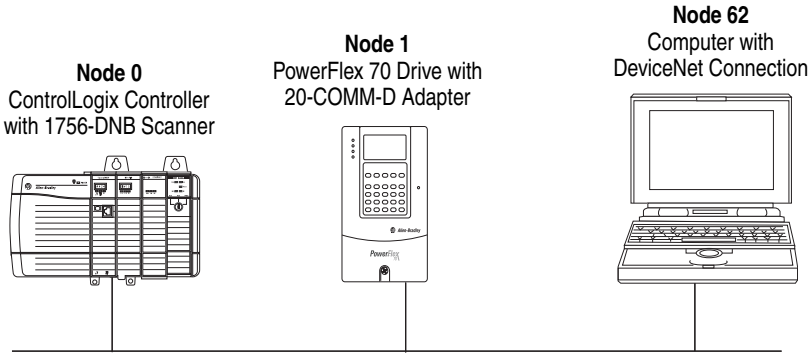
    a. Select **Communications > RSWho**.

    b. In the menu tree, click '+' next to the DeviceNet driver.

ControlLogix Controller Example

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple DeviceNet network (see Figure 4.1). In our example, we will configure a ControlLogix controller with 1756-DNB scanner to communicate with a drive using Logic Command/Status, Reference/ Feedback, and 16 Datalinks (8 to read and 8 to write) over the network.

Figure 4.1 Example ControlLogix Controller DeviceNet Network

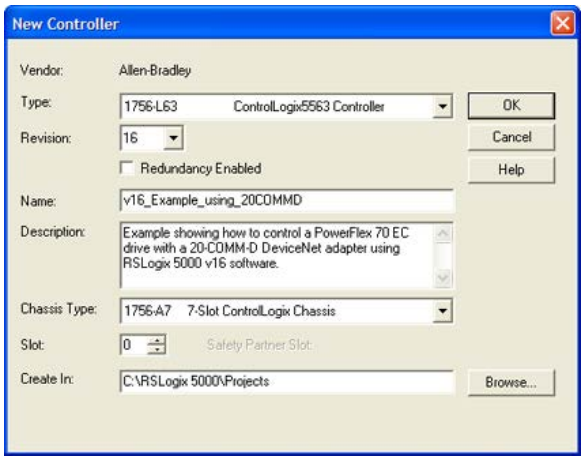


TIP: Information for PowerFlex 750-Series drives has been added to this manual where it is applicable.

Adding the Scanner to the I/O Configuration

To establish communication between the controller and adapter over the network, you must first add the ControlLogix controller and its scanner to the I/O configuration. This procedure is similar for all RSLogix 5000 versions.

1. Start RSLogix 5000 software.
2. Select **File > New** to display the New Controller screen.



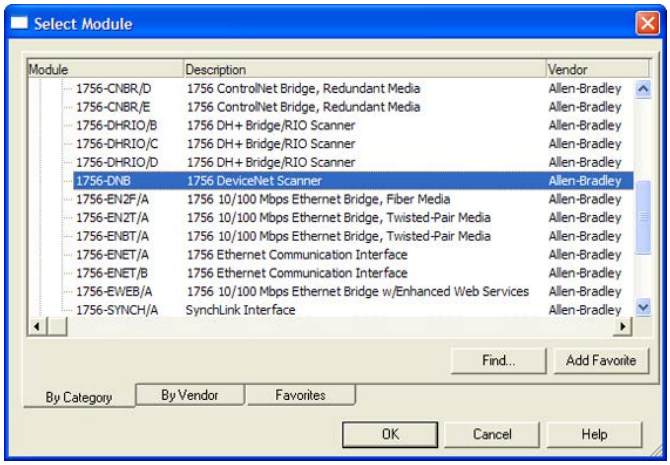
   a. Choose the appropriate choices for the fields in the screen to match your application.
   b. Click **OK**.

      The RSLogix 5000 window reappears with the treeview in the left pane.

3. In the treeview, right-click the I/O Configuration folder and choose **New Module**.

   The Select Module screen appears.

4. Expand the Communications group to display all of the available communication modules.



5. In the list, select the DeviceNet scanner used by your controller.

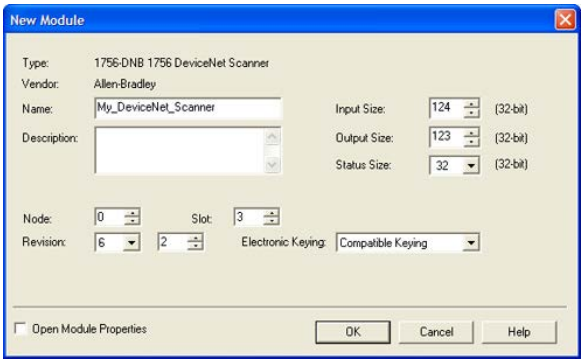
   In this example, we use a 1756-DNB DeviceNet Scanner, so the 1756-DNB option is selected.

6. Click **OK**.

7. In the Select Major Revision pop-up dialog box, select the major revision of its firmware.

8. Click **OK**.

   The scanner's New Module screen appears.

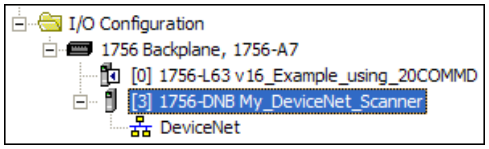


9. Edit the following.

Box	Setting
Name	A name to identify the DeviceNet scanner.
Description	Optional – description of the DeviceNet scanner.
Node	The node address of the DeviceNet scanner.
Slot	The slot of the DeviceNet scanner in the rack.
Revision	The minor revision of the firmware in the DeviceNet scanner. (You already set the major revision by selecting the scanner series in step 7.)
Electronic Keying	**Compatible Keying**. The 'Compatible Keying' setting for Electronic Keying ensures the physical module is consistent with the software configuration before the controller and scanner make a connection. Therefore, be sure that you have set the correct revision in this screen. See the online Help for additional information on this and other Electronic Keying settings.
Input Size	The size of the input data for the DeviceNet scanner. We recommend using the default value of 124.
Output Size	The size of the output data for the DeviceNet scanner. We recommend using the default value of 123.
Status Size	The size of the status data for the DeviceNet scanner. We recommend using the default value of 32.
Open Module Properties	When this box is checked, clicking **OK** opens additional module properties screens to further configure the scanner. When unchecked, clicking **OK** closes the scanner's New Module screen. For this example, uncheck this box.

10. Click **OK**.

    The scanner is now configured for the DeviceNet network and added to the RSLogix 5000 project. It appears in the I/O Configuration folder. In our example, a 1756-DNB scanner appears under the I/O Configuration folder with its assigned name.

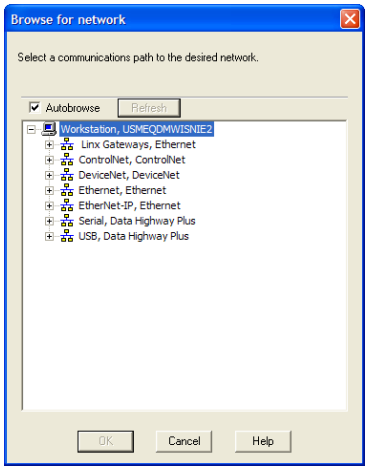


    For convenience, keep the project open. Later in this chapter the project will need to be downloaded to the controller.

Use RSNetWorx for DeviceNet Software to Configure and Save the I/O to the Scanner

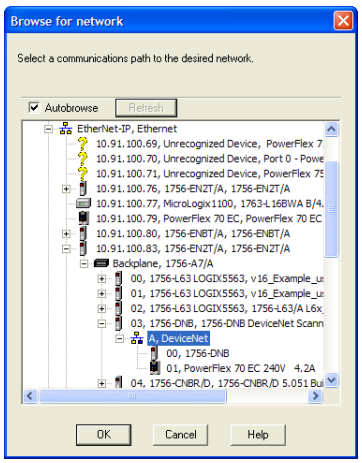
After adding the scanner to the I/O configuration, you now must configure and save the I/O to the scanner.

1. Start RSNetWorx for DeviceNet software.
2. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen.
3. Select 'DeviceNet Configuration' as the network configuration type.
4. Click **OK**.
5. Select **Network > Online** to display the Browse for Network screen.



6. Expand the communication path from your computer to the DeviceNet scanner.

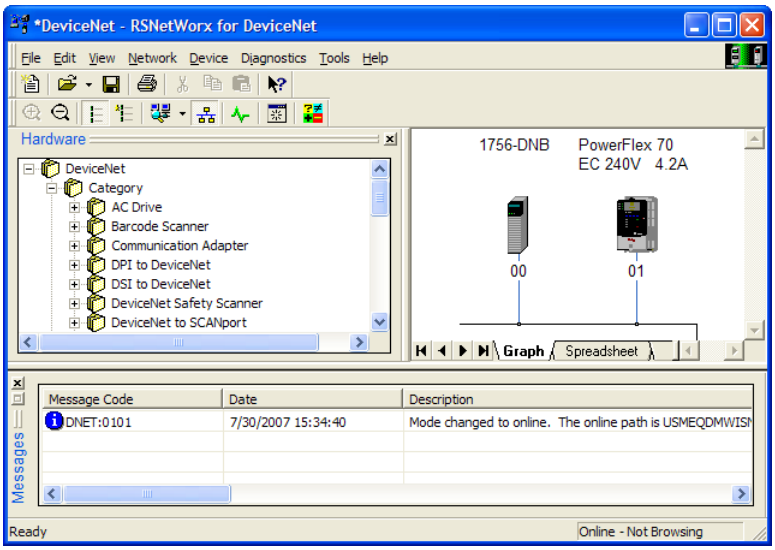
The following screen shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different.



7. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

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

   As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet creates a graph view window that shows a graphical representation of the devices on the network.



   If the icon for the drive (for this example, PowerFlex 70 EC) on the network appears as Unrecognized Device, either use RSNetWorx for DeviceNet software to create the appropriate drive EDS file or download the EDS file from the Rockwell Automation website.

   Important: If you will be using the optional DeviceNet Tag Generator to create descriptive controller tags (page 4-16), you must download and use the EDS file from the website.

Creating the EDS File from Online DeviceNet Network

a. Right-click the Unrecognized Device icon and choose Register Device.

The EDS Wizard appears.

b. Click **Next** to start creating the EDS file.

c. Select **Create an EDS file**.

d. Click **Next**.

If the EDS file is already downloaded and resides on your computer, select the **Register an EDS file** option and click **Next**. Then follow the screen prompts and disregard the remaining steps in this procedure.

e. Type a description (if desired) and click **Next**.

f. Check the Polled box, type ‘4’ in the Input Size and Output Size boxes (which accounts for just the basic I/O), and click **Next**.

RSNetWorx for DeviceNet software will upload the EDS file from the drive.

g. Click **Next** to display the icon options for the node.

We recommend using the icon for the PowerFlex 7-Class drive being used. You can change icons by clicking **Change icon**.

h. Click **Next** to view a summary.

i. Click **Next** again to accept it.

j. Click **Finish** to finish creating the EDS file.

A new icon represents the PowerFlex 7-Class drive and communication adapter in the RSNetWorx for DeviceNet graph view window.

Downloading the EDS File from Rockwell Automation Website

a. Go to the website http://www.rockwellautomation.com/resources/eds.

b. On the web page in the Electronic Data Sheets [EDS] section, click the link 'All Other EDS Files'.

The Find EDS Files search screen appears.

c. From the Network pull-down menu, choose the type of network (for this example, DeviceNet).

d. From the Device Type pull-down menu, choose 'AC Drive'.

e. In the Keyword entry field, enter the type of PowerFlex drive (for this example, PowerFlex 70EC), noting that this field is space sensitive.

f. Click **Search**.

Because of many EDS files, this search may take several minutes.

g. On the EDS File Search Results screen in the Details & Download column, click the 'Download' link for the EDS file that corresponds to the drive.

h. Click **Save** on the File Download dialog box to save the EDS file to an appropriate location on your computer.

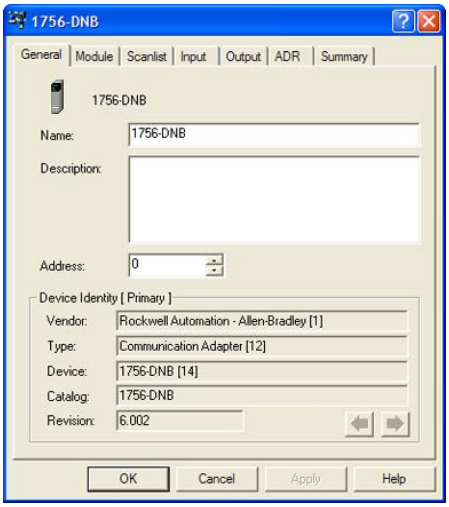
i. Launch the EDS Hardware Installation Tool by clicking the Microsoft Windows Start button and selecting **Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool**.

Follow the screen prompts to add the EDS file for use with your project.

j. Reboot the computer and repeat steps 1 through 7 at the beginning of this subsection.

The Unrecognized Device icon in the RSNetWorx for DeviceNet graph view window in step 7 should have been replaced by a drive icon (for this example, the icon for a PowerFlex 70 EC drive).

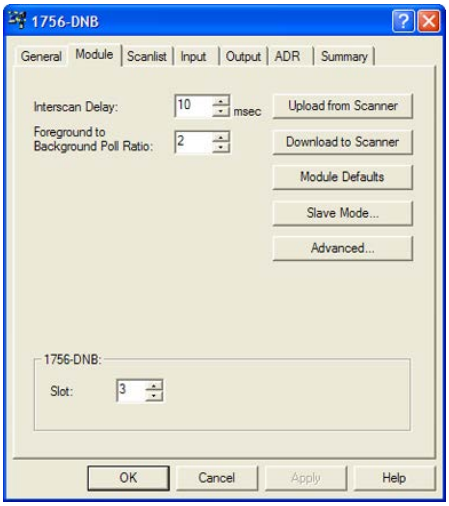
8. In the graph view window, right-click the 1756-DNB icon and choose **Properties…** to display its properties screen.



9. Click the Module tab to display the Scanner Configuration Applet screen.

10. Click **Upload** to upload the 1756-DNB configuration to the RSNetWorx for DeviceNet project.

    The 1756-DNB Module Tab screen appears.



    a. Edit the following.

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

    b. Click **Apply**.

11. Click the Scanlist tab to begin the drive I/O configuration.

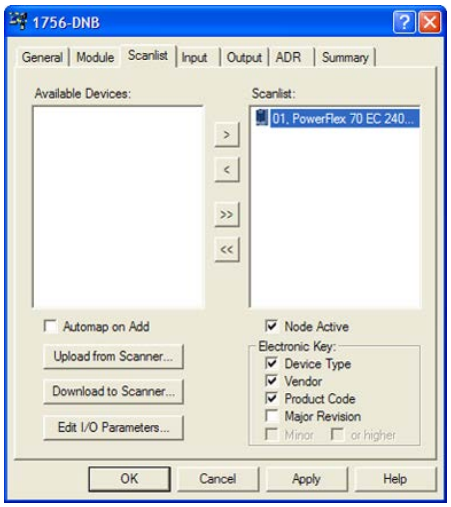
The Available Devices box shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist box shows devices that are presently on the DeviceNet network and are configured.

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

a. For this example, uncheck the Automap on Add box.

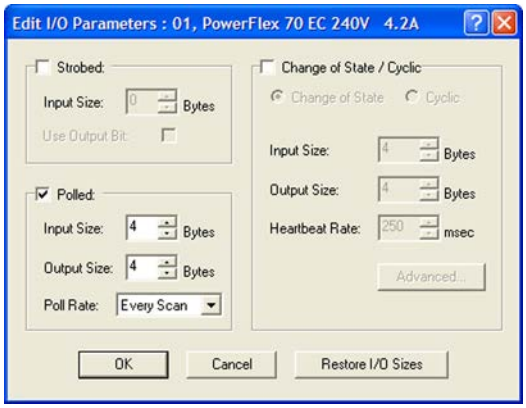
b. Select the PowerFlex 70 EC drive in the Available Devices box.

c. Click '>' to move the PowerFlex 70 EC drive to the Scanlist box.



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

d. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen for the PowerFlex 70 EC drive used in this example.



e. Select the type of data exchange (Polled, Change of State, and/or Cyclic).

For this example, we selected (and recommend) Polled.

f. For the Input Size and Output Size boxes, use the pull-down menus to choose the number of bytes that are required for your I/O.

The size will depend on the drive's Reference/Feedback and the number of Datalinks used in your I/O (enabled with adapter **Parameter 13 - [DPI I/O Cfg]**), and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of '20' and an Output Size of '20' are used.

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

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

Table 4.A Drives with 16-bit Reference/Feedback and 16-bit Datalinks

These products include the following:

- PowerFlex 70 drives with standard or enhanced control
- PowerFlex 700 drives with standard control
- PowerFlex 700H drives
- SMC Flex smart motor controllers
- SMC-50 smart motor controllers

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

Table 4.B Drives with 16-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700 drives with vector control
- PowerFlex 700L drives with 700 control
- PowerFlex Digital DC drives

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

Table 4.C Drives with 32-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700S control
- PowerFlex 753 drives
- PowerFlex 755 drives

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

g. Set the scan rate for the selected data exchange method.

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

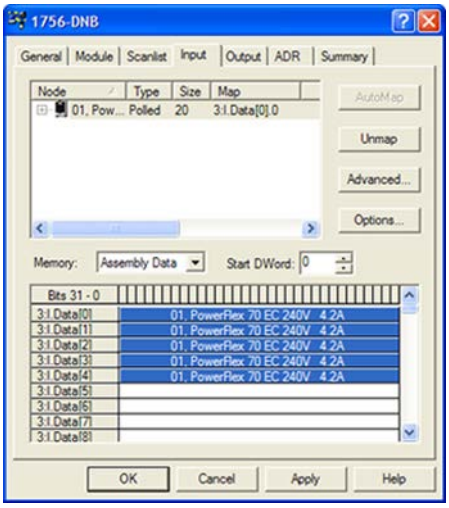
For more information about scan rates, see RSNetWorx for DeviceNet online help.

h. Click **OK**.

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

12. Click the Input tab to display the input registers for the 1756-DNB scanner.

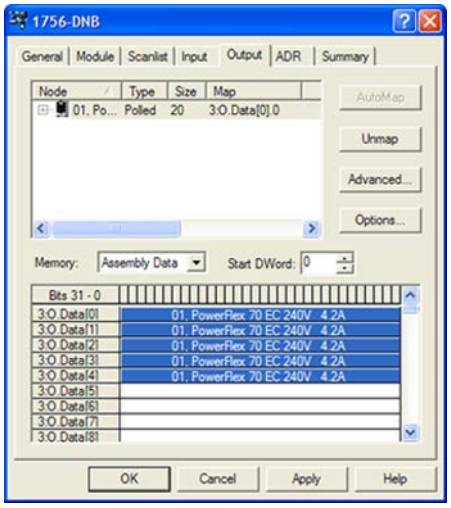
13. Click **AutoMap** to map the drive input image to the 1756-DNB scanner as shown in this example below.



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

14. Click the Output tab to display the output registers for the 1756-DNB scanner.

15. Click **AutoMap** to map the drive output image to the 1756-DNB scanner as shown in this example below.



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

16. Click **OK**.

    If the Scanner Configuration Applet appears and asks to download these settings to the 1756-DNB scanner, click **Yes**.

17. Click **File > Save**.

    If this is the first time you saved the project, the Save As dialog box appears.

    a. Navigate to a folder.

    b. Type a file name.

    c. Click **Save** to save the configuration as a file on your computer.

Setting Datalinks in the Drive (Optional)

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

1. Use any of the drive configuration tools or RSNetWorx for DeviceNet software to set the Datalinks in the drive.

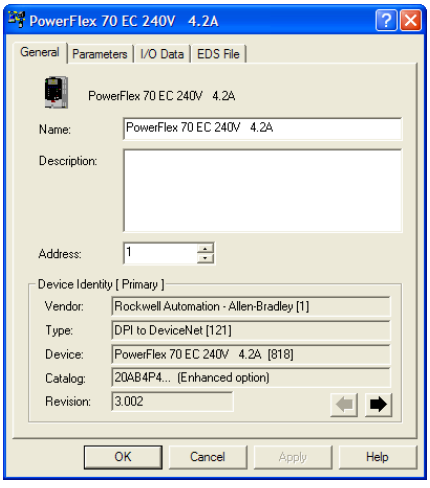
   For this example, RSNetWorx for DeviceNet software and the following Datalink values were used.

Table 4.D Example PowerFlex 70 EC Drive Datalink Settings

Parameter	Value	Description
300 - [Data In A1]	140	Points to Par. 140 - [Accel Time 1]
301 - [Data In A2]	142	Points to Par. 142 - [Decel Time 1]
302 - [Data In B1]	100	Points to Par. 100 - [Jog Speed]
303 - [Data In B2]	155	Points to Par. 155 - [Stop Mode A]
304 - [Data In C1]	101	Points to Par. 101 - [Preset Speed 1]
305 - [Data In C2]	102	Points to Par. 102 - [Preset Speed 2]
306 - [Data In D1]	103	Points to Par. 103 - [Preset Speed 3]
307 - [Data In D2]	104	Points to Par. 104 - [Preset Speed 4]
310 - [Data Out A1]	140	Points to Par. 140 - [Accel Time 1]
311 - [Data Out A2]	142	Points to Par. 142 - [Decel Time 1]
312 - [Data Out B1]	100	Points to Par. 100 - [Jog Speed]
313 - [Data Out B2]	155	Points to Par. 155 - [Stop Mode A]
314 - [Data Out C1]	101	Points to Par. 101 - [Preset Speed 1]
315 - [Data Out C2]	102	Points to Par. 102 - [Preset Speed 2]
316 - [Data Out D1]	103	Points to Par. 103 - [Preset Speed 3]
317 - [Data Out D2]	104	Points to Par. 104 - [Preset Speed 4]

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

2. In the RSNetWorx for DeviceNet graph view window, right-click the PowerFlex 70 EC drive icon and choose **Properties…** to display the drive's properties screen.



3. Click the Parameter tab to display the Parameters screen.

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

4. With the parameter list showing, set the various Data In and Data Out parameters.

   In this example, the Datalinks are set to the values shown in Table 4.D.

5. Click **OK**.

   If the EDS Editor dialog box appears, asking to download the configuration to the drive from the software configuration, click **Yes**. After the download is completed, the PowerFlex 70 EC Drive Properties screen closes.

Using the DeviceNet Tag Generator to Create Descriptive Controller Tags (Optional)

DeviceNet controller tags are non-descriptive for I/O configurations in RSLogix 5000 projects. However, the DeviceNet Tag Generator, a free Rockwell software tool, can generate descriptive controller tags for basic control I/O words (Logic Command/Status and Reference/Feedback) and Datalinks. Additionally, Datalinks automatically take the name of the drive parameter to which they are assigned.

Important: The DeviceNet Tag Generator will only create correct tag names if the EDS file being used is downloaded from the website (see Downloading the EDS File from Rockwell Automation Website on page 4-8)—not created from the network. Also, the DeviceNet Tag Generator is not supported on PowerFlex 700S and PowerFlex 750-Series drives.

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

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

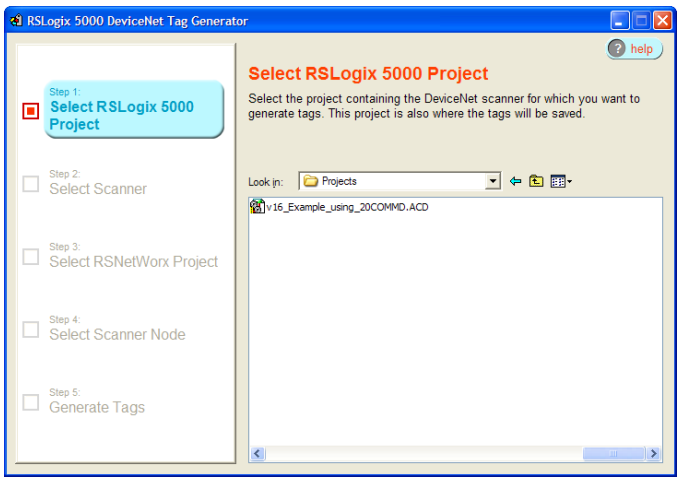
The DeviceNet Tag Generator is only recommended when:

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

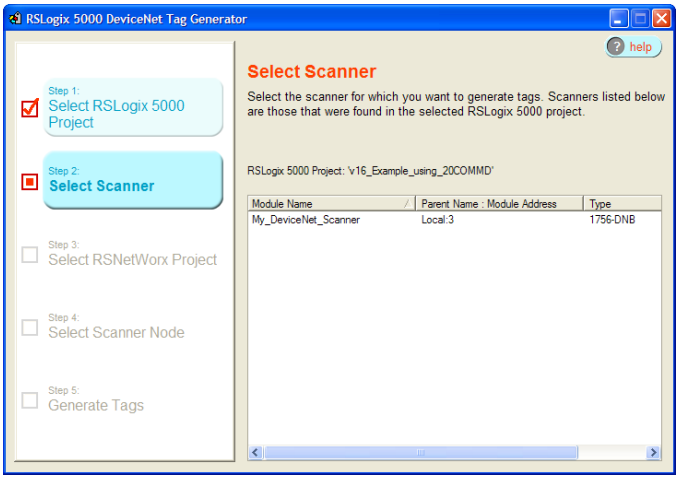
The **free** DeviceNet Tag Generator software is available for download on the Rockwell Automation website http://www.rockwellautomation.com/support/webupdates.

1. Close the RSNetWorx for DeviceNet software if it is running.
2. Verify that the controller is in Rem Prog or Program Mode, and that the RSLogix 5000 project is offline with the controller.

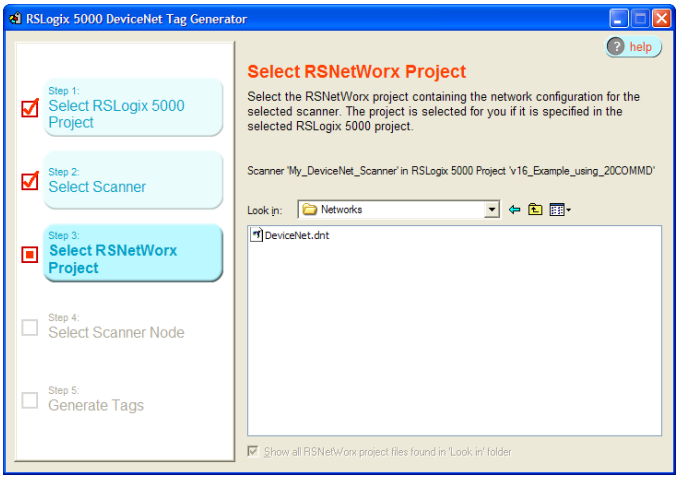
3. In RSLogix 5000 software, select **Tools > DeviceNet Tag Generator** to display the RSLogix 5000 DeviceNet Tag Generator Step 1 window.



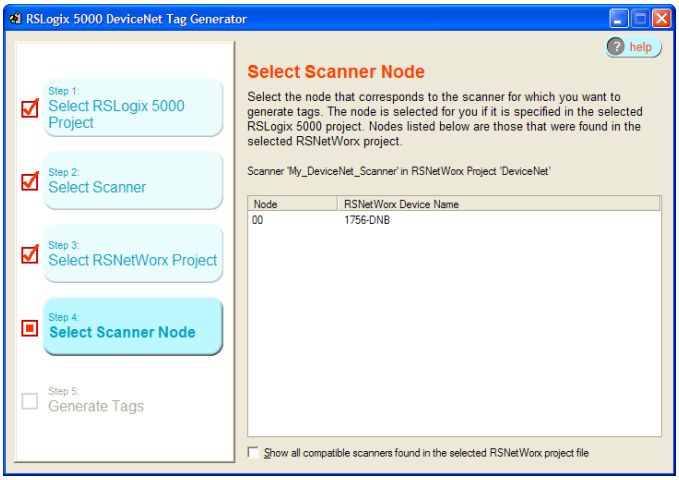
4. Select the appropriate RSLogix 5000 project (.ACD file) and click **Step 2** in the left pane to display the Step 2 window.



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



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



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

8. In the right pane, click **Generate Tags**.

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

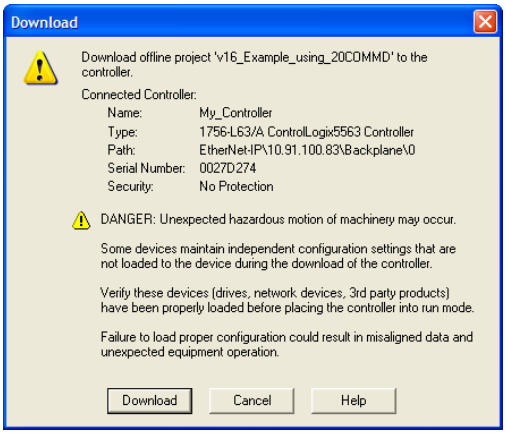
9. Close the DeviceNet Tag Generator software by clicking the ‘X’ close button in the upper-right corner of the window.

Downloading the Project to the Controller and Going Online

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

1. In the RSLogix 5000 window, select **Communications > Download**.

   The Download dialog box appears.



   TIP: If a message box reports that RSLogix 5000 software is unable to go online, select **Communications > Who Active** to find your controller in the Who Active screen. After finding and selecting the controller, click **Set Project Path** to establish the path. If your controller does not appear, you need to add or configure the DeviceNet driver with RSLinx software. See Using RSLinx Classic Software on page 4-1 and the RSLinx online help for details.

2. Click **Download** to download the configuration to the controller.

   When the download is successfully completed, RSLogix 5000 software goes into the Online mode and the I/O OK box in the upper-left of the screen should be steady green.

3. Select **File > Save**.

   If this is the first time you saved the project, the Save As dialog box appears.

   a. Navigate to a folder.

   b. Type a file name.

   c. Click **Save** to save the configuration as a file on your computer.

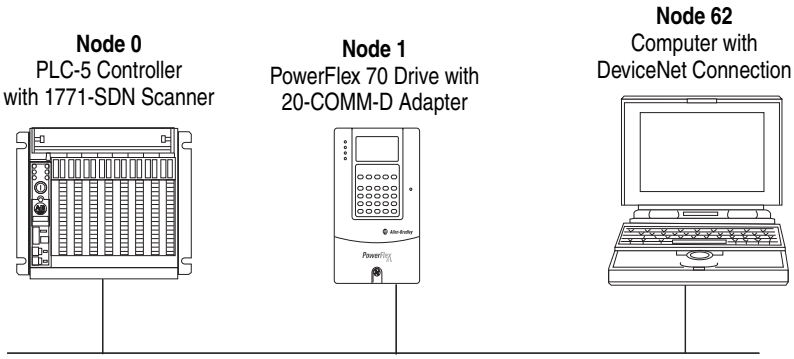
   To be sure that the present project configuration values are saved, RSLogix 5000 software prompts you to upload them. Click **Yes** to upload and save the values.

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

PLC-5 Controller Example

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple DeviceNet network (see Figure 4.2). In our example, we will configure a PLC-5 controller with 1771-SDN scanner to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.2 PLC-5 Controller Example DeviceNet Network



Configuring Parameters for Network I/O

Because the I/O for the drive is defined in the next subsection Use RSNetWorx for DeviceNet to Configure and Save the I/O to the Controller on page 4-21, there is no need to configure any I/O inside the RSLogix 5 project, version 7.20 or later, until using the I/O as described in Chapter 5.

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

1. Set adapter **Parameters 13 - [DPI I/O Cfg]**, **25 - [M-S Input]**, and **26 - [M-S Output]** to values that meet your application requirements.

   For this example, the adapter I/O parameters are set to these values.

Adapter Parameter No.	Setting
13 - [DPI I/O Cfg]	xxxx xxxx xxx1 1111
25 - [M-S Input]	xxxx xxxx xxx1 1111
26 - [M-S Output]	xxxx xxxx xxx1 1111

2. Reset the adapter (see Resetting the Adapter on page 3-12), or power cycle the drive.

   The drive speed reference and Datalink parameter values, and the adapter setup parameters for this example are shown below.

Drive Parameter No.	Setting (1)
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
301 - [Data In A2]	142 (Decel Time 1)
302 - [Data In B1]	100 (Jog Speed)
303 - [Data In B2]	155 (Stop Mode A)
304 - [Data In C1]	101 (Preset Speed 1)
305 - [Data In C2]	102 (Preset Speed 2)
306 - [Data In D1]	103 (Preset Speed 3)
307 - [Data In D2]	104 (Preset Speed 4)
310 - [Data Out A1]	140 (Accel Time 1)
311 - [Data Out A2]	142 (Decel Time 1)
312 - [Data Out B1]	100 (Jog Speed)
313 - [Data Out B2]	155 (Stop Mode A)
314 - [Data Out C1]	101 (Preset Speed 1)
315 - [Data Out C2]	102 (Preset Speed 2)
316 - [Data Out D1]	103 (Preset Speed 3)
317 - [Data Out D2]	104 (Preset Speed 4)

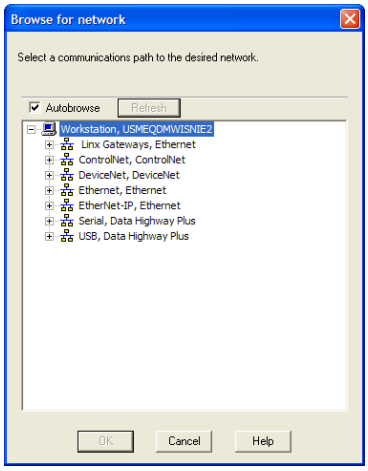
(1) Since the PowerFlex 70 EC drive uses 16-bit Datalinks, two contiguous Datalinks (for example, Data Out A1/A2) are required when assigning a 32-bit parameter such as Parameter 003 - [Output Current]. For drives with 32-bit Datalinks, only one Datalink is required.

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

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

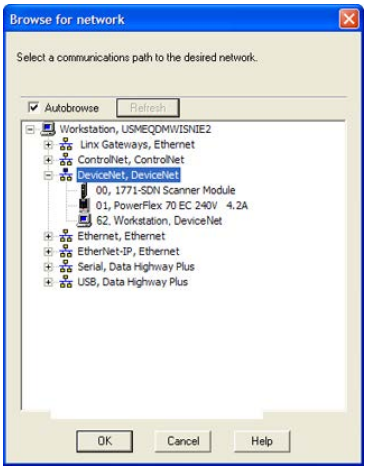
1. Start RSNetWorx for DeviceNet software.
2. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen.
3. Select ‘DeviceNet Configuration’ as the network configuration type.
4. Click **OK**.

5. Select **Network > Online** to display the Browse for Network screen.



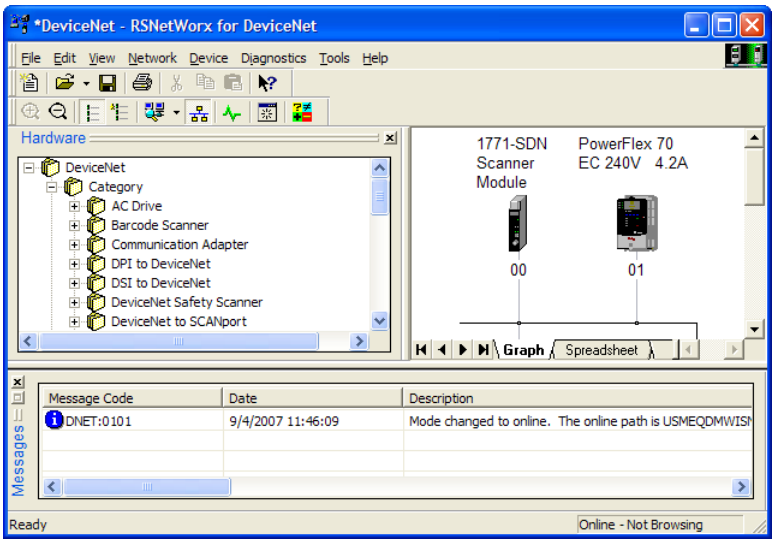
6. Expand the communication path from your computer to the 1771-SDN scanner.

   The following screen shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different.



7. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

   As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet software creates a graph view window that shows a graphical representation of the devices on the network.



If the icon for the drive (for this example, PowerFlex 70 EC) on the network appears as Unrecognized Device, either use RSNetWorx for DeviceNet software to create the appropriate drive EDS file or download the EDS file from the Rockwell Automation website.

Creating the EDS File from Online DeviceNet Network

a. Right-click the Unrecognized Device icon and choose Register Device.

The EDS Wizard appears.

b. Click **Next** to start creating the EDS file.

c. Select **Create an EDS file**.

d. Click **Next**.

If the EDS file is already downloaded and resides on your computer, select the **Register an EDS file** option and click **Next**. Then follow the screen prompts and disregard the remaining steps in this procedure.

e. Type a description (if desired) and click **Next**.

f. Check the Polled box, type ‘4’ in the Input Size and Output Size boxes (which accounts for just the basic I/O), and click **Next**.

RSNetWorx for DeviceNet software will upload the EDS file from the drive.

g. Click **Next** to display the icon options for the node.

We recommend using the icon for the PowerFlex 7-Class drive being used. You can change icons by clicking **Change icon**.

h. Click **Next** to view a summary.

i. Click **Next** again to accept it.

j. Click **Finish** to finish creating the EDS file.

A new icon represents the PowerFlex 7-Class drive and communication adapter in the RSNetWorx for DeviceNet graph view window.

Downloading the EDS File from Rockwell Automation Website

a. Go to the website http://www.rockwellautomation.com/resources/eds.

b. On the web page in the Electronic Data Sheets [EDS] section, click the link ‘All Other EDS Files’.

The Find EDS File search screen appears.

c. From the Network pull-down menu, choose the type of network (for this example, DeviceNet).

d. From the Device Type pull-down menu, choose ‘AC Drive’.

e. In the Keyword entry field, enter the type of PowerFlex drive (for this example, PowerFlex 70EC), noting that this field is space sensitive.

f. Click **Search**.

Because of many EDS files, this search may take several minutes.

g. On the EDS File Search Results screen in the Details & Download column, click the ‘Download’ link for the EDS file that corresponds to the drive.

h. Click **Save** on the File Download dialog box to save the EDS file to an appropriate location on your computer.

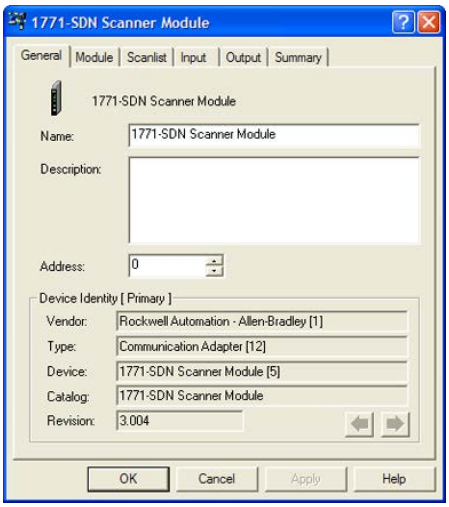
i. Launch the EDS Hardware Installation Tool by clicking the Microsoft Windows Start button and selecting **Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool**.

Follow the screen prompts to add the EDS file for use with your project.

j. Reboot the computer and repeat steps 1 through 7 at the beginning of this subsection.

The Unrecognized Device icon in the RSNetWorx for DeviceNet graph view window in step 7 should have been replaced by a drive icon (for this example, the icon for a PowerFlex 70 EC drive).

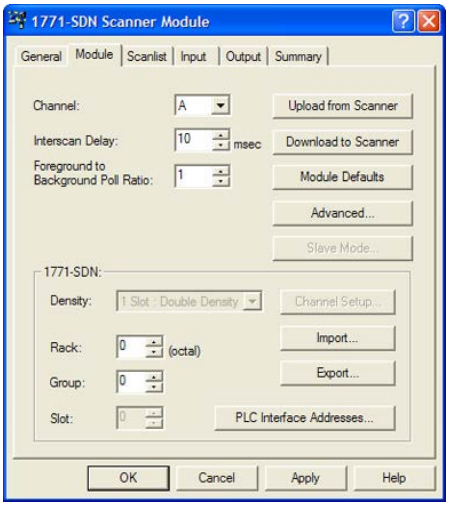
8. In the graph view window, right-click the 1771-SDN icon and choose **Properties…** to display its properties screen.



9. Click the Module tab to display the Scanner Configuration Applet screen.

10. Click **Upload** to upload the 1771-SDN configuration to the RSNetWorx for DeviceNet project.

The 1771-SDN Module Tab screen appears.



a. Edit the following.

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

b. Set the PLC-5 addresses that correspond to an existing RSLogix 5 project or will be used for a new project.

If an address file exists from a previous network configuration, click **Import…** to import those addresses into the RSNetWorx for DeviceNet project. For a new application where addresses do not exist, click **PLC Interface Addresses…** to display the PLC Interface Addresses screen. We recommend using the default addresses shown on this screen. However, if a different address is required, click the ... button to edit the address.

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

c. Click **Apply** to set the PLC-5 controller addresses.

11. Click the Scanlist tab to begin the drive I/O configuration.

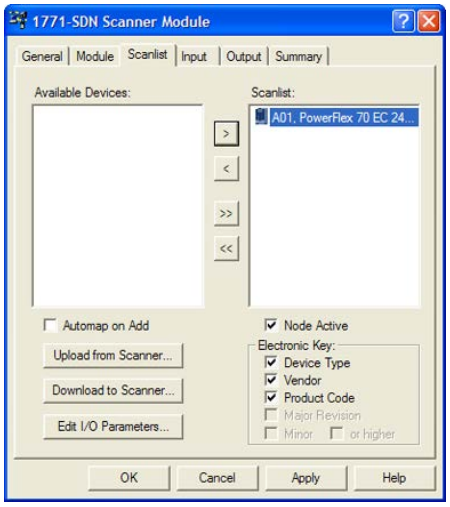
The Available Devices box shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist box shows devices that are presently on the DeviceNet network and are configured.

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

a. For this example, uncheck the Automap on Add box.

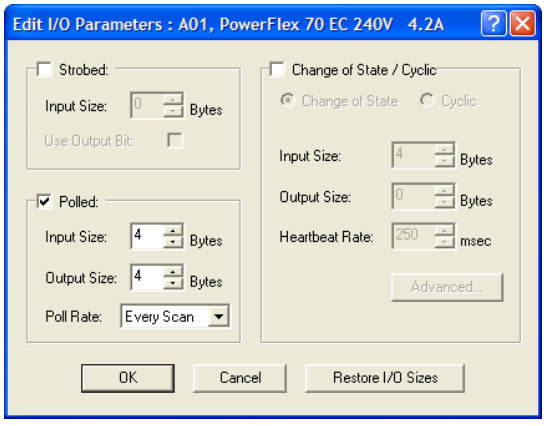
b. Select the PowerFlex 70 EC drive in the Available Devices box.

c. Click '>' to move the PowerFlex 70 EC drive to the Scanlist box.



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

d. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen for the PowerFlex 70 EC drive used in this example.



e. Select the type of data exchange (Polled, Change of State, and/or Cyclic).

For this example, we selected (and recommend) Polled.

f. For the Input Size and Output Size boxes, use the pull-down menus to choose the number of bytes that are required for your I/O.

The size will depend on the drive's Reference/Feedback and the number of Datalinks used in your I/O (enabled with adapter **Parameter 13 - [DPI I/O Cfg]**), and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of '20' and an Output Size of '20' are used.

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

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

Table 4.E Drives with 16-bit Reference/Feedback and 16-bit Datalinks

These products include the following:

- PowerFlex 70 drives with standard or enhanced control
- PowerFlex 700 drives with standard control
- PowerFlex 700H drives
- SMC Flex smart motor controllers
- SMC-50 smart motor controllers

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

Table 4.F Drives with 16-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700 drives with vector control
- PowerFlex 700L drives with 700 control
- PowerFlex Digital DC drives

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

Table 4.G Drives with 32-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700S control
- PowerFlex 753 drives
- PowerFlex 755 drives

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

g. Set the scan rate for the selected data exchange method.

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

For more information about scan rates, see RSNetWorx for DeviceNet online help.

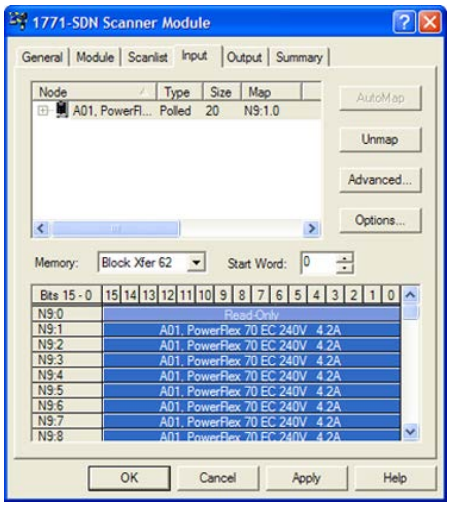
h. Click **OK**.

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

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

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

13. Click **AutoMap** to map the drive input image to the 1771-SDN scanner as shown in this example below.

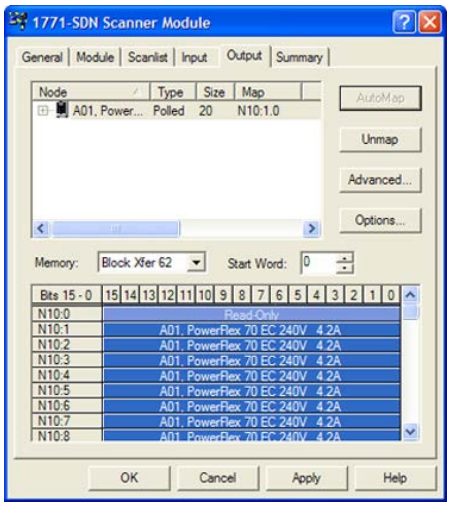


TIP: If your RSLogix 5 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive input image, set the Start Word field to the appropriate value.

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

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

15. Click **AutoMap** to map the drive output image to the 1771-SDN scanner as shown in this example below.



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

16. Click **OK**.

    If the Scanner Configuration Applet appears and asks to download these settings to the 1771-SDN scanner, click **Yes**.

17. Click **File > Save**.

    If this is the first time you saved the project, the Save As dialog box appears.

    a. Navigate to a folder.

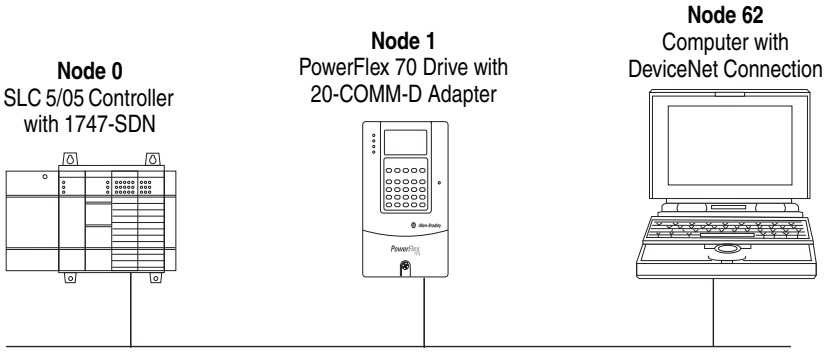
    b. Type a file name.

    c. Click **Save** to save the configuration as a file on your computer.

SLC 500 Controller Example

After the adapter is configured, the connected drive and adapter will be a single node on the network. This section provides the steps needed to configure a simple DeviceNet network (see Figure 4.3). In our example, we will configure a SLC 500 controller with 1747-SDN scanner to communicate with a drive using Logic Command/Status, Reference/Feedback, and Datalinks over the network.

Figure 4.3 SLC 500 Controller Example DeviceNet Network



Configuring Parameters for Network I/O

Because the I/O for the drive is defined in the next subsection Use RSNetWorx for DeviceNet to Configure and Save the I/O to the Controller on page 4-32, there is no need to configure any I/O inside the RSLogix 500 project, version 7.20 or later, until using the I/O as described in Chapter 5.

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

1. Set adapter **Parameters 13 - [DPI I/O Cfg]**, **25 - [M-S Input]**, and **26 - [M-S Output]** to values that meet your application requirements.

   For this example, the adapter I/O parameters are set to these values.

Adapter Parameter No.	Setting
13 - [DPI I/O Cfg]	xxxx xxxx xxx1 1111
25 - [M-S Input]	xxxx xxxx xxx1 1111
26 - [M-S Output]	xxxx xxxx xxx1 1111

2. Reset the adapter (see Resetting the Adapter on page 3-12), or power cycle the drive.

   The drive speed reference and Datalink parameter values, and the adapter setup parameters for this example are shown below.

Drive Parameter No.	Setting (1)
90 - [Speed Ref A Sel]	22 (DPI Port 5)
300 - [Data In A1]	140 (Accel Time 1)
301 - [Data In A2]	142 (Decel Time 1)
302 - [Data In B1]	100 (Jog Speed)
303 - [Data In B2]	155 (Stop Mode A)
304 - [Data In C1]	101 (Preset Speed 1)
305 - [Data In C2]	102 (Preset Speed 2)
306 - [Data In D1]	103 (Preset Speed 3)
307 - [Data In D2]	104 (Preset Speed 4)
310 - [Data Out A1]	140 (Accel Time 1)
311 - [Data Out A2]	142 (Decel Time 1)
312 - [Data Out B1]	100 (Jog Speed)
313 - [Data Out B2]	155 (Stop Mode A)
314 - [Data Out C1]	101 (Preset Speed 1)
315 - [Data Out C2]	102 (Preset Speed 2)
316 - [Data Out D1]	103 (Preset Speed 3)
317 - [Data Out D2]	104 (Preset Speed 4)

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

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

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

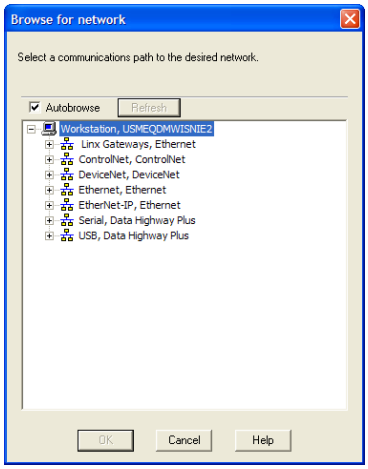
1. Start RSNetWorx for DeviceNet software.

2. In the RSNetWorx for DeviceNet window, select **File > New** to display the New File screen.

3. Select ‘DeviceNet Configuration’ as the network configuration type.

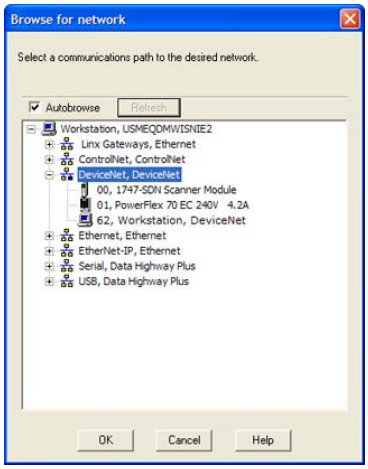
4. Click **OK**.

5. Select **Network > Online** to display the Browse for Network screen.



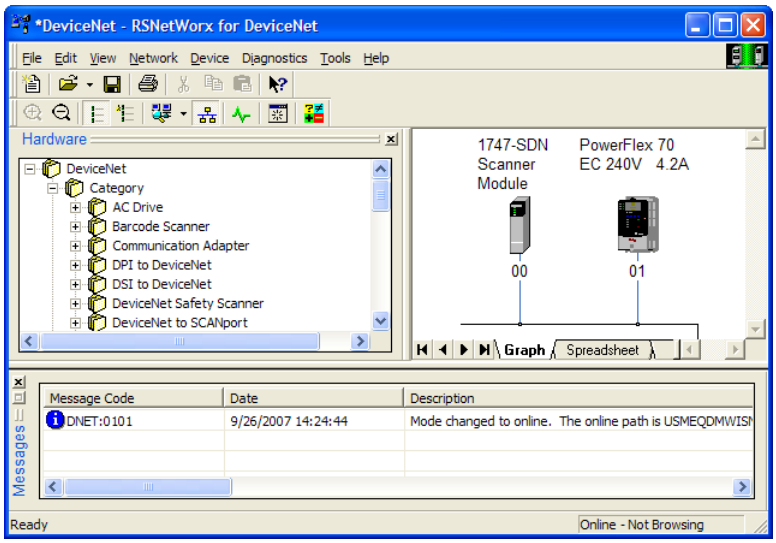
6. Expand the communication path from your computer to the 1747-SDN scanner.

   The following screen shows our example navigating to devices that are on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different.



7. After selecting a valid path to the DeviceNet network (for this example, A, DeviceNet), click **OK**.

   As the selected DeviceNet path is browsed, RSNetWorx for DeviceNet software creates a graph view window that shows a graphical representation of the devices on the network.



If the icon for the drive (for this example, PowerFlex 70 EC) on the network appears as Unrecognized Device, either use RSNetWorx for DeviceNet software to create the appropriate drive EDS file or download the EDS file from the Rockwell Automation website.

Creating the EDS File from Online DeviceNet Network

a. Right-click the Unrecognized Device icon and choose Register Device.

The EDS Wizard appears.

b. Click **Next** to start creating the EDS file.

c. Select **Create an EDS file**.

d. Click **Next**.

If the EDS file is already downloaded and resides on your computer, select the **Register an EDS file** option and click **Next**. Then follow the screen prompts and disregard the remaining steps in this procedure.

e. Type a description (if desired) and click **Next**.

f. Check the Polled box, type ‘4’ in the Input Size and Output Size boxes (which accounts for just the basic I/O), and click **Next**.

RSNetWorx for DeviceNet software will upload the EDS file from the drive.

g. Click **Next** to display the icon options for the node.

We recommend using the icon for the PowerFlex 7-Class drive being used. You can change icons by clicking **Change icon**.

h. Click **Next** to view a summary.

i. Click **Next** again to accept it.

j. Click **Finish** to finish creating the EDS file.

A new icon represents the PowerFlex 7-Class drive and communication adapter in the RSNetWorx for DeviceNet graph view window.

Downloading the EDS File from Rockwell Automation Website

a. Go to the website http://www.rockwellautomation.com/resources/eds.

b. On the web page in the Electronic Data Sheets [EDS] section, click the link ‘All Other EDS Files’.

The Find EDS Files search screen appears.

c. From the Network pull-down menu, choose the type of network (for this example, DeviceNet).

d. From the Device Type pull-down menu, choose ‘AC Drive’.

e. In the Keyword entry field, enter the type of PowerFlex drive (for this example, PowerFlex 70EC), noting that this field is space sensitive.

f. Click **Search**.

Because of many EDS files, this search may take several minutes.

g. On the EDS File Search Results screen in the Details & Download column, click the ‘Download’ link for the EDS file that corresponds to the drive.

h. Click **Save** on the File Download dialog box to save the EDS file to an appropriate location on your computer.

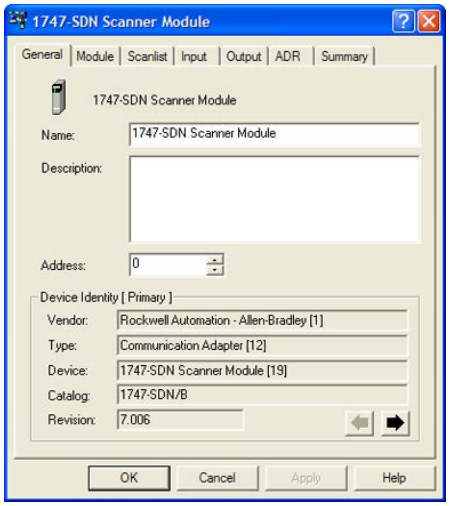
i. Launch the EDS Hardware Installation Tool by clicking the Microsoft Windows Start button and selecting **Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool**.

Follow the screen prompts to add the EDS file for use with your project.

j. Reboot the computer and repeat steps 1 through 7 at the beginning of this subsection.

The Unrecognized Device icon in the RSNetWorx for DeviceNet graph view window in step 7 should have been replaced by a drive icon (for this example, the icon for a PowerFlex 70 EC drive).

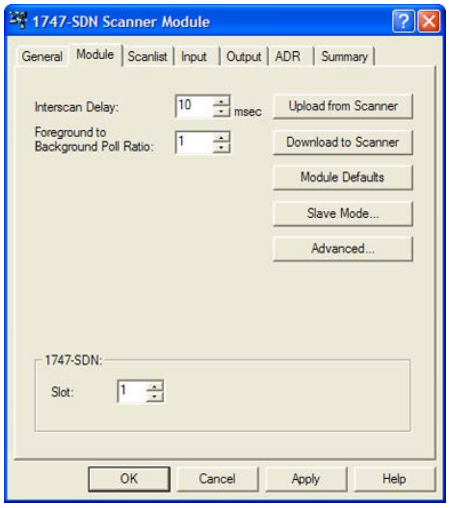
8. In the graph view window, right-click the 1747-SDN icon and choose **Properties…** to display its properties screen.



9. Click the Module tab to display the Scanner Configuration Applet screen.

10. Click **Upload** to upload the 1747-SDN configuration to the RSNetWorx for DeviceNet project.

The 1747-SDN Module Tab screen appears.



a. Edit the following.

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

b. Click **Apply**.

11. Click the Scanlist tab to begin the drive I/O configuration.

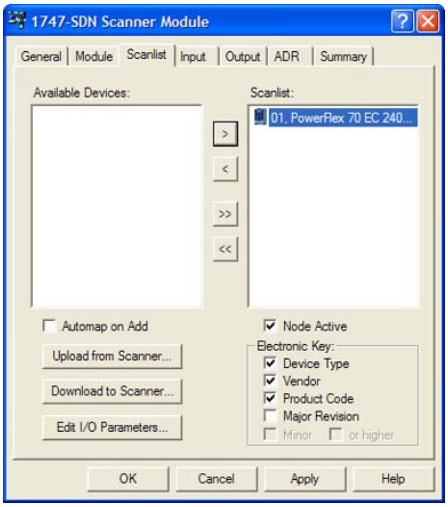
The Available Devices box shows devices that are presently on the DeviceNet network but are not yet configured. The Scanlist box shows devices that are presently on the DeviceNet network and are configured.

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

a. For this example, uncheck the Automap on Add box.

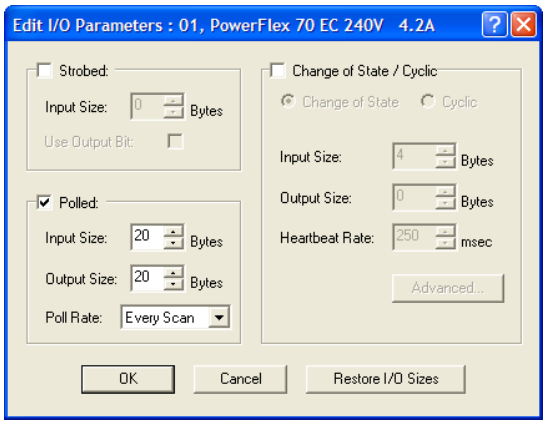
b. Select the PowerFlex 70 EC drive in the Available Devices box.

c. Click '**>**' to move the PowerFlex 70 EC drive to the Scanlist box.



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

d. Click **Edit I/O Parameters…** to display the Edit I/O Parameters screen for the PowerFlex 70 EC drive used in this example.



e. Select the type of data exchange (Polled, Change of State, and/or Cyclic).

For this example, we selected (and recommend) Polled.

f. For the Input Size and Output Size boxes, use the pull-down menus to choose the number of bytes that are required for your I/O.

The size will depend on the drive's Reference/Feedback and the number of Datalinks used in your I/O (enabled with adapter **Parameter 13 - [DPI I/O Cfg]**), and the selected data exchange method. (A 16-bit word is two bytes, and a 32-bit word is four bytes.) For this example, an Input Size of '20' and an Output Size of '20' are used.

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

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

Table 4.H Drives with 16-bit Reference/Feedback and 16-bit Datalinks

These products include the following:

- PowerFlex 70 drives with standard or enhanced control
- PowerFlex 700 drives with standard control
- PowerFlex 700H drives
- SMC Flex smart motor controllers
- SMC-50 smart motor controllers

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

Table 4.I Drives with 16-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700 drives with vector control
- PowerFlex 700L drives with 700 control
- PowerFlex Digital DC drives

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

Table 4.J Drives with 32-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700S control
- PowerFlex 753 drives
- PowerFlex 755 drives

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

g. Set the scan rate for the selected data exchange method.

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

For more information about scan rates, see RSNetWorx for DeviceNet software online help.

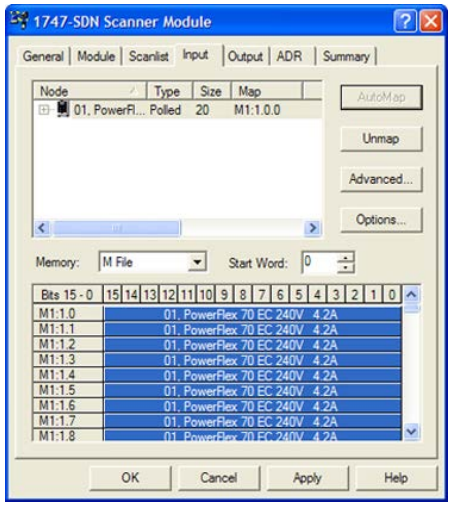
h. Click **OK**.

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

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

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

13. Click **AutoMap** to map the drive input image to the 1747-SDN scanner as shown in this example below.



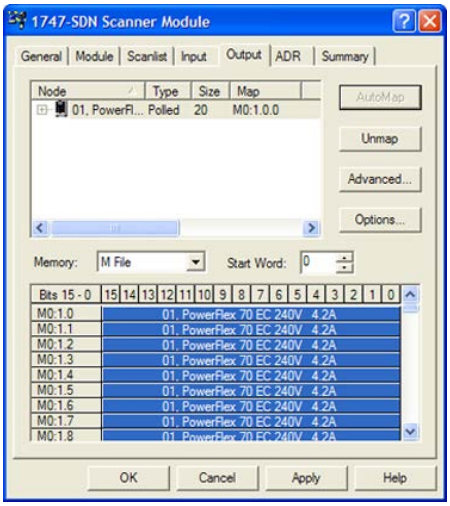
TIP: If your RSLogix 500 project requires a different starting Word (word, 32-bit) than the default value of 0 for the drive input image, set the Start Word field to the appropriate value.

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

Important: If your RSLogix 500 project requires a different memory selection than the default setting for the drive output image, set the Memory field to the appropriate setting. For this

example, change the default setting of Discrete to M File and its corresponding M-files are used.

15. Click **AutoMap** to map the drive output image to the 1747-SDN scanner as shown in this example below.



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

16. Click **OK**.

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

17. Click **File > Save**.

    If this is the first time you saved the project, the Save As dialog box appears.

    a. Navigate to a folder.

    b. Type a file name.

    c. Click **Save** to save the configuration as a file on your computer.

Notes:

Using the I/O

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

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation 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 CIP-based networks, including DeviceNet, I/O connections are used to transfer the data which controls the PowerFlex drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in PowerFlex 7-Class drives.

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

- Configuring the size of I/O by enabling or disabling the Logic Command/Reference and Datalinks
- Setting a Master-Slave hierarchy or a Peer-to-Peer hierarchy
- Using a Change of State, Cyclic, or Polled data exchange method

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

Understanding the I/O Image

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

- Size (either 16-bit or 32-bit) of the Reference/Feedback words and Datalink words used by the drive. To determine the size of the Reference/Feedback and Datalinks, view adapter **Parameters 07 - [Ref/Fdbk Size]** and **08 - [Datalink Size]**. For information to access parameters, see Using the PowerFlex 7-Class HIM to Access Parameters on page 3-2.
- Configuration of I/O (**Parameter 13 - [DPI I/O Cfg]**). If all I/O is not enabled, the image is truncated. The image always uses consecutive words starting at word 0.

ControlLogix Controller Image

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

The ControlLogix controller I/O image changes depending on the size of the drive’s Reference/Feedback and Datalinks, and the number of Datalinks used. Table 5.A, Table 5.B, and Table 5.C show the I/O image when using various PowerFlex 7-Class drives, and all Datalinks enabled.

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

Table 5.A ControlLogix Controller I/O Image for Drives with 16-bit Reference/ Feedback and 16-bit Datalinks

These products include the following:

- PowerFlex 70 drives with standard or enhanced control
- PowerFlex 700 drives with standard control
- PowerFlex 700H drives
- SMC Flex smart motor controllers
- SMC-50 smart motor controllers

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

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

Table 5.B ControlLogix Controller I/O Image for Drives with 16-bit Reference/ Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700 drives with vector control
- PowerFlex 700L drives with 700 control
- PowerFlex Digital DC drives

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

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

Table 5.C ControlLogix Controller I/O Image for Drives with 32-bit Reference/ Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700S control
- PowerFlex 753 drives
- PowerFlex 755 drives

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

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

PLC-5 or SLC 500 Controller Image

The I/O image for these controllers changes depending on the size of the drive's Reference/Feedback and Datalinks, and the number of Datalinks used. Table 5.D, Table 5.E, and Table 5.F show the I/O image when using various PowerFlex 7-Class drives, and all Datalinks enabled.

Table 5.D PLC-5 or SLC 500 Controller I/O Image for Drives with 16-bit Reference/ Feedback and 16-bit Datalinks

These products include the following:

- PowerFlex 70 drives with standard or enhanced control
- PowerFlex 700 drives with standard control
- PowerFlex 700H drives
- SMC Flex smart motor controllers
- SMC-50 smart motor controllers

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

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

Table 5.E PLC-5 or SLC 500 Controller I/O Image for Drives with 16-bit Reference/ Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700 drives with vector control
- PowerFlex 700L drives with 700 control
- PowerFlex Digital DC drives

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

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

Table 5.F PLC-5 or SLC 500 Controller I/O Image for Drives with 32-bit Reference/ Feedback and 32-bit Datalinks

These products include the following:

- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700S control
- PowerFlex 753 drives
- PowerFlex 755 drives

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

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

Using Logic Command/ Status

The Logic Command is a 16-bit word of control data produced by the controller and consumed by the adapter. The Logic Status is a 16-bit word of status data produced by the adapter and consumed by the controller. PowerFlex 750-Series drives have a 32-bit Logic Command/Status—but when using a 20-COMM-D adapter only the first 16 bits can be used.

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

Using Reference/Feedback

The Reference is produced by the controller and consumed by the adapter. The Feedback is produced by the adapter and consumed by the controller. The size of the Reference/Feedback is determined by the drive and can be displayed with adapter **Parameter 07 - [Ref/Fdbk Size]**.

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

When the Reference and Feedback are enabled, and a ControlLogix controller is used, specific controller tags are automatically created, sized

(16-bit or 32-bit), and placed in the I/O image. If the DeviceNet Tag Generator was used, the generic (non-descriptive) tag names were replaced with descriptive tag names.

PowerFlex 70/700/700H, and PowerFlex 700L Drives with 700 Control

The Reference/Feedback value is a scaled engineering value; it is **not** in Hertz or RPM. The Reference uses a '32767' scale. The '32767' endpoint of the scale is equal to the value of drive parameter 55 - [Maximum Freq], which has a default value of 130 Hz. For these drives, default scaling is 0…15123 which is equal to 0…60.0 Hz. This is based on the formula shown below. Reference/Feedback scaling is limited by drive parameter 82 - [Maximum Speed]. If the default value of 60 Hz. for parameter 82 - [Maximum Speed] is changed, the speed Reference/Feedback scaling also changes. To determine Reference/Feedback scaling, use the following formula:

(Parameter 82 ÷ Parameter 55) * 32767 = Scaling

Using drive parameter 82 and 55 default values, speed Reference/Feedback scaling is:

(60 Hz ÷ 130 Hz) * 32767 = 15123

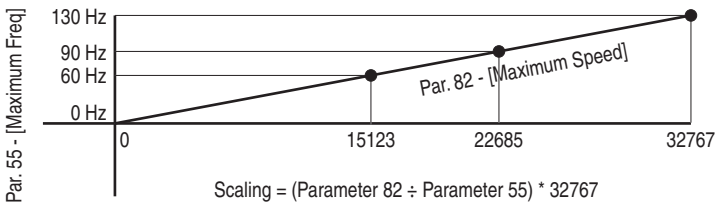
Therefore, 0…15123 = 0…60.0 Hz.

If parameter 82 - [Maximum Speed] is changed to 90 Hz, then:

(90 Hz ÷ 130 Hz) * 32767 = 22685

Therefore, 0…22685 = 0…90.0 Hz.

A graphic representation of this Reference/Feedback scaling is shown below.



For PowerFlex 70 drives with enhanced control, firmware 2.xxx or later, or PowerFlex 700 drives with vector control, firmware 3.xxx or later, drive parameter 298 - [DPI Ref Select] was added to simplify scaling for the speed Reference/Feedback. When drive parameter 298 - [DPI Ref Select] is set to its default '0' (Max Freq), the speed Reference/Feedback scaling is as shown above. However, when parameter 298 - [DPI Ref Select] is set to '1' (Max Speed), the speed Reference/Feedback scaling is equal to parameter 82 - [Max Speed]:

Parameter 82 = Scaling

Using the parameter 82 default value, speed Reference/Feedback scaling is:

0…32767 = 0…60.0 Hz.

If parameter 82 - [Maximum Speed] is changed to 90 Hz, then:

90 Hz = 32767

Speed Feedback uses the same scaling as the speed Reference.

TIP: For PowerFlex 700 drives with vector control, firmware 3.xxx or later, parameter 299 - [DPI Fdbk Select] enables you to select the feedback data coming from the drive over DPI. The default is 'Speed Fdbk' in Hz or RPM determined by parameter 079 - [Speed Units]. The data selection for parameter 299 is also displayed on the 1st line of the HIM and on DriveExplorer and DriveExecutive software screens in the drive status area of the screen.

PowerFlex 700S and PowerFlex 700L Drives with 700S Control

The Reference/Feedback value is:

32767 = Base Motor Speed

The base speed is set using drive parameter 4 - [Motor RPM]. To set a speed Reference/Feedback above base speed, a value greater than 32767 must be entered.

For 16-bit processors, such as PLC-5 and SLC 500 controllers, the data requires manipulation to set a speed Reference above 32767 or below -32767. Please see the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, in the Chapter 1 'Communications' section. Then go to the 'PLC 5 or SLC System' subsection and see the 'Reference/Feedback Programming' sub-subsection.

PowerFlex 753/755 Drives

The Reference/Feedback value is Hz x 1000 or RPM x 1000. Drive parameter 300 - [Speed Units] determines whether the scaling is Hz or RPM. The default scaling is Hz, where 0…60,000 equates to 0…60.000 Hz. When parameter 300 is set to RPM, then 0…1,765,000 equates to 0…1765.000 RPM.

For 16-bit processors, such as PLC-5 and SLC 500 controllers, the data requires manipulation to set a speed Reference above 32767 or below -32767. Please see the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, in the Chapter 1 'Communications' section. Then go to the 'PLC 5 or SLC System' subsection and see the 'Reference/Feedback Programming' sub-subsection.

PowerFlex Digital DC Drives

The Reference/Feedback value is:

25000 = Maximum Reference Speed

The maximum reference speed is set using drive parameter 45 - [Max Ref Speed].

Using Datalinks

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

Rules for Using Datalinks

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

Datalink Scaling

PowerFlex 70/700/700H Drives and PowerFlex 700L Drives with 700 Control

Datalink scaling is not automatic and uses whole numbers (INTs or DINTs). See the drive documentation to determine the unit resolution for the associated parameter Datalink. For example, PowerFlex 700VC drive parameter 3 - [Output Current] has a 0.1 unit resolution. Because Datalink scaling uses whole numbers, the Output Current value is multiplied by 10 in the adapter and then sent over the network. Suppose the actual Output Current value is 35.5 amps. Reading the associated parameter Datalink received by the controller, the value would be 355. By using ladder logic, divide the value by 10 in the controller to get the correct scaling. See the drive documentation to determine if the Datalink parameter is a 16-bit or 32-bit parameter.

PowerFlex 700S, PowerFlex 700L with 700S Control, PowerFlex 753/755, and PowerFlex Digital DC Drives

Datalinks require scaling in the following way. Parameters are either 16-bit or 32-bit integers or REALs. When the parameter is a 32-bit integer, the data needs to be copied using a COP command to a DINT tag. (Because PLC-5 and SLC 500 controllers do not support 32-bit integers, the data must be separated into two 16-bit integers.) When the parameter is a REAL, the data needs to be copied using a COP command to a REAL tag. See subsequent sections in this chapter for ladder logic examples. See the drive documentation to determine if the Datalink parameter is a 16-bit or 32-bit integer parameter, or a REAL parameter.

Using 16-Bit Datalinks to Read/Write 32-Bit Parameters

This subsection only pertains to PowerFlex 70 (standard or enhanced control), PowerFlex 700 (standard control), and PowerFlex 700H drives which use 16-bit Datalinks. To read or write a 32-bit parameter using 16-bit Datalinks, typically both Datalinks of a pair (A, B, C, D) are set to the same 32-bit parameter. For example, to read parameter 10 - [Elapsed Run Time] in a PowerFlex 70 drive, both Datalink A1 Out (Parameter 310) and Datalink A2 Out (Parameter 311) are set to ‘10’. Datalink A1 Out will contain the least significant word (LSW) and Datalink A2 Out will contain the most significant word (MSW).

32-bit data is stored in binary as follows:

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

In this example, the parameter 10 - [Elapsed Run Time] value of 6553.9 Hrs is read as ‘6553.9’ in Datalink A1 Out (Parameter 310) and Datalink A2 Out (Parameter 311).

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

Conversion Example:

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

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

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

Conversion Example:

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

Example Ladder Logic Program Information

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

Functions of the Example Programs

The example programs enable you to do the following:

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

Logic Command/Status Words

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

ControlLogix Controller Example

Creating Ladder Logic with Non-descriptive Tags Using RSLogix 5000 Software, All Versions

Drive and Adapter Parameter Settings

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

Device	Parameter	Value	Description
PowerFlex 70 EC Drive	90 - [Speed Ref A Sel	22 (DPI Port 5)	Assigns 20-COMM-D to be used for the Reference.
	300 - [Data In A1]	140	Points to Par. 140 - [Accel Time 1]
	301 - [Data In A2]	142	Points to Par. 142 - [Decel Time 1]
	302 - [Data In B1]	100	Points to Par. 100 - [Jog Speed]
	303 - [Data In B2]	155	Points to Par. 155 - [Stop Mode A]
	304 - [Data In C1]	101	Points to Par. 101 - [Preset Speed 1]
	305 - [Data In C2]	102	Points to Par. 102 - [Preset Speed 2]
	306 - [Data In D1]	103	Points to Par. 103 - [Preset Speed 3]
	307 - [Data In D2]	104	Points to Par. 104 - [Preset Speed 4]
	310 - [Data Out A1]	140	Points to Par. 140 - [Accel Time 1]
	311 - [Data Out A2]	142	Points to Par. 142 - [Decel Time 1]
	312 - [Data Out B1]	100	Points to Par. 100 - [Jog Speed]
	313 - [Data Out B2]	155	Points to Par. 155 - [Stop Mode A]
	314 - [Data Out C1]	101	Points to Par. 101 - [Preset Speed 1]
	315 - [Data Out C2]	102	Points to Par. 102 - [Preset Speed 2]
	316 - [Data Out D1]	103	Points to Par. 103 - [Preset Speed 3]
	317 - [Data Out D2]	104	Points to Par. 104 - [Preset Speed 4]
20-COMM-D Adapter	03 - [DN Addr Cfg]	2	Node address for the adapter.
	13 - [DPI I/O Cfg]	xxx1 1111	Enables Cmd/Ref and Datalinks A…D.
	25 - [M-S Input]	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26 - [M-S Output]	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

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

Controller Tags

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

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

Name	Data Type	Description
Local:3:I	AB:1756_DNB...	
Local:3:O	AB:1756_DNB...	
Local:3:S	AB:1756_DNB...	

You can expand the Input and Output tags to reveal the input and output configuration. The Input tag for this example requires ten 16-bit words of data (see Figure 5.2). The Output tag for this example program requires ten 16-bit words of data (see Figure 5.3).

Figure 5.2 ControlLogix Input Image with Non-descriptive Controller Tags for Example Ladder Logic Program

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

Figure 5.3 ControlLogix Output Image with Non-descriptive Controller Tags for Example Ladder Logic Program

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

Program Tags

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

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

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

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

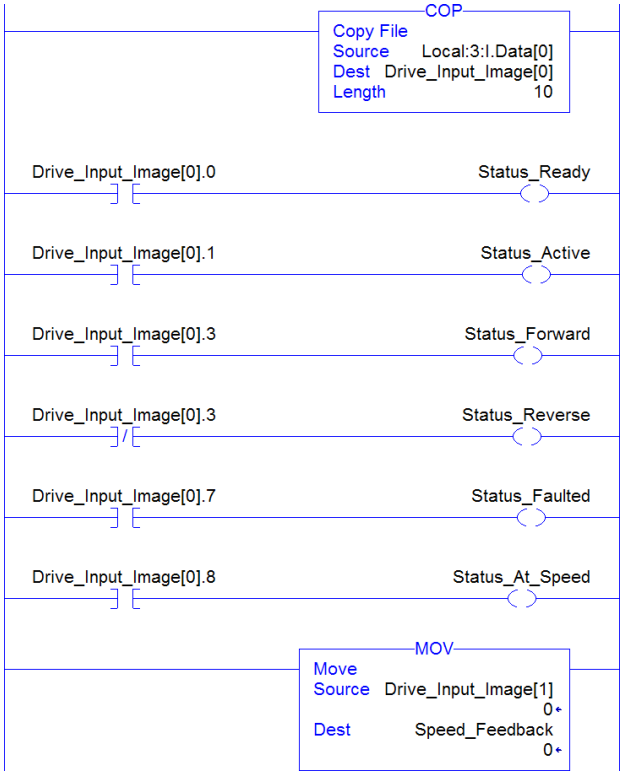
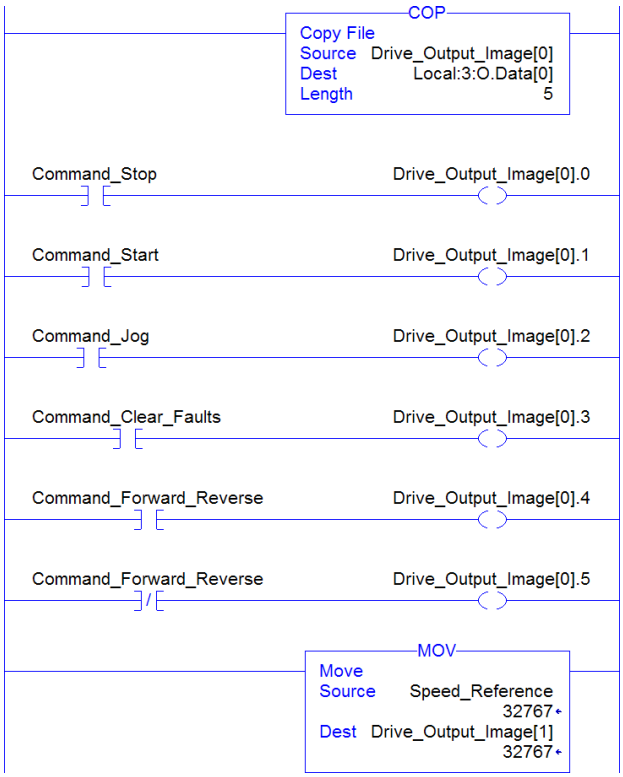


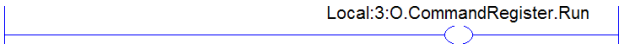
Figure 5.6 ControlLogix Example Ladder Logic Program with Non-descriptive Controller Tags for Logic Command/Reference



Enabling the DeviceNet Scanner

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

Figure 5.7 Ladder Logic Rung for Command Register Run Bit



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

Example Datalink Data

The Datalink data used in the example program is shown in Figure 5.8. Note that to describe the parameters to which the Datalinks are assigned, you may want to add descriptions to the automatically-created generic controller tags or create a User Defined Data Types (UDDT).

Figure 5.8 ControlLogix Example Datalinks for Ladder Logic Program with Non-descriptive Controller Tags

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

Creating Ladder Logic with Descriptive Tags Using RSLogix 5000 Software, Version 13.00 or Later

If the DeviceNet Tag Generator was used in Chapter 4 to automatically create descriptive controller tags for the entire I/O image, these tags can be used to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (PanelView, and so forth) to operate the drive and view its status, you will need to create descriptive Program tags (Figure 5.9) and a ladder logic program that will pass the Controller tag data to the Program tags.

TIP: If the descriptive controller tags created by the DeviceNet Tag Generator are not properly named, the correct EDS file may not have been used. The DeviceNet Tag Generator will only create correct tag names if the EDS file being used is downloaded from the website (see Downloading the EDS File from Rockwell Automation Website on page 4-8)—not created from the network.

Figure 5.9 ControlLogix Descriptive Program Tags for Example Ladder Logic Program

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

An example ladder logic program that uses the automatically-created descriptive Controller tags and passes their data to the user-defined Program tags is shown in Figure 5.10 and Figure 5.11. Note that the prefix for the drive Controller tags is determined by the name assigned when configuring the I/O (Chapter 4).

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

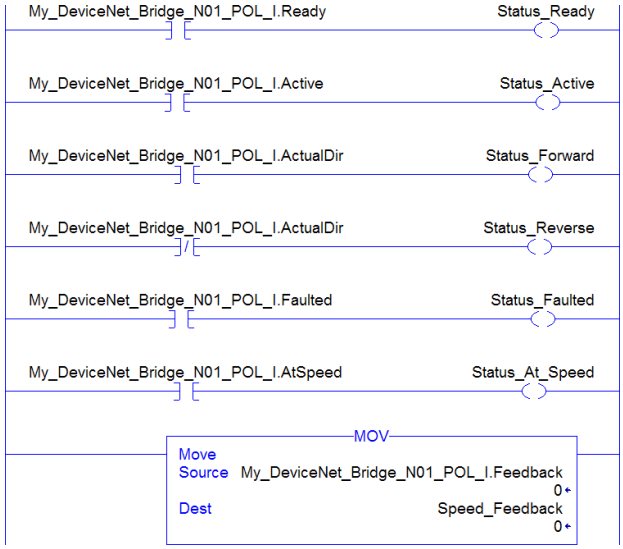
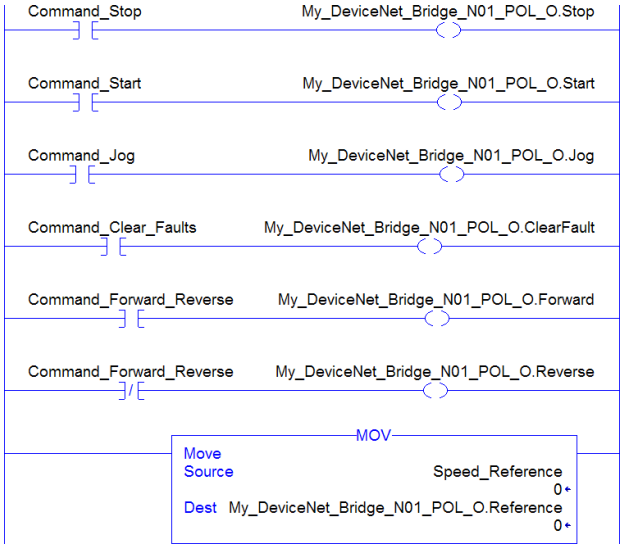


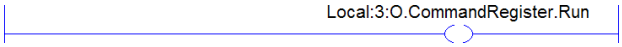
Figure 5.11 ControlLogix Example Ladder Logic Program with Descriptive Controller Tags for Logic Command/Reference



Enabling the DeviceNet Scanner

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

Figure 5.12 Ladder Logic Rung for Command Register Run Bit



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

Example Datalink Data

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

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

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

PLC-5 Controller Example

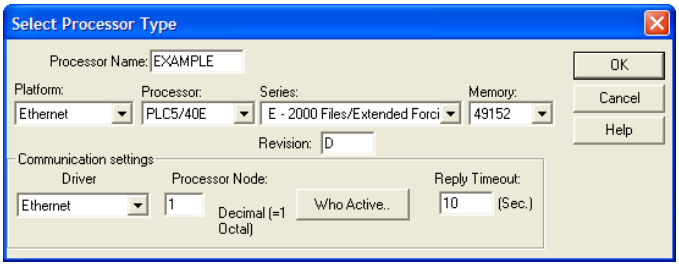
Creating an RSLogix 5 Project, Version 7.20 or Later

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

1. Start RSLogix 5 software.

   The RSLogix 5 window appears.

2. Select **File > New** to display the Select Processor Type screen.



3. Assign a name for the processor.

4. From the pull-down menus, choose the appropriate choices to match your PLC-5 controller and application.

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

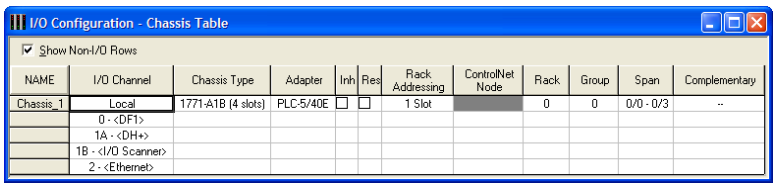
5. Click **OK**.

   The RSLogix 5 project window appears.

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

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

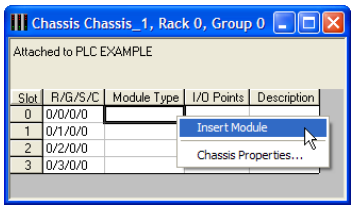
1. In the RSLogix 5 project treeview left pane, double-click IO Configuration to display the I/O Configuration - Chassis Table screen.



2. In the Chassis Type column, set the chassis type to match the chassis being used.

   For this example, the 1771-A1B (4 slots) is selected.

3. In the I/O Channel column, right-click the **Local** cell and choose **Display Chassis** to display the Chassis configuration screen.

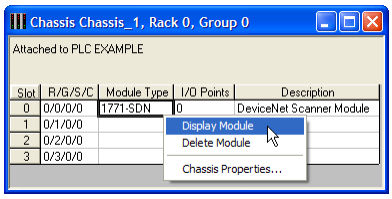


4. In the Module Type column, right-click the cell that corresponds with the slot row in which the 1771-SDN scanner physically resides (for this example, Slot 0) and choose **Insert Module** to display the Edit Module screen.

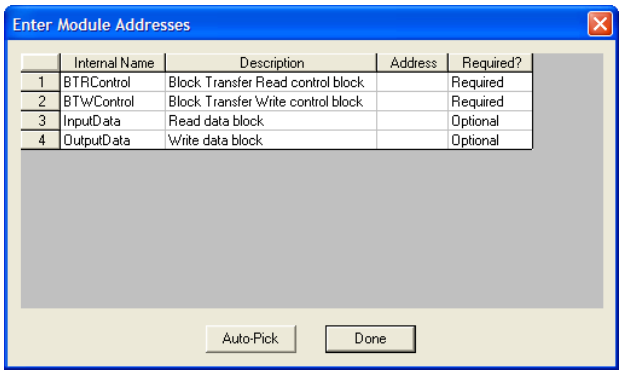
5. In the Edit Module screen, select '1771-SDN - DeviceNet Scanner Module'.

6. Click **OK**.

   The 1771-SDN scanner should now appear in the Module Type column in the appropriate slot row as shown in the example below.



7. Right-click the '1771-SDN' cell and choose **Display Module** to display the Enter Module Addresses screen.



   a. In the Enter Module Addresses screen, enter unique block transfer read and write control block addresses in the Address column.

      For this example, BT11:0 is used for the block transfer read and BT11:1 is used for the block transfer write.

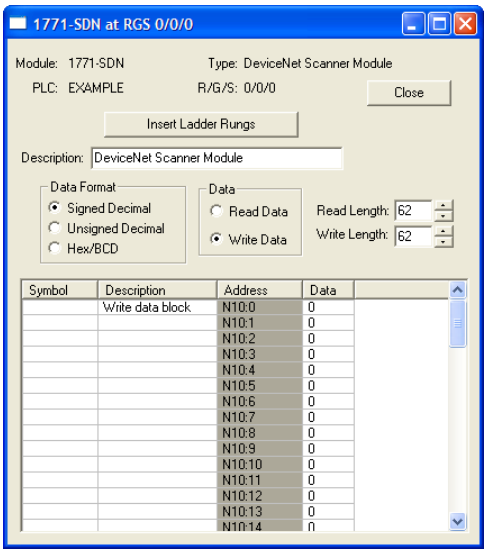
b. For the input data and output data rows, enter the corresponding N-files that were used in configuring the I/O (see step 10-b on page 4-26).

For this example, N9:0 is used for the input data and N10:0 is used for the output data.

c. After the Address column has been configured, click **Done**.

8. When the Monitor message screen appears, click **Yes**.

The 1771-SDN at RGS 0/0/0 screen appears.



a. Set the Read Length and Write Length fields to correspond with the default Block Xfer 62 and its associated N-files that were configured in step 10-b on page 4-26.

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

b. Click **Insert Ladder Rungs** to display the Select Program File For Rung Insertion screen.

In this screen, select the ladder file that you want the ladder rungs to be inserted into, and click **OK**.

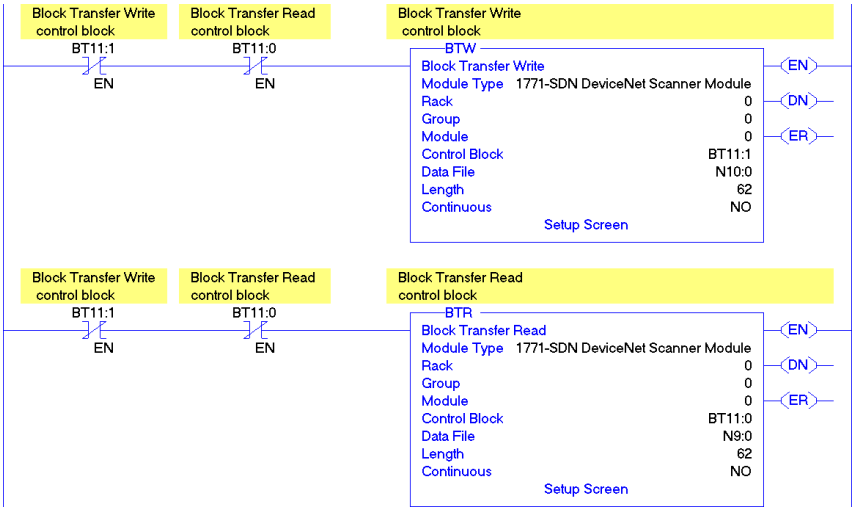
c. In the 1771-SDN at RGS 0/0/0 screen, click **Close** to close this screen.

9. When the Monitor message screen appears, click **Yes**.

The instructions will now appear in the form of rungs in the ladder file you selected.

The resulting ladder logic from this configuration is shown in Figure 5.14.

Figure 5.14 Ladder Logic for Communication Between the 1771-SDN Scanner and PLC-5 Processor



Drive and Adapter Parameter Settings

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

Device	Parameter	Value	Description
PowerFlex 70 EC Drive	90 - [Speed Ref A Sel	22 (DPI Port 5)	Assigns 20-COMM-D to be used for the Reference.
	300 - [Data In A1]	140	Points to Par. 140 - [Accel Time 1]
	301 - [Data In A2]	142	Points to Par. 142 - [Decel Time 1]
	302 - [Data In B1]	100	Points to Par. 100 - [Jog Speed]
	303 - [Data In B2]	155	Points to Par. 155 - [Stop Mode A]
	304 - [Data In C1]	101	Points to Par. 101 - [Preset Speed 1]
	305 - [Data In C2]	102	Points to Par. 102 - [Preset Speed 2]
	306 - [Data In D1]	103	Points to Par. 103 - [Preset Speed 3]
	307 - [Data In D2]	104	Points to Par. 104 - [Preset Speed 4]
	310 - [Data Out A1]	140	Points to Par. 140 - [Accel Time 1]
	311 - [Data Out A2]	142	Points to Par. 142 - [Decel Time 1]
	312 - [Data Out B1]	100	Points to Par. 100 - [Jog Speed]
	313 - [Data Out B2]	155	Points to Par. 155 - [Stop Mode A]
	314 - [Data Out C1]	101	Points to Par. 101 - [Preset Speed 1]
	315 - [Data Out C2]	102	Points to Par. 102 - [Preset Speed 2]
	316 - [Data Out D1]	103	Points to Par. 103 - [Preset Speed 3]
	317 - [Data Out D2]	104	Points to Par. 104 - [Preset Speed 4]
20-COMM-D Adapter	03 - [DN Addr Cfg]	2	Node address for the adapter.
	13 - [DPI I/O Cfg]	xxx1 1111	Enables Cmd/Ref and Datalinks A…D.
	25 - [M-S Input]	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26 - [M-S Output]	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

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

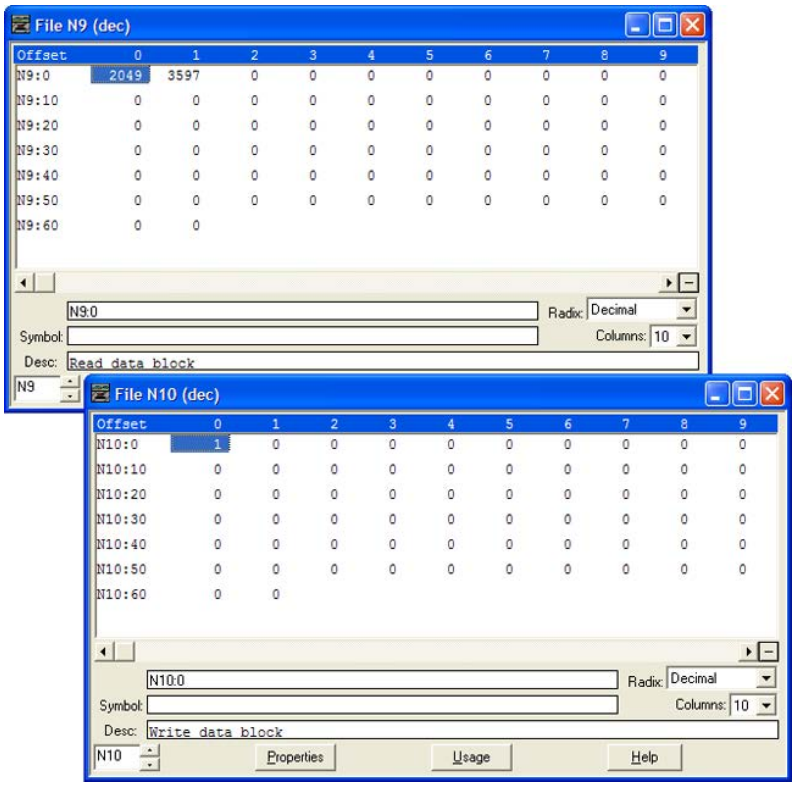
TIP: When using a drive that has 16-bit Datalinks (PowerFlex 70, PowerFlex 700, and PowerFlex 700H drives) to transfer a 32-bit parameter, two contiguous drive Datalink parameters (for example, Data Out A1/A2, B1/B2, and so forth) are required. To determine if a parameter is a 32-bit parameter, see the Parameter section in the drive documentation and look for a 32 symbol in the 'No.' column. (All parameters in PowerFlex 700 Series B drives are 32-bit parameters.) For example, parameter 3 - [Output Current] in a PowerFlex 70 EC drive is a 32-bit parameter. When using a drive that has 32-bit Datalinks (PowerFlex 700 VC, PowerFlex 700S, and PowerFlex 750-Series drives), only one drive Datalink parameter is required to transfer any parameter.

Understanding PLC-5 Controller Data Table Addresses

Because the PLC-5 controller is a 16-bit platform and is used with the 32-bit 20-COMM-D adapter, the data will be transposed from the least-significant word (LSW) to the most-significant word (MSW) in the controller.

When the I/O was configured (Chapter 4), two available data table addresses (N9:0 for input data and N10:0 for output data) were used. Figure 5.15 shows the entire data file address structure for this example.

Figure 5.15 Data File Table for Example Ladder Logic Program



Depending on the drive, Table 5.G, Table 5.H, Table 5.I, Table 5.J, Table 5.K, or Table 5.L show the I/O definitions as they relate to the N9:0 and N10:0 data table addresses (Figure 5.15) being used in this example.

PowerFlex 70, PowerFlex 700 with Standard Control, and PowerFlex 700H Drives

When using any of these products—which all contain INT (16-bit format) data types—you will read from and write to a single data table address in the controller.

Table 5.G PLC-5 Data Table Addresses for:
PowerFlex 70 Drives with Standard or Enhanced Control
PowerFlex 700 Drives with Standard Control
PowerFlex 700H Drives

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

PowerFlex 700 Drives with Vector Control and PowerFlex 700L Drives with 700 Control

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

Table 5.H PLC-5 Data Table Addresses for:
PowerFlex 700 Drives with Vector Control
PowerFlex 700L Drives with 700 Control

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

PowerFlex 700S, PowerFlex 700L with 700S Control, PowerFlex 750-Series, and PowerFlex Digital DC Drives

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

Table 5.I PLC-5 Data Table Addresses for PowerFlex 700S Drives (Phase I Control)

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

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

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

Table 5.K PLC-5 Data Table Addresses for PowerFlex 750-Series Drives

Data Table Address	Description
N9:0	1771-SDN Scanner Status Word (see its User Manual for bit definitions)
N9:1	Logic Status (see Appendix D)
N9:2	Not Used
N9:3	Speed Feedback LSW
N9:4	Speed Feedback MSW
N9:5	Value of parameter assigned to Parameter 905 [Data Out A1] LSW
N9:6	Value of parameter assigned to Parameter 905 [Data Out A1] MSW
N9:7	Value of parameter assigned to Parameter 906 [Data Out A2] LSW
N9:8	Value of parameter assigned to Parameter 906 [Data Out A2] MSW
N9:9	Value of parameter assigned to Parameter 907 [Data Out B1] LSW
N9:10	Value of parameter assigned to Parameter 907 [Data Out B1] MSW
N9:11	Value of parameter assigned to Parameter 908 [Data Out B2] LSW
N9:12	Value of parameter assigned to Parameter 908 [Data Out B2] MSW
N9:13	Value of parameter assigned to Parameter 909 [Data Out C1] LSW
N9:14	Value of parameter assigned to Parameter 909 [Data Out C1] MSW
N9:15	Value of parameter assigned to Parameter 910 [Data Out C2] LSW
N9:16	Value of parameter assigned to Parameter 910 [Data Out C2] MSW
N9:17	Value of parameter assigned to Parameter 911 [Data Out D1] LSW
N9:18	Value of parameter assigned to Parameter 911 [Data Out D1] MSW
N9:19	Value of parameter assigned to Parameter 912 [Data Out D2] LSW
N9:20	Value of parameter assigned to Parameter 912 [Data Out D2] MSW
N10:0	1771-SDN Scanner Command Word (see its User Manual for bit definitions)
N10:1	Logic Command (see Appendix D)
N10:2	Not Used
N10:3	Speed Reference LSW
N10:4	Speed Reference MSW
N10:5	Value of parameter assigned to Parameter 895 [Data In A1] LSW
N10:6	Value of parameter assigned to Parameter 895 [Data In A1] MSW
N10:7	Value of parameter assigned to Parameter 896 [Data In A2] LSW
N10:8	Value of parameter assigned to Parameter 896 [Data In A2] MSW
N10:9	Value of parameter assigned to Parameter 897 [Data In B1] LSW
N10:10	Value of parameter assigned to Parameter 897 [Data In B1] MSW
N10:11	Value of parameter assigned to Parameter 898 [Data In B2] LSW
N10:12	Value of parameter assigned to Parameter 898 [Data In B2] MSW
N10:13	Value of parameter assigned to Parameter 899 [Data In C1] LSW
N10:14	Value of parameter assigned to Parameter 899 [Data In C1] MSW
N10:15	Value of parameter assigned to Parameter 900 [Data In C2] LSW
N10:16	Value of parameter assigned to Parameter 900 [Data In C2] MSW
N10:17	Value of parameter assigned to Parameter 901 [Data In D1] LSW
N10:18	Value of parameter assigned to Parameter 901 [Data In D1] MSW
N10:19	Value of parameter assigned to Parameter 902 [Data In D2] LSW
N10:20	Value of parameter assigned to Parameter 902 [Data In D2] MSW

Table 5.L PLC-5 Data Table Addresses for PowerFlex Digital DC Drives

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Speed Feedback LSW
N9:2	Speed Feedback MSW
N9:3	Value of parameter assigned to Parameter 618 [Data Out A1] LSW
N9:4	Value of parameter assigned to Parameter 618 [Data Out A1] MSW
N9:5	Value of parameter assigned to Parameter 619 [Data Out A2] LSW
N9:6	Value of parameter assigned to Parameter 619 [Data Out A2] MSW
N9:7	Value of parameter assigned to Parameter 620 [Data Out B1] LSW
N9:8	Value of parameter assigned to Parameter 620 [Data Out B1] MSW
N9:9	Value of parameter assigned to Parameter 621 [Data Out B2] LSW
N9:10	Value of parameter assigned to Parameter 621 [Data Out B2] MSW
N9:11	Value of parameter assigned to Parameter 622 [Data Out C1] LSW
N9:12	Value of parameter assigned to Parameter 622 [Data Out C1] MSW
N9:13	Value of parameter assigned to Parameter 623 [Data Out C2] LSW
N9:14	Value of parameter assigned to Parameter 623 [Data Out C2] MSW
N9:15	Value of parameter assigned to Parameter 624 [Data Out D1] LSW
N9:16	Value of parameter assigned to Parameter 624 [Data Out D1] MSW
N9:17	Value of parameter assigned to Parameter 625 [Data Out D2] LSW
N9:18	Value of parameter assigned to Parameter 625 [Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Speed Reference LSW
N10:2	Speed Reference MSW
N10:3	Value of parameter assigned to Parameter 610 [Data In A1] LSW
N10:4	Value of parameter assigned to Parameter 610 [Data In A1] MSW
N10:5	Value of parameter assigned to Parameter 611 [Data In A2] LSW
N10:6	Value of parameter assigned to Parameter 611 [Data In A2] MSW
N10:7	Value of parameter assigned to Parameter 612 [Data In B1] LSW
N10:8	Value of parameter assigned to Parameter 612 [Data In B1] MSW
N10:9	Value of parameter assigned to Parameter 613 [Data In B2] LSW
N10:10	Value of parameter assigned to Parameter 613 [Data In B2] MSW
N10:11	Value of parameter assigned to Parameter 614 [Data In C1] LSW
N10:12	Value of parameter assigned to Parameter 614 [Data In C1] MSW
N10:13	Value of parameter assigned to Parameter 615 [Data In C2] LSW
N10:14	Value of parameter assigned to Parameter 615 [Data In C2] MSW
N10:15	Value of parameter assigned to Parameter 616 [Data In D1] LSW
N10:16	Value of parameter assigned to Parameter 616 [Data In D1] MSW
N10:17	Value of parameter assigned to Parameter 617 [Data In D2] LSW
N10:18	Value of parameter assigned to Parameter 617 [Data In D2] MSW

With any drive, you can use the controller data table addresses to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (PanelView, and so forth) to operate the drive and view its status, you will need to create descriptive controller data table addresses (Table 5.M and Table 5.N) and a ladder logic program that will pass that data to the data table addresses used for messaging.

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

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

Description	Program Data Table Address
Status Ready	B3:1/0
Status Active	B3:1/1
Status Forward	B3:1/3
Status Reverse	B3:1/4
Status Faulted	B3:1/7
Status At Speed	B3:1/8
Speed Feedback	N20:2

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

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

Description	PLC-5 Data Table Address
Drive Stop	N10:1/0
Drive Start	N10:1/1
Drive Jog	N10:1/2
Drive Clear Faults	N10:1/3
Drive Forward	N10:1/4
Drive Reverse	N10:1/5
Speed Reference	N10:2

An example ladder logic program that uses these descriptive controller data table addresses and passes their data to the descriptive program data table addresses is shown in Figure 5.16 and Figure 5.17.

Figure 5.16 PLC-5 Example Ladder Logic Program for Logic Status/Feedback

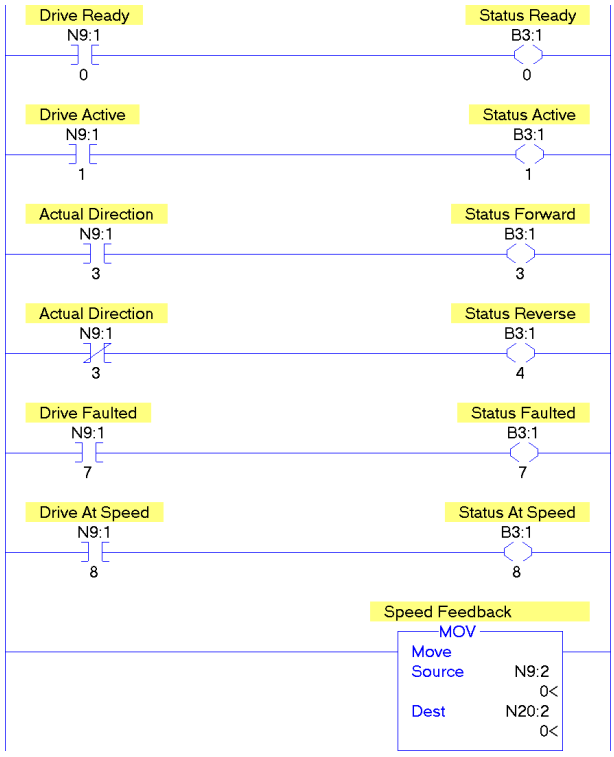
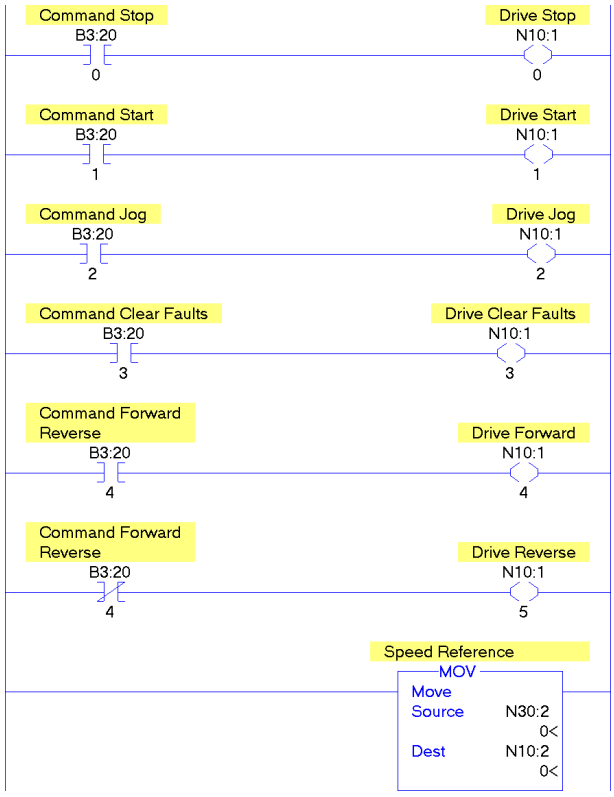


Figure 5.17 PLC-5 Example Ladder Logic Program for Logic Command/Reference



SLC 500 Controller Example

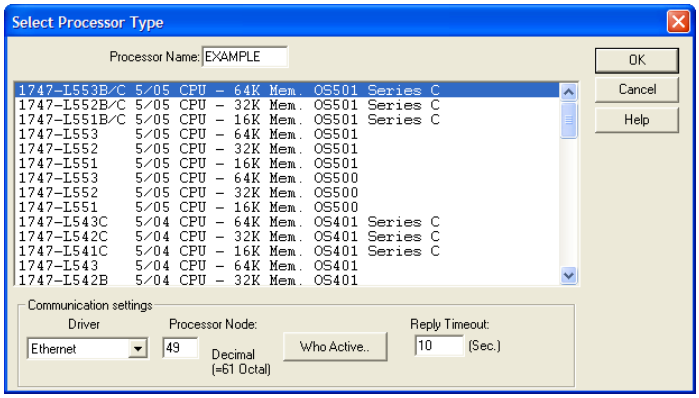
Creating an RSLogix 500 Project, Version 7.20 or Later

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

1. Start RSLogix 500 software.

   The RSLogix 500 window appears.

2. Select **File > New** to display the Select Processor Type screen.



3. Assign a name for the processor.

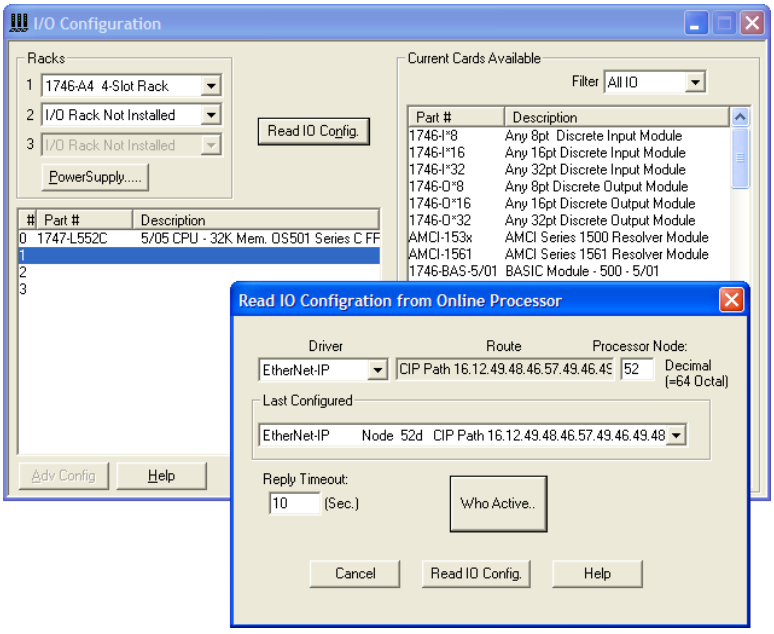
4. In the list, select the appropriate processor (for this example, 1747-L552C 5/05).

5. Choose the appropriate choices for the fields in the screen to match your application.

6. Click **OK**.

   The RSLogix 500 project window reappears.

7. In the project treeview, right-click IO Configuration and choose **Open** to display the I/O Configuration screen.



8. On the I/O Configuration screen, click **Read IO Config.** to display the Read IO Configuration from Online Processor screen.

   a. Click **Who Active** and select the communication path to the processor.

   b. Click **OK**.

   c. Click **Read IO Config.** to list the 1747-SDN DeviceNet Scanner Module.

   Note that the # column shows the slot number that the scanner occupies.

   d. Close the Read IO Configuration from Online Processor screen.

Drive and Adapter Parameter Settings

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

Device	Parameter	Value	Description
PowerFlex 70 EC Drive	90 - [Speed Ref A Sel	22 (DPI Port 5)	Assigns 20-COMM-D to be used for the Reference.
	300 - [Data In A1]	140	Points to Par. 140 - [Accel Time 1]
	301 - [Data In A2]	142	Points to Par. 142 - [Decel Time 1]
	302 - [Data In B1]	100	Points to Par. 100 - [Jog Speed]
	303 - [Data In B2]	155	Points to Par. 155 - [Stop Mode A]
	304 - [Data In C1]	101	Points to Par. 101 - [Preset Speed 1]
	305 - [Data In C2]	102	Points to Par. 102 - [Preset Speed 2]
	306 - [Data In D1]	103	Points to Par. 103 - [Preset Speed 3]
	307 - [Data In D2]	104	Points to Par. 104 - [Preset Speed 4]
	310 - [Data Out A1]	140	Points to Par. 140 - [Accel Time 1]
	311 - [Data Out A2]	142	Points to Par. 142 - [Decel Time 1]
	312 - [Data Out B1]	100	Points to Par. 100 - [Jog Speed]
	313 - [Data Out B2]	155	Points to Par. 155 - [Stop Mode A]
	314 - [Data Out C1]	101	Points to Par. 101 - [Preset Speed 1]
	315 - [Data Out C2]	102	Points to Par. 102 - [Preset Speed 2]
	316 - [Data Out D1]	103	Points to Par. 103 - [Preset Speed 3]
	317 - [Data Out D2]	104	Points to Par. 104 - [Preset Speed 4]
20-COMM-D Adapter	03 - [DN Addr Cfg]	2	Node address for the adapter.
	13 - [DPI I/O Cfg]	xxx1 1111	Enables Cmd/Ref and Datalinks A…D.
	25 - [M-S Input]	xxx1 1111	Configures the I/O Data to be transferred from the controller on the network to the drive.
	26 - [M-S Output]	xxx1 1111	Configures the I/O Data to be transferred from the drive to the controller on the network.

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

TIP: When using a drive that has 16-bit Datalinks (PowerFlex 70, PowerFlex 700, and PowerFlex 700H drives) to transfer a 32-bit parameter, two contiguous drive Datalink parameters (for example, Data Out A1/A2, B1/B2, and so forth) are required. To determine if a parameter is a 32-bit parameter, see the Parameter section in the drive documentation and look for a 32 symbol in the 'No.' column. (All parameters in PowerFlex 700 Series B drives are 32-bit parameters.) For example, parameter 3 - [Output Current] in a PowerFlex 70 EC drive is a 32-bit parameter. When using a drive that has 32-bit Datalinks (PowerFlex 700 VC, PowerFlex 700S, and PowerFlex 750-Series drives), only one drive Datalink parameter is required to transfer any parameter.

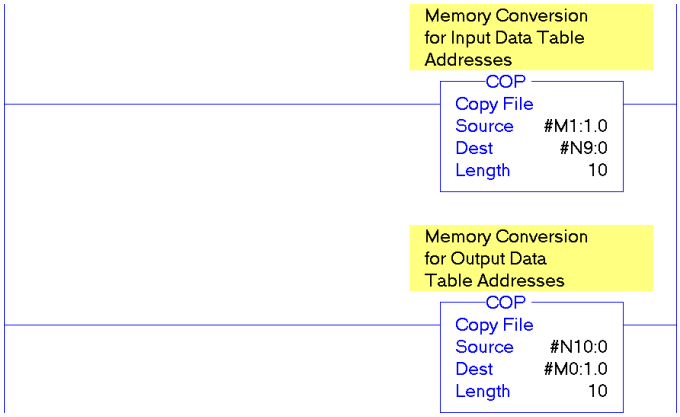
Understanding SLC 500 Controller Data Table Addresses

Because the SLC 500 controller is a 16-bit platform and is used with the 32-bit 20-COMM-D adapter, the data will be transposed from the least-significant word (LSW) to the most-significant word (MSW) in the controller.

When the I/O was configured (Chapter 4), two available default memory addresses (M1:1.x for input data and M0:1.x for output data) were used. However, because memory addresses cannot be used to display real data, COP instructions will be used in this example to convert these addresses to N data table addresses. With this conversion, the M1:1.0 address will become N9:0 and the M0:1.0 address will become N10:0.

Figure 5.18 shows an example ladder logic program to convert memory addresses to N data table addresses.

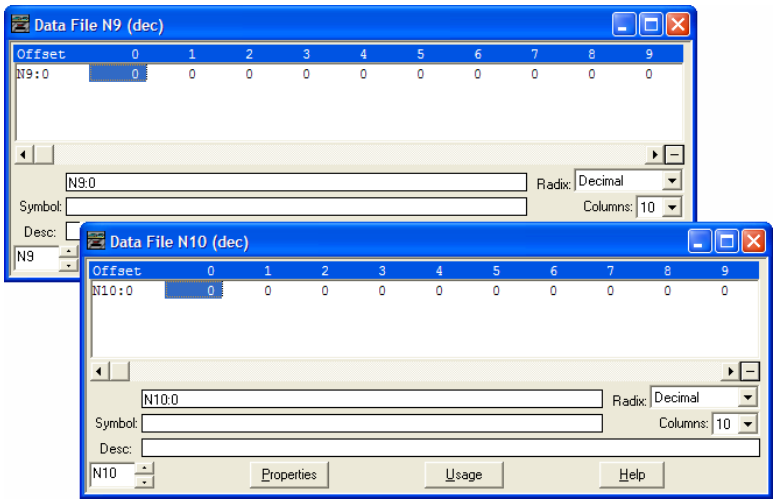
Figure 5.18 SLC 500 Example Ladder Logic Program to Convert Memory Addresses



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

After the conversion, Figure 5.19 shows the entire data file address structure for this example.

Figure 5.19 Data File Tables for Example Ladder Logic Program



Depending on the drive, Table 5.O, Table 5.P, Table 5.Q, Table 5.R, Table 5.S, or Table 5.T shows the I/O definitions as they relate to the N9:0 and N10:0 data table addresses (Figure 5.19) being used in this example.

PowerFlex 70, PowerFlex 700 with Standard Control, and PowerFlex 700H Drives

When using any of these products, which contain INT (16-bit format) data types, you will read from and write to a single data table address in the controller.

Table 5.O SLC 500 Data Table Addresses for:
PowerFlex 70 Drives with Standard or Enhanced Control
PowerFlex 700 Drives with Standard Control
PowerFlex 700H Drives

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

PowerFlex 700 Drives with Vector Control and PowerFlex 700L Drives with 700 Control

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

Table 5.P SLC 500 Data Table Addresses for:
PowerFlex 700 Drives with Vector Control
PowerFlex 700L Drives with 700 Control

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

PowerFlex 700S, PowerFlex 700L with 700S Control, and PowerFlex 750-Series, and PowerFlex Digital DC Drives

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

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

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

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

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

Table 5.S SLC 500 Data Table Addresses for PowerFlex 750-Series Drives

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Not Used
N9:2	Speed Feedback LSW
N9:3	Speed Feedback MSW
N9:4	Value of parameter assigned to Parameter 905 [Data Out A1] LSW
N9:5	Value of parameter assigned to Parameter 905 [Data Out A1] MSW
N9:6	Value of parameter assigned to Parameter 906 [Data Out A2] LSW
N9:7	Value of parameter assigned to Parameter 906 [Data Out A2] MSW
N9:8	Value of parameter assigned to Parameter 907 [Data Out B1] LSW
N9:9	Value of parameter assigned to Parameter 907 [Data Out B1] MSW
N9:10	Value of parameter assigned to Parameter 908 [Data Out B2] LSW
N9:11	Value of parameter assigned to Parameter 908 [Data Out B2] MSW
N9:12	Value of parameter assigned to Parameter 909 [Data Out C1] LSW
N9:13	Value of parameter assigned to Parameter 909 [Data Out C1] MSW
N9:14	Value of parameter assigned to Parameter 910 [Data Out C2] LSW
N9:15	Value of parameter assigned to Parameter 910 [Data Out C2] MSW
N9:16	Value of parameter assigned to Parameter 911 [Data Out D1] LSW
N9:17	Value of parameter assigned to Parameter 911 [Data Out D1] MSW
N9:18	Value of parameter assigned to Parameter 912 [Data Out D2] LSW
N9:19	Value of parameter assigned to Parameter 912 [Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Not Used
N10:2	Speed Reference LSW
N10:3	Speed Reference MSW
N10:4	Value of parameter assigned to Parameter 895 [Data In A1] LSW
N10:5	Value of parameter assigned to Parameter 895 [Data In A1] MSW
N10:6	Value of parameter assigned to Parameter 896 [Data In A2] LSW
N10:7	Value of parameter assigned to Parameter 896 [Data In A2] MSW
N10:8	Value of parameter assigned to Parameter 897 [Data In B1] LSW
N10:9	Value of parameter assigned to Parameter 897 [Data In B1] MSW
N10:10	Value of parameter assigned to Parameter 898 [Data In B2] LSW
N10:11	Value of parameter assigned to Parameter 898 [Data In B2] MSW
N10:12	Value of parameter assigned to Parameter 899 [Data In C1] LSW
N10:13	Value of parameter assigned to Parameter 899 [Data In C1] MSW
N10:14	Value of parameter assigned to Parameter 900 [Data In C2] LSW
N10:15	Value of parameter assigned to Parameter 900 [Data In C2] MSW
N10:16	Value of parameter assigned to Parameter 901 [Data In D1] LSW
N10:17	Value of parameter assigned to Parameter 901 [Data In D1] MSW
N10:18	Value of parameter assigned to Parameter 902 [Data In D2] LSW
N10:19	Value of parameter assigned to Parameter 902 [Data In D2] MSW

Table 5.T SLC 500 Data Table Addresses for PowerFlex Digital DC Drives

Data Table Address	Description
N9:0	Logic Status (see Appendix D)
N9:1	Speed Feedback LSW
N9:2	Speed Feedback MSW
N9:3	Value of parameter assigned to Parameter 618 [Data Out A1] LSW
N9:4	Value of parameter assigned to Parameter 618 [Data Out A1] MSW
N9:5	Value of parameter assigned to Parameter 619 [Data Out A2] LSW
N9:6	Value of parameter assigned to Parameter 619 [Data Out A2] MSW
N9:7	Value of parameter assigned to Parameter 620 [Data Out B1] LSW
N9:8	Value of parameter assigned to Parameter 620 [Data Out B1] MSW
N9:9	Value of parameter assigned to Parameter 621 [Data Out B2] LSW
N9:10	Value of parameter assigned to Parameter 621 [Data Out B2] MSW
N9:11	Value of parameter assigned to Parameter 622 [Data Out C1] LSW
N9:12	Value of parameter assigned to Parameter 622 [Data Out C1] MSW
N9:13	Value of parameter assigned to Parameter 623 [Data Out C2] LSW
N9:14	Value of parameter assigned to Parameter 623 [Data Out C2] MSW
N9:15	Value of parameter assigned to Parameter 624 [Data Out D1] LSW
N9:16	Value of parameter assigned to Parameter 624 [Data Out D1] MSW
N9:17	Value of parameter assigned to Parameter 625 [Data Out D2] LSW
N9:18	Value of parameter assigned to Parameter 625 [Data Out D2] MSW
N10:0	Logic Command (see Appendix D)
N10:1	Speed Reference LSW
N10:2	Speed Reference MSW
N10:3	Value of parameter assigned to Parameter 610 [Data In A1] LSW
N10:4	Value of parameter assigned to Parameter 610 [Data In A1] MSW
N10:5	Value of parameter assigned to Parameter 611 [Data In A2] LSW
N10:6	Value of parameter assigned to Parameter 611 [Data In A2] MSW
N10:7	Value of parameter assigned to Parameter 612 [Data In B1] LSW
N10:8	Value of parameter assigned to Parameter 612 [Data In B1] MSW
N10:9	Value of parameter assigned to Parameter 613 [Data In B2] LSW
N10:10	Value of parameter assigned to Parameter 613 [Data In B2] MSW
N10:11	Value of parameter assigned to Parameter 614 [Data In C1] LSW
N10:12	Value of parameter assigned to Parameter 614 [Data In C1] MSW
N10:13	Value of parameter assigned to Parameter 615 [Data In C2] LSW
N10:14	Value of parameter assigned to Parameter 615 [Data In C2] MSW
N10:15	Value of parameter assigned to Parameter 616 [Data In D1] LSW
N10:16	Value of parameter assigned to Parameter 616 [Data In D1] MSW
N10:17	Value of parameter assigned to Parameter 617 [Data In D2] LSW
N10:18	Value of parameter assigned to Parameter 617 [Data In D2] MSW

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

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

Description	SLC 500 Data Table Address	Description	Program Data Table Address
Drive Ready	N9:0/0	Status Ready	B3:1/0
Drive Active	N9:0/1	Status Active	B3:1/1
Actual Direction (XIO)	N9:0/3	Status Forward	B3:1/3
Actual Direction (XIC)	N9:0/3	Status Reverse	B3:1/4
Drive Faulted	N9:0/7	Status Faulted	B3:1/7
Drive At Speed	N9:0/8	Status At Speed	B3:1/8
Speed Feedback	N9:1	Speed Feedback	N20:1

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

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

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

An example ladder logic program that uses these descriptive controller data table addresses and passes their data to the descriptive program data table addresses is shown in Figure 5.20 and Figure 5.21.

Figure 5.20 SLC 500 Example Ladder Logic Program for Logic Status/Feedback

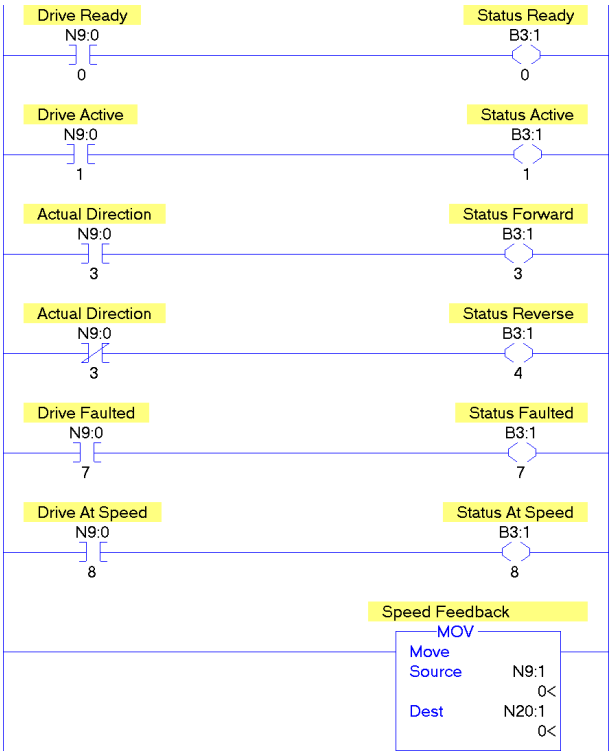
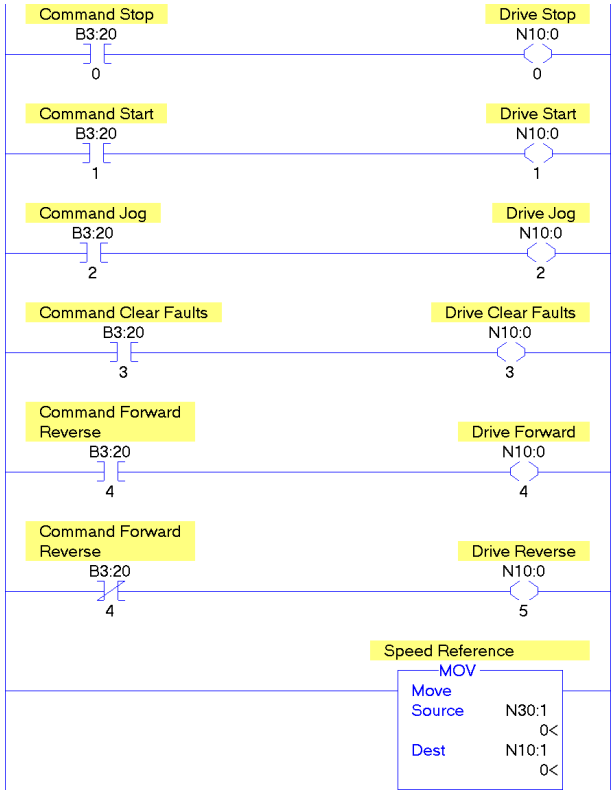


Figure 5.21 SLC 500 Example Ladder Logic Program for Logic Command/Reference



Notes:

Using Explicit Messaging

This chapter provides information and examples that explain how to use Explicit Messaging to configure and monitor the adapter and connected PowerFlex 7-Class drive or PowerFlex 750-Series drive.

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

ATTENTION: Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to Nonvolatile 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.

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

About Explicit Messaging

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

Important: When an explicit message is performed, by default no connection is made because it is an 'unconnected' message. When timing of the message transaction is important, you can create a dedicated message connection between the controller and drive by checking the 'Connected' box on the Communications tab message configuration screen during message setup. These message connections are in addition to the I/O connection. However, the trade off for more message connections is decreased network performance. If your application cannot tolerate this, we recommend to not check the 'Connected' box.

Important: PowerFlex 7-Class and PowerFlex 750-Series drives have explicit messaging limitations. Table 6.A shows the DeviceNet Object Class code compatibilities for these drives.

Table 6.A Explicit Messaging Class Code Compatibility with Drives

DeviceNet Object Class Code	PowerFlex 7-Class Drives	PowerFlex 750-Series Drives	Explicit Messaging Function
Parameter Object 0x0F	Yes	No	Single parameter reads/writes
DPI Parameter Object 0x93	Yes	Yes(1) with limitations	Single and scattered parameter reads/writes
Host DPI Parameter Object 0x9F	No	No	Single and scattered parameter reads/writes

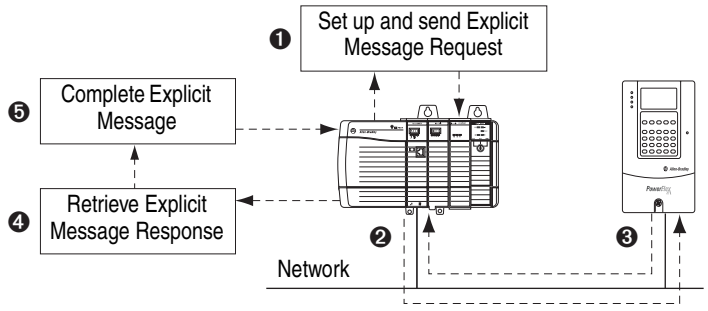
(1) Enables access to drive parameters (Port 0), DPI device parameters (Ports 1…6 only). For example, DPI Parameter Object Class code 0x93 can access a 20-COMM-D adapter in Port 6. However, Class code 0x93 cannot access, for example, the Host parameters in a 24V I/O option module in Port 5. See DPI Parameter Object on page C-13 for instance (parameter) numbering.

Performing Explicit Messaging

There are five basic events in the Explicit Messaging process. The details of each step will vary depending on the type of controller being used. See the documentation for your controller.

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

Figure 6.1 Explicit Message Process



Event	Description
❶	You format the required data and set up the ladder logic program to send an Explicit Message request to the scanner or bridge module (download).
❷	The scanner or bridge module transmits the Explicit Message Request to the slave device over the network.
❸	The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.
❹	The controller retrieves the Explicit Message Response from the scanner's buffer (upload).
❺	The Explicit Message is complete.

For information on the maximum number of Explicit Messages that can be executed at a time, see the documentation for the scanner and/or controller that is being used.

ControlLogix Controller Examples

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

For supported classes, instances, and attributes, see Appendix C, DeviceNet Objects.

Read a Single Parameter

ControlLogix Controller Example Ladder Logic Program to Read a Single Parameter Using RSLogix 5000 Software, Version 15.00 or Later

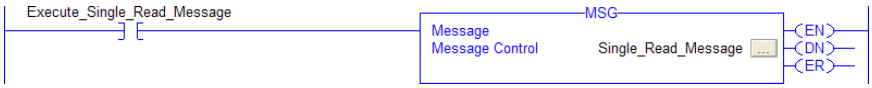
A Parameter Read message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Important: Parameter Object Class code 0x0F is not supported in PowerFlex 750-Series drives. To do a single parameter read, follow the RSLogix 5000 software (any version) single read example on page 6-7.

Table 6.B Example Controller Tags to Read a Single Parameter

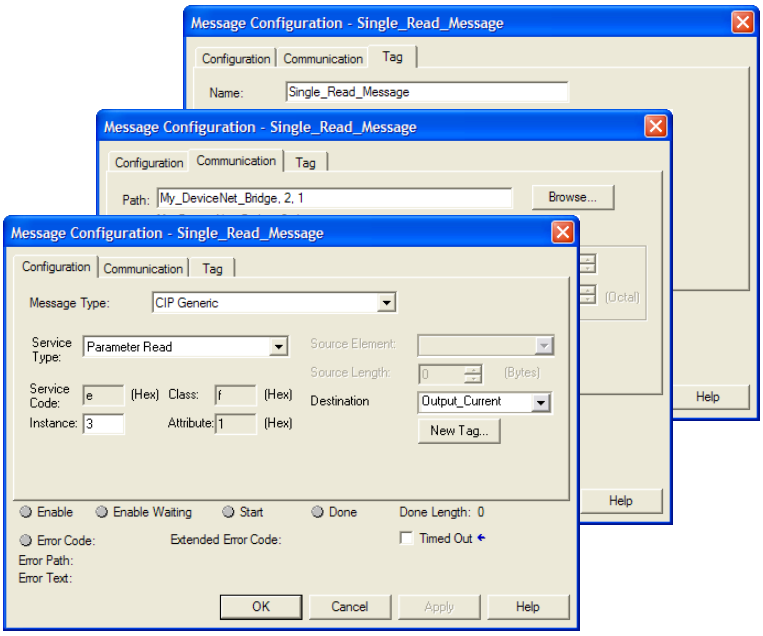
Operand	Controller Tags for Single Read Message	Data Type
XIC	Execute_Single_Read_Message	BOOL
MSG	Single_Read_Message	MESSAGE

Figure 6.2 Example Ladder Logic to Read a Single Parameter



ControlLogix Controller – Formatting a Message to Read a Single Parameter Using RSLogix 5000 Software, Version 15.00 or Later

Figure 6.3 Parameter Read Single Message Configuration Screens



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type [1]	Parameter Read	This service is used to read a parameter value.
Service Code [1]	e (Hex.)	Code for the requested service.
Class	f (Hex.)	Class ID for the DPI Parameter Object.
Instance [2]	3 (Dec.)	Instance number is the same as parameter number.
Attribute	1 (Hex.)	Attribute number for the Parameter Value attribute.
Destination	Output_Current [4]	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path [3]	My_DeviceNet_Bridge	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

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

[2] Only drive parameters (Port 0) can be read using Parameter Object Class code 0x0F. To read a parameter of a peripheral in another port, use DPI Parameter Object Class code 0x93 (see page 6-6).

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

[4] In this example, Output Current is a 32-bit integer parameter requiring the Data Type field to be set to 'DINT' when creating the controller tag. If the parameter being read is a 16-bit integer, the tag Data Type field must be set to 'INT'. When using a PowerFlex 700S drive, Output Current is a floating point number requiring the Data Type field to be set to 'REAL' when creating the controller tag. See the drive documentation to determine the size of the parameter and its data type (16-bit or 32-bit integer or REAL).

ControlLogix Controller Example Ladder Logic Program to Read a Single Parameter Using RSLogix 5000 Software, Any Version

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

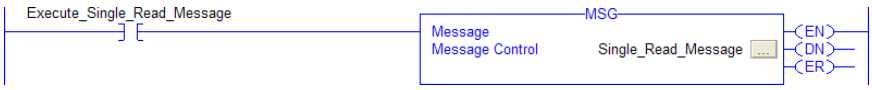
See DPI Parameter Object on page C-13 (Class Code 0x93) for parameter numbering.

Important: See Table 6.A on page 6-2 for limitations of PowerFlex 7-Class and PowerFlex 750-Series drives when using DPI Parameter Class code 0x93 for explicit messaging.

Table 6.C Example Controller Tags to Read a Single Parameter

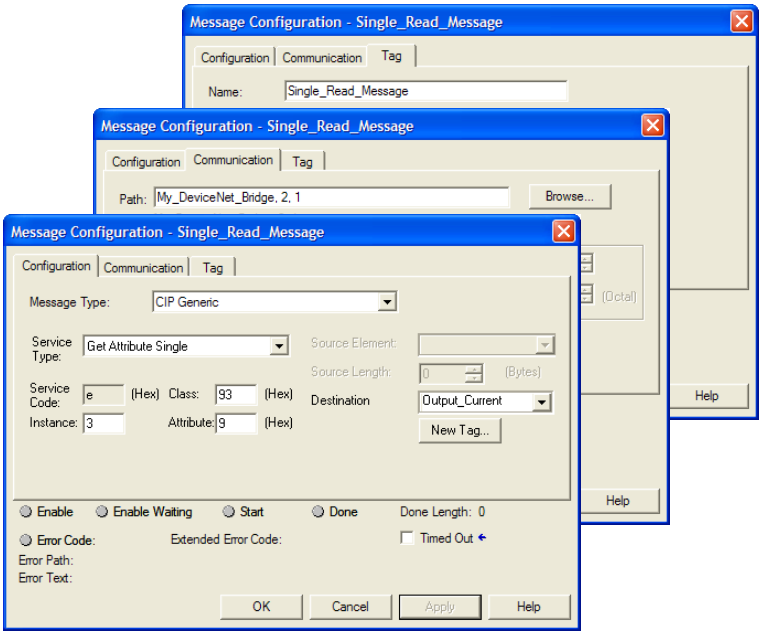
Operand	Controller Tags for Single Read Message	Data Type
XIC	Execute_Single_Read_Message	BOOL
MSG	Single_Read_Message	MESSAGE

Figure 6.4 Example Ladder Logic to Read a Single Parameter



ControlLogix Controller – Formatting a Message to Read a Single Parameter Using RSLogix 5000 Software, Any Version

Figure 6.5 Get Attribute Single Message Configuration Screens



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type (1)	Get Attribute Single	This service is used to read a parameter value.
Service Code (1)	e (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance (2)	3 (Dec.)	Instance number is the same as parameter number.
Attribute	9 (Hex.)	Attribute number for the Parameter Value attribute.
Destination	Output_Current (4)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (3)	My_DeviceNet_Bridge	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

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

(2) The instance is the parameter number in the drive (Port 0). To read a parameter in another port, see DPI Parameter Object on page C-13 (Class code 0x93) to determine the instance number. For example, to read parameter 4 of a peripheral in Port 5 of a PowerFlex 750-Series drive, the instance number would be 21504 + 4 = 21508.

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

(4) In this example, Output Current is a 32-bit integer parameter requiring the Data Type field to be set to 'DINT' when creating the controller tag. If the parameter being read is a 16-bit integer, the tag Data Type field must be set to 'INT'. When using a PowerFlex 700S or PowerFlex 750-Series drive, Output Current is a floating point number requiring the Data Type field to be set to 'REAL' when creating the controller tag. See the drive documentation to determine the size of the parameter and its data type (16-bit or 32-bit integer or REAL).

Write a Single Parameter

ControlLogix Controller Example Ladder Logic Program to Write a Single Parameter Using RSLogix 5000 Software, Version 15.00 or Later

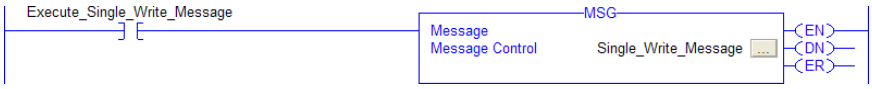
A Parameter Write message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Important: Parameter Object Class code 0x0F is not supported in PowerFlex 750-Series drives. To do a single parameter write, follow the RSLogix 5000 (any version) single write example on page 6-11.

Table 6.D Example Controller Tags to Write a Single Parameter

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

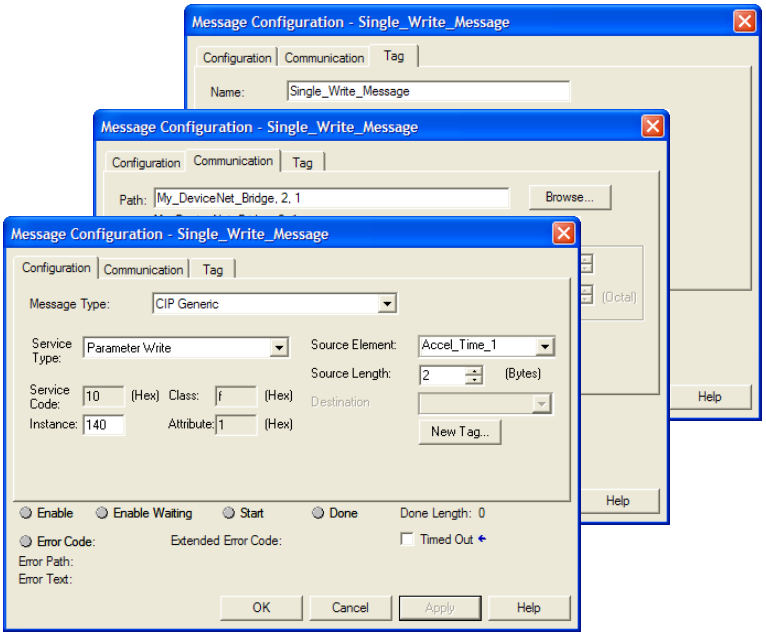
Figure 6.6 Example Ladder Logic to Write a Single Parameter



Important: If the explicit message single write must be written continuously, use DPI Parameter Object Class code 0x93 and attribute A (10 decimal; see page 6-11). This writes to RAM—not NVS (EEPROM) memory. This example single write message using Class code F writes to NVS. Over time, continuous writes will exceed the EEPROM life cycle and cause the drive to malfunction.

ControlLogix Controller – Formatting a Message to Write a Single Parameter Using RSLogix 5000 Software, Version 15.00 or Later

Figure 6.7 Parameter Write Single Message Configuration Screens



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

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

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

[2] Only drive parameters (Port 0) can be written to using Parameter Object Class code 0x0F. To write to a parameter of a peripheral in another port, use DPI Parameter Object Class code 0x93 (see page 6-10).

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

[4] In this example, Accel Time 1 is a 16-bit integer parameter requiring the tag Data Type field to be set to 'INT' when creating the controller tag. If the parameter being written to is a 32-bit integer, the tag Data Type field must be set to 'DINT'. Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 4 bytes for a DINT or a REAL). When using a PowerFlex 700S drive, Accel Time 1 is a floating point number requiring the Data Type field to be set to 'REAL' when creating the controller tag. See the drive documentation to determine the size of the parameter and its data type (16-bit or 32-bit integer or REAL).

ControlLogix Controller Example Ladder Logic Program to Write a Single Parameter Using RSLogix 5000 Software, Any Version

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

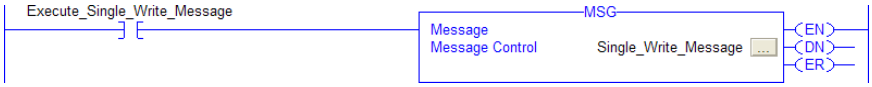
See DPI Parameter Object on page C-13 (Class Code 0x93) for parameter numbering.

Important: See Table 6.A on page 6-2 for limitations of PowerFlex 7-Class and PowerFlex 750-Series drives when using DPI Parameter Class code 0x93 for explicit messaging.

Table 6.E Example Controller Tags to Write a Single Parameter

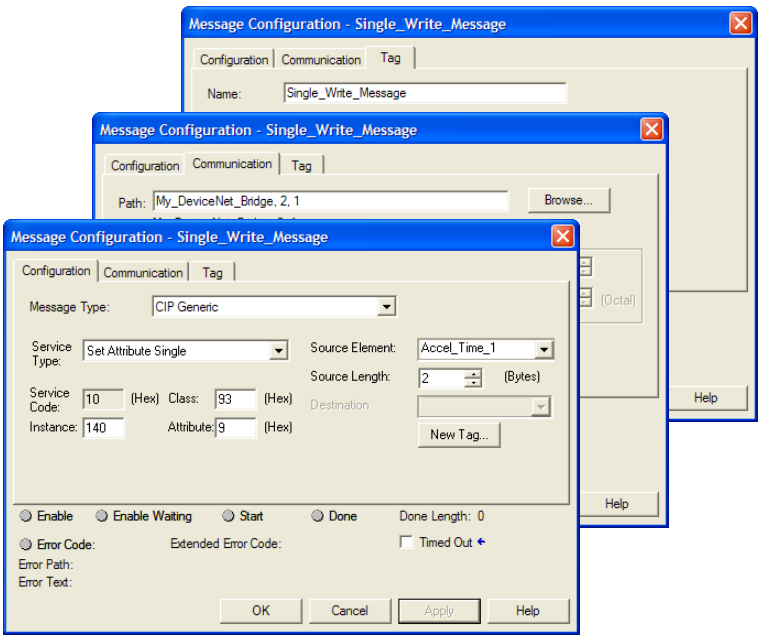
Operand	Controller Tags for Single Write Message	Data Type
XIC	Execute_Single_Write_Message	BOOL
MSG	Single_Write_Message	MESSAGE

Figure 6.8 Example Ladder Logic to Write a Single Parameter



ControlLogix Controller – Formatting a Message to Write a Single Parameter Using RSLogix 5000 Software, Any Version

Figure 6.9 Set Attribute Single Message Configuration Screens



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the Parameter Object in the adapter.
Service Type [1]	Set Attribute Single	This service is used to write a parameter value.
Service Code [1]	10 (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance [2]	140 (Dec.)	Instance number is the same as parameter number.
Attribute [3]	9 or A (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	Accel_Time_1 [5]	Name of the tag for any service data to be sent from the scanner or bridge to the adapter/drive.
Source Length	2 [5]	Number of bytes of service data to be sent in the message.
Communication Tab	**Example Value**	**Description**
Path [4]	My_DeviceNet_Bridge	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

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

[2] The instance is the parameter number in the drive (Port 0). To write to a parameter in another port, see DPI Parameter Object on page C-13 (Class code 0x93) to determine the instance number. For example, to write to parameter 4 of a peripheral in Port 5 of a PowerFlex 750-Series drive, the instance number would be 21504 + 4 = 21508.

[3] Setting the Attribute value to '9' will write the parameter value to the drive's Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the drive is power cycled. **Important:** When set to '9', the EEPROM may quickly exceed its life cycle and cause the drive to malfunction. Setting the Attribute value to 'A' (10 decimal) will write the parameter value to temporary memory, which deletes the parameter value after the drive is power cycled. When frequent write messages are required, we recommend using the 'A' (10 decimal) setting.

[4] Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder.

[5] In this example, Accel Time 1 is a 16-bit integer parameter requiring the tag Data Type field to be set to 'INT' when creating the controller tag. If the parameter being written to is a 32-bit integer, the tag Data Type field must be set to 'DINT'. Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for example, 4 bytes for a DINT or a REAL). When using a PowerFlex 700S or PowerFlex 750-Series drive, Accel Time 1 is a floating point number requiring the Data Type field to be set to 'REAL' when creating the controller tag. See the drive documentation to determine the size of the parameter and its data type (16-bit or 32-bit integer or REAL).

ControlLogix Controller – Explanation of Request and Response Data for Read/Write Multiple Messaging Using RSLogix 5000 Software, Any Version

The data structures in Figure 6.10 and Figure 6.11 use 16-bit words and can accommodate up to 22 parameters in a single message. In the Response Message, a parameter number with the high bit set indicates that the associated parameter value field contains an error code (parameter number in response data will be negative).

Important: See Table 6.A on page 6-2 for limitations of PowerFlex 7-Class and PowerFlex 750-Series drives when using Class code 0x93 for explicit messaging.

Figure 6.10 Data Structures for Scattered Read Messages

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

Figure 6.11 Data Structures for Scattered Write Messages

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

Read Multiple Parameters

ControlLogix Controller Example Ladder Logic Program to Read Multiple Parameters Using RSLogix 5000 Software, Any Version

A Scattered Read message is used to read the values of multiple parameters. Up to 22 parameters can be read. This read message example reads the values of these five parameters in a PowerFlex 7-Class drive:

- Parameter 001 - [Output Freq]
- Parameter 003 - [Output Current]
- Parameter 006 - [Output Voltage]
- Parameter 012 - [DC Bus Voltage]
- Parameter 017 - [Analog In1 Value]

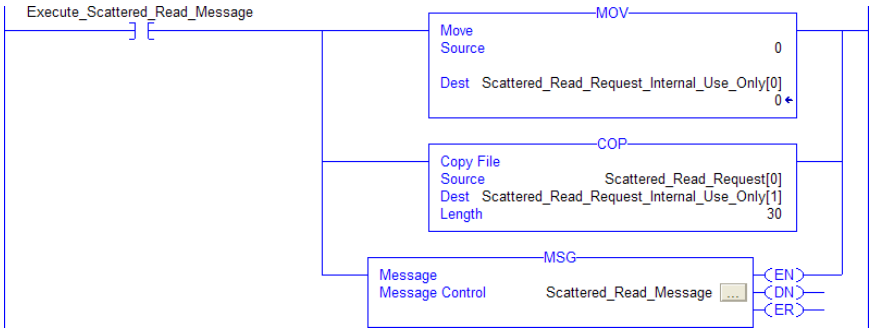
See DPI Parameter Object on page C-13 (Class Code 0x93) for parameter numbering.

Important: See Table 6.A on page 6-2 for limitations of PowerFlex 7-Class and PowerFlex 750-Series drives when using DPI Parameter Class code 0x93 for explicit messaging.

Table 6.F Example Controller Tags to Read Multiple Parameters

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

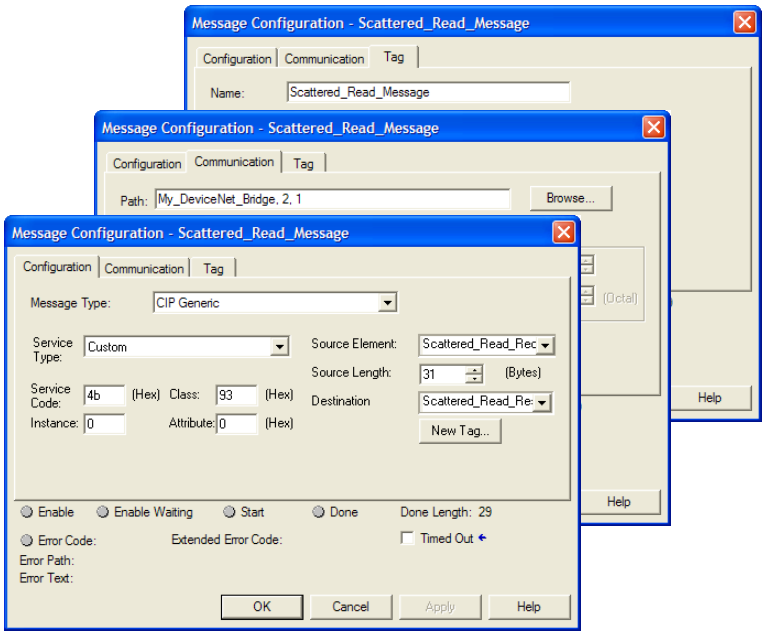
Figure 6.12 Example Ladder Logic to Read Multiple Parameters



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

ControlLogix Controller – Formatting a Message to Read Multiple Parameters Using RSLogix 5000 Software, Any Version

Figure 6.13 Scattered Read Message Configuration Screens



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access Parameter Object in the adapter.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4b (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Read_Request_ Internal _Use_Only[0] (3)	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	31 (3)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Read_Response[0]	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_DeviceNet_Bridge	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Read_Message	The name for the message.

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

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Bridge). Then always type in '2' which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, '1').

(3) In this example, we are reading five parameters. Each parameter being read requires an array of three INT registers. Therefore, a controller tag was created with its Data Type field set to 'INT[15]'. Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for this example, 31 bytes total; 30 bytes for an INT[15] array plus one extra required byte that is always set to zero). Scattered read messages always assume that every parameter being read is a 32-bit integer, regardless of its actual data type. Maximum length is 133 bytes; 132 bytes or 66 words which equates to 22 parameters plus one extra required byte.

ControlLogix Controller Example Scattered Read Request Data

In this message example, we use the data structure in Figure 6.14 in the source tag named Scattered_Read_Request to read these five parameters in a PowerFlex 7-Class drive:

- Parameter 001 - [Output Freq]
- Parameter 003 - [Output Current]
- Parameter 006 - [Output Voltage]
- Parameter 012 - [DC Bus Voltage]
- Parameter 017 - [Analog In1 Value]

Figure 6.14 Example Scattered Read Request Data

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

ControlLogix Controller Example Scattered Read Response Data

The Scattered Read Request message reads the multiple parameters and returns their values to the destination tag (Scattered_Read_Response). Figure 6.15 shows the parameter values.

Figure 6.15 Example Scattered Read Response Data

Name	Value	Data Type	Description
Scattered_Read_Response	{...}	INT[15]	
Scattered_Read_Response[0]	1	INT	Parameter Number (decimal)
Scattered_Read_Response[1]	325	INT	Parameter Value LSW
Scattered_Read_Response[2]	0	INT	Parameter Value MSW
Scattered_Read_Response[3]	3	INT	Parameter Number (decimal)
Scattered_Read_Response[4]	14	INT	Parameter Value LSW
Scattered_Read_Response[5]	0	INT	Parameter Value MSW
Scattered_Read_Response[6]	6	INT	Parameter Number (decimal)
Scattered_Read_Response[7]	1187	INT	Parameter Value LSW
Scattered_Read_Response[8]	0	INT	Parameter Value MSW
Scattered_Read_Response[9]	12	INT	Parameter Number (decimal)
Scattered_Read_Response[10]	3232	INT	Parameter Value LSW
Scattered_Read_Response[11]	0	INT	Parameter Value MSW
Scattered_Read_Response[12]	17	INT	Parameter Number (decimal)
Scattered_Read_Response[13]	8318	INT	Parameter Value LSW
Scattered_Read_Response[14]	0	INT	Parameter Value MSW

In this message example, the parameters have the following values.

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

Write Multiple Parameters

ControlLogix Controller Example Ladder Logic Program to Write Multiple Parameters Using RSLogix 5000 Software, Any Version

A Scattered Write message is used to write to multiple parameters. This write message example writes the following values to these five parameters in a PowerFlex 7-Class drive.

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

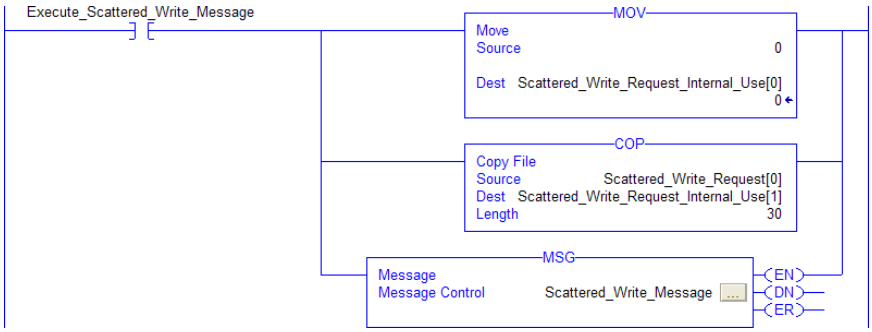
See DPI Parameter Object on page C-13 (Class Code 0x93) for parameter numbering.

Important: See Table 6.A on page 6-2 for limitations of PowerFlex 7-Class and PowerFlex 750-Series drives when using DPI Parameter Class code 0x93 for explicit messaging.

Table 6.G Example Controller Tags to Write Multiple Parameters

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

Figure 6.16 Example Ladder Logic to Write Multiple Parameters

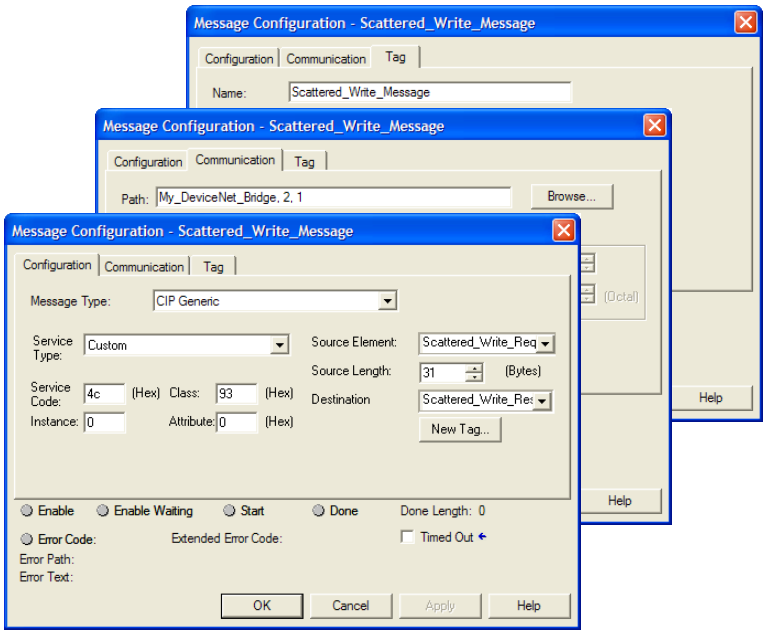


TIP: The MOV (Move) and COP (Copy) instructions are required to convert the data into the necessary data types, and to align the data into a usable display format.

Important: If the explicit message scattered write must be written continuously, then use a separate explicit message single write for each parameter using DPI Parameter Object Class code 0x93 and attribute A (10 decimal; see page 6-11). Attribute A writes to RAM—not NVS (EEPROM) memory. This example scattered write message using attribute 0 writes to NVS. Over time, continuous writes will exceed the EEPROM life cycle and cause the drive to malfunction.

ControlLogix Controller – Formatting a Message to Write Multiple Parameters Using RSLogix 5000 Software, Any Version

Figure 6.17 Scattered Write Multiple Message Configuration Screens



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access Parameter Object in the adapter.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4c (Hex.)	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Write_Request_ Internal_Use_Only[0] (3)	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	31 (3)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Write_Response[0]	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_DeviceNet_Bridge	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Write_Message	The name for the message.

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

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Bridge). Then always type in '2' which is the DeviceNet scanner port, followed by a comma, and then the node of the drive (for this example, '1').

(3) In this example, we are writing to five parameters. Each parameter being written to requires an array of three INT registers. Therefore, a controller tag was created with its Data Type field set to 'INT[15]'. Also, the Source Length field on the Message Configuration screen must correspond to the selected Data Type in bytes (for this example, 31 bytes total; 30 bytes for an INT[15] array plus one extra required byte that is always set to zero). Scattered write messages always assume that every parameter being written to is a 32-bit integer, regardless of its actual data type. Maximum length is 133 bytes; 132 bytes or 66 words which equates to 22 parameters plus one extra required byte.

ControlLogix Controller Example Scattered Write Request Data

In this message example, we use the data structure in Figure 6.18 in the source tag (Scattered_Write_Request) to write new values to these parameters.

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

Figure 6.18 shows the parameter values.

Figure 6.18 Example Scattered Write Request Data

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

ControlLogix Controller Example Scattered Write Response Data

The results of the message appear in the destination tag named Scattered_Write_Response (Figure 6.19). Values of ‘0’ indicate no errors occurred.

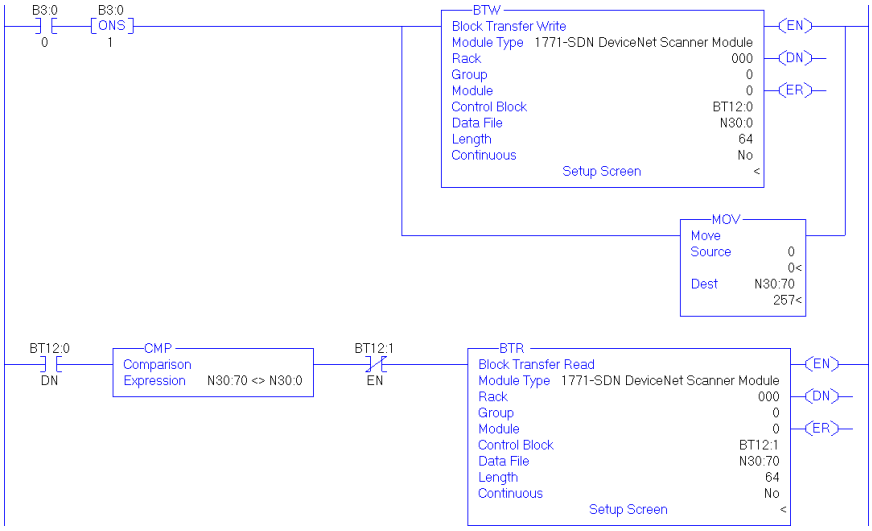
Figure 6.19 Example Scattered Write Response Data

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

PLC-5 Controller Examples

To perform explicit messaging on a DeviceNet network with a PLC-5 controller, a combination of a block transfer read and a block transfer write must be used (Figure 6.20).

Figure 6.20 PLC-5 Example Ladder Logic Program for All Explicit Messaging



PLC-5 Controller Example to Read a Single Parameter

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

Table 6.H Example Single Read Request Data

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

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

Figure 6.21 Example Single Read Request Data File

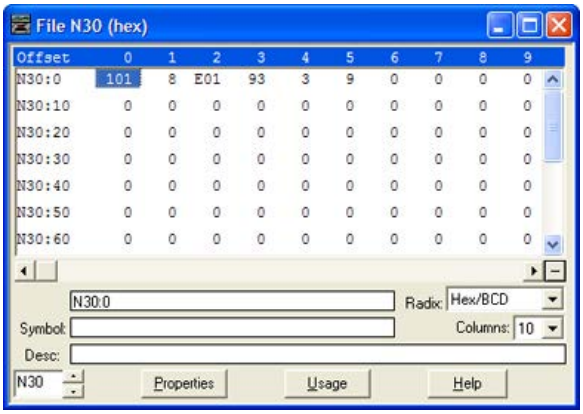


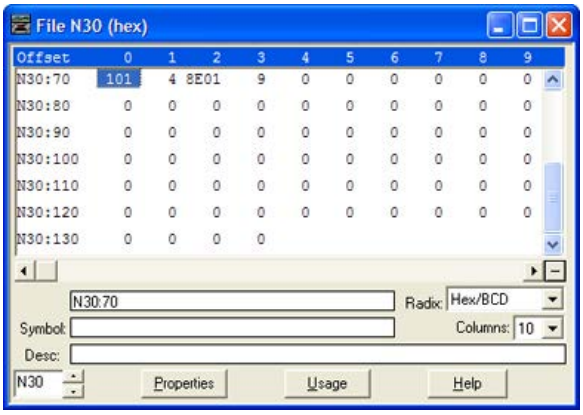
Table 6.I Example Single Read Response Data

Address	Value		Description
	Hex.(1)	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0004	4	Port = 00, Size = 04 bytes
N30:72	8E01	-29183	Service = 8E (successful), Address = 01 (Node)
N30:73	0009	9 (2)	Parameter Value Read (LSW) = 0.09 amps
N30:74	0000	0 (2)	Parameter Value Read (MSW) = 0

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

(2) In this example, Output Current is a 32-bit integer parameter. For PowerFlex 700S or PowerFlex 750-Series drives, Output Current is a floating point number. To manipulate REAL data into a proper Float tag, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

Figure 6.22 Example Single Read Response Data File



PLC-5 Controller Example to Write a Single Parameter

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

Table 6.J Example Single Write Request Data

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

[1] In RSLogix 5 software, leading zeros are not displayed in data file addresses. For example, '0008' in address N30:1 is shown as '8'.

[2] Setting the data file address value to '9' will write the parameter value to the drive's Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the drive is power cycled. **Important:** When set to '9', the EEPROM may quickly exceed its life cycle and cause the drive to malfunction. Setting the data file address value to 'A' (Hex.) will write the parameter value to temporary memory, which deletes the parameter value after the drive is power cycled. When frequent write messages are required, we recommend using the 'A' setting.

[3] In this example, Accel Time 1 is a 16-bit integer parameter. The most significant word (MSW) is not used. For PowerFlex 700S or PowerFlex 750-Series drives, Accel Time 1 is a floating point number. To manipulate REAL data into two 16-bit registers, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

Figure 6.23 Example Single Write Request Data File

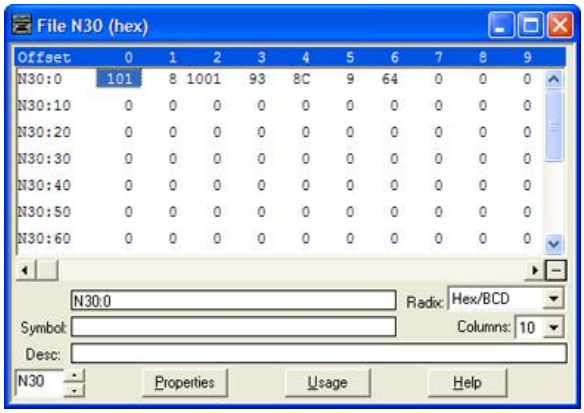
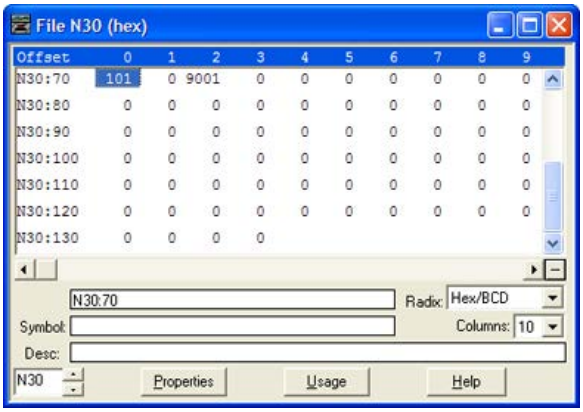


Table 6.K Example Single Write Response Data

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

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

Figure 6.24 Example Single Write Response Data File



PLC-5 Controller Example to Read Multiple Parameters

A scattered read message is used to read the values of multiple parameters. Up to 19 parameters can be read. This read message example reads the values of these five parameters in a PowerFlex 7-Class drive:

- Parameter 001 - [Output Freq]
- Parameter 003 - [Output Current]
- Parameter 006 - [Output Voltage]
- Parameter 012 - [DC Bus Voltage]
- Parameter 017 - [Analog In2 Value]

Table 6.L Example Scattered Read Request Data

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

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

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

Figure 6.25 Example Scattered Read Request Data File

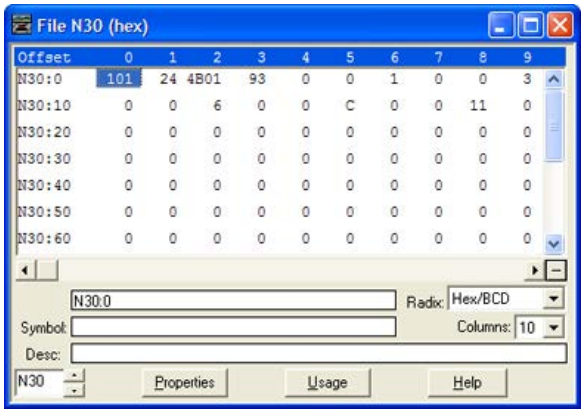


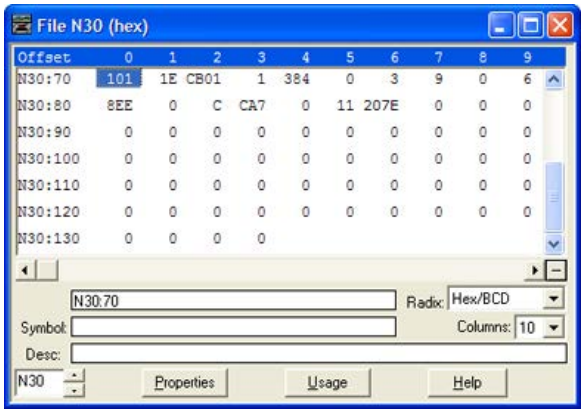
Table 6.M Example Scattered Read Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CB01	51969	Service = CB (successful), Address = 01 (Node)
N30:73	0001	1	Read Value = Parameter Number (verification)
N30:74	0384 [2]	900	Parameter Value (LSW) = 90.0 Hz.
N30:75	0000 [2]	0	Parameter Value (MSW) = 0
N30:76	0003	3	Read Value = Parameter Number (verification)
N30:77	0009 [2]	9	Parameter Value (LSW) = 0.09 Amp
N30:78	0000 [2]	0	Parameter Value (MSW) = 0
N30:79	0006	6	Read Value = Parameter Number (verification)
N30:80	8EE [2]	2286	Parameter Value (LSW) = 228.6 VDC
N30:81	0000 [2]	0	Parameter Value (MSW) = 0
N30:82	000C	12	Read Value = Parameter Number (verification)
N30:83	CA7 [2]	3239	Parameter Value (LSW) = 323.9 VDC
N30:84	0000 [2]	0	Parameter Value (MSW) = 0
N30:85	0011	17	Read Value = Parameter Number (verification)
N30:86	207E [2]	8318	Parameter Value (LSW) = 8.318 mA
N30:87	0000 [2]	0	Parameter Value (MSW) = 0

[1] In RSLogix 5 software, leading zeros are not displayed in data file addresses. For example, '001E' in address N30:71 is shown as '1E'.

[2] For PowerFlex 700S or PowerFlex 750-Series drives, if some of the parameters being read are floating point (REAL) data types, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, on how to manipulate REAL data into a proper Float tag.

Figure 6.26 Example Scattered Read Response Data File



PLC-5 Controller Example to Write Multiple Parameters

A scattered write message is used to write values to multiple parameters. Values for up to 19 parameters can be written. This write message example writes the following values to these five parameters.

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

PowerFlex 7-Class Drive Parameter	Write Value
106 - [Preset Speed 6]	44.4 Hz.
107 - [Preset Speed 7]	55.5 Hz.

Table 6.N Example Scattered Write Request Data

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

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

(2) For PowerFlex 700S or PowerFlex 750-Series drives, if some of the parameters being written to are floating point (REAL) data types, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, on how to manipulate REAL data into two 16-bit registers.

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

Figure 6.27 Example Scattered Write Request Data File

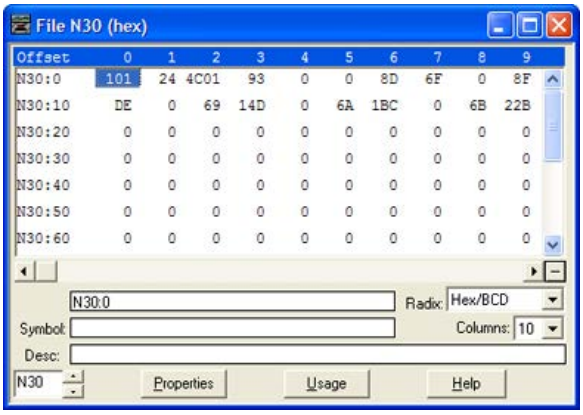
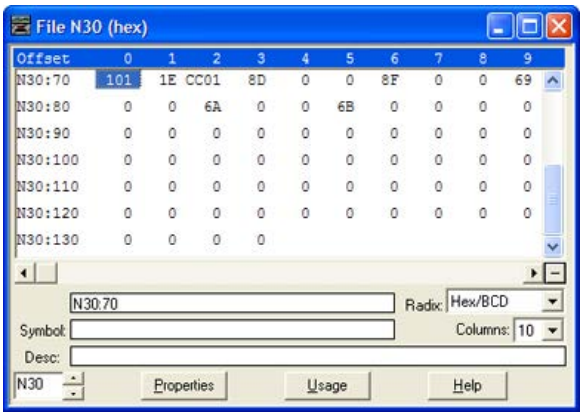


Table 6.O Example Scattered Write Response Data

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

[1] In RSLogix 5 software, leading zeros are not displayed in data file addresses. For example, '0024' in address N30:71 is shown as '24'.

Figure 6.28 Example Scattered Write Response Data File



SLC 500 Controller Examples

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

- Read/Write Parameter Service simplifies setup by requiring less data to be entered in message configuration screens. However, the Read/Write Parameter Service can only be used to perform single parameter read or single parameter write explicit messages. (Multiple parameter reads or writes must be performed using the Generic Get/Set Attribute Service described below.)

  Important: When performing a Write Parameter message, the data will always be written to the drive's Nonvolatile Storage (NVS). Continuous NVS writes may damage the drive's EEPROM. If continuous writes are necessary, use the Generic Set Attribute Single Service and attribute A (10 decimal; see page 6-33).

- Generic Get/Set Attribute Service requires more setup data to be entered in message configuration screens, but can be used to perform single parameter read or write explicit messages or multiple parameter read or write explicit messages. Also, the Generic Set Attribute Service offers the choice of writing the data to the drive's Nonvolatile Storage (NVS) or the drive's Random Access Memory (RAM; for Generic Set Attribute Single service only, see page 6-33). Note that when selecting the data to be written to RAM, the data will be lost if the drive loses power.

For supported classes, instances, and attributes, see Appendix C, DeviceNet Objects.

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

Important: RSLogix 500 software, version 7.10 or later, and a SLC 5/03, SLC 5/04 or SLC 5/05 Series C controller with firmware, version 10.00 or later, are required to use DEM instructions. However, DEM instructions cannot perform multiple (scattered) read or write messages. Therefore, an example ladder logic program with COP instructions is provided along with example configuration screens showing how to perform explicit messaging using this type of instruction.

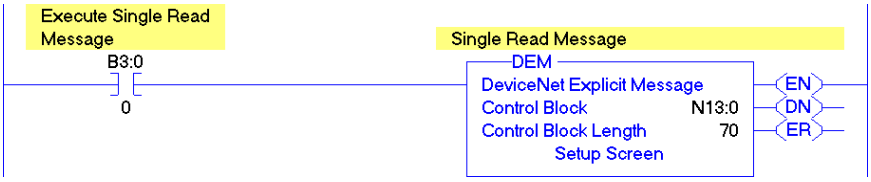
SLC 500 Controller Explicit Messaging Using the Read/Write Parameter Service

SLC 500 Controller Example Ladder Logic Program to Read a Single Parameter

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

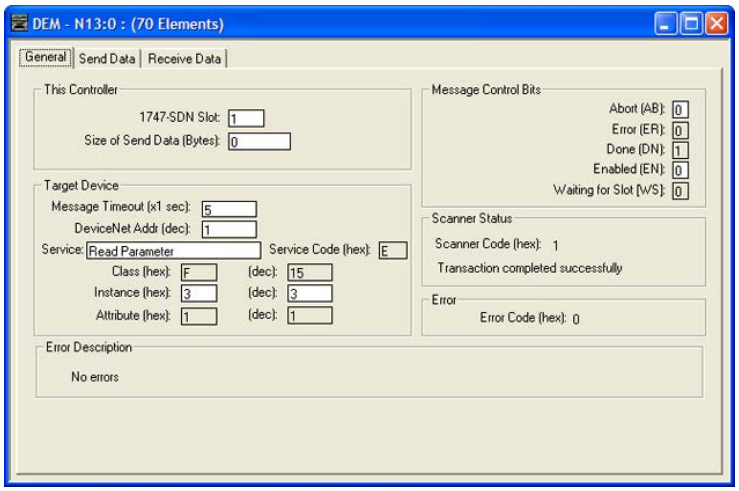
Important: Parameter Object Class code 0x0F is not supported in PowerFlex 750-Series drives. To do a single parameter read, follow the Generic Get/Set Attribute Service single read example on page 6-32.

Figure 6.29 Example Ladder Logic to Read a Single Parameter



SLC 500 Controller – Formatting a Message to Read a Single Parameter Using Read/Write Parameter Service

Figure 6.30 Read Parameter Message Configuration Screen



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

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

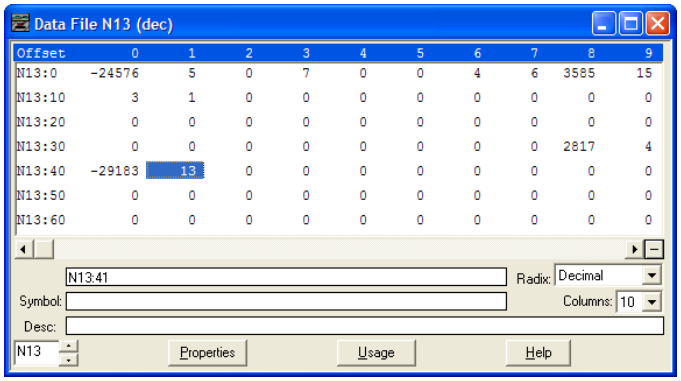
[1] The default setting for Service is 'Custom', enabling entry of a Service Code not available from the Service pull-down menu. When choosing a Service other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which is dimmed (unavailable).

SLC 500 Controller Example Read Single Response Data

In this message example, we use the data table address in Figure 6.31 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

In this example, Output Current is a 32-bit parameter. For PowerFlex 700S drives, Output Current is a floating point number. To manipulate REAL data into a proper Float tag, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

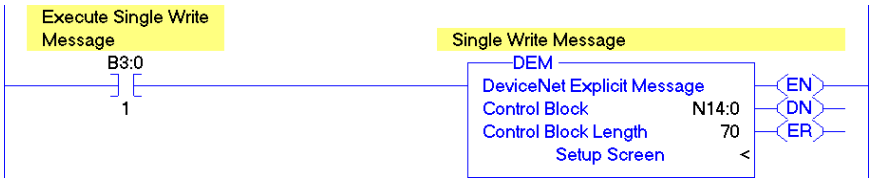
Figure 6.31 Example Read Single Response Data File



SLC 500 Controller Example Ladder Logic Program to Write a Single Parameter Using Read/Write Parameter Service

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

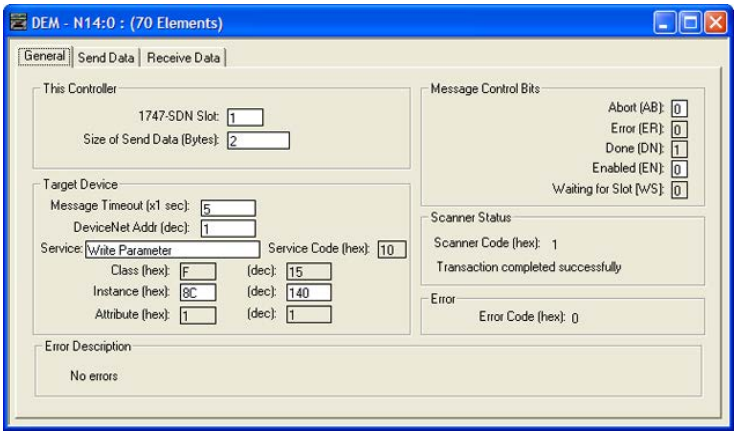
Figure 6.32 Example Ladder Logic to Write a Single Parameter



Important: If the explicit message single write must be written continuously, use the Generic Set Attribute Single service and attribute A (10 decimal; see page 6-33). This writes to RAM—not NVS (EEPROM) memory. This example single write message using Class code F writes to NVS. Over time, continuous writes will exceed the EEPROM life cycle and cause the drive to malfunction.

SLC 500 Controller – Formatting a Message to Write a Single Parameter Using Read/Write Parameter Service

Figure 6.33 Write Parameter Message Configuration Screen



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

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

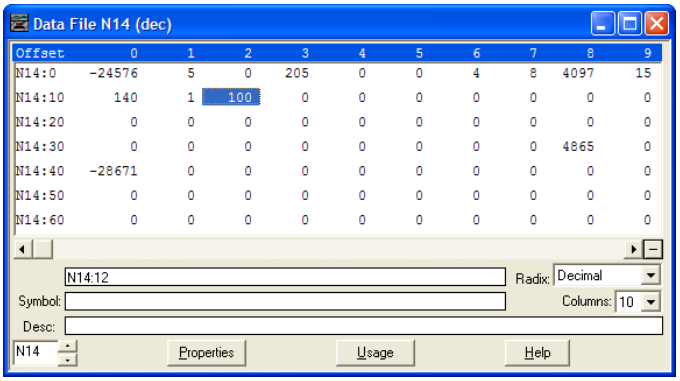
[1] The default setting for Service is 'Custom', enabling entry of a Service Code not available from the Service pull-down menu. When choosing a Service other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which is dimmed (unavailable).

SLC 500 Controller Example Write Single Request Data

In this message example, we use the data table address in Figure 6.34 to store the request value (10.0 sec.) that was written to drive parameter 140 - [Accel Time 1].

In this example, Accel Time 1 is a 16-bit parameter. The most significant word (MSW) is not used. For PowerFlex 700S drives, Accel Time 1 is a floating point number. To manipulate REAL data into two 16-bit registers, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

Figure 6.34 Example Write Single Request Data File

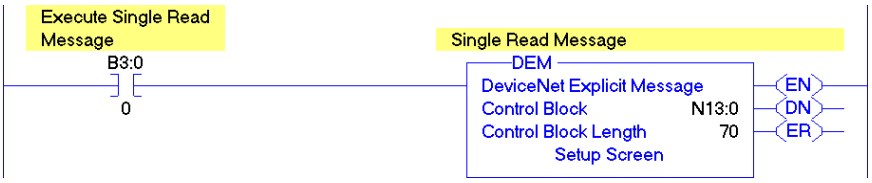


SLC 500 Controller Explicit Messaging Using the Generic Get/Set Attribute Service

SLC 500 Controller Example DEM Instruction Ladder Logic Program to Read a Single Parameter

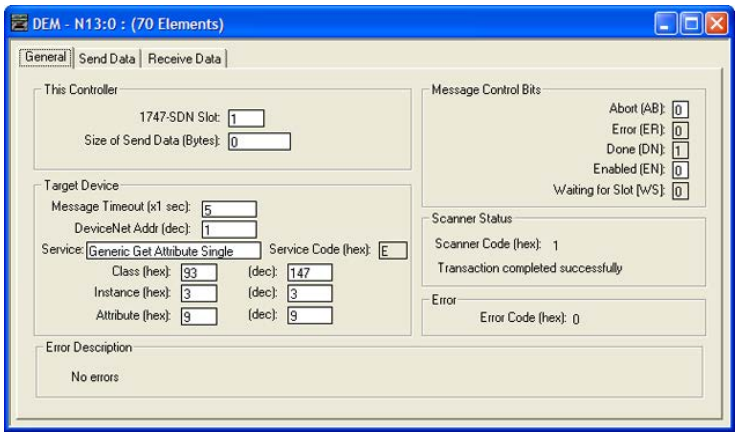
A Generic Get Attribute Single message is used to read a single parameter. This read message example reads the value of parameter 003 - [Output Current] in a PowerFlex 7-Class drive.

Figure 6.35 Example Ladder Logic to Read a Single Parameter



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

Figure 6.36 Generic Get Attribute Single DEM Message Configuration Screen



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

General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	0	Number of bytes to be sent. For a read message, always set to zero (0).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
Service [1]	Generic Get Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	3 (Dec.)	Instance number is the same as the parameter number.
Attribute	9 (Dec.)	Attribute number for the Parameter Value attribute.

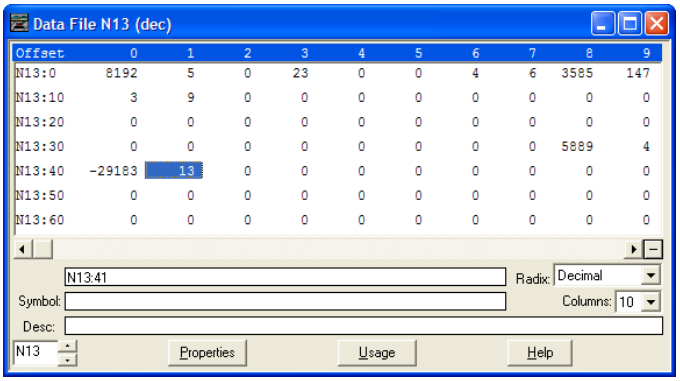
[1] The default setting for Service is 'Custom', enabling entry of a Service Code not available from the Service pull-down menu. When choosing a Service other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box which is dimmed (unavailable).

SLC 500 Controller Example Response Data for DEM Read Single Message

In this message example, we use the data table address in Figure 6.37 to store the response value (0.13 amps) that was read from drive parameter 003 - [Output Current].

In this example, Output Current is a 32-bit parameter. For PowerFlex 700S or PowerFlex 750-Series drives, Output Current is a floating point number. To manipulate REAL data into a proper Float tag, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

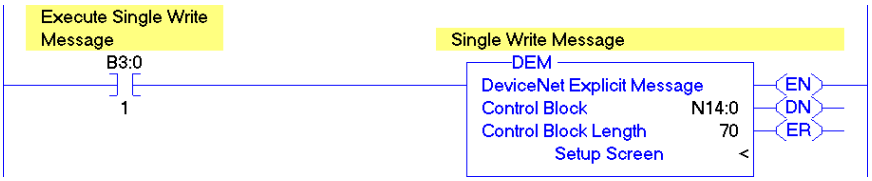
Figure 6.37 Example Response Data File for DEM Read Single Message



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

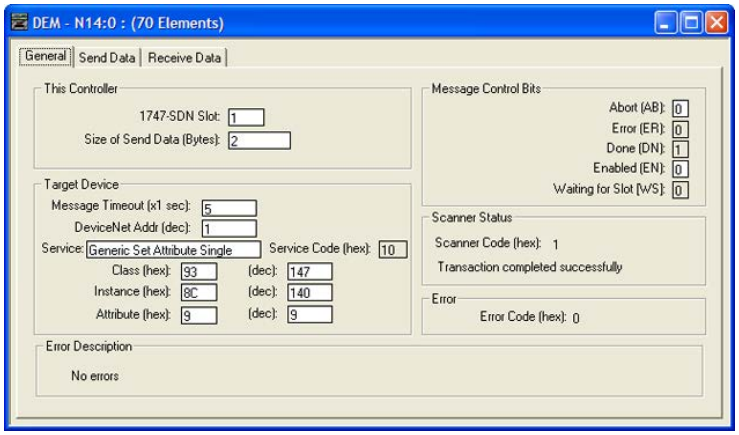
A Generic Set Attribute Single message is used to write to a single parameter. This write message example writes a value to parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive.

Figure 6.38 Example DEM Instruction Ladder Logic to Write a Single Parameter



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

Figure 6.39 Generic Set Attribute Single DEM Message Configuration Screen



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

General Tab	Example Value	Description
1747-SDN Slot	1	The chassis slot occupied by the scanner.
Size of Send Data (Bytes)	2	Number of bytes to be sent (written). Two bytes equal a 16-bit integer (word).
Message Timeout	5	The time (in seconds) that the message must be completed.
DeviceNet Addr	1 (Dec.)	The node address of the adapter connected to the drive.
Service [1]	Generic Set Attribute Single	Code for the requested service.
Class	93 (Hex.)	Class ID for the DPI Parameter Object.
Instance	140 (Dec.)	Instance number is the same as the parameter number.
Attribute [2]	9 or 10 (Dec.)	Attribute number for the Parameter Value attribute.

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

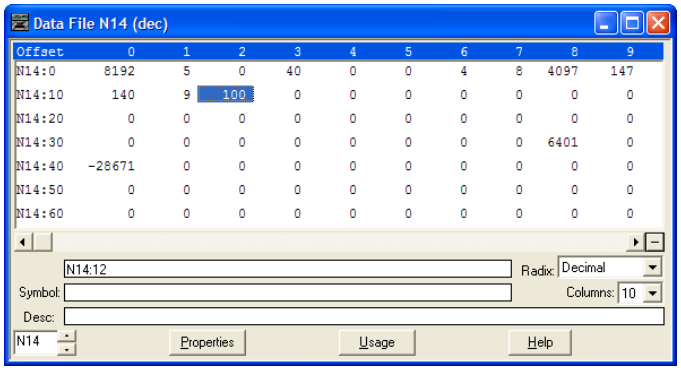
[2] Setting the Attribute value to '9' will write the parameter value to the drive's Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the drive is power cycled. Important: When set to '9', the EEPROM may quickly exceed its life cycle and cause the drive to malfunction. Setting the Attribute value to 'A' (10 decimal) will write the parameter value to temporary memory, which deletes the parameter value after the drive is power cycled. When frequent write messages are required, we recommend using the 'A' (10 decimal) setting.

SLC 500 Controller Example Request Data for DEM Write Single Message

In this message example, we use the data table address in Figure 6.40 to store the request value (10.0 sec.) that was written to drive parameter 140 - [Accel Time 1].

In this example, Accel Time 1 is a 16-bit parameter. The most significant word (MSW) is not used. For PowerFlex 700S drives, Accel Time 1 is a floating point number. To manipulate REAL data into two 16-bit registers, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

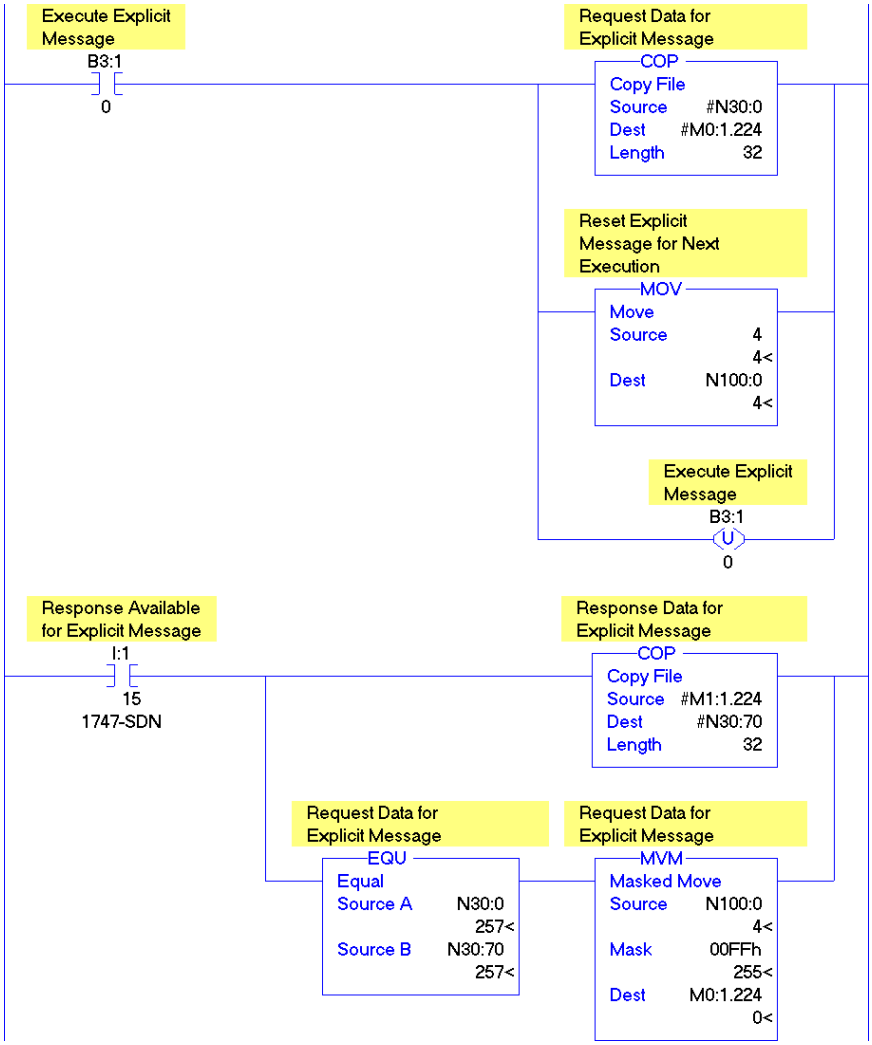
Figure 6.40 Example Request Data File for DEM Write SIngle Message



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

The example ladder logic program with a COP (Copy) instruction shown in Figure 6.41 can be used to perform single read, single write, scattered (multiple) read, and scattered (multiple) write explicit messaging.

Figure 6.41 Example COP Instruction Ladder Logic Program for All Explicit Messaging



SLC 500 Controller Example COP Message to Read a Single Parameter

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

Table 6.P Example Single Read COP Request Data

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

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

Figure 6.42 Example Single Read COP Request Data File

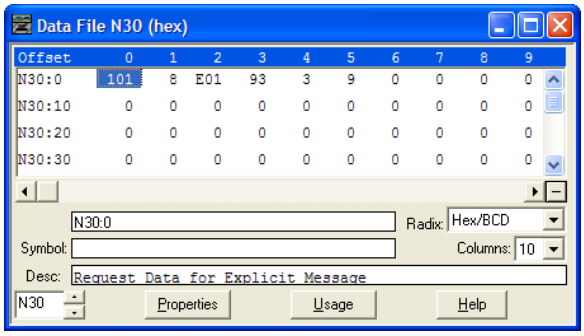


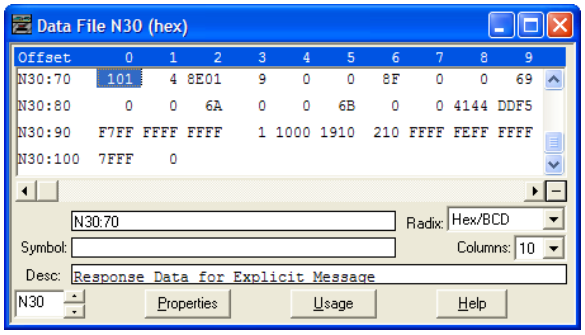
Table 6.Q Example Single Read COP Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	0004	4	Port = 00, Size = 04 bytes
N30:72	8E01	-29183	Service = 8E (successful), Address = 01 (Node)
N30:73	0009	9 [2]	Parameter Value Read (LSW) = 0.09 amps
N30:74	0000	0 [2]	Parameter Value Read (MSW) = 0

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

(2) In this example, Output Current is a 32-bit integer parameter. For PowerFlex 700S or PowerFlex 750-Series drives, Output Current is a floating point number. To manipulate REAL data into a proper Float tag, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

Figure 6.43 Example Single Read COP Response Data File



SLC 500 Controller Example COP Message to Write a Single Parameter

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

Table 6.R Example Single Write COP Request Data

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

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

(2) Setting the data file address value to '9' will write the parameter value to the drive's Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the drive is power cycled. **Important:** When set to '9', the EEPROM may quickly exceed its life cycle and cause the drive to malfunction. Setting the data file address value to 'A' (Hex.) will write the parameter value to temporary memory, which deletes the parameter value after the drive is power cycled. When frequent write messages are required, we recommend using the 'A' setting.

(3) In this example, Accel Time 1 is a 16-bit integer parameter. The most significant word (MSW) is not used. For PowerFlex 700S or PowerFlex 750-Series drives, Accel Time 1 is a floating point number. To manipulate REAL data into two 16-bit registers, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003.

Figure 6.44 Example Single Write COP Request Data File

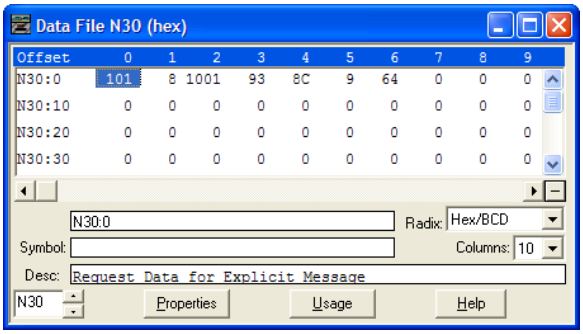
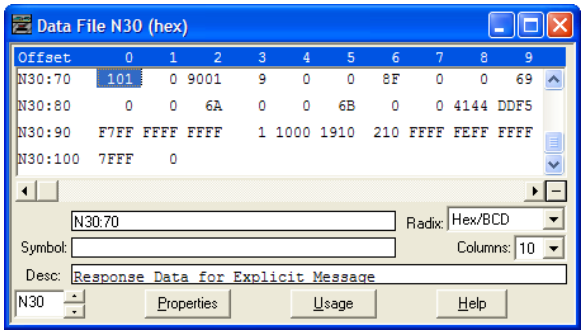


Table 6.S Example Single Write COP Response Data

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

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

Figure 6.45 Example Single Write COP Response Data File



SLC 500 Controller Example COP Message to Read Multiple Parameters

A scattered read message is used to read the values of multiple parameters. Up to 8 parameters can be read. This read message example reads the values of these five parameters in a PowerFlex 7-Class drive:

- Parameter 001 - [Output Freq]
- Parameter 003 - [Output Current]
- Parameter 006 - [Output Voltage]
- Parameter 012 - [DC Bus Voltage]
- Parameter 017 - [Analog In2 Value]

Table 6.T Example Scattered Read COP Request Data

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

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

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

Figure 6.46 Example Scattered Read COP Request Data File

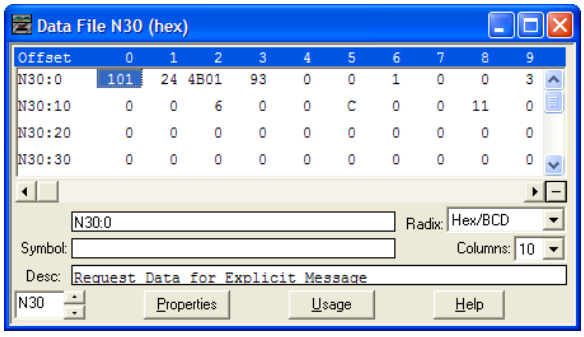


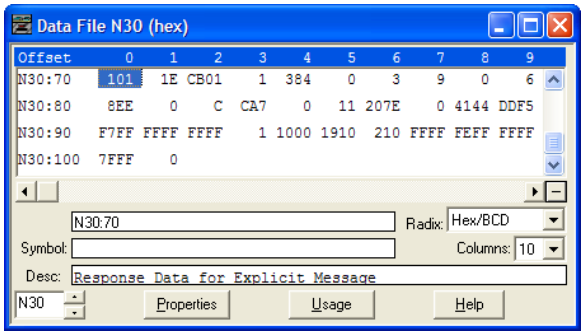
Table 6.U Example Scattered Read COP Response Data

Address	Value		Description
	Hex.[1]	Dec.	
N30:70	0101	257	TXID = 01, Status = 01 (successful)
N30:71	001E	30	Port = 00, Size = 30 bytes
N30:72	CB01	51969	Service = CB (successful), Address = 01 (Node)
N30:73	0001	1	Read Value = Parameter Number (verification)
N30:74	0384 [2]	900	Parameter Value (LSW) = 90.0 Hz.
N30:75	0000 [2]	0	Parameter Value (MSW) = 0
N30:76	0003	3	Read Value = Parameter Number (verification)
N30:77	0009 [2]	9	Parameter Value (LSW) = 0.09 Amp
N30:78	0000 [2]	0	Parameter Value (MSW) = 0
N30:79	0006	6	Read Value = Parameter Number (verification)
N30:80	08EE [2]	2286	Parameter Value (LSW) = 228.6 VDC
N30:81	0000 [2]	0	Parameter Value (MSW) = 0
N30:82	000C	12	Read Value = Parameter Number (verification)
N30:83	0CA7 [2]	3239	Parameter Value (LSW) = 323.9 VDC
N30:84	0000 [2]	0	Parameter Value (MSW) = 0
N30:85	0011	17	Read Value = Parameter Number (verification)
N30:86	207E [2]	8318	Parameter Value (LSW) = 8.318 mA
N30:87	0000 [2]	0	Parameter Value (MSW) = 0

[1] In RSLogix 5 software, leading zeros are not displayed in data file addresses. For example, '001E' in address N30:71 is shown as '1E'.

[2] For PowerFlex 700S or PowerFlex 750-Series drives, if some of the parameters being read are floating point (REAL) data types, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, on how to manipulate REAL data into a proper Float tag.

Figure 6.47 Example Scattered Read COP Response Data File



SLC 500 Controller Example COP Message to Write Multiple Parameters

A scattered write message is used to write values to multiple parameters. Values for up to 8 parameters can be written. This write message example writes the following values to these five parameters.

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

Table 6.V Example Scattered Write COP Request Data

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

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

(2) For PowerFlex 700S or PowerFlex 750-Series drives, if some of the parameters being written to are floating point (REAL) data types, see the 'Communications' section in Chapter 1 of the PowerFlex 700S AC Drives Phase II Control Reference Manual, publication PFLEX-RM003, on how to manipulate REAL data into two 16-bit registers.

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

Figure 6.48 Example Scattered Write COP Request Data File

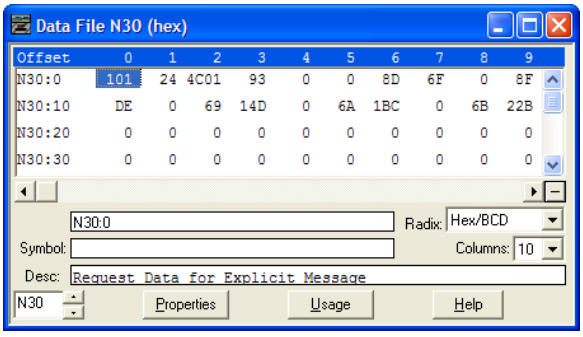
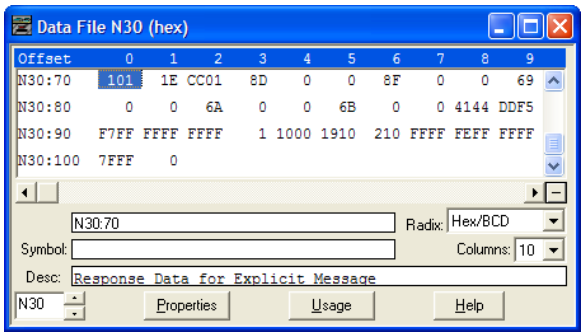


Table 6.W Example Scattered Write COP Response Data

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

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

Figure 6.49 Example Scattered Write COP Response Data File

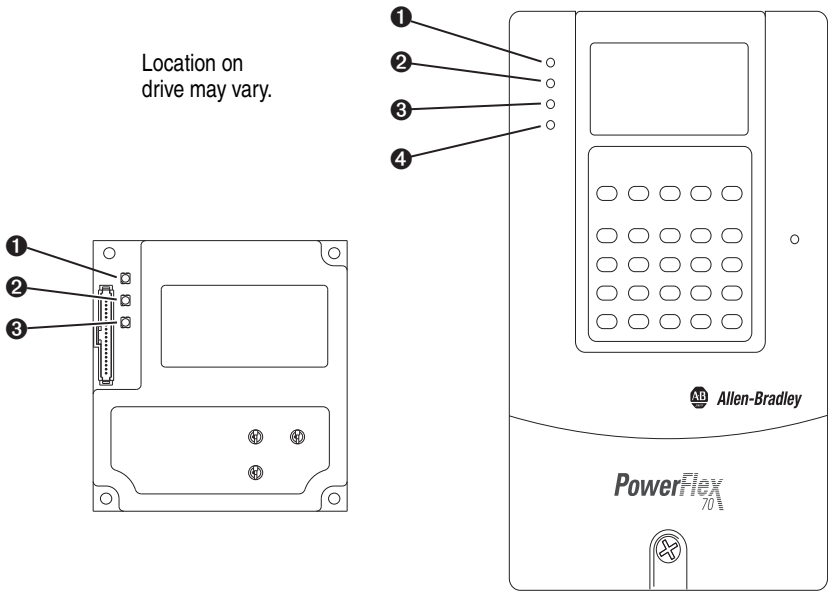


Troubleshooting

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

Understanding the Status Indicators

The adapter has three status indicators. They can be viewed on the adapter or through the drive cover.



Item	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 (only on drive cover)	Not used for DeviceNet	—

PORT Status Indicator

This red/green bicolor LED indicates the status of the adapter's connection to the drive as shown in the table below.

Status	Cause	Corrective Action
Off	The adapter is not powered or is not properly connected to the drive.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit).
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected and not damaged. Replace cables if necessary. • Cycle power to the drive (or adapter if mounted in a DPI External Comms Kit).
Steady Red	The drive has refused an I/O connection from the adapter. Another DPI peripheral is using the same DPI port as the adapter.	**Important:** Cycle power to the drive (or adapter if mounted in a DPI External Comms Kit) after making any of the following corrections: • Verify that all DPI cables on the drive are securely connected and not damaged. Replace cables if necessary. • Verify that the DPI drive supports Datalinks. • Configure the adapter to use a Datalink that is not already being used by another peripheral.
Steady Orange	The adapter is connected to a product that does not support Allen-Bradley DPI communications.	Connect the adapter to a product that supports Allen-Bradley DPI communications (for example, a PowerFlex 7-Class drive).
Flashing Green	The adapter is establishing an I/O connection to the drive.	No action required. Normal behavior if no DPI I/O is enabled.
Steady Green	The adapter is properly connected and is communicating with the drive.	No action required.

MOD Status Indicator

This red/green bicolor LED indicates the status of the adapter as shown in the table below.

Status	Cause	Corrective Action
Off	The adapter is not powered or is not properly connected to the drive.	• Securely connect the adapter to the drive using the Internal Interface (ribbon) cable. • Apply power to the drive (or adapter if mounted in a DPI External Comms Kit).
Flashing Red	The adapter has failed the firmware test. The adapter firmware is being updated. The node address switch setting is not valid.	• Clear faults in the adapter. • Cycle power to the drive (or adapter if mounted in a DPI External Comms Kit). • If cycling power does not correct the problem, the adapter parameter settings may have been corrupted. Reset defaults and reconfigure the adapter. • If resetting defaults does not correct the problem, update the adapter with the latest firmware revision. • Verify that the node address switch setting is valid (0…63).
Steady Red	The adapter has failed the hardware test.	• Cycle power to the drive (or adapter if mounted in a DPI External Comms Kit). • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data to a controller.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the adapter. • Configure the adapter for the program in the controller. • Normal behavior if no DPI I/O is enabled.
Steady Green	The adapter is operational and transferring I/O data to a controller.	No action required.

NET A Status Indicator

This red/green bicolor LED indicates the status of the network connection as shown in the table below.

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

Viewing Adapter Diagnostic Items

If you encounter unexpected communications problems, the adapter's diagnostic items may help you or Rockwell Automation personnel troubleshoot the problem. Adapter diagnostic items can be viewed with any of these drive configuration tools:

- LCD PowerFlex 7-Class HIM (Diagnostics/Device Items)
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer software, version 2.01 or later
- DriveExecutive software, version 3.01 or later

Using the HIM to View Adapter Diagnostic Items

Step	Example Screen
1. Access parameters in the adapter. See Using the PowerFlex 7-Class HIM to Access Parameters on page 3-2. 2. Press the ▲ or ▼ key to scroll to **Diagnostics**. 3. Press the ↵ (Enter) key to display the Diagnostics menu in the adapter. 4. Repeat steps 2 and 3 to enter the **Device Items** option. 5. Press the ▲ or ▼ key to scroll through the items.	Main Menu: Diagnostics Parameter Device Select Device Item # 3 Reference

Table 7.A Adapter Diagnostic Items

No.	Name	Description
1	Common Logic Cmd	The present value of the Common Logic Command being transmitted to the drive by this adapter.
2	Prod Logic Cmd	The present value of the Product Logic Command being transmitted to the drive by this adapter from the controller.
3	Reference	The present value of the Reference being transmitted to the drive by this adapter. Note that a 16-bit value will be sent as the Most Significant Word of the 32-bit field.
4	Common Logic Sts	The present value of the Common Logic Status being received from the drive by this adapter.
5	Prod Logic Sts	The present value of the Product Logic Status being received from the drive by this adapter from the controller.
6	Feedback	The present value of the Feedback being received from the drive by this adapter. Note that a 16-bit value will be sent as the Most Significant Word of the 32-bit field.
7	Datalink A1 In	The present value of respective Datalink In being transmitted to the drive by this adapter. (If not using a Datalink, this parameter should have a value of zero.)
8	Datalink A2 In	
9	Datalink B1 In	
10	Datalink B2 In	
11	Datalink C1 In	
12	Datalink C2 In	
13	Datalink D1 In	
14	Datalink D2 In	

Table 7.A Adapter Diagnostic Items (Continued)

No.	Name	Description
15	Datalink A1 Out	The present value of respective Datalink Out being received from the drive by this adapter. (If the drive indicates a 16-bit datalink size, the value appears in the least significant 16 bits of this diagnostic item, and the most significant 16 bits of this diagnostic item are zero.)
16	Datalink A2 Out	
17	Datalink B1 Out	
18	Datalink B2 Out	
19	Datalink C1 Out	
20	Datalink C2 Out	
21	Datalink D1 Out	
22	Datalink D2 Out	
23	Field Flash Cnt	The number of times the firmware in the adapter has been updated.
24	DPI Rx Errors	The present value of the DPI Receive error counter.
25	DPI Tx Errors	The present value of the DPI Transmit error counter.
26	DN Rx Errors	The number of receive errors reported by the DeviceNet hardware.
27	DN Tx Errors	The number of transmit errors reported by the DeviceNet hardware.
28	DN Image Size	The size of I/O image on the DeviceNet network.
29	Data Rate SW	The present value of the adapter data rate switch.
30	Node Address SW	The present value of the adapter node address switches.
31	OPT Status	The operating status of the optional I/O board in the DPI External Comms Kit. For the meanings of the individual bits, see Viewing Optional I/O Diagnostic Items on page 8-4.
32	OPT RX Errors	Number of optional I/O board receive errors.
33	OPT FW Version	Firmware version of optional I/O board (in DPI External Comms Kit).

Viewing and Clearing Events

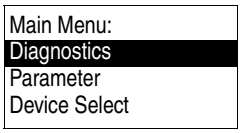
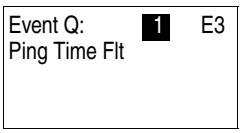
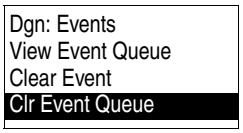
The adapter has an event queue to record significant events that occur in the operation of the adapter. When such an event occurs, an entry is put into the event queue. You can view the event queue with any of these drive configuration tools:

- LCD PowerFlex 7-Class HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer software, version 2.01 or later
- DriveExecutive software, version 1.01 or later

The event queue can contain up to 32 entries. Eventually the event queue will become full, since its contents are retained through adapter resets. At that point, a new entry replaces the oldest entry. Only an event queue clear operation or adapter power cycle will clear the event queue contents.

Resetting the adapter to defaults has no effect on the event queue.

Using the HIM to View and Clear Events

Step	Example Screen
Viewing Events	
1. Access parameters in the adapter. See Using the PowerFlex 7-Class HIM to Access Parameters on page 3-2.	
2. Press the ▲ or ▼ key to scroll to **Diagnostics**.	
3. Press the ↵ (Enter) key to display the Diagnostics menu in the adapter.	
4. Repeat steps 2 and 3 to enter the **Events** option and then **View Event Queue** option.	
5. Press the ▲ or ▼ key to scroll through the events. The most recent event is Event 1.	
Clearing Events	
1. Access parameters in the adapter. See Using the PowerFlex 7-Class HIM to Access Parameters on page 3-2.	
2. Press the ▲ or ▼ key to scroll to **Diagnostics**.	
3. Press the ↵ (Enter) key to display the Diagnostics menu in the adapter.	
4. Repeat steps 2 and 3 to enter the **Events** option and then the **Clear Event** option or **Clr Event Queue** option. A message will pop up to confirm that you want to clear the message or queue.	
5. Press the ↵ (Enter) key to confirm your request. If **Clr Event Queue** was selected, all event queue entries will then display 'No Event'.	

Events

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

Table 7.B Adapter Events

Code	Event	Description
1	No Event	Empty event queue entry.
2	DPI Bus Off Flt	A bus-off condition was detected on DPI. This event may be caused by loose or broken cables or by noise.
3	Ping Time Flt	A ping message was not received on DPI within the specified time.
4	Port ID Flt	The adapter is not connected to a correct port on a DPI product.
5	Port Change Flt	The DPI port changed after start up.
6	Host Sent Reset	The drive sent a reset event message.
7	EEPROM Sum Flt	The EEPROM in the adapter is corrupt.
8	Online @ 125kbps	The adapter detected that the drive is communicating at 125 kbps.
9	Online @ 500kbps	The adapter detected that the drive is communicating at 500 kbps.
10	Bad Host Flt	The adapter was connected to an incompatible product.
11	Dup Port Flt	Another peripheral with the same port number is already in use.
12	Type 0 Login	The adapter has logged in for Type 0 control.
13	Type 0 Time Flt	The adapter has not received a Type 0 status message within the specified time.
14	DL Login	The adapter has logged into a Datalink.
15	DL Reject Flt	The drive rejected an attempt to log in to a Datalink because the Datalink is not supported or is used by another peripheral.
16	DL Time Flt	The adapter has not received a Datalink message within the specified time.
17	Control Disabled	The adapter has sent a ‘Soft Control Disable’ command to the drive.
18	Control Enabled	The adapter has sent a ‘Soft Control Enable’ command to the drive.
19	PCCC IO Time Flt	The adapter has not received a PCCC Control message for longer than the PCCC Control Timeout.
20	Normal Startup	The adapter successfully started up.
21	Message Timeout	A Client-Server message sent by the adapter was not completed within 1 sec.
22	DPI Fault Msg	The drive has faulted.
23	DN Poll Timeout	A Polled I/O connection has timed out.
24	DN IO Too Long	Reconfigure the I/O length in the scanner.
25	Bad IO Fragment	A DeviceNet I/O fragment was received out of sequence. Possible line noise problem.
26	Idle IO Message	The DeviceNet scanner was placed in program mode.
27	Peer IO Timeout	The adapter has not received a Peer I/O message within the specified timeout interval.
28	DPI Fault Clear	The drive issued this because a fault was cleared.
29	DN COS Timeout	A Change of State (COS) I/O connection has timed out.
30	DN Poll Allocate	A Polled I/O connection has been allocated.
31	DN COS Allocate	A Change of State (COS) I/O connection has been allocated.
32	DN Poll Closed	A Polled I/O connection has was explicitly closed.
33	DN COS Closed	A Change of State (COS) I/O connection was explicitly closed.
34	Flt Cfg Error	One of the Flt Cfg xx parameters is set to a value greater than 65535 and the drive requires a 16-bit value.
35	DN Dup MAC Flt	The adapter has detected another node on DeviceNet using the same node address that it is using.
36	Manual Reset	The adapter was reset by changing its Reset Module parameter.

Table 7.B Adapter Events (Continued)

Code	Event	Description
37	Language CRC Bad	The language text memory segment is corrupt.
38	OPT Timeout	Communication between the adapter and I/O option of the DPI External Comms Kit was disrupted.
39	OPT Open	The adapter began exchanging I/O data with the I/O option of the DPI External Comms Kit.
40	OPT Close	The adapter forced a fault condition on the I/O option of the DPI External Comms Kit.

Using the Adapter in a DPI External Comms Kit (20-XCOMM-DC-BASE)

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

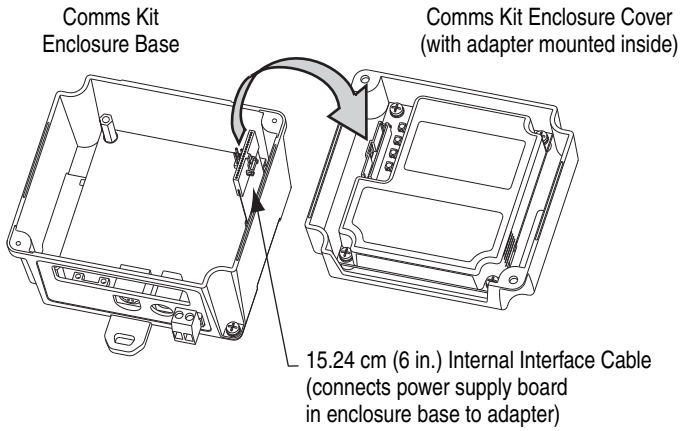
The adapter is typically installed in the internal communication slot on the PowerFlex 7-Class drive. However, an externally-mounted adapter may be desired when:

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

Installing the Adapter

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

Figure 8.1 Mounting and Connecting the Adapter

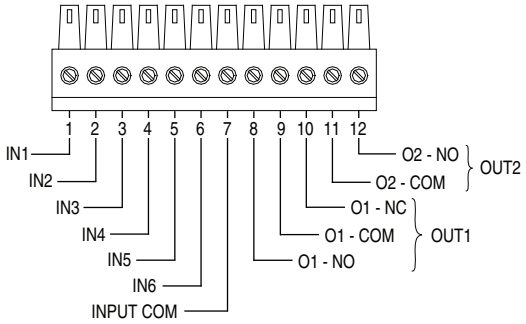


For more information, see the DPI External Communications Kit Installation Instructions, publication 20COMM-IN001.

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

The I/O Board option, when installed in the DPI External Comms Kit, can be used with only a Series B adapter, firmware revision 3.xxx or later. The I/O Board provides six DC inputs and two Relay outputs for use by a controller on the network.

Figure 8.2 I/O Connector Function Descriptions

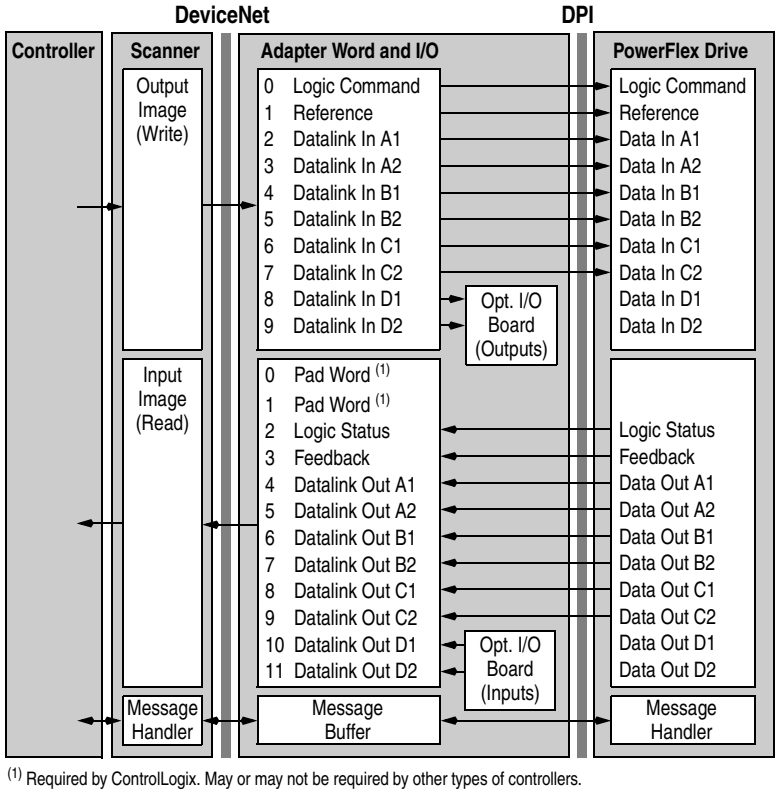


For more information, see the I/O Board Option Installation Instructions, publication 20COMM-IN002.

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

The data for the optional I/O Board is sent over the I/O connection using Datalink D. When the optional I/O Board is installed in the DPI External Comms Kit, Datalink D is dedicated only for this function and is not available for other uses. When the adapter detects the presence of the optional I/O Board, the I/O image is modified as shown in Figure 8.3.

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



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

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

For example, for the 20-XCOMM-IO-OPT1, the digital inputs and digital outputs are mapped as shown in Figure 8.4 and Figure 8.5 respectively.

Figure 8.4 I/O Board Option Digital Input Mapping

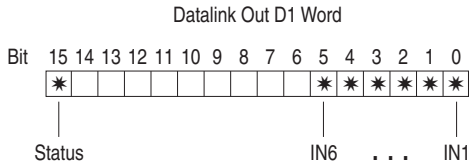
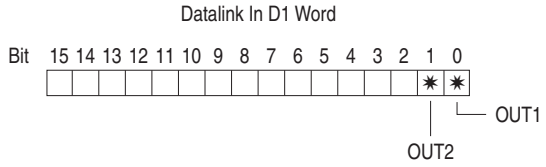


Figure 8.5 I/O Board Option Digital Output Mapping



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

Configuring the Adapter to Use the Optional I/O Data

To configure the adapter to use the optional I/O Board, **Parameters 13 - [DPI I/O Cfg]**, **25 - [M-S Input]**, and **26 - [M-S Output]** must be set. To send input/output data from the optional I/O board to the network, do the following:

- Turn on bit 4 (1xxxx) in **Parameter 25 - [M-S Input]**.
- Turn on bit 4 (1xxxx) in **Parameter 26 - [M-S Output]**.
- Turn off bit 4 (0xxxx) in **Parameter 13 - [DPI I/O Cfg]**.

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

If the I/O Board Fault Action Jumper (JMP1) is set to the Fault Configurable position, **Parameter 23 - [Flt Cfg D1 In]** is used to set the states of the outputs when the I/O Board takes its Fault Action. For details on setting the Fault Action jumper, see the I/O Board Option Installation Instructions, publication 20COMM-IN002.

Viewing Optional I/O Diagnostic Items

Viewing communication adapter diagnostic item 31 (OPT Status) shows the operating status of the optional I/O board.

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

Viewing communication adapter diagnostic item 32 (OPT RX Errors) shows the number of I/O board receive errors.

Viewing communication adapter diagnostic item 33 (OPT FW Version) shows the present firmware revision of the optional I/O board.

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

Diagnostic item 21 (Datalink D1 Out) will show the status of the inputs as a combined decimal value, including the status bit 15. For example, Figure 8.6 shows inputs that are valid and all on, and Figure 8.7 shows inputs that are valid and all off (zero).

Figure 8.6 Valid Inputs All On

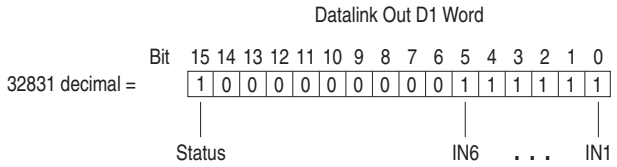
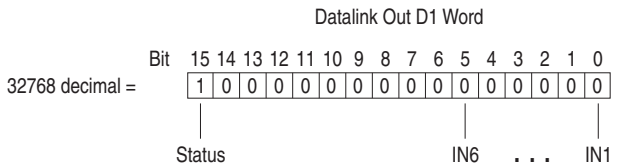


Figure 8.7 Valid Inputs All Off



Specifications

This appendix presents the specifications for the adapter.

Communications

Network Protocol Data Rates	 DeviceNet 125K, 250K, 500K, Autobaud, and PGM (Program)
Connection Limits	30 TCP connections 16 simultaneous CIP messaging connections including 1 exclusive-owner I/O connection
Requested Packet Interval (RPI)	5 ms minimum
Packet Rate	Up to 400 total I/O packets per second (200 in and 200 out)
Drive Protocol Data Rates	 DPI 125 kbps or 500 kbps

Electrical

Consumption Drive Network	 150 mA at 5V DC supplied by the host (drive or DPI External Comms Kit) 60 mA at 24V DC supplied by the network Use the 60 mA value to size the network current draw from the power supply.

Mechanical

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

Environmental

Temperature Operating Storage	 -10…50 °C (14…122 °F) -40…85 °C (-40…185 °F)
Relative Humidity	5…95% non-condensing
Atmosphere	**Important:** The adapter **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the adapter is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.

Regulatory Compliance

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

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

Adapter Parameters

This appendix provides information about the adapter parameters.

About Parameter Numbers

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

Configuration Tool	Numbering Scheme
• HIM • RSNetWorx for DeviceNet software • Connected Components Workbench software • DriveExplorer software • DriveExecutive software	The adapter parameters begin with parameter 01. For example, **Parameter 01 - [DPI Port]** is parameter 01 as indicated by this manual.
• Explicit Messaging	See Chapter 6, Using Explicit Messaging and Appendix C, DeviceNet Objects for details.

Parameter List

Parameter No.	Name and Description	Details
01	**[DPI Port]** Displays the port to which the adapter is connected. This will usually be port 5.	Minimum: 0 Maximum: 7 Type: Read Only
02	**[DPI Data Rate]** Displays the data rate used by the drive. This data rate is set in the drive and the adapter detects it.	Values: 0 = 125 kbps 1 = 500 kbps Type: Read Only
03	**[DN Addr Cfg]** Sets the DeviceNet node address used by the adapter if the Data Rate switch is set to 'PGM' (Program).	Default: 63 Minimum: 0 Maximum: 63 Type: Read/Write Reset Required: Yes
04	**[DN Addr Act]** Displays the actual DeviceNet node address used by the adapter.	Minimum: 0 Maximum: 63 Type: Read Only
05	**[DN Rate Cfg]** Sets the DeviceNet data rate at which the adapter communicates if the Data Rate switch is set to 'PGM' (Program). (Updates **Parameter 06 - [DN Rate Act]** after a reset.)	Default: 3 = Autobaud Values: 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps 3 = Autobaud Type: Read/Write Reset Required: Yes

Parameter No.	Name and Description	Details
06	**[DN Rate Act]** Displays the actual DeviceNet data rate used by the adapter.	Values: 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps Type: Read Only
07	**[Ref/Fdbk Size]** Displays the size of the Reference/Feedback. The drive determines the size of the Reference/ Feedback.	Values: 0 = 16-bit 1 = 32-bit Type: Read Only
08	**[Datalink Size]** Displays the size of each Datalink word. The drive determines the size of Datalinks.	Values: 0 = 16-bit 1 = 32-bit Type: Read Only
09	**[Reset Module]** No action if set to '0' (Ready). Resets the adapter if set to '1' (Reset Module). Restores the adapter to its factory default settings if set to '2' (Set Defaults). This parameter is a command. It will be reset to '0' (Ready) after the command has been performed. **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.	Default: 0 = Ready Values: 0 = Ready 1 = Reset Module 2 = Set Defaults Type: Read/Write Reset Required: No
10	**[Comm Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that I/O communication has been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter. When communication is re-established, the drive will automatically receive commands over the network again. **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 I/O communication is disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details
11	**[Idle Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that the controller is in program mode or faulted. This setting is effective only if I/O that controls the drive is transmitted through the adapter. When the controller is put back in Run mode, the drive will automatically receive commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
12	**[DN Active Cfg]** Displays the source from which the adapter node address and data rate are taken. This will either be '1' (Switches) or '0' (EEPROM) in which the address from **Parameter 03 - [DN Addr Cfg]** and the data rate from **Parameter 05 - [DN Rate Cfg]** is stored. The source is determined by the settings of the adapter switches.	Values: 0 = EEPROM 1 = Switches Type: Read Only
13	**[DPI I/O Cfg]** Sets the I/O that is transferred through the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read/Write Reset Required: Yes
14	**[DPI I/O Act]** Displays the I/O that the adapter is actively transmitting. The value of this parameter will usually be equal to the value of **Parameter 13 - [DPI I/O Cfg]**.	Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read Only

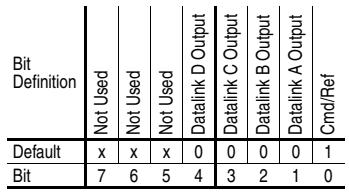
ATTENTION: Risk of injury or equipment damage exists. **Parameter 11 - [Idle Flt Action]** lets you determine the action of the adapter and connected drive when the controller is idle. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a faulted controller).

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

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

Parameter No.	Name and Description	Details
15	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • **Parameter 10 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 11 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 34 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. The bit definitions will depend on the product to which the adapter is connected. See Appendix D or the documentation for the drive being used.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No
16	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • **Parameter 10 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 11 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 34- [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.
17 18 19 20 21 22 23 24	**[Flt Cfg A1 In]** **[Flt Cfg A2 In]** **[Flt Cfg B1 In]** **[Flt Cfg B2 In]** **[Flt Cfg C1 In]** **[Flt Cfg C2 In]** **[Flt Cfg D1 In]** **[Flt Cfg D2 In]** Sets the data that is sent to the Datalink in the drive if any of the following is true: • **Parameter 10 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 11 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 34 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is 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]** Sets the Master-Slave input data. This data is produced by the scanner and consumed by the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read/Write Reset Required: Yes

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

Parameter No.	Name and Description	Details
26	**[M-S Output]** Sets the Master-Slave output data. This data is produced by the adapter and consumed by the Master device (for example, scanner).	Default: xxx0 0001 Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read/Write Reset Required: Yes 
27	**[COS Status Mask]** Sets the mask for the 16-bit Logic Status word. Unless they are masked out, the bits in the Logic Status word are checked for changes when the adapter is allocated using COS (Change of State). If a bit changes, it is reported as a change in the Change of State operation. If the mask bit is 0 (Off), the bit is ignored. If the mask bit is 1 (On), the bit is checked. **Important:** The bit definitions in the Logic Status word will depend on the drive. See Appendix D or the documentation for the drive being used.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Values: 0 = Ignore bit 1 = Check bit Type: Read/Write Reset Required: No
28	**[COS Fdbk Change]** Sets the hysteresis band to determine how much the Feedback word can change before it is reported as a change in the COS (Change of State) operation.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No
29	**[COS/Cyc Interval]** Displays amount of time that a scanner will wait to check for data in the adapter. When COS (Change of State) data exchange has been set up, this is the maximum amount of time between scans. Scans will occur sooner if data changes. When Cyclic data exchange has been set up, this interval is the fixed time between scans. This interval is the heartbeat rate configured in the scanner.	Minimum: 0.0 seconds Maximum: 655.35 seconds Type: Read Only
30 31	**[Peer A Input]** **[Peer B Input]** Sets the destination of the peer I/O input. The adapter receives this data from the network and sends it to the drive. **Important:** Changes to these parameters are ignored when **Parameter 37 - [Peer Inp Enable]** is '1' (On). **Important: Parameter 31 - [Peer B Input]** cannot be used when a 32-bit Datalink or Reference is used in **Parameter 30 - [Peer A Input]**.	Default: 0 = Off Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = Datalink A Input 3 = Datalink B Input 4 = Datalink C Input 5 = Datalink D Input Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details
32	**[Peer Cmd Mask]** Sets the mask for the Logic Command word when it is received through peer input. If the mask bit is '0' (Off), the command bit is ignored and not used. If the mask bit is '1' (On), the command bit is checked and used. **Important:** If the adapter receives a Logic Command from both a Master device and a peer device, each command bit must have only one source. The source of command bits set to '0' will be the Master device. The source of command bits set to '1' will be the peer device.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Values: 0 = Ignore bit 1 = Check bit Type: Read/Write Reset Required: Yes
33	**[Peer Ref Adjust]** Sets the percent scale factor for the Reference received from a peer. **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.	Default: 0.00% Minimum: 0.00% Maximum: 199.99% Type: Read/Write Reset Required: No
34	**[Peer Flt Action]** Sets the action that the adapter and drive will take if the adapter detects that peer I/O communication has been disrupted. This setting is effective only if I/O is transmitted through the adapter. **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, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
35	**[Peer Node to Inp]** Sets node address of the node producing the peer I/O. **Important:** A change to this parameter is ignored when **Parameter 37 - [Peer Inp Enable]** is '1' (On).	Default: 0 Minimum: 0 Maximum: 63 Type: Read/Write Reset Required: No
36	**[Peer Inp Timeout]** Sets the time-out for a Change of State peer I/O connection. If the time is reached without the adapter receiving (consuming) a message, the adapter will respond with the action specified in **Parameter 34 - [Peer Flt Action]**. On a slave drive, this parameter should be set to the value calculated as follows: Master **Parameter 42 - [Peer Out Time]** multiplied by value of Master **Parameter 43 - [Peer Out Skip]**.	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 180.00 Seconds Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details
37	**[Peer Inp Enable]** Sets peer I/O input to be on or off.	Default: 0 = Off Values: 0 = Off 1 = On Type: Read/Write Reset Required: No
38	**[Peer Inp Status]** Displays the status of the consumed peer I/O input connection.	Values: 0 = Off 1 = Waiting 2 = Running 3 = Faulted Type: Read Only
39 40	**[Peer A Output]** **[Peer B Output]** Selects the source of the peer I/O output data. The adapter transmits this data to the network. **Important:** Changes to these parameters are ignored when **Parameter 41 - [Peer Out Enable]** is '1' (On). **Important: Parameter 40 - [Peer B Output]** cannot be used when a 32-bit Datalink or Reference is used in **Parameter 39 - [Peer A Output]**.	Default: 0 = Off Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = Datalink A Input 3 = Datalink B Input 4 = Datalink C Input 5 = Datalink D Input 6 = Datalink A Output 7 = Datalink B Output 8 = Datalink C Output 9 = Datalink D Output Type: Read/Write Reset Required: No
41	**[Peer Out Enable]** Sets peer I/O output to be on or off.	Default: 0 = Off Values: 0 = Off 1 = On Type: Read/Write Reset Required: No
42	**[Peer Out Time]** Sets the minimum time that an adapter will wait when transmitting data to a peer. **Important:** A change to this parameter is ignored when **Parameter 41 - [Peer Out Enable]** is '1' (On).	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: No
43	**[Peer Out Skip]** Sets the maximum time that an adapter will wait when transmitting data to a peer. The value of **Parameter 42 - [Peer Out Time]** is multiplied by the value of this parameter to set the time. **Important:** A change to this parameter is ignored when **Parameter 41 - [Peer Out Enable]** is '1' (On).	Default: 1 Minimum: 1 Maximum: 16 Type: Read/Write Reset Required: No

Notes:

DeviceNet Objects

This appendix 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, see Chapter 6, Using Explicit Messaging.

(1) These objects are **not** supported when the adapter is used with a PowerFlex 750-Series drive.

TIP: See the DeviceNet specification for more information about DeviceNet objects. Information about the DeviceNet specification is available on the ODVA website (http://www.odva.org).

Supported Data Types

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

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Services

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

Instances

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

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

Class Attributes

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

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	UINT	Bit 0 = Owned Bit 8 = Minor recoverable fault Bit 10 = Major recoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_STRING	Product name and rating

Connection Object

Class Code

Hexadecimal	Decimal
0x05	5

Services

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

Instances

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

Instance Attributes

See the DeviceNet specification for more information.

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 2 = Waiting for connection ID 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	0 = Explicit message 1 = I/O message
3	Get	Transport	USINT	The Transport Class Trigger for this instance
4	Get	Produced Cnxn ID	USINT	CAN identifier to transmit on
5	Get	Consumed Cnxn ID	USINT	CAN identifier to receive on
6	Get	Initial Comm Char	USINT	Defines the DeviceNet message groups that the Tx/Rx Cnxn's apply
7	Get	Produced Cnxn Size	UINT	Max bytes to transmit across this connection
8	Get	Consumed Cnxn Size	UINT	Max bytes to receive across this connection
9	Get/Set	EPR	UINT	Expected Packet Rate (timer resolution = 2 msec.)
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	UNIT	Number of bytes of data in the consumed connection path
16	Get	Consumed Connection Path	ARRAY of UINT	Byte stream which defines Application objects whose data is to be consumed by this Connection object

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Services

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

Instances

Instance	Description
1	All 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.

Instance Attributes

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

(1) For this attribute, the Access Rule is Get if Direction = 0. The Access Rule is Set if Direction = 1.

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

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

Important: This object is not supported when the adapter is used with a PowerFlex 750-Series drive.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	No	Yes	Get_Attributes_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x15	Yes	No	Restore_Request
0x16	Yes	No	Save_Request
0x4B	No	Yes	Get_Enum_String

Instances

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

Instance	Description
0	Class Attributes
1	Drive Parameter 1 Attributes
⋮	⋮
n	Last Drive Parameter n Attributes (1)
n + 1	Adapter Parameter 1 Attributes
⋮	⋮
n + m	Last Adapter Parameter m Attributes (2)

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

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

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	(1)	Parameter Value	(2)	(3)
2	Get	Link Path Size	USINT	0 = No link specified n = The size of Attribute 3 in bytes
3	Get	Link Path		(4)
4	Get	Descriptor	WORD	0 = False, 1 = True Bit 1 = Supports ENUMs Bit 2 = Supports scaling Bit 3 = Supports scaling links Bit 4 = Read only Bit 5 = Monitor Bit 6 = Extended precision scaling
5	Get	Data Type	USINT	1 = WORD (16-bit) 2 = UINT (16-bit) 3 = INT (16-bit) 5 = SINT 6 = DINT 8 = USINT 9 = UDINT 11 = REAL 23 = SHORT_STRING 24 = BYTE 25 = DWORD
6	Get	Data Size	USINT	(3)
7	Get	Parameter Name String	SHORT_STRING	(3)
8	Get	Units String	SHORT_STRING	(3)
9	Get	Help String	SHORT_STRING	Null string
10	Get	Minimum Value	(2)	(3)
11	Get	Maximum Value	(2)	(3)
12	Get	Default Value	(2)	(3)
13	Get	Scaling Multiplier	UINT	(3)
14	Get	Scaling Divisor	UINT	(3)
15	Get	Scaling Base	UINT	(3)
16	Get	Scaling Offset	UINT	(3)
17	Get	Multiplier Link	UINT	(3)
18	Get	Divisor Link	UINT	(3)
19	Get	Base Link	UINT	(3)
20	Get	Offset Link	UINT	(3)
21	Get	Decimal Precision	USINT	(3)

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

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

(3) Value varies based on parameter instance.

(4) Refer to the DeviceNet specification for a description of the link path.

Parameter Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Important: This object is not supported when the adapter is used with a PowerFlex 750-Series drive.

Services

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

Instances

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

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

Class Attributes

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

Instance Attributes

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

(1) Value varies based on group instance.

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Services

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

Instances

Supports Instance 1.

Class Attributes

Not supported.

Instance Attributes

Not supported.

Message Structure for Execute_PCCC

Request		
Name	**Data Type**	**Description**
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte
STS	USINT	0
TNSW	UINT	Transport word
FNC	USINT	Function code; not used for all CMDs.
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters

Response		
Name	**Data Type**	**Description**
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte
STS	USINT	Status byte
TNSW	UINT	Transport word. Same value as the request.
EXT_STS	USINT	Extended status; not used for all CMDs.
PCCC_ results	ARRAY of USINT	CMD/FNC specific result data

Message Structure for Execute_Local_PCCC

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

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

The adapter supports the following PCCC command types:

CMD	FNC	Description
0x06	0x03	Identify host and some status
0x0F	0x67	PLC-5 typed write
0x0F	0x68	PLC-5 typed read
0x0F	0x95	Encapsulate other protocol
0x0F	0xA2	SLC 500 protected typed read with 3 address fields
0x0F	0xAA	SLC 500 protected typed write with 3 address fields
0x0F	0x00	Word range read
0x0F	0x01	Word range write

For more information regarding PCCC commands, see DF1 Protocol and Command Set Manual, publication 1770-6.5.16.

N-Files

N-File	Description	
N41	This N-file lets you read and write control I/O messages. You can write control I/O messages only when all of the following conditions are true: • The adapter is not receiving I/O from a scanner. For example, there is no scanner on the network, the scanner is in idle (program) mode, the scanner is faulted, or the adapter is not mapped to the scanner. • The adapter is not receiving Peer I/O from another adapter. • The value of N42:3 is set to a non-zero value.	
	Write	*Read*
N41:0	Logic Command Word	Logic Status Word
N41:1	Reference (least significant word)	Feedback (least significant word)
N41:2	Reference (most significant word)	Feedback (most significant word)
N41:3	Datalink A1 (least significant word)	Datalink A1 (least significant word)
N41:4	Datalink A1 (most significant word)	Datalink A1 (most significant word)
N41:5	Datalink A2 (least significant word)	Datalink A2 (least significant word)
N41:6	Datalink A2 (most significant word)	Datalink A2 (most significant word)
N41:7	Datalink B1 (least significant word)	Datalink B1 (least significant word)
N41:8	Datalink B1 (most significant word)	Datalink B1 (most significant word)
N41:9	Datalink B2 (least significant word)	Datalink B2 (least significant word)
N41:10	Datalink B2 (most significant word)	Datalink B2 (most significant word)
N41:11	Datalink C1 (least significant word)	Datalink C1 (least significant word)
N41:12	Datalink C1 (most significant word)	Datalink C1 (most significant word)
N41:13	Datalink C2 (least significant word)	Datalink C2 (least significant word)
N41:14	Datalink C2 (most significant word)	Datalink C2 (most significant word)
N41:15	Datalink D1 (least significant word)	Datalink D1 (least significant word)
N41:16	Datalink D1 (most significant word)	Datalink D1 (most significant word)
N41:17	Datalink D2 (least significant word)	Datalink D2 (least significant word)
N41:18	Datalink D2 (most significant word)	Datalink D2 (most significant word)
N42	This N-file lets you read and write some values configuring the port.	
N42:3	Time-out (read/write): Time (in seconds) allowed between messages to the N41 file. If the adapter does not receive a message in the specified time, it performs the fault action configured in its [Comm Flt Action] parameter. A valid setting is between 1 and 32767 seconds (5…20 seconds is recommended).	
N42:7	Adapter Port Number (read only): DPI port on the drive to which the adapter is connected.	
N42:8	Peer Adapters (read only): Bit field of devices having DPI Peer capabilities.	

DPI Device Object

Class Code

Hexadecimal	Decimal
0x92	146

Services

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

Instances

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

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

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

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Family Code	BYTE	0x00 = DPI Peripheral 0x30 = PowerFlex 70 0x34 = PowerFlex 700H 0x38, 0x39, or 0x3A= PowerFlex 700 0x40 = PowerFlex 7000 0x48, 0x49, or 0x4A = PowerFlex 700S 0x5A = SMC Flex 0x68, 0x69, or 0x6A = PowerFlex 700VC 0xFF = HIM
1	Get	Family Text	STRING[16]	Text identifying the device.
2	Set	Language Code	BYTE	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch
3	Get	Product Series	BYTE	1 = A 2 = B …
4	Get	Number of Components	BYTE	Number of components (for example, main control board, I/O boards) in the device.
5	Set	User Definable Text	STRING[16]	Text identifying the device with a user-supplied name.

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

Instance Attributes

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

DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x93	147

Instances

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

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

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

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
7	Get	DPI Online Read Full	STRUCT of: BOOL[32] CONTAINER(1) CONTAINER CONTAINER CONTAINER WORD WORD STRING[4] UINT UINT UINT INT BYTE[3] BYTE STRING[16]	 Descriptor (see page C-15) Parameter value Minimum value Maximum value Default value Next parameter Previous parameter Units (for example, Amp, Hz) Multiplier (2) Divisor (2) Base (2) Offset (2) Link (source of the value) (0 = no link) Always zero (0) Parameter name
8	Get	DPI Descriptor	BOOL[32]	Descriptor (see page C-15)
9	Get/Set	DPI Parameter Value	Various	Parameter value in NVS. (3)
10	Get/Set	DPI RAM Parameter Value	Various	Parameter value in temporary memory.
11	Get/Set	DPI Link	BYTE[3]	Link (parameter or function block that is the source of the value) (0 = no link)
12	Get	Help Object Instance	WORD	ID for help text for this parameter
13	Get	DPI Read Basic	STRUCT of: BOOL[32] CONTAINER CONTAINER CONTAINER CONTAINER STRING[16] STRING[4]	 Descriptor (see page C-15) Parameter value Minimum value Maximum value Default value Parameter name Units (for example, 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. See Formulas for Converting on page C-16.

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

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 (for example, drive running) 1 = Not writable when enabled
10	Instance	0 = Parameter value is not a Reference to another parameter 1 = Parameter value refers to another parameter
11	Reserved	Must be zero
12	Decimal Place (Bit 0)	Number of digits to the right of the decimal point. 0000 = 0 1111 = 15
13	Decimal Place (Bit 1)	
14	Decimal Place (Bit 2)	
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 1)	Right bit is least significant bit (16). 000 = Reserved 001 = DWORD used as an array of Boolean 010 = Reserved 011 = Reserved 100 = Reserved 101 = Reserved 110 = Reserved 111 = Reserved
17	Extended Data Type (Bit 2)	
18	Extended Data Type (Bit 3)	
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = Parameter can be a source for a link 1 = Parameter cannot be a source for a link
27	Enhanced Bit ENUM	Parameter supports enhanced bit ENUMs.
28	Enhanced ENUM	Parameter supports enhanced ENUMs.
29	Not Used	Reserved
30	Not Used	Reserved
31	Not Used	Reserved

Formulas for Converting

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

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

Common Services

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	No	Get_Attributes_Scattered
0x4C	Yes	No	Set_Attributes_Scattered

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

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

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

DPI Fault Object

Class Code

Hexadecimal	Decimal
0x97	151

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

Services

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

Instances

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

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

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

Class Attributes

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

Instance Attributes

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

DPI Alarm Object

Class Code

Hexadecimal	Decimal
0x98	152

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

Services

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

Instances

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

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

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

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description

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

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

DPI Diagnostic Object

Class Code

Hexadecimal	Decimal
0x99	153

Services

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

Instances

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

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

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

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Full/All Information	STRUCT of: BOOL[32] CONTAINER (1) CONTAINER CONTAINER CONTAINER WORD WORD STRING[4] UINT UINT UINT INT DWORD STRING[16]	 Descriptor (see page C-15) Value Minimum value Maximum value Default value Pad Word Pad Word Units (e.g., Amp, Hz) Multiplier (2) Divisor (2) Base (2) Offset (2) Link (source of the value) (0 = no link) Always zero (0) Parameter name
1	Get/Set	Value	Various	Diagnostic item value

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

(2) This value is used in the formulas used to convert the value between display units and internal units. See Formulas for Converting on page C-16.

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Services

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

Instances

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

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

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

Class Attributes

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

Instance Attributes

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

Logic Command/Status Words

This appendix presents the definitions of the Logic Command and Logic Status words that are used for some products that can be connected to the adapter. If the Logic Command/Logic Status for the product that you are using is not listed, refer to your product's documentation.

PowerFlex 70/700/700H, and 700L (with 700 Control) Drives

Logic Command Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Command**	**Description**
															x	Stop [1]	0 = Not Stop 1 = Stop
														x		Start [1][2]	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog (Par. 100) 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 (Par. 140) 10 = Accel Rate 2 Command (Par. 141) 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command (Par. 142) 10 = Decel Rate 2 Command (Par. 143) 11 = Hold Decel Rate
	x	x	x													Reference Select [3]	000 = No Command 001 = Ref A Select (Par. 90) 010 = Ref B Select (Par. 93) 011 = Preset 3 (Par. 103) 100 = Preset 4 (Par. 104) 101 = Preset 5 (Par. 105) 110 = Preset 6 (Par. 106) 111 = Preset 7 (Par. 107)
x																MOP Decrement	0 = Not Decrement 1 = Decrement

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

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

[3] This Reference Select will not function if a digital input (parameters 361…366) is programmed for 'Speed Sel 1, 2, or 3' (option 15, 16, or 17). Note that Reference Select is 'Exclusive Ownership' – see drive User Manual for more information.

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 (Par. 214) 1 = Ready
														x		Active	0 = Not Active (Running) 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 (Par. 211 and 212) 1 = Alarm
								x								Fault	0 = No Fault (Par. 243) 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control [1]	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Port 6 111 = No Local
x	x	x	x													Reference	0000 = Ref A Auto (Par. 90) 0001 = Ref B Auto (Par. 93) 0010 = Preset 2 Auto 0011 = Preset 3 Auto 0100 = Preset 4 Auto 0101 = Preset 5 Auto 0110 = Preset 6 Auto 0111 = Preset 7 Auto 1000 = Term Blk Manual 1001 = DPI 1 Manual 1010 = DPI 2 Manual 1011 = DPI 3 Manual 1100 = DPI 4 Manual 1101 = DPI 5 Manual 1110 = DPI 6 Manual 1111 = Jog Ref

[1] See 'Owners' in drive User Manual for further information.

PowerFlex 700S (Phase II Control) and 700L (with 700S Control) 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	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
														x		Start (1)	0 = Not Start 1 = Start
													x			Jog 1	0 = Not Jog using [Jog Speed 1] (Par. 29) 1 = Jog using [Jog Speed 1] (Par. 29)
												x				Clear Fault (2)	0 = Not Clear Fault 1 = Clear Fault
										x	x					Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									x							Reserved	
								x								Jog 2	0 = Not Jog using [Jog Speed 2] (Par. 39) 1 = Jog using [Jog Speed 2] (Par. 39)
							x									Current Limit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
						x										Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
					x											Reserved	
				x												Reserved	
			x													Spd Ref Sel0	
		x														Spd Ref Sel1	
	x															Spd Ref Sel2	
x																Reserved	

Bits			
14	13	12	
0	0	0	= Spd Ref A (Par. 27)
0	0	1	= Spd Ref B (Par. 28)
0	1	0	= Preset 2 (Par. 15)
0	1	1	= Preset 3 (Par. 16)
1	0	0	= Preset 4 (Par. 17)
1	0	1	= Preset 5 (Par. 18)
1	1	0	= Preset 6 (Par. 19)
1	1	1	= Preset 7 (Par. 20)

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

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

Logic Status Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Status	Description
															x	Active	0 = Not Active 1 = Active
														x		Running	0 = Not Running 1 = Running
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Jogging	0 = Not Jogging 1 = Jogging
								x								Fault	0 = No Fault (Par. 323, 324, 325) 1 = Fault
							x									Alarm	0 = No Alarm (Par. 326, 327, 328) 1 = Alarm
						x										Flash Mode	0 = Not in Flash Mode 1 = In Flash Mode
					x											Run Ready	0 = Not Ready to Run (Par. 156) 1 = Ready to Run
				x												At Limit (1)	0 = Not At Limit (Par. 304) 1 = At Limit
			x													Tach Loss Sw	0 = Not Tach Loss Sw 1 = Tach Loss Sw
		x														At Zero Spd	0 = Not At Zero Speed 1 = At Zero Speed
	x															At Setpt Spd	0 = Not At Setpoint Speed 1= At Setpoint Speed
x																Enable	0 = Not Enabled 1 = Enabled

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

PowerFlex 750-Series Drives

Important: When using a 20-COMM-D adapter with a PowerFlex 750-Series drive, the upper word (bits 16…31) of the Logic Command and Logic Status words are not accessible and cannot be used. Only when using a PowerFlex 750-Series drive with a 20-750-DNET DeviceNet communication option module is the upper word accessible and used.

Logic Command Word

Logic Bits																	
31…15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															x	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
														x		Start (1)	0 = Not Start 1 = Start
													x			Jog 1 (2)	0 = Not Jog 1 (Par. 556) 1 = Jog 1
												x				Clear Fault (3)	0 = Not Clear Fault 1 = Clear Fault
										x	x					Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									x							Manual	0 = Not Manual 1 = Manual
								x								Reserved	
						x	x									Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time
				x	x											Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time
			x													Ref Select 1	000 = No Command 001 = Ref A Select (Par. 545) 010 = Ref B Select (Par. 550) 011 = Preset 3 (Par. 573) 100 = Preset 4 (Par. 574) 101 = Preset 5 (Par. 575) 110 = Preset 6 (Par. 576) 111 = Preset 7 (Par. 577)
		x														Ref Select 2	
	x															Ref Select 3	
x																Reserved	

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

(2) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition will jog the drive. A transition to a '0' will stop the drive.

(3) To perform this command, the value must switch from '0' to '1'.

Logic Status Word

Logic Bits																	
31…15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															x	Run Ready	0 = Not Ready to Run (Par. 933) 1 = Ready to Run
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accelerating	0 = Not Accelerating 1 = Accelerating
										x						Decelerating	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm (Par. 959 and 960) 1 = Alarm
								x								Fault	0 = No Fault (Par. 952 and 953) 1 = Fault
							x									At Setpt Spd	0 = Not at Setpoint Speed 1 = At Setpoint Speed
						x										Manual	0 = Manual Mode Not Active 1 = Manual Mode Active
					x											Spd Ref ID 0	00000 = Reserved 00001 = Auto Ref A (Par. 545) 00010 = Auto Ref B (Par. 550) 00011 = Auto Preset Speed 3 (Par. 573) 00100 = Auto Preset Speed 4 (Par. 574) 00101 = Auto Preset Speed 5 (Par. 575) 00110 = Auto Preset Speed 6 (Par. 576) 00111 = Auto Preset Speed 7 (Par. 577) 01000 = Reserved 01001 = Reserved 01010 = Reserved 01011 = Reserved 01100 = Reserved 01101 = Reserved 01110 = Reserved 01111 = Reserved 10000 = Man Port 0 10001 = Man Port 1 10010 = Man Port 2 10011 = Man Port 3 10100 = Man Port 4 10101 = Man Port 5 10110 = Man Port 6 10111 = Reserved 11000 = Reserved 11001 = Reserved 11010 = Reserved 11011 = Reserved 11100 = Reserved 11101 = Man Port 13 (Emb. ENET) 11110 = Man Port 14 (Drive Logix) 11111 = Alternate Man Ref Sel
				x												Spd Ref ID 1	
			x													Spd Ref ID 2	
		x														Spd Ref ID 3	
	x															Spd Ref ID 4	
x																Reserved	

PowerFlex Digital DC Drives Logic Command Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
															x	Stop (1)	0 = Not Stop 1 = Stop
														x		Start (1)(2)	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog (Par. 266) 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 = Use Accel Rate 1 (Par. 660) 10 = Use Accel Rate 2 (Par. 24) 11 = Use Present Time
				x	x											Decel Rate	00 = No Command 01 = Use Decel Rate 1 (Par. 662) 10 = Use Decel Rate 2 (Par. 32) 11 = Use Present Time
	x	x	x													Reference Select (3)	000 = No Command 001 = Ref. 1 (Spd Ref A, Par. 44) 010 = Ref. 2 (Spd Ref B, Par. 48) 011 = Ref. 3 (Preset Spd 3, Par. 156) 100 = Ref. 4 (Preset Spd 4, Par. 157) 101 = Ref. 5 (Preset Spd 5, Par. 158) 110 = Ref. 6 (Preset Spd 6, Par. 159) 111 = Ref. 7 (Preset Spd 7, Par. 160)
x																MOP Decrement	0 = Not Decrement 1 = Decrement

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

(2) This Start will not function if a digital input (parameters 133…144) is programmed for 2-Wire Control (option 5 'Run', 6 'Run Forward', or 7 'Run Reverse').

(3) This Reference Select will not function if a digital input (parameters 133…144) is programmed for 'Speed Sel 1, 2, or 3' (option 17, 18, or 19). Note that Reference Select is 'Exclusive Ownership' – see drive User Manual for more information.

Logic Status Word

Logic Bits																Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
															x	Ready	0 = Not Ready (Par. 1403) 1 = Ready
														x		Active	0 = Not Active (Running) 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 (Par. 1380) 1 = Alarm
								x								Fault	0 = No Fault (Par. 1351) 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control (1)	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Reserved 111 = No Local
x	x	x	x													Reference Source	0000 = Spd Ref A Auto (Par. 44) 0001 = Spd Ref B Auto (Par. 48) 0010 = Preset Spd 2 Auto 0011 = Preset Spd 3 Auto 0100 = Preset Spd 4 Auto 0101 = Preset Spd 5 Auto 0110 = Preset Spd 6 Auto 0111 = Preset Spd 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 = Reserved 1111 = Jog Ref

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

Master-Slave I/O Configuration

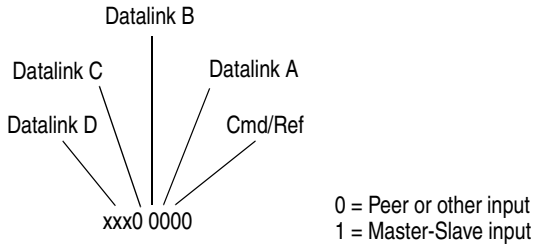
This appendix lists possible I/O configurations with corresponding M-S Input and M-S Output parameter settings, and the required data size allocations for all data exchange methods **except** Polled. The required data size allocation tables for the Polled data exchange method are listed below.

Polled Data Exchange Method Tables	Controller
Table 4.A, Table 4.B, or Table 4.C	ControlLogix
Table 4.E, Table 4.F, or Table 4.G	PLC-5
Table 4.H, Table 4.I, or Table 4.J	SLC 500

M-S Input Parameter Configurations

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

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



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

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

Table E.A Host Products with 16-bit Reference/Feedback and Datalinks

		Allocation (Number of Bytes)				
		Data Size sent from the Controller to the Adapter				
M-S Input	M-S Output	*Poll Only*	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
00000	xxxx0	0				
00001	xxxx0	4				
00010	xxxx0	4				
00011	xxxx0	8				
00100	xxxx0	4				
00101	xxxx0	8				
00110	xxxx0	8				
00111	xxxx0	12				
01000	xxxx0	4				
01001	xxxx0	8				
01010	xxxx0	8				

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

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

Table E.B Host Products with 32-bit Reference/Feedback and Datalinks

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

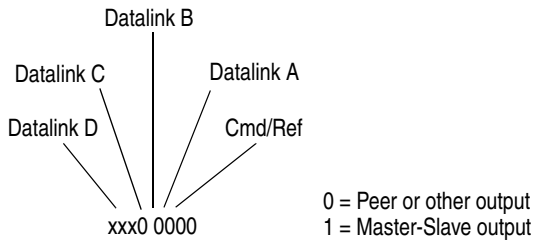
Table E.B Host Products with 32-bit Reference/Feedback and Datalinks (Continued)

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Controller to the Adapter				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
10100	xxxx1	16	16	16	16 and 0	16 and 0
10101	xxxx1	24	24	24	24 and 0	24 and 0
10110	xxxx1	24	24	24	24 and 0	24 and 0
10111	xxxx1	32	32	32	32 and 0	32 and 0
11000	xxxx1	16	16	16	16 and 0	16 and 0
11001	xxxx1	24	24	24	24 and 0	24 and 0
11011	xxxx1	32	32	32	32 and 0	32 and 0
11100	xxxx1	24	24	24	24 and 0	24 and 0
11101	xxxx1	32	32	32	32 and 0	32 and 0
11110	xxxx1	32	32	32	32 and 0	32 and 0
11111	xxxx1	40	40	40	40 and 0	40 and 0

M-S Output Parameter Configurations

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

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



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

Table E.C and Table 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 with 16-bit Reference/Feedback and Datalinks

M-S Input	M-S Output	Allocation (Number of Bytes) Data Size sent from the Adapter to the Controller				
		Poll Only	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
xxxxx	00000	0				
xxxxx	00010	4				
xxxxx	00100	4				
xxxxx	00110	8				
xxxxx	01000	4				
xxxxx	01010	8				
xxxxx	01100	8				
xxxxx	11100	12				
xxxxx	10000	4				
xxxxx	10010	8				
xxxxx	10100	8				
xxxxx	10110	12				

Table E.C Host Products with 16-bit Reference/Feedback and Datalinks (Continued)

		Allocation (Number of Bytes)				
		Data Size sent from the Adapter to the Controller				
M-S Input	**M-S Output**	*Poll Only*	*COS Only*	*Cyclic Only*	*Poll & COS*	*Poll & Cyclic*
xxxxx	11000	8				
xxxxx	11010	12				
xxxxx	11100	12				
xxxxx	11110	16				
xxxxx	00001	4	4	4	4 and 4	4 and 4
xxxxx	00011	8	4	4	8 and 4	8 and 4
xxxxx	00101	8	4	4	8 and 4	8 and 4
xxxxx	00111	12	4	4	12 and 4	12 and 4
xxxxx	01011	12	4	4	12 and 4	12 and 4
xxxxx	01101	12	4	4	12 and 4	12 and 4
xxxxx	01111	16	4	4	16 and 4	16 and 4
xxxxx	10001	8	4	4	8 and 4	8 and 4
xxxxx	10011	12	4	4	12 and 4	12 and 4
xxxxx	10101	12	4	4	12 and 4	12 and 4
xxxxx	10111	16	4	4	16 and 4	16 and 4
xxxxx	11001	12	4	4	12 and 4	12 and 4
xxxxx	11011	16	4	4	16 and 4	16 and 4
xxxxx	11101	16	4	4	16 and 4	16 and 4
xxxxx	11111	20	4	4	20 and 4	20 and 4

Table E.D Host Products with 32-bit Reference/Feedback and Datalinks

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

A

Adapter

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

The 20-COMM-D DeviceNet adapter connects PowerFlex 7-Class drives to a DeviceNet network. Adapters are sometimes also called ‘cards’, ‘embedded communication options’, ‘gateways’, ‘modules’, or ‘peripherals’.

Automatic Device Replacement (ADR)

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

B

Bridge

A network device that can route messages from one network to another. A bridge also refers to a communication module in a ControlLogix controller that connects the controller to a network. See also Scanner.

Bus Off

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

C

CAN (Controller Area Network)

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

Change of State (COS) I/O Data Exchange

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

CIP (Common Industrial Protocol)

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

Class

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

Connected Components Workbench Software

The recommended tool for monitoring and configuring Allen-Bradley products and network communication adapters. It can be used on computers running various Microsoft operating systems. You can obtain a **free copy** of Connect Components Workbench software at http://www.ab.com/support/abdrives/webupdate/software.html.

ControlFLASH

A **free** software tool used to electronically update firmware of Allen-Bradley products and network communication adapters. ControlFLASH software is downloaded automatically when the firmware revision file for the product being updated is downloaded from the Allen-Bradley updates website to your computer.

Controller

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

Cyclic I/O Data Exchange

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

D

Data Rate

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

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

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

Datalinks

A Datalink is a type of pointer used by PowerFlex 7-Class drives to transfer data to and from the controller. Datalinks allow specified parameters to be read or written to without using explicit messages. When enabled, each Datalink consumes either four bytes or eight bytes in both the input and output image table of the controller. The drive determines the size of Datalinks.

DeviceNet Network

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

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

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

DPI (Drive Peripheral Interface)

A second generation peripheral communication interface used by various Allen-Bradley drives and power products, such as PowerFlex 7-Class drives. It is a functional enhancement to SCANport.

DPI Peripheral

A device that provides an interface between DPI and a network or user. Peripheral devices are also referred to as 'adapters' or 'modules'. The 20-COMM-D adapter, 1203-USB or 1203-SSS converter, and PowerFlex 7-Class HIMs (20-HIM-xxx) are examples of DPI peripherals.

DPI Product

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

DriveExplorer Software

A tool for monitoring and configuring Allen-Bradley products and network communication adapters. It can be used on computers running various Microsoft Windows operating systems. DriveExplorer software, version 3.xx or later, can be used to configure this adapter and PowerFlex drives. This software tool has been discontinued and is now available as **freeware** at http://www.ab.com/support/abdrives/webupdate/software.html. There are no plans to provide future updates to this tool and the download is being provided 'as-is' for users that lost their DriveExplorer CD, or need to configure legacy products not supported by Connected Components Workbench software.

DriveTools SP Software

A software suite designed for running on various Microsoft Windows operating systems. This software suite provides a family of tools, including DriveExecutive software (version 3.01 or later), that you can use to program, monitor, control, troubleshoot, and maintain Allen-Bradley products. DriveTools SP software can be used with PowerFlex 7-Class and PowerFlex 4-Class drives, and legacy drives that implement the SCANport communication interface. Information about DriveTools SP software can be accessed at http://www.ab.com/drives/drivetools.

E

EDS (Electronic Data Sheet) Files

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

Explicit Messaging

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

F

Fault Action

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

Fault Configuration

When communication is disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive using specific fault configuration parameters in the adapter. When a fault action parameter is set to use the fault configuration data and a fault occurs, the data from these parameters is sent as the Logic Command, Reference, and/or Datalinks.

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.

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 occurs.

HIM (Human Interface Module)

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

Hold Last

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

Host Parameters (only PowerFlex 750-Series drives)

Host parameters are used to configure peripherals connected to a PowerFlex 750-Series drive. When using a PowerFlex 7-Class HIM (20-HIM-A3/-A5/-C3S/-C5S), Host parameters **do not** appear. When using a PowerFlex 750-Series HIM (20-HIM-A6/-C6S), Host parameters appear in the HOST PARAM folder. You can also view Host parameters with any of the following drive configuration tools:

- Connected Components Workbench software—click the tab for the option module at the bottom of the window, click the Parameters icon in the tool bar, and open the Host parameters folder.
- DriveExplorer software—find the option module in the treeview and open its Parameters folder.
- DriveExecutive software—find the option module in the treeview, expand the module in the tree, and open its Parameters folder.

I

Idle Action

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

I/O Data

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

L

Logic Command/Logic Status

The Logic Command is used to control the PowerFlex 7-Class drive (for example, start, stop, and direction). It consists of one 16-bit word of output to the adapter from the network. The definitions of the bits in this word depend on the drive, and are shown in Appendix D.

The Logic Status is used to monitor the PowerFlex 7-Class drive (for example, operating state and motor direction). It consists of one 16-bit word of input from the adapter to the network. The definitions of the bits in this word depend on the drive, and are shown in Appendix D.

M

Master-Slave Hierarchy

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

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

N

Node Address

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

NVS (Nonvolatile Storage)

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

O

Objects

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

P

PCCC (Programmable Controller Communications Command)

PCCC is the protocol used by some controllers to communicate with devices on a network. Some software products (for example, DriveExplorer and DriveExecutive software) 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 7-Class drive which then sends the same configuration or data to other PowerFlex 7-Class drives on the network. To use a peer-to-peer hierarchy, you configure one adapter to transmit data (2 or 4 words) and one or more adapters to receive the data.

Ping

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

Polled I/O Data Exchange

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

PowerFlex 7-Class (Architecture Class) Drives

The Allen-Bradley PowerFlex 7-Class family of drives supports DPI and, at the time of publication, includes the PowerFlex 70, PowerFlex 700, PowerFlex 700H, PowerFlex 700S, PowerFlex 700L, and PowerFlex 7000.

PowerFlex 750-Series (Architecture Class) Drives

The Allen-Bradley PowerFlex 750-Series of drives supports DPI and, at the time of publication, includes the PowerFlex 753 and PowerFlex 755 drives.

Producer/Consumer Network

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

R

Reference/Feedback

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

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

RSLogix 5/500/5000 Software

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

RSNetWorx for DeviceNet Software

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

S

Scanner

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

Status Indicators

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.

UDDT (User-Defined Data Type)

A structure data type that you define during the development of an application (for example, to convert 32-bit REAL parameter data for written and read values to correctly display them in human readable format).

Update

The process of updating firmware in a device. The adapter and its connected PowerFlex 7-Class host drive and its peripherals can be updated using various Allen-Bradley software tools. See Updating the Adapter Firmware on page 3-14 for more information.

Z

Zero Data

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

Numerics

A

B

C

D

E

F

G

H

I

L

M

N

S

T

U

W

Z

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products.
At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

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

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

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

New Product Satisfaction Return

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

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

Documentation Feedback

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

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